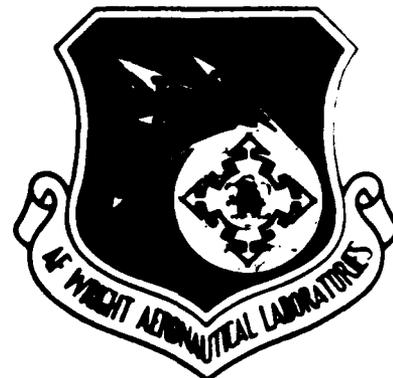


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Volume VIII
Part 31

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INTEGRATED INFORMATION
SUPPORT SYSTEM (IISS)
Volume VIII - User Interface Subsystem
Part 31 - Text Editor Unit Test Plan

General Electric Company
Production Resources Consulting
One River Road
Schenectady, New York 12345

Final Report for Period 22 September 1980 - 31 July 1985
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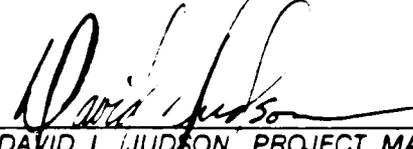
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This report has been reviewed by the Office of Public Affairs (ASD/PA) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.



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PREFACE

This unit test plan covers the work performed under Air Force Contract F33615-80-C-5155 (ICAM Project 6201). This contract is sponsored by the Materials Laboratory, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio. It was administered under the technical direction of Mr. Gerald C. Shumaker, ICAM Program Manager, Manufacturing Technology Division, through Project Manager, Mr. David Judson. The Prime Contractor was Production Resources Consulting of the General Electric Company, Schenectady, New York, under the direction of Mr. Alan Rubenstein. The General Electric Project Manager was Mr. Myron Hurlbut of Industrial Automation Systems Department, Albany, New York.

Certain work aimed at improving Test Bed Technology has been performed by other contracts with Project 6201 performing integrating functions. This work consisted of enhancements to Test Bed software and establishment and operation of Test Bed hardware and communications for developers and other users. Documentation relating to the Test Bed from all of these contractors and projects have been integrated under Project 6201 for publication and treatment as an integrated set of documents. The particular contributors to each document are noted on the Report Documentation Page (DD1473). A listing and description of the entire project documentation system and how they are related is contained in document FTR620100001, Project Overview.

The subcontractors and their contributing activities were as follows:

TASK 4.2

<u>Subcontractors</u>	<u>Role</u>
Boeing Military Aircraft Company (BMAC)	Reviewer.
D. Appleton Company (DACOM)	Responsible for IDEF support, state-of-the-art literature search.
General Dynamics/ Ft. Worth	Responsible for factory view function and information models.

<u>Subcontractors</u>	<u>Role</u>
Illinois Institute of Technology	Responsible for factory view function research (IITRI) and information models of small and medium-size business.
North American Rockwell	Reviewer.
Northrop Corporation	Responsible for factory view function and information models.
Pritsker and Associates	Responsible for IDEF2 support.
SofTech	Responsible for IDEFO support.

TASKS 4.3 - 4.9 (TEST BED)

<u>Subcontractors</u>	<u>Role</u>
Boeing Military Aircraft Company (BMAC)	Responsible for consultation on applications of the technology and on IBM computer technology.
Computer Technology Associates (CTA)	Assisted in the areas of communications systems, system design and integration methodology, and design of the Network Transaction Manager.
Control Data Corporation (CDC)	Responsible for the Common Data Model (CDM) implementation and part of the CDM design (shared with DACOM).
D. Appleton Company (DACOM)	Responsible for the overall CDM Subsystem design integration and test plan, as well as part of the design of the CDM (shared with CDC). DACOM also developed the Integration Methodology and did the schema mappings for the Application Subsystems.

Subcontractors

Role

Digital Equipment Corporation (DEC)

Consulting and support of the performance testing and on DEC software and computer systems operation.

McDonnell Douglas Automation Company (McAuto)

Responsible for the support and enhancements to the Network Transaction Manager Subsystem during 1984/1985 period.

