

ORDER

6170.1

Cover provided by
CHG 20 dated
5/28/75

ELECTRONIC EQUIPMENT MODIFICATION HANDBOOK - DATA HANDLING EQUIPMENT



JANUARY 14, 1969

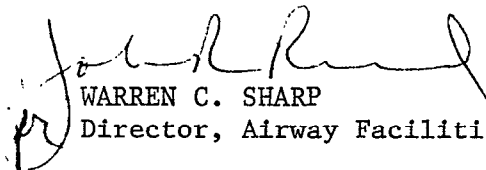
**DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION**

Distribution: Lists W-1/F-1, Item 30;
RAF-3

Initiated By: AAC-1010

FOREWORD

- * 1. PURPOSE. This directive contains all modification chapters pertaining to data handling equipment.
2. DISTRIBUTION. This directive is distributed to selected offices and services within Washington headquarters, NAFEC, and the Aeronautical Center; to branch level within regional Airway Facilities divisions; and to Airway Facilities sectors having data handling equipment.
3. BACKGROUND. Order 6170.1 originally contained modification chapters on both data handling and data switching equipment. With the issuance of change 20 to this order, the data switching modification chapters are relocated to 6180.1, Electronic Equipment Modification Handbook - Data Switching Equipment. Also change 20 to this order cancels phased-out equipment; therefore, this directive no longer contains modification chapters pertaining to such equipment as ADIS, AN/FGC-5, TDA-1 and -2.
4. MODIFICATION POLICY. Order 6032.1, Modifications to Ground Facilities, Systems, and Equipment in the National Airspace System, contains comprehensive policy and direction concerning the development, authorization, implementation, and recording of modifications to facilities, systems, and equipment in commissioned status. It supersedes all instructions published in earlier editions of maintenance technical orders and related directives. *


WARREN C. SHARP
Director, Airway Facilities Service

CHANGE

*Posted to TOC
1/28/98 J2*

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

6170.1
CHG 33

7/21/96

SUBJ: ELECTRONIC EQUIPMENT MODIFICATION HANDBOOK - DATA HANDLING EQUIPMENT

1. PURPOSE. This change transmits an updated table of contents for Order 6170.1.
2. DISTRIBUTION. This directive is distributed to selected offices and services within Washington headquarters, regional Airway Facilities divisions, the William J. Hughes Technical Center, the Mike Monroney Aeronautical Center, and Airway Facilities field offices having the following facilities/equipment: ARTCC, CERAP, ATCT, TRACO, COMCO, CNS, EOF, TELEX, WMSC, FSS, AFSS, RAPCO, DMUX, NADIN
3. DISPOSITION OF TRANSMITTAL. Retain this transmittal.

PAGE CONTROL CHART

Remove Pages	Dated	Insert Pages	Dated
xi and xii	10/23/90	xi xii	10/23/90 7/21/96

James W. Pritchard

for George W. Terrell
Program Director for Operational Support

Distribution: Selected Airway Facilities Field and Regional Offices; ZAF-600 Initiated By: AOS-210

<u>Chapter</u>	<u>Change</u>	<u>Date Issued</u>	<u>Title</u>
99	1	1/24/69	MODIFICATION - TELETYPEWRITER APPARATUS CABINET AC-273
100	3	7/22/69	MODIFICATION TO STANDARDIZE STUNT BOX ACCESSORY PANEL AND SERVICE CABLE WIRING MODEL 28 TELETYPEWRITERS
101	2	4/14/69	MODIFICATION TO TELETYPEWRITER LINE SWITCHING UNIT TYPES CA-1696, CA-334B, AND CA-334C
102	7	12/5/69	MODIFICATION TO TELETYPEWRITER EQUIPMENT IN LBAC 235 CABINETS
103	5	10/29/69	MODIFICATION TO 28 ASR LINE-TEST SWITCH
104	14	8/23/71	LPR BACKSPACE MAGNET DISCONNECT
105 (Canceled)	6	11/12/69	DIGITAL CHECK CHARACTER GENERATOR, FA-7883 (Canceled by CHG 13, 6/2/71)
* 106	8	3/6/70	MODIFICATION TO SECURE CIRCUIT EQUIPMENT TO PROVIDE LOW LEVEL KEYING (Page change by CHG 12, 6/29/70) *
107 (Canceled)	9	4/3/70	DIGITAL CHECK CHARACTER GENERATOR FA-7883 CRITICAL LEAD SHIELDING (Canceled by CHG 13, 6/2/71)
108			NOT ISSUED
109	10	5/11/70	MODIFICATION - TELETYPEWRITER APPARATUS RO/KSR AND ASR CABINETS
110	11	6/22/70	MODIFICATION - TELETYPEWRITER TRANSMITTER DISTRIBUTOR LBXD6
111			NOT ISSUED
112	15	7/3/73	PROVIDE MULTIPLE-CHARACTER STUNT-BOX CODES IN PLAN 59 FASS STATION CONTROL CHASSIS 9702A (Relocated to 6180.1 by CHG 20, 5/28/75)
113	16	7/20/73	TO PROVIDE RECOGNITION AND RESPONSE TO ICAO END-OF-MESSAGE CHARACTER SEQUENCE-NNNN TELETYPEWRITER M-28 PRINTER STUNT BOX (6)
114	17	3/19/74	REVISIONS TO APULS CA-5032 INSTRUCTION BOOK (Relocated to 6180.1 by CHG 20, 5/28/75)

