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SECTION 1

INTRODUCTION

1.1 PURPOSE.

This publication is one of a series of volumes published by the Navy concerning Shipboard Antenna Systems. The purpose of this volume is to give a brief description of various antenna couplers used aboard ship and to show the general characteristics of each of these equipments.

Antenna couplers are divided into two categories; multi-channel and single channel equipments. The multi-channel couplers have generally been called multi-couplers denoting that they are capable of coupling a number of transmitter and/or receiver combinations operating simultaneously into a common antenna. The multi-channel couplers described in this volume are in fact multi-couplers; therefore, this nomenclature will be used in their descriptions.

A single channel coupler denotes a coupler capable of coupling one transmitter and/or receiver to a single antenna. The term single channel is not intended to limit the coupler to a single frequency channel but to limit its operation to a one equipment/antenna combination.

1.2 MULTICOUPLERS.

Shipboard radio communications systems have certain restraints or requirements imposed on them because of their operational and physical environments. Principally, these are the limited space available for antennas and the simultaneous transmission on a number of channels at relatively high power levels with limited frequency separation. These conditions can result in unacceptable interchannel interference because of coupling between antennas, spurious emissions from transmitters, and limited dynamic ranges of the receivers.

Antenna couplers and multicouplers are used to improve the operational performance and function of shipboard radio communications systems. Antenna couplers and multicouplers provide an efficient coupling path between each transmitter and antenna or each transmitter and a common antenna, isolation between transmitters, filtering of harmonic and spurious transmitter output, rejection of local transmitter signals, impedance matching of the antenna to the transmitter or receiver, protection of receiver input circuits from high rf voltages, and reduction of spurious radiation from receivers. Thus, these equipments are often essential in achieving acceptable performance in the shipboard environment. The performance of the antennas, transmitters, and receivers without multicouplers is characterized by the generation and radiation of numerous spurious signals as well as the intended signals. Receivers are excessively susceptible to cross modulation, intermodulation, and desensitization, and transmitters can be detuned to the extent that readjustment is required.

INTRODUCTION

Transmitters can deliver spurious signals as well as the desired signals to the antennas. The undesired signals consist of spurious-drive signals to the power amplifiers and intermodulation products generated in the power amplifiers themselves as a result of the drive signals. In addition, if some of the output of other transmitters reaches a power amplifier, more intermodulation products will become evident.

The receiver characteristics of concern are dynamic range, sensitivity, and selectivity. Of particular interest is the selectivity provided ahead of the nonlinear element which limits dynamic range. Another factor which may be of some consequence is receiver spurious emission available at the receiver antenna terminals. The level of spurious signals from transmitters can be reduced by using bandpass filters tuned to the transmitted signal frequencies. The receiver dynamic ranges can be enhanced away from the received signal frequencies with bandpass filters tuned to the received signal frequencies. Bandpass filters are readily combined into multicouplers which permit the common use of a single antenna by several transmitters or receivers. Multiple use of antennas in this manner reduces the number of antennas required and allows a greater physical separation between them. It also permits greater utilization of antennas which have optimal locations.

A characteristic of multicouplers of particular importance is the isolation between two channels. The isolation is defined as the attenuation of a signal between channel inputs of the multicoupler when the antenna terminal of the multicoupler and the channel terminal at which attenuation is being measured are both connected to suitable loads. The isolation is usually expressed in dB for the percentage separation of the frequencies to which the two channels are tuned (for example, 40 dB at 5 percent). The mutual coupling between two antennas is also commonly called isolation. It is defined as the attenuation of a signal between antenna terminals when the terminal at which attenuation is being measured is connected to a suitable load.

One requirement imposed on antennas used with multicouplers is that the antenna voltage standing wave ratio (vswr) be limited over the operating frequency range. This is necessary since an antenna tuner cannot, for example, be used at the base of a whip antenna if several frequencies are being used simultaneously. The limited vswr obtained by broadbanding of the antennas results in an increase in the size of the antennas which is particularly significant in the medium frequency/high frequency (mf/hf) range.

Multicoupler groups, besides permitting multiple use of one antenna by many transmitters (or receivers), also convert antenna impedances having a vswr of up to 3.0 into a termination impedance having a vswr of 1.05 or less for the associated transmitters.

1.3 TRANSMITTER MULTICOUPLERS.

The transmitter output needs to be filtered since many of the spurious products are not only stronger than desired incoming signals but are sufficient to overload the receivers.

INTRODUCTION

In the high frequency range, a typical linear amplifier has the following output characteristics:

Signal-to-distortion ratio*	40 dB
Spurious signals	60 dB below full p-e-p (peak envelope power)
Harmonic suppression	2nd - 50 dB
	3rd - 65 dB
Noise	70 dB below full p-e-p output

For 1-kw p-e-p output, spurious signals would have a level of -30 dBw, the second harmonic -20 dBw, and the third -35 dBw. It should be noted that these levels include the filtering effect of the final amplifier tank and matching circuitry. If a transmitting-to-receiving antenna isolation of 10 dB** is assumed, an hf receiver with a noise figure of 10 dB and a 12-KHz bandwidth would see these signals at the following levels relative to its tangential sensitivity:

Spurious signals	+113 dB
Transmitter 2nd harmonic	+123 dB
Transmitter 3rd harmonic	+108 dB

These levels will overload any vacuum tube receiver.

Another source of spurious signals is the mixing of the signal from a second transmitter in a power amplifier. If the frequencies are within 5 to 10 percent of one another, the transmitter tank circuitry will offer little insertion loss to the incoming signal, and the only decrease in the second signal level will be by antenna-to-antenna isolation. The conversion gain of the amplifier will be approximately the signal-to-distortion ratio, or -40 dB. For a 10 dB antenna isolation, this spurious signal would then have a level of +123 dB relative to the receiver tangential sensitivity. Tangential sensitivity is defined for a pulse signal as that input signal level which will result in an output where the top of the noise along the base line is at the same level as the bottom of the noise on the pulse.

When a multicoupler is used, it must provide the isolation between transmitters since the antenna is common to them. The multicoupler can be made to do this readily. In fact, the more recently designed multicouplers provide 40 dB of isolation and selectivity at 5-percent frequency spacing and 50 to 60 dB over most of the hf range. Thus, multicouplers can result in a reduction of undesired signal levels by from 15 to 50 dB and often more. The use of the multicouplers also results in better radiation patterns and greater isolation among the fewer antennas. The antennas can also be better located relative to one another and the ship superstructure to provide best possible isolation.

In the very-high and ultra-high frequency (vhf/uhf) range, greater isolation between antennas is possible. Isolation comparable to that achieved between channels with the use of multicouplers can be obtained. However, this can be done only at a severe sacrifice of location optimization of the antennas, and then, only for a few channels.

* Two-tone test

**This value is typical at the lower hf frequencies; at the upper hf limit, antenna isolation may be as high as 25 dB

1.4 RECEIVER MULTICOUPLERS.

The performance of a receiver in the shipboard environment of high-level signals is limited primarily by the selectivity and dynamic range of the receiver. The selectivity is normally achieved in the i-f circuitry. The dynamic range is set in the rf and mixer tubes or transistors before the i-f selectivity is established.

To protect the receiver from damage and enable it to perform normally, passive selectivity must be provided ahead of the active elements. This requirement is additional to those for multicoupling several receivers to a single antenna.

Receiver multicoupling requirements are (1) efficient antenna power division, and (2) receiver isolation to prevent tuning interaction that might affect input signal levels and to prevent coupling of spurious signals from one receiver to another. Although these requirements can be met with active elements and a minimum of selectivity, the receiving channel dynamic ranges would still be unsatisfactory.

Typical receiver tangential sensitivity is about -153 dBw as determined in Paragraph 1.3. If a local desired transmitting signal is +30 dBw, antenna-to-antenna isolation is 10 to 25 dB, and receiver dynamic range is 80 dB, the reception of desired signals up to levels of -60 to -75 dBw would become difficult or impossible. Passive selectivity between the antenna and receiver effectively increases the dynamic range of the receiver. If a receiving filter has 60-dB attenuation 5 percent or more from its center frequency, the effective dynamic range of the receiver will be increased by the same amount in those regions.

Thus, shipboard receiver multicouplers logically use tuned bandpass filters to provide protection from local transmitter signals as well as the necessary receiver-to-receiver isolation.

1.5 TRANSCEIVER MULTICOUPLERS.

In some cases, channels of a multicoupler are used for either transmitting or receiving. This is most often the case in the vhf/uhf frequency range, and the channel must then be designed to include the requirements for both transmitting and receiving operations outlined above. In addition, increased isolation between channels must be provided, or increased channel spacing used, to replace the isolation between antennas which is lost when a common antenna is used.

1.6 SINGLE CHANNEL COUPLERS.

Single channel couplers (or antenna tuners) are devices intended to improve the impedance match and, therefore, the power transfer between the transmitter or receiver and the antenna on a single channel. The tuners may be located at either end, or both ends, of the transmission line. However, the most effective location is at the antenna. This position, of course, usually requires the use of a remote control system for the tuner. The use of antenna tuners should be minimized since these devices do not provide attenuation of off-channel signals.

The values of vswr of antennas with which tuners or couplers are used are often very high over at least some portion of the desired operating frequency range. Such values of vswr make it impractical to use these intrinsically narrow band antennas with tunable multicouplers.

INTRODUCTION

1.7 RF CABLES AND TRANSMISSION LINES.

In order to obtain maximum system operating parameters the selection of the proper type of coaxial cable for use between the coupler and its associated antenna must be given careful consideration. The length of the cable, its characteristic impedance, the system rf power level, the cable peak operating voltage, and the environment of the cable path are the prime factors governing the selection.

The impedance, rf power and peak operating voltage are established by the type and numbers of equipments employed in the system. The cable must satisfy the nominal impedance value presented by the antenna and the output termination of the coupler if near unity vswr levels are to be realized. The rf power level and peak operating voltage capabilities are especially important in multichannel high power systems. The cable must satisfy the calculated power and peak voltage values presented when the system is operating at maximum capacity.

