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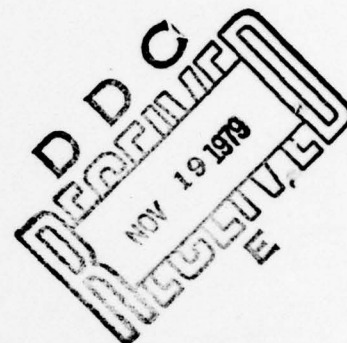
Research Memorandum 76-11

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PLANIT SUPPORT PROGRAMS-- OPERATOR/USER MANUAL

Richard F. Bergfeld, James L. Silva, Barry Seid,
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Litton Systems Incorporated



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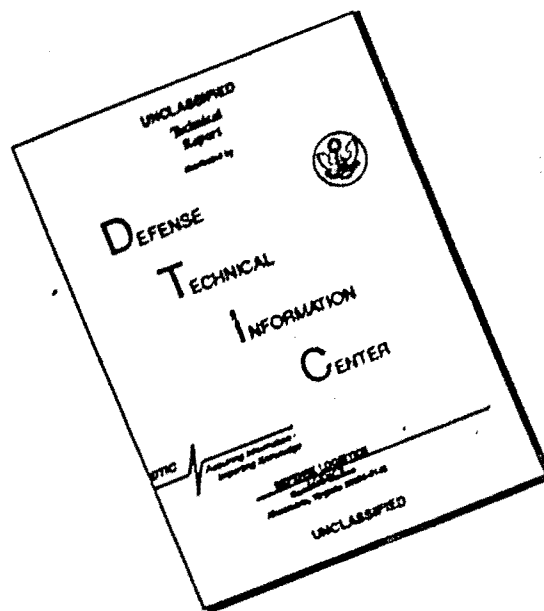
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ABSTRACT

→ This document presents the general operational information and specific procedural data for the operation and use of the PLANIT Support Programs. These programs were developed as a part of the system installation of PLANIT (Programming Language for Interactive Teaching) on the AN/GYK-12 (TACFIRE) computer. ←

Additional information on the operation and use of the AN/GYK-12 PLANIT installation is presented in the following documents:

PLANIT Utility Program Operator/User Manual

(Litton Document No. 125201-900)

PLANIT Support and Utility Programs Flow Charts

(Litton Document No. 125202-950)

PLANIT Author's Guide [SDC Document No. TM-(L)-4422/001/01]

PLANIT Language Reference Manual [SDC Document No. TM-(L)-4422/002/01]

Document Update Information for PLANIT, Version 2.0

(Northwest Regional Educational Laboratory document)

The PLANIT Support Programs were developed as a part of a Litton Systems, Inc., Data Systems Division (DSD), contract with the U. S. Army Research Institute for the Behavioral and Social Sciences (ARI). This contract (# DAHC19-74-C-0064) was awarded on 11 June 1974 as a part of an overall ARI research project which addresses the application of tactical computers to training. This contract specifically addressed the installation of the PLANIT author/student language on the U. S. Army Artillery Tactical Fire Direction System (TACFIRE) general purpose computer. This computer (AN/GYK-12) is also used in several other Army tactical computer systems.

The successful completion of this contract included the delivery and demonstration of a fully operational PLANIT system on the AN/GYK-12 computer. This project included the development of a translator and translation of PLANIT (version 2.6) from FORTRAN to TACPOL (AN/GYK-12 computer programming language). This task was accomplished under a separate ARI contract to the Northwest Regional Educational Laboratory. The Litton contract included the development of the operating system, machine input/output programs, system start and termination routines, utility support programs, and system integration and support to the installation of PLANIT on the AN/GYK-12 system.

BACKGROUND OF THE PLANIT USER TRAINING SYSTEM

Several explicit user requirements converged to generate the research which resulted in the documents contained in this set of reports. The need for some type of user training subsystem in support of tactical automatic data processing (ADP) system developments was clearly established during the evolutionary phase of the Army Tactical Operations System (TOS) development in Europe.¹ In 1974, after a decade of involvement in the development of tactical ADP systems, the Army Computer Systems Command summarized this experience into six "Lessons Learned."² One of these lessons was: A dedicated and trained user is required if tactical ADPS is to succeed.

One approach toward meeting this requirement is to apply techniques derived from modern educational technology and the computer sciences by embedding training subsystem packages within the operating system and then using the system itself to teach the user how to use the system. The approach was delineated in a concept paper,³ which was subsequently submitted, evaluated and found by key Army Personnel to have merit. As a consequence, a requirement was placed on the Army's Behavior and Systems Research Laboratory (BESRL--the predecessor of what is now the Army Research Institute) by what was then the Assistant Chief of Staff for Force Development (ACSFOR) and the Director of Army Research, Office of the Chief of Research and Development (OCRD),^{4,5} to effectuate the research necessary to test the concept.

¹Baker, J. D. "Human Factors Experimentation Within a Tactical Operations System (TOS) Environment." Proceedings: Office of Naval Research Sponsored Tri-Service Coordination Meeting, London, England, 20-21 February 1968.

²Memorandum from Headquarters, U.S. Army Computer Systems Command to Assistant Deputy Commander, CACDA, Ft. Leavenworth, KA; Deputy Commander, MASSTER, Fort Hood, TX; Project Manager, Army Tactical Data Systems, Fort Monmouth, NJ, dtd 30 January 1974, Subject: TSDG Lessons Learned.

³Memorandum from U.S. Army Behavior and Systems Research Laboratory to Assistant Chief of Staff for Force Development, dated 28 September 1971, Subject: Proficiency Maintenance Using Computer-Assisted Instruction in an Operational Setting.

⁴Memorandum from Assistant Chief of Staff for Force Development to Chief of Research and Development, dated 10 November 1971; with 18 November 1971 indorsement to Behavior and Systems Research Laboratory, Subject: Request for Research in Application of Tactical Data Systems for Training.

⁵Memorandum from Chief of Research and Development to Assistant Chief of Staff for Force Development, dated 29 Nov 1971, Subject: Request for Research in Application of Tactical Data Systems for Training.

The terms of the requirement actually levied, however, went well beyond the scope of the original concept and called for a simultaneous attack on all facets of the problem associated with testing the feasibility of the approach. In terms of broadened scope, the primary role of these systems is in support of tactical operations. Our original concept paper suggested a potential, select secondary role for these computerized tactical data systems, viz., that of directly supporting the system user by using the system itself, in a stand-alone mode, to teach the user how to use the system. The agencies structuring the research requirements saw a possible tertiary role for these systems. About the time they were structuring their requirements, the Army's Dynamic Training Board identified the maintenance of proficiency of Military Occupation Specialty (MOS) 11B40, the light weapons infantryman, as a glaring unit training problem and suggested that Computer-Assisted Instruction (CAI) as one technique for alleviating the situation.⁶ In addition, a subsequent Continental Army Command (CONARC) Task Group report on CAI identified the 11B40 MOS as a top contender for attention in the "non-technical" skills area.⁷ Consequently, the scope of the effort was expanded to encompass an examination of a tertiary role, i.e., in support of the system's parent unit by using these computers to meet individual and unit training requirements such as those associated with the 11B40 MOS. Additionally, in response to concern that the implementation of the Modern Volunteer Army concept might produce a need for general education development (GED) upgrading it was determined that an examination should be made of the feasibility of employing extant CAI GED on tactical computers in an operational setting. The assumption was made that accomplishment of these latter requirements would be tantamount to proving the feasibility of the secondary role concept as well. The test, therefore, would be a cost-effective undertaking since it would provide data directed toward answering a number of diverse questions concerned with a common training delivery system, viz., tactical computers.

Irrespective of whether it was the secondary or tertiary role concept being assessed, four major components were required: a test in a credible operational environment; appropriate hardware; functioning software and representative people-ware. The vehicle for this overall assessment was MASSTER⁸ Test FM 122, "IBCS: Automated Instruction." The hardware was a "given" viz., the Developmental Tactical Operations

⁶Report of the Board for Dynamic Training, Volume II. 17 December 1971, page 116.

⁷Headquarters, United States Continental Army Command Task Group Report and Computer Assisted Instruction. April 1972.

⁸MASSTER - Modern Army Selected Systems Test, Evaluation, and Review--is the Army's test bed for assessing equipment, concepts and doctrine. This activity is located at Fort Hood, Texas.

System (DEVLOS) which was then located at Fort Hood, Texas (Hoyt, et al⁹ provide a description of the hardware). Likewise, the people were a "given"--our student population would be MOS 11B40 personnel drawn from the 2nd Armored Division and 1st Cavalry Division located at Fort Hood. The question of what "software" approach to take (specifically, whether to use an existing student/author language) was key to the success or failure of Test 122. Clearly, the decision made at this juncture would determine whether we would hit the assigned "test window" in time to conduct the test. As a related issue, courseware development would largely depend upon the structure of the student/author language selected, so courseware development could not commence until this decision was made. The decision itself had to be correct and timely--and whatever decision was made would undoubtedly be risky.

To add to the difficulty in reaching a decision, it must be realized that it could not be made unilaterally. Conduct of a test of the complexity of MASSTER Test FM 122 required support from and coordination between a number of different agencies--key among them being mutual cooperation of the organization which had DEVLOS responsibility, the U.S. Army Computer Systems Command (USACSC), and the Army Research Institute (ARI). A Memorandum of Understanding¹⁰ was drawn up between these two organizations and, as the first USACSC task in this joint undertaking, a MASSTER Test 122 CAI Concept Paper¹¹ was to provide alternative concepts for implementing automated instruction materials on the DEVLOS in support of MASSTER Test 122. Concurrent with this effort, a contract was let by ARI with the System Development Corporation (SDC) to develop the courseware (i.e., the instructional materials which would be presented through CAI). The first task SDC had to accomplish was to provide alternative student/author language alternatives for generating the courseware and to determine which alternative provided the best likelihood of success under the test conditions and time constraints imposed. In essence, the combined results of these analytic studies were expressed as follows: "At this stage, many alternative design concepts can be formulated. However, due to time constraints on the implementation of any concept, the only alternative concept considered feasible...is the use of PLANIT."¹²

⁹Hoyt, W. G., Butler, A. K. and Bennik, F. D. "Application of Tactical Data Systems for Training: DEVLOS Feasibility Determination and Selection of an Instructional Operating System." ARI Technical Paper 267, October 1975.

¹⁰Memorandum of Understanding Between Commander, U.S. Army Research Institute and Commander, U.S. Army Computer Systems Command, Dated 5 June 1973.

¹¹Bunker-Ramo Technical Note "MASSTER Test 122--Computer Assisted Instruction (CAI) Concept Paper," February 1973, prepared for the U.S. Army Computer Systems Command.

¹²Ibid. 11, page 18.

PLANIT (Programming Language for Interactive Teaching) is an instructional system consisting of an author language and supporting computer programs for preparing, editing and presenting any subject matter suitable for individualized CAI presentation to students, as well as recording all relevant response data for immediate utilization and subsequent analyses. PLANIT was developed over an eleven year period under the aegis of the National Science Foundation (NSF) at a total investment cost of approximately \$740,000. The main goal of this NSF project was to produce a student/author language which would be fully transportable and guaranteed compatible with a large and diversified class of machines.¹³ We at ARI take professional pride in the fact that it was our early and subsequent work with PLANIT which validated this visionary transportability notion of NSF.¹⁴ We also take "economic" pride in the fact that we capitalized upon an already "hefty" U.S. Government investment to solve a problem, rather than slipping into the classic mold of "reinventing the wheel" by starting from scratch and building a separate student/author language tailored to the hardware/software system constraints.

To lower the curtain on MASSTER Test FM 122, the test was successfully conducted and demonstrated that it was feasible to use tactical computers in a stand-alone training mode to satisfy individual and unit training requirements. It was found that automated instruction in a field setting was enthusiastically accepted by the non-commissioned officers (NCO's) examined and, as a training medium, it proved to be more effective than the traditional study-method of training.^{15,16,17,18,19}

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- ¹³Frye, C. H. "A Report on PLANIT: One Stage of Completion," Final Report for the National Science Foundation Grant No. EPP73-07319 A04, August 1975.
 - ¹⁴For a complete account of the experiences of ARI in installing, using and evaluating PLANIT in an Army setting, including all the "warts and blemishes" uncovered during this endeavor, see: Johnson, C. "Implementation of PLANIT at the U.S. Army Research Institute for the Behavioral and Social Sciences," PLANIT Newsletter, July 1975.
 - ¹⁵Hoyt, W. G. and Baker, J. D. The use of tactical computers to provide weapons and tactics training to combat NCO's: Results of a field test. Proceedings: Sixteenth Annual Conference of the Military Testing Association MTA, U.S. Coast Guard Institute, Oklahoma City, OK. 21-25 October 1974.
 - ¹⁶Hoyt, W. G., Butler, A. K. and Bennik, F. D. Application of tactical data systems for training: Volume II - CAI/DEVLOS automation studies. ARI Technical Paper 267, October 1975.
 - ¹⁷Hoyt, W. G., Butler, A. K. and Bennik, F. D. Application of tactical data systems for training: Volume I - Executive Summary. ARI Technical Paper ___, in preparation.

But the results of this test proved more than the preceding. They also indicated that the obvious Army needs mentioned at the outset of this preface, could be met by applying this technology to a real and present problem. It also went beyond the exploratory stage and satisfied a specific Army requirement. The U.S. Army Combat Developments Command (CDC)/Systems Analysis Group (now the U.S. Army Training and Doctrine Command/Combined Arms Combat Developments Activity, or TRADOC/CACDA) had levied the following requirement²⁰ on ARI:

The Proposed Material Need for the Tactical Operations System - TOS (Unclassified title, portions of contents classified CONFIDENTIAL) states: "During system non-tactical employment the equipment shall have the capability to permit the training of user personnel without affecting the mission ready capability of the system." While the need exists, no specific data are extant which can be brought to bear on this problem. The requested research will provide data which could impact on all TOS users and result in considerable savings in training costs related to the user's need to maintain proficiency in the use of these systems.

The 122 Test data satisfied the CDC requirement. The Proposed Material Need (MN) for TOS was found to be a viable concept and that MN remains to this day as a bonafide component of the TOS program.

As previously discussed, the results from MASSTER Test FM 122 demonstrated the viability of the embedded training subsystem concept in general and that tactical data systems could be used in a tertiary role, i.e., specifically, that these systems could be used in a stand-alone mode in support of individual and unit softskills training requirements. But conceptually our main goal had always been to embed system specific training packages within the operating system itself and then to use the system to teach the user how to use the system--the earlier noted secondary role for these systems.

¹⁸Hoyt, W. G., Butler, A. K. and Bennik, F. D. Application of tactical data systems for training: Volume III - Development of courseware and analysis of results for MOS 11B40. ARI Technical Paper ___, in preparation.

¹⁹Hoyt, E. G., Butler, A. K. and Bennik, F. D. Application of tactical data systems for training: Volume IV - Development of courseware and analysis of results for GED math. ARI Technical Paper ___, in preparation.

²⁰Letter, DARB-ARB 19 July 1972, Subject: New Research Requirements for the Human Resources Research and Development Program (RCS CSCRD 70 CRI); letter response from CDCSAG-AG1, same subject as above, dated 1 September 1972.

As a follow-on to Test 122, research was initiated under the aegis of the Product Manager, Computer Training Systems (PM CTS) through HRN 75-158 (and, subsequently, HRN 76-195) which tasked ARI to address the problem of reducing the novice user's difficulties by making tactical data systems (e.g., TOS², TACFIRE, TSQ-73, etc.) more "approachable" through applications of the embedded training concept.²¹

Because of its stage of development, the fact that its basic central processing unit would serve as the core for other Army Tactical Data Systems (ARTADS) to follow, and the fact that its operator training problems appeared to be amenable to reduction through the application of automated instructional technology, TACFIRE (the Army's field artillery tactical fire control system) was chosen by the PM CTS as the test vehicle for assessing the embedded training subsystems concept. The initial and specific requirements for the TACFIRE research were delineated in HRN 76-193, "Development and Evaluation of PLANIT Based Computer Embedded Training Packages for TACFIRE" which was prepared by personnel of the U.S. Army Field Artillery School, Fort Sill, OK.

Once again we were faced with the dilemma as to whether the best decision would be to develop a tailor-made student/author language smoothly fitted to the hardware/software constraints of the TACFIRE system, or to build upon our already successfully operating PLANIT system and attempt to install it on TACFIRE. The latter approach had many merits, among them: (1) it was an author language system with which we were familiar, while a customized system would be untested, costly and would require an extensive checkout; (2) a customized authoring system would be limited to a given TACFIRE configuration, whereas PLANIT would be transportable to the family of ARTADS systems, and (3) because of PLANIT's machine independent characteristics, courseware could be prepared on commercial computers and, after content checkout, easily installed on the tactical system, whereas a customized approach would tie-up the actual tactical system during courseware preparation.

The effort to install PLANIT on the AN/GYK-12 computer, the results of which are contained in this set of reports, was independently undertaken as Technology Based - Exploratory Development research and not as Advanced Development activity (i.e., it was not done in direct response to an explicit, stated user need). It serves as a classic example of what Dr. Malcolm R. Currie, Director of Defense Research and Engineering (DDR&E) was describing in the following statement to the Second Session of the 94th Congress: "The objective of the Technology Base is the advancement of technology applicable to future systems and subsystem

²¹Human Resource Need (HRN) 75-158, title: "User Training and Proficiency Maintenance in a Tactical Data Systems Environment," submitted as a research requirement for inclusion in the ARI FY 75 Advanced Development Work Program by the Product Manager, Computerized Training System, Fort Monmouth, NJ. HRN 76-195 was a revalidation of the requirements delineated in 75-158 for inclusion in the FY 76 Work Program.

options. These options (or new ideas) usually involve enhanced military capability, reduced cost, increased performance, better reliability and maintainability, more efficient use of resources or some combination of these attributes." Success in this effort would produce a broadly applicable, cost-effective vehicle for employing embedded training subsystem packages in a variety of military system settings.

It merits comment, however, that while this work was a Technology Based-Exploratory Effort, it had the potential for feeding into the Advanced Development program efforts associated with the user tasks presented in HRN 75-158, "User Training and Proficiency Maintenance in a Tactical Data Systems Environment," if the outcome were successful. Consequently, the PM-CTS was appraised of this effort at the outset and he, in turn, coordinated it with the Program Manager, Army Tactical Data Systems (PM ARTADS). During this coordination some valid points of criticism were raised²² concerning the PLANIT approach. The PM ARTADS recommended that ARI meet with system developers, users and training agencies as soon as sufficient data were available to determine whether, or not, PLANIT would operate on TACFIRE. At that time a determination would be made concerning implementation implications and to assess if, indeed, this were the most effective approach to take, given the potential for impact on TACFIRE system development efforts. In keeping with this recommendation, a Workshop was convened at ARI in Arlington, VA on 1 October 1974 and these items were covered in detail with personnel from all of the suggested groups in attendance. The interaction was found to be most beneficial to all concerned and the consensus of the group was to install the system described in this set of reports on the TACFIRE system at Fort Sill, OK, and to use it as the test vehicle for assessing the embedded training concept on that ARTADS system.

This historic overview of the events leading up to the production of the set of quite specialized reports may seem untoward in view of the projected, limited set of users of these documents. It is, however, a quite meaningful forum for discussing these events. Too frequently the question is raised as to how did a particular research product originate and was it utilized. The intent here is to show that the warp and woof of concepts and coordination, requirements and research are so intertwined that a simple one-to-one relationship (one response, one use) does not tell the story--only a view of the whole cloth will put it into proper perspective. Additionally, it exemplifies a point made in the previously cited presentation by the Director of Defense Research and Engineering to the 94th Congress when he said: "To deploy systems DOD must not only pursue advanced technology but must endure the long years of research required to bring an idea through growth problems to a finished, proven and useful end product."

²²Memorandum from Product Manager, Computer Training Systems (PM-CTS) to Program Manager, Army Tactical Data Systems (PM-ARTADS) 28 Jan 74, Subject: HRN 75-158 and 1st indorsement from PM-ARTADS to PM-CTS, same subject as above dated 7 February 74.

This set of reports provides detailed instructions for implementation and operation of PLANIT and auxiliary programs on the AN/GYK-12 computer. The set consists of a report on:

- o TRANSL - The PLANIT Translator Program: Installation and Application
- o PLANIT Support Programs - Operator/user manual
- o PLANIT Utility Program - Operator/user manual
- o PLANIT Support and Utility Programs - Test Procedure
- o PLANIT Support and Utility Programs - Flow Charts.

The first report contains the information for installing and operating a program which is designed to translate the FORTRAN from the PLANIT system of programs into the TACPOL language for compilation on the AN/GYK-12 computer. The second covers the general and specific aspects of leading and operating PLANIT on the AN/GYK-12 computer. The third document covers the general and specific aspects of operating the PLANIT utility programs which are a specialized group of routines developed to accomplish various tasks in support of the AN/GYK-12 computer installation of PLANIT. The fourth report covers the procedures used to verify that PLANIT Support and Utility Programs are functioning as per specifications. The fifth document provides the detailed flow charts of the computer logic of the PLANIT Support and Utility Programs.

The effort detailed in the first report (i.e., TRANSL) was accomplished under ARI Contract DAHC19-74-C-0038 by the Northwest Regional Educational Laboratory, Portland, Oregon. The other four reports in the series were prepared by the Data Systems Division, Litten Systems Inc., Van Nuys, CA under ARI Contract No. DAHC19-74-C-0064.

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SECTION 1
INTRODUCTION

1.1 Scope

This manual covers the general and specific aspects of using and operating the PLANIT Support Programs. These programs are a part of the overall AN/GYK-12 computer PLANIT installation and provide the required equipment and operator interface routines to interface PLANIT with the AN/GYK-12 computer and related peripheral devices and user terminals.

1.2 Manual Organization

This manual has been organized in procedural/sequence of operations scenario format as an aid to understanding the use and operation of the PLANIT Support Programs. The sections of the manual have been ordered in the same sequence that a user would normally encounter the individual program modules, procedures and operational sequences. The information covered in each section is briefly summarized below:

- a. Section 1: This section provides general and background information related to the overall AN/GYK-12 PLANIT system installation.
- b. Section 2: POS/RAMCHECK program modules procedures and operational sequences encountered during PLANIT system initialization. This section specifically identifies the messages, error indicators and procedures to be utilized during system initialization.
- c. Section 3: START program module procedures and operational sequences encountered during PLANIT system initialization. This section specifically identifies the messages, error indications and procedures to be utilized during system initialization after the POS/RAMCHECK initialization sequences have been completed.
- d. Section 4: MIOP/TMIOP program modules procedural and operational sequences encountered during PLANIT system initialization and PLANIT operation. This section specifically identifies the messages, error indications and procedures to be utilized during system initialization and system operations involving MIOP and TMIOP.

- e. Section 5: FINAL program module procedures and operational sequences encountered during PLANIT system termination operations. This section specifically identifies the messages, error indications and procedures to be utilized during PLANIT system termination.
- f. Appendix A: Diagnose Status Codes summary. This section lists in numerical order and describes the meaning of Diagnose Status Codes (DIG Codes) output to the CPU DIG lights by the PLANIT Support Programs.
- g. Appendix B: ACC/OCC operating procedures. This section identifies the specific operator/author/student operating procedures associated with the ACC and OCC terminals.
- h. Appendix C: MIOD operating procedures. This section identifies the specific operator/author/student operating procedures associated with the MIOD terminal.
- i. Appendix D: VFMED operating procedures. This section identifies the specific operator/author/student operating procedures associated with the VFMED terminal.
- j. Appendix E: PLANIT character sets. This section summarizes the character differences between: 1.) the TACFIRE (and TOS²) ASCII and EBCDIC character sets, 2.) the ARI CDC 3300 character set, and 3.) the ARI Univac 1108 character set.
- k. Appendix F: PLANIT cards file. This section provides a listing of the cards file for the version 2.6 PLANIT system used in the AN/GYK-12 PLANIT installation.
- l. Appendix G: PLANIT map. This section provides a listing of the PLANIT map for the version 2.6 PLANIT system used in the AN/GYK-12 PLANIT installation.
- m. Appendix H: TACFIRE/TOS² equipment pictures. This section provides a set of pictures of the TACFIRE and TOS² equipment items most frequently used during operation of the AN/GYK-12 PLANIT system.
- n. Appendix I: Glossary of terms. This section provides a glossary of terms and mnemonics used throughout the PLANIT support and utility programs manuals and related documentation.