<u>Chapter</u>	<u>Change</u>	<u>Date Issued</u>	<u>Title</u>
115			NOT ISSUED
116	22	7/21/76	MODIFICATION TO TELETYPE LINE SWITCHING UNIT WIRING TO PROVIDE FULL DUPLEX OPERATION
117	24	7/16/79	CORRECTIONS TO VOLUME I OF DATA TERMINAL EQUIPMENT TYPE FA-9669 INSTRUCTION BOOK
118 (Withdrawn)	25	7/18/88	MPX-96 PARADYNE MODULATOR-DEMULATOR (MODEM) RETROFIT (Withdrawn by 6170.1 CHG 29, 2/6/90)
118 (Revised)	29	2/6/90	MPX-96 PARADYNE MODULATOR-DEMULATOR (MODEM) RETROFIT
119	26	11/16/88	PARADYNE ANALYSIS NETWORK MANAGEMENT SYSTEM UPGRADE
120	27	12/21/89	SERVICE MANUAL ADDENDUM FOR PARADYNE 3400 SERIES MULTIPLEXING MODEM
121	28	12/28/89	REMOVE MAINTENANCE PROCEDURES FROM INSTRUCTION BOOKS: TELECOM SWITCHING UNIT, MODEL TSU-10; AUTOMATIC PROGRAM UNIT, LOW SPEED (APULS), TYPES CA-5032 AND FA-5032A
* 122	31	7/7/94	REPLACE DUAL PORT EPROMS IN THE DCX-816/832 STATISTICAL MULTIPLEXER
123	32	9/11/95	REPLACE FLEX CARTRIDGE IN THE CODEX 3600 MODEM *

Revised to
mid
10/2/97
Ohio
No 13 pages

US DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

6170.1
CHG 34

7/21/97

SUBJ: ELECTRONIC EQUIPMENT MODIFICATION HANDBOOK - DATA HANDLING EQUIPMENT

CHAPTER 124 INSTALL CODEX 6250 OPERATIONAL
INTEGRATION (OI) SOFTWARE

1. PURPOSE. This modification provides procedures to install the Codex 6250 OI software on the 9800 Network Management System (NMS).

2. DISTRIBUTION. This directive is distributed to selected offices and services within Washington headquarters, the William J. Hughes Technical Center, the Mike Monroney Aeronautical Center, regional Airway Facilities divisions, and Airway Facilities field offices having the following facilities/equipment: ARTCC, SOLID-STATE TRACO.

3. WITHDRAWALS. None.

4. REFERENCES.

- a. Codex 6250 Operational Integration Option Guide, 1991.
- b. Codex 6250 Operator's Guide, 1992.
- c. Codex 9800 NMS Building Your Network, 1994.
- d. Multi-Port Spooler II Installation and Operation Manual, April 1991.

5. BACKGROUND.

a. This software option is being added to the 9800 NMS to provide network monitoring of the Codex 6250.

b. This modification installs the 6250 OI software version 1.20 and the Multi-Port Spooler II.

c. This modification has been operationally tested at the Jacksonville, Florida, Air Route Traffic Control Center (ARTCC).

6. APPLICATION. This modification applies to all Codex 9800 NMS, when used to monitor the Codex 6250 High Speed Time Division Multiplexer (HSTDM).

7. MATERIALS REQUIRED. The following materials are required to install the OI software option:

	<u>Description</u>	<u>NSN</u>	<u>Quantity</u>
a.	Codex 6250 OI Software Version 1.20 Installation Tape	N/A	1 each
b.	Multi-Port Spooler II, Blackbox Part No. PI523A or equivalent	7025-01-446-3577	1 each

Distribution: Selected Airway Facilities Field
and Regional Offices, ZAF-600

Initiated By: AOS-510

	<u>Description</u>	<u>NSN</u>	<u>Quantity</u>
c.	Cable, DB-25 Male to DB-25 Male Connectors, straight-through, 50-foot lengths	6150-01-446-3579	3 each
d.	Cable, DB-25 Male to DB-25 Female Connectors, crossover, 5 feet	6150-01-446-3586	1 each

8. SOURCE OF MATERIALS. The Codex 6250 OI software installation tape will be shipped to the site by AOS-510. Request the remaining material from the Supply Management Division, AML-600, using the assigned NSN. KITS WILL BE USED ONLY TO MODIFY THE EQUIPMENT LISTED IN PARAGRAPH 6 OF THIS CHAPTER. ORDER THE AMOUNT LISTED IN PARAGRAPH 7 FOR EACH SITE.

9. SPECIAL TOOLS AND TEST EQUIPMENT REQUIRED. VT-100 terminal or equivalent.

10. MODIFICATION TO BE PERFORMED BY. Field maintenance personnel or as determined by the regional Airway Facilities division.