The environment of the cable path will determine the necessity for armor, weatherproof sheath or other protection from physical or weather damage. The length of the cable will determine the amount of attenuation or power loss that will be introduced in transferring energy between the coupler and the antenna. Attenuation at vhf/uhf frequencies increases critically with length and frequency. It also depends on the physical size and configuration of the individual cable. Therefore, for long runs it may be necessary to use a larger size cable to reduce attenuation. The selection may also be resolved by a choice between a solid or an air dielectric or pressurized cable. At mf/hf and vlf frequencies the amount of attenuation introduced by coaxial cables is not as great as at the higher frequencies; however, all runs at these frequencies should be kept as short as possible.

The cable from the coupler to the antenna should be one continuous length. On installation where large size solid or air dielectric cables are used to reduce attenuation, a transition section not to exceed 18 inches, must be installed at the coupler and antenna ends to reduce the possibility of cable failure due to flexing from vibration. The flexible sections must have the same characteristic impedance as the main cable.

A listing of preferred coaxial cables and transmission lines is contained in Appendix A, NAVSHIPS 0967-177-3020, SHIPBOARD ANTENNA SYSTEMS, ANTENNA INSTALLATION DETAILS. Selection of cables or transmission lines should be made from this listing.

1.8 CONTROL CABLES.

A number of the couplers require cabling for remote control or monitoring functions between the coupler and its associated equipment. The control functions may be dc voltages, audio, or servo systems. Suitable cable types are generally outlined in the technical manual for the specific equipment. In such cases where this information is not furnished the IR drop, shielding and physical size must be considered in selecting the cable. The physical size of the cable will be determined by the size of the connector plugs furnished with the equipment, the cable entrances on the equipment or the cross section of the individual conductors required to satisfy IR drops and shielding. The distance between units is often limited by the rf cable limitations.

In all cases, except where specific cables are furnished by the equipment manufacturer, standard Navy electric shipboard cables should be used. A listing of those cables is contained in NAVSHIPS 250-660-23 CABLE COMPARISON GUIDE.

1.9 FIELD CHANGES.

The descriptions of the individual equipments in this volume do not reflect authorized field changes. Authorized field changes are promulgated periodically in the ELECTRONICS INSTALLATION BULLETIN (EIB) NAVSHIPS 0967-001-3781, and are summarized in the ELECTRONICS INSTALLATION and MAINTENANCE BOOK (EIMB), NAVSHIPS 0967-000-0150. Prior to the use of information contained in this volume for engineering or operational commitments, the current field change information should be referenced to insure that the equipment is compatible with the requirements.

1.10 COMBINING TECHNIQUES.

The transmitting multicouplers described in this volume are composed of narrow-band tuned filters connected together in two basic configurations.

- (1) Series combining.
- (2) Parallel combining.

The AN/SRC-16, AN/SRA-16, and AN/SRA-34 are illustrative of parallel combining techniques. This technique parallels each narrow-band filter through a capacitor to the antenna. Any particular filter of the multicoupler is presented with a load consisting of an antenna that is shunted by a capacitance whose value varies whenever another circuit is retuned. This can be overcome by utilizing automatically tuned circuits as in the AN/SRC-16 or AN/SRA-34 coupler groups or by utilizing a differential capacitor scheme as in the AN/SRA-16 coupler group. The differential capacitor approach provides any filter with a load consisting of the antenna shunted by a capacitance whose value remains constant when the resonant frequencies of other filters are varied.

The AN/SRA-13, -14, -15, -35, -36, -37, -56, -57, and -58 are illustrative of series combining techniques. In the series combining method the narrow-band tunable filters are arranged so that their coupling links are in series with the antenna transmission line. Any particular filter of the multicoupler is presented with a load consisting of the antenna plus the coupling links of all the other channels in series.

Series combining has the advantages of providing a simple, fixed element combiner for a limited number of channels and allowing a tune-up procedure that is independent of adjacent channels. Parallel combining has the advantages of allowing a greater number of channels and not requiring mechanical motion between the coupling link and the filter.

Receiving and transmitting combining techniques are similar where only a few channels are to be combined. A receiving combining technique that provides virtually unlimited channel capacity is the terminated artificial transmission line. This technique also allows the intermixing of different frequency range coupler units and thus permits one antenna to service a broad frequency band. Each coupling to the transmission line is designed as a short section of transmission line having the same characteristic impedance as the terminated line. A dummy load of the same characteristic impedance must terminate this line and also must be capable of dissipating half the power present at any time. The AN/SRA-38, -39, -40, -49, and -50 coupler units are combined by using the terminated artificial transmission line technique.

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Section 2
Paragraph 2.1

VHF/UHF MULTICOUPLERS

SECTION 2

VHF/UHF MULTICOUPLERS

2.1 GENERAL.

VHF/UHF multicouplers are usually used for transceiving. This and the close channel spacing desired during operation require multiple-resonator filters to achieve the necessary isolation between channels. In this frequency range compact cavities can readily and economically provide the high values of unloaded Q required. This high selectivity of these cavities also reduces intermodulation interference, cross-modulation interference and other spurious responses. Harmonic radiation from the transmitters is also attenuated.

VHF/UHF multicouplers are designed for use with antennas whose $vswr$ is 2:1 or less throughout the operating frequency range of the multicouplers.



2.2 ANTENNA COUPLER GROUP AN/SRA-33.

- a. TYPE/USE. - Antenna Coupler Group AN/SRA-33 provides isolation between as many as four transmitter and/or receiver combinations operating simultaneously into a common uhf antenna. The AN/SRA-33 is designed for operation with AN/SRC-20, -21, and AN/GRC-27 equipments.
- b. PHYSICAL CONFIGURATION. - See Figure 2-1.
- c. INTERCONNECTION CABLING DIAGRAM. - See Figure 2-2.
- d. FREQUENCY RANGE. - 225 to 400 MHz.
- e. NUMBER OF CHANNELS. - Four.
- f. TYPE OF TUNING. - Remote or local selection of any 19 preset frequencies per channel for a total of 76 available channels.
- g. POWER RATING. - 200 watts per channel, average and pep.
- h. ANTENNA IMPEDANCE REQUIRED. - 50 ohms nominal unbalanced; vswr not greater than 2:1.
- i. OUTPUT CONNECTOR. - Type HN (UG-61A/U).
- j. INPUT CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.
- k. INPUT CHANNEL CONNECTOR. - Type C (UG-571/U).
- l. PROTECTIVE CIRCUITS. - The lockout circuit disables the associated transmitter and disconnects the coupler from the antenna when the coupler is tuning. It also disconnects the transmitter and antenna whenever another coupler/transmitter is set to the same channel and keyed to transmit.
- m. PRIMARY POWER REQUIRED. - 115/230 vac 60 Hz 1 phase 450 watts.
- n. HEAT DISSIPATION. - 60 watts per channel when operating at 200 watts maximum input.
- o. TEMPERATURE RANGE. - Minus 54° to +65°C (-65° to +149°F).
- p. COOLING. - Natural convection.
- q. SELECTIVITY. - See Figure 2-3.
- r. ISOLATION. -
 - (1) 1.5 MHz channel separation -20 dB.
 - (2) 3.0 MHz channel separation -40 dB.
 - (3) 10 MHz channel separation -60 dB.
- s. INSERTION LOSS (MAXIMUM). - No greater than 3 dB.
- t. INSTALLATION REQUIREMENTS. - A minimum of 18 inches is required in front of the equipment to allow the individual units to be removed from the equipment cabinet.

- u. SPECIAL CONSIDERATIONS. - None.
- v. MEAN TIME BETWEEN FAILURES (MTBF). - 2000 HRS.
- w. EQUIPMENT SUPPLIED. - See Table 2-1.

