

PROJECT SHEET  
DISTANT COMMUNICATIONS AND WARNING SYSTEMS  
PROJECT 660  
TRANSMISSION ENGINEERING Eastern AREA

DATE ISSUED <b>DECEMBER/1959</b>	ISSUE NO. <b>1</b>	SERIAL NO. <b>EDE-16</b>
TITLE (TYPE OF EQPT, TYPE OF COMMUNICATIONS, NO. OF CHANNELS, ETC.) <b>HF Emergency Radio Communications System (2 to 30 mc.) and HF Disaster Radio System (5295 kc.) for use at DYE-1, DYE-2, DYE-3, and DYE-4.</b>		
PURPOSE (SHOW WHAT FUNCTION EQPT LISTED IN "TITLE" ABOVE WILL PERFORM) <b>The HF Emergency Radio Equipment will be used as an emergency communication facility at DYE-1, DYE-2, DYE-3, and DYE-4. It will also be available as an amateur radio station capable of operation in the 80, 40, 20, 15 and 10 meter amateur bands.</b>  <b>The HF Disaster Radio Equipment at DYE-1 and DYE-4 will consist of monitor receivers only. These will be used to continuously monitor the Ice Cap Sites (DYE-2 and DYE-3) on 5295 kc. The HF Disaster Equipment at DYE-2 and DYE-3 will consist of a Transmitter-Receiver operating on 5295 kc. This will be used in case of a disaster which causes failure of all other communication facilities.</b>		
REFERENCES (AUTHORIZATION FOR PROVISION OF SERVICE) <b>1 Systems Engineering Specification DE-10, Issue 2.</b>		
ASSOCIATE WITH (SYSTEM OR EQUIPMENT) <b>Control Console EDE-11</b>		
DISTRIBUTE COPIES TO: O. R. Richter R. B. Stecker (4) H. G. Miller P. W. Harrison R. A. Sidur (5) H. W. Albrecht W. V. Beaney J. B. Gardner M. O. Laird N. R. Weible C. W. Fink (3)		APPROVALS <i>R. J. Viano</i> DEPT. CHIEF <i>[Signature]</i> ASST. SUPT <i>[Signature]</i> SUPERINTENDENT NAME TITLE NAME TITLE NAME TITLE
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**TITLE**

HF Emergency Radio Communications System (2 to 30 mc.) and HF Disaster Radio System (5295 kc.) for use at DYE-1, DYE-2, DYE-3, and DYE-4.

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4	1	DYE-4	
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		Arrangement for DYE-2 and	
		DYE-3	
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		for DYE-1, DYE-2, DYE-3	
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**REVISION APPROVALS**

_____	_____
NAME	TITLE
_____	_____
NAME	TITLE
_____	_____
NAME	TITLE

## PROJECT SHEET - SUPPLEMENTARY PAGE \_\_\_\_\_

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1. SYSTEM REQUIREMENTS

1.1 Provide equipment for HF Emergency and HF Disaster Radio Communications as listed in Attachment A.

1.2 The following systems will be required:

a) HF Emergency Radio Communications System (2 to 30 mc.) at all sites.  
(For DYE-1 and DYE-4 refer to Attachments B, D to H)  
(For DYE-2 and DYE-3 refer to Attachments C, D and J)

b) HF Disaster Radio System (5295 kc)  
Provide disaster transmitter-receiver combinations at DYE-2 and DYE-3 only. (1 for DYE-2 and 1 for DYE-3) (Refer to Attachment K)  
Provide disaster monitor receivers at DYE-1 and DYE-4 only:  
(1 for DYE-1 and 1 for DYE-4) (Refer to Attachment K)

2. GENERAL

2.1 The disaster monitor receiver at DYE-1 will be used to continuously monitor DYE-2 on 5295 kc, and the disaster monitor receiver at DYE-4 will be used to continuously monitor DYE-3 on 5295 kc.

2.2 The disaster transmitter-receiver at DYE-2 will be used for communication with DYE-1, and the disaster transmitter-receiver at DYE-3 will be used for communication with DYE-4, on the frequency of 5295 kc, in case of disaster at the Ice Cap sites.

2.3 The disaster transmitter-receivers at DYE-2 and DYE-3 should be located in the Disaster Shelter at each of these sites. The antennas associated with this equipment should be mounted on the Disaster Shelter.

2.4 The emergency radio equipment (shown in Attachment B for DYE-1 and DYE-4, and in Attachment C for DYE-2 and DYE-3) should be located in a 10' x 10' shielded section of the LC room at each of the sites.

3. POWER REQUIREMENTS

3.1 HF Disaster Monitor Receivers (1 each at DYE-1 and DYE-4) require the following: 105-125 Volt, 50-60 cycle, single phase power source. Power Consumption of each receiver is 85 watts at 93% power factor.

3.2 HF Disaster Transmitter-Receivers (1 each at DYE-2 and DYE-3) require the following: 117 Volt, 50-60 cycle, single phase power source. Power Consumption of each Transmitter- Receiver is 175 watts in the receive condition; 175 watts in the standby condition; and 440 watts when transmitting.

3.3 HF Emergency Radio Transmitters (1 at each site-DYE-1, DYE-2, DYE-3, DYE-4) require the following: 115/230 Volt, 50-60 cycle, single phase power source. Power Consumption of each transmitter is 2600 watts at a power factor of .87 for Continuous Commercial service output. If it is desired to use a 208 volt AC source, it will be necessary to provide an aut -XFMR or equivalent for step-up to 230 volts.

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<b>3. <u>POWER REQUIREMENTS</u> (Cont'd)</b>		
3.4 HF Emergency Radio Receivers (1 at each site-DYE-1, DYE-2, DYE-3, DYE-4) require the following: 105-125 Volt, 50-60 Cycle, single phase power source. Power Consumption of <u>each</u> receiver is 90 watts.		
3.5 HF Emergency Transmitting Mode Selectors (1 at each site-DYE-1, DYE-2, DYE-3, DYE-4) require the following: 110/220 Volt, 50-60 Cycle, single phase power source. Power Consumption of <u>each</u> selector is 120 watts average, and 140 watts when the oven is on.		
3.6 HF Emergency Receiving Mode Selectors (1 at each site-DYE-1, DYE-2, DYE-3, DYE-4) require the following: 110/220 Volt, 50-60 Cycle, single phase power source. Power Consumption of <u>each</u> selector is 65 watts.		
3.7 HF Emergency Remote Control Amplifiers (1 at each site-DYE-1, DYE-2, DYE-3, DYE-4) require the following: 110/220 Volt, 50-60 Cycle, single phase power source. Power Consumption of <u>each</u> amplifier is 50 watts.		
<b>4. <u>ANTENNAS AND RF TRANSMISSION LINES</u></b>		
4.1 At the Ice Cap Sites (DYE-2 and DYE-3) the following antennas and associated equipment will be required at <u>each</u> site:		
Two Navy type 66047 Whip Antennas (35 foot, 5 section antennas). One of these antennas will be used for the HF Emergency Radio System, and the other will be used for the HF Disaster System.		
a) The antenna for the Emergency System should be mounted on Navy type 61350 Feedthrough Insulator, on the South side wall of the composite building at each site (DYE-2 and DYE-3). This will permit optimum East-West transmission. The HF Emergency antenna should be connected to the remotely controlled RF tuner (part of antenna Tuning System ATS) with RG-10A/U Coaxial Cable. (Refer to Attachment J).		
b) The antenna for the Disaster System should be mounted on Navy type 61350 Feedthrough Insulator, on the roof of the Disaster Shelter at each site (DYE-2 and DYE-3). The roof of this shelter is metal, and the metal sections of the roof should be bonded together at intervals less than five feet. ( $1/10$ wave-length at 5295 kc). This will permit use of the roof as an effective counterpoise for the disaster whip antenna. The antenna should be connected to the disaster transmitter-receiver with RG-10A/U coaxial cable. (Refer to Attachment K).		

