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CATEGORY I TEST REPORT

(TRI), Building 1210

COMPUTER PROGRAMS

FOR

TSDT TACC GRAPHICS FUNCTIONAL SOFTWARE

CONTRACT F19628-72-C-0068

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TECHNICAL MEMORANDUM

(TM Series)

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CATEGORY I TEST REPORT

COMPUTER PROGRAMS

FOR

TSDST TACC GRAPHICS FUNCTIONAL SOFTWARE

SYSTEM

DEVELOPMENT

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ABSTRACT

This document contains the Category I test results (Computer Programs) for the Graphics Display Capability added to the Current Operations Functional Software of the Tactical Data Systems Development Testbed. This test was conducted as the final task under Contract Number F19628-72-C0068.

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1.0 INTRODUCTION

The principle purpose of this test report is to document the conduct and results of the system test of the System Development Corporation current operations graphics software. This test was conducted as the Final task under contract F19628-72-C-0068 to verify the capability of the CUROPS Program System developed under that contract to generate, transfer and respond to graphic display information as specified in TM-LX-346/600/01B Computer Program Development Specification, TDSDT Graphics Functional Software.

This report also contains a brief description of the graphics capabilities that were developed under this contract. This descriptive information should provide a quick single point reference for anyone interested in the graphics capabilities developed under this contract.

2.0 BACKGROUND

2.1 HARDWARE SYSTEM DESCRIPTION

The Adage AGT-10 System provides the graphic display equipment capability. This system provided three graphic display terminals for use in Command Post A of the TDSDT. Each of these terminals is assigned to a specific User Station. Each terminal includes a 12x12 display screen, an alphanumeric keyboard and a lightpen. The display screens are an integrated component of a graphic display system that includes:

- a) Ambilog 200 computer
- b) Vector generator
- c) Character generator

The Ambilog 200 computer has a memory capacity of 8K 30 bit words. Associated with Ambilog 200 in the TDSDT Configuration are a disc drive and a magnetic tape drive. The vectors are generated at rates ranging from 5.54 sec for a 1/2" line to 384 sec for a 10" line. The maximum vector output per frame is:

- 2940 - 1" vectors, or
- 1660 - 3" vectors, or
- 800 - 7" vectors,

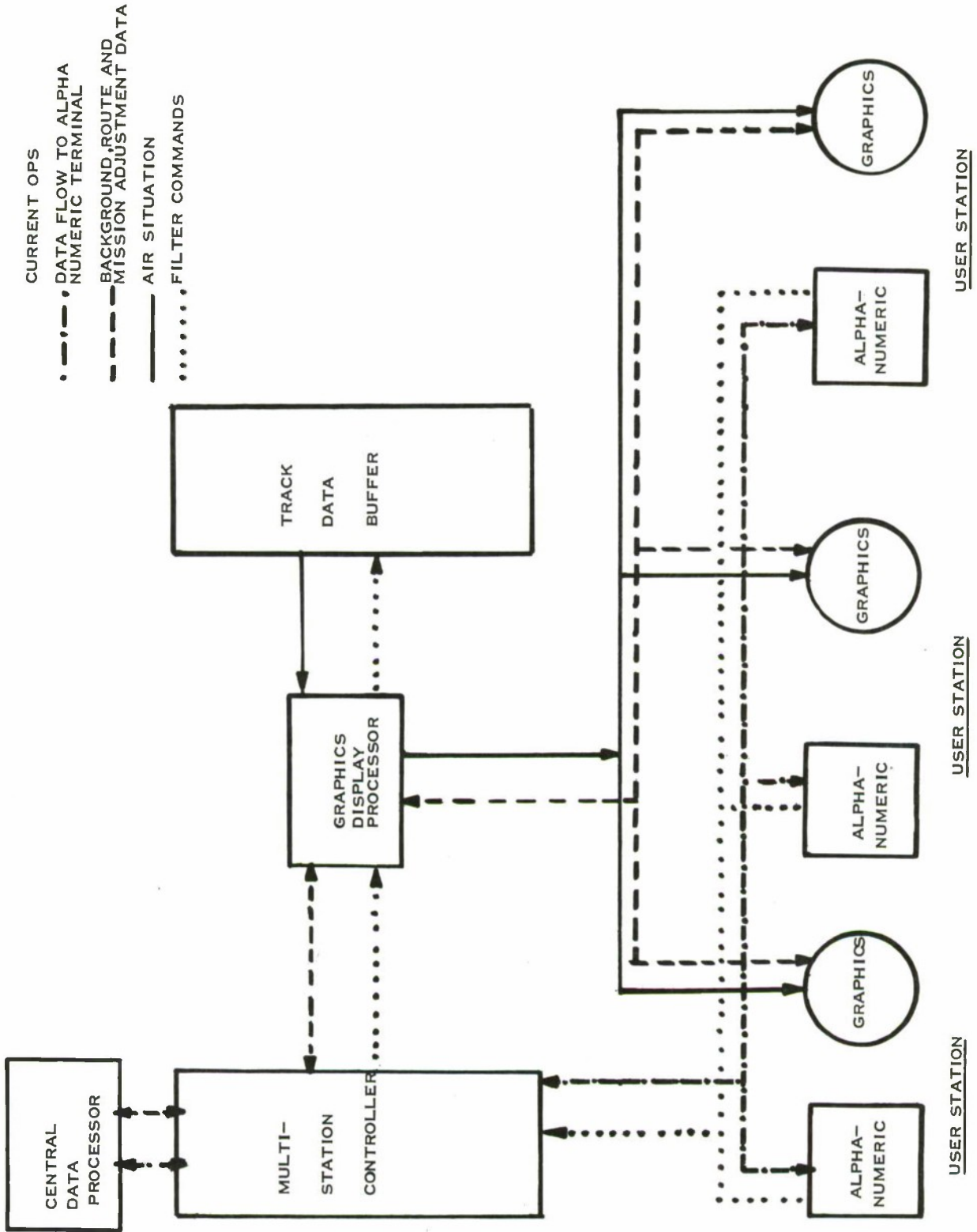


FIGURE 1

GRAPHIC DISPLAY CAPABILITY INFORMATION FLOW

or equivalent combinations of any of the above.