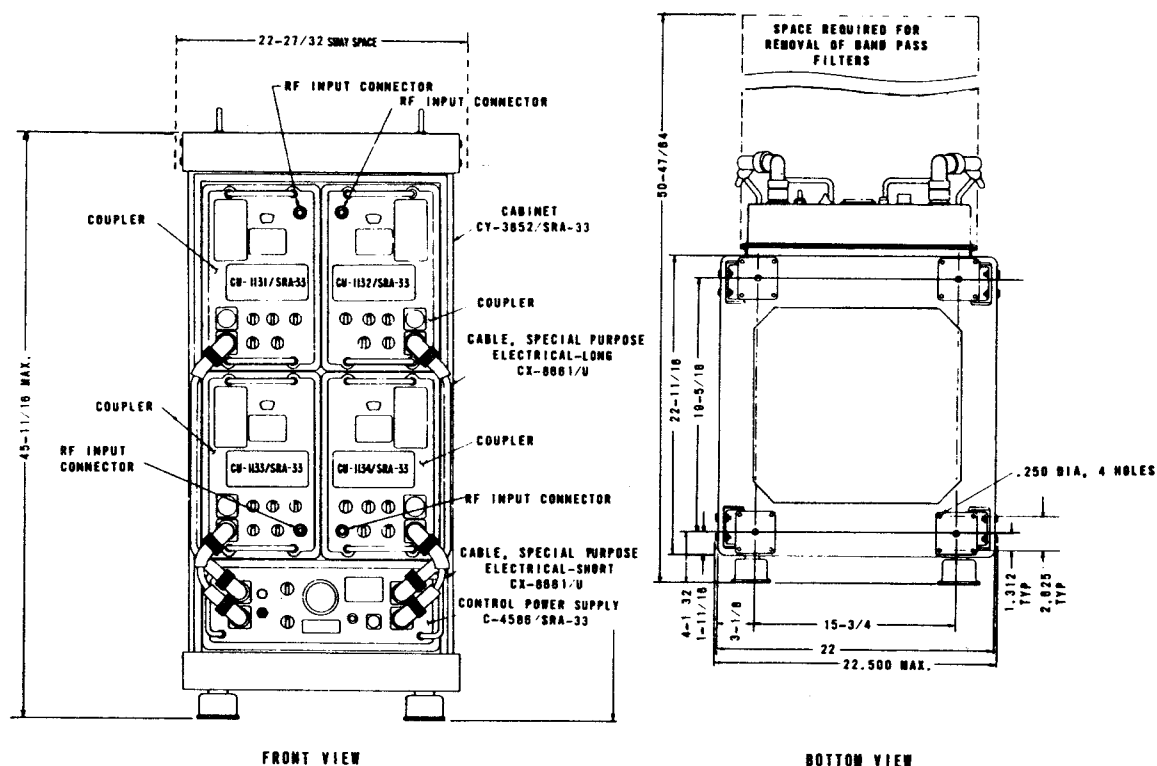


Figure 2-1 Antenna Coupler Group AN/SRA-33, Physical Configuration

VHF/UHF MULTICOUPLERS

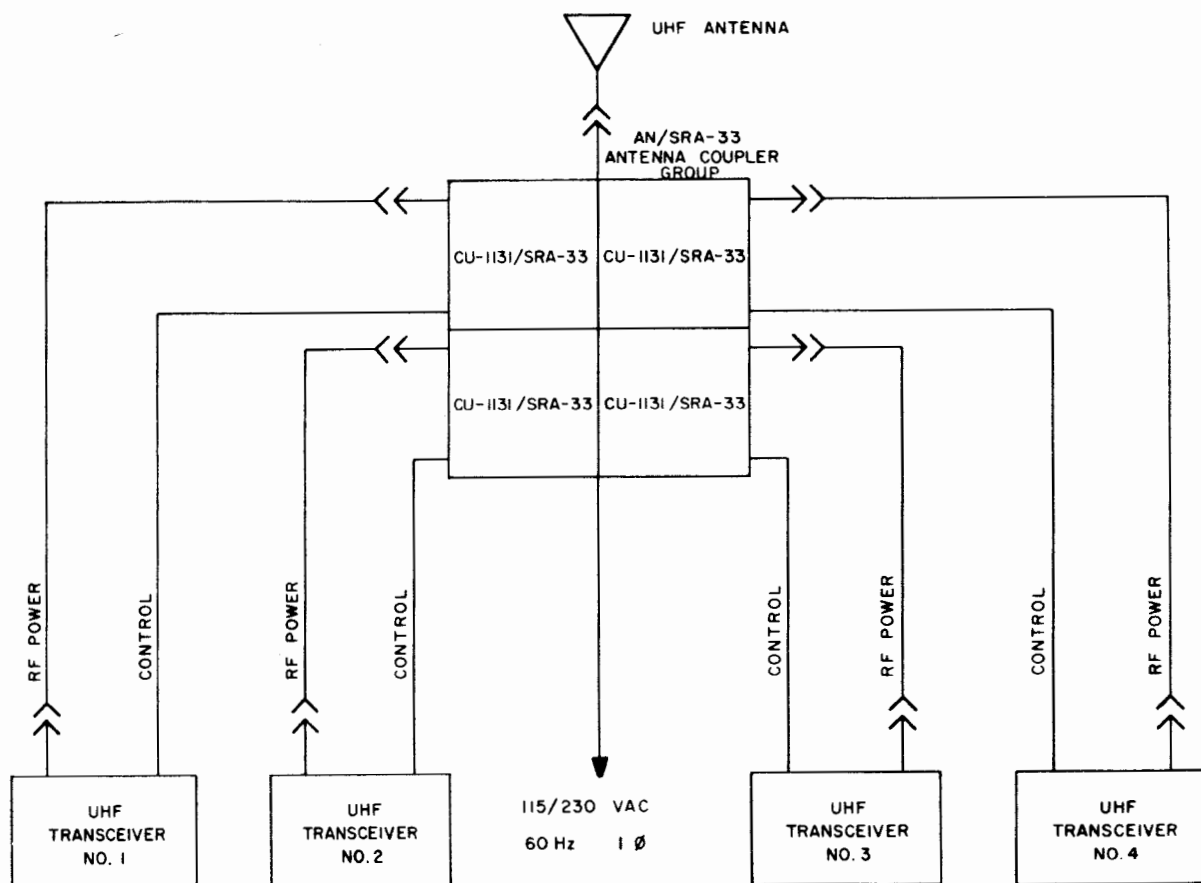


Figure 2-2 Antenna Coupler Group AN/SRA-33, Interconnection Diagram.

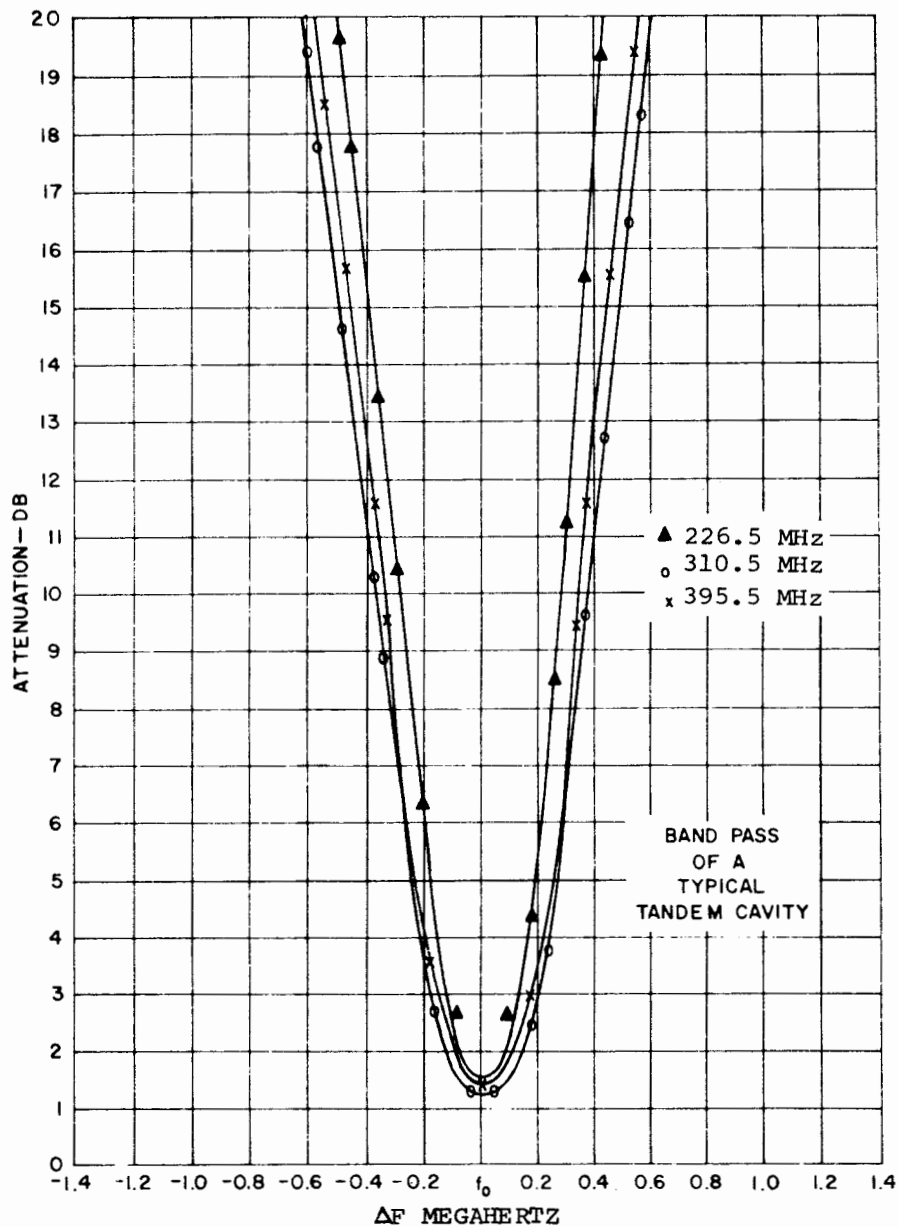


Figure 2-3 Antenna Coupler Group AN/SRA-33
Dual-Cavity Resonator Selectivity Curves

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 Table 2-1

TABLE 2-1 ANTENNA COUPLER GROUP AN/SRA-33 EQUIPMENT SUPPLIED

QTY PER EQUIP.	NOMENCLATURE		OVERALL DIMENSIONS (in.)			VOLUME (cu ft)	WEIGHT (lb)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
	Antenna coupler group	AN/SRA-33	53-5/16	22-3/16	34-1/2	23.6	420.4
1	Antenna coupler	CU-1131/SRA-33	14-7/16	9-7/16	25-1/16	2	53
1	Antenna coupler	CU-1132/SRA-33	14-7/16	9-7/16	25-1/16	2	53
1	Antenna coupler	CU-1133/SRA-33	14-7/16	9-7/16	25-1/16	2	53
1	Antenna coupler	CU-1134/SRA-33	14-7/16	9-7/16	25-1/16	2	53
1	Control-power supply	C-4586/SRA-33	7-3/16	18-7/8	12-1/2	1	52
1	Electronic equipment cabinet	CY-3852/SRA-33	49-15/16	22-27/32	32-7/8	22.3	150
2	Special purpose electrical cable assembly	CX-8661/U (0 ft 10.5 in.)	10.5 in. long				1.5
2	Special purpose electrical cable assembly	CX-8661/U (2 ft 0.5 in.)	24.5 in. long				1.7
2	Technical manual for antenna coupler group	NAVSHIPS 0967-037-8001					



