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STANDARD ENGINEERING INSTALLATION PACKAGE

AIR TRAFFIC RADIO CHANNEL CONTROL EQUIPMENT

(ATTACC) (11) 9 Final rept.

1 NOVEMBER 1979

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US ARMY COMMUNICATIONS-ELECTRONICS
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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

This Standard Engineering Installation Package (SEIP) provides information for the engineering and installation of ATRCC facilities worldwide. Information provided consists of site survey data, siting criteria, installation specifications and instructions, a bill of materials, quality assurance procedures and completion certification format. Information provided must be adapted to the specific ATRCC facility/location by the project engineer.

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Standard Engineering Installation Package
AIR TRAFFIC RADIO CHANNEL CONTROL EQUIPMENT

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SECTION 1. GENERAL

1.1 PURPOSE. The purpose of this standard engineering installation package (SEIP) is to provide detailed guidance for engineering, installing, and testing of the ATRCC equipment at US Army airfields for pilot-to-forecaster, flight following, and advisory communications control.

1.2 SCOPE. The SEIP is applicable to all US Army Communications Command (USACC) engineering-installation activities involved in the planning and implementation of ATRCC equipment. This SEIP provides site survey data, engineering and installation specifications and instructions, typical installation drawings, a bill of materials (BOM), quality assurance and test and acceptance procedures, and completion certification format.

1.3 REFERENCES.

1.3.1 Government Documents.

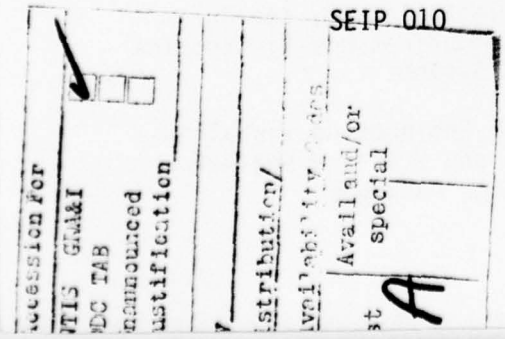
Manuals

TM 11-5820-805-14	Operator, Organizational, Direct Support, and General Support Maintenance Manual. Receiver, Radio AN/GRR-23 and AN/GRR-24
TM 11-5820-806-14	Operator, Organizational, Direct Support, and General Support Maintenance Manual. Transmitting, Sets, Radio AN/GRT-21 and AN/GRT-22
USAF T.O. 31-10 Series	Standard Installation Practices

Regulations

AR 105-6, USACC Suppl 1	Communications-Electronics Standardized Telecommunications Program (U)
CCR 385-1	Communications Mission Safety
CCR 702-1-2	USACC Quality Assurance Program for Engineering, Installation, and Acceptance of Communications-Electronics Equipment and Systems
CCCR 34-2	Preparation of Engineering Installation Packages and Standard Engineering Installation Packages

CCCR 34-3	Standardization Engineering Drawings
CCCR 702-1	USACEEIA Quality Assurance and Testing Program
CCCR 702-2	Preparation of Documentation for Test and Evaluation of Communications-Electronics Materiel
CCCR 702-4	Quality Assurance During On-Site Installation
CCCR 702-7	Product Assurance Quality Assurance Corrective Actions
Technical Bulletin	
TB 95-1	U.S. Army Air Traffic Control and NAVAID Facility Standards
Circular	
DCAC 370-160-3	Site Survey Data Book for Communications Facilities
Military Handbook	
(C) MIL-HDBK-232	RED/BLACK Engineering and Installation Guidelines (U)
Miscellaneous	
USACEIA Bn	The Communications-Electronics installation Planning and Implementation Guide
SB 700-20	Army Adopted/Other Items Selected for Authorization/List of Reportable Items
CCC-TED-75-TP-200	Quality Assurance Evaluation and Technical Acceptance Test of World-Wide Army Airfields/Heliports Communcations and Navigational Aids (revision 2) Test Plan
SEIP 010	Standard Engineering Installation Package. US Army Airfields/Heliports, Air/Ground Communications



1.3.2 Non-Government Publications.

NFPA 70-XXXX	National Electrical Code (Current edition)
IM-1000	GRM Corporation Instruction Book, Air Traffic Radio Channel Control Equipment
IM-1588	GRM Corporation Instruction Book, Table Top Console Model TTC-8/800

1.4 DEFINITION OF TERMS.

Amplification. Increase in magnitude of a signal, usually to counteract losses.

Attenuation. Weakening of a signal, either incidentally by normal transmission losses or deliberately.

Collocated. Two or more units placed in close proximity so as to share common facilities.

Radio channel control equipment. The facilities which enable an operator at a console to have access to multiple send and receive radio channels through remote radio transmitters and receivers.

Ring. A ring-shaped contacting part of a plug in back of, but insulated from, the tip. The corresponding contact on a jack. The corresponding conductor.

Sleeve. A cylindrical contacting part of a plug in back of the ring, insulated from both the ring and the tip. The corresponding contact on a jack. The corresponding conductor.

Tip. The contacting part at the tip end of a plug. The corresponding contact on a jack. The corresponding conductor.

1.5 BACKGROUND. This SEIP is prepared in accordance with US Army Communications Command (USACC) Supplement 1 to AR 105-6.

1.6 OTHER CONSIDERATIONS. RED/BLACK criteria have not been covered in this document. Refer to MIL-HDBK-232 for details.

1.7 SYSTEM DESCRIPTION. The ATRCC equipment provides control over the ground-based portion of radio communications between the airfield operations center and aircraft. The ATRCC equipment consists of a table-top console, model TTC-8/800, which houses one jack

panel, JP-2401, one audio unit, AU-2400, and one selector unit, ASU-2400. The console comprises a complete radio control operator's position with the capability of controlling one to eight radio channels. The console is designed to be mounted on a flat, horizontal surface wherever operation is convenient and the necessary wiring is accessible. Figure 1-1 shows a block diagram of the ATRCC equipment interconnections and figure 1-2 shows the front elevation of the console.

1.7.1 Jack Panel (JP-2401). The jack panel consists of a panel in which five jacks are mounted for accommodating the microphones, headphone, and headset as required, and a circuit board. The jack panel is connected to the audio unit by means of a cable and plug. The jacks and associated circuits are as follows:

a. J1 and J2. The J1 and J2 jacks are spaced 5/8 inch apart to receive a standard, twin, three-wire plug (JAN type PJ-511). The associated circuits are for operation with an HS-0111-2A, headset. The microphone is connected to the tip terminals, the earphone to the sleeve terminals, and the transmitter keying switch to the ring terminals.

b. J3. The auxiliary headphone jack, J3, is connected directly across the headset amplifier output line in parallel with the headset earphones and enables use of a separate headphone unit.

c. J4. The auxiliary microphone jack, J4, is connected in parallel with the microphone terminals of J5 and enables use of a separate microphone, M80-C, if required.

d. J5. The J5 jack accommodates a type HS-0111-2A headset, or equivalent. J5 may also be used for an M80-C microphone equipped with the matching 5-pin connector. Isolation between this and a headset microphone connected to J1 and J2, and also attenuation of the signals to the correct levels for input to the microphone amplifier circuits, are provided.

1.7.2 Audio Unit (AU-2400). The audio unit is a module that plugs into and becomes a part of the console. This module is interconnected to the other modules within the console through three connectors located on the back of the module. The audio unit contains a microphone amplifier/lamp brightener module, volume control module, speaker amplifier, and speaker.

1.7.3 Air Traffic Control Tower (ATCT) Selector Unit (ASU-2400). The ATCT selector unit is an enclosure that plugs into and becomes a part of the control console. This enclosure houses the ATCT

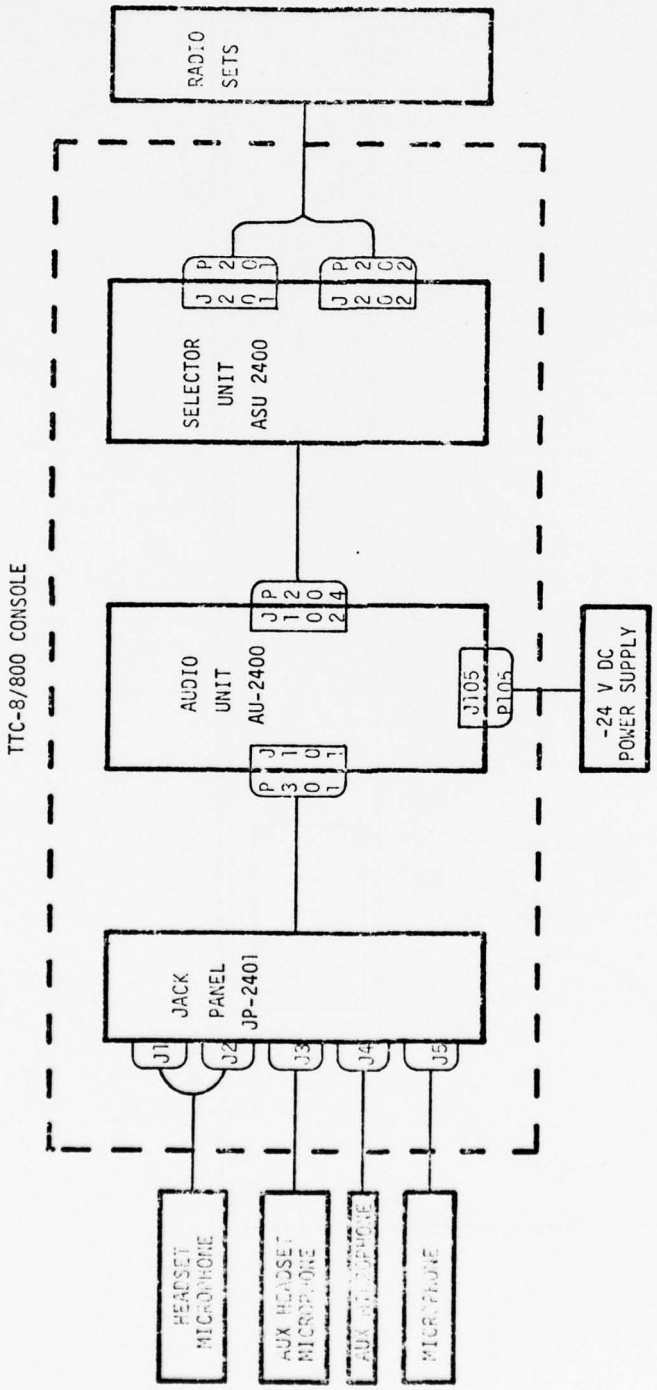


Figure 1-1. Air Traffic Radio Channel Control Equipment Block Diagram.

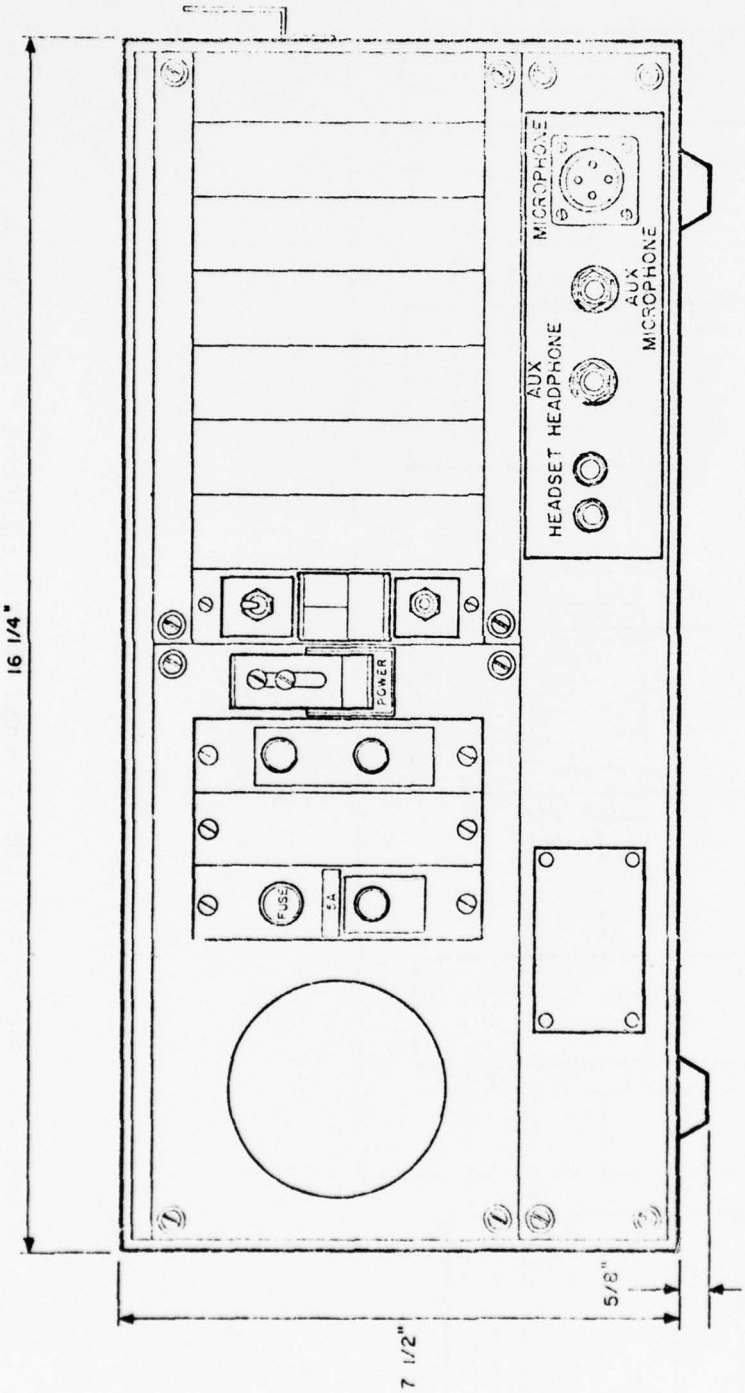


Figure 1-2. TTC-8/800 Console.

selector modules (ASM-2401) and provides the interconnect capability between the selector modules, the audio unit, and the external radios. The ATCT selector unit can house from one to eight selector modules.

1.7.4 ATCT Selector Modules (ASM-2401). Each ATCT selector module provides the capability for control of one radio channel. This capability consists of audio transmit and receive amplifications, transmit keying provisions, visual indication of receive audio, channel selection and channel status, and a headset/speaker selector control.

1.7.5 Console Power Supply Module (HP62024G). The power supply module provides 24-V dc nominal output at 7.5 amperes maximum for the console. The power supply module is not part of the operating console.

1.7.6 Forty-eight Volt Power Supply Module (HP62048G). The 24-V console power supply described in 1.7.5 is required at all sites. In addition, some sites will require a 48-V power supply. The HP-62048G provides 48 V at 4 A. The 48-V power supply will be used:

a. When 48-V dc power is not otherwise available but is required to operate transmit/receive relays where the ATRCC, the transmitters, and the receivers are all collocated.

b. When the cable plant is such that a 48-V dc keying circuit must be used to operate the keying relay in a transmitter control panel located at a remote transmitter site.

c. When a transmitter control panel is presently installed and command decision has been made to continue its use without alteration.

1.7.7 Power Supply Module Tray (HP62410A). The HP 62410A is a rack mounted tray in which the power supply module(s) will be mounted. The tray may be installed in any convenient 19-inch equipment rack or in a separate cabinet (see 1.7.8). The tray requires three rack mounting spaces.

1.7.8 Cabinet (EK 314). Where no rack space is available, the HP-62410A power supply module tray may be mounted in Par Metal cabinet EK 314.

1.8 PROCEDURES FOR SUBMITTING COMMENTS.

a. Users of this publication are invited to submit recommendations for its improvement. Comments should be keyed to the drawing, 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.

b. Requests for USACEEIA regulations and forms should be addressed to the Commander, USACEEIA, ATTN: CCC-SPT-RM, Fort Huachuca, Arizona 85613.

SECTION 2. SITE SURVEY DATA AND CHECKLIST

2.1 GENERAL. This section provides the information necessary to accomplish preliminary engineering, equipment layout, and arrangements pertinent to the installation of the ATRCC equipment.

2.2 PRE-SITE SURVEY. Prior to the site survey, it should be determined whether the ATRCC installation will be a new facility or a part of an existing facility. Where the ATRCC must interface with an existing facility, the following must be determined:

a. Collocated, separate, remote, local, or a combination of these configurations for transmitters and receivers.

b. Type of equipment with which ATRCC must interface.

c. Keying voltage required.

2.3 SITE SURVEY. Adequate current information may be available at the responsible area engineering-installation agency. If this information is sufficient to perform detail engineering, no site survey is necessary. If a site survey is required, it should be conducted in accordance with the criteria set forth in DCAC 370-160-3.

2.3.1 Site Survey Checklist. The site survey checklist (figure 2-1) should be used as a guide by the survey team for identifying and assembling the required technical data during the site survey. The checklist, when completed, will aid in preparing an official site survey report with equipment layout drawings.

2.3.2 Information To Be Obtained. Information to be obtained during the survey include:

a. Location for all planned equipment.

b. Accurate, dimensioned floor plan of all areas affected.

c. Rack and cabinet layouts of all equipment to be interfaced.

d. Data for cable ladders, ducts, and conduits, as required.

e. Ac power panels and circuit breakers available and their locations.

f. Interconnecting cabling available or required between console and transmitters and receivers.

2.4 EQUIPMENT CHARACTERISTICS. The physical and electrical characteristics of the applicable equipments are listed in table 2-1. This table should be used to determine the site's physical size, ac power requirements, floor loading criteria, and additional heat dissipation.

2.5 SITE SUPPORT. During the survey, arrangements should be made for the site support required prior to and during installation. Immediately after the survey, the project engineer will document agreements reached in the project coordination letter (PCL). The project engineer is also responsible for updating the PCL if site support requirements change.

SITE SURVEY CHECKLIST

1. PROJECT TITLE AND NUMBER: _____

2. SITE NAME: _____

3. LAT: _____ LONG: _____ ELEV: _____ FT MSL

4. PURPOSE OF SITE SURVEY: _____

5. PERSONNEL CONTACTED:

Name and Grade or Rank	Position and Organization	Phone No.

Figure 2-1. Sample Site Survey Checklist.

(Sheet 1 of 6)

6. EQUIPMENT TO BE INSTALLED (On separate sheet or sheets, provide sketch of operating floor plan and show relationship to existing equipment.):

Nomenclature	Power required	Temperature range	Dimensions	Weight

Figure 2-1. Sample Site Survey Checklist (Continued).

(Sheet 2 of 6)

7. PRESENTLY INSTALLED EQUIPMENT (List each item of installed equipment that will interface with planned installation. Give sketch showing rack and cabinet layout of all equipment being interfaced.):

Room	Nomenclature	Problems

Figure 2-1. Sample Site Survey Checklist (Continued).

