TM 55-5895-376-14-2

TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL,

DIRECT SUPPORT AND GENERAL SUPPORT

MAINTENANCE MANUAL

FOR

ET-A

TRIBUTARY SITE

HEADQUARTERS, DEPARTMENT OF THE ARMY

MAY 1976

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the 115-volt ac line connections, or on the dc power supply circuits. Serious injury or death may result from contact with these points.

DON’T TAKE CHANCES !

TECHNICAL MANUAL
No. 11-5895-376-14-2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *20* **May** *1976*

OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL FOR ET-A TRIBUTARY SITE

REPORTING OF ERRORS

You can help improve this manual by calling attention to errors and by recommending improvements and stating your reasons for the recommendations. Your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) should be mailed direct to the Commander, US *Army Electronics Command, ATTN: DRSEL-MA-Q, Fort Monmouth, New Jersey 07703.

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This technical manual is an authorization of the manufacturer's commercial literature and does not conform with the format and content specified in AR 310-3, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.

LIST OF ILLUSTRATIONS

PREFACE

This manual provides general information about the tributary site in the ET-A communications system, and its relationship with other sites in the system.

The equipment installed at the tributary sites are components of the ET-A communications system, and are described in other manuals The following is a list of publications pertaining to the ET-A communications system component equipment

Manual Title	*Manual Number*
Maintenance Control Group AN/GSA-99(V)1 through AN/GSA-99(V)12 (NUS 6283)	11-5820-570-14
Operator's Manual for Center, Communications Operations AN/MSQ-76(V)1 through AN/MSQ-76(V)3 and AN/GSQ-106(V)1 through AN/GSQ-106(V)3 (Console Local Equipment)	11-5820-571-10
Radio Set AN/FRC-113(V)1 through AN/FRC-113(V)11 (NUS 6060)	11-5820-572-14
Multiplexer Set AN/FCC-40 through AN/FCC-54	11-5820-573-15
Nodal Point Receiver (NUS 8021/8024)	11-5820-574-14
Console Communication Control OA-8149/MRC-114(V) through OA-8154/MRC-114(V) (NUS 5972-5. -6)	11-5820-575-14
Console Training Facility (NUS 8423)	11-5820-576-14
Switching Set, Communications AN/MSQ-74(V)1 through AN/MSQ-74(V)10 and AN/MSQ-74(V)12 (Console Remote Equipment) (NUS 7640)	11-5820-577-14/1 11-5820-577-14/2 11-5820-577-14/3 11-5820-577-14/4 11-5820-577-14/5
Center, Communications Operations AN/MSQ-76(V)1 through AN/MSQ-76(V)3 and AN/GSQ-106(V)1 through AN/GSQ-106(V)3 (Console Local Equipment)	11-5820-578-24
Communication Group OA-8319/MSM (NUS 6052-23G1)	11-5820-578-14-1
Power Amplifier Group AN/MRA-15 (NUS 7561)	11-5820-579-15
Electronic Tube Cooler, ET-A Type 15-27-32 5	11-5820-579-15-1
Amplifier-Power Supply AM-4832/FRC-113(V) (NUS 6061-3)	11-5820-580-14
Transmitter (NUS 5951)	11-5820-581-14
Console, Communication Control OA-7695/GRC and OA-7696/GRC (NUS 5972-3, -7)	11-5820-582-14
Dual Receiver (NUS 5961)	11-5820-583-14
Maintenance Control Group AN/GSA-100 (NUS 6284)	11-5820-585-14
Tributary Terminal Set AN/FSC-34 (NUS 7957)	11-5820-587-15
Amplifier-Power Supply AM-4419/GRC (NUS 8013-2)	11-5820-603-14
ET-A Mainline Site Manual	11-5895-376-14-1
ET-A Tributary Site Manual	11-5895-376-14-2
ET-A Site Equipment. Towers and Antennas	11-5895-376-14-3
Test Facilities Kit MK-884/FRC-81( )	11-6625-647-14

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1. Scope of Manual

This manual provides a general description of a typical tributary site in the ET-A communications network. Chapter 1 presents descriptive information on tributary sites, and their relationship with other tributary, nodal, and main line sites in the ET-A system. While considerations for tributary, nodal, and main line sites are necessarily involved in this manual, major attention has been focused upon a typical tributary site. The latter portion of chapter 1 is devoted to data pertaining to a tributary site. Chapter 2 presents a functional description of a typical tributary site and describes the principles of operation and details on site capability. Site interconnecting data and maintenance instructions are provided in chapters 3 and 4, respectively. Additional information concerning maintenance or operation of site equipment can be obtained by reference to specific equipment manuals listed in the preface.

2. Definitions and Terminology

Terms and abbreviations which are frequently used in this manual are listed in the following chart.

Definitions and Terminology

Term	Definition
Baseband	Frequency spectrum of a composite signal containing multiplexed voice and pilot-tone data carried in channels, groups, and supergroups
Channel	Band of frequencies covering a 300-cps to 3-kc spectrum associated with a given carrier
Console System	A command and control facility within the ET-A system used to establish conferences rapidly on a semi-automatic basis
ET-A	European Tropo- Army Communication System
FSK	Frequency-shift keying
FST	Frequency-shift tone
Group	Multiplexed set of signals at the channel-frequency level used for modulating a higher frequency carrier known as the “group carrier”
LOS	Line-of -sight transmission, or reception
Mainline site	Site serving main route of communications, directly in line with other important communication links

Definitions and Terminology (cont)

Term	Definition
MCC	Maintenance control center
MUX	Multiplex
Nodal site	Mainline site serving tributaries
NUS	Prefix to manufacturer's identification number
OW	Order wire, orderwire telephone (maintenance)
Pilot tone	Unique frequency signal sent along with multiplexed audio for continuous monitoring of communication facility's reliability
Shoot, shot	Radio link with another site
Super group	Multiplexed set of signals at the group-carrier frequency level used for modulating a higher-frequency carrier known as the "supergroup carrier"
	A group of tributary stations served by a common carrier frequency from the nodal point radio set at the associated
VSWR	Voltage standing wave ratio

3. Technical Characteristics

Type of propagation . . . . . Tropospheric scatter or line of sight

Radio-frequency band . . . . . 4.4 to 5.0 gc

Types of modulation:

Voice-frequency channels . . . . Single-sideband, suppressed-carrier, frequency modulation

Signaling and status channels . . . Narrow-band fsk (2820 ±30 cps)

Number of voice channels. . . . . plus order wire

Order wire signaling . . . . . 1600 cps

Type of reception . . . . . Dual or quad diversity

Transmitter output power . . . . . watt or 1 kilowatt (depending on site requirements)

Automatic malfunction alarms . . . . Transmitter, receiver, tributary, and ancillary equipment

Antenna system

Diameter . . . . . 6, 15 or 30 feet (depending on site requirements)

Frequency . . . . . 4,400 to 5,000 mc

Polarization . . . . . Dual (horizontal and vertical)

VSWR . . . . . Less than 1.2

Decoupling (polarization) . . . . . 40 db

Power handling . . . . . 1 kw (cw)

Radiation properties

Minor lobes . . . . . -20 db with respect to the main lobe

Gain and beamwidth at 4,700 mc . . . . .

Antenna	Gain	Beamwidth
30 feet	50 db	0.50 degree
15 feet	44 db	0.98 degree
6 feet	38 db	2.50 degrees

Power requirements . . . . . Single-phase, 120-volt, 3-wire

l-watt radio equipment shelter . . 11.6 kw

1-kw radio equipment shelter . . . 21.6 kw

Tributary equipment cabinet . . . 1.5 kw

Area lighting, generator shelter, and miscellaneous . . . 15 kw

Section II. DESCRIPTION AND DATA

4. System Tie-In

(fig. 1)

a. Tributary sites are used to connect remotely located military installations to six command locations (Console Local Equipment) served by the main line of communication in the ET-A network. The tributary sites are connected to the ET-A main line through nodal sites. The nodal sites are located on the ET-A main line and include a maximum of three nodal equipment vans. Each nodal equipment serves a maximum of eight tributary sites on a sector-coverage basis in the nodal-to-tributary site direction. This permits the use of a single rf carrier frequency for the transmission of the Console Local Equipment's audio and digital data signals to all tributary sites in the associated sector. Separate carriers are used in the tributary-to-nodal site direction. Either line-of-sight or tropospheric scatter may be employed for the radio links between the nodal equipment van and the tributary sites. The basic technique used for the nodal equipment van-tributary site radio links is shown in figure 2.

b. The Console System audio and digital data signals from the distant tributary and Console Local Equipment (CLE) sites are routed through the ET-A network over five channels and applied to an associated Console Remote Equipment van (CRE van). In the CRE van, the Console System audio and digital data signals are converted into a two-channel baseband signal for transmission to the applicable tributary sites. Audio and digital data signals originated at a tributary are transmitted to the CRE van on a single channel. The CRE van places the tributary site signals on a Console System channel for transmission to the CLE sites or tributary sites.

5. Typical Tributary Site

The typical tributary site is usually located on, or adjacent to a military installation. The site layout and equipment are described in paragraphs a and b below.

a. Site Layout. A typical site layout is shown in figure 3. The site is surrounded by a security fence, and a paved area in front of the generator building is for auto parking. The military building houses the tributary logic cabinet and the tributary control unit. The radio equipment shelter is located beneath the antenna tower to permit the shortest possible waveguide runs to the antennas. Two 30-foot parabolic antennas are mounted on the antenna tower. The antennas are oriented for communication with the associated nodal site.