1.3 General Information

The AN GYK-12 PLANIT system installation utilizes the basic PLANIT version 2.6 generated with the AN/GYK-12 computer and system parameters and then translated from FORTRAN to TACPOL. The resulting nine program modules (PLANIT MAIN and PLAN1 through PLAN8 overlays) are compiled along with the PLANIT Support Programs (described in this manual) and integrated into the object and load tapes using the PLANIT Utility Program (PUP). All compilations were performed using the TACFIRE PSSB Compiler (version 3.4). In addition to this manual and the individual program listings, detailed information on the operation and use of the AN/GYK-12 PLANIT System can be found in the following documents:

PLANIT Utility Program Operator/User Manual

(Litton Document No. 125201-900)

PLANIT Support and Utility Programs Flow Charts

(Litton Document No. 125202-950)

PLANIT Author's Guide [SDC Document No. TM-(L)-4422/001/01]

PLANIT Language Reference Manual [SDC Document No. TM-(L)-4422/002/01]

Document Update Information for PLANIT, Version 2.0

(Northwest Regional Educational Laboratory document)

The PLANIT Utility Program (PUP) Operator/User Manual provides a detailed description of the procedures and operational sequences for use of the PUP routines for such support tasks as preparation of PLANIT load tapes or cartridges, field history/lesson tapes and cartridges, object library updates, and processing of PLANIT translation tapes.

The PLANIT Support and Utility Programs Flow Charts document provides an overview of the AN GYK-12 PLANIT System functional interfaces and the detailed flow charts of the support programs and utility routines.

The PLANIT Author's Guide, Language Reference Manual and Document Update Information provide the information required for the application and use of PLANIT itself. In addition, supplementary information on the AN/GYK-12 PLANIT is provided in Appendix F (character set), Appendix G (PLANIT cards file), and Appendix H (PLANIT map) of this manual.

1.4 Special Considerations

The basic (commercial computer) PLANIT system is written in a meta FORTRAN and uses the floating point, trig functions and other special features of the FORTRAN language. The AN/GYK-12 computer and its TACPOL language uses fixed point arithmetic and display buffers of 520 terminal output characters. The translation of PLANIT from FORTRAN to TACPOL results in certain special considerations in the operation and use of the AN/GYK-12 PLANIT system. These special considerations are described below:

- a. The display format is 72 characters per line (plus carriage return/line feed) by 7 lines. The top line is used for special MIOP messages or is blank for entering answers. Thus a single PLANIT display output segment is 6 lines (up to 72 characters per line). This is a fixed (non-scrolling) display output, i. e., a frame of 21 output lines of data in PLANIT will result in 3 display outputs of 6 lines followed by a display output of 3 lines (plus a top blank line for response if applicable).
- b. The PLANIT/MIOP display buffer is 520 terminal output characters in the current implementation. For display outputs of greater than 520 terminal output characters (such as printing a large segment of a lesson to the display). The output will result in a splitting of a line (partial line printed followed by rest of line printed on next line of the display) after each 520 terminal output character increment. This does not affect the output to other peripheral devices such as the card reader or punch, printer, tape units, etc.
- c. 62,15 [DCL X (62,15)] notation was used in the majority of the cases of conversion from the FORTRAN floating point arithmetic to the TACPOL fixed point arithmetic (scientific notation was used in some instances). The selection of 62,15 results in up to four (4) decimal place numbers.
- d. The 62,15 notation and the single word precision used in the TACPOL library functions (such as SQRT, LOG, LN, etc.) results in a limitation to a maximum value of 2^{15} for input to these functions.
- e. Since TACPOL does not include fractional exponentation, only integer powers may be used. The base number may be fractional (e. g., $(3.1416)^5$).

- f. The limitation of 4 place (decimal) numbers, e. g., XX.XXXX, in the current implementation restricts the use and decimal accuracy of CALC statements and answers. Certain combinations of math statements may result in a degree of error in the decimal portion of the resulting answer. For example, XX.XXX times YY.YY implies five place accuracy in the calculation and will result in a degree of error in the resulting decimal portion of the answer. On the other hand XX.XXX times YY.Y implies four place accuracy and will yield a correct answer. Similarly certain functions such as SQRT (square root) may yield a degree of error in the decimal portion of the answer. Integer arithmetic is not affected by this limitation.

This does imply the need to use the WITHIN expression for answer matching within lessons in cases where the decimal portion of the answer may be affected by this limitation in the current implementation.

SECTION 2

POS/RAMCHECK PROCEDURES/SEQUENCE OF OPERATIONS

This section describes the procedures, sequence of operations, messages and error indications during loading of the POS and RAMCHECK modules and the POS initialization process. The description and procedures are repeated for each of the current AN/GYK-12 system configurations as follows:

- Subsection 2.1 - TACFIRE Field Configurations
(Division or Battalion)
- Subsection 2.2 - TOS² Field Configurations
(Division or Brigade)
- Subsection 2.3 - TACFIRE PSSB Configurations
(Division or Battalion)
- Subsection 2.4 - TOS² SSS Configurations
(Division or Brigade)

Descriptions and operator actions are included for the DIAGNOSE STATUS (DIG) Codes which may occur during each procedure/sequence of operations. A summary of all DIG Codes and their meaning is included in Appendix A.

Subsection 2.5 describes the meanings of the TEST SWITCH settings during system loading so that a user can determine the TEST SWITCH setting to be used if loading on other than the standard configuration TACFIRE or TOS² system.

Subsection 2.6 describes the meanings of the TEST SWITCH settings after system loading which in conjunction with the COMPUTER RESTART pushbutton allow the TAPE, CARD and PRINTER devices to be changed from the field devices to the PSS/SSS devices and vica versa. This allows a PSS/SSS center to more easily prepare tapes for field use.

2.1 PLANIT SYSTEM SET-UP AND LOADING PROCEDURE FOR TACFIRE FIELD CONFIGURATION

- A. Set ACC ADDRESS Switches on the IOU to the ACC switch assembly device address (25).
- B. Set the DATA EXCHANGE CHANNEL SELECT switches (IOU Maintenance and Status Panel) A, B and C = 1, 2 and 3 respectively.
- C* Insure a minimum of two drums on-line (one drum can be used with load/history tape with a modified " cards file" file allocation).
- D. Set all 8K Memory Banks to off-line.
- E. Set MCMU BANK ADDRESS switches = 00 (if more than one; 00, 01, 02, etc.)
- F. Mount PLANIT LOAD MLU on ARMM1.
- G. Set TEST Switches on IOU Maintenance and Status Panel = 00, 20 if 192 track drums. See 2.5 for non-standard configuration.
- H. Depress CHANNEL 11 Program Load Switch on the IOU Maintenance and System Panel. This action will bootstrap load the PLANIT Operating System. If the loading operation is successful, the DIAGNOSE STATUS Lights will display 777201 and System Initialization will begin.
- I. During the execution of the System Initialization Phase, certain errors may occur which will display any of the following DIAGNOSE STATUS Codes. The appropriate operator action for each code is indicated.

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
776300	Rewind system tape and return to step H.
776301	Rewind system tape and return to step H.
776302	Rewind system tape and return to step H.
776303	Check setting of ACC Switches (step A), rewind system tape and return to step H.
776304	Check setting of TEST switches (step G), rewind system tape and return to step H.
776310	Check ACC Switch setting (step A), rewind system tape and return to step H.

* This step is omitted if the system's Memory Configuration consists of three or more MCMUs.

DIAGNOSE CODEOPERATOR ACTION

771700

Rewind system tape and return to step A.

J. The PRIORITY MESSAGE Light on the ACC Switch Assembly should be illuminated within 5 seconds following step I. If it is not, depress the LAMP TEST Switch on the Switch Assembly. If the light is inoperative, replace and continue with step K. If the lamp is operating, check the DIAGNOSE STATUS Display for one of the codes listed in step I.

K. Depress the ACC PRIORITY MESSAGE Switch.

L. The light associated with the PRIORITY MESSAGE Switch is extinguished and a listing of all peripheral devices and their device addresses will be displayed on the Compose/Edit Display as follows:

CTUO/ARMM1:1/1; CTU1/ARMM2:3/6; CTU2:0/0; CTU3:0/0; RAM:1/0;
DDTAI:2/0; DDTAO:2/1; DDTEI:3/0; DDTBO:3/1; DDTCI:1/2; DDTCO:1/3;
DDTDI:2/2; DDTDO:2/3; DDTEI:1/4; DDTEO:1/5; DDTFI:1/6; DDTFO:1/7;
DDTGI:3/4; DDTGO:3/5; DDTHI:0/0; DDTHO:0/0;
ACCRD:2/6; ACCSA:2/5; ACCCED:2/4;
ELP1:3/3; ELP2:2/7; CARD READER:0/0; CARD PUNCH:0/0; H-S PRINTER:0/0;

In the absence of a display, the following DIAGNOSE STATUS Code will appear:

DIAGNOSE CODEOPERATOR ACTION

771200

Check for "POWER ON" on Compose/Edit Display Module, rewind system tape and return to step H.

M. If no device address changes are desired, go to step O.

N. Device address changes are effected as follows:

Each device address is displayed in the form of two octal digits separated by a slash (/). Activation of the tab key will position the cursor to the first digit of each address in turn. Thus positioned, either or both digits may be altered by entering the desired octal digit from the keyboard. The two digits represent the primary and secondary IOU channels assigned/cabled to the device. 0/0 designates the device is off-line or not used.

- O. After entering changes (if any), depress the CURSOR RESET Key, then depress the XMIT Key to store the device addresses displayed and to print a hard copy of the Device Address Assignments (if ELP 1 is on-line). System malfunction at this time will result in the display of one of the following DIAGNOSE STATUS Codes:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
771201	Rewind system tape and return to step H. Do not enter device address whose octal value is less than 6 or greater than 77.
771202	No operator action required.
771701	Rewind system tape and return to step H.

- P.* The second program on the system tape (RAMCHECK) will be loaded next and executed. Possible errors associated with this or subsequent program loads will result in the display of the following DIAGNOSE STATUS Codes:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
774000	Recheck step B and G. Rewind system tape and return to step H.
774005	Rewind system tape and return to step H.
776305	Recheck step G. Rewind system tape and return to step F.
776306	Rewind system tape and return to step C.

- Q.* Execution of RAMCHECK will terminate with the display of one of the following DIAGNOSE STATUS Codes:

0540XX (XX= # Drums on-line) - Drums are operational and program has advanced to step R.

056001-056020 Non-recoverable error. Rewind system tape and return to step H.

- R. The remaining programs on the system tape are now being loaded. Errors which may occur during loading and subsequent storage will be displayed as the following DIAGNOSE STATUS Codes:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
774001	Rewind system tape and return to step H.
774002	Rewind system tape and return to step H.

- * This step is omitted if the system's Memory Configuration consists of three or more MCMUs.

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
774003	Rewind system tape and return to step H.
774004	Rewind system tape and return to step H.
774005	Rewind system tape and return to step H.
774006	Rewind system tape and return to step H.

- S. Successful conclusion of step R results in the execution of the "START" program which requires prompted inputs from the ACC Terminal Keyboard. System initialization and loading has been completed.

ADDITIONAL DIAGNOSE STATUS CODES WHICH MAY APPEAR DURING PLANIT
EXECUTION ARE AS FOLLOWS:

DIAGNOSE CODE	MEANING	OPERATOR ACTION
770000	A NON-IMPLEMENTED PROGRAM LEVEL HAS BEEN REQUESTED.	DEPRESS MASTER RESET SWITCH.
7713XX	XMIT CHANNEL (LEVEL 13) ERROR ON DDT XX (XX = 0-7 FOR DDT A-H).	NONE.
7715XX	RECEIVE CHANNEL (LEVEL 15) ERROR ON DDT XX (XX = 0-7 FOR DDT A-H).	NONE
772000	RAM READ ERROR DURING OVERLAY CALL.	DEPRESS MASTER RESET SWITCH.
770100	UNABLE TO RESTART CLOCKS DURING HOT START.	RETURN TO STEP H
770200	DEVICE TIMEOUT OR PARITY ERROR DURING ITR TO MONITOR REGISTER.	DEPRESS MASTER RESET SWITCH.
77XX17	A TRAP CONDITION OCCURRED IN LEVEL XX (CAUSED BY NON- IMPLEMENTED INSTRUCTION OR ARITHMETIC OVERFLOW).	DEPRESS MASTER RESET SWITCH
776307	ALL PROGRAM LEVELS EXCEPT LEVEL 63 ARE INACTIVE OR A PERIPHERAL DEVICE WAS EXER- CISED WITHOUT PROPER PRE- PARATION OF KEY AND TERM WORDS.	DEPRESS MASTER RESET SWITCH

2.2 PLANIT SYSTEM SET-UP AND LOADING PROCEDURE FOR TOS² FIELD CONFIGURATION

- A. Set ACC ADDRESS Switches on the IOU to the OCC switch assembly device address (35).
- B. Set the DATA EXCHANGE CHANNEL SELECT switches (IOU Maintenance and Status Panel) A, B and C = 1, 2 and 3 respectively.
- C. Insure a minimum of two drums on-line.
- D. Mount PLANIT LOAD Tape on Potter Drive #1 (800 BPI tape).
- E. Set TEST Switches on IOU Maintenance and Status Panel = 11. See 2.5 for non-standard configuration.
- F. Depress CHANNEL 11 Program Load Switch on the IOU Maintenance and Status Panel. This action will bootstrap load the PLANIT Operating System. If the loading operation is successful, the DIAGNOSE STATUS Lights will display 777201 and System Initialization will begin.
- G. During the execution of the System Initialization Phase, certain errors may occur which will display any of the following DIAGNOSE STATUS Codes. The appropriate operator action for each code is indicated.

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
776300	Rewind system tape and return to step F.
776301	Rewind system tape and return to step F.
776302	Rewind system tape and return to step F.
776303	Check setting of ACC Switches (step A), rewind system tape and return to step F.
776304	Check setting of TEST switches (step E), rewind system tape and return to step F.
776310	Check ACC Switch setting (step A), rewind system tape and return to step F.
771700	Rewind system tape and return to step A.

H. The PRIORITY MESSAGE Light on the OCC Switch Assembly should be illuminated within 5 seconds following step G. If it is not, depress the LAMP TEST Switch on the Switch Assembly. If the light is inoperative, replace and continue with step I. If the lamp is operating, check the DIAGNOSE STATUS Display for one of the codes listed in step G.

I. Depress the OCC PRIORITY MESSAGE Switch.

J. The light associated with the PRIORITY MESSAGE Switch is extinguished and a listing of all peripheral devices and their device addresses will be displayed on the Compose/Edit Display as follows:

CTUO/ARMM1:1/1; CTU1/ARMM2:1/1; CTU2:1/1; CTU3:1/1; RAM:1/0;
DDTAI:2/0; DDTAO:2/1; DDTBI:2/2; DDTBO:2/3; DDTCI:2/4; DDTCO:2/5;
DDTDI:2/6; DDTDO:2/7; DDTEI:1/4; DDTEO:1/5; DDTFI:1/6; DDTFO:1/7;
DDTGI:1/2; DDTGO:1/3; DDTHI:3/0; DDTHO:3/1;
ACCRD:3/6; ACCSA:3/5; ACCCED:3/4;
ELP1:3/3; ELP2:0/0; CARD READER:0/0; CARD PUNCH:0/0; H-S PRINTER:0/0;

In the absence of a display, the following DIAGNOSE STATUS Code will appear:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
771200	Check for "POWER ON" on Compose/Edit Display Module, rewind system tape and return to step F.

K. If no device address changes are desired, go to step M.

L. Device address changes are effected as follows:

Each device address is displayed in the form of two octal digits separated by a slash (/). Activation of the tab key will position the cursor to the first digit of each address in turn. Thus positioned, either or both digits may be altered by entering the desired octal digit from the key-board.

M. After entering changes (if any), depress the CURSOR RESET Key, then depress the XMIT Key to store the device addresses displayed and to print a hard copy of the Device Address Assignments (if ELP 1

is on-line). System malfunction at this time will result in the display of one of the following DIAGNOSE STATUS Codes:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
771201	Rewind system tape and return to step F. Do not enter device address whose octal value is less than 6 or greater than 77.
771202	No operator action required.
771701	Rewind system tape and return to step F.

- N. The second program on the system tape (RAMCHECK) will be loaded next and executed. Possible errors associated with this or subsequent program loads will result in the display of the following DIAGNOSE STATUS Codes:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
774000	Recheck steps B and E. Rewind system tape and return to step F.
774005	Rewind system tape and return to step F.
776305	Recheck step E. Rewind system tape and return to step F.
776306	Rewind system tape and return to step C.

- O. Execution of RAMCHECK will terminate with the display of one of the following DIAGNOSE STATUS Codes:

0540XX (XX= # Drums on-line) - Drums are operational and program has advanced to step P.

056001-056020 Non-recoverable error. Rewind system tape and return to step F.

- P. The remaining programs on the system tape are now being loaded. Errors which may occur during loading and subsequent storage will be displayed as the following DIAGNOSE STATUS Codes:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
774001	Rewind system tape and return to step F.
774002	Rewind system tape and return to step F.
774003	Rewind system tape and return to step F.

DIAGNOSE CODEOPERATOR ACTION

774004

Rewind system tape and return to step F.

774005

Rewind system tape and return to step F.

774006

Rewind system tape and return to step F.

- Q. Successful conclusion of step P results in the execution of the "START" program which requires prompted inputs from the OCC Terminal Keyboard. System initialization and loading has been completed.

ADDITIONAL DIAGNOSE STATUS CODES WHICH MAY APPEAR DURING PLANIT
EXECUTION ARE AS FOLLOWS:

DIAGNOSE CODE	MEANING	OPERATOR ACTION
770000	A NON-IMPLEMENTED PROGRAM LEVEL HAS BEEN REQUESTED.	DEPRESS MASTER RESET SWITCH.
7713XX	XMIT CHANNEL (LEVEL 13) ERROR ON DDT XX (XX = 0-7 for DDT A-H).	NONE.
7715XX	RECEIVE CHANNEL (LEVEL 15) ERROR ON DDT XX (XX = 0-7 for DDT A-H).	NONE
772000	RAM READ ERROR DURING OVERLAY CALL.	DEPRESS MASTER RESET SWITCH.
770100	UNABLE TO RESTART CLOCKS DURING HOT START.	RETURN TO STEP F.
770200	DEVICE TIMEOUT OR PARITY ERROR DURING ITR TO MONITOR REGISTER.	DEPRESS MASTER RESET SWITCH.
77XX17	A TRAP CONDITION OCCURRED IN LEVEL XX (CAUSED BY NON- IMPLEMENTED INSTRUCTION OR ARITHMETIC OVERFLOW).	DEPRESS MASTER RESET SWITCH
776307	ALL PROGRAM LEVELS EXCEPT LEVEL 63 ARE INACTIVE OR A PERIPHERAL DEVICE WAS EXER- CISED WITHOUT PROPER PRE- PARATION OF KEY AND TERM WORDS.	DEPRESS MASTER RESET SWITCH

2.3 PLANIT SYSTEM SET-UP AND LOADING PROCEDURE FOR TACFIRE PSSB CONFIGURATION

- A. Set ACC ADDRESS Switches on the IOU to the ACC switch assembly device address (25).
- B. Set the DATA EXCHANGE CHANNEL SELECT switches (IOU Maintenance and Status Panel) B and C = 1, 2 and 3 respectively.
- C.* Insure a minimum of two drums on-line.
- D. Set all 8K Memory Banks to off-line.
- E. Set MCMU BANK ADDRESS switches = 00 (if more than one; 00, 01, 02, etc.)
- F. Mount PLANIT LOAD Tape on IBM Tape Drive 0, 1, 2 or 3.
- G. Set TEST switches on IOU Maintenance Panel to one of the following values:
 - 02 if tape is mounted on Unit 0, 22 if 192 track drums.
 - 03 if tape is mounted on Unit 1, 23 if 192 track drums.
 - 04 if tape is mounted on Unit 2, 24 if 192 track drums.
 - 05 if tape is mounted on Unit 3, 25 if 192 track drums.See 2.5 for non-standard configuration.
- H. If the cards file is to be entered via the Card Reader, place cards in input hopper and start Card Reader.
- I. Set INSTRUCTION STOP and press MASTER CLEAR on Computer Test Set.
- J. Set PEBU CHANNEL SELECT switch to 1 and BSL SELECT switch to the TU0-TU3 setting which corresponds to the tape drive selected for system load.
- K. Depress the PEBU Load switch to Bootstrap Load the PLANIT Operating System from the System Tape. If the load is successful, the computer will halt and the DIAGNOSE STATUS Lights will display 777201. If the load is unsuccessful, rewind the System Tape and return to step I.

* This step is omitted if the system's Memory Configuration consists of three or more MCMUs.

- L. Set the PEBU CHANNEL SELECT switch to 7.
- M. Release the INSTRUCTION STOP Switch and press the COMPUTER START Switch. This action will start system initialization.
- N. During the execution of the System Initialization Phase, certain errors may occur which will display any of the following DIAGNOSE STATUS Codes. The appropriate operator action for each code is indicated.

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
776300	Rewind system tape and return to step I.
776301	Rewind system tape and return to step I.
776302	Rewind system tape and return to step I.
776303	Check setting of ACC Switches (step A), rewind system tape and return to step I.
776304	Check setting of TEST switches (step G), rewind system tape and return to step I.
776310	Check ACC Switch setting (step A), rewind system tape and return to step I.
771700	Rewind system tape and return to step A.

- O. The PRIORITY MESSAGE Light on the ACC Switch Assembly should be illuminated within 5 seconds following step N. If it is not, depress the LAMP TEST Switch on the Switch Assembly. If the light is inoperative, replace and continue with step P. If the lamp is operating, check the DIAGNOSE STATUS Display for one of the codes listed in step N.
- P. Depress the ACC PRIORITY MESSAGE Switch.
- Q. The light associated with the PRIORITY MESSAGE Switch is extinguished and a listing of all peripheral devices and their device addresses will be displayed on the Compose/Edit Display as follows:

CTUO/ARMM1:7/0; CTU1/ARMM2:7/1; CTU2:7/2; CTU3:7/3; RAM:1/0;
 DDTAI:2/0; DDTAO:2/1; DDTBI:3/0; DDTBO:3/1; DDTCI:1/2; DDTCO:1/3;
 DDTDI:2/2; DDTDO:2/3; DDTEI:1/4; DDTEO:1/5; DDTFI:1/6; DDTFO:1/7;
 DDTGI:3/4; DDTGO:3/5; DDTHI:3/6; DDTHO:3/7;
 ACCRD:2/6; ACCSA:2/5; ACCCED:2/4;
 ELP1:3/3; ELP2:2/7; CARD READER:7/4; CARD PUNCH:7/5; H-S PRINTER:7/6;

In the absence of a display, the following DIAGNOSE STATUS Code will appear:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
771200	Check for "POWER ON" on Compose/Edit Display Module, rewind system tape and return to step I.

R. If no device address changes are desired, go to step T.

S. Device address changes are effected as follows:

Each device address is displayed in the form of two octal digits separated by a slash (/). Activation of the tab key will position the cursor to the first digit of each address in turn. Thus positioned, either or both digits may be altered by entering the desired octal digit from the key-board.

T. After entering changes (if any), depress the CURSOR RESET Key, then depress the XMIT Key to store the device addresses displayed and to print a hard copy of the Device Address Assignments (if ELP 1 is on-line). System malfunction at this time will result in the display of one of the following DIAGNOSE STATUS Codes:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
771201	Rewind system tape and return to step I. Do not enter device address whose octal value is less than 6 or greater than 77.
771202	No operator action required.
771701	Rewind system tape and return to step I.

U. * The second program on the system tape (RAMCHECK) will be loaded next and executed. Possible errors associated with this or subsequent program loads will result in the display of the following DIAGNOSE STATUS Codes:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
774000	Recheck step B and G. Rewind system tape and return to step I.
774005	Rewind system tape and return to step I.

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
776305	Recheck step G. Rewind system tape and return to step I.
776306	Rewind system tape and return to step C.

V.* Execution of RAMCHECK will terminate with the display of one of the following DIAGNOSE STATUS Codes:

0540XX (XX= # Drums on-line) - Drums are operational and program has advanced to step W.

056001-056020 Non-recoverable error. Rewind system tape and return to step I.

W. The remaining programs on the system tape are now being loaded. Errors which may occur during loading and subsequent storage will be displayed as the following DIAGNOSE STATUS Codes:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
774001	Rewind system tape and return to step I.
774002	Rewind system tape and return to step I.
774003	Rewind system tape and return to step I.
774004	Rewind system tape and return to step I.
774005	Rewind system tape and return to step I.
774006	Rewind system tape and return to step I.

X. Successful conclusion of step W results in the execution of the "START" program which requires prompted inputs from the ACC Terminal Keyboard. System initialization and loading has been completed.

* This step is omitted if the system's Memory Configuration consists of three or more MCMUs.