Characters are generated at rates ranging from 5.5 μ sec per 4 characters of text to 15 μ sec per character in a single character write-space mode. The maximum output per frame is 2600 characters.

The total display output limit of the graphic display system, utilizing all three display terminals, is the sum of all data displayed at the three terminals. This sum cannot exceed 2600 characters or 2940 1" vectors or the equivalent thereof. The average displayable data is about 900 characters/vectors per display.

The graphics display system interfaces with the Track Data Buffer Computer (PDP-8I) and the PDP-8 associated with the user stations located in Command Post A of the TSDST. Track position and status information is transferred from the Track Data Buffer Computer to the graphics computer for the display of an Air Situation. Information from the Current Operations data base is transferred from the 1800 computer to the graphics data processor. The data is routed via the Command Post A PDP-8 computer and contains Background and Mission Adjustment information used to generate displays at the graphic terminal. Filter commands for the Track Data Buffer computer are entered at the Sanders display terminal and are transferred to the Track Data Buffer Computer via the PDP-8 and Ambilog 200 computer. Figure 1 indicates the information flow between the Central Data Processor (IBM 1800), the Multistation Controller (PDP8), the Graphics Display Processor, the Track Data Buffer Computer (PDP-8I), and the Sanders and Graphics display terminals.

2.2 SOFTWARE OVERVIEW

The Current Operations Functional Software for the TDSDT is designed to be responsive to the TACC Current Operations requirements. The TACC is the focal point of the Tactical Air Control System (TACS) and serves to direct the employment of the tactical air forces in response to a constantly changing tactical situation. The TACC is connected by communications with operations centers of higher and lateral headquarters, subordinate units and subordinate agencies of the TACS. The basic principle of this structure is centralized control of tactical air operations by the TACC.

TACC centralized control of air operations is made possible through the presentation and evaluation of the operational factors of tactical operations data and reports. The data reflects the status of forces, operations in progress and actions of the enemy. This data is received in the form of reports, messages and requests from the various elements within the TACS. They are used by TACC personnel in performing the mission planning, coordinating, directing and monitoring responsibilities.

The data received from elements within the TACS reflects a dynamic tactical situation. It must be received, processed, and presented such that in a timely manner it supports the execution of the TACC operational responsibilities.

This Software provides support to the TACC in coordinating, directing and monitoring the tactical air effort and performs the following processing functions:

1. Input Message Processing
2. Mission Adjustment
3. Message Preparation
4. Condition/Event Monitoring
5. Display Control and Generation
6. Simulation

The graphic display capability that has been added to the Current Operations functional software provides the following general classes of display information:

1. Geography
2. Background overlays
3. Dynamic graphic displays

The geography developed for display was a map of Korea. This selection permitted the use of existing data base and simulation data to demonstrate a graphics display capability in the Current Operations environment. The geographic displays consisted of a vector display that approximated the outline of the Korean peninsula. Background overlays are made up of selected data classes that are by their nature relatively static. The background overlays available for graphic display in the Current Operations system are:

- Countries
- Cities
- Landmarks
- FEBA- Forward Edge of the Battle Area
- Enemy Airbases
- Enemy Missile Units
- Enemy Electronic Order of Battle
- Enemy Ground Order of Battle
- Friendly Forces Headquarters
- Air Force Units
- Ground Forces
- ADA - Air Defense Artillery
- Tactical Air Control Parties
- Naval Forces
- Search and Rescue Units
- Refueling Areas
- Electronic Warfare Stations
- Combat Air Patrol Stations
- Weather Points
- Hot Areas
- Route Points

Associated with each overlay is a different symbol. This symbol is displayed for each element that is included within an overlay. These overlays may be viewed separately or in combination with other overlays, geography or dynamic graphic displays.