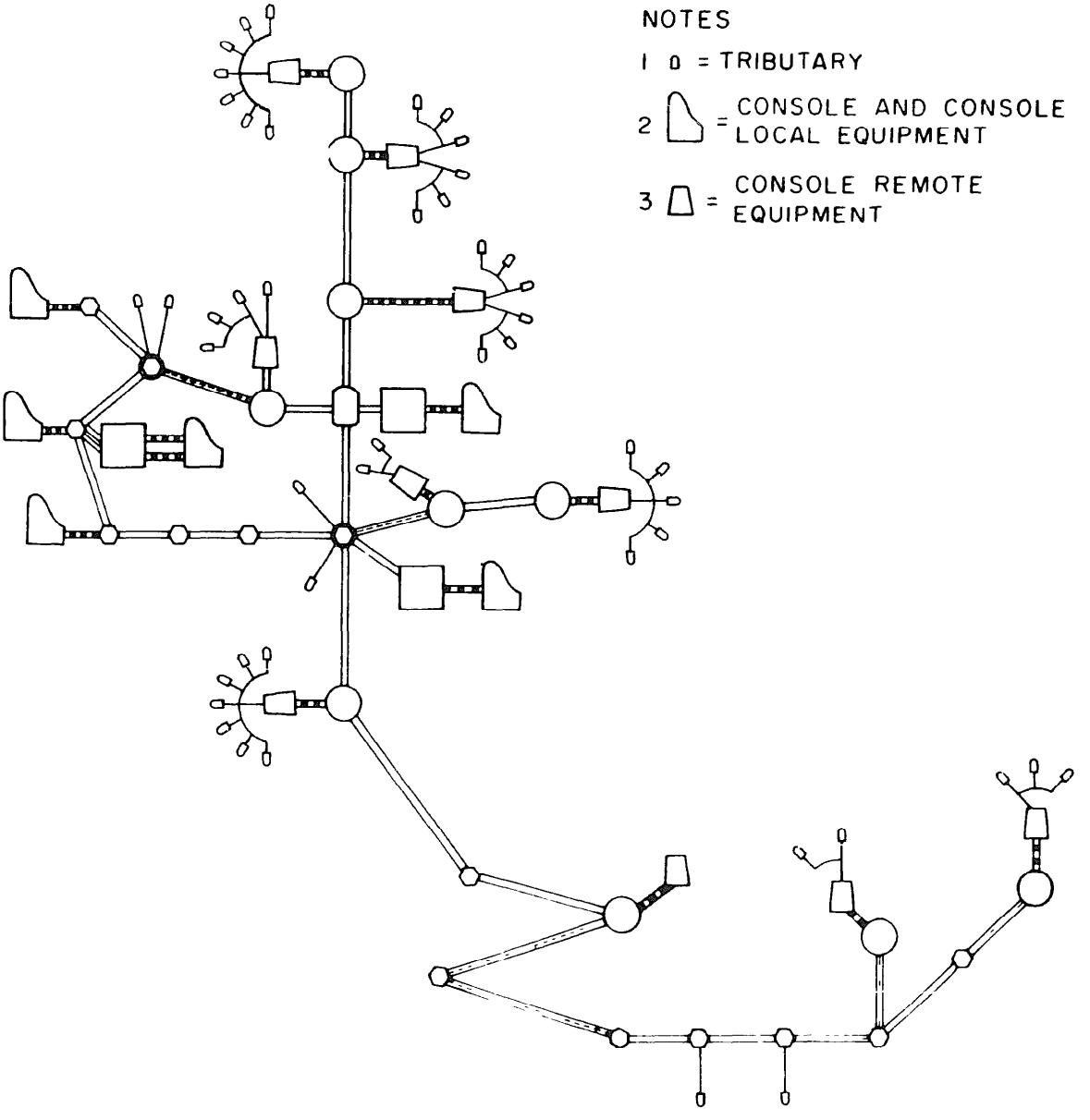
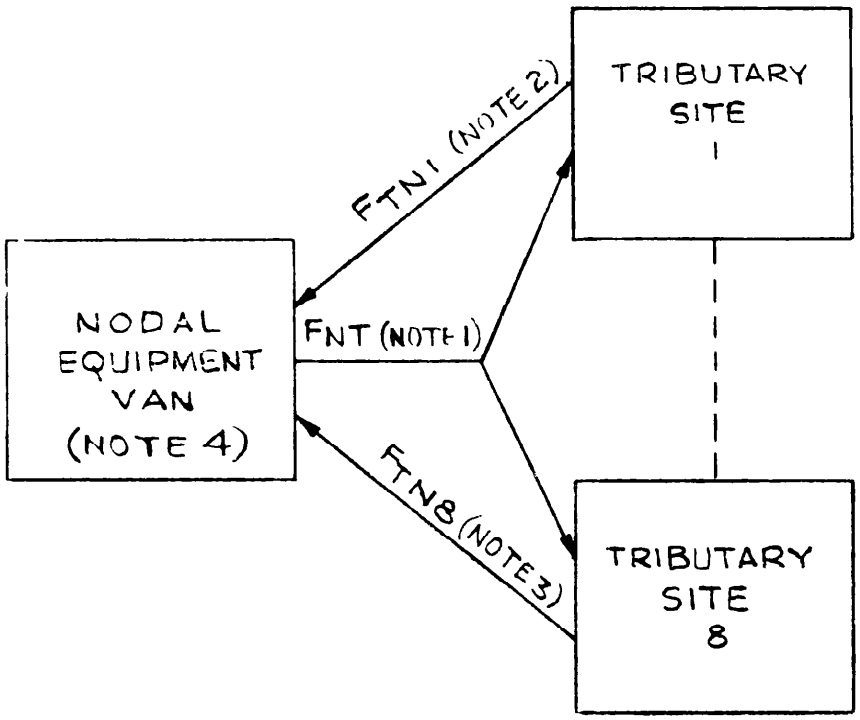


Figure 1. System configuration.



NOTES:

1. F_{NT} - NODAL-TO-TRIBUTARY SITE CARRIER FREQUENCY
2. F_{TN1} - TRIBUTARY 1- TO NODAL SITE CARRIER FREQUENCY
3. F_{TN8} - TRIBUTARY 8 - TO NODAL SITE CARRIER FREQUENCY
4. NODAL EQUIPMENT VAN LOCATED AT MAIN LINE SITE

Figure 2. Nodal equipment van-tributary site radio links, block diagram.

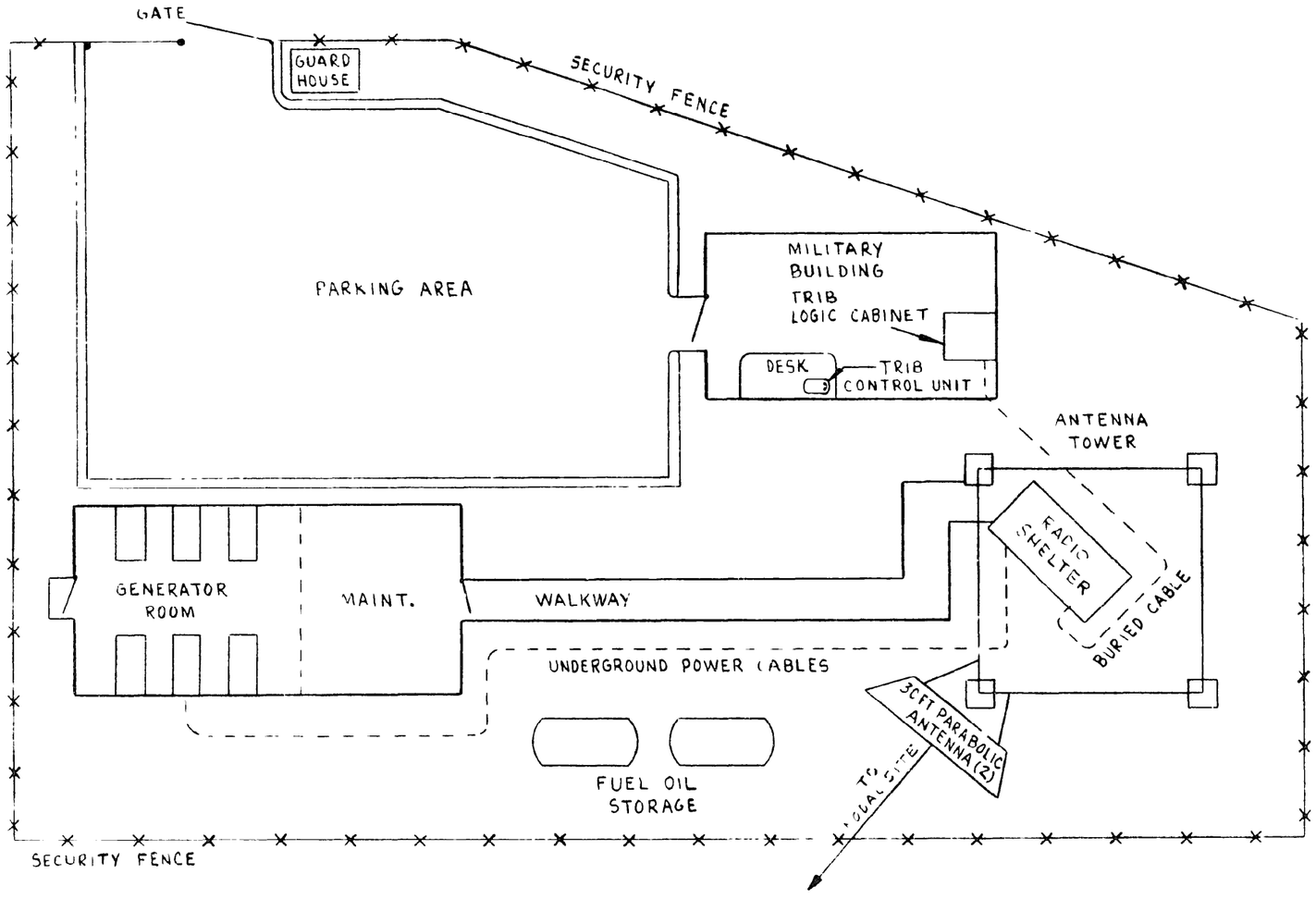


Figure 3. Typical tributary site, plan view.

b. Site Equipment

(1) Typical antenna equipment. Figure 4 shows two 30-foot parabolic antennas mounted on a steel tower to provide communication between this site and the associated nodal site. The tower shown is approximately 190 feet high, and is provided with obstruction lights and lightning protection. The tower height, antenna size and antenna elevation are dependent upon the particular requirements of each tributary site. Other tower and antenna configurations will be found in the ET-A Site Equipment, Towers and Antennas (POMM 11-5895-376-15-3) instruction manual. The base of the tower is mounted on concrete piers, and the tower grounding system is connected to earth ground by 8-foot, copper- clad- steel grounding rods. The antenna grounding system is connected to the entire station grounding system. A protective wire-mesh screen is -mounted above the radio equipment shelter on the antenna tower to protect personnel from falling objects. Ladders in safety cages permit maintenance personnel to climb the tower when repairs or adjustments are required. Both antennas are correctly oriented for the shoot to the associated nodal site. This particular link employs tropospheric scatter as the transmitting media.

