TM11-5895-932-14&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 LETTERKENNY ARMY DEPOT, PENNSYLVANIA

HEADQUARTERS, DEPARTMENT OF THE ARMY

JANUARY 1978

TECHNICAL MANUAL

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HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON DC, 26 January 1978

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LETTERKENNY ARMY DEPOT, PENNSYLVANIA

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LIST OF ILLUSTRATIONS

CHAPTER 1

INTRODUCTION

Section 1. GENERAL

1-1. Scope

a. This manual describes the Patch and Test Facility at Letterkenny Army Depot, Chambersburg, Pennsylvania and provides instructions for operating and maintaining the facility equipment. A repair parts list (app B) 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. R&r 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 there are modification work orders (MWOs) pertaining to the equipment.**

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. **Use equipment forms and records in accordance with instructions in TM 38-750.**

b. Station Operation and Maintenance. **Use forms and records in accordance with instructions in the station Standard 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 (CEDFER), Fort Huachuca, Arizona 85613.**

1-4. Administrative Storage

The procedures for administrative storage are outlined in TM 740-90-1; however, the exact procedure in repacking for limited storage depends on the materials available and the conditions under which the equipment is to be stored.

1-5. Destruction of Army Materiel

Refer to TM 750-244-2 for demolition procedures for electronic equipment.

Section II. DESCRIPTION AND DATA

1-6. Purpose and Use

The patch and test facility (PTF) installed at this station provides a centralized point, which is part of the Automated Telecommunication Center (ATCC) at Letterkenny Army Depot in Chambersburg, Pennsylvania, for the interconnection of signals to and from the site. Additionally, the PTF contains equipment which provides access to all incoming and outgoing communication lines, transmission security, and line, and component

1-7. Tabulated Data

NOTE

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

Circuits (FDX)	*Number*
Autodin	2ea
Remote terminals	18 ea (expandable to 24)
Teletype	12ea
Patching *Facilities*	*Number*
2/wire jack ack appearances	
VF	48
DC High level	12 trans. 12 Rec
DC Low level	12 trans. 12 Rec
Multichannel Jack appearances	48 (3 bays)
COMSEC Facilities	
AC Power	KG- 13 (2 operation, 2 spare) KG-34
Red and black	120/208.3 phase 60 Hz (supplied from three separate power distribution panels)
DC Power Supplies	Uses
48 Vdc	Alarm panel signaling. H/L- L/L operation and testing purposes
Red/Black Isolation	Modulated light sources and photosensitive receivers
Alarms	***Conditions***
(Audible alarm and alarm panel light)	
Isolator	Loss of power, door open, high temp(l30°)

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

The Patch and Test Facility (PTF) is part of the

Automated Telecommunications Center (ATCC) at Letterkenny Army Depot. The PTF is installed in the communications center in building 3, along with the Automated Multimedia Exchange (AMME) which it serves. The PTF equipment is laid out in three rows (figure l-l) in two rooms, using standard cabinets which accept 19 inch rack-mounted equipment/components and provide housing for cable distribution frames.

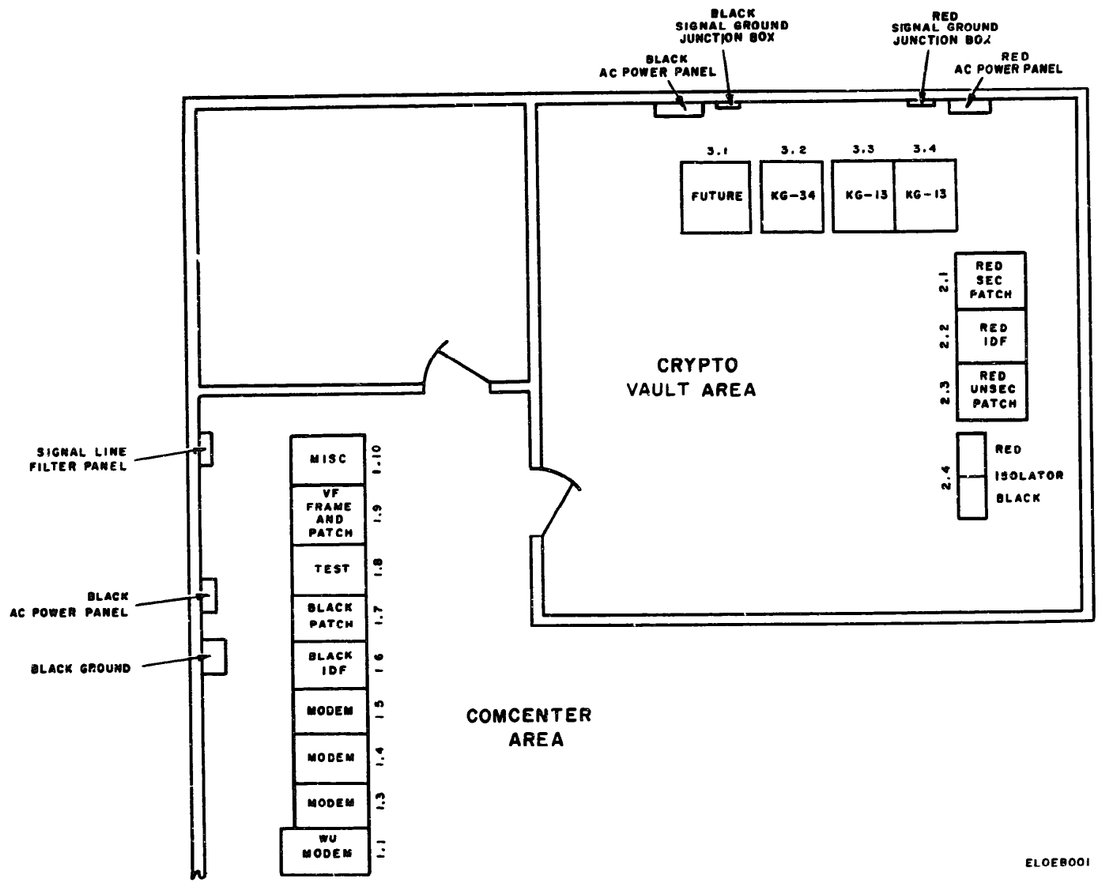


Figure l-l Patch and Test Facility Floor Plan.

Cable ducts for carrying signal and power cables between the cabinets are installed under the floor. Conduits from the cable ducts bring the cables and power under the center of the cabinets. In addition, a large conduit is connected between the signal line filter panel (located in the ceiling) into the cable duct to carry the entrance signal cable in the PTF. Power for operating the cabinet components is taken from outlets installed in the rear of cabinets or are wired directly. The COMSEC equipment bays (3.1 through 3.4) in the cryptovault are part of special circuits not covered in this manual.

1-9. Row 1 Equipment Bays

The Row 1 equipment bays are located in the left side of the comcenter. Row 1 equipments (fig. 1-2) include Western Union bay 1.1, modem bays 1.3, 1.4, and 1.5, black IDF bay 1.6, black patch bay 1.7, test equipment bay 1.8, VF frame and patch bay 1.9, and miscellaneous bay 1.10. The Western Union and Timplex modems are furnished and maintained by contractors. A configuration of equipment bays is shown in figure 1.3.

a. Western Union Bay 1.1. Western Union (WU) modems are installed in bay 1.1. The cabinet is connected to the underground cable ducts with conduits that carry signal cables and black power. The signal cable terminates on the VR entrance frame (channels 47 and 48).

b. Modem Bays 1.3, 1.4, and 1.5 (fig. 1-4). Modem bay 1.3 contains a WU Codex 9600 Data Modem, an associated patch panel, and eight additional WU 2200/24

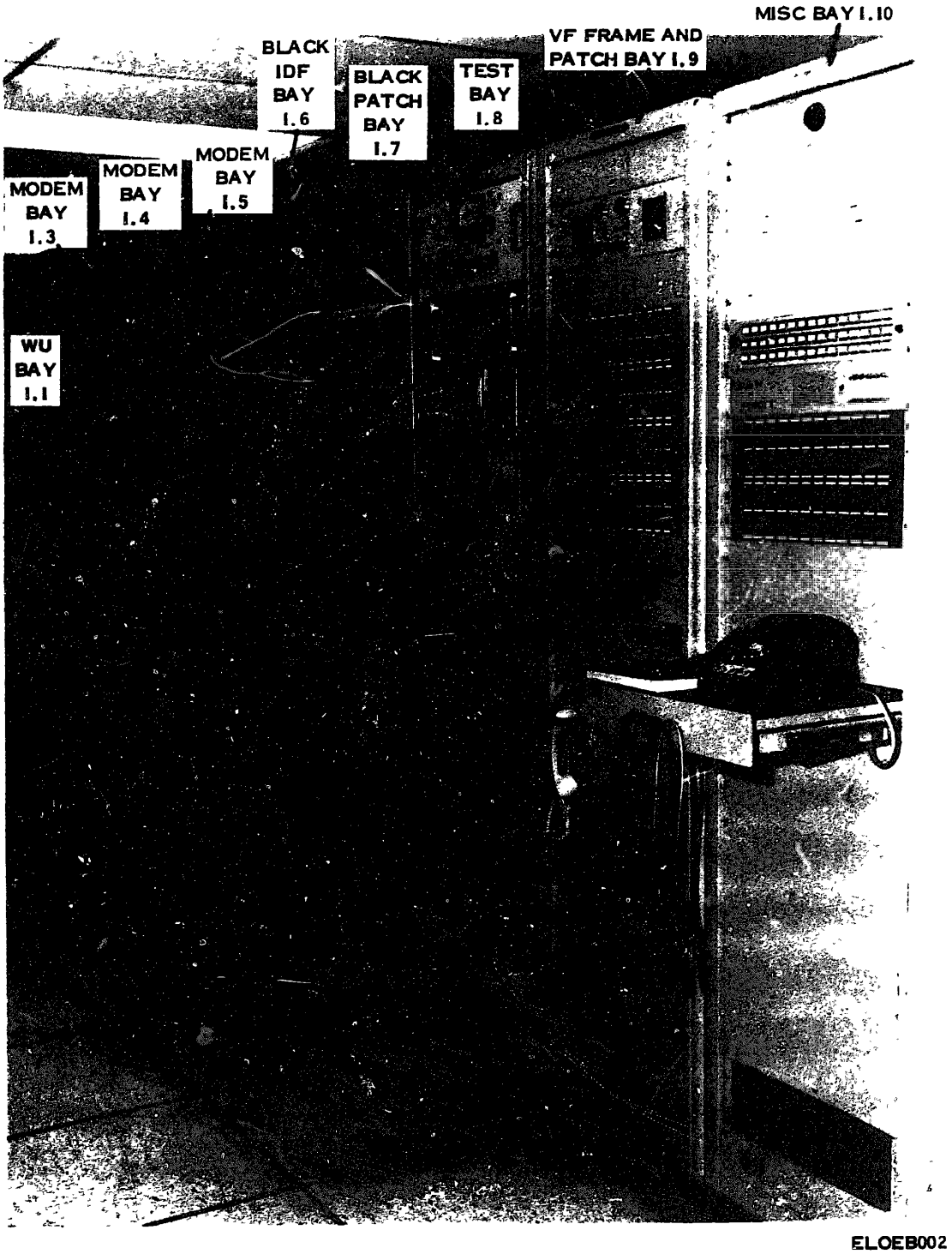


Figure 1-2 Patch and Test Facility, Row 1 Equipment Rays

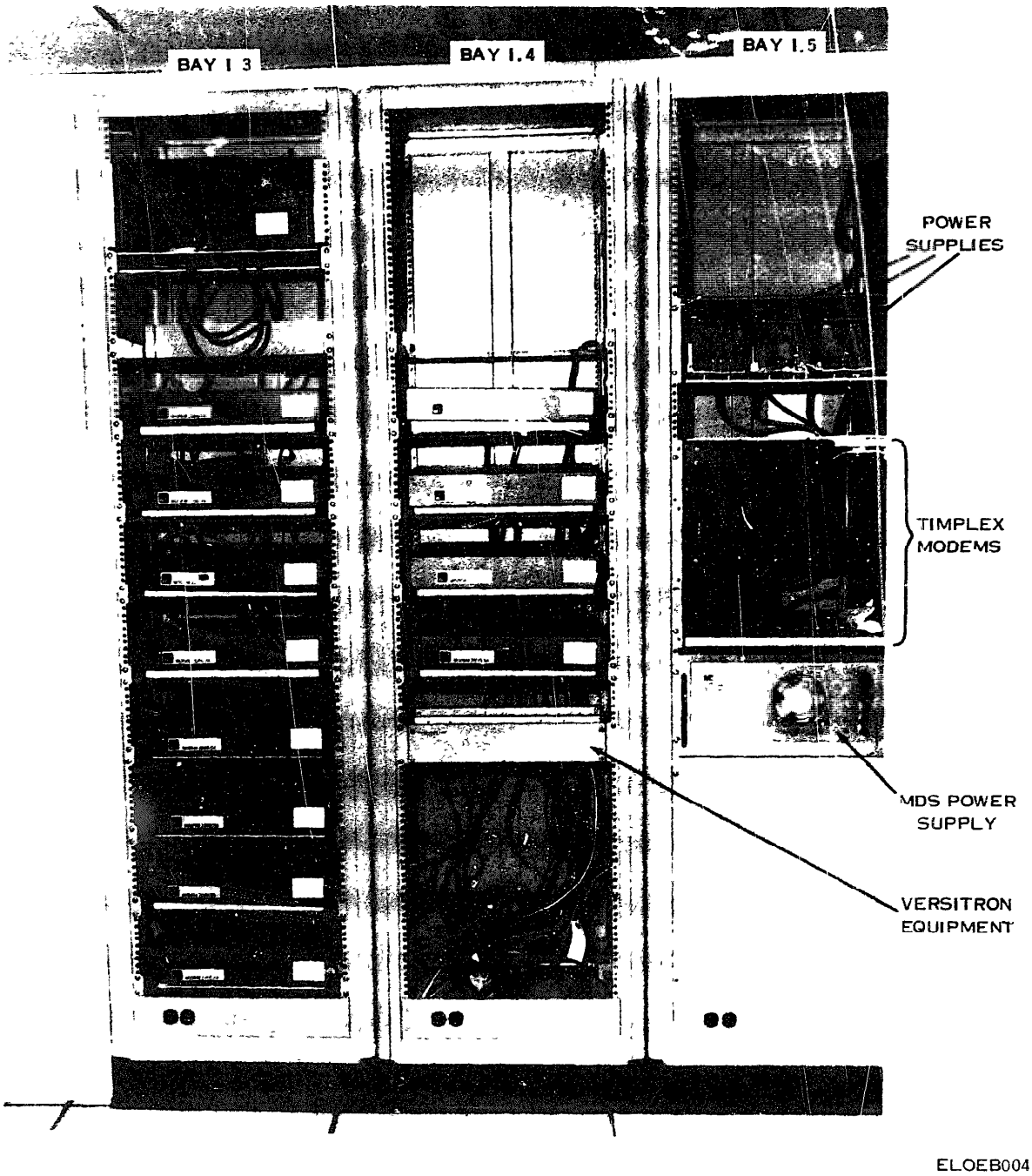


Figure 1-4 Modem Bays 13 14 15

modems. Modem bay 1.4 contains four WU 2200/24 modems and the Versitron equipment for the Communications Line Interface (CLI). Modem bay 1.5 contains eight Timplex modems with associated power supplies and a MDS power supply. Signal cables connect on the rear of each individual modem (fig. 1-5).

c. Black *IDF* Bay 1.6 (fig. 1-6) The black IDF bay contains cable terminating blocks mounted on a metal frame. The cable blocks are used to terminate and/or crossconnect signal cables on the black side of the signal path through the PTF.

d. Black *Patch Buy* 1.7 (fig 1-7). The black patch bay contains seven patch modules (patch panels) and a rollout shelf. Three patch panels are multicircuit or 12-wire types. Each multicircuit module handles 16 each 12-wire data circuits which am connected between the AMME (COMP) and appropriated circuit modems (modem) by cable connectors on the rear of the module Two dc patch modules are of the 2-wire type, each containing 12 normalled through circuits and used for low level dc patching (black). The bottom panels are used for miscellaneous (MISC) and interbay (INT BAY) 2-wire connections and has facilities for 48 two-wire patch connections. All permanent connections to the patch panels are at the rear of the bay (fig. 1-8). The MISC patch panel has the first 8 rows (top and bottom jacks) connected to the monitor (MON IN) jack strip of each multichannel patch panel. The INT BAY panel is tied directly (jack to jack) to the INT BAY patch panel (dc) on bay 1.8.

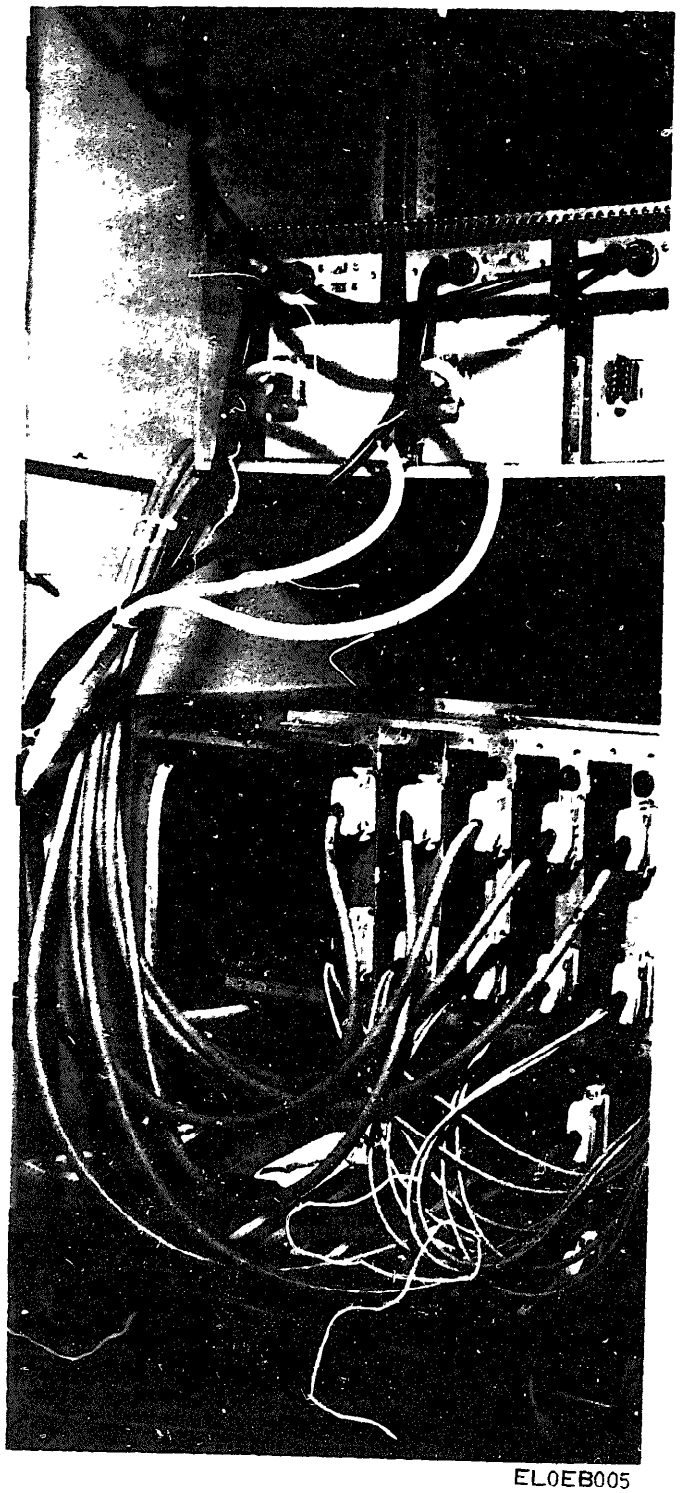


Figure 1-5 Signal Cable Connections to Moderns

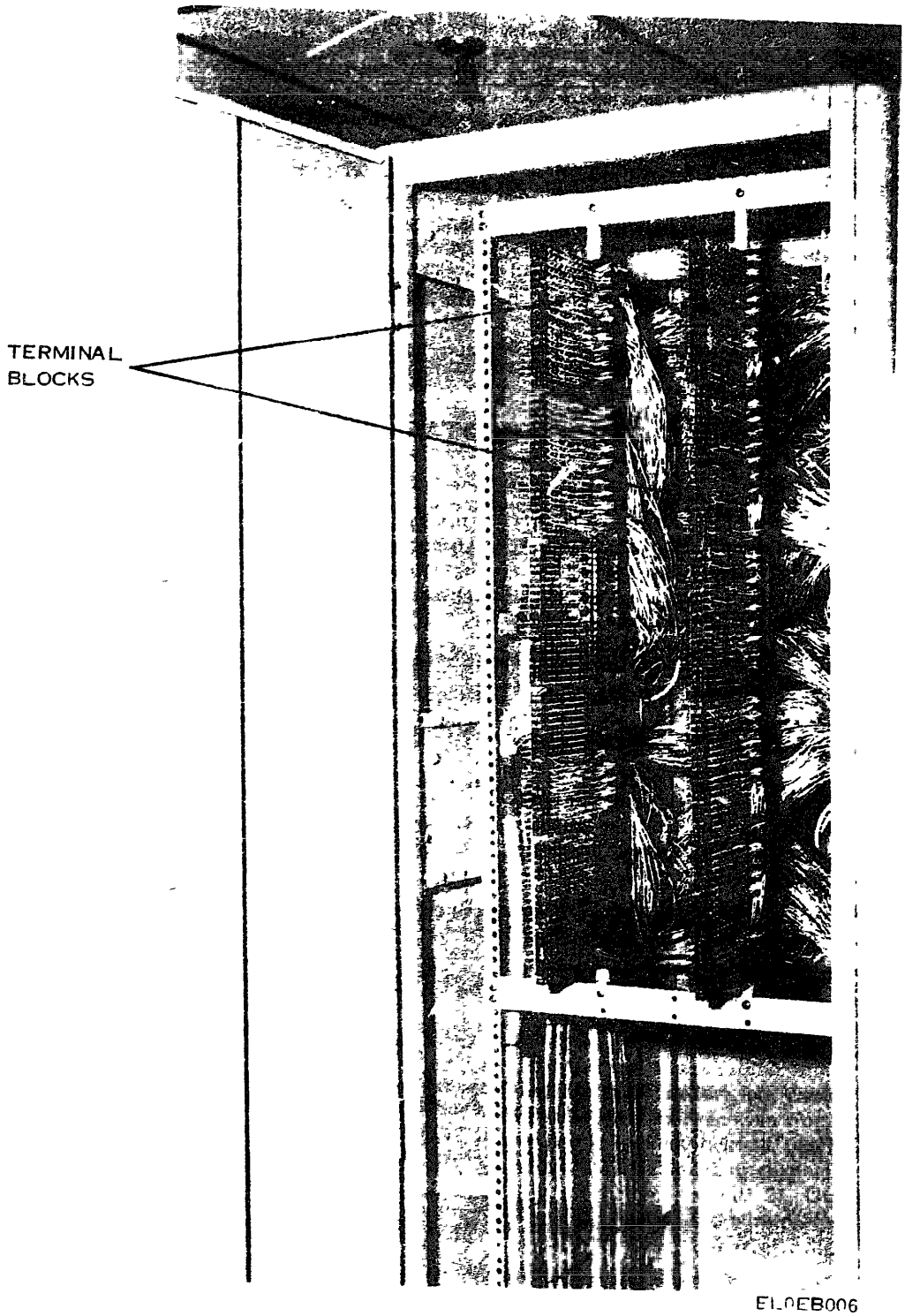


Figure 1-6 Back IDI Box [illegible]