GRAPHIC SYMBOLS AND ASSIGNMENT





















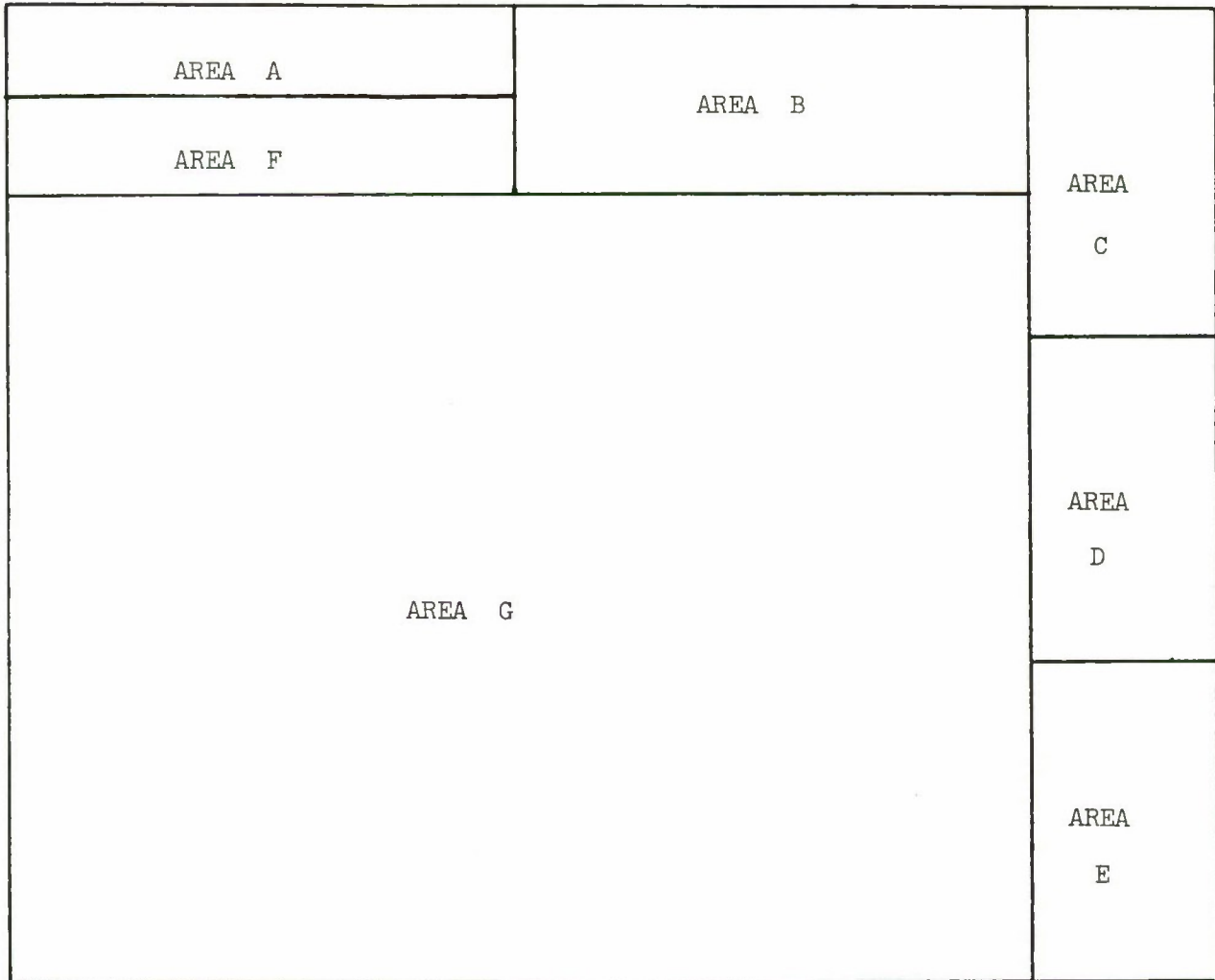
1	•	Point
2		(Undefined)
3		(Undefined)
4		Refueling Area
5		Surface Target
6		Circle (Approx)
7		SAM Site
10		Radar Site
11		Tactical Air Control Party
12		(Undefined)
13		Hot Areas
14		Cities
15	+	Route Points
16	≡	CAS Request
17	=	RECCE Request
20		Ground Forces
21		Combat Air Patrol Station
22		Enemy Electronic Order of Battle
23		Electronic Warfare Station
24		Enemy Ground Order of Battle
25		Friendly Headquarters
26		Air Force Unit
27		Naval Forces
30		Search and Rescue Stations
31		A/C in Distress or Downed A/C
32		Weather Points

TABLE 1

The dynamic graphic displays consist of those displays generated as a direct result of program action in the Current Operations system. Graphic displays have been provided for the following functions:

1. Candidate Targets
2. Candidate RECCE Requirements
3. Candidate CAS Requirements
4. Candidate Mission
5. Candidate Mission Schedule
6. SAR Requirements
7. Mission Adjustment
8. Air Situation

The 12x12 inch screen associated with a graphics terminal has been divided into seven functional areas. Each of these areas has been assigned a letter for identification and the space allocated to each area is illustrated in Figure 2.



GRAPHICS DISPLAY SCREEN

SURFACE ALLOCATION

Figure 2

Area A The purpose of this area is to provide space for composing keyboard input queries and for the receipt of error response messages when input messages are erroneous. This area contains two lines of 64 characters each.

Area B is reserved for the Mode Selection List. This list is always displayed and contains:

ADD
DELETE
MAP
OVERLAY
IDENT
TABULAR
ROUTE
TEXT
WINDOW

Each of the entries in this list is a selectable display option with the exception of the ADD and DELETE. A description of the use of the Mode Selection List is provided following the definition of functional display areas.

Area C is reserved for the Variable Selection Sub lists. The contents of this area is dependent upon the Mode Selection List action and is described in the section following the definition of functional display areas.

Area D and E are reserved for tabular information which amplifies a particular symbol's data that appears in the main geographic portion of the display. Each area provides a display area of 16 lines of 8 characters of tabular data.

Area F is reserved for 64 characters of legend or title data for the graphic information being displayed.

Area G All of the map related data, geographic overlays, and current air situation is presented in this area.

Mode Selection and Variable Selection Lists

Selection of the desired mode displayed in Area B is by lightpenning the AUD or DELETE option and the mode desired. In response to this selection a programmed response is provided. This response may include the presentation in Area C a Variable Selection Sub list from which further display actions may be requested. The contents of the Variable Selection List and programmed response for each Mode Selection is Contained in Table 1.

<u>MODE</u>	<u>VARIABLE SELECTION LIST</u>	<u>RESPONSE</u>
MAP	OVERALL SECTOR 1 SECTOR 2 SECTOR 3 SECTOR 4	The map for the sublist entry selected is added or deleted from the display.
OVERLAY	A list of overlay titles	The overlay title selected from the sublist is added or deleted from the display.
IDENT	None	The LABEL for the symbol light-penned is added or deleted from the display.
TABULAR	None	The TABULAR DATA for the symbol lightpenning is added or deleted from the display.
ROUTE	None	The ROUTE of the mission symbol lightpenning is displayed or deleted.
WINDOW	VIEWBOX EXPAND CONTRACT ZOOM	A square area of current display is expanded or contracted.
TEXT	None	Displays are converted into the alphanumeric format of the Sanders display.