(Sheet 3 of 6)

8. EXISTING POWER CONFIGURATION (for each room, building, or site):

a. Main power panel:

(1) Location: _____

(2) Rating in kVA or kW (state which): _____

(3) Voltage: _____

(4) Number of phases: _____

(5) Frequency in Hz: _____

(6) Number of spare circuit breakers: _____

9. COMMUNICATIONS CABLE:

a. Existing cable:

(1) From: _____ *To:* _____

(2) Cable number: _____

(3) Pairs available: _____

(4) Pairs needed: _____

b. New cable requirements:

(1) From: _____ To: _____

(2) Number of new pairs required: _____

c. Leased line requirements: _____

_____

Figure 2-1. Sample Site Survey Checklist (Continued).

(Sheet 4 of 6)

10. PHOTOGRAPHS:

a. Title: _____.

(1) Source: _____.

(2) Date: _____.

(3) Shows: _____

_____.

b. Title: _____.

(1) Source: _____.

(2) Date: _____.

(3) Shows: _____

_____.

c. Title: _____.

(1) Source: _____.

(2) Date: _____.

(3) Shows: _____

_____.

d. Title: _____.

(1) Source: _____.

(2) Date: _____.

(3) Shows: _____

_____

(Add additional sheets if necessary.)

Figure 2-1. Sample Site Survey Checklist (Continued).

(Sheet 5 of 6)

11. SPECIAL PROBLEMS:

a. EMI: _____

_____

b. Equipment interface: _____

_____

c. Other: _____

12. MISCELLANEOUS:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ _____

DATE SITE SURVEY TEAM CHIEF

Figure 2-1. Sample Site Survey Checklist (Continued).

(Sheet 6 of 6)

Table 2-1. ATRCC Equipment Characteristics

Equipment	Size cm	Size in.	Power input	Heat dissipation (Btu/hr)	Power output	Ambient operating temp (°C)	Weight (lb)
TTC-8/800 Console	H = 19.0 D = 36.8 W = 41.3	H = 7.5 D = 14.5 W = 16.25	24 ±2 V dc 48 watts	170		0-50	19
HP62024G power supply module	H = 12.9 D = 31.1 W = 21.2	H = 5.08 D = 12.25 W = 8.36	120/240 V ac single phase 50/60 Hz 300 watts max	1025 max	24 V at 7.5 A max	0-50	15
HP62048G power supply module	H = 12.9 D = 31.1 W = 21.2	H = 5.08 D = 12.25 W = 8.36	120/240 V ac single phase 50/60 Hz 300 watts max	1025 max	48 V at 4 A max	0-50	15
EK 314 Cabinet	H = 146 D = 45.7 W = 55.9	H = 47.5 D = 18 W = 22					25
HP62410A power supply module tray	H = 13.3 D = 50.8 W = 48.3	H = 5.25 D = 20 W = 19					5

SECTION 3. INSTALLATION SPECIFICATIONS AND INSTRUCTIONS

3.1 INTRODUCTION. This section provides installation specifications and guidance for the installation of an ATRCC facility.

3.2 GENERAL INSTRUCTIONS.

3.2.1 Adherence to Policies and Documents.

a. The equipment shall be installed in accordance with established policies, the engineering drawings and instructions, and referenced drawings and publications deemed necessary by the responsible engineering activity. Minor deviations from the engineering installation package (EIP) or SEIP may be made by the installation supervisor without prior approval by the project engineer. A minor change is one that does not-

(1) Alter the specified floor plan or major item of equipment

(2) Violate a mandatory standard

(3) Alter the intended operational capability or procedures

(4) Alter the intent or end result of the required testing.

A major change is one which does alter or violate specifications listed in 1 through 4 above. The installation team shall not make major changes to the requirements and instructions contained in this specification without the prior approval of the project engineer. Requests for an approval of major changes may be made by telephone; however, a follow-up message or letter is required. All changes shall be documented (redlined) by the team chief and the document which authorized the change shall be included in the documentation. Two sets of redlined documents are required. One set shall be left on site.

b. Installation personnel must be familiar with applicable technical order AFTO 31-10 series to ensure that the facility is installed in accordance with standard practices.

c. Prior to start of installation, all team members should review the safety instructions in CCR-385-1 and in the installation and operating instruction manuals furnished by the equipment manufacturers.

3.2.2 Changes in Scope. The installation team shall not accomplish work requested by local post, camp, or station personnel unless such work is covered by the EIP or other agreements.

3.2.3 General Installation Precautions. The installation team chief will ensure that all safety regulations and proper accident prevention regulations are observed by all members of his team during all phases of installation. He must contact the responsible accident clinic prior to start of work to ensure quick medical treatment in case of emergency. To help prevent injuries to personnel and damage to equipment, the following safety regulations should be observed:

a. Installation personnel should be trained in safety practices pertinent to their duties and in the application of emergency first aid, rescue, resuscitation, and closed-chest heart massage.

b. Approved insulated tools, in good condition, should be used for electrical work. Tools with friction- or rubber-tape-covered handles should be avoided.

c. With the exception of test equipment, metallic measuring rules or metal-cased objects should not be used near energized electrical circuits. Personnel shall not wear metallic objects such as rings, identification tags, medals, wrist watches, or bracelets while working on or near electrical equipment.

3.3 INSTALLATION INSTRUCTIONS. The procedures required to install the ATRCC facility must be accomplished in a definite order. This will ensure that all work is completed as represented on the installation drawings and that all specifications are adhered to. Minor changes to the installation sequence may be made in consideration of manpower, time, equipment, material, and safety. The following steps are recommended:

3.3.1 Preinstallation steps. Prior to starting installation, the following must be accomplished:

a. Coordinate installation tasks with the operating agencies and/or other cognizant organizations. This will include clearance to proceed, logistics, review of support requirements, and request of any other support necessary for the completion of tasks.

b. Verify that all support requirements are complete or will be completed in time to prevent delays.

c. Brief team members on particular hazards that may be encountered. Emphasize safety by reviewing safety procedures and practices.

d. Inventory the BOM items to ensure all items are on hand. Missing items or shortages must be noted prior to the arrival of the installation team onsite.

e. Arrange for the transportation of personnel and equipment; determine the methods for control and storage of BOM items, tools, and other required equipment.

f. Review all specifications and drawings to ensure that no additional engineering assistance is required prior to the start of installation.

g. Coordinate all outages that may be required for the installation and/or cutover of this facility with the air traffic control (ATC) chief and the airfield commander.

3.3.2 Console Installation.

3.3.2.1 The TTC-8/800 console is comprised of several operational components. Reference STD-AF-0665, sheet 2, for console details. The number of selector modules (radio channels) will be determined by the operational requirements of the airfield being installed.

3.3.2.2 Install the TTC-8/800 console at location determined in site survey and in accordance with EIP drawings. Reference STD-AF-0665, sheet 1, for typical console location.

3.3.3 Power Supply Installation.

3.3.3.1 The 24-V dc power supply will be utilized in all cases where a TTC-8/800 console is being installed. In addition, the 48-V dc power supply will be used as specified in 1.7.6.

3.3.3.2 Install the 24-V dc power supply (and the 48-V dc power supply, where required) in accordance with STD-AF-0665, sheets 1 and 3, and the EIP drawings.

3.3.4 Terminal Box. Install the terminal box and terminal board in accordance with STD-AF-0665, sheets 1 and 4, and EIP drawings.

3.3.5 Cable Raceway Installation. Install the cable raceway in accordance with STD-AF-0665, sheet 4, and EIP drawings.

3.3.6 Cable Installation. Install cables in accordance with STD-AF-0665, sheets 4, 5, 6, 7, and 8, and EIP drawings.

3.3.7 Ground Installation. Install a ground in accordance with STD-AF-0665, sheet 9, and EIP drawings.

3.3.8 Coaxial Relay Installation. Install a coaxial relay (at those sites where no control panel is installed) in accordance with STD-AF-0665, sheet 10.

3.3.9 Terminations. Terminate cables in accordance with STD-AF 0665, sheets 5, 6, 7, and 8, and EIP drawings.

SECTION 4. ENGINEERING INSTALLATION DRAWINGS

4.1 GENERAL. The engineering installation drawings contained in this section show typical interconnect diagrams, console configuration, and cabinet details.

4.2 MODIFICATION OF INSTALLATION DRAWINGS. The engineering drawings may be modified during and after the installation of a project to reflect changes. Drawing changes will be marked with color pencils as follows: red for additions, blue for engineering notes, and yellow for deletions. Copies of modified drawings will be retained at each site and will also be forwarded to the responsible area office of the C-E engineers for corrective action.

4.3 US ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY DRAWINGS.

STD-AF-0665 10 sheets	Air traffic radio channel control equipment
Sheet 1	Typical floor plan
Sheet 2	Console configuration
Sheet 3	Power supply cabinet details
Sheet 4	Raceway installation details
Sheet 5	Typical block interconnect diagram
Sheet 6	Channel one schematic for 6-wire operation
Sheet 7	Channel one schematic for 48-V dc keying operation
Sheet 8	Wiring lists
Sheet 9	Grounding
Sheet 10	Coaxial relay panel

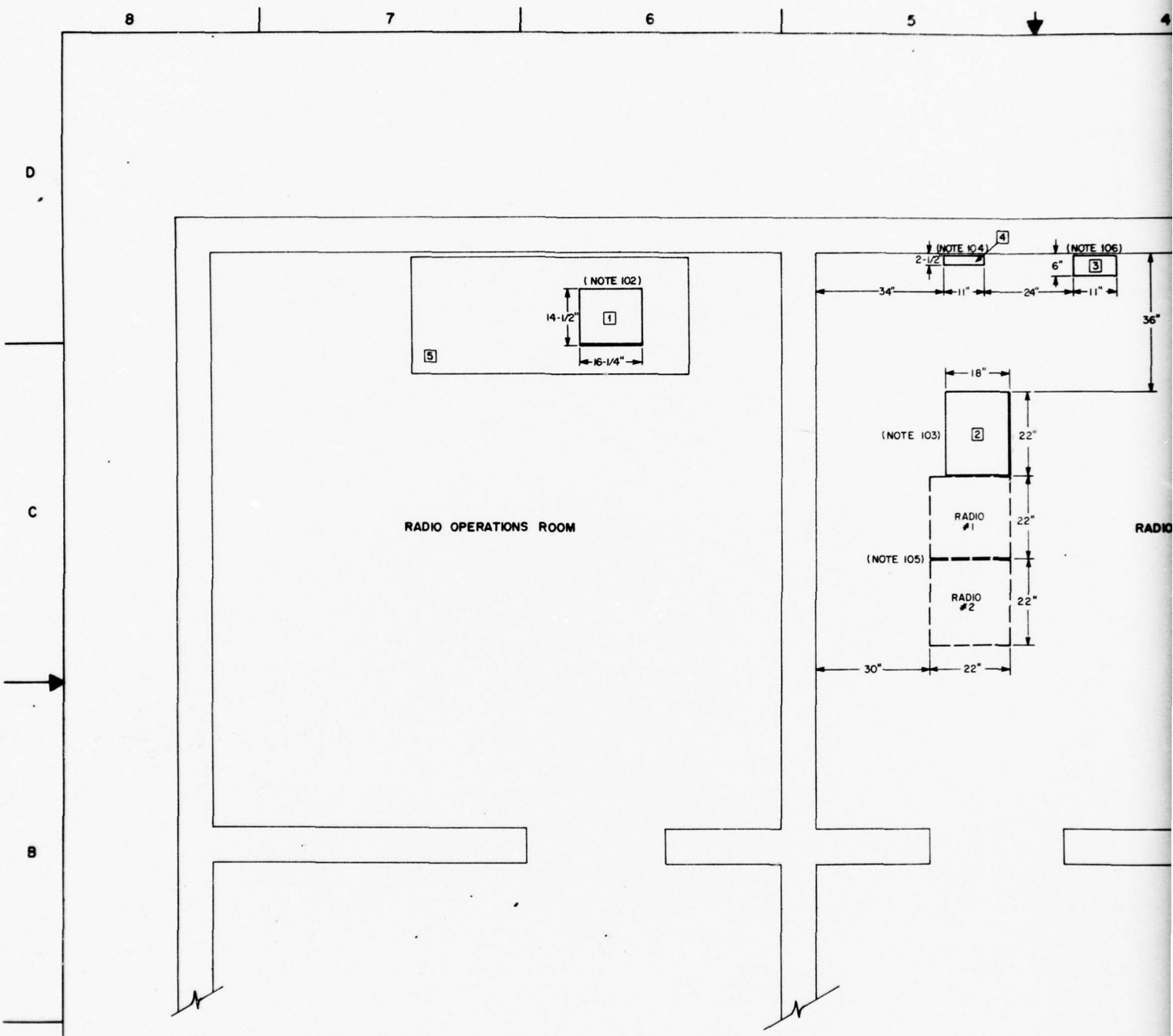


FIGURE 1

FLOOR PLAN EQUIPMENT LAYOUT
(NOTE 101)

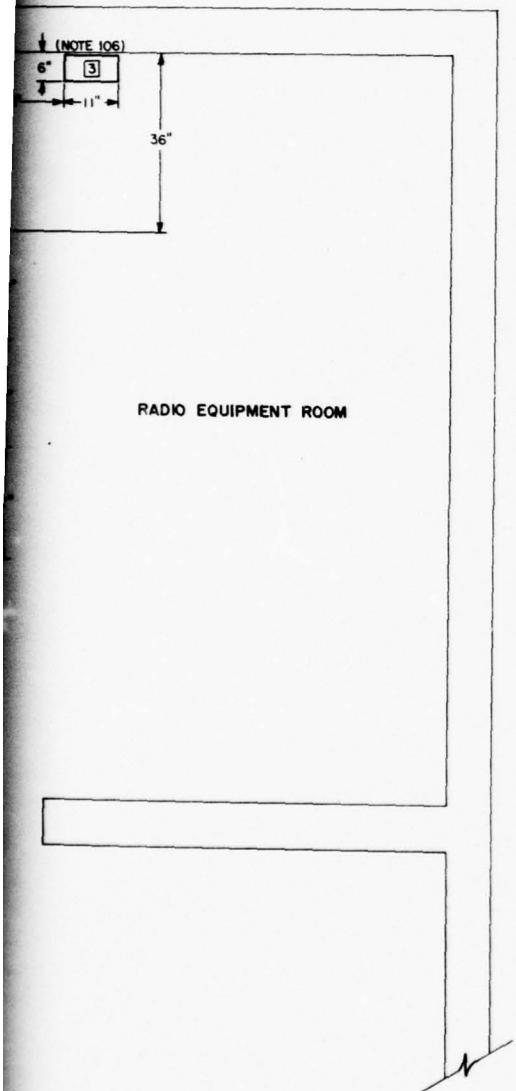
REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

LEGEND:

1. TTC-8/800 CONSOLE
2. POWER SUPPLY CABINET
3. AC POWER PANEL
4. SIGNAL CABLE TERMINAL BOX
5. TABLE OR DESK

NOTES:

101. THE FLOOR PLAN LAYOUT IS FOR A TYPICAL SITE WITH RADIO TRANSMITTERS AND RECEIVERS LOCATED NEAR OPERATIONS ROOM. OTHER LAYOUTS MAY CONSIST OF THE FOLLOWING:
   - A. SEPARATE REMOTE TRANSMITTER AND RECEIVER SITES.
   - B. LOCAL TRANSMITTER OR RECEIVER SITE WITH REMOTE RECEIVER OR TRANSMITTER SITE.
   - C. REMOTE COLLOCATED TRANSMITTER AND RECEIVER SITE.
102. REFER TO SHEET 2 FOR CONSOLE LAYOUT.
103. REFER TO SHEET 3 FOR POWER SUPPLY CABINET INSTALLATION DETAILS.
104. REFER TO SHEET 4 FOR SIGNAL CABLE TERMINAL BOX AND WIREWAY INSTALLATION DETAILS.
105. REFER TO SEIP 010 FOR RADIO TRANSMITTERS AND RECEIVERS ENGINEERING CRITERIA.
106. ONE 15-AMPERE, 120 VAC, 50 OR 60 HZ, CIRCUIT BREAKER IS REQUIRED FOR POWER SUPPLY CABINET OUTLET STRIP. PROJECT COORDINATION LETTER SHOULD RESERVE THIS BREAKER IF EXISTING OR PROVIDE FOR NEW PANEL OR NEW BREAKER IN EXISTING PANEL.