(2) Radio equipment. The receiving and transmitting equipment used to provide the radio link with the associated nodal site is housed in a type S-141 shelter. The shelter is mounted on a concrete slab and is connected to other site equipment by underground cables. The transmitter provides a l-watt or 1-kw output in the 4.4- to 5.0-gc frequency range and uses quadruple diversity reception and transmission.

(3) Console System equipment. The Console System equipment consists of two units: a tributary logic cabinet and a tributary control unit. These two units form the tributary terminal set. Both units are located in the military building and are connected to the radio equipment shelter by underground cables.

(a) Tributary logic cabinet. The tributary logic cabinet contains the logic circuits which encode and decode Console System digital data. This data is continuously received and transmitted in the form of fst signals. Incoming fst signals are converted to logic level signals

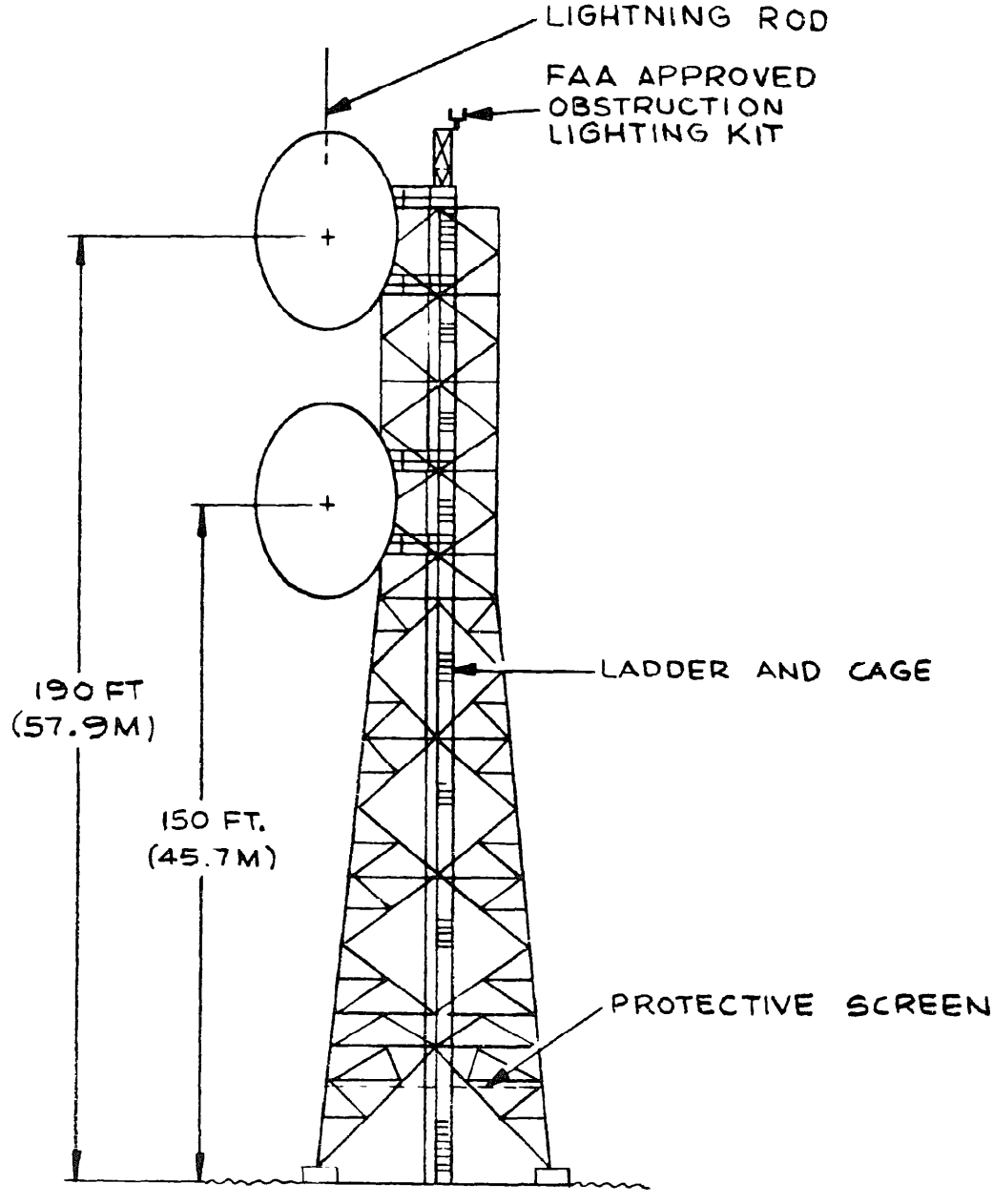


Figure 4. Antenna Lower assembly at tributary site.

by the fst converter in the fst modem shelf. The logic level signals (marks or spaces) are applied to the logic circuits for processing. The outputs of the logic circuits actuate indicators and a buzzer on the tributary control unit. In the transmit direction, actuating the pushbuttons on the tributary control unit causes the logic circuits to generate digital characters which are applied to the fst keyer (in the fst modem shelf). The resulting fst signals are transmitted to the nodal site. Fault indicator lamps on the maintenance panel located at the top of the tributary cabinet indicate faults in the tributary logic cabinet.

(b) Tributary control unit. The tributary control unit contains the indicators which display the orders decoded by the tributary logic cabinet. It also contains pushbuttons which generate signals to be transmitted to the CLE sites. A telephone handset and a speaker are provided to permit oral communication with all CLE sites.

(4) Primary power equipment. Primary power for the site is supplied by a diesel-powered electric plant which is housed in a conventional quonset building. The plant consists of six heavy-duty diesel generators, a main power switchboard, and supporting equipment. Three of the diesel generators supply site power continuously, while the other three are on standby, Although the site is supplied with power from the diesels on a 24-hour basis, outside commercial power is available for emergency use, and is used to supply power for buildings and equipment which are not directly connected with the site radio equipment.

(5) Maintenance facilities.

(a} The maintenance facilities are housed in part of the quonset building which houses the diesel generators. This area contains work benches, office facilities, storage space for spare parts, and the maintenance control center (MCC) console.

(b) The MCC console is equipped with order wire telephone facilities and a status indicator unit. The status indicator unit contains pushbutton indicators which provide visual indications of faults in the radio equipment shelter, tower lights, and tributary terminal set.

CHAPTER 2

PRINCIPLES OF OPERATION

6. General

The block diagram (fig. 5) shows the functional relationship of equipment used at the tributary site. The radio equipment shelter provides the radio link with the associated nodal site. The tributary logic cabinet and tributary control unit provide the Console System interface. The maintenance control center provides order wire and fault monitoring facilities.

7. Basic Signal Flow

a. Console System Receive Path

(1) The 4.4- to 5.0-gc fm carrier from the associated nodal site is demodulated in the radio equipment shelter to produce a 2-channel baseband signal (fig. 6A). This baseband signal is separated into a 4-kc pilot tone and its constituent audio channels (Al and A2). The pilot tone is used for monitoring purposes within the radio equipment shelter. Both audio channels are applied to the tributary logic cabinet. Channel Al is normally used for Console System speech signals as well as the fst signal containing the Console System control data. Channel A2 is normally used for order wire traffic. The Console System has priority over the use of channel A2 if another tributary site in the same sector requires communication with a Console Local Equipment (CLE) site.

(2) In the tributary logic cabinet, the fst signal contained in channel Al is converted into logic-level signals which are applied to the logic circuits. The logic circuits decode these signals to select the channel designated by the CLE site consolette operator (usually channel Al) and generate buzzer and lamp driver signals which are applied to the tributary control unit.

(3) The speech signals contained within the selected channel are applied to the tributary control unit telephone handset and speaker. The lamp and buzzer driver signals alert the tributary control unit operator of an incoming call and light appropriate indicators to indicate actions that he must perform.