Mode Selection and Variable Selection
Sublists for Graphic Displays

GRAPHIC DISPLAY EXAMPLE

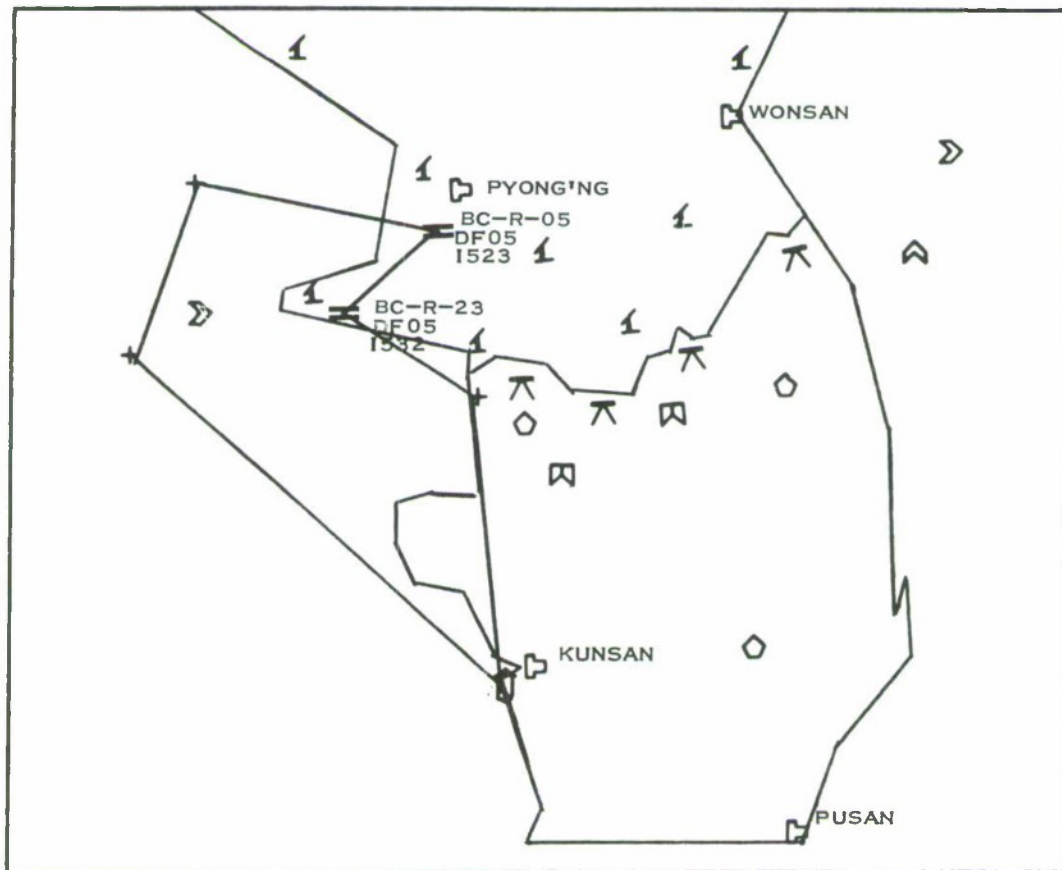


FIGURE 3

3.0 TEST CONDITIONS

The series of tests conducted during this effort were limited in scope to the validation of data and control messages generated by the Current Operations functional programs. All test results reported in this document were established from data that was recorded prior to transmission to the graphic display processing system. The documentation of these test results is a deviation from the original intention of documenting the results of a formal demonstration of the graphic display capability developed for the Current Operations system. It was necessary to deviate from the original test plan as documented in TM LX 346/801/00 because the required equipment/software capability of the Adage Graphic Display processing system could not support the data transfer, storage, retrieval and display generation requirements imposed on it by the Current Operations system operating in the scripted environment of a formal demonstration. Two serious problems appeared to prevent the graphics display equipment/software from meeting these requirements. The first of these problems was that the software associated with the graphics display processing system (Adage Equipment) was never fully developed or adequately tested prior to use with the Current Operations system. Attempts to use the graphic display processing system as a result of this software condition resulted in continual failure of the graphic display system. In addition to this lack of completely developed and tested software the second problem associated with this effort was a recurrent disk storage failure which usually caused the loss of the complete graphic display data base. Both of these problems prevented the delivery of an operational graphic display processing and generation system with which the graphic display capability of the Current Operations program system was to interface. The originally scheduled demonstration of this capability to validate the operation of this graphic display capability was modified to document the data generation and control message reaction of the Current Operation programs without actually using the graphic display interface or processing equipment. Because of this the test series described in section 4.0 were conducted. The results of these tests were used to verify that the Current Operations programs were able to generate, transfer and respond to the graphic display control messages as specified for each of the functions tested.

4.0 TEST DATA

4.1 CANDIDATE TARGETS

4.1.1 Function Description

The display is forced to the graphic display system as a result of a User taking the Candidate Target Selection action. As many as ten candidate targets may be displayed at one time. Each target type selected is identified by a unique symbol. Appearing with this symbol is a 3x8 character matrix containing the following information:

- a. Target Number
- b. Desired time over target
- c. Target Priority
- d. Mission Type

In addition, the following information is available by lightpen request as tabular data appearing in areas D or E of the display surface:

- a. Target Number
- b. Fighter Support Requirement
- c. EW Support Requirement
- d. Target Description
- e. A/C Type
- f. Number of Sorties
- g. Recommended Ordnance 1 and 2
- h. Latest time over target

4.1.2 Test Objective

The purpose of this test was to verify that the Candidate Targets Requirements transfer file (CRA1-3) is updated with the candidate targets that are identified by the Candidate Target selection process.

4.1.3 Test Procedure

- a. Request Candidate Target Requirements Selection
DED (CTRS)
- b. Enter 4 in LOWEST PRIORITY
- c. SEND BLOCK
- d. Compare the contents of each page of the Candidate Target display with the contents of the Candidate Requirements data transfer file (CRA1).
- e. Record test result data.

4.1.4 Test Results

The Candidate Target Selection process identified 49 candidate targets that met the selection criteria input. The first 10 targets were displayed at the Sanders.

The transfer file CRA2 contained entries for each of the Candidate Targets identified on the Sanders display.

All data contained in the transfer file was set as specified. Page 5 of the display was requested to verify that the graphic transfer file data generated was correctly associated with the Candidate Targets appearing on the Sanders display.