ITEM	SML	DESCRIPTION	NSN	UI	QTY
22	06342N	BOX, TERMINAL, 23" HIGH, 11" WIDE, 2-1/2" DEEP, RELIABLE 5603	5975-00-933-7678	EA	
21	19544L	BOLT, MACH, HEX HD 1/4" - 20 x 7/8" LG	5306-00-834-3939	HD	
20	21454D	BLOCK, TERMINAL, 25 PAIR, PROTECTED W/1304 PROTECTORS, RELIABLE WT-25P	NSNR	EA	
19	25143L	BLOCK, TERMINAL, 12 PAIR, PROTECTED W/1304 PROTECTORS, RELIABLE WT-12P	NSNR	EA	
18	25142M	BLOCK, TERMINAL, 6 PAIR, PROTECTED W/1304 PROTECTORS, RELIABLE WT-6P	NSNR	EA	
17	25140Y	BLOCK, TERMINAL, 26 PAIR, UNPROTECTED RELIABLE 5585	5940-00-933-7904	EA	
16	11279D	BLOCK, TERMINAL, 11 PAIR, UNPROTECTED RELIABLE 5555	5940-00-933-7902	EA	
15	25141N	BLOCK, TERMINAL, 6 PAIR, UNPROTECTED RELIABLE 5561	5940-00-933-7901	EA	
14	22326G	BLANK END FITTING, WIREMOLD G-3010B	5975-01-008-7219	EA	
13	25139D	VOLUME CONTROL MODULE, GRM CORP. VCM-2400	NSNR	EA	
12	25136A	TRAY, POWER SUPPLY, RACK MOUNTING, 19" W x 5-1/4" H, HEWLETT PACKARD 62410A	NSNR	EA	
11	25138C	SELECTOR UNIT, ATCT, GRM CORP. ASU 2400	NSNR	EA	
10	25137B	SELECTOR MODULE, ATCT, GRM CORP. ASM 2401	NSNR	EA	
9	25244J	POWER SUPPLY 48-V DC 4 AMPERES OUTPUT, 120/240 V AC INPUT, HEWLETT PACKARD MODEL HP62048G	NSNR	EA	
8	25135G	POWER SUPPLY, 24-V DC 7.5 AMPERES OUTPUT, 120/240 V AC INPUT, HEWLETT PACKARD MODEL HP62024G	NSNR	EA	
7	25132L	MICROPHONE AMPLIFIER MODULE, GRM CORP. MAM-2400	NSNR	EA	
6	25131M	JACK PANEL, GRM CORP. JP-2401	NSNR	EA	
5	25130N	CONSOLE, GRM CORP. TC-8/800	NSNR	EA	
4	25129E	CABINET, EQUIPMENT, 21-1/2" WIDE, 15" DEEP 19-1/4" HIGH, PAR METAL #DL-1713	NSNR	EA	
3	25128D	CABINET, EQUIPMENT, 22" WIDE, 18" DEEP, 47-1/2" HIGH, PAR METAL #EK-314	NSNR	EA	
2	25127C	BLANK PANEL, ATCT SELECTOR UNIT, GRM CORP. ABP-2400	NSNR	EA	
1	25126B	AUDIO UNIT, GRM CORP. AU-2400	NSNR	EA	

LIST OF MATERIALS

IDENT NO STD-AF-0665 SHEET 1 OF 10	ORGANIZATION US ARMY COMMUNICATIONS-ELECTRONICS ENGINEERING INSTALLATION AGENCY
DESIGN BY J COTHRAN — DATE MAY 79	AIR TRAFFIC RADIO CHANNEL CONTROL EQUIPMENT
DRAWN BY L H LEE — MAY 79	
CHECKED BY F E MYERS, JR — MAY 79	
APPROVAL Robert W. Tabuchi — ACTIVITY CCC-CED-SLIA	SIZE D — FSCM NO 50470 — DRAWING NO
PROJECT	SCALE NONE — SHEET OF

C1 05-12 ENTERED IN USACCEIA DDD

2

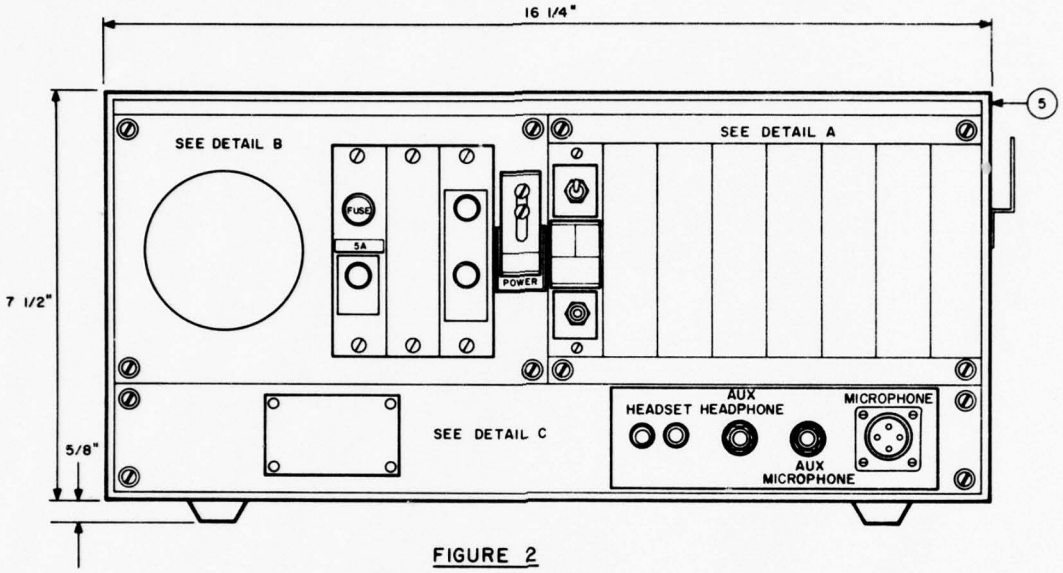
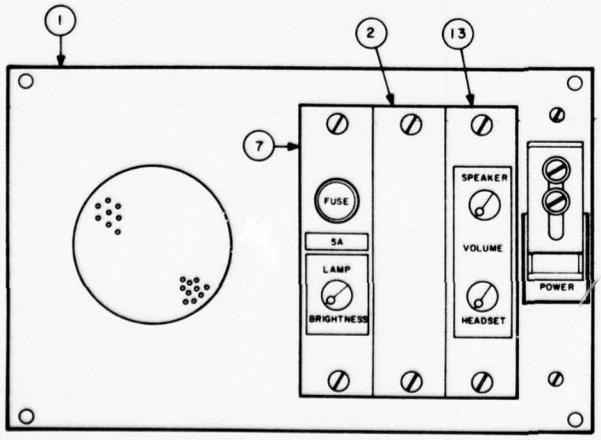
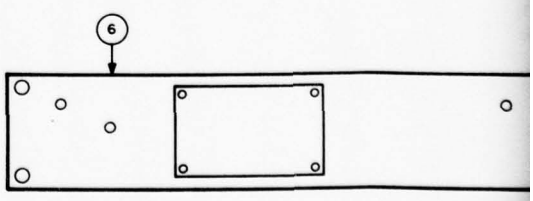


FIGURE 2
TTC-8/800 CONSOLE



DETAIL B
AUDIO UNIT AU-2400 WITH MICROPHONE AMPLIFIER
MAM 2400 AND VOLUME CONTROL MODULE VCM-2400
(NOTE 202)



DETAIL
JACK PANEL JP
(NOTE 203

BRUNING 40-21 35667

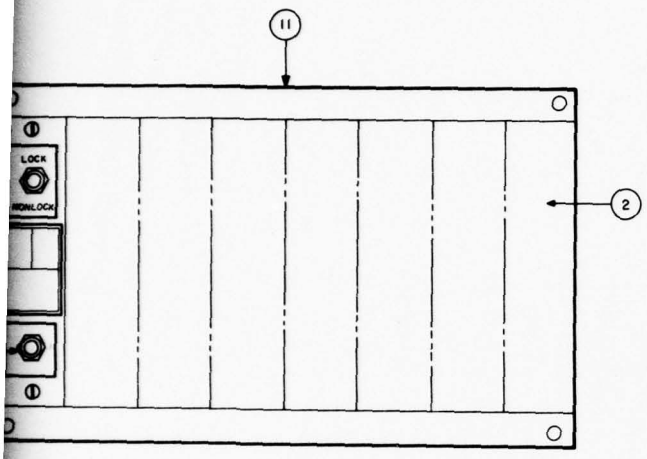
REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

NOTES:

201. THE SELECTOR UNIT CONTAINS ONE TO EIGHT SELECTOR MODULES. ONE MODULE IS REQUIRED FOR EACH CHANNEL. EACH SELECTOR MODULE PLUGS INTO A RECEPTACLE IN THE SELECTOR UNIT. THE SELECTOR UNIT HAS THREE RECEPTACLES (J201, J202, AND J203) AND P204. P204 MATES WITH J102 ON THE AUDIO UNIT. J203 IS USED ONLY IF MORE THAN EIGHT CHANNELS ARE REQUIRED. J201 AND J202 ARE THE OUTLETS FOR THE AUDIO AND KEYING. REFER TO SHEETS 5, 6, 7, AND 8 FOR WIRING INFORMATION.

202. THE AUDIO UNIT HAS FIVE RECEPTACLES (J101, J102, J103, J104, AND J105) ON THE REAR. J101 MATES WITH P301 FROM THE JACK PANEL. J102 MATES WITH P204 FROM THE SELECTOR UNIT. J105 IS THE 24 V DC INPUT. J104 IS A RECORDER-MONITOR JACK AND IS NOT USED. J103 IS USED FOR REMOTE VOICE TRANSMISSION (AUDIO AND PUSH-TO-TALK) THIS ALSO IS NOT USED IN THIS SEIP. REFER TO SHEET 8 FOR WIRING INFORMATION.

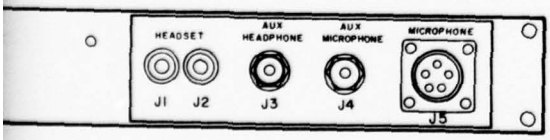
203. CONNECTOR RECEPTACLES J1, J2, J3, J4, AND J5 ARE WIRED INTERNALLY WITHIN THE JACK PANEL. PLUG P301 PLUGS INTO THE AUDIO UNIT CONTINUING THE NECESSARY SIGNAL AND VOLTAGE.



DETAIL A

SELECTOR UNIT ASU-2400 WITH SELECTOR MODULE ASM-2401

(NOTE 201)



DETAIL C

PANEL JP-2401

(NOTE 203)

ITEM	SML	DESCRIPTION	NSN	UI	QTY
52	00487C	WASHER, FLAT, STEEL, #8	5310-00-167-0833	HD	
51	09458K	WASHER, FLAT, STEEL, #4	5310-00-595-6425	HD	
50	21955Z	TERMINAL LUG, #10-12 AWG, 1/4"	5940-00-866-2586	EA	
49	25133K	TEE, RACEWAY, WIREMOLD G-3015	5975-00-962-1816	EA	
48	00740C	SHIELD, EXPANSION, 3/8" - 16	5340-00-754-4560	BX	
47	06315A	SHIELD, EXPANSION, 1/4" x 1-1/2"	5340-00-961-7302	HD	
46	00189B	SCREW, WOOD, 8 x 1"	5305-00-901-2134	GR	
45	19746A	SCREW MACHINE, 10-32 x 3/4"	NSNR	EA	
44	08301M	SCREW, MACHINE, ROUND HEAD, STEEL, 8-32 x 3/4"	5305-00-013-2768	HD	
43	11042K	SCREW, MACHINE, PAD HD, STEEL, 4-40 x 1/2"	5305-00-964-6032	EA	
42	00230J	SCREW, CAP, 3/8" - 16 x 1-1/2", HEX HD STEEL	5305-00-022-7798	EA	
41	11743F	RELAY, COAX, 500 W, 24V DC CHANGEOVER, TYPE N, AMPHENOL P/N 316-10744-3	5945-00-066-7131	EA	
40	23559H	RACEWAY, 2-3/4" W x 1-7/6" D x 10' L, BASE AND COVER WIREMOLD G-3000B AND G-3000C	NSNR	EA	
39	14278Z	PANEL CONNECTOR, RACEWAY, WIREMOLD G-3086A	NSNR	EA	
38	02406H	PANEL, BLANK, 19" x 7" x 1/8", GREY	5975-00-685-9791	EA	
37	02469E	PANEL, BLANK, 19" x 5-1/4" x 1/8", GREY	5975-00-685-9546	EA	
36	08712Z	PANEL, BLANK, 19" x 3-1/2" x 1/8", GREY	5975-00-686-2541	EA	
35	07788Z	OUTLET STRIP, AC, 6 OUTLETS, WIREMOLD 20GB306	5935-00-490-9842	EA	
34	00558H	NUT, HEX, STEEL, CADMIUM PLATED, 1/4 x 20	5310-00-285-1650	HD	
33	07675L	NUT, HEX, STEEL, CADMIUM PLATED, 8-32	5310-00-550-2490	EA	
32	07676K	NUT, HEX, STEEL, CADMIUM PLATED, 4-40	5310-00-194-8195	EA	
31	13789F	ENTRANCE END FITTING, WIREMOLD 2010A	5975-00-673-7658	EA	
30	21190P	ELBOW, RACEWAY, 90° FLAT, WIREMOLD G-3011	5975-00-771-2085	EA	
29	25145J	ELBOW, RACEWAY, INVERTED INTERNAL, WIREMOLD G-3017W	NSNR	EA	
28	25144K	COUPLING, WIREWAY, WIREMOLD G-3001	NSNR	EA	
27	23560K	CLIP, WIRE, F/U/W G-3000 WIREWAY, WIREMOLD G-3000WC	5975-00-979-6528	EA	
26	17106A	CABLE, POWER, BX, 3-CONDUCTOR, #12 AWG, 0.307 DIAMETER	6145-00-806-9389	FT	
25	14548F	CABLE, ELEC, 15-PAIR, #22 AWG, STR, I.S. BELDEN 8776	6145-00-948-6412	FT	
24	11385Z	BOX CONNECTOR, ELEC, 0.375" TO 0.500" CABLE, STRAIGHT	5975-00-669-9467	EA	
23	16392R	BOX CONNECTOR, F/U/W 0.307 DIA. BX CABLE, TNB 3301	5975-00-141-0453	EA	

LIST OF MATERIALS CONT'D

IDENT NO	SIZE	FSCM NO	DRAWING NO
STD-AF-0665 SHEET 2 OF 10	D	50470	
DRAWN BY S. D. H	SCALE NONE		SHEET OF
APPROVED			

CH 00 12 ENTERED IN USACEETA EDP 2

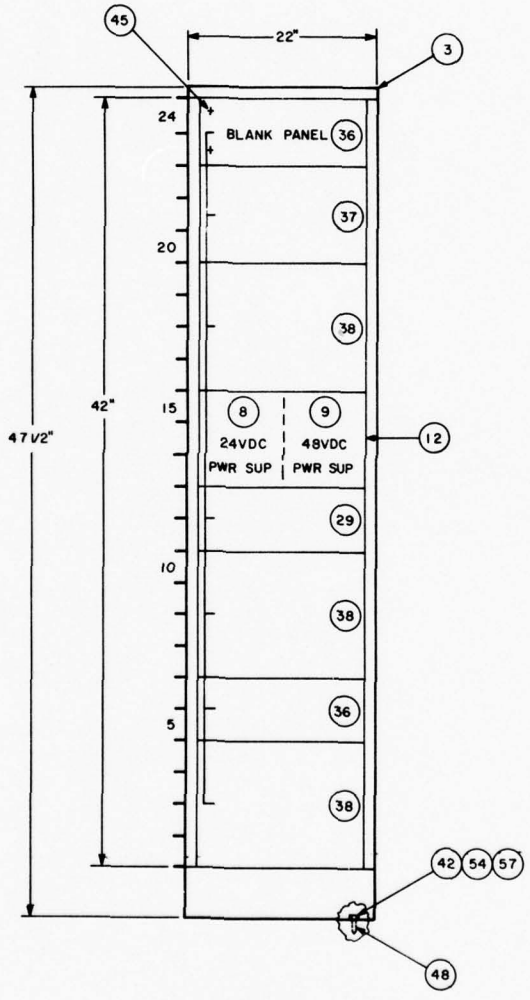


FIGURE 3

POWER SUPPLY CABINET
(FRONT VIEW)
(NOTE 302)

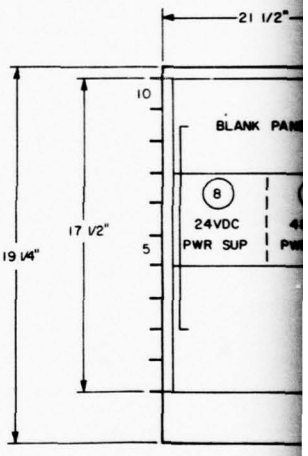


FIGURE 4

TABLE MOUNTED POWER SUPP
(NOTE 301)

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

NOTES:

301. WHEN SPACE PERMITS, INSTALL POWER SUPPLIES IN EXISTING 19" EQUIPMENT RACKS OR CABINETS WITHIN 50 CABLE FEET OF CONSOLE.

302. WHEN EXISTING RACK SPACE IS NOT AVAILABLE FOR THE POWER SUPPLIES, PROVIDE A SEPARATE CABINET; EITHER A FREE-STANDING CABINET (ITEM 3) OR TABLE-MOUNTED CABINET (ITEM 4) DEPENDING ON SPACE AND OTHER EQUIPMENT CONSIDERATIONS.

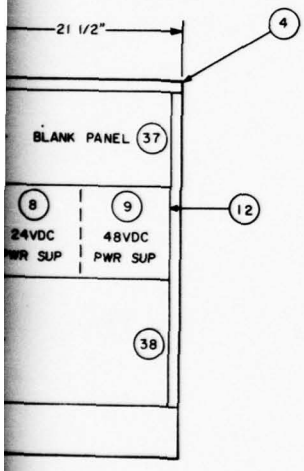


FIGURE 4

POWER SUPPLY CABINET
(NOTE 301)

ITEM	SML	DESCRIPTION	NSN	UI	QTY
61	25134J	WIRE CONNECTOR, PRESSURE TYPE, #12-14 AWG, WIREMOLD W30	5940-00-984-5060	EA	
60	03506A	WIRE, ELEC, #12 AWG, YELLOW, SOLID, TW	6145-00-184-5344	FT	
59	03540K	WIRE, ELEC, #14 AWG, BLK, SOLID, INS, 600V	6145-00-191-2577	FT	
58	03509A	WIRE, ELEC, #14 AWG, WHT, SOLID, INS, 600V	6145-00-184-5348	FT	
57	00586C	WASHER, LOCK, SPLIT, STEEL, 3/8"	5310-00-637-9541	HD	
56	25252M	WASHER, LOCK INT & EXT TEETH 1/4"	5310-00-689-2528	EA	
55	09019J	WASHER, LOCK, SPLIT, STEEL, #8	5310-00-045-3299	HD	
54	08658A	WASHER, FLAT, STEEL, 3/8"	5310-00-687-7693	HD	
53	00516Z	WASHER, FLAT, RD, STEEL, 0.266" ID x 0.50" OD	5310-00-788-3542	EA	

LIST OF MATERIALS CONT'D

IDENT NO	SIZE	FSCM NO	DRAWING NO
STD-AF-0665 SHEET 3 OF 10	D	50470	
DRAWN BY L H LEE	SCALE NONE		SHEET OF
APPROVED Robert W Tabuteau			

C1-09-F2

ENTERED IN USACCELA EDB

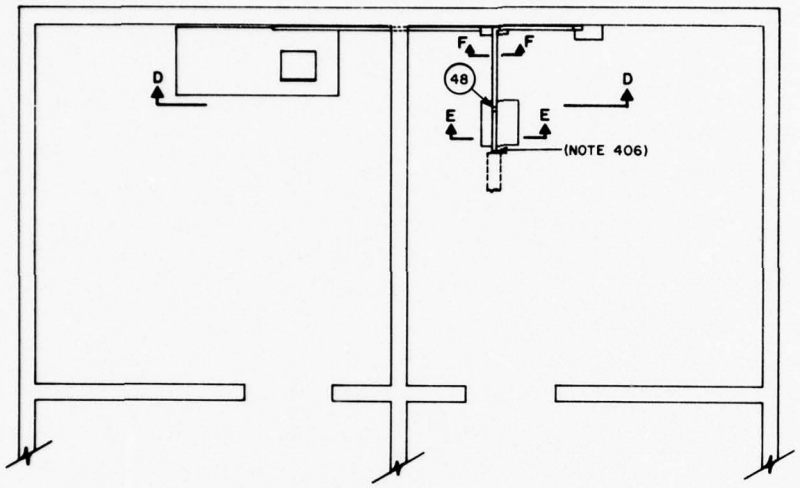
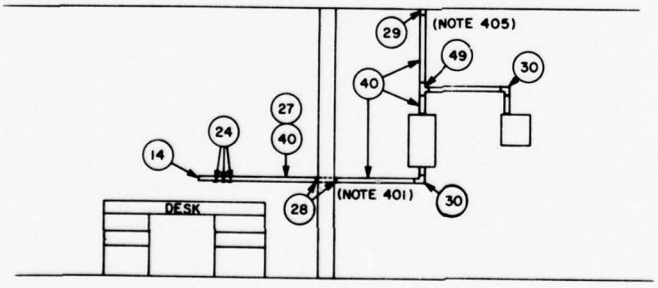


FIGURE 5

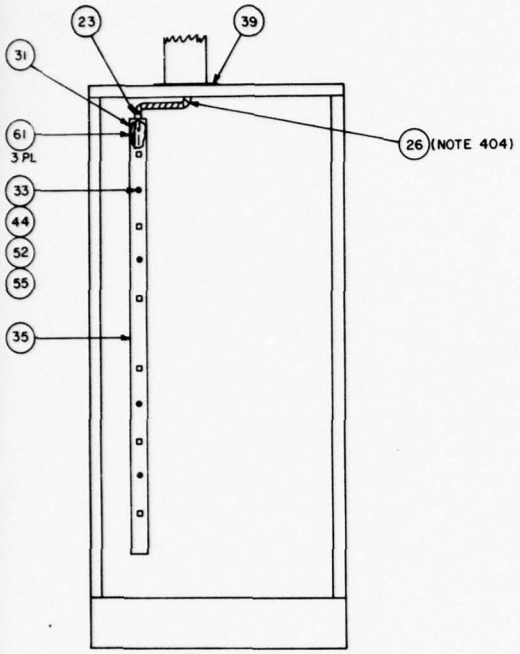
RACEWAY LAYOUT



SECTION D-D

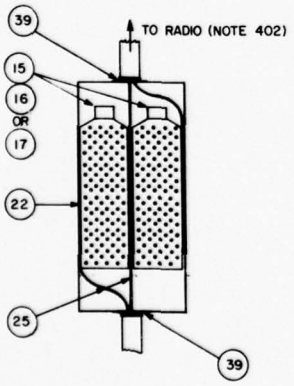
RACEWAY INSTALLATION ON
EQUIPMENT ROOM WALL

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED



SECTION E-E

POWER SUPPLY CABINET RACEWAY AND AC OUTLET INSTALLATION



SECTION F-F

SIGNAL TERMINAL BOX MOUNTING AND RACEWAY TERMINATION

(NOTE 403)

NOTES:

401. SPECIFY HOLE LOCATION AND SIZE IN PROJECT COORDINATION LETTER AS INSTRUCTIONS TO THE FACILITIES ENGINEER.

402. REFER TO SEIP 010 FOR ENGINEERING CRITERIA FOR CABLE INSTALLATION BETWEEN TERMINAL BOARD AND RADIO TRANSMITTERS AND RECEIVERS.

