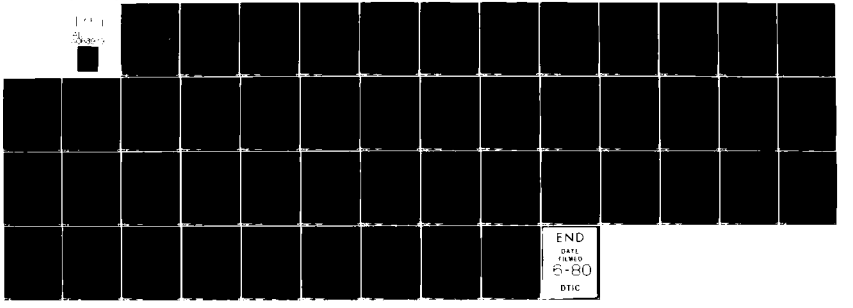
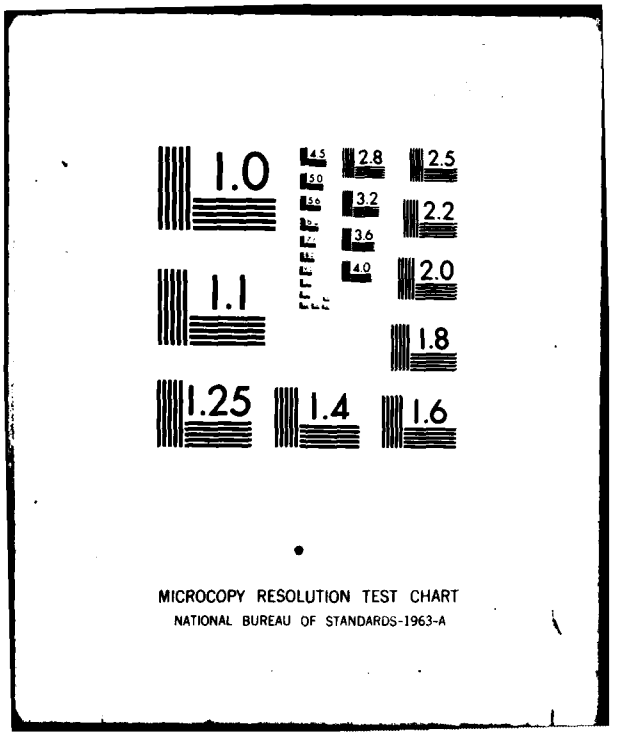
AD-A083 979 LOGISTICS MANAGEMENT INST WASHINGTON DC F/G 15/5
DEPOT MAINTENANCE PERFORMANCE,(U)
NOV 79 E A NARRAGON, D M KENNELLY MDA903-77-C-0370
UNCLASSIFIED LMI-ML914 NL



END
DATE FILMED
5-80
DTIC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

DEPOT MAINTENANCE PERFORMANCE

November 1979

E. A. Narragon
D. M. Kennelly

Prepared pursuant to Department of Defense Contract No. MDA 0370-51 (Task ML914). Views or conclusions contained in this document should not be interpreted as representing the official opinion or policy of the Department of Defense. Except for use for Government purposes, permission to quote from or reproduce portions of this document must be obtained from the Logistics Management Institute.

LOGISTICS MANAGEMENT INSTITUTE
4701 Sangamore Road
Washington, D.C. 20016

DEPOT MAINTENANCE PERFORMANCE

November 1979

E. A. Narragon
D. M. Kennelly

Prepared pursuant to Department of Defense Contract No. MDA 0370-51 (Task ML914). Views or conclusions contained in this document should not be interpreted as representing the official opinion or policy of the Department of Defense. Except for use for Government purposes, permission to quote from or reproduce portions of this document must be obtained from the Logistics Management Institute.

LOGISTICS MANAGEMENT INSTITUTE
4701 Sangamore Road
Washington, D.C. 20016

PREFACE

The Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs, and Logistics), OASD(MRA&L), has overall responsibility for depot level maintenance within the DoD. In fiscal 1976, uniform depot maintenance cost accounting procedures were established by DoD Handbook 7220.29-H (The Department of Defense Depot Maintenance and Maintenance Support Cost Accounting and Production Reporting Handbook). The handbook also calls for the annual submission of depot performance data on all completed job orders. Although the Services have reported the data as requested, an access capability has never been developed. As a result, OASD(MRA&L) visibility of the depot maintenance program is restricted to data normally provided during the budget process. That visibility is inadequate and untimely for a $6 to $7 billion annual program.

To improve OASD(MRA&L) visibility of the depot program, LMI was tasked to develop an analysis capability for the reported depot performance data. This report describes the work performed in response to that tasking. The first section deals with our analysis of OASD(MRA&L) data needs and selection of a data processing methodology. Section two provides a general description of that methodology; the third and fourth sections describe and illustrate a depot performance analysis framework and supporting data displays. Finally, some suggestions for future efforts are offered. An appendix contains technical information on the loading and utilization of the data processing system.

EXECUTIVE SUMMARY

The OASD(MRA&L) has little visibility into the performance of depot-level maintenance activities. This condition exists in spite of extensive depot cost and productivity data being submitted by the Military Services in accordance with DoD Handbook 7220.29-H. Absence of an automated method of summarization precludes effective use of the data.

Of various data processing approaches that might be used to overcome that deficiency, the most promising is data base management. It provides the capability of storing a large quantity of data, selectively retrieving desired items of information, and producing a variety of summary reports. A state of the art data base management system, INQUIRE, already resident on the Air Force Data Services Center IBM 360/75, provides a good basis for the required data processing capability.

The Fiscal Year 1978 performance data were used in testing the INQUIRE capability and in evaluating proposed data summaries which would form the basis of OASD(MRA&L) analyses. Although the proposed summaries have been illustrated using only Army data, they can be readily produced for the other Military Services.

The testing of INQUIRE was a success. Although a variety of definition and report errors surfaced, the potential of INQUIRE to support OASD(MRA&L) analyses of depot cost and productivity was affirmed.

The evaluation exercise indicated, however, that cost and productivity data alone are insufficient for assessing the performance of depot-level maintenance. Budget, capacity, and staffing information is also required. In order for OASD(MRA&L) to have the desired visibility, inconsistencies and

errors in the cost/productivity data must be resolved; budget, capacity and staffing information must be integrated; and experience in the use of the new data processing capability must be gained.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

DEPOT MAINTENANCE PERFORMANCE

APPROACH

A review of the depot management process and associated data needs highlighted potential management applications of depot cost information, types and quantities of data required to support those applications, and desirable characteristics of an access methodology. Further insight into data needs was obtained by analyzing a variety of summary reports prepared by OASD(MRA&L) personnel in response to specific areas of concern.

That review and analysis indicated the need for a wide variety of data and an extensive access capability. Specifically, we concluded that OASD (MRA&L) should have the capability to:

- develop cost and production summaries by Military Service, facility, and weapon system
- obtain detailed cost and production data on selected programs and facilities
- identify and compute a variety of performance indicators
- access annual cost and production data when reported
- integrate additional depot maintenance factors with cost and production data.

These requirements demand a flexible data processing tool. Furthermore, operational simplicity is essential to insure usefulness.

A survey of potential methodologies indicated that the best data processing approach to satisfy both the flexibility and simplicity requirements is data base management. A data base management system is a software package whose primary functions are retrieving and/or calculating selected items of information, reporting derived data in a variety of formats, and maintaining

data currency and accuracy. Since a data base management system is a generalized system, it can be applied to any properly structured data. The information retrieval, computation, and report generation abilities of a data base management system allow it to fulfill all the OASD(MRA&L) requirements. Furthermore, simplicity in controlling each of these operations is provided through an English-like user language. The INQUIRE data base management system was used because it is capable of meeting OASD(MRA&L) information needs and is available on DoD computer systems.

OVERVIEW OF INQUIRE

This section provides an overview of the INQUIRE data base management system and its application to depot maintenance performance data. For more complete information on the structure and operation of INQUIRE, the INQUIRE User Language Tutorial[1] should be consulted. Detailed discussions on the depot maintenance performance data base contents and organization, and specific procedures for loading and using the system can be found in the appendix.

System Description

The depot performance data processing system consists of a data base, which contains depot cost and productivity information, and the INQUIRE data base management system, which retrieves, manipulates and reports the data.

A data base is a structured collection of information on one general topic. Structure is provided by fields and logical records. A field is a unit of information, such as repair cost, quantity overhauled, or facility name. Grouping fields to provide a variety of information on a single subject

[1]The INQUIRE User Language Tutorial can be obtained from Infodata Systems Inc., 5205 Leesburg Pike, Falls Church, Va. 22041.

(e.g., a job order) results in a logical record. A sequence of similar logical records, each of which provides information on a particular subject within the same family of subjects, is a data base.

Both the content and structure of the depot performance data base are derived from data submitted by the Services in response to the uniform cost accounting handbook. The reported data contains 50 items of information for each job order completed during the reporting year. Figure 1 lists these items. In the depot performance data base, each data item is a field, and each reported job order defines a logical record.

The INQUIRE data base management system is a collection of software modules and a user control language. Each software module contains the computer coding for performing a specific operation, such as retrieving a record from the data base or performing a specific calculation. The language is made up of commands and command specifications which evoke software modules and control certain operations. The user requests a report by linking commands together to specify records to be retrieved, manipulations of data from retrieved records and formats of reports.

System Utilization

To extract the full value from the depot performance data base, the user must be capable of performing two tasks: data base maintenance and report generation. To the extent possible, these operations have been automated so the user need not be deeply involved in their execution. However, since it is impossible to anticipate all system applications, the user must assume some developmental responsibility.

The maintenance function assures that information in the data base is current and accurate. This task includes the addition of new data and correction of errors in existing data. New depot cost information, submitted

FIGURE 1. SERVICE REPORTED DATA ITEMS

RECORD IDENTIFICATION

- Record Type
- Quarter Code
- Fiscal Year

FACILITY IDENTIFICATION

- Program Element
- Facility Name or Code
- Inside or Outside U.S. Code
- Owner/Operator Code
- Reporting Facility Code

ITEM/SERVICE/CUSTOMER IDENTIFICATION

- Item Identification Number
- Item Nomenclature
- Standard Inventory Price
- Weapon or Support System Code
- Work Breakdown Structure Code
- Work Performance Category
- Customer Code

LABOR AND COST DATA

- Direct Civilian Labor (Production) Cost
- Direct Civilian Labor (Production) Hours
- Direct Civilian Labor (Other) Cost
- Direct Civilian Labor (Other) Hours
- Direct Military Labor (Production) Cost
- Direct Military Labor (Production) Hours
- Direct Military Labor (Other) Cost
- Direct Military Labor (Other) Hours
- Direct Material Cost - Funded
- Direct Material Cost - Unfunded (Investment Items at Full Price)
- Direct Material Cost - Unfunded (Exchanges)
- Direct Material Cost - Unfunded (Modification Kits)
- Direct Material Cost - Unfunded (Expense)

LABOR AND COST DATA (Cont'd.)