ADDITIONAL DIAGNOSE STATUS CODES WHICH MAY APPEAR DURING PLANIT
EXECUTION ARE AS FOLLOWS:

DIAGNOSE CODE	MEANING	OPERATOR ACTION
770000	A NON-IMPLEMENTED PROGRAM LEVEL HAS BEEN REQUESTED.	DEPRESS MASTER RESET SWITCH.
7713XX	XMIT CHANNEL (LEVEL 13) ERROR ON DDT XX (XX = 0-7 for DDT A-H).	NONE.
7715XX	RECEIVE CHANNEL (LEVEL 15) ERROR ON DDT XX (XX = 0-7 for DDT A-H).	NONE
772000	RAM READ ERROR DURING OVERLAY CALL.	DEPRESS MASTER RESET SWITCH.
770100	UNABLE TO RESTART CLOCKS DURING HOT START.	RETURN TO STEP H
770200	DEVICE TIMEOUT OR PARITY ERROR DURING ITR TO MONITOR REGISTER.	DEPRESS MASTER RESET SWITCH.
77XX17	A TRAP CONDITION OCCURRED IN LEVEL XX (CAUSED BY NON- IMPLEMENTED INSTRUCTION OR ARITHMETIC OVERFLOW).	DEPRESS MASTER RESET SWITCH
776307	ALL PROGRAM LEVELS EXCEPT LEVEL 63 ARE INACTIVE OR A PERIPHERAL DEVICE WAS EXER- CISED WITHOUT PROPER PRE- PARATION OF KEY AND TERM WORDS.	DEPRESS MASTER RESET SWITCH

2.4 PLANIT SYSTEM SET-UP AND LOADING PROCEDURE FOR TOS² SSS CON-
FIGURATION

- A. Set ACC ADDRESS Switches on the IOU to the OCC switch assembly device address (35).
- B. Set the DATA EXCHANGE CHANNEL SELECT switches (IOU Maintenance and Status Panel) A, B and C = 1, 2 and 3 respectively.
- C. Insure a minimum of two drums on-line.
- D. Mount PLANIT LOAD Tape on IBM Tape Drive 0, 1, 2 or 3.
- E. Set TEST switches on IOU Maintenance Panel to one of the following values:
 - 12 if tape is mounted on Unit 0.
 - 13 if tape is mounted on Unit 1.
 - 14 if tape is mounted on Unit 2.
 - 15 if tape is mounted on Unit 3.See 2.5 for non-standard configuration.
- F. If the cards file is to be entered via the Card Reader, place cards in input hopper and start Card Reader.
- G. Set INSTRUCTION STOP and press MASTER CLEAR on Computer Test Set.
- H. Set PEBU CHANNEL SELECT switch to 1 and BSL SELECT switch to the TU0-TU3 setting which corresponds to the tape drive selected for system load.
- I. Depress the PEBU Load switch to Bootstrap Load the PLANIT Operating System from the System Tape. If the load is successful, the computer will halt and the DIAGNOSE STATUS Lights will display 777201. If the load is unsuccessful, rewind the System Tape and return to step G.
- J. Set the PEBU CHANNEL SELECT switch to 7.

- K. Release the INSTRUCTION STOP Switch and press the COMPUTER START Switch. This action will start system initialization.
- L. During the execution of the System Initialization Phase, certain errors may occur which will display any of the following DIAGNOSE STATUS Codes. The appropriate operator action for each code is indicated.

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
776300	Rewind system tape and return to step G.
776301	Rewind system tape and return to step G.
776302	Rewind system tape and return to step G.
776303	Check setting of ACC Switches (step A), rewind system tape and return to step G.
776304	Check setting of TEST switches (step E), rewind system tape and return to step G.
776310	Check ACC Switch setting (step A), rewind system tape and return to step G.
771700	Rewind system tape and return to step A.

- M. The PRIORITY MESSAGE Light on the OCC Switch Assembly should be illuminated within 5 seconds following step L. If it is not, depress the LAMP TEST Switch on the Switch Assembly. If the light is inoperative, replace and continue with step N. If the lamp is operating, check the DIAGNOSE STATUS Display for one of the codes listed in step L.
- N. Depress the OCC PRIORITY MESSAGE Switch
- O. The light associated with the PRIORITY MESSAGE Switch is extinguished and a listing of all peripheral devices and their device addresses will be displayed on the Compose/Edit Display as follows:

CTUO/ARMM1:7/0; CTU1/ARMM2:7/1; CTU2:7/2; CTU3:7/3; RAM 1/0;
 DDTAI:2/0; DDTAO:2/1; DDTEI:2/2; DDTBO:2/3; DDTCI:2/4; DDTCO:2/5;
 DDTDI:2/6; DDTDO:2/7; DDTEI:1/4; DDTEO:1/5; DDTFI:1/6; DDTFO:1/7;
 DDTGI:1/2; DDTGO:1/3; DDTHI:3/0; DDTHO:3/1;
 ACCRD:3/6; ACCSA:3/5; ACCCED:3/4;
 ELP1:3/3; ELP2:0/0; CARD READER:7/4; CARD PUNCH:7/5; H-S PRINTER:7/6;

In the absence of a display, the following DIAGNOSE STATUS Code will appear:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
771200	Check for "POWER ON" on Compose/Edit Display Module, rewind system tape and return to step G.

P. If no device address changes are desired, go to step R.

Q. Device address changes are effected as follows:

Each device address is displayed in the form of two octal digits separated by a slash (/). Activation of the tab key will position the cursor to the first digit of each address in turn. Thus positioned, either or both digits may be altered by entering the desired octal digit from the keyboard.

R. After entering changes (if any), depress the CURSOR RESET Key, then depress the XMIT Key to store the device addresses displayed and to print a hard copy of the Device Address Assignments (if ELPI is on-line). System malfunction at this time will result in the display of one of the following DIAGNOSE STATUS Codes:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
771201	Rewind system tape and return to step G. Do not enter device address whose octal value is less than 6 or greater than 77.
771202	No operator action required.
771701	Rewind system tape and return to step G.

S. The second program on the system tape (RAMCHECK) will be loaded next and executed. Possible errors associated with this or subsequent program loads will result in the display of the following DIAGNOSE STATUS Codes:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
774000	Recheck steps B and E. Rewind system tape and return to step G.
774005	Rewind system tape and return to step G.

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
776305	Recheck step E. Rewind system tape and return to step G.
776306	Rewind system tape and return to step C.

T. Execution of RAMCHECK will terminate with the display of one of the following DIAGNOSE STATUS Codes:

0540XX (XX= # Drums on-line) - Drums are operational and program has advanced to step U.

056001-056020 Non-recoverable error. Rewind system tape and return to step G.

U. The remaining programs on the system tape are now being loaded. Errors which may occur during loading and subsequent storage will be displayed as the following DIAGNOSE STATUS Codes:

<u>DIAGNOSE CODE</u>	<u>OPERATOR ACTION</u>
774001	Rewind system tape and return to step G.
774002	Rewind system tape and return to step G.
774003	Rewind system tape and return to step G.
774004	Rewind system tape and return to step G.
774005	Rewind system tape and return to step G.
774006	Rewind system tape and return to step G.

V. Successful conclusion of step U results in the execution of the "START" program which requires prompted inputs from the OCC Terminal Keyboard. System initialization and loading has been completed.

ADDITIONAL DIAGNOSE STATUS CODES WHICH MAY APPEAR DURING PLANIT
EXECUTION ARE AS FOLLOWS:

DIAGNOSE CODE	MEANING	OPERATOR ACTION
770000	A NON-IMPLEMENTED PROGRAM LEVEL HAS BEEN REQUESTED.	DEPRESS MASTER RESET SWITCH.
7713XX	XMIT CHANNEL (LEVEL 13) ERROR ON DDT XX (XX = 0-7 for DDT A-H).	NONE.
7715XX	RECEIVE CHANNEL (LEVEL 15) ERROR ON DDT XX (XX = 0-7 for DDT A-H).	NONE
772000	RAM READ ERROR DURING OVERLAY CALL.	DEPRESS MASTER RESET SWITCH.
770100	UNABLE TO RESTART CLOCKS DURING HOT START.	RETURN TO STEP F
770200	DEVICE TIMEOUT OR PARITY ERROR DURING ITR TO MONITOR REGISTER.	DEPRESS MASTER RESET SWITCH.
77XX17	A TRAP CONDITION OCCURRED IN LEVEL XX (CAUSED BY NON- IMPLEMENTED INSTRUCTION OR ARITHMETIC OVERFLOW).	DEPRESS MASTER RESET SWITCH
776307	ALL PROGRAM LEVELS EXCEPT LEVEL 63 ARE INACTIVE OR A PERIPHERAL DEVICE WAS EXER- CISED WITHOUT PROPER PRE- PARATION OF KEY AND TERM WORDS.	DEPRESS MASTER RESET SWITCH

Test Switch Settings During System Load

During system loading, the TEST SWITCH settings shown in Figure 2-1 will have the following effects:

- a. The loading device will be based on the right digit of the TEST SWITCH setting.
- b. The Peripheral Device Skeleton (PDS) displayed will be based on the loading device first and secondly on the "system" TEST SWITCH settings as follows:

XO	TACFIRE field PDS (loading from ARMM-1)
XI	TOS ² field PDS (loading from POTTER, drive 1)
mn	TACFIRE PSS PDS (loading from IBM unit (m = 0, 2, 4 or 6) TACFIRE system) (n = 2, 3, 4 or 5)
pq	TOS ² PSS PDS (loading from IBM unit (p = 1, 3, 5 or 7) TOS ² system) (q = 2, 3, 4 or 5)
- c. The selection of MIOD vs VFMED terminal type is based on the left digit of the TEST SWITCH setting; VFMED if 0, 2, 4 or 6; MIOD if 1, 3, 5 or 7.
- d. Operation with short (192-track) vs long (256-track) drums will be based on the left digit of the TEST SWITCH setting. Short drums if 2, 3, 6 or 7; long drums if 0, 1, 4 or 5. TEST SWITCH setting has no effect for 3 or 4 bank MCMU system.

LEFT DIGIT TEST SWITCH VALUE MEANINGS:

VALUE	SYSTEM	DRUM TRACKS
0Y	TACFIRE	256
1Y	TOS ²	256
2Y	TACFIRE	192
3Y	TOS ²	192
4Y	TACFIRE	256
5Y	TOS ²	256
6Y	TACFIRE	192
7Y	TOS ²	192

RIGHT DIGIT TEST SWITCH VALUE MEANINGS:

VALUE	LOAD DEVICE
X0	LOAD FROM ARMM-1
X1	LOAD FROM POTTER, DRIVE 1
X2	LOAD FROM IBM DRIVE 0
X3	LOAD FROM IBM DRIVE 1
X4	LOAD FROM IBM DRIVE 2
X5	LOAD FROM IBM DRIVE 3
X6	Undefined
X7	Undefined

FIGURE 2-1. TEST SWITCH Settings

Example:

To load on a TACFIRE field system with 192 track drums and a mixture of VFMED and MIOD terminals use the TEST SWITCH value of 30 during system load.

2.6

Test Switch Settings During Hot Start

Anytime after the system has been loaded and PLANIT requests "PLEASE LOG IN" the TEST SWITCH setting used in conjunction with the COMPUTER RESTART pushbutton may be used to change the TAPE, CARD and PRINTER devices from the field device assignments to the PSS/SSS device assignments or vica versa. Activating the COMPUTER RESTART will in addition cause a PLANIT HOT START and resumption of PLANIT with the "PLEASE LOG IN" message.

The right digit of the TEST SWITCH setting will have the following affect on system operation only if it has been changed since system loading:

- X0 Clears indications of CARD READER, CARD PUNCH and H-S PRINTER. Replaces four possible tape unit assignments with ARMM assignments 1/1 and 3/6.
- X1 Clears indications of CARD READER, CARD PUNCH and H-S PRINTER. Replaces four possible tape unit assignments with POTTER assignments (all 1/1).
- X2 Enters assignments for CARD READER (7/4), CARD
thru PUNCH (7/5) and H-S PRINTER (7/6). Replaces four
X7 possible tape unit assignments with IBM
Commercial assignments (7/0 thru 7/3).

SECTION 3

START MODULE PROCEDURES/SEQUENCE OF OPERATIONS

This section describes the procedures, sequence of operations, messages and error indications during the START initialization process.

After POS initialization (and RAMCHECK if applicable) the next module to be executed is the START Module. START inputs date, time and number of terminals and initializes PLANIT files on a HISTORY start.

3.1 Running Message

The first message from START will appear only on the RD screen of the ACC (OCC) and reads as follows:

+START MODULE IS RUNNING

The message is informational and requires no action.

Except as indicated, all messages will only appear on the CE screen of the ACC(OCC).

3.2 Date and Time Message

The second message from the START module requests the date and time and will appear as follows:

+
+START MODULE, ENTER DATE AND TIME
+FORMAT MODDYY,HHMM
+

Enter the date and time in the format indicated.

For example, January 12, 1975 at 6:30 P.M. would be entered as:

011275,1830

If an error is made, the following message is displayed:

+DIDNT UNDERSTAND
+START MODULE, ENTER DATE AND TIME
+FORMAT MODDYY,HHMM
+

Reenter the date and time.

3.3 Type of Start Message

The third message from START requests the type of start and will appear as follows:

```
+  
+ENTER TYPE OF START  
+COLD START FROM TAPE (TAPE)  
+COLD START FROM CARD READER (CARD)  
+HISTORY START (HISTORY)  
+
```

Enter the type of start as a single word TAPE, CARD or HISTORY. The operator actions and results of the various start types are described below:

- a. TAPE. This start type requires no specific operator action. When PLANIT starts execution it will read the CARDS FILE located at the end of the program load tape. Since this will be a PLANIT COLD START the PLANIT FILES will be empty - i.e., no lesson material and no student records.
- b. CARD. This reply will cause the system load tape to be rewound and the following message to be displayed:

+YOU MAY REMOVE TAPE FROM ARMM UNIT 0

This start type requires that a CARDS FILE deck be loaded into the card reader and that the card reader be made ready before continuing. When PLANIT starts execution, it will read the CARDS FILE in the card reader. This is also a PLANIT cold start and the PLANIT files will be empty.

- c. HISTORY. This reply will cause the system load tape to be rewound and the following message to be displayed:

+YOU MAY REMOVE TAPE FROM ARMM UNIT 0

This type of start will require that a HISTORY tape be mounted and made ready on any unit. Prior to PLANIT's execution, START will read the HISTORY tape and load the PLANIT FILES with the same data that existed at the time of the HISTORY DUMP. When PLANIT starts execution it will be given a simulated HOT START.

If an error is made the following message is displayed:

+DIDNT UNDERSTAND
+ENTER TYPE OF START
+COLD START FROM TAPE (TAPE)
+COLD START FROM CARD READER (CARD)
+HISTORY START (HISTORY)
+

Reenter the type of start.

3.4 Active Terminal Message

The next message from START requests the number of terminals to be made available to PLANIT. The first terminal is always the ACC (OCC), additional terminals are remote terminals connected to DDT A through DDT H. The message appears as follows:

+
+ENTER NUMBER OF ACTIVE TERMINALS
+(ONE DIGIT, 1 THRU 9)
+

If an error is made the following message is displayed:

+DIDNT UNDERSTAND
+ENTER NUMBER OF ACTIVE TERMINALS
+(ONE DIGIT, 1 THRU 9)
+

Reenter the number of terminals.

3.5 RAM Message

The next message from START will be output only if the system configuration includes RAMs. The message prints the number of online drums found and the number of bad tracks (in octal). The message is informational and requires no operator action. The message appears as follows:

+
+2 DRUMS ON LINE
+01 BADTRACKS (OCTAL)

If there were bad tracks, an informational report will be displayed which appears as follows:

```
+BADTRACK ALTERNATE (DRUM TRACK IN OCTAL)
+1 216      0 003
+1 220      0 004
```

The above report indicates that tracks 216 and 220 (octal) of drum 1 were bad and that tracks 3 and 4 of drum 0 were assigned as alternates.

3.6 History Tape Mount Message

A tape mount request will be displayed if the HISTORY start was selected. The message will suggest a tape unit on which to mount the HISTORY tape (IBM UNIT 0, POTTER UNIT 1 or ARMM UNIT 1) depending on the system configuration. The message appears as follows:

```
+
+PLANIT SUSPENDED, MOUNT INPUT TAPE
+ON IBM UNIT 0
+REEL IDENTITY IS HISTORY
+REPLY CANCEL OR UNIT WHEN COMPLETED (C,0,1,2,3)
+
```

The operator should verify that the tape is mounted and ready on some unit and then reply with the correct digit (0 thru 3 for IBM units, 1 thru 4 for POTTER units, 1 or 2 for ARMM units).

The next message is the header data from the HISTORY tape showing when the HISTORY tape was created; it appears as follows:

HISTORY TAPE DATE 122174 TIME 0420

The HISTORY tape will be loading after this message is displayed.

3.7 START Initialization Complete Message

The last message from START, appears on both the RD screen and on the CE screen and is as follows:

```
+
+START INITIALIZATION COMPLETE
```

No operator action is required.

If the HISTORY or TAPE mode was selected the following message will be displayed:

+YOU MAY REMOVE TAPE FROM IBM UNIT 0

The operator may remove the tape at this time.

3.8 PLANIT Log In Message

The next message to appear will be the PLANIT log in message which is as follows:

PLEASE LOG IN***

3.9 START Error Messages

Error messages from START are shown in Table 3-I. A typical error message is shown below:

+HISTORY LOAD PROBLEM
+HISTORY TAPE HEADER RECORD INVALID
+DO YOU WISH TO RETRY HISTORY LOAD (Y,N)
+

Enter a Y for yes or an N for no.

The Y response will rewind the tape and cause the following message:

+YOU MAY REMOVE TAPE FROM IBM UNIT 0

It is not necessary to remove the tape and the next message will be the tape mount message as described in 3.6.

If the N response is given the following message will be displayed:

+LOAD NEXT SYSTEM ON COMPUTER

No further operation is possible until the next system is booted into the computer.

TABLE 3-I. ERROR MESSAGES FROM START (Sheet 1 of 3)

<u>MESSAGE</u>	<u>POSSIBLE CAUSE</u>	<u>RECOMMENDED ACTION</u>
+START FAILURE, CANT OPEN TERMINAL (Note: Appears on RD screen only)	ACC turned off or failing. ACC in- correctly cabled or IOX switches incorrect.	Turn on ACC (if off) verify configuration of system. If recovery is effected, date and time will be asked for, however error message will remain on RD screen.
+SYSTEM LOAD ABORTED - NO RECOVERY +MORE THAN 64 BAD TRACKS, PLANIT CANNOT RUN +TRY RELOADING SYSTEM	Badtracks on drum(s) exceed 64	Try reloading system. Re- place drum or turn off failing drum. PLANIT re- quires one or two drums depending on PLANIT file allocation
+SYSTEM LOAD ABORTED - NO RECOVERY +FILE DID NOT OPEN +TRY RELOADING SYSTEM	Not enough RAMs or MCMUs on line and HISTORY tape from larger system.	Verify number of on-line RAMs or MCMUs and origin of history tape. Try reloading system.

TABLE 3-1. ERROR MESSAGES FROM START (Sheet 2 of 3)

<u>MESSAGE</u>	<u>POSSIBLE CAUSE</u>	<u>RECOMMENDED ACTION</u>
+HISTORY LOAD PROBLEM +MOUNT OR HISTORY TAPE NOT ACCOMPLISHED +DO YOU WISH TO RETRY HISTORY LOAD? (Y,N) +	Incorrect or no response to tape mount message.	Enter Y (yes) and respond correctly to tape mount message.
+HISTORY LOAD PROBLEM +MOUNT OF HISTORY TAPE NOT APPROVED +DO YOU WISH TO RETRY HISTORY LOAD? (Y,N) +	Incorrect response to tape mount message.	Enter Y (yes) and respond correctly to tape mount message.
+HISTORY LOAD PROBLEM +HISTORY TAPE DID NOT OPEN +DO YOU WISH TO RETRY HISTORY LOAD? (Y,N) +	No tape was mounted or tape was not mounted on correct unit.	Enter Y (yes) and respond correctly to tape mount message. Verify location of HISTORY tape.
+HISTORY LOAD PROBLEM +HISTORY TAPE HEADER RECORD INVALID +DO YOU WISH TO RETRY HISTORY LOAD? (Y,N) +	Incorrect tape was mounted or incorrect response given to tape mount message.	Enter Y (yes) and verify tape to be read in is HISTORY tape.

TABLE 3-I. ERROR MESSAGES FROM START (Sheet 3 of 3)

<u>MESSAGE</u>	<u>POSSIBLE CAUSE</u>	<u>RECOMMENDED ACTION</u>
+HISTORY LOAD PROBLEM	Tape error	Enter Y (yes) and try again. If still no good, use older history tape.
+HISTORY TAPE UNRECOVERABLE ERROR		
+DO YOU WISH TO RETRY HISTORY LOAD? (Y,N)		
+		
+HISTORY LOAD PROBLEM	RAM controller error	Enter Y (yes) and try again. If still no good use RAMFI program to verify RAM status.
+UNRECOVERABLE FILE WRITE ERROR		
+DO YOU WISH TO RETRY HISTORY LOAD? (Y,N)		

MIOP/TMIOP PROCEDURES/SEQUENCE OF OPERATIONS

This section describes the procedures, sequence of operations, messages, and error indications during MIOP/TMIOP operations.

MIOP/TMIOP messages consist of tape mount messages. PLANIT termination messages and error messages. Tape mount messages are utilized by both the START and FINAL modules as well as PLANIT.

- 4.1 Mount Input Tape Message. PLANIT operation is suspended when a tape mount request is made. A typical request will appear as follows:

```
+  
+PLANIT SUSPENDED, MOUNT INPUT TAPE  
+ON IBM UNIT 0  
+REEL IDENTITY IS TEST 001  
+REPLY CANCEL OR UNIT WHEN COMPLETED (C,0,1,2,3)  
+
```

The message "MOUNT INPUT TAPE" indicates that the tape will be read only. It is suggested that the write ring be removed before mounting. The message also suggests a unit on which to mount the tape, that unit or any free unit may be used. The next line gives the reel identity, in this case "TEST 001."

The operator should either cancel the request or mount the tape and reply with the proper digit (0 thru 3 for IBM units, 1 or 2 for ARMM units, 1 thru 4 for POTTER units).

If an error is made, one of the following will replace the top line of the mount message:

- a) +INVALID REPLY, TRY AGAIN

A reply other than C or a legal digit (0 thru 3 for IBM units; 1 thru 4 for POTTER units; 1 or 2 for ARMM units) was given. Reenter reply.

- b) +REPLY UNIT IS BUSY, TRY A DIFFERENT UNIT

The unit selected by the operator was not released by PLANIT. Reply with an unused unit.

4.1.1 Multi-Lesson Input Tape Message. The next message is used to determine if the tape is a multi-lesson tape or not. The message appears as follows:

```
+  
+PLANIT SUSPENDED, A TAPE READ REQUEST HAS BEEN MADE FOR  
+REEL nnnnnnnn LESSON pppppppp.  
+  
+IS THE NAMED LESSON PART OF A MULTI-LESSON REEL?  
+REPLY YES, NO OR CANCEL. (Y,N,C)
```

The message indicates the reel and lesson name requested for the read request. The message gives the operator the opportunity to verify the lesson name and reel against various tape inventories.

The operator should either cancel the request or reply Y or N as appropriate.

If an operator error is made the top line of the message will be replaced by the following:

```
+INVALID REPLY, TRY AGAIN.
```

A reply other than Y, N or C was given.

Re-enter reply.

If the reply is N, the tape is rewound and PLANIT will read the tape.

If the reply is Y, the tape will be automatically positioned by MIOP before PLANIT will read the tape.

4.2 Mount Card Input Tape Message. PLANIT operation is suspended when this tape mount request is made. A typical request will appear as follows:

```
+  
+PLANIT SUSPENDED, MOUNT CARD INPUT TAPE  
+ON ARMM UNIT 1  
+IDENTITY IS CARD INPUT TAPE  
+REPLY CANCEL OR UNIT WHEN COMPLETED (C,1,2)  
+
```

This message is a special case of the mount input tape message. The tape mounted must be in a special format created by the stand alone PLANIT Utility Program (PUP) or a card output tape created by this system (see 4.4).

The operator should either cancel the request or mount the requested tape on an available unit. The operator should then reply with the proper digit (0 thru 3 for IBM units, 1 thru 4 for POTTER units, 1 or 2 for ARMM units).

If an error is made one of the following will replace the top line of the mount message:

- a) +INVALID REPLY, TRY AGAIN
- b) +REPLY UNIT BUSY, TRY A DIFFERENT UNIT

See 4.1 a) and b) for a description of the errors.

4.3 Mount Write Enabled Scratch Tape Message. PLANIT operation is suspended when a tape mount request is made. A typical request will appear as follows:

```
+  
+PLANIT SUSPENDED, MOUNT WRITE ENABLED SCRATCH TAPE  
+ON IBM UNIT 0  
+REEL IDENTITY IS TEST 002  
+REPLY CANCEL OR UNIT WHEN COMPLETED (C,0,1,2,3)  
+
```

The message "MOUNT WRITE ENABLED SCRATCH TAPE" indicates that the tape will be written on. The message also suggests a unit on which

to mount the tape, that unit or any free unit may be used. The next line gives the reel identify, in this case "TEST 002."

