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STANDARD ENGINEERING INSTALLATION PACKAGE, LOW LEVEL MODIFICATI--ETC(U)
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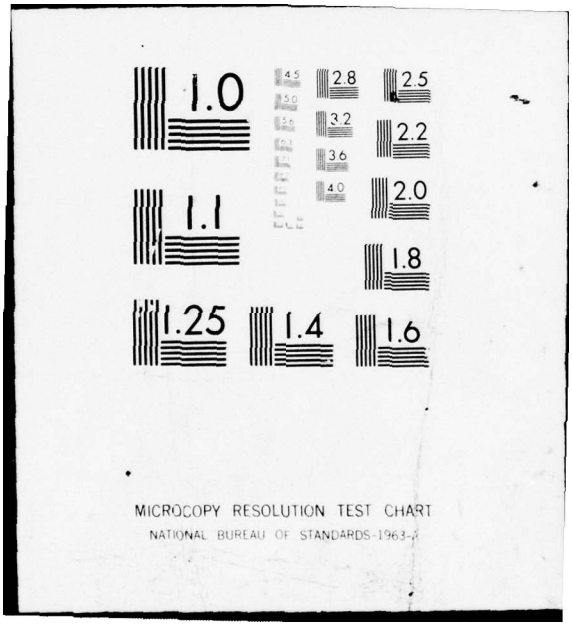
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VOICE OF THE ARMY

STANDARD ENGINEERING INSTALLATION PACKAGE

LOW LEVEL MODIFICATION OF MODE V AUTODIN SUBSCRIBER TERMINAL (OVERSEAS ONLY)

1 JULY 1977

HEADQUARTERS
U. S. ARMY COMMUNICATIONS COMMAND
FORT HUACHUCA, ARIZONA 85613

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REPORT DOCUMENTATION PAGE

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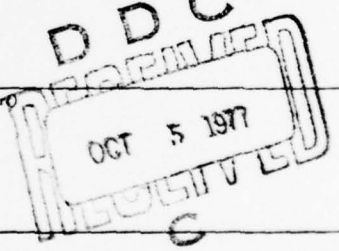

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*
Teletypewriter system AN/FGC-161 or -161X, with asynchronous secure capability and interface with the AUTODIN switching centers. Includes a teletype control unit (TCU), page printer and perforator, transmitter-distributor (TD), and patch and test facility.

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*
This standard engineering installation package (SEIP) assists managers, engineers, technicians, logistics personnel and project officers to plan, engineer, install, and modify low level MODE V AUTODIN subscriber terminals (overseas). Document provides system description along with technical functional information of main equipment. It contains a list of applicable documents, provides a checklist for site surveys, and provides instructions for modification of equipment, to include applicable drawings and bill of materials. (continued)

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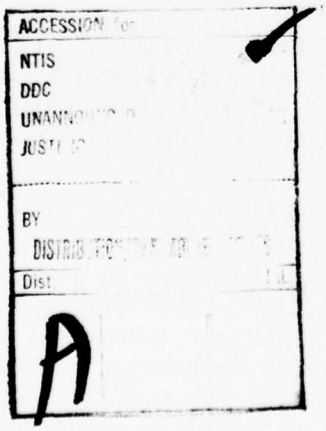
The SEIP describes quality assurance inspections and gives sample forms to ascertain areas of responsibility, checklists, and certification. One section gives a detailed test plan and checkout procedure while the system is in operation and suggests the form for a technical acceptance record. The SEIP also contains a completion certificate that verifies the project has met all test criteria.



DEPARTMENT OF THE ARMY
HEADQUARTERS, US ARMY COMMUNICATIONS COMMAND
Fort Huachuca, Arizona 85613

USACC SEIP
No. 026

1 July 1977

Standard Engineering Installation Package LOW LEVEL MODIFICATION OF MODE V AUTODIN SUBSCRIBER TERMINAL (OVERSEAS ONLY)

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SECTION 1. GENERAL

1.1 BACKGROUND. The US Army Communications-Electronics Engineering Installation Agency (USACEEIA) is responsible for standardization of engineering and installation of telecommunication systems. This document sets the standards to upgrade and modify overseas MODE V terminals only. Standards for the low level teletypewriter system are in USACEEIA SEIP 005, Low Level Teletypewriter Communications Centers.

1.1.1 A major effort in the Army fixed plant environment, during the 1976 to 1980 time-frame, will be to convert the teletypewriter (TTY) and data equipment used in telecommunications centers from high level to low level signaling operation. When the TTY in the MODE V AUTODIN terminal is converted to low level, the low to high converter (AN/UGA-8) must be removed from the system.

1.1.2 The requirement for low level operation is based on the following: DOD Directive S-5200.19, Control of Compromising Emanations; USCB Memorandum, 15 September 1972, subject: TEMPEST Threat Assessment; Army Master Plan Signal Security (AMPSS), 7 August 1972; AR 530-4, Chapter V, Section II; DAFD-ZBG Ltr, 17 February 1973; MIL-HDBK-232; and MIL-STD-188-347.

1.1.3 Project drawings will be prepared and updated in accordance with the applicable configuration management plan. (See USACSA/USACEEIA Pamphlet 70-1, USACSA/USACEEIA Configuration Management Program.)

1.1.4 Each project/site engineer will be responsible for compliance with the configuration management plan.

1.2 PURPOSE AND USE. This document is the standard for all overseas activities engaged in engineering and installing the subject system.

1.3 GENERAL SYSTEM DESCRIPTION.

1.3.1 The system controls and coordinates messages between a TTY terminal equipment and an AUTODIN switching center (ASC). The TTY sends and receives messages asynchronously through a TTY control unit (TCU), an asynchronous security device, and either a telegraph modem or voice frequency carrier terminal (VFCT). The TCU performs the necessary channel control functions and coordinates message traffic with the ASC.

1.3.1.1 Teletypewriter sets. The TTY set consists of a page printer and perforator (including a transmitter-distributor (TD)) which are

usually mounted on a table. Transmission is possible from previously punched tape processed through the TD. Messages are received on both the page printer and the perforator. The TTY set is designed for full-duplex or half-duplex operation over wire lines or radio systems. (In the MODE V application the TTY will be used in full-duplex operation.) Synchronous or series-governed motors can be used on the TTY equipment which allows operation with regulated or unregulated power. The keyboard transmitter and TD in the AN/FGC-161 or -161X each transmit a 7.42 unit code. The signal level for the modified TTY set is: the send line supplies +6 V dc at an impedance of 90 ohms to the TCU; the receive line requires +6 V dc at less than 100 microamperes. Baud rates of 45.45 and 74.2 or 75 can be used.

1.3.1.2 Patch and test facility. The patch and test facility consists of patch panels and test equipment mounted in an equipment rack. The patch panel provides access points for the interchange, test, and monitoring of equipment and circuits within and external to the communications center. A separate patch and test rack is provided for RED and BLACK signal areas.

1.3.1.3 TCU function. The TCU, C-7050/G, controls and coordinates messages between TTY terminal equipment and the ASC. In the overseas AUTODIN system, the low-speed transmit and receive TTY devices send and receive TTY information asynchronously through the TCU (an asynchronous security device) and either a telegraph modem or a direct-current (dc level) converter. Refer to TM 11-5815-335-12.

1.3.2 To satisfy user's low level requirements, the now existing TTY equipment must be modified and converted to meet interface specifications with the TCU. This modification and conversion pertains to organizations outside the Continental United States (OCONUS).

1.3.3 Service/systems requirements are being satisfied by the use of a modification kit, removing the low level signaling unit (LLSU), installing a junction box, and rewiring.

1.3.4 TTY sets AN/FGC-25 or -25X will be converted to the AN/FGC-161 or -161X by installing a modification kit. Since the conversion of the TTY to low level units, the need for the LLSU, AN/UGA-8, is no longer needed or required. Therefore, the LLSU, with its associated power supply, will be removed and replaced with a breeze junction box. The other junction box, located on the rear of the TTY table, will also be modified to accommodate additional fabricated cables. The terminal boards (TB) of the TCU and the red patch must be rewired to properly interface the TB of newly installed breeze junction boxes.

1.3.5 The existing facility includes the TCU, LLSU, red patch panel, and TTY sets (AN/FGC-25 or -25X).

1.3.6 The systems performance requirements must meet those in section 7 of this SEIP. In addition to section 7, the modification of the TTY sets, AN/FGC-25 or -25X, to TTY sets, AN/FGC-161 or -161X, must meet all specifications and operational tests set forth in the modification work order (MWO).

1.4 LIST OF APPLICABLE DOCUMENTS.

(C) DOD Directive S-5200-19	Control of Compromising Emanations (U)
USCB Memorandum	TEMPEST Threat Assessment, 15 Sep 1972
Army Master Plan Signal Security (AMPSS)	
MIL-STD-188-347	Equipment Technical Design Standards for Digital End Instruments and Ancillary Devices
(C) MIL-HDBK-232	RED/BLACK Engineering Installation Guidelines (U)
(S) DAFD-ZBG Ltr	Low Level Conversion of Telecommunications Equipment, 17 Feb 1973 (U)
(C) AR 530-4	Control of Compromising Emanations (U)
MIL-STD-188C	Military Communication System Technical Standards
TM 11-5815-335-12	Teletypewriter Control Unit C-7050/G
TM 11-5815-335-35	Teletypewriter Control Unit C-7050/G
TM 11-5815-244-34	Direct Support and General Support Maintenance Repair Parts and Special Tools lists

TM 11-5815-336-15	Interface Conversion Group AN/UGA-8
CCTM 105-50-21	Telecommunication Engineering-Installation Practices, Installation--General
USACSA/USACEEIA Pam 70-1	Configuration Management Program
MWO 11-5815-244-40-1	Modification of Teletypewriter Sets AN/FGC-25 and AN/FGC-25 (X)
SEIP 005	Low Level Teletypewriter Communications Centers
CCR 702-1-2	USACC Quality Assurance Program for Engineering, Installation, and Acceptance of Communications-Electronics Equipment and Systems
CCCR 702-2	Preparation of Documentation for Test and Evaluation of Communications-Electronics Materiel

1.5 COMMENTS ON PUBLICATION. Users of this publication are invited to submit recommendations for its improvement. Comments should be keyed to the page, paragraph, and line of the text for which the change is recommended. A mailing card for convenience is bound with this SEIP. Comments should be sent directly to the Commander, US Army Communications-Electronics Engineering Installation Agency, ATTN: CCC-CED-SEP, Fort Huachuca, Arizona 85613.

SECTION 2. SITE SURVEY DATA AND CHECKLIST

No site survey or checklist is required for this upgrade and modification. Power, air conditioning, and floor plan will not require a change. The physical and electrical characteristics of applicable equipment are listed in table 2-1.

Table 2-1. Equipment Characteristics

Equipment	Size	Ambient operating range	Power input	Access clearance	Weight (lbs)
AN/FGC-161 or AN/FGC-161X	40¼" H 23½" D 40" W	32 to 132 °F (0 to 55 °C)	105 to 125 V ac or 195 to 260 V ac 50 to 60 Hz 440 W	24" front 15" rear	192
KW-26 1 XMT and 1 RCV per rack	84" H 30" D 21" W	-5 to 125 °F (-15 to 51 °C)	115/230 V ac 50 to 60 Hz 1110 W	30" front 15" rear	550
TCU C-7050/G	26¼" H 21" D 19" W		120/230 V ac 50 to 60 Hz 71 W	36" front 36" rear	150

SECTION 3. INSTALLATION SPECIFICATIONS AND INSTRUCTIONS

3.1 GENERAL. The installation specifications and instructions outlined in this section provide standard engineering guidance for use by responsible overseas activities during the engineering and installation phase to convert MODE V AUTODIN subscriber terminals to operation using AN/FGC-161 or -161X TTY sets. AN/FGC-25 or -25X TTY sets, converted to MIL-STD-188C signaling levels by application of MWO 11-5815-244-40-1, are redesignated as AN/FGC-161 or -161X. The installations will be performed in compliance with the listed installation specifications in section 4 and applicable documents listed in 1.4.

3.2 EQUIPMENT TO BE INSTALLED. All major equipment items and changes that will be made include removing the AN/UGA-8, interface conversion group; installing a breeze junction box (BJB); and modifying the TTY sets (AN/FGC-25 or -25X) and the junction box located on the rear of the TTY table.

3.3 INSTALLATION INSTRUCTIONS. The existing MODE V terminal wiring does not provide a maintenance or test capability and cannot be used as an off-line position. The wiring must be restored to normal for bench repair, adjustments, and test and then rewired for MODE V application. The wiring changes included in this SEIP will modify the TTY wiring for use as either MODE V or off-line use. The TTY is changed from off-line to on-line use by moving a cable connector from one receptacle to another. A similarly wired "off-line" receptacle mounted at the maintenance bench will eliminate rewiring of the TTY.

3.3.1 Mode of Operation. The AN/UGA-8 operates as a low level converter to change the AN/FGC-25 or -25X signals to MIL-STD-188C signals used by the TCU. The AN/UGA-8 is also the termination point for interconnect cables between the TCU and the red patch panel. With the conversion of the AN/FGC-25 or -25X to the AN/FGC-161 or -161X, the operation is in the low level signal mode thereby eliminating the requirement for the AN/UGA-8. The BJB will provide interfacing between the TCU and the red patch panel.

3.3.2 Installation Sequence. The procedures required to upgrade the equipment and facilities should be done in a definite order to ensure compliance with the installation drawings. Minor changes may be made to the sequence considering available manpower, material, equipment, and facilities. Coodination between the installers and the using agency must be maintained. The following sequential steps are suggested:

3.3.2.1 At the TCU rack:

a. Remove the AN/UGA-8.

b. Install BJB.

c. Rewire the TCU.

d. Wire the TCU and the red patch panel to the BJB.

3.3.2.2 At the TTY system:

a. Modify the AN/FGC-25 or -25X to the AN/FGC-161 or -161X specifications.

b. Modify the BJB on the rear of the TTY table.

c. Rewire the TD and the perforator.

d. Fabricate cable harness and install.

3.3.3 Detailed Instructions. This paragraph provides general and specific installation instructions for the upgrade and modification of the MODE V AUTODIN subscriber terminals. Drawing COM-TL03-181 shows a typical site as presently installed. Drawing COM-TL03-180 shows the upgrade and wiring diagrams. Drawings referenced are contained in section 4 of this SEIP. Specific installation instructions are as follows:

a. Inventory equipment and installation hardware.

b. Disconnect all ac power to the subscriber terminal.

c. At the TCU rack:

(1) Disconnect all connections to, and remove, the AN/UGA-8 (LLSU) and its associated power supply from the TCU rack. TM 11-5815-336-15 shows the LLSU configurations and should be used for the deinstallation procedures.

(2) Where the AN/UGA-8 was removed, install the BJB on the rear of the rack, in accordance with drawing COM-TL03-180, sheet 1. Ensure that enough space is left between the patch panel and the BJB to access the TB in the BJB.

(3) Connect the TCU signal and ac power cables to the connector on the bottom of the BJB. (If the TCU signal ground cable was terminated in the LLSU, then terminate this cable on the ground bus located in the red patch panel.) Drawing COM-TL03-180 sheet 2 of 2 shows all wiring connections.

(4) Install flex conduit between the ac power "T" condulet on the rack and the side of the BJB. Terminate the ac wiring on the TB in the BJB.

(5) Remove the signal conduit and cables that are installed between the red patch panel and the LLSU and install flex conduit. Pull in and terminate signal cables on appropriate TB's of units as shown on drawing COM-TL03-180, sheet 2 of 2.

(6) Perform the following wire changes at TB A1A3TB4, located on the rear of the control-indicator panel, C-7094/G (figs. 3-1 and 3-3, TM 11-5815-335-35, 1969 edition):

(a) Remove the straps from terminals 5 and 6 and from terminals 17 and 18.

(b) Install six straps to connect the following terminals: 1 to 3; 5 to 11; 6 to 10; 11 to 17; 13 to 15; and 18 to 22.

d. At the TTY system:

(1) Convert TTY set AN/FGC-25 or -25X to TTY set AN/FGC-161 or -161X, using modification kit, MK-16321 FGC. Test the newly converted TTY set for operations and specifications in accordance with the MWO.

(2) Punch two each, 1-3/8 inch holes in the top of the junction box mounted on the rear of the TTY table to mount the MODE V and "off-line" connector receptacles. If the cable installed between the BJB and the patch panel has sufficient slack to permit termination on the MODE V receptacle, it may be reused, if not, pull in a new 6-pair cable and terminate on the patch panel and the receptacle. Install jumpers on the MODE V and "off-line" receptacles and mount the receptacles in the BJB.