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4 ANTENNAS AND RF TRANSMISSION LINES (Cont'd)

4.2 At DYE-1 and DYE-4 the following antennas and associated equipment will be required at each site:

- a) One horizontal, center-fed, multiband antenna for the Emergency Radio System. This consists of 8 elements which are calculated for optimum performance on the 80, 40, 20, and 15 meter bands, and on the disaster frequency of 5295 kc. The antenna is connected to the balanced output terminals of the TAC Antenna Tuning Unit with two RG-17A/U coaxial cables. (Refer to Attachment H for antenna details and connections.) This antenna should be mounted on poles for a height of approximately 50 feet above the ground. The antenna should be oriented so that the axis along the length of the wire is 25° West of North at DYE-1, and is directly North at DYE-4.
- b) One rotary beam antenna for the Emergency Radio System. This consists of a 3 element, 20 meter Yagi array, and a 3 element, 10 meter Yagi array, both mounted on a common mast. Each array is connected with RG-8A/U coaxial cable through separate baluns to the emergency equipment. (Refer to Attachments E, F, G.) The antenna is rotated by a rotator which consists of a motor and gear box assembly. Control of the rotator is by use of a control box which includes a switch and an antenna position indicator.
- c) One vertical, end-fed,  $\frac{1}{4}$  wave antenna for the Disaster Monitor Receiving System. This will consist of a vertical wire  $44\frac{1}{2}$  feet long ( $\frac{1}{4}$  wave at 5295 kc), located near the garage. This will be connected through a TMC antenna connector A-1125 to the disaster monitor receiver with RG-8A/U Coaxial Cable. (Refer to Attachment K). A counterpoise is required and should consist of 32 radials each 50 feet long (from the center).

4.3 At DYE-1 and DYE-4 the HF Emergency multi-band antenna, and the rotary beam 10 meter and 20 meter arrays should be connected into an antenna patch panel. This will permit the connection of any of these antennas to the Emergency equipment, and will allow complete versatility. (Refer to Attachment-D for details)

EQUIPMENT LIST

The following equipment is required for the HF Emergency Radio Communications System (2 to 30 mc.):

		<u>DYE</u> <u>1</u>	<u>DYE</u> <u>2</u>	<u>DYE</u> <u>3</u>	<u>DYE</u> <u>4</u>
Radio Transmitter**	TMC Model GPT-750(B)-2	1	1	1	1
Consisting of:					
Master Oscillator-RF Amplifier	Model RTF-2	1	1	1	1
Radio Transmitter Modulator	Model RTM-2	1	1	1	1
Radio Transmitter Power Supply	Model RTP-2	1	1	1	1
Modulator; Power Supply Group	TMC Model SBE-2	1	1	1	1
Consisting of:					
Transmitting Mode Selector		1	1	1	1
Power Supply Group		1	1	1	1
Console	TMC Model CON-4-FC-R	1	1	1	1
Remote Control Amplifier	TMC Model RTC	1	1	1	1
Loudspeaker	TMC Model LSP-1	1	1	1	1
Receiving Mode Selector	TMC Model MSR-4	1	1	1	1
Communications Receiver	TMC Model GPR-90	1	1	1	1
Antenna Tuning Unit	TMC Model TAC	1	0	0	1
Antenna Tuning System	TMC Model ATS-70-2	0	1	1	0
Consisting of:					
RF Tuner, Remotely Controlled	ATS-70TU-2	0	1	1	0
Control Monitor	ATS-MCU-2	0	1	1	0
Standing Wave Coupling Unit	ATS-70CU-2	0	1	1	0
Remote Control Cable (Control Monitor to RF Tuner)	TMC No. CA-359-X*	0	1	1	0
35' Whip Antenna***	Navy Type 66047	0	1	1	0
Feedthrough Insulator***	Navy Type 61350	0	1	1	0
HF Emergency Multiband Antenna (Horizontal, 1/2 wave, center-fed dipole)		1	0	0	1
Antenna Assembly, Rotary Beam	Telrex Package No. WE-X100	1	0	0	1
Consisting of:					
Array WE-10M-3-A		1	0	0	1
Array WE-503-A		1	0	0	1
Hardware Kit WE-SPX-200		1	0	0	1
Rotator and Indicator Assembly R-200		1	0	0	1
Steel Mast 16 ft. long; 2 in. O.D.		1	0	0	1

\* X indicates length in feet. Specify when ordering cable.

\*\* Radio Transmitters at DYE-1 and DYE-4 only, should be equipped with crystals for operation on 5295 kc. on 2 channels in each transmitter.

\*\*\* Additional Antenna and Insulator listed under "Disaster Eqpt."

EQUIPMENT LIST (Cont'd)

DYE   DYE   DYE   DYE  
1   2   3   4

The following equipment is required for the HF Disaster Radio System (5295 kc):

Monitor Receiver	Collins 51N-2B modified (Collins #522-0213-043)	1	0	0	1
e/w 3.1 kc Mechanical Filter					
e/w Crystal for operation on 5295 kc.					

Transmitter-Receiver	Kaar Model 117TR222A Radio-Telephone	0	1	1	0
e/w Microphone, power supply, and interconnecting cables					
e/w <u>Crystals</u> for the following channel operation:					