On-Line Software International (OSI)

Responsible for programming the Communications Subsystem on the IBM and for consulting on the IBM.

Rath and Strong Systems Products (RSSP) (In 1985 became McCormack & Dodge)

Responsible for assistance in the implementation and use of the MRP II package (PIOS) that they supplied.

SofTech, Inc.

Responsible for the design and implementation of the Network Transaction Manager (NTM) in 1981/1984 period.

Software Performance Engineering (SPE)

Responsible for directing the work on performance evaluation and analysis.

Structural Dynamics Research Corporation (SDRC)

Responsible for the User Interface and Virtual Terminal Interface Subsystems.

Other prime contractors under other projects who have contributed to Test Bed Technology, their contributing activities and responsible projects are as follows:

Contractors

ICAM Project

Contributing Activities

Boeing Military Aircraft Company (BMAC)

1701, 2201, 2202

Enhancements for IBM node use. Technology Transfer to Integrated Sheet Metal Center (ISMC).

<u>Contractors</u>	<u>ICAM Project</u>	<u>Contributing Activities</u>
Control Data Corporation (CDC)	1502, 1701	IISS enhancements to Common Data Model Processor (CDMP).
D. Appleton Company (DACOM)	1502	IISS enhancements to Integration Methodology.
General Electric	1502	Operation of the Test Bed and communications equipment.
Hughes Aircraft Company (HAC)	1701	Test Bed enhancements.
Structural Dynamics Research Corporation (SDRC)	1502, 1701, 1703	IISS enhancements to User Interface/Virtual Terminal Interface (UI/VTI).
Systran	1502	Test Bed enhancements. Operation of Test Bed.

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SECTION 1

GENERAL

1.1 Purpose

This unit test plan establishes the methodology and procedures used to adequately test the capabilities of the computer program identified as the Forms Processor Text Editor known in this document as the Text Editor (TE). The TE is one configuration item of the Integrated Information Support System (IISS) User Interface (UI).

1.2 Project References

- [1] ICAM Documentation Standards, 15 September 1983, IDS150120000C.
- [2] General Electric Co., System Design Specification, 7 February 1983.
- [3] Structural Dynamics Research Corporation, Text Editor Development Specification, DS 620144600B, 1 November 1985.
- [4] Structural Dynamics Research Corporation, Report Writer Unit Test Plan, UTP620144501, 1 November 1985.
- [5] Structural Dynamics Research Corporation, Rapid Application Generator Unit Test Plan, UTP620144502, 1 November 1985.
- [6] Structural Dynamics Research Corporation, Form Processor Unit Test Plan, UTP620144200, 1 November 1985.
- [7] Structural Dynamics Research Corporation, Application Interface Unit Test Plan, UTP620144700, 1 November 1985.
- [8] Structural Dynamics Research Corporation, Forms Language Compiler Unit Test Plan, UTP620144402, 1 November 1985.

- [9] Structural Dynamics Research Corporation, Forms Driven Form Editor Unit Test Plan, UTP620144402 , 1 November 1985.
- [10] Structural Dynamics Research Corporation, User Interface Services Unit Test Plan, UTP620144100 , 1 November 1985.
- [11] Structural Dynamics Research Corporation, Virtual Terminal Unit Test Plan, UTP620144300 , 1 November 1985.

1.3 Terms and Abbreviations

Buffer Name: The default file in which the buffer will be saved if no file is given on a save command.

Current Cursor Position: the position of the cursor before an edit command or function is issued in the text editor.

Cursor Position: the position of the cursor after any command is issued.

Cut and Paste Buffer: where deleted lines go and the paste and fill edit commands get their data.

Display Start Line: the first line in the buffer to be displayed.

Display Size: the number of lines used in the edit area.

Field: two-dimensional space on a terminal screen.

Field Pointer: indicates the ITEM which contains the current cursor position.

Form Processor: (FP), subset of the IISS User Interface that consists of a set of callable execution time routines available to an application program for form processing.

Form Processor Text Editor: (FPTE), subset of the Form Processor that consists of software modules that provide text editing capabilities to all users of applications that use the Form Processor.