(3) Six cables must be fabricated to interconnect the TTY components and the connector plug. Use only 2-pair (individually shielded) and 3-conductor (shielded) cable. Cut and mark the cables as follows:

(a) Cable 1, 2-pair, 4 feet 6 inches, perforator to connector.

(b) Cable 2, 3-conductor, 4 feet 6 inches, perforator to connector.

(c) Cable 3, 2-pair, 5 feet 6 inches, TD to connector.

(d) Cable 4, 3-conductor, 5 feet 6 inches, TD to connector.

(e) Cable 5, 2-pair, 6 feet, S216 on perforator to connector.

(f) Cable 6, 2-pair, 5 feet 6 inches, page printer to perforator. NOTE: Lengths may vary depending on location of junction box on TTY table. Check lengths required before cutting.

(4) Terminate cables 1 through 5 on the MS-3106A24-28P connector. Install shrinkable tubing over cables at connector end and assemble connector using the rubber bushing and cable clamp.

(5) Apply spiral wrap over the cables to the point of entry into the perforator.

(6) Cables 1, 2, 5, and 6 enter the perforator through the cable access port located at the right rear side of the perforator.

(7) Apply spiral wrap over cables 3, 4, and 6 from the right rear of the perforator to point where cables 3 and 4 leave the harness for connection to the TD. Continue the spiral wrap on cable 6 to the point of entry into the page printer.

(8) Remove the TD from the perforator and make the following changes on TB 202:

(a) Transfer the brown/white lead of L201 (clutch magnet) from terminal 3 to terminal 6.

(b) Transfer the green/red lead of L201 from terminal 4 to terminal 7.

(c) Transfer the brown/black lead connected to the common (C) contact of switch S-205 (start-stop switch) from terminal 3 to terminal 9.

(d) Transfer the red/black lead connected to normally closed (NC) contact of S-205 from terminal 4 to terminal 8.

(e) Install a new lead between the normally open (NO) contact of S-205 and terminal 10.

(f) Ground terminals 3 and 11 to the chassis of the TD.

(g) Before reinstalling the TD on the perforator, cut an opening in the left rear corner of the bottom plate of the TD to provide an entrance for cables 3 and 4.

(9) Perform the following wiring changes on TB2 located in the page printer terminal box:

(a) Remove the blue/yellow jumper from terminals 1A and 2A.

(b) Remove the brown/yellow wire from terminal 3A and the orange/black wire from terminal 4A. Using an ohmmeter, measure the resistance between the two wires. It should be 940 ohms or infinity. Start the motor and depress a key on the keyboard. The ohmmeter needle should fluctuate, indicating transmitter contact opening and closing. If no fluctuations are observed, check the two remaining wires on terminal 3 and 4 for contact closures.

(c) Connect the brown/yellow wire, which indicates fluctuations, to terminal 1A and the orange/black wire to terminal 2A. The two other wires will remain on terminals 3B and 4B. This wiring change puts the TD contacts and page printer contacts in series so that both may be used for transmitting.

(10) Cable harness terminations.

(a) Prepare the six cables of the cable harness for terminations on the TTY terminal boards. Leave sufficient slack in all cables to permit movement of TTY components during maintenance or repair.

(b) Terminate all wires and shields as shown on the interconnect of drawing COM-TL03-180, sheet 2 of 2.

(c) Terminate cables 1, 2, and 6 on TB A1TB1 of the perforator terminal box.

(d) Cable 5 is terminated on switch S-216 located under the perforator blank tape supply reel. Disconnect the TTY cable from S-216. Connect the red wire of CA-5 to the NC contact and the black wire to the C contact of S-216. Splice shield of CA-5 to the shield of TTY cable.

(e) Terminate cable 3 and 4 on TB TB202 of the TD.

(f) Terminate cable 6 on TB A1TB1 of the page printer terminal box.

(g) Secure cable harness to TTY components and TTY table using tie raps and/or cable clamps.

(h) Strap off line receptacle plug as shown on the drawing.

e. The following local tests are not intended to replace section 7 of the SEIP but will provide installation and local maintenance personnel a check of electrical wiring for proper operation of TTY equipment.

(1) Insert the TTY cable plug in the "off-line" receptacle. All features of the TTY should operate normally except the out-of-tape buzzer, i.e., the page printer and perforator will receive from either the TD or the keyboard and the tight tape switch of the TD will control operation of the TD.

(2) To test TTY for correct operation as a MODE V terminal, transfer the TTY cable plug from the "off-line" receptacle to the MODE V receptacle. Ensure that TTY being tested is wired normal-through or patched to the TCU at red patch panel. Perform tests sequence number 26 through 31 listed in Chapter 5, paragraph 6, Change 2 to TM 11-5815-355-12; Organizational Maintenance Manual, TTY Control Unit C-7050/G. Successful completion of these tests indicates correct operation of all circuits between the TCU and the TTY.

3.3.4 Cutover Information. Sequential steps required to make the cutover are developed jointly by the O&M command and USACEEIA.

3.3.5 Equipment Removal Instructions.

a. Remove equipment to be removed as soon as possible after cutover.

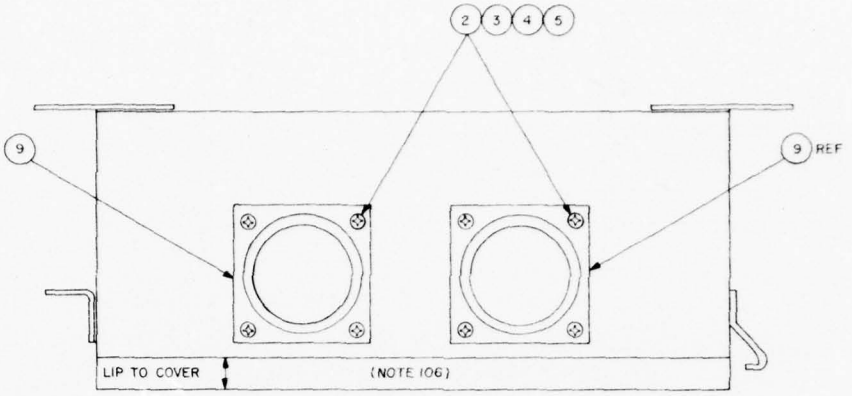
b. Instructions for the movement of any unique equipment should be discussed with the project engineer, installation supervisors, and O&M personnel.

c. All unused cable shall be removed from the communication center.

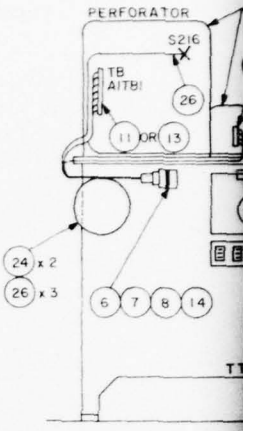
SECTION 4. ENGINEERING INSTALLATION DRAWINGS

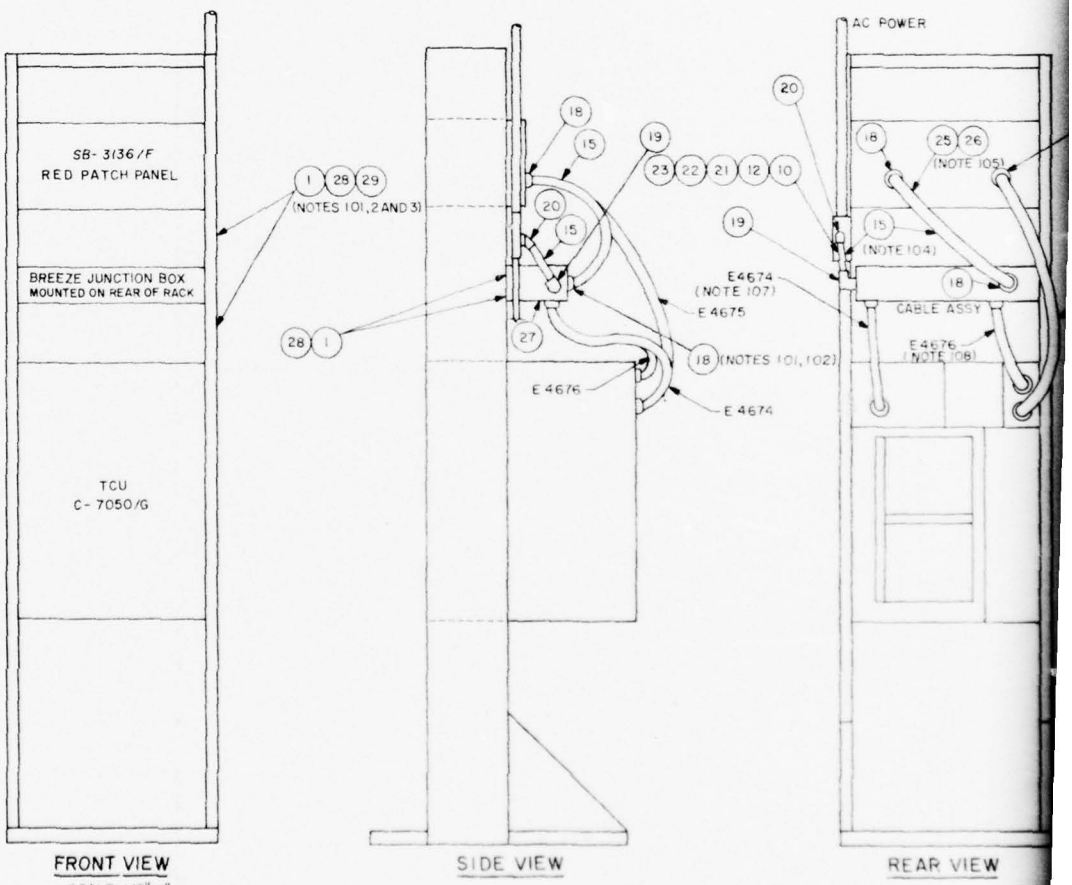
This section of the SEIP contains all drawings required for installation and checkout in a typical situation. Details of installation are provided as completely as possible but do not repeat CCTM 105-50-21.

COM-TL03-180	(2 sheets)	Typical Low Level Mode V AUTODIN Teletypewriter Subscriber Terminal
COM-TL03-181	(3 sheets)	Typical Low Level Mode V AUTODIN Teletypewriter Subscriber Terminal "As Installed"



DETAIL A
TOP VIEW
6"x 8"x 3 1/2" JB
FULL SIZE





FRONT VIEW
SCALE 1/8"=1"

SIDE VIEW

REAR VIEW

REVISIONS				
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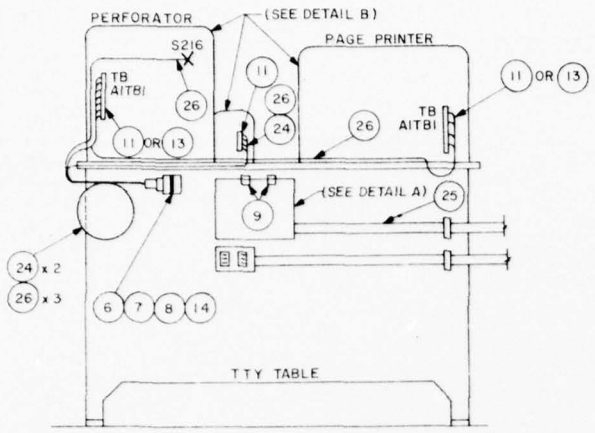


NOTES:

101. INSTALL BREEZE JB ON REAR OF RACK APPROX MIDWAY BETWEEN RED PATCH AND TCU. LEAVE SUF SPACE BETWEEN RED PATCH AND JB TO ACCESS TERMINAL BOARDS IN JB.

102. CONNECT TCU POWER AND SIGNAL CABLE ASSY TO RECEPTACLES ON BOTTOM OF JB.

103. IF TCU SIGNAL GND CABLE WAS CONNECTED TO LLSU, RETERMINATE ON PATCH PANEL. CONNECT GND LEADS TO GND BUS IN PATCH PANEL. IF GND CABLE WAS FORMERLY CONNECTED TO PATCH PANEL OR JB ON SIDE OF RACK, LEAVE AS IS.

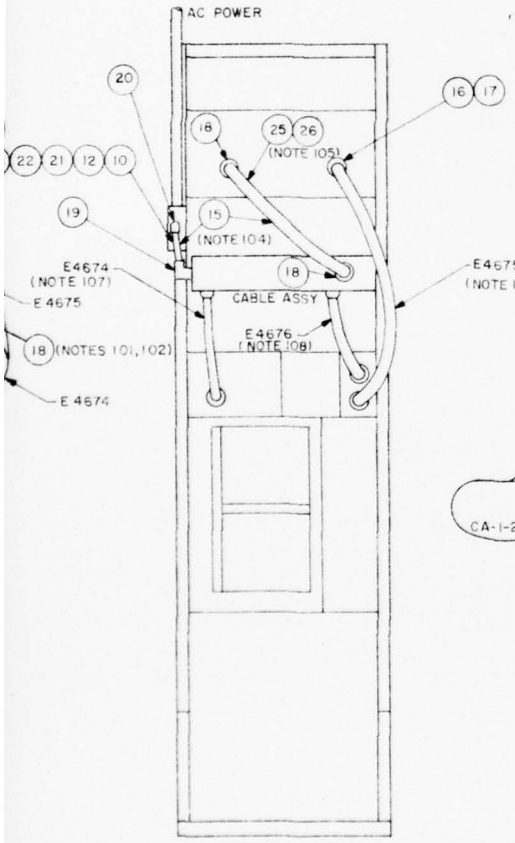
104. INSTALL 3/4" FLEX CONDUIT BETWEEN AC PWR "T" CONDULET ON SIDE OF RACK AND SIDE OF BREEZE JB. TERMINATE AC PWR ON TB IN JUNCTION BOX CONNECTIONS ARE SHOWN ON WIRING SCHEM (COM-TL03-108, SH 2 OF 2).

105. REMOVE CONDUIT AND SIGNAL CABLES FORMERLY INSTALLED BETWEEN AN/UGA-8 AND PATCH PANEL. INSTALL 3/4" FLEX CONDUIT BETWEEN PATCH PANEL AND JB. TERMINATE NEW SIGNAL CABLES AND GROUND LEAD IN PATCH PANEL AND JB CONNECTIONS ARE SHOWN ON WIRING SCHEMATIC.

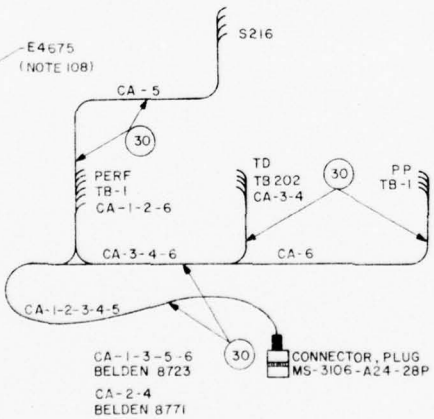
106. PUNCH 1 3/8" HOLES IN JB MOUNTED ON REAR OF TTY TABLE TO MOUNT RECEPTACLES. IF CABLE INSTALLED BETWEEN PATCH PANEL AND JB HAS SUFFICIENT SLACK IT MAY BE TERMINATED ON MODE V RECEPTACLE. IF NOT PULL IN NEW 6 PR CABLE AND TERMINATE IN PATCH PANEL AND ON RECEPTACLE. INSTALL JUMPERS ON MODE V AND POKER RECEPTACLE AND MOUNT IN JUNCTION BOX. WIRE AND JUMPER CONNECTIONS ARE SHOWN ON WIRING SCHEMATIC.