403. TERMINAL BOX SHOWN WITH UNPROTECTED BLOCKS INSTALLED. USE PROTECTED BLOCKS (ITEM 18, 19, OR 20) WHEN OUTSIDE PLANT CABLES ARE USED FOR CONNECTION TO RADIO TRANSMITTERS AND RECEIVERS.

404. CONNECT POWER CABLE TO 15 AMP CIRCUIT BREAKER IN TECHNICAL POWER PANEL.

405. ATTACH RACEWAY BASE TO WALL AND CEILING USING BOM ITEM 46 OR 47.

406. CONNECT WIREWAY TO EXISTING DUCT OR RADIO CABINET AS REQUIRED.

IDENT NO. STD-AF-0665 SHEET 4 OF 10	SIZE D	FSCM NO. 50470	DRAWING NO.
DRAWN BY L H LEE	SCALE NONE		SHEET OF
APPROVED			

C1-05-F2 ENTERED IN USACEEIA EDP

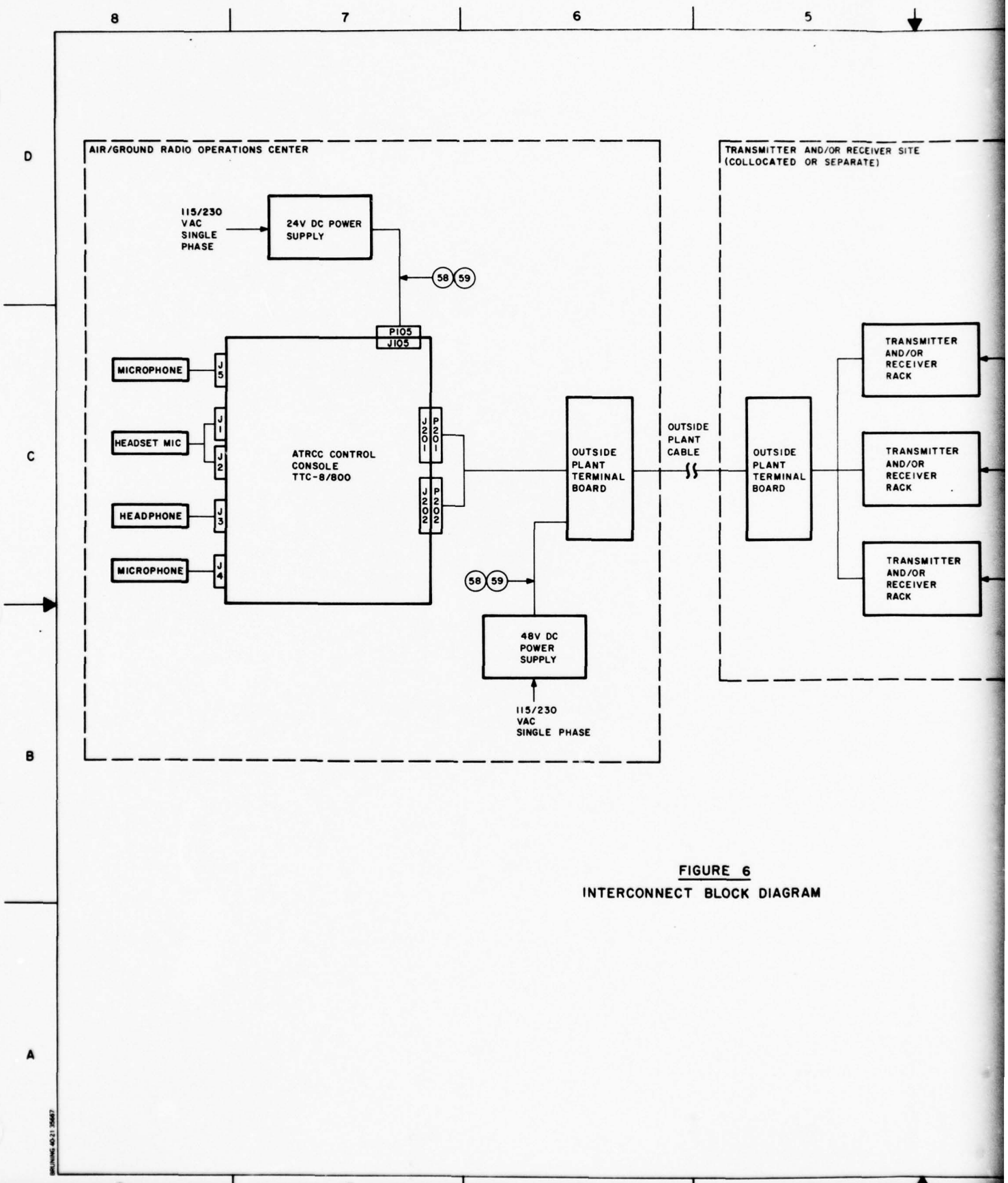


FIGURE 6

INTERCONNECT BLOCK DIAGRAM

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

ER SITE

TRANSMITTER AND/OR RECEIVER RACK

TRANSMITTER AND/OR RECEIVER RACK

TRANSMITTER AND/OR RECEIVER RACK

115/230 VAC SINGLE PHASE

IDENT NO. STD-AF-0665 SHEET 5 OF 10	SIZE D	FSCM NO. 50470	DRAWING NO.
DRAWN BY S.D.H.	SCALE NONE		SHEET OF
APPROVED Robert Valentine			

C1-05-12 ENTERED IN USACEEIA FDB

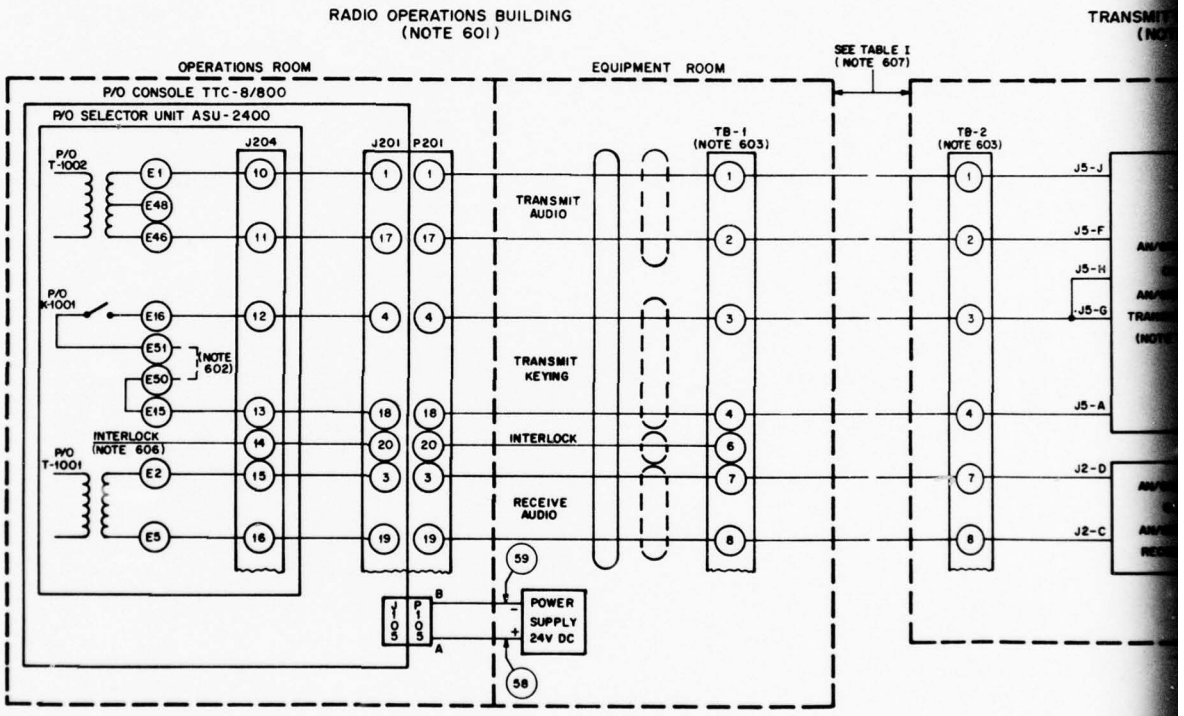
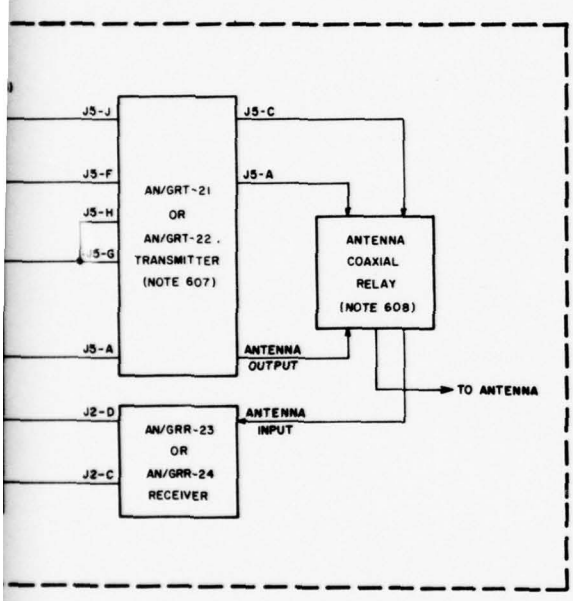


FIGURE 7

CHANNEL ONE CIRCUIT SCHEMATIC
FOR SIX-WIRE OPERATION

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

TRANSMITTER/RECEIVER SITE
(NOTES 604 & 605)



NOTES:

601. ONLY CONNECTIONS FOR CHANNEL ONE ARE SHOWN. CONNECTIONS FOR CHANNELS ONE THROUGH EIGHT ARE SHOWN ON SHEET 8.

602. FOR SIX WIRE OPERATION THE INTERNAL JUMPERS BETWEEN E15 AND E16, E48 AND E51, AND E49 AND E50 MUST BE REMOVED AND E50 JUMPERED TO E51 AS SHOWN.

603. TERMINAL BOARD NUMBERS ARE FOR REFERENCE ONLY.

604. THE TRANSMITTER AND/OR RECEIVER FACILITY MAY BE ANY OF THE FOLLOWING CONFIGURATIONS:

A. COLLOCATED REMOTE TRANSMITTER/RECEIVER SITE.

B. COLLOCATED LOCAL TRANSMITTER/RECEIVER SITE.

C. SEPARATE REMOTE TRANSMITTER AND RECEIVER SITES.

D. LOCAL TRANSMITTER OR RECEIVER FACILITY WITH REMOTE RECEIVER OR TRANSMITTER FACILITY.

605. CRITERIA FOR ALL ENGINEERING EXTERNAL TO TB-1 IS PRESENTED IN SEIP 010.

606. INTERLOCK BUS IS USED WHERE MORE THAN ONE CONSOLE TTC-8/800 IS USED.

607. FOR SIX-WIRE OPERATION, TRANSMITTER PIN J5-H MUST BE JUMPERED TO J5-G. THIS METHOD OF KEYING IS LIMITED TO A CABLE DISTANCE OF 300 OHMS LOOP RESISTANCE OR LESS AND UTILIZES THE INTERNAL AN/GRT-21/22 KEYING VOLTAGE (SEE TABLE 1).

608. A COAXIAL RELAY PANEL WILL BE REQUIRED FOR EACH TRANSMITTER/RECEIVER SET AT COLLOCATED SITES WHERE A CONTROL PANEL IS NOT USED (SEE SHEET 10).

TABLE 1

REMOTE KEYING LINE DISTANCE LIMITS FOR FOUR TYPICAL WIRE GAGE SIZES

Keying Line Wire Gage		Ohms Per 1000 Feet at 20° C	Maximum Linear Keying Line Distance, Miles (1)		
AWG	Metric (mm)		One Pair	Two (2) Pairs	Three (2) Pairs
#19	0.912	8.05	3.53	7.06	10.6
#20	0.812	10.15	2.80	5.60	8.40
#22	0.644	16.14	1.76	3.52	5.28
#24	0.511	25.67	1.11	2.21	3.32

NOTES:

1. BASED ON A MAXIMUM EXTERNAL KEYING LOOP RESISTANCE OF 300 OHMS.
2. TWO OR THREE UNLOADED CABLE PAIRS CONNECTED IN PARALLEL.

IDENT NO. STD-AF-0665 SHEET 6 OF 16	SIZE D	FSCM NO. 50470	DRAWING NO.
DRAWN BY L H LEE	SCALE NONE		SHEET OF
APPROVED Robert W Schuler			

21 05 12 ENTERED IN USACCEIA DDB

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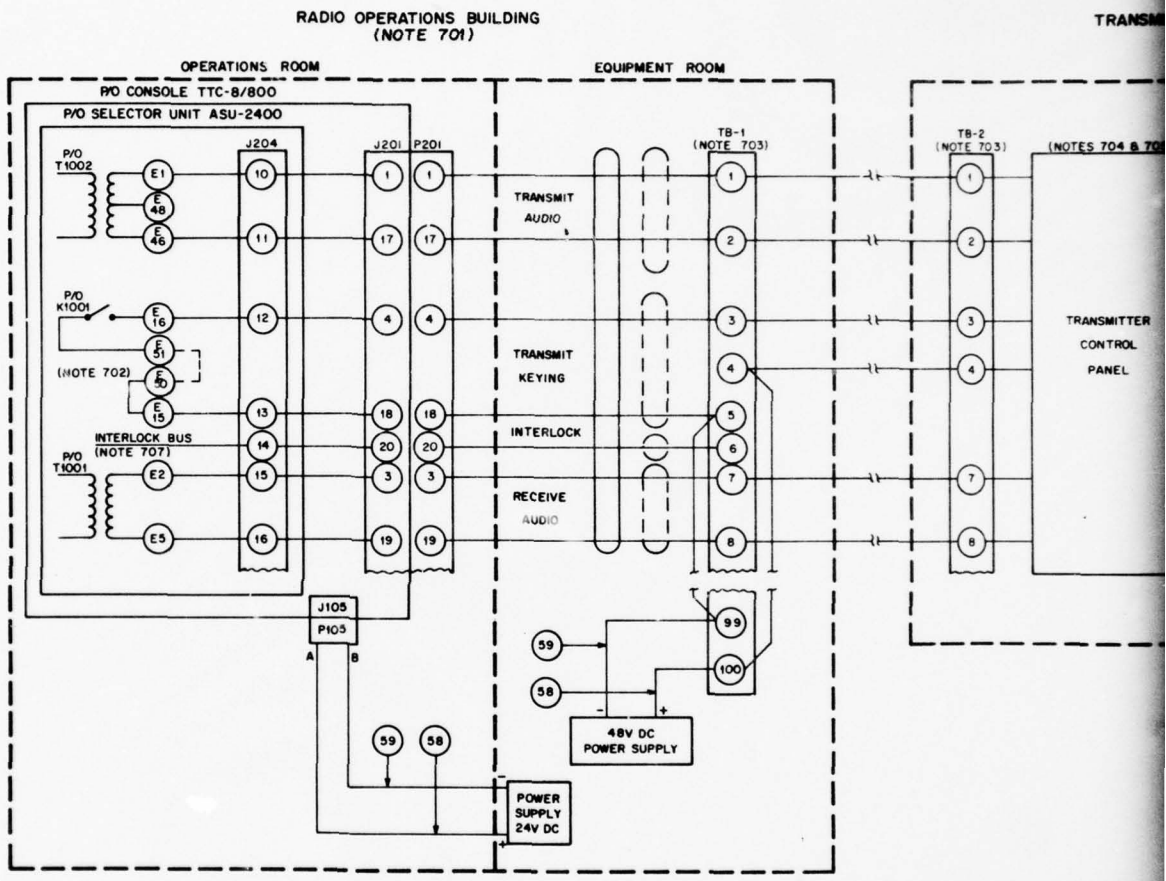
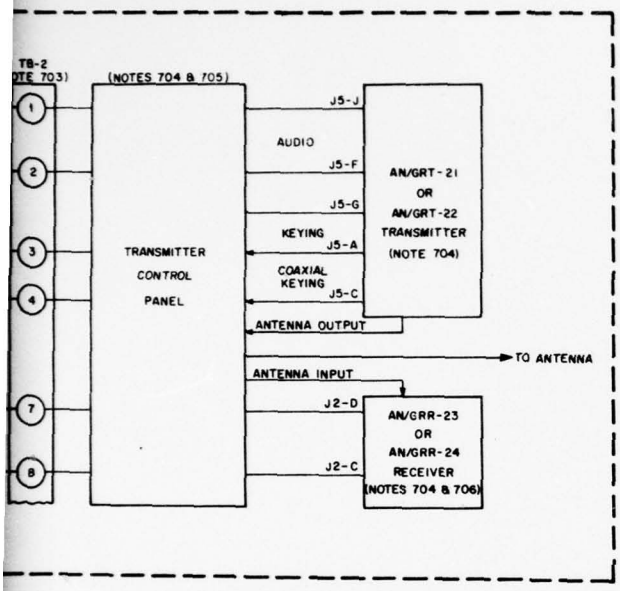


FIGURE 8

CHANNEL ONE CIRCUIT SCHEMATIC
USING 48V DC KEYING OPERATION

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

TRANSMITTER/RECEIVER SITE



NOTES:

701. ONLY CONNECTIONS FOR CHANNEL ONE ARE SHOWN. CONNECTIONS FOR CHANNELS ONE THROUGH EIGHT ARE SHOWN ON SHEET 8. 48 V DC KEYING REQUIRED WHERE TRANSMITTER CONTROL PANELS INSTALLED.