11. WHEN MODIFICATION IS TO BE PERFORMED. As soon as practical after receipt of this directive and materials.

12. ESTIMATED TIME REQUIRED. Approximately 2 hours. Estimated time does not include modification preparation.

13. DISPOSITION OF SURPLUS PARTS. None.

14. MODIFICATION PROCEDURE. Read the procedures thoroughly before installing the OI software. Shutdown of the 9800 NMS equipment is required. Coordinate downtime with air traffic control (ATC) personnel and other users before removing any equipment from operation.

a. Configuring the Multi-Port Spooler II, item 7b.

(1) Remove the top cover of the spooler, by removing the four screws located on the bottom of the spooler and sliding the cover off. Retain the cover and four screws.

(2) Baud rate jumper settings. There is a total of six baud rate jumpers (one for each port) labeled E1 through E6. See figure 1 for location of the jumpers. To change a jumper setting, simply remove the plastic shunt and place on the appropriate pins. Set all port jumper settings to 9600 b/s.

(3) Individual switch bank settings. Each port has its own switch bank, labeled S1 through S6. See figure 1 for location of switch banks. Set the port's switch bank according to table 1. If necessary, refer to the Multi-Port Spooler II Installation and Operation Manual for more information about the function of the switch banks.

(4) Advanced option bank switch settings. Switch bank S7 (refer to figure 1 for location) is used to configure the advanced options of the spooler. Set switch bank S7 according to table 2. If necessary, refer to the Multi-Port Spooler II Installation and Operation Manual for more information about the function of the switch banks.

FIGURE 1. MULTI-PORT SPOOLER II BOARD LAYOUT

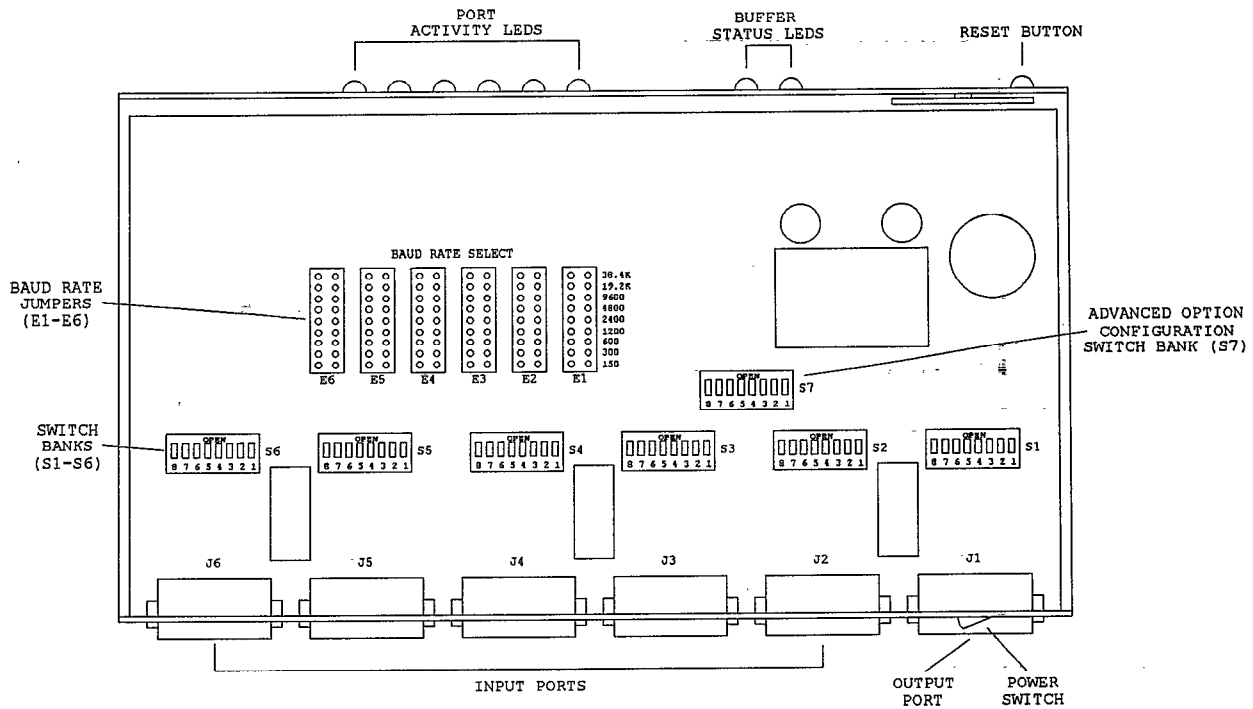


TABLE 1. INDIVIDUAL SWITCH BANK SETTINGS

Switch	Setting
1	CLOSED or ON
2	CLOSED or ON
3	CLOSED or ON
4	OPEN or OFF
5	OPEN or OFF
6	OPEN or OFF
7	CLOSED or ON
8	OPEN or OFF

TABLE 2. ADVANCED OPTION CONFIGURATION SETTINGS

Switch	Setting
1	CLOSED or ON
2	OPEN or OFF
3	CLOSED or ON
4	CLOSED or ON
5	OPEN or OFF
6	OPEN or OFF
7	OPEN or OFF
8	OPEN or OFF

NOTE: Spoolers that have serial numbers of 90079999 and below will have switch banks labeled OPEN and CLOSED, while spoolers that have serial numbers of 90080000 and above will have switch banks labeled OFF and ON.