107. BREEZE CABLE E4674 AND BREEZE JUNCTION BOX NO 1299-69-10 ARE FURNISHED AS ONE UNIT.

108. E4675 AND E4676 ARE PRESENTLY IN THE SYSTEM AND ARE USED FOR THE MODIFICATION.



REAR VIEW

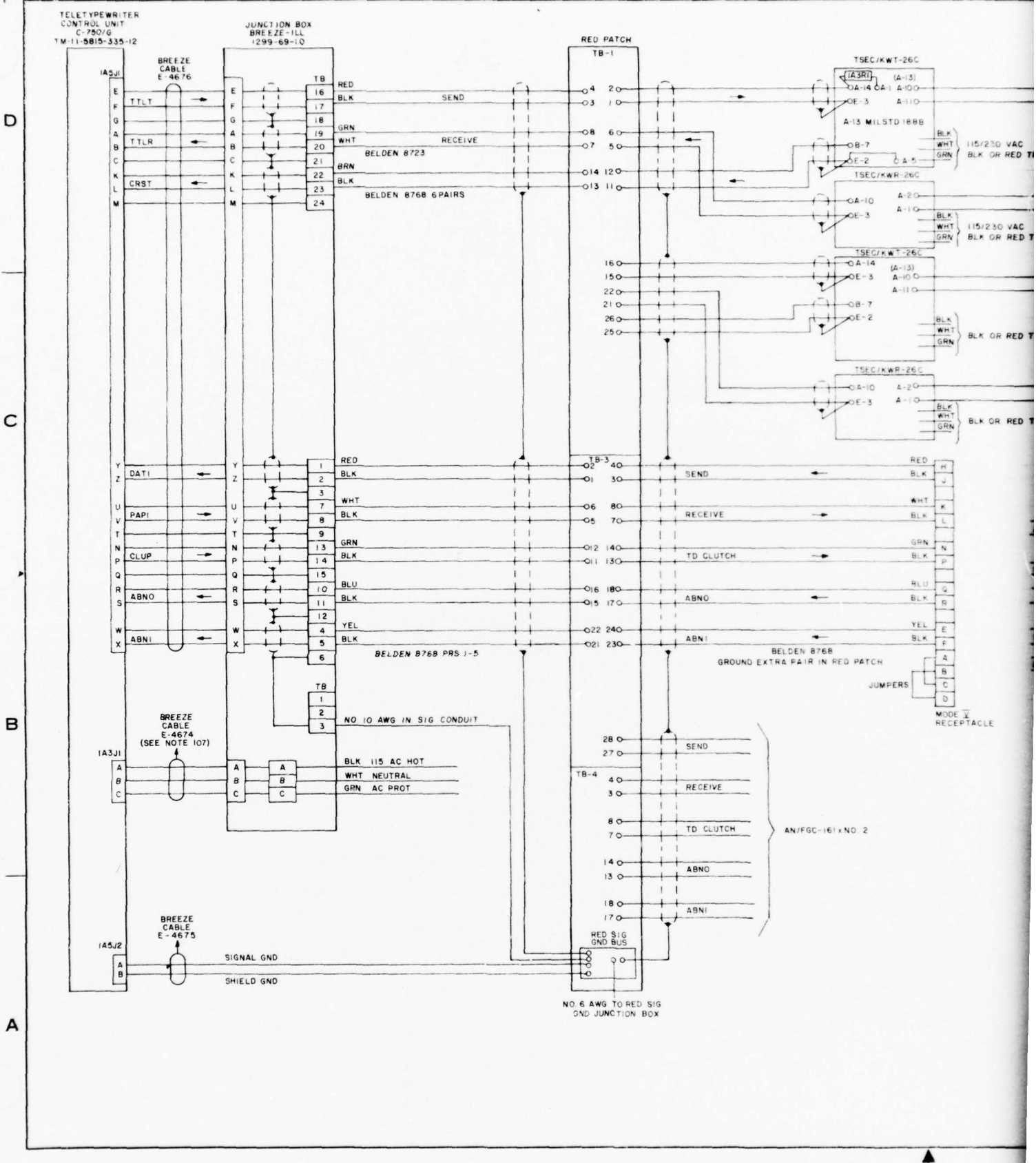


DETAIL B

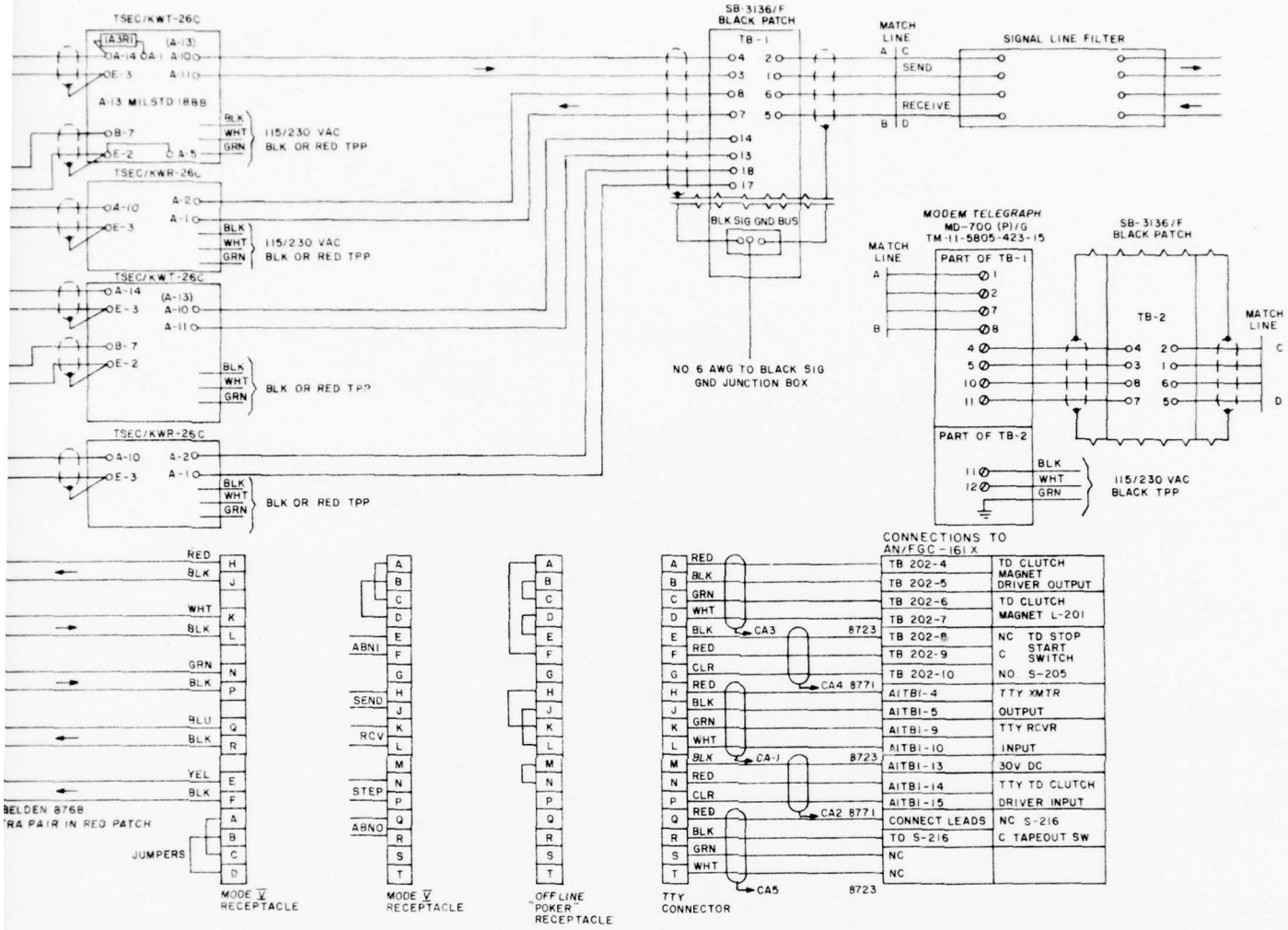
ITEM	DESCRIPTION	PART NO / NSN	UI	QTY
30	WRAPPING, SPIRAL, PANDUIT NR T25F	9330-00-016-3597	PG	AR
29	PANEL, BLANK, 5 1/4"	5975-00-243-1324	EA	2
28	WASHER, FINISHING, NO 10	5310-00-595-5028	EA	8
27	BOX, JUNCTION, (AELONLY 09610M), BREEZE	1299-69-10	EA	1
26	CABLE, 2 PR, SHIELDED	6145-00-957-8519	FT	AR
25	CABLE, 6 PR, SHIELDED	6145-00-866-2306	FT	AR
24	CABLE, 3 COND, SHIELDED	6145-00-846-9798	FT	AR
23	WIRE, 14 AWG, BLACK	6145-00-191-2577	FT	AR
22	WIRE, 14 AWG, GREEN	6145-00-191-2571	FT	AR
21	WIRE, 14 AWG, WHITE	6145-00-184-5348	FT	AR
20	ELBOW, FLEXIBLE, 45°, 3/4"	5975-00-995-8165	EA	1
19	ELBOW, FLEXIBLE, 90°, 3/4"	5975-00-904-6222	EA	1
18	CONNECTOR, STRAIGHT, FLEXIBLE, 3/4"	5975-00-801-7411	EA	2
17	NUT, LOCK AN-3066-10	5975-00-180-6079	EA	2
16	CONNECTOR, BOX AN-3064-10	5975-00-263-1100	EA	1
15	CONDUIT, FLEXIBLE, 3/4"	5975-00-087-0758	FT	AR
14	TUBING, SHRINKABLE, 3/4"	5970-00-727-6728	FT	AR
13	LUG, TERMINAL, 14 AWG	5940-00-660-3633	EA	AR
12	LUG, TERMINAL, 22/26 AWG	5940-00-549-5978	EA	AR
11	LUG, TERMINAL, 12 AWG	5940-00-407-2369	EA	AR
10	NUT, WIRE, PT 66 M	5940-00-348-9226	EA	1
9	CONNECTOR, RECP, MS-3102A24-28S	5935-00-721-050	EA	2
8	CLAMP, CABLE, MS-3057-16A	5935-00-280-2353	EA	2
7	CONNECTOR, PLUG, MS-3106A24-28P	5935-00-229-2650	EA	2
6	BUSHING, RUBBER, AN-3420-16A	5365-00-598-5379	EA	2
5	WASHER, LOCK NO 6	5310-00-835-5028	HD	100
4	NUT, HEX NO 6	5310-00-208-5188	HD	8
3	WASHER, FLAT NO 6	5310-00-167-0816	HD	8
2	SCREW, MACHINE 6-32 X 3/8"	5305-00-984-4988	HD	8
1	SCREW, MACHINE 10-32 X 3/8"	5305-00-984-7342	HD	8

LIST OF MATERIALS

	ORGANIZATION: USACEEIA-CED, FORT HUACHUCA, ARIZONA		
DESIGN BY H. DEAN	TYPICAL LOW LEVEL MODE V AUTODIN TELETYPEWRITER SUBSCRIBER TERM. TCU RACK - AN/FGC-161(X) MOD		
DRAFTSMAN C. SCANLON			
CHECKER			
DATE 14 MAR 77			
ORGANIZATION APPROVAL	CODE IDENT NO. 50470	SIZE D	COM-TL03-180
	SCALE NONE		SHEET 1 OF 2


8
7
6
5
D
C
B
A
TELETYPEWRITER CONTROL UNIT C-750/G TM-11-5815-335-12
JUNCTION BOX BREEZE-1LL 1299-69-10
RED PATCH TB-1
BREEZE CABLE E-4676
1A5J1
TTLT
TTLR
CRST
DATI
PAPI
CLUP
ABNO
ABNI
SEND
RECEIVE
BELDEN 8723
BELDEN 8768 6PAIRS
BELDEN 8768 PRS 1-5
TSEC/KWT-26C
TSEC/KWR-26C
A-13 MILSTD 1888
115/230 VAC
BLK OR RED T
TB-3
TD CLUTCH
BELDEN 8768
GROUND EXTRA PAIR IN RED PATCH
JUMPERS
MODE V RECEPTACLE
NO. 10 AWG IN SIG CONDUIT
BREEZE CABLE E-4674 (SEE NOTE 107)
BLK 115 AC HOT
WHT NEUTRAL
GRN AC PROT
TB-4
AN/FGC-161 x NO. 2
BREEZE CABLE E-4675
1A5J2
SIGNAL GND
SHIELD GND
RED SIG GND BUS
NO. 6 AWG TO RED SIG GND JUNCTION BOX

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED



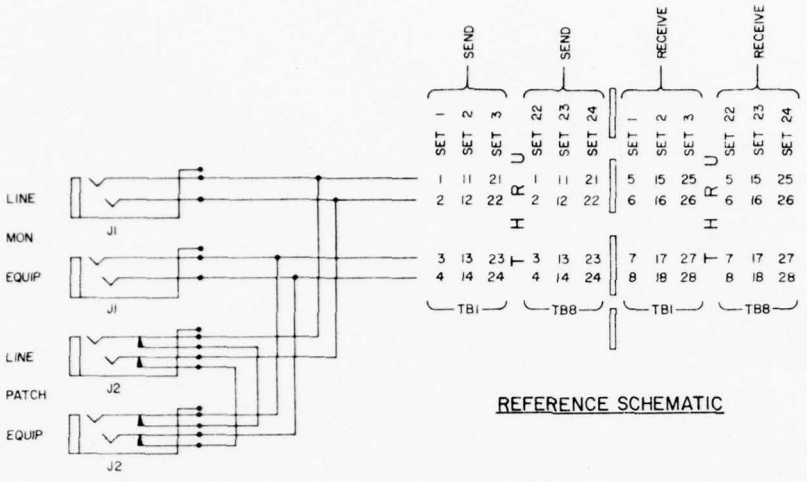
TB 202-4	TD CLUTCH MAGNET DRIVER OUTPUT
TB 202-5	
TB 202-6	TD CLUTCH MAGNET L-201
TB 202-7	
TB 202-8	NC TD STOP
TB 202-9	C START SWITCH
TB 202-10	NO S-205
AITBI-4	TTY XMTR
AITBI-5	OUTPUT
AITBI-9	TTY RCVR
AITBI-10	INPUT
AITBI-13	30V DC
AITBI-14	TTY TD CLUTCH
AITBI-15	DRIVER INPUT
CONNECT LEADS TO S-216	NC S-216 C TAPEOUT SW
NC	
NC	

AN/FGC-161 x NO 2

ITEM	DESCRIPTION	NSN	UI	QTY

LIST OF MATERIALS

	ORGANIZATION: USACEEIA-CED, FORT HUACHUCA, ARIZONA
DESIGN BY H DEAN	TYPICAL LOW LEVEL MODE V AUTODIN TELETYPEWRITER SUBSCRIBER TERM. INTERCONNECT WIRING DIAGRAM
DRAFTSMAN D SCHEER	
CHECKER	
DATE 11 MAR 77	
ORGANIZATION APPROVAL	CODE IDENT NO. 50470 / SIZE D / COM-TL 03-180
	SCALE NONE / SHEET 2 OF 2



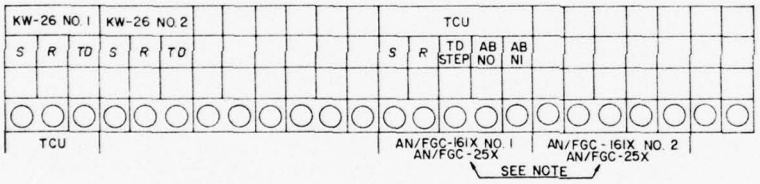
REFERENCE SCHEMATIC

TYPICAL 24 SETS

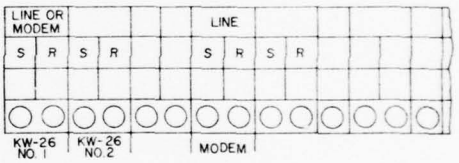
PIN NO.	COLOR
1	BROWN
2	RED
3	ORANGE
4	YELLOW
5	GREEN
6	BLUE
7	VIOLET
8	GRAY
11	WHITE
12	BLACK
13	WHITE/BROWN
14	WHITE/RED
15	WHITE/ORANGE
16	WHITE/YELLOW
17	WHITE/GREEN
18	WHITE/BLUE
21	WHITE/VIOLET
22	WHITE/GRAY
23	WHITE/BLACK
24	WHITE/BLACK/RED
25	WHITE/BLACK/ORANGE
26	WHITE/BLACK/YELLOW
27	WHITE/BLACK/GREEN
28	WHITE/BLACK/BLUE

