TM 11-5895-865-14&P

TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS FOR

FACILITIES IN PLACE, PATCH AND TEST FACILITY REDSTONE ARSENAL, ALABAMA

HEADQUARTERS, DEPARTMENT OF THE ARMY

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Technical MANUAL
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HEADQUARTERS
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REPORTING OF ERRORS

You can improve this manual by recommending improvements using DA Form 2028-2 (Test) located in the back of the manual. Simply tear out the self-addressed form, fill it out as shown on the sample, fold it where shown, and drop it in the mail.

If there are no blank DA Forms 2028-2 (Test) in the back of your manual, use the standard DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forward to the Commander, US Army Communications and Electronics Materiel Readiness Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703

In either case a reply will be furnished direct to you.

LIST OF ILLUSTRATIONS

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. scope

a. This manual describes the Patch and Test Facility at Redstone Arsenal, Alabama, and provides instructions for operating and maintaining the facility equipment. A repair parts list is also included.

b. Throughout this manual references are made to other publications that cover equipment in the facility A complete listing of applicable publications is provided in appendix A.

1-2. Indexes of Equipment Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether them are modification work orders (MWOs) pertaining to the equipment.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment.

Maintenance forms, records, and reports which are to be used by maintenance personnel at ail maintenance levels are listed in and prescribed by TM 38-760.

b. Station Operation and Maintenance. Use forms and records in accordance with instructions in the station Standing Operating Procedures (SOP).

c. Plant-in-Place Records. Changes, corrections and updating of Plant-in-Place Records (para 3-3) should be reported to US Army Communications Electronics Engineering Installation Agency (CED -SWSR), Fort Huachuca, Arizona, 85613.

d. Reporting Equipment Improvement Recommendations (EIR).

EIR will be prepared using DA Form 2407, Maintenance Request. Instructions for preparing EIR are provided in TM 38-750, The Army Maintenance Management System. EIR should be mailed direct to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, NJ 07703. A reply will be furnished direct to you.

l-4. Administrative Storage

Administrative storage of equipment issued to and used by Army activities shall be in accordance with paragraph 4-5.

l-5. Destruction of Army Material

Destruction of electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

Section II. DESCRIPTION AND DATA

1-6. Purpose and Use

The patch and test facility (PTF) is part of the Automated Telecommunication Station at Redstone Arsenal, Alabama, and provides a centralized point for the termination and interconnection of cables to and from the station. Additionally, the PTF contains equipment which provides access to the communications lines, line conditioning, transmission security and line/component testing.

1-7. Tabulated Data

N O T E

See individual technical manuals (app A) for technical characteristics of installed components of the PTF.

	Number	Speed
Circuits (FDX)	2 ea	2400 bps
AUTODIN (Mode I)	17ea	1200 bps
Remote Terminals (HDX)	2ea	75/150 bps
Teletype	Number	
Patching Facilities	96	
2-wire jack appearances:	24 trans, 24 rec.	
VF	24 trans. 24 rec/bay (3 bays)	
DC High Level	48/bay (3 bays)	
DC Low Level	KW-13 (2 operational, 2 Spare	
12-wire jack appearances:		
COMSEC Facilities		
AC Power:	120/208, 3 phase 60 Hz (supplied from separate power panels)	
Red and black		

DC Power Supplies	*Uses*
120 VDC (Dual)	High level signaling
60 VDC (Dual)	DLIU operation

6 VDC (Dual)	Testing purposes
48 VDC (Red)	Alarm panel
48 VDC (Black)	Alarm panel, dual speaker panel noise measuring set.
Red/Black Isolation	Modulated light sources and photosensitive receivers.

Alarms	Condition
(Audible alarm and alarm panel **light)**	
Isolator:	Loss of power, door open, high temp (**130** F)
DC power supplies:	Loss of 48, 60, 120, or 6 volt power.
Fuse alarm Panel:	Any blown fuse.

1-8. Description of Patch and Test Facility, General

The Patch and Test Facility (PTF) is part of the Automated Telecommunications Center at Redstone Arsenal, Alabama. The PTF is installed in the building adjacent to the Automated Multimedia Exchange (AMME) which it serves. The PTF equipment is installed in three rows (fig. 1-1) using standard cabinets which accepts 19-inch rack-mounted equipment/components and provide housings for cable distribution frames. Overhead cable ducts, for carrying signal and power cables between the cabinets, are also part of the install&ion. Conduits from the cable ducts bring the cables and power into the rear of the cabinets. In addition, a large conduit is connected between the signal line filter panel into the overhead cable duct to carry the entrance signal cable. Power for operating the cabinet components is taken from duplex outlets installed in the rear of cabinets The COMSEC equipment bays on the power panel end of the PTF room, are part of special security circuits not covered in this manual.

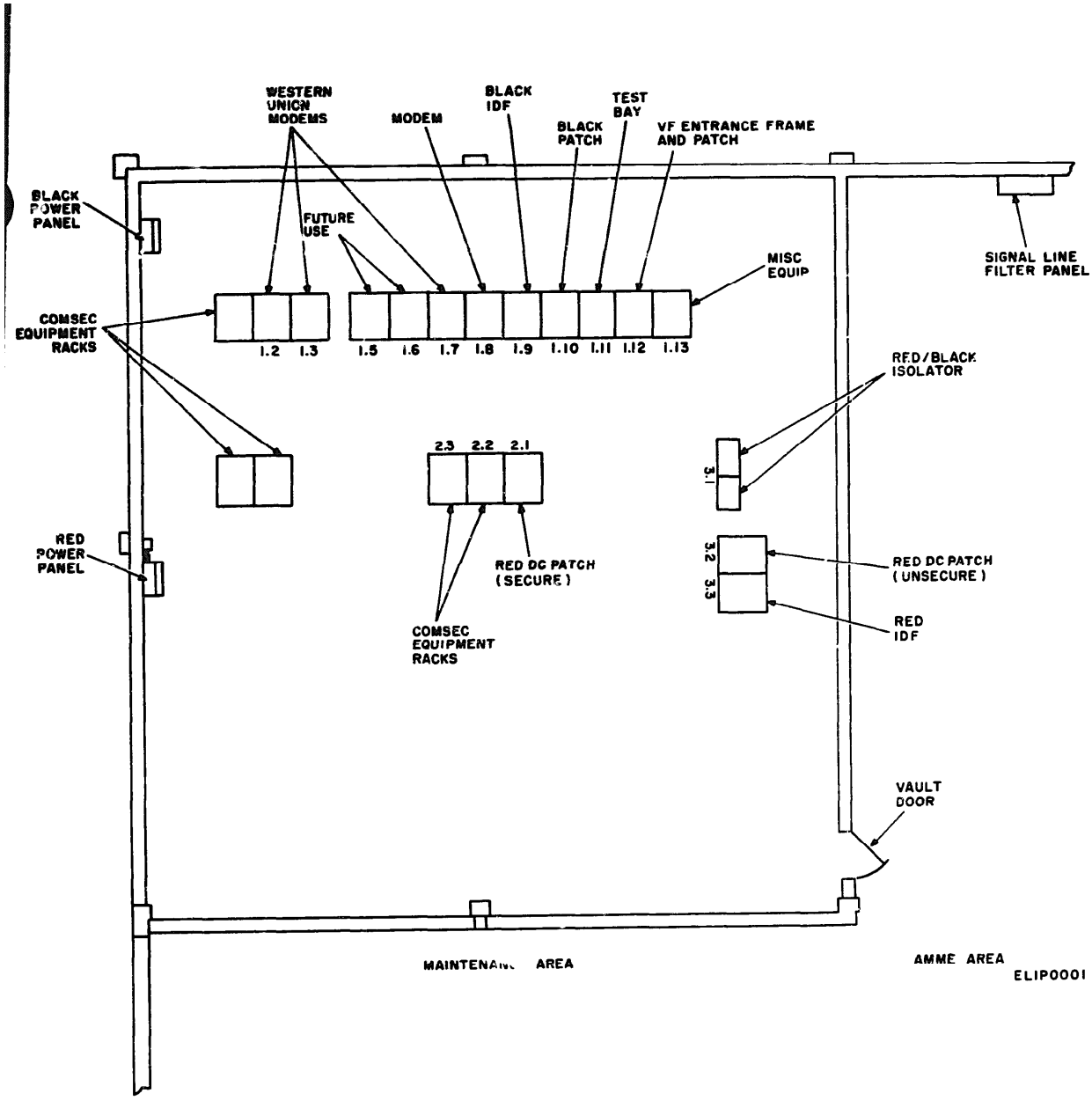

Figure 1-1. Patch and test facility, equipment floor plan.

1-9. Row 1 Equipment Bays (fig. 1-2)

The equipment bays include three Western Union (WU) modems, a bay containing Timeplex modems, the black IDF bay, the black patch bay, a bay containing test equipment, the vf entrance frame and patch bay, and the miscellaneous equipment bay. Two presently empty cabinets are reserved for future use. The WU model bays and the Timeplex model bay are furnished and maintained by a commercial contractor.

a. Western Union Modems (fig. l-3). Western Union modems are installed in bays 1.2, 1.3, and 1.7. The modem cabinets are connected to the overhead cable ducts with conduits that carry signal cables and black power. The three signal cables terminate at the vf entrance frame.

b. Modem Bay 1.8 (fig. 1-3). Timeplex modems

are mounted in bay 1.8 along with a power supply which supplies them power. Four signal cables from the overhead cable ducts are terminated on blocks and cross-connected to cables which connect on the rear of each individual modem (fig. l-4).

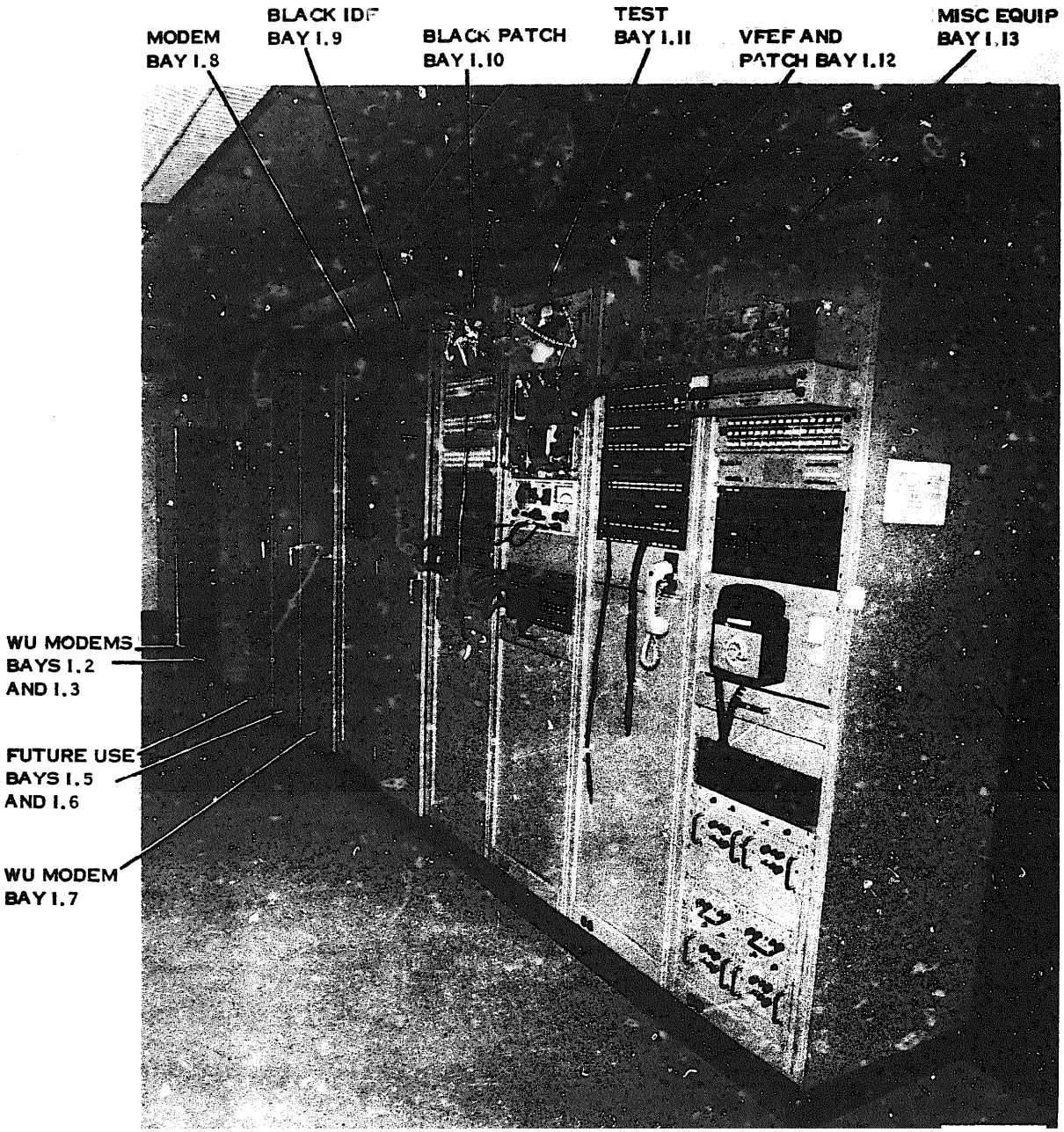

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Figure 1-2. Row *1* equipment bays.

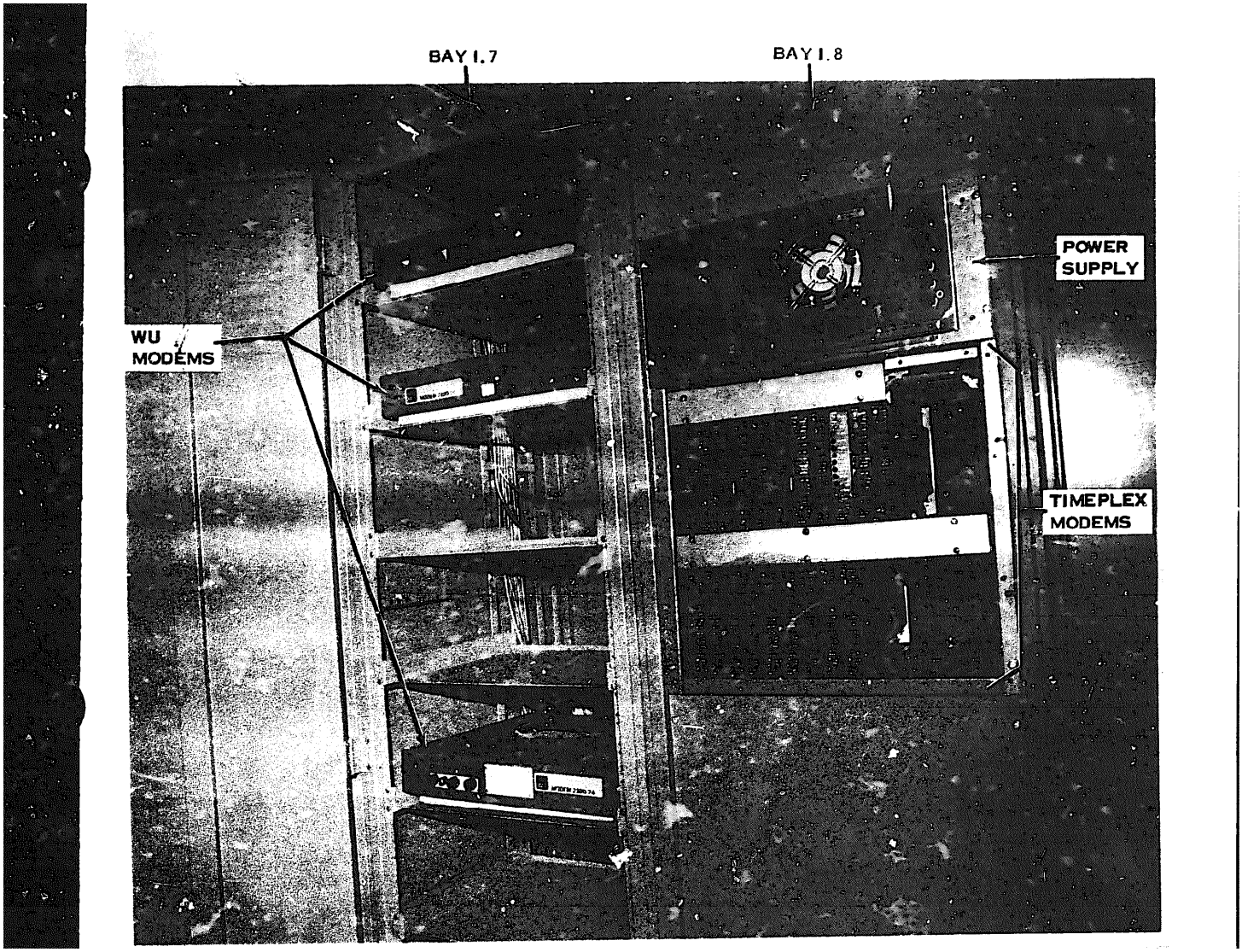

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Figure 1-3. WU modem bay 1.7 and modem bay 1.8.

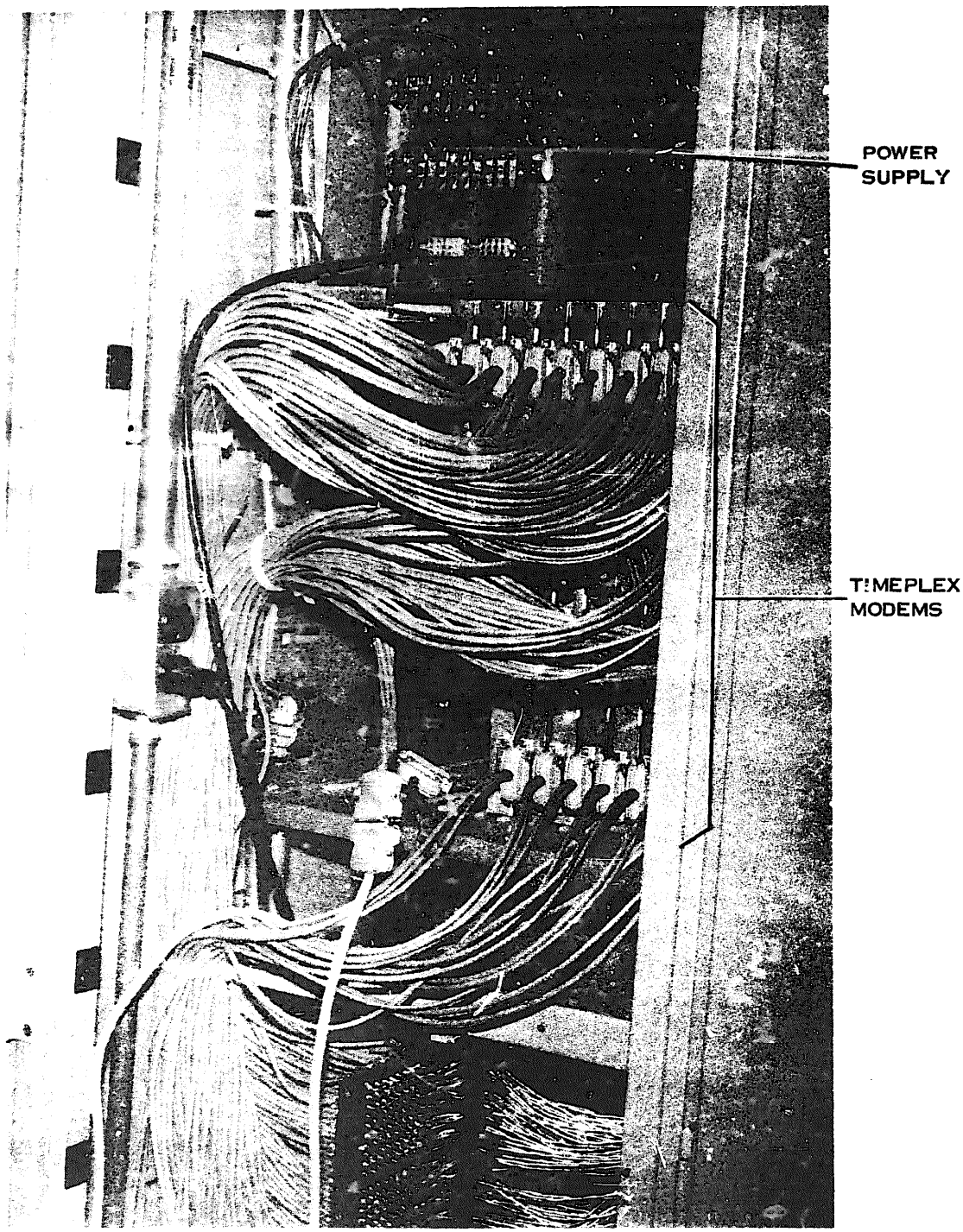

Figure 1-4. Modem bay 1.8, rear view.

c. Black IDF Bay 1.9 (fig. 1-5). The black IDF bay contains 20 cable terminating blocks mounted on a metal frame work. The 20 cable blocks are used to terminate and cross-connect signal cables on the black side of the signal path through the PTF.

d. Block Patch Bay 1.10 (fig. 1-6). The black patch bay contains seven patch modules (patch panels) and a roll out shelf. Three patch modules are multicircuit or 12-wire types. Each multicircuit module handles 16, 12-wire circuits which are normalled through, from and to cable connectors on the module rear. Two patch modules are of the 2-wire type, each containing 24 normalled through circuits and used for low level dc patching (black). The last (bottom) two patching modules are used for miscellaneous and inter-bay 2-wire connections and have facilities for 96, 2-wire connections.

e. Test Bay 1.11 (fig. 1-7) The test bay consists of four items of test equipment, three patching modules, and a pull out shelf. The patching modules provide connections to other bays (through the INT BAY patch) and terminates test equipment connections (MISC patch module). Test equipment power input connections are made at the cabinet rear along with signal and cable connectors for the patching modules.

f. VF Entrance Frame and Patch Bay 1.12) (fig. 1-8). Bay 1.12 contains a dual speaker panel, four, 2-wire audio patch modules, an INT BAY patch module, an intercom handset, and six cable terminating blocks. Each 2-wire audio patch module has the capability for 24, 2-wire normalled through circuits. Connections are made through connectors on the rear of the patching modules to the cable terminating blocks. The main signal cable from the signal line filter panel is connected to the terminating blocks.

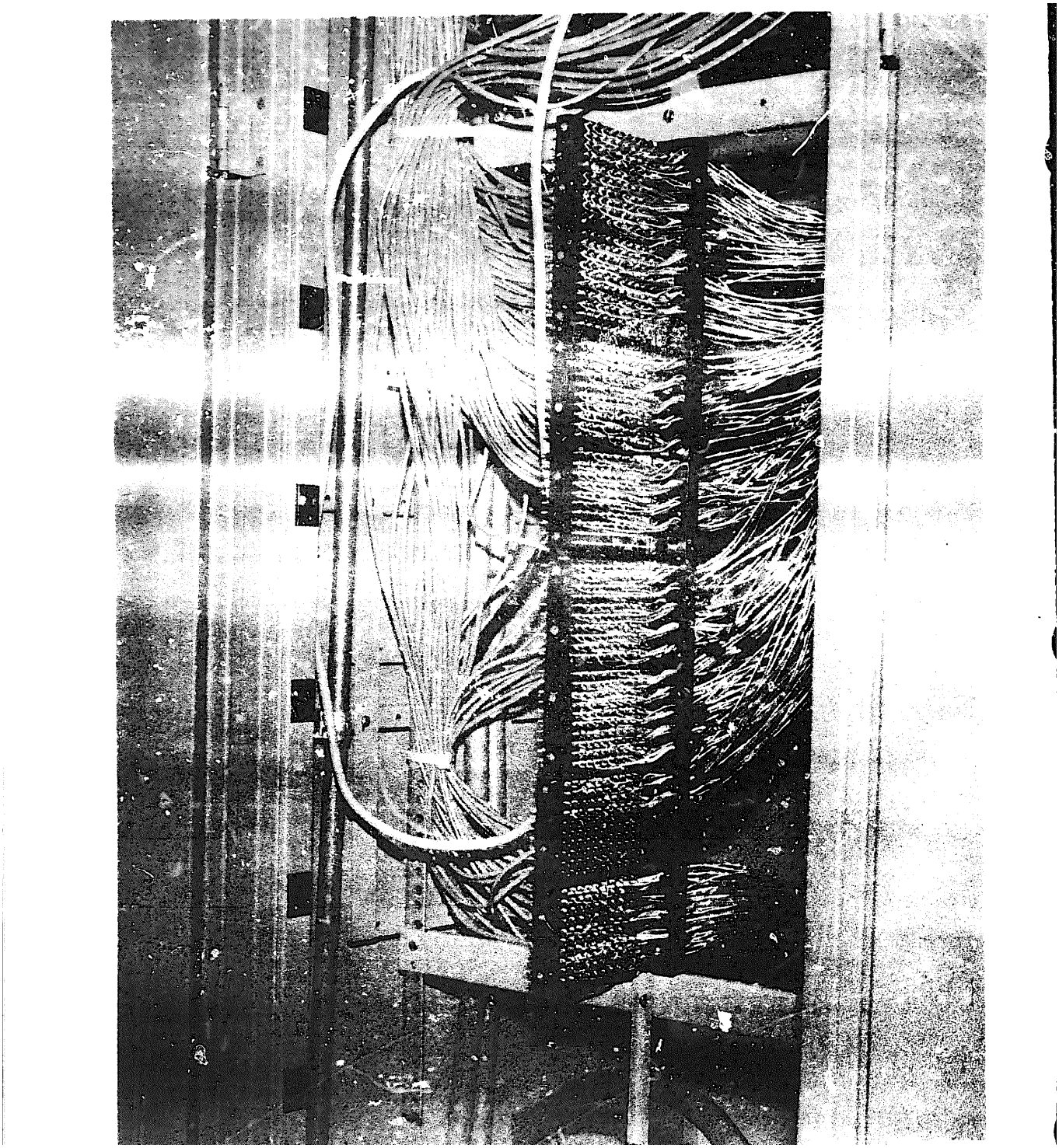

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Figure 1-5. Black IDF bay 1.9