2.3 ANTENNA COUPLER CU-691/U.

- a. TYPE/USE. - Antenna Coupler CU-691/U provides isolation between as many as four transmitter and/or receiver combinations operating simultaneously into a common antenna. The CU-691/U coupler is generally used with AN/URC-9 transceivers and with TED series transmitter and AN/URR-13 or AN/URR-35 series receiver combinations.
- b. PHYSICAL CONFIGURATION. - See Figure 2-4.
- c. INTERCONNECTION CABLING DIAGRAM. - See Figure 2-5.
- d. FREQUENCY RANGE. - 225 to 400 MHz.
- e. NUMBER OF CHANNELS. - Four.
- f. TYPE OF TUNING. - Manual.
- g. POWER RATING. - 200 watts per channel, average and pep.
- h. ANTENNA IMPEDANCE REQUIRED. - 50 ohms nominal, unbalanced; vswr not greater than 2:1.
- i. OUTPUT CONNECTOR. - Type HN (UG-61A/U).
- j. INDIVIDUAL CHANNEL INPUT IMPEDANCE. - 50 ohms nominal, unbalanced.
- k. INPUT CHANNEL CONNECTOR. - Type N (UG-22B/U).
- l. PROTECTIVE CIRCUITS. - None.
- m. PRIMARY POWER REQUIRED. - None.
- n. HEAT DISSIPATION. - 60 watts per channel at maximum input of 200 watts rf.
- o. TEMPERATURE RANGE. - Minus 40° to +50°C (-40° to +120°F).
- p. COOLING. - Natural convection.
- q. SELECTIVITY. - See Figure 2-6.
- r. ISOLATION. -
 - (1) 1.5 MHz channel separation -20 dB.
 - (2) 3 MHz channel separation -40 dB.
 - (3) 10 MHz channel separation -60 dB.
- s. INSERTION LOSS (MAXIMUM). - 2 dB.
- t. INSTALLATION REQUIREMENTS. - The coupler may be rack or bench mounted. Shock mounts and rack mounting brackets are supplied with the equipment. A minimum clearance of four inches is required at the rear of the coupler for connecting the transmission lines.

u. SPECIAL CONSIDERATIONS. - When used as a receiving multicoupler only, the CU-691/U requires an input signal for tuning purposes. If no signal is available, a signal generator or a transmitter may be used to provide the required signal.

v. MEAN TIME BETWEEN FAILURE (MTBF). - 8000 hours.

w. EQUIPMENT SUPPLIED. - See Table 2-2.