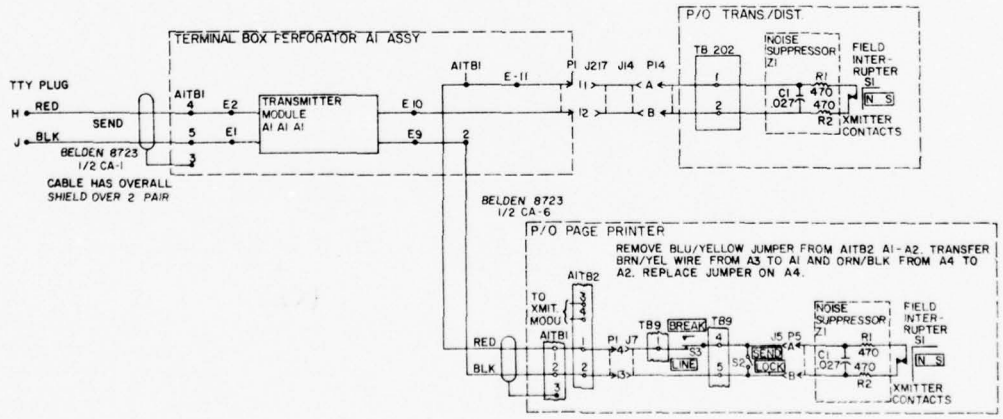
NOTE: ALL JACK INTERCONNECTS ARE BLACK

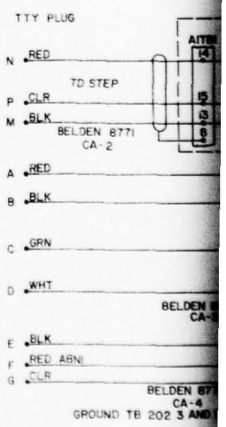
RED PATCH



BLACK PATCH



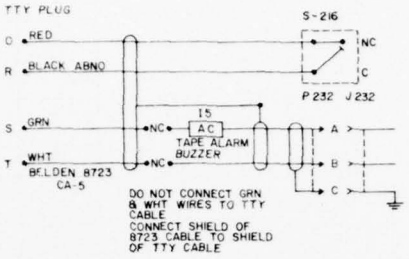




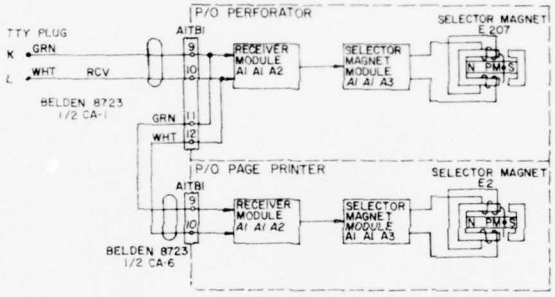
REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED

COLOR
BROWN
RED
ORANGE
YELLOW
GREEN
BLUE
VIOLET
GRAY
WHITE
BLACK
WHITE/BROWN
WHITE/RED
WHITE/ORANGE
WHITE/YELLOW
WHITE/GREEN
WHITE/BLUE
WHITE/VIOLET
WHITE/GRAY
WHITE/BLACK
WHITE/BLACK/RED
WHITE/BLACK/ORANGE
WHITE/BLACK/YELLOW
WHITE/BLACK/GREEN
WHITE/BLACK/BLUE

ACK INTERCONNECTS ARE BLACK



NOTE:
101. INTERCONNECTION WIRING SHOWN ON THIS SHEET IS NOT AFFECTED BY THE AN/FGC 25X CONVERSION TO MODE V LOW LEVEL AN/FGC 161X MODIFICATION AND IS PROVIDED FOR CIRCUIT INFORMATION ONLY.



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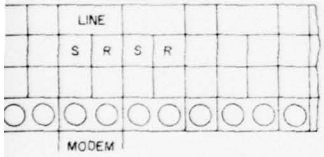
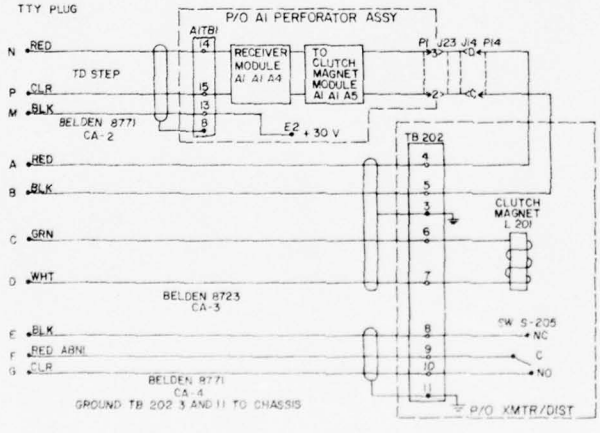
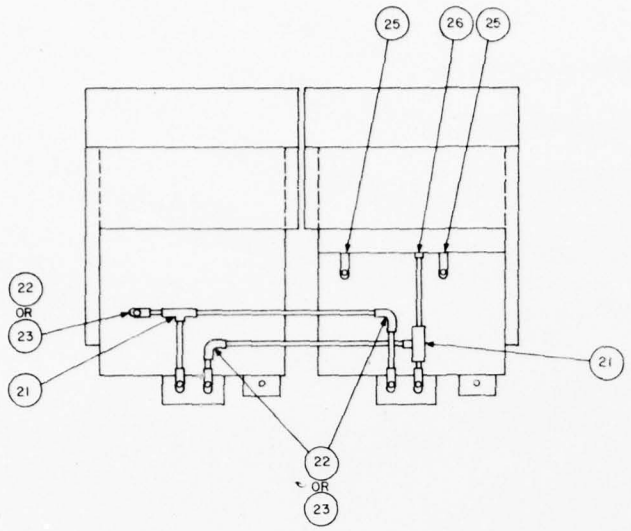


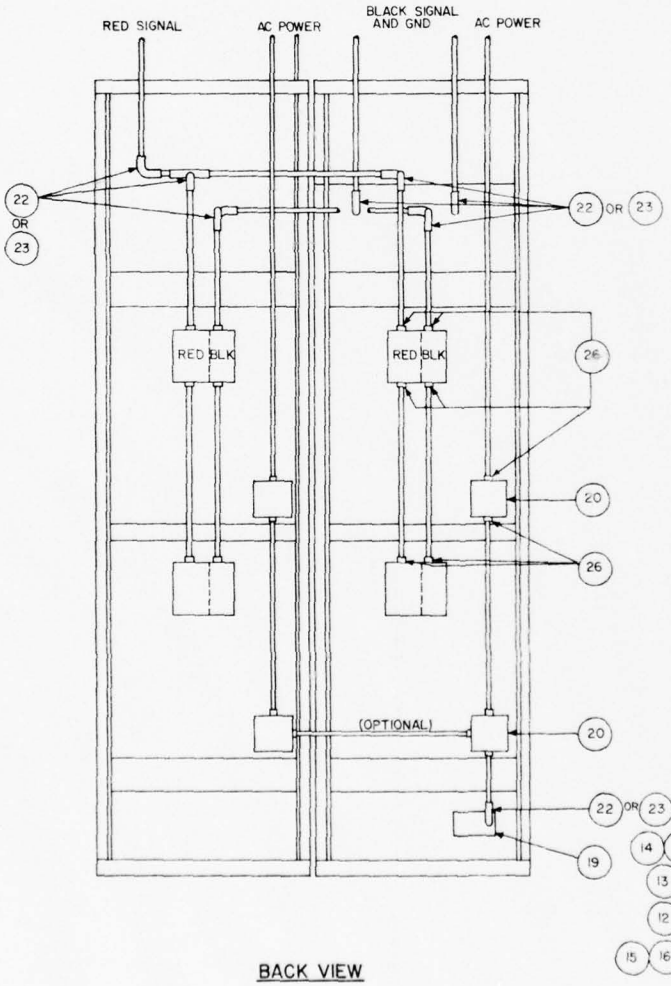


ITEM	DESCRIPTION	NSN	UI	QTY
	LIST OF MATERIALS			

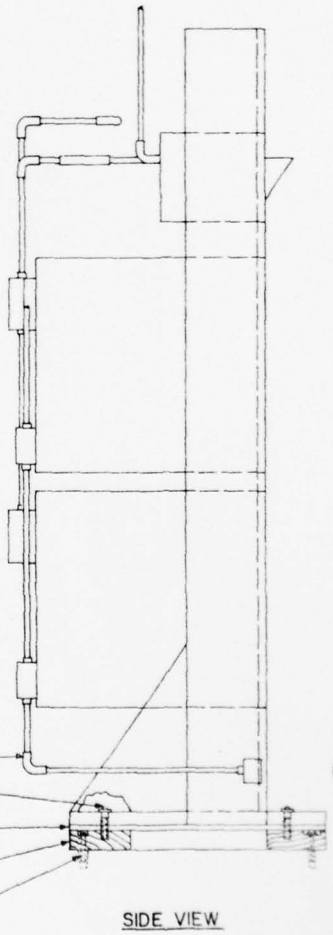
	ORGANIZATION: USACEEIA-CED, FORT HUACHUCA, ARIZONA		
DESIGN BY H. DEAN	TYPICAL LOW LEVEL MODE V AUTODIN TELETYPEWRITER SUBSCRIBER TERMINAL INTERCONNECT WIRING DIAGRAM "AS INSTALLED"		
DRAFTSMAN G. BRENT			
CHECKER			
DATE 10 MARCH 77			
ORGANIZATION APPROVAL	CODE IDENT NO. 50470	SIZE D	COM-TL03-181
	SCALE NONE		SHEET 1 OF 3



TOP VIEW



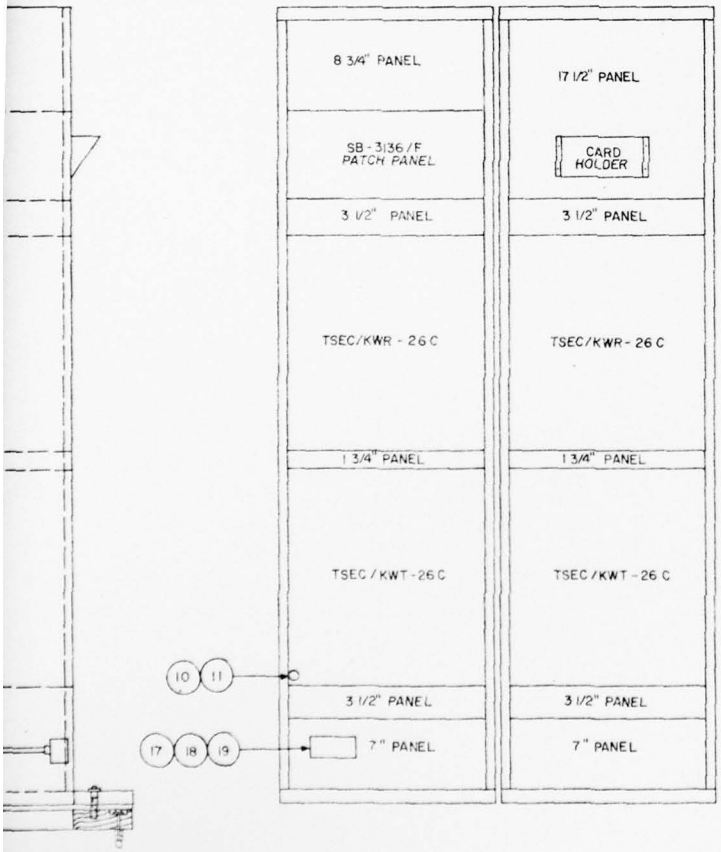
BACK VIEW



SIDE VIEW

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED

NOTE:
201 NO CHANGES REQUIRED FOR TTY EQUIPMENT MODIFICATION.

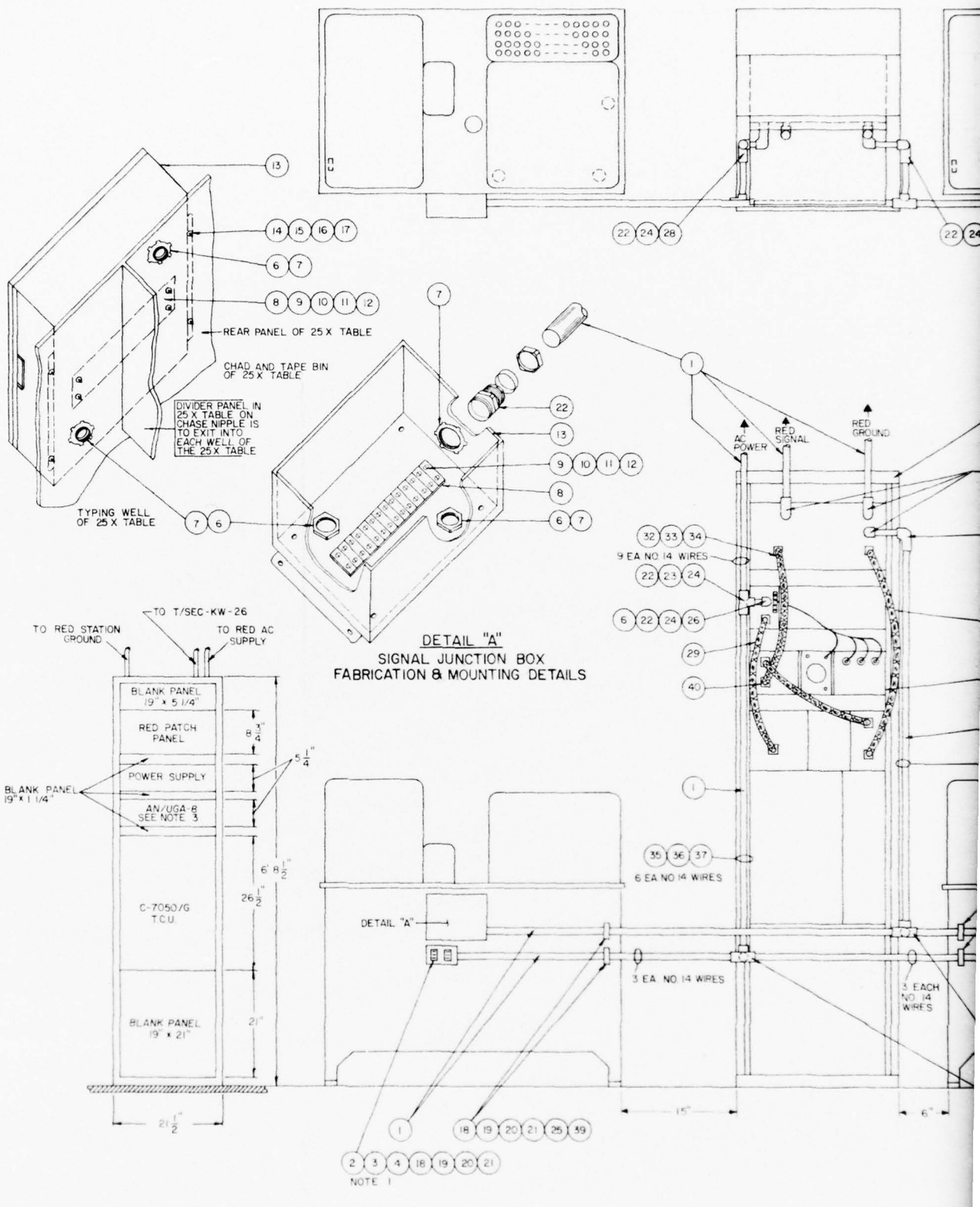


FRONT VIEW

ITEM	DESCRIPTION	NSN	UI	QTY
27	ADAPTER, 3/4" EMT, APPLETON 80T61	5975-00-284-6167		
26	CONNECTOR, BOX 3/4" T&B 5223	5975-00-983-9229		
25	CHASE NIPPLE, 3/4"	5975-00-225-5293		
24	CONDUIT, EMT, 3/4" x 10"	5975-00-178-1217		
23	ELBOW, PULLING, 3/4" APLTN, PEL-37452	5975-00-435-0350		
22	CONDULET, 3/4" LB-28 w/COVER	NOT LISTED		
21	CONDULET, 3/4" T-28 w/ COVER	5975-00-578-4679		
20	JUNCTION BOX, 4 x 4 x 3, HOFFMAN 404 SC	5975-00-467-3999		
19	CONDULET, ELECT, 3/4" HUB FSA-2	NOT LISTED		
18	COVER, CONDULET, DUPLEX OUTLET, DS-23	5975-00-296-0021		
17	AC POWER DUPLEX OUTLET, HUBBEL NO 5262	5935-00-823-0910		
16	SHIELD, EXPANSION, 3/8" LAG BOLT	5304-00-331-5457		
15	SCREW, LAG, 3/8" x 3 1/2"	5306-00-687-6612		
14	WASHER, FLAT 7/16" ID, 11/16" OD	5310-00-809-0940		
13	PLYWOOD, 3/4" x 4' x 8'	5530-00-128-4061		
12	LUMBER, 2" x 6" x 10'	5510-00-220-6244		
11	WASHER, COUNTERSUNK	5310-00-595-7687		
10	SCREW, MACH OVAL HEAD, 10-32 x 1/2"	5335-00-637-7346		
9	CARD HOLDER & CHAN IDENT ASSY	9905-00-933-8117		
8	PANEL, BLANK, 17 1/2" x 19"	5975-00-937-4582		
7	PANEL, BLANK, 8 3/4" x 19"	5975-00-243-1325		
6	PANEL, BLANK, 7" x 19"	5975-00-937-4500		
5	PANEL, BLANK, 3 1/2" x 19"	5975-00-234-4867		
4	PANEL, BLANK, 1 3/4" x 19"	5975-00-221-0570		
3	PANEL, PATCHING, SB-3136/F	5815-00-879-1374		
2	RACK, RR-197	5975-00-527-2533		
1	TSEC/KW-26C	5810-00-986-4276		