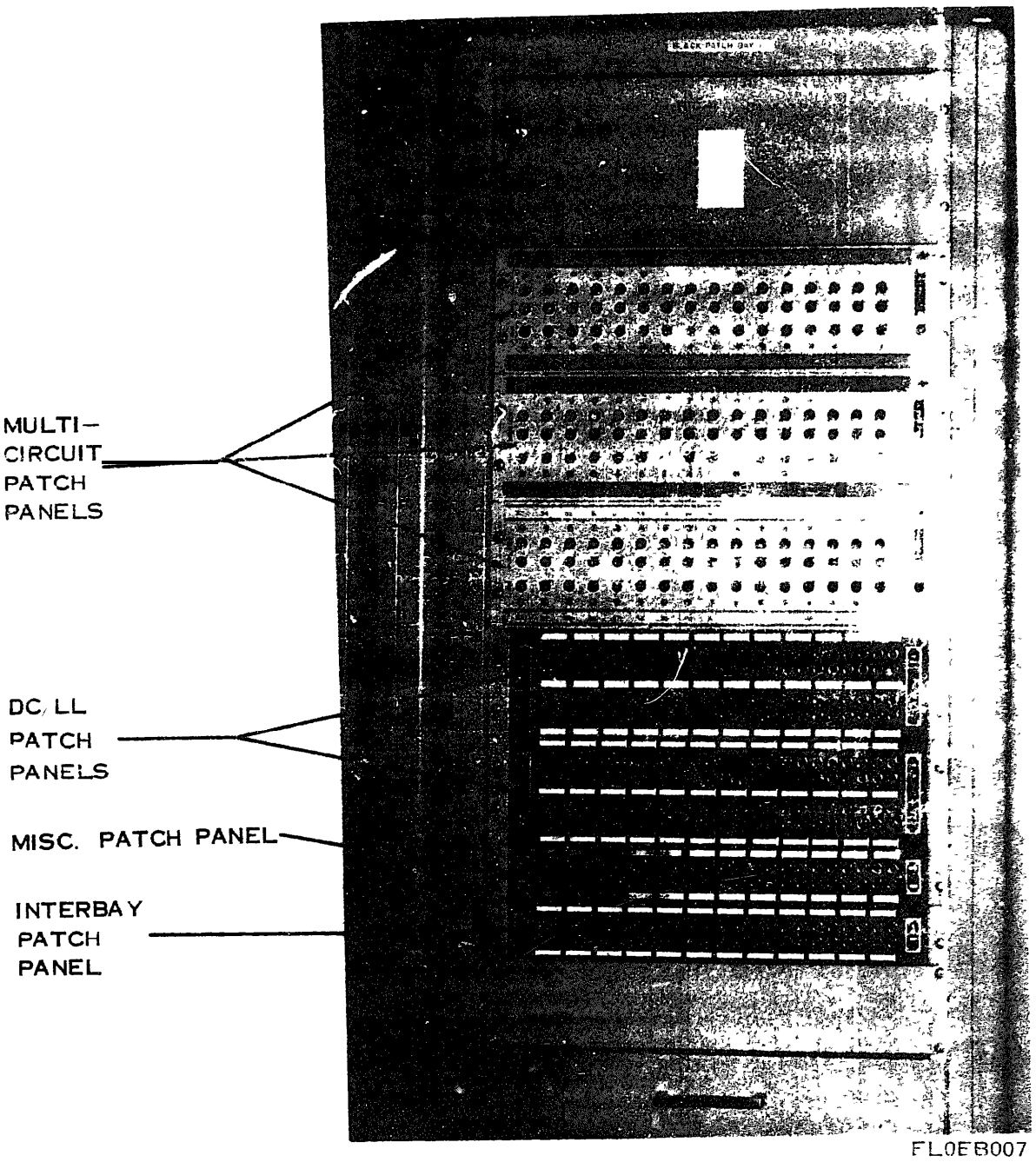


Figure 1-7 Black Patch Bay 1 7

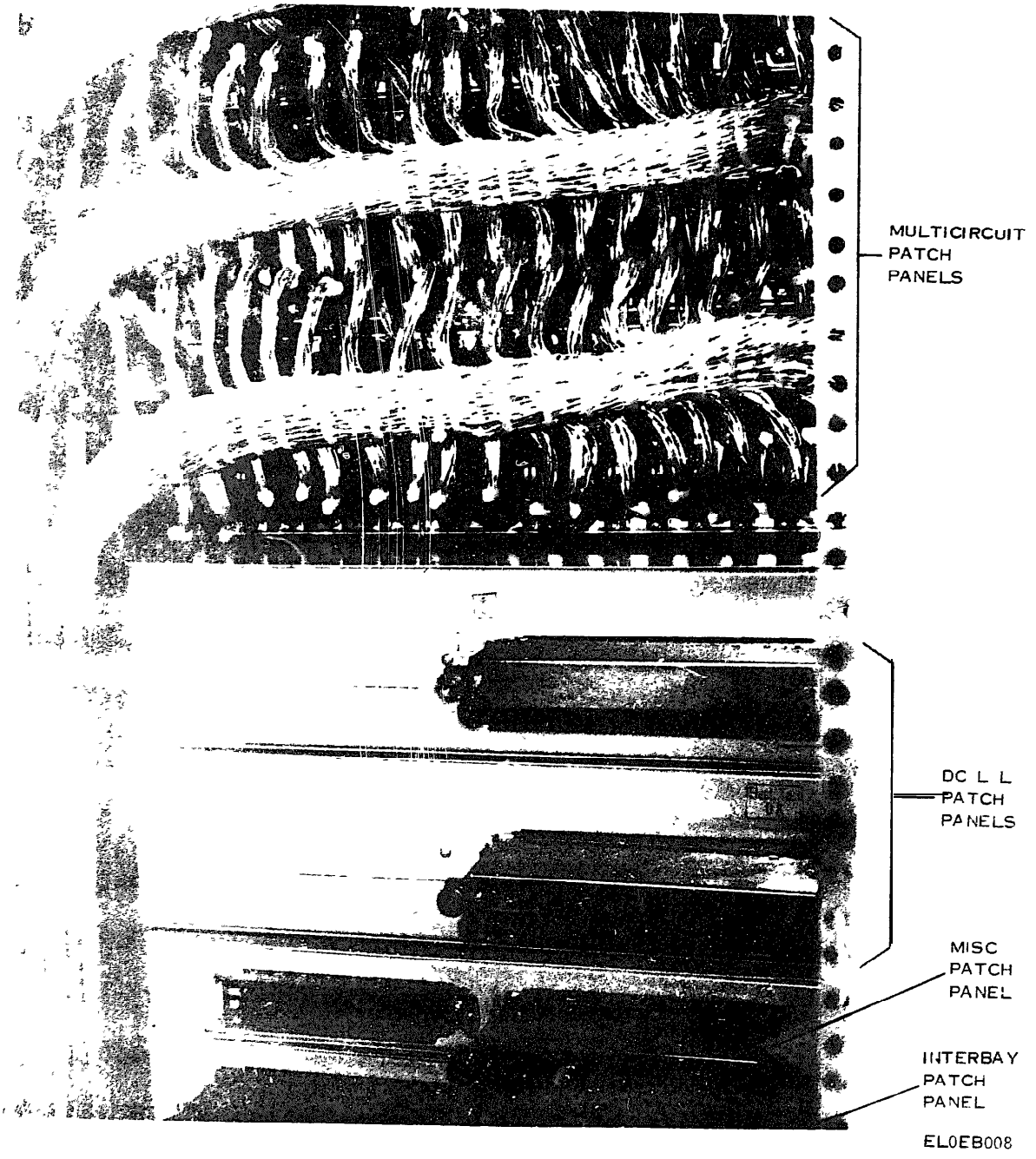


FIgure 1-8 Cable Connections to Bay 17

e. Test Buy 1.8 (fig. 1-9). Test bay equipment consists of four items of test equipment, two interbay (INT BAY) patch panels, one miscellaneous (MISC) panel, and a pullout shelf. Each INT BAY patch panel provides connections to another bay (through its INT BAY patch) (dc to dc, vf to vf). The MISC patch panel provides external patching to all test equipment. Teat equipment power input connections are made at the cabinet rear, along with the signal and cable connectors (fig. 1-10).

f. VF Frame & Patch Bay 1.9 (fig. 1 -11). **Bay 1.9 contains a dual speaker panel, four two-wire vf patch modules, and INT BAY patch module (vf), and cable terminal blocks located on the bottom of the rack (fig. 1-12). Each 2W jack panel has the capability for 24 two-wire normal through circuits. Connections are made through connectors on the rear of the patching modules to the cable terminal blocks (fig. 1-13). The main signal cable from the signal line filter panel (in the ceiling) is connected to the terminating blocks.**

g. Miscellaneous Equipment Bay 1.10 (fig. **1-14). Bay 1.10 is designated the miscellaneous equipment bay. It contains the audible alarm, the black alarm panel, intercom, 48-vdc power supply, and two high-level dc patch panels. All wiring connections (signal and power) are made on the rear of the components (figs. 1-16 and 1-16).**

1-10. Row 2 Equipment Bays

The Row 2 equipment bays (fig. 1-17) are located in the Crypto Vault area and includes two red patch bays (secure and unsecure), one red IDF bay, and two isolator bays (red and black). A configuration of Equipment bays is shown in figure 1-18.