- Other Direct Cost - Funded
- Other Direct Cost - Unfunded
- Operations Overhead - Funded
- Operations Overhead - Unfunded
- General and Administrative Expense - Funded
- General and Administrative Expense - Unfunded
- Maintenance Support Costs Organic - Funded
- Maintenance Support Costs Organic - Unfunded

NON-ORGANIC LABOR AND COST DATA

- Contract/Interservice/Non-Depot Maintenance Activity Cost
- Government-Furnished Material (Investment Items at Full Price)
- Government-Furnished Material (Exchanges)
- Government-Furnished Material (Modification Kits)
- Government-Furnished Material (Expense)
- Government Furnished Services - Funded
- Government Furnished Services - Unfunded

PRODUCTION DATA

- Total Production Quantity Completed
- Quantity of Completed Items Inducted During Reporting Year
- Quantity of Completed Items Inducted During Year Preceding Reporting Year
- Quantity of Completed Items Inducted During All Other Previous Years
- Work Days in Process

annually by the Services, must be loaded into the data base before it can be accessed. Loading involves collecting the depot performance data, submitting copies for editing, and running a predefined INQUIRE loader program. Inaccuracies in the data base that are uncovered either during loading or when extracting information can be corrected by submission of a maintenance request, written in the INQUIRE user language. Since it is impossible to predict the nature of these requests, they must be developed by the user on an ad hoc basis.

The report generation task provides data to support either an overall analysis of depot performance or to answer specific depot-related questions. Summary reports, which provide an overview of aggregate data, should be compiled annually. Since these reports and the required INQUIRE instructions have already been developed and tested, the user need only initiate their production by executing a set of one-line INQUIRE requests called macros. Specific information needs, which cannot be fulfilled by data from summary reports, can be met by producing special reports. This is accomplished by submitting unique, individually developed INQUIRE requests. Such requests must be defined and validated by the user.

AN ANALYSIS FRAMEWORK

From our analyses of the depot cost data and various applications of INQUIRE to that data, a framework for evaluating the depot maintenance program within each Service emerged. That framework has a hierarchical structure which begins at the most aggregate level and successively provides a series of more narrow, definitive reporting of depot performance. A set of summary reports has been developed and is available at each level of the heirarchy. The predefined summaries are based on our best current understanding of OASD(MRA&L) information needs. As the follow-on analysis proceeds, these

reports might need to be supplemented and altered to keep pace with evolving requirements and capabilities.

At the most aggregate level of the hierarchy, the summary reports are mostly descriptive. Three reports appear necessary:

- total program cost (funded/unfunded) by commodity group
- total program cost by program element (funded/unfunded within element) and commodity group
- total program cost by facility type (funded/unfunded within type) and commodity group.

A second series of reports focuses on performing activities. Two of the reports are descriptive while a third contrasts activity performance. These reports are:

- total program cost by facility type (all activities within each type) and commodity group
- total depot activity cost by category (separate formats for type 1 and type 2, 3, and 4 activities)[2]
- selected performance statistics for type 1 activities.

At the most detailed level of the framework, the emphasis is on the weapon system--the associated maintenance cost, work performed, and performing activity. Only two summaries appear to be required on a routine basis:

- total cost by weapon system and work performance category (separate formats for maintenance and support categories)
- total cost for designated weapon systems and selected work performance categories by performing activity.

When the summary reports are evaluated, several specific questions will likely be raised. Some of these questions may require information not contained in the data base; hence, alternative sources must be sought (e.g.,

[2]Type 1 facilities are government-owned, government-operated (GOGO) depots; type 2 facilities are GOGO non-depot activities; type 3 are contractor-owned, contractor-operated (COCO); and type 4 facilities are GOGO depots within other Military Services.

budgets). Others however, can be answered by data base information not provided by summary reports. INQUIRE can support the analysis/evaluation of the latter type of question through the generation of special, one-time reports. This ad hoc report capability provides an additional level to the framework hierarchy and makes possible a variety of report perspectives.

The following section provides an example of each of the suggested formats and their utilization for analysis of depot performance.

ILLUSTRATION OF THE FRAMEWORK

We used Army data from fiscal year 1978 to exercise/evaluate our suggested framework. The same data are used here to illustrate the analysis framework and the special queries that could arise. This discussion is intended only as an illustration; it is not a comprehensive analysis of Army depot performance in fiscal 1978.

Table 1 shows that the fiscal 1978 Army depot maintenance program was $1,064 million, with approximately $950 million reimbursable by DoD to depot maintenance activities. The vehicle (combat) and aircraft commodity groups dominated the depot maintenance program--approximately 60 percent of the total program was in support of these commodities.

TABLE 1. ARMY: TOTAL DEPOT MAINTENANCE COST

($000)

	Funded	Unfunded	Total
Aircraft	217,147	32,044	249,191
Automotive	48,283	2,535	50,818
Vehicles	300,529	56,569	357,098
Construction	9,481	372	9,853
Communications/Electronics	105,818	7,361	113,179
Missiles	166,864	11,601	178,466
Ships	1,729	0	1,730
Weapons & Munitions	43,500	1,371	44,872
General	35,950	1,267	37,217
Other	21,231	843	22,074
Total	950,537	113,966	1,064,503

The total program is shown by program element in Table 2. Approximately $600 million was industrially funded (program element 72007) while non-industrially funded maintenance (program element 72207) accounted for $200 million. Maintenance training (program element 72897) consumed another $12 million, with maintenance support (program element 78017) being another $235 million.

Table 3 displays the total program by performing facility type. This table highlights a data reporting problem in that no maintenance or maintenance support costs were reported under facility type 2. All such facilities apparently were miscoded as type 1.

In Table 4, the level of the program at each activity is displayed. Those facility type 2 activities previously miscoded as type 1 are shown as they should appear. Also, not all type 4 activities are displayed because of reporting errors. Approximately $618 million, or 58 percent of the total program, was consumed in Army depots. Another $204 million was spent in other Army facilities (type 2), either in maintenance or maintenance support roles. Approximately $233 million of maintenance was performed by contractors (type 3), with $148 million of that amount attributed to one facility--the Mainz Army Depot. Finally, the Army received almost $8 million of maintenance interservicing support, primarily from the Naval Air Rework Facility at Pensacola.

Table 5 shows the total direct labor hours and costs, by category, for each of the Army depots. Table 6 shows a comparable display for depots providing interservice support. A report similar to Table 6 can also be produced for all contractor support.

TABLE 2. ARMY: COST BY PROGRAM ELEMENT AND COMMODITY

($000)

	COMMODITY										TOTAL
	AIRCRAFT	AUTO	VEHICLES	CONSTRUCT	COM/ELEC	MISSILES	SHIPS	WEAP&MUN	GENERAL	OTHER	
Program Element 72007											
Funded	145,937	33,653	173,576	5,264	73,565	63,059	23	13,832	30,166	12,664	551,939
Unfunded	25,280	2,131	11,468	359	7,129	7,703	0	1,012	1,087	655	56,824
Total	171,217	35,784	185,044	5,623	80,694	70,762	23	14,844	31,453	13,319	608,763
Program Element 72207											
Funded	22,235	4,473	105,148	1,462	2,757	11,662	977	2,734	1,701	194	153,343
Unfunded	6,626	341	44,957	0	0	2,177	0	336	148	4	54,589
Total	28,861	4,814	150,105	1,462	2,757	13,839	977	3,070	1,849	198	207,932
Program Element 72897											
Funded	838	268	299	181	1,192	6,459	0	1,968	460	564	12,219
Unfunded	1	0	0	0	0	50	0	0	15	6	72
Total	839	266	299	181	1,192	6,509	0	1,968	475	570	12,291
Program Element 78017											
Funded	48,136	9,888	21,505	2,572	28,302	85,683	728	24,965	3,421	7,808	233,008
Unfunded	134	62	142	12	230	1,669	0	22	14	176	2,461
Total	48,270	9,950	21,647	2,584	28,532	87,352	728	24,987	3,435	7,984	235,469

TABLE 3. ARMY: COST BY FACILITY TYPE AND COMMODITY

($000)

	COMMODITY										TOTAL
	AIRCRAFT	AUTO	VEHICLES	CONSTRUCT	COM/ELEC	MISSILES	SHIPS	WEAP&MUN	GENERAL	OTHER	
Facility Type 1											
Funded	186,668	45,854	196,052	7,754	99,810	127,827	673	42,340	34,490	20,820	762,288
Unfunded	25,417	2,201	11,631	371	7,360	10,905	0	1,369	1,118	838	61,210
Total	212,085	48,055	207,683	8,125	107,170	138,732	673	43,709	35,608	21,658	823,498
Facility Type 2											
Funded	0	0	0	0	0	0	0	0	0	0	0
Unfunded	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0
Facility Type 3											
Funded	24,509	2,428	104,477	1,727	6,007	39,036	1,055	1,160	1,460	267	182,126
Unfunded	4,653	333	44,937	0	0	696	0	2	148	4	50,773
Total	29,162	2,761	149,414	1,727	6,007	39,732	1,055	1,162	1,608	271	232,899
Facility Type 4											
Funded	5,968	0	0	0	0	0	0	0	0	143	6,111
Unfunded	1,973	0	0	0	0	0	0	0	0	0	1,973
Total	7,941	0	0	0	0	0	0	0	0	143	8,084

TABLE 4. ARMY: COST BY FACILITY AND COMMODITY

($000)