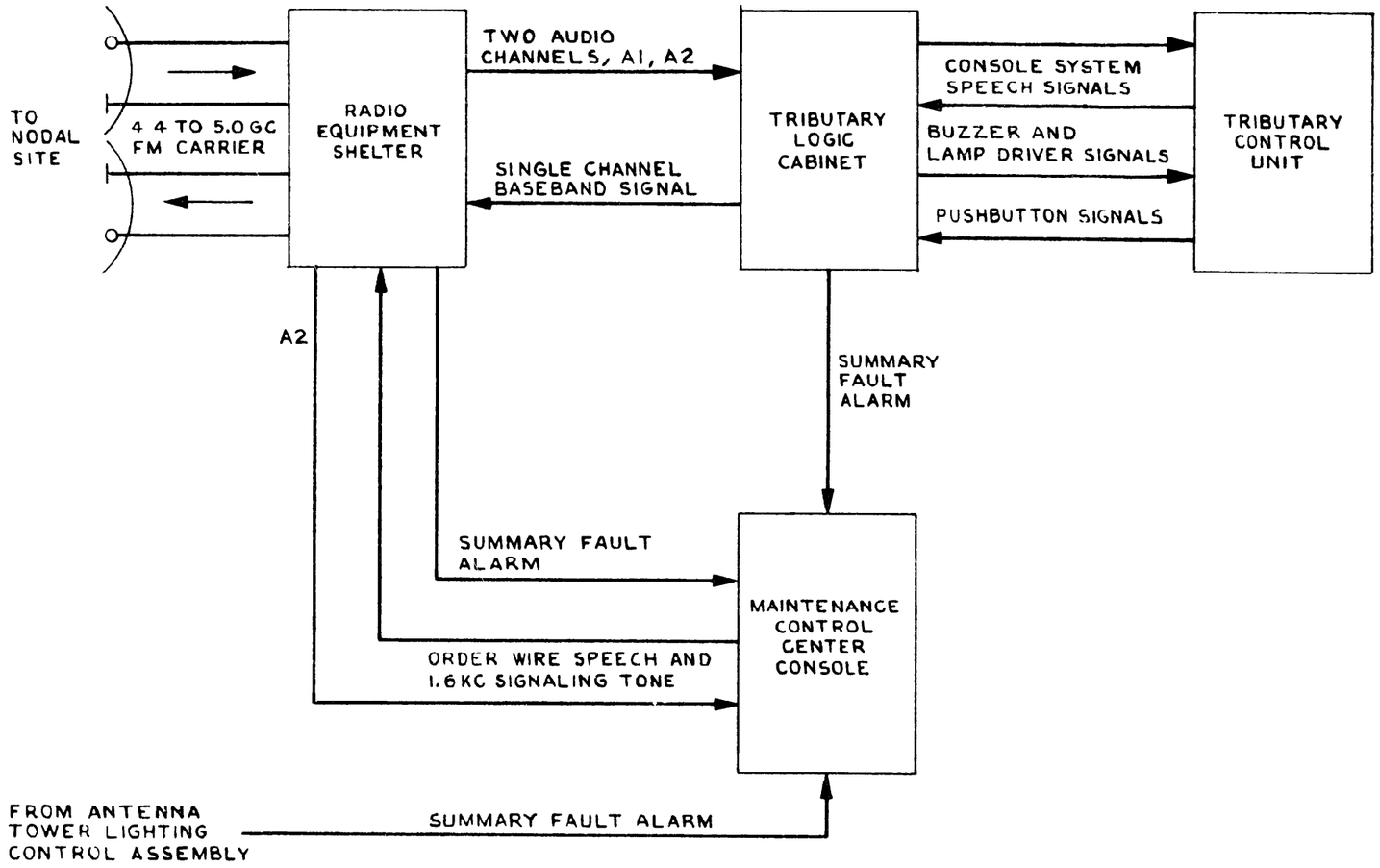
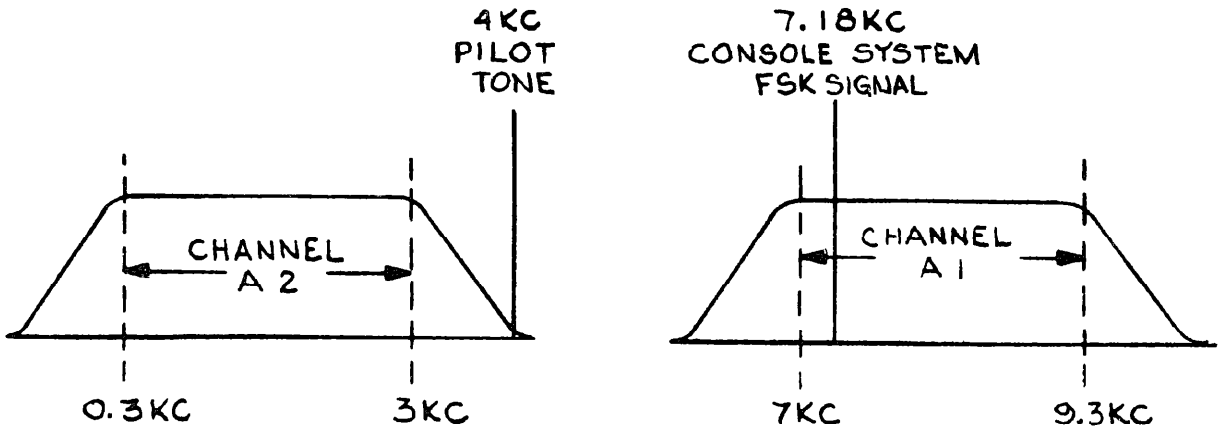
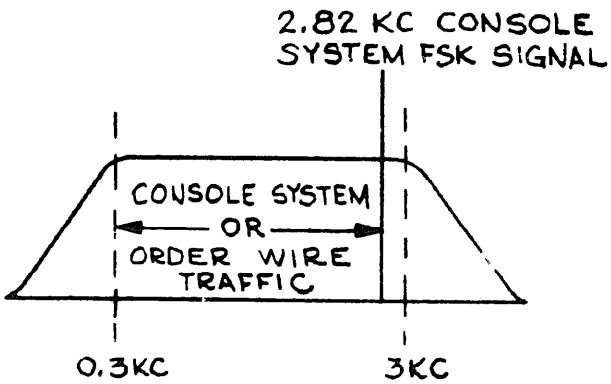


Figure 5. Typical tributary site, block diagram.



A. NODAL-TO-TRIBUTARY SITE 2-CHANNEL BASEBAND SIGNAL



B. TRIBUTARY-TO NODAL SITE BASEBAND SIGNAL

Figure 6. Nodal- tributary site baseband signals.

b. Console System Transmit Path

(1) Pushbutton signals from the tributary control unit, initiated by the tributary control unit operator in response to lighted Indicators or to initiate a call Lo a CLE site, are applied to the tributary logic cabinet. In the tributary logic cabinet the pushbutton signals are applied to the logic circuits. The logic circuits encode the push-button signals into logic-level signals and combine these signals with the logic-level signals containing status information for application to an fst keyer. The keyer converts the logic-level signals into an fsk signal.

(2) Speech signals originated by the tributary control unit operator are also applied to the tributary logic cabinet. In the tributary logic cabinet, the speech signals are combined with the fst signal to form a single channel baseband signal (fig. 6B) for application to the radio equipment shelter. In the radio equipment shelter, the baseband signal frequency modulates an rf signal to produce a carrier in the 4.4- to 5.0-gc range. The carrier is transmitted to the associated nodal site.

c. Order Wire Receive Path. Order wire signals from the associated nodal site are obtained from the channel A2 output of the radio equipment shelter when this channel is not handling Console System traffic. The order wire signals, which consist of speech signals and a 1.6-kc signaling tone, are applied to the maintenance control center console. The speech signals are applied to the order wire telephone handset, while the tone lights an indicator to alert the operator of an incoming call. The speech and tone signals are applied to the radio equipment shelter central equipment cabinet.

d. Order Wire Transmit Path. The order wire speech and 1.6-kc tone signals originated by the maintenance control center operator are applied to the radio equipment shelter. In the radio equipment shelter, the speech and tone signals are combined with the fst signals from the tributary logic cabinet and transmitted to the associated nodal site on a carrier in the 4.4- to 5.0-gc range. The tributary MCC order wire speech and tone signals cannot be transmitted when Console System speech signals are being transmitted.

e. Alarm Facilities. The radio equipment shelter, tributary logic, and antenna tower lighting control assembly generate a summary fault alarm signal whenever an equipment malfunction occurs. The summary fault alarm signal is applied to the maintenance control center, where it causes the appropriate pushbutton-indicator

to flash red and actuates a buzzer. The operator acknowledges the fault condition by pressing the flashing pushbutton-indicator. This action causes the pushbutton-indicator to light steady red and silences the buzzer. When the malfunction has been corrected, the pushbutton-indicator flashes green and the buzzer is actuated again. At this point the operator presses the flashing pushbutton-indicator again. This action causes the pushbutton-indicator to light steady green, silences the buzzer, and restores the alarm circuit to the normal operating condition.

CHAPTER 3

INTERCONNECTING CABLING

8. General

The ET-A cabling system is applicable to all site interconnecting diagrams in the system. The ET-A Site Cabling chart (para. 9) identifies each cable by jack or plug number and provides its function and destination. The numbering system for ET-A site cables is divided into 10 groups, itemized below. Each group of cables applicable to tributary sites is preceded by an asterisk (*).

*W1 -W100	Main power
*W101 -W200	De-icer and misc power
W201 -W300	RF cables
*W301 -W400	Maintenance order wire and remote alarm
*W401 -W500	Audio and power at tributary sites
W501 -W600	Multiplex/con&e remote/nodal point radio
W601 -W700	Console local equipment, operations center
W701 -W800	Console local equipment, operations center
W801 -W900	Multiplex/control van (audio)
W901 -W999	Interface and misc.

9. Site Cabling

Cabling at a typical tributary site is placed underground from shelter to shelter. Cable connections are made at the signal entry or power entry panels on equipment shelters. Tags (bands), are on the cables near the connector ends to assist in their identification. A group of typical interconnecting cable diagrams has been included to show the routing of signal, alarm, and power cables on a typical tributary site. Cabling which may be peculiar to a particular site will be found in the as-built drawings for that site. Refer to figures 7 through 9 for interconnection data between the major equipments of a typical tributary site. The system configuration shown in figure 1 indicates how the tributary sites are interlinked with the main line.

