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THE ARDENNES CAMPAIGN SIMULATION DATA BASE (ACSDB)

Final Report

7 February 1990

Prepared for:

US Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, MD 20814

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by:

Data Memory Systems,

Incorporated

under:

Contract No. MDA903-87-C-0787

Volume 1 of 2

Sections I through II-I

**An Information
Services Company**

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Fairfax, Virginia 22030
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ABSTRACT

The Ardennes Campaign Simulation Data Base (ACSDB) is a computerized data base of the World War II 1944 campaign fought in December 1944 and January 1945, popularly known as the "Battle of the Bulge." The ACSDB uses the dBASE IV data base management software for storage and manipulation of the data. The data consists of daily information on unit location, activities, order of battle, personnel, equipment, and logistics at the army-, corps-, division-, and brigade-level for the period 16 December 1944 through 16 January 1945, plus data on tactical air operations, tables of organization and equipment (T/O&E) of units, and equipment used by opposing forces in the Ardennes Campaign. Data for the ACSDB was obtained from primary and secondary sources on file at libraries and archives in the United States, Great Britain, and the Federal Republic of Germany. The approximate size of the computer portion of the ACSDB is 39 megabytes. Additional material provided as part of the ACSDB includes a written draft final report with bibliographic, definitional, and other information; a set of full-scale color photographs of 1/100,000 scale maps of the Ardennes region with a clear acetate overlay on which are shown locations of US and German units on 16 December 1944; a user's guide for the ACSDB; a narrative on single-shot probability of kill (SSPK) data researched for the ACSDB; and a collection of photocopies of all records used for generation of the ACSDB totalling some ten cubic feet of printed material.

The ACSDB was prepared under contract number MDA903-87-C-0787 for the US Army Concepts Analysis Agency by Data Memory Systems, Inc.

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The Ardennes Campaign Simulation Data Base (ACSDB)

INTRODUCTION

In September 1987 the Historical Evaluation and Research Organization (HERO), a division of Data Memory Systems, Inc. (DMSi), was awarded a contract with the US Army Concepts Analysis Agency (CAA) to compile a data base on the World War II Ardennes Campaign of 1944-45 in sufficient detail for application with the Force Evaluation Model and Joint Theater Level Simulation (contract number MDA903-87-C-0787). Researching data from archives and libraries in the United States, Great Britain, and the Federal Republic of Germany, DMSi has compiled information on US, British, and German ground and air forces in a 39-megabyte data base. The Ardennes Campaign Simulation Data Base (ACSDB) utilizes the dBASE IV data base management software to store this information. The ACSDB tracks data for division- and brigade-size units on a daily basis, i.e., 0600 hours on one day to 0559 hours on the subsequent day. Data for 42 German divisions and brigades, 34 American divisions, and eight British divisions and brigades from 16 December 1944 through 16 January 1945 is contained in the ACSDB. Additionally, data on the non-divisional combat and service support elements of corps and armies is recorded in the ACSDB. These units are listed in Attachment 1 to this paper.

This introduction serves as the introductory section to the written material which comprises the draft final report that accompanies the ACSDB. The computerized portion of the ACSDB, i.e., the data base itself, requires substantial documentation to explain derivation of data, organization of data, and the types of data recorded in the data base. This introduction contains:

- a table of contents which lists all sections of the draft final report,
- explanation of the organization of the ACSDB and its component elements,
- discussion of the research and data compilation tasks performed by DMSi for the ACSDB,
- a list of all component material submitted to CAA as part of the ACSDB report (including maps, photocopies of records, etc.),

- an abstract historical narrative of the Ardennes Campaign to familiarize analysts and users of the ACSDB with the campaign,
- a list of primary and secondary sources used by DMSi in its preparation of the ACSDB, but not provided to CAA due to limited availability,
- acknowledgements of all professional and administrative staff participants in the ACSDB project, and
- two attachments, one with a list of national units, and the other containing a diagram of the ACSDB's organization.

TABLE OF CONTENTS

The table of contents precedes this paper. On it are listed all the "narratives" prepared for the ACSDB written report. The narratives are arranged in the same order as the ACSDB data base files in the dBASE IV format. Narratives contain information on the derivation and definitions of information in the various data base files of the ACSDB. An introductory sub-narrative provides definitions of fields used in the data base file, while subsequent sub-narratives explain the derivation of data, and any inherent characteristics of the data, of the three national forces in the ACSDB (US, British, and German). Appended to the ends of some narratives are attachments which provide bibliographies, glossaries, definitions of terms, data tables, etc.

ORGANIZATION OF THE ACSDB

The ACSDB is divided into eight data base files, each of which is designed to store and display all pertinent information on a particular aspect of the Ardennes battle. The eight data base files are:

- Unit Data Base (File)
- Unit Inventory Data Base (File)
- Unit Location Data Base (File)
- Air Data Base (File)
- Table of Organization and Equipment (T/O&E) Data Base (File)
- Weapons Data Base (File)
- Reference Data Base (File)
- Bibliography Data Base (File)

Attachment 2 illustrates the general organization of the ACSDB and the relationship of its components.

For purposes of discussion in the draft final report, the eight data base files are commonly referred to as "data bases," i.e., "Unit Data Base," "Unit Inventory Data Base," "Bibliography Data Base," etc. A data base (file) is composed of records, ranging in numbers from a minimum of 153 (Bibliography Data Base) to a maximum of 15,033 (Unit Inventory Data Base) records per data base. Each record is in turn composed of data fields, which contain identifying, statistical, or narrative information, such as a unit name, number of infantry personnel, or a description of a unit's operational mission.

The eight data bases in the ACSDB are:

Unit Data Base.

The Unit Data Base file contains personnel, medical, and logistical statistics of ground combat units of US, British, and German forces that participated in the Ardennes battle. Fields are also used in the Unit Data Base to record the order of battle of the US, British, and German units.

Unit Inventory Data Base.

The Inventory Data Base contains data on equipment (weapons and vehicles) strengths and losses of US, British, and German ground combat units. Abbreviations used for equipment designations in the Unit Inventory Data Base are identical to those used in the Table of Organization and Equipment (T/O&E) and Weapons Data Bases.

Unit Location Data Base.

In the Unit Location Data Base is recorded information on the location of US, British, and German ground combat units, including brigades, divisions, corps, and armies. The Unit Location Data Base is the narrative portion of the ACSDB and provides information on the geographical positions, activities, operations, missions, and commander status of ground combat units. Unit location is described utilizing Universal Transverse Mercator (UTM) grid coordinates used on the 1943 Geographical Section, General Staff maps (1/100,000 scale) produced by the Army Map Service. Full-scale color photographs of ten maps from this series, covering the Ardennes region, are provided to CAA as part of the deliverable.

Air Data Base.

The Air Data Base contains information on tactical air sorties flown by United States Army Air Forces, Royal Air Force, and Luftwaffe air units in the Ardennes battle area. Air Data Base information includes number of sorties, a description of operations and events during the missions, and geographical location of missions and airbases of origin of aircraft. Mission locations utilize the same map grid coordinates employed in the Unit Location Data Base.

Table of Organization and Equipment (T/O&E) Data Base.

Data from official Tables of Organization and Equipment (T/O&E) for all US, British, and German battalion-, regiment-, brigade-, and division-size units covered in the ACSDB are provided in the T/O&E Data Base, as well as some company-/troop-/battery-size units. Authorized personnel, equipment, and logistics strengths are provided for each unit in the T/O&E Data Base. The same equipment designations used in the Unit Inventory and Weapons Data Bases are used in the T/O&E Data Base.

Weapons Data Base.

In the Weapons Data Base is recorded information on equipment (vehicles and weapons) characteristics. Weapons Data Base records are used for all air and ground systems tracked in the Inventory and T/O&E Data Bases, including aircraft, armored fighting vehicles, indirect fire weapons, and softskin transport vehicles. Weapons characteristics include movement rates of vehicles and aircraft; caliber, rate of fire, and ammunition loads of artillery and tank guns; weights of systems; etc. The same equipment designations used in the Unit Inventory and T/O&E Data Bases are used in the Weapons Data Base.

Reference Data Base.

The Reference Data Base records the sources used for data and information in other data base files. Each record in the Unit Location, Air, T/O&E, and Weapons Data Bases contains a field identified as "Sources." An entry in this field matches identically an entry in the field "Source Number" in the Reference Data Base record which identifies the sources consulted for data and information in the data record.

Bibliography Data Base.

An entry under the field "Bibliography Name" in a Reference Data Base record in turn matches the entry under "Bibliography Name" in a Bibliography Data Base record. Full bibliographic citations for primary and secondary sources are provided in the Bibliography Data Base. Additional information in the written narratives of the draft final report supplement the Reference and Bibliography Data Bases for comprehensive referencing of all data recorded in the ACSDB.

ACSDB DATA RESEARCH AND COMPILATION

DMSi researchers examined primary and secondary data sources at archives and library facilities in the Washington, D.C. area and in Europe. DMSi's Fairfax, Virginia, office is conveniently located for research at the Washington area facilities which house many of the relevant records used for the compilation of data and information on the Ardennes battle. Foremost among these facilities is the National Archives annex in Suitland, Maryland -- the Washington Federal Records Center -- where operational records of US Army World War II units are stored. These include G-1, G-2, G-3, G-4, after-action, and historical file records of US armies, corps, and divisions, and separate field artillery, tank destroyer, and tank battalions. The majority of the data for the US forces that participated in the Ardennes campaign is derived from these records. The main building of the US National Archives in downtown Washington contains microfilm copies of German Army records collected at the end of World War II, as well as additional records of US Army units. The Office of the Center of Military History (OCMH), also located in downtown Washington, has an extensive collection of information on the Ardennes Campaign. Manuscripts on file at OCMH and prepared for Hugh M. Cole's official US Army history of the Ardennes were copied and used in DMSi's data compilation. Two Washington area libraries, the Library of Congress and the Pentagon Library, have extensive collections of unit histories of divisions participating in the Battle of the Bulge. These histories frequently prove to be valuable detailed secondary sources of information. Additional primary and secondary data sources are on file at the US Army Military History Institute Library at Carlisle Barracks, Carlisle, Pennsylvania. Finally, the Office of Air Force History at Bolling Air Force Base in Washington, D.C., was utilized for data on US tactical air operations in the Ardennes. DMSi researchers also located a valuable collection of microfilm records of selected US Army ground units at Bolling, including some not in the National Archives annex at Suitland.

Two DMSi researchers obtained data and information on British air and ground units in the Ardennes Campaign from primary sources at Her Majesty's Public Records Office in London. West German military archives in Freiburg and Koblenz were visited by a two-man DMSi research team to collect data on German Army units. Although the US Army acquired and shipped these records to the United States at the end of World War II, many of the operational records of German Army combat units were not microfilmed before the collection was returned to West Germany. DMSi researchers obtained relevant personnel, operations, and other records on units that took part in the Ardennes Campaign.

The mass of records assembled by DMSi researchers was catalogued and then analyzed to compile the detailed data required for the campaign-level data base. Of necessity, much data was interpolated, extrapolated, or otherwise derived from the various sources acquired from the research facilities. Records containing information pertinent to the ACSDB were sometimes kept on a weekly or monthly basis by the US Army during World War II. DMSi developed various "estimation methodologies" for generating daily data, using known data or experience to fill in gaps where data does not exist. The shortage of data and information for German units was more severe than that affecting US forces. Because of Germany's collapsing military situation at the end of 1944 and due to other factors, combat units either did not compile detailed reports or lost them in the defeat of the Germany Army. Some important monthly status reports (Zustandsbericht) for German armored and armored infantry divisions survived the war, as have other records, but by and large the German history of the Ardennes Campaign suffers from a lack of primary source records. This situation is somewhat ameliorated by the availability of postwar interviews with and manuscripts by German officers who participated in and planned the Ardennes offensive. Prepared by US Army historians, these reports provide an excellent overview of tactical operations by German units in the Ardennes, and fragmentary data on personnel and equipment strengths and attrition.

ACSDB COMPONENT ELEMENTS

The components of the ACSDB consist of the following items:

- a 39 megabyte computerized data base compatible with dBASE IV data base management software;

- a written draft final report, of which this paper is one section, with a description of the data base format, sources used in derivation and compilation of data, and bibliographic information on sources;

- under separate cover, a written report on single-shot probability of kill (SSPK) data researched for weapons used in the ACSDB;

- under separate cover, a user's guide for the computerized elements of the ACSDB;

- a set of full-scale color photographs of ten 1943 Geographical Section, General Staff maps (1/100,000 scale) produced by the Army Map Service, covering the Ardennes Campaign region (roughly bounded on the east by the Moselle and Rhine Rivers, on the west the Meuse River, on the north by an east-west line north of Aachen, and on the south by an east-west line south of Trier);

- a set of three overlays on 42-inch wide clear acetate showing 16 December 1944 front-line traces, unit boundaries, headquarters locations, supply installation locations, and known US artillery battalion and battery locations (a key to this overlay is provided in the written draft final report); and

- a collection of photocopies of all primary source and selected secondary source records obtained from research facilities and employed in preparation of the ACSDB, including those records from the US National Archives, the Public Records Office, and the German Archives (also included are color photographs of daily German High Command of the Army (OKH) briefing maps and material obtained from DMSi consultant Colonel Gerhard Muhm).

HISTORICAL ABSTRACT OF THE ARDENNES CAMPAIGN

This brief historical abstract is provided to give analysts a general history of the Ardennes Campaign. If more detailed information is required, several of the sources listed in a later section of this report should be consulted.

On 16 December 1944, three German armies (the Fifth Panzer (Armored), Sixth Panzer, and Seventh) launched a surprise offensive against a thinly-held section of the US front line in rugged, wooded terrain centered around the intersection of the borders of Luxembourg, Germany, and Belgium. This area, known as the Ardennes, was to become the focal point of a bitterly contested battle of several weeks' duration fought between units of the three German armies mentioned above and units of the US First and Third Armies and the British XXX Corps.

The Ardennes Campaign, popularly known as the "Battle of the Bulge," caught US units by almost complete surprise. By late 1944, the Allied High Command were confident that the Germans lacked the materiel and personnel resources to launch a major attack against Allied forces on the Western Front. However, under cover of strict security measures and a clever deception plan, the Germans managed to assemble an impressive force of armored, artillery, and infantry units without detection by the Allies. The overly ambitious German plan called for a penetration of the Allied lines in the same area used by the Germans in their victorious campaign in 1940, a swift advance to the port city of Antwerp which would split the British and US forces, and defeat the Allied armies in detail. Although impressive on paper, the forces assembled for the German attack suffered from a number of major weaknesses. Personnel quality was low, transportation networks were inadequate, and German air forces, although massed for the offensive, were wholly inadequate in face of the overwhelming air supremacy of the Allies. Nevertheless, aided by inclement weather conditions which grounded Allied aircraft, the Germans massed forces and penetrated the US line in several places, inflicting severe defeats on two US divisions in the opening phases of the battle.

After several days of major German penetrations, US forces rallied to slow and then stop the German attack. In fact, on the evening of the first day of the battle, US units on the northern shoulder of what was to become the "bulge" -- the salient created by the German attack -- had blunted critical attacks by some of the most formidable of the German panzer units, which had been ordered to reach the Meuse River line on the way to Antwerp by the end of the first day of the attack. Hard-fought defensive operations by US units at St. Vith and by the US 101st Airborne Division also hindered the German advance. From the south, by

beginning about 18 December, Lieutenant General George S. Patton's US Third Army attacked into the left shoulder of the bulge to relieve beleaguered US units at Bastogne. By Christmas Day, skies had cleared over the Ardennes region and the full might of Allied air supremacy was brought to bear on the German units in the bulge. By New Year's Day, the Germans had lost the initiative, the Allies counterattacked and approximately two weeks later, restored the front line in the Ardennes to its pre-16 December positions.

The German Ardennes Offensive was the last major offensive of the German Army on the Western Front. It cost the Germans heavily in personnel and equipment, irreplaceable losses which could not be made up from Germany's diminished manpower pool and crippled war industry. The attack was a desperate last gamble, whose chances for success from the start were minimal. Although US forces were badly defeated at the beginning of the attack, the eventual defeat of the German attack is attributable in large measure to the motivation of the individual American combat soldier, manifested from the very start of the attack.

The ACSDB contains data on operations from the period 16 December 1944-16 January 1945. Most historians agree that German failure was inevitable after late December, and 16 January is the approximate date on which the front line in the Ardennes were restored. German ground units included in the ACSDB belong to the German Fifth Panzer, Sixth Panzer, Seventh, and Fifteenth Armies, the latter army north of the main battle area and not directly involved in the campaign. US ground units included those of the First, Third, and Ninth Armies, the latter army opposite the German Fifteenth Army and only peripherally involved in combat operations in the Battle of the Bulge. British units are from the British XXX Corps.

ADDITIONAL SOURCES

DMSi has endeavored to provide CAA with copies of all sources used for compilation of data in the ACSDB. However, due to their limited availability or rarity, several important sources have not been provided to CAA. These include unit histories of the US First and Third Armies, the US Army official history of the Ardennes Campaign, and several secondary sources on the campaign. The following annotated bibliography lists these sources, a description of their contents, and libraries or bookstores where they may be obtained.

After Action Report Third US Army 1 August 1944-9 May 1945.

Volume 1, The Operations, and Volume 2, Staff Section Reports. This two-volume report on the operations of the US Third Army in the European Theater of Operations contains statistics and information on the Army's participation in the Ardennes Campaign. It is a large-format book, each volume approximately 18" by 13" in size and several thousand pages in length. It is also a rare book, sold for \$1000.00 when available. It is recommended that relevant sections of this report be obtained for use in analysis of the ACSDB. DMSi owns a copy of this source. It is available at the Library of Congress, the Office of the Center of Military History in Washington, D.C., and the US Army Military History Institute Library in Carlisle, Pennsylvania.

Cole, Hugh M. The Ardennes: Battle of the Bulge. United States Army in World War II, The European Theater of Operations. Washington, D.C.: USGPO, 1965. This is the US Army's official history of the Ardennes Campaign. It is an excellent account of the campaign, with detailed operations maps and narratives of the events of December 1944. It is recommended that CAA acquire a copy of this source from the US Government Printing Office which sells the book. It is also available at the Library of Congress, the Pentagon Library, and other local Washington, D.C., city and county libraries.

First United States Army Report of Operations 1 August 1944-22 February 1945. N.p., n.d. 4 volumes and annexes. This is a detailed history of the operations of the US First Army which includes much information on the army's role in the Ardennes Campaign. A considerable amount of statistics on personnel, equipment, and logistics is provided in the report, as well as information on periodic locations of combat and administrative units. It is highly recommended that this report be consulted for information on the Ardennes Campaign that could not be included in the ACSDB data recording format. The Pentagon Library or the Library

of Congress in Washington, D.C., has copies of this source, as does the US Army Military History Institute Library in Carlisle, Pennsylvania.

MacDonald, Charles B. A Time for Trumpets: The Untold Story of the Battle of the Bulge. New York: Bantam, 1985. This is a relatively recent account of the Ardennes Campaign, written by one of the US Army's official historians of World War II. It provides an excellent overview of the campaign, as well as detailed information on the individual operations and events which made up the overall battle. This book is available at many bookstores and is also at the Library of Congress, the Pentagon Library, and other local Washington, D.C., city and county libraries. Mr. MacDonald's volume of the US Army official history of World War II which discusses the events in the Ardennes during January 1945, is also recommended (Charles B. MacDonald, The Last Offensive. United States Army in World War II, The European Theater of Operations (Washington, D.C.: USGPO, 1973)). This source should be available at the same libraries where Hugh Cole's book is available (see above).

Pallud, Jean Paul. The Battle of the Bulge: Then and Now. London: After the Battle, 1984. This is a detailed pictorial and narrative account of the Ardennes Campaign. The author has taken historical photographs of the campaign and identified and photographed the modern-day locations of the historical photos. In doing so, he has compiled a detailed and highly informative account of the operations conducted by Allied and German forces in the Ardennes. This book should be available at some military history bookstores and also at the Library of Congress and the Pentagon Library in Washington, D.C.

The Bibliography Data Base of the ACSDB lists 337 sources used in the preparation of the data base. For review of the draft final report, it is recommended that each source be retrieved on computer and then printed out using the "Print Screen" key of the computer. The print-outs should then be fastened together in alphabetical order, the order in which they are currently listed in the ACSDB. This will provide ACSDB users with a printed version of the bibliography and facilitate access to information on sources described in the draft final report.

Another recommendation for users of the ACSDB, which does not directly pertain to bibliographic information but which is included here for convenience, is to print out the daily order of battle of all national forces, by unit and by day. Options 4 and 5 of UNIT DATA Reports in the ACSDB main menu allow users to print orders of battle of all combat units of the three nations

involved in the Ardennes Campaign. It is imperative to understanding of the ACSDB that the orders of battle be readily accessible. They serve as the foundation for all data in the ACSDB, and, without them, interpretation, manipulation, and application of the data base will be restricted.

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Acknowledgement is also extended to CAA contracting officer's technical representative Mr. John Haley for his assistance in the ACSDB project.

Attachment 1
Units in the ACSDB

American --

2d Armored Division (AD)
3d AD
4th AD
5th AD
6th AD
7th AD
9th AD
10th AD
11th AD
17th Airborne Division (AbnD)
82d AbnD
101st AbnD
1st Infantry Division (ID)
2d ID
4th ID
5th ID
8th ID
9th ID
26th ID
28th ID
29th ID
30th ID
35th ID
75th ID
78th ID
80th ID
83d ID
84th ID
87th ID
90th ID
95th ID
99th ID
102d ID
104th ID
106th ID

British --

Guards Armoured Division
6th Airborne Division
43d Infantry Division (ID)
51st ID
53d ID
29th Armoured Brigade (ArmBde)

33d ArmBde
34th Tank Brigade

German --

1st SS Panzer Division (SSPzD)
2d SSPzD
9. SSPzD
10th SSPzD
12th SSPzD
27th SS Panzer Grenadier Division (SSPzGD)
28th SSPzGD
130th (Lehr) Panzer Division (PzD)
2d PzD
9th PzD
11th PzD
116th PzD
3d Panzer Grenadier Division (PzGD)
15th PzGD
3d Fallschirmjaeger Division (FJD)
5th FJD
150th Panzer Brigade
Fuehrer Begleit Brigade
Fuehrer Grenadier Brigade
9th Volks Grenadier Division (VGD)
12th VGD
18th VGD
26th VGD
47th VGD
62d VGD
79th VGD
167th VGD
212th VGD
246th VGD
272d VGD
276th VGD
277th VGD
326th VGD
340th VGD
344th VGD
352d VGD
363d VGD
560th VGD
59th Infantry Division (ID)
85th ID
89th ID
353d ID

In addition to the divisions, the ACSDB provides data for the separate combat units and service support units subordinated under corps and armies.

US armies and corps in the ACSDB are:

First Army
Third Army
Ninth Army
III Corps
V Corps
VII Corps
VIII Corps
XII Corps
XIII Corps
XVIII Airborne Corps
XIX Corps
XX Corps

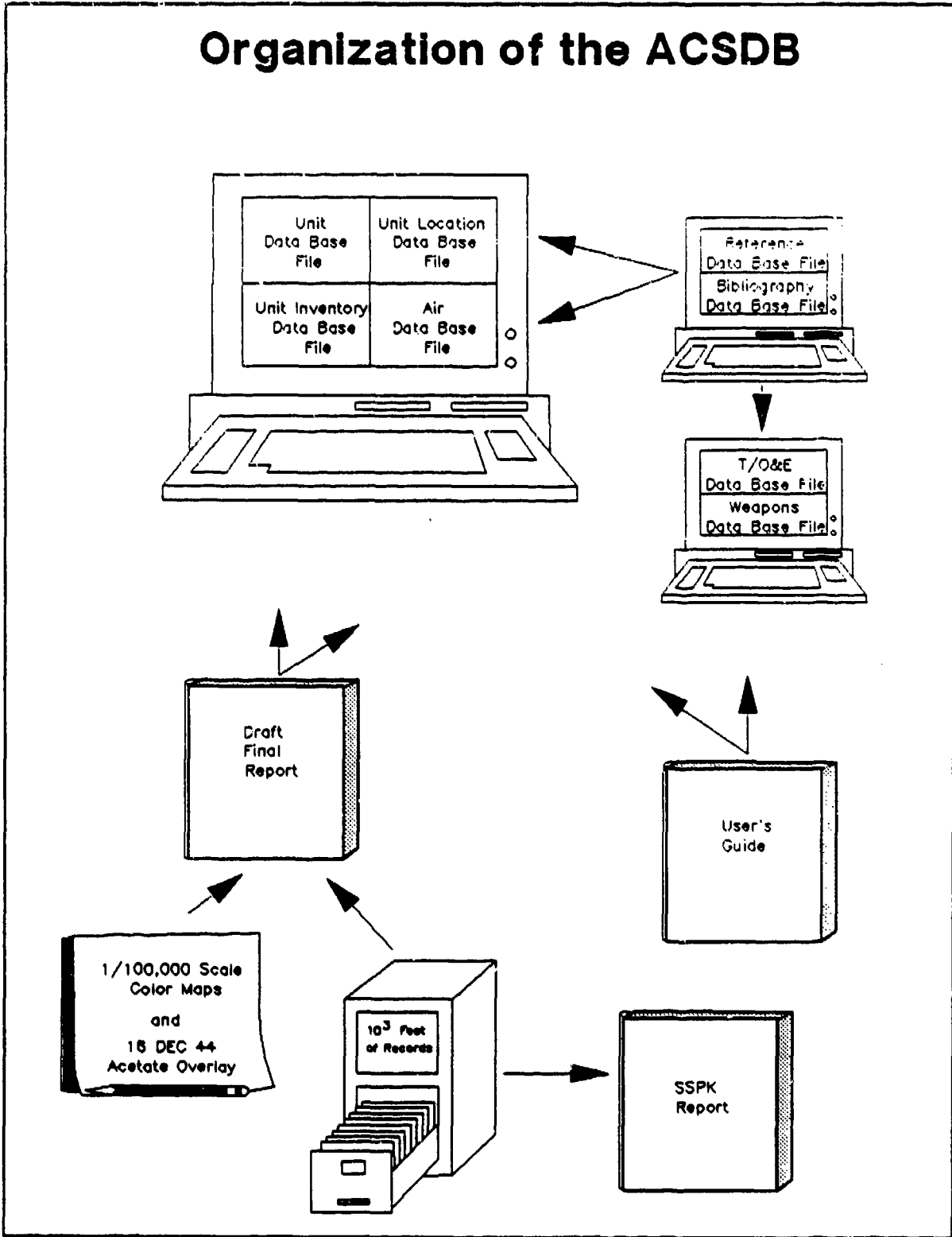
The British corps in the ACSDB is:

XXX Corps

The German armies and corps include:

Fifth Panzer Army
Sixth Panzer Army
Seventh Army
Fifteenth Army
I SS Panzer Corps
II SS Panzer Corps
XII SS Corps
Corps Group Felber (renamed XIII Corps)
Corps Group Decker (provisionally organized)
XXXIX Panzer Corps
XLVII Panzer Corps
LVIII Panzer Corps
LIII Corps
LXVI Corps
LXVII Corps
LXXIV Corps
LXXX Corps
LXXXI Corps
LXXXV Corps

Organization of the ACSDB



The ACSDB Unit Data Base

INTRODUCTION

The Ardennes Campaign Simulation Data Base (ACSDB) Unit Data Base is used to record a variety of information on the US, British, and German ground forces which operated in the Ardennes Campaign. This information includes:

- Personnel strengths, replacements, returns to duty (RTDs), and battle and nonbattle casualties.

- Personnel data by so-called military occupational specialty (MOS).

- Statistics of medical facilities.

- Logistics data, i.e., ammunition and fuel levels, expenditure and consumptions, and receipts.

- Daily order of battle of the forces of the three nationalities.

Because of the scope and complexity of the data recorded in the ACSDB Unit Data Base, and due to the large number of primary sources and the considerable degree of estimation employed to compile this data, it is critical to the review and application of the Unit Data Base that this paper be consulted. This paper defines data fields that are used in the Unit Data Base, explains compilation of its data, and provides explanations of any peculiarities of the data. The information contained in this paper is vital to the interpretation of data in the Unit Data Base. Therefore, it is imperative that all users of the ACSDB maintain a copy of this and other Data Base narratives for proper utilization of the Unit Data Base.

The narrative is organized in four major sections. The first ("The ACSDB Unit Data Base") explains the meaning of the data fields which comprise the Unit Data Base. The second, third, and fourth sections address the data recorded in the Unit Data Base for the (second) US, (third) British, and (fourth) German forces which participated in the Ardennes Campaign. These sections contain data estimation methodologies, bibliographic information, and explanations of any special characteristics inherent to data of the three nations, as explained above. Attachments at the end of the narrative provide glossaries, computations, and other information used in the preparation of the Unit Data Base.

The relevant narratives of the second, third, and fourth sections are entitled as follows:

- US Divisional Personnel Data.
- US Non-Divisional Personnel Data.
- US Medical Facilities Data.
- US Logistics Data.
- Derivation of the US Order of Battle.
- British Personnel, Logistics, and Order of Battle Data Derivation.
- German Personnel Data.
- German Divisional Battle Casualty Estimation Methodology.
- German Disease and Non-Battle Injury (DNBI) Rate Estimation Methodology.
- German Return to Duty (RTD) Estimation Methodology.
- German Personnel Replacement Estimation Methodology.
- German Divisional Personnel Data.
- German Divisional Military Occupational Specialty (MOS) Data Estimation and Derivation.
- German Non-Divisional Unit Personnel Battle Casualty, Return to Duty, and DNBI Estimation Methodologies.
- German Non-Divisional Service Support Unit Personnel, Equipment, and Medical Data.
- Derivation of German Logistics Data.
- Compilation of German Order of Battle.

UNIT DATA BASE DEFINITIONS

"Unit Name" (Field 1): Listed under "Unit Name" is the identification of the ground unit for which data is recorded in the Unit Data Base record. Data is recorded at three general echelons: division- (or independent armored brigade-) level, corps-level, and army-level.

Division-level data is subdivided into two parts, that pertaining to the entire division alone, and that describing any non-divisional combat unit(s) attached to the division. This format was utilized to facilitate the recording of data for units. Originally, it had been intended to incorporate the data of major detached organic divisional elements (such as Combat Command R of the 9th Armored Division detached from the 9th AD and attached to the 101st Airborne Division at Bastogne), as well as the data of attached non-divisional units, with parent divisions. This scheme proved to be entirely impractical for systematic recording of data and its proofing. Therefore, the data was split as described above. Entries such as "1st SSPzD", "Guards AD", and "106th ID" -- German 1st SS Panzer Division, British Guards Armoured Division, and US 106th Infantry Division -- under "Unit Name" indicate that the data recorded is for those divisions' organic components. Designations such as "1st SSPzD Att" or "28th ID Att" are used for any non-divisional combat unit(s) -- such as field artillery, tank, antitank, combat engineer, etc. -- attached to those divisions. Composition of divisional attachments is specified under the "ATTACHMENTS & DETACHMENTS" fields of the Unit Data Base which are described below.

Data for corps and armies is also subdivided into two parts, that describing non-divisional combat formations subordinated to corps or army -- field artillery, tank, antitank, combat engineer, etc. -- and that describing non-divisional service support units subordinated to corps or army -- the numerous quartermaster, medical, ordnance, and headquarters units which comprise the corps and army organizations of the German and Allied armies. Data is aggregated for these units, on a daily basis, in a single record. Entries under "Unit Name" describing non-divisional corps or army combat units include "Troops" as part of the unit name, for example "XLVII PzK Troops", "XXX Corps Troops", and "1st Army Troops" -- German XLVII Panzer Corps combat troops, British XXX Corps combat troops, and US First Army combat troops. Designations for the non-divisional corps or army service and support units include "HQ", in the case of US forces, or just the designation of the unit for the Germans and British. Examples are "3d Army HQ", "XVIII Corps HQ", "XXX Corps", "5th PzArmy", and "I SSPzK" -- US Third Army service support troops, US XVIII (Airborne) Corps service support troops, British XXX

Corps service support troops, German Fifth Panzer Army service support troops, and German I SS Panzer Corps (Korps) service support troops.

To assist in the identification of Allied and German units entered under "Unit Name" the following list of abbreviations is provided:

AD	armored division
PzD	panzer division
SSPzD	SS panzer division
PzGD	panzer grenadier division
SSPzGD	SS panzer grenadier division
ID	infantry division
VGD	volks grenadier division
AbnD	airborne division
FJD	fallschirmjaeger division
ArmBde	armoured brigade
Gds TkBde	Guards Tank Brigade
FBB	Fuehrer Begleit Brigade
FGP	Fuehrer Grenadier Brigade
TkBde	tank brigade
Corps	corps
K	corps
Korps Decker	German temporary administrative HQ formation
Korps Felber	German corps renamed XIII K (Corps) in January 1945
PzK	panzer corps
SSPzK	SS panzer corps
1st Army	US First Army
3d Army	US Third Army
9th Army	US Ninth Army
5th PzArmy	German Fifth Panzer Army
6th PzArmy	German Sixth (SS) Panzer Army
7th Army	German Seventh Army
15th Army	German Fifteenth Army
AG B	German Army Group B

"Date" (Field 2): Provided under "Date" is the date in month-day-year format. In general, for data recorded on German forces in the Unit Data Base, a day lasts from 0600 hours of the indicated date to 0600 hours of the following day. For US and British forces, the day is 0001 hours to 2400 hours of the

indicated date. See the ACSDB Time Conventions narrative for details.

"Nationality" (No field number): This is the nationality of the unit for which data is recorded. "A" designates American (US), "B" designates British, and "G" designates German.

"ON-HAND PERSONNEL --Total, --Armor, --Infantry, --Artillery, --Maintenance, --Maintenance-2, --Medical, --Transportation, --Supply, --Engineer, --Other" (Fields 3-12): A unit's total number of effective, or present for duty, personnel, is recorded under "ON-HAND PERSONNEL -- Total." The most equivalent German personnel strength category is "Tagesstaerke", or daily strength, which denotes all effective personnel with organic elements of a unit only.

The ten so-called military occupational specialty (MOS) categories (hereafter referred to as MOS categories for purposes of discussion) are used to record the number of effective personnel belonging to that MOS in a unit. MOS in the sense used in the ACSDB does not refer to specific military occupational specialty, except in the cases of critical maintenance MOSs, but rather to all personnel in a particular kind of unit. For example, all personnel in a separate US tank battalion, or in the self-propelled panzerjaeger (antitank) battalion of a German panzer division, are considered "Armor" personnel.

The definitions provided below are also used for the MOS categories in the ACSDB T/O&E Data Base. Note that in the Unit Data Base MOS strengths of divisions are provided only for US and German forces, and not for those of the British.

Terminology in the definitions includes the phrase "of regimental strength or below." This phrase pertains primarily to separate units. For organic divisional units, the phrase is not relevant. This means for example that the personnel of the component antitank company of the US infantry division's infantry regiment are not counted as artillery personnel, but rather as infantry. On the other hand, all personnel of a separate towed antitank company are counted as artillery personnel.

- Armor (or Combat Vehicle Crewmen in the T/O&E Data Base): All personnel in separate or organic divisional tank, armored, self-propelled tank destroyer, self-propelled antitank (panzerjaeger), cavalry, and armored reconnaissance units of regimental strength or below. Examples of units include the US cavalry group, the US self-propelled tank destroyer battalions, the tank battalion of the US armored division, the reconnaissance troop of the US infantry division, the self-propelled panzerjaeger abteilung (antitank battalion) of the German panzer division, the panzer aufklaerungs abteilung (armored reconnaissance battalion) of the German panzer division, the

self-propelled panzerjaeger kompanie (company) of the German volks grenadier division, and the German schwere panzer abteilung (heavy tank battalion). Personnel in the headquarters units of US tank destroyer and armored groups are also classified under the "Armor" MOS category.

- Infantry: All personnel in separate or organic divisional infantry, armored infantry, panzer grenadier, parachute infantry, glider infantry, ranger, and fallschirmjaeger (paratrooper) units of brigade strength or below. Examples of units include the US ranger battalion, the infantry regiment of the US infantry division, the fallschirmjaeger regiment of the German fallschirmjaeger division, and the panzer grenadier regiment of the German panzer grenadier division. Also categorized as infantry are personnel in miscellaneous German fortress units such as the fortress machine gun battalion and the fortress penal battalion (FstMGBn and FstPnBn), personnel in the feld ersatz bataillon (replacement battalion) of German divisions, and personnel in the US airborne division reconnaissance platoon.

- Artillery: All personnel in separate or organic divisional artillery, armored field artillery, towed tank destroyer or panzerjaeger, and chemical mortar units of regimental strength or below. Examples of units include US field artillery battalions, the divisional artillery of the US infantry division, US towed tank destroyer battalions, the panzerjaeger abteilung of the German volks grenadier division, and the US chemical mortar company. Also categorized as artillery are the personnel in the headquarters units of US field artillery groups and brigades.

- Maintenance: All personnel in separate or organic divisional ordnance maintenance battalions and companies. Examples include the US heavy automotive maintenance company, the ordnance company of the US airborne division, and the kraftfahrpark truppen (motor transport park troops) of German divisions.

- Maintenance-2: Maintenance-2 is a subset of Maintenance. Data for these personnel is provided only for US units in the ACSDB. These personnel are found in US divisional ordnance maintenance units and in US corps and army ordnance maintenance units. The following table shows current MOS descriptions and US Army World War II equivalents, the World War II equivalents used to calculate the Maintenance-2 personnel strengths in the ACSDB.

<u>Current Description</u>	<u>World War II Equivalent</u>		
Hawk Launcher Repairer	24L	--	
Vulcan Repairer	27F	--	
Chaparral/Vulcan Repairer	27G	--	
Lance Repairer	27L	--	
MLRS Repairer	27M	--	
Fire Control Instrument Repairer	41C	Fire Control Repairer	918
Metal Worker	44B	Metal Body Repairer	040
Machinist	44E	Machinist	4
Small Arms Repairer	45B	Small Arms Repairer	903
Fire Control System Repairer	45G	Fire Control Repairer	918
Tank Turret Repairer	45K	Turret Artillery Repairer	907
Artillery Repairer	45L	Artillery Repairer	913
Fuel & Electrical System Repairer	63G	Fuel & Electrical Repairer	912
Track Vehicle Repairer	63H	Track Vehicle Repairer	966

- Medical: All personnel in separate or organic divisional medical units of battalion strength or below. Examples of units are the sanitae ts truppen (medical troops) of German divisions, the medical battalion of the US infantry division, the US field hospital, and the US collecting and clearing companies. Personnel of German veterinary units are also considered medical personnel.

- Transportation: All personnel in non-divisional transportation units responsible for "long-haul" transport between divisions and higher echelons. These are primarily personnel in the US quartermaster truck company and its equivalent in the German and British armies. Although there exists a transportation component in US, British, and German divisions, it is not considered "long-haul" transport.

- Supply: All personnel in separate or organic divisional supply units. Examples of units include the quartermaster company of the US infantry division, the verwaltungs truppen (administrative and supply troops) of German divisions, and US quartermaster bakery and laundry companies.

- Engineer: All personnel in separate or organic divisional combat engineer, construction engineer, and pionier (engineer) units of regimental strength or below. Examples of units include the armored engineer regiment of the US armored division, the US combat engineer battalion, the US general service engineer regiment, and the pioniere (engineers) of German divisions. Personnel in the headquarters units of US engineer groups are also considered engineers.

- Other: All personnel not included in the MOS categories defined above. These include military police, divisional transportation personnel, antiaircraft artillery personnel, bandsmen, and personnel in divisional headquarters and headquarters companies.

"REPLACEMENT PERSONNEL --Total, --Armor, --Infantry, etc."
(Fields 13-22): Replacements are new personnel received by a unit during the day entered under "Date". For British units, all replacement and return to duty personnel are recorded under "REPLACEMENT PERSONNEL". Replacement personnel are recorded in total and by the MOS categories defined above.

"RETURNING PERSONNEL --Total, --Armor, --Infantry, etc."
(Fields 23-32): Returning personnel are primarily personnel returning to duty from treatment at medical facilities above divisional echelon during the day entered under "Date". These may also include personnel returning from leave or detached duty. Personnel listed as "Returnees" or "Casuals" in US records are considered returning to duty personnel. Returning personnel are recorded in total and by the MOS categories defined above.

"CASUALTIES -- Total" (Field 33): Total casualties include the sum of the battle and non-battle casualties incurred by a unit during the day entered under "Date", i.e., killed, wounded, captured/MIA, and DNBI.

"Total Killed" (Field 34): These are the total number of personnel killed in action or died of wounds in a unit during the day entered under "Date".

"Total Wounded" (Field 35): These are the total number of personnel wounded or injured in action during the day entered under "Date". For US forces, lightly wounded in action, i.e., those personnel treated at divisional medical facilities not at higher echelons, are included. For German forces, the number includes only those personnel evacuated from and treated at

medical facilities above division, although this is not a confirmed precise definition of the term for German forces. For additional information on this field, see the various narratives which describe the compilation and estimation of US and German personnel data.

"Total Captured/MIA" (Field 36): These are the total number of personnel captured by the enemy or whose whereabouts following a combat action are unknown, whether through becoming separated from their unit, being wounded or killed or unidentified, or through desertion. These statistics are recorded for the day entered under "Date". For further information on the derivation of this data, see later discussions in this paper on US and German personnel data.

"Total DNBI" (Field 37): These are the total number of personnel who become sick or injured through causes other than combat on the day entered under "Date".

"FACILITIES & STATISTICS -- No. of Hospital Beds" (Field 38): This is the number of available fully supported hospital beds maintained at army level. This data is provided for US forces from statistics found in Office of the Surgeon General records, and is estimated for German forces using typical German hospital army-level organization. These statistics are recorded for the day entered under "Date".

"FACILITIES & STATISTICS -- No. of Beds Filled" (Field 39): This is the number of fully supported hospital beds maintained at army level, occupied by patients. This data is provided only for US forces, using statistics from the Surgeon General records. These statistics are recorded for the day entered under "Date".

"FACILITIES & STATISTICS -- No. of WIA Entering Hospital" (Field 40): This is the number of admissions of wounded in action personnel to hospitals maintained at army level. This data is provided only for US forces, using statistics from the Surgeon General records. These statistics are recorded for the day entered under "Date".

"FACILITIES & STATISTICS -- No. of DNBI Entering Hospital" (Field 41): This is the number of admissions of DNBI (disease and non-battle injury cases) to hospitals maintained at army level. This data is provided only for US forces, using statistics from the Surgeon General records. These statistics are recorded for the day entered under "Date".

"FACILITIES & STATISTICS -- No. Died in Hospital" (Field 42): This is the number of hospital cases, in fully supported hospital beds maintained at army level, who died from all causes, i.e., wounds or DNBI. This data is provided only for US forces, using statistics from the Surgeon General records. These

statistics are recorded for the day entered under "Date".

"FACILITIES & STATISTICS -- No. Evacuated" (Field 59):
This is the number of personnel evacuated from army-level hospitals for medical treatment at higher echelons. This data is provided only for US forces, using statistics from the Surgeon General records. These statistics are recorded for the day entered under "Date".

Unit Data Base Logistics Data (Fields 43-48, 54-55):
Recorded in the logistics data section of the Unit Data Base is information on ammunition, other supply, and motor fuel or POL amounts stored, received, and expended or consumed by a unit on the day entered under "Date". For complete definitions of ammunition categories as they relate to the US, British, and German forces ("Tank/AT", "Artillery", "Special", and "Other Ammo"), consult the ACSDB T/O&E narrative.

Due to the variety of sources used for US, British, and German logistics data, the various methodologies employed for data estimation, and the different supply systems maintained by the Allied and German armies, it is necessary to refer to later sections of this paper for comprehensive descriptions of the supply data recorded in the ADCSB. The following are general definitions of terms.

"SUPPLY CAPACITY -- AMMO TYPE -- ON-HAND, REC'D, USED" (Fields 43-46): All ammunition amounts in the Unit Data Base are in hundreds of pounds. For divisions, ammunition on-hand ("AMMO TYPE -- ON-HAND") includes ammunition in divisional supply. For corps or armies, it is the ammunition stored in corps or army dumps and depots and does not include ammunition of subordinated divisions (or in the case of armies, subordinated corps or divisions). For divisions, ammunition received ("AMMO TYPE -- REC'D") includes ammunition supplied to or received by a division. For corps or armies, ammunition received is the amount received by a corps or army and does not include the ammunition received by subordinated divisions (or in the case of armies, subordinated corps or divisions). For divisions, ammunition used ("AMMO TYPE -- USED") includes ammunition expended or consumed by a division. For corps or armies, it is the ammunition expended or consumed by non-divisional corps or army units and the ammunition supplied to subordinated divisions (or in the case of armies, subordinated corps or divisions). As detailed in the T/O&E narrative, "Tank/AT" ammunition is primarily tank and antitank gun ammunition; "Arty" ammunition is ammunition of artillery guns and howitzers; "Special" ammunition is the ammunition of the German nebelwerfer rocket projectors; and "Other" ammunition is small arms, machine gun, antiaircraft artillery, and miscellaneous ammunition.

"Other Supply -- ON-HAND, REC'D, USED" (Field 47): For US units, these are the amounts of Class I, II, and IV supplies, as described in US Army Field Manual 101-10, 21 December 1944, page 308. The supply distribution scheme outlined above applies to "Other Supply" data. "Other Supply" data is provided in the Unit Data Base for US forces only.

"Fuel -- ON-HAND, REC'D, USED" (Field 48): These are the amounts of fuel, in thousands of gallons, stored, received, and expended or consumed by a unit. The supply distribution scheme outlined above applies to "Fuel" data. Fuel data for British units includes all petroleum, oil, and lubricants (POL). For Germans, the data pertains only to motor fuel. For US divisions, the data is for motor fuel only, and for US corps and armies it includes motor fuel and POL.

"Transportation Capacity (dry)/Transportation Capacity (wet)" (Fields 54 & 55): This is the total payload capacity in tons and thousands of gallons of transportation units responsible for long-haul transport between divisions and higher echelons. Details on the calculation of these capacities for US, British, and German forces are provided in later sections of this paper.

"ATTACHMENTS & DETACHMENTS -- TYPE, UNIT NAME" (Fields 60-79): Encoded in this section of the Unit Data Base is information critical to understanding the organization of and data contained in the Unit, Unit Inventory, and Unit Location Data Bases of the ACSDB. Fields 60-79 are used to record the daily order of battle of combat units in the US, British, and German armies during the period 16 December 1944-16 January 1945. Attached and detached units, divisional and non-divisional, are recorded under "ATTACHMENTS & DETACHMENTS", including company-/battery-/troop-size units and above. (Selected platoon-size units, such as US tank destroyer platoons, are also recorded under "ATTACHMENTS & DETACHMENTS".) It is important to note that a comprehensive listing of attachments and detachments of a unit on its first day of participation in the ACSDB is provided for that day. On subsequent days changes only in attachments and detachments of a unit are recorded. Two report features of the ACSDB (see description of the "ADLIST 1" and "ADLIST 2" programs in the ACSDB User's Guide under separate cover) allow analysts to view on computer screen or print out in hard copy the daily attachment and detachment changes of all units of a nationality (US, British, or German), or all attachment and detachment changes of a single unit by day. It is recommended that analysts print out hard copies of both of the ADLIST programs to utilize most fully the ACSDB.

Under "ATTACHMENTS & DETACHMENTS -- UNIT NAME" is identified the specific unit which is attached or detached. Examples of entries are "655th HyPjBN", "259th FA BN 4.5" G (T)", and "2/B/635th TD BN (T)" -- German 655th Heavy Panzerjaeger

Battalion, US 259th Field Artillery Battalion (towed 4.5" gun),
US 2d Platoon, B Company, 635th Tank Destroyer Battalion (towed).

Attachments and detachments of are qualified in two ways:
1) by the absence of the term "(REF)" after the attachment or
detachment name, or 2) by the inclusion of the term "(REF)" after
the attachment or detachment name. The difference between the
two qualifications is as follows.

- An entry recorded under "ATTACHMENTS & DETACHMENTS --
UNIT NAME" without the term "(REF)" after it means
that the personnel, equipment, and logistics data for
this unit in the Unit and Unit Inventory Data Base is
recorded with the parent unit identified under "Unit
Name." This qualification is used primarily with non-
divisional corps- and army-level units such as tank,
tank destroyer, and field artillery battalions.

- An entry recorded under "ATTACHMENTS & DETACHMENTS --
UNIT NAME" followed by the term "(REF)" means that the
identified unit is an army, corps, division, or organic
divisional unit, and that the personnel, equipment, and
logistics data for this unit in the Unit and Unit
Inventory Data Bases is not recorded with the parent
unit identified under "Unit Name". Attachments and
detachments identified with "(REF)" are marked as such
for reference purposes only. In the case of
armies/corps/divisions subordinated to army group,
corps/divisions to armies, and divisions to corps, this
information is provided primarily to describe order of
battle organization. This is also the reason for
identifying organic divisional attachments and
detachments, although originally it had been intended
to record the personnel, equipment, and logistics data
of these units with the controlling division as is done
with non-divisional units. Due to the impracticality
of separating data of organic divisional units from
data of the parent division, however, it was decided to
qualify all attachments and detachments of organic
divisional units with "(REF)".

For the Germans, attachments and detachments listed with
armies and corps headquarters (I SSPzK, LIII K, 7th Army, etc.),
include corps- and army-level service support units. The
"Remarks" field (Field 57), should also be consulted for German
armies and corps, as it was not possible to identify all service
support units in Fields 60-79 due to space limitations. For US
and British units, service support units are not identified in
Fields 60-79, but instead are described in other narratives for
the ACSDB. This is done because of the limited space available
in the computer format, and the inability to list all of the many
service support units in the limited format. The appropriate

narrative section of the report containing descriptive information on US service support organization is II-B ("US Non-Divisional Personnel Data"). Section II-F of the report ("British Personnel, Logistics, and Order of Battle Data Derivation") explains the derivation of the daily British order of battle. Due to time constraints and lack of information in sources, an abbreviated order of battle is provided for the British. Specific British service support elements are not identified in the "Attachments and Detachments" section of the ACSDB; only combat formations are included.

Entries under "ATTACHMENTS & DETACHMENTS -- TYPE" match the designations used for units in the T/O&E Data Base. Examples include "HYPjBN", "RcnReg", and "TDCoSP" -- German heavy panzerjaeger battalion, British reconnaissance regiment, and US self-propelled tank destroyer company. Some unit designations entered under "ATTACHMENTS & DETACHMENTS -- TYPE" are not in the T/O&E Data Base, because T/O&Es are not recorded for these units. These are principally units organic to divisions. An example is "PzAA", or panzer aufklaerungs abteilung -- German armored reconnaissance battalion. To assist in the identification of all designations recorded under "ATTACHMENTS & DETACHMENTS -- TYPE", Attachment 1 to this paper lists all designations with their full definitions.

Preceding all entries under "ATTACHMENT & DETACHMENTS -- TYPE" is either a "+" or a "-" sign. These signs indicate if the designated unit was attached (+) or detached (-) from the unit identified under "Unit Name" on the day entered under "Date".

Organization of the Allied and German armies as provided under the "ATTACHMENTS & DETACHMENTS" section of the Unit Data Base is the blueprint for understanding and interpreting the personnel, equipment, and logistics data recorded in the Unit and Unit Inventory Data Base. For example, if a corps controls five non-divisional field artillery battalions, the total tube strength recorded for the "corps troops" in the Unit Inventory Data Base will be 60 tubes, at 12 tubes per battalion and discounting any equipment attrition. The artillery personnel strength of the corps will reflect that of five artillery battalions, assuming no other artillery personnel such as chemical mortar and towed antitank troops are subordinated to the corps.

"Sources" (Field 56): Due to the considerable amount of estimation and the variety and number of sources necessary to generate data for the Unit Data Base, this paper serves as the sources reference for the Unit Data Base. To record in Reference Data Base format all bibliographic sources and estimation methodologies used for the Unit Data Base would have proved impractical and unwieldy. Later sections of this paper record in detail the sources and estimation processes employed to generate

data, by individual unit. Section XV of the report ("Comprehensive List of Data Sources Identified in Final Report") contains a list of all sources described in the written final report. Section XV and the Bibliography Data Base should be consulted if complete information on a data source is required.

"Remarks" (Field 57): Entered under "Remarks" is information in text format which qualifies and amplifies data in any other field in the record.

Attachment 1

**Unit Abbreviations Used for ATTACHMENTS & DETACHMENTS
Section of Unit Data Base**

US Units

AAABNG	Antiaircraft Artillery Battalion, Gun
AAABNAW	Antiaircraft Artillery Battalion, Automatic Weapons
AAABNSP	Antiaircraft Artillery Battalion, Self-Propelled
AAABtAW	Antiaircraft Artillery Battery, Automatic Weapons
AAABtG	Antiaircraft Artillery Battery, Gun
AAABtSP	Antiaircraft Artillery Battery, Self-Propelled
AAAGrph	Antiaircraft Artillery Group, Headquarters
AbnD	Airborne Division
AD	Armored Division
ArmBde	Armored Brigade (Combat Command)
ArmFABN	Armored Field Artillery Battalion
ArmGrph	Armored Group Headquarters
ArmInfB	Armored Infantry Battalion
ArmInfC	Armored Infantry Company
Army	Army
CavGrp	Cavalry Group
CavGrph	Cavalry Group Headquarters
CavSq	Cavalry Squadron
CavTrp	Cavalry Troop
Corps	Corps
DIVARTY	Divisional Artillery
EngBN	Engineer Battalion
EngCo	Engineer Company
EngReg	Engineer Regiment
FABN105	105mm Howitzer Field Artillery Battalion (towed)
FABN155	155mm Gun or Howitzer Field Artillery Battalion (towed)
FABN240	240mm Howitzer Field Artillery Battalion (towed)
FABN4.5	4.5-inch Gun Field Artillery Battalion (towed)
FABN8"G	8-inch Gun Field Artillery Battalion (towed)
FABN8"H	8-inch Howitzer Field Artillery Battalion (towed)
FABN(P)	Field Artillery Battalion (provisional)
FABNSP	155mm Gun Field Artillery Battalion (self-propelled)
FABt155	155mm Gun or Howitzer Field Artillery Battery (towed or self-propelled)
FABtSP	155mm Gun Field Artillery Battery (self-propelled)
FAGrphQ	Field Artillery Group Headquarters
FAObsCo	Field Artillery Observation Company
FRInfBN	French Infantry Battalion
FRInfCo	French Infantry Company
FRPIBN	French Parachute Infantry Battalion
GIBN	Glider Infantry Battalion
GIReg	Glider Infantry Regiment
ID	Infantry Division
InfBN	Infantry Battalion

InfBde	Infantry Brigade
InfReg	Infantry Regiment
MrtBN	Chemical Mortar Battalion
MrtCo	Chemical Mortar Company
PFABN	Parachute Field Artillery Battalion
PIBN	Parachute Infantry Battalion
PIReg	Parachute Infantry Regiment
RcnTrp	Reconnaissance Troop
RgrBN	Ranger Battalion
TDBNSP	Tank Destroyer Battalion (self-propelled)
TDBNT	Tank Destroyer Battalion (towed)
TDCoSP	Tank Destroyer Company (self-propelled)
TDCoT	Tank Destroyer Company (towed)
TDPltT	Tank Destroyer Platoon (towed)
TkBN	Tank Battalion
TkBNMX	Mine-Exploding Tank Battalion
TkCo	Tank Company
TkCoMX	Mine-Exploding Tank Company

British Units

AAABdeH	Antiaircraft Artillery Brigade Headquarters
AbnD	Airborne Division
ACReg	Armoured Car Regiment
AD	Armoured Division
AGRA	Army Group Royal Artillery
ALBde	Air Landing Brigade
AOPFlt	Air Observation Post Flight
APCReg	Armoured Personnel Carrier Regiment
ArmBde	Armoured Brigade
ArmReg	Armoured Regiment
ATBty	Antitank Battery
ATReg	Antitank Regiment
CrocReg	Crocodile (flamethrowing tank) Regiment
CrocSq	Crocodile (flamethrowing tank) Squadron
DIVARTY	Divisional Artillery
DIVRE	Divisional Royal Engineers
FldBty	Field Artillery Battery
FldCoRE	Field Company, Royal Engineers
FldReg	Field Artillery Regiment
FldSqRE	Field Squadron, Royal Engineers
Gds	Guards
ID	Infantry Division
InfBde	Infantry Brigade
InfBN	Infantry Battalion
HAAREg	Heavy Antiaircraft Artillery Regiment
HvyBty	Heavy Artillery Battery
LAAREg	Light Antiaircraft Artillery Regiment
MedReg	Medium Artillery Regiment
ParaBde	Parachute Brigade
RcnReg	Reconnaissance Regiment
SASSq	Special Air Service Squadron
TkBde	Tank Brigade
TkReg	Tank Regiment
TrkCo	Truck Company

German Units

AArtyBN	Army Artillery Battalion
AArtyBt	Army Artillery Battery
AG	Army Group
AMrtBN	Army Mortar Battalion
ArtBN	Artillery Battalion
ArtReg	Artillery Regiment
ASvcs	Army Service School
BN	Battalion
BrB(GE)	Light bridge equipment column (company) non-motorized
BrB(m)	Light bridge column (company) fully motorized
BrJ(GE)	Heavy bridge equipment column (company) non-motorized
BrJ(m)	Heavy bridge column (company) fully motorized
Bty	Battery
Co	Company
EngBde	Engineer Brigade
EngBN	Combat Engineer Battalion
EngBN C	Construction Engineer Battalion
EngBrBN	Engineer Bridge Battalion
EngCo	Engineer Company
EngEABN	Engineer Ersatz und Ausbildung (Replacement and Training) Battalion
EngRegC	Construction Engineer Regiment
FBB	Fuehrer Begleit (Escort) Brigade
FEB	Feld Ersatz Abteilung (Field Replacement Battalion)
FGB	Fuehrer Grenadier Brigade
FJArtr	Fallschirmjaeger (Paratrooper) Artillery Regiment
FJBN	Fallschirmjaeger (Paratrooper) Battalion
FJD	Fallschirmjaeger (Paratrooper) Division
FJEngBN	Fallschirmjaeger (Paratrooper) Engineer Battalion
FJMtrBN	Fallschirmjaeger (Paratrooper) Mortar Battalion
FJPjBN	Fallschirmjaeger Panzerjaeger (Paratrooper Antitank) Battalion
FJReg	Fallschirmjaeger (Paratrooper) Regiment
FJStBde	Fallschirmjaeger Sturmgeschuetz (Paratrooper Assault Gun) Brigade
FLAKBde	Fliegerabwehrkanone (Antiaircraft) Brigade
FLAKBN	Fliegerabwehrkanone (Antiaircraft) Battalion
FLAKCo	Fliegerabwehrkanone (Antiaircraft) Company
FLAKD	Fliegerabwehrkanone (Antiaircraft) Division
FLAKReg	Fliegerabwehrkanone (Antiaircraft) Regiment
FLAKStB	Fliegerabwehrkanone Sturm (Antiaircraft Assault) Battalion
FLAKStR	Fliegerabwehrkanone Sturm (Antiaircraft Assault) Regiment
FstArBN	Festung (Fortress) Artillery Battalion

FstArBt	Festung (Fortress) Artillery Battery
FstBN	Festung (Fortress) Battalion
FstMGBN	Festung (Fortress) Machine Gun Battalion
FstPAK	Festung Panzerabwehrkanone (Fortress Antitank) Company
FstPKBN	Festung Panzerabwehrkanone (Fortress Antitank) Battalion
FstPnBN	Festung (Fortress) Penal Battalion
FusBN	Fusilier (Rifle) Battalion
FusCo	Fusilier (Rifle) Company
FusR	Fusilier (Rifle) Regiment
GrenBN	Grenadier (Infantry) Battalion
Grp	Group
HG	Hermann Goering (used in reference to German fallschirmjaeger (paratrooper) units)
HyPjBN	Heavy Panzerjaeger (Antitank) Battalion
HyPzBN	Heavy Panzer (Armored) Battalion
ID	Infantry Division
InfBN	Infantry Battalion
InfReg	Infantry Regiment
K	Korps (Corps)
KG	Kampfgruppe (Battle Group)
OKW	Oberkommando der Wehrmacht (High Command of Armed Forces)
OTBde	Organization Todt (paramilitary civilian construction corps) Brigade
OTReg	Organization Todt (paramilitary civilian construction corps) Regiment
PjBN	Panzerjaeger (Antitank) Battalion
PjBNT	Towed Panzerjaeger (Antitank) Battalion
PjCo	Panzerjaeger (Antitank) Company
PzAA	Panzer Aufklaerungsabteilung (Armored Reconnaissance Battalion)
PzAR	Panzer (Armored) Artillery Regiment
PzArmy	Panzer (Armored) Army
PzBde	Panzer (Armored) Brigade
PzBN	Panzer (Armored) Battalion
PzCo	Panzer (Armored) Company
PzD	Panzer (Armored) Division
PzEngCo	Panzer (Armored) Engineer Company
PzGD	Panzer Grenadier (Armored Infantry) Division
PzGR	Panzer Grenadier (Armored Infantry) Regiment
PzK	Panzer Korps (Armored Corps)
PzLehrD	Panzer Lehr (Armored "Instruction") Division
PzReg	Panzer (Armored) Regiment
RRArtBN	Railway Artillery Battalion
RRArtBt	Railway Artillery Battery
SS	Schutzstaffeln (indicates combat elements of SS -- Waffen SS)
SSArtBN	SS Artillery Battalion
SSFLABN	SS Fliegerabwehrkanone (Antiaircraft) Battalion
SSFLABt	SS Fliegerabwehrkanone (Antiaircraft) Battery

SSHPzBN	SS Heavy Panzer (Armored) Battalion
SSK	SS Korps (Corps)
SSNwBN	SS Nebelwerfer (Rocket Launcher) Battalion
SSPzAA	SS Panzer Aufklaerungsabteilung (SS Armored Reconnaissance Battalion)
SSPzAR	SS Panzer (Armored) Artillery Regiment
SSPzBN	SS Panzer (Armored) Battalion
SSPzD	SS Panzer (Armored) Division
SSPzGD	SS Panzer Grenadier (Armored Infantry) Division
SSPzGR	SS Panzer Grenadier (Armored Infantry) Regiment
SSPzK	SS Panzer Korps (Armored Corps)
SSPzR	SS Panzer (Armored) Regiment
SSWfrBN	SS Werfer (Rocket Launcher) Battalion
StgBde	Sturmgeschuetz (Assault Gun) Brigade
StgCo	Sturmgeschuetz (Assault Gun) Company
StMrsCo	Sturm Moerser (Assault Mortar) Company
StPzBN	Sturm Panzer (Assault Vehicle) Battalion
VAK	Volksartillerie Korps ("People's" Artillery Corps)
VABN	Volksartillerie ("People's" Artillery) Battalion
VGBN	Volks Grenadier ("People's" Infantry) Battalion
VGD	Volks Grenadier ("People's" Infantry) Division
VGR	Volks Grenadier ("People's" Infantry) Regiment
VTB	Volga Tartar Battalion
VWB	Volkswerfer ("People's" Rocket Launcher) Brigade
VWBN	Volkswerfer ("People's" Rocket Launcher) Battalion
VWBty	Volkswerfer ("People's" Rocket Launcher) Battery
VWR	Volkswerfer ("People's" Rocket Launcher) Regiment

US Divisional Personnel Data

INTRODUCTION

Daily personnel data for US armored, infantry, and airborne divisions is derived from various primary source records, including the 12th Army Group G-1 Daily Summary, G-1 records of divisions themselves, and G-1 records of selected corps to which the divisions belonged. Personnel data includes daily on-hand strengths in total and by MOS categories (for definitions of the so-called MOS categories, see the UNIT DATA BASE DEFINITIONS section of the ACSDB Unit Data Base narrative), daily attrition (killed, wounded, captured/missing, and DNBI -- disease and non-battle injury), and daily replacements and returns to duty (RTDs) in total and by MOS categories.

Compilation of personnel data for US divisions in the Ardennes Campaign Simulation Data Base (ACSDB) proved to be a complicated task, despite the abundance of primary source records. Obstacles encountered in the task resulted from contradictory or incomplete data in the records, and the requirement to make a daily accounting of on-hand, replacement, and RTD personnel strengths by MOS categories.

This narrative serves as the bibliographic reference for the sources used in compiling US divisional personnel data. It also explains any data estimation, interpolation, or extrapolation employed in generating the data. The narrative should be examined and consulted with other US Unit Data Base narratives for a complete summary and explanation of the personnel data recorded for US divisions in the Unit Data Base. It is arranged by division, with infantry divisions first, followed by armored divisions, and finally the three airborne divisions which participated in the Ardennes Campaign.

One source frequently referenced in this narrative is the US 12th Army Group G-1 Daily Summary (hereafter cited in this report as "12th AG G-1" or "12th AG G-1s"). This document was obtained from the US National Archives in Record Group 407, Box 1753, File 3 and Box 1754, File 1. It contains daily personnel strengths, battle casualties, DNBI, and "reinforcements" for divisions, corps and army combat troops, and corps and army service support troops of the US 12th Army Group. Its value to generation of personnel data in the ACSDB is great, although it has some limitations, as discussed below.

Most sources used in the generation of US personnel data are

from the US National Archives Washington National Records Center in Suitland, Maryland. Unless otherwise indicated, they are from Record Group (RG) 407. They are identified in the narrative by their box numbers, the Archives record identification code, and a brief description of the record including, when appropriate, dates. Some other sources are from microfilm records at the Office of Air Force History, Bolling Air Force Base, Washington, D.C. These are identified with their roll number (a four-digit number preceded by the letter "C") and their classification number (with a decimal), followed by a brief description of the item, i.e., "C5141, 585.034 to 585.04A, 4th ID records including 'Reinforcements for the Month of January 1945.'"

Attached to the end of this paper are a series of charts and tables showing the data used for derivation of various averages. Most of these averages relate to the personnel MOS categories. One of the requirements of the ACSDB is to provide daily on-hand strengths of personnel by MOS, as well as daily replacements and RTDs by MOS. Generation of the MOS data is achieved for most US divisions through the use of computer programs. Computer programs are utilized to save lengthy and cumbersome calculations with hand calculators. The programs calculate daily replacement and RTD MOS strengths using averages, and then calculate daily on-hand MOS strengths using the calculated replacement/RTD MOS strengths and MOS attrition percentages. This process does not compromise the accuracy of the MOS data, as it is simply not available on a daily basis for on-hand strengths, casualties, and reinforcements in primary source records of most divisions. For those divisions for which it is available on a daily basis, such as the 30th Infantry Division, it is incorporated in the ACSDB.

The 12th Army Group G-1s mentioned above proved to be a valuable source of personnel data used in the ACSDB. They contain in one source personnel data of all divisions in the US 12th Army Group for the period 15 December 1944-16 January 1945. This data is as of 2400 hours each day, and this fact, coupled with the 12th AG G-1s' extensive use as a source of data, is probably the single most important reason that US personnel data is as of end of day in the ACSDB. The 12th AG G-1s provide total on-hand personnel strengths, casualties by killed, wounded, captured/missing, and DNBI, and (in some cases) reinforcements on a daily basis, as well as cumulative casualties by killed, wounded, etc. These cumulative casualties proved to be very useful in analysis of divisional personnel data and are mentioned frequently in the discussions on the individual divisions.

The 12th AG G-1s are not without their limitations. Principal among these is their failure to record any daily reinforcement data for units of the US First Army. Another limitation is the lack of differentiation between replacements and returns to duty (RTDs) for divisions of the US Third and Ninth Armies. All reinforcement data is recorded under one

heading in the 12th AG G-1. Upon examination of this data and its comparison with that found in corps and divisional personnel records, it was determined that the data may be either replacement data only or combined replacement/RTD data.

Perhaps the most serious limitation of the 12th AG G-1s, and one which upon deliberation should not be unexpected, becomes evident only upon analysis of the "RTD Tracking Program Printouts" found in an attachment at the end of this paper. These printouts are generated by a computer program which takes the recorded strength of a unit and on a daily basis adds to and subtracts from it the gains (reinforcements -- replacements/RTDs) and losses (battle and non-battle casualties) of the unit. A calculated strength based on this mathematics is provided and the difference, if any, between the calculated strength and the next day's recorded strength is shown as a positive or negative number. Not surprisingly, there are numerous differences (or deltas, as they are called throughout this paper), between the calculated and actual recorded strengths. This is not surprising when one considers that the 12th AG G-1s were compiled on a daily basis with information sent up to the army group from divisions, information which was frequently only estimated through a process which no doubt lacked accuracy during the severe and confused combat of the Ardennes Campaign's initial stages. Other reasons for deltas become manifest upon examination of the RTD Tracking Program Printouts. Occasionally, divisional personnel data leaves out personnel strengths of organic divisional units or, conversely, includes the personnel strengths of non-divisional formations, a phenomenon best exemplified by the 12th AG G-1 data of the US 3d and 10th Armored Divisions. If no reinforcement data is provided for a division, a series of deltas with positive values generally appear in the printout. Often, the reason for the deltas can only be determined by scrutinizing the increases or decreases in the cumulative casualties, caused by corrections made to casualty reports and incorporated in the 12th AG G-1s after the fact. In some cases no explanation can be found for the deltas, as 's the case with the 35th ID.

Despite these limitations, the utility of the 12th AG G-1s for the ACSDB is great, and extends far beyond the convenience of having much data recorded in one source. This utility becomes most evident when the personnel data is analyzed in the format of the RTD Tracking Program Printouts. Presented in this manner, the data proves most useful in estimating reinforcements for divisions lacking this data. Attachment 9 to this paper contains both original and final RTD Tracking Printouts for selected divisions, the former containing unmodified data and the latter showing data as it is recorded in the ACSDB. These printouts should be used in the review of the individual division narratives which follow.

It is recommended that the attachments to this paper be read

prior to the review of the individual divisional narratives. Readers will then be able to familiarize themselves with the processes used in generating US divisional personnel data. A profusion of terms and references unique to the ACSDB are used in the divisional narratives, and, unless familiar to the reader, these may seem confusing.

DIVISIONAL NARRATIVES

The following narratives reference all sources used for US divisional personnel data and describe any methodologies used to estimate data.

Two items found in the narratives are important enough to require elaboration. Both of them have their source in the adjustments of the cumulative casualties as recorded in the 12th AG G-1s.

- For some divisions, additional casualties are added into the casualties of certain days. These are the result of increases in the 12th AG G-1 cumulative casualties, which become most apparent when deltas with negative values appear in the original RTD Tracking Program Printouts. The additional casualties are not casualties incurred on the day on which they are added. Most often, they represent casualties sustained on prior dates, usually during periods of severe combat, but not recorded until later. Since it is impossible to determine with any degree of certainty when the casualties were actually sustained, the casualties are added on the date when the cumulative casualties increase.

- Additional RTDs are added into the returns to duty of certain days, when cumulative casualties show decreases (frequently most apparent when deltas with positive values appear in the original RTD Tracking Program Printouts). These personnel are always identified in the narratives as returnees from previously "unaccounted for" status and not from medical treatment.

The above-described casualty and RTD modifications are made to the 12th AG G-1 data in order to incorporate in a logical, identifiable, and consistent manner the personnel dynamics "hidden" in the cumulative casualties. The decision to make these changes was made after much deliberation and the realization that the changes in the cumulative casualties had to be accounted for in some manner. The process employed to represent the changes not only accounts for the changes, but permits the implementation of the various MOS calculation programs used to generate daily MOS personnel data.

1st ID (Infantry Division)

The start strength of the 1st ID is taken from the 12th AG G-1 of 15 December 1944. Daily battle and non-battle casualties and replacements and reinforcements are from Box 5672, 301-1, "Casualties for the Month of December 1944 and the Month of January 1945" and "Replacements for the Month of December 1944 and the Month of January 1945." These numbers are used in lieu of the numbers in the 12th AG G-1 as they were compiled after the operations and are likely more accurate than the daily 12th AG G-1s. Daily personnel strengths are computed using the start strength as the initial benchmark and calculating the subsequent days' strengths using the net losses and gains from Box 5672, 301-1. As no specific data was found for 1st ID MOS losses, the MOS Casualty Averages are used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths are from the MOS RTD Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for the 1st ID.

2d ID

All personnel data for the 2d ID is calculated in the same manner used for the 1st ID, i.e., total start strength from the 15 December 12th AG G-1; daily casualties, replacements, and RTDs from divisional records; daily strengths calculated from the net daily gains and losses using the 15 December strength as the initial benchmark; the MOS Casualty Averages used for the start MOS strengths and in the MOS Casualty Calculation Program; the FUSA MOS Replacement Averages for the 2d ID for the replacement MOS strengths; and the MOS RTD Averages for the RTD MOS Strengths. The divisional records used for daily casualties, replacements, and RTDs are from Box 5978, 302-1 and Box 5979, 302-1.2 to 302-1.13 which contain excellent daily personnel reports with daily and cumulative casualties, replacements, and RTDs, personnel shortages in personnel in organic divisional units, and decorations awarded.

4th ID

The original RTD Tracking Program Printout shows the deltas calculated using personnel strengths and casualties for the 4th ID from the 12th AG G-1s; 16-31 December 1944 reinforcements (all listed under replacements) from Box 6437, 304-1 to 304-1.2, 4th ID G-1 Journal; and 1-16 January 1945 replacements and RTDs from C5141, 585.034 to 585.04A, 4th ID records including "Reinforcements for the Month of January 1945." After comparing the 12th AG G-1 reinforcements (which do not exist for the period 16-21 December 1944) and the replacements and RTDs for 1-16 January 1945 from Box 6437, 304-1 to 304-1.2 (during this period some daily reinforcement data from Box 6437 is in fact broken down into replacements and RTDs), revisions were made to the original 4th ID numbers which resulted in those shown in the final RTD Tracking Program Printout for the 4th ID. Major changes include the addition of an estimated 103 reinforcements on 18 December, based on the delta of that day, and broken down into replacements/RTDs using the Replacement/RTD Percentage. Additional casualties of 55 and 69 are added on 20 and 21 December respectively to reflect the deltas and changes in the cumulative casualties on those days. Their breakdown into killed, wounded, captured/missing, and DNBI is estimated using the Battle/Non-Battle Casualty Percentages. On 1 January 1945 228 personnel are subtracted from the total divisional strength, a figure which disappears from the next day's strength and probably reflects the inclusion of an attached non-divisional unit's personnel strength in the 12th AG G-1 strength for the 4th ID. Finally, 783 personnel are added as RTDs on 18 December. These personnel almost certainly were personnel cut off from contact with the division and counted as casualties on 17 December. Therefore, they represent RTD personnel from captured/missing status, and not from hospital treatment. The Replacement/RTD Percentage used for 18 December is also used on other days to break down the total number of reinforcements into the two categories when this is not indicated in the data source. In general, the 4th ID uses the 12th AG G-1s and Box 6437 as the main sources for replacements and RTDs. For on-hand personnel and casualty strengths, the 12th AG G-1 is the primary data source.

As no specific data was found for 4th ID MOS losses, the MOS Casualty Averages are used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths are from the MOS RTD Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for all infantry divisions. This figure is used instead of the FUSA averages specific to the 4th ID due to the inordinately low percentage of infantry replacements in the specific 4th ID averages.

5th ID

All numbers shown in the original RTD Tracking Program Printout for the 5th ID are taken from the 12th AG G-1s. Under replacements are recorded all reinforcements. These are both replacements and RTDs, and a 61.4%/38.6% replacement/RTD split is used to divide them into the two respective categories. This percentage split comes from Box 6746, 305-1.3, 5th ID G-1 Journal, which has information on replacements and RTDs by organic divisional unit. Two major changes affect the numbers shown in the original RTD Tracking Program Printout. On 27 December 1944, an additional 131 casualties are added to the total casualties to reflect changes in the cumulative casualties in the 12th AG G-1s as made evident in the delta of 130 for this day. Their breakdown into killed, wounded, captured/missing, and DNBI is estimated using the Battle/Non-Battle Casualty Percentages. And, on 1 January 1945, the total on-hand personnel is changed to 13,964 by adding the delta of the subsequent day (408) a figure which almost certainly reflects the exclusion of a divisional field artillery battalion in the division's total personnel strength.

As no specific data was found for 5th ID MOS losses, the MOS Casualty Averages are used to estimate the division's MOS start strengths and in the MOS Casualty Calculation Program. Replacement and RTD MOS strengths are from Box 6746, 305-1.3.

8th ID

All numbers shown in the original RTD Tracking Program Printout for the 8th ID are taken from the 12th AG G-1s. It is apparent upon examination of the numbers that the figures listed under replacement are for replacements only, and do not include RTDs. In general RTDs are estimated to be equal to the daily delta for the 8th ID. On the following days, the indicated numbers are RTDs which, based on changes in cumulative casualties, likely represent RTDs from "unaccounted for" status and not from medical treatment.

- 16 Dec	86 RTDs
- 17 Dec	6 RTDs
- 18 Dec	165 RTDs
- 19 Dec	20 RTDs
- 20 Dec	36 RTDs

The 113 reinforcements originally recorded for 21 December 1944 are recorded on 22 December to reduce the deltas of 101 and 142 respectively on those days. (The reason for these deltas may lie in the possibility that the 12th Army Group recorded the reinforcements on the day prior to their arrival at the division.) The final major change made to the 12th AG G-1s is the addition of 912 personnel (the 31 December 1944 delta) to the 31 December total personnel strength. This appears to be a case of failure to record the strength of an organic divisional unit, probably a detached infantry battalion, totalling some 900 men with the division's total strength.

8th ID MOS loss percentages, from C5146, 585.08 which includes "G-1 ANNEXES (ANNEX #2 -- PERSONNEL ANNEX) FOR OPERATIONS REPORTS PERIODS 1 DEC 44 TO 31 DEC 44 and 1 JAN 45 TO 31 JAN 45 -- BATTLE and SICK AND NON-BATTLE CASUALTIES," are used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths are from the MOS RTD Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for the 8th ID.

9th ID

All figures shown in the original RTD Tracking Program Printout are from the 12th AG G-1s, except the 1-16 January 1945 replacements and RTDs taken from C5150, 585.09-1, which includes 9th ID January 1945 battle casualties and "REPLACEMENTS RECEIVED AND CASUALS RETURNED TO DUTY" for January 1945.

Additional casualties of 21, 23, 11, and 13 are added on 22, 24, and 28 December and 16 January respectively to reflect the deltas and changes in the cumulative casualties on those days. Their breakdown into killed, wounded, captured/missing, and DNBI is estimated using the Battle/Non-Battle Casualty Percentages. For 16 31 December, the replacements and RTDs are estimated to be the deltas with positive value; they are broken down into replacements/RTDs using the Replacement/RTD Percentage. Replacements/RTDs recorded on 2 January are changed to 3 January to reduce the deltas on those two days, deltas which likely reflect the difference in recording their arrival at division by the 12th Army Group and the 9th ID. This same change is made for 79 RTDs on 6 and 7 January. On the following days, the indicated numbers are RTDs who, based on changes in cumulative casualties, likely represent RTDs from "unaccounted for" status and not from medical treatment.

- 16 Dec	11 RTDs
- 18 Dec	109 RTDs
- 30 Dec	22 RTDs
- 11 Jan	12 RTD

Finally, 100 reinforcements are subtracted from the replacements/RTDs on 10 January to eliminate the delta on that day. The remaining total replacement/RTD figure is broken down using the Replacement/RTD Percentage.

9th ID MOS losses, from C5150, 585.09-1 ("SECTION V -- PERSONNEL," part of a January 1945 divisional report with battle casualties by organic divisional units), are used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths are from the MOS RTD Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for the 8th ID.

26th ID

All figures shown in the original RTD Tracking Program Printout are from the 12th AG G-1s. Note that the figures recorded under replacements in fact denote replacements only and that for the 26th ID, the general approach used to estimate RTDs is to take the positive deltas and assume that they represent the RTDs. (Evidence gathered in analysis of US Third Army Divisions indicates that for some divisions, the 12th AG G-1s in fact record replacement personnel only as reinforcements.) On 23 December 59 personnel are subtracted from the on-hand personnel total to reduce the delta on the following day. The 64 replacements recorded on 25 December are moved to 26 December to reduce the deltas on both days, as are the 27 replacements on 29 and 30 December. For other days, the positive deltas are added as RTDs, or negative deltas subtracted from replacements. Finally, to compensate for major changes in cumulative casualty figures on 26 December and 4 January, an additional 90 and 73 casualties are added on those days respectively. Their breakdown into killed, wounded, captured/missing, and DNBI is estimated using the Battle/Non-Battle Casualty Percentages.

As no specific data was found for 26th ID MOS losses, the MOS Casualty Averages are used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths are from the MOS RTD Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for all infantry divisions.

28th ID

The 28th ID was one of the US infantry divisions which suffered heavy personnel losses in the opening days of the Ardennes Campaign. The 12th AG G-1s, the main source used for personnel data on the division, probably do not reflect the actual personnel data of the division in the first week of the German attack, and are therefore adjusted to portray the losses sustained by the division.

All data on the original RTD Tracking Program Printout is from the 12th AG G-1s, except the replacements for the period 25-31 December which are from Box 8481, 328-1.2, "Extract from [28th ID] G-1 'ELR' [Estimated Loss Reports] Totals."

Basically, the approach used to estimate the strengths, losses, and gains of the 28th ID during the first week of Ardennes Campaign is to let the casualties recorded in the 12th AG G-1s determine the daily on-hand strengths. Upon examination of the 12th AG G-1 casualties for the 28th ID and analysis of the division's activities during the period, it appears that the 12th AG G-1 numbers are close to what the division actually lost, with two major differences. On 16 December an additional 154 casualties, a value equal to the delta on that day, are added to the division's total casualties. Then, on 20 December an additional 739 casualties are added to the division's total casualties, this number determined by the delta on that day, after the previous days' strengths are calculated from the casualties recorded in the 12th AG G-1s. For the additional casualties on 16 and 20 December, the breakdown into killed, wounded, captured/missing, and DNBI is estimated using the Battle/Non-Battle Casualty Percentages. Similar adjustments are made to the division's casualties on 26 December, 8 January, and 10 January, adjustments which reflect deltas and changes in the cumulative casualties and are almost certainly casualties incurred by the division in its initial action but not recorded until the later dates. Additional RTDs are added to the division using the positive deltas. In almost all cases these probably reflect actual returnees from medical treatment, except for 204 RTD personnel on 21 December who are most likely personnel who had been out of contact with the division during the previous period. (This determination is made based on examination of the 28th ID's cumulative casualties on 21 December.)

The total battle and non-battle casualties for the period 16 December-16 January are estimated to be approximately 6,300, a figure some 1,400 personnel greater than the casualties for the same period given by the 12th AG G-1s. However, according to C5137, 585.020 to 585.03, records which include the 28th ID's Unit Report No. 6 for December 1944 (page 7), the 28th ID lost in December alone 4,252 battle casualties, most if not all of which were lost during the period 16-31 December. Add to this figure

battle casualties lost during the period 1-16 January 1945 and DNBI for the entire 16 December-16 January period and the total casualties sustained by the 28th ID between 16 December 1944 and 16 January 1945 may have actually exceeded 6,300.

The 28th ID suffered high losses in MOS categories other than infantry, in particular in artillery personnel. Therefore, the average of the MOS loss percentages of the 2d and 99th IDs, units which experienced similar MOS loss distributions, are used as the 28th ID's MOS loss percentages. (These percentages are from Box 3412, 205-0.13 to 205-1.12, V Corps G-1 After Action Report for January 1945, page 6.) RTD MOS strengths are from the MOS RTD Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for the 28th ID. Note that the MOS Casualty Averages are used to estimate the division's 15 December MOS strengths, and that the loss percentages of the 2d and 99th IDs described above are not used because they would incorrectly reflect high artillery MOS losses sustained by the 28th ID after 16 December.

29th ID

All numbers shown in the original RTD Tracking Program Printout are from the 12th AG G-1s. Note that replacements include all reinforcements. These numbers are in general broken down into replacements/RTDs using the Replacement/RTD Percentage. On-hand personnel strengths on 16-18 December are changed to compensate for the deltas on 16 and 19 December, numbers which may represent the strength of a small 75-man unit. On 24 December the total number of replacements is deleted and on 24-26 December the on-hand strengths of the division changed to eliminate the deltas of 69 and -136 on 25 and 27 December. The final major change is the on-hand personnel strength of 5 January, which is reduced by 496, the delta on that day and obviously the strength of a non-divisional unit included on that day (note the delta of -496 on the subsequent day, 6 January).

MOS loss percentages from C5137, 585.020 to 585.03, which includes a chart titled "Headquarters, 29th Infantry Division, Battle Casualties Occuring in January 1945." are used to estimate the 29th ID's 15 December MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths are from the same source, and replacement MOS strengths are from the FUSA MOS Replacement Averages for all infantry divisions.

30th ID

The 30th ID and the 102d IDs are the US divisions for which the most complete personnel data for the time period 16 December 1944-16 January 1945 is available, i.e., on-hand strengths, casualties, replacements, and RTDs in aggregate and by MOS category (actually by organic divisional unit). This data is from Box 8735, 330-1.2, which includes the 30th ID's highly detailed Daily Estimated Loss Reports. The numbers recorded for the 30th ID are taken directly from this source, with no modifications. As can be seen in the final RTD Tracking Program Printout for the 30th ID, there remain some large deltas on certain days, particularly on days of intense combat activity. However, it was decided not to adjust these numbers, as they represent what are most likely the most accurate available for the division.

35th ID

Examination of the 12th AG G-1 figures for the 35th ID, as shown in the original RTD Tracking Program Printout, shows an unexplainable negative deltas between the 12th AG G-1 on-hand personnel strengths and the strengths derived from the net daily gains and losses. (The 12th AG G-1s are the source of all data shown in the original RTD Tracking Program Printout.) The general approach used in revising these numbers is to break down the aggregate reinforcements into replacements and RTDs using the Replacement/RTD Percentage. On most days this is done after negative deltas are subtracted from the total reinforcements. Other revisions include changing the 29 December personnel strength to the calculated strength and adding an additional 31, 19, and 41 casualties on 10, 12, and 13 January respectively to reflect changes in cumulative casualty figures. Their breakdown into killed, wounded, captured/missing, and DNBI is done using the Battle/Non-Battle Casualty Percentages. Note that 21 and 25 RTDs on 3 and 6 January respectively represent personnel who were formerly listed as missing in action and not personnel returning from medical treatment.

As no specific data was found for 35th ID MOS losses, the MOS Casualty Averages are used to estimate the division's 26 December MOS start strengths and in the MOS Casualty Calculation Program. RTD MOS strengths are from the MOS RTD Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for all infantry divisions.

75th ID

The 75th ID first entered combat around 22 December 1944. No data is available in any source for daily reinforcements received by the division during the period 22 December-16 January. Therefore, it was necessary to utilize the daily deltas shown in the original RTD Tracking Program Printout to generate reinforcement personnel figures. Numerous other adjustments and changes are made to the 12th AG G-1 data. (The 12th AG G-1s are the source of all data shown in the original RTD Tracking Program Printout.)

For example, total on-hand personnel strengths are changed to the calculated strengths or other strengths generated by adjusted daily losses and gains on the following days: 24, 25, 29, and 31 December, and 2-7 January. Reinforcements are estimated in general using deltas with positive values, in some cases adjusted to compensate for negative deltas on prior or subsequent days. The reinforcements are broken down into replacements and RTDs using the Replacement/RTD Percentage. On 26 and 28 December and 9 and 11 January additional casualties of 37, 28, 11, and 71 are added to reflect increases in cumulative casualties. The additional casualties are broken down into killed, wounded, captured/missing, and DNBI using the Battle/Non-Battle Casualty Percentages.

As no specific data was found for 75th ID MOS losses, the MOS Casualty Averages are used to estimate the division's 22 December start MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths are from the MOS RTD Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for the 75th ID.

78th ID

All data for the 78th ID as recorded in the original RTD Tracking Program Printout is from the 12th AG G-1s. In general, this data required only minor revisions. The replacements and RTDs, combined as reinforcements in the 12th AG G-1s, are broken down using two replacement/RTD percentages, both of which are calculated from 78th ID records for December 1944 and January 1945. The source of these 78th ID records is C5145, 585.075 to 585.08, which includes a 78th ID December 1944 report with "ANNEX # 6: REINFORCEMENTS RECEIVED DURING PERIOD, and a 78th ID January 1945 After Action Report with Chart 4 "REINFORCEMENTS DURING PERIOD." On-hand personnel strengths are changed on 17 and 19 December to reflect gains and losses during that period. From 22 December to 16 January 432 personnel are added to the 78th ID's total personnel strengths on a daily basis. This important change is done because the 78th ID evidently stopped counting the strength of what appears to be an organic divisional field artillery battalion (approximately 433 personnel) on 22 December. On 24 December and 1 January, 92 and 102 personnel respectively are added to the division's reinforcements. Finally, on 18 December 310 personnel are added as RTDs. These personnel represent formerly "unaccounted for" personnel, and not returnees from medical treatment. The 78th ID was peripherally involved in the defense against the German Sixth Panzer Army's attack and as a result several hundred personnel were evidently unaccounted for in the first days of the Ardennes Campaign. This is reflected in the reduction of cumulative casualties in the 12th AG G-1s.

MOS loss percentages from C5145 (the same source described above) are used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. This source is also used for RTD MOS strengths. Replacement MOS strengths are from the FUSA MOS Replacement Averages for the 78th ID in December and from C5145 in January. Two sets of averages are used as the division received an unusually high number of artillery replacement personnel in December.

80th ID

All data recorded for the 80th ID in the original RTD Tracking Program Printout is from the 12th AG G-1s. Reinforcements recorded under replacements include both replacements and RTDs. These are broken into the respective categories using the Replacement/RTD Percentage. On 25, 26, and 28 December and 3 January 20, 318, 145, and 85 additional casualties are recorded for the division to reflect changes in the cumulative casualties. These are broken down into killed, wounded, captured/missing, and DNBI using the Battle/Non-Battle Casualty Percentages. On 29 and 31 December 1944 additional RTDs (47 and 67) are added to the division's total RTDs to reflect changes in cumulative casualties. These are personnel returning from previously "unaccounted for" status and not returnees from medical treatment.

As no specific data was found for the 80th ID MOS losses, the MOS Casualty Averages are used to estimate the division's 20 December MOS start strengths and in the MOS Casualty Calculation Program. RTD MOS strengths are from the MOS RTD Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for all infantry divisions.

83d ID

Personnel data recorded for the 83d ID is generated in a manner similar to that used for the 1st and 2d IDs. All battle casualty, DNBI, replacements, and RTDs are from C5148, 585.083 to 585.09, which includes two tables, "CASUALTIES, REINFORCEMENTS, AND RETURNS TO DUTY" (for December 1944) and "CASUALTIES, REINFORCEMENTS, AND RETURNS TO DUTY, JANUARY 1945." Battle casualties on these tables are not broken down, so the Battle/Non-Battle Casualty Percentages are used to separate them into killed, wounded, and captured/missing. The division's 15 December start strength is from the 12th AG G-1, and strengths on all subsequent days are generated using the net gains and losses of each day.

As no specific data was found for 83d ID MOS losses, the MOS Casualty Averages are used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths are from the MOS RTD Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for the 83d ID.

84th ID

On-hand personnel strengths for the 84th ID recorded in the original RTD Tracking Program Printout are from the 12th AG G-1s, as is the casualty data, and the total reinforcements for 16-19 December, recorded under replacements. Reinforcements for 23, 24, 26, and 27-31 December and 1 January are from Box 3839, 207-1.8 to 207-1.16, which includes daily VII Corps Estimated Loss Reports.

On-hand personnel strengths on 21-23 December are changed to compensate for the deltas on 21 and 23 December, which may be the result of the failure of the 12th AG G-1s to record data for an organic divisional unit on 21 and 22 December. For 2-16 January, total daily reinforcements are estimated to equal the deltas with positive values. These reinforcements, and the daily reinforcements in December are broken down into replacements and RTDs using the Replacement/RTD Percentage. Additional casualties totalling 60, 17, and 49 are added on 27 and 28 December and 9 January respectively to reflect changes in the cumulative casualties. These are broken down into killed, wounded, captured/missing, and DNBI using the Battle/Non-Battle Casualty Percentages.

As no specific data was found for 84th ID MOS losses, the MOS Casualty Averages are used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths are from the MOS RTD Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for all infantry divisions.

87th ID

All data shown on the original RTD Tracking Program Printout is from the 12th AG G-1s. The reinforcements, all recorded under replacements, evidently include replacements and RTDs and so they are broken down into these two categories using the Replacement/RTD Percentage. On-hand personnel strengths are changed to equal the calculated strengths or reflect strengths generated mathematically by gains and losses on 30 and 31 December and 1 and 10 January. On 4 and 8 January, 55 and 23 additional reinforcements are added to the total reinforcements received by the division on those days. The 55 reinforcements are broken down into replacements and RTDs on 4 January, but the 23 additional reinforcements on 8 January should be considered personnel in previously "unaccounted for" status and not returnees from medical treatment.

As no specific data was found for 87th ID MOS losses, the MOS Casualty Averages are used to estimate the division's 29 December MOS start strengths and in the MOS Casualty Calculation Program. RTD MOS strengths are from the MOS RTD Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for all infantry divisions.

90th ID

All data shown in the original RTD Tracking Program Printout is from the 12 AG G-1s. All reinforcements are grouped under replacements, so the Replacement/RTD Percentage is used to break them down into the respective categories. In general, little modification to these numbers is necessary, except for changes on three days. On 22 December the on-hand strength is changed to the calculated strength to compensate for the delta of 97 on that day. On 23 December an additional 148 casualties are added to reflect the changes in the cumulative casualties. These are broken down into killed, wounded, captured/missing, and DNBI using the Battle/Non-Battle Casualty Percentages. Finally, to compensate for the extremely high delta on 24 December (1,022) which upon examination could not be explained, an additional 1,022 reinforcements are added on that day.

As no specific data was found for 90th ID MOS losses, the MOS Casualty Averages are used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths are from the MOS RTD Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for all infantry divisions.

99th ID

Like the 28th and 106th IDs, the 99th ID was one of the US infantry division hard pressed by the initial German attacks of the Ardennes Campaign. This fact is especially reflected in the delta of -2,129 on 18 December shown on the original RTD Tracking Program Printout. All data on that printout comes from the 12th AG G-1s. Note that no reinforcements are provided in the 12th AG G-1s.

The final numbers generated for the 99th ID are arrived mainly by adjusting the on-hand personnel strengths on 18-23 December to reflect net losses and gains during this period. This reduced the large delta on 18 December, but also necessitated increasing casualties on 16, 18, and 19 December (16, 414, and 225 respectively). These casualties are broken down into killed, wounded, captured/missing, and DNBI using the Battle/Non-Battle Casualty Percentages. The revised casualties represent a reasonable compromise between the 12th AG G-1s reported losses and the high delta of -2,129 personnel on 18 December, a figure which unquestionably reflects a high number of personnel out of contact with the division but who remained in combat and eventually returned to the 99th ID rolls. Additional casualties on 23, 24, 28, and 31 December and 4 January (108, 269, 130, 158, 15, and 12) are added to the 12th AG G-1 losses to account for changes in the cumulative casualties. They are also broken down using the Battle/Non-Battle Casualty Percentages. On the following days the indicated number of RTDs should be considered personnel returning from previously "unaccounted for" status and not returnees from medical facilities. These numbers are estimated from decreases in cumulative casualties.

- 22 Dec	227 RTDs
- 23 Dec	28 RTDs
- 29 Dec	18 RTDs
- 30 Dec	24 RTDs
- 14 Jan	9 RTDs

Reinforcements are in general estimated using positive deltas and are broken down into replacements/RTDs using the Replacement/RTD Percentage.

Since the 99th ID's combat support units suffered higher than average casualties in the initial German attacks, the average of the MOS loss percentages of the 2d and 99th IDs are used as the 99th ID's MOS loss percentages. (These percentages are from Box 3412, 205-0.13 to 205-1.12, V Corps G-1 After Action Report for January 1945, page 6, and are the same ones used for the 28th ID.) RTD MOS strengths are from the MOS RTD Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for the 99th ID. Note that the MOS Casualty Averages are used to estimate the division's 15 December MOS strengths,

and that the loss percentages of the 2d and 99th IDs described above are not used because they would incorrectly reflect high non-infantry MOS losses sustained by the 99th ID after 16 December.

102d ID

Along with the 30th ID, the 102d ID is the US division for which the most detailed daily personnel data is available during the period 16 December 1944-16 January 1945. Its detail matches that of the 30th ID with one exception. Replacements and RTDs are not given by MOS categories. This missing data is estimated by comparing the on-hand strengths of the MOS categories and the daily casualties by MOS categories to determine how many personnel of a particular MOS were assigned on each day. Aside from this estimation, all data is obtained from Boxes 14454 and 14455, 3102-1, from which the "Daily G-1 Summary: Daily Losses and Gains and Estimate of Assigned Strength" is taken. In addition to this document, there are numerous other reports and personnel casualty analyses for the 102d ID during the Ardennes Campaign, making it one of the most thoroughly documented divisions involved in the operation. Unfortunately, its participation was only limited as it served under the US Ninth Army north of the main battle area.

104th ID

All data shown on the original RTD Tracking Program Printouts for the 104th ID is from the 12th AG G-1s. Upon examination it was determined that the replacements include only replacements and that the deltas with positive values are likely RTDs. On 3 and 7 January the replacement figures are changed by subtracting out the negative deltas (-13 and -27). Otherwise, no changes are made to the 12th AG G-1 figures.

MOS loss percentages from C5154, 585.099 to 585.104, which includes the document "Annex #3 - Report # 1: CONSOLIDATED CASUALTY REPORT 104TH INFANTRY DIVISION, Casualties reported for period covering: 1 Dec 44 thru 31 Dec 44," are used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. The MOS RTD Averages are used for RTD MOS strengths. Replacement MOS strengths are from the FUSA MOS Replacement Averages for the 104th ID.

106th ID

The initial German attacks of the Ardennes Campaign inflicted severe losses on the 106th ID, destroying two infantry regiments. The data recorded in the 12th AG G-1s reflects the confusion and destruction of the division in the first German attacks. For example, it is not until 24 December, four days after the catastrophic losses suffered by the division by 20 December, that the 12th AG G-1s record the total on-hand personnel strength of the division as approximately one-third of the authorized strength of an infantry division, i.e., 4,586 personnel. Casualties recorded in the 12th AG G-1s on the critical days of the offensive, 16-20 December, are obviously estimates and, upon examination of the division's activities during those days, unquestionably too low.

The period for which the 106th ID 12th AG G-1 data required the least revision is 1-16 January 1945. For data pertaining to this period, the daily deltas with positive values are considered reinforcements. They are broken down into replacements and RTDs using the Replacement/RTD Percentage. On 16 January the 170 RTDs should be considered personnel who were previously in "unaccounted for" status, and not returnees from medical treatment. Other changes made during the period 1-16 January are the addition of 607 and 172 casualties on 14 and 15 January respectively to account for changes in the cumulative casualties. These are without question casualties which had been sustained in the division's December activities but which were not accounted for until mid-January. They are broken down into killed, wounded, captured/missing using the Battle/Non-Battle Casualty Percentages. Reinforcement and RTD MOS strengths are calculated for January (and December) using the FUSA MOS Replacement Averages for the 106th ID, with the averages modified by taking the average of the Other MOS and adding it to the Infantry MOS average. Casualties in the MOS categories for January are calculated using the MOS Casualty Averages, with the averages modified by taking the average of the Armor (CVC) MOS and adding it to the Infantry MOS average. Adding the averages of the Other and Armor MOS categories to Infantry MOS is done because the 106th ID was likely sustaining the majority of its casualties in Infantry personnel in January, and receiving the same after its catastrophic losses in mid-December.

The following description of the estimation of personnel data for the 106th ID during the period 16-31 December is presented in general terms, because the exact process used to estimate the numbers was complicated and underwent several revisions. The final numbers are intended to represent an approximation of the actual divisional personnel experience. Any attempt to recreate exactly the historical personnel strengths and losses would of course be impossible.

The main consideration in estimating the 106th ID's personnel experience is to replicate the heavy losses suffered during the 16-20 December period. To this end, the description on pages 166-170 of Hugh Cole's book (Cole, Hugh M. The Ardennes: Battle of the Bulge. United States Army in World War II: The European Theater of Operations. Washington, D.C.: USGPO, 1965.) serves as the primary reference for the description of the organic divisional losses suffered by the division up to 20 December. These units included:

- 589th Field Artillery Battalion (elements)	312 casualties
- 590th Field Artillery Battalion	502 casualties
- B/81st Engineer Battalion (+)	432 casualties
- B/331st Medical Battalion	98 casualties
- 106th Recon Troop (Mechanized)	133 casualties
- 422d Infantry Regiment	3092 casualties
- 423d Infantry Regiment	3058 casualties

TOTAL: 7627

Estimated casualties incurred by the units in the surrender of 20 December are listed after the unit identification.

These estimates and estimated losses on other days during December are derived from strengths and losses recorded in documents of the division and organic divisional units including the 106th ID's divisional artillery, the 422d Infantry Regiment, and the 424th Infantry Regiment. For example, see the following sources:

- Box 14745, 3106 ART-0.1 to 0.3.
- "Memo to: Former Members of the 422d Inf:" from Lieutenant Colonel Joseph C. Matthews, Jr., former regt'l exec officer of the 422d Infantry, dated 25 September 1945.
- Box 14733, 3106 INF(424)-0.1 to 0.3
- General Orders No. 51, Headquarters 106th Infantry Division, "Award of Combat Infantryman Badge (Posthumous), (MIA), (POW)," dated 31 July 1945.
- Headquarters 106th Infantry Division, "Action Against Enemy, Report After," dated 27 January 1945.

Total on-hand personnel strengths are generated by using the estimated daily gains and losses. MOS strengths are calculated without any of the Calculation Programs, and instead are hand calculated using the MOS categories of the destroyed organic divisional units. Finally, the 1 January personnel strengths (total and by MOS categories) comes from the 27 January 1945 report listed above. All personnel strengths after 1 January are

from the 12th AG G-1s.

2d AD (Armored Division)

All personnel and casualty data shown on the original RTD Tracking Program Printout comes from the 12th AG G-1s. Reinforcement data, available only for December 1944, comes from the same source and Box 3839, 207-1.8 to 207-1.16, which includes daily VII Corps Estimated Loss Reports. Reinforcements are recorded under replacements, as there is no differentiation between replacements and RTDs. There is no data on daily reinforcements for 1-16 January 1945.

For January, the deltas with positive values are assumed to be the total reinforcements, and are broken down into replacements/RTDs using the Replacement/RTD Percentage. This percentage is also used for reinforcements received during the period 16-21 December. Positive deltas for 24-28 December are assumed to be RTDs. On 2, 6, and 16 January, increases in the 2d AD's cumulative casualties of 24, 8, and 63 respectively are added in to the daily casualties on those days. These are broken down into killed, wounded, captured/missing, and DNBI using the Battle/Non-Battle Casualty Percentages.

As no specific data was found for 2d AD MOS losses, the MOS Casualty Averages are used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths also use the MOS Casualty Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for the 2d AD. Note that for the 2d AD and several other armored divisions identified later in this paper, the MOS Casualty Averages are used to estimate RTD MOS strengths. This is done because no satisfactory RTD MOS averages could be calculated for armored divisions, and it was assumed that RTD MOS percentages were approximately the same as casualty percentages and could serve as legitimate substitutes.

3d AD

All casualty and on-hand personnel data shown on the original RTD Tracking Program Printout comes from the 12th AG G-1s. Excellent daily replacement/RTD data is available in Box 15061, 603-1.2 to 603-1.13, which includes the 3d AD's daily G-1 Journal with "INCIDENTS, MESSAGES AND ETC." This data is shown on the original RTD Tracking Program Printout.

Considerable manipulation of the 12th AG G-1 and 3d AD G-1 Journal numbers was required. On 22 and 25 December and 9 January additional casualties (88, 65, and 98 respectively) are added to the daily casualties to reflect increases in the cumulative casualties. These numbers are broken down into killed, wounded, captured/missing, and DNBI using the Battle/Non-Battle Casualty Percentages. On 19 December, the calculated on-hand personnel strength is used instead of the actual strength due to the extremely high deltas on 19 and 20 December (-1,135 and 1,118) which represent the exclusion of the personnel of organic divisional units in the 12th AG G-1 figures on 19 December. On 23-24 December; 28-29 December; and 2-3 January; the RTDs of the former days are shifted to the latter days to reduce the negative deltas on the latter days. On other days where deltas with positive values exist, additional RTDs are added into the daily RTD figures (i.e., 18, 21, 27, and 31 December, and 4, 5, 14, and 15 January). These RTDs represent personnel returning from previously "unaccounted for" status and not returnees from medical treatment. Finally, on 24 December, the total number of casualties is reduced from 510 to 85, the latter figure coming from Box 3839, 207-1.8 to 207-1.16, which includes daily VII Corps Estimated Loss Reports. This change helps to reduce the high delta (544) on 24 December.

As no specific data was found for 3d AD MOS losses, the MOS Casualty Averages are used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths and replacement MOS strengths are from Box 15061, 603-1.2 to 603-1.13, which includes the 3d AD's daily G-1 Journal with "INCIDENTS, MESSAGES AND ETC."

4th AD

All data shown in the original RTD Tracking Program Printout is from the 12th AG G-1s. On 2-4 January, the on-hand personnel strength are substituted with the calculated strengths to eliminate the deltas on 2 and 5 January (60 and -60 respectively), which may represent a small body of non-divisional personnel counted in the 12th AG G-1s with the division from 2-4 January. The total reinforcements shown under replacements are split into replacements/RTDs using the Replacement/RTD Percentage. Finally, on 23 December and 13 January additional RTDs (155 and 71) are added to the daily RTDs to reflect reductions in the cumulative casualties. These RTDs therefore represent personnel in previously "unaccounted for" status and not returnees from medical treatment.

As no specific data was found for 4th AD MOS losses, the MOS Casualty Averages are used to estimate the division's 20 December start MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths also use the MOS Casualty Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for all armored divisions.

5th AD

All on-hand personnel and casualty data shown in the original RTD Tracking Program Printout is from the 12th AG G-1s. The only available reinforcement data, for 17-20 December, is from Box 3839, 207-1.8 to 207-1.16, which includes daily VII Corps Estimated Loss Reports.

On 22 December the calculated on-hand personnel strength is substituted for the 12th AG G-1 figures, eliminating the high deltas (1,246 and -1,214) on 22 and 23 December. Upon examination of the 12th AG G-1 figures, it is apparent that approximately 1,200 personnel of another division were counted with the 5th AD in the 12th AG G-1s on 22 December. On 20 and 21 December an additional 82 and 209 RTDs are added to the daily figures to reflect changes in the cumulative casualties. These additional RTDs are personnel who were in previously "unaccounted for" status and not returnees from medical treatment. Finally, all reinforcements for the period 21 December-16 January are estimated using the positive deltas, and split into replacements/RTDs using the Replacement/RTD Percentage.

As no specific data was found for 5th AD MOS losses, the MOS Casualty Averages are used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths also use the MOS Casualty Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for the 5th AD.

6th AD

All on-hand personnel and casualty data shown on the original RTD Tracking Program Printouts comes from the 12th AG G-1s. This is also the source for the 1-16 January reinforcements, all recorded under replacements. Replacements and RTDs for 26-31 December are from Box 15416, 606-1 to 606-1.7, which includes a table titled "Replacements Received during December 1944," dated 31 December 1944. Reinforcements recorded for the period 1-16 January are split into replacements/RTDs using the Replacement/RTD Percentage. Note that the 31 reinforcements received on 6 January appear, upon examination, to have been picked up on 7 January and so are shifted to the latter date.

As no specific data was found for 6th AD MOS losses, the MOS Casualty Averages are used to estimate the division's 26 December MOS start strengths and in the MOS Casualty Calculation Program. RTD MOS strengths also use the MOS Casualty Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for all armored divisions.

7th AD

All on-hand personnel and casualty data on the original RTD Tracking Program Printout is from the 12th AG G-1s. The replacements/RTDs are from Box 15546, 607-0.12 to 607-1.2, which includes pages 131-173 of the 7th AD's daily G-1 Journal. Upon examination of the replacement/RTD data, it was determined that this data includes all reinforcements for the period 17 December-8 January, and breaks down replacements/RTDs only on 16 December and 9-16 January.

From 20 to 30 December, the daily on-hand personnel strengths are changed and estimated by the daily gains and losses of the 7th AD. On 25 and 26 December additional casualties of 357 and 128 respectively are added to the daily casualties to reflect changes in the cumulative casualties. They unquestionably are personnel lost in earlier fighting at St. Vith but not accounted for until several days after the action. They are broken down into killed, wounded, captured/missing, and DNBI using the Battle/Non-Battle Casualty Percentages. Late reporting by the division and the 12th Army Group is also evident in the changes in cumulative casualties on 28 December which are represented by 359 RTDs added on that day. These are personnel in previously "unaccounted for" status and not returnees from medical treatment. Finally, all daily reinforcements from 29 December to 16 January are shifted to the subsequent days. This is done because the 7th AD records (Box 15546) and the 12th AG G-1s are apparently one day off on those dates. The reinforcements are broken down into replacements/RTDs using the percentage derived from data found Box 15546, 607-0.12 to 607-1.2.

Data on 7th AD MOS losses found in Box 15546 is used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths are estimated using RTD MOS data from the same source (for the division's RTD experience on 9-16 January), and replacement MOS strengths are from the averages of the 7th AD's 9-16 January replacement experience (Box 15546) and the FUSA MOS Replacement Averages for the 7th AD.

9th AD

All data shown on the original RTD Tracking Program Printout is from the 12th AG G-1s. Upon comparison with data in Box 15776, 609-1.2 to 609-1.6, which includes daily 9th AD ELRs (estimated loss reports) and BCR (battle casualty reports) and miscellaneous reports and tables with personnel data, it was decided to use selected data from these reports to substitute for the 12th AG G-1 reinforcement data and then to generate daily on-hand personnel strengths using net daily gains and losses. Two sources from Box 15776, one produced by the "HEADQUARTERS, 9TH ARMORED DIVISION," dated 1 February 1945 and titled "Gains for January 1945", the other titled "ESTIMATED LOSS REPORT" and recorded on a daily basis for 16-29 December 1944, are used for selected personnel reinforcement data, particularly on 27-28 December and 14 and 16 January. On 26 December an additional 706 casualties are added to the daily casualties to reflect changes in the cumulative casualties. These are most likely personnel lost in previous days' combat but not recorded until 26 December.

Data on 9th AD MOS RTDs by organic divisional unit found on the table "CONSOLIDATED FR (sic) BCR REPORTS TO INCLUDE 16 JANUARY 1945" (Box 15776) is used to estimate the division's RTD strengths. Data from two tables in Box 15776, "LOSSES FOR DECEMBER 1944 BY TYPE AND UNIT" and "LOSSES FOR JANUARY 1945 BY TYPE AND UNIT" is used to estimate the 9th AD's 15 December MOS strengths and in the MOS Casualty Calculation Program. Replacement MOS strengths are from the FUSA MOS Replacement Averages for the 9th AD.

10th AD

All data shown in the original RTD Tracking Program Printout is from the 12th AG G-1s. Note that all reinforcements are recorded under replacements. These are divided into replacements/RTDs using the Replacement/RTD Percentage. On 20 December 177 additional RTDs are added. These reflect changes in the cumulative casualties and represent personnel who were in a previously "unaccounted for" status and not returnees from medical treatment. On 22, 23, and 26 December, additional casualties (212, 194, and 200) are added to the daily casualties to reflect changes in the cumulative casualties. Finally, on 21 December the on-hand personnel strength is changed to the calculated strength to eliminate the high deltas (-1,466 and 1,254) on 21 and 22 December caused by the failure of the 12th AG G-1s to record the personnel of a 1,200- or 1,300-man organic divisional unit on 21 December (probably Combat Command B in Bastogne).

As no specific data was found for 10th AD MOS losses, the MOS Casualty Averages are used to estimate the division's 15 December MOS strengths and in the MOS Casualty Calculation Program. RTD MOS strengths also use the MOS Casualty Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for all armored divisions.

11th AD

All data shown on the original RTD Tracking Program Printout is from the 12th AG G-1s. On-hand personnel strengths on 30 and 31 December are changed to reduce the deltas on 30 December-1 January. On-hand personnel strengths are also increased by 119 on 13-16 January because the 12th AG G-1s evidently stopped recording the strength of one tank company (119 personnel) on 13 January (note the delta of -119 on 13 January). On 2, 4, 5, 10, and 16 January, the daily casualties are increased by 7, 155, 97, 53, and 19 respectively to reflect changes in the cumulative casualties. The reinforcements recorded in the 12th AG G-1s are not divided into replacements and RTDs because the Ardennes Campaign was the 11th AD's first combat operation and it probably did not receive many returnees from medical treatment during this period.

As no specific data was found for 11th AD MOS losses, the MOS Casualty Averages are used to estimate the division's 25 December MOS start strengths and in the MOS Casualty Calculation Program. RTD MOS strengths also use the MOS Casualty Averages, and replacement MOS strengths are from the FUSA MOS Replacement Averages for all armored divisions.

17th AbnD (Airborne Division)

All personnel data for the 17th AbnD is from Box 7617, 317-1 to 317-1.12, which includes the daily "ESTIMATED LOSS REPORT" of the division for the period 4-16 January. This data, like that of the 30th ID, is recorded without any modifications. Note that this is the only division for which effective personnel strength is recorded. This fact may help explain large deltas on 6, 7, and 11 January of -594, -159, and 203. These may be the result of the change of status of large bodies of personnel from combat effective to non-effective or vice versa who are not recorded as casualties, replacements, or RTDs. Also note that replacements and RTDs are not broken down but rather are all recorded under replacements. The "ESTIMATED LOSS REPORT" groups them together. Since the Ardennes Campaign was the 17th AbnD's first combat action, it probably received few returnees from medical treatment by mid-January 1945.

82d AbnD

The key to understanding the estimation process used for the 82d AbnD's personnel data are three daily "ESTIMATED CASUALTY REPORT[S]," for 2, 3, and 4 January taken from 82d AbnD G-3 records, found in Box 12408, 382-3.3. These reports give estimated daily effective strengths and cumulative casualties of the division's glider and parachute infantry regiments, plus those of the division's organic combat support elements, including artillery, engineer, medical, signal, and other personnel. Note that the data recorded for the 82d AbnD is for the division with the 325th Glider and 504th, 505th, and 508th Parachute Infantry Regiments. The other airborne infantry units described in Box 12408 are considered non-divisional units.

In general, the approach used to estimate the daily on-hand personnel strengths of the 82d AbnD is to work backwards and forwards from the benchmark data of 2-4 January to derive strengths during the periods 19 December-1 January and 5-16 January, principally by generating the daily strengths using net daily gains and losses. The net losses of course are the casualties. All casualty data for the 82 AbnD is derived from the 12th AG G-1s, except for casualties on 3 and 4 January which are calculated using the cumulatives in Box 12408. The net gains are the reinforcements (replacements/RTDs) which are estimated in the following manner. First, the replacements in the Infantry MOS category are estimated using data from the 325th Glider Infantry Regiment's S-1 Journal (Box 12448, 382-INF(325)-0 to 382-INF(325)-0.3 and data from Box 12408, described above. A ratio of replacements to casualties for the 325th Regiment was established using data for the period 19 December-11 January found on one page of the regiment's S-1 Journal. This same ratio is applied to the total casualties suffered by the 504th, 505th, and 508th Regiments up to 4 January, as described in Box 12408. Then, the Replacement/RTD Percentage is applied to the total of all four regiment's estimated replacements to estimate the reinforcement/RTD breakdown. These total figures are divided by 23 (the number of days from 19 December to 12 January, excluding 3 and 4 January for which data is available in Box 12408) for an average daily infantry replacement figure of 56 personnel and RTD figure of 31. No reinforcements are assigned to the 82d AbnD after 12 January, although the division may have actually received some after that date. This is because the estimation process described above used cumulative casualties for divisional organic units up to either 4 or 11 January.

Based on the 17th AbnD's reinforcement experience for artillery and engineer MOS categories, percentages are applied to the total artillery and engineer MOS losses to arrive at total artillery and engineer reinforcements. (The source of the percentages used as MOS casualty percentages, employed in determining the total number of 82d AbnD artillery and engineer

losses, is described below.) The total artillery and engineer reinforcements are split into replacements/RTDs using the Replacement/RTD Percentages. Estimated cumulative artillery replacements/RTDs are 12/7, and estimated engineer replacements/RTDs are 6/3 for the 82d AbnD. These are distributed at random on a daily basis and added to the daily infantry replacements/RTDs to arrive at total daily net personnel gains.

The cumulative MOS casualty percentages as of 4 January (Box 12408) are used as the percentage in the MOS Casualty Calculation Program. Thus, using these percentages and the total casualties, it is possible to estimate total losses by MOS categories, as used for artillery and engineer MOS reinforcement estimation described above.

To estimate the start MOS strengths of the division on 19 January, the MOS strengths as of 2 January are taken and to them subtracted and added the total daily gains and losses in the categories for the period 20 December-2 January.

101st AbnD

All daily casualty and reinforcement data for the 101st AbnD is taken from the 12th AG G-1s. The reinforcements are broken down into replacements/RTDs using a percentage for the 506th Parachute Infantry Regiment (Box 14438, 3101-INF(506)-0.3, including "ANNEX NO. 4: Effective Strength, Casualty, and Prisoner Report," dated 29 January 1945). The start strength of the division (total on-hand personnel and by MOS categories) comes from an untitled chart with officer and enlisted personnel strengths of organic divisional units on three unspecified dates (Box 14339, 3101-1 to 3101-1.5, 101st Airborne Division G-1 files). These dates are probably around the beginning of December, on 21 December, and on 15 January. The personnel data for the beginning of December matches identically that found on an undated table with "Present for Duty" strengths of organic divisional units, also from Box 14339. These figures are used as the 101st AbnD's total and MOS start strengths. Note that the personnel of the 463d Parachute Field Artillery Battalion are included with the division's strengths, as are those of the 327th Glider and 501st, 502d, and 506th Parachute Infantry Regiments, plus the 1st Battalion/401st Glider Infantry Regiment.

Daily personnel strengths are calculated using the start strength as a benchmark and adding and subtracting net daily gains and losses of the subsequent days. The MOS casualty percentages are taken from a 14 January 1945 table titled "Estimated Loss Report as of 2400--14 January 1945." Reinforcement MOS percentages are estimated using the ratio of reinforcements to losses of the 17th AbnD. An estimated total 54 artillery and 22 engineer reinforcements are calculated. These are all assigned to the division on 1 January. No reinforcements are assumed to have been received by the 101st AbnD during the period 21-28 December, except 9 medical personnel who were transported by air to the surrounded division on 26 December.

Cole, Ardennes, page 461, reports that the medical company of the 101st Airborne Division was destroyed by the Germans on the night of 19 December. These losses are reflected by manually adjusting casualties and taking the 133 captured/missing reported in the 12th AG G-1s on 22 December and assigning them on 19 December. Personnel in the medical MOS category of the division are reduced accordingly on subsequent days.

It is important to note that the estimated personnel figures for the 101st AbnD include all personnel assigned to the division plus additional non-organic elements such as the 463d Parachute Field Artillery Battalion. The composition of the 101st AbnD is described in Box 14339. Some of these personnel, particularly service support personnel, were not with the division when it was cut off in Bastogne. For these reasons, the estimated personnel data may not match that provided in other sources found in

research. Much of the data in the various sources is contradictory or fragmentary. The estimated figures provided here represent the entire division, plus additional units as shown in the untitled chart with officer and enlisted personnel strengths of organic divisional units on three unspecified dates (Box 14339).

Attachment 1

MOS Start Calculation Program

The MOS Start Calculation Program calculates the MOS start strengths of a division using MOS attrition percentages, authorized (Table of Organization and Equipment) MOS strengths for a US infantry or armored division, and the actual total on-hand strength of a division on the day when it is first recorded in the ACSDB. The program is used for divisions for which no historical data on MOS start strengths is available in the records.

The program uses the difference between the actual and the authorized strengths and applies MOS attrition percentages to the difference. (MOS attrition percentages are derived from data specific to a division, or from averages of historical data, as indicated in the individual divisional narratives.) The resulting figures are then subtracted from or added to the authorized MOS strengths to get estimated MOS strengths entered into the ACSDB.

The following example illustrates application of the MOS Start Calculation Program:

AUTHORIZED INFANTRY DIVISION PERSONNEL STRENGTHS:

ARMOR:	149
INFANTRY:	9621
ARTILLERY:	2170
MAINTENANCE:	147
MEDICAL:	444
SUPPLY:	186
ENGINEER:	637
OTHER:	689
TOTAL:	14043

ACTUAL TOTAL PERSONNEL STRENGTH OF EXAMPLE

INF DIV:	13592
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DIFFERENCE BETWEEN TOTAL AUTHORIZED AND ACTUAL STRENGTHS:	-451
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MOS ATTRITION PERCENTAGES (APPLIED TO DIFFERENCE)
(ESTIMATED MOS START STRENGTH):

ARMOR:	0.5%	(-2)	(147)
INFANTRY:	91.5%	(-413)	(9208)
ARTILLERY:	3.0%	(-14)	(2156)
MAINTENANCE:	0.1%	(0)	(147)
MEDICAL:	0.6%	(-3)	(441)
SUPPLY:	0.1%	(0)	(186)
ENGINEER:	3.2%	(-14)	(623)
OTHER:	1.0%	(-5)	(684)

TOTAL: (13592)

On 15 December 1944, most US divisions were below authorized personnel strength. Some, however, were above authorized strength. In these cases, if the historical start MOS strengths are not available in the records, then the positive values which result from application of the MOS attrition percentages are added to the authorized MOS strengths.

Attachment 2

MOS Replacement Calculation Program/ MOS RTD (Return to Duty Calculation) Program

The MOS Replacement and RTD Calculation Programs are used to estimate the daily MOS replacement/RTD strengths of divisions for which historical data is not available in the divisions' records. The programs take the daily aggregate replacement or RTD strengths and break them down into component MOS strengths using percentages derived from data specific to a division or averages of historical data. The calculations used to generate the component MOS strengths are similar to those used in the MOS Start Calculation Program to break down the difference between authorized and actual strengths (see Attachment 1).

Attachment 3

MOS Casualty Calculation Program

Once MOS start strengths and MOS replacement/RTD strengths have been determined using historical data or the processes described in Attachments 1 and 2, the MOS Casualty Calculation Program is initiated to determine daily losses by MOS categories and daily on-hand strengths by MOS categories. The MOS Casualty Calculation Program takes the start MOS strengths and adds to them the net gains of the MOS categories (replacements and RTDs and subtracts from them the net losses (battle and non-battle casualties) of the first day to estimate the next day's MOS strengths. This process is then repeated on a daily basis to estimate the MOS strengths on subsequent days.

MOS casualty percentages are determined using data specific to division or from historical averages.

Attachment 4

FUSA MOS Replacement Averages

The US First Army After Action Report for December 1944 contains a chart titled "'REINFORCEMENTS ASSIGNED TO UNITS' Period: 1 December 1944 to 31 December 1944 Inclusive." This document was obtained from microfilm records at the Office of Air Force History, Bolling Air Force Base, Washington, D.C. It is on Microfilm Roll C5133, 585.01, Frames 1081-1082.

In US Army World War II usage the term "reinforcements" usually, but not always, denotes replacements and returns to duty. It is assumed that in the chart in the US First Army After Action Report described above, reinforcements are replacements only. The basis for this assumption is a comparison between two tables found in Appendixes 1 and 2 of Annex 1 (pages 62-73) of First United States Army, Report of Operations, 1 August 1944-22 February 1945. (The titles of the tables are: "REINFORCEMENTS REQUISITIONED, Period: 1 August 1944 to 22 February 1945, inclusive" and "REINFORCEMENTS ASSIGNED TO UNITS, Period: 1 August 1944 to 22 February 1945 inclusive." Comparison between these two tables show that overall 75.14% of the requisitions were for infantry, while 76.46% of the "reinforcements" received were infantry. These tables appear to have been compiled from the same data used in the chart in the US First Army After Action Report for December 1944. As the 1 August 1944 to 22 February 1945 tables are intended to demonstrate what "reinforcements" were requisitioned compared to what were received, it is most likely that the US First Army After Action Report chart does not include returns to duty.

The US First Army After Action Report chart lists reinforcements received by 19 divisions, by "Corps Units," and by "Army Troops." There are 19 categories of personnel types. The personnel type categories and their ACSDB MOS category equivalents are listed at the end this attachment.

In the individual divisional narratives of this paper, the "FUSA MOS Replacement Averages" for specific divisions or for "infantry divisions" or "armored divisions" are referenced. When specific data is available for a division, as shown in the next section of this attachment, it is used in the MOS Replacement Calculation Program. If no specific data is available for a unit, the average data for "all infantry divisions" or "all armored divisions" is used. The average data is calculated for infantry divisions using the data of the 14 infantry and airborne divisions, and for armored divisions using the data of the 5 armored divisions, as shown in the next section of this attachment.

MOS Reinforcement (Replacement) Percentages
 Derived from US First Army
 After Action Report for December 1944

	<u>Number</u>	<u>Percent</u>
1st ID		
CVC	5	0.2
Inf	2465	93.2
Arty	90	3.4
Maint	2	0.1
Med	1	0.0
Trans	0	0.0
Sup	5	0.2
Eng	71	2.7
Other	6	0.2

Total Reinforcements = 2,645

2d ID		
CVC	4	0.2
Inf	2127	95.5
Arty	34	1.5
Maint	19	0.9
Med	0	0.0
Trans	0	0.0
Sup	2	0.1
Eng	31	1.4
Other	10	0.4

Total Reinforcements = 2,227

4th ID		
CVC	12	1.3
Inf	754	78.8
Arty	69	7.2
Maint	3	0.3
Med	75	7.8
Trans	0	0.0
Sup	7	0.7
Eng	30	3.1
Other	7	0.7

Total Reinforcements = 957

8th ID		
CVC	2	0.1
Inf	1882	92.1
Arty	42	2.1
Maint	0	0.0
Med	39	1.9
Trans	0	0.0
Sup	1	0.0
Eng	18	0.9
Other	60*	2.9

Total Reinforcements = 2,044

* Number modified to match totals

9th ID		
CVC	2	0.1
Inf	1370	91.2
Arty	46	3.1
Maint	1	0.0
Med	39	2.6
Trans	0	0.0
Sup	4	0.3
Eng	32	2.1
Other	9	0.6

Total Reinforcements = 1,503

28th ID		
CVC	1	0.1
Inf	937	88.9
Arty	53	5.0
Maint	1	0.1
Med	11	1.0
Trans	0	0.0
Sup	1	0.1
Eng	15	1.4
Other	35	3.3

Total Reinforcements = 1,054

75th ID		
CVC	0	0.0
Inf	246	97.6
Arty	0	0.0
Maint	0	0.0
Med	0	0.0
Trans	0	0.0
Sup	0	0.0
Eng	1	0.4
Other	5	2.0

Total Reinforcements = 252

78th ID		
CVC	1	1.6
Inf	21	34.4
Arty	28	45.9
Maint	0	0.0
Med	3	4.9
Trans	0	0.0
Sup	2	3.3
Eng	6	9.8
Other	0	0.0

Total Reinforcements = 61

83d ID		
CVC	2	0.1
Inf	1980	94.5
Arty	56	2.7
Maint	0	0.0
Med	21	1.0
Trans	0	0.0
Sup	1	0.0
Eng	22	1.1
Other	13	0.6

Total Reinforcements = 2,095

84th ID		
CVC	0	0.0
Inf	1427	97.4
Arty	20	1.4
Maint	0	0.0
Med	3	0.2
Trans	0	0.0
Sup	0	0.0
Eng	14	1.0
Other	1	0.1

Total Reinforcements = 1,465

99th ID		
CVC	1	0.3
Inf	260	67.5
Arty	32	8.3
Maint	2	0.5
Med	23	6.0
Trans	0	0.0
Sup	5	1.3
Eng	31	8.1
Other	31	8.1

Total Reinforcements = 385

104th ID		
CVC	4	0.4
Inf	969	88.7
Arty	21	1.9
Maint	0	0.0
Med	76	7.0
Trans	0	0.0
Sup	1	0.1
Eng	18	1.6
Other	4	0.4

Total Reinforcements = 1,093

106th ID

CVC	2	0.3
Inf	571	82.5
Arty	56	8.1
Maint	2	0.3
Med	5	0.7
Trans	0	0.0
Sup	1	0.1
Eng	0	0.0
Other	55	7.9

Total Reinforcements = 692

82d AbnD

CVC	0	0.0
Inf	34	64.2
Arty	1	1.9
Maint	0	0.0
Med	0	0.0
Trans	0	0.0
Sup	0	0.0
Eng	7	13.2
Other	11	20.8

Total Reinforcements = 53

2d AD

CVC	109	37.2
Inf	157	53.6
Arty	14	4.8
Maint	1	0.3
Med	3	1.0
Trans	0	0.0
Sup	0	0.0
Eng	7	2.4
Other	2	0.7

Total Reinforcements = 293

3d AD

CVC	236	29.6
Inf	427	53.6
Arty	40	5.0
Maint	0	0.0
Med	15	1.9
Trans	0	0.0
Sup	0	0.0
Eng	20	2.5
Other	58	7.3

Total Reinforcements = 796

5th AD

CVC	323	24.1
Inf	892	66.4
Arty	27	2.0
Maint	4	0.3
Med	27	2.0
Trans	0	0.0
Sup	0	0.0
Eng	67	5.0
Other	3	0.2

Total Reinforcements = 1,343

7th AD

CVC	62	11.2
Inf	461	83.1
Arty	3	0.5
Maint	4	0.7
Med	3	0.5
Trans	0	0.0
Sup	0	0.0
Eng	9	1.6
Other	13*	2.3

Total Reinforcements = 555

* Number modified to match totals

9th AD		
CVC	20	16.7
Inf	95	79.2
Arty	1	0.8
Maint	2	1.7
Med	1	0.8
Trans	0	0.0
Sup	0	0.0
Eng	1	0.8
Other	0	0.0

Total Reinforcements = 120

TOTALS FOR US FIRST ARMY DIVISIONS IN DEC 1944

These totals are calculated by adding the above-listed figures.

Infantry Divisions -- including 82d AbnD ("FUSA MOS Replacement Averages for all infantry divisions"):

	<u>TOTAL NUMBER</u>	<u>PERCENT</u>
CVC	36	0.2
Inf	15043	91.0
Arty	548	3.3
Maint	30	0.2
Med	296	1.8
Trans	0	0.0
Sup	30	0.2
Eng	296	1.8
Other	247	1.5
Total	16526	100.0

Armored Divisions: ("FUSA MOS Replacement Averages for all armored divisions"):

	<u>TOTAL NUMBER</u>	<u>PERCENT</u>
CVC	750	24.1
Inf	2032	65.4
Arty	85	2.7
Maint	11	0.4
Med	49	1.6
Trans	0	0.0
Sup	0	0.0
Eng	104	3.3
Other	76	2.4
Total	3107	99.9

Category in US First Army <u>AA Report</u>	<u>Definition</u>	MOS Category in <u>ACSDB</u>
AF	Armored Forces	Armor (CVC)
AG	Adjutant General's Corps	Other
ANC	Army Nurse Corps	Other
BI	Battle(field) Intelligence?	Other
CAC	Coast Artillery Corps	Other
CAV	Cavalry	Armor (CVC)
CE	Combat Engineer	Engineer
ChC	Chaplain Corps	Other
CMP	Corps of Military Police	Other
CWS	Chemical Warfare Service	Artillery
FA	Field Artillery	Artillery
INF	Infantry	Infantry
JA	Judge Advocate	Other
MAC	Medical Administrative Corps	Other
MC	Medical Corps	Medical
ORD	Ordnance Corps	Maintenance
QMC	Quartermaster Corps	Supply
SC	Signal Corps	Other
TD	Tank Destroyer	Armor (CVC)

CVC = combat vehicle crewman. Towed and self-propelled tank destroyer unit replacements for US forces are both counted as Armor (CVC), since there is no way to differentiate between the two in the First Army After Action Report. This distinction is not made for US replacements, even though towed tank destroyer personnel are otherwise considered Artillery in the ACSDB.

Attachment 5

MOS RTD (Return to Duty) Averages

The following tables contain data derived from primary sources. The data shown is for return to duty personnel by MOS categories for armored divisions and infantry divisions. The calculated average percentages are the so-called "MOS RTD Averages" referenced in the individual divisional narratives in a previous section of this paper. The sources for this data are listed at the end of this attachment.

ARMORED DIVISIONS

	9th AD	7th AD	3d AD	Totals	Average Percents
Armor	15	93	286	394	43.1%
Infantry	18	113	210	341	37.3%
Artillery	2	9	66	77	8.4%
Maintenance	1	0	7	8	0.9%
Medical	0	4	6	10	1.1%
Transportation	0	0	0	0	0.0%
Supply	0	0	1	1	0.1%
Engineer	5	3	29	37	4.0%
Other	2	7	37	<u>46</u>	<u>5.0%</u>
TOTALS	43	229	642	914	99.9%

9th AD data is for 16 December 1944-16 January 1945

7th AD data is for 9-16 January 1945

3d AD data is for 16 December 1944-16 January 1945

INFANTRY DIVISIONS

	5th ID	78th ID	29th ID	30th ID	Totals	Average Percents
Armor	5	2	0	4	11	0.4%
Inf	770	179	361	969	2279	89.3%
Arty	55	28	9	10	102	4.0%
Maint	3	1	0	0	4	0.2%
Med	21	4	0	2	27	1.1%
Trans	0	0	0	0	0	0.0%
Supply	3	0	0	4	7	0.3%
Engr	23	6	13	54	96	3.8%
Other	9	2	4	10	<u>25</u>	<u>1.0%</u>
TOTALS	889	222	387	1053	2551	100.1%

5th ID data is for 16 December 1944-16 January 1945
78th ID data is for December 1944 and January 1945
29th ID data is for January 45
30th ID data is for 16 December 1944-16 January 1945

SOURCES FOR RTD DATA RECORDED IN ATTACHMENT 5 TABLES

5th ID: Box 6746, 305-1.3, 5th Infantry Division G-1 Journal.
29th ID: C5137, 585.020-585.03, including document titled
"Headquarters, 29th Infantry Division, Battle Casualties
Occuring in January 1945."
30th ID: Box 8735, 330-1.2, including Daily Estimated Loss
Reports.
78th ID: C5145, 585.075 to 585.08, including two tables on
reinforcements received during December 1944 and January
1945.
3d AD: Box 15061, 603-1.2, including Daily G-1 Journal.
7th AD: Box 15546, 607-0.12 to 607-1.2, including daily G-1
Journal.
9th AD: Box 15776, 609-1.2 to 609-1.6, including table titled
"CONSOLIDATED FR (sic) BCR REPORTS TO INCLUDE 16 JANUARY
1945."

Attachment 6

MOS Casualty Averages

The following tables contain data derived from primary sources. The data shown is for casualties by MOS categories for armored divisions and infantry divisions. The calculated average percentages are the so-called "MOS Casualty Averages" referenced in the individual divisional narratives in a previous section of this paper. The sources for this data are listed at the end of this attachment.

ARMORED DIVISIONS

	9th AD	7th AD	9th AD Percents	7th AD Percents
Armor	548	528	25.5%	29.0%
Inf	1334	1176	62.2%	64.6%
Arty	144	45	6.7%	2.5%
Maint	6	9	0.3%	0.5%
Med	9	7	0.4%	0.4%
Trans	0	0	0.0%	0.0%
Supply	0	0	0.0%	0.0%
Engr	85	32	4.0%	1.8%
Other	20	24	<u>0.9%</u>	<u>1.3%</u>
TOTALS	2146	1821	100.0%	100.1%

9th AD data is for 16 December 1944-16 January 1945

7th AD data is for 16 December 1944-16 January 1945

After reviewing the above data, it was decided to use the MOS casualty percentages of the 7th AD as the "MOS Casualty Averages" for armored divisions. This decision was made due to the unusually high losses in artillery and engineers for the 9th AD, loss percentages which were judged to be higher than average.

INFANTRY DIVISIONS

	29th ID	102d ID	104th ID	78th ID
Armor	0	1	2	9
Inf	86	196	1238	2969
Arty	1	6	17	97
Maint	0	0	0	0
Med	0	1	1	14
Trans	0	0	0	0
Supply	0	0	0	0
Engr	11	29	38	78
Other	1	3	9	21
TOTALS	99	236	1305	3188

	9th ID	8th ID	102d ID	Totals	Average Percents
	0	26	22	60	0.5%
	338	2258	3962	11047	91.5%
	2	89	151	363	3.0%
	0	6	3	9	0.1%
	0	22	34	72	0.6%
	0	0	0	0	0.0%
	0	2	5	7	0.1%
	30	58	131	375	3.1%
	1	37	67	<u>139</u>	<u>1.2%</u>
TOTAL	371	2498	4375	12072	100.1%

29th ID data is for 1-31 January 1945
 102d ID data is for 1-31 January 1945
 104th ID data is for 1-31 December 1944
 78th ID data is for December 1944 and January 1945
 9th ID data is for 1-31 January 1945
 8th ID data is for December 1944 and January 1945
 102d ID data is for date of unit's entry into combat to 16
 January 1945

SOURCES FOR CASUALTY DATA RECORDED IN ATTACHMENT 6 TABLES

7th AD: Box 15546, 607-0.12 to 607-1.2, including daily G-1 Journal.
 9th AD: Box 15776, 609-1.2 to 609-1.6, including table titled "CONSOLIDATED FR (sic) SCR REPORTS TO INCLUDE 16 JANUARY 1945."

- 8th ID: C5146, 585.08 which includes "G-1 ANNEXES (ANNEX #2 -- PERSONNEL ANNEX) FOR OPERATIONS REPORTS PERIODS 1 DEC 44 TO 31 DEC 44 and 1 JAN 45 TO 31 JAN 45 -- BATTLE and SICK AND NON-BATTLE CASUALTIES."
- 9th ID: C5150, 585.09-1 ("SECTION V -- PERSONNEL," part of a January 1945 divisional report with battle casualties by organic divisional units).
- 78th ID: C5145, 585.075 to 585.08, including data from a January 1945 After Action Report and a chart w/December 1944 casualties by organic divisional unit.
- 102d ID: Boxes 14454 and 14455, 3102-1, including "Cumulative Losses Based on Army Group Figures through 15 January 1945."
- 104th ID: C5154, 585.099 to 585.104, which includes the document "Annex #3 - Report # 1: CONSOLIDATED CASUALTY REPORT 104TH INFANTRY DIVISION, Casualties reported for period covering: 1 Dec 44 thru 31 Dec 44."
- 29th ID and 102 ID: Box 4555, 213-0.3, including Machine Records Unit personnel data for January 1945.

Attachment 7

Replacement/RTD Percentage

One of the shortcomings of the 12th AG G-1s described in the first section of this paper is their failure to differentiate between replacements and RTDs. In order to overcome this shortcoming, an average "replacement/RTD split" was calculated using data from divisions for which the data is available in primary source records. This "split" was then applied to reinforcement (combined replacement/RTD) data for divisions lacking the breakdown. The data used to calculate the so-called "Replacement/RTD Percentage," a term used in the individual divisional narratives, is shown in the following chart. The sources of this data are all described in the individual divisional narratives in a previous section of this paper.

	A	B	C	D	E	F		
RPL	3888	351	548	762	2226	5171		
+RTD	2448	229	642	357	928	2407		
REINF	6336	580	1190	1119	3154	7578		
	G	H	I	J	K	L	Total	Percents
RPL	3282	302	1622	829	759	3366	23106	64.6%
+RTD	222	1293	1001	258	1053	1820	12658	35.4%
REINF	3504	1595	2623	1087	1812	5186	35764	100.0%

- A = 5th ID, December 1944 and January 1945
- B = 7th AD, January 1945
- C = 3d AD, 16 December 1944-16 January 1945
- D = 6th AD, December 1944
- E = 2d ID, 16 December 1944-16 January 1945
- F = 83d ID, December 1944 and January 1945
- G = 78th ID, December 1944 and January 1945
- H = 9th ID, January 1945
- I = 4th ID, January 1945
- J = 102d ID, 16 December 1944-16 January 1945
- K = 30th ID, 16 December 1944-16 January 1945
- L = 1st ID, December 1944 and January 1945

Attachment 8

Battle/Non-Battle Casualty Percentages

For several divisions a breakdown of casualties into killed, wounded, captured/missing, and DNBI was necessary because the casualty data available for divisions did not include such a breakdown. The data used to establish this breakdown comes from the US First Army After Action Report for December 1944 from Office of Air Force History, Bolling Air Force Base, Washington, D.C. It is on Microfilm Roll C5133, 585.01, Frames 1071. Casualty data for the 1st, 2d, 4th, 8th, 9th, 30th, 75th, 78th, 83d, 84th, and 99th IDs is used to generate the percentages. They are as follow:

- Killed	3213	(9.1%)
- Wounded	12608	(35.5%)
- Cap/MIA	5269	(14.8%)
- DNBI	14399	(40.6%)
- TOTALS	35489	(100.0%)

These percentages are also applied to any additional casualties added as a result of increases in the 12th AG G-1 cumulative casualties.

Attachment 9

RTD Tracking Program Printouts

This attachment contains selected RTD Tracking Program Printouts. These are provided to assist in the review of the estimation processes and data changes used to generate the daily personnel data of US divisions in the ACSDB. The first section contains original printouts containing data obtained directly and without any changes from original records. The second section contains final printouts showing the data as it is recorded in the ACSDB.