The operator should either cancel the request or mount the tape and reply with the proper digit (0 thru 3 for IBM units, 1 thru 4 for POTTER units, 1 or 2 for ARMM units).

If an error is made one of the following will replace the top line of the mount message:

- a) +INVALID REPLY, TRY AGAIN
- b) +REPLY UNIT BUSY, TRY A DIFFERENT UNIT

See 4.1 a) and b) for a description of the errors.

4.3.1 Multi-Lesson Output Tape Message. The next message is used to determine if the tape is to be a multi-lesson tape or not. The message appears as follows:

```
+
+PLANIT SUSPENDED, A TAPE WRITE REQUEST HAS BEEN MADE FOR
+REEL nnnnnnnn LESSON pppppppp.
+
+IS THE NAMED LESSON PART OF A MULTI-LESSON REEL?
+REPLY YES, NO OR CANCEL. (Y,N,C)
```

The message indicates the reel and lesson name which will be written on the tape. The message gives the operator the opportunity to verify the lesson name and reel before continuing.

The operator should either cancel the request or reply Y or N as appropriate.

If an operator error is made the top line of the message will be replaced by the following:

+INVALID REPLY, TRY AGAIN

A reply other than Y, N or C was given.
Re-enter reply.

If the reply is N, the tape is rewound and PLANIT will write the lesson on the tape.

If the reply is Y, the next message will be displayed.

4.3.2 First Record Output Tape Message. The third message is used to determine if the lesson is to be written as the first file on the tape. The message appears as follows:

```
+  
+PLANIT SUSPENDED, A TAPE WRITE REQUEST HAS BEEN MADE FOR  
+REEL nnnnnnnn LESSON pppppppp.  
+IS THE NAMED LESSON TO BE WRITTEN  
+AS THE FIRST RECORD ON THE REEL?  
+REPLY YES, NO OR CANCEL. (Y,N,C)
```

This message gives the opportunity to add a new lesson to an existing tape (N response) or start a new tape (Y response).

The operator should either cancel the request or reply Y or N as appropriate.

If an operator error is made the top line of the display will be replaced by the following:

```
+INVALID REPLY, TRY AGAIN
```

A reply other than Y, N or C was given.
Re-enter reply.

If the reply is N, the tape is rewound and PLANIT will write the lesson on the tape.

If the reply is Y, the tape will be automatically positioned by MIOP before PLANIT writes the lesson on tape.

4.4 Mount Card Output Tape Message. PLANIT operation is suspended when this tape mount request is made. A typical request will appear as follows:

+
+PLANIT SUSPENDED, MOUNT WRITE ENABLED SCRATCH TAPE
+ON IBM UNIT 2
+MARK IDENTITY AS CARD OUTPUT TAPE
+REPLY CANCEL OR UNIT WHEN COMPLETED (C,0,1,2,3)
+

This message is a special case of the mount output tape message. The card output tape will be written in a special packed format which can only be read by the stand alone PLANIT Utility Program (PUP) or as a card input tape in this system. (see 4.2).

The operator should either cancel the request or mount a scratch tape on an available unit. The operator should then reply with the proper digit (0 thru 3 for IBM units, 1 thru 4 for POTTER units, 1 or 2 for ARMM units).

If an error is made, one of the following will replace the top line of the mount message:

- a) +INVALID REPLY, TRY AGAIN
- b) +REPLY UNIT BUSY, TRY A DIFFERENT UNIT

See 4.1 a) and b) for a description of the errors.

- 4.5 Remove Tape Message. When PLANIT is finished with a tape it will cause the following typical message to be displayed:

+YOU MAY REMOVE TAPE FROM IBM UNIT 0

The unit is now free for use and the reel or MLU may be removed and labeled as required.

- 4.6 PLANIT Termination Messages. When PLANIT terminates it will produce one of the following messages:

+PLANIT NORMAL END (In response to PLANIT
+DUMP HISTORY TAPE? (Y,N) QUIT ALL Command.)

or:

+PLANIT FATAL ERROR 000 (In response to PLANIT
+DUMP HISTORY TAPE? (Y,N) FATAL ERROR indication.)

In the case of a "FATAL ERROR" the number given is a PLANIT error number and is described in the PLANIT manual.

At this point the operator must determine whether a HISTORY TAPE should be made. As a general rule, a HISTORY TAPE should be made for the PLANIT NORMAL END condition and none should be made for the PLANIT FATAL ERROR condition.

A HISTORY TAPE preserves lesson and student record files so that system operation can be resumed with no loss of data.

The N (no) response to the "DUMP HISTORY TAPE" question will produce the following message:

+PRESS MASTER RESET TO HOT START PLANIT IF DESIRED
+OTHERWISE MOUNT NEXT SYSTEM
+FINI

As indicated the computer can be MASTER RESET which will restart PLANIT or the next system can be loaded.

The Y(yes) response to the "DUMP HISTORY TAPE" question will cause the FINAL module to be executed (see Section 5).

- 4.7 RD Screen Error Messages . Table 4-I shows the error messages which may appear on the RD screen of the ACC(OCC). The most recent error will be at the bottom of the screen and errors will move from the bottom to the top of the screen as more errors occur. The error messages appearing on the RD screen require no action and PLANIT, START on FINAL will put out specific messages requesting action should any be required.

Table 4-I. RD Screen Error Messages

ERROR ON POTTER UNIT X
ERROR ON IBM UNIT X
ERROR ON ARMM UNIT X
ERROR ON CARD READER
ERROR ON CARD PUNCH
ERROR ON SYSTEM LINE PRINTER
ERROR ON ELP1
ERROR ON TERMINAL X
ERROR ON DRUM
PAPER LOW ELP1
PAPER LOW ELP2

4.8 MIOP Error Messages and Error Correction. Table 4-II shows the error messages which may occur during MIOP tape positioning of multi-lesson tape reels. Most of the errors will cause an automatic cancellation of the request and return to PLANIT for further activity.

4.8.1 Multi-Lesson Tape Inventory. To inventory a tape, use the PLANIT request "GET TAPEINV nnnn". MIOP will detect the lesson name "TAPEINV", rewind the tape and display headers, six at a time, until a double EOF is detected. A cancel will be returned to PLANIT at the completion of the task and the tape will be rewound. Reel and lesson name checking is bypassed and no multi-lesson questions are asked.

4.8.2 Multi-Lesson Tape Error Correction. Tape correction is provided in the write mode by responding to error messages. The tape correction is limited to ending the tape or rewriting over the invalid lesson and rewriting all following lessons. Either of the following messages will be displayed when an error situation is encountered:

Message A. +
+WRITE REQUEST FOR REEL nnnnnnnn LESSON pppppppp
+REEL DOES NOT MATCH TAPE HEADER WHICH IS:
0999 FM1 ZFM1 GERMAS
+REPLY OK TO WRITE NEW LESSON, END TO END TAPE OR
+CANCEL. (OK,END,C)

Message B. +
+WRITE REQUEST FOR REEL nnnnnnnn LESSON pppppppp
+LESSON MATCHES EXISTING TAPE HEADER WHICH IS:
09999 FM1 ZFM1 GERMAS
+REPLY OK TO WRITE NEW LESSON, END TO END TAPE OR
+CANCEL. (OK,END,C)

The END response to message A or B will cause two End of File (EOF) marks to be written over the header record, ending the tape.

The OK response to message A or B will allow PLANIT to write the desired lesson over the header record.

The following examples illustrate correction of typical problems:

Example 1

To correct a reel number error where the TAPEINV display is as follows:

212	MATH1	ZMATH1	DOE
212	MATH2	ZMATH2	DOE
222	MATH3	ZMATH3	DOE
212	MATH4	ZMATH4	DOE
END OF TAPE			

- a. Position the tape manually at BOT.
- b. SAVE the correct lesson and Reel, i.e.,
"SAVE MATH3 212".
- c. Message A will be displayed, Reply "OK".
- d. When completed SAVE the next lesson on tape, i.e.,
"SAVE MATH4 212".

Example 2

To correct a lesson name error where the TAPEINV display is as follows:

100	TANKS1	ZTANKS1	DOE
100	RIVER	ZRIVER	JOE
100	TANKS3	ZTANKS3	DOE
END OF TAPE			

- a. Position the tape manually at BOT.
- b. SAVE the incorrect lesson and reel, i.e.,
"SAVE RIVER 100".
- c. Message B will be displayed, Reply "END".
Tape will be ended and rewound.
- d. SAVE the correct lessons and reel, i.e., SAVE TANKS2
100" and "SAVE TANKS3 100".

Example 3

To correct a tape on which the last lesson is not complete (end of tape encountered), and where the last part of the TAPEINV display is as follows:

...			
900	MATH50	ZMATH50	DOE
900	MATH51	ZMATH51	DOE
TAPE ERROR			

NOTE: The "TAPE ERROR" entry indicates the lesson preceeding (MATH51) was bad.

- a. Position the tape manually at BOT.
- b. SAVE the last lesson and reel, i.e., "SAVE MATH51 900".
- c. Message B will be displayed, Reply "END".

TABLE 4-II. ERROR MESSAGES FROM MIOP (Sheet 1 of 2)

<u>Message</u>	<u>Cause</u>	<u>Recommended Action</u>
+ READ REQUEST FOR REEL nnnnnnnn LESSON pppppppp + CAN NOT BE PROCESSED AT THIS TIME. + WAIT FOR COMPLETION OF PRESTORE OR PUNCH JOB(S) + AND TRY AGAIN. + REQUEST AUTOMATICALLY CANCELLED.	The Buffer used for tape positioning is allocated to a Prestore or Punch job.	Cancel or wait for completion of Prestore or punch job and try again.
+ WRITE REQUEST FOR REEL nnnnnnnn LESSON pppppppp + CAN NOT BE PROCESSED AT THIS TIME. + WAIT FOR COMPLETION OF PRESTORE OR PUNCH JOB(S) + AND TRY AGAIN. + REQUEST AUTOMATICALLY CANCELLED.	The Buffer used for tape positioning is allocated to a Prestore or Punch job.	Cancel or wait for completion of Prestore or punch job and try again.
+ READ REQUEST FOR REEL nnnnnnnn LESSON pppppppp + COULD NOT BE LOCATED. END OF TAPE + REQUEST AUTOMATICALLY CANCELLED.	The lesson tape was searched from beginning to end and the lesson name could not be located.	Verify spelling of lesson name compared to inventory of lesson tape.

TABLE 4-II. ERROR MESSAGES FROM MIOP (Sheet 2 of 2)

<u>Message</u>	<u>Cause</u>	<u>Recommended Action</u>
+ +READ REQUEST FOR REEL nnnnnnnn LESSON ppppppppp +REEL DOES NOT MATCH TAPE HEADER WHICH IS: 0999 FM1 AFM1 GERMAS + +REQUEST AUTOMATICALLY CANCELLED.	Incorrect reel was mounted or incorrect unit reply given for tape mount.	Verify lesson name and reel compared to inventory of lesson tape.
+ +WRITE REQUEST FOR REEL nnnnnnnn LESSON ppppppppp +REEL DOES NOT MATCH TAPE HEADER WHICH IS: 0999 FM1 ZFM1 GERMAS +REPLY OK TO WRITE NEW LESSON, END TO END TAPE OR +CANCEL. (OK,END,C)	Reel number in tape header does not match write request.	See Section 4.8 Tape Error Correction.
+ +WRITE REQUEST FOR REEL nnnnnnnn LESSON ppppppppp +LESSON MATCHES EXISTING TAPE HEADER WHICH IS: 0999 FM1 ZFM1 GERMAS +REPLY OK TO WRITE NEW LESSON, END TO END TAPE OR +CANCEL. (OK,END,C)	Lesson name in tape header matches write request.	See Section 4.8 Tape Error Correction.

SECTION 5

FINAL MODULE PROCEDURES/SEQUENCE OF OPERATIONS

This section describes the procedures, sequence of operations, messages and error indications during execution of the FINAL module for PLANIT system termination operations.

The FINAL module is activated by replying Y (yes) to the MIOP message "DUMP HISTORY TAPE?". The FINAL module will make a HISTORY tape by copying the contents of all PLANIT files.

5.1 Tape Mount Message

The first message to be displayed is the tape mount message. The message will suggest a tape unit on which to mount a write enabled scratch tape which will become the HISTORY tape. The unit suggested depends on the system configuration (IBM UNIT 0, POTTER UNIT 1 or ARMM UNIT 1). A typical message appears as follows:

```
+
+PLANIT SUSPENDED, MOUNT WRITE ENABLED SCRATCH TAPE
+ON IBM UNIT 0
+REEL IDENTITY IS HISTORY
+REPLY CANCEL OR UNIT WHEN COMPLETED (C,0,1,2,3)
+
```

The operator should mount a write enabled scratch on any available unit, double checking that the tape is at load point (beginning of tape) and write enabled. The operator then responds with the correct digit (0 thru 3 for IBM units, 1 thru 4 for POTTER units, 1 or 2 for ARMM units).

5.2 History Header Record Message

The next message is the HISTORY tape header record. It includes the current date and time and appears as follows:

```
+HISTORY TAPE DATE 012975 TIME 2356
```

Although the message is informational, it is suggested that the data be copied onto a stick-on-label to be affixed to the physical tape or MLU.

5.3 File Allocation Message

The next two messages are an informational table on the PLANIT files and appear as follows for a RAM system:

FILE	R SIZE	COUNT	DRUM	TRACK	SECTOR
01	000640	000005	0	001	000
02	000640	000010	0	003	004
03	000384	000010	0	009	012
04	000320	000400	0	013	004
05	001824	000050	0	138	004

FILE	R SIZE	COUNT	DRUM	TRACK	SECTOR
06	004160	000009	0	227	006
08	000064	000001	1	007	024
09	004160	000002	1	007	026
10	000160	000100	1	015	030
11	000160	000025	1	031	018

For an all MCMU system the report will appear as follows:

FILE	R SIZE	COUNT	ADDRESS
01	000640	000005	022000
02	000640	000010	0237FE
03	000384	000010	0258A0
04	000320	000400	02F990
05	001824	000050	03D000

FILE	R SIZE	COUNT	ADDRESS
06	004160	000009	06E3F0
08	000064	000001	0A33FC
09	004160	000002	0A34CC
10	000160	000100	100300
11	000160	000035	12AF30

The tables are interpreted in the following manner:

- FILE. PLANIT file number 1 thru 11 except 7 which is non-existent.
- ADDRESS. For the all MCMU system this is the core address (in hex) of the beginning of the file.
- DRUM, TRACK, SECTOR. For the RAM system this is the address in decimal of the beginning of the file.
- R SIZE. This is the size of each record in the file in 32 bit words.
- COUNT. This is the number of records in the file.

The Report is informational and no operator action is required.

5.4 Remove Tape Message

When the HISTORY tape is complete the tape will rewind and the following typical message will be output:

+YOU MAY REMOVE TAPE FROM IBM UNIT 1

The tape should be removed, labeled and the write ring removed (if not an MLU).

5.5 History Tape Complete Message

The last message from FINAL is as follows:

+HISTORY TAPE COMPLETE WITH NO ERRORS
+TRACKS USED 000305 OR MCMU WORDS 312320
+REMOVE HISTORY TAPE
+PRESS MASTER RESET TO HOTSTART PLANIT IF DESIRED
+OTHERWISE MOUNT NEXT SYSTEM
+FINI

The first variable is the number of tracks used for a TACFIRE or TOS² drum system plus the number of bad tracks. The MCMU words value for a drum system is the additional core required to replace the drums and does not include resident core storage.

The MCMU words value for an MCMU system (no drums) is the total core used for resident programs and PLANIT FILES. The tracks value is the track equivalent of the MCMU words and is not directly relateable to a drum system.

As indicated the computer can be MASTER RESET which will restart PLANIT or the next system can be loaded.

5.6 FINAL Error Messages

Error messages from FINAL are shown in Table 5-I.

TABLE 5-I. FINAL ERROR MESSAGES (Sheet 1 of 2)

<u>MESSAGE</u>	<u>POSSIBLE CAUSE</u>	<u>RECOMMENDED ACTION</u>
+CANNOT REOPEN ACC TERMINAL FOR MESSAGES (Note: Appears on RD screen only)	ACC turned off or failing. ACC incorrectly cabled or IOU switches incorrect.	Turn on ACC (if off) verify configuration of system. If recovery is effected, the error message will remain but normal operation will be possible.
+HISTORY DUMP PROBLEM +MOUNT OF HISTORY TAPE NOT ACCOMPLISHED +DO YOU WISH TO RETRY HISTORY DUMP? (Y,N) +	Incorrect or no response to tape mount message.	Enter Y (yes) and respond correctly to tape mount message.
+HISTORY DUMP PROBLEM +MOUNT OF HISTORY TAPE NOT APPROVED +DO YOU WISH TO RETRY HISTORY DUMP? (Y,N) +	Incorrect response to tape mount message	Enter Y (yes) and respond correctly to tape mount message.
+HISTORY DUMP PROBLEM +HISTORY TAPE DID NOT OPEN +DO YOU WISH TO RETRY HISTORY DUMP? (Y,N) +	No tape was mounted or tape was not mounted on correct unit.	Enter Y (yes) and respond correctly to tape mount message. Verify location of scratch tape.

TABLE 5-I. FINAL ERROR MESSAGES (Sheet 2 of 2)

<u>MESSAGE</u>	<u>POSSIBLE CAUSE</u>	<u>RECOMMENDED ACTION</u>
+HISTORY DUMP PROBLEM +HISTORY TAPE UNRECOVERABLE ERROR +DO YOU WISH TO RETRY HISTORY DUMP? (Y,N) +	Tape error	Enter Y (yes) and try again. If still no good, use a different scratch tape.
+HISTORY DUMP PROBLEM +UNRECOVERABLE DRUM READ ERROR +DO YOU WISH TO RETRY HISTORY DUMP? (Y,N) +	RAM controller error	Enter Y (yes) and try again. If still no good use RAMFI program to verify RAM status.

APPENDIX A
DIAGNOSTIC STATUS (DIG) CODES

<u>CODE</u>	<u>MEANING</u>
0540XX	RAM IS FUNCTIONAL. THERE ARE XX DRUMS ON-LINE.
056001	DEVICE TIMEOUT ON ITR FROM DRUM DURING RAMCHECK EXECUTION.
056002	INPUT PARITY ERROR ON ITR FROM DRUM DURING RAMCHECK EXECUTION.
056003	DEVICE TIMEOUT ON OFR TO DRUM DURING RAMCHECK EXECUTION.
056004	DEVICE TIMEOUT ON DEV TO DRUM DURING RAMCHECK EXECUTION.
056005	BUSY FAULT BIT SET IN ITR WORD FROM DRUM DURING RAMCHECK EXECUTION.
056006	ERROR BIT SET IN ITR WORD FROM DRUM DURING RAMCHECK EXECUTION.
056007	F&I BITS IN DRUM TERMWORD NOT SET AT CONCLUSION OF DRUM OPERATION DURING RAMCHECK EXECUTION.
056010	TRANSMISSION OR OPERATIONAL ERROR BIT SET IN DRUM TERMWORD DURING RAMCHECK EXECUTION.
056011	COMPUTER ERROR OR DRUM WRITE PARITY ERROR DURING RAMCHECK EXECUTION.
056012	DRUM READ PARITY ERROR DURING RAMCHECK EXECUTION.
056013	EOB COUNT IN TERMWORD NOT ZERO AT CONCLUSION OF DRUM OPERATION DURING RAMCHECK EXECUTION.
056014	STATUS ERROR ON ITR FROM DRUM DURING RAMCHECK EXECUTION.
056015	DRUM 0 NOT ON LINE.
056016*	DRUM WRITE DATA ERROR.
056017*	DRUM READ DATA ERROR.
056020	DRUMS NOT ASSIGNED CONSECUTIVELY.
770000	ACTIVATION OF A NON-IMPLEMENTED LEVEL HAS BEEN REQUESTED.
770100	DEVICE TIMEOUT OCCURRED WHILE ATTEMPTING TO RESTART REAL TIME CLOCKS 1 AND 2 DURING A HOT START.
770200	DEVICE TIMEOUT OR A PARITY ERROR ON ITR FROM MONITOR REGISTER DURING LEVEL 2 I/O ERROR INTERRUPT PROCESSING.
771200	ERROR OCCURRED DURING ATTEMPT TO DISPLAY I/O DEVICE ADDRESSES ON COMPOSE/EDIT SCREEN. ERROR CAUSED BY ONE OF THE FOLLOWING: 1. DEVICE TIMEOUT ON DEVICE COMMAND. 2. TRANSMISSION ERROR. 3. OPERATIONAL ERROR. 4. STATUS ERROR.
771201	AN ILLEGAL I/O DEVICE ADDRESS WAS ENTERED VIA KEYBOARD.

* RAM CONTROLLER FAILURE. READS ARE PERFORMED WITH THE IGNORE DATA INABLE BIT SET. WRITE ERRORS SHOULD NOT BE DETECTABLE.

<u>CODE</u>	<u>MEANING</u>
771202	A BUFFER OSCILLATOR MALFUNCTION OR A PARITY ERROR OCCURRED DURING THE OUTPUT OF THE DEVICE ADDRESS TABLE TO THE ELP.
7713XX	TRANSMIT CHANNEL ERROR ON DDT XX (0-7 for DDT A-H).
7715XX	RECEIVE CHANNEL ERROR ON DDT XX (0-7 for DDT A-H).
771700	DEVICE TIMEOUT OR PARITY ERROR ON ITR FROM LOCAL TERMINAL (ACC/OCC).
771701	ERROR OCCURRED DURING ATTEMPT TO READ C/E DISPLAY: 1. DEVICE TIMEOUT ON DEVICE COMMAND. 2. TRANSMISSION ERROR. 3. OPERATIONAL ERROR. 4. STATUS ERROR.
772000	ERROR WHILE LOADING OVERLAY FROM DRUM TO CORE. 1. DEVICE TIMEOUT ON ITR, OFR, OR DEVICE COMMAND TO DRUM. 2. STATUS ERROR. 3. OVERLAY LOAD NOT COMPLETED WITHIN 250 MILLISECONDS.
774000	DEVICE TIMEOUT ON OFR TO SET EOB COUNTER FOR IBM TAPE READ.
774001	PROGRAM MODULE LOADED FROM SYSTEM TAPE HAS ILLEGAL I.D. OR IS OUT OF SEQUENCE.
774002	DEVICE TIMEOUT ON DEVICE COMMAND TO WRITE OVERLAY ON DRUM.
774003	ERROR DURING ATTEMPT TO WRITE OVERLAY ON DRUM. 1. F&I BITS NOT SET. 2. EOB COUNT NOT ZERO.
774004	STATUS ERROR DURING ATTEMPT TO WRITE OVERLAY ON DRUM.
774005	ERROR READING PROGRAM MODULE FROM SYSTEM TAPES: 1. DEVICE TIMEOUT ON READ COMMAND. 2. MODULE NOT READ WITHIN 5 SECONDS. 3. END OF TAPE (ARMM OR POTTER). 4. STATUS ERROR. 5. DEVICE AND CHANNEL END BITS NOT SET WITHIN 5 SECONDS OF READ COMMAND (IBM).
774006	DEVICE TIMEOUT ON OFR OR ITR TO DRUM DURING OVERLAY STORAGE ON DRUM.
776300	DEVICE TIMEOUT ON OFR TO SET MONITOR REGISTER DURING SYSTEM INITIALIZATION.
776301	DEVICE TIMEOUT OR PARITY ERROR ON ITR TO READ ACC ADDRESS AND TEST SWITCHES DURING SYSTEM INITIALIZATION.

<u>CODE</u>	<u>MEANING</u>
776302	DEVICE TIMEOUT ON COMMAND TO START REAL TIME CLOCKS 1 AND 2.
776303	LOCAL TERMINAL (ACC/OCC) ADDRESS ENTERED VIA ACC ADDRESS SWITCHES LESS THAN OCTAL "13."
776304	TEST SWITCH SETTING FOR SELECTION OF SYSTEM TAPE DRIVE IS NOT AN ACCEPTABLE VALUE.
776305	DEVICE ADDRESS FOR SELECTED SYSTEM TAPE DRIVE = 0.
776306	DEVICE TIMEOUT ON ITR FROM DRUM DURING SYSTEM INITIALIZATION.
776307	SYSTEM INITIALIZATION (LEVEL 63) HAS BEEN ILLEGALLY ACTIVATED.
776310	DEVICE TIMEOUT ON OFR TO ILLUMINATE THE MESSAGE WAITING SWITCH (PRIORITY MESSAGE) ON THE LOCAL TERMINAL (ACC/OCC).
77XX17	OVERFLOW TRAP (ARITHMETIC OVERFLOW OR NON-IMPLEMENTED INSTRUCTION) OCCURRED IN LEVEL XX.

APPENDIX B

LOCAL TERMINAL (ACC/OCC) OPERATING PROCEDURES

1. The following sequence of steps is designed to assist the student/operator in preparing the ACC/OCC as the PLANIT Local Terminal.