IISS Function Screen: the first screen that is displayed after logon. It allows the user to specify the function he wants to access and the device type and device name on which he is working.

Integrated Information Support System: (IISS), a test computing environment used to investigate and demonstrate and test the concepts of information management and information integration in the context of Aerospace Manufacturing. The IISS addresses the problems of integration of data resident on heterogeneous data bases supported by heterogeneous computers interconnected via a Local Area Network.

Item: non-decomposable area of a form in which hard-coded descriptive text may be placed and the only defined areas where user data may be input/output.

Message: descriptive text which may be returned in the standard message line on the terminal screen. Messages are used to warn of errors or provide other user information.

Message Line: a line on the terminal screen that is used to display messages.

Operating System: (OS), software supplied with a computer which allows it to supervise its own operations and manage access to hardware facilities such as memory and peripherals.

Paging and Scrolling: a method which allows a form to contain more data than can be displayed with provisions for viewing any portion of the data buffer.

Previous Cursor Position: the position of the cursor when the previous edit command was issued.

Previous Edit Command: the function key pressed before the current one.

Select Line: one terminus of the select range.

Select Mode: when on, certain commands will be executed over the lines in the selected range. The commands are <DELETE LINE> or replace.

Text Editor: (TE), subset of the IISS User Interface that consists of a file editor that is based on the text editing functions built into the Form Processor.

Top of File: the first line of the buffer.

User Interface: (UI), IISS subsystem tht controls the user's terminal and interfaces with the rest of the system. The UI consists of two major subsystems: the User Interface Development System (UIDS) and the User Interface Management System (UIMS).

User Interface Development System: (UIDS), collection of IISS User Interface subsystems that are used by applications programmers as they develop IISS applications. The UIDS includes the Form Editor and Application Generator.

User Interface Services: (UIS), subset of the IISS User Interface that consists of a package of routines that aid users in controlling their environment. It includes message management, change password, and application definition services.

Virtual Terminal: (VT), subset of the IISS User Interface that performs the interfacing between different terminals and the UI. This is done by defining a specific set of terminal features and protocols which must be supported by the UI software which constitutes the virtual terminal definition. Specific terminals are then mapped against the virtual terminal software by specific software modules written for each type of real terminal supported.

SECTION 2

DEVELOPMENT ACTIVITY

2.1 Statement of Pretest Activity

During system development, the computer program was tested progressively. Functionality was incrementally tested and as bugs were discovered by this testing, the software was corrected.

This testing was conducted by the individual program developer in a manual mode. Any errors were noted by the developer and corrections to the program were then made after a testing session.

2.2 Pretest Activity Results

Testing of the forms discovered a few minor bugs which were then corrected and retesting proved successful. Testing included exceptional conditions and error conditions for editing. The overall test results during development showed no major programming errors. Only minor bugs were discovered and corrected.

SECTION 3
SYSTEM DESCRIPTION

3.1 System Description

The Text Editor is an IISS application and as such can be invoked from the IISS function menu. It provides IISS users with file editing capabilities.

The Text Editor has two basic modes, edit and command. Usually you are in the edit mode entering text and using key commands, called functions. The command mode is entered by pressing the <COMMAND> key in the edit mode. The command mode is exited by completing a command or by pressing the <QUIT> key.

Text files are input through the host operating system's file access method, modified by the TE's user and then written back to the file. Depending on the host this may overwrite the old version or create a new version of the file.

Figure 3-1 describes the structure of the TE interfaces.