	COMMODITY										TOTAL
	AIRCRAFT	AUTO	VEHICLES	CONSTRUCT	COM/ELEC	MISSILES	SHIPS	WEAPONS	GENERAL	OTHER	
Facility Type 1											
Anniston	17	747	101,265	0	0	10,405	0	6,434	6	1,325	120,201
Corpus Christi	128,059	0	0	0	0	0	0	0	0	195	128,255
Letterkenny	306	6,416	52,374	84	4	32,357	0	6,255	1,755	2,214	101,768
Lexington	16	0	0	0	1,101	755	0	0	0	1,712	3,586
New Cumberland	29,191	60	0	0	0	0	0	4	372	42	29,671
Pueblo	0	40	0	0	0	12,011	0	0	286	1,279	13,617
Red River	3,194	16,604	21,488	3	58	12,343	0	1,194	337	72	55,298
Sacramento	5,339	0	284	0	23,088	2,316	0	0	193	2,032	33,253
Tobyhanna	6,560	0	644	18	60,971	2,448	0	0	949	802	72,396
Tooele	742	12,042	10,247	5,530	0	2,301	23	1,059	28,198	448	60,594
Total	173,424	35,909	186,302	5,635	85,222	74,936	23	14,946	32,096	10,121	618,639
Facility Type 2											
AVSCOM	28,725	0	0	0	0	0	0	0	0	0	28,725
Fort Belvoir	0	0	0	190	0	0	387	0	871	0	1,448
Harry Diamond	0	0	0	0	0	0	0	0	0	200	200
HQ ECOM	3,687	0	1,634	0	18,632	445	11	0	0	0	24,411
MECOM	0	0	0	0	0	0	0	0	823	0	823
MICOM	1,497	0	3,885	0	0	53,924	0	0	0	6,165	65,472
Ober Ramstadt	0	2,546	2,392	0	0	0	0	6	19	0	4,965
Redstone	0	0	0	0	0	0	0	0	0	3,379	3,379
Savanna	0	0	0	0	0	0	0	24	0	0	24
Seneca	0	0	0	0	0	2,762	0	900	0	0	3,662
Sierra	0	0	0	0	0	1,406	0	1,170	0	0	2,577
TACOM	0	5,770	4,782	1,535	0	401	0	0	652	0	13,140
TARADCOM	0	614	585	0	0	0	0	0	0	0	1,200
MIDA	1,514	757	1,009	252	1,850	757	252	1,261	504	252	8,413
USALOG Data	2,013	2,455	1,031	510	1,463	1,050	0	854	441	0	9,820
WECOM	1,212	0	6,058	0	0	3,044	0	24,543	196	1,537	36,593
Total	38,655	12,142	21,376	2,487	21,945	63,789	650	28,758	3,506	11,533	204,852
Facility Type 3											
001052406007	1,387	0	0	0	0	0	0	0	0	0	1,387
.											
.											
.											
56093200000GY	0	1,108	144,445	20	8	2,104	0	21	462	0	148,172
.											
.											
.											
999999999999	0	0	0	0	0	0	851	0	50	0	901
Total	29,163	2,762	149,414	1,727	6,008	39,733	1,055	1,163	1,608	271	323,908
Facility Type 4											
NARF North Island	120	0	0	0	0	0	0	0	0	0	120
NARF Cherry Point	703	0	0	0	0	0	0	0	0	0	703
NARF Pensacola	6,850	0	0	0	0	0	0	0	0	0	6,850
Norfolk Naval Shpyd.	46	0	0	0	0	0	0	0	0	0	46
Warner Rob ALC	108	0	0	0	0	0	0	0	0	3	111
Total	7,827	0	0	0	0	0	0	0	0	3	7,830

TABLE 5. ARMY: COST BREAKDOWN BY GOGO DEPOT FACILITY

($000)

Depot	Direct Hours (000s)	Cost						
		Direct Labor	Direct Material	Other Direct	Maint. Support	Opns. Overhead	General Admin.	Total
Anniston	3,301	28,776	47,943	6,897	3,135	26,307	7,140	120,201
Corpus Christi	2,646	26,466	60,520	111	1,876	33,953	5,327	128,255
Letterkenny	3,452	31,239	28,609	2,546	1,194	30,531	7,647	101,768
Lexington	161	1,484	297	478	125	806	393	3,586
New Cumberland	787	7,847	11,947	44	48	8,482	1,301	29,671
Pueblo	415	4,268	3,630	147	235	4,558	776	13,617
Red River	1,898	16,117	15,224	160	736	19,896	3,162	55,298
Sacramento	1,206	12,961	4,685	282	729	13,757	835	33,253
Tobyhanna	3,271	28,162	16,050	763	3,816	16,959	6,644	72,396
Tooele	2,406	22,584	10,760	456	1,359	20,860	4,572	60,594
Total	19,543	179,904	199,665	11,884	13,253	176,109	37,797	618,639

TABLE 6. ARMY: COST BREAKDOWN OF INTERSERVICING WORKLOAD

($000)

Depot	Contract	Gov't. Furnished		Maint. Support	Total
		Material	Service		
NARF North Island	95	24	0	0	119
NARF Cherry Point	555	147	0	0	702
NARF Pensacola	5,050	1,800	0	0	6,850
Norfolk Naval Shpyd.	46	0	0	0	46
Warner Rob ALC	112	0	0	0	112
Total	5,858	1,971	0	0	7,829

Several performance statistics for the Army depots are displayed in Table 7. These statistics immediately raise a variety of questions, including:

- Why do the labor to material ratios differ so drastically between Sacramento and Tobyhanna, which have similar missions?
- Why is the operations overhead to direct labor ratio at Red River inconsistent with other depots having similar missions?
- Why is Tobyhanna's operations overhead to direct labor ratio so low? Are different definitions being applied?
- Why are the indirect (i.e., operations overhead plus general and administrative) to direct labor ratios at Corpus Christi and Red River so large? Are they mission-dependent or do they reflect ineffective management, thereby resulting in excessive indirect burden?

TABLE 7. ARMY: SELECTED DEPOT PERFORMANCE STATISTICS

Depot	Total Cost (000s)	Pct. Funded	Ratios			Cost Per Direct Labor Hour		
			Dir. Lab. / Dir. Mat.	Overhead / Dir. Lab.	Indirect / Dir. Lab.	Direct Material	Indirect	Direct Civilians
Anniston	$120,201	95	0.60	0.91	1.16	$14.52	$10.13	$ 8.71
Corpus Christi	128,255	86	0.44	1.28	1.48	22.87	14.85	10.00
Letterkenny	101,768	91	1.09	0.98	1.22	8.29	11.06	9.05
Lexington	3,586	98	4.99	0.54	0.80	1.85	7.44	9.21
New Cumberland	29,671	80	0.66	1.08	1.24	15.18	12.43	9.97
Pueblo	13,617	95	1.17	1.07	1.24	8.75	12.85	10.28
Red River	55,298	88	1.06	1.23	1.43	8.02	12.15	8.49
Sacramento	33,253	88	2.77	1.06	1.12	3.88	12.10	10.75
Tobyhanna	72,396	92	1.75	0.60	0.84	4.91	7.22	8.61
Tooele	60,594	96	2.09	0.92	1.12	4.47	10.57	9.38

Specific answers to these and related questions, however, may not necessarily be obtained from the available cost accounting data. In many cases, they simply pinpoint areas for more detailed investigations.

Table 8 illustrates the type of data provided in the first weapon system summary report. Since that report displays costs by maintenance work performance category for every weapon system, only a small section is reproduced in the table. Table 9 indicates the format of a corresponding report by maintenance support work performance category.

Note that all commodities and weapon systems in Tables 8 and 9 are referenced by their alphabetic codes. While this practice is not attractive, the codes are the only system designation in the data.

Using the complete version of Tables 8 and 9, the user will likely identify several weapon systems requiring further investigation. Additional detail on such systems can be obtained from the final summary report which shows the support provided by performing activity broken out by the predominant work performance categories. Table 10 illustrates the format of this summary. Only combat vehicle weapon systems (commodity C) are displayed in the table, but similar data can be generated for any designated weapon system.

TABLE 8. ARMY: COST BY WEAPON SYSTEM AND WORK PERFORMANCE CATEGORY

($000)

WEAPON SYSTEM	WORK PERFORMANCE CATEGORY				
	OVERHAUL	RENOVATION	REPAIR	MANUFACTURE	STORAGE
COMMODITY A					
CS	25	0	0	0	0
DG	94	0	0	0	0
EJ	27	0	0	0	0
.					
.					
.					
YS	1,389	0	0	0	0
998	1,775	0	1,694	2,858	0
COMMODITY B					
AAA	0	0	236	0	0
AAH	0	0	202	0	0
.					
.					
.					

TABLE 9. ARMY COST BY WEAPON SYSTEM AND MAINTENANCE SUPPORT CATEGORY

($000)

WEAPON SYSTEM	SUPPORT CATEGORY				
	PLANS/PROGRAMS	TECH SUPPORT	TECH DATA	TECH TRAIN.	NON-MAINT.
COMMODITY A					
AS	0	48	0	0	0
GC	0	12	0	0	0
GH	390	2,908	727	167	0
GQ	143	1,315	606	124	0
.					
.					
.					
COMMODITY B					
.					
.					
.					

As an illustration of this process, Tables 8 and 9 were used to identify the automotive and combat vehicle weapon systems with the highest total maintenance costs. The work performed in support of those systems was then contrasted. Several interesting obervations emerged including:

- The three automotive weapon systems with the highest total costs were the M54A2 (5 ton truck), the M561 (gamma goat), and the M35A2 (2½ ton

TABLE 10. ARMY: COST BY FACILITY, SELECTED WORK PERFORMANCE CATEGORIES AND DESIGNATED WEAPON SYSTEMS

($000)

COMMODITY	WEAPON SYSTEM	FACILITY	WORK PERFORMANCE CATEGORY					
			OVERHAUL	CONVERS	MOD	REPAIR	TEST	MFG
C	AH (M48A1)	Anniston	26,740	0	0	29	0	78
		Letterkenny	2,127	0	0	0	151	0
		Red River	396	0	0	0	0	0
		Tooele	44	0	0	0	0	0
	AS (M60)	Anniston	11,340	0	11	0	6	0
		Letterkenny	225	0	0	1	0	0
		Ober Ramstadt	84	0	0	0	0	0
		Red River	54	0	0	0	0	0
		Tooele	146	0	0	2	0	0
		Mainz	19,055	0	0	0	0	17
	AT (M60A1)	Anniston	11,963	617	292	382	0	0
		Letterkenny	149	4	0	18	0	0
		Red River	117	0	0	15	0	0
		Tooele	143	0	0	12	0	0
		Mainz	16,378	498	343	21,341	0	0
	BC (M113A1)	Anniston	11	0	0	130	0	0
		Letterkenny	4,886	287	0	0	0	0
		Ober Ramstadt	150	0	0	0	0	0
		Red River	4,153	29	0	0	0	0
		Tobyhanna	39	0	0	0	0	0
		Mainz	27,887	0	0	30	0	0

truck); these systems accounted for approximately $18 million of the total automotive program of almost $51 million.