Original RTD Tracking Program Printouts

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
4th ID	12/16/44	-63	64	1	0	12937	12871	66
4th ID	12/17/44	-824	824	0	0	12216	12113	103
4th ID	12/18/44	-120	120	0	0	12908	12096	812
4th ID	12/19/44	-23	53	30	0	12862	12695	-23
4th IC	12/20/44	-61	61	0	0	12746	12601	-55
4th ID	12/21/44	-53	60	1	0	12618	12687	-69
4th ID	12/22/44	-157	157	0	0	12617	12461	156
4th ID	12/23/44	-145	145	0	0	12495	12472	23
4th ID	12/24/44	-120	120	0	0	12395	12375	20
4th ID	12/25/44	601	49	650	0	12392	12396	-604
4th ID	12/26/44	471	59	530	0	13005	12863	142
4th ID	12/27/44	419	65	464	0	13486	13424	62
4th ID	12/28/44	-161	166	5	0	13843	13325	518
4th IF	12/29/44	-43	43	0	0	13852	13600	52
4th ID	12/30/44	-47	61	14	0	13819	13805	14
4th ID	12/31/44	46	42	88	0	13864	13865	-1
4th ID	01/01/45	-23	27	0	4	14069	13841	228
4th ID	01/02/45	17	55	2	70	13835	14086	-251
4th ID	01/03/45	-34	34	0	0	13818	13801	17
4th ID	01/04/45	-32	44	5	7	13892	13786	106
4th ID	01/05/45	-24	45	0	21	13863	13868	-5
4th ID	01/06/45	34	39	0	73	13897	13897	0
4th ID	01/07/45	-54	54	0	0	13942	13843	99
4th ID	01/08/45	1	53	1	53	13946	13943	3
4th ID	01/09/45	-55	55	0	0	13960	13891	69
4th ID	01/10/45	82	34	0	116	13992	14042	-50
4th ID	01/11/45	13	38	5	46	14099	14005	94
4th ID	01/12/45	-45	45	0	0	14102	14054	48
4th ID	01/13/45	17	31	3	45	14113	14119	-6
4th IC	01/14/45	-67	67	0	0	14135	14046	89
4th IC	01/15/45	-38	38	0	0	14210	14097	113
4th ID	01/16/45	57	43	2	98	14225	14267	-42
TOTALS:			2791	1821	533			1728

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
5th ID	12/25/44	-264	264	0	0	13447	13450	-3
5th ID	12/26/44	-175	219	44	0	13273	13272	1
5th ID	12/27/44	324	308	632	0	13467	13597	-130
5th ID	12/28/44	-161	161	0	0	13307	13306	1
5th ID	12/29/44	-91	91	0	0	13219	13216	3
5th ID	12/30/44	-74	74	0	0	13152	13145	7
5th ID	12/31/44	799	36	835	0	13954	13951	3
5th ID	01/01/45	418	44	462	0	14371	14372	-1
5th ID	01/02/45	-37	37	0	0	13926	14334	-408
5th ID	01/03/45	16	42	58	0	13937	13942	-5
5th ID	01/04/45	-25	25	0	0	13923	13912	11
5th ID	01/05/45	-31	31	0	0	13894	13892	2
5th ID	01/06/45	-26	26	0	0	13869	13868	1
5th ID	01/07/45	-6	30	24	0	13861	13863	-2
5th ID	01/08/45	18	31	49	0	13879	13879	0
5th ID	01/09/45	26	26	52	0	13908	13905	3
5th ID	01/10/45	-25	25	0	0	13883	13883	0
5th ID	01/11/45	108	24	132	0	13990	13991	-1
5th ID	01/12/45	11	20	31	0	14001	14001	0
5th ID	01/13/45	3	20	23	0	14004	14004	0
5th ID	01/14/45	18	26	44	0	14002	14022	-20
5th ID	01/15/45	15	24	39	0	14037	14017	20
5th ID	01/16/45	20	26	46	0	14057	14057	0
TOTALS:			1610	2471	0			-518

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
8th ID	12/16/44	-163	196	33	0	13035	12638	397
8th ID	12/17/44	-164	180	16	0	12945	12871	74
8th ID	12/18/44	-70	71	1	0	13049	12875	174
8th ID	12/19/44	-64	64	0	0	12946	12985	-39
8th ID	12/20/44	-62	64	2	0	12959	12884	75
8th ID	12/21/44	34	79	113	0	12892	12993	-101
8th ID	12/22/44	-65	68	3	0	12969	12827	142
8th ID	12/23/44	-111	111	0	0	12669	12858	11
8th ID	12/24/44	-115	115	0	0	12740	12754	-14
8th ID	12/25/44	-77	98	21	0	12648	12883	-18
8th ID	12/26/44	-168	169	1	0	12505	12477	28
8th ID	12/27/44	-49	115	66	0	12453	12458	-5
8th ID	12/28/44	-86	87	1	0	12376	12367	9
8th ID	12/29/44	-34	56	22	0	12364	12342	22
8th ID	12/30/44	-60	69	9	0	12328	12304	24
8th ID	12/31/44	-6	43	37	0	13234	12322	912
8th ID	01/01/45	67	38	105	0	12412	13301	-589
8th ID	01/02/45	99	53	152	0	12506	12511	-5
8th ID	01/03/45	-2	45	43	0	12511	12504	7
8th ID	01/04/45	-7	39	32	0	12511	12504	7
8th ID	01/05/45	258	49	307	0	12789	12769	20
8th ID	01/06/45	75	30	105	0	12868	12864	4
8th ID	01/07/45	129	40	169	0	13000	12997	3
8th ID	01/08/45	47	31	78	0	13054	13047	7
8th ID	01/09/45	14	25	39	0	13093	13068	25
8th ID	01/10/45	-13	24	11	0	13092	13080	12
8th ID	01/11/45	28	27	55	0	13134	13120	14
8th ID	01/12/45	-45	61	16	0	13097	13089	8
8th ID	01/13/45	55	37	92	0	13152	13152	0
8th ID	01/14/45	94	29	123	0	13273	13246	27
8th ID	01/15/45	56	23	79	0	13324	13329	-5
8th ID	01/16/45	16	39	55	0	13357	13340	17
TOTALS:			2175	1786	0			945

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
9th ID	12/16/44	-182	182	0	0	13338	13215	123
9th ID	12/17/44	-155	155	0	0	13241	13183	58
9th ID	12/18/44	-114	114	0	0	13338	13127	211
9th ID	12/19/44	-44	44	0	0	13292	13294	-2
9th ID	12/20/44	-31	31	0	0	13279	13261	18
9th ID	12/21/44	-20	20	0	0	13223	13259	-36
9th ID	12/22/44	-59	59	0	0	13283	13164	119
9th ID	12/23/44	-90	90	0	0	13259	13193	66
9th ID	12/24/44	-180	180	0	0	13540	13079	461
9th ID	12/25/44	-78	78	0	0	13523	13482	61
9th ID	12/26/44	-63	63	0	0	13396	13460	-64
9th ID	12/27/44	-72	72	0	0	13304	13324	-20
9th ID	12/28/44	-77	77	0	0	13788	13227	559
9th ID	12/29/44	-83	83	0	0	13891	13703	188
9th ID	12/30/44	-41	41	0	0	13957	13850	107
9th ID	12/31/44	-72	72	0	0	13961	13885	76
9th ID	01/01/45	-56	71	0	15	13859	13905	-46
9th ID	01/02/45	103	57	4	156	13805	13962	-157
9th ID	01/03/45	-77	77	0	0	13907	13728	179
9th ID	01/04/45	-33	59	12	14	13870	13974	-4
9th ID	01/05/45	-42	73	3	27	13826	13823	-2
9th ID	01/06/45	21	58	0	79	13759	13847	-88
9th ID	01/07/45	-51	76	1	24	13781	13708	73
9th ID	01/08/45	-29	59	2	28	13784	13752	32
9th ID	01/09/45	-62	62	0	0	13760	13722	38
9th ID	01/10/45	100	71	12	159	13760	13860	-100
9th ID	01/11/45	-12	71	4	55	13819	13748	71
9th ID	01/12/45	-58	58	0	0	13799	13761	38
9th ID	01/13/45	-13	59	11	35	13781	13786	-5
9th ID	01/14/45	-27	45	2	16	13775	13754	21
9th ID	01/15/45	-39	39	0	0	13768	13736	32
9th ID	01/16/45	42	53	1	94	13711	13810	-99
TOTALS:			2349	52	703			1908

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
26th ID	12/22/44	-105	115	10	0	14544	14525	19
26th ID	12/23/44	-126	160	34	0	14359	14418	-59
26th ID	12/24/44	-185	195	10	0	14280	14174	106
26th ID	12/25/44	-119	183	64	0	14088	14161	-73
26th ID	12/26/44	-186	187	1	0	13874	13902	-28
26th ID	12/27/44	-96	113	17	0	13822	13776	44
26th ID	12/28/44	-109	137	28	0	13753	13713	40
26th ID	12/29/44	-145	172	27	0	13551	13608	-47
26th ID	12/30/44	-182	183	1	0	13404	13379	25
26th ID	12/31/44	-275	276	1	0	13192	13129	63
26th ID	01/01/45	281	185	446	0	13452	13473	-21
26th ID	01/02/45	-192	192	0	0	13264	13260	4
26th ID	01/03/45	-159	185	26	0	13089	13105	-16
26th ID	01/04/45	-191	249	58	0	12867	12898	-31
26th ID	01/05/45	-163	174	11	0	12744	12704	40
26th ID	01/06/45	-106	135	29	0	12650	12638	12
26th ID	01/07/45	-102	120	18	0	12610	12548	62
26th ID	01/08/45	-55	100	45	0	12562	12555	7
26th ID	01/09/45	-119	167	48	0	12482	12443	39
26th ID	01/10/45	-160	186	26	0	12311	12322	-11
26th ID	01/11/45	-155	173	18	0	12172	12156	16
26th ID	01/12/45	-96	120	24	0	12050	12076	-26
26th ID	01/13/45	-79	120	41	0	11977	11971	6
26th ID	01/14/45	-67	106	39	0	11906	11910	-4
26th ID	01/15/45	-145	146	1	0	11798	11761	37
26th ID	01/16/45	75	69	144	0	11910	11873	37
TOTALS:			4128	1167	0			241

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
28th ID	12/16/44	-26	26	0	0	14074	14228	-154
28th ID	12/17/44	-684	684	0	0	13510	13390	120
28th ID	12/18/44	-752	752	0	0	13648	12758	1090
28th ID	12/19/44	-759	759	0	0	13221	13089	132
28th ID	12/20/44	-650	650	0	0	11286	12571	-1285
28th ID	12/21/44	-123	123	0	0	10571	11163	-592
28th ID	12/22/44	-1164	1164	0	0	9430	9407	23
28th ID	12/23/44	-148	148	0	0	9503	9282	221
28th ID	12/24/44	-111	111	0	0	9192	9192	0
28th ID	12/25/44	43	43	86	0	9189	9235	-46
28th ID	12/26/44	220	4	224	0	9235	9409	-174
28th ID	12/27/44	-60	60	0	0	9232	9175	57
28th ID	12/28/44	-60	70	10	0	9213	9172	41
28th ID	12/29/44	-47	51	4	0	9203	9166	37
28th ID	12/30/44	6	14	20	0	9238	9209	29
28th ID	12/31/44	18	19	37	0	9274	9256	18
28th ID	01/01/45	-8	8	0	0	9372	9266	106
28th ID	01/02/45	-1	1	0	0	9371	9371	0
28th ID	01/03/45	3	7	10	0	9368	9374	-6
28th ID	01/04/45	10	48	58	0	9416	9378	38
28th ID	01/05/45	86	16	102	0	9508	9502	6
28th ID	01/06/45	26	39	65	0	9565	9534	31
28th ID	01/07/45	-47	48	1	0	9565	9518	47
28th ID	01/08/45	28	64	92	0	9285	9593	-308
28th ID	01/09/45	20	13	33	0	9274	9305	-31
28th ID	01/10/45	-16	16	0	0	9230	9258	-28
28th ID	01/11/45	5	2	7	0	9227	9235	-8
28th ID	01/12/45	37	1	38	0	9254	9264	-10
28th ID	01/13/45	576	9	585	0	10259	9830	429
28th ID	01/14/45	666	9	675	0	11076	10925	151
28th ID	01/15/45	660	15	675	0	11662	11736	-74
TOTALS:			4974	2722	0			-340

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
29th ID	12/16/44	-7	25	18	0	13519	13444	75
29th ID	12/17/44	32	17	49	0	13538	13551	-13
29th ID	12/18/44	0	22	22	0	13543	13538	10
29th ID	12/19/44	81	18	99	0	13555	13629	-74
29th ID	12/20/44	1	17	18	0	13569	13556	13
29th ID	12/21/44	36	18	54	0	13583	13605	-22
29th ID	12/22/44	39	22	61	0	13641	13622	19
29th ID	12/23/44	-18	27	9	0	13624	13623	1
29th ID	12/24/44	49	19	68	0	13673	13673	0
29th ID	12/25/44	-36	36	0	0	13706	13697	9
29th ID	12/26/44	-17	18	1	0	13688	13689	-1
29th ID	12/27/44	-9	25	16	0	13543	13679	-136
29th ID	12/28/44	6	20	26	0	13549	13549	0
29th ID	12/29/44	-24	25	1	0	13525	13525	0
29th ID	12/30/44	40	20	60	0	13582	13565	-3
29th ID	12/31/44	39	20	59	0	13600	13601	-1
29th ID	01/01/45	22	13	35	0	13619	13622	-3
29th ID	01/02/45	3	15	18	0	13623	13622	1
29th ID	01/03/45	64	16	82	0	13658	13687	-1
29th ID	01/04/45	12	24	36	0	13693	13698	0
29th ID	01/05/45	-10	15	5	0	14124	13688	496
29th ID	01/06/45	59	22	81	0	13747	14243	-496
29th ID	01/07/45	10	9	19	0	13757	13757	0
29th ID	01/08/45	-5	25	20	0	13752	13752	0
29th ID	01/09/45	33	21	54	0	13785	13785	0
29th ID	01/10/45	50	22	72	0	13837	13835	2
29th ID	01/11/45	40	8	48	0	13877	13877	0
29th ID	01/12/45	14	10	24	0	13891	13891	0
29th ID	01/13/45	-6	16	10	0	13885	13885	0
29th ID	01/14/45	-9	18	9	0	13876	13876	0
29th ID	01/15/45	32	7	39	0	13908	13908	0
29th ID	01/16/45	20	10	30	0	13929	13928	1
TOTALS:			602	1143	0			-63

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
35th ID	12/27/44	-77	80	3	0	14085	14102	-17
35th ID	12/28/44	-59	63	4	0	14011	14026	-15
35th ID	12/29/44	-128	132	4	0	13840	13883	-43
35th ID	12/30/44	-172	183	11	0	13724	13668	56
35th ID	12/31/44	-453	491	38	0	13269	13271	-2
35th ID	01/01/45	-86	211	123	0	13145	13181	-36
35th ID	01/02/45	-61	210	129	0	13043	13064	-21
35th ID	01/03/45	-157	169	12	0	12907	12686	21
35th ID	01/04/45	-272	312	40	0	12591	12635	-43
35th ID	01/05/45	-221	312	91	0	12376	12371	5
35th ID	01/06/45	-32	141	109	0	12369	12344	25
35th ID	01/07/45	-116	246	130	0	12221	12253	-32
35th ID	01/08/45	592	41	633	0	12778	12813	-35
35th ID	01/09/45	-220	289	69	0	12505	12556	-53
35th ID	01/10/45	-41	91	50	0	12445	12464	-19
35th ID	01/11/45	27	63	90	0	12459	12472	-13
35th ID	01/12/45	-35	122	87	0	12405	12424	-19
35th ID	01/13/45	-42	101	59	0	12194	12363	-69
35th ID	01/14/45	-6	65	59	0	12251	12288	-37
35th ID	01/15/45	-71	115	44	0	12135	12180	-45
35th ID	01/16/45	-44	99	55	0	12087	12091	-4
TOTALS:			3536	1840	0			-396

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
75th ID	12/23/44	-14	14	0	0	13914	14157	-243
75th ID	12/24/44	-12	12	0	0	13866	13902	-36
75th ID	12/25/44	-93	93	0	0	13866	13773	93
75th ID	12/26/44	-158	158	0	0	13614	13708	-94
75th ID	12/27/44	-163	163	0	0	13450	13451	-1
75th ID	12/28/44	-163	163	0	0	13253	13267	-14
75th ID	12/29/44	-63	63	0	0	13143	13196	-53
75th ID	12/30/44	-116	116	0	0	13096	13027	69
75th ID	12/31/44	-64	64	0	0	12911	13011	-70
75th ID	01/01/45	-62	62	0	0	12510	12811	300
75th ID	01/02/45	-45	45	0	0	13746	13475	271
75th ID	01/03/45	-197	197	0	0	13407	13248	159
75th ID	01/04/45	-93	93	0	0	13280	13351	-71
75th ID	01/05/45	-95	95	0	0	13171	13185	-14
75th ID	01/06/45	-95	95	0	0	12986	13076	-90
75th ID	01/07/45	-102	102	0	0	12714	12864	-150
75th ID	01/08/45	-51	51	0	0	12881	12663	218
75th ID	01/09/45	-64	64	0	0	12800	12817	-17
75th ID	01/10/45	-75	75	0	0	12800	12715	85
75th ID	01/11/45	-162	162	0	0	12520	12635	-115
75th ID	01/12/45	-152	152	0	0	12450	12368	82
75th ID	01/13/45	-228	228	0	0	12497	12222	275
75th ID	01/14/45	-92	92	0	0	12695	12405	290
75th ID	01/15/45	-93	93	0	0	12607	12602	5
75th ID	01/16/45	-123	123	0	0	12460	12484	-24
TOTALS:			2561	0	0			870

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT PTE STR	CURNT STR	CALC STR	DELTA
78th ID	12/16/44	-532	532	0	0	12936	12892	44
78th ID	12/17/44	-680	680	0	0	12510	12256	254
78th ID	12/18/44	-440	440	0	0	12126	12070	56
78th ID	12/19/44	-68	68	0	0	12110	12053	57
78th ID	12/20/44	-110	110	0	0	11939	12000	-61
78th ID	12/21/44	-63	63	0	0	11665	11876	-11
78th ID	12/22/44	-42	63	15	0	11364	11817	-453
78th ID	12/23/44	-27	30	11	0	11274	11257	17
78th ID	12/24/44	-36	30	0	0	11437	11213	22
78th ID	12/25/44	-21	21	0	0	11401	11402	0
78th ID	12/26/44	-21	21	0	0	11396	11213	0
78th ID	12/27/44	-45	45	0	0	11316	11313	-3
78th ID	12/28/44	-33	33	0	0	11293	11293	0
78th ID	12/29/44	-14	20	6	0	11279	11279	0
78th ID	12/30/44	10	27	37	0	11289	11289	0
78th ID	12/31/44	-31	38	7	0	11250	11259	0
78th ID	01/01/45	-4	12	8	0	11356	11254	102
78th ID	01/02/45	175	24	199	0	11531	11531	0
78th ID	01/03/45	52	29	91	0	11564	11563	1
78th ID	01/04/45	-27	37	10	0	11557	11557	0
78th ID	01/05/45	374	19	393	0	11931	11931	0
78th ID	01/06/45	439	31	470	0	12370	12370	0
78th ID	01/07/45	486	20	506	0	12856	12856	0
78th ID	01/08/45	6	22	28	0	12862	12862	0
78th ID	01/09/45	-7	24	17	0	12855	12855	0
78th ID	01/10/45	-74	77	3	0	12791	12781	10
78th ID	01/11/45	-32	54	22	0	12759	12759	0
78th ID	01/12/45	-78	94	16	0	12661	12661	0
78th ID	01/13/45	59	51	110	0	12740	12740	0
78th ID	01/14/45	172	46	218	0	12907	12912	-5
78th ID	01/15/45	145	38	183	0	13047	13052	-5
78th ID	01/16/45	255	38	293	0	13302	13302	0
TOTALS:			2851	2633	0			96

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
80th ID	12/21/44	23	14	37	0	13943	13957	-14
80th ID	12/22/44	-52	52	0	0	13891	13891	0
80th ID	12/23/44	-212	214	2	0	13653	13679	-
80th ID	12/24/44	-170	213	43	0	13513	13513	0
80th ID	12/25/44	-159	159	0	0	13333	13354	-21
80th ID	12/26/44	-353	363	0	0	12696	12970	-274
80th ID	12/27/44	-75	379	304	0	12921	12821	0
80th ID	12/28/44	98	139	215	0	12515	12707	-192
80th ID	12/29/44	548	216	1002	0	13447	13341	96
80th ID	12/30/44	-150	163	13	0	13234	13197	-37
80th ID	12/31/44	644	102	742	0	14001	13923	78
80th ID	01/01/45	-114	114	0	0	13887	13887	0
80th ID	01/02/45	-93	93	0	0	13811	13794	17
80th ID	01/03/45	-37	37	0	0	13697	13774	-77
80th ID	01/04/45	-11	34	23	0	13689	13686	3
80th ID	01/05/45	89	42	132	0	13795	13776	19
80th ID	01/06/45	-94	124	30	0	13701	13701	0
80th ID	01/07/45	-128	128	0	0	13589	13570	-19
80th ID	01/08/45	-58	91	33	0	13461	13500	-41
80th ID	01/09/45	-97	97	0	0	13384	13384	0
80th ID	01/10/45	-48	48	0	0	13332	13316	16
80th ID	01/11/45	71	61	132	0	13404	13400	4
80th ID	01/12/45	-54	78	24	0	13347	13350	-3
80th ID	01/13/45	-40	84	44	0	13310	13307	3
80th ID	01/14/45	-6	44	38	0	13297	13304	-7
80th ID	01/15/45	-83	108	25	0	13214	13214	0
80th ID	01/16/45	22	55	77	0	13236	13236	0
TOTALS:			3251	2990	0			-437

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALL STR	DELTA
84th ID	12/16/44	-49	57	8	0	12865	12865	0
84th ID	12/17/44	-15	26	11	0	12850	12850	0
84th ID	12/18/44	-9	27	18	0	12841	12841	0
84th ID	12/19/44	-20	31	11	0	12821	12821	0
84th ID	12/20/44	-21	21	0	0	12813	12800	13
84th ID	12/21/44	-7	7	0	0	12600	12600	-106
84th ID	12/22/44	-30	30	0	0	12600	12570	30
84th ID	12/23/44	-70	70	0	0	12500	12530	170
84th ID	12/24/44	-25	25	0	0	12752	12775	7
84th ID	12/25/44	-204	204	0	0	12739	12578	161
84th ID	12/26/44	-107	107	0	0	12732	12631	101
84th ID	12/27/44	302	113	422	0	12975	13001	-26
84th ID	12/28/44	243	133	377	0	13201	13118	-17
84th ID	12/29/44	0	65	65	0	13219	13101	18
84th ID	12/30/44	187	38	223	0	13381	13406	-25
84th ID	12/31/44	-50	50	0	0	13509	13331	178
84th ID	01/01/45	100	38	138	0	13623	13609	14
84th ID	01/02/45	-23	23	0	0	13779	13500	179
84th ID	01/03/45	-193	193	0	0	13788	13591	197
84th ID	01/04/45	-153	153	0	0	13799	13615	184
84th ID	01/05/45	-168	168	0	0	13798	13591	147
84th ID	01/06/45	-129	129	0	0	13641	13609	32
84th ID	01/07/45	-201	201	0	0	13602	13440	162
84th ID	01/08/45	-105	105	0	0	13507	13497	10
84th ID	01/09/45	-108	108	0	0	13350	13399	-49
84th ID	01/10/45	-159	159	0	0	13280	13191	89
84th ID	01/11/45	-105	105	0	0	13294	13175	119
84th ID	01/12/45	-102	102	0	0	13189	13192	-3
84th ID	01/13/45	-183	183	0	0	13103	13006	97
84th ID	01/14/45	-178	178	0	0	13010	12925	85
84th ID	01/15/45	-209	209	0	0	12932	12801	131
84th ID	01/16/45	-91	91	0	0	12837	12841	-4
TOTALS:			3152	1271	0			1804

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT PTD	CURNT STF	CALC STR	DELTA
87th ID	12/30/44	-45	59	14	0	11763	11830	-67
87th ID	12/31/44	-73	77	4	0	11686	11690	-4
87th ID	01/01/45	-77	93	16	0	11541	11609	-68
87th ID	01/02/45	131	128	259	0	11530	11672	-142
87th ID	01/03/45	250	139	389	0	11785	11780	5
87th ID	01/04/45	-59	91	32	0	11761	11726	35
87th ID	01/05/45	-69	98	3	0	11683	11692	-9
87th ID	01/06/45	-61	66	5	0	11519	11621	-102
87th ID	01/07/45	-82	103	47	0	11429	11417	-22
87th ID	01/08/45	-144	156	12	0	11308	11288	20
87th ID	01/09/45	-61	92	31	0	11246	11247	-1
87th ID	01/10/45	-151	151	0	0	11914	11090	824
87th ID	01/11/45	-139	154	15	0	11675	11778	-103
87th ID	01/12/45	-92	122	30	0	11574	11583	-9
87th ID	01/13/45	-28	46	18	0	11557	11546	11
87th ID	01/14/45	275	36	311	0	11649	11832	-17
87th ID	01/15/45	283	15	298	0	12147	12132	15
87th ID	01/16/45	475	30	505	0	11606	12622	-16
TOTALS:			1652	1985	0			398

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALL STR	DELTA
90th ID	12/16/44	-57	57	0	0	11919	11919	0
90th ID	12/17/44	-55	55	0	0	11911	11864	47
90th ID	12/18/44	-15	15	0	0	11890	11896	-6
90th ID	12/19/44	-19	46	27	0	11885	11871	14
90th ID	12/20/44	-7	43	36	0	11874	11876	-4
90th ID	12/21/44	-24	24	0	0	11849	11850	-1
90th ID	12/22/44	26	40	66	0	11972	11875	97
90th ID	12/23/44	55	23	78	0	11758	12017	-259
90th ID	12/24/44	318	47	355	0	13043	12073	1021
90th ID	12/25/44	-20	37	0	0	13004	13062	-1
90th ID	12/26/44	297	38	235	0	13361	13361	0
90th ID	12/27/44	403	37	440	0	14170	14269	-29
90th ID	12/28/44	6	32	38	0	14171	14176	-5
90th ID	12/29/44	32	30	62	0	14227	14208	24
90th ID	12/30/44	-28	30	2	0	14201	14192	2
90th ID	12/31/44	-33	33	0	0	14171	14163	3
90th ID	01/01/45	57	25	62	0	14224	14218	-4
90th ID	01/02/45	-23	23	0	0	14201	14201	0
90th ID	01/03/45	-13	28	18	0	14198	14191	4
90th ID	01/04/45	-26	26	0	0	14161	14167	-6
90th ID	01/05/45	-24	24	0	0	14139	14137	2
90th ID	01/06/45	-1	24	23	0	14180	14138	42
90th ID	01/07/45	-11	11	0	0	14169	14169	0
90th ID	01/08/45	-44	44	0	0	14090	14125	-35
90th ID	01/09/45	-6	142	136	0	14093	14084	9
90th ID	01/10/45	-208	208	0	0	13861	13865	-4
90th ID	01/11/45	-160	160	0	0	13722	13721	1
90th ID	01/12/45	-203	206	93	0	13520	13519	1
90th ID	01/13/45	-197	197	0	0	13322	13323	-1
90th ID	01/14/45	-113	182	69	0	13198	13209	-11
90th ID	01/15/45	-251	283	32	0	12958	12947	11
90th ID	01/16/45	-198	198	0	0	12753	12760	-7
TOTALS:			2446	2392	0			831

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
99th ID	12/16/44	-239	239	0	0	13591	13403	188
99th ID	12/17/44	-199	199	0	0	13402	13392	10
99th ID	12/18/44	-431	431	0	0	10842	12971	-2129
99th ID	12/19/44	-289	289	0	0	10347	10553	-211
99th ID	12/20/44	-404	404	0	0	10739	9933	796
99th ID	12/21/44	-85	85	0	0	10877	10849	28
99th ID	12/22/44	-163	163	0	0	11560	10711	849
99th ID	12/23/44	-77	77	0	0	11900	11483	-417
99th ID	12/24/44	-82	82	0	0	11161	11313	-152
99th ID	12/25/44	-31	31	0	0	11161	11121	40
99th ID	12/26/44	-33	33	0	0	11107	11131	-24
99th ID	12/27/44	-52	52	0	0	11075	11001	74
99th ID	12/28/44	-76	76	0	0	10901	10999	-97
99th ID	12/29/44	-92	92	0	0	10916	10810	106
99th ID	12/30/44	-35	35	0	0	10737	10871	-134
99th ID	12/31/44	-40	40	0	0	10770	10827	-57
99th ID	01/01/45	-44	44	0	0	10713	10711	2
99th ID	01/02/45	-34	34	0	0	10641	10689	-48
99th ID	01/03/45	-47	47	0	0	11109	10801	308
99th ID	01/04/45	-34	34	0	0	10879	11075	-196
99th ID	01/05/45	-45	45	0	0	11219	10929	290
99th ID	01/06/45	-31	31	0	0	11537	11183	349
99th ID	01/07/45	-48	48	0	0	11552	11489	63
99th ID	01/08/45	-39	39	0	0	11532	11513	19
99th ID	01/09/45	-47	47	0	0	12021	11485	536
99th ID	01/10/45	-52	52	0	0	12021	11969	52
99th ID	01/11/45	-64	64	0	0	12047	11957	90
99th ID	01/12/45	-72	72	0	0	12066	11975	91
99th ID	01/13/45	-49	49	0	0	12009	12017	-8
99th ID	01/14/45	-35	35	0	0	12048	11974	74
99th ID	01/15/45	-46	46	0	0	12218	12002	216
99th ID	01/16/45	-76	76	0	0	12152	12142	10
TOTALS:			3099	0	0			1609

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
104th ID	12/16/44	-137	148	11	0	13201	13085	116
104th ID	12/17/44	-172	173	1	0	13062	13029	33
104th ID	12/18/44	-58	68	10	0	13106	13004	102
104th ID	12/19/44	-57	57	0	0	13111	13049	62
104th ID	12/20/44	12	67	79	0	13133	13123	10
104th ID	12/21/44	13	47	60	0	13204	13146	58
104th ID	12/22/44	-49	49	0	0	13184	13155	29
104th ID	12/23/44	-39	40	1	0	13179	13140	39
104th ID	12/24/44	-19	19	0	0	13179	13160	19
104th ID	12/25/44	-19	29	0	0	13180	13109	71
104th ID	12/26/44	-50	50	0	0	13130	13110	20
104th ID	12/27/44	22	31	53	0	13173	13157	16
104th ID	12/28/44	-7	29	22	0	13163	13166	-3
104th ID	12/29/44	-28	28	0	0	13138	13135	3
104th ID	12/30/44	-22	32	10	0	13115	13116	-1
104th ID	12/31/44	-24	28	4	0	13077	13091	-14
104th ID	01/01/45	4	34	38	0	13089	13081	8
104th ID	01/02/45	65	41	105	0	13235	13159	76
104th ID	01/03/45	26	29	57	0	13220	13210	10
104th ID	01/04/45	-18	26	8	0	13182	13202	-20
104th ID	01/05/45	-31	41	10	0	13192	13151	41
104th ID	01/06/45	46	31	77	0	13284	13238	46
104th ID	01/07/45	108	40	148	0	13365	13392	-27
104th ID	01/08/45	13	23	36	0	13412	13378	34
104th ID	01/09/45	-11	31	20	0	13400	13401	-1
104th ID	01/10/45	-69	71	2	0	13341	13331	10
104th ID	01/11/45	0	24	24	0	13404	13341	63
104th ID	01/12/45	-5	25	20	0	13404	13399	5
104th ID	01/13/45	3	29	32	0	13430	13407	23
104th ID	01/14/45	-22	35	13	0	13423	13408	15
104th ID	01/15/45	-19	19	0	0	13435	13404	31
104th ID	01/16/45	202	41	243	0	13660	13637	23
TOTALS:			1435	1085	0			788

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
2d AD	12/16/44	30	17	47	0	14541	14541	0
2d AD	12/17/44	-7	18	11	0	14549	14534	15
2d AD	12/18/44	-6	30	24	0	14542	14548	-1
2d AD	12/19/44	-7	25	16	0	14535	14535	0
2d AD	12/20/44	0	15	15	0	14535	14535	0
2d AD	12/21/44	0	10	10	0	14535	14535	0
2d AD	12/22/44	-5	5	0	0	14530	14530	0
2d AD	12/23/44	-25	25	0	0	14524	14524	0
2d AD	12/24/44	-21	22	1	0	14514	14514	0
2d AD	12/25/44	-40	41	1	0	14509	14509	0
2d AD	12/26/44	-45	45	0	0	14499	14499	0
2d AD	12/27/44	-100	100	4	0	14416	14391	25
2d AD	12/28/44	-63	64	1	0	14393	14362	31
2d AD	12/29/44	-80	84	4	0	14310	14310	0
2d AD	12/30/44	75	21	96	0	14357	14385	-28
2d AD	12/31/44	32	21	53	0	14355	14369	-14
2d AD	01/01/45	-27	27	0	0	14380	14381	-1
2d AD	01/02/45	-17	17	0	0	14299	14347	-48
2d AD	01/03/45	-143	140	0	0	14339	14162	177
2d AD	01/04/45	-133	133	0	0	14250	14206	44
2d AD	01/05/45	-147	147	0	0	14097	14103	-6
2d AD	01/06/45	-101	101	0	0	13942	13996	-54
2d AD	01/07/45	-162	162	0	0	13925	13780	145
2d AD	01/08/45	-134	134	0	0	13793	13791	2
2d AD	01/09/45	-118	118	0	0	14008	13675	333
2d AD	01/10/45	-148	148	0	0	13878	13860	18
2d AD	01/11/45	-91	91	0	0	13907	13787	120
2d AD	01/12/45	-166	166	0	0	13755	13741	14
2d AD	01/13/45	-211	211	0	0	13500	13544	-44
2d AD	01/14/45	-199	199	0	0	13617	13401	216
2d AD	01/15/45	-159	159	0	0	13577	13458	119
2d AD	01/16/45	-174	174	0	0	12355	13403	-1048
TOTALS:			2677	285	0			1236

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
3d AD	12/16/44	-3	38	1	24	14399	14404	-5
3d AD	12/17/44	-22	22	0	0	14391	14377	14
3d AD	12/18/44	1	8	4	5	14375	14382	-7
3d AD	12/19/44	-12	22	0	0	13308	14417	-1109
3d AD	12/20/44	-30	31	0	0	14144	13324	1120
3d AD	12/21/44	-115	115	0	0	14317	14331	-14
3d AD	12/22/44	32	32	0	0	14239	14387	-148
3d AD	12/23/44	61	33	0	34	14291	14320	-29
3d AD	12/24/44	-510	510	0	0	14333	13759	574
3d AD	12/25/44	-154	154	0	0	14114	14179	-65
3d AD	12/26/44	-112	160	0	48	13982	14002	-20
3d AD	12/27/44	-89	89	0	0	14012	13893	119
3d AD	12/28/44	32	26	0	39	13992	14044	-52
3d AD	12/29/44	246	30	244	32	14025	14339	-314
3d AD	12/30/44	23	21	4	46	14291	14054	237
3d AD	12/31/44	-10	10	0	0	14335	14281	54
3d AD	01/01/45	-17	17	0	0	14324	14313	11
3d AD	01/02/45	47	22	2	67	14300	14371	-71
3d AD	01/03/45	-139	148	0	9	14300	14161	139
3d AD	01/04/45	-144	152	0	8	14271	14156	115
3d AD	01/05/45	-112	121	1	8	14215	14159	56
3d AD	01/06/45	-59	71	6	6	14153	14156	-3
3d AD	01/07/45	-177	177	0	0	14045	13976	69
3d AD	01/08/45	-42	121	1	78	13931	14003	-72
3d AD	01/09/45	61	98	159	0	13894	13992	-98
3d AD	01/10/45	-4	78	1	73	13874	13690	-16
3d AD	01/11/45	-24	65	10	31	13923	13850	73
3d AD	01/12/45	-80	60	0	0	13911	13843	68
3d AD	01/13/45	-181	181	0	0	13836	13730	106
3d AD	01/14/45	-16	139	109	14	13997	13820	177
3d AD	01/15/45	-141	143	4	0	14051	13956	195
3d AD	01/16/45	-96	139	2	41	13968	13955	13
TOTALS:			3044	548	642			1415

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
4th AD	12/21/44	-19	20	1	0	9962	9964	-2
4th AD	12/22/44	-10	10	0	0	9952	9952	0
4th AD	12/23/44	34	11	45	0	10141	9986	155
4th AD	12/24/44	-105	116	11	0	10036	10036	0
4th AD	12/25/44	-175	175	0	0	9881	9881	0
4th AD	12/26/44	337	89	425	0	10198	10198	0
4th AD	12/27/44	395	77	472	0	10200	10192	8
4th AD	12/28/44	-43	54	11	0	10557	10557	0
4th AD	12/29/44	-97	100	3	0	10480	10480	0
4th AD	12/30/44	63	35	102	0	10525	10520	5
4th AD	12/31/44	-139	141	2	0	10389	10389	0
4th AD	01/01/45	-105	113	8	0	10284	10284	0
4th AD	01/02/45	-105	105	0	0	10239	10179	60
4th AD	01/03/45	125	26	151	0	10364	10364	0
4th AD	01/04/45	-48	48	0	0	10316	10316	0
4th AD	01/05/45	-79	125	46	0	10177	10177	0
4th AD	01/06/45	-10	30	20	0	10187	10187	0
4th AD	01/07/45	-10	40	30	0	10157	10157	0
4th AD	01/08/45	-47	47	0	0	10055	10110	-55
4th AD	01/09/45	-21	21	0	0	10067	10067	0
4th AD	01/10/45	-32	42	10	0	10035	10035	0
4th AD	01/11/45	-55	55	0	0	9991	9950	41
4th AD	01/12/45	-64	111	47	0	9913	9927	-14
4th AD	01/13/45	-12	32	20	0	9997	9901	96
4th AD	01/14/45	171	44	215	0	10168	10168	0
4th AD	01/15/45	33	6	39	0	10214	10201	13
4th AD	01/16/45	-6	15	9	0	10207	10208	-1
TOTALS:			1687	1668	0			243

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STR	CURNT STR	CALC STR	DELTA
5th AD	12/16/44	-132	132	0	0	9712	9652	60
5th AD	12/17/44	-68	84	16	0	9620	9644	-24
5th AD	12/18/44	-70	80	10	0	9548	9550	-2
5th AD	12/19/44	-7	26	19	0	9550	9541	9
5th AD	12/20/44	-241	242	1	0	9505	9309	196
5th AD	12/21/44	-132	132	0	0	9501	9378	123
5th AD	12/22/44	-29	29	0	0	10718	9471	1247
5th AD	12/23/44	-29	29	0	0	9475	10689	-1214
5th AD	12/24/44	-42	42	0	0	9418	9420	-2
5th AD	12/25/44	-27	27	0	0	9381	9387	-6
5th AD	12/26/44	-19	19	0	0	9372	9367	5
5th AD	12/27/44	-16	16	0	0	9387	9377	10
5th AD	12/28/44	-25	25	0	0	9336	9342	-6
5th AD	12/29/44	-29	29	0	0	9344	9337	7
5th AD	12/30/44	-14	14	0	0	9352	9330	22
5th AD	12/31/44	-7	7	0	0	9349	9345	4
5th AD	01/01/45	-13	13	0	0	9349	9344	5
5th AD	01/02/45	-12	12	0	0	9316	9310	6
5th AD	01/03/45	-8	8	0	0	9355	9312	43
5th AD	01/04/45	-9	9	0	0	9340	9345	-5
5th AD	01/05/45	-12	12	0	0	9349	9334	15
5th AD	01/06/45	-7	7	0	0	9395	9340	55
5th AD	01/07/45	-14	14	0	0	9901	9331	570
5th AD	01/08/45	-12	12	0	0	9908	9339	569
5th AD	01/09/45	-11	11	0	0	9907	9337	570
5th AD	01/10/45	-16	16	0	0	9907	9331	576
5th AD	01/11/45	-22	22	0	0	9922	9335	587
5th AD	01/12/45	-18	18	0	0	9938	9304	634
5th AD	01/13/45	-12	12	0	0	9937	9326	611
5th AD	01/14/45	-16	16	0	0	9949	9321	628
5th AD	01/15/45	-8	8	0	0	10105	9341	164
5th AD	01/16/45	-7	7	0	0	10096	10098	-2
TOTALS:			1128	46	0			1394

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD STP	CURNT STP	CALC DELTA	
6th AD	12/27/44	-16	18	1	1	10884	10860	24
6th AD	12/28/44	-29	29	0	0	10847	10855	-8
6th AD	12/29/44	-34	35	0	1	10812	10813	-1
6th AD	12/30/44	-12	16	2	2	10813	10800	13
6th AD	12/31/44	-10	5	28	17	10805	10803	2
6th AD	01/01/45	-86	96	10	0	10718	10719	-1
6th AD	01/02/45	-117	117	0	0	10612	10611	11
6th AD	01/03/45	-252	145	12	0	10357	10361	-4
6th AD	01/04/45	-211	298	84	0	10148	10148	0
6th AD	01/05/45	-148	205	57	0	9995	9998	-3
6th AD	01/06/45	-64	115	31	0	9881	9810	71
6th AD	01/07/45	-69	142	73	0	9844	9817	27
6th AD	01/08/45	194	96	244	0	9867	9838	29
6th AD	01/09/45	-96	137	41	0	9871	9871	0
6th AD	01/10/45	-112	116	4	0	9759	9759	0
6th AD	01/11/45	-64	91	27	0	9701	9695	6
6th AD	01/12/45	23	76	99	0	9726	9724	2
6th AD	01/13/45	-59	64	5	0	9668	9667	1
6th AD	01/14/45	101	153	259	0	9783	9768	15
6th AD	01/15/45	-92	139	47	0	9676	9677	-1
6th AD	01/16/45	291	66	357	0	9967	9967	0
TOTALS:			2325	1382	21			13

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALL STR	DELTA
7th AD	12/16/44	17	7	1	23	10640	10640	0
7th AD	12/17/44	-29	29	0	0	10640	10611	29
7th AD	12/18/44	-99	99	0	0	10562	10541	21
7th AD	12/19/44	-103	114	11	0	10452	10459	-7
7th AD	12/20/44	-21	21	0	0	10085	10431	-346
7th AD	12/21/44	-47	47	0	0	10542	10030	504
7th AD	12/22/44	-12	11	0	0	10542	10520	22
7th AD	12/23/44	-20	20	0	0	10542	10542	0
7th AD	12/24/44	-103	103	23	0	10341	10341	0
7th AD	12/25/44	-41	41	1	0	9011	9011	0
7th AD	12/26/44	-163	163	0	0	9221	9221	-163
7th AD	12/27/44	-83	86	0	0	9130	9130	-3
7th AD	12/28/44	-64	64	0	0	9467	9086	481
7th AD	12/29/44	191	43	234	0	9402	9658	-256
7th AD	12/30/44	118	22	140	0	9591	9520	71
7th AD	12/31/44	276	10	286	0	9881	9887	-185
7th AD	01/01/45	-19	19	0	0	9952	9683	269
7th AD	01/02/45	13	16	29	0	9930	9913	-17
7th AD	01/03/45	29	21	50	0	9540	9959	-19
7th AD	01/04/45	-7	19	12	0	10011	9933	78
7th AD	01/05/45	93	19	112	0	9989	10104	-115
7th AD	01/06/45	-13	23	10	0	10075	9976	99
7th AD	01/07/45	-19	19	0	0	10067	10056	11
7th AD	01/08/45	-16	16	0	0	10052	10051	1
7th AD	01/09/45	147	12	33	126	10036	10199	-163
7th AD	01/10/45	12	23	0	35	10136	10048	88
7th AD	01/11/45	-18	37	7	12	10195	10118	77
7th AD	01/12/45	253	23	272	4	10204	10448	-244
7th AD	01/13/45	37	16	37	16	10471	10241	230
7th AD	01/14/45	-11	14	3	0	10515	10460	55
7th AD	01/15/45	3	13	16	0	10498	10518	-20
7th AD	01/16/45	17	20	1	36	10492	10515	-23
TOTALS:			1528	1303	252			-156

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
9th AD	12/16/44	-22	22	0	0	10702	10669	33
9th AD	12/17/44	-140	143	3	0	10611	10562	49
9th AD	12/18/44	-66	67	1	0	10627	10545	82
9th AD	12/19/44	-463	463	0	0	10203	10164	39
9th AD	12/20/44	-32	32	0	0	10123	10171	-48
9th AD	12/21/44	-259	259	0	0	7085	9884	-1278
9th AD	12/22/44	-85	87	2	0	7005	7001	4
9th AD	12/23/44	-73	74	1	0	6971	6992	-1
9th AD	12/24/44	-37	37	0	0	6899	6894	5
9th AD	12/25/44	-8	8	0	0	6884	6891	-139
9th AD	12/26/44	-40	40	0	0	6849	6844	105
9th AD	12/27/44	-53	64	11	0	6857	6896	1
9th AD	12/28/44	614	61	675	0	6246	6911	-665
9th AD	12/29/44	-71	71	0	0	6209	6177	32
9th AD	12/30/44	-7	7	0	0	6170	6202	-32
9th AD	12/31/44	73	20	93	0	6159	6243	-64
9th AD	01/01/45	-37	43	6	0	6152	6122	30
9th AD	01/02/45	-35	42	8	0	6127	6117	10
9th AD	01/03/45	-11	11	0	0	6298	6116	182
9th AD	01/04/45	-4	4	0	0	6298	6294	4
9th AD	01/05/45	-9	9	0	0	6306	6289	17
9th AD	01/06/45	-12	12	0	0	6321	6294	27
9th AD	01/07/45	-19	24	5	0	6296	6302	-6
9th AD	01/08/45	-13	13	0	0	6154	6283	-129
9th AD	01/09/45	5	4	9	0	6159	6159	0
9th AD	01/10/45	79	2	81	0	6158	6238	-80
9th AD	01/11/45	0	0	0	0	6158	6158	0
9th AD	01/12/45	-3	3	0	0	6155	6155	0
9th AD	01/13/45	16	4	20	0	6107	6171	-64
9th AD	01/14/45	-7	7	0	0	6100	6100	0
9th AD	01/15/45	-8	8	0	0	6092	6092	0
9th AD	01/16/45	-26	26	0	0	6066	6066	0
TOTALS:			1688	915	0			-872

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TST REPL	TOT RTD STF	CUPNT STP	CALC STP	DELTA
10th AD	12/16/44	-12	20	8	0	9777	9777	0
10th AD	12/17/44	-48	48	0	0	9777	9729	48
10th AD	12/18/44	-29	29	0	0	9747	9748	-1
10th AD	12/19/44	-140	140	0	0	9662	9607	55
10th AD	12/20/44	-34	34	0	0	9607	9628	-21
10th AD	12/21/44	-14	14	0	0	9377	9043	-1486
10th AD	12/22/44	6	55	61	0	9307	9323	-1257
10th AD	12/23/44	-62	62	0	0	9327	9274	-1294
10th AD	12/24/44	318	44	260	0	9297	9298	0
10th AD	12/25/44	-107	115	12	0	9297	9207	90
10th AD	12/26/44	-329	329	0	0	9064	9284	-2200
10th AD	12/27/44	-16	16	0	0	9046	9046	0
10th AD	12/28/44	-17	22	5	0	9021	9031	0
10th AD	12/29/44	9	25	34	0	9046	9046	0
10th AD	12/30/44	-1	1	0	0	9029	9045	-8
10th AD	12/31/44	4	14	18	0	9046	9046	0
10th AD	01/01/45	-5	8	0	0	9038	9038	0
10th AD	01/02/45	-6	8	0	0	9030	9030	0
10th AD	01/03/45	-12	12	0	0	9018	9018	0
10th AD	01/04/45	1	10	14	0	9022	9022	0
10th AD	01/05/45	-7	7	0	0	9015	9015	0
10th AD	01/06/45	-13	13	0	0	9002	9002	0
10th AD	01/07/45	0	9	9	0	9002	9002	0
10th AD	01/08/45	-7	7	0	0	8995	8995	0
10th AD	01/09/45	22	14	39	0	9080	9060	0
10th AD	01/10/45	38	8	46	0	9118	9118	0
10th AD	01/11/45	144	5	149	0	9262	9262	0
10th AD	01/12/45	24	15	39	0	9286	9286	0
10th AD	01/13/45	-7	7	0	0	9279	9279	0
10th AD	01/14/45	508	17	525	0	9787	9787	0
10th AD	01/15/45	1	14	15	0	9788	9788	0
10th AD	01/16/45	-7	7	0	0	9781	9781	0
TOTALS:			1127	1394	0			-275

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT FTD STP	CURNT STR	CALC DELTA	
11th AD	12/26/44	-7	7	0	0	10729	10722	7
11th AD	12/27/44	-5	5	0	0	10717	10724	-7
11th AD	12/28/44	-7	7	0	0	10710	10710	0
11th AD	12/29/44	-17	17	0	0	10712	10693	19
11th AD	12/30/44	-137	137	0	0	10530	10575	-45
11th AD	12/31/44	-215	215	0	0	10137	10315	-178
11th AD	01/01/45	-214	218	4	0	10142	9921	213
11th AD	01/02/45	-95	90	0	0	10000	10047	-47
11th AD	01/03/45	-19	19	0	0	10008	10041	-33
11th AD	01/04/45	-57	50	0	0	9847	9800	47
11th AD	01/05/45	-64	69	5	0	9736	9811	-75
11th AD	01/06/45	-51	59	8	0	9606	9685	-79
11th AD	01/07/45	-33	44	21	0	9660	9683	-23
11th AD	01/08/45	-18	40	12	0	9632	9602	30
11th AD	01/09/45	-12	31	19	0	9588	9620	-32
11th AD	01/10/45	-11	32	21	0	9494	9577	-83
11th AD	01/11/45	-28	45	17	0	9484	9481	3
11th AD	01/12/45	-23	23	0	0	9441	9441	0
11th AD	01/13/45	-82	121	30	0	9134	9353	-219
11th AD	01/14/45	-107	100	0	0	9134	9134	0
11th AD	01/15/45	31	128	160	0	9170	9166	4
11th AD	01/16/45	-74	74	0	0	9071	9096	-25
TOTALS:			1536	300	0		-422	

Final RTD Tracking Program Printouts

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CUPNT STR	CALC STR	DELTA
1st ID	12/16/44	13	29	1	41	13225	13226	0
1st ID	12/17/44	-22	22	0	0	13204	13204	0
1st ID	12/18/44	-45	61	11	5	13159	13159	0
1st ID	12/19/44	-74	74	0	0	13085	13085	0
1st ID	12/20/44	-112	112	0	0	12973	12973	0
1st ID	12/21/44	-55	210	0	155	12918	12918	0
1st ID	12/22/44	329	191	506	14	13247	13247	0
1st ID	12/23/44	76	161	237	0	13323	13323	0
1st ID	12/24/44	207	113	253	67	13530	13530	0
1st ID	12/25/44	-60	60	0	0	13470	13470	0
1st ID	12/26/44	325	66	328	63	13795	13795	0
1st ID	12/27/44	-72	72	0	0	13723	13723	0
1st ID	12/28/44	-90	110	11	9	13633	13633	0
1st ID	12/29/44	28	78	6	100	13661	13661	0
1st ID	12/30/44	-10	66	56	0	13651	13651	0
1st ID	12/31/44	112	59	148	23	13763	13763	0
1st ID	01/01/45	-52	56	0	4	13711	13711	0
1st ID	01/02/45	13	59	2	70	13724	13724	0
1st ID	01/03/45	-66	66	0	0	13658	13658	0
1st ID	01/04/45	-37	49	5	7	13621	13621	0
1st ID	01/05/45	-42	63	0	21	13579	13579	0
1st ID	01/06/45	23	50	0	73	13602	13602	0
1st ID	01/07/45	-53	53	0	0	13549	13549	0
1st ID	01/08/45	2	52	1	53	13551	13551	0
1st ID	01/09/45	-72	72	0	0	13479	13479	0
1st ID	01/10/45	83	33	0	116	13562	13562	0
1st ID	01/11/45	16	35	5	46	13578	13578	0
1st ID	01/12/45	-60	60	0	0	13518	13518	0
1st ID	01/13/45	-39	87	3	45	13479	13479	0
1st ID	01/14/45	-44	44	0	0	13435	13435	0
1st ID	01/15/45	-309	309	0	0	13126	13126	0
1st ID	01/16/45	-155	235	2	98	12991	12991	0
TOTALS:			2807	1575	1010			0

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
2d ID	12/16/44	-145	145	0	0	13155	13155	0
2d ID	12/17/44	-361	361	0	0	12794	12794	0
2d ID	12/18/44	-402	402	0	0	12392	12392	0
2d ID	12/19/44	-378	390	12	0	12014	12014	0
2d ID	12/20/44	-622	632	1	9	11392	11392	0
2d ID	12/21/44	-81	232	35	116	11311	11311	0
2d ID	12/22/44	240	70	300	10	11551	11551	0
2d ID	12/23/44	-59	59	0	0	11492	11492	0
2d ID	12/24/44	8	56	64	0	11500	11500	0
2d ID	12/25/44	-40	40	0	0	11460	11460	0
2d ID	12/26/44	8	50	0	58	11468	11468	0
2d ID	12/27/44	199	26	131	94	11667	11667	0
2d ID	12/28/44	-84	84	0	0	11583	11583	0
2d ID	12/29/44	5	73	4	74	11588	11588	0
2d ID	12/30/44	454	47	473	28	12042	12042	0
2d ID	12/31/44	268	31	299	0	12310	12310	0
2d ID	01/01/45	425	50	472	3	12735	12735	0
2d ID	01/02/45	-47	47	0	0	12688	12688	0
2d ID	01/03/45	142	43	101	84	12830	12830	0
2d ID	01/04/45	-38	76	34	4	12792	12792	0
2d ID	01/05/45	25	55	5	75	12817	12817	0
2d ID	01/06/45	25	41	3	63	12842	12842	0
2d ID	01/07/45	-9	35	4	22	12833	12833	0
2d ID	01/08/45	176	55	205	26	13009	13009	0
2d ID	01/09/45	-25	57	26	6	12984	12984	0
2d ID	01/10/45	46	54	1	99	13030	13030	0
2d ID	01/11/45	18	56	20	54	13048	13048	0
2d ID	01/12/45	-55	55	0	0	12993	12993	0
2d ID	01/13/45	-42	47	0	5	12951	12951	0
2d ID	01/14/45	-62	62	0	0	12889	12889	0
2d ID	01/15/45	-44	98	21	33	12845	12845	0
2d ID	01/16/45	-37	117	15	65	12808	12808	0
TOTALS:			3646	2226	928			0

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
4th ID	12/16/44	-63	64	1	0	12937	12871	66
4th ID	12/17/44	-721	824	67	36	12216	12216	0
4th ID	12/18/44	700	120	37	783	12908	12916	-8
4th ID	12/19/44	-23	53	30	0	12862	12885	-23
4th ID	12/20/44	-116	116	0	0	12746	12746	0
4th ID	12/21/44	-128	129	1	0	12618	12618	0
4th ID	12/22/44	-1	157	30	126	12617	12617	0
4th ID	12/23/44	-122	145	15	8	12495	12495	0
4th ID	12/24/44	-100	120	13	7	12395	12395	0
4th ID	12/25/44	-2	49	0	47	12392	12393	-1
4th ID	12/26/44	609	59	650	18	13005	13001	4
4th ID	12/27/44	484	65	530	19	13486	13489	-3
4th ID	12/28/44	392	166	521	37	13843	13878	-35
4th ID	12/29/44	9	43	34	18	13852	13852	0
4th ID	12/30/44	-35	61	14	12	13819	13817	2
4th ID	12/31/44	46	42	88	0	13864	13865	-1
4th ID	01/01/45	-23	27	0	4	13837	13841	-4
4th ID	01/02/45	17	55	2	70	13835	13854	-19
4th ID	01/03/45	-13	34	14	7	13818	13822	-4
4th ID	01/04/45	70	44	107	7	13892	13888	4
4th ID	01/05/45	-21	45	3	21	13863	13871	-8
4th ID	01/06/45	38	39	4	73	13897	13901	-4
4th ID	01/07/45	48	54	102	0	13942	13945	-3
4th ID	01/08/45	5	53	5	53	13946	13947	-1
4th ID	01/09/45	15	55	49	21	13960	13961	-1
4th ID	01/10/45	34	34	49	19	13992	13994	-2
4th ID	01/11/45	109	38	78	69	14099	14101	-2
4th ID	01/12/45	3	45	19	29	14102	14102	0
4th ID	01/13/45	12	31	1	42	14113	14114	-1
4th ID	01/14/45	21	67	28	60	14135	14134	1
4th ID	01/15/45	75	38	52	61	14210	14210	0
4th ID	01/16/45	16	43	16	43	14225	14226	-1
TOTALS:			2915	2560	1690			-44

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
Sth ID	12/25/44	-264	264	0	0	13447	13450	-3
Sth ID	12/26/44	-175	219	27	17	13273	13272	1
Sth ID	12/27/44	193	439	388	244	13467	13466	1
Sth ID	12/28/44	-161	161	0	0	13307	13306	1
Sth ID	12/29/44	-91	91	0	0	13219	13216	3
Sth ID	12/30/44	-74	74	0	0	13152	13145	7
Sth ID	12/31/44	799	36	513	322	13964	13951	13
Sth ID	01/01/45	10	44	33	21	13964	13974	-10
Sth ID	01/02/45	-37	37	0	0	13926	13927	-1
Sth ID	01/03/45	16	42	36	22	13937	13942	-5
Sth ID	01/04/45	-25	25	0	0	13923	13912	11
Sth ID	01/05/45	-31	31	0	0	13894	13892	2
Sth ID	01/06/45	-26	26	0	0	13869	13868	1
Sth ID	01/07/45	-6	30	15	9	13861	13863	-2
Sth ID	01/08/45	18	31	30	19	13879	13879	0
Sth ID	01/09/45	26	26	32	20	13908	13905	3
Sth ID	01/10/45	-25	25	0	0	13883	13883	0
Sth ID	01/11/45	108	24	81	51	13990	13991	-1
Sth ID	01/12/45	11	20	19	12	14001	14001	0
Sth ID	01/13/45	3	20	14	9	14004	14004	0
Sth ID	01/14/45	-2	26	15	9	14002	14002	0
Sth ID	01/15/45	35	24	36	23	14037	14037	0
Sth ID	01/16/45	20	26	28	18	14057	14057	0
TOTALS:			1741	1267	796			21

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
8th ID	12/16/44	234	196	33	397	13035	13035	0
8th ID	12/17/44	-90	186	16	80	12945	12945	0
8th ID	12/18/44	104	71	1	174	13049	13049	0
8th ID	12/19/44	-84	84	0	0	12946	12965	-19
8th ID	12/20/44	-23	64	2	39	12959	12923	36
8th ID	12/21/44	-67	79	0	12	12892	12892	0
8th ID	12/22/44	54	68	116	6	12969	12946	23
8th ID	12/23/44	-99	111	0	12	12869	12870	-1
8th ID	12/24/44	-109	115	0	6	12740	12760	-20
8th ID	12/25/44	-92	98	0	6	12645	12648	-3
8th ID	12/26/44	-138	169	1	30	12505	12507	-2
8th ID	12/27/44	-52	115	63	0	12453	12453	0
8th ID	12/28/44	-76	87	1	10	12376	12377	-1
8th ID	12/29/44	-15	56	22	19	12364	12361	3
8th ID	12/30/44	-35	69	9	25	12328	12329	-1
8th ID	12/31/44	-2	43	37	4	12322	12326	-4
8th ID	01/01/45	74	38	105	7	12396	12396	0
8th ID	01/02/45	104	53	152	5	12506	12500	6
8th ID	01/03/45	5	45	43	7	12511	12511	0
8th ID	01/04/45	4	39	32	11	12511	12515	-4
8th ID	01/05/45	279	49	307	21	12789	12790	-1
8th ID	01/06/45	75	30	105	0	12868	12864	4
8th ID	01/07/45	135	40	169	6	13000	13003	-3
8th ID	01/08/45	56	31	78	9	13054	13056	-2
8th ID	01/09/45	40	25	39	26	13093	13094	-
8th ID	01/10/45	0	24	11	13	13092	13093	-
8th ID	01/11/45	45	27	55	17	13134	13137	-3
8th ID	01/12/45	-32	61	16	13	13097	13102	-5
8th ID	01/13/45	55	37	92	0	13152	13152	0
8th ID	01/14/45	121	29	123	27	13273	13273	0
8th ID	01/15/45	59	23	79	3	13324	13332	-8
8th ID	01/16/45	33	39	55	17	13357	13357	0
TOTALS:			2201	1762	1002			-7

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
9th ID	12/16/44	-59	182	72	51	13338	13338	0
9th ID	12/17/44	-97	155	37	21	13241	13241	0
9th ID	12/18/44	97	114	66	145	13338	13338	0
9th ID	12/19/44	-44	44	0	0	13292	13294	-2
9th ID	12/20/44	-13	31	12	6	13279	13279	0
9th ID	12/21/44	-20	20	0	0	13223	13259	-36
9th ID	12/22/44	60	80	90	50	13283	13283	0
9th ID	12/23/44	-24	90	43	23	13259	13259	0
9th ID	12/24/44	281	203	313	171	13540	13540	0
9th ID	12/25/44	-17	78	39	22	13523	13523	0
9th ID	12/26/44	-63	63	0	0	13396	13460	-64
9th ID	12/27/44	-72	72	0	0	13304	13324	-20
9th ID	12/28/44	482	88	368	202	13786	13786	0
9th ID	12/29/44	105	83	121	67	13891	13891	0
9th ID	12/30/44	66	41	55	52	13957	13957	0
9th ID	12/31/44	4	72	49	27	13961	13961	0
9th ID	01/01/45	-56	71	0	15	13859	13905	-46
9th ID	01/02/45	-57	57	0	0	13805	13802	3
9th ID	01/03/45	83	77	4	156	13907	13888	19
9th ID	01/04/45	-33	59	12	14	13870	13874	-4
9th ID	01/05/45	-42	73	3	28	13826	13820	-6
9th ID	01/06/45	-58	58	0	0	13759	13768	-9
9th ID	01/07/45	28	76	1	103	13781	13787	-6
9th ID	01/08/45	-29	59	2	28	13784	13752	32
9th ID	01/09/45	-62	62	0	0	13760	13722	38
9th ID	01/10/45	0	71	46	25	13760	13760	0
9th ID	01/11/45	0	71	4	67	13819	13760	59
9th ID	01/12/45	-58	58	0	0	13799	13761	38
9th ID	01/13/45	-13	59	11	35	13781	13786	-5
9th ID	01/14/45	-27	45	2	16	13775	13754	21
9th ID	01/15/45	-39	39	0	0	13768	13736	32
9th ID	01/16/45	29	66	1	94	13711	13797	-86
TOTALS:			2417	1351	1418			-38

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
26th ID	12/22/44	-86	115	10	19	14544	14544	0
26th ID	12/23/44	-126	160	34	0	14418	14418	0
26th ID	12/24/44	-138	195	10	47	14280	14280	0
26th ID	12/25/44	-183	183	0	0	14088	14097	-9
26th ID	12/26/44	-212	277	65	0	13874	13876	-2
26th ID	12/27/44	-52	113	17	44	13822	13822	0
26th ID	12/28/44	-69	137	28	40	13753	13753	0
26th ID	12/29/44	-172	172	0	0	13561	13581	-20
26th ID	12/30/44	-155	183	28	0	13404	13406	-2
26th ID	12/31/44	-212	276	1	63	13192	13192	0
26th ID	01/01/45	260	165	425	0	13452	13452	0
26th ID	01/02/45	-188	192	0	4	13264	13264	0
26th ID	01/03/45	-175	185	10	0	13089	13089	0
26th ID	01/04/45	-222	322	58	42	12867	12867	0
26th ID	01/05/45	-123	174	11	40	12744	12744	0
26th ID	01/06/45	-94	135	29	12	12650	12650	0
26th ID	01/07/45	-40	120	18	62	12610	12610	0
26th ID	01/08/45	-48	100	45	7	12562	12562	0
26th ID	01/09/45	-80	167	48	39	12482	12482	0
26th ID	01/10/45	-171	186	15	0	12311	12311	0
26th ID	01/11/45	-139	173	18	16	12172	12172	0
26th ID	01/12/45	-120	130	0	0	12050	12052	-2
26th ID	01/13/45	-73	120	41	6	11977	11977	0
26th ID	01/14/45	-67	106	39	0	11906	11910	-4
26th ID	01/15/45	-108	146	1	37	11798	11798	0
26th ID	01/16/45	112	69	144	37	11910	11910	0
TOTALS:			4291	1095	515			-3

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
28th ID	12/16/44	-180	180	0	0	14074	14074	0
28th ID	12/17/44	-684	684	0	0	13390	13390	0
28th ID	12/18/44	-752	752	0	0	12638	12638	0
28th ID	12/19/44	-759	759	0	0	11879	11879	0
28th ID	12/20/44	-1389	1389	0	0	10490	10490	0
28th ID	12/21/44	81	123	0	204	10571	10571	0
28th ID	12/22/44	-1141	1164	15	8	9430	9430	0
28th ID	12/23/44	-127	148	14	7	9303	9303	0
28th ID	12/24/44	-111	111	0	0	9192	9192	0
28th ID	12/25/44	-3	43	40	0	9189	9189	0
28th ID	12/26/44	46	178	224	0	9235	9235	0
28th ID	12/27/44	-3	60	0	57	9232	9232	0
28th ID	12/28/44	-19	70	10	41	9213	9213	0
28th ID	12/29/44	-10	51	4	37	9203	9203	0
28th ID	12/30/44	35	14	20	29	9238	9238	0
28th ID	12/31/44	36	19	37	18	9274	9274	0
28th ID	01/01/45	98	8	106	0	9372	9372	0
28th ID	01/02/45	-1	1	0	0	9371	9371	0
28th ID	01/03/45	3	7	10	0	9368	9374	-6
28th ID	01/04/45	48	48	58	38	9416	9416	0
28th ID	01/05/45	92	16	102	6	9508	9508	0
28th ID	01/06/45	57	39	65	31	9565	9565	0
28th ID	01/07/45	0	48	1	47	9565	9565	0
28th ID	01/08/45	-244	336	92	0	9285	9321	-36
28th ID	01/09/45	20	13	33	0	9274	9305	-31
28th ID	01/10/45	-44	44	0	0	9230	9230	0
28th ID	01/11/45	5	2	7	0	9227	9235	-8
28th ID	01/12/45	37	1	38	0	9254	9264	-10
28th ID	01/13/45	1005	9	585	429	11059	10259	800
28th ID	01/14/45	817	9	675	151	11076	11076	0
28th ID	01/15/45	586	15	601	0	11662	11662	0
TOTALS:			6341	2737	1103			-91

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURMT STR	CALC STR	DELTA
29th ID	12/16/44	-7	25	12	6	13444	13444	0
29th ID	12/17/44	19	17	24	12	13463	13463	0
29th ID	12/18/44	10	22	21	11	13473	13473	0
29th ID	12/19/44	81	18	64	35	13555	13554	1
29th ID	12/20/44	1	17	12	6	13569	13556	13
29th ID	12/21/44	18	18	24	12	13583	13587	-4
29th ID	12/22/44	58	22	52	28	13641	13641	0
29th ID	12/23/44	-18	27	6	3	13624	13623	1
29th ID	12/24/44	-19	19	0	0	13605	13605	0
29th ID	12/25/44	-36	36	0	0	13569	13569	0
29th ID	12/26/44	-17	18	1	0	13551	13552	-1
29th ID	12/27/44	-9	25	10	6	13543	13542	1
29th ID	12/28/44	6	20	17	9	13549	13549	0
29th ID	12/29/44	-24	25	1	0	13525	13525	0
29th ID	12/30/44	40	20	39	21	13562	13565	-3
29th ID	12/31/44	39	20	38	21	13600	13601	-1
29th ID	01/01/45	22	13	23	12	13619	13622	-3
29th ID	01/02/45	3	15	12	6	13623	13622	1
29th ID	01/03/45	64	18	53	29	13686	13687	-1
29th ID	01/04/45	12	24	23	13	13698	13698	0
29th ID	01/05/45	-10	15	3	2	13688	13688	0
29th ID	01/06/45	59	22	52	29	13747	13747	0
29th ID	01/07/45	10	9	12	7	13757	13757	0
29th ID	01/08/45	-5	25	13	7	13752	13752	0
29th ID	01/09/45	33	21	35	19	13785	13785	0
29th ID	01/10/45	50	22	47	25	13837	13835	2
29th ID	01/11/45	40	8	31	17	13877	13877	0
29th ID	01/12/45	14	10	16	8	13891	13891	0
29th ID	01/13/45	-6	16	6	4	13885	13885	0
29th ID	01/14/45	-9	18	6	3	13876	13876	0
29th ID	01/15/45	32	7	25	14	13908	13908	0
29th ID	01/16/45	20	10	19	11	13929	13928	1
TOTALS:			602	697	376			7

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
30th ID	12/16/44	-14	25	0	11	14011	14017	-6
30th ID	12/17/44	-23	31	0	8	14003	13988	15
30th ID	12/18/44	-8	14	0	6	14005	13995	10
30th ID	12/19/44	-100	105	0	5	13504	13905	-401
30th ID	12/20/44	-356	362	0	6	13580	13148	432
30th ID	12/21/44	-216	240	0	24	13335	13364	-29
30th ID	12/22/44	-51	99	1	47	13322	13284	38
30th ID	12/23/44	-91	108	0	17	13260	13231	29
30th ID	12/24/44	193	204	188	209	13520	13453	67
30th ID	12/25/44	-108	130	0	22	13339	13412	-73
30th ID	12/26/44	-20	49	0	29	13357	13319	38
30th ID	12/27/44	-5	52	26	21	13340	13352	-12
30th ID	12/28/44	-36	64	1	27	13297	13304	-7
30th ID	12/29/44	87	44	63	68	13402	13384	18
30th ID	12/30/44	197	47	162	82	13579	13599	-20
30th ID	12/31/44	34	36	9	61	13642	13613	29
30th ID	01/01/45	-45	61	0	16	13612	13597	15
30th ID	01/02/45	1	24	11	14	13604	13613	-9
30th ID	01/03/45	78	31	2	107	13690	13682	8
30th ID	01/04/45	188	40	145	83	13878	13878	0
30th ID	01/05/45	-32	49	4	13	13850	13846	4
30th ID	01/06/45	-24	47	4	19	13858	13826	32
30th ID	01/07/45	87	45	97	35	13969	13945	24
30th ID	01/08/45	-28	41	0	13	13944	13941	3
30th ID	01/09/45	-12	33	7	14	13964	13932	32
30th ID	01/10/45	22	26	14	34	13980	13986	-6
30th ID	01/11/45	3	52	17	38	14005	13983	22
30th ID	01/12/45	24	43	10	57	14031	14029	2
30th ID	01/13/45	-225	248	0	23	13839	13806	33
30th ID	01/14/45	-326	332	0	6	13532	13513	19
30th ID	01/15/45	-334	349	0	15	13245	13198	47
30th ID	01/16/45	-234	263	1	28	13297	13011	286
TOTALS:			3294	762	1158			640

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
35th ID	12/27/44	-77	80	2	1	14085	14102	-17
35th ID	12/28/44	-59	63	3	1	14011	14026	-15
35th ID	12/29/44	-128	132	3	1	13883	13883	0
35th ID	12/30/44	-172	183	7	4	13724	13711	13
35th ID	12/31/44	-453	491	25	13	13269	13271	-2
35th ID	01/01/45	-124	211	56	31	13145	13145	0
35th ID	01/02/45	-102	210	70	38	13043	13043	0
35th ID	01/03/45	-136	169	8	25	12907	12907	0
35th ID	01/04/45	-312	312	0	0	12592	12595	-3
35th ID	01/05/45	-221	312	91	0	12376	12371	5
35th ID	01/06/45	-7	141	70	64	12369	12369	0
35th ID	01/07/45	-148	246	63	35	12221	12221	0
35th ID	01/08/45	557	41	386	212	12778	12778	0
35th ID	01/09/45	-276	289	8	5	12505	12502	3
35th ID	01/10/45	-72	122	32	18	12445	12433	12
35th ID	01/11/45	27	63	58	32	12459	12472	-13
35th ID	01/12/45	-54	141	56	31	12405	12405	0
35th ID	01/13/45	-83	142	38	21	12294	12322	-28
35th ID	01/14/45	-6	65	38	21	12251	12288	-37
35th ID	01/15/45	-115	115	0	0	12135	12136	-1
35th ID	01/16/45	-44	99	36	19	12087	12091	-4
TOTALS:			3627	1050	572			-87

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
75th ID	12/23/44	-14	14	0	0	13914	13914	0
75th ID	12/24/44	-12	12	0	0	13902	13902	0
75th ID	12/25/44	-93	93	0	0	13809	13809	0
75th ID	12/26/44	-195	195	0	0	13614	13614	0
75th ID	12/27/44	-163	163	0	0	13450	13451	-1
75th ID	12/28/44	-191	191	0	0	13259	13259	0
75th ID	12/29/44	-63	63	0	0	13196	13196	0
75th ID	12/30/44	-116	116	0	0	13096	13080	16
75th ID	12/31/44	-64	64	0	0	13032	13032	0
75th ID	01/01/45	488	63	356	195	13520	13520	0
75th ID	01/02/45	-45	45	0	0	13475	13475	0
75th ID	01/03/45	-197	197	0	0	13278	13278	0
75th ID	01/04/45	-95	95	0	0	13183	13183	0
75th ID	01/05/45	-95	95	0	0	13088	13088	0
75th ID	01/06/45	-95	95	0	0	12993	12993	0
75th ID	01/07/45	-102	102	0	0	12891	12891	0
75th ID	01/08/45	0	51	33	18	12881	12891	-10
75th ID	01/09/45	-75	75	0	0	12800	12806	-6
75th ID	01/10/45	0	75	48	27	12800	12800	0
75th ID	01/11/45	-236	236	0	0	12520	12564	-44
75th ID	01/12/45	-70	152	53	29	12450	12450	0
75th ID	01/13/45	47	228	177	98	12497	12497	0
75th ID	01/14/45	198	92	187	103	12695	12695	0
75th ID	01/15/45	-93	93	0	0	12607	12602	5
75th ID	01/16/45	-123	123	0	0	12460	12484	-24
TOTALS:			2728	854	470			-64

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
78th ID	12/16/44	-532	532	0	0	12936	12892	44
78th ID	12/17/44	-680	680	0	0	12256	12256	0
78th ID	12/18/44	-130	440	0	310	12126	12126	0
78th ID	12/19/44	-68	68	0	0	12058	12058	0
78th ID	12/20/44	-110	110	0	0	11939	11948	-9
78th ID	12/21/44	-63	63	0	0	11865	11876	-11
78th ID	12/22/44	-48	63	11	4	11817	11817	0
78th ID	12/23/44	-27	38	8	3	11807	11790	17
78th ID	12/24/44	56	36	69	23	11863	11863	0
78th ID	12/25/44	-21	21	0	0	11842	11842	0
78th ID	12/26/44	-21	21	0	0	11821	11821	0
78th ID	12/27/44	-45	45	0	0	11759	11776	-17
78th ID	12/28/44	-33	33	0	0	11726	11726	0
78th ID	12/29/44	-14	20	5	1	11712	11712	0
78th ID	12/30/44	10	27	28	9	11722	11722	0
78th ID	12/31/44	-31	38	5	2	11691	11691	0
78th ID	01/01/45	98	12	104	6	11789	11789	0
78th ID	01/02/45	175	24	188	11	11964	11964	0
78th ID	01/03/45	52	29	77	4	12017	12016	1
78th ID	01/04/45	-27	37	9	1	11990	11990	0
78th ID	01/05/45	374	19	372	21	12364	12364	0
78th ID	01/06/45	439	31	445	25	12803	12803	0
78th ID	01/07/45	486	20	479	27	13289	13289	0
78th ID	01/08/45	6	22	26	?	13295	13295	0
78th ID	01/09/45	-7	24	16	1	13288	13288	0
78th ID	01/10/45	-74	77	3	0	13224	13214	10
78th ID	01/11/45	-32	54	21	1	13192	13192	0
78th ID	01/12/45	-78	94	15	1	13114	13114	0
78th ID	01/13/45	59	51	104	6	13173	13173	0
78th ID	01/14/45	172	46	206	12	13340	13345	-5
78th ID	01/15/45	145	38	173	10	13480	13485	-5
78th ID	01/16/45	255	38	277	16	13735	13735	0
TOTALS:			2851	2641	496			25

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
80th ID	12/21/44	23	14	24	13	13943	13957	-14
80th ID	12/22/44	-52	52	0	0	13891	13891	0
80th ID	12/23/44	-212	214	2	0	13683	13679	4
80th ID	12/24/44	-170	213	28	15	13513	13513	0
80th ID	12/25/44	-179	179	0	0	13333	13334	-1
80th ID	12/26/44	-681	681	0	0	12696	12652	44
80th ID	12/27/44	-75	379	196	108	12621	12621	0
80th ID	12/28/44	-59	284	145	80	12515	12562	-47
80th ID	12/29/44	893	216	686	423	13447	13408	39
80th ID	12/30/44	-150	163	8	5	13284	13297	-13
80th ID	12/31/44	711	102	482	331	14001	13995	6
80th ID	01/01/45	-114	114	0	0	13887	13887	0
80th ID	01/02/45	-93	93	0	0	13811	13794	17
80th ID	01/03/45	-122	122	0	0	13697	13689	8
80th ID	01/04/45	-11	34	15	8	13629	13686	3
80th ID	01/05/45	89	43	85	47	13795	13778	17
80th ID	01/06/45	-94	124	19	11	13701	13701	0
80th ID	01/07/45	-126	126	0	0	13560	13575	-15
80th ID	01/08/45	-58	91	21	12	13461	13502	-41
80th ID	01/09/45	-97	97	0	0	13364	13364	0
80th ID	01/10/45	-48	48	0	0	13332	13316	16
80th ID	01/11/45	71	61	85	47	13404	13403	1
80th ID	01/12/45	-54	78	16	8	13347	13350	-3
80th ID	01/13/45	-40	84	28	16	13310	13307	3
80th ID	01/14/45	-6	44	25	13	13297	13304	-7
80th ID	01/15/45	-83	108	16	9	13214	13214	0
80th ID	01/16/45	22	55	50	27	13236	13236	0
TOTALS:			3819	1931	1173			17

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
83d ID	12/16/44	-116	185	34	35	12369	12369	0
83d ID	12/17/44	-128	141	0	13	12241	12241	0
83d ID	12/18/44	-93	115	1	21	12148	12148	0
83d ID	12/19/44	-66	92	2	24	12082	12082	0
83d ID	12/20/44	305	59	307	57	12387	12387	0
83d ID	12/21/44	15	41	1	55	12402	12402	0
83d ID	12/22/44	-17	51	1	33	12385	12385	0
83d ID	12/23/44	-13	27	5	9	12372	12372	0
83d ID	12/24/44	-11	53	15	27	12361	12361	0
83d ID	12/25/44	0	0	0	0	12361	12361	0
83d ID	12/26/44	0	0	0	0	12361	12361	0
83d ID	12/27/44	-16	21	1	4	12345	12345	0
83d ID	12/28/44	121	61	175	7	12466	12466	0
83d ID	12/29/44	348	88	406	30	12814	12814	0
83d ID	12/30/44	162	80	237	5	12976	12976	0
83d ID	12/31/44	0	0	0	0	12976	12976	0
83d ID	01/01/45	9	83	77	15	12985	12985	0
83d ID	01/02/45	636	22	654	4	13621	13621	0
83d ID	01/03/45	-15	32	8	9	13606	13606	0
83d ID	01/04/45	-6	71	36	29	13600	13600	0
83d ID	01/05/45	-22	122	72	28	13578	13578	0
83d ID	01/06/45	-64	94	0	30	13514	13514	0
83d ID	01/07/45	-106	119	6	7	13408	13408	0
83d ID	01/08/45	-34	40	0	6	13374	13374	0
83d ID	01/09/45	-139	209	28	42	13235	13235	0
83d ID	01/10/45	-256	370	3	111	12979	12979	0
83d ID	01/11/45	-144	175	5	26	12835	12835	0
83d ID	01/12/45	-189	262	0	73	12646	12646	0
83d ID	01/13/45	-201	310	1	108	12445	12445	0
83d ID	01/14/45	-290	300	0	10	12155	12155	0
83d ID	01/15/45	-410	411	0	1	11745	11745	0
83d ID	01/16/45	332	236	363	205	12077	12077	0
TOTALS:			3870	2438	1024			0

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
84th ID	12/16/44	-49	57	5	3	12865	12865	0
84th ID	12/17/44	-15	26	7	4	12850	12850	0
84th ID	12/18/44	-9	27	12	6	12841	12841	0
84th ID	12/19/44	-20	31	7	4	12821	12821	0
84th ID	12/20/44	-8	21	8	5	12813	12813	0
84th ID	12/21/44	-7	7	0	0	12806	12806	0
84th ID	12/22/44	-30	30	0	0	12776	12776	0
84th ID	12/23/44	-70	70	0	0	12706	12706	0
84th ID	12/24/44	27	25	0	52	12782	12733	49
84th ID	12/25/44	-43	204	104	57	12739	12739	0
84th ID	12/26/44	-7	107	0	100	12732	12732	0
84th ID	12/27/44	243	179	273	149	12975	12975	0
84th ID	12/28/44	226	151	244	133	13201	13201	0
84th ID	12/29/44	0	65	42	23	13219	13201	18
84th ID	12/30/44	187	36	144	79	13381	13406	-25
84th ID	12/31/44	115	50	90	75	13509	13496	13
84th ID	01/01/45	100	36	88	48	13623	13609	14
84th ID	01/02/45	156	23	116	63	13779	13779	0
84th ID	01/03/45	-11	193	118	64	13768	13768	0
84th ID	01/04/45	-9	153	93	51	13759	13759	0
84th ID	01/05/45	-21	168	95	52	13738	13738	0
84th ID	01/06/45	-97	129	21	11	13641	13641	0
84th ID	01/07/45	-39	201	105	57	13602	13602	0
84th ID	01/08/45	-95	105	6	4	13507	13507	0
84th ID	01/09/45	-157	157	0	0	13350	13350	0
84th ID	01/10/45	-70	159	57	32	13280	13280	0
84th ID	01/11/45	14	105	77	42	13294	13294	0
84th ID	01/12/45	-102	102	0	0	13189	13192	-3
84th ID	01/13/45	-86	183	63	34	13103	13103	0
84th ID	01/14/45	-93	178	55	30	13010	13010	0
84th ID	01/15/45	-78	209	85	46	12932	12932	0
84th ID	01/16/45	-91	91	0	0	12837	12841	-4
TOTALS:			3278	1915	1224			62

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RID	CURNT STR	CALC STR	DELTA
87th ID	12/30/44	-45	59	9	5	11830	11830	0
87th ID	12/31/44	-73	77	3	1	11757	11757	0
87th ID	01/01/45	-77	93	10	6	11680	11680	0
87th ID	01/02/45	-150	150	0	0	11530	11530	0
87th ID	01/03/45	250	139	251	138	11785	11780	5
87th ID	01/04/45	-4	91	56	31	11781	11781	0
87th ID	01/05/45	-89	98	6	3	11683	11692	-9
87th ID	01/06/45	-164	169	3	2	11519	11519	0
87th ID	01/07/45	-62	109	30	17	11429	11457	-28
87th ID	01/08/45	-121	156	8	27	11308	11308	0
87th ID	01/09/45	-61	82	14	7	11246	11247	-1
87th ID	01/10/45	554	151	455	250	11800	11800	0
87th ID	01/11/45	-139	154	10	5	11675	11661	14
87th ID	01/12/45	-101	122	14	7	11574	11574	0
87th ID	01/13/45	-17	46	19	10	11557	11557	0
87th ID	01/14/45	292	36	211	117	11849	11849	0
87th ID	01/15/45	298	15	202	111	12147	12147	0
87th ID	01/16/45	459	30	316	173	12608	12606	0
TOTALS:			1777	1617	910			-19

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
90th ID	12/16/44	-57	57	0	0	11919	11919	0
90th ID	12/17/44	-55	55	0	0	11911	11864	47
90th ID	12/18/44	-15	15	0	0	11890	11896	-6
90th ID	12/19/44	-19	46	17	10	11885	11871	14
90th ID	12/20/44	-7	43	23	13	11874	11878	-4
90th ID	12/21/44	-24	24	0	0	11849	11850	-1
90th ID	12/22/44	36	40	43	33	11875	11885	-10
90th ID	12/23/44	-103	171	50	18	11758	11772	-14
90th ID	12/24/44	1337	40	890	487	13095	13095	0
90th ID	12/25/44	-30	30	0	0	13064	13065	-1
90th ID	12/26/44	797	38	539	296	13861	13861	0
90th ID	12/27/44	309	37	224	122	14170	14170	0
90th ID	12/28/44	6	32	25	13	14171	14176	-5
90th ID	12/29/44	32	30	40	22	14227	14203	24
90th ID	12/30/44	-28	30	2	0	14201	14199	2
90th ID	12/31/44	-33	33	0	0	14171	14168	3
90th ID	01/01/45	57	25	53	29	14224	14228	-4
90th ID	01/02/45	-23	23	0	0	14201	14201	0
90th ID	01/03/45	-10	28	12	6	14195	14191	4
90th ID	01/04/45	-28	28	0	0	14161	14167	-6
90th ID	01/05/45	-24	24	0	0	14139	14137	2
90th ID	01/06/45	-1	24	15	8	14180	14138	42
90th ID	01/07/45	-11	11	0	0	14169	14169	0
90th ID	01/08/45	-44	44	0	0	14090	14125	-35
90th ID	01/09/45	-6	142	88	48	14093	14084	9
90th ID	01/10/45	-208	208	0	0	13881	13885	-4
90th ID	01/11/45	-160	160	0	0	13722	13721	1
90th ID	01/12/45	-203	296	60	33	13520	13519	1
90th ID	01/13/45	-197	197	0	0	13322	13323	-1
90th ID	01/14/45	-113	182	45	24	13198	13209	-11
90th ID	01/15/45	-251	283	21	11	12958	12947	11
90th ID	01/16/45	-198	198	0	0	12753	12760	-7
TOTALS:			2594	2147	1173			51

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NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
99th ID	12/16/44	-51	255	132	72	13591	13591	0
99th ID	12/17/44	-199	199	0	0	13402	13392	10
99th ID	12/18/44	-845	845	0	0	12557	12557	0
99th ID	12/19/44	-514	514	0	0	12043	12043	0
99th ID	12/20/44	-404	404	0	0	11639	11639	0
99th ID	12/21/44	-85	85	0	0	11554	11554	0
99th ID	12/22/44	64	163	0	227	11668	11618	50
99th ID	12/23/44	-157	185	0	28	11511	11511	0
99th ID	12/24/44	-351	351	0	0	11160	11160	0
99th ID	12/25/44	4	39	28	15	11164	11164	0
99th ID	12/26/44	-33	33	0	0	11107	11131	-24
99th ID	12/27/44	-32	52	13	7	11075	11075	0
99th ID	12/28/44	-173	206	21	12	10902	10902	0
99th ID	12/29/44	4	92	50	46	10906	10906	0
99th ID	12/30/44	-169	193	0	24	10737	10737	0
99th ID	12/31/44	39	55	61	33	10776	10776	0
99th ID	01/01/45	-44	44	0	0	10723	10732	-9
99th ID	01/02/45	-34	34	0	0	10648	10689	-41
99th ID	01/03/45	461	47	328	180	11109	11109	0
99th ID	01/04/45	-46	46	0	0	11063	11063	0
99th ID	01/05/45	156	45	130	71	11219	11219	0
99th ID	01/06/45	317	31	225	123	11537	11536	1
99th ID	01/07/45	15	48	41	22	11552	11552	0
99th ID	01/08/45	-20	39	12	7	11532	11532	0
99th ID	01/09/45	489	47	346	190	12021	12021	0
99th ID	01/10/45	0	52	34	18	12021	12021	0
99th ID	01/11/45	26	64	58	32	12047	12047	0
99th ID	01/12/45	19	72	59	32	12066	12066	0
99th ID	01/13/45	-49	49	0	0	12009	12017	-8
99th ID	01/14/45	39	35	42	32	12048	12048	0
99th ID	01/15/45	170	46	140	76	12218	12218	0
99th ID	01/16/45	-76	76	0	0	12152	12142	10
TOTALS:			4446	1720	1247			-11

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
102d ID	12/16/44	-5	18	4	9	13057	13051	6
102d ID	12/17/44	4	8	2	10	13052	13061	-9
102d ID	12/18/44	-1	18	1	16	13047	13051	-4
102d ID	12/19/44	7	20	17	10	13060	13054	6
102d ID	12/20/44	-7	17	1	9	13047	13053	-6
102d ID	12/21/44	12	11	12	11	13060	13059	1
102d ID	12/22/44	-20	20	0	0	13041	13040	1
102d ID	12/23/44	-19	19	0	0	13026	13022	4
102d ID	12/24/44	-15	18	0	3	13008	13011	-3
102d ID	12/25/44	-27	27	0	0	12982	12981	1
102d ID	12/26/44	25	25	11	39	13012	13007	5
102d ID	12/27/44	-27	33	4	2	12988	12985	3
102d ID	12/28/44	-23	34	1	10	12970	12965	5
102d ID	12/29/44	-25	25	0	0	12942	12945	-3
102d ID	12/30/44	10	35	31	14	12957	12952	5
102d ID	12/31/44	-2	22	2	18	12958	12955	3
102d ID	01/01/45	-25	30	3	2	12934	12933	1
102d ID	01/02/45	84	16	96	4	13020	13018	2
102d ID	01/03/45	11	13	4	20	13043	13031	12
102d ID	01/04/45	-19	19	0	0	13022	13024	-2
102d ID	01/05/45	-12	18	3	3	13013	13010	3
102d ID	01/06/45	165	26	181	10	13177	13178	-1
102d ID	01/07/45	76	19	80	15	13270	13253	17
102d ID	01/08/45	-4	26	17	5	13251	13266	-15
102d ID	01/09/45	30	7	21	16	13282	13281	1
102d ID	01/10/45	-13	13	0	0	13263	13269	-6
102d ID	01/11/45	-17	30	5	8	13273	13246	27
102d ID	01/12/45	-5	18	5	8	13267	13268	-1
102d ID	01/13/45	213	20	231	2	13480	13480	0
102d ID	01/14/45	56	10	62	4	13544	13536	8
102d ID	01/15/45	5	19	14	10	13552	13549	3
102d ID	01/16/45	-10	19	4	5	13539	13542	-3
TOTALS:			653	812	263			61

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NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
104th ID	12/16/44	-21	148	11	116	13201	13201	0
104th ID	12/17/44	-139	173	1	33	13062	13062	0
104th ID	12/18/44	31	68	10	89	13106	13093	13
104th ID	12/19/44	5	57	0	62	13111	13111	0
104th ID	12/20/44	22	67	79	10	13133	13133	0
104th ID	12/21/44	71	47	60	58	13204	13204	0
104th ID	12/22/44	-19	49	0	30	13184	13185	-1
104th ID	12/23/44	-5	40	1	34	13179	13179	0
104th ID	12/24/44	0	19	0	19	13179	13179	0
104th ID	12/25/44	-19	29	0	10	13160	13160	0
104th ID	12/26/44	-25	50	0	25	13135	13135	0
104th ID	12/27/44	38	31	53	16	13173	13173	0
104th ID	12/28/44	-7	29	22	0	13163	13166	-3
104th ID	12/29/44	-28	28	0	0	13138	13135	3
104th ID	12/30/44	-22	32	10	0	13115	13116	-1
104th ID	12/31/44	-24	28	4	0	13077	13091	-14
104th ID	01/01/45	12	34	38	8	13089	13089	0
104th ID	01/02/45	116	41	106	51	13205	13205	0
104th ID	01/03/45	15	29	44	0	13220	13220	0
104th ID	01/04/45	-18	26	8	0	13182	13202	-20
104th ID	01/05/45	10	41	10	41	13192	13192	0
104th ID	01/06/45	92	31	77	46	13284	13284	0
104th ID	01/07/45	81	40	121	0	13365	13365	0
104th ID	01/08/45	47	23	36	34	13412	13412	0
104th ID	01/09/45	-11	31	20	0	13400	13401	-1
104th ID	01/10/45	-59	71	2	10	13341	13341	0
104th ID	01/11/45	63	24	24	63	13404	13404	0
104th ID	01/12/45	0	25	20	5	13404	13404	0
104th ID	01/13/45	26	29	32	23	13430	13430	0
104th ID	01/14/45	-7	35	13	15	13423	13423	0
104th ID	01/15/45	12	19	0	31	13435	13435	0
104th ID	01/16/45	225	41	243	23	13660	13660	0
TOTALS:			1435	1045	852			-24

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
106th ID	12/16/44	-14	35	0	21	13909	13912	-3
106th ID	12/17/44	-566	566	0	0	13343	13343	0
106th ID	12/18/44	-417	417	0	0	12926	12926	0
106th ID	12/19/44	-7276	7276	0	0	5650	5650	0
106th ID	12/20/44	-407	407	0	0	5243	5243	0
106th ID	12/21/44	-139	139	0	0	5104	5104	0
106th ID	12/22/44	-48	48	0	0	5056	5056	0
106th ID	12/23/44	-61	61	0	0	4995	4995	0
106th ID	12/24/44	-30	30	0	0	4965	4965	0
106th ID	12/25/44	-21	21	0	0	4944	4944	0
106th ID	12/26/44	-26	26	0	0	4918	4918	0
106th ID	12/27/44	-63	63	0	0	4855	4855	0
106th ID	12/28/44	-13	13	0	0	4842	4842	0
106th ID	12/29/44	-15	15	0	0	4827	4827	0
106th ID	12/30/44	-12	12	0	0	4815	4815	0
106th ID	12/31/44	-10	10	0	0	4805	4805	0
106th ID	01/01/45	729	35	494	270	5534	5534	0
106th ID	01/02/45	0	27	17	10	5534	5534	0
106th ID	01/03/45	-1	4	2	1	5533	5533	0
106th ID	01/04/45	43	3	30	16	5576	5576	0
106th ID	01/05/45	80	3	54	29	5656	5656	0
106th ID	01/06/45	34	2	23	13	5690	5690	0
106th ID	01/07/45	30	4	22	12	5720	5720	0
106th ID	01/08/45	14	6	13	7	5734	5734	0
106th ID	01/09/45	38	19	37	20	5772	5772	0
106th ID	01/10/45	0	24	16	8	5772	5772	0
106th ID	01/11/45	30	41	46	25	5802	5802	0
106th ID	01/12/45	-34	61	17	10	5768	5768	0
106th ID	01/13/45	-27	43	10	6	5741	5741	0
106th ID	01/14/45	-399	607	134	74	5342	5342	0
106th ID	01/15/45	-388	400	8	4	4954	4954	0
106th ID	01/16/45	390	91	0	481	5344	5344	0
TOTALS:			10509	923	1007			-3

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
2d AD	12/16/44	30	17	30	17	14541	14541	0
2d AD	12/17/44	-7	18	7	4	14549	14534	15
2d AD	12/18/44	-6	30	16	8	14542	14543	-1
2d AD	12/19/44	-7	25	12	6	14535	14535	0
2d AD	12/20/44	0	15	10	5	14535	14535	0
2d AD	12/21/44	0	10	6	4	14535	14535	0
2d AD	12/22/44	-5	5	0	0	14530	14530	0
2d AD	12/23/44	9	25	22	12	14539	14539	0
2d AD	12/24/44	0	22	1	21	14539	14539	0
2d AD	12/25/44	0	41	1	40	14539	14539	0
2d AD	12/26/44	-45	45	0	0	14491	14494	-3
2d AD	12/27/44	-65	104	4	35	14426	14426	0
2d AD	12/28/44	-28	64	1	35	14398	14398	0
2d AD	12/29/44	-80	84	4	0	14310	14318	-8
2d AD	12/30/44	75	21	96	0	14357	14385	-28
2d AD	12/31/44	32	21	53	0	14388	14389	-1
2d AD	01/01/45	-27	27	0	0	14360	14361	-1
2d AD	01/02/45	-41	41	0	0	14309	14319	-10
2d AD	01/03/45	30	143	112	61	14339	14339	0
2d AD	01/04/45	-89	133	28	16	14250	14250	0
2d AD	01/05/45	-147	147	0	0	14097	14103	-6
2d AD	01/06/45	-109	109	0	0	13942	13988	-46
2d AD	01/07/45	-17	162	94	51	13925	13925	0
2d AD	01/08/45	-134	134	0	0	13793	13791	2
2d AD	01/09/45	215	118	215	118	14008	14008	0
2d AD	01/10/45	-148	148	0	0	13878	13860	18
2d AD	01/11/45	29	91	78	42	13907	13907	0
2d AD	01/12/45	-166	166	0	0	13755	13741	14
2d AD	01/13/45	-155	211	36	20	13600	13600	0
2d AD	01/14/45	17	199	140	76	13617	13617	0
2d AD	01/15/45	-40	159	77	42	13577	13577	0
2d AD	01/16/45	-237	237	0	0	13355	13340	15
TOTALS:			2772	1043	613			-40

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
3d AD	12/16/44	-3	28	1	24	14399	14404	-5
3d AD	12/17/44	-22	22	0	0	14361	14377	4
3d AD	12/18/44	131	8	47	92	14515	14512	3
3d AD	12/19/44	-22	22	0	0	14493	14493	0
3d AD	12/20/44	-30	30	0	0	14446	14463	-17
3d AD	12/21/44	-27	115	33	55	14419	14419	0
3d AD	12/22/44	-120	120	0	0	14299	14299	0
3d AD	12/23/44	-33	33	0	0	14299	14266	33
3d AD	12/24/44	9	85	0	94	14333	14308	25
3d AD	12/25/44	-219	219	0	0	14114	14114	0
3d AD	12/26/44	-112	160	0	48	13982	14002	-20
3d AD	12/27/44	30	89	23	96	14012	14012	0
3d AD	12/28/44	-20	26	0	6	13992	13992	0
3d AD	12/29/44	58	30	4	84	14025	14050	-25
3d AD	12/30/44	269	21	244	46	14291	14294	-3
3d AD	12/31/44	44	10	20	34	14335	14335	0
3d AD	01/01/45	-17	17	0	0	14324	14318	6
3d AD	01/02/45	-20	22	2	0	14300	14304	-4
3d AD	01/03/45	-8	148	64	76	14300	14292	8
3d AD	01/04/45	-29	152	22	101	14271	14271	0
3d AD	01/05/45	-33	121	1	87	14215	14238	-23
3d AD	01/06/45	-59	71	6	6	14153	14156	-3
3d AD	01/07/45	-99	177	0	78	14045	14054	-9
3d AD	01/08/45	-120	121	1	0	13931	13925	6
3d AD	01/09/45	-37	196	159	0	13894	13894	0
3d AD	01/10/45	-4	78	1	73	13874	13890	-16
3d AD	01/11/45	49	65	44	70	13923	13923	0
3d AD	01/12/45	-12	80	31	37	13911	13911	0
3d AD	01/13/45	-75	181	49	57	13836	13836	0
3d AD	01/14/45	161	139	143	157	13997	13997	0
3d AD	01/15/45	54	145	61	138	14051	14051	0
3d AD	01/16/45	-96	139	2	41	13968	13955	13
TOTALS:			2870	958	1500			-27

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
4th AD	12/21/44	-19	20	1	0	9962	9964	-2
4th AD	12/22/44	-10	10	0	0	9952	9952	0
4th AD	12/23/44	189	11	29	171	10141	10141	0
4th AD	12/24/44	-105	116	7	4	10036	10036	0
4th AD	12/25/44	-175	175	0	0	9861	9861	0
4th AD	12/26/44	337	88	275	150	10198	10198	0
4th AD	12/27/44	395	77	305	167	10600	10593	7
4th AD	12/28/44	-43	54	7	4	10557	10557	0
4th AD	12/29/44	-97	100	2	1	10460	10460	0
4th AD	12/30/44	78	35	67	46	10525	10538	-13
4th AD	12/31/44	-139	141	2	0	10389	10386	3
4th AD	01/01/45	-105	113	5	3	10284	10284	0
4th AD	01/02/45	-105	105	0	0	10179	10179	0
4th AD	01/03/45	125	26	98	53	10304	10304	0
4th AD	01/04/45	-48	48	0	0	10256	10256	0
4th AD	01/05/45	-79	125	30	16	10177	10177	0
4th AD	01/06/45	-17	30	13	0	10167	10160	7
4th AD	01/07/45	-10	40	19	11	10157	10157	0
4th AD	01/08/45	-47	47	0	0	10088	10110	-22
4th AD	01/09/45	-21	21	0	0	10067	10067	0
4th AD	01/10/45	-32	42	6	4	10035	10035	0
4th AD	01/11/45	-55	55	0	0	9991	9980	11
4th AD	01/12/45	-64	111	30	17	9913	9927	-14
4th AD	01/13/45	59	32	13	78	9997	9972	25
4th AD	01/14/45	171	44	139	76	10168	10168	0
4th AD	01/15/45	33	6	25	14	10214	10201	13
4th AD	01/16/45	-6	15	6	3	10207	10208	-1
TOTALS:			1687	1079	818			14

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
Sth AD	12/16/44	-72	132	39	21	9712	9712	0
Sth AD	12/17/44	-68	84	16	0	9620	9644	-24
Sth AD	12/18/44	-70	80	10	0	9548	9550	-2
Sth AD	12/19/44	-7	26	19	0	9550	9541	9
Sth AD	12/20/44	-159	242	1	82	9505	9391	114
Sth AD	12/21/44	77	132	0	209	9501	9582	-81
Sth AD	12/22/44	-29	29	0	0	9472	9472	0
Sth AD	12/23/44	3	29	21	11	9475	9475	0
Sth AD	12/24/44	-42	42	0	0	9416	9433	-17
Sth AD	12/25/44	-27	27	0	0	9386	9389	-3
Sth AD	12/26/44	-10	19	6	3	9376	9376	0
Sth AD	12/27/44	-9	16	5	2	9367	9367	0
Sth AD	12/28/44	-25	25	0	0	9336	9342	-6
Sth AD	12/29/44	8	29	24	13	9344	9344	0
Sth AD	12/30/44	8	14	14	8	9352	9352	0
Sth AD	12/31/44	497	7	326	178	9849	9849	0
Sth AD	01/01/45	-9	13	3	1	9840	9840	0
Sth AD	01/02/45	-12	12	0	0	9818	9828	-10
Sth AD	01/03/45	37	6	28	15	9855	9855	0
Sth AD	01/04/45	-9	9	0	0	9846	9846	0
Sth AD	01/05/45	3	12	10	5	9849	9849	0
Sth AD	01/06/45	46	7	34	19	9895	9895	0
Sth AD	01/07/45	6	14	13	7	9901	9901	0
Sth AD	01/08/45	7	12	12	7	9908	9908	0
Sth AD	01/09/45	-1	11	6	4	9907	9907	0
Sth AD	01/10/45	0	16	10	6	9907	9907	0
Sth AD	01/11/45	15	22	24	13	9922	9922	0
Sth AD	01/12/45	16	18	22	12	9938	9938	0
Sth AD	01/13/45	-1	12	7	4	9937	9937	0
Sth AD	01/14/45	12	16	18	10	9949	9949	0
Sth AD	01/15/45	156	8	106	58	10105	10105	0
Sth AD	01/16/45	-7	7	0	0	10096	10098	-2
TOTALS:			1128	774	688			-22

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
6th AD	12/27/44	-16	18	1	1	10884	10860	24
6th AD	12/28/44	-29	29	0	0	10847	10855	-8
6th AD	12/29/44	-34	35	0	1	10812	10813	-1
6th AD	12/30/44	-12	16	2	2	10813	10800	13
6th AD	12/31/44	-10	55	28	17	10805	10803	2
6th AD	01/01/45	-86	96	7	3	10718	10719	-1
6th AD	01/02/45	-117	117	0	0	10612	10601	11
6th AD	01/03/45	-252	265	9	4	10357	10360	-3
6th AD	01/04/45	-211	295	57	27	10146	10146	0
6th AD	01/05/45	-148	205	39	18	9998	9998	0
6th AD	01/06/45	-115	115	0	0	9886	9883	3
6th AD	01/07/45	-38	142	71	33	9844	9848	-4
6th AD	01/08/45	154	90	166	78	9967	9998	-31
6th AD	01/09/45	-96	137	28	13	9871	9871	0
6th AD	01/10/45	-112	116	3	1	9759	9759	0
6th AD	01/11/45	-64	91	18	9	9701	9695	6
6th AD	01/12/45	23	76	67	32	9726	9724	2
6th AD	01/13/45	-59	64	3	2	9668	9667	1
6th AD	01/14/45	101	158	176	83	9769	9769	0
6th AD	01/15/45	-92	139	32	15	9676	9677	-1
6th AD	01/16/45	291	66	243	114	9967	9967	0
TOTALS:			2325	950	453			13

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
7th AD	12/16/44	17	7	1	23	10640	10640	0
7th AD	12/17/44	-29	29	0	0	10640	10611	29
7th AD	12/18/44	-99	99	0	0	10562	10541	21
7th AD	12/19/44	-103	114	11	0	10452	10459	-7
7th AD	12/20/44	-21	21	0	0	10431	10431	0
7th AD	12/21/44	-47	47	0	0	10384	10384	0
7th AD	12/22/44	-22	22	0	0	10362	10362	0
7th AD	12/23/44	-202	202	0	0	10160	10160	0
7th AD	12/24/44	-193	216	23	0	9967	9967	0
7th AD	12/25/44	-402	428	26	0	9565	9565	0
7th AD	12/26/44	-293	293	0	0	9272	9272	0
7th AD	12/27/44	-86	86	0	0	9186	9186	0
7th AD	12/28/44	295	64	0	359	9481	9481	0
7th AD	12/29/44	-43	43	0	0	9438	9438	0
7th AD	12/30/44	212	22	142	92	9650	9650	0
7th AD	12/31/44	30	10	25	15	9682	9680	2
7th AD	01/01/45	257	19	173	103	9952	9939	13
7th AD	01/02/45	-16	16	0	0	9930	9936	-6
7th AD	01/03/45	8	21	18	11	9940	9938	2
7th AD	01/04/45	31	19	30	20	10011	9971	40
7th AD	01/05/45	-7	19	7	5	9989	10004	-15
7th AD	01/06/45	89	23	68	44	10075	10078	-3
7th AD	01/07/45	-9	19	6	4	10067	10066	1
7th AD	01/08/45	-16	16	0	0	10052	10051	1
7th AD	01/09/45	-12	12	0	0	10036	10040	-4
7th AD	01/10/45	136	23	33	126	10136	10172	-36
7th AD	01/11/45	35	37	0	72	10195	10171	24
7th AD	01/12/45	-4	23	7	12	10204	10191	13
7th AD	01/13/45	260	16	272	4	10471	10464	7
7th AD	01/14/45	39	14	37	16	10515	10510	5
7th AD	01/15/45	-10	13	3	0	10498	10505	-7
7th AD	01/16/45	-4	20	16	0	10492	10494	-2
TOTALS:			2013	898	906			78

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
9th AD	12/16/44	-22	22	0	0	10669	10669	0
9th AD	12/17/44	-140	143	3	0	10529	10529	0
9th AD	12/18/44	-66	67	1	0	10463	10463	0
9th AD	12/19/44	-463	463	0	0	10000	10000	0
9th AD	12/20/44	-32	32	0	0	9968	9968	0
9th AD	12/21/44	-259	259	0	0	9709	9709	0
9th AD	12/22/44	-85	87	2	0	9624	9624	0
9th AD	12/23/44	-73	74	1	0	9551	9551	0
9th AD	12/24/44	-37	37	0	0	9517	9514	3
9th AD	12/25/44	-8	8	0	0	9509	9509	0
9th AD	12/26/44	-746	746	0	0	8723	8763	-40
9th AD	12/27/44	3()	64	350	14	9023	9023	0
9th AD	12/28/44	259	61	320	0	9282	9282	0
9th AD	12/29/44	-67	71	0	4	9215	9215	0
9th AD	12/30/44	-7	7	0	0	9208	9208	0
9th AD	12/31/44	75	20	93	2	9283	9283	0
9th AD	01/01/45	-37	43	1	5	9246	9246	0
9th AD	01/02/45	-35	43	2	6	9211	9211	0
9th AD	01/03/45	-2	11	8	1	9209	9209	0
9th AD	01/04/45	-4	4	0	0	9205	9205	0
9th AD	01/05/45	-9	9	0	0	9196	9196	0
9th AD	01/06/45	-12	12	0	0	9184	9184	0
9th AD	01/07/45	-19	24	5	0	9165	9165	0
9th AD	01/08/45	-13	13	0	0	9152	9152	0
9th AD	01/09/45	5	4	9	0	9157	9157	0
9th AD	01/10/45	79	2	79	2	9236	9236	0
9th AD	01/11/45	0	0	0	0	9236	9236	0
9th AD	01/12/45	-5	3	0	0	9233	9233	0
9th AD	01/13/45	16	4	20	0	9249	9249	0
9th AD	01/14/45	148	7	155	0	9397	9397	0
9th AD	01/15/45	-8	8	0	0	9389	9389	0
9th AD	01/16/45	170	26	195	1	9559	9559	0
TOTALS:			2374	1244	35			-37

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
10th AD	12/16/44	-12	20	8	0	9777	9777	0
10th AD	12/17/44	0	48	31	17	9777	9777	0
10th AD	12/18/44	-29	29	0	0	9747	9748	-1
10th AD	12/19/44	-85	140	36	19	9662	9662	0
10th AD	12/20/44	143	34	0	177	9857	9805	52
10th AD	12/21/44	-14	14	0	0	9843	9843	0
10th AD	12/22/44	-206	267	39	22	9637	9637	0
10th AD	12/23/44	-257	257	0	0	9380	9380	0
10th AD	12/24/44	316	44	233	127	9696	9696	0
10th AD	12/25/44	-103	115	8	4	9593	9593	0
10th AD	12/26/44	-529	529	0	0	9064	9064	0
10th AD	12/27/44	-16	16	0	0	9048	9048	0
10th AD	12/28/44	-17	22	3	2	9031	9031	0
10th AD	12/29/44	9	25	22	12	9046	9040	6
10th AD	12/30/44	-1	1	0	0	9039	9045	-6
10th AD	12/31/44	4	14	12	6	9043	9043	0
10th AD	01/01/45	-5	5	0	0	9038	9038	0
10th AD	01/02/45	-8	8	0	0	9030	9030	0
10th AD	01/03/45	-12	12	0	0	9018	9018	0
10th AD	01/04/45	4	10	9	5	9022	9022	0
10th AD	01/05/45	-7	7	0	0	9015	9015	0
10th AD	01/06/45	-13	13	0	0	9002	9002	0
10th AD	01/07/45	0	9	6	3	9002	9002	0
10th AD	01/08/45	-7	7	0	0	8995	8995	0
10th AD	01/09/45	85	14	64	35	9080	9080	0
10th AD	01/10/45	38	8	30	16	9118	9118	0
10th AD	01/11/45	144	5	96	53	9262	9262	0
10th AD	01/12/45	24	15	25	14	9286	9286	0
10th AD	01/13/45	-7	7	0	0	9279	9279	0
10th AD	01/14/45	508	17	339	186	9787	9787	0
10th AD	01/15/45	1	14	10	5	9788	9788	0
10th AD	01/16/45	-7	7	0	0	9781	9781	0
TOTALS:			1733	971	703			51

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
11th AD	12/26/44	-7	7	0	0	10729	10722	7
11th AD	12/27/44	-5	5	0	0	10717	10724	-7
11th AD	12/28/44	-7	7	0	0	10710	10710	0
11th AD	12/29/44	-17	17	0	0	10712	10693	19
11th AD	12/30/44	-137	137	0	0	10575	10575	0
11th AD	12/31/44	-215	215	0	0	10360	10360	0
11th AD	01/01/45	-214	218	4	0	10142	10146	-4
11th AD	01/02/45	-102	102	0	0	10022	10040	-18
11th AD	01/03/45	-19	19	0	0	10003	10003	0
11th AD	01/04/45	-205	205	0	0	9897	9798	99
11th AD	01/05/45	-161	166	5	0	9736	9736	0
11th AD	01/06/45	-51	59	8	0	9686	9685	1
11th AD	01/07/45	-23	44	21	0	9660	9663	-3
11th AD	01/08/45	-28	40	12	0	9632	9632	0
11th AD	01/09/45	-12	31	19	0	9588	9620	-32
11th AD	01/10/45	-64	85	21	0	9494	9524	-30
11th AD	01/11/45	-28	45	17	0	9464	9466	-2
11th AD	01/12/45	-23	23	0	0	9441	9441	0
11th AD	01/13/45	-88	121	33	0	9353	9353	0
11th AD	01/14/45	-100	100	0	0	9253	9253	0
11th AD	01/15/45	32	128	160	0	9289	9285	4
11th AD	01/16/45	-93	93	0	0	9190	9196	-6
TOTALS:			1867	300	0			28

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
17th AbnD	01/04/45	-574	574	0	0	12025	-574	12599
17th AbnD	01/05/45	-158	163	5	0	11977	11867	110
17th AbnD	01/06/45	-75	88	13	0	11308	11902	-594
17th AbnD	01/07/45	-943	957	14	0	10206	10365	-159
17th AbnD	01/08/45	-841	862	21	0	9418	9365	53
17th AbnD	01/09/45	12	196	208	0	9436	9430	6
17th AbnD	01/10/45	-262	313	51	0	9175	9174	1
17th AbnD	01/11/45	-58	189	131	0	9320	9117	203
17th AbnD	01/12/45	-90	103	13	0	9231	9230	1
17th AbnD	01/13/45	-40	51	11	0	9189	9191	-2
17th AbnD	01/14/45	-48	53	5	0	9143	9141	2
17th AbnD	01/15/45	-34	39	5	0	9109	9109	0
17th AbnD	01/16/45	-49	103	54	0	9103	9060	43
TOTALS:			3691	531	0			12263

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
82d AbnD	12/20/44	-11	11	0	0	11580	11580	0
82d AbnD	12/21/44	48	39	56	31	11628	11628	0
82d AbnD	12/22/44	56	31	56	31	11684	11684	0
82d AbnD	12/23/44	-59	146	56	31	11625	11625	0
82d AbnD	12/24/44	-137	224	56	31	11488	11488	0
82d AbnD	12/25/44	-61	159	67	31	11427	11427	0
82d AbnD	12/26/44	-18	110	61	31	11409	11409	0
82d AbnD	12/27/44	0	102	71	31	11409	11409	0
82d AbnD	12/28/44	32	61	60	33	11441	11441	0
82d AbnD	12/29/44	17	70	56	31	11458	11458	0
82d AbnD	12/30/44	54	37	58	33	11512	11512	0
82d AbnD	12/31/44	50	43	60	33	11562	11562	0
82d AbnD	01/01/45	43	48	58	33	11605	11605	0
82d AbnD	01/02/45	38	49	56	31	11643	11643	0
82d AbnD	01/03/45	-451	451	0	0	11184	11192	-8
82d AbnD	01/04/45	-113	255	111	31	11071	11071	0
82d AbnD	01/05/45	-54	131	46	31	11017	11017	0
82d AbnD	01/06/45	-17	104	56	31	11000	11000	0
82d AbnD	01/07/45	-78	155	46	31	10922	10922	0
82d AbnD	01/08/45	-40	134	60	34	10882	10882	0
82d AbnD	01/09/45	-36	113	46	31	10846	10846	0
82d AbnD	01/10/45	-42	133	58	33	10804	10804	0
82d AbnD	01/11/45	53	44	66	31	10857	10857	0
82d AbnD	01/12/45	20	67	56	31	10877	10877	0
82d AbnD	01/13/45	-88	88	0	0	10789	10789	0
82d AbnD	01/14/45	-38	38	0	0	10751	10751	0
82d AbnD	01/15/45	-39	39	0	0	10712	10712	0
82d AbnD	01/16/45	-29	29	0	0	10683	10683	0
TOTALS:			2911	1316	695			-8

RETURN-TO-DUTY TRACKING PROGRAM

NAME	DATE	CAS CHN	TOT CAS	TOT REPL	TOT RTD	CURNT STR	CALC STR	DELTA
101st AbnD	12/19/44	-297	297	0	0	14494	14494	0
101st AbnD	12/20/44	-3	35	22	10	14491	14491	0
101st AbnD	12/21/44	-132	132	0	0	14359	14359	0
101st AbnD	12/22/44	-838	838	0	0	13521	13521	0
101st AbnD	12/23/44	-249	249	0	0	13272	13272	0
101st AbnD	12/24/44	-179	179	0	0	13093	13093	0
101st AbnD	12/25/44	-64	64	0	0	13029	13029	0
101st AbnD	12/26/44	-173	182	9	0	12856	12856	0
101st AbnD	12/27/44	-85	85	0	0	12771	12771	0
101st AbnD	12/28/44	-101	101	0	0	12670	12670	0
101st AbnD	12/29/44	-54	114	41	19	12616	12616	0
101st AbnD	12/30/44	-84	84	0	0	12532	12532	0
101st AbnD	12/31/44	270	115	264	121	12802	12802	0
101st AbnD	01/01/45	406	100	348	158	13208	13208	0
101st AbnD	01/02/45	-66	66	0	0	13142	13142	0
101st AbnD	01/03/45	-73	73	0	0	13069	13069	0
101st AbnD	01/04/45	-455	486	21	10	12614	12614	0
101st AbnD	01/05/45	-269	331	43	19	12345	12345	0
101st AbnD	01/06/45	-96	107	8	3	12249	12249	0
101st AbnD	01/07/45	-127	174	32	15	12122	12122	0
101st AbnD	01/08/45	-34	84	34	16	12088	12088	0
101st AbnD	01/09/45	-122	122	0	0	11966	11966	0
101st AbnD	01/10/45	-155	157	2	0	11811	11811	0
101st AbnD	01/11/45	-279	280	1	0	11532	11532	0
101st AbnD	01/12/45	-27	46	13	6	11505	11505	0
101st AbnD	01/13/45	-132	146	10	4	11373	11373	0
101st AbnD	01/14/45	-187	193	4	2	11186	11186	0
101st AbnD	01/15/45	87	159	169	77	11273	11273	0
101st AbnD	01/16/45	-77	103	18	8	11196	11196	0
TOTALS:			5102	1039	468			0

US Non-Divisional Personnel Data

INTRODUCTION

This paper serves as the bibliographic reference for sources used in generating personnel data for US non-divisional units as recorded in the Ardennes Campaign Simulation Data Base (ACSDB), to include daily on-hand strengths in total and by MOS categories, daily attrition (killed, wounded, captured/missing, and disease and non-battle injury (DNBI)) and daily replacements and returns to duty (RTDs) in total and by so-called military occupational specialties (MOS) categories. For definitions of the so-called MOS categories, see the UNIT DATA BASE DEFINITIONS section of the ACSDB Unit Data Base narrative. This paper also explains any estimation methodologies employed in generating the US non-divisional personnel data. It should be reviewed with other US Unit Data Base narratives for a comprehensive explanation of the personnel data recorded for US non-divisional units in the Unit Data Base. The paper is divided into three sections. The first is an introductory section explaining the scope of the task and the general approach used to address the task. The second discusses personnel data generation for US non-divisional combat units. The third discusses personnel data generation for US non-divisional service support units. Attachments at the end of the paper contain charts and tables providing data and information used to generate US non-divisional personnel data.

Personnel data of US non-divisional combat and service support units is recorded in the Unit Data Base of the ACSDB in records identified as:

- (Army or Corps) Troops,
- (Army or Corps) HQ, and
- (ID, AD, or AbnD) Att.

- (Army or Corps) Troops: Units identified as such include the personnel of all non-divisional combat units (artillery, tank, tank destroyer, combat engineer, etc.) subordinated either to army or corps. For example, "XIX Corps Troops" is the designation assigned to the various non-divisional field artillery battalions, combat engineer battalions, tank destroyer battalions, etc., subordinated directly to US XIX Corps control. However, personnel data for non-divisional combat units subordinated to divisions under XIX Corps control is not recorded under "XIX Corps Troops," but rather under "(ID, AD, or AbnD) Att" as described below. The composition of the non-divisional combat units subordinated to armies and corps is described in the

"ATTACHMENTS & DETACHMENTS" section of the Unit Data Base, where the daily order of battle of combat units is recorded.

- (Army or Corps) HQ: Units identified as such include the personnel of all non-divisional service support units (medical, quartermaster, ordnance maintenance, etc.) subordinated either to army or corps. For example, "1st Army HQ" is the designation assigned to the various non-divisional quartermaster companies, ordnance maintenance companies, field hospitals, etc., subordinated to US First Army control. Since the composition of non-divisional service support units is not described in the "ATTACHMENTS & DETACHMENTS" section of the Unit Data Base, a later section of this paper presents the US order of battle for non-divisional service support units.

- (ID, AD, or AbnD) Att: Units identified as such include the personnel of all non-divisional combat units subordinated directly to US infantry, armored, or airborne divisions. For example, "75th ID Att" designates the various non-divisional combat units (chemical mortar company, tank destroyer battalion, tank battalion, etc.) attached directly to the US 75th Infantry Division. These units almost invariably include the tank destroyer and tank battalions attached to US infantry divisions, which in practice became virtual organic divisional units by the time of the Ardennes Campaign. The composition of the non-divisional combat units subordinated to divisions is described in the "ATTACHMENTS & DETACHMENTS" section of the Unit Data Base, where the daily order of battle of combat units is recorded.

In generating personnel data of US non-divisional units for the ACSDB, two major considerations had to be addressed. First, as is the case with US divisional personnel data, there exists inconsistencies and contradictions in the historical personnel data of the units for which such data was found in research. For example, the daily on-hand personnel strength of a unit on one day does not always equal the unit's daily on-hand personnel strength of the previous day plus and minus the reported personnel gains and losses of the period between the two reports. Secondly, it proved impractical to obtain daily personnel data for the hundreds of US non-divisional units which participated in the Ardennes Campaign. Research in primary source records was directed at units of division-size and greater. Some divisional and corps records contain personnel data for non-divisional units, and this data is incorporated in the process used to generate non-divisional personnel data. However, the number of these units for which data was obtained is only a portion of the total number of US non-divisional units. Related to this problem was the question of how to record the data for the divisional units. To record the data of all non-divisional units individually, as was done with the divisions, would have created an accounting task and computer data base file of unmanageable dimensions, although it was recognized that this would have been

the most accurate methodology for recording the data.

To address these considerations, it was decided to record personnel data of non-divisional units in aggregate for "Army/Corps Troops," "Army/Corps HQ," and "ID/AD/AbnD Att" as described above. This approach utilizes personnel attrition and reinforcement (i.e., replacements and RTDs) rates, derived from the available historical data of non-divisional units which participated in the Ardennes Campaign. This approach was decided upon after considerable deliberation and only after all other possibilities had been evaluated. Chief among these alternatives was the utilization of the 12th Army Group G-1 Daily Summary, the same document discussed in the US Divisional Personnel narrative -- acquired from the US National Archives in Record Group 407, Box 1753, File 3, and Box 1754, File 4. Review of the 12th Army Group G-1 data showed that its applicability to the required task was not possible due to limitations in the data. For example, the 12th Army Group G-1s do not record daily casualties for US First and Third Army combat troops and the assigned strengths of these same units change only on a weekly basis. Strengths of various corps combat and service support troops frequently fluctuate on a daily basis, due to daily changes in corps orders of battle. Comparisons of these personnel strengths with the sum of the strengths of the subordinated non-divisional units -- the organization of which is recorded in the ATTACHMENTS & DETACHMENTS section of the Unit Data Base -- often shows some variance in the 12th AG G-1 strengths and the aggregate strengths of the subordinated units. Therefore, since the 12th AG G-1 data was inherently lacking in accuracy and a consistent correlation between it and the data derived from the order of battle was not possible, it was decided to base the personnel data on the order of battle. This decision was made in order to maintain consistency within the data base between the order of battle and personnel data, and to simplify accounting procedures, the necessity of which became most apparent when the scheme was actually implemented.

US NON-DIVISIONAL COMBAT UNIT PERSONNEL DATA

The daily order of battle recorded in the ATTACHMENTS & DETACHMENTS section of the Unit Data Base is used as a blueprint in estimating the personnel data of non-divisional combat units. Personnel strengths of the non-divisional combat units subordinated to an army or corps, or attached to a division, are summed by the various MOS personnel categories. (As explained in the UNIT DATA BASE DEFINITIONS section of the ACSDB Unit Data Base narrative, all personnel in non-divisional units are considered to belong to a single MOS category. i.e., all personnel in a 105mm howitzer towed field artillery battalion are "Artillery," and all personnel in a self-propelled tank destroyer battalion are "Armor." To the sum of these unit's personnel strengths are applied attrition and reinforcement rates derived from historical data. The calculated figures are the estimated personnel casualties and reinforcements by MOS category for the army troops, corps troops, or divisional attachments. The strengths, casualties, and reinforcements of the various MOS categories are totalled to provide the estimated total strengths, casualties, and reinforcements of the unit.

Attachment 1 shows the attrition and reinforcement rates applied in the above-described process for the following MOS categories: Armor, Infantry, Artillery, Engineer, and Other (antiaircraft artillery units). These rates are derived from the historical data of units listed in the attachment.

Examination of the daily on-hand personnel strengths of US army and corps troops and divisional attachments as recorded in the ACSDB shows fluctuations in the daily strengths caused by the attachment or detachment of units and consequent changes in the daily order of battle. It was recognized that a methodology was needed to account for personnel attrition sustained by non-divisional combat units, which would reduce a unit's personnel strength by subtracting its personnel losses when the unit moved from one parent organization to another. The key element of this methodology is the estimation of daily personnel strengths of non-divisional combat units, using the daily percentages of assigned strength to authorized strength of army and corps troops, percentages calculated using the 12th AG G-1 data. In the 12th AG G-1 data are found both assigned and authorized strengths of corps and army combat troops. The percentage of assigned to authorized is invariably less than 100 percent and often shows a recognizable decline during the period 16 December 1944-16 January 1945. When a non-divisional combat unit moves from one parent organization (army, corps, or division) to another, its strength on the day it is reassigned is estimated to be the same percent of its authorized strength as the percent of assigned to authorized of the new parent organization. Although

only a rough approximation, the approach was adopted partly to provide a means of compensating for some unit personnel attrition and, most importantly, to simplify what would have been an accounting process of unwieldy dimensions. The process used to estimate German non-divisional combat unit personnel strength does in fact utilize an approach in which strengths of all component units are estimated on a daily basis and then added together. This methodology is feasible for German non-divisional combat units because the daily German order of battle is much less comprehensive and detailed, and consequently has fewer attachments and detachments, than the US order of battle.

Along with the US 28th and 106th Infantry Divisions, and elements of other divisions, several non-divisional combat units suffered heavy personnel losses in the opening phases of the Ardennes Campaign. These units, their estimated personnel losses, and the derivation of their personnel attrition are provided in Attachment 2. Note that for the periods after these units had incurred their high personnel losses, they are assumed to be at the heavily attrited strengths when changing parent organizations in the ACSDB.

To simplify accounting of personnel attrition in US non-divisional combat units, the attrition rate applied to daily personnel strengths included battle and non-battle casualties aggregated. To break down these casualties into killed, wounded, captured/missing, and DNBI, a set of percentages was derived using the sums of the casualties presented in Attachment 1. The percentages, and the data used to calculate them are as follow.

	Killed	Wounded	Captured/Missing	DNBI
Armor	55	276	100	459
Infantry	15	28	13	63
Artillery	15	70	53	138
Other	6	23	1	101
TOTALS	91/1416	397/1416	167/1416	761/1416
Percents	6.43%	28.04%	11.79%	53.74%

US NON-DIVISIONAL SERVICE SUPPORT UNIT PERSONNEL DATA

The composition of US non-divisional service support units subordinated to corps and armies is not described in the ATTACHMENTS & DETACHMENTS section of the Unit Data Base where only combat units are listed. This composition is instead described in this paper along with the sources used in its preparation and methodologies and sources used to generate the personnel data of the US non-divisional service support units.

Attachment 3 is a description of the order of battle of the non-divisional service support units subordinated to US corps and armies. This order of battle is derived from a number of sources including:

- First United States Army. Report of Operations, 1 August 1944-22 February 1945. 4 vols.

- After Action Report, Third US Army: 1 August 1944-9 May 1945. Vol. 1, The Operations and Vol. 2, Staff Section Reports.

- Weekly 12th Army Group G-4 Reports Nos. 20-25, covering the period 10 December 1944 to 20 January 1945 (available in US National Archives Record Group 407, Box 1779, 99/12-4.1 to 99/12-5).

- V Corps G-1 After Action Reports for December 1944 and January 1945, including monthly station lists and strengths of command (available in US National Archives Record Group 407, Box 3412, 205-0.13 to 205-1.12).

- VII Corps Estimated Loss Reports (US National Archives Record Group 407, Box 3839, 207-1.8 to 207-1.16).

- XIII Corps Machine Records Unit (MRU), including 31 December 1944 list of assigned and attached troops (US National Archive Record Group 407, Box 4555, 213-0.3).

- XIX Corps G-1 Weekly Reports for the period 16 December 1944-20 January 1945 (US National Archives Record Group 407, Box 4983, 219-1).

- XX Corps G-1 Daily Summary for the period 16 December 1944-16 January 1945 (US National Archives Record Group 407, Box 5075, 220-1 to 220-1.2).

Using these sources and US Army Field Manual (FM) 101-10, Staff Officers' Field Manual: Organization, Technical and Logistical Data, 21 December 1944, it was possible to determine the "core" service support elements common to either armies or

corps, such as laundry companies, military police companies, band personnel, etc. These units are considered static, i.e., their assignment to army or corps does not change during the period 16 December 1944-16 January 1945. Their identification, personnel strengths, and assigned MOS categories, are shown in the first part of Attachment 3. Particularly useful in the determination of the "core" army and corps service support units was the XIX Corps Weekly Reports for the period 16 Dec 44-20 Jan 45, records fully referenced above. These documents provide the composition of corps troops for the US XIX Corps and the authorized and assigned strengths of its component non-divisional service support units.

Part 2 of Attachment 3 describes the order of battle changes for army and corps in medical, supply, ordnance, and transportation MOS categories. The order of battle changes mainly affect army units, although changes occur in corps, principally by the attachment or detachment of ordnance-maintenance units and field artillery/antiaircraft artillery/engineer group headquarters. The ordnance-maintenance unit changes for corps are listed in Part 2 of Attachment 3. Changes in the group headquarters are not listed. When changes are made in Corps HQ personnel strengths for the MOS categories of Artillery, Armor, Engineer, or Other, it is the result of the attachment or detachment of the personnel in the following units:

Antiaircraft Group HQ	73 Other personnel
Antiaircraft Brigade HQ	79 Other personnel
Armored Group HQ	98 Armor personnel
Field Artillery Group HQ	99 Artillery personnel
Field Artillery Brigade HQ	103 Artillery personnel
Tank Destroyer GroHQ H	72 Armor personnel
Engineer Group HQ	479 Engineer personnel

(An engineer group HQ normally controlled or included one light equipment company, one pontoon bridge company, and elements -- approximately one-half -- of one treadway bridge company. The personnel of these units are counted in the above figure.)

The orders of battle of non-divisional service support units for the US First and Third Armies are well documented in the sources listed above. Unfortunately, the Ninth Army's report of operations is not as informative as those of the First and Third Armies (see Conquer: The Story of the Ninth Army, 1944-1945, Washington, Infantry Journal Press, 1947). Therefore, it was necessary to estimate composition of certain service support units for the Ninth Army. This was achieved by comparing the average number of divisions or corps under Ninth Army control with comparable information for the First Army and estimating the number of service support units based on the ratio of divisions/corps between the two armies. Typically, the Ninth

Army was found to have about two-thirds of the divisional and corps assets of the First Army, so estimated numbers of service support elements were assigned accordingly to the Ninth Army.

In the same way that the daily order of battle of combat units serve as the blueprint for estimating "Corps Troops" and "Army Troops" personnel strengths, the organization of the non-divisional service support units as described in this paper is used as the blueprint for calculating the personnel strengths of the "Corps HQ" and "Army HQ." The 12th Army Group G-1 Daily Summaries contain aggregate daily personnel data for the service and headquarters troops of the armies and corps under the 12th Army Group. This data, however, is not broken down into the MOS categories and contains some of the same limitations as found in the data for the army and corps troops.

Personnel strengths for the army and corps HQs is based on the order of battle of non-divisional service support units. Estimation of personnel attrition and reinforcements is done using a different approach than that used for army and corps troops.

For armies (US First, Third, and Ninth Armies), the 12th AG G-1s serve as the main source of data for personnel losses and gains in non-divisional service support units. Daily battle and non-battle casualties are not provided in the 12th AG G-1s. However, cumulative casualties for the period 15 December 1944-16 January 1945 can be estimated by taking the difference of the cumulative casualty figures on those days. The differences are calculated as:

First	29 KIA	101 WIA	31 Cap/MIA	855 DNBI
Third	32	30	49	932
Ninth	18	55	1	846

These losses, particularly the battle casualties, are almost negligible. In all three cases the battle losses are less than the battle casualties of a single division on a day of heavy combat. Therefore, to facilitate accounting procedures and to compensate for the lack of daily casualty data, it was determined to assign losses at equal daily increments for the three armies.

For reinforcements, the only data available in the 12th AG G-1s for the three armies during the period 16 December-16 January is for the Third Army. On 22 and 30 December and 5 and 12 January respectively, reinforcements of 197, 271, 234, and 87 personnel (totalling 789) are reported. These are cumulative weekly figures. The same total (789) is used for the First Army, as its average daily personnel strength of non-divisional service support units and total casualties approximates that of the Third Army. For the Ninth Army, 75 percent of 789 (592 reinforcements) is estimated to be the total reinforcement figure for 16

December-16 January, a percentage based on the ratio of the average daily strengths of the Ninth and Third Armies' non-divisional service support units (approximately 36,000/48,000). Reinforcements are assigned to the armies in equal daily increments in the same manner losses are assessed against the armies. Reinforcements are broken down into replacements/returns to duty (RTDs) using a ratio taken from data for the US XIX Corps (XIX Corps G-1 Weekly Reports for the period 16 December 1944-20 January 1945 from US National Archives Record Group 407, Box 4983, 219-1). This ratio is derived from the total number of replacements/RTDs for five weekly reports between 16 December and 13 January (84 replacements/57 RTDs, i.e., 59.6%/40.4% -- these numbers are calculated using adjustments to the 23 December G-1 Report, which are made in light of the anomalies in the personnel data for the 817th Military Police Company on 16 and 23 December).

Casualties and replacements/RTDs are distributed proportionately among army non-divisional service support units using the ratios of the start strengths of the MOS categories to the start strength of the entire "Army HQ." For example, the First Army HQ's estimated strengths on 15 December are as follow:

- Armor	72
- Artillery	400
- Maintenance	13620
- Medical	10178
- Transportation	4742
- Supply	9816
- Engineer	5093
- Other	5540
TOTAL	49461

Casualties and reinforcements are distributed among the MOS categories by applying the following percentages to the total number of casualties and replacements/RTDs:

- Armor	0%	72/49461
- Artillery	1%	400/49461
- Maintenance	27%	13620/49461
- Medical	21%	10178/49461
- Transportation	10%	4742/49461
- Supply	20%	9816/49461
- Engineer	10%	5093/49461
- Other	11%	5540/49461

This scheme is used because there is no data on casualty and reinforcement distribution among army service support personnel. As discussed above, the battle casualties among these units are negligible. The majority of their losses are DNBI. Since there is no indication that any MOS category would experience a higher

proportion of DNBI losses, it is assumed that the losses would likely be incurred at an equal rate among the service support personnel, and that the distribution of reinforcements would follow a similar pattern as the units requested personnel to replace losses and received returnees from medical treatment.

When non-divisional service support units in armies are attached or detached, their personnel strengths are assumed to be at authorized levels. This is done primarily to simplify accounting procedures. In any event, as described in this paper, the changes in the non-divisional service support order of battle are relatively infrequent and the estimated losses sustained by the units very low.

Like the personnel data for armies, personnel data for non-divisional service support units subordinated to corps is generated primarily by using the data contained in the 12th AG G-1s. On-hand personnel strengths are calculated using the orders of battle presented in this paper as blueprints. Casualties and reinforcements are taken from the data of those corps HQs in the 12th AG G-1s with reliable data. Some corps HQs have no reinforcement data or casualty data. Some have casualty data only, but this data cannot be used. See the 12th AG G-1 data on the XVIII Airborne Corps, for which no reinforcement data, on a daily basis or in weekly cumulatives, is recorded during the period 15 December-16 January. For the same period, see the 12th AG G-1 data on the VIII Corps's battle and non-battle casualty data. No daily casualty data is provided, and the cumulative casualties actually decrease between 1 and 16 January as the composition of the corps HQ changes.

The following data, extracted from the 12th AG G-1 Daily Summary, is used in generating corps HQ casualty and reinforcement data:

III Corps HQ	1	Battle Casualties	40	DNBI
V Corps HQ	49	"	101	"
XII Corps HQ	19	"	114	"
XIII Corps HQ	7	"	54	"
XX Corps HQ	11	"	103	"
XIX Corps HQ	12	"	120*	"

III Corps data is from daily reports for 15 Dec-16 Jan.

V Corps data is from cumulative reports for 15 Dec-16 Jan.

XII Corps data is from daily reports for 15 Dec-16 Jan.

XIII Corps data is from cumulative reports for 19 Dec-16 Jan.

XX Corps data is from daily reports for 15 Dec-16 Jan.

* Data from XIX Corps G-1 Weekly Reports for the period 16 December 1944-13 January 1945 (US National Archives Record Group 407, Box 4983, 219-1).

III Corps HQ	14 Reinforcements
XII Corps HQ	145 Reinforcements
XX Corps HQ	179 Reinforcements
XIX Corps HQ	141 Reinforcements*

III Corps data is from daily reports for 15 Dec-16 Jan.
 XII Corps data is from daily reports for 15 Dec-16 Jan.
 XX Corps data is from daily reports for 15 Dec-16 Jan.

* Data from XIX Corps G-1 Weekly Reports for the period 16 December 1944-13 January 1945 (US National Archives Record Group 407, Box 4983, 219-1).

This data is modified to compensate for the differences in average daily strengths of the units in the 12th AG G-1s and the start strengths of the units as estimated by the order of battle presented in this paper (the start strengths being approximations of the average daily strengths of the units as recorded in the ACSDB). The compositions of the corps HQs in the ACSDB differ in some cases from the 12th AG G-1 corps HQs, because the various corps evidently counted the personnel of some units with the corps combat troops. This may in part explain the differences between the ACSDB corps troops personnel strengths and those in the 12th AG G-1s. Thus, the data listed in the above tables is changed using the following ratios.

<u>Unit</u>	<u>ACSDB Start Strength to Average Daily Strength in 12th AG G-1s</u>	<u>Ratio</u>
III Corps	5581/2112	2.6/1
V Corps	6813/3072	2.2/1
XII Corps	7515/4558	1.6/1
XIII Corps	6916/4003	1.7/1
XIX Corps	6777/3901	1.7/1
XX Corps	7496/5898	1.3/1

Average daily strengths in the above table are determined by taking the aggregate of the daily strengths given in the 12th AG G-1s and dividing by the number of days, i.e.,

III Corps	69698/33	
V Corps	101392/33	
XII Corps	150427/33	
XIII Corps	112077/28	
XX Corps	194621/33	
XIX Corps	19505/5	(weekly strengths -- five reports)

Thus, the estimated casualties and reinforcements, as used in the ACSDB, for the following units are as follow:

	<u>Casualties</u>	<u>Reinforcements</u>
III Corps:	107 (2.6x41)	36 (2.6x14)
V Corps:	329 (2.2x150)	--
XII Corps:	213 (1.6x133)	232 (1.6x145)
XIII Corps:	104 (1.7x61)	--
XX Corps:	149 (1.3x114)	233 (1.3x179)
XIX Corps:	225 (1.7x132)	240 (1.7x141)

These calculated figures are used to estimate casualties for the VII, VIII, and XVIII Corps and reinforcements for the V, VII, VIII, XIII, and XVIII Corps.

For casualty estimation, average daily battle casualty and DNBI rates are generated using the total 12th AG G-1 losses (and the XIX Corps G-1s for that unit) for the III, V, XII, XIII, XX, and XIX Corps and the average daily strengths of these units, or:

<u>Total Strength</u>	<u>Battle Cas</u>	<u>DNBI</u>	<u># Days</u>
69698	1	40	33
101392	49	101	33
105427	19	114	33
112077	7	54	28
194621	11	103	33
19505	12	120	35 (5 weekly reports)
602720	99	532	165 TOTALS (incl. 5 weekly rpts)

$602720/165 = 3653$
 $99/165 = 0.51$, $0.51/3653$, or $0.01\%/day$ -- Battle Casualties
 $532/165 = 2.7$, $2.7/3652$, or $0.07\%/day$ -- DNBI

The rates of $0.01\%/day$ and $0.07\%/day$ are applied to the start strengths of the VII, VIII, and XVIII Corps, and the resulting figures are then multiplied by the number of days of participation by the unit to calculate the total number of estimated casualties of these three corps. These numbers are distributed evenly over the period of a corps' participation in the campaign. The battle casualties are broken down into killed, wounded, and captured/missing using the following percentages:

<u>Unit</u>	<u>Killed</u>	<u>Wounded</u>	<u>Cap/MIA</u>
V Corps	5	27	17
XII Corps	6	13	0
XIII Corps	1	6	0
XX Corps	2	9	0
TOTALS	14/86 (16.3%)	55/86 (64.0%)	17/86 (19.7%)

Casualty and reinforcement distribution are distributed proportionately among corps non-divisional service support units using the same methodology employed with army non-divisional

service support units, i.e., using the ratios of the start strengths of the MOS categories to the start strength of the entire "Corps HQ." For the US VIII Corps, additional casualties of 140 artillery personnel captured/missing on 17 December and 20 medical personnel captured/missing on 20 December are added to the casualties estimated using the above-described processes. These personnel represent the "Malmedy Massacre" involving troops of the 285th Field Artillery Observation Battalion on 17 December, and the capture of personnel of the 42d Field Hospital on 20 December, events well-documented in primary and secondary sources.

For the V, VII, VIII, XIII, and XVIII Corps, a ratio of reinforcements to casualties is used to estimate the reinforcements of these corps. This ratio is derived from the estimated reinforcements and casualties of the III, XII, XIX, and XX Corps.

III Corps	REINF 36	CAS 107	(0.336)
XII Corps	232	213	(1.089)
XIX Corps	240	225	(1.066)
XX Corps	233	149	(1.564)
			4.055

$4.055/4 = 1.014$, or 1.014 reinforcements per casualty

Reinforcements for all corps HQ units are broken down into replacements/RTDs using the same ratio of 59.6/40.4, as employed with the army HQ units. Replacements/RTDs are distributed evenly over the period of a unit's participation in the Ardennes and proportionately among MOS categories in the same manner as the casualties.

**Attachment 1: US Non-Divisional Combat Unit Attrition
and Reinforcement Rates**

	<u>ARMOR</u>	<u>INF</u>	<u>ARTY</u>	<u>ENG</u>	<u>Other</u>
Total Casualty %	0.35	0.34	0.20	0.19	0.08
Replacement %	0.07	0.26	(0.07)	(0.12)	0.05
Return-to-duty %	0.12	0.02	(0.03)	(0.05)	0.04

ARTY and ENG Replacement/Return to Duty breakdown estimated by using breakdowns of ARMOR, INF, and OTHER. $(0.07+0.26+0.05)/(0.12+0.02+0.04)$, or 0.38/0.18, or 68% Replacement and 32% Return to Duty.

Abbreviations used in the following tables:

AAABN	Antiaircraft Artillery Battalion
AIBN	Armored Infantry Battalion
ArmFABN	Armored Field Artillery Battalion
Cav	Cavalry
CavGrp	Cavalry Group
PIRN	Parachute Infantry Battalion
PIReg	Parachute Infantry Regiment
YDBNSP	Self-Propelled Tank Destroyer Battalion
TDENT	Towed Tank Destroyer Battalion
TKBN	Tank Battalion

ARMOR

Unit	Total Str.	# Days	Avg.		Total								
			Daily Str.	Total Str.	Total K	Total W	Total MIA	Total BC	Total DNBI	Total Repl.	Total RTD	Total Reinf	
V Corps	166018 (1)	30	5534										339
VII Corps	77223	13	5940	26	92	13	131	93					143
703d TDBNSP	20608	32	644						6	17			23
603d TDBNSP	10304	16	644						1	7			8
814th TDBNSP	13770	24	574	3	36	28	67	84					54
811th TDBNSP	4822	10	482	7	31	19	57	6	0	0			0
70th TkBN	5536	8	692	6	16	0	22	14					
803d TDBNSP	5032	8	629	1	1	1	3	3					
737th TkBN/ 803d TDBNSP	42056 (2)	62	678						8	28			36
823d TDBNSP	21904	31	707	2	43	31	76	50	52	97			149
743d TkBN	22072	31	712	2	21	4	27	30	0	63			63
771st TDBNSP	18977	31	612	0	5	0	5	13	44	3			47
771st TkBN	17520	25	701	1	4	0	5	10	8	0			8
Cav Units	37649	18	2092	4	21	3	28	63	9	8			17
3d Cav Gp	7811	5	1562	3	6	1	10	11					6
Casualty	232316	204	1139	55	276	100	431	377					
Reinf.	460734	328	1405						128	223			893

(1) Estimated strength of one cavalry squadron, five self-propelled tank destroyer battalions, and three tank battalions for 16 days, plus one cavalry squadron, three self-propelled tank destroyer battalions, and three tank battalions for 14 days.

(2) 62 days' of one tank battalion and one self-propelled tank destroyer battalion.

ARMOR (continued)

	Avg. RC	Avg. DMRI	Avg. Reinf.	SEC	DMRI	Reinf.	SEC	DMRI	Reinf.
V Corps									V Corps G-1s
VII Corps									VII Corps G-1s
703d TDGNP									3d AB G-1s
603d TDGNP									6th AB G-1s
814th TDGNP									7th AB G-1s
811th TDGNP									9th AB G-1s
70th TkbN									4th AB G-1s
803d TDGNP									4th AB G-1s
737th TkbN/									
803d TDGNP									5th AB G-1s
823d TDGNP									5th AB G-1s
763d TkbN									5th AB G-1s
771st TDGNP									5th AB G-1s
771st TkbN									5th AB G-1s
Cav Units									5th AB G-1s
3d Cav Gp									VI Corps G-1s
Casualty %	2.11	1.85		0.19	0.16				
Reinf. %			2.72			(0.07)	(0.12)	0.19	

Replacement/RTD breakdown calculated as 128/351 and 223/351.

INFANTRY

Unit	Total Str.	# Days	Avg.		Total							
			Daily Str.	Total K	Total W	Cap/ MIA	Total BC	Total DNBI	Total Repl.	Total RTD	Total Reinf	
VII Corps	456	1	456	0	0	0	0	0	---	---	2	
517th PIReg	4204	4	1051	0	1	1	2	15	0	0	0	
509th PIBN	1007	2	504	0	0	0	0	2	0	0	0	
526th AIBN	12431	18	691	4	2	12	18	32	60	3	63	
99th InfBN	15911	19	837	11	25	0	36	14	28	3	31	
Casualty	34009	44	773	15	28	13	56	63				
Reinf.	34009	44	773						88	6	96	

INFANTRY (continued)

	<u>Avg. BC</u>	<u>Avg. DNBI</u>	<u>Avg. Reinf.</u>	<u>%BC</u>	<u>%DNBI</u>	<u>%Repl.</u>	<u>%RID</u>	<u>%Reinf.</u>	<u>Sources</u>
VII Corps									VII Corps G-1s
517th PIReg									7th AD G-1s
509th PIBN									7th AD G-1s
526th AIBN									30th ID G-1s
99th InfBN									30th ID G-1s
Casualty %	1.27	1.43		0.16	0.18				
Reinf. %			2.18			0.26	0.02	0.28	

ARTILLERY

<u>Unit</u>	<u>Total</u>	<u>#</u>	<u>Avg.</u>		<u>Total</u>							
			<u>Str.</u>	<u>Days</u>	<u>Total</u>	<u>Total</u>	<u>Cap/</u>	<u>Total</u>	<u>Total</u>	<u>Total</u>	<u>Total</u>	<u>Total</u>
					<u>K</u>	<u>W</u>	<u>MIA</u>	<u>BC</u>	<u>DNBI</u>	<u>Repl.</u>	<u>RTD</u>	<u>Reinf</u>
V Corps	223780	(1) 30	7459									252
VII Corps	114891	(2) 13	8838	13	60	46	119	93				60
275th ArmFAHM	9740	20	487	0	0	7	7	13				41
808th TDBNT	11520	16 (3)	720									9
801st TDBNT	18780	27	696	2	10	0	12	32				28
Casualty	143411	60	2390	15	70	53	138	138				
Reinf.	378711	106	3572									390

(1) Data for ten field artillery battalions for 16 days, and nine battalions for 14 day, plus all chemical mortar and towed tank destroyer units.

(2) Data includes chemical mortar and towed tank destroyer units.

(3) Estimated number of days (exact inclusive period not specified in records).

ARTILLERY (continued)

	<u>Avg. BC</u>	<u>Avg. DNBI</u>	<u>Avg. Reinf.</u>	<u>%BC</u>	<u>%DNBI</u>	<u>%Repl.</u>	<u>%RTD</u>	<u>%Reinf.</u>	<u>Sources</u>
V Corps									V Corps G-1s
VII Corps									VII Corps G-1s
275th ArmFABN									7th AD G-1s
808th TDBNT									5th ID G-1s
801st TDBNT									99th ID G-1s
Casualty %	2.3	2.3		0.1	0.1				
Reinf. %			3.68					0.1	

ENGINEER

<u>Unit</u>	<u>Total</u> <u>Str.</u>	# <u>Days</u>	<u>Avg.</u>		<u>Total</u>							
			<u>Daily</u> <u>Str.</u>	<u>Total</u> <u>Str.</u>	<u>Total</u> <u>K</u>	<u>Cap/</u> <u>W</u>	<u>Total</u> <u>MIA</u>	<u>Total</u> <u>BC</u>	<u>Total</u> <u>DNBI</u>	<u>Total</u> <u>Repl.</u>	<u>Total</u> <u>PTD</u>	<u>Total</u> <u>Reinf</u>
V Corps	56693 (1)	30	1890									94
XX Corps	67147	32	2098	6	23	1	30	101				112
Casualty	67147	32	2098	6	23	1	30	101				
Reinf.	123840	62	1997									206

(1) Estimated strength of three engineer battalions for 30 days.

ENGINEER (continued)

	<u>Avg. BC</u>	<u>Avg. DNBI</u>	<u>Avg. Reinf.</u>	<u>%BC</u>	<u>%DNBI</u>	<u>%Repl.</u>	<u>%RTD</u>	<u>%Reinf.</u>	<u>Sources</u>
V Corps									V Corps G-1s
XX Corps									XX Corps G-1s
Casualty %	0.94	3.16		0.04	0.15				
Reinf. %			3.3					0.17	

OTHER

<u>Unit</u>	<u>Total</u>	<u>#</u>	<u>Avg.</u>		<u>Total</u>							
			<u>Days</u>	<u>Str.</u>	<u>Total</u>	<u>Total</u>	<u>Cap/</u>	<u>Total</u>	<u>Total</u>	<u>Total</u>	<u>Total</u>	<u>Total</u>
					<u>K</u>	<u>W</u>	<u>MIA</u>	<u>BC</u>	<u>DNBI</u>	<u>Repl.</u>	<u>RTD</u>	<u>Reinf</u>
V Corps	142884	30	4763									144
VII Corps	71890	13	5530	1	24	3	28	40				53
486th AAABN	22599	31	729						3	14		17
777th AAABN	11664	16	729						16	7		23
449th AAABN	29160	40	729						4	8		12
531st AAABN	24381	31	786	0	1	0	1	12	26	10		36
548th AAABN	24681	31	796	0	3	0	3	3	4	2		6
Casualty	120952	75	1613	1	28	3	32	55				
Reinf.	327259	192	1704						53	41		291

OTHER (continued)

	<u>Avg. BC</u>	<u>Avg. DNBI</u>	<u>Avg. Reinf.</u>	<u>%BC</u>	<u>%DNBI</u>	<u>%Repl.</u>	<u>%RTD</u>	<u>%Reinf.</u>	<u>Sources</u>
V Corps									V Corps G-1s
VII Corps									VII Corps G-1s
486th AAABN									3d AD G-1s
777th AAABN									6th AD G-1s
449th AAABN									5th ID G-1s
531st AAABN									30th ID G-1s
548th AAABN									102d ID G-1s
Casualty %	0.43	0.73		0.03	0.05				
Reinf. %			1.52			0.05 (1)	0.04 (1)	0.09	

(1) Replacement/RTD breakdown calculated as 53/94 and 41/94.

Sources used in Attachment 1 tables (all US National Archives Record Group 407 with box numbers as indicated)

V Corps G-1s: V Corps G-1 After Action Reports for December 1944 and January 1945 (Box 3412, 205-0.13 to 205-1.12).

VII Corps G-1s: VII Corps Estimated Loss Reports (Box 3839, 207-1.8 to 207-1.16).

XX Corps G-1s: XX Corps G-1 Daily Summary for the period 16 December 1944-16 January 1945 (Box 5075, 220-1 to 220-1.2).

3d AD G-1s: 3d Armored Division daily G-1 Journal with "INCIDENTS, MESSAGES AND ETC" (Box 15061, 603-1.2 to 603-1.13).