(5) Reinstall the top cover and secure it with the four screws retained in a(1).

b. Install the spooler close to the 9800 NMS primary workstation. Locate the spooler so that the front panel indicators are visible and easily accessible.

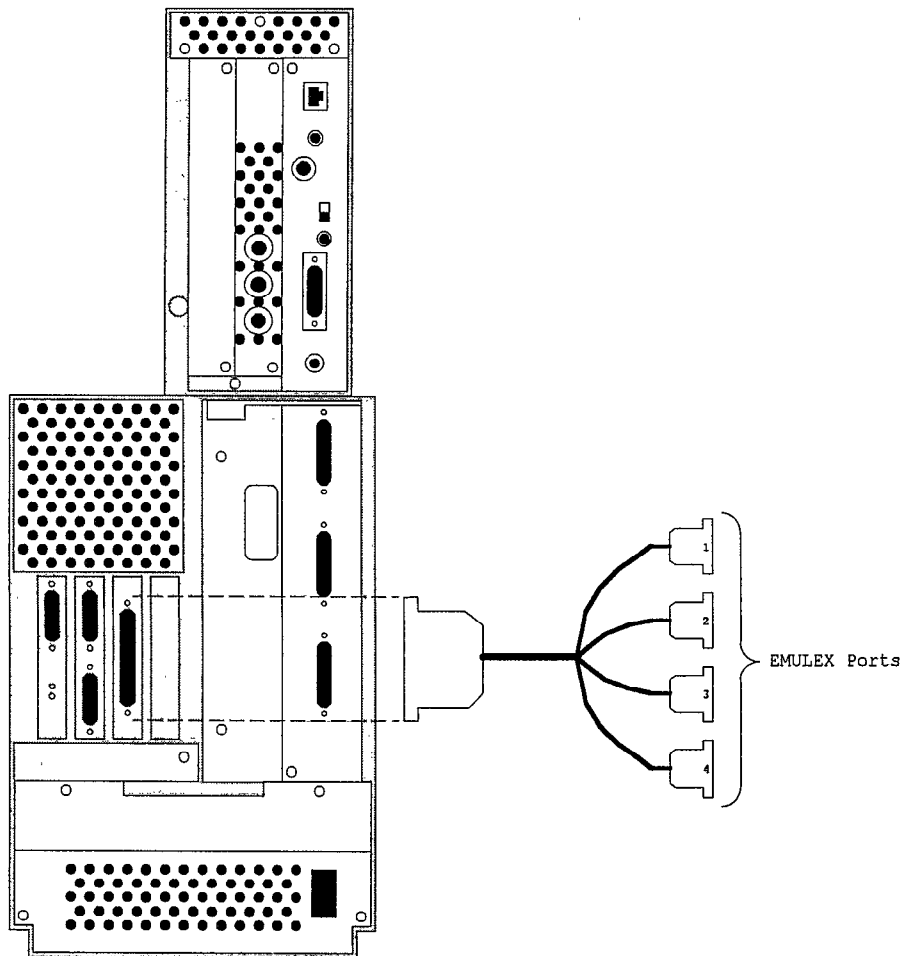
c. Installation of cables.

(1) Connect the spooler to the 9800 NMS primary workstation with the 5-foot crossover cable, item 7d, using the following procedures:

(a) Connect the female end of the crossover cable, item 7d, to the one-to-four octopus EMULEX cable of the 9800 NMS primary workstation (see figure 2 for location of the EMULEX ports). There are four EMULEX ports, two of which are already in use by the Communications Applications Processor (CAP) and the event printer. Connect the cable to one of the remaining available EMULEX ports, preferably, EMULEX port 3. Record this port number. It will be needed to connect the 6250(s) in the network topology.

(b) Connect the male end of the crossover cable, item 7d, to the output port (port 1) of the spooler.