LIST OF MATERIALS

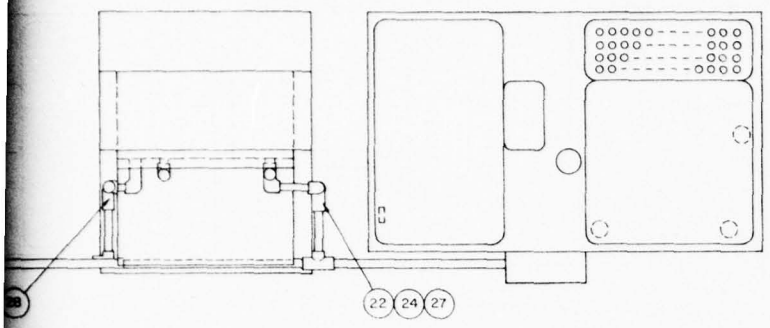
	ORGANIZATION: USACEEIA-CED, FORT HUACHUCA, ARIZONA
DESIGN BY H. DEAN	TYPICAL MODE V AUTODIN TSEC/KW-26C AND BLACK PATCH DETAILS "AS INSTALLED"
DRAFTSMAN G. BRENT	
CHECKER	
DATE 14 MARCH 77	
ORGANIZATION APPROVAL	CODE IDENT NO. 50470 / SIZE D / COM-TL03-181
	SCALE NONE / SHEET 2 OF 3



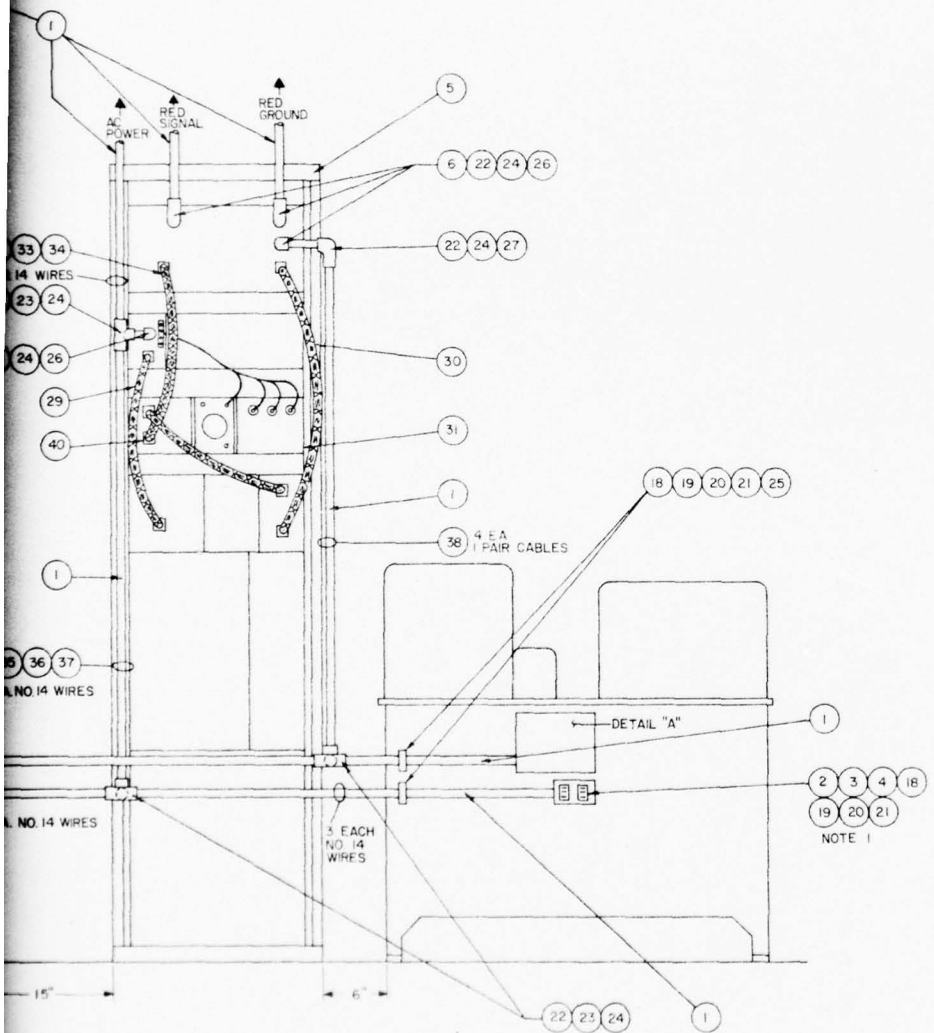
DETAIL "A"
SIGNAL JUNCTION BOX
FABRICATION & MOUNTING DETAILS

5 4 3 2 1

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED



NOTES:
301. AC OUTLET AND CONDUIT OUTLET WILL BE FASTENED TO THE BACK OF 25X TABLE IN THE POSITION SHOWN USING 2 EA-1/4-20 BOLTS.
302. FOR NEW MODE V CALLOUTS THAT HAVE NOT BEEN INSTALLED PREVIOUSLY, THE MODE V INSTALLATION KIT, FSN 5815-00-G38-3653, WILL BE ORDERED IN ADDITION TO BOM ON THIS DRAWING.
303. AN/UGA-8 TO BE REMOVED FOR CONVERSION TO MODE V LOW LEVEL.
304. MATERIALS ARE NOT MAJOR ITEMS AND MAY BE SUBSTITUTED AS REQUIRED.



ITEM	DESCRIPTION	PART NO/NSN	UI	QTY
41	TERMINAL LUG, COPPER, NO. 16-22 AWG, SOLDERLESS			
40	ADAPTER, NIPPLE, 1 3/16"-18 TO 3/4"-14 F/U/W ITEM 32			
39	HANGER, PIPE, F/U/W 3/4" CONDUIT			
38	CABLE, SHIELDED, 1 PAIR NO. 22 AWG, SOLID			
37	WIRE, ELECTRIC NO 14 AWG STRANDED, GRN			
36	WIRE, ELECTRIC NO 14 AWG STRANDED, BLK			
35	WIRE, ELECTRIC NO 14 AWG STRANDED, WH			
34	NUT, LOCK, F/U/W ITEM 32,	AN3066-16		
33	CONNECTOR BOX, F/U/W ITEM 32,	AN3064-16		
32	CONDUIT ASSY, METAL FLEX, BREEZE ILL., ID 3/4" FERRULE COUPLING, 36" LONG NUT SIZE 1 7/16-18 & 1 3/16-18	C223-0750-3600-G3G4		
31	CABLE ASSY, BREEZE ILL	E4676		
30	CABLE ASSY, BREEZE ILL	E4675		
29	CABLE ASSY, BREEZE ILL	E4674		
28	CONDULET, 3/4", C-HINDS	LL-28		
27	CONDULET, 3/4", C-HINDS	LR-28		
26	CONDULET, 3/4", C-HINDS	LB-28		
25	SCREW, MACH, PH, 1/4"-20 x 3/4" STEEL			
24	COVER, 3/4", C-HINDS	280		
23	CONDULET, 3/4", C-HINDS	TB-28		
22	CONNECTOR, 3/4", T & B	5223		
21	NUT, PLAIN HEX, 1/4"-20			
20	WASHER, LOCK, F/U/W 1/4" SCREW			
19	WASHER, FLAT ROUND, F/U/W 1/4" SCREW			
18	SCREW, MACH PH, 1/4"-20 x 1/2" BRASS			
17	NUT, PLAIN HEX, NO 10-32, STEEL, RH THREAD			
16	WASHER, LOCK F/U/W NO 10 SCREW			
15	WASHER, FLAT ROUND, F/U/W NO 10 SCREW			
14	SCREW, MACH PH, NO 10-32 x 1/2" STEEL			
13	JUNCTION BOX, 8"x6"x 3 1/2", HOFFMAN	806LP		
12	NUT, PLAIN HEX, NO 6-32, STEEL, RH THREAD			
11	WASHER, FLAT ROUND, F/U/W NO 6 SCREW			
10	WASHER, LOCK, F/U/W NO 6 SCREW			
9	SCREW, MACH, NO 6-32 x 3/4" BRASS, CS HEAD			
8	TERMINAL BOARD, 12 EA DBL SCREW TERM	38TB12		
7	LOCKNUT, 3/4", T & B	142		
6	CHASE NIPPLE, 3/4", T & B	1943		
5	RACK, PAR METAL	RR-197		
4	COVER, CONDUIT OUTLET, RECEPTACLE, C-HINDS	DS23		
3	RECEPTACLE, ELEC, AC POWER, HUBBELL	5262		
2	CONDULET, OUTLET C-HINDS	FS2		
1	CONDUIT, 3/4" x 10' EMT			

LIST OF MATERIALS

	ORGANIZATION: USACEEIA-CED, FORT HUACHUCA, ARIZONA
DESIGN BY H. DEAN	TYPICAL LOW LEVEL MODE V AUTODIN TELETYPEWRITER SUBSCRIBER TERMINAL TCU RACK AND AN/FGC-25(X) EQUIPMENT "AS INSTALLED"
DRAFTSMAN G. BRENT	
CHECKER	
DATE 16 MARCH 77	
ORGANIZATION APPROVAL	CODE IDENT NO. 50470 / SIZE D / COM-TL03-181
	SCALE NONE / SHEET 3 OF 3

SECTION 5. BILL OF MATERIALS

This section contains a listing of major items and installation materials required to upgrade and modify existing MODE V terminals. The BOM prepared by the project engineer should remain in this section for use by installer personnel.

BILL OF MATERIALS

PROJECT NO.	LOCATION CODE	DRAWING LIST NO.
DATE	UNIT IDENT CODE	SHEET OF

ITEM	NSN	AEL-ID	NOMENCLATURE	UNIT	QTY	REMARKS
1	5815-00-025-9035	11800H	Modification kit, low level conversion, MK-1632/FGC, F/U/W, AN/FGC-25 and AN/FGC-52	ea	ar	MWO 11-5815-244-40-1
2	9330-01-016-3597	07782Y	Spiral Wrapping, Panduit No. T25F	pg	ar	Polyethylene, 1/4" OD
3	NSNR	09610M	Junction box, 19" rack mounted, F/U/W MODE V when LLSU is not used. Breeze No. 1299-69-10	ea	ar	
4	5305-00-984-4988	16031P	Screw mach., pan head, No. 6-32 NCXO, 3-5	hd	ar	
5	5305-00-984-7342	09837C	Screw mach., 10-32 NF, 3/4" lg flat countersink hd, chromated, MS 35191-274	hd	ar	
6	5310-00-167-0816	09439A	Washer, flat steel No. 6	hd	ar	
7	5310-00-208-5188	08908W	Nut, hex, No. 6-32 steel	hd	ar	
8	5310-00-595-7687	14568D	Washer, finishing, 10	hd	ar	
9	5310-00-835-5028	11358F	Washer, lock, internal teeth, No. 6	hd	ar	
10	5340-00-286-9443	09153X	Clamp, loop, alum alloy, spec Fed QQ-A-362.56" ID, MS 21919, WDG9	ea	ar	
11	5340-00-543-4394	13183Y	Clamp loop, F/3/8" cable	ea	ar	
12	5365-00-598-5379	13667E	Bushing, rubber type, AN3420-16A	ea	ar	

USACC

BILL OF MATERIALS

PROJECT NO | LOCATION CODE | DRAWING LIST NO

DATE | UNIT IDENT CODE | SHEET OF

ITEM NO	NSN	AEL NO	NOMENCLATURE	UNIT	QTY	REMARKS
13	5935-00-229-2650	16032Y	Connector, plug, elec, AN3106 A24-28P	ea	ar	
14	5935-00-280-2353	06590X	Clamp, adapter cable, phone line bushing, MS-3057-16A	ea	ar	
15	5935-00-721-0501	16033N	Connector, receptacle, elec, MS-3102R24-28S	ea	ar	
16	5940-00-348-9226	07250X	Joint, wire, for 3 No. 12 AWG wires. T & B No. PT 66M	ea	ar	
17	5490-00-407-2369	02115C	Terminal lug, F/NR. 12 AWG, squeeze grip type, solderless tongue end shape, 5/8" 1 x 5/16" W PG/10	pg	ar	
18	5490-00-660-3633	11918F	Terminal lug, solderless, 14 AWG (10 ea/pg)	pg	ar	
19	5490-00-885-8450	06898A	Terminal lug, solderless, spade tongue, 22-18 AWG, stud size 8, VACO (79061) No. 11310, Hughes-Peters (10423) No. 2402, pg/25	pg	ar	
20	5970-00-727-6728	12846W	Tubing, shrinkable, alpha wire, FIT,221-3/8", std, pkg. C/O 6" lgths. to total 8' clear	ft	ar	
21	5970-00-767-0511	07131Q	Tubing, shrinkable, 3/4" size 6" lg, alpha wire No. 55E9943C (12 per pkg.)	ft	ar	

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BILL OF MATERIALS

PROJECT NO	LOCATION CODE	DRAWING LIST NO
DATE	UNIT IDENT CODE	SHEET OF

ITEM	NSN	AEL-ID	NOMENCLATURE	UNIT	QTY	REMARKS
22	5975-00-074-2072	07456K	Strap, tie down, T & B, TY-25M	hd	ar	
23	5975-00-087-0758	05207D	Conduit, metal flexible, 3/4" stl. inner wall, polyvinyl outer wall, 1.040" OD, T & B type EF	ft	ar	
24	5975-00-263-1100	16026J	Box, connector, aluminum alloy	ea	ar	
25	5975-00-280-6079	16027J	Locknut, elec for 5/8" conduit	ea	ar	
26	5975-00-727-5153	07457J	Strap, tie down, elec T & B No. TY-23M	hd	ar	
27	5975-00-801-7411	05250Q	Box connector, elec 3/4" straight type for flexible conduit, T & B 5333	ea	ar	
28	5975-00-904-6222	02806B	Box connector, elec 3/4" conduit size, 3/4" knockout size, 90 deg angle type, mallcable iron designed for flex. metallic conduit sec. to conn by gland nut	ea	ar	
29	5975-00-937-4501	08711J	Panel, blank, 19" x 5 1/4" x 1/8" par-metal (74156) H-6677	ea	ar	
30	7975-00-995-8167	16028A	Box connector for 3/4" flex conduit, elbow 45 degree	ea	ar	
31	6145-00-184-5348	03509A	Wire, elec, TW, solid 14 WH 600V thermoplastic insul	ft	ar	

USACC [illegible]

BILL OF MATERIALS

PROJECT NO	LOCATION CODE	DRAWING LIST NO
DATE	UNIT IDENT CODE	SHEET OF

ITEM	NSN	AEL ID	NOMENCLATURE	UNIT	QTY	REMARKS
32	6145-00-191-2571	03535D	Wire, elec, TW, solid 14 GR 600V thermoplastic insul	ft	ar	
33	6145-00-191-2577	03540K	Wire, elec, TY, solid 14 BK 600V thermoplastic insul	ft	ar	
34	6145-00-846-9798	16030Q	Cable, SP 4 cond, 22 AWG, strand polyethylene insul	ft	ar	
35	6145-00-866-2306	11502G	Cable, SP, elec, 6 pr 22 AWG, solid, indiv shld prs w/drain wire each PR, Belden 8768	ft	ar	
36	6145-00-957-8519	09218Z	Cable, SP purpose, elec strand 5 C 600V, 22 AWG, alum Belden 8723 Bk, Gr, Rd, Wh	ft	ar	
37	8135-00-634-2941	06638E	Tape, pressure sensitive plastic, red, 1" W x 36 yds PPP-T-0066A	ro	ar	
38	NSNR	07524Z	Marker, wire, Brady No. B-600-CPMM-1-25	bk	ar	

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SECTION 6. QUALITY ASSURANCE

6.1 GENERAL.

6.1.1. Quality assurance evaluation criteria. This quality assurance (QA) inspection will be implemented in accordance with CCR 702-1-2, USACC Quality Assurance Program for Engineering, Installation, and Acceptance of Communications-Electronics Equipment and Systems. The procedures in this section will be used to inspect the completed facilities with the results being used to:

a. Determine the quality and capability of the installed hardware and equipment and to determine that the installed equipment provides and fulfills all requirements specified in sections 3, 4, and 7 of this SEIP.

b. Identify, isolate, and recommend resolutions to discrepancies and conduct inspections and reevaluations to determine the adequacy of the system.