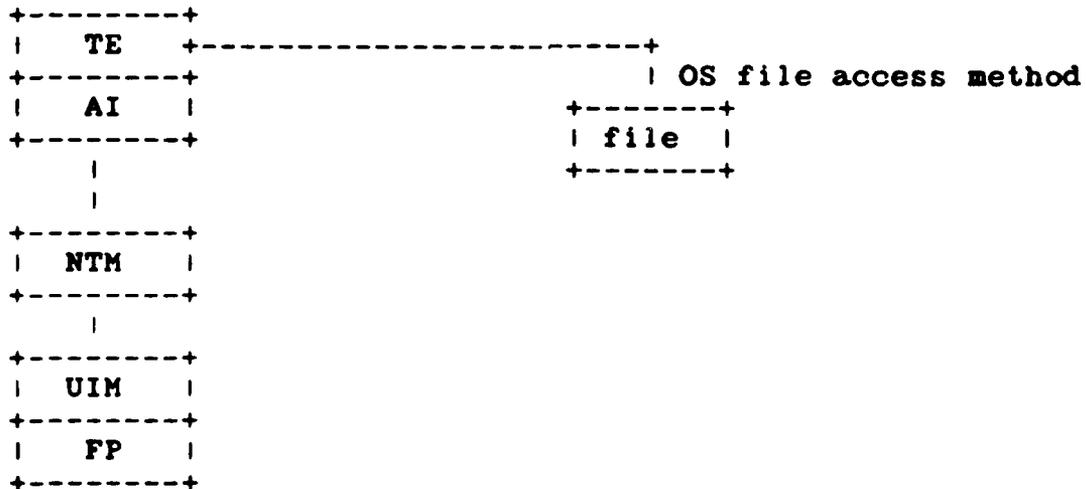


Figure 3-1 Text Editor Interfaces

3.2 Testing Schedule

The execution of the Text Editor is dependent upon the NTM subsystem of IISS and testing of the TE must be done only after the NTM has been successfully tested. Within the UI subsystem, the TE uses the Forms Processor and must be tested only after its successful tests.

3.3 First Location Testing

These tests of the TE require the following:

Equipment: Air Force VAX, terminals supported by the virtual terminal as listed in the UI Terminal Operator's Guide.

Support Software: The Integrated Information Support System, and the Oracle database management system.

Personnel: One integrator familiar with the IISS.

Training: The TE User Manual has been provided with the current release.

Deliverables: The Text Editor subsystem of the IISS UI/VTI.

Test Materials: This test is interactive and can be manually performed as outlined in this test plan. It also could be run as a script file if so desired.

Security considerations: None.

3.4 Subsequent Location Testing

The requirements as listed above need to be met; however, in subsequent testing it is advantageous to create a script file of the outlined tests and run this saving the output of the test for future comparisons. The script file, TEUTP.SCP and the saved output from running the script TEUTP.SAV are under IISS Configuration Management.

SECTION 4
SPECIFICATIONS AND EVALUATIONS

4.1 Test Specification

The following requirements are demonstrated by the outlined tests:

Functional Requirements	Test Activity														
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Scroll and Page of text.	*														
Insert lines.		*													
Break in midline.			*												
Delete lines.				*											
Select lines for paste buffer.					*										
Paste text.						*									
Paste text with fill.							*								
Quit.								*							
Search for text.									*						
Replace text.										*					
Load a file for editing.											*				
Save the edits.												*			
Clear the workspace.													*		
Set fill margins.														*	
Repeat a command.															*

- A - press <PAGE> and <SCROLL> function keys.
- B - press <INSERT LINE> function key.
- C - press <MIDLINE BREAK> function key.
- D - press <DELETE LINE> function key.
- E - press <SELECT> and <CUT> function keys.
- F - press <PASTE> function key.
- G - press <FILL> function key.
- H - press <QUIT> function key.
- I - enter SEARCH command.
- J - enter REPLACE command.
- K - enter LOAD command.
- L - enter SAVE command.
- M - enter CLEAR command.
- N - enter REPEAT command.

The steps outlined in section 5.3 show the correspondence between the test and the functional requirements as listed in this section. These functional requirements match those as specified in the TE Development Specification.

4.2 Testing Methods and Constraints

The tests as outlined in section 5.3 must be followed. The required input is stated for each test. This testing tests the normal mode of operation of these functions and does not completely exercise all the error combinations that a user of the TE might create by faulty entry of form field information. These tests have been done, however, through the normal testing done by the developer of these functions. It is suggested that on further running of this test scripting of the test be done and the output from running the script be saved for future testing. No additional constraints are placed on this unit test besides those listed in section 3.3 of this unit test plan.