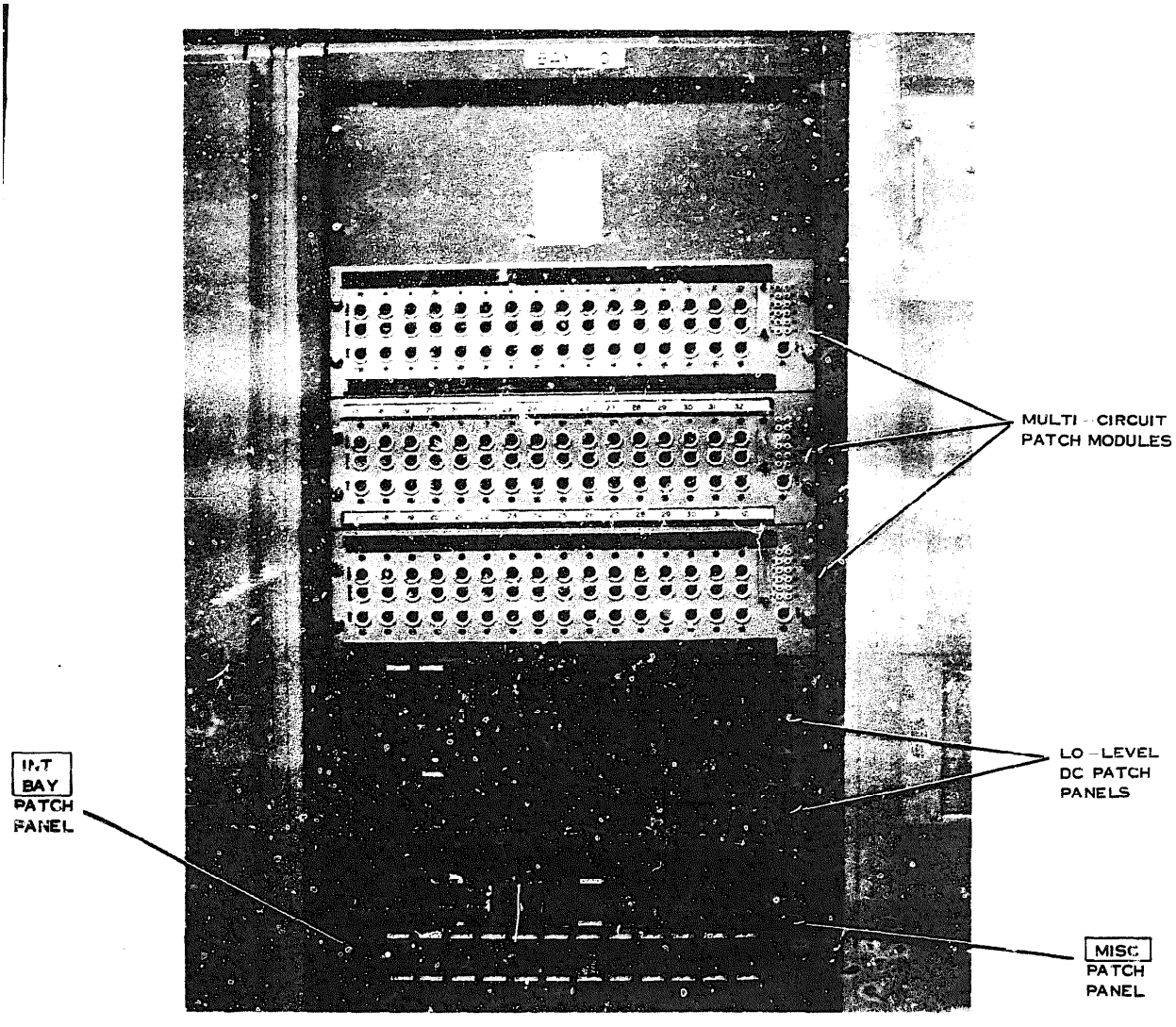

Figure 1-6. Black patch bay 1.10

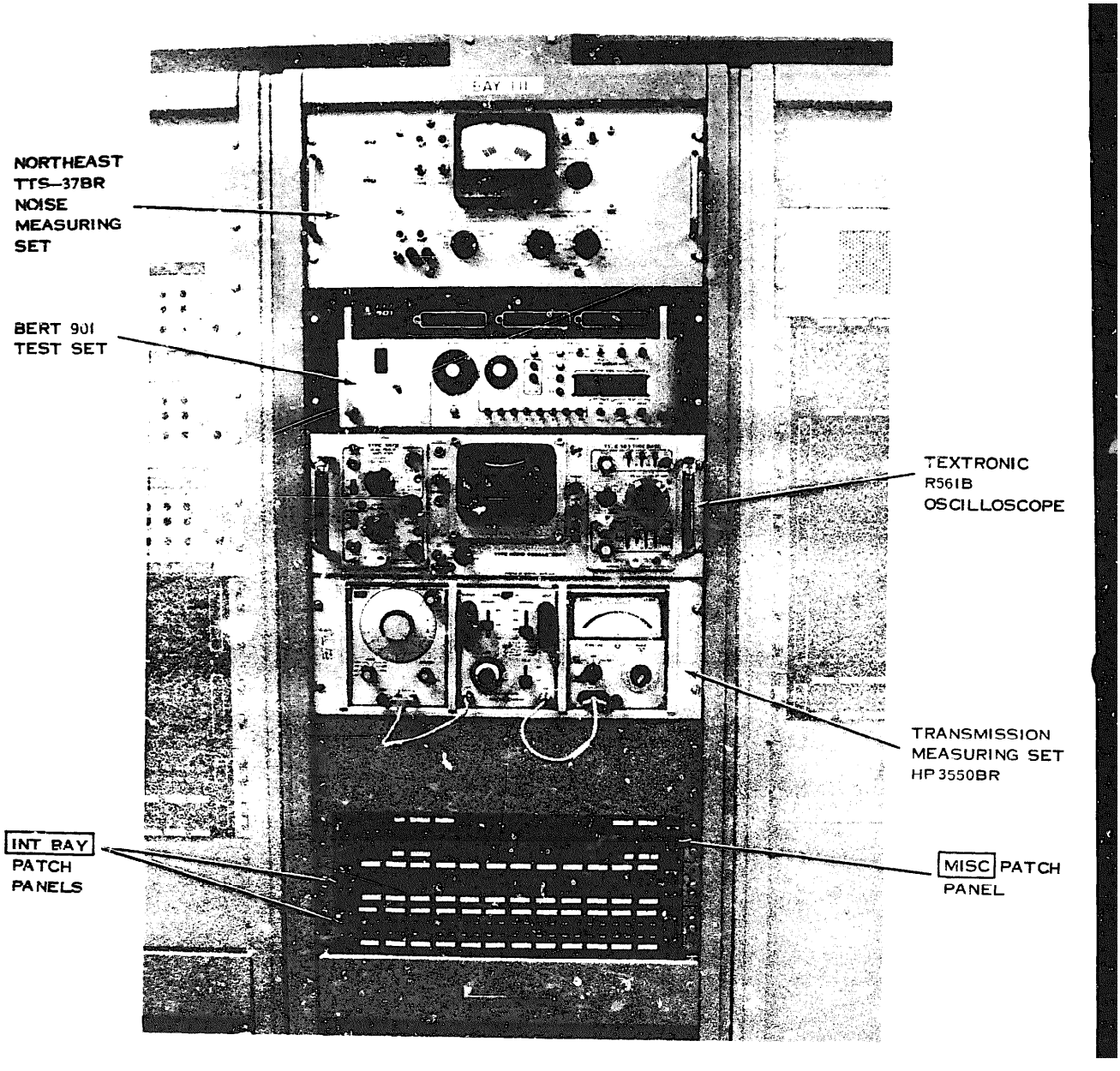

Figure 1-7. Test bay 1.11

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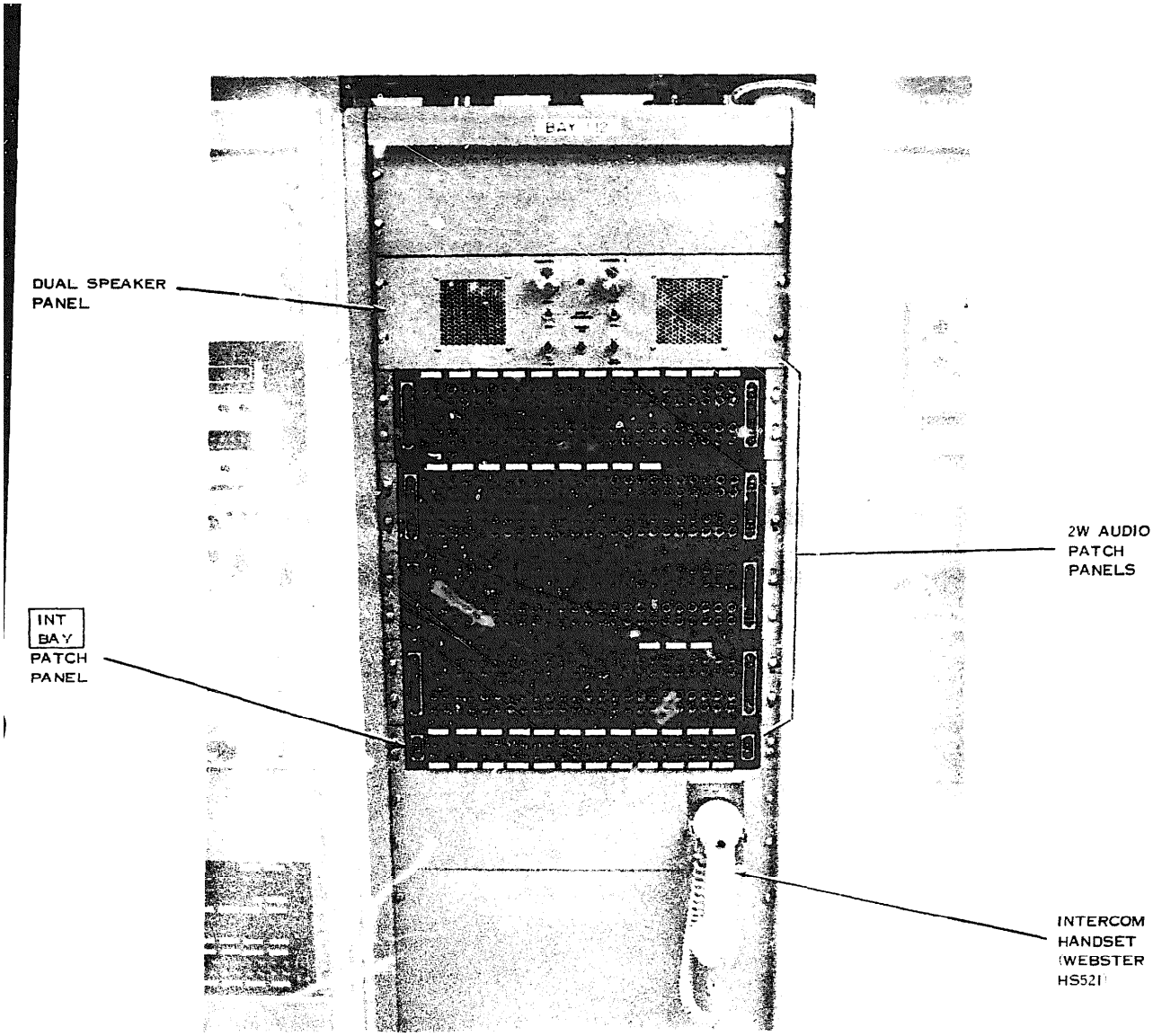


Figure 1-8. Vf entrance frame and patch bay 1.12

EL1P0008

g. Miscellaneous Equipment Bay 1.13 (fig. l-9). Bay 1.13 is designated the miscellaneous equipment bay. It mounts the DLIU modules and shelf, fuse and alarm panel, major-minor alarm panel, an intercom panel, two high-level dc patch panels, four power supplies (48, 6, 60 and 120 volt), two power supply alarm panels, and an audible alarm. All wiring connections (signal and power) are made on the rear of the components. A commercial telephone is mounted on a black panel.

1-10. Row 2 Equipment Bays (fig. 1-10)

Row 2 equipments include a cabinet for mounting patching modules, two bays of COMSEC equipment, and miscellaneous equipment (not shown) used for special circuits not part of the PTF.

a. Red DC Patch Buy 2. 1 (Secure). Six patching modules and a pull out shelf are installed in the front panel of bay 2.1. Three patch modules are 12-wire types containing 16 individual patch circuits.

Two patch modules are 2-wire types containing 24 individual patch circuits each. The last patch module is used for miscellaneous circuits containing 24 individual patch modules. Mounted behind the patch modules, and available from the rear of the cabinet. are cable terminating blocks from which cross connections are made to cables entering the cabinet, from the overhead signal cable ducts, to the cables connecting to the patch modules.

b. COMSEC Equipment Bays 2.2 and 2.3. Two identical racks are used to mount two sets of communication security (COMSEC) equipment. Each rack has a Western Union junction box (J Box) installed above the COMSEC equipment. Signal wiring and cabling on the rear of the equipment is all carried through conduit or ducts for shielding purposes.

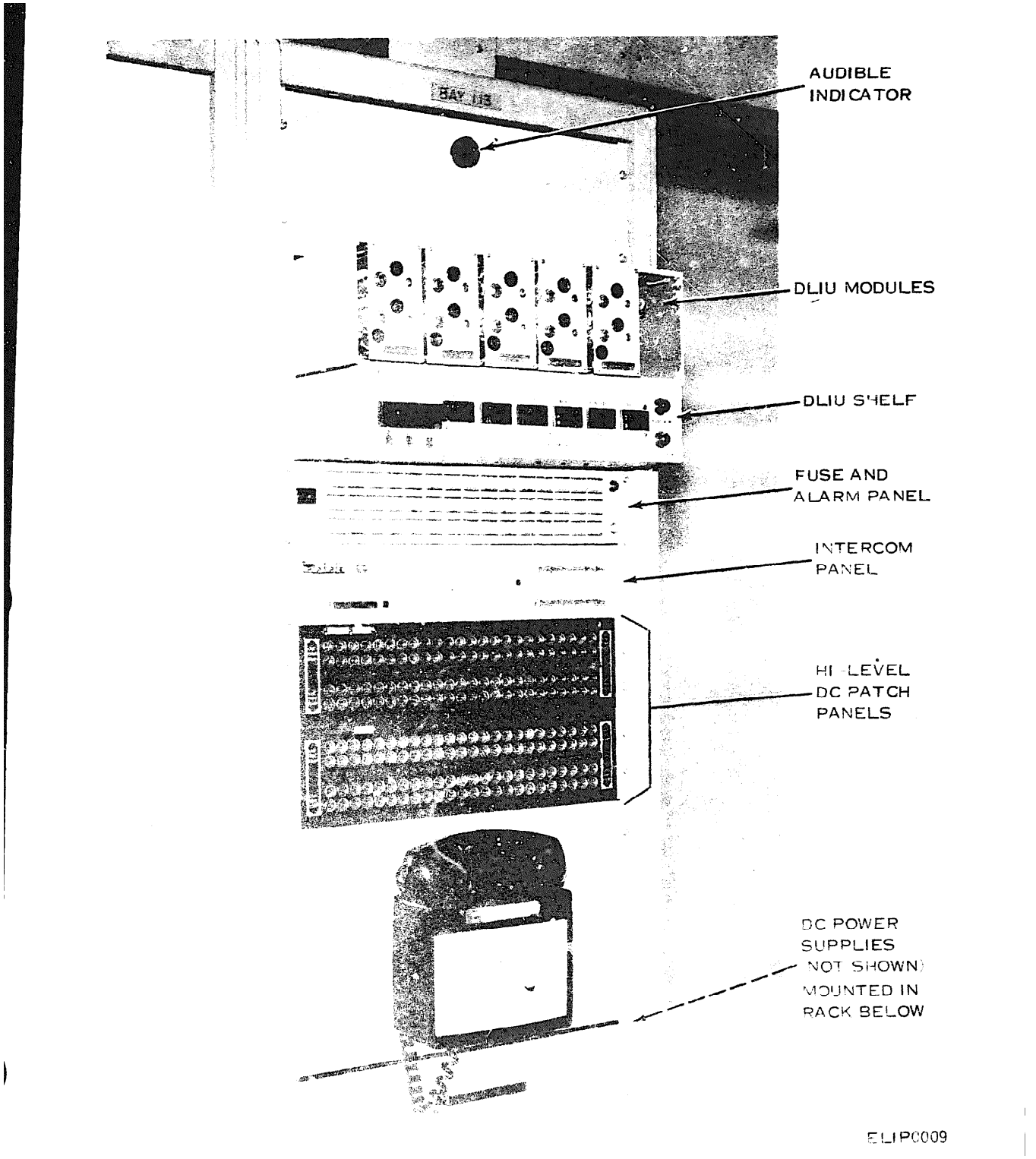


Figure 1-9. Miscellaneous equipment bay 1.13. EL1P0009

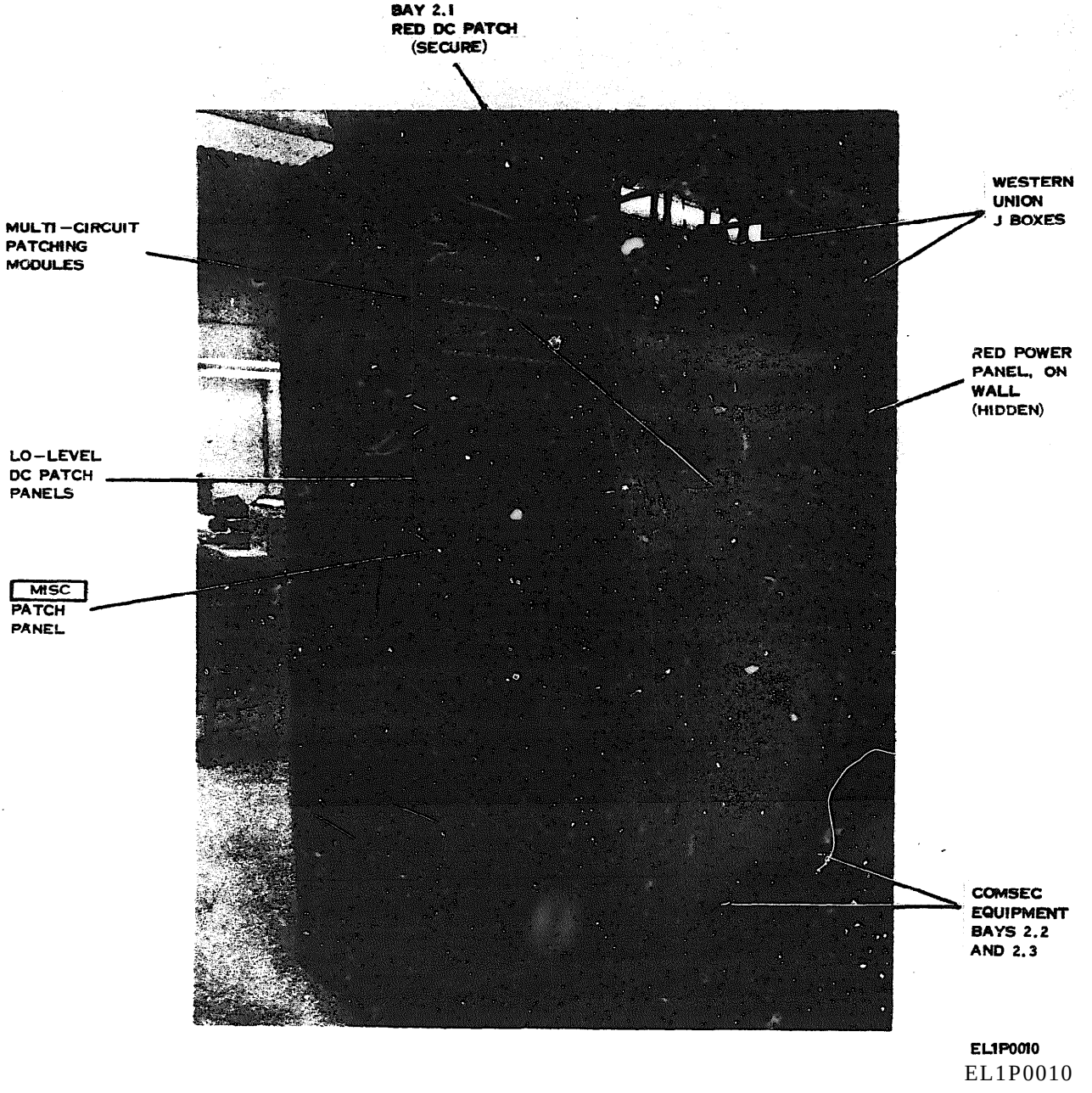


Figure l-10. Row 2 equipment bays.

1-11. Row 3 Equipment Bays
(fig. 1-11)

Row 3 equipments include two bays used for **equipment** that isolates black signal circuits from **red signal circuit**s, the **red** dc patch (unsecure) **bay, and the red** IDF b**ay. O**verhead signal ducts are used to carry signal and power cables to the cabinets as required.

a. Red/Black Isolator Bay 3.1. Two separate side by side cabinets, using special radio frequency (RF) door seals and a series of clamps around the edges to hold the doors tightly closed, are used to

house the red/black isolator circuitry. Black and red signals and power are connected through conduits from the overhead cable ducts into the cabinets. The left cabinet contains all the black signals, the right cabinet the red signals. Connection of signals between the cabinets is made through common wall bushings that carry fiberglass light pipes between light transmitting and receiving modules installed in both cabinets.

b. Red DC Patch Bay 3.2 (Unsecure). Bay 3.2 contains five patching modules: three, 16-circuit 12-wire patching modules, two, 24-circuit 2-wire patch modules, and one miscellaneous patch module (48, 2 w/jack appearances). Additionally, an audible alarm indicator, a major-minor alarm panel, a pullout shelf, and a -48 volt dc power supply are also contained in this bay.

c. Red IDF Bay 3.3. The red IDF bay contains 10 cable terminating blocks mounted on a metal frame work. The blocks are used to terminate and cross-connect cables between AMME and the PTF.

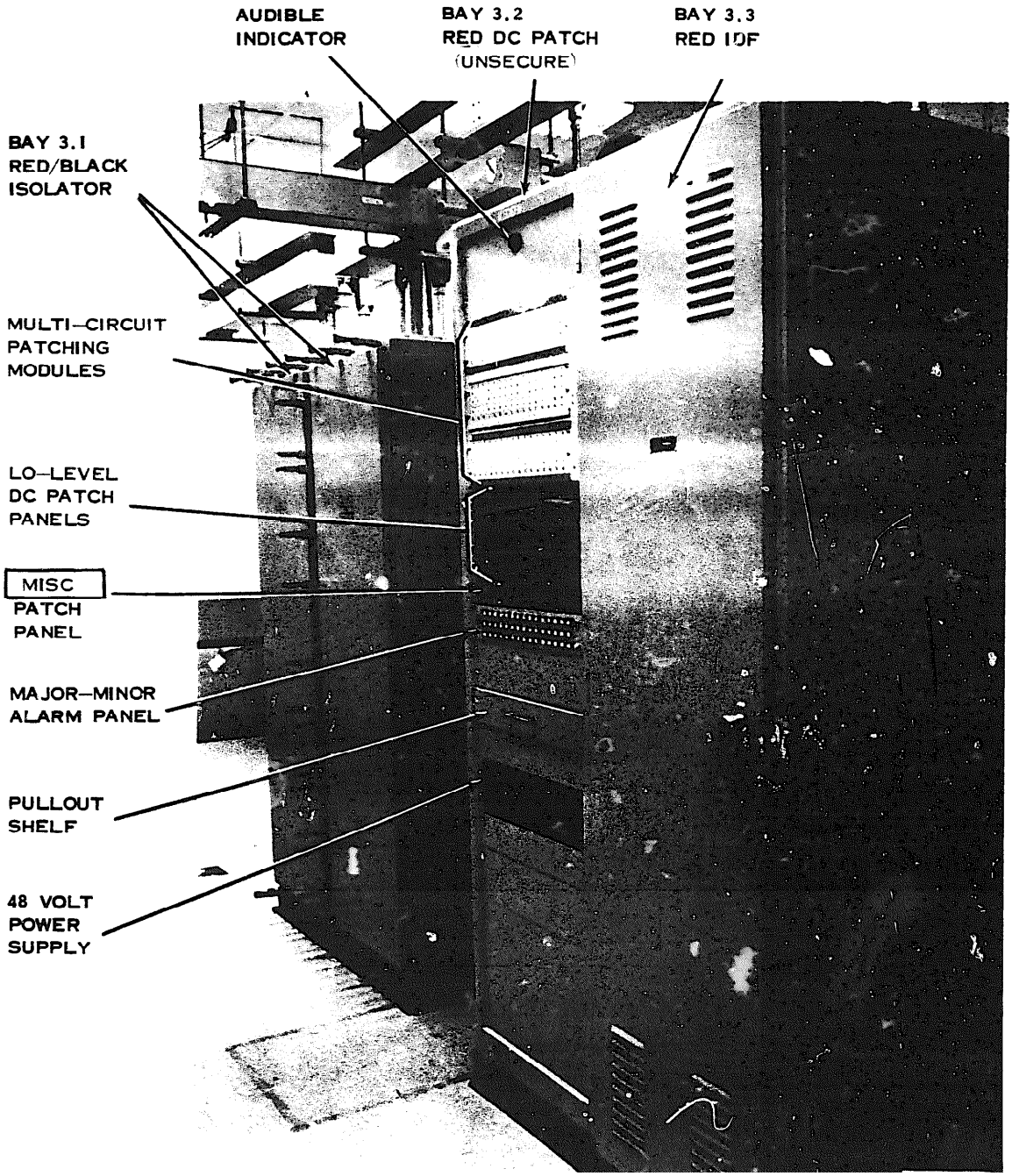


Figure 1-11. Row 3 equipment bays.

CHAPTER 2

FACILITY CIRCUIT DESCRIPTION

2-1. General

This chapter provides an introduction to the circuits and signals that are handled by the PTF. The introduction is made on a block diagram and simplified circuit diagram level. Complete circuit details including pin numbers, and cable routing is available in the plant-in-place records (para 3-3) which are part of every telecommunication station. Detailed functioning of the individual items of equipment represented by the blocks in the block diagram is covered in separate manuals (app A).

2-2. Station Description

a. The PTF described in this manual is part of the Automated Telecommunications Station at Redstone Arsenal, Alabama. The station itself is a Defense Communication System (DCS) Automatic Digital Network (AUTODIN) tributary station, part of a worldwide system of tributaries interconnected through 19 Automatic Switching Centers (ASC), which function to route messages and data traffic between tributaries. Each ASC essentially functions to receive, store, and forward messages between tributaries and ASCs; other functions, in connection with the traffic it handles are also performed. These other functions include processes concerning the message handling such as: error correction, insuring proper delivery, timely delivery, message security, and other functions that are not relevant to the tributary operation. In addition to containing message handling and processing equipment, the ASC also contains equipments which are used to interface with different types of equipment contained at the tributary stations, and to transmit and receive the digital messages on the voice frequency communications channels used between stations.

b. The Redstone Automated Telecommunications Station can be separated into three functional sections: the patch and test facility (PTF); the Automated Multimedia Exchange (AMME); and a system of remote terminals.

(1) PTF. The patch and test portion of the station is used to terminate all communication lines for the station. It contains equipment for monitoring, measuring, testing, and troubleshooting those lines. It also contains equipment for processing the signals received and transmitted to the ASCs, to the remote terminals, and to AMME.

(2) AMME. The AMME performs a function similar to an ASC as it is a store and forward facility between AUTODIN and the remote terminals. As with the ASCs, AMME also performs other functions in connection with the transmission of the data and message traffic. The AMME contains equipment to: record all traffic; switch traffic to proper remote terminal; provide AUTODIN routing symbols on outgoing messages; and other message handling functions. The AMME equipment is leased and maintained by a private contractor.

(3) Remote terminals. There are several different equipment configurations used at the remote terminals. The equipments required depend on the traffic intended to the remote terminal. A remote terminal may have any combination of a card reader, a card punch, a line printer, and a visual display unit (VDU). Two remote terminals have teletypewriters only.

2-3. Facility Signal Block Diagram (fig. 2-l)

a. Station Signal Routing. The signal flow for received and transmitted traffic to the telecommunications station passes through the PTF. The received signal flow from the ASC enters the station at the PTF and is processed and fed to AMME. From AMME the signal path to the intended remote terminal is again through the PTF. A transmitted signal from a remote terminal follows the reverse of a received signal: from the remote terminal to the PTF, to AMME, back to PTF, and then to the ASC.

b. ASC Signal. The signal received from, and also transmitted to, the ASC is a data message which has been incrypted for message security and changed to an analog signal for transmittal on the voice frequency lines between stations. On the block diagram (fig. 2-1, the ASC signal is shown entering the PTF at the signal line filter panel.

(1) The ASC signal proceeds through the PTF to and from the AMME through six significant blocks. The blocks represent equipments which either modify the signal, such as the WU modem or COMSEC blocks, or provided access to the signal for testing, such as the patch panel blocks. The remaining block represents the signal line filter panel which contains a separate, shielded, low pass filter for every signal line that enters the PTF. The signal line filters prevent the signal lines

from radiating spurious, and possibly security-compromising, signals.

(2) The Western Union (WU) modulator-demodulator (modem) requires four wires input on the ASC side of the equipment, and 12 wires output on the AMME side of the equipment. Half of each wire set is used for receiving, the other half for transmitting.

(a) The signal on the ASC side of the WU modem is a carrier or tone at 1800 Hz. The carrier is frequency modulated (fin) at the digital rate (2400 bits/second) with the data (message) information. The purpose of the WU modem is to convert the signal received from the ASC to a digital direct current signal, for use by the AMME, and convert the digital signal originating in the AMME to the FM signal transmitted to the ASC.

(b) On the AMME side of the WU modem, data, control, and clock signals are exchanged with the AMME. The data contains the message information received from or to be transmitted to the ASC. The control signals are dc levels which are exchanged between the AMME and the modem which allows the AMME to control the modem. The clock signals are used in controlling the transfer of the individual data bits between the AMME and the modem.

(3) The Communication Security (COMSEC) block provides for security of the data (message) transmitted by encrypting them automatically. Received data, which has been encrypted at the ASC, is decrypted automatically in the equipment represented by the COMSEC block. The COMSEC equipment provides a dividing point between red and black signal lines.

(4) As the communication lines move between the AMME and the signal line filter panel, they encounter three patch panels: the vf, the red dc, and the black dc. The lines normally pass through the patch panels but can be interrupted or monitored by use of patch cords or plugs. The patch panels are used for testing, rerouting and monitoring signals at different points in the signal muting chain.

c. Remote Terminal Signal. The signal flow between the AMME and the remote terminals is more complex than the signal between the AMME and the ASC because there are more circuits involved. In most cases the signal processing is the same. The remote terminal lines are shown entering the PTF as circuits 1 through 17, and 48 through 51.

(1) Following circuits 1 through 17 from the AMME through the PTF, six significant blocks are encountered. The most significant block is the Timeplex modem which transposes the dc digital signal used in the AMME into the analog frequency signal which is used on the voice frequency transmission lines to the individual remote terminals. The next most significant block is the red/black isolator which provides electrical isolation between the red signal wiring and the black signal wiring. The remaining blocks are three patch panels and the signal line filter panel. The patch panels and the signal line filter panel function in the same manner as in the AUTODIN signal line described previously.

(2) Circuits 49 and 50 are transmit-only channels that pass through the PTF in the following manner: through the red dc patch panel; red/black isolator; dc patch panel; DLIU (digital line interface unit); high-level dc patch panel; signal line filter panel. The remote terminals for these two lines are teletypewriters which require high-level dc voltages (120 volts) to operate. The function of the DLIU is to transpose the low-level digital signals used in the AMME to high-level signals used to transmit the message. Other blocks in the PTF signal flow function as previously explained.

(3) Circuit 51, shown along with circuits 49 and 50, follows the same path through the PTF but does not originate in the AMME. This circuit is a secure teletype transmit-only channel whose lines use the facilities of the PTF only. The circuit functioning is the same as circuits 49 and 50.

(4) Circuit 52 is a spare circuit which has both a transmit and receive line. It follows the same path through the PTF as circuits 49, 50 and 51.

(5) Circuits 47 (not shown) and 48 have been connected into the PTF to be utilized at a later date. Circuit 48 (shown) is to be a high-speed data line (2000 bits/second) and as such does not have patch appearances. Circuit 47 is intended as a secure circuit utilizing a COMSEC device with appropriate modems.

2-4. Circuit Configurations (fig. 2-2)

The circuits that pass through the PTF can be placed in three general catagories: the transmit-only teletype lines, the AUTODIN lines, and the lines to the remote terminals. The simplified diagram shows the three configurations and symbols that represent the major equipment blocks and interface points.

a. Transmit-Only Lines. The transmit-only lines handle low-speed teletype signals which originate in the AMME. Moving across the diagram, from left to right, the line encounters the red dc patch panel, shown by the symbol for two normal through and two monitor jacks (the circle symbols on the line represent terminals in the distribution

frame to which the wire pairs are connected); the red/black isolators, which provide isolation of the red wiring from the black wiring; the black dc patch panel; the DLIU, which changes the low-level signals used by AMME to high-level signals sent to the teletypewriter terminals; and the high-level dc patch panel.