6th AD G-1s: 6th Armored Division G-1 records, including a table titled "Replacements Received during December 1944" (Box 15416, 606-1 to 606-1.7).

7th AD G-1s: 7th Armored Division daily G-1 Journal, pages 131-173 (Box 15546, 607-0.12 to 607-1.2)

9th AD G-1s: 9th Armored Division G-1 reports, including daily ESTIMATED LOSS REPORT (Box 15776, 609-1.2 to 609-1.6).

4th ID G-1s: 4th Infantry Division G-1 reports, including weekly G-1 Station List and Strength Reports for 23 and 30 December 1944 (Box 6437, 304-1 to 304-1.2).

5th ID G-1s: 5th Infantry Division G-1 Journal (Box 6746, 305-1.3).

30th ID G-1s: 30th Infantry Division Daily Estimated Loss Reports (Box 8735, 330-1.2).

99th ID G-1s: 99th Infantry Division Estimated Loss Reports for December 1944 and January 1945 (Boxes 14125 and 14126, 399-1.2).

102d ID G-1s: 102d Infantry Division Daily G-1 G-1 Summary: Daily Losses and Gains and Estimate of Assigned Strength (Boxes 14454 and 14455, 3102-1).

Attachment 2

US Non-Divisional Combat Unit Catastrophic Losses

Through research in secondary sources, the following non-divisional combat units were determined to have sustained inordinately high personnel casualties in German attacks in the initial stages of the Ardennes Campaign. (See especially Charles B. MacDonald, A Time for Trumpets: The Untold Story of the Battle of the Bulge (New York; William Morrow, 1985); Jean Paul Pallud, Battle of the Bulge: Then and Now (London: After the Battle, 1984); and Hugh M. Cole, The Ardennes: Battle of the Bulge, US Army in World War II, The European Theater of Operations (Washington, D.C.: USGPO, 1965).)

820th Tank Destroyer Battalion
630th Tank Destroyer Battalion
447th Antiaircraft Artillery Battalion
14th Cavalry Group
58th Armored Field Artillery Battalion
707th Tank Battalion
44th Engineer Battalion
168th Engineer Battalion
634th Antiaircraft Artillery Battalion
770th Field Artillery Battalion
333d Field Artillery Battalion

The personnel losses of these units are determined through a variety of primary and secondary source records.

For the 630th TD Battalion, the 447th AAA Battalion, and the 707th Tank Battalion, a 28th Infantry Division personnel report is used to determine losses (see US National Archives RG407, Box 8481, 328-1.2, "Extract from [28th ID] G-1 "ELR" [Estimated Loss Report] Totals). This document provides daily and cumulative losses for combat units attached to the 28th ID during the period 23-31 December 1944. Using this report's data, the 630th TD Battalion's losses are estimated to be 14 killed, 93 wounded, and 101 captured/missing on 19 December, leaving the battalion with a strength of 550 men after 19 December. The 447th AAA Battalion's estimated losses on 19 December are 10 killed, 38 wounded, and 43 captured/missing, with a strength of 700 personnel after 19 December. The 707th Tank Battalion's estimated losses are 10 killed, 40 wounded, and 318 captured/missing on 19 December with a strength of 380 personnel after 19 December.

For the 820th TD and 634th AAA Battalions, information taken from Cole, Ardennes, indicates that these units lost one company and one battery respectively during the defeat suffered by the 106th Infantry Division. Therefore, the personnel of one company

and one battery respectively are added as captured/missing to the losses of the battalion's parent organizations ("106th ID Att" and "VIII Corps Troops") and the battalions are considered at one company or battery below authorized personnel strength after 19 December. Cole also reports that the 58th Armored Field Artillery Battalion lost 8 of its 18 artillery pieces. Therefore, its losses on 18 December are estimated to be 8/18 of its authorized personnel strength, or 232 casualties, and the battalion is considered at a strength of 300 men after 18 December. Cole, page 211, reports that the 44th Engineer Battalion lost 178 personnel in its initial actions. These are assessed against the battalion on 19 December and the battalion's strength after that date is estimated to be 460 personnel. Cole, page 400, reports that the 770th Field Artillery Battalion's guns were cut off around 20 December. Its losses are estimated to be roughly 250 personnel, with 250 personnel its approximate strength after losses. Cole, page 403, reports that the 168th Engineer Battalion and the 81st Engineer Battalion of the 106th ID together lost some 400 personnel around 19 December. The estimated engineer losses of the 106th ID are 209, so the losses of the 168th Engineer Battalion are estimated to be 191, with the strength of the battalion after 19 December at 450 personnel. MacDonald, pages 315-316, describes the activities of the 333d Field Artillery Battalion, whose losses, based on that source, are estimated at 143 personnel with the strength of the unit at 370 personnel after 17 December. Finally, the 14th Cavalry Group's losses are partially documented in 7th Armored Division G-1 records (US National Archives RG407, Box 15546, 60-0.12 to 607-1.2, which includes pages 131-173 of the 7th AD's daily G-1 Journal). Data from this source permits the estimation of casualties of 25 killed, 115 wounded, and 246 captured/missing for the period 16-24 December, leaving a strength of 1,100 personnel on 24-25 December; and losses of 2 killed, 16 wounded, and 105 captured/missing on 26 December, leaving a strength of 1,000 personnel after that date.

The estimated losses described above are added to the appropriate units in the ACSDB (divisional attachments or corps troops). The estimated personnel strengths -- after the losses are assessed -- are used if a unit changes its parent organization through detachment and attachment.

Attachment 3

US Non-Divisional Service Support Unit Order of Battle

Part 1: "Core" Army and Corps Service Support Units

<u>Corps Units</u>	<u>Personnel</u>	<u>MOS Category</u>
Corps HQ	189	(Other)
HQ Company	183	(Other)
MP Platoon	90	(Other)
Signal Battalion	989	(Other)
Signal Detachment	51	(Other)
Aircraft Liaison Squadron	16	(Other)
Signal Service Company	128	(Other)
Corps Artillery	118	(Artillery)
Medical Battalion	29	(Medical)
Collecting Company (x2)	202	(XVIII Corps -- 1) (Med)
Clearing Company	113	(XVIII Corps -- 0) (Med)
Band	29	(Other)
Quartermaster Battalion HQ	27	(Supply)
Laundry Company	262	(Supply)
Graves Registration Company	130	(Supply)
Fumigation and Bath Company	86	(Supply)
Quartermaster Service Company	212	(Supply)
Quartermaster Truck Company (x2)	272	(Transportation)
Military Police Company	163	(Other)
CIC Detachment	19	(Other)
Engineer Technical Intel Team	4	(Engineer)
Topographical Company	118	(Engineer)
Engineer Maintenance Company	191	(Engineer)
Finance Section (x2)	40	(Other)
Service Company	114	(Other)
Machine Records Unit	48	(Other)
Army Postal Unit (x2)	24	(Other)
Field Artillery Observation Bn	466	(Artillery)
Engineer Camouflage Company	67	(Engineer)

<u>Army Units</u>	<u>Personnel</u>	<u>MOS Category</u>
Heavy Pontoon Battalion (x3)	1146	(Engineer)
Topographical Battalion	426	(Engineer)
Camouflage Battalion	371	(Engineer)
Water Service Company (x2)	272	(Engineer)
Engineer Technical Intel Team	4	(Engineer)
Engineer Depot Company	209	(Engineer)
Engineer Dump Truck Company (x6)	749	(Engineer)
Army HQ & HQ Company	1044	(Other)
Chemical Decontamination Company	163	(Other)
Chemical Depot Company (x2)	356	(Other)

Chemical Maintenance Company (x2)	238	(Other)
Chemical Smoke Generator Coy (x4)	532	(Other)
Military Police Battalion (x2)	1356	(Other)
Signal Construction Battalion (x2)	912	(Other)
Signal Operations Battalion	552	(Other)
Aircraft Liaison Squadron	16	(Other)

Part 2: Order of Battle Changes for Army/Corps Ordnance, Supply, Medical, and Transportation Units

The following tables identify the composition of the US First, Third, and Ninth Armies' ordnance, supply, medical, and transportation service support units. Information on the tables includes the unit types, their number, their total personnel strength (in parentheses), and the date(s) of changes in the armies' compositions. On the first table, ordnance units are listed for both armies and corps, with corps identified by roman numerals.

First Army and Subordinated Corps Ordnance Units

	15 December				19 Dec	20 Dec	23 Dec	30 Dec	6 Jan	
	VIII	V	VII	First	XVIII	First	First	First	First	
MMCo	2(324)	2(324)	2(324)	6 (972)	2	4	4	4	4	5
HMCo(FA)				7(1386)		7	7	7	6	6
GpHQ				4 (212)		4	4	4	4	4
BnHQ	1 (25)	1 (25)	1 (25)	13 (325)	1	12	12	12	12	12
AmmoCo				12(2232)		12	10	12	11	11
HmCo(Tk)	1(210)	1(210)	1(210)	5(1050)	1	4	4	5	5	5
DepoCo				10(1860)		10	10	10	9	9
MAMCo	1(216)	1(216)	1(216)	12(2808)	1	12	12	12	12	12
EvacCo				2 (370)		2	1	1	2	2
CollCo				4 (480)		4	4	4	4	4
HAMCo				7(1414)		7	7	7	7	7
MtCo(AA)	1(163)	1(163)	1(163)	2 (326)	1	1	1	1	1	1
MVDCo				1 (164)		1	1	1	1	1
BDSq	2 (14)	2 (14)	2 (14)	3 (21)	2	1	0	0	6	6
	(952)	(952)	(952)	(13620)	(952)	(12668)	(12104)	(12686)	(12343)	(12505)

Third Army and Subordinated Corps Ordnance Units

	15 December				20 Dec	13 Jan
	III	XII	XX	Third	Third	Third
GpHQ				3 (159)	3	3
BnHQ	1 (25)	1 (25)	1 (25)	13 (325)	13	13
AmmoCo				9(1674)	11	13
DepoCo	1(186)	1(186)	1(186)	5 (930)	5	5
EvacCo				5 (925)	6	6
HAMCo				6(1212)	6	6
HMCo(FA)				6(1188)	6	6
HMCo(Tk)	1(210)	1(210)	1(210)	4 (840)	4	4
MtCo(AA)				6 (978)	6	6
MAMCo	1(216)	2(432)	2(432)	8(1728)	8	8
MMCo	2(324)	3(486)	3(486)	3 (486)	3	3
MVDCo				1 (164)	1	1
BDSq	2 (14)	2 (14)	2 (14)	3 (21)	4	4
TR Unit				2 (290)	2	2
	(975)	(1353)	(1353)	(10920)	(11484)	(11856)

Ninth Army and Subordinated Corps Ordnance Units

	15 December			23 Dec	30 Dec	6 Jan
	XIII	XIX	Ninth	Ninth	Ninth	Ninth
MMCo	2(324)	2(324)	4 (648)	4	4	3
HMCo(FA)			5 (990)	5	6	6
GpHQ			3 (159)	3	3	3
BnHQ	1 (25)	1 (25)	9 (225)	9	9	9
AmmoCo			8(1488)	6	7	8
HMCo(Tk)	1(210)	1(210)	3 (630)	2	2	2
DepoCo			7(1302)	7	8	8
MAMCo	1(216)	1(216)	9(1944)	9	9	9
EvacCo			2 (370)	2	1	1
CollCo			3 (360)	3	3	3
HAMCo			5(1010)	5	5	5
MtCo(AA)	1(163)	1(163)	2 (326)	2	2	2
MVDCo			1 (164)	1	1	1
BDSq	2 (14)	2 (14)	2 (14)	2	2	2
	(952)	(952)	(9630)	(9048)	(9433)	(9457)

MMCo = Medium Maintenance Company HMCo(FA) = Heavy Maintenance Company (Field Army)
 GpHQ = Group HQ BnHQ = Battalion HQ AmmoCo = Ammunition Company HMCo(Tk) = Heavy Maintenance
 Company (Tank) DepoCo = Depot Company MAMCo = Medium Automotive Maintenance Company
 EvacCo = Evacuation Company CollCo = Collecting Company HAMCo = Heavy Automotive Maintenance
 Company MtCo(AA) = Maintenance Company (Antiaircraft) MVDCo = Motor Vehicle Distribution
 Company BDSq = Bomb Disposal Squadron TR Unit = Tire Repair Unit

Ordnance Maintenance Units with "key" MOS Personnel as listed in the UNIT DATA BASE DEFINITIONS
 SECTION of the ACSDB Unit Data Base narrative are as follow (key MOS personnel in parentheses):
 MMCo (41); HMCo(FA) (44); HMCo(Tk) (41); MAMCo (10); HAMCo (23); and MtCo(AA) (33).

First Army Supply Units

	15 Dec	23 Dec	30 Dec	6 Jan	13 Jan
QMGrpHQ	2 (62)	3	3	3	3
QMBn	7 (105)	7	7	7	7
DepoSupCo	2 (372)	2	2	2	2
RefrgCo	1 (103)	1	1	1	1
RhdCo	6(1062)	6	6	6	6
SalvRprCo	3 (603)	3	3	3	3
SalvCollCo	3 (618)	3	3	3	3
LdryCo	2 (534)	2	2	3	3
F&BCo	1 (86)	2	2	2	2
GasSupCo	8(1000)	8	7	7	7
ServCo	19(4028)	21	20	21	21
BkryCo	5 (800)	5	4	5	6
GRCo	1 (265)	1	1	2	2
SalesCo	1 (178)	1	1	1	1
	(9816) (10240)	(9743)	(10647)	(10807)	

Third Army

Ninth Army

	19 Dec	30 Dec	13 Jan	15 Dec	23 Dec	30 Dec	13 Jan
QMGrpHQ	2 (62)	2	2	2 (62)	2	2	3
QMBn	7 (105)	7	7	5 (75)	5	5	5
BkryCo	6 (960)	7	7	3 (480)	3	3	3
DepoSupCo	2 (372)	2	2	2 (372)	2	2	2
F&BCo	1 (86)	1	2	1 (86)	1	1	1
GasSupCo	7 (875)	9	9	5 (625)	5	4	4
GRCo	0	0	0	1 (265)	1	1	1
LdryCo	2 (534)	2	2	2 (534)	2	1	1
RhdCo	5 (885)	7	7	4 (708)	4	4	4
RefrgCo	1 (103)	1	1	1 (103)	1	1	1
SalesCo	1 (178)	1	1	1 (178)	1	1	1
SalvCollCo	3 (618)	3	3	2 (412)	2	2	2
SalvRprCo	3 (603)	3	3	2 (402)	2	2	2
ServCo	20(4240)	22	21	13(2756)	11	12	12
	(9621) (10809)	(10683)		(7058)	(6644)	(6454)	(6485)

QMGrpHQ = Quartermaster Group HQ
QMBn = Quartermaster Battalion
BkryCo = Bakery Company
DepoSUpCo = Depot Supply Company
F&BCo = Fumigation and Bath Company
GasSupCo = Gas Supply Company
GRCo = Graves Registration Company
LdryCo = Laundry Company
RhdCo = Railhead Company
RefrgCo = Refrigeration Company
SalesCo = Sales Company
SalvCollCo = Salvage Collecting Company
SalvRprCo = Salvage Repair Company
ServCo = Service Repair Company

First Army Medical Units

	15 Dec	19 Dec	20 Dec	30 Dec	13 Jan
Evac Hosp	10(3950)	10	8	6	6
MedGrpHQ	2 (66)	2	1	1	2
MedBn	6 (168)	6	4	4	6
CollCo	18(1800)	20	19	19	19
AmbCo	11 (990)	12	8	7	7
ClrCo	7 (784)	7	6	6	6
MedDepoCo	1 (145)	1	1	1	1
Fld Hosp	5(1110)	5	4	4	4
MedLab	1 (53)	1	1	1	1
SgrGrp	1 (477)	1	1	1	1
ConvHosp	1 (215)	1	1	1	1
GasTrBn	1 (420)	1	1	1	1
	(10178)	(10468)	(8795)	(7915)	(8004)

Third Army Medical Units

	15 Dec	20 Dec	13 Jan
Evac Hosp	10(3950)	12	12
MedGrpHQ	3 (99)	4	3
MedBn	7 (196)	9	7
CollCo	15(1500)	16	16
AmbCo	11 (990)	15	15
ClrCo	7 (784)	8	8
MedDepoCo	2 (290)	2	2
FldHosp	6(1332)	7	7
MedLab	1 (53)	1	1
SgrGrp	1 (555)	1	1
ConvHosp	1 (215)	1	1
GasTrBn	1 (840)	2	2
	(10804)	(12477)	(12477)

Ninth Army Medical Units

	15 Dec	19 Dec	30 Dec
EvacHosp	7(2765)	7	9
MedGrpHQ	2 (66)	2	2
MedBn	4 (112)	3	3
CollCo	12(1200)	9	9
AmbCo	8 (720)	7	8
ClrCo	5 (560)	5	5
MedDepoCo	1 (145)	1	1
FldHosp	3 (666)	3	3
MedLab	1 (53)	1	1
SgrGrp	1 (315)	1	1
ConvHosp	1 (215)	1	1
GasTrBn	1 (420)	1	1
	(7237)	(6819)	(7699)

EvacHosp = Evacuation Hospital
 MedGrpHQ = Medical Group HQ
 MedBn = Medical Battalion
 CollCo = Collecting Company
 AmbCo = Ambulance Company
 ClrCo = Clearing Company
 MedDepoCo = Medical Depot Company
 FldHosp = Field Hospital
 MedLab = Medical Laboratory
 SgrGrp = Surgical Group
 ConvHos = Convalescent Hospital
 GasTrBn = Gas Treatment Battalion

First Army Transport Units

	12/15	12/17	12/30	1/6
CarCo	1 (129)	1	1	1
TrkCo	37 (4070)	41	41	41
AmphbTrkCo	2 (360)	2	2	2
QMBn	8 (152)	8	8	8
QMGrpHQ	1 (31)	1	1	1
	(4742)	(5182)	(5182)	(5182)

Third Army

	12/15	12/17	12/30	1/6
CarCo	1 (129)	1	1	1
TrkCo	25 (2750)	25	26	30
AmphbTrkCo	1 (180)	1	1	1
QMBn	6 (114)	6	6	6
QMGrpHQ	1 (31)	1	1	1
	(3204)	(3204)	(3314)	(3754)

Ninth Army

	12/15	12/17	12/30	1/6
CarCo	1 (129)	1	1	1
TrkCo	25 (2750)	21	21	21
AmphbTrkCo	1 (180)	1	1	1
QMBn	6 (114)	6	6	6
QMGrpHQ	1 (31)	1	1	1
	(3204)	(2764)	(2764)	(2764)

CarCo = Car Company

TrkCo = Truck Company (the principal US Army long-haul transport unit)

AmphbTrkCo = Amphibious Truck Company

QMBn = Quartermaster Battalion

QMGrpHQ = Quartermaster Group HQ

US Medical Facilities Data

Fields 38-42, and 59 in the Unit Data Base contain data for army-level medical facilities. This data is provided primarily for US units. It was not found in the historical record for German forces, so medical facilities data for German forces in the Ardennes Campaign Simulation Data Base (ACSDB) is limited to an estimate of the available "Number of Hospital Beds." The derivation of the German data is discussed in another narrative for the ACSDB final report.

The data provided for US Army medical statistics is recorded only for army-level units since the data found in research is compiled in aggregate for each of the three armies of the US 12th Army Group -- the First, Third, and Ninth Armies. US divisions in the Ardennes had elements of hospital units assigned to them in a command relationship most equivalent to "operational control" (OPCON) in the modern US Army. During World War II, hospital units generally served the personnel of a particular division or divisions. However, all reports on the operations were forwarded to the Army Surgeon's office. Thus, the reports at the army level include all of the statistics for hospital units under army command.

A report prepared by consultant Shelby L. Stanton for the ACSDB, titled Medical Evacuation and Hospitalization during the Ardennes Campaign, contains substantial information on the organization and activities of US Army medical units during the Ardennes. Relevant sections of the US First and Third Army After Action Reports also provide descriptions of the activities of the armies.

US medical facilities statistics are recorded in the Unit Data Base of the ACSDB in the records of the US army headquarters units, i.e., in the records identified with the names "1st Army HQ," "3d Army HQ," and "9th Army HQ."

The data entered in these records is taken directly from the sources listed below. All records are from US National Archives Record Group (RG) 112, Boxes 402 and 403, Office of the Surgeon General, World War II Administrative Records.

- Field 38 (FACILITIES & STATISTICS -- No. of Hospital Beds): Data for the First, Third, and Ninth Armies is taken directly from "HEADQUARTERS TWELFTH ARMY GROUP, Medical Section, Daily Status of Patients and Evacuation of Personnel, US Army, ending..."

- Field 39 (FACILITIES & STATISTICS -- No. of Beds Filled): Data is taken for the First, Third, and Ninth Armies from the same source used for Field 38 data.

- Field 40 (FACILITIES & STATISTICS -- No. of WIA Entering Hospital): Data for the First and Ninth Armies is taken from either "WEEKLY NUMBER OF ADMISSIONS AND DISPOSITIONS OF FIRST ARMY MEDICAL INSTALLATIONS SINCE D-DAY" (table dated 9 April 1945), or "WEEKLY NUMBER OF ADMISSIONS & DISPOSITIONS OF NINTH ARMY MEDICAL INSTALLATIONS SINCE 8 Sept 44" (table dated 9 April 1945). The data in these sources is weekly data and is divided by seven to estimate daily numbers of wounded admissions. Data for the Third Army is taken from an undated table titled "THIRD U.S. ARMY HOSPITALS DIRECT ADMISSIONS" which provides weekly data from 21 July 1944 to 2 February 1945. This data is also divided by seven to give estimated daily averages.

- Field 41 (FACILITIES & STATISTICS -- No. of DNBI Entering Hospital): Data for the three US armies is derived exactly as the data for Field 40.

- Field 42 (FACILITIES & STATISTICS -- No. Died in Hospital): Data for the three US armies is derived exactly as the data for Field 40.

- Field 59 (FACILITIES & STATISTICS -- No. Evacuated): Data for the Third and Ninth Armies is taken directly from "HEADQUARTERS TWELFTH ARMY GROUP, Medical Section, Daily Status of Patients and Evacuation of Personnel, US Army, ending..." This source is also used for First Army data on 15-16 December and 26 December-16 January. For 17-25 December the daily number of evacuated personnel from the First Army is estimated by taking the weekly number of admissions for the weeks ending 22 December and 29 December, as found in "NUMBER OF ADMISSIONS...SINCE D-DAY," and subtracting out the daily evacuated personnel figures for 16 December and 26-29 December. The resulting number is divided by nine to give an average daily number of admissions for the period 17-25 December. This estimation is performed because the source "NUMBER OF ADMISSIONS...SINCE D-DAY" does not report daily evacuated personnel figures during the period 17-25 December, omissions no doubt due to the confusion caused by the German offensive.

The math used in this estimation process is as follows:

$((10791-1267) + (3873-936-871-970-1059))/9$, or 1396 per day.

US Logistics Data

INTRODUCTION

Fields 43-48 and 54-55 of the Ardennes Campaign Simulation Data Base (ACSDB) Unit Data Base are used to record daily logistics information for ground units which participated in the Ardennes Campaign. For complete definitions of these fields, see the appropriate sections of the ACSDB Unit Data Base narrative.

This paper serves as the bibliographic reference for the US logistics data entered in fields 43-48 and 54-55 of the Unit Data Base. To understand most fully the US logistics data, the paper should be reviewed along with the ACSDB Unit Data Base narrative. The paper also explains any estimation methodologies used to generate US logistics data. As is evident from the list of records in Attachment 1, there is abundant primary source documentation available for logistics data on US units during the Ardennes Campaign period. Nevertheless, some missing data is estimated, and this paper explains in general terms the processes used to generate this data.

US AMMUNITION DATA

Attachment 1 is a list of the primary source records researched for the ACSDB and used to generate ammunition and other logistics data for US units in the Ardennes Campaign. Unless otherwise indicated, all data is from Record Group (RG) 407 in the US National Archives. Data from these sources is entered without modification (i.e., prorating) in the Unit Data Base if the data is recorded on a daily basis. If no daily primary source ammunition data is available in the records, various methodologies are employed to interpolated or extrapolate ammunition data on a daily basis.

For categorization of ammunition types as used for US Army units in the ACSDB, see the T/O&E Data Base narrative.

US Army Ammunition Supply.

The flow of ammunition supply described for US units in the ACSDB is as follows. All data is recorded for army- and corps-level units in the "troops" records, i.e., "1st Army Troops," "3d Army Troops," "VII Corps Troops," "XVIII Corps Troops," etc, with one exception as noted below.

- Army-level "on-hand" figures are estimated for the First and Third Armies to be three times the average daily consumption of the army, as armies by doctrine maintained a three-day supply of ammunition at all times. For the Ninth Army the amount on-hand is estimated to equal one day's average daily expenditure.

- Corps-level "on-hand" figures are estimated to be three to five times the average daily consumption of the corps, as corps by doctrine maintained a three- to five-day supply of ammunition at all times. Note that for "corps HQ" units ("XVIII Corps HQ," "XX Corps HQ," etc.), on-hand supply for "Tank/AT" and "Other" ammunition is recorded in the ACSDB. These figures represent the ammunition levels maintained by the organic army and corps service support units. This is the exception noted above.

- Division-level "on-hand" figures are assumed to be the total doctrinal ammunition loads as listed in FM 101-10, Staff officers' Field Manual: Organization, Technical and Logistical Data, 21 December 1944 when actual historical data is not available in records. Total ammunition includes the basic load, and that which was carried in the unit trains. In the ACSDB, US on-hand ammunition figures are reduced only when heavy ammunition expenditures cause the amount of ammunition consumed to exceed the maximum resupply capacity in tons per day, or when unit supply routes are known to have been interrupted.

- Army-, corps-, and division-level "received" ammunition figures are considered to equal ammunition consumed by the unit unless the amount consumed exceeds the transport capacity of a unit, or unless enemy action interdicted supply lines.

- Army-level "used" figures include the amount of ammunition transferred to, and received by, the corps in the army, as well as the amount of ammunition that was expended by organic army assets.

- Corps-level "used" figures include the amount of ammunition transferred to and received by the divisions in the corps as well as the amount of ammunition that was expended by organic corps assets, including non-divisional units attached to divisions.

- Division-level "used" figures include only the amount of ammunition expended by organic divisional units of the division.

An exception to the above-described flow of supplies is the aerial resupply of the 101st Airborne Division. Amounts of ammunition received by the 101st during aerial resupply operations from 21-29 December 1944 are not included in the VIII Corps Troops ammunition consumption (used) totals since these supplies originated in the communications zone.

US Ammunition Data Estimation.

When sufficient data is available in the primary source records, it is used to generate data for the above-described requirements. However, estimation is required for some units. Examples of the major estimation methodologies used to fill in missing data points include the following.

- US First Army and US Third Army records (the armies' "reports of operations") contain excellent ammunition supply records from which corps data is in some cases estimated. Ammunition data for days on which individual corps data is unavailable is derived from army-level records of ammunition consumed and ammunition received by taking the aggregate army figures and subtracting from them the known figures for corps and distributing the remainder among the corps for which data is not available. This same approach for divisions is used in cases where corps ammunition data is known but ammunition figures are not available for division(s). Adjustment of some values derived from the estimation process insures that no unit expends more ammunition than the amount for which it has transport capacity.

- US Ninth Army ammunition data is estimated by creating ratios of the number of divisions in the First and Ninth Armies and then using these ratios to calculate Ninth Army ammunition statistics from First Army figures.

- Ammunition data from records compiled on a weekly or monthly basis are prorated by dividing the aggregate data by the total number of days of the period.

- For the US 2d Armored Division, ammunition data for the US 3d Armored Division is used to estimate the ammunition data. Both units were organized as heavy armored divisions, larger than the standard armored division organizations.

- For all units not engaged in combat or in reserve, the amount of ammunition used is assumed to be none, unless the historical record indicates that ammunition was consumed.

US FUEL DATA

The organization of fuel supply for US units as recorded in the ACSDB is identical to that used for ammunition supply for US units except for the inclusion of attached units with divisions. For US infantry, airborne, and armored divisions, the fuel data of the "standard" attached combat battalions is added to the fuel data for the division organic units. In the case of the infantry and airborne divisions these include one tank battalion, one tank destroyer battalion, and one antiaircraft artillery battalion. In the case of the armored division, these include one tank destroyer battalion and one antiaircraft artillery battalion.

Fuel data is also calculated for army HQ and corps HQ units in the ACSDB, representing the fuel supply of the service support units maintained by army and corps.

US Fuel Data Estimation.

When fuel data for US units is available in primary sources, it is used in the ACSDB. The US First Army and Third Army After Action Reports contain daily fuel consumption (used) figures for the two armies, as do some divisional records.

On-hand fuel data for army and corps is based on three times the average amount of fuel consumed per day to represent the three days of Class III supply maintained by armies and corps. Note that this data, and the fuel received and fuel used data as well, includes all Class III supply -- petroleum, oil, and lubricants -- and not just motor fuel. This is because the data in the historical records for these units includes all POLs. For divisions, the fuel data (on-hand, received, and used) includes only motor fuel.

Fuel used by army troops includes fuel consumed by separate combat units of the army plus fuel supplied to subordinate corps of the army. The formula used to calculate consumption by the separate combat units is calculated using an equation from FM 101-10, December 1944, Chapter 3, Page 13:

MD = Movement Distance
SD = Supply Distance
UD = Unit Distance

$MD + (.2 \times SD) + 10 = UD$ (Administrative consumption of fuel is a variable value, in this case it equals 10.)

$UD \times 109.2 = \text{Gallons Consumed}$ (The amount of fuel required to move all vehicles of army troops units one mile is 109.2 gallons.)

Movement Distance is the displacement of the headquarters of a unit. Supply Distance is the average round trip distance between supply points and the unit. Unit Distance is the equivalent movement distance, derived from the above formula, used to estimate fuel consumption of a unit. See Attachment 2 for a copy of Chapter 3, Page 13 of FM 101-10, 21 December 1944.

For the US Ninth Army, fuel consumption data is prorated from US First Army figures using ratios of the numbers of divisions in the two armies and using these ratios to estimate Ninth Army consumption from that of the First Army.

Fuel used by corps troops is estimated in the same manner as army troops fuel consumption with a different amount of fuel required to move all vehicles of corps troops units one mile:

$$UD \times 163.64 = \text{Gallons Consumed}$$

These formulae are used primarily in the estimation of fuel data figures for corps or divisions with no fuel figures. For example, if fuel used figures for all but one corps of an army are known from historical data, the data for that corps is estimated by subtracting the data for all other corps and the data for the army troops from the total army data.

The gallons used to move one mile for divisions and their standard attachments as described above are:

Infantry Division:	243.86 gallons
Airborne Division:	135.73 gallons
Armored Division:	1028.26 gallons

Supply Distance (SD) in the above formulae is calculated using the nearest fuel depot to a unit headquarters. Attachment 3 is a list of these depots. During the Ardennes Campaign, US units were authorized to draw fuel from the closest supply unit, including communications zone supply points in Liege, Belgium. Gallons required by vehicles to displace one mile are found in FM 101-10, 21 December 1944.

In generating fuel data for US units, fuel used is never allowed to exceed fuel on-hand, and fuel received is limited to prevent fuel on-hand from exceeding three days of supply.

US OTHER SUPPLY DATA

As described in the ACSDB T/O&E Data Base narrative, "Other Supply" weight is estimated using data for Classes I, II, and IV supplies as found on page 308 of FM 101-10, 21 December 1944. Other Supply data for US units in the Unit Data Base is estimated using the data derived from FM 101-10, 21 December 1944, for the US T/O&Es.

The estimated T/O&E Other Supply weights of divisions is used to calculate the on-hand Other Supply weights for infantry, armor, and airborne divisions in the unit data base. For "Corps HQ," "Corps Troops," "Army HQ," and "Army Troops," the on-hand personnel strength is multiplied by 24.99 pounds (the pounds of "Other Supply" used per man per day, as taken from FM 101-10, 21 December 1944), to estimate the on-hand weight of "Other Supply."

Other Supply received is equal to Other Supply used in all but a few special circumstances in the US Army in the Ardennes Campaign. Exceptions include the 28th and 106th Infantry Divisions, the 101st Airborne Division, and the 7th Armored Division units whose supply was disrupted during the initial German attacks of the Ardennes Campaign. In these cases, the replacement of used Other Supply did not occur on the days on which those units were isolated.

Other Supply Used is calculated by multiplication of the pounds per man per day figure described above by the number of on-hand personnel in a formation on a given day. In cases where units were out of supply, rationing is represented in the ACSDB by distributing the amount of Other Supply on-hand across the period of no supply until the unit surrendered or regained a source of supply.

US TRANSPORTATION CAPACITY

Long-haul transport capacity for US army and corps is recorded in the Unit Data Base in records of the "army HQ" and "corps HQ." The capacity is based on a cargo capacity of 175 tons per quartermaster truck company, the principal long-haul transport unit in the US Army during World War II, and the number of quartermaster truck companies per army or corps. This capacity includes that of the company's 2-1/2 ton trucks and 1 ton trailers.

Transportation Capacity (Wet) is estimated to be 10.1% of the total transport capacity of the long-haul transport assigned to the unit. The percentage is derived from US First Army figures for the period 16 December 1944-22 February 1945 as found in First United States Army: Report of Operations, 1 August 1944-22 February 1945, Vol. 4, page 122 (47,730 tons of Class V supplies out of 471,761 tons of all Classes of supplies). The number of gallons of 80 octane gasoline per ton is 326. This figure comes from page 214 of FM 101-10, Staff Officers' Field Manual: Organization Technical, and Logistical Data, July 1953. (The July 1953 version of this manual is used because the 21 December 1944 version does not have a gasoline weight.)

The following tables show the values used for long-haul transport capacity in the ACSDB.

<u>Unit</u>	<u>Period</u>	<u>Total</u>		<u>Fuel (1000</u>	
		<u>Tons</u>	<u>(x.101)</u>	<u>Gals.)</u>	<u>Dry (Tons)</u>
III Corps	All days	350	35.35	11.524	314.65
V Corps	All days	350	35.35	11.524	314.65
VII Corps	All days	350	35.35	11.524	314.65
VIII Corps	All days	350	35.35	11.524	314.65
XII Corps	All days	350	35.35	11.524	314.65
XIII Corps	All days	350	35.35	11.524	314.65
XVIII Corps	28 Dec-16 Jan	350	35.35	11.524	314.65
XIX Corps	All days	350	35.35	11.524	314.65
XX Corps	All days	350	35.35	11.524	314.65

<u>Unit</u>	<u>Period</u>	<u>Total</u>		<u>Fuel (1000</u>	
		<u>Tons</u>	<u>(x.101)</u>	<u>Gals.)</u>	<u>Dry (Tons)</u>
1st Army	15-16 Dec	6475	653.975	213.196	5821.025
	17-29 Dec	7175	724.675	236.244	6450.325
	30 Dec-5 Jan	7175	724.675	236.244	6450.325
	6-15 Jan	7175	724.675	236.244	6450.325
3d Army	15-16 Dec	4375	441.875	144.051	3933.125
	17-29 Dec	4375	441.875	144.051	3933.125
	30 Dec-5 Jan	4550	459.55	149.813	4090.450
	6-15 Jan	5250	530.25	172.862	4719.750

<u>Unit</u>	<u>Period</u>	<u>Total</u> <u>Tons</u>	<u>Fuel (1000</u> <u>(x.101)</u>	<u>Gals.)</u>	<u>Dry (Tons)</u>
9th Army	15-16 Dec	4375	441.875	144.051	3933.125
	17-29 Dec	3675	371.175	121.003	3303.825
	30 Dec-5 Jan	3675	371.175	121.003	3303.825
	6-15 Jan	3675	371.175	121.003	3303.825

Attachment 1

List of Logistics Records used for US Units
in the ACSDB

The following records are available at the US National Archives unless otherwise noted. They are from Record Group 407 and are kept in the indicated box numbers.

12th Army Group

12th Army Group G-4 Reports 99/12-4.1 to 99/12-5
Dec 44-Jan 45, Box 1779

- Report #20 19 Dec 44
1. Classes of Supply onhand as of 15 Dec 44, p. 3
 2. Tons of Class II & IV by Army 19 Dec 44, p. 4
 3. Tons of Class V by Army 15 Dec 44, p. 5
 4. Availability of Ammo on 15 Dec by type
15 Dec 44, p. 6
- Report #21 26 Dec 44
1. Classes of Supply onhand as of 21 Dec 44, p. 2
 2. Supplies lost to enemy action 18-24 Dec 44, p. 3
 3. Tons of Class II & IV by Army 26 Dec 44, p. 4
 4. Tons of Class V by Army 21 Dec 44, p. 4
 5. ComZ ammo 14-20 Dec, p. 5
 6. Availability of Ammo 21 Dec 44, p. 5
- Report #22 2 Jan 45
1. Status of Supply 29 Dec 44, pp. 2-3
 2. Class V by Army 29 Dec 44, p. 5
 3. ComZ Ammo 26-28 Dec 44, p. 6
- Report #23 9 Jan 45
1. Status of Supply by Army 5 Jan 45, p. 2
 2. Class II & IV by Army 6 Jan 45, p. 3
 3. Class V by Army 3-4 Jan 45, p. 4
 4. ComZ Ammo 28 Dec-3 Jan 45, p. 4
 5. Availability of Ammo 3-4 Jan 45, p. 5
- Report #24 16 Jan 45
1. Status of Supply by Army 12 Jan 45, p. 2
 2. Class II & IV by Army 13 Jan 45, p. 3
 3. Class V by Army 11 Jan 45, p. 4
 4. ComZ Ammo 4-10 Jan 45, p. 4
 5. Availability of Ammo 11 Jan 45, pp. 4-5

First Army

First United States Army. Report of Operations, 1 August 1944-22 February 1945. 4 vols. (This is not a US National Archives document.)

Annex No. 2, G-4 Section Report.

1. Demands on Transportation for Troop Movements and Evacuation of Supplies, pp. 122-123
2. Losses of Supplies as a Result of German Counteroffensive, p. 123
3. Ammunition Situation, pp. 125-126

Annex No. 4, Artillery Section Report

1. Artillery Ammunition Expenditures, p. 26

Annex No. 9, Ordnance Section Report

1. Ammunition Supply 16 Dec-22 Feb, p. 5
2. Ordnance Troop Gains and Losses, p. 16

Annex No. 10, Quartermaster Section Report

1. Class III Consumption 16 Dec-22 Feb, pp. 118-119
2. Transportation Tonnage Report for 16 Dec-22 Feb, p. 122 (Includes a breakdown of the classes of supply hauled.)

Third Army

After Action Report, Third US Army: 1 August 1944-9 May 1945. Vol. 1, The Operations and Vol. 2, Staff Section Reports. (This is not a US National Archives document.)

Section 9 - Artillery

1. Artillery Ammunition Expenditures 10-17 Dec, p. 15
2. Arty Ammo Expenditures 18-24 Dec, p. 16
3. Arty Ammo Expenditures 19-31 Dec, p. 17
4. Arty Ammo Expenditures 1-7 Jan, p. 19
5. Arty Ammo Expenditures 8-14 Jan, p. 20
6. Arty Ammo Expenditures 15-21 Jan, p. 20

Section 5 - G-4

1. Total Tonnage by Month of All Classes of Supplies Received from 1 Aug to 8 May (by month), p. 69
2. Parachute Resupply of 101st Airborne Division 23-27 Dec, pp. 38-39
3. Summary of Major Types of Hauls Made during December, p. 40
4. Summary of Major Types of Hauls Made during January, p. 47

Third Army

Third Army G-4 Journal

1. 16 Dec G-4 report - Class III, Class IV, & Total Supply, Box 16 (This document is from US National Archive Record Group 338.)
2. 3d Army Circular # 1, 1 Jan 45
"76mm and 3-inch Gun, HE Ammunition with Reduced Charge" 3d US Army

Corps

V Corps

1. 17 Dec-16 Jan G-4 Journal, Ammo Allocations, 205-4.2, Oct 44 to Feb 45, Box 3574

XII Corps

1. 30 Nov-31 Dec Ordnance Officer After Action Report, Ammo Expenditures, 213-0.3 Dec 44, Box 4554

XIX Corps

1. 1-31 Dec G-4 report, Percent of Unit of Fire Expended by Day, by Type, 219-3.2, 6-21 Jan 45, Box 5022
2. Dec G-4 Report, Tons of Ammo Handled in Army Supply Point 823, 219-3.2, 6-21 Jan 45, Box 5022

Infantry Divisions

5th ID

1. 16 Dec-16 Jan G-4 Journal, complete journal with miscellaneous logistics data, 305-4.2, 11 Dec 44-31 Jan 45, Box 6822

8th ID

1. 1-31 Dec Division After Action Report, Classes III & V Expenditures (This record is from the Office of Air Force History microfilm files at Bolling Air Force Base, Washington, D.C., Roll #C5146, 585.08, 8/44-5/45, pp. 451, 456, 457.)

9th ID

1. Jan 45 G-4 After Action Report, Class III average daily consumption (Bolling Air Force Base microfilm Roll #C5150, 585.09-1 Jan 45 to 585.09A, p. 22.)

28th ID

1. 27 Dec Combat Loss Report, G-4, Consolidated list of Combat Losses, 328-4.2, 1 Dec 44-28 Feb 45, Box 8342

- 29th ID
1. 15 Dec-16 Jan LOGSTAT, complete records of all classes of supply, 329-4.1 to 329-4.2, Box 8655
- 30th ID
1. 16-23 Dec G-4 Periodic Report, Supply Status by Class, 330-4, Box 3839
- 83d ID
1. 9-16 Dec, 23-30 Dec, 30 Dec-6 Jan, 6 Jan-13 Jan S-4 Periodic Reports, Status of Supply by Class, 383-4.2, 1 Oct 44 to 31 Dec 44, Box 12523
- 102d ID
1. 1-31 Jan G-4 After Action Report, Tons of Supply by Class Processed during the Period, 3102-3.9 to 3102-4, Box 14472
 2. 102d ID Memorandum No. 9 "Ammunition Levels" (7 Jan 45) HQ, 102d Infantry Division
- 104th ID
1. 24 Dec-4 Jan Daily LOGSTAT Reports, On-hand Supply in Days of Supply, 3104-4.2 Dec 1 to 3104.4.11, Box 14673
- 106th ID
1. 16 Dec DIVARTY S-3 Report - # of rounds expended, 3106-3.3 16 Dec to 3106-3.3 31 Dec, Box 14754
 2. 12, 13, 15 Jan DIVARTY S-3 Report - # of rounds expended, 3106-3.3 1-15 Jan, Box 14735

A. Airborne Divisions

- 17th AbnD
1. 31 Dec-16 Jan LOGSTAT, complete record of all classes of supply, 317-4 to 317-3.6, Box 7629
- 82d AbnD
1. 18 Dec G-3 Report, "Guidelines for Extra Fuel to be Carried by Vehicles," 382-3.3 17 Dec to 28 Dec, Box 12407
 2. 30 Dec G-3 report, DIVARTY fired 122 missions and 4,143 rounds, 382-3.3 17 Dec 44 to 28 Dec 44, Box 12407
 3. 1 Jan G-3 report, DIVARTY fired 90 missions

101st AbnD

1. 2-4 Jan G-4 Journal, Class III on-hand, 3104-4 to 3101-4.5, Box 14377
2. 19-29 Dec G-4 Journal, Equipment Losses and Gains, 3101-4 to 3101-4.5, Box 14377
3. 10 Dec-10 Jan Ammo Consumption, Ammo Consumed by Type during the Period 3104-4 to 3101-4.5, Box 14337

Armored Divisions

3d AD

1. 30 Dec-6 Jan, 7 Jan-14 Jan LOGSTAT Report Nos. 1 & 2, Supply Status by Class, 603-4.2, Box 15078
2. 1-16 Jan G-4 Journal, Miscellaneous Messages only, 603-4.2, Box 15078

5th AD

1. 16-31 Dec & 16 Jan G-4 Journal, Miscellaneous data, 605-3.9 to 605-4.2, Box 15338

6th AD (Records from Bolling Air Force Base)

1. 16 Dec-12 Jan Ammo Expenditures, Roll #C5143 585.06A, 7/44-5/45, pp. 44, 46, 48, 50
2. Dec 44 & Jan 45 Transport Capacity, Roll #C5143 585.06A, 7/44-5/45, p. 54
3. 23 Dec-26 Jan Fuel Consumption, Roll #C5143 585.06A, 7/44-5/45, p. 57

7th AD

1. 1-31 Dec, 1-31 Jan G-4 After Action Reports, Supplies Consumed by Class, 607-4.9 to 607-26, Box 15608
2. 16 Dec-16 Jan G-4 Daily Reports, on-hand class of supply in days of supply, 607-4.4 1 Nov 44 to 31 Mar 45, Boxes 15605 & 15606

10th AD

1. 20-25 Dec 44 G-4 Report, Classes III & V per day, 610-4.2, Box 15925
2. 8-14 Jan G-4 Report, Classes III & V per day, 610-4.2, Box 15925

Attachment 2

Extracts from FM 101-10, 21 December 1944

SUPPLY

314-315

BASIC DATA—CLASS III SUPPLY (Continued):

(3) Capacity of cargo trucks and trailers for carrying 5 gallon gasoline drums (filled):

1-ton trailer	80
1½-ton truck	75
2½-ton truck	125

■ 315. GASOLINE SUPPLY.—The factors controlling gasoline requirements of motor vehicles in military operation are:

a. *Movement distance (MD)*, or the distance in miles that the center of mass of a unit is displaced. On a march this distance is measured from center to center of successive bivouac areas.

b. *Supply distance (SD)*, or the average round trip distance between supply points and the troops. This distance is measured from supply points to center of the most distant bivouac area.

c. *Variables (V)*, which consist of internal travel, reconnaissance, warming up engines, and abnormal periods or time required for low-gear operation. These items differ in each situation with the character of the operation, season of the year, weather, roads, and terrain, and must be estimated in accordance with actual conditions. Under average conditions, a constant of 10 unit miles of travel will usually cover these variables for estimating purposes.

To determine the Unit Distance (UD) in miles of travel the following formula may be used:

$$UD = MD + (.2 \times SD)^2 + V$$

Example: Infantry division will move 20 miles, and the average round trip supply distance is 50 miles

$$\begin{aligned} MD &= 20 \\ SD &= 50 \\ V &= 10 \end{aligned}$$

Applying the formula we have:

$$\begin{aligned} UD &= 20 + (.2 \times 50)^2 + 10 \\ UD &= 20 + 10 + 10 = 40 \end{aligned}$$

Now if we multiply this UD (miles of travel) by the number of gallons required to move all vehicles of the division one mile, we will have the gasoline requirements.

In order to determine the amount of gasoline to move all vehicles of a small unit one mile, specific computations are required.

* Approximately two-tenths of the vehicles of a division function as supply vehicles, therefore multiply the supply distance by two-tenths.

Attachment 3

Supply Points Used for the Calculation of Supply Distance

Information on the location of the supply points is taken from the after action reports of the US First Army and US Third Army, sources listed in Attachment 1.

- Third Army AAR, Section 5, Vol 2, Part 5, pp. 42-43
- First Army AAR, Annex 9, Appendix 8, p. 39

The four- or six-digit grid coordinates are the Universal Transverse Mercator (UTM) grid coordinates used on the 1943 Geographical Section, General Staff maps produced by the Army Map Service. The maps are:

<u>Sheet Number</u>	<u>Name</u>
8	Brussels
9	Liege
12	Namur
13	Marche
16	Mezieres
14	Arlon
R-1	Koeln
S-1	Bonn
T-1	Trier
V-1	Neunkirchen

SUPPLY POINTS

Communications Zone	Classes I, II, III & V - vicinity I471295 (Liege)
12th Army Group	Class III - vicinity I625548 (Brussels)
Canadian 1st Army	Class III - vicinity I385550
US First Army	Classes I, II, & III - vicinity I8421 (Genboux) Cl I - vicinity I965315 Cl I - vicinity I975295 Cl I - vicinity K175095 Cl III - vicinity K571270 Cl III - vicinity K641203 Cl III - vicinity K672124 Cl III - vicinity K750303 Cl II - vicinity K775274 Cl I - vicinity K812281

Cl V - vicinity P563595 (Bastogne)
Cl V - vicinity K620283
Cl V - vicinity K789044
Cl V - vicinity K843372
Cl V - vicinity K882343

US Third Army

Classes I & III - vicinity P3149 (opened 19
Dec, closed 20 Dec)
Classes I & III - vicinity P2924 (opened 19
Dec)
Cl I - vicinity P6323 (Arlon) (opened 20
Dec)
Cl III - vicinity P5720 (opened 20 Dec)
Classes I & III - vicinity P5807 (opened 19
Dec)
Classes I & III - vicinity V9490 (opened 21
Nov, closed 22 Dec)
Cl V - vicinity P950180 (opened 24 Dec)
Cl V - vicinity V0579

US Ninth Army

Cl V - vicinity K828545

Derivation of the US Order of Battle

INTRODUCTION

Fields 60-79 of the Unit Data Base are used to describe the daily order of battle of forces tracked in the Ardennes Campaign Simulation Data Base (ACSDB). For complete information on the methods used to record the order of battle, see the section titled "ATTACHMENTS & DETACHMENTS -- TYPE, UNIT NAME" of the ACSDB Unit Data Base narrative.

The task of compiling the daily US Army Order of Battle for the ACSDB was aided by abundant and readily available primary and secondary sources of information. This paper is intended to serve as a bibliographic reference for the most commonly used sources. In some cases, particularly with non-divisional units, the information found in sources is fragmentary and sometimes contradictory. Therefore, this paper also serves as a basic description of some of the problems encountered in preparing the US Order of Battle, steps taken to address these problems, and the nature of the US Army's Order of Battle organizational scheme as used in World War II.

The last section of this paper lists the most important sources used in the compilation of the daily US Order of Battle, as well as the abbreviated references for them used in the text of this paper.

US DOCTRINE

US Army doctrine in World War II normally used two descriptions for a unit's subordination status. These were:

- 1) Assigned
- 2) Attached

These descriptions could be and were used together to give a precise description of a unit's status. For example, the US 7th Armored Division on 17 December 1944 was assigned to the US Ninth Army but was attached to the US VIII Corps of the US First Army. Thus, whenever known, effective dates of change of attachment are reflected in the US Order of Battle rather than dates of change of assignment, as changes of assignment in many instances occurred days or even weeks after the unit was under the operational control of (i.e., attached to) another headquarters.

US non-divisional artillery units, most commonly corps artillery battalions, are often noted in sources as "supporting" a specific unit, usually a division. In these cases, if the artillery unit is not found in any source to have been actually attached to the unit, the artillery is not noted as being attached in the US Order of Battle.

US NINTH ARMY

Recreating the daily Order of Battle of the US Ninth Army and its subordinate units proved to be the most difficult aspect of work on the US Order of Battle and required the most estimation. Primary sources information is particularly limited for the non-divisional engineer, antiaircraft artillery, and service support (ordnance, quartermaster, etc.) elements of the Ninth Army. To determine the Order of Battle as accurately as possible, the following assumptions are made:

1) Service support elements are assumed to be two-thirds the number of those of US First Army, based on the ratio of two corps in the Ninth (XIII and XIX) versus three corps in the First (V, VII, and VIII) as of 15 December 1944. Changes in service support unit organization are made as shown in the weekly 12th Army Group G-4 Reports Nos. 20-25, covering the period 10 December 1944 to 20 January 1945 (available in US National Archives Record Group (RG) 407, Box 1779, 99/12-4.1 to 99/12-5).

2) Engineer and antiaircraft artillery unit organization is determined using a list of all units which served under the Ninth Army found in Conquer. From this list are eliminated all units known to have served with the US First and Third Armies throughout the period 15 December 1944-16 January 1945. Also eliminated are all units listed in Stanton as having arrived in the European Theater of Operations after December 1944. Of the remaining units, the following are assumed to have been with the US XIX Corps (the XII Corps Order of Battle is known): two engineer groups with six combat engineer battalions and one antiaircraft artillery group with two antiaircraft artillery automatic weapons battalions, typical organization for a US corps. Having eliminated the above units from the list in Conquer, all remaining engineer and antiaircraft artillery troops are assigned to the Ninth Army.

3) For field artillery, tank, and tank destroyer units, information found in various primary and secondary sources proved to be sufficiently detailed to determine their daily Order of Battle without estimation methodologies as described above.

SOURCES

Primary sources used in the compilation of the daily US Order of Battle for the ACSDB include relevant army, corps, and division G-3 reports, including histories, after action reports, and station lists, and relevant G-1 reports where specific unit information is included. Note that because units in some cases continued to make G-1 reports to the units to which they were assigned rather than attached, the G-1 reports do not always give an accurate order of battle picture and must therefore be utilized with discretion.

Particularly informative were the First Army After Action Report and the Third Army After Action Report, which give extensive order of battle data in their narratives and in their various staff sections. A vast amount of detail on attachments at division level may be found in Order of Battle US Army -- ETO. Although information found in it is sometimes contradictory and incomplete, it is an indispensable reference for information on the daily US Army Order of Battle. (Much of the inconsistency was resolved when it became apparent that, in many cases, what is listed as a battalion is in fact only elements of a battalion. In other instances elements of one division are attached to elements of another division which are then in turn attached to yet a third division, thus resulting in duplication of attachments in the source.)

The most important sources used in the compilation of the daily US Army Order of Battle are as follow:

Secondary:

- Conquer: The Story of the Ninth Army, 1944-1945.
Washington, D.C.: Infantry Journal Press, 1947.

- Office of the Theater Historian. Order of Battle of the United States Army in World War III. European Theater of Operations. Divisions. Paris, France: December 1945. (Cited above as Order of Battle US Army -- ETO.)

- Stanton, Shelby L. Order of Battle U.S. Army, World War II. Novato, CA: Presidio, 1984. (Cited above as Stanton.)

Primary:

- First United States Army. Report of Operations, 1 August 1944-22 February 1945. 4 vols. (Cited above as First Army After Action Report.)

- After Action Report, Third US Army: 1 August 1944-9 May 1945. Vol. 1, The Operations and Vol. 2, Staff Section Reports. (Cited above as Third Army After Action Report.)

- Weekly 12th Army Group G-4 Reports Nos. 20-25, covering the period 10 December 1944 to 20 January 1945 (available in US National Archives Record Group 407, Box 1779, 99/12-4.1 to 99/12-5).

- V Corps G-1 After Action Reports for December 1944 and January 1945, including monthly station lists and strengths of command (available in US National Archives Record Group 407, Box 3412, 205-0.13 to 205-1.12).

- VII Corps Estimated Loss Reports (US National Archives Record Group 407, Box 3839, 207-1.8 to 207-1.16).

- XIII Corps Machine Records Unit (MRU), including 31 December 1944 list of assigned and attached troops (US National Archive Record Group 407, Box 4555, 213-0.3).

- XIX Corps G-1 Weekly Reports for the period 16 December 1944-20 January 1945 (US National Archives Record Group 407, Box 4983, 219-1).

- XX Corps G-1 Daily Summary for the period 16 December 1944-16 January 1945 (US National Archives Record Group 407, Box 5075, 220-1 to 220-1.2).

British Personnel, Logistics, and Order of Battle Data Derivation

INTRODUCTION

This paper serves as the bibliographic reference for sources used to generate British data for the Unit Data Base. This includes data on personnel strengths, personnel attrition, supply amounts and consumption, and the daily British order of battle. The paper also describes methodologies used to estimate any of the above-listed data, and the format used to record information in the British Unit Data Base. All sources mentioned herein are listed in full bibliographic format in Attachment 1 of the paper.

BRITISH PERSONNEL DATA

British Personnel Start Strengths (20 December 1944).

Personnel start strengths of British units were estimated by using the personnel strengths of units found in SHAEF G-1, 14 December, and subtracting from them the battle casualties and disease and non-battle injury (DNBI) losses for the period between 14 December and the date when the British unit was first recorded in the Ardennes Campaign Simulation Data Base (ACSDB), usually 20 December. The strength of the 6th Airborne Division was not listed in the SHAEF G-1, 14 December. Its strength was estimated from its average battalion strength in RG331, 704-1.2, when it first appeared in the ACSDB. Personnel strengths of non-divisional combat units were estimated to equal the relevant authorized T/O&E strengths. This estimation was necessary as all personnel strengths for these units were aggregated under corps troops in SHAEF G-1, 14 December. (A copy of SHAEF G-1, 14 December, is found in Attachment 2 of this paper. It was obtained from the US National Archives.) British XXX Corps non-divisional supply personnel start strengths were taken from WO171/354. All other service support and corps headquarters personnel start strengths were estimated from contemporary British VIII Corps figures (WO171/292), prorated to reflect the difference in the reported VIII and XXX Corps HQ strengths given in SHAEF G-1, 14 December.

British Daily Personnel Strengths.

Daily British personnel strengths of divisions/brigades were determined by matching the average battalion strengths for 14 December of division/brigades as given in RG331, 704-1.2, with the SHAEF G-1, 14 December strengths of the units. (RG331, 704-1.2, has daily average battalion strengths of British units for the period of the Ardennes Campaign.) This procedure gave a ratio of total unit personnel strength to average battalion strength of each division/brigade which was used as a multiplier with the average battalion strengths from RG331, 704-1.2, to estimate daily division/brigade personnel strengths.

British Daily Personnel Battle Casualties.

Daily British personnel battle casualties for divisions/brigades were taken from WO171/348, WO171/4084, and RG331, 704-1.2. In the few cases where reports conflicted, casualties in RG331, 704-1.2, were taken as definitive as these reports were assembled later and were assumed to be corrected versions.

British Daily Replacements>Returns to Duty (RTDs)/DNBI.

This personnel data was estimated by subtracting from the daily personnel strength the following day's on-hand personnel strength, and from the resultant number was subtracted the current day's battle casualties. The remainder, either "+△" or "-△," was assumed to be generated by either Replacements/RTDs in the case of a "-△," or DNBI's in the case of a "+△".

Miscellaneous Information on British Personnel Data.

Due to the lack of data in sources and time restrictions in the ACSDB schedule, certain personnel data requirements were not met for British units. If necessary for analytical purposes, missing data may be generated using rates of comparable US units. The following descriptions apply:

- No daily military occupational specialty (MOS) data is provided for British brigades and divisions in the ACSDB.

- Battle casualties, DNBI, and replacements/RTDs are not provided for divisional attachments ("53d ID Att," "Guards AD Att," etc.). Only on-hand personnel strengths are provided for these units.

- Battle casualties and replacements/RTDs are not provided for the "XXX Corps HQ."

- Differentiation between replacements and RTDs is not made for any British unit in the ACSDB. All reinforcement figures are recorded as "REPLACEMENT" personnel in the Unit Data Base and should be considered reinforcement personnel, composed of both new replacements and returnees from medical treatment.

BRITISH LOGISTICS DATA

Ammunition Used (Expended).

Daily ammunition expenditure amounts are given by unit in numbers of rounds in WO171/348 and WO171/4084. These figures were multiplied by round weight to yield ammunition weights expended by units. For the "Other" ammunition category, only 3-inch mortar (Mtr 3") round expenditures are listed in WO171/348 and WO171/4084. The weight fired by this weapon was used as a ratio with the total authorized on-hand weights of "Other" ammunition to derive the total amount of expended "Other" ammunition.

Ammunition On-Hand and Received.

All British units were assumed to start with full T/O&E ammunition loads. Reductions in corps ammunition stocks in WO171/348 and WO171/4084 were assumed to be distributions to corps units and were allocated to units to bring them back to T/O&E levels. On-hand levels were computed by adding receipts and subtracting expenditures from one day's current on-hand amount to estimate the next day's on-hand amount.

British Fuel Data.

Fuel On-Hand. On-hand fuel amounts are given daily in WO171/348 and WO171/4084 in number of miles a unit could move with available fuel. This was converted to gallons by computing from FM 101-10, Staff Officers' Field Manual: Organization, Technical and Logistical Data, 21 December 1944, or the mileage figures found in the ACSDB Weapons Data Base, the number of gallons required to move the vehicles of a unit the distance of one mile. (FM 101-10 was used because mileage figures were not determined for all British vehicles in the Weapons Data Base. Therefore, mileage of comparable vehicles was in some cases substituted.) This was then multiplied times the "number of miles" figure to create the number of gallons on hand.

Fuel Expended/Received. Gallons expended by British units were calculated by taking distance displaced times the number of gallons required to move the unit's vehicles that distance. Where the total fuel on-hand figures increased in WO171/348 and WO171/4084, it was assumed that additional fuel over expenditures was received by the unit.

British XXX Corps Long-Haul Transport Capacity.

Data for long-haul transport capacity was determined by the number of 1.5-ton trailers and 3-ton trucks in the British truck

company, the cargo capacity of the trailers and trucks, and the number of companies in the corps. The breakdown into "Transportation Capacity (dry)/Transportation Capacity (wet)" used the same ratio used for the US units, i.e., 10.1 percent of total capacity was estimated to be for wet transport capacity.

Description of British Supply Flow in the ACSDB.

Data recorded in the ACSDB for British logistics is intended to reflect a flow of supplies similar to that used for the US and German units in the ACSDB.

- "XXX Corps HQ" supply amounts on-hand include the ammunition and fuel with service support units and supplies kept in corps dumps. "XXX Corps HQ" supply expended includes all supplies used by service support units and supplied to subordinated divisions, corps non-divisional combat units, and divisional attachments. "XXX Corps HQ" supply received is estimated to equal the amount of supply required to maintain the previous day's "XXX Corps HQ" on-hand supply amounts or the on-hand supply amounts recorded in sources.
- "XXX Corps Troops" supply amounts on-hand include the ammunition and fuel with non-divisional combat units attached directly to corps. "XXX Corps Troops" supply amounts expended and used are the amounts for the same units.
- Ammunition and fuel data for divisional attachments is recorded with the appropriately identified unit ("Guards AD Att," "53d ID Att," etc.).
- Note that the large increase of fuel and other supplies shown on 30 December reflects the opening of the XXX Corps supply installations on that date. Prior to 30 December all XXX Corps units drew supplies directly from British Second Army railheads.
- Note that the XXX Corps HQ consumption figures for artillery ammunition on 14-16 January reflects the relocation of the corps stocks to the British Second Army area.

Attachment 1

Sources Used for British Records in the Unit Data Base

Joslen, Lieutenant Colonel H.F. Orders of Battle, United Kingdom and Colonial Formations and Units in the Second World War, 1939-1945. London: Her Majesty's Stationery Office, 1960.

RG 331, 704-1.2. 21st Army Group G-1 Report, 15-31 Dec 1944 and 1-22 Jan 45. Battle casualty report by corps/division/brigade/corps troops with daily amendments. Average infantry/armored battalion personnel strengths by division/brigade. Daily army group replacements available. Battle casualties differ slightly from those found in WO171/348 and WO171/4084. This source is from the US National Archives, Record Group 331, 704-1.2.

SHAEF G-1, 14 December (1944). A copy of this document is in Attachment 2 of this paper. It was obtained from the US National Archives.

WO171/231. British Second Army Logistical Summary, Dec 1944. Daily gun states, ammunition stocks, ammunition expenditures, POL stocks by corps.

WO171/292. VIII Corps Administrative Records, Oct-Nov 1944.

WO171/346. XXX Corps War Diary Daily Operations Summary. Operations Instructions No. 38, 20 Dec 1944; No. 39, 22 Dec 1944; No. 40, 23 Dec 1944; and No. 41, 29 Dec 1944. Situation Reports 21-29 Dec 1944.

WO171/348. XXX Corps Logistical Summary, Dec 1944. Daily ammunition stocks, ammunition expenditure, AFV repair states, and battle casualty reports given by division/brigade/corps troops. Data for 13-21 December is not given.

WO171/354. XXX Corps Daily Supply Troops Strength Report 11-31 Dec 1944.

WO171/627. 29th Armoured Brigade War Diary Dec 1944. Daily operations summary, locations, main battle tank operational strength.

WO171/3964. British Second Army Logistical Summary, Jan 1945. Daily gun states, ammunition stocks, ammunition expenditures, POL stocks by corps.

WO171/4075. XXX Corps Operations Instructions No. 42, 1 Jan 1945; No. 43, 7 Jan 1945; No. 44, 8 Jan 1945. Situation Reports 1-16 Jan 1945. War Diary 1-17 Jan 1945, daily operations summary.

WO171/4084. XXX Corps Logistical Summary, Jan 1944. Daily ammunition stocks, ammunition expenditure, AFV repair states, and battle casualty reports given by division/brigade/corps troops.

WO171/4276. 53d Infantry Division War Diary, Jan 1945. Daily operations summary 1-16 Jan 1945.

WO171/4345. 29th Armoured Brigade War Diary, Jan 1945. Daily operations summary, locations, main battle tank operational strength.

WO205/9720. XXX Corps After Action Report, Dec 1944/Jan 1945. Planning, operations, order of battle, unit locations, and movements.

Records with a "WO" prefix are from the Public Records Office. The three main sources used for British order of battle information were WO171/346, WO171/4075, and WO205/9720.

Attachment 2

Copy of SHAEF G-1 Report Used for British Personnel Data

NMD 740212

381 6 20

Rg 231 SHACMO's

Admin Section 1944-45

322.2 to 961.3 (Locations as of 11 Jan; strengths as of 14 Dec) 1944-45
(370.21/1-4)

BRITISH & AMERICAN TROOPS LOCATED

WITHIN A 100-MILE RADIUS OF BRUSSELS

21 Army Group Hq

2nd British Army Troops	52,536	
1st Canadian Army Troops	37,265	
1 Corps	8,668	
11 Canadian Corps	11,216	
8 Corps	9,285	
12 Corps	8,163	
30 Corps	8,940	
2 Canadian Inf Div.	17,700	
3 Canadian Inf Div.	18,126	
3 Inf Div.	18,228	
15 Inf Div.	17,472	
43 Inf Div.	17,611	
49 Inf Div.	17,183	
51 Inf Div.	17,652	
52 Inf Div.	18,651	
53 Inf Div.	17,444	
Guards Armd Div.	14,276	
Polish Armd Div.	17,400	
4 Canadian Armd Div.	14,058	
7 Armd Div.	13,476	
11 Armd. Div.	14,288	
79 Armd. Div.	11,048	
6 A/B Div.	13,210	
		391,596
GHQ AA Tps (not allotted Armies)	40,374	
GHQ & L of C Tps	234,202	
3 AGRA	4,676	
4 AGRA	4,436	
5 AGRA	4,735	
8 AGRA	4,017	
9 AGRA	3,801	
50 Inf Div	16,944	
4 Armd Bde	4,786	
6 Gds Tk Bde	3,411	
8 Armd Bde	4,723	
31 Tk. Bde.	4,224	
33 Armd Bde	3,957	
34 Tk Bde	3,086	
2 AGRA	2,167	
Theatre Reserve	653	
Unposted Reinforcements	38,690	
Sick & Wounded	15,459	
In Prison & Detention	1,337	
Miscellaneous	8,027	
		401,935

Total 21 Army Group

795,531

Does not include Air Forces or other Allied Contingents, such as Czechs, Belgians & Dutch.

CLASSIFICATION CHANGED
 TO
 By authority of CALA
 By *Interabloway*
 wds 30 OCT 1945
 Date

RESTRICTED

10013 R

Americas

1st U. S. Army Hq.	148,172
9th U. S. Army Hq.	107,430
V Corps	2,710
VII Corps	2,792
VIII Corps	2,232
XIII Corps	2,137
XVI Corps	1,413
XVIII Corps	19,435
XIX Corps	2,308
1 Inf Div.	13,277
2 Inf Div.	13,415
8 Inf Div.	13,217
9 Inf Div.	13,588
26 Inf Div.	12,322
28 Inf Div.	13,980
29 Inf Div.	13,609
30 Inf Div.	14,173
35 Inf Div.	12,565
75 Inf Div.	13,968
76 Inf Div.	9,750
78 Inf Div.	13,112
80 Inf Div.	13,320
83 Inf Div.	13,058
84 Inf Div.	13,000
87 Inf Div.	13,940
90 Inf Div.	11,548
99 Inf Div.	13,491
102 Inf Div.	12,994
104 Inf Div.	13,170
106 Inf Div.	13,834
2 Armd. Div.	14,611
3 Armd. Div.	14,609
4 Armd. Div.	10,225
5 Armd. Div.	10,205
6 Armd. Div.	10,410
7 Armd. Div.	10,659
9 Armd. Div.	10,636
11 Armd. Div.	10,643
17 A/B Div.	11,038
82 A/B Div.	13,725
101 A/B Div.	10,814
Adv Sect, Com "Z"	<u>81,365</u>

Total American

772,920

Does not include Air Forces or Service Forces.

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German Personnel Data

This paper serves as an introduction to the various narratives used to describe the derivation of German personnel data in the Ardennes Campaign Simulation Data Base (ACSDB). The paper describes the overall process used to estimate the German personnel data and is intended to demonstrate the relationship of the individual data generation methodologies to one another. Detailed explanations of the various steps outlined below are provided in other sections of this paper.

The process by which German personnel data was generated for the ACSDB was a multi-step task involving several different estimation methodologies. In each methodology all available primary and reliable secondary source material was researched for relevant German personnel data which was then compiled and entered in the ACSDB and then used for interpolation and extrapolation of the many missing data points for which virtually no information was available in any sources.

The general outline of the German personnel data estimation process used in the ACSDB was as follows:

- 1) Estimation of German divisional battle casualties. Using all aggregate army, corps, and division personnel battle casualty data (i.e., 10-day, weekly, and monthly), in addition to the limited amount of available daily divisional battle casualty data in primary source records, daily killed, wounded, and captured/missing figures were derived for all 39 German divisions and three brigades involved in the Ardennes Campaign. Attachment 1 provides a list of the daily German divisional casualties as entered in the ACSDB. The daily battle casualties shown in Attachment 1 were also employed in the German equipment inventory attrition estimation, as described in the German Equipment Inventory Data Derivation narrative.
- 2) Estimation of a daily DNBI rate. After researching and compiling all available disease and non-battle injury (DNBI) data from primary and reliable secondary sources, a daily DNBI rate was estimated, using a "typical" German Ardennes divisional strength. This divisional strength was calculated as the average of all German daily present for duty (or on-hand) divisional strengths available in primary sources. Anomalies in the primary source DNBI data are addressed in the narrative on the DNBI rate estimation methodology. The daily DNBI rate was applied to all divisions on days for which no DNBI data was available

in primary or secondary sources, to estimate daily DNBI figures.

- 3) Estimation of German divisional return to duty (RTD) personnel figures. All primary and secondary source material was researched for reliable data on German return to duty statistics. The available data was used to calculate four estimated daily RTD personnel figures, one for each 10- or 11-day period between 10 December 1944 and 20 January 1945. These figures were used when no data on RTDs for a division was available in primary or secondary sources.
- 4) Estimation of German divisional replacement personnel figures. Using all available primary and secondary sources, all information on replacements for divisions was compiled and then used in the estimation of daily divisional personnel data (see Step 5 following) and in the derivation of an estimated average German infantry-type division cumulative replacement figure. In general, sufficient information on German armored (SS panzer, panzer, and panzer grenadier) divisions' replacements was available in primary sources to determine cumulative historical replacement figures for these divisions. Due to a lack of primary source material for infantry-type divisions, estimation was employed for these divisions, as explained in the narrative on replacement estimation.
- 5) Calculation of daily divisional strengths and attrition, or the divisional personnel dynamics process. Using the data compiled and the methodologies derived in Steps 1-4 above, personnel strengths (starting with the unit's strength on its first day in the Ardennes area), battle casualties, DNBI, RTDs, and replacements were calculated for the 39 divisions and three brigades which participated in the Ardennes. This data was recorded on spreadsheets for later use in determining attrition rates of non-divisional units subordinated to divisions. An explanation of this process (generally one page of text), as it was applied to each division and brigade, including descriptions of the sources employed, is provided in another section of this paper (see the German Divisional Personnel Data narrative).
- 6) Calculation of on-hand daily military occupational specialty (MOS) strengths for divisions, as well as daily replacement and RTD MOS strengths. This was accomplished using a computer program which took the MOS strength of a unit on its first day in the Ardennes Campaign, and added to it and subtracted from it the

daily casualties and reinforcements (replacements and RTDs) by MOS to generate the daily MOS personnel strengths.

- 7) Derivation of daily personnel statistics for non-divisional units, including combat units attached to divisions, corps and army combat units, and corps and army service support units. Upon completion of the estimation of the daily divisional statistics, methodologies were formulated for the estimation of daily personnel statistics of non-divisional units. In general, non-divisional unit battle casualties were calculated at the same rate as the parent division to which they were attached. DNBI, return to duty, and replacement data were calculated using estimation rates and figures whose derivation is explained in a later section of this paper. Unless data or information in the sources indicated otherwise, all non-divisional units were started at full authorized personnel strength on their first day in the Ardennes area.

Full referencing of all sources used in the German personnel data estimation narratives has been maintained. For certain sources, complete referencing of the source has been provided within the narrative (i.e., identification of source, its provenance, its archival record number, etc.). For other sources, particularly those referenced in the divisional data narrative, only the bibliographic identification used in the ACSDB Bibliography Data Base has been provided, and users of the data base must consult the Bibliography Data Base for full referencing of the source.

The titles of the relevant narratives which describe derivation of German personnel data are:

- German Divisional Battle Casualty Estimation Methodology.
- German Disease and Non-Battle Injury (DNBI) Rate Estimation Methodology.
- German Return to Duty (RTD) Estimation Methodology.
- German Personnel Replacement Estimation Methodology.
- German Divisional Personnel Data.
- German Divisional Military Occupational Specialty (MOS) Data Estimation and Derivation.
- German Non-Divisional Unit Personnel Battle Casualty, Return to Duty, and DNBI Estimation Methodologies.
- German Non-Divisional Service Support Unit Personnel, Equipment, and Medical Data.
- Derivation of German Logistics Data.
- Compilation of German Order of Battle.

Attachment 1

German Divisional Battle Casualties

The following pages contain the daily killed, wounded, and captured/missing figures for the 39 divisions and three brigades which participated in the Ardennes Campaign. The first column of figures on each page is the killed, the second column is the wounded, and the third is the captured/missing. These figures are the ones recorded in the ACSDB and were used to estimate equipment losses for the German divisions, as explained in another section of this paper.

3679	1st	SSPzD	12/16/44	38	115	34
3680	1st	SSPzD	12/17/44	38	115	34
3681	1st	SSPzD	12/18/44	38	115	34
3682	1st	SSPzD	12/19/44	38	115	34
3683	1st	SSPzD	12/20/44	38	115	34
3684	1st	SSPzD	12/21/44	38	115	34
3685	1st	SSPzD	12/22/44	38	115	34
3686	1st	SSPzD	12/23/44	38	115	34
3687	1st	SSPzD	12/24/44	38	115	34
3688	1st	SSPzD	12/25/44	38	115	34
3689	1st	SSPzD	12/26/44	10	30	19
3690	1st	SSPzD	12/27/44	10	30	19
3691	1st	SSPzD	12/28/44	0	0	0
3692	1st	SSPzD	12/29/44	0	0	0
3693	1st	SSPzD	12/30/44	38	115	34
3694	1st	SSPzD	12/31/44	38	115	34
3695	1st	SSPzD	01/01/45	27	76	17
3696	1st	SSPzD	01/02/45	27	76	17
3697	1st	SSPzD	01/03/45	27	76	17
3698	1st	SSPzD	01/04/45	27	76	17
3699	1st	SSPzD	01/05/45	27	76	17
3700	1st	SSPzD	01/06/45	27	76	17
3701	1st	SSPzD	01/07/45	28	76	17
3702	1st	SSPzD	01/08/45	28	76	17
3703	1st	SSPzD	01/09/45	4	13	3
3704	1st	SSPzD	01/10/45	4	13	3
3705	1st	SSPzD	01/11/45	4	13	3
3706	1st	SSPzD	01/12/45	4	13	3
3707	1st	SSPzD	01/13/45	28	76	17
3708	1st	SSPzD	01/14/45	28	77	17
3709	1st	SSPzD	01/15/45	4	13	3
3710	1st	SSPzD	01/16/45	4	13	3

4116	2d	SSPzD	12/16/44	0	0	0
4117	2d	SSPzD	12/17/44	0	0	0
4118	2d	SSPzD	12/18/44	0	0	0
4119	2d	SSPzD	12/19/44	0	0	0
4120	2d	SSPzD	12/20/44	0	0	0
4121	2d	SSPzD	12/21/44	5	16	2
4122	2d	SSPzD	12/22/44	5	16	2
4123	2d	SSPzD	12/23/44	33	108	15
4124	2d	SSPzD	12/24/44	34	108	15
4125	2d	SSPzD	12/25/44	34	108	15
4126	2d	SSPzD	12/26/44	34	108	15
4127	2d	SSPzD	12/27/44	34	108	15
4128	2d	SSPzD	12/28/44	34	108	15
4129	2d	SSPzD	12/29/44	34	108	15
4130	2d	SSPzD	12/30/44	34	108	16
4131	2d	SSPzD	12/31/44	34	108	16
4132	2d	SSPzD	01/01/45	20	58	45
4133	2d	SSPzD	01/02/45	20	58	45
4134	2d	SSPzD	01/03/45	20	58	45
4135	2d	SSPzD	01/04/45	20	58	45
4136	2d	SSPzD	01/05/45	20	58	45
4137	2d	SSPzD	01/06/45	20	58	45
4138	2d	SSPzD	01/07/45	20	58	45
4139	2d	SSPzD	01/08/45	20	58	45
4140	2d	SSPzD	01/09/45	20	58	45
4141	2d	SSPzD	01/10/45	20	58	45
4142	2d	SSPzD	01/11/45	20	58	45
4143	2d	SSPzD	01/12/45	20	58	46
4144	2d	SSPzD	01/13/45	20	59	46
4145	2d	SSPzD	01/14/45	20	59	46
4146	2d	SSPzD	01/15/45	20	59	46
4147	2d	SSPzD	01/16/45	20	59	46

5106	9th	SSPzD	12/16/44	0	0	0
5107	9th	SSPzD	12/17/44	0	0	0
5108	9th	SSPzD	12/18/44	0	0	0
5109	9th	SSPzD	12/19/44	0	0	0
5110	9th	SSPzD	12/20/44	10	30	19
5111	9th	SSPzD	12/21/44	38	115	34
5112	9th	SSPzD	12/22/44	10	30	19
5113	9th	SSPzD	12/23/44	38	115	34
5114	9th	SSPzD	12/24/44	38	115	34
5115	9th	SSPzD	12/25/44	38	115	34
5116	9th	SSPzD	12/26/44	38	115	34
5117	9th	SSPzD	12/27/44	38	115	34
5118	9th	SSPzD	12/28/44	38	115	34
5119	9th	SSPzD	12/29/44	38	115	34
5120	9th	SSPzD	12/30/44	38	115	34
5121	9th	SSPzD	12/31/44	10	30	19
5122	9th	SSPzD	01/01/45	10	30	19
5123	9th	SSPzD	01/02/45	0	0	0
5124	9th	SSPzD	01/03/45	38	115	34
5125	9th	SSPzD	01/04/45	38	115	34
5126	9th	SSPzD	01/05/45	10	30	19
5127	9th	SSPzD	01/06/45	0	0	0
5128	9th	SSPzD	01/07/45	0	0	0
5129	9th	SSPzD	01/08/45	0	0	0
5130	9th	SSPzD	01/09/45	0	0	0
5131	9th	SSPzD	01/10/45	10	30	19
5132	9th	SSPzD	01/11/45	38	115	34
5133	9th	SSPzD	01/12/45	38	115	34
5134	9th	SSPzD	01/13/45	38	115	34
5135	9th	SSPzD	01/14/45	38	115	34
5136	9th	SSPzD	01/15/45	38	115	34
5137	9th	SSPzD	01/16/45	38	115	34

3243	10th	SSPzD	12/16/44	0	0	0
3244	10th	SSPzD	12/17/44	0	0	0
3245	10th	SSPzD	12/18/44	0	0	0
3246	10th	SSPzD	12/19/44	0	0	0
3247	10th	SSPzD	12/20/44	0	0	0
3248	10th	SSPzD	12/21/44	0	0	0
3249	10th	SSPzD	12/22/44	0	0	0
3250	10th	SSPzD	12/23/44	0	0	0
3251	10th	SSPzD	12/24/44	0	0	0
3252	10th	SSPzD	12/25/44	0	0	0
3253	10th	SSPzD	12/26/44	0	0	0
3254	10th	SSPzD	12/27/44	0	0	0
3255	10th	SSPzD	12/28/44	0	0	0
3256	10th	SSPzD	12/29/44	0	0	0
3257	10th	SSPzD	12/30/44	0	0	0
3258	10th	SSPzD	12/31/44	0	0	0
3259	10th	SSPzD	01/01/45	0	0	0
3260	10th	SSPzD	01/02/45	0	0	0
3261	10th	SSPzD	01/03/45	0	0	0
3262	10th	SSPzD	01/04/45	0	0	0
3263	10th	SSPzD	01/05/45	0	0	0
3264	10th	SSPzD	01/06/45	0	0	0
3265	10th	SSPzD	01/07/45	0	0	0
3266	10th	SSPzD	01/08/45	0	0	0
3267	10th	SSPzD	01/09/45	0	0	0
3268	10th	SSPzD	01/10/45	0	0	0
3269	10th	SSPzD	01/11/45	0	0	0
3270	10th	SSPzD	01/12/45	0	0	0
3271	10th	SSPzD	01/13/45	0	0	0
3272	10th	SSPzD	01/14/45	0	0	0
3273	10th	SSPzD	01/15/45	0	0	0
3274	10th	SSPzD	01/16/45	0	0	0

3365	12th	SSPzD	12/16/44	5	19	8
3366	12th	SSPzD	12/17/44	36	127	54
3367	12th	SSPzD	12/18/44	36	127	54
3368	12th	SSPzD	12/19/44	36	127	54
3369	12th	SSPzD	12/20/44	36	127	54
3370	12th	SSPzD	12/21/44	37	128	54
3371	12th	SSPzD	12/22/44	37	128	54
3372	12th	SSPzD	12/23/44	5	19	8
3373	12th	SSPzD	12/24/44	6	19	9
3374	12th	SSPzD	12/25/44	6	20	9
3375	12th	SSPzD	12/26/44	6	20	9
3376	12th	SSPzD	12/27/44	37	128	54
3377	12th	SSPzD	12/28/44	37	128	54
3378	12th	SSPzD	12/29/44	6	20	9
3379	12th	SSPzD	12/30/44	6	20	9
3380	12th	SSPzD	12/31/44	6	20	9
3381	12th	SSPzD	01/01/45	5	14	5
3382	12th	SSPzD	01/02/45	36	94	38
3383	12th	SSPzD	01/03/45	5	14	5
3384	12th	SSPzD	01/04/45	36	94	38
3385	12th	SSPzD	01/05/45	36	94	38
3386	12th	SSPzD	01/06/45	36	94	38
3387	12th	SSPzD	01/07/45	36	94	38
3388	12th	SSPzD	01/08/45	5	14	5
3389	12th	SSPzD	01/09/45	5	14	6
3390	12th	SSPzD	01/10/45	5	14	6
3391	12th	SSPzD	01/11/45	5	14	6
3392	12th	SSPzD	01/12/45	5	14	6
3393	12th	SSPzD	01/13/45	6	14	6
3394	12th	SSPzD	01/14/45	6	14	6
3395	12th	SSPzD	01/15/45	6	14	6
3396	12th	SSPzD	01/16/45	6	15	6

4010	27th	SSPzGD	12/27/44	0	0	0
4011	27th	SSPzGD	12/28/44	0	0	0
4012	27th	SSPzGD	12/29/44	0	0	0
4013	27th	SSPzGD	12/30/44	0	0	0
4014	27th	SSPzGD	12/31/44	0	0	0
4015	27th	SSPzGD	01/01/45	0	0	0
4016	27th	SSPzGD	01/02/45	0	0	0
4017	27th	SSPzGD	01/03/45	0	0	0
4018	27th	SSPzGD	01/04/45	0	0	0
4019	27th	SSPzGD	01/05/45	0	0	0
4020	27th	SSPzGD	01/06/45	0	0	0
4021	27th	SSPzGD	01/07/45	0	0	0
4022	27th	SSPzGD	01/08/45	0	0	0
4023	27th	SSPzGD	01/09/45	0	0	0
4024	27th	SSPzGD	01/10/45	0	0	0
4025	27th	SSPzGD	01/11/45	0	0	0
4026	27th	SSPzGD	01/12/45	0	0	0
4027	27th	SSPzGD	01/13/45	0	0	0
4028	27th	SSPzGD	01/14/45	0	0	0
4029	27th	SSPzGD	01/15/45	0	0	0
4030	27th	SSPzGD	01/16/45	0	0	0

4031	28th	SSPzGD	12/27/44	0	0	0
4032	28th	SSPzGD	12/28/44	0	0	0
4033	28th	SSPzGD	12/29/44	0	0	0
4034	28th	SSPzGD	12/30/44	0	0	0
4035	28th	SSPzGD	12/31/44	0	0	0
4036	28th	SSPzGD	01/01/45	0	0	0
4037	28th	SSPzGD	01/02/45	0	0	0
4038	28th	SSPzGD	01/03/45	0	0	0
4039	28th	SSPzGD	01/04/45	0	0	0
4040	28th	SSPzGD	01/05/45	0	0	0
4041	28th	SSPzGD	01/06/45	0	0	0
4042	28th	SSPzGD	01/07/45	0	0	0
4043	28th	SSPzGD	01/08/45	0	0	0
4044	28th	SSPzGD	01/09/45	0	0	0
4045	28th	SSPzGD	01/10/45	0	0	0
4046	28th	SSPzGD	01/11/45	0	0	0
4047	28th	SSPzGD	01/12/45	0	0	0
4048	28th	SSPzGD	01/13/45	0	0	0
4049	28th	SSPzGD	01/14/45	0	0	0
4050	28th	SSPzGD	01/15/45	0	0	0
4051	28th	SSPzGD	01/16/45	0	0	0

6065	PzLehrD	12/16/44	1	7	0
6066	PzLehrD	12/17/44	5	40	0
6067	PzLehrD	12/18/44	1	6	0
6068	PzLehrD	12/19/44	6	41	0
6069	PzLehrD	12/20/44	6	41	0
6070	PzLehrD	12/21/44	3	11	6
6071	PzLehrD	12/22/44	3	12	6
6072	PzLehrD	12/23/44	21	75	38
6073	PzLehrD	12/24/44	21	75	39
6074	PzLehrD	12/25/44	20	75	38
6075	PzLehrD	12/26/44	3	12	6
6076	PzLehrD	12/27/44	3	11	6
6077	PzLehrD	12/28/44	20	75	38
6078	PzLehrD	12/29/44	20	74	38
6079	PzLehrD	12/30/44	20	74	38
6080	PzLehrD	12/31/44	20	74	38
6081	PzLehrD	01/01/45	11	34	14
6082	PzLehrD	01/02/45	11	34	14
6083	PzLehrD	01/03/45	2	6	3
6084	PzLehrD	01/04/45	2	6	2
6085	PzLehrD	01/05/45	2	6	2
6086	PzLehrD	01/06/45	2	6	2
6087	PzLehrD	01/07/45	1	6	2
6088	PzLehrD	01/08/45	1	5	2
6089	PzLehrD	01/09/45	1	5	2
6090	PzLehrD	01/10/45	10	34	14
6091	PzLehrD	01/11/45	14	47	42
6092	PzLehrD	01/12/45	2	7	7
6093	PzLehrD	01/13/45	14	47	42
6094	PzLehrD	01/14/45	14	47	42
6095	PzLehrD	01/15/45	14	47	42
6096	PzLehrD	01/16/45	14	47	42

4052	2d PzD	12/16/44	8	28	2
4053	2d PzD	12/17/44	7	28	2
4054	2d PzD	12/18/44	7	27	1
4055	2d PzD	12/19/44	7	27	1
4056	2d PzD	12/20/44	7	27	1
4057	2d PzD	12/21/44	3	12	10
4058	2d PzD	12/22/44	3	12	10
4059	2d PzD	12/23/44	3	12	10
4060	2d PzD	12/24/44	23	77	68
4061	2d PzD	12/25/44	23	77	68
4062	2d PzD	12/26/44	24	78	68
4063	2d PzD	12/27/44	3	12	10
4064	2d PzD	12/28/44	3	12	10
4065	2d PzD	12/29/44	3	12	11
4066	2d PzD	12/30/44	3	12	11
4067	2d PzD	12/31/44	3	12	11
4068	2d PzD	01/01/45	4	16	6
4069	2d PzD	01/02/45	4	16	6
4070	2d PzD	01/03/45	4	16	6
4071	2d PzD	01/04/45	26	104	34
4072	2d PzD	01/05/45	5	16	5
4073	2d PzD	01/06/45	4	16	5
4074	2d PzD	01/07/45	4	16	5
4075	2d PzD	01/08/45	4	16	5
4076	2d PzD	01/09/45	4	16	5
4077	2d PzD	01/10/45	4	16	5
4078	2d PzD	01/11/45	18	37	84
4079	2d PzD	01/12/45	17	37	84
4080	2d PzD	01/13/45	17	36	84
4081	2d PzD	01/14/45	3	6	13
4082	2d PzD	01/15/45	3	6	13
4083	2d PzD	01/16/45	3	6	13

5046	9th	PzD	12/16/44	0	0	0
5047	9th	PzD	12/17/44	0	0	0
5048	9th	PzD	12/18/44	0	0	0
5049	9th	PzD	12/19/44	0	0	0
5050	9th	PzD	12/20/44	0	0	0
5051	9th	PzD	12/21/44	0	0	0
5052	9th	PzD	12/22/44	0	0	0
5053	9th	PzD	12/23/44	0	0	0
5054	9th	PzD	12/24/44	2	6	5
5055	9th	PzD	12/25/44	2	7	5
5056	9th	PzD	12/26/44	15	41	34
5057	9th	PzD	12/27/44	15	41	34
5058	9th	PzD	12/28/44	15	41	34
5059	9th	PzD	12/29/44	15	41	34
5060	9th	PzD	12/30/44	14	41	33
5061	9th	PzD	12/31/44	14	41	33
5062	9th	PzD	01/01/45	14	51	30
5063	9th	PzD	01/02/45	2	8	5
5064	9th	PzD	01/03/45	2	8	5
5065	9th	PzD	01/04/45	14	51	31
5066	9th	PzD	01/05/45	2	8	5
5067	9th	PzD	01/06/45	2	8	5
5068	9th	PzD	01/07/45	2	8	5
5069	9th	PzD	01/08/45	2	8	5
5070	9th	PzD	01/09/45	2	8	4
5071	9th	PzD	01/10/45	2	8	4
5072	9th	PzD	01/11/45	2	5	10
5073	9th	PzD	01/12/45	2	5	10
5074	9th	PzD	01/13/45	2	5	10
5075	9th	PzD	01/14/45	12	32	62
5076	9th	PzD	01/15/45	12	32	61
5077	9th	PzD	01/16/45	12	32	61

3339	11th PrD	12/22/44	0	0	0
3340	11th PrD	12/23/44	0	0	0
3341	11th PrD	12/24/44	0	0	0
3342	11th PrD	12/25/44	0	0	0
3343	11th PrD	12/26/44	0	0	0
3344	11th PrD	12/27/44	0	0	0
3345	11th PrD	12/28/44	0	0	0
3346	11th PrD	12/29/44	0	0	0
3347	11th PrD	12/30/44	0	0	0
3348	11th PrD	12/31/44	0	0	0
3349	11th PrD	01/01/45	0	0	0
3350	11th PrD	01/02/45	0	0	0
3351	11th PrD	01/03/45	0	0	0
3352	11th PrD	01/04/45	0	0	0
3353	11th PrD	01/05/45	0	0	0
3354	11th PrD	01/06/45	0	0	0
3355	11th PrD	01/07/45	0	0	0
3356	11th PrD	01/08/45	0	0	0
3357	11th PrD	01/09/45	0	0	0
3358	11th PrD	01/10/45	0	0	0
3359	11th PrD	01/11/45	0	0	0
3360	11th PrD	01/12/45	0	0	0
3361	11th PrD	01/13/45	0	0	0
3362	11th PrD	01/14/45	0	0	0
3363	11th PrD	01/15/45	0	0	0
3364	11th PrD	01/16/45	0	0	0

3307	116th	PzD	12/16/44	59	141	155
3308	116th	PzD	12/17/44	23	73	0
3309	116th	PzD	12/18/44	3	11	0
3310	116th	PzD	12/19/44	23	73	0
3311	116th	PzD	12/20/44	22	72	0
3312	116th	PzD	12/21/44	28	71	93
3313	116th	PzD	12/22/44	4	11	14
3314	116th	PzD	12/23/44	28	71	93
3315	116th	PzD	12/24/44	29	72	93
3316	116th	PzD	12/25/44	29	72	93
3317	116th	PzD	12/26/44	29	72	93
3318	116th	PzD	12/27/44	28	72	93
3319	116th	PzD	12/28/44	5	11	15
3320	116th	PzD	12/29/44	5	11	14
3321	116th	PzD	12/30/44	4	11	14
3322	116th	PzD	12/31/44	4	11	14
3323	116th	PzD	01/01/45	3	13	20
3324	116th	PzD	01/02/45	3	13	21
3325	116th	PzD	01/03/45	3	13	21
3326	116th	PzD	01/04/45	3	13	21
3327	116th	PzD	01/05/45	3	13	21
3328	116th	PzD	01/06/45	3	13	21
3329	116th	PzD	01/	17	86	133
3330	116th	PzD	01 3/45	2	13	20
3331	116th	PzD	0 19/45	2	13	20
3332	116th	PzD	01/10/45	2	13	20
3333	116th	PzD	01/11/45	2	6	10
3334	116th	PzD	01/12/45	2	6	9
3335	116th	PzD	01/13/45	11	38	59
3336	116th	PzD	01/14/45	11	38	59
3337	116th	PzD	01/15/45	10	37	59
3338	116th	PzD	01/16/45	2	6	9

4473	3d	PzGD	12/16/44	0	0	0
4474	3d	PzGD	12/17/44	0	0	0
4475	3d	PzGD	12/18/44	3	10	6
4476	3d	PzGD	12/19/44	3	10	6
4477	3d	PzGD	12/20/44	21	65	40
4478	3d	PzGD	12/21/44	21	65	40
4479	3d	PzGD	12/22/44	21	65	40
4480	3d	PzGD	12/23/44	3	10	6
4481	3d	PzGD	12/24/44	3	10	6
4482	3d	PzGD	12/25/44	4	10	6
4483	3d	PzGD	12/26/44	4	10	6
4484	3d	PzGD	12/27/44	4	10	6
4485	3d	PzGD	12/28/44	4	9	5
4486	3d	PzGD	12/29/44	21	65	40
4487	3d	PzGD	12/30/44	21	65	40
4488	3d	PzGD	12/31/44	21	65	40
4489	3d	PzGD	01/01/45	19	62	58
4490	3d	PzGD	01/02/45	19	62	58
4491	3d	PzGD	01/03/45	3	10	9
4492	3d	PzGD	01/04/45	19	62	57
4493	3d	PzGD	01/05/45	3	10	9
4494	3d	PzGD	01/06/45	3	10	9
4495	3	PzGD	01/07/45	19	61	57
4496	3d	PzGD	01/08/45	3	10	9
4497	3d	PzGD	01/09/45	3	10	9
4498	3d	PzGD	01/10/45	3	10	9
4499	3d	PzGD	01/11/45	3	9	9
4500	3d	PzGD	01/12/45	3	9	9
4501	3d	PzGD	01/13/45	3	9	9
4502	3d	PzGD	01/14/45	3	9	9
4503	3d	PzGD	01/15/45	19	61	57
4504	3d	PzGD	01/16/45	18	61	57

3554	15th	PzGD	12/16/44	0	0	0
3555	15th	PzGD	12/17/44	0	0	0
3556	15th	PzGD	12/18/44	0	0	0
3557	15th	PzGD	12/19/44	0	0	0
3558	15th	PzGD	12/20/44	0	0	0
3559	15th	PzGD	12/21/44	0	0	0
3560	15th	PzGD	12/22/44	0	0	0
3561	15th	PzGD	12/23/44	0	0	0
3562	15th	PzGD	12/24/44	0	0	0
3563	15th	PzGD	12/25/44	33	78	244
3564	15th	PzGD	12/26/44	33	77	243
3565	15th	PzGD	12/27/44	33	77	243
3566	15th	PzGD	12/28/44	5	12	38
3567	15th	PzGD	12/29/44	5	12	37
3568	15th	PzGD	12/30/44	5	12	38
3569	15th	PzGD	12/31/44	5	12	37
3570	15th	PzGD	01/01/45	2	8	7
3571	15th	PzGD	01/02/45	12	53	44
3572	15th	PzGD	01/03/45	2	6	7
3573	15th	PzGD	01/04/45	11	53	44
3574	15th	PzGD	01/05/45	2	8	7
3575	15th	PzGD	01/06/45	1	8	6
3576	15th	PzGD	01/07/45	2	8	6
3577	15th	PzGD	01/08/45	2	8	7
3578	15th	PzGD	01/09/45	11	52	43
3579	15th	PzGD	01/10/45	2	8	7
3580	15th	PzGD	01/11/45	1	2	2
3581	15th	PzGD	01/12/45	1	2	1
3582	15th	PzGD	01/13/45	0	2	1
3583	15th	PzGD	01/14/45	1	2	2
3584	15th	PzGD	01/15/45	1	3	2
3585	15th	PzGD	01/16/45	5	15	10

5245	FBB	12/16/44	0	0	0
5246	FBB	12/17/44	0	0	0
5247	FBB	12/18/44	0	0	0
5248	FBB	12/19/44	23	58	8
5249	FBB	12/20/44	23	58	8
5250	FBB	12/21/44	4	9	2
5251	FBB	12/22/44	23	57	8
5252	FBB	12/23/44	4	9	2
5253	FBB	12/24/44	4	9	1
5254	FBB	12/25/44	4	9	1
5255	FBB	12/26/44	23	57	8
5256	FBB	12/27/44	4	9	2
5257	FBB	12/28/44	22	57	8
5258	FBB	12/29/44	22	57	8
5259	FBB	12/30/44	22	57	8
5260	FBB	12/31/44	4	9	1
5261	FBB	01/01/45	19	40	15
5262	FBB	01/02/45	19	40	15
5263	FBB	01/03/45	3	7	3
5264	FBB	01/04/45	2	6	2
5265	FBB	01/05/45	18	40	15
5266	FBB	01/06/45	3	6	2
5267	FBB	01/07/45	19	40	15
5268	FBB	01/08/45	3	6	3
5269	FBB	01/09/45	3	6	2
5270	FBB	01/10/45	19	40	15
5271	FBB	01/11/45	2	4	6
5272	FBB	01/12/45	2	4	6
5273	FBB	01/13/45	2	3	6
5274	FBB	01/14/45	13	22	39
5275	FBB	01/15/45	2	3	6
5276	FBB	01/16/45	13	22	38

5277	FGB	12/16/44	0	0	0
5278	FGB	12/17/44	0	0	0
5279	FGB	12/18/44	0	0	0
5280	FGB	12/19/44	0	0	0
5281	FGB	12/20/44	0	0	0
5282	FGB	12/21/44	3	6	12
5283	FGB	12/22/44	3	6	12
5284	FGB	12/23/44	20	40	78
5285	FGB	12/24/44	20	40	78
5286	FGB	12/25/44	20	40	78
5287	FGB	12/26/44	20	40	78
5288	FGB	12/27/44	20	40	78
5289	FGB	12/28/44	20	40	78
5290	FGB	12/29/44	20	40	78
5291	FGB	12/30/44	20	40	78
5292	FGB	12/31/44	4	6	12
5293	FGB	01/01/45	5	14	12
5294	FGB	01/02/45	6	15	11
5295	FGB	01/03/45	5	14	11
5296	FGB	01/04/45	6	14	12
5297	FGB	01/05/45	5	14	11
5298	FGB	01/06/45	6	15	12
5299	FGB	01/07/45	34	92	73
5300	FGB	01/08/45	5	14	11
5301	FGB	01/09/45	5	14	11
5302	FGB	01/10/45	5	14	11
5303	FGB	01/11/45	4	19	0
5304	FGB	01/12/45	1	3	0
5305	FGB	01/13/45	1	3	0
5306	FGB	01/14/45	1	3	0
5307	FGB	01/15/45	1	3	0
5308	FGB	01/16/45	1	3	0

3472	150th	PzBde	12/16/44	0	0	0
3473	150th	PzBde	12/17/44	0	0	0
3474	150th	PzBde	12/18/44	0	0	0
3475	150th	PzBde	12/19/44	0	0	0
3476	150th	PzBde	12/20/44	0	0	0
3477	150th	PzBde	12/21/44	35	122	77
3478	150th	PzBde	12/22/44	5	19	12
3479	150th	PzBde	12/23/44	5	19	12
3480	150th	PzBde	12/24/44	5	19	12
3481	150th	PzBde	12/25/44	5	19	12
3482	150th	PzBde	12/26/44	5	19	12
3483	150th	PzBde	12/27/44	5	19	12
3484	150th	PzBde	12/28/44	0	0	0
3485	150th	PzBde	12/29/44	0	0	0
3486	150th	PzBde	12/30/44	0	0	0
3487	150th	PzBde	12/31/44	0	0	0
3488	150th	PzBde	01/01/45	0	0	0
3489	150th	PzBde	01/02/45	0	0	0

4425	3d	FJD	12/16/44	20	61	84
4426	3d	FJD	12/17/44	20	61	84
4427	3d	FJD	12/18/44	20	61	84
4428	3d	FJD	12/19/44	20	61	84
4429	3d	FJD	12/20/44	20	61	84
4430	3d	FJD	12/21/44	19	109	52
4431	3d	FJD	12/22/44	19	109	51
4432	3d	FJD	12/23/44	3	17	8
4433	3d	FJD	12/24/44	3	17	8
4434	3d	FJD	12/25/44	3	17	8
4435	3d	FJD	12/26/44	3	17	8
4436	3d	FJD	12/27/44	3	17	8
4437	3d	FJD	12/28/44	3	17	8
4438	3d	FJD	12/29/44	3	17	8
4439	3d	FJD	12/30/44	3	17	8
4440	3d	FJD	12/31/44	2	16	7
4441	3d	FJD	01/01/45	7	21	8
4442	3d	FJD	01/02/45	7	21	8
4443	3d	FJD	01/03/45	7	21	8
4444	3d	FJD	01/04/45	7	21	8
4445	3d	FJD	01/05/45	7	21	8
4446	3d	FJD	01/06/45	7	21	8
4447	3d	FJD	01/07/45	7	21	8
4448	3d	FJD	01/08/45	7	21	8
4449	3d	FJD	01/09/45	7	21	8
4450	3d	FJD	01/10/45	7	21	8
4451	3d	FJD	01/11/45	20	61	57
4452	3d	FJD	01/12/45	20	61	57
4453	3d	FJD	01/13/45	20	62	57
4454	3d	FJD	01/14/45	20	62	57
4455	3d	FJD	01/15/45	20	62	57
4456	3d	FJD	01/16/45	20	62	58

4598	Sth FJD	12/16/44	23	107	76
4599	Sth FJD	12/17/44	23	107	76
4600	Sth FJD	12/18/44	4	16	12
4601	Sth FJD	12/19/44	4	16	12
4602	Sth FJD	12/20/44	4	16	12
4603	Sth FJD	12/21/44	0	0	0
4604	Sth FJD	12/22/44	18	72	79
4605	Sth FJD	12/23/44	122	468	516
4606	Sth FJD	12/24/44	122	468	515
4607	Sth FJD	12/25/44	122	468	515
4608	Sth FJD	12/26/44	122	467	515
4609	Sth FJD	12/27/44	121	467	515
4610	Sth FJD	12/28/44	19	72	80
4611	Sth FJD	12/29/44	19	72	79
4612	Sth FJD	12/30/44	19	72	79
4613	Sth FJD	12/31/44	19	72	79
4614	Sth FJD	01/01/45	7	24	8
4615	Sth FJD	01/02/45	7	24	8
4616	Sth FJD	01/03/45	7	25	9
4617	Sth FJD	01/04/45	7	25	9
4618	Sth FJD	01/05/45	7	25	9
4619	Sth FJD	01/06/45	47	161	57
4620	Sth FJD	01/07/45	8	25	9
4621	Sth FJD	01/08/45	46	160	56
4622	Sth FJD	01/09/45	7	25	9
4623	Sth FJD	01/10/45	46	160	56
4624	Sth FJD	01/11/45	20	61	84
4625	Sth FJD	01/12/45	6	18	19
4626	Sth FJD	01/13/45	6	18	19
4627	Sth FJD	01/14/45	6	18	19
4628	Sth FJD	01/15/45	6	18	19
4629	Sth FJD	01/16/45	6	18	19

S138	9th	VG	D	12/24/44	0	0	0
S139	9th	VG	D	12/25/44	0	0	0
S140	9th	VG	D	12/26/44	0	0	0
S141	9th	VG	D	12/27/44	0	0	0
S142	9th	VG	D	12/28/44	0	0	0
S143	9th	VG	D	12/29/44	4	7	12
S144	9th	VG	D	12/30/44	20	39	77
S145	9th	VG	D	12/31/44	3	6	12
S146	9th	VG	D	01/01/45	35	92	74
S147	9th	VG	D	01/02/45	35	93	74
S148	9th	VG	D	01/03/45	6	14	12
S149	9th	VG	D	01/04/45	5	14	11
S150	9th	VG	D	01/05/45	6	14	11
S151	9th	VG	D	01/06/45	35	93	74
S152	9th	VG	D	01/07/45	5	14	12
S153	9th	VG	D	01/08/45	35	92	73
S154	9th	VG	D	01/09/45	6	15	11
S155	9th	VG	D	01/10/45	5	14	11
S156	9th	VG	D	01/11/45	7	20	22
S157	9th	VG	D	01/12/45	1	3	3
S158	9th	VG	D	01/13/45	1	3	3
S159	9th	VG	D	01/14/45	7	20	22
S160	9th	VG	D	01/15/45	1	3	3
S161	9th	VG	D	01/16/45	1	3	3

3429	12th	VG	12/16/44	20	61	84
3430	12th	VG	12/17/44	20	61	84
3431	12th	VG	12/18/44	20	61	84
3432	12th	VG	12/19/44	20	61	84
3433	12th	VG	12/20/44	20	61	84
3434	12th	VG	12/21/44	20	61	84
3435	12th	VG	12/22/44	20	61	84
3436	12th	VG	12/23/44	6	18	19
3437	12th	VG	12/24/44	6	18	19
3438	12th	VG	12/25/44	6	18	19
3439	12th	VG	12/26/44	6	18	19
3440	12th	VG	12/27/44	6	18	19
3441	12th	VG	12/28/44	6	18	19
3442	12th	VG	12/29/44	6	18	19
3443	12th	VG	12/30/44	0	0	0
3444	12th	VG	12/31/44	6	18	19
3445	12th	VG	01/01/45	6	18	19
3446	12th	VG	01/02/45	6	18	19
3447	12th	VG	01/03/45	20	61	84
3448	12th	VG	01/04/45	20	61	84
3449	12th	VG	01/05/45	20	61	84
3450	12th	VG	01/06/45	20	61	84
3451	12th	VG	01/07/45	20	61	84
3452	12th	VG	01/08/45	20	61	84
3453	12th	VG	01/09/45	20	61	84
3454	12th	VG	01/10/45	20	61	84
3455	12th	VG	01/11/45	20	61	84
3456	12th	VG	01/12/45	20	61	84
3457	12th	VG	01/13/45	20	61	84
3458	12th	VG	01/14/45	20	61	84
3459	12th	VG	01/15/45	6	18	19
3460	12th	VG	01/16/45	6	18	19

3628	18th	VGD	12/16/44	20	61	84
3629	18th	VGD	12/17/44	20	61	84
3630	18th	VGD	12/18/44	20	61	84
3631	18th	VGD	12/19/44	20	61	84
3632	18th	VGD	12/20/44	20	61	84
3633	18th	VGD	12/21/44	20	61	84
3634	18th	VGD	12/22/44	20	61	84
3635	18th	VGD	12/23/44	20	61	84
3636	18th	VGD	12/24/44	6	18	19
3637	18th	VGD	12/25/44	0	0	0
3638	18th	VGD	12/26/44	0	0	0
3639	18th	VGD	12/27/44	6	18	19
3640	18th	VGD	12/28/44	6	18	19
3641	18th	VGD	12/29/44	6	18	19
3642	18th	VGD	12/30/44	6	18	19
3643	18th	VGD	12/31/44	6	18	19
3644	18th	VGD	01/01/45	6	18	19
3645	18th	VGD	01/02/45	6	18	19
3646	18th	VGD	01/03/45	6	18	19
3647	18th	VGD	01/04/45	6	18	19
3648	18th	VGD	01/05/45	6	18	19
3649	18th	VGD	01/06/45	20	61	84
3650	18th	VGD	01/07/45	20	61	84
3651	18th	VGD	01/08/45	6	18	19
3652	18th	VGD	01/09/45	6	18	19
3653	18th	VGD	01/10/45	20	61	84
3654	18th	VGD	01/11/45	15	31	125
3655	18th	VGD	01/12/45	3	5	20
3656	18th	VGD	01/13/45	15	31	125
3657	18th	VGD	01/14/45	15	31	124
3658	18th	VGD	01/15/45	15	31	124
3659	18th	VGD	01/16/45	2	5	19

3839	26th	VDG	12/16/44	30	65	8
3840	26th	VDG	12/17/44	30	65	8
3841	26th	VDG	12/18/44	30	65	8
3842	26th	VDG	12/19/44	30	65	9
3843	26th	VDG	12/20/44	30	65	9
3844	26th	VDG	12/21/44	20	61	84
3845	26th	VDG	12/22/44	20	61	84
3846	26th	VDG	12/23/44	20	61	84
3847	26th	VDG	12/24/44	6	18	19
3848	26th	VDG	12/25/44	20	61	84
3849	26th	VDG	12/26/44	20	61	84
3850	26th	VDG	12/27/44	20	61	84
3851	26th	VDG	12/28/44	20	61	84
3852	26th	VDG	12/29/44	4	11	8
3853	26th	VDG	12/30/44	20	61	84
3854	26th	VDG	12/31/44	20	61	84
3855	26th	VDG	01/01/45	12	30	74
3856	26th	VDG	01/02/45	12	30	74
3857	26th	VDG	01/03/45	12	30	74
3858	26th	VDG	01/04/45	12	30	74
3859	26th	VDG	01/05/45	12	30	75
3860	26th	VDG	01/06/45	12	30	75
3861	26th	VDG	01/07/45	12	30	75
3862	26th	VDG	01/08/45	12	30	75
3863	26th	VDG	01/09/45	13	32	75
3864	26th	VDG	01/10/45	13	32	75
3865	26th	VDG	01/11/45	6	19	46
3866	26th	VDG	01/12/45	6	19	46
3867	26th	VDG	01/13/45	6	19	46
3868	26th	VDG	01/14/45	5	19	46
3869	26th	VDG	01/15/45	5	19	45
3870	26th	VDG	01/16/45	5	19	45

4505	47th VGD	12/16/44	17	46	77
4506	47th VGD	12/17/44	24	82	526
4507	47th VGD	12/18/44	12	41	9
4508	47th VGD	12/19/44	5	10	13
4509	47th VGD	12/20/44	1	6	0
4510	47th VGD	12/21/44	2	8	1
4511	47th VGD	12/22/44	3	8	1
4512	47th VGD	12/23/44	0	5	1
4513	47th VGD	12/24/44	3	13	7
4514	47th VGD	12/25/44	4	5	0
4515	47th VGD	12/26/44	0	9	1
4516	47th VGD	12/27/44	4	1	1
4517	47th VGD	12/28/44	0	4	0
4518	47th VGD	12/29/44	3	14	0
4519	47th VGD	12/30/44	3	17	8
4520	47th VGD	12/31/44	3	17	8
4521	47th VGD	01/01/45	7	21	8
4522	47th VGD	01/02/45	7	21	8
4523	47th VGD	01/03/45	0	0	0
4524	47th VGD	01/04/45	0	0	0

4576	59th ID	12/26/44	3	17	8
4577	59th ID	12/27/44	3	17	8
4578	59th ID	12/28/44	3	17	8
4579	59th ID	12/29/44	3	17	8
4580	59th ID	12/30/44	3	17	8
4581	59th ID	12/31/44	3	16	7
4582	59th ID	01/01/45	47	137	55
4583	59th ID	01/02/45	7	21	8
4584	59th ID	01/03/45	7	21	8
4585	59th ID	01/04/45	7	21	8
4586	59th ID	01/05/45	7	21	8
4587	59th ID	01/06/45	7	21	8
4588	59th ID	01/07/45	7	21	8
4589	59th ID	01/08/45	7	21	8
4590	59th ID	01/09/45	7	21	8
4591	59th ID	01/10/45	7	21	8
4592	59th ID	01/11/45	1	7	11
4593	59th ID	01/12/45	1	7	11
4594	59th ID	01/13/45	1	7	11
4595	59th ID	01/14/45	1	7	11
4596	59th ID	01/15/45	1	7	11
4597	59th ID	01/16/45	1	7	11

4725	62d	VGd	12/16/44	20	61	84
4726	62d	VGd	12/17/44	20	61	84
4727	62d	VGd	12/18/44	20	61	84
4728	62d	VGd	12/19/44	20	61	84
4729	62d	VGd	12/20/44	20	61	84
4730	62d	VGd	12/21/44	20	61	84
4731	62d	VCD	12/22/44	20	61	84
4732	62d	VGd	12/23/44	6	18	19
4733	62d	VGd	12/24/44	6	18	19
4734	62d	VGd	12/25/44	6	18	19
4735	62d	VGd	12/26/44	6	18	19
4736	62d	VGd	12/27/44	20	61	84
4737	62d	VGd	12/28/44	20	61	84
4738	62d	VGd	12/29/44	20	61	84
4739	62d	VGd	12/30/44	6	18	19
4740	62d	VGd	12/31/44	6	18	19
4741	62d	VGd	01/01/45	6	18	19
4742	62d	VGd	01/02/45	6	18	19
4743	62d	VGd	01/03/45	20	61	84
4744	62d	VGd	01/04/45	20	61	84
4745	62d	VGd	01/05/45	20	61	84
4746	62d	VGd	01/06/45	20	61	84
4747	62d	VGd	01/07/45	20	61	84
4748	62d	VGd	01/08/45	20	61	84
4749	62d	VGd	01/09/45	20	61	84
4750	62d	VGD	01/10/45	6	18	19
4751	62d	VGd	01/11/45	17	43	10
4752	62d	VGd	01/12/45	17	43	10
4753	62d	VGd	01/13/45	17	43	10
4754	62d	VGd	01/14/45	17	43	10
4755	62d	VGd	01/15/45	16	42	10
4756	62d	VGd	01/16/45	16	42	9

4821	79th VGD	12/20/44	0	0	0
4822	79th VGD	12/21/44	0	0	0
4823	79th VGD	12/22/44	0	0	0
4824	79th VGD	12/23/44	17	30	39
4825	79th VGD	12/24/44	16	29	39
4826	79th VGD	12/25/44	2	4	6
4827	79th VGD	12/26/44	3	5	6
4828	79th VGD	12/27/44	16	29	39
4829	79th VGD	12/28/44	72	312	91
4830	79th VGD	12/29/44	13	68	1
4831	79th VGD	12/30/44	4	11	13
4832	79th VGD	12/31/44	4	11	13
4833	79th VGD	01/01/45	4	11	13
4834	79th VGD	01/02/45	4	11	13
4835	79th VGD	01/03/45	27	69	82
4836	79th VGD	01/04/45	4	11	13
4837	79th VGD	01/05/45	4	10	12
4838	79th VGD	01/06/45	2	13	0
4839	79th VGD	01/07/45	13	86	2
4840	79th VGD	01/08/45	2	14	0
4841	79th VGD	01/09/45	5	10	12
4842	79th VGD	01/10/45	5	10	13
4843	79th VGD	01/11/45	6	14	27
4844	79th VGD	01/12/45	5	13	26
4845	79th VGD	01/13/45	5	13	26
4846	79th VGD	01/14/45	2	3	3
4847	79th VGD	01/15/45	1	3	3
4848	79th VGD	01/16/45	1	3	3

4918	85th ID	12/16/44	4	10	5
4919	85th ID	12/17/44	4	10	5
4920	85th ID	12/18/44	4	10	5
4921	85th ID	12/19/44	5	10	5
4922	85th ID	12/20/44	5	10	4
4923	85th ID	12/21/44	3	17	8
4924	85th ID	12/22/44	3	17	8
4925	85th ID	12/23/44	3	17	8
4926	85th ID	12/24/44	19	109	51
4927	85th ID	12/25/44	3	17	8
4928	85th ID	12/26/44	3	17	8
4929	85th ID	12/27/44	3	16	8
4930	85th ID	12/28/44	3	16	8
4931	85th ID	12/29/44	2	16	8
4932	85th ID	12/30/44	2	16	8
4933	85th ID	12/31/44	2	16	7
4934	85th ID	01/01/45	8	21	9
4935	85th ID	01/02/45	8	21	9
4936	85th ID	01/03/45	8	21	9
4937	85th ID	01/04/45	8	21	9
4938	85th ID	01/05/45	8	21	9
4939	85th ID	01/06/45	8	21	9
4940	85th ID	01/07/45	8	21	9
4941	85th ID	01/08/45	8	21	9
4942	85th ID	01/09/45	8	21	9
4943	85th ID	01/10/45	8	21	9
4944	85th ID	01/11/45	2	8	12
4945	85th ID	01/12/45	2	8	12
4946	85th ID	01/13/45	2	8	12
4947	85th ID	01/14/45	2	8	12
4948	85th ID	01/15/45	2	8	12
4949	85th ID	01/16/45	2	8	12

4982	89th ID	12/16/44	4	10	5
4983	89th ID	12/17/44	4	10	5
4984	89th ID	12/18/44	4	10	5
4985	89th ID	12/19/44	5	10	5
4986	89th ID	12/20/44	5	10	4
4987	89th ID	12/21/44	3	17	8
4988	89th ID	12/22/44	3	17	8
4989	89th ID	12/23/44	3	17	8
4990	89th ID	12/24/44	3	17	8
4991	89th ID	12/25/44	3	17	8
4992	89th ID	12/26/44	3	17	8
4993	89th ID	12/27/44	0	0	0
4994	89th ID	12/28/44	3	17	8
4995	89th ID	12/29/44	3	17	8
4996	89th ID	12/30/44	2	16	7
4997	89th ID	12/31/44	2	16	7
4998	89th ID	01/01/45	7	21	9
4999	89th ID	01/02/45	7	21	9
5000	89th ID	01/03/45	7	21	9
5001	89th ID	01/04/45	7	21	9
5002	89th ID	01/05/45	7	21	9
5003	89th ID	01/06/45	7	21	9
5004	89th ID	01/07/45	7	21	9
5005	89th ID	01/08/45	7	21	9
5006	89th ID	01/09/45	7	21	9
5007	89th ID	01/10/45	7	21	9
5008	89th ID	01/11/45	3	10	2
5009	89th ID	01/12/45	3	10	2
5010	89th ID	01/13/45	3	10	2
5011	89th ID	01/14/45	3	10	2
5012	89th ID	01/15/45	2	10	2
5013	89th ID	01/16/45	2	10	2

3586	167th	VGD	12/16/44	0	0	0
3587	167th	VGD	12/17/44	0	0	0
3588	167th	VGD	12/18/44	0	0	0
3589	167th	VGD	12/19/44	0	0	0
3590	167th	VGD	12/20/44	0	0	0
3591	167th	VGD	12/21/44	0	0	0
3592	167th	VGD	12/22/44	0	0	0
3593	167th	VGD	12/23/44	0	0	0
3594	167th	VGD	12/24/44	0	0	0
3595	167th	VGD	12/25/44	0	0	0
3596	167th	VGD	12/26/44	0	0	0
3597	167th	VGD	12/27/44	0	0	0
3598	167th	VGD	12/28/44	0	0	0
3599	167th	VGD	12/29/44	6	18	19
3600	167th	VGD	12/30/44	20	61	84
3601	167th	VGD	12/31/44	20	61	84
3602	167th	VGD	01/01/45	20	61	84
3603	167th	VGD	01/02/45	20	61	84
3604	167th	VGD	01/03/45	6	18	19
3605	167th	VGD	01/04/45	6	18	19
3606	167th	VGD	01/05/45	6	18	19
3607	167th	VGD	01/06/45	6	18	19
3608	167th	VGD	01/07/45	6	18	19
3609	167th	VGD	01/08/45	6	18	19
3610	167th	VGD	01/09/45	6	18	19
3611	167th	VGD	01/10/45	6	18	19
3612	167th	VGD	01/11/45	20	61	84
3613	167th	VGD	01/12/45	6	18	19
3614	167th	VGD	01/13/45	20	61	84
3615	167th	VGD	01/14/45	20	61	84
3616	167th	VGD	01/15/45	20	61	84
3617	167th	VGD	01/16/45	6	18	19

3743	212th	VGD	12/16/44	23	107	77
3744	212th	VGD	12/17/44	23	107	76
3745	212th	VGD	12/18/44	23	107	76
3746	212th	VGD	12/19/44	23	107	76
3747	212th	VGD	12/20/44	4	6	12
3748	212th	VGD	12/21/44	4	7	12
3749	212th	VGD	12/22/44	3	6	12
3750	212th	VGD	12/23/44	20	39	77
3751	212th	VGD	12/24/44	20	39	77
3752	212th	VGD	12/25/44	3	6	12
3753	212th	VGD	12/26/44	3	6	12
3754	212th	VGD	12/27/44	3	6	12
3755	212th	VGD	12/28/44	3	6	12
3756	212th	VGD	12/29/44	3	6	12
3757	212th	VGD	12/30/44	3	6	12
3758	212th	VGD	12/31/44	3	6	12
3759	212th	VGD	01/01/45	5	14	11
3760	212th	VGD	01/02/45	5	14	11
3761	212th	VGD	01/03/45	6	15	12
3762	212th	VGD	01/04/45	5	14	11
3763	212th	VGD	01/05/45	6	14	11
3764	212th	VGD	01/06/45	5	14	11
3765	212th	VGD	01/07/45	6	15	12
3766	212th	VGD	01/08/45	5	14	11
3767	212th	VGD	01/09/45	5	14	11
3768	212th	VGD	01/10/45	5	14	12
3769	212th	VGD	01/11/45	2	4	3
3770	212th	VGD	01/12/45	1	3	3
3771	212th	VGD	01/13/45	1	3	3
3772	212th	VGD	01/14/45	1	3	3
3773	212th	VGD	01/15/45	1	3	3
3774	212th	VGD	01/16/45	1	3	3

3807	246th	VGD	12/16/44	2	9	2
3808	246th	VGD	12/17/44	2	5	1
3809	246th	VGD	12/18/44	4	10	5
3810	246th	VGD	12/19/44	4	10	5
3811	246th	VGD	12/20/44	4	10	5
3812	246th	VGD	12/21/44	3	17	8
3813	246th	VGD	12/22/44	3	17	8
3814	246th	VGD	12/23/44	3	17	8
3815	246th	VGD	12/24/44	3	17	8
3816	246th	VGD	12/25/44	0	0	0
3817	246th	VGD	12/26/44	0	0	0
3818	246th	VGD	12/27/44	3	17	8
3819	246th	VGD	12/28/44	3	17	8
3820	246th	VGD	12/29/44	3	17	8
3821	246th	VGD	12/30/44	2	16	7
3822	246th	VGD	12/31/44	2	16	7
3823	246th	VGD	01/01/45	8	21	9
3824	246th	VGD	01/02/45	8	21	9
3825	246th	VGD	01/03/45	8	21	9
3826	246th	VGD	01/04/45	8	21	9
3827	246th	VGD	01/05/45	8	21	9
3828	246th	VGD	01/06/45	8	21	9
3829	246th	VGD	01/07/45	8	21	9
3830	246th	VGD	01/08/45	8	21	9
3831	246th	VGD	01/09/45	8	21	9
3832	246th	VGD	01/10/45	8	21	9
3833	246th	VGD	01/11/45	3	10	4
3834	246th	VGD	01/12/45	3	9	4
3835	246th	VGD	01/13/45	2	9	4
3836	246th	VGD	01/14/45	2	9	4
3837	246th	VGD	01/15/45	2	9	3
3838	246th	VGD	01/16/45	2	9	3

3903	272d	VGd	12/16/44	4	10	4
3904	272d	VGd	12/17/44	29	65	1
3905	272d	VGd	12/18/44	5	10	4
3906	272d	VGd	12/19/44	5	10	5
3907	272d	VGd	12/20/44	0	0	0
3908	272d	VGd	12/21/44	0	0	0
3909	272d	VGd	12/22/44	0	0	0
3910	272d	VGd	12/23/44	0	0	0
3911	272d	VGd	12/24/44	3	17	8
3912	272d	VGd	12/25/44	3	17	8
3913	272d	VGd	12/26/44	3	17	8
3914	272d	VGd	12/27/44	3	17	8
3915	272d	VGd	12/28/44	3	17	8
3916	272d	VGd	12/29/44	3	17	8
3917	272d	VGd	12/30/44	3	17	8
3918	272d	VGd	12/31/44	2	16	7
3919	272d	VGd	01/01/45	7	21	8
3920	272d	VGd	01/02/45	7	21	8
3921	272d	VGd	01/03/45	7	21	8
3922	272d	VGd	01/04/45	7	21	8
3923	272d	VGd	01/05/45	7	21	8
3924	272d	VGd	01/06/45	7	21	8
3925	272d	VGd	01/07/45	7	21	8
3926	272d	VGd	01/08/45	7	21	8
3927	272d	VGd	01/09/45	7	21	8
3928	272d	VGd	01/10/45	7	21	8
3929	272d	VGd	01/11/45	10	48	74
3930	272d	VGd	01/12/45	1	7	4
3931	272d	VGd	01/13/45	10	49	75
3932	272d	VGd	01/14/45	1	7	11
3933	272d	VGd	01/15/45	1	7	11
3934	272d	VGd	01/16/45	1	7	11

3935	276th	VGD	12/16/44	23	107	77
3936	276th	VGD	12/17/44	23	107	76
3937	276th	VGD	12/18/44	23	107	76
3938	276th	VGD	12/19/44	22	107	76
3939	276th	VGD	12/20/44	23	107	76
3940	276th	VGD	12/21/44	4	7	12
3941	276th	VGD	12/22/44	3	6	12
3942	276th	VGD	12/23/44	3	6	12
3943	276th	VGD	12/24/44	20	39	77
3944	276th	VGD	12/25/44	3	6	12
3945	276th	VGD	12/26/44	3	6	12
3946	276th	VGD	12/27/44	3	6	12
3947	276th	VGD	12/28/44	3	6	12
3948	276th	VGD	12/29/44	3	6	12
3949	276th	VGD	12/30/44	3	6	12
3950	276th	VGD	12/31/44	3	6	12
3951	276th	VGD	01/01/45	5	14	11
3952	276th	VGD	01/02/45	5	14	11
3953	276th	VGD	01/03/45	6	15	12
3954	276th	VGD	01/04/45	5	14	11
3955	276th	VGD	01/05/45	6	14	11
3956	276th	VGD	01/06/45	34	92	73
3957	276th	VGD	01/07/45	5	14	12
3958	276th	VGD	01/08/45	6	14	11
3959	276th	VGD	01/09/45	35	93	74
3960	276th	VGD	01/10/45	5	14	11
3961	276th	VCD	01/11/45	7	20	22
3962	276th	VGD	01/12/45	2	4	3
3963	276th	VGD	01/13/45	1	3	3
3964	276th	VGD	01/14/45	1	3	3
3965	276th	VGD	01/15/45	1	3	3
3966	276th	VGD	01/16/45	1	3	3

3978	277th	VG	12/16/44	20	61	84
3979	277th	VG	12/17/44	20	61	84
3980	277th	VG	12/18/44	20	61	84
3981	277th	VG	12/19/44	20	61	84
3982	277th	VG	12/20/44	20	61	84
3983	277th	VG	12/21/44	3	17	8
3984	277th	VG	12/22/44	3	17	8
3985	277th	VG	12/23/44	3	17	8
3986	277th	VG	12/24/44	3	17	8
3987	277th	VG	12/25/44	3	17	8
3988	277th	VG	12/26/44	3	17	8
3989	277th	VG	12/27/44	3	17	8
3990	277th	VG	12/28/44	3	17	8
3991	277th	VG	12/29/44	2	17	8
3992	277th	VG	12/30/44	2	16	7
3993	277th	VG	12/31/44	2	16	7
3994	277th	VG	01/01/45	8	21	9
3995	277th	VG	01/02/45	8	21	9
3996	277th	VG	01/03/45	8	21	9
3997	277th	VG	01/04/45	8	21	9
3998	277th	VG	01/05/45	8	21	9
3999	277th	VG	01/06/45	8	21	9
4000	277th	VG	01/07/45	8	21	9
4001	277th	VG	01/08/45	8	21	9
4002	277th	VG	01/09/45	8	21	9
4003	277th	VG	01/10/45	8	21	9
4004	277th	VG	01/11/45	1	7	2
4005	277th	VG	01/12/45	1	7	2
4006	277th	VG	01/13/45	1	7	2
4007	277th	VG	01/14/45	1	7	2
4008	277th	VG	01/15/45	2	7	2
4009	277th	VG	01/16/45	2	7	2

4165	326th	VGD	12/16/44	29	65	31
4166	326th	VGD	12/17/44	29	65	31
4167	326th	VGD	12/18/44	29	65	31
4168	326th	VGD	12/19/44	4	10	5
4169	326th	VGD	12/20/44	4	10	5
4170	326th	VGD	12/21/44	3	17	8
4171	326th	VGD	12/22/44	3	17	8
4172	326th	VGD	12/23/44	3	17	8
4173	326th	VGD	12/24/44	3	17	8
4174	326th	VGD	12/25/44	3	17	8
4175	326th	VGD	12/26/44	3	17	8
4176	326th	VGD	12/27/44	3	17	8
4177	326th	VGD	12/28/44	3	17	8
4178	326th	VGD	12/29/44	2	16	7
4179	326th	VGD	12/30/44	2	16	7
4180	326th	VGD	12/31/44	2	16	7
4181	326th	VGD	01/01/45	6	18	19
4182	326th	VGD	01/02/45	6	18	19
4183	326th	VGD	01/03/45	6	18	19
4184	326th	VGD	01/04/45	6	18	19
4185	326th	VGD	01/05/45	6	18	19
4186	326th	VGD	01/06/45	6	18	19
4187	326th	VGD	01/07/45	6	18	19
4188	326th	VGD	01/08/45	6	18	19
4189	326th	VGD	01/09/45	6	18	19
4190	326th	VGD	01/10/45	6	18	19
4191	326th	VGD	01/11/45	4	13	22
4192	326th	VGD	01/12/45	4	13	22
4193	326th	VGD	01/13/45	4	13	22
4194	326th	VGD	01/14/45	26	86	146
4195	326th	VGD	01/15/45	26	86	145
4196	326th	VGD	01/16/45	4	14	23

4197	340th	VGD	12/16/44	4	10	5
4198	340th	VGD	12/17/44	4	10	5
4199	340th	VGD	12/18/44	4	10	5
4200	340th	VGD	12/19/44	5	10	5
4201	340th	VGD	12/20/44	5	10	4
4202	340th	VGD	12/21/44	20	61	84
4203	340th	VGD	12/22/44	6	18	19
4204	340th	VGD	12/23/44	6	18	19
4205	340th	VGD	12/24/44	6	18	19
4206	340th	VGD	12/25/44	6	18	19
4207	340th	VGD	12/26/44	0	0	0
4208	340th	VGD	12/27/44	0	0	0
4209	340th	VGD	12/28/44	0	0	0
4210	340th	VGD	12/29/44	0	0	0
4211	340th	VGD	12/30/44	0	0	0
4212	340th	VGD	12/31/44	0	0	0
4213	340th	VGD	01/01/45	0	0	0
4214	340th	VGD	01/02/45	6	24	11
4215	340th	VGD	01/03/45	39	155	72
4216	340th	VGD	01/04/45	38	154	71
4217	340th	VGD	01/05/45	38	154	71
4218	340th	VGD	01/06/45	6	24	11
4219	340th	VGD	01/07/45	6	24	11
4220	340th	VGD	01/08/45	6	24	11
4221	340th	VGD	01/09/45	6	24	11
4222	340th	VGD	01/10/45	38	155	71
4223	340th	VGD	01/11/45	6	18	19
4224	340th	VGD	01/12/45	6	18	19
4225	340th	VGD	01/13/45	20	61	84
4226	340th	VGD	01/14/45	6	18	19
4227	340th	VGD	01/15/45	20	61	84
4228	340th	VGD	01/16/45	20	61	84

4229	344th	ID	12/16/44	0	0	0
4230	344th	ID	12/17/44	0	0	0
4231	344th	ID	12/18/44	0	0	0
4232	344th	ID	12/19/44	0	0	0
4233	344th	ID	12/20/44	0	0	0
4234	344th	ID	12/21/44	0	0	0
4235	344th	ID	12/22/44	0	2	0
4236	344th	ID	12/23/44	0	2	0
4237	344th	ID	12/24/44	0	0	0
4238	344th	ID	12/25/44	2	3	0
4239	344th	ID	12/26/44	0	2	0
4240	344th	ID	12/27/44	0	0	0
4241	344th	ID	12/28/44	0	0	0

4242	352d	VGD	12/16/44	22	107	77
4243	352d	VGD	12/17/44	23	107	76
4244	352d	VGD	12/18/44	23	107	76
4245	352d	VGD	12/19/44	23	107	76
4246	352d	VGD	12/20/44	23	107	76
4247	352d	VGD	12/21/44	20	40	78
4248	352d	VGD	12/22/44	21	40	78
4249	352d	VGD	12/23/44	21	40	78
4250	352d	VGD	12/24/44	21	40	78
4251	352d	VGD	12/25/44	21	40	78
4252	352d	VGD	12/26/44	21	40	78
4253	352d	VGD	12/27/44	21	40	78
4254	352d	VGD	12/28/44	3	6	12
4255	352d	VGD	12/29/44	3	6	12
4256	352d	VGD	12/30/44	3	6	12
4257	352d	VGD	12/31/44	3	6	12
4258	352d	VGD	01/01/45	5	14	11
4259	352d	VGD	01/02/45	6	15	12
4260	352d	VGD	01/03/45	5	14	11
4261	352d	VGD	01/04/45	6	15	12
4262	352d	VGD	01/05/45	5	14	11
4263	352d	VGD	01/06/45	5	14	11
4264	352d	VGD	01/07/45	5	14	11
4265	352d	VGD	01/08/45	6	15	12
4266	352d	VGD	01/09/45	5	14	11
4267	352d	VGD	01/10/45	5	14	12
4268	352d	VGD	01/11/45	2	4	3
4269	352d	VGD	01/12/45	1	3	3
4270	352d	VGD	01/13/45	1	3	3
4271	352d	VGD	01/14/45	1	3	3
4272	352d	VGD	01/15/45	1	3	3
4273	352d	VGD	01/16/45	1	3	3

4297	353d	ID	12/16/44	12	45	73
4298	353d	ID	12/17/44	12	45	73
4299	353d	ID	12/18/44	12	45	73
4300	353d	ID	12/19/44	11	45	73
4301	353d	ID	12/20/44	11	45	73
4302	353d	ID	12/21/44	15	37	35
4303	353d	ID	12/22/44	30	129	101
4304	353d	ID	12/23/44	1	17	1
4305	353d	ID	12/24/44	18	25	0
4306	353d	ID	12/25/44	6	23	18
4307	353d	ID	12/26/44	23	48	21
4308	353d	ID	12/27/44	10	16	53
4309	353d	ID	12/28/44	2	4	68
4310	353d	ID	12/29/44	9	4	79
4311	353d	ID	12/30/44	3	17	8
4312	353d	ID	12/31/44	3	17	8
4313	353d	ID	01/01/45	7	21	9
4314	353d	ID	01/02/45	7	21	9
4315	353d	ID	01/03/45	7	21	9
4316	353d	ID	01/04/45	7	21	9
4317	353d	ID	01/05/45	7	21	9
4318	353d	ID	01/06/45	7	21	9
4319	353d	ID	01/07/45	7	21	9
4320	353d	ID	01/08/45	7	21	9
4321	353d	ID	01/09/45	7	21	9
4322	353d	ID	01/10/45	7	21	9
4323	353d	ID	01/11/45	2	8	12
4324	353d	ID	01/12/45	2	8	12
4325	353d	ID	01/13/45	2	8	12
4326	353d	ID	01/14/45	2	8	12
4327	353d	ID	01/15/45	2	8	12
4328	353d	ID	01/16/45	2	8	12

4361	363d	VG	12/16/44	0	9	0
4362	363d	VG	12/17/44	2	3	0
4363	363d	VG	12/18/44	3	5	0
4364	363d	VG	12/19/44	3	1	0
4365	363d	VG	12/20/44	0	5	0
4366	363d	VG	12/21/44	2	8	0
4367	363d	VG	12/22/44	2	10	1
4368	363d	VG	12/23/44	0	0	0
4369	363d	VG	12/24/44	2	1	3
4370	363d	VG	12/25/44	0	3	0
4371	363d	VG	12/26/44	1	6	0
4372	363d	VG	12/27/44	4	4	0
4373	363d	VG	12/28/44	0	3	0
4374	363d	VG	12/29/44	0	0	0
4375	363d	VG	12/30/44	3	17	8
4376	363d	VG	12/31/44	3	17	8
4377	363d	VG	01/01/45	7	20	8
4378	363d	VG	01/02/45	7	20	8
4379	363d	VG	01/03/45	7	20	8
4380	363d	VG	01/04/45	7	20	8
4381	363d	VG	01/05/45	7	20	8
4382	363d	VG	01/06/45	7	20	8
4383	363d	VG	01/07/45	7	20	8
4384	363d	VG	01/08/45	7	20	8
4385	363d	VG	01/09/45	7	20	8
4386	363d	VG	01/10/45	7	20	8
4387	363d	VG	01/11/45	1	7	11
4388	363d	VG	01/12/45	1	7	11
4389	363d	VG	01/13/45	1	7	11
4390	363d	VG	01/14/45	2	8	12
4391	363d	VG	01/15/45	2	8	12
4392	363d	VG	01/16/45	2	8	12

4544	560th	VGD	12/16/44	25	84	205
4545	560th	VGD	12/17/44	25	84	205
4546	560th	VGD	12/18/44	25	83	204
4547	560th	VGD	12/19/44	4	13	32
4548	560th	VGD	12/20/44	4	13	31
4549	560th	VGD	12/21/44	20	61	84
4550	560th	VGD	12/22/44	20	61	84
4551	560th	VGD	12/23/44	20	61	84
4552	560th	VGD	12/24/44	6	18	19
4553	560th	VGD	12/25/44	20	61	84
4554	560th	VGD	12/26/44	20	61	84
4555	560th	VGD	12/27/44	20	61	84
4556	560th	VGD	12/28/44	20	61	84
4557	560th	VGD	12/29/44	20	61	84
4558	560th	VGD	12/30/44	6	18	19
4559	560th	VGD	12/31/44	6	18	19
4560	560th	VGD	01/01/45	6	18	19
4561	560th	VGD	01/02/45	6	18	19
4562	560th	VGD	01/03/45	20	61	84
4563	560th	VGD	01/04/45	20	61	84
4564	560th	VGD	01/05/45	20	61	84
4565	560th	VGD	01/06/45	20	61	84
4566	560th	VGD	01/07/45	6	18	19
4567	560th	VGD	01/08/45	20	61	84
4568	560th	VGD	01/09/45	20	61	84
4569	560th	VGD	01/10/45	6	18	19
4570	560th	VGD	01/11/45	20	61	84
4571	560th	VGD	01/12/45	20	61	84
4572	560th	VGD	01/13/45	20	61	84
4573	560th	VGD	01/14/45	0	0	0
4574	560th	VGD	01/15/45	0	0	0
4575	560th	VGD	01/16/45	0	0	0

German Divisional Battle Casualty Estimation Methodology

The first phase in developing the Unit Data records for the German segment of the Ardennes Campaign Simulation Data Base (ACSDB) was to determine daily battle casualties (killed, wounded, and captured/missing) for all German division- and brigade-level units participating in the campaign during the 16 December 1944-16 January 1945 time frame. Due to various reasons, including the poor record keeping practices maintained by the German Army in the last six months of World War II and the destruction of many reports, there is a notable paucity of daily battle casualty statistics for German units at any level of aggregation during the Ardennes period. Therefore, it was determined that the estimation of lacking battle casualty data was necessary. This was accomplished in a three-step process, outlined here and described in greater detail below. Step 1 involved deriving all known battle casualty data for divisions and brigades from original source records, including daily data as well as aggregate multi-day, 10-day, and monthly data, and devising and applying a methodology for breaking down the aggregate data into daily increments. Step 1 was applied to all division- and brigade-level units for which appropriate data existed and without regard to which German army -- the Fifth Panzer, Sixth Panzer, Seventh, or Fifteenth -- the unit belonged. Step 2 involved estimating the battle casualty data for division- and brigade-level units not covered in Step 1 and subordinated to the German Seventh and Fifteenth Armies, armies located on the northern and southern shoulders of the "bulge." The missions of these armies were to cover the flanks of the main attacking armies. Step 2's estimation methodology was derived primarily from the 10-day aggregate battle casualty statistics of the two armies (Seventh and Fifteenth). Step 3 involved estimating daily battle casualties for the division- and brigade-level units not covered in Step 1 and belonging to the Fifth and Sixth Panzer Armies, the primary attacking armies. Step 3 relied upon the application of an average daily battle casualty rate derived from data used for Step 1. Step 3 was implemented since it was not possible to use the Step 2 methodology for certain units in these armies (primarily infantry divisions) because of problems with the primary source data. These problems are discussed below in greater detail.

Step 1.

Original records and secondary sources pertaining to German units participating in the Ardennes Campaign are notably lacking in daily battle casualty data. Of the 42 division- and brigade-level German units tracked in the ACSDB, six Volksgrenadier or infantry divisions (47th VGD, 79th VGD, 246th VGD, 344th ID, 353d VGD, and 363d VGD) (ENDNOTE #1) have among them daily battle

casualty data from original records for a total of 46 division-days. Since the six divisions belonged to either the German Seventh Army or Fifteenth Army and were thus located outside the main offensive area of the Fifth and Sixth Panzer Armies, their battle casualty experience was deemed inappropriate for use as the sole basis for estimating daily battle casualties of the attacking German units in the main offensive area. Nevertheless the daily battle casualty data of these divisions was extracted from the original records, and, as the first action in the entire German battle casualty estimation methodology, recorded for the divisions as their daily battle casualties on the appropriate days.

Although substantial German daily battle casualty data for the Ardennes period is not available, aggregate battle casualty data for multi-day, 10-day, or monthly periods -- recorded in original records -- does exist for the 25 divisions and brigades included in the following list:

<u>Unit</u>	<u>Period For Which Aggregate Battle Casualty Data Exists</u>
2d PzD	11-20 Dec, 21-31 Dec, 1-10 Jan, 1-31 Jan
9th PzD	11-20 Dec, 21-31 Dec, 1-31 Dec, 1-10 Jan, 1-31 Jan
15th PzGD	11-20 Dec, 21-31 Dec, 1-31 Dec, 1-10 Jan, 11-20 Jan, 1-31 Jan
116th PzGD	11-20 Dec, 21-31 Dec, 1-31 Dec, 1-10 Jan, 11-20 Jan, 1-31 Jan
2d SSPzD	1-31 Dec, 1-31 Jan
12th SSPzD	1-31 Dec, 1-31 Jan
3d PzGD	21-31 Dec, 1-31 Dec, 1-10 Jan, 1-31 Jan
1st SSPzD	1-31 Jan
PzLehrD	11-20 Dec, 21-31 Dec, 1-31 Dec, 1-10 Jan, 1-31 Jan
FBB	21-31 Dec, 1-10 Jan, 11-20 Jan
FGB	11-20 Jan
3d FJD	11-20 Jan
5th FJD	21-31 Dec, 1-10 Jan
26th VGD	11-20 Dec, 1-10 Jan, 11-21 Jan, 1-31 Jan
47th VGD	11-20 Dec,
62d VGD	1-10 Jan, 11-20 Jan
79th VGD	23 Dec-10 Jan, 23 Dec-14 Jan, 6-8 Jan
89th ID	11-20 Jan
246th VGD	11-20 Jan
277th VGD	11-20 Jan
326th VGD	11-20 Jan
340th VGD	1-10 Jan
353d VGD	11-20 Dec
363d VGD	11-20 Dec
560th VGD	11-20 Dec

(Units listed in order in which battle casualty data was extracted. ACSDB period is from 16 Dec 1944 to 16 Jan 1944.)

This data was derived mainly from the monthly Zustandsbericht (situation report) of the German armored and armored infantry units and from a Heeresarzt (surgeon general) report of the Fifth Panzer Army. The latter document provided 10-day battle casualty data for all divisions under command of the Fifth Panzer Army at the time that the report was issued, generally two days after the end of the reporting period.

Having determined the extent of the available German battle casualty data, the next action taken in determining daily battle casualty data was to derive all multi-day, 10-day, and monthly battle casualty statistics from original sources for German brigades and divisions. (ENDNOTE #2) This data was recorded on spreadsheets.

The next step was to develop a formula for breaking down aggregate battle casualty data into daily battle casualty data. Several approaches were considered.

- Divide the aggregate data by the total number of days of the reporting period and assign an equal number of battle casualties to all units for each day. This approach was considered too coarse as it would assign an equal number of casualties to days of intense combat activity and days of inactive reserve.

- Use judgement on an individual basis for each unit to determine its daily casualties. Lacking any set guidelines, this approach was deemed unacceptable as it would not allow for a consistent casualty estimation methodology.

- Determine casualty rates for US or British unit(s) opposite the German unit and base the German battle casualties on the US or British rates. This approach would have required considerable time and effort and would still not provide a very high level of confidence in the accuracy of the data. This approach was also rejected.

The method used by DMSi to estimate daily battle casualties from aggregate battle casualty data first required an assessment of a unit's level of activity. One of three levels was assigned to each unit for every day that it remained within the ACSDB area.

- Active. Major combat in either an offensive or defensive posture and in the front line.

- Inactive. Combat such as positional warfare or holding actions where the intensity of major operations is lacking. This level of activity was typical of many of the German Fifteenth Army units in Westwall fortifications north of the main battle area. The level was also assigned to units in reserve positions off of the front line but judged to be within range of enemy artillery and vulnerable to Allied air attacks, situations that many German units experienced in the "bulge" formed by the offensive.

- Out of Contact. The level of activity assigned to German units in reserve or rear area positions outside of enemy artillery range. This level was assigned mainly to German units arriving at or departing from the ACDSB area and to those units which remained in reserve for the duration of the offensive, such as the 10th SSPzD and the 11th PzD.

Other categories assigning activity levels were also considered, such as differentiation between attack and defense. It was decided not to use an "attack-defense" differentiation because additional factors such as the outcome of a unit's activities (i.e., victory or defeat), would have to be considered in estimating casualties using this kind of differentiation. More than three levels of activity were considered, but this approach was rejected due to the inability to define clearly differences in the levels from the available information in the German records. As the methodology chosen for Step 1 is used primarily to interpolate data between 10-day periods, the overall casualties for a 10-day period will reflect the more intense combat, although not precisely by day.

The sources used to determine activity levels of German divisions were primarily the post-war manuscripts prepared by German officers who participated in the Ardennes Campaign. These manuscripts are part of the Foreign Military Study series available on file at the US National Archives. Also used in determining activity of German units were the US Army's official history of the Ardennes Campaign by Hugh M. Cole, Charles B. MacDonald's recent book on the Battle of the Bulge, and Jean Paul Pallud's detailed study of the campaign (Cole, Hugh M. The Ardennes: Battle of the Bulge. US Army in World War II, The European Theater of Operations. Washington, D.C.: USGPO, 1965; MacDonald, Charles B. A Time for Trumpets: The Untold Story of the Battle of the Bulge. New York: William Morrow, 1985; and Pallud, Jean Paul. Battle of the Bulge: Then and Now. London: After the Battle, 1984).