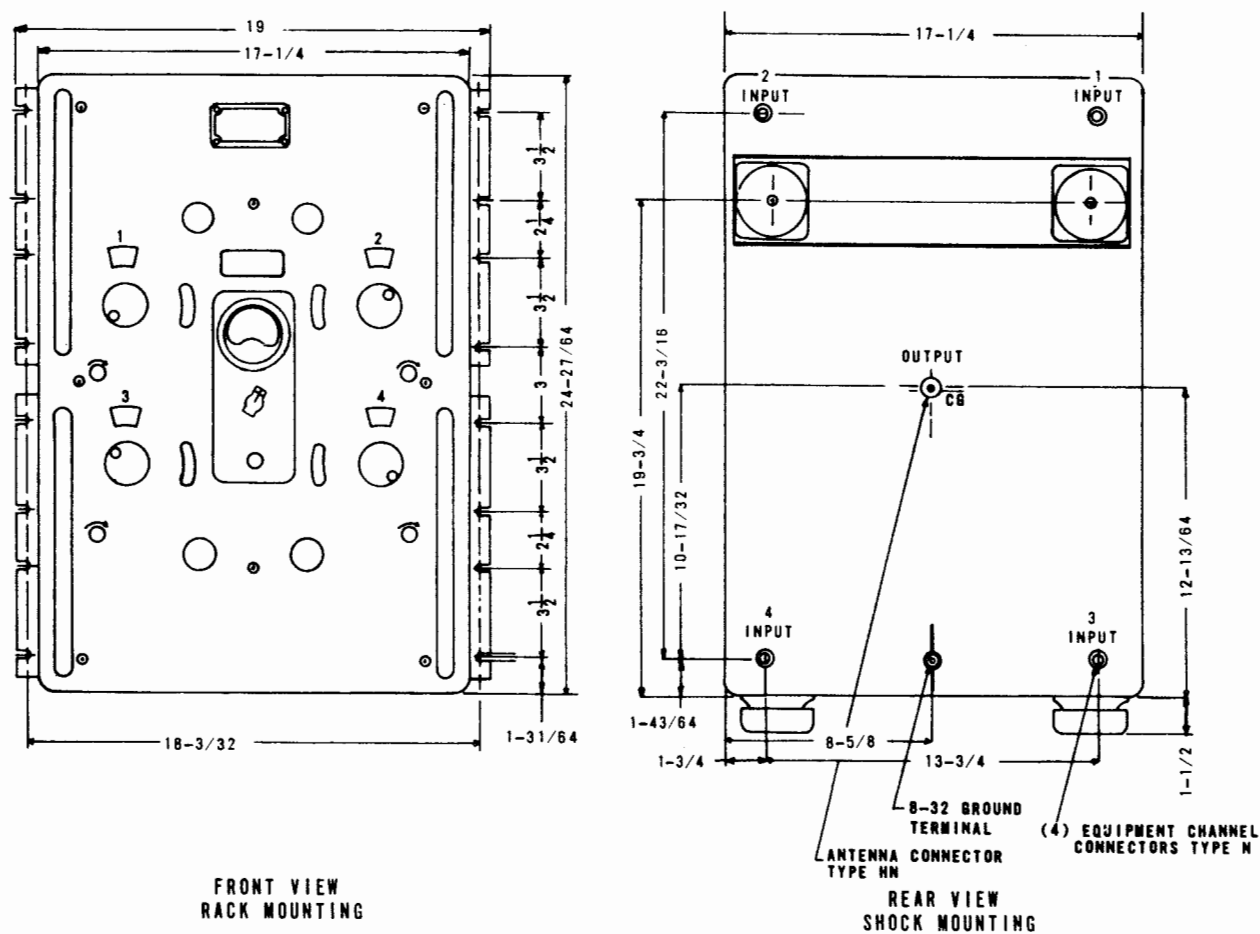


Figure 2-4 Antenna Coupler CU-691/U Physical Configuration

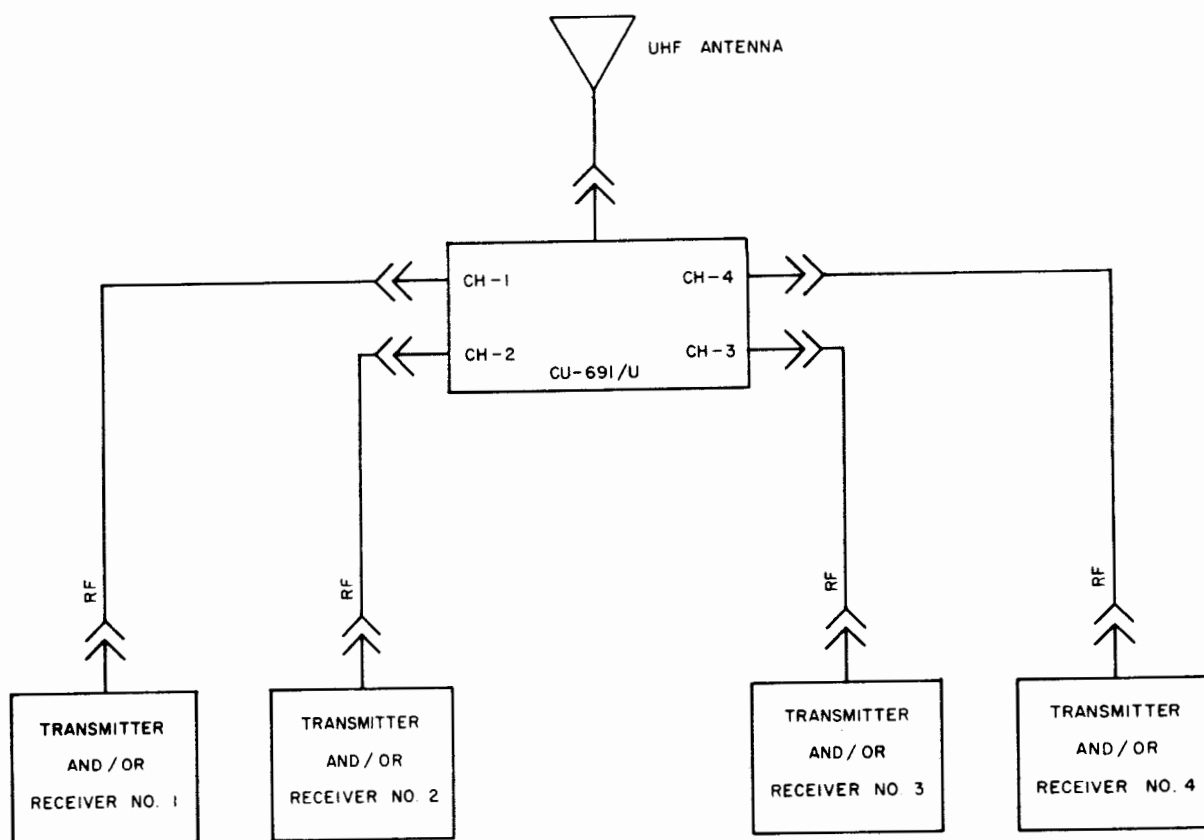


Figure 2-5 Antenna Coupler CU-691/U Interconnection Diagram

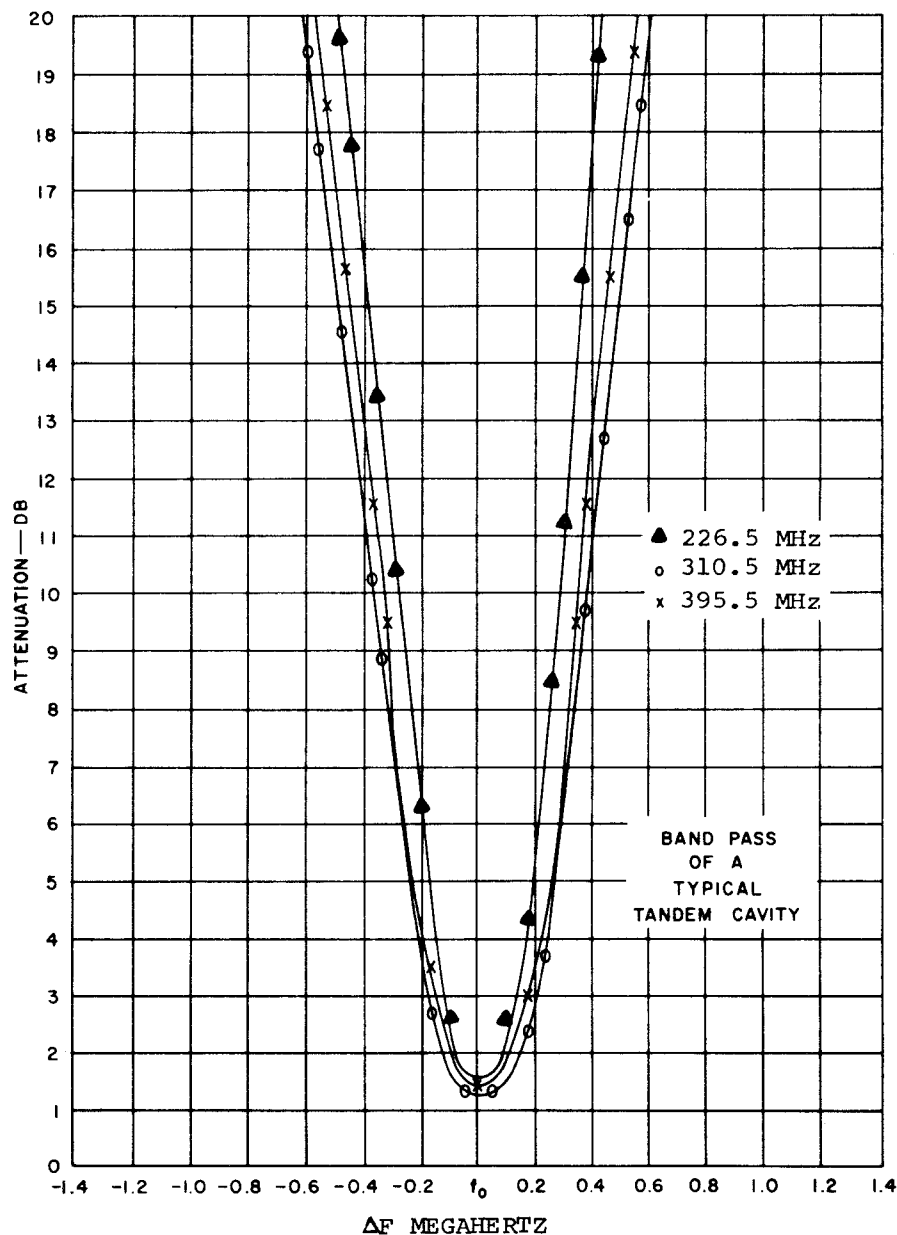


Figure 2-6 Antenna Coupler CU-691/U Dual Cavity Resonator Selectivity Curves

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 Table 2-2

TABLE 2-2 ANTENNA COUPLER CU-691/U EQUIPMENT SUPPLIED

Qty Per Equip.	Nomenclature		Overall Dimensions (In.)			Vol. (Cu Ft)	Weight (Lb)
	Name	Designation	Height	Width	Depth		
1	Antenna Coupler	CU-691/U	27.42	17.25	22.44	5.5	90
6	Shock Mounts	None	1.5	3	3	—	—
4	Rack Mounting Brackets	None	11.25	0.87	1	—	—
1	Channel Mount	None	16.17	3.38	1.06	—	—
1	Tech Manual	NAVSHIPS 93235	—	—	—	—	—



2.4 ANTENNA COUPLER CU-692/U.

a. TYPE/USE. - Antenna Coupler CU-692/U provides isolation between two transmitter and/or receiver combinations operating simultaneously into a common antenna. The CU-692/U coupler is generally used with AN/URC-9 transceivers and with TED series transmitter and AN/URR-13 or AN/URR-35 series receiver combinations.

b. PHYSICAL CONFIGURATION. - See Figure 2-7.

c. INTERCONNECTION CABLING DIAGRAM. - See Figure 2-8.

d. FREQUENCY RANGE. - .225 to 400 MHz.

e. NUMBER OF CHANNELS. - Two.

f. TYPE OF TUNING. - Manual.

g. POWER RATING. - 200 watts per channel, average and pep.

h. ANTENNA IMPEDANCE REQUIRED. - 50 ohms nominal, unbalanced; vswr not greater than 2:1.

i. OUTPUT CONNECTOR. - Type HN (UG-61A/U).

j. INDIVIDUAL CHANNEL INPUT IMPEDANCE. - 50 ohms nominal, unbalanced.

k. INPUT CHANNEL CONNECTOR. - Type N (UG-22B/U).

l. PROTECTIVE CIRCUITS. - None.

m. PRIMARY POWER REQUIRED. - None.

n. HEAT DISSIPATION. - 60 watts per channel at maximum input of 200 watts rf.

o. TEMPERATURE RANGE. - Minus 40° to +50°C (-40° to +120°F).

p. COOLING. - Natural convection.

q. SELECTIVITY. - See Figure 2-9.

r. ISOLATION. -

- (1) 1.5 MHz channel separation -20 dB.
- (2) 3 MHz channel separation -40 dB.
- (3) 10 MHz channel separation -60 dB.

s. INSERTION LOSS (MAXIMUM). - 2 dB.

t. INSTALLATION REQUIREMENTS. - The coupler may be rack or bench mounted. Shockmounts and rack mounting brackets are supplied with the equipment. A minimum clearance of 4 inches is required at the rear of the coupler for connecting transmission lines.

u. SPECIAL CONSIDERATIONS. - When used as a receiving multicoupler only, the CU-692/U requires an input signal for tuning purposes. If no input signal is available, a signal generator or a transmitter may be used to provide the required signal.

v. MEAN TIME BETWEEN FAILURE (MTBF). - 8,000 hours.

w. EQUIPMENT SUPPLIED. - See Table 2-3.