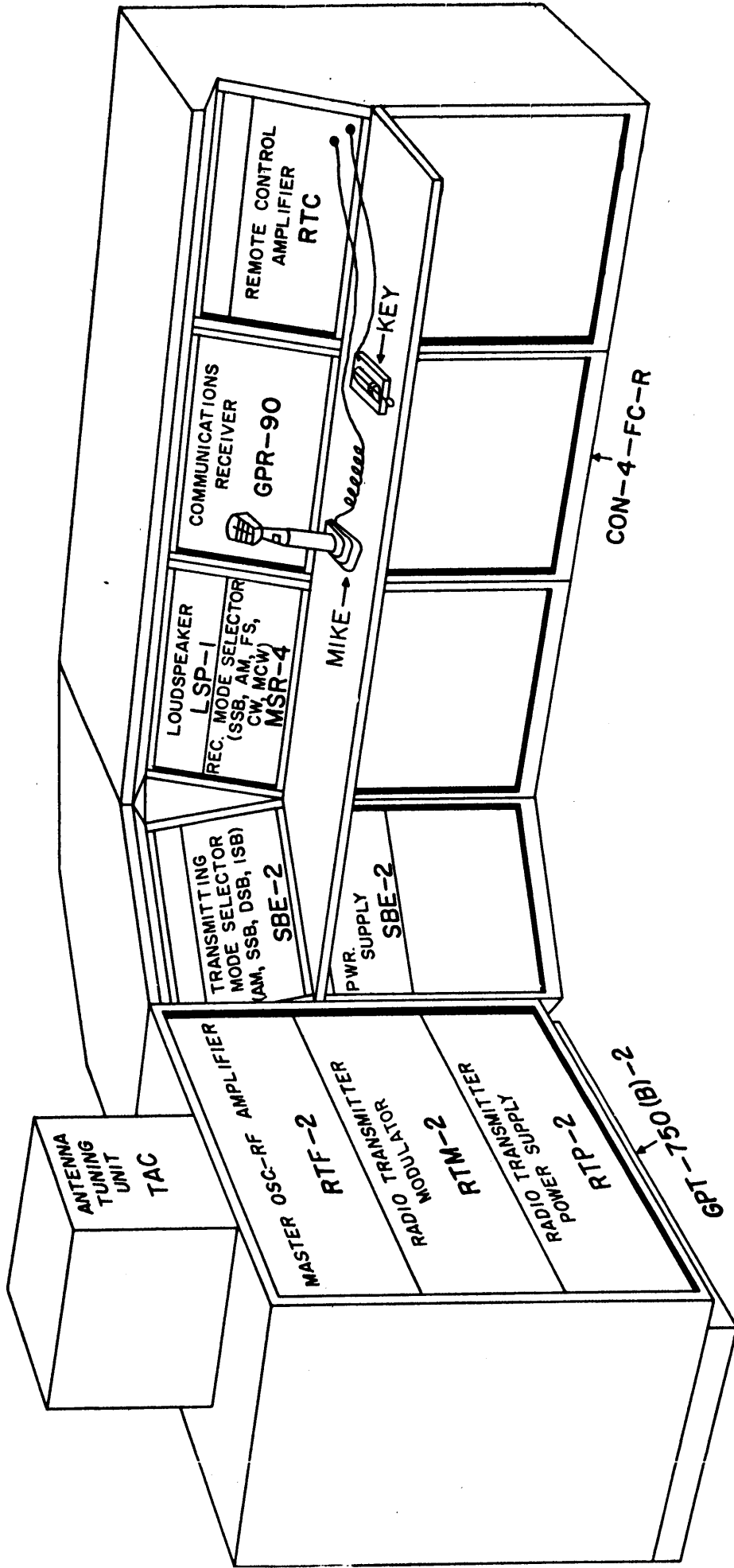
<u>CHANNEL</u>	<u>OPERATING FREQ-KCS</u>	
<u>NUMBER</u>	<u>XMTG &amp; RCVG</u>	
1	5295	DISASTER
2	5295	DISASTER
3	3023.5	HF-A/G DISTRESS

**NOTE:** THE TWO 5295 KC CHANNELS SHOULD BE DESIGNATED "DISASTER CHAN" WHILE THE 3023.5 KC CHANNEL DESIGNATION SHOULD BE "HF-A/G DISTRESS".

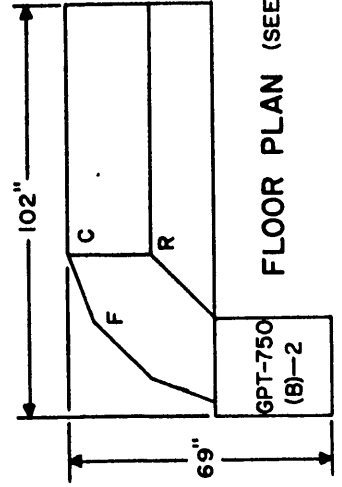
IF POSSIBLE, AN ARRANGEMENT FOR PREVENTING ACCIDENTAL SWITCHING INTO UNEQUIPPED CHANNEL POSITIONS SHOULD BE PROVIDED.

Vertical, 1/4 Wave, End-fed Antenna	1	0	0	1
Antenna Connector	1	0	0	1
35' Whip Antenna #	0	1	1	0
Feedthrough Insulator #	0	1	1	0

#Additional Antenna and Insulator listed under "Emergency Eqpt".



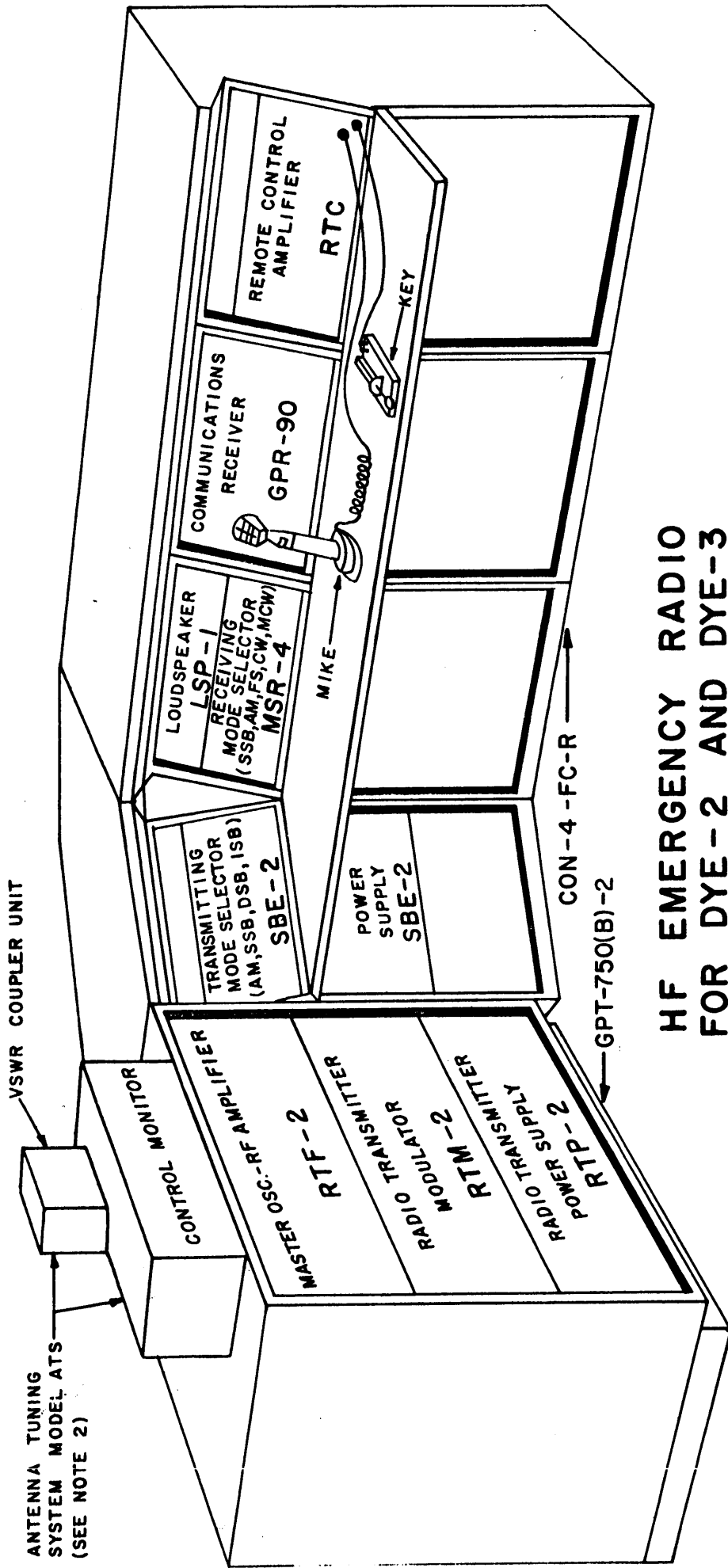
## HF EMERGENCY RADIO FOR DYE-I AND DYE-4



FLOOR PLAN (SEE NOTE 1)

NOTE 1. CONSOLE IS LOCATED IN 10' X 10' SHIELDED SECTION OF LC ROOM.