6.1.2 Amendments. This plan may be amended by the officially designated quality assurance representative (QAR), where necessary to meet local requirements or contingencies. Amendments which do not reflect changes in overall USACEEIA QA policy do not require prior concurrence or approval of USACEEIA, Test and Evaluation Directorate. Copies of all amendments must be forwarded to Commander, USACEEIA, Test and Evaluation Directorate, Fort Huachuca, Arizona 85613.

6.2 RESPONSIBILITIES. Quality control procedures will be planned, established, and implemented to ensure that installation meets applicable installation standards. Those procedures shall include the designation of quality control representatives (QCR) to provide continuous on-site surveillance of the installation efforts. Reports of the extent, scope, and findings of the QC inspections shall be provided to the installation supervisor for corrective actions.

6.2.2 Quality Assurance Procedures.

6.2.2.1 Inspection responsibilities. USACEEIA Test and Evaluation Directorate will assign a QAR to conduct inspections and evaluate the installation, to include both compliance with installation standards and adequacy of the installation's QC program. Upon completion of the installation and prior to acceptance testing, the QAR will perform final QA inspection. Reports of inspections,

findings, and corrective actions will be prepared and distributed as specified in paragraph 6.3. Where inadequacies are identified, the QAR will ensure that prompt initiation of appropriate corrective action is taken.

6.2.2.2 Inspection guidelines and phasing. The QA checklist, discussed below, will be used as a general inspection guide and final inspection record. This checklist is not restrictive, and the QAR may delete nonapplicable items or investigate other areas not normally concerned. The QA inspection shall be performed in the following phases:

a. Phase I. Cognizant Agency, Command, and Facility Points of Contact. Figure 6-1 of this document shall be completed prior to beginning any formal inspections. This figure will become a part of the permanent records.

b. Phase II. Preparations for the Visual, Mechanical, Electrical, and Operational Inspections of the C-E Equipment and Facilities. Preparations for the visual, mechanical, electrical, and operational inspections shall be made by obtaining a copy of the site plans, specifications, and drawings. These shall be used to mark and identify discrepancies. Any discrepancies noted shall be recorded using green markings to record deletions of equipment or cables, or changes in schematic diagrams. All additions shall be recorded using red markings. Notes to the draftsman will be in blue.

c. Phase III. Inspections During Installation. The site engineering plans and CCTM 105-50-21, shall be the referenced technical material for the inspection of sites. Inspections during installation consist of thorough visual and mechanical reviews of the C-E equipment during the installation of the equipment along with inspection of the facility in which the C-E equipment is located, and all applicable ancillary factors. The ancillary factors consist of power system installation and the locations of ducting and conduit; and placement of C-E equipment in the facility and locations and appearances of all fixed test, measuring, alarm, and system status equipment and indicators.

d. Phase IV. Final QA Inspection. The final QA inspection shall be conducted in accordance with the foregoing procedures and the QA checklist, figure 6-2. The QA checklist is designed as a guide to the QA inspectors. The checklist provides a means whereby QA inspectors have their attention focused on the C-E equipment elements and functions inherent in the systems and sites.

6.2.2.3 Revisions. The checklist may be revised to satisfy the QA inspection requirements for a specific function whenever that

becomes necessary as a result of abnormal situations. A revision is considered to be any change to an inspection requirement or procedure through additions, deletions, or modifications. Revisions to this checklist may be authorized by the on-site QAR. All revisions will be documented and forwarded as specified in 6.1.2.

6.2.2.4 Exceptions and discrepancies. The QAR will identify and document all exceptions and deficiencies and will ensure that prompt corrective action is taken for any discrepancies. Discrepancies not within the capability or responsibility of USACEEIA to resolve will be reported, to include recommended corrective action and identification of the responsible agency. Sections 6 and 7 of this SEIP are written to be used at all locations and links in this project.

6.2.3 Special QA Inspection Procedures.

6.2.3.1 The inspections described in the figures are interruptible at any point if disrupted by a hardware malfunction. They also may be interrupted at a compatible breaking point by the quality assurance inspector (QAI) to permit scheduled duty breaks. Any inspection that is interrupted because of a hardware malfunction shall be restarted at a point mutually agreed upon by the QAI and the installation team leader.

6.2.3.2 The QA inspections and procedures in the QA checklist have been sequenced in an orderly controlled manner; however, unforeseen problems may require an inspection or procedure to be resequenced. Resequencing of any inspection or procedure shall be mutually agreed upon by the QAI and the installation team leader.

6.2.3.3 Spare equipment may be substituted for malfunctioning equipment upon mutual agreement between the QAI and the installation team leader.

6.2.3.4 Once QA inspections have been completed on any C-E equipment including cables, conduit, etc., no changes or adjustments shall be performed without the approval of the QAI pending performance of the operational acceptance test.

6.2.4 Acceptance Testing.

6.2.4.1 The installation agency will power the equipment and conduct a "burn-in" period of no less than 24 hours. Defective modules and components of the completed communications subsystem will be replaced during this period and the QAR shall be notified of any exchange.

6.2.4.2 Upon satisfactory completion of the installation, USACEEIA Test and Evaluation Directorate will perform operational tests to verify conformance with specified operational requirements. The operational tests shall be conducted in accordance with the test procedures contained in section 7 of this SEIP. Test results shall be fully documented.

6.2.5 Acceptance or Rejection.

6.2.5.1 Recommendations for acceptance or rejection of the expanded facilities will be based upon a detailed analysis of all data obtained from the detailed inspection and the operational acceptance test.

6.2.5.2 Based upon the results of the detailed analysis, the QAI may direct that all, or portions of any, inspections and tests be repeated to verify compliance with stated requirements and objectives.

6.2.5.3 The QAI also may recommend acceptance with exceptions. These exceptions will be documented and will be made only under conditions which permit use of the system, pending permanent resolution, using procedural methods to alleviate known problems.

6.3 QUALITY ASSURANCE DOCUMENTATION.

6.3.1 When figure 6-1 is completed according to 6.2.2.2a, it will become part of the site's permanent records.

6.3.2 Figure 6-2 shall be used for verification of inspection by the QAI, the installation team leader, and the local command or facility QA coordinator or representative(s). Signatures on the QA checklist only recommend acceptance, they do not signify acceptance of the items under inspection.

6.3.3 Section 7 of this SEIP is for verification of satisfactory operational capability. All applicable data sheets are to be completed and will become part of the site's permanent records.

6.3.4 Section 8 of this SEIP contains the material acceptance record forms that will be used for itemizing the major component and documents for listing exceptions, deficiencies, and remarks along with responsible agencies and for acceptance and transferring of equipment.

6.4 QUALITY ASSURANCE PLANS AND REPORTS.

6.4.1 Quality Assurance Plans. A formal QA plan is not required for this project. The provisions of this SEIP (section 6) cover all

QA plans and procedures deemed necessary to ensure that the facility meets its stated requirements.

6.4.2 Status Reports. The QAI will issue status reports, as deemed necessary, during the conduct of the inspections. Upon completion of all inspections and any necessary reinspections, the QAI shall prepare and issue a final QA inspection report and furnish copies to all cognizant organizations.

6.4.3 Corrections or Modifications of Documentation. The corrected copies of site plans, specifications, and drawings which were marked up during step 2 of the QA inspection process (6.2.2.2b) shall be forwarded to Commander, USACEEIA, ATTN: CCC-CED-SWS, Fort Huachuca, Arizona 85613.

6.4.4 Final Report. A final summary report of the QA and test efforts will be provided by USACEEIA Test and Evaluation Directorate and forwarded to the appropriate agencies. The report will be in the format specified by USACEEIA CCCR 702-2 and will note any remaining installation and operational exceptions and recommend corrective actions as well as documenting project completion. The following items will be inclosed:

a. QA checklist prepared in accordance with this section.

b. Test results in accordance with section 7 of this SEIP.

c. Technical acceptance records of section 8 of this SEIP.

d. Other supporting data as appropriate.

COGNIZANT AGENCY, COMMAND, AND
FACILITY POINTS OF CONTACT

	Phone No.	Bldg. No.	Rm. No.
Installation:			
Team Leader_____	_____	_____	_____
Assistant Team Leader_____	_____	_____	_____
Quality Assurance:			
Coordinator_____	_____	_____	_____
Alternate Coordinator_____	_____	_____	_____

Figure 6-1. Sample of Cognizant Agency, Command, and Facility Points of Contact.

FINAL QUALITY ASSURANCE INSPECTION CHECKLIST

Project Name_____ Site_____

QUALITY ASSURANCE OF EQUIPMENT INSTALLATION

(Refer to paragraphs as listed below in CCTM 105-50-21)

	Yes	No	NA
A. Drawings And Specifications (Para 3-2, 3-3)			
1. Are floor plan drawings available?	___	___	___
2. Are equipment location drawings available?	___	___	___
3. Are face layout drawings of equipment in bays available?	___	___	___
4. Are drawings for distributing frame block assignments available?	___	___	___
5. Are pin connections on terminal blocks shown on drawings?	___	___	___
6. Is stenciling of terminal blocks shown on drawings?	___	___	___
7. Are drawings of power distributing equipment available?	___	___	___
8. Are wire sizes indicated on drawings?	___	___	___
9. Are schematic diagrams of circuit types to be installed included in drawings?	___	___	___
10. Are drawings of site grounding systems available?	___	___	___
11. Are drawings showing arrangement of cable racks, ducts, and trenches available?	___	___	___

Figure 6-2. Sample of Final Installation Inspection Checklist (sheet 1 of 11).

	Yes	No	NA
12. Do specifications contain list of reference material required by installers?	___	___	___
13. Do specifications contain cable running list for power distribution?	___	___	___
14. Do specifications contain cable running list for signal cabling?	___	___	___
15. Do specifications contain cable running list for cabling?	___	___	___
16. Do specifications contain detailed information on grounding?	___	___	___
17. Do specifications contain details on all special instructions for installers?	___	___	___
18. Do drawings reference all applicable items on BOM?	___	___	___
B. Tools and Equipment (Para 3-8)			
1. Is equipment damaged or unserviceable?	___	___	___
2. Are all installation materials on hand and serviceable?	___	___	___
3. Are all tools necessary for completion of the job on hand?	___	___	___
4. Is all test equipment needed for test and checkout of installation available?	___	___	___
C. General Safety Practice (Chapter 4)			
1. Are goggles being worn when drilling and grinding?	___	___	___

Figure 6-2. Sample of Final Installation Inspection Checklist (sheet 2 of 11).

	Yes	No	NA
2. Are sharp edges left on frame or duct work?	___	___	___
3. Are all hand tools properly used?	___	___	___
4. Are electric power tools properly grounded?	___	___	___
D. Floor Plan Layout (Para 3-7)			
1. Are equipment layout plans in accordance with drawings?	___	___	___
2. Was layout plan completed before equipment was moved into area?	___	___	___
E. Erecting and Mounting (Para 3-9)			
1. Is equipment laid out in accordance with floor plan drawing?	___	___	___
2. Are equipment bays level and plumbed within tolerances?	___	___	___
3. Has proper spacing been provided between equipment racks?	___	___	___
4. Are base angles of frames secured to floor in proper location?	___	___	___
5. Are all cabinets flush mounted and plumbed?	___	___	___
6. Has finish of equipment, cabinets, and racks been touched up?	___	___	___
7. Are bolts and screws free from stripped threads and defaced heads?	___	___	___

Figure 6-2. Sample of Final Installation Inspection Checklist (sheet 3 of 11).

		Yes	No	NA
8.	Have sufficient clearances been provided between apparatus for heat dissipation?	___	___	___
9.	Are terminal blocks aligned on distributing frames?	___	___	___
10.	Has equipment been installed in cabinets or racks in accordance with face layouts?	___	___	___
11.	Are all nuts and bolts securely tightened?	___	___	___
12.	Are exposed or cut ends of metal filed smooth and painted?	___	___	___
13.	Have lock and flat washers been used?	___	___	___
14.	Is the C-E equipment BOM available at the facility?	___	___	___
15.	Has the C-E equipment been inventoried and discrepancies posted?	___	___	___
16.	Is all required C-E equipment at the site?	___	___	___
17.	Is all C-E equipment installed?	___	___	___
F.	Cable Racks (Para 3-10) (Inspect new installation and/or where applicable)			
1.	Location of cable racks:			
	a. Are cable racks located in accordance with cable plan drawing?	___	___	___
	b. Does height of cable racks conform to height above floor as indicated on cable plan drawing?	___	___	___
	c. Are cable racks located so that clearance is provided for installation and maintenance of ultimate equipment?	___	___	___

Figure 6-2. Sample of Final Installation Inspection Checklist (sheet 4 of 11).

	Yes	No	NA
d. Are cable racks located so cables are not subject to damage or exposure or other detrimental conditions?	___	___	___
2. Assembly of cable racks:			
a. Are long sections of cable racks used where possible?	___	___	___
b. Have clamping details been altered other than where necessary to avoid interference?	___	___	___
c. Are open ends of cable racks properly closed?	___	___	___
d. Are vertical cable racks properly terminated on floors?	___	___	___
3. Support of cable racks:			
a. Are cable racks properly supported and fastened?	___	___	___
b. Are cable racks installed so that no excessive load or binding is imposed on the equipment?	___	___	___
c. Are horizontal cable racks supported on approximately 5 foot centers but not to exceed 6 feet?	___	___	___
d. Has support been provided within 3 feet of free end of cable rack?	___	___	___
e. Are cable racks braced where necessary to prevent sway?	___	___	___
G. Running Cable (Para 3-11)			
1. Are cable runs made in accordance with cable running list?	___	___	___

Figure 6-2. Sample of Final Installation Inspection Checklist (sheet 5 of 11).

		Yes	No	NA
2.	Are cables twisted or crossed on cable rack?	___	___	___
3.	Do cables at turns or bends conform to the bending radii and position? (See table 3-1, page 3-55, and figures 3-55 and 3-56, page 3-56.)	___	___	___
4.	Is protection provided where cable sheaths contact rough or sharp edges or metal?	___	___	___
5.	Are cables which are turned off over side of cable racks formed with *minimum allowable radii*? (See table 3-1, page 3-55.)	___	___	___
6.	Are cables turned off rack horizontally and then up?	___	___	___
7.	Do cables to the distributing frame enter on the vertical side?	___	___	___
8.	Are cables serving the horizontal side of a distributing frame secured to the transverse arms near the vertical upright?	___	___	___
9.	Are cable tags properly prepared and in accordance with the cable running list?	___	___	___
10.	Are cable tags secured at each end of cable run?	___	___	___
11.	Have cable tags been removed upon completion of verification and termination?	___	___	___
12.	Are cable butts located as near as practicable to the point where the first wires turn out?	___	___	___

Figure 6-2. Sample of Final Installation Inspection Checklist (sheet 6 of 11).

		Yes	No	NA
13.	Are cable butts properly treated?	___	___	___
14.	Is insulation of wires undamaged at butt location?	___	___	___
15.	Are unused and spare wires protected at butt location?	___	___	___
H.	Securing Cable (Para 3-13)			
1.	Is starting stitch properly made and placed?	___	___	___
2.	Is required Kansas City stitch properly made?	___	___	___
3.	Are first and succeeding layers of cable properly secured?	___	___	___
4.	Are cables secured at every cable rack cross strap?	___	___	___
5.	When cable butt is between securing devices, are cables secured together with an appropriate stitch?	___	___	___
6.	Are lock stitches properly made and spaced?	___	___	___
7.	Are splices in twine properly made?	___	___	___
I.	Sewed Forms (Para 3-14)			
1.	Is proper size twine used for the diameter of the form?	___	___	___
2.	Are proper number of strands used?	___	___	___
3.	Are stitches properly spaced?	___	___	___

Figure 6-2. Sample of Final Installation Inspection Checklist (sheet 7 of 11).

	Yes	No	NA
J. Butting and Stripping (Para 3-15)			
1. Are proper tools used for butting and stripping of cable?	___	___	___
2. Are cable butts properly dressed?	___	___	___
3. Is proper distance maintained from cable butt to fanning strip?	___	___	___
K. Fanned Forms (Para 3-16)			
1. Are cables fanned and connected to the left side of verticle mounted terminal blocks and to the bottom of horizontal terminal blocks?	___	___	___
2. Are conductors in fanned forms twisted and bunched?	___	___	___
3. Are fanned forms straight and taut from butt location to fanning strip?	___	___	___
4. Is length of skinners correct?	___	___	___
5. Has color code been properly followed?	___	___	___
6. Are spare wires disposed of properly?	___	___	___
L. Stenciling (Para 3-17)			
1. Is equipment correctly identified and stenciled in accordance with floor plan drawings?	___	___	___
2. Are designations located correctly?	___	___	___
3. Are correct size designations used on particular types of apparatus or equipment?	___	___	___

Figure 6-2. Sample of Final Installation Inspection Checklist (sheet 8 of 11).