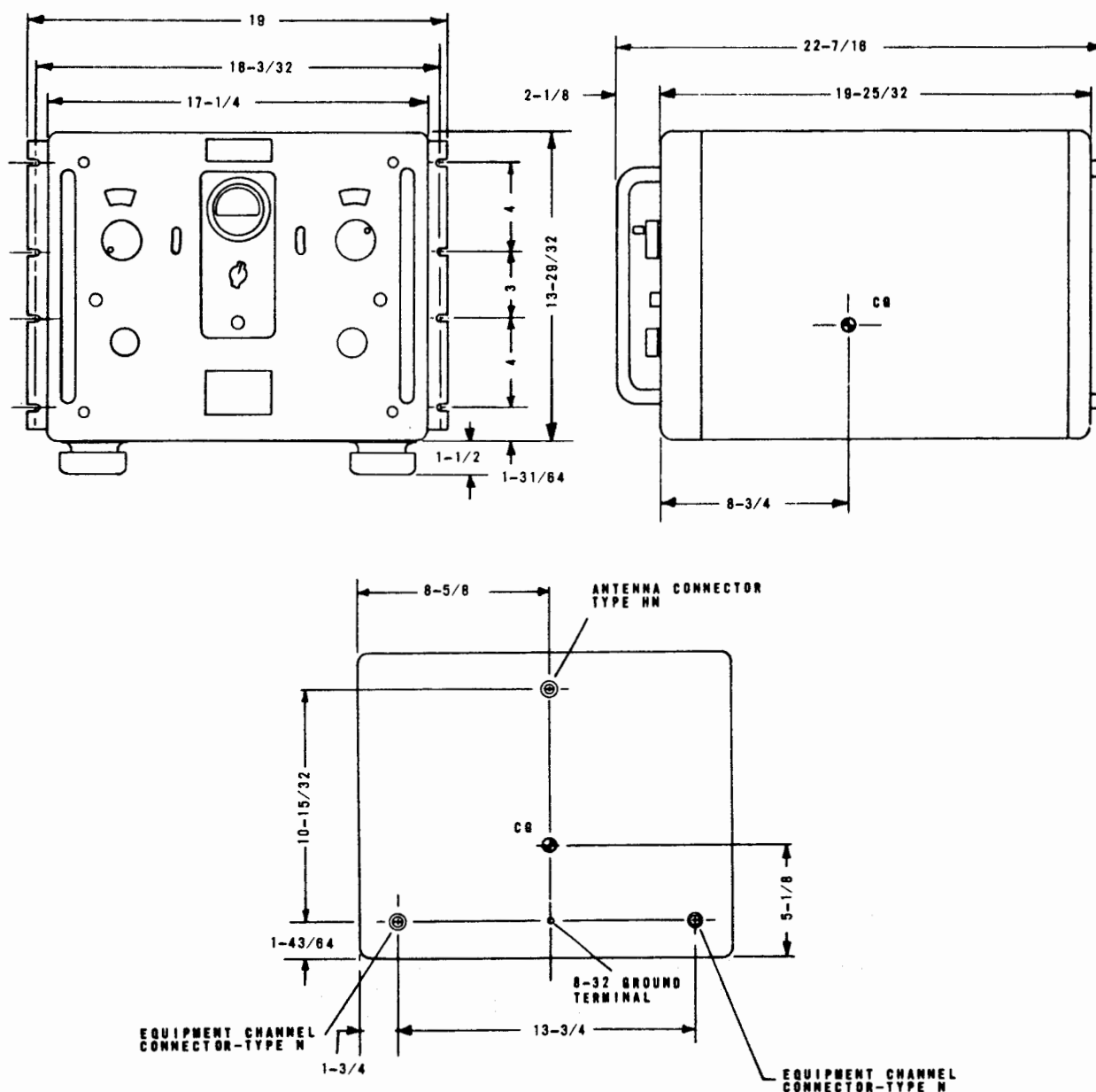


Figure 2-7 Antenna Coupler CU-692/U Physical Configuration

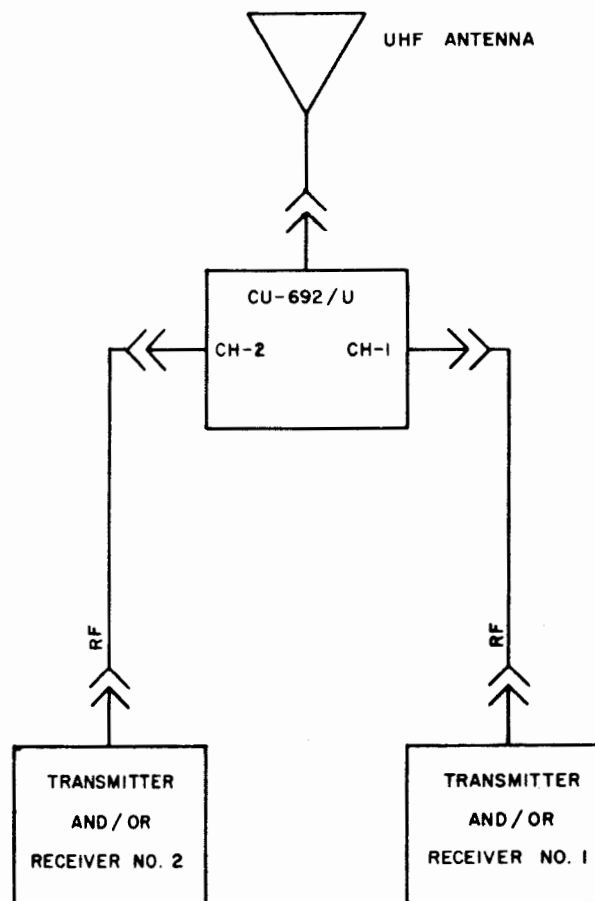


Figure 2-8 Antenna Coupler CU-692/U Interconnection Diagram

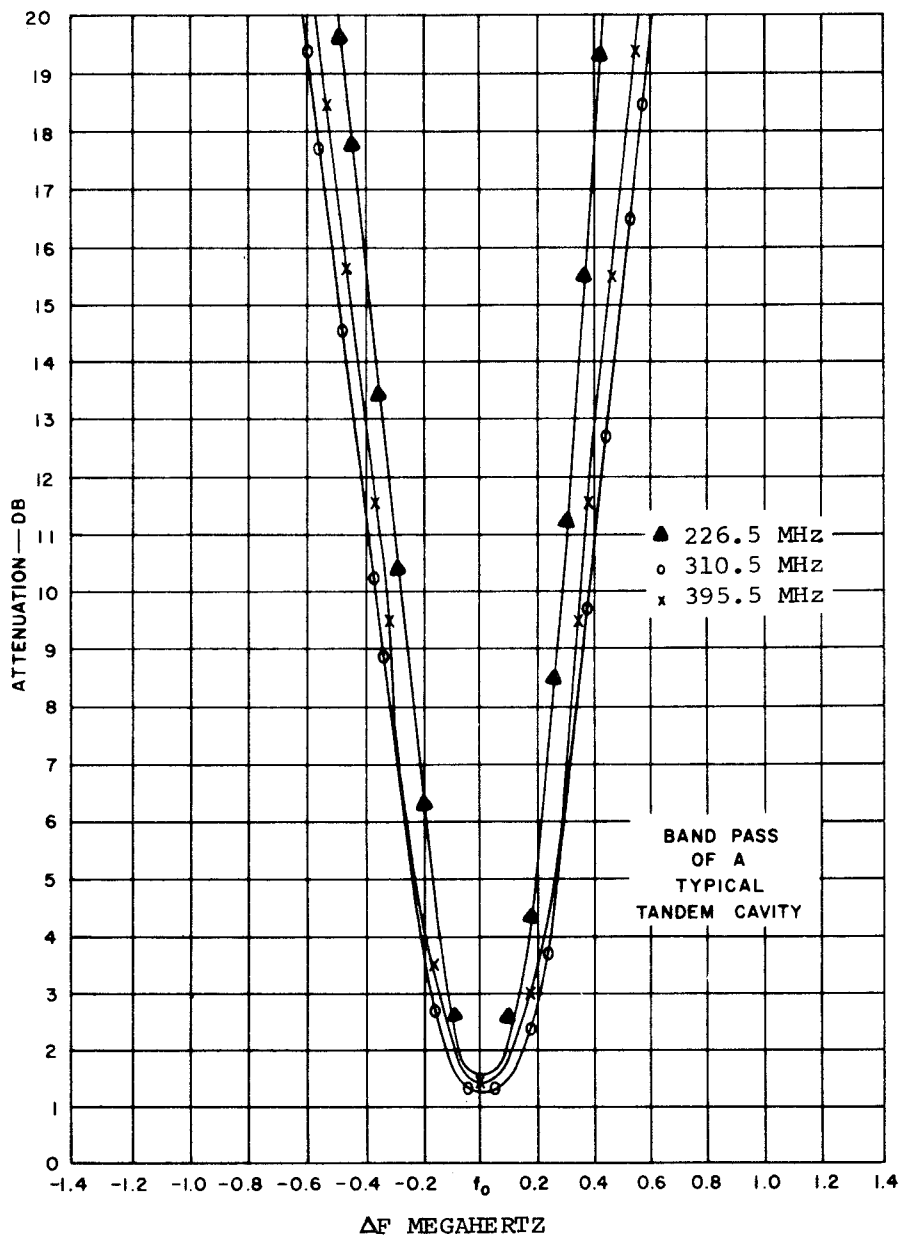


Figure 2-9 Antenna Coupler Dual-Cavity Resonator Selectivity Curves

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 Table 2-3

TABLE 2-3 ANTENNA COUPLER CU-692/U EQUIPMENT SUPPLIED

Qty Per Equip.	Nomenclature		Overall Dimensions (In.)			Vol. (Cu Ft)	Weight (Lb)
	Name	Designation	Height	Width	Depth		
1	Antenna Coupler	CU-692/U	13.91	17.25	22.44	3.1	(total)
4	Shock Mounts	None	1.5	3	3	—	—
2	Rack Mounting Brackets	None	13	0.87	1	—	—
1	Tech Manual	NAVSHIPS 93243					



2.5 ANTENNA COUPLER CU-1559/SRC.

- a. TYPE/USE. - Antenna Coupler CU-1559/U is a dual two-port impedance matching device and isolation network designed to allow duplex operation of two uhf transceivers such as the AN/SRC-31. The CU-1559/SRC may be used to couple two uhf transmitters to one antenna and two uhf receivers to a second antenna. It can also couple either four transmitters or four receivers to two antennas. The CU-1559/U is normally used with two uhf transceivers and two antennas.
- b. PHYSICAL CONFIGURATION. - See Figure 2-10.
- c. INTERCONNECTION CABLING DIAGRAM. - See Figure 2-11.
- d. FREQUENCY RANGE. - 225 to 400 MHz.
- e. NUMBER OF CHANNELS. - Four, consisting of two 2-channel units. A separate antenna is required for each unit.
- f. TYPE OF TUNING. - Automatic; remotely slaved to transmitter or receiver servo system.
- g. POWER RATING (MAXIMUM). - 1500 watts per channel, average and pep.
- h. ANTENNA IMPEDANCE REQUIRED. - 50 ohms nominal unbalanced; vswr not greater than 2:1.
- i. OUTPUT CONNECTOR. - Two type LC (UG-352A/U).
- j. INPUT CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.
- k. INPUT CHANNEL CONNECTOR. - Type N (UG-22B/U).
- l. PROTECTIVE CIRCUITS. - None.
- m. PRIMARY POWER REQUIRED. - All operating voltages are supplied by associated uhf equipments.
- n. HEAT DISSIPATION. - 150 watts per transmitting channel when operating at maximum rf power output. Negligible when operating on receiving channels only.
- o. TEMPERATURE RANGE. - Minus 28° to +65° C (-18° to +150° F).
- p. COOLING. - Forced air, each channel is equipped with blower.
- q. SELECTIVITY. - See Figure 2-12.
- r. ISOLATION. - 50 dB when tuned to frequencies separated by 5 MHz or more.
- s. INSERTION LOSS. - No greater than 1.3 dB over uhf range from 225 to 400 MHz.

t. INSTALLATION REQUIREMENTS. - Clearance is required above the equipment for transmission and control cables. A minimum of 18 inches clearance is required between the air filter and exhaust louvers and any deck, platform, or bulkhead that could restrict intake and exhaust air movement. Allow clearance in front of cabinet to permit cavity withdrawal and servicing.

u. SPECIAL CONSIDERATIONS. - None.

v. MEAN TIME BETWEEN FAILURES (MTBF). - 2000 hours.

w. EQUIPMENT SUPPLIED. - See Table 2-4.