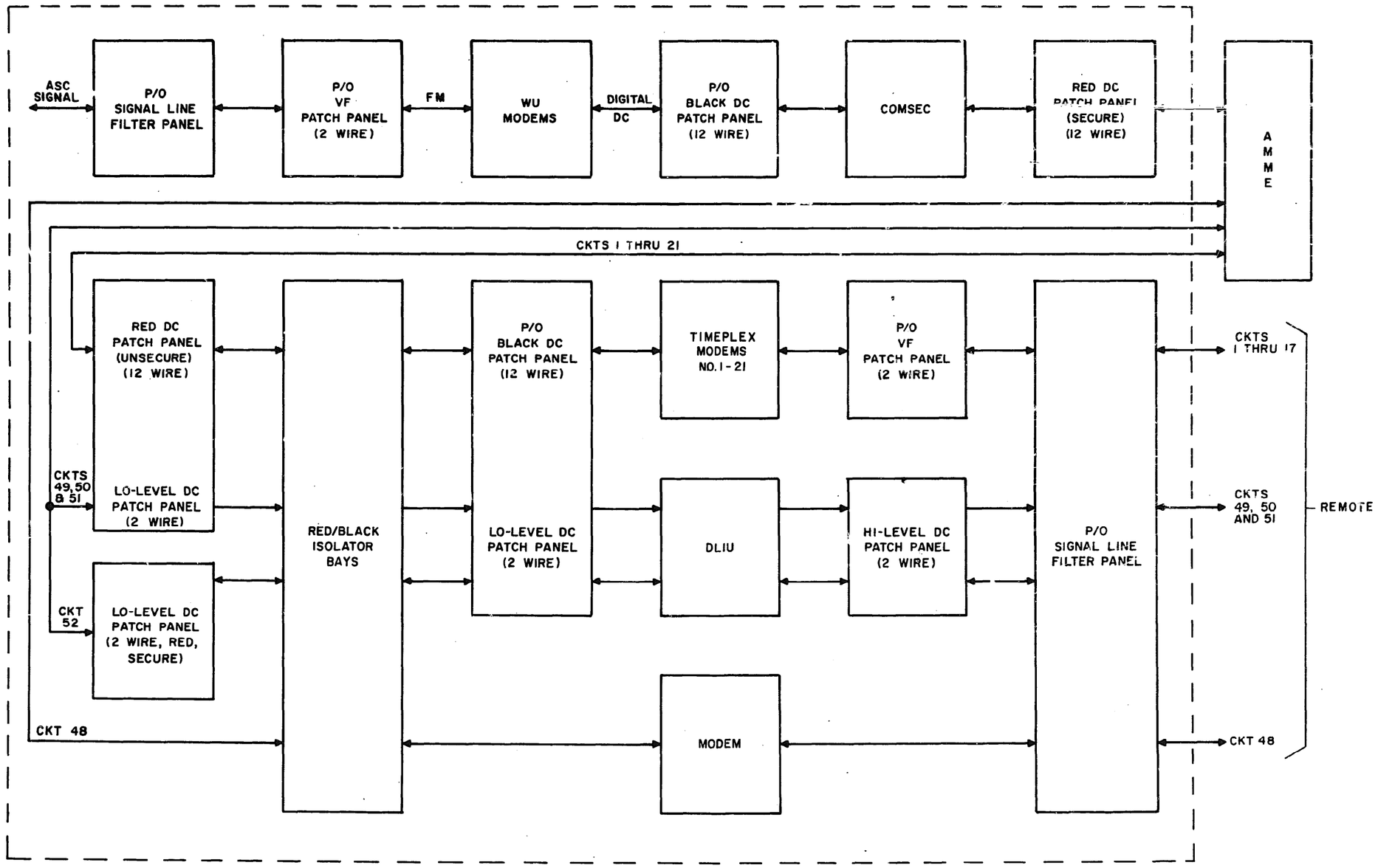
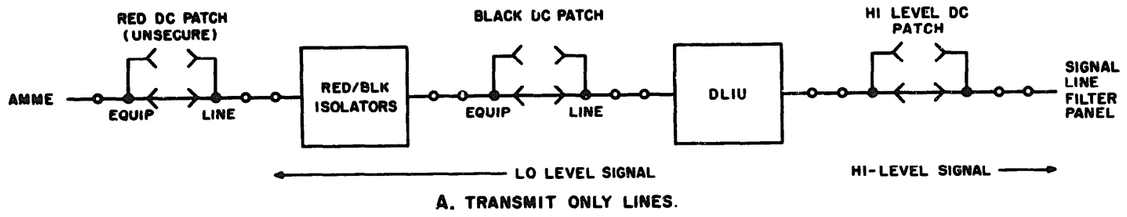
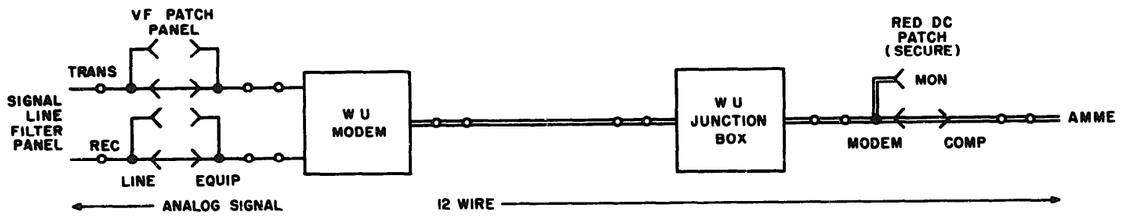


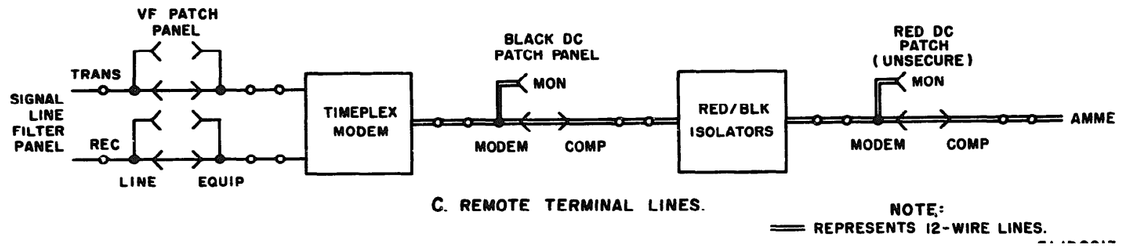
Figure 2-l. Patch and test facility, block diagram.



A. TRANSMIT ONLY LINES.



B. AUTODIN LINES.



C. REMOTE TERMINAL LINES.

NOTE:
═══ REPRESENTS 12-WIRE LINES.

EL1P0013

Figure 2-2. Typical circuit configurations.

b. AUTODIN Lines. The AUTODIN lines consist of two AUTODIN duplex circuits that travel through the PTF. The station entrance is at the signal line filter panel and two sets of panel jacks at the vf patch panel. The signal flow-through to the AMME is: the WU modem; the WU junction box; and the red dc patch panel. The WU modem functions to modulate the AMME signal for transmission to the ASC and demodulate the signal from the ASC. The signal between modem and AMME is carried on 12 wires and requires a special 12-wire patch panel; six wires are used for each direction of signal flow. The WU junction box is the entrance point to the COMSEC devices. The WU junction box also provides for switching-in spare COMSEC units and testing, by connecting the transmit and received lines together (back-to-back testing).

c. Remote Terminal Lines. The remote terminal lines are configured similiar to the AUTODIN lines in that they are duplex and use a modem. The lines connect to the signal line filter panel, the vf patch panel, Timeplex modem, the black dc patch panel, the red/black isolators, and the red dc patch panel. The Timeplex modem performs the same function, as the WU modem in that it modulates the signal for transmission on voice frequency lines and demodulates the voice frequency line signal for use by AMME. The red/black isolators provide a means of isolating the red signal wiring from the black signal wiring, as previously explained.

CHAPTER 3

PATCH AND TEST FACILITY OPERATIONS

Section I. OPERATIONAL PRACTICES AND METHODS

3-1. General.

The purpose of this chapter is to identify and establish maintenance responsibilities and procedures which will contribute to successful PTF operation. While there are many aspects LO successful PTF operation, there are none more important than those described in this chapter. Information contained herein will aid operating personnel and bring out the importance of maintaining accurate maintenance data. It also points out many items which could be overlooked by maintenance personnel. This information should especially be read and studied by new personnel to familiarize themselves with proper station operating procedures.

3-2. Duties of PTF Personnel

The prime mission of PTF personnel is to maintain Proper communications. Maintaining proper communications can be further broken down to restoration of circuit failure and maintaining circuit quality. Both of these functions require a knowledge of the circuit status at all times. The basic requirements for maintaining proper communications are divided into the following individual duties:

a. Perform quality control checks and tests on circuits and equipment in the PTF.

b. Provide assistance to the ASC's and remote terminals in the checking of circuits.

c. Substitute equipment or channels for maintenance purposes, or to isolate circuit and equipment faults.

d. Answering fault alarms and restore communications.

e. Perform the required administration and record keeping.

f. Troubleshooting and repair of station equipment.

g. Maintenance of records (para 3-3).

3-3. Maintenance of Records

Maintenance of records, as defined here, is to insure that all the PTF technical data (technical manuals, plant-in-place records, circuit drawings, circuit and switch markings) is up to date and complete. PTF records are divided into the following categories.

a. Plant-in-Place Records. Plant-in-place records are those engineering drawings, cable run lists, planning documents, etc., which show the site electronic equipment installation. These records also show planning for future changes and are essential to site operation.

(1) Plant-in-place records (sometimes called "as-built-s") are prepared by the engineering/installation agency. The plant-in-place records are first developed as part of the engineering plan before the construction update of a communications station. After the work on the communications station is completed, the plant-in-place records must be updated to document the installation and becomes the basis for any new additions or future station planning.

(2) Plant-in-place records are also used by operation and maintenance (O and M) personnel as maintenance data. This is because plant-in-place records show all circuit and wiring connections made in the telecommunications station. Corrected copies of the original drawings must be retained at the telecommunication site and used as a guide in troubleshooting and fault location.

(3) Before site construction, errors can appear in the plant-in-place records as they are being produced. These errors should become obvious during the installation process as equipment is installed and connected. Usually the mistakes can be corrected during the electrical testing of the site. Corrections to the plant-m-place records are made on prints (by installation personnel) and sent to the engineering/installation agency for correction of the originals. Corrected prints are returned to the telecommunication site for use in troubleshooting, circuit and wiring tracing, etc. While the corrections are made by the installation personnel, site O and M personnel have the responsibility to insure that all corrections are completely accurate and show the equipment as installed.

(4) The importance of accurate and complete plant-in-place records cannot be overemphasized. They are needed by the communications engineering agency to document the cite equipment and circuits and to provide information for updating, modernizing or expanding the site at some future date. Plant-in-place records are also used daily by the site personnel for circuit tracing and troubleshooting. If this circuit tracing or troubleshooting is used to restore communications.

a faulty or incorrect diagram can add hours onto the time of the communications outage. Simple fault location becomes a long drawnout procedure when a faulty drawing complicates it even more. To summarize, plant-in-place records must be accurate and complete at all times in order to ensure a properly maintained station.

b. Equipment Manuals. The equipment manuals (commercial and military), which come under the heading of station records, cover the individual items of station equipment. These items of equipment are either mounted in a rack or, in the case of the red/black isolators, are whole equipment racks. They are generally not built by the installation/engineering agency but procured as a separate item from a commercial company. A list of equipment manuals is included in appendix A.

c. Reference Publications. Reference publications which should be included in the station records are those manuals, documents and "other data which provide background, standards, or testing information. A list of these types of documents is included in appendix A.

d. Locally Prepared Data. Locally prepared data that is included as part of station records **are** the patch board labels, labels on the power load centers denoting circuit breaker application, any simplified patching diagrams placed on patch bays, and trouble logs. In general, any instructions or aids to operation and troubleshooting of the equipment can be considered part of the station records.

Section II. PATCHING OPERATIONS

3-4. Patching, General

a. The communication lines or paths that run through the PTF are provided with patch boards which are connected between equipments and at the line entrance and exit points. The patch boards are equipped with jacks that allow for either a parallel circuit connection for monitoring (MON), or a series connection which opens the circuit and connects another circuit in its place. The series jacks on the patch boards are used for testing and temporarily rearranging circuit paths for troubleshooting and for the restoration of communications.

b. Successful patching requires knowledge of the circuits and equipments, a technique that comes from practice, and adherence to certain precautionary measures.

(1) Circuit knowledge. Knowledge of the circuits and the type of signals they handle is essential for proper patching. Like-signals have to be patched to like-signals. Signal paths must be maintained, i.e., output from one item of equipment must connect to the input of the equipment patched to.

(2) Operational spares. Operational spare lines and equipment must be maintained. Standby equipments maintained in these spare circuits are used when patching around a defective item. When spares are not available, substitute patches cannot be made.

(3) Precautions. Patches should not be made haphazardly, without thought to the interruption of traffic. Always know what is on the circuit to be interrupted. When possible, coordinate with others affected so that when circuits are patched, no traffic is being passed.

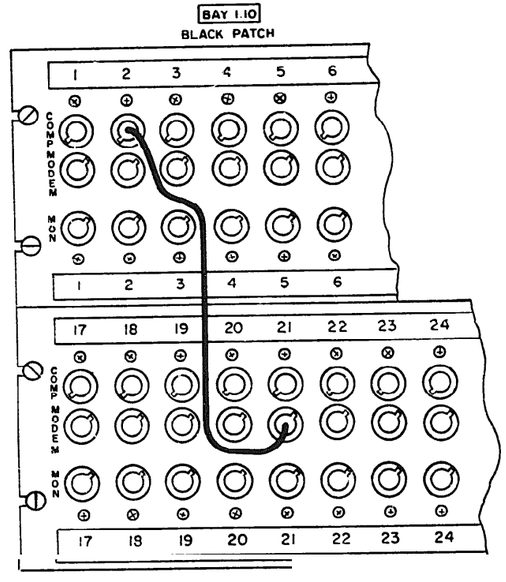
(4) Technique. Develop the habit of rechecking your cord and plug positions before completing the patch. Set the patch up with the cable plugs loosely set into the patch jacks. Then recheck the signal flow before plugging-in the idle sections; then plug-in idle section fully; and finally complete the patch by setting-in (or throwing) the plugs to the active line section simultaneously.

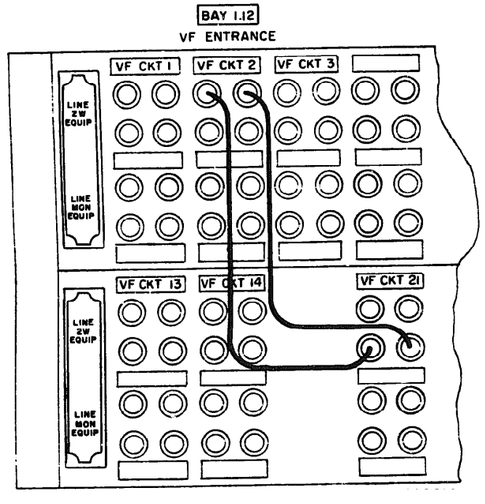
(5) Prohibitions. The PTF was designed to minimize the chances of red and black circuits being patched together; operators should be alert to this possibility. Red circuits must not be patched to black circuits directly. The electrical isolation of circuits provided by the red/black isolator cabinets must not be defeated.

3-5. Patching for Equipment Substitution

Examples of typical patch cord connections are provided here to illustrate connections for patching-in substitute equipment. PTF personnel should fully examine the diagrams to understand the principles involved.

a. Modem Substitution (fig 3-1. This patch removes the modem on circuit number 2 and substitutes a spare modem from circuit number 21. At bay 1.10, a multicircuit patch cord is connected from the COMP jack of channel 2 to the MODEM jack of channel (circuit) 21. On the vf entrance panel bay 1.12, two 2-wire patch cords connect the modem transmit and receive lines from circuit 21 to the lines of circuit 2.





EL1P0014

Figure 3-1. Patching for modem substitution.

b. Isolator Substitution (fig 3-2). Isolator substitution involves the multicircuit (12-wire) patch cords. Operational spares for the isolators are connected to circuit 19. On the black patch, the MODEM jack of circuit 2 is connected to the COMP jack of circuit 19. On the other side of the isolator cabinet (red dc unsecure patch), the MODEM jack of circuit 19 is connected to the COMP jack of circuit number 2 to complete the patch.

c. DLIU Substitution (fig 3-3). This patch is presented schematically to show the principle involved in patching. The defective DLIU is the top one in the diagram. Patch cords are connected to divert the signal (transmit only) from the top 2-wire line to the spare DLIU on the bottom line and then back to the correct line on the top.

3-6. Testing Patches

Testing patches are those patches which connect the analog test equipment (noise measuring set, transmission measuring set) into the vf lines. The patching arrangements for these patches are shown on figure 3-4. A schematic and a drawing representing the way the actual patch cords are set up are shown. PTF personnel should study this diagram before performing patching for testing. The types of tests, the performance standards, and procedures to be used for these tests are contained in various DCA manuals, listed in appendix A.

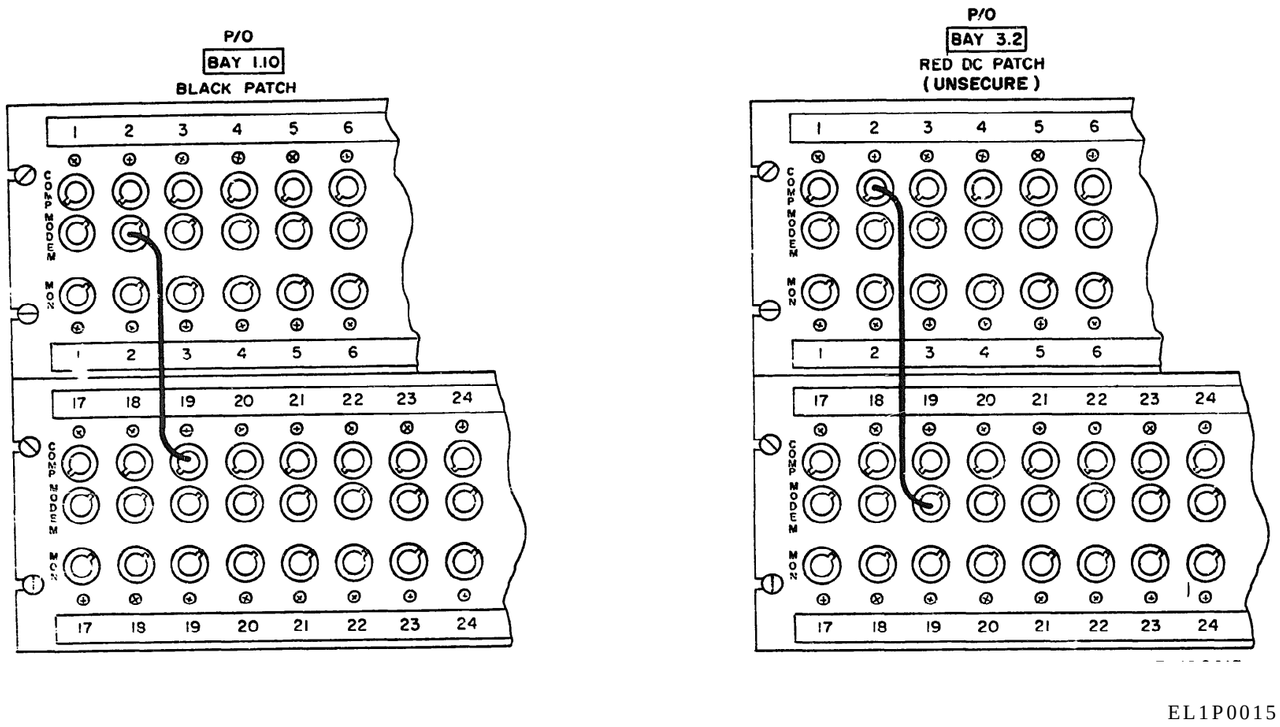
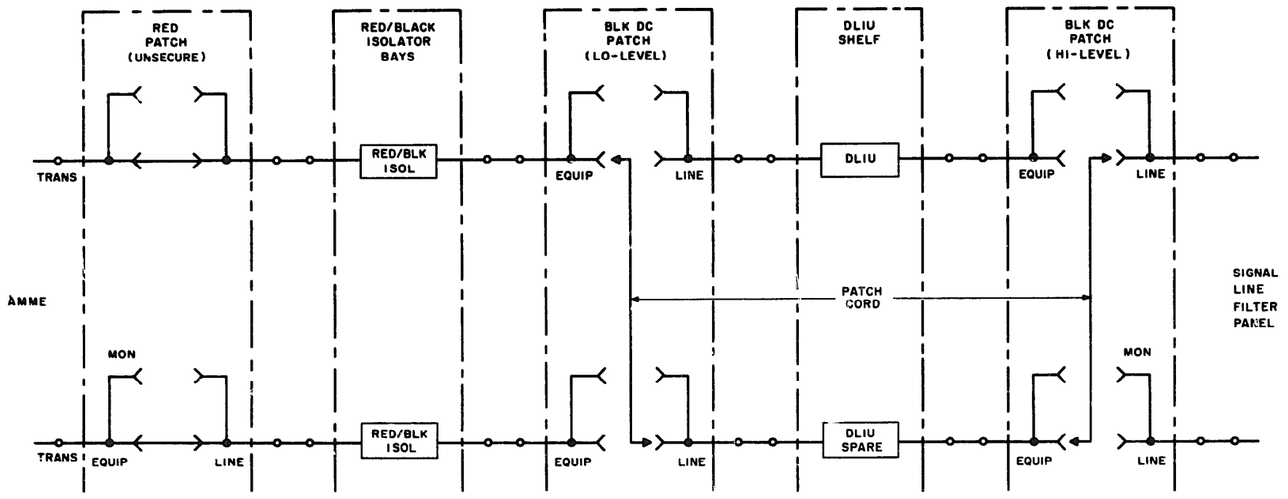


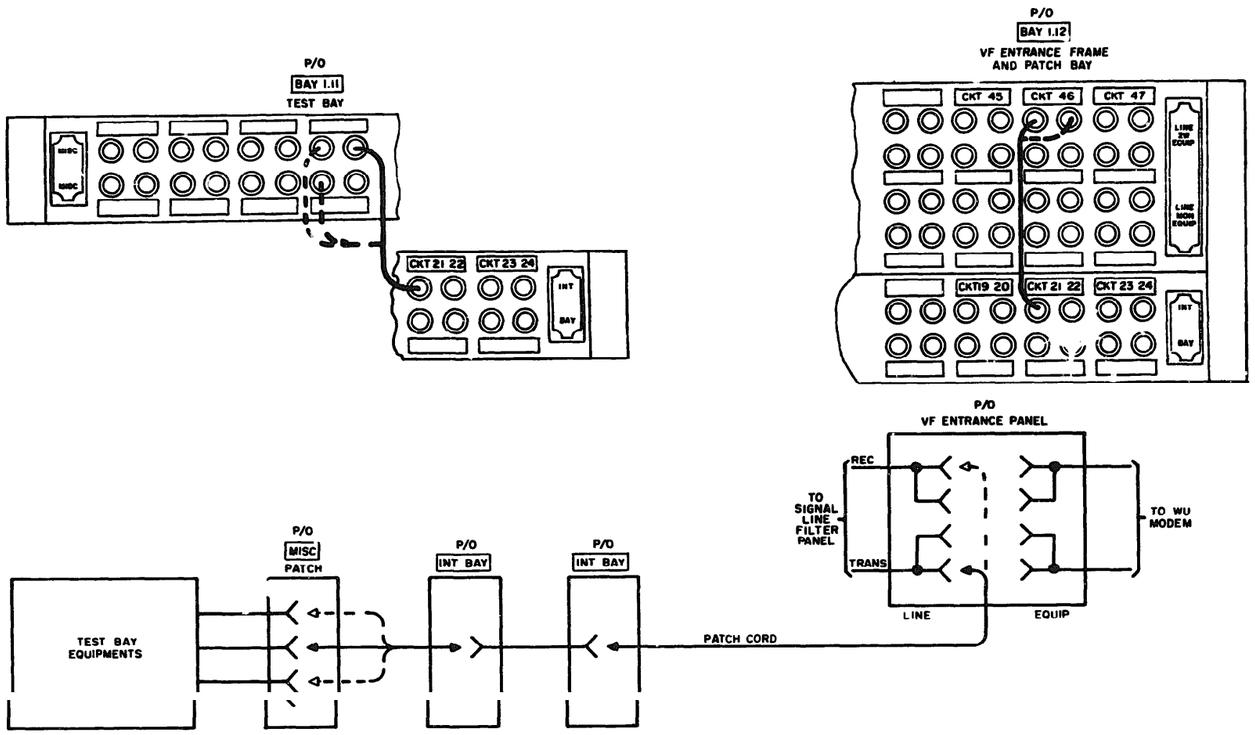
Figure 3-2. Patching for isolator substitution.



NOTE:

BOTH DLIU'S MUST BE STRAPPED FOR THE SAME POLARITY AND LEVEL.

Figure 3-3. Patching for DLIU substitution.



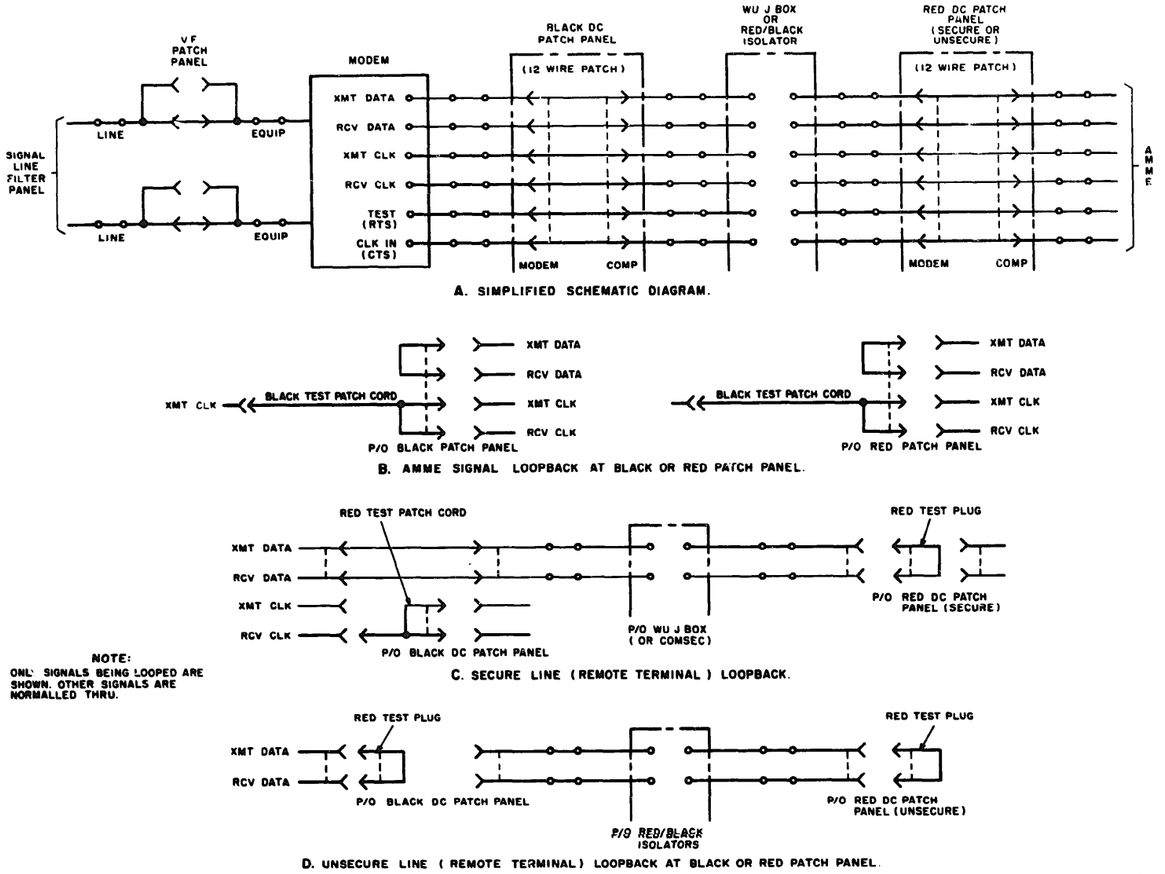
EL1P0017

Figure 3-4. Typical patching arrangment for DCS testing of AUTODIN lines.

3-7. Patching for Fault Location

Patching for fault lo&ion includes loopback by use of special test cords and plugs and use of the BERT for troubleshooting.

a. Loopback. Loopback is a method for connecting the transmitting lines of a communication device to its received lines. The purpose of the loopback is so that a standard, or test message may be sent from and to the communication device for comparison of the transmitted-to-the-received message for testing purposes. At the PTF, request for loopback comes from either the AMME or the remote terminals. Two special loopback cables and one special plug are provided at the PTF. The use of the cables and plug is illustrated in figure 3-5.



EL1P0018

Figure 3-5. Test plug and test cord use, simplified schematic diagram.

(1) Black test patch cord. The black test cord is identified by the plug ends. One end has three pins and the other nine pins. It is used for looping back the AMME signal as shown in B, of figure 3-5.

(2) Red test patch cord. The red test cord is identified by the plug ends. One end has three pins and the other has five pins. It is used with the red test plug for looping back a secure remote terminal line and is shown in C, of figure 3-5.

(3) Red test plug. The red test plug is used to loop back a remote terminal signal as shown in C and D of figure 3-5.

b. BERT Patching. When the BERT is used for troubleshooting as described in paragraph 4-11, it is connected and patched into the system as shown in figure 3-6. This arrangement may or may not be practical depending on the length of the patch cords. It may be able to patch directly from the MISC of bay 1.10 to MISC of bay 1.11.

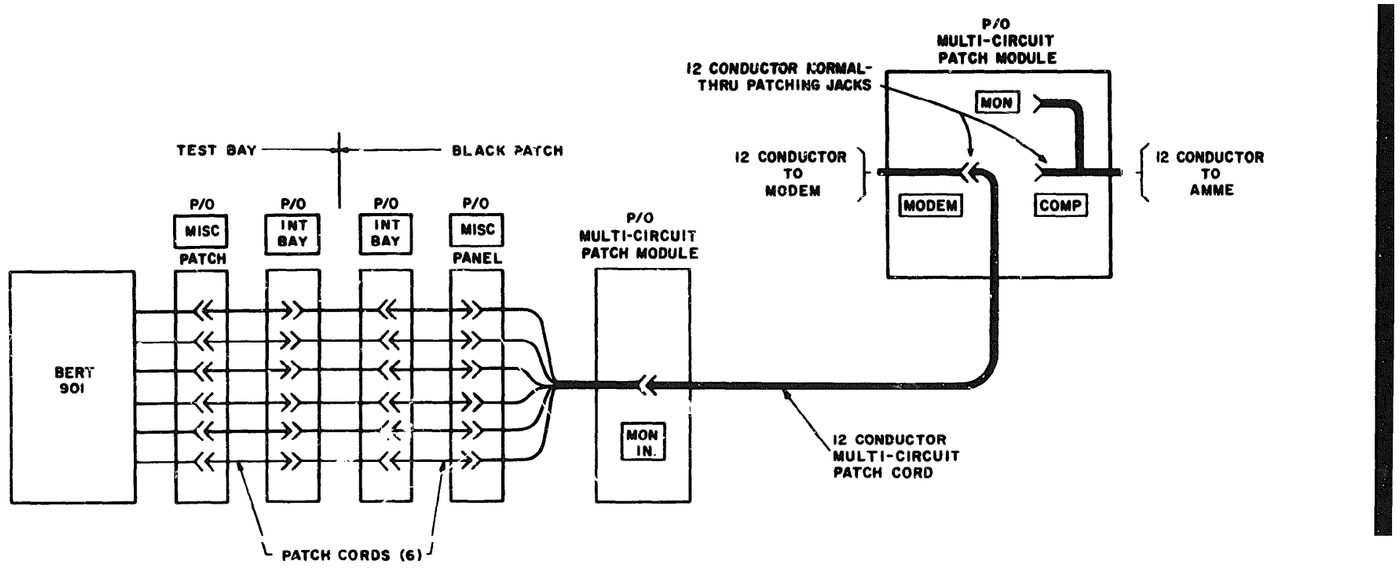


Figure 3-6. Typical BERT 901 Patching Arrangment.