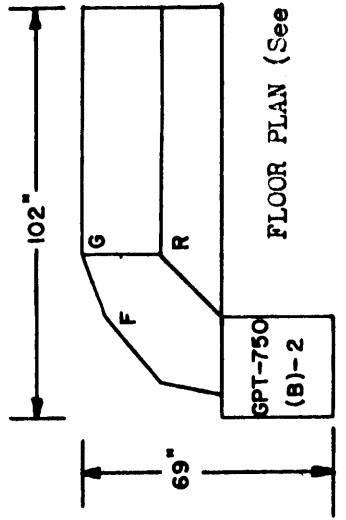




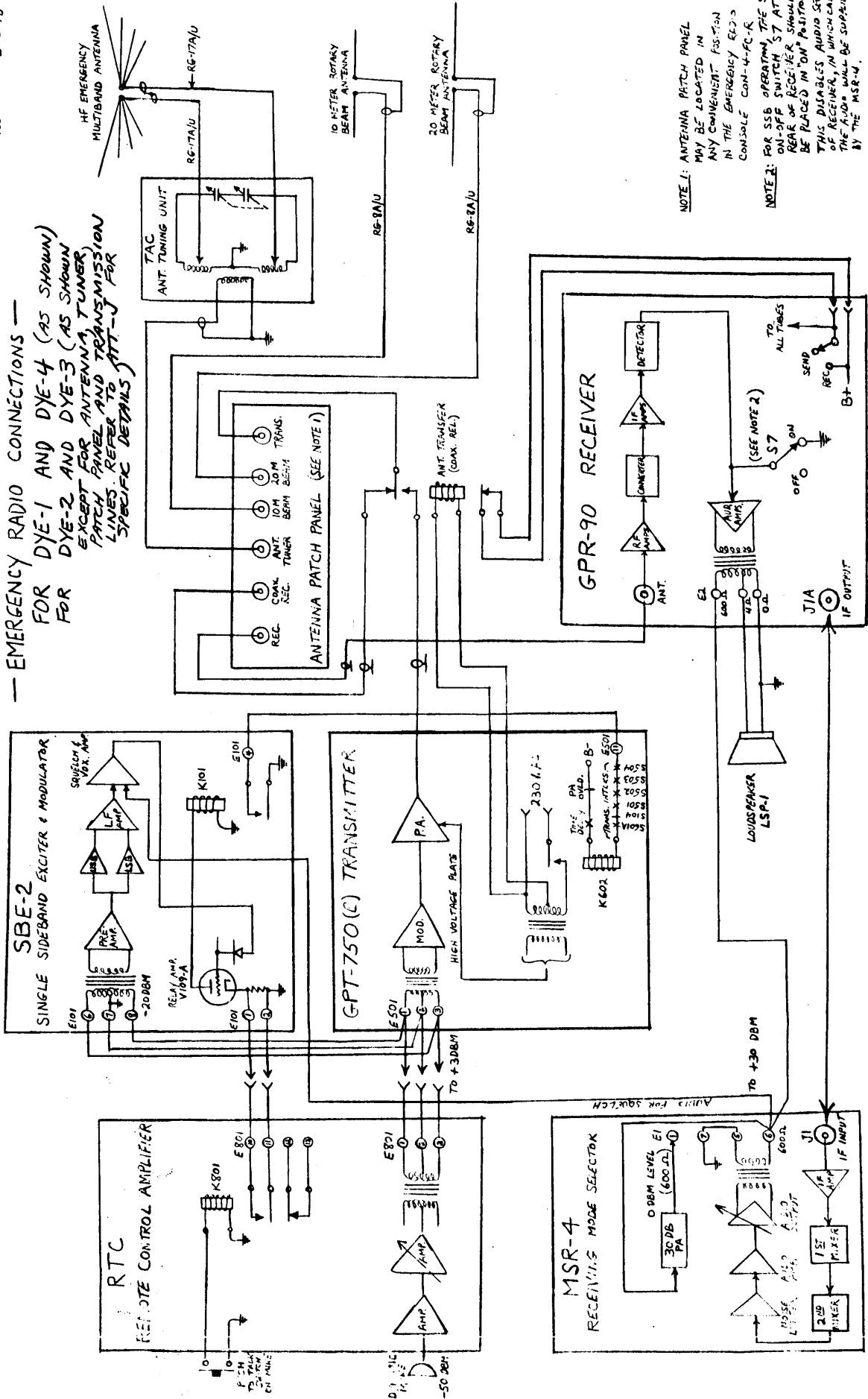
## HF EMERGENCY RADIO FOR DYE-2 AND DYE-3

**NOTES:**

1. CONSOLE IS LOCATED IN SHIELDED 10'x10' SECTION OF LC ROOM.
2. REMOTELY CONTROLLED RF TUNER, WHICH IS PART OF MODEL ATS, IS LOCATED ON THE WALL (INSIDE BUILDING) NEAR THE 35' WHIP ANTENNA WHICH IS MOUNTED ON WALL (OUTSIDE THE BUILDING.)