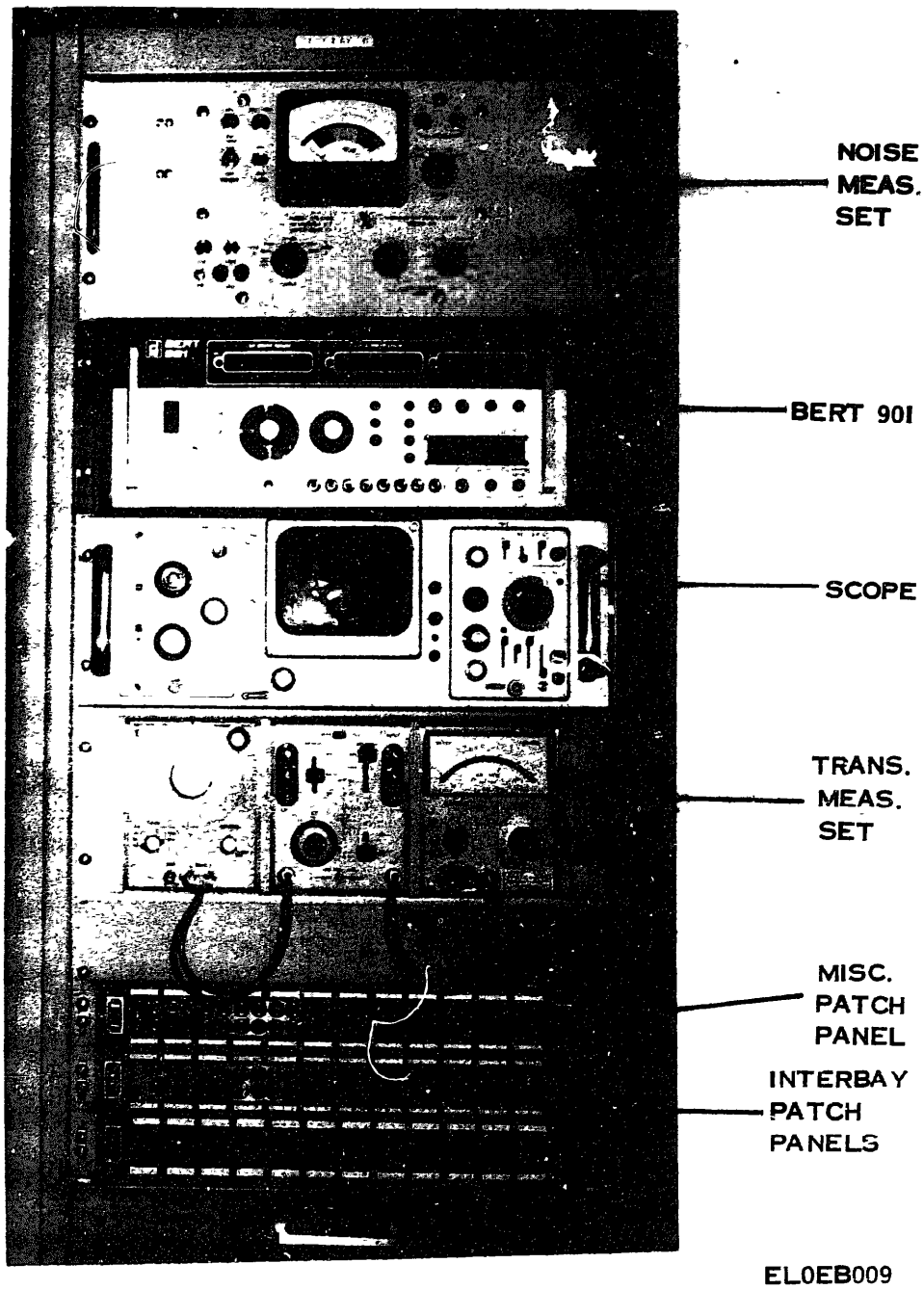


Figure 1-9 Test Bay 1.8

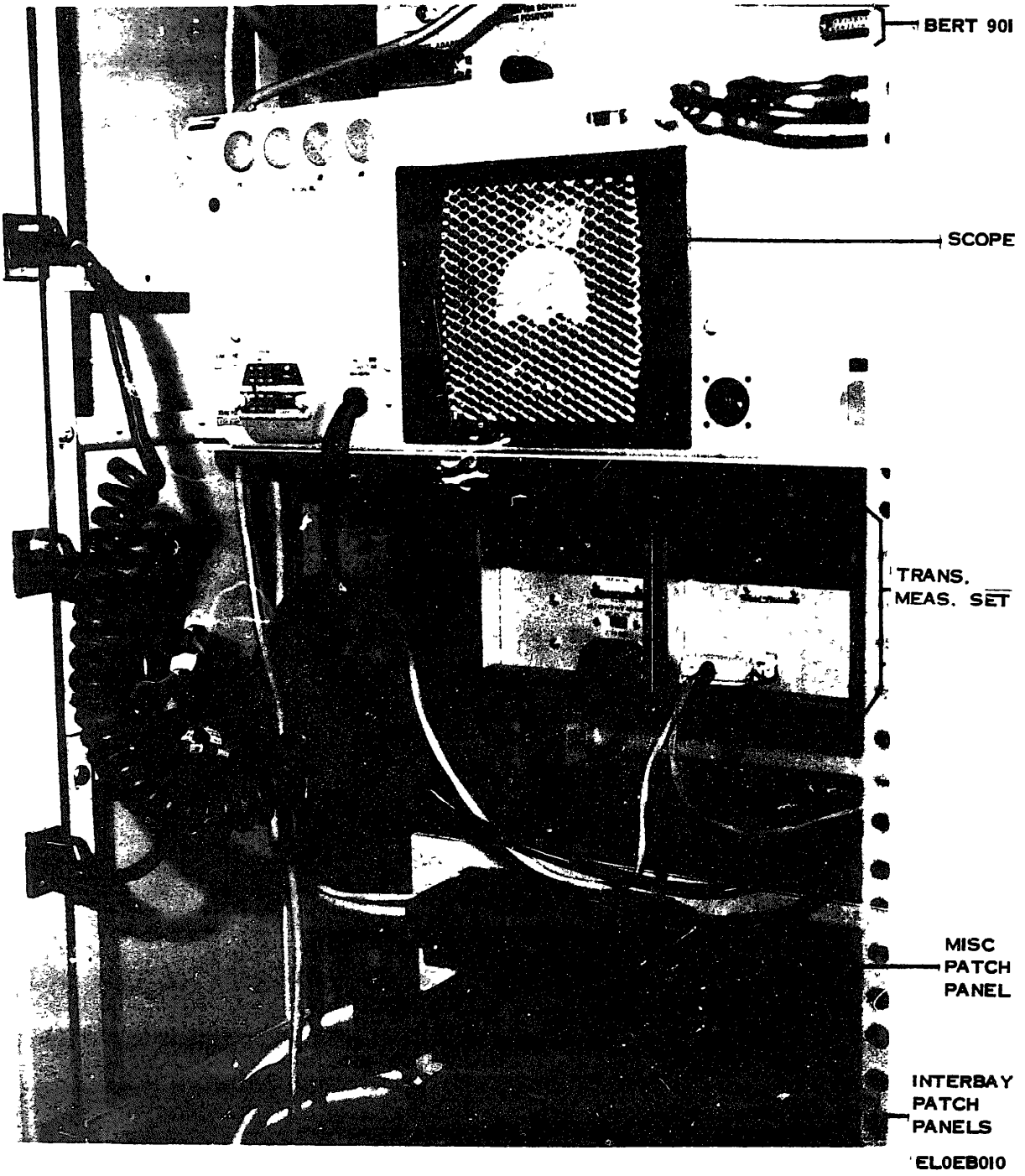


Figure 1-10 Cable Connections to Bay 18

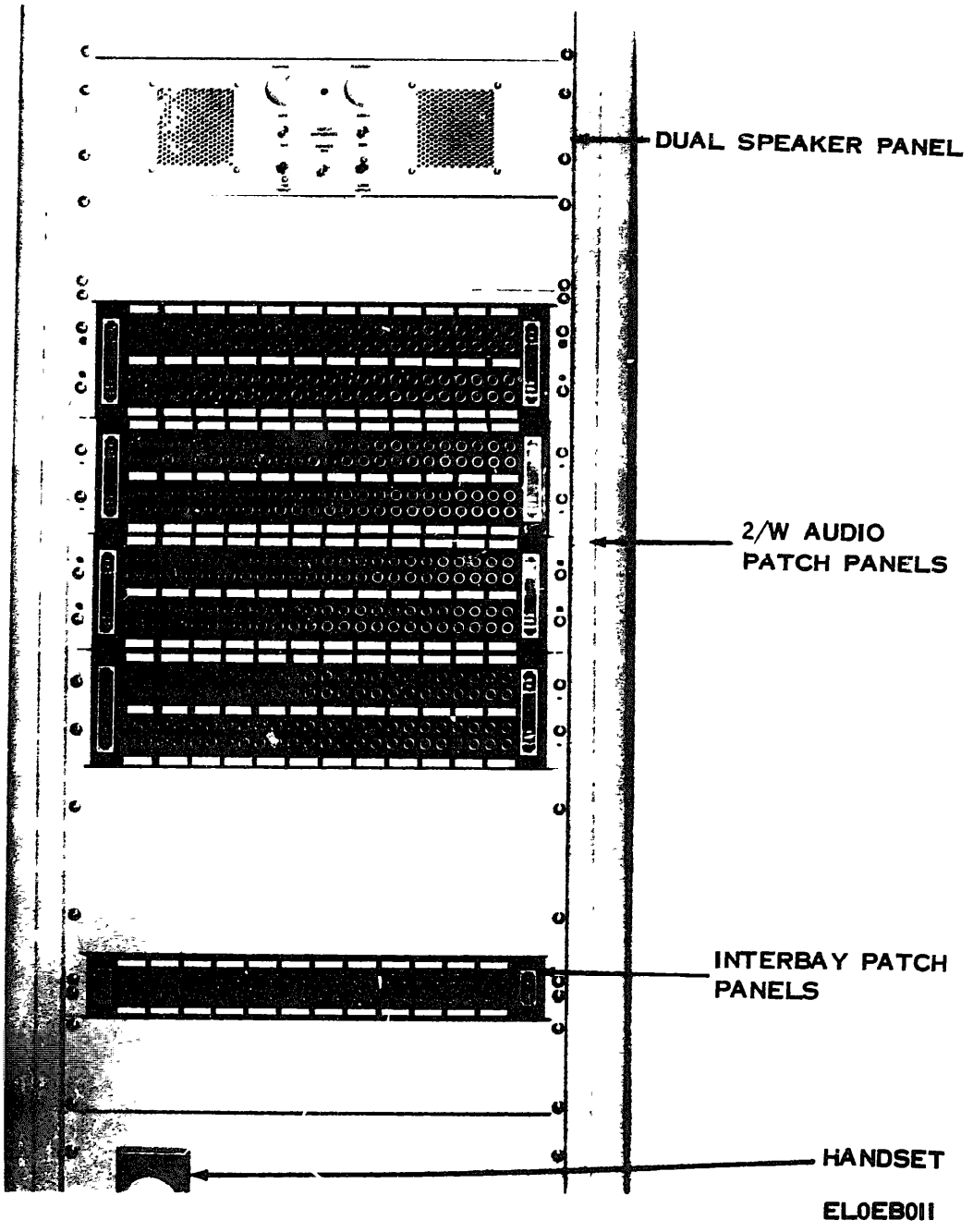


Figure 1-11 VF Frame and Patch Bay 19

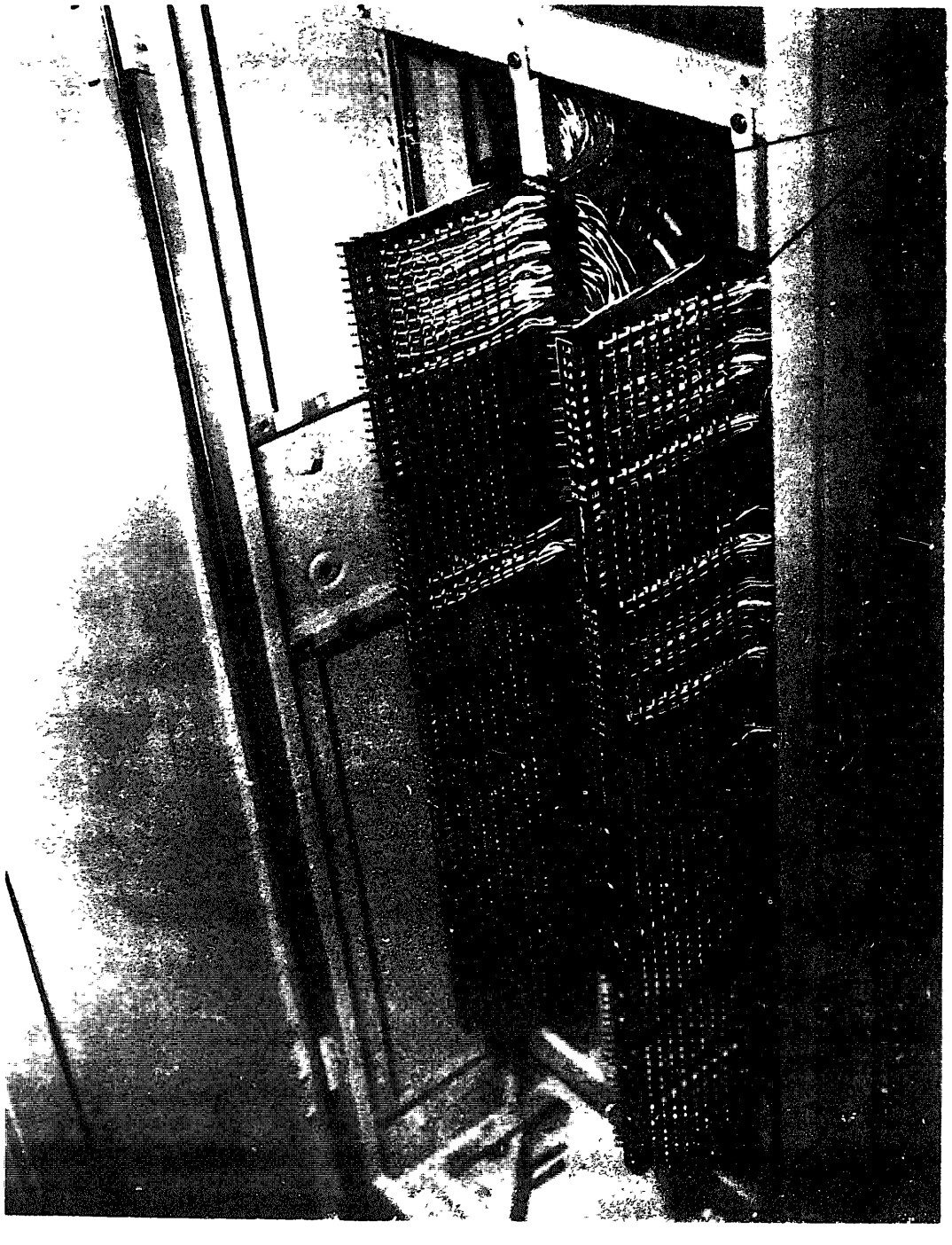


Figure 1 12 Terminal Blocks on Rear of Bay 19

Figure 1-13 Cable Connections to Bay 19

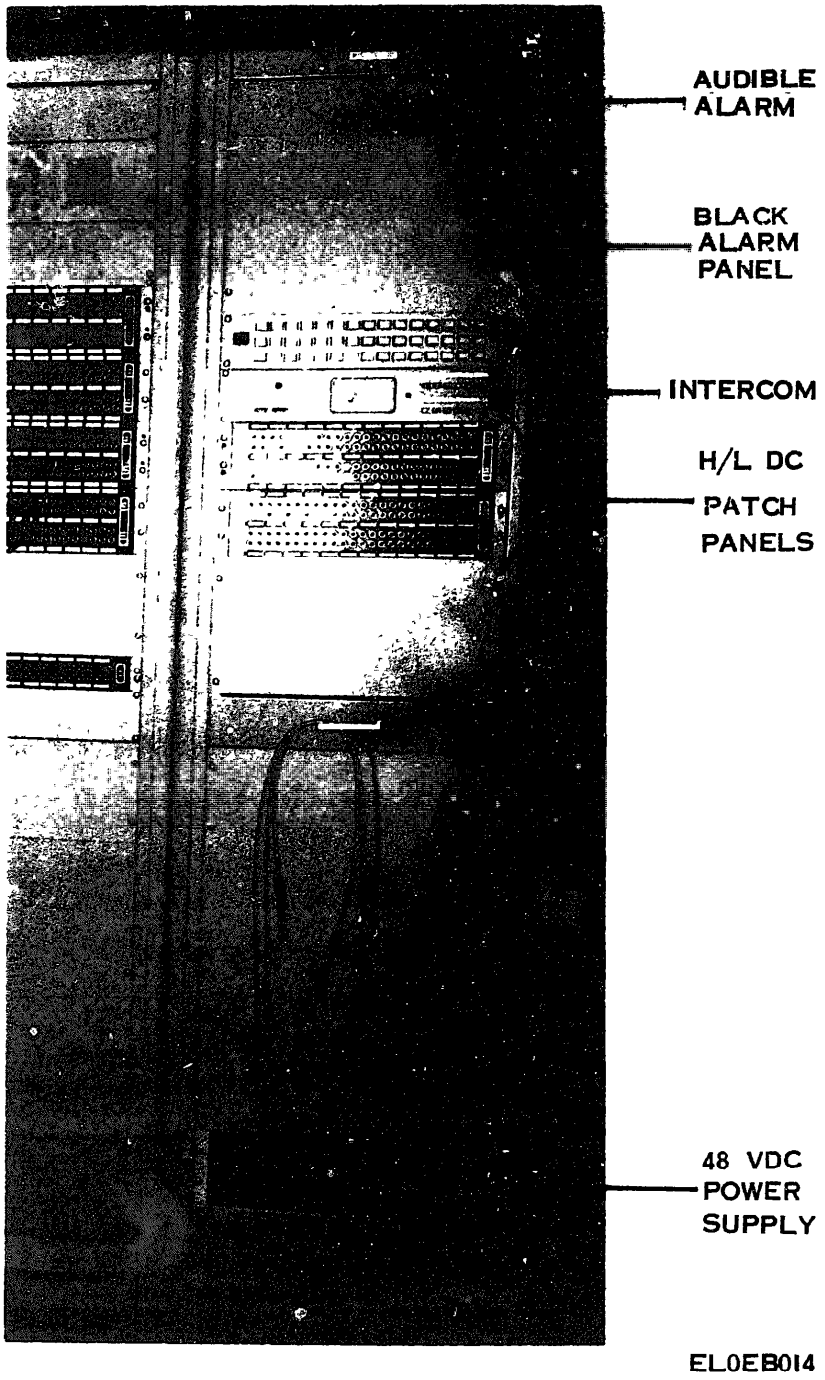


Figure 1-14 Misc Bay 1 10

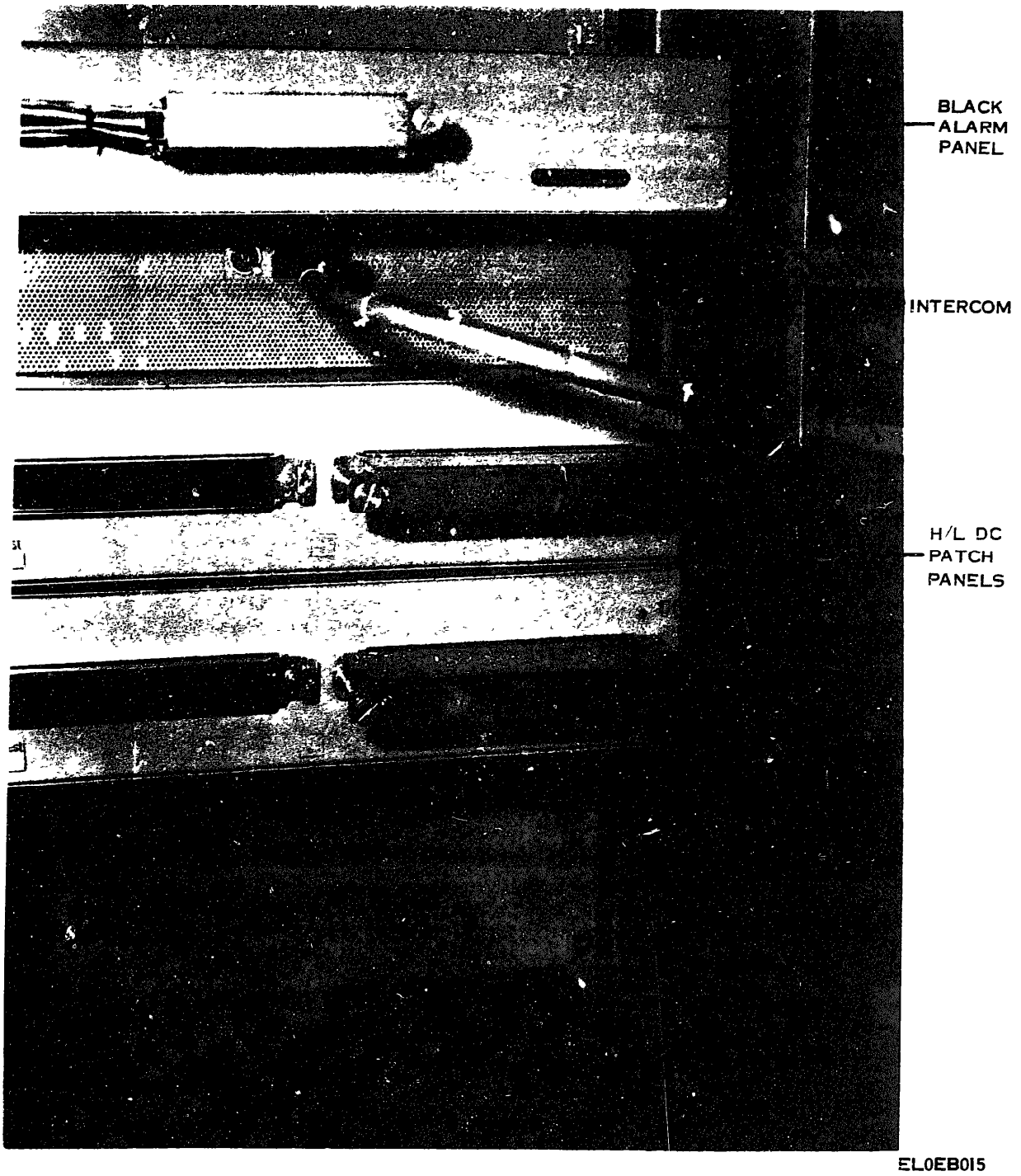


Figure 1 15 Cable Connections to Upper Half of Bay 1 10

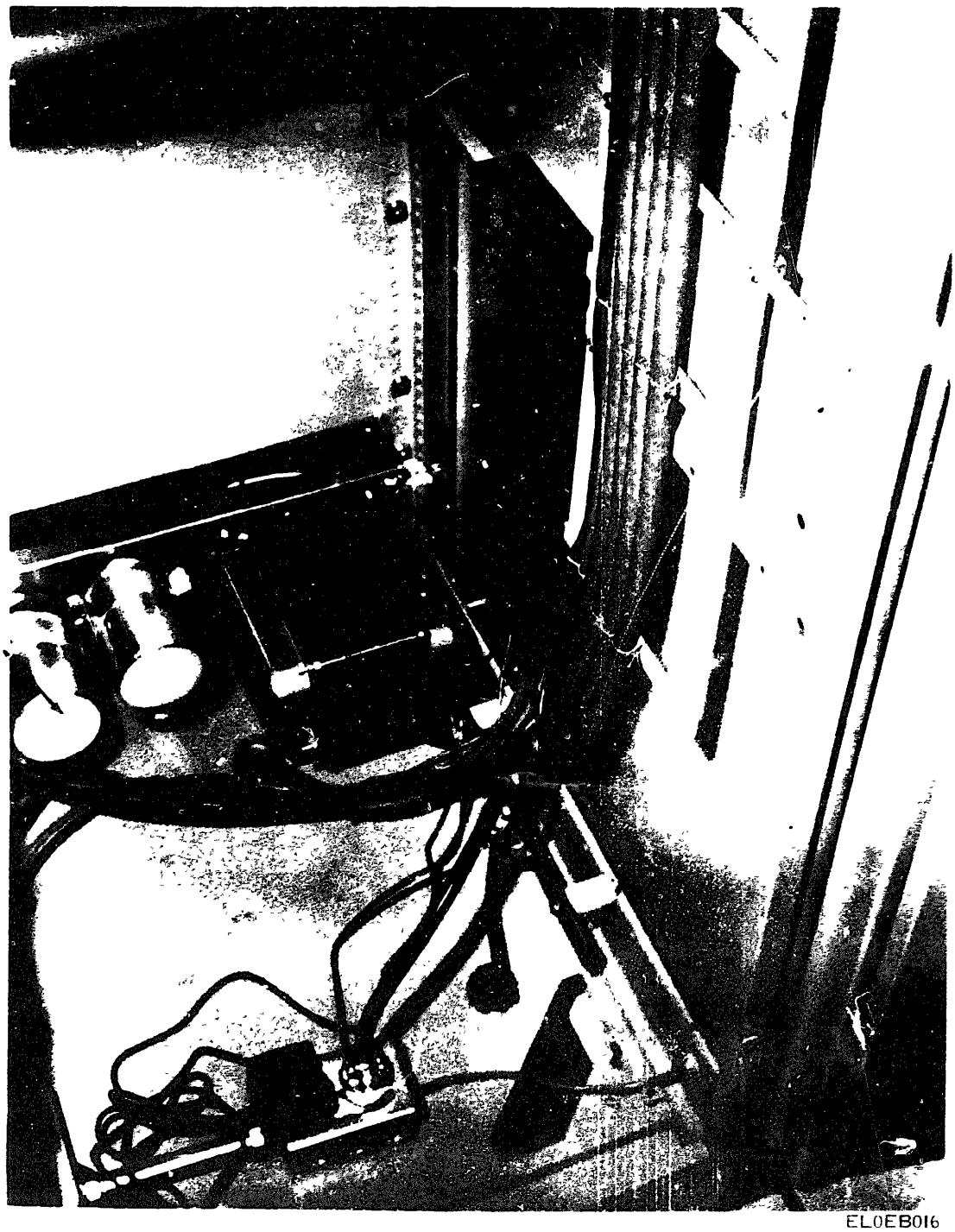


Figure 1-16 Cable Connections to Lower Half of Bay 1 10

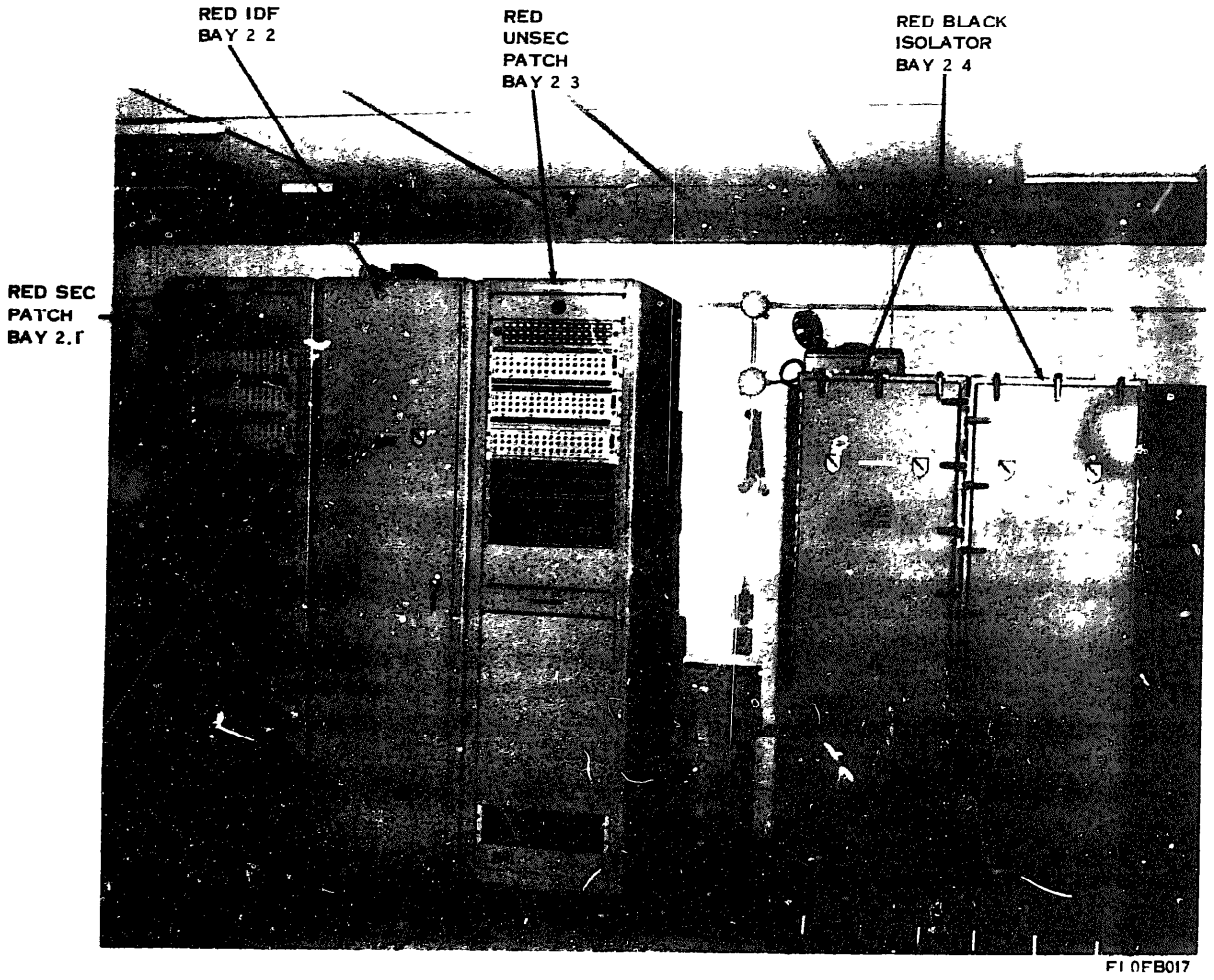


Figure 1-17 Patch and Test Facility, Row 2 Equipment Bays

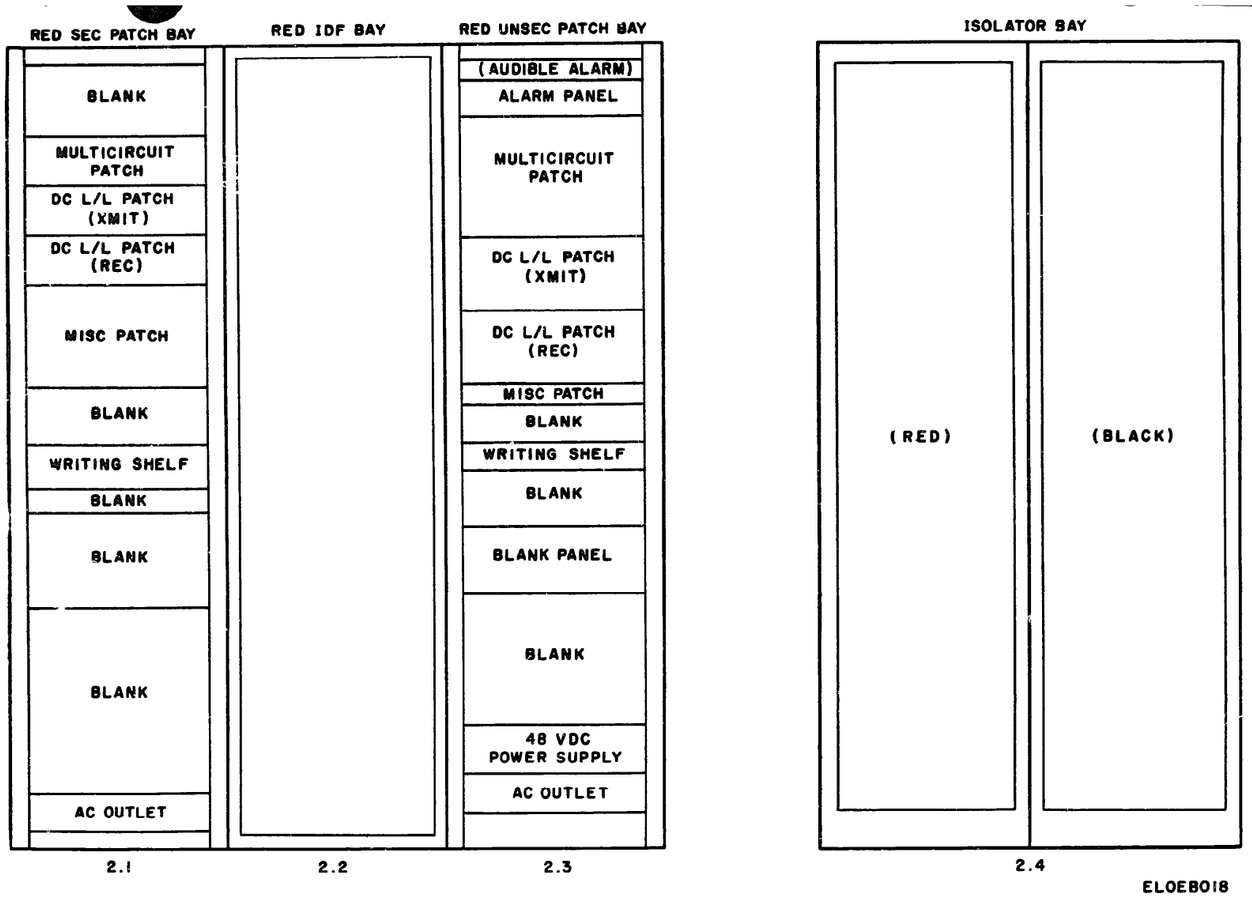


Figure 1-18 Row 2 Equipment Bays, Configuration Diagram

a. Red Sec Patch Bay 2.1 (Secure) (fig. **1-19). Six patching modules and a pullout shelf are installed in the front panel of red dc patch bay 2.1. Three patch modules are 12-wire types containing 16 individual patch circuits. Two patch modules are 2-wire type containing 12 individual patch circuits each. The last patch module is used for miscellaneous (MISC) circuits containing 48 individual patch modules. The first eight rows (top and bottom) are wired to the monitor** (MON **IN) test pins of each multichannel patch panel. All connections to the patch panels are made at the mar of the bay (fig. 1-20).**

b. Red IDF Bay 2.2 (fig. 1-21). The red IDF contains cable terminal blocks mounted on a metal frame. The blocks are used to terminate and crow-connect circuits within the PTF.

c. Red Unsec Patch Buy 2.3 (Unsecure) (fig. **1-22). Bay 2.3 is designated the red dc patch bay. It contains six patching modules: three 16 circuit, 12-wire patching modules, two 12 circuit, 2-wire patch modules, and one miscellaneous (MISC) patch module (48, 2-wire jack appearances), a major alarm panel, and an alarm buzzer. All connections to the patch panels are made at the rear of the bay (fig. 1-23).**

d. Red/Black Isolator Bay 2.4 (fig. **1-24). 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 under the floor cable ducts into the cabinets. The right cabinet contains all the black signals, the left cabinet the red signals.**