4.3 Test Progression

The progression of testing of the TE is fully outlined in section 5.3 of this unit test plan. This progression should be followed exactly to insure the successful testing of this IISS configuration item.

4.4 Test Evaluation

The test results are evaluated by comparing the information returned on the various output screens to that specified as successful for the given test. As outlined in section 5.3, each test of TE functionality provides an input screen with the required data entry specified and the resulting output for a successful test. To speed up testing of future releases, scripting may be used. The TEFIL.SAV file listed in Appendix B should be compared to the TEFIL.SAV produced from the UTP.

SECTION 5
TEST PROCEDURES

5.1 Test Description

A general description of this unit test is provided in section 5.3.

5.2 Test Control

As outlined, this unit test is a manual test which may be done by anyone. The required input data are documented for each function being tested and the resulting successful output is also documented. The order of the testing is also completely documented. The test control information is completely described in section 5.3. Accurate observation of the resulting successful output must be made to ensure the unit test was done properly.

5.3 Test Procedures

Below is an example of how the Text Editor may be invoked in the VAX/VMS environment. To run the unit test plan as outlined: one must be logged on to an IISS account. The NTM must be up and running and the UI group logical names IISSFLIB, IISSULIB and IISSMLIB must be set properly. IISSFLIB points to the directory containing form definitions (.FD files). IISSULIB is set to the current directory, the NTM environment directory. IISSMLIB points to the directory containing error messages (.MSG files). The function key definitions are documented in Appendix C for a VT100.

Assuming the NTM is up and running, an IISS user may start the test using scripting as follows:

```
$ SET DEF (directory containing NTM environment)
$ RUN VT100 -RTEUTP.SCP -STEUTP.SAV
```

5.3.1 Access to IISS

Following entry of the system command "RUN VT100" which activates the User Interface, the form in Figure 5-1 is displayed.

USER ID: _____
PASSWORD: _____
ROLE: _____

Msg: 0 application

Figure 5-1 IISS Logon Screen

- (1) USER ID is the identification name of the user, and is 1 to 10 alpha-numeric characters. USER ID is input as "MORENC".
- (2) PASSWORD must be the password associated with the USER ID, and is 1 to 10 alpha-numeric characters. PASSWORD is input as "STANLEY".
- (3) ROLE is any of the identifiers which are associated with the USER ID, and is 1 to 10 alpha-numeric characters. It is checked against functions and applications which are selected by the user. ROLE is input as "MANAGER". When this form is correctly completed and the ENTER key is pressed, the screen in Figure 5-2 is displayed.

- (5) **FUNCTION** is the function the user desires to activate. In the function field type "SDTEZZZZZZ" and press the <ENTER> key. The screen in Figure 5-3 is displayed.