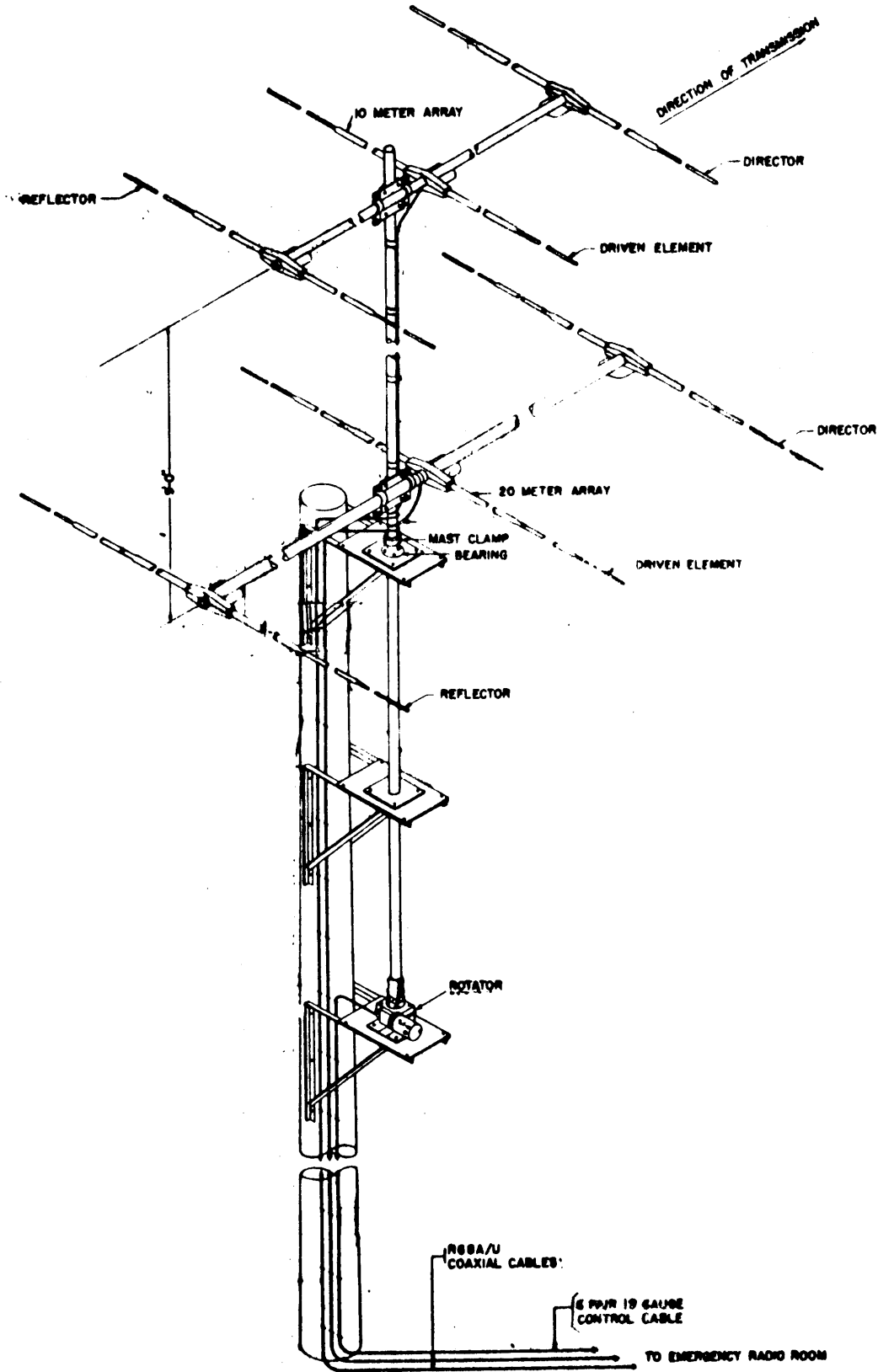


— EMERGENCY RADIO CONNECTIONS —  
FOR DYE-1 AND DYE-4 (AS SHOWN)  
FOR DYE-2 AND DYE-3 (AS SHOWN)  
EXCEPT FOR ANTENNA, TUNER  
PATCH PANEL AND TRANSMISSION  
LINES REFER TO ATT-J FOR  
SPECIFIC DETAILS

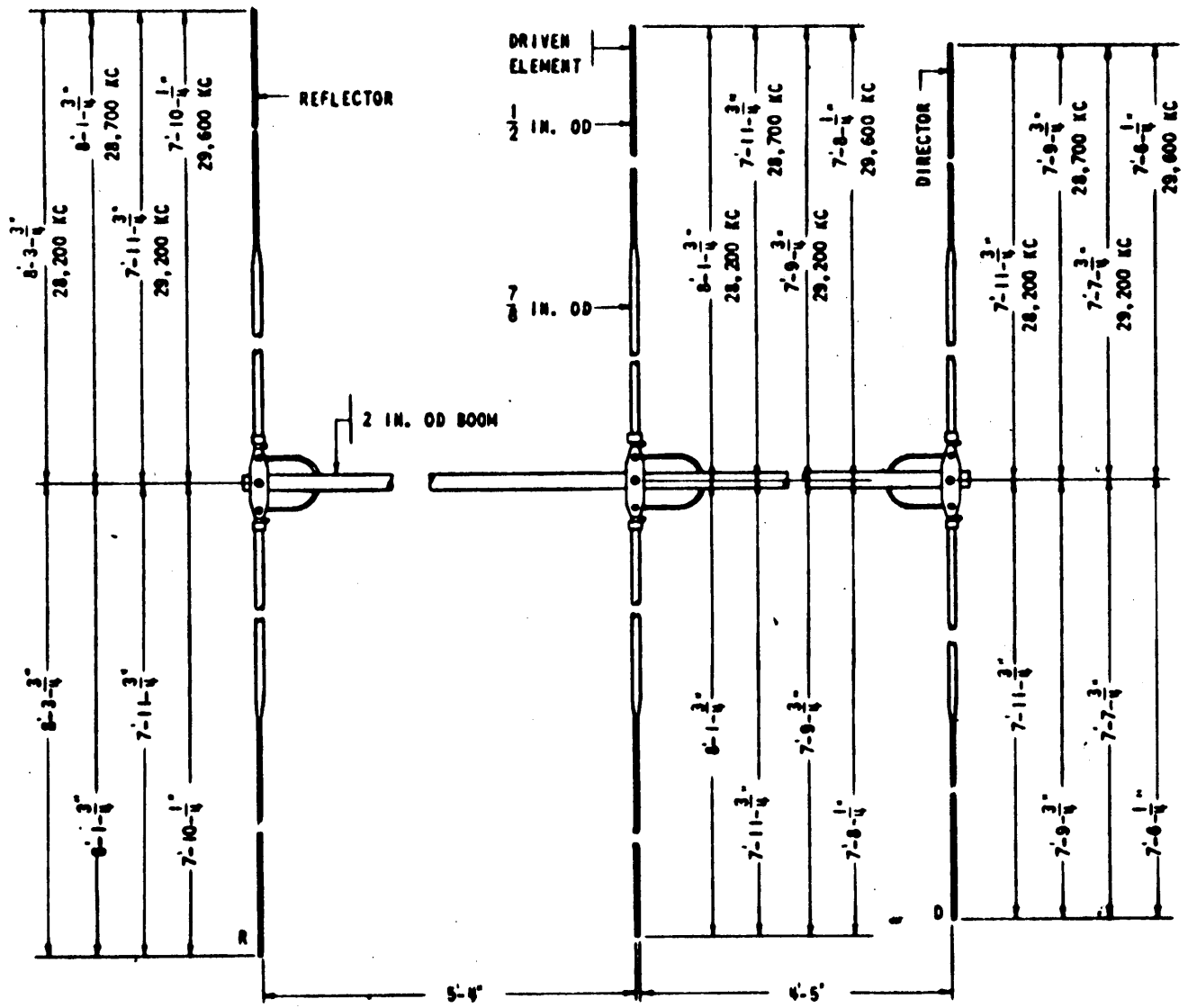


NOTE 1: ANTENNA PATCH PANEL MAY BE LOCATED IN ANY CONVENIENT POSITION IN THE EMERGENCY EDC-3 CONSOLE CON-4-PC-R

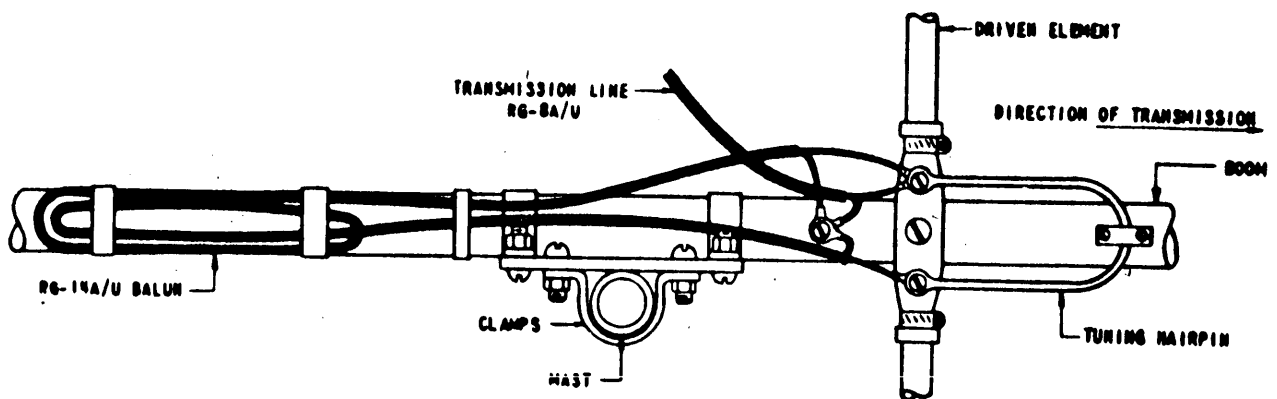
NOTE 2: FOR SSB OPERATION, THE SSB ON-OFF SWITCH S7 AT REAR OF RECEIVER SHOULD BE PLACED IN "ON" POSITION. THIS DISABLES AUDIO SECTION OF RECEIVER, IN WHICH CASE THE AUDIO WILL BE SUPPLIED BY THE MSR-4.