- Approximately 92 percent of M54A2 costs were in support of vehicle overhaul versus 12 percent for the M561 and 79 percent for the M35A2 (the balance were predominantly in the repair category).

- The four vehicle systems with the highest total costs were the M60A1 (tank), the M113A1 (armored personnel carrier), the M60 (tank), and the M48A1 (tank); these systems accounted for approximately $152 million of a $357 million vehicle program.

The four largest combat vehicle systems were selected for more detailed evaluation (Table 10). Several observations emerged:

- The concentration of M48A1 work in the overhaul category is understandable because that work is being performed in support of foreign military sales.

- The reasons behind the dominance of M60 overhauls versus repairs are unclear (since general support maintenance units in Europe are not supporting these vehicles, one would expect much of the work performed at Mainz to be repairs).

- The balance between M60A1 overhauls and repairs at Mainz is consistent with the findings of LMI Task ML804, "Effectiveness of Army Direct and General Support Maintenance Units."

- The amount of M60A1 work performed at CONUS installations ($13.7 million) versus overseas ($38.6 million) appears inconsistent with equipment/troop inventories but also reinforces previous observations that Mainz is routinely used to perform less-than-depot-level repairs.

- The dominance of Mainz support to the M113A1 is also inconsistent ($27.9 million against $9.5 million in CONUS); equipment usage data may provide additional insight, but the likely finding is that Mainz performs more than just depot-level maintenance.

Since the summary reports could provide no further information to support an analysis of these observations, a special, one-time query into depot performance on overhaul of specific major assemblies (for the M113A1 and M60A1 only) was initiated. The results of that query are displayed in Table 11.

TABLE 11. ARMY: REPAIR COST/QUANTITY FOR SELECTED ITEMS

Weapon System	Assembly	Facility	Total Cost	Production Quantity	Average Cost	Standard Inventory Price
AT (M113A1)	Engine	Letterkenny	1,515,073	48	3,156	5,136
		Mainz	13,408,256	3,223	4,160	5,136
	Transmission	Mainz	1,311,026	1,030	1,273	1,782
	Transfer	Mainz	727,617	875	832	1,720
	Differential	Mainz	1,095,051	1,072	1,022	2,796
	Final Drive	Mainz	289,517	851	340	632
BC (M60A1)	Engine	Anniston	9,534,526	667	14,295	33,552
		Mainz	18,042,226	1,000	18,042	33,552
	Transmission	Anniston	707,779	165	4,290	25,016
		Mainz	2,075,200	658	3,154	25,016
	Final Drive	Anniston	234,674	231	1,016	3,488
		Mainz	731,792	548	1,335	3,488

For all major assemblies in the table, the Mainz program is significantly larger than the CONUS program or Mainz is the only activity supporting those assemblies. Two factors may account for this situation:

- In CONUS, major assemblies may be repaired more frequently by military or civilian general support maintenance units, whereas in Europe those assemblies may be returned to the depot for overhaul.

- Different definitions may be employed; at Mainz all such assemblies may be individually tracked, while in CONUS they may be subsumed under end-item overhauls.

The thesis that different definitions are being used is partially substantiated by another special query, this time into overhaul costs by work breakdown structure. The results of that query, for these same combat vehicles, are displayed in Table 12. With one major exception, the bulk of the repair costs are attributed to the basic vehicle (work breakdown structure code 1). Only with the M113A1 at Mainz are significant costs assigned to other than the basic vehicle. While this evidence is not convincing, it does lend credibility to the conjecture that different definitions are being used by the various activities.

FUTURE DIRECTIONS

The INQUIRE data base management system described in the preceeding sections provides OASD(MRA&L) with a significant depot performance analysis capability. However, additional efforts are required to fully develop that capability. In particular, two interrelated tasks should be performed:

- development of complementary systems
- analysis of current depot performance and practices.

Costs and production quantities, accessible via the depot performance data base management system, provide only a partial view of depot performance. For a more comprehensive analysis capability, budget and capacity information and performance criteria must be available as well. This data can be conveniently obtained only through data processing systems. Therefore, a further effort directed towards the definition, development and implementation of a complementary system(s) is suggested.

Once a thorough depot analysis capability is operational, an extensive analysis of depot maintenance is recommended. Such an analysis would serve

TABLE 12. ARMY: COST BY WORK BREAKDOWN STRUCTURE FOR DESIGNATED COMBAT VEHICLE SYSTEMS

($000)

System	Facility	Work Breakdown Structure Code	Cost
AT (M60A1)	Anniston	1	$10,012
		2	542
		3	325
		5	2,377
	Letterkenny	5	172
	Red River	3	133
	Tooele	3	10
		5	144
	Mainz	1	35,794
		2	498
		3	2,093
		5	230
BC (M113A1)	Anniston	1	130
		5	11
	Letterkenny	1	3,030
		2	1,515
		3	726
	Ober Ramstadt	3	150
	Red River	1	4,629
		3	108
	Tooele	1	143
	Mainz	1	10,556
		2	13,408
		3	4,289

three purposes: (1) it would highlight areas requiring OASD(MRA&L) attention, (2) it would provide OASD(MRA&L) with a variety of management information, and (3) it would provide an opportunity to assess and refine the data processing system and clarify definition problems with the data. The completion of these efforts would result in the identification of current depot problems and a capability for maintaining future visibility over all aspects of depot performance.

APPENDIX

LOADING AND UTILIZATION PROCEDURES

Using the depot performance data processing system requires an understanding of two distinct processing steps: adding new data and exercising the data retrieval capability. This appendix discusses the procedures and associated computer programs for performing both steps.

Since these procedures are dependent on the computer hardware and software and the policies of the system operators, the user should be aware of changes and adjust processing steps accordingly. Modifications are explained in periodic Technical Information Bulletins (TIBs) issued by the Air Force Data Services Center (AFDSC).

DATA BASE LOADING

The process of installing a new data base can be broken down into three operations:

- tape processing
- storage allocation
- loading.

Each operation can, in turn, be segmented into several consecutive steps. Figure A-1 lists these steps in the form of a checklist which the user can follow to ensure that nothing is neglected. A description of the corresponding procedures is provided in the following paragraphs.

Tape Processing

The annual depot performance data is submitted by the Services to the DoD in the form of computer tapes. Before these tapes can be used, they must be edited, translated, and cataloged.

FIGURE A-1. DATA BASE LOADING CHECKLIST

Action	Initiation Date	Completion Date	Notes
TAPE PROCESSING			
Acquire Annual Tapes			
Submit Tapes for Editing			
Analyze Edit Results			
Request Service Correction of Indicated Data			
Repeat Edit Cycle for Corrected Tapes			
Request Translation of Tapes to IBM EBCIDIC			
Copy Tapes into the IBM 360 Library			
Extend Retention Period of Cataloged Tapes			
STORAGE ALLOCATION			
Calculate Space for Data, Search, and Index Files			
Calculate Remaining Space on Each Direct Access Volume			
Request Additional Storage Space if Necessary			
Determine Disc Location of Files			
DATA BASE LOADING			
Modify Loader Program to Reflect Storage Requirements			
Execute Loader Program			
Correct and Insert Rejected Records			
Verify that All Records Were Loaded			
Compute and Insert the TOTLCOST Field			
Create Backup Copies			

Tape editing involves examining a variety of factors to isolate recording and format errors. The Logistics Systems Division of the Air Force Data Services Center has developed a computer program which checks the important data characteristics and identifies job order records that do not conform to specifications. This edit routine will be automatically applied as soon as new depot performance tapes are received by the AFDSC. Questions regarding tape editing should be directed to:

Ms. Priscilla Puckett
Logistics Systems Division
Directorate of OSD Systems
Air Force Data Services Center

The output of the edit routine is a listing of rejected records with erroneous characters marked by asterisks. Figure A-2 illustrates a typical output page. To correct faulty data, the user should compile a list of needed adjustments for each Service by comparing rejected records with the data specification in DoD 7220.29-H. This list should be submitted to the Service along with a request for corrected data. The error isolation and correction cycle should continue until the edit routine indicates no significant inconsistencies.

The tapes are developed and edited on Honeywell equipment, but the data base management system resides on an IBM machine. Since these systems differ in the binary codes used to represent characters, the final corrected tapes must be translated from Honeywell Standard Format to IBM EBCIDIC Format. The Logistics Systems Division has a utility program which performs such translations. A request for this service should take the form of a memo addressed to Mr. T. H. Thoreson, AFDSC. For consistency, output should be placed on 60000 reel, 9 track, 1600 bpi tape with a block size of 10. When the translation is complete, the user should be notified of the reel numbers of the new tapes and the total number of records reported by each Service.