	Yes	No	NA
M. Strapping (Para 3-18)			
1. Are straps properly placed?	___	___	___
2. Is correct type of strap wire used?	___	___	___
3. Does insulation extend to terminal?	___	___	___
4. Are straps placed so as not to interfere with operation of apparatus?	___	___	___
5. Is removal of apparatus blocked?	___	___	___
6. Are designations of apparatus obscured?	___	___	___
N. Connecting and Soldering (Para 3-19)			
1. Is soldering clamp used when connecting wires?	___	___	___
2. Are connections made on terminal blocks in proper manner?	___	___	___
3. Is all soldering done with standard rosin core solder?	___	___	___
4. Are connections secure and free of foreign substances?	___	___	___
5. Has all unsightly flux and excess globules of solder been removed?	___	___	___
6. Is insulation on skinners free of burn or other damage?	___	___	___
7. Do skinners on connected terminals exceed 1/16 of an inch?	___	___	___
8. Are all conductors given a continuity test after connection is made?	___	___	___

Figure 6-2. Sample of Final Installation Inspection Checklist (sheet 9 of 11).

	Yes	No	NA
O. Wrapped Connections (Para 3-20)			
1. Are wrapped connections applied only on suitable terminals?	___	___	___
2. Are connections essentially straight and free of angular bends or crimps?	___	___	___
3. Are the required number of turns in contact with the terminal in accordance with criteria for gage of wire used? (22G-5 turns; 24G-6 turns; 26G-8 turns.)	___	___	___
4. Are wrapped connectors soldered where applicable?	___	___	___
P. Cross Connections (Para 3-21)			
1. Are jumpers properly routed at distributing frame?	___	___	___
2. Do jumpers have sufficient slack after connection?	___	___	___
3. Are conductors twisted between fanning strip and terminal?	___	___	___
4. Does twist remain in conductors beyond rear of fanning strip?	___	___	___
5. Are jumpers properly dressed?	___	___	___
6. Has excess solder been removed from terminals?	___	___	___
Q. Equipment and Signal Grounds (Para 3-12)			
Are equipment and signal grounds installed in accordance with applicable codes and standards and in accordance with installation drawings?	___	___	___

Figure 6-2. Sample of Final Installation Inspection Checklist (sheet 10 of 11).

	Yes	No	NA
R. CONDUIT (Para 3-24)			
1. Are burrs removed from conduit after cutting?	___	___	___
2. Is bending radii in accordance with table 3-14, page 3-152?	___	___	___
3. Are there no more than four 90-degree bends in a single conduit run?	___	___	___
4. Does number of conductors in conduit conform to table 2-3, page 2-9?	___	___	___
5. Are conduits supported at intervals not exceeding 6 feet?	___	___	___
6. Have all fittings been tightened after installation?	___	___	___
S. DUCTS (RF SHIELDINGS) (Para 3-25)			
1. Are hangers for overhead ducts mounted first?	___	___	___
2. Is proper type mallet used in assembly?	___	___	___
3. Are flange sections cleaned before installation?	___	___	___
T. INSTALLATION DRAWINGS (para 3-2)			
Have drawings been reviewed to assure "as built" accuracy?	___	___	___

Figure 6-2. Sample of Final Installation Inspection Checklist (sheet 11 of 11).

SECTION 7. OPERATIONAL TEST PLAN AND CHECKOUT PROCEDURES

7.1 INTRODUCTION.

7.1.1 This test plan is designed to be used in conjunction with the operating procedures for the upgrade of modified overseas MODE V terminals. These procedures are supplemental to those in the (AUTODIN/DSSCS) MODE V, dated December 1971.

7.1.2 All test steps should be performed by the terminal operators under the direction of the test director. This test plan contains only enough information to direct the test of the upgrade and modification of MODE V terminals.

7.1.3 Step-by-step procedures must come from operating manuals and trained operators. Any questions on MODE V AUTODIN subscriber terminal test programs, test plans, etc., should be directed to Commander, USACEEIA, ATTN: CCC-TED-TSRC, Fort Huachuca, Arizona 85613, AUTOVON 897-6658.

7.1.4 When the test is completed, the test director will evaluate the adequacy of the operating procedures and the ability of the operators observed. The test director is responsible for identifying problems and discrepancies to the project manager or site engineer. In the event of an equipment modification or other major discrepancy, the test director (in coordination with test team members, the user, and the contractor) will determine if the test may proceed or must halt until the problem is resolved. In the event testing proceeds, any portion of the test that is bypassed will be retested prior to final acceptance.

7.2 TERMINAL CONTROLS AND INDICATORS.

7.2.1 Purpose. To demonstrate the terminal's capability to display controls and indicators, pass narrative traffic while in a self-test mode, and to check functions of the TCU.

7.2.2 Requirement. The terminal shall be able to operate while in the self-test mode.

7.2.3 Notes.

7.2.3.1 The terminal will respond as outlined in the operator's manual. Verification is based on visual alarm conditions, audible alarms, printouts, page copy and integrity checks. Account for both input and output messages.

7.2.3.2 Sample test messages shown in figure 7-2 will be used for this series of tests.

7.2.4 Test Equipment Requirements. No special equipment required.

7.2.5 Test Setup. Procedures outlined in the sample sheet (fig. 7-1) will be followed after preparing the terminal for self-test mode.

7.2.6 Procedure.

7.2.6.1 Test personnel will perform test steps outlined in the sample data sheet (fig. 7-1).

7.2.6.2 Test procedures have been sequenced in the most desirable manner. Resequencing of procedures may be conducted at the discretion of the test director.

7.2.7 Results.

7.2.7.1 Compare the terminal's reactions and outputs to the operator's manual.

7.2.7.2 Record discrepancies and comments of test personnel and observers.

7.3 TRANSFER TO ON-LINE.

7.3.1 Objective. To ensure the terminal's capability to pass traffic with the ASC and respond to the ASC's signals and diagnostics.

7.3.2 Requirements. The terminal shall pass traffic in accordance with local operating procedures.

7.3.3 Notes.

7.3.3.1 The terminal will respond as outlined in the operator's manual.

7.3.3.2 Test messages in figure 7-2 will be used for this series of tests.

7.3.4 Test Equipment Requirements. No special equipment required.

7.3.5 Test Setup. The terminal shall interface with the ASC as outlined in DCAC-370-D195-1.

7.3.6 Procedures. Test personnel will perform test steps outlined in the sample data sheet (fig. 7-3).

7.3.7 Results.

7.3.7.1 Compare the terminal's reaction and outputs to the operator's manual.

7.3.7.2 Record discrepancies and comments of test personnel and observers.

DATA SHEET - TERMINAL CONTROL AND INDICATORS

Step		Accept	Reject
1	Power on-off indicator. Place the ac power ON-OFF switch on the power supply and isolator assembly to ON. The control indicator panel POWER ON and CANCEL xmitted lamps and the isolator panel +6 V and -6 V lamps will illuminate.	_____	_____
2	Lamp test switch. Depress the LAMP TEST switch on the front panel. All indicators on the front panel will illuminate.	_____	_____
3	Simulator test panel lamp test. Depress the LAMP TEST switch on the simulator test panel (rear). All indicators on the rear panel will illuminate.	_____	_____
4	Audible alarm test. Set the alarm test switch to the test position. The audible alarm will activate and the alarm indicator will illuminate. While the audible alarm is sounding, rotate the volume control first clockwise then counter-clockwise. Clockwise rotation will increase the volume; counter-clockwise will reduce the volume. Set the alarm reset switch momentarily to the reset position. The alarm indicator will extinguish and the audible alarm will reset.	_____	_____
5	Tight tape condition.		
	a. Load and begin transmission of test message A-01 (fig. 7-2). The XMIT IN PROCESS and REC IN PROGRESS will illuminate. The message will start to be received.		

Figure 7-1. Sample Data Sheet - Terminal Control and Indicators (sheet 1 of 10).

Step	Accept	Reject
b. While the message is being transmitted, simulate a tight tape condition. The INPUT and ALARM indicators will illuminate and the audible alarm will be activated. Transmission of the message will stop.		
c. Set the alarm RESET switch to the reset position. The audible alarm will reset.		
d. Clear the tight tape condition. The INPUT and ALARM indicators will extinguish and the transmission of the message will resume. After the EOM sequence is transmitted, the ACK-2T and ACK-2R indicators will extinguish; ACK-1T and ACK-1R indicators will illuminate; XMIT IN PROCESS and REC IN PROGRESS indicators will extinguish and when the end of the tape feeds through the TD, the INPUT indicator will illuminate and the TD will stop. The message will be received correctly.	____	____
6 Low paper supply alarm. Load and begin transmission of test message A-02 (fig. 7-2). As the test message is being received, remove the paper from the output device. The OUTPUT and ALARM indicators will illuminate and the audible alarm will be activated. Reception of the message will stop. Reset the alarm and replace paper supply. The OUTPUT and ALARM indicators will extinguish, reception of the message will resume, and the message will be received correctly.	____	____
7 Character step control test. Set the CHARACTER STEP CONTROL to the TCU position. Load and transmit test message A-03 (fig. 7-2). The message will be received correctly with the normal indications. Set the		

Figure 7-1. Sample Data Sheet - Terminal Control and Indicators (sheet 2 of 10).

Step	Accept	Reject
CHARACTER STEP CONTROL to the CRYPTO then load and transmit test message A-04 (fig. 7-2). Test message will be received with all normal indications. (NOTE: Reset CHARACTER STEP CONTROL for normal operation.) (NOTE: If no external step control is provided, skip step using test message A-04).	_____	_____
8 Control sequences test.		
a. For simulated ACK-1 control sequence:		
(1) Set the transmit CONT SEQ SIMULATOR switch to the ACK-1 position. ACK-2T and ACK-2R indicators will extinguish and ACK-1T and ACK-1R indicators will illuminate.	_____	_____
(2) Set the receive CONT SEQ SIMULATOR switch to the ACK-1 position. The MONITOR indicator will flash.	_____	_____
(3) Set the receive and transmit CONT SEQ SIMULATOR switches to the OFF position. The MONITOR lamp will extinguish.	_____	_____
b. For simulated ACK-2 control sequence:		
(1) Set the transmit CONT SEQ SIMULATOR switch to the ACK-2 position. The ACK-1T and the ACK-1R indicators will extinguish and the ACK-2T and ACK-2R indicators will illuminate.	_____	_____

Figure 7-1. Sample Data Sheet - Terminal Control and Indicators (sheet 3 of 10).

Step	Accept	Reject
(2) Set the receive CONT SEQ SIMULATOR switch to the ACK-2 position. The MONITOR indicator will flash.	_____	_____
(3) Set the transmit and receive CONT SEQ SIMULATOR switches to the OFF position. The MONITOR indicator will extinguish.	_____	_____
c. For simulated STOP control sequence:		
(1) Set the transmit CONT SEQ SIMULATOR switch to the STOP position. The STOP indicator will flash.	_____	_____
(2) Set the receive CONT SEQ SIMULATOR switch to the STOP position. The MONITOR indicator will flash.	_____	_____
(3) Set the receive CONT SEQ SIMULATOR switch to the REP position. The MONITOR indicator will flash.	_____	_____
(4) Set the transmit and receive CONT SEQ SIMULATOR switches to the OFF position. The MONITOR indicator will extinguish.	_____	_____
(5) Set the SYS CLR switch momentarily to the SYS CLR position. The CANCEL XMITED indicator will illuminate and the STOP indicator will extinguish. The ACK-2T and ACK-2R indicators will illuminate.	_____	_____
(6) Set the START XMIT switch momentarily to the START XMIT position. The CANCEL XMITED indicator will extinguish.	_____	_____

Figure 7-1. Sample Data Sheet - Terminal Control and Indicators (sheet 4 of 10).

Step	Accept	Reject
d. For simulated RETRANSMIT control sequence:		
(1) Set the transmit and receive CONT SEQ SIMULATOR switches to the REP position. The MONITOR will flash.	_____	_____
(2) Set the transmit and receive CONT SEQ SIMULATOR switches to the OFF position. The MONITOR indicator will extinguish.	_____	_____
(3) Set the transmit CONT SEQ SIMULATOR switch to the ACK-1 position. After the normal reaction, set the same switch to the RT position. The AUTO MES RT, CANCEL XMITED, ACK-2T, ACK-2R and ALARM indicators will illuminate; the ACK-1T and ACK-1R indicators will extinguish; and the audible alarm will sound.	_____	_____
(4) Reset the audible alarm. ALARM and AUTO MES RT indicators will extinguish and the audible alarm will be silenced.		
(5) Set the RECEIVE CONT SEQ SIMULATOR switch to RT, then to CANCEL, then to ACK-2 and finally the monitor will flash for each position.	_____	_____
(6) Set the transmit CONT SEQ SIMULATOR to OFF. The MONITOR will extinguish.	_____	_____
(7) Set the START XMIT switch momentarily to the START XMIT position. The CANCEL XMITED indicator will extinguish.	_____	_____
e. For simulated CANCEL control sequence:		
(1) Set the transmit CONT SEQ SIMULATOR switch to the ACK-1 position, then after		

Figure 7-1. Sample Data Sheet - Terminal Control and Indicators (sheet 5 of 10).

Step	Accept	Reject
normal indications, set the same switch to the CANCEL position. The CANCEL XMITED indicator will illuminate; ACK-1T and ACK-1R extinguish; then ACK-2T and ACK-2R will illuminate.	_____	_____
(2) Set the receive CONT SEQ SIMULATOR switch to CANCEL, then to ACK-2. The MONITOR will flash in each position.	_____	_____
(3) Set the transmit CONT SEQ SIMULATOR to OFF. After MONITOR has extinguished, set the START XMIT momentarily. CANCEL XMITED will extinguish.	_____	_____
f. For simulated START control sequence: Set the transmit and receive CONT SEQ SIMULATOR to start position then to the OFF position. The MONITOR indicator will flash then extinguish.	_____	_____
g. For manual CANCEL control sequence:		
(1) Set the transmit CONT SEQ SIMULATOR to the ACK-1 position. After the appropriate response, set the same switch to OFF and the receive CONT SEQ SIMULATOR to CANCEL. The MONITOR indicator will flash.	_____	_____
(2) Set the XMIT CANCEL switch momentarily to the XMIT CANCEL position. The CANCEL XMITED indicator will illuminate; the ACK-1 indicator will extinguish; and the ACK-2 indicator will illuminate.		
(3) Set the transmit and receive CONT SEQ SIMULATOR switches to OFF. MONITOR will extinguish.	_____	_____

Figure 7-1. Sample Data Sheet - Terminal Control and Indicators (sheet 6 of 10).

Step	Accept	Reject
(4) Set the START XMIT switch momentarily to START XMIT position. The CANCEL XMITED indicator will extinguish.	_____	_____
h. For manual RETRANSMIT control sequence:		
(1) Set the receive CONT SEQ SIMULATOR switch to the RT position. Set the REQUEST MES RT switch momentarily to REQUEST MES RT position. The MONITOR indicator will flash and audible alarm activate.	_____	_____
(2) Reset the audible alarm then set the receive CONT SEQ SIMULATOR switch to the OFF position and the SYS CLR switch momentarily to the SYS CLR position. The TCU logic will be cleared and POWER ON, TEST, CANCEL XMITED, ACK-2T, and ACK-2R indicators will be illuminated.		
(3) Set the START XMIT switch momentarily to the START XMIT position. The CANCEL XMITED will extinguish.		
9 Automatic Message Identifier Test:		
a. Set the AUTO NO ON-OFF switch to OFF. The AUTO NO OFF indicator will illuminate.	_____	_____
b. Set the AUTO NO ON-OFF switch to ON position. The AUTO NO OFF indicator will extinguish.	_____	_____
c. Set the MESSAGE NUMBER SELECT switches as follows:		
(1) HUNDREDS switch to 9.		
(2) TENS switch to 9.		

Figure 7-1. Sample Data Sheet - Terminal Control and Indicators (sheet 7 of 10).