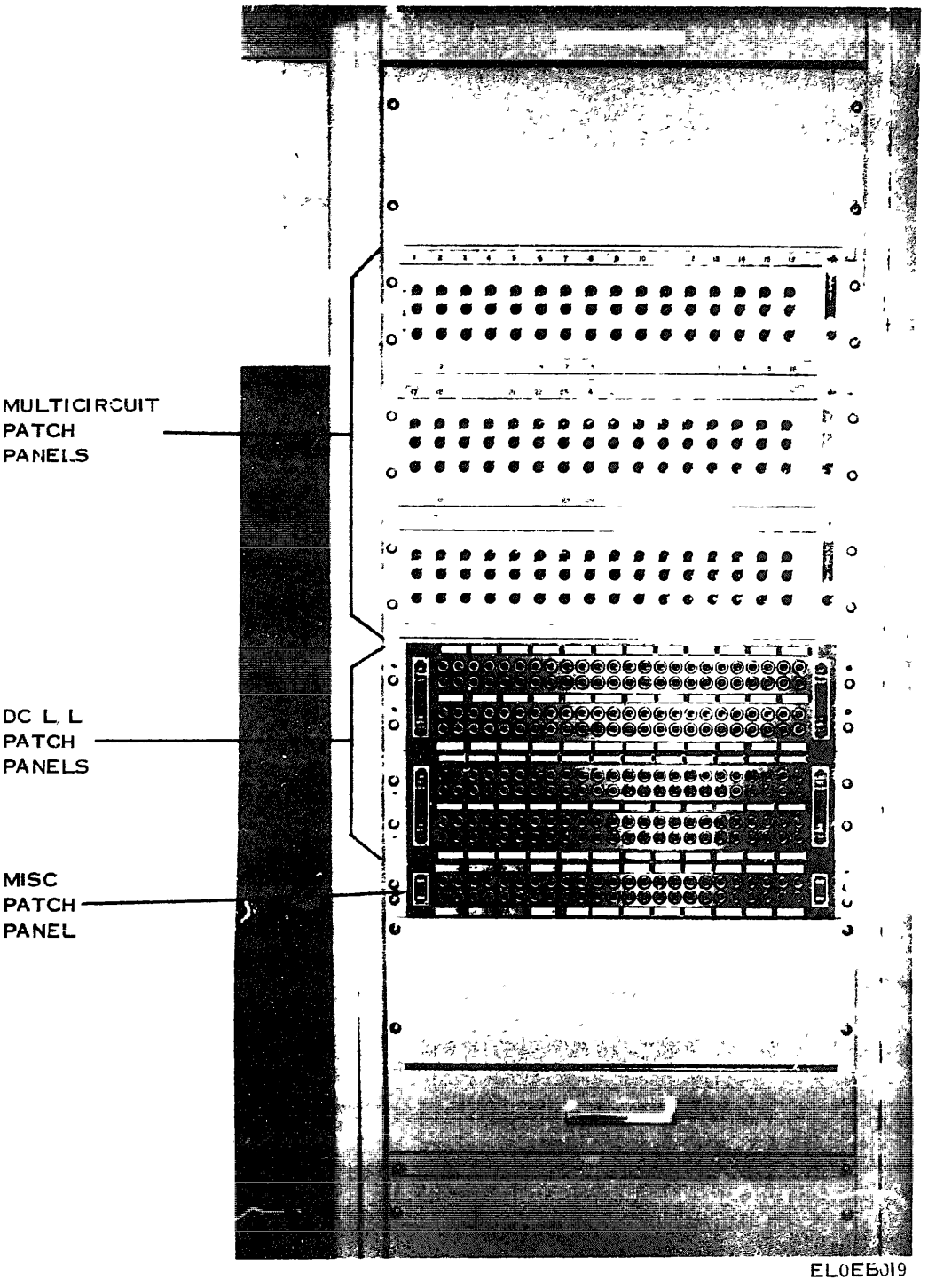


Figure 1-19 Red Sec Patch Bay 2 1

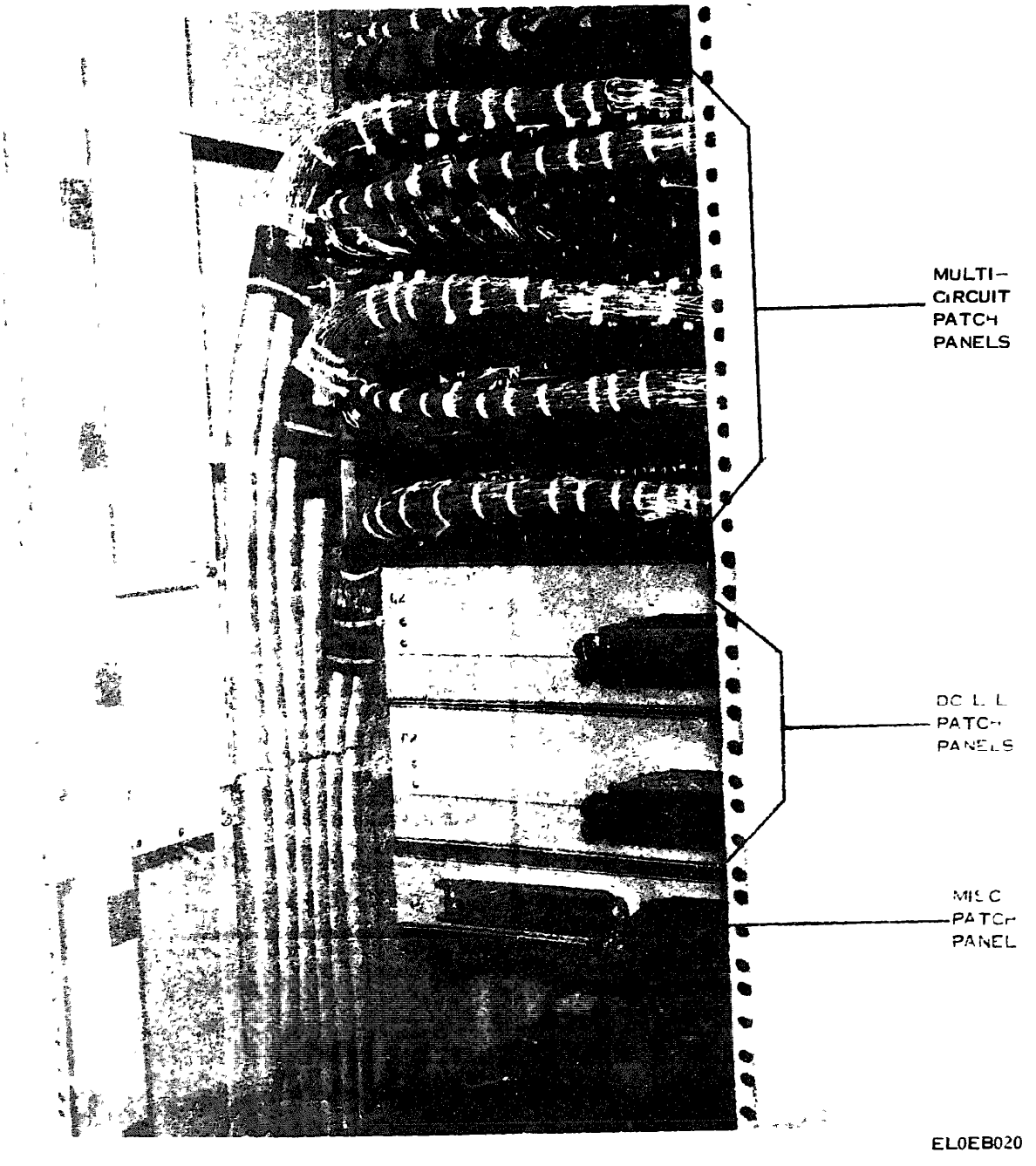


Figure 1-20 Cable Connections to Bay 21

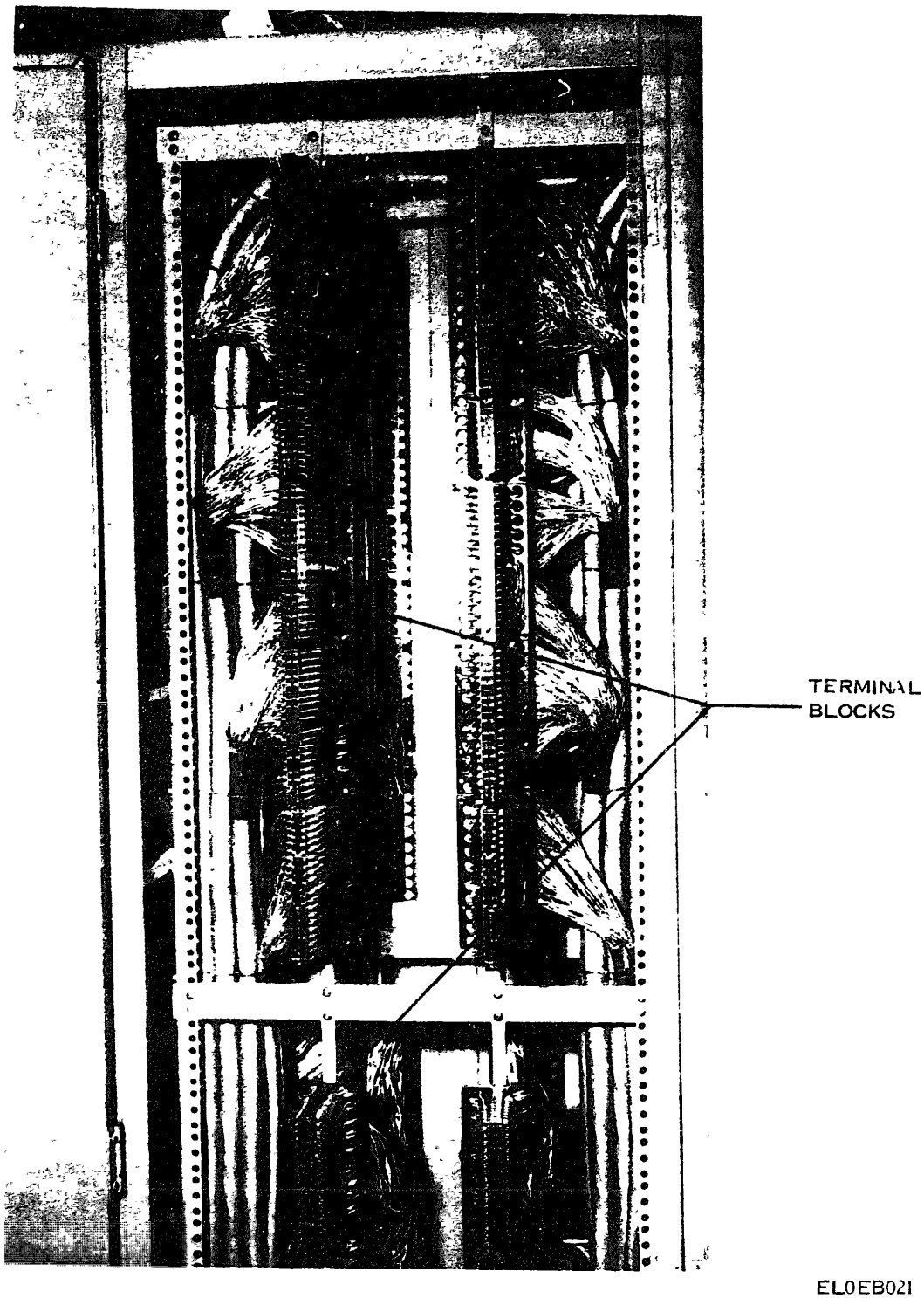


Figure 1-21 Red IDF Bay 22

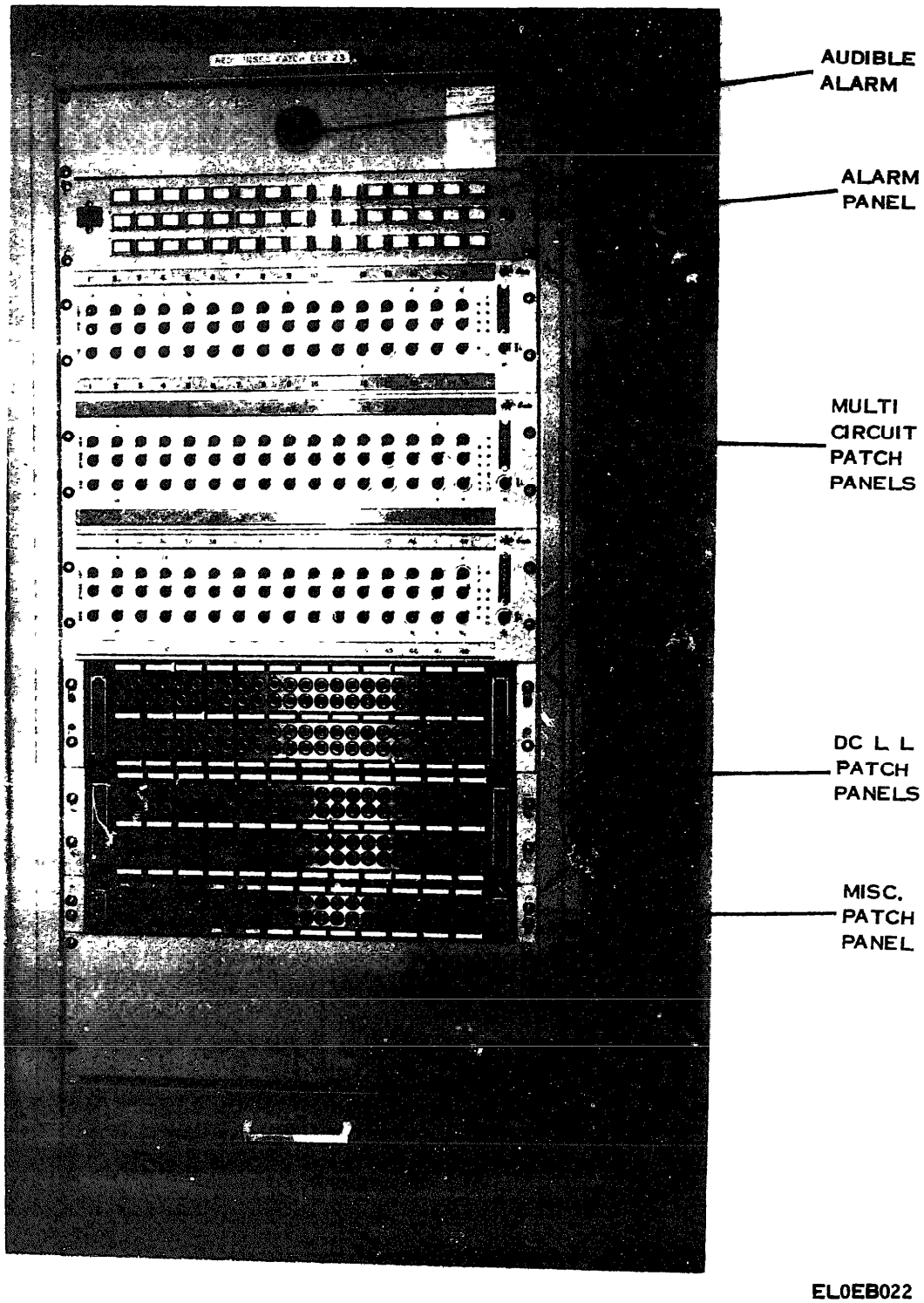


Figure 1-22 Red Unsec Patch Bay 23

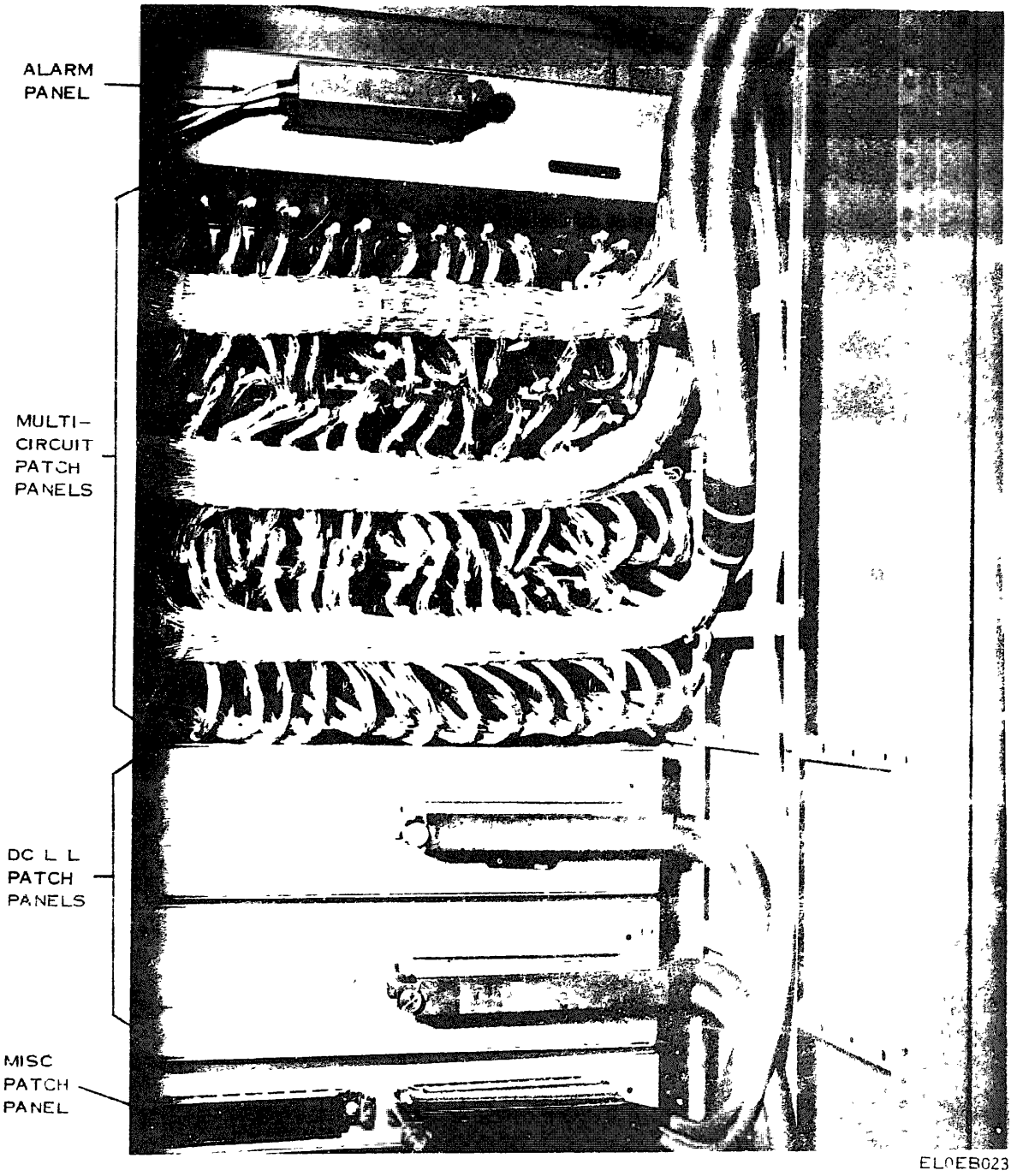


Figure 1-23 Cable Connections to Bay 23

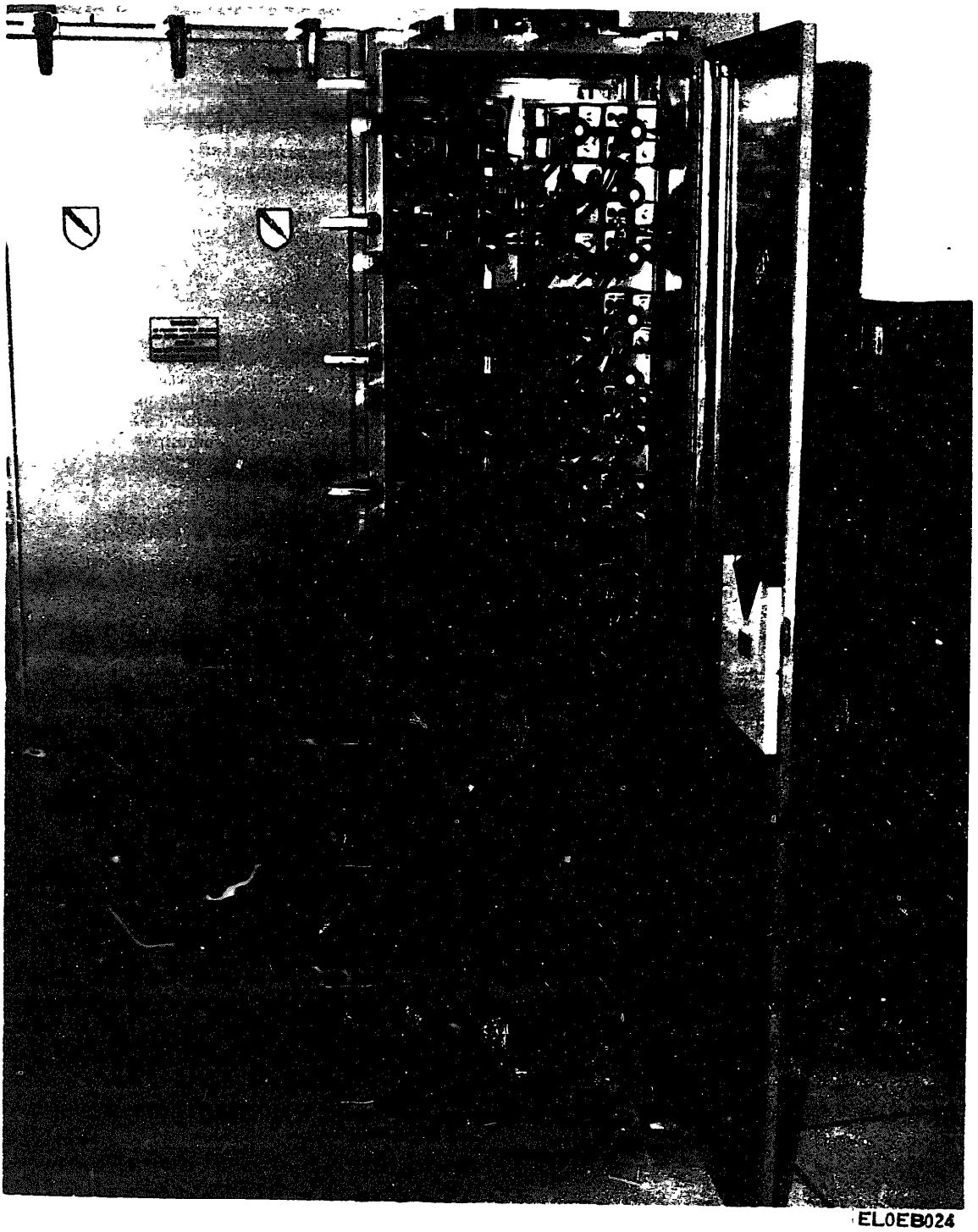


Figure 1-24 Red Black Isolator Bay 24

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.

1-11. Row 3 Equipment Bays

The Row 3 equipment bays (fig. 1-25) are located in the cryptovault and includes two cabinets (bays 3.3 and 3.4) housing KG-13 cryptoequipment and Western Union circuits for AUTODIN circuits 1 and 2 (circuits 47 and 48), and one cabinet (bay 3.2) which houses the KG-34 cryptoequipment used with the data processing systems. One cabinet (bay 3.1) is for future use.

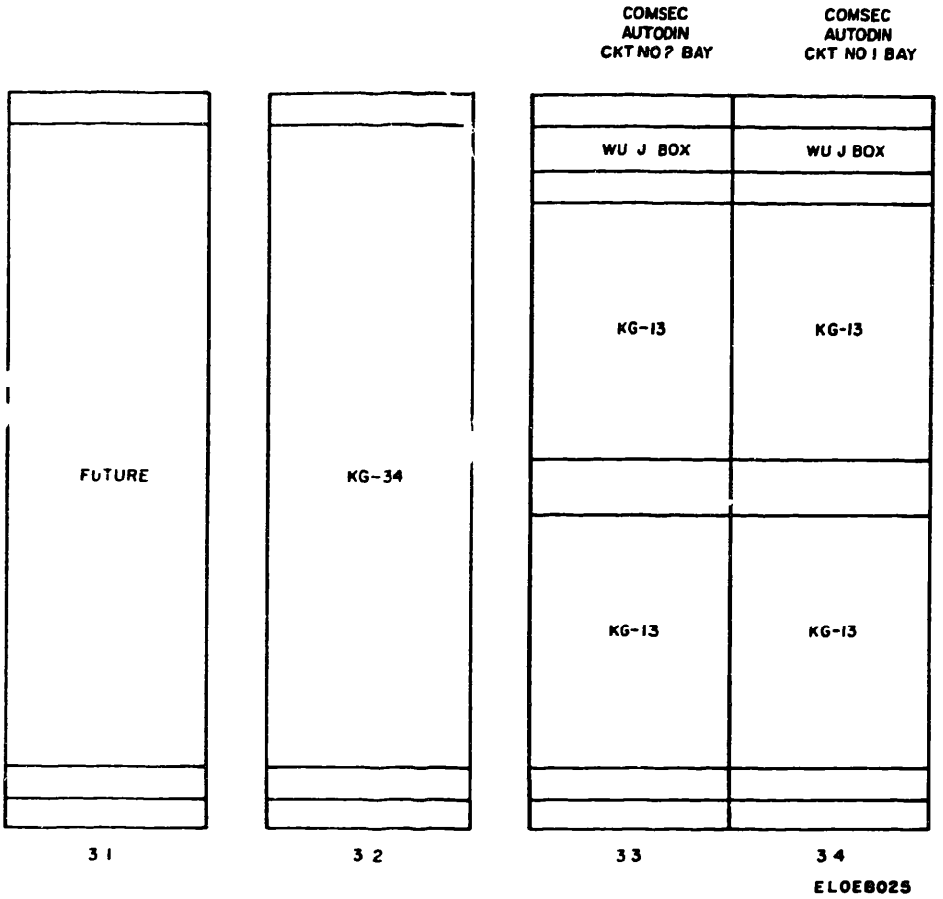


Figure 1-25 *Row 3 Equipment Bays, Configuration Diagram*

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 available at 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 Letterkenny Army Depot, Chambersburg, Pennsylvania. 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 but also performs other functions in connection with the traffic it handles, such as error indication, proper delivery address, timely delivery (automatic time mark), and message security. The ASC also contains equipment which is 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. For the purpose of this discussion the Letterkenny Automated Telecommunications Station can be separated into three functional sections: the Patch and Test Facility (PTF), the Automated Multimedia Exchange (AMME); ME 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 trouble-shooting 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; send traffic to the proper remote terminal (if addressed properly), 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 depends on the traffic intended to the remote terminal (narrative teletype or fast speed data). A remote terminal may have any combination of a card reader, a card punch, a line printer, and a visual display unit (VDU); fast data systems have equipments unique to their needs.

2-3. Facility Signal Block Diagram

a. Station Signal Routing (fig. 2-1). 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 through signal line filters to the PTF, is processed and fed to AMME, where the heading is read, and fed back through the PTF to the intended remote terminal. 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 (SLF).

(1) The ASC signal proceeds through the PTF to and from the AMME through several significant blocks. The blocks represent equipment which either modifies the signal, such as the modem or cryptobay, or provides access to the signal for testing, such as the patch panel blocks. The signal line filter panel, which contains a separate, shielded, low pass filter for every signal line that enters the PTF, prevents the signal lines from radiating unwanted 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 twelve wires output on the AMME side of the equipment. Half of each wire set (six lines) is used for receiving, the other half for transmitting.

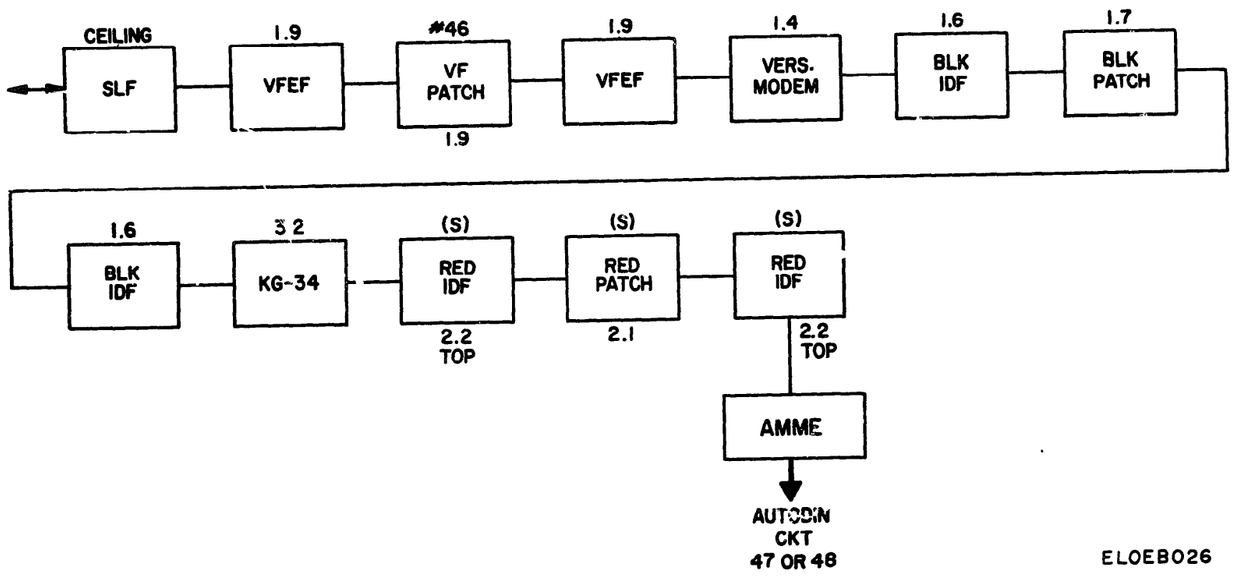


Figure 2-1 Data Processing Installation (DPI) Circuit, Block Diagram

(a) The signal on the ASC side of the WU modem is a carrier or tone at 1800 Hz. The carrier is frequency modulated (fm) 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 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. The baud rates to the ASC are 1200 and 4800.

(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 am used in controlling the transfer of the individual data bits between the AMME and the modem.

(3) The Communication Security (COMSEC) equipment 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 crypto equipment. 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 routing chain.

c. Remote Terminal Signal (fig. 2-2). **The information and data flow between the AMME and the remote terminals are voice frequency (vf) signals (analog) compared to the digital data between the AMME and ASC. The remote terminal lines are shown entering the PTF.**

(1) Following the circuits through from the AMME through the PTF, several significant blocks are encountered. The most significant block is the modem (modulator/demodulator) 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 second most significant black is the red/black isolator which functions to electrically separate the red signal from the black signal wiring. Other blocks remaining are the patch panel blocks 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) The teletype dc circuit channels pass through the PTF low and high level dc black patch panels. They can be wired through the red-black isolators, red dc patch panel, digital line interface unit low-high dc interface, and signal line filter panel. The remote terminals for these lines are teletypewriters and require high level dc voltages to operate. The function of a digital line interface unit (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.

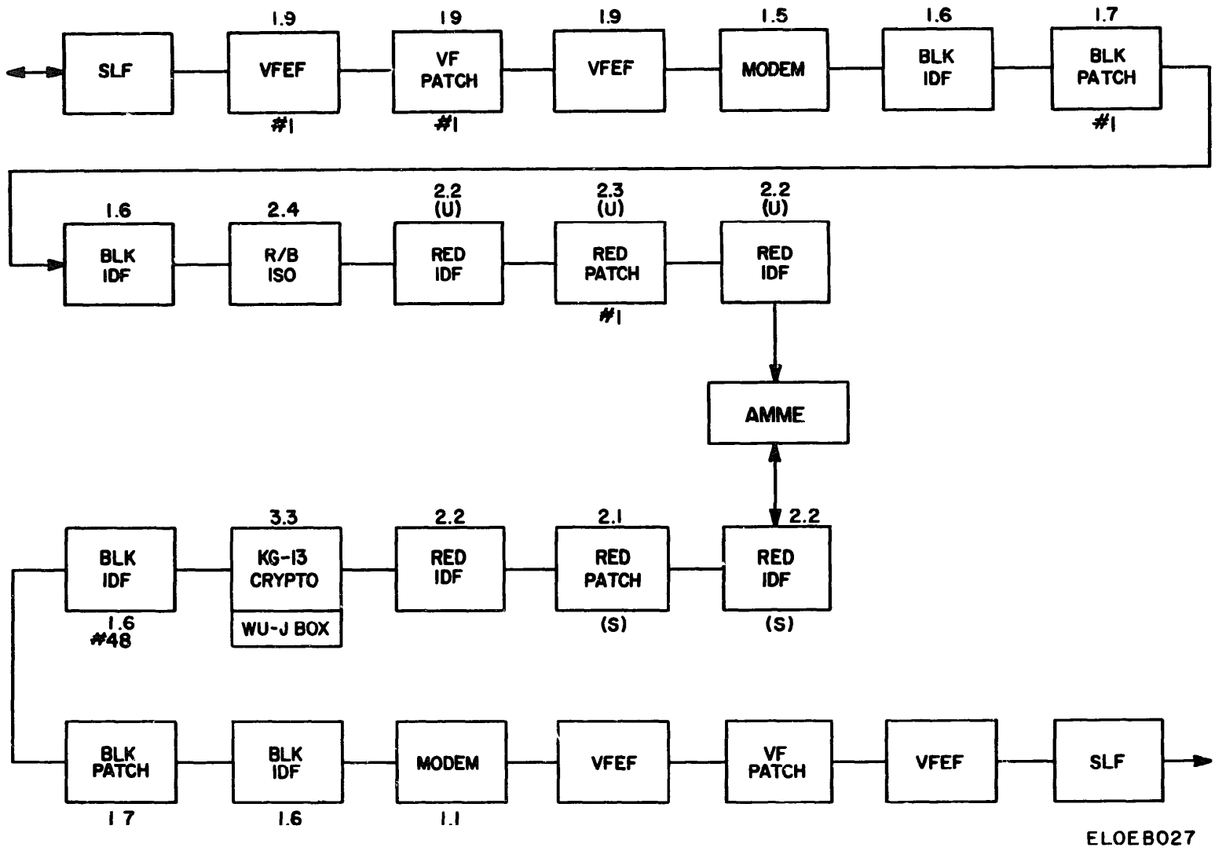


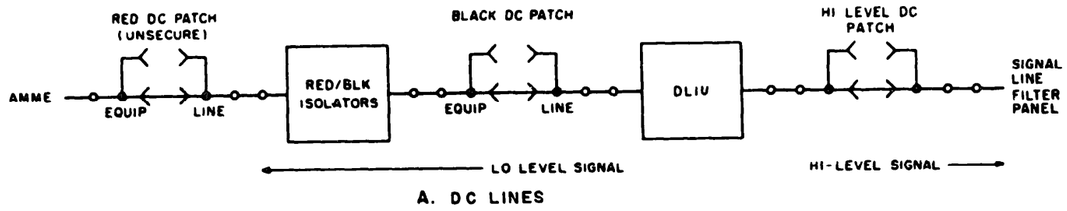
Figure 2-2 Voice Frequency Circuits, Block Diagram

2-4. Circuit Configurations

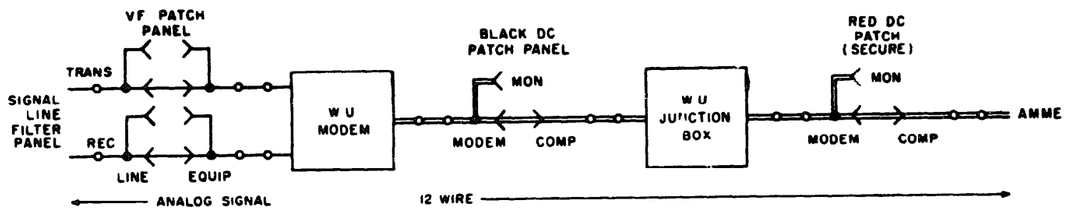
The circuits that pass through the PTF can be placed in three general categories: the teletype (dc) lines, the AUTODIN lines, and the lines to the remote terminals (vf) (both secure and unsecure). The simplified diagram (fig. 2-3) shows the configurations and symbols that represent the major equipment blocks and interface.

a. DC lines. The **dc lines handle low speed teletpye signals as shown on the left hand side of the diagram. Moving across the diagram from left to right, the line encounters the red dc patch as showon 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 and can be identified on the station as-built cross-connect drawings. The red-black isolators, which provide isolation of the red wiring from the black wiring; the black dc patch; the DLIU which changes the low level** signals **used by AMME to high level signal sent to the teletypewriter terminals; and the high level dc patch panel.**

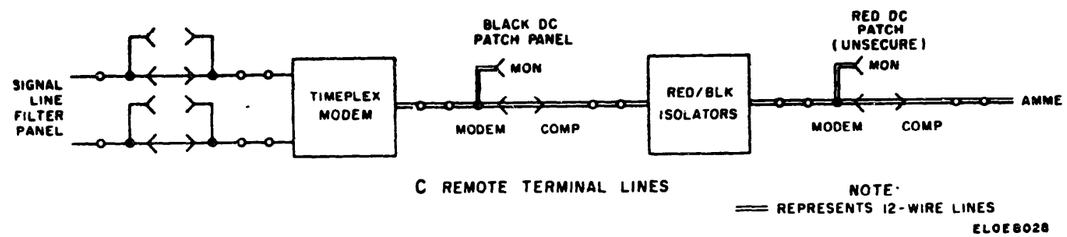
b. AUTODIN *Lines*. The AUTODIN lines handle the two AUTODIN duplex lines that travel through the PTF. Shown on the left side of the diagram is the station entrance at the signal line filter and two sets of panel jacks at the vf patch panel. Following the signal through to the AMME there is the WU modem block, the black dc patch panel, the WU junction box, and the red dc patch. The WU modem functions to modulate the AMME signal or 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; it also provides for switching in spare COMSEC units and testing by connecting the transmit and received lines together (back-to-back testing).