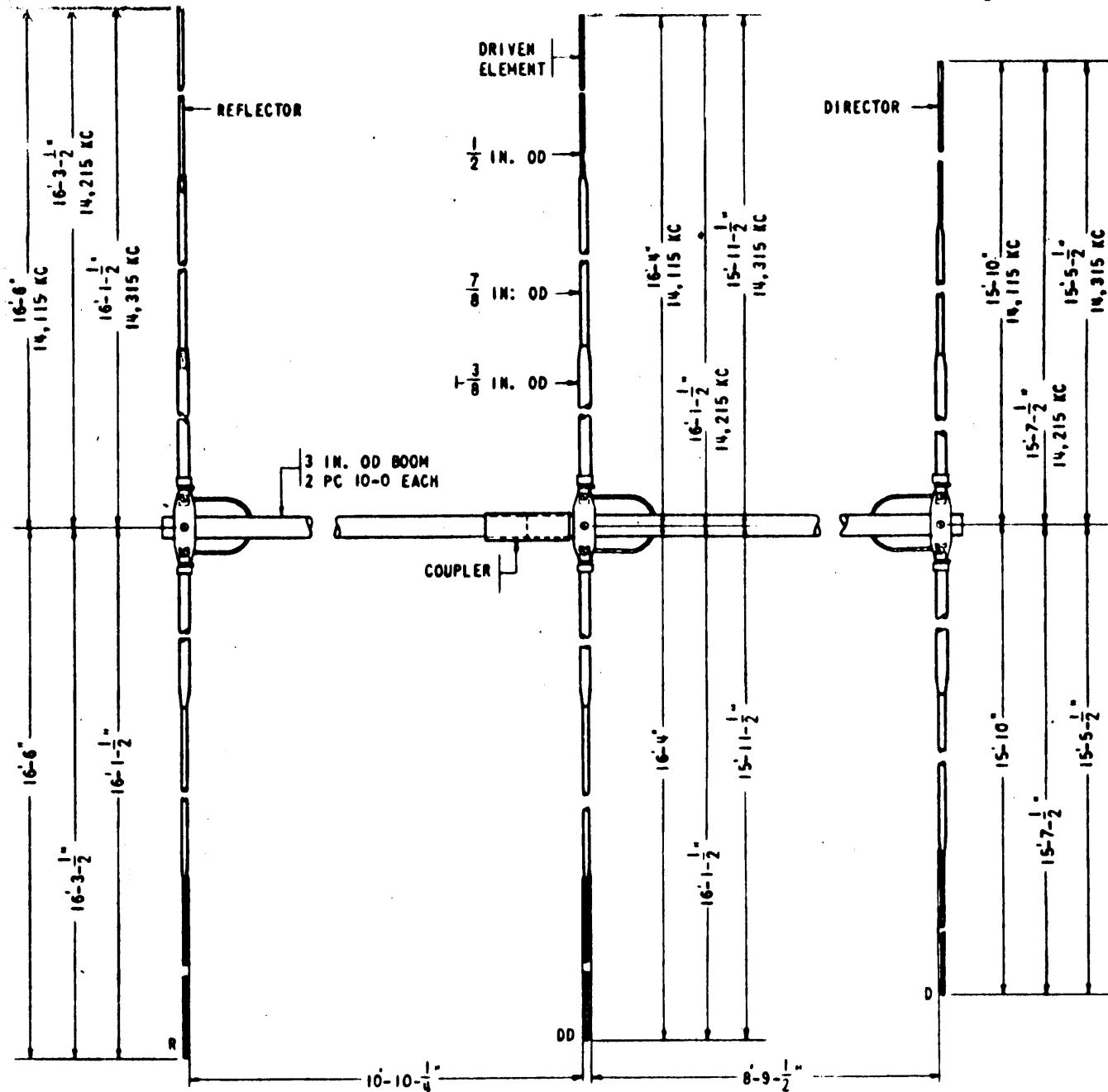
Details of Emergency Rotary Beam Antenna  
FOR DYE-1 AND DYE-4