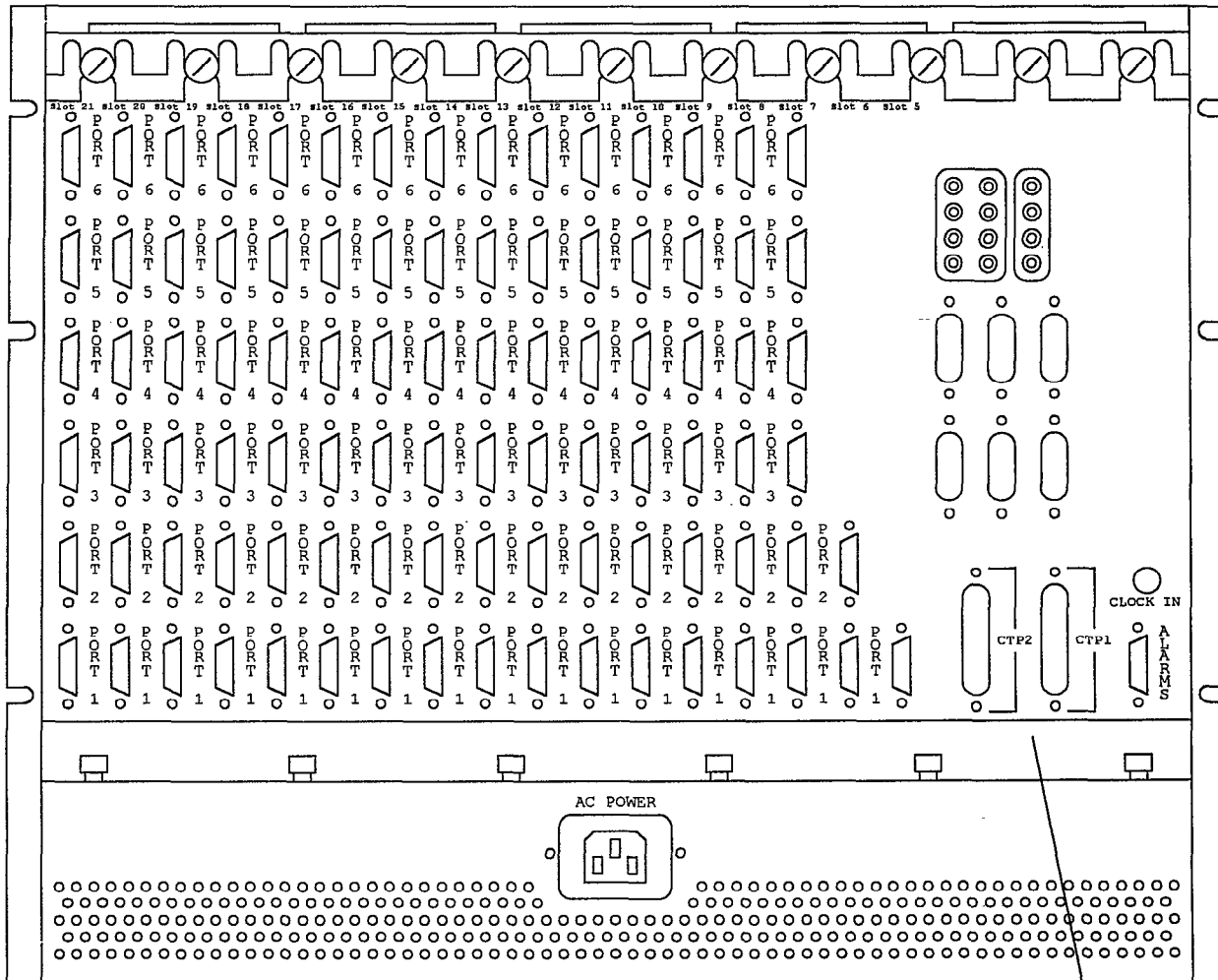
FIGURE 2. 9800 NMS WORKSTATION BACKPLANE



(2) Connect each 6250 node to the spooler, using a separate 50-foot straight-through cable, item 7c, for each 6250 node. Perform the following steps to connect each 6250 node:

(a) Connect one end of the 50-foot straight-through cable, item 7c, to the 6250's Control Terminal Port 1, CTP-1, (see figure 3).

FIGURE 3. 6250 BACKPLANE



Control Terminal Ports (CTP)

(b) Connect the other end of the straight-through cable to one of the input ports of the spooler. The spooler's input ports are labeled ports 2 through 6. Use the lowest numbered port that is available.

d. Installation of 6250 OI software.

(1) Exit the 9800 NMS application.

(a) Open the UTILITIES menu, and click on EXIT NMS.

(b) A confirmation window will appear. Click on OK to confirm the exit. Wait for the NMS windows to close before continuing.

(2) Load the 6250 OI software.

(a) Open a shell by pressing the SHIFT and SHELL/CMD keys simultaneously. A shell window will appear.

(b) Enter the following command at the \$ prompt to start the installation software:

```
$ /nmsys/install/install_9800<RETURN>
```

(c) The 9800 SOFTWARE INSTALLATION menu appears. Enter the following at the INSTALL_9800> prompt to begin the installation of the 6250 OI software option:

```
INSTALL_9800> options<RETURN>
```

(d) The 9800 OPTIONAL SOFTWARE INSTALLATION menu appears. Insert the 6250 OI cartridge tape, item 7a, and close the latch (see figure 4).

(e) Enter the following at the OPT_9800> prompt to read the 6250 OI software option tape:

```
OPT_9800> read<RETURN>
```

(f) The 6250 OPERATIONAL INTEGRATION SOFTWARE menu will appear. Enter the following at the OPT_9800> prompt to load the OI software:

```
OPT_9800> load<RETURN>
```

(g) After the OI software installation has completed, exit the 9800 OPTIONAL SOFTWARE INSTALLATION menu by entering the following at the OPT_9800> prompt:

```
OPT_9800> exit<RETURN>
```

(h) Enter the following at the INSTALL_9800> prompt to exit the SOFTWARE INSTALLATION menu:

```
INSTALL_9800> exit<RETURN>
```

(i) Open the latch and remove the cartridge tape.

(3) Start up the 9800 system software.

(a) Restart the 9800 software by entering the following command at the \$ prompt:

```
$ start_9800<RETURN>
```

NOTE: The 9800 software takes approximately 10 minutes to restart.