CHAPTER 4

MAINTENANCE

Section I.. GENERAL

4-1. Scope of Maintenance

Maintenance for a PTF includes the following functions:

a. Daily and weekly preventive maintenance checks and services (para 4-5).

b. Monthly preventive maintenance checks and services (para 4-6).

c. Quarterly preventive maintenance checks and services (para 4-7).

d. Cleaning (para 4-8).

e. Touch-up painting (para 4-9).

f. Troubleshooting.

4-2. Tools, Materials, and Test Equipment Required for Maintenance.

a. Tools. Tool Kit, Electronic Equipment TK-100/G, TK-101/G, and TK-105/G.

b. Materials.

(1) Lint-free cloth.

(2) Brush (MIL-G-7241).

(3) Distilled water.

(4) Lubricating oil, general purpose preservative (PL Special).

(5) Fine sandpaper, No. 000.

c. Test Equipment.

(1) All rack-mounted test equipment in test bay 1.11.

(2) Multimeter AN/USM-223.

Section II. PREVENTATIVE MAINTENANCE PROCEDURES

4-3. Preventive Maintenance

Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition and assure maximum operational capability. Preventive maintenance is the responsibility of PTF maintenance personnel.

a. Systematic Care. The procedures given in paragraphs 4-4, 4-5, 4-8, and 4-7 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and service charts (para 4-5, 4-8, and 4-7) outline functions to be performed at specific intervals (para 4-4). These checks and services are to maintain equipment in good general (physical) condition and in good operating condition. To assist maintenance personnel in maintaining the equipment in peak condition, the charts indicate what to check, how to check, and the normal conditions. The reference column lists the paragraphs or manuals that contain detailed repair or replacement procedures. If a defect is noted that cannot be remedied by the PTF maintenance personnel, a higher category of maintenance or repair is required.

4-4. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the PTF are required on a daily, weekly, monthly, and quarterly basis unless otherwise directed by the station commander.

a. Paragraph 4-5 specifies checks and services that must be accomplished weekly and under the special conditions listed below.

(1) When the equipment is initially installed.

(2) When the equipment is reinstalled after removal for any reason.

(3) At least once each month if the equipment is maintained in standby condition.

b. Paragraphs 4-8 and 4-7 specify additional maintenance checks and services that must be performed monthly and quarterly.

4-5. Daily and Weekly Preventive Maintenance Checks and Services Charts

Perform the maintenance functions indicated in the daily and weekly preventive maintenance checks and service charts below. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions. If any installed components are scheduled for ad-

ministrative storage (1-45 days), perform the preventive maintenance checks and services listed in the following charts, as applicable, immediately prior to placing it in storage and immediately after removing it from storage.

a. Patch and Test Facility (Daily).

Sequence No.	Item to be inspected	Procedure	References
	Alarm Lamps	Verify lamps illuminate by pressing test button on alarm panels.	

b. Patch and Test Facility (Weekly).

Sequence No.	Item to be inspected	Procedure	References
1	Grounding System	Check and verify that grounding system is properly installed with good electrical connections throughout.	As-built
2	Cables, wires, and cords.	*a.* Remove dirt from cable insulation and connections. Tighten loose connections at all accessible connectors and jacks.	Para 4-8
		b. Check for cut insulation; removal and kinks and strains.	*b.* None
3	Lighting System	Report defective lamps to Post Electrician	
4	Walls, ceilings, and floors	Report any discrepancies to Post Maintenance.	

c. Equipment Racks, Equipment, and Power Distribution Panel (Weekly).

Sequence No.	Item to be inspected	Procedure	References
1	Cleanliness	Remove dirt, dust, and other foreign matter from all exposed exterior surfaces.	Para 4-8
2	Connectors	Check cables and connectors for secure fit.	
3	Mounting	Check that units are securely mounted.	
4	Operation	During normal operation, observe that mechanical action of each switch and control is smooth and free of binding.	
5	Lamps	Check all indicating lamps; replace defective lamps.	

4-6. Monthly Preventative Maintenance Checks and Service Charts

Perform the maintenance functions indicated in the monthly preventive maintenance checks and service chart below, once each month. A month is defined as approximately 30 calendar days. Adjustment of the maintenance interval should be made to compensate for any unusual operating conditions. Equipment maintained in a standby condition must have monthly preventive checks and service. Equipment in limited storage required services before operation but not daily and weekly preventive maintenance.

a. Patch and Test Facility (Monthly).

Sequence No.	Item to be inspected	Procedure	References
1	Grounding System	Inspection station grounding system.	As-built
2	Movable parts	Check all hinges, latches, and metal-to-metal moving parts, as necessary.	
		a. Clean and paint bare metal parts.	Para 4-8 and 4-9.
		b. Clean all air filters.	
		c. Tighten loose screws, nuts, and bolts.	
		d. Lubricate.	
3	Cables, Wires, and Cords	*a.* Tighten screws, clamps, and nuts that secure wires to terminals.	
		b. Repair insulation cuts and abrasions with electrical insulation tape.	
4	Electrical system conduits and switching	Tighten loose screws, bolts, and clips. Repair or replace defective switches, switch plates, outlets, and receptacles.	
5	Equipment mountings	*a.* Tighten all loose bolts, nuts, screws, and clamps that secure equipment racks, frames, shelves, braces, and mounting hardware. Replace missing hardware.	
		b. Check to see that equipment mounting racks, frames, shelves, braces, and clamps are not bent, borken, or out of shape to endanger equipment or personnel.	
6	Fuses	Check fuses at fuse panel and equipment. Replace defective fuses. Verify that all operating fuses are of the correct value. Check spare fuses or proper value and quantity.	

b. Equipment (Monthly). Perform periodic checks and services on each equipment in the facility as outlined in the applicable manual as listed in appendix A.

4-7. Quarterly Preventive Maintenance Checks and Services Charts

Quarterly preventive maintenance checks are required on the PTF. Periodic daily, weekly and monthly services constitute a part of the quarterly preventive maintenance checks and services and must be performed concurrently. All deficiencies will be recorded and corrected.

a. Patch and Test Facility (Quarterly).

Sequence No.	Item to be inspected	Procedure	References
1	Publications	Check to see that all publications are complete, servicable, and current.	
2	Mounting	Verify that all bolts, nuts, and washers are correctly positioned and properly tightened. Check for cracked, bent, or broken brackets.	
3	Spare parts	Check all spare parts for general condition and method of storage. There should be no evidence of overstock, and all shortages must be on requisition.	

b. Equipment (Quarterly).

Sequence No.	Item to be inspected	Procedure	References
1	Completeness	Verify that the equipment is complete.	
2	Preservation	Check all surfaces for evidence of fungus. Remove rust and corrosion and spot-paint bare spots.	Para 4-8 and 4-9.
3	Connections	Verify that plugs, sockets, and jacks are clean, intact, and not loose fitting.	
4	Pluck-out items	Inspect clamps and seating of pluckout items. Check for wrong, bent, or broken parts.	
5	Knobs, dials, and switches.	While making the operating checks, observe that the mechanical action of each knob, dial, and switch is smooth and free of external or internal binding.	

4-8. Cleaning

a. Remove dust and loose dirt from the exterior surfaces with a clean, soft cloth.

WARNING

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever wed. DO NOT use near an open flame. Trichloroethane is not flammable, but exposure of the fumes to an open flame or hot metal surface forms highly toxic phosgene gas.

b. Remove grease and ground-in dirt from the equipment; use a cloth dampened (not wet) with trichloroethane.

CAUTION

Do not use trichloroethane on plastic display windows. Damage to equipment may result.

c. Clean indicator glass; use a soft, clean cloth. If difficulty in removing dirt occurs, dampen the cloth with water. Mild soap may be used to make cleaning mom effective.

4-9. Touchup Painting Instructions

a. When the finish on the exterior of the equipment has been scarred or damaged, corrosion may be prevented by touching up the surfaces. Touchup the surface as outlined in (1), (2). and (3) below.

(1) Use No. 000 sandpaper to clean the surface down to the bare metal; obtain a bright, clean finish.

(2) Sand the area back to solid paint and feather the paint edge that leads to exposed metal.

(3) Wipe the area clean and apply to metal surfaces, one coat of zinc chromate metal primer and two thin finish coats of enamel.

b. When a touchup paint job is necessary, apply paint with a small brush.

Section III. TROUBLESHOOTING

4-10. General

a Troubleshooting in the PTF involves determining which item is defective and then locating the defect in the item or equipment unit. The first approach or step is on a system basis, to find out what item of equipment is faulty in a series of equipment that make up the communications chain. The typical communication chain would be composed of the AMME, red/black isolators, modem, the communication lines, the modem at the remote site, and the remote terminal equipment. A fault in any item will degrade or **interrupt** communications. The first part of a **troublesh**ooting procedure is to determine which is the faulty equipment and remove it from the system and restore communications. The second step is to fix the faulty item of equipment.

b. The time required between steps one and two in the troubleshooting procedure depends on the complexity of the trouble. The simpler type troubles which involve a complete breakdown, such as a power supply failure which provides an alarm indication, can be located almost immediately. **Troubles that degrade the signal or increase the errors received in a message require more time because they require the use of test equipment and test procedures.**

c. How the second step, or repairing the faulty

item or equipment is accomplished, depend3 on the maintenance concept for that item. For example, if the equipment is maintained by a contractor, PTF personnel would simply take the equipment out of service and notify the contractor. When the equipment is to be maintained at the PTF, it is taken out of service and repaired, using the troubleshooting procedure in the applicable equipment manual.

d. Troubleshooting procedure3 in this section cover the procedure used in the first troubleshooting step, that is, locating the faulty equipment in the communication chain (para 4-11) and a troubleshooting chart for a specific equipment item which does not have its own manual. The PTF equipment item that doe3 not have its own manual is the major-minor alarm panel. The troubleshooting chart (para 4-14) will aid in locating the defective component of the faulty major-minor alarm panel. All other equipment item3 have their own manuals, listed in appendix A, which contains troubleshooting data for the repair of the item.

4-11. Troubleshooting the Communications Channel

a. The communication3 chain which connects the AMME to the remote terminal equipment has several functional areas that can degrade communications. The functional areas are shown on the block diagram, figure 4-l. The degradation of communication is a more significant problem to the technician than the complete failure which is usually quite easily pinpointed to a single defective equipment. In the communication chain shown, a diagnostic program can be run on the AMME and the terminal equipment, to determine whether they are degrading the system. The transmission system, represented by the modem3 and communication lines, require a special item of test equipment, a bit error rate tester (BERT). It generates a known digital signal that can be transmitted to itself for the purpose of determining any error3 created in the transmission. The number of errors are received by the BERT and totalized and the total provides an indication of the quality of the transmission medium or circuits being tested. That is, a high number of errors represents a transmission through faulty circuits whereas a low number of error3 recorded represent3 normal transmission.

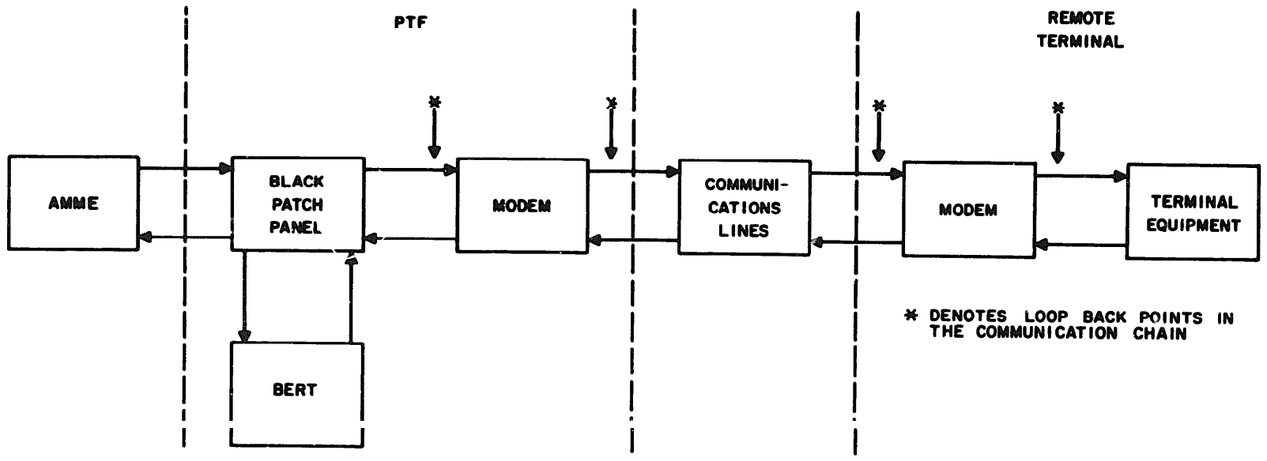


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Figure 4-1. Troubleshooting the Communication Chain.

b. Use of the BERT in testing a typical communications system is shown in figure 4-1. In this case, the BERT is connected into the modem side of the black patch panel to supply signals to the modem, the communications lines, and the remote terminal modem. The lines are looped back at the points shown separately, progressing from left to right on the diagram. At each loopback point, the BERT is operated and the number of errors totalized, is noted. A significant increase in errors, caused by the addition of a loopback segment, pinpoints the cause of the trouble to that added segment. If the modems prove defective by this method, they should be replaced. If the communications lines prove defective they should be further tested, using conventional analog techniques and then report this trouble, symptom, and measurement to the maintenance personnel responsible for the communications lines.

4-12. Station Drawings

In addition to this manual, a considerable amount of maintenance data which is used for troubleshooting, is contained in the station drawings. Site personnel must become familiar with the information contained in them and in their use, numbering system, order, etc. Source of the information contained in the station drawings are as follows:

a. Cable runs-routing through cable ducts.
b. Cable pair color coding connections.
c. Cross connection diagrams.
d. Location, stenciling of terminal blocks.
e. Schematic diagrams.
   (1) Fuse and alarm panels.
   (2) Patch panels.
   (3) Major-minor alarm panel.
f. Connection and distribution of:
   (1) Dc power.
   (2) Ac power.
   (3) Intercom.

4-13. Use of Troubleshooting Charts

Troubleshooting of this facility is based upon malfunctions that may occur during normal operation of the equipment in the system. When a trouble occurs, refer to the Trouble Sympton column in the chart. Perform the checks and corrective measures indicated in the Check and Corrective Maintenance column to locate and clear the trouble.

4-14. Troubleshooting Chart for Major-Minor Alarm Panel

Item	Trouble symptom	Probable trouble	Check and Corrective Maintenance
1	No audible tone from audible indicator with a switch illuminated.	*a.* Tellite has been pressed, locking out audible tone.	*a.* Check for trouble as indicated by switch light.
		b. Ground from alarm panel not being extended to audible indicator.	*b.* Provide ground to audible indicator with jumper wire. If alarm does not sound, check for voltage at audible indicator. If voltage is present, audible indicator is defective. (1) If alarm sounds when ground is provided, circuit fault is between ground back to alarm panel. (2) If voltage is not found at alarm, trace voltage back to −48-vdc power supply.
		c. Ground not being extended through alarm panel.	*c.* If no ground is found coming out of alarm panel it will be necessary to remove alarm panel from rack to gain access to the component parts. With the top and bottom covers removed, make a continuity check from the pin number corresponding to the illuminated lamp to switch pins NC1 COM1. Refer to LBAD-D-33163, symbol SW3, for switch location. If continuity is obtained on COM1 but not NC1, this indicates a defective switch. Care must be taken to insure that the (+) lead

Item	Trouble sympton	Probable trouble	Check and Corrective Maintenance
			of the VOM is connected to the corresponding lead (1-45). This will forward bias the diode in the circuit, thus insuring a valid VOM reading. If continuity is not obtained at either NC1 or COM1, check associated diode. Refer to parts list, symbol CR1, parts location.
2	Audible tone from alarm converter without any lamp indicaton on alarm panels.	Defective lamp in switch	*a.* Press switch SW1. All switches should glow red. Press switch SW2. All switches should glow amber. If any switch fails to glow in either color, replace associated bulb. *b.* If all switches fail to light, check circuit breaker located on front panel. Reset if found deactivated.
3	Equipment is known to be in an alarm condition with no alarm indication given.	Ground not being extended from equipment to alarm panel.	Remove connector from back of alarm panel, locate pin associated with equipment alarm and check for ground. *a.* If ground is found, internal wiring of alarm panel is defective. *b.* If no ground is found, circuit trace wiring back to IDF where ground originates. Use station drawing showing the alarm wiring.
4	Audible alarm interrupted only while switch is pressed.	Switch is defective	In order to check the switch coil, it will be necessary to remove the panel from the bay to gain access to the component parts. With the top and bottom covers removed, a reading of approximitely 340 - ohms across pins 4 and 5 indicates a good coil, while an open reading will require the replacement of the switch.

CHAPTER 5

COMPONENT FUNCTIONING

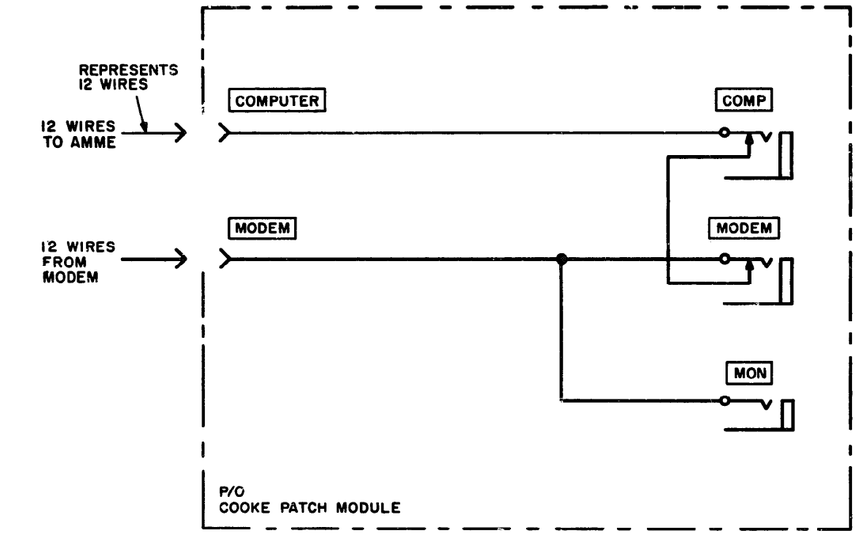
5-1. General

This chapter covers the functioning of items manufactured by Lexington-Blue Grass Army Depot and installed in the PTF. These items do not have their own individual manuals but are covered in this manual and in the station drawings. The station drawings cover the complete schematic and how the item is connected into the station.

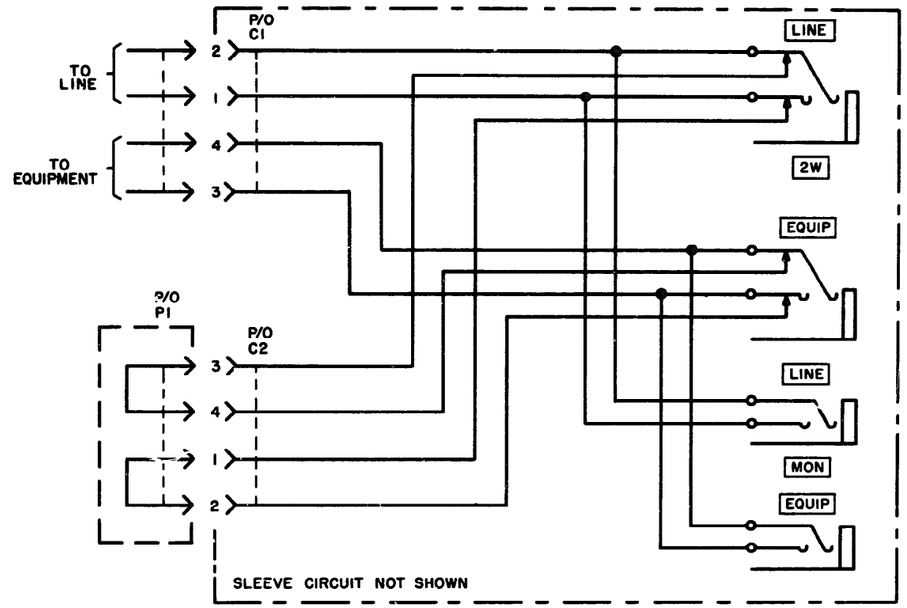
5-2. Patching Modules. (fig. 5-1)

There are four different types of patching modules (patch panels) used in the PTF. The differences are based on the type of signals that patch panels are designed to handle. There are four different types of signals involved in the PTF. These are the dc signals from the modem to the AMME, the audio signals which enter and leave the PTF, the low-level teletype signal transmitted between the DLIU and AMME, and the high-level signal output from the DLIU. Each type signal has a special requirement and a special type of patch panel.

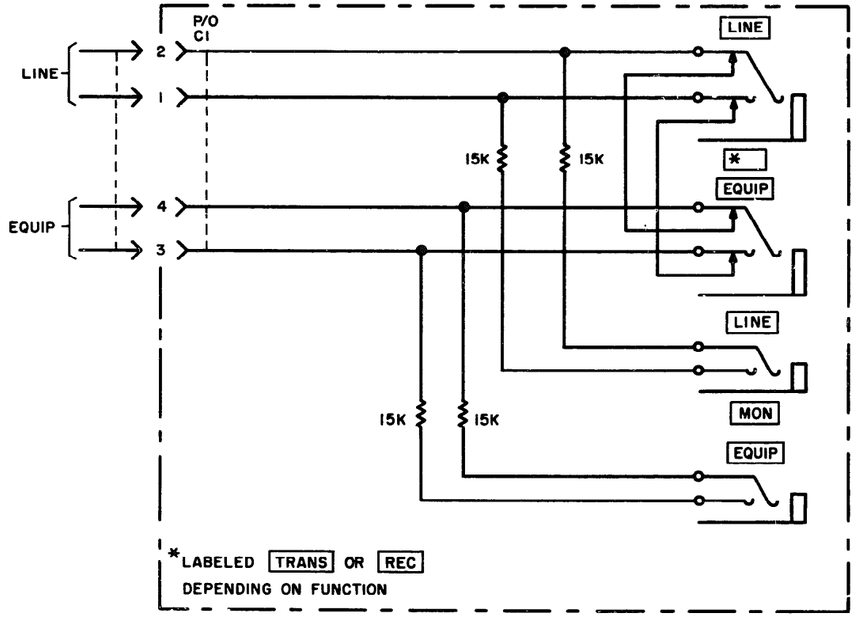
a. 12-Wire Patch Panel. The 12-wire patch panel is required for the signal between the AMME and the modem. Six are required to carry the transmitting signals; the other six carry the receiving signals. A series of three 12-wire jacks am used for each of 16 circuits in the moule. There are two normal through and one monitor jack for each circuit.



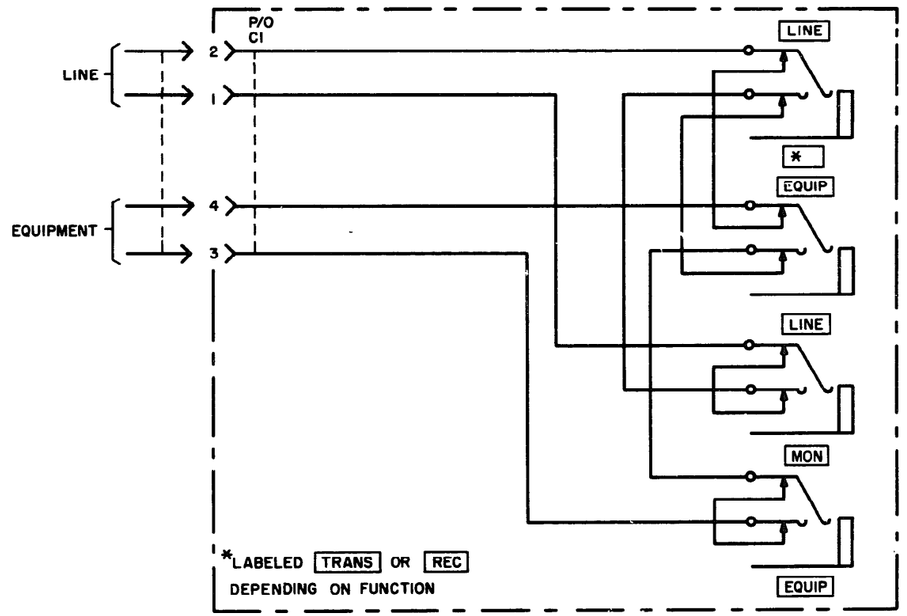
A. 12-WIRE PATCH SIMPLIFIED



B. 2-WIRE AUDIO SIMPLIFIED SCHEMATIC



C. LO LEVEL DC TRANSMIT/REC SIMPLIFIED SCHEMATIC



D. HI LEVEL DC TRANSMIT/REC SIMPLIFIED SCHEMATIC

EL1P0021

Figure 5-1. Patching modules, simplified schematic diagram.

(1) Following the circuit path from the AMME to the modem through the patch module (A, fig 5-l) there is a separate 12-wire connector for the wires from the AMME, a normal through jack (marked COMP), another normal through jack (marked MODEM), to a separate connector for the 12 wires to the modem. A 12-wire jack, marked MON, is also connected to the circuit for monitoring purposes.

(2) During patching operations, one end of a patch cord connected to the COMP jack breaks the through connection to the MODEM jack puts the lines from the AMME in series with the patch cord. The other end of the patch cord transfers the wires to another circuit which would be connected to the MODEM jack. The connection into the MODEM jack disconnects the through circuit connection and puts the patch cord in series connection to the modem.

b. 2-Wire Audio Module. The 2-wire module is used in the vf entrance jack field. A module handles twenty-four 2-wire circuits* using four 2-wire jacks arranged vertically for each 2-wire circuit. There are two normal through and two monitor jacks for each 2-wire circuit. A duplex circuit uses two vertical jack sets; one for the transmit line and one for the receive line.

(1) A 2-wire line connected to pins 1 and 2 on Cl (B, fig 5-1) proceeds through the equipment as follows: from Cl to the LINE jack; from the LINE jack to C2 where it is looped around by P1; from C2 to the EQUIP jack; and then from the EQUIP jack to the equipment side of the line at Cl. Two jacks marked MON are used for monitoring lines connected to the equipment and the line jacks.

(2) For patching, a 2-wire patch cord is used for each transmit and receive line. Connecting to the LINE jack, the patch cord is in series with the line side of the patch panel and the equipment side of the patch panel is disconnected by action of the LINE jack. To transfer the line to another circuit's equipment line, the second end of the patch cord is inserted into the EQUIP jack of that circuit. This disconnects the line from the equipment in that circuit and completes the patch.

c. Low Level Patch Module. The low level patch module is arranged the same as the 2-wire audio patch modules. That is, there are two normal through and two monitor jacks for each circuit and 24 circuits for each module.

(1) Following the circuit show a in C of **5-1, the line is connected to the LINE normal through jack and the equipment is connected to the EQUIP normal through jack. Parallel con-**nections from both the LINE and EQUIP jacks are two monitor jacks marked LINE and EQUIP. Both monitor jacks am isolated by 15K resistors from the communication lines to reduce any possible loading from monitoring equipment.

(2) Patching for this module is the same as the 2-wire audio module explained above, that is a 2-wire patch cord set into a normal through jack to break the communication line and reroute it to a new path.

d. Hi Level DC Patch Modules. The high level dc patch module is used to patch the high level (120 vdc) teletype signals (output of the DLIU). The patch module is arranged similar to the other 2-wire patch modules; that is, four vertical jacks for each circuit, 24 circuits to the module.

(1) Following the line connections to the equipment connections on the diagram (D, fig. 5-1), an arrangement different from the ones previously encountered is found. One wire of each circuit pair is routed through a monitor jack before connecting to the normal through patch jacks. In this case each monitoring jack (MON) is connected in series with the lines, rather than in parallel.

(2) The patching principle for this module is the same as previously encountered. The patch cord inserted into the normal through jack breaks the circuit and the patch cord is used to transpose the wires to another circuit number. Monitoring, however, is entirely different because instead of a parallel connection, a series one is used. The series connection provides a means of connecting a dc milliammeter in series with the line for meas**uring** and setting the telegraph **current.**

5-3. Major-Minor Alarm **Panel**

This alarm panel centralizes, within a single panel, alarm controls for up to 45 alarm circuits**. Each** alarm circuit condition is displayed by a **lighted segm**ent of the front panel, which is also a **sw**itch **used** for removing the audio alarm. Each item which provides an alarm input to the alarm panel can be designated a major or minor alarm. The major and minor alarm conditions are displayed in different colors.

***a.* Considering first the external circuits which connect to the alarm panel on figure 5-2, there is a possibility of 90 inputs for alarms. Each alarm is signalled by a ground input to pins 1 through 90 on the main connector. Pins 91 and 92 are outputs (grounds) which connect to an audible indicator, causing it to sound. Other pins on the main connector are connected to dc ground, input power, and negative 48 or 60 volts dc.**

b. Internal circuits are 45 identical switches and components used for controlling the alarm and items common to all circuits, such as power.