Step	Accept	Reject
(3) UNITS switch to 8. Then set the PRESET switch momentarily to the PRESET position. Load and transmit test message A-04 (fig. 7-2). A transmission identification (TI) number of 998 will be received at the output device within the transmission indicator line, then the message will be received. The MESSAGE NUMBER indicators will advance to 999.	_____	_____
d. Load and transmit test message A-04 (fig. 7-2). The TI line block will be received on the output device with the number 999 and the MESSAGE NUMBER will increment to 000. The message will be received correctly.	_____	_____
10 Message Handling Back-to-Back:		
a. Load and begin transmission of a test tape containing test messages A-01 through A-04 (fig. 7-2). During transmission of A-01, set the XMIT CANCEL switch to XMIT CANCEL position. Transmission of TI number 000 will begin. When the XMIT CANCEL switch is activated, the CANCEL XMITED indicator will illuminate and message processing will stop. The XMIT IN PROCESS and REC IN PROCESS indicators will extinguish.	_____	_____
b. Reset the tape to the beginning of A-01 and momentarily set START XMIT switch to the START XMIT position. The message will be transmitted and received correctly with TI number of 000. The tape will advance and begin processing test message A-05 with a TI number of 001.	_____	_____

Figure 7-1. Sample Data Sheet - Terminal Control and Indicators (sheet 8 of 10).

Step	Accept	Reject
c. During transmission of test message A-02, set the STOP AT EOM receive switch to the STOP AT EOM position. When the EOM sequence is detected on the tape, the tape will stop, and the audible alarm activated. The test message will be received correctly.	_____	_____
d. Reset the alarm and set the STOP AT EOM switch to CONTINUE. The tape will advance and begin to process test message A-03 with TI number 002.	_____	_____
e. During transmission of A-03, set the STOP AT EOM transmit switch to STOP AT EOM. At the end of message A-03, the message number will increment to 003, message transmission will stop and the audible alarm will be activated. Message A-03 will be received correctly.	_____	_____
f. Reset the audible alarm and activate the START XMIT switch. Processing of messages will continue and test message A-04, TI number 004 will begin processing.	_____	_____
g. During transmission of test message A-04, set the REQUEST MES RT switch to REQUEST MES RT position. When the REQUEST MES RT is activated, message processing will stop and the stop indicator will flash; the ACK-2 indicators will remain illuminated; the STOP indicator will extinguish, and the message will be partially received.	_____	_____
h. Reset the tape to the beginning of test message A-01 and begin transmission by operating the START XMIT switch. The		

Figure 7-1. Sample Data Sheet - Terminal Control and Indicators (sheet 9 of 10).

Step	Accept	Reject
terminal will process the remaining messages correctly beginning with A-01 (TI number 004) and ending with A-04 (TI number 008).	_____	_____

Figure 7-1. Sample Data Sheet - Terminal Control and Indicators (sheet 10 of 10).

PAPER TAPE MESSAGES, ITA, INSTRUCTIONS

1. Messages A-01 through A-05 are to be prepared in standard ITA-2 five-level teletype code.

2. Each message will contain a specified number of text blocks. Each block will contain all valid ITA-2 characters. The text line will be written in the following manner: 001 ABCDE FGHIJ KLMNO PQRST UVWXY Z↑0123 45678 9!"#S &,()' -./;:?↓

3. Each line, as necessary, will be sequentially numbered in the first three character positions.

TEST MESSAGE A-01

```
RR Y-----
DE Y-----#0001-------
ZNY MM---
ZKZK RR AOH DE
R------Z --- --
ZEM
UNCLAS
THIS IS A GOOD TEST MESSAGE
(TEST LINES OF 69 CHARACTERS TO BE AS FOLLOWS WITH EACH LINE
SEQUENTIALLY NUMBERED IN THE FIRST THREE CHARACTER POSITIONS):
```

LINE	LETTER	LINE	LETTER	LINE	LETTER	LINE	LINE
1	A	12	L	23	W	31 4	39 #
2	B	13	M	24	X	32 5	40 $
3	C	14	N-N-N	25	Y	33 6	41 &
4	D	15	O	26	Z	34 7	42-,-,-,
5	E	16	P	27	0	35 8	43 (
6	F	17	Q	28	1	36 9	44)
7	G	18	R	29	2	37 !	45 '
8	H	19	S	30	3	38 "	46 -
9	I	20	T				
10	J	21	U				
11	K	22	V				

Figure 7-2. Sample Test Messages (sheet 1 of 4).

TEST MESSAGE A-01 (continued)

```
                    LINE

                    47 .
                    48 /
                    49 :
                    50 ;
                    51 ?

052 ABCDE FGHIJ KLMNO PQRST UVWXY Z↑0123 45678 9!"#$ &,()' -./;:?↓
#001
⟨⟨=======NNNN (12 LTRS)
```

Figure 7-2. Sample Test Messages (sheet 2 of 4).

TEST MESSAGE A-02

```
PP Y-----
DE Y-----#0002 -------
ZNY MM---
ZKZK PP AOH DE
P------Z --- --
ZEM
UNCLAS
THIS IS A GOOD TEST MESSAGE -- PRIORITY PRECEDENCE
INSERT 40 LINES OF TEXT
#0002
(( ========NNNN  (12 LTRS)
```

TEST MESSAGE A-03

```
OO Y-----
DE Y-----#0003 -------
ZNY MM
ZKZK OO AOH DE
O------Z --- --
ZEM
UNCLAS
THIS IS A GOOD TEST MESSAGE -- IMMEDIATE PRECEDENCE
INSERT 40 LINES OF TEXT
#0003
(( ========NNNN  (12 LTRS)
```

Figure 7-2. Sample Test Messages (sheet 3 of 4).

TEST MESSAGE A-04

```
RR Y-----
DE Y-----#0004 -------
ZNY SSSSS
R------Z --- --
ZKZK RR SOA DE
FM TEST DIRECTOR
TO -----
ZEM
S E C R E T
TEST MESSAGE
INSERT 40 LINES OF TEXT
#0004
<<========NNNN (12 LTRS)
```

TEST MESSAGE A-05

```
PP Y-----
DE Y-----#0005 -------
ZNY CCCCC
ZKZK RR SOA DE
R------Z --- --
FM TEST DIRECTOR
TO -----
ZEM
C O N F I D E N T I A L
THIS IS A GOOD UNCLAS TEST MESSAGE
INSERT 40 LINES OF TEXT
#0005
<<========NNNN (12 LTRS)
```

Figure 7-2. Sample Test Messages (sheet 4 of 4).

DATA SHEET - TRANSFER TO ON-LINE

Step		Accept	Reject
1	Transfer to on-line condition with the ASC. Place the TCU mode switch to NORMAL and momentarily set the SYS CLR switch to the SYS CLR position. The CANCEL XMITED indicator will illuminate.	_____	_____
2	Coordinate with the ASC to initialize the numbering machine.	_____	_____
3	Load message A-01 and, after 15 seconds, begin transmission. The CANCEL XMITED lamp will extinguish.	_____	_____
4	Transmit test message A-02. During transmission, CANCEL the message. Transmission will cease and CAN will be transmitted.	_____	_____
5	Transmit test message A-03. During reception of this message, operate REQUEST MESSAGE RT switch. Receipt will halt and a CAN will be received. The message will be retransmitted from the ASC and received in its entirety.	_____	_____
6	Transmit test message A-04. During transmission of text, stop transmission. After 5 minutes, a retransmit request will be received.	_____	_____
7	Retransmit test message A-03. The message will be received correctly.	_____	_____

Figure 7-3. Sample Data Sheet - Transfer to On-line (sheet 1 of 2).

Step		Accept	Reject
8	Prepare the terminal for emergency operation and request the ASC to do the same. Prepare to receive a TI number 001. Transmit test message A-01 through A-05 and A-01 (TI 001), A-02 (TI 002), A-03 (TI 003), A-04 (TI 005), and A-05 (TI 006) messages. A-01, A-02, and A-03 will be received correctly. A-04 (TI 005) will be rejected because of an out-of-sequence numbering. The ASC will send a service message requesting TI 004 and TI 005 be retransmitted. (NOTE: Make sure messages used in this test step are transmitted with the correct TI numbers for test purposes).	____	____
9	Request ASC take the channel out of service, then send a CANCEL; when no reply is received from the ASC for CAN SEQUENCE, the three RPT and ALARM indicators will illuminate and the alarm will be deactivated.	____	____
10	Coordinate with the ASC and restore the terminal to normal operating condition for live message handling.	____	____

Figure 7-3. Sample Data Sheet - Transfer to On-line (sheet 2 of 2).

SECTION 8. COMPLETION CERTIFICATION

8.1 GENERAL. The completion document shall consist of the information indicated by the technical acceptance record (TAR). The information and documentation provided by these sheets may be expanded to meet the requirements of a specific project.

8.2 DISTRIBUTION. The distribution list for the TAR will be provided in the tasking document, QA test plan, or contractual document.

8.3 FORM. Prescribed TAR form items are as follows: (form may be locally reproduced.)

8.3.1 Paragraph 1 (Project). Identify project.

8.3.2 Paragraph 2 (Facility). Identify facility.

8.3.3 Paragraph 3 (Location). Identify geographic location (e.g., city or post, state, and zip code).

8.3.4 Paragraph 4 (Operating Agency). Identify organization.

8.3.5 Paragraph 5 (Engineering Agency). Identify organization.

8.3.6 Paragraph 6 (Installation Agency). Identify organization.

8.3.7 Paragraph 7 (Quality Assurance/Test Agency). Identify organization (e.g., test director's parent organization).

8.3.8 Paragraph 8 (Project Description). Provide brief description of the project purpose, e.g., "This project provides capability. . . ."

8.3.9 Paragraph 9 (Equipment Provided). This paragraph normally lists two parts: paragraph 9A, operational equipment installed, and paragraph 9B, test equipment seccessfully tested and test equipment successfully calibrated. All hardware listed is correlated to the project BOM item number, and quantities shown are for items successfully tested/calibrated only.

8.3.10 Paragraph 10 (Documentation Provided). This paragraph normally lists two parts: paragraph 10A, drawings provided to the operator, and paragraph 10B, technical manuals provided to the operator. Drawings are listed in numerical sequence, with the title and sheet quantity identified for each. Technical manuals are listed by equipment BOM item in numerical sequence, with the equipment described and the manual quantity identified for each item.

8.3.11 Paragraph 11 (Exceptions). Exceptions to project completion and to full facility operation are identified in detail in this paragraph. Each exception will be identified separately and categorized according to the agency, or 11A, B, C, or D, anticipated to be responsible for corrective action. This categorization constitutes the test director's recommendation and is not binding. The project manager retains tasking authority regarding resolution of all exceptions.

8.3.12 Paragraph 12 (Remarks). Comment by the QA/test, installation, and operating agencies or respective paragraphs 12A, B, or C is encouraged. In the event a representative of the engineering agency is at hand during execution of final documentation, comment from that source is also encouraged. Remarks should be confined to technical matters affecting the project. Lauditory comment relative to support received, work accomplished, etc., while commendable, should be addressed in separate correspondence. Standard statements to be entered on all TAR's by the QA/test agency are shown in this paragraph. Reference to other documentation, if required, should also be addressed in this paragraph.

8.3.13 Paragraph 13 (Certification). Signatures are affixed by installation, operating, and QA/test agency representatives to authenticate activity which transpired during the acceptance test phase and to verify that system status is as stated in the document.

8.3.14 Paragraph 14 (Acceptance). The O&M Commander, or his/her representative, indicates by his/her signature that the system described in the document is accepted for full operation, less exceptions noted, if any.

TECHNICAL ACCEPTANCE RECORD

1. Project:

2. Facility:

3. Location:

4. Operating Agency:

5. Engineering Agency:

6. Installation Agency:

7. Quality Assurance/Test Agency:

8. Project Description:

Figure 8-1. Sample Technical Acceptance Record (sheet 1 of 14).

9. Equipment Provided A. Operational Equipment

Bom Item No.	Description	Part Number	Qty Rqr	Qty On Site

Figure 8-1. Sample Technical Acceptance Record (sheet 2 of 14).

9. Equipment Provided: B. Test Equipment

Bom Item No.	Description	Part Number	Qty Rqr	Qty On Site

Figure 8-1. Sample Technical Acceptance Record (sheet 3 of 14).

10. Documentation Provided A. Drawings

Drawing Number	Title	Sheet

Figure 8-1. Sample Technical Acceptance Record (sheet 4 of 14).

10. Documentation Provided: B. Tech Manuals

Bom Item No.	Description	Part Number	Tech Manual Qty Rqr	Tech Manual Qty On Site

Figure 8-1. Sample Technical Acceptance Record (sheet 5 of 14).

11. A. Exceptions for which the Operating Agency Assumes Responsibility

Figure 8-1. Sample Technical Acceptance Record (sheet 6 of 14).

11. B. Exceptions for which the Installation Agency Assumes Responsibility

Figure 8-1. Sample Technical Acceptance Record (sheet 7 of 14).

11. C. Exceptions Requiring Resolution by the Engineering Agency:

Figure 8-1. Sample Technical Acceptance Record (sheet 8 of 14).

11. D. Exceptions Requiring Resolution by the Project Manager:

Figure 8-1. Sample Technical Acceptance Record (sheet 9 of 14).

12. Remarks:

A. QA/Test Agency

(1) This document signifies that the equipment identified in paragraph 9 is technically acceptable for operation. This document does not signify acceptance of the equipment by the O&M Command, nor does it serve to transfer accountability for property book purposes; both of these are actions which must be consummated by the Project Manager/O&M Commander.

(2) Paragraph 11 contains agreements by personnel involved in acceptance testing relative to Agency responsibility for correction of exceptions identified therein. Assignments will be adjusted if necessary and confirmed by the PM subsequent to distribution of this document.

(3) Disposition of excess project material is a USACSA function.

(4) One copy of each marked-up drawing listed at paragraph 10A, above is provided to the Operating Command with execution of this document.

(5) All tech manuals listed at paragraph 10B, above, are provided to the Operating Command with execution of this document.

(6) One copy of each test data sheet, prepared during the installation shakedown test and during acceptance test, is provided to the Operating Command with execution of this document.

Figure 8-1. Sample Technical Acceptance Record (sheet 10 of 14).

(sheet 1 of 2).

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12. Remarks:

B. Installation Agency:

Figure 8-1. Sample Technical Acceptance Record (sheet 11 of 14).

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12. Remarks:

C. Operating Agency:

Figure 8-1. Sample Technical Acceptance Record (sheet 12 of 14).

13. Certification:

Acceptance Test and Quality Assurance inspections are complete for this project
Without Exception _____ With Exception Cited Para 11 _____

INSTALLATION AGENCY REPRESENTATIVE

Printed: _____

Signed: _____

Title: _____

Organization: _____

Date: _____

OPERATING AGENCY REPRESENTATIVE

Printed: _____

Signed: _____

Title: _____

Organization: _____

Date: _____

QA/TEST AGENCY REPRESENTATIVE

Printed: _____

Signed: _____

Title: _____

Organization: _____

Date: _____

Figure 8-1. Sample Technical Acceptance Record (sheet 13 of 14).

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14. Acceptance:

This project is accepted for full operation:

Without Exception_____ With Exception Cited Para 11_____

OPERATING COMMAND

Printed: _____

Signed: _____

Title: _____

Organization: _____

Date: _____

Figure 8-1. Sample Technical Acceptance Record (sheet 14 of 14).

1 July 1977 USACC SEIP 026

(CC-OPS)

FOR THE COMMANDER:

OFFICIAL:

SAMUEL G. CONLEY, Jr.
Colonel, GS
Acting Chief of Staff

R. R. SANDERS
Major, AGC
Adjutant General

DISTRIBUTION:
Special
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10 - CCC-CED-SEP
4 - CCC-CED-SW
4 - CCC-TED
5 - USACEI Bn
10 - USACEEIA-CONUS, ATTN: CCN-TR, Fort Ritchie, MD 21719
10 - USACEEIA-EUR, APO New York 09056
10 - USACEEIA-PAC, APO San Francisco 96557
10 - US Army Signal School, ATTN: ATSN-CD-MS, Fort Gordon, GA 31905
2 - US Army Materiel Development and Readiness Command, ATTN: CCN-PI-P, Washington, DC 20315
5 - 5th Signal Command, APO New York 09056
5 - 6th Signal Command, APO San Francisco 96558
5 - 7th Signal Command, Fort Ritchie, MD 21719
2 - US Army Communications Command, ATTN: CC-OPS-SM, Fort Huachuca, AZ 85613
2 - US Army Training and Doctrine Command, ATTN: ATCE, Fort Monroe, VA 23351
2 - US Army Forces Command, ATTN: AFCE, Fort McPherson, GA 30330
2 - Defense Communications Agency, Technical Library Center, Code 205 Washington, DC 20305
12 - Defense Documentation Center, Cameron Station, Alexandria, VA 22314
2 - US Air Force, ATTN: USAFSAAS/TEOOA, Keesler AFB, MS 39534
2 - Air Force Communications Service, ATTN: 1842 EEG/EEM (MAJ Tilmon), Richards-Gebaur AFB, MO 64030
2 - Naval Electronic Systems Command (NAVELEX), Code 51032 (D. O'Bryhim), Washington, DC 20315

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