A. MANDATORY REQUIREMENTS:

1. ACC/OCC POWER Switch ON.
2. Keyboard POWER Switch ON.
3. COMPOSE MODE Switch ON.
4. AUX I/O Switch OFF.

B. OPTIONAL REQUIREMENTS:

1. RD POWER Switch ON.

The RD Screen is used by PLANIT to display information which is useful but not necessary for successful terminal operation.

2. ELP1 POWER Switch ON.

All information displayed on the Compose/Edit Display will be printed via ELP1 except if ELP1 is the only printer available and is being used as a system printer for a PLANIT specified function. The unavailability of an ELP prevents execution of PLANIT listing functions and hard copies of C/E displays during execution of PLANIT system printer functions.

2. Terminal Operating Procedures.

A. TERMINAL INPUT:

Messages generated by PLANIT to be displayed on the C/E screen are transmitted to the terminal only when requested by the student/operator.

Whenever a PLANIT message is ready for transmission to the terminal, the PRIORITY MESSAGE Switch on the Switch/Assembly is illuminated to alert the student/operator. The student/operator will receive the message on the C/E Display when

he depresses the PRIORITY MESSAGE Switch. If the entire message can be displayed on one screen, the light associated with the PRIORITY MESSAGE Switch is extinguished. If the message length exceeds the display screen size the PRIORITY MESSAGE Switch light will remain lighted. Subsequent depression(s) of the PRIORITY MESSAGE Switch will display the remaining portion(s) of the message.

B. TERMINAL OUTPUT

If a message received from PLANIT requires a response from the student/operator, the top line of the C/E display will be blank to accommodate this student/operator response which is entered as follows;

1. Reset the cursor.
2. Enter the response via the keyboard (72 characters max.).
3. (Optional) Enter .EOT (␣) character.
4. Reset the cursor.
5. Depress the XMIT Switch.

Failure of the terminal to transmit is indicated by the illumination of the XMTG light and by the failure of the cursor to re-position itself beyond the end of the message. Remedial action consists of turning the COMPOSE MODE Switch OFF, then ON, then repeating steps 4 and 5 above. Repeated failures may necessitate a hot start.

C. MESSAGE REPEAT:

If the student/operator requires a re-display of the last message received depression of the CYCLE MESSAGES Switch on the Switch Assembly will initiate a retransmission of the last message display segment.

D. SUMMARY:

Excepting the keyboard entry keys, only three ACC/OCC switches are normally utilized during PLANIT Terminal Operations:

1. PRIORITY MESSAGE - press when lighted to receive PLANIT message.
2. CYCLE MESSAGES - press when repeat of last PLANIT message is desired.

3. XMIT - press when response to PLANIT message has been entered into top line of C/E display. Message length may be up to 72 characters ; messages should be (optional on ACC/OCC) followed by an EOT (␣) character.

APPENDIX C

REMOTE TERMINAL (MIOD) OPERATING PROCEDURES

1. The following sequence of steps is designed to assist the student/operator in preparing the MIOD as a PLANIT remote terminal.

A. OPERATIONAL REQUIREMENTS:

1. DDT associated with MIOD properly set up [max of one MIOD per computer DDT (A-H) channel].
2. DDT POWER Switch ON.
3. Keyboard POWER Switch ON.
4. COMPOSE MODE Switch ON.
5. AUX I/O Switch OFF.
6. ELP POWER Switch ON.
7. ELP CHANNEL SELECT Switch set to "0".

2. Terminal Operating Procedures.

A. TERMINAL INPUT:

Messages generated by PLANIT to be displayed on the C/E screen are transmitted to the terminal only when requested by the student/operator. Whenever a PLANIT message is ready for transmission to the terminal, the MESSAGE READY Switch is illuminated to alert the student/operator. The student/operator should reset the cursor and will receive the message on the C/E display when he depresses the MESSAGE READY Switch. If the message length exceeds the display screen size, the first line of the display screen will advise "PRESS ACK FOR REST OF MESSAGE". Resetting the cursor and depression of the ACK Switch will display the next portion of the message.

B. TERMINAL OUTPUT:

If a message received from PLANIT requires a response from the student/operator, the top line of the C/E display will be blank (except for 0000FJ) to accommodate the student/operator response which is entered as follows:

1. Reset the cursor.
2. Enter the communications address preamble J0000 (numeric zeros) via the keyboard.

3. Enter the response via the keyboard (67 characters max.,
4. Enter the EOT (␣) character. one line of display only).
5. Reset the cursor.
6. Depress the XMIT Switch.

Failure of the terminal to transmit is indicated by the failure of the cursor to reposition itself just beyond the EOT marker. Remedial action consists of turning the COMPOSE MODE Switch OFF, then ON, then repeating steps 5 and 6 above.

C. MESSAGE REPEAT:

If the student/operator requires a re-display of the last message received, the student/operator resets the cursor and depresses the RE-XMIT Switch which will initiate a retransmission of the last message display segment.

D. SUMMARY:

Excepting the keyboard entry keys, only four MIOD Switches are normally utilized during PLANIT terminal operations:

1. MESSAGE READY - press when lighted to receive PLANIT message.
2. RE-XMIT - press when repeat of last PLANIT message is desired.
3. ACK - press when directed to do so on C/E display.
4. XMIT - press when response to PLANIT message has been entered into top line of C/E display. Message must start with the communications address preamble (J0000 letter J, numeric zeros) followed by a message of no more than 67 characters (one line of display) followed by an EOT (␣) character.

APPENDIX D

REMOTE TERMINAL (VMED) OPERATING PROCEDURES

1. The following sequence of steps is designed to assist the student/operator in preparing the VMED as a PLANIT remote terminal.

A. OPERATIONAL REQUIREMENTS:

1. DDT associated with VMED properly set up [max of one VMED per computer DDT (A-H) channel].
2. DDT POWER Switch ON.
3. Keyboard POWER Switch ON.
4. COMPOSE MODE Switch OFF. (after Cursor Reset to top of display).
5. AUX I/O Switch OFF.
6. ELP POWER Switch ON.
7. ELP CHANNEL SELECT Switch set to "0".

2. Terminal Operating Procedures.

A. TERMINAL INPUT:

Messages generated by PLANIT to be displayed on the C/E screen are transmitted to the terminal only when requested by the student/operator. Whenever a PLANIT message is ready for transmission to the terminal, the message "OOOOTJ MESSAGE WAITING, PRESS ACK SWITCH" is printed and the MESSAGE Light is illuminated to alert the student/operator. The student/operator will receive the message on the C/E display when he resets the cursor^{*} and depresses the ACK Switch. If the message length exceeds the display screen size, the first line of the display screen will advise, "PRESS ACK FOR REST OF MESSAGE"^{*}. Resetting the cursor and depression of the ACK Switch will display the next portion of the message.

B. TERMINAL OUTPUT:

If a message received from PLANIT requires a response from the student/operator, the top line of the C/E display will be blank (except for OOOO3J) to accommodate the student/operator response which is entered as follows:

* To reset the cursor, turn COMPOSE MODE Switch on, depress CURSOR RESET, then turn COMPOSE MODE Switch off.

1. Switch COMPOSE MODE Switch to ON.
2. Reset the cursor.
3. Enter the communications address preamble J0000 (numeric zeros) via the keyboard.
4. Enter the response via the keyboard (67 characters max., one line of display only).
5. Enter the EOT (J) character.
6. Reset the cursor.
7. Depress the XMIT Switch.
8. Reset the cursor.
9. Switch COMPOSE MODE Switch to OFF.

Failure of the terminal to transmit is indicated by the failure of the cursor to reposition itself just beyond the EOT marker after XMIT (step 7 above). Remedial action consists of turning the COMPOSE MODE Switch OFF, then ON, then repeating steps 6-9 above.

C. MESSAGE REPEAT:

If the student/operator requires a re-display of the last message received the student/operator resets the cursor^{*} and depresses the RE-XMIT Switch which will initiate a retransmission of the last message display segment.

D. SUMMARY:

Excepting the keyboard entry keys, only three VFMED Switches are normally utilized during PLANIT terminal operation:

1. RE-XMIT - press when repeat of last PLANIT message is desired.
2. ACK - press when directed to do so on C/E display.
3. XMIT - press when response to PLANIT message has been entered into top line of C/E display. Message must start with the communications address preamble (J0000; letter J, numeric zeros) followed by a message of no more than 67 characters (one line of display) followed by an EOT (J) character.

* To reset the cursor, turn COMPOSE MODE Switch on, depress CURSOR RESET, then turn COMPOSE MODE Switch off.

APPENDIX E

AN/GYK-12 PLANIT SYSTEM CHARACTER SETS

Table E-I summarizes the character differences between: 1) the TACFIRE (and TOS²) AN/GYK-12 PLANIT system ASCII and EBCDIC character sets, 2) the ARI CDC 3300 character set, and 3) the ARI Univac 1108 character set.

The AN/GYK-12 PLANIT character set includes the letters A through Z zero (0) through 9 and the special characters shown in Table E-I. The AN/GYK-12 PLANIT system operates internally with the ASCII Character Set and code converts to from the EBCDIC Character Set for output to or input from the commercial card punch, card reader and the high speed printer.

In addition to the special characters shown in Table E-I, the system includes the following ASCII/EBCDIC characters:

Quote (") - EBCDIC punch 7, 8

At (@) - EBCDIC punch 4, 8

Greater than (>) - EBCDIC punch 0, 6, 8

Underscore (_)- EBCDIC punch 0, 5, 8

Unrecognized EBCDIC input characters (including ¢, see below) are code converted in the AN/GYK-12 planit system to the ASCII ACK character (⌵). Unrecognized ASCII output characters including the ASCII ACK (⌵), NAK (⊗), EOT (⌵), left bracket ([) and right bracket (]) are code converted to the EBCDIC cents character (¢); EBCDIC punch 12, 2, 8.

Table E-1

PLANIT Character Set Differences - AN/GYK-12 and ARI Commercial Systems

TACFIRE PLANIT (ASCII) CHARACTER	IBM (EBCDIC) PUNCH	029 KEY PUNCH CHARACTER	CDC PUNCH	029 KEY PUNCH CHARACTER	UNIVAC PUNCH	029 KEY PUNCH CHARACTER
Plus +	12,6,8	+	12	2	12	2
Minus -	11	-	11	-	11	-
Asterisk *	11,4,8	*	11,4,8	*	11,4,8	*
Slash /	0,1	/	0,1	/	0,1	/
Open Paren (	12,5,8	(	0,4,8	%	0,4,8	%
Close Paren)	11,5,8	)	12,4,8	<	12,4,8	<
Period .	12,3,8	.	12,3,8	.	12,3,8	.
Percent %	0,4,8	%	12,6,8	+	0,5,8	-
Equals =	6,8	=	3,8	#	3,8	#
Comma ,	0,3,8	,	0,3,8	,	0,3,8	,
Colon :	2,8	:	2,8	:	5,8	/
Semi-colon ;	11,6,8	;	5,8	/	11,6,8	;
Prime	5,8	'	4,8	@	4,8	@
Backslash \	11,7,8	¬	11,2,8	!	0,6,8	>
Blank		(Blank)		(Blank)		(Blank)
Pound Sign #	3,8	#	12,5,8	(	2,8 ⁽¹⁾	:
Ver Arrow ^	12,7,8		11,5,8	)	11,7,8	¬
Hor Arrow <	12,4,8	<	12,2,8	¢	11,6,8	;
Question Mk ?	0,7,8	?	11,7,8	¬	12,0 (multi-punch)	12 0
Dollar Sign \$	11,3,8	\$	11,3,8	\$	11,3,8	\$
Exclamation !	11,2,8	!	None	(Blank)	11,0 (multi-punch)	11 0
Ampersand &	12	&	None	(Blank)	2,8	:

(1) An ampersand is used for the Pound Sign in this system.

(2) Letters A-Z and numbers 0-9 are same in all three code sets.

APPENDIX F

PLANIT CARDS FILE

C-0123456789ABCDEFGHIJKLMNPOQRSTUVWXYZ+-*/().,;:'"~!<?>	04000200
ABCDEF8CHAJCLMNAHCRCDARWCAC	04000300
1.5 "	04000400
2.5 "	04000500
C:THE TWO CARDS ABOVE PERMIT THE ADDING OF NEW CHARACTERS	04000600
C:THAT MAY BE FOUND ON THE TERMINAL AND EQUATING THE NEW ONE	04000700
C:(2ND CARD) WITH THE OLD ONE (1ST CARD) DIRECTLY ABOVE IT. THE	04000800
C:OLD CHARACTER MUST BE FROM THE LIST ON THE FIRST CARD. THIS	04000900
C:THE " IS EQUATED TO THE " AND LOWER CASE LETTERS MAY BE ADDED	04001000
C:ON THE 2ND CARD IN A SIMILAR MANNER, EQUATING THEM WITH UPPER	04001100
C:CASE WHICH WOULD BE ADDED TO THE 1ST CARD. IF ADDITIONAL SPACE	04001200
C:IS NEEDED, REPEAT THE PAIR OF CARDS IMMEDIATELY BELOW.	04001300
C:	04001400
C:-NOTE- THE BACKSLASH CHARACTER IN THE FIRST CARD HAS BEEN	04001500
C:CHANGED TO A " TO FACILITATE TRANSPORT. IT SHOULD BE CHANGED	04001600
C:BACK AGAIN IF THAT CHARACTER IS DESIRED.	04001700
C:	04001800
IRECRD IFTN NAMES NSRCH KEEF LINKS NOCMBN PRIME PI OPERATOR ISYS	04001900
NEGPOS NMCH 4DEF ADDLOG TQUANT NOTUSED IFTST IDCHK PRICES	04002000
C:	04002100
C:THE FOLLOWING (IFTN) CARD CONTAINS THE TOTAL COUNTS	04002200
C:OF THE NUMBER OF DISK RECORDS WHICH HAVE BEEN ALLOCATED	04002300
C:TO EACH OF THE 11 DISK FILES. PLANIT WILL USE ANY OF	04002400
C:THESE BUT NO MORE. DO A COLD START AFTER ANY CHANGE.	04002500
IFTN 5 15 15 400 50 9 0 1 2 100 25	04002600
C:	04002700
C:THE CARDS BELOW MUST LIST EACH PLANIT PROCEDURE NUMBER AFTER	04002800
C:THE OVERLAY PARTITION NUMBER ON WHICH IT RESIDES. NUMBER ZERO	04002900
C:IS THE MAIN PROGRAM. UNASSIGNED PROCEDURE NUMBERS ARE IGNORED	04003000
C:EVERY THOUGH THEY HAPPEN TO BE IN THE LIST BELOW.	04003100
1# 26.27.28.29.30.31.32.33.34.35.36.37	04003200
2# 39.40.41.42.43.44.45.46.47.48.49	04003300
3# 50.51.52.53.54.55.56.57.58	04003400
4# 60.61.62.63.64.65.66.67	04003500
5# 69.70.71.72.73.74.75.76	04003600
6# 78.79.80.81	04003700
7# 83.84.85.86.87.88.89	04003800
8# 91.92.93.94.95.96.97.98	04003900
C:	04004000
C:THE ORDER OF THE FIRST FOUR CARDS MUST NOT BE CHANGED. THE	04004100
C:FIRST CARDS TO HERE HAVE SOME ORDER RELATIONSHIPS WITH THOSE	04004200
C:THAT FOLLOW AND SHOULD COME EARLY IN THE DECK. THE ORDER	04004300
C:OF THE REMAINING CARDS UP TO THE ADDLOG CARDS ARE OPTIONAL	04004400
C:(THE ADDLOG CARDS MUST IMMEDIATELY PRECEDE THE FINAL \$\$\$ CARD).	04004600
C:	04004700
OPERATOR = 1	04004800
C:A SECOND NUMBER MAY APPEAR AFTER THE OPERATOR'S NUMBER	04004900
C:WHICH WILL INITIALIZE AN AUX TERMINAL IF SO DESIRED.	04005000
NUMCH=9	04005100
C:THE ABOVE 'NUMCH' MAY BE LESS THAN THE GENERATED 'NUMCH'	04005200
C:IF DESIRED.	04005300
C:	
TQUANT=10	

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C:QUANT (QUANTUM) UNITS ARE CONSISTENT WITH THE <SEC DIV>	04005400
C:PARAMETER (NUMBER OF UNITS PER SECOND).	04005500
IDCHK(1) ST	04005600
C:THE NAME IN IDCHK(1) WILL DESIGNATE THE PREFIX OF STUDENT LOGINS.	04005700
PRICES 1.0 .033 .055 .009	04005800
C:PRICES ARE IN PENNIES FOR CPU/SEC. CONNECT SECONDS. UNIT	04005900
C:RECORD UNITS. AND DISK SPACE PER <RECSIZE> WORDS PER DAY.	04006000
C:	04006100
C:THE TSYS. NAMES AND NEGPOS ARRAYS CONTAIN ALL THE PRIMITIVE	04006200
C:NAMES OF PLANT. THESE MAY BE CHANGED IF DESIRED SO LONG AS	04006300
C:THEY REMAIN DISTINCT (WITHIN EACH ARRAY).	04006400
C:	04006500
TSYS A F I J DATE ENTRY VALUE LOOK PRESTORE PUNCH ADJLOG DELLOG OK	04006600
TSYS(14) CANCEL QUIT AUX SAVE HCT TOC DEBUG DELETE BUILD LIST	04006700
TSYS(24) SWM UNLOAD AND EXCEPT ALL EOTEXT ACCOUNT JOBS	04006800
NEGPOS(1) PJSNEG	04006900
PRIME 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53 59 61 67 71	04007000
73 79 83 89 91 97	04007100
PI=3.1416	04007200
NOCMAN 68 69 78 87 84 89 90 91 92 93 72 99 105 106 110	04007300
129 71 76 111 125 95 96	04007400
C:	04007500
C:THE FOLLOWING MDEF ENTRIES ARE SET TO (-1) TO DESIGNATE	04007600
C:THAT THE CORRESPONDING CALL AUTHOR NAMES ARE TO BE	04007700
C:INITIALIZED IN THE ALLOWED STATUS. ANY AUTHOR ENTRY BEYOND	04007800
C:THE 87TH ONE MAY BE THUS INITIALIZED.	04007900
MDEF(103) -1	04008000
MDEF(109) -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1	04008100
MDEF(125) -1	04008200
MDEF(127) -1	04008300
KREP 1 64 59 53 30 37 46 27 157 107 112 160	04008400
LINKS 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 109	04008500
LINKS(27) 26 29 0 31 32 33 34 35 36 104	04008600
LINKS(37) 38 39 40 41 42 43 44 45 0	04008700
LINKS(46) 47 48 49 50 51 52 0	04008800
LINKS(55) 56 57 58 59 0	04008900
LINKS(57) 60 61 62 63 0	04009000
LINKS(69) 65 66 67 0	04009100
LINKS(63) 0 70 73 76 69 84 80 81 82	04009200
LINKS(77) 123 126 74 87 83 75 77 74	04009300
LINKS(85) 75 79 68	04009400
LINKS(89) 87 90 91 92 93 94 95 96 98 0 127 100 101 102 105 110	04009500
LINKS(104) 109 106 108 88 104 0	04009600
LINKS(110) 0 129 117 114 103 116 125 118 119 120 121 122	04009700
LINKS(122) 115 124 85 111 86 128 99 113	04009800
LINKS(156) 0 158 159 71	04009900
LINKS(150) 0	04010000
NAMES S P O I E M A COPY EX BREAK GET SAVE OUT RESTART	04010100
NAMES(15) UNLOCK LOCK CLEAR ATTACH DISPLAY SYSTEM DIAL	04010200
NAMES(27) T NOT CANNOT	04010300
NAMES(30) FROM ALL NAME RIGHT WRONG SEEN USED	04010400
NAMES(37) YES CORRECT TRUE RIGHT OK POSITIVE PLUS ACCURATE SO	04010500
NAMES(46) NO WRONG FALSE INCORRECT NEGATIVE MINUS INACCURATE	04010600

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NAMES(53) LS LU EQ GO GR NU	04010700
NAMES(54) IF AND OR ELSE END	04010800
NAMES(64) F R C B	04010900
NAMES(68) CHANGE SPT TO PRINT DROP ROUND TEMP FINISHED ALIGN	04011000
NAMES(77) FOR MATRIX NORMAL ARRAY READY RETURN SUM PROD	04011100
NAMES(85) FUNCTION RANDOM ASSIGN	04011200
NAMES(88) KEYWORD PHONETIC FORMULAS EQUATE TRACE	04011300
NAMES(93) RELATED WAIT RECYCLE TEXT	04011400
NAMES(98) WITHIN STATUS TIME FRAME RESPONSE REVIEW MINUTES ALLOW	04011500
NAMES(106) PROHIBIT GOTO REEL CALC	04011600
NAMES(110) HELP BANK SORT COMB FACT LOG LN SIN COS TAN	04011700
NAMES(120) COT SEC CSC ABSOLUTE TRUNCATE INVERT	04011800
NAMES(126) PI USE REPLY SORT	04011900
NAMES(157) ON OFF ALL LINK	04012000
NSRCH 13 45 51 52 53 55 58 59 65 66 67 70	04012100
NSRCH(15) 0 0 0 0 0 10 9 12 11 13 14 15 22 23 25 16 17 18 19 20 0 0	04012200
NSRCH(35) 0 9 17 18 19 22 23 -11 20 25 -10 -12 -13 -14 -15 16	04012300
NSRCH(51) 0	04012400
NSRCH(52) 24	04012500
NSRCH(53) 24 25	04012600
NSRCH(55) 1 16 25	04012700
NSRCH(58) 25	04012800
NSRCH(59) 24 2 3 4 5 25	04012900
NSRCH(65) 2	04013000
NSRCH(66) 8	04013100
NSRCH(67) 6 7 8	04013200
1.1 ENTER CALC LINE.	04013300
2.2 (P)(D)(I)(J)(P)(D)(M)(D.)	04013400
3.3 NO DISK. BACKGROUND HALTED.	04013500
126.268 = ?	04013600
149.147 (M.*	04013700
10.1 DONE	04013800
11.1 GONE	04013900
12.1 IN	04014000
13.1 WILL DO	04014100
60.274 ENTER COMMAND	04014200
67.244 J/M/J/P	04014300
68.68(10) DONE	04014400
69.69 FRAME	
70.262 LABEL=*	04014600
75.245 G2. STATEMENTS	04014700
78.246 G2. CRITERIA	04014800
81.249 G2. TEXT	04014900
82.250 G3. ANSWERS	04015000
83.252 G4. ACTIONS	04015100
84.249(81)	04015200
85.250(82)	04015300
86.252(83)	04015400
101.259 /MATCH/	04015500
102.260 OK? (Y/N)	04015600
103.261 /FRM777/	04015700
104.104 AT FRAME	04015800
105.105 . GROUP	04015900

106.106 . LINE	04016000
112.112 READY.	04016100
120.267 ENTER SYSTEM COMMAND.	04016200
122.122 TO: \$	04016300
125.4 *10**	04016400
128.128 DEBUG MODE.	04016500
132.132 BREAK AT	04016600
135.135 **STUDENT**	04016700
136.136 FUNCTIONS**	04016800
137.137 MATRICES**	04016900
138.138 IYF4S**	04017000
139.139 **LESSON**	04017100
150.150 ENTER YOUR ANSWER	04017200
152.152 CORRECT	04017300
153.153 FINE	04017400
154.154 GOOD	04017500
155.155 OK	04017600
156.156 RIGHT	04017700
157.157 TRUE	04017800
158.158 VERY GOOD	04017900
159.159 YES	04018000
162.162 FALSE	04018100
163.163 INCORRECT	04018200
164.164 NO	04018300
165.165 NOT SO	04018400
166.166 NOT TRUE	04018500
167.167 WRONG	04018600
169.169 WRONG TRY AGAIN	04018700
170.170 NUMERIC ANSWER PLEASE	04018800
206	04018900
14.228 SYNONYMS HAVE BEEN DROPPED	04019000
15.229 CAN'T USE THIS NAME WITH ALLOW OR PROHIBIT	04019100
16.230 UNRECOGNIZED	04019200
17.231 NAME IS AUTHOR PROTECTED	04019300
18.232 ILLEGAL EXPONENTIATION	04019400
19.232 LINE CONTINUATION NOT PERMITTED	
20.233 ILLEGAL DIVISION BY ZERO	04019600
21.233 ILLEGAL COMBINATORIAL	04019700
22.233 ILLEGAL USE OF LOGS	04019800
23.233 ILLEGAL NEGATIVE SQUARE ROOT	04019900
24.233 ILLEGAL USE OF TRIG FUNCTION	04020000
25.233 FACTORIAL LIMITS EXCEEDED	04020100
26.233 ILLEGAL CHARACTER ON LINE	04020200
27.233 ILLEGAL DECIMAL POINT IN NUMBER	04020300
28.233 COMMA MISUSED	04020400
29.233 MISUSED	04020500
30.233 NUMBER OR SYMBOL MISPLACED	04020600
31.233 LEFT PARENTHESIS MISSING	04020700
32.233 RIGHT PARENTHESIS MISSING	04020800
33.233 '=' MISUSED	04020900
34.233 NAME MISUSED	04021000
35.233 NAME NOT FOUND	04021100
36.233 NAME ALREADY IN USE	04021200