(1) Following an alarm ground, generated by the closing of a switch (left side of fig. 5-2), through the main connector (pin 1 or pin 2), the following action occurs: diode CR1 or CR2 is forward biased; current flows from the negative power supply, pins 97 through 100 of the main connector, through indicating lamp L1 or L2, voltage dropping resistor R1 or R2, through diode CR1 or CR2, to pin 1 or pin 2 on the main connector. The indicating lamps are part of switch assembly S3 and cause the segment on the front panel representing the alarm to light, signalling the alarm condition

(2) Another current path is established following an alarm ground from either the major or minor alarm switch. This patch provides an interruptable output ground (pin 91) to the audible alarm. The other side of the audible alarm (not shown) is connected to the -48-vdc supply. The current path is from the -48-vdc supply to the audible alarm, to pin 91 on the alarm panel, through the normally-closed switch contact of S3, through forward-biased diode CR3 or CR4, to pin 1 or pin 2 on the main connector of the alarm panel.

(3) As the result of the alarm ground input to the alarm panel, indicator lamp L1 or L2 lights and the audible alarm sounds. The operator responding to the alarm, presses the alarm switch (lighted panel segment) on the alarm panel front. This action silences the audible alarm and sets the alarm switch into the manual lock, or latch position.

(4) The electrical circuit that is set up when the operator presses the alarm switch results in energizing the coil in S3 (alarm switch). Current flow is not routed through limiting resistor, R3, through the coil of S3, which holds the armature and switch S3 in the locked position, and through diode CR3 or CR4 to ground. This condition holds until the alarm ground on the input to the alarm panel is removed by clearing the trouble which caused the alarm.

(5) To test the lamps on the alarm panel, switches S1 and S2 are provided. When either switch is pressed, a ground is connected to the input of all 45 alarm switch circuits. They are all similar to circuit number 1 shown. Diode CR5 or CR6 is forward biased and current flows through each individual lamp (L1 or L2) from the negative power supply.

5-4. Fuse and Alarm Panel (fig. 5-3)

The fuse and alarm panel is used as a central point for the location of fuses. It also contains indicator lamps which, when an alarm sounds, indicates whether the alarm is the result of a blown fuse in the alarm panel, or an equipment problem. outside the fuse and alarm panel. A third, and independent function of the fuse and alarm panel involves a milliammeter installed on the front panel. The milliammeter is connected to three front panel jacks and is used to measure the line current and voltage in connection with the DLIU adjustment.

a. Fuse Alarm Circuit. When a fuse blows in the fuse and alarm panel, the FUSE ALARM lights on the panel and an audible alarm sounds. Defective fuses are found by inspection and replaced to clear the alarm.

(1) Fuse F1 is the alarm type and, when its link fails, the output is disconnected from the load and the input is connected to the coil of K1, causing it to energize. When K1 energizes, the FUSE ALARM lamp lights and an alarm ground is connected to the alarm panel which sounds the audible alarm.

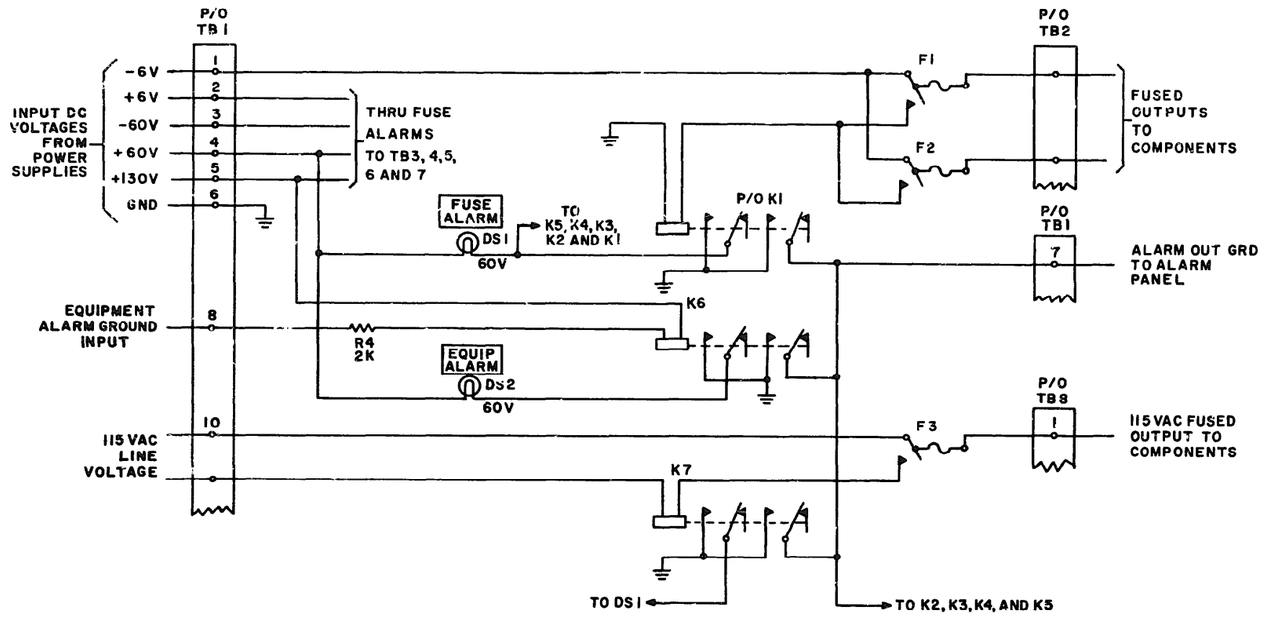


Figure 5-3. Fuse and alarm panel, simplified schematic diagram.

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(2) The fuse and alarm panel contains five other relay circuits similar to the circuit of K1. There is a separate relay for each voltage circuit passing through the fuse and alarm panel. A failure of any fuse in any one of these voltage circuits causes a relay to energize and lights the FUSE ALARM lamp.

b. Equipment Alarm Circuit. An equipment alarm ground, shown as an input at TB1 pin 8, originates from some defect in the equipment. The ground causes K6 to energize and the EQUIP ALARM lamp DS2 to light. A second relay contact connects ground to the major-minor alarm panel which sounds the audible alarm.

APPENDIX A

REFERENCES

The following publications contain information applicable to the maintenance of the Patch and Test Facility, Redstone Arsenal, Alabama. Footnotes indicate addresses for ordering publications not available through the Adjutant General's Publications Centers.

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9). Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	US Army Equipment Index of Modification Work Orders.
TB 43-0118	Field Instructions for: Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters.
TM 11-6625-602-12	Organizational Maintenance Manual Including Repair Parts and Special Tools Lists: Test Set, Telephone AN/USM -181 and Hewlett-Packard Model 3550B.
TM 11-6625-1510-15	Operator's Organizational, DS, GS, and Depot Maintenance Manual: Textronix Incorporated Oscilloscope, Type 561A; Time Base Type 2B67; Amplifier Type 2A60. and Dual-Trace Amplifier Type 3A72.
TM 11-6625-2426-15	Operator's Organizational, Direct Support, General Support, and Depot Maintenance Manual: Northeast Electronics Corporation Noise-Level-VU Measuring Set, Model TTS-37B.
TO 31W2-2FGC151-2	SVC Instr-Power Supply, Type PP-6132/FGC-151, Model 6430, 643CP (Tele-Signal)-AN/FGC-151.
TO 31W4-2FGC-332	SVC Instr-Electrical Equipment Shelves, Types MT-3488/FGC, MT-4233/G, Models 639. 639B (Tele-Signal).
TO 31W4-4-261-2	SVC Instr-Power Supply, Type PP-6062/G, Model 676D, 676DP (Tele-Signal).

COMMERICAL MANUALS*

Operation & Installation MANUAL	Bert 901 Bit Error Rate Tester.[1]
Technical Note	Bert 901-Use of the I. I. 232C Interface Adapter and Applications to Bell 201 and 202 Modems.[2]
Technical Manual	Isolation Device Model R-202S.[2]
Technical Manual	Series-T Housing.[2]
Instruction Manual Issue II	Model 676D PP-6062/G/FSA-82 Polar 6V Power Supply.[3]
Instruction Manual Issue I	Model 643C Power Supply.[3]
Operating Instructions	Intercom Master R2812A[4]
Installation and Services Instructions Instruction Manual	Intercom Master R2812A, Bulletin 211-46170.[4]
	Type R561B Oscilloscope[5]
Instruction Manual	Type 3A72 Type Plug-in[5]
Instruction Manual	Type 3B3 Plug-In Unit Tektronix, Inc.[5]
Operator's Guide	MDS Model 2407 ICC Automated Tele-communications Center (ATCC)[6]
Technical Manual	Dual Speaker Panel[7]
Instruction Manual	Model TTS 37B Noise-Level-VU Measuring Set[8]
Technical Manual	Power Supply Model P-12 (P/N 11857)[2]

*See footnotes at the end of this appendix.

DEFENSE COMMUNICATION CIRCULARS

DCAC 310-50-3	**Concept for Technical Control of the Defense Communication System.**
DCAC 310-70-1	**Vol I, DCS Technical Control Policy and Facilities; Vol II, DCS Technical Control Procedures; Vol IV, DCS Technical Control Glossary.**
DCAC 370-D95-1	**System Description DCS-AUTODIN.**
DCAC 300-175-9	**DCS Operating-Maintenance Electrical Performance Standards.**

[1] II Communications Corporation, 139 Terwood Rd., Willow Grove, PA 19090.
[2] Versitron Inc., 6310 Chillum Place, N.W., Washington, D.C. 20011
[3] Tele-Signal Corp., 250 Creeways Part Drive, Woodbury, LI, NY 11791
[4] Webster Electric Company, Racine, Wisconsin 53403.
[5] Tektronics, Inc., P.O. Box 500, Beaverton, Oregon 97005.
[6] Mohawk Data Science Corp., Palisade Street, Herkimer, NY 13350.
[7] Engineered Devices Company, Inc., 680 Bissel Drive, Lexington, KY 40504.
[8] Northeast Electronics Corp., P.O. Box 649, Concord NH 03301.
[9] Defense Communications Agency, Publications Management Section, Code 211.1, Washington, DC 20305.

APPENDIX B

INSTALLATION AND OPERATING INSTRUCTIONS FOR DIGITAL LINE INTERFACE UNIT (DLU) MODEL DL1

Section I. INTRODUCTION

B-1. Scope

This appendix describes the installation, operation, and principles of operation for the digital line interface unit (DLIU). If due to a component failure maintenance is required, the DLIU is to be returned to the depot for repair.

B-2. Purpose and Use

The DLIU is a rack-mounted plug-in assembly containing two units (unit A and unit B) each of which provides-

a. **Interface** (level conversion and DC isolation) **between input**-to-output combinations of high level **neutral, high** level polar, and low level polar data **signals.**

b. Built-in loop battery fusing.

c. Automatic adjustable loop current regulation (high level only).

d. No transition/open-loop detection and alarm.

B-3. Description

a. Physical. The DL1-J contains two in**dependent interface units (marked A and B) on one plug-in assembl**y. The module is designed for **mounting in a** universal shelf, requiring 5 1/4 **inches of vertical** rack space in a standard 19-inch **relay rack or cabinet. Up to six DLIUs can be housed in one shelf. The DLIU has all its active** elements mounted on a printed-circuit board that slides into guides and connects to a receptacle at the rear of the universal shelf. All input-output connections, alarm closure connections, and loop **and power voltages for the DLIU are brought to the DLIU through the rear connector. The front panel of the DLIU has an output loop MONITOR jack, an open line/no transition alarm (OL/NT ALARM) indicator light, and an output loop** CURRENT ADJUST control for each of the units. **In addition a single blown FUSE ALARM lamp provides a monitor to indicate failure of any one of the units fuses.**

b. Electrical. **The DLIU provides two channels of interface between high level and low level data equipment. Inputs and outputs are dc isolated from each other, from ground, and from the ac power source. The following combinations of input** and output lines are accomodated by means of strapping options.

(1) High level neutral or polar input to low level output.

(2) High level neutral or polar input to high level neutral or polar output.

(3) Low level polar input to high level neutral or polar output.

(4) Low level polar input to low level polar output. The DLIU operates with either synchronous or start-stop data at s**peeds up to 2400** bauds. Automatic adjustable loop **current regulation** for high level output lines is **provided as well as** no-transition/open-loop detection and alarm, loop battery and ac power fusing, output loop monitor jacks, and self-contained power supplies for internal circuit operation.

B-4. Specifications

a. Input Characteristics.

(1) High level.

(a) Impedance less than 200 ohms; reactance essentially 0 ohms for all rates.

(b) Keyover points; 10 ma -+0.7 ma (20-ma neutral signal) 30 ma -+2 ma (60-ma neutral signal); 0 ma -+2 ma (polar signal).

(c) Input current: 100 maximum.

(d) Keying sense; M**ark with positive** voltage between line and s**ignal ground; Space with** negative voltage (for polar) o**r zero voltage (for** netural).

(2) Low level.

(a) Impedance **6800** ohms minimum; input capacitance less than 2500 picofarads.

(b) Keyover point: 0-+0.0001 (maximum) **amperes.**

(*c*) Keying sense: Mark with current not in **excess of 0.0001 amperes producing positive voltage between line and signal ground; Space with current not in excess of 0.0001 amperes producing negative voltage.**

b. Output Characterisitcs.

(1) *High level.*

(*a*) Impedance (not including waveshaping network) less than 50 ohms at currents from 10 to

150 ma. Reactance essentially 0 Ohms for all modulation rates.

(b) Contact voltage rating 260 volts between either mark and tongue or space and tongue. Maximum reference, signal to ground: 300 volts.

(c) Space leakage less than 5.0 micro amperes at 260 volts.

(d) Waveshaping network (strapping option): Series connected 200 ohms -+10 percent wirewound resistor plus a 1 mfd, -+l0 percent 200-volt capacitor between line side of 200-ohm resistor and out-put common lead.

(e) Current Regulator (strapping option) operating range: 15 ma to 65 ma. Regulation -+5 percent of operating current for external loop resistances of 0 to 1500 ohms (neutral) and 0 to 2500 ohms (polar).

(2) Low level.

(a) Impedance less than 50 ohms for currents between 100 microamperes and 10 ma; reactance essentially 0 ohms for all modulation rates.

(b) Maximum short circuit current to output terminals 100 ma.

(c) Waveshpaing networks (strap selectable): Series resistors and shunt capacitors providing rise and fall times of 5 percent to 7 percent of the duration of unit intervals for 50, 75, and 150 bauds. Terminals provided and values listen in manual for components required for 42, 45.5., 300, 600, 1200, and 2400 baud.

c. Input/Output Characteristics.

(1) Side stable: Unit remains in the last signalled contact position.

(2) Modulation rate: Up to 2400 bauds.

(3) Distortion: Less than I percent distortion of all type-switched bias, bias end, cyclic and random at all rates up to 2400 bauds.

d. Alarm Section (Strappable Options).

(1) Open loop-alarm light (front panel) and ground contact (to rear connector) for continuous spacing condition on output line in excess of 1.0 second.

(2) No-transition-alarm light (front panel) and ground contact (rear connector) for continuous marking condition on output line in excess of 1.0 second.

e. Monitoring and Fusing.

(1) Monitor jacks for output loops (front panel mounted). Series connected in high level output mode: briding output on low level mode (15K ohm resistors in series with each lead).

(2) Fusing (indicating type fuses) for all loop power supply inputs and internal supply input. Ground contact output to rear for alarm condition.

f. Temperature Conditions.

(1) Operating: 0 To 75 C.

(2) Non-operating: -55 C to 125 C.

g. AC Power Supply Requirements.

120 vac -+10 percent, 47 to 60 Hz., single phase 1/4 watt (approx).

Section II. INSTALLATION AND OPERATION

B-5. Unpacking

No special instructions are required for unpacking. Inspect the DLIU carefully for any shipping damage upon removal. The equipment is not shipped for installation. The strapping procedure given in B-6 below must be followed before the equipment is operational.

B-6. Strapping Options

The DLIU must be checked for strapping options before installation Determination of the input/output requirements for the particular installation must be made by the installing personnel. Strapping is accomplished using No. 20 or No. 22 soft drawn solder tinned copper buss wire to interconnect appropriate terminals on the printed circuit board and on the MONITOR jacks. Use insulating sleeving when connecting non-adjacent terminals. Selection of the required strapping arrangment is indicated in table B-l below. The terminals associated with unit A am sequentially numbered from 1 to 43. The corresponding terminals associated with unit B are numbered from 101 to 143. The numbers of the terminals can be located on the printed circuit board. All numbers except 35, 36, 135 and 136 are on the board: 35, 36, 135 and 136 are terminals on the back of the front panel.

Table B-l. Required Strapping Arrangements

Function	Operation	Unit A strapping	Unit B strapping
Input	High level polar	1-2, 3-5	101-102, 103-105
	High level neutral	1-2, 3-6	101-102, 103- 106
	Low level	3-4	303-104
Signal sense, input to output	Normal	7-8, 9-10	107-108.109-110
	Reverse	7-10, 8-9	107-110, 108-109
output	High level polar: with rheostat and waveshaper	1314, 15-15, 21-25, 26-34,35-36, 38-39	13-114, 115-16, 121-125, 126-134, 135-136, 138-139
	High level polar: with rehostat without waveshaper	13-14, 15-16, 21-34, 35-36,38-39	13-114, 115-16, 121-134, 135-136, 138-139
	High level neutral: with rehostat and waveshaper	11-12, 12-14, 21-25, 26-34, 35-36,38-39	11-112, 112-114, 121-125, 126-124, 136-136, 138-139
	High level neutral: with rehostat, without waveshaper	11-12, 12-14, 21-34, 35-36, 38-39	11-112, 112-114, 121-134, 135-136, 138-139
	Low level: 50 baud	13-14, 15-16, 17-20, 27-33,33-39,32-37, 27-28	13-114, 115-16, 117-120, 127-133, 133-139, 132-137, 127-128
	Low level: 75 baud	13-14, 16-16, 17-29, 27-33, 33-39, 32-37, 27-29	13-114, 115-16, 117-120, 127-133, 133-139, 132-137. 127-129
	Low level: 150 baud	13-14, 15-16, 17-20, 27-33, 33-39,32-37, 27-30	13-114, 115-16, 117-120, 127-133, 133-139, 132-137, 127-130
	Low level: 42, 45.5, 300,600,1200 or 2400 baud	13-14, 16-16, 17-20. 27-33,33-39,32-37, 27-31 and add two capacitors, values listed in table B-2, one between terminals 32 and 24 (plus to 32) and the second between terminals 24 and 37 (plus to 37).	13-114, 115-16, 117-120, 127-333, 133-139, 132-137, 127-131 and add two capacitors, values listed in table B-2, one between terminals 132 and 124 (plus to 132) and the second between terminals 124 and 137 (plus to 137).

Function	Operation	Unit A strapping	Unit B strapping
Alarm	Steady mark	42-43	142-143
	Steady space	41-42	141-142
	Steady mark or steady space	42-43.41-42	142-143,141-142

Table B-2. Baud Rates and Capacitor Values

Bud rate designation	Capacitor value	Military
42 Baud	3.9 mfd	CS13BF395K
45.5	4.7	CS13BF475K
300	0.68	CS13BF684K
600	**0.83**	CS13BF334K
1200	0.22	CSR13G224KL
2400	0.1	CSR13G104KL

Table B-3. DLIU Pin Connections

Connector pin	External circuit
A	Input unit A-High (tip)
B	Input unit A-Low (ring)
c	Output unit A- High (tip)
D	Output unit A-Low (ring)
E	Input unit B-High (tip)
F	Input unit B-Low (ring)
H	Output unit B-High (tip)
J	Output unit B-Low (ring)
K	NT/OL alarm closure (to ground) unit A and B
L	Fuse alarm closure (to ground)
M	Not used
N	Not used
P	Not used
R	Not used

B-7. **Oper**ation

a. After appropriate strapping, as described in paragraph B-6, the equipment can be plugged into a prepared shelf position. Operation of the equipment beings automatically. Where high level output lines are being keyed, the CURRENT ADJUST control must be set to the desired loop current. This is done for neutral output signals by setting the input to a mark condition and monitoring the loop current by means of the unit's MONITOR Jack. Set the loop current by adjusting the CURRENT ADJUST control to the desired mark current (normally 60 ma). Once set, the mark current will be regulated to within -+5 percent of its set value for external loop resistances of 0 to 1500 ohms.

b. For polar output signals, set the input to either a steady mark or steady space condition. Monitor the loop and set the CURRENT ADJUST control to the desired current (normally 20 ma). Once set, the mark and space current will be be regulated to within -+5 percent of its set value for external loop resistances of 0 to 2500 ohms.

Connector pin	External circuit
S	+60 volts dc in
T	-60 volts dc in
u	Not used
V	Not used
W	DC ground
X	-130 volts dc in
Y	120 volts ac input
Z	120 volts ac input

Section III. PRINCIPLES OF OPERATION

B-8. General (fig. B-1)

The main sections of the DLIU are the power supply and two identical circuits with their associated NT/OL alarm and a fuse alarm. Each of the two identical circuits (unit A and unit B) contains an input amplifier, an output keying section, a current regulating device and various components for low level limiting and high and low level waveshaping. A MONITOR jack is also included to monitor a current waveform in the high level mode and a voltage waveform in the low level mode.

B-9. Circuit Analysis

The following description covers unit A circuit. Operation of unit B circuit is identical in all respects. Numbering of unit B components follow the same order as in unit A, beginning with 101.

a. Input Section. The input section functions to switch at the appropriate level of the input waveform and conditions the signal for application to the output section. The input amplifier consists of an operational amplifier U1 and a complimentary emitter follower stage, Q1 and Q2, with appropriate resistors and capacitors for each operating mode. The input signal develops a voltage across R2 and R3 (or R1 in the high level mode). This voltage is applied to one input of U1. A comparison voltage established by the particular strapping option (WT5, WT6 or WT7) is applied to the second input of U1. When the input voltage reaches the level of the comparison voltage, the amplifier rapidly changes state and remains in this state until the opposite threshold voltage is attained by the input. Resistor R5 is for low level, R6 for high level polar and R7, R8 and R9 for high level neutral. Resistor R3 is factory adjusted to provide for keyover with an input of 30 ma (the half-current point on a 60 ma neutral input signal). Transistors Q1 and Q2 drive isolation transformer T1, which couples the transition signal to the output section.

b. Output Section. The output section operates is a bistable manner. Transistor Q3 and Q5 operates in the positive region and Q4 and Q6 in the negative region. Feedback is from Q5 and Q6 collectors to Q3 and Q5 bases through R17. The operating voltage is selected by strapping (+ 130 vdc for neutral and -+60 vdc for polar and low level).

c. Current Regulator. The current regulator has a range of approximately 15 to 65 ma, adjusted by R21, a front panel mounted potentiometer. The current regulator consists of a regulator section (CR6 and CR7, Q8, R20 and R21). A reference current regulator section (CR4 and CR5, Q7 and R19) and a diode bridge (CR2, CR3, CR9 and CR9). The reference current regulator maintains a constant current through CR6 and CR7 in order to establish a constant reference voltage for Q8. The diode bridge depolarizes the circuit for polar operation. Diode CR29 protects Q7 from high voltage spikes developed when switching inductive loads.

d. Low Level Limting and Wave-shaping. Resistor R18 and diodes CR22 and CR23 provide low level limiting and short circuit protection. Short circuit current is 20 ma maximum in the low level mode. Resistor R18 also serves as the charging resistor for the low level shaping capacitors. C6 through C11. A linear ramp is generated because of the high value of R18, yet a low output impedance is maintained because of the low impedance of CR22 and CR23. The high level waveshaping components are R22, a 200 ohm wirewound resistor, and C5, a 1 mfd capacitor.

e. MONITOR Jack. The MONITOR jack is strapped in series with the output loop to provide current monitoring in the high level mode. In the low level mode, the monitor jack is bridged across the output pair with a 15K ohm resistor placed in series with each output lead.

f. Signal Alarm. The signal alarm consists of two differential amplifiers and two output transistors. The circuit can be strapped to alarm on constant mark, constant space or both (no transition). The input differential amplifier controls the charge on timing capacitors Cl2 and Cl3 which are strapped to the output differential amplifier through diodes CR11 and CR12. The output amplifier, Q11 and Q12 have a reference voltage established at the base of Q12 and R36 and R37. When the input voltage exceeds this level, Q11 turns on, thereby signalling an alarm. In the constant mark mode C12 is allowed to charge, and in the constant space mode Cl2 charges, to provide an input voltage to Q11. In the no-transition mode both capacitor voltages are summed, thereby giving an alarm condition no matter what state the unit has stopped signalling in. Transistor Q14 and DS201 (unit A) and Q114 and DS202 (unit B) form the output for the front panel lamps. Transistors Q14 and Q114 pull in relay K201 to provide a contact closure output to the connector. The signal alarm will reset upon resumption of normal signalling.

g. Fuse Alarm.

(1) The fuse alarm circuit provides a visual indication (front panel lamp DS203) and an electrical output (contact closure to connector) if any fuse blows or ac power is lost.

(2) The ac failure signal is derived by relay K202 across the channel power supply. The dc fuse alarms are actuated by fuses F1, F2 and F3. If a failure occurs, a voltage will be applied to K203 causing it to activate, which in turn lights front panel lamp DS203 and produces a contact closure on the connector.

A. Power Supply (Internal). The power supply of transformer T201, with dual counter-tapped secondaries. The secondary voltage is bridge rectified, filtered and regulated to provide the necessary operating voltages for the input amplifiers.

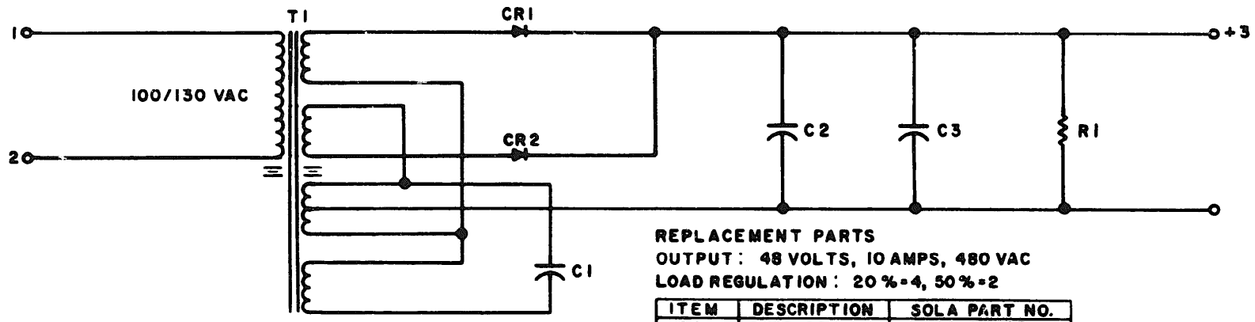
APPENDIX C

OPERATION AND MAINTENANCE INSTRUCTIONS FOR

SOLA CVDC POWER SUPPLY TYPE 28-1561-2

C -1. General Description

The SOLA CVDC Power Supply Type 28-1561-2 is a regulated, constant voltage power supply which is designed to furnish regulated dc voltage. Within the limits of the specifications, this regulated supply will deliver regulated voltage despite changes in input line voltage, line frequency, load impedance and temperature as described in the specification limits. The power supply consists of a constant voltage transformer (described in greater detail under principles of operation (para C-2) a rectifying means, and a filter circuit. The transformer not only converts the incoming line voltage to the desired level, but also is the regulating means. The rectifiers, by use of conventional circuitry, convert the ac to dc. The filter circuit reduces the magnitude of the ripple to the desired specification level. The output ripple at full load and nominal input voltage is less than 1 percent rms. The nominal output voltage tolerance is -+1 percent at nominal input voltage and full load. The output voltage is regulated to -+1 percent over an input line variation of 100 to 130 volts rms. The power supply shall not be operated in an ambient of greater than 50°C or stored at a temperature greater than 85 C.



ITEM	DESCRIPTION	SOLA PART NO.
C1	6MFD 66VAC	211-02-24415
C2, C3	23KMFD 55V	215-02-24864-05
CR1, CR2	IN3210	267-17206-03
T1		9-1628-1
R1	500Ω 20W	219-6992

EL1P0025

Figure C-1. SOLA CVDC type 28-1561-2 power supply, schematic diagram.

C-2. Principles of Operation

(fig. C-1)

The heart of the regulator is the constant voltage transformer. A constant-voltage transformer has a magnetic core structure different from conventional transformers. It has a magnetic shunt with a fixed air gap interposed between the primary and secondary windings. The secondary winding is shunted by a fixed ac capacitor. Upon application of primary voltage, the secondary voltage increases to the point at which that portion of the magnetic core directly under the secondary winding approaches saturation due to the capacitative load connected across the secondary winding. As the core approaches saturation, it cannot carry much additional magnetic flux, and the increase in secondary voltage is less than any proportional increase in primary voltage. Thus, a condition of relative stability of secondary voltage is reached. Over the range of specified primary voltage, the core under the secondary winding is magnetically saturated, and the voltage of the secondary changes very little for this range of primary voltage. Due to the magnetic shunt between the primary and secondary windings, that part of the core under the primary is not saturated. To equalize the small effect of increasing primary voltage on the secondary, a compensating coil is wound over the primary coil and is connected in series with the secondary load circuit, but out of phase with the secondary. Thus, when the primary voltage increases beyond the design voltage, the voltage in the compensating coil also increases, but since it is out of phase with the secondary voltage, it subtracts from the secondary voltage an amount equal to the slight increase induced in the secondary winding by the increase of primary voltage. Likewise, when the primary voltage decreases, the compensating coil voltage decreases in proportion to the primary voltage, and subtracts from the secondary voltage. The design is such that the vector sum of the compensating coil voltage and the secondary voltage is practically constant throughout the design range of input voltage. When the power supply is overloaded in excess of its rated load, a point is reached where the output voltage drops to approximately zero. Due to the magnetic shunt in the transformer, its output current is limited. With excessive load current, the effect of the ac capacitor is lost; secondary flux opposes primary flux to demagnetize the secondary core leg, and the output voltage collapses, limiting short-circuit current to approximately 150 percent of full load.