A system for calculating daily battle casualties from aggregate casualty data was then developed. If a unit was determined to be in "Out of Contact," its battle casualty rate on

those days was considered to be 0.0%. This rate was based on the negligible rates experienced by four German divisions (2d PzD, 15th PzGD, 116th PzD, and 344th VGD) (ENDNOTE #3) while in reserve during parts of December 1944. These rates were found in primary source records. If a unit's level of activity was determined to be the same for the entire period covered by the aggregate battle casualty data, its battle casualties were distributed evenly over each day of the period. For example, if a unit had 20 killed, 50 wounded, and 30 captured/missing in action for a 10-day period in which its level of activity did not vary, its daily casualties for each day were 2 killed, 5 wounded, and 3 captured/missing in action.

For periods in which levels of activity were not constant, an equation based on the total number of casualties, the number of "Active" days, and the number of "Inactive" days was applied. This equation was predicated on the assumption that casualties on "Active" days were 6.5 times greater than on "Inactive" days. The value of 6.5 was derived from a table in the July 1953 version of FM 101-10, Staff Officer's Field Manual -- Organization, Technical, and Logistical Data, a reproduction of which is contained in Attachment 1 to this paper. This same table, apparently based on US Army World War II experience, appears in the 1983 version of RB 101-999, Staff Officer's Handbook. Derivation of the 6.5 value was done by determining the ratio of the average battle casualty rates of front line divisions in all types of operations ("division in contact, battle loss") to the average battle casualty rate of divisions in corps and reserve ("division in corps and reserve, battle loss") in all types of operations.

The equation is:

$$\text{Casualties per "Inactive Day"} = \frac{T}{6.5a + b}$$

when T = total number of casualties, a = number of "Active" days, and b = number of "Inactive" days.

Casualties per "Active Day" were calculated with the following equation:

$$\text{Casualties per "Active Day"} = 6.5 \times \frac{T}{6.5a + b}$$

An example of an application of this equation is:

A division sustains a total of 42 killed, 84 wounded, and 21 captured/missing in action during a 10-day period. There are determined to be two "Active" days and eight "Inactive" days during the 10-day period.

The number of killed per "Inactive" day is calculated thusly -- $42/[6.5(2) + 8]$, or 2 killed per "Inactive" day. The number of killed per "Active" day is 6.5×2 , or 13. The number of wounded per "Inactive" day is calculated thusly -- $84/[6.5(2) + 8]$, or 4 wounded per "Inactive" day. The number of wounded per "Inactive" day is 6.5×4 , or 26. The number of captured/missing in action per "Inactive" day is calculated as follows -- $21/[6.5(2) + 8]$, or 1 captured/missing in action per "Inactive" day. The number of captured/missing in action per "Active" day is 6.5×1 , or 6 and 7 respectively on each day.

Calculations were done out to one decimal place and rounded off to the next highest whole number. In general, decimal values of .5 were rounded up to the next highest whole number, except in cases such as that illustrated above for captured/missing in action where provisions had to be made so that the sum of the individual days equalled the total ($6 + 7 = 13$). Calculations were performed to ensure that cumulative daily battle casualties equalled the total number provided in original records for a given period.

Step 2.

Step 2 relied primarily upon the 10-day battle casualty reports of the Seventh and Fifteenth Armies for calculating daily battle casualties for divisions and brigades. The same methodology was used for both armies, in a relatively simple process for the Seventh Army with its constant subordination of units and in a more complicated process for the Fifteenth Army, units of which were transferred at various points to other German armies in the Ardennes operation.

The process involved first determining the 10-day totals of killed, wounded, and captured/missing in action for the armies, from the Heeresarzt so-called 10-day inclusive and cumulative reports. (ENDNOTE #4) These reports were generated for every 10-day period from 22 June 1941 through the Ardennes operation. The 10-day periods relevant to the ACSDB covered 11-20 Dec 1944, 21-31 Dec 1944, 1-10 Jan 1945, 11-20 Jan 1945, and 21-31 Jan 1945. Note that two of these periods are actually 11 days in duration. The inclusive reports provided only the casualties of the 10-day period; the cumulative reports provided the total casualties for German armies from 22 June 1941 to the end of the last 10-day period. Caution had to be exercised in reviewing and utilizing the data in the reports. Later supplementary or revised reports of casualties, assembled when late reports from subordinate units had been received, are provided for some armies or time periods. Comparison of the various 10-day inclusive and cumulative reports was performed to arrive at what were considered the actual figures for army 10-day casualties, in all cases derived from the original records. (In the case of the Fifth and Sixth Panzer Armies, DMSi could not determine what it considered acceptable

10-day casualties. This necessitated the implementation of Step 3, as described below.) The final figures used for the Seventh and Fifteenth Armies were:

<u>Period</u>	<u>Seventh Army</u>	<u>Fifteenth Army</u>
11-20 Dec 44	4176	3720
21-31 Dec 44	4514* (3163)	4781
1-10 Jan 45	3526	4699
11-20 Jan 45	1100	1823

The number marked by an asterisk was estimated from the 10-day and cumulative casualty reports. The original figure, shown in parentheses, was from the 10-day Heeresarzt inclusive reports. This figure (3163) was judged to be too low for the 21-31 Dec period, in light of the activity of the German Seventh Army and compared with the figure given for 1-10 Jan (3526). A late Heeresarzt cumulative report for 1-10 Jan provided a revised figure (4937) for the Seventh Army for the period 1-10 Jan. It was assumed that the difference between this value and 3526, or 1411, was incurred during the previous reporting period (21-31 Dec) and included with the Heeresarzt 1-10 Jan cumulative report. This assumption was also based on the relative activities of the Seventh Army during the 21-31 Dec period (more combat) and 1-10 Jan (less combat). Therefore the difference, broken down by killed, wounded, and captured/missing in action, was added to the original value to arrive at what it considered an acceptable value for the Seventh Army for the period 21-31 Dec (3163 + 1411 = 4574). The difference between this figure (4574) and the number given above (4514), or 60, is due to a math error in the original German records in computing breakdown by killed, wounded, and captured/missing in action.

Once estimated figures for cumulative Seventh and Fifteenth Army battle casualties were compiled, the orders of battle for the armies on the days two days after the end of the relevant 10-day periods (22 Dec, 2 Jan, 12 Jan, and 22 Jan) was consulted. All divisions and brigades belonging to the armies on these days were considered to be included in the battle casualty totals for the 10-day periods. This assumption was made based on the fact that an army's 10-day casualty reports were usually generated 2 days after the end of each 10-day period and included all units subordinate to the army on the day on which the report was generated.

A matrix was then created for the Seventh and Fifteenth Armies for each 10-day period showing total army battle casualties, broken down by killed, wounded, and captured/missing in action with all known casualties for the divisions and brigades derived from Step 1. Figures equal to nine percent of the cumulative army battle casualties were then subtracted from the 10-day total army battle casualties, to account for losses in

corps and army assets. The figure of nine percent is an estimate derived from data for US 12th Army Group casualties in the Ardennes (see Attachment 2 to this paper). The approximate percentage of battle casualties in 12th Army Group non-divisional assets during the Ardennes period was 11 percent of total battle casualties. Non-divisional assets comprised approximately 50 percent of the 12th Army Group's total personnel strength. In the German Seventh Army, the strength of non-divisional assets was estimated to be about 40 percent of the Army's total strength. To derive an estimated percentage of German non-divisional assets casualties, a value of .80 (40/50) was applied to the 12th Army Group's non-divisional assets battle casualty percentage (11 percent) to give a percentage for the Germans of nine percent, after rounding. An attempt was also made to determine a non-divisional assets battle casualty percentage using data from the German Fifth Panzer Army. (This data was from the Fifth Panzer Army report identified in Endnote #2.) The figure derived using the Fifth Panzer Army data, five percent, was considered unreliable because of the incomplete casualty returns for both divisions and non-divisional assets in the report.

From the figures derived by subtracting the estimated non-divisional assets battle casualties from the armies' total battle casualties, all known battle casualties of divisions and brigades as determined in Step 1 were then subtracted. The resulting figures were considered the total battle casualties of the divisions and brigades belonging to the armies (on 22 Dec, 2 Jan, 12 Jan, and 22 Jan) for which no daily battle casualty data had been derived in Step 1. One anomaly for the Fifteenth Army during the period 11-20 Dec was addressed at this point. Total captured/missing casualties given in original sources for the period 11-20 Dec for two Fifteenth Army divisions, the 47th VGD and the 353d ID, exceeded the total captured/missing casualties for the entire Fifteenth Army during the period. The reason for the discrepancies between these two divisions' captured/missing figures and that of the Fifteenth Army is not positively ascertainable. However, the reason for the high captured/missing casualties of these divisions is ascertainable. It is likely due to the fact that they were engaged in severe combat around the town of Dueren in a bridgehead west of the Roer River. Lacking any other data on captured/missing casualties, DMSi utilized only the captured/missing of all Fifteenth Army units, except the 47th VGD and the 353d ID, in the calculations described above. However, the captured/missing casualties for the two divisions were included with those divisions.

A process involving the "Active/Inactive/Out of Contact" levels of activity, used in Step 1, was then applied to estimate the daily battle casualties of the divisions and brigades in question. This process involved determining the breakdown of active, inactive, and out of contact days for divisions and

brigades on the days for which no daily battle casualty data was known. (The process was repeated for each 10-day period for both armies). For days on which units were out of contact, 0 (zero) battle casualties were assigned. For active and active days, the same equations applied in Step 1 resulted in the estimation of daily battle casualties which were applied to all appropriate divisions and brigades within an army during a 10-day period.

Step 3.

Like the total battle casualties of the Seventh Army for the period 21-31 Dec, the total 10-day battle casualties of the Fifth Panzer and Sixth Panzer Armies in both the Heeresarzt 10-day inclusive and cumulative reports were determined to contain anomalies. The figures from original records are as follows:

<u>Period</u>	<u>Sixth PzArmy</u>	<u>Fifth PzArmy</u>
11-20 Dec 44	845	1306
21-31 Dec 44	6286	6041
1-10 Jan 45	4674*	8907*
11-20 Jan 45	9167	411
21-31 Jan 45	6116*	6209

All numbers except those marked by asterisks were taken from the Heeresarzt 10-day inclusive reports. The numbers marked with asterisks were taken from the Heeresarzt cumulative reports and reflect changes made by revisions included in late reports. There are several apparent anomalies in these figures. The figure for the Sixth Army on 11-20 Dec is probably too low. The figures for the same Panzer Army on 11-20 Jan and 21-31 Jan are without question far too high. By mid-January 1945 the Sixth Panzer Army had started to withdraw its units from the Ardennes for commitment against the Soviet Army in the East. This process was well underway by 20 January and virtually complete by the end of January. Therefore, it is certain that the figure for 11-20 Jan (9167) is too high and the figure for 21-31 Jan (6116), or any substantial number of battle casualties for 21-31 Jan (over 1000, for example) a virtual impossibility. The probable explanation for these figures (9167 and 6116) is that the Germans were receiving late battle casualty returns for Sixth Panzer Army units and included them in the reports for these periods. For the Fifth Panzer Army, the figure for the 11-20 Jan period (411) is far too low, as the army was involved in severe defensive fighting during this period. The figure for the subsequent period (6209) is possibly too high, but may be relatively accurate, as the Fifth Panzer Army continued in defensive operations during this period. Likewise the figure for 1-10 Jan (8907) for the Fifth Panzer Army may be too high, in light of the battle casualties that the army sustained in the immediately previous period and the experience of the Sixth Panzer Army for 1-10 Jan.

Any redistribution of the casualties would result in the derivation of figures which would be considered estimates of unacceptably questionable reliability. Furthermore, due to frequent changes in the Fifth and Sixth Panzer Armies' orders of battle and the shifting between them of divisions under their subordination, it was impossible to determine with a high degree of certainty which units were included in the 10-day periods. (This was a problem similar to that of the German Fifteenth Army, although that Army experienced considerably fewer changes to its order of battle than the Fifth and Sixth Panzer Armies.) Therefore, a methodology for using average daily numbers of battle casualties, based on active and inactive levels of activity, was applied to the divisions and brigades of the Fifth and Sixth Panzer Armies. In summary, the average daily numbers of battle casualties were calculated for two generic kinds of divisions: 1) SS panzer (armored) and 2) infantry/volksgrenadier/fallschirmjaeger (paratrooper). The organization and armament of these divisions and their missions was considered sufficiently different to warrant separate calculations of average daily battle casualties. To calculate the average daily numbers of battle casualties, all divisions and brigades with data from primary source records, i.e., those divisions and brigades from Step 1, were used. Dividing them into active and inactive categories, average daily battle casualties were calculated as follows:

INFANTRY/VOLKSGRENADIER/FALLSCHIRMJAEGER (PARATROOPER)

Unit	Active			# Days	Inactive			# Days
	K	W	C/MIA		K	W	C/MIA	
3dFJD					201	618	575	10
18th VGD	74	155	622	5	11	24	96	5
26th VGD	301	753	1062	21				
47th VGD	24	82	526	1	120	344	533	18
62d VGD					164	424	95	10
79th VGD	174	623	293	7	79	161	193	15
89th ID					24	98	18	10
246th ID	20	35	65	1	41	139	58	15
277th VGD					30	121	59	20
326th VGD	77	257	436	3	28	92	157	7
340th VGD	153	618	285	4	30	119	55	5
344th ID					2	7	31	5
353d ID	53	177	122	2	179	571	984	17
363d ID					21	77	4	17
560th VGD	83	280	687	5	3	9	21	1
TOTALS	959	2980	4098	49	933	2804	2879	155
Averages	20	61	84		6	18	19	

SS PANZER

Unit	Active			# Days	Inactive			# Days
	K	W	C/MIA		K	W	C/MIA	
1st SSPzD	294	761	170	10	44	130	30	10
2d SSPzD	271	864	135	4	330	964	745	19
12th SSPzD	472	1490	622	13	105	312	133	19
TOTALS	1037	3115	927	27	479	1406	908	47
Averages	38	115	34		10	30	19	

(Averages = Total Casualties/Total # of Days)

Note that the data in the above tables gives an active to inactive ratio of 3.2:1 for SS Panzer and 3.8:1 for Infantry/Volksgrenadier/Fallschirmjaeger units. These ratios are lower than the 6.5:1 ratio used in Steps 1 and 2. The reason that they were not used in Steps 1 and 2 is because they were derived from what was considered too small a statistical sampling (76 total combat days -- 27 + 49).

One unit for which primary source battle casualty data was available, the 5th FJD, was omitted from the estimation process for INFANTRY/VOLKSGRENADIER/FALLSCHIRMJAEGER divisions because its battle casualties were considered too high and skewed the average daily battle casualties on active days for these kinds of divisions. The 5th FJD sustained 748 K, 2820 W, and 2745 C/MIA on 8 active days and 144 K, 533 W, and 457 C/MIA on 12 inactive days, with a ratio of active to inactive daily casualties of 8.4:1. The 5th FJD participated in particularly severe combat around Bastogne and was subjected to numerous attacks by US Third Army units advancing from the south to relieve US units surrounded in Bastogne.

Thus, the following figures were applied to Fifth and Sixth Panzer Army divisions and brigades in the appropriate categories:

	Active			Inactive		
	K	W	C/MIA	K	W	C/MIA
SSPzD	38	115	34	10	30	19
ID/VGD/FJD	20	61	84	6	18	19

Summary

Utilizing Steps 1, 2, and 3, it was possible to determine or estimate daily battle casualties, broken down by killed, wounded, and captured/missing in action, for all German division- and brigade-level units involved in the ACSDB, except for one unit, the 150th Panzer Brigade. This unit, composed of specially

selected personnel, was organized for special and infiltration operations and partly equipped with captured US weapons. Since its cumulative battle casualty figure, not broken down into killed, wounded, and captured/missing in action, were provided in a postwar manuscript by its commander, Otto Skorzeny, it was determined to use these figure to estimate its daily battle casualties. (ENDNOTE #5) The process for this estimation involved compiling the cumulative battle casualties for the Fifth Panzer, Sixth Panzer, Seventh, and Fifteenth Armies for the periods 11-20 Dec, 21-31 Dec, 1-10 Jan, 19-20 Jan, and 21-31 Jan, broken down into killed, wounded, and captured/missing in action. Total figures for this period were 12782 killed, 44042 wounded, and 27197 captured/missing in action. Values of 0.15 for killed, 0.52 for wounded, and 0.33 for missing in action were multiplied by the total number of battle casualties of the 150th Panzer Brigade. This process resulted in total battle casualties by killed, wounded, and captured/missing in action. The process used in Step 1 was then applied to the resultant figures to give estimates of daily battle casualties of the brigade.

The following matrices show the adjudged levels of activity of each German division- or brigade-level unit in the ACSDB. They also indicate which Step in the above-described methodology was employed in calculating the unit's daily battle casualty figures.

A = Active
I = Inactive
R = Out of Contact
X = Division Outside ACSDB Area

1 = Step 1 (Multi-day)
2 = Step 2 (Seventh and Fifteenth Army)
3 = Step 3
4 = Daily Battle Casualty Data from Primary Source
5 = 150th PzBde

	1 SSPzD	2 SSPzD	9 SSPzD	10 SSPzD	12 SSPzD	27 SSPzD	28 SSPzD
6 Dec	A-3	R-1	R-3	R-3	I-1	X	X
17	A-3	R-1	R-3	R-3	A-1	X	X
18	A-3	R-1	R-3	R-3	A-1	X	X
19	A-3	R-1	R-3	R-3	A-1	X	X
20	A-3	R-1	I-3	R-3	A-1	X	X
21	A-3	I-1	A-3	R-3	A-1	X	X
22	A-3	I-1	I-3	R-3	A-1	X	X
23	A-3	A-1	A-3	R-3	I-1	X	X
24	A-3	A-1	A-3	R-3	I-1	X	X
25	A-3	A-1	A-3	R-3	I-1	X	X
26	I-3	A-1	A-3	R-3	I-1	X	X
27	I-3	A-1	A-3	R-3	A-1	X	X
28	R-3	A-1	A-3	R-3	A-1	X	X
29	R-3	A-1	A-3	R-3	I-1	R-3	R-3
30	A-3	A-1	A-3	R-3	I-1	R-3	R-3
31	A-3	A-1	I-3	R-3	I-1	R-3	R-3
1 Jan	A-1	A-1	I-3	R-3	I-1	R-3	R-3
2	A-1	A-1	R-3	R-3	A-1	R-3	R-3
3	A-1	A-1	A-3	R-3	I-1	R-3	R-3
4	A-1	A-1	A-3	R-3	A-1	R-3	R-3
5	A-1	A-1	I-3	R-3	A-1	R-3	R-3
6	A-1	A-1	R-3	R-3	A-1	R-3	R-3
7	A-1	A-1	R-3	R-3	A-1	R-3	R-3
8	A-1	A-1	R-3	R-3	I-1	R-3	R-3
9	I-1	A-1	R-3	R-3	I-1	R-3	R-3
10	I-1	A-1	A-3	R-3	I-1	R-3	R-3
11	I-1	A-1	A-3	R-3	I-1	R-3	R-3
12	I-1	A-1	A-3	R-3	I-1	R-3	R-3
13	A-1	A-1	A-3	R-3	I-1	R-3	R-3
14	A-1	A-1	A-3	R-3	I-1	R-3	R-3
15	I-1	A-1	A-3	R-3	I-1	R-3	R-3
16	I-1	A-1	A-3	R-3	I-1	R-3	R-3

	2 PzD	9 PzD	11 PzD	116 PzD	PzLehrD	3 PzGD	15 PzGD
16 Dec	A-1	R-1	R-1	A-1	I-1	R-1	R-1
17	A-1	R-1	R-1	A-1	A-1	R-1	R-1
18	A-1	R-1	R-1	I-1	I-1	I-1	R-1
19	A-1	R-1	R-1	A-1	A-1	I-1	R-1
20	A-1	R-1	R-1	A-1	A-1	A-1	R-1
21	I-1	R-1	R-1	A-1	I-1	A-1	R-1
22	I-1	R-1	R-1	A-1	I-1	A-1	R-1
23	I-1	R-1	R-1	A-1	A-1	I-1	R-1
24	A-1	I-1	R-1	A-1	A-1	I-1	R-1
25	A-1	I-1	R-1	A-1	A-1	I-1	A-1
26	A-1	A-1	R-1	A-1	I-1	I-1	A-1
27	I-1	A-1	R-1	A-1	I-1	I-1	A-1
28	I-1	A-1	R-1	I-1	A-1	I-1	I-1
29	I-1	A-1	R-1	I-1	A-1	A-1	I-1
30	I-1	A-1	R-1	I-1	A-1	A-1	I-1
31	I-1	A-1	R-1	I-1	A-1	A-1	I-1
1 Jan	I-1	A-1	R-1	I-1	A-1	A-1	I-1
2	I-1	I-1	R-1	I-1	A-1	A-1	A-1
3	I-1	I-1	R-1	I-1	I-1	I-1	I-1
4	A-1	A-1	R-1	I-1	I-1	A-1	A-1
5	I-1	I-1	R-1	I-1	I-1	I-1	I-1
6	I-1	I-1	R-1	I-1	I-1	I-1	I-1
7	I-1	I-1	R-1	A-1	I-1	A-1	I-1
8	I-1	I-1	R-1	I-1	I-1	I-1	I-1
9	I-1	I-1	R-1	I-1	I-1	I-1	A-1
10	I-1	I-1	R-1	I-1	A-1	I-1	I-1
11	A-1	I-1	R-1	I-1	A-1	I-1	I-1
12	A-1	I-1	R-1	I-1	I-1	I-1	I-1
13	A-1	I-1	R-1	A-1	A-1	I-1	I-1
14	I-1	A-1	R-1	A-1	A-1	I-1	I-1
15	I-1	A-1	R-1	A-1	A-1	A-1	I-1
16	I-1	A-1	R-1	I-1	A-1	A-1	A-1

	FGB	FBB	150	PzBde	3 FJD	5 FJD	9 VGD	12 VGD	18 VGD
6 Dec	R-3	R-1	R-5		A-3	A-2	X	A-3	A-3
17	R-3	R-1	R-5		A-3	A-2	X	A-3	A-3
18	R-3	R-1	R-5		A-3	I-2	X	A-3	A-3
19	R-3	A-1	R-5		A-3	I-2	X	A-3	A-3
20	R-3	A-1	R-5		A-3	I-2	X	A-3	A-3
21	I-2	I-1	A-5		A-2	R-1	X	A-3	A-3
22	I-2	A-1	I-5		A-2	I-1	X	A-3	A-3
23	A-2	I-1	I-5		I-2	A-1	X	I-3	A-3
24	A-2	I-1	I-5		I-2	A-1	R-2	I-3	I-3
25	A-2	I-1	I-5		I-2	A-1	R-2	I-3	R-3
26	A-2	A-1	I-5		I-2	A-1	R-2	I-3	R-3
27	A-2	I-1	I-5		I-2	A-1	R-2	I-3	I-3
28	A-2	A-1	R-5		I-2	I-1	R-2	I-3	I-3
29	A-2	A-1	R-5		I-2	I-1	I-2	I-3	I-3
30	A-2	A-1	R-5		I-2	I-1	A-2	R-3	I-3
31	I-2	I-1	R-5		I-2	I-1	I-2	I-3	I-3
1 Jan	I-2	A-1	R-5		I-2	I-1	A-2	I-3	I-3
2	I-2	A-1	R-5		I-2	I-1	A-2	I-3	I-3
3	I-2	I-1	X		I-2	I-1	I-2	A-3	I-3
4	I-2	I-1	X		I-2	I-1	I-2	A-3	I-3
5	I-2	A-1	X		I-2	I-1	I-2	A-3	I-3
6	I-2	I-1	X		I-2	A-1	A-2	A-3	A-3
7	A-2	A-1	X		I-2	I-1	I-2	A-3	A-3
8	I-2	I-1	X		I-2	A-1	A-2	A-3	I-3
9	I-2	I-1	X		I-2	I-1	I-2	A-3	I-3
10	I-2	A-1	X		I-2	A-1	I-2	A-3	A-3
11	A-1	I-1	X		A-1	A-3	A-2	A-3	A-1
12	I-1	I-1	X		A-1	I-3	I-2	A-3	I-1
13	I-1	I-1	X		A-1	I-3	I-2	A-3	A-1
14	I-1	A-1	X		A-1	I-3	A-2	A-3	A-1
15	I-1	I-1	X		A-1	I-3	I-2	I-3	A-1
16	I-1	A-1	X		A-1	I-3	I-2	I-3	I-1

	26 VGD	47 VGD	59 ID	62 VGD	79 VGD	85 VGD	89 VGD	167 VGD	212 VGD
16 Dec	A-1	I-4	X	A-3	X	I-2	I-2	R-3	A-2
17	A-1	A-4	X	A-3	X	I-2	I-2	R-3	A-2
18	A-1	I-4	X	A-3	X	I-2	I-2	R-3	A-2
19	A-1	I-4	X	A-3	X	I-2	I-2	R-3	A-2
20	A-1	I-4	X	A-3	R-1	I-2	I-2	R-3	I-2
21	A-3	I-4	X	A-3	R-1	I-2	I-2	R-3	I-2
22	A-3	I-4	X	A-3	R-1	I-2	I-2	R-3	I-2
23	A-3	I-4	X	I-3	A-1	I-2	I-2	R-3	A-2
24	I-3	I-4	X	I-3	A-1	A-2	I-2	R-3	A-2
25	A-3	I-4	X	I-3	I-1	I-2	I-2	R-3	I-2
26	A-3	I-4	I-2	I-3	I-1	I-2	I-2	R-3	I-2
27	A-3	I-4	I-2	A-3	A-1	I-2	R-2	R-3	I-2
28	A-3	I-4	I-2	A-3	A-4	I-2	I-2	R-3	I-2
29	I-3	I-4	I-2	A-3	A-4	I-2	I-2	I-3	I-2
30	A-3	I-2	I-2	I-3	I-1	I-2	I-2	A-3	I-2
31	A-3	I-2	I-2	I-3	I-1	I-2	I-2	A-3	I-2
1 Jan	A-1	I-2	A-2	I-3	I-1	I-2	I-2	A-3	I-2
2	A-1	I-2	I-2	I-3	I-1	I-2	I-2	A-3	I-2
3	A-1	R-2	I-2	A-3	A-1	I-2	I-2	I-3	I-2
4	A-1	R-2	I-2	A-3	I-1	I-2	I-2	I-3	I-2
5	A-1	X	I-2	A-3	I-1	I-2	I-2	I-3	I-2
6	A-1	X	I-2	A-3	I-1	I-2	I-2	I-3	I-2
7	A-1	X	I-2	A-3	A-1	I-2	I-2	I-3	I-2
8	A-1	X	I-2	A-3	I-1	I-2	I-2	I-3	I-2
9	A-1	X	I-2	A-3	I-1	I-2	I-2	I-3	I-2
10	A-1	X	I-2	I-3	I-1	I-2	I-2	I-3	I-2
11	A-1	X	I-2	I-1	I-1	I-2	I-1	A-3	I-2
12	A-1	X	I-2	I-1	I-1	I-2	I-1	I-3	I-2
13	A-1	X	I-2	I-1	I-1	I-2	I-1	A-3	I-2
14	A-1	X	I-2	I-1	I-2	I-2	I-1	A-3	I-2
15	A-1	X	I-2	I-1	I-2	I-2	I-1	A-3	I-2
16	A-1	X	I-2	I-1	I-2	I-2	I-1	I-3	I-2

	246 VGD	272 VGD	276 VGD	277 VGD	326 VGD	340 VGD	344 ID	352 VGD
6 Dec	I-4	I-2	A-2	A-3	A-2	I-2	R-2	A-2
17	I-4	A-2	A-2	A-3	A-2	I-2	R-2	A-2
18	I-2	I-2	A-2	A-3	A-2	I-2	R-2	A-2
19	I-2	I-2	A-2	A-3	I-2	I-2	R-2	A-2
20	I-2	R-2	A-2	A-3	I-2	I-2	R-2	A-2
21	I-2	R-2	I-2	I-2	I-2	A-3	R-2	A-2
22	I-2	R-2	I-2	I-2	I-2	I-3	R-4	A-2
23	I-2	R-2	I-2	I-2	I-2	I-3	R-4	A-2
24	I-2	I-2	A-2	I-2	I-2	I-3	R-4	A-2
25	R-2	I-2	I-2	I-2	I-2	I-3	R-4	A-2
26	R-2	I-2	I-2	I-2	I-2	R-3	R-4	A-2
27	I-2	I-2	I-2	I-2	I-2	R-3	R-2	A-2
28	I-2	I-2	I-2	I-2	I-2	R-3	R-2	I-2
29	I-2	I-2	I-2	I-2	I-2	R-3	X	I-2
30	I-2	I-2	I-2	I-2	I-2	R-3	X	I-2
31	I-2	I-2	I-2	I-2	I-2	R-3	X	I-2
1 Jan	I-2	I-2	I-2	I-2	I-3	R-1	X	I-2
2	I-2	I-2	I-2	I-2	I-3	I-1	X	I-2
3	I-2	I-2	I-2	I-2	I-3	A-1	X	I-2
4	I-2	I-2	I-2	I-2	I-3	A-1	X	I-2
5	I-2	I-2	I-2	I-2	I-3	A-1	X	I-2
6	I-2	I-2	A-2	I-2	I-3	I-1	X	I-2
7	I-2	I-2	I-2	I-2	I-3	I-1	X	I-2
8	I-2	I-2	I-2	I-2	I-3	I-1	X	I-2
9	I-2	I-2	A-2	I-2	I-3	I-1	X	I-2
10	I-2	I-2	I-2	I-2	I-3	A-1	X	I-2
11	I-1	A-2	A-2	I-1	I-1	I-3	X	I-2
12	I-1	I-2	I-2	I-1	I-1	I-3	X	I-2
13	I-1	A-2	I-2	I-1	I-1	A-3	X	I-2
14	I-1	I-2	I-2	I-1	A-1	I-3	X	I-2
15	I-1	I-2	I-2	I-1	A-1	A-3	X	I-2
16	I-1	I-2	I-2	I-1	I-1	A-3	X	I-2

	353 ID	363 VGD	560 ID
16 Dec	I-1	I-4	A-1
17	I-1	I-4	A-1
18	I-1	I-4	A-1
19	I-1	I-4	I-1
20	I-1	I-4	I-1
21	I-4	I-4	A-3
22	A-4	I-4	A-3
23	I-4	I-4	A-3
24	I-4	I-4	I-3
25	I-4	I-4	A-3
26	A-4	I-4	A-3
27	I-4	I-4	A-3
28	I-4	I-4	A-3
29	I-4	I-4	A-3
30	I-2	I-2	I-3
31	I-2	I-2	I-3
1 Jan	I-2	I-2	I-3
2	I-2	I-2	I-3
3	I-2	I-2	A-3
4	I-2	I-2	A-3
5	I-2	I-2	A-3
6	I-2	I-2	A-3
7	I-2	I-2	I-3
8	I-2	I-2	A-3
9	I-2	I-2	A-3
10	I-2	I-2	I-3
11	I-2	I-2	A-3
12	I-2	I-2	A-3
13	I-2	I-2	A-3
14	I-2	I-2	R-3
15	I-2	I-2	R-3
16	I-2	I-2	R-3

ENDNOTES

1. This data comes from a series of LXXXI Korps reports on US National Archive Microfilm Roll Series T-314, Roll 1594, Frames 1134-1331 and Roll 1597, Frames 3-10, 666-671, and 699-732 for all divisions mentioned, except the 79th VGD. Data for this division comes from Series T-315, Roll 1113, Frames 1029-1054.
2. Data for these units was provided in the following sources:
 - German Archives Record RW6v/577, pp. 2-26. Armeearzt beim Oberkommando der 5. Panzer Armee -- 10 Taeg. Verlustmeldung (Surgeon General, High Command of the Fifth Panzer Army -- 10-day Loss Reports).
 - German Archives Record RH10/312, p. 42. 1st SS Panzer Division Zustandsbericht for 2 Feb 1945.
 - German Archives Record RH10/313, pp. 44 and 47. 2d SS Panzer Division Zustandsbericht for 1 Jan and 1 Feb 1945.
 - German Archives Record RH10/321, pp. 41 and 52. 12th SS Panzer Division Zustandsbericht for 31 Dec 1944 and 1 Feb 1945.
 - German Archives Record RH10/172, pp. 51 and 61. Panzer Lehr Division Zustandsbericht for 1 Jan and 1 Feb 1945.
 - German Archives Record RH10/141, p. 61. 2d Panzer Divisions Zustandsbericht for 1 Feb 1945.
 - German Archives Record RH10/148, pp. 87 and 94. 9th Panzer Division Zustandsbericht for 1 Jan and 1 Feb 1945.
 - German Archives Record RH10/163, pp. 32 and 38. 116th Panzer Division Zustandsbericht for 1 Jan and 1 Feb 1945.
 - German Archives Record RH10/178, pp. 69a and 76. 3d Panzer Grenadier Division Zustandsbericht for 1 Jan and 1 Feb 1945.
 - German Archives Record RH10/181, pp. 51 and 61. 15th Panzer Grenadier Zustandsbericht for 1 Jan and 1 Feb 1945.
3. See the 10-day loss reports for the 2d Panzer Division (1-10 Dec), 15th Panzer Grenadier Division (11-20 Dec), and 116th Panzer Division (1-10 Dec), in RW6v/577. Also see the LXXXI Korps records from the US National Archives for the 344th VGD, mentioned in Endnote 1.

4. US National Archives Microfilm Series T78, Roll 414, Frames 6383182-6383371. Cumulative Personnel Battle Casualties (Personnelle bluetige Verluste) compiled for each German army every 10 days from 22 Jun 1941 through the Ardennes Campaign. Compiled by the Heeresarzt, Oberkommando des Heeres.

German Archives Record Number RW6v/559, Inclusive 10-day Personnel Battle Casualties (Personnelle blutige Verluste) compiled for each German army for the periods 1-10 Dec 1944, 11-20 Dec 1944, 21-31 Dec 1944, 1-10 Jan 1945, 11-20 Jan 1945, and 21-31 Jan 1945. Compiled by the Heeresarzt. Oberkommando des Heeres.

5. ETHINT 12, An Interview with ObstLt Otto Skorzeny, p. 10. This sources is one of the Foreign Military Studies available at the US National Archives.

Attachment 1

Extract from July 1953 Version of FM 101-10
Used in Estimating Battle Casualties on Active/Inactive Days

21

c. Short-Period Estimates (periods not in excess of 5 days).

(1) Daily personnel losses as percent of strength. (Do not use this table for loss-estimate periods over 5 days):

1	2	3	4	5	6	7	8	9	10
General type of operations for the force as a whole	Front line divisions			Divisions in corps and army reserves			Nondivisional units corps, and army ¹		
	Casualty per-centage	Nonbattle per-centage	Total percent-age	Casualty per-centage	Nonbattle per-centage	Total percent-age	Casualty per-centage	Nonbattle per-centage	Total percent-age
2 Covering, and security force action.....	0.9	0.3	1.2	0.3	0.3	0.6	0.3	0.1	0.4
3 ATTACK:									
4 Meeting engagement.....	2.4	0.3	2.7	0.3	0.3	0.6	0.4	0.1	0.5
5 Of a position—1st day.....	2.8	0.3	3.1	0.4	0.3	0.7	0.5	0.1	0.6
6 Succeeding days.....	1.9	0.3	2.2	0.3	0.3	0.6	0.4	0.1	0.5
7 Of a fortified zone—1st day.....	0.3	0.3	0.6	0.5	0.3	0.8	0.7	0.1	0.8
8 Succeeding days.....	3.2	0.3	3.5	0.4	0.3	0.7	0.5	0.1	0.6
9 DEFENSE:									
10 Meeting engagement.....	1.8	0.3	2.1	0.3	0.3	0.6	0.3	0.1	0.4
11 Of a position—1st day.....	1.9	0.3	2.2	0.3	0.3	0.6	0.4	0.1	0.5
12 Succeeding days.....	1.9	0.3	2.2	0.3	0.3	0.6	0.3	0.1	0.4
13 Of a zone—1st day.....	2.2	0.3	2.5	0.4	0.3	0.7	0.5	0.1	0.6
14 Succeeding days.....	1.9	0.3	2.2	0.3	0.3	0.6	0.4	0.1	0.5
15 Inactive situation ²	0.7	0.3	1.0	0.3	0.3	0.6	0.3	0.1	0.4
16 Pursuit.....	1.2	0.3	1.5	0.3	0.3	0.6	0.3	0.1	0.4
17 Retirement and delaying action.....	0.7	0.3	1.0	0.3	0.3	0.6	0.3	0.1	0.4

¹ Use divisional loss rates for units attached to a division.

² Forces in contact—neither side attacking.

Attachment 2

US 12th Army Group Strength and Casualty Data

12th Army Group Personnel Data

(Source: 12th AG G-1 Daily Summary
US National Archives Record Group 407, Boxes 1753-54)

	15 December 1944		16 January 1945		Notes
	TO&E Strength	Cumulative Battle Casualties	TO&E Strength	Cumulative Battle Casualties	
12AG HQ	11826	17	13359	159	Excluded
12AG AT	1897	61	3246	88	Excluded
1st HQ	47091	459	47573	669	18 Jan data
1st CT	31477	1116	21508	1206	18 Jan data
V HQ	3058	89	3178	138	
V CT	25202	3150	25040	3726	
2 ID	14184	10443	14184	12066	
8 ID	14184	8903	14184	9622	
78 ID	14184	515	14184	2047	
99 ID	14184	390	14184	2840	
VII HQ	7886	614	7677	668	
VII CT	26745	3445	21550	2974	
1 ID	14184	9494	14184	10679	
AD	14515	6399	14515	7739	
AD	10729	2424	10720	2901	
9 ID	14184	14000	14184	14496	
83 ID	14184	11165	14184	13587	
104 ID	14184	4258	14184	4616	
VIII HQ	2626	14	4328	60	
VIII CT	17989	1161	17551	1884	
4 ID	14184	18039	14184	18629	
9 AD	10729	97	10720	2228	
28 ID	14184	9578	14184	14807	15 Jan data
106 ID	14184	29	14184	9198	
3d HQ	50565	508	54772	619	
3d CT	15102	76	17750	374	
III HQ	1900	3	2381	4	
III CT	1441	27	23435	1782	
26 ID	14184	5143	14184	7880	
XII HQ	4510	64	5019	97	
XII CT	30488	2283	29127	2947	
4 AD	10729	3445	10720	4126	
6 AD	10729	2537	10720	3784	
35 ID	14184	11098	14184	13873	
80 ID	14184	8300	14184	10393	
87 ID	14169	749	14184	2516	
XX HQ	6954	235	5922	200	
XX CT	28803	2160	22448	1801	
	14184	7524	14184	8792	

10 AD	10729	1225	10720	2041	
ID	14184	13600	14184	15065	
HQ	33453	44	35005	118	
9 CT	15112	80	12267	391	
XIII HQ	4438	144	4307	153	
XIII CT	21979	1164	25405	992	
7 AD	10729	3434	10720	4432	
84 ID	14184	2933	14184	4717	
102 ID	14184	2265	14184	2522	
XVI HQ	3001	0	1460	0	
XVI CT	6733	1	241	0	
XIX HQ	4016	49	3925	60	
XIX CT	23088	2419	27137	2307	
2 AD	14515	4521	14515	5625	
29 ID	14184	18961	14184	19195	
30 ID	14184	13426	14184	15209	
XVIII HQ	--	--	1543	9	New Unit
XVIII CT	--	--	32322	4100	New Unit
75 ID	--	--	14184	1386	New Unit
82 AbnD	--	--	9901	1765	New Unit
11 AD	--	--	10720	1332	New Unit
17 AbnD	--	--	12362	2892	New Unit
101 AbnD	--	--	14441	3545	New Unit

AT = attached troops (used in reference to 12th Army Group)
 HQ = headquarters and service troops (1st, 3d, and 9th Armies, and all corps)
 CT = combat troops (1st, 3d, and 9th Armies, and all corps)
 ID = infantry division
 AD = armored division
 AbnD = airborne division

Cumulative Battle Casualties = Casualties since 6 June 1944

	Strengths	Cumulative Battle Casualties
12/15/44		
Total HQ and Service Troops	169,498	2,223
Combat Troops (Corps & Army)	244,159	17,082
Divisional Troops*	<u>391,199</u>	<u>194,895</u>
	804,856	214,200

01/16/45

Total HQ and Service Troops	175,547	2,786
Combat Troops (Corps & Army)	243,459	20,384
Divisional Troops*	<u>391,214</u>	<u>245,625</u>
	810,220	268,795

Battle Casualties from 12/16/44-01/16/45:

Total HQ & Service Troops (less XVIII Corps)	563
Combat Troops	3,302
Divisional Troops	<u>50,730</u>
	54,595

Battle Casualties New Units only:

Total HQ and Service Troops	9
Combat Troops	4,106
Divisional Troops	<u>10,920</u>
	15,029

Total Casualties:	Total
HQ and Service Troops:	572
Combat Troops:	7,402
Divisional Troops:	<u>61,650</u>
	69,624

* Divisional for 15 December = 20 ID x 14,184; 6 AD x 10,720; 2 AD x 14,515 + 14,169

Divisional for 16 January = 21 ID x 14,184; 6 AD x 10,720; 2 AD x 14,515

Summary:

15 Dec 51.4% of authorized strength were non-divisional troops;
9.0% of cumulative casualties to date (since D-Day) were
non-divisional troops (excluding new units)

16 Jan 51.7% of authorized strength were non-divisional troops;
8.6% of cumulative casualties to date were non-divisional
troops (excluding new units)

7.1% of casualties from 12/18/44 - 01/16/45 were non-divisional troops
(not counting new units)

11.5% of casualties from 12/18/44 - 01/16/45 were non-divisional troops
(counting new units)

German Disease and Non-Battle Injury (DNBI) Rate Estimation Methodology

The second phase in developing the Unit Data records for the German segment of the Ardennes Campaign Simulation Data Base (ACSDB) was to determine a daily disease and non-battle injury rate for all German division- and brigade-level units.

Determination of this rate was based upon all known available Kranke (sick) data from primary sources for German units in the Ardennes operation.

These included:

- 1) 54 division-days of sick data for units of the LXXXI Korps (German Fifteenth Army)
- 2) 56 "10-day" reports for units subordinated to the German Fifth Panzer Army and the LXXXI Korps during the period 1 December 1944-31 January 1945
- 3) 18 monthly Zustandsbericht (situation reports) for December 1944 and January 1945 providing data on monthly losses in armored and armored infantry (panzer and panzer grenadier) divisions

The data described above is listed in Attachments 1-3 of this paper.

Several important assumptions concerning this data are discussed in this paper.

Data in the daily reports (1) included only Kranke (Sick). The German reports contained no information on non-battle injuries. These Sick are assumed to include all personnel reporting sick on that day, and do not exclusively denote personnel lost to the unit (i.e., evacuated to the Zone of the Interior) but include those personnel who reported sick and were treated and expeditiously processed back to their unit.

Data in the "10-day" reports mentioned in (2) -- some of which are actually for 11-day periods as they were compiled three times a month, 1-10 Dec or Jan, 11-20 Dec or Jan, and 21-31 Dec or Jan -- likewise represents all personnel who reported sick during the period. The data includes personnel in categories D1 and G of the 10-day reports: Krankenzugang bei der Truppe (sick admitted by the troops) (Cat D1) and Kalteschaeden (frostbite) (Cat G). An example of a 10-day report and a key is contained in Attachment 4 to this paper. Note that there is overlap in the daily data and 10-day reports for the 47th, 246th, and 363d VGDs

and the 353d ID (see Attachments 1 and 2). This overlap did not affect the derivation of the estimated DNBI rate but was taken into account when actual DNBI figures were compiled for the above-mentioned divisions, to avoid double counting.

Data in the monthly Zustandsbericht (3) contains Kranke (Sick) and Sonstige (Other) losses to the unit during the reporting period, either 1-31 December or 1-31 January. The Other figures presumably include transfers, personnel on leave, and other losses to the unit. Comparison of the Zustandsbericht Sick and Other losses with the 10-day Cat D1 and Cat G data shows a consistent lack of correlation between the two sources of data. Attachment 5 to this paper shows that cumulative 10-day report figures (sometimes only for one-third or two-thirds of the month) in some cases exceed the monthly Zustandsbericht Sick and even the combined Zustandsbericht Sick and Other figure. In other cases, the monthly Zustandsbericht Sick (or Sick and Other) exceeds the cumulative 10-day report figures. There are several possible explanations for these inconsistencies. The 10-day report sick data may have been incomplete or an approximate estimate, which was corrected in time for inclusion in the monthly Zustandsbericht. Or, the 10-day reports may include all reported sick, including personnel who were quickly treated and sent back to their battalions, as is assumed to be the case in the daily data. The validity of this explanation is reinforced by the language used for Sick and Other in the monthly Zustandsbericht. Sick and Other, along with TOT (Dead), Verw. (Wounded), and Verm. (Missing) are grouped under the subheading Verluste und Sonstige Abgaenge in der Berichtszeit (Casualties and other Departures in the Reporting Period). What the monthly Zustandsbericht is apparently recording for Sick and Other are personnel lost to the unit's effective combat strength and remaining absent at the time of the report. Thus, any minor illness cases that may be reported in the daily or 10-day reports but not absent from the unit's combat strength at the end of the month when the Zustandsbericht was compiled would not be included.

It must be remembered that inconsistency in all aspects of the German reporting systems is frequently the norm for reports dating from the 1944-1945 time period. The Germans, short of manpower, in some cases likely regarded their minor illness cases as not serious enough to report, especially if a soldier was quickly returned to his unit. Numerous post-war manuscripts written by German officers and researched for the ACSDB speak of the depleted combat effectiveness of German forces due to insufficient rehabilitation. Presumably, this would imply that to rectify manpower shortages, minor illness cases were retained at the front.

With these considerations, the estimation of the German DNBI rate for the ACSDB proceeded with the focus on the daily and 10-

day casualty statistics. Note that the derived rate was intended to represent all sick reporting for treatment, not just sickness cases lost to an organization's strength for extended periods of time.

An average sick figure was derived from the daily reports. For 54 total division-days in December on which sick data was recorded, the 47th, 246th, 344th, 353d, and 363d VGDs reported a total of 1080 Sick, giving an average of 20 per day (1080/54). This data is shown in Attachment 1.

An average daily Sick and Frostbite figure (Cats D1 and G) was derived from the 10-day reports. For 573 total "division-days," in December and January recorded in 10-day and 11-day increments (including 41 days for brigade-level units) the units in Attachment 2 reported 11,518 Sick and Frostbite cases, giving an average of 20 per day (11,518/573).

Finally, average daily Sick and Other figures were derived from the monthly Zustandsbericht (see Attachment 3). This was done for comparative purposes only. Total Sick for the divisions shown in Table D was 7,313, giving an average "daily" Sick figure of 13 (7,313/558, where 558 is the number of division-days). Total Other for these divisions was 5,837 giving an average "daily" Other figure of 10 (5,837/558). Combined Sick and Other losses were 24 (7,313+5,837/558).

In order to derive a rate to apply for German divisions in the ACSDB, an average daily present for duty strength was calculated. An estimated figure of 10,000 was first considered, based upon a rough survey of known divisional strengths and approximate estimates given by German officers in their post-war manuscripts. To test the validity of this figure, an average strength figure was calculated based on the most reliable daily present for duty strengths of German divisions during the time period late November 1944 to early February 1945. This data was obtained from primary source records. The divisions, their strengths, and the sources of the data are provided below.

Unit	Strength	Date	Source
PzLehrD	12788	1 Dec	RH10/172, p. 47
	11072	1 Jan	RH10/172, p. 51
	10093	1 Feb	RH10/172, p. 55
2d PzD	12173	6 Dec	RH10/141, p. 41
	10971	31 Jan	RH10/141, p. 61
	10260	3 Feb	RH19IV/241
9th PzD	11289	1 Dec	RH10/148, p. 77
	12050	1 Jan	RH10/148, p. 87
	10507	1 Feb	RH10/148, p. 92
	9737	3 Feb	RH19IV/241

11th PzD	11164	1 Dec	RH10/149, p. 60
	10123	1 Jan	RH10/149, p. 80
	10111	1 Feb	RH10/149, p. 73
116th PzD	14168	1 Dec	RH10/163, p. 30
	13252	1 Jan	RH10/163, p. 32
	13151	1 Feb	RH10/163, p. 37
1st SSPzD	17988	1 Dec	RH10/312, p. 37
2d SSPzD	15286	1 Jan	RH10/313, pp. 44-45
	13246	1 Feb	RH10/313, p. 47
12th SSPzD	16967	31 Dec	RH10/321, p. 41
	15836	1 Feb	RH10/321, p. 52
28th SSPzGD	1916	1 Dec	SRS-1869 * (USNA)
	2314	20 Jan	RH19IV/241 *
3d PzGD	10492	1 Dec	RH10/178, p. 60
	11465	1 Jan	RH10/178, p. 69a
	10334	1 Feb	RH10/178, p. 76
15th PzGD	11210	1 Dec	RH10/181, p. 42
	9974	1 Jan	RH10/181, p. 51
	8139	20 Jan	RH19IV/241
	9230	1 Feb	RH10/181, p. 61
	7500	3 Feb	RH19IV/241
FGB	5200	7 Jan	T314, 1335, 1029 (USNA)
FBB	6050	20 Jan	RH19IV/242
3d FJD	12257	5 Dec	T319, 1597, 671 (USNA)
	11465	9 Dec	T319, 1597, 670 (USNA)
	6552	30 Dec	RH19IV/242
	6493	6 Jan	RH19IV/241
5th FJD	6152	7 Jan	T314, 1335, 1028 (USNA)
9th FJD	7987	7 Jan	T314, 1335, 1028 (USNA)
12th VGD	8130	3 Feb	RH19IV/241
18th VGD	4030	3 Feb	RH19IV/241
47th VGD	6993	14 Dec	T314, 1597, 669 (USNA)
	6139	19 Dec	T314, 1597, 668 (USNA)
	6183	24 Dec	T314, 1597, 667 (USNA)
	6629	29 Dec	T314, 1597, 666 (USNA)
	6670	30 Dec	T314, 1597, 4 (USNA)
167th VGD	6000	20 Jan	RH19IV/241
59th ID	5109	30 Dec	RH19IV/241
	6362	6 Jan	RH19IV/241
	5946	20 Jan	RH19IV/241
	6235	3 Feb	RH19IV/241
62d VGD	5215	20 Jan	RH19IV/241
79th VGD	9211	30 Jan	T315, 1114, 280 (USNA)
	6302	3 Feb	RH19IV/241
85th ID	5602	30 Dec	RH19IV/241
	5690	6 Jan	RH19IV/241
	5649	20 Jan	RH19IV/241
	5720	3 Feb	RH19IV/241
89th ID	6220	30 Dec	RH19IV/241
	5991	6 Jan	RH19IV/241
212th VGD	10971	3 Feb	RH19IV/241

246th VGD	9521	1 Dec	T314,1597,152 (USNA)
	8537	6 Dec	T314,1597,671 (USNA)
	8234	9 Dec	T314,1597,670 (USNA)
	7621	14 Dec	T314,1597,669 (USNA)
	9311	30 Dec	RH19IV/241
	8916	6 Jan	RH19IV/241
	5289	3 Feb	RH19IV/241
272d VGD	8409	30 Dec	RH19IV/241
	7965	6 Jan	RH19IV/241
	7933	20 Jan	RH19IV/241
276th VGD	7695	1 Jan	T314,1335,1028 (USNA)
277th VGD	6171	30 Dec	RH19IV/241
	7448	6 Jan	RH19IV/241
326th VGD	8346	30 Dec	RH19IV/241
	3900	3 Feb	RH19IV/241
340th VGD	5125	20 Jan	RH19IV/241
	5633	3 Feb	RH19IV/241
344th VGD	4017	24 Dec	T314,1597,667 (USNA)
352d VGD	6555	3 Feb	RH19IV/241
353d ID	4128	24 Dec	T314,1597,667 (USNA)
	4337	29 Dec	T314,1597,666 (USNA)
	4938	30 Dec	T314,1597,4 (USNA)
	5146	6 Jan	RH19IV/241
	5227	20 Jan	RH19IV/241
	5516	3 Feb	RH19IV/241
363d VGD	8815	1 Dec	T314,1597,148 (USNA)
	8395	5 Dec	T314,1597,671 (USNA)
	8234	9 Dec	T314,1597,670 (USNA)
	8289	14 Dec	T314,1597,669 (USNA)
	8338	19 Dec	T314,1597,668 (USNA)
	8386	24 Dec	T314,1597,667 (USNA)
	8873	29 Dec	T314,1597,666 (USNA)
	9017	30 Dec	T314,1597,2 (USNA)
	8593	6 Jan	RH19IV/241
	8911	20 Jan	RH19IV/241
	8780	3 Feb	RH19IV/241

(Sources beginning with "RH" are from the German Archives in Freiburg, West Germany. SRS-1869 and sources beginning with "T" are from the US National Archives--USNA--in Washington, D.C. The US National Archives records are on microfilm, with the roll and frame identified by the latter two numbers of the code, i.e., T314,1597,2 -- roll 1597, frame 2.)

The sum of the daily present for duty strengths in the above list is 808,508. Subtracting the strengths of the 28th SSPzGD (marked by an asterisk) from the total, because they are considered anomalous as they are for a battlegroup-size division, gives a total of 804,278 (808,508-1,916-2,314). Dividing this figure by the total number of reported strengths (95) gives a "typical" daily present for duty strength of 8,466 (804,278/95 where 95 equals the total number of data points) for a German

division in the December 1944-January 1945 time period. This figure is less than the 10,000 estimate of the "rough survey" and may be considered to be a reliable "typical" daily strength figure for German divisions in the Ardennes period for purposes of calculating a daily German DNBI rate for ACSDB.

A DNBI rate was then calculated using the average daily Sick and Sick and Frostbite figures derived from daily and 10-day reports (Attachments 1 and 2), as described above, and the "typical" daily divisional strength. The rate was based on an average of 20 Sick (Sick and Frostbite) cases reported per day in a division of 8,466 men, or 0.236 or 0.24%/day. This figure is not inconsistent with the nonbattle loss percentage rate of 0.3%/day provided on pg. 7-47 of the 1983 version of RB 101-999, Staff Officer's Handbook.

Application of the estimated DNBI rate for German forces in the Ardennes was done in the following manner. All known daily and 10-day data as presented in Attachments 1 and 2, was used for the units and the time periods shown in the tables. The 10-day figures were divided by the total number of days of the reporting period (either 10 or 11 days) to give an estimated daily figure for the division or brigade for the period.

For the remainder of the units, the rate of 0.24%/day was applied to the daily unit strength at the start of each day. The calculated value was then subtracted from the daily unit strength at the start of each day as part of the German personnel calculation process.

Note on German DNBI Estimation Rate.

It is important to reiterate the above-described peculiarities of the German primary sources containing DNBI data, to alert users of the ACSDB to the fact that the data base's German DNBI rate is based upon data which may not contain nonbattle injuries. The nature of the German reports is not clear, but would seem to indicate that sick (and frostbite) cases are the only types of casualties tracked in the daily and 10-day reports, the primary sources used in the estimation methodology. It should also be noted that these figures themselves may actually be low, as personal memoirs and histories indicate that, at this stage of the war, many German soldiers did not report sick or received only minimal treatment for illness due to combat personnel requirements and medical facility shortages. Therefore, the records may not even track cases of minor illness. Nevertheless, based upon available data and by comparing the estimated rate of 0.24%/day with that in RB 101-999, the derived rate is considered a reliable estimate.

Attachment 1

Select Daily Sick (Kranke) Data

DECEMBER

	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
47th VGD					12	35	31	27	34	22	24	17	23	13	8	8	14	16	7	16	17	
246th VGD					17	18	14	21														
344th VGD													14	16	--	9	--	30	21			
353d VGD													13	8	9	10	4	12	12	21	8	
363d VGD					40	27	64	--	38	28	31	45	24	17	18	13	35	38	30	32	19	

Attachment 2

10-day Report Sick and Frostbite Data

	DEC						JAN					
	1-10		11-20		21-31		1-10		11-20		21-31	
	Sick	RTD	Sick	RTD	Sick	RTD	Sick	RTD	Sick	RTD	Sick	RTD
PzLehrD	186	157	333	247	152	59	220	109				
2d PzD	303	160	83	144	91	122	133	92				
9th PzD			556	390	193	117	145	84				
116th PzD	378	378	324	130			285	203	668	206		
3d PzGD					297	374	116	63			101	48
15th PzGD			348	199	267	178	163	74	363	132		
F88					125	69	135	79	149	67		
FGB									83	80		
3d FJD									257	155		
5th FJD					79	136	113	58				
12th VGD											162	192
18th VGD	252	127							174	71		
26th VGD	212	242	78	137			122	168	164	96	485	383
47th VGD	191*	122*	131*	160*								
62d VGD	198	60					6	108	180	179		
89th ID									242	266		
246th VGD	360*	229*							178	147		
277th VGD									232	239	87	35
326th VGD									125	51	97	77
340th VGD							435	123				
353d VGD			179*	261*								
363d VGD	177*	85*	175*	108*								
560th VGD			58	18					71	19	101	53

* Data from LXXXI K Report (US National Archives microfilm record T315,1594,1134-1331). All other data from 5th Panzer Army Verlust Meldung (German Archives source RM6v/577, pp. 2-26). *Sick* includes Category D1 (sick admitted by the troops) and Category G (frostbite). RTD indicates Category D4 (wounded and sick again service-ready returned to the troops, i.e., returned to duty).

Attachment 3

Zustandsbericht Sick and Other Data

UNIT	STRENGTH	1-31 DEC		STRENGTH	1-31 JAN		STRENGTH
	30 NOV (1 DEC)	SICK	OTHER	31 DEC (1 JAN)	SICK	OTHER	31 JAN (1 FEB)
PzLehrD	12,788 (12/1)	75	52	11,072 (1/1)	383	78	10,093 (2/1)
2d PzD					126	110	10,971 (2/1)
9th PzD	11,289 (12/1)	245	582	12,050 (1/1)	486	442	10,507 (2/1)
11th PzD	11,164 (12/1)	243	236	10,123 (1/1)	376	574	10,111 (2/1)
116th PzD	14,168 (12/1)	317	80	13,252 (1/1)	650	212	13,151 (2/1)
1st SSPzD	17,988 (12/1)				632	127	19,055 (2/1?)
2d SSPzD		475	--	15,286 (1/1)	470	170	13,246 (2/1)
12th SSPzD		212	171	16,967 (12/31)	296	1,261	15,836 (2/1)
3d PzGD	10,492 (12/1)	779	527	11,465 (1/1)	498	874	10,334 (2/1)
15th PzGD	11,210 (12/1)	566	224	9,974 (1/1)	884	117	9,230 (2/1)

Sources Used for Data on Attachments
1-3 of German DNBI Rate
Estimation Methodology

LXXXI Korps Abt IVb - T315,1594,1134-1131
5th Panzer Army Verlust Meldung - RH6W/577, pp. 2-26
PzLehr - RH10/172, pp. 51 & 55
2d PzD - RH10/141, p. 61
9th PzD - RH10/148, pp. 77, 87, & 92
11th PzD - RH10/149, pp. 60, 80, & 74
116th PzD - RH10/163, pp. 30, 32, & 37
1st SSPzD - RH10/312, pp. 37 & 42
2d SSPzD - RH10/313, pp. 94 & 47
12th SSPzD - RH10/321, pp. 41 & 52
3d PzGD - RH10/178, pp. 60, 69a, & 76
15th PzGD - RH10/181, pp. 42, 51, & 61

RH prefix indicates German archive source; T prefix indicates US
National Archives microfilm record.

Attachment 4

Example of 10-day Loss Report

20

ARZNEIARZT
beim
Oberkommando der 5. Panzer-Armee
Ref. Hyg.

- 6 FEB 1945

Betr.: 10 tägige personelle Verlustmeldung v. 1.-10.1.1945
Meldung unvollständig. Nr. 65/45 geh.

An
Stabschef für Wehrmachtverlustwesen.

	A	B	C	D1	D2	D3	D4	G
XXXVII. Pz. Kps.	108(8)	228(5)	88(2)	112(1)	84(1)	127	79(2)	10/10/1
✓ Pz. Gren. Div.	12	37	26	13	24	39	33	--
✓ Pz. A. Nachr. B. S.	2	12	-	32	19	-	19(5)	--
Gruppe Decker	3	7(2)	-	40	23	-	20(2)	--
Nachsch. Stb. 287	1	-	-	-	-	-	-	--
✓ 26. V. Gren. Div.	114(8)	297(7)	730(16)	97	45	32	168(39)	4/20/1
✓ Korpstruppen	-	3	-	24	50	33	22	7/4/0
V. Art. Korps	6(1)	15(1)	-	33	1	3	29	--
Nachsch. Btl. 612	-	3	-	15	13	2	10	--
Kf. Abt. 513	-	-	-	18	15	-	4	--
H. Pi. Btl. 660	1	2	48	12	2	-	7(1)	--
Brücke St. 940	-	1	-	18(1)	7(1)	4	13	--
Feldg. Abt. 693	2	-	-	12	7	-	9	--
Schl. Kp. 756(mot)	-	-	-	1	-	-	2	--
Fp. Nr. 64638A	2	9	-	13	10	1	11(1)	--
" 15226	-	1	-	1	3	-	3	--
" 01395	-	-	-	3	-	-	1	--
" 29992	-	-	-	3	2	-	-	--
" 45561	-	-	-	1	-	-	1	--
KTA 562	-	-	-	4	1	4	3	--
KTA 571	-	-	-	2(2)	2(1)	5	-	--
Kr. S. St. Weidenbach	-	-	-	-	58	183	17	5/12/3
" Schöneck	-	-	-	-	24	1654(10)	6	--
" Neuenburg	-	-	-	-	146(3)	2371(36)	5	-/97/-
Feldlaz. 2/562	-	-	-	5	80	121	32	--
" 161	-	1	-	6	1	1	2	--
" 257	-	1	-	2	18	355	16(13)	-/22/1
Kr. Kw. Zug 726	-	-	1	2	-	-	-	--
245(15) 615(15) 890(15) 489(3) 615(6) 4931(46) 512(63)								
								26/165/8/

Erklärungen.

- A = Gefallene
 - B = Verwundete
 - C = Vermisste
 - D1 = Krankensgang bei der Truppe
 - D2 = Krankenbestand (ohne Feindeinwirkung)
 - D3 = Verwundenbestand (durch Feindeinwirkung)
 - D4 = Verwundete und Kranke (der Truppe wieder dienstfähig zugeführt)
 - E = Kampfstoffverletzte
 - F = Fleckfieberausbrüchekrankungen
 - G = Kälteschäden
- (2) = Offiziere, in der ersten Zahl enthalten.

Translation of Terms Used
in 10-tägige Personelle Verlustmeldung
(10-day Personnel Loss Report)

Erläuterung (Explanation)

- A = Killed
- B = Wounded
- C = Missing
- D1 = Sick admitted by the troops
- D2 = Sick on-hand (not by enemy causes)
- D3 = Wounded on-hand (not by enemy causes)
- D4 = Wounded and sick again service-ready returned to the troops
- E = Chemical warfare injuries
- F = Typhus sickness
- G = Frostbite
- () = Officers, included in the first number

Source: RW6v/568, p. 9 (German Archives source)

Attachment 5

Zustandsbericht (ZB) and 10-day Report Sick Comparison

PzLehrD	ZB Dec	127 (75 sick)	ZB Jan	461 (383 sick)
	1-31 Dec	671	1-10 Jan	220
2d PzD			ZB Jan	336 (126 sick)
			1-10 Jan	133
9th PzD	ZB Dec	827 (245 sick)	ZB Jan	928 (486 sick)
	11-31 Dec	749	1-10 Jan	145
11Gth PzD	ZB Dec	397 (317 sick)	ZB Jan	862 (650 sick)
	1-20 Dec	702	1-20 Jan	953
3d PzGD	ZB Dec	906 (379 sick)	ZB Jan	1372 (498 sick)
	21-31 Dec	297	1-10, 21-31 Jan	217
15th PzGD	ZB Dec	790 (566 sick)	ZB Jan	1001 (884 sick)
	11-31 Dec	615	1-20	526

Note: ZB (Zustandsbericht) sick figures included in ZB totals, i.e., PzLehrD in December had 127 "Other and Sick" total of which 75 were sick.

German Return to Duty (RTD) Estimation Methodology

The third phase in developing Unit Data records for the German segment of the Ardennes Campaign Simulation Data Base (ACSDB) was to calculate return to duty (RTD) data for all German division- and brigade-level units.

Determination of this data was based upon all known "Genesene" (Convalescent) and "Verwundete und Kranke (der Truppe wieder dienstfaehig zugefuehrt)" (wounded and sick again service-ready and returned to the troops) data as found in primary sources. This data is located in the monthly Zustandsbericht (for the Genesene) and 10-day reports of the LXXXI Korps and Fifth Panzer Army under Category D4 (for the "dienstfaehig"). Copies of one Zustandsbericht and a 10-day report are contained in Attachment 1 to this paper. As in the case of the German DNBI data available in primary sources, the Genesene and "dienstfaehig" data contains anomalies and inconsistencies. These are addressed in this paper.

1) Genesene and "dienstfaehig" figures in some cases do not correlate when both figures are available in the records. In Attachment 2 note that the PzLehrD's December monthly Genesene figure (34) is substantially less than the cumulative "dienstfaehig" data (157+247+59=463). This difference, evident in the PzLehrD's January figures (for which only one 10-day period report is available) and the 15th PzGD's December and January data, was interpreted to mean that perhaps the Genesene figures and "dienstfaehig" data were recording different kinds of information. A telephone conversation with Mr. Meyer, a German archivist at the German Archives in Freiburg, West Germany, who assisted ACSDB researchers at that facility, in fact confirmed this interpretation. Mr. Meyer reported that, to the best of his knowledge, the Genesene data (these are always found in the Zustandsbericht (ZB) monthly reports) recorded those cases, usually seriously wounded or sick, who had been treated in a field hospital or the Zone of the Interior for less than eight weeks and then returned after recovery to the unit. At this stage of the war, a German casualty lost to the effective present for duty strength of a unit for less than eight weeks remained on the unit's rolls. After eight weeks he was made part of the Replacement Army and stricken from the unit's rolls. The "dienstfaehig" figures, according to Mr. Meyer, tracked personnel treated for wounds or sickness at facilities within the division (presumably including lightly wounded in action) and also returned to duty within eight weeks of the report date.

2) Upon examination of the records, apparent inconsistencies in the methods of reporting by the various German divisions in the Ardennes period appeared evident, as did

deviations in the reporting formats described above. In Attachment 2, the PzLehrD, 1st SSPzD, 2d SSPzD, 12th SSPzD, and 15th PzGD show low values for monthly Genesene figures compared with those of the 9th PzD, 116th PzD, and 3d PzGD. Comparing the monthly Genesene data for these latter three divisions with their known 10-day "dienstfaehig" figures indicates that the monthly Genesene reported for these three divisions likely included all returned to duty personnel within the reporting period, including lightly wounded in action.

3) As is the case with all aspects of the German personnel data during the Ardennes period, there are major gaps in the Genesene and "dienstfaehig" data. A particularly serious deficiency was a lack of daily return to duty data for any unit. These gaps had to be addressed through an estimation methodology based on the available data.

The German personnel return to duty estimation methodology for the ACSDB was developed from the available "dienstfaehig" data and adjudged reliable monthly Genesene Zustandsbericht (ZB) data, i.e., that data judged to have included all returned to duty personnel, not just those back from field hospitals and facilities in the Zone of the Interior. The derived numbers are intended to show all personnel treated for wounds or sickness and returned to the unit's present for duty strength.

The ideal estimation methodology for German return to duty data would have involved a rate based upon known return to duty, present for duty strength, and sick and wounded data. Derivation of such a rate would have been complicated by two factors. For German units during the initial phase of the Ardennes campaign, it would have been necessary to have researched available casualties for November 1944. These casualties are only available for some divisions in the form of the monthly November Zustandsbericht. Additionally, a rate would have had to have been based at least in part upon estimated battle casualty and disease and non-battle injury (DNBI) data which may only have been derived from strengths estimated through application of the entire strength estimation process. In other words, to determine an RTD rate in such a manner would have necessitated using data derived from a process in part dependent on an already existing RTD rate.

Therefore, it was determined to formulate a return to duty estimation methodology using an average daily number to apply to units when no 10-day or adjudged reliable monthly figures were available in primary source records. This number was based upon the known data in the "dienstfaehig" categories of the Fifth Panzer Army and LXXXI Korps 10-day reports (see Attachment 2). For each 10-day period (or 11-day period for 21-31 December), a value was calculated by adding the total number of "dienstfaehig" personnel and dividing by the number of division- or brigade-days.

The calculated numbers were then applied to all division- and brigade-level units for which no 10-day "dienstfaehig" or adjudged reliable monthly Genesene ZB data was available.

The calculated values are as follow:

11-20 December:	18 RTD/day	(1794/100)
21-31 December:	14 RTD/day	(1055/77)
1-10 January:	11 RTD/day	(1161/110)
11-20 January:	13 RTD/day	(1708/130)

For four units peripherally involved in the Ardennes offensive, a different estimation methodology was applied. These units (10th SSPzD, 11th PzD, 27th SSPzGD, and 28th SSPzGD) were in reserve for the entire offensive (16 December 1944 to 16 January 1945), except for the 10th SSPzD which was committed in combat around 13 January south of the Ardennes area. A value was applied to these units based upon the Genesene figures given for the 11th Panzer Division in December and January. During December, the 11th PzD received 252 Genesene, an average of 8/day (252/31) and during January 140 Genesene or an average of 5/day. The 10th SSPzD, a unit of comparable size to the 11th PzD, is assumed to have received identical numbers of return to duty personnel. The 27th and 28th SSPzGDs, units of considerably smaller size than the 10th SSPzD and 11th PzD, were estimated to have received return to duty personnel in daily numbers 0.17 times those of the 10th SSPzD and 11th PzD. The value 0.17 is based on the ratio of the 1 December present for duty strengths of the 28th SSPzGD (1916) and the 11th PzD (11164) as found in the sources from the US National Archives and the German archives -- SRS-1869 and RH10/149, p. 60. The 27th SSPzGD's and 28th SSPzGD's monthly return to duty total for December is thus estimated to be 43 (252 x 0.17) and for January to be 24 (140 x 0.17). Since these two divisions were estimated to be of similar strength in personnel, their estimated RTD figures are assumed to be the same.

A final unit required a unique approach for estimating return to duty data. This was the 150th PzBde, the provisional formation armed in part with captured US equipment. Since it was substantially smaller in size than the other German division- and brigade-level units in the Ardennes, its daily return to duty figure was estimated to be 0.35 times the estimated values of the 21-31 December and 1-10 January periods. The value 0.35 was based upon the ratio of the 150th PzBde's strength (ETHINT 12, An Interview with ObstLt Otto Skorzeny, a study available at the US National Archives which gives the 150th PzBde's strength as 2960 total personnel) and the "typical" German total personnel division strength in the Ardennes derived from the German DNBI Rate Estimation Methodology narrative (8466) or 2960/8466. Thus the daily return to duty figure for the 150th PzBde in December was either 6 (0.35 x 18) or 5 (0.35 x 14) and in January

was 4 (0.35 x 11). (The 150th PzBde was withdrawn from the Ardennes before 10 January.)

Attachment 3 shows units for which 10-day "dienstfaehig" and select monthly Zustandsbericht Genesene data was used as return to duty data. The numbers from the 10-day and monthly reports were divided by the appropriate number of days for the reporting period (10, 11, or 31 days) and the calculated value used as the daily RTD figure for the unit. For monthly reports, this value was always rounded off to the nearest whole number. For 10- and 11-day periods, the numbers were always rounded off so that their sums equaled the total number for the period. For the remainder of all German units in the Ardennes, including those shown on Attachment 2 for which no data was available (i.e., the 3d FJD during the period 11-20 December), estimated daily values of 18, 14, 11, and 13 RTD, as described above, were used.

Attachment 1
Examples of German Reports

Meldung vom 1. Dezember 1944

Verband: 1. SS-Pz. Div. "LSSAH"
Unterstellungsverhältnis: 1. SS-Pz. Korps

1. Personelle Lage am Stichtag der Meldung:

a) Personal:

	Soll	Real	Kr.u.Verw. l.nerh.v.8
Offiziere	633	80	25
Uffz.....	4128	662	457
Mannsch.	12820	+3635	2461
Miw.....	967	442	8
Insgesamt	19548	+2451	3011

c) In der Berichtszeit eingetretener Ersatz:

	Woch Ersatz	Gesamte
Offiziere	27	4
Uffz. und Mannsch.	396	142

b) Verluste und sonstige Abgänge
in der Berichtszeit vom 1.11. bis 30.11.44

	Tot	verw.	verm.	krank	Sonst.
Offiziere	-	1	-	4	2
Uffz. und Mannsch.	15	13	-	298	259
Insgesamt	15	19	-	302	261

d) über 7 Jahr nicht beurlaubt:

Insgesamt:	3205	18	% d. Iststärke
davon:	28-30 Monate	78-30 Monate	über 30 Monate
	3360	448	-

2. Materielle Lage:

	Expansierte Fahrzeuge							Kraftfahrzeuge				
	Stv. Gesch.	III	IV	V	VI	Stv. Nr. 20-25 Art.Nr. 10-15 Art.Nr. 16-18	Pkt. St.	Kräder			Pkw	
								Katzen	Wagen & Trg.	Sonst.	gel.	0
Soll (Zahlen)	-	6	109	79	-	491	31	367	102	146	782	74
einsetzbar	1	-	35	34	-	184	20	24	84	90	304	253
in kurzfristiger Instandsetzung (bis 3 Wochen)	-	-	-	-	-	14	1	4	17	10	13	21
in längerfristiger Instandsetzung (bis 3 Monate)	-	-	-	-	-	2,8	3,2	1	16,6	6,8	2,3	23,3

NW 10/312

	noch Kraftfahrzeuge						Waffen				
	Lkw			Kettenfahrzeuge			s Pkt	Art-Gesch.	MG. ()	sonstige Waffen	
	Wahlkraft	gel.	0	Zusage	Zgkw.	ASO					
Soll (Zahlen)	147	1122	830	5247	119	215	-	25	59	1514	-
einsetzbar	56	377	973	3375	49	74	-	25	52	266 (221)	-
in kurzfristiger Instandsetzung (bis 3 Wochen)	14	35	95	327	1	2	-	-	-	-	-
in längerfristiger Instandsetzung (bis 3 Monate)	9,6	3,1	11,5	6,2	0,8	1,7	-	-	-	-	-

3. Pferdefehlstellen:

Anl. zu Nr. 1733/44 geh.
Gen. Insp. u. Pz Tr.

Abteilung VII

G.F., den 18. Dezember 1944.

AN

Abteilung VII

Personal Verluste für die Zeit vom 1. - 10. Dezember 1944:

10. Dezember 1944:

G.F.

	Killed Gefallen	Wounded Verwundet	Missing Vermisst	Returned Kran- kenan- gang	Kran- ken- best.	Verw. be- stand	Other dienst- fähig
47. Volksgren.- Div.	8	45	43	191	41	31	122 15
246.	74 (3)	415 (10)	307 (3)	360	193	55	229 17
363.	103 (2)	255 (4)	145 (3)	177	62	4	85 1
stab Gen. Ado. XLIII.	2	-	-	2	1	-	7
Korps-Instr.-abt., 492	-	-	-	3	2	-	1
Volksart. Korps 403	14 (2)	56 (5)	1	41	14	-	46
No. Fest. Art. Abt. 1310	-	3	-	12	5	1	10
No. Fest. Art. Abt. 1301	-	3	-	4	3	-	6
S. Pz. Jg. Abt. Tiger 1.) 301	3 (1)	5	1	15	10	5	16
Sturmgesch. Brigade 341	10 (4)	4	-	33	14	-	30
B. Art. Abt. 725	-	1	-	21	10	-	13
Rech. Abt. (Ingen.) 63	-	-	-	7	5	-	7
S. Heeres-Verband Abt. 682	2	8	-	6	-	-	7
Sturmgesch. Abt. 902	-	-	-	9	6	-	12
San. Komp. 1/211	-	-	-	1	-	-	3
San. Gesch. Btl. / 1/6	-	6	-	2	1	-	-
Deutsche Wehrmacht- angehörige bei Wehr- machtserbehalten. 627	-	-	-	4	-	-	2
	216 (12)	811 (19)	497 (6)	655	372	96	596 33
2. post. Kommt. of Nachrichtlich 3. Fallschirmjg. Div.	245 (6)	592 (23)	260 (3)	225	90	1 6	148 4
Volksgren. Wehr-Inf. 627	-	2	-	11	1	-	6

Attachment 2

Gesene and "Dienstfaehig" Data

	December				January			
	ZB 1-30 Nov Con	"Dienstfaehig"			ZB 1-31 Dec Con	"Dienstfaehig"		
	1-10	11-20	21-31	1-10	11-20	21-31		
PzLehrD	--	157	247	59	34	109		91
2d PzD	313	160	144	122		92		75
9th PzD	221		390	117	582	84		192
11th PzD	88				252			140
116th PzD	296	378	130		557	203	206	692
1st SSPzD	148							2
2d SSPzD					4			37
12th SSPzD					36			13
3d PzGD	447			374	414	63		48
15th PzGD	185		199	178	26	74	132	111
F88				69		79	67	
FGB							80	
3d FJD	--						155	
5th FJD				136		58		
18th VGD		127					71	
26th VGD		242	137			168	96	383
47th VGD		122	160					
62d VGD		60				108	179	
89th ID							266	
246th VGD	71	229					147	
277th VGD							239	35
326th VGD							51	77
340th VGD						123		
353d VGD			261					
363d VGD	162	85	108					
560th VGD			18				19	5

10-day period data from: LXXXI K Report (T315,1594,1134-1331) and 5th PzArmy Verlust Meldung (RH6M/577, pp. 2-26)

Monthly ZB data from: PzLehrD - RH10/172; 2d PzD - RH10/141; 9th PzD - RH10/148; 11th PzD - RH10/149; 116th PzD - RH10/163; 1st SSPzD - RH10/312; 2d SSPzD - RH10/313; 12th SSPzD - RH10/321; 3d PzGD - RH10/178; 15th PzGD - RH10/181; 3d FJD - T314,1597,155; 246th VGD - T314,1597,152; 363d VGD - T314,1597,148.

Con = Convalescent

Attachment 3

Application of Genesene and "Dienstfaehig" Data

	December		ZB (Dec)	January		ZB (Jan)
	11-20	21-31		1-10	11-20	
PzLehr	X	X		X		
2d PzD	X	X		X		
9th PzD	X	X		X		
11th PzD			X			X
116th PzD	X	Y		X	X	
3d PzGD		X		X	Y	
15th PzGD	X	X		X	X	
FBB		X		X	X	
FGB					X	
3d FJD					X	
5th FJD		X		X		
18th VGD					X	
26th VGD	X			X	X	
47th VGD	X					
62d VGD				X	X	
89th ID					X	
246th VGD					X	
277th VGD					X	
326th VGD					X	
340th VGD				X		
353d VGD	X					
363d VGD	X					
560th VGD	X				X	

"X" indicates that the data was used as it appears in the record to estimate the daily return to duty figures.

"Y" indicates that the estimated daily return to duty figures for this unit for this period was derived by subtracting the known 10-day "dienstfaehig" figures from the monthly Genesene data.

German Personnel Replacement Estimation Methodology

The fourth phase in developing Unit Data records for the German segment of the Ardennes Campaign Simulation Data Base (ACSDB) was to calculate personnel replacement data for all German division- and brigade-level units. This paper discusses the derivation of replacement data for German divisions and brigades, and for non-divisional units which participated in the Ardennes Campaign.

Attachments 1-3 contain all available data on personnel replacements for German divisions in the Ardennes Campaign. Sufficient information was available to determine replacements for all SS, panzer, panzer grenadier, and fallschirmjaeger divisions (SSPzD, PzD, PzGD, and FJD) and the three panzer brigades (150th, FBB, and FGB) with relatively minimal estimation. Derivation of the replacements for these units is explained in the narrative for each unit (see the German Divisional Personnel Data narrative).

Due to the lack of Zustandsbericht for the volksgrenadier and infantry divisions (VGD and ID), a greater degree of estimation was required to determine an average, or "typical," replacement figure for those units for which no information was available in the German post-war manuscripts. These latter documents proved to be the main source of information on replacements of volksgrenadier divisions in the Ardennes. They are part of the Foreign Military Studies series on file at the US National Archives. In the following list, they are identified by their manuscript number, i.e., MS#B027.

Information used to estimate an average replacement value for volksgrenadier and infantry divisions was as follows:

12th VGD:	10 Jan -- 600 repl. (MS#B027, pg. 61)
18th VGD:	15 Jan -- 500 repl. (MS#B688, pg. 77)
62d VGD:	"during" Jan -- 800 repl. (MS#B028, pg. 27)
277th VGD:	"during" Jan -- 1500 repl. (MS#B273, pg. 17)
340th VGD:	Jan -- 550 repl. (MS#B678, pg. 45)
89th ID:	21 Dec -- 467 repl. (MS#P032a, pg. 17)
89th ID:	28 Dec -- "further repl." (MS#P032a, pg. 18)

An "average" replacement increment was estimated by totalling the numbers received by the six divisions (with adjustments for the 62d and 340th VGDs) and dividing by six. The 62d and 340th VGD totals were each divided by two, as their figures are for the entire month of January, and it was assumed that one-half arrived in the period 1-16 January. The 277th VGD total was not divided by two, as comparison of the 30 December

and 6 January Wochenmeldung Ob West reports (German Archives source RH19IV/241) indicated that the division probably received 1,500 replacements in the first half of January. Thus the average value was calculated $600+500+400+1,500+275+467/6$, or 624. Unless data or information in other sources indicated otherwise, all VGDs and IDs were allocated 624 replacements during the month of January at the rate of 39/day. Note that unless data indicates otherwise, all replacements received by volksgrenadier and infantry divisions are assumed to have arrived starting in January 1945. This assumption is made based on the experiences of the divisions in the table above, and the experiences of the other types of divisions. The overall experiences of all divisions would seem to indicate that the German personnel replacement system was unable to initiate regular replacements of casualties in the German Army Group B divisions until January 1945, and even then the German Army was hard pressed to make good its personnel losses.

Replacements for non-divisional units were estimated using the average of the divisional replacement figures. Attachment 4 lists the German divisions in the ACSDB and their estimated cumulative replacement personnel. The total divisional replacement personnel figure was 26,916 for 39 divisions. Of this total, 6,734 were estimated to have arrived with units in December 1944, and 20,182 during January 1945.

The average divisional replacement total was calculated as $26,916/39$, or 690 personnel, 39 equal to the number of German divisions in the ACSDB (including two brigades--the FBB and FGB, but excluding the 150th PzBde and 27th and 28th SSPzGDs, units which were less than 3,000 personnel in strength). Taking the average divisional start strength ($400,992/39$, or 10,282), and the average divisional replacement total, it was possible to calculate a divisional replacement percentage, based on the average unit start strength. The calculation used was $690/10,282$, or 6.7%. This percentage was subsequently used with all non-divisional unit start strengths to estimate a total replacement figure for non-divisional units.

Allocation of the replacements for non-divisional units was estimated using the ratio of division replacements received in December to the total number of divisional replacements ($6,734/26,916$). Based on this ratio, it was estimated 25 percent of the divisional replacements arrived in December and 75 percent in January. These percentages were applied to the derived total replacement figure for each non-divisional unit. To simplify accounting procedures, all replacements estimated to have been received in December were allocated to non-divisional units on 26 December, and in January on 6 January. If the sum of the replacement figures and a unit's 26 December or 6 January on-hand personnel strength exceeded the unit's authorized personnel strength, then the number of replacements was limited to that

number which would bring the unit up to full authorized strength.

Attachment 1

German Personnel Replacement Data

<u>Unit</u>	<u>TIME PERIOD</u>	<u>RE-PLACMNTs</u>	<u>SOURCE</u>	<u>SOURCE TYPE</u>
PzLehrD	1-31 Dec	609	RH10/172, p. 51	ZB
	1-31 Jan	1111	RH10/172, p. 55	ZB
2d PzD	1-31 Jan	1292	RH10/141, p. 55	ZB
9th PzD	1-31 Dec	2187	RH10/148, p. 87	ZB
	1-31 Jan	951	RH10/148, p. 92	ZB
11th PzD	1-31 Dec	1356	RH10/149, p. 80	ZB
	1-31 Jan	1004	RH10/149, p. 92	ZB
116th PzD	1-31 Dec	1580	RH10/163, p. 32	ZB
	1-31 Jan	950	RH10/163, p. 37	ZB
1st SSPzD	1-31 Jan	1377	RH10/312, p. 42	ZB
2d SSPzD "During Operation"	1-31 Dec	80	RH10/313, p. 44	ZB
	1-31 Jan	500-600	PO32, p. 22	
	1-31 Jan	106	RH10/313, p. 47	ZB
12th SSPzD	1-31 Dec	175	RH10/321, p. 41	ZB
	1-31 Jan	1737	RH10/321, p. 52	ZB
3d PzGD	1-31 Dec	1707	RH10/178, p. 69a	ZB
	1-31 Jan	1757	RH10/178, p. 76	ZB
15th PzGD	1-31 Dec	1732	RH10/181, p. 51	ZB
	1-31 Jan	940	RH10/181, p. 61	ZB
FBB	"During Offensive Rec'd Replacements Three Times"		B838, p. 17	
3d FJD	10 Jan	500-1000	OKW, KTB, IV 2, p. 1361	
5th FJD	10 Jan	500-1000	OKW, KTB, IV 2, p. 1361	
12th VGD	Early Dec	3000 (+ 500 RTD?)	B733, p. 3	
	10 Jan	600	B027, p. 61	
18th VGD	16 Dec-6 Jan	No Repl	B688, pp. 58 & 71	
	15 Jan	500	B688, p. 77	
62d VGD	During Jan	800	B028, p. 27	

277th VGD	During Jan	1500	B273, p. 17
326th VGD	22 Jan	60	B092, p. 9
340th VGD	*Jan ?	550	B678, p. 45
353d VGD	1-20 Dec	1278	T314,1597,190 Zwischen ZB
363d VGD	1 Dec-20 Jan	380	B069, p. 70

Sources in the above table are described in full in the Bibliography Data Base. Zwischen ZB = Interim Zustandsbericht. * = precise date(s) not specified in source. ZB = Zustandsbericht

Attachment 2

Unterlagen fuer den Fuehrervortrag
am 28.12.1944 (RH10/90, pp. 5-16)

PzLehrD 350 infantry sent 1 Dec, arrived 8 Dec
600 Luftwaffe sent 9 Dec, arrived 11 Dec
300 Luftwaffe sent 21 Dec, arrived ---
300 Panzer Grenadier sent 24 Dec, arrived ---

2d PzD 350 Infantry sent 1 Dec, arrived 7 Dec
300 Luftwaffe sent 1 Dec, arrived 7 Dec
300 Luftwaffe sent 21 Dec, arrived ---

9th PzD 700 Infantry sent 1 Dec, arrived 5 Dec
300 Luftwaffe sent 4 Dec, arrived 10 Dec
300 Luftwaffe sent 11 Dec, arrived 18 Dec
300 Luftwaffe sent 23 Dec, arrived ---
300 Panzer Grenadier sent 30 Nov, arrived 6 Dec
300 Panzer Grenadier sent 11 Dec, arrived 16 Dec

11th PzD 700 Infantry sent 1/5 Dec, arrive 4/12 Dec
300 Luftwaffe sent 21 Dec, arrived --- *
300 Panzer Grenadier sent 18 Dec, arrived ---

116th PzD 350 Infantry sent 30 Nov, arrived 6 Dec
350 Infantry sent 1 Dec, arrived 6 Dec
300 Luftwaffe sent 30 Nov, arrived 6 Dec
300 Panzer Grenadier sent 2 Dec, arrived 6 Dec **

3d PzGD 350 Infantry sent 5 Dec, arrived 11 Dec
300 Luftwaffe sent 1 Dec, arrived 10 Dec
300 Luftwaffe sent 9 Dec, arrived 15 Dec
300 Luftwaffe sent 11 Dec, arrived ---
300 Luftwaffe sent 21 Dec, arrived 23 Dec
300 Panzer Grenadier sent 11 Dec, arrived 19 Dec

15th PzGD 300 Luftwaffe sent 1 Dec, arrived 10 Dec
300 Luftwaffe sent 14 Dec, arrived ---
300 Luftwaffe sent 20 Dec, arrived ---
300 Luftwaffe sent 21 Dec, arrived 23 Dec ***

Additionally, ca. 2800 armored troop specialists will be sent to Ob West.

* 900 additional Luftwaffe planned but apparently not sent by 28 Dec.

** 300 additional Panzer Grenadier planned but apparently not sent by 28 Dec.

*** 300 additional Luftwaffe planned but apparently not sent by 28 Dec.

Data is from German Archives source RH10/90, pp. 5-16.

Attachment 3

Additional German Ardennes Campaign Personnel Replacement Data

RH10/90, p. 205 Anlage zu Gen. Insp.d.Pz.Tr.Nr.117/45 g.kdos,
v.16.1.45

- Personnel replacements for Ob West (Dec): 15150 men.
- January preparations for Ob West: 2400 panzer grenadier replacements.

RH10/90, p. 23 Following personnel situation in the sphere of
the Ob West (10 Dec?):

2d PzD	full
9th PzD	full
11th PzD	full
116th PzD	full
PzLehrD	full
3d PzGD	full

Attachment 4

ACSDB German Personnel Replacements for Divisions

<u>Unit</u>	<u>Total</u> <u>Replacements</u>	<u>(Received</u> <u>in Dec)</u>	<u>Start Strength</u>
PzLehrD	576		12,672
2d PzD	720		12,680
9th PzD	796	(300)	12,889
11th PzD	512		10,157
116th PzD	496		15,468
3d PzGD	1,812	(900)	11,442
15th PzGD	780	(300)	10,988
1st SSPzD	704		17,988
2d SSPzD	550	(272)	17,000
9th SSPzD	800		13,363
10th SSPzD	1,600	(800)	13,069
12th SSPzD	896		18,548
FBR	426	(142)	7,000
FGB	426	(142)	6,270
3d FJD	750		12,474
5th FJD	750		13,543
9th VGD	624		8,730
12th VGD	600		9,517
18th VGD	500		10,390
26th VGD	624		9,951
47th VGD	688	(688)	6,993
59th ID	1,687		5,215
62d VGD	400		11,050
79th VGD	624		10,132
85th ID	342		6,073
89th ID	934	(934)	5,585
167th VGD	0		11,050
212th VGD	624	(312)	10,490
246th VGD	698	(698)	8,958
272d VGD	624		8,771
276th VGD	624		9,320
277th VGD	1,500		7,249
326th VGD	0		9,083
340th VGD	275		7,613
344th ID	0		3,979
352d VGD	624		10,595
353d ID	1,145	(521)	5,092
363d VGD	1,185	(725)	8,408
560th VGD	0		11,197
TOTAL	26,916	(6,734)	400,992

Numbers in parentheses are personnel replacements estimated to have been received in December 1944, out of the total number received.

German Divisional Personnel Data

This paper contains individual descriptions on derivation of personnel data for each of the 39 divisions and three brigades of German Army Group B, which are recorded in the Ardennes Campaign Simulation Data Base (ACSDB). The paper discusses the fifth phase of the development of Unit Data records for the German segment of the ACSDB, namely the application of the methodologies described in the first through third phases.

The units are arranged with army panzer divisions first, followed by army panzer grenadier, SS panzer, brigades, and then the infantry-type divisions (fallschirmjaeger (paratrooper), infantry, and volks grenadier).

Referenced throughout the narrative are the various estimation methodologies described in other sections of this report, namely the German battle casualty, DNBI, RTD, and replacement methodologies. Also referenced are numerous primary and secondary sources. These references are identified in abbreviated format, with full bibliographic information on them recorded in the Bibliography Data Base. The primary and secondary sources are of three primary provenances:

- The German Archives (records from this source are usually identified with the prefix "RH");
- The US National Archives Microfilm (records from this source are usually identifiable by the prefix "T");
- The post-war German manuscripts series on file at the US National Archives (records from this source are identified with their manuscript number, i.e., MS #B027).

PzLehrD

The PzLehrD's estimated start strength was calculated by subtracting from the 1 December Zustandsbericht strength (German Archives source RH10/172, pg. 72) the 1-10 December 1944 battle casualties and DNBI (696 and 186, respectively) and adding in the "dienstfaehig" (return to duty) number (157) for the same period. This data is from the 5th PzArmy Surgeon General report (RW6v/577, pg. 17). Also added to the 1 December strength was the total December replacements figure, 609, representing personnel who were assumed to have arrived prior to 16 December. (The source for the replacements is RH10/172, pg. 47.) The PzLehrD's start strength is calculated as follows: 12,788 - (696+186)+609+157, or 12,672. Note that this replacement figure is lower than the 950 total replacements reported received on 8 and 11 December in the Fuehrer report (RH10/90, pg. 14). It is assumed, however, that these replacements did not arrive as reported, and that 609 represents the PzLehrD's total replacement figure for December 1944. DNBI and return to duty ("dienstfaehig") for 16-31 December were derived from the 5th PzArmy Surgeon General report. Battle casualties were calculated using the battle casualty estimation methodology.

The estimated 1 January strength, calculated from attriting the estimated 16 December strength, is 11,372, a figure not inconsistent with the 1 January Zustandsbericht strength of 11,072 (RH10/172, pg. 51). DNBI and return to duty for 1-10 January were calculated from the 5th PzArmy Surgeon General report. For 11-16 January, the same data was estimated from the DNBI and return to duty estimation methodologies (13 returns to duty per day, and 0.24%/day DNBI rate). Replacement personnel were estimated at the rate of 36/day, based on the PzLehrD's January cumulative figure divided by the number of days in January (1,111/31, or 36). This replacement figure is from RH10/172, pg. 55.

2d PzD

The 2d PzD's estimated start strength, 12,680, was calculated by subtracting the 1-10 December 1944 DNBI (303) from and adding the 1-10 December "dienstfaehig" (return to duty) figure (160), plus the 7 December replacements (650), to the 6 December 1944 strength (12,173). (Data described above is from the 5th PzArmy Surgeon General report--RW6v/577, pg. 16, the Fuehrer report--RH10/90, pg. 14, and the 2d PzD 6 December Zustandsbericht, RH10/141, pg. 41.) Note that the 6 December Zustandsbericht personnel strength figure represents the 2d PzD's on-hand strength as of 30 November 1944. Return to duty and DNBI data for 16-31 December were derived from the 5th PzArmy Surgeon General report. The 2d PzD was assumed to have received no replacements during 16-31 December. For 1-10 January, return to duty and DNBI data was taken from the 5th PzArmy Surgeon General report. Return to duty and DNBI for 11-16 January were estimated from the return to duty and DNBI estimation methodologies (13 return to duty per day, and 0.24%/day DNBI rate), and replacement personnel were estimated at the rate of 45/day, based on the 2d PzD's January cumulative figure divided by the number of days in January (1392/31 or 45). This cumulative replacement figure is from RH10/141, pg. 55.

9th PzD

The 9th PzD's start strength was estimated by adding the 1 December 1944 Zustandsbericht strength (11,289) to the replacements received between 5-16 December (1,600). (Sources for this data are RH10/148, pg. 77, and the Fuehrer report--RH10/90, pgs. 14-16.) Since the 5th PzArmy Surgeon General report (RW6v/577) has no data for 1-10 December 1944 for the 9th PzD, the division's casualties for this period are not known, and so no DNBI and replacements are calculated for the 9th PzD for this period. Research was unable to determine the 9th PzD's exact activities in early December 1944, but comparing the division's total monthly casualties with those reported for 11-20 and 21-31 December in the 5th PzArmy Surgeon General report, indicates that the division was not in major combat during the period 1-10 December. Therefore, no battle casualties are assessed against the 9th PzD for 1-10 December.

Daily personnel data for the 9th PzD in December was estimated using data from the 5th PzArmy Surgeon General report. 300 replacement personnel are assigned to the 9th PzD on 18 December, as the Fuehrer report indicates. The additional 300 replacements reported in the Fuehrer report as being sent on 23 December are assumed to have arrived in January.

Personnel data for 1-10 January was estimated using the 5th PzArmy Surgeon General report. For 11-16 January, the return to duty personnel data was estimated by taking the 1-10 January return to duty data, subtracting it from the monthly return to duty data (RH10/148, pg. 92), and multiplying the resulting figure by 0.29 to give the appropriate estimated return to duty figure for 11-16 January. (Subtracting the 1-10 January figure from the monthly figure gives the estimated 11-31 January total. 0.29 equals $6/21$, the fraction of 11-16 January total days (6), to 11-31 January total days (21).) This number was then divided by 6 and allocated on a daily basis. DNBI for 11-16 January was estimated using the DNBI estimation methodology.

Replacement data for 1-16 January was estimated using the 9th PzD's monthly Zustandsbericht figure, divided by 31, and allocated on a daily basis.

11th PzD

The 11th PzD's start strength (the division is tracked from 22 December 1944 to 16 January 1945 in the ACSDB) was estimated by taking the 1 December Zustandsbericht strength and subtracting from it the 11th PzD's 1-31 December battle casualties, sustained during the division's heavy combat south of the Ardennes in the first half of December ($11,136 - 1,947 = 9,189$). All data is from the 11th PzD's 1 December 1944 and 1 January 1945 Zustandsbericht--RH10/149, pgs. 60 and 80. To the resulting figure (9,217) were added replacements (1,300) reported in the Fuehrer report (RH10/90, pgs. 14-16) and 21 days' worth of return to duty personnel, based on the 1 January Zustandsbericht's cumulative return to duty figure of 252 for the 11th PzD in December 1944. Finally, DNBI for 1-21 December were assessed against the 11th PzD, based on a daily rate of 0.24%/day for an estimated daily divisional strength of 10,000 personnel. Thus, the 11th PzD's estimated start strength was 10,157 ($11,136 - 1,947 + 1,300 + 172 - 504$).

For 16 December-16 January, the 11th PzD's return to duty figures were based on the 1 January and 1 February Zustandsbericht (RH10/149, pgs. 60 and 80), as described in the return to duty estimation methodology. DNBI were estimated at an average rate of 0.24%/day, as described in the DNBI estimation methodology, based on the derived daily 11th PzD personnel strength.

Replacements for January were estimated from the monthly total (1,004), divided by 31, to give an average daily replacement figure of 32.

116th PzD

The 116th PzD's start strength was estimated by adding the 1,300 replacements received on 6 December (as reported in the Fuehrer report -- RH10/90, pgs. 14-15) to the 1 December Zustandsbericht (RH10/163, pg. 30) strength (14,168), for a total estimated strength of 15,468. The sick and return to duty reported in the 5th PzArmy Surgeon General (RW6v/577) for 1-10 December both equal 378, and thus cancel out each other in the calculation of the 116th PzD's 16 December estimated start strength. Return to duty are derived from the 5th PzArmy Surgeon General report. For 21-31 December, the return to duty are estimated to equal the difference between the 116th PzD's monthly December total (see 116th PzD's 1 January Zustandsbericht--RH10/163, pg. 32) and the 1-10, and 11-20 December numbers in the 5th PzArmy Surgeon General report [$557 - (378 + 130) = 49$]. DNBI for 21-31 December were derived from DNBI estimation methodology. For 1-10 and 11-16 January, return to duty and DNBI data were derived from the 5th PzArmy Surgeon General report figures. No replacements were assumed to have been received during 16-31 December. Daily replacements were estimated from the total received during January (see 116th PzD's 1 February Zustandsbericht--RH10/163, pg. 37), divided by 31, the number of days in January ($950/31 = 30.6$, or 31).

3d PzGD

The 3d PzGD's estimated start strength was calculated by adding the 1 December 1944 Zustandsbericht strength (RH10/178, pg. 60) to the replacements reported in the Fuehrer report (RH10/90, pgs. 14-16) as being received by the 3d PzGD from 11-15 December ($10492+950=11442$). The 3d PzGD was involved in some combat between 1-10 December, but records from the LXXXI Korps (T314,1597,720-730), indicate that the 3d PzGD's battle casualties for the period were relatively light, and therefore are not figured into the calculation of the 3d PzGD's estimated start strength. Any DNBI or return to duty for 1-16 December are also not counted in estimating the division's start strength, as this data for the 3d PzGD does not exist. The Fuehrer report indicates that an additional 600 total replacements were received by the 3d PzGD on 19 and 23 December. These are credited to the division, as are 300 additional replacements reported sent to the 3d PzGD on 11 December but not yet arrived at the time of the Fuehrer report (28 December). Therefore, they are assumed to have arrived on 29 December. Return to duty and DNBI for 16-20 December are estimated from the return to duty and DNBI estimation methodologies. For 21-31 December, the same data is derived from the 5th PzArmy Surgeon General report (RW6v/577). The same source is used for return to duty and DNBI estimates during the period 1-10 January. Return to duty for 11-16 January are estimated by subtracting the 1-10 and 21-31 January 5th PzArmy Surgeon General report return to duty figures from the total 1-31 January Zustandsbericht figure (RH10/178, pg. 76), and allocating the resulting figure on a daily basis [$213-(63+48)/6$, or 17/day]. DNBI for 11-16 January were estimated from the DNBI estimation methodology. Daily replacements for 1-16 January were estimated by dividing the cumulative 1-31 January Zustandsbericht figure (1,757) by 31 (the number of days in January) ($1757/31$, or 57/day).

15th PzGD

The 15th PzGD's estimated start strength was calculated by adding the 15th PzGD 1 December Zustandsbericht strength (RH10/181, pg. 42) to the replacements reported received in the Fuehrer report (RH10/90, pgs. 14-16) on 10 December, and then subtracting out the battle casualties derived from the difference between the 1-31 December battle casualties reported in the 15th PzGD 1 January Zustandsbericht (RH10/181, pg. 51) and the battle casualties for 21-31 December derived from the 5th PzArmy Surgeon General report (RW6v/577) to account for battle casualties incurred by the 15th PzGD during combat in the first half of December 1944. [11210+300-(1801-1279), or 10,988]. As the 5th PzArmy Surgeon General report has no data on DNBI and return to duty personnel for the 15th PzGD during 1-10 December, no accounting was made for them in estimating the 15th PzGD's 16 December start strength.

Total replacements reported received by the 15th PzGD during 1-31 December in the division's 1 January Zustandsbericht were 1,732, but the Fuehrer report indicated that 900 replacements were sent but apparently not received by 28 December. 300 replacements (in addition to the 300 received on 10 December) were reported received by the 15th PzGD on 23 December, and these are credited to the division on that date.

All return to duty and DNBI data was derived from the 5th PzArmy Surgeon General report for 16 December-16 January. Replacements received by the 15th PzGD during 1-16 January were estimated at the rate of 30/day, a rate derived by dividing the total number of replacements reported in the 15th PzGD 1 February Zustandsbericht by the number of days in January (940/31, or 30).

1st SSPzD

The 1st SSPzD's personnel data documentation was notably lacking in coverage. The 1 December 1944 Zustandsbericht (RH10/312, pg. 37) gives an on-hand personnel strength of 17,988, but no data exists for replacements, return to duty, and DNBI for 1-31 December, and the lack of a 31 December/1 January Zustandsbericht makes a late December derived strength comparison impossible. Since the 1st SSPzD was refitting and out of the front line prior to 16 December, no battle casualties are assessed against the division for this period. MS #B779, pg. 13, describes the 1st SSPzD as 90 percent of authorized in personnel strength (authorized strength being 18,548--see RH10/312, pg. 37), and so a 16 December start strength of 17,988 (97 percent of authorized) was considered a reasonable estimate for the 1st SSPzD. No replacements are assumed to have arrived for the 1st SSPzD in December. Return to duty and DNBI for the entire period (16 December-16 January) were estimated using the appropriate estimation methodologies. Daily replacements for 1-16 January were estimated by taking the total 1-31 January replacements as reported in the 1 February Zustandsbericht (RH10/312, pg. 42) and dividing by 31, the number of days in January (1377/31, or 44 replacements per day).

2d SSPzD

The 2d SSPzD had no personnel strength records for early December 1944. MS #A924, pg. 61, reported the division at 80% in personnel, and MS #P032, pg. 4, reported it at 90%. The 31 December authorized personnel strength of the 12th SSPzD (see RH10/313, pgs. 44-45) is 17,432. Subtracting the estimated 15-31 December battle casualties from this figure and then comparing the resulting number with the 1 January Zustandsbericht on-hand strength (RH10/313, pgs. 44-45) makes a personnel strength of 17,000 men on 16 December a realistic estimated figure for the division's start strength (17,000-1,460, or 15,540, compared with 15,286). (This approximate comparison does not take into account estimated replacements, return to duty, and DNBI for 16-31 December, which, when calculated together do not significantly affect the estimated 31 December 2d SSPzD strengths.)

No 5th PzArmy Surgeon General reports (RW6v/577) contained data on the 2d SSPzD. All return to duty and DNBI were estimated using the appropriate estimation methodologies. Replacements were estimated from the average of the range of figures in MS #P032, pg. 22 (500-600), divided by the total number of days of the Ardennes operation (550/32, or 17-18/day).

9th SSPzD

Data on personnel strengths and losses for the 9th SSPzD is notably lacking. MS #A924, pg. 61, reports that the 9th SSPzD was at 75 percent authorized strength; authorized strength on 10 December was 17,817, according to the 1 November 1944 Gliederung (RH10/318, pg. 33). With no other information available on the 9th SSPzD's start strength, 75 percent of 17,817 was used as the division's estimated personnel start strength (13,363). No replacements were assumed to have been received by the division during December 1944, and the number of daily replacements received during January was estimated as an average of the totals received by the 1st and 12th SSPzD's, the only SS divisions for which this data was available in the Zustandsbericht ($([1,377 + 1,737]/2)/31$, or 50/day). (The 2d SSPzD total Zustandsbericht replacements for January (106)--see RH10/313, pg. 47, were substituted with data from MS #P032, pg. 22.) DNBI and return to duty were estimated for the 9th SSPzD for the entire period using the appropriate estimation methodologies.

10th SSPzD

Virtually no data on the 10th SSPzD's 16 December on-hand personnel start strength was available in documentation on the division. According to MacDonald, Siegfried Line, elements of it were engaged in the Aachen sector in November 1944. It's pre-Ardennes combat experience was similar to that of the 9th SSPzD, and so an estimated start strength of 75 percent of authorized personnel was calculated for the division, as used for the 9th SSPzD. (The 10th SSPzD's authorized personnel as of an unspecified date in December was 17,425--see RH10/319, pg. 59.) The 10th SSPzD was refitting throughout the Ardennes period, and was likely receiving replacements during the period 16 December-16 January. Therefore, its daily replacements for the entire period 16 December-16 January are estimated to be 50/day, the average calculated for the 9th SSPzD. Return to duty and DNBI data for the division for the entire period were estimated using the appropriate estimation methodologies.

12th SSPzD

The 12th SSPzD had no Zustandsbericht for early December 1944. The 4 November 1944 Zustandsbericht for the division (RH10/321, pg. 37) gives the on-hand personnel strength of the 12th SSPzD as 18,833. Meyer, pg. 406, estimates that the 12th SSPzD was at full personnel strength, which, on 31 December was 18,548 (authorized) according to the 31 December Zustandsbericht (RH10/321, pg. 41). MS #B779, pg. 13, estimates that the 12th SSPzD's strength was 90 percent. However, based on a comparison of the 31 December Zustandsbericht on-hand personnel strength (16,967) with the full authorized divisional strength, less the battle casualties for 16-31 December (18,548-2,017, or 16,531), the full authorized divisional strength as Meyer estimates, seems to be a valid 16 December start strength for the 12th SSPzD.

The 12th SSPzD 31 December Zustandsbericht indicates that the division received 175 replacements during December. These are assumed to have arrived before 16 December and are included in the 12th SSPzD's start strength, and no additional replacements are credited to the division for 16-31 December. Replacements during January are estimated to have been received at the rate of 56/day, based on the 1-31 January total replacement figure (RH10/321, pg. 52), divided by the number of days in January (1737/31). No 5th PzArmy Surgeon General (RW6v/577) reports are available for the 12th SSPzD. All return to duty and DNBI data for the period 16 December-16 January, therefore, is estimated using the appropriate estimation methodologies.

27th and 28th SSPzGDs

Personnel data was found in research for only the 28th SSPzGD. All personnel data was assumed to be identical for both units.

Neither unit was near full strength or constituted a division-size unit. In fact, they were closer in strength to a regiment. SRS-1869 reports on 1 December 1944 that the 28th SSPzGD had a personnel strength of 1,916. RH24-81/125 (LXXXI K reports) gives the strength of the 28th SSPzGD as 3,000 personnel. (This documentation is unclear; the division may have had an additional 1,200-1,300 men.) RH19IV/241 (Wochenmeldung Ob West) reports the 28th SSPzGD's strength as 2,314 on 20 January.

Based on this data, the 28th SSPzGD's start strength was estimated to be 2,000 personnel. Its return to duty and DNBI were estimated using the appropriate estimation methodologies. The division was assumed to have received 400 replacements between 1-16 January, distributed evenly on a daily basis for this period. This figure of 400 personnel is based on comparison of the SRS-1869 and RH19IV/241 strengths (1,916 and 2,314, respectively). The 27th SSPzGD's personnel strength, for which no personnel data was available, was estimated exactly as the 28th SSPzGD.

FBB

MS #B592, pg. 5, gives the strength of the FBB's replacement battalion as 1,400 men, at 20 percent of the brigades personnel strength (7,000). This figure was estimated to be the brigade's start strength. The 20 January Wochenmeldung Ob West (RH19IV/241), gives the FBB's strength as 6,050 personnel. Using these two strengths, and the estimated battle casualties, DNBI, and return to duty personnel, it was possible to derive an estimated number of replacements for the brigade. MS #B838, pg. 17, reports that the brigade received replacements two times during the offensive, but does not provide figures for the number of replacements received.

The 5th Panzer Army Surgeon General reports (RW6v/577) give data on the brigade's DNBI and return to duty for the periods 21-31 December and 1-20 January. Using this data, and estimated DNBI and return to duty data for the period 16-20 December (derived from the appropriate estimation methodologies), it was possible to compile daily DNBI and return to duty figures for the FBB for the entire Ardennes period. These figures, and the estimated battle casualties, were subsequently added to or subtracted from the 20 January Wochenmeldung Ob West figure to give a strength which was then compared with the MS #B592 strength to give a difference which was estimated to be the number of replacements received by the brigade ($[6,050 + 1,321 + (7,000 \times 0.0024 \times 5) + 125 + 35 + (6 \times 15)] - [(5 \times 18) + 69 + 79 + (6 \times 7)]$). All figures in this equation were derived from primary or secondary sources, except $(7,000 \times 0.0024 \times 5)$ and (5×18) , DNBI and return to duty estimated derived from the appropriate estimation methodologies. For DNBI estimation calculations, an average approximate daily personnel strength was estimated at 7,000 men.

Thus, a figure of 7,426 was calculated and the difference between it and 7,000 (426) was the estimated number of replacements received by the brigade. These were assigned to the brigade in three equal increments on 26 December, 6 January, and 16 January.

FGB

Personnel data available for the FGB is minimal. The LIII K 7 January Weekly report (T314,1335,1028) reports the brigade's personnel strength as 5,200. This figure was used to estimate the brigade's 16 December personnel start strength. The total number of estimated return to duty personnel (310) for the period 16 December-16 January, derived from the return to duty estimation methodology, and replacements totalling 284 personnel were subtracted from the brigade's 7 January strength. (This value of 284 is the estimated number received by the FBB on 26 December and 6 January. As there is virtually no data on the number of replacements received by the FGB, the estimated replacements for the FBB, similar in organization to the FGB, were used.) To the 7 January strength were added the estimated battle casualties (1,356) and an approximate estimate for the total number of DNBI (308), calculated by using a percentage of 0.24%/day at an approximate average daily personnel strength of 5,750 personnel. Thus, the derived FGB personnel start strength was estimated to be 6,270 ($5,200 - [(5 \times 18) + (11 \times 14) + (6 \times 11)] - 284 + 1,356 + 308$). All DNBI and return to duty personnel were estimated using the appropriate estimation methodologies, except for the period 11-16 January, for which the 5th PzArmy Surgeon General report (RW6v/577) was used.

150th PzBde

The 150th PzBde's estimated start strength, 2,960, was taken from ETHINT 12, pgs. 2-4. Since it was a provisionally organized unit and was disbanded in early January 1945, it was assumed to have received no replacements during the Ardennes operation. Its DNBI and return to duty personnel were derived from the appropriate estimation methodologies.

3d FJD

The 3d FJD's personnel strength as of 9 December was 11,465, according to the 9 December LXXXI K Strength report (T314,1597,666). According to the 30 December Wochenmeldung Ob West (RH19IV/241), the division's personnel strength was 6,552, and on 6 January, 6,493, as indicated by the same document.

Attempting to account for the difference between the 9 December and 30 December strengths using the estimated battle casualties, DNBI, and return to duty figures was not possible, as the difference between the 9 and 30 December strengths was too great. (The implications of this difference of several thousand men were that the 9 December strength, or an approximation of it for the 16 December start strength of the division, was too high, or the 30 December strength was too low.) The 3d FJD was pulled out of combat near Dueren around 11 December (see MacDonald, Siegfried Line), so its 9 December strength may be an accurate approximation of its start strength. MS #B779, pg. 4, reports that the 3d FJD was excellent in armament, while pg. 13 of the same document reports that it was 75 percent in authorized strength. MS #A877, pg. 20, also describes the 3d FJD as 75 percent in manpower.

Therefore, a personnel start strength of 12,474 (75 percent of authorized strength of a fallschirmjaeger division) was used for the 3d FJD. DNBI and return to duty figures were estimated using the appropriate estimation methodologies, except for 11-16 January for which the data was taken from the 5th PzArmy Surgeon General report (RW6v/577). A total of 750 replacements were estimated to have been received by the division on 10 January. This number is based on the average of the range of values (500-1,000) reported received by the 3d FJD on 10 January in OKW,KTB,IV 2, pg. 1361.

The strengths presented in Wochenmeldung Ob West on 30 December and 6 January are assumed to be anomalous. This anomaly is based on the analysis of the various pieces of data as discussed above.

5th FJD

The 5th FJD's personnel start strength was estimated by taking the LIII K 7 January 1945 Weekly report (T314,1335,1028), strength--6,152--and adding to it the estimated battle casualties and DNBI and subtracting from it the estimated return to duty for the period 16 December-6 January. The calculated figure was then compared with the authorized strength of a fallschirmjaeger division less its supply units, artillery regiment and panzerjaeger company as was the situation for the 5th FJD described in MS #B023, pgs. 24-25.

The 5th PzArmy Surgeon General report (RW6v/577) provides DNBI and return to duty data for the 5th FJD for the periods 21-31 December and 1-10 January (79 and 136--December and 113 and 58--January). These values (prorated for 1-6 January) and the estimated DNBI and return to duty for 16-20 December and the estimated battle casualties were subtracted from or added to 6,152 as indicated in the following equation $(6,152 - [136 + 36 + 90] + [7,347 + 79 + 66] + [0.0024 \times 13,400 \times 5])$, where 13,400 is an approximate average of the 5th FJD's strength on 16-20 December, or 13,543). Subtracting the authorized strength of a fallschirmjaeger division panzerjaeger company, artillery regiment, and supply units (supply units' strength from RL2III/388) from the division's strength gives a value of 14,824 $(16,632 - 139 - 1,418 - 251)$. A value of 13,543 compares favorably with this value, and so was used as the 5th FJD's estimated start strength. Note that this value (13,543) was calculated using a 7 January strength which likely includes the strength of the division's artillery regiment, which was attached to the LIII K during the Ardennes operation. Since its strength was minimal (elements of two immobile artillery battalion--See MS #B467, pg. 12), its strength was not subtracted from the estimation. DNBI and return to duty for 11-16 January were derived from the appropriate estimation methodologies. A total of 750 replacements (the average of the range -- 500-1,000 -- presented in OKW,KTB,IV 2, pg. 1361) was allotted to the 5th FJD on 10 January, as indicated in that source.

9th VGD

The 9th VGD's personnel strength as of 7 January was 7,987, according to the LIII K Weekly report (T314,1335,1028). This figure was used to estimate the division's 24 December start strength. To this figure were added the estimated 24 December-6 January battle casualties (the 9th VGD did not enter the Ardennes area until 24 December) and estimated DNBI, for the same period, calculated at a rate of 0.24%/day, at an average approximate daily strength of 8,250 personnel. Subtracted from the 7,987 figure were the estimated return to duty personnel and replacements for 24 December-6 January, as derived from the appropriate estimation methodologies. Thus, the equation was $7,987 + 878 + (0.0024 \times 8,250 \times 14) - 178 - 234$, or 8,730.

This figure was used as the estimated start strength of the 9th VGD. Attrition of the division for all periods of its participation in the Ardennes operation (24-31 December, 1-10 January, and 11-16 January) was determined using the appropriate estimation methodologies.

12th VGD

The start strength of the 12th VGD was estimated from the percentage of authorized personnel as described in MS #B779 (85 percent of authorized strength, or $0.85 \times 11,197$). Daily personnel strengths were calculated using the appropriate return to duty and DNBI estimation methodologies. Replacements arrived at the division on 10 January (600) according to MS #B027, pg. 61.

18th VGD

MS #B688, pg. 1, reports the strength of the 18th VGD as 10,500 personnel in September 1944. The same document, on pg. 19, reports that between September and December the 18th VGD lost 110 men, and that on 16 December it had 450 cases of sick and wounded. Since its unclear if those sick and wounded remained with the division or departed for hospitalization at a higher echelon, they are assumed to be with the division and included in its personnel start strength of 10,390, or 10,500 - 110. MS #B688, pg. 77, reports the unexpected arrival of 500 replacements for the 18th VGD on 15 January (the only replacements received by the division during the Ardennes operation). The 5th PzArmy Surgeon General report (RW6v/577) has data for DNBI and return to duty personnel for 11-20 January. This data was prorated for the period 11-16 January. DNBI and return to duty personnel for the period 16 December-10 January were estimated using the appropriate estimation methodologies.

26th VGD

Pallud, pg. 51, describes the 26th VGD as "almost at full strength" when it entered the front line in late November in preparation for its attack on 16 December. The 5th PzArmy Surgeon General report (RW6v/577) gives data on return to duty personnel and DNBI for the 26th VGD during the periods 1-10, 11-20 December and 1-10, 11-20 January.

The 26th VGD's 16 December personnel strength was estimated at 85 percent of authorized ($0.85 \times 11,707$, or 9,951). Its DNBI and return to duty for the above periods were derived from the 5th PzArmy Surgeon General report, prorated for 11-20 December and 11-20 January. DNBI and return to duty for 21-31 December were estimated using the appropriate estimation methodologies, as were replacements during the entire period 16 December-16 January.

47th VGD

Various LXXXI K reports (Strength reports--T314,1597,666, Daily Personnel Loss reports--T314,1597,1134, and a 30 December Weekly report--T314,1597,3) were used for daily on-hand personnel strengths and DNBI for the 47th VGD.

For 16-30 December, DNBI data was taken from T314,1597,1134. For 31 December-4 January (the 47th VGD's last day in the Ardennes area), the DNBI estimation methodology was used to derive daily DNBI figures. For 16 December-4 January, return to duty personnel were estimated using the return to duty estimation methodology.

Daily personnel strengths are available for the 47th VGD on 14, 19, 24, 29, and 30 December. These figures were used as the division's daily personnel strengths on those days, the 14 December strength used as the division's start strength on 16 December. Estimated replacement figures were assigned to the 47th VGD on 18, 23, 28, and 29 December to balance the difference in the strengths derived using the daily return to duty, battle casualties, and DNBI, and the actual on-hand strengths given in the LXXXI K Reports.

59th ID

The Wochenmeldung Ob West on 30 December and 6 and 20 January (RH19IV/241) have on-hand strengths for the 59th ID. These strengths were used to estimate the division's 26 December start strength (the 59th VGD entered the Ardennes area on 26 December) and replacements.

The 26 December strength was estimated by adding the 26-29 December battle casualties and the estimated, approximate daily DNBI to, and subtracting the estimated 26-29 December return to duty from, the 30 December strength (5,109). Thus, the 26 December strength was calculated: $5,109 + 112 + (0.0024 \times 5,200 \times 4) - 56$, or 5,215.

DNBI and return to duty personnel for 26 December-16 January were estimated from the appropriate estimation methodologies. Replacements were estimated for 5 January (1,687), as the difference between the derived daily 6 January strength (4,675) and the 6 January strength (6,362) provided in Wochenmeldung Ob West.

62d VGD

The 62d VGD was "up to full strength" in manpower according to MS #B028, pg. 29. It was also lacking its FLAKCo -- anti-aircraft company -- 147 personnel. Therefore, its estimated 16 December personnel strength is 11,050 or 11,197 - 147, the authorized volks grenadier division personnel strength, less FLAKCo personnel. The 5th PzArmy Surgeon General report (RW6v/577) has DNBI and return to duty data for 1-10 and 11-20 January. This data (prorated for 11-16 January) was used for daily DNBI and return to duty during the period 1-16 January. DNBI and return to duty personnel during December were estimated using the appropriate estimation methodologies. MS #B068, pg. 27, reports the arrival of 800 replacements during January. Half of these are assumed to have arrived during the period 1-16 January, in equal increments allocated on a daily basis.

79th VGD

MS #B070, pg. 2, reports that the 79th VGD was at 80 percent of authorized personnel strength in December (authorized being 11,701 for the 79th VGD, a volks grenadier division with a full replacement battalion), or 9,361. However, the 30 December Wochenmeldung Ob West (RH19IV/241) reports the division's 30 December strength as 9,211, or 78 percent, ten days after the division entered combat. The division's 20 December start strength (it entered the Ardennes area on 20 December) was estimated by taking the 9,211 figure and adding to it the 20-29 December battle casualties and estimated DNBI (estimated by taking a daily rate of 0.24 percent using an approximate daily strength of 9,500), and subtracting from it the estimated return to duty personnel. Thus, the 20 December personnel strength was estimated: $9,211 + 837 + (0.0024 \times 9,500 \times 10) - 144$, or 10,132.

DNBI, return to duty personnel, and replacements were estimated for the entire 20 December-16 January period using the appropriate estimation methodologies.

85th ID

The 85th ID's 30 December personnel strength was 5,602, according to the Wochenmeldung Ob West (RH19IV/241). As no other data or information was available on its 16 December strength, its 16 December strength was derived by adding to the 30 December strength the 16-29 December battle casualties and the 16-29 December DNBI (estimated by a daily rate of 0.24 percent of an approximate average daily strength of 5,700), and subtracting from it the estimated 16-29 December return to duty. Thus, the division's 16 December strength was calculated: $5,602 + 495 + (14 \times 0.0024 \times 5,700) - 216$, or 6,073. DNBI and return to duty were estimated for the entire 16 December-16 January period using the appropriate estimation methodologies. Replacement personnel (342) were assumed to have arrived on 5 January, their numbers estimated as the difference between the 6 January Wochenmeldung Ob West strength (5,690) and the derived 6 January strength (5,348).

89th ID

The 30 December and 6 January Wochenmeldung Ob West (RH19IV/241) provide the 89th ID's personnel strength on those days (6,220 and 5,991). The 6,220 figure was used to estimate the division's start strength. To it were added the division's 16-29 December battle casualties (320) and DNBI (estimated using a rate of 0.24 percent per day of a force of an approximate daily strength of 5,800 personnel) and from it were subtracted the estimated 16-29 December return to duty personnel (216) and replacements (467 received on 21 December and an additional estimated 467 received on 28 December, the latter value not specified in MS #P032a, pg. 18). Thus, the 89th ID's start strength for 16 December was calculated: $6,220 + 320 + (0.0024 \times 5,800 \times 14) - 216 - 467 - 467$, or 5,585.

The 5th PzArmy Surgeon General report (RW6v/577) has data on DNBI and return to duty personnel for the 89th ID during the period 11-20 January. This data was prorated and used for 11-16 January. All other DNBI and return to duty personnel were estimated using the appropriate estimation methodologies.

167th VGD

MS #B041, pg. 4, describes the 167th VGD as having been brought "up to full strength" prior to the Ardennes operation. Its start strength was therefore estimated to be full authorized strength of a volks grenadier division, less personnel in its FLAKCo -- antiaircraft company (see the Panzerjaeger Abteilung report, RH10/105, which indicates that the 167th VGD did not have its FLAKCo), or 11,050 (11,197-147).

As no data or information was available for return to duty personnel and DNBI, this data was estimated for the entire 16 December-16 January period. The 20 January Wochenmeldung Ob West (RH19IV/241) reports the division's strength at 6,000 personnel. Comparing this strength with the derived 16 January strength indicates that the division likely received no replacements. Therefore, none were allocated to the division in estimating its daily personnel data.

212th VGD

Pallud, pg. 54, indicates that the 212th VGD was the German 7th Army's best division and up to strength in manpower at the start of the Ardennes operation. The 3 February Wochenmeldung Ob West (RH19IV/241) reports the division's 3 February strength at 10,971 personnel (after its combat in the Ardennes, but likely also after receiving replacements in late January). However, MS #B073's description of the Ardennes activity of the 212th VGD indicates that the division's combat strength was depleted by 25/26 December (see MS #B073, pgs. 3 and 5), even after receiving replacements sometime around 19-21 December.

The 212th VGD's 16 December start strength was estimated to be 95 percent of authorized, less the strength of its FLAKCo which was not present with the division (see the Panzerjaeger Abteilung report, RH10/105), or $(0.95 \times 11,197) - 147 = 10,490$. MS #B073's description of the 212th VGD's personnel strengths must be attributed to the casualties of the combat units of the division.

Replacements were assumed to have arrived on 20 December. Their number was assumed to be 50 percent of the 624 average derived from the German personnel replacement methodology (312). The remainder (312) were assumed to have arrived in equal daily increments during 1-16 January. All DNBI and return to duty personnel were estimated using the appropriate estimation methodologies.

246th VGD

The LXXXI K 's Personnel Strength reports for 6, 9, and 14 December (T314,1597,666) provide the daily strengths of the 246th VGD on those days. The 30 December and 6 January Wochenmeldung Ob West (RH19IV/241) provide data on the division's personnel strength on those days. MS #A924, pg. 61, reports the 246th VGD's 16 December start strength as 80 percent of authorized. LXXXI K Daily Personnel Loss reports for 16-17 December (T314,1597,1134) provide the division's DNBI on those days.

The figure 8,958 (80 percent of authorized volks grenadier division personnel strength--11,197) was used as the division's start strength. All return to duty personnel and DNBI were derived from the appropriate estimation methodologies for 16 December-10 January (except DNBI on 16-17 December as described above). The 5th PzArmy Surgeon General report (RW6v/577) provided data, which was prorated for 11-16 January, for return to duty and DNBI for 11-20 January.

Replacements were estimated as the difference between the derived 30 December strength (8,613) and the 30 December Wochenmeldung Ob West strength (9,311), or 698, allocated to the division on 29 December. The difference between the derived 6 January strength (9,000) and the 6 January Wochenmeldung Ob West strength (8,916) was not considered sufficient to warrant adjusting the estimated DNBI figures for 31 December-5 January.

272d VGD

The 272d VGD's strength on 30 December, 6 January, and 20 January were 8,409, 7,965, and 7,933, according to the Wochenmeldung Ob West (RH19IV/241) of those dates.

The division's 16 December start strength was estimated by adding the 16-29 December battle casualties and DNBI (DNBI derived at a daily rate of 0.24 percent for an estimated approximate daily strength of 8,500 personnel) to, and subtracting the 16-29 December return to duty personnel from the 8,409 figure. Thus, the 16 December strength was estimated to be 8,771, or $8,409 + 320 + (0.0024 \times 8,500 \times 14) - 244$.

DNBI and return to duty personnel were estimated for all days, except 1-5 January, using the appropriate estimation methodologies. For 1-5 January, the return to duty personnel daily figure was reduced to 5 and the DNBI daily figure personnel to 30, adjustments made to reflect the 6 January Wochenmeldung Ob West strength of 7,965. (The actual estimated ACSDB personnel strength on 6 January value is 8,007.) The 272d VGD was assumed to have received replacements after 6 January totalling 624 (the number determined in the German personnel replacement methodology) at an average daily rate of 56-57 per day.

276th VGD

All DNBI, return to duty, and replacement data was estimated for the 276th VGD. Its 16 December strength was estimated by subtracting the estimated 16 December-6 January replacements and return to duty and adding the 16 December-6 January battle casualties and DNBI to the 7 January strength (7,695) reported in the 7 January LIII K Weekly report (T314,1335,1028). DNBI for 16 December-6 January were estimated at a daily rate of 0.24 percent for an estimated approximate daily force strength of 8,300 personnel. Thus, the division's start strength was calculated $7,695 + 1,731 + (0.0024 \times 8,300 \times 22) - 310 - 234$, or 9,320.

277th VGD

MS #A924, pg. 61, reports the 277th VGD's 16 December start strength as 75 percent of authorized, and MS #B779, pg. 13, reports its as 80 percent. However the 30 December Wochenmeldung Ob West (RH19IV/241) reports the division's 30 December strength as 6,171 personnel.

The 6,171 personnel figure was used to derive the 16 December start strength of the division. To it were added the 16-29 December battle casualties and DNBI (DNBI estimated at an average daily rate of 0.24 percent of an approximate daily force strength of 6,500), and subtracted from it were the 16-29 December return to duty personnel. Thus, the 277th VGD's estimated start strength was $6,171 + 1,076 + (0.0024 \times 6,500 \times 14) - 216$, or 7,249. This value was only 65 percent of authorized volks grenadier division strength (11,197), but was considered a close estimate based on the 277th VGD's 30 December strength.

Return to duty personnel and DNBI were estimated for the period 16 December-10 January. For 11-16 January this data was determined using prorated values from the 11-20 January figures provided in the 5th PzArmy Surgeon General report (RW6v/577). MS #B273, pg. 17, reports that the 277th VGD received 1,500 replacements in January. Comparison of the 30 December (6,171) and 6 January (7,448) Wochenmeldung Ob West strengths indicated that the replacements were very likely assigned to the division sometime between 1-6 January. Therefore, they were assumed to have arrived on 5 January, and were allocated to the division on that date. Note that the derived 6 January personnel strength as used in the ACSDB (7,412) was almost the same as the Wochenmeldung Ob West 6 January value.

326th VGD

MS #A924, pg. 61, reports the 326th VGD's 16 December strength as 80% of authorized. The 30 December Wochenmeldung Ob West (RH19IV/241) reports the division's strength as 8,346. To this figure were added the 16-29 December battle casualties and estimated DNBI (DNBI estimated at a rate of 0.24 percent per day for a force with an approximate average daily strength of 8,650), and from it were subtracted the estimated return to duty personnel for 16-20 December. Thus, the 326th VGD's start strength was calculated: $8,346 + 662 + (0.0024 \times 8,650 \times 14) - 216$, or 9,083 (81 percent of a volks grenadier division's authorized personnel strength--11,197).

Return to duty and DNBI for all days except 11-16 January were estimated using the appropriate estimation methodologies. For 11-16 January the 5th PzArmy Surgeon General report (RW6v/577) 11-20 January figures were prorated for six days.

The 3 February Wochenmeldung Ob West reports a very low personnel strength for the division (3,900). MS #B092, pg. 9, mentions only 60 replacements arriving with the division on 22 January. Therefore, no replacements are allocated to the division during the period 16 December-16 January.

340th VGD

The 20 January Wochenmeldung Ob West (RH19IV/241) reports that the 340th VGD's strength was 5,125 personnel. To estimate the 16 December strength of the division, the 16 December-19 January divisional personnel losses and gains were added and subtracted to this strength. Estimated battle casualties for 16 December-16 January were 2,317. For 17-19 January, an additional 129 battle casualties (43 per day) were estimated. (These three days were "inactive" combat days, and the estimated daily battle casualty figure for inactive days during the 11-20 January period was 43.) The 5th PzArmy Surgeon General report (RW6v/577) reports 435 DNBI for 1-10 January. DNBI for 16-31 December and 11-19 January were estimated at the rate of 0.24 percent per day for an approximate average daily strength of 6,100 personnel, or $25 \times 0.0024 \times 6,100$. The 5th PzArmy Surgeon General report also provides return to duty for 1-10 January (123). Return to duty for all other days between 16 December and 19 January were estimated using the return to duty estimation methodology. MS #B678, pg. 45, reports 550 replacements received by the 340th VGD during January. One-half of these were assumed to have arrived between 1-16 January. Thus, the 340th VGD's 16 December start strength was estimated as 7,613, or $5,125 + 2,317 + 129 + 435 + (25 \times 0.0024 \times 6,100) - 123 - 361 - 275$.

344th ID

The 24 December LXXXI K Personnel Strength report (T314,1597,666) reports the strength of the 344th ID as 4,017. The LXXXI K Daily Personnel Loss reports (T314,1597,1134) report the division's daily battle casualties and DNBI for 22-28 December. Using these figures, and estimated return to duty personnel for 16-28 December and DNBI for 16-21 December, the division's daily strengths and losses were determined. For 22-28 December, this data was estimated by adding and subtracting losses, as appropriate. For 16-21 December, the estimated daily return to duty were subtracted from the next day's strengths and the resulting figure multiplied by 0.0024 to give an estimated DNBI value. The return to duty and DNBI were then subtracted from and added to the next day's strength to give the previous day's strength. No battle casualties were assessed against the 344th ID between 16-21 December as it was in reserve during this period.

352d VGD

MS #B067, pg. 2, reports that the 352d VGD's enlisted personnel and officers were at full authorized strength, and its noncommissioned officers at 75 percent of authorized. According to T78,410,6378533 (the volks grenadier division organizational table), a volks grenadier division's authorized NCO strength was 1,848 personnel. The 352d VGD's start strength was estimated by subtracting out the strength of its FLAKCo -- antiaircraft company (147) which it lacked (see RH10/105), and then subtracting 1,819 (the FLAKCo's authorized NCO strength was 29) from the resulting figure, multiplying 1,819 by 0.75 and adding it back to arrive at an estimated strength for one volks grenadier division, with NCOs at 75 percent of authorized and less its FLAKCo, or $(11,197-147)-1,819+(1,819 \times 0.75)$, or 10,595.

All DNBI, return to duty, and replacements were estimated using the appropriate estimation methodologies.

353d ID

The 353d ID's personnel strengths on 24, 29, and 30 December, and 6 and 20 January are provided in the LXXXI K 24 and 29 December Personnel Strength reports, the LXXXI K 30 December Weekly report, and the Wochenmeldung Ob West (T314,1597,666; T314,1597,3; and RH19IV/241)--4,128, 4,337, 4,938, 5,146, and 5,227. DNBI and return to duty for 11-20 December are provided in the LXXXI K Daily Personnel Loss reports (T314,1597,1134) as are the 22-30 December DNBI. These figures were used to estimate the 353d ID's daily strengths, DNBI and return to duty for those days on which no data was available, and for replacements for the division (for which no data was available on any day). Strengths for 16-23 December (including the 16 December start strength) were estimated using data from the above sources and the 353d ID's battle casualties, plus return to duty data for 21-23 as estimated from the return to duty estimation methodology, and DNBI on 21 December estimated at 0.24 percent of the 353d VGD's personnel strength on that day. For 24-28 December, daily strengths were derived using the battle casualties, the DNBI from the above sources, and return to duty derived from the return to duty estimation methodology. The division was assumed to have received 521 replacements on 28 December, this value being equal to the difference between the derived 29 December strength (3,816), and the LXXXI K 29 December Personnel Strength report figure (4,337). The 30 December LXXXI K Weekly report figure (4,938), was determined to include attachments, when compared with the 29 December personnel strength in the 29 December LXXXI Personnel Strength report, which differentiates between the strengths of the division and its attachments. Therefore no replacements are allocated to the division on 29 December to compensate for the difference between the derived 30 December strength (4,238) and the LXXXI K Weekly report strength (4,938). Return to duty and DNBI for the period 30 December-16 January were estimated from the appropriate estimation methodologies, except for DNBI on 30 December which were available in the above sources. The 6 January Wochenmeldung Ob West strength (5,146) was assumed to include attachments, like the 30 December strength, and was not used in calculating 353d ID replacements. Instead, the personnel replacement estimation methodology was used for all replacements received during January (39 per day).

363d VGD

The 363d VGD's DNBI for 16-30 December were taken from the LXXXI K Daily Personnel Loss reports (T314,1597,1134). Daily personnel strengths for 19, 24, and 29 December are available in the LXXXI K Personnel Strength reports (T314,1597,666) for those days. Using these figures and the daily return to duty derived from the return to duty estimation methodology, it was possible to determine estimated daily strengths and replacements for the period 16-30 December. Replacements (147) on 23 December were allocated to the 363d VGD based on the difference between the 24 December LXXXI K Personnel report strength (8,386) and the calculated 24 December strength (8,239). For 28 December, replacements were estimated in the same manner (replacements equal to the difference between 8,295 and 8,873, or 578). Replacements (31) were assumed to have reached the 363d VGD on 5 January, based on comparison of the Wochenmeldung Ob West (RH19IV/241) 6 January strength (8,593) and the calculated 6 January strength (8,562). For 6-16 January replacements were assumed to have arrived at the replacement estimation methodology rate of 39 per day, as a comparison of the 6 and 20 January Wochenmeldung Ob West strengths indicated that the division probably received new personnel before 20 January. Note that all return to duty personnel and DNBI for 31 December-16 January were estimated using the appropriate estimation methodologies.

560th VGD

The 560th VGD was described in MS #B027, pg. 1, as "up to strength." Its 16 December start strength was therefore estimated to be full authorized volks grenadier division strength 11,197. (Note: Not all elements of the division had arrived by 16 December. These units, and their dates of arrival to the 560th VGD, are indicated on the attachment/detachment list in the Unit Data Base.) DNBI and return to duty personnel for 16-20 December and 11-16 January were derived from the 5th PzArmy Surgeon General report (RW6v/577). All other DNBI and return to duty were estimated using the appropriate estimation methodologies.

The 20 January Wochenmeldung Ob West (RH19IV/241) reported the 560th VGD in low "fighting quality" condition, and the same source for 3 February reports that the division was in even worse condition. Based on these assessments (no personnel strengths are reported in the Wochenmeldung) the division was assumed to have received no replacements during January.

German Divisional Military Occupational Specialty (MOS) Data Estimation and Derivation

The sixth phase in developing the Unit Data records for the German segment of the Ardennes Campaign Simulation Data Base (ACSDB) involved generating the so-called "military occupational specialty" (MOS) personnel data for the 39 German divisions and three brigades, including daily on-hand strengths, replacements by MOS, and returns to duty (RTDs) by MOS. For complete definitions of the MOS categories, see the ACSDB Unit Data Base narrative.

This paper is intended to serve as the bibliographic reference for sources used in generating German divisional personnel MOS data; it also explains the general approach used in calculating the data. Daily data on personnel strengths by MOS categories was notably lacking in primary and secondary source records to a greater extent than the shortage of similar data for US divisions. In point of fact, there were no records available for German units in the Ardennes Campaign, comparable to those of the US 30th and 102d Infantry Divisions, and the US 17th Airborne Division, which provide daily personnel strengths, casualties, and reinforcements (replacements and RTDs), for all of the component units of these US divisions. Therefore, a considerable amount of estimation was used to generate daily German MOS data. This estimation process relied on the use of a computer program to generate the daily data, in a manner similar to that employed for some US divisions.

Sources referenced in this narrative are recorded in the Bibliography Data Base, where complete bibliographic information is provided on them.

The first step in generating daily MOS data was to determine the start MOS strengths of the units. This was a relatively straightforward process for the armored, armored infantry, and SS armored (panzer, panzer grenadier, and SS panzer) divisions. Using the monthly divisional reports for these units (Zustandsbericht or Gliederung), usually dated the beginning of December 1944, it was possible to determine the MOS strengths of the units on those dates. (The reports provided either authorized or assigned personnel strengths by the component units of the divisions.) A set of ratios was then created for the various MOS categories, based on the historical MOS strengths and the total strength of the division. These ratios were then applied to the total personnel start strength of the division, whose derivation is explained in the German Divisional Personnel Data narrative, to estimate the personnel start strengths by MOS categories. Note that there was frequently more than one report available with historical MOS data for some divisions. Judgement

was used in these cases to select the most appropriate report for use in the process described above.

As an example of this process, the derivation of the 1st SS Panzer Division's (SSPzD) start MOS strengths is provided here. The 1 December 1944 Gliederung of the division (see RH10/312, pg. 38), provides the following MOS strengths:

-- Division HQ	(Other MOS):	595
- Armored Regiment	(Armor MOS):	2,346
- Armored Infantry Regiments	(Infantry MOS):	7,061
- Self-Propelled Antitank Battalion	(Armor MOS):	640
- Armored Reconnaissance Battalion	(Armor MOS):	1,021
- Antiaircraft Battalion	(Other MOS):	1,156
- Artillery & Rocket Launcher Battalions	(Artillery MOS):	2,370
- Replacement Battalion	(Infantry MOS):	1,950
- Signals Battalion	(Other MOS):	692
- Engineer Battalion	(Engineer MOS):	1,001
- Transport Battalion	(Other MOS):	870
- Maintenance Battalion	(Maintenance MOS):	718
- Medical Battalion	(Medical MOS):	640
- Supply Battalion	(Supply MOS):	382
	TOTAL:	21,442

Total personnel by MOS categories:

Armor:	4,007	(18.69% of 21,442)
Infantry:	9,011	(42.02% ")
Artillery:	2,370	(11.05% ")
Maintenance:	718	(3.35% ")
Medical:	640	(2.98% ")
Supply:	382	(1.78% ")
Engineer:	1,001	(4.67% ")
Other:	3,313	(15.45% ")

These percentages were then applied to the start strength of the division (17,988) to arrive at the following MOS strengths for the 1st SSPzD on 16 December 1944 (some strengths affected by rounding):

- Armor:	3,362
- Infantry:	7,559
- Artillery:	1,988
- Maint:	603
- Medical:	536
- Supply:	320
- Engineer:	840
- Other:	2,780

The sources used for the other panzer, panzer grenadier, and SS panzer divisions in the MOS start strength estimations are as follow:

2d SSPzD:	6 Nov 1944 Gliederung (RH10/313, pg. 42)
9th SSPzD:	1 Nov 1944 Gliederung (RH10/318, pg. 33)
10th SSPzD:	8 Dec 1944 Personnelles Ist (RH10/319, pg. 43)
12th SSPzD:	8 Dec 1944 Personnelles Ist (RH10/321, pg. 44)
2d PzD:	5 Dec 1944 Personnelles Ist (RH10/141, pg. 42)
9th PzD:	4 Dec 1944 Personnelles Ist (RH10/148, pg. 81)
11th PzD:	1 Dec 1944 Personnelles Ist (RH10/149, pg. 62)

PzLehrD and 116th PzD: Averages of data for 2d, 9th, and 11th PzDs were used. Averages of the other three panzer divisions were used, due to a lack of suitable information for early December 1944 for the PzLehrD and 116th PzD.

3d PzGD:	8 Dec 1944 Personnelles Ist (RH10/178, pg. 62)
15th PzGD:	8 Dec 1944 Personnelles Ist (RH10/181, pg. 42)

For other divisions and brigades (volks grenadier, infantry, fallschirmjaeger (paratrooper), etc.), a variety of sources or methodologies were used to estimate or determine the start MOS strengths. Principal among these was the use of a methodology similar to the one employed to determine start MOS personnel strengths for US divisions in the ACSDB. This methodology involved:

1) determining the difference between total authorized and actual personnel strengths of a division,

2) multiplying that difference by MOS attrition percentages (the derivation of which is explained later in this paper), and

3) subtracting the values calculated in Step 2 from the authorized MOS strengths of a division type to arrive at the estimated MOS personnel start strengths of a particular division.

This methodology was used for the following divisions:

3d FJD
9th VGD
12th VGD
18th VGD
26th VGD
47th VGD
246th VGD
272d VGD
277th VGD
340th VGD
363d VGD

For other units, the methodology described above was used along with modification of MOS personnel strength data, based on known shortages in MOS categories. For example, several of the volks grenadier and infantry divisions were without artillery, FLAK (antiaircraft), or self-propelled antitank components during the Ardennes Campaign.

These units included:

59th ID (less antitank company)
62d VGD (less FLAK company)
79th VGD (less antitank and FLAK companies)
85th ID (less antitank and FLAK companies)
89th ID (with only the equivalent of one artillery
battalion)
167th VGD (less FLAK company)
212th VGD (less FLAK company)
276th VGD (less FLAK company)
326th VGD (less FLAK company)
344th ID (with only the equivalent of two artillery
batteries)
352d VGD (less FLAK company)
353d ID (less towed antitank company)

For these divisions, the MOS strengths of the lacking component units were subtracted from the authorized MOS strengths of the divisions. The three-step described above process was then implemented. In cases where the lack of a component unit

eliminated the total strength of an MOS category in a unit (such as the lack of a self-propelled antitank company with a volks grenadier division), the attrition percentage of that MOS category was included with the Infantry MOS attrition percentage.

The 560th VGD was considered at full authorized personnel strength and so its start MOS strengths were estimated to be the authorized strengths of a volks grenadier division.

MOS personnel start strengths of the 150th PzBde were determined from the information provided in ETHINT 12 (Otto Skorzeny's manuscript on the operations of the 150th Panzer Brigade, one of the post-war Foreign Military Studies on file at the US National Archives).

Information on the organization of the Fuehrer Begleit Brigade (FBB) is found in MS #B592 and RH10/101. From this information, MOS start strengths of the brigade were estimated. Information on the Fuehrer Grenadier Brigade is almost nonexistent, so the MOS category percentages from the FBB were applied to the start strength of the FGB to determine the latter brigade's MOS start personnel strengths.

The 5th FJD lacked several component units, including antitank elements, supply units, and artillery units. The personnel in these units were subtracted from the strength of the divisions, and the three-step process described above was then implemented.

The 27th and 28th SSPzGDs were considered to be composed entirely of Infantry MOS personnel, based on the organization of the 28th SSPzGD described in RH24-81/125.

After start MOS strengths had been determined for all divisions, a computer program was used to generate daily MOS strengths for replacement and RTD personnel, daily personnel attrition rates by MOS category, and, using these figures, daily on-hand personnel strengths by MOS categories.

The key element in this estimation process was a set of MOS attrition percentages taken from the HERO Attrition Handbook. This study, prepared in 1986 by the Historical Evaluation and Research Organization (HERO), contains information and data on personnel and equipment attrition based on historical data. A copy of the table from the Handbook with the relevant MOS attrition percentages is contained in Attachment 1 to this paper.

The World War II percentages from the Handbook were used for estimating German MOS attrition percentages, as well as MOS replacements and RTD strengths because of the lack of comparable information for German units in German historical records. In the 5th PzArmy Surgeon General reports (RW6v/577), pages 7-8, MOS

losses for certain German divisions in Normandy in July 1944 are provided. After deliberation, it was decided that the number of divisions in this sample was insufficient for generating MOS loss percentages, and so the Handbook figures, derived from US Army World War II experience, were selected instead.