For each Candidate Target Selection request action taken the Shoulder TAP message COMM CRA2 1 U was generated.

4.2 CANDIDATE RECCE REQUIREMENTS

4.2.1 Function Description

This display is forced to the graphic display system as a result of a User taking the Candidate RECCE Request Selection action. Ten candidate RECCE requests may be displayed at one time at their respective geographic positions. Each Request selected is identified by a unique symbol. Appearing with this symbol is a 3x8 character matrix containing the following information:

- a. Request Number
- b. Request Type
- c. Latest time information is of value
- d. Request Priority
- e. Type of RECCE Requested

In addition to this information the following information is available by light-pen request as tabular data appearing in areas D or E of the display surface:

- a. Request Number
- b. Target Number
- c. Fighter Support Requirement
- d. EW Support Requirement
- e. Delivery Time Required

4.2.2 Test Objective

The purpose of this test was to verify that the Candidate RECCE Requirements transfer file (CRAL-3) is updated with the Candidate RECCE requests that are identified by the Candidate RECCE selection process.

4.2.3 Test Procedure

- a. Request Candidate RECCE Requirements Selection DED (CRRS)
- b. Enter 4 in LOWEST PRIORITY
- c. SEND BLOCK
- d. Compare the contents of each page of the Candidate RECCE Request display with the contents of the Candidate Requirements data transfer file (CRA1-3)
- e. Record test results

4.2.4 Test Results

The selection process could not identify any qualified RECCE Requirements from the data base files. Three RECCE requests were entered via the JOINT TAC AIR RECCE/SURVEILLANCE RFQ DED. These three requests were identified as WC-R-04, WC-R-05 and WC-R-06.

The Candidate RECCE Requirements Selection action caused the selection process to identify these requests as RECCE candidates. The contents of the data transfer file CRA3 contained entries for each of the three candidates that qualified and all data entries were correct. The Shoulder TAP message COMM CRA3 1 U was generated each time the Candidate RECCE Selection process identified qualified candidates.

4.3 CANDIDATE CAS REQUIREMENTS

4.3.1 Function Description

This graphic display capability presents candidate CAS requests identified by the candidate CAS request selection process on the graphic display surface at the geographic location specified in the CAS Request file of the data base. Each CAS request selected is identified by a symbol. Appearing with this symbol is a 3 X 8 character matrix containing the following information.

- a. Request Number
- b. Request Type
- c. Tactical Situation Indicator
- d. Request Priority
- e. Desired Results

In addition to this information the following information is available by lightpen request as tabular data appearing in areas D or E of the display surface.

- a. Request Number
- b. Requestor Identification
- c. Fighter Support Requirement
- d. EW Support Requirement
- e. Target
- f. Number of Sorties Requested
- g. A/C Type Requested
- h. Ordnance Recommended

This display is forced to the graphic display system as a result of a User taking the Candidate CAS Request Selection action. Ten candidate CAS Requests may be displayed at one time.

3.3.2 Test Objective

The purpose of this test was to verify that the Candidate CAS Requirements transfer file (CRAL-3) is updated with the candidate CAS requests that are identified by the Candidate CAS Request selection process.

4.3.3 Test Procedures

- a. Request Candidate CAS Requirements Selection
DED (CCRS)
- b. Enter 4 in LOWEST PRIORITY
- c. SEND BLOCK
- d. Compare the contents of each page of the Candidate CAS Requirements display with the contents of the Candidate Requirements Data Transfer File (CRA1-3)
- e. Record Test Result Data

4.3.4 Test Results

One Candidate CAS Request was identified by the selection process as qualifying as a Candidate CAS Requirement. This requirement was identified as DA-02. The graphic data transfer file contained all data items required for the display of request DA-02. The Shoulder TAP message COMM CRA3 1 U was generated.

4.4 CANDIDATE MISSION

4.4.1 Function Description

This graphic display capability presents candidate missions identified by the candidate mission selection process on the graphic display surface. For selected candidate missions that are currently airborne the estimated present position of the mission is displayed. Selected candidate missions that are not airborne are indicated at their scheduled departure base by unit number. Provision has been made to display as many as 3 units at a base having qualified candidate missions.

For the selected candidate missions that are airborne the following information is available:

- a. Mission Number
- b. Target Number
- c. Number of Sorties
- d. A/C Type

This information is displayed at the current position symbol associated with airborne mission. In addition, the following tabular information is available for airborne missions by lightpen request.

- a. Mission Number
- b. Ordnance Code
- c. Estimated Time Over Target
- d. Alternate Target and Priority
- e. Fighter Support Requirement
- f. EW Support Requirement
- g. Estimated Time to Return

For airborne RECCE missions, a single entry in the Tabular information is provided for each Request Number and estimated time over target associated with the RECCE mission.

This display is forced to the graphic display system as a result of a User taking the Candidate Mission selection action. As many as 10 candidate missions can be displayed at one time.

4.4.2 Test Objectives

The purpose of this test was to verify that the Candidate Mission transfer file (CMAL-3) is updated with Candidate RECCE or Fighter data that have been identified by the Candidate Mission selectuib process.

4.4.3 Test Procedures

4.4.3.1 Candidate RECCE Mission

- a. Request Candidate RECCE Mission Selection
DED (CRMS)
- b. Enter 252/0030 in START TIME
- c. Enter 252/1800 in END TIME
- d. SEND BLOCK
- e. Compare the contents of each page of the Candidate RECCE Mission display with the contents of the Candidate Mission transfer file (CMAL-3).