C -3. Maintenance

The regulated power supply is designed for continuous, unattended operation; little or no maintenance is required. If due to a component failure maintenance is required, the power supply is to be returned to the depot for repair.

C -4. Circuit Analysis

The chart below lists some possible malfunctions which may be encountered in the use of the supply and their corresponding cause and remedy.

Symptom	Probably trouble	Corrective action
Output voltage too high	*a.* Load current less than minimum rated load.	*a.* Correct load current.
	b. Line frequency too high.	*b.* Correct primary power frequency.
Output voltage too low	*a.* Load current greater than maximum rated load.	*a.* Reduce load current.
	b. Line voltage too low.	*b.* Increase primary voltage.
	c. Line frequency too low.	*c* Correct primary power frequency.
	d. Defective dc filter capacitor.	*d.* Depot repair.
	e. Defective ac capacitor.	*e.* Depot rapair.
	f. Defective rectifier.	*f.* Depot repair.
No output voltage	*a.* Open connection.	*a.* Check all connections and repair bad connections.
	b. Open transformer winding.	*b.* Depot repair.

APPENDIX D

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

D-1. General

This appendix provides a summary of the maintenance operations for PTF/Redstone. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

D-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments. one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment or system.

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system. This function does not include the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

j. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary far the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipments/components.

D-3. Column Entries

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn(s), the lowest level of

maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "worktime" figures will be shown for each category. The number of task-hours specified by the "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C - Operator/Crew
O - Organizational
F - Direct Support
H - General Support
D - Depot

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6. Remarks. Column 6 contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

D-4. Tool and Test Equipment Requirements (sec III)

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Numenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5 -digit) in parentheses.

D-5. Remarks (sec. IV)

a. Reference Code. This code refers to the appropriate item in section II, column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in section II.

(Next printed page is D -3.)

Section II MAINTENANCE ALLOCATION CHART
FOR
FACILITIES IN PLACE, PATCH AND TEST FACILITY, REDSTONE, ALABAMA

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
00	FACILITIES IN PLACE, PATCH AND TEST FACILITY, REDSTONE, ALABAMA	Inspect		0.5					
		Test		1.0					A
		Test			2.0			1	B
		Service		0.5				4	
		Repair		1.0				4	
		Repair			4.0			1 thru 4	B, C
01, 02, 03	WU MODEM BAYS 1.2, 1.3, 1.7	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair			4.0			1 thru 4	
0101, 0201, 0301	CABINET CY-3397A/G (MOD)								
04	TIMEPLEX MODEM BAY 1.8	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair			4.0			1 thru 4	
0401	CABINET CY-3397A/G (MOD)								
05	BLACK DISTRIBUTION FRAME BAY 1.9	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair			4.0			1 thru 4	
0501	CABINET CY-3397A/G (MOD)								
06	BLACK PATCH BAY 1.10	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair			4.0			1 thru 4	
0601	CABINET CY-3397A/G (MOD)								
0602	MULTICIRCUIT PATCH PANEL (PANEL 1, CIRCUITS 1 TO 16)	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
0603	MULTICIRCUIT PATCH PANEL (PANEL 2, CIRCUITS 17 TO 32) SAME AS 0602								
0604	MULTICIRCUIT PATC PANEL (PANEL 3, CIRCUITS 33 TO 48) SAME AS 0602								
0605	LO-LEVEL DC PATCH PANEL (PANEL 1)	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
0606	LO-LEVEL DC PATCH PANEL (PANEL 2) SAME AS 0605								
0607	MISC-PATCH PANEL	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
0608	INTERBAY PATCH PANEL	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
07	TEST BAY 1.11	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair		1.0				4	
		Repair			2.0			1 thru 4	

SECTION II MAINTENANCE ALLOCATION CHART - CONTINUED
FOR
FACILITIES IN PLACE, PATCH AND TEST FACILITY, REDSTONE, ALABAMA

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQPT.	(6) REMARKS
0701	CABINET CY-3397A/G (MOD)								
0702	NOISE MEASURING SET (NORTHEAST TTS-37BR)	Replace Repair		1.0				4	D
0703	TEST SET (BERT 901)	Replace Repair		1.0				4	E
0704	OSCILLOSCOPE (TEKTRONIX R561B)	Replace Repair		1.0				4	F
0705	TRANSMISSION MEASURING SET (HP 3550 BR)	Replace Repair		1.0				4	G
0706	MISC-PATCH PANEL	Replace Repair			0.5 1.0			2, 3, 4 1 thru 4	
0707	PATCH PANEL, INTERBAY (PANEL 1)	Replace Repair			0.5 1.0			2, 3, 4 1 thru 4	
0708	PATCH PANEL, INTERBAY (PANEL 2), SAME AS 0707								
08	VF ENTRANCE FRAME AND PATCH BAY 1.12	Inspect Test Test Service Repair		0.5 1.0 0.5 	 2.0 4.0			 1 4 1 thru 4	
0801	CABINET CY-3397A/G (MOD)								
0802	DUAL SPEAKER PANEL	Replace Repair			0.5			2, 3, 4	E
0803	2W AUDIO PATCH PANEL (PANEL 1, CIRCUITS 1 TO 12)	Test Replace Repair			0.5 0.5 1.0			1 2, 3 1, 2, 3	
0804	2W AUDIO PATCH PANEL (PANEL 2, CIRCUITS 13 to 24) SAME AS 0803								
0805	2W AUDIO PATCH PANEL (PANEL 3, CIRCUITS 25 TO 36) SAME AS 0803								
0806	2W AUDIO PATCH PANEL (PANEL 4, CIRCUITS 37 TO 48) SAME AS 0803								
0807	INTERBAY PATCH PANEL	Replace Repair			0.5 1.0			2, 3, 4 1 thru 4	
0808	INTERCOM HANDSET (WEBSTER HS 521)	Replace Repair			0.5			2, 3, 4	E
C9	MISC-EQUIPMENT BAY 1.13	Inspect Test Test Service Repair Repair		0.5 1.0 0.5 1.0 	 2.0 4.0			 1 4 4 1 thru 4	
0901	CABINET CY-3397A/G (MOD)								
0902	BLANK PANEL W/AUDIBLE ALARM	Replace Repair			0.5 1.0			2, 3, 4 1 thru 4	
0903	DLIU ASSEMBLY	Replace Repair			1.0 2.0			2, 3, 4 1 thru 4	

SECTION II MAINTENANCE ALLOCATION CHART - CONTINUED
FOR
FACILITIES IN PLACE, PATCH AND TEST FACILITY, REDSTONE, ALABAMA

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQPT.	(6) REMARKS
090301	DLIU SHELF	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
090302	DLIU MODULES	Replace			0.5			2, 3, 4	
		Repair							E
0904	FUSE AND ALARM PANEL	Replace			1.0			2, 3, 4	
		Repair			2.0			1 thru 4	
090401	PCB ASSY	Replace			0.5			2, 3, 4	
		Repair					1.0	1 thru 4	
0905	BLACK ALARM PANEL, MAJOR-MINOR ALARM	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
090501	CIRCUIT BOARD ASSEMBLY (-48V)								
0906	INTERCOM (WEBSTER R-2812A)	Replace			0.5			2, 3, 4	
		Repair							E
0907	H/L DC PATCH (XMIT)	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
0908	H/L DC PATCH (REC)	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
0909	48 VDC PWR SUPPLY (SOLA 28-1561-2)	Replace			0.5			2, 3, 4	
		Repair							E
0910	ALARM PANEL (SR-143A)	Replace			1.0			2, 3, 4	
0915		Repair			2.0			1 thru 4	
0911,	60 VOLT POWER SUPPLY	Replace		0.5				4	
0912,		Repair							E
0916,									
0917									
0913,	6 VOLT POWER SUPPLY	Replace		0.5				4	
0914		Repair							E
10	RED PATCH (SECURE) BAY 2.1	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair			4.0			1 thru 4	
1001	CABINET CY-3397A/G (MOD)								
1002,	MULTICIRCUIT PATCH PANELS	Replace			0.5			2, 3, 4	
1003,		Repair			1.0			1 thru 4	
1004									
1005	LO-LEVEL DC PATCH (XMIT) PANEL	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
1006	LO-LEVEL DC PATCH PANEL (REC)	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
1007	MISC-PATCH PANEL	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
11	COMSEC AUTODIN CKT NO. 1 BAY 2.2	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair			4.0			1 thru 4	
1101	CABINET CY-3397A/G (MOD)								
12	COMSEC AUTODIN CKT NO. 2 BAY 2.3	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5					
		Repair			4.0			1 thru 4	
1201	CABINET CY-3397A/G (MOD)								

SECTION II MAINTENANCE ALLOCATION CHART - CONTINUED
FOR
FACILITIES IN PLACE, PATCH AND TEST FACILITY, REDSTONE, ALABAMA

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
13	RED/BLACK ISOLATOR BAY 3.1	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair			4.0			1 thru 4	
1301	CABINET CY-3397A/G (MOD)								
14	RED PATCH (UNSECURE) BAY 3.2	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair			4.0			1 thru 4	
1401	CABINET CY-3397A/G (MOD)								
1402	BLANK PANEL W/AUDIBLE ALARM	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
1403, 1404, 1405	MULTICIRCUIT PATCH PANELS	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
1406	DC LO-LEVEL PATCH PANEL (XMIT)	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
1407	DC LO-LEVEL PATCH PANEL (REC)	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
1408	MISC-PATCH PANEL	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
1409	ALARM PANEL, MAJOR-MINOR ALARM	Replace			0.5			2, 3, 4	
		Repair			1.0			1 thru 4	
140901	CIRCUIT BOARD ASSEMBLY (-48V)								
1410	48 VDC PWR SUPPLY (SOLA 28-1561-2)	Replace			1.0			2, 3, 4	
		Repair							E
15	RED FRAME BAY 3.3	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair			4.0			1 thru 4	
1501	CABINET CY-3397A/G (MOD)								

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
FACILITIES IN PLACE, PATCH AND TEST FACILITY, REDSTONE, ALABAMA

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	F, H, D	MULTIMETER AN/USM-223	6625-00-999-7465	
2	F, H, D	TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G	5180-00-605-0079	
3	F, H, D	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G	5180-00-610-8177	
4	O, F, H, D	TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G	5180-00-064-5178	

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APPENDIX E

OPERATOR'S ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

E-l. Scope

This appendix lists repair parts required for performance of organizational and direct support maintenance of the Patch and Test Facility (PTF), Redstone Arsenal, Huntsville, Alabama. It authorizes the requisitioning and issue of spares and repair parts as indicated by the source and maintenance codes.

E -2. General

This Repair Parts and Special Tools List is divided into the following sections:

a. Section IX. Repair Parts List. A list of repair parts authorized for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending numerical sequence, with the parts in each group listed in figure and item number sequence.

b. Section III. Special Tools List. Not applicable

c. Section IV. National Stock Number and Part Number Index. A list, in National item identification number (NIIN) sequence, of all National stock numbers (NSN) appearing in the listings, followed by a list, in alphameric sequence, of all part numbers appearing in the listings. National stock number and part numbers are cross-referenced to each illustration figure and item number appearance.

E -3. Explanation of Columns

The following provides an explanation of columns found in the tabular listings:

a. Illustration. This column is divided as follows:

(1) Figure number. Indicates the figure number of the illustration on which the item is shown.

(2) Item number. The number used to identify each item called out in the illustration.

b. Source, Maintenance, and Recoverability Codes (SMR).

(1) Source code. Source codes are assigned to support items to indicate the manner of acquiring support items for maintenance, repair, or overhaul of end items. Source codes are entered in the first and second positions of the Uniform SMR Code format as follows:

Code	Definition
PA	Item procured and stocked for anticipated or known usage.
XB	Item is not procured or stocked. If not available through salvage, requisition.

NOTE

Cannibalization or salvage may be used as a source of supply for any items source-coded above, except those coded XA and aircraft support items as restricted by AR 700-42.

(2) Maintenance code. Maintenance codes are assigned to indicate the levels of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the Uniform SMR Code format as follows:

(a) The maintenance code entered in the third position will indicate the lowest maintenance level authorized to remove, replace, and use the support item. The maintenance code entered in the third position will indicate one of the following levels of maintenance:

Code	Application/Explanation
O	Support item is removed, replaced, used at the organizational level.
F	Support item is removed, replaced, used at the direct support level.

(b) The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair (i.e., all authorized maintenance functions). This position will contain one of the following maintenance codes:

Code	Application/Explanation
F	The lowest maintenance level capable of

Code	Application/Explanation
	complete repair of the support item is the direct support level.
H	- The lowest maintenance level capable of complete repair of the support item is the general support level.
Z	- Nonreparable. No repair is authorized.

(3) Recoverability code. Recoverability codes are assigned to support items to indicate the disposition action on unserviceable items. The recoverability cod, is entered in the fifth position of the Uniform SMR Code format as follows:

Code	Definition
Z	- Nonreparable item. When unserviceable, condemn and dispose at the level indicated in position 3.
F	- Reparable item. When uneconomically reparable, condemn and dispose at the direct support level.
D	- Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal not authorized below depot level.

c. National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

d. Part Number. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements, to identify an item or range of items.

NOTE

When a stock-numbered item is requisitioned, the repair part received may have a different part number than the part being replaced.

e. Federal Supply Code for Manufacturer (FSCM). The FSCM is a 5-digit numeric code listed in SB 708-42 which is used to identify the manufacturer, distributor, or Government agency, etc.

f. Description. Indicates the Federal item name and, if required, a minimum description to identify the item.

g. Unit of Measure (U/M). Indicates the standard of the basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr, etc.). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

h. Quantity Incorporated in Unit. Indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly, A "V" appearing in this column in lieu of a quantity indicates that no specific quantity is applicable (e.g., shims, spacers, etc.).

E-4. Special Information

National stock numbers (NSN's) that are missing from P source-coded items have been applied for and will be added to this appendix by future change/revision when they are entered in the Army Master Data File (AMDF). Until the NSN are established and published, submit exception requisitions to: Commander, US Army Electronics Command, ATTN: DRSEL-MM, Fort Monmouth NJ 07703 for the part required to support your equipment.

E-5. How to Locate Repair Parts

a. When National stock number or part number is unknown-

(1) First. Using the table of contents, determine the functional group within which the repair part belongs. This is necessary since illustrations are prepared for functional groups, and listings are divided into the same groups.

(2) Second. Find the illustration covering the functional group to which the repair part belongs,

(3) Third. Identify the repair part on the illustration and note the illustration figure and item number of the repair part.

(4) Fourth. Using the Repair Parts Listing, find the figure and item number noted on the illustration.

b. When National stock number or part number is known-

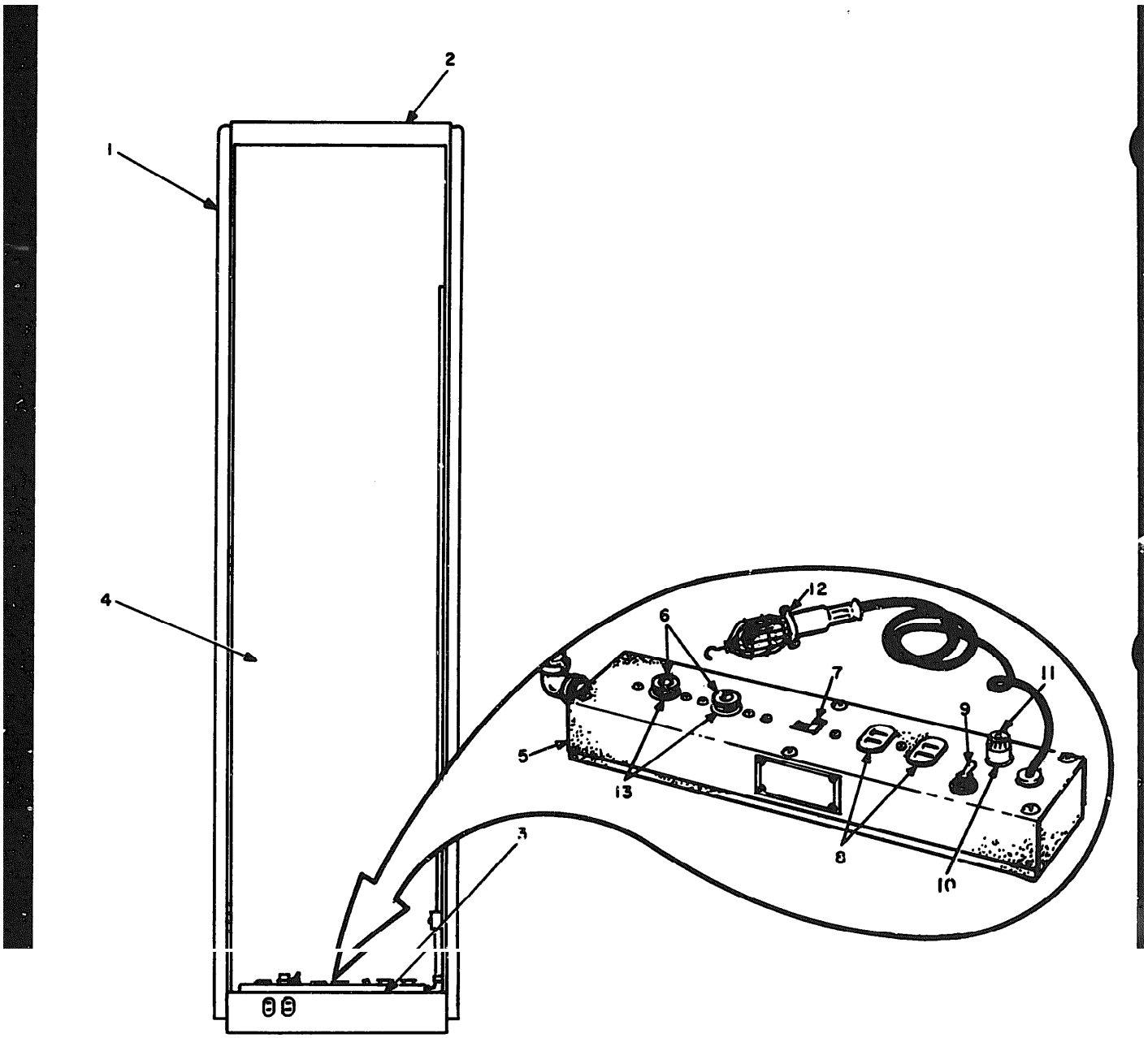
(1) First. Using the Index of National Stock Numbers and Part Numbers, find the pertinent National stock number or part number. This index is in ascending NIIN sequence, followed by a list of part numbers in ascending alphanumeric sequence, cross-referenced to the illustration figure number and item number.

(2) Second. After finding the figure and item number, locate the figure and item number in the repair parts list.

E -6. Abbreviations

Not applicable.

(Next printed Page is E-4)



EL1P0026

Figure E-1. Cabinet, parts location.

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) UNIT OF MEAS	(8) QTY INC IN UNIT
						GROUP: 00 FACILITIES IN PLACE PATCH AND TEST FACILITY, REDSTONE, ALABAMA		
						GROUP: 0101 CABINET CY-3397A/G		
E-1	1	XBFHD		LBAD-D-51556	21617	CABINET CY-3397A/G (MODIFIED)	EA	14
E-1	2	XBFZZ		LBAD-D-51539	21617	TOP, COVER, 3397A/G	EA	1
E-1	3	XBFZZ		LBAD-D-51540	21617	BOTTOM, COVER, 3397A/G	EA	1
E-1	4	XBFHD		SM-D-433907	21617	DOOR, CABINET	EA	1
E-1	5	PAFFF	6110-00-856-2410	SA-238/G	32758	SWITCH, PANEL ASSEMBLY	EA	1
E-1	6	PAFZZ	5920-00-296-4884	MIL-F-15160	81349	FUSE, PLUG 15 AMP	EA	2
E-1	7	PAFZZ	5930-00-989-6768	1202	74545	SWITCH, TOGGLE DPST	EA	1
E-1	8	PAFZZ	5935-00-283-4003	5242	27193	OUTLET, CONVENIENCE, DUPLEX	EA	1
E-1	9	PAFZZ	5930-00-501-4859	7561K5	15605	SWITCH, TOGGLE, DPST	EA	1
E-1	10	PAFZZ	5920-00-785-5071	282001	75915	FUSEHOLDER, (FOR 1 AMP GLASS FUSE)	EA	1
E-1	11	PAFZZ	5920-00-403-8497	FM 03-1A	81349	FUSE, 3AG, 1 AMP	EA	1
E-1	12	XBFZZ	6230-00-164-7061	SJTO-WL-661	32757	LAMP TROUBLE WITH PROTECTOR AND TERMINAL TUBE	EA	1
E-1	13	XBFZZ		TYPE 4063	27193	RECEPTACLE FOR 15 AMP FUSE	EA	2

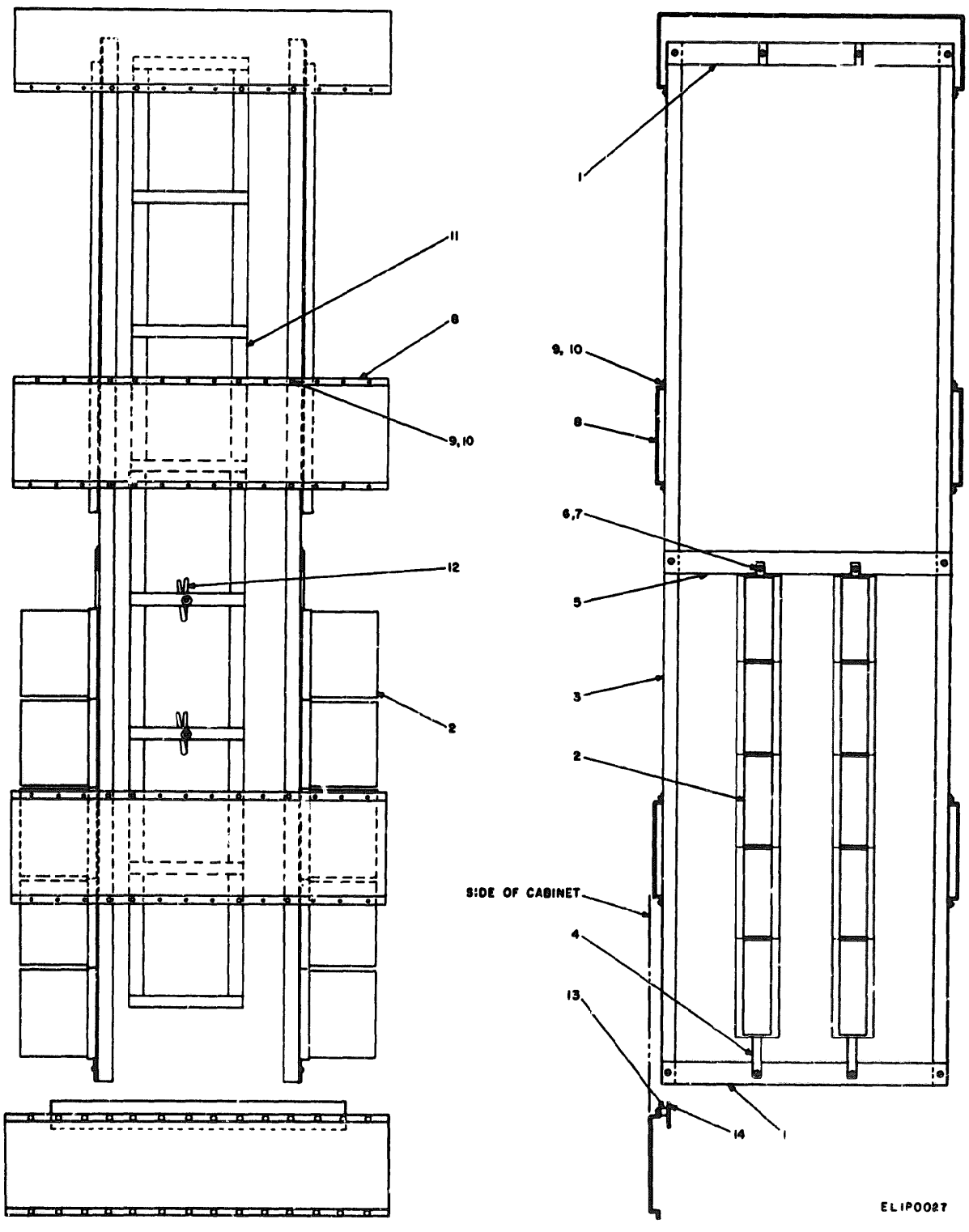
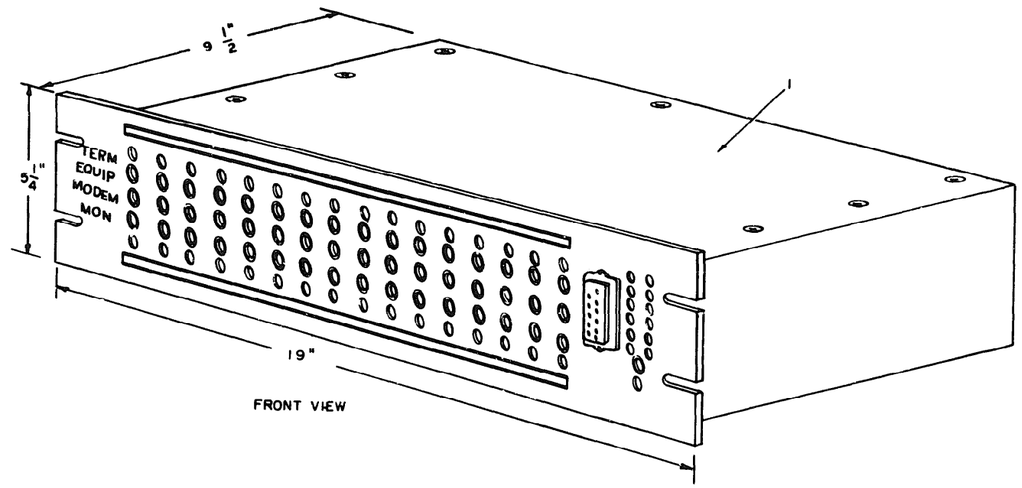


Figure E-2. Blac[illegible]bution frame mounting assembly, parts location.

SECTION II REPAIR PARTS LIST (CONTINUED)

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION / USABLE ON CODE	(7) UNIT OF MEAS	(8) QTY INC IN UNIT
						GROUP: 04 BLACK DISTRIBUTION FRAME BAY		
E-2	1	XBFZZ		LBAD-C-51544	21617	MOUNTING BRACKET	EA	4
E-2	2	XBFZZ		421C-10W	81812	TERMINAL BLOCK 10 x 20 PINS	EA	20
E-2	3	XBFZZ		PMA-52A	21617	AMCOR, ANGLE	EA	4
E-2	4	XBFZZ		LBAD-C-51543	21617	TERMINAL BLOCK MOUNTING BRACKET	EA	4
E-2	5	XBFZZ		LBAD-C-51542	21617	MOUNTING BRACKET	EA	2
E-2	6	PAFZZ	5305-00-989-6265	MS-35207-262	96906	SCREW 10-32 UNF 3/8 LG	EA	40
E-2	7	PAFZZ	5310-00-877-5797	MS-21044-N3	96906	, SELF LOCKING, 10-32 UNF	EA	40
E-2	8	XBFZZ		LBAD-D-51551	21617	CABINET, SUPPORT CY-3397A/G	EA	V
E-2	9	PAFZZ	5305-00-784-6208	MS-34206-261	96906	SCREW, 8-32, UNC 3/8	EA	112
E-2	10	PAFZZ	5310-00-877-5795	MS-21044-N8	96906	NUT, SELF LOCKING 8-32	EA	112
E-2	11	XBFZZ		LBAD-C-51545	21617	CABLE, LADDER	EA	2
E-2	12	XBFZZ		LBAD-D-51546	21617	JUMPER, RING	EA	4
E-2	13	XBFZZ		DR6176	83338	STANDOFF 3/8 x 1 1/16 LG, 632 THD	EA	4
E-2	14	XBFZZ		ASTMB187	88729	GROUND BUSS 1 x 1/4 x 12	EA	2

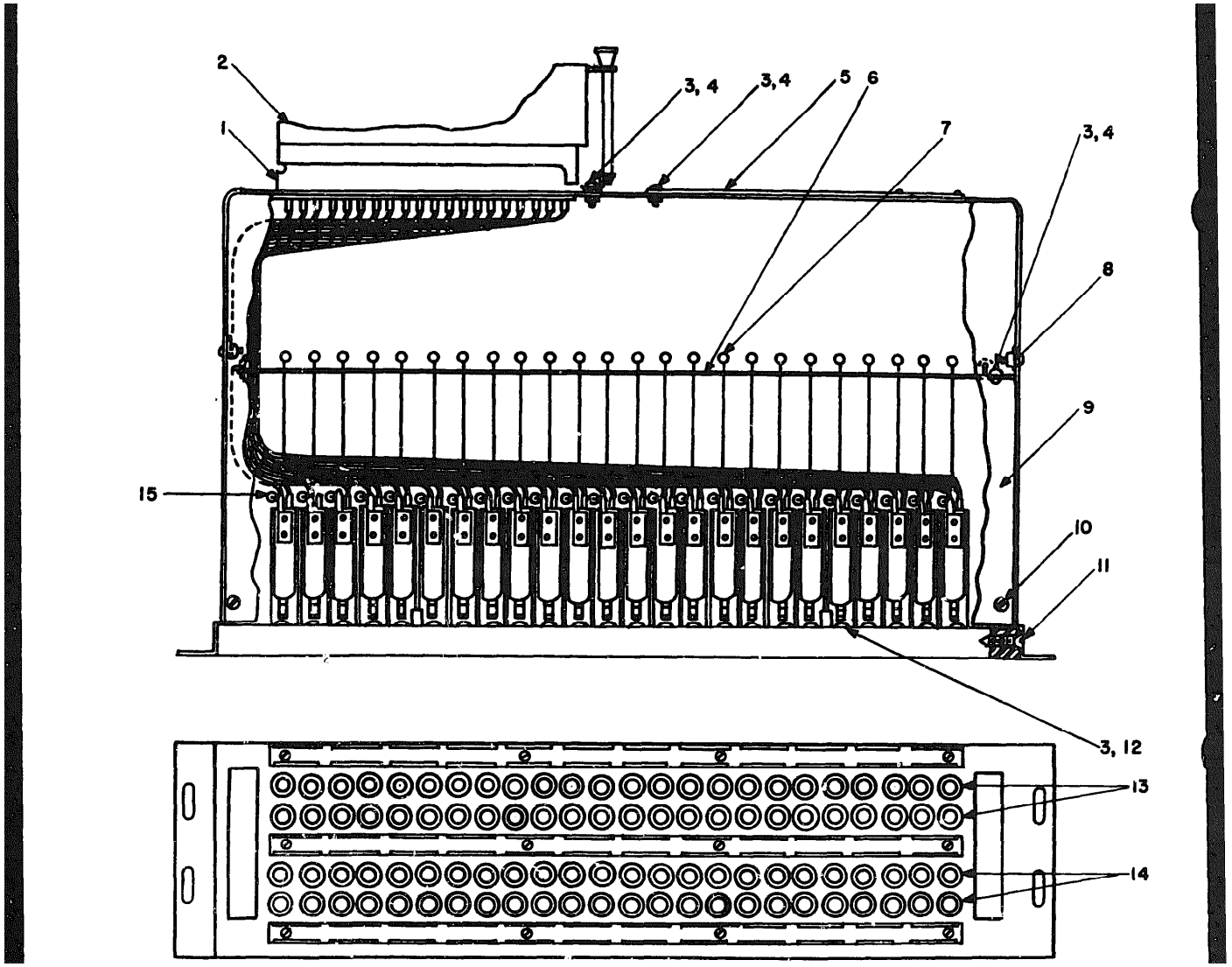


EL1P0028

Figure E-3. Data patch module multicircuit patch panel.