702. FOR 48 V DC KEYING THROUGH TRANSMITTER CONTROL PANEL, THE INTERNAL JUMPERS BETWEEN E15 AND E16, E48 AND E51, AND E49 AND E50 MUST BE REMOVED AND E50 JUMPERED TO E51 AS SHOWN.

703. TERMINAL BOARD NUMBERS ARE FOR REFERENCE ONLY.

704. THE TRANSMITTER AND/OR RECEIVER FACILITY MAY BE ANY OF THE FOLLOWING CONFIGURATIONS:

A. COLLOCATED REMOTE TRANSMITTER/RECEIVER SITE.

B. COLLOCATED LOCAL TRANSMITTER/RECEIVER SITE.

C. SEPARATE REMOTE TRANSMITTER AND RECEIVER SITES.

D. LOCAL TRANSMITTER OR RECEIVER SITE WITH REMOTE RECEIVER OR TRANSMITTER SITE.

705. CRITERIA FOR ALL ENGINEERING EXTERNAL TO TB-1 IS PRESENTED IN SEIP 010.

706. WHERE RECEIVERS ARE SEPARATE FROM TRANSMITTERS, THE RECEIVE AUDIO WILL GO DIRECTLY FROM THE RECEIVER TO THE TERMINAL BOARD.

707. INTERLOCK BUS IS USED ONLY WHERE MORE THAN ONE CONSOLE TTC-8/800 IS USED.

IDENT NO. STD-AF-0665 SHEET 7 OF 10	SIZE D	FSCM NO. 50470	DRAWING NO.
DRAWN BY L H LEE			SHEET OF
APPROVED	SCALE NONE		ENTERED IN USAEEIA DOD

2

TABLE 2

INTERCONNECT WIRING LIST
48V DC KEYING VOLTAGE SYSTEM

CABLE	PAIR	CONN	PIN NO.	FUNCTION	TB-1 PIN NO.
S1	1	P-201	1	CHANNEL ONE TRANSMIT AUDIO	1
			17	CHANNEL ONE TRANSMIT AUDIO	2
	2		4	CHANNEL ONE TRANSMIT KEYING	3
			18	CHANNEL ONE TRANSMIT KEYING	5
	3		3	CHANNEL ONE RECEIVE AUDIO	7
			19	CHANNEL ONE RECEIVE AUDIO	8
	4		20	CHANNEL ONE INTERLOCK	6
	5		5	CHANNEL TWO TRANSMIT AUDIO	11
			21	CHANNEL TWO TRANSMIT AUDIO	12
	6		8	CHANNEL TWO TRANSMIT KEYING	13
			22	CHANNEL TWO TRANSMIT KEYING	15
	7		7	CHANNEL TWO RECEIVE AUDIO	17
			23	CHANNEL TWO RECEIVE AUDIO	18
	4		24	CHANNEL TWO INTERLOCK	16
	9		9	CHANNEL THREE TRANSMIT AUDIO	21
			25	CHANNEL THREE TRANSMIT AUDIO	22
	10		12	CHANNEL THREE TRANSMIT KEYING	23
			26	CHANNEL THREE TRANSMIT KEYING	25
	11		11	CHANNEL THREE RECEIVE AUDIO	27
			27	CHANNEL THREE RECEIVE AUDIO	28
	8		28	CHANNEL THREE INTERLOCK	26
	13		13	CHANNEL FOUR TRANSMIT AUDIO	31
			29	CHANNEL FOUR TRANSMIT AUDIO	32
	14		16	CHANNEL FOUR TRANSMIT KEYING	33
			30	CHANNEL FOUR TRANSMIT KEYING	35
	15		15	CHANNEL FOUR RECEIVE AUDIO	37
			31	CHANNEL FOUR RECEIVE AUDIO	38
S1	8	P-201	32	CHANNEL FOUR INTERLOCK	36
S2	1	P-202	1	CHANNEL FIVE TRANSMIT AUDIO	41
			17	CHANNEL FIVE TRANSMIT AUDIO	42
	2		4	CHANNEL FIVE TRANSMIT KEYING	43
			18	CHANNEL FIVE TRANSMIT KEYING	45
	3		3	CHANNEL FIVE RECEIVE AUDIO	47
			19	CHANNEL FIVE RECEIVE AUDIO	48
	4		20	CHANNEL FIVE INTERLOCK	46
	5		5	CHANNEL SIX TRANSMIT AUDIO	51
			21	CHANNEL SIX TRANSMIT AUDIO	52
	6		8	CHANNEL SIX TRANSMIT KEYING	53
			22	CHANNEL SIX TRANSMIT KEYING	55
	7		7	CHANNEL SIX RECEIVE AUDIO	57
			23	CHANNEL SIX RECEIVE AUDIO	58
	4		24	CHANNEL SIX INTERLOCK	56
	9		9	CHANNEL SEVEN TRANSMIT AUDIO	61
			25	CHANNEL SEVEN TRANSMIT AUDIO	62
	10		12	CHANNEL SEVEN TRANSMIT KEYING	63
			26	CHANNEL SEVEN TRANSMIT KEYING	65
	11		11	CHANNEL SEVEN RECEIVE AUDIO	67
			27	CHANNEL SEVEN RECEIVE AUDIO	68
	8		28	CHANNEL SEVEN INTERLOCK	66
	13		13	CHANNEL EIGHT TRANSMIT AUDIO	71
			29	CHANNEL EIGHT TRANSMIT AUDIO	72
	14		16	CHANNEL EIGHT TRANSMIT KEYING	73
			30	CHANNEL EIGHT TRANSMIT KEYING	75
	15		15	CHANNEL EIGHT RECEIVE AUDIO	77
			31	CHANNEL EIGHT RECEIVE AUDIO	78
S2	8	P-202	32	CHANNEL EIGHT INTERLOCK	76
JUMPER			4	+48 VDC TO KEYING LINE	14
			14		24
			24		34
			34		44
			44		54
			54		64
			64		74
			74	+48 VDC TO KEYING LINE	100
			5	-48 VDC TO KEYING LINE	15
			15		25
			25		35
			35		45
			45		55
			55		65
			65		75
JUMPER			75	-48 VDC TO KEYING LINE	99

TABLE 3

INTERCONNECT WIRING LIST
6-WIRE SYSTEM

CABLE	PAIR	CONN	PIN NO.	FUNCTION	TB PIN
S1	1	P-201	1	CHANNEL ONE TRANSMIT AUDIO	
			17	CHANNEL ONE TRANSMIT AUDIO	
	2		4	CHANNEL ONE TRANSMIT KEYING	
			18	CHANNEL ONE TRANSMIT KEYING	
	3		3	CHANNEL ONE RECEIVE AUDIO	
			19	CHANNEL ONE RECEIVE AUDIO	
	4		20	CHANNEL ONE INTERLOCK	
	5		5	CHANNEL TWO TRANSMIT AUDIO	
			21	CHANNEL TWO TRANSMIT AUDIO	
	6		8	CHANNEL TWO TRANSMIT KEYING	
			22	CHANNEL TWO TRANSMIT KEYING	
	7		7	CHANNEL TWO RECEIVE AUDIO	
			23	CHANNEL TWO RECEIVE AUDIO	
	4		24	CHANNEL TWO INTERLOCK	
	9		9	CHANNEL THREE TRANSMIT AUDIO	
			25	CHANNEL THREE TRANSMIT AUDIO	
	10		12	CHANNEL THREE TRANSMIT KEYING	
			26	CHANNEL THREE TRANSMIT KEYING	
	11		11	CHANNEL THREE RECEIVE AUDIO	
			27	CHANNEL THREE RECEIVE AUDIO	
	8		28	CHANNEL THREE INTERLOCK	
	13		13	CHANNEL FOUR TRANSMIT AUDIO	
			29	CHANNEL FOUR TRANSMIT AUDIO	
	14		16	CHANNEL FOUR TRANSMIT KEYING	
			30	CHANNEL FOUR TRANSMIT KEYING	
	15		15	CHANNEL FOUR RECEIVE AUDIO	
			31	CHANNEL FOUR RECEIVE AUDIO	
S1	8	P-201	32	CHANNEL FOUR INTERLOCK	
S2	1	P-202	1	CHANNEL FIVE TRANSMIT AUDIO	
			17	CHANNEL FIVE TRANSMIT AUDIO	
	2		4	CHANNEL FIVE TRANSMIT KEYING	
			18	CHANNEL FIVE TRANSMIT KEYING	
	3		3	CHANNEL FIVE RECEIVE AUDIO	
			19	CHANNEL FIVE RECEIVE AUDIO	
	4		20	CHANNEL FIVE INTERLOCK	
	5		5	CHANNEL SIX TRANSMIT AUDIO	
			21	CHANNEL SIX TRANSMIT AUDIO	
	6		8	CHANNEL SIX TRANSMIT KEYING	
			22	CHANNEL SIX TRANSMIT KEYING	
	7		7	CHANNEL SIX RECEIVE AUDIO	
			23	CHANNEL SIX RECEIVE AUDIO	
	4		24	CHANNEL SIX INTERLOCK	
	9		9	CHANNEL SEVEN TRANSMIT AUDIO	
			25	CHANNEL SEVEN TRANSMIT AUDIO	
	10		12	CHANNEL SEVEN TRANSMIT KEYING	
			26	CHANNEL SEVEN TRANSMIT KEYING	
	11		11	CHANNEL SEVEN RECEIVE AUDIO	
			27	CHANNEL SEVEN RECEIVE AUDIO	
	8		28	CHANNEL SEVEN INTERLOCK	
	13		13	CHANNEL EIGHT TRANSMIT AUDIO	
			29	CHANNEL EIGHT TRANSMIT AUDIO	
	14		16	CHANNEL EIGHT TRANSMIT KEYING	
			30	CHANNEL EIGHT TRANSMIT KEYING	
	15		15	CHANNEL EIGHT RECEIVE AUDIO	
			31	CHANNEL EIGHT RECEIVE AUDIO	
S2	8	P-202	32	CHANNEL EIGHT INTERLOCK	

BRUNING 40-21 35667

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

TABLE 3

INECT WIRING LIST
IE SYSTEM

FUNCTION	TB-1 PIN NO.
HANNEL ONE TRANSMIT AUDIO	1
HANNEL ONE TRANSMIT AUDIO	2
HANNEL ONE TRANSMIT KEYING	3
HANNEL ONE TRANSMIT KEYING	4
HANNEL ONE RECEIVE AUDIO	7
HANNEL ONE RECEIVE AUDIO	8
HANNEL ONE INTERLOCK	6
HANNEL TWO TRANSMIT AUDIO	11
HANNEL TWO TRANSMIT AUDIO	12
HANNEL TWO TRANSMIT KEYING	13
HANNEL TWO TRANSMIT KEYING	14
HANNEL TWO RECEIVE AUDIO	17
HANNEL TWO RECEIVE AUDIO	18
HANNEL TWO INTERLOCK	16
CHANNEL THREE TRANSMIT AUDIO	21
CHANNEL THREE TRANSMIT AUDIO	22
CHANNEL THREE TRANSMIT KEYING	23
CHANNEL THREE TRANSMIT KEYING	24
CHANNEL THREE RECEIVE AUDIO	27
CHANNEL THREE RECEIVE AUDIO	28
CHANNEL THREE INTERLOCK	26
CHANNEL FOUR TRANSMIT AUDIO	31
CHANNEL FOUR TRANSMIT AUDIO	32
CHANNEL FOUR TRANSMIT KEYING	33
CHANNEL FOUR TRANSMIT KEYING	34
CHANNEL FOUR RECEIVE AUDIO	37
CHANNEL FOUR RECEIVE AUDIO	38
CHANNEL FOUR INTERLOCK	36
CHANNEL FIVE TRANSMIT AUDIO	41
CHANNEL FIVE TRANSMIT AUDIO	42
CHANNEL FIVE TRANSMIT KEYING	43
CHANNEL FIVE TRANSMIT KEYING	44
CHANNEL FIVE RECEIVE AUDIO	47
CHANNEL FIVE RECEIVE AUDIO	48
CHANNEL FIVE INTERLOCK	46
CHANNEL SIX TRANSMIT AUDIO	51
CHANNEL SIX TRANSMIT AUDIO	52
CHANNEL SIX TRANSMIT KEYING	53
CHANNEL SIX TRANSMIT KEYING	54
CHANNEL SIX RECEIVE AUDIO	57
CHANNEL SIX RECEIVE AUDIO	58
CHANNEL SIX INTERLOCK	56
CHANNEL SEVEN TRANSMIT AUDIO	61
CHANNEL SEVEN TRANSMIT AUDIO	62
CHANNEL SEVEN TRANSMIT KEYING	63
CHANNEL SEVEN TRANSMIT KEYING	64
CHANNEL SEVEN RECEIVE AUDIO	67
CHANNEL SEVEN RECEIVE AUDIO	68
CHANNEL SEVEN INTERLOCK	66
CHANNEL EIGHT TRANSMIT AUDIO	71
CHANNEL EIGHT TRANSMIT AUDIO	72
CHANNEL EIGHT TRANSMIT KEYING	73
CHANNEL EIGHT TRANSMIT KEYING	74
CHANNEL EIGHT RECEIVE AUDIO	77
CHANNEL EIGHT RECEIVE AUDIO	78
CHANNEL EIGHT INTERLOCK	76

IDENT NO.	SIZE	FSCM NO.	DRAWING NO.
STD-AF-0665 SHEET 8 OF 10	D	50470	
DRAWN BY S.D.H.	SCALE NONE		SHEET OF
APPROVED			

2105-12 ENTERED IN UDACEETA EDB

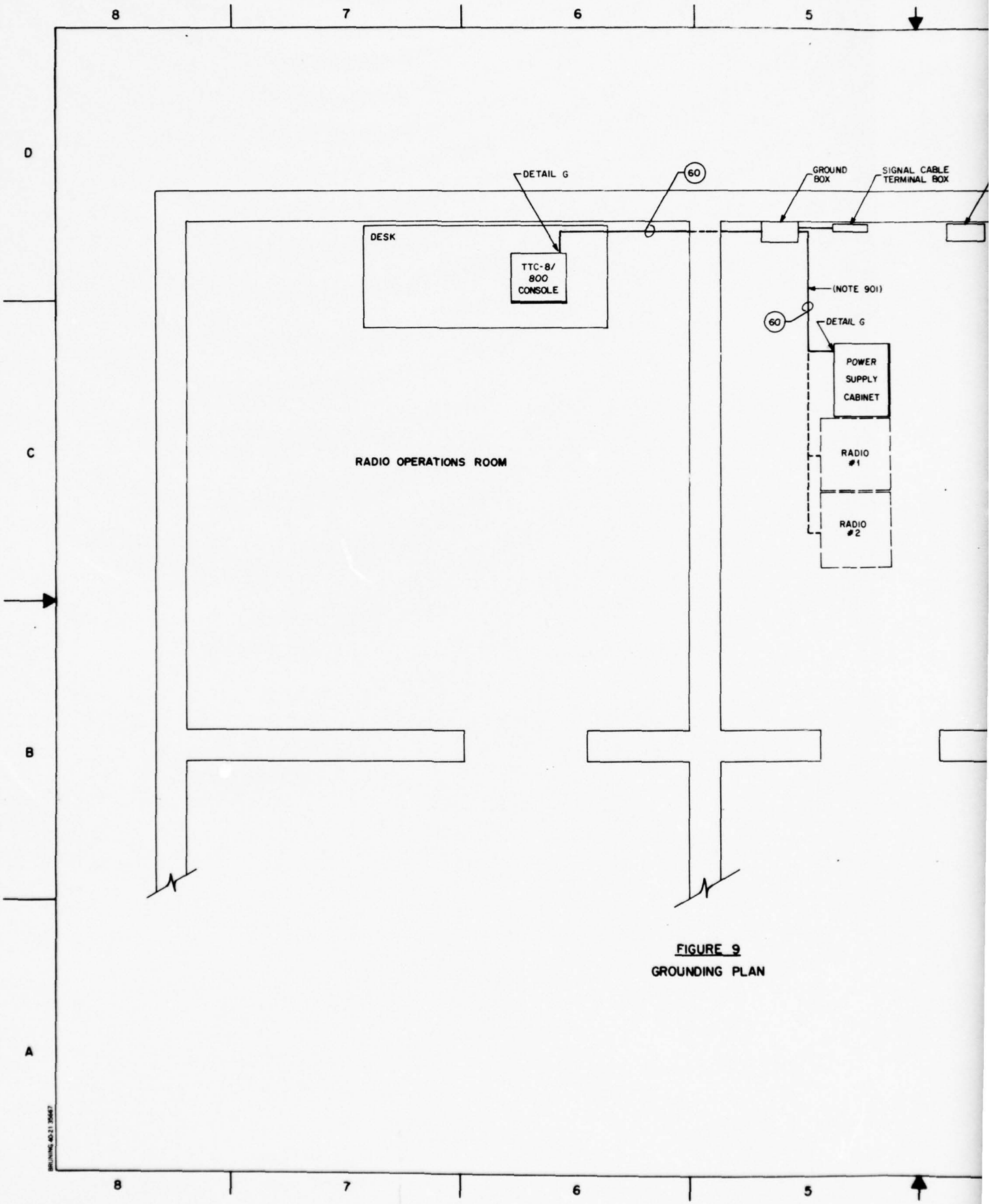


FIGURE 9

GROUNDING PLAN

REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

SIGNAL CABLE TERMINAL BOX

POWER PANEL

(NOTE 901)

DETAIL G

POWER SUPPLY CABINET

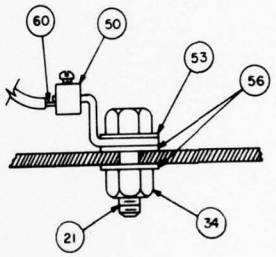
RADIO #1

RADIO #2

RADIO EQUIPMENT ROOM

NOTES:

901. INSTALL THE GROUND CONDUCTORS ON THE OVERHEAD WIREWAY.

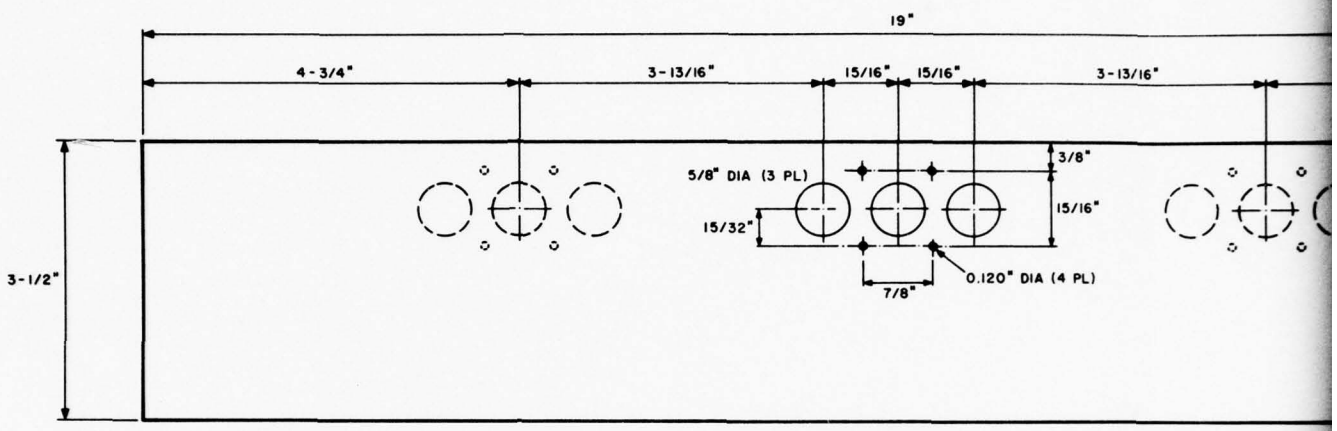


DETAIL G

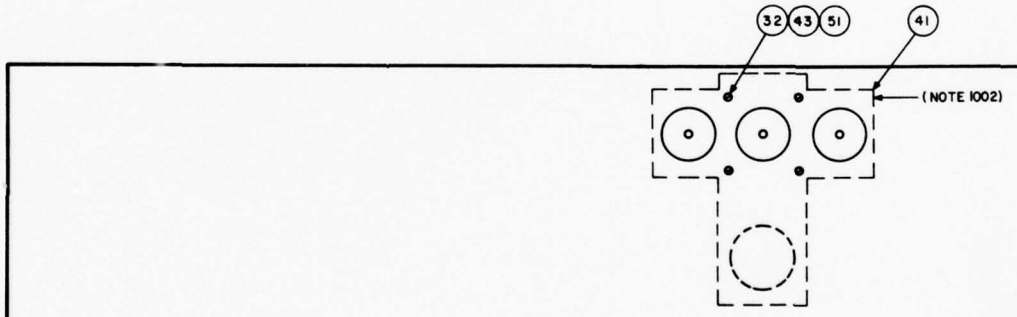
TERMINAL LUG ATTACHMENT TO GROUND PLATE OR EQUIPMENT CABINET

IDENT NO. STD-AF-0665 SHEET 9 OF 10	SIZE D	FSCM NO. 50470	DRAWING NO.
DRAWN BY L H LEE	SCALE NONE		SHEET OF
APPROVED Robert W Thelander			

81-05-12 ENTERED IN USACCEIA EDP



FRONT VIEW
(NOTE 1003)



REAR VIEW

FIGURE 10
COAXIAL TRANSMIT/RECEIVE RELAY PANEL
(NOTE 1001)

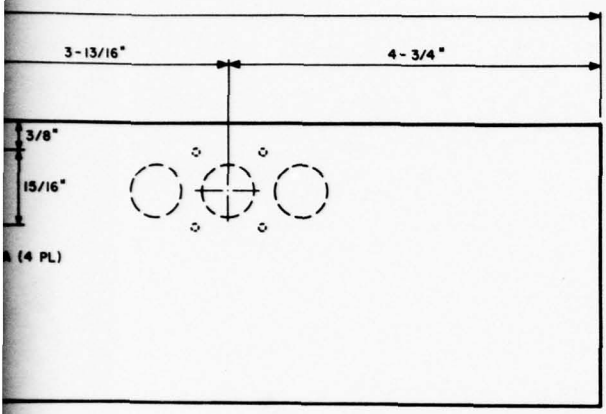
REVISION				
ZONE	REV	DESCRIPTION	DATE	APPROVED

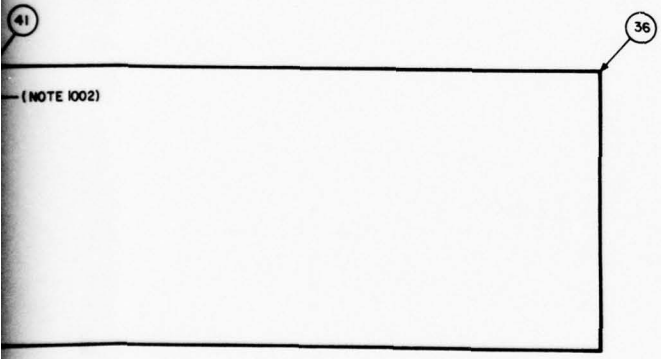
NOTES:

1001. INSTALL PANEL IN THE REAR OF THE TRANSMITTER/RECEIVER RACK.

1002. MOUNT COAXIAL RELAY TO PANEL WITH COAXIAL CABLE CONNECTORS FACING THE REAR OF THE CABINET.

1003. DRILL THREE 5/8" DIAMETER HOLES FOR EACH COAXIAL RELAY. DRILL FOUR 0.120" DIAMETER HOLES USING NO. 31 DRILL FOR MOUNTING RELAY TO PANEL.





AY PANEL

IDENT NO.	SIZE	FSCM NO.	DRAWING NO.
STD-AF-0665 SHEET 10 OF 10	D	50470	
DRAWN BY S.D.H.	SCALE	NONE	SHEET OF
APPROVED			

01-05-13 ENTERED IN USACCETA EDS

SECTION 5. BILL OF MATERIALS

5.1 GENERAL. The BOM provided in this section, figure 5-1, illustrates the essential materials required for the installation of an ATRCC facility. It is for a typical installation and should be modified and supplemented by the responsible engineering activity to fit the particular site.

5.2 BILL OF MATERIALS. The BOM contains USACC standard authorized materials which are to be used in the preparation of individual EIP's. Requests for significant changes to the BOM will be submitted to Headquarters, USACEEIA, ATTN: CCC-CED-SEP, with justification for approval. Identification of items is primarily by National Stock Number (NSN), Management Control Number (MCN), and System Material List (SML) number. When military identification numbers are not available, the manufacturer's part description and number (or catalog number) with approximate cost will be provided. The number in parentheses in the Stock Number column is the SML number.

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-20; the proponent agency is the United States Army Communications Command.

PROJECT: SEIP 036			UNIT IDENT CODE			
TITLE NUMBER: AIR TRAFFIC RADIO CHANNEL CONTROL EQUIPMENT			DATE		PAGE NO 1	NO OF PAGES 6
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQ'D AE
1	NSNR (25126B)	Audio Unit, 5" H x 8" W x 12-1/4" D, Aluminum Front Panel Containing Speaker Amplifier Assembly and 3" Loudspeaker, GRM Corp. AU-2400	EA			
2	NSNR (25127C)	Blank Panel, ATCT Selector Unit, GRM Corp. ABP-2400	EA			
3	NSNR (25128D)	Cabinet, Equipment, 22" Wide, 18" Deep, 47-1/2" High, 42" x 19" Panel Mounting Space, Modification Rear Door (Mod LS), Gray Hammertone, Par Metal #EK-314	EA			
4	NSNR (25129E)	Cabinet, Equipment, 21-1/2" Wide, 15" Deep, 19-1/4" High, 17-1/2" x 19" Panel Mounting Space, Gray Hammertone, Par Metal #DL-1713	EA			
5	NSNR (25130N)	Console, Radio Control Operator's Position, 1 to 8 Radio Channels, 16-1/2" W x 14-1/2" D, 7-1/2" H at Front and 5" H at Rear, Table Top Mounting With Four 5/8" H Rubber Feet, GRM Corp. TTC-8/800	EA			
6	NSNR (25131M)	Jack Panel, Equipped With Five Jacks for Microphones, Headphones, and Headset, GRM Corp. JP-2401	EA			
7	NSNR (25132L)	Microphone Amplifier Module, GRM Corp. MAM-2400	EA			
8	NSNR (25135G)	Power Supply, 24-V Dc 7.5 Amperes Output, 120/240 V Ac Input, 5.08" H x 8.36" W x 12.25" D, Hewlett Packard Model HP62024G	EA			
9	NSNR (25244J)	Power Supply, 48-V Dc 4 Amperes Output, 120/240 V Ac Input, 5.08" H x 8.36" W x 12.25" D, Hewlett Packard Model HP62048G	EA			
10	NSNR (25137B)	Selector Module, ATCT, GRM Corp. ASM 2401	EA			

DA FORM 1 APR 72 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 1 of 6).

TEST COMMUNICATIONS DEVELOPMENT PROJECT - BILL OF MATERIALS

For use of this form, see AR 700-22; the proponent agency is the United States Army Communications Command.

PROJECT: SEIP 036	UNIT IDENT CODE			
TITLE NUMBER AND TITLE: AIR TRAFFIC RADIO CHANNEL CONTROL EQUIPMENT	DATE		PAGE NO 2	NO OF PAGES 6

ITEM NO	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
11	NSNR (25138C)	Selector Unit, ATCT, 5" H x 8" W x 12-1/4" D, GRM Corp. ASU 2400	EA			
12	NSNR (25136A)	Tray, Power Supply, Rack Mounting, 19" W x 5-1/4" H, Hewlett Packard 62410A	EA			
13	NSNR (25139D)	Volume Control Module, GRM Corp. VCM-2400	EA			
14	5975-01-008-7219 (22526G)	Blank End Fitting, 1-7/8" Long F/U/W G-3000 Wireway, Wiremold G-3010B	EA			
15	5940-00-933-7901 (25141N)	Block, Terminal, 6 Pair, Unprotected, 7.09" H x 1.25" W x 1.38" D, Reliable 5561	EA			
16	5940-00-933-7902 (11279D)	Block, Terminal, 11 Pair, Unprotected, 12.41" H x 1.25" W x 1.75" D, Reliable 5555	EA			
17	5940-00-933-7904 (25140Y)	Block, Terminal, 26 Pair, Unprotected, 15.53" H x 2.5" W x 1.75" D, Reliable 5585	EA			
18	NSNR (25142M)	Block, Terminal, 6 Pair, Protected W/1304 Protectors, 7" H x 3.04" W x 1.72" D, Reliable W1-6P	EA			
19	NSNR (25143L)	Block, Terminal, 12 Pair, Protected W/1004 Protectors 14" H x 3.04" W x 1.72" D, Reliable W1-12P	EA			
20	NSNR (21454D)	Block, Terminal, 25 Pair, Protected W/1304 Protectors, 16.75" H x 5" W x 1.75" D, Reliable W1-25P	EA			
21	5306-00-834-3939 (19544L)	Bolt, Mach, Hex Hd 1/4" - 20 x 7/8" lg	HD			
22	5975-00-933-7678 (06342N)	Box, Terminal, 23" High, 11" Wide, 2-1/2" Deep, 18 Gage Steel, Hinged Cover, Reliable 5603	EA			

DA FORM 1 APR 78 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 2 of 6).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-72; the proponent agency is the United States Army Communications Command.

OPERATION: SEIP 036		UNIT IDENT CODE	
TELCO NUMBER: AIR TRAFFIC RADIO CHANNEL CONTROL EQUIPMENT		DATE	PAGE NO 3 / NO OF PAGES 6

ITEM NO	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
23	5975-00-141-0453 (16392R)	Box Connector, F/U/W 0.307 Dia. BX Cable, T&B 3301	EA			
24	5975-00-669-9467 (11385Z)	Box Connector, Elec, 0.375" to 0.500" Cable, Straight Watertight Strain Relief Type W/Neoprene Bushing	EA			
25	6145-00-948-6412 (14848F)	Cable, Elec, 15-Pair, #22 AWG, Stranded Individual Shielded Pairs, Belden 8776	FT			
26	6145-00-806-9389 (17106A)	Cable, Power, BX, 3-Conductor, #12 AWG, 0.307 Diameter	FT			
27	5975-00-979-6528 (23560K)	Clip, Wire, F/U/W G-3000 Wireway, Wiremold G-3000WC	EA			
28	NSNR (25144K)	Coupling, Wireway, Wiremold G-3001	EA			
29	NSNR (25143J)	Elbow, Raceway, Inverted Internal, 2-3/4" W x 1-7/16" D, Wiremold G-3017N	EA			
30	5975-00-771-2085 (21190P)	Elbow, Raceway, 90° Flat, 2-3/4" W x 1-7/16" D, Wiremold G-3011	EA			
31	5975-00-673-7658 (13789F)	Entrance End Fitting, 2-3/8" Long x 1-9/32" High, Wiremold 2010A	EA			
32	5310-00-194-8195 (07676K)	Nut, Hex, Steel, Cadmium Plated, 4-40	EA			
33	5310-00-550-2490 (07675L)	Nut, Hex, Steel, Cadmium Plated, 8-32	EA			

DA FORM 1 APR 79 3071-R

EDITION OF 1 AUG 73 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 3 of 6).

TEST COMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

SEIP 036			UNIT IDENT CODE			
ITEM NUMBER: AIR TRAFFIC RADIO CHANNEL CONTROL EQUIPMENT			DATE		PAGE NO. 4	NO. OF PAGES 6
ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
34	5310-00-285-1650 (00658H)	Nut, Hex, Steel, Cadmium Plated, 1/4 x 20	HD			
35	5935-00-490-9842 (07788Z)	Outlet Strip, Ac, 6 Outlets on 6" Centers, 3-Wire, 1-Circuit W/Insulated Grounding Conductor, 3' Long, Wiremold 20GB306	EA			
36	5975-00-686-2541 (08712Z)	Panel, Blank, 19" x 3-1/2" x 1/8", Grey	EA			
37	5975-00-685-9546 (02469E)	Panel, Blank, 19" x 5-1/4" x 1/8", Grey	EA			
38	5975-00-685-9791 (02406H)	Panel, Blank, 19" x 7" x 1/8", Grey	EA			
39	NSNR (14273Z)	Panel Connector, Raceway, 2-3/4" W x 1-7/16" D, Wiremold G-3036A	EA			
40	NSNR (23659H)	Raceway, 2-3/4" W x 1-7/6" D x 10' L, 0.040" Steel, ANSI-61, Grey, Base and Cover, Wiremold G-3000B and G-3000C	EA			
41	5945-00-066-7131 (11743F)	Relay, Coax, 500 W, 24V dc Changeover, Type N, Amphenol P/N 316-10744-3	EA			
42	5306-00-022-7798 (00230J)	Screw, Cap, 3/8" - 16 x 1-1/2", Hex Hd Steel	EA			
43	5305-00-964-6032 (11042K)	Screw, Machine, Pan Hd, Steel, 4-40 x 1/2"	EA			
44	5305-00-013-2768 (08301M)	Screw, Machine, Round Head, Steel, 8-32 x 3/4"	HD			

DA FORM 1 APR 79 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 4 of 6).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

LOCATION		UNIT IDENT CODE				
	SEIP 036					
TITLE NUMBER	AIR TRAFFIC RADIO CHANNEL CONTROL EQUIPMENT	DATE			PAGE NO. 5	NO. OF PAGES 6

ITEM NO.	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
45	NSNR (19746A)	Screw, Machine, 10-32 x 3/4", Par Metal GSC-10-3	EA			
46	5305-00-901-2134 (00189B)	Screw, Wood, 8 x 1", Round Head, Cross Recess Drive	GR			
47	5340-00-961-7302 (06315A)	Shield, Expansion, 1/4" x 1-1/2", With Pan Head, Slot Drive Screw	HD			
48	5340-00-754-4560 (00740C)	Shield, Expansion, 3/8" - 16, Machine Bolt	BX			
49	5975-00-962-1816 (25133K)	Tee, Raceway, 2-3/4" W x 1-7/16" D, Complete with Couplings Wiremold G-3015	EA			
50	5940-00-866-2586 (21955Z)	Terminal Lug, #10-12 AWG, 1/4"	EA			
51	5310-00-595-6425 (09458K)	Washer, Flat, Steel, #4	HD			
52	5310-00-167-0833 (00487C)	Washer, Flat, Steel, #8	HD			
53	5310-00-138-3642 (00616Z)	Washer, Flat, Rd, Steel, 0.266" ID x 0.50" OD	EA			
54	5310-00-087-7493 (08858A)	Washer, Flat, Steel, 3/8"	HD			
55	5310-00-045-3299 (09019J)	Washer, Lock, Split, Steel, #8	HD			

DA FORM 1 APR 78 3071-R

EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 5 of 6).

TELECOMMUNICATIONS DEVELOPMENT PROJECT – BILL OF MATERIALS

For use of this form, see AR 105-22; the proponent agency is the United States Army Communications Command.

SYSTEM: SEIP 036		UNIT IDENT CODE	
AREA NUMBER: AIR TRAFFIC RADIO CHANNEL CONTROL EQUIPMENT		DATE	PAGE NO. 6 / NO. OF PAGES 6

ITEM NO	STOCK NUMBER	NOMENCLATURE	UNIT	TOTAL REQ FOR PROJECT	AVAILABLE IN COMMAND	REQUIRED
56	5310-00-689-2528 (25252M)	Washer, Lock Int & Ext Teeth 1/4"	EA			
57	5310-00-637-9541 (00586C)	Washer, Lock, Split, Steel, 3/8"	HD			
58	6145-00-184-5348 (03509A)	Wire, Elec, #14 AWG, Wht, Solid, Ins, 600V	FT			
59	6145-00-191-2577 (03540K)	Wire, Elec, #14 AWG, Blk, Solid, Ins, 600V	FT			
60	6145-00-184-5344 (03506A)	Wire, Elec, #12 AWG, Yellow, Solid, TW	FT			
61	5940-00-984-5060 (25134J)	Wire Connector, Pressure Type, #12-14 AWG, Wiremold W30	EA			

DA FORM 1 APR 79 3071-R EDITION OF 1 AUG 72 IS OBSOLETE.

Figure 5-1. Bill of Materials (sheet 6 of 6).