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37.233	ILLEGAL--NOT A MATRIX	04021300
38.233	BUILT-IN NAME CAN'T BE REDEFINED	04021400
39.234	VARIABLE HAS NOT PREVIOUSLY BEEN DEFINED	04021500
40.235	ILLEGAL FORMAT. ONLY TYPE THE COMMAND NAME AND DESIRED ENTRY LABEL (OR JUST THE COMMAND NAME ALONE).	04021600
41.233	FUNCTION CAN'T CALL ON ITSELF	04021700
42.233	ILLEGAL USE OF FOR	04021800
43.233	ILLEGAL SUBSCRIPTING	04021900
44.233	SUBSCRIPTING EXCEEDS DEFINED RANGE	04022000
45.233	WRONG NUMBER OF ARGUMENTS OR SUBSCRIPTS	04022100
46.233	MATRICES ARE NOT CONFORMABLE	04022200
47.233	MATRIX MUST BE N BY N TO INVERT	04022300
48.233	A SINGULAR MATRIX CAN'T BE INVERTED	04022400
49.236	HANGING EXPRESSION	04022500
50.237	MATRIX SPACE IS FULL	04022600
51.237	ITEM SPACE IS FULL	04022700
52.237	FUNCTION SPACE IS FULL	04022800
53.233	WORK SPACE EXCEEDED	04022900
54.233	FOR VARIABLE NOT CLOSING IN ON TERMINAL VALUE	04023000
55.233	ALIGN STATEMENT MUST SPECIFY A COLUMN	04023100
56.233	LABEL NAME NOT VALID. TYPE JUST THE COMMAND NAME TO SEE THE FULL LIST.	04023200
57.233	PAIRED PRIME MISSING	04023300
58.1	ENTER LABEL	04023400
59.1	EXIT TO	04023500
61.61	PLEASE LOG IN***S	04023600
114.60	UNNAMED LESSON RESTORED.	04023700
312.312	PLANT TERMINAL NO.	04023800
62.241	ILLEGAL USE OF SLASH	04023900
63.63	ENTER NEXT LINE OF LESSON	04024000
64.60	NAME OR FORMAT ERROR.	04024100
65.60	NO SUCH FRAME/LABEL	04024200
66.60	FRAME TABLE FULL. DELETE BEFORE ADDING	04024300
71.71	SAVE LESSON? (Y/N)	04024400
72.242	FRAME DIRECTORY FULL.	04024500
73.243	ILLEGAL GROUP	04024600
74.70	ILLEGAL LABEL/FNAME. ENTER COMMAND	04024700
76.76	RECORDS FOR	04024800
77.77	RENT LESSON? (Y/N)	04024900
79.60	READ-ONLY. CANNOT ALTER LESSON.	04025000
80.248	ILLEGAL FRAME TYPE CHANGE	04025100
87.87	INVALID	04025200
88.253	ILLEGAL ANSWER FORMAT	04025300
89.254	ILLEGAL MIX OF ANSWER TYPES	04025400
90.255	DELIMITERS NOT PROPERLY PAIRED.	04025500
91.60	FRAME DOESN'T EXIST	04025600
92.60	GROUP DOESN'T EXIST	04025700
93.60	LINE DOESN'T EXIST	04025800
94.60	FRAME LENGTH EXCEEDED	04025900
95.45	ELSE/END MUST FOLLOW IF	04026000
96.46	ILLEGAL CONNECTIVE...AND/OR MUST FOLLOW IF	04026100
97.47	RECORD TABLE FULL AND NO MORE WILL BE KEPT. LESSON WILL CONTINUE BUT YOU SHOULD PROBABLY SIGN OFF AND GET HELP.	04026200
		04026300
		04026400
		04026500

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98.257	FRAME LABEL EXISTS. LABEL=S	04026600
99.258	FRAME EXISTS	04026700
100.258	GROUP EXISTS	04026800
107.60	LINE EXCEEDED	04026900
108.108	IDENTIFY YOURSELF***S	04027000
109.316	NOT ON DISK.	04027100
110.60	WRONG REEL NO.	04027200
111.60	AUTHORING COMMANDS RESTRICTED. GET YOUR LESSON.	04027300
113.60	RESTART OR SAVE LESSON FIRST.	04027400
115.60	NO DISK SPACE ON	04027500
116.60	NO G3. ANSWERS. ERROR	04027600
117.60	DECISION STATEMENT MUST START WITH A CONNECTIVE OR F.C.B.R.	04027700
118.266	DUPLICATE LESSON NAME	04027800
119.1	ILLEGAL USE OF READY	04027900
121.120	SAVE LESSON ONTO TAPE FIRST.	04028000
123.120	UNLOAD AND SAVE LESSON ONTO TAPE FIRST.	04028100
124.60	INTEGERS ONLY FOR GROUPS/LINES/COLUMNS	04028200
127.127	LESSON REEL	04028300
129.124	CHOOSE ONE:	04028400
130.60(109)	NOT ON DISK.	04028500
131.60	LESSON END	04028600
133.269	IMPROPER KEYWORD SPECIFICATION	04028700
134.60	TO NONEXISTENT FRAME/LABEL	04028800
140.140	NONE-DEFINED	04028900
141.270	IMPROPER FROM SPECIFICATION	04029000
142.270	ERROR IN DECISION STATEMENT	04029100
143.270	TAGS MISSING IN DECISION STATEMENT	04029200
144.144	NUMBER OF FRAMES LEFT	04029300
145.145	YOU'VE BEEN LOGGED OFF DUE TO A BAD LESSON.	04029400
146.120(64)		
147.120(90)		04029600
149.120	DEVICE IS BUSY. TRY LATER.	04029700
151.151	CAN'T USE CALC JUST NOW.	04029800
160.160(152)	THIS ENTRY IS RESERVED FOR NEW FEEDBACK MSGS.	04029900
161.161(152)	THIS ENTRY IS RESERVED FOR NEW FEEDBACK MSGS.	04030000
163.163	THE ANSWER IS:	04030100
171.171	CHOOSE ONE OF THE ABOVE LETTERS.	04030200
172.172	ANSWER EITHER YES OR NO.	04030300
173.173	ILLEGAL USE OF F: NO CORRECT ANSWER SPECIFIED	04030400
174.174	ILLEGAL USE OF R:	04030500
175.60	ILLEGAL C: NO CORRECT ANSWER SPECIFIED.	04030600
176.176	ILLEGAL BRANCH	04030700
177.177	DATE	04030800
178.178	STUDENT HISTORY	04030900
179.179	STUDENT SUMMARY	04031000
180.180	LESSON NAME	04031100
181.181	STUDENT NAME	04031200
182.182	FRAME TYPE TIME NEUTRAL ANSWER LABEL	04031300
183.183	MIN/ RIGHT+ TAG	04031400
184.184	SEC WRONG-	04031500
185.185	NUMBER RIGHT	04031600
186.186	NUMBER WRONG	04031700
187.187	NUMBER ENTRIES	04031800

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188.188 NUMBER TIME-OUTS	04031900
189.189 TOTAL TIME	04032000
190.233 FOR MUST BE COMBINED WITH SUM OR PROD	04032100
191.60 DISK I/O ERROR. GET HELP. IF NOT AVBL. TYPE OUT TO LOGOUT.	04032200
192.192 END	04032300
193.193 START	04032400
194.194 LESSON NOT ON REEL SPECIFIED.	04032500
195.195 ENTER RECORD NAMES. FOLLOW ALL BUT LAST NAME BY A COMMA.	04032600
196.196 NEW TAPE? (Y/N)	04032700
197.197 NO ENTRY LABELS ARE AVAILABLE AT THIS TIME.	04032800
198.198 SUMMARY ONLY? (Y/N)	04032900
199.199 TO THE TERMINAL? (Y/N)	04033000
200.200 CARD READER ERROR	04033100
201.60 TAPE REQUEST CANCELLED.	04033200
202.202 KILLING PERIOD:	04033300
203.120 DEVICE OUT OF SERVICE.	04033400
204.204 IDENTITY CPU UNIT-REC CONNECT MEM	04033500
DRY CURR-MEM TOTAL	04033600
205.205 ILLEGAL GROUP NUMBER.	04033700
206.206 DUPLICATE FRAME NUMBER--INCREMENTED BY 0.01.	04033800
207.207 CONTINUATION CARD DOES NOT FOLLOW A PROPER LINE.	04033900
208.208 LABEL TABLE FULL.	04034000
209.209 DUPLICATE LABEL.	04034100
210.1 ENTER HELP (ANY BUILT-IN OR USER DEFINED NAME)	04034200
211.1 RANK (MATRIXNAME)--RANKS THE VALUES OF THE MATRIX.	04034300
212.1 SORT (EXPRESSION)--POSITIVE SQUARE ROOT FUNCTION.	04034400
213.1 COMBINATION--COMBINATION OF M THINGS TAKEN N AT A TIME.	
214.1 FACT (EXPRESSION)--FACTORIAL FUNCTION.	04034500
215.1 LOG (NUMBER/BASE)--LOG TO ANY BASE.	04034700
216.1 LN (NUMBER)--LOG TO THE BASE E.	04034800
217.1 SIN (EXPRESSION)--SINE FUNCTION.	04034900
218.1 COS (EXPRESSION)--COSINE FUNCTION.	04035000
219.1 TAN (EXPRESSION)--TANGENT FUNCTION.	04035100
220.1 COT (EXPRESSION)--COTANGENT FUNCTION.	04035200
221.1 SEC (EXPRESSION)--SECANT FUNCTION.	04035300
222.1 CSC (EXPRESSION)--COSECANT FUNCTION.	04035400
223.1 ABSOLUTE (EXPRESSION)--ABSOLUTE VALUE FUNCTION.	04035500
224.1 TRUNCATE (EXPRESSION)--ROUNDS TO AN INTEGER.	04035600
225.1 INVERSE (MATRIXNAME)--PERFORMS A MATRIX INVERSE OPERATION.	04035700
226.1 A BUILT-IN 1 X 10 MATRIX. CONSULT TM-4422/002 PART V FOR ITS USE.	04035800
227.1 BUILT-IN NAME. CONSULT TM-4422/002 PART V FOR ITS USE.	04035900
228.1 BUILT-IN NAMES CAN'T BE DROPPED.	04036000
229.1 NAME ENTERED CAN'T BE DENIED USING THE COMMAND--PROHIBIT (NAME).	04036100
230.1 NAME ENTERED CAN'T BE FOUND.	04036200
231.1 CAN'T ALTER AN AUTHOR DEFINED NAME.	04036300
232.1 A CALC STATEMENT CAN'T EXCEED A SINGLE LINE IN A LESSON.	04036400
233.1 CONSULT TM-4422/002 APPENDIX C FOR REPRESENTATIVE ERROR SITUATIONS	04036500
234.1 SORRY, BUT YOU LOST FRAME NO.	04036600
235.40 A COMMA OR TOO MANY LABELS HAVE BEEN ENTERED.	04036700
236.1 STATEMENT IS AMBIGUOUS AND CAN'T BE EVALUATED.	04036800
237.1 DELETE AN ITEM, FUNCTION, OR MATRIX AND TRY AGAIN.	04036900
238.238 BACKGROUND OPERATIONAL LEVEL	04037000
239.239 GROUP 1 CARD FORMAT ERROR.	04037100

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240.120 NOT FOUND.	04037200
241.60 A NUMBER MUST FOLLOW THE + OR -.	04037300
242.60 DELETE ONE OR MORE FRAMES TO CONTINUE.	04037400
243.60 GROUP NUMBER ENTERED IS NOT LEGAL FOR THE TYPE OF FRAME.	04037500
244.251 (Q)UESTION/(M)ULTIPLE CHOICE/(D)ECISION/(P)ROGRAMMING	04037600
245.75 G2. ENTER PROGRAMMING STATEMENTS	04037700
246.78 G2. ENTER DECISION STATEMENTS	04037800
247.1 'REPLY' MUST FOLLOW 'SET' OR 'USE.'	04037900
248.60 CAN'T MAKE A Q OR M FRAME INTO A D OR P FRAME OR VICE VERSA.	04038000
249.81 G2. SPECIFY QUESTION.	04038100
250.82 G3. SPECIFY ANSWERS.	04038200
251.67 ENTER FRAME TYPE.	04038300
252.83 G4. SPECIFY ACTIONS.	04038400
253.60 ANSWER TAG FORMAT IS ILLEGAL, E.G., .A OR +.A	04038500
254.60 NUMBER AND LETTER ANSWER TAGS CAN'T BE MIXED WITH DELIMITERS.	04038600
255.60 ANSWER IN A CONDITIONAL Q FRAME MUST BE ENCLOSED BY DELIMITERS	04038700
256.250 BACKGROUND HALTED.	04038800
257.96 A LESSON CAN'T CONTAIN A DUPLICATE FRAME LABEL. ENTER ANOTHER.	04038900
258.00 CAN'T INSERT OVER AN EXISTING FRAME OR GROUP.	04039000
259.101 SPECIFY CHARACTERS TO BE USED IN SEARCH.	04039100
260.102 REQUEST CONFIRMATION THAT RANGE OF FRAMES IS TO BE DELETED.	04039200
261.103 SPECIFY CHARACTERS FOR MODIFICATION.	04039300
262.263 LABEL FRAME IF DESIRED.	04039400
263.70 A LABEL MUST START WITH A LETTER.	
264.264 PRESS RETURN TO TRY AGAIN OR TYPE #RESTART TO ESCAPE.	04039600
265.265 BACKGROUND JOBS MUST FINISH FIRST.	04039700
266.60 REPEAT THE COMMAND WITH A DIFFERENT NAME.	04039800
267.120 THE SYSTEM COMMANDS FOR AN AUTHOR: ACCOUNT, BUILD, DELETE, EDIT, LIST, UNLOAD.	04039900
268.1 ENTER A VALUE FOR THE INDICATED NAME.	04040000
269.60 KEYWORD WAS NOT FOLLOWED BY ALL, OFF, ON, OR A NUMBER.	04040100
270.270(233) CONSULT TM-4422/002 APPENDIX C. FOR OTHER SITUATIONS.	04040200
271.271 JOB AT TOP OF QUEUE IS	04040300
272.266 ENTER Y TO UNLOAD OR N TO ADD MORE NAMES.	04040400
273.60 LESSON ACCESS DENIED BY AUTHOR.	04040500
274.60 PLAIN COMMANDS ARE: A (APPEND), ATTACH, BREAK, CALC, CLEAR, COPY, D (DELETE), DIAL, DISPLAY, E (EDIT), EX (EXECUTE), GET, I (INSERT), LOCK, M (MODIFY), OUT, P (PRINT), RESTART, SAVE, S (SEARCH), SYSTEM, UNLOCK. SEE TM-4422/002 FOR DETAILS.	04040600
275.195 REPEAT WITH FEWER NAMES.	04040700
276.310 ENTER A NAME THAT CAN LATER BE USED WITH THE BUILD COMMAND.	04040800
277.277 ENTRY ON DISK? TAPE ASSIGNMENT	04040900
278.278 STUDENT RECORD IS BEING USED.	04041000
279.120 THIS TAPE ALREADY CONTAINS UNLOADED RECORDS.	04041100
280.120 ILLEGAL ADDRESS/OFFLOW FORMAT.	04041200
281.120 ABOVE LOGIN(S) NOT FOUND.	04041300
282.282 TAPE I/O ERROR.	04041400
283.60 BUSY. ENTER COMMAND.	04041500
284.284 TOO MANY CHARACTERS ON INPUT LINE	04041600
285.285 ITEM	04041700
286.272(102) OK? (Y/N)	04041800
287.287 R/O	04041900
288.288 R/W	04042000

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289.289 LOCKED	04042500
290.290 STUDENT	04042600
291.291 UNLOCKED	04042700
292.304 NOT FOUND/NOT ACTIVE	04042800
293.293 NUMBER OF JOBS ENQUEUED	04042900
294.120 NOT READY YET.	04043000
295.295 DUPLICATE USE OF RECORD IN:	04043100
296.296 CHAINED RECORD ERROR IN:	04043200
297.297 DELETE ALL RECORDS. Y/N?	04043300
298.00 UNEXPECTED END OF TAPE.	04043400
299.120 SOME RECORDS WERE ALREADY UNLOADED IN ANOTHER TAPE.	04043500
300.120 REQUEST ABANDONED.	04043600
301.301 END OF REQUESTED SEQUENCE.	04043700
302.60 INCORRECT LESSON NAME GIVEN.	04043800
303.233 NAME ASSIGNMENT COULD NOT BE MADE	04043900
304.304 AUTHOR HAS LOCKED THE LESSON. YOU WILL BE LOGGED OUT	04044000
305.305 LESSON OR SKM IN USE. CANNOT DELETE OR UNLOAD.	04044100
306.305 SAME IDENTITY ALREADY BEING USED FOR THIS LESSON.	04044200
307.307 UNAUTHORIZED.	04044300
308.60(148) BUSY	04044400
309.1 CUMPYED (N) TO JUT OF RANGE	
310.276 ENTER FILE NAME.	04044600
311.311 ENTER REEL NO.	04044700
313.313 NOT LOGGED IN.	04044800
314.314 PLANTY ERROR	04044900
315.315 SYSTEM SHUTDOWN? (Y/N)	04045000
316.108 TO GET FROM TAPE, TYPE *GET LESSONNAME 1234*	04045100
(FILL IN YOUR OWN LESSONNAME AND REEL NUMBER).	04045200
317.60 EMPTY LESSON DELETED. ENTER COMMAND.	04045300
318.1 REVIEW(ANYLABEL) -- TYPE 'REVIEW' TO GET THE LIST.	04045400
319.1 SORT(MATRIX(ANY)) -- SORTS VALUES IN MATRIX.	04045500
320.320 DEVICE STATUS:	04045600
ADDLOG /EXYE/CHP/CHUCK/BAKER/ELANSON/BERNAS/BERG/CILVE/INFF/ELFCH/	04045700
ADDLOG /STUD1/STUD2/STUD3/STUD4/STUD5/STUD6/STUD7/STUD8/STUD9/	04045800
C:USE AS MANY ADDLOG CARDS AS NECESSARY AND AS MANY NAMES ON EACH	04045900
C:CARD AS DESIRED. ONLY THE 3555 CARD MAY FOLLOW ADDLOG C: IS.	04046000
35553555	04046100
451 CARDS.	

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APPENDIX G

PLANIT MAP

++WRITE PRINT,PLAN10	
1 IFIRST(1)	00001
2 MSGTBL(125)	00002
127 KARDUM	00003
128 KARSET(57)	00004
185 MAPDUM	00005
186 MAP(255)	00006
441 PRIME(25)	00007
491 PRICES(4)	00008
499 MSGOPR(20)	00009
519 MSGOPN	00010
520 MCHPHN(26)	00011
546 INNPR	00012
547 IPART(100)	00013
647 IDISK(50)	00014
697 LUGNR(9)	00015
706 ICWH	00016
707 IETIME	00017
708 JOUTBF(1170)	00018
1878 JCNT	00019
1879 JDIAL(23)	00020
1902 ISPOOL(10)	00021
1912 JSPOGL(10)	00022
1922 LPAR	00023
1923 ILIST	00024
1924 IPUNCH	00025
1925 IRDR	00026
1926 ISYS(62)	00027
1988 NEGPOS(2)	00028
1990 INCHK(2)	00029
1992 MSGDR1(330)	00030
2322 MSGDR2(330)	00031
2652 IBLANK	00032
2653 MAGTBL(10)	00033
2663 NOCMBN(25)	00034
2688 IASMD(3)	00035
2691 IDSMA(3)	00036
2694 IDVCE(9)	00037
2703 IRSTAT(9)	00038
2712 IWSTAT(9)	00039
2721 IDIAL(9)	00040
2730 IEPTR(9)	00041
2739 ISTAT(9)	00042
2748 IDASP1(9)	00043
2757 IDALOG	00044
2758 IFBTK(11)	00045
2769 IFBTM(11)	00046
2780 IFBTN(11)	00047
2791 IDATE	00048
2792 IOPRTR	00049
2793 IOPER	00050
2794 IAUX	00051
2795 PI	00052
2797 IRAND	00053

2798	ISTART	00054
2799	NCHBEG	00055
2800	NUMCH	00056
2801	KYPBRK	00057
2802	ICHNUM	00058
2803	ICHNO	00059
2804	MRKGND	00060
2805	NBKGND	00061
2806	ISTOP1	00062
2807	ISTOP2	00063
2808	JOB	00064
2809	IQUANT	00065
2810	ISWAP	00066
2811	IMASK	00067
2812	NAMES(480)	00068
3292	NAME SX(180)	00069
3472	NBRNAM(2)	00070
3474	LOCTAG	00071
3475	LSTNAM(2)	00072
3477	MDEF(133)	00073
3610	KFEP(34)	00074
3644	LEP(14)	00075
3658	NREC1	00076
3659	NREC2	00077
3660	NREC3	00078
3661	NOTFUL	00079
3662	MQUIT	00080
3663	MKNT1	00081
3664	MKNT2	00082
3665	INREVM	00083
3666	MFUNSV(50)	00084
3716	LPTATX	00085
3717	LPTMFU	00086
3718	WITHIN	00087
3720	IROUND	00088
3721	LSTRYL	00089
3722	NBRRYL	00090
3723	KEEPID(2)	00091
3725	LNCORR(2)	00092
3727	LHSCOM	00093
3728	MDE	00094
3729	LFND	00095
3730	LNBR	00096
3731	LFREXD	00097
3732	LSTPTR(6)	00098
3738	LSOFT(2)	00099
3740	LREPLY(2)	00100
3742	NREPLY(40)	00101
3782	RSPNSE	00102
3784	ARG(61)	00103
3906	ATXVAL(400)	00104
4706	IONUFF(10)	00105
4716	IRECRD(528)	00106
5244	LSNENT	00107

5245	LBNENT	00108
5246	LESSON(2)	00109
5248	KURRYL	00110
5249	NFWORD	00111
5250	LSDR1(118)	00112
5368	LSUR2(118)	00113
5486	LAB1(94)	00114
5580	LAB2(48)	00115
5628	MSVMSG(6)	00116
5634	KPTR(8)	00117
5642	LIBS(10)	00118
5652	ICYCLE	00119
5653	IPRCLE(20)	00120
5673	MSGBUF(160)	00121
5833	LESLIN(80)	00122
5913	MRUMSG	00123
5914	IDLFLG	00124
5915	IDASR	00125
5916	LTOC	00126
5917	ICHCLN	00127
5918	LPSW	00128
5919	KNEG	00129
5920	NPNT1	00130
5921	NPNT2	00131
5922	IDAFD	00132
5923	IDASRM	00133
5924	NDEX(5)	00134
5929	NPTR	00135
5930	IBLFLG	00136
5931	ICHAP	00137
5932	ICMPRE	00138
5933	ICDOWN	00139
5934	ICR	00140
5935	IFMT	00141
5936	IFRSWD	00142
5937	IFTFLG	00143
5938	MODFLG	00144
5939	IMAG1	00145
5940	IMAG2	00146
5941	IMOVER	00147
5942	INDFLG	00148
5943	INFORM	00149
5944	INWDNR	00150
5945	IRDWRT	00151
5946	NMRPLY	00152
5947	IBTPTR	00153
5948	ITPCNT	00154
5949	NEXT	00155
5950	ISRBYT(10)	00156
5960	INDBYT(10)	00157
5970	ITDBYT(10)	00158
5980	ISVDEC	00159
5981	ISCFLG	00160
5982	IEXP	00161

5983	ISVBYT	00162
5984	ISVDWN	00163
5985	ITRFLG	00164
5986	IWKPTR	00165
5987	JWKPTR	00166
5988	KWKPTR	00167
5989	LWKPTR	00168
5990	LFMT	00169
5991	LMARG	00170
5992	IRMARG	00171
5993	LSBLNK	00172
5994	LSBLWD	00173
5995	ILNPR	00174
5996	JLNPR	00175
5997	KLNPR	00176
5998	MLNPR	00177
5999	NLNPR	00178
6000	INTR	00179
6001	MINT	00180
6002	NINT	00181
6003	MOVER	00182
6004	MVEND	00183
6005	INT	00184
6006	ISKIP	00185
6007	LINEUP	00186
6008	IDEC	00187
6009	INTPTR	00188
6010	INDVCE	00189
6011	INTTBL(12)	00190
6023	MINFLG	00191
6024	MCUE	00192
6025	NWRD1	00193
6026	NWRD2	00194
6027	NPACK	00195
6028	NFUNL	00196
6029	MCUESV	00197
6030	LSTCHR	00198
6031	NWRK	00199
6032	NPcnt	00200
6033	NAMBEG	00201
6034	NPREV	00202
6035	NUMFLG	00203
6036	NUMPRS	00204
6037	NOCHAR	00205
6038	MFOR	00206
6039	NOKTR	00207
6040	NSRCH(75)	00208
6115	NCPU	00209
6116	NUNITR	00210
6117	NCONN	00211
6118	MEMORY	00212
6119	LIBSV	00213
6120	LIBUSE	00214
6121	ITMNM(2)	00215