A. DC LINES



B. AUTODIN LINES



C REMOTE TERMINAL LINES

NOTE:
═══ REPRESENTS 12-WIRE LINES

EL0E8028

Figure 2-3 Typical Circuit Configurations

c. ***Remote Terminal Lines*** **The remote terminal lines am configured similar to the AUTODIN lines in that they are duplex (send and receive at the same time) and use a modem Following the lines from the left side of figure 2 -3, there is the signal line filter panel, the vf patch panel, modem, the black dc patch panel, the red/black isolators (unsecure circuits) or COMSEC (secure circuits) and the red dc patch panel (secure or unsecure). The modem performs the same function as the WU modem does, that is, it modulates the signal for transmission on voice frequency lines and demodulates the vf 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 for the unsecure circuits.**

CHAPTER 3

PATCH AND TEST FACILITY OPERATIONS

Section 1. 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 to successful PTF operation, there are none more important than those described in this chapter. When PTF personnel become familiar with procedures in this chapter and with the circuits of the PTF and its equipment, they will be contributing to the successful PTF operation. 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 basic duties of PTF personnel is to maintain communication. Maintaining communications can be further broken down to restoration of failure and maintaining circuit quality. Both of these functions require a knowledge of the circuit status at all times. The basic requirements can be further divided into individual duties below:

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

b. Provide assistance to the ASCs 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 recordkeeping.

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-builts") are prepared by the engineering/installation agency. The plant-in-place records are first developed as part of the engineering plan done prior to the construction update of a communication station. After the work on the communication station is completed, the plant-in-place records must be updated to document the installation and become the basis of any new additions or future station planning.

(2) Plant-in-place records are also used by operation and maintenance (0 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) Prior to 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-in-place records are made on prints (by installation personnel) and sent to the engineer/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 indeed completely accurate and portray the equipment as installed.

(4) The importance of accurate and complete plant-in-place records cannot be overemphasized. They are needed by the communication engineering agency to document the site 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 brought about in an effort to restore communications, a faulty or incorrect diagram can add hours onto the time of the communications outage. Simple fault location becomes a long drawn out procedure when a faulty drawing complicates it even more. Plant-in-place records must be accurate and complete prior to time of the failure which interrupts communications.

b. Equipment Manuals. The equipment manuals which come under the heading of station records are all manuals, commercial and military, that 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 separate 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 are included in appendix A.

d. Locally Prepared Data. Locally prepared data which 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 diagram placed on patch bays, and trouble logs. In general, any instruction or aid 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 go into the input of the equipment patched to.

(2) Operational Spares. Operation spare lines and equipment must be maintained. Standby equipment maintained in these spare circuits are used when patching around a defective item.

(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 just prior to completing the patch. Set the patch up with the cable plugs only loosely set into the patch jacks. Then recheck the signal flow prior to 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. Although the PTF was designed to minimize the chances that red and black circuits can be patched together, operators should especially be alert to this possibility. Red circuits must not be patched to black circuits. The electrical Isolation of circuits provided by the red/black isolator cabinets must not be ignored.

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 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 1.7, a multicircuit patch cord is connected from the COMP jack of channel 2 to the MODEM jack of channel (circuit) 21. On the vf frame and patch bay 1.9, two 2-wire patch cords connect the modem transmit and receive lines from circuit 21 to the lines of circuit 2.

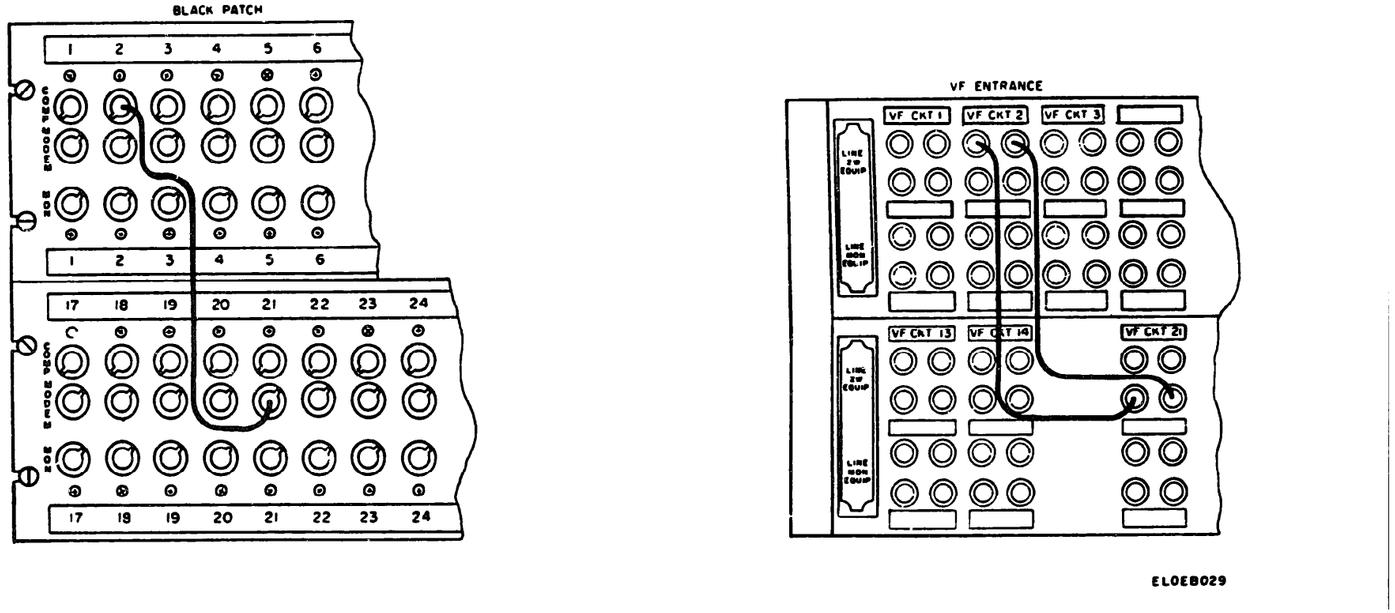


Figure 3-1. Patching for Modem Substitution

b. Isolator Substitution **(fig. 3-2). Isolator substitution involves the multicircuit (12-wire) patch cords. In this case, it is assumed that 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.**

3-6. Testing Patches

Testing patches, as described here, are defined as 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 3-3*. A schematic and a drawing representing the way the actual patch cords are set up are shown. PTF personnel should study this diagram prior to 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.

3-7. Patching for Fault Location

Patching for fault location 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 *-4.***

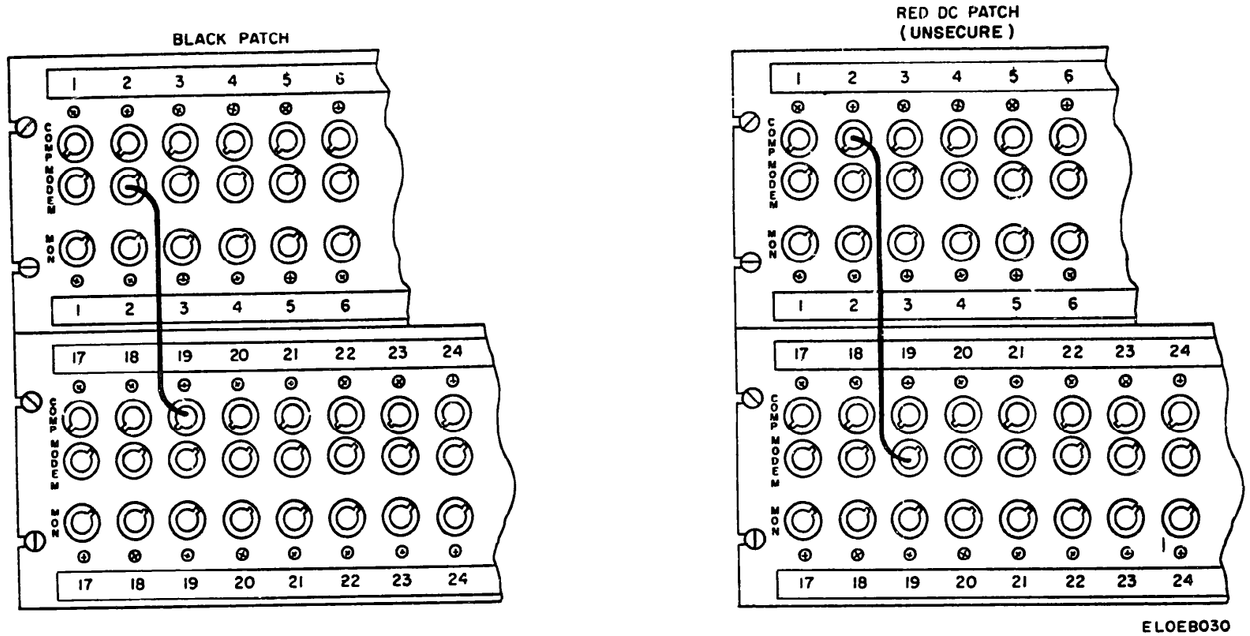


Figure 3-2 Patching for Isolator Substitution

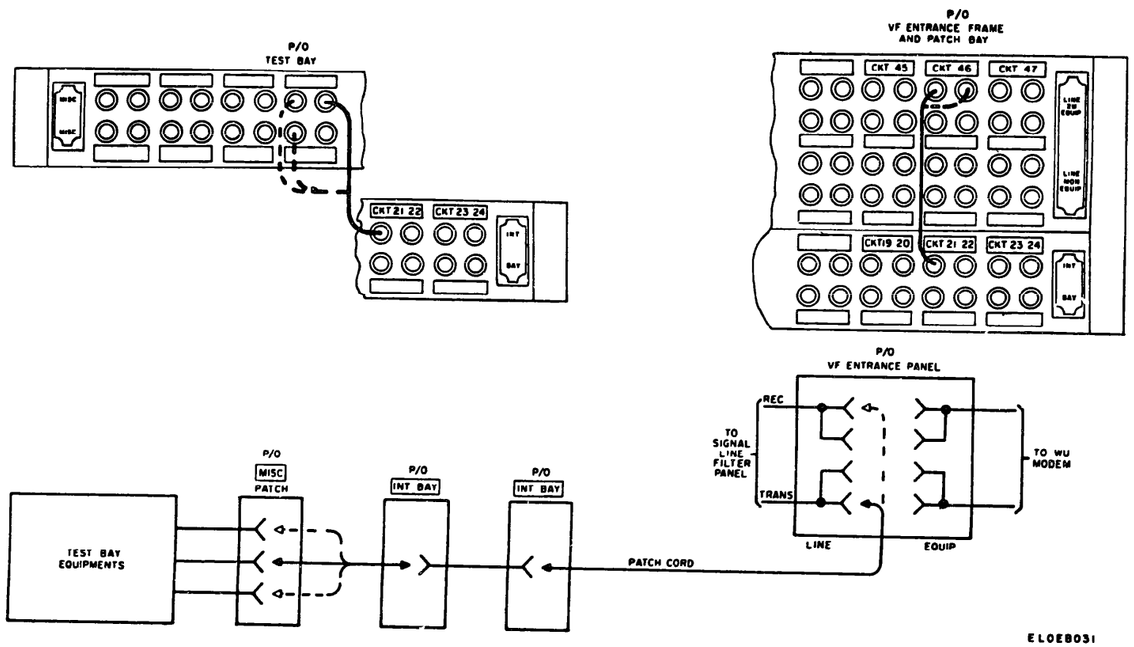


Figure 3-3 Typical Patching Arrangement for DCS Testing of AUTODIN Lines

(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 figure 3-4B.

(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 in conjunction with the red test plug for looping back a secure remote terminal line and is shown in figure 3-4C.

(3) *Red Test Plug.* The red test plug is used to loop back a remote terminal signal as shown in the diagram, figure 3-4C and D.

***b. BERT Patching.* When the BERT is used for troubleshooting, as described in chapter 4, it is connected and patched into the system as shown in figure 3-5.**

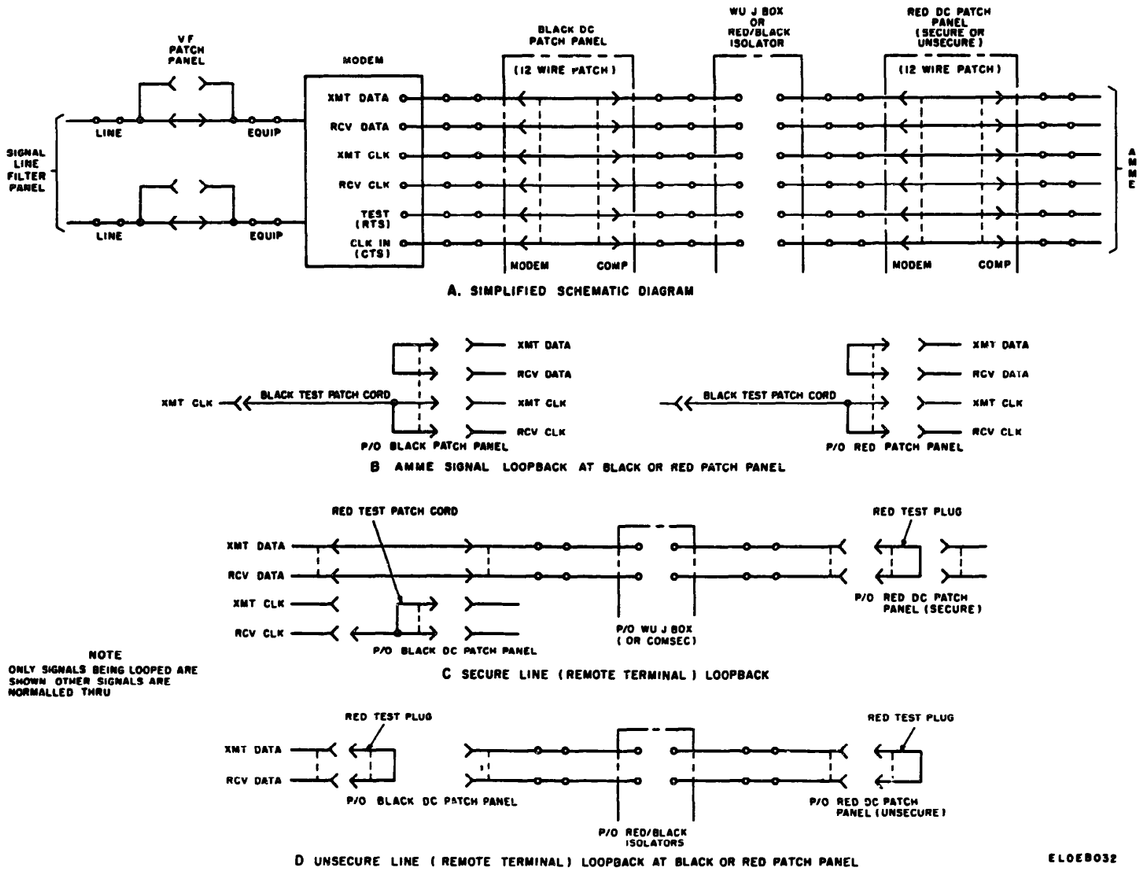


Figure 3-4 Test Plug and Test Cord Use, Simplified Schematic Diagram

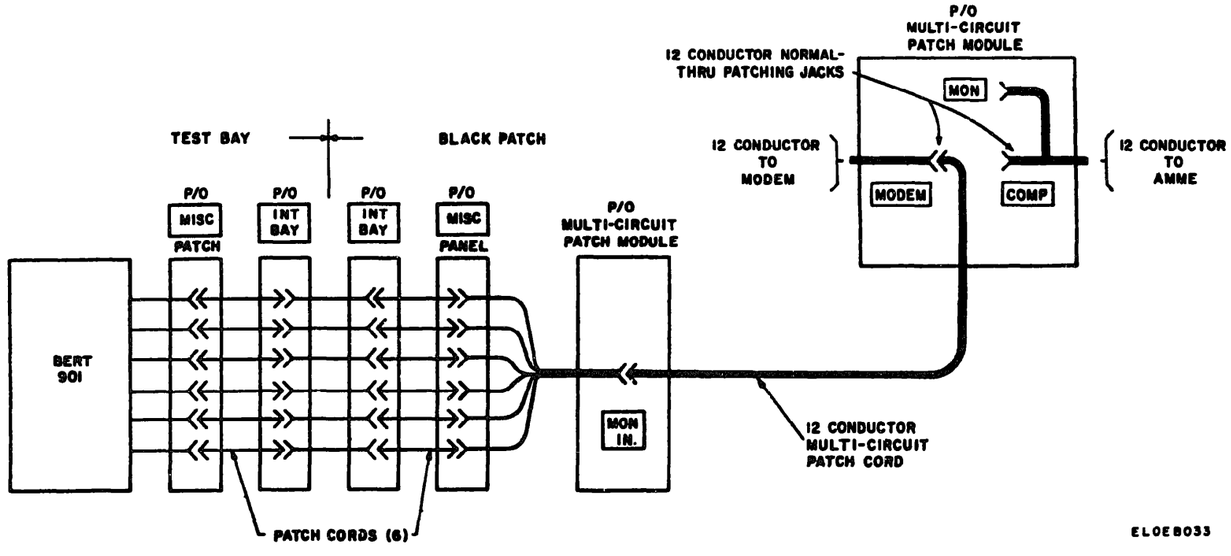


Figure 3-5. Typical BERT 901 Patching Arrangement

CHAPTER 4

MAINTENANCE

Section I. GENERAL

4-1. Scope of the 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. Touchup painting (para 4-9).

f. Troubleshooting.

4-2. Materials and Test Equipment Required for Organizational Maintenance

a. 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.

b. Test Equipment. All rack-mounted test equipment in test bay 1.8 and that listed in Appendix G, Maintenance Allocation.

Section II. PREVENTIVE 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. 4-6, 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 (paras 4-5 through 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, refer to a high category of maintenance or repair.

4-4. Preventive Maintenance Checks and Service 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 4-6 and 4-7 specify additional maintenance checks and services that must be performed monthly and quarterly, respectively.

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

Perform the maintenance functions indicated in the daily and weekly preventive maintenance checks and service charts below, daily and weekly, respectively. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions.

a. Patch and Test Facility (Daily)

Sequence No.	Item to be inspected	Procedure	References
	Alarm Lamps	Press test button on alarm panels	

b. Patch and Test Facility (Weekly).

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

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	None
3	Mounting	Check to be sure that the units are securely mounted.	None
4	Operation	During normal operation. observe that the mechanical action of each switch and control is smooth and free of binding	None
5	Lamps	Check all indicating lamps Replace defective lamps	None

4-6. Monthly Preventive 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 must 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 requires 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	Inspect the station grounding system	
2	Movable parts	Check all hinges. latches, and metal-to-metal moving parts, as necessary a Clean and paint bare metal parts b Clean all air filters	Para 4-8 and 4-9
3	Cables, wires, and cords	Repair insulation cuts and abrasions with electrical insulation tape	None
4	Electrical system	Report any indication of defective switches, switch-plates, outlets, and receptacles to Post Maintenance	None
5	Equipment mountings	Check to see that equipment mounting racks. frames, shelves, braces, and clamps are not bent. broken, or out of shape to endanger equipment or personnel	None
6	Fuses	Check fuses at equipment Replace defective fuses Verify that all operating fuses are of the correct value Check spare fuses for proper value and quantity	None

b. Equipment (Monthly). **Perform periodic checks and services on each equipment in the facility (app A).**

4-7. Quarterly Preventive Maintenance Checks and Service 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. serviceable. and current	None
2	Mounting	Verify that all bolts, nuts, and washers are correctly positioned and properly tightened Check for cracked, bent, or broken brackets	None
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	None

b. Equipment (Quarterly).

Sequence No	Item to be inspected	Procedure	References
1	Completeness	See that the equipment IS complete	Appendix B
2	Preservation	Check all surfaces for evidence of fungus Remove rust and corrosion and spot-paw bare spots	Para 4-8 and para 4-9
3	Connections	Verify that plugs. sockets, and lacks are clean, mltact. and not loose fitting	None

Sequence No	Item to be Inspected	Procedure	References
4	Pluck-out items	Inspect clamps and sealing of pluck out items Check for wrong. bent or broken parts	None
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	None

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 used. DO NOT use near an open flame. Trichloroethane is not flammable but exposure of the fumes to an open flame or hot metal 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 more 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 troubleshooting 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. Wow the second step or repairing the faulty item of equipment is accomplished, depends 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 procedures 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 does not have its own manual is the major alarm panel. The troubleshooting chart (para 4-14) will aid in locating the defective component of the faulty major alarm panel. All other equipment items have their own manuals, listed in appendix A, which contains troubleshooting data for the repair of the item.

4 -11. Troubleshooting the Communication Channel

a. **The communication 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 4-1. The degradation of communication is a more significant problem to the repairman that 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 modems 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 errors 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 errors recorded represents normal transmission.

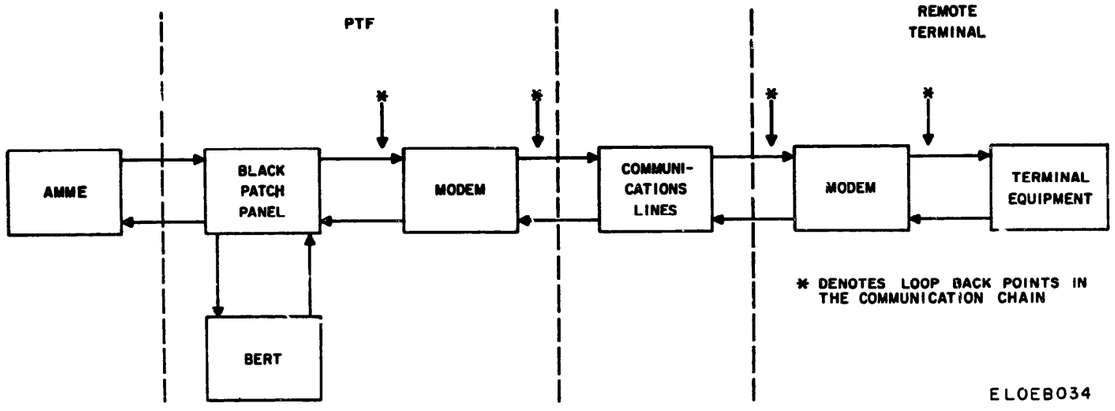


Figure 4-1 Troubleshooting the Communication Chain

b. Use 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 he black patch panel to supply signals to the modem, the communications lines, and the remote terminal modem. The lines are looped back at the mints 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 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 Symptom" 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 Alarm Panel.

Trouble symptom	Probable trouble	Check and corrective maintenance
No audible tone from audible indicator with a switch illuminated	a Tellite has been pressed, locking out audible tone	f Check for trouble as indicated by switch line
	b Gnd from alarm panel not being extended to audible indicator	h 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 trace ground back to alarm panel (1) If voltage is not found at alarm, trace voltage back to -48 vdc power supply
	c Gnd not being extended through alarm panel	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 pm 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 of the VOM IS connected to the corresponding lead (1-45) This

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

Item	Trouble symptom	Probable trouble	Check and corrective maintenance
			(Continued)
			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 indication on alarm panels	Defective lamp in switch	1 Press switch SW1. All switches should glow red. Press switch SW2 All switches should glow amber If any switch fads 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	Gnd not being extended from equipment to alarm panel.	1 Remove connector from back of alarm panel, locate pm 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 hay to gain access to the component parts With the top and bottom covers removed. a reading of approximately 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 Lexinton-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 the 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 which enter and leave the PTF, the low level I signal transmitted between the DLIU and AMME and the high level signal output from the Each type signal has a special requiremen special type of patch panel.

a. 12-Wire Patch Panel. **The 12-wire patch is required for the signal between the AMME the modem Of the 12 wires, six are required the transmitting signals; the other six ca receiving signals A series of three 12-wire jack used for each of 16 circuits in the module. T two normal through and one monitor jack circuit.**

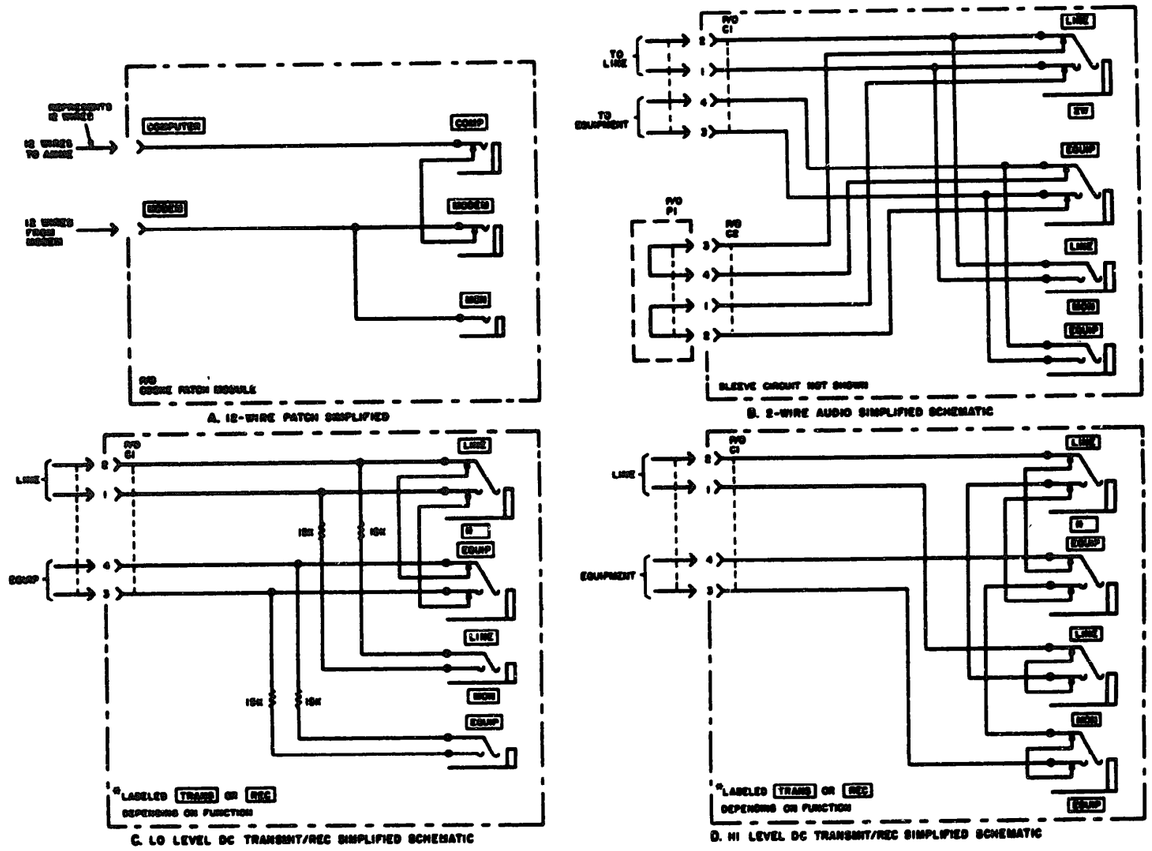


Figure 5-1 Patch Modules, Simplified Schemata.