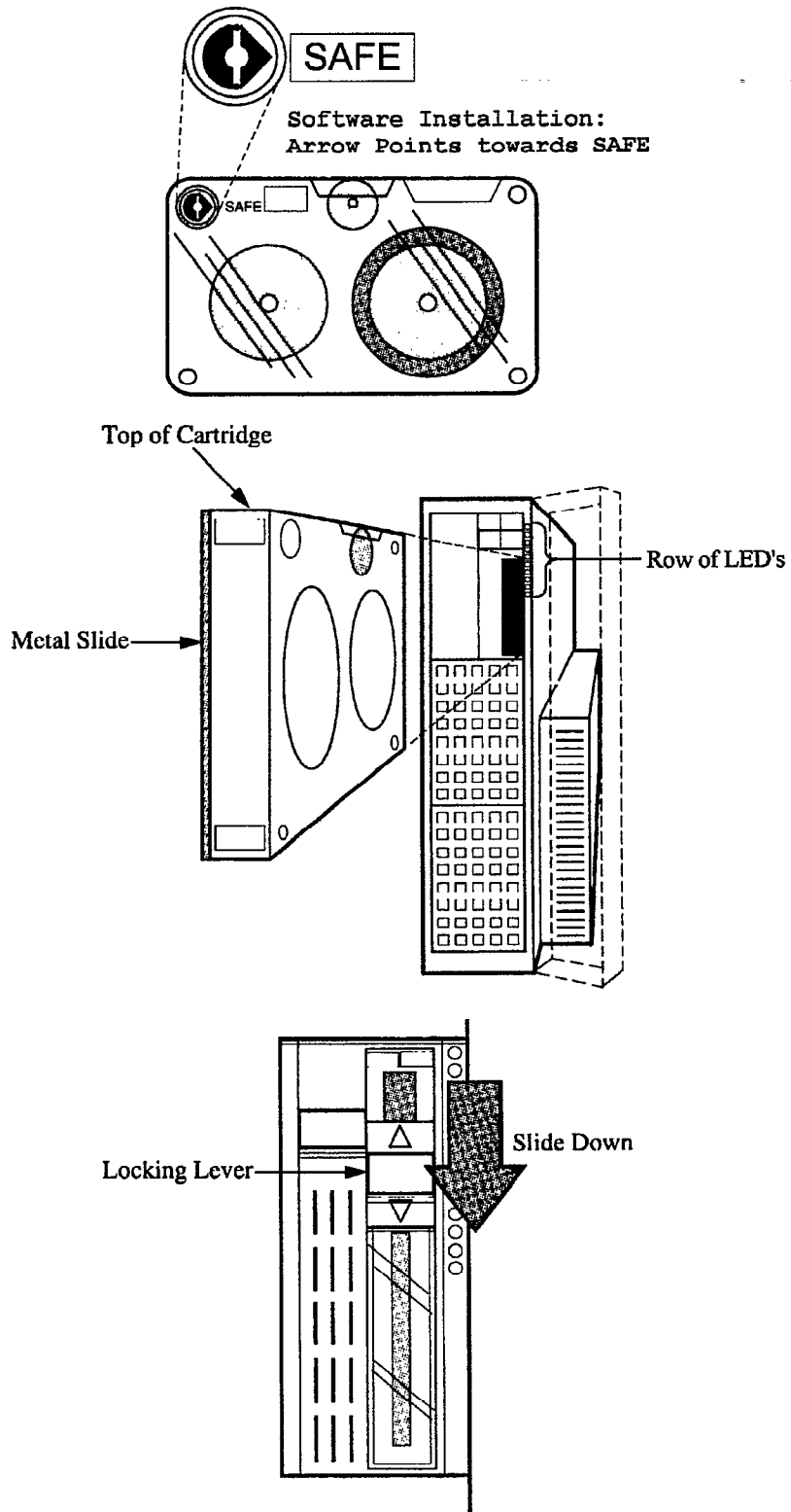
(b) When the \$ prompt returns, close the shell by pressing <CTRL>Z and then <CTRL>N.

e. Configure the 6250 to report alarms.

(1) Connect a VT-100 terminal (or equivalent) to the 6250 CTP-2 port.

(2) Press <CTRL>-W to display the 6250 login screen.

FIGURE 4. CARTRIDGE TAPE LOADING



(3) Login to the 6250, using the appropriate password. The default password is SUPER.

(4) Configure the CTP port for OI operation. At the 6250 prompt, enter the following command:

```
admin config -m OI_VT100<RETURN>
```

NOTE: The CTP port of **all** 6250 nodes must be configured for OI operation.

(5) Configure the 6250 NPC alarm thresholds.

(a) Configure the RED alarm threshold by entering the following command at the 6250 prompt:

```
c a -m [l_slot/port] ... red 11 2500 10000
```

(b) Configure the YELLOW alarm threshold by entering the following command at the 6250 prompt:

```
c a -m [l_slot/port] ... yellow 11 1000 1000
```

(c) Configure the frame bit error rate (FBER) alarm threshold by entering the following command at the 6250 prompt:

```
c a -m [l_slot/port] ... fber 4 5 1 20 20 5 6 1 20 20
```

(d) Configure the cyclic redundancy check error rate (CRCR) alarm threshold by entering the following command at the 6250 prompt:

```
c a -m [l_slot/port] ... crcr 3 4 1 20 20 4 5 1 20 20
```

(e) Configure the transmit frame slip (TXSLIP) alarm threshold by entering the following command at the 6250 prompt:

```
c a -m [l_slot/port] ... txslip 255 1 24 4 1 24
```