FIGURE A-2. SAMPLE EDIT PROGRAM OUTPUT

```
MAR 13, 1979                         DEPOT MAINTENANCE SUBMISSION ERRORS                                PAGE 48

  1 -  86 F178    F603428472014  13F50313110008582659BEARNINGS,ANTIFRIC,UN0000001227998 A    7F
                                                                                           ***
 87 - 198 0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
199 - 310 0000000000000000000000000000000000000000000006480000000000000000000000000000000000000000000000000000000000000000
311 - 360 00000006              0000000600000000000000000000

  1 -  86 F178    F603428472014  13F50313110008649404BEARNINGS,ANTIFRIC,UN0000000404998 A    7F
                                                                                           ***
 87 - 198 0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
199 - 310 0000000000000000000000000000000000000000000006280000000000000000000000000000000000000000000000000000000000000000
311 - 360 00000011              0000000000000000000000000000

  1 -  86 F278    F603428472014  13F50313110008682741BEARNINGS,ANTIFRIC,UN0000000308998 A    7F
                                                                                           ***
 87 - 198 0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
199 - 310 0000000000000000000000000000000000000000000003250000000000000000000000000000000000000000000000000000000000000000
311 - 360 00000005              0000000500000000000000000000

  1 -  86 F178    F603428472014  13F50313110008692568BEARNINGS,ANTIFRIC,UN0000000714998 A    7F
                                                                                           ***
 87 - 198 0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
199 - 310 0000000000000000000000000000000000000000000005000000000000000000000000000000000000000000000000000000000000000000
311 - 360 00000010              0000000000000000000000000000

  1 -  86 F178    F603428472914  13F50313110008814808BEARNINGS,ANTIFRIC,UN0000001404998 A    7F
                                                                                           ***
 87 - 198 0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
199 - 310 0000000000000000000000000000000000000000000000750000000000000000000000000000000000000000000000000000000000000000
311 - 360 00000050              0000005000000000000000000000

  1 -  86 F178    F103110634005  13D50433110009282285BEARNINGS,ANTIFRIC,UN0000000160998 A    7F
                                                                                           ***
 87 - 198 0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
199 - 310 0000000000000000000000000000000000000000000010560000000000000000000000000000000000000000000000000000000000000000
311 - 360 00000016              0000001600000000000000000000
```

The 60000 series tapes are transients used in transferring data from one computer system to another. Thirty days is the maximum retention period for such tapes. The data can be kept for longer periods by copying them to 85000 series tapes, which can be cataloged in the IBM system library. Figure A-3 lists the program for tape copying and cataloging along with expected output. A record of the serial numbers of the new tapes should be kept for future reference.

The management of cataloged 360 system tapes is the responsibility of the creator of the tape. New tapes are kept only 30 days unless the user extends their life. Tape library lists, which are issued weekly, describe all tapes cataloged under one area code (ASNM21 for this project) and specify release dates. By indicating desired actions on the library list, the user can delete or lengthen the retention period of selected tapes. Requests for tape lists should be directed to:

Mr. Larry Robertson
Directorate of OSD Systems
Air Force Data Services Center

Storage Allocation

Since the number of reported records varies from year to year, several parameters must be calculated prior to annual data base loading. Figure A-4 provides a worksheet for computing those parameters. Interested readers can find additional information on the role of the parameters in the INQUIRE Installations and Operations Guide. Total number of job order records, the primary input to the computations, should be provided by the AFDSC following tape translation.

The data space and search space parameters indicate the number of disc tracks required by the data and search files. The remainder of the data base is comprised of the index file, which requires 60 tracks. Before new

FIGURE A-3. TAPE COPYING AND CATALOGING ROUTINE

Input

```
//COPYCAT JOB (OS2Ø,N3Ø8D,15U),_____,CLASS=A
                               Programmer
                                 Name
/*ROUTE  PRINT LOCAL
//COPYTAPE EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=A
//SYSIN DD DUMMY
//SYSUT1 DD UNIT=TAPE6,DISP=(OLD,KEEP,KEEP),
//    DCB=(RECFM=FB,LRECL=36Ø,BLKSIZE=36ØØ),
//    VOL=SER=_____
                Reel Number of
              Tape to be Copied
//SYSUT2 DD DSNAME=ASNM21.N3Ø8D.DATA____, UNIT=TAPE6,DISP=(NEW,CATLG),
                                      FY
//    DCB=(RECFM=FB,LRECL=36Ø,BLKSIZE=36ØØ,DEN=4)
//
```

Output

```
IEF2361 ALLOC. FOR COPYCAT COPYTAPE
IEF2371 631   ALLOCATED TO SYSPRINT
IEF2371 18Ø   ALLOCATED TO SYSUT1
IEF2371 181   ALLOCATED TO SYSUT2
IEF1421 - STEP WAS EXECUTED - COND CODE ØØØØ
IEF2851   VOL SER NOS=_____                KEPT
                      Reel Number of
                      Tape to be Copied
IEF2871   ASNM21U.N3Ø8D.DATA____          CATALOGUED
                           FY
IEF2871   VOL SER NOS=_____
                      Reel Number
                      of New Tape
IEF3731 STEP /COPYTAPE/ START 79248.Ø9ØØ
IEF3741 STEP /COPYTAPE/ STOP  79248.Ø9Ø5 CPU  ØMIN 4Ø.4ØSEC MAIN  48K LCS   ØK
```

Note: All programs in this attachment are provided in a format suitable for batch processing via cards. To submit a batch job through the terminal, the following changes should be made to all programs:

- replace the job name (COPYCAT in this case) with the User ID
- add to the end of the JOB card, NOTIFY = _____
                                                User ID
- place ROUTE PRINT LOCAL with ROUTE PRINT TSO

FIGURE A-4. DEPOT PERFORMANCE INQUIRE LOADER WORKSHEET

Total Number of Reported Records (All Services) = _____

Space Allocation for Key Work File = 7 x (# Reported Records)/1,000
= _____

Block Size for Sort Work File = 6 x (Space Allocation for Key Work File)
= _____

Total Data Size = 412 x (# Reported Records) + 10,000 = _____

Data Space = (Total Data Size)/7,276 = _____

Search Space = (# Reported Records)/91 = _____

data can be loaded, the user must verify that the proper space on assigned direct access volumes is free. Four volumes, OS2ØØ1, OS2ØØ2, OS2ØØ3 and OS2ØØ4, are currently assigned to this project. A picture of the available space on each disc can be obtained by submitting the mapping program shown in Figure A-5; also displayed in Figure A-5 is a sample output of the Disc Map Program. By comparing the required and available space, the user can assess the adequacy of storage. Requests for additional space should be addressed to:

Director
Automated Systems Office
Office of the Assistant Secretary of Defense
(Manpower, Reserve Affairs, and Logistics)

In addition to assessing the adequacy of storage, the user must determine the disc location of each file. Placement on the direct access volume is discretionary, but three factors warrant consideration:

- To operate efficiently, the search and data files of the same data base should be on different volumes.

FIGURE A-5. DISC MAP PROGRAM

Input

```
//MAP JOB (OS2Ø,N3Ø8D,15U),____________________,CLASS A
                           Programmer's Name
/*ROUTE  PRINT LOCAL
//MAP EXEC DISKMAP,PK=____________________
                     Serial Number of
                     Disc to be Mapped
//
```

Sample Output

```
05 SEP 79 / 1211      AFCP SYSTEMS SUPPORT UTILITY - DASD ALLOCATION MAP  UPDATED 10/07/69                    PAGE    1

                CONTENTS ON VOLUME=SER=OS2001   UNIT=232
                                    DATE    DATE    FILE          FILE    VOL.          TOTAL  TRACKS  DIREC.  BLKS
            DATA SET NAME           CREATED PURGE   TYPE  EXTENTS SERIAL  SEQ. SECURITY ALLOC  USED    BLOCKS  USED
VTOC                                                                                      19     1
        EXT--FIRST---LAST-LENGTH
         01  00001  00019  00019
FREE SPACE                                                                                2679
        EXT--FIRST---LAST-LENGTH
         01  01321  03999  02679
OS2001U.N3080.COSTAC78.IT3.MACRO    79227   00000   PART  05      OS2001  01    NO        15     15      10      1
    DSORG=PO   RECFM=F    LRECL=80
    BLKSIZE=80    2ND ALLOCATION=3
        EXT--FIRST---LAST-LENGTH
         01  01306  01308  00003
         02  01309  01311  00003
         03  01312  01314  00003
         04  01315  01317  00003
         05  01318  01320  00003
OS2001U.N3080.COSTAC78.IT3.SEARCH   79178   00000   DIR.  01      OS2001  01    NO        1185   1185
    DSORG=DA   RECFM=F    LRECL=7292
    BLKSIZE=7292  2ND ALLOCATION=10
        EXT--FIRST---LAST-LENGTH
         01  00121  01295  01175
         02  01296  01305  00010
OS2001U.N3080.KEN                   79163   00000   PART  01      OS2001  01    NO        100    42      17      2
    DSORG=PO   RECFM=FB   LRECL=80
    BLKSIZE=3120  2ND ALLOCATION=0
        EXT--FIRST---LAST-LENGTH
         01  00020  00119  00100
OS2001U.N3080.REJECT78              79178   00000   SEQ.  01      OS2001  01    NO        1      0
    DSORG=PS   RECFM=FB   LRECL=360
    BLKSIZE=3600  2ND ALLOCATION=1
        EXT--FIRST---LAST-LENGTH
         01  00120  00120  00001
```

```
05 SEP 79 / 1211      AFCP SYSTEMS SUPPORT UTILITY - DASD ALLOCATION MAP  UPDATED 10/07/69                    PAGE    2

                CONTENTS ON VOLUME=SER-OS2001   UNIT=232
FIRST TRACK   LAST TRACK      LENGTH     EXTENT      DATA SET NAME
  00001         00019         00019        01       VOTC
  00020         00119         00100        01       OS2001U.N3080.KEN
  00120         00120         00001        01       OS2001U.N3080.REJECT78
  00121         01295         01175        01       OS2001U.N3080.COSTAC78.IT3.SEARCH
  01296         01305         00010        02       OS2001U.N3080.COSTAC78.IT3.SEARCH
  01306         01308         00003        01       OS2001U.N3080.COSTAC78.IT3.MACRO
  01309         01311         00003        02       OS2001U.N3080.COSTAC78.IT3.MACRO
  01312         01314         00003        03       OS2001U.N3080.COSTAC78.IT3.MACRO
  01315         01317         00003        04       OS2001U.N3080.COSTAC78.IT3.MACRO
  01318         01320         00003        05       OS2001U.N3080.COSTAC78.IT3.MACRO
  01321         03999         01679        01       FREE SPACE * * *
```

- The permanent on-line volume, OS2ØØ1, is the only disc that can be conveniently edited; therefore, space should be reserved on this volume for new programs.

- Since only two discs, excluding the permanent on-line volume, can be mounted simultaneously, no data base should have files on all four discs.

Loading

Information from the edited depot performance tapes is loaded into a data base by the INQUIRE loader program, which must be modified to reflect annual changes. Figure A-6 lists this program and indicates parameters to be derived by the user. All program changes can be developed from either the worksheet or the file location process discussed in the preceding section.