4.4.3.2 Candidate Fighter Mission

- a. Request Candidate Fighter Mission Selection
DED (CMS)
- b. Enter 252/0030 in START TIME
- c. Enter 252/1800 in END TIME
- d. Enter YES IN EXAMINE ALERT FIRST
- e. Enter 01 in NO. OF SORTIES
- f. SEND BLOCK
- g. Compare the contents of each page of the Candidate Fighter Mission display with the contents of the Candidate Mission transfer file
- h. Record Test Result Data

4.4.4 Test Results

4.4.4.1 Candidate RECCE Missions

The Candidate RECCE Mission selection process identified the following RECCE Missions as airborne candidates: 555-252-PRO1 and 555-252-PRO4. This process also selected the 555 TRS as having qualified candidate missions that were not airborne at the time of the request. The items of information were set in the data transfer file CMA2 as specified for Candidate RECCE Missions. The Shoulder TAP message COMM CMA2 1 U was generated as a result of the Candidate RECCE Missions request.

4.4.4.2 Candidate Fighter Missions

The Candidate Fighter Mission selection process identified 25 candidate missions as qualified candidates. The graphics data transfer file CMA2 contained an entry for each Candidate Fighter Mission that was airborne at the time of the request and contained an additional entry for each airbase at which candidate missions had been identified. Six squadrons at 4 different airbases were identified in the transfer file. All required data items were set in the graphics data transfer file and the Shoulder TAP message COMM CMA2 1 U was generated.

4.5 CANDIDATE MISSION SCHEDULE

4.5.1 Function Description

This graphic display capability presents the schedule and routes of as many as two missions that have been identified as candidates by the Candidate Mission Schedule Selection process. The display contains the route of the selected candidates indicated by vectors with appropriate symbols for each point designated on the route. For each point on the route, the following information is available by lightpen request.

- a. Mission Number
- b. Estimated Time at Point

For selected candidate mission schedules that are currently airborne at the time of the display request, the following information is available at the current location symbol.

- a. Mission Number
- b. Track Number
- c. Number of Sorties
- d. A/C Type

The display of the Candidate Mission Schedule is forced to the graphic display system when a User takes the Candidate Mission Schedule Selection action. The process identifies no more than two missions as candidate selections for this display.

4.5.2 Test Objective

The purpose of this test was to verify that the Candidate Mission Schedule transfer file is updated with the Candidate Mission (Fighter or RECCE) Schedule data identified by the Candidate Mission Schedule selection process

4.5.3 Test Procedures

4.5.3.1 Candidate RECCE Mission Schedule (Single Request)

- a. Request the Candidate RECCE Mission Schedule Display Request DED (CRSD)
- b. Enter 555-252-PRO1 in MSN NO.
- c. Enter DI-R-02
- d. SEND BLOCK
- e. Compare the contents of the display generated with the contents of the Candidate Mission Schedule transfer file (CMS11-31)
- f. Record Test Results Data

4.5.3.2 Candidate RECCE Mission Schedule (Candidate Mission Schedule Request)

- a. Request Candidate RECCE Mission Selection DED (CRMS)
- b. Enter 252/0700 START TIME
- c. Enter 252/1200 END TIME
- d. Enter DI-R-04 REQUEST NO.
- e. SEND BLOCK
- f. Compare the contents of the mission schedules displayed with the contents of the Candidate Missions Schedule data transfer files (CMS11-CMS12)
- g. Record Test Results Data

4.5.3.3 Candidate Fighter Mission Schedule (Single Request)

- a. Request the Candidate Fighter Mission Schedule Display Request DED (CFSD)
- b. Enter 123-252-INO2 in MSN NO.
- c. Enter BT05 in REQ/TGT NO.
- d. SEND BLOCK
- e. Compare the contents of the Candidate Fighter Mission Schedule display with the contents of the Candidate Mission Schedule transfer file (CMS11)
- f. Record Test Results Data

4.5.3.4 Candidate Fighter Mission Schedule (Candidate Mission Schedule Request)

- a. Request Candidate Fighter Mission Selection
DED (CFMS)
- b. Enter 252/0100 in START TIME
- c. Enter 252/1800 in END TIME
- d. Enter YES in EXAMINE ALERT FIRST
- e. Enter AB-01 in REQ/TGT NO.
- f. Enter 1200 in TOT
- g. SEND BLOCK
- h. Compare the contents of the display generated with the contents
of the Candidate Mission Schedule transfer files (CMS11-CMS12)
- i. Record Test Results Data

4.5.4 Test Results

4.5.4.1 Candidate RECCE Mission Schedule (Single Request)

The Candidate Mission Schedule Display was generated for mission 555-252-PR01 as requested. The graphic data transfer file CMS31 was updated to contain all the data items necessary for the generation of the Candidate RECCE Mission Schedule Graphic Display. Shoulder TAP messages for files CMS31 and CMS32 were generated. The message for file CMS32 is not required by this request.

4.5.4.2 Candidate RECCE Mission Schedule

The selection process identified two missions as candidates for scheduling. These missions are 555-252-PR01 and 555-252-PR02. The schedule for each mission was developed correctly and used to update the graphic transfer files CMS21 and CMS22 respectively. Each of these files contained all necessary data items required for graphic display generation. The process also generated the Shoulder TAP messages COMM CMS21 1 U and COMM CMS22 1 U as required.

4.5.4.3 Candidate Fighter Mission Schedule (Single Request)

The Candidate Fighter Mission Schedule process generated the mission schedule display for 123-252-IN02 as requested. The data transfer file CMS31 contained all mission schedule information required to generate a graphics display for mission 123-252-IN02. The process generated the Shoulder TAP message COMM CMS31 1 U as required and in addition generated a Shoulder TAP message for file CMS32 which is not required by this process.

During this test, the location associated with the departure base was being incorrectly updated in the transfer file. This condition was corrected and the departure base location is being properly updated now.

4.5.4.4 Candidate Fighter Mission Schedule

The Candidate Fighter Mission Selection process identified the missions 123-252-IN02 and 123-252-CA01 as qualified for being scheduled against the requirement input. The graphic data transfer files CMS21 and CMS22 were updated to contain the data items required for transfer to the graphic display system. All required data items were set as required in each of these files. The Shoulder TAP messages: COMM CMS21 1 U and COMM CMS22 1 U were generated by the selection process as required.