(1) Following the circuit path from the AMME to the modem through the patch module, 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 and 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 audio 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 (fig. 5-1B), 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 configured 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 shown in figure 5-1C, the line is connected to the LINE normal though jack and the equipment is connected to the EQUIP normal through jack. Parallel connections from both the LINE and EQUIP jacks are two monitor jacks marked LINE and EQUIP. Both monitor jacks are isolated by 16K 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 configured 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 (fig. 5-1D), an arrangement different from the ones previously encountered is found. One wire of each circuit pair is muted 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 as before, in parallel.

(2) The patching principal 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 measuring and setting the telegraph current.

5-3. Major Alarm Panel

The major alarm panel operates as an indicator for remote troubles and centralized, within a single panel, alarm controls for up to 45 alarm circuits. Each alarm circuit condition is displayed by a lighted segment of the front panel, which is also a switch used for removing the audio alarm. Each item which provides an alarm input to the alarm panel can be designated a major alarm The major alarm conditions are displayed in different colors.

a. Considering first the external circuits which connect to the major 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 45 on the main connector. Pins 46 and 47 are outputs (grounds) which go to an audible indicator, causing it to sound. Other pins on the main connector are dc ground and input power and negative 48 volts direct current.

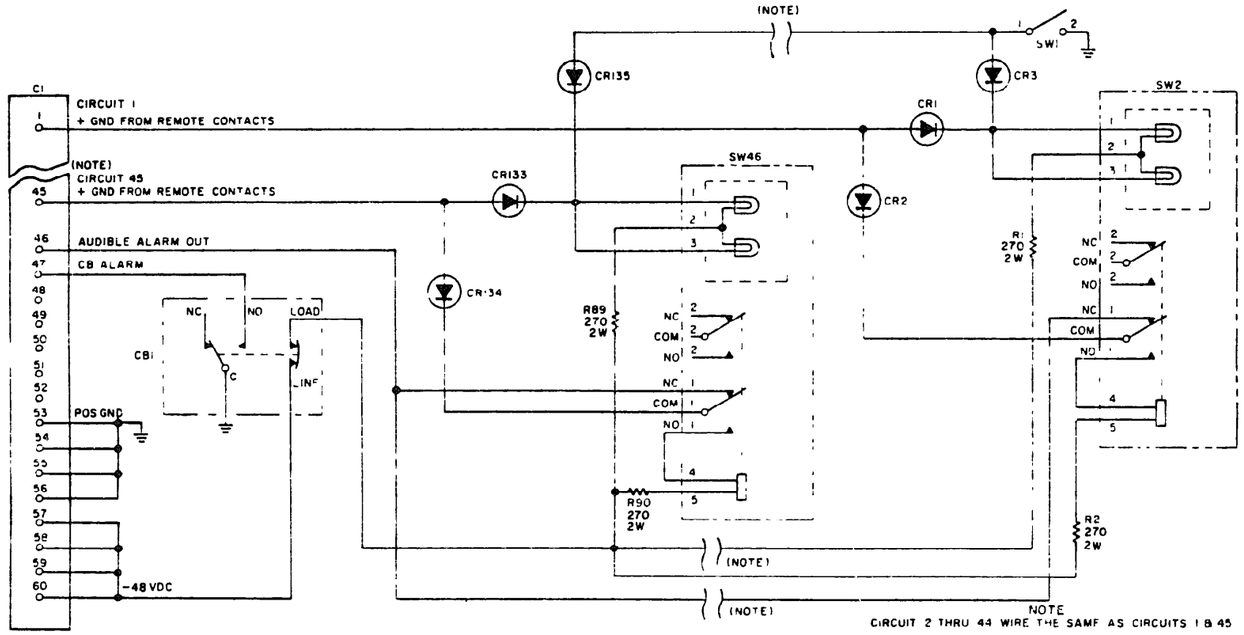


Figure 5-2 Major Alarm Panel Schematic Diagram

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 figure 5-2, through the main connector pin 1, the following action occurs: diode CR1 and CR2 are forward biased; one path of current flows through CR1, indicating lamps (part of S2), voltage dropping resistor R1, to the negative power supply connected at pins 57 through 60 of the main connector. The indicating lamps are part of switch S2 and cause the segment on the front panel representing the alarm to light, signaling the alarm condition.

(2) The other current path is through diode CR2 through the relay contacts to pin 46 of the main connector . This path provides an interuptable output ground (at pin 46) which goes 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 negative 48 vdc supply to the audible alarm; to pin 46 on the alarm panel; through the normally closed switch contact of S2; through forward biased diode CR2; to pin 1 on the main connector on the alarm panel.

(3) As the result of the alarm ground input to the alarm panel, the indicator lamps light 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 S2 (alarm switch). Current flow is now routed through limiting resistor, R2, through the coil of S2, which holds the armature and switch S2 in the locked position, and through diode CR2 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, switch S1 is provided. When the switch is pressed, a ground is connected to the input of all 45 alarm switch circuits. They are all similar to circuit #1 shown. Diodes CR3 and CR135 are forward biased and current flows through each individual lamp from the negative power supply.

5-4. Power Circuits

NOTE

Main ac power is first distributed through the distribution box located near the door.

Power for operation of the patch and test facility are provided as follows: alternating current (ac) is provided through power distribution boxes located in the main room and crypto vault (fig. l-l); direct current (dc) is provided by the dc power supply located in bay 1.10. Schematic and wiring diagrams for power distribution are provided by figures 5-3, 5-4, 5-5, and 5-6.

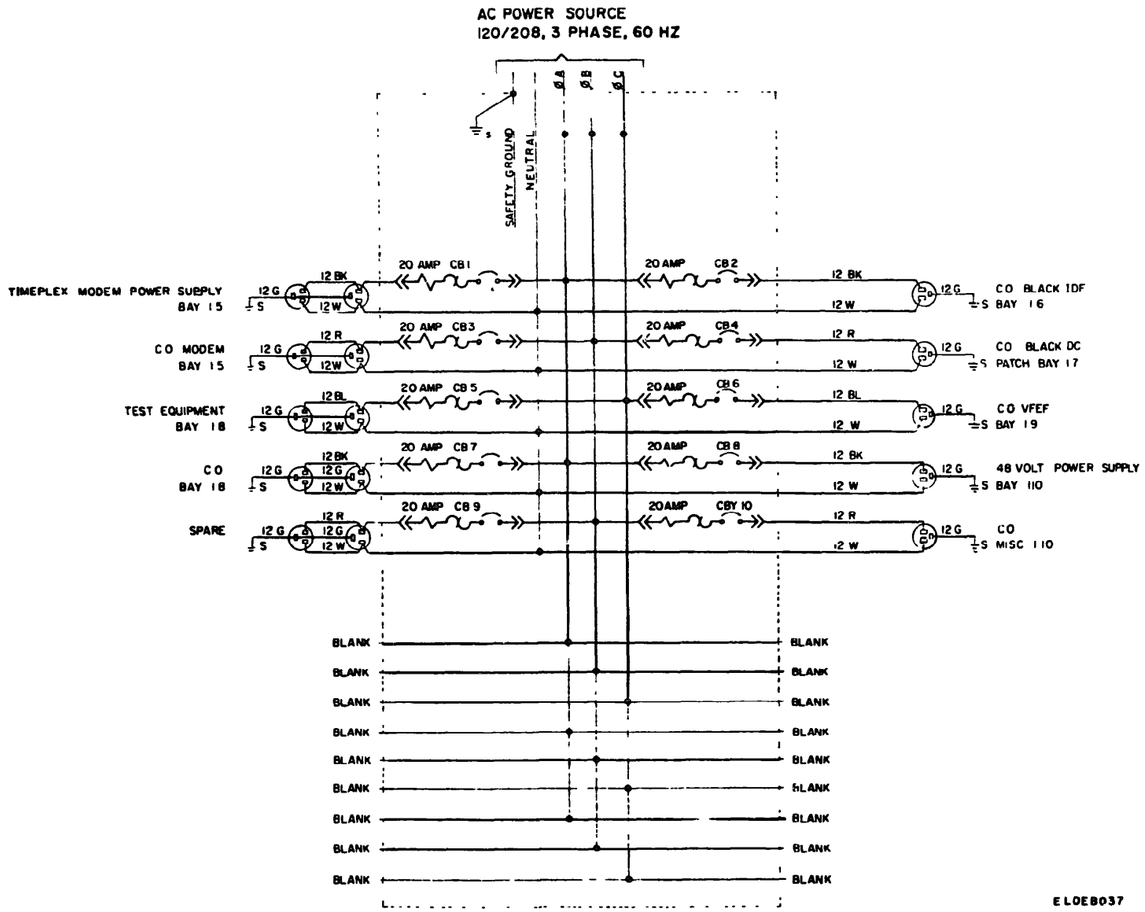


Figure 5-3. Ac Power Schematic, Black Power Panel (Main Room).

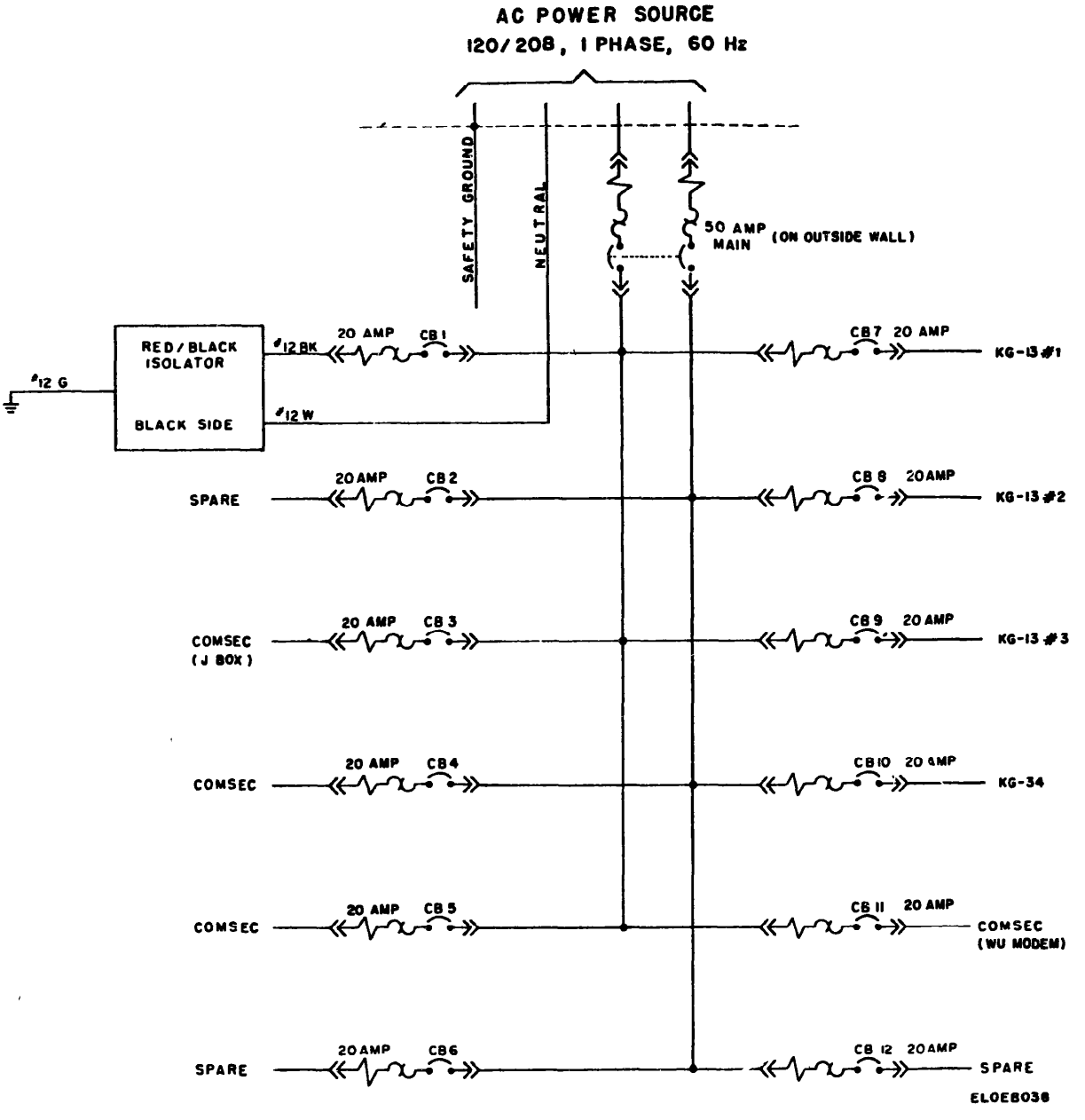


Figure 5-4 Ac Power Schematic, Black Power Panel (COMSEC Room)

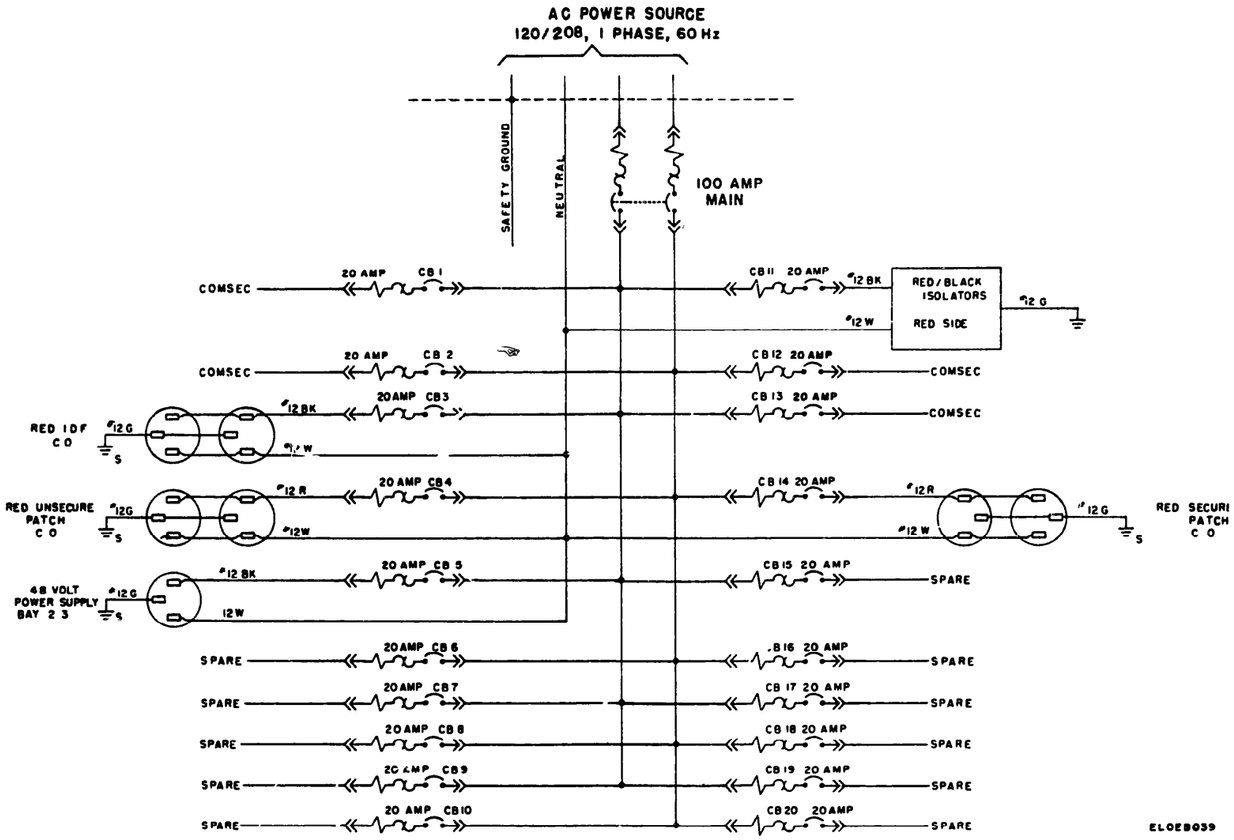


Figure 5-5 *AC Power Schematic, Red Power Panel (COMSEC Room)*

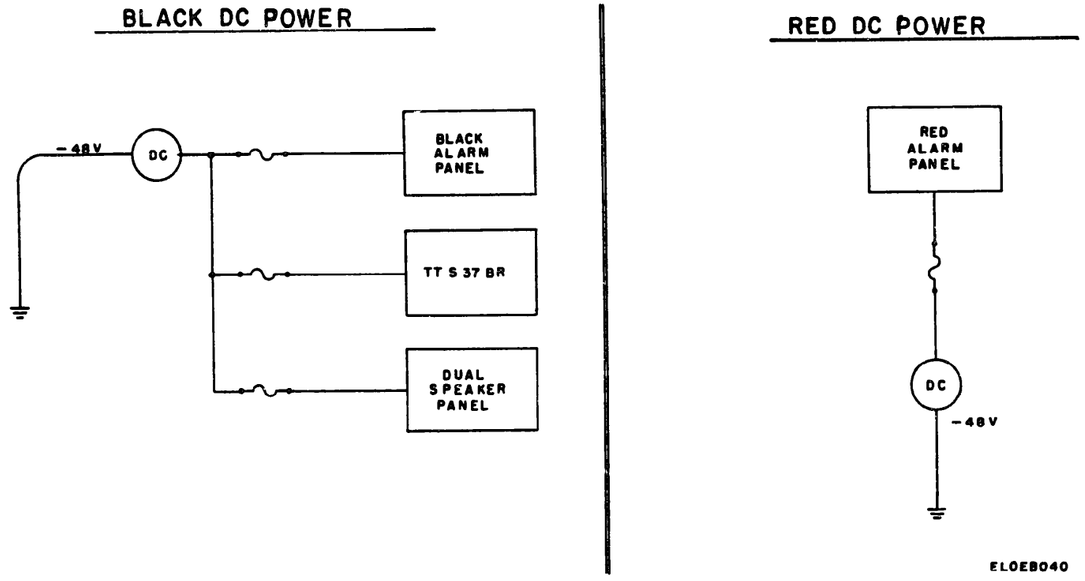


Figure 5-6 DC Power Distribution

APPENDIX A

REFERENCES

The following publications contain information applicable to the maintenance of the Patch and Test Facility, Letterkenny Army Depot, Pennsylvania.

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 Modifications Work Orders.**
TB 43-0118	**Field Instructions for Painting and Preserving Electronics Command Equipment Including Camouflage Pattern Painting of Electrical Equipment Shelters.**
TM 11-6626-620-12	**Organizational Maintenance Manual: Test Set, Teletypewriter AN/UGM-1.**
TM 11-6625664-14	**Operator's Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools List) for Multimeter AN/USM-223.**
TM 11-6625-2426-16	**Operator's, Organizational, Direct Support, General Support and Depot Maintenance Manual: Northeast Electronics Corporation Noise-Level-Vu Measuring Set Model TTS-37B.**
TM 11-6626-2658-14	**Operator's, Organizational, Direct Support, and General Support Maintenance Manual for Oscilloscope AN/USM-281C.**
TM 38-750	**The Army Maintenance Management Systems (TAMMS).**
TM 740-90-1	**Administrative Storage of Equipment.**
TM 750-244-2	**Procedures for Destruction of Electronics Materiel to Prevent Enemy Use.**

COMMERCIAL MANUALS

NOTE

The following commercial manuals may be procured from the associated contractor listed below.

Operating and Service Manual	**Data Error Analyzer Model 1645A (P/N 01646-90905 Dated Oct 1976) Hewlett-Packard Company P.O. Box 301 Loveland, Colorado 80537**
Operating Manual	**Portable Test Set HP-3550B (P/N 03650-90005, dated Feb 1973) Hewlett-Packard Company**
Operating and Service Manual	**Oscillator 204C/204D (P/N 00204 -90003) Hewlett-Packard Company**
Operating and Service Manual	**Patch Panel 353A (P/N 00363 -9003) Hew let&Packard Company**
Operating and Service Manual	**AC Voltmeter 403B (P/N 00403 -90013) Hewlett-Packard Company**
Operators Instruction Manual	**Oscilloscope 7603/R7603 (P/N 070-1310-00) Tektronix, Inc. P.O. Box 500 Beaverton, Oregon 97005**
Operators Instruction Manual	**Type 7B53A/7B53AN Dual Time Base Plug-In (P/N 070-1262-60) Tektronix, Inc.**

Service Instruction Manual	**Type 7B53A/7B53AN Dual Time Base Plug-In (P/N 070-1342-00) Tektronix, Inc.**
Instruction Manual	**Type 7A18/7A18N Dual Trace Amplifer (P/N 070-1126-01) Tektronix, Inc.**
Instruction Manual	**Multicircuit Patch Panels, (P/N 153-004A(16)) Cooke Engineering Co. 900 Slaters Lane Alexandria, Virginia**
Technical Manual	**Dual Speaker Panel Engineered Devices Company, Inc. 680 Bizzel Drive Lexington, Kentucky 40504**
Operating Instructions	**Intercom, Teletalk, R2812A, Bulletin 211-45326-1 Faraday, Inc. 805 South Maumee Street Tecumseh, Michigan 49286**
Installation and Service Instructions	**Intercom, Teletalk, R2812A, Bulletin 211-46170 Faraday, Inc.**
Instruction Manual	**Model TTS-37BAQ, Noise-Level-VU Measuring Set, (P/N A0037-89-600, Issue 3, dated Mar 75) Northeast Electronics Corporation P.O. Box 649 Concord, New Hampshire 03301**
Instruction Manual	**Sola CVDC Power Supplies-Type Standard CVDC Regulated (-48 vdc 28-1561-2) (P/N 272-60416) Sola Electric Company, Division of Sola Basic Industries 1717 Busse Road Elk Grove Village, Illinois 60007**
Technical Manual	**Digital Isolator Model R-205 Versitron, Inc. 6310 Chillum Place NW Washington, DC 20011**
Technical Manual	**Isolation Device Model R0292S Versitron, Inc.**
Technical Manual	**Power Supply Model P-12 (P/N 11857) Versitron, Inc.**
Technical Manual	**Series T Housing, Operation, Theory and Maintenance (T612BW) Versitron, Inc.**

DEFENSE COMMUNICATION AGENCY CIRCULARS

DCAC 310-60-3	**Concept for Technical Control of the Defense Communication System.**
DCAD-313-70-1	**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 330-175-1	**DCS Engineering-Installation Standards Manual.**
DCAC 300-175-9	**DCS Operating-Maintenance Electrical Performance Standards.**

APPENDIX E

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LISTS (INCLUDING DEPOT MAINTENACE REPAIR PARTS AND SPECIAL TOOLS)

Section I. INTRODUCTION

E-1. Scope

This appendix lists spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE), and other special support equipment required for performance of direct support and general support maintenance of the Letterkenny Automated Telecommunications Center Transmission Facilities and Remote Subsystems. It authorizes the requisitioning and issue of spares and repair parts as indicated by the source codes.

E-2. General

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

a. Section II. Repair Parts List. A list of spares and 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 numeric sequence.

b. Section III. Special Tools List Not applicable.

c. Section IV. National Stock Number and Part Number Index. Not applicable.

d. Section IV. National Stock Number and Part Number Index. Not applicable.

E -3. Explanation of Columns

a. Illustration. Not applicable.

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

(1) *Source* code. Source codes 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.
PD	Support item, excluding support equipment, procured for initial issue or outfitting and stocked only for subsequent or additional initial issues or outfittings. Not subject to automatic replenishment.
XD-A	support item that is not stocked. When required, item will be procured through normal supply channels.

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*
F	Support item is removed, replaced, used at the direct support level.
H	Support item is removed, replaced, used at the general support level.
D	Support items that are removed, replaced, used at depot, mobile depot, specialized repair activity only.

(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 com-

Code *Application/Explanation*

plete 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

D-The lowest maintenance level capable of complete repair of the support item is the depot 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 code is entered in the fifth position of the Uniform SMR Code format as follows:

Recoverability codes *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.

H- Reparable item. When uneconomically reparable, condemn and dispose at the general 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 characteristica 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 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 functional group, subfunctional group, or 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 TM by future change/revision when they are entered in the Army Master Data File (AMDF). Until the NSN's are established and published, submit exception requisitions to: Commander, US Army Electronics Command, ATTN: DRSEL-MM, Fort Monmouth, New Jersey 07703 for the part required to support your equipment.

E -5. How to Locate Repair Parts

Not applicable.

E -6. Abbreviations

Not applicable.