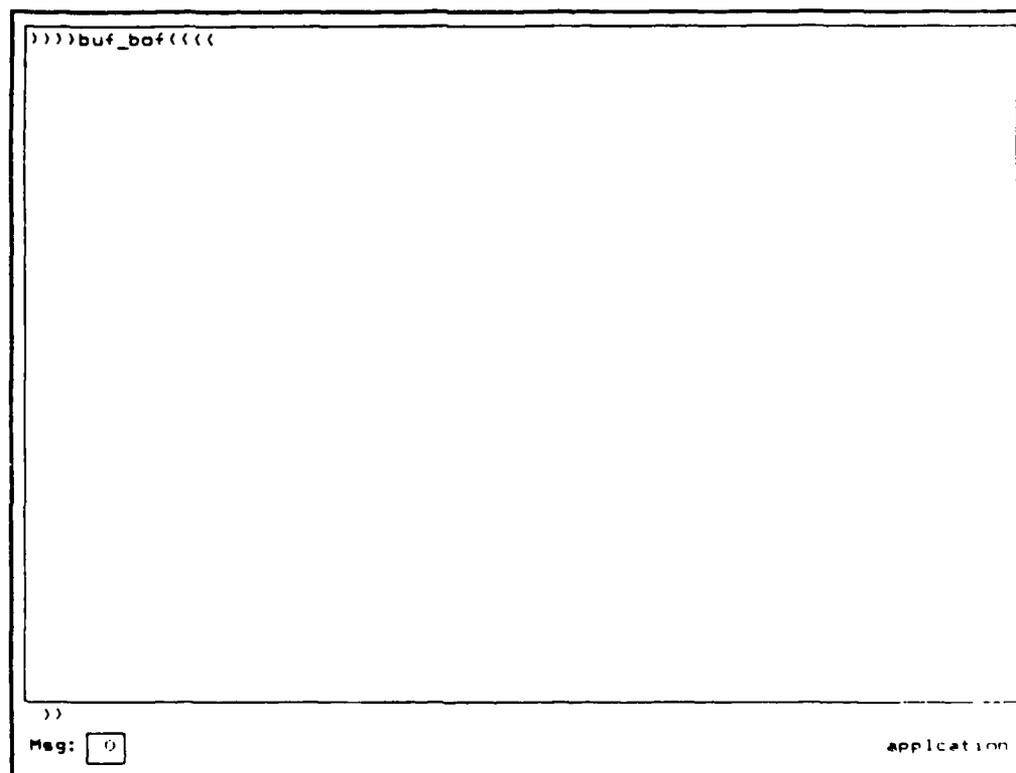


Figure 5-3 TE Screen

5.3.3 Loading a File

Press <COMMAND>. On the command line type "load tefile.txt" and press the <ENTER> key. Wait until the next screen appears and then press the <FIRST PAGE> key. Figure 5-4 shows what the screen should look like. A listing of the file TEFILE.TXT is given in Appendix A. A copy of this file is under IISS Configuration Management.

```
this is the first line
this is the second line
this is the third line
this is the fourth line
this is the fifth line
this is the sixth line
this is the seventh line
this is the eighth line
this is the ninth line
this is the tenth line
this is the 11th line
this is the 12th line
this is the 13th line
this is the 14th line
this is the 15th line
this is the 16th line
this is the 17th line
this is the 18th line
this is the 19th line
this is the 20th line
this is the 21st line
this is the 22nd line

)) load tefile.txt
Msg:  1 Top of File                                application
```

Figure 5-4 TE Screen after a LOAD

5.3.4 Scrolling

Press the <MODE> key until the mode shown in the lower right of the screen is "scrl1/page". Next press <SCROLL UP>. All the lines should move up one line and a new one should be displayed at the bottom. Next press <SCROLL DOWN>. All the lines should move down one line and the screen should appear as in Figure 5-5 again.

5.3.5 Paging

Press <PAGE UP>. The last line of Figure 5-4 should be at the top of the display and the next 21 lines after that should be displayed. Next press <PAGE DOWN>. The screen should appear as in Figure 5-4 again. Press <MODE> until the mode shown in the lower right of the screen is "application".

5.3.6 Insert Line

Press <INSERT LINE>. A blank line appears on the same line as the cursor with all following lines scrolled down one as shown in Figure 5-5.