(f) Configure the reframe error count (REFR) alarm threshold by entering the following command at the 6250 prompt:

```
c a -m [l_slot/port] ... refr 511 1 24 17 1 24
```

(g) Configure the receive frame slip (RXSLIP) alarm threshold by entering the following command at the 6250 prompt:

```
c a -m [l_slot/port] ... rxslip 255 1 24 4 1 24
```

NOTE: The parameter [l_slot/port] represents the physical slot and port for the card to be configured. For example, the [l_slot/port] for the first NPC card in slot 5 would be 5/1. For details on the NPC alarm configuration values, refer to the 6250 Operators Guide under Chapter 11, Configure Commands, and Appendix A, 6250 Initialization Defaults. The values listed above will be incorporated in the Standards and Tolerances of Order 6170.10, Maintenance of DMN Equipment.

(6) Logout of the 6250 by entering the following command at the 6250 prompt:

admin logout -m<RETURN>

(7) Perform steps 14e(1) through 14e(6) for all remaining 6250 nodes.

f. Adding the 6250 icons to the 9800 NMS network views and topology.

(1) Go to the CONSTRUCT view by selecting CONSTRUCT on the VIEWS menu.

(2) Create a new 6250 view.

(a) Click on the CREATE softbutton.

(b) Name the new view 6250_VIEW.

(c) Click on the OK softbutton to create the new view.

(3) Copy the NMS icon to the new 6250 view.

(a) Go to the MAP view.

(b) Select the NMS icon by clicking on it with the mouse.

(c) Copy the icon to the clipboard by clicking on the COPY softbutton from the OBJECTS menu.

(d) Go to the 6250_VIEW view.

(e) Paste the NMS icon by clicking on the PASTE softbutton from the OBJECTS menu.

(4) Add the 6250 icon(s) to the network configuration topology. Perform the following steps to create an icon for each of the 6250 nodes.

(a) Select the 6250 multiplexer icon from the icon palette and place it in the view. See figure 5 for the correct multiplexer icon and the typical arrangement of the 6250_VIEW.

(b) Select the 6250 multiplexer icon by clicking on it with the mouse.

(c) Select INVENTORY from the MANAGE RESOURCE menu.

(d) Enter the inventory information in the Multiplexer Device Inventory window (see figure 6).

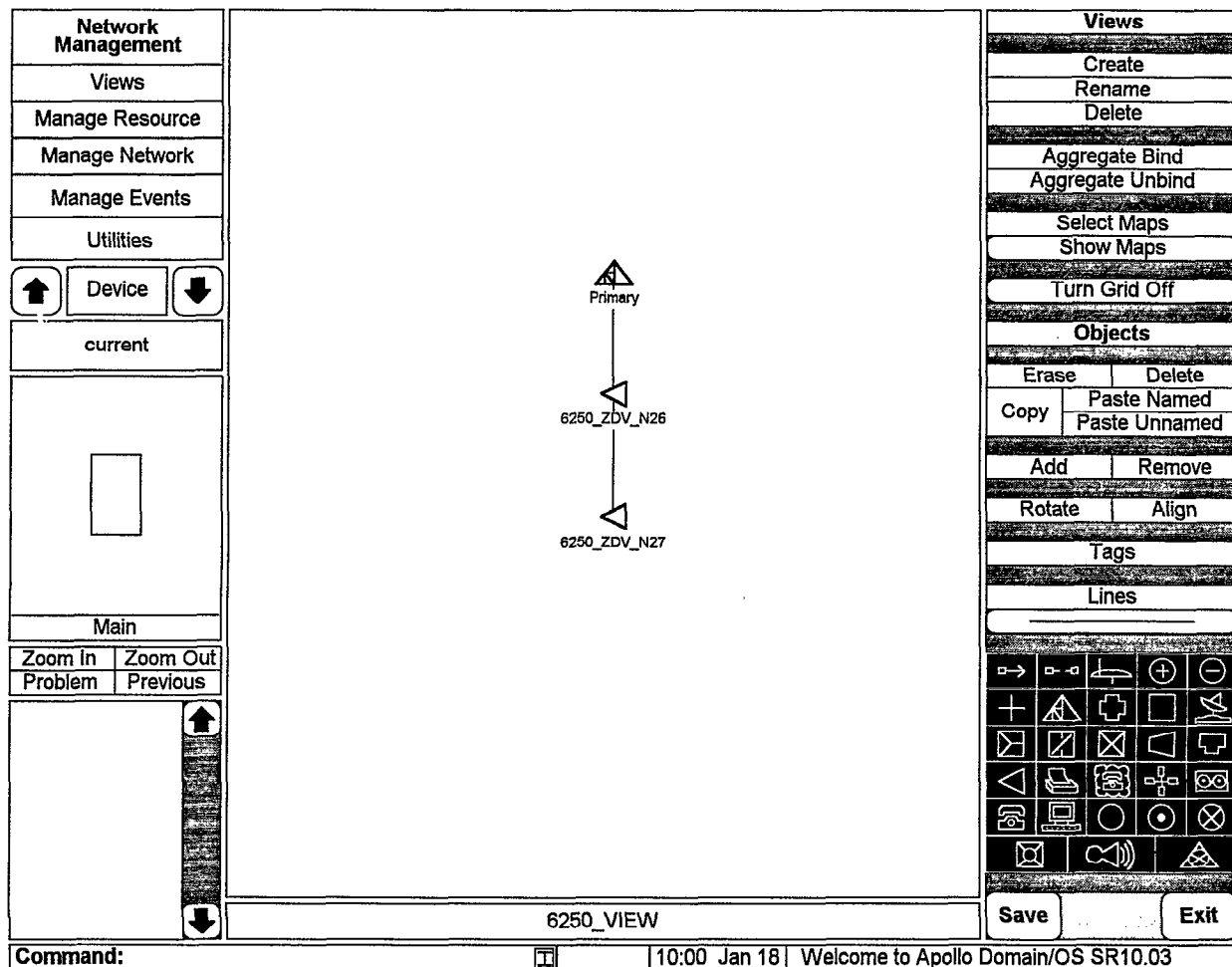
1 The NAME of each device icon should be 6250_ followed by the node name (6250_ZDV_N26).