Several modifications were made to these percentages. For German panzer, panzer grenadier, and SS panzer units, the "Air Defense" and "Other" categories in the table were combined and the resultant figure then divided by three for the "Maintenance," "Supply," and "Other" MOS categories used in the ACSDB. Thus, the following set of figures was used for the panzer, panzer grenadier, and SS panzer units:

- Infantry:	80.4%
- Armor:	3.5%
- Artillery:	5.6%
- Engineer:	3.6%
- Medical:	2.9%
- Maintenance:	1.3%
- Supply:	1.3%
- Other:	1.4%

For infantry, volks grenadier, and fallschirmjaeger units, the "Armor" MOS percentage was reduced to one percent (1.0%), and the difference between that and 3.5% (2.5%), was added to the "Other" MOS percentages. Thus, the following set of figures was used for the infantry, volks grenadier, and fallschirmjaeger units ("infantry-type" divisions):

- Infantry:	80.4%
- Armor:	1.0%
- Artillery:	5.6%
- Engineer:	3.6%
- Medical:	2.9%
- Maintenance:	1.3%
- Supply:	1.3%
- Other:	3.9%

Armor MOS percentages were reduced to reflect the smaller Armor component of the infantry-type divisions. The percentage of one percent (1.0%) was derived by taking the total self-propelled antitank gun losses of the infantry-type divisions as calculated for the ACSDB and estimating the number of personnel lost with these vehicle losses. The total gun losses of the organic self-propelled antitank units of 20 infantry-type divisions was 48 destroyed and 104 damaged. Based on an assumed average of three casualties per destroyed and two casualties per damaged, a total of 352 Armor MOS personnel losses were estimated for the infantry-type divisions. The combined start personnel strengths of the infantry-type units was 162,824, or an average of 8,141 per division (162,824/20). An average loss per division

of 17.6 Armor MOS personnel is estimated (352/20), for an average MOS percentage loss per division of 0.2% (17.6/8,141). This percentage was increased to 1.0% to reflect disease and non-battle injury losses (DNBI) among Armor personnel of the infantry-type divisions, as well as any other losses possibly sustained by non-combat vehicle crewmen of the division's antitank units.

The computer program used to estimate daily MOS data for German divisions incorporated the MOS attrition percentages from the HERO Attrition Handbook in calculation of MOS replacement and return to duty personnel strengths. These percentages were used on the assumption that reinforcements received by units would be similar in composition among MOS categories to the losses sustained by the units. In fact, examination of the personnel attrition, replacement, and RTD MOS percentages experienced by US divisions in the Ardennes showed this to be the case.

Taking the start MOS strengths of a German division, the computer program added to it the day's reinforcements, and subtracted from it the casualties, all by MOS category, to arrive at the next day's MOS personnel strengths. The process was repeated for the division for each day of the Ardennes Campaign.

For units lacking personnel in MOS categories (the 150th PzBde without Medical and Supply personnel, the 3d FJD without Armor personnel, etc.), the figures calculated using the computer program were manually adjusted so that all attrition and reinforcements in the missing MOS personnel categories were credited to the Infantry MOS category of the unit. This was done to ensure that no unit without a particular MOS category sustained losses or received reinforcements of personnel in that category.

Attachment 1

Table from HERO Attrition Handbook

Figure 33

Percentage of Casualties by Branch for
American Wars of the 20th Century

	World War I	World War II	Korea
Infantry	87.9	80.3	83.8
Armor	0.2	3.5	2.5
Artillery	4.3	5.6	6.9*
Engineer	3.2	3.6	2.4
Air Defense	-	1.9	*
Medical	1.5	2.9	3.0
Other	2.0	2.2	1.4

*Artillery and Air Defense were combined in the Korean War.

**German Non-Divisional Unit Personnel Battle Casualty,
Return to Duty, and DNBI
Estimation Methodologies**

The seventh phase in developing the Unit Data records for the German segment of the Ardennes Campaign Simulation Data Base (ACSDB) was to generate data for non-divisional combat units attached to divisions or subordinated to armies or corps. To a much greater degree than the German divisions in the Ardennes operation, the German non-divisional units in the Ardennes lack personnel strength and casualty data in primary and secondary sources. As the documentation of the divisions is far from complete, the information on non-divisional units is indeed very limited. Of necessity, several major generalizations concerning non-divisional units were made, such as starting non-divisional units at full authorized personnel strength and attriting non-divisional units at one rate when subordinated to corps or armies, or at the rate of the parent unit to which they were attached.

All sources referenced in this narrative are recorded in the Bibliography Data Base with complete bibliographic information.

Battle casualty attrition estimation for German non-divisional units was based on either the attrition rate of their parent divisions, when the non-divisional units were subordinated to divisions, on an average attrition rate derived from a table in the 1983 version of RB 101-999, Staff Officer's Handbook, a reproduction of which is attached to this paper (Attachment 1), or on an average of 25 attrition rates of non-divisional units derived from historical data.

- For all non-divisional units when attached to divisions, total battle casualties were determined by the same rate calculated for the parent division. Decimals were rounded off to the nearest whole number.
- For infantry, armored, self-propelled and towed antitank, and combat engineer non-divisional units when in corps or army, an average of the rate derived from rates in Figure 7-19 of the 1983 version of RB 101-999 (the same table used to estimated Active/Inactive/Out of Contact attrition rates for German divisional battle casualties) was used to determine battle casualties. The rate used was 0.4 percent -- $(0.3 + 0.4 + 0.5 + 0.4 + 0.7 + 0.5 + 0.3 + 0.4 + 0.3 + 0.5 + 0.4 + 0.3 + 0.3 + 0.3 + 0.3)/15$.
- For antiaircraft, artillery, and construction engineer units when in corps or army, an average rate of 0.2 percent (rounded off), as derived from the historical data shown in

Attachment 2 of this paper, was used. The historical data in Attachment 2 was also used in lieu of estimated data for the appropriate units for the time periods shown in the Attachment.

Note that the rate of 0.4 percent used for the armored, antitank, combat engineers, and infantry units is twice as great as the rate used for the other non-divisional units in corps and army. This difference is intended to reflect the heavier casualties incurred by the former units as their mission generally put them in greater proximity to the front line.

For all units, the ratio of killed, wounded, and missing was determined by the total divisional killed, wounded, and missing ratio, as shown in Attachment 3, or 12,073:37,978:32,728 -- 15% - - 46% -- 39%. Decimals derived in applying this ratio were rounded off to the nearest whole number.

Return to duty personnel for non-divisional units were calculated using the average 11-20 and 21-31 December, and 1-10 and 11-20 January figures derived in the German divisional return to duty estimation methodology (18, 14, 11, and 13), and the "typical" daily strength figure for German division in the Ardennes calculated in the German DNBI Rate Estimation Methodology narrative (8,466). For each non-divisional unit, daily return to duty rates of 0.21, 0.17, 0.13, and 0.15 for the 11-20 December, 21-31 December, 1-10 January, and 11-20 January periods were applied to the unit's start strength to derive a daily return to duty figure (18/8,466, 14/8,466, 11/8,466, and 13/8,466). Decimals derived from this methodology were rounded off to the nearest whole number. For derivation of German non-divisional unit replacement estimation, see the German Personnel Replacement Estimation Methodology narrative.

The DNBI rate used for all non-divisional units was 0.24 percent per day of the unit's daily start strength, the same rate used for German divisions in the Ardennes.

The above-described percentages and methodologies were applied to each of the German non-divisional combat units in the ACSDB. This approach differed from that employed for US non-divisional combat units, for which personnel data was generated using personnel strengths of MOS categories to which were applied daily attrition and reinforcement rates. Because of the fewer number of German attachments and detachments of non-divisional combat units, it was possible to generate data for them on an individual basis, using hand calculators, and then aggregate data for the appropriate "Corps Troops," "Army Troops," or "divisional Att (Attachment)" and record that data in the ACSDB.

The system used to record (not to generate) German non-divisional combat unit personnel data is identical to that used

for US units. Specifically, the personnel strengths, casualties, and reinforcements of a "Corps Troops," "Army Troops," or "divisional Att (Attachment)" reflect the data of the units identified in the "ATTACHMENTS & DETACHMENTS" section of the German Unit Data Base. As is the case with the US Unit Data Base, the personnel data of non-divisional combat units subordinated to German divisions is recorded in records identified with "Att," i.e., "10th SSPzD Att."

Attachment 1
RB 101-999 Table

SECTION VI--Personnel Loss Computations

7-23. Daily Personnel Losses as Percentage of Strength.

1	2									
	3			4			5			6
	7	8	9	10	11	12	13	14	15	16
General type of operation for the force as a whole	Division in contact			Division in force and reserve			Handed-over units (camps) ¹			Total (per-centage)
	Battle loss (per-centage)	Nonbattle loss (per-centage)	Total (per-centage)	Battle loss (per-centage)	Nonbattle loss (per-centage)	Total (per-centage)	Battle loss (per-centage)	Nonbattle loss (per-centage)	Total (per-centage)	
2 Covering and security force action	0.6	0.3	1.2	0.3	0.3	0.6	0.3	0.1	0.4	
Attack:										
3 Meeting engagement	2.4	0.3	2.7	0.3	0.3	0.6	0.4	0.1	0.5	
4 Of a position - 1st day	3.8	0.3	4.1	0.4	0.3	0.7	0.5	0.1	0.6	
5 Succeeding days	1.9	0.3	2.2	0.3	0.3	0.6	0.4	0.1	0.5	
6 Of a fortified zone - 1st day	6.3	0.3	6.6	0.5	0.3	0.8	0.7	0.1	0.8	
7 Succeeding days	3.2	0.3	3.5	0.4	0.3	0.7	0.5	0.1	0.6	
Defense:										
8 Meeting engagement	1.6	0.3	1.9	0.3	0.3	0.6	0.3	0.1	0.4	
9 Of a position - 1st day	1.9	0.3	2.2	0.3	0.3	0.6	0.4	0.1	0.5	
10 Succeeding days	1.6	0.3	1.9	0.3	0.3	0.6	0.3	0.1	0.4	
11 Of a sector - 1st day	3.2	0.3	3.5	0.4	0.3	0.7	0.5	0.1	0.6	
12 Succeeding days	1.6	0.3	1.9	0.3	0.3	0.6	0.4	0.1	0.5	
13 Inactive situations ²	0.7	0.3	1.0	0.3	0.3	0.6	0.3	0.1	0.4	
14 Pursuit	1.3	0.3	1.6	0.3	0.3	0.6	0.3	0.1	0.4	
15 Retirement and delaying action	0.7	0.3	1.0	0.3	0.3	0.6	0.3	0.1	0.4	

¹ Use divisional loss rates for units attached to a division.
² Casualties in contact - neither side attacking.

Figure 7-19. Daily personnel losses.

DCOM2429D/MAR83

7-47

Source: RB 101-999, Staff Officer's Handbook, 1983.

Attachment 2

German Non-Divisional Unit Battle Casualty Rates
(Historical Data)

<u>Unit</u>	<u>BCas %/Day</u>	<u>Dates</u>	<u>BCas</u>
8th VWB	.01%/day	1-10 Dec	3
401st VAK	.16%/day	1-10 Dec	53
766th VAK	.01%/day	11-20 Dec	4
766th VAK	.07%/day	21-31 Dec	26
? VAK*	.06%/day	1-10 Jan	21
4th VWB	.12%/day	1-10 Jan	36
409th VAK	.13%/day	1-10 Jan	44
9th VWB	.27%/day	11-20 Jan	79
409th VAK	.21%/day	11-20 Jan	69
4th VWB	.18%/day	11-20 Jan	52
? VAK*	.23%/day	11-20 Jan	77
4th VWB	.08%/day	21-31 Jan	26
402d VAK	.13%/day	21-31 Jan	47
409th VAK	.17%/day	21-31 Jan	63
9th VWB	.11%/day	21-31 Jan	36
1.94/15	.13%/day average		

VWB Authorized strength = 2,933

VAK Authorized strength = 3,326

*VAK is unidentified in source

519th HyPjBN	.25%/day	1-10 Dec	17
657th HyPjBNT	.94%/day	1-10 Jan	62
683d HyPjBNT	.91%/day	1-10 Jan	60
683d HyPjBNT	.73%/day	11-20 Jan	48
2.83/4	.71%/day		

HyPjBN Authorized strength = 686

HyPjBNT Authorized strength = 661

301st HyPzBN	.09%/day	1-30 Nov	22
319th PzCo	.32%/day	1-30 Nov	13
341st StgBde	.18%/day	1-30 Nov	30
1310th FstArBN	.08%/day	1-30 Nov	9
519th HyPjBN	.23%/day	1-30 Nov	47
682d HyPjBNT	.08%/day	1-30 Nov	16
0.98/6	.16%/day		

HyPzBN Authorized strength = 823

PzCo Authorized strength = 137

FstArBN Authorized strength = 385

StgBde Authorized strength = 548

$(1.94 + 2.83 + 0.98) / (15 + 4 + 6) = 0.23\%$, rounded off to 0.2% per day

10- and 11-day data from 5th PzArmy Surgeon General report (German Archives record RW6v/577). November casualty data from various Zustandsbericht of LXXXI Korps units (US National Archives microfilm T314,1597,159-179).

Attachment 3

Cumulative Daily German Divisional Battle Casualties
(ACSDB Figures)

DATE	EDD ONHAND	REPL	RTD	TOTAL CAS	KIA	WIA	MIA	DNBI	%CAS	CAS	%ABO	ABO CNC	WIA CNC
12/15	0	0	0	0	0	0	0	0	0	0	0	0	0
12/16	369718	67	635	3180	433	1406	1341	916	0.85	0.61	0.49	0.11	0.11
12/17	366324	134	635	3700	466	1560	1674	849	1.00	0.77	0.55	0.10	0.10
12/18	362477	519	635	2789	393	1292	1104	386	0.76	0.52	0.46	0.10	0.10
12/19	359822	886	635	2596	389	1287	920	362	0.72	0.48	0.46	0.10	0.10
12/20	367498	1265	653	2533	386	1260	887	300	0.68	0.44	0.44	0.10	0.10
12/21	365097	1799	490	2851	416	1337	1098	319	0.77	0.53	0.43	0.11	0.11
12/22	372608	1866	498	2658	372	1261	1025	329	0.71	0.45	0.44	0.10	0.10
12/23	369687	2809	498	3428	478	1539	1411	805	0.92	0.70	0.54	0.11	0.11
12/24	375625	2876	511	3559	518	1638	1403	809	0.94	0.73	0.57	0.12	0.12
12/25	371835	2943	512	3627	495	1581	1551	300	0.97	0.75	0.53	0.13	0.13
12/26	373202	3294	526	3570	493	1545	1532	321	0.95	0.73	0.54	0.13	0.13
12/27	373688	3361	529	3745	509	1578	1662	370	0.94	0.76	0.55	0.13	0.13
12/28	369665	5475	531	2734	401	1375	958	339	0.79	0.51	0.48	0.13	0.13
12/29	364726	6600	518	2209	325	1059	821	334	0.60	0.37	0.38	0.13	0.13
12/30	363376	6667	519	2398	353	1168	867	330	0.63	0.43	0.42	0.13	0.13
12/31	360704	6734	520	1995	338	983	728	318	0.55	0.35	0.35	0.13	0.13
01/01	358474	7558	400	2227	375	1031	761	399	0.62	0.40	0.40	0.13	0.13
01/02	356672	8382	400	2166	362	1054	753	393	0.60	0.38	0.39	0.13	0.13
01/03	352439	9206	396	2309	360	1107	836	386	0.65	0.41	0.42	0.13	0.13
01/04	350565	0030	396	2719	430	1396	935	334	0.77	0.55	0.50	0.13	0.13
01/05	341765	4414	385	2225	361	1073	791	361	0.63	0.42	0.42	0.13	0.13
01/06	343544	5618	391	2554	411	1218	925	333	0.74	0.52	0.47	0.14	0.14
01/07	341822	6538	393	2504	396	1192	925	330	0.73	0.51	0.46	0.14	0.14
01/08	339375	7458	396	2117	337	1016	764	333	0.62	0.39	0.40	0.14	0.14
01/09	338318	8379	394	1897	230	861	730	331	0.60	0.38	0.38	0.14	0.14
01/10	336982	1400	392	2131	238	1053	743	337	0.60	0.41	0.41	0.14	0.14
01/11	337512	2322	466	2304	303	925	1071	331	0.60	0.41	0.38	0.14	0.14
01/12	335764	3344	466	1925	235	673	691	331	0.47	0.29	0.33	0.14	0.14
01/13	334722	4166	466	2353	321	963	1374	331	0.61	0.43	0.38	0.14	0.14
01/14	332897	5088	466	2263	311	915	1013	331	0.60	0.42	0.38	0.14	0.14
01/15	331213	6510	466	2143	263	897	994	331	0.57	0.40	0.37	0.14	0.14
01/16	330129	7716	466	1691	149	730	694	331	0.50	0.33	0.37	0.14	0.14

**German Non-Divisional Service Support Unit
Personnel, Equipment, and Medical Data**

INTRODUCTION

The derivation of German non-divisional service support personnel and equipment inventory data was a task complicated by two major data shortfalls. (For purposes of discussion in this paper, service support includes maintenance, transport, supply and medical units, as well as headquarters and signals units.)

First, there was a lack of information on the organization (or order of battle) of the service support components of German Army Group B, which provided the logistical assistance to the combat elements of the German attack force. Secondary sources invariably focussed such items as the armored fighting vehicle strengths and organization of the German combat divisions, as well as their activities. Relatively little mention was made of the logistical network which provided support to the German Ardennes offensive. The shortage of information in secondary sources was also evident in primary source records, which were characterized by an equally notable paucity of information on the order of battle of service support units. Few primary source records have survived with descriptions of service support elements in Army Group B during the Ardennes Campaign. There were exceptions to this shortfall -- German I SS Panzer Korps and XLVII Panzer Korps records gave some intimation of the organization of the corps service support component -- and this information was fully exploited to estimate service support data for other corps and the four armies of German Army Group B.

Secondly, there was also a lack of information on the equipment and personnel strengths of German service support units, both in the Ardennes Campaign, and in authorized T/O&E numbers. One source used extensively for information on the strengths of German combat units -- War Department Technical Manual TM-E 30-451, Handbook on German Military Forces, 15 March 1945 -- described the evacuation and supply system of the German Army, but failed to provide comprehensive detailed information on personnel and equipment strengths of the units which ran this system. German Order of Battle, 1944 (London: Arms and Armour, 1975) -- hereafter cited as German OB -- provided minimal information on strengths of non-divisional service support units, but did describe typical corps and army organization of the units.

Therefore, it was with these two major data restrictions that personnel and equipment inventory data was estimated for the

service support elements of German Army Group B. This estimation process was conducted separately from the data generation for similar US units, and without the relative abundance of sources of information for US forces. Upon completion of the estimation process for the Germans, a brief comparison between German and US service support data was made. This comparison gave encouraging results vis a vis the validity of the estimated German data. It showed a German service support component estimated for the ACSDB considerably smaller in size than the massive "headquarters and service" element of the US 12th Army Group's three armies. Nevertheless, the German service support strengths did not appear unrealistically low and, in light of the shortages and weaknesses of the German Army in all sectors by late-1944, are probably realistic estimates of the actual personnel and equipment of Army Group B's supply, maintenance, medical, and transportation units.

This paper serves as the bibliographic reference for sources used to estimate German non-divisional service support units in the Ardennes Campaign. Any source mentioned in this narrative is either fully referenced in the narrative or may be found, with complete bibliographic information on it, in the Bibliography Data Base. This paper also explains any methodologies used to estimate data. Note that data described in this paper relates to both the German Unit Data Base and Unit Inventory Data Base, i.e., German personnel, medical facilities, and equipment inventory data.

PERSONNEL AND EQUIPMENT OF GERMAN CORPS SERVICE SUPPORT UNITS

Information found in I SSPzK, XLVII PzK, LXXXI K records, and German OB, was used to generate personnel and equipment strengths of German corps headquarters units for the ACSDB. Note that unlike the designations used for US corps HQs, the designation employed for German corps HQs in both the Unit and Unit Inventory Data Bases does not utilize the abbreviation "HQ," i.e., "XLVII PzK" and "LIII K" are the designations used for the headquarters units of the XLVII Panzer Korps and LIII Korps.

German Corps Service Support Organization.

Again unlike the US records, it proved possible to list all service support units which comprised the German corps HQ units in the "ATTACHMENTS & DETACHMENTS" section of the Unit Data Base. The following abbreviations were used for German corps service support units and were entered in the "ATTACHMENTS & DETACHMENTS" section of the Unit Data Base:

- CorpsHQ: Corps Headquarters
- SigBN: Signal Battalion
- MedHQ: Medical Headquarters Unit
- MedCoy: Medical Company
- TranCoy: Transportation Company

It is important to note that the German corps headquarters was primarily used for tactical control of subordinate combat elements, and that logistical support of an army's combat elements (divisions and non-divisional units subordinated to division, corps, or army), was in normal doctrine primarily the responsibility of the army. There may have existed additional miscellaneous units in the German corps headquarters, but only those units positively identified in the records of the three German corps (I SSPzK, XLVII PzK, and LXXXI K) were considered in deriving the composition of the German corps service support component for the ACSDB.

The records of the I SSPzK, XLVII PzK, and LXXXI K include:

- I SSPzK -- 1 Dec 44 and 1 Jan 45 Zustandsbericht and Gliederung (German Archives source RH10/309);
- XLVII PzK -- 14 Dec 44 Gliederung (US National Archives microfilm T314,1133,620)
- LXXXI K -- 16 Dec 44 Gliederung (US National Archives microfilm T314,1597,203)

From these records, it was determined that each German corps in the Ardennes Campaign was organized with a headquarters detachment and a signals battalion. This organization was assumed to pertain to all German corps headquarters in the ACSDB, including the provisionally organized headquarters units of the XXXIX PzK, Korps Decker, and Korps Felber. In addition, a medical component (either one company or an unspecified "headquarters" medical unit) and a transportation company probably operated with each corps headquarters. Medical and transportation units were assumed not to have served with the XXXIX PzK, Korps Decker, and Korps Felber, as these were provisionally organized corps units and probably did not immediately acquire medical and transportation components. The XIII K, Korps Felber's successor, was assumed to have acquired medical and transportation elements by the date of its start of operations on 13 January 1945.

German Corps Service Support Personnel Data.

Personnel strengths and attrition of the corps headquarters units were estimated from the experiences of the I SSPzK, as derived from the two sets of reports in RH10/309; the experiences of the 432d Signals Battalion of the LXXXI K (see US National Archives microfilm T314,1597,166-7, a November 1944 Zustandsbericht of the unit); data found on German medical organizations in Military Attache Report No. 2835 (see MID 2835 in the Bibliography Data Base); and the XLVII PzK Corps Doctor December 1944 Activity Report (German Archives sources RH24-47/255).

The following personnel strengths were derived from the sources listed above, and in abbreviated notation in parantheses below:

CorpsHQ: 686 (RH10/309) -- includes headquarters unit and postal unit, used for all corps.

SigBN: 844 (RH10/309) -- used for the panzer corps only (I SSPzK, II SSPzK, XXXIX PzK, Korps Decker, XLVII PzK, and LVIII PzK.

SigBN 499: (T314,1597,166-7) -- used for all other corps instead of 844 personnel, as the strengths of the non-armored corps signals units were assumed to be less than those of the mobile armored formations.

MedHQ: 123 (RH10/309) -- used for the I SSPzK and II SS PzK only (see discussion on medical units in Attachment 1).

MedCoy: 286 (MID 2835) -- used for all corps units other than the I SSPzK, II SSPzK, XLVII PzK, and LVIII PzK (see discussion on medical units in Attachment 1).

MedCoy: 270 (MID 2835) -- used for the XLVII PzK and LVIII PzK (see the discussion on medical units in Attachment 1). The XLVII PzK's medical company is assumed to have arrived at the corps on 22 December 1944 as described in RH24-47/255.

TranCoy: 302 (RH10/309) -- used for all corps.

These personnel strengths were assumed to be the strengths of the corps units when the corps first operated in the Ardennes Campaign. Attrition of the units was based on the experience of the I SSPzK as determined from interpolation of data from the 1 December and 1 January Zustandsbericht of that unit; the experience of the 432d Signals Battalion (T314,1597,166-7); the rate of 0.2%/day as estimated for antiaircraft, artillery, and construction engineer units in the German Non-Divisional Unit Personnel Battle Casualty, Return to Duty, and DNBI Estimation Methodology narrative; and the disease and non-battle injury (DNBI) rate of 0.24%/day.

All units were attrited using a DNBI rate of 0.24%/day. For battle casualty attrition, medical units were attrited at the rate of 0.2%/day, except for the I and II SSPzKs, whose medical personnel were not attrited for battle losses, to reflect data found in RH10/309. All transportation units were attrited at the rate of one (1) wounded personnel every day, reflecting data found in RH10/309. Signals and headquarters personnel were attrited at the rate of one (1) wounded personnel every other day, to reflect data found in RH10/309 and T314,1597,166-7.

Replacements and RTDs were estimated for the units using the same estimation methodologies employed for the non-divisional combat units.

After daily personnel data had been estimated individually for each non-divisional corps service support unit, it was aggregated and entered in the ACSDB in the same manner used for the non-divisional combat units. Note that the designations for the non-divisional corps service support units entered in the "ATTACHMENTS & DETACHMENTS" section of the Unit Data Base are in some cases interpolations based on the standard German corps numbering system, i.e., 485th TranCoy, 413th MedCoy, etc. When actual identifications were known, as for the I SSPzK and the XLVII PzK, they were used.

German Corps Service Support Equipment Data.

Equipment inventory data for corps service support units was estimated from the I SSPzK reports (RH10/309) and the 432d Signals Battalion Zustandsbericht (T314,1597,166-7). The PKW, LKW, and LMG strengths of the I SSPzK on 1 December for all units in the corps headquarters were 123, 234, and 75 respectively. These strengths were used as the start equipment strengths of all

corps HQ, except the XXXIX PzK, Korps Decker, and Korps Felber. The equipment strengths of these units was based on the strengths of the 432d Signals Battalion, i.e., 55 PKW, 62 LKW, and 12 LMG.

Attrition of equipment in the corps HQ was based on the data found in RH10/309. Between 1 December and 1 January the I SSPzK's PKW strength decreased by 6 and the LKW strength by 9. The strengths of these systems were reduced accordingly every 15 days for all units except the XXXIX PzK, Korps Decker, and Korps Felber. As the equipment losses of the I SSPzK were relatively small, no losses were assessed against the three provisional headquarters units.

Note that for both the Unit and Unit Inventory Data Bases, personnel and equipment of units other than service support units may in some cases be included in the corps headquarters units (I SSPzK, etc.). These are personnel and equipment of the static, non-mobile field artillery and construction engineer units whose data is recorded with corps headquarters and not corps troops.

PERSONNEL AND EQUIPMENT OF GERMAN ARMY SERVICE SUPPORT UNITS

Considerable estimation was of necessity used for generating data on personnel, equipment inventory, and medical facilities capacities for German army-level service support units. Research for the ACSDB turned up no records for army headquarters units comparable to the Zustandsbericht and Gliederung of the I SSPzK, XLVII PzK, and LXXXI K.

Therefore, it was necessary to rely on information from a variety of sources to create the organization and personnel and equipment data of the army headquarters service support units. These sources included:

- German OB (referenced above.)
- TM-E 30-451 (referenced above.)
- MID 2835 (referenced above.)
- MID 2842 (Military Attache Report No. 242 -- see MID 2842 in the Bibliography Data Base.)
- ETHINT 61 (An Interview with Gen Pz Horst Stumpff -- see ETHINT 61 in the Bibliography Data Base.)
- DA Pamphlet No. 20-202 (Historical Study: German Tank Maintenance in World War II -- see DA Pamphlet No. 20-202 in the Bibliography Data Base.)
- RW6v/577 (German 5th PzArmy Surgeon General reports -- see RW6v/577 in the Bibliography Data Base.)
- Various German divisional records (see details below.)
- Data generated for corps service support units (see details below.)

It is recommended that users of the ACSDB review these sources for information on the organization and functions of German service support elements at army-level. All information contained in them cannot be replicated in the ACSDB computer format.

German Army Service Support Organization.

From the sources the following army-level service support organization, common to all four armies of German Army Group B -- 5th PzArmy, 6th PzArmy, 7th Army, and 15th Army -- was derived:

- one Army Headquarters Detachment (ArmyHQ)
- one Signals Regiment (SigRgt)
- one Supply Battalion (SupBN)
- one Transportation Battalion (TranBN)
- one Maintenance Battalion (MaintBN)
- one Veterinary Hospital (VetHos)

The abbreviations in parentheses are the designations used in the "ATTACHMENTS & DETACHMENTS" section of the Unit Data Base. Like the German corps service support elements, German army service support units are listed in the "ATTACHMENTS & DETACHMENTS" section of the Unit Data Base. Their numeric designations are either entirely fictitious or generic in nature, i.e., 5th MaintBN, 15th ArmyHQ, etc. Designations entered under "Unit Name" for the army service support elements are: "5th PzArmy;" "6th PzArmy;" "7th Army;" and "15th Army," without the abbreviation "HQ" in the title, as used for comparable US entries ("1st Army HQ," "3d Army HQ," etc.).

The estimated army-level tank maintenance and medical organization was unique to the four German armies. From the above-listed sources the following organizations were created:

5th PzArmy: three tank repair companies and one-half tank evacuation company (combined together as TkRprA -- tank repair abteilung); three field hospitals (FldHos); three ambulance battalions (AmbBN); one ambulance platoon (AmbPlt); one medical battalion (MedBN); and joining on 11 Jan 45 one additional FldHos and one base hospital (BasHos).

6th PzArmy: three tank repair companies and one-half tank evacuation company (combined together as TkRprA -- tank repair abteilung); three field hospitals (FldHos); three ambulance battalions (AmbBN); one ambulance platoon (AmbPlt); and one medical battalion (MedBN).

7th Army: two field hospitals (FldHos); three ambulance battalions (AmbBN); four base hospitals (BasHos); and one medical battalion (MedBN).

15th Army: two field hospitals (FldHos); three ambulance battalions (AmbBN); four base hospitals (BasHos); and one medical battalion (MedBN).

It is important to point out that the derivation of the above-described organizations was based primarily on doctrinal army organization and the miscellaneous pieces of information found in historical German unit records. Much of the organization (order of battle) was based on assumptions. TM-E 30-451, MID 2835, MID 2842, DA Pamphlet No. 20-202, and German OB contained the bulk of the available information on doctrinal organization (i.e., the number of hospitals per army) and

personnel and equipment strengths of service support units. Other sources only provided partial information on how the units were distributed among German Army Group B's four armies. ETHINT 61 described the availability of six tank repair companies to German Army Group B. Their distribution among the four armies was not specified, but was assumed to have been concentrated in the two attacking panzer armies. Therefore, the 5th PzArmy and 6th PzArmy were assumed to have had three companies apiece. Information on medical unit organization, particularly for the 5th PzArmy, was gleaned from RW6v/577. This document contained 10-day personnel casualty statistics for divisions and non-divisional units of the 5th Panzer Army. The units in the document were identified by their German abbreviations, complicating the task of determining the composition of the 5th PzArmy. The fact that the list of units in the document was probably not a comprehensive accounting, and only recorded on a 10-day basis with periodic updates and changes, further hindered interpretation of the document. Nevertheless, it proved possible to determine such items as the fact that the 5th PzArmy apparently did not have a base hospital (Krgs.-Laz.605 -- kriegslazarett) until 11 January 1945, at the earliest date.

The composition of the German army-level service support component in the ACSDB certainly does not represent a comprehensive list of all units, a characteristic similar to the German corps-level component. It contains only those units which can be positively identified in records, or which were doctrinally common to all army service support organizations. German Archives source RH20-7/378, a German 7th Army Rail Movement document, listed a number of non-divisional service support formations in movement orders, such as the Schneeraeumskp. 226 (226th Snow Removal Company) on 28 November. This unit's destination (and composition, i.e., personnel and equipment strength) could not be positively identified, and so it was not considered for the ACSDB. However, the assumed organization of the major German army-level service support units as incorporated into the ACSDB should provide users of the data base with data on the most important elements.

German Army Service Support Personnel Data.

German army-level service support personnel data was estimated using the estimated data of corps service support organizations, averages of divisional service support organizations, and from various other sources. The following list identifies the unit, its estimated personnel strength, and the source used for its personnel data.

<u>Unit</u>	<u>Personnel</u>	<u>Source</u>
ArmyHQ	673	CorpsHQ (w/o postal unit)
SigRgt	1,688	SigBN x 2
TranBN*	1,488	Divisional data x 2
SupBN*	528	" "
MaintBN*	990	" "
VetHos	287	MID 2842
TkRprA**	620	DA Pamphlet No. 20-202
FldHos	76	MID 2835
AmbBN	400	" "
AmbPlt	41	" "
MedBN***	1,080	" "
Bashos	59	" "

* Averages of the personnel strengths of the transport, supply, and maintenance elements of the 1st SSPzD, 2d SSPzD, 9th SSPzD, 10th SSPzD, 12th SSPzD, 2d PzD, 9th PzD, 11th PzD, 116th PzD, 3d PzGD, and 15th PzGD multiplied by two. The divisional units were essentially large company-size units, so their strengths were multiplied by two to arrive at estimated battalion-size strengths. Data is from divisional Personneles Ist and Gliederung reports in German Archives sources RH10/141, RH10/148, RH10/149, RH10/163, RH10/178, RH10/181, RH10/312, RH10/313, RH10/318, RH10/319, and RH10/321.

** Strength is for three tank repair companies and one-half tank evacuation company.

*** Strength is for four medical companies.

To simplify personnel data accounting procedures, and in light of the experience of comparable US units, only the personnel of the medical and transport components of the German army service support units were attrited. The rates of battle casualty and DNBI attrition, and replacements and RTDs, were the same ones used for German non-divisional non-mobile artillery and construction engineer units. The US experience showed minimal attrition for "service and HQ" troops, so limiting the personnel attrition of the German Army service support units to the medical and transportation units -- the units normally closest to the front line -- was considered a legitimate estimate of the personnel losses of the army service support units.

German Army Service Support Equipment Data.

The German army service support equipment included PKW, LKW, LMG, 8-18t PM, and trl.

Data for all four armies was estimated by taking the equipment strengths of the I SSPzK and 432d Signals Battalion, i.e., 123 PKW, 234 LKW, and 75 LMG and 55 PKW, 62 LKW, and 12 LMG

and multiplying by the strengths by two. For the 5th and 6th PzArmy, the strengths of the tank maintenance units were added (48x 8-18t PM, 19x PKW, 68x LKW, and 6x trl -- data from DA Pamphlet No. 20-202). Attrition of the equipment was estimated to be twice of that of the corps service support units, i.e., reduction of strengths by 12 PKWs and 18 LKWs every 15 days.

German Army Medical Facilities Statistics.

Data on German army-level medical facilities statistics was estimated for Field 38 of the Unit Data Base ("FACILITIES & STATISTICS -- No. of Hospital Beds"). The estimated data was based on the composition of base and field hospitals with the armies and the authorized number of beds per hospital type. TM-E 30-451, page VI-24, described German Army hospital organization and bed capacities. A Base Hospital (Kriegslazarett) normally had accommodations for 500 cases, while a Field Hospital could accommodate 200 cases. Therefore, the bed capacity of these two hospital types was estimated to be 500 and 200 beds, respectively.

Hospital bed capacities of the German armies in the ACSDB were assumed to be as follow:

- 5th PzArmy:	600 (16 Dec-10 Jan)
" "	1,300 (11-16 Jan)
- 6th PzArmy:	600 (16 Dec-16 Jan)
- 7th Army:	2,400 (16 Dec-16 Jan)
- 15th Army:	2,400 (16 Dec-16 Jan)

These estimates were approximations only. The exact organization of hospitals for any of Army Group B's four armies was not found in primary or secondary sources. RW6v/577 did provide pieces of information on some of the hospital units of the 5th PzArmy, but this information was fragmentary. Many of the German wounded personnel were evacuated to hospitals in Germany, or some of the army base hospitals may have been actually maintained in the Zone of the Interior. A study by Charles von Luetlichau quotes statistics on wounded personnel evacuated by rail across the Rhine River (into the Zone of the Interior). (See Charles von Luetlichau, GERMAN RAIL COMMUNICATIONS IN THE ARDENNES OFFENSIVE: A Study of Factors Which Affected the Strategic Concentration and the Conduct of Operations (Washington, D.C.: Office of the Chief of Military History, September 1952), page 85.)

Likewise, data on numbers of beds filled, number of personnel died in hospital, etc. was notably lacking, and to such a degree that estimation of this data was not attempted. RW6v/577 contained 10-day statistics for medical facilities, but this information was so fragmentary and confusing that its suitability for compilation of medical statistics was minimal.

Review of RW6v/577 is recommended for users of the ACSDB, if very rough approximations of hospital statistics is vital to the utilization of the ACSDB.

Attachment 1

German Corps Medical Formations

Information on German army and corps medical formations was found in several primary sources. These sources and their application in the ACSDB are discussed below.

I SSPzK -- on 1 December 1944 and 1 January 1945 one field hospital medical unit, the 501st SS Military Hospital HQ? (exact designation uncertain), with 123 personnel total. Source is 1 December 1944 and 1 January 1945 I SSPzK Gliederung (German Archives source RH10/309).

XLVII PzK -- one corps medical company, the 447th Corps Medical Company, arriving on 22 December 1944. Source is XLVII PzK Corps Doctor December 1944 Activity report. (German Archives source RH24-47/255)

LXXXI K -- one medical unit (company?), unidentified, on 16 December. Source is LXXXI K 16 December Gliederung (US National Archives microfilm T314,1597,203).

MS #B266 (one of the Foreign Military Studies on file at the US National Archives) reports that after 1944 corps were equipped with one horse-drawn medical company and one motorized ambulance platoon each. Until 1944 the corps had no organized medical troops.

The medical units assigned to the German corps for the ACSDB are based on the known data for the I SSPzK, the XLVII PzK, and the LXXXI K. The corps medical units are considered administrative units whose primary functions were to coordinate the missions of the medical units of divisions and at army-level and to assist in evacuation of casualties, and are not assigned a bed capacity (see MS #B266, pgs. 83-84, for a description of the various missions of the corps medical units). The assigned corps medical units are organized in the ACSDB as follow:

I SSPzK: 501st (SS) MedHQ (SS Medical Headquarters) with 123 personnel.

II SSPzK: 502d (SS) MedHQ with 123 personnel (unit designation assumed to be 502d).

XLVII PzK: 447th MedCoy (Medical Company), assumed to be motorized, with 270 personnel. This unit does not arrive until 22 December.

LVIII PzK: 458th MedCoy, organized as the 447th MedCoy and assumed to be with the LVIII PzK on 16 December (unit designation assumed to be 458th).

XXXIX PzK: No medical units were assigned to the XXXIX PzK, as it consisted of a headquarters staff and probably without additional service support units.

Korps Decker: An ad hoc organization which originated from the LVIII PzK artillery and battle staff, Korps Decker is also assumed to have no medical component.

LXXXI K: 481st MedCoy, assumed to have 286 personnel (unit designation assumed to be 481st).

XII SSK, LIII K, LXVI K, LXVII K, LXXIV K, LXXX K, LXXXV K, and XIII K medical organizations organized identically to LXXXI K with the following assumed designations: 412th MedCoy, 453d MedCoy, 466th MedCoy, 467th MedCoy, 474th MedCoy, 480th MedCoy, 485th MedCoy, and 413th MedCoy. Korps Felber, the XIII K's predecessor is not assigned a medical component as it was organized from a divisional staff in its initial commitment in the Ardennes Campaign.

Personnel strengths for all of the above-listed units, except the 501st and 502d SS MedHQ are from MID 2835 ("Abbreviated Table of Organization of the Medical Services"). (The SS units are considered "HQ Military Hospital Units," and the other units "Medical Companies," motorized for the XLVII and LVIII PzK.)

Derivation of German Logistics Data

INTRODUCTION

This paper serves as the bibliographic reference for sources used to compile data on German logistics in the Ardennes Campaign Simulation Data Base (ACSDB). Because of a lack of primary and secondary source information on German Army Group B logistics in the Ardennes Campaign, the majority of the data on German logistics in the ACSDB was estimated. Therefore, this paper also explains all data estimation methodologies used to generate German logistics figures.

As explained in the ACSDB Unit Data Base narrative, Fields 43-48, and 54-55 of the Unit Data Base were used to record information on ammunition, other supply, and motor fuel or petroleum, oil, and lubricants (POL) amounts -- stored, received, and expended or consumed by ground forces. All ammunition data requirements for the ACSDB were generated for German forces. However, no data on "Other Supply," i.e., food, fodder, medical supplies, and other miscellaneous supply, was estimated for German units in the ACSDB. Likewise, data on "Transportation Capacity (dry)/Transportation Capacity (wet)" was estimated only for corps-level units. A later section of this paper discusses the dearth of information in primary and secondary sources on German transport capacity in the Ardennes Campaign, and the expediencies adopted by the Germans to move their supplies from dumps to frontline units, as well as recommendations for possible data substitutes which may be used in lieu of hard data on German transport capacity.

The paper is divided into three major sections. The first addresses German ammunition data generation and the conventions used for recording the data in the ACSDB. The second section provides information on German fuel data and its generation and the format for recording it in the ACSDB. The third addresses long-haul transport capacity for German units.

Full bibliographic information is provided either in this paper or in the Bibliography Data Base for all primary and secondary sources referenced in the paper.

To assist in the review of German logistics data recorded in the ACSDB, the following discussion of German supply doctrine and assumptions made for the ACSDB is provided. By German doctrine, the movement and allocation of supplies was the responsibility of the army. Supplies were transported from railheads by army transport to army dumps and then distributed to corps

distribution points by army and corps transport. (The corps augmented transport capacity of the army/divisions as the situation required.) Division transport then picked up supplies from distribution points and moved them to the divisional dump. In some cases supplies would be transported directly from army dumps to division dumps by army and/or divisional transport. In the Ardennes Campaign, this doctrine was modified. Apparently the army dumps established prior to the German offensive were the same as the railheads in the army group area. Due to the lack of transport capacity at all echelons, German divisions in the Ardennes Campaign drew supplies either directly from the these railheads, or, in some cases, from supply dumps east of the Rhine River. This meant that a divisions could on one day draw supplies from a railhead as little as 5-10 kilometers away, and on the next day, due to interdiction of rail communications, be forced to draw supplies from dumps over 100 kilometers away. An additional supply complication arose because the supply dumps were limited to existing railheads and the rail network at the start of the Ardennes Campaign, and supply distances increased as units advanced, further overloading an already overtaxed transport system. (Due to manpower shortages and Allied air supremacy, it proved impossible to extend the rail net forward as units advanced.)

GERMAN AMMUNITION DATA

Information on categorization of German ammunition types is found in the ACSDB T/O&E (Table of Organization and Equipment) Data Base narrative. This categorization scheme was utilized for German T/O&E and Unit Data Base logistics data in the ACSDB.

Sources Used for German Ammunition Data.

A variety of sources were used to derive German ammunition data for the ACSDB. It is recommended that some of them be reviewed by users of the ACSDB for better comprehension of the complex subject of German logistics, which unfortunately lacks the kind of complete and detailed documentation most suitable for the data compilation tasks of the ACSDB. Chief among these sources is a manuscript study prepared by Charles V. von Luettichau in September 1952 for the Office of the Chief of Military History (Charles V. von Luettichau, GERMAN RAIL COMMUNICATIONS IN THE ARDENNES OFFENSIVE 1944-1945, A Study of the Factors Which Affected the Strategic Concentration and the Conduct of Operations (Washington, D.C.: Office of the Chief of Military History, September 1952)). Information contained in this study was used extensively in the ACSDB estimation process for German logistics data (the study is hereafter referenced in this paper as "von Luettichau, GERMAN RAIL"). Two other sources which should be reviewed and were also used for data estimation are daily supply reports for the German XLVII Panzer and LXXXI Korps. The first are a series of daily XLVII Panzer Korps reports produced by the Korps Quartermaster for the period 14-31 December 1944 on US National Archives Microfilm T314,1133,626-644. The second document is the "LXXXI Korps Munitions Situation according to the Daily Report for the period 15-31 December 1944...Total Rounds Fired in Tons" ("Munitionslage nach der Tagesmeldung...Gesamtverschuss in to:") on US National Archives Microfilm T314,1594,1131-1330. Both Korps documents are the only primary source records found in research for the ACSDB, which contain information on daily ammunition expenditures by German units below army-level in the Ardennes Campaign.

In addition to information found in these three sources, a variety of other sources, primary and secondary, were researched and examined for German logistics data. Attachment 1 contains a list of these sources and a brief description of information contained in them. It is recommended that they also be reviewed if users of the ACSDB want fullest appreciation of all available primary and secondary source data on German logistics in the Ardennes Campaign.

Estimation Methodology for German Ammunition Data.

The data estimation methodology for German ammunition supply in the ACSDB was created 1) to reflect as completely as possible all information contained in sources on German ammunition supply, and 2) to permit a logical and mathematically sound approach for data generation and recording in computer format. Due to the unavailability of daily historical German ammunition statistics, it proved necessary to estimate virtually all ammunition data for the German armies, corps, divisions, and non-divisional units in the ACSDB. The fragmentary information found in the historical record was used to the extent possible to formulate the estimation methodologies for German ammunition data.

The first step in estimating German ammunition data was to determine the initial and total amounts of available ammunition for units, using all available information found in the historical record. Several of the Foreign Military Studies produced in the postwar period by German participants in the Ardennes Campaign discussed the supplies of ammunition stockpiled for the offensive. These sources focussed primarily on artillery ammunition supplies. (See Attachment 1 for a listing of sources.) Other primary sources (also listed in Attachment 1) had information on ammunition supplies stockpiled at army group and for the High Command of the West (OB West) in December 1944.

From these sources, ammunition levels were estimated for the non-divisional, divisional, corps, and army units of German Army Group B. The total amount of ammunition expended by Army Group B during the period 16 December 1944-16 January 1945 was estimated to equal one issue of supply for each division and non-divisional combat unit. This assumption applied to Tank/AT (Antitank) and Other ammunition for all 5th Panzer, 6th Panzer, 7th, and 15th Army units, and to Artillery and Special ammunition for 15th Army units. For Artillery ammunition of the 5th Panzer, 6th Panzer, and 7th Armies, the amount expended was assumed to equal one issue of supply, plus $\frac{3}{8}$ of an issue per day expended on the first two days of the offensive for the 7th Army, and $\frac{1}{2}$ of an issue per day on the first two days of the offensive for the 5th and 6th Panzer Armies.

Ammunition weights by unit for one issue of supply were obtained from the Tables of Organization and Equipment compiled for German units in the ACSDB. TM-E 30-451, pages VI-20 to VI-21 (source referenced in the Bibliography Data Base) contained information on German ammunition allowances in World War II. A discussion in the ACSDB T/O&E Data Base narrative compares the information found in TM-E 30-451 with data found in another source on German divisional ammunition levels (see RH3/v.135, a source referenced in the Bibliography Data Base). As explained in the ACSDB T/O&E narrative, the authorized ammunition supply weights in German T/O&Es were assumed to be close to the maximum

weights maintained by German units in the Ardennes Campaign.

Each division was assumed to start on 16 December, or its first day of participation in the ACSDB, with three-quarters of an authorized issue of supply for each ammunition type carried by the division type. For artillery units of the 5th and 6th Panzer Armies, and for the divisional artillery of divisions initially subordinated to these armies, the initial artillery ammunition weights included three-quarters of an issue plus one entire issue for the artillery preparation. For artillery units of the 7th Army, and for the divisional artillery of divisions initially subordinated to this army, the initial artillery ammunition weights included three-quarters of an issue plus three-quarters of an issue for the preparation. Note that for non-divisional units of all armies, data was estimated only for the unit's primary type of ammunition, i.e., Artillery with artillery units, Tank/AT with panzer (armored) and panzerjaeger (antitank) units, Special with nebelwerfer (rocket projector) units, etc. Also note that the primary ammunition type of combat engineer units was considered Other, and for certain FLAK (antiaircraft) units both Other and Tank/AT, dependent on the armament of the FLAK unit and its ammunition types as listed in the T/O&E Data Base.

The second step in estimating daily German ammunition statistics was to determine ammunition consumption for German units. For each division and non-divisional unit type, i.e., volks grenadier division, panzer division, FLAK brigade, heavy panzerjaeger battalion, etc., "pools" of ammunition to be expended during the period 16 December-16 January, by type (Tank/AT, Artillery, Other, and Special), were calculated by multiplying the authorized issues of supply of the unit type by the number of the unit types which participated in the Ardennes Campaign. These were the total amounts of ammunition assumed to have been expended by the units during the period 16 December-16 January. The ammunition "pools" were segregated by division and non-divisional unit type to simplify the accounting process used to estimate daily ammunition consumption.

The data found in the XLVII Panzer and LXXXI Korps documents referenced above was used as the foundation for estimation of German ammunition consumption. Based on the ammunition consumption figures found in these sources, the following daily average consumption figures were calculated:

XLVII PzK: 3,104.8 metric tons/15 days (17-31 Dec 44),
or 206.99 tons per day.

LXXXI K: 994.8 metric tons/17 days (15-31 Dec 44),
or 58.52 tons per day.

These two corps were essentially composed of the same numbers of divisions and non-divisional units (three-four

divisions, plus corps artillery) during the second half of December 1944. Therefore, the ratio of their daily ammunition averages were estimated to be the ratio of ammunition consumptions for an "active" day and an "inactive" day (206.99/58.52, or 3.5:1 after rounding). The XLVII Panzer Korps was one of the primary attacking corps of the German offensive, and the LXXXI Korps was a 15th Army corps which was engaged in static, positional warfare east of Aachen during the second half of December.

The total numbers of active and inactive days by division and non-divisional unit type were determined next. The daily activity levels were the same as used in the German battle casualty estimation methodology (see the German Divisional Battle Casualty Estimation Methodology narrative for a list of daily activity levels for each division). Activity levels of non-divisional units were determined in the cases of attachments to divisions, by the activity level of the parent division, and, in the cases of subordination to corps and army, assumed to be "inactive."

Using the ratio of 3.5:1 and the total number of active/inactive days by unit type, daily average ammunition consumption figures for an active or inactive day were estimated for the various division types. For example, there were four SS panzer divisions (1st, 2d, 9th, and 12th) in the Ardennes Campaign (the 10th SSPzD was not engaged in the combat operations, except for its artillery in the preparation fire), which together had an estimated 46,601.20 hundredweight of Other ammunition to be expended during the period 16 December-16 January ($11,650.30 \times 4$). Together all four divisions had 77 active days, 34 inactive days, and 16 out of contact days during which the divisions were completely out of the front line. The total number of activity points was calculated as 303.5 ($[77 \times 3.5] + 34$). Other ammunition expenditure for an SS panzer division on an inactive day was therefore estimated to be 153.55 hundredweight ($46,601.20/303.5$), and on an active day to be 537.43 hundredweight (153.55×3.5). On out of contact days ammunition consumed (expended) was assumed to be none (0).

For Artillery ammunition consumption of 5th and 6th Panzer and 7th Army units, the above-described procedure was estimated for the period 18 December-16 January only. For 16 and 17 December, 5th and 6th Panzer Army artillery consumption was estimated at one-half of an artillery issue of supply on each day, and three-eighths of an issue of supply per day for 7th Army units, these amounts based on descriptions of the artillery preparation fire found in sources listed in Attachment 1.

The third step in generating daily ammunition data for German units was to estimate on-hand ammunition amounts for divisions and non-divisional units. This estimation process was

based on descriptions in von Luettichau, GERMAN RAIL, pages 120, 126, 142 and 143. These descriptions indicate that, for all practical purposes, railroad lines of communications on which supplies were shipped to army and divisional dumps were severed during the period 29 December-4 January by damage to and destruction of railroad bridges and rail lines leading into the Ardennes region from the main supply dumps east of the Rhine River. Nevertheless, Army Group B apparently managed to maintain at least one day's supply of ammunition (see page 120, "...supplies on hand were sufficient for the next day's operations"). Based on the definition of issue of supply in TM-E 30-451, page VI-20 to VI-21 ("three issues sufficient to maintain an army for 8-10 days"), and the reduced allowances of ammunition levels maintained by German units in the Ardennes, the minimum amount of ammunition for a unit during the period 29 December-4 January was assumed to be one-quarter of an issue. For the period 16-28 December, it was assumed to be three-quarters of an issue. After 4 January, any depleted ammunition stocks of divisions and non-divisional units below one-half of an issue were restored to one-half an issue, and this level was assumed to be the minimum amount maintained by units from 4-16 January.

Ammunition amounts received by divisions and non-divisional units were always estimated to equal the amount needed to maintain a unit at its minimum supply level, as described in the preceding paragraph. Therefore, ammunition received by units in most cases was estimated to equal the previous days' ammunition consumed.

The fourth and final step in generating ammunition data for German units in the ACSDB was to aggregate data for divisions and non-divisional units and use these compiled figures for army ammunition data. German doctrine maintained that corps headquarters were employed primarily for tactical purposes, i.e., operational control of divisions and non-divisional combat units, and that the army was responsible for logistical support of divisions and non-divisional combat units. Ammunition consumed data for the four armies was estimated to equal the sum of the ammunition received by all subordinated divisions and non-divisional units, and expended by independent army units, such as artillery and armored battalions. Thus, the ammunition consumption figures for armies were intended to reflect ammunition consumed by independent army units, and ammunition supplied to units at lower echelon. This data was recorded with the "army troops," i.e., "5th PzArmy Troops," "6th PzArmy Troops," "7th Army Troops," and "15th Army Troops." The data on ammunition amounts on-hand and received by independent army units, i.e., non-divisional army assets, was also recorded with the "army troops."

Data representing ammunition in army supply dumps and received by army supply dumps was recorded with "army HQ" units,

i.e., those units identified as "5th PzArmy," "6th PzArmy," "7th Army," and "15th Army." Ammunition received was estimated to equal the amount necessary to maintain one issue of supply.

Each army's issue of supply was calculated based on the average daily consumption of the army (ammunition expended by independent army units and ammunition delivered to divisions and corps troops). The daily artillery and special ammunition consumption from the periods 19-28 December and 7-16 January were used in calculations for the 5th Panzer, 6th Panzer, and 7th Armies. For all other ammunition types in all four armies (including artillery ammunition with the 15th Army), the periods were 17-28 December and 7-16 January. Data from 16-18 December was not used for the 5th Panzer, 6th Panzer, and 7th Armies because of the high artillery ammunition consumption rates of the first two days of the Ardennes Campaign. Data for 29 December-6 January was not used for any of the armies because of reduced ammunition consumption due to the interruption of the flow of supplies during the period 28 December-6 January, when divisions were not drawing the majority of their ammunition from army stocks. The following figures were calculated:

A V E R A G E
D A I L Y C O N S U M P T I O N O F
A M M U N I T I O N (100 lbs.)

<u>Army</u>	<u>Artillery</u>	<u>Tank/AT</u>	<u>Special</u>	<u>Other</u>
15th	3256.45	1181.83	0.00*	1343.84
5th	4867.13	4858.39	706.63	2522.35
6th	5611.38	4584.73	2318.85	2748.58
7th	2974.84	1517.56	885.31	1286.63

* No nebelwerfer (rocket projector) units with the 15th Army.

Miscellaneous Information on German Ammunition Data.

This section of the narrative contains miscellaneous information on the data compiled for German ammunition in the ACSDB.

- The 150th PzBde had no ammunition data estimated. It was assumed that majority of its supplies were drawn from 6th PzArmy divisions, principally the 1st SSPzD, alongside which it operated for most of its participation in the Ardennes Campaign.

- Ammunition data for the FBB and FGB (two armored brigades for which T/O&Es were not generated) was estimated based on the relative equipment strengths of the brigades and an army panzer division (PzD). The estimated percentages of panzer division ammunition data used for the brigades was as follows:

FBB: 1/3 Artillery; 1/2 Tank/AT; and 1 Other.
FGB: 1/2 Artillery; 1/2 Tank/AT; and 1 Other.

- Artillery ammunition data for immobile artillery units was calculated using the same conventions used for other artillery units, and the ammunition data estimated for the immobile artillery units was recorded with the "corps troops" units.

- Certain units lacked organic tank/AT and artillery weapons, including the 5th FJD (no artillery except 12cm heavy mortars -- HMTR); the 79th VGD and 85th ID (no self-propelled antitank guns); and the 326th and 560th VGDs (no self-propelled antitank guns until 26 and 25 December, respectively). Ammunition data for these units was modified accordingly, in the case of the units without self-propelled antitank guns by reducing the ammunition data by approximately one-third (the divisions retained towed antitank guns). For the 5th FJD, the ammunition data of the 406th VAK(-) was included with the division, as this volks artillery korps effectively replaced the division's organic artillery component during the Ardennes Campaign.

- All ammunition data for corps was recorded with "corps troops" units, i.e., "LVIII PzK Troops," "Korps Felber Troops," "LXXXI Korps Troops," etc. This data represents the ammunition of separate non-divisional combat units attached directly to corps. Ammunition data for divisional attachments was recorded with the divisional attachments ("Att"), i.e., "1st SSPzD Att," "167th VGD Att," "212th VGD Att," etc. This data represents the ammunition of non-divisional units attached directly to divisions. Divisional ammunition data (i.e., the ammunition data of organic divisional units only) was recorded with the division ("1st SSPzD," "276th VGD," "9th PzD," etc.). Data for armies and army troops was recorded in the format explained above. To determine the composition of corps and armies, and attachments to divisions, it is necessary to consult the "ATTACHMENTS & DETACHMENTS" section of the German Unit Data Base, in which is recorded the daily order of battle of German Army Group B during the Ardennes Campaign period.

GERMAN FUEL DATA

German fuel data in the ACSDB was estimated for consumption and supply of motor fuel only. Information in primary and secondary sources on German fuel supply in the Ardennes Campaign was characterized by a lack of detailed, daily data necessary to meet the requirements of the ACSDB. However, primary sources did contain aggregate statistics on fuel availability at the army group level, and secondary sources, mainly from the Foreign Military Studies series at the US National Archives, provided information on fuel levels available for certain attack divisions. The statistics and information were incorporated in the estimation process used to generate daily fuel data for the German units in the ACSDB.

Estimation Methodology for German Fuel Data.

The first step in estimating German fuel data was to estimate fuel consumption of German divisions. German divisional fuel consumption was based on fuel consumed in displacement (movement) of the division, and fuel consumed for administrative purposes, such as powering generators, stoves, etc., and for minor tactical movements.

Fuel consumption for displacement of divisions was based on the displacement of a division, as recorded in the Unit Location Data Base, and a fuel consumption factor for unit type derived either from the T/O&E fuel data of the unit, or from primary source records. T/O&E fuel data is the amount of fuel required to move all vehicles of a unit 100 kilometers over moderate terrain, multiplied by four or five for non-armored and armored units respectively (see the ACSDB T/O&E Data Base narrative for details). The T/O&E fuel amount is the amount planned for by German staff doctrine. The 100 kilometer distance was halved, for application in the fuel estimation methodology, to reflect information provided in multiple sources, and specifically in two sources (ETHINT 21 and A938) which indicated that the fuel supply necessary to move a unit 100 kilometers was adequate for only 50 kilometers of movement in the rugged terrain of the Ardennes. ETHINT 21, pg. 4, and A938, pg. 3 (both sources completely referenced in the Bibliography Data Base) both mention that one verbrauchssaetze ([fuel] requirement) was sufficient for only 50 kilometers of movement.

Fuel consumption for administrative purposes was estimated to be 0.0267 times the amount of fuel required to move a unit 50 kilometers. This fraction was based on information found in FM 101-10, Staff Officers' Field Manual: Organizational, Technical and Logistical Data, 21 December 1944, page 329, and the estimated fuel requirements for moving a German panzer division

50 kilometers in the Ardennes. FM 101-10, page 329, notes that 2,000 gallons of fuel was the normal daily requirement of a standard US armored division to power generators, cooking stoves, etc. Comparison of the amounts of fuel required to move a German panzer division and a US armored division the same distance showed that a US armored division used approximately twice the fuel to move the same distance. Therefore, the amount of daily administrative fuel requirements for a panzer division was estimated to be 1,000 gallons, or one-half of the US armored division requirements. This amount is $1,000/37,456$, or 0.0267 of the 50-kilometer requirement of a panzer division. The value of 0.0267 was applied to the 50-kilometer requirement of all units to estimate the daily administrative fuel consumption of the units.

Attachment 2 is a list of fuel requirements for German divisions as used in the ACSDB.

Fuel consumption of divisions was calculated by determining the displacement of the division from data in the Unit Location Data Base, and using that value and the 50-kilometer requirement to arrive at fuel consumption for movement of the unit. To this value was added the administrative consumption to arrive at the total daily consumption of the unit. If a division's displacement was none (0.0 kilometers), it's fuel consumption was equal only to the administrative consumption.

The second step in estimating German fuel data was to calculate on-hand fuel supply of divisions. All divisions were assumed to start with one 50-kilometer fuel issue (the amount of fuel needed to move the unit 50 kilometers), unless data in primary or secondary sources indicated otherwise. This assumption was made based on the limited information found in sources on fuel supply of individual German divisions at the start of the Ardennes Campaign. These included:

<u>Unit</u>	<u>Fuel</u> <u>(1,000 gals.)</u>	<u>Source</u>
116th PzD	40.814	T314,1134,349
PzLehrD	63.360	T314,1134,276
26th VGD	7.075	T314,1134,296
12th SSPzD	60.593	B522, pgs. 12-13
1st SSPzD	56.041	B779, pgs. 14-15
FBB	65.712	B592, pg. 20
15th PzGD	45.988	T314,1134,520

(All sources described fully in the Bibliography Data Base.)

Analysis of these sources and the descriptions in other sources (see B151, pg. 147 and ETHINT 21, pg. 4, both sources fully referenced in the Bibliography Data Base), indicated that

divisional supplies of fuel probably ranged from one to two 50-kilometer fuel issues per first echelon division, with more than one issue in army dumps, but not with the front line units. German sources invariably mentioned a major shortage of fuel supply at division level, and so, based on those descriptions, and on the specified amounts of fuel for units in the above table, all divisions were assumed to have started with one 50-kilometer fuel issue.

Information on fuel levels maintained by divisions after the first day of the attack is minimal. Some sources described the capture of US fuel stocks, and this data, as well as any other information on daily on-hand fuel supply, is incorporated in the ACSDB. When no data was provided for a division in any source, the following methodology was used to estimate on-hand fuel supply and fuel receipts.

Divisions were assumed to have maintained at least three times the daily administrative fuel requirement (i.e., three days of supply for administrative purposes). Divisions were assumed not to have been resupplied with fuel until their stocks had been reduced to a level equal to three times the daily administrative fuel requirement. This assumption was made to reflect the chronic fuel shortages experienced by German units in the Ardennes Campaign. The minimum level of three times the administrative requirement was set on the assumption that a commander would not have allowed his unit's fuel supply to fall below this amount. Fuel received was then calculated as the amount necessary to maintain a unit's fuel level at three times the administrative requirement.

Historical fuel data was used in the ACSDB for the following units on the indicated dates. The source of the data is also provided. Note that the amounts for the 15th PzGD came from the same source shown in a previous table as having been used as the sources for on-hand fuel on 16 December. The amounts shown here were extrapolated to estimate the on-hand fuel of the 15th PzGD on 16 December, as shown in the previous table.

<u>Unit</u>	<u>Date(s)</u>	<u>Fuel</u> <u>(1,000 gals.)</u>	<u>Source</u>
116th PzD	21 Dec 44	30.000 captured	T314,1666,511
1st SSPzD	17 Dec 44	30.000 captured	ETHINT 11, pg. 2
2d PzD	22 Dec 44	14.482 on-hand	T314,1133,626
9th PzD	23 Dec 44	18.484 on-hand	T314,1133,626
PzLehrD	22 Dec 44	29.568 on-hand	SRH-049, pg. 133
PzLehrD	23 Dec 44	42.240 on-hand	SRH-049, pg. 133
15th PzGD	21 Dec 44	14.256 on-hand	T314,1134,520
15th PzGD	22 Dec 44	27.192 on-hand	T314,1134,520
15th PzGD	23 Dec 44	23.496 on-hand	T314,1134,520
15th PzGD	24 Dec 44	79.200 on-hand	T314,1134,520

(Sources in above table are fully referenced in the Bibliography Data Base.)

The third step in estimating German fuel data was to calculate daily fuel consumption, fuel received, and fuel amounts on-hand for divisional attachments and separate corps and army units. The methodology employed in this step was essentially the same as the one used for the divisions. Fuel data for divisional attachments was recorded with the records of units identified with "Att" in their title ("1st SSPzD Att," "167th VGD Att," etc.). Fuel data for corps and army separate units was recorded with the records of the corps and army headquarters units ("XLVII PzK," "5th PzArmy," "I SSPzK," etc.).

For divisional attachments, daily fuel consumption was based on the displacement of the units comprising the attachment and an administrative fuel consumption factor 0.0267 times the 50-kilometer fuel requirement. Divisional attachments are identified in the "ATTACHMENTS & DETACHMENTS" section of the Unit Data Base. The 50-kilometer fuel requirement was calculated in the same manner used for divisions. It was "tailored" to the daily order of battle of the attachments, i.e., the fuel requirement was driven by the composition of the divisional attachments. Displacement was determined by the displacement of the parent division of the attachments. No information was found in historical records on daily fuel supply for German non-divisional units. Therefore, because of this lack of information, and to simplify accounting procedures, on-hand fuel amounts and fuel receipts were assumed to equal the daily expenditures of the attachments. Implementation of this limitation on German fuel supply for non-divisional units was also done to reflect the chronic fuel shortages experienced by the German forces in the Ardennes Campaign.

For separate corps and army units, daily fuel consumption was estimated to equal the amount of fuel required to move, plus fuel required for administrative consumption. The displacement of corps and armies is recorded in the Unit Location Data Base.

The daily fuel consumption was calculated by adding the movement consumption of the corps or army units (as identified in the "ATTACHMENTS & DETACHMENTS" section of the Unit Data Base); the movement consumption of service support units of corps or armies; and administrative fuel consumption. The service support consumption factor was based on the amount of fuel required to move 123 PKW (personnel carriers) and 234 LKW (cargo carriers) the displacement distance of the corps or army.

Start on-hand fuel amounts for corps and armies were estimated to equal the first day's consumption of the unit plus a reserve of fuel. The reserve of fuel for all corps was based on the estimated daily administrative consumption of the I SSPzK (1,535 gallons) times three (1,535 x 3, or 4,605 gallons). All corps and armies were assumed to have maintained 4,605 gallons on-hand, and daily fuel receipts were estimated to equal the amount of fuel required to maintain this on-hand value. Note that the administrative consumption amount (1,535 gallons) was used for all corps at all times.

The fourth step in estimating German fuel data was to calculate army-level fuel supply figures. As German corps were by doctrine tasked primarily for tactical control of combat units, all German fuel dump stocks were assumed to have been maintained at army-level in the ACSDB.

T122, pgs. 410-414, noted that Army Group B had 12,000 cubic meters (CBM) of fuel stockpiled at the beginning of the Ardennes Campaign. This was estimated in the ACSDB to be the total amount of on-hand fuel with the four armies of Army Group B on 16 December 1944. From this total amount (3,168,000 gallons, or 12,000 CBM x 264 gallons per CBM), the amounts of fuel with all separate army and corps units, all divisions, and all divisional attachments were subtracted (746,665 gallons). The remainder (2,421,335 gallons) was considered the fuel in army dumps. It was distributed among the four armies using the percentages of on-hand fuel with the subordinated units of the armies. These percentages were:

- 15th Army:	8.47%
- 7th Army:	21.78%
- 6th PzArmy:	40.94%
- 5th PzArmy:	28.81%

These percentages were applied to the total army stocks (2,421,335), to which were added the amounts with the separate army units, to estimate the amount of fuel per army on 16 December.

- 15th Army:	218.409	(1,000 gals.)		
- 7th Army:	533.462	"	"	
- 6th PzArmy:	1,011.913	"	"	
- 5th PzArmy:	704.816	"	"	

Daily fuel consumption by army was calculated as the total of all receipts by subordinated separate army and corps units, divisions, and divisional attachments. To this total was added fuel estimated to have been consumed by army transport vehicles moving supplies (all fuel and ammunition and a portion of other supply -- rations, medical supplies, etc.) from army dumps to units .

The formula used for army transport vehicle fuel consumption was based on a payload capacity of 3 tons per truck, a fuel mileage of 42.24 gallons per 100 kilometer, and one-way supply distance of 100 kilometers (200 kilometers round trip).

The standard German wheeled cargo carrier had a 3-ton payload. RH10/363, pg. 10, gives the mileage of a German 3-ton truck [(m.LKW (o) (S. u. A. - Typ)] as 80 liters per 100 kilometers over moderate terrain. (This figure was doubled to 160 liters, or 42.24 gallons, per 100 kilometer to reflect increased fuel consumption in the rugged terrain of the Ardennes region.) The supply distance was an approximation and was based on the distance from the 16 December front line to the Rhine-Moselle River line.

To determine daily fuel consumption by army, the estimated daily amount of fuel required to move all fuel and ammunition received by units subordinated to an army, was added to the daily amount of fuel receipts by all subordinated units. To this sum was added fuel estimated to move one-fourth of the other supply (rations, medical supplies, etc.) to arrive at the total estimated daily consumption of an army.

The value of one-fourth of the other supply was determined by comparing the recorded fuel consumed during the period 16 December-3 January (20,000 CBM) in von Luettichau, GERMAN RAIL, pg. 138a, with the total amount estimated consumed in the ACSDB during the same period, the latter amount only for ammunition and fuel shipment and ammunition receipts by subordinated units. This comparison showed a difference of approximately 2,160,000 gallons of fuel. Assuming that one man required 24.99 pounds of other supply per day (see FM 101-10, Staff Officers' Field Manual: Organization, Technical and Logistical Data, 21 December 1944, pg. 308, and the ACSDB T/O&E Data Base narrative), the amount of fuel estimated as required to move the total other supply used from 16 December-3 January, based on the sum of the daily personnel strengths of the armies and the requirement per man of 24.99 pounds, was equal to approximately one-fourth of 2,160,000 gallons. The remainder of the other supply was assumed

to have been moved by horse-drawn transport.

Once the 16 December on-hand fuel supply of the armies had been determined, and the daily consumption by army also estimated, daily on-hand supply per army after 16 December was estimated by subtracting out the daily consumption from the 16 December on-hand supply, and repeating the process for each subsequent day. Fuel received was allocated to the armies for the period 16-29 December based on information found in von Luettichau, GERMAN RAIL, pgs. 133-34, which gives the dates of arrival and destinations of 39 fuel trains during the period. The destinations were used to determine which army received the fuel. The amount of fuel carried by each fuel train was based on von Luettichau, GERMAN RAIL, pg. 134. which described a total of 50 fuel trains moving 12,500 tons of fuel. For the period 1-16 January, fuel receipts by army were estimated to have arrived in numbers and at intervals sufficient to prevent the depletion of army stocks.

GERMAN LONG-HAUL TRANSPORT CAPACITY

Estimation of German long-haul transport capacity for the ACSDB was complicated by a lack of data on organization and capacity of German corps and army service support units during the Ardennes Campaign. Another complication was caused by the chaotic condition of supply transport for German Army Group B in December 1944 and January 1945. Numerous German sources mention the adverse effects of Allied air supremacy on the German lines of communication. Supply difficulties were compounded by a lack of motor fuel available to the combat and supply units, the variety of trucks in use with the German Army in late 1944 (Czech, Italian, French, Russian, German, etc.), the poor condition of motor vehicles and the lack of spare parts for the different truck models, shortages of trained, experienced drivers, and poor road conditions in the Ardennes region. German army-level transport shortages were so acute that combat divisions were forced to employ their organic transport for the retrieval of supplies from distant supply dumps, some located east of the Rhine River, a fact attested to in many of the post-war manuscripts prepared by German officers who participated in the Ardennes Campaign and on file at the US National Archives. (These and other sources are listed in Attachment 1 to this paper and in the Bibliography Data Base. They should be reviewed for details on the German transportation system in the Ardennes.) German transport difficulties were further evidenced by the fact that transport vehicles of some German combat formations were requisitioned and provided to first echelon formations to enhance their mobility.

With these considerations, estimation of German long-haul transport capacity started with the formulation of several possible estimation methodologies. These included:

- 1) Using the maximum tonnage of supplies moved by an army on a single day as the long-haul transport capacity of the army.
- 2) Using the average daily tonnage of supplies moved by an army as the long-haul transport capacity of the army.
- 3) Using the daily tonnage of supplies moved by an army, on a daily basis, as the long-haul transport capacity of the army.
- 4) Using the known transport column tonnage capacities of German armored or armored infantry divisions, or the I SS Panzer Korps, to estimate the long-haul transport capacity of armies. (This data is found in German Archives sources RH10/141, /148, /149, /178, /181, /309, /312, /313, /318,

/319, and /321, described in full bibliographic annotation in the Bibliography Data Base.)

Of the four alternative methodologies, (3) was considered the most applicable, because it appeared that, based on descriptions found in sources, German long-haul transport capacity fluctuated on a daily basis and was more a function of available transport vehicles than a standard organizational capacity.

The other three alternative methodologies were not considered applicable. Methodology (2) would have resulted in German supplies shipped exceeding the long-haul capacity on some days, while (1) would have inflated the capacity to a higher level than the Germans were probably able to maintain without interruption. No information was found on authorized long-haul transport capacity of army-level transport units. OKW, KTB, IV 2, pg. 983 (source fully described in the Bibliography Data Base), mentioned that Army Group B's total transport capacity for the Ardennes operation was supplemented by an additional 1,000 tons, but the distribution of this tonnage was not indicated, nor is it apparent whether the supplemental capacity in fact became available during the Ardennes Campaign (see von Luettichau, GERMAN RAIL, pg. 139). Using the capacities of the division transport columns to estimate data for army columns was deemed unacceptable, because 1) they were organized for different functions than the army units, and 2) there was no information relating divisional transport column capacities to that of their army counterparts. Although the I SS Panzer Korps document (RH10/309) contained information on transport column capacity for the corps, there was likewise no way to relate this capacity to that of its army counterpart.

Therefore, it was decided after deliberation to estimate long-haul transport capacity for corps units only. Using the daily tonnage of supplies used by an army was considered too artificial a construct for estimating German long-haul transport at the army level. There would be too much variation in the capacity and no possibility of distinguishing capacity provided by division transport from capacity of army transport columns.

Thus, for all corps assumed to have a transport component (see the German Non-Divisional Service Support Unit Personnel, Equipment, and Medical Data narrative for details), a dry transport capacity of 107 metric tons (converted to 117.914 short tons) was estimated, based on the column capacity of the I SS Panzer Korps on 1 December 1944. German Archives source RH10/309 (full reference in the Bibliography Data Base) is the source used for this capacity. The tonnage amount was not divided into wet and dry transport capacity, as there was no information on which to make such a division.

Attachment 1

Primary and Secondary Sources with Information on German Logistics During the Ardennes Campaign

The following sources contain information on German ammunition and fuel data for the periods immediately preceding, during, and immediately after the Ardennes Campaign (16 December 1944-16 January 1945). Information derived from these sources was used in the estimation methodologies described in previous sections of this paper. It is recommended that the sources be reviewed to obtain full appreciation and understanding of German logistics data in the Ardennes Campaign period.

The sources identified are described in full bibliographic notation in the Bibliography Data Base. The information contained in the following list includes:

- Identification of the source.
 - Relevant page numbers.
 - Brief description of the information on the relevant page numbers.
- B701, pgs. 21-22. Fuel allocated to combat units, fuel reserve of High Command West. Ammo issued to combat units prior to and during the Ardennes Campaign with Army Group B.
- B311, pgs. 2, 7. Problems with artillery ammo supply due to variety of weapons in Army Group B.
- T122, pgs. 410-14. Ammo and fuel supplies stockpiled for German attack with Army Group B.
- ETHINT 21, pgs. 4, 12. Ammo and fuel information for 6th PzArmy.
- B577, pg. 12. Discussion of I SSPzK fuel shortage.
- B779, pgs. 14-15, 27-30, and 49-50. Discussion of I SSPzK supply situation on 15-16 Dec, including fuel, ammo, and food supplies. Information on I SSPzK supply situations during operations of Ardennes Campaign, particularly shortages of fuel supplies of divisions.
- A877, pgs. 21-22. Discussion of supply shortages of I SSPzK, particularly ammo and fuel, as well as information on food supply.
- B347, pg. 12. Ammo supply for 6th PzArmy artillery preparation.

B759, pgs. 2, 21, 22-24, and 29. 6th PzArmy supply information, including fuel and ammo preparations prior to and expenditures during the Ardennes Campaign.

P032, pg. 7. Discussion of 2d SSPzD fuel difficulties.

B522, pgs. 12-13. 12th SSPzD ammo and fuel supply situation.

Meyer, pg. 411. 12th SSPzD anticipated and actual ammo and fuel supply.

ETHINT 10, pg. 16. Fuel captured by 1st SSPzD.

ETHINT 11, pg. 2. Fuel captured by 1st SSPzD.

B151, pgs. 118-119, 137, 143, 145-47. Discussion of railroad supply routes of 5th PzArmy. Difficulties of employment of motor transport for supply purposes. 5th PzArmy ammo supply situation and shortages during operations, and capture of ammo dumps. Difficulties of ammo and fuel resupply for 5th PzArmy units due to transport shortages and obstacles.

B393, pgs. 22, 34-35, 54-55. Information on 5th PzArmy artillery ammo supply, location of ammo dumps, and movement of ammo distribution points.

P032c, pg. 9. Shortage of fuel at start of attack for the 15th PzGD, due to concentration of supply with front line panzer units.

B688, pgs. 58, 84. Difficulties of supply of 18th VGD during operations due to supply distances. Serious lack of trucks, shortages of certain ammo types and fuel, but plentiful supply of food.

A874, pg. 2. Discussion of supply of various ammo types of 116th PzD. In general, adequate supply of all ammo types and food, but shortages of fuel.

B678, pgs. 30, 31, 35-36, 41-42. Considerable discussion of all aspects of supply of 340th VGD. Fuel allocations too small, ammo shortages for artillery, long supply distances, inadequate motor transport (transport not supplied by higher headquarters) and fuel supply.

B024, pg. 7. Only 50 tons of transport for entire 560th VGD, supply bases noted as distant from division.

B467, pgs. 7-8. 7th Army artillery ammo supply for preparation.

B594, pgs. 8. 7th Army artillery ammo supply for preparation.

B783, pgs. 7, 26. 7th Army artillery ammo supply for preparation.

B032, pgs. 10, 14. LIII K supply distribution (in some cases supply had to be drawn from east of the Rhine River), shortages of artillery ammo, and persistent shortage of motor fuel.

SRH-049, pgs. 115, 124, 125, 130, 133, 141, 146, 158, 159, 162, 166, 169-70. Fragmentary information on ammo and fuel supply of 341st StgBde, 10th SSPzD, PzLehrD, 5th FJD, 12th SSPzD, 116th PzD, and 1st SSPzD.

RH20-7/379. Daily Transport Officer Reports to 7th Army Headquarters, with information on number of supply trains.

T311,18,7020854. Memorandum from OB West, Chief Supply Officer, 6 Dec 1944 with information on ammo supply and the "Fuehrer Reserve."

T311,18,7021067. Supply of fuel for Army Group B on 13 December.

T314,1134,305. 2d PzD ammo supply situation on 9 December.

T314,1134,279. PzLehrD ammunition supply on 8 December.

T314,1134,285. 26th VGD ammunition supply on 1 December.

Attachment 2

Motor Fuel Requirements (in 1,000 gallons) for German Divisions

<u>Unit</u>	<u>VS (50 km)</u>	<u>Admin. Use</u>
1st SSPzD	46.701	1.247
2d SSPzD	44.937	1.200
9th SSPzD	44.864	1.198
10th SSPzD	44.930	1.200
12th SSPzD	46.610	1.244
PzLehrD*	42.240	1.128
116th PzD**	40.313	1.076
PzD (all others)	37.456	1.000
PzGD	25.726	0.687
26th VGD***	7.075	0.189
VGD (all others)	6.020	0.161
ID	7.952	0.213
27th & 28th SSPzGDs****	1.505	0.040
150th PzBje*****	5.562	0.148
FBB*****	32.856	0.877
FGB*****	34.649	0.925
3d FJD*****	7.952	0.213
5th FJD*****	6.020	0.161

* 50 km requirement from US National Archives microfilm T314,1134,276, 10 December 1944 Report of Quartermaster "Work Staff" Kollmann (special planning staff of XLVII PzK for Ardennes offensive).

** 50 km requirement from US National Archives microfilm T314,1134,349, 2 December 1944 Level of One Fuel Requirement and Fuel Stocks.

*** 50 km requirement from US National Archives microfilm T314,1134,296, 10 December 1944 Description of Fuel Situation from Quartermaster Report.

**** 50 kilometer requirement estimated to be one-fourth of VGD, based on numbers of vehicles in units.

***** 50 kilometer requirement estimated based on numbers of vehicles in units.

***** 50 kilometer requirements based on requirements of ID and VGD. Both fallschirmjäger divisions (FJDs) were considerably below authorized strength in motor transport. (In B023, pg. 25, the 5th FJD was noted as lacking its supply columns entirely, which had to be replaced by 100 civilian horse-drawn vehicles)

All other values are calculated using the methodology discussed in the main body of this paper.

Compilation of German Order Of Battle

The task of compiling a daily German Order of Battle for the Ardennes Campaign Simulation Data Base (ACSDB) was complicated by the fact that information from primary and secondary sources was fragmentary and in some cases contradictory. This paper describes the nature of the German Order of Battle, problems encountered in its compilation, and the decisions made to create as accurate a final product as possible within the limitations of the existing records.

The sources referenced in the paper are either described in full bibliographic notation in Attachment 1 of this paper, or are listed in the Bibliography Data Base.

German Doctrine.

German Army doctrine allowed for a number of different types of subordination within the army's command structure. These included:

- 1) Attached for supply purposes only
- 2) Attached for tactical purposes
- 3) Subordinated for tactical purposes

Of these three the first is self-explanatory and is not considered an attachment for the purposes of the Order of Battle. The second form of subordination meant that the unit was for all intents and purposes a part of the parent unit. That is, supply was drawn from the parent unit, orders were given by the parent unit, and unit reports were passed via the parent unit. The third form of subordination is most closely analogous to the concept of OPCON (operational control). The subordinate was under operational control of a headquarter other than its parent unit but could continue to draw supplies and pass reports via its parent unit. By German doctrine, any unit under the command of another for a period less than eight weeks was considered to be subordinated. For the purposes of the ACSDB German Order of Battle, both the second and third forms are considered to be attached. An additional method of subordination employed by the Germans in the Ardennes and considered in the ACSDB was the formation of "ad hoc" headquarters to which divisions and other units were subordinated. For example, Korps Felber was formed around the headquarters staff of an infantry division, while Armeegruppe Von Luetwitz was formed by subordinating the XXXIX Panzer Korps to the XLVII Panzer Korps. (See the notes on Korps Decker below.)

several days after the change was noted in other primary sources. It is believed that this is a result of the apparent lack of timeliness in the maps. In cases such as this, the maps were considered to be incorrect. A major contradiction was found to be the assignment of the LVIII Panzer Korps in January 1945. This corps was active in the northwest corner of the Ardennes salient until 3 January. At that time the OKW maps show a change in location for the corps to the vicinity of Bastogne, then for the period from 5-10 January it disappears from the maps entirely. "Sunset" reports the relief of the corps by elements of the II SS Panzer Korps on 3 January and its reassignment to the vicinity of Bastogne. The postwar manuscript by the corps commander says that the corps moved to the vicinity of Bastogne on 11 January, whereas the corps artillery commander's manuscript says the move was made on 4 January. These contradictions were not resolved until a radio message dated 8 January was found on microfilm in the US National Archives (Microfilm #T314,1666,544), routed via the LVIII Panzer Korps signals battalion, with the sender listed as "Korps Decker." It was concluded that a temporary "Korpsgruppe" (corps group) under command of General Decker (commander of the XXXIX Panzer Korps which was being withdrawn on 5 January) was formed around the LVIII Panzer Korps artillery staff until the arrival of the remainder of the LVIII Panzer Korps headquarters on 11 January.

Other contradictions were found in the various planning papers of Heeresgruppe B for the offensive. A particular problem was the designation and assignment of some artillery units. In these cases the decision was made to use those documents with dates that were the closest to 16 December.

In cases where no resolution of a contradiction could be found, the original assignment of a unit was assumed to be correct. In cases where an effective date of change was missing it was assumed to have occurred on the day following the day on which a new assignment was first noted in a source.

Additional Notes on the German Order of Battle.

Several units have been eliminated from the Order of Battle, although they were originally assigned to the Ardennes Offensive. These include the 638th Army Artillery Battery (5th Panzer Army) and the 653d Heavy Antitank Battalion, both of which were apparently trapped in transit on railway cars by Allied bombing until they were transferred to Heeresgruppe G, as various rail transport notes in the Heeresgruppe D Kriegstagebuch for 21 December, 22 December, and particularly 29 December indicate.

Conventions Used in the German Order of Battle.

To reflect particular elements of the German tactical situation in the Ardennes in as accurate a manner as possible,

certain German units were tracked in a manner different from that used in the US segment of the ACSDB. The units concerned were all artillery, and the critical factor affecting the tactical situation was the mobility capability of these units.

The Germans used a number of different mobility classifications for their units, these included:

mot (motorisiert)	-	fully motorized
t-mot (teile motorisiert)	-	partly motorized
bew (bewegung)	-	mobile, horse drawn
t-bew (teile bewegung)	-	partly mobile, horse drawn
bo (bodenstandige)	-	non-mobile
Fst (festungs)	-	static fortress

Examination of available records showed that in the Ardennes Campaign even German units listed as motorized were stripped of vehicles to increase the supply transport capacity of corps or armies. Partly motorized or partly mobile units normally had the prime mover capacity to move one-third of the units' artillery pieces. To ensure that least a portion of the corps and army artillery would be capable of advancing to support the offensive, the German resorted to the expedient of concentrating the available prime mover capacity in a number of artillery batteries or battalions.

In order to reflect this fact, the following conventions in the German Order of Battle have been used.

1) All artillery units listed as attached to corps or army headquarters units (these units are designated as "6th PzArmy," "I SSPzK," etc.) are considered to be static; that is, they remained within the corps or army area as of 16 December 1944 and did not move forward with the corps or army combat units, if and when these units advanced.

2) All artillery units listed as attached to the Corps or Army "Troops" ("6th PzArmy Troops," "I SSPzK Troops," etc.) are considered to have some degree of mobility. For reference, the mobility classification of all artillery units is listed in the next section of this paper. That percent of the unit with a mobility capability should be considered to be able to move with the corps or army as it advances. That percent of the unit without a mobility capability should be treated as (1) above.

3) All artillery units, normally batteries and/or battalions, listed as attached to divisions should be considered to be fully mobile and should be treated as being capable of moving with the division to which it is attached. The sole exception to this is the artillery regiment of the 5th FJD, attached to the 352d VGD from 25 December to 16 January, which

was virtually immobile and only brought forward when the 352d VGD assumed a static defensive posture.

In the 16 December 1944 German Order of Battle, as recorded in the "ATTACHMENTS & DETACHMENTS" section of the Unit Data Base records, note that some organic divisional units, particularly with the Volksgrenadier ("people's" infantry) divisions, are shown as being detached from the parent unit. This indicates that these components were not with the parent unit as of 16 December. This situation was particularly relevant to antitank components of a number of the Volksgrenadier divisions. If the organic division unit's identification is followed by a "(REF)," it appears at a later date (between 17 December 1944 and 16 January 1945) in the data base. If the organic division unit is not followed by a "(REF)" on 16 December 1944, it does not show up in the Order of Battle on a later date, indicating that the parent unit did not have the unit within its organization during the Ardennes Offensive. For example, the 2d and 3d companies of the 79th Volksgrenadier Division's antitank battalion (2/ and 3/79th PjBN) are shown on 16 December as being detached from the 79th VGD. They do not appear on any date between 17 December 1944 and 16 January 1945 under "ATTACHMENTS & DETACHMENTS" and were therefore not with the division during the Ardennes Campaign.

Mobility Capability and Weapons of German Artillery Units.

<u>Unit</u>	<u>Mobility Percent</u>	<u>Armament (Weapons Designations & Numbers of Weapons)</u>
388th VAK	100	K75(7), PAK43ARTY(18), LFH105(17), SFH150(22), HOW210(6), K170(3)
401st VAK	100	K75(12), K105(12), LFH105(17), HFH122(12), K152(12)
402d VAK	100	K75(16), K105(12), LFH105(18), HFH122(10), K152(10)
403d VAK	50	PAK43ARTY(17), LFH105(34), HFH122(11), HFH150(9), HOW210(5), K170(3)
405th VAK	50	K75(18), K105(12), LFH105(18), HFH122(12), K152(12)
406th VAK	50	K75(18), K105(12), LFH105(18), HFH122(12), K152(12)
407th VAK	50	K75(18), K105(12), LFH105(18), HFH122(12), K152(12)
408th VAK	50	K75(18), K105(12), LFH105(18), HFH122(12), K152(12)
409th VAK	50	K75(18), K105(12), LFH105(18), HFH122(12), K152(12)
410th VAK	50	PAK43ARTY(18), LFH105(36), HFH122(12), K152(12), NW42(27)
766th VAK	100	K75(17), LFH105(14), HFH150(31), HOW210(5), K170(3)

4th VWB	100	NW41(72), NW42(36)
7th VWB	100	NW41(72), NW42(18), NW42HVY(18), NW41 SP(16)
8th VWB	33	NW41(54), NW42(18), NW42HVY(36), NW41 SP(16)
9th VWB	100	NW41(54), NW42(54), NW41 SP(16)
15th VWB	100*	NW41(72), NW42(18), NW42HVY(18)
16th VWB	33	NW41(72), NW42(18), NW42HVY(18)
17th VWB	33	NW41(72), NW42(18), NW42HVY(18)
18th VWB	33	NW41(72), NW42(36)
19th VWB	33	NW42(72), NW42HVY(36)
502d SSWrfBN	100	NW42(18), NW42(6)
508th SSWrfBN	100	NW41(18), NW42(6)
674th RRArtBt	---	K280(3)
688th RRArtBt	---	K280/5(1)
749th RRArtBt	---	K280/5(2)
III/139th AArtyBN	100	HFH150(9)
843d AArtyBN	100	LFH105(12)
628th AArtyBN	0	HOW210(6)
992d AArtyBN	100	LFH105(6), K152(4)
1193d AArtyBN	100	HFH150(9)
428th AArtyBt	0	HOW355(2)
1100th AArtyBN	0	HOW355(3)
1120th AArtyBN	0	HOW210(3)
1098th AArtyBN	0	HOW355(3)
501st SSArtBN	100	HOW210(4), K170(6)
502d SSArtBN	100	HOW210(4), K170(6)
460th AArtyBN	100	HFH150(9)
1099th AArtyBN	0	HOW355(3)
1121st AArtyBN	0	HOW210(3)
1124th AArtyBt	33	K128(6)
1125th AArtyBt	33	K128(6)
1119th AArtyBN	0	HOW355(3)
660th AArtyBt	0	K170(2)
1094th AArtyBN	33	K128(6)
5th FJArtR	0	LFH105(24), HFH150(12)
1095th AArtyBN	33	K128(6)
1093d AArtyBt	33	K128(6)
1122d AArtyBt	0	HOW210(3)
1092d AArtyBt	33	K128(6)
423d AArtyBN	100	LFH105(12)
15th AArtyBt	0	HFH150
1513th FstArBN	0	HFH122(20)
1076th FstArBN	0	K170(2)
1301st FstArBN	0	HOW210(9)
1310th FstArBN	0	HFH122(14)
1308th FstArBN	0	K75(27)
1123d FstArBt	0	K170(2)
1350th FstArBt	0	K152(4)

* The 15th VWB is considered to be at 50% mobility for the period 16-31 Dec as 50% of its transport had been stripped to augment logistical transport capacity during this period. The NW41 SP is always considered to be 100% mobile.

Attachment 1

Sources Used in Compilation of German Order of Battle

Primary -

- Heeresgruppe D Kriegstagebuch This document is from the German Archives in Freiburg, West Germany. Its German Archives identification number is RH19IV/84. "KT3" is the designation used for this source in a later section of this attachment.
- T311, 18, 7020716 to 7020717 "Planned Arrangement of Troops for the Offensive"
- T311, 18, 7021051 to 7021063 "Heeresgruppe B Artillery List, 14 December 1944"
- T314, 1133, 601 and 603 "5th Panzer Army Order of Battle, 13 December 1944"
- T314, 1133, 620 "XLVII Panzer Korps Gliederung, 14 December 1944"
- T314, 1134, 244 "XLVII Panzer Korps Attachments, 13 December 1944"
- T314, 1335, 419 to 438 "LIII Korps War Diary, 15 December 1944-16 January 1945"
- T314, 1335, 978 "Situation Map LIII Korps, 16 January 1945"
- T314, 1335, 1028 and 1029 "LIII Korps Strength Report, 8 January 1945"
- T314, 1594, 1130 to 1332 "LXXXI Korps Panzer and Panzerjaeger (Tank and Antitank) Report, 15-31 December 1944"
- T314, 1597, 203 "LXXXI Korps Gliederung, 16 December 1944"
- T314, 1597, 240 and 241 "85th Infantry Division Gliederung, 28 December 1944 and 16 January 1945"
- T314, 1597, 270 "LXXXI Korps Artillery Gliederung, 16 December 1944"
- T314, 1597, 271 "LXXXI Korps Artillery Gliederung, 18 December 1944"

T314, 1597, 274 "LXXXI Korps Artillery Gliederung, 25 December 1944"

T314, 1597, 666 to 671 "LXXXI Korps Strength Reports, 5-29 December 1944"

T314, 1666, 421 "LVIII Panzer Korps Artillery Gliederung, 30 December 1944"

T314, 1666, 544 "Situation Report, Korps Decker, 8 January 1945"

T314, 1666, 560 "Korps Decker Situation Map, 8 January 1945"

RH20-7/378 and 379 "7th Army Transportation Corps Reports"

SUNSET. Recently declassified US intelligence signal intercept documents available at the US National Archives. They are in Record Group 457, SRS-1869.

Note: In the above list, a source beginning with a "T" followed by three digits is on microfilm at the US National Archives. A source beginning with "RH" is from the German Archives in Freiburg, West Germany.

Secondary -

Pallud, Jean Paul. Battle of the Bulge: Then and Now. London: After the Battle, 1984.

Ritgen, Helmut. Die Geschichte der Panzer-Lehr-Division im Westen, 1944-1945. Stuttgart: Motorbuch, 1979.

Strauss, Franz Josef. Geschichte der 2-(Wiener) Panzer-Division. Vowinckel.

Tieke, Wilhelm. Im Feuersturm letzter Kriegsjahre. II.SS-Panzerkorps mit 9. und 10. SS-Division "Hohenstaufen" und "Frundsberg." Osnabrueck: Munin.

German Postwar Manuscripts -

A873	B027	B046	B332	B733	P032c
A874	B028	B049	B333	B759	P032d
A877	B029	B068	B347	B761	P032e
A924	B030	B073	B465	B779	P109a
A936	B031	B087	B477	B838	P109b
A940	B032	B118	B506	C002	P109c
A944	B033	B151	B577	C004	P109g
B023	B039	B151a	B594	P032	
B024	B040	B290	B688	P032a	

These are the identification numbers of the German postwar manuscripts available from the US National Archives and used to compile the Order of Battle. Complete bibliographic information for them is provided in the Bibliography Data Base.

Maps -

RH2W/605	13 Dec	(P)
RH2W/881	16 Dec	(P)
RH2W/607	17 Dec	
RH2W/608	17 Dec	(2d situation) (P)
RH2W/609	17 Dec	(3d situation)
RH2W/610	18 Dec	
RH2W/611	18 Dec	(2d situation) (P)
RH2W/613	19 Dec	(2d situation) (P)
RH2W/615	20 Dec	(3d situation)
RH2W/616	21 Dec	(2d situation) (P)
RH2W/617	21 Dec	(3d situation)
RH2W/619	22 Dec	(2d situation) (P)
RH2W/621	22 Dec	(3d situation)
RH2W/622	23 Dec	(2d situation) (P)
RH2W/624	23 Dec	(3d situation)
RH2W/863	24 Dec	(P)
RH2W/629	25 Dec	(3d situation) (P)
RH2W/631	26 Dec	(3d situation) (P)
RH2W/632	27 Dec	(2d situation) (P)
RH2W/634	27 Dec	(3d situation)
RH2W/637	28 Dec	(3d situation) (P)
RH2W/638	28 Dec	(3d situation)
RH2W/641	30 Dec	(2d situation) (P)
RH2W/646	31 Dec	(3d situation) (P)
RH2W/647	1 Jan	(2d situation) (P)
RH2W/649	1 Jan	(3d situation)
RH2W/651	2 Jan	(P)
RH2W/655	3 Jan	(P)
RH2W/657	3 Jan	(3d situation)
RH2W/659	4 Jan	(2d situation) (P)
RH2W/662	5 Jan	(P)

RH2W/664 6 Jan (P)
 RH2W/666 6 Jan (2d situation)
 RH2W/668 7 Jan (P)
 RH2W/669 7 Jan (2d situation)
 RH2W/671 7 Jan (3d situation;
 RH2W/673 8 Jan (2d situation) (P)
 RH2W/675 8 Jan (3d situation)
 RH2W/677 9 Jan (P)
 RH2W/680 9 Jan (3d situation)
 RH2W/682 10 Jan (P)
 RH2W/685 11 Jan (2d situation) (P)
 RH2W/687 11 Jan (3d situation)
 RH2W/689 12 Jan (P)
 RH2W/692 12 Jan (3d situation)
 RH2W/694 13 Jan (2d situation) (P)
 RH2W/696 13 Jan (3d situation)
 RH2W/698 14 Jan (2d situation) (P)
 RH2W/700 14 Jan (3d situation)
 RH2W/702 15 Jan (P)
 RH2W/704 15 Jan (3d situation)
 RH2W/707 17 Jan (P)

The maps listed above were researched at the German Archives in Freiburg, West Germany. These are the Oberkommando der Wehrmacht (CKW) (High Command of the Armed Forces) situation maps referenced in the main body of this paper. The maps were compiled by the High Command of the Armed Forces (OKW) three times daily for briefing purposes either for Hitler or the OKW (1st situation, 2d situation, or 3d situation). They contain information on locations of German units, assignments of German units, and armored fighting vehicle strengths of German units. A "(P)" indicates that a color photograph was made of the map during research. Information from other maps was recorded in text format.

Sources by Unit -

The following list shows the major sources used to determine the German Order of Battle by unit.

10th SSPzD
 KTB

116th PZD
 KTB
 A873
 A874
 B506

12th SSPzD
KTB
P032

12th VGD
KTB
B733
P032
P032e
P109a
P109b

15th Army
KTB
B033
B046
B087
B118
B290
B761
T311, 18, 7021051
T311, 18, 7020716--7020717

15th PzGD
KTB
P032c

167th VGD
T314, 1666, 544

18th VGD
KTB
B333
B688

1st SSPzD
KTB
T314, 1666, 544

212th VGD
KTB
B073
RH20-7/378 and 379

246th VGD
KTB

26th VGD
B040
P032d
T314, 1133, 601
T314, 1133, 603

276th VGD
T314,1335,978

277th VGD
Tieke

2d PzD
KTB
P109c
T314,1133,601 and 620
T314,1134,244
Strauss

2d SSPzD
KTB
P032
P032e
P109a
P109b

326th VGD
B028
B031
B039

344th ID
T314,1597,667

352d VGD
B030
B594
B783
P109g

353d ID
T314,1597,666
T314,1597,667

353d VGD
T314,1594,1130
T314,1594,1221

3d FJD
KTB
B838

3d PzGD
B068
B465
C002

47th VGD
T314,1597,667, and 669

560th VGD
B024
B027
P032
P109b

5th FJD
KTB
B023
B029
B032
B594
B783

5th PzArmy
B151
B151a
T314,1133,601
T314,1133,603
T311,18,7020716-7020717
T311,18,7021053

62d VGD
B024
E028

6th PzArmy
KTB
A877
A924
B039
B046
B347
B477
E759
B779
T311,18,7020716-7020717
T311,18,7021052

79th VGD
B594
B783

7th Army

B028

B030

B032

B594

B783

P109g

T311, 18, 7020716-7020717

T311, 18, 7021054

85th ID

P032a

T311, 1597, 240 and 241

89th ID

P032a

T314, 1597, 240

T314, 1597, 241

9th PzD

KTB

T314, 1594, 1130-1332

9th SSPzD

P032

Tieke

9th VGD

B029

B032

T314, 1335, 978

AG B

KTB

T311, 18, 7020716-7020717

FGB

B783

I SSPzK

A877

B577

B779

II SSPzK

KTB

Tieke

KG Cochenhausen

KTB

Fallud

Korps Decker

T314,1666,544

T314,1666,560 (map)

Korps Felber

B039

B046

B087

LIII K

B029

B032

T314,1335,419

T314,1335,424

T314,1335,438

T314,1335,978

T314,1335,1028-1029

LVIII PzK

B332

B506

T314,1133,601

T314,1133,603

T314,1666,421

LXVI K

B333

B477

T314,1133,601

T314,1133,603

LXVII K

A936

LXXIV K

B033

B118

LXXX K

B594

B783

LXXXI K

T314,1594,1130-1332

T314,1597,203

T314,1597,270

T314,1597,271

T314,1597,274

T314,1597,669

LXXXV K
B030
P109g

OKW
T314, 1133, 601

PzLehrD
A944
B049
Ritgen
T314, 1133, 601
T314, 1133, 620
T314, 1134, 244

XII SSK
B290

XIII K
B039
B046
B087

XLVII PzK
A940
T314, 1133, 601
T314, 1133, 620
T314, 1134, 244

THE ARDENNES CAMPAIGN SIMULATION DATA BASE (ACSDB)

Final Report

7 February 1990

Prepared for:

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Volume 2 of 2

Sections III through XV

The views, opinions, and findings contained in this report are those of the author(s) and should not be construed as an official Department of Army position, policy, or decision, unless so designated by other official documentation.

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- XVII. User's Guide (under separate cover)

The ACSDB Unit Inventory Data Base

INTRODUCTION

Data on major items of equipment of ground units, including crew-served weapons, artillery pieces, tanks, antitank guns, trucks, etc., is recorded in the Unit Inventory Data Base of the Ardennes Campaign Simulation Data Base (ACSDB). Numbers and status of the items of equipment -- how many are operational, how many are in maintenance or repair, how many are damaged in combat, etc. -- are the primary pieces of information contained in the Unit Inventory Data Base.

The purposes of this discussion are 1) to provide definitions of the data fields used in the Unit Inventory Data Base, 2) to serve as bibliographic reference for the sources from which data was extracted to generate the information in the Unit Inventory Data Base, and 3) to explain any estimation methodologies used to fill in missing data points.

The discussion is divided into five major sections. The first ("The ACSDB Unit Inventory Data Base") explains the meaning of the data fields which comprise the Unit Inventory Data Base. The second through fifth sections address the data recorded in the Unit Data base for US, British, and German ground forces which participated in the Ardennes Campaign. These sections contain data estimation methodologies, bibliographic information, and explanations of any unique characteristics of the data which can only be identified in a narrative. Attachments at the end of the sections provide glossaries, computations, and tables used in the preparation of the Unit Inventory Data Base. The sections are entitled:

- US Equipment Inventory Data.
- British Equipment Inventory Data.
- German Equipment Inventory Data Derivation.
- German Armored Fighting Vehicle Data Generation Methodology.

UNIT INVENTORY DATA BASE DEFINITIONS

"Unit Name" (No field number): Listed under "Unit Name" is the identification of the ground unit for which data is recorded in the Unit Inventory Data Base record. Data is recorded for three echelons: division (or independent armored brigade-) level; corps-level, and army-level.

Unlike records in the Unit Data Base (see the ACSDB Unit Data Base narrative), records for US and German division- or brigade-level units in the Unit Inventory Data Base are not subdivided into two parts with different identifications, i.e., "28th ID" and "28th ID Att." Instead, all Unit Inventory records pertaining to divisions, including those describing the equipment of the non-divisional units attached to divisions, are identified only by the division (or brigade) name, and the equipment of the division (or brigade) itself and any attachments to it are recorded on different pages. For a comprehensive explanation of this identification system, see the narratives on the derivation of the US, German, and British inventory data.

"Date" (No field number): Provided under "Date" is the date in month-day-year format of the record. See the ACSDB Time Conventions narrative for definitions of time periods for the US, British, and German unit records in the Unit Inventory Data Base.

"Nationality" (No field number): This is the nationality of the unit for which data is recorded. "A" designates American (US), "B" designates British, and "G" designates German.

"Amt" (Fields 1-16): Recorded under "Amt" (amount) are the types and numbers of items of equipment on-hand and in operational status. Note that equipment designations match those used in the ACSDB T/O&E and Weapons Data Bases.

"Dst" (Fields 1-16): Recorded under "Dst" (destroyed) are the types and numbers of items of equipment destroyed in action. This field is used primarily to describe the status of armored fighting vehicles and artillery weapons, as discussed in the narratives on US, British, and German inventory data derivation. Note that equipment designations match those used in the ACSDB T/O&E and Weapons Data Bases.

"Dmg" (Fields 1-16): Recorded under "Dmg" (damaged) are the types and numbers of items of equipment damaged in action. This field is used primarily to describe the status of armored fighting vehicles and artillery weapons, as discussed in the narratives on US, British, and German inventory data derivation. Note that equipment designations match those used in the ACSDB T/O&E and Weapons Data Bases.

"Abd" (Fields 1-16): Recorded under "Abd" (abandoned) are the types and numbers of items of equipment abandoned in action. This field is used primarily to describe the status of armored fighting vehicles and artillery weapons, as discussed in the narratives on US, British, and German inventory data derivation. Note that equipment designations match those used in the ACSDB T/O&E and Weapons Data Bases.

"Rpl" (Fields 1-16): Recorded under "Rpl" (replacement) are the types and numbers of items of equipment received as replacement by a unit. This field is used primarily to describe the status of armored fighting vehicles and artillery weapons, as discussed in the narratives on US, British, and German inventory data derivation. Note that equipment designations match those used in the ACSDB T/O&E and Weapons Data Bases.

"Rpr" (Fields 1-16): Recorded under "Rpr" (in-repair) are the types and numbers of items of equipment in short- or long-term repair, or undergoing maintenance. This field is used primarily to describe the status of armored fighting vehicles and artillery weapons, as discussed in the narratives on US, British, and German inventory data derivation. Note that equipment designations match those used in the ACSDB T/O&E and Weapons Data Bases.

"Rtn" (Fields 1-16): Recorded under "Rtn" (returned) are the types and numbers of items of equipment returned to operational status from repair. This field is used primarily to describe the status of armored fighting vehicles and artillery weapons, as discussed in the narratives on US, British, and German inventory data derivation. Note that equipment designations match those used in the ACSDB T/O&E and Weapons Data Bases.

"Remarks" (No field number): Entered under "Remarks" is information in text format which qualifies and amplifies data in any other field in the record.

"Sources" (No field number): Due to the considerable amount of estimation and the variety and number of sources required to generate data for the Unit Inventory Data Base, this paper serves as the source reference for the Unit Inventory Data Base. To record in Reference Data Base format all sources and data estimation used for the Unit Inventory Data base would have proved impractical and unwieldy. The narratives on the derivation of data for US, British, and German inventory data discuss in detail the sources and estimation processes employed to generate that data.

OPERATIONAL AND REPAIR STATUS FOR
ARMORED FIGHTING VEHICLES IN THE ACSDB

In examining US National Archives records on US tank and tank destroyer units, it was found that the following definitions for vehicle status were most often used:

- Operational: Operational or available for operations in less than 24 hours.
- Repair: Non-operational with an estimated repair time of greater than 24 hours.

"Repair" status evidently included all types of repair due to battle damage or routine maintenance. All vehicles recovered from the battlefield with battle damage were generally classified as "repair" until and unless the vehicle was declared a battle loss by Ordnance. Thus, a vehicle recovered by unit ordnance recovery teams could be evacuated to 3d or 4th echelon repair and still be carried as a "repair" on the unit's vehicle status report. For the purposes of the ACSDB, all vehicles carried on the reports as "operational" are considered on-hand ("Amt"), all listed in the reports as "repair" are considered in-repair ("Rpr"), and, in the absence of other information, a drop in "repair" without an increase in "operational" in the reports is considered a destroyed vehicle ("Dst").

No precise definitions of vehicle status for the German Army were found in research. However, the most common conventions followed appear to be:

- Operational (ready for action).
- Short-term repair (ready for action in less than three weeks).
- Long-term repair (ready for action in more than three weeks).

As with the US terminology, "repair" included both routine maintenance and battle damaged vehicles. Virtually all German maintenance and repair in the Ardennes Campaign appears to have been conducted by division-level maintenance units and below. The six tank repair workshops available to German Army Group B apparently functioned as a parts depot and distribution network, due to a lack of sufficient numbers of tank transporter vehicles and motor fuel. The workshops cannibalized parts from new (replacement) vehicles and forwarded them to the divisional workshops for use in repairing vehicles in divisional repair.

US National Archives Foreign Military Study ETHINT 61, An Interview with Gen Pz Horst STUMPF: TANK MAINTENANCE IN THE ARDENNES OFFENSIVE, discusses in general terms the German tank maintenance organization during the Ardennes Campaign.

US Equipment Inventory Data

INTRODUCTION

This narrative serves as the bibliographic reference for sources used in generating equipment inventory data for US units. It also explains the data estimation methodologies used to generate this data, as well as any peculiarities inherent to the data, such as the system of page numbers used in recording data for the numerous US Army divisional and non-divisional units which participated in the Ardennes Campaign. The narrative should be reviewed thoroughly and in conjunction with the Ardennes Campaign Simulation Data Base (ACSDB) Unit Inventory Data Base narrative in order to understand most fully the US data recorded in the Unit Inventory Data Base.

ORGANIZATION OF THE US INVENTORY DATA BASE RECORDS

There are over 9,000 records in the ACSDB Inventory Data Base used to record equipment inventory data on US units which participated in the Ardennes Campaign. The records contain data on equipment with infantry, airborne, and armored divisions, non-divisional combat units, and non-divisional service support units. The key to understanding in which records the data of the various units is recorded is the page number of the record as described in the following scheme.

<u>Unit Name</u>	<u>Page #</u>	<u>Description</u>
ID	1	All equipment of the three organic infantry regiments and one organic cavalry reconnaissance troop of an infantry division.
AD (Heavy)	1	Miscellaneous equipment of the two organic armored regiments of a heavy armored division, including M-3 HT, M-21 81mm, M-2 .50 HMG, 1 ton trl, 10 ton wrecker, .25 ton 4x4, and 2.5 ton 6x6. Also, all tanks in the division (the various M-4 models and the M-5 Tk), all M-8 AC, all M-32, and all M-8 75mm SP.
AD (Standard)	1	Miscellaneous equipment of the three organic tank battalions of a standard armored division, including M-9 2.36" Rkt, M-21 81mm, M-3 HT, .25 ton 4x4, 2.5 ton 6x6, 10 ton wrecker, and 1 ton trl. Also, all tanks in the division (the various M-4 models and the M-5 Tk), all M-8 AC, all M-32, and all M-8 75mm SP.

AbnD

1

All equipment of the organic parachute and glider infantry regiments of an airborne division. With the 82d and 101st Airborne Divisions, this equipment includes that of one glider and two parachute infantry regiments. With the 17th Airborne Division, this equipment includes that of one parachute and two glider infantry regiments.

ID

2 & 3

All equipment of all organic infantry division units not recorded on Page 1.

AD (Heavy)

2

All equipment of the one organic armored infantry regiment and one organic armored reconnaissance battalion of a heavy armored division, except the reconnaissance battalion's M-8 AC, M-8 75mm SP, and M-5 Tk which are included on Page 1.

AD (Standard)

2

All equipment of the three organic armored infantry battalions and one organic cavalry reconnaissance squadron of a standard armored division, except the reconnaissance squadron's M-8 AC, M-8 75mm SP, and M-5 Tk which are included on Page 1.

AbnD

2

All equipment of all organic airborne division units not recorded on Page 1.

AD (Heavy
and Standard) 3 & 4

All equipment of all organic armored division units not recorded on Pages 1 & 2.

ID, AD, AbnD,
Corps Troops,
and Army Troops 5

All artillery guns and howitzers, antiaircraft artillery weapons (including light pieces), and 4.2-inch chemical mortars of non-divisional field artillery, antiaircraft artillery, and chemical mortar units attached to divisions or subordinated to corps or armies.

ID, AD, AbnD,
Corps Troops,
and Army Troops 6

Selected equipment of non-divisional tank destroyer, tank, and cavalry units attached to divisions or subordinated to corps or armies. This equipment includes -- for tank destroyer units -- M-10, M-18, and M-36 tank destroyers, and M-5 3" AT (M-5 antitank) guns. For cavalry units, it includes M-5 Tk, M-8 AC, and M-8 75mm SP. For tank units, it includes the various M-4 models, M-5 Tk, M-24, and M-32. Equipment in records numbered as Page 6 are recorded in this order: tank destroyer unit equipment, cavalry unit equipment, and tank unit equipment. Therefore, there is some duplication of equipment names such as M-5 Tk, which is found in both cavalry and tank units, in cases where both kinds of units are subordinated to a division, corps, or army.

ID, AD, AbnD,
Corps Troops,
and Army Troops 8 & 9

Miscellaneous equipment not recorded on Pages 5 & 6, belonging to all non-divisional field artillery, antiaircraft artillery, chemical mortar, tank destroyer, tank, cavalry, airborne infantry, armored infantry, combat engineer, ranger, and other combat units.

Corps HQ and
Army HQ 8 & 9

All equipment of non-divisional service support units subordinated to corps or army.

Note: ID = Infantry Division, AD = Armored Division, and AbnD = Airborne Division. The 2d and 3d ADs were "heavy" armored divisions. The 4th, 5th, 6th, 7th, 9th, 10th, and 11th ADs were "standard" armored divisions.

The "ATTACHMENTS & DETACHMENTS" section of the Unit Data Base records the daily order of battle of US combat units during the Ardennes Campaign. The order of battle serves as the "blueprint" for determining equipment strengths in records numbered from Pages 5 to 9. For example, if the 28th ID has one non-divisional tank battalion attached to it on 25 December 1944, the equipment strengths of the tank battalion, as well as any attrition sustained by the tanks of the battalion, are reflected in the equipment recorded on Pages 6, 8, and 9 for the unit identified as "28th ID" on 12/25/44.

Similarly, for Corps HQ and Army HQ units, the equipment recorded on Pages 8 & 9 for units identified with these designations reflects the equipment strengths of non-divisional service support units. The daily order of battle of these units is not recorded in the "ATTACHMENTS & DETACHMENTS" section of the Unit Data Base, but instead is described in the US Non-Divisional Personnel Data narrative.

The system used for recording US inventory data, as described above, was created to facilitate generation, computer entry, and proofing of the data, and to allow for the data's logical, systematic presentation in computer format. The complications encountered in generation of data for units whose subordination frequently changes on a daily basis are described

in the ACSDB Unit Data Base narrative. These complications are compounded by the necessity of recording data for over 200 different items of equipment. The system employed to record US inventory data was created after considerable deliberation. It allows for an organized and logical presentation of the data. Short of recording data for all separate non-divisional units, a task of unmanageable data entry and storage proportions, it most faithfully represents the daily status of equipment for US Army units in the Ardennes Campaign.

US INVENTORY DATA GENERATION

Unlike the US Army unit personnel data available in primary source records, especially the daily personnel statistics found in the US 12th Army Group G-1 Daily Summary (located in US National Archives Record Group 407, Boxes 1753 and 1754), US Army primary source records lack the detailed, daily information on equipment status necessary to generate data at the ACSDB's required level of detail. Therefore, it proved necessary to employ several estimation methodologies to fill in missing data points and to supplement the data available in primary source records.

The principal estimation methodology uses an equipment attrition rate based on personnel attrition, which is applied to the equipment of the organic divisional "line" units found on Page 1 for infantry and airborne divisions, and Page 2 for armored divisions. This methodology is discussed below in greater detail.

Another frequently-used estimation methodology may be more accurately described as an application of mathematics, based on an underlying assumption. The underlying assumption is that the combat support and service support units of US Army divisions, corps and armies, including field and antiaircraft artillery units but not armored units, incurred minimal equipment losses and that their equipment strength was generally at or near full authorization levels. This assumption is based on the limited information found in research on non-divisional units. (To reduce the scope of a considerable data assembly task, research in US Army records for the ACSDB was directed at units at the division-level and above, except in the case of separate non-divisional armored units, as discussed below.) Based on the above-described assumption, calculation of inventory data for all units recorded on Pages 6, 8, and 9; for infantry and airborne divisions on Pages 2 and 3; and for armored divisions on Pages 3 & 4 essentially involves multiplying the numbers of particular types of unit by the authorized equipment strengths of the units, with the numbers of particular unit types determined by the daily order of battle. Exceptions to this approach do occur. For example, in the cases of the non-divisional field artillery battalions which lost unusually high amounts of equipment in the initial German attacks of the Ardennes Campaign, the actual equipment losses of these units are recorded, if known, or otherwise estimated, and their equipment strengths decreased accordingly. Also, in cases in which historical data is available, it is used in lieu of full authorized equipment strengths. These cases are described below in greater detail.

For all armored units (armored divisions, non-divisional tank units, towed and self-propelled tank destroyer units, and non-divisional cavalry units), most primary source documentation was researched in order to assemble as much information as possible on the equipment status of these units. These include the records of the armored divisions, the non-divisional battalions, and tank status reports. The sources researched and their use in generating daily armored fighting vehicles strengths as recorded on Page 6 for all units and Page 1 for armored divisions are discussed below in greater detail.

US LINE INFANTRY BATTALION AND REGIMENT DATA

Attrition of equipment strength for US infantry, armored, and airborne divisions is recorded on Page 1 for the infantry divisions, Page 2 for the armored divisions, and Page 1 for the airborne divisions. These pages contain data on the "line" infantry units of the divisions, namely the infantry regiments, armored infantry regiments and battalions, and airborne infantry regiments, which sustained the majority of the personnel losses of the divisions. Since the personnel attrition is used to calculate divisional equipment losses for most units, the equipment attrition is "isolated" in the line units of the divisions.

Data on items of equipment in the inventory of the line infantry units is recorded only in the "Amt" (operational status) field. Most items of equipment are transport vehicles or crew served weapons for which only data on numbers in operational status is required in the ACSDB. Several systems, i.e., M-3 HT, M-21 81mm, M-1 57mm AT, and M-3 105mm How, normally would have had data describing all types of equipment status -- "Dst," "Dmg," "Rpr," etc. However, since the data on the line infantry units' equipment is generated primarily with personnel loss attrition rates which are used to determine net losses and gains only, it is feasible to produce adjudged reliable estimates of numbers of items of equipment only in operational status.

Attachment 1 contains a series of tables with equipment loss and replacement rates, based on US First Army and selected division data and used to estimate daily strengths of the items of equipment in the line units of the infantry, armored, and airborne divisions. These rates are applied to the equipment strengths of the line units using the daily battle casualties of the divisions.

For divisions for which the 12th AG Daily G-1 Daily Summary was used as the principal source of personnel battle casualty data, the battle casualties from this document are used for equipment data estimation, without any modifications performed on them as described in the US Divisional Personnel Data narrative. The unmodified numbers are used in lieu of modified numbers, because most modifications made to them reflect changes in the cumulative casualties. As explained in the US Divisional Personnel Data narrative, it is not possible to determine exactly the date of changes in casualties reflected in the changes in the cumulative figures. (The one exception to this is the 106th ID, whose modified numbers are used.) For units for which sources other than the 12th AC G-1 Daily Summary for personnel battle casualties were used, such as the 1st ID, the 2d ID, the 83d ID, etc., the battle casualty figures from those other sources are

used in equipment data estimation.

Data in the sources used to compile the tables in Attachment 1 does not differentiate between decreases (or losses) in operational strength due to damaged or destroyed equipment. Likewise, the origin of increases (or replacements) in equipment strengths is not clearly defined as replacement with new equipment or return of equipment from repair or maintenance. Therefore, it is not possible to estimate strengths of equipment in other than operational status, and it is not possible to describe how all losses occurred or the type of equipment received as replacements (new or from repair/maintenance).

The approach used to calculate the line unit equipment strengths is as follows:

1) Total losses of each item of equipment are determined using the equipment loss rate and the total battle casualties of the unit for the period of its participation in the Ardennes Campaign.

2) Total replacements of each item of equipment are calculated using the replacement percentage of losses applied to the total losses.

3) Starting at full authorized equipment strength for each item of equipment on the day when a unit first appears in the ACSDB, daily equipment strengths are determined by subtracting out the daily losses of equipment as calculated using the equipment loss rates and the daily battle casualties.

4) After the appropriate elapsed time period from first loss to first replacement (as calculated from data shown in Attachment 1), replacements are added back to the strengths of each item of equipment, with replacements distributed roughly evenly over the time between the receipt of the first replacement and a unit's last day of participation in the Ardennes Campaign (usually 16 January). In some cases, equipment losses incurred in the latter period of the Ardennes Campaign (usually 10 January or later) are not replaced. These cases are determined by the number of losses estimated to have occurred in the latter period of the campaign, and the average elapsed time period from first loss to first replacement for each item of equipment. This is done to ensure that high equipment losses sustained in mid-January 1945, which would probably not have been replaced until after 16 January 1945, are not immediately replaced.

5) When "hard" data is available in primary source records, it is used in lieu of the estimation process described in steps 1-4 above. This data is usually fragmentary, i.e., a single report will describe shortages of major items of equipment on one day, or total losses of items of equipment incurred during a one-

or two-week period. The units which use selected "hard" data and the sources from which it is extracted are as follow (all sources are from the US National Archives Record Group (RG) 407 with the box numbers as indicated):

- 2d ID: Data for all equipment on 30 December 1944 is taken from V Corps G-4 Report STATUS OF CRITICAL ORDNANCE MATERIEL, 2d and 99th Infantry Divisions, dated 30 December 1944 (Box 3574, 205-4.2, Oct 44 to Feb 45), and 2d ID Artillery G-3 Journal (Box 6036, 302-ART-0.7, Nov 44-Mar 45).

- 5th ID: Data for all equipment is taken from 5th ID Daily Journal of G-4 (Box 6822, 305-4.2, 11 Dec 44 to 31 Jan 45).

- 88th ID: Data for all equipment is estimated using the first four steps of the above-described methodology, but numbers of replacements received modified to reflect the fact that the division was refilled with equipment to outfit only two infantry regiments.

- 29th ID: Data for all equipment is taken from 29th ID Daily G-4 Journal (Box 8655, 329-4.1 to 329-4.2).

- 83d ID: Data for all equipment is taken from weekly reports which comprise 83d ID G-4 (S-4) Periodic Reports 16 December 1944 to 13 January 1945 (Boxes 12523 and 12524, 383-4.2, 1 Oct 44 to 31 Jan 45).

- 99th ID: Data for all equipment on 30 December 1944 is taken from V Corps G-4 Report STATUS OF CRITICAL ORDNANCE MATERIEL, 2d and 99th Infantry Divisions, dated 30 December 1944 (Box 3574, 205-4.2, Oct 44 to Feb 45).

- 104th ID: Data for all equipment for the period 24 December 1944-12 January 1945 is from 24 December 1944 Critical Shortage Report and daily typewritten 104th ID G-4 reports for 24 December 1944 to 12 January 1945 (Box 14673, 3104-4.2 to 3104-4.11).

- 100th ID: Data for all equipment is estimated using the first four steps of the above-described methodology, but numbers of replacements received modified to reflect the fact that the division was refilled with equipment to outfit only one infantry regiment.

- 17th AbnD: Data for all equipment is from 17th AbnD G-4 daily Periodic Reports 31 December 1944 to 16 January 1945 (Box 7639, 317-4 to 317-36, 31 Dec 44 to 31 Jan 45).

- 3d AD: Data for M-3 HT and .25 ton 4x4 on 16 and 21 December 1944 and 6 and 14 January 1945 is from information found in the 3d AD G-4 (S-4) Periodic Reports dated 6 and 14 January

1945, and the 3d AD Daily G-4 Journal Message File, 16 December 1944 to 16 January 1945 (Box 15078, 603-4.2).

- 4th AD: Since this division was heavily engaged immediately prior to its commitment to the Ardennes on 20 December 1944, its on-hand equipment strengths for 20 December are reduced by the personnel shortfall of the division, some 1,150 personnel below authorized strength.

- 5th AD: Data for M-21 81mm for 25-29 December is taken from the 5th AD Daily G-4 Journal Message File (Box 15339, 605-4.2 to 605-30).

- 7th AD: Data for M-3 HT, M-21 81mm, .25 ton 4x4, 2.5 ton 6x6, and .75 ton 4x4 on selected dates is from the 7th AD Daily G-4 Journal 16 December 1944 to 16 January 1945 (Box 15605, 607-3.22 to 607-4.2).

- 9th AD: Data for M-3 HT and M-21 81mm on selected dates is from a shortages report on 14 January 1945 (Box 15797, 609-4.2, 18 Oct 44 to 28 Feb 45) and a table titled "Vehicular Losses during December:" (this source from microfilm records at the Office of Air Force History, Bolling Air Force Base, Washington, D.C., Microfilm Roll #C5150, 585.09-1).

- 10th AD: Data for M-3 HT, M-21 81mm, and .25 ton 4x4 on selected dates is from equipment loss reports dated either 25 or 26 December 1944 (Box 15925, 610-4.2).

On the tables in Attachment 1 are listed rates described as "Normal" and "Withdrawal." These are created to account for the higher equipment losses sustained by certain divisions during the initial German attacks of the Ardennes Campaign.

The "Withdrawal" rates are used to estimate equipment data for the period 16-25 December 1944 for the following divisions:

- 2d ID
- 4th ID
- 28th ID
- 78th ID
- 99th ID
- 106th ID
- 7th AD
- 9th AD

For all other divisions at all times, and the eight divisions listed above during the period 26 December 1944-16 January 1945, the "Normal" rates are used.

EQUIPMENT DATA FOR US COMBAT SUPPORT AND SERVICE SUPPORT
UNITS OF US DIVISIONS, CORPS, AND ARMIES

Equipment data for the non-line infantry units of the divisions and the non-divisional units subordinated to corps and armies is in general recorded at full authorized strength. Exceptions to this generalization are made in the cases of units for which "hard" data is available in primary sources, or in the cases of units which suffered high losses in the initial German attacks of the Ardennes Campaign. These include certain field artillery units attached to the 28th and 106th Infantry Divisions and subordinated to the VIII Corps during the period 16-25 December 1944.

This section describes the sources used for equipment data with the non-line infantry units of the divisions. It also describes the derivation of equipment data of those non-divisional units which suffered heavy equipment losses in the first phase of the Ardennes Campaign.

Equipment Data of Non-Line Infantry Units of Divisions

The non-line equipment data of the following divisions is generated using data found in primary source records or through estimation methodologies as explained below. The data generated for the divisions in some cases consists only of information on one item of equipment, such as details on numbers of 2.5 ton Dump (dump trucks) with the 35th Infantry Division.

- 2d ID
- 5th ID
- 26th ID
- 28th ID
- 35th ID
- 83d ID
- 99th ID
- 106th ID
- 3d AD
- 7th AD
- 9th AD
- 17th AbnD
- 82d AbnD
- 101st AbnD

2d ID: On 16 December a V-1 rocket struck the 2d ID's quartermaster maintenance company. This event and the equipment losses are described in a 2d ID G-4 Report (Box 6029, 302-4.2 Oct 44 to May 45). Information on equipment in other non-line units

is contained in the V Corps G-4 Report STATUS OF CRITICAL ORDNANCE MATERIEL, 2d and 99th Infantry Divisions, dated 30 December 1944 (Box 3574, 205-4.2, Oct 44 to Feb 45), and 2d ID Artillery G-3 Journal (Box 6036, 302-ART-0.7, Nov 44-Mar 45).

5th ID: Information on equipment in non-line units is contained in the 5th ID Daily Journal of G-4 (Box 6822, 305-4.2, 11 Dec 44 to 31 Jan 45).

26th ID: Information on equipment in non-line units is contained in the III Corps Equipment Shortages by Division, 8 and 14 January 1945 (Box 3329, 203-16 to 203-4.2).

28th ID: Information on equipment in non-line units is derived from several 28th ID G-4 reports, including a 29 December 1944 table "CONSOLIDATED LIST OF SHORTAGES - 28th INFANTRY DIVISION (Units concerned);" a 28 December 1944 memorandum, to Chief of Staff with "Total trucks requested and received to date" and "following vehicles will be or have been issued to units;" and an undated table "Consolidated List of Combat Losses - 28th Infantry Division" (Box 8542, 328-4.2, 12 Dec 44 to 28 Feb 45).

35th ID: Information on equipment in non-line units is contained in the III Corps Equipment Shortages by Division, 8 and 14 January 1945 (Box 3329, 203-16 to 203-4.2).

83d ID: Information on equipment in non-line units is contained in the 83d ID G-4 (S-4) Periodic Reports 16 December 1944 to 13 January 1945 (Boxes 12523 and 12524, 383-4.2, 1 Oct 44 to 31 Jan 45).

99th ID: Information on equipment in non-line units is contained in the V Corps G-4 Report STATUS OF CRITICAL ORDNANCE MATERIEL, 2d and 99th Infantry Divisions, dated 30 December 1944 (Box 3574, 205-4.2, Oct 44 to Feb 45).

106th ID: The account of the 106th ID's experience found in Hugh Cole's book (Cole, Hugh M. The Ardennes: Battle of the Bulge. United States Army in World War II. The European Theater of Operations. Washington, D.C.: USGPO, 1965), particularly pages 166-170, is used to estimate equipment losses of the non-line units of the division. Particularly hard-hit were the following divisional organic units:

- 589th Field Artillery Battalion (elements)
- 590th Field Artillery Battalion
- B/81st Engineer Battalion (+)
- B/331st Medical Battalion
- 106th Reconnaissance Troop (Mechanized)

The authorized equipment of these units are subtracted from the divisional inventory strengths on the dates when they were

overrun or surrendered. Additional information in Pallud's book (Pallud, Jean Paul. Battle of the Bulge: Then and Now. London: After the Battle, 1984), particularly pages 300-301, aids in determining the status of howitzers in the 589th Field Artillery Battalion.

3d AD: Information on equipment in non-line units is contained in the 3d AD G-4 (S-4) Periodic Reports dated 6 and 14 January 1945, and the 3d AD Daily G-4 Journal Message File, 16 December 1944 to 16 January 1945 (Box 15078, 603-4.2).

7th AD: Information on equipment in non-line units is contained in the 7th AD Daily G-4 Journal 16 December 1944 to 16 January 1945 (Box 15605, 607-3.22 to 607-4.2).

9th AD: Information on equipment in non-line units is contained in a shortages report on 14 January 1945 (Box 15797, 609-4.2, 18 Oct 44 to 28 Feb 45) and a table titled "Vehicular Losses during December:" (this source from Microfilm records at the Office of Air Force History, Bolling Air Force Base, Washington, D.C., Microfilm Roll #C5150, 585.09-1).

17th AbnD: Equipment data for non-line units is taken from the 17th AbnD G-4 daily Periodic Reports 31 December 1944 to 16 January 1945 (Box 7639, 317-4 to 317-36, 31 Dec 44 to Jan 45). Note that the equipment of one quartermaster truck company is maintained with the 17th AbnD, as one of these companies was with the division.

82d AbnD: Equipment data for non-line units is derived from a 17 December 1944 movement order for the 82d AbnD, "ANNEX NO. 1 - ORGANIC TRANSPORTATION (Box 12407, 382-3.3, 17 to 28 Dec 44). Note that one of the 82d AbnD's artillery battalions, the 320th Glider Field Artillery Battalion, was equipped with M-3 105mm How instead of M-1 75mm How. This information is from Napier Crookenden, Dropzone Normandy (New York: Scribner's, 1976).

101st AbnD: One artillery battalion of the 101st AbnD was also equipped with the M-3 105mm How, according to Crookenden. Much information on equipment data for non-line units is derived from 101st AbnD G-4 reports including a 1 January 1944 DIVISION ARTILLERY memorandum, "SUBJECT: Material Losses;" an 8 March 1945 MEMORANDUM to "G-4, 101st AB Division...major items of Ordnance equipment...lost between 10 December 1944 and 10 January 1945;" and a 1 February 1945 DIVISION ARTILLERY memorandum, "SUBJECT: Material Losses" (Box 14337, 3101-4 to 3101-4.5).

Equipment Data of Non-Divisional Units

The artillery losses of non-divisional field artillery battalions either attached to divisions or subordinated to corps are recorded on Page 5 records for US units in the Unit Inventory Data Base. Units principally affected include VIII Corps Troops and 28th ID (attachments) during the period 16-25 December.

Sources used in compilation of artillery loss data include the following (all sources from US National Archives Record Group (RG) 407, with box numbered as indicated):

- 2d ID Artillery G-3 Journal (Box 6036, 302-ART-0.7, Nov 44-Mar 45).

- 106th Infantry Division Divisional Artillery After Action Report, Box 14745, 3106-ART-0.1 to 0.3.

- 740th Field Artillery Battalion December 1944 After Action Report, Box 20158, FABN 740-0.3 to 0.7.

- 561st Field Artillery Battalion December 1944 After Action Report, Box 20067, FABN 561-0.3 to 0.7.

- 333d Field Artillery Battalion December 1944 Unit Report, Box 20008, FABN 333-0.3.

- 4th Armored Division Daily Equipment Status Reports December 1944-January 1945, Box 15260, 604-4-4.2.

- 559th Field Artillery Battalion G-3 Journal 9-17 December 1944, Box 20063, 559-01. to 0.7.

- VIII Corps After Action Report, Box 4029, 208-3.2.

- After Action Report, Third US Army: 1 August 1944-9 May 1945. Vol. 1, The Operations and Vol. 2, Staff Section Reports. (This is not a US National Archives record.)

US ARMORED FIGHTING VEHICLE DATA

For purposes of this discussion, armored fighting vehicles of US units in the ACSDB include light and medium tanks, self-propelled tank destroyers, the M-8 75mm SP (self-propelled 75mm howitzer), M-8 AC (M-8 armored car), M-32 (recovery vehicle), and the M-5 3" AT (3-inch towed antitank gun), the latter system not an armored fighting vehicle per se but the primary weapon of the US non-divisional towed tank destroyer battalion.

Data for US armored fighting vehicles is recorded in the Unit Inventory Data on Page 1 for armored divisions and Page 6 for non-divisional tank, tank destroyer, and cavalry units. This data includes not just operational ("Amt") status, but also destroyed ("Dst"), damaged ("Dmg"), in-repair ("Rpr"), etc.

Data for US armored fighting vehicles comes from battalion, division, and corps records on file at the Washington Federal Records Center in Suitland, Maryland, an annex of the US National Archives. This paper contains bibliographic information on all records researched at Suitland, and discusses in general terms the methodology employed to extract data from the records, as well as any peculiarities inherent to the records and assumptions made in deriving armored fighting vehicle data from them.

One problem encountered with the records is a lack of complete information for all units. For example, the 702d Tank Battalion records have no vehicle strength reports for January 1945, and the 705th Tank Destroyer Battalion has no reports with relevant data for the Ardennes Campaign period. Another problem encountered in reviewing the records is an inconsistency of reporting formats. Some units only reported the number of vehicles in operational status. The most common report format gives vehicle combat losses only. There was no standard format for vehicle status reports in the US 12th Army Group, and, while reporting formats are usually similar within armies, this is not always the case.

Vehicle status reports, typically the corps G-4 tank status reports, identify vehicles by type with a series of three or four numbers following. In general, the first number gives the number operational or operational in less than 24 hours, the second number gives the number in repair or considered repairable in more than 24 hours, the third number usually indicates those vehicles totally lost, or estimated to have been lost, to the unit (including vehicles evacuated to higher echelon repair facilities), and the fourth number usually indicates the shortfall of vehicles below authorized (T/O&E) strength.

In many cases the number listed as lost remains constant over several days. This reflects the number of vehicles estimated to have been lost by the unit. When this number changes, the loss has either been confirmed, the vehicle has been recovered and is in repair, or the report was erroneous and the vehicle was not actually lost. Normally, in these cases the numbers listed as operational and non-operational will also change. In some units the number in repair includes vehicles that were a total loss, but had not been condemned as unserviceable. This is evidently a reflection of the requirement that vehicles could not be replaced until a T/O&E vacancy occurred.

The figure giving the T/O&E shortfall of the unit cannot in most cases be used for data generation in the Unit Inventory Data Base, as all armored formations of the 12th Army Group operated under unique, modified T/O&Es (MTOEs), the specific natures of which cannot be found in the records.

In some cases figures given for operational vehicles specifically identify all variants of that type of vehicles (i.e., M-4 75mm, M-4 76mm, M-4 Dozer, etc., some of the different models of the US M-4 "Sherman" medium tank) whereas the figures for in-repair, lost, and T/O&E shortfall are provided by generic designation ("M-4," "mediums," etc.) for the aggregate numbers of specific vehicle types.

When no information is found in a record to the contrary, it is assumed that the first number refers to on-hand, the second refers to in-repair, with increases reflecting additional vehicles requiring repair, and decreases indicating vehicles repaired. The third number is assumed to refer to number destroyed, when the total on-hand or in-repair decreases. If the total on-hand or in-repair increases, it is assumed that this reflects replacements. (It is evident from fragmentary detailed reports that such increases may reflect returns of repaired vehicles from higher echelon repair facilities.)

In cases where information is excessively fragmentary, on-hand and in-repair figures are derived from averages computed with complete information for similar units (i.e., tank battalions, or tank destroyer battalions with the various kinds of armament -- M-10, M-18, M-36, and M-5 3" AT).

As the non-divisional battalions infrequently report the status of support vehicles (M-3 HT, M-32, M-8 AC, etc.) these are taken as being at T/O&E strength, in the absence of other information.

G-4 records of all US tank and tank destroyer battalions and armored divisions were researched for information on armored fighting vehicles. The following lists identify all records

reviewed for data. Unless otherwise specified, they come from the US National Archives Record Group (RG) 407, with the box numbers as indicated. "AAR" designates "after action report."

Non-Divisional Tank Battalions

70th TkBN: Box #16630, ARBN-70-0.3 12-1-44 to 12-31-44 AAR. Losses reported in narrative, operational states for 16 December. Box #16631, ARBN-70-0.3 1-1-45 to 1-31-45 AAR. No losses indicated.

701st TkBN: Box #16654, ARBN-701-0 to ARBN-702-0.2. Operational states for 15 December, no losses indicated.

702d TkBN: Box #16674 and 16675, ARBN-702-3.1 12-1-44 to 1-17-45 AAR. Daily operational states, losses for December.

702d TkBN: Box #16654, ARBN-701-0 to ARBN 702-0.2. Operational states for 25 December, 31 December (M-4 only), losses for 22 December, 24 December given.

707th TkBN: Box #16680. ARBN-707-0.1 to ARBN 707-3.9.1 AAR. Losses reported in narrative, operational states not given.

736th TkBN: Box #16698, ARBN-736-0.3 to 0.7 AAR. Daily operational states 20 December, 31 December, 3 January-10 January.

737th TkBN: Box #16699, ARBN-737-0.1 to ARBN 737-Co(A)-0.3 AAR and daily G-4 report. Operational states and losses December 44-January 45.

740th TkBN: Box #16702, ARBN-740-0 to ARBN-740-Co(A)-0.3 AAR. Operational states, replacements, losses December and January.

741st TkBN: Box #16706, ARBN-741-0.1 to ARBN-741-0.16 AAR. No losses or operational states December or January, replacements for 6 January (M-4 76mm).

743d TkBN: Box #16707, ARBN-743-0.3 to ARBN-743-3.2 AAR. Losses for December and January, no operation states.

744th TkBN (Light): Box #16708, ARBN-744-0 to ARBN-744-0.3 AAR. No losses reported for December or January, no operational states, replacements for 24 December (M-24).

745th TkBN: Box #16710, ARBN-745-0.1 to ARBN-745-0.3 AAR. Daily shortfalls (deadline and lost) for December and January, no operational states.

746th TkBN: Box #16712, ARBN-746-0.1 1-1-44 to 12-31-44
AAR. Fragmentary loss information for December and January.

750th TkBN: Box # not recorded, ARBN-750-0.1 to ARBN-750-0.3 AAR. Daily losses, returns, replacements for December and January, no operational states.

761st TkBN: Box #16792, ARBN-761-0.3 1-1-45 to ARBN-761-0.7 AAR. Daily losses, in repair, operational for January.

784th TkBN: Box # not recorded, ARBN-784-0.1 to ARBN-784-3.2 AAR. Fragmentary loss information for December and January.

Divisional Tank Battalions

8th TkBN (4th AD): Box #15305, 604-Tk(8)-0.2 to 604-Tk(8)-3.6 AAR, S-3 Journal. Daily losses for December and January, no operational states.

35th TkBN (4th AD): Box #15306, 604-Tk(35)-0.1 to 604-Tk(35)-1.13 AAR. Daily losses for December and January, no operational states.

37th TkBN (4th AD): Box #15309, 604-Tk(37)-0.1 to 604-Tk(37)-0.2 AAR. Daily losses for December and January, maximum number operational 23-27 December.

15th TkBN (6th AD): Box #15538, 606-Tk(15)-0 to 606-Tk(15)-0.7 History. Fragmentary daily losses for January (no losses in December), no operational states.

68th TkBN (6th AD): Box #15540, 606-Tk(68)-0 to 606-Tk(15)-1.13 AAR. Fragmentary daily losses for January (no losses in December), no operational states.

69th TkBN (6th AD): Box #15541, 606-Tk(69)-0.3 AAR. Fragmentary daily losses for January (no losses in December), no operational states.

2d TkBN (9th AD): Box #15896, 609-Tk(2)-0.7 S-3 Journal, AAR. Fragmentary daily losses and aggregate losses for December (no losses in January), replacements for January, no operational states.

14th TkBN (9th AD): Box #15897, 609-Tk(2)-0.12 to 609-Tk(14)-1.13 AAR. Fragmentary daily losses and aggregate losses for December (no losses in January), replacements for January, no operational states.

19th TkBN (9th AD): Box #15900, 609-Tk(19)-0.8 to 09-Tk(19)-3.23 AAR. No useful information. Box #15898, 609-Tk(19)-0.1 to 609-Tk(19)-0.7 AAR. Aggregate losses for December and January, replacements for January, no operational states.

3d TkBN (10th AD): Box #16039, 610-Tk(3)-3 to 610-Tk(3)-3.2 S-3 Journal. Daily losses for December and January, operational states on 7 January. Box #16037, 610-Tk(3)-0.1 to 610-Tk(3)-0.7 AAR. Fragmentary daily operational states, December and January. Box #16038, 610-Tk(3)-0.21. Operational states for December and January.

11th TkBN (10th AD): Box #16042, 610-Tk(11)-0.1 to 610-Tk(11)-0.9 AAR. Aggregate losses for December (no losses in January), no operational states.

21st TkBN (10th AD): Box #16055, 610-Tk(21)-2 to 610-Tk(21)-3 S-3 Journal. No relevant information.

22d TkBN (11th AD): Box #16622, ARBN-4-1.13 to ARBN-22-2.2 AAR. Fragmentary daily losses for December and January, no operational states.

32d TkBN (11th AD): Box #16624, ARBN-31-0.1 to ARBN-44-0.10 AAR. Fragmentary daily losses for December and January, no operational states.

41st TkBN (11th AD): Box #16119, 611-Tk(41)-0.3 to 611-Tk(41)-0.7 AAR. Fragmentary daily losses for December and January, no operational states.

Armored Division and Corps Reports

III Corps: Box #3329, 203-16 to 203-4.2. Tank status reports for 22 December 1944-16 January 1945.

V Corps: Box #3540, 205-3.2 17-20 Dec Tank/TD status reports
Box #3541, 205-3.2 20-24 Dec Tank/TD status reports
Box #3542, 205-3.2 25-29 Dec Tank/TD status reports
Box #3543, 205-3.2 30 Dec-3 Jan Tank/TD status reports
Box #3544, 205-3.2 4-9 Jan Tank/TD status reports
Box #3545, 205-3.2 9-15 Jan Tank/TD status reports
Box #3546, 205-3.2 16-21 Jan Tank/TD status reports

VII Corps: Box #3901, 207-3.2 15-19 Dec Tank status reports
Box #3902, 207-3.2 20-24 Dec Tank status reports
Box #3903, 207-3.2 23-27 Dec Tank status reports
Box #3904, 207-3.2 28-31 Dec Tank status reports
Box #3905, 207-3.2 1-5 Jan Tank status reports
Box #3906, 207-3.2 6-8 Jan Tank status reports

Box #3907, 207-3.2 9-12 Jan Tank status reports
Box #3908, 207-3.2 13-14 Jan Tank status reports

XIX Corps: Box #5020, 219-3.2 Tank/TD status reports
Box #5021, 219-3.2 Tank/TD status reports
Box #5022, 219-3.2 Tank/TD status reports
(XIX Corps reports are Tank status for 18 Dec-15 Jan and TD status for 1-16 Jan.)

2d AD: Box #14963, 602-3.2 12-1-44 to 12-31-44 G-3 Journal.
Tank status reports for 16 Dec-16 Jan.

3d AD: Box #15078, 603-4.2 G-4 Journal. Tank status reports for
16 Dec-16 Jan (some days missing).

5th AD: Box #15338, 605-3.9 to 605-4.2 Tank status reports for
16 December-1 January
Box #15339, 605-4.2 to 605-30

7th AD: Box #15603, 607-3.22 to 607-4.4 G-4 Journal. Tank
status reports for 16 Dec, 20-21 Dec, 24 Dec, 26
Dec-6 Jan, 9 Jan, 11 Jan, and 16 Jan (information
incomplete for some days).

10th AD: Box #15979, 610-CCB-3.17 to 610-CCB-4.9 G-4 Journal.
Operational states for 1 January only.

5th ID: Box #6822, 305-4.2 12-11-44 to 1-31-45 G-4 Journal.
Tank status reports for 735th and 737th Tank
Battalions) for 16 Dec-16 Jan.

83d ID: Box #12523, 383-4.2 10-1-44 to 12-31-44 G-4 Journal
Tank status report for 774th Tank Battalion (17
Dec).

First United States Army, Report of Operations, 1 August 1944-22
February 1945. 4 vols. The Armor Section of this document
contains average monthly strengths and cumulative losses of US
First Army armored divisions and tank battalions. This document
is not a US National Archive record.

Tank Destroyer Battalions

602d TD BN: Box #23552, TD BN-602-0.3 12-1-44 to 5-8-45
AAR. Fragmentary daily losses for January (no loss in December),
no operational states.

603d TD BN: Box #23554, TD BN-603-0.1 to TD BN-603-0.3 AAR.
Weekly operational states, non-operational states, losses for
December and January.

609th TD BN: Box #23562, TD BN-609-0.1 to TD BN-609-0.7
AAR. Aggregate monthly losses for December and January, no
operational states.

610th TD BN: Box #23565, TD BN-610-0 to TD BN-610-0.7 AAR.
Fragmentary daily losses for December and January, no operational
states.

612th TD BN: Box #23571, TD BN-612-0.1 to TD BN-612-0.3
AAR. Fragmentary daily losses for December and January, no
operational states.

628th TD BN: Box #23581, TD BN-628-0 to TD BN-628-Co(A)-0.2
AAR. Fragmentary daily losses for December and January, no
operational states.

629th TD BN: Boxes #23582 and #23583, TD BN-29-0.3 to TD
BN-629-0.7 AAR. Fragmentary daily losses and aggregate
replacements for December and January, no operational states.

630th TD BN: Box #23585 and 23586, TD BN-630-0.7 AAR.
Fragmentary daily losses and replacements for December and
January, no operational states.