6123	NPRSV	00216
6124	LBYTE(80)	00217
6204	X(1)	00218
6206	IWORK(164)	00219
6370	NOPI(60)	00220
6430	NOP2(60)	00221
6490	EXP1(60)	00222
6610	EXP2(60)	00223
6730	MFRAME(320)	00224
7050	NFRAME(320)	00225
7370	MNSTAT(2)	00226
7372	MNNENT(2)	00227
7374	NTRYF	00228
7375	NTRYG	00229
7376	NTRYL	00230
7377	MNFSW	00231
7378	NFULL	00232
7379	NLINE	00233
7380	JDLFLG	00234
7381	LHSEQ	00235
7382	NFNLSV	00236
7393	ISTFLG	00237
7384	ITIME	00238
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7387	NRMFLG	00241
7388	IARPTR	00242
7389	IPRPTR	00243
7390	ICOMMA	00244
7391	IPAREN	00245
7392	IFRLUP	00246
7393	IPMPTR	00247
7394	LOK	00248
7395	NSVPRS	00249
7396	IVLEND	00250
7397	VALUE	00251
7399	IASCNT	00252
7400	LESNAM	00253
7401	LRET	00254
7402	KFNBRX	00255
7403	LPTR	00256
7404	LCNT	00257
7405	LDIR1	00258
7406	LDIR2	00259
7407	KBLNO1	00260
7408	KBLNO2	00261
7409	KENTRY	00262
7410	NCODE	00263
7411	KFNBR	00264
7412	KGNBR	00265
7413	KLNBR	00266
7414	KOMNR	00267
7415	IFCOND	00268
7416	MKIND	00269

7417	IHOLD(9)	00270
7426	JHOLD(9)	00271
7435	XHOLD	00272
7437	YHOLD	00273
7439	LTAG	00274
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7441	LANS1	00276
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7444	KDKTR	00279
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7448	NMAP	00283
7449	LOOP	00284
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7451	IXFER	00286
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7456	KFTYPE	00291
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7458	KHR	00293
7459	KTYPE	00294
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7461	IDA	00296
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7464	IDERR	00299
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7469	NCALC	00304
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7473	ILOG(2)	00307
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7478	JPEFL	00310
7479	IDTAPE	00311
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7508	ISYS4	00320
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7511	ISYS7	00323

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7518 ISYS14
7519 ISYS15
7520 ESYS1
7522 ESYS2
7524 ESYS3
7526 NTMP1
7527 NTMP2
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7558 X1
7560 X2
7562 Y1
7564 TEMP1
7566 TEMP2
7568 TEMP3
7570 TEMP4
7572 FLOAT
7574 IERROR
7575 NXPRT
7576 IGOTO

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7577	IRTRN	00378
7578	IDEPH	00379
7579	ICALLS(1)	00380
7580	IPUSH(9)	00381
7589	MODES	00382
7590	MSGNO	00383
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7592	IBYT1	00385
7593	IBYT2	00386
7594	INDEX	00367
7595	IURST(15)	00388
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3784	ARG(61)	00390
3906	ATXVAL(400)	00391
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7522	ESYS2	00393
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6490	EXP1(60)	00395
6610	EXP2(60)	00396
7572	FLOAT	00397
7550	I	00398
7388	IARPTR	00399
7399	IASCNT	00400
2689	IASMD(3)	00401
2794	IAUX	00402
2652	IBLANK	00403
5930	IBLFLG	00404
5947	IBTPTR	00405
7592	IBYT1	00406
7593	IBYT2	00407
7579	ICALLS(1)	00408
5931	ICHR	00409
5917	ICHCLN	00410
2803	ICHNO	00411
2802	ICHNUM	00412
5932	ICMPRE	00413
5933	ICNDWN	00414
7390	ICOMMA	00415
5934	ICR	00416
706	ICWH	00417
5652	ICYCLE	00418
7461	IUA	00419
5922	IDAFD	00420
2757	IDALUG	00421
5915	IDASR	00422
5923	IDASRM	00423
2748	IDASR1(9)	00424
2791	IDATE	00425
1990	IDCHK(2)	00426
6008	IDEC	00427
7578	IDEPH	00428
7464	IDERR	00429
2721	IDIAL(9)	00430
647	IDISK(50)	00431

5914	IDLFLG	00432
2691	IDSMA(3)	00433
7479	IDTAPE	00434
7471	IDUSER(2)	00435
2694	IDVCE(9)	00436
2730	IEPTR(9)	00437
7574	IERROR	00438
707	IETIME	00439
5982	IEXP	00440
2758	IFBTK(11)	00441
2769	IFBTM(11)	00442
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7415	IFCOND	00444
7610	IFILL(2)	00445
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5935	IFMT	00447
7386	IFRFLG	00448
7392	IFRLUP	00449
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7480	IFTAPE	00451
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7576	IGOTO	00453
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1923	ILIST	00455
5995	ILNPR	00456
7473	ILOG(2)	00457
5939	IMAG1	00458
5940	IMAG2	00459
2811	IMASK	00460
5941	IMOVER	00461
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7594	INDEX	00463
5942	INDFLG	00464
6010	INDVCE	00465
5943	INFORM	00466
546	INNPR	00467
3665	INREVW	00468
6005	INT	00469
6009	INTPTR	00470
6000	INTR	00471
6011	INTTBL(12)	00472
7481	INUSE	00473
5944	INWONR	00474
4706	IONOFF(10)	00475
2793	IOPER	00476
2792	IOPRTR	00477
7595	IORST(15)	00478
7391	IPAREN	00479
547	IPART(10)	00480
7393	IPMPTR	00481
5653	IPRCLE(20)	00482
7389	IPRPTH	00483
1924	IPUNCH	00484
7580	IPUSH(9)	00485

2809	IQUANT	00486
2797	IRAND	00487
1925	IRDR	00488
5945	IRDWRT	00489
4716	IRECRD(528)	00490
7477	IREEL	00491
5992	IRMARG	00492
3720	IKOUND	00493
2703	IRSTAT(9)	00494
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5981	ISCFLG	00496
6006	ISKIP	00497
1902	ISPOOL(10)	00498
5950	ISRBYT(10)	00499
2798	ISTART	00500
2739	ISTAT(9)	00501
7383	ISTFLG	00502
7485	ISTOP(20)	00503
2806	ISTOP1	00504
2807	ISTOP2	00505
7475	ISTUD(2)	00506
5983	ISVBYT	00507
5980	ISVDEC	00508
5984	ISVDWN	00509
2810	ISWAP	00510
7505	ISYS1	00511
7514	ISYS10	00512
7515	ISYS11	00513
7516	ISYS12	00514
7517	ISYS13	00515
7518	ISYS14	00516
7519	ISYS15	00517
7506	ISYS2	00518
7507	ISYS3	00519
7508	ISYS4	00520
7509	ISYS5	00521
7510	ISYS6	00522
7511	ISYS7	00523
7512	ISYS8	00524
7513	ISYS9	00525
1926	ISYS(62)	00526
7384	ITIME	00527
6121	ITMNM(2)	00528
5970	ITOBYT(10)	00529
5948	ITPCNT	00530
5985	ITRFLG	00531
7385	ITYM	00532
7396	IVLEND	00533
5986	IWKPTR	00534
6206	IWORK(164)	00535
2712	IWSTAT(9)	00536
7451	IXFER	00537
7551	J	00538
1878	JCNT	00539

1879	JDIAL(23)	00540
7380	JDLFLG	00541
7455	JF TYPE	00542
7426	JHOLD(9)	00543
5996	JLNPR	00544
2808	JUB	00545
708	JOUTRF(1170)	00546
7478	JREEL	00547
1912	JSPDOL(10)	00548
7483	JSYS(2)	00549
5987	JWKPTR	00550
7552	K	00551
127	KARDUM	00552
128	KARSET(57)	00553
7407	KBLNU1	00554
7408	KBLNO2	00555
7458	KBR	00556
7462	KCORE	00557
7444	KOKTR	00558
3723	KEEPID(2)	00559
7409	KENTRY	00560
3610	KFEP(34)	00561
7465	KFLG	00562
7411	KFNBR	00563
7402	KFNBRX	00564
7452	KFONLY	00565
7456	KF TYPE	00566
7412	KGNBR	00567
7453	KGONLY	00568
7413	KLNBR	00569
7466	KLNBR1	00570
5997	KLNPR	00571
7454	KLONLY	00572
5919	KNEG	00573
7414	KOMNR	00574
7457	KOPY	00575
5634	KPTR(8)	00576
7460	KRWS	00577
7459	KTYPE	00578
5248	KURRYL	00579
7470	KUSER	00580
5989	KWKPTR	00581
7463	KWRDS	00582
2801	KYPBRK	00583
7553	L	00584
5486	LAB1(94)	00585
5580	LAB2(48)	00586
7441	LANS1	00587
7442	LANS2	00588
7443	LANS3	00589
5245	LBNENT	00590
7467	LBRK1	00591
7468	LBRK2	00592
6124	LBYTE(80)	00593

7404	LCNT	00594
7446	LDEC	00595
7405	LDIR1	00596
7406	LDIR2	00597
3644	LEP(14)	00598
5833	LESLIN(80)	00599
7400	LESNAM	00600
5246	LESSON(2)	00601
5990	LFMT	00602
3729	LFND	00603
3731	LFREXD	00604
3727	LHSCOM	00605
7381	LHSEQ	00606
6119	LIBSV	00607
5642	LIBS(10)	00608
6120	LIBUSE	00609
6007	LINEUP	00610
5991	LMARG	00611
3730	LNBR	00612
3725	LNCORR(2)	00613
3474	LOCTAG	00614
697	LUGNR(9)	00615
7394	LOK	00616
7449	LOOP	00617
1922	LPAR	00618
7440	LPLUS	00619
5918	LPSW	00620
3716	LPTATX	00621
3717	LPTMFU	00622
7403	LPTR	00623
3740	LREPLY(2)	00624
7401	LRET	00625
5993	LSBLNK	00626
5994	LSBLWD	00627
3738	LSDFT(2)	00628
5250	LSDR1(118)	00629
5363	LSDR2(118)	00630
5244	LSNENT	00631
6030	LSTCHR	00632
3475	LSTNAM(2)	00633
3732	LSTPTR(6)	00634
3721	LSTRYL	00635
7447	LSW	00636
7439	LTAG	00637
5916	LTOC	00638
5989	LWKPTR	00639
7554	M	00640
2653	MAGTBL(10)	00641
186	MAP(255)	00642
185	MAPDUM	00643
2804	MBKGND	00644
5913	MBUMSG	00645
520	MCHPHN(26)	00646
6029	MCUESV	00647

6024	MCUE	00648
3728	MDE	00649
3477	MDEF(133)	00650
6118	MEMORY	00651
6038	MFOR	00652
6730	MFRAME(320)	00653
3666	MFUNSV(50)	00654
6023	MINFLG	00655
6001	MINT	00656
7416	MKIND	00657
3663	MKNT1	00658
3664	MKNT2	00659
5998	MLNPR	00660
7377	MNFSW	00661
7372	MNNENT(2)	00662
7370	MNSTAT(2)	00663
7589	MODES	00664
5938	MODFLG	00665
6003	MOVER	00666
3662	MQUIT	00667
5673	MSGBUF(160)	00668
1992	MSGDR1(330)	00669
2322	MSGDR2(330)	00670
7590	MSGNO	00671
519	MSGOPN	00672
499	MSGOPR(20)	00673
2	MSGTBL(125)	00674
5628	MSVMSG(6)	00675
6004	MVEND	00676
7555	N	00677
6033	NAMBEG	00678
2812	NAMES(480)	00679
3292	NAMESX(180)	00680
2805	NBKGND	00681
3472	NBRNAM(2)	00682
3722	NBRRYL	00683
7469	NCALC	00684
2799	NCH3EG	00685
7410	NCODE	00686
7445	NCONJ	00687
6117	NCONN	00688
6115	NCPU	00689
6037	NOCHAR	00690
5924	NDEX(5)	00691
6039	NOKTR	00692
1988	NEGPOS(2)	00693
5249	NEWORD	00694
5949	NEXT	00695
7382	NFNLSV	00696
7050	NFRAME(320)	00697
7378	NFULL	00698
6028	NFUNL	00699
6002	NINT	00700
7379	NLINE	00701

5999	NLNPR	00702
7448	NMAP	00703
7482	NMREEL	00704
5946	NMRPLY	00705
2663	NUCMBN(25)	00706
6370	NOP1(60)	00707
6430	NOP2(60)	00708
3661	NOTFUL	00709
6027	NPACK	00710
7450	NPASS	00711
6032	NPENT	00712
5920	NPNT1	00713
5921	NPNT2	00714
6034	NPREV	00715
6123	NPRSV	00716
5929	NPTR	00717
7591	NREAD	00718
3658	NREC1	00719
3659	NREC2	00720
3660	NREC3	00721
3742	NREPLY(40)	00722
7387	NRMFLG	00723
6040	NSRCH(75)	00724
7395	NSVPRS	00725
7526	NTMP1	00726
7535	NTMP10	00727
7536	NTMP11	00728
7537	NTMP12	00729
7538	NTMP13	00730
7539	NTMP14	00731
7540	NTMP15	00732
7541	NTMP16	00733
7542	NTMP17	00734
7543	NTMP18	00735
7544	NTMP19	00736
7527	NTMP2	00737
7545	NTMP20	00738
7546	NTMP21	00739
7547	NTMP22	00740
7548	NTMP23	00741
7549	NTMP24	00742
7528	NTMP3	00743
7529	NTMP4	00744
7530	NTMP5	00745
7531	NTMP6	00746
7532	NTMP7	00747
7533	NTMP8	00748
7534	NTMP9	00749
7374	NTRYF	00750
7375	NTRYG	00751
7376	NTRYL	00752
2800	NUMCH	00753
6035	NUMFLG	00754
6036	NUMPRS	00755

6116	NUNITR
6025	NWRD1
6026	NWRD2
6031	NWRK
7575	NXTPRT
7556	N1
7557	N2
2795	P1
491	PRICES(4)
441	PRIME(25)
3782	RSPNSE
7564	TEMP1
7566	TEMP2
7568	TEMP3
7570	TEMP4
7397	VALUE
3718	WITHIN
6204	X(1)
7435	XHOLD
7558	X1
7560	X2
7437	YHOLD
7562	Y1

&ENDPRUG

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APPENDIX H

TACFIRE/TOS² EQUIPMENT PICTURES

This appendix includes a set of pictures of the TACFIRE and TOS² equipment items most frequently used during operation of the AN/GYK-12 PLANIT system. The equipment items shown are those which include significant PLANIT operator/author/student interface. The figures are as follows:

- Figure H-1. Artillery Control Console (ACC)/
Operator Control Console (OCC)
- Figure H-2. Variable Format Message Entry Device (VFMED)
- Figure H-3. Message Input/Output Device (MIOD)
- Figure H-4. Electronic Line Printer (ELP)
- Figure H-5. AN/GYK-12 Computer
[CPU, IOU, (2) 8K Memories, MCMU]
- Figure H-6. Auxiliary Removable Media Memory (ARMM)
and Random Access Memory (RAM)
- Figure H-7. (TOS²) Potter Tape Unit
- Figure H-8. Digital Data Terminal (DDT)
- Figure H-9. Computer Test Set (CTS)

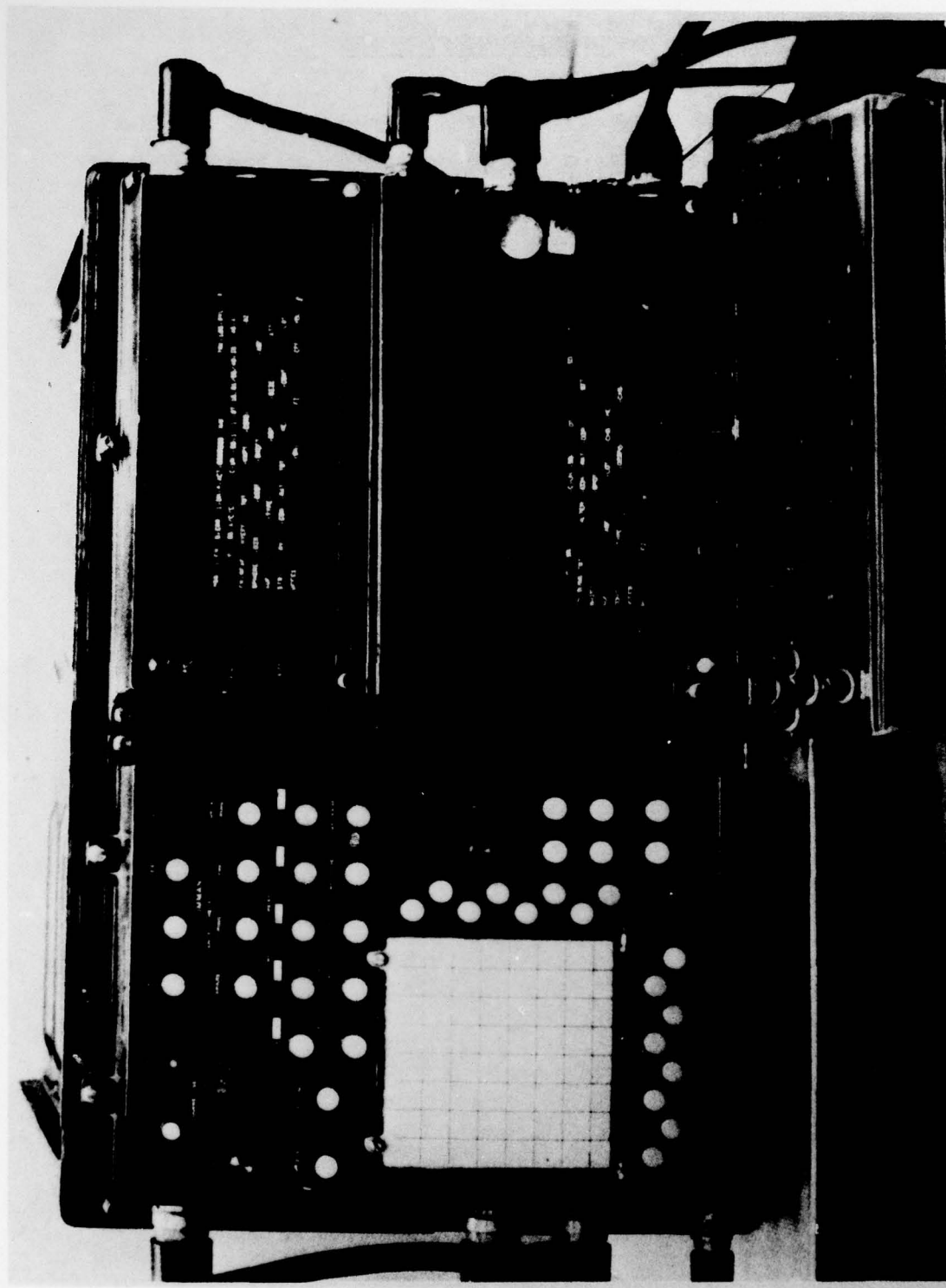


Figure H-1. Artillery Control Console (ACC)/
Operator Control Console (OCC)

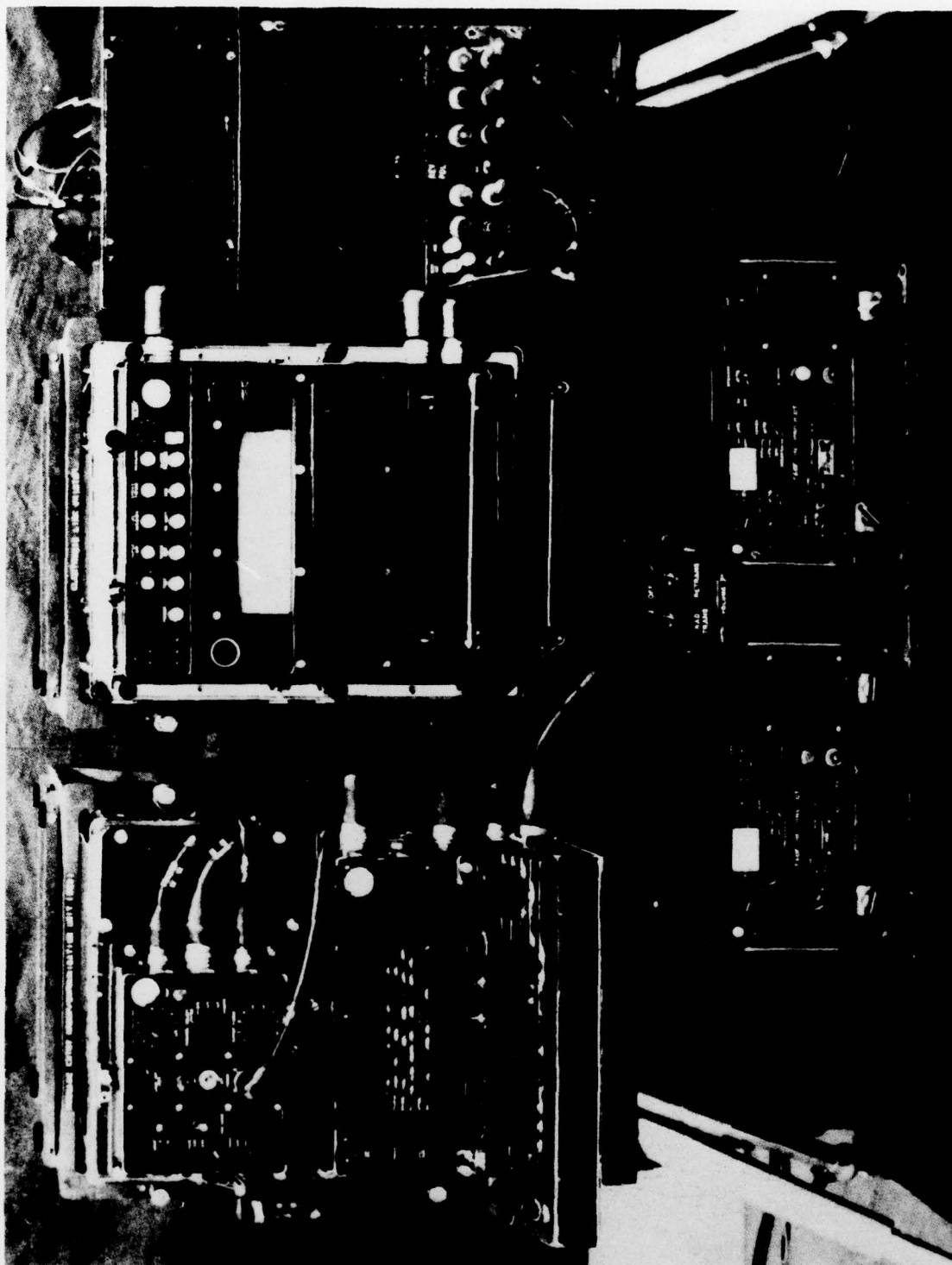


Figure H-2. Variable Format Message Entry Device (VFMED)