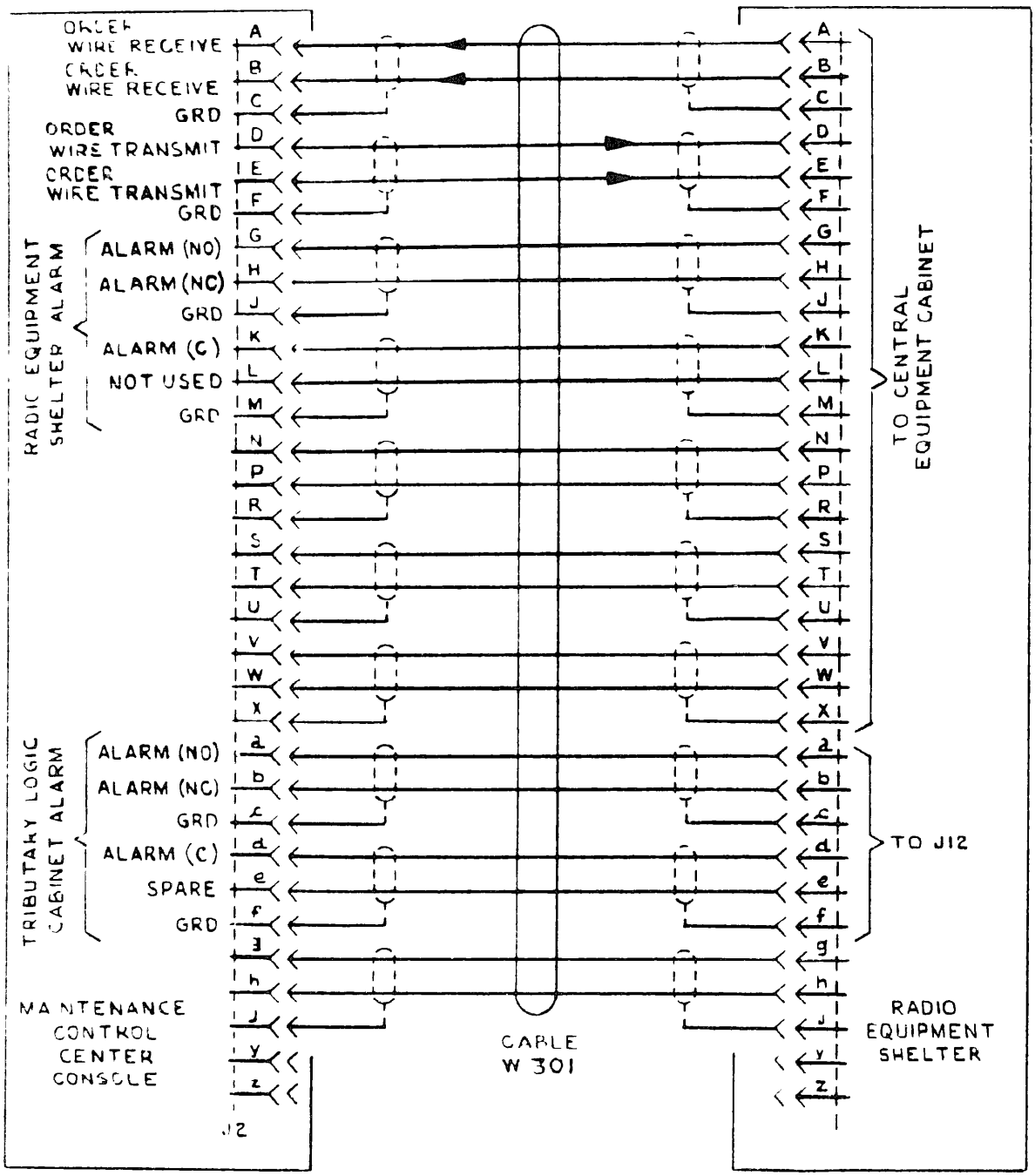


Figure 7. Radio equipment shelter and maintenance control center console, interconnection diagram.

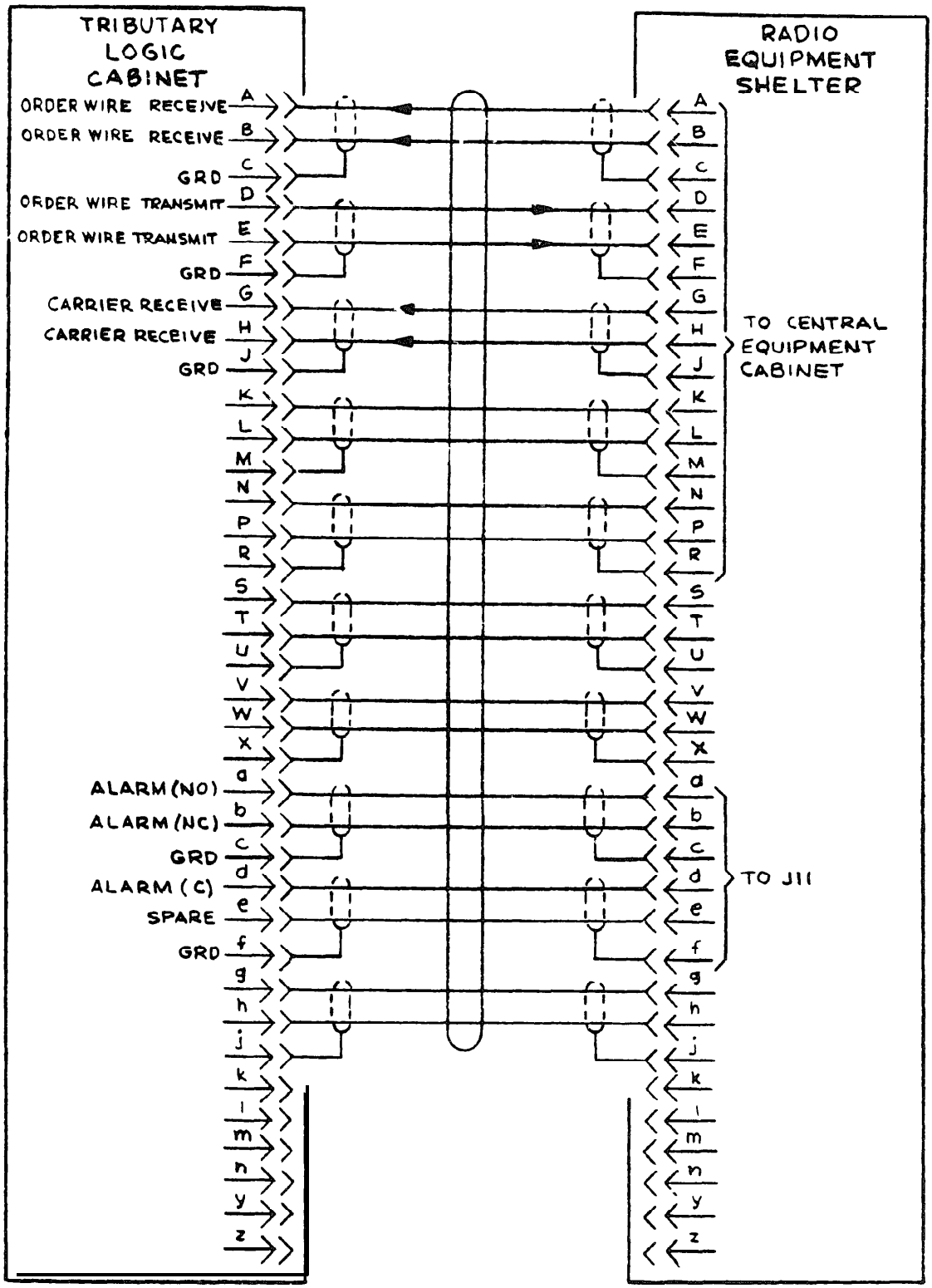


Figure 8. Radio equipment shelter and tributary logic cabinet, interconnection diagram.

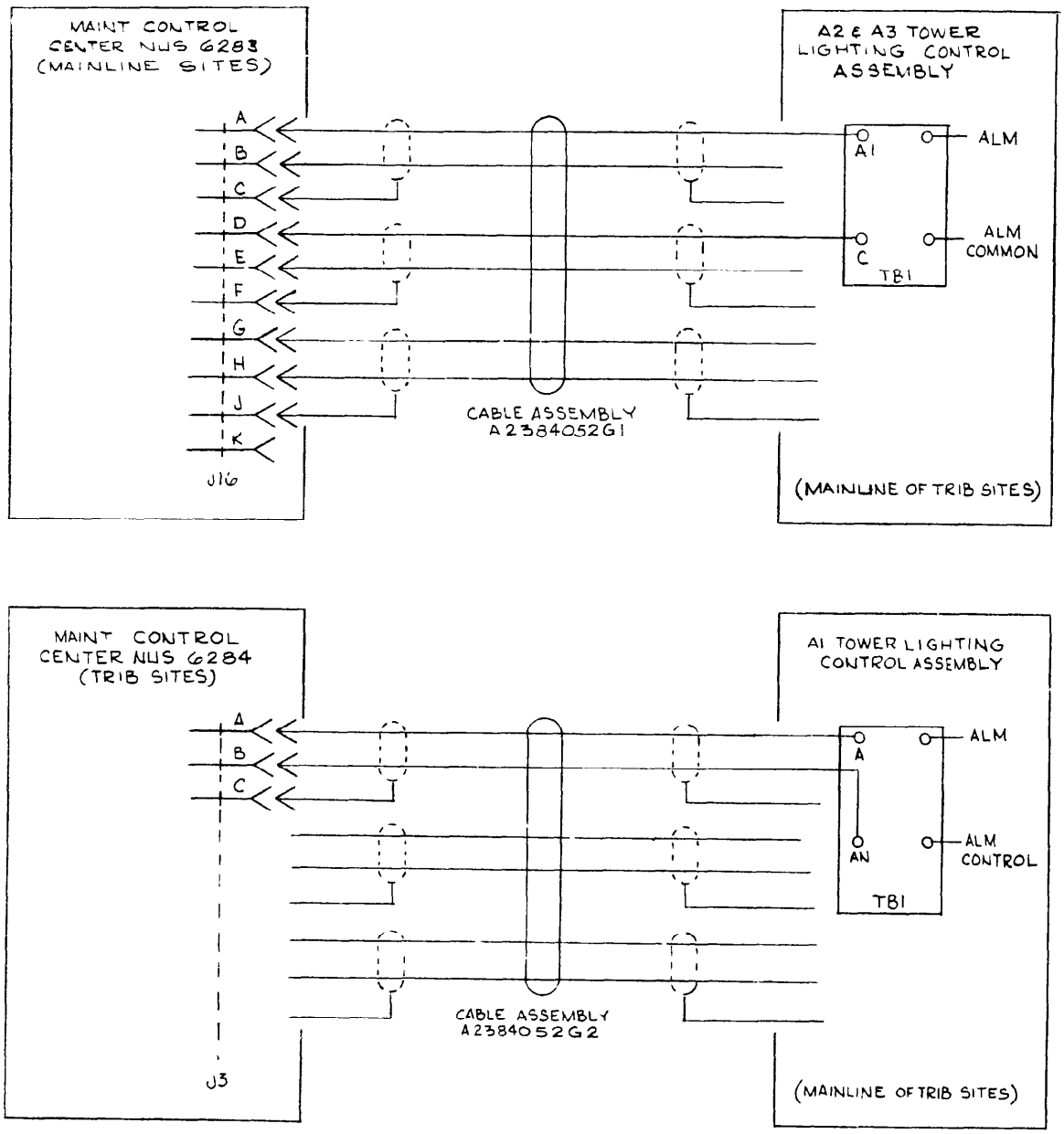


Figure 9. Maintenance control center console and antenna tower lighting control assembly, interconnection diagram.