634th TD BN: Box #23594, TD BN-634-0.3, 12-1-44 to 12-31-44
AAR, S-3 Journal. Detailed daily (by company) losses, repairs,
operational states, including operational states with some daily
losses for other US First Army tank destroyer battalions (VII
Corps antitank (AT) Bulletins for 16 December 0800-01 January
0800, some missing). Box #23595, TD BN-634-0.3 1-1-45 to 1-31-45
same as preceding description, for January.

635th TD BN: Box #23611, TD BN-635-0.3 to TD BN-635-0.1
AAR. Fragmentary daily losses, no operational states.

638th TD BN: Box #23622, TD BN-638-0.7 12-1-44 to 12-17-44.
Operational states for XIII Corps tank destroyer battalions (15
December 44 only) including the 638th. Box #23623, TD BN-638-0.7
12-18-44 to 12-31-44. Daily operational states for December
(some days missing) and various (XIII, V, VII, XIX) Corps TD
reports, fragmentary daily operational states for First Army tank
destroyer battalions, fragmentary loss and repair information as
well.

654th TD BN: Box #23665, TD BN-654-3.1 S-3 Journal. Daily
operational states and losses for December and January.

704th TD BN: Box #23716, TD BN-704-3.2 S-3 Journal.
Operational states for December and January (no losses or repair
states given).

705th TD BN: Box #23718, TD BN-705-0.1 to TD BN-735-1.8

AAR. Fragmentary daily (16-19 December) operational, repair states, aggregate losses for December (no losses in January).

773d TD BN: Box #23725, TD BN-773-0 to TD BN-773-0.7 AAR. Fragmentary losses for January only. Box #23726, TD BN-773-0.3 to TD BN-773-0.12 Periodic reports. Daily operational, repair states (battle damage and mechanical failure) for December and January. Box #23730, TD BN-773-3.2 12-1-44 to 12-31-44 S-3 Journal. Losses for XX Corps tank destroyer battalions (17 December 1200-19 December 1200 only), including 773d Tank Destroyer Battalion. Box #23731, TD BN-773-3.2 1-1-45 to 1-31-45 S-3 Journal. Operational states, repair states, shortfalls for XX Corps battalions (09 January 1200-17 January 1200) including the 773d.

803d TD BN: Identification not recorded. Operational states daily for December and January, no loss data.

807th TD BN: Box #23793, TD BN-807-0.8, 12-17-44 to 12-31-44 Periodic Reports. Daily losses for various XII Corps tank destroyer battalions (15 December 1200-31 December 1800) and operational, repair states (28 December 0800-31 December 0800 only), including 807th. Box #23794, TD BN-807-0.8, 1-1-45 to 1-31-45 Periodic Reports. Daily losses and operational, repair states for various XII Corps battalions, including the 807th.

808th TD BN: Boxes #23798 and #23799, TD BN-808-0.1 to TD BN-808-0.3 12-1-44 to 12-31-45. Fragmentary loss information only.

811th TD BN: Identification not recorded. No data for December, operational states (1 January) and aggregate losses and replacements for January.

814th TD BN: Identification not recorded. Fragmentary operational states, losses and repairs daily for December and January.

820th TD BN: Box # not recorded, TD BN-820-0.1 to TD BN-820-0.3 12-1-44 to 12-31-44 AAR. Fragmentary daily losses for December, no operational states.

823d TD BN: Box #23847, TD BN-823-0.1 to TD BN-823-0.7 12-1-44 to 1-31-45, AAR. Operational states (16 December) and losses, repairs, replacements daily for December and January. Box #23855 TD BN-823-0.8 12-1-44 to 12-31-44. Operational and repair states daily for December. Box #23856, TD BN-823-0.8 1-1-45 to 1-31-45 same as previous description, for January.

825th TD BN: Box #23870, TD BN-825-0.1 to TD BN-825-Co(A)-0.3 AAR. Operational states and losses daily for Company A only for December (no losses in January).

Attachment 1

US Line Infantry Unit Attrition Rates

Equipment	1 Aug-15 Dec 44, 26 Dec 44-22 Feb 45		16-25 Dec 44	
	Personnel Losses*	Equipment Losses	Personnel Losses*	Equipment Losses
.25 ton 4x4	94096	2387	21902	1345
2.5 ton 6x6	"	712	"	534
M-2 .50 HMG	"	680	"	402
M-3 105mm How	"	14	"	26
M-1 81mm Mtr	"	189	"	193
M-1 57mm AT	"	137	"	124
M-9 2.36" Rkt	"	4155	"	1312
M-2 60mm Mtr	"	685	"	349
.75 ton 4x4	"	368	"	149
1.5 ton 6x6	"	123	"	102
trl	"	959	"	1109

*Personnel losses include killed, wounded, and captured/MIA.

All data in above table is from First United States Army. Report of Operations, 1 August 1944-22 February 1945. Annex 1, pages 2-4; Annex 2, Appendix 3; and Annex 9, Appendix 1. 1 Aug-15 Dec 44/26 Dec 44-22 Feb equipment losses calculated by subtracting 16-25 Dec equipment losses from total 1 Aug 44-22 Feb 45 equipment losses.

Equipment loss rates per 100 battle casualties derived from data in the above table are:

Equipment	"Normal" Rate	"Withdrawal" Rate
.25 ton 4x4	2.537	6.141
2.5 ton 6x6	0.757	2.438
M-2 .50 HMG	0.723	1.835
M-3 105mm How	0.015	0.119
M-1 81mm Mtr	0.201	0.881
M-1 57mm AT	0.146	0.566
M-9 2.36" Rkt	4.416	5.990
M-2 60mm Mtr	0.728	1.593
.75 ton 4x4	0.391	0.680
1.5 ton 6x6	0.131	0.466
trl	1.019	5.063

Equipment Replacement Percentages

<u>Equipment</u>	<u>Total Replacements</u>	<u>Total Loss</u>	<u>Repl. %</u>
.25 ton 4x4	46	97	47.4%
2.5 ton 6x6	7	12	58.3%
M-2 .50 HMG	2	2	100.0%
M-3 105mm How	0	2	0.0%
M-1 81mm Mtr	0	7	0.0%
M-1 57mm AT	5	16	31.3%
M-9 2.36" Rkt	202	303	66.7%
M-2 60mm Mtr	21	35	60.0%
.75 ton 4x4	4	15	26.7%
1.5 ton 6x6	3	5	60.0%
trl	5	25	20.0%

Data is derived from information found in records for the 5th ID, 29th ID, 83d ID, and 17th AbnD. Interpretation of this information is complicated by the presence of obvious anomalies in the data, such as inexplicably high increases or decreases in numbers of certain items of equipment. There are also complications caused by the system of reporting in which shortages of equipment below authorized strength are used, rather than actual on-hand strengths.

Elapsed Time (Number of Days)
From First Loss to First Replacement

<u>Equipment</u>	<u>Average</u>
.25 ton 4x4	11 days
2.5 ton 6x6	10 "
M-2 .50 HMG	6 "
M-1 57mm AT	5 "
M-9 2.36" Rkt	9 "
M-2 60mm Mtr	4 "
.75 ton 4x4	6 "
1.5 ton 6x6	12 "
trl	14 "

Averages are derived from information found in records for the 5th ID, 29th ID, 83d ID, and 17th AbnD. Interpretation of this information is complicated by the time period of the reports. For example, some are weekly reports and as such do not give exact dates for first losses and replacements. There are also obvious anomalies in the data, such as inexplicably high increases or decreases in numbers of certain items of equipment. There are also complications caused by the system of reporting in which shortages of equipment below authorized strength are used, rather than actual on-hand strengths.

Data Sources

Data in the "Equipment Replacement Percentages" and "Elapsed Time..." tables is from (all sources are from US National Archives Record Group (RG) 407, with box numbers as indicated):

- 5th ID Daily Journal of G-4 (Box 6822, 305-4.2, 11 Dec 44 to 31 Jan 45).

- 29th ID Daily G-4 Journal (Box 8655, 329-4.1 to 329-4.2).

- 83d ID G-4 (S-4) Periodic Reports 16 December 1944 to 13 January 1945 (Boxes 12523 and 12524, 383-4.2, 1 Oct 44 to 31 Jan 45).

- 17th AbnD G-4 daily Periodic Reports 31 December 1944 to 16 January 1945 (Box 7639, 317-4 to 317-36, 31 Dec 44 to 31 Jan 45).

M-8 AC Loss Rates

<u>Armored Division</u>	<u>M-8 AC Losses</u>	<u>M-8 AC Replacements</u>	<u>Total Personnel Battle Casualties</u>
11th AD	0	0	1043
10th AD	0	0	705
9th AD*	2 (14)	0	230 (1107)
7th AD*	8 (16)	3	713 (778)
6th AD	12	10	1228
5th AD	0	0	650
4th AD	10	9	889
3d AD	31	15	2403
2d AD	11	6	1455
TOTAL	74 (30)	43	9316 (1885)

* Numbers in parentheses are for 16-25 December 1944.

Data on this table is taken from data entered in the ACSDB. For derivation of M-8 AC loss data in the armored divisions, see the section of this paper on derivation of armored fighting vehicle data. For derivation of battle casualty data, see the US Divisional Personnel Data narrative.

M-8 AC loss rates (per 100 battle casualties):

16-25 Dec 1944 "Withdrawal" Rate: 30/1885, or 1.592/100 BC
 "Normal" Rate: 74/9316, or 0.794/100 BC

M-8 AC replacement rate: 43/104, or 41.3%

M-8 AC replacement arrival times:

7th AD:	28 days	before first replacement
6th AD:	4 days	"
4th AD:	2 days	"
3d AD:	2 days	"
2d AD:	10 days	"

TOTAL: 46 days, or an average of 9 days before first M-8 AC replacement (46/5 = 9.2)

NOTE: "Replacement" denotes both equipment returned from repair or maintenance, and new equipment issued to the unit in all tables in Attachment 1 where the term appears.

M-3 HT and M-21 81mm Loss Rates

7th Armored Division Losses 17-29 Dec:

61 M-3 HT
9 M-21 81mm

Total Personnel Battle Casualties 17-29 Dec: 935

16-25 Dec 1944 "Withdrawal" Loss Rates:

M-3 HT: 61/935, or 6.524/100 battle casualties
M-21 81mm: 9/935, or 0.963/100 battle casualties

"Normal" Loss Rates:

M-3 HT: 321/94096, or 0.341/100 battle casualties (data from FUSA Report of Operations, the source described on the table "US Line Infantry Unit Attrition Rates")

M-21 81mm: 0.148×0.341 , or 0.050/100 battle casualties
($0.148 = 0.963/6.524$) (M-21 81mm Normal Rate is an extrapolation from M-21 81mm Withdrawal Rate in relation to M-3 HT Withdrawal Rate.)

Replacement for M-3 HT = $38/61$, or 62% (data from 7th AD G-4 Journal, i.e., 38xM-3 HT received as replacements during week ending 1 January 1945)

Replacement for M-21 81mm = $3/9$, or 33% (data from 7th AD G-4 Journal, i.e., 6xM-21 81mm short on 14 January, implying that 3xM-21 81mm had been replaced)

Elapsed time between first loss and first replacement is 8 days for both M-3 HT and M-21 81mm.

7th AD M-3 HT and M-21 81mm data on this page is from 7th AD Daily G-4 Journal 16 December 1944 to 16 January 1945 (Box 15605, 607-3.22 to 607-4.2).

British Equipment Inventory Data

British equipment inventory data for the Ardennes Campaign Simulation Data Base (ACSDB) was derived from the few available primary source records with information on British equipment data and the authorized equipment strengths of units. This paper serves as the bibliographic reference for sources used to generate British equipment inventory data and also describes the general methodologies used to estimate data that was not available in sources. All sources mentioned in the paper are fully referenced in Attachment 1 of the paper.

British Armored Fighting Vehicles.

The only complete armored fighting vehicle (AFV) status report extant for British units during the Ardennes Campaign period is for 28 December 1944, as found in WO171/346. This gives a breakdown of major AFV types ready for action, in repair, and in reserve. The only other report available is the daily AFV states given by the 29th Armoured Brigade in WO171/627 and WO171/4345. This gives an aggregate ready for action figure for main battle tanks only on a daily basis. Occasional mention is also given in various unit diaries of tank losses, as in the case of the 29th Armoured Brigade. In the case of the 29th Armoured Brigade, these seem to follow the fluctuations found in the daily reports. Daily in-repair states by AFV type -- aggregated at corps -- are also found in WO171/348 and WO171/4084. From the daily unit diary entries it appears that the Guards Armoured Division and 33d Armoured Brigade suffered no vehicle losses; it was thus assumed that the AFV strengths in the report for 28 December would be in effect for the entire Ardennes Campaign period in question. For the 34th Tank Brigade the corps repair states were used to generate the daily strength figures with 28 December as a benchmark. This proved possible as the 34th Tank Brigade was the only formation in the Ardennes Campaign equipped with the various models of Churchill tank. The 29th Armoured Brigade figures were generated from the 28 December report with losses as given in the daily unit diary entered for the relevant date.

British Artillery.

WO171/231 and WO171/3964 give daily tube strengths for each corps in the Second British Army on a daily basis. These match the authorized T/O&E strengths of the corps artillery in all cases. It is not known if this report is for all tubes available or for all tubes in service. In the absence of evidence to the contrary, all British artillery is assumed to be at full strength throughout the period.

Other Items of Equipment.

As no data was found in research for equipment types other than AFVs and artillery, it was assumed that British units started on their first day of participation in the Ardennes Campaign at full T/O&E strength. The other equipment types were then attritted by matching similar British systems with those US systems found in the US units in the Unit Inventory Data Base and applying the same attrition methodology as used for the US, i.e., the "Normal" equipment loss rate described in the "US LINE INFANTRY BATTALION AND REGIMENT DATA" section of the US Equipment Inventory Data narrative.

Format Used for Recording British Equipment Inventory Data.

Equipment data for British units is recorded using a numbering sequence similar to those employed for US and German units, based on page numbers and unit designations. The format used for the British equipment inventory as follows:

<u>Unit Designation</u>	<u>Page(s)</u>	<u>Description of Data</u>
29th ArmBde	1-2	Data for organic units of 29th ArmBde
29th ArmBde Att	1-2	Data for units attached to 29th ArmBde
33d ArmBde	1-2	Data for organic units of 33d ArmBde
33d ArmBde Att	1	Data for units attached to 33d ArmBde
34th TkBde	1	Data for organic units of 34th TkBde
34th TkBde	1	Data for units attached to 34th TkBde
43d ID	1-2	Data for organic units of 43d ID
43d ID Att	1	Data for units attached to 43d ID
51st ID	1-2	Data for organic units of 51st ID
51st ID Att	1	Data for units attached to 51st ID
53d ID	1-2	Data for organic units of 53d ID
53d ID Att	1	Data for units attached to 53d ID
Gds AD	1-3	Data for organic units of Guards AD
Gds AD Att	1	Data for units attached to Guards AD
6th AbnD	1-2	Data for organic units of 6th AbnD
6th AbnD Att	1	Data for units attached to 6th AbnD

XXX Corps HQ	1	Data for non-divisional service support units subordinated directly under the XXX Corps
XXX Corps Troops	1-2	Data for non-divisional combat units subordinated directly under the XXX Corps

Note: AbnD = airborne division; AD = armored division; ArmBde = armoured brigade; ID = infantry division; Tkbde = tank brigade; Att = attachments; and HQ = headquarters.

Attachment 1

Sources Used for British Equipment Inventory Data

- WO171/231 -- Second Army "Q" (Quartermaster) War Diary, Dec 44.
- WO171/346 -- XXX Corps War Diary, 15-31 Dec 44.
- WO171/348 -- XXX Corps "Q" (Quartermaster) War Diary, Dec 44.
- WO171/378 -- Guards Armoured Division War Diary, 18-30 Dec 44.
- WO171/627 -- 29th Armoured Brigade War Diary, 1-31 Dec 44.
- WO171/3964 -- Second Army "Q" (Quartermaster) War Diary, Jan 45.
- WO171/4084 -- XXX Corps "Q" (Quartermaster) War Diary, Jan 45.
- WO171/4345 -- 29th Armoured Brigade War Diary, 1-31 Jan 45.

German Equipment Inventory Data Derivation

INTRODUCTION

German equipment inventory (weapons and vehicles) strengths and losses for the Ardennes Campaign Simulation Data Base (ACSDB) were estimated in a multi-step process using all available primary and secondary sources. As with all elements of the German data relevant to the ACSDB, the German equipment inventory lacked documentation with the comprehensive, daily statistics necessary to meet the detailed requirements of the Unit Inventory Data Base. Records for only a relatively small number of units (several LXXXI Korps divisions and the 116th PzD in December) contained information on actual daily losses of equipment. Therefore, it was necessary to interpolate and extrapolate most of the required data from the periodic reports (generally monthly) of the divisions for which this data was available, and then use the experiences of these divisions to estimate equipment losses for those divisions lacking any documentation.

The sources used for German equipment inventory estimation consisted primarily of monthly divisional reports, several corps reports, miscellaneous Army Group B artillery and tank reports, and periodic Inspector General of the Panzer Troops reports. These latter documents (15 and 30 December and 15 and 30 January) contained information on operational and in-repair armored fighting vehicle strengths by unit (including self-propelled antiaircraft, antitank, and artillery systems).

The Army Group B reports proved most useful for German 16 December artillery and armored fighting vehicle strengths. Monthly divisional reports were available almost exclusively for army and SS panzer (armored) and panzer grenadier (armored infantry) divisions. These reports were in general either divisional Zustandsbericht (situation reports) or Gliederung (organizational reports). The former document contained information on operational and in-repair major items of equipment, but usually grouped together all equipment types, such as artillery, under one general category without differentiation between specific weapons. The Gliederung was a report in graphic format roughly equivalent to a table of equipment, which gave the actual strength of the divisions, at a level of detail usually by specific weapons, but without any differentiation between operational and in-repair status.

Most sources referenced in this paper were obtained from the US National Archives or the German Archives in Freiburg, West Germany. For convenience and to facilitate preparation of this

paper, sources are referenced in abbreviated format (a source with a "T" prefix was obtained from the US National Archives, a source with an "RH" prefix from the German Archives). Full bibliographic annotations of all sources referenced in this paper are provided in the Bibliography Data Base.

EQUIPMENT INVENTORY DATA GENERATION METHODOLOGY

Using the various sources available for certain divisions, it was possible to determine their estimated periodic equipment strengths. The sources used for these divisions and their application in the estimation process are described and referenced in one- or two-page individual descriptions for all divisions in a later section of this paper.

The overall approach used to estimate German equipment inventory was as follows:

- 1) Estimate armored fighting vehicle (including self-propelled antitank and assault guns) inventory data for all German divisions and non-divisional units in the ACSDB. This task is explained in the German Armored Fighting Vehicle Data Generation Methodology narrative.
- 2) Determine the equipment inventory start strengths (all other equipment besides tanks) for all German divisions in the ACSDB. The sources used and their application are explained in the individual division descriptions.
- 3) Estimate daily equipment strengths and attrition (all other equipment besides armored fighting vehicles) of divisions for which sufficient periodic reports (Gliederung, Zustandsbericht, etc.) existed. The six divisions addressed in this step were German Army panzer and panzer grenadier divisions: PzLehrD, 2d PzD, 9th PzD, 116th PzD, 3d PzGD, and 15th PzGD. This process was keyed to personnel attrition and is explained in greater detail below as the "Army Panzer Divisions averages."
- 4) Using averages derived from the experiences of the six panzer and panzer grenadier divisions, estimate daily equipment strengths and attrition of divisions for which no or minimal data was available. The divisions addressed in this step were the SS panzer divisions and the German infantry-type divisions (fallschirmjaeger (paratrooper), volks grenadier, and infantry), which lacked periodic documentation of equipment strength. This process is described in greater detail below.
- 5) Using the same averages employed in step 4), estimate equipment data of German non-divisional units. This process is also described below.

Active/Inactive/Out of Contact Assessments.

To estimate daily equipment strengths and losses of the six divisions for which the most extensive equipment data was available, a methodology was employed involving the activity levels and divisional battle casualties estimated in the German personnel data estimation process.

An example of its application is as follows: The PzLehrD's 1 December Zustandsbericht figure for light and heavy machine guns (LMG/HMG) strength was 538, and its 1 January figure 401. (Both sources are from German Archives record #RH10/172, pgs. 47 and 51.) These figures were used as the PzLehrD's 16 December and 1 January LMG/HMG strengths. The difference between them (137) was estimated as the net LMG/HMG losses for 16-31 December. To determine the daily losses, the battle casualties for 16-20 December (154) and 21-31 December (1,013) were used to determine percentages to apply to the net LMG/HMG losses to estimate losses for the two time periods--13 percent for 16-20 December (154/1,167), and 87 percent for 21-31 December (1,013/1,167). Thus, 13 percent of the 16-31 December LMG/HMG losses, or 18 weapons, were estimated to have been lost from 16-20 December, and 87 percent, or 119 weapons, from 21-31 December.

To determine daily losses, the Active/Inactive/Out of Contact assessments made for estimating personnel battle casualties were applied to the 16-20 and 21-31 December LMG/HMG losses. The basic underlying assumption of this approach was that equipment losses, like personnel losses, occurred at an estimated rate 6.5 times higher on "Active" Days than on "Inactive" Days, and that no losses occurred on the so-called "Out of Contact" Days. For the period 16-20 December the equation used to estimate losses on "Inactive" Days was: $a = 18 / [(6.5 \times 3) + 2]$, when a = losses on an "Inactive" Day, 18 = total 16-20 December losses, 3 = number of "Active" Days, and 2 = number of "Inactive" Days, or 0.84. Rounded off to the nearest whole number, this value equaled 1, and multiplied by 6.5, it equaled 5.46 (0.84×6.5), which (rounded off) was the estimated number of LMG/HMG losses on "Active" Days. Thus, the number of LMG/HMG losses on 16 and 18 December was estimated to be 1, and on 17, 19, and 20 December, 5, 5, and 6 respectively. Losses on "Inactive" Days from 21-31 December were estimated to be 2-3/day -- $119 / [(6.5 \times 7) + 4]$, and 15-16/day on "Active" Days (6.5×2.4). Note that this process was applied for four time periods of the Ardennes Campaign, i.e., 16-20 December, 21-31 December, 1-10 January, and 11-16 January. This was done because the manner in which German battle casualties were estimated for the ACSDB used "Active/Inactive/Out of Contact" assessments for each of the four time periods. Therefore, in order to derive evenly weighted equipment losses based on personnel attrition, the equipment losses were also estimated for each of the four periods.

The example presented here represents a straightforward application of the methodology. It involves a weapon for which only on-hand strength data was required (see details below on these requirements). For weapons which required determination of daily destroyed, damaged, abandoned, and in-repair status data, comparison was made of the periodic reports which differentiated between operational and in-repair equipment (Zustandsbericht for example) or judgement was frequently used to estimate the data required for other than on-hand status. A detailed pictorial account of the Ardennes Campaign, Jean Paul Pallud, Battle of the Bulge: Then and Now (London: After the Battle, 1984), proved particularly useful in determining some daily data on destroyed and abandoned weapons and vehicles, as it did for German tanks. When the total number of equipment losses of a particular weapon was substantially less than the number of days for the period in which the losses occurred (an estimate of only one loss over a 10-day period, for example), the day of the loss was determined, when possible, using secondary sources with information on a units' daily activities, or, when no information was available, selected at random.

The estimation methodology outlined above was used in conjunction with other information (such as Pallud's book and any daily loss reports such as those of the 116th PzD for several days in December 1944) to determine all equipment data for the PzLehrD, 2d PzD, 9th PzD, 116th PzD, 3d PzGD, and 15th PzGD. This data was then combined to determine averages of destroyed and damaged equipment and return from repair and replacement equipment for use in estimating SS panzer and infantry-type divisions' equipment losses. These averages, termed the "Army Panzer Divisions averages," are presented in Attachments 1-4.

The Army Panzer Divisions averages.

Equipment attrition of German divisions other than the six Army armored units described above, necessitated the use of averages derived from the experience of the six Army units. This was due to the lack of periodic equipment status reports for the non-Army armored divisions, particularly the infantry-type divisions, but also for the SS panzer (armored) units.

An example of the application of the averages is as follows: The 212th VGD was estimated to have sustained 1,662 battle casualties between 16 December and 16 January. The average rate at which the six Army panzer divisions lost light and heavy machine guns (LMG/HMG) was estimated to be 9.597 per 100 battle casualties. Therefore, the 212th VGD's total LMG/HMG losses were estimated to be 9.597×16.62 , or 160 weapons. The numbers lost on "Active" and "Inactive" Days were estimated using the Active/Inactive/Out of Contact assessments. On an "Inactive" Day, the number was estimated as follows: $a = 160 / (6.5 \times 6) + 26$, where a = the number of LMG/HMG losses on an "Inactive" Day, 6 =

the number of "Active" Days, and 26 = the number of "Inactive" Days, or 2-3/day (2.46/day). The number lost on an "Active" Day was estimated to be 6.5 times greater than 2.46, or 15.99 (16).

For the same division, 75mm antitank gun (PAK75) losses and return from repair weapons were estimated as follows: 16.62 x 0.390, or 6 destroyed, 16.62 x 0.042, or 1 damaged, and 26 x 0.104, or 3 returned from repair (26 equaling the number of "Inactive" Days). Note that equipment loss estimates (destroyed and damaged) were keyed to personnel battle casualties, whereas equipment gains were keyed to numbers of "Inactive" Days. Since the total number of damaged PAK75s did not exceed one weapon, the number of returned from repair was limited to one. As no secondary source information was available on PAK75 losses, the day on which the one PAK75 was returned from repair was selected at random. (This is a typical example of random assignment of equipment strength changes. A total of 1 PAK75 was estimated to have been returned from repair over a 32-day period, 26 of which were assessed as "Inactive" Days. With no other information available, the day randomly selected for the return from repair of the one damaged PAK75 was 5 January.)

The "Army Panzer Divisions averages" were used in conjunction with whatever other data or information on equipment was available in primary or secondary sources. For example, the Inspector General of the Panzer Troops reports provided information for many units' 30 December armored fighting vehicles' status (half-tracks, armored cars, etc.). This data would be used with 16 December strengths to estimate the 16-29 December losses, employing the Active/Inactive/Out of Contact assessments, while the 30 December-16 January losses would be estimated using the Army Panzer Divisions averages.

Details on equipment strength and attrition estimation for all 39 divisions and the three brigades involved in the Ardennes operation are provided in the individual division descriptions in a later section of this report. References of all sources consulted and the various methodologies employed are also provided.

The 340th VGD Vehicle averages.

Upon application of the Army Panzer Divisions averages to the German infantry-type divisions, it was determined that the average numbers lost per 100 battle casualties for certain non-armored vehicles were so high that the divisions' inventory of these vehicles was depleted. (Those vehicles included wheeled personnel carriers, cargo trucks, two models of prime movers, and horse-drawn vehicles---PKW, LKW, RSO, MAUL, and HDR.) Therefore, alternative averages were derived for these vehicles, from the experience of one volks grenadier division for which reliable secondary source data was available---the 340th VGD.

B678, pgs. 47-48 (source fully referenced in the Bibliography Data Base), provided information on the 340th VGD's 22 November-27 January equipment losses (42 PKW, 38 LKW, 22 RSO, 4 MAUL, and 346 HDR). Between 22 November and 27 January the division was estimated to have had 20 "Active" Days, 35 "Inactive" Days, and 12 "Out of Contact" Days. The corresponding number of days for 16 December-16 January were 8, 17, and 7. Using these numbers, total losses for 16 December-16 January were estimated. The total activity level "value" for 22 November-27 January was calculated as $(6.5 \times 20) + 35$, or 165, where 20 = the number of "Active" Days and 35 = the number of "Inactive" Days. For 16 December-16 January, this value was calculated to be 69, or $(6.5 \times 8) + 17$. The ratio of 69/165 equals 0.418, which value was applied to the total losses of each vehicle type to determine the estimated 16 December-16 January losses. The resulting values 17.556 (PKW), 15.884 (LKW), 9.196 (RSO), 1.672 (MAUL), and 144.628 (HDR), were used with the total 16 December-16 January divisional battle casualties (2,317) to calculate a loss rate per 100 battle casualties. For the vehicles listed above the values are as follows:

PKW:	17.556/23.17, or 0.758 loss/100 battle casualties		
LKW:	15.884/23.17, or 0.686	"	"
RSO:	9.196/23.17, or 0.397	"	"
MAUL:	1.672/23.17, or 0.072	"	"
HDR:	144.628/23.17, or 6.242	"	"

These averages, termed the "340th VGD Vehicle averages," were used instead of the Army Panzer Divisions averages for volks grenadier, infantry, and fallschirmjaeger (VGD, ID, and FJD) non-armored vehicle losses.

Miscellaneous Notes on German Divisions' Equipment Data.

On-Hand Equipment. The fields in the Unit Inventory Data Base are broken down into seven major categories. These include: Amt (Amount On-Hand), Dst (Destroyed), Dmg (Damaged), Abd (Abandoned), Rpl (Replacement), Rpr (In-Repair), and Rtn (Return from Repair). Certain equipment was only tracked in the "Amt" field. This equipment included infantry weapons, antiaircraft weapons, trucks, prime movers, recovery vehicles, and horse-drawn vehicles. FLAK88 (the 88mm dual-purpose antiaircraft gun) were to be tracked in all categories, but it was determined that insufficient data was available in primary sources to estimate numbers of weapons in repair status or numbers of replacement weapons. Therefore, these weapons were tracked only in the "Amt" field.

Panzerfaust (PF) and Panzerschreck (PS). The panzerfaust (PF) was a German antitank weapon roughly equivalent in design to the modern day US Army M-72 LAW. Because it was a disposable weapon and because there is a general lack of data on its

"attrition," the start strength for this weapon for the divisions which fielded it is provided in the ACSDB, and that strength maintained throughout the 16 December-16 January period. Sufficient data on the German expenditure of this weapon in the Ardennes does not exist to estimate its daily on-hand strengths. The underlying assumption in maintaining the PF at its start strength is that the Germans were able to maintain a constant supply of this lightweight weapon with their units in the Ardennes.

The panzerschreck (PS), a German 88mm antitank weapon similar in design to the US Army "bazooka" (M-9 2.36" Rkt), was another weapon for which very little strength on loss data was available in German records. However, as it was not a disposable weapon, it was attrited in the ACSDB. The PS's attrition was estimated at the same rate as LMG/HMGs, on the assumption that the weapon was fielded with German front line combat units and therefore susceptible to loss and damage at rates similar to those of machine guns.

K75. The 75mm field gun (K75), a weapon used exclusively by the volks grenadier divisions (VGD) and volks artillery korps (VAK), was not a weapon in the panzer divisions' inventories. Therefore, no average was available in the "Army Panzer Divisions averages" for estimating its attrition. To address this shortfall, the Army Panzer Divisions averages of the 105mm howitzer (LFH105) were used for the K75 in the VGDs. Both the LFH105 and K75 were part of the VGD's artillery regiment equipment and served in a similar role as artillery, although the K75 had a secondary antitank capability.

German Non-Divisional Equipment Data Generation.

Few sources with daily data on German non-divisional combat units during the Ardennes Campaign were found in research. The general approach used to estimate data for non-divisional units was to use full authorized equipment strength of the unit as its start strength, and to attrit the equipment using the Army Panzer Divisions averages. To reflect shortages of transport vehicles with German units, the authorized strengths of the following systems were reduced to the indicated percentages:

- | | | |
|-------------------|----------------------------|---|
| - PKW | 71% of authorized strength | |
| - LKW | 84% | " |
| - MAUL | 71% | " |
| - 1-5t PM | 60% | " |
| - 8-18t PM | 78% | " |
| - BGPZ-III/IV & V | 67%* | " |

* Based on BGPZ-V experience.

These reductions were made based on data found for the following units in the indicated sources. These were non-divisional units for which primary source data on equipment strengths at the beginning of December 1944 was available. The percentages of operational to authorized equipment strengths are show for items of equipment in the units' inventories.

<u>Unit</u>	<u>PKW</u>	<u>LKW</u>	<u>MAUL 1-5t PM</u>		<u>8-18t PM</u>	<u>BGPZ-V</u>
301st HyPzBN	90%	90%	83%	89%	70%	67%
319th PzCo	75%	100%	--	50%	--	--
341st StgBde	51%	82%	54%	--	67%	--
682d PjBNT	58%	51%	78%	--	90%	--
519th PjBN	79%	99%	69%	40%	86%	--
AVERAGE	71%	84%	71%	60%	78%	67%

Sources:

519th PjBN -- 1 Dec 44 Zustandsbericht (T314,1597,176)
 682d PjBNT -- 9 Dec 44 Zustandsbericht (T314,1597,178)
 341st StgBde -- 1 Dec 44 Zustandsbericht (T314,1597,164)
 319th PzCo -- 4 Dec 44 Zustandsbericht (T314,1597,162)
 301st HyPzBN -- 1 Dec 44 Zustandsbericht (T314,1597,159)

(All sources described in the Bibliography Data Base under "T314,1597,159-179.")

FORMAT FOR RECORDING GERMAN EQUIPMENT DATA
IN THE UNIT INVENTORY DATA BASE

The variety of German units tracked in the Unit Inventory Data Base (divisions, non-divisional combat units, non-divisional service support units, etc.) necessitated use of a data recording format characterized by the employment of page numbers, a format similar to that used for US equipment data. (For details on the US format, see the US Equipment Inventory Data narrative.)

Equipment data of all organic divisional units of a division (i.e., the component units which comprise the division) was recorded on Pages 1-3 in the Unit Inventory Data Base. Note that the volks grenadier, infantry, and fallschirmjaeger (paratrooper) divisions generally required two pages per day (Pages 1-2) to record all equipment data of organic divisional units on, while army and SS panzer and panzer grenadier divisions required three pages (Pages 1-3), due to the greater variety of systems in the armored formations.

Included on the Pages 1-3 series, by convention on the last page of this series (Page 2 for volksgrenadier divisions, Page 3 for panzer divisions, etc.), was data on the armored fighting vehicles of any attached non-divisional panzer (armored) or self-propelled panzerjaeger (antitank) unit, most commonly independent heavy tank battalions (schwere panzer abteilung), antitank battalions (panzerjaeger abteilung), or assault gun brigades (sturmggeschuetz brigade). Only data on armored fighting vehicles of these units was included on the pages described above. Data on the other items of equipment of the non-divisional panzer and panzerjaeger units was recorded elsewhere in the Unit Inventory Data Base. The "ATTACHMENTS & DETACHMENTS" section of the Unit Data Base records the daily order of battle of ground forces in the ACSDB. The order of battle identifies the panzer and panzerjaeger units and should be consulted to determine the parent units of the armored fighting vehicles on Pages 2 and 3.

Corps and army "troops" records ("5th PzArmy Troops," "15th Army Troops," "LXXIV K Troops," etc.) identified with Page 3 were also used to record the armored fighting vehicle data for non-divisional panzer and panzerjaeger units attached directly to corps or armies, as identified in the daily order of battle.

All other German equipment inventory data (i.e., equipment of all units other than divisions, except the armored fighting vehicles of non-divisional units) was recorded as follows:

- For equipment of divisional attachments (as identified in the order of battle), records identified as Page 7 and with the division's name ("9th PzD," "89th ID," etc.) were used.

Note that included here were the artillery and antiaircraft artillery weapons of any artillery or FLAK (antiaircraft artillery) units attached directly to divisions.

- For equipment of the non-divisional combat or service support units attached directly to corps or armies (as identified in the order of battle), records identified as Pages 1 and 2 and with the unit's name ("5th PzArmy," "I SSPzk Troops," "15th Army Troops," etc.) were used. (Due to a great variety of non-divisional units in some corps and armies, two records per day were sometimes required to record all equipment data.) Note that included here were the artillery and antiaircraft artillery weapons of any artillery or FLAK (antiaircraft artillery) units attached directly to corps or armies. Also note that equipment of immobile artillery and construction engineer units was recorded with the corps or army "HQ" unit ("6th PzArmy", "LXXXI K," etc.).

INDIVIDUAL DIVISION DESCRIPTIONS

For each of the 39 divisions and three German brigades which participated in the Ardennes Campaign, an individual description of the sources and the general approach used to generate daily equipment data is provided in the following section of this paper. All sources mentioned in the descriptions are fully referenced in the Bibliography Data Base.

Descriptions of the six divisions used for the "Army Panzer Divisions averages" are presented first. Following these are the SS panzer divisions, then the remainder of the divisions by type and in numeric order.

PzLehrD (used for "Army Panzer Divisions averages")

The PzLehrD's equipment inventory start strengths were taken from the 10 December 1944 Supply report (T314,1134,276) and the 1 December 1944 Gliederung (RH10/172, pgs. 47-49). Vehicle strengths (PKW, LKW, Maul) were taken from the 1 December Zustandsbericht (RH10/172, pgs 47-49).

Attrition of the PzLehrD's equipment inventory was estimated by comparing the derived 16 December strengths with strengths in the 1 January and 1 February Zustandsbericht and Gliederung (RH10/172, pgs. 51-61), to determine changes in equipment numbers. Artillery strengths in the General Inspector of the Panzer Troops report (RH10/352) were also used to determine artillery losses. Daily losses were estimated from the changes based on the Active/Inactive/Out of Contact assessments employed in the German battle casualty estimation methodology. Note that the 1 January strength of LFH105 in the 1 January Gliederung (14 cannon) is lower than the total figure estimated for 1 January (22 cannon). This is because the Gliederung does not include the weapons of one detached battalion. Attrition of Tr1 was estimated at the same rate as LKW attrition.

For MHT attrition, the 30 December General Inspector of the Panzer Troops report (RH10/352), showing a substantial increase in the PzLehrD's MHT strength, indicated that the division received MHT replacements, which were assumed to have arrived on 18 and 19 December. Attrition for LHT in December and LHT and MHT in January was estimated by comparing the 16 and 30 December strengths with the 1 February Zustandsbericht, and allocating net strength decreases on a daily basis. This resulted in an estimated decrease in MHT strength, which was assumed to have occurred when vehicles were abandoned on 12-13 January.

Note that for LKW the 1 February Zustandsbericht strength (732) was considered too high and assumed to have been attained through reinforcements received after 16 January. Therefore, the 1 January Zustandsbericht strength (529) was assumed to have remained constant from 1-16 January.

2d PzD (used for "Army Panzer Divisions averages")

The 2d PzD's equipment inventory start strength's were taken from the 2d PzD's 6 and 9 December 1944 reports, including the 6 December Zustandsbericht, for infantry weapons and antiaircraft artillery (RH10/141, pg. 41 and T314,1134,303)

Vehicle start strengths (PKW, LKW, and prime movers) were derived from the 2d PzD's 6 December Zustandsbericht. LAC, HAC, LHT, and MHT start strengths were derived from the 9 December reports. The 2d PzD's artillery strengths were estimated by comparison of data in several reports including the 10 December Panzer Divisions report (T311,18,7021020-25), and the 2d PzD 14 December Weapons report (RH10/141. pg. 43). PF strength was estimated from the PzLehrD's strength.

Equipment inventory attrition for the 2d PzD was estimated by comparing the derived 16 December 1944 start strengths with strengths in the 1 January 1945 Gliederung (RH10/141, pg. 52), the 1 February weapons and vehicles reports (RH10/141, pgs. 56-60), and the 1 February Zustandsbericht (RH10/141, pg. 61), to determine changes in equipment numbers.

Daily losses were estimated from the changes based on the Active/Inactive/Out of Contact assessments employed in the German battle casualty estimation methodology. For artillery attrition in December, the majority of the 2d PzD's artillery losses were assessed on 24-26 December, when division artillery elements were overrun. The strengths in the 1 February reports were assumed to be equal to the 2d PzD's 17 January 1945 strengths for estimation purposes. Attrition of Tr1 was estimated at the same rate as LKW attrition.

9th PzD (used for "Army Panzer Divisions averages")

The 9th PzD's equipment inventory start strengths for infantry weapons, vehicles, and antiaircraft artillery were derived from the 9th PzD's 1 and 14 December 1944 reports (including the 1 December Zustandsbericht and Gliederung). These are contained in the German Archives source RH10/148, pgs. 77-76.

For artillery, the same sources were used, supplemented by the 10 December Panzer Divisions report (T311,18,7021020-25), the General Inspector of the Panzer Troops report (RH10/352), and the 10 December Army Group B Artillery report (T311,18,7021051-54). Information on weapons from these sources was compared to arrive at estimated 16 December 1944 equipment inventory strengths. PF and PS start strengths were estimated from averages of the known data for the 2d PzD and PzLehrD (350 and 85, respectively).

For estimation of equipment inventory attrition, the 9th PzD's 1 January and 1 February 1945 Zustandsbericht and Gliederung (RH10/148, pgs. 87-88 and 94-97) and the General Inspector of the Panzer Troops reports for 30 December and 15 January (RH10/352) were compared with the 9th PzD's estimated start strengths. Decreases in equipment strengths were assessed against the 9th PzD's equipment inventory based on the Active/Inactive/Out of Contact assessments employed in the German battle casualty estimation methodology. Strengths from the data in the 1 February Zustandsbericht and Gliederung were assumed to be approximately equal to the 17 January 1945 strengths for estimation of the 9th PzD's equipment inventory. Attrition of Tr1 was estimated at the same rate as LKW attrition. Note that HMTR start strength is estimated to have been 3 tubes, as indicated by the 28 December 1944 Battle Strength report (T314,1666,383).

116th PzD (used for "Army Panzer Divisions averages")

The 116th PzD's equipment inventory start strengths were derived from a variety of sources obtained from the US National Archives (on microfilm) and the German Archives. Compared with other German units that participated in the Ardennes Campaign, the 116th PzD is one of the more thoroughly documented German divisions. For infantry and antiaircraft weapons and armored vehicles (excluding tanks), the 1 January 1945 Gliederung strengths (RH10/163, pg. 32), were added to the recorded losses for 16-27 December (T314,1666,102-514) to give estimated start strengths for 16 December 1944. PF and PS start strengths were derived from averages of known data for the 2d PzD and PzLehrD (350 and 85 respectively). Non-armored vehicle strengths (i.e., trucks and prime movers) were estimated from the 1 December 1945 Zustandsbericht strengths (RH10/163, pg. 30), the 10 December Army Group B Artillery report (T311,18,7021051-54), and the 10 December Panzer Divisions report (T311,18,7021020-25) were the main sources for artillery strengths. The percentage of weapons estimated to be in non-operational status was based on the 1 December Zustandsbericht ratio of operational to in-repair weapons, and is reflected in the 116th PzD's estimated artillery start strengths.

For certain vehicles in the 116th PzD's inventory (FLAK20(v) SP, FLAK37 SP, RCV, BGPZ-III, and BGPZ-V) the 16th Panzer Regiment's situation report of 16 December 1944 (T315,1298,5-10), was used as the source for start strengths. The number of Tr1 was estimated from the average of the known amounts of the PzLehrD, 2d PzD, 9th PzD, and 11th PzD (90+89+49+106/4).

Attrition of 116th PzD equipment inventory was estimated by comparing the derived 16 December 1944 strength estimation with the 1 January and 1 February Zustandsbericht, the 5 January and 1 February Gliederung, the General Inspector of the Panzer Troops report, and the 29 December 1944 116th PzD Combat Strengths report (RH10/163, pgs. 32-47, RH10/352, and T314,1666,403-404). Differences in the estimated start strengths and strengths in the later reports were the basis for daily loss estimates, based on the Active/Inactive/Out of Contact assessments employed in the German battle casualty estimation methodology. Attrition of Tr1 was estimated at the same rate as LKW attrition.

3d PzGD (used for "Army Panzer Divisions averages")

The 3d PzGD's estimated equipment inventory start strengths were derived from the 1 December 1944 Zustandsbericht and Gliederung and the 14 December weapons and vehicles reports. For LAC, HAC, LHT, and MHT a percentage of vehicles in repair status (taken from the 1 December Zustandsbericht) was applied to the total on-hand numbers in the 14 December weapons and vehicles reports. (All reports described above were in German Archives source RH10/178, pgs. 60-65.) Artillery start strengths were taken from the same sources and the 10 December Panzer Divisions report (T311,18,7021020-25). Artillery weapons status was also estimated from the 1 December 1944 Zustandsbericht. PF and PS start strengths were estimated from known data for the 2d PzD and PzLehrD (350 and 85, respectively).

Attrition of the 3d PzGD's equipment was estimated by comparing the derived 16 December start strengths with the 1 January and 1 February Zustandsbericht and Gliederung and the 15 January and 8 February weapons and vehicles reports (RH10/178, pgs. 67-83). Differences in the start strengths and strengths in the later reports served as the basis for estimated daily losses, using the Active/Inactive/Out of Contact assessments employed in the German battle casualty estimation methodology. For LAC the 30 December General Inspector of the Panzer Troops report (RH10/352) was also used. Note that the numbers of Tr1 is assumed to remain constant (100), as the 8 February vehicle report shows no net decrease from the derived 16 December start strength.

15th PzGD (used for "Army Panzer Divisions averages")

The 15th PzGD's estimated equipment inventory start strengths were derived from the 1 December 1944 Zustandsbericht and Gliederung, and the 14 December weapons and vehicles reports (RH10/181, pgs. 42-50). Artillery strengths in the 10 December Panzer Divisions report (T311, 18,7021020-25) were also used. In-repair status for vehicles and artillery was determined from the in-repair percentages in the 1 December Zustandsbericht. PF and PS start strengths were estimated from known data for the 2d PzD and PzLehrD (350 and 85, respectively).

Attrition of the 15th PzGD's equipment inventory was estimated by comparing the derived 16 December equipment strengths with the 1 January and 1 February Zustandsbericht, the 1 January Gliederung, and the 14 January weapons and vehicles reports (RH10/181, pgs. 50-59 and 61-62). Differences in the start strength and strengths in the later reports served as the basis for estimated daily losses, using the Active/Inactive/Out of Contact assessments employed in the German battle casualty estimation methodology. For LAC, LHT, and MHT, the 30 December General Inspector of the Panzer Troops report (RH10/352) was also used to derive equipment losses. Tr1 for January were attrited at the same rate as LKW.

1st SSPzD

The 1st SSPzD's equipment inventory start strengths were taken from the 1 December 1944 Zustandsbericht and Gliederung (RH10/312, pgs. 37-38). The number of 75HT in repair was estimated from the percentage of armored vehicles in repair given in the Zustandsbericht.

The number of Tr1 (118) was taken from the number with the 12th SSPzD, a similarly equipped unit. The numbers of LFH105 SP and HFH105 SP were estimated from information in the General Inspector of the Panzer Troops report (RH10/352), as was the strength of the BEPZ-III/IV.

A variety of methods were used to estimate attrition of the 1st SSPzD's equipment inventory. Unless otherwise indicated, the Army Panzer Divisions estimation averages were used to attrit weapons and vehicles. Information provided in Pallud was used in part to determine losses of the following equipment: FLAK20 SP, FLAK37 SP, HIG SP, LFH105, and MHT. For 16-30 December the strengths in the 30 December General Inspector of the Panzer Troops report (RH10/352) were compared with the estimated start strengths of the following weapons, and daily losses estimated from the net changes using the Active/Inactive/Out of Contact assessments: LAC, HAC, LHT, MHT, and 75HT. For PKW, LKW, MAUL, 1-5t PM, and 8-16t PM, the 1st SSPzD 1 February Zustandsbericht strengths (RH10/312, pg. 42) were compared with the derived 16 December start strengths, and daily losses were estimated using the Active/Inactive/Out of Contact assessments. The aggregate artillery strengths in the 1 February Zustandsbericht were also used to estimate artillery attrition (K105, LFH105, and HFH150). The 30 December or 15 January General Inspector of the Panzer Troops report was used to estimate daily losses (in conjunction with the Active/Inactive/Out of Contact assessments) for RCV, BEPZ-V, LFH105 SP, and HFH150 SP.

2d SSPzD

No records for the 2d SSPzD prior to 1 January 1945 were found in research. Therefore, the equipment inventory of the 9th SSPzD, a unit equipped similarly to the 2d SSPzD, was used to estimate the start strengths of the 2d SSPzD. PAK75 and artillery start strengths were taken from the 10 December Panzer Divisions report (T311,18,7021020), and the number of HIG was derived from the 1 January Gliederung (RH10/313, pg. 45).

The number of 75HT and MHT was estimated to be 80 percent of authorized strength, as provided in RH10/101, pgs. 51-55 (German armored units T/O&Es). The 80 percent figure is from the percentage of equipment available according to P032, pg. 4. LHT were estimated at full T/O&E strength. These estimates were used for the 75HT, MHT, and LHT, because the strengths of the 9th SSPzD could not be reconciled with the strengths provided in the 2d SSPzD's 1 January Gliederung.

Equipment attrition estimation of the 2d SSPzD was complicated by the lack of comprehensive weapons and vehicles reports with information on operational items of equipment after 16 January 1945. Sufficient data was provided in the 1 January 1945 Zustandsbericht and Gliederung (RH10/313, pgs. 44-45) to estimate attrition for 16-31 December strengths with the 1 January strengths. Decreases in strengths were allocated as daily losses using the Active/Inactive/Out of Contact assessments employed in the German battle casualty estimation methodology. Equipment attrition during the 1-16 January was estimated by comparing the 1 January strengths with data found in the 1 February 1945 Zustandsbericht and a 30 January Vehicle (Kfz) report (RH10/313, pgs. 47-48). For certain weapons and vehicles--HMTR, FLAK20 SP, FLAK37, FLAK88, HIG, 75HT, LAC, LKW, and 8-18t PM--attrition based on the Army Panzer Divisions estimation averages was applied, because later January data for these systems was either lacking or showed a substantial increase in strength which likely reflected reinforcements received after the 2d SSPzD's withdrawal from the Ardennes. In January FLAK20(v) and FLAK20(v) SP strengths were assumed to remain at their estimated 1 January strength. Tr1 were attrited at the same rate as LKW. Artillery weapons' attrition for January was estimated by comparing the derived 1 January strengths with the 1 February Zustandsbericht strengths and operational percentages.

9th SSPzD

The 9th SSPzD's equipment inventory start strengths were derived from the 14 December weapons and vehicles reports (RH10/318, pgs. 38-43). The number of PF and PS is taken from the number assigned to the 10th SSPzD.

Attrition of the 9th SSPzD's equipment inventory was estimated by applying the Army Panzer Divisions estimation averages for all weapons and equipment for 16 December 1944-16 January 1945, except for the following systems: LFH105 SP, HFH150 SP, LAC, HAC, LHT, MHT, BGPZ-III, BGPZ-V, BEPZ-III/IV, BEPZ-V. For 16-31 December, the attrition of the LFH105 SP, HFH 150 SP, LAC, HAC, LHT, MHT, BGPZ-III, and BGPZ-V was estimated by comparing the derived 16 December start strengths with the strengths in the 30 December General Inspector of the Panzer Troops report (RH10/352), and allocating daily losses from net changes in strengths using the Active/Inactive/Out of Contact assessments from the German battle casualty estimation methodology. The same methodology was used for 16 December-16 January for BEPZ-III/IV and BEPZ-V, using the 15 January General Inspector of the Panzer Troops report. For 31 December-16 January the Army Panzer Divisions estimation averages were applied to the equipment attrited through comparison with the 30 December General Inspector of the Panzer Troops report. Attrition of Tr1 was at the same rate as LKW.

10th SSPzD

Two sets of records (early December 1944 records and early January 1945) were used to estimate the 10th SSPzD's equipment inventory strengths during the Ardennes. Since the 10th SSPzD did not actually participate in combat operations, its equipment inventory strengths were estimated to be the same for 16-31 December, and 1-16 January, with changes in the division's strength noted on 31 December to reflect the changes in the division's early January 1945 records.

The 10th SSPzD's equipment inventory start strengths were based on the 14 December 1944 reports on weapons and vehicle strengths. Changes in the 10th SSPzD's equipment on 31 December-1 January reflect the 2 February 1945 reports on weapons and vehicle strengths. (These reports are dated 2 February but represent the 10th SSPzD's situation as of 1 January.) PF and PS strengths are kept unchanged for the entire ACSDB period.

All records used for the 10th SSPzD's estimated equipment inventory are from German Archives source RH10/319, pgs. 43-43 and 61-68. Note that they represent on-hand strengths which likely include a number of equipment items in non-operational status. No information is contained in the German records to indicate percentages of these equipment items in non-operational status. Therefore, all equipment for the 10th SSPzD is recorded under on-hand strength amounts. Equipment decreases are assumed to have occurred through equipment wastage (i.e., equipment lost to normal mechanical breakdown as opposed to equipment lost to enemy action) or transfer to other units.

12th SSPzD

The 12 SSPzD's equipment inventory start strengths were estimated from the 19 December 1944 weapons and vehicles reports (RH10/321, pgs. 44-50). (These reports, although dated 19 December, actually show the 12th SSPzD's 8 December weapons and vehicles situation.) The number of operational PKW, LKW, and MAUL was estimated by applying the 1st SSPzD's ratio of operational/non-operational vehicles of these types to the total number of PKW, LKW, and MAUL in the 12th SSPzD. The number of PF is from the 31 December Gliederung (RH10/321, pg. 40), and the number of PS is from the 1st SSPzD's 1 December Gliederung (RH10/312, pg. 38). (The 12th SSPzD was as equally well-equipped for the Ardennes Offensive as was the 1st SSPzD.)

Start strengths for LHT and MHT were taken from the total numbers of these vehicle types provided in the 12th SSPzD 31 December Gliederung. These figures were used in lieu of those from the 14 December Weapons report, because the latter numbers were considerably lower than the 31 December Gliederung numbers, an indication that the 12th SSPzD probably received reinforcements prior to 16 December.

Equipment inventory attrition of the 12th SSPzD was estimated by comparing the derived start strengths with strengths in the 31 December 1944 and 1 February 1945 Zustandsbericht and Gliederung, and, for FLAK20(d) SP, 75HT, LAC, HAC, LHT, and MHT, strengths in the 30 December General Inspector of the Panzer Troops report (RH10/352). Net decreases in strengths were allocated on a daily loss basis using the Active/Inactive/Out of Contact assessments employed in the German battle casualty estimation methodology. FLAK20(d) SP losses in January were estimated using the Army Panzer Division's estimation averages because the 1 February strengths, substantially higher than the derived 1 January strengths, were inadequate for assessing losses.

Because the estimated 1 January strengths of LHT and MHT strengths were lower than the 1 February Gliederung strengths of these vehicles (likely due to reinforcements received after the Ardennes operation), the Army Panzer Divisions estimation averages were used to estimated their attrition for 1-16 January. Attrition of Tr1 was at the same rate as LKW.

11th PzD

The 11th PzD is tracked in the ACSDB for the period 22 December 1944-16 January 1945. Two sets of records (early December 1944 records and early January 1945 records) were used to estimate the 11th PzD's equipment inventory strengths during the Ardennes. Since the 11th PzD did not actively participate in combat operation, its equipment inventory strengths were estimated to be the same for 22 December-7 January, and 8-16 January, with changes in the division's strength noted on 7 January to reflect the changes in the 11th PzD's early January 1945 records.

The 11th PzD's equipment inventory start strengths were based on the 4 December 1944 Zustandsbericht and the 16 December 1944 reports on weapons and vehicle strengths, including a 6 December 1944 Gliederung. (These records are from German Archives source RH10/149, pgs. 60-70). Artillery data from the above sources was compared with data from the 10 December Panzer Divisions report (T311,18,7021020-25), to derive estimated start strengths for artillery. PF and PS start strengths were estimated from known data for the 2d PzD and PzLehrD (350 and 85, respectively). These strengths are maintained for the entire ACSDB period.

The 11th PzD's changes in inventory strengths on 7-8 January 1945 were estimated by determining the differences between the derived start strengths and the strengths from the 14 January 1945 weapons and vehicle reports (RH10/149, pgs. 88-93). (These reports are dated 14 January but describe the 11th PzD's situation as of 8 January.) Decreases in numbers of operational vehicles and increases in numbers of damaged vehicles were assumed to have been incurred through equipment wastage and transfer to other units. For PKW and LKW the 7-8 January 1945 strength changes were determined by comparing the derived start strengths with the 1 January 1945 Zustandsbericht data (RH10/149, pg. 80).

27th and 28th SSPzGDs

Weapons and equipment inventory information was only available for the 28th SSPzGD. This information (in RH24-81/125--LXXXI K reports) was for 30 December 1944. Since very little other information was available on these units, the data given in RH24-81/125 and RH10/133, pg. 69 was used for both divisions. (RH10/133, pg. 73, contained an undated Gliederung for the SS-Volunteer Brigade "Wallonien," which was the title of the 28th SSPzGD.) It's weapons strengths were greater than those presented in RH24-81/125 and so were not used to estimate strengths of these units.) Neither was engaged in combat for the duration of the Ardennes campaign, and the equipment inventory strengths are assumed to remain the same for the duration of their presence in the Ardennes area (27 December 1944-16 January 1945).

3d FJD

The 3d FJD's equipment inventory start strength was derived from the 3d FJD's 30 November 1944 Gliederung and Zustandsbericht (T314,1597,155-157), except for the LFH105 and HFH150 strengths which were taken from the 12 December LXXXI K Artillery Gliederung (T314,1597,264).

The Tr1 start strength was estimated by determining the percentage of authorized LKW strength and applying that percentage to the Tr1 authorized strength. B779, pg. 4, reports that the 3d FJD's "armament was excellent, but it was deficient in prime movers." This description is not inconsistent with the 3d FJD's 30 November 1944 Gliederung.

The 3d FJD's equipment attrition for all weapons was estimated using the Army Panzer Divisions estimation averages, except PKW, LKW, RSO, MAUL, and HDR, which were attrited using the 340th VGD Vehicle averages, with Tr1 attrited at the same rate as LKW.

5th FJD

The 5th FJD's equipment inventory start strength was estimated to be at 95 percent of authorized for all weapons except PAK75 and LMG/HMG. These weapons were estimated to be at 95 percent of divisional authorized strengths, less the PAK75 and LMG/HMG of the panzerjaeger battalion, artillery regiment, and supply units, all of which were not with the division during the Ardennes operation. Vehicle strengths were assumed to be the same as estimated for the 3d FJD, less the vehicles of the above-listed organic divisional units. B023, pgs. 24-25, describes the organization of the 5th FJD and notes that its inadequate motor transport was supplemented by 100 HDR.

Attrition of the 5th FJD's equipment was estimated using the Army Panzer Divisions averages, or, for PKW, LKW, MAUL, and HDR, the 340th VGD Vehicle averages -- with one major modification. During the period 23-27 December 1944, two-thirds of weapons and vehicle losses and decreases were estimated to have been incurred by the 5th FJD as approximately two-thirds of the division's battle casualties were sustained by the division during this period of intense combat.

150th PzBde

The 150th PzBde's equipment inventory start strength was estimated from Pallud, pp. 62-65 and ETHINT 12, pgs. 4-5 for all weapons and vehicles, except LMG/HMG and MMTR. Strengths of LMG/HMG were based on the strengths of these weapons in a panzer grenadier regiment (see TM-E 30-451, pg. II-26), a unit similar in personnel strength to the 150th PzBde. Note that the 150th PzBde was partially equipped in the ACSDB with US equipment to reflect the captured systems used by the unit.

The 150th PzBde's equipment attrition was estimated using the Army Panzer Divisions estimation averages for all weapons and vehicles. The .25 ton 4x4 and 2.5 ton 6x6, both US vehicles, were considered PKW and LKW equivalents and attrited at the estimated rate used for the latter two vehicles. For MHT and M-3 HT (the latter US vehicle considered the equivalent of the German MHT and attrited at the estimated rate used for the German vehicle), no replacement vehicles were estimated for the 150th PzBde, as the unit was provisionally organized and likely did not have priority in receiving replacement vehicles.

FBB

Documentation of the FBB's equipment is substantial, although the documentation lacks the detailed coverage for the units such as PzLehrD, 2d PzD, and 9th PzD available in the Zustandsbericht and Gliederung. Weapons data was taken from the FBB's 28 November 1944 Gliederung (RH10/132, pg. 8), compared with information given in RH26-1004/2 (the FBB documentation from the German Archives) -- particularly a post-war Gliederung on pg. 85 -- and the post-war German Manuscripts B592, ETHINT 80, and B838. PKW and LKW strengths were estimated in the same way strengths of these vehicles were estimated for the FGB (based on panzer division vehicle strengths in RH10/101), as data on these vehicles is lacking. RSO and 8-18t PM strengths were calculated to match the number of FLAK105, LFH105, and HFH105 weapons (the RSO and 8-18t PM were assumed to be the towing vehicles for these weapons). Note that the HIG system shown on the 28 November Gliederung has been changed to HIG SP, to reflect the data in the 30 December General Inspector of the Panzer Troops report (RH10/352). PF and PS strengths were assumed to be one-half of those of a panzer division (500 and 40, respectively). As with the FGB, the total authorized strengths of all weapons, vehicles, and equipment derived as described above were reduced by only five percent to reflect the relatively high state of readiness of the brigade on 16 December 1944. LHT, LAC, and MHT strengths were taken from the 15 December General Inspector of the Panzer Troops report (RH10/352).

Equipment attrition of all FBB weapons and vehicles was estimated using the Army Panzer Divisions averages, with the exception of HIG SP, BGPZ-V, and RSO. Attrition of the HIG SP was estimated by using a combination of the Army Panzer Divisions averages, and comparing derived start strengths with the 30 December General Inspector of the Panzer Troops report (RH10/352) and using the Active/Inactive/Out of Contact assessments to determine daily losses from net changes in strengths. RSOs, the prime mover for the LFH105 and HFH150, were attrited at the rate of these artillery weapons. BGPZ-V strengths were provided in the 15 January General Inspector of the Panzer Troops report for the Fuehrer Grenadier Division, a unit which was composed of the FBB and FGB. The 15 January BGPZ-V strengths for this unit were divided equally among the FBB and FGB and the resulting figures compared with their respective start strengths to estimate attrition. Note that the FLAK105 antiaircraft gun was attrited at the same average (using the Army Panzer Divisions averages) as the FLAK88, a system similar in design and operation, because no average had been estimated for the FLAK105, the FBB being the only German unit in the Ardennes to have them. PAK75 strengths for the period 16-30 December were determined by comparing the estimated PAK75 start strength with the strength given in the 30 December Wochenmeldung Ob West (RH19IV/241).

FGB

Insufficient information exists for the equipment inventory start strength of the FGB to allow for the derivation of a 16 December inventory without substantial estimation. An undated Gliederung for the unit (RH10/134, pg. 9) was the main document used for estimating the brigade's start strength. For transport vehicles (MHT, PKW, and LKW), the strengths of comparable units in a panzer division (see RH10/101, pgs. 36-43) that were in the FGB (headquarters, panzer grenadier regiment, antiaircraft battalion, field replacement battalion, artillery regiment--one-third, transport troops--one-fifth, medical section--one-third, and panzer regiment--one-half) were used to estimate the start strengths of these vehicles in the FGB. Note that the HIG SP, LFH105 SP, and HFH150 SP shown on the FGB Gliederung have been changed to HIG, LFH105, and HFH150, as the General Inspector of the Panzer Troops report (RH10/352) does not show evidence of self-propelled weapons with the brigade. MAUL, RCV, 1-5t PM, 8-18t PM, and BGPZ-V were estimated in a similar manner. For the strengths of the 929th Grenadier Battalion (shown on the FGB Gliederung without data on weapons strengths), the 28 November 1944 Gliederung of the FBB (RH10/132, pg. 8) was used. This document shows the weapons of the 928th Grenadier Battalion, a unit organized like the 929th. The strengths of the weapons with the 928th were included in the FGB's equipment inventory. PF and PS strengths were estimated to be one-half of those with a panzer division (500 and 40, respectively). Finally, all weapons, vehicles, and equipment strengths derived as described above were reduced by 5 percent, to give the FGB an estimated 95 percent start strength, as the brigade had started to organize in November 1944, and was likely near but not completely at full strength.

Attrition for all weapons and vehicles in the FGB was estimated using the Army Panzer Divisions estimation averages, except for 75HT, LAC, MHT, and BGPZ-V. BGPZ-V attrition was estimated using the methodology employed for the FBB (based on the 15 January General Inspector of the Panzer Troops report for the Fuehrer Grenadier Division). For 75HT, LAC, and MHT, attrition for 16-31 December was estimated by comparing the derived 16 December start strengths with the 30 December General Inspector of the Panzer Troops report, and assigning daily losses from net strength changes using the Active/Inactive/Out of Contact assessments from the German battle casualty estimation methodology. For 1-16 January the attrition of these vehicles was estimated using the Army Panzer Divisions estimation averages.

9th VGD

The 9th VGD's equipment inventory start strength was estimated at 95 percent of authorized strength, a percentage based on its 7 January personnel strength (7,987) from T314,1335,1028 (LIII K 7 January Weekly report).

The 9th VGD was formed in the autumn of 1944 and was committed to the Ardennes Offensive several days after the opening of the offensive on 16 December. Therefore, based on its attrited 7 January personnel strength and pre-offensive experience, its equipment inventory was assumed to be near full authorized strength less its FLAKCo (see the Panzerjaeger Abteilung report--RH10/105, pg. 9). Artillery weapons (K75, LFH105, and HFH150) were assumed to be at full strength as was the situation with the other Volksgrenadier divisions of the 7th Army.

Attrition of 9th VGD equipment was estimated using the Army Panzer Divisions averages for all weapons. T314,1335,1028 provided 7 January 1945 strengths for PAK75, and the number of active batteries for K75, LFH105, and HFH150. This data was used to estimate the 9th VGD's 24 December-7 January strengths. Attrition of these systems for 8-16 January was estimated using the Army Panzer Divisions averages, based on the battle casualties for this period. PKW, LKW, MAUK, RSO, and HDR were attrited using the 340th VGD Vehicle averages, and Trl were attrited at the same rate as LKW.

12th VGD

A877, pg. 20, reports the 12th VGD at 80 percent strength in personnel, while B779, pg. 3, reports the division as "very well equipped." Pallud reports that the 6th PzArmy considered it as its best infantry division. Its estimated equipment inventory start strength is 95 percent of authorized strength for all weapons and vehicles, except artillery (K75, LFH105, and HFH150) the start strengths of which were taken from the 10 December Army Group B Artillery report (T311,18,7021051).

Equipment attrition of the 12th VGD was estimated using the Army Panzer Divisions averages for all equipment except PKW, LKW, Trl, MAUL, RSO, and HDR. These vehicles were attrited using the 340th VGD Vehicle averages. Trl attrition was estimated at the same rate as LKW.

18th VGD

The equipment inventory start strength of the 18th VGD was estimated to be at 95 percent authorized strength, for all weapons and vehicles. B688, pgs. 15-22, discusses the condition of the division at the start of the Ardennes Campaign, including a cumulative total for PAK75 and FLAK37 weapons. The 10 December Army Group B Artillery report (T311,18,7021051), gives data on the 18th VGD's artillery start strength.

Equipment attrition for the 18th VGD was estimated using the Army Panzer Divisions averages for all equipment except those detailed as follows. PKW, LKW, MAUL, RSO, and HDR were attrited using the 340th VGD Vehicle averages. Trl were attrited at the same rate as LKW. According to B688, pg. 58, no PS were in operating condition at the end of the Ardennes operation; they were attrited accordingly. B688, pg. 77, also reports "several" antitank guns lost on 15 January. Therefore, 3 PAK75 losses were assessed against the 18th VGD on that day (as part of the total PAK75 losses estimated using the Army Panzer Divisions averages).

26th VGD

The 26th VGD's equipment inventory start strength was taken from the 26th VGD's December weapons and vehicle reports (T314,1134,253). Trl were assumed to be 85 percent authorized strength, as the division's LKW strength was at that percentage of authorized strength. HDR strength was based on the percentage of horses on-hand (number given in T314,1134,253) to the authorized strength. RCV and prime mover strengths were estimated from the total number of prime movers given in T314,1134,253.

P032d, pg. 72, gives 24 January 1945 strengths for artillery, PAK75, MMTR, HMTR, and FLAK37. This information was compared with the estimated start strengths of these weapons to derive losses for them during the period 16 December-16 January. Net losses were estimated on a daily basis using the Active/Inactive/Out of Contact assessments. For K75, LFH105, and HFH150, damaged guns were estimated using the Army Panzer Divisions averages. PKW, LKW, MAUL, RSO, and HDR attrition was estimated using the 340th VGD Vehicle averages, while Trl were attrited at the same rate as LKW. All other equipment was estimated using the Army Panzer Divisions averages.

47th VGD

The 47th VGD's equipment inventory start strength was taken from the division's 9 December Gliederung (T314,1597,212) for all equipment except K75, LFH105, HFH150, PKW, LKW, Trl, MAUL, RCV, 1-5t PM, 8-18t PM, HDR, and PF and PS. The start strengths of the vehicles was estimated at 50 percent of authorized strength. This estimation was based on the on-hand percentage of authorized RSO (50 percent), and on the daily personnel strengths of the division for 14-30 December, as found in the LXXXI strength reports (T314,1597,666) which show the division personnel at approximately 55 percent of authorized strength. PF and PS strengths were taken from the LXXXI Korps 15 December munitions report (T314,1594,1131). K75, LFH105, and HFH150 were taken from the 16 December LXXXI K Artillery Gliederung (T314,1597,264).

Attrition of the 47th VGD's equipment inventory was calculated using T314,1597,264; T314,1594,1130 (LXXXI K Armor/Antitank reports); and T314,1594,1131 for all equipment except PKW, LKW, Trl, MAUL, RSO, HDR, and LMG/HMG. LMG/HMG attrition was estimated using the Army Panzer Divisions averages. Trl attrition was estimated using the PKW loss rate. Attrition of the vehicles was estimated using the 340th VGD Vehicle averages.

59th ID

The estimated equipment inventory start strengths of the 59th ID were assumed to be 50 percent of authorized strength. This assessment was based on the personnel strength of the 59th ID on 30 December 1944, as found in the Wochenmeldung Ob West (RH19IV/241), and the assessment of XII SSK divisions provided in B290, pg. 39 (" . . .equipment poor"). Artillery strengths (LFH105 and HFH150) were taken from the 10 December Army Group B Artillery report (T311,18,7021051).

Attrition of the 59th ID was estimated using the Army Panzer Divisions averages. For PKW, LKW, MAUL, RSO, and HDR, the 340th VGD Vehicle averages were used to estimate losses. Tr1 were attrited at the same rate as LKW.

62d VGD

The 62d VGD was "up to strength" in equipment according to B028, pg. 29 Therefore, its equipment at the start of the Ardennes Campaign was estimated to be at 95 percent of authorized for all weapons and vehicles, except artillery (K75, LFH105, and HFH150). Data for artillery start strengths was taken from the 10 December Army Group B Artillery report (T311,18,7021051). No FLAK37 were included with the 62d VGD as the Panzerjaeger Abteilung report indicated that the division's FLAKCo was not with the division (see RH10/105, pg. 14).

Attrition of the 62d VGD equipment inventory was estimated using the Army Panzer Divisions averages, and (for PKW, LKW, MAUL, RSO, and HDR) the 340th VGD Vehicle averages. Trl attrition was estimated using the LKW loss rate. B028, pg. 16, reports that the 62d VGD lost 2 pieces of artillery between 16-26 December. These are assessed against the division during that period.

79th VGD

Based on the descriptions of the 79th VGD in B070, pgs. 2-3, the equipment start strengths were estimated at 80 percent of the authorized strength of a Volksgrenadier division organized like the 26th VGD (with a complete fuesilier battalion). Vehicle strengths were based on the mobility levels of the division given in the 79th VGD's 26 December Weekly report (T315,1114,254), i.e., 60% motorized and 75% horse-drawn. Artillery, MMTR, and RSO strengths were taken from the 18 January Gliederung (T315,1134,1011).

Attrition of PKW, LKW, MAUL, RSO, and HDR was estimated using the 340th VGD Vehicle averages (Trl attrition estimated at the same rate as LKW). RCV and 1-5t PM attrition estimates were based on the Army Panzer Divisions averages. Estimation of the remainder of the 79th VGD's equipment's attrition was done by comparing the derived start strengths with the 18 January Gliederung, and allocating daily losses using the Active/Inactive/Out of Contact assessments. K75 and LFH105 loss estimates took into account information in the divisions 23-31 December 1944 Artillery report (T315,1114,254).

85th ID

As of 30 December 1944, the 85th ID's personnel strength was 5,602 (see Ob West Wochenmeldung, RH19IV/241). Its 16 December equipment inventory strengths were therefore estimated to be at 50 percent. MMR, HMTR, FLAK37, and PAK75 strengths were estimated from the 16 and 28 January Gliederung (T314,1597,240).

Artillery strengths (LFH105) were taken from the 10 December Army Group B Artillery report (T314,18,7021051). The number of RSO was based on the number of available artillery pieces.

The 85th ID's equipment attrition was estimated using the Army Panzer Divisions averages (and the 340th VGD Vehicle averages for PKW, LKW, MAUL, RSO, and HDR), with Trl estimated at the LKW loss rate) for all equipment except PAK75. PAK75 daily strengths were based on the 30 December and 6 and 20 January Ob West Wochenmeldung (RH19IV/241) which showed no decrease in PAK75 strengths for the division.

89th ID

The 89th ID's equipment start strength was estimated to be 50 percent of authorized. This assessment was based on the description of the division in P032a. Artillery strength was taken from the 10 December Army Group B Artillery report (T311,18,7021051).

Attrition of the 89th ID's equipment inventory was estimated using the Army Panzer Divisions averages (and the 340th VGD Vehicle averages for PKW, LKW, MAUL, RSO, and HDR, with Tr1 attrited at the LKW estimated loss rate) for all equipment except LFH105 and HFHF150. P032a, pgs. 18 and 20, indicated increases in LFH105 strength and no changes in HFHF150 strength. This information was incorporated into the 89th ID's equipment inventory.

167th VGD

The 167th VGD's equipment start strengths were estimated at 95 percent of authorized, based on the description of the division found in B041, pg. 1. The division evidently lacked RSO prime movers and the equipment with its FLAKCo (see B041, pg. 1, and the Panzerjaeger Abteilung report--RH10/105, pg. 21).

Attrition of the 167th VGD's equipment inventory was estimated using the Army Panzer Divisions averages (and for PKW, LKW, MAUL, RSO, and HDR the 340th VGD Vehicle averages, with Trl attrition estimated at the LKW loss rate).

212th VGD

The 212th VGD (less its FLAKCo and equipment) was described in Pallud as being "almost full strength" in manpower. (For status of the divisions's FLAKCo, see the Panzerjaeger Abteilung report, RH10/105.) Its equipment strength was therefore estimated to be 95 percent of authorized. Artillery strengths (K75, LFH105, and HFH150) were taken from the 10 December Army Group B Artillery report (T311,18,7021051).

Equipment attrition of the 212th VGD was estimated using the Army Panzer Divisions averages (and for PKW, LKW, MAUL, RSO, and HDR the 340th VGD Vehicle averages, with Trl losses estimated using the LKW loss percentage), for all equipment except artillery (K75, LFH105, and HFH150). These weapons were attrited for estimated damage losses and return from repair estimated using the Army Panzer Division averages. However, because B783, pg. 20, reports no artillery losses for the division, no K75, LFH105, and HFH150 losses were assessed against the division.

246th VGD

The 246th VGD had a 1 December Zustandsbericht and Gliederung (T314,1597,152), which contained comprehensive information on the division's equipment inventory strengths. This information was used to compile the division's 16 December equipment inventory. The number of PF was estimated from the PS authorized strength. (The 246th VGD had 64 PS out of an authorized strength of 250, or 26 percent. Authorized PS strength is 2,000, 26 percent of which equals 520.) This estimate is not inconsistent with the divisional commander's description of a "significant lack of antitank equipment" in the division (see T314,1597,152). HDR strength was estimated at 85 percent of authorized strength, or 971, based on the horse-drawn ("bespannt") mobility level of the 246th VGD. Tr1 strength was based on the LKW percentage of authorized strength (100 percent). RCV were assumed to be at full authorized strength. Artillery strengths (K75, LFH105, HFH150, and HFH122) were taken from the 16 December LXXXI K Artillery Gliederung (T314,1597,264), and the number of PAK75 was taken from the 15 December LXXXI K Armor/Antitank report (T314,1594,1130).

Attrition of the 246th VGD's equipment inventory was estimated using the Army Panzer Divisions averages (for PKW, LKW, MAU1, RSO, and HDR the 340th VGD Vehicle averages were used, with Tr1 attrited at the LKW rate), for all equipment except PAK75 and K75. Attrition of these weapons was estimated using the Army Panzer Divisions averages and the total number of antitank weapons show with the 246th VGD in the 30 December and 6 January Wochenmeldung Ob West (RH19IV/241).

272d VGD

The 272d VGD's personnel strength on 30 December (see Wochenmeldung Ob West -- RH19IV/241), was approximately three-fourths of the authorized personnel strength of a Volksgrenadier division. Therefore, the equipment inventory start strengths of the division was estimated to be 75 percent of authorized. Artillery strengths (K75, LFH105, and HFH150) were taken from the 10 December Army Group B Artillery report (T311,18,7021051).

Attrition of PKW, LKW, MAUL, RSO, and HDR was estimated using the 340th VGD Vehicle averages. Attrition of all other equipment, except PAK75, was estimated using the 30 December and 6 January antitank strengths provided in Wochenmeldung Ob West (RH19IV/241), and the total number of destroyed PAK75 estimated from the Army Panzer Divisions averages.

276th VGD

According to the Panzerjaeger Abteilung report, (RH10/105, pg. 26), the 276th VGD had no FLAKCo, so no FLAK37 were assigned to the division's start strength. The remainder of the 276th VGD's equipment inventory start strength is estimated to be 75 percent of authorized, this estimate being based on the LIII K 7 January Weekly report (T314,1335,1028), which indicates that the division was at 75 percent of authorized personnel strength. Artillery strengths (K75, LFH105, and HFH150) were taken from the 10 December Army Group B Artillery report (T311,18,7021051). RSO data was estimated from B467, pgs. 6-7.

Attrition of PKW, LKW, MAUL, RSO, and HDR was estimated using the 340th VGD Vehicle averages, with Tr1 attrition estimated at the same rate as LKW. All other equipment attrition estimation was done using the Army Panzer Divisions averages, except for PAK75. PAK75 daily strengths for 16 December-7 January were assumed to remain constant, as indicated by comparison of the estimated PAK75 start strength and the 7 January strength in the LIII K Weekly report (T314,1335,1028). For 8-16 January, PAK75 attrition was estimated using the Army Panzer Divisions averages.

277th VGD

The 277th VGD's equipment ("materiel") strengths on 16 December were estimated at 75-80 percent (see A924, pg. 61, and B779, pg. 13). Therefore, its equipment inventory start strength was estimated to be 75 percent, and its artillery strengths (K75, LFH105, and HFH150) were taken from the 10 December Army Group B Artillery report (T311,18,7021051).

PKW, LKW, MAUL, RSO, and HDR attrition for the 277th VGD was estimated using the 340th VGD Vehicle averages, with Tr1 attrition estimated at the LKW loss rate. For all other equipment, except PAK75, the Army Panzer Divisions averages were used for attrition estimation. PAK75 strengths were derived by comparing the estimated 16 December start strength with the strengths provided in the 30 December and 6 January Wochenmeldung Ob West (RH19IV/241), and using only the damaged and returned derived from the Army Panzer Divisions averages.

326th VGD

B092, pg. 1, reports the 326th VGD as "fully equipped" in equipment, except for a shortage of 400 horses and "insufficient motor vehicles." A924, pg. 61, reports the 326th VGD at 80 percent in materiel. The estimated equipment start strength used in the ACSDB for the 326th VGD is 95 percent for weapons, and 75 percent for PKW, LKW, Trl, and HDR. Artillery strengths were taken from the 10 December Army Group B Artillery report (T311,18,7021051).

PKW, LKW, MAUL, RSO, and HDR were attrited using the 340th VGD Vehicle averages, with Trl attrited estimation at the same rate as LKW losses. For all other equipment, attrition was estimated using the Army Panzer Divisions averages.

340th VGD

B678, pgs. 47-48, provides information on total equipment losses sustained by the 340th VGD during the period 22 November 1944-27 January 1945. This data was interpolated to determine the start strength of the 340th VGD on 16 December 1944. Using information found in B678 and MacDonald, Siegfried Line, the daily activity levels of the 340th VGD were determined for 22 November-27 January. For the period 22 November-15 December, the 340th VGD had 9 Active days, 10 Inactive days, and 5 Out of Contact days. For 16 December-27 January, the 340th VGD had 11 Active days, 25 Inactive days, and 7 Out of Contact days. The percentage for 22 November to 16 December of total equipment losses was calculated by determining the percentage of activity for 22 November-16 December to the activity for the entire 22 November-27 January period $[(9 \times 6.5) + 10] / [(20 \times 6.5) + 35]$, or 41.5 percent). (This percentage was derived using the Active/Inactive/Out of Contact assessments developed for the German battle casualty estimation methodologies.)

This percentage was then applied to the total losses for each weapon and vehicle and the resulting numbers subtracted from the authorized volksgrenadier division strengths to give the estimated start strengths of the 340th VGD's equipment. PF strength was estimated at eight times the PS strength, the ratio of PS to PF in a volksgrenadier division being 1:8. Artillery strengths (K75, LFH105, and HFH150) were taken from the 10 December Army Group B Artillery report (T311,18,7021051).

Since B678 does not distinguish between PAK75 and K75, but rather groups them together in its losses (the weapons were identical), the start strength of PAK75 was estimated by subtracting the appropriate percentage (41.5) of one-third of the total losses (14) of 75mm antitank guns from the authorized volksgrenadier division strength. (There are 9 PAK75 and 18 K75 authorized in a VGD.)

Attrition of all 340th VGD equipment, except K75, LFH105, and HFH150, was estimated by taking the total "activity percentage" for 16 December-16 January (41.8 percent), calculated in the same manner as the activity level for 22 November-16 December---8 Active/17 Inactive/7 Out of Contact $[(8 \times 6.5) + 17] / [(20 \times 6.5) + 35]$, or 41.8 percent--and multiplying this percentage by the total losses in B678 to give the aggregate losses for the 16 December-16 January period. Losses were then allocated on a daily basis according to the activity level of the 340th VGD. For K75, LFH105, and HFH150, the Army Panzer Divisions averages were used to estimated losses. The estimated losses using this method were not inconsistent with the total losses of K75, LFH105, and HFH150 presented in B678.

344th ID

According to the 24 December 1944 LXXXI K Personnel Strength report (T314,1597,666), the 344th ID's personnel strength was less than one-half of authorized strength. The division's equipment inventory strength is estimated to be 50 percent of authorized. Artillery strengths (LFH105) were taken from the 10 December Army Group B Artillery report (T311,18,7021051). As the division was not engaged in combat, and its battle casualties were negligible, its equipment strength was estimated to remain constant for the duration of its presence in the Ardennes area (16-28 December 1944). PAK75 strength was taken from the 24 December LXXXI Armor/Antitank report (T314,1594,1130).

352d VGD

According to B067, pg. 3, the 352d VGD was "almost complete" in equipment. Its artillery, however, lacked prime movers (see B467, pg. 12). According to the Panzerjaeger Abteilung report (RH10/105, pg. 29), the 352d VGD lacked its FLAKCo. The division's equipment start strength is estimated to have been 95 percent of authorized strength, less its RSO prime movers and the equipment of its FLAKCo. Artillery strengths for the 352d VGD were taken from the 10 December Army Group B Artillery report (T311,18,7021051).

Attrition of PKW, LKW, MAUL, RSO, and HDR was estimated using the 340th VGD Vehicle averages, with Trl losses estimated at the same attrition rate as LKW. Attrition of all other equipment, except K75, LFH105, and HFH150, was estimated using the Army Panzer Divisions averages. K75, LFH105, and HFH150 (the division's artillery) were almost all lost according to B783, pgs. 20-21. For the division's artillery, losses estimated from the Army Panzer Divisions averages were used in addition to the equivalent loss of one entire battalion (6 K75 and 12 LFH105) on 22-23 December, as described in B783, pg. 30.

353d ID

The 353d ID's condition during December 1944 was poor, in terms of personnel and equipment, as data in the 24 and 28 December LXXXI K Personnel Strength reports (T314,1597,666) and information in the 353d ID's interim Zustandsbericht (T314,1597,190) indicated. The division's equipment start strength was estimated to be 25 percent of authorized, with data on artillery (LFH105 and HIG) coming from the 10 December Army Group B Artillery report (T311,18,7021051). Mobility levels reported in the interim Zustandsbericht were used to estimate vehicle strengths (PKW, LKW, Tr1, MAUL, RCV, prime movers, and RSO at 38 percent, and HDR at 31 percent). MMTR and PS strengths were taken from the division's 30 December Gliederung (T314,1597,190). FLAK37 SP strength was taken from the Panzerjaeger Abteilung report (RH10/105). This document also indicated that the unit was not equipped with PAK75, as did the 15-20 December LXXXI Armor/Antitank reports (T314,1594,1130), and so these weapons were not included in the 353d ID's equipment inventory.

Losses for the 353d VGD's equipment inventory were calculated and estimated in several ways. For PKW, LKW, MAUL, RSO, and HDR, the 340th VGD Vehicle averages were used, with Tr1 estimated at the same rate as LKW. For RCV and prime movers, the Army Panzer Divisions averages were used. For the other equipment during the period 16-31 December, the LXXXI K Weapons Losses reports (T314,1594,1186), the 28 December LXXXI K Artillery Gliederung (T314,1597,264), and the 353d VGD Interim Zustandsbericht were used to determine daily losses. For these weapons during the period 1-16 January, losses were estimated using the Army Panzer Divisions averages.

363d VGD

The 363d VGD's equipment inventory start strengths were taken from the divisions 1 December 1944 Zustandsbericht (T314,1597,148) and Gliederung (T314,1597,206) for all equipment except PAK75, K75, LFH105, and HFH150. Start strengths of these systems were taken from the 15 December LXXXI K Armor/Antitank report (T314,1594,1130) and the 16 December LXXXI K Artillery Gliederung (T314,1597,264). The numbers of Trl was based on the on-hand number of LKW. (The on-hand number of LKW is 148, or 86 percent of authorized, the percentage used to estimate the number of Trl.) The number of HDR was based on the horse-drawn mobility level of the 363d VGD, as given in the 1 December 1944 Zustandsbericht. PF and PS strengths were taken from the 15 December LXXXI K Daily Munitions report (T314,1594,1631).

Attrition of PKW, LKW, MAUL, RSO, and HDR was estimated using the 340th VGD Vehicle averages, with Trl attrition estimated at the LKW loss rate. For all other weapons and vehicles, the Army Panzer Divisions averages were used except for the following equipment during the indicated time periods: 16-28 December---PS (LXXXI K Daily Munitions report); 16-31 December---PAK75 and K75 (LXXXI K Armor/Antitank reports); 16-25 December---LFH105 and HFH150 (LXXXI K Artillery Gliederung).

560th VGD

The 560th VGD was described by its commander in B027, pg. 1, as "fully equipped." Therefore, its estimated equipment inventory start strength is assumed to be at 95 percent of authorized. Artillery strengths for the 560th VGD were taken from the 10 December Army Group B Artillery report (T311,18,7021051).

Attrition of 560th VGD PKW, LKW, MAUL, RSO, and HDR used the 340th VGD Vehicle averages, with Trl attrition based on the LKW attrition rate. For all other equipment, except artillery for 16-28 December, the Army Panzer Divisions averages were used to estimate attrition. For K75, LFH105, and HFH150, a 28 December 560th VGD Daily report (T314,1666,380) was used to determine losses between 16-28 December. For 29 December-16 January, the Army Panzer Divisions averages were used to estimate artillery attrition. Note that for 16-20 December, LMG/HMG, MMTR, and PS attrition was weighted (twice the averages) to reflect the high personnel battle casualties sustained by the 560th VGD during this period.

Attachment 1

Average Destroyed per 100 Battle Casualties

	PzLehrD	2d PzD	9th PzD	116th PzD	3d PzGD	15th PzGD	Avg.	Ignore+
LMG/HMG	12.629	22.020	10.977	6.453	2.510	2.993	9.597	
MMTR	0.206	1.078	+1.291	0.587	+0.615	0.791		0.666
HMTR	0	0.454	0.242	0	0.051	0.169	0.153	
PS	1.701	2.667	1.937	0.897	0.410	0.734	1.391	
FLAK15(d)	---	---	0.484	---	---	---	0.484	
FLAK15(d) SP	---	---	0.323	0.207	---	---	0.265	
FLAK20	+0.155	0.851	0.565	0	0	0.452		0.374
FLAK20 SP	0.052	0	+0.404	0.035	---	---		0.029
FLAK20(v)	0.309	0.227	+0.161	0	---	---		0.179
FLAK20(v) SP	+0.052	0.114	0.081	+0.069	0	0		0.049
FLAK37	0.103	0.681	0	---	---	---	0.261	
FLAK37 SP	+0.052	0.057	0.484	0	---	0		0.135
FLAK37(z)	0.155	---	0	0	0	+0.169		0.039
FLAK88	0.258	0.511	0	0	0	0	0.128	
PAK75	0.464	0.454	0.565	0.242	0.051	0.565	0.390	
LIG	0.309	0.227	---	0	0.051	0.113	0.140	
HIG	0.155	0.284	0.081	0	0.051	0	0.095	
HIG SP	0.155	0.114	---	0.035	0	---	0.076	
K105	0	0.227	0	0	0	0	0.038	
LFH105	0.103	0.057	0.242	0.173	0.051	0.847	0.246	
LFH105 SP	---	0.341	---	0.035	---	---	0.188	
HFH150	0.309	0.284	0	0	0	0.113	0.118	
HFH150 SP	---	0.227	0.242	0.069	---	---	0.179	
75HT	0.309	0.170	0	0.035	0.051	---	0.113	
LAC	0	0.170	0.081	0	0.205	0.678	0.189	
HAC	0	0.341	0.081	0	0	---	0.084	
LHT	0.722	1.022	0.242	0.345	0.256	0	0.431	
MHT	2.268	1.078	0.484	1.656	0.102	0.113	0.950	
PKW	7.732	7.775	11.380	10.559	7.838	18.577	10.644	
LKW	19.639	7.094	10.815	14.907	13.473	16.940	13.811	
Trl	1.959	1.476	0.968	1.173	0	3.876	1.575	
MAUL	0.412	0.908	1.695	0.207	0.102	0	0.554	
RCV	0	0	0	0.069	0	+0.113		0.014
1-5t PM	+0.258	1.022	0.807	0.242	0.973	0.508		0.710
8-18t PM	1.031	1.078	0.646	0.104	0.307	0.621	0.631	
RSO	---	0.341	+0.404	+0.069	+0.051	1.073		0.707
BGP2-III	---	0	0.081	0	0	0	0.016	
BGP2-V	0	0	0	0.069	0	---	0.014	
BEP2-III/IV	0.103	0	0	0	0	0	0.017	
BEP2-V	0.206	0.284	0.242	0	---	---	0.183	

NOTE: A "+" indicates a net increase in the number of systems. These values were not used for calculation of averages (calculated averages are recorded under Ignore +).

Attachment 2

Average Damaged per 100 Battle Casualties

	PzLehrD	2d PzD	9th PzD	116th PzD	3d PzGD	15th PzGD	Avg.
PAK75	0	0	0.081	0.173	0	0	0.042
LIG	0	0	---	0	0	0	0
HIG	0	0	0	0	0	0	0
HIG SP	0.206	0.227	---	0	0	---	0.108
K105	0	0	0	0	0	0.056	0.009
LFH105	0.206	0.057	0.161	0.035	0.256	0.056	0.129
LFH105 SP	---	0	---	0.035	---	---	0.018
HFH150	0.052	0.114	0	0	0.051	0.056	0.046
HFH150 SP	---	0.057	0	0.035	---	---	0.031
75HT	0.412	0.227	0.161	0.035	0.102	---	0.187
LAC	0.155	0.057	0.081	0.069	0.102	0	0.077
HAC	0.103	0.114	0.161	0.069	0	---	0.089
LHT	0	0	0.081	0.035	0.461	0	0.096
MHT	1.856	0.908	1.453	0.276	0.102	0.169	0.794
BGPZ-III	---	0	0.081	0	0.051	0	0.026
BGPZ-V	0.103	0.057	0	0	---	---	0.040
BEPZ-III/IV	0.103	0.227	0.242	0	0.051	0	0.104
BEPZ-V	0	0	0	0.035	---	---	0.009

NOTE: A "+" indicates a net increase in the number of systems. These values were not used for calculation of averages (calculated averages are recorded under Ignore +).

Attachment 3

Average Replaced per "Inactive" Day

	PzLehrD	2d PzD	9th PzD	116th PzD	3d PzGD	15th PzGD	Avg.
HIG SP	0.286(4/14)	0	---	0	0	---	0.072
HAC	0	0	0.095(2/21)	0	0	---	0.019
MHT	0.643(9/14)	0	0	0	0.100(2/20)	0	0.124
BGPZ-V	0.071(1/14)	0	0	0	---	---	0.018
BEPZ-111/IV	---	0.200	0	0	0	0	0.040

NOTE: Number replaced/number of "Inactive" days shown in parantheses.

Attachment 4

Average Returned per "Inactive" Day

	PzLehrD	2d PzD	9th PzD	116th PzD	3d PzGD	15th PzGD	Avg.
PAK75	0	0.100(2/20)	0.048(1/21)	0.235(4/17)	0	0.240(6/25)	0.104
LIG	0	0	---	0.059(1/17)	0	0.080(2/25)	0.028
HIG	0	0	0.095(2/21)	0.059(1/17)	0	0	0.026
HIG SP	0	0	---	0	0	---	0
K105	0	0	0	0	0	0	0
LFH105	0	0.050(1/20)	0	0.235(4/17)	0.500(10/20)	0.120(3/25)	0.151
LFH105 SP	---	0	---	0.059(1/17)	---	---	0.030
HFH150	0	0.050(1/20)	0	0.059(1/17)	0.010(2/20)	0.080(2/25)	0.033
HFH150 SP	---	0.050(1/20)	0	0.118(2/17)	---	---	0.056
75HT	0	0	0	0	0.050(1/20)	---	0.010
LAC	0.286(4/14)	0	0	0	0	0.080(2/25)	0.061
HAC	0.143(2/14)	0	0	0	0	---	0.029
LHT	0.143(2/14)	0	0	0	0	0	0.024
MHT	0.786(11/14)	0.900(18/20)	0	0	0	0	0.281
BGPZ-III	---	0	0	0	0	0	0
BGPZ-V	0	0	0	0.059(1/17)	---	---	0.015
BEPZ-III/IV	0	0	0	0	0	0.040(1/25)	0.007
BEPZ-V	0	0	0	0	---	---	0

NOTE: Number returned/number of "Inactive" days shown in parantheses.

German Armored Fighting Vehicle Data Generation Methodology

The process of deriving daily German tank strengths and attrition data for the Ardennes Campaign Simulation Data Base (ACSDB) was complicated by several factors. Chief among these were:

- 1) A general lack of complete, reliable primary source material with daily German tank data.
- 2) Secondary source material of dubious reliability and accuracy, which also lacked daily German tank data.
- 3) Conflicting tank data in primary and/or secondary source material.

The lack of primary source material was a result of the state of German Army record-keeping in the late World War II period. Many reports were either never completed, never filed, destroyed to prevent capture, and/or lost due to enemy action. Secondary sources were compiled after the war by officers who no longer had access to their unit records or were compiled long after the war with the available records in the condition in which we find them today. Conflicting information may be explained in some cases by understanding the purpose for and the methodology of German reports.

To resolve these problems required the use of numerous sources (detailed below) and analysis of the available records, including in particular comparison of the records with units' daily activities. Not all questions can be resolved, and in some cases arbitrary decisions were of necessity made. However, the German tank information in the ACSDB may be considered to be a complete and accurate estimation, performed under constraints imposed by the condition of the available records and the limitations of the data which they provide.

Note that for purposes of this paper, the term "tank(s)" refers to German tanks, assault guns, and self-propelled antitank guns, i.e., all combat vehicles on fully-tracked chassis. Also note that due to the variety of sources used for this paper and to derive German tank data, a system employing bibliographic abbreviations is used to reference data. A list of explanations of abbreviations and full bibliographic references of all sources cited herein are located at the end of the paper.

German Reporting Methods.

All German units containing armored vehicles were required to submit daily status reports either verbally or in writing. In

addition, units reported verbally three times a day to higher headquarters on their operational status; these reports are reflected on the high command maps referred to below.

All units also filed a monthly status report -- Zustandsbericht (ZB) -- detailing the overall condition of the unit, including both operational vehicles and vehicles in short-term repair. Abbreviated unit status reports were also generated by some units on a weekly or 10-day basis. These reports were made by units to their parent corps and appear to be found exclusively in corps reports.

The following types of reports were researched and collected at the US National Archives in Washington, D.C., and the German archives in Freiburg, West Germany and used for estimating German tank data in the ACSDB.

A) Tagesmeldungen (TM) - daily reports on armored vehicles by type, total operational, total in short-term repair (repair possible in less than three weeks), total destroyed since the last report, total damaged since the last report, and, in some reports, the total in long-term repair (three weeks or more). Very few of these types of records pertaining to the Ardennes period have survived. The few records include those of the 116th PzD and LXXXI Korps.

B) Wochenmeldungen (WM) or Dekadmeldungen (10-day) - weekly or 10-day reports generally with the same information given as in the daily reports. However, in some cases, they list operational totals only. Only limited numbers of these records have survived as well, such as one for the LIII Korps on 7 January 1945.

C) Zustandsbericht and Kriegsgliederung (ZB and Gld) - status report and order of battle. Compiled on a monthly basis, the ZB gives aggregate operational and in-repair vehicle status by general type for the day of the report. These are available for most of the SS and army panzer (armored) and panzer grenadier (armored infantry) divisions, but they do not provide comprehensive coverage for all units for the entire Ardennes period since there are missing reports. The Gld, which in theory accompanied the ZB each month, gives aggregate vehicle strength in diagrammatic form without detailing operational status. In many cases these reports do not detail the exact types of vehicles, listing only a generic type, e.g. "STG" (assault gun), without specifying exact model of the vehicle (i.e., an assault gun on a Mark III tank chassis, on a Mark IV tank chassis, or a Panzerjaeger IV tank destroyer vehicle).

D) Miscellaneous reports - include Inspector General of Panzer (Armored) Troops reports for various periods, Sixth Panzer Army reports for 1 February 1945, and other fragmentary unit

reports. These are detailed in the section on units and sources.

E) Maps - used for German high command planning purposes and compiled three times a day, reflect the verbal reports made daily by units to higher command echelons as a general indication of a unit's condition. Tank status for units is usually displayed on the maps as two numbers, the second normally being in parentheses. After extensive research it was determined that the first number usually refers to the number combat ready, while the second number, when in parentheses, refers to the number not combat ready. The utility of the maps to the ACSDB is complicated by the fact that the second number may refer to vehicles in repair, those in transit to the unit, and those not combat operational due to a lack of crew, fuel, ammunition, etc. The second number does not include vehicles in long term repair, or detached and unable to report to the parent unit. (In theory, a unit would continue to report through its parent unit until it had been detached for a period greater than four weeks. In practice, communications limitations and security meant that a detached unit, in many cases, was not reported at all.) Thus, the sum of the two numbers on the operations maps does not always equal the actual total number of a particular type of vehicle in a unit. An additional limitation to the maps' applicability to the ACSDB is that in most cases, units did not in the heat of combat accurately report their status three times a day. In practice the unit reported when it had time, and so the map tank numbers do not always change on a daily basis but often after a span of several days, frequently during a period of inactivity following combat.

German Tank Data Estimation Methodology.

The general methodology used to estimate German tank data started with the creation of a hand-drafted spread sheet for each unit, on which was recorded all known information from all source material. The six categories of vehicle status on the spreadsheets matched the fields of the Unit Inventory records: Amt (Operational On-hand), Dst (Destroyed), Dmg (Damaged), Abd (Abandoned), Rpl (Replacements), Rpr (In-repair), and Rtn (Return from Repair). Differences between successive reporting periods were then calculated giving a gross gain/loss in vehicles during the period. Reliable secondary sources such as Cole and Pallud were used in some cases to identify date of loss. Map strength data was used to track periods of time in which changes occurred.

When daily loss data was lacking for these periods, losses were allocated based on a unit's activities. As a general rule, in the absence of other information, the first number on the maps was used as operational strength.

In-Repair. When no information was available in reports on tank in-repair status, the number reported operational (or the first number from the maps in cases where the only information

available was the maps) was subtracted from the total strength (or the adjusted total strength of the previous day in the cases where information was solely derived from the maps) to give an assumed in-repair figure. Note that in some cases this number may include vehicles in transit, out of fuel/ammunition, or lacking crews, due to the German reporting methodology.

Replacements. Evidence from the Fuehrervortrag (reports prepared for Hitler by the Inspector General of the Panzer Troops from German Archives source #RH10/90,91) indicated that some German armored units were allocated replacements during the Ardennes Campaign. In the absence of other information it was assumed that increases of total strength between reporting periods were the result of the arrival of replacement vehicles. These replacements were confirmed when possible by checking the Fuehrervortrag on vehicles in transit for the unit during the previous reporting periods. Due to German reporting methods it was not possible to determine if these replacements were used in combat or if they were stripped for parts to repair vehicles at the front as has been referred to in ETHINT 61, pg. 1 (ETHINT 61, An Interview With Gen Pz Horst Stumpff: Tank Maintenance in the Ardennes Offensive, one of the postwar Foreign Military Studies available at the US National Archives).

Damaged and Abandoned. Damaged vehicle status includes vehicles disabled by enemy action and non-operational due to mechanical breakdowns. Secondary sources consulted for this paper generally implied that German armored units started the Ardennes offensive with all available tanks in operational condition. In the review of primary sources, it was determined that this was likely not the case. Thus, some German units start the offensive with some tanks in repair status. The commander of the Fuehrer Begleit Brigade addresses this situation in his manuscript (B838, The Fuehrer Escort Brigade in the Ardennes Offensive -- Part II, pp. 12-13, one of the Foreign Military Studies on file at the US National Archives). Abandoned vehicle status includes vehicles damaged and not recovered or repaired by the Germans before capture by the enemy, as well as vehicles abandoned due to mechanical failure or lack of fuel.

Upon compilation and review of the spreadsheets, an aggregate loss check was made by comparing the total estimated losses (destroyed and abandoned) with the following German numbers found in Jung and the Kriegstagebuch of OKW (KTB/OKW) (Daily War Diary of the High Command of the Wehrmacht) for German Army Group B and the German forces on the entire Western Front:

AG B losses 16-31 Dec Estimated ACSDB losses 16-31 Dec

PZ-IV	77	94
PZ-V	132	139
PZ-VI	13	16
Assault Gun	102	106

West Front
losses 16 Dec-1 Feb

Estimated ACSDB
losses 16 Dec-16 Jan

Total	600	556
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Note: Some 14 PZ-VIb ("King Tiger" tank) losses could be accounted for on the route of Kampfgruppe Peiper (1st SSPzD) for 16-20 December as they were recovered on the battlefield by the Allies after the campaign. In this case it would appear that the Army Group B figures were in error. AG B losses do not differentiate between the PZ-VIb and PZ-VIe models. All ACSDB PZ-VI losses are PZ-VIb models.

Sources - KTB/OKW, IV/2, pgs. 1359 and 1384; Jung, pg. 195.

Details of Panzer and Panzer Grenadier Units

1st SSPzD. Data for the 1st SSPzD includes vehicles (PZ-VIb) with the 501st SSHPzBN. Pallud gives a detailed account of losses to Kampfgruppe (KG) Peiper (1st SS Panzer Regiment) for 16-26 December (total loss = 9 PZ-IV, 23 PZ-V, 14 PZ-VIb, 1 PZJG-IV). The maps do not show a marked drop until 28 December, four days after KG Peiper abandoned its remaining vehicles at La Gleize (24 December). All tank losses for the 1st SSPzD in December were estimated from Pallud and from the net changes shown in the December maps, allocated according to the 1st SSPzD's daily activities. Start strengths for PZ-IV and PZ-V were taken from the 10 December Pz Report. The start strengths for the PZJG-IV and STG III were taken from the 1st SSPzD 1 December Gld, as this appears to be more detailed than either the 1st SSPzD 1 December ZB or the 10 December Pz Report. The 16 December operational total of these two vehicle types is estimated to be 21.

To calculate the 1st SSPzD's tank strengths in January, the strengths (PZ-IV, PZ-V, and PZ-VIb) given in the 15 January IG Pz Troops Report for the 1st SSPzD were subtracted from the adjusted 31 December strength (start strength minus 16-31 December losses) to give a total strength change figure for 1-15 January. The resulting figures, all positive numbers, were then allocated as replacements for the 1st SSPzD and added based on changes in the 1st SSPzD's January map strengths.

For PZJG-IV, the 30 December strengths from the 30 December IG Pz Troops Report were used as a benchmark for estimating the

1st SSPzD's strength for this vehicle. Also used as a benchmark were the strengths in the 1 February Sixth Pz Army Report (10 operational and 3 in repair). These were assumed to have been the PZJG-IV strength on 12 January and the differences between these figures and the 30 December strengths were distributed within the 1-12 January period based on the map strengths and the 1st SSPzD's activities.

STG-III data was based on the 16 December start strength as estimated above, and the 15 January IG Pz Troops Report strengths. The difference of one vehicle was assumed to have been destroyed on 30 December.

Note that the majority of the 1st SSPzD's tank losses (destroyed and abandoned) were estimated to have occurred in December when the unit was most heavily involved in combat operations.

2d SSPzD. Start strength for PZ-IV was based on the 10 December Pz Report and on the 21 December map (RHW/616), the day on which major elements of the 2d SSPzD were first engaged in combat. PZ-V start strength was estimated based on the same map. PZJG-IV and STG-III start strengths were based on the 10 December Pz Report. Note that in this report, the two vehicle types are combined under the heading "Stu-Gesch" (assault gun). The 2d SSPzD's 1 January Gld lists both PZJG-IV and STG-III in the unit's operational strength. Therefore, the 2d SSPzD was assumed to have both types in its inventory. Pallud described destroyed losses of 11 PZ-V for 24-25 December. The PZ-V damaged loss for December was calculated by subtracting the 1 January Gld from the estimated start strength and allocating these losses based on 2d SSPzD activities. PZ-IV losses for December were estimated by subtracting the 1 January ZB operational strength from the estimated 16 December total operational and in-repair strength, taking into consideration increases in operational strengths shown on the 28 and 31 December maps (RH2W/637 and RH2W/646) and the 1 January ZB. Comparison of the numbers from these three sources indicates that the 2d SSPzD's PZ-IV losses in December were probably all damaged vehicles and that repaired vehicles were returned to operational status. PZJG-IV and PZ-IV losses were all estimated to be damaged vehicles, determined by subtracting the 1 January Gld strength from the estimated 16 December start strength. Losses for 1-16 January for all vehicles were estimated by subtracting the 15 January IG Pz Troops Report strengths (for the PZJG-IV the 2d SSPzD's 1 February ZB strength) from the estimated 1 January figures and allocating daily losses according to 2d SSPzD daily activity. Repair figures were estimated based on strength changes indicated on the January maps.

9th SSPzD. Start strength of the PZ-IV was estimated from the 21 December map (RH2W/616), recorded on the day when the 9th

SSPzD first entered combat. The PZ-V strength was estimated from the 10 December Pz Report. The start number (35 operational) is considerably less than the cumulative figures from the 22 December (RH2W/619) map (58 total). This difference may be accounted for by the "?" in the "Zulauf" (in transit) column in the 10 December Pz Report and the fact that the 9th SSPzD suffered fuel shortages at the beginning of the Ardennes Campaign, which slowed the 9th SSPzD's movement and may have prevented its entire inventory of PZ-V from entering combat. Start strength for PZJG-IV and STG-III was estimated based on the total figure for "Stu-gesch" (assault guns) given in the 10 December Pz Report and the numbers of the PZJG-IV and STG-III vehicle types as presented in the 9th SSPzD's 8 December Weapons/Tank Report. Aggregate losses for all vehicle types from 16-30 December were calculated by comparing the estimated 16 December strengths with the 30 December IG Pz Troops Report strength. For 1-16 January, aggregate losses were estimated by comparing the estimated 30 December strengths with the 1 February Sixth Pz Army Report. Daily losses were allocated in both December and January, based on daily activity of the 9th SSPzD and strength fluctuations in the December and January maps. Pallud also described the destruction of three PZ-V on 21 December. Note that STG-III strength was adjudged to have increased in January with the arrival of two replacement vehicles.

10th SSPzD. The 10th SSPzD spent the entire Ardennes time period in reserve rebuilding its tank strength, as indicated by the strengths given in the 10 December Pz Report, the 15 January IG Pz Troops Report, and various December and January maps. 10th SSPzD PZ-IV and PZ-V start strengths were estimated from the 10 December Pz Report. As of 10 December 34 PZ-IV's and 25 PZ-V's (adjusted to 24 PZ-Vs in the data base) were in transit to the 10th SSPzD. The 19 December map (RH2W/613) shows 35 PZ-IVs and 23 PZ-Vs (with 11 PZ-Vs in parentheses). These total strengths equaled the total PZ-IV and PZ-V strengths provided in the 30 December IG Pz Troops Report. The 10th SSPzD was equipped with both the PZJG-IV and the STG-III (note that the STG-III category for purposes of this data base, included Jagdpanzer IV short-barrel vehicles, which the 10th SSPzD probably had in its inventory). The 10th SSPzD apparently had no PZJG-IVs at the beginning of the Ardennes Campaign. Its STG-III start strength was based on the 10 December Pz Report. On 1 January, the 10th SSPzD's Tank Report listed 12 STG-IIIs, and on 15 January the 10th SSPzD's Weapons Report listed 10 PZJG-IVs. These vehicles (less the 4 STG-IIIs with the 10th SSPzD on 16 December) were assumed to have arrived in operational condition on 1 and 15 January. The 30 December IG Pz Troops Report showed 31 operational STG-IIIs. These were likely vehicles with the 655th HyPjBN, which was attached to the 10th SSPzD for the duration of the Ardennes battle. These vehicles were assumed to have arrived in operational condition to the 10th SSPzD on 19 December.

12th SSPzD. Start strengths of PZ-IV and PZ-V were estimated from the 10 December Pz Report and the 8 December Weapons/Tank Report of the 12th SSPzD. Start strengths of STG-III, PZJG-IV, and PZJG-V were estimated from the same sources compared with the 17 December map (RH2W/608) and the strengths in the 15 December IG Pz Troops Report. (The 560th HyPjBN, equipped with PZJG-V, was attached to the 12th SSPzD.) Pallud gave detailed losses by type for 16-22 December, and the US 644th Tank Destroyer Battalion also had a detailed after-action report for the period which agreed substantially with Pallud. (Total losses were: PZ-IV = 7 DSTYD, 4 DAMGD, 1 ABND; PZ-V = 19 DSTYD, 10 DAMGD; STG-III = 2 DSTYD; PZJG-IV = 2 DSTYD; PZJG-V = 3 DSTYD.) Losses for the remainder of December were calculated by subtracting the 31 December ZB and Gld figures or the 30 December IG Pz Troops Report figures from the estimated 23 December strength (start strength minus losses for 16-22 December). January losses were calculated by subtracting the 15 January IG Pz Troops Report from the estimated 31 December strength. Losses (destroyed and damaged) were allocated for all vehicles according to the activity level of the 12th SSPzD and, when possible, to reflect the fluctuations in map strengths.

PzLehrD. Start strengths of tanks in PzLehrD organic units (PZ-IV, PZ-V, and PZJG-IV) were based on the 10 December Pz Report. Pallud described losses of five PZ-IV and four PZ-V between 19 and 23 December. The arrival of five PZ-IV as replacements on 24 December is noted in SRH-049, p. 139 (US radio intercept). These were assumed to have arrived on 1 January, as their strength was not reflected in the 1 January ZB. Remaining December losses were calculated by subtracting the 1 January ZB and Gld figures (modified for the PZ-IV by the 30 December map strength) from the start strength less those casualties and replacements noted above (30 December map is RH2W/641). January losses (and gains for PZ-V) were calculated by subtracting the 15 January IG Pz Troops Report strengths from the estimated 1 January strength. Losses were allocated by day according to the activity level of the PzLehrD and when possible to reflect fluctuations in the map strengths. Strengths of the PZJG-IV, PZJG-V, STG-III, and STG105 in the attached 559th HyPjBN and 243d StgBde were based on the 30 December and 15 January IG Pz Troops Reports, which contained data on these units. Their daily strengths were estimated to reflect fluctuations in map strengths.

2d PzD. PZ-IV, PZ-V, and STG-III start strengths were derived from the 14 December report on the 2d PzD's tank strength and the 10 December Pz Report. Pallud described the loss of 4 PZ-V on 24-25 December. Remaining losses for December were calculated by subtracting 1 January Gld strengths from the estimated start strengths. Losses for January were calculated by subtracting the 15 January IG Pz Troops figures from the 1 January strengths. Losses were allocated by day according to the

activity level of the 2d PzD and to reflect the fluctuations in the map strengths. Note that the 1 January Gld strengths reflect on-hand tank strengths and include damaged vehicles. Damaged or operational vehicles were estimated from the 4 January map (RH2W/659).

9th PzD. Start strengths for PZ-IV and PZ-V were based on the 10 December Pz Report and the 9th PzD's 10 December Tank Report. From this total were subtracted 30 PZ-V to reflect the fact that these were in transit from the 9th PzD's assembly area when it entered combat on 25 December according to the 9th PzD 28 December Combat Strength Report. It was assumed that these arrived on 31 December and 2 January. Pallud described the loss of 4 PZ-V on 26 December. The remaining December losses were calculated by subtracting 1 January strengths estimated from the 1 January ZB and Gld figures from the start strengths. Losses for January were calculated by subtracting the 15 January IG Pz Troops Report figures from the estimated 1 January strength. Pallud also noted the loss of 1 PZ-V on 15 January. For PZJG-IV and STG-III vehicles, strengths and losses were based on the 1 December Gld, the 10 December Pz Report, and the 30 December IG Pz Troops Report (for start strengths) and the 15 January IG Pz Troops Report. The 9th PzD apparently had both the STG-III and PZJG-IV vehicle types. STG-III and PZJG-IV strengths on 1 January were estimated to reflect operational status shown on the 1 January map (RH2W/647). Losses for all tanks were allocated by day according to the activity level of the 9th PzD, and when possible to reflect fluctuations in the map strengths.

11th PzD. As the 11th PzD did not actively participate in the offensive, no losses were assessed against it. Start strength of STG-IIIs was taken from the 11th PzD's 1 December ZB. STG-III strength remained generally constant, with an increase of one vehicle noted for 14 January, as indicated by the 15 January IG Pz Troops Report. PZ-IV start strength was estimated from the 10 December Pz Report. The 30 December IG Pz Troops Report shows an increase of 3 vehicles while the 8 January 11th PzD Weapons/Tank Report and 15 January IG Pz Troops Report show an increase of 2 additional vehicles. PZ-V start strength was 56 vehicles (10 December Pz Report) which remained constant until 8 January (8 January 11th PzD Tank Report) when 63 vehicles were shown with the 11th PzD. The 11th PzD had 64 vehicles total on 15 January according to the 15th January IG Pz Troops Report.

116th PzD. PZ-IV and PZ-V start strengths were from the 16th Panzer Regiment's report for 16 December (PZJG-IV and STG-III from the 10 December Pz Report). Losses were recorded in the two daily reports, 16 and 17 December, of the 16th Panzer Regiment. Also, cumulative tank losses were given in 116th PzD reports on 20 and 29 December. Pallud described the loss of 2 PZ-IV and 1 PZ-V on 21 December and the loss of 1 PZ-V on 13 January and 1 PZ-V on 15 January. PZ-IV and PZ-V losses for the

remainder of December were calculated by subtracting the 1 January strength on the ZB and Gld from the start strength minus the losses noted above. January PZ-IV and PZ-V losses were calculated by subtracting the 15 January IG Pz Troops Report figures from the 1 January strength. Losses were allocated by day according to the activity level of the 116th PzD, and to reflect map strength fluctuations. PZJG-IV and STG-III strengths and losses were particularly difficult to estimate due to limited information available in sources. Start strengths were based on the 10 December Pz Troops report. Losses and subsequent strengths were estimated from map strength fluctuations and the various 116th PzD reports used for PZ-IV and PZ-V data estimates.

3d PzGD. PZJG-IV and STG-III vehicle data was particularly difficult to estimate as data in sources was contradictory (compare the STG-III strength in the 1 December Gld -- 25, with the 1 December ZB -- 18), and map data was confusing and did not differentiate between the two vehicles. Start strength was based on a comparison of the 1 December ZB, 1 December Gld, 8 December Weapons Report, 10 December Tank Report, and the 10 December Pz Report. Pallud noted the losses of 2 PZJG-IV on 30 December. The remainder of the December losses was estimated by comparing the derived start strengths with the 1 January ZB and Gld strength. January losses were calculated by subtracting the 3d PzGD's 8 January Weapons Report strength figures from the 1 January strength and the 15 January IG Pz Troops Report from the 8 January strengths. Losses were allocated by day according to the activity level of the 3d PzGD.

15th PzGD. Tank start strength was based on the 10 December Pz Report and the 15th PzGD's 9 December Tank Report. (The 10 December Pz Report did not distinguish PZ-IV from STG-III.) Pallud noted the loss of 8 STG-III destroyed and 4 damaged and 6 PZ-IV destroyed on 25 December. The 29 STG-III recorded in the ACSDB as replacements on 31 December and 1 January were probably original inventory vehicles arriving from the 15th PzGD's assembly area. Remaining losses for December were calculated by subtracting the 31 December tank strength report from the estimated start strength minus losses and plus gains noted above. The January losses were calculated by subtracting the 15 January IG Pz Troops Report from the estimated 1 January strength. Losses were allocated by day according to the activity level of the 15th PzGD.

FGB (Fuehrer Grenadier Brigade). As no other sources were available, start strength was taken from the 17 December map with vehicle types determined by the 17 December map (RH2W/608) and by the 15 January IG Pz Troops Report. Pallud notes that the FGB had PZJG-V, but no evidence in primary sources was found to support this description. Losses for 23 December in the vicinity of Heiderscheid were well detailed by Cole, with type determined by the changes found in the maps. Total losses were determined

by subtracting the 15 January IG Pz Troops Report figures from the estimated start strength and allocating them by day according to the activity level of the FGB.

FBB (Fuehrer Begleit Brigade). Determination of vehicle type (PZ-IV, PZJG-IV, STG-III, and STG105) was made from the 15 January IG Pz Troops Report. Start strength was based on B592, B838, RH26-1004/2, and the 15 January IG Pz Troops Report, and was adjusted to reflect the 17 December map (RH2W/608) start strength. Note that the total tank start strength, including operational and in-repair, is just over 100 vehicles. This strength is not inconsistent with the approximation given in B838 ("approximately 100"). Losses were determined by subtracting the 15 January IG Pz Troops Report figures from the estimated start strength. Losses were then allocated by day according to the activity level of the FBB, and to reflect the fluctuations in the map strength.

150th PzBde. Start strength was taken from Pallud. (The 150th PzBde had been assigned US Sherman M-4 tanks but none were evidently operational during the campaign.) The loss of 1 STG-III and 4 PZ-V on 21 December were noted in Pallud, as is 1 STG-III abandoned on an unspecified date and shown in a photograph in Pallud being inspected by US troops on 15 January. Note that the German tanks were modified by the attachment of sheet metal to resemble US vehicles.

Details of Other (Fallschirmjaeger, Infantry, and Volks Grenadier) Units.

German "infantry-type" divisions usually had an organic self-propelled antitank or assault gun element in their organization for infantry support. The most common vehicles included in this armored element were assault guns (STG-III or PZJG-38t). In the following descriptions, the appropriate vehicle type is indicated in parentheses immediately after the unit's identification.

3d FJD (STG-III). 17 December map (RH2W/608) showed no tanks. Pallud and other sources (German postwar manuscripts) indicated that the 3d FJD started without its assault gun element. Assault gun strength figures appeared first on 7 January map (RH2W/668) with 10. The 15 January IG Pz Troops Report shows 8 vehicles operational, and 2 in repair. Note that the German FJD did not have an authorized organic assault gun unit. These vehicles may be from an independent army assault gun company, attached from an army assault gun company, attached from the 11th FJStBde (5th FJD), or from an ad hoc unit organized in the division. It did not prove possible to identify positively the origin of the unit.

5th FJD. No organic armor was with the 5th FJD (30 December and 15 January IG Pz Troops Reports), and assault guns were provided by attached 11th Fallschirmjaeger Sturmgeschuetz Brigade (FJStBde).

9th VGD (PZJG-38t). Start strength was from 15 December IG Pz Troops Report. The 9th VGD was noted in LIII Korps Weekly Report of 7 January with 5 vehicles operational. Final strength was from 15 January IG Pz Troops Report.

12th VGD (STG-III). Start strength was estimated from B733, compared with various map strengths. Final strength was from 15 January IG Pz Troops Report.

18th VGD (PZJG-38t). Start strength was from 13 and 17 December maps (RH2W/605 and RH2W/608). Strength for 30 December was from IG Pz Troops Report. Final strength was from B688 and 11 January map (RH2W/685).

26th VGD (PZJG-38t). Start strength was from the 26th VGD's TM for 13 December. Losses for 25 and 30 December were estimated from P032d and 1 and 3 January maps. Strength for 30 December was based on 30 December IG Pz Troops Report. Final strength was based on P032d and 11 January map (RH2W/685).

47th VGD (PZJG-38t). Strengths for 16-31 December were from LXXXI Korps TMs. Final strength is estimated from 13 January map (RH2W/694).

59th ID. No assault guns were present with this division, as B152, pg. 1, indicated.

62d VGD (PZJG-38t). Start strength was derived from B028 and 17 December map (RH2W/608). Strength for 30 December was from 30 December IG Pz Troops Report. Final strength was estimated from B028 and 7 January map (RH2W/668).

79th VGD. No assault guns were present with unit during the Ardennes Campaign, as indicated by 79th VGD 18 January Gld, and two 79th VGD WMs (26 and 30 December).

85th ID. No assault guns were present with unit during the Ardennes Campaign, as indicated by 85th ID Gld for 16 January and all maps.

89th ID (STG-III). Assault guns were assumed to have arrived on 22 December (date estimated from P032a and maps). Final strength is from 15 January IG Pz Troops Report.

167th VGD (PZJG-38t). 14 PZJG-38t were shown in route to the 167th VGD on 30 December from 30 December IG Pz Troops Report. They first appeared on 7 January map (RH2W/668). 167th

VGD TM for 8 January showed 4 vehicles operational.

212th VGD (STG-III). Start strength was based on the 19 December IG Pj Report and the 17 December map (RH2W/608). Operational strength for 13-28 December was from maps. Final strength was from 15 January IG Pz Troops Report.

246th VGD (PZJG-38t). Start strength was from LXXXI Korps TM for 16 December. Strength for 30 December was from 30 December IG Pz Troops Report. Final strength was based on 10 January map (RH2W/682).

272d VGD (PZJG-38t). Start strength was based on 13 December map (RH2W/605). 30 December strength was derived from 30 December IG Pz Troops Report. Final strength was based on 14 January map (RH2W/698).

276th VGD (STG-III). Total start strength was from 19 December IG Pj Report, with estimated operational strength from 16 December map (RH2W/881). Strength for 7 January was derived from LIII Korps WM. Final strength was from 15 January IG Pz Troops Report. Note that Cole stated that the division's assault guns did not arrive from railhead at Trier until 20 December.

277th VGD (PZJG-38t). Start strength was based on the 13 December map (RH2W/605). Strength for 30 December was from 30 December IG Pz Troops Report. Final strength was derived from 14 January map (RH2W/698).

326th VGD (PZJG-38t). Maps did not show assault guns with unit until 26 December (RH2W/631). Start strength was derived from 30 December IG Pz Troops Report. Final strength was from 11 January map (RH2W/685).

340th VGD (PZJG-38t). Start strength was derived from 30 December IG Pz Troops Report and B678. January strengths and losses were derived from maps and B678.

344th ID (STG-III). Strengths for 24-27 December were from LXXXI Korps TMs. Unit first appeared on maps with assault guns on 26 December (RH2W/631). It withdrew from the Ardennes area on 29 December.

352d VGD (PZJG-38t). Start strength was estimated from Cole and 13 December map (RH2W/605). Strength for 30 December was estimated from 30 December IG Pz Troops Report, compared with map strengths. Final strength was estimated from 11 January map (RH2W/685).

353d ID (STG-III). 353d ID did not receive assault guns until 19 December, as deduced from LXXXI Korps TMs and 21 December map (RH2W/616). Strengths for 19-31 December were from

LXXXI K reports. Final strength was from 15 January IG Pz Troops Report.

363d VGD (PZJG-38t). Strengths for 16-31 December were from LXXXI Korps TMs. Final strength was from 14 January map (RH2W/698).

560th VGD (PZJG-38t). B024 assigned arrival of assault guns to 22-25 December, and the maps first showed them on 27 December (RH2W/632). Strength for 29 December was from 560th VGD TM, for 30 December from 30 December IG Pz Troops Report. Final strength was estimated from 11 January map (RH2W/685).

Details of Non-Divisional Units.

519th HyPjBN. Vehicle mix was determined from 19 December IG Pj Report, 15 December IG Pz Troops Report, 30 December IG Pz Troops Report, and 15 January IG Pz Troops Report (STG-III, PZJG-IV, and PZJG-V). Start and daily strengths were estimated from same reports and map figures.

741st PjBN. Start strength was from 19 December IG Pj Report. Strengths were estimated from map figures.

217th StPzBN. Start strength was from 19 December IG Pj Report. End strength was from 15 January IG Pz Troops report. Daily strengths were estimated from the maps.

319th PzCo. Start strength was from 19 December IG Pj Report. End strength was from 15 January IG Pz Troops Report. Daily strengths were estimated from maps. Note that the unit's strength apparently increased by five vehicles between 18 December and 15 January. These were assumed to have arrived on 1 January.

301st HyPzBN. Start strength was from the 16 December LXXXI Korps TM. 30 December strength was from the 30 December IG Pz Troops Report. Daily strengths were estimated from the maps.

506th HyPzBN. Start strength was from 19 December IG Pj Report. End strength was derived from 506th HyPzBN 8 January TM. Daily strengths were estimated from the maps, with replacement vehicles estimated from the Fuehrervortrag.

11th FJStBde. Start strength was from the 17 December map (RH2W/608). Vehicle mix (STG-III and STG105) was derived from the 30 December IG Pz Troops Report. Daily strengths were estimated from the maps. Note that this unit served with the 5th Fallschirmjaeger Division (FJD) throughout the Ardennes Campaign, although (as noted above) one company may have been attached to the 3d FJD in January. Due to the lack of evidence for this, it was assumed that the brigade operated intact with the 5th FJD

throughout the Ardennes Campaign.

244th StgBde. Start strength was estimated from the maps and the vehicle mix (STG-III and STG105) from the 15 December IG Pz Troops Report. Daily strengths were estimated from the maps.

341st StgBde. Start strength, vehicle mix (STG-III and STG105), and daily strengths for 16-24 December were taken from the LXXXI Korps daily reports (TMs) for 16-24 December. End strength was from the 15 January IG Pz Troops Report, and daily 25 December-14 January strengths were estimated from the maps.

394th StgBde. Vehicle mix (STG-III and STG105) was from the 15 January IG Pz Troops Report. Start strength and daily strengths were estimated from the maps.

667th StgBde. Start strength and vehicle mix (STG-III and STG105) were derived from the 13 December map (RH2W/605) and the 15 January IG Pz Troops Report. Daily strengths were estimated from the maps.

902d StgBde. Start strength was from the 902d StgBde's 15 December tank situation report. End strength was from the 15 January IG Pz Troops Report. Daily strengths were derived from the maps.

905th StgBde -- Strength was estimated from the 13 December map (RH2W/605).

The following non-divisional units were attached to the indicated divisions for the duration of the Ardennes period. Their tank strengths and losses were estimated with those of the parent divisions.

501st SSHPzBN	-	1st SSPzD
559th HyPjBN	-	PzLehrD
243d StgBde	-	PzLehrD
560th HyPjBN	-	12th SSPzD
655th HyPjBN	-	10th SSPzD

SOURCES USED FOR GENERATING GERMAN TANK STRENGTHS

This discussion provides listings of sources used to compile data on German tanks in the Ardennes Campaign. The first section lists general primary sources used in research. The second section lists general secondary sources used in research. The third section lists sources (primary and secondary) used for specific panzer and panzer grenadier units. The fourth section lists sources (primary and secondary) used for infantry, volksgrenadier, fallschirmjaeger, and non-divisional units. The fifth section lists German operations maps consulted for data.

Any primary source with a prefix "RH" is from the German Archives in Freiburg, West Germany. Sources beginning with a "T" followed by three digits are available at the US National Archives.

General Primary Sources.

T311,18,7021020-7021024 Report of Divisions Available for the Offensive 10 Dec (cited as 10 December Pz Report)

RH10/352, pp. 1-36 Inspector General Panzer Troops Report, reports for 15 December, 30 December, and 15 January (cited as 15 December, 30 December, or 15 January IG Pz Troops Report)

RH10/90,91 Fuehrervortrag (fragmentary December and January reports on vehicle replacements prepared for Hitler by the Inspector General Panzer Troops -- cited as Fuehrervortrag)

RH21-6/1,3 Sixth SS Panzer Army Tank Report 1 February (cited as 1 February Sixth Pz Army Report)

RH10/105,107 Panzerjaeger Abteilung (Antitank Units) Report and 15 December Army Troops (Armored, Antitank, and Motorized Reconnaissance) Report (cited as 19 December IG Pj Report).

Kriegstagebuch des Oberkommandos der Wehrmacht (Wehrmachtfuehrungstab). Band IV: 1 Jan 1944-22 May 1945. (introduction and commentary by Percy Ernst Schramm) 2d volume. Frankfurt: Bernard and Graefe, 1961 (cited as KTB/OKW, IV/2).

General Secondary Sources.

Cole, Hugh M. The Ardennes: Battle of the Bulge. United States Army in World War II, The European Theater of Operations. Washington, D.C.: USGPO, 1965.

ETHINT 61, An Interview With Gen Pz Horst Stumpff: Tank Maintenance in the Ardennes Offensive. German postwar manuscript available at the US National Archives.

Jung, Hermann. Die Ardennen-Offensive 1944/45: Ein Beispiel fuer die Kriegfuehrung Hitlers. Zuerich: Muensterschmidt Goettingen, 1971.

von Luettichau, Charles. Armor in the Ardennes Offensive. Study prepared for Office of the Center of Military History in 1952.

Pallud, Jean Paul. Battle of the Bulge, Then and Now. London: After the Battle, 1984.

Sources for Panzer and Panzer Grenadier Units.

1st SSPzD-

RH10/312, pp. 37-38. ZB and Gld 1 Dec
RH10/312, p. 42. ZB 1 Feb

2d SSPzD-

RH10/313, pp. 44-45. ZB and Gld 1 Jan
RH10/313, pp. 47-48. ZB 1 Feb

9th SSPzD-

RH10/318, pp. 38-39. Weapons/Tank Report 8 Dec (total only)

10th SSPzD-

RH10/319, p. 44. Weapons Report 7 Dec (total only)
p. 62. Weapons Report 15 Jan (total only)
p. 63. Tank Report 1 Jan (total only)

12th SSPzD-

RH10/321, pp. 40-41. ZB and Gld 31 Dec
pp. 45-46. Weapons/Tank Report 8 Dec (total only)
pp. 52-53. ZB and Gld 1 Feb
RG407, Box 23636. TDBN-644-0.3. 644th Tank Destroyer Battalion After-Action Report (available at Federal Records Center, Suitland, MD)

PzLehrD-

RH10/172, pp. 47-49. ZB and Gld 1 Dec
pp. 51-53. ZB and Gld 1 Dec
pp. 55-59. ZB and Gld 1 Feb
T314, 1134, 280. Report on vehicles 8 Dec (total only)

- 276. Condition Report 8 Dec (total and operational)
- 279. Weapons Report 10 Dec (total only)
- SRH-049, p. 139. Signal Security Detachment "D." Technica'
Signal Intelligence Transmitted Directly to G-2. 12th
Army Group from 14 August 1944 to 7 May 1945.
Message 23 Dec. (Source is from Record Group RG
457, US National Archives.)

2d PzD-

- RH10/141, pp. 41-42. Gld 1 Dec
- p. 43. Weapons Report 5 Dec (total only)
- p. 44. Tank Report 14 Dec (total only)
- p. 52. Gld 1 Jan
- pp. 56-57. Weapons/Tank Report 25 Jan total only
- pp. 61-63. IB and Gld 1 Feb
- T314,1134,305. Weapons Report 9 Dec (total only)

9th PzD-

- RH10/148, pp. 77-78. ZB and Gld 1 Dec
- p. 84. Tank Report 10 Dec (total only)
- pp. 87-88. ZB and Gld 1 Jan
- pp. 92-97. ZB and Gld 1 Feb
- T314,1666,383-384. Combat Strength Report 28 December
(incomplete, operational/repair)

11th PzD-

- RH10/149, pp. 60-62. ZB and Gld 1 Dec
- p. 63. Weapons Report 6 Dec (total only)
- p. 64. Tank Report 14 Dec (total only)
- pp. 80-82. ZB and Gld 1 Jan
- p. 83. Status Report 15th Panzer Regiment 2 Jan
- pp. 88-89. Weapons/Tank Report 8 Jan (total only)
- pp. 73-76. ZB and Gld 1 Feb
- pp. 96-97. Weapons/Tank Report 8 Feb (total only)

116th PzD-

- RH10/163, p. 30. ZB 1 Dec
- pp. 32-33. ZB and Gld 1 Jan
- pp. 37-39. ZB and Gld 1 Feb
- pp. 45-46. Weapons/Tank Report 8 Feb (total only)
- T315,1298,7. 16th Panzer Regiment Status Report 16-17 Dec
- 269. Tank Report 20 Dec (operational and total losses)
- 379. Combat Strength 28 Dec (operational only)
- 401. Combat Strength 29 Dec (operational and total
losses)
- 406. Tank Report 29 Dec
- SRH 049, p. 167. Message 12 Jan (see complete reference under
PzLehrD)

3d PzGD-

RH10/178, pp. 60-61. ZB and Gld 1 Dec
p. 63. Weapons Report 8 Dec (total only)
p. 64. Tank Report 10 Dec (total only)
pp. 69-69a. ZB and Gld 1 Jan
p. 72. Weapons Report 8 Jan (total only)
pp. 76-77. ZB and Gld 1 Feb
pp. 79-80. Weapons/Tank Report 8 Feb (total only)

15th PzGD-

RH10/181, pp. 42-43. ZB and Gld 1 Dec
p. 45. Weapons Report 10 Dec (total only)
p. 46. Tank Report 9 Dec (total only)
pp. 51-54. ZB and Gld 1 Jan
p. 56. Weapons Report 10 Jan (total only)
p. 57. Tank Report 31 Dec (total only)
p. 61. ZB 1 Feb

FBB (Fuehrer Begleit Brigade) -

MS B592, The Fuehrer-Begleit-Brigade (The Brigade under the Command of Remer) in the Ardennes Offensive (16 Dec 44 to 26 Jan 45). German postwar manuscript available at the US National Archives.
MS B838, The Fuehrer Escort Brigade in the Ardennes Offensive (Part II). German postwar manuscript available at the US National Archives.
RH26-1004/20. German Archives records containing miscellaneous material (after-action reports, news articles) on the Fuehrer Begleit Brigade.

Sources for Other Units-

RH24-81/127. 902d StgBde PanzerLage (Tank Situation) Report 15 Dec (cited as 902d StgBde 15 December tank situation report).
T314,1335,1029. LIII K (Korps) WM 7 Jan
T314,1594,1130-1332. LXXXI K (Korps) TM 15-31 Dec
T314,1134,286-287. 26th VGD TM 13 Dec
T315,1113,1011. 79th VGD Gld 18 Jan
T315,1114,280. 79th VGD WM 30 Dec
T315,1114,308. 79th VGD WM 26 Dec
T314,1597,241. 85th ID Gld 16 Jan
T314,1498,556. 167th VGD TM 8 Jan
T314,1666,380. 560th VGD TM 28 Dec
T314,1498,556. 506th HyPzBN TM 8 Jan

Note: WM = Wochenmeldung (weekly report), TM = Tagesmeldung (daily report)

- MS B733, 12th Volks Grenadier Division (3-29 Dec 1944). German postwar manuscript available at the US National Archives.
- MS B688, 18th Volks Grenadier Division (1 Sep 1944-25 Jan 1945). German postwar manuscript available at the US National Archives.
- MS P032d, Die 26. Division (V.G.) in der Ardennen-Schlacht 1944/45. German postwar manuscript available at the US National Archives.
- MS B028, 62d Volks Grenadier Division (16 Dec 44-27 Jan 45). German postwar manuscript available at the US National Archives.
- MS P032a, Gefechtstaetigkeit der 89. Infanterie Division in der Zeit vom 1. Dezember 1944 bis 4. Maerz 1945. German postwar manuscript available at the US National Archives.
- MS B678, 340th Volks Grenadier Division at Bastogne, Clervaux, and the Westwall. German postwar manuscript available at the US National Archives.
- MS B024, 560th Volks Grenadier Division (11 Nov 44-25 Jan 45). German postwar manuscript available at the US National Archives.
- MS B152, 59th Infantry Division (2 Dec 44-28 Feb 45). German postwar manuscript available at the US National Archives.

German Operations Maps.

RH2W/605	13 Dec (P)
RH2W/881	16 Dec (P)
RH2W/607	17 Dec
RH2W/608	17 Dec (2d situation) (P)
RH2W/609	17 Dec (3d situation)
RH2W/610	18 Dec
RH2W/611	18 Dec (2d situation) (P)
RH2W/613	19 Dec (2d situation) (P)
RH2W/615	20 Dec (3d situation)
RH2W/616	21 Dec (2d situation) (P)
RH2W/617	21 Dec (3d situation)
RH2W/619	22 Dec (2d situation) (P)
RH2W/621	22 Dec (3d situation)
RH2W/622	23 Dec (2d situation) (P)
RH2W/624	23 Dec (3d situation)
RH2W/863	24 Dec (P)
RH2W/629	25 Dec (3d situation) (P)
RH2W/631	26 Dec (3d situation) (P)
RH2W/632	27 Dec (2d situation) (P)
RH2W/634	27 Dec (3d situation)

RH2W/637	28 Dec (3d situation) (P)
RH2W/638	28 Dec (3d situation)
RH2W/641	30 Dec (2d situation) (P)
RH2W/646	31 Dec (3d situation) (P)
RH2W/647	1 Jan (2d situation) (P)
RH2W/649	1 Jan (3d situation)
RH2W/651	2 Jan (P)
RH2W/655	3 Jan (P)
RH2W/657	3 Jan (3d situation)
RH2W/659	4 Jan (2d situation) (P)
RH2W/662	5 Jan (P)
RH2W/664	6 Jan (P)
RH2W/666	6 Jan (2d situation)
RH2W/668	7 Jan (P)
RH2W/669	7 Jan (2d situation)
RH2W/671	7 Jan (3d situation)
RH2W/673	8 Jan (2d situation) (P)
RH2W/675	8 Jan (3d situation)
RH2W/677	9 Jan (P)
RH2W/680	9 Jan (3d situation)
RH2W/682	10 Jan (P)
RH2W/685	11 Jan (2d situation) (P)
RH2W/687	11 Jan (3d situation)
RH2W/689	12 Jan (P)
RH2W/692	12 Jan (3d situation)
RH2W/694	13 Jan (2d situation) (P)
RH2W/696	13 Jan (3d situation)
RH2W/698	14 Jan (2d situation) (P)
RH2W/700	14 Jan (3d situation)
RH2W/702	15 Jan (P)
RH2W/704	15 Jan (3d situation)
RH2W/707	17 Jan (P)

The maps listed above were researched at the German Archives in Freiburg, West Germany. They were compiled either by the General Staff of the Army (Gen.St.D.H) or the High Command of the Armed Forces (OKW), three time daily for briefing purposes for Hitler or the OKW (1st situation, 2d situation, or 3d situation).

Their tank information is described in a previous section of this paper. A "(P)" indicates that a photograph of the map was obtained in research.

The ACSDB Unit Location Data Base

INTRODUCTION

The Unit Location Data Base of the Ardennes Campaign Simulation Data Base (ACSDB) is used to record daily information on the activities and locations of US, British, and German ground units at division-level and above. Four- or six-digit grid coordinates from 1943 maps produced by the Army Map Service are used to record the front-line trace and locations of other significant elements of units. Text fields in the Unit Location Data Base contain narrative material which describes the activities and missions of a unit, environmental conditions in the vicinity of a unit, status of unit commanders, etc.

This paper provides definitions of fields used in the Unit Location Data Base of the Ardennes Campaign Simulation Data Base (ACSDB). The paper also describes the general methodology used to derive location data for US, British, and German units. Because the location data was extracted from sources with relatively minimal estimation, unlike the personnel and equipment inventory data of the Unit and Unit Inventory Data Bases, it was possible to list all sources used for location data in records in the Reference Data Base. These Reference Data Base records are keyed to the Unit Location Data Base records as explained in a later section of this paper. Nevertheless, the major sources used for location data and their application in the ACSDB are described herein.

UNIT LOCATION DATA BASE DEFINITIONS

"Unit Name: (Field 1): Identification of the unit for which location data is recorded in the record is provided under "Unit Name." The designations used for divisions and brigades are the same ones used in the Unit and Unit Inventory Data Bases. For corps and armies, only the title of the unit is entered (i.e., "5th PzArmy," "XXX Corps," "1st Army," "III Corps," "I SSPzK," etc.), unlike the entries used in the Unit and Unit Inventory Data Bases which differentiate between corps/army headquarters and corps/army troops ("5th PzArmy Troops," "XXX Corps Troops," "1st Army HQ," etc.)

"Date" (Field 2): Provided under "Date" is the date in month-day-year format of the record. See the ACSDB Time Conventions narrative for definitions of time periods for the US, British, and German records in the Unit Location Data Base

"Nationality" (Field 3): This is the nationality of the unit for which data is recorded. "A" designates American (US), "B" designates British, and "G" designates German.

"Parent Unit" (Field 4): Recorded under "Parent Unit" is the identification of the immediate superior unit of the unit tracked in the Unit Location record. Designations recorded under "Parent Unit" are the same as those used for "Unit Name," i.e., "5th PzArmy," "I SSPzK," "XXX Corps," "1st Army," etc.

"HQ Starting Location" (Field 5): Recorded under "HQ Starting Location" is the location of the unit's headquarters at the beginning of the day. Its location is designated in all cases by the Universal Transverse Mercator (UTM) four- or six-digit grid coordinates used on the 1943 Geographical Section, General Staff maps produced by the Army Map Service. These maps are:

<u>Sheet #</u>	<u>Name</u>
8	Brussels
9	Liege
12	Namur
13	Marche
16	Mezieres
14	Arlon
R-1	Koeln
S-1	Bonn
T-1	Trier
V-1	Neunkirchen

If information is available, an actual place location name is included, most commonly a town, village, or city name.

"Mission" (Field 6): This is a text field, i.e., information recorded in this field is in text format. Under "Mission" is recorded a unit's basic mission for the day, including planned activities, operations, changes in organization, and other pertinent information. This is a "required" data field, i.e., information on unit mission is provided in the Unit Location Data Base for each unit for every day.

"Displacement" (Field 7): Under "Displacement" is recorded:

- 1) the straight-line distance in kilometers that the center of a unit's front line moved during the 24 hours beginning at 0600 hours of the date recorded under "Date," or
- 2) the straight-line distance in kilometers that the headquarters of a unit moved during the 24 hours beginning at 0600 hours of the date recorded under "Date," or
- 3) the straight-line distance in kilometers that the center of mass of a unit moved during the 24 hours beginning at 0600 hours of the date recorded under "Date," or
- 4) any other straight-line movement distance (in kilometers) moved by a unit from one point to another as specified under "Remarks."

The "Displacement" value is always positive. Displacement can indicate movement of a unit while in reserve or transit. Case 1) above is always used to describe unit movement while the unit is in a front-line position. The movement can be forward, lateral, or retrograde movement. Cases 2) to 4) above are most commonly used when a unit is in a reserve position, such as in transit to the front. The data recorded under "Displacement" in Cases 2) to 4) depends on the nature and availability of the information found in data sources. When not self-evident in meaning, data recorded under "Displacement" is always explained under "Remarks" to facilitate understanding of a unit's movement.

"Distance Opposed Advanced" (Field 8): Data recorded under "Distance Opposed Advanced" is the distance in kilometers that a unit moves in combat, and is only used to record data when a unit or significant elements of it are in the front line. "Distance Opposed Advanced" is a subset of location displacement, and its absolute value never exceeds the value of "Displacement." Positive values entered under "Distance Opposed Advanced" represent advances or forward movement, and negative values represent retrograde movement.

"Width of Front" (Field 9): Entered under "Width of Front" is a unit's front line width (in kilometers), bounded on its flanks by the grid coordinates provided under "Left Flank" and

"Right Flank" (Fields 10 and 11) and following a front line trace delineated by grid coordinates provided under "REFERENCE POINTS" (Fields 12-15 and 34-37). When a unit is in transit behind or in reserve out of the front line, a value of 0.0 is provided under "Width of Front." The front and rear of a unit march column may also be provided under "Left Flank" and "Right Flank." When information in sources is available, the route of a march column is identified by grid coordinates recorded under "REFERENCE POINTS." Data in "REFERENCE POINTS" is also used to describe the outline of a unit's "goose egg" position when it is in reserve. In cases where information in sources on a unit's location in reserve was minimal, only one or two "REFERENCE POINTS" may be used to identify the unit's location.

"SEPARATE ELEMENTS" (Fields 30-33): Data entered under "SEPARATE ELEMENTS" (using grid coordinates) describes the location of major elements of a unit not in the immediate vicinity of the main body of the unit, such as detached organic elements of the unit, or units in transit to the main body of the unit. When necessary, amplification of data recorded under "SEPARATE ELEMENTS" is provided under "Remarks."

"Total Time In Combat," "Total Time Not In Combat," and ancillary fields (Fields 16-21): Data entered in Fields 16-21 records the duration and time periods of a unit's participation in combat or its time out of combat. Data is provided in these fields when available in sources.

"Major Decisions/Redirections," "Other Significant Events," and "Remarks" (Fields 22, 28, and 29): These are text fields provided for explanation of a unit's activities and any interpretive remarks to clarify data provided in other fields. Information is provided in these fields when it is available or pertinent to the understanding of data entered in any other field. In practice, due to limitations of text space in the computer data format, the use of the fields is interchangeable, i.e., they are all employed to record any textual information on a unit's activities, location, mission, displacement, etc.

"Unit Commander Data" (Field 23): This is a text field. Entered under "Unit Commander Data" are the name and rank of the commander of a unit. When a change in command occurs, it is also recorded under "Unit Commander Data." German commanders' rank titles are used for commanders of German units.

"Fortifications" (Field 24): This is a text field. Recorded under "Fortifications" is information on permanent and field fortifications maintained and occupied by a unit or other units of the same nationality, which are located in the vicinity of the unit. Information is provided in this field when available in sources.

"Obstacles" (Field 25): This is a text field. Recorded under "Obstacles" is information on permanent and field fortifications of a unit's opponents, or natural obstructions such as woods, rivers, and steep terrain in the vicinity of the unit. Information is provided in this field when available in sources.

"Surface Trafficability" (Field 26): This is a text field. Recorded under "Surface Trafficability" is information describing the condition of the ground and roads in the vicinity of the unit. Information is provided in this field when available in sources.

"Weather" (Field 27): This is a text field. Recorded under "Weather" is information on climatic conditions for the 24 hour period on the indicated date and in the vicinity of the unit. Information is provided in this field when available in sources. It is frequently taken verbatim from sources and is thus recorded in the format or style of the source.