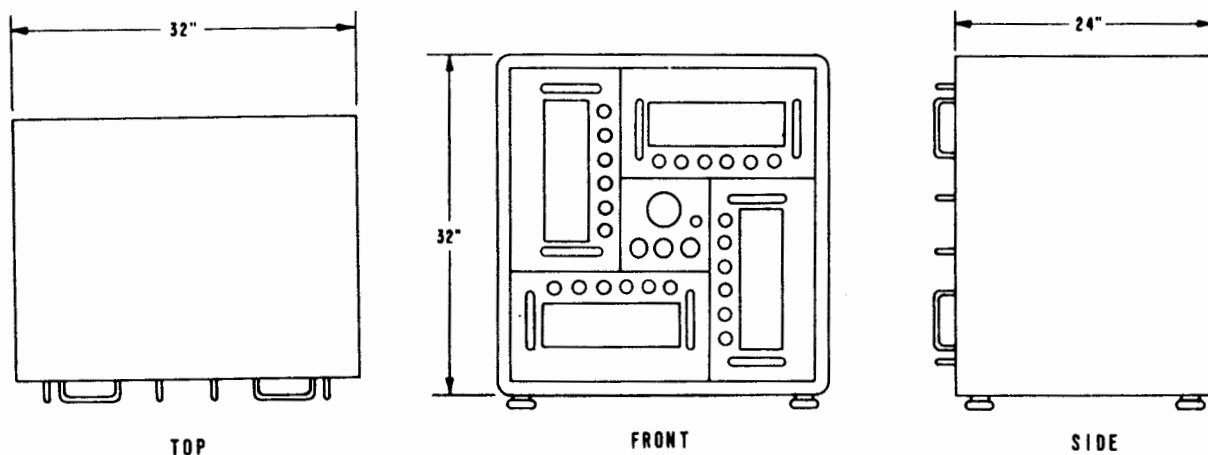


Figure 2-10 Antenna Coupler CU-1559/SRC Physical Configuration

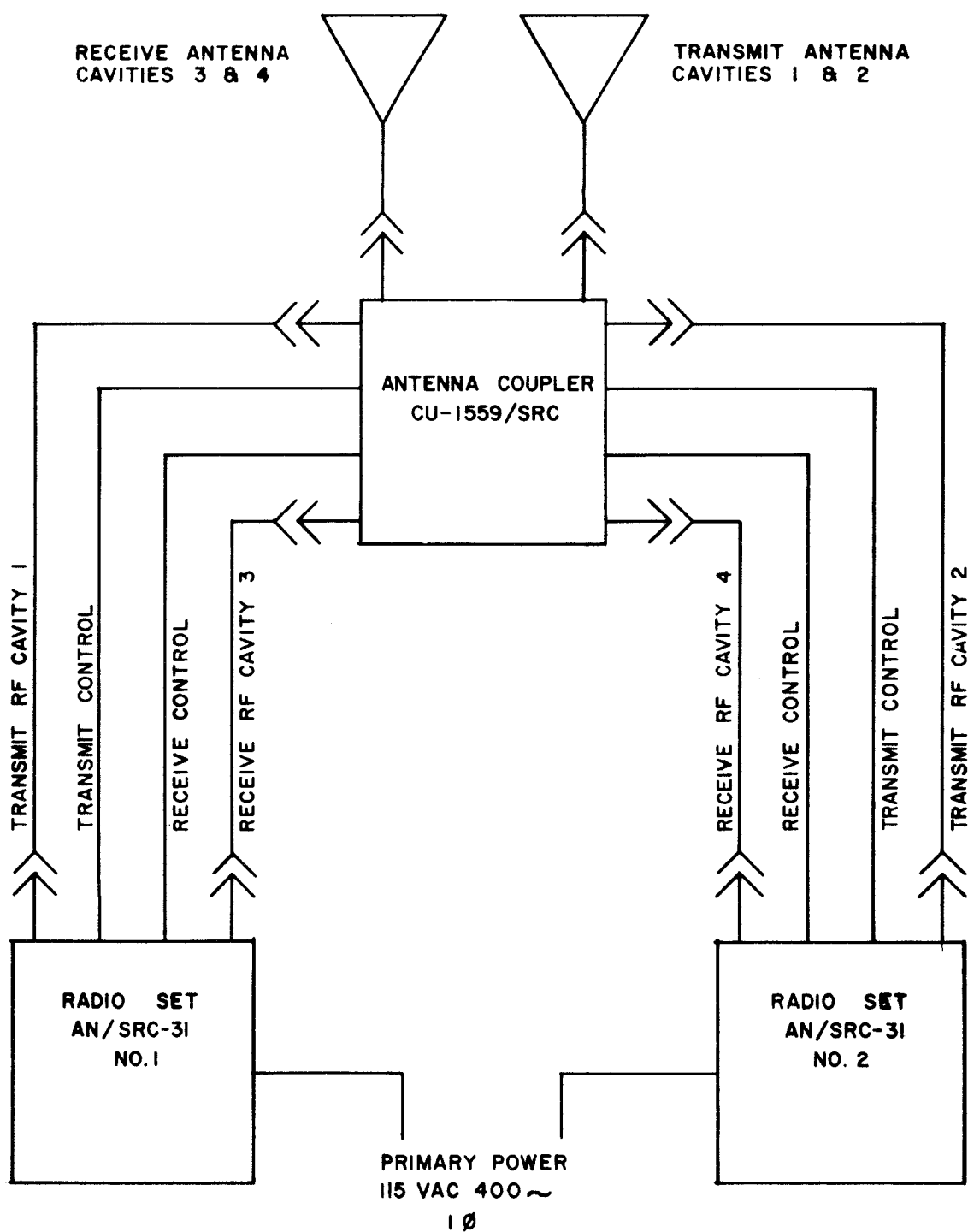


Figure 2-11 Antenna Coupler CU-1559/SRC Interconnection Diagram

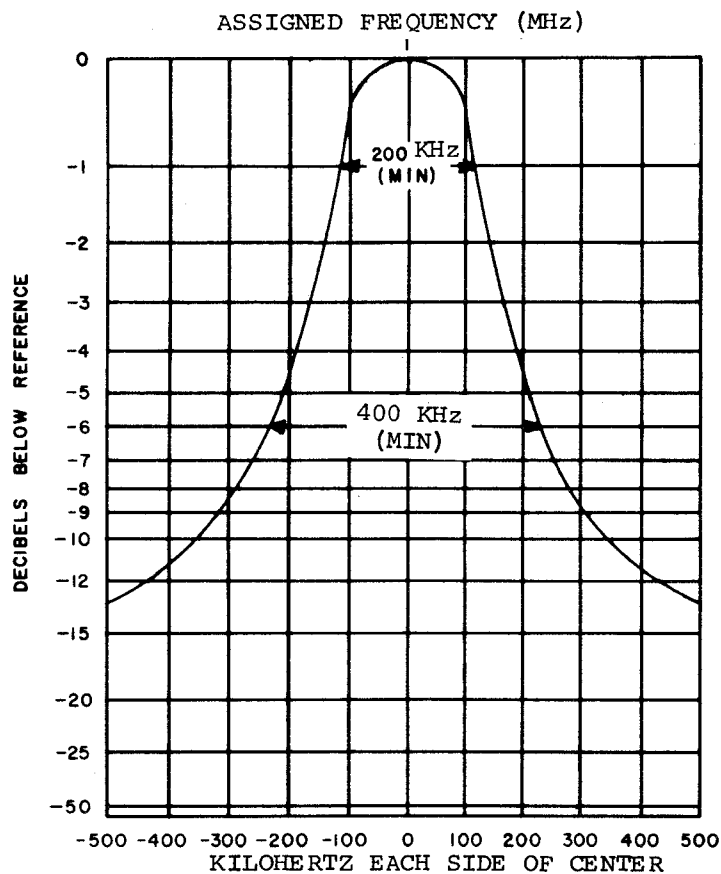


Figure 2-12 Antenna Coupler CU-1559/SRC Selectivity Curves

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 Table 2-4

TABLE 2-4 ANTENNA COUPLER CU-1559/SRC EQUIPMENT SUPPLIED

QTY PER UNIT	NOMENCLATURE		*OVERALL DIMENSIONS (IN.)			*VOLUME (CU FT)	*WEIGHT (LB)
	NAME	DESIGNATION OR PART NO.	HEIGHT	WIDTH	DEPTH		
1	Electrical Equipment Cabinet (less assemblies)	CY-6240/SRC	37.65	35.42	23.88	18.4	70
4	Tuned Cavity	FR-173/GRC	12.02	22.02	21.18	**3.24	**35
1	Technical Manual, Vol 1	NAVSHIPS 0967-238-0010	11.0	8.5	0.5	-	-
1	Technical Manual, Vol 2	NAVSHIPS 0967-238-0020	11.0	8.5	1.5	-	-
1	Reference Standards Book	NAVSHIPS 0967-238-0050	11.0	8.5	0.3	-	-
1	Performance Standards Sheet	NAVSHIPS 0967-238-0040	11.0	8.5	-	-	-
1	Operating Instruction Chart	NAVSHIPS 0967-238-0030	11.0	8.5	-	-	-

*Does not include mounting materials.

**Each Tuned Cavity FR-173/GRC.



SECTION 3

VHF MULTICOUPLERS (30 to 76 MHZ)

3.1 GENERAL.

The increased emphasis on the use of the lower portion of the vhf spectrum has established a requirement for multicouplers for these frequencies. Multi-couplers have been developed for installation especially on ships supporting amphibious operations.

VHF multicouplers are usually used for transceiving. Tunable pass-band filters are employed to provide the necessary isolation between channels. The high selectivity of these filters also reduces intermodulation interference, cross-modulation interference and other spurious responses. Harmonic radiation from the transmitters is also attenuated. The coupler and its associated broadband antenna are generally supplied as a complete system.



3.2 ANTENNA COUPLER GROUP AN/SRA-60(V).

a. TYPE/USE. Antenna Coupler Group AN/SRA-60(V) is a basic system of four couplers capable of operating simultaneously into a single broadband antenna. A single cabinet, supplied with the basic system, is capable of housing either one or two of the 4 channel coupler groups. The cabinet also contains a forced air blower, control power supply, antenna connectors, combiners and slides to accommodate the two 4 channel coupler groups.

b. PHYSICAL CONFIGURATION. - See Figures 3-1 and 3-2.

c. INTERCONNECTION DIAGRAM. - See Figures 3-3 and 3-4.

d. FREQUENCY RANGE. - 30 to 76 MHz.

e. NUMBER OF CHANNELS. - Four.

f. TYPE OF TUNING. - Manual.

g. POWER RATING. - 100 watts rf per channel, average and pep.

h. ANTENNA IMPEDANCE. - 50 ohms nominal, unbalanced; vswr not greater than 3:1.

i. OUTPUT CONNECTOR. - Type N (UG-22B/U).

j. INDIVIDUAL CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

k. INPUT CHANNEL CONNECTOR. - Type N (UG-22B/U).

l. PROTECTIVE CIRCUITS. - Interlock control circuits are provided to shut down the associated 100 watt transmitter when coupler vswr is greater than 4:1. Excessive temperature rise in coupler operates thermostat which also opens interlock circuit.

m. PRIMARY POWER. - 115 vac 60 Hz single phase.