ET-A Site Cabling[a]

Cable no.	From		To		Function
	Unit	Conn	Unit	Conn	
W1	Generator no. 1		PWR switch ps no.		3Ø-5W-208 vac
W1A	Generator no. 1		PWR switch ps no.		3Ø-5W-208 vac
W1B	Generator no. 1		PWR switch ps no.		3Ø-5W-208 vac
W2	Generator no. 2		PWR switch ps no.		3Ø-5W-208 vac
W2A	Generator no. 2		PWR switch ps no.		3Ø-5W-208 vac
W2B	Generator no. 2		PWR switch ps no.		3Ø-5W-208 vac
W3	Generator no. 3		PWR switch ps no.		3Ø-5W-208 vac
W3A	Generator no. 3		PWR switch ps no.		3Ø-5W-208 vac
W3B	Generator no. 3		PWR switch ps no.		3Ø-5W-208 vac
W4	Generator no. 4		PWR switch ps no.		3Ø-5W-208 vac
W4A	Generator no. 4		PWR switch ps no.		3Ø-5W-208 vac
W4B	Generator no. 4		PWR switch ps no.		3Ø-5W-208 vac
W5	Generator no. 5		PWR switch ps no.		3Ø-5W-208 vac
W5A	Generator no. 5		PWR switch ps no.		3Ø-5W-208 vac
W5B	Generator no. 5		PWR switch ps no.		3Ø-5W-208 vac
W6	Generator no. 6		PWR switch ps no.		3Ø-5W-208 vac
W6A	Generator no. 6		PWR switch ps no.		3Ø-5W-208 vac
W6B	Generator no. 6		PWR switch ps no.		3Ø-5W-208 vac
W7	Generator no. 7		PWR switch ps no.		3Ø-5W-208 vac
W7A	Generator no. 7		PWR switch ps no.		3Ø-5W-208 vac
W7B	Generator no. 7		PWR switch ps no.		3Ø-5W-208 vac
W11					Not used
W12					Not used
W13					Not used
W14					Not used
W15					Not used
W16					Not used
W17					Not used
W18					Not used
W19					Not used
W20					Not used

[a]See footnotes at end of chart.

ET-A Site Cabling[a] (cont)

Cable no.	From		To		Function
	Unit	Conn	Unit	Conn	
W21					Not used
W22					Not used
W23					Not used
W24					Not used
W25					Not used
W26					Not used
W27					Not used
W28					Not used
W29					Not used
W30					Not used
W31	Tech no. CB no.		6060 radio set RSA	J1	3Ø-5W-208 vac
W32	Tech no. CB no.		6060 radio set RSA	J2	3Ø-5W-208 vac
W33	Util no. CB no.		6060 radio set RSA	J3	3Ø-5W-208 vac
W34	Tech no. CB no.		6060 radio set RSB	J1	3Ø-5W-208 vac
W35	Tech no. CB no.		6060 radio set RSB	J2	3Ø-5W-208 vac
W36	Util no. CB no.		6060 radio set RSB	J3	3Ø-5W-208 vac
W37	Tech no. CB no.		6060 radio set RSC	J1	3Ø-5W-208 vac
W38	Tech no. CB no.		6060 radio set RSC	J2	3Ø-5W-208 vac
W39	Util no. CB no.		6060 radio set RSC	J3	3Ø-5W-208 vac
W40	Tech no. CB no.		6060 radio set RSD	J1	3Ø-5W-208 vac
W41	Tech no. CB no.		6060 radio set RSD	J2	3Ø-5W-208 vac
W42	Util no. CB no.		6060 radio set RSD	J3	3Ø-5W-208 vac
W43	Tech no. CB no.		6060 radio set RSE	J1	3Ø-5W-208 vac
W44	Tech no. CB no.		6060 radio set RSE	J2	3Ø-5W-208 vac
W45	Util no. CB no.		6060 radio set RSE	H3	3Ø-5W-208 vac
W46	Tech no. CB no.		7561 pwr amplifier	J1	3Ø-5W-208 vac
W47	Tech no. CB no.		7561 pwr amplifier	J2	3Ø-5W-208 vac
W48	Util no. CB no.		7561 pwr amplifier	J3	3Ø-5W-208 vac
W49	Util no. CB no.		7561 pwr amplifier	J4	3Ø-5W-208 vac
W50					Not used
W51	Tech no. CB no.		6270 MUX set MSA	J1	3Ø-5W-208 vac

[a]See footnotes at end of chart

ET-A Site Cabling[a] (cont)

Cable no.	From		To		Function
	Unit	Conn	Unit	Conn	
W52	Tech no. CB no.		6270 Mux set MSA	J2	3Ø-5W-208 vac
W53	Util no. CB no.		6270 Mux set MSA	J3	3Ø-5W-208 vac
W54	Tech no. CB no.		6270 Mux set MSB	J1	3Ø-5W-208 vac
W55	Tech no. CB no.		6270 Mux set MSB	J2	3Ø-5W-208 vac
W56	Util no. CB no.		6270 MUX set MSB	J3	3Ø-5W-208 vac
W57	Tech no. CB no.		6270 Mux set MSC	J1	3Ø-5W-208 vac
W58	Tech no. CB no.		6270 Mux set MSC	J2	3Ø-5W-208 vac
W59	Util no. CB no.		6270 Mux set MSC	J3	3Ø-5W-208 vac
W60					Not used
W61	Tech no. CB no.		6260 Rad set NPRSA	J1	3Ø-5W-208 vac
W62	Tech no. CB no.		6260 Rad set NPRSA	J2	3Ø-5W-208 vac
W63	Util no. CB no.		6260 Rad set NPRSA	J3	3Ø-5W-208 vac
W64	Util no. CB no.		6260 Rad set NPRSA	J4	3Ø-5W-208 vac
W65	Tech no. CB no.		6260 Rad set NPRSB	J1	3Ø-5W-208 vac
W66	Tech no. CB no.		6260 Rad set NPRSB	J2	3Ø-5W-208 vac
W67	Util no. CB no.		6260 Rad set NPRSB	J3	3Ø-5W-208 vac
W68	Util no. CB no.		6260 Rad set NPRSB	J4	3Ø-5W-208 vac
W69	Tech no. CB no.		6260 Rad set NPRSC	J1	3Ø-5W-208 vac
W70	Tech no. CB no.		6260 Rad set NPRSC	J2	3Ø-5W-208 vac
W71	Util no. CB no.		6260 Rad set NPRSC	J3	3Ø-5W-208 vac
W72	Util no. CB no.		6260 Rad set NPRSC	J4	3Ø-5W-208 vac
W73					Not used
W74					Not used
W75					Not used
W76	Tech no. CB no.		7640 CRE van CRE A	J1	3Ø-5W-208 vac
W77	Tech no. CB no.		7640 CRE van CRE A	J2	3Ø-5W-208 vac
W78	Util no. CB no.		7640 CRE van CRE A	J3	3Ø-5W-208 vac
W79	Util no. CB no.		7640 CRE van CRE A	J4	3Ø-5W-208 vac
W80					Not used
W81	Tech no. CB no.		7642 CLE van CLE A	J1	3Ø-5W-208 vac
W82	Tech no. CB no.		7642 CLE van CLE A	J2	3Ø-5W-208 vac

[a]See footnotes at end of chart

ET-A Site Cabling[a] (cont)

Cable no.	From		To		Function
	Unit	Conn	Unit	Conn	
W83	Util no. CB no.		7642 CLE van CLE A	J3	3Ø-5W-208 vac
W84	Util no. CB no.		7642 CLE van CLE A	J4	3Ø-5W-208 vac
W85	Tech no. CB no.		7641 COC van COC A	J1	3Ø-5W-208 vac
W86	Tech no. CB no.		7641 COC van COC A	J2	3Ø-5W-208 vac
W87	Util no. CB no.		7641 COC van COC A	J3	3Ø-5W-208 vac
W88	Util no. CB no.		7641 COC van COC A	J4	3Ø-5W-208 vac
W89					Not used
					Not used
W91	Tech no. CB no.		Tech control van	J1	3Ø-5W-208 vac
W92	Tech no. CB no.		Tech control van	J2	3Ø-5W-208 vac
W93					Not used
W94					Not used
W95					Not used
W96					Not used
W97					Not used
W98					Not used
W99					Not used
W100					Not used
W101	Rad set RSA	J17	Deicer assy-ant	A1	1Ø-3W-115 vac
W102	Rad set RSA	J19	Deicer assy-ant	A2	1Ø-3W-115 vac
W103	Rad set RSB	J17	Deicer assy-ant	B1	1Ø-3W-115 vac
W104	Rad set RSB	J19	Deicer assy-ant	B2	1Ø-3W-115 vac
W105	Rad set RSC	J17	Deicer assy-ant	C1	1Ø-3W-115 vac
W106	Rad set RSC	J19	Deicer assy-ant	C2	1Ø-3W-115 vac
W107	Rad set RSD	J17	Deicer assy-ant	D1	1Ø-3W-115 vac
W108	Rad set RSD	J19	Deicer assy-ant	D2	1Ø-3W-115 vac
W109	Rad set RSE	J17	Deicer assy-ant	E1	1Ø-3W-115 vac
W110	Rad set RSE	J19	Deicer assy-ant	E2	1Ø-3W-115 vac
W111	Rad set NPRSA	J6	Deicer assy-ant	F1	1Ø-3W-115 vac
W112	Rad set NPRSA	J7	Deicer assy-ant	F2	1Ø-3W-115 vac
W113	Rad set NPRSA	J8	Deicer assy-ant	G1	1Ø-3W-115 vac
W114	Rad set NPRSA	J9	Deicer assy-ant	G2	1Ø-3W-115 vac