"Sources" (No field number): Each unit has a unique corresponding Reference Data Base record which lists all sources used to compile unit location data for that unit. The Reference Data Base record is identified by a unique alphanumeric code, which is also entered under "Source" in the Unit Location Data Base records of the corresponding unit. Attachment 1 contains a list with the names of units and the alphanumeric codes of their corresponding Reference Data Base records. These are the same codes entered under "Sources" in the Unit Location Data Base records. Note that the specific sources used for each item of information are not provided in the relevant Reference Data Base records. Instead, sources and the page numbers consulted in them are listed as the reference material for "All" data. This format proved necessary because of the impracticability of referencing every piece of data in the Unit Location Data Base, a task which would have resulted in the creation of an excessively large series of reference records for the Unit Location Data Base.

GENERATION OF UNIT LOCATION DATA

Both primary and secondary sources were used to generate the daily unit location data for the ACSDB. These included primary source records, postwar manuscripts prepared by German participants in the Ardennes Campaign, and copies of German Oberkommando der Wehrmacht (OKW) -- High Command of the Armed Forces -- briefing maps. The major sources used for unit location data by nation (i.e., US, British, and German units) and the general approach used to derive data for them are as follow.

US and British Unit Location Data.

The major sources used for US unit location data included:

- HQ, First US Army Daily SITREPS (Situation Reports) Nos. 385-449 (15 Dec 44 - 16 Jan 45). US National Archives Record Group (RG) 407, Boxes 5020-22. 219-3.2.
- WO 171/346. British XXX Corps War Diary, 15-31 Dec 44, Operations Orders and Fragmentary Orders 20-31 Dec 44. Public Records Office Record WO171/346.
- WO 171/4075. British XXX Corps War Diary, 1-15 Jan 45, Operations Orders and Fragmentary Orders 1-16 Jan 45. Public Records Office Record WO171/4075.

These three sources provided daily information on front-line locations of units, boundaries between front-line units, and other unit location data of US and British units. Information from them was supplemented by data from other sources identified in the Reference Data Base. Chief among these sources for information on daily activities of units were:

- Cole, Hugh M. Ardennes: Battle of the Bulge. United States Army in World War II. The European Theater of Operations. Washington, D.C.: USGPO, 1965.
- Pallud, Jean Paul. The Battle of the Bulge: Then and Now. London: After the Battle, 1984.
- Williams, Mary H. (compiler). Chronology 1941-1945. United States Army in World War II. Special Studies. Washington, D.C.: USGPO, 1960.

German Unit Location Data.

The major sources of information for German unit location data were the postwar manuscripts, prepared for the US Army's Foreign Military Studies program by German officers who

participated in the Ardennes Campaign . This program operated during the decade immediately after the end of World War II and involved interviews with and preparation of manuscripts by German military officers who had played key roles in the conduct of the war by Nazi Germany. The Ardennes Campaign was one of the most thoroughly documented operations in the program. Division, corps, and army commanders were interviewed and wrote down their recollections of the events of December 1944 and January 1945. The specific manuscripts used for the units are identified in the Reference Data Base record keyed to the individual units. Other important sources of information on German unit location were the OKW briefing maps listed in Attachment 2 of this paper. These were prepared three times daily for briefing purposes. They are topographical maps illustrated with red and blue markings which show locations of German and enemy (US and British) units. Color photographs of many of these maps for the Ardennes Campaign period were obtained in research. Supplementary German unit location information was obtained from secondary sources, including Pallud, Battle of the Bulge: Then and Now, and other sources identified in the Reference Data Base.

Generation of Unit Location Data.

Generation of daily unit location data for units of all three nations was conducted using the same general approach. The first step was to determine the daily locations of divisions and brigades. This information was then reviewed and the front-line traces compiled to generate the data of corps. The process was repeated using corps data for armies. Finally, the front-line traces and locations of other significant unit elements of all forces were proofed by comparing the daily front-line locations of opposing Allied and German units. This step was necessary because the unit location data of opposing forces was derived separately. The proofing process involved plotting grid coordinates of units using the graphics feature of the Reflex database management software. The proofing showed remarkably close correlation between the front-line traces of the opposing forces, testimony to the accuracy of the German maps, the Allied situation reports, and the postwar manuscripts of the German officers.

Attachment 1

List of Units and Reference Data Base Alphanumeric Codes

German Units

1st SSPzD	LC1SS
2d SSPzD	LC2SS
9th SSPzD	LC9SS
10th SSPzD	LC10SS
12th SSPzD	LC12SS
27th SSPzGD	LB27SS
28th SSPzGD	LB28SS
PzLehrD	LCLEHR
2d PzD	LC002
9th PzD	LC009
11th PzD	LC011
116th PzD	LC116
3d PzGD	LC003
15th PzGD	LC015
3d FJD	LB003
5th FJD	LB005
150th PzBde	LA150
FBB	LAFBB
FGB	LAFGB
9th VGD	LB009
12th VGD	LB012
18th VGD	LB018
26th VGD	LB026
47th VGD	LB047
62d VGD	LB062
79th VGD	LB079
167th VGD	LB167
212th VGD	LB212
246th VGD	LB246
272d VGD	LB272
276th VGD	LB276
277th VGD	LB277
326th VGD	LB326
340th VGD	LB340
344th VGD	LB344
352d VGD	LB352
363d VGD	LB363
560th VGD	LB560
59th ID	LB059
85th ID	LB085
89th ID	LB089
353d ID	LB353
5th PzArmy	LF005
6th PzArmy	LF006

7th Army	LF007	
15th Army	LF015	
I SSPzK	LE001	
II SSPzK	LE002	
XII SSK	LE012	
Korps Felber	LEFEL	
XIII Korps	LEFEL	(Korps Felber became XIII Korps)
Korps Decker	LEDEC	
XXXIX PzK	LE039	
XLVII PzK	LE047	
LIII K	LE053	
LVIII PzK	LE058	
LXVI K	LE066	
LXVII K	LE067	
LXXIV K	LE074	
LXXX K	LE080	
LXXXI K	LE081	
LXXXV K	LE085	

US Units

2d AD	L3002
3d AD	L3003
4th AD	L3004
5th AD	L3005
6th AD	L3006
7th AD	L3007
9th AD	L3009
10th AD	L3010
11th AD	L3011
17th AbnD	L2017
82d AbnD	L2082
101st AbnD	L2101
1st ID	L2001
2d ID	L2002
4th ID	L2004
5th ID	L2005
8th ID	L2008
9th ID	L2009
26th ID	L2026
28th ID	L2028
29th ID	L2029
30th ID	L2030
35th ID	L2035
75th ID	L2075
78th ID	L2078
80th ID	L2080
83d ID	L2083
84th ID	L2084
87th ID	L2087
90th ID	L2090
95th ID	L2095

99th ID	L2099
102d ID	L2102
104th ID	L2104
106th ID	L2016
3d CavGrp	L7003
1st Army	L6001
3d Army	L6003
9th Army	L6009
III Corps	L5003
V Corps	L5005
VII Corps	L5007
VIII Corps	L5008
XII Corps	L5012
XIII Corps	L5013
XVIII Corps	L5018
XIX Corps	L5019
XX Corps	L5020

British Units

Guards AD	LTGDS
6th AbnD	LS006
43d ID	LS043
51st ID	LS051
53d ID	LS053
29th ArmBde	LR029
XXX Corps	LV030

Attachment 2

German Oberkommando der Wehrmacht (OKW) Briefing Maps

RH2W/605	13 Dec	(P)	
RH2W/881	16 Dec	(P)	
RH2W/607	17 Dec		
RH2W/608	17 Dec	(2d situation)	(P)
RH2W/609	17 Dec	(3d situation)	
RH2W/610	18 Dec		
RH2W/611	18 Dec	(2d situation)	(P)
RH2W/613	19 Dec	(2d situation)	(P)
RH2W/615	20 Dec	(3d situation)	
RH2W/616	21 Dec	(2d situation)	(P)
RH2W/617	21 Dec	(3d situation)	
RH2W/619	22 Dec	(2d situation)	(P)
RH2W/621	22 Dec	(3d situation)	
RH2W/622	23 Dec	(2d situation)	(P)
RH2W/624	23 Dec	(3d situation)	
RH2W/863	24 Dec	(P)	
RH2W/629	25 Dec	(3d situation)	(P)
RH2W/631	26 Dec	(3d situation)	(P)
RH2W/632	27 Dec	(2d situation)	(P)
RH2W/634	27 Dec	(3d situation)	
RH2W/637	28 Dec	(3d situation)	(P)
RH2W/638	28 Dec	(3d situation)	
RH2W/641	30 Dec	(2d situation)	(P)
RH2W/646	31 Dec	(3d situation)	(P)
RH2W/647	1 Jan	(2d situation)	(P)
RH2W/649	1 Jan	(3d situation)	
RH2W/651	2 Jan	(P)	
RH2W/655	3 Jan	(P)	
RH2W/657	3 Jan	(3d situation)	
RH2W/659	4 Jan	(2d situation)	(P)
RH2W/662	5 Jan	(P)	
RH2W/664	6 Jan	(P)	
RH2W/666	6 Jan	(2d situation)	
RH2W/668	7 Jan	(P)	
RH2W/669	7 Jan	(2d situation)	
RH2W/671	7 Jan	(3d situation)	
RH2W/673	8 Jan	(2d situation)	(P)
RH2W/675	8 Jan	(3d situation)	
RH2W/677	9 Jan	(P)	
RH2W/680	9 Jan	(3d situation)	
RH2W/682	10 Jan	(P)	
RH2W/685	11 Jan	(2d situation)	(P)
RH2W/687	11 Jan	(3d situation)	
RH2W/689	12 Jan	(P)	
RH2W/692	12 Jan	(3d situation)	
RH2W/694	13 Jan	(2d situation)	(P)

RH2W/696 13 Jan (3d situation)
RH2W/698 14 Jan (2d situation) (P)
RH2W/700 14 Jan (3d situation)
RH2W/702 15 Jan (P)
RH2W/704 15 Jan (3d situation)
RH2W/707 17 Jan (P)

The maps listed above were researched at the German Archives in Freiburg, West Germany. These are the Oberkommando der Wehrmacht (OKW) (High Command of the Armed Forces) situation maps referenced in the main body of this paper. The maps were compiled by the High Command of the Armed Forces (OKW) three times daily for briefing purposes either for Hitler or the OKW (1st situation, 2d situation, or 3d situation). They contain information on locations of German units, assignments of German units, and armored fighting vehicle strengths of German units. A "(P)" indicates that a color photograph was made of the map during research. Information from other maps was recorded in text format. Note that the 16 December map (RH2W/881) is apparently a postwar reconstruction.

The ACSDB Air Data Base

INTRODUCTION

The Ardennes Campaign Simulation Data Base (ACSDB) Air Data Base contains information on tactical air sorties conducted by United States Army Air Forces (USAAF), Royal Air Force (RAF), and German Luftwaffe air units over the Ardennes battle area. This paper explains the general approach used to generate the ACSDB tactical air data. It is divided into four major sections. The first defines the data fields used in the Air Data Base, the second addresses the generation of US air data, the third describes British air data, and the fourth describes German air data. Data recorded in the Air Data Base required both the least and most amount of data estimation of any of the ACSDB data bases. Data on Allied (US and British) air sorties was taken directly from daily operations reports, while Luftwaffe data, for which primary source records are nearly non-existent, was almost completely estimated.

Full bibliographic annotation of all sources referenced in this paper are contained in the Bibliography Data Base.

ACSDB AIR DATA BASE DEFINITIONS

"Day (MM/DD/YY)" (Field 1): Provided under Field 1 is the date in month-day-year format of the tactical air sorties on which information is recorded.

"# of Sorties flown" (Field 2): Provided under Field 2 is the number of sorties flown. A sortie is defined as one aircraft flying one mission.

"Aircraft Type" (Field 3): The generic type of aircraft flying all sorties counted in Field 2 is recorded in Field 3. Aircraft types are identified as:

- B (Bomber)
- F (Fighter)
- FB (Fighter-bomber)
- NF (Nightfighter)
- T (Transport)

"Aircraft Name" (Field 4): The specific aircraft model flying all sorties counted in Field 2 is identified in Field 4. Aircraft variants or sub-models are not identified, as data sources generally do not identify the variants and the differences in them are fundamentally insignificant. British aircraft are identified by name; US and German aircraft are identified by the alphanumeric designation for the aircraft. Aircraft models recorded in the Air Data Base are as follow:

- | | |
|-------------|------------------|
| - A-26 | (Bomber) |
| - A-20 | " |
| - Ar-234 | " |
| - B-17 | " |
| - B-24 | " |
| - B-25 | " |
| - B-26 | " |
| - Boston | " |
| - Halifax | " |
| - Ju-88 | " |
| - Lancaster | " |
| - Mitchell | " |
|
 | |
| - Me-109 | (Fighter) |
| - P-38 | " |
| - P-51 | " |
| - Spitfire | " |
|
 | |
| - Fw-190 | (Fighter-bomber) |
| - Fw-190D | " |
| - Me-262 | " |

- Mosquito "
- P-47 "
- Tempest "
- Typhoon "

- P-61 (Nightfighter)

- C-47 (Transport)
- Ju-52 "

"General Location of Mission" (Field 5): The geographical location of all sorties counted in Field 2 is recorded under Field 5. This is most often the area described or identified in the record, such as a town, road junction, etc.

"Airbase of Origin" (Field 6): Recorded under Field 6 is the name of the airbase of origin of all sorties counted in Field 2. Attachment 1 of this paper contains information on locations of US airbases from the Final Report of the Chief Engineer, European Theater of Operations. Locations of British and German airbases are also provided in a later section of this paper.

"Specific Location of Mission" (Field 7): Provided under Field 7 is the location of all sorties counted in Field 2, recorded in the Universal Transverse Mercator (UTM) four- or six-digit grid coordinates used on the 1943 Geographical Section, General Staff maps produced by the Army Map Service. These maps are:

<u>Sheet #</u>	<u>Name</u>
8	Brussels
9	Liege
12	Namur
13	Marche
16	Mezieres
14	Arlon
R-1	Koeln
S-1	Bonn
T-1	Trier
V-1	Neunkirchen

For purposes of the ACSDB, boundaries were established to define the Ardennes area within which all tactical air sorties that occurred were to be recorded in the Air Data Base. These boundaries are:

- On the east, the Rhine and Moselle Rivers.

- On the north, an east-west line running from Mulheim (F5064) to Mechelen (K5864).

- On the west, the Meuse River.

- On the south, a west-east line running from Flize (O8626) to Wasserbillig (Q1125).

In the initial stages of the Ardennes Campaign, the US and British air forces carried out significant air operations of a strategic nature within 40 kilometers of the 16 December forward edge of the battle area (FEBA), including attacks on Cologne, Dusseldorf, Bonn, Trier, and other cities. These attacks included raids on industrial targets and the railroad transportation network. As the Ardennes Campaign continued, Allied air operations against the German rail system intensified and struck targets within 15 kilometers of the 16 December FEBA. Attacks on the rail system also extended east of the Rhine and Moselle Rivers well into the heart of Germany. Due to the large numbers of Allied air operations against industrial and rail targets, it was decided to exclude these kinds of air missions, which were primarily of a strategic nature, and focus the air data research effort on tactical and other types of mission. The effects of the strategic Allied air effort is represented by the arrival, or failure to arrive, of German ground units and supplies. However, note that the Air Data Base does include interdiction missions against German ground units and supplies arriving by rail, once they have been detrained. Specific criteria for inclusion of Allied air operations in the ACSDB are as follow:

- They are attacks on detrained units.
- They are of an unspecified purpose.
- They are attacks on non-rail transported logistics.
- They are attacks on any stationary target such as a depot or positions that directly support combat operations.
- They are attacks on detrained units at rail heads.

Allied air operations are excluded if:

- They are against entrained units.
- They are against industrial targets.
- They are fighter escort missions for missions that would not otherwise be included.
- They are exclusively attacking the railroad facilities of a rail head.
- They are attacking a railroad bridge, a railroad tunnel, or other components of the railroad infrastructure.
- Aircraft recalled due to weather are excluded. Aircraft turning back due to weather are excluded from the mission total even if the mission was completed by other aircraft in that flight. Information is usually provided under "Remarks" (Field 11).

All photoreconnaissance, reconnaissance, or other missions without an identifiable location are excluded. A photoreconnaissance, reconnaissance, or other type of mission

against an identifiable target in the battle area is included. Aircraft that spend only part of the time in the Ardennes Campaign area are recorded, and their activity outside of the area is noted under Field 11. Aircraft that have mechanical problems or failures are included, and are usually described under "Remarks."

Criteria for inclusion of German Luftwaffe air operations in the Air Data Base are not as exact as those for Allied air operations because of the nature of the available German records and the methodology used to estimate daily German air data. Essentially, any German air operation over the Ardennes Campaign area was included in the ACSDB.

"Aircraft Nationality" (Field 8): Recorded under Field 8 is the nationality of all sorties counted in Field 2. "A" = US (American), "B" = British, and "G" = German.

"Mission" (Field 9): Recorded under Field 9 is a brief description of the type of mission conducted by all aircraft making the sorties counted in Field 2. The descriptions were derived from those used in the historical records. These include:

- Aerial Resupply: Supply of ground units by aircraft.
- Alert Flight: Fighters airborne to intercept enemy aircraft.
- Attack: Ground attack mission of unidentified nature (bombs, rocket, strafing, etc.).
- A/R: Armed reconnaissance.
- A/R-Night: Armed reconnaissance at night.
- Blind Bombing - Night: Bombing mission conducted without visual target identification/acquisition at night.
- Blind Bombing - Radar: Bombing mission conducted with radar target acquisition.
- Bombing: Includes bombing missions using high-explosive bombs, fragmentation bombs, napalm, and rockets.
- Escort: Fighter escort of a bombing mission.
- Fighter Sweep: Fighter patrol of an area.
- Immediate Support: British term for "Support" (q.v.).
- Intercept: Fighters directed to intercept enemy aircraft.
- Intruder - Night: Night intercept/fighter sweep mission.
- Pathfinding: Mission flown by an aircraft to mark bombardment target area with flares.
- Paradrop: Supply of ground units by parachute.
- Patrol: Fighter patrol of an area.
- Patrol - Night: Fighter patrol of an area at night.
- Photo Recon: Photo reconnaissance.
- Scramble: Fighters taking off to defend airfield.
- Support: Tactical support of ground units. Unit is identified when known.
- Weather Recon: Weather reconnaissance mission.

"Sources" (Field 10): Recorded under Field 10 is an alphanumeric code which matches an entry under "Source Number" in the Reference Data Base record which lists the sources used for the corresponding Air Data Base record. All German air records are referenced using a code beginning with "AG" followed by three arabic numerals ("AA001," "AA012," etc.) All British air records are referenced using a code beginning with "AB" followed by three arabic numerals ("AB001," "AB015," etc.).

Entries under Field 10 for US air records use a coding systems which corresponds to the unit of the aircraft conducting all sorties recorded in Field 2.

- AA001 series (AA001-AA100): XXIX Tactical Air Command aircraft.
- AA200 series: XIX Tactical Air Command aircraft.
- AA300 series: IX Tactical Air Command aircraft.
- AA400 series: 9th Bombardment Division.
- AA700 series: Eighth Air Force aircraft.
- AA900 series: 9th Troop Carrier Command aircraft.

"Remarks" (Field 11): Additional information which amplifies data in any other field is recorded in text format under Field 11.

Abbreviations used in Field 11 and other fields of the Air Data Base, as derived from historical sources, include:

- A/C: Aircraft
- AI: Air intercept (visual or radar).
- E/A: Enemy aircraft.
- Gp: Group.
- MET: Motorized enemy transport.
- M/T: Motor transport.
- NFS: Night fighter squadron.
- NRO: No results observed.
- NYR: Not yet returned.
- PFF: Pathfinder force.
- R/V: Rendezvous.
- Spare a/c: An aircraft that flies along with a formation of aircraft on a combat mission, and which replaces any aircraft that aborts before reaching enemy territory
- Sq: Squadron.
- T/G: Target.
- U/I: Unidentified.
- (Unk): Unknown -- refers to lost airplane whose status is not known, i.e., destroyed or not yet returned, or refers to unknown cause of loss.
- Wg: Wing.
- Window a/c: Aircraft dropping chaff (foil strips) to interfere with radar

COMPILATION OF US AIR DATA

For the ACSDB five main types of historical US air records were used. The sources and their identification as used in the Reference and Bibliography Data Bases (given in parentheses) were as follow:

- 1) Operations summaries prepared by the IX, XIX, and XXIX Tactical Air Commands (OPSUM).
- 2) Summaries of operations prepared by the Ninth Air Force Intelligence (A-2) Section (HQ, 9th AF, Intel Smry).
- 3) Morning summaries prepared by the IX, XIX, and XXIX Tactical Air Commands (TAC AIR MS).
- 4) 9th Bombardment Division mission summaries (9 Bom Div MS).
- 5) Eighth Air Force intelligence operations summaries (Intops Sum).
- 6) IX Troop Carrier Command operations summaries (IX TCC, OPSUM).

The OPSUM was a daily chronological compilation of Tactical Air Command pilot reports (opflashes) which includes: mission designation, unit (group and squadron), strength (number of sorties and type of planes), take-off and landing times (time up and time down), time over target, ammunition, results and observations, own aircraft losses, enemy aircraft destroyed claims, and, when possible, map coordinates). Four OPSUMs were issued daily, each covering a different period of time. Part I covers from sunset to sunrise, Part II from sunrise to 1100, Part III from 1100-1600, Part IV from 1600 to sunset.

The TAC AIR MS was a daily compilation by mission of OPSUM reports. It includes: mission designation, unit, task, time, strength, results and observations, and own aircraft losses.

The HQ, 9th AF, Intel Smry, was a summary of daily operations of each Ninth Air Force command or division. It included reports of strength and group, mission, aircraft type, results and remarks (in abbreviated format), enemy aircraft destroyed claims, and own aircraft losses or damaged. The summary combines the sorties of each group.

The 9 Bom Div MS provided a list of the targets assigned to groups of the 9th Bombardment Division and a summary of the results of the mission.

The Intops Sum provided data on Eighth Air Force operations including number of heavy bomber attacks, tonnage dropped, targets, and own aircraft losses.

The IX TCC, OPSUM contains information on aerial resupply of ground units by the IX Troop Carrier Command.

Comparison and Application of Sources used for US Air Data.

Information in the OPSUM, TAC AIR MS, and HQ, 9th AF, Intel Smry -- the three sources used for the air operations of US Ninth Air Force's three tactical air commands (IX, XIX, and XXIX) -- was compared. The OPSUM and TAC AIR MS provide the same data in a slightly different format. Since the OPSUM was the source used for both the TAC AIR MS and HQ, 9th AF, Intel Smry, it was decided to use the OPSUM as the primary source for the US air data. It also was more economical to retrieve the OPSUM than the TAC AIR MS because it required approximately three times as much paper in a TAC AIR MS as in an OPSUM to record the same amount of information. A notable difference between the OPSUM and the HQ, 9th AF, Intel Smry, is that the OPSUM identifies aircraft with mechanical failure and includes them in the number of sorties flown. One difference between the TAC AIR MS and HQ, 9th AF, Intel Smry is that the HQ, 9th AF, Intel Smry summarizes mission results and observations by group. For example, the 16 December HQ, 9th AF, Intel Smry, records 48 sorties by the 406th Fighter Group. The XIX TAC AIR MS for the same date reports four squadron sorties of the 406th Fighter Group each made up of 12 P-47s.

The OPSUMs were retrieved for approximately 95 percent of the information in the Air Data Base on US tactical air command operations. When an OPSUM was illegible or unavailable, then the TAC AIR MS was used. For the XIX Tactical Air Command on 14 and 16 January it was necessary to use the HQ, 9th AF, Intel Smry. Therefore, information in the Air Data Base on these days does not identify squadrons or times. However, all other essential data, including groups, is included. Attachment 2 identifies the sources used for tactical air command data on a daily basis.

All information recorded in the Air Data Base for the 9th Bombardment Division, Eighth Air Force, and IX Troop Carrier Command was taken from 9 Bom Div MS, Intops Sum, and IX TCC, OPSUM.

No estimation was required for any of the US air data in the ACSDB. The sources described above were all retrieved from microfilm records at the Office of Air Force History, Bolling Air Force Base, Washington, D.C. In the Reference Data Base, the sources are identified by specific dates or numbers (OPSUMs were numbered consecutively and on a daily basis), and complete annotation on the sources themselves is provided in the Bibliography Data Base.

Attachment 3 of this paper is an order of battle of US Army Forces Units in the Ardennes Campaign. Attachment 4 is a selected bibliography of secondary sources which contain general information on US air operations in the Ardennes. Attachment 5 is a list of terms used in US Ninth Air Force reports for damaged or destroyed aircraft, which are also used in the Air Data Base.

GENERATION OF BRITISH AIR DATA

Data on British air operations in the Air Data Base was taken directly from the Public Records Office documents listed in the Reference Data Base.

The following airbases were used by British air units which participated in the Ardennes Campaign. Locations of bases on the European mainland may be found in the material contained in Attachment 1 to this paper. When known, the Base Numbers used in the US Army Corps of Engineers document found in Attachment 1 are provided.

<u>Name</u>	<u>General Location</u>	<u>Base Number</u>
Allerton Park	UK-Yorkshire	
Blackbushe	UK?	
Bawtry	UK-Yorkshire	
Castle Hill House	UK-Yorkshire	
Chievres	Belgium	A.84
Deurne	Netherlands	B.70
Diest	Belgium	B.64
Eindhoven	Netherlands	B.78
Epinoy	Belgium	A.75
Evere	Belgium	B.56
Exning	UK-Suffolk	
Gilze Rijen	Netherlands	B.77
Glisy	France	B.48
Heesch	Netherlands	B.88
Heslington Hall	UK-Yorkshire	
Lille Vendeville	Belgium	B.51
Maldegem	Netherlands	B.65
Melsbrock	Belgium	B.58
Odiham	UK?	
Ophoven	Belgium	Y.32
Skellingthorpe	UK-Lincolnshire	
Spilsby	UK-Lincolnshire	
Swinderby	UK-Lincolnshire	
Thorney Island	UK?	
Vitry	France	B.50
Volkel	Netherlands	B.80
Woensdrecht	Netherlands	B.79

A "?" indicates that the exact location of an airbase is not known.

ESTIMATION OF GERMAN AIR DATA

This discussion outlines the problems facing the researcher and data compiler for Luftwaffe air operations during the Ardennes Campaign. The solution to the problems is presented to explain to the users of the ACSDB the data estimation methodology employed in assembling information on Luftwaffe air sorties in the Ardennes.

Luftwaffe Data.

The problem facing researchers for Luftwaffe operations during the Ardennes Campaign is essentially two-fold. First and foremost is the dearth of primary source records of Luftwaffe operational units. In the late 1960s and early 1970s a Historical Evaluation and Research Organization (HERO) consultant and German military records expert, Miss Lucille Peterson, conducted exploratory research on Luftwaffe records at the Imperial War Museum in London, the National Archives in Washington, D.C., and the German Military Archives in Freiburg, West Germany. Her findings revealed the deficiencies in World War II Luftwaffe air units' documentation that remain today, as she wrote in 1969:

...Mr. Noack [the German archivist in charge of Luftwaffe records in 1969] confirmed most emphatically what Mr. Jackets had said about the deficiencies in the existing Luftwaffe records. [Mr. L.A. Jackets, Director, Air Historical Branch, British Air Ministry, had reported in an earlier meeting with Miss Peterson that the two major shortcomings of the Luftwaffe records were shortages of high-level policy records and low-level squadron records.] In particular [Noack] stressed the paucity of war diaries, and pointed out that those few war diaries of Luftwaffe fighting units...available in the [German] archives were interrupted and fragmentary.

Unfortunately for the researcher of daily Luftwaffe operations, it is the war diaries of the German air corps, air groups, and air squadrons that contain the data most relevant to the ACSDB.

A survey of a 1970 German publication from the German Bundesarchiv-Militaerarchiv entitled Bestandsgruppe RL 10: Verbaende der Fliegertruppe, which is a finding aid to German Air Force unit documents from German Archives Record Group 10, was conducted for the ACSDB and confirmed the findings of Miss Petterson. The records of all German World War II air groups -- reconnaissance, fighter, nightfighter, ground attack, bomber,

transport, etc. -- are often fragmentary or non-existent, not solely for the 1944-45 period but for the entire war. In 1988, two separate research trips to the German Archives for the ACSDB proved that the available World War II Luftwaffe records do not support data compilation at the level of detail required by the ACSDB. At least 16 Luftwaffe air groups (comprised of some 40-45 total squadrons) were involved in the Ardennes Campaign.

Excerpts from six combat units were obtained from the German Archives: 3d Squadron, 4th Ground-attack Group (III/SG 4); 20th Night Ground-attack Squadron (NSGr 20); 4th Fighter Group (JG 4); 76th Bomb Group (KG 76); 2d Nightfighter Group (NJG 2); and 3d Squadron, 3d Fighter Group (III/JG 3).

The second element of the two-fold problem facing Luftwaffe scholars is that the information contained in available sources is either lacking in detail or is at variance with other sources. Of the six German Archives records excerpts obtained by HERO, only that of the 3d Squadron, 4th Ground-attack Group (German Archives ID# RL 10/359), contained all Air Data Base requirements. The excerpt of the 4th Fighter Group (a January 1945 Monthly Report -- German Archives ID# RL 10/510) provided daily sortie data for the group in January 1945 with numbers of aircraft and participating squadrons but without target locations. Another problem with the report concerns base of origin information. Since the Germans based fighter group sub-units (i.e., fighter squadrons) at different airfields, and the report does not specify how many aircraft flew from each squadron, the base of origin for sorties cannot be determined from the report. Thus, it is not possible to determine the exact origin or destination of the 4th Fighter Group's January sorties.

The war diary of the 1st Squadron, 26th Fighter Group (cited as Priller), contained in part in the group's postwar history which is on file in its entirety at the German Archives, also demonstrates this lack of complete information. A partial translation from Priller, pg. 265, follows:

17 December, 0930-0935 hours. 26 Fw-190s take off in very bad weather, led by Major Borris. No enemy contact over the battlefield. 19 Fw-190s take off at 1427 hours, led by Lieutenant Colonel Heckmann. Dogfight with greatly superior enemy fighter force. Sergeant Delor shoots down his second enemy plane...

18 December. Two take-offs to the battle area. Strength of the group: 80 Fw-190s, of which 28 are Fw-190Ds.

23 December, 1114 hours. 23 Fw-190s from the 2d and 3d Squadrons take off to the battle area. Lieutenants Guenther and Ahrens shoot down two planes.

Unlike US Army Air Forces units, the German units evidently did not report in a consistent format, and, as the above translation demonstrates, left out information on sortie location and mission type.

Because the war diaries of Luftwaffe operational units proved unproductive for data research, no recourse was left but to turn to alternate sources for data. Sources such as the US Army Air Forces official history of World War II (Craven and Cate), postwar US and British studies, war diaries of German Army units, and wartime Allied intelligence reports were consulted. These sources also have their shortcomings. Containing only aggregate daily data, they do not provide detailed information on aircraft type, sortie location, mission type, base of origin, etc. The information that they do provide, i.e., aggregate daily numbers of sorties, is often incomplete or at variance with other sources. For 27 December 1944 the following figures are provided in four different sources:

US IX Tactical Air Command reported 150 enemy aircraft. (Thompson, Tactical Air, pg. 170).

Our own (German) air force flew reconnaissance, 78 attacks against communications and assembly areas, and 337 planes in low-level attacks. (H.Gr. D., KTB: Army Group D, Kriegstagebuch, Anlage 1771 -- US National Archives Microfilm T-311, Roll 17).

60-70 enemy sorties over the First US Army area. (FUSA, Annex 6: First United States Army, Report of Operations, Annex No. 6, Antiaircraft Section Report, pg. 82).

Effort of the Luftwaffe against ground objectives, as reported by AAA channels: 238 aircraft. (Appreciation of LW: HQ, US XX Corps, Annex 5 to G-2 Report 155, Appreciation of the Luftwaffe).

Any methodology for estimating Luftwarfe sorties must consider such data discrepancies.

Research for the ACSDB project also turned up a limited number of secondary sources which contain Luftwaffe sortie data. These sources often lack bibliographic information but are evidently based on personal diaries and memoirs of German World War II participants. Due to the projected difficulties in contacting such persons and the probable limited amount of available data from these sources, it was not determined cost-effective to pursue this research course of action.

Methodology for Data Estimation.

The estimation methodology used for generating German air data for the ACSDB was divided into seven steps:

- Step 1. Derive and record all specific data from primary sources.
- Step 2. Derive and record all specific data from reliable secondary sources.
- Step 3. Estimate total number of remaining sorties by day.
- Step 4. Determine breakdown of sorties by aircraft type.
- Step 5. Determine mission type of sorties.
- Step 6. Determine airbase of origin of sorties.
- Step 7. Determine location of mission.

Steps 1 and 2. Derive and record all specific data.

All primary and reliable secondary sources were consulted for discrete information on Luftwaffe sorties. These included war diaries such as that of III/SG 4 described above and reliable secondary sources such as Ethell & Price, The German Jets, which provides good data on operations by the Ar-234 jet bomber during the Ardennes Campaign.

Step 3. Estimate total number of remaining sorties by day.

For each day data from one source was chosen from the available aggregate data sources. The chosen source was recorded on the reference data entry form. This selection was based on comparative judgement of the various numerical values from the sources and extraneous factors such as weather (which may limit air operations) or known historical facts such as termination of German tactical night operations after 1 January 1945. (See Aders, History of the German Night Fighter Force, pg. 207.)

Step 4. Determine breakdown of sorties of aircraft type.

Determination of aircraft type for the aggregate daily data selected in Step 2 was based on the following breakdown for 20 December 1944 derived from Luftwaffe records and found in Wood & Gunston, Hitler's Luftwaffe, and Pallud, Battle of the Bulge:

- Single-engine day fighters, fighter-bombers, and night fighter-bombers (Me-109, Fw-190, Fw-190D): 1,583

- Bombers (Ju-88): 171 (Estimated one-half as night operations aircraft)
- Jet fighter-bombers (Me-262): 42
- TOTAL AIRCRAFT: 1,796

The breakdown of Me-109s, Fw-190s, and Fw-190Ds was derived from the ratio of squadrons known to be equipped with a specific aircraft type.

19 sqdns w/Me-109, 14 sqdns w/Fw-190, 4 sqdns w/Fw-190D, or 813 x Me-109s, 599 x Fw-190s, and 171 x Fw-190Ds.

Thus, determination of aircraft was achieved by multiplying the following values (for each aircraft type) by the total numbers of sorties per day:

Me-109:	0.45	(813/1,796)
Fw-190:	0.33	(599/1,796)
Fw-190D:	0.10	(171/1,796)
Ju-88:	0.10	(171/1,796)
Me-262:	0.02	(42/1,796)

These values were used in applying the methodology, on the assumption that attrition rates for all aircraft were identical.

Step 5. Determine mission type of sorties.

Lacking consistent information on mission types for the Luftwaffe, the method of determining this information was based on the arbitrary division of missions into bombing and intercept in the ratio of 1:1 unless specific information on mission types was found in research. German air units assembled for the Ardennes Offensive were assigned the primary mission of supporting German ground units. Allied air superiority rendered this mission unfeasible, and German fighters and fighter-bombers were frequently diverted from their ground support role to engage Allied medium and heavy bombers and fighter aircraft. The 1:1 ratio was applied only to Me-109, Fw-190, and Fw-190D single-engine fighters and fighter-bombers and Me-262 jets. All Ju-88 sorties were assumed to be bombing.

Step 6. Determine airbase of origin of sorties.

All Ju-88 sorties were assumed to have originated at Varel, the location of the 2d Nightfighter Group's base and, for purposes of the ACSDB, the assumed location of the Ju-88 day bombers. All Me-262 sorties were assumed to be from Rheine, the 51st Bomb Group's base. All Ar-234 sorties were assumed to be from Muenster-Handorf, the 76th Bomb Group's base.

Airbases with Me-109, Fw-190, and Fw-190D units were at the following locations:

Me-109: Rheine, Nidda, Ettinghausen, Paderborn, Lippspringe, Darmstadt-Griesheim, Rhine-Main, Bissel, Zellhausen, Plantlunne, Hopsten, Hesepe, Achmer, Malmsheim, Kirrlach, Sankt-Echterdingen, Dortmund, Bonninghardt, and Dusseldorf-Lohausen.

Fw-190: Twenthe, Drope, Merzhausen, Gutersloh, Babenhasuen, Delmenhorst, Quakenbruck, Vecta, Darmstadt-Griesheim, Gross-Ostheim, Vorden, Cologne-Wahn, Cologne-Ostheim, and Bonn-Hangelar.

Fw-190D: Altenstadt, Furstenau, Nordhorn, and Varrelbusch.

Locations of some German airbases are found in the US Army Corps of Engineers material contained in Attachment 1 to this paper. Locations of other bases may be found in a detailed atlas of Central Europe, as most of the German airbases were named after nearby towns or cities.

Since comprehensive information on sortie origin was lacking, bases of origin for Me-109, Fw-190, and Fw-190D sorties were assigned on a rotation basis by groups of 30 aircraft (Ethell and Price, The German Jets, gives the strength of a German squadron as 30 to 68 aircraft), unless specific information on bases was found in research. For example, if Steps 2 and 3 resulted in an estimated 90 Me-109 sorties for one day and 45 Me-109 sorties for the next day, then the Me-109 bases for the first day (starting at the beginning of the list of base locations) were Rheine, Nidda, and Ettinghausen, and for the next day, Paderborn and Lippspringe.

Step 7. Determine location of mission.

All air missions derived in Steps 2 to 5 were assigned the ACSDB area as the general location of mission unless specific information on exact mission locations was found in research. Bastogne, for example, was the focal point for much of the Luftwaffe effort at various times during the battle.

Operation BODENPLATTE.

Operation BODENPLATTE was a massive raid by German fighters and fighter-bombers conducted on 1 January 1945 against Allied air bases in Holland and Belgium. This note on the operation is included to explain the derivation of the comparatively small estimated number of Luftwaffe sorties in the ACSDB on 1 January.

Girbig, Six Months, reports that the 1st, 2d, and 3d Squadrons of the 4th Fighter Group operated on 1 January 1945. The 2d Squadron attacked targets outside of the ACSDB air

operations area. The 1st and 4th Squadrons, with 10 and 20 Me-109s respectively, are assumed to have belonged to the "elements of Jagdgeschwader 4 which had completely lost contact [and] went over to strafing troop concentrations on the roads round Bastogne." It is estimated that one-quarter of the 1st and 4th Squadrons participated in this attack at Bastogne for a total of eight aircraft (five from the 4th Squadron and three from the 1st Squadron). This figure is somewhat corroborated by information in Franks, Battle of the Airfields, which reports that the 4th Fighter Group struck four targets (in addition to the 2d Squadron target described above) -- one fourth of 30 aircraft gives some eight planes.

To analysts familiar with the Ardennes Campaign, eight aircraft on missions in the ACSDB air operations area on 1 January may seem exceedingly low. Some 800 to 1,000 German planes participated in BODENPLATTE. However, almost all of these planes attacked north of the battle area. The FUSA, Annex 6, mentions that on 1 January 280 German aircraft crossed the US First Army area and attacked only one airfield in the US First Army area (actually outside of the ACSDB air operations area). Therefore, the comparatively low number for German sorties on this day is considered valid.

Abbreviations of German air units used in the Air Data Base include:

JG = Jagdgeschwader (German Fighter Group)
KG = Kampfgeschwader (German Bomb Group)
SG = Schlachtgeschwader (German Ground-attack Group)
NSGr = Nachtschlachtgruppe (German Night Ground-attack Squadron)

Attachment 6 contains an outline order of battle for German air units which participated in the Ardennes Campaign.

Attachment 1
Information on US Air Bases

Attachment 2

Sources Used for US Tactical Air Command Data

The following tables identify the sources used for data on US tactical air command operations. All data was taken from the daily OPSUMs unless otherwise indicated.

MS = TAC AIR MS

A-2 = HQ, 9th AF, Intl Smry

IX TAC Air Sources Summary

Date	OPSUM #	Parts			
		I	II	III	IV
12/16	191	X	X	X	X
12/17	192	X	X	X	X
12/18	193	X	X	X	X
12/19	194	X	X	X	X
12/20	195	X	X	X	X
12/21	196	X	X	X	X
12/22	197	X	X	X	X
12/23	198	X	X	X	X
12/24	199	X	X	X	X
12/25	200	X	X	X	X
12/26	201	X	X	X	X
12/27	202	X	X	X	X
12/28	203	X	X	X	X
12/29	204	X	X	X	X
12/30	205	X	X	X	X
12/31	206	X	X	X	X
01/01	207	X	X	X	X
01/02	208	X	X	X	X
01/03	209	X	X	X	X
01/04	210	X	X	X	X
01/05	211	X	X	X	X
01/06	212	X	X	X	X
01/07	213	X	X	X	X
01/08	214	X	X	X	X
01/09	215	X	X	X	X
01/10	216	X	X	X	X
01/11	217	X	X	X	X
01/12	218	X	X	X	X
01/13	219	X	X	X	X
01/14	220	X	X	X	X
01/15	221	X	X	X	X
01/16	222	X	X	X	X

XIX TAC Air Sources Summary

Date	OPSUM #	Parts			
		I	II	III	IV
12/16	MS	X	X	X	X
12/17	128	MS	X	X	X
12/18	129	X	X	X	X
12/19	130	X	X	X	X
12/20	131	X	X	MS	X
12/21	132	X	X	MS	X
12/22	133	X	X	MS	X
12/23	134	X	X	X	MS
12/24	135	X	X	X	X
12/25	136	X	X	X	X
12/26	MS	X	X	X	X
12/27	MS	X	X	X	X
12/28	139	X	X	X	X
12/29	140	X	X	X	X
12/30	141	X	X	X	X
12/31	142	X	X	X	X
01/01	143	X	X	X	X
01/02	144	X	X	X	X
01/03	145	X	X	X	X
01/04	146	X	X	X	X
01/05	147	X	X	X	X
01/06	148	X	X	X	X
01/07	149	X	X	X	X
01/08	150	X	X	X	X
01/09	151	X	X	X	X
01/10	152	X	X	X	X
01/11	153	X	X	X	X
01/12	154	X	X	X	X
01/13	155	X	X	X	X
01/14	156	A-2	A-2	A-2	A-2
01/15	157	X	X	X	X
01/16	158	A-2	A-2	A-2	A-2

XXIX TAC Air Sources Summary

Date	OPSUM #	Parts			
		I	II	III	IV
12/16	77	X	X	X	X
12/17	78	X	X	X	X
12/18	79	X	X	X	X
12/19	80	X	X	X	X
12/20	81	A-2	X	X	X
12/21	82	A-2	X	X	X
12/22	83	A-2	X	X	X
12/23	84	X	X	X	X
12/24	85	X	X	X	X
12/25	86	X	X	X	X
12/26	87	X	X	X	X
12/27	88	X	X	X	X
12/28	89	X	X	X	X
12/29	90	X	X	X	X
12/30	91	X	X	X	X
12/31	92	X	X	X	X
01/01	1	X	X	X	X
01/02	2	X	X	X	X
01/03	3	X	X	X	X
01/04	4	X	X	X	A-2
01/05	5	X	X	X	X
01/06	6	X	X	X	X
01/07	7	X	X	X	X
01/08	8	X	X	X	X
01/09	9	X	X	X	X
01/10	10	X	X	X	X
01/11	11	X	X	X	X
01/12	12	X	X	X	X
01/13	13	X	X	X	X
01/14	14	X	X	X	X
01/15	15	X	X	X	X
01/16	16	X	X	X	X

Attachment 3

Order of Battle for Ninth US Air Force for
Ardennes Campaign

(16 December 1944 - 16 January 1945)

Ninth Air Force (Major General H.S. Vandenberg)

9th Bombardment Div (M) (Major General S.E. Anderson)

98th Combat Bombardment Wing (M)

Group	Squadron
323d BG (M)	453, 454, 455, 456
387th BG (M)	556, 557, 558, 559
394th BG (M)	584, 585, 586, 587
397th BG (M)	596, 597, 598, 599

99th Combat Bombardment Wing (M)

322d BG (M)	449, 450, 451, 452
344th BG (M)	494, 495, 496, 497
386th BG (M)	552, 553, 554, 555
391st BG (M)	572, 573, 574, 575

97th Combat Bombardment Wing (L)

409th BG (L)	640, 641, 642, 643
410th BG (L)	644, 645, 646, 647
416th BG (L)	668, 669, 670, 671

IX Tac Air Command - 70th Fighter Wing (Major General E.R. Quesada)

67th Tac Rcn Gp	12, 15, 30, 107, 109, 153
352d FG *	328, 486, 487
365th FG	386, 387, 388
366th FG	389, 390, 391
367th FG	392, 393, 394
368th FG	395, 396, 397
370th FG	401, 402, 485
474th FG	428, 429, 430
422d NFS	

XIX Tac Air Command - 100th Fighter Wing (Brigadier General O.P. Weyland)

354th FG	353, 355, 356
361st FG **	374, 375, 376
362d FG	377, 378, 379
405th FG	509, 510, 511
406th FG	512, 513, 514
10th Photo Rcn GP	12, 15, 31, 34, 155
425th NFS	

XXIX Tac Air Command (Provisional) - 71st Fighter Wing, 84th Fighter Wing, 303d Fighter Wing (Brigadier General R.E. Nugent)

36th FG	22, 23, 53
48th FG	492, 493, 494, 495
373d FG	410, 411, 412
404th FG	506, 507, 508
363d Tac Rcn	160, 161, 162, 380, 381, 382

* Added from the Eighth Air Force, reported through IX TAC

** Added from the Eighth Air Force, reported through XIX TAC

Attachment 4

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Attachment 5

Definitions of Terms used in US Records in the Air Data Base

Damage Categories:

- A = A/C repairable by nearest convenient combat unit
- AC = A/C repairable on site by an air service command unit or equivalent
- B = A/C to be collected by a salvage organization and dispatched for repair to an air service command unit or equivalent
- E = A/C damaged beyond economical repair. A/C which crash in friendly territory are considered to be damaged Category E.

US Aircraft are considered lost:

- when seen to crash in enemy territory or at sea.
- when pilot and entire crew are seen to bail out over enemy territory or at sea.
- when seen to disintegrate or enveloped in flames.
- when failed to return from mission after a reasonable length of time, and not known to have landed in friendly territory.

Attachment 6

Luftwaffe Unit List

The following Luftwaffe unit list shows the major Luftwaffe combat units involved in the Ardennes battle. The list is not intended to be a comprehensive order of battle but rather is provided to give ACSDB analysts a general inventory of the principal Luftwaffe combat units participating in the Ardennes Campaign. All units are subordinated to II Jagdkorps (II Fighter Corps).

UNIT	COMPOSITION	-- AIRCRAFT
Jagdgeschwader (Fighter Group) 1	(3 squadrons	-- Fw-190/Me-109)
Jagdgeschwader " " 2	(3 squadrons	-- Fw-190/Fw-190D/Me-109)
Jagdgeschwader " " 3	(4 squadrons	-- Fw-190/Me-109)
Jagdgeschwader " " 4	(4 squadrons	-- Fw-190/Me-109)
Jagdgeschwader " " 6	(3 squadrons	-- Fw-190/Me-109)
Jagdgeschwader " " 11	(3 squadrons	-- Fw-190/Me-109)
Jagdgeschwader " " 26	(3 squadrons	-- Fw-190D/Me-109)
Jagdgeschwader " " 27	(4 squadrons	-- Me-109)
Jagdgeschwader " " 53	(3 squadrons	-- Me-109)
Jagdgeschwader " " 54	(2 squadrons	-- Fw-190/Fw-190D)
Jagdgeschwader " " 77	(3 squadrons	-- Me-109)
Schlachtgeschwader (Ground-attack Group) 4	(3 squadrons	-- Fw-190)
Kampfgeschwader (Bomb Group) 51	(elements	-- Me-262)
Kampfgeschwader " " 66	(elements	-- twin-engine bombers)
Kampfgeschwader " " 76	(elements	-- Ar-234)
Nachtjagdgeschwader (Nightfighter Group) 2	(elements	-- Ju-88)
Nachtschlachtgruppe (Night Ground-attack Squadron) 1	(elements	-- Ju-87?)
" " " 2	(elements	-- Ju-87?)
" " " 20	(elements	-- Fw-190)

Sources: Pallud, pgs. 55, 435; Schmid, pgs. 40-47; Wolter, pg. 54-57; and Wood & Gunston, pg. 114.

The ACSDB T/O&E (Table of Organization and Equipment) Data Base

INTRODUCTION

Data from tables of organization and equipment (T/O&E) for battalion-, regiment-, brigade-, and division-size units of the US, British, and German forces engaged in the Ardennes Campaign is recorded in the ACSDB T/O&E Data Base. Data is also provided for selected company-/battery-/troop-size units.

This data lists authorized equipment and personnel numbers and supply levels (ammunition, fuel, and rations) for the units. Equipment is identified by the same designations employed in the Weapons and Unit Inventory Data Bases. Total authorized personnel strengths are provided for units. Personnel strengths are also identified for units by the so-called "military occupational specialty" (MOS) categories employed in the ACSDB. For definitions of these categories, see the ACSDB Unit Data Base narrative. Authorized supply amounts are given for "Tank/AT (Antitank)", "Artillery", "Special", and "Other" ammunition categories, and "Other Supply" (primarily rations) in hundreds of pounds. "Fuel" levels, including fuel in fuel tanks of units' vehicles, are provided in thousands of gallons.

This following description of the T/O&E Data Base is organized in four major sections, plus attachments. The first section defines the data fields that comprise the T/O&E Data Base records. The second, third, and fourth sections explain methodologies used to estimate missing data for German, US, and British T/O&Es. Most of the required data was researched in primary sources which furnished data on the T/O&Es in effect during the Ardennes Campaign, such as the 21 December 1944 version of US Army Field Manual (FM) 101-10, Staff Officers' Field Manual: Organization, Technical and Logistical Data. However, for certain data requirements no precise figures were found in primary or secondary sources, i.e., fuel supply levels for most German units. Their derivation is explained in the section on German T/O&Es. The second, third, and fourth sections of this paper also explain peculiarities inherent to the data recorded for the T/O&Es of the different nations. For example, it is noted that German T/O&E "Other" ammunition amounts include medium mortar ammunition, whereas US T/O&E ammunition amounts do not. The attachments following the main body of this paper include computations, glossaries, and other information used in the compilation of tables of organization and equipment for the ACSDB.

In reviewing and using the ACSDB T/O&E Data Base, this paper should be consulted, since it contains much information not included in the records of the T/O&E Data Base. (This is due primarily to the limitation of the "Remarks" field in the T/O&E Data Base.) The sources used to compile the T/O&E data should also be reviewed when necessary. These sources are listed in records contained in the ACSDB Reference Data Base. The "Remarks" fields of the Reference Data Base records contain additional information for some T/O&Es and should be examined as well.

T/O&E DATA BASE DEFINITIONS

"Unit Name" (Field 1): Listed under Field 1 in abbreviated format is the designation of the military unit for which T/O&E data is recorded. This designation matches (without specific numeric identification) the designation entered under the "Unit Name" fields of the ACSDB Unit, Unit Inventory, and Unit Location Data Bases. For example, "AD" is the designation for US and British armored division. In Unit, Unit Inventory, and Unit Location Data Bases are entries for numerous armored divisions, such as "2d AD", "9th AD", and "Guards AD" (2d Armored Division, 9th Armored Division, and Guards Armoured Division). These designations also match entries under the "ATTACHMENTS & DETACHMENTS -- TYPE" field in the Unit Data Base, where the daily order of battles of the US, British, and German armies are described.

Designations used for "Unit Name" were formulated to reflect in abbreviated format the full designation of the unit. To facilitate interpretation of these designations, Attachment 1 lists all designations and their definitions. The full designation for each unit in the T/O&E Data Base, is also presented under "Remarks" in the T/O&E Data Base record.

"Nationality" (Field 2): The nationality of the unit for which T/O&E data is recorded. "A" designates American (US), "B" designates British, and "G" designates German.

"AUTHORIZED EQUIPMENT -- TYPE and AUTHORIZED EQUIPMENT -- AMOUNT" (Fields 3-50): The authorized numbers of major items of equipment, including machine guns, armored vehicles, transport, artillery, etc., for a unit are recorded under Fields 3-50. Under "TYPE" is recorded the system designation, and under "AMOUNT" its authorized number. System designations match identically the designations employed in the ACSDB Weapons and Unit Inventory Data Bases.

"AUTHORIZED PERSONNEL --Total, --Combat Vehicle Crewmen (Armor), --Infantry, --Artillery, --Maintenance, --Maintenance-2, --Medical, --Transportation, --Supply, --Engineer, --Other" (Fields 52-60): The authorized number of personnel of a unit are recorded under these fields. For all units, "AUTHORIZED PERSONNEL --Total" indicates the total personnel strength of a unit. The remaining fields provide the number of personnel of a specific military occupational specialty, as categorized in the ACSDB Unit Data Base narrative. As defined in that narrative, all personnel in independent artillery formations are classified as "Artillery", all personnel in independent tank and tank destroyer formations are "Combat Vehicle Crewmen", etc. For divisions and independent armored and tank brigades only,

personnel strengths are divided into the military occupational specialties.

"AUTHORIZED SUPPLY -- AMMO ON HAND BY TYPE -- Tank/AT"
(Field 61a): This is the total weight, in hundreds of pounds, of ammunition carried by a formation for tank guns, antitank guns, man-portable antitank weapons, and certain large caliber anti-aircraft guns such as the German 88mm and the US 90mm anti-aircraft guns. Details on the categorization of ammunition types for the weapons of various nations are provided in the second, third, and fourth sections of this paper.

"AUTHORIZED SUPPLY -- AMMO ON HAND BY TYPE -- Artillery"
(Field 61b): This is the total weight, in hundreds of pounds, of ammunition carried by a formation for artillery guns and howitzers and certain infantry support weapons such as the US 105mm cannon company howitzer (M-3 105mm How) and the German self-propelled 150mm "Brummbaer" infantry support gun (BRUM). See below for additional information.

"AUTHORIZED SUPPLY -- AMMO ON HAND BY TYPE -- Special"
(Field 61c): This is the total weight, in hundreds of pounds, of ammunition carried by a formation for rocket projectors. Only the German Army was equipped with rocket projectors (nebelwerfer) in the Ardennes Campaign.

"AUTHORIZED SUPPLY -- AMMO ON HAND BY TYPE -- Other Ammo"
(Field 61d): This is the total weight, in hundreds of pounds, of all ammunition other than that in the above three categories carried by a formation. This includes small arms ammunition, demolition explosives, land mines, etc. See below for additional information.

"AUTHORIZED SUPPLY -- Other Supply" (Field 61): This is the total weight, in hundreds of pounds, of all supplies other than ammunition, carried by a formation. These include rations, fodder for German formations using horse-drawn transport, construction supplies, medical supplies, etc. See below for additional information.

"AUTHORIZED SUPPLY -- Fuel" (Field 62): This is the total supply, in thousands of gallons, of motor fuel carried by a formation. For US and German units, this includes motor fuel only. For British units it is the estimated amount of all POL (petroleum, oil, and lubricants).

"Remarks" (Field 63): Entered under "Remarks" is information in text format which contains the full designation of the unit and qualifies or amplifies data in any other fields.

"Sources" (Field 64): Entries under "Sources" match exactly entries under "Source Number" in the ACSDB Reference Data

Base, where information on sources used for T/O&E data is recorded. A prefix of "TU" is assigned to US T/O&Es, "TB" to British T/O&Es, and "TG" to German T/O&Es. Each prefix is followed by a unique two-digit number (for US T/O&Es) or three-digit number (for German T/O&Es). Note that all entries under "Sources" for British T/O&Es are "TB500". This is because individual Reference Data Base records are not written for the British T/O&Es; their sources and compilation are listed and explained entirely in this paper.

ADDITIONAL INFORMATION ON US T/O&E

T/O&Es are recorded for all US combat units which operated in the Ardennes Campaign, starting at battalion- (or squadron-) level up to division-level. T/O&Es are also recorded in the T/O&E Data Base for independent tank, tank destroyer (towed and self-propelled), chemical mortar, and combat engineer companies, and for the cavalry troop. T/O&E data is not provided for antiaircraft or artillery batteries. Data is included in the T/O&E Data Base for key non-combat units, including several types of ordnance maintenance, medical, and quartermaster companies.

The primary source of information used for compilation of US T/O&Es is the 21 December 1944 version of US Army FM 101-10, Staff Officers' Field Manual: Organization, Technical and Logistical Data. Information from this manual was augmented by information contained in individual tables of organization and equipment, particularly for ordnance maintenance units and the "heavy" armored division.

Two US division types, the airborne division and the heavy armored division, required considerable analysis for compilation of their T/O&Es. In the case of the airborne division, this is due to the flexible structure of its organization in late 1944. Problems associated with data compilation for the heavy armored division T/O&E stem from a general lack of information on this type of unit. Both division types are discussed below.

Airborne Division T/O&Es

Three US airborne divisions participated in the Ardennes Campaign, the 17th, 82d, and 101st. The history of their organizational development is a particularly complex one. In December 1944 none of these divisions maintained an established table of organization and equipment. Sources describing their organization, including FM 101-10, 21 December 1944, and Order of Battle of the United States Army, World War II, European Theater of Operation: Divisions, published in Paris, France, in December 1945 by the Office of the Theater Historian (hereafter cited in this paper as OB USA Dec 45), show different organizations for airborne divisions on 1 August 1944, prior to 1 March 1945, and after 1 March 1945.

Based on data found in these sources and knowledge of the organization of the three divisions during the Ardennes Campaign, the T/O&Es recorded in the ACSDB reflect the composition of the divisions maintained in December 1944-January 1945.

The 82d and 101st Airborne Divisions were organized identically, with the exception of one additional parachute field

artillery battalion in the 82d. Both divisions' actual organizations during the Ardennes Campaign had one glider and three parachute infantry regiments, each regiment with three battalions. The 82d Airborne Division had originally been organized with two parachute and one glider infantry regiments, and the 101st Airborne Division with two parachute and two glider infantry regiments. One of the 101st Division's glider infantry regiments was split up between the two divisions to add a third battalion to the divisions' remaining glider infantry regiments. One glider field artillery battalion in each division (12 pieces) was armed with the M-3 105mm How instead of the M-1 75mm How (these are designations used in the ACSDB -- see the ACSDB Weapons Data Base narrative for a complete list of the designations). The 17th Airborne Division generally retained the previous airborne division organization with one parachute and two glider infantry regiments, but the glider infantry now had three battalions each. The 17th had one glider and two parachute field artillery battalions.

The battalion -- glider and parachute infantry -- is used as the basic building block to arrive at numbers of M-2 60mm Mtr and M-1 81mm Mtr, as well as M-9 2.36" Rkt in the airborne divisions. FM 101-10, 21 December 1944, is the source used to determine the numbers of these weapons authorized per battalion, as well as for these and other weapons authorized in the other component units of an airborne division.

Personnel strength is based on data in OB USA Dec 45, adjusted for the actual number of parachute and glider infantry regiments assigned (all with three battalions each), and utilizing the FM 101-10, 21 December 1944, personnel strength for divisional artillery.

The ammunition supply weights for the airborne divisions are based on the weights of ammunition in tons per individual weapon system. These weights are computed using data taken from FM 101-10, 21 December 1944. The total weights of ammunition for airborne units are not given in that source. Therefore, the weight per system in a standard infantry regiment, self-propelled antiaircraft artillery automatic weapons battalion, or cavalry reconnaissance squadron, determined by taking the total weight given for a type system and dividing by the number of that system, is used for estimating ammunition weights in the airborne divisions. The calculated "per weapon" ammunition weights are then multiplied by the number of similar systems in the airborne divisions. Finally, the resulting figures are multiplied by the appropriate percentages that reflect the differences in basic loads (in numbers of rounds) between airborne units (these numbers are provided in FM 101-10, 21 December 1944) and a standard infantry regiment, to arrive at the estimated weights in tons of ammunition by major weapons systems in the airborne divisions.

The percentages of airborne units' to other units' basic loads are as follows:

<u>System</u>	<u>%</u>	<u>Other Unit</u>
- M-2 .50 HMG	100%	infantry regiment
- M-1 37mm AAA	25%	SP AAA auto wpns battalion
- M-9 2.36" Rkt	167%	infantry regiment
- M-2 60mm Mtr	70%	infantry regiment
- M-1 81mm Mtr	57%	infantry regiment
- M-1 57mm AT	80%	infantry regiment
- M-1 75mm How	42%	cav recon squadron

Motor fuel supply for the airborne divisions is estimated by multiplying the number of vehicles by type and by the amount of fuel that each could hold in its fuel tanks (.25 ton 4x4 - 15 gals; .75 ton 4x4 - 30 gals; 2.5 ton 6x6 - 40 gals). Added to this is the amount of motor fuel in 5-gallon cans listed in FM 101-10, 21 December 1944, tripled to account for the increase in vehicles over the numbers listed in the field manual's 1 August 1944 airborne division T/O&E.

In addition to the three airborne divisions, several independent airborne infantry and artillery formations operated in the Ardennes Campaign. In the ACSDB Unit and Unit Inventory Data Bases their personnel and equipment strengths and attrition are recorded both separately and in combination with those of the three divisions. For detailed explanations of the order of battle of the airborne units and the recording of their data, see the ACSDB Unit and Unit Inventory Data Bases narratives.

Heavy Armored Division T/O&Es

Two US armored divisions which participated in the Ardennes Campaign, the 2d and the 3d Armored Divisions, were organized as "heavy" armored divisions. The T/O&E for this type unit in the ACSDB T/O&E Data Based is based on incomplete T/O&E reference data, primarily the T/O 17, 1 March 1942, and Changes 1 and 2, dated 1 August and 29 October 1942. Certain revisions are made to this table of organization and included with the T/O&E provided in the ACSDB. For example, M-32s (recovery vehicles) are assigned to the ACSDB heavy armored division T/O&E, although they are not included in T/O 17 or its changes.

For determining ammunition data, extrapolations are made from the standard armored division based on the percentage increases of major systems over those authorized in the standard armored division. (Ammunition weights are available for the standard armored division in FM 101-10, 21 December 1944.)

- Tank/AT ammunition weight is estimated at 160% of the standard armored division because tank allocation for the heavy armored division is 160% of the standard armored division.

- Artillery ammunition weight is estimated at 119% of the standard armored division because artillery allocation for the heavy armored division is 119% of the standard armored division (counting M-4 105mm and M-7 105mm SP as the primary artillery weapons).

- Other ammunition weight is estimated at 136% of the standard armored division because the heavy armored division has 136% of the personnel that the standard armored division has.

For motor fuel supply, data for the subunits of the standard armored division is utilized to compute the fuel allocation for the heavy armored division, which consisted of a larger number of these units. The subunits themselves were not of identical structure in all cases so some adjustments were required.

US T/O&Es -- Miscellaneous Notes

- Weapons counts

For the purpose of weapons accounting in the US T/O&Es, the numbers of M-2 .50 HMGs on systems with this machine gun organic to them (M-15 37mm; M-16 4x.50; M-55 4x.50; M-4 (all tank types); M-24; M-8 AC; M-20 AC; M-10, M-18, M-36; M-7 105mm SP; M-8 75mm SP; M-21 81mm; M-3 HT; M-32; and T-41) are subtracted from the total numbers of M-2 .50 HMGs listed in the T/O&E data (taken from FM 101-10, 21 December 1944) for the various units in order to arrive at total M-2 .50 HMG counts. (In the armored division the M-3 HT is considered to be armed only with .30 caliber machine guns and not M-2 .50 HMGs.) This is done in all cases to avoid double-counting of the M-2 .50 HMGs. This was also the approach used with 37mm guns mounted on M-8 AC and M-5 Tk, and 81mm mortars on the M-21 81mm and the M-32.

- Maintenance-2 MOS

Numbers of personnel belonging to key ordnance maintenance MOSs were calculated for ordnance maintenance company T/O&Es and for the division T/O&Es. (For MOS definitions, see the Unit Data Base narrative. The sources used for the ordnance maintenance companies are given in the Reference Data Base. The sources used for the divisions are as follow:

Infantry Division -- T/O&E 9-8, Ordnance Light Maintenance Company, Infantry Division, 17 November 1944.

Airborne Division -- T/O&E 9-87, Airborne Ordnance Maintenance Company, 1 August 1944.

Standard Armored Division -- T/O&E 9-67, Maintenance Company, Ordnance Maintenance Battalion, Armored Division, 15 September 1943.

Heavy Armored Division -- Estimated using the proportion of the total personnel strengths of the maintenance battalions of the two armored division types (873/770, or 113 percent of the key ordnance maintenance personnel in a standard armored division).

- Ammunition categories

For calculating US T/O&E ammunition supply levels by type ("Tank/AT", "Arty", and "Other"), the following categorization is used:

Tank/AT

Tank gun ammunition
Self-propelled tank destroyer gun ammunition
Towed antitank/tank destroyer gun ammunition
M-9 2.36" Rkt ammunition
M-8 AC (37mm gun) ammunition
M-1A1 90mm AAA ammunition

Arty

Howitzer and gun (SP and towed) ammunition
M-2 60mm Mtr and M-1 81mm Mtr ammunition
M-3 105mm How ammunition
M-4 105mm ammunition

Other

Machine gun ammunition (including all M-2 .50 HMGs)
Small arms ammunition
Demolition explosives
Land mines
Antitank rifle grenade ammunition
M-1 37mm AAA and M-1 40mm AAA ammunition
M-1 4.2" Mtr

This categorization scheme is used for US unit ammunition data recorded in the ACSDB Unit Data Base. Note that 60mm and 81mm mortar ammunition (M-2 60mm Mtr and M-1 81mm Mtr) is counted as artillery ammunition because US Army World War II records included this ammunition with artillery ammunition expenditures. On the other hand, M-1 4.2" Mtr (chemical mortar) ammunition was not included in artillery ammunition amounts in the records. Thus the ammunition categorization scheme for US T/O&Es described above is formulated to be consistent with ammunition data in the Unit Data Base.

- Other Supply

Other supply weight was estimated for US T/O&Es using the weights of Class I, Class II, and Class IV supplies in FM 101-10, 21 December 1944; page 308. The total pounds per day of average daily expenditures of these supplies equals 24.99 pounds. This value is multiplied by the total personnel in a unit, and the resulting figure by two, to reflect the maintenance of two days of supply of Class I, II, and IV supplies by US Army units (24.99 x total personnel x 2).

ADDITIONAL INFORMATION ON BRITISH T/O&Es

Data on British T/O&Es from battalion- up to division-level is provided in the T/O&E Data Base for infantry formations. Data is also provided for T/O&Es of other key combat units (primarily armored units) and service and support units.

British T/O&Es are not referenced by individual ACSDB Reference Data Base records. (Entered under "Sources" for all British T/O&Es is the entry "TB500".) This discussion serves as an explanation of how the British T/O&Es are compiled, any estimation methodologies used in their compilation, and the sources used in their derivation.

The sources used in compilation of the British T/O&Es are:

- Ellis, Chris and Peter Chamberlain (eds.). Handbook on the British Army, 1943. London: Arms and Armour Press, 1975. (This is a reprint of the US Army's TM 30-410, Handbook on the British Army, originally produced in 1943.) Hereafter cited as Handbook.

- Ellis, Major L.F. The Battle of Normandy. Vol. I. Victory in the West. History of the Second World War. UK Military Series. London: Her Majesty's Stationery Office, 1962. Hereafter cited as Ellis.

- Joslen, Lieut-Colonel H.F. Orders of Battle: United Kingdom and Colonial Formations and Units in the Second World War, 1939-1945. Vols. I & II. London: Her Majesty's Stationery Office, 1960. Hereafter cited as Joslen.

- Miscellaneous Records of the British 5th Infantry Division in the Italian Campaign, 1943-1944. (These records were obtained from the British Public Records Office during the 1960s and are kept in File Folder No. 181 at the Historical Evaluation and Research Organization's offices. Their exact archival identification is not known. They include "Strengths of Main Bodies 5 Div Less 15 Ind Bde Gp Adv Parties and Rear Parties - Appx 'A' to 5 Div Movement Control Order No. 9 dated 24 Jun 44", and "Composition of 15 Inf Bde Gp - Appendix 'A' to 5 Div Movement Control Order No. 1 dated 15 June 1944.") Hereafter cited as 5th ID.

Joslen is the major source of information on vehicle and total personnel strengths for the British infantry, armoured, and airborne division T/O&Es (ID, AD, and AbnD). Specific MOS strengths for the divisions are estimated from the strengths of the divisions' component units. In some cases, strengths of comparable US units are used for estimation. For example, the

personnel and equipment strengths of the field hygiene section of the British infantry division is estimated to be one-fourth of that of the US sanitary company, a unit which had a similar function. Other MOS data is estimated from data on British units with similar functions. For example, the airborne division's parachute engineer squadron is estimated as three-fourths of an engineer field squadron of a standard British infantry battalion. (A parachute battalion had approximately three-fourths the personnel strength of an infantry battalion.)

The major source of data for the infantry battalion, motor infantry battalion, reconnaissance battalion, artillery, and engineer units -- InfBn, MotorInfBn, RcnBn, FldReg (Royal Arty), MedReg (Royal Arty), HvyReg (Royal Arty), FpkCoRE, FldCoRE -- is Handbook. For the machine gun battalion (MGBn), Handbook provides data on a battalion with four machine gun companies. The 1944 organization of this unit was three MG companies and one 4.2" mortar company. Appendix 4 of Ellis contains the strengths of these company-size units.

For the antiaircraft regiments, the antitank regiment (HAAREg, LAAREg, and ATReg), and divisional medical, maintenance and supply units, 5th ID is the main source of data. Data on transport for the AT Reg, as well as the MedReg and HvyReg (Royal Arty), is estimated using the transport strength of the FldReg (Royal Arty) from Handbook, pgs. 30-33.

For British non-divisional medical units (FldAmbl, LtFldAMbl, and FldDsSt), data from T/O&Es of similar US units is used for estimation. For example, the field ambulance (FldAmbl) data is estimated from that of the US clearing and collecting companies, the functions of which the British unit combined. (Ambulance strength for this unit is from Handbook).

Handbook provides data on the T/O&Es of the independent armoured brigade, the infantry brigade, and the tank brigade -- ArmBde (Independent), InfBde, and Tkbde. Total softskin transport vehicle strength of the ArmBde (Independent) is given as approximately 1,200 in Ellis. The distribution of vehicle types is estimated by subtracting the number of identified vehicle types of the motor battalion and the number of armored fighting vehicles from the total strength ($1,200 - 483 = 717$). A ratio for determining numbers of specific vehicle types is established by dividing 717 into the total number of softskin transport vehicles in a British armoured division (2,601) -- 0.28. This ratio was then applied to the numbers of specific softskin transport vehicle types to calculate numbers of these vehicle types in the brigade. A similar approach is used to estimate the number of vehicles in the tank brigade T/O&E.

Personnel data for the armoured car regiment (ACReg) is taken from Ellis, while softskin vehicle strengths are estimated

as that of a British infantry division's reconnaissance battalion without the T16s and M-3 HTs.

No Maintenance-2 MOS strengths are estimated for British T/O&Es. As discussed in the ACSDB Unit Data Base narrative, MOS strengths are not estimated for British units in the Unit Data Base. The MOS strengths provided here may be used for estimation purposes with British units in the Unit Data Base.

British T/O&E fuel supply data is estimated by using the POL (petroleum, oil, and lubricants) computations for similar US vehicles found in US Army FM 101-10, 21 December 1944, Chapter 3, pg. 12. Handbook, pg. 84, gives the following principles of supply to be followed for gasoline in units: "...all vehicles are filled and all reserves are made complete...adequate reserve is maintained on wheels in front of railhead (sufficient for 75 miles, carried by petrol companies)." The fuel amounts carried in the fuel tanks of each similar vehicle type are multiplied by the number of vehicles in the British T/O&E. To this figure is added the fuel amounts required to move the total numbers of vehicles 75 miles, as presented in columns 4-7 of FM 101-10, Chapter 3, pg. 12. The total figure is the estimated authorized POL level of the unit.

British T/O&E ammunition supply data is estimated from the basic load data (first and second echelon) for British weapons as recorded in the ACSDB Weapons Data Base. Upon comparison with ammunition supply levels of comparable US units, it was determined that the amounts in first and second echelon are probably one-half of the total unit load. Therefore, the amounts calculated for first and second echelon are multiplied by two to give the estimated total unit ammunition levels.

British terminology classifies tanks into an "Infantry" and a "Cruiser" category. These terms are used in the T/O&E data base for British units in the following manner:

- British AD.

Cruiser Tank: M-4 75mm; Sherman 17-pr (M-4A4); Cromwell 75mm (A27); Cromwell 95mm (A27); A-30 Challenger

- British AbnD.

Cruiser Tank: M-4 75mm; Cromwell 75mm (A27)

- TkBde.

Infantry Tank: Churchill 6-pr (A22); Churchill 75mm (A22); Churchill 95mm (A22)

Cruiser Tank: M-4 75mm; Sherman 17-pr (M-4A4)

- ArmBde (Independent). See under "Remarks" in the T/O&E Data Base.

For calculating British T/O&E ammunition supply levels by type ("Tank/AT", "Arty", and "Other"), the following categorization is used:

Tank/AT

Tank gun ammunition
Self-propelled antitank gun ammunition
Towed antitank gun ammunition
PIAT ammunition
Armored car armament ammunition greater than .50 caliber

Arty

Howitzer and gun (SP and towed) ammunition
Mtr 4.2" ammunition

Other

Machine gun ammunition
Armored/scout car machine gun ammunition (incl. .50 cal. MG)
Antiaircraft artillery ammunition, including the 3.7" AA (T)

This same categorization scheme is used for British unit ammunition data recorded in the ACSDB Unit Data Base. Note that the ammunition for the British 3.7" AA (T) (the 3.7" antiaircraft gun) is counted as "Other" ammunition, unlike the ammunition of its US and German equivalents, the 90mm and 88mm antiaircraft gun, which is considered antitank ammunition in the ACSDB. Although the British piece had the capability of engaging armor, British doctrine called for its use in its primary antiaircraft role and only in emergencies in an antitank role. British XXX Corps ammunition expenditure records show a relatively minor expenditure of 3.7" ammunition during the Ardennes Campaign period, all after the German armor threat had dissipated. No mention was made in British operations orders of using 3.7" guns in the antitank role, unlike US orders for the 90mm piece. The German 88mm gun's employment as an antitank weapon is well documented.

No authorized weights are provided for the "Other Supply" category of British T/O&Es. This is because no information was found which provided exact data or could be used to estimate the data. In the ACSDB Unit Data Base, "Other Supply" data is also not provided for British units. If necessary, the estimation process used for US units could be applied to estimate British "Other Supply" data, i.e., total personnel x 24.99 pounds per man. See the above discussion on US T/O&Es for additional information.

ADDITIONAL INFORMATION ON GERMAN T/O&Es

Data on authorized personnel and equipment strengths recorded in the ACSDB German T/O&Es is generally derived directly from primary sources. The "Remarks" field in the T/O&E records contains explanations of some equipment or personnel data estimation. Estimation is mainly used for T/O&Es of German non-divisional units for which incomplete information was found in research. Division-level units have adequate documentation to compile equipment and personnel data with minimal estimation.

Note that each SS panzer division (SSPzD) has a unique T/O&E establishment. The Army panzer and panzer grenadier divisions (PzD and PzGD), in line with the German organizational system, also had unique T/O&Es. However, data on the individual Army panzer and panzer grenadier divisions is insufficient to allow compilation of complete, unique T/O&Es for these units, without an undue amount of estimation. Therefore, only one generic T/O&E is provided for each of the Army division types.

In using the German T/O&Es, it is important to note that many of the German units in the Ardennes Campaign were not at full strength in personnel and equipment. Some units were even equipped with systems in their 16 December inventories which they were not authorized by T/O&E to have. Conversely, in some cases, authorized items of equipment supposed to be in units' inventories were not actually with units. The T/O&Es of the SS and Army panzer and panzer grenadier divisions presented in the ACSDB give a relatively accurate picture of what these units were supposed to have in their inventory. This information, when used with the data in the Unit Data and Unit Inventory Data Bases, should help in the application and utilization of T/O&Es for analytical purposes.

Volks grenadier, infantry, and fallschirmjaeger (paratrooper) divisions (VGD, ID, and FJD) also maintained unique T/O&E establishments. Unfortunately, data in the records, even more so than is the case with the Army panzer and panzer grenadier divisions, does not support the creation of unique T/O&Es for each division of these types. As with the panzer and panzer grenadier divisions, comparison of the ACSDB VGD, ID, and FJD T/O&Es with strengths in the Unit Inventory and Unit Data Bases should help in the utilization of T/O&Es for analytical purposes.

Compilation of data for authorized ammunition weights for German T/O&Es units involves considerable estimation, as the main document used for this data has figures only for divisions (panzer, panzer grenadier, volks grenadier, and infantry), broken down into numbers of rounds and weight of ammunition per weapons

system (see German Archives source # RH3/v.135, Munitions Allotment Tables for German Divisions). Attachment 2 contains examples of data estimation used to calculate ammunition weights for German non-divisional units. Data was estimated directly from the weights provided in RH3/v.135 and, particularly for units at or below battalion-level, using "first generation" estimated data derived from RH3/v.135. For example, the ammunition weights for a fallschirmjaeger regiment were estimated from RH3/v.135, and then data for a fallschirmjaeger battalion from the regiment's figures.

The ammunition weights provided in RH3/v.135 are for the erste Munitions Ausstattung (first munitions issue) of divisions. On pages VI-20 and VI-21 of US War Department Technical Manual TM-E 30-451, Handbook on German Military Forces, 15 March 1945, (hereafter cited as TM-E 30-451), a discussion of German ammunition supplies indicates that the first munitions issue was one of two issues carried by a division. More than one unit was apparently found forward on the men, with the guns, and as company and battalion reserves, while less than one full issue was kept in division columns and dumps. The terminology in RH3/v.135 indicates that the amounts provided in that document are for ammunition of the first munitions issue in total (gesamt), with the men and guns of the combat troops (...bei der fechtender Truppe, Mann, Gesch.), and with the divisional supply column (Div. Nachsch. Kol.). When German logistics data was estimated for the Unit Data Base (on-hand, received, and consumed or expended), however, it was determined that the amounts provided in RH3/v.135 are more likely the maximum ammunition levels maintained by German units in the Ardennes. This determination was made based on comparisons with ammunition tonnages of comparable US units and on figures provided for aggregate German ammunition consumption and availability in the Ardennes. German doctrine may in fact have stipulated that more than one ammunition issue be maintained by units. In light of the above discussion, however, the ammunition figures provided for German T/O&Es likely represent the authorized ammunition supply maintained by German units during the Ardennes Campaign.

For calculating German T/O&E ammunition supply levels by type ("Tank/AT", "Arty", and "Other"), the following categorization is used:

Tank/AT

Tank gun ammunition
Self-propelled antitank gun ammunition
Assault gun (sturmgeschuetz) ammunition
105mm assault gun (STG105) ammunition
Towed antitank gun ammunition
PF and PS (panzerfaust and panzerschreck) ammunition
Armored car armament ammunition greater than 7.92mm caliber
88mm (FLAK88) gun ammunition

Arty

Howitzer and gun (SP and towed) ammunition
HMTR (12cm mortar) ammunition
Infantry gun (LIG, HIG, and HIG SP) ammunition

Other

Machine gun ammunition
Armored car machine gun ammunition
2cm and 3.7cm (FLAK20 and FLAK37) antiaircraft artillery ammunition
MMTR (8cm mortar) ammunition
Small arms ammunition
Demolition explosives
Land mines

Note that this same categorization scheme is used for German unit ammunition data recorded in the ACSDB Unit Data Base.

Authorized "Other Supply" levels for German T/O&Es are estimated using information found in TM-E 30-451, pages VI-18 to VI-20. The data provided for German "Other Supply" in the ACSDB T/O&E Data Base represents only the weights of human rations and fodder for horses, for units with horse-drawn transport. At division level and below, 2-1/2 "iron" rations and four standard rations per man are normally carried, for a total human rations weight of 18.02 pound per man (each full iron ration weighs 1.82 pounds, a half iron ration weighs 1.18 pounds, and a standard ration 3.30 pounds). For units below division, the same human rations less one standard ration are carried (14.72 pounds per man). Two standard horse rations (each of 22 pounds) and two iron horse rations (either 5.5 or 11 pounds per iron ration) are carried for all units for a total per-horse ration weight of 60.5 pounds. The number of horses per unit is estimated as twice the number of horse-drawn vehicles (HDR) per unit. Attachment 3 gives some examples of German other supply calculations.

Note that German "Other Supply" weights are provided only in the ACSDB T/O&E Data Base. Data on "Other Supply" is not estimated in the Unit Data Base for the Germans, except as part of the calculations used to estimate fuel consumption by German units in the Ardennes. See the ACSDB Unit Data Base narrative for additional information.

German authorized fuel amounts were estimated using a description of German fuel distribution found on page VI-20 of TM-E 30-451 and a document on German vehicular fuel requirements obtained from the German Archives, Betriebsstoff Verbrauchssatze (German Archives source # RH10/363, pages 10-11). The German T/O&E fuel levels are estimated using fuel consumption figures provided under the column 1 VS. in ltr./100 km -- Leichtes Gelaende in RH10/363. These are motor fuel amounts required by combat and transport vehicles to move 100 kilometers over

moderate terrain. These figures were multiplied by the number of vehicle types in a unit to determine the total amount of fuel required by the unit to move 100 kilometer. This figure is then multiplied by four for armored formations, and five for all other units, to determine the total amount of fuel carried by a unit. TM-E 30-451, page VI-20, explains that armored formations normally carried four fuel issues and all other formations (except reconnaissance) five issues. Attachments 4 and 5 provide data on the amount of fuel per vehicle type required by armored or other formations and an example of the calculation of total motor fuel supply for one unit.

For three German brigade-size units, the Fuehrer Begleit Brigade, the Fuehrer Grenadier Brigade, and the 150th Panzer Brigade (FBB, FGB, and 150th PzBde), no T/O&Es are provided. This is because, in the case of the first two brigades, the units had no standard organization at the end of 1944. The 150th Panzer Brigade, a provisional unit organized for the Ardennes Offensive, never attained its planned organizational strength. It is recommended that the data provided for these units in the Unit and Unit Inventory Data Bases on their first day of inclusion in the ACSDB be used as T/O&E strengths. For the 27th and 28th SS Panzer Grenadier Divisions, no T/O&Es are provided. These units, actually regiment-size units, did not actively participate in the Ardennes Campaign. German documents describe their basic organizations, which the divisions never attained according to documents found in research for the ACSDB. Their organizations on the first day of inclusion in the ACSDB may be used in lieu of actual T/O&Es.

The ID and ID (45) recorded in the T/O&E Data Base are for the two types of German infantry division organizations in effect in late 1944. In the Ardennes, the 59th ID was an ID (45); the remainder -- the 85th, 89th, 344th, and 353d IDs -- were organized as 1944-type infantry divisions (ID).

No Maintenance-2 personnel strengths are provided for German units in the ACSDB T/O&E or Unit Data Bases. No data was found in research on key maintenance MOS strengths for German units.

Provided below is a short list of German terms commonly used in the T/O&E Data Base. It is intended to supplement the larger list in Attachment 1 to assist user of the ACSDB in their review and application of the T/O&E Data Base.

Ersatz und Ausbildung -- replacement and training
Fallschirmjaeger -- paratrooper
Festung -- fortress (used for Westwall occupation units)
FLAK -- anti-aircraft
OTBde -- Organization Todt (a paramilitary construction organization) Brigade
OTBN -- Organization Todt battalion

OTReg -- Organization Todt regiment
PAK -- antitank
Panzer -- armored
Panzer Grenadier -- armored infantry
Panzerjaeger -- "tank hunter", or antitank
Volks -- "peoples'" (used in reference to German formations
organized in the final year of World War II)
Volks Grenadier -- "peoples'" infantry
Werfer -- rocket projector

Attachment 1

List of T/O&E Unit Designations/Abbreviations

American

AAABdeH	Antiaircraft Artillery Brigade Headquarters
AAABNAW	Antiaircraft Artillery Battalion, Automatic Weapons
AAABN G	Antiaircraft Artillery Battalion, Gun
AAABNSP	Self-propelled Antiaircraft Artillery Battalion
AAAGrpHQ	Antiaircraft Artillery Group Headquarters
AbnD	Airborne Division
AD (Heavy)	Heavy Armored Division
AD (Standard)	Standard Armored Division
ArmFABN	Armored Field Artillery Battalion
ArmGrpH	Armored Group Headquarters
ArmInfB	Armored Infantry Battalion
CavGrpH	Cavalry Group Headquarters
CavSq	Cavalry Squadron
CavTrp	Cavalry Troop
ClrngCo	Medical Clearing Company
CollCo	Medical Collecting Company
EngBN	Combat Engineer Battalion
EngBNC	Construction Engineer Battalion
EngCo	Combat Engineer Company
EngGrpH	Engineer Group Headquarters
EngReg	Engineer General Service Regiment
EvacHosp	Evacuation Hospital
FABde	Field Artillery Brigade Headquarters
FABN105	105mm Howitzer Field Artillery Battalion
FABN155	105mm Gun or Howitzer Field Artillery Battalion
FABN240	240mm Howitzer Field Artillery Battalion
FABN4.5	4.5" Gun Field Artillery Battalion
FABN8"G	8" Gun Field Artillery Battalion
FABN8"H	8" Howitzer Field Artillery Battalion
FABNSP	Self-propelled 155mm Gun Field Artillery Battalion
FAGrpHQ	Field Artillery Group Headquarters
FAObsBN	Field Artillery Observation Battalion
FAObsBt	Field Artillery Observation Battery
FldHosp	Field Hospital
GIReg	Glider Infantry Regiment
HAMCo	Heavy Automotive Maintenance Company
HMCo (FA)	Heavy Maintenance Company (Field Army)
HMCo (Tk)	Heavy Maintenance Company (Tank)
ID	Infantry Division
InfBN	Infantry Battalion

InfReg	Infantry Regiment
MaintCo (AA)	Maintenance Company (Antiaircraft)
MAMCo	Medium Automotive Maintenance Company
MMaintCo	Medium Maintenance Company
MrtBN	Chemical Mortar Battalion
MrtCo	Chemical Mortar Company
PFABN	Parachute Field Artillery Battalion
PIBN	Parachute Infantry Battalion
PIReg	Parachute Infantry Regiment
QMTrkCo	Quartermaster Truck Company
QMTrlBN	Quartermaster Trailer Battalion
RcnTrp	Reconnaissance Troop
RgrBN	Ranger Battalion
TDBNSP	Self-propelled Tank Destroyer Battalion
TDBNT	Towed Tank Destroyer Battalion
TDCoSP	Self-propelled Tank Destroyer Company
TDCoT	Towed Tank Destroyer Company
TDGrpHQ	Tank Destroyer Group Headquarters
TkBN	Tank Battalion
TkBN (Lt)	Light Tank Battalion
TkBNMX	Mine-exploding Tank Battalion
TkCo	Tank Company
TkCoMX	Mine-exploding Tank Battalion

The following suffixes are used with US field and antiaircraft artillery units: (Gun-Tractor); (Gun-Truck); (HOW-Tractor); (HOW-Truck); (Mbl); (SM); (Tractor); and (Truck). Gun tractor-drawn; Gun truck-drawn; Howitzer tractor-drawn; Howitzer truck-drawn; Mobile; Semimobile; Tractor-drawn; and Truck-drawn.

British

AbnD	Airborne Division
ACReg	Armoured Car Regiment
AD	Armoured Division
ArmBde (Independent)	Independent Armoured Brigade
ATReg	Antitank Regiment
FldAmbl	Field Ambulance
FldCoRE	Field Company, Royal Engineers
FldDsSt	Field Dressing Station
FldReg (Royal Artillery)	Field Regiment, Royal Artillery
FpkCoRE	Field Park Company, Royal Engineers
HAAREg	Heavy Antiaircraft Regiment
HvyReg (Royal Artillery)	Heavy Regiment, Royal Artillery
ID	Infantry Division
InfBde	Infantry Brigade
InfBn	Infantry Battalion
LAAREg	Light Antiaircraft Regiment
LtFldAmbl	Light Field Ambulance
MedReg (Royal Artillery)	Medium Regiment, Royal Artillery

MGBn
MotorInfBn
MtzdInfBn
RcnBn (RcnReg)
TkBde

Machine Gun Battalion
Motor Infantry Battalion
Motorized Infantry Battalion
Reconnaissance Battalion (Regiment)
Tank Brigade

German

AArtyBN	Army Artillery Battalion
AArtyBt	Army Artillery Battery
AMrtBN	Army Mortar Battalion
ASvcs	Army Service School
BrB(GE)	Light bridge equipment column (company) non-motorized
BrB(m)	Light bridge column (company) fully motorized
BrJ(GE)	Heavy bridge equipment column (company) non-motorized
BrJ(m)	Heavy bridge column (company) fully motorized
EngBde	Engineer Brigade
EngBN	Combat Engineer Battalion
EngBN C	Construction Engineer Battalion
EngBrBN	Engineer Bridge Battalion
EngEABN	Engineer Ersatz und Ausbildung (Replacement and Training) Battalion
FJArtr	Fallschirmjaeger (Paratrooper) Artillery Regiment
FJBN	Fallschirmjaeger (Paratrooper) Battalion
FJD	Fallschirmjaeger (Paratrooper) Division
FJReg	Fallschirmjaeger (Paratrooper) Regiment
FLAKBde	Fliegerabwehrkanone (Antiaircraft) Brigade
FLAKBN	Fliegerabwehrkanone (Antiaircraft) Battalion
FLAKCo	Fliegerabwehrkanone (Antiaircraft) Company
FLAKReg	Fliegerabwehrkanone (Antiaircraft) Regiment
FLAKStR	Fliegerabwehrkanone Sturm (Antiaircraft Assault) Regiment
FstArBN	Festung (Fortress) Artillery Battalion
FstArBt	Festung (Fortress) Artillery Battery
FstMGBN	Festung (Fortress) Machine Gun Battalion
FstPAKC	Festung Panzerabwehrkanone (Fortress Antitank) Company
FstPnBN	Festung (Fortress) Penal Battalion
HyPzBN	Heavy Panzer (Armored) Battalion
HyPjBN	Heavy Panzerjaeger (Antitank) Battalion
ID	Infantry Division
OTBde	Organization Todt (paramilitary civilian construction corps) Brigade

OTBN	Organization Todt (paramilitary civilian construction corps) Battalion
OTReg	Organization Todt (paramilitary civilian construction corps) Regiment
PjBN	Self-propelled Panzerjaeger (Antitank) Battalion
PjBNT	Towed Panzerjaeger (Antitank) Battalion
PjCo	Self-propelled Panzerjaeger (Antitank) Company
PzCo	Panzer (Armored) Company
PzEngCo	Panzer (Armored) Engineer Company
PzGD	Panzer Grenadier (Armored Infantry) Division
PzD	Panzer (Armored) Division
SSArtBN	SS Artillery Battalion
SSPzD	SS Panzer (Armored) Division
SSWfrBN	SS Werfer (Rocket Launcher) Battalion
StgBde	Sturmgeschuetz (Assault Gun) Brigade
StMrsCo	Sturm Moerser (Assault Mortar) Company
StPzBN	Sturm Panzer (Assault Vehicle) Battalion
VAK	Volksartillerie Korps ("People's" Artillery Corps)
VABN	Volksartillerie ("People's" Artillery) Battalion
VGD	Volks Grenadier ("People's" Infantry) Division
VWB	Volkswerfer ("People's" Rocket Launcher) Brigade
VWBN	Volkswerfer ("People's" Rocket Launcher) Battalion
VWBty	Volkswerfer ("People's" Rocket Launcher) Battery
VTB	Volga Tartar Battalion

Note: SS = Waffen SS (Schutz Staffeln) field formations of the SS.

Attachment 2

Examples of German Ammunition Weight Estimation

System	SSPzDs			Ammo	Ammo
	Number in SSPzD	Number in PzD	SSPzD% of PzD	Tonnage PzD	Tonnage SSPzD
LMG/HMG	918-1514 (1216)	697	174%	159.5	277.5
MMTR	62-66 (64)	52	123%	39.0	48.0
HMTR	26	18	144%	55.1	79.3
PF	1000-1800 (1400)	1000	140%	4.6	6.4
PS	80	130	62%	10.0	6.2
FLAK20*	54-64 (59)	79	75%	68.4	51.3
FLAK37*	9-27 (18)	17	106%	32.7	34.7
FLAK88	18	12	150%	53.3	80.0
PAK75	25-28 (27)	13	208%	14.3	29.7
HIG SP	12	12	100%	53.7	53.7
K105	4	4	100%	18.2	18.2
LFH105*	37	25	148%	114.9	170.1
HFH150*	18	14	129%	114.1	147.2
NW41**	18	0	---	---	---
NW42**	6	0	---	---	---
PZJG-IV/PZ-IV***	129	112	115%	459.0	527.9
PZ-V	73-75 (74)	73	101%	346.6	350.1
LAC/HAC	20-24 (22)	32	69%	51.6	35.6
Personnel	17425-18548 (17987)	14727	122%	96.0****	117.1

* FLAK20, FLAK37, LFH105, and HFH150 include self-propelled weapons. FLAK20 includes 4-barrel weapons.

** NW41 and NW42 for 1st and 12th SSPzDs only.

*** STG-III for PzD (in lieu of PZJG-IV).

**** Includes rifle, rifle grenade, pistol, engineer and high explosive, illumination and signal, and smoke munitions.

Numbers in parentheses are averages. 1st and 12th SSPzDs have an additional 108.8 tons of "Special" ammo weight, based on SSWfrBN "Special" ammo weight.

NOTE: AMMUNITION WEIGHTS AND THIS AND SUBSEQUENT TABLES ARE IN METRIC TONS. THEY WERE CONVERTED INTO SHORT TONS FOR ENTRY IN THE ACSDB.

FJD

<u>System</u>	<u>FJD Number</u>	<u>Number in PzGD</u>	<u>FJD% of PzGD</u>	<u>Ammo Tonnage PzGD</u>	<u>Ammo Tonnage FJD</u>
LMG/HMG	1123	861	130%	99.7	129.6
MMTR	131	64	205%	48.0	98.4
HMTR	63	26	242%	79.6	192.6
PF	2000	1500	133%	15.0	20.0
PS	250	130	192%	4.6	8.8
FLAK20	9	13	69%	7.4	5.1
FLAK20(v)	12	6	200%	20.3	40.6
FLAK37	12	9	133%	21.0	27.9
FLAK88	18	12	150%	53.3	80.0
PAK75	72	19	379%	39.5	149.7
LIG	18	19	95%	30.0	28.5
LFH105	24	36	67%	172.3	115.4
HFH150	12	12	100%	97.8	97.8
Personnel	16,632	14,738	113%		

The FLAK20(v) ammo tonnage of 40.6 was derived by first isolating the tonnage for the FLAK20 (using the ID44 division for this process). It was determined that 13 FLAK20s had 7.4 tons, so 52 FLAK20s (the number in a PzGD) had 29.6 tons of ammo. This 29.6 was subtracted from the total of 49.9 tons of 20mm FLAK ammo for the PzGD, leaving 20.3 tons for the 6 FLAK20(v) in the PzGD. This was then doubled to derived the FJD tonnage for its 12 FLAK20(v). LIG ammo weight derived from ID. FJD "Other" ammo includes difference between total PzGD Other less PzGD LMG/HMG, MMTR, FLAK20 and 37 times 113% (FJD personnel percentage of PzGD).

System	FJ Reg		FJ Reg% of FJD	Ammo	Ammo
	Number in FJ Reg	Number in FJD		Tonnage FJD	Tonnage FJ Reg
LMG/HMG	269	1123	24%	129.6	31.1
MMTR	41	131	31%	98.4	30.5
HMTR	9	63	14%	192.6	27.0
PS	54	250	22%	8.8	1.9
PAK75	12	72	17%	149.7	25.4
LIG	6	18	33%	28.5	9.4
PF	286	2000	14%	20.0	2.8
Personnel	3229	16632	19%		

FJ Reg "Other" ammo includes difference between total FJD "Other" less FJD LMG/HMG, MMTR, FLAK20 and FLAK37 times 19% (FJReg personnel percentage of FJD).

FJBN

<u>System</u>	<u>Number in</u> <u>FJBN</u>	<u>Number in</u> <u>FJ Reg</u>	<u>FJBN% of</u> <u>FJReg</u>	<u>Ammo</u> <u>Tonnage</u> <u>FJ Reg</u>	<u>Ammo</u> <u>Tonnage</u> <u>FJBN</u>
LMG/HMG	74	269	28%	31.1	8.7
MMTR	13	41	32%	30.5	9.8
LIG	2	6	33%	9.4	3.1
PS	18	54	33%	1.9	0.6
PF	86	286	30%	2.8	0.8
Personnel	831	3229	26%		

FJBN "Other" ammo includes 26 percent of non-LMG/HMG and MMTR ammo in FJReg.

HyPzBN

<u>System</u>	<u>Number in HyPzBN</u>	<u>Number in HyPjBN/PzD of</u>	<u>HyPzBN% HyPjBN/PzD</u>	<u>Ammo Tonnage PzD</u>	<u>Ammo Tonnage HyPzBN</u>
PZ-Vib	45				258.8
LMG	36	46	78%	5.3	4.1
FLAK20(v) SP	3	12	25%	40.6	10.2
Personnel	1037	686	151%		

Each PZ-Vib round weighed 50.7 pounds. Assuming each tank had a main gun allocation of 250 rounds gives a weight of 12,675 pounds, or 5.75 tons (not including packing material weight). FLAK20 ammo weight based on appropriate percentage of FJD FLAK20 weight, LMG ammo weight based on appropriate percentage of HyPjBN LMG weight. "Other" ammo includes percentage, based on personnel strength, of HyPjBN "Other" ammo, less LMG ammo weight (7.4 tons, or 1.51 x 4.9). This is estimated data for the heavy panzer battalion equipped with Tiger II tanks (PZ-Vib).

System	StgBde		StgBde% of 667th	Ammo	Ammo
	Number in StgBde	Number in 667th*		Tonnage 667th	Tonnage StgBde
STG-III	33	12	275.0%	43.0	118.3
STG105	12	8	150.0%	38.0	57.0
LMG	39	861**	4.5%	99.7	4.5
Personnel	548				

* 667th Sturmgeschuetz Brigade (US National Archives Microfilm # T314,1134,427 -- 23 November 1944 report "Supply Information of Assault Gun Brigade 667.")

** LMG ammo weight based on percentage of PzGD weight.

System	HyPjBN			Ammo	Ammo
	Number in HyPjBN	Number in StqBde	HyPjBN% of StqBde	Tonnage StqBde	Tonnage HyPjBN
STG-III	28	33	85%	118.3	100.6
PZJG-V	17				116.5
LMG	46	39	118%	4.5	5.3
Personnel	686	435	158%		

Based on the STG-III (which has an individual round weight of 26.5 lbs) with 33 systems having 118.3 tons of ammo, the estimated amounts break down to 3.58 tons per system, which equals 7890 lbs (at 2204 lbs per ton), each STG-III having an allotment of 298 rounds.

If we assume that the PZJG-V had an identical allotment of rounds, with an individual round weight of 50.7 lbs, then each system would have an allotment weighing 15109 lbs, or 6.86 tons. With 17 PZJG-IV systems in the HyPjBN this would amount to 116.5 tons of ammo. HyPjBN "Other" ammo includes percentage, based on personnel strengths, of PjBN "Other" ammo, less FLAK20 and LMG ammo weights. (4.9 tons, or 1.58 x 3.1)

System	ASvcs			Ammo	Ammo
	Number in ASvcc	Number in VGD	ASvcc % of VGD	Tonnage VGD	Tonnage ASvcs
LMG/HMG	38	465	8.2%	48.3	3.96
MMTR	6	44	13.6%	33.0	4.49
LIG	4	39	10.3%	55.8	5.75
PF	86	2000	4.3%	20.0	0.86
PS	18	250	7.2%	9.0	0.65
Personnel	642	11197	5.7%		

ASvcs "Other" ammo weight includes percentage, based on personnel strength, of VGD rifle, rifle grenade, machine pistol, engineer and high explosive, light and signal, and smoke munitions (4.9 tons, or 0.057 x 85.75).

EstPnBN and EstMGBN

Ammo weight calculated identically to ASvcs, with exception of "Other" ammo weight, which includes 5.3 percent of VGD "Other" weight, as defined for ASvcs (4.5 tons, or 0.053×85.75).

System	FLAKStR			Ammo	Ammo
	Number in FLAKStR	Number in FLAKBde	FLAKStR % of FLAKBde	Tonnage FLAKBde	Tonnage FLAKStR
FLAK88	32	64	50.0%	284.1	142.1
FLAK20 SP	72	96	75.0%	54.4	40.8
LMG	32	64	50.0%	6.4	3.2
Personnel	2526	5204	48.5%		

FLAKBde had 29.5 tons of additional "Other" so $.485 \times 29.5 = 14.3$ tons of additional "Other" for FLAKStR. FLAKStR "Other" ammo weight includes percentage, based on personnel strength, of FLAKBde "Other" ammo weight.

System	VAK			Ammo	Ammo
	Number in VAK	Number in 766th VAK	VAK % of 766th VAK	Tonnage 766th VAK	Tonnage VAK
K75	18	18	100.0%	54.00	54.0
PAK43ARTY	18	36	50.0%	142.90	71.5
LFH105	18	18	100.0%	86.70	86.7
HFH150	12	18	66.6%	90.10	60.1
HOW210	6	6	100.0%	67.50	67.5
K170	3	3	100.0%	41.30	41.3
LMG	61	13	469.0%	1.35	6.3
Personnel	3326	385	864.0%		

VAK "Other" ammo weight includes percentage, based on personnel strength, of FstArBN "Other" ammo weight. PAK43ARTY, HFH122, and LMG strengths used in above table are from PjBNT, and FstArBN. Source for 766th VAK is US National Archives Microfilm # T314,1134,238 (766th VAK Artillery and Ammunition report).

System	VABN		VABN % of VAK	Ammo	Ammo
	Number in VABN	Number in VAK		Tonnage VAK	Tonnage VABN
HFH150	12	12	100.0%	97.8	97.80
LMG	6	61	9.8%	6.3	0.62
Personnel	379	3326	11.4%		

VABN "Other" ammo weight includes percentage, based on personnel strength, of VAK "Other" ammo weight.

System	VWB			Ammo	Ammo
	Number in VWB	Number in 15th VWB	VWB % of 15th VWB	Tonnage 15th VWB	Tonnage VWB
NW41	72	72	100.0%		298.0
NW42	18	18	100.0%		103.0
NW42HVY	18	18	100.0%		84.4
LMG	57	61	93.4%	6.3	5.9
Personnel	2933	3326	88.2%		

US National Archives Microfilm # T314,1134,239 (15th VWB report) gives percentage of authorized number of rounds for artillery. "Special" ammo weight is based on total authorized numbers of rounds times round weights (75.3 lbs x 6922, 78 lbs x 1739, 246 lbs x 915, and 309 lbs x 602). VWB "Other" ammo weight includes percentage, based on personnel strength, of VAK "Other" ammo weight.

System	VWBN			Ammo	Ammo
	Number in VWBN	Number in VWBN	VWBN % in VWB	Tonnage VWB	Tonnage VWBN
NW41	18	72	25%	298.0	74.50
LMG	8	57	14%	5.9	0.83
Personnel	434	2933	14.8%		

VWBN "Other" ammo weight includes percentage, based on personnel strength, of VWB "Other" ammo weight.

Attachment 3

Examples of Estimated German Units' Ration Weights

<u>Unit</u>	<u>Number Personnel</u>	<u>In Pounds Personnel Ration Weight</u>	<u>Number of Horses</u>	<u>In Pounds Horses Rat'n Weight</u>	<u>Pounds Total Weight</u>
1st SSPzD	18,548	334,235	0	0	334,235
PzD	14,727	265,381	0	0	265,381
ID	12,352	222,583	2,932	177,386	399,969
VGD	11,197	201,770	2,284	138,182	339,952
HyPzBN	823	12,115	0	0	12,115
FLAKReg	5,814	85,582	0	0	85,582
VWBty	116	1,708	0	0	1,708
EngBN	755	11,114	0	0	11,114

Attachment 4

German Vehicles POL Data

<u>Equipment Type</u>	<u>1 VS (gals.)</u>	<u>1 VS x 4 Armored Units</u>	<u>1 VS x 5 Other Units</u>
FLAK20 SP	26.400	105.60	132.00
FLAK20(v) SP	44.880	179.52	224.40
FLAK37 SP	44.880	179.52	224.40
HIG SP	55.440	221.76	277.20
LFH105 SP	71.280	285.12	356.40
HFH150 SP	118.800	475.20	594.00
PZJG-IV	118.800	475.20	594.00
PZ-IV	118.800	475.20	594.00
PZ-V	198.000	792.00	990.00
LAC	21.120	84.48	105.60
HAC	34.320	137.28	171.60
LHT	29.040	116.16	145.20
MHT	39.600	158.40	198.00
KK	5.148	20.59	25.74
PKW	11.880	47.52	59.40
LKW	21.120	84.48	105.60
MAUL	31.680	126.72	158.40
RCV	36.960	147.84	184.80
1-5t PM	29.040	116.16	145.20
8-18t PM	55.440	221.76	277.20
BEPZ-III/IV	118.800	475.20	594.00
BEPZ-V	198.000	792.00	990.00
BGPZ-III	118.800	475.20	594.00
BGPZ-V	198.000	792.00	990.00
STG-III	118.800	475.20	594.00
PZJG-38t	55.440	221.76	277.20
RSO	39.600	158.40	198.00
PZ-VI	237.600	950.40	1188.00
FKL	10.560	42.24	52.80
PZ-VIb	237.600	950.40	1188.00
STRMTIGER	237.600	950.40	1188.00
STG105	118.800	475.20	594.00
PZJG-V	198.000	792.00	990.00
BRUM	118.800	475.20	594.00
75HT	34.320	137.28	171.60

VS = Verbrauchssaetze, the amount of fuel (in gallons) required by a vehicle to move (in the above examples) 100 kilometers over moderate cross country terrain.

Attachment 5

Examples of Estimated German Unit POL Data
(for 1st SSPzD)

<u>Equipment Type</u>	<u>Number of</u>	<u>VS x 4</u>
FLAK20 SP	30	3,168
FLAK20(v) SP	13	2,334
FLAK37 SP	14	2,513
HIG SP	12	2,661
LFH105 SP	12	3,421
HFH150 SP	6	2,851
PZJG-IV	31	14,731
PZ-IV	98	46,570
PZ-V	73	57,816
LAC	4	338
HAC	20	2,746
LHT	64	7,434
MHT	400	63,360
KK	615	12,663
PKW	856	40,677
LKW	1,788	151,050
MAUL	147	18,628
RCV	3	444
1-5t PM	70	8,131
8-18t PM	87	19,293
BEPZ-III/IV	3	1,426
BEPZ-V	6	<u>4,752</u>
TOTAL		467,007

VS = Verbrauchssaetze, the amount of fuel (in gallons) required by a vehicle to move (in the above examples) 100 kilometers over moderate cross country terrain.

The ACSDB Weapons Data Base

Major items of equipment (weapons, vehicles, and aircraft) are identified and recorded in the T/O&E, Unit Inventory, and Air Data Bases of the ACSDB. These three data bases focus on the numerical strengths and losses of the items of equipment (including damage and in-repair status of selected systems). Performance and descriptive data on the items of equipment themselves is recorded in the Weapons Data Base.

There are 209 systems in the Weapons Data Base. These include all primary weapons, vehicles, and aircraft of the US, British, and German formations which operated in the Ardennes. Each system is identified by a unique designation, recorded under "Equipment Name" (Field 1) in the Weapons Data Base. In all but one case, there is one record per system in the Weapons Data Base. The one exception is the German cargo carrier truck, identified as "LKW" in the ACSDB (for Lastkraftwagen, or cargo truck). German documents and records do not distinguish between the various kinds of cargo trucks used by German units. Data is therefore provided for two of the most common variants in use.

The unique designations that identify the systems in the Weapons Data Base match exactly the designations recorded in the T/O&E and Weapons Data Bases of the ACSDB. For example, "M-4 75mm", the designation assigned to the M-4 "Sherman" medium tank used by US and British forces, is found in the Weapons Data Base, in Unit Inventory Data Base records of units equipped with this tank, and in T/O&E Data Base records of armored divisions and tank battalions equipped with it. The designations assigned to the systems were created to reflect in abbreviated format the full designation of the system, and to fit into the limited space available in the fields of the various data bases. Attachment 1 is a complete list of all weapon, vehicle, and aircraft designations in use in the ACSDB.

Under "Weapon System Description" and "Remarks" (Fields 18 and 30) is recorded information which describes the system. For some US and British systems additional text is provided in Attachment 2. This text was added because limited space in Fields 18 and 30 in some cases did not permit the inclusion of complete information on the system. Therefore, it is critical to a comprehensive review and to the most efficient use of the ACSDB Weapons Data Base that this paper be consulted. Additional descriptive information may also be found for some systems under "Remarks" in the Reference Data Base. (The data for each Weapons Data Base record is referenced by one record in the Reference Data Base.)

The Single-Shot Probability of Kill (SSPK) narrative prepared for the ACSDB should also be consulted when reviewing and using the Weapons Data Base, as should documents referenced as sources of data in that paper and for the Weapons Data Base. Much information is contained in these sources which, due to the format limitations of the Weapons Data Base records, could not be included in the Weapons Data Base. The subject of World War II-era weapons is a complex one, and all pertinent sources of information should be examined when studying the it.

Provided below are definitions of the fields used in the Weapons Data Base to record data on systems characteristics and specifications.

"Equipment Name" (Field 1): The unique designation assigned to each item of equipment recorded in the ACSDB. Attachment 1 is a complete listing of the equipment designations. Data was not recorded in the Weapons Data Base for most system variants or submodels, because they are not identified in the historical records of units. For example, there were three different production submodels of the German Panzerkampfwagen V "Panther" medium tank, the D, the A, and the G models. These differed in minor details such as secondary armament and commander's cupola design. The records of German units do not identify the submodel of the tank, but rather simply identify the tank as "PzKw V" or "V". Therefore, data for all three submodels of the Panther tank is not recorded in the Weapons Data Base.

"Nationality" (No field number): The nationality of the military force which employed the system in the Ardennes Campaign. "A" designates American (US), "B" designates British, and "G" designates German. Some systems were used by both US and British forces, such as the ".25 ton 4x4" (the 1/4 ton jeep) and the "M-4 75mm" (the M-4 Sherman medium tank). In these cases, the nationality of the manufacturing nation is used.

"Fuel Consumption Factor" (Field 2): This data is provided in either gallons used per 12 hours (gallons/12 hours) or miles per gallon (miles/gal). These values represent fuel consumption at cruising speed for aircraft and under average road conditions at moderate speeds for vehicles, except where otherwise specified under "Remarks".

"Ammo Weight Carried" (Field 3): Ammunition weight carried is provided in hundreds of pounds for systems which possess organic armament. This is the weight of the basic ammunition load of the system. For systems with more than one armament, it is the weight of the basic load of the primary armament, i.e., bomb load for aircraft and main gun ammunition for tanks. This is a computed value arrived at by multiplying the number of rounds carried by the weight of the individual round.

"Weapon Weight" (Field 4): This is the total weight in pounds of the entire system. Unless otherwise indicated under "Remarks", this weight is for systems with full fuel and ammunition loads.

"Individual Round Weight" (Field 5): This is the weight in pounds of the primary ammunition round used by systems which carry armament. This is complete round weight, including propellant, projectile, and casing. For aircraft, this is the individual weight of the most common bomb carried by the system. In the Weapons Data Base, the primary armament of aircraft is the bomb. Data on machine guns or cannons mounted on aircraft is recorded as secondary armament.

"Basic Load" (Field 6): Basic load is the number of rounds of ammunition either carried by the system, or carried by the system and carried in the trains of the unit equipped with the system. For combat vehicles, such as tanks, tank destroyers, and self-propelled artillery, the data provided is actually the ammunition load stowed on the vehicle, a figure normally significantly less than the basic load. For towed artillery and antitank guns, particularly in the case of the Germans, the information provided under "Basic Load" is of two different kinds. This is due to the fact that different sources were utilized, out of necessity, to generate basic load data. For data referenced by the source RH3/v.135, Munitions Allotment Tables for German Divisions, the figure provided is for number of rounds with the man or on the gun, i.e., weapon ("Mann, Gesch."). On systems that have the basic load field referenced by US National Archives Microfilm # T314,1594,1166 or T314,1134,232, or by "Ger. Army Equipment" (any of the volumes of the source Illustrated Record of German Army Equipment), the information provided reflects total basic load for the system, and not merely what was with the man or weapon. For many of the US systems, a breakdown between total basic load and ammunition forward with the man or weapon does exist. In these cases, the ammunition amount forward with the system is provided under "Basic Load" and the complete basic load is provided under "Remarks". In all cases, the "Remarks" field and any source(s) used for data should be consulted for clarification. For aircraft, data provided under "Basic Load" is the total number of bombs carried by the aircraft. If this data is maximum bomb load, it is so indicated under "Remarks". Alternate bomb load configurations, when known, are provided under "Remarks".

"Maximum Effective Range" (Field 7): In the sources used for weapons data, a variety of information is provided for ranges. These include vertical range for antiaircraft systems, maximum range for artillery pieces, and effective range against various targets for tank and antitank guns. The value entered under "Maximum Effective Range" is described under "Remarks" if it means anything other than the maximum effective range. See the SSPK narrative for further discussion on this subject.

"Failure on Issue (RAM)" (Field 8): This value represents the frequency of weapons failures due to failures intrinsic to the weapon itself. In no cases in the Weapons Data Base does this value represent reliability of drive train or automotive components; it pertains only to armament. For aircraft bombs, data is in some cases provided for the reliability of bomb release mechanisms, as indicated under "Remarks". In fact, only limited data was found on reliability of systems, and the SSPK narrative should be consulted for additional information on the subject.

"Crew Size" (Field 9): Crew size is the number of personnel required to operate the system as intended by design.

"Crew Specialty" (Field 10): Entries in this field indicate the so-called military occupational specialty (MOS) designations employed in the ACSDB. For definitions of these designations see the ACSDB Unit Data Base narrative. Entries under this field are made only for systems employed exclusively by units of a single MOS type, such as artillery pieces. Many systems were employed by artillery, infantry, armored, engineer, and other units, i.e., the ".25 ton 4x4" (the jeep) in widespread use with the US and British armies. The following abbreviations are entered under "Crew Specialty":

- Airmen	= Airmen (Aircraft Crewmen)
- Arty	= Artillery
- CVC	= Combat Vehicle Crewmen (Armor)
- Eng	= Engineer
- Inf	= Infantry
- Maint	= Maintenance
- Other	= Other, primarily Antiaircraft Artillery

"Sustained Rate of Fire" (Field 11): In most cases, the practical rate of fire which a weapon can fire in rounds per minute is entered under "Sustained Rate of Fire". For some systems, only the cyclic rate of fire is available in data sources. In these cases, the type of rate of fire is described under "Remarks". For aircraft, sustained rate of fire is equal to the standard bomb load carried by the aircraft.

"Sensor Type/Characteristics" (Field 12): Sensor type describes the sighting or detection system attached to or most commonly used in conjunction with a weapon. If available, additional data, such as the magnification power of the sight, is provided in Attachment 3.

"Sensor Range" (Field 13): Sensor range is the maximum distance in meters at which the most commonly engaged target can be detected by the sensor equipment organic to the weapon, under ideal environmental conditions.

"Off-road Movement Rate" (Field 14): Off-road movement rate is the speed in kilometers per hour at which a vehicle can move over cross-country terrain. For aircraft, speed is always recorded under "Off-road Movement Rate". Aircraft speed recorded in the Weapons Data Base is usually maximum speed, although cruising speed is also in some cases provided under "Remarks". Movement rates are provided for some towed systems as the speed of the towing vehicle with the system in tow. Standard movement rates of infantry, taken from World War II-era field manuals, are also provided for certain man-portable systems.

"On-road Movement Rate" (Field 15): On-road movement rate is the speed in kilometers per hour at which a vehicle can move over paved or hard-road surfaces. In general, this is equal to maximum speed in data source.

"Weapon Category" (Field 16): An abbreviated code is provided in this field to identify the type of system. The codes and their definitions are as follow:

- AAA-SP Self-propelled Antiaircraft Artillery
- AAA-T Towed Antiaircraft Artillery
- AC-B Bomber Aircraft
- AC-F Fighter Aircraft
- AC-FB Fighter-bomber Aircraft
- AC-LN Liaison Aircraft
- AC-NF Night-fighter Aircraft
- AC-T Transport Aircraft
- ArmCar Armored Car
- Arty-T Towed Artillery
- AT-Inf Man-portable Antitank Weapon
- AT-SP Self-propelled Antitank Gun
- AT-T Towed Antitank Gun
- Half-T Half-track
- HT Heavy Tank
- Inf-SP Self-propelled Infantry Support Weapon
- LT Light Tank
- Misc Miscellaneous (includes Flamethrowers, Ammunition Carriers, Tracked Personnel Carriers, Command Vehicles, Cranes, Demolition Vehicles, Motorcycles, and Horse-drawn Vehicles)
- MG Machine Gun
- Mortar Mortar
- MT Medium Tank
- PM Prime Mover
- Rkt-SP Self-propelled Rocket Launcher
- Rkt-T Towed Rocket Launcher
- RRArty Railroad Artillery
- RV Recovery Vehicle
- SPArty Self-propelled Artillery
- Trl Trailer
- Truck Wheeled Personnel or Cargo Carrier

"Sources" (Field 17): Entries here match exactly entries under "Source Number" in the Reference Data Base of the ACSDB, where information on sources used for weapons data is recorded. A prefix of "WA" is assigned to American (US) systems, "WB" for British systems, and "WG" for German systems. Each prefix is followed by a unique three-digit number. Note that all of the numbers are not consecutive. This is due to the fact that the ACSDB weapons list was drafted several times before a final, comprehensive list was prepared.

"Remarks" (Field 18): Entered under "Remarks" is information in text format which describes the system and qualifies or amplifies data in any of the other fields. For vehicles and aircraft with secondary armament, the secondary armament is briefly described here.

"Burst Area" (Field 19): The area of burst in square meters is provided in this field for systems which employ high-explosive ammunition, such as artillery and aircraft. For further discussion on this subject, consult the SSPK narrative.

"ANTIAIRCRAFT DATA -- Salvo Size" (Field 20): For magazine-fed, small-caliber antiaircraft guns, the capacity of the magazine, if known, is provided in this field. This data requirement, and the other requirements prefaced by "ANTIAIRCRAFT DATA", may be more relevant to modern surface-to-air missiles (SAMs). Therefore, any data entered under these fields may not have direct application in the ACSDB.

"ANTIAIRCRAFT DATA -- Time Between Reloads" (Field 21): No data is entered under this field, as it could not be found in research.

"ANTIAIRCRAFT DATA -- Shots Before Reloads" (Field 22): For belt- and magazine-fed antiaircraft systems (including machine guns), the belt or magazine capacity in rounds is provided under this field, if the data is available.

"ANTIAIRCRAFT DATA -- Maximum Targets" (Field 23): This is the maximum number of targets that an antiaircraft systems can engage. For most systems recorded in the ACSDB, this value should be one (1). Some large-caliber antiaircraft guns had radar direction capability, but no data was found on the number of systems that they could engage simultaneously.

"AIRCRAFT DATA -- Fuel Requirements" (Field 24): This is the maximum amount of fuel, in pounds, that an aircraft's fuel tank(s) can hold.

"AIRCRAFT DATA -- Range" (Field 25): This is the straight-line distance, in kilometers, that an aircraft can fly on a full load of fuel. It is not equal to combat radius.

"AIRCRAFT DATA -- Runway Length Needed" (Field 26): This is the distance, in feet, that an aircraft requires to take off or land.

"AIRCRAFT DATA -- Dry Cargo Capacity" (Field 27): This is the weight, in tons, of dry supplies that an aircraft can carry. This data is provided for only six aircraft in the ACSDB: C-47 (transport); Ju-52 (transport); B-17 (heavy bomber); B-24 (heavy bomber); Halifax (heavy bomber); and Lancaster (heavy bomber). For the bombers, this field is computed by subtracting the empty weight of the aircraft from the maximum loaded weight of the aircraft.

"AIRCRAFT DATA -- Wet Cargo Capacity" (Field 28): This is the weight, in tons, of wet supplies that an aircraft can carry. No information relevant to this data requirement was found in research for aircraft in the ACSDB.

"AIRCRAFT DATA -- Crew Rest Requirements" (Field 29): This is the maximum time, in days, that an aircrew can fly an aircraft. No data on crew rest requirements was found in research for aircraft in the ACSDB.

"Weapon System Description" (Field 30): This is a brief description of the system and includes, for weapons, the caliber (bore diameter) of the system (for tanks, the caliber of the main gun). A complete list of weapon systems descriptions is provided in Attachment 1.

SECONDARY ARMAMENT DATA #1 and SECONDARY ARMAMENT DATA #2 (Fields 31-42): For combat vehicles and aircraft with more than one type of armament, data is recorded under fields 31-42. This includes data for machine guns on tanks and machine guns and cannons on aircraft. Definitions of these fields are identical to those provided above, with the exception of "Weapon Category" (Field 31), which is defined as an abbreviation identifying the type of armament. The four abbreviations used are:

- B Aerial Bomb
- C Cannon
- Misc Miscellaneous (i.e., Flamethrower)
- MG Machine Gun

Primary and secondary sources were researched for data recorded in the Weapons Data Base. Data was not found for all data requirement for all systems. To reduce this lack of data for British systems, substitutions were made for requirements using suitable data from other German, US, and British systems. Attachment 4 lists the fields filled with substitute data and the systems from which this data was obtained.

Some data was not found for the ACSDB Weapons Data Base and could not be substituted with data from other systems. The

fields for which data is not available are filled with "9s" (i.e., "99", "999", "9999", etc.). Additional research may obtain this data, or further substitutions may be made.

Attachment 1

ACSDB Weapons Designations

US Designations

INFANTRY WEAPONS

M-1919 A4/A5 MMG	US M-1919 A4/A5 .30 caliber machine gun
M-2 .50 HMG	US M-2 .50 caliber heavy machine gun
M-9 2.36" Rkt	US M-9 2.36" rocket launcher ("bazooka")
M-2 60mm Mtr	US M-2 60mm mortar
M-1 81mm Mtr	US M-1 81mm mortar
M-1 4.2" Mtr	US M-1 4.2" chemical mortar

ANTI-AIRCRAFT ARTILLERY

M-55 4x.50	US M-55 quad .50 caliber towed heavy machine guns
M-16 4x.50	US M-16 quad .50 caliber self-propelled heavy machine guns
M-1 37mm AAA	US M-1 37mm towed anti-aircraft gun
M-15 37mm	US M-15 37mm self-propelled anti-aircraft gun w/twin .50 caliber heavy machine guns
M-1 40mm AAA	US M-1 40mm towed anti-aircraft gun
M-1A1 90mm AAA	US M-1A1 90mm towed anti-aircraft gun

ANTI-TANK (TOWED)

M-3A1 37mm AT	US M-3A1 37mm towed anti-tank gun
M-1 57mm AT	US M-1 57mm towed anti-tank gun
M-5 3" AT	US M-5 3" towed anti-tank gun

ARTILLERY

M-1 75mm How	US M-1 75mm pack howitzer
M-8 75mm SP	US M-8 75mm self-propelled howitzer
M-2A1 105mm How	US M-2 105mm towed howitzer
M-3 105mm How	US M-3 105mm towed infantry howitzer
M-7 105mm SP	US M-7 105mm self-propelled howitzer ("Priest")
M-1 4.5" Gun	US M-1 4.5" gun
M-1A1 155mm Gun	US M-1A1 155mm towed gun
M-12 155mm SP	US M-12 155mm self-propelled gun
M-1 155mm How	US M-1 155mm towed howitzer

M-1 8" How	US M-1 8" towed howitzer
M-1 8" Gun	US M-1 8" towed gun
M-1 240mm How	US M-1 240mm towed howitzer

ANTITANK AND INFANTRY SUPPORT (SELF-PROPELLED)

M-10	US M-10 3" tank destroyer
M-18	US M-18 76mm tank destroyer ("Hellcat")
M-36	US M-36 90mm tank destroyer ("Jackson")

TANKS

M-5 Tk	US M-5A1 light tank w/37mm gun ("Stuart")
M-24	US M-24 light tank w/75mm gun ("Chaffee")
M-4 75mm	US M-4 medium tank w/75mm gun ("Sherman")
M-4 76mm	US M-4 medium tank w/76mm gun ("Sherman")
M-4 A3E2	US M-4 medium tank w/75mm or 76mm gun ("Jumbo")
M-4 105mm	US M-4 medium tank w/105mm howitzer
M-4 MX	US M-4 medium tank w/mine exploding device
*M-4 Dozer	US M-4 medium tank w/bulldozer blade attached

HALF-TRACKS

M-3 HT	US M-3 half-track
M-21 81mm	US M-21 81mm half-track mounted mortar

ARMORED CARS

M-8 AC	US M-8 armored car w/37mm gun ("Greyhound")
M-20 AC	US M-20 armored utility vehicle

SOFTSKIN VEHICLES

.25 ton 4x4	US 1/4 ton truck ("jeep")
.25 ton trl	US 1/4 ton trailer
.75 ton 4x4	US 3/4 ton truck
*.75 ton Amb1	US 3/4 ton ambulance
1 ton trl	US 1 ton 2-wheeled trailer
1.5 ton 6x6	US 1-1/2 ton truck
2.5 ton 6x6	US 2-1/2 ton truck
2.5 ton Dump	US 2-1/2 ton dump truck

2.5 ton SWB	US 2-1/2 ton truck w/short wheel base
*2.5 ton wrecker	US 2-1/2 ton wrecker
2.5 ton trl	US 2-1/2 ton 4-wheeled trailer
750 gal trk	US 2-1/2 ton truck w/750 gallon tank (gasoline)
*700 gal trk	US truck w/700 gallon tank (water)
250 gal trl	US 250 gallon trailer (water)
4 ton 6x6	US 4 ton truck
4 ton trl	US 4 ton 2-wheeled trailer
4 ton wrecker	US 4 ton wrecker
5 ton 4x2 Tractor	US 5 ton tractor-trailer
*5 ton trl	US 5 ton trailer
6 ton 6x6	US 6 ton truck
7.5 ton 6x6	US 7-1/2 ton truck
8 ton trl	US 8 ton 4-wheeled trailer
10 ton wrecker	US 10 ton wrecker
40 ton tractor trailer	US 40 ton tank transporter/tractor-trailer
M-4 Tractor	US M-4 18 ton tracked prime mover
M-5 Tractor	US M-5 13 ton tracked prime mover
Clamshell trl	US trailer used to carry clamshell bucket used w/crane
crane	US truck-mounted crane
*DUKW	US 2-1/2 ton amphibious truck

MISCELLANEOUS ARMORED VEHICLES

M-30	US M-30 ammunition carrier used w/M-12 155mm SP
M-32	US M-32 tank recovery vehicle w/M-1 81mm Mtr
T-41	US T-41 tracked prime mover/armored utility vehicle

AIRCRAFT

Light Airplane	US Piper L-4 single-engine observation aircraft ("Grasshopper")
A-20	US Douglas A-20 twin-engine bomber ("Havoc")
A-26	US Douglas A-26 twin-engine bomber ("Invader")
B-17	US Boeing B-17 four-engine bomber ("Flying Fortress")
B-24	US Consolidated B-24 four-engine bomber ("Liberator")
B-25	US North American B-25 twin-engine bomber ("Mitchell")
B-26	US Martin B-26 twin-engine bomber ("Marauder")

C-47 US Douglas C-47 twin-engine transport plane
("Skytrain")
*F-5 Photoreconnaissance version of P-38
P-38 US Lockheed P-38 twin-engine fighter
("Lightning")
P-47 US Republic P-47 single-engine fighter-bomber
("Thunderbolt")
P-51 US North American P-51 single-engine fighter
("Mustang")
P-61 US Northrop P-61 twin-engine night-fighter
("Black Widow")

British Designations

INFANTRY WEAPONS

Bren MG	British Bren .303 caliber machine gun (air-cooled/magazine-fed)
Vickers MG	British Vickers .303 caliber machine gun (water-cooled/belt-fed)
Mtr 2"	British 2" light mortar
Mtr 3"	British 3" medium mortar
*Mtr 4.2"	British 4.2" mortar
PIAT	British man-portable antitank grenade projector (Projectile, Infantry, Anti-Tank)

ANTIAIRCRAFT ARTILLERY

20mm AA	British 20mm towed antiaircraft gun
40mm AA (T)	British 40mm Bofors towed antiaircraft gun
40mm AA (SP) (A-15)	British 40mm Bofors self-propelled antiaircraft gun (Crusader tank chassis)
AA tank (20mm)	British twin 20mm Oerlikon self-propelled antiaircraft guns (Crusader tank chassis)
3.7" AA (T)	British 3.7" towed antiaircraft gun

ANTITANK (TOWED)

6-pr AT (T)	British 6-pounder (57mm) towed antitank gun
17-pr AT (T)	British 17-pounder (76.2mm) towed antitank gun

ARTILLERY

25-pr (T)	British 25-pounder (3.45") towed gun-howitzer
25-pr (SP)	British 25-pounder (3.45") self-propelled gun-howitzer ("Sexton")
5.5" Med Gun	British 5.5" towed gun-howitzer
7.2" How	British 7.2" towed howitzer

ANTITANK AND INFANTRY SUPPORT (SELF-PROPELLED)

17-pr AT (SP)	British 17-pounder (76.2mm) self-propelled antitank gun (Valentine tank or US M-10 chassis)
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A-30 Challenger British 17-pounder (76.2mm) self-propelled antitank gun (Cromwell tank chassis)

TANKS

Churchill 6-pr (A22) British Churchill infantry tank w/6-pounder gun
Churchill 75mm (A22) British Churchill infantry tank w/75mm gun
Churchill 95mm (A22) British Churchill infantry tank w 95mm howitzer
Crocodile British Churchill tank w flamethrower and 75mm gun
Cromwell 75mm (A27) British Cromwell cruiser tank w 75mm gun
Cromwell 95mm (A27) British Cromwell cruiser tank w 95mm howitzer
Sherman 17-pr (M-4A4) British M-4 cruiser tank w 17-pounder gun ("Firefly")

ARMORED CARS

BSA Daimler SC British BSA Daimler scout car w/.303 caliber machine gun
Humber SC British Humber scout car w/.303 caliber machine gun
Lt Recon Car British Morris reconnaissance car w/.303 caliber machine gun
Daimler AC British Daimler armored car w/2-pounder gun
T17E1 Staghound British (US manufacture) armored car w/37mm gun
AEC AC British AEC armored car w/75mm gun (Mk III) or w/6-pounder gun (Mk II)

SOFTSKIN VEHICLES

15 CWT trk British 15 hundred weight truck
*15 CWT Water trk British 15 hundred weight water truck
*15 CWT Water trl British 15 hundred weight water trailer
*15 CWT trl British 15 hundred weight trailer
*15 CWT Ambl British 15 hundred weight ambulance
3 ton lorry British 3 ton truck
*3 ton Dump British 3 ton dump truck
Tractor C8 British Morris C8 wheeled artillery tractor
6 ton Scammel British 6 ton wheeled prime mover
Tractor

MISCELLANEOUS ARMORED VEHICLES

*Arm CV	British armored command/observation vehicle (US M-4 tank chassis)
T16	British Universal (Bren Gun) tracked carrier
ARV	British armored recovery vehicle (Churchill tank chassis)
*OP Tank	British armored command/observation vehicle (US M-4 tank chassis)
RAM K	British armored personnel carrier (Canadian tank chassis)
Ram	
*Av1B	British armored bridge-laying vehicle (Churchill tank chassis)

AIRCRAFT

Boston	British designation for US A-20
Halifax	British four-engine bomber
Lancaster	British four-engine bomber
Mitchell	British designation for US B-25
Mosquito	British twin-engine fighter-bomber/bomber/ photoreconnaissance aircraft/night-fighter
Mustang	British designation for US P-51
Spitfire	British single-engine fighter
Tempest	British single-engine fighter-bomber
Typhoon	British single-engine fighter-bomber

German Designations

INFANTRY WEAPONS

LMG	German MG-34/42 7.92mm light machine gun
HMG	German MG-34/42 7.92mm heavy machine gun
MMTR	German GrW 34 80mm mortar
HMTR	German GrW 42 120mm mortar
PF	German Panzerfaust 150-200mm man-portable antitank rocket launcher
PS	German Panzerschreck 88mm man-portable antitank rocket launcher (German equivalent of M-9 2.36" Rkt)
FLAM	German flamethrower

ANTI-AIRCRAFT ARTILLERY

FLAK15(d) SP	German MK 151 15mm self-propelled antiaircraft gun (three barrel)
FLAK20	German Flak 38 20mm towed antiaircraft gun (single barrel)
FLAK20 SP	German Flak 38 20mm self-propelled antiaircraft gun (single barrel)
FLAK20(v)	German 20mm towed antiaircraft gun (four barrel)
FLAK20(v) SP	German 20mm self-propelled antiaircraft gun (four barrel)
FLAK37	German Flak 43 37mm towed antiaircraft gun
FLAK37 SP	German Flak 43 37mm self-propelled antiaircraft gun
FLAK37(z)	German Flak 43 37mm towed antiaircraft gun (two barrel)
FLAK88	German Flak 41 88mm towed antiaircraft gun
FLAK105	German Flak 38 105mm towed antiaircraft gun

ANTITANK (TOWED)

PAK50	German Pak 38 50mm towed antitank gun
PAK75	German Pak 40 75mm towed antitank gun
PAK88	German Pak 43/41 88mm towed antitank gun

ARTILLERY

LIG	German LeIG 18 & 37 75mm towed light infantry guns
HIG	German SIG 33 150mm towed heavy infantry gun

HIG SP	German SIG 33 150mm self-propelled heavy infantry gun
K75	German 75mm towed gun (various models -- FK 40; FK 16 n.a.; Pak 97/38; FK(r); FK 240(d))
PAK43ARTY	German Pak 43 88mm towed antitank gun (used as artillery)
K105	German Kan 18 105mm towed gun
K128	German Kan 44 128mm towed gun
K152	German 152mm towed gun-howitzer (various models -- KH 433(r) and K 425(f))
K170	German 170mm towed gun on howitzer carriage (various models -- Kan.i.Mrs.L.; Kan(t); K 3; 52)
Kan	
LFH105	German 105mm towed howitzer (various models -- LeFH 18/40; LeFH 315(i))
LFH105 SP	German 105mm self-propelled howitzer
HFH150	German SFH 18 150mm towed howitzer
HFH150 SP	German SFH 18 150mm self-propelled howitzer
HFH122	German SFH 396(r) 122mm towed howitzer
HOW210	German Mrs 18 & 531(f) 210mm towed howitzers
HOW355	German 355mm towed howitzer (various models -- Mrs 1; Mrs 16(t); Mrs "Karl;" Mrs 601(f))
K240	German 240mm railway gun (various models -- Kan.Th.K; Kan.Th.Br.)
K280/5	German 280mm railway gun (various models -- K.5; K.5 gl; Kan.(f))
NW41	German Nebelwerfer 41 150mm towed six barrel rocket launcher
NW41 SP	German Nebelwerfer 41 150mm self-propelled ten barrel rocket launcher (Panzerwerfer 42)
NW42	German Nebelwerfer 42 210mm towed five barrel rocket launcher
NW42HVY	German Nebelwerfer 42 280mm (high explosive)/320mm (incendiary) towed six barrel rocket launcher (heavy)

(Note: (r) indicates weapon of Russian manufacture, (d) of Danish manufacture, (f) of French manufacture, (t) of Czechoslovakian manufacture, and (i) of Italian manufacture.)

ANTITANK AND INFANTRY SUPPORT (SELF-PROPELLED)

75HT	German half-track w/75mm howitzer (SdKfz 250/8 or 251/9)
PZJG-IV	German self-propelled antitank gun on PZ-IV chassis w/75mm L70 gun
PZJG-V	German self-propelled antitank gun on PZ-V chassis w/88mm L71 gun (Jagdpanther)
PZJG-38t	German self-propelled antitank gun on Czech chassis w/75mm L48 gun (Hetzer)
38t	

STG-III German self-propelled assault gun w/75mm gun
(various models -- Stg. III; Stg. IV; Pz Jg
IV(k); PAK 39(SP))

BRUM German Brummbaer self-propelled armored 150mm
heavy infantry gun

STG105 German self-propelled assault gun w/105mm
howitzer

STRM TIGER German Sturm Moerser self-propelled assault
vehicle on PZ-VI Tiger chassis w/380mm rocket
launcher

TANKS

PZ-IV German Mark IV medium tank -- all types
(w/75mm gun)

PZ-V German Mark V medium tank (Panther) -- all
types (w/75mm gun)

PZ-VI German Mark VIe heavy tank (Tiger I) -- all
types (w/88mm gun)

PZ-VIb German Mark VIb heavy tank (Tiger II) -- all
types (w/88 mm gun)

ARMORED CARS

LAC German armored cars w/20mm gun (all types --
includes SdKfz 250/9 half-track)

HAC German armored cars w/50mm or 75mm gun (all
types)

HALF-TRACKS

LHT German SdKfz 250 half-track -- all types

MHT German SdKfz 251 half-track -- all types

SOFTSKIN VEHICLES

KK German motorcycle and motorcycle half-track

PKW German wheeled personnel carrier

LKW German wheeled cargo carrier

trl German trailer

MAUL German Maultier half-track cargo carrier

RCV German SdKfz 100 & 9/1 recovery vehicle

1-5t PM German 1-5 ton half-track prime movers

8-18t PM German 8-18 ton half-track prime movers

RSO German Raupenschlepper Ost and Schwere
HDR Wehrmacht Schlepper full-track prime movers
German horse-drawn vehicle

MISCELLANEOUS ARMORED VEHICLES

BGPZ-III German armored recovery vehicles on PZ-III
chassis
BGPZ-V German armored recovery vehicle on PZ-V
chassis
BEPZ-III/IV German armored command/observation vehicles
on PZ-III/IV chassis
BEPZ-V German armored command/observation vehicle on
PZ-V chassis
GOL German Goliath wire-controlled demolition
vehicle FKL German Funklenk armored radio-
controlled demolition vehicle

AIRCRAFT

Ar-234 German Arado 234 twin-engine jet boml
Fw-190 German Focke-Wulf 190 single-engine fighter-
bomber
Fw-190D German Focke-Wulf 190D single-engine fighter-
bomber
Ju-52 German Junkers 52 twin-engine transport plane
Ju-88 German Junkers 88 twin-engine bomber
Me-109 German Messerschmitt 109 single-engine
fighter-bomber
Me-262 German Messerschmitt 262 twin-engine jet
fighter-bomber

An asterisk (*) indicates that 1) sufficient data was not available for this system to create a weapons record, 2) that the system was very similar to other systems for which data was recorded in a weapons record (this data should be used as a substitute), or 3) that the system appears in insignificant numbers in the ACSDB and does not warrant a weapons record.

Attachment 2

Additional Descriptions of ACSDB Weapons

BRITISH

Equipment Name: 25-pr (SP)

Field 4: Combat weight.

Field 5: HE projectile weight is 25 lbs.

Equipment Name: RAM K

Fields 2 & 15: Based on standard RAM tank version.

Field 6: Standard RAM tank had 880 rounds.

Field 9: Could carry between 8 and 11 infantrymen.

Equipment Name: Churchill 75mm (A22)

Also had a Bren LMG with 600 rounds of ammo.

Field 6: 44 rounds of 75mm ammo were stored in the turret.

Field 7: This is maximum effective range, head-on, against the PZ-IV turret front. Maximum effective range against lower hull front is 1,097 meters. Not effective against the PZ-VI.

Field 38: This is actual rate of fire; 800 rounds a minute with an accelerator.

Equipment Name: Churchill 6-pr (A22)

Also carried a Bren LMG with 600 rounds of ammo.

Fields 6 & 35: Based on Marks III and IV.

Field 7: This is maximum effective range, head-on, against the PZ-IV turret front. Maximum effective range against lower hull front is 1,335 meters. Maximum effective range, head on, against PZ-VI is 293 meters, against the upper hull front.

Equipment Name: Churchill 95mm (A22)

Also carried a Bren LMG with 600 rounds of ammo.

Equipment Name: Crocodile

Field 4: This includes the 12,000 lb. trailer, and is combat weight.

Field 7: This is maximum effective range, head-on, against the PZ-IV turret front. Maximum effective range against lower hull front is 1,097 meters. Not effective against the PZ-VI.

Field 35: 480 gallons which was sufficient to generate 80 one-second bursts.

Field 38: The system could fire continuously, thus 60 one-second bursts in a minute.

Equipment Name: BSA Daimler SC

Used for reconnaissance and patrol work. Has a 200 mile radius of action.

Field 31: This is a bolt-action, magazine-fed rifle, meant to be fired from a bipod.

Field 41: This weapon fires an armor-piercing bullet.

Equipment Name: Humber SC

This vehicle had a range of 200 miles.

Field 6: 1,100 rounds on vehicle and 220 in unit trains for a total of 1,320.

Field 9: 2 to 3 men.

Equipment Name: Daimler AC

Vehicle has a radius of 150 miles.

Field 6: 80 rounds on the vehicle and 5 in unit trains for total of 85.

Field 15: This is maximum speed.

Equipment Name: AEC AC

This vehicle had a diesel engine. This vehicle had a range of 250 miles.

Field 7: This is maximum effective range, head-on, against PZ-IV turret front. Maximum effective range against lower hull front is 1,097 meters. Not effective against PZ-VI.

Equipment Name: Cromwell 75mm (A27)

This vehicle had a range of 173 miles.

Field 7: This is maximum effective range, head-on, against PZ-IV turret front. Maximum effective range against lower hull front is 1,097 meters. Not effective against PZ-VI.

Equipment Name: A-30 Challenger

This was a cruiser tank. This vehicle had a road radius of 120 miles.

Equipment Name: Sherman 17-pr (M-4A4)

Field 5: This may be 29 lbs.

Field 15: This is maximum speed.

Equipment Name: T17E1 Staghound

Field 4: This is gross weight.

Field 7: This is maximum effective range, head-on, against the PZ-IV (turret only). Not effective against the PZ-VI.

Equipment Name: Bren MG

Field 6: 330 rounds on individual and 420 in unit trains for a total of 750 rounds.

Field 7: On bipod.

Field 9: Based on photographs, 1 to 2 men.

Fields 14 & 15: These are walking speeds of infantry.

Equipment Name: Vickers MG

Field 3: Computed. Ammunition carried on a vehicle.

Field 4: This is with water; 32 lbs. without water.

Field 6: 8,000 rounds on prime mover and 1,000 rounds in unit trains for a total of 9,000.

Field 9: Based on photographs, 2 to 3 men.

Fields 14 & 15: Dependent on transportation provided. Figures given are walking speeds of infantry.

Equipment Name: Mtr 2"

Field 6: 54 with the mortar and 72 in the unit trains for a total of 126.

Fields 14 & 15: These are walking speeds of infantry. This system was also often transported by truck.

Equipment Name: Mtr 3"

Field 6: 96 rounds with the mortar and 60 more in unit trains for a total of 156.

Field 7: This is maximum range of the Mark 2 model. The Mark I has a range of only 1,463 meters.

Fields 14 & 15: Weapon normally transported by truck. Numbers provided are dismounted rates for infantry.

Equipment Name: T16

This vehicle is a high speed full-tracked cargo carrier designed to transport personnel, ammunition, and accessories.

Field 4: This is gross weight.

Field 6: 1,100 rounds on vehicle and 220 in unit trains for a total of 1,320.

Equipment Name: 6-pr AT (T)

Field 9: 4 to 5 men.

Fields 14 & 15: The data provided is for identical US system.

Equipment Name: 25-pr (T)

Field 6: 56 on prime mover and 80 in unit trains and 192 carried in battalion trains for a total of 328.

Field 9: Based on photos of guns in action.

Fields 14 & 15: The data provided is for comparable US system.

Equipment Name: 40mm AA (T)

Fields 14 & 15: The data presented is for identical US system.

Equipment Name: 15 CWT trk

These vehicles could carry 7 personnel, or 1-1/5 tons of cargo.

Field 4: This is net weight.

Field 15: Governed.

Equipment Name: 3 ton lorry

These vehicles could carry 28 personnel, or up to 3-2/5 tons of cargo.

Field 4: This is net weight.

Field 10: Vehicle was used by all units.

Equipment Name: Tractor C8

This is the standard prime mover for all field artillery.

Field 4: This is net weight.

Field 9: Could carry 6-7 personnel.

Field 15: This is governed maximum speed.

Equipment Name: Lt Recon Car

Field 6: 1,100 rounds on vehicle and 220 in unit trains for a total of 1,320.

Equipment Name: 17-pr AT (T)

Field 4: In action weight.

Field 6: 34 rounds on prime mover and 36 rounds in battalion trains for a total of 70.

Field 7: This is maximum range, not maximum effective range against armor. Firing 16 lb., 15 oz. AP shot penetration was 109mm at 1,000 yds at 30 degree angle. Firing the 17 lb. APC shot penetration was 118mm at 1,000 yds at 30 degree angle. Firing 7 lb. 10 oz. APDS shot penetration was 231mm at 1,000 yds at 30 degree angle.

Equipment Name: ARV

Field 9: This data is for the Churchill ARV I.

Equipment Name: PIAT

Field 6: 6 rounds with weapon and 1 in unit trains for a total of 7.

AMERICAN (US)

Equipment Name: M-16 4x.50

Field 6: 5,000 rounds on vehicle and 795 rounds in unit trains.

Field 7: This is maximum effective range in antiaircraft role due to tracer burnout. Maximum effective range against ground targets is 1,829 meters.

Equipment Name: M-1A1 90mm AAA

Field 4: This is total weight of gun and mount.

Field 6: 54 rounds with gun and 68 rounds in unit trains for a total of 122.

Equipment Name: M-1 37mm AAA

Field 7: This is maximum vertical range. Maximum horizontal range is 8,115 meters.

Field 11: This is maximum rate of fire - not sustained rate of fire.

Equipment Name: M-8 AC

Field 4: This is fully loaded combat weight. Unloaded vehicle weighs 14,500 lbs.

Field 6: 80 on vehicle and 5 in unit trains for a total of 85 rounds.

Field 7: This is maximum effective range, head-on, against the PZ-IV (turret only). Not effective against upper and lower hull front of PZ-IV. Not effective head-on against PZ-VI.

Field 11: This is aimed fire. 30 rounds per minute maximum rate of fire.

Field 35: 550 with vehicle and 220 on unit trains for a total of 770.

Field 38: Maximum rate is 400-600.

Field 45: 1,250 with vehicle and 1,250 with unit trains for a total of 2,500.

Field 48: Maximum rate is 450-600.

Equipment Name: M-20 AC

Field 4: This is loaded combat weight. Unloaded it weighs 12,800 lbs.

Field 6: 1,100 with vehicle and 220 with unit trains for a total of 1,320 rounds.

Equipment Name: M-9 2.36" Rkt

Field 6: 6 rounds carried on individual and 1 round in unit trains.

Field 7: Maximum effective range against a tank target is 274 meters. (Source: "Inspection of Special Weapons and Vehicles at the Ordnance Research Center, Aberdeen Proving Ground, 23 Feb 1944", page 1.)