4.6 SAR REQUIREMENTS

4.6.1 Function Description

This graphics display capability presents SAR requirements that have been established in the data base of the Current Operations system. Each Downed Pilot or Aircraft in Distress report received by this system to which SAR missions have been assigned causes the SAR requirements symbol and label information to be displayed at the reported location of the event. The following information is available associated with the symbols:

- a. SAR Requirement number
- b. Mission Number
- c. Airborne or Ground Indicator

The following tabular information is available by lightpen request for each symbol appearing in the display.

- a. SAR Requirement Number
- b. Mission Number
- c. Trunk Number
- d. Assigned SAR Mission #1
- e. Assigned SAR Mission #2
- f. Assigned SAR Mission #3
- g. Time of report

This display must be requested by the User at the Graphic display terminal.

4.6.2 Test Objective

The purpose of this test was to verify that the SAR Requirements transfer file (SARR) is updated with the data base information required concerning the SAR Mission Assignment.

4.6.3 Test Procedures

- a. Request a Downed Pilot Report
DED (DPRT)
- b. Enter 123-252-CA04 in MSN NO.
- c. Enter AJAX-01 in C/S
- d. Enter 272/1000 in TIME
- e. Enter 3745N/2754E in POSITION
- f. SEND BLOCK
- g. Request a SAR Assignment
DED (SRAD)
- h. Enter 049-252-SR01 in MSN NO.
- i. Enter SAR01 in SAR REQ.NO.
- j. SEND BLOCK
- k. Compare the contents of the SAR Assignment display with the
contents of the SARR transfer file.
- l. Record test result data

4.6.4 Test Results

The SARR data transfer file was updated as required when the SAR assignment action was taken. The file contained an entry for each active SAR Requirement in the system. A Shoulder TAP message COMM SARR 1 U was generated.

4.7 MISSION ADJUSTMENT

4.7.1 Function Description

This graphic display capability permits the User to request a display of the route of any mission which has been modified or created by the mission adjustment action. As a result of the adjustment actions of a User the information associated with the route of the adjusted mission is transferred to the display data base of the graphic system. The route display contains a unique symbol for each point on a mission route with the point identifier, mission number and estimated time at the point available for display at the point by lightpen request.

4.7.2 Test Objectives

The purpose of this test was to verify that the Route File is updated with route data as the result of a Mission Adjustment action.

4.7.3 Test Procedure

4.7.3.1 Fighter Mission Adjustment

- a. Request a Fighter Planning Adjustment DED (FPAD) for MSN NO. 110-252-CA01
- b. Change time over target 252/1630
- c. Change target to BT13
- d. SEND BLOCK
- e. Establish PMNO assigned to adjusted mission
- f. Compare contents of ROUTE file for adjusted mission to mission display generated by the adjustment action
- g. Record test results data

4.7.3.2 RECCE Mission Adjustment

- a. Request a RECCE Planning Adjustment DED (RPAD) for MSN NO. 555-252-PRO2
- b. Change time over target to 1640
- c. SEND BLOCK
- d. Establish PMNO assigned to adjusted mission
- e. Compare contents of ROUTE file for adjusted mission to mission display generated by the adjustment action
- f. Record test results data

4.7.3.3 Support Mission Planning

- a. Request a Support Mission Planning DED (SMPD)
- b. Enter 555TRS in UNIT
- c. Enter EW in MSN. TYPE
- d. Enter EB66D in A/C type
- e. Enter 1 in NO. of SORTIES
- f. Enter CHAF in EW TYPE
- g. Enter 3800N/12700E in ORBIT
- h. Enter 272/1300 in REQ. TIME
- i. Enter 1+30 in DURATION
- j. Enter WC in INGRESS
- k. Enter WC in EGRESS
- l. SEND BLOCK
- m. Establish PMNO assigned to planned support mission
- n. Compare contents of ROUTE file with mission route data contained in mission display.
- o. Record test result data

This test should be repeated for Fighter Escort and CAP Missions.

4.7.4 Test Results

The mission routes were entered into the Route File for each adjustment or planning action taken. All time, route points and station identifier entries for each route generated by adjustment action were correct as to form and content. The entries in the Route File were properly identified for transfer when the Shoulder TAP message was issued by the Route coreload.

As specified, routes are not generated for Fighter or EW missions that are designated as escorts.

4.8 AIR SITUATION

4.8.1 Function Description

This graphics display capability permits the display in near real time air situation data relating to both friendly and hostile aircraft. The inputs to this display capability are simulated PLRACTA track position messages that cause the specified symbology for the track to appear at its most recent reported position.

4.8.2 Test Objective

The purpose of this test was to verify the PLRACTA messages necessary for an air situation display are recorded on the STAG tape.

4.8.3 Test Procedures

The contents of STAG tape used to generate air situation display is printed using the TAP processor on the PDP-8I.

4.8.4 Test Results

Aircraft position report messages were generated and stored on the STAG tape. This is a simulation system for the generation of simulated PLRACTA messages. The contents of the STAG were printed using the TAP processing system. All messages, PLA and T, required for the generation of an air situation display were present on the tape.

During this test no attempt to have the PDP-8I (Track Data Buffer Computer) read and process these simulated messages using the message filtering capability was attempted.

4.9 INITIALIZATION

4.9.1 Function Description

This is the process whereby all the information necessary to create the specified graphic display Overlays is transferred from the data base of Current Operations to the graphic display system data base. The graphic display overlays available for the Current Operations system are identified in Table 3. The information that is available for display as label data for each of these overlays is identified.