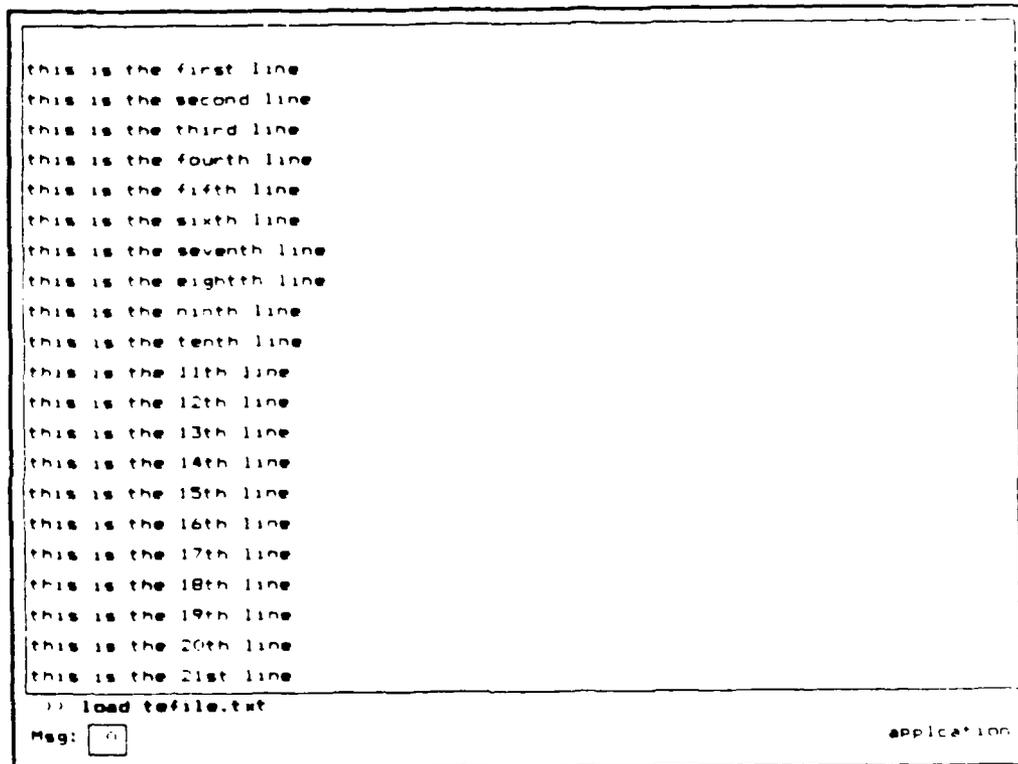


Figure 5-5 TE Screen After Insert Line

5.3.7 Midline Break

Move the cursor down one line and right four characters using the arrow keys. Next press <MIDLINE BREAK>. The line will be broken at the cursor and appear as in Figure 5-6.

5.3.11 Paste with Fill

Press **<FILL>** then **<FIRST PAGE>**. The selected lines are pasted with fill and should appear as in Figure 5-7.

```
this is the first line this is the second line
this is the third line
this is the fourth line
this is the fifth line
this is the sixth line
this is the seventh line
this is the eighth line
this is the ninth line
this is the tenth line
this is the 11th line
this is the 12th line
this is the 13th line
this is the 14th line
this is the 15th line
this is the 16th line
this is the 17th line
this is the 18th line
this is the 19th line
this is the 20th line
this is the 21st line
this is the 22nd line
this is the 23rd line
>> load tefile.txt
Msg:  Top of File
```

Figure 5-7 TE Screen after Paste with Fill

5.3.12 Set Fill Margins

Press **<COMMAND>**. On the command line type **"margins 20 40"** and press the **<ENTER>** key. Next press **<FILL>** and **<FIRST PAGE>**. The selected lines are pasted between the margins of 20 and 40 and should appear as in Figure 5-8.

```

                this is the first
                line this is the
                second line
this is the first line this is the second line
this is the third line
this is the fourth line
this is the fifth line
this is the sixth line
this is the seventh line
this is the eighth line
this is the ninth line
this is the tenth line
this is the 11th line
this is the 12th line
this is the 13th line
this is the 14th line
this is the 15th line
this is the 16th line
this is the 17th line
this is the 18th line
this is the 19th line
this is the 20th line
)) margins 20 40
Msg: 1 Top of File

```

Figure 5-8 TE Screen Paste with Fill, Margins 20 40

5.3.13 Search

Press **<COMMAND>**. On the command line type "search line" and press the **<ENTER>** key. The cursor should move to the first occurrence of the word "line".

5.3.14 Search Next

Press **<SEARCH NEXT>**. The cursor should move to the next occurrence of the word "line".

5.3.15 Repeat Command

Press **<FIRST PAGE>** then **<COMMAND>**. On the command line type "repeat 2" and press **<ENTER>**. The message line should display the message "in repeat". Next type "search line" on the command line and press the **<ENTER>** key. The cursor should move to the second occurrence of the word "line".

5.3.16 Repeat Function Key

Press `(FIRST PAGE)` then `(COMMAND)`. On the command line type "repeat 2" and press `(ENTER)`. The message line should display the message "in repeat". Next press `(SEARCH NEXT)`. The cursor should move to the second occurrence of the word "line".