Equipment Name: M-18

- Field 6: 48 rounds on vehicle and 32 in battalion trains for a total of 80.
- Field 7: This is maximum effective range, head-on, against PZ-IV turret front. Maximum effective range against PZ-IV lower hull front is 2,780 meters. Maximum effective range, head-on, against the PZ-VI is 933 meters.
- Field 11: This is maximum rate of fire.
- Field 15: On level ground.
- Field 19: Effective area of burst - 27.4 meters lateral, 9.1 meters range.

Equipment Name: M-36

- Field 6: 47 rounds on vehicle and 33 with battalion trains for a total of 80.
- Field 7: This is maximum effective range, head-on, against turret front of a PZ-IV. Maximum effective range against lower hull front of PZ-IV is 3,731 meters. Maximum effective range against PZ-VI, head-on, is 2,652 meters against upper hull front and 1,719 meters against lower hull front.
- Field 11: This is maximum rate of fire.
- Field 15: This is maximum speed on level surface.
- Field 19: Effective area of burst - 36.6 meters lateral, 13.7 meters range.
- Field 38: Maximum rate of fire is 400-600 rounds per minute.

Equipment Name: M-5 3" AT

- Field 6: 34 with gun and 36 in battalion trains for a total of 70.
- Field 7: This is maximum effective range, head-on, against a PZ-IV turret front. Maximum effective range, head-on, against PZ-IV lower hull front is 2,780 meters. Maximum effective range against a PZ-VI, head-on, is 933 meters.

Equipment Name: M-3A1 37mm AT

- Field 3: Computed
- Field 6: 80 rounds with gun and 20 rounds in battalion trains for a total of 100 rounds.
- Field 7: This is maximum effective range against PZ-IV, head-on (turret only). Not effective, head-on, against a PZ-VI.

Equipment Name: M-1 57mm AT

Field 6: All rounds with vehicle.

Field 7: This is maximum effective range, head-on, against the PZ-IV turret front. Maximum effective range, head on, against lower hull front is 1,335 meters. Maximum effective range against the PZ-VI, head-on, is 293 meters, against the upper hull front.

Field 9: 4 to 5 men.

Equipment Name: M-12 155mm SP

Field 6: 10 on vehicle; 40 on M-30 cargo carrier that traveled with the gun; and 30 in the 3d or 5th section for a total of 80.

Field 11: Maximum rate of fire is 4 rounds per minute.

Field 19: Effective area of burst - 54.9 meters lateral, 16.5 meters range.

Equipment Name: M-3 105mm How

Field 4: In firing position.

Field 6: 30 rounds carried on 1-1/2 ton truck prime mover and 80 rounds carried in unit trains for a total of 110. If towed by half-track, 64 rounds on prime mover and 80 rounds in unit trains for a total of 144.

Field 11: Maximum rate of fire is 6 rounds per minute.

Field 19: Effective area of burst - 45.7 meters lateral, 13.7 meters range.

Equipment Name: M-7 105mm SP

Field 6: For standard armored division and separate battalions, 108 rounds on carrier, 33 rounds in 3d or 5th section, and 80 rounds in battalion trains, for a total of 221. (Note: Catalogue of Standard Ordnance Items, 2d Edition, 1944, lists load on vehicle as 69 rounds.)

Field 11: Based on M-2 105mm howitzer (towed). (Maximum rate of fire is 4 rounds per minute.)

Field 19: Effective area of burst - 45.7 meters lateral, 13.7 meters range.

Field 38: 400-600 rpm cyclic rate.

Equipment Name: M-8 75mm SP

Field 6: 202 rounds were carried on the vehicle and with its accompanying trailer (46 rounds actually on the M-8 motor carriage) and 10 rounds in unit trains, for a total of 212.

Field 11: Maximum rate of fire 6 rounds per minute.

Field 15: This is maximum speed on level ground.

Field 19: Effective area of burst - 27.4 meters lateral, 9.1 meters range.

Field 35: 330 rounds with the vehicle; and 220 in unit trains for total of 550.

Equipment Name: M-2A1 105mm How

Field 6: 42 rounds carried on prime mover; 80 carried in 3d or 5th section; and 119 carried in battalion trains, for a total of 241.

Field 11: This is maximum rate of fire.

Field 19: Effective area of burst - 45.7 meters lateral, 13.7 meters range.

Equipment Name: M-1 8" How

Field 6: 12 rounds on prime mover and 67 rounds carried in 3d or 5th section.

Field 19: Effective area of burst - 73.2 meters lateral, 18.3 meters range = 1,339.

Equipment Name: M-1 240mm How

Field 6: 30 rounds on prime mover and 20 rounds in 3d or 5th section.

Field 19: Effective area of burst - 91.4 meters lateral, 22.9 meters range.

Equipment Name: M-1A1 155mm Gun

Field 6: 36 rounds on prime mover and 73 rounds in 3d or 5th section, when truck-drawn. When tractor-drawn, it was 30 rounds and 68 rounds respectively, for a total of 98.

Field 19: Effective area of burst - 54.9 meters lateral, 16.5 meters range.

Equipment Name: M-1 155mm How

Field 6: When truck-drawn; 36 rounds on prime mover, 40 rounds in 3d or 5th section, and 54 in battalion trains for a total of 130. When tractor-drawn; 24 on prime mover, 63 in 3d or 5th section, and 54 in battalion trains for a total of 141 rounds.

Field 19: Effective area of burst - 54.9 meters lateral, 16.5 meters range.

Equipment Name: M-1 75mm How

Field 4: The standard version of this howitzer with the M1 carriage weighs 1,269 lbs. The airborne version on the M8 carriage is identical except for different wheels.

Field 19: Effective area of burst - 27.4 meters, lateral, 9.1 meters range.

Equipment Name: M-1 4.5" Gun

Field 6: 38 rounds on prime mover, 103 rounds in the 3d or 5th section, and 98 rounds in battalion trains, for total of 239.

Field 11: Maximum rate of fire, 4 rounds per minute.

Equipment Name: M-2 .50 HMG

- Field 4: Gun with tripod M-3 and 45" barrel
- Field 5: 100 rounds weighed 30 lbs. (Source is FM 101-10 Oct 1943, page 602.)
- Field 6: This is for infantry units. 330 rounds on the prime mover and 110 rounds in unit trains.
- Field 7: 4,000 meters in indirect fire mode.
- Fields 14 & 15: This is the rate at which dismounted infantry moves.

Equipment Name: M-1919 A4/A5 MMG

- Field 6: This is for infantry general purpose vehicles, with 750 on prime mover and 750 in battalion trains for a total of 1,500. Basic load is 2,000 for infantry combat vehicles with 1,250 on prime mover and 750 in battalion train.
- Field 7: Maximum effective range in the indirect fire mode; 3,658 meters with M-1 ammunition. (Source is FM 101-10 Oct 1943, page 602.)
- Field 10: For those mounted in combat vehicles.
- Field 11: Maximum rate of fire: 400-500 round per minute (Catalogue of Standard Ordnance Items, 2d Edition, 1944, page 406). Maximum usable rate: 150 rounds per minute.
- Fields 14 & 15: Depends on vehicle on which it is mounted.

Equipment Name: M-5 Tk

- Field 6: 123 rounds on vehicle, and 5 more in unit trains for total of 128.
- Field 7: This is maximum effective range, head-on, against the PZ-IV (turret only). Not effective against PZ-IV hull front. Not effective against PZ-VI, head-on.
- Field 11: Maximum rate of aimed fire.
- Field 14: This is maximum speed on level ground.
- Field 35: 6,250 rounds on vehicle, and 500 in unit train for total of 6,750.
- Field 46: 640 meters in antiaircraft role.

Equipment Name: M-24

- There was a second .30 caliber machine gun mounted in the bow.
- Field 2: Highway; cross country 9 miles per gallon.
- Field 6: 48 rounds on vehicle and 20 in unit train, for total of 68.
- Field 7: This is maximum effective range, head-on, against PZ-IV turret front. Maximum effective range, head-on, against lower hull front is 1,097 meters. It is ineffective, head-on, against the PZ-VI.
- Field 15: Maximum speed on level ground.
- Field 35: 3,750 rounds on vehicle; 1,250 in unit train, for

total of 5,000.
Field 45: 330 rounds on vehicle; 220 in unit train for total of 550.
Field 46: 914 meters in antiaircraft role.

Equipment Name: M-4 75mm

Data provided is on the M-4 A4 version. There is one additional .30 caliber machine gun in bow.
Field 6: 90 rounds on vehicle, and 40 in unit train for total of 130.
Field 7: This is maximum effective range, head-on, against PZ-IV turret front. Maximum effective range, head-on against lower hull front is 1,097 meters. It is ineffective, head-on, against PZ-VI.
Field 35: 6,750 rounds on vehicle, 500 in unit train for total of 7,250.
Field 45: 330 rounds on vehicle, 220 in unit trains for total of 550.
Field 46: 914 meters in antiaircraft role.

Equipment Name: M-10

Field 6: 68 rounds on vehicle, and 28 in battalion trains for total of 96.
Field 7: This is maximum effective range, head-on, against the turret front of PZ-IV. Maximum effective range against lower hull front is 2,780 meters. Maximum effective range, head-on, against the PZ-VI is 933 meters.
Field 15: This is maximum speed on level ground.
Field 36: 914 meters in antiaircraft role.

Equipment Name: M-4 76mm

Field 6: 71 on vehicle, 15 in unit train, for total of 86.
Field 7: This is maximum effective range, head-on, against the PZ-IV turret front. Maximum effective range against lower hull front is 2,780 meters. Maximum effective range, head-on, against the PZ-VI is 933 meters.
Field 11: This is maximum rate of fire.
Field 15: Maximum speed on level ground.
Field 35: 330 rounds on vehicle, 220 in unit train for total of 550.
Field 45: 6,250 on vehicle, 500 rounds in unit train for total of 6,750.

Equipment Name: M-1 81mm Mtr

Field 6: 96 rounds on prime mover, and 60 rounds in unit trains for total of 156.
Fields 14 & 15: These are the rates of movement for dismounted infantry.
Field 19: Effective radius of burst - 17 yards.

Equipment Name: M-1 4.2" Mtr

Field 6: 30 rounds on prime mover, and 70 rounds in battalion trains, for total of 100.

Fields 14 & 15: Depends on vehicle it is being transferred on.

Field 19: Effective radius of burst - 20 yards.

Equipment Name: M-2 60mm Mtr

Field 6: 54 rounds with mortar, and 72 rounds carried in unit train for total of 126.

Field 19: Effective radius of burst - 11 yards.

Equipment Name: M-21 81mm

Field 6: 96 rounds on carrier, and 60 in unit trains, for total of 156.

Field 15: This is maximum speed on level ground.

Field 19: Effective radius of burst - 17 yards.

Field 35: 770 rounds on carrier, and 220 in unit trains for total of 990.

Field 45: 3,750 on vehicle, and 1,250 in unit trains for total of 5,000.

Equipment Name: 7.5 ton 6x6

This vehicle can tow the M-1 8" How, or the M-1 155mm Gun
In the prime mover role this vehicle is armed with one M-2 .50 HMG.

Field 4: This is curb weight. Gross weight is 43,570 lbs. The payload is 15,450 lbs., without towed load (with towed load it is 5,000 lbs.)

Field 15: This is maximum speed with a towed load on a smooth concrete highway.

Equipment Name: 1 ton trl

Field 4: Gross weight is 3,460 lbs. Payload is 2,000 lbs.

Fields 14 & 15: This is dependent on the vehicle pulling the trailer.

Equipment Name: .75 ton 4x4

Field 4: This is curb weight. Gross weight is 7,550, with a cargo capacity of 1,800 lbs.

Field 9: Varies.

Field 15: This is maximum speed for gross weight without towed load.

Equipment Name: 4 ton 6x6

This vehicle can tow a 12,000 lb. trailer. Body styles are cargo, wrecker, and dump. One vehicle in four is equipped with one M-2 .50 HMG mount.

Field 4: Gross weight 26,400 lbs. Payload is 8,300 lbs.

Field 15: This is maximum speed for gross weight without towed load.

Equipment Name: 2.5 ton 6x6

Vehicle can tow up to a 4,000 lb load.

Field 4: This is curb weight without winch. Gross weight is 15,485 lbs. Payload is 5,300 lbs.

Field 15: This is maximum speed for gross weight without towed load.

Equipment Name: 1.5 ton 6x6

This vehicle can tow a load up to 4,000 lbs.

Field 4: This is curb weight. Gross weight is 11,500 lbs. Payload is 3,320 lbs.

Field 15: This is maximum speed for gross weight without towed load.

Equipment Name: .25 ton 4x4

This vehicle can tow a 37mm antitank gun or 1/4 ton trailer.

Field 4: This is curb weight. Gross weight is 3,250 lbs. Payload is 800 lbs. This vehicle can tow up to a 1,000 lb load.

Field 10: Varies.

Field 15: This is maximum speed for gross weight without towed load. With towed load maximum speed is 80.45 kph.

Fields 3,5,6,7,11,12,13, and 19: Provision is made for this vehicle to be armed with one M-1919 A4/A5 MMG or one M-2.50 HMG. Data listed is for MMG.

Equipment Name: M-15 37mm

Field 7: This is maximum vertical range. Maximum horizontal range is 8,115 meters.

Fields 6 & 35: All ammunition carried on vehicle.

Field 11: This is maximum rate of fire.

Field 15: This is maximum speed on level ground.

Field 36: This is maximum effective range in antiaircraft role due to tracer burnout.

Field 38: This is maximum rate of fire.

Equipment Name: M-4 A3E2

Field 7: This is maximum effective range, head-on, against the PZ-IV turret front. Maximum effective range, head-on, against lower hull front is 1,097 meters. It is ineffective, head-on, against the PZ-VI.

Field 12: Telescopes M71G, M38A2.

Field 15: This is maximum speed.

Equipment Name: M-3 HT

Field 6: 770 rounds on vehicle and 220 in unit trains for a total of 990.

Field 15: This is maximum speed on level ground.

Field 35: 3,750 rounds on vehicle and 500 rounds in unit trains.

Equipment Name: 750 gal trk

Field 4: This is curb weight. Gross weight is 15,450 lbs.
(5,000 lb. cargo) Can tow up to 4,500 lb. load.

Equipment Name: 250 gal trl

Field 4: This is curb weight. Gross weight is 3,390 lbs.
(2,000 lb. payload.)

Fields 14 & 15: Dependent on towing vehicle.

Equipment Name: .25 ton trl

Field 4: This is curb weight. Gross weight is 1,050 lbs.
Payload is up to 500 lbs.

Fields 14 & 15: These are dependent on the type of vehicle
towing it. At gross weight the trailer is
capable of being towed for indefinite
periods of time under all conditions of
terrain and speeds encountered in military
operations.

Equipment Name: M-55 4x.50

Field 6: Carried on prime mover or half-track in self-
propelled battalions. (800 rounds carried loaded
in guns.)

Field 7: In antiaircraft role due to tracer burnout.
Maximum effective range against ground targets is
1,829 meters.

Field 11: Sustained - 160 rounds per minute.

Field 12: Navy reflector sight Mk IX.

Fields 14 & 15: Dependent on towing vehicle.

Field 22: 200 rounds for each gun.

Equipment Name: M-5 Tractor

This is a prime mover for artillery loads weighing up to
16,000 lbs; along with the personnel, ammunition, and
relevant equipment.

Field 4: This is gross weight.

Field 6: These are for one M-2 .50 HMG. This vehicle would
also carry either 56 rounds of 105mm, 38 rounds of
4.5" gun, or 24 rounds of 155mm ammunition.

Field 15: This is maximum speed towing M-1 155mm How on
level ground.

Equipment Name: M-4 Tractor

Field 4: This is gross weight.

Field 15: This is maximum speed towing M-1A1 90mm AAA on
level ground.

Equipment Name: M-4 105mm

A second .30 caliber machine gun was also mounted on this vehicle.

Field 5: This is the high-explosive M1 round.

Field 6: 68 rounds on vehicle, and 40 in unit trains for total of 108.

Field 11: This is maximum rate of fire for the M4 105mm gun mounted on the M37 motor carriage.

Field 12: Periscope M4 with Telescope T73.

Field 15: This is maximum speed on level ground.

Field 19: Effective area of burst - 45.7 meters lateral, 13.7 meters range.

Field 35: 6,500 rounds on vehicle or with accompanying vehicle, and 500 in unit train for total of 7,000.

Field 39: Periscope M4 with Telescope T73.

Field 45: 330 rounds carried on vehicle, and 220 in unit train for total of 550.

Equipment Name: T-41

This vehicle has stowage and accessory equipment for use as a prime mover for the M-5 3" AT. It carries the crew and initial rounds of ammo for the gun. This vehicle was intended to be used with US towed tank destroyer battalions, but by late-1944 had not replaced the M-3 HT as the standard towing vehicle.

Field 6: This is for the M-2 .50 HMG. The vehicle also carries up to 42 rounds of 3" ammo.

Equipment Name: M-1 8" Gun

Field 6: 32 rounds carried on prime mover and 38 rounds carried in 3d or 5th section.

Field 12: Panoramic Telescope M12

Field 19: Effective area of burst - 73.2 meters lateral, 18.3 meters range, which equals 1,339.56 square meters.

Equipment Name: 6 ton 6x6

One in four was equipped with one M-2 .50 HMG mount. (This applies only to the prime mover version.)

Field 4: This is curb weight. Gross weight is 34,370 lbs. (Payload of 12,350 lbs.) Could tow a load up to 16,500 lbs.

Field 10: Varied.

Field 15: This is maximum speed for gross weight without towed load.

Equipment Name: 1.5 ton 6x6

One vehicle in four had one M-2 .50 HMG mount.

Field 4: This is curb weight. Gross weight is 10,525 lbs. (Payload of 3,300 lbs.) Could tow up to a 3,500 lb load.

Field 15: This is maximum speed for gross weight without towed load.

Equipment Name: 2.5 ton Dump

Field 4: This is curb weight. Gross weight is 13,010 lbs. (Payload is 5,000 lbs.)

Field 15: This is maximum speed for gross weight.

Equipment Name: 2.5 ton SWB

Field 4: This is curb weight. Gross weight is 15,350 lbs. (Payload is 5,350 lbs.) Can tow up to 4,500 lbs.

Field 15: This is maximum speed for gross weight without towed load.

Equipment Name: 4 ton wrecker

Vehicle used for light recovery operations of wheeled vehicles.

Field 4: This is gross weight.

Field 10: This varies.

Equipment Name: crane

This vehicle is meant to operate in conjunction with the M-1 240mm How and the M-1 8" Gun.

Field 4: This is gross weight.

Field 15: This is maximum speed on level ground.

Equipment Name: Clamshell trl

Field 4: This is empty weight. Loaded weight is 8,240 lbs with the clamshell bucket, and ten 3" x 24" x 10' timbers.

Fields 14 & 15: This assumes it is being pulled by the truck mounted crane, M2.

Equipment Name: 4 ton trl

This is an ammunition trailer.

Field 3: This is based on 108 4.5" rounds.

Field 4: This is gross weight. This trailer is designed to hold 72 complete 155mm howitzer rounds, or 108 complete 4.5" gun rounds.

Fields 14 & 15: These are dependent on towing vehicle.

Equipment Name: 8 ton trl

Field 3: This is based on 32 rounds of 240mm howitzer ammunition.

Field 4: This is net weight. Gross weight is 26,000 lbs. (The trailer has a 16,000 lb payload.) It is designed to carry 32 complete 240mm howitzer rounds, 33 complete 8" gun rounds, 60 complete 8" howitzer rounds, or 96 complete 155mm rounds.

Equipment Name: 5 ton 4x2 Tractor

Field 4: This is curb weight. Gross weight is 20,410 lbs. (Payload is 12,300 lbs.) Can tow up to 28,000 lbs.

Field 15: This is maximum speed for gross weight without towed load.

Equipment Name: 2.5 ton trl

Data provided is for the K-72 van.

Field 4: This is gross weight. Payload is 5,000 lbs.

Equipment Name: 10 ton wrecker

Field 4: This is curb weight. Gross weight is 38,500 lbs. (Payload is 8,450 lbs.)

Field 15: This is maximum speed for gross weight on level ground.

Equipment Name: M-32

This vehicle is a modification to the M-4 medium tank, designed primarily for recovery of tanks from the battle field.

Field 4: This is gross weight.

Field 19: Effective radius of burst - 17 yards.

Equipment Name: 40 ton tractor trailer

Normal towed load for this system is 115,000 lbs.

Field 4: This is gross weight of tractor and trailer without a tank load. (With tank load; 163,300 lbs.)

Field 15: This is maximum speed on level ground.

Equipment Name: 5 ton 4x2 Tractor

Field 4: This is curb weight. Gross weight is 20,493 lbs. (Payload is 10,300 lbs.)

Field 15: This is maximum speed on level ground.

Equipment Name: M-4 MX

Data provided is based on the M-4 A4 tank. There was a second .30 caliber machine gun in the bow.

Field 7: This is maximum effective range, head-on, against the PZ-IV turret front. Maximum effective range, head-on, against lower hull front is 1,097 meters. Ineffective, head-on, against the PZ-VI.

Field 12: Periscope M4 (w/Telescope M38).

Field 14: This was speed while engaged in mineclearing action.

Field 39: Periscope M4 (w/Telescope M38).

Equipment Name: M-30

Field 6: This vehicle also carried 40 rounds of 155mm ammo for the M12.

Field 9: 5 to 6 men.

Equipment Name: P-38

Ceiling is 44,000 ft.

Fields 3, 5, & 6: It could carry two 1,000 lb. or two 1,600 lb. bombs, or ten 5-inch rockets.

Field 36: This is maximum range for the H.E.I. 20mm Mk I round.

Equipment Name: P-47

Ceiling is 42,000 ft.

Field 3: This is 2,500 lbs. of bombs, or ten 5-inch rockets.

Equipment Name: P-51

Ceiling 41,900 ft.

Field 3: 2,000 lbs of bombs or six 5-inch rockets.

Equipment Name: P-61

Ceiling 33,100 ft.

Field 14: This is maximum speed at 20,000 ft.

Field 36: This is maximum range for the H.E.I. 20mm Mk I round.

Equipment Name: B-25

Ceiling 21,200 ft.

Equipment Name: B-26

Ceiling 19,800 ft.

Field 14: This is maximum speed at 5,000 ft.

Equipment Name: Light Airplane

Ceiling 9,300 ft.

Field 14: This is maximum speed.

Equipment Name: C-47

Ceiling 23,200 ft.

Equipment Name: A-20

Ceiling 25,800 ft.

Field 36: This is maximum range for the H.E.I. 20mm Mk I
round.

Equipment Name: A-26

Ceiling 31,300 ft.

Attachment 3

Additional ACSDB Weapons Data Base Sight/Sensor Information

US Primary Armament

<u>Weapon System</u>	<u>Sight Type</u>	<u>Sight Power</u>	<u>Sight Source</u>
M-1 155mm How	M12 Panoramic Tele Quadrant Sight	4	A, p. 276 A, p. 285
M-1 240mm How	M12 Panoramic Tele Quadrant Sight	4	A, p. 278 A, p. 285
M-1 37mm AAA	M5 Sight System Telescope M7	1	A, p. 204
M-1 4.5" Gun	M12 Panoramic Tele	4	A, p. 278
M-1 40mm AAA	M74 Telescope M7 Computing Sight		A, p. 206
M-1 57mm AT	M18 Telescope		A, p. 158
M-1 75mm How	M1 Panoramic Tele Elbow Telescope	3 3	A, p. 276 A, p. 283
M-1 8" Gun	M12 Panoramic Tele	4	A, p. 278
M-1 8" How	M12 Panoramic Tele	4	A, p. 278
M-1 81mm Mtr	Collimator, M4 Sight		A, p. 151
M-10	M51 Telescope	3	A, p. 325
M-12 155mm SP	M53 Telescope	3	A, p. 325
M-15 37mm AAA	M5 Sight System with M7 and M64 Telescopes	1	A, p. 331
M18	M47A Telescope or M76C or M70H Telescope	3	A, p. 325
M-1A1 155mm Gun	M12 Panoramic Tele Quadrant Sight	4	A, p. 278 A, p. 285
M-1A1 90mm AAA	Elbow Telescope	3	A, p. 211
M-2 60mm Mtr	Collimator, M4 Sight		A, p. 151
M-21 81mm Mtr	M6 Sight		A, p. 52
M-24	M71G Telescope	3	A, p. 11, 325
M-2 105mm How	M12A2 Panoramic Tele Elbow Telescope	4 3	A, p. 278 A, p. 283
M-3 105mm How	Elbow Telescope	3	A, p. 283
M-36	M71C or M76D or M76F Telescope	3	A, p. 325
M-3A1 37mm AT	M6 Telescope	1	A, p. 286
M-4 105mm	T73 Telescope		A, p. 21
M-4 75mm	M70F Telescope	3	A, p. 20, 325
M-4 76mm	M70H or M71D Tele	3	A, p. 22, 329
M-4A3E2	M70F Telescope	3	A, p. 20, 325
M-4 MX	M70F Telescope	3	A, p. 20, 325

M-5 3" AT	M41 Telescope		A, p. 169
	M12 Panoramic Tele	4	A, p. 278
	Elbow Telescope	3	A, p. 283
M-5 Tk	M70D Telescope	3	A, p. 8, 325
M-7 105mm SP	M12A2 Panoramic Tele	4	A, p. 278
	Elbow Telescope	3	A, p. 283
M-8 75mm SP	M12 Panoramic Tele	4	A, p. 278
	M70C Telescope	3	A, p. 41, 324
M8 AC	M70D Telescope	3	A, p. 325

US Secondary Armament

M-15 37mm	M5 Sight System	1	A, p. 331
M-24	M71G Telescope	3	A, p. 11, 325
M-4 105mm	Periscope M4 with Telescope T73		A, p. 21
M-4 75mm	Periscope M4 with Telescope M38		A, p. 20
M-4 MX	Periscope M4 with Telescope M38		A, p. 20
M-5 Tk	Periscope M4 with Telescope M40		A, p. 8

US Tertiary Armament

M-4 76mm	Periscope M4 with Telescope M47		A, p. 22
M-4 A3E2	Periscope M4 with Telescope M38		A, p. 22

UK Primary Armament

Churchill 6-pr	Telescope 39 Mk I S	B, p. 102
Churchill 75mm	Telescope 39 Mk I S	
Churchill 95mm	Telescope 39 Mk I S	
Cromwell 75mm	Telescope 50x3L Mk I	B, p. 30
Cromwell 95mm	Telescope 50x3L Mk I	
T17E1 Staghound	Periscope M4 with Telescope M40	A, p. 58

UK Secondary Armament

Churchill 6-pr	Telescope 39 Mk I.S	B, p. 102
Churchill 75mm	Telescope 39 Mk I.S	
Churchill 95mm	Telescope 39 Mk I.S	
Cromwell 75mm	Telescope 50x3L Mk I	B, p. 30
Cromwell 95mm	Telescope 50x3L Mk I	
T17E1 Staghound	Periscope M4 with Telescope M40	A, p. 58

Tertiary Armament

Churchill 6-pr	Telescope 30 Mk I	B, p. 102
Churchill 75mm	Telescope 30 Mk I	
Churchill 95mm	Telescope 30 Mk I	
Cromwell 75mm	Telescope 50x1.9 Mk I	B, p. 30
Cromwell 95mm	Telescope 50x1.9 Mk.I	A, p. 58

Note: The Churchill 75mm and 95mm are assumed to have the same sensor/sight equipment as the Churchill 6-pr.
The Cromwell 95mm is assumed to have the same sensor/sight equipment as the Cromwell 75mm.

German Primary Armament

<u>Weapon System</u>	<u>Sight Type</u>	<u>Sight Power</u>	<u>Range (meters)</u>	<u>Sight Source</u>
BGPZ-V	KZF2 Telescope	1.75	200	C, p. 11, 12
Brum	ZF1a Telescope			
HAC	TZF46 Telescope			
HGH122	M32 Panoramic Tele	4		C, p. 10, 13
HFH150	M32 Panoramic Tele	4		C, p. 10, 13
HIG	M32 Panoramic Tele	4		C, p. 10, 13
K105	M32 Panoramic Tele	4		C, p. 10, 13
K128	M32 Panoramic Tele	4		C, p. 10, 13
K152	M32 Panoramic Tele	4		C, p. 10, 13
K170	M32 Panoramic Tele	4		C, p. 10, 13
K240	M32 Panoramic Tele	4		C, p. 10, 13
K280/5	M32 Panoramic Tele	4		C, p. 10, 13
K75	M32 Panoramic Tele	4		C, p. 10, 13
LAC	TZF6 Telescope	2.4		C, p. 11, 12
LFH105	M32 Panoramic Tele	4		C, p. 10, 13
PAK43ARTY	M32 Panoramic Tele	4		C, p. 10, 13
PAK75	ZF38/II	3		C, p. 14
PAK88	ZF38/II	3		C, p. 14
PZ-IV	TZF 5f1 Tele	2.4	4000	C, p. 11, 12
PZ-V	TZF 12a	2.5/5	4000	C, p. 11, 12
PZ-VI	TZF 9b	2.4	4000	C, p. 11, 12
PZ-VIb	TZF 9d		5000	C, p. 11, 12
PZJG-38t	ZF 1a			
PZJG-V	ZF 1a			
STG-III	ZF 1			
STG105	ZF 1a			
PAK50	ZF 38/II	3		C, p. 14

German Secondary Armament

BEPZ-V	KZF2 Tele	1.75	200	C, p. 30-45
BGPZ-V	KZF2 Tele	1.75	200	C, p. 11, 12
LAC	TZF6 Tele	2.4		
PZ-IV	TZF 5f1 Tele	2.4		
PZ-V	TZF 12a	2.5/5		
PZ-VI	TZF 9b	2.4		
PZ-VIb	TZF 9d			

German Tertiary Armament

PZ-IV	KZF2 Tele	1.75	200	C, p. 11, 12
PZ-V	KZF2 Tele	1.75	200	C, p. 11, 12
PZ-VI	KZF2 Tele	1.75	200	C, p. 11, 12
PZ-VIb	KZF2 Tele	1.75	200	C, p. 11, 12

Sources for Additional Sensor Data:

- A = Office of the Chief of Ordnance, Technical Division,
Catalogue of Standard Ordnance Items, Second Edition,
Washington, D.C., 1944.
- B = Crow, Duncan (ed.). Armoured Fighting Vehicles in Profile
(AFV's of the World Series). Vol. 3. British and
Commonwealth AFVs, 1940-46. Garden City, NY: Doubleday,
1972.
- C = TM-E 30-451, Handbook on German Military Forces, 15 March
1945. All page numbers from Chapter VIII.

Attachment 4

Substitute British Data

	<u>British System</u>	<u>Missing Data Point(s)</u>	<u>Comparable System Used</u>	
1.	25-pr (SP)	3, 5	25-pr (T)	B
	25-pr (SP)	19	M-7 105mm SP	US
	25-pr (SP)	14	LFH105 SP	G
2.	RAM-K	3, 4, 6, 14	25-pr (SP)	B
3.	Churchill 75mm	3, 5, 7, 11	M-4 75mm	US
	Churchill 75mm	36, 46	Bren MG	B
4.	Churchill 6-pr	11	6-pr AT (T)	B
	Churchill 6-pr	5, 7	M-1 57mm AT	US
	Churchill 6-pr	36, 46	Bren MG	B
5.	Churchill 95mm	3, 5, 11, 19	M-4 105mm	US
	Churchill 95mm	36, 46	Bren MG	B
6.	Crocodile	3, 5, 7, 11	M-4 75mm	US
	Crocodile	14	Churchill 75mm	B
	Crocodile	46	Bren MG	B
7.	BSA Daimler SC	2	M-20 AC	US
8.	Humber SC	2, 3, 6	M-20 AC	US
	Humber SC	14	*BSA Daimler SC	B
9.	Daimler AC	2, 3, 6, 32, 35, 43, 45	M-8 AC	US
	Daimler AC	14	BSA Daimler SC	*B
	Daimler AC	36	Bren MG	B
10.	AEC AC	2, 6, 14	HAC *	G
	AEC AC	3, 5, 7, 11	M-4 75mm	US
	AEC AC	36, 46	Bren MG	B
	AEC AC	32, 35, 43, 45	M-8 AC	US
	Vickers MG	48, 49	**7.92mm Besa MG	B
11.	Cromwell 75mm	3, 5, 7, 11	M-4 75mm	US
	Cromwell 75mm	2, 14	PZ-IV	G
	Cromwell 75mm	36, 46	Bren MG	B
12.	Cromwell 95mm	2	PZ-IV	G
	Cromwell 95mm	3, 5, 11, 19	M-4 105mm	US
	Cromwell 95mm	36, 46	Bren MG	B

13.	A-30 Challenger	2, 3, 5, 11	M-4 76mm	US
	A-30 Challenger	7	PZ-V	G
	A-30 Challenger	12, 32, 35	M-36	US
14.	Sherman 17-pr	3, 5, 11	M-4 76mm	US
	Sherman 17-pr	7	PZ-V	G
	Sherman 17-pr	14	PZ-IV	G
15.	T17E1 Staghound	11	M-8 AC	US
	T17E1 Staghound	14	HAC	G
16.	Bren MG	3, 6	**BAR	US
17.	Vickers MG	3, 6	**Cal. 30 MG M1917A1	US
18.	Mtr 2"	3, 6, 19	M-2 60mm Mtr	US
19.	Mtr 3"	3, 6, 19	M-1 81mm Mtr	US
20.	T16	3, 6	Humber SC	B
	T16	32, 35, 38	M-9 2.36" Rkt	US
21.	6-pr AT (T)	3, 6, 9	M-1 57mm AT	US
22.	25-pr (T)	5	LFH105 SP	G
	25-pr (T)	3, 6, 19	M-3 105mm How	US
23.	40mm AA (T)	3, 6, 14, 15, 20	M-1 40mm AAA	US
24.	15 CWT trk	9	1.5 ton 4x4	US
25.	AA tank (20mm)	3, 5, 6, 7, 11	FLAK20(v) SP	G
	AA tank (20mm)	2	FLAK37 SP	G
26.	40mm AA (SP)	3, 6	M-1 40mm AAA	US
	40mm AA (SP)	14	AA tank (20mm)	B
	40mm AA (SP)	2	FLAK37 SP	G
27.	Lt Recon Car	2, 3, 6, 7, 11, 14	Humber SC	B
28.	17-pr AT (T)	5, 7	Sherman 17-pr	B
	17-pr AT (T)	3, 6, 11	M-5 3" AT	US
29.	ARV	2, 14, 15	BGPZ-V	G
	ARV	3, 6, 32, 35	M-32	US
	ARV	7	Bren MG	B
30.	PIAT	3, 6, 11	M-9 2.36" Rkt	US

* Based on ratio of on-road to off-road maximum speed

** System not included in the ACSDB Weapons Data Base

The ACSDB Reference Data Base

The Ardennes Campaign Simulation Data Base (ACSDB) Reference Data Base is used to reference data recorded in the Air, Unit Location, Table of Organization and Equipment (T/O&E), and Weapons Data Bases. The Reference Data Base was originally intended to record sources used for all ACSDB data bases (the four listed above, plus the Unit and Unit Inventory Data Bases), but it proved impractical to use this data referencing system for the Unit and Unit Inventory Data Bases. Instead, written descriptions of the derivation of the Unit and Unit Inventory Data Bases are provided in various narratives (for example, see the ACSDB Unit Data Base and the ACSDB Unit Inventory Data Base narratives), and the Reference Data Base is used primarily for the four former data bases mentioned above.

Definitions of the fields in the ACSDB Reference Data Base are as follow:

- "Source Number" (No field number): Recorded under "Source Number" is a unique alphanumeric entry that matches the entry under "Sources" in the corresponding Air, Unit Location, T/O&E, and Weapons Data Base record.

- Air reference records begin with "AA," "AB," or "AG," followed by three arabic numerals.

- Unit Location reference records begin with "L," followed by a second letter or an arabic numeral, which is in turn followed by a series of three or four letters or arabic numerals, depending on the nationality and designation of the unit. The alphanumeric entries used for all Unit Location reference records are listed in the ACSDB Unit Location Data Base narrative.

- T/O&E reference records begin with "TU," "TB," or "TG," followed by three arabic numerals.

- Weapons reference records begin with "WA," "WB," or "WG," followed by three arabic numerals.

- "DATA BASE ITEMS" (Fields 1-20): Recorded under "DATA BASE ITEMS" are the data field(s) in the corresponding Air, Unit Location, T/O&E, or Weapons Data Base record for which data is referenced by the source listed under "BIBLIOGRAPHY NAMES."

- "BIBLIOGRAPHY NAMES" (Fields 1-20): Recorded under "BIBLIOGRAPHY NAMES" are the identifications of sources used for data listed under "DATA BASE ITEMS." All identifications entered under "BIBLIOGRAPHY NAMES" match exactly entries under

"Bibliography Name" in the Bibliography Data Base. The identifications are usually in abbreviated format, using author's names, archives identification numbers, microfilm numbers, etc.

- "PAGES" (Fields 1-20): Entered under "PAGES" are the relevant page number(s) of the sources listed under "BIBLIOGRAPHY" names.

- "Remarks" (No field number): Entered under "Remarks" is information which amplifies any other entries in the record and, in some cases, data in the corresponding Air, Unit Location, T/O&E, and Weapons Data Base record.

The ACSDB Bibliography Data Base

The Ardennes Campaign Simulation Data Base (ACSDB) Bibliography Data Base is used to record full bibliographic information on primary and secondary sources used for data in the various data bases of the ACSDB. The entries in the Bibliography Data Base describe sources referenced in both the Reference Data Base and in the various narratives used to describe the derivation of data (for example, see the ACSDB Unit Data Base and the ACSDB Unit Inventory Data Base narratives).

Note that some sources referenced in the narratives are not listed in the Bibliography Data Base. Instead, their full bibliographic references are contained in the narratives themselves. Thus, any document, record, book, or other source used to generate data for any part of the ACSDB is always fully referenced. In general, the numerous primary source records used for the generation of US Army personnel, equipment, and logistics data are referenced only in the narratives. These records are from the Washington Federal Records Center annex of the US National Archives, in Suitland, Maryland. Most other sources in the narratives are fully referenced in the Bibliography Data Base, and some sources are referenced in both the narratives and the Bibliography Data Base. Note that if sources mentioned in narratives are annotated only in the Bibliography Data Base, this fact is always highlighted at the beginning of the narrative.

The variety and great number of sources used in the ACSDB resulted in the use of both formats for full bibliographic annotations. For convenience and to minimize crossreferencing from a hard-copy to computer format, it was decided to use just the hard-copy format in some cases, especially those involving long lists of records from the same provenance. Nevertheless, full referencing of all sources used for data generation in the ACSDB is maintained.

Definitions of the Bibliography Data Base records are as follow.

- "Bibliography Name" ((Field 1): Recorded under "Bibliography Name" is a unique entry in abbreviated format, most commonly an author's name, an archives identification number, or a microfilm number, which identifies the source described under "Bibliography" (Field 2). An entry under "Bibliography Name" matches exactly an entry under "BIBLIOGRAPHY NAME" in the Reference Data Base records, or the abbreviation used for a source in a data estimation and referencing narrative.

- "Bibliography" (Field 2): Described under "Bibliography" is the full bibliographic annotation of the source. For

secondary sources, this includes author's name, title of the book, place and date of publishing, and publisher. For primary source records, this includes the title of the document and, in some cases, an archives or microfilm identification number. Generally, British records from the Public Records Office have their archives identification number recorded under "Bibliography." On the other hand, German sources from the German Archives in Freiburg, West Germany, or on microfilm at the US National Archives have their archives or microfilm number listed under "Record, Box, and File" (Field 3). Note that for all primary source records, archives or microfilm identification numbers are provided in either Field 2 or Field 3.

- "Record, Box, and File" (Field 3): Most commonly recorded under "Record, Box, and File" is the archival facility from which a primary source record was obtained. Typical entries are:

- US Nat'l [National] Archives -- followed by a microfilm #
- German Archives -- followed by a source #
- British Public Records Office
- Bolling AFB (Air Force Base) -- followed by a microfilm #
- German Post-War Manuscript

The documents from the Bolling Air Force Base were obtained from microfilm records maintained at the Office of Air Force History at Bolling AFB in Washington, D.C. These records are mainly World War II records of the US Army Air Forces used for generation of data in Air Data Base records. The German Post-War Manuscripts are frequently-referenced sources for German unit location information in the Unit Location Data Base. These are kept on file at the US National Archives in Washington, D.C., and at the US Army Military History Institute library in Carlisle, Pennsylvania.

- "Remarks" (Field 4): Additional information on a bibliographic source may be recorded under "Remarks." This information includes comments on accuracy or importance of data found in a source. Due to space limitations in the computer format, it was not possible to record all relevant bibliographic information for some sources in Fields 1-3. In these cases, the additional information was recorded under "Remarks."

Sources Not Recorded in the Bibliography Data Base.

For bibliographic items not recorded in the Bibliography Data Base (most commonly US Army records, as discussed above), the same conventions used in the Bibliographic Data Base are used in the various data estimation and referencing narratives. Secondary sources are described by their author's name, title of the book, place and date of publishing, and publisher. Primary

sources are identified by all relevant archives identification. For US Army records from the Washington Federal Records Center, this includes record group (most commonly RG 407), box number, and the code used in the National Archives filing system, i.e., 304-1.1 (4th Armored Division, G-1 (Personnel) records.

ACSDB Time Conventions

As originally tasked in the Statement of Work of the Ardennes Campaign Simulation Data Base (ACSDB) Request for Proposal (RFP No. MDA903-87-R-0091), data was to be recorded on "the initial situation of each unit and subsequently a sequence of events by 24-hour intervals (0600-0559) throughout the campaign..." (see page 1 of the statement of work). This system of recording time was maintained to the extent possible in the compilation of the ACSDB, but, due to the nature of the primary source records used for data compilation, it was in some cases modified. This paper explains the time conventions in effect for personnel, equipment, and other data of the three nations in the ACSDB (US, British, and German data).

The primary reason for deviation from the required system of recording time was the nature of the records of the US Army units which participated in the Ardennes Campaign. In general, US Army units reported status of personnel, equipment, etc., at the end of the day, i.e., 1600 hours or 2400 hours. One of the main sources used for US personnel data, the 12th Army Group G-1 Daily Summary (US National Archives Record Group 407, Boxes 1753 and 1754), recorded personnel strengths of US divisions and non-divisional units as of 2400 hours of the reporting day. Therefore, in order to facilitate use of this important document for generating US personnel data, it was decided to change the time of the US personnel strengths in the ACSDB from as of beginning of the day (0600 hours) to as of the end of the day (0559 hours). In other words, the personnel strength of the 101st AbnD recorded in the ACSDB on 24 December 1944 is as of 0559 hours on 25 December, not 0600 hours on 24 December 1944. (To maintain consistency in the 24-hour time intervals, it was assumed that strengths as of 2400 hours in the above example would approximate the strengths as of 0559 hours on the next morning.)

Thus, the 24-hour time intervals for all data in the ACSDB are consistent (i.e., 0600 hours on one day to 0559 hours on the subsequent day). Casualties or equipment losses, personnel reinforcements or equipment replacements always occur in that 24-hour time interval. Only the time of the "initial situation," or status, of personnel, equipment, and logistics varies. These are explained below.

US Data.

- All personnel strengths, to include personnel by military occupational specialty (MOS) category, are as of 0559 hours of the date immediately subsequent to the indicated date. (The indicated date is the date recorded under "Date" in the Unit Data Base record.)

- All casualties and reinforcements (replacements and returns to duty) occur in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.

- All medical facilities data (number of available and filled hospital beds) is as of 0559 hours of the date immediately subsequent to the indicated date. All "dynamic" medical facilities data (number of wounded personnel entering, number of disease and non-battle injury personnel entering, number of personnel died in, and number of personnel evacuated from hospitals) occurs in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.

- All logistics data (ammunition, fuel, and other supply amounts on-hand and wet and dry transportation capacity) is as of 0559 hours of the date immediately subsequent to the indicated date. All "dynamic" logistics data (supplies consumed and received) occurs in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.

- The order of battle changes are as of 0600 hours of the indicated date.

- All equipment data (equipment on-hand and in-repair) is as of 0559 hours of the date immediately subsequent to the indicated date. All "dynamic" equipment data (equipment losses and gains) occurs in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.

- All location data (headquarters location, front-line trace, location of other significant elements) is as of 0600 hours of the indicated date. All "dynamic" location data (displacement, distance opposed advanced, activities, and operations) occurs in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.

- All air data occurs in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.

British Data.

- All personnel strengths are as of 0559 hours of the date immediately subsequent to the indicated date.
- All casualties and reinforcements (replacements and returns to duty) occur in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.
- All logistics data (ammunition, fuel, and other supply amounts on-hand and wet and dry transportation capacity) is as of 0559 hours of the date immediately subsequent to the indicated date. All "dynamic" logistics data (supplies consumed and received) occurs in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.
- The order of battle changes are as of 0600 hours of the indicated date.
- All equipment data (equipment on-hand and in-repair) is as of 0600 hours of the indicated date. All "dynamic" equipment data (equipment losses and gains) occurs in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.
- All location data (headquarters location, front-line trace, location of other significant elements) is as of 0600 hours of the indicated date. All "dynamic" location data (displacement, distance opposed advanced, activities, and operations) occurs in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.
- All air data occurs in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.

German Data.

- All personnel strengths, to include personnel by military occupational specialty (MOS) category, are as of 0600 hours of the indicated date.

- All casualties and reinforcements (replacements and returns to duty) occur in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.

- All logistics data (ammunition, fuel, and other supply amounts on-hand and wet and dry transportation capacity) is as of 0600 hours of the indicated date. All "dynamic" logistics data (supplies consumed and received) occurs in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.

- The order of battle changes are as of 0600 hours of the indicated date.

- All equipment data (equipment on-hand and in-repair) is as of 0600 hours of the indicated date. All "dynamic" equipment data (equipment losses and gains) occurs in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.

- All location data (headquarters location, front-line trace, location of other significant elements) is as of 0600 hours of the indicated date. All "dynamic" location data (displacement, distance opposed advanced, activities, and operations) occurs in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.

- All air data occurs in the 24 hours between 0600 hours of the indicated date and 0559 hours of the immediately subsequent date.

Miscellaneous Information on US Units in the ACSDB

This brief paper is provided to elaborate on several aspects of the data recorded for US units in the Ardennes Campaign Simulation Data Base (ACSDB). The information contained in this paper pertains to personnel data in the Unit Data Base, as well as equipment inventory in the Unit Inventory Data Base. The paper should be reviewed with other narratives on the ACSDB for the most complete understanding of the data contained therein.

US Airborne Unit Organization in the ACSDB.

The complexities of the organization of organic divisional and non-divisional US airborne units in the Ardennes Campaign necessitated the preparation of the following discussion. The discussion identifies the airborne units, their parent units, the dates of subordination of the airborne units to their parent units, and the location of the personnel and equipment inventory data of the units in the ACSDB.

The following abbreviations are used in the discussion:
PIBN = parachute infantry battalion, PIReg = parachute infantry regiment, ID = infantry division, AD = armored division, AbnD = airborne division, PFABN = parachute field artillery battalion, GliFABN = glider field artillery battalion, GIReg = glider infantry regiment, AbnAABN = airborne antiaircraft battalion, AbnEngBN = airborne engineer battalion.

- 509th PIBN: XVIII Corps Troops (19-22 Dec 44, 1-10 Jan 45); 3d AD (23-28 Dec 44); 75th ID (29-31 Dec 44); and 7th AD (11-16 Jan 45).

- 551st PIBN: 30th ID (19-24 Dec 44); XVIII Corps Troops (25 Dec 44, 13-16 Jan 45); and 82d AbnD (26 Dec 44-12 Jan 45).

- 501st PIReg: 101st AbnD (19 Dec 44-16 Jan 45).

- 506th PIReg: 101st AbnD (19 Dec 44-16 Jan 45).

- 507th PIReg: 17th AbnD (19 Dec 44-16 Jan 45).

- 508th PIReg: 82d AbnD (19 Dec 44-16 Jan 45).

- 1/517th PIReg: 30th ID (17-21 Dec 44, 26-27 Dec 44, 29-31 Dec 44); 3d AD (22-25 Dec 44); 7th AD (28 Dec 44); 82d AbnD (1-10 Jan 45); and 106th ID (11-16 Jan 45).

- 2/517th PIReg: 30th ID (17-27, 29-31 Dec 44); 7th AD (28 Dec 44, 11-16 45); and 82d AbnD (1-10 Jan 45).

- 3/517th PIReg: 30th ID (17-29 Dec 44); 75th ID (30-31 Dec 44); 82d AbnD (1-10 Jan 45); and 11-16 Jan 45 (106th ID).

- 460th PFABN: V Corps Troops (17-22 Dec 44); 30th ID (23-24 Dec 44); XVIII Corps Troops (25 Dec 44-1 Jan 45), 12-16 Jan 45); 82d AbnD (2-10 Jan 45); and 75th ID (11 Jan 45).

- 463d PFABN: 101st AbnD (19 Dec 44-16 Jan 45).

Personnel data of the 501st and 506th PIRegs is included with the personnel data of the 101st AbnD, as is personnel data of the 463d PFABN. Personnel data of the 508th PIReg is included with the personnel data of the 82d AbnD. Personnel data of the 507th PIReg is included with personnel data of the 17th AbnD. Personnel data of the other airborne units is included either with the corps troops, as indicated, or the attachments ("Att") of the indicated divisions.

Equipment inventory data of the 506th PIReg is included with the equipment of the 101st AbnD on Page 1 in the Unit Inventory Data Base. Equipment data for all other airborne regiments and battalions in the above list units is recorded on Pages 5, 8, and 9 in the Unit Inventory Data Base, in the records of the appropriate corps troops or attachments ("Att") of divisions.

For purposes of the ACSDB the order of battle of the major organic units of the 17th, 82d, and 101st AbnDs (to which are added the units described above) is as follows:

17th AIRBORNE DIVISION

193d GIREg
194th GIREg
513th PIREg
466th PFABN
680th GliFABN
681st GliFABN
139th AbnEngBN
155th AbnAABN

82d AIRBORNE DIVISION

325th GIREg (incl. 2d BN/401st GIREg)
504th PIREg
505th PIREg
376th PFABN
456th PFABN
319th GliFABN
320th GliFABN
307th AbnEngBN
80th AbnAABN

101st AIRBORNE DIVISION

327th GIREg (incl. 1st BN/401st GIREg)
502d PIREg
377th PFABN
321st GliFABN
907th GliFABN
326th AbnEngBN
81st AbnAABN

XVI Corps Headquarters (HQ).

The US XVI Corps was organized during the Ardennes Campaign period, but the unit did not control front-line divisions and did not play a tactical role in operations. Therefore, no personnel or service support equipment inventory data is recorded for the unit. Records for the XVI Corps are provided on only two days in the ACSDB (15 and 22 December 1944), dates on which a division in reserve passed to and from control of the corps.

12th Army Group (A.G.) Data.

Daily records of the US 12th Army Group are provided in the Unit Data Base. Only personnel data is provided for the 12th A.G., the primary purpose of its inclusion in the Unit Data Base being its use in describing the daily US Order of Battle. The personnel data of the 12th A.G. comes from the US 12th Army Group G-1 Daily Summary, located in US National Archives Record Group 407, Boxes 1753 and 1754.

Quartermaster Truck Company Data with US "Standard" Armored Divisions.

The organic transport of the so-called "standard" armored division (4th, 5th, 6th, 7th, 9th, 10th, and 11th ADs) was found to be inadequate to serve the needs of the armored division. To compensate for this shortcoming, two quartermaster truck companies served with each division. The equipment data of these units is included on Pages 3 and 4 of the armored division's equipment inventory records, this equipment being: 8x .25 ton 4x4; 2x .75 ton 4x4; 100x 2.5 ton 6x6; and 98x 1 ton trl. The personnel data of the companies (110 men per company), however, is not recorded in the Unit Data Base. Primary source records of the armored divisions did not provide data on them so they were left out of the ACSDB. An additional 220 personnel may be added in as supply personnel on each day for the 4th, 5th, 6th, 9th, 10th, or 11th AD to reflect the personnel strengths of the truck companies.

Dates on Which US Units First Appear in the ACSDB.

In generating data for the data bases of the ACSDB (Unit, Unit Inventory, and Unit Location Data Bases), consistency was maintained among the various records of the dates of units' first appearance in the Ardennes Campaign. Due to the nature of some of the primary source records, and due to the fact that elements of certain units arrived before the units' main bodies, dates of the first records of the three data bases may vary. For example, the records of the 17th and 101st Airborne Divisions lend themselves most readily to the recording of personnel data on 18 December 1944 and 3 January 1945, respectively. Organic divisional equipment data for the two divisions is first recorded on 19 December and 4 January for the divisions.

In no cases is data not provided for a US unit during its period of participation in the Ardennes Campaign. In some cases, such as those described above, data is provided for periods prior to a unit's participation in the campaign. To most fully determine the activities and "personnel and equipment" experiences of units, it is recommended that information in all three data bases be reviewed simultaneously.

Multiple Records for US Corps and Armies.

For some US corps and armies, two records in the Unit Data Base are provided on their first day of activity in the ACSDB. This was done to permit identification of all attachments with the corps or army, which in some cases exceeded the total number of fields per record provided for "ATTACHMENTS & DETACHMENTS."

The ACSDB 16 December 1944 Map Overlay Description

One of the deliverables for the Ardennes Campaign Simulation Data Base (ACSDB) is a clear acetate overlay showing positions of Allied and German units at the beginning of the Ardennes Campaign on 16 December 1944. This paper serves as a key to the overlay and explains any symbols on the map that are not self-evident.

The overlay is on three pieces of 42" wide acetate. Two pieces form the base overlay which covers the entire Ardennes Campaign area. The third piece lays on top of the other two and is used to record known locations of US artillery units.

The maps used with the overlays are the same maps used to record Unit Location and Air Data in the ACSDB. They are ten 1943 Geographical Section, General Staff, maps produced by the Army Map Service. Full-scale, color photographs of these maps were provided to the US Army Concepts Analysis Agency.

<u>Sheet #</u>	<u>Name</u>
8	Brussels
9	Liege
12	Namur
13	Marche
14	Arlon
16	Mezieres
R-1	Koeln
S-1	Bonn
T-1	Trier
V-1	Neunkirchen

Date/Time.

Overlay shows positions as of 0530 16 December 1944, unless otherwise indicated.

Colors.

Blue - All Allied (US and British) units, unit boundaries, airbases, and supply installations.

Red - All German units, unit boundaries, proposed objectives, supply installations, and railheads.

Green - All German Rollbahnen (motor routes), identified by code letter--"A," "B," etc., for motor routes of the Sixth Panzer Army, or by assigned unit--"116th PZ," "7th A," etc., for units of the Fifth Panzer or Seventh Armies. The routes are marked in green for clarity. (The Rollbahnen were road routes assigned to specific motorized formations for use by their vehicles exclusively. They were not necessarily advance routes, as the

formations could and did to some degree deviate from them.)

Black - General information--distance to Antwerp (off map), map grid coordinates, reference points, etc.

German Objectives.

German objectives are shown by broken red lines, and planned dates for reaching these objectives are shown when known. It was understood by the German Army Group B command that the I and II SS Panzer Korps would attempt to gain their initial objectives (Meuse River bridgeheads) by 0530 hours on 17 December, and the Fifth Panzer Army's initial objectives (Meuse River bridgeheads) were anticipated to be reached during the afternoon or evening of 17 December. Timetables for reaching the objectives of the LXVII Korps and the Seventh Army are less well defined. It is believed that the final objectives for the I and II SS Panzer Korps and the Fifth Panzer Army were expected to be reached some 24-48 hours after the crossing of the Meuse. Further objectives and intentions were not expressly defined in the Army Group B operations order, in which it was merely stated that "Heeresgruppe (Army Group) B will ...exploit this breakthrough... in order to wipe out the Allied enemy forces north of our thrust in later combined operations with Heeresgruppe H."

Rollbahnen Assignments.

Formations assigned specific Rollbahnen were as follows:

12th SSPzD - "A"--I/25th SSPzGReg (+)
 "B"--25th SSPzGReg (-)(+)
 "C"--12th SSPzD (-)(+)

1st SSPzD - "D"--1st SSPzD (-)(+), I SSPzK HQ
 "E"--1st SSPzGReg (+), 1st SSAA(+)

116th PzD - "116th PZ"--116th PzD (+)

2d PzD - "2d PZ"--2d PzD (+), elms PzLehrD (902d PzGReg (+))

PzLehrD - "PZ LEHR"--PzLehrD (-)(+)

7th Army - "7A"--None (originally intended for the 11th PzD, which was not committed, part of the route west of Bastogne later became the advance route used by the PzLehrD)

NOTE: PzD = panzer division; SSPzD = SS panzer division; SSPzGReg = SS panzer grenadier regiment; SSAA = SS aufklaerungs abteilung; SSPzK = SS panzer korps; PzLehrD = Panzer Lehr Division; PzGReg = panzer grenadier regiment.

US ARTILLERY LOCATIONS AS OF 0530 HOURS, 16 DEC 1944

NINTH ARMY

XIII Corps:

211th FA BN	4.5"G (T)	K923592	(Setterich)
808th FA BN	155H (T)	K920590	(Setterich) *
261st FA BN	155G (T)	Unknown	
259th FA BN	4.5"G (T)	K902623	(Immendorf)
264th FA BN	8"H (T)	K912603	(Loverich)
809th FA BN	155H (T)	K850590	(Palenberg) *
777th FA BN	4.5"G (T)	K859614	(Frelenberg)
774th FA BN	4.5"G (T)	K871625	(Breil)
2d FA BN	155H (T)	K874648	(Vic Suggesterath)
207th FA BN	8"H (T)	K890618	(Waurichen)
256th FA BN	8"H (T)	K910573	(Baesweiler)
265th FA BN	240H	K912602	(Loverich)
516th FA BN	155G (T)	K850590	(Palenberg) *
753d FA BN	155H (T)	K861617	(Vic Frelenberg)
754th FA BN	155H (T)	K910612	(Floerich)
557th FA BN	155G (SP) (-)	K913600	(Loverich)

*Location as of 23 December, previous location unknown.

84th ID:

DIVARTY		Unknown	
692d FA BN	105H (T)	K882637	(Loherhuf)
691st FA BN	105H (T)	K886618	(Waurichen)
B/557th FA BN	155G (SP)	Unknown	

7th AD:

DIVARTY		K8664	(Vic Geilenkirchen)
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102d ID:

DIVARTY		K880582	(Vic Ubach)
252d FA BN	105H (T)	K954620	(Ederen)
83d Armored FA BN		Unknown	

XIX Corps:

280th FA BN	105H (T)	Unknown	
70th FA BN	105H (T)	K958530	(Laurensberg)
65th Armored FA BN		Unknown	
758th FA BN	105H (T)	Unknown	
254th FA BN	155H (T)	Unknown	
25th FA BN	105H (T)	Unknown	
793d FA BN	8"H (T)	Unknown	
963d FA BN	155H (T)	Unknown	
269th FA BN	240H	Unknown	
959th FA BN	4.5"G (T)	Unknown	

203d FA BN	155H (T)	Unknown
228th FA BN	155H (T)	Unknown
755th FA BN	155H (T)	Unknown
758th FA BN	155H (T)	Unknown
963d FA BN	155H (T)	Unknown
978th FA BN	155G (T)	Unknown
979th FA BN	155G (T)	Unknown

2d AD:
DIVARTY Unknown

29th ID:
DIVARTY K980565 (Aldenhoven)
283d FA BN 105H (T) K959574 (Durboslar)
967th FA BN 155H (T) Unknown

FIRST ARMY

552d FA BN	240H	K9441	(Stolberg)
551st FA BN	240H (-)	K8935	(Walheim)
272d FA BN	240H (-)	K921329	(Rott)
C/551st FA BN	240H	K9536	(Zweifall)

VII Corps:

87th Armored FA BN		K8939	(Brand)
981st FA BN	155G (T)	K9842	(Gressenich)
980th FA BN	155G (T)	K971409	(Mausbach)
153d FA BN	8"G (T) (-)	K9740	(Vic Mausbach)
172d FA BN	4.5"G (T)	F015455	(Heistern)
195th FA BN	8"H (T)	F015455	(Heistern)
268th FA BN	8"G (T)	F0349	(Luchem)
991st FA BN	155G (SP)	Unknown	
266th FA BN	240H	Unknown	
79th FA BN	(Provisional)	Unknown	
690th FA BN	105H (T)	Unknown	
240th FA BN	155G (T)	K946422	(Stolberg)

1st ID:
DIVARTY Unknown
A/987th FA BN 155G (SP) K973382 (Vieht)
957th FA BN 155H (T) Unknown

3d AD:
DIVARTY Unknown
58th Armored FA BN Unknown

5th AD:
DIVARTY (-) K9536 (Zweifall)
400th Armored FA BN K9536 (Zweifall)
71st Armored FA BN (DIV) K8935 (Walheim)

9th ID:

DIVARTY		Unknown	
951st FA BN	155H (T)	F0440	(Vic Grosshau)
193d FA BN	105H (T)	Unknown	
183d FA BN	155H (T)	F050467	(Jungersdorf)

104th ID:

DIVARTY		K9949	(Weisweiler)
188th FA BN	155H (T)	K986480	(Weisweiler)

V Corps:

186th FA BN	155H (T)	K939191
C/272d FA BN	240H	K904183
941st FA BN	4.5"G (T)	K944181
190th FA BN	155G (T)	K979343
955th FA BN	155H (T)	K916144
953d FA BN	155H (T)	K943301
997th FA BN	8"H (T)	K911324
187th FA BN	155H (T)	K957308

2d ID:

12th FA BN	155H (T) (DIV)	K9307
15th FA BN	105H (T) (DIV)	"A" K927104
		"B" K918099
		"C" K925109
37th FA BN	105H (T) (DIV)	"A" K970071
		"B" K976071
		"C" K970065
38th FA BN	105H (T) (DIV)	K9912
18th FA BN	105H (T)	K928152
196th FA BN	105H (T)	K929124
C/987th FA BN	155G (SP)	K983086
B/200th FA BN	155G (T)	K927198
16th Armored FA BN (REF 9th AD)		K938137 (Kalterherberg)

78th ID:

307th FA BN	105H (T) (DIV)	K958285
308th FA BN	105H (T) (DIV)	K970268
309th FA BN	155H (T) (DIV)	K917276
903d FA BN	105H (T) (DIV)	K968292
95th Armored FA BN (REF 5th AD)		K925285
B/987th FA BN	155G (SP)	K911297
62d Armored FA BN		"A" K918273
		"B" K925273
		"C" K930275

99th ID:

370th FA BN	105H (T) (DIV)		K981050	(Krinkelt)
371st FA BN	105H (T) (DIV)		K982022	(Muerringen)
372d FA BN	155H (T) (DIV)	"A"	K9904	
		"B"	K9805	
		"C"	K9906	
924th FA BN	105H (T) (DIV)		K984075	
200th FA BN	155G (T) (-)		K927198	
776th FA BN	155H (T)		K977068	

8th ID:

45th FA BN	105H (T) (DIV)		F0334	
43d FA BN	105H (T) (DIV)		F0336	
56th FA BN	105H (T) (DIV)		F0337	
28th FA BN	155H (T) (DIV)		K9934	
76th FA BN	105H (T)		F003338	(Vic Germeter)
179th FA BN	(Provisional)		F036356	(Huertgen)

VIII Corps:

333d FA BN	155H (T)		P955885	
559th FA BN	155G (T)	"A"	P870820	
		"B"	P870820	
		"C"	P818830	
561st FA BN	155G (T)	"A"	P837869	
		"B"	P936871	
		"C"	P890870	
578th FA BN	8"H (T)		P858788	
740th FA BN	4.5"G (T)		1933884	
770th FA BN	4.5"G (T)		P834792	
771st FA BN	4.5"G (T)		P947875	
965th FA BN	155H (T)		P869783	
969th FA BN	155H (T)		P800765	
106th I				
589th FA BN	105H (T) (DIV)	"A"	P993879	
		"B"	P997893	
		"C"	P991888	
590th FA BN	105H (T) (DIV)	"A"	P976864	
		"B"	P981867	
		"C"	P982861	
591st FA BN	105H (T) (DIV)	"A"	P903793	
		"B"	P903789	
		"C"	P902785	
592d FA BN	155H (T) (DIV)	"A"	P991891	
		"B"	P987892	
		"C"	P985899	
275th Armored FA BN			P9693	

28th ID:			
107th FA BN	105H (T) (DIV)	"A"	P849458
		"B"	P864432
		"C"	P896392
108th FA BN	155H (T) (DIV)		P865419
109th FA BN	105H (T) (DIV)	"A"	P803678
		"B"	P787633
		"C"	P791584
229th FA BN	105H (T) (DIV)		P859744
687th FA BN	105H (T)	"A"	P872447
		"B"	On "special mission" w/3d Army
		"C"	P797538

4th ID:			
42d FA BN	105H (T) (DIV)	"A"	L061332
		"B"	L0531
		"C"	P9932
20th FA BN	155H (T) (DIV)		P982133
29th FA BN	105H (T) (DIV)		P9413 (arriving)
44th FA BN	105H (T)		L0327
81st FA BN	155H (T)	"A"	L067260
		"B"	L067269
		"C"	L063257
174th FA BN	155G (SP)		L001289

(Four- and six-digit grids are from the 1943 Army Map Service maps.)

Abbreviations in the above list include:

ID	infantry division
AD	armored division
FA BN	field artillery battalion
DIVARTY	divisional artillery
(DIV)	(divisional)
(REF)	divisional artillery from another division
(T)	towed
(SP)	self-propelled
G	gun (preceded by caliber of weapon)
H	howitzer (preceded by caliber of weapon)
"A"	"A" Battery
"B"	"B" Battery
"C"	"C" Battery

ACSDB Consultants' Review

As part of the Ardennes Campaign Simulation Data Base (ACSDB) project, three military historians reviewed the data base about mid-way through its development. In March and May 1989, Dr. Hugh M. Cole, Charles B. MacDonald, and Colonel Gerhard Muhm met with Data Memory Systems, Inc. (DMSi), historians and researchers to evaluate the ACSDB and make recommendations on its final preparation. At that time (the spring of 1989), the ACSDB was approximately 69.9 percent complete (the completion figure of the 5 May 1989 weekly progress report). As such, it was at a logical stage for review by the consultants since it was possible for them to both evaluate the completed material and make recommendations which could be incorporated into the final product.

Dr. Cole and Mr. MacDonald consulted with DMSi personnel on 29-30 March. Both consultant are eminent military historians: Dr. Cole the author of the US Army official history of the Ardennes Campaign (Hugh M. Cole, The Ardennes: Battle of the Bulge. United States Army in World War II, The European Theater of Operations (Washington, D.C.: USGPO, 1965), and Mr. MacDonald the author of several other volumes of the Army's official history of World War II and a recently published history of the Ardennes Campaign (Charles B. MacDonald, A Time for Trumpets: The Untold Story of the Battle of the Bulge (New York: Bantam, 1985). Both scholars' credentials and qualifications for commentary on the ACSDB are based on an exhaustive knowledge of US Army World War II history and the source records of that subject.

Attachments 1 and 2 contain copies of memoranda of the record prepared by DMSi personnel following their meetings with Dr. Cole and Mr. MacDonald. Attachments 3 and 4 are copies of memoranda prepared by the consultants themselves. All material in Attachments 1-4 is identical to that prepared in March and April 1989, with minor editorial revisions and corrections of typographical errors.

Dr. Cole and Mr. MacDonald commented favorably on the ACSDB. Their comments were more than complimentary, as they provided information on certain aspects of the data on which DMSi had some questions. They also recommended several sources for data on uncompleted tasks remaining in the data base. One source, Charles von Luettichau's manuscript on German rail transportation in the Ardennes (Charles von Luettichau, GERMAN RAIL COMMUNICATIONS IN THE ARDENNES OFFENSIVE 1944-1945. A Study of the Factors Which Affected the Strategic Concentration and the Logistical Operations (Washington, D.C.: Office of the Chief of Military History, September 1952) proved instrumental in estimating German logistics data for the ACSDB.

On 22-24 May 1989, Colonel Gerhard Muhm, a German World War II veteran of the 29th Panzer Grenadier Division and historian of German Army World War II operations, met with DMSi program manager Brian Bader and CAA contracting officer's technical representative John Haley. Mr. Muhm reviewed data prepared for DMSi on German units in the Ardennes Campaign. He commented favorably on the work performed up to that point and the sources used for German data compilation. Colonel Muhm also helped to interpret information contained in German sources, particularly some information in the Fifth Panzer Army's Surgeon General Report which pertains to German hospital organization. He analyzed DMSi's interpretations of German reports and provided a number of pages of data which he had assembled in preparation for his review. This material is included in the collection of primary source records provided to CAA as part of the final report for the ACSDB. Attachment 5 to this paper contains memoranda for the record prepared by Brian Bader immediately after Colonel Muhm's review of the ACSDB. Except for editorial changes, they are identical to material written in May 1989.

Attachment 1

30 March 1989

Memorandum for the Record: 29 March 1989 Meeting for Ardennes Data Base (Preliminary Meeting)

In Attendance:

Dr. Hugh Cole (consultant)
Mr. Charles B. MacDonald (consultant)
Mr. John Haley (CAA contracting officer's technical representative)
Mr. Brian Bader (DMSi program manager)
Mr. Chris Lawrence (DMSi)
Mr. Lee Sweetapple (DMSi)
Mr. Richard Anderson (DMSi)
Mr. Keith Posen (DMSi)

This preliminary meeting focused on the design of the data base and making acquaintance of the DMSi staff, consultants, and John Haley (CAA). Each consultant, John Haley, and the DMSi staff received one copy of a review package (table of contents attached to this memo).

Design of data base was described by Mr. Bader. One of Dr. Cole's initial questions was about the flexibility of the data base design. He asked this question because he felt that certain weapons characteristics, particularly frontal armor thickness of tanks, were not tracked in the weapons data base records. DMSi and Mr. Haley explained that the weapons data base design was created in a cooperative DMSi-CAA effort and that the field selection was driven by model requirements. Also, Dr. Cole was informed that much data, such as tank armor thickness, was contained in sources assembled for SSPK analysis, to be provided in paper copies to CAA as part of the project.

In a discussion on weapons inventories, Dr. Cole mentioned that replacement statistics on US 105mm artillery pieces would be a possible indicator of attrition of this kind of artillery piece. Dr. Cole noted that in his research he had seen records indicating that a substantial number of US 105mm replacements was being sent to units. These records corroborate the fact that the US forces lost high numbers of abandoned artillery in the opening phases of the Ardennes campaign, as German units overran US artillery positions.

In a general discussion on two types of German weapons, the nebelwerfer (a World War II multiple rocket launcher) and the assault gun (a tank destroyer-infantry support armored vehicle),

Dr. Cole discussed his experience on the subject of the use of these vehicles. The nebelwerfer was noted in one British source as being a high casualty-inducing weapon. The assault gun was, according to German sources, a weapon in which the Germans placed great reliance. Mr. Bader indicated that this discussion made clear the importance of providing to the client full definitions of the various weapons systems tracked in the data base.

Dr. Cole discussed the importance of thorough self-explanatory referencing of data. He said that identification of sources by microfilm identification number, for example, without the explanation of the actual record, was insufficient. This led to a general discussion of the referencing and bibliography sections of the data base. DMSi informed Dr. Cole that these sections were designed in such a manner as to provide thorough referencing. However, Mr. Bader alerted Dr. Cole and Mr. Haley that the reference section of the data base has the potential of becoming a data base entity in itself and that to track each item's source is a considerable task. Mr. Bader also pointed out that, in some of the draft estimation methodologies on German data that he had written, he had only provided microfilm or archival identification numbers. DMSi made known its appreciation of the need for thorough and comprehensive referencing, and Mr. Bader stated that a satisfactory method would be used in the data base to reference data and, in the many cases where it occurs, explain its derivation.

Dr. Cole alerted the meeting attendees that US forces had instituted several tables of organization and equipment revisions, albeit minor ones, for some units in the 1944 time period. DMSi is in fact using the 21 December 1944 version of FM101-10, Staff Officers Field Manual: Organization, Technical and Logistical Data, for US T/O&Es.

Dr. Cole reviewed German Surgeon General reports containing 10-day compilations of battle casualties by field army. A general discussion followed on the comparison of Dr. Cole's estimate of total German battle casualties for the Ardennes campaign (ca. 67,000) with DMSi's approximation (70,000-80,000). It was agreed to continue this discussion on the following day after DMSi had reviewed German postwar manuscripts for all data on battle casualties and had compiled its exact aggregate figure for estimated German battle casualties in the Ardennes.

In a discussion on the dearth of German hospital and medical facility load statistics for the Ardennes period, Dr. Cole emphasized that the most pertinent data in this area, for planning and analytical purposes, is related to hospital data (particularly bed capacity) at the Army level and above. Mr. Haley informed DMSi that hospital capacity is the medical statistic most relevant to CAA's analytical purposes.

Mr. Sweetapple and Mr. MacDonald performed a separate, quick general review of elements of the US portion of the data base. A memorandum of this review is attached to this MFR.

At the conclusion of the meeting, Mr. Bader offered a general work plan for the remainder of the consultants' time.

- DMSi will prepare a table showing present completion of the data base from which the consultants would select items that would interest them as review material. This would include a compilation of battle casualty data from the German postwar manuscripts for use in assessing DMSi's German battle casualty estimates.

- DMSi will prepare a list of data base items remaining to be addressed, on which the consultants could provide assistance or recommendations.

- DMSi will prepare to review with the consultants the computer resources (including recorded data and data base design details), data sources (primary and secondary), and the 16 December front line trace and locations of US and German units on the maps with which DMSi has been compiling unit location data, for appraisal and critique by the consultants for these and any other ACSDB items.

Brian Bader, DMSi program manager

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Memo for the Record

Date: 30 March 1989
Subject: Meeting between Sweetapple and MacDonald
From: Lee Sweetapple

On 29 March 1989 I met with Charles MacDonald for the purpose of a quick review of US elements of the Ardennes Data Base. During the review of this data, Mr. MacDonald was given a brief demonstration of the data base in which he was able to observe the structure and basic design as it currently existed on that date. Mr. MacDonald saw examples of the Unit location file, the Unit data file, the Inventory file, and the Reference file. The review of the above mentioned files consisted of looking at 101st Airborne Division records for the 19th of December in each of the above mentioned files, and viewing the 2nd Infantry Division records in the browse mode.

Mr. MacDonald was then taken to my office, where he reviewed the hard copy records for the XIX Corps and the 17th Airborne Division.

Mr. MacDonald was pleased with what he saw and stated that our research appeared thorough, and that we had used sources which he had not had the opportunity to review. The specific sources Mr. MacDonald referred to as being new to him were the 12th Army Group G-1 records and select Corps and Division G-4 records.

Mr. MacDonald was asked if he knew of any additional sources in which Corps Service and Support Unit Order of Battle information could be found. Mr. MacDonald stated that from his experience only combat units were carefully tracked in the historical record and that we might have to utilize estimation for our corps and army order of battle.

Mr. MacDonald was shown the lack of replacements information by division in the records of the First Army for December 1944. I then described the method of adding the total number of US divisions in the First Army for which no replacement date was available, and then dividing the total replacements as contained in division and corps records less known replacements sent to division by the number of divisions for which we had no data and then evenly distributing the result. Mr. MacDonald stated that our estimating procedure seemed to be the only reasonable approach.

Attachment 2

Memorandum for the Record: 30 March Meeting for Ardennes Data Base (Second day Meeting)

In Attendance:

Dr. Hugh Cole (consultant)
Mr. Charles MacDonald (consultant)
Mr. Brian Bader (DMSi program manager)
Mr. Chris Lawrence (DMSi)
Mr. Lee Sweetapple (DMSi)
Mr. Richard Anderson (DMSi)

The meeting began with circulation of two papers compiled as a result of the previous day's meeting (attached to this MFR). The consultants received a description of the status of the data base showing its completed sections and those sections remaining to be addressed, and a list of important action items to be discussed by the consultants and DMSi.

Dr. Cole inquired about several sources he had employed when writing the Army's official history of the Ardennes, including:

- Magna Bauer's study on the "cost" of the Ardennes operation (DMSi has this study).
- Charles von Luettichau's study on German tank strengths at the beginning of the Ardennes operation (DMSi has copies of sections of this study and has used them in its research on the Ardennes).
- Von Luettichau's study on German rail movement during the Ardennes operation (DMSi must obtain this report as it contains data on POL supply and transportation of casualties).
- Royce Thompson's tactical study on the battle at the twin villages of Krinkelt-Rocherath on the northern shoulder of the Ardennes salient (DMSi does not have this study).
- Thompson's study on tactical air operations in the Ardennes (DMSi has this study and will use it in the final proof of the air portion of the data base).
- Thompson's study on air supply during the Ardennes operation (DMSi has this study).
- Thompson's study on combat intensity and its measurement (DMSi must obtain a copy of this study).

Dr. Cole notified DMSi that in his research he had discovered that British 25-pounder artillery pieces, without crews, were provided to the Americans as replacements during the Ardennes operation.

Dr. Cole inquired about sources used for the unit location portion of the data base, particularly about the maps prepared for his book and Charles MacDonald's book (Mr. MacDonald has written the Army's official history volume covering the January phase of the Ardennes operation). DMSi informed the consultants that its primary sources for unit locations were German OKH and OKW (High Command of the Army and High Command of the Armed Forces) daily situation maps, German postwar manuscripts written by Ardennes participants, US First Army and VII Corps records, British War Office records (British XXX Corps), and secondary sources such as the consultants' works.

A discussion of the inventory data base focused on DMSi's plans to attrit weapons and equipment using a rate based on personnel attrition, when other data was not available in the records, and DMSi's plans to track certain items of equipment in non-divisional units at full T/O&E strength, when other data was not available in the records. Dr. Cole recommended that the weapons attrition rate (which is contained in DMSi's Attrition Handbook) be checked against known data from the Ardennes operation, if possible. As regards full T/O&E strength for certain items of equipment in non-divisional units (note: not including tanks, tank destroyers, and artillery pieces in tank, TD, and artillery battalions, as this data will be determined from the records), the consultants notified DMSi that certain divisions (the 4th and 28th Infantry Divisions) were understrength in the time prior to the opening of the German offensive on 16 December, although they may have been up to strength by 16 December. A general consensus was reached that tracking at full T/O&E for the trucks, trailers, etc., in the various non-divisional units was a reasonable approach to use. Dr. Cole notified DMSi that one of the Royce Thompson studies contained the US VIII Corps strengths as of 0600 on 16 December.

Dr. Cole, Mr. Bader, and Mr. Lawrence discussed the methods of reporting WIA in the German reports. At this point Mr. MacDonald, Mr. Sweetapple, and Mr. Anderson left the discussion to review other items in the data base (a memo of that discussion is attached to this memorandum). After reviewing the cumulative divisional casualties for German units, it was determined that the ratio of German wounded to killed for the Ardennes period was approximately 3:1, a figure that was considerably lower than comparable US data for the period and for the entire European Theater of Operations. This raised the question about German reporting methods, namely whether or not lightly wounded in action who are not evacuated from the division are reported in the German casualty reports. Dr. Cole indicated that he did not think lightly wounded in action (non-evacuees) were reported. Dr. Cole also stated that the British regularly increased the number of German WIA by approximately 30% to cover for the differences in the reporting systems of the Germans. This percentage is in the range of numbers being considered by Chris

Lawrence in a similar approach. Dr. Cole will look for a source he remembers seeing on German medical reporting systems and provide it to DMSi, if available.

Concerning tank gun ranges, Dr. Cole mentioned a history on the US 1st Armored Division written by US Army historian Richard Howe with descriptions of tank gun ranges in World War II. (DMSi will attempt to locate this history.) Dr. Cole also recommended a British study on tanks in the Ardennes which DMSi has already acquired.

A discussion was held on US medical facilities and their statistics. DMSi has located statistics at the Army level for daily hospital admissions and dispositions. DMSi informed the consultants that it had looked at the US Army Surgeon General's report and that this source did not contain statistical data on medical facilities. The consultants thought that field hospital records data (data from those hospitals -- army assets -- assigned responsibility at the corps level by the army) should exist, but they were not surprised that it did not. Dr. Cole will try to get information on US medical systems for the period.

Concerning MOS (military occupational specialty) data (which must be tracked for on-hand, return to duty, and replacement personnel in the data base), Dr. Cole informed DMSi that the primary MOS categories with which the US Army was concerned in World War II (i.e., which had the greatest requirements for replacements) were riflemen and tank gunners/drivers. Dr. Cole looked at attrition ratios in the 1983 version of RB101-999, Staff Officer's Handbook, and deemed them reasonable. These ratios break down losses by MOS categories for infantry, armored, and airborne divisions. Dr. Cole thought the use of ratios from a June-July 1944 German Fifth Panzer Army report for the Germans (which, unlike the RB101-999 ratios, show a consistently high percentage of infantry casualties in both infantry and armored divisions) was not appropriate for estimating German MOS breakdowns in the Ardennes as they are from a campaign fought under very different circumstances. Ideally, the German MOS breakdowns, according to Dr. Cole, should be estimated from a similarly organized force fighting under similar operational and environmental conditions.

The consultants were asked about the holdings of the US National Archives at its St. Louis, Missouri, facility. Mr. MacDonald had acquired copies of company morning reports for use in one of his books, but to the knowledge of both consultants, the only sources housed at this facility which might be applicable to the Ardennes data base were personnel reports, company morning reports, and perhaps battalion morning reports.

Dr. Cole was shown the computer resources used by DMSi to store the data base and saw examples of unit location, unit data,

unit inventory, and reference data screens. Dr. Cole reiterated the importance of thorough referencing which he had made in the previous day's meeting. Dr. Cole also saw some of the sources used by DMSi to compile German tank statistics. Mr. MacDonald was shown the collection of German postwar manuscripts, examples of German divisional records from the German Archives in Freiburg, West Germany, the photocopies of German OKH and OKW maps, and the 16 December frontline overlay created by DMSi on photo copies of US Army Map Service maps of the Ardennes region.

At the conclusion of the meeting it was agreed that the consultants would receive copies of the memoranda for the record of the meetings. The consultants would also provide DMSi written copies of their evaluations of the DMSi's work, based on their review over the past two days. The consultants agreed to meet again with DMSi for one-half to one day towards the end of the project for review of the data base in its completed form.

Brian Bader, DMSi program manager.

List Prepared as a Result of Preliminary Meeting with
ACSDB Consultants

UNIT LOCATION

Germans-completed/proof completed
US/UK-completed/proof in process

UNIT DATA

Germans-selected estimation methodologies completed/
order of battle completed
US-completed/proof in process
UK-not started

UNIT INVENTORY

Germans-tank data estimation completed
US-all items of equipment partially completed
UK-not started

AIR DATA

Germans/US/UK-completed and proofed

T/O&E

Germans-completed for divisions/compilation for non-
divisional units in process
US-completed
UK-not started

REFERENCE DATA

US Unit Data-completed/proof in process

BIBLIOGRAPHY

Air Data sources completed
German Postwar Manuscripts completed

**Second Page of Material Prepared
After Preliminary Meeting**

ITEMS TO BE ADDRESSED

(prepared as a result of preliminary meeting with
ACSDB consultants)

Referencing for Unit Location (German and US)
Tracking attachments and detachments at full TO&E
Non-divisional battle casualties (German and US)
Do a daily strength tracking process for the PzLehrD
Explain interpretation of ZB and 10-day reports
The "slightly wounded in action" anomaly for the Germans
US intelligence reports for German data
Query on St. Louis archives (morning reports)
US medical data statistics
German tank ranges

Memo for the Record

Date: 31 March 1989
Subject: 30 March Meeting between Sweetapple, MacDonald,
and Anderson
From: Rich Anderson

Subject covered in discussion was mainly German tank data. Reviewed for Mr. MacDonald the various sources (Luettichau, Pallud, Inspector General Panzer Troops Report, Division Reports, etc.). Explained methodology and showed him a sample worksheet for 1st SS Panzer Division. We discussed briefly the problems associated with the German data, particularly the lumping together of vehicle types (i.e., assault guns), which he brought up as being a typical problem. I explained the use we made of Pallud to determine some vehicle losses. MacDonald indicated that sources used and amount of research for ACSDB were comprehensive.

Material discussed by Sweetapple and Anderson concerned US data and was similar to what had been covered during the previous day's meeting.

Attachment 3

Charles MacDonald's Comments on ACSDB Review

5300 Columbia Pike
Arlington, Va. 22204
April 5, 1989

Col. Trevor A. Dupuy, Director
Data Memory Systems, Inc.
10392 Democracy Lane
Fairfax, VA 22030

Dear Colonel Dupuy:

Having spent two days last week consulting with Mr. Brian Bader and others of your staff who are performing the work for the Ardennes Campaign Simulation Data Base, I believe it might be helpful for me to provide an interim assessment of the project.

In my opinion, Mr. Bader and his fellow scholars are doing a superb job.

When the Concepts Analysis Agency first let this project out for bids, I was performing occasional work for another research agency and prepared the bid for that agency. In the process, I noted that in my opinion the existing records would not sustain several of the required categories.

I now have to take that back. Although I have performed considerable research in the Ardennes records and did some additional research before rendering that opinion, your scholars have discovered records — particularly at the level of 12th Army Group — that I did not know existed. As a consequence, they are obviously capable of providing the required data.

Although some blanks in the record still exist, I was impressed by the intelligent and logical methods of extrapolation that your team is employing.

My consultation was confined primarily to the American records, but my fellow consultant, Dr. Hugh Cole, delved deeply into the findings on German data.

My sole objection is to the inclusion of data on the U.S. Ninth Army and the German Fifteenth Army, but I understand that this requirement was specifically instituted by the client.

I will have a final opportunity to judge the work when it is completed but can hardly envision that my interim assessment might change.

Sincerely,

Charles B. MacDonald

Charles B. MacDonald

Attachment 4

Hugh Cole's Comments on ACSDB Review

16 April 1989

To: Col. T.N. Dupuy, DMSi

From: Hugh M. Cole

Subject: Brief Review of the Ardennes Campaign Simulation Base

References:

- A. 12 March 1989 letter, Bader to Cole and enclosures
- B. DMSi Memorandum for the Record, 30 and 31 March, 1989: "Meeting for Ardennes Data Base."
- C. "Work Book" prepared by DMSi for ACDSB Review Board, N.d.
- D. Hugh M. Cole, The Ardennes: Battle of the Bulge, US Army in WWII, European Theater of Operations, 1965.

- 1) It should be noted that Charles MacDonald and I spent only two days in reviewing the work, completed or in progress, of the ACSDB Team. This brief critique, therefore, must not be considered as analysis in depth. It should be properly viewed as suggestive in content for the DMSi Team and for the client, CAA, rather than as a final and carefully reasoned judgment. Nonetheless, it has been possible to evaluate the competency of the ACSDB Team as a working group and to assign a rating to the product as it nears completion.
- 2) The review which follows has been organized, as much as time permits, in the order of the eight separate Data Base files shown to us and discussed with the Team and the client representative.

AIR DATA

Although this subject was exempted from our review, a few notes may be useful. (See Ref. D above.) Most of the Allied sorties were flown against targets and enemy aircraft met at and east of the Rhine. These data at the time were considered important: maximum range, service ceiling, weight of ordnance loading. Few Allied ground forces ever saw more than a handful of German planes, this because the bulk of the Luftwaffe sorties were encountered and battled outside the area of the ground battle. Perhaps this phenomenon cannot be shown in the Model. Nonetheless, it seems important to show a ratio, in the Data Base, between the number of German sorties made and the number of those reaching the battlefield and intervening in the combat on the ground.

UNIT DATA

- 1) The type and amount of data uncovered by the Team under this rubric is most impressive, especially the German data. [Both MacDonald and I expressed the wish that we could go back several years and incorporate these new data in our volumes in the "Green Books".]

2) I note that the Team has been very careful to explain the methods they have chosen to use when dealing with large gaps in the documentation or in those cases where the data are generalized or of questionable origin.

3) I stress again (as in Ref. B above) that the casualty rate should be determined for division size units, along with the rate at which RTD's appear in the replacement flow.

4) Note also (Ref. B above) comments on hospital and medical facility loads, as these become prime analytical tools for both Allied and German forces.

5) The Team method for tracing attachments and detachments seems well reasoned and the proper Order of Battle sources have been used. This problem of tactically "stitching" together disparate units (because of the necessities of the defensive battle) is one of the major items in the story of the Ardennes and one of the major US Army achievements.

6) One of the most important casualty statistics in modern warfare is the ratio between KIAs (plus DOWs) and WIAs. In Ref. B above, I raised a question about a possible appreciable contrast between this particular ratio as experienced in the Allied and in the German camps. [I have worked out this ratio for the US forces from D Day, 1944--as given in 12th Army Group G-1 Statistics--and at the moment I find little difference between these ratios in Allied and German experience on the Western Front.]

7) I understand that the client wishes to include British forces in the Unit Data Base. I confess that the reason for this escapes me. Although F M Montgomery at one point assumed general command of the American forces on the north shoulder, the 30 British Corps, assigned as back-up at the Meuse River, did not engage the Germans in combat at any time during the critical days of the German offensive.

8) There is one important item under the Unit Data heading which I may have missed. During the first ten days of the Ardennes battle one of the most important elements was the availability (or non-availability) of logistic motor transport. Such vehicles should be numbered in the data base and are far more important than the number of small arms and side arms, for example.

9) In particular, to the above, I do not understand the Team statement in Ref. C, p.7 that "Most divisions have no such transportation personnel" (i.e.) as contrasted with units involved "in transport between divisions and higher echelons." Refer to my analysis of the German armored thrust which advanced or paused over and over again as the divisional transport bore the burden of bringing POL and ammo forward from bases as far back as the Rhine depots. (Ref. D) Note that the Volksgranadierdivision, as fielded in the Ardennes, contained a Versorgungregiment which combined all the service elements including the division trains. Although the American Infantry Division, (T/O and E7, 15 Jul 43, the organization in the Ardennes), no longer contained truck companies, as in the earlier organizations, this infantry division carried 1402 "General Purpose Vehicle" and 592 Trailers.

[One of the "pay problems", when I was in the 12th General Staff class at Leavenworth, was to move all of the Div Arty and its ammunition plus three or four rifle battalions with only those vehicles organic to the division.] [Perhaps I have missed something here.]

INVENTORY DATA

1) I refer to the classification of equipment in the Inventory Data Base, i.e. "Destroyed", "Damaged", "Replaced", etc. This rather complex classification was not used during combat operations in the ETO. The common--and legal--report "Lost in Combat" simplified the inventory problem (although short-cutting and confusing the present day model builder.) Ordnance reporting systems on tanks, for example, normally used only the headings "On Hand" or "Combat Ready", "Damaged", "Damaged and Repairable in 24 Hrs", and "Lost." [The British system was similar except that they used the term "runners" for armored fighting vehicles and SP artillery which were combat ready.]

2) The types of equipment losses which were regarded as most serious are demonstrated in the War Department "Monthly Replacement Factors", 1 June 1944; these factors were changed after the Ardennes. The three major changes, doubling the original replacement factors, listed these items: Howitzer 105 mm, M3; Medium Tanks w/75 mm and w/76 mm gun. [As I recall these same items were most carefully followed when in the COMZ "pipeline" and when stocked in Army Reserve.]

UNIT LOCATION DATA

1) This organization of data seems reasonable and not too complicated.

2) The exact location of US div. Hqs is given by day in the Order of Battle of the US Army, World War II, ETO, Divisions (Paris, 1945). (Some locations were in hamlets which could only be found on detailed maps). For German units the OB West KTB normally showed the location of division headquarters and those of important Kampfgruppen.

3) See Ref. C, para 8. The definition of "Total Time in Combat" becomes meaningless if "hours" are the measure. W D Regulations of the period required the reporting of precise "Days in Combat", this rubric for purposes of campaign and battle "credits". Combat days were reported by 12th Army Group. The dates on which a division entered combat and on which the entire division closed will be found in the ETO Order of Battle cited in para 1 above. (For the Ardennes Battle; 8th Armored Div, 17 Abn Div, etc.)

4) See Ref. C, para 6. "Width of Front" should be handled with care. I assume that the client includes the German Fifteenth Army in gross frontage calculations since it was part of Army Group B, this latter mandated by the client. Despite planned commitment by the Fifteenth, none of its divisions took part in the Ardennes offensive. This fact should be reflected in frontage measurements. On 16 December the total A Gp B front measured 269 kms--but when the front of the Fifteenth is subtracted the "Ardennes Battle"

front measured only 143 Kms (and the main German armored thrust debouched on a front of 97 kms.)

5) See Ref. C, para, 11 and 12. "Fortifications" and "Obstacles" should be squared against the frontages discussed above. For example, the 18th V G Div, in the Schnee Eifel Sector, was deployed on a front of 19 kms because the German high command viewed this as reasonable in this difficult terrain. Although there were no permanent fortifications east of Dinant and the Meuse, a few village "strong point" emerged as simulated "fortifications" (by reason of road junctions, narrow defiles and the weather) and so para 11. should be reflected in conjuncture with para 6. The same holds true with para 12. [Note St. Vith, Bastogne, Monschau, Malmedy, etc.]

6) See Ref. C, para 7. The item "Separate Elements" may be the most important of the "Unit Location Data Conventions," certainly this is true in the fragmented and often piece-meal battles fought on this tortuous and frozen (or muddy) terrain. The manner and timing of troop commitment on both sides provided many more tactical "forms" than in standard deployments of triangular US divisions or of the reduced German Type 1944 and Volksgrenadierdivision (3 regts but of 2 bns). [Thus the deployment of the triangular infantry division could take three forms; 3 regiments abreast, 2 abreast and 1 up or back, 3 regiments in column. This divisional organization obviously can be simulated with greater ease than when, as in the Ardennes, elements of regimental or combat command strength from--let us say--three divisions are inter-mixed under perhaps eight or nine "local" commanders and represent an uncountable array of tactical forms.]

One may see this problem of "Separate Elements" depicted on Map VI, Ref. D. Also, compare Map VIII which illustrates this same problem for both American and German forces during a four day period.

7) Not only does the portrayal of "Separate Elements", here in the Ardennes data base, present a problem when applied in simulations, models and computerized war games, but if not handled properly may create an extremely erroneous ratio between opposing forces. [Example: Ref. D, p. 643 f and Map X. Here the sector assigned to the US 87th Inf. Div appears to oppose this entire division to the 902d regiment of Panzer Lehr. In fact, when the 87th started its attack at New Year's to open the western road to Bastogne, only a single regiment was committed at any one time. Example: Ref. D, p. 119 f. and Map II. On 18 December the 326 VG Div, having all of its three regiments at hand, made a desperate attack to take Hofen, a pivotal point for the extreme right wing of the German offensive. This sector was held by the 3d Bn/395 Inf (99th Inf Div) and a few TDs frozen into the ground. Their German commander put a fresh rifle battalion and ten tanks into the initial assault, following this by battalion waves and, in total, using two regiments. "The disparity in losses suffered by the combatants is amazing. The German dead counted in and around Hofen numbered 554; prisoners numbered 53. The American casualties were five killed and seven wounded."]

8) Reference C. paras 12, 13 and 14. An unreasonable number of items may be crowded under these three headings. I suggest that reading the so called "Green Books", (i.e., the Official History of the US Army in WWII,

will show that two items subsumed under these headings are of far greater tactical importance than all of the others which may be inserted because the data bank must show "completeness." These items are a) rivers and b) mud-- Napoleon's "Fifth Element of War".

Although the Ardennes campaign definitely demonstrates the paramount nature of these two items, a careful reading of the volumes on the Italian campaign, the Tunisian campaign and even Okinawa will underscore the special character of these two items.

TO & E Data. I question whether "Authorized" (sic!) figures for fuel (POL) and ammunition are very meaningful at this late stage of WWII.. The Germans at no time attained the "units" of POL or ammunition which were "authorized" for Army Group B. The American forces had, as early as 1 November, a tonnage of POL and ammunition in the Army depots and the reserves in the close advance depots of ADSEC that far surpassed the "authorized" levels set by the War Department and ETO Hqs. I suggest that the Team and the client read pages 663-668 in Ref. D. If very detailed data is required check R.G. Ruppenthal, Logistical Support of the Armies (2 Vols) in The European Theater of Operations series.

WEAPONS DATA

1. Ref. C. para 5. "Burst Radius" is important in theory but is modified from standard "terminal ballistics" calculation, here in the Ardennes, by the wooded terrain and by the type of impact on snowy ground and mud. More important is the "penetration" achieved by various types of ammo against face hardened steel plate, this because of the ranges of engagement in the Ardennes and the considerable differences between the defensive armor on American and German armored fighting vehicles. Thus, the American Sherman (M-4) could not "penetrate" the front (turret, upper and lower hull) of the Panther, Tiger I or Tiger II. [This has been discussed with the CAA project manager who states that an "outboard" model will indeed handle these data on tank armor and competing muzzle velocities/gun calibers.] [See Ref. B.]

2. Ref. C, para 8. In the tank battles, where resupply was difficult, "Ammo Weight" is less important than the number of fixed rounds (and type) carried in the tank ammo racks.

3. Ref. C, para 11. I do not understand this. The Cannon Co. 105 mm How, the 57 mm AT gun, the German "Zwilling" FLAK and multi-barrel "Werfer" all could be and were towed by 2-1/2 ton trucks or the German Krader.

4. "Aircraft", Ref. C, para 5. I do not understand the "rate of fire" for A/C; this only applies to "strip" and "pattern" bombing. More significant a measure is the weight of ordnance deposited on a measured area and the type of target.

5. "Aircraft", Ref. C. para 13. I do not understand this, except possibly for long sustained strategic bombing campaigns. In the Ardennes, as well as NW Africa and Italy, the measure of sustained capability was not

"crew rest requirements" but the availability of reserve aircraft crews. [NOTE that in Europe, during 1944, the a/c "crew" is not reckoned as "1 man", but the convention is that for every 1000 sorties the RAF lost 36 men and 9 a/c, while the USAF lost 34 men and 8 a/c.]

Reference Data

1. For this see my comments in Ref. b.
2. The critical element here, for purposes of model builders and computer simulations, is that the user of historical data should be able to determine when the historical document refers precisely and specifically to a number, e.g., the casualties recorded on 22 December (for that date), in the regimental S-1 Journal, as contrasted with total and gross figures appearing at months-end in the Regimental After Action Report which have been used to "pro-rate" an estimated daily casualty number for specific and separate days in that month. [The practice of pro-rating and making linear projections from a generalize datum is often necessary but the user of such data must be aware of this practice.]

Bibliography Data

1. The method developed herein is clear and seems to be both complete and in accord with recognized conventional historical methodology.
2. [My first reading of the description of the above methodology led me to think that the format was unduly cumbersome. When the retrieval of this bibliographical data was demonstrated on the computer screen, I found it to be understandable and economical in form.]

Addendum

It may be that my brief observation of the workings of the Team and my limited analysis of their as yet unfinished product does not justify personal comment. Nonetheless, I am a long time organizer of similar research teams and employer of multi-discipline groups, beginning with the Army historical team, European Theater of Operations and, through many years, in charge of Operations Research multi-disciplinary teams at ORO and RAC. Therefore, I am impelled to proffer the following comments.

The Team is operating on well-defined guide lines and with assumptions which are clearly stated. The relationship between the Team and the client--as represented by the Project Administrator--seems to be unusually close and based on mutual professional respect (may I say that this is not SOP?). The team does not "fight the problem". The Team does work well together on defining areas of responsibility and in developing methods for attacking the Team problem. Nonetheless, the Team is not a "debating team" but appears to accept the final decision and follow the directives of the Team leader. The members of the Team are, in my judgment, smart, motivated, hard working and personally concerned that the final product should be a credit to their employer and themselves.

Attachment 5

Memoranda on Three Days' of Meetings With Colonel Muhm

Summary of 22 May 1989 Meeting Between Colonel Gerhard Muhm and Brian Bader prepared by Brian Bader, DMSi Program Manager

1) On Monday, 22 May 1989, I picked up Colonel Gerhard Muhm at his hotel and drove him to the DMSi office.

2) Colonel Muhm brought with him a collection of secondary source material on the Ardennes Offensive which he had collected since DMSi's notifying him of his consultant work. The material contained information on unit strengths, cumulative German battle casualties during the Ardennes Offensive, and copies of maps showing front line movement. I reviewed the material and found that it contained no new data which DMSi had not already found in primary or secondary source material. The maps (from secondary sources) showing front line movement may have been useful as aids in our unit location research, but as this has already been completed and as we have reproductions of the actual German High Command maps, I did not consider it necessary to copy Muhm's maps.

3) I showed Colonel Muhm our holdings on German records of the Ardennes Offensive including:

- The Freiburg Material on the German Divisions
- Other Freiburg Material such as the Panzerjaeger Abteilungen report and the Inspector General of the Panzer Troops reports
- The Color Reproductions of the Daily Situation Maps (High Command Maps)
- The Post-War German Manuscripts

Colonel Muhm indicated that what we have was comprehensive and exactly what DMSi required to do the sort of work which we are performing on the Ardennes.

4) Colonel Muhm performed an estimation of the major items of equipment and an evaluation of other pertinent information for two German divisions. Summarized below are his findings:

12th SSPzD (SS Panzer Division)

Personnel Full = 18,500 (10 Dec 1944)

Ersatz Personnel = 5,300 (above strength)

Negative Evaluations:

- 1) Many soldiers from Air Force and Navy
- 2) 1,000 Hiwis (Russian auxiliary volunteers)
- 3) Short Training Period
- 4) Few Combat Veterans

Material Situation (12th SSPzD):

	Soll (Authorized)	4 Nov	10 Dec
Armor	171	54	72
SP Antitank	31	22	22
Artillery	59	44	57
Inf Guns	12	6	13
Half-tracks	464	68	131

Material very well equipped.

2d PzD

Personnel: 15% Shortage (6 Dec 1944)

Ersatz (Replacement) Battalion: 2/3 Shortage. After 7 Dec 2 march battalions arrived which in Colonel Muhm's estimation would have filled the replacement battalion of the division.

Negative Evaluations:

- 1) Short 150 NCOs and troop leaders
- 2) Short 29 panzer (tank) crews

Material:

	Soll	Ist (actual)
Tank	84	30
SP Antitank	21	-
Half-track	311	165
Artillery	42	34
Inf Guns	?	15
Assault Guns	28	10

Only 50% authorized armor and heavy weapons

Shortage of 400-500 LKW (cargo trucks).

Muhm's figures are generally similar to DMSi's estimated equipment start strengths for these two divisions. His estimation is not nearly as comprehensive as that of DMSi (DMSi differentiates between the various tank models and estimates the number of tanks in non-operational status, etc.). In performing his equipment estimation, Muhm confirmed various aspects of DMSi's estimation methodologies, such as its interpretation of the category in the German reports labelled "instandsetzung" (in-repair). Muhm did not include the personnel of the "ersatz" (replacement) battalion in his personnel strength estimation, personnel which DMSi did include in its estimation. The replacement battalion was a unit which normally trained soldiers for front-line service, some distance behind the front, after their arrival from the Zone of the Interior and prior to their commitment with front-line battalions. I pointed out to Muhm that in some German units during the Ardennes (the 26th Volks Grenadier Division was one, I believe) the ersatz battalion was organized and utilized as a combat unit. In evaluating German divisional personnel strengths, DMSi or analysts may wish to reduce the total strength by some factor to account for the exclusion of the ersatz battalion personnel.

5) We reviewed examples of Muhm's work on German casualties in World War II. This work contained information which I considered of importance to the Ardennes Project, i.e., killed to wounded to captured/missing in action ratios, daily divisional battle casualty losses, etc. Summarized below is some of the information. Muhm agreed that I would copy any of his papers which I considered relevant to the Ardennes project.

Casualties -- Eastern Front

1 July - 31 October 1943

Daily Totals for 186 divisions = 7407

" " " Korps -- Army -- Army Group = 554

Daily rate = 219 for divisions (2.2%)

Heavy combat day daily rate = 663 estimated casualties
(a division would typically spend 1/3 of the time on
the front in "heavy combat")

22 June 1941 - May 1944

25% killed

68% wounded

7% missing/POW

Casualties -- Italian Campaign

6 of 22 months

15.5% killed
46.5% wounded
38% missing

11 May - 31 July 1944

13% k
43% w
44% m

Battle of Rome (23 days)

Army Group total casualties = 1507 (2%) for divisions
" " " = 146 (.5%) for spt and logs
troops

Ist (authorized) strength Kampftruppen (combat personnel) =
225,000
Authorized strength Spt and Logs = 87,300

Casualties 29th PzGD 11 May 44 -- 26 Oct 44

(6 months)

77% --- inf
23% --- other Waffengattungen ("branches of service")
broken down into --
12% tank/armored reconnaissance
7% artillery/air defense
2% engineer
1% communications
1% logistics troops

Several important items should be noted about this material. The daily divisional casualty rates reinforce, in my estimation, the legitimacy of DMSi's estimated rates for the Ardennes divisions. German divisions in Muhm's estimation may have sustained over 600 casualties on a day of intense combat (on the Eastern Front), and about 220 daily on the average. Very few of DMSi's estimated daily losses exceed 600 battle casualties (the 5th Fallschirmjaeger Division is the only one that immediately comes to mind), but DMSi did estimate some particularly high daily battle casualties (around 200 personnel) for some of the

units, such as the SS armored divisions. As DMSi's estimates for the SS divisions were based largely on cumulative 10-day and monthly casualty data, I had already had confidence in DMSi's figures prior to seeing Muhm's analysis. Muhm's data serves to increase my confidence in DMSi's estimates.

Muhm's casualties by branch of service do not differ appreciably from DMSi percentages in use with the US Army units in the Ardennes (from divisional and army records) and from the "usual" percentages of 75-90 percent for infantry and the remainder for all other branches.

Perhaps most significant is the ratio of killed to wounded to missing. For the Eastern Campaign, the missing rate is much lower than that of the Italian Campaign and the DMSi Ardennes rate. Muhm's Italian rate is very close to DMSi rate for the Ardennes. I brought this to his attention, and he explained that this was a typical rate for the 1944 and later period in the West (including Italy) because of the high number of German POWs and that because of the lower number of POWs in the East, the missing rate was much lower in that theater. I asked Muhm about the 1:3 killed to wounded ratio in our German Ardennes casualties and his Italian Campaign figures, and he said that only the seriously wounded in action would be included in German reports on casualties. Lightly wounded in action, in his experience, went to company support platoons for treatment and from there back to their units and were probably not recorded in the German statistics.

6) We discussed medical organization. Muhm reviewed the 5th Panzer Army 10-day loss reports and from the medical units identified in that document determined what was the likely organization of the Army's medical facilities, an organization, he said, probably maintained by the other three German armies participating in the Ardennes. This information will be incorporated into the German hospital bed capacity and medical personnel strengths which we estimate for the German portion of the data base.

7) We discussed the difference between genesene (convalescent) and dienstfaehig (service ready), two categories of returning personnel data which I used in DMSi's German "return to duty estimation methodology." Muhm explained that dienstfaehig are for treated and recuperated sick and non-battle injured, and genesene for wounded convalescent. I was not aware of this difference, but it will not affect the estimation methodology. I still maintain that dienstfaehig includes recovered from battle wounds, as the German document (5th Panzer Army Surgeon General report) implies in its definition of the term, a definition for which Muhm had no explanation.

Summary of 23 May 1989 Meeting Between Colonel Gerhard Muhm, Brian Bader, and John Haley, CAA contracting officer's representative -- prepared by Brian Bader, DMSi program manager.

1) On Tuesday, 23 May, John Haley joined Colonel Muhm and Brian Bader for continued discussion on the German sections of the Ardennes data base.

2) During the morning, the discussion focussed on German medical and logistical statistics, and various German military facilities which may contain information on this and other data.

3) Muhm said that a Bundeswehr medical school in Muenich would have information on wound ballistics data, incidence of kinds of wounds, etc., but he was unsure whether or not it would have statistics on hospitals in use by the Germans in the Ardennes campaign, i.e., number of available beds, beds filled, number of personnel who died in or were discharged from hospitals, etc. Muhm maintained that organizational data on medical facilities should exist.

4) Muhm mentioned that there are two logistics schools for the Bundeswehr, one in Hamburg (for the Army, Navy, and Air Force) and one in Aachen (a training center). He was unsure if these facilities would have the kind of information which we seek for German units in the Ardennes, i.e., daily consumption by division of petroleum, oil, and lubricants (POL) and ammunition by type -- tank/AT, artillery, etc.

5) Muhm (a former company commander in the 29th Panzer Grenadier Division during World War II) mentioned that his company's 10-day reports are contained in a West German archival facility in Berlin. This is the same facility which houses personal records of German servicemen, and, in my interpretation, is the West German equivalent of our National Archives facility in St. Louis. (This facility contains the US Army World War II company morning reports as well as individual servicemen's records, as was discussed with Charles MacDonald and Hugh Cole.)

6) Muhm confirmed that our adding the statistics of the Nachmeldung (late reports) in the German 5th Panzer Army Surgeon General 10-day reports was the correct procedure for determining the cumulative 10-day losses of the units which had late reports in this document. The use of the 5th Panzer Army Surgeon General reports was key to our German battle casualty estimation methodology.

7) Muhm explained that German divisions in static defensive situations may have maintained their own hospital facilities, with organic bed capacity, as was the case with his own division

in Italy in 1944. However, in offensive operations, the divisional medical unit would normally establish four hauptverbandplatzen (dressing stations) two of which would move with the frontline, with two further back. Muhm provided several hand-drawn illustrations of the variations in German army and divisional medical arrangements, which, along with all material provided by Muhm, will be maintained in a file containing material on his visit.

8) John Haley recommended to me that I check our 6.5:1 Active-Inactive ratio with data in the German 5th Panzer Army Surgeon General report to test its validity.

9) During the afternoon, we discussed and reviewed German equipment strengths and attrition and German personnel data, as it had been estimated by DMSi for the Ardennes data base.

10) I explained to Muhm our methodology for estimating German equipment attrition. Using available data from German Army panzer (armored) divisions, DMSi established rates for equipment attrition based on personnel losses. Muhm remarked that the methodology was sound and the only alternative under the circumstances of limited availability of daily German equipment loss data.

11) I showed Muhm specific examples of our work, deliberately showing him some items on which I had concerns, principally the high losses of crew-served infantry weapons and their decline in strength in our Ardennes estimates. Being a former armored infantry officer, Muhm was well qualified to comment on our estimates. I showed him examples of machine gun losses for the Panzer Lehr and 1st SS Panzer Divisions. He thought that the machine gun attrition was too high. In his experience, machine guns, mortars, small arms, and light air defense weapons (20mm) losses were quickly replaced, as the German Army in Italy had these kinds of weapons in abundance, unlike other equipment such as trucks which were much more difficult to replace. I then showed Muhm two of the records from which we derived our infantry (and other) weapons loss rates, namely those of the two divisions mentioned above. This led to an interesting discussion. The records indeed show a major decline in strengths of some infantry weapons, such as machine guns. Muhm suggested that if there was a corresponding decrease in infantrymen (which of course there was in the Ardennes), and a unit was unable to replace the personnel, particularly the trained crew-served weapons personnel, then a commander would have no need for weapons and would not request them. I asked Muhm about the equipment of soldiers in the so-called "march battalions," which contained replacement personnel for front-line units. Muhm maintained that these soldiers would only carry small arms, and that machine guns and mortars and heavier weapons would be provided by the division. In light of this discussion

and Muhm's examination of the records and his acknowledgement that the German records show a strength decline in infantry weapons in many categories, I feel that our German equipment loss estimates remain sound and accurate.

12) We discussed the Panzerfaust strength numbers for German units in the Ardennes (DMSi estimates). Muhm emphasized that this weapon, a hand-held disposable antitank weapon similar to the M-72 LAW, was considered ammunition by the Germans, as records we have researched for the Ardennes indeed indicate. Since it was a relatively cumbersome weapon, its numbers, according to Muhm, would be relatively few for units in an attack posture. Muhm thought that our panzerfaust numbers were too high, and we may wish to reduce them by some factor.

13) We discussed German MOS replacement percentages. Muhm maintained that it would be very difficult to determine this data and added that at this stage of the war the Germans had difficulty replacing specialist losses with well-trained personnel (a fact highlighted in many of the German Post-War manuscripts prepared by German participants in the Ardennes Campaign for US Army historians -- currently maintained on file at the US National Archives and used extensively by DMSi on the ACSDB project). He thought that replacements for the German units in the Ardennes would not have arrived until after 16 January, although I have evidence in German sources which indicates that units in fact began receiving replacements (or, more accurately, were still receiving replacement personnel) in December. Muhm explained that specialist personnel replacement requests would in part depend on the availability of weapons, i.e., a commander would not request tank crewmen replacements if he had no tanks for them. Muhm also recommended using different MOS loss rates for infantry and armored divisions, a different recommendation from one presented in our meeting with Cole and MacDonald. As we have not yet estimated MOS losses and replacements for the German divisions, this is something we may wish to consider.

Summary of 24 May 1989 Meeting Between Colonel Gerhard Muhm and Brian Bader, Joined by DMSi Staff Member Vince Hawkins -- prepared by Brian R. Bader, DMSi program manager.

1) On Wednesday, 24 May, I met with Colonel Muhm for his final day of consultation. We were joined by Vince Hawkins, a DMSi historian who speaks fluent German. Muhm's English is adequate, and my German (and Italian -- Muhm sometimes spoke in Italian) is sufficient to have allowed us to communicate without difficulty for our three days of meetings. Vince Hawkins joined us to elaborate on a few points that had been raised in the previous two days.

2) We discussed Army-level transport and supply unit organization. Muhm indicated that the division was probably responsible at this stage of the war for hauling supplies from Army depots to the front, but that this was a task it may have also shared with Army transport units, which earlier in the war had been officially mandated this task. In fact, in the confusion of the Ardennes battle, division trucks were used to haul supplies from Army depots, according to many of the German Post-War Manuscripts. I asked Muhm about POL transport, and he described the use of tanker trucks for fuel in armored units and gasoline cans for infantry units such as his in Italy.

3) As regards authorized fuel loads for German units, Muhm mentioned a book by Mueller-Hillebrand (Das Heer) which may contain information on this data. (DMSi has since secured this book, and in a quick survey of its contents has not found data on POL loads in German units.)

4) Vince Hawkins and Muhm discussed the Berlin archival facility, the addition of the statistics from the late reports in the 5th Panzer Army Surgeon General report, the medical school in Muenich, and availability of POL data. In their discussion, Muhm claimed that we had assembled a "fantastic collection of documents" on German participation in the Ardennes.

5) Muhm departed on the afternoon of 24 May. He took with him a list of several items which he will look into upon his return to Europe. He promised an expeditious response to DMSi.

- a) Information on Army-level transport organization
- b) Authorized fuel loads of German units
- c) Army-level medical organization
- d) Statistics for medical facilities of the German armies participating in the Ardennes Offensive.

6) Muhm left copies of approximately 50 pages of material which he brought with him. As much of this material is either hand-written or contains information which we already have, I have not included it in this report. I will maintain it in a file to be included in the final report for the ACSDB, and will include as appropriate any important information in the final report narrative.

POSTSCRIPT TO CONSULTANTS' REVIEW

As of 10 December 1989, the time of preparation of the draft final report for the ACSDB, DMSi has received a package of material from Colonel Muhm. It is included in the records provided to CAA. DMSi had completed preparation of the German data in the ACSDB and did not incorporate any of the material received from Colonel Muhm. Review of the material showed that it did not contain any additional data which would have contributed substantively to the ACSDB.

ACSDB Data Reliability Estimates

One of the requirements of the Ardennes Campaign Simulation Data Base (ACSDB) Request for Proposal is to give for "[all] data elements provided...an index of assurance. For those elements which are exact or uncertain, a range of values shall be provided in addition to the estimate." (See RFP NO. MDA903-87-R-0091, page 5, Section C, Paragraph C-3.d.)

Attachment 1 to this paper contains responses ("Replies to DISCUSSION ISSUES FOR DMSI") prepared by Data Memory Systems, Inc. (DMSi) to a list of questions submitted by the US Army Concepts Analysis Agency (CAA) concerning DMSi's proposal.

The codes and definitions laid out in Attachment 1 are used to provide a set of "data reliability estimates" for certain items of data in the ACSDB for which such estimates can be realistically made. The definitions are modified slightly to elaborate on what is meant by "primary" and "secondary" sources. The codes and definitions in use with the data reliability estimates are as follow:

- A **Primary Official Records.** These include all records and reports prepared by separate battalions, divisions, corps, armies, etc., during or immediately after the Ardennes Campaign. Examples include the G-1, G-2, G-3, and G-4 reports of US divisions, corps, and armies prepared on a daily basis; and daily Royal Air Force logs of the 2d Tactical Air Force, which provide data on tactical air operations of British air units. Primary official records were most often obtained from archives in the United States, Great Britain, or the Federal Republic of Germany.

- B **Primary Official Records (derived).** This includes data interpolated, extrapolated, or otherwise estimated from Primary Official Records as described above. Many of the primary official records contain aggregate data for a weekly or monthly period, or daily data, which, due to internal inconsistencies, vagaries of reporting format, or other reasons, require interpolation or extrapolation for derivation of daily data. Since the ACSDB requires data on a daily basis, the aggregate data must be used for estimation of daily data, if daily data is unavailable. The estimation methodologies are explained in detail in the various "narratives" which pertain to the data base files of the ACSDB.

- C **Other Primary Official Records.** Many sources consulted for the ACSDB use the Primary Official Records described above for data contained within them. These include the US Army's official history of the Ardennes Campaign (Hugh M. Cole, Ardennes: Battle of the Bulge, United States Army in World War II, The European Theater of Operations (Washington D.C.: USGPO, 1965)); the US First Army's after-action report (First United States Army: Report of Operations, 1 August 1944-22 February 1945); and other sources which rely exclusively on Primary Official Records for their information (for example, see Royce L. Thompson, Tactical Air Phase of the Ardennes Campaign, 16 December 1944-28 January 1945 (Washington, D.C.: Office of Military History, 1950)).

- D **Secondary Sources.** Secondary Sources include books, periodical articles, memoirs written primarily from memory and without access to Primary Official Records, and other sources which do not rely exclusively on Primary Official Records for information contained within them. Examples include Jean Paul Pallud's detailed photographic account of the Ardennes Campaign (Jean Paul Pallud, The Battle of the Bulge: Then and Now (London: After the Battle, 1984)), and a more general work (in German) by Hermann Jung on the campaign (Hermann Jung, Die Ardennen-Offensive, 1944/45: Ein Beispiel fuer die Kriegfuehrung Hitlers (Zureich: Muesterschmidt, 1971)). Also included in this category are the numerous postwar manuscripts prepared for US Army historians in the 1950s by German officers who participated in the Ardennes Campaign. The majority of these were written from memory, while their authors were still in captivity and did not have access to records, diaries, etc. They are an important source of information for the ACSDB, and, considering the conditions under which they were prepared, they are exceptionally detailed and accurate sources of information on German operations in the Ardennes.

- E **Estimate.** For some of the required data in the ACSDB, minimal or no information was available in primary or secondary sources. German hospital statistics are an example of this lack of data. Pieces of information were found in several primary sources identifying some of the hospital facilities maintained by one of the four German armies (the Fifth Panzer) in the Ardennes Campaign. Using this fragmentary information and the authorized organization of German medical facilities, it was possible to piece together an approximation of German army-level medical organization during the Ardennes Campaign. Estimation methodologies such as

this are explained in detail in the various narratives which pertain to the data base files of the ACSDB.

As described in Attachment 1, if data is adjudged to be of questionable reliability, the letter code used to designate the type of data source (see above) is followed by a "(#)" and an arabic numeral which identifies the range of values of the accuracy of the estimated data:

- (#1) a highly reliable estimate, presumed to be within plus or minus 10% of the true facts;
- (#2) a relatively reliable estimate, presumed to be within plus or minus 20% of the true facts;
- (#3) a reliable estimate, presumed to be within plus or minus 50% of the true facts; or
- (#4) a relatively unreliable estimate, probably varying from the true facts by more than plus or minus 50%.

Data reliability estimated are provided for those elements of the ACSDB for which such mathematical estimates can logically be made. For example, reliability estimates are not made on unit commander status in the Unit Location Data Base, airbase of origin in the Air Data Base, and attachments and detachments (the daily order of battle) in the Unit Data Base. The sources of information for all ACSDB elements are adequately described in the various narratives which explain the generation of data for the ACSDB data base files. Users of the ACSDB may assess the reliability of sources used for "non-mathematical" data by reviewing the narratives.

The data reliability estimates are keyed to data for the three national forces in the various ACSDB data base files and their component data fields, i.e., US personnel casualty data in the Unit Data Base, British logistics data in the Unit Data Base, and German armored fighting vehicle data in the Unit Inventory Data Base. To maintain consistency in providing a range of values, reliability estimates are provided in tabular format by unit.

Definitions of Terms Used in Tables.

Personnel: All aggregate on-hand, replacement, and return to duty personnel data.

Casualties: Battle casualties and disease and non-battle injury.

MOS: Military occupational specialty data -- on-hand, replacement, and return to duty.

Hospital: Medical facilities and statistics data.

Logistics: All supply data -- ammunition, other supply, and fuel on-hand, consumed (expended), and received, and long-haul transportation capacity.

AFVs: All data (on-hand, losses, and gains) on armored fighting vehicles -- tanks, self-propelled tank destroyers, assault guns, and other tracked armored vehicles with weapons of 50mm or greater in caliber, and selected armored cars for which loss and gain data was recorded, as well as on-hand data.

All Other Items of Equipment: All equipment in the Unit Inventory Data Base not considered AFVs.

Distance Opposed Advanced: Forward or retrograde movement of a unit while in contact with enemy forces, a subset of displacement (q.v.).

Displacement: Any movement by a unit while in combat or in reserve.

Reference Points: Map grid coordinates used to define the front-line trace of a unit, locations of major elements of a unit not with the unit's main body, etc.

Number of Sorties: Number of aircraft in an Air Unit Record.

Location of Mission: Location of air mission using map grid coordinates.

N/A: Data reliability estimate is not applicable, as the data is not recorded for the unit.

Divn'l Att: Divisional attachments. Since data in most cases was generated in a similar manner for divisional attachments in the Unit and Unit Inventory Data Bases, a single set of data reliability estimates is given for these units.

Corps T and Corps HQ: Corps troops and corps headquarters units. Since data in most cases was generated in a similar manner for corps troops or corps headquarters units in the Unit and Unit Inventory Data Bases, a single set of data reliability estimates is given for these units. Assessment of reliability of Logistics data is provided under Corps T.

Army T and Army HQ: Army troops and army headquarters units. Since data in most cases was generated in a similar manner for army troops or army headquarters units in the Unit and Unit Inventory Data Bases, a single set of data reliability estimates is given for these units. Assessment of reliability of Logistics and Hospital data is provided under Army T.

US UNIT DATA BASE DATA RELIABILITY ESTIMATES

<u>Unit</u>	<u>Personnel Casualties</u>		<u>MOS</u>	<u>Hospital</u>	<u>Logistics</u>
2d AD	A(#1)	A(#1)	E(#2)	N/A	E(#2)
3d AD	A(#1)	A(#1)	E(#2)	N/A	B(#1)
4th AD	A(#1)	A(#1)	E(#2)	N/A	E(#2)
5th AD	A(#1)	A(#1)	E(#2)	N/A	B(#1)
6th AD	A(#1)	A(#1)	E(#2)	N/A	B(#1)
7th AD	A(#2)	A(#2)	B(#2)	N/A	B(#1)
9th AD	A(#2)	A(#2)	B(#2)	N/A	E(#2)
10th AD	A(#1)	A(#1)	E(#2)	N/A	B(#1)
11th AD	A(#1)	A(#1)	E(#2)	N/A	E(#2)
17th AbnD	A(#1)	A(#1)	A(#1)	N/A	B(#1)
82d AbnD	B(#2)	B(#2)	E(#2)	N/A	B(#1)
101st AbnD	B(#3)	A(#2)	E(#2)	N/A	B(#1)
1st ID	A(#1)	A(#1)	E(#1)	N/A	E(#2)
2d ID	A(#1)	A(#1)	E(#1)	N/A	E(#2)
4th ID	A(#1)	A(#1)	E(#2)	N/A	E(#2)
5th ID	A(#1)	A(#1)	E(#2)	N/A	B(#1)
8th ID	A(#1)	A(#1)	B(#1)	N/A	B(#1)
9th ID	A(#1)	A(#1)	B(#1)	N/A	B(#1)
26th ID	A(#1)	A(#1)	E(#2)	N/A	E(#2)
28th ID	B(#3)	B(#3)	E(#2)	N/A	E(#2)
29th ID	A(#1)	A(#1)	B(#1)	N/A	B(#1)
30th ID	A(#1)	A(#1)	A(#1)	N/A	B(#1)
35th ID	A(#1)	A(#1)	E(#2)	N/A	E(#2)
75th ID	A(#1)	A(#1)	E(#2)	N/A	E(#2)
78th ID	A(#1)	A(#1)	B(#1)	N/A	E(#2)
80th ID	A(#1)	A(#1)	E(#2)	N/A	E(#2)
83d ID	A(#1)	A(#1)	E(#1)	N/A	B(#2)
84th ID	A(#1)	A(#1)	E(#2)	N/A	E(#2)
87th ID	A(#1)	A(#1)	E(#2)	N/A	E(#2)
90th ID	A(#1)	A(#1)	E(#2)	N/A	E(#2)
99th ID	A(#2)	A(#2)	E(#2)	N/A	E(#2)
102d ID	A(#1)	A(#1)	A(#1)	N/A	B(#1)
104th ID	A(#1)	A(#1)	B(#1)	N/A	B(#1)
106th ID	B(#3)	B(#3)	B(#3)	N/A	B(#1)
Divn'1 Att	E(#2)	E(#2)	E(#2)	N/A	B(#1)
Army T	E(#2)	E(#2)	E(#2)	B(#1)	C(#1)
Army HQ	E(#2)	E(#2)	E(#2)	N/A	N/A
Corps T	E(#2)	E(#2)	E(#2)	N/A	C(#1)
Corps HQ	E(#2)	E(#2)	E(#2)	N/A	N/A

BRITISH UNIT DATA BASE DATA RELIABILITY ESTIMATES

<u>Unit</u>	<u>Personnel</u>	<u>Casualties</u>	<u>Logistics</u>
Guards AD	B(#1)	A(#1)	A(#1)
6th AbnD	B(#1)	A(#1)	A(#1)
43d ID	B(#1)	A(#1)	A(#1)
51st ID	B(#1)	A(#1)	A(#1)
53d ID	B(#1)	A(#1)	A(#1)
29th ArmBde	B(#1)	A(#1)	A(#1)
33d ArmBde	B(#1)	A(#1)	A(#1)
34th Tkbde	B(#1)	A(#1)	A(#1)
Divn'l Att	E(#2)	A(#1)	A(#1)
XXX Corps T	E(#2)	A(#1)	A(#1)
XXX Corps HQ	E(#2)	A(#1)	A(#1)

GERMAN UNIT DATA BASE DATA RELIABILITY ESTIMATES

<u>Unit</u>	<u>Personnel</u>	<u>Casualties</u>	<u>MOS</u>	<u>Hospital</u>	<u>Logistics</u>
1st SSPzD	B(#2)	E(#2)	E(#2)	N/A	E(#3)
2d SSPzD	D(#2)	E(#2)	E(#2)	N/A	E(#3)
9th SSPzD	E(#2)	E(#2)	E(#2)	N/A	E(#3)
10th SSPzD	E(#2)	E(#2)	E(#2)	N/A	E(#3)
12th SSPzD	D(#2)	E(#2)	E(#2)	N/A	E(#3)
27th SSPzGD	E(#3)	E(#3)	E(#1)	N/A	E(#3)
28th SSPzGD	E(#3)	E(#3)	E(#1)	N/A	E(#3)
PzLehrD	B(#2)	E(#2)	E(#2)	N/A	E(#3)
2d PzD	B(#2)	E(#2)	E(#2)	N/A	E(#3)
9th PzD	B(#2)	E(#2)	E(#2)	N/A	F(#3)
11th PzD	B(#2)	E(#2)	E(#2)	N/A	E(#3)
116th PzD	B(#1)	E(#1)	E(#2)	N/A	E(#3)
3d PzGD	B(#2)	E(#2)	E(#2)	N/A	E(#3)
15th PzGD	B(#2)	E(#2)	E(#2)	N/A	E(#3)
3d FJD	B(#2)	E(#2)	E(#2)	N/A	E(#3)
5th FJD	E(#3)	E(#2)	E(#2)	N/A	E(#3)
150th PzBde	D(#2)	D(#3)	E(#3)	N/A	N/A
FBB	D(#2)	E(#2)	E(#3)	N/A	E(#3)
FGB	E(#3)	E(#2)	E(#3)	N/A	E(#3)
9th VGD	E(#2)	E(#2)	E(#3)	N/A	E(#3)
12th VGD	D(#2)	E(#2)	E(#3)	N/A	E(#3)
18th VGD	D(#2)	E(#2)	E(#3)	N/A	E(#3)
26th VGD	D(#2)	E(#2)	E(#3)	N/A	E(#3)
47th VGD	A(#2)	B(#2)	E(#3)	N/A	E(#3)
62d VGD	D(#2)	E(#2)	E(#3)	N/A	E(#3)
79th VGD	E(#3)	E(#2)	E(#3)	N/A	E(#3)
167th VGD	D(#3)	E(#2)	E(#3)	N/A	E(#3)
212th VGD	B(#2)	E(#2)	E(#3)	N/A	E(#3)
246th VGD	D(#2)	E(#2)	E(#3)	N/A	E(#3)
272d VGD	E(#2)	E(#2)	E(#3)	N/A	E(#3)
276th VGD	E(#3)	E(#2)	E(#3)	N/A	E(#3)
277th VGD	E(#2)	E(#2)	E(#3)	N/A	E(#3)
326th VGD	D(#2)	E(#2)	E(#3)	N/A	E(#3)
340th VGD	E(#3)	E(#2)	E(#3)	N/A	E(#3)
344th VGD	E(#2)	E(#2)	E(#3)	N/A	E(#3)
352d VGD	D(#2)	E(#2)	E(#3)	N/A	E(#3)
363d VGD	B(#2)	E(#2)	E(#3)	N/A	E(#3)
560th VGD	D(#2)	E(#2)	E(#3)	N/A	E(#3)
59th ID	E(#2)	E(#2)	E(#3)	N/A	E(#3)
85th ID	E(#2)	E(#2)	E(#3)	N/A	E(#3)
89th ID	E(#2)	E(#2)	E(#3)	N/A	E(#3)
353d ID	B(#2)	E(#2)	E(#3)	N/A	E(#3)
Divn'1 Att	E(#3)	E(#3)	E(#3)	N/A	E(#3)
Army T	E(#3)	E(#3)	E(#3)	E(#4)	E(#3)
Army HQ	E(#3)	E(#3)	E(#3)	N/A	N/A

Corps T
Corps HQ

E(#3)
E(#3)

E(#3)
E(#3)

E(#3)
E(#3)

E(#4)
N/A

E(#3)
N/A

US UNIT INVENTORY DATA BASE DATA RELIABILITY ESTIMATES

<u>Unit</u>	<u>AFVs</u>	<u>All Other Items of Equipment</u>
2d AD	B(#2)	E(#2)
3d AD	B(#2)	B(#2)
4th AD	B(#2)	E(#2)
5th AD	B(#2)	E(#2)
6th AD	B(#2)	E(#2)
7th AD	B(#2)	B(#2)
9th AD	B(#2)	B(#2)
10th AD	B(#2)	E(#2)
11th AD	B(#2)	E(#2)
17th AbnD	N/A	B(#2)
82d AbnD	N/A	E(#2)
101st AbnD	N/A	3(#3)
1st ID	N/A	E(#2)
2d ID	N/A	E(#2)
4th ID	N/A	E(#2)
5th ID	N/A	B(#2)
8th ID	N/A	E(#2)
9th ID	N/A	E(#2)
26th ID	N/A	E(#2)
28th ID	N/A	E(#3)
29th ID	N/A	A(#1)
30th ID	N/A	E(#2)
35th ID	N/A	E(#2)
75th ID	N/A	E(#2)
78th ID	N/A	E(#2)
80th ID	N/A	E(#2)
83d ID	N/A	B(#2)
84th ID	N/A	E(#2)
87th ID	N/A	E(#2)
90th ID	N/A	E(#2)
99th ID	N/A	E(#2)
102d ID	N/A	E(#2)
104th ID	N/A	E(#2)
106th ID	N/A	E(#3)
Divn'l Att	B(#2)	E(#2)
Army T	B(#2)	E(#2)
Army HQ	N/A	E(#2)
Corps T	B(#2)	E(#2)
Corps HQ	N/A	E(#2)

BRITISH UNIT INVENTORY DATA BASE DATA RELIABILITY ESTIMATES

<u>Unit</u>	<u>AFVs</u>	<u>All Other Items of Equipment</u>
Guards AD	B(#2)	E(#2)
6th AbnD	N/A	E(#2)
43d ID	N/A	E(#2)
51st ID	N/A	E(#2)
53d ID	N/A	E(#2)
29th ArmBde	B(#2)	E(#2)
33d ArmBde	B(#2)	E(#2)
34th Tkbde	B(#2)	E(#2)
Divn'l Att	B(#2)	E(#2)
XXX Corps T	B(#2)	E(#2)
XXX Corps HQ	N/A	E(#2)

GERMAN UNIT INVENTORY DATA BASE DATA RELIABILITY ESTIMATES

<u>Unit</u>	<u>AFVs</u>	<u>All Other Items of Equipment</u>
1st SSPzD	B(#2)	B(#2)
2d SSPzD	B(#2)	E(#2)
9th SSPzD	B(#2)	E(#2)
10th SSPzD	B(#2)	B(#2)
12th SSPzD	B(#2)	B(#2)
27th SSPzGD	N/A	E(#4)
28th SSPzGD	N/A	E(#4)
PzLehrD	B(#2)	B(#2)
2d PzD	B(#2)	B(#2)
9th PzD	B(#2)	B(#2)
11th PzD	B(#2)	B(#2)
116th PzD	B(#2)	B(#2)
3d PzGD	B(#2)	B(#2)
15th PzGD	B(#2)	B(#2)
3d FJD	B(#3)	E(#2)
5th FJD	B(#3)	E(#2)
150th PzBde	D(#3)	D(#3)
FBB	B(#2)	B(#2)
FGB	B(#3)	B(#3)
9th VGD	B(#2)	E(#3)
12th VGD	B(#2)	E(#3)
18th VGD	B(#2)	E(#3)
26th VGD	B(#2)	E(#3)
47th VGD	B(#2)	E(#3)
62d VGD	B(#2)	E(#3)
79th VGD	N/A	E(#3)
167th VGD	B(#2)	E(#3)
212th VGD	B(#2)	E(#3)
246th VGD	B(#2)	E(#3)
272d VGD	B(#2)	E(#3)
276th VGD	B(#2)	B(#2)
277th VGD	B(#2)	E(#3)
326th VGD	B(#2)	E(#3)
340th VGD	B(#2)	E(#3)
344th VGD	B(#2)	E(#3)
352d VGD	B(#2)	E(#3)
363d VGD	B(#2)	E(#3)
560th VGD	B(#2)	E(#3)
59th ID	B(#2)	E(#3)
85th ID	N/A	E(#3)
89th ID	B(#2)	E(#3)
353d ID	B(#2)	E(#3)
Divn'l Att	B(#2)	E(#3)
Army T	B(#2)	E(#3)
Army HQ	N/A	E(#3)

Corps T
Corps HQ

B(#2)
N/A

E(#3)
E(#3)

US UNIT LOCATION DATA BASE DATA RELIABILITY ESTIMATES

<u>Unit</u>	<u>Distance</u>		<u>Displacement</u>	<u>Reference Points</u>
	<u>Opposed</u>	<u>Advanced</u>		
All units	A(#1),D(#2)		A(#1),D(#2)	A(#1),D(#2)

BRITISH UNIT LOCATION DATA BASE DATA RELIABILITY ESTIMATES

<u>Unit</u>	<u>Distance</u>		<u>Displacement</u>	<u>Reference Points</u>
	<u>Opposed</u>	<u>Advanced</u>		
All units	A(#1),D(#2)		A(#1),D(#2)	A(#1),D(#2)

GERMAN UNIT LOCATION DATA BASE DATA RELIABILITY ESTIMATES

<u>Unit</u>	<u>Distance</u>		<u>Displacement</u>	<u>Reference Points</u>
	<u>Opposed</u>	<u>Advanced</u>		
All units	A(#1),D(#2)		A(#1),D(#2)	A(#1),D(#2)

US AIR DATA BASE DATA RELIABILITY ESTIMATES

<u>Data</u>	<u>Number of Sorties</u>	<u>Location of Mission</u>
All data	A(#1)	A(#1)

BRITISH AIR DATA BASE DATA RELIABILITY ESTIMATES

<u>Data</u>	<u>Number of Sorties</u>	<u>Location of Mission</u>
All data	A(#1)	A(#1)

GERMAN AIR DATA BASE DATA RELIABILITY ESTIMATES

<u>Data</u>	<u>Number of Sorties</u>	<u>Location of Mission</u>
All data	E(#4)	E(#4)

T/O&E DATA BASE DATA RELIABILITY ESTIMATES

<u>Nationality</u>	<u>Personnel</u>	<u>Equipment</u>	<u>Logistics</u>
US	A(#1)	A(#1)	A(#1)
British	B(#1)	B(#1)	E(#2)
German	A(#1)	A(#1)	B(#2)

WEAPONS DATA BASE DATA RELIABILITY ESTIMATES

<u>Nationality</u>	<u>All Data</u>
US	A(#1)
British	A(#2)
German	A(#2)

Attachment 1

Copy of DMSi Replies

Replies to

DISCUSSION ISSUES FOR DMSI

1. In what form will you provide the index of assurance/range of values called for by RFP Section C-3.d? What is your rationale for proposing this method of presentation?

Section C-3.d of the RFP reads:

"d. All data elements provided shall be given an index of assurance. For those elements which are inexact or uncertain, a range of values shall be provided in addition to the best estimate."

It is currently assumed that there will be data entries for each division for each day it is committed to the operation. Each entry will be labelled to indicate the reliability of its source in accordance with the following symbols:

- A, primary source data from official records;
- B, derived from official primary source records by interpolation or extrapolation; the procedure to be indicated;
- C, other primary source
- D, secondary source
- E, estimate, the basis of which will be explained;
- (#), indication of questionable reliability of data from a primary or secondary source.

All items of estimated data will be further qualified by the following symbols:

- (#1), a highly reliable estimate, presumed to be within plus or minus 10% of the true facts, if known;
- (#2), a relatively reliable estimate, presumed to be within plus or minus 20% of the true facts, if known;
- (#3), a fairly reliable estimate, presumed to be within plus or minus 50% of the true facts, if known.
- (#4), a relatively unreliable estimate, probably varying from the true facts by more than plus or minus 50%.

The rationale for the indexes of assurance and the range of values will be the confidence of senior members of the HERO staff as a result of approximately 25 years of data research in primary and secondary source combat records and narrative reports.

2. How will you provide the explicit association of each item of data with its source as called for by RFP Section C-3.e? What is your rationale for proposing this method of presentation?

Data items will be referenced by citations showing explicitly the source(s) of the data. All documentation will be prepared in accordance with The HERO Style Manual, which incorporates the style guidelines of the University of Chicago's Manual of Style. The rationale for using this method is that the Manual of Style is the standard, definitive style guide for scholarly, formal publications in the social sciences.

3. Do you propose to obtain from primary sources ALL items of data in ALL categories for ALL military units described in para 5 of Attachment 1 to the RFP? If not, identify exactly what information on which items, categories of data, or units will not be obtained from primary sources. For each such type of information, explain exactly how you propose to "derive" the corresponding values as called for in Section C-3.c of the RFP. What is your rationale for proposing this approach?

For a variety of reasons, the primary source record will not be adequate to provide all of the data in the detail required by the SOW. Without performing an extensive literature search it is not possible to state how great the deficiency of the primary source record will be, nor how this (these) deficiencies might be overcome. Deficiencies will have to be handled on a case-by-case basis. In the answers to various questions provided below examples of suspected deficiencies, and how they might be approached and overcome, are provided.

Comprehensive List of Data Sources Identified in Final Report

The computerized ACSDB Bibliography Data Base contains full bibliographic information on all sources used in the Reference Data Base. However, as explained in several sections of this written final report, some data is referenced primarily or exclusively in the narrative sections of the final report. This proved necessary because of the considerable amount of estimation required to derive some data. The "Comprehensive List of Data Sources" provided below contains those sources recorded in the written final report and not contained in the Bibliography Data Base. (These mainly represent sources used in the compilation of data on US and British forces. German sources are almost completely referenced in the Bibliography Data Base.) Together with the Bibliography Data Base, it comprises a complete listing of all data sources used in the preparation of the ACSDB.

The term "Box" in sources descriptions refers to the Box Number used by the US National Archives to store a record. Almost all records from the National Archives used in the ACSDB are from Record Group 407. Records from the Office of Air Force History, Bolling Air Force Base, are identified by an alpha-numeric code, beginning with the letter "C" followed by four digits.

MISCELLANEOUS PRIMARY AND SECONDARY SOURCES.

After Action Report Third US Army 1 August 1944-9 May 1945.
Volume 1, The Operations, and Volume 2, Staff Section Reports.

Carter, Kit C. & Richard Mueller. The Army Air Forces in World War II. Combat Chronology 1941-1945. Washington, D.C.: US Government Printing Office, 1973.

Cole, Hugh M. The Ardennes: Battle of the Bulge. United States Army in World War II, The European Theater of Operations. Washington, D.C.: USGPO, 1965.

Conquer: The Story of the Ninth Army, 1944-1945, Washington, Infantry Journal Press, 1947.

The Contribution of the Air Forces to the Stemming of the Enemy Threat in the Ardennes. 2d Tactical Air Force Operational Research Section, Report #19. 1945.

Craven, W.F. & J.L. Cate. Army Air Forces in World War II. Chicago: University of Chicago Press, 1951.

Crookenden, Napier. Dropzone Normandy. New York: Scribner's, 1976.

Crow, Duncan (ed.). Armoured Fighting Vehicles in Profile (AFV's of the World Series). Vol. 3. British and Commonwealth AFVs, 1940-46. Garden City, NY: Doubleday, 1972.

Ellis, Chris and Peter Chamberlain (eds.). Handbook on the British Army, 1943. London: Arms and Armour Press, 1975. (This is a reprint of the US Army's TM 30-410, Handbook on the British Army, originally produced in 1943.)

Ellis, Major L.F. The Battle of Normandy. Vol. I. Victory in the West, History of the Second World War, UK Military Series. London: Her Majesty's Stationery Office, 1962.

First United States Army Report of Operations 1 August 1944-22 February 1945. N.p., n.d., 4 volumes and annexes.

Joslen, Lieutenant Colonel H.F. Orders of Battle, United Kingdom and Colonial Formations and Units in the Second World War, 1939-1945. London: Her Majesty's Stationery Office, 1960.

Jung, Hermann. Die Ardennen-Offensive, 1944/45: Ein Beispiel fuer die Kriegfuehrung Hitlers. Zuerich: Muesterschmidt, 1971.

MacDonald, Charles B. A Time for Trumpets: The Untold Story of the Battle of the Bulge. New York: Bantam, 1985.

Maurer, Maurer, ed. Air Force Combat Units of World War II. New York: Franklin Watts, Inc., 1960.

McDonald, George C. Allied Air Power and the Ardennes Offensive, 15 December 1944-16 January 1945. Director of Intelligence, USSTAF, 16 March 1945.

Office of the Chief of Ordnance, Technical Division. Catalogue of Standard Ordnance Items. Second Edition, Washington, D.C., 1944.

Office of the Theater Historian. Order of Battle of the United States Army, World War II, European Theater of Operations: Divisions. Paris, France, December 1945.

Pallud, Jean Paul. The Battle of the Bulge: Then and Now. London: After the Battle, 1984.

Rust, Ken C. The Ninth Air Force in World War II. Fallbrook, CA: AERO Publishers, 1967.

Stanton, Shelby L. Order of Battle U.S. Army, World War II. Novato, CA: Presidio, 1984.

Thompson, Royce. Air Supplies to Isolated Units, Ardennes Campaign. Washington, D.C.: Office of the Center of Military History, 1953.

_____. Malmedy, Belgium: Mistaken Bombing. Washington, D.C.: OCMH, 1952.

_____. Tactical Airphase of Ardennes Campaign. Washington, D.C.: OCMH, 1950.

_____. Weather in the Ardennes Campaign. Washington, D.C.: OCMH, 1953.

TM-E 30-451. Handbook on German Military Forces. 15 March 1945.

US Army Field Manual (FM) 101-10, Staff Officers' Field Manual: Organization, Technical and Logistical Data, 21 December 1944

US Army Field Manual (FM) 101-10, Staff Officers' Field Manual: Organization Technical, and Logistical Data, July 1953.

US NATIONAL ARCHIVES AND OFFICE OF AIR FORCE HISTORY RECORDS

SHAEF G-1 Records, SHAEF Administrative Section 1944-45, Record Group 331, 322.8 to 331.3.

12th Army Group, G-1 Daily Summary. US National Archives Record Group 407, Box 1753, File 3 and Box 1754, File 1.

12th Army Group, Weekly G-4 Reports Nos. 20-25, covering the period 10 December 1944 to 20 January 1945, Record Group 407, Box 1779, 99/12-4.1 to 99/12-5.

21st Army Group, G-1 Report, 15-31 Dec 1944 and 1-22 Jan 45, Record Group 331, 704-1.2.

HQ, First US Army, Daily SITREPS (Situation Reports) Nos. 385-449 (15 Dec 44 - 16 Jan 45), Record Group 407, Boxes 5020-22. 219-3.2.

First Army, After Action Report for December 1944, including a chart titled "'REINFORCEMENTS ASSIGNED TO UNITS' Period: 1 December 1944 to 31 December 1944 Inclusive," C5133, 585.01, Frames 1071, 1081-1082.

Third Army, G-4 Journal, Record Group 338.

Office of the Surgeon, World War II Administrative Records,
Record Group 112, Boxes 402 and 403.

III Corps, Equipment Shortages by Division, 8 and 14 January
1945, Record Group 407, Box 3329, 203-16 to 203-4.2.

III Corps, Tank Status Reports, Record Group 407, Box #3329,
203-16 to 203-4.2.

V Corps, Tank/Tank Destroyer Status Reports, Record Group 407,
Boxes #3540-3546, 205-3.2.

V Corps, G-4 Report STATUS OF CRITICAL ORDNANCE MATERIEL, 2d
and 99th Infantry Divisions, dated 30 December 1944, Record Group
407, Box 3574, 205-4.2

V Corps, G-1 After Action Reports for December 1944 and
January 1945, including monthly station lists and strengths of
command, Record Group 407, Box 3412, 205-0.13 to 205-1.12.

VII Corps, Tank Status Reports, Record Group 407, Boxes #3901-
3908, 207-3.2.

VII Corps, Estimated Loss Reports, Record Group 407, Box 3839,
207-1.8 to 207-1.16.

VIII Corps, After Action Report, Record Group 407, Box 4029,
208-3.2.

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Miscellaneous Records of the British 5th Infantry Division in the Italian Campaign, 1943-1944. (These records were obtained from the British Public Records Office during the 1960s and are kept in File Folder No. 181 at the Historical Evaluation and Research Organization's offices. Their exact archival identification is not known. They include "Strengths of Main Bodies 5 Div Less 15 Ind Bde Gp Adv Parties and Rear Parties - Appx 'A' to 5 Div Movement Control Order No. 9 dated 24 Jun 44", and "Composition of 15 Inf Bde Gp - Appendix 'A' to 5 Div Movement Control Order No. 1 dated 15 June 1944.")

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