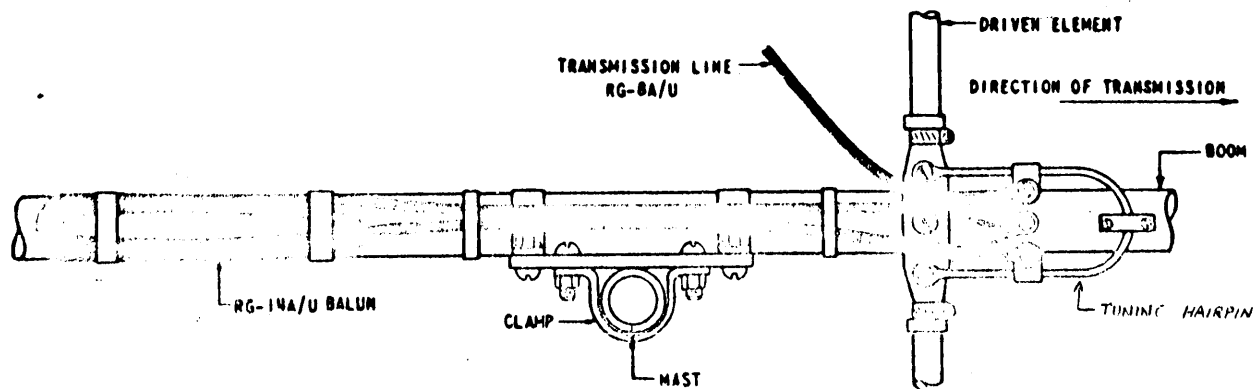
ELEMENT LENGTHS OF 10 METER ARRAY FOR DYE-1 AND DYE-4



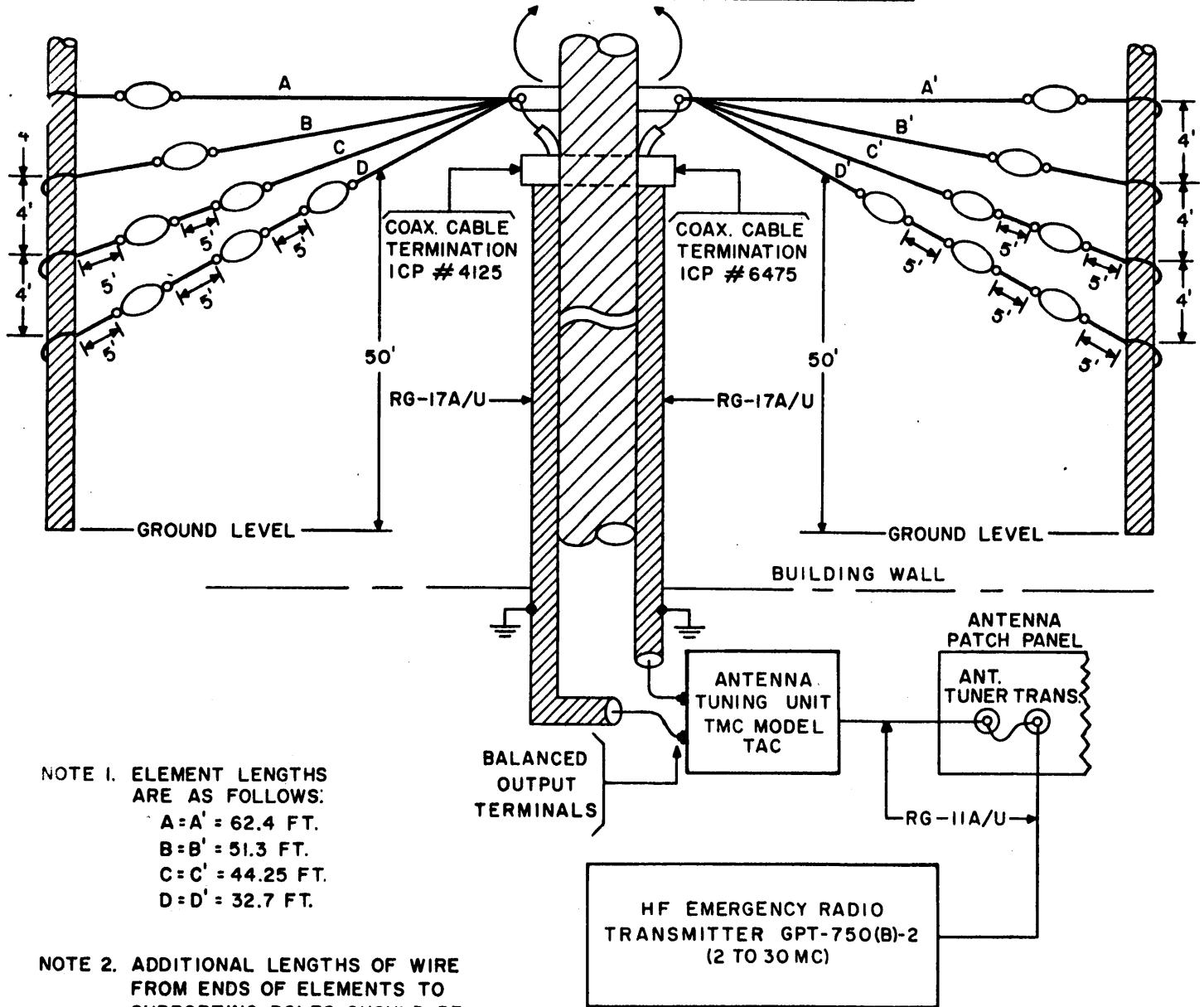
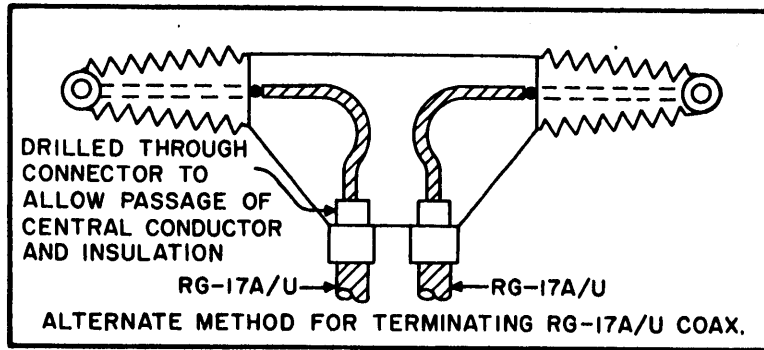
BALUN HOOKUP ON 10 METER ARRAY FOR DYE-1 AND DYE-4