5.3.17 Replace

Move the cursor to the line which reads "this is the fifth line". Press `(COMMAND)`. On the command line type "replace is **" and press `(ENTER)`. The first occurrence of "is" should be changed to "**". Press `(TAB)` to move to the start of the next line and press `(COMMAND)`. On the command line type "replace is **" and press `(ENTER)`. All occurrences of "is" on the line will be changed to "**". Press `(TAB)` twice and then press `(SELECT)`. Press `(TAB)` three more times then press `(COMMAND)`. On the command line type "replace is **" and press `(ENTER)`. All occurrences of "is" should be changed to "**" on the two lines between the selected line and the cursor's line.

5.3.18 Clear

Press `(COMMAND)`. On the command line type "clear" and press `(ENTER)`. The workspace is cleared of all lines. Press `(PASTE)` and `(FIRST PAGE)` and the workspace is restored.

5.3.19 Save

Press `(COMMAND)`. On the command line type "save tefile.sav" and press `(ENTER)`.

5.3.20 Quitting

Press `(QUIT)`. When the function screen is displayed press the `(QUIT)` key again.

APPENDIX A

TEFILE.TXT LISTING

The following is a listing of the file TEFILE.TXT which is the input file used for testing the text editor.

this is the first line
this is the second line
this is the third line
this is the fourth line
this is the fifth line
this is the sixth line
this is the seventh line
this is the eighth line
this is the ninth line
this is the tenth line
this is the 11th line
this is the 12th line
this is the 13th line
this is the 14th line
this is the 15th line
this is the 16th line
this is the 17th line
this is the 18th line
this is the 19th line
this is the 20th line
this is the 21st line
this is the 22nd line
this is the 23rd line
this is the 24th line
this is the 25th line
this is the 26th line
this is the 27th line
this is the 28th line
this is the 29th line
this is the 30th line

APPENDIX B

TEFILE.SAV LISTING

The following is a listing of the file TEFILE.SAV which is the output file from the editing session of the text editor.

```
                this is the first
                line this is the
                second line
this is the first line this is the second line
this is the first line
this is the second line
this is the third line
this is the fourth line
th** is the fifth line
th** ** the sixth line
this is the seventh line
this is the eighth line
th** ** the ninth line
th** ** the tenth line
this is the 11th line
this is the 12th line
this is the 13th line
this is the 14th line
this is the 15th line
this is the 16th line
this is the 17th line
this is the 18th line
this is the 19th line
this is the 20th line
this is the 21st line
this is the 22nd line
this is the 23rd line
this is the 24th line
this is the 25th line
this is the 26th line
this is the 27th line
this is the 28th line
this is the 29th line
this is the 30th line
```

APPENDIX C

VT100 KEYPAD LAYOUTS

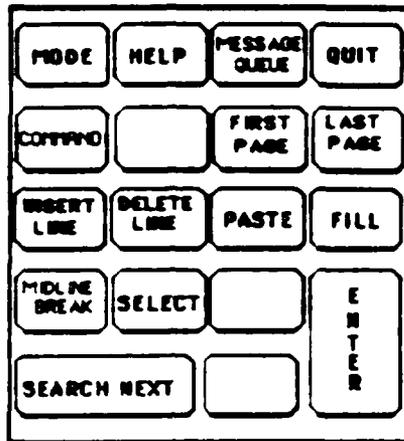


Figure C-1 Text Editor Function Keys (application mode)

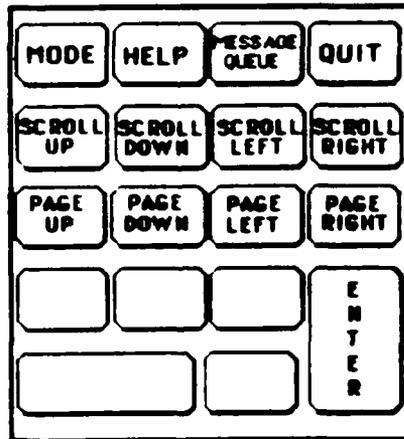


Figure C-2 Text Editor Function Keys (scroll/page mode)

END

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DTIC