PLANIT SUPPORT AND UTILITY PROGRAMS--FLOW CHARTS

Richard F. Bergfeld, James L. Cilva, Barry Seid
James M. Fletcher and Alan M. Hoff
Litton Systems Incorporated

EDUCATIONAL TECHNOLOGY AND TRAINING SIMULATION TECHNICAL AREA

U. S. Army
Research Institute for the Behavioral and Social Sciences
May 1976
DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DDC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.
1. The reports listed on Inclosure 1 are approved for public release with unlimited distribution (50 numbered ARI Research Memorandums, 74-1 thru 76-30).

2. These are among the previously unrecorded ARI reports which you identified to us 22 June 1979 as not in your retrieval system. The accompanying box contains at least one copy of each report for your retention and reproduction.

HELEN S. PRICE  
Research Publications Group  
Army Research Institute
Research Memorandums are informal reports on technical research problems. Limited distribution is made, primarily to personnel engaged in research for the Army Research Institute.
This document presents the detailed flow charts of the computer program logic of the AN/GYK-12 computer PLANIT support and utility programs. The flows are intended for use in conjunction with the program listings to aid in understanding the program logic. These programs are part of the system installation of PLANIT (Programming Language for Interactive Teaching) on the AN/GYK-12 (TACFIRE) computer.

The PLANIT Support and Utility 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. 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." 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, 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), to effectuate the research necessary to test the concept.

---


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.


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. 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. 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 MASSTER Test FM 122, "IBCS: Automated Instruction." The hardware was a "given" viz., the Developmental Tactical Operations

---


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 (DEVTOS) which was then located at Fort Hood, Texas (Hoyt, et al. 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 DEVTOS responsibility, the U.S. Army Computer Systems Command (USACSC) and the Army Research Institute (ARI). A Memorandum of Understanding was drawn up between these two organizations and, as the first USAEAC task in this joint undertaking, a MASSTER Test 122 CAI Concept Paper was to provide alternative concepts for implementing automated instruction materials on the DEVTOS 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 Ibid. 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. 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. 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.  

---


14 For 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.


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 requirement 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 NASSTER 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.


20 Letter, DARB-ARB 19 July 1972, Subject: New Research Requirements for the Human Resources Research and Development Program (RCS CSCRD 70 CRI); letter response from CDCSAC-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, N.J. 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 raised 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."

22 Memorandum 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:

- TRANSL - The PLANIT Translator Program: Installation and Application
- PLANIT Support Programs - Operator/user manual
- PLANIT Utility Program - Operator/user manual
- PLANIT Support and Utility Programs - Test Procedure
- 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 installing 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, Litton Systems Inc., Van Nuys, CA under ARI Contract No. DAHC19-74-C-0064.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>SECTION</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1.1 Scope</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1.2 General Information</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1.3 General System Flow</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>DETAILED FLOW CHARTS</td>
<td>6</td>
</tr>
</tbody>
</table>
## LIST OF ILLUSTRATIONS

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PLANIT System Functional Interfaces</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>POS Flowchart (33 sheets)</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>RAMCHECK Flowchart (16 sheets)</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>START Flowchart (26 sheets)</td>
<td>56</td>
</tr>
<tr>
<td>5</td>
<td>FINAL Flowchart (18 sheets)</td>
<td>82</td>
</tr>
<tr>
<td>6</td>
<td>MIOP Flowchart (66 sheets)</td>
<td>100</td>
</tr>
<tr>
<td>7</td>
<td>TMIOP Flowchart (31 sheets)</td>
<td>166</td>
</tr>
<tr>
<td>8-19</td>
<td>Not Used</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>PUP Flowchart (56 sheets)</td>
<td>197</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SUPPLEMENTARY INFORMATION DOCUMENTS</td>
<td>2</td>
</tr>
</tbody>
</table>
SECTION 1

INTRODUCTION

1.1 Scope

This document provides the detailed flow charts of the computer program logic of the PLANIT support and utility programs. The programs were developed in support of the installation of the PLANIT (Programming Language for Interactive Teaching) author/student language on the AN/GYK-12 computer used in the U. S. Army Artillery Tactical Fire Direction System (TACFIRE). The flow charts are intended for use in conjunction with the program listings to aid in understanding the logic of the programs.