SECTION II REPAIR PARTS LIST (CONTINUED)

(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) IFSC	(6) DESCRIPTION USABLE ON CODE	(7) UNIT OF MEAS	(8) QTY INC IN UNIT
				GROUP: 0502 MULTICIRCUIT PATCH PANEL		
PAFZZ		LBAD-D-51563-1	21617	PATCHING MODULE WITH MONITOR POSITION	EA	1
PAFZZ		LBAD-D-51563-2	21617	CONNECTOR, PLUG, DATAPHONE, 25 PIN DB-19604-432	EA	16
PAFZZ		LBAD-D-51563-3	21617	CONNECTOR, HOOD, DATAPHONE HDB-51226-1	EA	32
PAFZZ		LBAD-D-51563-4	21617	CONNECTOR, SOCKET, DATAPHONE, 25 PIN DB-19604-433	EA	16

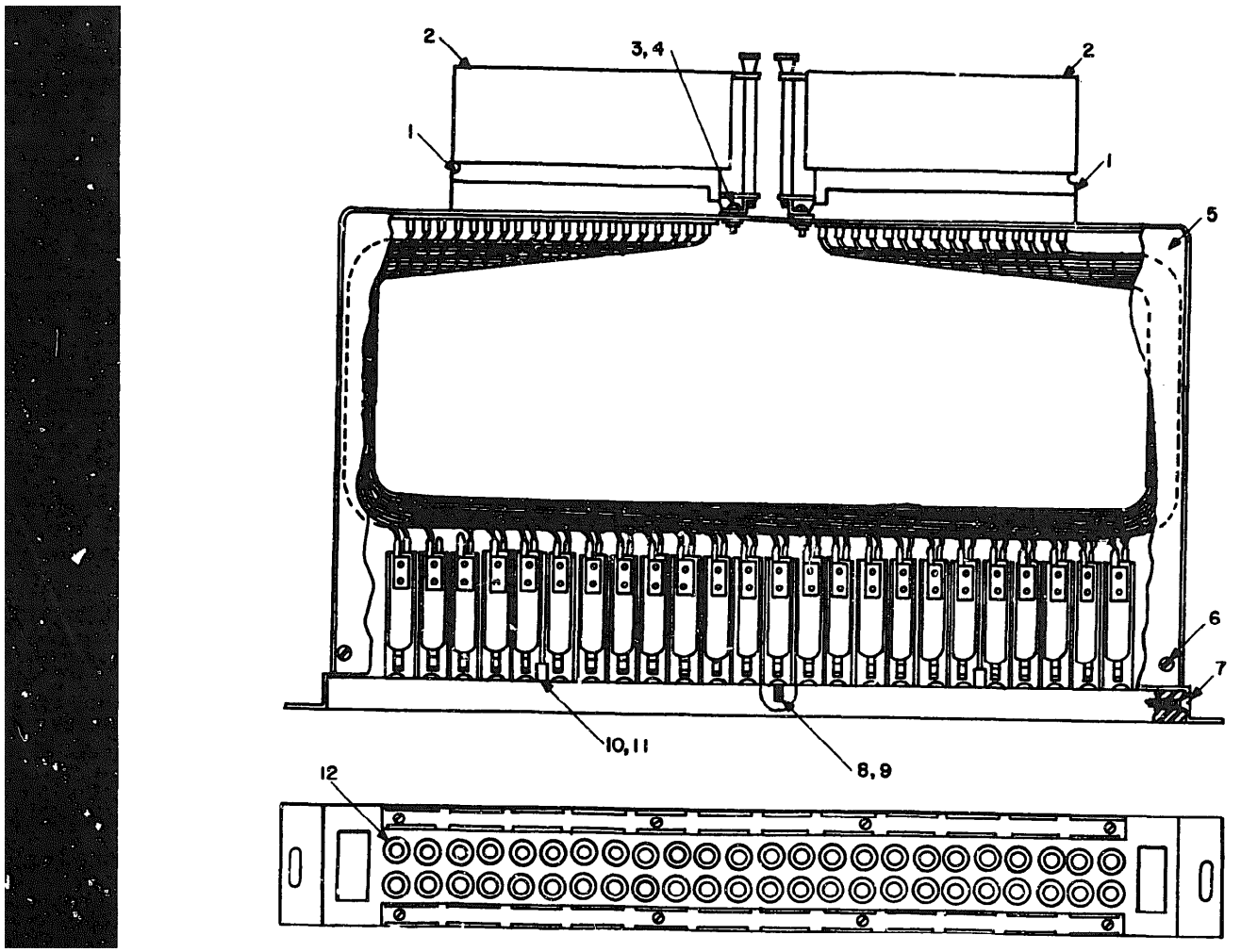


EL1P0029

Figure E-4. Patch panel assembly dc xmit low level and patch panel assembly dc receiver, low level, parts location.

SECTION II REPAIR PARTS LIST (CONTINUED)

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) UNIT OF MEAS	(8) QTY INC IN UNIT
						GROUP: 0505 LO-LEVEL DC PATCH PANEL (PANEL, 1 XMIT)		
E-4	1	PAFZZ	5935-00-847-7840	513938	44038	CONNECTOR, (FRAME) 100 JACKS	EA	1
E-4	2	PAFZZ	5935-00-799-2442	513936	44038	CONNECTOR, (CABLE) 100 PIN	EA	1
E-4	3	PAFZZ	5305-00-984-4988	MS-35206-228	96906	P.H.M.S. CAD. PLTD. 632 x 3/8	EA	96
E-4	4	PAFZZ	5310-00-081-8087	MS-21046-N06	96906	ELASTIC STOP NUT 6-32	EA	10
E-4	5	XBFZZ		LBAD-C-28998	21617	CONNECTOR COVER	EA	1
E-4	6	XBFHH		LBAD-D-28993	21617	RESISTOR BOARD ASSEMBLY	EA	1
E-4	7	PAFZZ	5905-00-195-6453	RC20GF562J	44655	RESISTOR, 5.6K 5% 1/2W	EA	25
E-4	8	XBFZZ		LBAD-C-28992	21617	RESISTOR, BOARD, MTG BRACKET	EA	2
E-4	9	XBFZZ		LBAD-D 24514	21617	PANEL, TOP AND BOTTOM	EA	2
E-4	10	PAFZZ	5305-00-833-8862	MS-18211-19C	96906	F.H.M.S. 4-40 x 5/16 NC (NYLON)	EA	22
E-4	11	XBFZZ		MS-18211-84F	96906	F.H.M.S. 10-32 x 3/8 NF (NYLON)	EA	6
E-4	12	PAFZZ	5310-00-595-7203	MS-35338-117	96906	LOCK, WASHER NO. 6	EA	96
E-4	13	PAFZZ	5935-00-578-2701	240C	64959	JACK, TELEPHONE 240C	EA	48
E-4	14	PAFZZ	5935-00-194-3079	239C	64959	JACK, TELEPHONE 239C	EA	48
E-4	15	PAFZZ	5905-00-106-1273	RCR20G153JS	81349	RESISTOR, 15K OHMS 1/2W 5%	EA	96

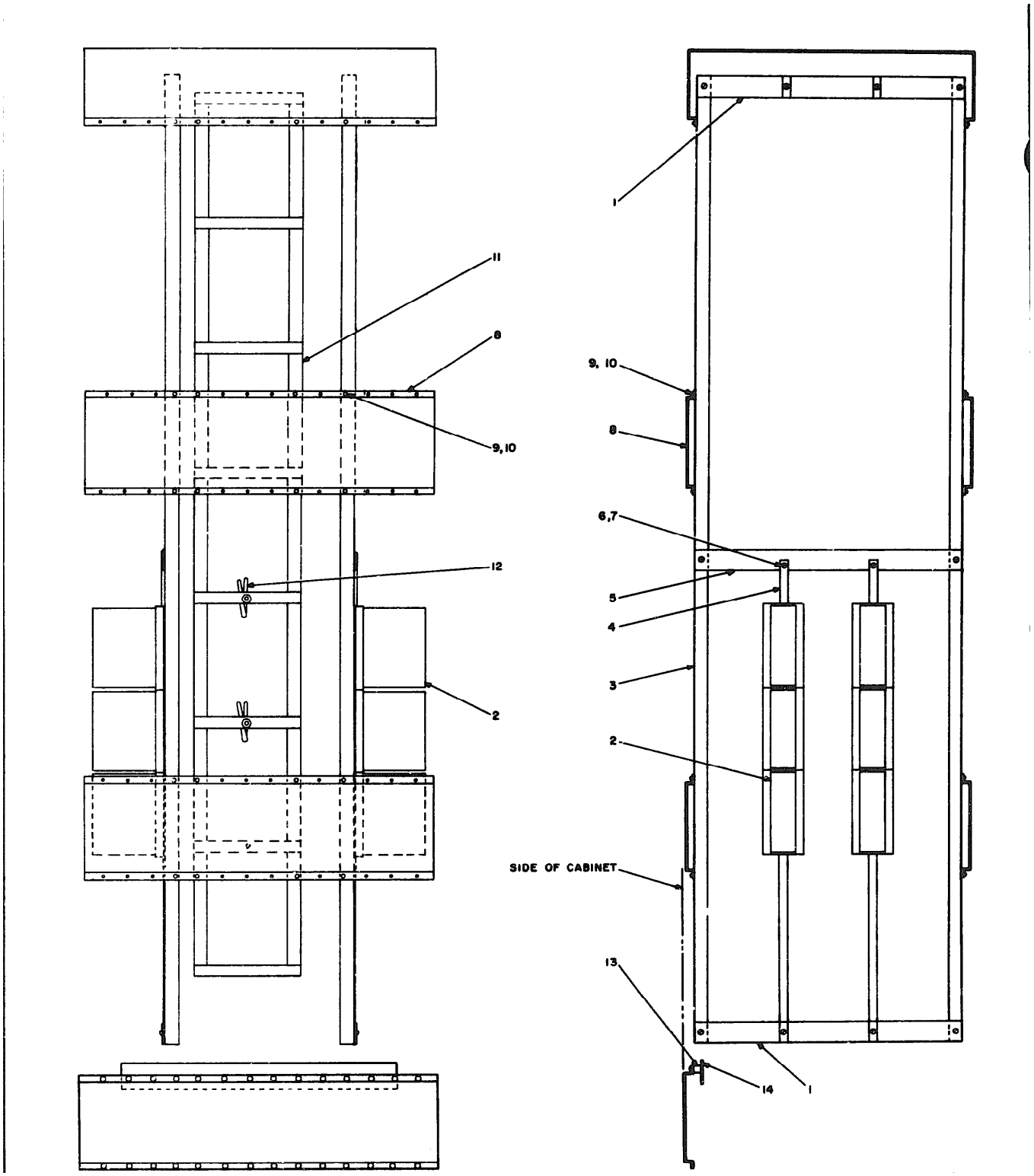


EL1P0030

Figure E-5. Patch panel assembly miscellaneous and patch panel assembly interbay, parts location.

SECTION II REPAIR PARTS LIST (CONTINUED)

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) UNIT OF MEAS	(8) QTY INC IN UNIT
						GROUP: 0507 MISCELLANEOUS PATCH PANEL		
E-5	1	PAFZZ	5935-00-085-4730	512240	44038	CONNECTOR, 80 PIN (FRAME)	EA	1
E-5	2	PAFZZ	5935-00-814-6421	512241	44038	CONNECTOR, 80 PIN (CABLE)	EA	1
E-5	3	PAFZZ	5305-00-889-3000	MS-35206-230	96906	SCREW, PAN-HD., 6-32 x 1/2 LG	EA	6
E-5	4	PAFZZ	5310-00-081-8087	MS-21044-N06	96906	ELASTIC STOP NUT, 6-32 NC	EA	6
E-5	5	XBFZZ		LBAD-D-24514	21617	COVER, TOP AND BOTTOM	EA	2
E-5	6	PAFZZ	5305-00-995-6653	MS-[illegible]190-222	96906	SCREW, FLAT HEAD, 4-40 NC x 5/16 LG	EA	4
E-5	7	PAFZZ	5305-00-984-7361	MS-35191-270	96906	SCREW, FLAT HEAD, 10-32 NF x 3/8	EA	4
E-5	8	PAFZZ	5305-00-984-4988	MS-35206-228	96906	SCREW, R.H. 6-32 x 3/8 LG	EA	48
E-5	9	PAFZZ	5310-00-209-1366	MS-35335-58	96906	WASHER, LOCK NO. 6 (EXTERNAL TEETH)	EA	49
E-5	10	XBFZZ		LBAD-D-28568-3	21617	SPACER, FIBER NO. 2335	EA	4
E-5	11	PAFZZ	5305-00-054-5657	MS-51957-17	96906	SCREW, R.H. 4-40 x 1/2 LG	EA	4
E-5	12	PAFZZ	5805-00-877-2965	238A	64959	JACK, TELEPHONE 238A (KEY)	EA	48

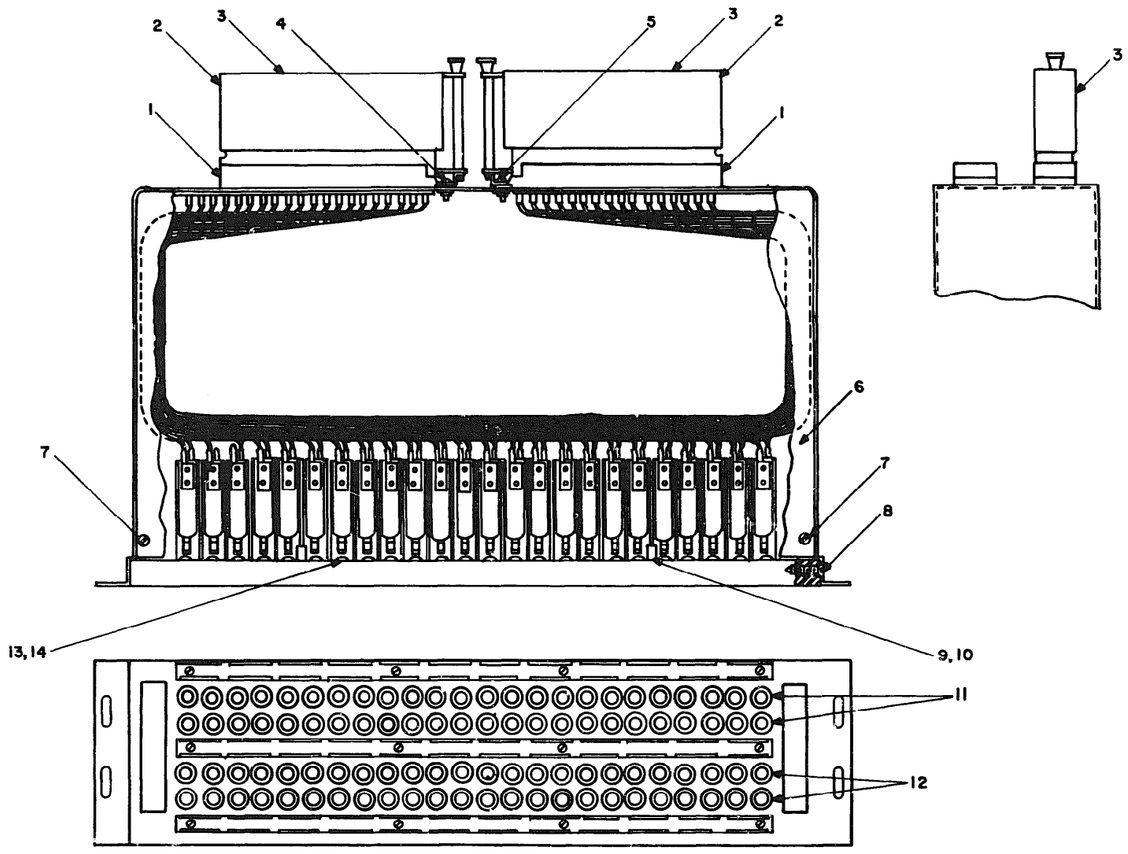


EL1P0031

Figure E-6. Vf entrance frame mounting assembly, parts location.

SECTION II REPAIR PARTS LIST (CONTINUED)

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) UNIT OF MEAS	(8) QTY INC IN UNIT
						GROUP: 07 VF ENTRANCE FRAME AND PATCH BAY 1.12		
E-6	1	XBFZZ		LBAD-C-51544	21617	MOUNTING BRACKET	EA	4
E-6	2	XBFZZ		421C-10W	81812	TERMINAL BLOCK 10 x 20 PINS	EA	12
E-6	3	XBFZZ		PMA-52A	21617	AMCOR, ANGLE	EA	4
E-6	4	XBFZZ		LBAD-C-51543	21617	TERMINAL, BLOCK MTG. BRACKET	EA	4
E-6	5	XBFZZ		LBAD-C-51542	21617	MOUNTING BRACKET	EA	2
E-6	6	PAFZZ	5305-00-989-6265	MS-35207-262	96906	SCREW, 10-32-UNF x 3/8 LG	EA	V
E-6	7	PAFZZ	5310-00-877-5797	MS-21044-N3	96906	NUT, SELF LOCKING 10-32 NF	EA	V
E-6	8	XBFZZ		LBAD-D-51551	21617	CABINET, SUPPORT CY-3397A/G	EA	V
E-6	9	PAFZZ	5305-00-784-6208	MS-34206-261	96906	SCREW, 8-32 UNC x 3/8	EA	V
E-6	10	PAFZZ	5310-00-877-5795	MS-21044-N8	96906	NUT, SELF LOCKING 8-32 UNC	EA	V
E-6	11	XBFZZ		LBAD-C-51545	21617	CABLE, LADDER	EA	2
E-6	12	XBFZZ		LBAD-D-51546	21617	JUMPER, RING	EA	V

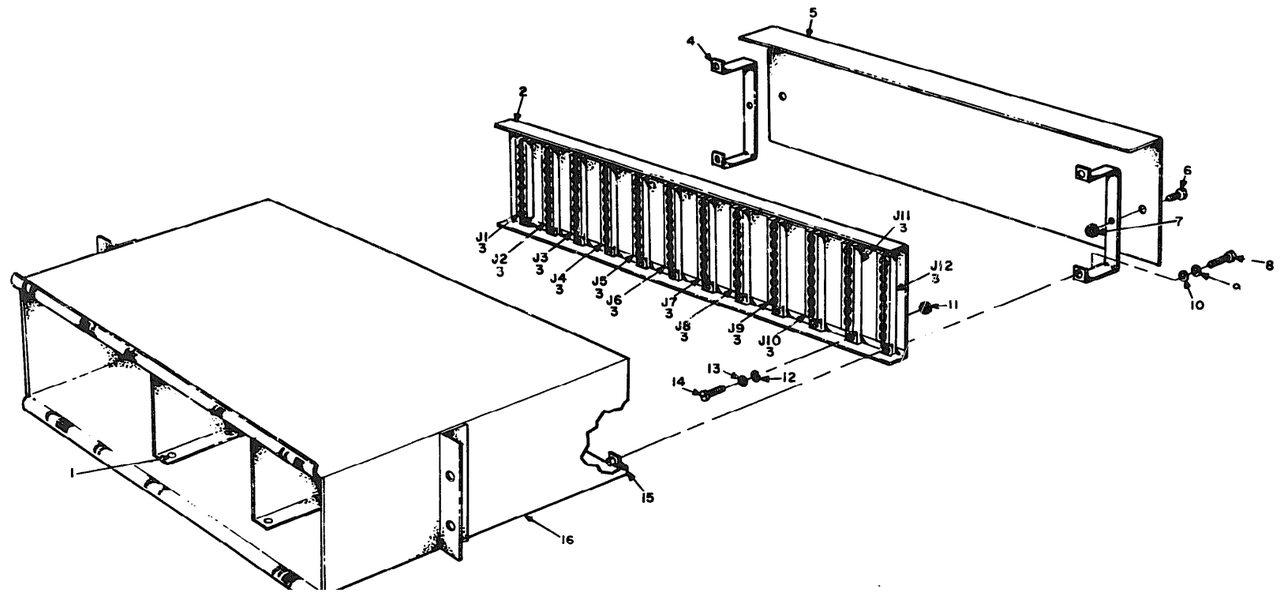


EL1P0032

Figure E-7. Patch panel assembly, two-wire audio, parts location

SECTION II REPAIR PARTS LIST (CONTINUED)

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMSER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) UNIT OF MEAS	(8) QTY INC IN UNIT
						GROUP: 0703 2W AUDIO PATCH PANEL (PANEL 1, CIRCUIT 1 TO 12)		
E-7	1	PAFZZ	5935-00-085-4730	512240	44038	CONNECTOR 80 PIN (FRAME)	EA	4
E-7	2	PAFZZ	5935-00-814-6421	512241	44038	CONNECTOR 80 PIN (CABLE)	EA	2
E-7	3	XBFZZ		LBAD-D-28592	21617	CONNECTOR-NORMAL THROUGH	EA	2
E-7	4	PAFZZ	5310-00-081-8087	MS-21044-N06	96906	ELASTIC STOP NUT 6-32 NC	EA	12
E-7	5	PAFZZ	5305-00-886-3000	MS-35206-230	96906	PHMS, CAD PLTD. 6-32 x 1 1/2 NC	EA	12
E-7	6	XBFZZ		LBAD-D-24514	21617	COVER, TOP AND BOTTOM	EA	2
E-7	7	PAFZZ	5305-00-995-6653	MS-35190-222	96906	SCREW, FLAT HEAD 4-4 NC 5/16 LG	EA	4
E-7	8	PAFZZ	5305-00-984-7361	MS-35181-270	96906	SCREW, FLAT HEAD 10-32 NF x 3/8 LG	EA	6
E-7	9	XBFZZ		LBAD-D-28563	21617	SPACER, FIBER NO. 2335	EA	4
E-7	10	PAFZZ	5305-00-828-9821	MS-24629-13	96906	SCREW, TAPPING PAN HD CAD PLATED	EA	4
E-7	11	PAFZZ	5935-00-192-4805	280C	64959	JACK, TELEPHONE 280C	EA	48
E-7	12	PAFZZ	5935-00-578-2647	241C	64959	JACK, TELEPHONE 241C	EA	48
E-7	13	PAFZZ	5305-00-984-4988	MS-35206-228	96906	PHMS, CAD PLATED, 6-32 x 3/8 NC	EA	96
E-7	14	PAFZZ	5310-00-209-1366	MS-35335-58	96906	LOCK, WASHER NO. 6 EXTERNAL TEETH	EA	96



EL1P0033

Figure E-8. Shelf digital line interface unit, parts location.

SECTION II REPAIR PARTS LIST (CONTINUED)

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION / USABLE ON CODE	(7) UNIT OF MEAS	(8) QTY INC IN UNIT
						GROUP: 080301 DLIU SHELF (DIGITAL LINE INTERFACE UNIT)		
E-8	1	PAFZZ	5320-00-879-4473	SD42BS	46384	RIVET, TUBLER	EA	40
E-8	2	PAFHD		80409000-000	96238	PRINTED WIRING BOARD	EA	1
E-8	3	PAFZZ		HBD22WC-408D	81312	CONNECTOR, RECEPTACLE, ELECTRICAL, 22 AN	EA	12
E-8	4	XBFZZ		LBAD-C-29005	21617	COVER MOUNTING BRACKET	EA	2
E-8	5	XBFZZ		LBAD-D-29004	21617	COVER PANEL	EA	1
E-8	6	PAFZZ	5305-00-984-4983	MS-35206-226	73734	SCREW 6-32 x 1/4 LG	EA	2
E-8	7	PAFZZ	5310-00-725-4719	CLS632-2	46384	NUT, PLAIN, CLINCH CRES NO. 6-32	EA	2
E-8	8	PAFZZ	5305-00-054-6654	MS-51957-30	96906	SCREW, MACHINE,CRES NO. 6-32 x 1/2 LG	EA	4
E-8	9	PAFZZ	5310-00-722-5998	MS-15795-805	96906	WASHER, FLAT, CRES, 0-156 INCH ID 0.312 INCH OD	EA	4
E-8	10	PAFZZ	5310-00-929-6395	MS-35338-136	96906	WASHER, LOCK, SPLIT, CRES, 0-138 INCH ID 0.250 INCH OD	EA	4
E-8	11	XBFZZ		SST4-40SMPAT	70318	NUT, PLAIN, HEXAGON, STAINLESS STEEL NO. 4-40	EA	24
E-8	12	PAFZZ	5310-00-933-8118	MS-35338-135	96906	WASHER, LOCK, SPLIT, CRES, 0.115 INCH ID, 0.250 INCH OD	EA	24
E-8	13	PAFZZ	5310-00-595-6211	MS-15795-803	96906	WASHER, FLAT, CRES, 0.125 INCH ID, 0.250 INCH OD	EA	24
E-8	14	PAFZZ	5305-00-177-5545	MS-51957-120	96906	SCREW, MACHINE, CRES, NO. 4-40 x 9/16 INCH LG	EA	24
E-8	15	PAFZZ	5310-00-725-4719	CLS632-2	46384	NUT, PLAIN, CLINCH, CRES NO. 6-32	EA	4
E-8	16	PAFHD		90409000-000	07703	UNIVERSAL SHELF	EA	1

SECTION II REPAIR PARTS LIST (CONTINUED)

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) UNIT OF MEAS	(8) QTY INC IN UNIT
						GROUP: 0804 FUSE AND ALARM PANEL		
E-9	1	XBOZZ		9-85-11	75382	BLOCK, TERMINAL, PRESSURE CONTACT	EA	4
E-9	2	PAFZZ	5305-00-984-7199	MS-35206-251	96906	SCREW, P.H.M.S., 8-32 x 1 1/2 LG STL. CAD. PLTD.	EA	2
E-9	3	PAFZZ	5310-00-809-8544	MS-27183-7	96906	WASHER, FLAT, RD, STL, CAD. PLATED, NO. 8	EA	2
E-9	4	PAFZZ	5310-00-934-9751	MS-35649-282	96906	NUT, PLAIN, HEX, 8-32, UNC, STEEL CAD. PLTD. NO. 8	EA	2
E-9	5	PAFZZ	5940-00-643-5717	7-170	71785	BLOCK, TERMINAL STRIP	EA	9
E-9	6	PAFZZ	5305-00-889-2999	MS-35206-217	96906	SCREW, P.H.M.S., 4-10 UNC x 1/2 LG STL.	EA	18
E-9	7	PAFZZ	5310-00-934-9739	MS-35649-242	96906	NUT, PLAIN, HEX, 4-40 UNC STL, CAD PLATED	EA	18
E-9	8	XBFZZ		LBAD-D-29024	21617	COVER	EA	1
E-9	9	PAFZZ	5305-00-984-4999	MS-35206-232	96906	SCREW, P.H.M.S., 6-32 UNC x 3/4 LG, STL CAD PLATED	EA	12
E-9	10	XBFZZ		GOB-1104	34234	GROMMET, RUBBER, 2 1/8 OD, 1 1/2 ID	EA	1
E-9	11	PAFZZ	6210-00-235-2064	81-1059-01-102	72619	LAMPHOLDER, BASE ASSEMBLY	EA	2
E-9	12	PAOZZ	6240-00-081-6321	60PSB	08108	LAMP, SLIDE, BASE 60 VDC TYPE	EA	2
E-9	13	PAOZZ	2530-00-950-2065	95-3171	72619	LENS, SMOOTH TYPE, RED	EA	2
E-9	14	PAFZZ	5920-00-968-3238	HLT	71400	FUSEHOLDER, TYPE HLT	EA	36
E-9	15	PAFZZ	5310-00-983-8483	MS-27183-5	96906	WASHER, FLAT, RD NO. 6, STL CAD PLTD	EA	18
E-9	16	PAFZZ	5310-00-934-9747	MS-35649-262	96906	NUT, PLAIN, HEX, 6-32 UNC, STL CAP PLATED	EA	12
E-9	17	PAOZZ	5920-00-857-8416	GMT-1-1-3	71400	FUSE, TELEPHONE, TYPE G.M.T., 1 1/3 AMP	EA	6
E-9	18	PAOZZ	5920-00-081-5958	GMT-3	71400	FUSE, TELEPHONE, TYPE G.M.T., 3 AMP	EA	12
E-9	19	PAOZZ	5920-00-901-9936	GMT-1	71400	FUSE, TELEPHONE, TYPE, G.M.T., 1 AMP	EA	12
E-9	20	PAOZZ	5920-00-023-2926	GMT-18	71400	FUSE, TELEPHONE, TYPE, G.M.T., 180 AMP	EA	12
E-9	21	PAFZZ	5935-00-578-2647	241C	64959	JACK, TELEPHONE	EA	1
E-9	22	PAFZZ	5935-00-192-4825	238A	64959	JACK, TELEPHONE	EA	2
E-9	23	XBFZZ		2S-DVV-15U	32171	METER, VOLT, DC, 15VDC-0-15VDC	EA	1
E-9	24	PAFZZ	5310-00-934-9751	MS-35650-302	96906	NUT, PLAIN, HEX, 10-32 UHF STL, CAD. PLATED	EA	6
E-9	25	PAFZZ	5310-00-809-8546	MS-27183-8	96906	WASHER, FLAT, RD, STL, CAD PLTD NO. 10	EA	6
E-9	26	PAFZZ	5905-00-071-1629	10015312-960	18816	RESISTOR, POWER, MINATURE, 100 OHM, 3 WATT	EA	1
E-9	27	XBFZZ		863	83330	TERMINAL STRIP, LUG TYPE	EA	1
E-9	28	PAFZZ	5905-00-518-7504	RN70D1333F	81349	RESISTOR, FIXED FILM 133K, 1/2 INCH, 1%	EA	1
E-9	29	XBFZZ		9413	73734	SPACER, BRASS NICKLE PLATED 7/32 DIA 3/8 LG	EA	4
E-9	30	XBFZZ		LBAD-C-29027	21617	P.C.B. ASSEMBLY	EA	1