[a]See footnotes at end of chart

ET- A Site Cabling[a] (cont)

Cable no.	From		To		Function
	Unit	Conn	Unit	Conn	
W115	Rad set NPRSA	J10	Deicer assy-ant	H1	1Ø-3W-115 vac
W116	Rad set NPRSA	J11	Deicer assy-ant	H2	1Ø-3W-115 vac
W117	Rad set NPRSA	J12	Deicer assy-ant	J1	1Ø-3W-115 vac
W118	Rad set NPRSA	J13	Deicer assy-ant	J2	1Ø-3W-115 vac
W119	Rad set NPRSA	J14	Deicer assy-ant	K1	1Ø-3W-115 vac
W120	Rad set NPRSA	J15	Deicer assy-ant	K2	1Ø-3W-115 vac
W121	Rad set NPRSA	J16	Deicer assy-ant	L1	1Ø-3W-115 vac
W122	Rad set NPRSA	J17	Deicer assy-ant	L2	1Ø-3W-115 vac
W123	Rad set NPRSA	J18	Deicer assy-ant	M1	1Ø-3W-115 vac
W124	Rad set NPRSA	J19	Deicer assy-ant	M2	1Ø-3W-115 vac
W125	Rad set NPRSA	J20	Deicer assy-ant	N1	1Ø-3W-115 vac
W126	Rad set NPRSA	J21	Deicer assy-ant	N2	1Ø-3W-115 vac
W127	Rad set NPRSB	J6	Deicer assy-ant	P1	1Ø-3W-115 vac
W128	Rad set NPRSB	J7	Deicer assy-ant	P2	1Ø-3W-115 vac
W129	Rad set NPRSB	J8	Deicer assy-ant	R1	1Ø-3W-115 vac
W130	Rad set NPRSB	J9	Deicer assy-ant	R2	1Ø-3W-115 vac
W131	Rad set NPRSB	J10	Deicer assy-ant	S1	1Ø-3W-115 vac
W132	Rad set NPRSB	J11	Deicer assy-ant	S2	1Ø-3W-115 vac
W133	Rad set NPRSB	J12	Deicer assy-ant	T1	1Ø-3W-115 vac
W134	Rad set NPRSB	J13	Deicer assy-ant	T2	1Ø-3W-115 vac
W135	Rad set NPRSB	J14	Deicer assy-ant	U1	1Ø-3W-115 vac
W136	Rad set NPRSB	J15	Deicer assy-ant	U2	1Ø-3W-115 vac
W137	Rad set NPRSB	J16	Deicer assy-ant	V1	1Ø-3W-115 vac
W138	Rad set NPRSB	J17	Deicer assy-ant	V2	1Ø-3W-115 vac
W139	Rad set NPRSB	J18	Deicer assy-ant	W1	1Ø-3W-115 vac
W140	Rad set NPRSB	J19	Deicer assy-ant	W2	1Ø-3W-115 vac
W141	Rad set NPRSB	J20	Deicer assy-ant	X1	1Ø-3W-115 vac
W142	Rad set NPRSB	J21	Deicer assy-ant	X2	1Ø-3W-115 vac
W143	Rad set NPRSC	J6	Deicer assy-ant	Y1	1Ø-3W-115 vac
W144	Rad set NPRSC	J7	Deicer assy-ant	Y2	1Ø-3W-115 vac
W145	Rad set NPRSC	J8	Deicer assy-ant	Z1	1Ø-3W-115 vac
W146	Rad set NPRSC	J9	Deicer assy-ant	Z2	1Ø-3W-115 vac

[a]See footnotes at end of chart

ET-A Site Cabllng[a] (cont)

Cable no.	From		To		Function
	Unit	Conn	Unit	Conn	
W147	Rad set NPRSC	J10	Deicer assy-ant	AA1	1Ø-3W-115 vac
W148	Rad set NPRSC	J11	Deicer assy-ant	AA2	1Ø-3W-115 vac
W149	Rad set NPRSC	J12	Deicer assy-ant	BB1	1Ø-3W-115 vac
W150	Rad set NPRSC	J13	Deicer assy-ant	BB2	1Ø-3W-115 vac
W151	Rad set NPRSC	J14	Deicer assy-ant	CC1	1Ø-3W-115 vac
W152	Rad set NPRSC	J15	Deicer assy-ant	CC2	1Ø-3W-115 vac
W153	Rad set NPRSC	J16	Deicer assy-ant	DD1	1Ø-3W-115 vac
W154	Rad set NPRSC	J17	Deicer assy-ant	DD2	1Ø-3W-115 vac
W155	Rad set NPRSC	J18	Deicer assy-ant	EE1	1Ø-3W-115 vac
W156	Rad set NPRSC	J19	Deicer assy-ant	EE2	1Ø-3W-115 vac
W157	Rad set NPRSC	J20	Deicer assy-ant	FF1	1Ø-3W-115 vac
W158	Rad set NPRSC	J21	Deicer assy-ant	FF2	1Ø-3W-115 vac
W159					Not used
W160					Not used
W161					Not used
W162					Not used
W163					Not used
W164					Not used
W165					Not used
W166					Not used
W167					Not used
W168					Not used
W169					Not used
W170					Not used
W171					Not used
W172					Not used
W173					Not used
W174					Not used
W175					Not used
W176					Not used
W177					Not used

[a]See footnotes at end of chart

ET-A Site Cabling[a] (cont)

Cable no.	From		To		Function
	Unit	Conn	Unit	Conn	
W178					Not used
W179					Not used
W180					Not used
W181					Not used
W182					Not used
W183					Not used
W184					Not used
W185					Not used
W186					Not used
W187					Not used
W188					Not used
W189					Not used
W190					Not used
W191	8883 Disp frame (L)	J1	120 vac, 1Ø-3W 600 w		Cooling fans 120 vac
W192	7660 Disp frame (C)	J1	120 vac, 1Ø-3W 600 w		Cooling fans 120 vac
W193	8883 Disp frame (R)	J1	120 vac, 1Ø-3W 600 w		Cooling fans
W194					Not used
W195					Not used
W196					Not used
W197					Not used
W198					Not used
W199					Not used
W200	Radio set RSA	J14	Tower lt cont assy		1Ø-3W-115 vac
W351	6284 Maint cont ckt	J1	AC source		1Ø-3W-115 vac
W352	6284 Maint cont ckt	J2	6060 Radio set RSA	J11	Trk ow/remote alm
W353	6284 Maint cont ckt	J3	Twr ltg cont box		Twr light alm
W354	6284 Maint cont ckt	J4			Spare
W355					Not used
W356					Not used
W357					Not used

[a]See footnotes at end of chart

ET- A Site Cabling[a] (cont)

Cable no.	From		To		Function
	Unit	Conn	Unit	Conn	
W358					Not used
W359					Not used
W360					Not used
W361					Not used
W362					Not used
W363					Not used
W364					Not used
W365					Not used
W366					Not used
W367					Not used
W368					Not used
W369					Not used
W370					Not used
W371					Not used
W372					Not used
W373					Not used
W374					Not used
W375					Not used
W376					Not used
W377					Not used
W378					Not used
W379					Not used
W380					Not used
W381					Not used
W382					Not used
W383					Not used
W384					Not used
W385					Not used
W386					Not used
W387					Not used
W388					Not used
W389					Not used

[a]See footnotes at end of chart.

ET-A Site Cabling[a] (cont)

Cable no.	From		To		Function
	Unit	Conn	Unit	Conn	
W390					Not used
W391					Not used
W392					Not used
W393					Not used
W394					Not used
W395					Not used
W396					Not used
W397					Not used
W398					Not used
W399					Not used
W400					Not used
W401	6060 Rad set RSA	J12	7895 Trib term set	J1	Aud line/remote alm
W402	6060 Rad set RSA	J12	5973 Tel & sig unit	J2	Aud line/remote alm
W403	5973 Tel & sig unit	J1	AC source		1Ø-3W-115 vac
W404					Not used
W405					Not used
W406					Not used
W407					Not used
W408					Not used
W409					Not used
W410					Not used
W411	6060 Rad set RSA	J12	Cable junction A		Aud line/remote alm
W412	Cable junction A		7895 Trib cabt	J1	Aud line/remote alm
W413					Not used
W414					Not used
W415					Not used
W416					Not used
W417					Not used
W418					Not used
W419					Not used
W420					Not used
W421	6060 Rad set RSA	J12	Cable junction A		Aud line/remote alm

[a]See footnotes at end of chart.

ET-A Site Cabling[a] (cont)

Cable no.	From		To		Function
	Unit	Conn	Unit	Conn	
W422	Cable junction A		Cable junction B		Aud line/remote alm
W423	Cable junction B		7895 Trib cab	J1	Aud line/remote alm
W424					Not used
W425					Not used
W426					Not used
W427					Not used
W428					Not used
W429					Not used
W430					Not used
W431	6060 Rad set RSA		Cable junction A		Aud line/remote alm
W432	Cable junction A		Cable junction B		Aud line/remote alm
W433	Cable junction B		Cable junction C		Aud line/remote alm
W434	Cable junction C		7895 Trib cab		Aud line/remote alm
W435					Not used
W436					Not used
W437					Not used
W438					Not used
W439					Not used
W440					Not used
W441					Not used
W442					Not used
W443					Not used
W444					Not used
W445					Not used
W446					Not used
W447					Not used
W448					Not used
W449					Not used
W450					Not used
W451	7895 Trib cab	J2	7658 Trib contr unit	J2	Audio
W452	7895 Trib cab	J3	7658 Trib contr unit	J3	Audio

[a]See footnotes at end of chart.