SECTION II REPAIR PARTS LIST

(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 LETTERKENNY AUTOMATED TELECOMMUNICATIONS CENTER TRANSMISSION FACILITIES AND REMOTE SUBSYSTEMS		
		PDDFD		LBAD-D-51715	21617	WU MODEM BAY	EA	2
		PDDFD		LBAD-D-51709	21617	FUTURE EQUIPMENT BAY	EA	3
		PDDFD		LBAD-D-51714	21617	BLACK DISTRIBUTION FRAME BAY	EA	1
		PDDFD		LBAD-D-51713	21617	BLACK DC PATCH BAY	EA	1
		PDDFD		LBAD-D-51712	21617	TEST BAY	EA	1
		PDDFD		LBAD-D-51721	21617	VF ENTRANCE FRAME & PATCH BAY	EA	1
		PDDFD		LBAD-D-51710	21617	MISCELLANEOUS EQUIPMENT BAY	EA	1
		PDDFD		LBAD-C-51716	21617	RED PATCH (SECURE) BAY	EA	1
		PDDFD		LBAD-D-51717	21617	RED FRAME BAY	EA	1
		PDDFD		LBAD-D-51718	21617	RED PATCH (UNSECURE) BAY	EA	1
		PDDFD		LBAD-D-51719	21617	RED/BLACK ISOLATOR BAY	EA	1
		PDDFD		LBAD-D-51704	21617	FUTURE BAY	EA	1
		PDDFD		LBAD-D-51703	21617	KG-34 BAY	EA	1
		PDDFD		LBAD-D-51706	21617	COMSEC AUTODIN CKT No 2 BAY	EA	1
		PDDFD		LBAD-D-51707	21617	COMSEC AUTODIN CKT No 1 BAY	EA	1
		PDDFD		R2812A	64294	TELEPHONE INTERCOMM STATION	EA	1
						GROUP 01 WU MODEM BAY		
		PDDFD		LBAD-D-51726	21617	CABINET CY-3397A/G		
						GROUP 0101 CABINET CY-3397A/G (MODIFIED)		
		XDFZZ		BAD-C-51539	21617	COVER, TOP	EA	1
		XDFZZ		BAD-D-51540	21617	COVER, BOTTOM	EA	1
		XDFHD		MD3-00	80063	DOOR, CABINET	EA	1
		PAFFF	6110-00-856-2410	A-238/G	32757	SWITCH PANEL ASSEMBLY	EA	1
		PAFZZ		MB249225	80063	FUSE, PLUG 15 AMP	EA	8
		PAFZZ	5930-00-989-6768	202	74345	SWITCH, TOGGLE DPST	EA	1
		PAFZZ	5935-00-263-4003	242	27193	OUTLET, CONVENIENCE DUPLEX	EA	1
		PAFZZ	5930-00-501-4859	561K5	15605	SWITCH, TOGGLE DPST	EA	1
		PAFZZ	5920-00-968-3238	LT	71400	FUSEHOLDER (FOR 1 AMP GLASS FUSE)	EA	1
		PAFZZ	5920-00-403-8497	MO3-1A	81349	FUSE, 3 AG, 1 AMP	EA	1
		XDFZZ		A-238/G1A	32757	LAMP, TROUBLE, W/PROTECTOR & TERMINAL TUBE	EA	1
		XDFZZ		YPE 4063	27193	RECEPTACLE (FOR 15 AMP PLUG FUSE)	EA	2
						GROUP 04 FUTURE EQUIPMENT BAY		
		PDDFD		BAD-D-51726	21617	CABINET CY-3397A/G (MODIFIED)	EA	3
		PDFZD		3390	17297	RELAY COMPONENT MODEM	EA	2
						GROUP 0402 RELAY COMPONENT MODEM		
		PAFDD		TRC2-2	17297	TRANSMITTER/RECEIVER	EA	1
		PAFDD		13389	17297	CLOCK MODULE	EA	1
		PAFDD		13387	17297	RECEIVER MODULE	EA	1
		PAFDD	5805-00-009-3475	11857	17297	POWER SUPPLY	EA	1
		PAFDD		12847	7297	SHELF, MODEL RA111C	EA	1

MISA-FM 7885-74

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 06 BLACK DISTRIBUTION FRAME BAY		
		PDDFD		LBAD-D-51726	21617	CABINET CY-3397A/G (MODIFIED)	EA	1
		XDFZZ		LBAD-C-51544	21617	MOUNTING BRACKET	EA	4
		XDFZZ		4210-17W	81343	TERMINAL BLOCK 10X20 PINS (TRIMM CO)	EA	20
		XDFZZ		LBAD-C-51543	21617	TERMINAL BLOCK MOUNTING BRACKET	EA	5
		XDFZZ		LBAD-C-51542	21617	MOUNTING BRACKET	EA	2
		PAFZZ	5305-00-989-6265	MS35207-262	96906	SCREW, 10-32 UNF X 3/8 LG	EA	40
		PAFZZ	5310-00-877-5797	MS21044-N3	96906	NUT, SELF-LOCKING, 10-32 UNF	EA	40
		PAFZZ	5305-00-984-6208	MS34206-261	96906	SCREW, 8-32 UNC X 3/8	EA	112
		PAFZZ	5310-00-877-5795	MS21044-N8	96906	NUT, SELF-LOCKING, 8-32	EA	112
		XDFZZ		LBAD-C-51545	21617	CABLE, LADDER	EA	2
		XDFZZ		LBAD-D-51546	21617	JUMPER, RING	EA	4
		XDFZZ		DR6176	53431	STANDOFF, 3/8 X 1-1/16 LG,6-32 THD (WILLIAMS CO OAKDALE, PA)	EA	4
		XDFZZ		ASTMB187	88729	GROUND BUSS, 1 X 1/4 X 12	EA	2
						GROUP 07 BLACK DC PATCH BAY		
		PAFFD		LBAD-D-51726	21617	CABINET CY-3397A/G (MODIFIED)	EA	1
		PDDFT		LBAD-D-51563	21617	MULTI-CIRCUIT PATCH PANEL	EA	3
		PDDFD		LBAD-D-28561	21617	DC LOW LEVEL PATCH PANEL	EA	2
		PDDFD		LBAD-D-28562	21617	MISCELLANEOUS PATCH PANEL	EA	1
		PDDFD		LBAD-D-28563	21617	INTERBAY PATCH PANEL DC	EA	1
						GROUP 0702 MULTI-CIRCUIT PATCH PANEL (PANEL 1, CIRCUITS 1 TO 16)		
		PDFFD		153-004-A16	02002	MULTI-CIRCUIT DATA PATCHING	EA	3
		PAFZZ	6935-00-098-9135	204-208-1	00779	CONNECTOR, ELECTRICAL, MALE, 12 CONTACTS	EA	16
		PAFZZ	5935-00-032-9565	205-207-1	00779	CONNECTOR, ELECTRICAL, FEMALE, 12 CONTACTS	EA	16
		PAFZZ		DP12-2	02002	JACK, PATCHING, 12 CKT	EA	3
		PAFZZ		DP12-3	02002	JACK, PATCHING, 12 CKT	EA	1
		PAFZZ		DPP16-24	02002	PATCH CORD ASSEMBLY, 6 CKT 100 PAIR	EA	4
		PAFZZ		DPP12-24	02002	PATCH TEST CORD 12 CKT 100T	EA	4
		PAFZZ	5995-00-508-1524	DPC12(48)	02002	PATCH TEST CORD ASSEMBLY, 48-INCH LG	EA	9
		PAFZZ	5820-01-014-7070	DPC 12(36)	02002	PATCH TEST CORD ASSEMBLY 36-INCH LG	EA	9
		PAFZZ	5995-00-518-1534	DPC 12(24)	02002	PATCH TEST CORD ASSEMBLY, 24-INCH LG	EA	9
		PAFZZ		016-8010-209	SFLFTRA	TEST POINTS	EA	12
						GROUP 0705 LO-LEVEL DC PATCH, PANEL (NO 1)		
		PAFZZ	5935-00-847-7840	513938	44038	CONNECTOR (FRAME), 100 JACKS	EA	1
		PAFZZ	5935-00-799-2442	513936	44038	CONNECTOR (CABLE), 100 PIN	EA	1
		PAFZZ	5305-00-984-4388	MS35206-278	96906	SCREW, RH, 6-32 X 3/8 LG	EA	96
		PAFZZ		MS21044-6	96906	ELASTIC STOP NUT, 6-32NC	EA	10
		XDFZZ		LBAD-C-28908	21617	CONNECTOR COVER	EA	1
		XDFHH		LBAD-D-28993	21617	RESISTOR BOARD ASSEMBLY	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
		PAHZZ	5905-00-195-6453	RC20GF562J	44655	RESISTOR, 5.6K, 5%, 1/2W	EA	25
		XDFZZ		LBAD-C-28992	21617	RESISTOR BOARD MOUNTING BRACKET	EA	2
		XDFZZ		LBAD-D-24514	21617	COVER, TOP & BOTTOM	EA	2
		PAFZZ	5305-00-833-8862	MS18211-19C	96906	F H.M.S , 4-40 X 5/16 NC (NYLON)	EA	22
		XDFZZ		MS13211-84F	96906	F H.M.S, 10-32 X 3/8 NF (NYLON)	EA	6
		PAFZZ	5310-00-595-7203	MS35338-117	96906	WASHER, LOCK NO 6	EA	96
		PAFZZ	5935-00-578-2701	240C	64959	JACK, TELEPHONE	EA	48
		PAFZZ	5935-00-194-3079	239C	64959	JACK, TELEPHONE	EA	48
		PAHZZ	5905-00-106-1273	RCR20G153JS	81349	RESISTOR, 15K OHMS, 1/2W, 5%	EA	96
						GROUP 0707 MISCELLANEOUS PATCH PANEL		
		PAFZZ	5935-00-085-4730	512240	44038	CONNECTOR, 80 PIN (FRAME)	EA	1
		PAFZZ	5935-00-246-6421	512241	44038	CONNECTOR, 80 PIN (CABLE)	EA	1
		PAFZZ	5305-00-889-3000	MS35206-230	96906	SCREW, PAN-HD, 6-32 X 1/2 LG	EA	6
		PAFZZ	5310-00-081-8087	MS21044-6	96906	ELASTIC STOP NUT, 6-32 NC	EA	6
		PAFZZ	5305-00-995-6653	MS35190-222	96906	SCREW, FLAT-HEAD, 4-40NC X 5/16 LG	EA	4
		PAFZZ	5305-00-984-7361	MS35191-270	96906	SCREW, FLAT-HEAD, 10-3 NF X 3/8	EA	4
		PAFZZ	5305-00-984-4988	MS35206-228	96906	SCREW, RH, 6-32 X 3/8 LG	EA	48
		PAFZZ	5310-00-209-1366	MS35335-58	96906	WASHER, LOCK, No 6 (EXTERNAL TEETH)	EA	48
		XDFZZ		LBAD-D-28568-3	21617	SPACER, FIBER, No 2335	EA	4
		PAFZZ	5305-00-054-5657	MS51957-17	96906	SCREW, RH, 4-40 X 1/2 LG	EA	4
		PAFZZ	5805-00-877-2965	238A	64959	JACK, TELEPHONE, 238A (KEY)	EA	48
						GROUP 08 TEST BAY		
		PDDFD		LBAD-D-51726	21617	CABINET CY-3397A/G (MODIFIED)	EA	1
		PDDFD	6625-00-133-7496	TTS-37BR	06819	NOISE MEASURING SET	EA	1
		PDDFD		BERT 901	51527	TEST SET	EA	1
		PDDFD	6625-00-449-7652	R561B	80009	OSCILLOSCOPE	EA	1
		PDDFD		HP3550BR	28480	TRANSMISSION MEASURING SET	EA	1
		PDDFD		LBAD-D-28567	21617	MISCELLANEOUS PATCH PANEL	EA	1
		PDDFD		LBAD-D-28568	21617	INTERBAY PATCH PANEL	EA	2
						GROUP 09 VF ENTRANCE FRAME AND PATCH BAY CABINET CY-3397A/G (MODIFIED)		
		PAFFD						
		PAFDD		SC628	22231	DUAL SPEAKER PANEL	EA	1
		PAFDD		LBAD-D-28563	21617	2W AUDIO PATCH PANEL	EA	4
		PAFDD		LBAD-D-28568	21617	INTERBAY PATCH PANEL	EA	1
		PAFDD		HS521	64294	INTERCOM HAND SET	EA	1
						GROUP 0903 2W AUDIO PATCH PANEL (PANEL 1, CIRCUITS 1 TO 12)		
		PAFZZ	5935-00-085-4730	512240	44038	CONNECTOR, 80 PIN (FRAME)	EA	4
		PAFZZ	5935-00-246-6421	512241	44038	CONNECTOR, 80 PIN (CABLE)	EA	2
		XDFZZ		LBAD-D-28592	21617	CONNECTOR-NORMAL THROUGH	EA	2
		PAFZZ	5310-00-081-8087	MS21044-6	96906	ELASTIC STOP NUT, 6-32 NC	EA	12

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(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
		PAFZZ	5305-00-889-3000	MS35206-230	96906	SCREW, PAN-HD, 6-32 X 1/2 LG	EA	12
		XDFZZ		LBAD-D-24514	21617	COVER, TOP & BOTTOM	EA	2
		PAFZZ	5305-00-995-6653	MS35190-222	96906	SCREW, FLAT-HEAD, 4-40NC, 5/16 LG	EA	4
		PAFZZ	5305-00-984-7361	MS35181-270	96906	SCREW, FLAT-HEAD, 10-32 NF X 3/8 LG	EA	6
		XDFZZ		LBAD-D-28568-3	21617	SPACER, FIBER, No. 2335	EA	4
		PAFZZ	5305-00-828-9821	MS24629-13	96906	SCREW, TAPPING, PAN-HD, CADMIUM-PLATED, 4-40 X 1/2	EA	4
		PAFZZ	5935-00-192-4805	280C	64959	JACK, TELEPHONE	EA	48
		PAFZZ	5935-00-578-2647	241C	64959	JACK, TELEPHONE	EA	48
		PAFZZ	5305-00-984-4988	MS35206-228	96906	SCREW, RH, 6-32 X 3/8 LG	EA	96
		PAFZZ	5310-00-209-1366	MS35335-58	96906	WASHER, LOCK, No 6 (EXTERNAL TEETH)	EA	96
						GROUP 10 MISCELLANEOUS EQUIPMENT BAY		
		PDFDD		LBAD-D-51726	21617	CABINET CY-3397A/G (MODIFIED)	EA	1
		PDFDD		LBAD-D-51710-2	21617	BLANK PANEL W/AUDIBLE ALARM	EA	1
		PDFDD		LBAD-D-33162	21617	BLACK ALARM PANEL, MAJOR-MINOR ALARM	EA	1
		PDFDD		WEBSTER R2812A	64294	INTERCOM	EA	1
		PDFDD		LBAD-D-28566	21617	HIGH LEVEL DC PATCH	EA	2
		PDFDD		SOLA 28-1561-2	83587	48V DC POWER SUPPLY	EA	1
						GROUP 1003 BLACK ALARM PANEL, MAJOR-MINOR ALARM		
		XDFZZ		LBAD-D-33167	21617	ALARM COVER PANEL	EA	1
		PAFZZ	5305-00-889-3000	MS35206-230	96906	SCREW, PAN-HD, 6-32 X 1/2 LG	EA	31
		PAFZZ	5935-00-847-1840	513938	44038	CONNECTOR (FRAME), 100 JACKS	EA	1
		PAFZZ	5935-00-799-2442	513936	44038	CONNECTOR (CABLE), 100 PIN	EA	1
		PAFZZ	5905-00-279-2656	RC32GF511J	44655	RESISTOR, CARBON COMP, 510 OHMS, 5%,1W	EA	90
		PAFZZ	5905-00-279-1922	RC42GF271J	44655	RESISTOR, CARBON COMP, 270 OHMS, 5%, 2W	EA	45
		PAFZZ	5310-00-983-8483	MS27183-5	96906	WASHER, FLAT, ROUND, STEEL, CADMIUM-PLATED, No 6	EA	12
		PAFZZ	5310-00-045-4007	MS35338-41	96906	WASHER, LOCK, CADMIUM-PLATED, No 6	EA	15
		PAFZZ	5310-00-088-0553	MS21044-5	96906	NUT, HEX, 6-32	EA	15
		PAFZZ	5930-00-268-0309	138187E	96182	SWITCH, PUSHBUTTON	EA	1
		PAFZZ	5930-00-194-1548	138187G	96182	SWITCH, PUSHBUTTON	EA	1
		PAFZZ		90E A2C2 F3J4 (RA)L4-N1	96182	SWITCH, TELLITE	EA	45
		PAFZZ	6240-00-155-7836	MS25237-327	81344	LAMP, INCANDESCENT (2 EA IN SWITCH)	EA	90
		PAFZZ		117-210-101	79405	CIRCUIT BREAKER	EA	1
		XDFFF		LBAD-D-33172-GP1	21617	CIRCUIT BOARD ASSEMBLY (-48V)	EA	3
						GROUP 100301 CIRCUIT BOARD ASSEMBLY (-48V)		
		XDHZZ		LBAD-D-33171	21617	PCB ASSEMBLY (MAJOR-MINOR)	EA	3
		PAFZZ	5961-00-068-4708	584	81483	SEMICONDUCTOR DEVICE, DIODE	EA	270

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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 1005 HIGH LEVEL DC PATCH (XMIT)		
		XDFZZ		LBAD-D-28575	21617	FRAME	EA	1
		XDFZZ		LBAD-D-28577	21617	COVER, TOP & BOTTOM	EA	2
		XDFZZ		LBAD-D-28588	21617	CABLE, HARNESS	EA	1
		PAFZZ	5935-00-194-3079	239C	64959	JACK, TELEPHONE	EA	43
		PAFZZ	5935-00-578-2701	240C	64959	JACK, TELEPHONE	EA	48
		XDFZZ		LBAD-D-28568-3	21617	SPACER, FIBER, No. 2335	EA	4
		PAFZZ	5310-00-209-1366	MS35335-58	96906	WASHER, LOCK, No 6 (EXTERNAL TEETH)	EA	48
		PAFZZ	5305-00-054-5657	MS51957-17	96906	SCREW, RH, 4-40 X 1/2 LG	EA	4
		PAFZZ	5305-00-984-7361	MS35191-270	96906	SCREW, FLAT-HEAD, 10-32NF X 3/8	EA	4
		PAFZZ	5310-00-081-8087	MS21044-6	96906	ELASTIC STOP NUT, 6-32 NC	EA	4
		PAFZZ	5305-00-889-3000	MS 5206-230	96906	SCREW, PAN-HD, 6-32 X 1/2 LG	EA	12
		PAFZZ	5305-00-984-4988	MS35206-228	96906	SCREW, RH, 6-32 X 3/8 LG	EA	4
						GROUP 11 RED PATCH (SECURE) BAY		
		PDFDD		LBAD-D-51726	21617	CABINET CY-3397A/G (MODIFIED)	EA	
		PDFDI		153-C04-A16	02002	MULTI-CIRCUIT DATA PATCHING	EA	
		PDFDD		LBAD-D-28973	21617	DC LOW LEVEL PATCH PANEL	EA	
		PDFD		LBAD-D-28567	21617	MISCELLANEOUS PATCH PANEL	EA	
						GROUP 1105 DC LOW LEVEL PATCH PANEL W/O CK & LP (XMIT)		
		PAFZZ	5935-00-847-7840	513938	44038	CONNECTOR (FRAME), 100 JACKS	EA	
		PAFZZ	5935-00-799-2442	513930	44038	CONNECTOR (CABLE), 100 PIN	EA	
		PAFZZ	5305-00-984-4988	MS35206-228	96906	SCREW, RH, 6-32 X 3/8 LG	EA	9
		PAFZZ	5310-00-081-8087	MS21044-6	96906	ELASTIC STOP NUT, 6-32 NC	EA	1
		XDFHH		LBAD-D-28933	21617	RESISTOR BOARD ASSEMBLY	EA	
		PAHZZ	5905-00-195-6453	RC20GF562J	44655	RESISTOR, 5 6K, 5%, 1/2W	EA	2
		XDFZZ		LBAD-C-28992	21617	RESISTOR BOARD MOUNTING BRACKET	EA	
		PAFZZ	5305-00-833-8862	MS18211-19C	96906	F H M S, 4-40 X 5/16 NC (NYLON)	EA	2
		XDFZZ		MS18211-84F	96906	F.H M.S , 10-32 X 3/8 NF (NYLON)	EA	
		PAFZZ	5310-00-595-7203	MS35338-117	96906	WASHER, LOCK, NO 6	EA	9
		PAFZZ	5935-00-578-2701	240C	64959	JACK, TELEPHONE	EA	1
		PAFZZ	5935-00-194-3079	239C	64959	JACK, TELEPHONE	EA	1
		PAHZZ	5905-00-106-1273	RCR20G153JS	81349	RESISTOR, 15K OHMS, 1/2W, 5%	EA	9
						GROUP 12 RED FRAME BAY		
		XDFZZ		LBAD-C-51689	21617	GROUND BAR, COPPER, 18 X 1 x 1/4	EA	
		XDFZZ		LBAD-C-51690	21617	STANDOFF	EA	
		XDFZZ		LBAD-C-51725	21617	BLOCK DESIGNATION	EA	1
		XDFZZ		SMD33907	80063	DOOR, CABINET	EA	
		XDFZZ		LBAD-D-724	21617	FRAME	EA	
		PAFFD		LBAD-D-51726	21617	CABINET CY-3397A/G (MODIFIED)	EA	

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(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 13 RED PATCH (UNSECURE) BAY		
		PDFDD		LBAD-D-51726	21617	CABINET CY-3397A/G (MODIFIED)	EA	1
		PDFDD	6350-00-102-4210	700064-0002	65597	BLANK PANEL W/AUDIBLE ALARM	EA	1
		PDFDD		LBAD-D-33162	21617	ALARM PANEL, MAJOR-MINOR ALARM	EA	1
		PDFDD		LBAD-D-51563	21617	MULTI-CIRCUIT PATCH PANEL	EA	3
		PDFDD		LBAD-D-28973	21617	DC LOW LEVEL PATCH PANEL	EA	2
		PDFDD		LBAD-D-28567	21617	MISCELLANEOUS PATCH PANEL	EA	1
		PDFDD		SOLA 28-1561-2	83587	48V DC POWER SUPPLY	EA	1
						GROUP 14 RED/BLACK ISOLATOR BAY		
		PAFFD		LBAD-D-51726	21617	CABINET CY-3397A/G (MODIFIED)	EA	1
		XDFZZ		LBAD-D-51719	21617	RED/BLACK, ISOLATOR BAY	EA	1
		XDFZZ		T-126BW	17297	HOUSING, RED/BLACK ISOLATOR CABINET	EA	1
		PAFZZ		P-12, 11857	17297	POWER SUPPLY	EA	96
		PAFZZ		H2025 W/LIGHT GUIDES	17297	ISOLATOR, DIGITAL DATA & TIMING, DUAL	EA	26
		PAFZZ		H205 W/LIGHT GUIDES	17297	ISOLATOR, DIGITAL DATA & TIMING, DUPLEX	EA	26
						GROUP 15 FUTURE BAY		
		PDFDD		LBAD-D-51726	21617	CABINET CY-3397A/G (MODIFIED)	EA	1
						GROUP 16 KG-34 BAY		
		PDDFD		LBAD-D-51726	21617	CABINET CY-3397A/G (MODIFED)	EA	
						GROUP 17 COMSEC AUTODIN CKT NO 2 BAY		
		PDDFD		LBAD-D-51726	21617	CABINET CY-3397A/G (MODIFIED)	EA	1
						GROUP COMSEC AUTODIN CKT NO 1 BAY		
		PDDFD		LBAD-D-51726	21617	CABINET CY-3397A/G (MODIFIED)	EA	1
						GROUP 19 TELEPHONE INTERCOM STATION (WEBSTER "TELFTAK")		
		PDDFD		H522-1	64294	TELEPHONE HANDSET ASSEMBLY	EA	1
		PDDFD		2906AT	64294	INTERCOMM-SPEAKER AMPLIFIER ASSEMBLY	EA	1

APPENDIX F

OPERATION AND MAINTENANCE

OF SOLA CVDC POWER SUPPLY

TYPE 28-1561-2

F-l. 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.

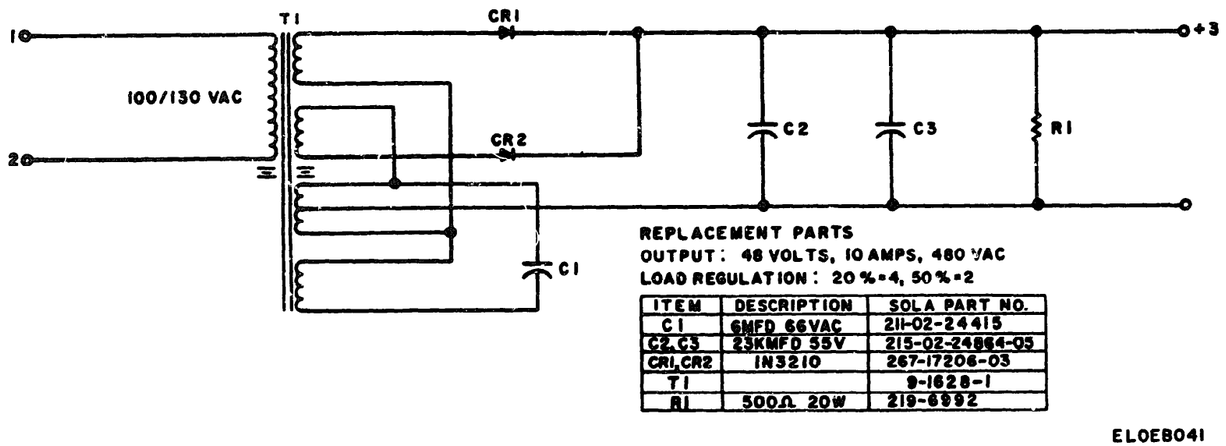
The power supply consists of a constant voltage transformer (described in greater detail under principles of operation), a rectifying means and a filter circuit. The transformer not only converts the incoming line voltage to the desired level, but also is the regulating means. The rectifiers, by use 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% RMS. The nominal output voltage tolerance is ±1% at nominal input voltage and full load. The output voltage is regulated to ±1% 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.

F-2. Principles of Operation (Figure F-I)

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 ap proaches saturation due to the capacitative load connected across the secondary winding.



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

Figure F-l. Sola CVDC Power Supply 28-1561-2, Schematic Diagram.

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.

F-3. Maintenance

This regulated power supply is designed for continuous, unattended operation. Little or no maintenance is required. If due to a component failure maintenance is required, be sure to shut off line voltage prior to performing any repair operations. Discharge any residual charge on the dc filter capacitors by connecting a jumper across the output terminals or across the dc capacitor terminals, or allow at least one minute to elapse after shutting off line voltage to permit the capacitors to discharge. The energy stored in these capacitors could be harmful or fatal to personnel.

F-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	Probable trouble	Corrective action
Output voltage too high	a Load current less than minumum 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 Replace
	e Defective ac capacitor	e Replace
	f Defective rectifier	f Replace
No output voltage	a Open connection	a Check all connections and repair bad connections
	b Open transformer winding	b Replace transformer

APPENDIX G

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

G-l. General

This appendix provides a summary of the maintenance operations for Patch and Test Facility, Letterkenny Army Depot. It authorizes categories of maintenance for specific maintenance functions on repairable items and componenets and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

G-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 corections 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 for 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.

G-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 "work time" 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 "work time" figures will be shown the each category. The number of task-hours specified by the "work time" 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 assure ance/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
I-I-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.

G-4. Tool and Test Equipment Requirements (Sect. 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 applictable 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. Nomenclature. 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.