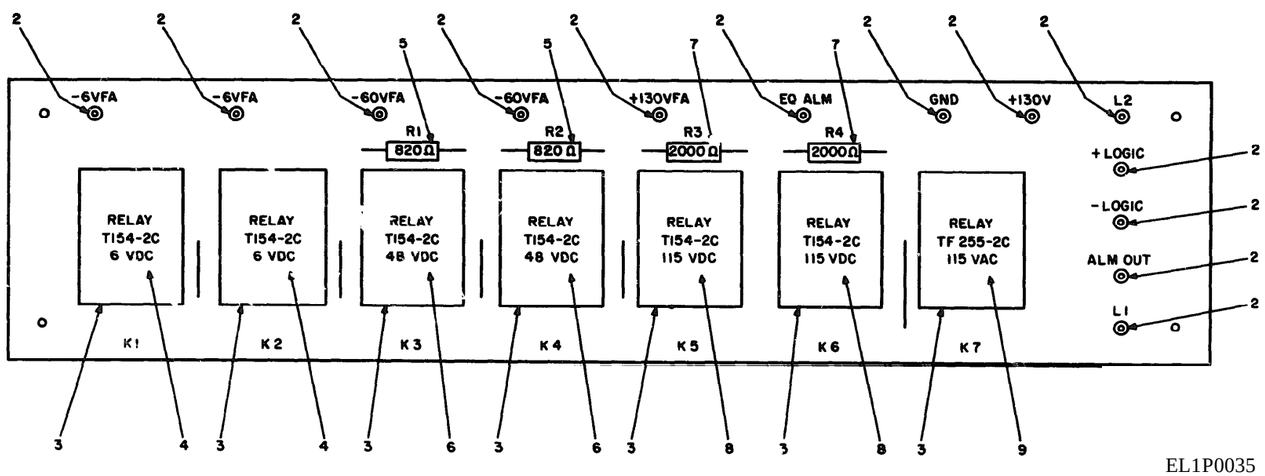


Figure E-10. Pcb assembly, parts location

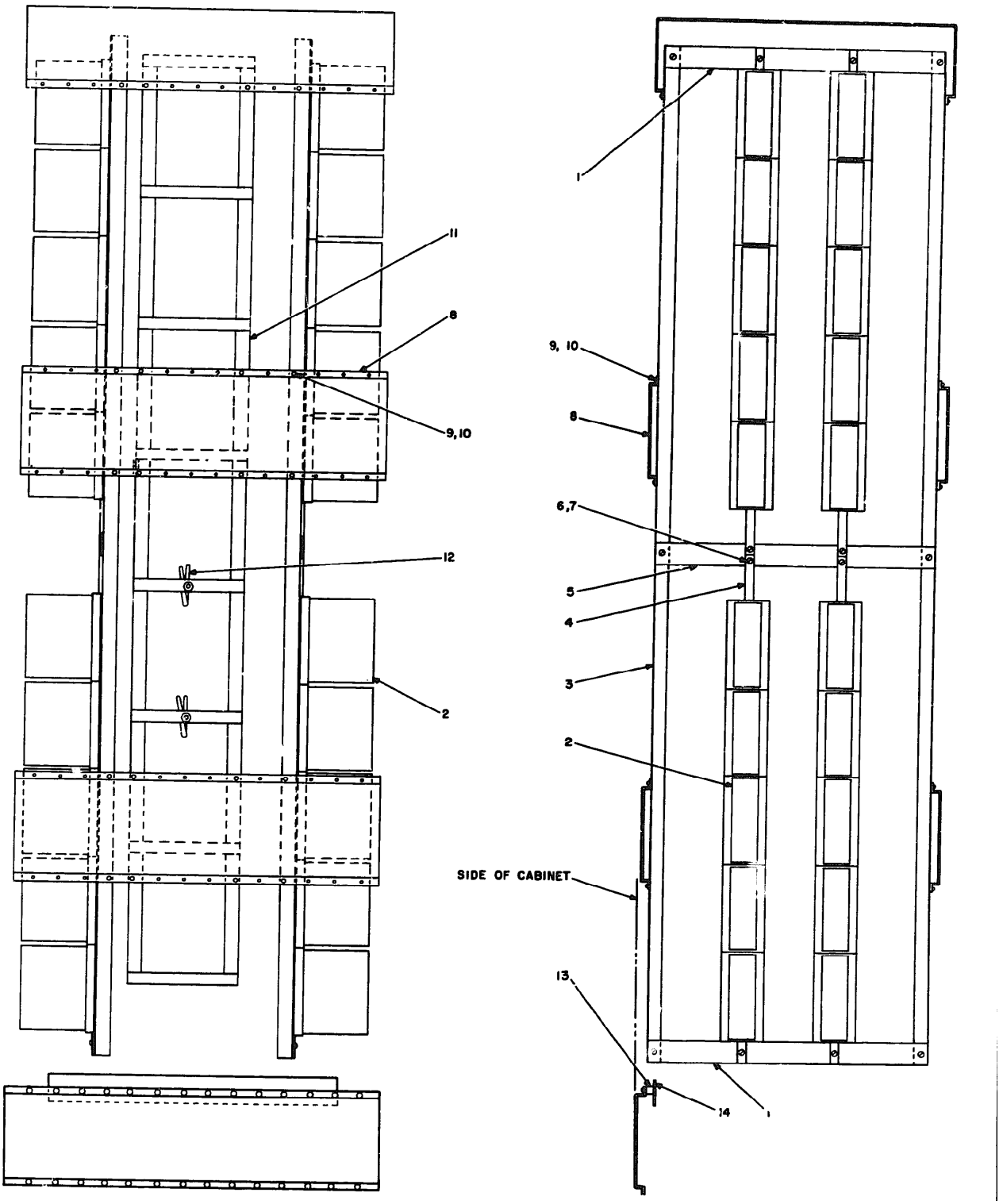
SECTION REPAIR PARTS LIST (CONTINUED)

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) UNIT OF MEAS	(8) QTY INC IN UNIT
						GROUP: 080401 PCB ASSEMBLY		
E-10	1	XBFZZ		LBAD-C-29049	21617	PRINTED CIRCUIT BOARD		
E-10	2	XBFZZ		125220	73734	TERMINAL, TURRET, 125220	EA	13
E-10	3	PAFZZ	5935-00-866-5894	300555	02288	SOCKET, RELAY	EA	6
E-10	4	PAFZZ	5945-00-013-6953	T154-2C	02288	RELAY, DPDT, 6 VDC	EA	2
E-10	5	PAFZZ	5905-00-171-1999	RC20GF821J	81349	RESISTOR, CARBON COMP. 820 OHM, 1/2 WATTS	EA	2
E-10	6	PAFZZ	5905-00-988-0851	T154-2C	02288	RELAY, DPDT, 48 VDC	EA	2
E-10	7	PAFZZ	5905-00-190-8887	RC20GF202J	81349	RESISTOR, CARBON COMP. 2000 OHMS, 1/2 WATTS	EA	2
E-10	8	PAFZZ	5945-00-732-5763	T154-2C	02288	RELAY, DPDT 115 VAC	EA	2
E-10	9	PAFZZ	5945-00-494-8898	TF-255-2C	02288	RELAY, DPDT 115 VAC	EA	1

SECTION II REPAIR PARTS LIST (CONTINUED)

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) UNIT OF MEAS	(8) QTY INC IN UNIT
						GROUP: 080301 DLIU SHELF (DIGITAL LINE INTERFACE UNIT)		
E-8	1	PAFZZ	5 5320-00-879-4473	SD42BS	46384	RIVET, TUBLER	EA	40
E-8	2	PAFHD		80409000-000	96238	PRINTED WIRING BOARD	EA	1
E-8	3	PAFZZ		HBD22WC-408D	61312	CONNECTOR, RECEPTACLE, ELECTRICAL, 22 AN	EA	12
E-8	4	XBFZZ		LBAD-C-29005	21617	COVER MOUNTING BRACKET	EA	2
E-8	5	XBFZZ		LBAD-D-29004	21617	COVER PANEL	EA	1
E-8	6	PAFZZ	5 5305-00-984-4983	MS-35206-226	73734	SCREW 6-32 x 1/4 LG	EA	2
E-8	7	PAFZZ	55310-00-725-4719	CLS632-2	46384	NUT, PLAIN, CLINCH CRES NO. 6-32	EA	2
E-8	8	PAFZZ	5 5305-00-054-6654	MS-51957-30	96906	SCREW, MACHINE,CRES NO. 6-32 x 1/2 LG	EA	4
E-8	9	PAFZZ	55310-00-722-5998	MS-15795-805	96906	WASHER, FLAT, CRES, 0-156 INCH ID 0.312 INCH OD	EA	4
E-8	10	PAFZZ	55310-00-929-6395	MS-35338-136	96906	WASHER, LOCK, SPLIT, CRES, 0-138 INCH ID 0.250 INCH OD	EA	4
E-8	11	XBFZZ		SST4-40SMPAT	70318	NUT, PLAIN, HEXAGON, STAINLESS STEEL NO. 4-40	EA	24
E-8	12	PAFZZ	5 5310-00-933-8118	MS-35338-135	96906	WASHER, LOCK, SPLIT, CRES, 0.115 INCH ID, 0.250 INCH OD	EA	24
E-8	13	PAFZZ	5 5310-00-595-6211	MS-15795-803	96906	WASHER, FLAT, CRES, 0.125 INCH ID, 0.250 INCH OD	EA	24
E-8	14	PAFZZ	55305-00-177-5545	MS-51957-120	96906	SCREW, MACHINE, CRES, NO. 4-40 x 9/16 INCH LG	EA	24
E-8	15	PAFZZ	5 5310-00-725-4719	CLS632-2	46384	NUT, PLAIN, CLINCH, CRES NO. 6-32	EA	4
E-8	16	PAFHD		90409000-000	07703	UNIVERSAL SHELF	EA	1

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) UNIT OF MEAS	(8) QTY INC IN UNIT
						GROUP: 0805 BLACK ALARM PANEL MAJOR-MINOR ALARM		
E-11	1	XBFZZ		LBAD-D-33167	21617	ALARM COVER PANEL	EA	1
E-11	2	PAFZZ	5305-00-889-3000	MS-3 206-230	96906	SCREW, P.H.M.S. STEEL CAD PLATED 6-32 x 1/2 LG	EA	31
E-11	3	PAFZZ	5935-00-847-7840	513938	44038	CONNECTOR, SERIES MTC TYPE "D"	EA	1
E-11	4	PAFZZ	5935-00-799-2442	513936	44038	CONNECTOR, 100 PIN	EA	1
E-11	5	XBFHD		LBAD-D-33172-GP1	21617	CIRCUIT BOARD ASSEMBLY (-48V)	EA	3
E-11	6	XBFZZ		LBAD-D 33171	21617	P.C.B. ASSEMBLY (MAJOR-MINOR)	EA	3
E-11	7	PAFZZ	5961-00-068-4708	5A4	81483	SEMICONDUCTOR DEVICE, DIODE	EA	270
E-11	8	PAFZZ	5905-00-279-2656	RC32GF511J	44655	RESISTOR, CARBON COMP. 510 OHMS, 5% 1W	EA	90
E-11	9	PAFZZ	5905-00-279-1922	RC42GF271J	44655	RESISTOR, CARBON COMP. 270 OHMS, 5% 2W	EA	45
E-11	10	XBFZZ		LBAD-C-12684	21617	BRACKET, CIRCUIT BOARD	EA	6
E-11	11	XBFZZ		MS-35237-37	96906	SCREW, (FHMS) CAD PLATED 6-32 x 1/2 LG	EA	12
E-11	12	PAFZZ	5310-00-983-8483	MS-27183-5	96906	WASHER, FLAT, ROUND STEEL CAD PLATED NO. 6	EA	12
E-11	13	PAFZZ	5310-00-045-4007	MS-35338-41	96906	WASHER, LOCK, CAD PLATED NO. 6	EA	15
E-11	14	PAFZZ	5310-00-088-0553	MS-21044-5	96906	NUT, HEX. 6-32	EA	15
E-11	15	PAFZZ	5930-00-268-0309	138187E	96182	SWITCH, PUSHBUTTON	EA	1
E-11	16	PAFZZ	5930-00-194-1548	13817G	96182	SWITCH, PUSHBUTTON	EA	1
E-11	17	PAFZZ		90EA2C2F3J4(RA) L4-NI	96182	SWITCH, TELLITE	EA	45
E-11	18	PAOZZ	6240-00-155-7836	MS-25237-327	81344	LAMP, INCANDESCENT (2 EA IN SWITCH)	EA	90
E-11	19	XBFZZ		117-210-101	79405	CIRCUIT BREAKER	EA	1



EL1P0037

Figure E-12. Red distribution frame mounting assembly, parts location.

SECTION II REPAIR PARTS LIST (CONTINUED)

(1) ILLUSTRATION (A) FIG NO.	(1) ILLUSTRATION (B) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) PART NUMBER	(5) FSCM	(6) DESCRIPTION USABLE ON CODE	(7) UNIT OF MEAS	(8) QTY INC IN UNIT
						GROUP: 14 RED FRAME BAY 3.3		
E-12	1	XBFZZ		LBAD-C-51544	21617	MOUNTING BRACKET	EA	4
E-12	2	XBFZZ		421C-10W	81812	TERMINAL, LOCK 10 x 20 PINS	EA	40
E-12	3	XBFZZ		PMA-52A	21617	AMCOR ANGLE	EA	4
E-12	4	XBFZZ		LBAD-C-51543	21617	TERMINAL, BLOCK MOUNTING BRACKET	EA	8
E-12	5	XBFZZ		LBAD-C-51542	21617	MOUNTING BRACKET	EA	2
E-12	6	PAFZZ	5305-00-989-6265	MS-35207-262	96906	SCREW, 10-32, UNC x 3/8 LG	EA	40
E-12	7	PAFZZ	5310-00-877-5797	MS-21044-N3	96906	NUT, SELF LOCKING: 10-32 NF	EA	40
E-12	8	XBFZZ		LBAD-D-51551	21617	CABINET, SUPPORT CY-3397	EA	V
E-12	9	PAFZZ	5305-00-784-6208	MS-34206-261	96906	SCREW, 8-32 UNC x 3/8 LG	EA	V
E-12	10	PAFZZ	5310-00-877-5795	MS-21044-N8	96906	NUT, SELF LOCKING 8-32 UNC	EA	V
E-12	11	XBFZZ		LBAD-C-51545	21617	CABLE LADDER	EA	2
E-12	12	XBFZZ		LBAD-D-51546	21617	JUMPER RING	EA	V
E-12	13	XBFZZ		DR6176	83338	STANDOFF, 3/8 x 1 1/16 LG 6-32 THD	EA	4
E-12	14	XBFZZ		ASTMB187	88724	GROUND BUSS 1 x 1/4 x 12	EA	2

SECTION IV NATIONAL STOCK NUMBER AND PART NUMBER INDEX

NOTE: LATEST NATIONAL STOCK NUMBER AND PART NUMBER ASSIGNMENTS ARE INCLUDED AT END OF INDEX

STOCK NUMBER	FIG. NO.	ITEM NO.
5905-00-011-1629	E-9	26
5945-00-013-6953	E-10	4
5920-00-023-2926	E-9	20
5305-00-045-4007	E-11	13
5305-00-054-5657	E-5	11
5305-00-054-6654	E-8	8
5905-00-068-4708	E-11	7
5905-00-071-1629	E-9	26
5920-00-081-5958	E-9	18
6440-00-081-6321	E-9	12
5305-00-081-8087	E-4	4
5305-00-081-8087	E-5	4
5310-00-081-8087	E-4	4
5310-00-081-8087	E-5	4
5310-00-081-8087	E-7	4
5935-00-085-4730	E-5	1
5935-00-085-4730	E-7	1
5310-00-088-0553	E-11	14
5905-00-104-8346	E-2	8
5905-00-106-1273	E-4	15
5910-00-111-1811	E-9	35
6440-00-155-7836	E-11	18
6230-00-164-7061	E-1	12
5905-00-171-1999	E-10	5
5305-00-177-5545	E-8	14
5905-00-190-8887	E-10	7
5935-00-192-4805	E-7	11
5935-00-192-4825	E-9	22
5930-00-194-1548	E-11	16
5935-00-194-3079	E-4	14
5905-00-195-6453	E-4	7
5310-00-209-1366	E-5	9
5310-00-209-1366	E-7	14
6210-00-235-2064	E-9	11
5930-+00-268-0309	E-11	15
5930-00-268-0309	E-12	15
5905-00-279-1922	E-11	9
5905-00-279-2656	E-11	8
5935-00-283-4003	E-1	8
5920-00-403-8497	E-1	11
5945-00-494-8898	E-10	9
5920-00-501-4859	E-1	9
5905-00-518-7504	E-9	28
5935-00-578-2647	E-7	12
5935-00-578-2647	E-9	21
5935-00-578-2701	E-4	13
5935-00-579-2442	E-12	4
5310-00-595-6211	E-8	13
5310-00-595-7203	E-4	12
5940-00-643-5717	E-9	5
5930-+00-655-1575	E-1	9
5310-00-722-5998	E-8	9
5310-00-725-4719	E-8	7
5310-00-725-4719	E-8	15
5945-00-732-5763	E-10	8
5305-00-784-6208	E-2	9
5305-00-784-6208	E-6	9
5305-00-784-6208	E-12	9
5920-00-785-5071	E-1	10
5935-00-799-2442	E-4	2
5935-00-799-2442	E-11	4
5310-00-809-8544	E-9	3
5310-00-809-8546	E-9	25
5935-00-814-6421	E-5	2
5935-00-814-6421	E-7	2
5305-00-828-9821	E-7	10
5305-00-833-8862	E-4	10
5935-00-847-7840	E-4	1
5935-00-847-7840	E-11	3
6110-00-856-2410	E-1	5
5920-00-857-8416	E-9	17
5935-00-866-5894	E-10	3
5905-00-877-2965	E-5	12
5310-00-877-5795	E-2	10
5310-00-877-5795	E-6	10
5310-00-877-5795	E-12	10
5310-00-877-5797	E-2	7
5310-00-877-5797	E-6	7
5310-00-877-5797	E-12	7
5320-00-879-4473	E-8	1
5305-00-889-2999	E-9	6
5305-00-889-3000	E-5	3
5305-00-889-3000	E-7	5
5305-00-889-3000	E-11	2
5930-00-901-9936	E-9	19
5310-00-929-6395	E-8	10
5310-00-933-8118	E-8	12
5310-00-934-9739	E-9	7
5310-934-9747	E-9	16
5310-00-934-9751	E-9	4
5310-00-934-9751	E-9	24
5310-00-934-9757	E-9	4
2530-00-950-2065	E-9	13
5920-00-968-3238	E-9	14
5310-00-983-8483	E-9	15
5310-00-983-8483	E-11	12
5305-00-984-4992	E-9	9
5305-00-984-4983	E-8	6

SECTION IV NATIONAL STOCK NUMBER AND PART NUMBER INDEX (CONTINUED)

STOCK NUMBER	FIG. NO.	ITEM NO.	STOCK NUMBER	FIG. NO.	ITEM NO.
5305-00-984-4988	E-4	3			
5305-00-984-4988	E-5	8			
5305-00-984-4988	E-7	13			
5305-00-984-4999	E-9	9			
5305-00-984-7199	E-9	2			
5305-00-984-3361	E-5	7			
5305-00984-7361	E-7	8			
5905-00-988-0851	E-4	6			
5905-00-988-0851	E-10	6			
5305-00-989-6265	E-2	6			
5305-00-989-6265	E-6	6			
5305-00-989-6265	E-12	6			
5930-00-989-6768	E-1	7			
5305-00-995-6653	E-5	6			
5305-00-995-6653	E-7	7			

SECTION IV NATIONAL STOCK NUMBER AND PART NUMBER INDEX (CONTINUED)

PART NUMBER	FSCM	FIG. NO.	ITEM NO.
ASTM B187	88724	E-2	14
ASTM B187	88724	E-12	14
CLS 632-2	46384	E-8	7
CLS-632-2	46384	E-8	15
DR 6176	83338	E-12	13
DR 6176	83338	E-2	13
FM 03-1A	81349	E-1	11
GMT-1	71400	E-9	19
GMT-1-1-3	71400	E-9	17
GMT-18	71400	E-9	20
GMT-3	71400	E-9	18
GOB-1104	24324	E-9	10
HBD22WO-408D	81312	E-8	3
HLT	71400	E-9	14
LBAD-C-12684	21617	E-11	10
LBAD-C-12684	21617	E-12	10
LBAD-C-28992	21617	E-4	8
LBAD-C-28998	21617	E-4	5
LBAD-C-29005	21617	E-8	4
LBAD-C-29027	21617	E-9	30
LBAD-C-29049	21617	E-10	1
LBAD-C-51542	21617	E-12	5
LBAD-C-51542	21617	E-6	5
LBAD-C-51542	21617	E-2	5
LBAD-C-51543	21617	E-12	4
LBAD-C-51543	21617	E-6	4
LBAD-C-51543	21617	E-2	4
LBAD-C-51544	21617	E-12	1
LBAD-C-51544	21617	E-6	1
LBAD-C-51544	21617	E-2	1
LBAD-C-51545	21617	E-12	11
LBAD-C-51545	21617	E-6	11
LBAD-C-51545	21617	E-2	11
LBAD-D-24514	21617	E-4	9
LBAD-D-24514	21617	E-5	5
LBAD-D-24514	21617	E-7	6
LBAD-D-28563	21617	E-7	9
LBAD-D-28568-3	21617	E-5	10
LBAD-D-28592	21617	E-7	3
LBAD-D-28993	21617	E-4	6
LBAD-D-29004	21617	E-8	5
LBAD-D-29024	21617	E-9	8
LBAD-D-33167	21617	E-11	1
LBAD-D-33167	21617	E-12	15
LBAD-D-33171	21617	E-11	6
LBAD-D-33172-GP1	21617	E-11	5
LBAD-D-33174	21617	E-12	7
LBAD-D-33175-GP2	21617	E-12	6
LBAD-D-51539	21617	E-1	2
LBAD-D-51540	21617	E-1	3
LBAD-D-51546	21617	E-12	12
LBAD-D-51546	21617	E-6	12
LBAD-D-51546	21617	E-2	12
LBAD-D-51551	21617	E-12	8
LBAD-D-51551	21617	E-6	8
LBAD-D-51551	21617	E-2	
LBAD-D-51556	21617	E-1	
LBAD-D-51563-1	21617	E-3	
LBAD-D-51563-2	21617	E-3	
LBAD-D-51563-3	21617	E-3	
LBAD-D-51563-4	21617	E-3	
MJE-3739	80131	E-9	
MS-15795-803	96906	E-8	
MS-15795-805	96906	E-8	
MS-18211-19C	96906	E-4	
MS-18211-84F	96906	E-4	
MS-21044-N3	96906	E-12	
MS-21044-N3	96906	E-6	
MS-21044-N3	96906	E-2	
MS-21044-N8	96906	E-12	
MS-21044-N8	96906	E-6	
MS-21044-N8	96906	E-2	
MS-21044-5	96906	E-11	
MS-21046-N06	96906	E-4	
MS-21046-N06	96906	E-5	
MS-21046-N06	96906	E-7	
MS-24629-13	96906	E-7	
MS-25237-327	81344	E-11	
MS-27183-5	96906	E-11	
MS-27183-5	96906	E-9	
MS-27183-7	96906	E-9	
MS-27183-8	96906	E-9	
MS-34206-261	96906	E-12	
MS-34206-261	96906	E-6	
MS-34206-261	96906	E-2	
MS-35190-222	96906	E-5	
MS-35190-222	96906	E-7	
MS-3590-238	96906	E-13	
MS-35191-270	96906	E-5	
MS-35191-270	96906	E-7	
MS-35206-217	96906	E-9	
MS-35206-226	73734	E-8	
MS-35206-228	96906	E-4	
MS-35206-228	96906	E-5	
MS-35206-228	96906	E-7	
MS-35206-230	96906	E-11	
MS-35206-230	96906	E-5	
MS-35206-230	96906	E-7	
MS-35206-230	96906	E-13	
MS-35206-232	96906	E-9	
MS-35206-251	96906	E-9	
MS-35207-262	96906	E-12	
MS-35207-262	96906	E-6	
MS-35207-262	96906	E-2	
MS-35237-37	96906	E-11	
MS-25237-327	96906	E-11	
MS-35335-58	96906	E-5	
MS-35335-58	96906	E-7	
MS-35338-117	96906	E-4	
MS-35338-135	96906	E-8	

SECTION IV NATIONAL STOCK NUMBER AND PART NUMBER INDEX (CONTINUED)

PART NUMBER	FSCM	FIG. NO.	ITEM NO.
MS-35338-136	96906	E-8	10
MS-35338-41	96906	E-11	13
MS-35649-242	96906	E-9	7
MS-35649-262	96906	E-9	16
MS-35649-262	96906	E-13	4
MS-35649-282	96906	E-9	4
MS-35650-302	96906	E-9	24
MS-51957-120	96906	E-8	14
MS-51957-17	96906	E-5	11
MS-51957-30	96906	E-8	8
NLW	14655	E-12	41
PMA-52A	21617	E-12	3
PMA-52A	21617	E-6	3
PMA-52A	21617	E-2	3
RCR20G153JS	81349	E-4	15
RC20GF202J	81349	E-10	7
RC20GF562J	44655	E-4	7
RC32GF511J	44655	E-11	8
RC42GF271J	44655	E-11	9
RC20GF821J	81349	E-10	5
RN70A1333F	81349	E-9	28
SA-238/G	32757	E-1	5
SD42BS	46384	E-8	1
SJTO-WL-661	32757	E-1	12
SM-D-433907	21617	E-1	4
SST4-40SMPAT	70318	E-8	11
TF-255-2C	02288	E-10	9
T154-2C	02288	E-10	4
T154-2C	02288	E-10	6
T154-2C	02288	E-10	8
10015312-960	18816	E-9	26
117-210-101	79405	E-11	9
1202	74545	E-1	7
125220	73734	E-10	2
138127E	96182	E-12	12
138187E	96182	E-11	15
138187G	96182	E-11	16
2S-DVV-154	32171	E-9	23
238A	64959	E-5	12
238A	64959	E-9	22
239C	64959	E-4	14
240C	64959	E-4	13
241C	64959	E-9	21
241C	64959	E-7	12
280C	64959	E-7	11
282001	75915	E-1	10
300555	02288	E-10	3
3037P-1-102	32997	E-12	7
4063	27193	E-1	13
421C-10W	81812	E-2	2
421C-10W	81812	E-6	2
421C-10W	81812	E-12	2
4410	44655	E-11	9
4410	44655	E-12	9
4421	44655	E-11	8
5A4	81483	E-11	7
512240	44038	E-5	1
512240	44038	E-7	1
512240	44038	E-5	2
512240	44038	E-7	2
512241	44038	E-5	2
512241	44038	E-7	2
513925	44038	E-12	3
513927	44038	E-12	2
	44038	E-11	4
513936	44038	E-4	2
513938	44038	E-11	3
	44038	E-4	1
5242	27193	E-1	8
60PSB	08108	E-9	12
7-170	71785	E-9	5
7C023324X0500D	56289	E-11	42
7561K5	15605	E-1	9
80409000-000	96238	E-8	2
81-1059-01-102	72619	E-9	11
863	83330	E-9	27
9-85-11		E-9	1
90409000-000	96238	E-8	16
90EA2C2F3J1(R)L1-N1	96182	E-12	13
90EQ2C2F3J4(RA)L4N1	96182	E-11	17
9413	73734	E-9	29
95-3171	72619	E-9	13

LATEST NATIONAL STOCK NUMBER ASSIGNMENT

STOCK NUMBER	FIG. NO.	ITEM NO.
5920-00-296-4884	E-1	6

LATEST PART NUMBER ASSIGNMENT

PART NUMBER	FSCM	FIG. NO.	ITEM NO.
MIL-F-15160	77400	E-1	6

TM 11-5895-865-14&P

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Stateside, N.J. 07703

DATE 10 July 1975

PUBLICATION NUMBER	DATE	TITLE
TM 11-5840-340-12	23 Jan 74	Radar Set AN/PPC-76

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PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
2-25	2-28			Recommend that the installation antenna alignment procedure be changed throughout to specify a 2° IFF antenna lag rather than 1°. REASON: Experience has shown that with only a 1° lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2° without degradation of operation.
3-10	3-3		3-1	Item 5, Function column. Change "2 db" to "3db." REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.
5-6	5-8			Add new step f.1 to read, "Replace cover plate removed in step e.1, above." REASON: To replace the cover plate.
		F03		Zone C 3. On J1-2, change "+24 VDC to "+5 VDC." REASON: This is the output line of the 5 VDC power supply. + 24 VDC is the input voltage.

TEAR ALONG DOTTED LINE

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SSG I. M. DeSpiritof 999-1776	SSG I. M. DeSpiritof

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HISA 1686-75

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TM 11-5895-865-14&P	17 May 78	

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By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:

J.C. PENNINGTON
Brigadier General, United States Army
The Adjutant General

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