SECTION 6. QUALITY ASSURANCE PROCEDURES

6.1 GENERAL. The quality assurance (QA) program for the ATRCC has been developed in CCR 701-1-2. The QA program is to be implemented in accordance with this and the following two sections and will provide the assurance to all concerned that the specified equipment and facilities have been installed in accordance with the requirements and criteria of this SEIP as supplemented through individual EIP's and are acceptable for turnover to and use by the operating agency. The requirements and criteria specified here and in sections 7 and 8 constitute the quality assurance procedures for the specified ATRCC. Individual EIP's will be used to supplement, expand, modify, or otherwise adapt the requirements and criteria to unique situations and circumstances applicable to each site location.

6.2 QUALITY ASSURANCE PROGRAM.

6.2.1 Approach. The QA program consists of a planned and systematic approach for assessing the quality during the installation and acceptance testing of project implementation and correcting at the earliest time any discrepancies, deficiencies, or shortcomings revealed through inspection and test efforts. The QA and quality control (QC) planning and functions will begin at the earliest stages of project implementation and end after all possible corrective action efforts are completed and the ATRCC is released to the operating or user agency. QA and QC functions are to be performed by personnel operating independently from those charged with the engineering of the installation or involved in the process of installing the ATRCC. Under the program, these functions are divided among three participating organizations: (1) the test agency, (2) the installation agency, and (3) the operating agency.

6.2.2 Test Agency. As the manager and implementor of the QA program and acceptance testing efforts for the ATRCC, the test agency will commence project planning as soon as tasked. The test agency quality assurance representative (QAR)/test director is responsible for periodic in-process QA checks, final QA inspections, and acceptance tests in accordance with management provisions of CCCR 702-3 and this SEIP. Quality assurance inspections will be performed at the discretion of this Agency for the purpose of assessing the effectiveness of the QC effort by the installation agency; initiating corrective actions as appropriate; and determining the extent to which the installation effort adheres to the quality requirements. Acceptance testing is conducted in accordance with section 7 and for the purpose of determining if the installed ATRCC complies with the technical requirements of this SEIP as amended

by individual EIP's and the ATRCC is suitable for the intended application. At the earliest stages of project initiation, the test agency is to identify a QAR/test director. For project continuity and effective management, a single individual should be assigned both roles. This will assure that the QA and test efforts are fully integrated and accomplished in the following manner and sequence:

a. Implement the QA concepts and requirements identified. Participate in the development of individual EIP's incorporating site particular requirements.

b. Assure that the participating elements and organizations are thoroughly familiar with their respective roles in support of QA, QC, and testing and have been properly tasked.

c. Validate QC and installation efforts for compliance with stated requirements through the use of project oriented reports, formal and informal contacts, project status reviews, onsite inspections, etc. The installation agency's QC effort will be reviewed by the QAR utilizing USACEEIA Form 112-R (figure 6-2). When an inadequacy is found in the installation agency's QC effort, the procedures of CCCR-702-7 will be applied. Follow-up actions will be monitored and those discrepancies or differences which cannot be resolved in a timely manner will be brought to the attention of higher authority.

d. Facilitate responsibilities by identifying and recording this information and data as required by USACEEIA Form 113-R (figure 6-1). This form becomes a part of the project files and will be updated to assure orderly project execution. The dissemination of this information with the participants in the QA program is encouraged.

e. Perform a final QA inspection using USACEEIA Form 111-R (figure 6-3), which is tailored to the specifics of this effort. When the installation effort and checkout of the ATRCC is performed, this SEIP, individual EIP, and the AFTO series shall be the evaluation criteria for the site inspection efforts. This inspection will consist of thorough visual and mechanical observations of the installed materiel, QC records, onsite inspection, and other factors to evaluate the quality of the work performed and its acceptability.

f. Conduct acceptance tests in accordance with the provisions of section 7, the subsidiary documents specified, and CCCR 702-3, to determine the acceptability of the ATRCC, as installed. If the results of any portion of acceptance tests are not satisfactory, corrective action efforts are to be initiated through onsite engineering, installation, and operational participants and in the

absence of such representation, through channels. The QAR/test director may retest to verify that corrective action efforts have been implemented and that the efforts will preclude recurrence. After satisfactory resolution, he may subsequently resume acceptance tests. If these items cannot be resolved by onsite personnel, the QAR/test director will take either of the following actions: (1) Reject the ATRCC and terminate testing until the matter is corrected or resolved, or (2) Attempt to complete the acceptance tests, noting the discrepancies, deficiencies, or shortcomings as exceptions on the Technical Acceptance Recommendation (TAR), Form 98-R in section 8. The participating agencies and organizations will be notified of these discrepancies, deficiencies, and shortcomings at the earliest practical date.

g. Record and analyze test results; determine acceptability of the installed ATRCC; record the data and findings on the TAR and coordinate the data with the designated participants; and prepare a final test report and make distribution with the guidance, direction, and format of CCCR 702-2. Project tasking documents must be consulted for modification of the distribution requirements. The acceptance test report will note outstanding installation and operational exceptions, and will recommend corrective actions to be taken by the responsible and participating agency(s). The report will document project completion with correction of the exceptions being documented by correspondence or supplemental test reports as determined by the QAR/test director or test agency.

6.2.3 Installation Agency. In accordance with the provisions and authority of CCCR-702-4, the installation agency will establish and maintain a QC system. The QC system will assure that assessments of quality are conducted in accordance with the published procedures and that the results of the agency's QC inspections and follow-up actions are adequately recorded. USACEEIA Form 111-R (figure 6-3) will be used for this purpose. The records are to be made available for review and evaluation by the test agency's QAR/test director. The shakedown checkouts are to be completed and corrections made prior to offering the ATRCC for acceptance testing. The installation activity's QC system must meet all procedures contained in USACEI Bn Pamphlet 105-3. The installation agency will designate a quality control representative (QCR) who will assure that the following actions are performed.

a. Assure that QC procedures are applied on this installation and establish the reporting requirements consistent with this project, the EIP, and all policies. Assure that the corrective action efforts related to the installation are resolved and corrected at the earliest possible point in the installation effort.

b. Assure the availability of test equipment for shakedown in conjunction with participating elements and checkout and acceptance testing. Reliance is to be placed upon the operating agency to supply test equipment when it is common to operations and maintenance functions.

c. Assure that shakedown is accomplished as specified and any corrective action is completed prior to acceptance testing.

d. Advise the QAR/Test Director of the anticipated completion date at the earliest time. This notice should be given not less than 10 days prior to the scheduled completion to permit efficient and expeditious transportation of test personnel and equipment.

e. Assure that an adequate complement of personnel remains onsite to assist in the final QA inspection and acceptance test.

f. Assure the QC inspection records and installation documentation are maintained onsite and readily available to the QAR/Test Director. When the onsite effort is completed, the QC documentation shall be placed in the project files and maintained for 1 year.

6.2.4 Operating Agency. The operating agency will be the site or location cognizant organization element and will be so identified in all project documentation and individual EIP's. Tasking to support the USACEEIA QA and acceptance test effort will be accomplished through command channels. The operating agency will designate a representative early in the project but no later than the start of installation. He will assure the following actions are taken and completed:

a. Provide administrative and typing support.

b. Serve as interface between the installation, quality assurance, and test personnel and the operating agency.

c. Assist in resolution of discrepancies, deficiencies, and shortcomings.

d. Make operating and maintenance personnel available to assist on an as-required basis.

e. Provide a representative to witness the acceptance test and sign the TAR.

6.3 SPECIAL CONSIDERATIONS.

6.3.1 Interruptions. Quality assurance inspections and tests may be interrupted at any point if disrupted by an equipment or system malfunction. They may also be interrupted at a compatible breaking point to permit scheduled duty breaks. Any inspection that is interrupted because of equipment malfunction shall be restarted at a point determined by the QAR/test director.

6.3.2 Substitutions. Spare equipment may be substituted for malfunctioning equipment with the approval of the QAR/test director. Any equipment which has been replaced shall be repaired and retested. During acceptance tests, any piece of equipment, including cables, conduit, etc., may not be changed or adjusted without the approval of the QAR/test director.

6.3.3 Corrections or Modifications of Documentation. Site plans, specifications, EIP's, drawings, etc., are to be acquired by QA, QC, and test personnel prior to commencement of the specified work effort. The QAR/test director will identify the applicable and non-applicable items on USACEEIA Form 112-R and will delete or mark "non-applicable" (N/A) those items inappropriate for this QA inspection. These documents shall be used as master documents to mark, record, and identify discrepancies. Any discrepancies noted shall be recorded, using yellow markings to record deletions of equipment, cables, or changes in schematic diagrams. All additions shall be noted with red markings. Notes to the draftsman shall be in blue. Site documentation will be marked in the same manner. The designated installation agency representative will deliver a copy of the marked-up drawings to the onsite USACEEIA installation engineering element and in the absence of an engineer to Commander, USACEEIA, ATTN: CCC-CED, Fort Huachuca, Arizona 85613 or as amended by the EIP. In all cases, a complete set of marked drawings will be left onsite and maintained by the operating agency.

COGNIZANT AGENCY, COMMAND, AND
FACILITY QA POINTS OF CONTACT
(CCCR 702-2)

	Individual POC	Bldg. No.	Rm. No.	Phone No.	Name of Agency
Installation:					
Team Leader					
Assistant Team Leader					
Quality Control					
Quality Assurance Agency:					
Representative					
Testing Activity					
Operating Agency:					
Representative					
Site Commander					

HQ CEEIA CCC-TED-QA FM 113-R
1 JAN 79

Figure 6-1. QA Points of Contact.

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)		DATE (Day, Month, Year)		
SITE	LOCATION			
PROJECT NAME		TASK NO.		
REFERENCES FOLLOW MAIN AND SUB PARAGRAPHS		YES	NO	NA
A. Drawings and Specifications (AFTO 31-10-3, -9, -27, -29, USACEEIA PAM 105-10):				
1. Is the EIP complete and available?				
2. Are floor plans available?				
3. Are equipment location drawings available?				
4. Are face layout drawings of equipment in bays available?				
5. Are drawings for the MDF/CDF/IDF/CCFB block assignments available?				
6. Is stenciling of terminal blocks shown on drawings?				
7. Are pin connections on terminal blocks shown on drawings?				
8. Are drawings of AC/DC power distribution equipment available?				
9. Are wire sizes and circuit breaker capacity shown on drawings?				
10. Are schematic diagrams of typical circuits to be installed included in drawings?				
11. Are drawings of site grounding systems available?				
12. Do specifications contain a list of reference material required by installers?				
13. Are drawings showing the arrangement of cable racks, ducts, and trenches available?				

HQ CEEIA CCC-TED-QA FM 112-R
Rev (6 JAN 79) Previous edition 1 JAN 79 is obsolete.

Figure 6-2. QA Inspection Checklist - Installation.

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
14. Do specifications contain the cable running list for power distribution?			
15. Do specifications contain the cable running list for signal cabling?			
16. Do specifications contain the cable running list for RF cabling?			
17. Do specifications contain the cable running list for optical cabling?			
18. Do specifications contain detailed information on grounding/bonding/ shielding?			
19. Do specifications contain details on all special instructions for installers?			
20. Do the drawings reference all applicable items to the BOM?			
B. Tools and Equipment (AFTO 31-10-29):			
1. Is equipment damaged or unserviceable?			
2. Are all installation materials on hand and serviceable?			
3. Are all special tools necessary for completion of the job on hand?			
4. Will all test equipment needed for test and checkout be available?			
5. Is the BOM equipment available at the facility?			
6. Is the C-E equipment BOM available at the facility?			
7. Has the C-E equipment been inventoried and are discrepancies reported (2-13)?			
C. General Safety Practice (AFTO 31-10-all):			
1. Are goggles worn when drilling and grinding?			

2

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
2. Are all sharp edges properly disposed of?			
3. Are hand tools properly used?			
4. Are electric tools properly grounded?			
5. Are rubber gloves used when working near electrical hazards?			
6. Is first-aid equipment on site?			
7. Are emergency numbers posted conspicuously?			
8. Are safety practices observed during the installation?			
D. Floor Plan Layout (AFTO 31-10-9):			
1. Are equipment layout plans in accordance with drawings?			
2. Was the layout plan completed before equipment was moved into area?			
3. Are reference lines still visible/useable (2-11)?			
E. Erecting and Mounting (AFTO 31-10-29):			
1. Is equipment laid out in accordance with floor plan drawing (2-10)?			
2. Are equipment bays level and plumbed within tolerances (2-42)?			
3. Has proper spacing been provided between equipment racks (2-36)?			
4. Are base angles of frames secured to floor in the proper location (2-48)?			
5. Are all cabinets flush mounted and plumbed (2-36)?			
6. Has the finish of equipment/cabinets/racks been touched up (3-2a)?			

3

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
7. Are bolts and screws free from stripped threads and defaced heads (3-3f)?			
8. Are sufficient clearances provided between apparatus for heat dissipation (3-11)?			
9. Are terminal blocks aligned on MDF/CDF/IDF (3-23)?			
10. Has equipment been installed in cabinets or racks in accordance with face layouts?			
11. Are all nuts and bolts securely tightened (3-3h)?			
12. Are exposed or cut ends of metal filed smooth and painted?			
13. Are the correct lock and flat washers used (3-3a, e, and f)?			
F. Cable Racks (AFTO 31-10-6):			
1. Location of cable racks:			
a. Are racks located in accordance with the cable plan drawing (3-17)?			
b. Does the height of racks conform to the drawing (3-13)?			
c. Are racks located so that clearances for installation and maintenance of equipment are unencumbered (3-14)?			
d. Are racks located so cables are not subject to damage, exposure, or other detrimental conditions (3-36a)?			
2. Assembly of cable racks:			
a. Are long sections of racks used where possible (3-3b)?			
b. Have clamping details been altered other than where necessary to avoid interference?			

4

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
c. Are open ends of racks properly closed (3-34)?			
d. Are vertical racks properly terminated on floors (3-36h)?			
3. Support of cable racks:			
a. Are racks properly supported and fastened (3-36b)?			
b. Are racks installed so that no excessive load or binding is imposed on the equipment (3-36e)?			
c. Are horizontal racks supported on 5' centers but not exceeding 6' (1-16)?			
d. Has support been provided within 3' of free end of rack (1-16)?			
e. Are racks braced to prevent sway (2-50)?			
f. Are racks level (3-33)?			
G. Running Cable (AFTO 31-10-13):			
1. Are cable runs made in accordance with cable running list (1-34)?			
2. Are cables twisted or crossed on cable rack (1-43)?			
3. Do cables at turns or bends conform to the bending radius and maintain their position (1-42)?			
4. Is protection provided where cable sheaths contact rough or sharp edges or metal (1-53)?			
5. Are cables, which are turned off over the side of cable racks, formed with the minimum allowable radius (1-42)?			
6. Are cables turned off rack horizontally and then up/down (1-42)?			
7. Do cables to the MDF/CDF/IDF enter on the vertical side (3-56)?			

5

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
8. Are cables serving the horizontal side of a frame secured to the transverse arms near the vertical upright (3-58)?			
9. Are cable tags properly prepared and in accordance with the cable running list (1-26)?			
10. Are cable tags secured at each end of the cable run (2-3)?			
11. Have cable tags been removed upon completion of verification and termination excluding coaxial cables (1-32)?			
12. Are cable butts located as near as practicable to the point where the first conductors turn out (4-8)?			
13. Are cable butts properly treated (4-9)?			
14. Is the cable pile-up exceeded (1-18)?			
15. Are the conductors damaged at the cable butt (4-9)?			
16. Are the AC/DC power cables separated for signal cables (1-49)?			
17. Are the correct color conductors used for power runs(AFTO 31-10-2,3-100)?			
H. Securing Cable (AFTO 31-10-2, -13)?			
1. Is the starting stitch properly made and placed (3-22)?			
2. Is the required Kansas City City Stitch properly made (3-26)?			
3. Are first and succeeding layers properly secured (3-28)?			
4. Are cables secured at every other cable rack cross strap on horizontal runs (3-21)?			

6

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
5. Are cables secured at every cable rack cross strap on vertical runs (3-53)?			
6. When cable butt is between securing devices, are cables secured together with the appropriate stitch (3-54)?			
7. Are lock stitches properly made and spaced (3-32)?			
8. Are splices in twine properly made (3-32)?			
9. Are cables protected where twine is apt to cut or damage cable (3-3)?			
10. Is the correct amount of cable secured under one stitch (3-16)?			
I. Sewed Forms (AFTO 31-10-2):			
1. Is proper size twine used for the diameter of the form (3-25)?			
2. Are the proper stitches used and spaced (3-26, 3-30)?			
3. Are wires formed correctly (3-49)?			
4. Are the skinners the correct length (2-26)?			
5. When ty-wraps are used, are the correct size and spacing maintained (3-42)?			
6. Are spare wires treated correctly for the form (3-51)?			
J. Butting and Stripping (AFTO 31-10-13):			
1. Are the proper tools used (4-9, 4-15, 4-24)?			
2. Are the cable butts properly dressed (4-32, 4-34)?			
3. Is the proper distance maintained from the cable to the fanning strip (4-8)?			
4. Is the cable butt adequately supported (3-54)?			

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Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
5. Are the conductors damaged at the cable butt (4-9)?			
K. Fanned and Formed Conductors (AFTO 31-10-2):			
1. Are cables fanned and connected to the correct side of the terminal blocks (2-7)?			
2. Are the conductors in the fanned form twisted and bunched (2-14)?			
3. Are fanned forms straight and taut from the cable butt to the fanning strip (2-23)?			
4. Is the length of the skinners correct (2-26)?			
5. Has the correct color code been followed (2-28)?			
6. Are spare/unused/unequipped conductors disposed of properly (2-31)?			
7. Are the shields properly disposed of (3-79)?			
L. Stenciling (AFTO 31-10-27):			
1. Is equipment correctly identified and stenciled in accordance with floor plan drawings (1-24)?			
2. Are designations located correctly (2-16)?			
3. Are correct size designations used on particular types of apparatus or equipment (2-16)?			
4. Are the correct abbreviations used (3-3, 3-5)?			
M. Strapping (AFTO 31-10-16):			
1. Are the straps properly placed (1-15)?			
2. Is the correct type of strap wire used (1-17)?			
3. Does the insulation extend to the terminal (2-9)?			
4. Do the straps interfere with the operation of the equipment?			

8

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
5. Do the straps make maximum contact with the terminals (2-6)?			
6. Do wrapped straps conform to the criteria of wrapped conductors (AFTO 31-10-1, 2-111)?			
7. Do straps obscure equipment designations (2-52f)?			
N. Terminating and Soldering Conductors (AFTO 31-10-7):			
1. Are the soldering clamp and solder bag used when connecting conductors (2-45a)?			
2. Is the proper soldering iron used (2-5)?			
3. Is all soldering done with the correct rosin core solder (2-22)?			
4. Is the conductor connected to the terminal correctly (2-34, 2-38)?			
5. Do skinners on terminals, both wrapped and soldered, exceed 1/16"(2-34)?			
6. Is the insulation burnt, frayed, or otherwise damaged (2-34)?			
7. Have all unsightly flux and excess globules of solder been removed?			
8. Are the conductors given a continuity test after termination?			
9. Are wrapped connections applied only to suitable terminals (2-113)?			
10. Are mechanical connections making good contact, secure, and under no local stress (2-81)?			
11. Do pressure connections provide a good electrical connection (2-86)?			