G-5. Remarks (Sect. 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 G-3)

SECTION II MAINTENANCE ALLOCATION CHART

PATCH AND TEST FACILITY

LETTERFRONT ARMY DEPOT

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT	(6) REMARKS
			C	O	F	H	D		
0 0	PTF/LETTERKENNY AUTOMATED	Inspect		0.5					
	TELECOMMUNICATIONS CENTER	Test		1.0					
	TRANSMISSION FACILITIES AND	Test			2.0			1	
	REMOTE SUBSYSTEMS	Service		0.5				4	
		Repair		1.0				4	
		Repair			4.0			1 thru 4	
0 1	WU MODEM BAY 1.1	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair			4.0			1 thru 4	
0101	CABINET CY-3397A/G (MOD)								
03,	MODEM BAYS 1.3, 1.4, & 1.5	Inspect		0.5					
04,		Test		1.0					
a		Test			2.0			1	
05		Service		0.5				4	
		Repair			4.0			1 thru 4	
0301, 0401,& 0501	CABINET CY-3397A/G (MOD)								
0402	RELAY COMPONENT MODEM	Replace			1.0			1,2, &3	
	(Versitron)	Repair					*		
	* This item will be repaired at Depot level and/or by a commercial contractor until further maintenance data is obtained.								
06	BLACK IDF BAY 1.6	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)								

SECTION II MAINTENANCE ALLOCATION CHART
FOR
PATCH AND TEST FACILITY

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT	(6) REMARKS
			C	O	F	H	D		
0 7	BLACK PATCH BAY 1.7	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair			4.0			1 thru 4	
0701	CABINET CY-3397A/G (MOD)								
0702	MULTI-CIRCUIT PATCH PANEL (Panel 1, Circuits 1 to 16)								
		Replace			0.5			2 & 3	
		Repair			1.0			1 thru 4	
0703	MULTI-CIRCUIT PATCH PANEL (Panel 2, Circuits 17 to 32) Same as 0702								
0704	MULTI-CIRCUIT PATCH PANEL (Panel 3, Circuits 33 to 48) Same as 0702								
0705	LO-LEVEL DC PATCH PANEL (No. 1)	Replace			0.5			2 & 3	
		Repair			1 0			1 thru 4	
0706	LO-LEVEL DC PATCH PANEL (No. 2) Same as 0705								
0707	MISC PATCH PANEL	Replace			0 5			2 & 3	
		Repair			1.0			1 thru 4	
0708	INTERBAY PATCH PANEL, DC	Replace			0 5			2 & 3	
		Repair			1 0			1 thru 4	
0 8	TEST BAY 1.8	Inspect		0 5					
		Test		1 0					
		Test			2.0			1	
		Service		0 5				4	
		Repair		2.0				4	
		Repair			4.0			1 thru 4	
0801	CABINET CY-3397A/G (MOD)								

SECTION II MAINTENANCE ALLOCATION CHART

F O R

PATCH AND TEST FACILITY

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQPT	(6) REMARKS
0802	NOISE MEASURING SET	Replace		1.0				4	
	(Northeast TTS-37BR)	Repair					*		
	* For Maintenance Allocation see TM 11-6625-2426-15								
0803	TEST SET (Bert 901)	Replace		1.0				4	
		Repair					*		
	* This item will be commercially repaired								
0804	OSCILLOSCOPE (Textronic R561B)	Replace		1.0				4	
		Repair					*		
	* For Maintenance Allocation see TM 11-6625-1706-15								
0805	TRANSMISSION MEASURING SET	Replace		1.0				4	
	(HP 3550 BR)	Repair					*		
	* For Maintenance Allocation see TM 11-6625-602-15								
0806	MISC PATCH PANEL								
		Replace			0 5			2 & 3	
		Repair			1.0			1 thru 4	
0807	VF INTERBAY PATCH PANEL	Replace			0.5			2 & 3	
		Repair			1.0			1 thru 4	
0808	DC INTERBAY PATCH PANEL	Replace			0.5			2 & 3	
		Repair			1.0			1 thru 4	
09	VF FRAME AND PATCH BAY 1.9	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0 5				4	
		Repair			4.0			1 thru 4	
0901	CABINET CY-3397A/G (MOD)								
0902	DUAL SPEAKER PANEL	Replace			0.5			2 & 3	
		Repair					*		
	* This item will be repaired at Depot level and/or by a commercial contractor until further maintenance data is obtained.								

SECTION II MAINTENANCE ALLOCATION CHART

PATCH AND TEST FACILITY

LETTERKENNY ARMY DEPOT

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT	(6) REMARKS
			C	O	F	H	D		
0903	2W AUDIO PATCH PANEL								
	(Panel 1, Circuits 1 to 12)	Replace			0.5			2 & 3	
		Repair			1.0			1 thru 4	
0904	2W AUDIO PATCH PANEL								
	(Panel 2, Circuits 13 to 24)								
	Same as 0903								
0905	2W AUDIO PATCH PANEL								
	(Panel 3, Circuits 25 to 36)								
	Same as 0903								
0906	2W AUDIO PATCH PANEL								
	(Panel 4, Circuits 37 to 48)								
	Same as 0903								
0907	PATCH PANEL, INTERBAY	Replace			0.5			2 & 3	
		Repair			1.0			1 thru 4	
0908	INTERCOM HANDSET	Replace			0 5				
	(Webster HS-521)	Repair					*		
	* This item will be repaired at Depot level and/or by a commercial contractor until further maintenance data is obtained.								
1 0	MISC EQUIPMENT BAY 1.10	Inspect		0.5					
		Test		1.0					
		Test			2.0			1 & 2	
		Service		0.5				4	
		Repair			4 0			1 thru 4	
1001	CABINET CY-3397A/G (MDD)								
1002	BLANK PANEL W/AUDIBLE ALARM	Replace			0.5			3	
		Repair			1.0			1 thru 4	
1003	BLACK ALARM PANEL	Replace			0.5			2 & 3	
		Repair			1 0			1 thru 4	
100301	CIRCUIT BOARD ASSEMBLY (-48V)								
1004	INTERCOM (Webster R-2812A)	Replace			0.5			2 & 3	
		Repair					*		
	* This item will be repaired at Depot level and/or by a commercial contractor until further maintenance data is obtained.								

SECTION II MAINTENANCE ALLOCATION CHART
FOR
PATCH AND TEST FACILITY
LETTERKENNY ARMY DEPOT

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT	(6) REMARKS
			C	O	F	H	D		
1005	H/L DC PATCH (XMIT)	Replace			0.5			2	
		Repair			1.0			1 thru 4	
1006	H/L DC PATCH (REC)	Replace			0.5			2	
		Repair			1.0			1 thru 4	
1007	48 VDC PWR SUPPLY								
	(Sola 28-1561-2)	Replace			0.5			2	
		Repair					*		
	* This item will be repaired at Depot Level and/or by a commercial contractor until further maintenance data is obtained.								
11	RED SEC PATCH BAY 2.1	Inspect		0.5					
	(SECURE)	Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair			4.0			1 thru 4	
1101	CABINET CY-3397A/G (MOD)								
1102	MULTI-CIRCUIT PATCH PANEL								
	(Panel 1, Circuits 1 to 16)	Replace			0.5			2 & 3	
		Repair			1.0			1 thru 4	
1103	MULTI-CIRCUIT PATCH PANEL								
	(Panel 2, Circuits 17 to 32)								
	Same as 1102								
1104	MULTI-CIRCUIT PATCH PANEL								
	(Panel 3, Circuits 33 to 48)								
	Same as 1102								
1105	DC L/L PATCH PANEL W/O CK & LP	Replace			0.5			2 & 3	
	(XMIT)	Repair			1.0			1 thru 4	
1106	DC L/L PATCH PANEL W/O CK & LP	Replace			0.5			2 & 3	
	(REC)	Repair			1.0			1 thru 4	
1107	MISC PATCH PANEL	Replace			0.5			2 & 3	
		Repair			1.0			1 thru 4	

SECTION II MAINTENANCE ALLOCATION CHART
FOR
PATCH AND TEST FACILITY
LETTERKENNY ARMY DEPOT

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQPT	(6) REMARKS
12	RED ODF BAU 2.?	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair			4.0			1 thru 4	
1201	CABINET CY-3397A/G (MOD)								
13	RED UNSEC PATCH BAY 2.3	Inspect		0.5					
	(UNSECURE)	Test		1.0					
		Test			2.0			1	
		Service		0 5				4	
		Repair			4.0			1 thru 4	
1301	CABINET CY-3397A/G (MOD)								
1302	BLANK PANEL W/AUDIBLE ALARM	Replace			0.5			3	
		Repair			1.0			1 thru 4	
1303	ALARM PANEL	Replace			0.5			2 & 3	
		Repair			1.0			1 thru 4	
130301	CIRCUIT BOARD ASSEMBLY (-48V)								
1304	MULTI-CIRCUIT PATCH PANEL								
	(Panel 1, Circuits 1 to 16)	Replace			0.5			2 & 3	
		Repair			1.0			1 thru 4	
1305	MULTI-CIRCUIT PATCH PANEL								
	(Panel 2, Circuits 17 to 32)								
	Same as 1304								
1306	MULTI-CIRCUIT PATCH PANEL								
	(Panel 3, Circuits 33 to 48)								
	Same as 1304								
1307	DC L/L PATCH PANEL W/O CK & LP	Replace			0.5			2 & 3	
	(XMIT)	Repair			1.0			1 thru 4	
1308	DC L/L PATCH PANEL W/O CK & LP	Replace			0.5			2 & 3	
	(REC)	Repair			1.0			1 thru 4	
1309	MISC PATCH PANEL	Replace			0.5			2 & 3	
		Repair			1.0			1 thru 4	

SECTION II MAINTENANCE ALLOCATION CHART

F O R

P A T C H A N D T E S T F A C I L I T Y

L E T T E R K E N N Y A R M Y D E P O T

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQPT.	(6) REMARKS
1310	48 VDC PWR SUPPLY (Sola 28-1561-2) * This item will be repaired at Depot Level and/or by a commercial contractor until further maintenance data is obtained.	Replace			0.5			2	
		Repair					*		
14	RED/BLACK ISOLATOR BAY 2.4	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)								
15	FUTURE BAY 3 1	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)								
16	KG-34 BAY 3.2	Inspect		0.5					
		Test		1.0					
		Test			2.0			1	
		Service		0.5				4	
		Repair			4 0			1 thru 4	
1601	CABINET CY-3397A/G (MOD)								
17	COMSEC AUTODIN CKT NO. 2 BAY 3.3	Inspect		0.5					
		Test		1 0					
		Test			2.0			1	
		Service		0 5				4	
		Repair			' 0			1 thru 4	
1701	CABINET CY-3397A/G (MOD)								

SECTION II MAINTENANCE ALLOCATION CHART

F O R

PATCH AND TEST FACILITY

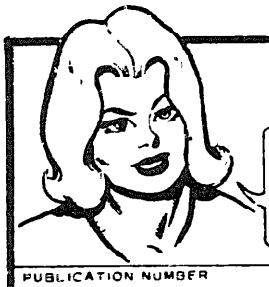
LETTERKENNY ARMY DEPOT

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	O	F	H	D	(5) TOOLS AND EQPT	(6) REMARKS
1 8	COMSEC AUTODIN CKT NO. 1 BAY 3.4	Inspect		0.5					
		Test		1 0					
		Test			2.0			1	
		Service		0.5				4	
		Repa r			4 0			1 thru 4	
1801	CABINET CY-3397A/G (MOD)								
19	TELEPHONE INTERCOMM STATION	Inspect		0.5					
	(Webste: "Telstalk")	Test					*		
	* This item will be repaired at Depot	Service		0.5				4	
	Level and/or by a commercial con-	Replace			1 0			1,2, & 3	
	trsctor until further maintenance	Repair					*		
	data is obtained.								

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
PATCH AND TEST FACILITY
LETTERKENNY ARMY DEPOT

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	

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS



SOMETHING WRONG WITH THIS MANUAL?

THEN JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM (YOUR UNIT'S COMPLETE ADDRESS)
Commander
United States Army Element
ATTN: AMSEL-MS
Stateside, N.J. 07703

DATE 11 July 1975

PUBLICATION NUMBER	DATE	TITLE
TM 11-5840-329-12	1 Jan 74	Radar Set AN/PPS-76

BE EXACT PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT.
PAGE NO	PARA GRAPH	FIGURE NO	TABLE NO	
3-5	-			Recommend that the installation antenna alignment procedure be changed to read to specify a 2° IFF antenna beamwidth and 1°.
				REASON: Experience has shown that with only a 1° lag, the tracker servo system is too sensitive to wind gusts 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.
3-12	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.
3-6	-			Add new step f. to read, "Replace cover plate removed in step e.1, above."
				REASON: To replace the cover plate.
		3		Zone C 3 on J1-C, change "+24 VDC to "+5 VDC."
				REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

TYPED NAME GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE
SSG I. M. DeSpiritof 999-1776	SSG I.M. DeSpiritof

DA FORM 1 AUG 74 2028-2 (TEST)

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HISA 1686-75

TEAR ALONG DOTTED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

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FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER	DATE	TITLE

BE EXACT . . PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

TYPED NAME GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE

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DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DOD-314

Commander
US Army Electronics Command
ATTN: DRSEL-MA-Q
Fort Monmouth, New Jersey 07703

TEAR ALONG DOTTED LINE

FOLD BACK

REVERSE OF DA FORM 2028-2 (TEST)

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

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DATE

PUBLICATION NUMBER	DATE	TITLE

BE EXACT PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT
PAGE NO	PARA GRAPH	FIGURE NO	TABLE NO	

TYPED NAME GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE

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RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

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DATE

PUBLICATION NUMBER	DATE	TITLE

BE EXACT. . .PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	

TYPED NAME GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE

DA FORM 1 AUG 74 2028-2 (TEST)

P.S --IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

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Commander
US Army Electronics Command
ATTN: DRSEL-MA-Q
Fort Monmouth, New Jersey 07703

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REVERSE OF DA FORM 2028-2 (TEST)

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
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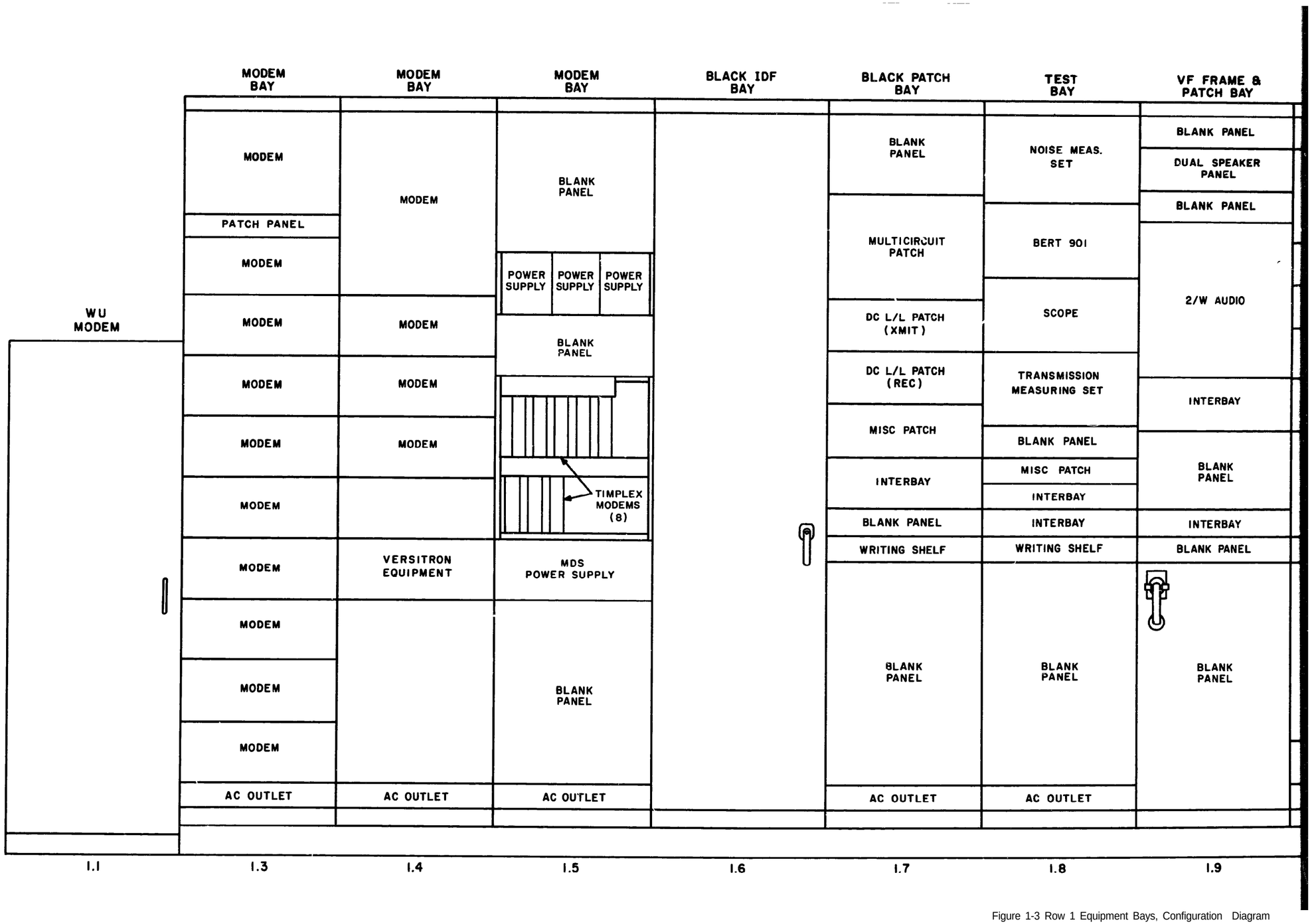

Figure 1-3 Row 1 Equipment Bays, Configuration Diagram

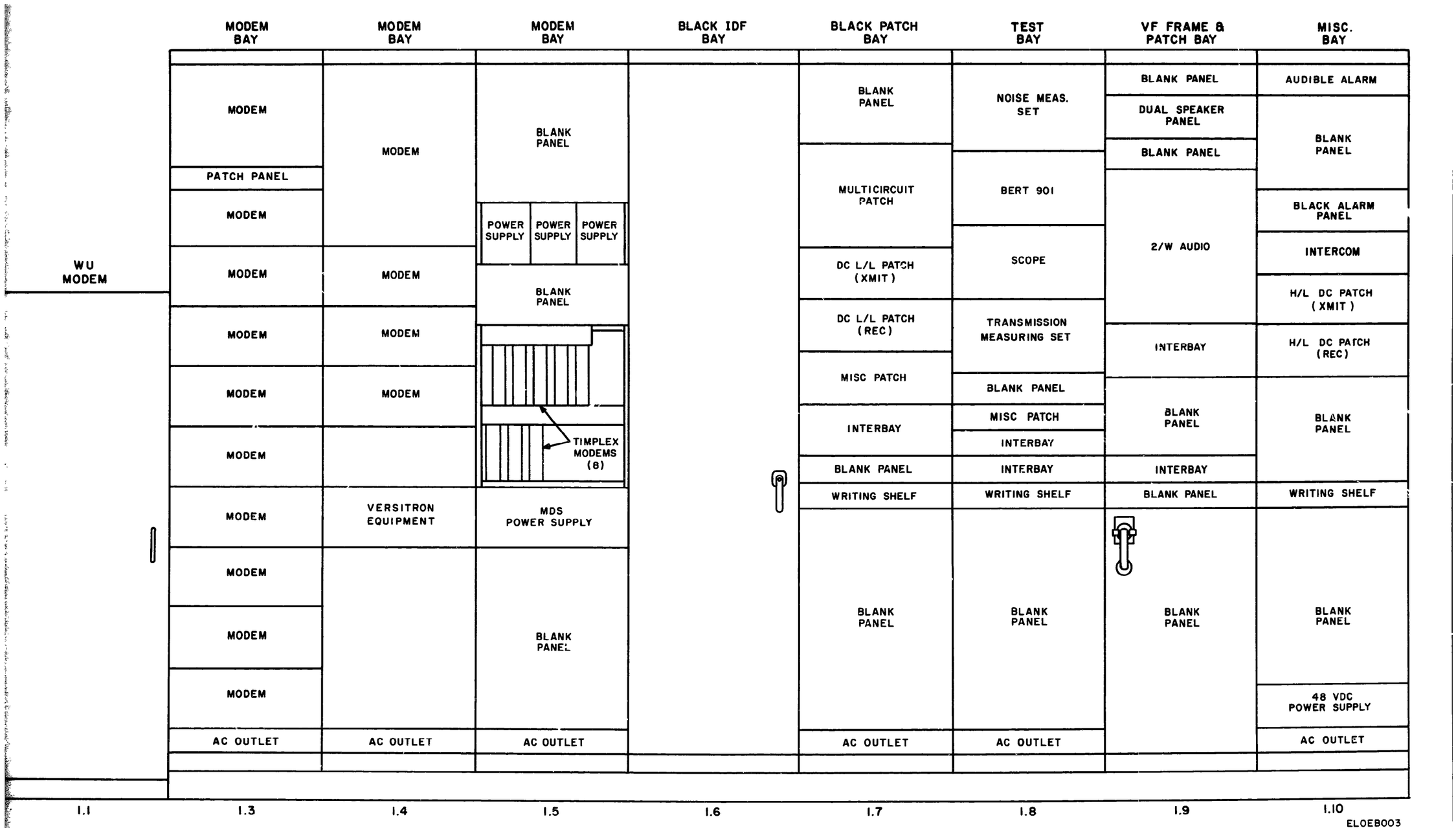

Figure 1-3 Row 1 Equipment Bays, Configuration Diagram

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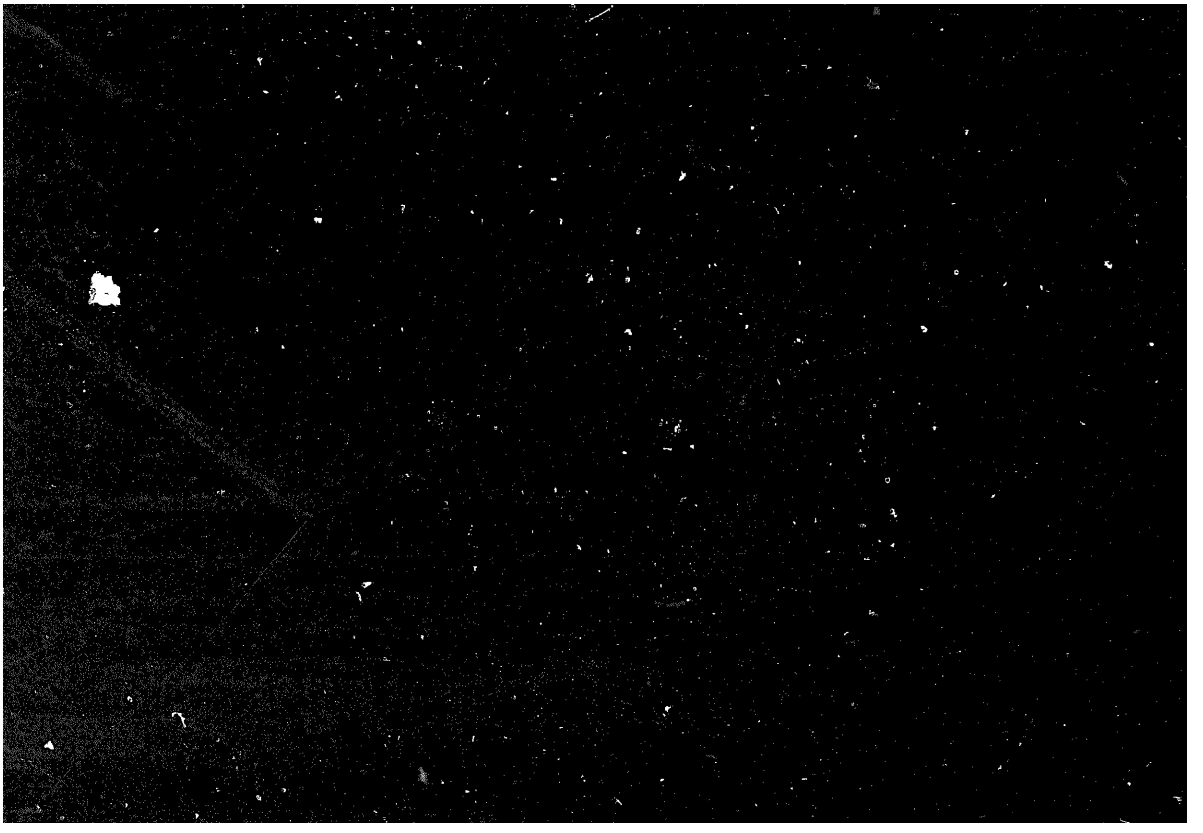

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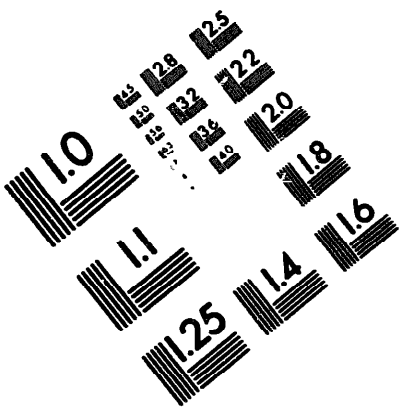

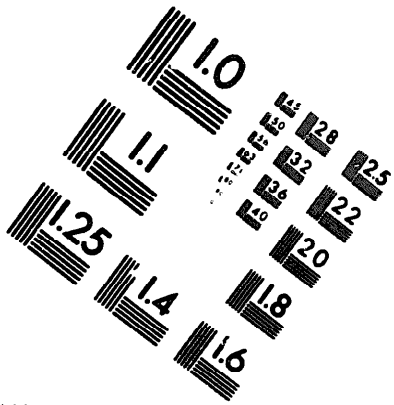

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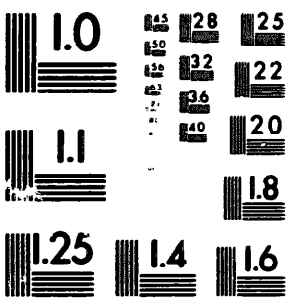

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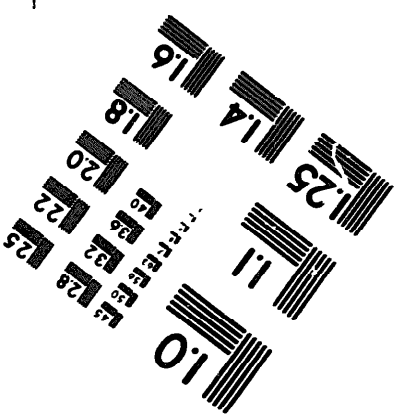

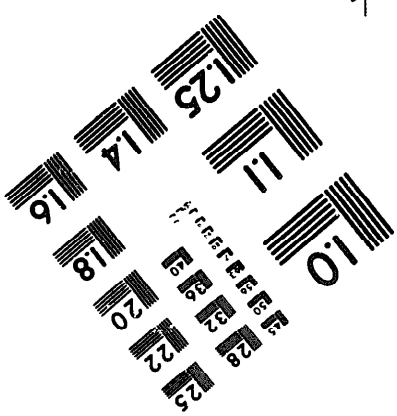

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