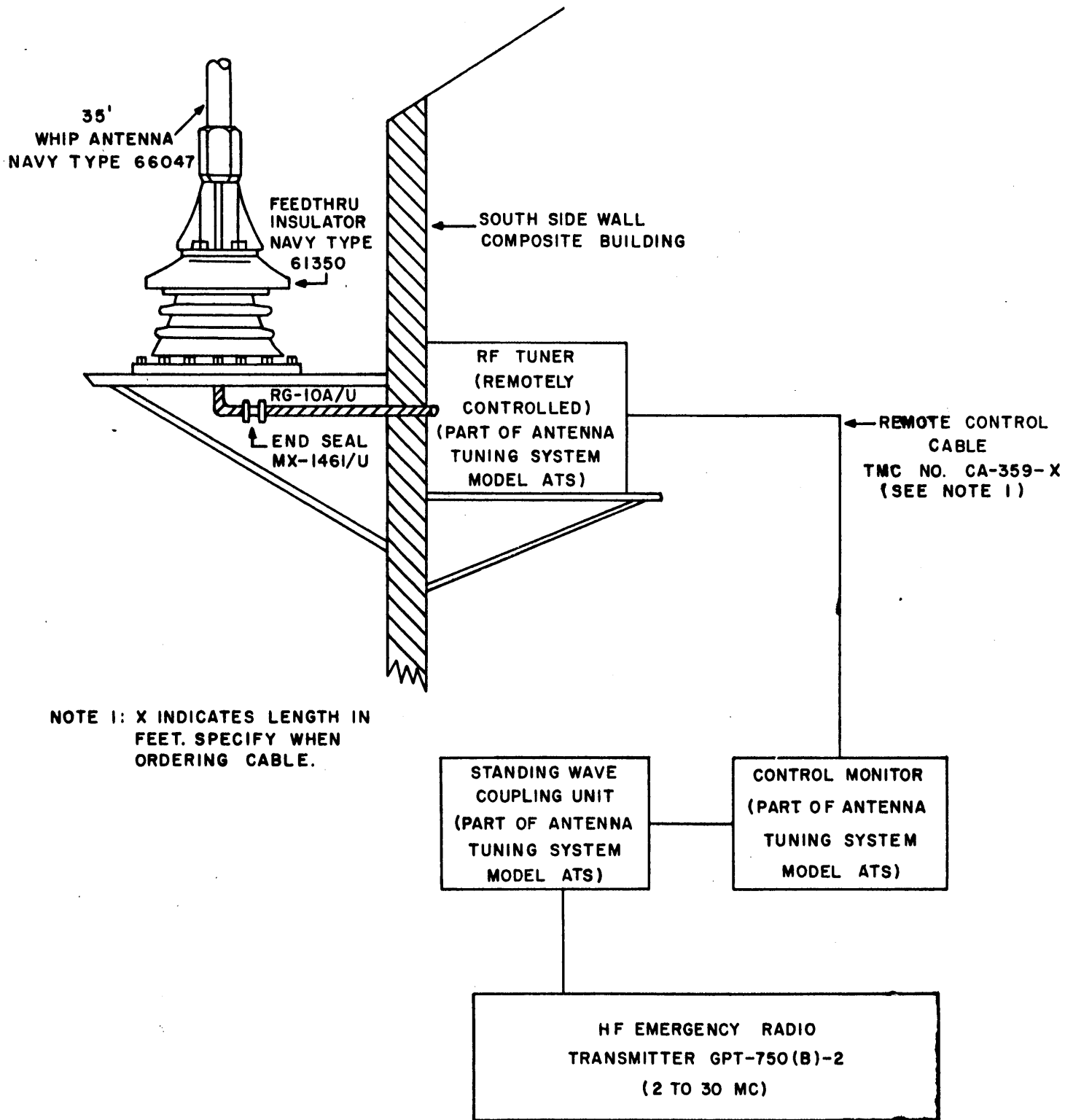
ELEMENT LENGTHS OF 20 METER ARRAY FOR DYE-1 AND DYE-4



BALUN HOOKUP ON 20 METER ARRAY FOR DYE-1 AND DYE-4

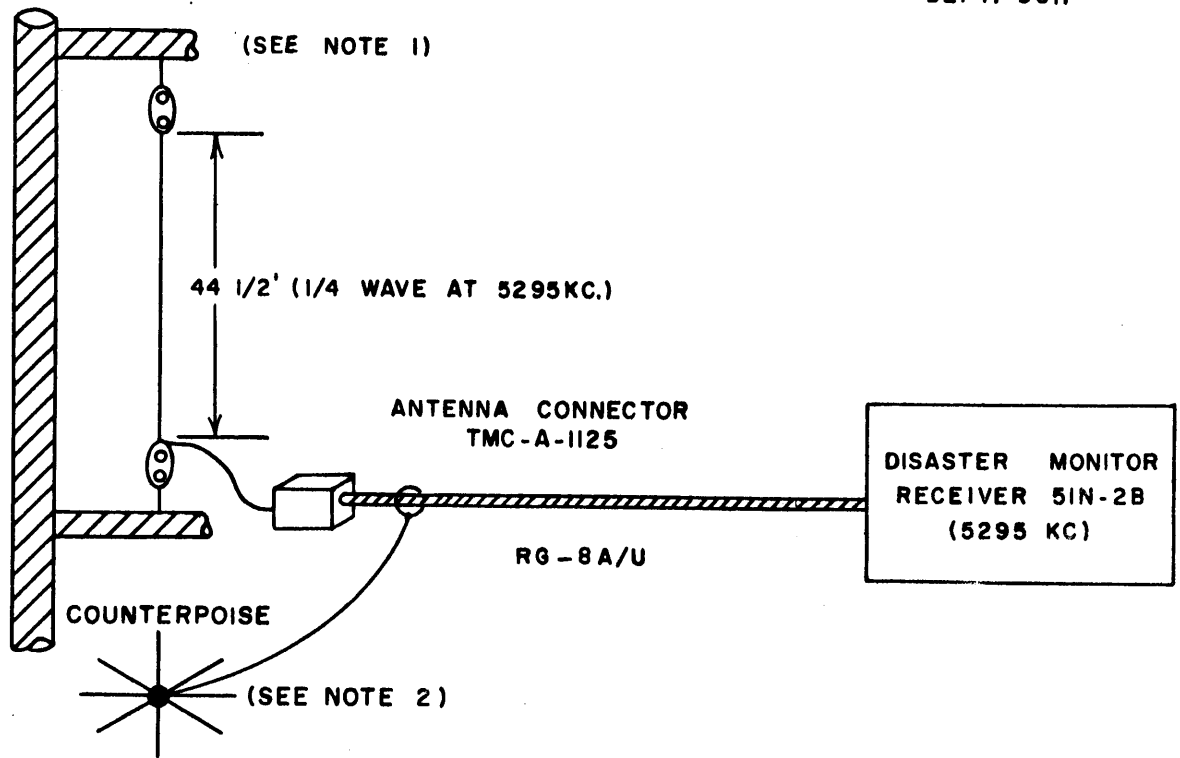


HF EMERGENCY MULTIBAND ANTENNA FOR DYE-1 AND DYE-4

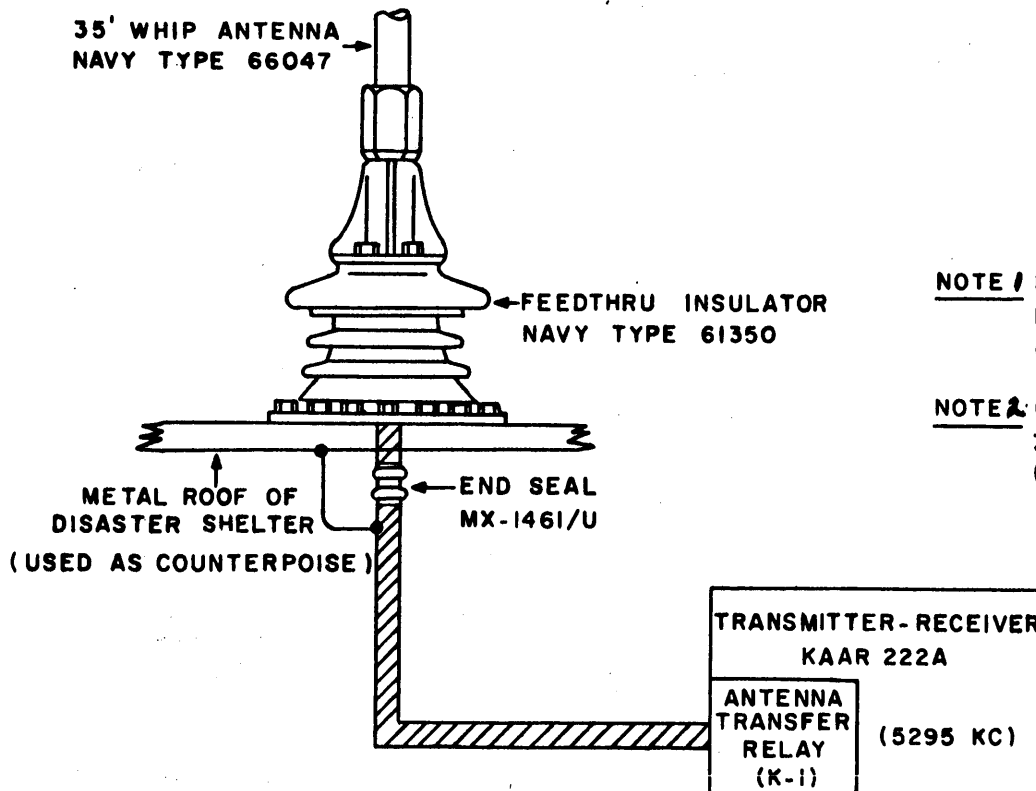


NOTE 1: X INDICATES LENGTH IN FEET. SPECIFY WHEN ORDERING CABLE.

HF EMERGENCY RADIO WHIP ANTENNA FOR  
DYE-2 AND DYE-3



**DISASTER MONITOR ANTENNA FOR DYE-1 AND DYE-4**



NOTE 1 DISASTER MONITOR ANTENNA IS LOCATED IN VICINITY OF GARAGE AT DYE-1 AND DYE-4

NOTE 2 COUNTERPOISE CONSISTS OF 32 RADIALS, EACH 50' LONG (FROM THE CENTER)

**DISASTER RADIO ANTENNA FOR DYE-2 AND DYE-3**