Successful execution of the loader routine results in a new data base. Although the reported information can now be accessed, several steps should be taken to validate and enhance the system prior to its use. To ensure that all data was loaded, the logical record count, produced as an output of the loader program, should be compared to the number of records reported by the AFDSC following tape translation. Discrepancies in these figures might be explained by records which do not conform to the data definition (i.e., field definition in the loader program). Such records will be listed as part of the loader program output. Each rejected record should be corrected and added to the data base using the program in Figure A-7. Finally, to improve computational efficiency, a total cost field should be added to each record. The program illustrated in Figure A-8 will compute and record the additional field. When these developmental steps are completed, the new data base is ready for use.

Occasionally, storage discs are damaged and the resident data are destroyed. Therefore, as a precautionary measure, a backup copy of each new data base should be created. Figure A-9 provides the program recommended for

FIGURE A-6. INQUIRE LOADER PROGRAM

```
//LOAD JOB (OS20,N300D,15U,90,70),_____,CLASS=A
                                 Programmer Name
/*ROUTE  PRINT LOCAL
//LOAD EXEC INQLOAD,AREA=OS2001U,PROJ=N300D,EXTNAME=COSTAC___,ITER=3,
                                                          FY
//   INTNAME=ACCTNG___,SRCVOL=_____,INXVOL=_____,
                  FY          Volume to Contain    Volume to Contain
                                 Search File          Index File
//   KEYLEN=23, LREC33, INXREC43, KEYRECS=_____,
                                      Space Allocation for
                                         Key Work File
//   SRTRECS=_____,
              Sort Work File
                Block Size
//   DATPARM='CREAT,DIRECT',SRCPARM='MOVFIL,CREATE,S=_____,
                                                  # Reported Records
//   INXSPC=50,SK=8,SRCSPC=_____,DATSPC=_____,
                          Search Space     Data Space
//   SROBLK=37,SROSPC=7846,DATEXT=3033,DATTIME=40,DSKTYPE='(2314/_____)',
                                                  # Volumes to Contain
                                                       Data File
//   DATVOL=(_____)
            Volume(s) to Contain
                 Data File
//DAT.ISI00 DD DSN=OS2001U.N300D.DATA___,UNIT=TAPE6,VOL=SER=_____,
                                    FY                    Serial Number
                                                          of Input Tapes
//   DCB=(RECFM=FB,BLKSIZE=3600,LRECL=360,DEN=4),DISP=OLD
//DAT.SYSIN DD *
RECTYPE  F   1
QUARTER  F   1
FY       FPR 2
PROGELT  F   6
PROGRAM  F   5          SPROGELT 1
SERVICE  FPR 1          SPROGELT 6
FACILITY FPR 14
IN/OUTUS F   1
OWNROPER F   1
RPTGFAC  F   5
ITEMNUMB FPR 13
ITEMNAME F   20   B
PRICE    N   10
SYSTEM   FPR 4
WBS      F   3
COMMODTY FPR 1          SWBS     1
CATEGORY F   1          SWBS     2
COMPONET F   1          SWBS     3
WPC      FPR 3
CUSTOMER F   2
CLABRP   N   8
CLABRPHR N   8
CLABRO   N   8
CLABROHR N   8
MLABRP   N   8
MLABRPHR N   8
MLABRO   N   8
MLABROHR N   8
FMATL    N   8
UMATLII  N   8
UMATLXC  N   8
UMATLMK  N   8
UMATLXP  N   8
FOTHER   N   8
UOTHER   N   8
FOVHED   N   8
UOVHED   N   8
FG&A     N   8
UG&A     N   8
CONTRACT N   8
GFMII    N   8
GFMXC    N   8
GFMMK    N   8
GFMXP    N   8
FGFSERV  N   8
UGFSERV  N   8
FMAINSPT N   8
UMAINSPT N   8
PRODQNTY N   8
TOTLCOST N   8
QNTREPYR N   8
QNTPREYR N   8
QNTOTHYR N   8
WORKDAYS N   4
BLANK    N   6
END
/*
//
```

FIGURE A-7. RECORD ADDITION PROGRAM

```
//OS2ØDMK JOB (OS2Ø,N3Ø8D,15U,6Ø),_____,CLASS=B
                                  Programmer Name
/*ROUTE  PRINT TSO
//INQBATCH EXEC PGM=INQUIRE,REGION=22ØK,
//   PARM='/MAINT,SHR,SM=15ØØØØ,T=15K,L=72'
//REPORT DD SYSOUT=A
//SYSPRINT DD SYSOUT=A
//SORTWK DD UNIT=SYSDA,SPACE=(CYL,(12Ø,5),RLSE)
//SYSLIB DD DUMMY
//PLIDUMP DD SYSOUT=A
//DATAFIL DD DSN=OS2ØØ1U.N3Ø8D.COSTAC____.IT3.DATA,DISP=SHR
                                        FY
//INXFIL DD DSN=OS2ØØ1U.N3Ø8D.COSTAC____.IT3.INDEX,DISP=SHR
                                        FY
//SRCFIL DD DSN=OS2ØØ1U.N3Ø8D.COSTAC____.IT3.SEARCH,DISP=SHR
                                        FY
//SROVFIL DD DUMMY
//SYSIN DD *
OPTION ENDMINUS 8.
.
ADD BATCH
field name†     field value†
field name      field value
     :               :
     :               :
KEYS            key,key,key,...
END
field name      field value
field name      field value
     :               :
     :               :
KEYS            key,key,key,...
END
END BATCH
//
```

†The records to be added are inserted after the ADD BATCH command. One field name and value are punched on each card. The card format is

Columns	1-8	-	field name, KEYS, or END
Column	9	-	blank
Columns	10-72	-	field value or keys (separated by commas)
Columns	73-80	-	sequence number or blank

FIGURE A-8. TOTAL COST DERIVATION PROGRAM

```
//OS2ØDMK JOB (OS2Ø,N3Ø8D,15U,6Ø),____________________,CLASS=B
                                  Programmer Name
/*ROUTE  PRINT TSO
//INQBATCH EXEC PGM=INQUIRE,REGION=22ØK,
//   PARM='/MAINT,SHR,SM=15ØØØØ,T=15K,P=5Ø,L=72'
//REPORT DD SYSOUT=A
//SYSPRINT DD SYSOUT=A
//SORTWK DD UNIT=SYSDA,SPACE=(CYL,(1Ø,5),RLSE)
//SYSLIB DD DUMMY
//PLIDUMP DD SYSOUT=A
//DATAFIL DD DSN=OS2ØØ1U.N3Ø8D.COSTAC____.IT3.DATA,DISP=SHR
                                      FY
//INXFIL DD DSN=OS2ØØ1U.N3Ø8D.COSTAC____.IT3.INDEX,DISP=SHR
                                      FY
//SRCFIL DD DSN=OS2ØØ1U.N3Ø8D.COSTAC____.IT3.SEARCH,DISP=SHR
                                      FY
//SROVFIL DD DUMMY
//SYSIN DD *
OPTION ENMINUS 8.
.
REPLACE TOTLCOST BY TOTAL IN FY=__, COMPUTE TOTAL FORMAT (I8) (CLABRP + CLABRO
                              FY
+ MLABRP + MLABRO + FMATL + UMATLII + UMATLXC + UMATLMK + UMATLXP + FOTHER
+ UOTHER + FOVRHD + UOVRHD + FG&A + UG&A + CONTRACT + GFMII + GFMXC + GFMMK
+ GFMXP + FGFSERV + UGFSERV + FMAINSPT + UMAINSPT).
/*
```

FIGURE A-9. DATA BASE BACKUP PROGRAM

```
//BACKUP JOB (OS2Ø,N3Ø8D,15U),____________________,CLASS=A
                                  Programmer's Name
/*ROUTE PRINT TSO
//DUMP EXEC IMGDUMP,AREA=OS2ØØ1U,PROJ=3Ø8D,EXTNAME=COSTAC____,
                                                        FY
//   INTNAME=ACCTNG____,ITER=3,ITEROP=_____________
                      FY                  See † Below
//DUMPALL.SROVFIL DD DUMMY
//
```

†The number provided by the ITEROP parameter is incorporated in the data set name of the backup copy of the data base. The purpose of the parameter is to assure the uniqueness of the data set name, since a data set created under a non-unique name cannot be cataloged or retained. Hence, the user should pick some value that has not been specified in previous backups. We suggest you use the ITEROP parameter to number your copies sequentially; for, in this way, you will be able to determine which copy is the most recent.

copying INQUIRE files to high density tape. A tape backup copy can be used by the program in Figure A-10 to restore a data base.

FIGURE A-10. DATA BASE RESTORE PROGRAM

```
//RESTORE JOB (OS2Ø,N3Ø8D,15U),____________________,CLASS=A
                               Programmer's Name
/*ROUTE  PRINT LOCAL
//RESTORE EXEC IMGRESTR,AREA=OS2ØØ1U,PROJ=N3Ø8D,EXTAME=COSTAC____,
                                                              FY
//   INTNAME=ACCTG____,ITER=3,IMGPARM="RESTORE,OVWRITE"
                  FY
//SYSIN DD *
RESTORE INTNAME _____________________________________________________
                Restore Control Card from Data Base Backup Program
/*
```

SYSTEM UTILIZATION

Utilization of the depot performance data processing system entails annual production of overview information and periodic development of reports to support ad hoc analyses. However, prior to discussing procedures involved in these two operations, it is necessary to describe the data base and explain the common INQUIRE processing program.

Data Base Description

A depot performance data base contains all the depot cost and workload information reported by the Services during one fiscal year. Each logical record in the data base provides information on a completed job order, which is defined by a unique combination of performing facility, customer, item and type of work. The fields of the logical records are derived from the data items reported for each job order. Figure A-11 illustrates and explains the relationship between fields and data items. Additional information on the data items can be found in Department of Defense Handbook 7220.29-H.