9

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
12. Are the required number of turns in contact with the terminal in accordance with the gauge of wire used (2-120)?			
13. Are the conductors dressed on the terminal block after termination?			
14. Are wrapped connectors soldered where necessary (2-131f)?			
15. Do the wrap connections appear uniform with no open spirals, overwraps, or shiners exceeding 1/16" (2-131)?			
O. Cross Connections (AFTO 31-10-11):			
1. Are jumpers routed at the MDF/CDF/IDF correctly (2-6)?			
2. Is there sufficient slack remaining after termination (2-32)?			
3. Are conductors twisted between fanning strip and terminal (2-34)?			
4. Does the pair twist remain in conductors beyong the rear of the fanning strip (2-34)?			
5. Are jumpers properly dressed (2-54)?			
6. Are jumpers made in accordance with the cable running list?			
7. Is the correct gauge wire used?			
8. CCP's (USACEEIA PAM 105-10):			
a. Are sufficient jacks/plugs available for use with the CCP's (3-1)?			
b. Are jumpers made with 26 AWG wire only (3-1a)?			
c. Are modular tools available (3-2)?			

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Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY CHECKLIST - INSTALLATION
(CCCR 702-2)

	YES	NO	NA
P. Equipment and Signal Grounds (AFTO 31-10-24, MIL-STD-188-24, TM 11-487-4):			
1. Are equipment and signal grounds installed in accordance with applicable drawings?			
2. Are the correct color coded cables used?			
3. Are grounds/bonds/shields protected from external corrosion?			
4. Are the correct screw/washer/nut combinations used on ground junctions?			
5. Are equipment/signal/protective grounds connected at the station ground box only?			
6. Are the signal grounds and signal buss insulated?			
Q. Conduit (AFTO 31-10-12):			
1. Are burrs removed from conduit after cutting (2-40)?			
2. Is the bending radius exceeded (2-55)?			
3. Are there more than 360 degrees of total bends in a single conduit run(2-46)?			
4. Does the number of conductors in a conduit exceed the established criteria (2-16)?			
5. Are conduits supported at intervals not exceeding 6' and within 3' of the end or outlet box (2-58)?			
6. Are flexible conduits terminated correctly (2-93)?			
7. Are all connections tight and secure?			
8. Are secure conduit runs correctly marked?			
R. Metal Ducts (AFTO 31-10-12):			
1. Are the ducting/raceways supported and anchored adequately (2-97, 3-10)?			

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Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)	YES	NO	NA
2. Is the percent of fill or voltage rating of the duct exceeding (3-5, 3-50)?			
3. Are junction boxes of underfloor raceway level and secure (-3-26)?			
4. Are all covers secured in place?			
5. Have all entrance/exit holes for outside ducting been properly sealed(2-23)?			
6. Is the red/black criteria observed?			
S. Coaxial Cables (AFTO 31-10-14):			
1. Is cable inspected for damage prior to termination?			
2. Where required, is cable sewn in the same manner as signal cable?			
3. Are the correct connectors on cable ends (2-6)?			
4. Are connections secure, free of excess solder, and electrically open (1-42, 1-55)?			
5. Are cable tags still connected to both ends of the RF cable (3-29)?			
6. Is the bending radius exceeded (1-73)?			
7. Are the cables properly supported (1-26, 3-21)?			
8. Are rigid cables properly grounded (1-46, 3-27)?			
9. Is the pressure maintained (1-75, 3-61)?			
T. Optical Fiber Cables (OFC):			
1. Are the OFC protected so that external conditions will not crush the fibers?			
2. Has adequate slack been provided for maintenance loops?			

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Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY CHECKLIST - INSTALLATION (CCCR 702-2)			
	YES	NO	NA
3. Are the external strength members of the OFC properly served?			
4. Are the fibers properly terminated?			
U. Waveguides and Antennas (USACEEIA PAM 105-3):			
1. Are waveguides stored horizontally and away from heavy objects (7a)?			
2. Are waveguides inspected for damage and cleaned prior to installation (7a)?			
3. Are waveguides supported correctly (7a)?			
4. Are the feed horns aligned correctly?			
5. Do waveguide bends conform to the minimum radius (8b, 8e)?			
6. Are antennas/reflectors mounted at the prescribed heights?			
7. Are antennas/reflectors oriented to the correct azimuth?			
8. Are E and H plane benders on hand for elliptical waveguides?			
9. Are waveguides grounded correctly (7-6 (7))?			

_____

QUALITY REPRESENTATIVE

13

Figure 6-2. QA Inspection Checklist - Installation (Continued).

QUALITY ASSURANCE/MIL-Q-9858A/ MIL-I-45208 PROGRAM CHECKLIST (CCCR 702-2)			DATE (Day, Month, Year)
SITE/LOCATION		PROJECT NAME	QUALITY ASSURANCE REPRESENTATIVE (QAR)
___QA	___MIL-Q-9858A	___MIL-I-45208	TASK NO.

	YES	NO	NA
1. Is the on-site inspection/quality program available for review?			
2. Does the inspection system/quality program address the pertinent requirements which will assure that all conditions are complied with?			
3. Are quality personnel and their responsibilities identified?			
4. Are detailed work instructions provided and complied with?			
5. Do records provide useful information, data, and indicate follow-up action?			
6. Are provisions made for prompt corrective actions when deficiencies occur?			
7. Are procedures provided and complied with for prevention and correction of defects?			
8. Are pertinent documents and drawings available?			
9. Are procedures provided and complied with for updating and controlling documents and drawings?			
10. Are procedures provided and complied with for storage of material prior to installation.			
11. Are in-process and final test and inspection procedures available and used?			
12. Is inspection system being complied with in all phases?			

HQ CEEIA CCC-TED-QA FM 111-R
(Rev 1 Jan 79) Previous edition 6 DEC 78 is obsolete.

Figure 6-3. QC Checklist - Installation (sheet 1 of 2).

QUALITY ASSURANCE/MIL-Q-9858A/MIL-I-45208 PROGRAM CHECKLIST (CCCR 702-2)			
	YES	NO	NA
13. Are procedures provided for control of subcontractor's work?			
14. Are procedures provided for calibration and controlling of test equipment?			
15. Are procedures provided for handling, inspection, and test of furnished material?			

NOTE: IF THE "NO" COLUMN IS CHECKED, EXPLAIN HERE, AND CONTINUE ON REVERSE SIDE IF NEEDED.

Figure 6-3. QC Checklist - Installation (sheet 2 of 2).

SECTION 7. ACCEPTANCE TEST PLAN AND PROCEDURES

7.1 GENERAL. This section contains the test procedures and states the special conditions which apply to shakedown, checkout, and acceptance tests for the installed ATRCC. Onsite tests are performed to determine if the designated ATRCC has been installed correctly, performs in accordance with the technical requirements of this SEIP and subsidiary documents, and is operationally suitable for the intended application.

7.2 TESTING.

7.2.1 Shakedown Test and Checkout. Functional tests will be conducted by the installation agency for the purpose of assuring that the equipment is alined and operable and the installation is in accordance with the engineering documentation. These tests and checkouts will be conducted in coordination with personnel of the operating agency using the test plan identified in paragraph 7.2.2 and applicable technical bulletins and technical manuals available to the operating agency (the user). These tests will be conducted prior to the installation agency offering the installation for acceptance tests. As stated in section 6, the installation agency is to anticipate the installation completion date and notify the test agency of this completion not less than 10 days before the scheduled installation completion date.

7.2.2 Onsite Acceptance Tests. Onsite acceptance testing will be accomplished in accordance with USACEEIA technical publication number CCC-TED-75-TP-200. These tests will be preceded by a thorough QA inspection in accordance with the requirements of section 6. Tests will be conducted in a normal operating environment, as stated in TB 95-1. Abnormal ambient conditions (e.g., temperature, humidity, or barometric pressure) during any test will be noted in the test log with detailed remarks included with the test results. The test director will determine if any retesting is required. The operating agency will provide personnel to operate and maintain the equipment during tests. Installation agency will provide personnel to assist the test director in the conduct of tests and measurements.

7.2.3 Flight Checks. Operational flight checks will be performed by Federal Aviation Administration (FAA) qualified ATC personnel in conjunction with the acceptance tests and under the direction of the test director. Flight checks will determine whether or not the installed ATRCC functions correctly and performs in accordance with individual equipment system mission requirements. This flight check is documented by the Army test director. (An FAA flight check is not required.) Copies of this report will be furnished participating agencies and included in the test report and retained in project files.

7.2.4 Test Equipment. A complete listing of the required test equipment is contained in the technical manuals and approved test plan. Although the installation agency is responsible for assuring that the required complement of test equipment is available for installation, inspection, and test purposes, this test equipment should be available onsite from the operating agency.

7.2.5 Technical Acceptance Recommendation. Based on the QA inspections, QC reports and documentation, acceptance test results, and flight check results, the Test Director will determine the acceptability of the work effort. Prior to actual rejection, if the circumstances so warrant, the test director will attempt to coordinate his determination with the test agency and other cognizant agencies. The test director will prepare and distribute the TAR in accordance with the requirements of section 8. Preparation of the TAR will be accomplished onsite immediately following acceptance tests.

7.2.6 Test Results. When one or more tests fail to meet requirements, the test director will determine which portion(s) of the test was affected and which portion(s) of the equipment or facility is to be retested. All deficiencies will be corrected, or, if not corrected, the deficiencies will be reported on the TAR and in the final test report.

7.2.7 Final Test Report. The test agency will prepare and distribute a test report in accordance with CCCR 702-2 as amended by the individual EIP and tasking documents. Copies of the completed TAR and flight inspection report will be included.

SECTION 8. COMPLETION CERTIFICATION

8.1 GENERAL. The results of the QA inspections and acceptance tests specified in sections 6 and 7 will be documented onsite by the QAR/test director using USACEEIA Form 98-R, (figure 8-1). The purpose of this technical document is to record the significant project information to include the scope of the effort, results and conclusions of the requisite inspections and tests. exceptions to the technical requirements, and recommendations regarding acceptance with or without exceptions or rejections of the work effort. The TAR also allows other participants to indicate agreement or disagreement with the inspection and test assessments. and for the user to state a willingness to technically accept the installed ATRCC.

8.2 DISTRIBUTION. A copy of the TAR will be provided to the signing participants and the operating agency. The original copy will be maintained in the test agency project files, but copies will be reproduced and included as part of the test report.

8.3 WAIVERS. Waivers to include command approvals for individual installations will be recorded in the TAR and copies attached for the purpose of clarifying deviations from this SEIP, the individual EIP, and TB 95-1.

8.4 TAR PREPARATION INSTRUCTIONS.

a. Entries on the data sheets are to be typed whenever possible to ensure legibility and provide a quality, fully legible product when reproduced. If a typewriter is not available, the forms may be completed by printing with black ink in block letters to ensure legibility. The instructions for completion of this form follow on a block-by-block basis.

b. Pages are to be sequentially numbered to show both the individual page number and the total number of pages constituting the completed TAR. Additionally, each page will be identified by the date, project, and contract number in the appropriate blocks.

c. Instructions for completion of the TAR are delineated in the following subparagraphs and will be completed in accordance with these instructions:

(1) DATE: Enter the day, month, and year of completion for this action (e.g., 1/1/79 as the first day of the first month of 1979).

(2) PROJECT/CONTRACT NUMBER: Enter the appropriate project or contract number. If this is a subproject or part of a subproject, provide all necessary information (i.e., IIP milestone number(s) and subproject number(s), as well as subdivision(s) to same).

(3) TITLE: Enter the project name or title.

(4) LOCATION: Enter the geographic location where the project was installed.

(5) FACILITY: Enter the name of the facility and other pertinent identifying information.

(6) TEST DIRECTOR: Enter the name, title, and grade of the test director or QAR assigned to this project.

(7) OPERATING AGENCY: Enter the name, symbol, and complete mailing address of the organization having O&M responsibility for this project, system, or equipment installation.

(8) ENGINEERING AGENCY: Enter the name, symbol, and complete mailing address of the organization having engineering cognizance and responsibility.

(9) INSTALLATION AGENCY: Enter the name, symbol, and complete mailing address of the organization having been tasked to install the TAR materiel.

(10) TESTING AGENCY: Enter the name, symbol, and complete mailing address of the QA and testing organization tasked for this project.

(11) PROJECT DESCRIPTION: Enter a brief and concise description of the project to which the TAR applies.

(12) MAJOR EQUIPMENT INSTALLED/RELOCATED: List the major items of equipment installed or relocated in accordance with the project requirements. Enter the BOM line item number, materiel description, assigned part number or NSN, and the quantity of each major item

(13) DOCUMENTATION: Enter the document identification (i.e., drawing number, technical manual number, etc.), title, and the quantity of each document provided to the operating unit as part of the project.

(14) EXCEPTIONS:

(a) Upon completion of installation and testing, any exceptions to the project requirements that require corrective action will be listed. Include complete identification of each missing item. Exceptions must be based on the specified requirements of the project, supportable through the test results or other valid documentation, fully described, and precisely identified.

(b) The appropriate exception block must be annotated, and separate sheets should be used for each category of exception.

(c) The test director will also enter the suggested action agency for each exception, recognizing that the test director may not always be in a position to determine the final action agency.

(d) For facilities that are becoming partially operational, identify installation agency actions remaining for project completion. In this situation, the TAR will show the tests that have been made, but will be identified as a partial record. A final TAR will be prepared after installation and testing of all remaining project equipment.

(15) REMARKS: The REMARKS section may be used to provide any additional information on or in support of a recommendation, commendation, or criticism in relation to the project installation, engineering, or testing. Entries may include the following:

(a) Shortcomings that do not require corrective action (not considered an exception).

(b) Recommendations for improving projects of a similar nature.

(c) Identification of support items that have not been accomplished, and a description of any activity in progress by the operating agency to satisfy the requirement.

(d) A description of test results with the performing agency and date(s) accomplished.

(e) A statement to the effect that the installation agency will forward final as-built drawings when completed.

(f) A description of the ac power system with identification of source and backup capability.

(g) A statement to indicate that a list of excess material was provided the operating command for final disposition or to identify material that was excess to the project.

(16) CERTIFICATION: Enter the signatures and certification that the project was installed, tested, and accepted for operation with or without exceptions, as applicable.

TECHNICAL ACCEPTANCE RECOMMENDATION (SUMMARY) (CCCR 702-2)		PAGE OF PAGES DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NO.	TITLE	LOCATION
FACILITY		TEST DIRECTOR
OPERATING AGENCY		ENGINEERING AGENCY
INSTALLATION AGENCY		TESTING AGENCY
PROJECT DESCRIPTION		

This Technical Acceptance Recommendation is executed by the onsite representatives of the installation, test and operating agencies. It does not constitute official acceptance of the project but does certify that the MAJOR ITEMS INSTALLED AND DOCUMENTATION PROVIDED are as stated herein. This document further certifies that the project has been installed and performs satisfactorily in accordance with the requirements listed under REFERENCES except as noted under EXCEPTIONS and REMARKS. Upon execution of this TECHNICAL ACCEPTANCE RECOMMENDATION, USACEEIA considers this project complete except for such follow-on action as may be necessary to clear the EXCEPTIONS stated herein.

HQ CEEIA CCC-TED-QA FM 98-R
(Rev 1 Jan 79) Previous edition 27 Mar 78 is obsolete.

Figure 8-1. Technical Acceptance Recommendation (sheet 1 of 6).

TECHNICAL ACCEPTANCE RECOMMENDATION (INSTALLED EQUIPMENT) (CCCR 702-2)		PAGE OF PAGES DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
MAJOR EQUIPMENT INSTALLED/RELOCATED		

BOM ITEM NO.	DESCRIPTION	PART NUMBER/FSN	QUANTITY

Figure 8-1. Technical Acceptance Recommendation (sheet 2 of 6).

TECHNICAL ACCEPTANCE RECOMMENDATION (DOCUMENTATION) (CCCR 702-1)		PAGE OF PAGES
		DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
PROJECT DOCUMENTATION PROVIDED		
REFERENCE DOCUMENTATION	TITLE	NO. OF COPIES

Figure 8-1. Technical Acceptance Recommendation (sheet 3 of 6).

TECHNICAL ACCEPTANCE RECOMMENDATION (EXCEPTIONS) (CCR 702-2)		PAGE OF PAGES DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION

EXCEPTIONS ENGINEERING INSTALLATION OTHER	SUGGESTED ACTION AGENCY

Figure 8-1. Technical Acceptance Recommendation (sheet 4 of 6).

TECHNICAL ACCEPTANCE RECOMMENDATIONS (REMARKS) (CCCR 702-2)		PAGE OF PAGES
		DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
REMARKS:		

Figure 8-1. Technical Acceptance Recommendation (sheet 5 of 6).

TECHNICAL ACCEPTANCE RECOMMENDATION (CERTIFICATION)		PAGE OF PAGES DATE (DAY, MO, YEAR)
PROJECT/CONTRACT NUMBER	TITLE	LOCATION
CERTIFICATION Acceptance tests and Quality Assurance Inspections are complete for equipment installed under this project.		
WITHOUT EXCEPTIONS ☐	WITH NOTED EXCEPTIONS ☐	
INSTALLATION AGENCY	SIGNATURE AND TITLE PRINTED	
OPERATING AGENCY	SIGNATURE AND TITLE PRINTED	
TEST AGENCY	SIGNATURE AND TITLE PRINTED	
ACCEPTANCE Equipment herein certified successfully installed and tested, is accepted.		
OPERATING COMMAND	SIGNATURE TITLE	

Figure 8-1. Technical Acceptance Recommendation (sheet 6 of 6).

1 November 1979 SEIP 036

(CCC-CED)

FOR THE COMMANDER:

OFFICIAL:

R. K. BOWERS
Colonel, Signal Corps
Deputy Commander

Merton M. K. Chun

MERTON M. K. CHUN
Lieutenant Colonel, Signal Corps
Executive Officer

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4 - 1st Signal Brigade, USACC-Korea, ATTN: CCK-OPS, APO SFRAN 96218
1 - USACC Agency-Japan, ATTN: CCJ-OPS, APO SFRAN 96343
5 - USACEEIA Installation Detachment-Korea, ATTN: CCCK-IN, CCCK-QA, APO San Francisco 96301
3 - USACSA, ATTN: CCM-SW-C, Fort Monmouth, NJ 07703
2 - USACC-WESTCOM Fort Shafter, HI 96851

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