2 The MODEL NUMBER is 6250.

3 The DEVICE ADDRESS is the node ID.

4 Complete the remaining fields as desired.

FIGURE 5. TYPICAL ARRANGEMENT OF THE 6250_VIEW



5 Click on the DB (database) softbutton to save the inventory data to the Network Configuration database.

(5) Connecting the 6250 icons.

(a) Connecting the first 6250 icon to the primary workstation.

1 Select the PHYSICAL LINE from the LINES menu.

2 Connect the line to the EMULEX port of the primary workstation icon.

a Click on the primary workstation icon added in paragraph 14f. A window representing the workstation's port will appear.

b Connect the line to the EMULEX port that the cable was connected to in paragraph 14c(1) by clicking on the appropriate port.

CAUTION: The 6250 OI will not receive events if the icons are connected to the wrong port number.

FIGURE 6. 6250 DEVICE INVENTORY WINDOW

Multiplexer Device Inventory	
Name: 6250_ZDV_N26	6760
Model Number: 6250	6745
Vendor:	6742
Device Address: 26	6740
Software Revision Number:	6015
Serial Number: 000000	6005
Purchase Date:	6002
Installation Date:	6250
Service Contact:	(other)
Service Tel Num:	
Site:	
Comments:	
<input type="button" value="All"/> <input type="button" value="None"/> <input type="button" value="Init"/> <input type="button" value="Last"/> <input type="button" value="Copy"/> <input type="button" value="Delete"/> <input type="button" value="Warm"/> <input type="button" value="Cold"/> <input type="button" value="DB"/> <input type="button" value="Cancel"/>	

3 Connect the other end of the line to the 6250 icon.

a Click on the appropriate 6250 icon. A window representing the different types of 6250 OI ports will appear.

b Connect the line to the EVENT port by clicking on the EVENT port.

(b) Connect the remaining 6250 icons.

1 Select the PHYSICAL LINE from the LINES menu.

2 Connect the line to the previously connected 6250 icon.

a Click on the appropriate 6250 icon. A window representing the different types of 6250 OI ports will appear.

b Connect the line to the NETWORK port by clicking on the NETWORK port.

3 Connect the other end of the line to the next 6250 icon.

a Click on the appropriate 6250 icon. A window representing the different types of 6250 OI ports will appear.

b Connect the line to the NETWORK port by clicking on the NETWORK port.

(6) Add the 6250 icons to the appropriate network views as desired to represent how the 6250 Synchronous Data Cards (SDC) are connected.

g. Plug in the spooler's power cord to an available ac outlet and turn on the spooler. See figure 1 for location of the power switch.

15. TEST AFTER MODIFICATION. Perform the following test procedures for each 6250 node.

a. Patch out one of the NPC aggregates at the Digital Direct Connect (DDC) demarc V.35 patch panel. Verify on the 9800 NMS that the correct device icon reported the NPC alarm(s).

CAUTION: Ensure that all circuits have a working alternate path so that a service outage does not occur.

b. Patch out an SDC port at the patch panel. Verify on the 9800 that the correct device icon reported the SDC alarm(s).

CAUTION: Ensure that the affected circuit has a working alternate path so that a service outage does not occur.

16. RESULT OF MODIFICATION. End user operation remains the same. The new software provides 6250 monitoring capabilities to the 9800 NMS.

NOTE: When a terminal is connected to either of the CTP ports (for configuring the 6250), the 6250 will stop reporting alarms to the 9800 NMS. However, the alarms will be reported to the terminal screen. Logging out and disconnecting the terminal from the CTP port will resume the 6250 reporting alarms to the 9800 NMS.

17. CHANGES TO INSTRUCTION BOOK. None.

18. CHANGES TO INSTALLATION DRAWINGS. None.

19. CHANGES TO RECORDED DATA. Enter this directive number, date, and chapter number in the appropriate FAA Form 6032-1, Airway Facilities Modification Record.

20. CHANGES TO TABLE OF CONTENTS. This chapter will be included in the next revision to the table of contents for Order 6170.1.

21. RECOMMENDATIONS FOR CHANGES. Forward any recommendations for changes to this directive through normal channels to the OKC Communications Systems Engineering Support Branch, AOS-510.


George W. Terrell
Program Director for Operational Support