FIGURE A-11. FIELD AND DATA ITEM RELATIONSHIPS

Data Base Fields	Data Items	Data Base Fields	Data Items
RECTYPE	Record Type "F"	UMATLMK	Direct Material Cost-Unfunded (Modification Kits)
QUARTER	Quarter Code		
FY	Fiscal Year		
PROGELT[a]	Program Element	UMATLXP	Direct Material Cost-Unfunded (Expense)
PROGRAM[a]	Program Element		
SERVICE[a]	Program Element	FOTHER	Other Direct Cost-Funded
FACILITY	Facility Name or Code	UOTHER	Other Direct Cost-Unfunded
IN/OUTUS	Inside or Outside U.S. Code	FOVRHD	Operations Overhead-Funded
OWNROPER	Owner/Operator Code	UOVRHD	Operations Overhead-Unfunded
RPTGFAC	Reporting Facility Code		
ITEMNUMB	Item Identification Number	FG&A	General and Administrative Expense-Funded
ITEMNAME	Item Nomenclature		
PRICE	Standard Inventory Price	UG&A	General and Administrative Expense-Unfunded
SYSTEM	Weapon or Support System Code	CONTRACT	Contract/Interservice/Non-Depot Maintenance Activity Cost
WBS[b]	Work Breakdown Structure Code		
COMMODTY[b]	Work Breakdown Structure Code	GFMII	Government Furnished Material (Investment Items & Full Price)
CATEGORY[b]	Work Breakdown Structure Code		
COMPONET[b]	Work Breakdown Structure Code	GFMXC	Government Furnished Material (Exchanges)
WPC	Work Performance Category	GFMMK	Government Furnished Material (Modification Kits)
CUSTOMER	Customer Code		
CLABRP	Direct Civilian Labor (Production) Cost	GFMXP	Government Furnished Material (Expense)
CLABRPHR	Direct Civilian Labor (Production) Hours	FGFSERV	Government Furnished Services-Funded
CLABRO	Direct Civilian Labor (Other) Cost	UGFSERV	Government Furnished Services-Unfunded
CLABROHR	Direct Civilian Labor (Other) Hours	FMAINSPT	Maintenance Support Costs Organic-Funded
MLABRP	Direct Military Labor (Production) Cost	UMAINSPT	Maintenance Support Costs Organic-Unfunded
MLABRPHR	Direct Military Labor (Production) Hours	PRODQNTY	Total Production Quantity Completed
MLABRO	Direct Military Labor (Other) Cost	TOTLCOST[c]	All Cost Fields
MLABROHR	Direct Military Labor (Other) Hours	QNTRKPYR	Quantity of Completed Items Inducted During Reporting Year
FMATL	Direct Material Cost-Funded		
UMATLII	Direct Material Cost-Unfunded (Investment Items at Full Price)	QNTPRYR	Quantity of Completed Items Inducted During Year Preceding Reporting Year
UMATLXC	Direct Material Cost-Unfunded (Exchanges)	QNTOTHYR	Quantity of Completed Items Inducted During All Other Previous Years
		WORKDAYS	Work Days in Process

[a]This field structure allows the program code and service code to be referenced as separate pieces of information or as one unit.

[b]This field structure allows commodity, category and component to be referenced as separate pieces of information or as one unit

[c]This field was added to each record to improve computational efficiency.

Each data base field is assigned several descriptive characteristics, such as print format and length, which the DBMS uses in retrieving data and formatting reports. Figure A-12 delineates the attributes of each field in the depot cost accounting data base. For ease of comparison with the user's manual, this display has the form of a fields definition table. The codes are translated at the bottom of the figure and discussed in detail in the INQUIRE Installation and Operations Guide.

Procedure INQUIRE

The depot performance data processing system is invoked by the submission of a computer program. Each such program consists of a general routine (procedure INQUIRE), which provides computer specifications and INQUIRE parameters, and an INQUIRE query, which commands the data base management system (DBMS) to carry out particular operations. Although queries may vary greatly, procedure INQUIRE changes very little.

Figure A-13 lists the general procedure INQUIRE routine and notes modifications that might be required. Only the INQUIRE parameters, however, demand significant user attention. These values influence the performance of certain data base management system functions. Frequently specified parameters are described in Figure A-14, which also indicates recommended utilizations. A complete list of parameters is provided in the INQUIRE User Language Tutorial. The order in which parameters are specified in the program is immaterial, but they must be separated by commas.

Summary Report Generation

Summary reports, like all INQUIRE output, are the result of queries. However, since these displays are standardized, it is not necessary to develop a new request each time the summary is desired. Furthermore, the macro capability of INQUIRE eliminates the necessity of expressing each query in its

FIGURE A-12. FIELD DEFINITION TABLE

Field Name	Key	Type	Stored Length	Structure	Repetitions	Print	
						Format	Length
RECTYPE		CHR	1		SCALAR	NB	1
QUARTER		CHR	1		SCALAR	NB	1
FY	PFX	CHR	2		SCALAR	NB	2
PROGELT		CHR	6	BASE	SCALAR	NB	6
PROGRAM		CHR	5	SUBF	SCALAR	NB	5
SERVICE	PFX	CHR	1	SUBF	SCALAR	NB	1
FACILITY	PFX	CHR	14		SCALAR	NB	14
IN/OUTUS		CHR	1		SCALAR	NB	1
OWNROPER		CHR	1		SCALAR	NB	1
RPTGFAC		CHR	5		SCALAR	NB	5
ITEMNUMB	PFX	CHR	13		SCALAR	NB	13
ITEMNAME		CHR	20		SCALAR	B	20
PRICE		UNP	10		SCALAR	I	10
SYSTEM	PFX	CHR	4		SCALAR	NB	4
WBS		CHR	3	BASE	SCALAR	NB	3
COMMODTY	PFX	CHR	1	SUBF	SCALAR	NB	1
CATEGORY		CHR	1	SUBF	SCALAR	NB	1
COMPONET		CHR	1	SUBF	SCALAR	NB	1
WPC	PFX	CHR	3		SCALAR	NB	3
CUSTOMER		CHR	2		SCALAR	NB	2
CLABRP		UNP	8		SCALAR	I	8
CLABRPHR		UNP	8		SCALAR	I	8
CLABRO		UNP	8		SCALAR	I	8
CLABROHR		UNP	8		SCALAR	I	8
MLABRP		UNP	8		SCALAR	I	8
MLABRPHR		UNP	8		SCALAR	I	8
MLABRO		UNP	8		SCALAR	I	8
MLABROHR		UNP	8		SCALAR	I	8
FMATL		UNP	8		SCALAR	I	8
UMATLII		UNP	8		SCALAR	I	8
UMATLIC		UNP	8		SCALAR	I	8
UMATLMK		UNP	8		SCALAR	I	8
UMATLIP		UNP	8		SCALAR	I	8
FOTHER		UNP	8		SCALAR	I	8
UOTHER		UNP	8		SCALAR	I	8
FOVRED		UNP	8		SCALAR	I	8
UOVRED		UNP	8		SCALAR	I	8
FG&A		UNP	8		SCALAR	I	8
UG&A		UNP	8		SCALAR	I	8
CONTRACT		UNP	8		SCALAR	I	8
GFMII		UNP	8		SCALAR	I	8
GFMIC		UNP	8		SCALAR	I	8
GFMMK		UNP	8		SCALAR	I	8
GFMIP		UNP	8		SCALAR	I	8
FGFSERV		UNP	8		SCALAR	I	8
UGFSERV		UNP	8		SCALAR	I	8
FMAINSPT		UNP	8		SCALAR	I	8
UMAINSPT		UNP	8		SCALAR	I	8
PRODQNTY		UNP	8		SCALAR	I	8
TOTLCOST		UNP	8		SCALAR	I	8
QNTREPTR		UNP	8		SCALAR	I	8
QNTPRETR		UNP	8		SCALAR	I	8
QNTOTHTR		UNP	8		SCALAR	I	8
WORKDAYS		UNP	4		SCALAR	I	4
BLANK		UNP	6		SCALAR	I	6

Abbreviations and Codes:

- PFX - prefix key
- CHR - character data
- UNP - unpacked numeric data
- SUBF - subfield
- NB - a default print format code for character data which allows a word to be broken for printing on more than one line
- B - a default print format code for character data which specifies that each line end at a blank between words
- I - a default print format code for numeric data which indicates that the number should be printed as an integer

FIGURE A-13. PROCEDURE INQUIRE

```
//INQUIRE JOB (OS2Ø,N3Ø8D,15U,6Ø),________________,CLASS=B
                                  Programmer Name
/*ROUTE  PRINT LOCAL
//INQBATCH EXEC PGM=INQUIRE,REGION=22ØK,
//   PARM='/____________________'
            INQUIRE Parameters
//REPORT DD SYSOUT=A
//SYSPRINT DD SYSOUT=A
//SORTWK DD UNIT=SYSDA,SPACE=(CYL,(1Ø,5),RLSE)
//SYSLIB DD DSN=OS2ØØ1U.N3Ø8D.MACRO,DISP=SHR
//PLIDUMP DD SYSOUT=A
//DATAFIL DD DSN=OS2ØØ1U.N3Ø8D.COSTAC____.IT3.DATA,DISP=SHR
                                       FY
//INXFIL DD DSN=OS2ØØ1U.N3Ø8D.COSTAC____.IT3.INDEX,DISP=SHR
                                       FY
//SRCHFIL DD DSN=OS2ØØ1U.N3Ø8D.COSTAC__.IT3.SEARCH,DISP=SHR
                                       FY
//SROVFIL DD DUMMY
//SYSIN DD *
OPTION ENDMINUS 8.
.
ALLOCATE WDOP +12Ø%, WDTX +12Ø%.
     Query Statements
/*
```

entirety. (A macro is an INQUIRE command or group of commands which can be evoked by a single word.) To facilitate the generation of summary information, a set of standard reports has been developed and validated. Macros have been written to generate these summaries. Figure A-15 describes the standard displays and their associated macro call words. Any set of summary reports can be secured by submitting procedure INQUIRE with the appropriate macro call words substituted for the query. Figure A-16 provides an example which would yield three of the summary reports for the Army for fiscal 1978. Since the time required to compile the entire set of standard reports sequentially is long, it is necessary to submit several jobs, each of which requests a small number of summaries.

FIGURE A-14. FREQUENTLY USED INQUIRE PARAMETERS

Parameter	Description	Suggested Application
L=number	Indicates the number of character positions on a printed line (default L=132)	Specify only if the maximum number of characters that can be printed on a line is not equal to 132
P=number	Indicates the number of lines to be printed on each page (default P=160)	Use to adjust page length to device or to personal preference
MAINT	Specifies that maintenance queries are to be processed	Specify only if the data base is to be changed as a result of the run
NM	Prevents the accomplishment of maintenance operations	Include for all jobs except those involving data base maintenance
MACRO	Allows the use of macros in the query	Use when obtaining summary reports
TABLE=number	Controls the total space occupied by internal tables	Specify T=50K. Adjust if error messages indicate table overflow
SHR	Allows files to be used by two or more jobs simultaneously	Specify for all jobs

Detailed Report Generation

Due to the variable nature of ad hoc information needs, the user must consider each on an individual basis. The development of all such data will include:

- identifying required information
- developing display formats
- producing identified reports
- validating results.