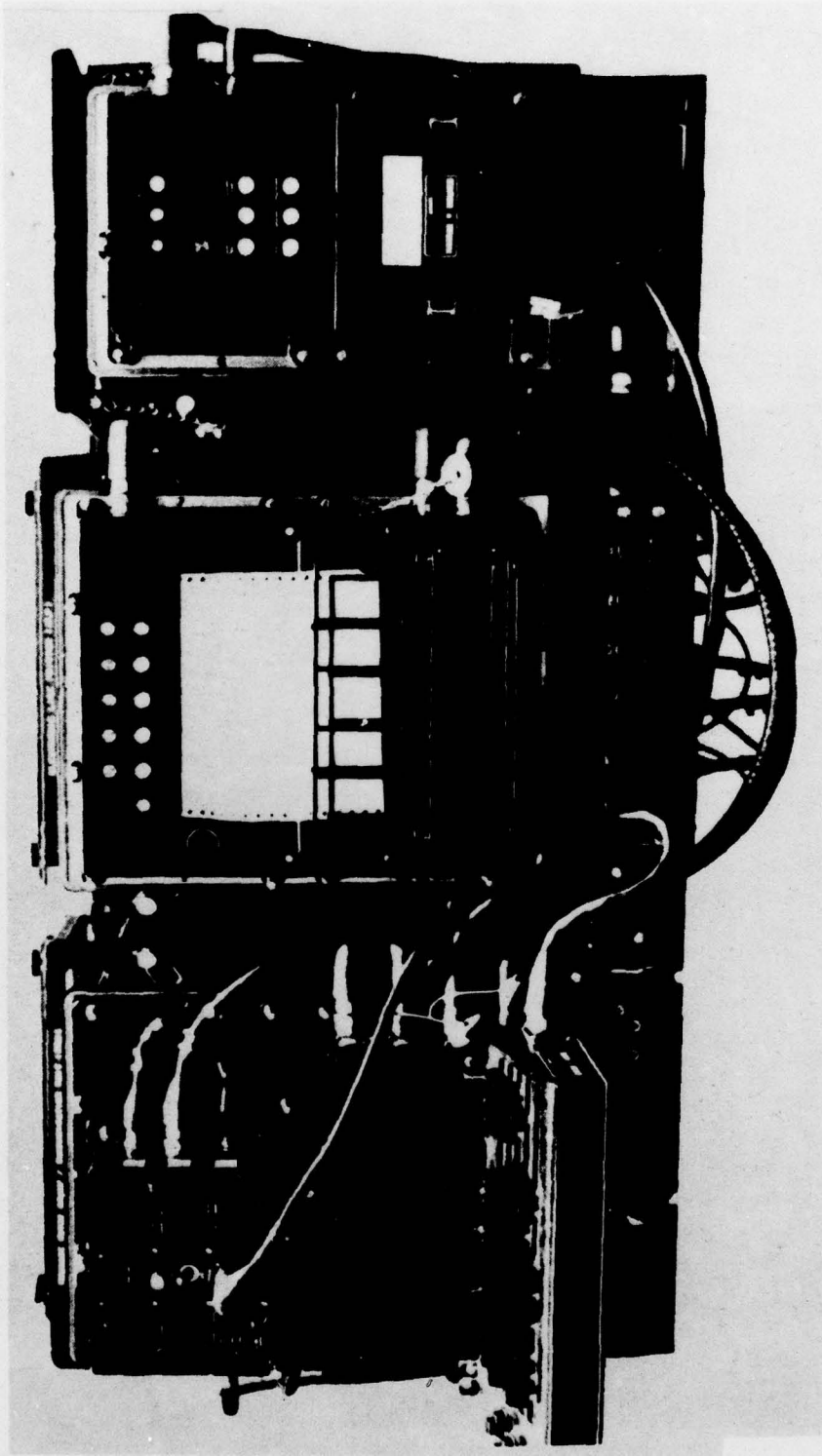


Figure H-3. Message Input/Output Device (MIOD)

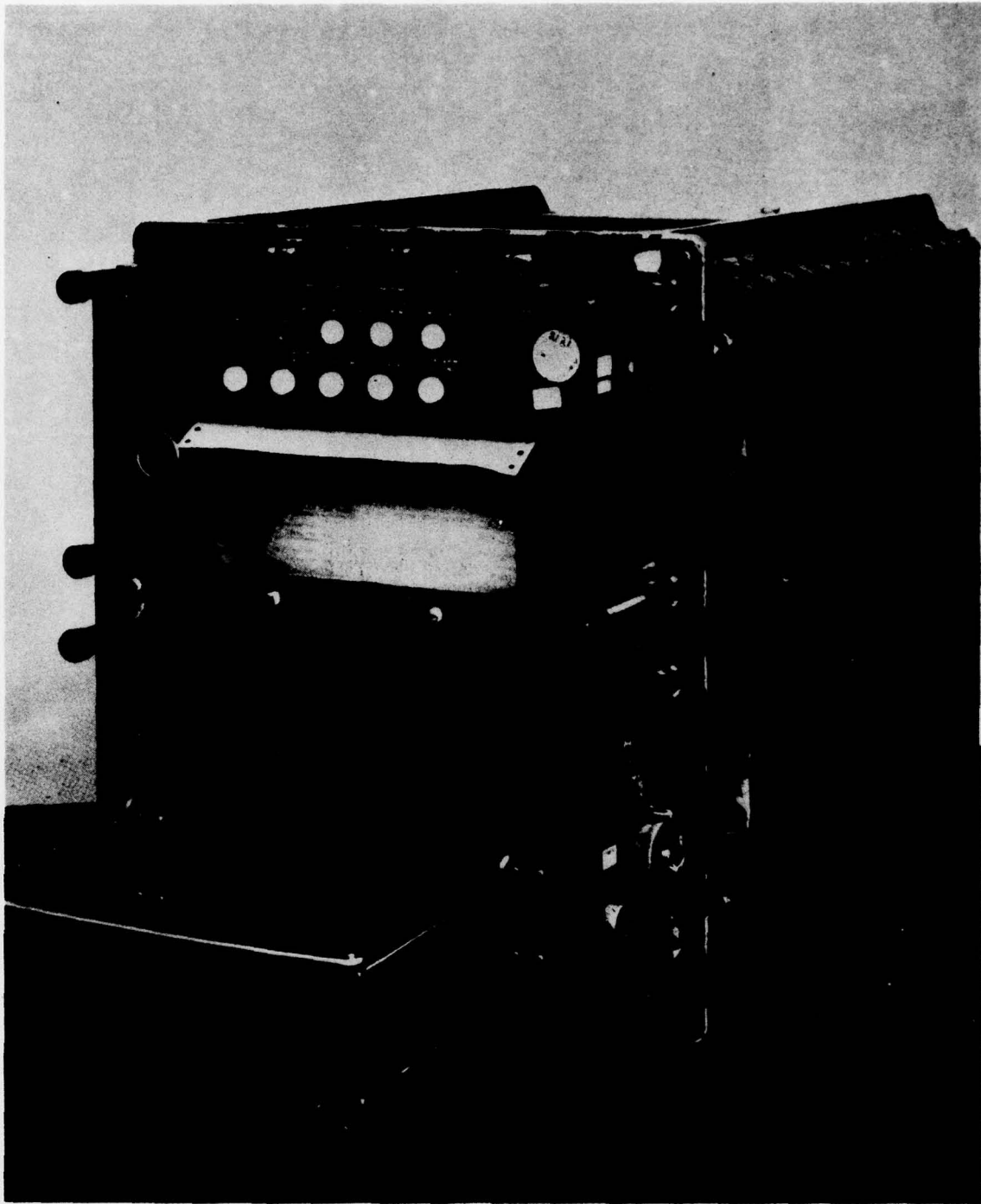


Figure H-4. Electronic Line Printer (ELP)

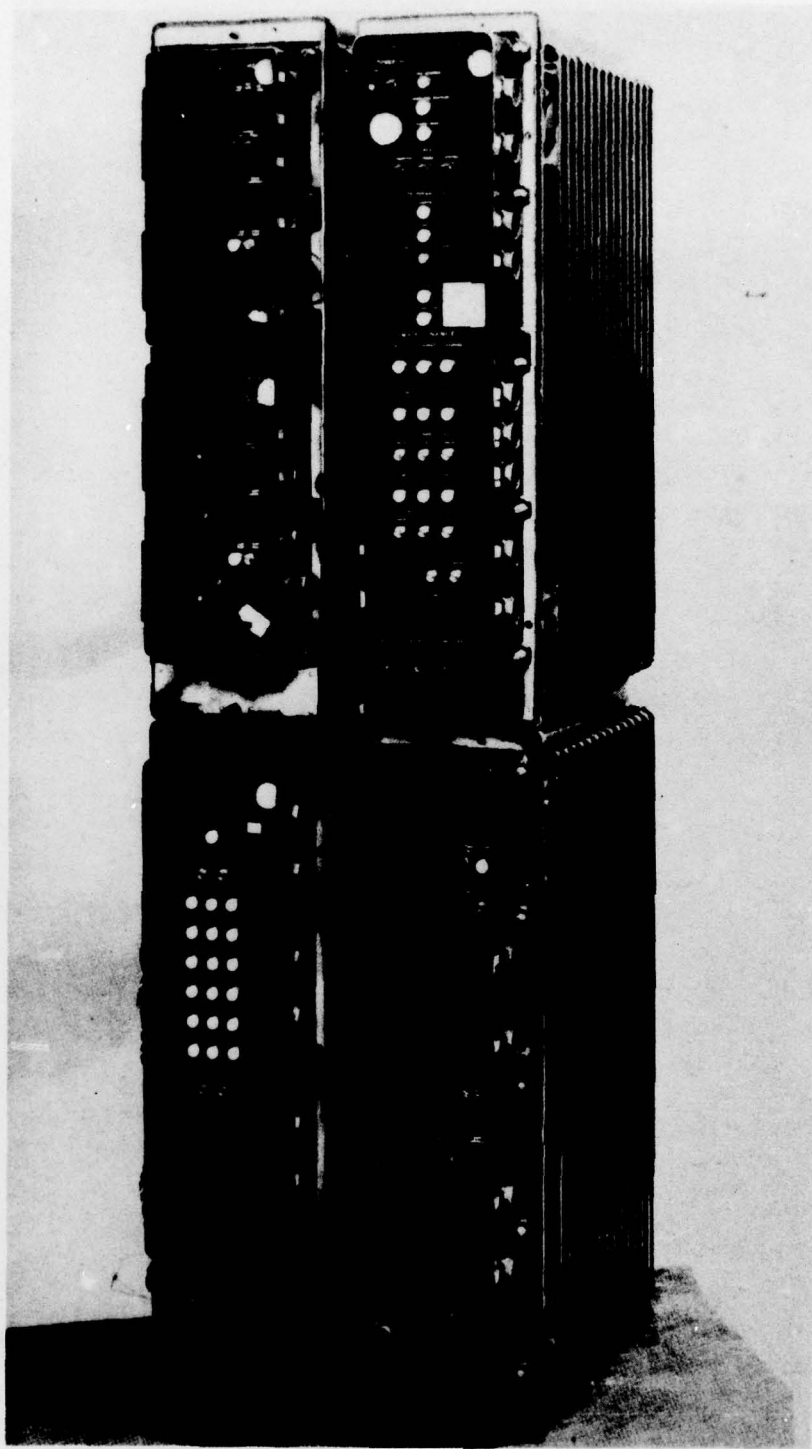


Figure H-5. AN/GYK-12 Computer

H-6

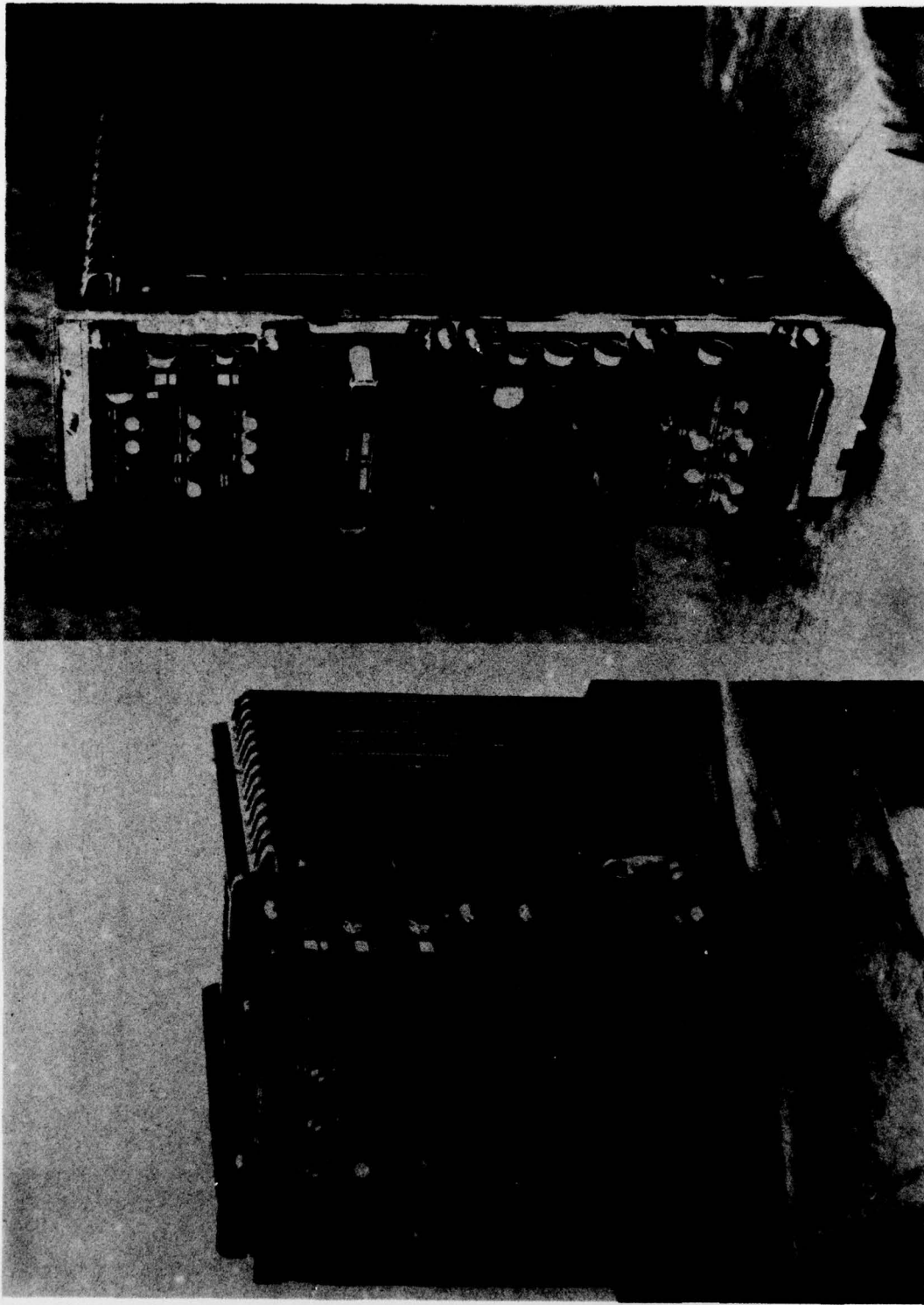


Figure H-6. Auxiliary Removable Media Memory (ARMM)
and Random Access Memory (RAM)

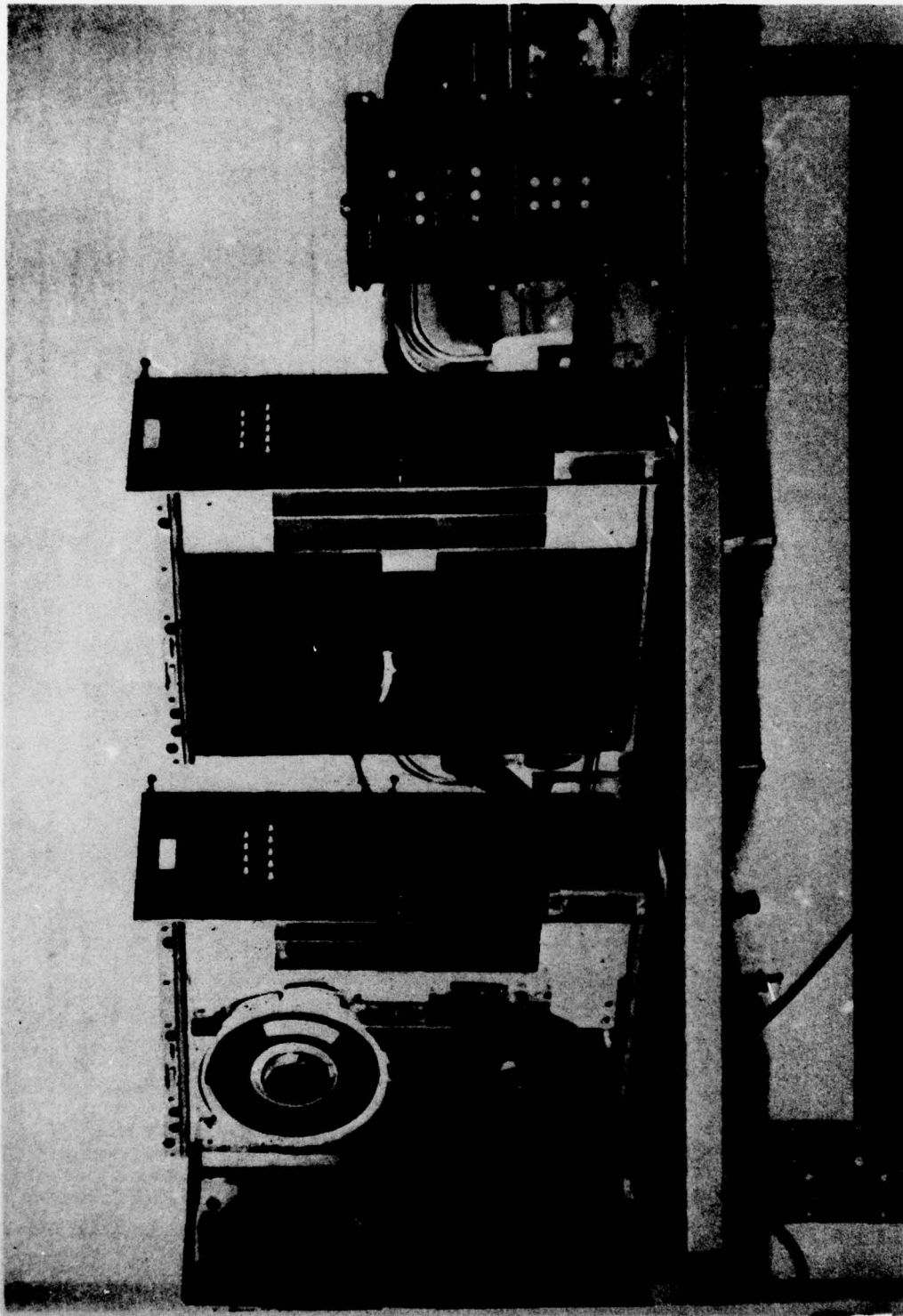


Figure H-7. (TOS²) Potter Tape Unit

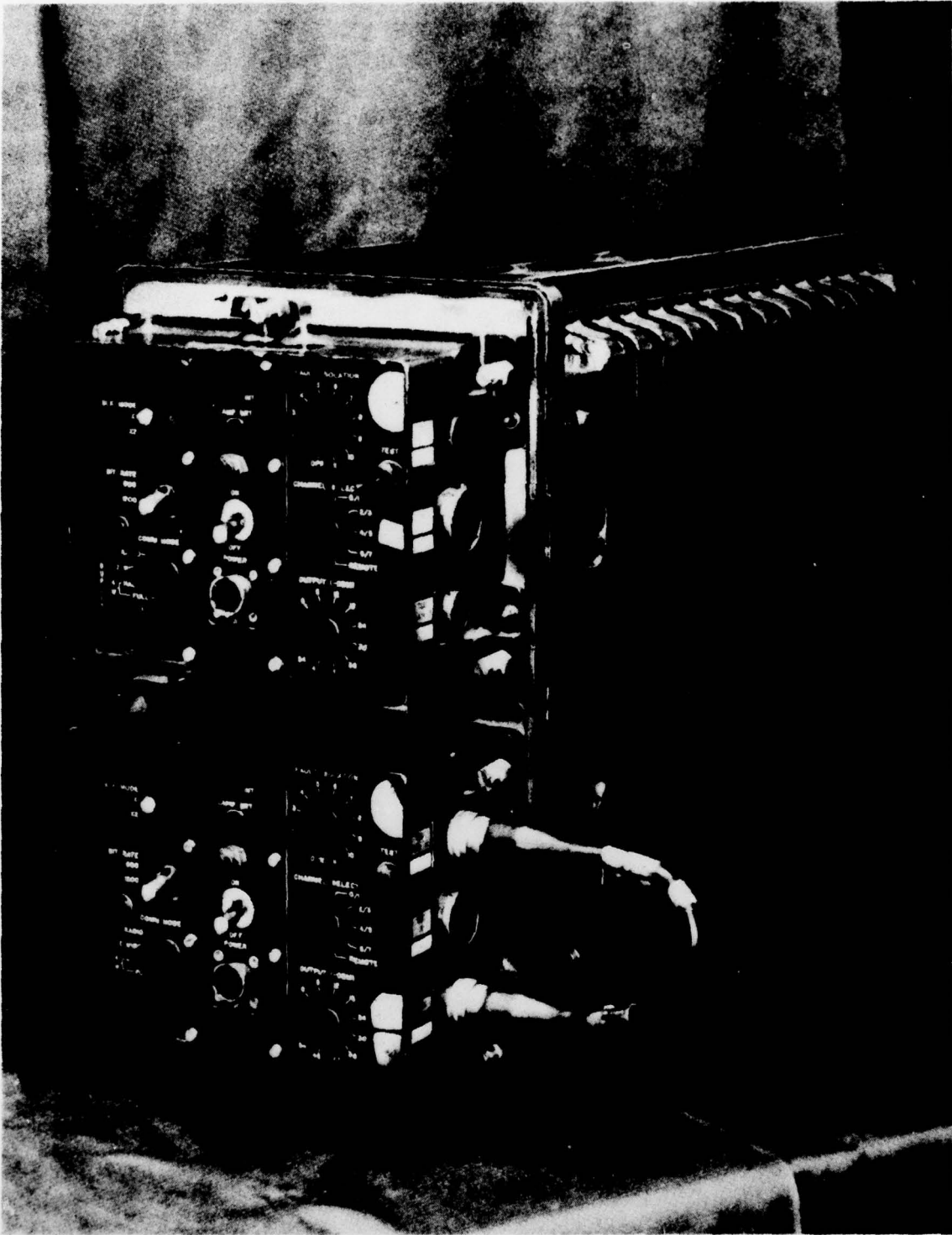


Figure H-8. Digital Data Terminal (DDT)

APPENDIX I

GLOSSARY OF TERMS

A

ACC - (TACFIRE) Artillery Control Console
ACCCE/ACCCEd - (ACC) Compose Edit (lower) Display
ACCRD - (ACC) Receive (upper) Display
ACCSA - (ACC) Switch Assembly
ARMM - Auxiliary Removable Media Memory Unit (includes MLU)

B

BOT - Beginning of Tape
BSL - Bootstrap Load

C

CE/CED - Compose Edit Display on the ACC or OCC (Same as ACCCED
(C/E) or OCCCED)
CPU - AN/GYK-12 Computer Central Processing Unit
CTS - Computer Test Set

D

DDT - Digital Data Terminal
DE - Display Editor
DIG - (CPU) Diagnose Status Lights
DPM - Digital Plotter Map (not used with PLANIT)

E

ELP - Electronic Line Printer

EOT - End of Tape

ETD - Electronic Tactical Display (not used with PLANIT)

F

FI - Fault Isolation program(s), part of AN/GYK-12 system software
(not a part of PLANIT system)

FINAL - AN/GYK-12 PLANIT System Final (termination of PLANIT
System operations) program module

FSU - (MIOD) Format Storage Unit (not used with PLANIT)

H

HSP - High Speed Printer (commercial peripheral printer in SSS
and PSSB)

I

IOU - AN/GYK-12 Computer Input/Output Unit

K

KB - Alphanumeric Keyboard

L

LSS - L-3050 Support Software (General Utility Programs)

M

MADCAP - Maintenance and Diagnostic Control and Activation Program
(MADCAP Operating System used as basic building block
for POS)

MCMU - Mass Core Memory Unit (131 k words, 32 bits plus parity
per word)

MEOF - MADCAP End of File

MIOD - (TOS²) Message Input/Output Device

MIOP - Machine Input/Output Program

MLU - Memory Load Unit (part of ARMM, includes TTC)

O

OCC - (TOS²) Operator Control Console

OCCCE/OCCCED - (OCC) Compose Edit (lower) Display

OCCRD - (OCC) Receive (upper) Display

OCCSA - (OCC) Switch Assembly

P

PCG - Power Converter Group

PEBU - Peripheral Equipment Buffer Unit

PLAN 1 - PLANIT Overlay 1 Program Module

PLAN 2 - PLANIT Overlay 2 Program Module

PLAN 3 - PLANIT Overlay 3 Program Module

PLAN 4 - PLANIT Overlay 4 Program Module

PLAN 5 - PLANIT Overlay 5 Program Module

PLAN 6 - PLANIT Overlay 6 Program Module

PLAN 7 - PLANIT Overlay 7 Program Module

PLAN 8 - PLANIT Overlay 8 Program Module

P
(Continued)

PLANIT - Programming Language for Interactive Teaching

Note: This is also the name given to the PLANIT MAIN program module.

POS - PLANIT Operating System

PSSB - (TACFIRE) Programming Support System B

PUP - PLANIT Utility Program

R

RAM - Random Access Memory (drum)

RAMCHECK - RAM track check program

RAMFI - RAM Fault Isolation program, part of AN/GYK-12 system software (not a part of PLANIT system)

RD - Read-only Display on the ACC or OCC (same as ACCRD or OCCRD)

RMMU - Removable Media Memory Unit (Same as ARMM)

S

SA - (ACC/OCC) Switch Assembly

SSS - (TOS²) Software Support System

START - AN/GYK-12 PLANIT System Start program module

T

TACFIRE - Tactical Fire Direction System (U. S. Army Artillery)

TACPOL - Tactical Procedure Oriented Language (programming language for the AN/GYK-12 computer)

TMIOP - Terminal MIOP

TOS² - Tactical Operating System Operable Segment

TTC - (ARMM/MLU) Tape Transport Cartridge

V

VFMED - (TACFIRE) Variable Format Message Entry Device