1.2 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 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 document and the individual program listings, detailed information on the operation and use of the AN/GYK-12 PLANIT System can be found in the documents listed in Table I.

The PLANIT Support Programs Operator/User Manual provides a detailed description of the procedures and operational sequences encountered during operation and use of the PLANIT Support Programs as a part of the overall AN/GYK-12 PLANIT system installation. Appendix I of the Support Programs Manual is a Glossary of Terms for reference purposes.
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 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 the PLANIT Support Programs Operator/User Manual.

**TABLE I. SUPPLEMENTARY INFORMATION DOCUMENTS**

<table>
<thead>
<tr>
<th>Litton Systems, Inc.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Systems Division</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>System Development Corporation</td>
<td></td>
</tr>
<tr>
<td>TM-(L)-4422/001/01 (Dated 1 October 1970)</td>
<td>PLANIT Author's Guide</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Northwest Regional Educational Laboratory</td>
<td></td>
</tr>
</tbody>
</table>
1.3 General System Flow

The AN/GYK-12 PLANIT system is comprised of the basic PLANIT author/student language (version 2.6, translated from FORTRAN to the AN/GYK-12 TACPOL programming language) and a set of support programs as listed below:

- PLANIT Operating System (POS)
- RAMCHECK
- START
- FINAL
- Machine Input/Output Program (MIOP)
- Terminal MIOP (TMIOP)

In addition a set of specialized utility routines have been developed to support the installation in such areas as preparation of field load tapes and cartridges, field history tapes and cartridges, library updates, character conversion, etc. This program is identified as the PLANIT Utility Program (PUP).

The detailed flow charts for the above programs are included in Section 2 of this document. Figure 1 depicts the generalized functional system interfaces of the various programs. It should be noted that PLANIT consists of nine program modules; PLANIT Main and the PLAN 1 through PLAN 8 overlays.

POS provides all of the initialization, executive and interrupt control functions including the bootstrap load routine and the byte handling routines; LDBYTE and SBYTE. RAMCHECK is used by POS during system initialization to check the Random Access Memory (RAM, drum memory) for bad tracks and establish an operational KAM map. In addition, POS handles MIOP and PLANIT calls, I/O support functions, PLANIT timer service and time of day and date maintenance.
START is used during system initialization to handle the date/time initialization, load sequences (bad RAM tracks, warm start, load history tape, etc.) and transfers control of the system to PLANIT upon completion of the initialization sequence.

FINAL is used to process the termination sequence, unload history tape data, termination file statistics, etc.

MIOP and TMIOP handle all RAM operations, unit record operations (card reader/punch, line printer, magnetic tape), terminal operations and PLANIT system service operations.
FIGURE 1. PLANIT SYSTEM FUNCTIONAL INTERFACES
SECTION 2

DETAILED FLOW CHARTS

This section is comprised of the detailed flow charts for the PLANIT support and utility programs. The flow charts are identified as figures 2 through 7 and figure 20 as listed below (figure numbers 8 through 19 not used):

Figure 2: POS Flow Chart
Figure 3: RAMCHECK Flow Chart
Figure 4: START Flow Chart
Figure 5: FINAL Flow Chart
Figure 6: MIOP Flow Chart
Figure 7: TMIOP Flow Chart
Figure 20: PUP Flow Chart

In addition to the flow charts and the individual program listings, detailed information on the operation and use of the AN/GYK-12 PLANIT system can be found in the documents identified in Section 1.2.
FIGURE 10. MURPHY FLOWCHART
null
Figure 12185 of Flowchart

198
FIGURE 1. DIAGRAM OF COMPUTER CONTROL