ET-A Site Cabling[a] (cont)

Cable no.	From		To		Function
	Unit	Conn	Unit	Conn	
W453	7895 Trib cab	J4	7658 Trib contr unit	J1	Signal
W454	7895 Trib cab	J5	AC source		1Ø-3W-115 vac
W455					Not used
W456					Not used
W457					Not used
W458					Not used
W459					Not used
W460					Not used
W461					Not used
W462					Not used
W463					Not used
W464					Not used
W465					Not used
W466					Not used
W467					Not used
W468					Not used
W469					Not used
W470					Not used
W471					Not used
W472					Not used
W473					Not used
W474					Not used
W475					Not used
W476					Not used
W477					Not used
W478					Not used
W479					Not used
W480					Not used
W481					Not used
W482					Not used
W483					Not used
W484					Not used

[a]See footnotes at end of chart.

ET-A Site Cabling[a] (cont)

Cable no.	From		To		Function
	Unit	Conn	Unit	Conn	
W485					Not used
W486					Not used
W487					Not used
W488					Not used
W489					Not used
W490					Not used
W491					Not used
W492					Not used
W493					Not used
W494					Not used
W495					Not used
W496					Not used
W497					Not used
W498					Not used
W499					Not used
W500					Not used

[a]This chart includes abbreviations defined below

NPRS	Nodal point radio set
CRE	Console Remote Equipment
CLE	Console Local Equipment
COC	Console Operations Center
TRK OW ALM	Trunk order wire alarm

CHAPTER 4

MAINTENANCE

10. Preventive Maintenance

Preventive maintenance is work which is performed on equipment to keep it in good working condition so that interruptions in service are kept to a minimum. Preventive maintenance differs from troubleshooting and repair in that its object is to prevent trouble from occurring.

a. Equipment Required. The following chart lists test equipment and supplies required to perform preventive and corrective maintenance procedures on site cabling and waveguide connections.

Item	Description
Multitester	Multimeter TS-352/U
Insulation tester	James Biddle Insulation tester, Model 805 or equivalent
Brushes	Soft, bristle
Cloth	Clean, lint-free
Sandpaper	Number 000

b. Preventive Maintenance Procedures. Preventive maintenance of cabling and waveguide runs should be performed at scheduled Intervals. Make sure that the scheduled maintenance procedures will not conflict with the operation of the site. Periods of maintenance should be scheduled when traffic loads are lightest.

Warning Make certain that the power is turned off when performing maintenance on electrical plugs and connectors.

c. Performing Scheduled Maintenance.

Warning - The cleaning compound used in (1) below is inflammable and its fumes are toxic Provide adequate vential-tion and do not apply compound in vicinity of a flame.

(1) Use a clean, dry lint-free cloth such as cheese cloth, or a dry brush for cleaning plugs, parts or connectors. If necessary, moisten the cloth or brush with cleaning compound FSN 7930-395-9542, and then wipe the parts dry with a cloth

(2) Check plugs and connectors for tightness. Tighten ground clamp connections and plugs where necessary. Look for damage to plugs or connectors, also see that wires and cables are not frayed. Wires

and cables should be installed with sufficient slack in their length to allow for the effects of expansion and contraction due to temperature changes. Check for evidence of moisture in plugs, connectors, wire conducts, or places where the effects of moisture may cause deterioration.

(3) Check waveguide sections for damage such as dents, cracks, or corrosion. Make sure that waveguide Joints are securely fastened together by checking the nuts or screws with a small wrench and screwdriver. See that the waveguide is held in place firmly by the mounting clamps. (Vibration caused by the wind may cause cracks in the waveguide sections or damage to the seals, resulting in the loss of pressurizaiton.)

11. Troubleshooting and Corrective Action

a. General. Electrical cables or waveguides may be damaged by extreme heat or cold, fungus, insects, accidents, lighting, or overloads. To minimize down time at a radio site, prompt and efficient troubleshooting procedures and corrective action is necessary. Refer to the appropriate manual (see preface) for troubleshooting equipment at a specific site.

b. Cable Troubleshooting. The equipment used in troubleshooting cables are listed in the chart in paragraph 10a. Most defects in site cabling are indicated by the automatic alarm system. Reference to the cabling tables or to the site as-built drawings will provide the cable number and location. Cable numbers are stamped or marked on bands which are permanently fastened around the cable and located near the connector ends. Specific cable troubleshooting information IS given in (1) through (3), below.

(1) Loss of signal. This is usually caused by a poor connection at the plug or socket or by wires which have become either partially or totally shorted. With power disconnected, remove cable from both ends of the circuit and use an ohmmeter to make continuity checks between the pins or connectors on each end of the cable. At the same time, check each wire for a possible short (if applicable) to the other wires, or to the outside shield wire,

(2) Excessive hum. This is usually caused by ground connections which have either broken off or developed high resistance. Check all ground connections for low-resistance continuity.

(3) Loss of rf. Rf cables may become shorted, or partially shorted. Remove and inspect plugs and connectors from both ends of the cable (with power disconnected). Use an ohmmeter for continuity checks; use an insulation tester for leakage tests. For leakage tests, connect the insulation tester between the center conductor and the outside shield of the cable. With both ends of the cable disconnected, the insulation tester should indicate a resistance of at least 5 megohms. Using the ohmmeter, check for continuity between sections in the shielding throughout the entire length of the cable. (The shielding may be broken somewhere unseen between the two ends.) Corrosion may cause damage to the rf plugs. Clean connectors and pins with no. 000 sandpaper if necessary. Wash off residue and corrosion with cleaning solution and dry carefully before reassembling. Recheck the rf cable with the insulation tester after reassembly to ensure the lowest possible leakage.

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TOAD (14)
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Sig FLDMS (1)
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USAERDAW (1)
Units org under fol TOE None

NG None

USAR None

For explanation of abbreviations used see, AR 310-50

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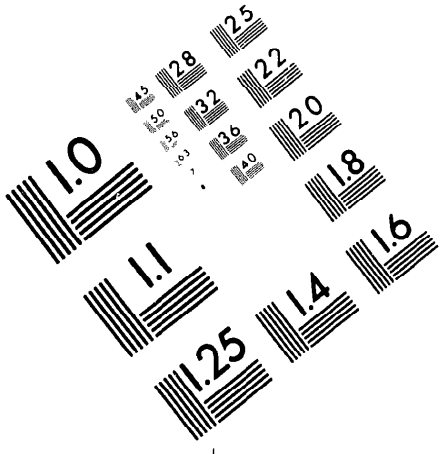

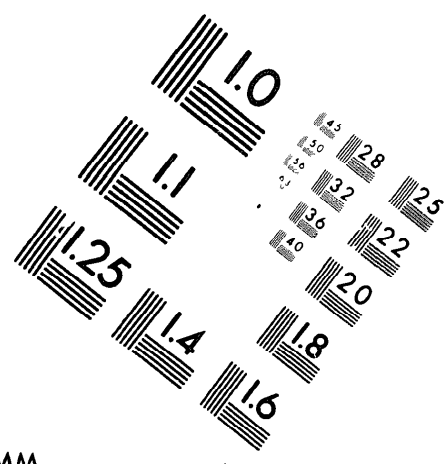

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abcdefghijklmnopqrstuvwxyz$¢£ %# ½ ¼ ¾ —=+ ×&@

1 5 mm (e= 1 09 mm)

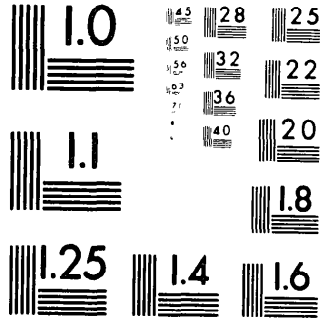
ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
abcdefghijklmnopqrstuvwxyz$¢£/%# ½ ¼ ¾ —=+ ×&@*

2 0 mm (e= 1 37 mm)

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890$¢£/%# ½ ¼ ¾ —=+ ×&@*

2.5 mm (e= 1 77 mm)

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890$¢£/%# ½ ¼ ¾ —=+ ×&@*



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1 5 mm (e= 1 09 mm)

ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
abcdefghijklmnopqrstuvwxyz$¢£/%# ½ ¼ ¾ —=+ ×&@*

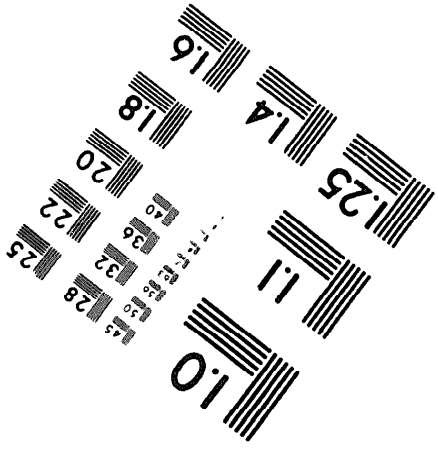
2 0 mm (e= 1 37 mm)

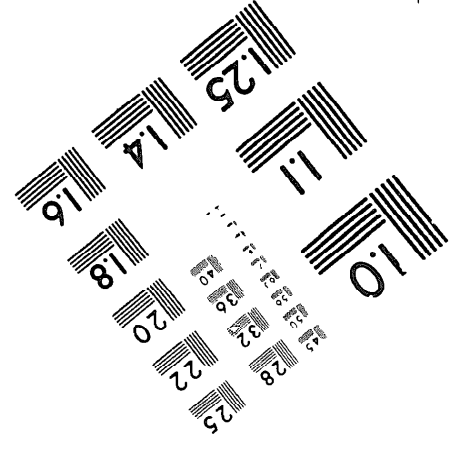
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890$¢£/%# ½ ¼ ¾ —=+ ×&@*

2 5 mm (e= 1 77 mm)

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890$¢£/%# ½ ¼ ¾ —=+ ×&@*

200 MM





250 MM