LABEL 3

LABEL 2

LABEL 1

	LABEL 1	LABEL 2	LABEL 3
BOUNDARIES	None (Vectors Only)	None	None
CITIES	NAME	None	None
LANDMARKS	NAME	None	None
FEBA	None (Vectors Only)	None	None
ENEMY AIRBASE	BASENAME		
ENEMY MISSILE UNIT	SITE IDENTIFIER	TYPE MISSILE	None
ENEMY ELECTRONIC	SITE IDENTIFIER	EW	GCI
ORDER OF BATTLE			
ENEMY GROUND ORDER OF BATTLE	UNIT IDENTIFIER	None	None
FRIENDLY HTQRS	AGENCY	CALLSIGN	None
AIR FORCE UNITS	AGENCY/UNIT	CALLSIGN	Location Identifier
GROUND FORCES	AGENCY	CALLSIGN	TYPE
ADA	ELEMENT ID	BATTERY	CALLSIGN
TACTICAL AIR-CONTROL PARTY	UNIT	BRIGADE	CALLSIGN
NAVAL FORCE	UNIT	CALLSIGN	TYPE
SEARCH AND RESCUE STATION	IDENTIFIER	CALLSIGN	A/C no & type
REFUELING AREAS	IDENTIFIER	CALLSIGN	None
ELECTRONIC WARFARE STATION	IDENTIFIER	CALLSIGN	None
COMBAT AIR PATROL STATIONS	CAP	CALLSIGN	None
WEATHER POINTS	IDENTIFIER	Ceiling/Visibility	Weather
HOT AREA	IDENTIFIER	None	None
ROUTE POINTS	IDENTIFIER	None	None

GRAPHIC DISPLAY OVERLAYS

TABLE 3

In addition to the transfer of the overlay files during the initialization process, the mission route data for a missions currently contained in the Frag Order Mission files of the data base are also transferred to the graphic display system data base. The graphic display of any mission route contained in the Frag Order may be requested by a User.

4.9.2 Test Objectives

The purpose of this test was to verify that the background data files required for graphic display overlay are transferred during the initialization process. Also the transfer of entries in the Route File are verified to establish that route data for all planned missions are transferred as required during initialization.

4.9.3 Test Procedures

- a. Enter COMM INITIALIZE ADAGE FILES
- b. SEND BLOCK
- c. Compare printed output of transfer file contents with background display files and planned mission route data.
- d. Record test results data

4.9.4 Test Results

The files identified in the list of files to be initialized were transferred to the printer and printed in 5 object pages. The complete list of files as identified in the STATICINIT File were transferred and printed in this manner.

The graphic display ROUTE file was updated for each mission that was identified in the Frag Order/Mission Schedule files for which a PLRACTA mission number

had been established (property PMNO). The route data was printed for each mission. The following files were processed for route data for graphic display initialization:

- Pre-Planned Fighter Frag Order/Mission Schedule
- Pre-Planned RECCE Frag Order/Mission Schedule
- Electronic Warfare Frag Order/Mission Schedule
- Immediate Close Air Support Mission Schedule
- Immediate RECCE Mission Schedule
- Search and Rescue Frag Order/Mission Schedule

All times, route point identifiers and locations were in proper format for each mission route transferred during the initialization process.

5.0 SUMMARY

This test program indicated that all the modifications and additions to the Current Operations functional software necessary to control and transfer data to a graphic display processing system operated as specified. The capability to actually generate graphic displays as required by the Current Operations functions was never achieved. All test result data for this report was gathered on the Current Operations side of the Current Operations - Graphic Display interface and validated only the fact that the data was generated correctly and in proper format.

6.0 CONCLUSION

From the analysis of test result data the ability of the Current Operations functional software to provide the necessary data for the generation of graphic displays has been indicated. The specific test results indicate that for each of the functions to which a graphic display capability was added the function performed as specified generating the proper display and control information.

Table 3 identifies each of the Current Operations functions that have been provided with a graphic display capability. For each capability tested the data transfer file is identified and the requirements for a unique control (Shoulder Tap) message is indicated.

Current Operations Capability	Specification Reference TM-LX-346/600/01B
1. Candidate Target Requirements	3.1.2.7.8.3.1.1.2.3
2. Candidate RECCE Requirements	3.1.2.7.8.3.1.1.1
3. Candidate CAS Requirements	3.1.2.7.8.3.1.1.2
4. Candidate Mission	
A. Fighter	3.1.2.7.8.3.1.2.1
B. RECCE	3.1.2.7.8.3.1.2.2
5. Candidate Mission Schedule	
A. Fighter	3.1.2.7.8.3.1.3.1
B. RECCE	3.1.2.7.8.3.1.3.2
6. SAR Requirements	3.1.2.7.8.3.1.1.4
7. Mission Adjustment	
A. Fighter	3.1.2.7.8.3.1.4
B. RECCE	3.1.2.7.8.3.1.4
C. Support	3.1.2.7.8.3.1.4
8. Air Situation	
A. Simulated Messages	3.1.2.7.8.3.2
9. Initialization	
A. Background	3.1.2.7.8.3.3
B. Routes	3.1.2.7.8.3.3

TABLE 3

7.0 RECOMMENDATION

The essential objectives of the test conducted in this effort have been to verify the performance of the ability of the Current Operations program system to generate information necessary for a graphic display capability. Since these objectives have been attained it is recommended that the results of this test effort be accepted as completion of the efforts of SDC to develop and implement a graphics display capability for the Current Operations programs.

During the development and implementation of this graphic display capability in some instances data was transferred to the graphic display system and displays were generated. Sufficient capability to operate without equipment and/or software malfunctions for extended time periods prevented any realistic evaluation of the design or information presentation of the graphic displays. The usefulness of these graphic displays is in relating locations and distances.

The use of label data with symbols should be kept to a minimum. All amplifying data associated with a displayed symbol should appear as tabular data and appear only at the request of an operator.

The use of forced label displays also tends to clutter the display and the number of characters available for display as label information should be kept to a minimum. Possibly eight characters would be sufficient for label information.

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13. ABSTRACT

This document contains the Category I test results (Computer Programs) for the Graphics Display Capability added to the Current Operations Functional Software of the Tactical Data Systems Development Testbed. This test was conducted as the final task under Contract Number F19628-72-C-0068.