FIGURE A-15. STANDARD SUMMARY REPORTS

MACRO CALL WORD	REPORT DESCRIPTION
ACTYCMDT(_____,_____) Service* Code, Service Name	Total Service Depot Maintenance Cost by Facility and Commodity
CONTRCST(_____,_____) Service Code, Service Name	Cost Breakdown by COCO Facility
DEPOTCST(_____,_____) Service Code, Service Name	Cost Breakdown by GOGO Depot Maintenance Facilities
FACCMDT(_____,_____) Service Code, Service Name	Total Cost by Facility and Commodity
HISYS(_____,_____,_____,_____,_____,_____,_____, Service Code, Commodity Code, System Code, Commodity Code, System Code, Commodity Code, System Code _____,_____,_____,_____,_____,_____,_____, Commodity Code, System Code, Commodity Code, System Code, Commodity Code, System Code, Commodity Code _____,_____,_____,_____,_____,_____,_____, System Code, Commodity Code, System Code, Commodity Code, System Code, Commodity Code, System Code _____) Service Name	Total Cost by Facility and Selected WPC for Designated Weapon Systems
INTERSER(_____,_____) Service Code, Service Name	Cost Breakdown by GOGO Other Facilities (Interservicing)
NONDEPOT(_____,_____) Service Code, Service Name	Cost Breakdown by GOGO Non-Depot Maintenance Facilities
PECBDGT(_____,_____) Service Code, Service Name	Funded and Unfunded Cost by Program Element Code
STATISTI(_____,_____) Service Code, Service Name	Selected Depot Performance Statistics
SYSWPC(_____,_____) Service Code, Service Name	Total Cost by Weapon System and Non-Maintenance Support Work Performance Categories
SYSWPCMS(_____,_____) Service Code, Service Name	Total Cost by Weapon System and Maintenance Support Work Performance Categories
TOTLBDGT(_____,_____) Service Code, Service Name	Funded and Unfunded Cost by Commodity

*Service Codes are: A for Army, N for Navy, and F for Air Force.

FIGURE A-16. SAMPLE STANDARD REPORT GENERATION PROGRAM

```
//INQUIRE JOB (OS2Ø,N3Ø8,15U,6Ø),_____________________,
                                  Programmer Name
// CLASS=B
/*ROUTE  PRINT LOCAL
//INQBATCH EXEC PGM=INQUIRE,REGION=22ØK,
// PARM='/NM,SM=15ØØØØ,T=5Ø,P=55,L=132,MACRO'
//REPORT DD SYSOUT=A
//SYSPRINT DD SYSOUT=A
//SORTWK DD UNIT=SYSDA,SPACE=(CYL,(1Ø,5),RLSE)
//SYSLIB DD DSN=OS2ØØ1U.N3Ø8D.MACRO,DISP=SHR
//PLIDUMP DD SYSOUT=A
//DATAFIL DD DSN=OS2ØØ1U.N3Ø8D.COSTAC78.IT3.DATA,DISP=SHR
//INXFIL DD DSN=OS2ØØ1U.N3Ø8D.COSTAC78.IT3.INDEX,DISP=SHR
//SRCHFIL DD DSN=OS2ØØ1U.N3Ø8D.COSTAC78.IT3.SEARCH,DISP=SHR
//SROVFIL DD DUMMY
//SYSIN DD *
OPTION ENDMINUS 8, NOAUTOMAC.
.
ALLOCATE WDOP +12Ø%, WDTX +12Ø%.
 &ACTYCMDT(A,ARMY)
 &CONTRCST(A,ARMY)
 &DEPOTCST(A,ARMY)
 &FACCMDT(A,ARMY)
 &INTERSER(A,ARMY)
/*
```

The data base management system responds to very specific requests and can produce only information contained in or derived from the data base. Therefore, to analyze some broad topic, the user must identify the required data items and verify that the data base contains the information necessary to generate those items. This can best be accomplished by breaking the analysis topic into a series of specific questions, identifying information needed to answer each question and isolating the subset of information that can be obtained from the data base.

Once the required information is defined, the user must develop a format in which to display it. The INQUIRE user language facilitates production of a wide variety of reports including tables, record listings and

histograms. The user should be familiar with INQUIRE's report formatting capability.

To produce the desired information, the user must formulate and execute an INQUIRE query. Query development is explained in detail in the INQUIRE User Language Tutorial. Execution is initiated by the submission of the query as part of procedure INQUIRE. Figure A-17 provides an example of a detailed report production program. Execution of this illustration would produce a breakdown of FY 78 depot maintenance costs by work performance category for high cost aircraft systems repaired at Corpus Christi Army Depot (which is identified as ARADMAC in the data).

Finally, the output of each request should be checked for completeness and accuracy. A valuable aid in assessing the completeness of an INQUIRE operation is the ITEMS RETRIEVED parameter provided at the bottom of each display. This value indicates the number of job order records that were used in developing the display. By comparing number of retrieved items with the quantity of records reported by each service, the user can be assured that all desired job orders were included in the report. In addition, a new report should be checked for consistency with known data and computational accuracy.

FIGURE A-17. SAMPLE DETAIL REPORT GENERATION PROGRAM

```
//INQUIRE JOB (OS2Ø,N3Ø8D,15U,6Ø),_____________________,
                                  Programmer Name
// CLASS=B
/*ROUTE  PRINT LOCAL
//INQBATCH EXEC PGM=INQUIRE,REGION=22ØK,
// PARM='/NM,SHR,T=5ØK,P=55,L=132,MACRO'
//REPORT DD SYSOUT=A
//SYSPRINT DD SYSOUT=A
//SORTWK DD UNIT=SYSDA,SPACE=(CYL(1Ø,5),RLSE)
//SYSLIB DD DSN=OS2ØØ1U.N3Ø8D.MACRO,DISP=SHR
//PLIDUMP DD SYSOUT=A
//DATAFIL DD DSN=OS2ØØ1U.N3Ø8D.COSTAC78,IT3.DATA,DISP=SHR
//INXFIL DD DSN=OS2ØØ1U.N3Ø8D.COSTAC78.IT3.INDEX,DISP=SHR
//SRCHFIL DD DSN-OS2ØØ1U.N3Ø8D.COSTAC78.IT3.SEARCH,DISP=SHR
//SROVFIL DD DUMMY
//SYSIN DD *
OPTION ENDMINUS 8.
.
ALLOCATE WDOP +12Ø%, WDTX +12Ø%.
FIND FACILITY=ARADMAC AND SYSTEM IS (GH,GL,GM,LD,MB,MC,RA,RB,YL,YS)
AND (WPC IS (A,B,C,D,E,F,G,H,I,J,K,L,M,N,P,Q,R,S,T) SET ROW OF A),
 DEFINE A TABLE (LABRHRS LABRCOST FMATL MATLUNF
MAINTSPT OTHRDRCT TOTLDRCT OPOVRHD G&A TOTLINDR TOTLCOST, SETB TOTAL)
B TEXT (LABRHRS LABRCOST MATL-FUND MATL-UNF MAINSPT OTHRDRCT TOTLDRCT
 OPNSOVRHD G&A TOTLINDR TOTLCOST) C TEXT (A B C D E F G H I J K L M N P
  Q R S T), COMPUTE LABRHRS (CLABRPHR
 + CLABROHR + MLABRPHR + MLABROHR) LABRCOST (CLABRP + CLABRO + MLABRP
 + MLABRO) MATLUNF (UMATLII + UMATLXC + UMATLMK + UMATLXP) MAINTSPT
(FMAINSPT + UMAINSPT) OTHRDRCT (FOTHER + UOTHER) TOTLDRCT (LABRCOST
 + FMATL + MATLUNF + MAINTSPT + OTHRDRCT) OPOVRHD (FOVRHD
+ UOVRHD) G&A (FG&A + UG&A) TOTLINDR (OPOVRHD + G&A), TAB,
 TITLE B R/A, BREAK ON SYSTEM 'COST BREAKDOWN BY WPC FOR SYSTEM '
 SYSTEM SKIP C TOTAL OF A 6 * (I 9) SKIP 2,
TOTAL 'TOTAL' SKIP C A (I 9).
/*
```

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER

2. GOVT ACCESSION NO. AD-A083979

3. RECIPIENT'S CATALOG NUMBER

4. TITLE (and Subtitle)

(6) DEPOT MAINTENANCE PERFORMANCE (14)

5. TYPE OF REPORT & PERIOD COVERED

6. PERFORMING ORG. REPORT NUMBER LMI-[redacted] ML914

7. AUTHOR(s)

(10) E. A. Narragon
D. M. Kennelly

8. CONTRACT OR GRANT NUMBER(s) (15) MDA903-77-C-0370

9. PERFORMING ORGANIZATION NAME AND ADDRESS

Logistics Management Institute
4701 Sangamore Road
Washington, D.C. 20016

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS

11. CONTROLLING OFFICE NAME AND ADDRESS

(11) Assistant Secretary of Defense
(Manpower, Reserve Affairs, and Logistics)

12. REPORT DATE November 1979

13. NUMBER OF PAGES 45

14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)

(12) 49

15. SECURITY CLASS. (of this report) Unclassified

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

"A" Approved for Public Release: Distribution Unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Depot Maintenance, Depot Maintenance Cost, Depot Maintenance Performance, Cost Accounting, Management Information Systems, Depot Management

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This study proposes a data processing tool for use by the Department of Defense in assessing depot maintenance cost and productivity. The capabilities required for effective DoD use of depot performance data are described along with a data processing design to provide those capabilities. The results of a sample application of the data processing system are presented and analyzed. To produce a complete depot maintenance analysis capability, the DoD should take the following actions:

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

210475 LB

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

20. ABSTRACT (Cont'd)

(1) Investigate the development of depot cost and performance data and take steps to insure uniformity;

(2) Refine the proposed depot performance system by developing additional performance indicators and more concise, useful management reports;

(3) Develop complementary data processing systems to provide depot budget and capacity data.

When these efforts are complete, an extensive analysis of depot maintenance is recommended.