- | | |
|---------------------------------|------------|
| (1) Four channel operation. | 200 watts. |
| (2) Two four channel operation. | 300 watts. |

n. HEAT DISSIPATION. -

- | | |
|---------------------------------|------------|
| (1) Four channel operation. | 200 watts. |
| (2) Two four channel operation. | 300 watts. |

o. TEMPERATURE RANGE. -

- | | |
|--------------------|--|
| (1) Coupler Group. | 0° to $+50^{\circ}$ C ($+32^{\circ}$ to $+120^{\circ}$ F). |
| (2) Antenna. | -54° to $+75^{\circ}$ C (-65° to $+168^{\circ}$ F). |

p. COOLING. - Forced air.

q. SELECTIVITY. - See Figure 3-5.

r. ISOLATION. - The isolation of all frequencies within the tuning range separated 1.5% from the center of the passband are greater than 40 dB. All frequencies separated 7% or more above the center of the passband are greater than 80 dB. Those separated 7% below center are greater than 75 dB.

s. INSERTION LOSS. - Not greater than 2.4 dB across frequency range.

t. INSTALLATION REQUIREMENTS. - A minimum of 18 inches is required at the rear of the cabinet for access to the rf input and output and control connections. A minimum of 38 inches is required in front of the cabinet for coupler removal and servicing.

u. SPECIAL CONSIDERATIONS. - The cabinet is supplied with a 5 inch detachable mounting base. This may be removed and the cabinet mounted directly to the deck when space is restricted. Figure 3-4 outlines the interconnection requirements for the operation of AN/VRC-46 series equipments with the AN/SRA-60 (V).

v. MEAN TIME BETWEEN FAILURES. (MTBF). - Coupler Group.	1340 hours.
Antenna.	3000 hours.

w. EQUIPMENT SUPPLIED. - See Table 3-1.

SHIPBOARD ANTENNA SYSTEMS
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 Figure 3-1

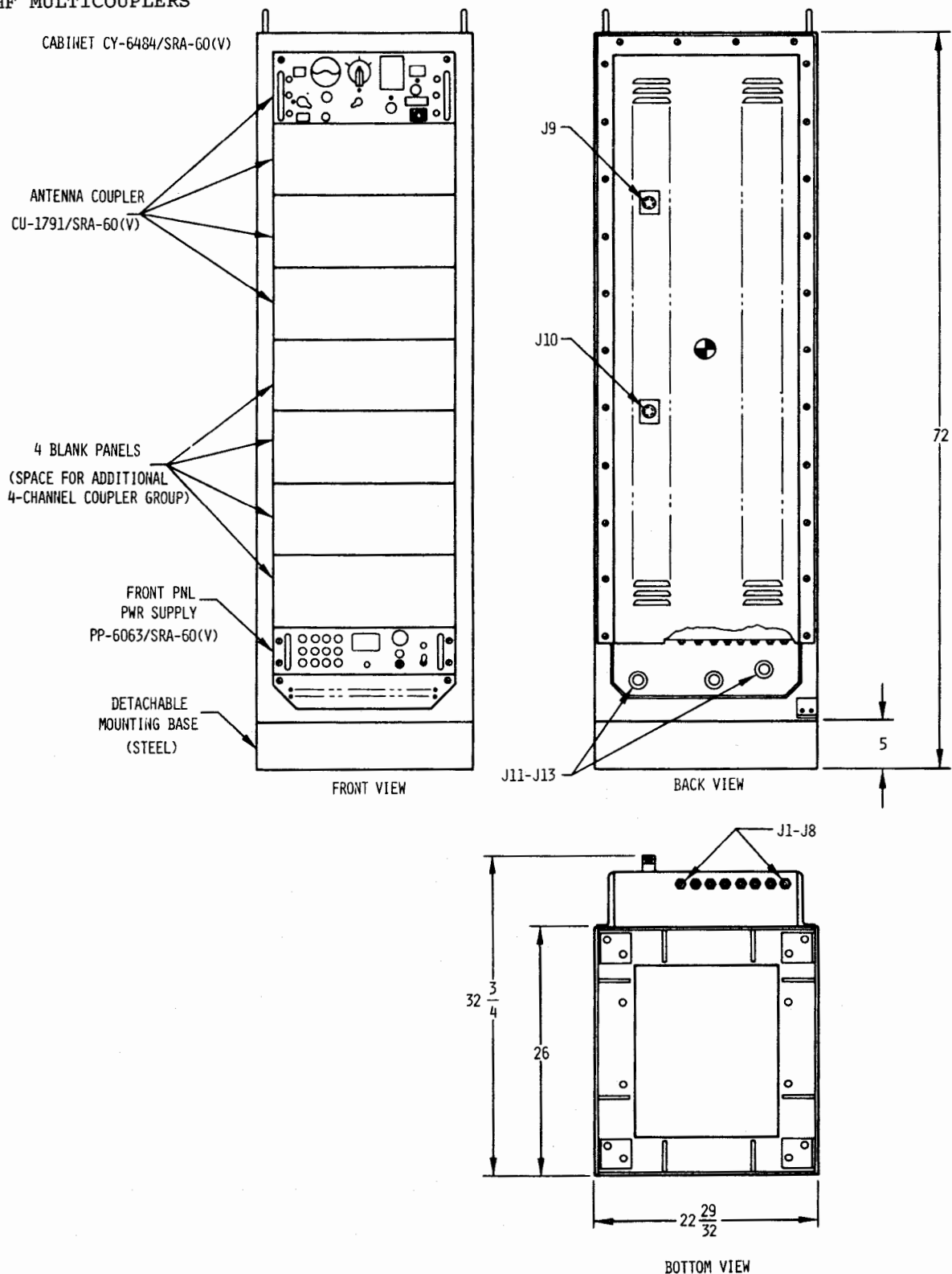


Figure 3-1 Antenna Coupler Group AN/SRA-60(V) Physical Configuration

Section 3
Figure 3-2

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SHIPBOARD ANTENNA SYSTEMS
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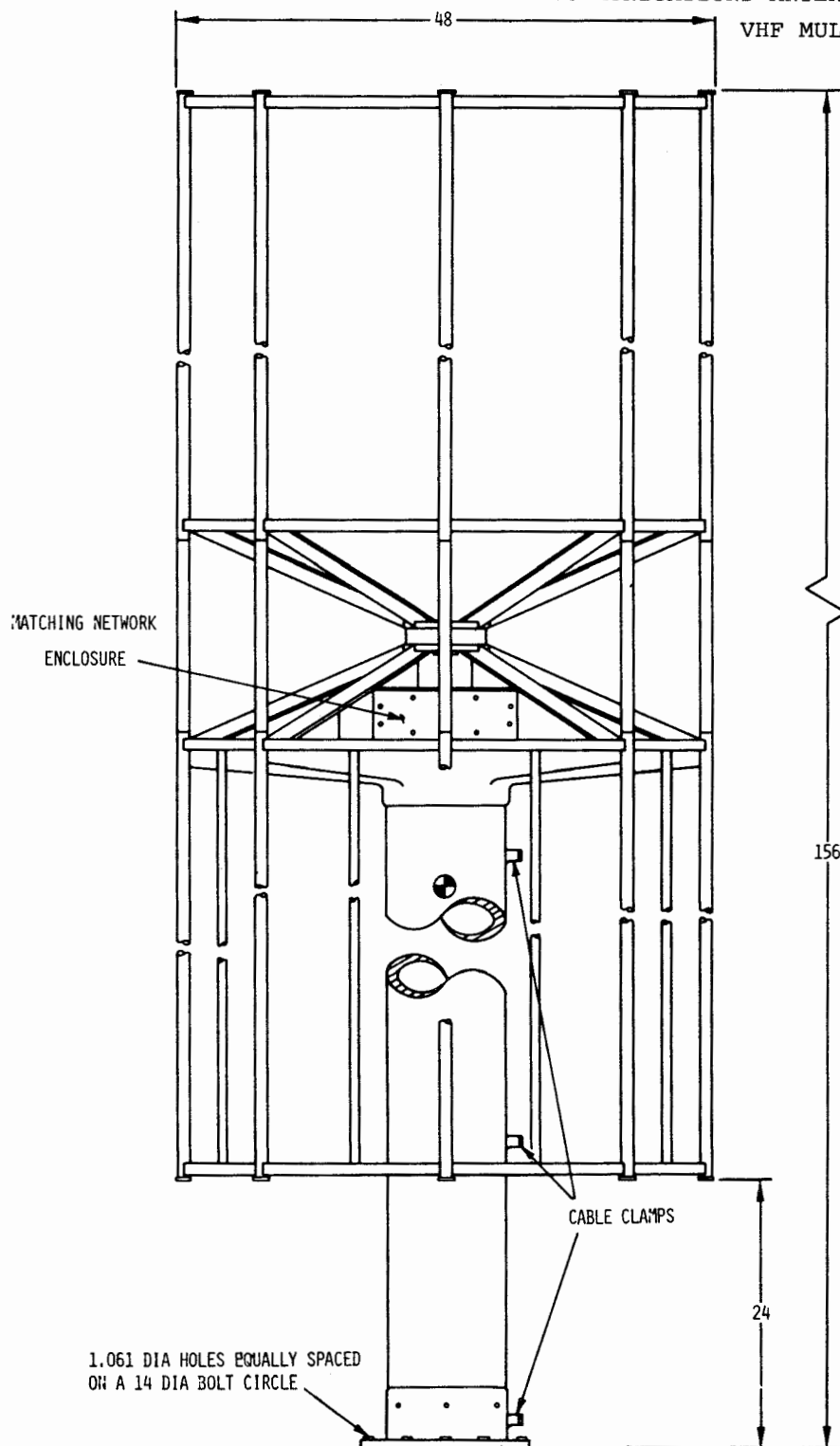


Figure 3-2 Antenna Coupler Group AN/SRA-60(V), AS-2231/SRA-60(V) Configuration

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Figure 3-3

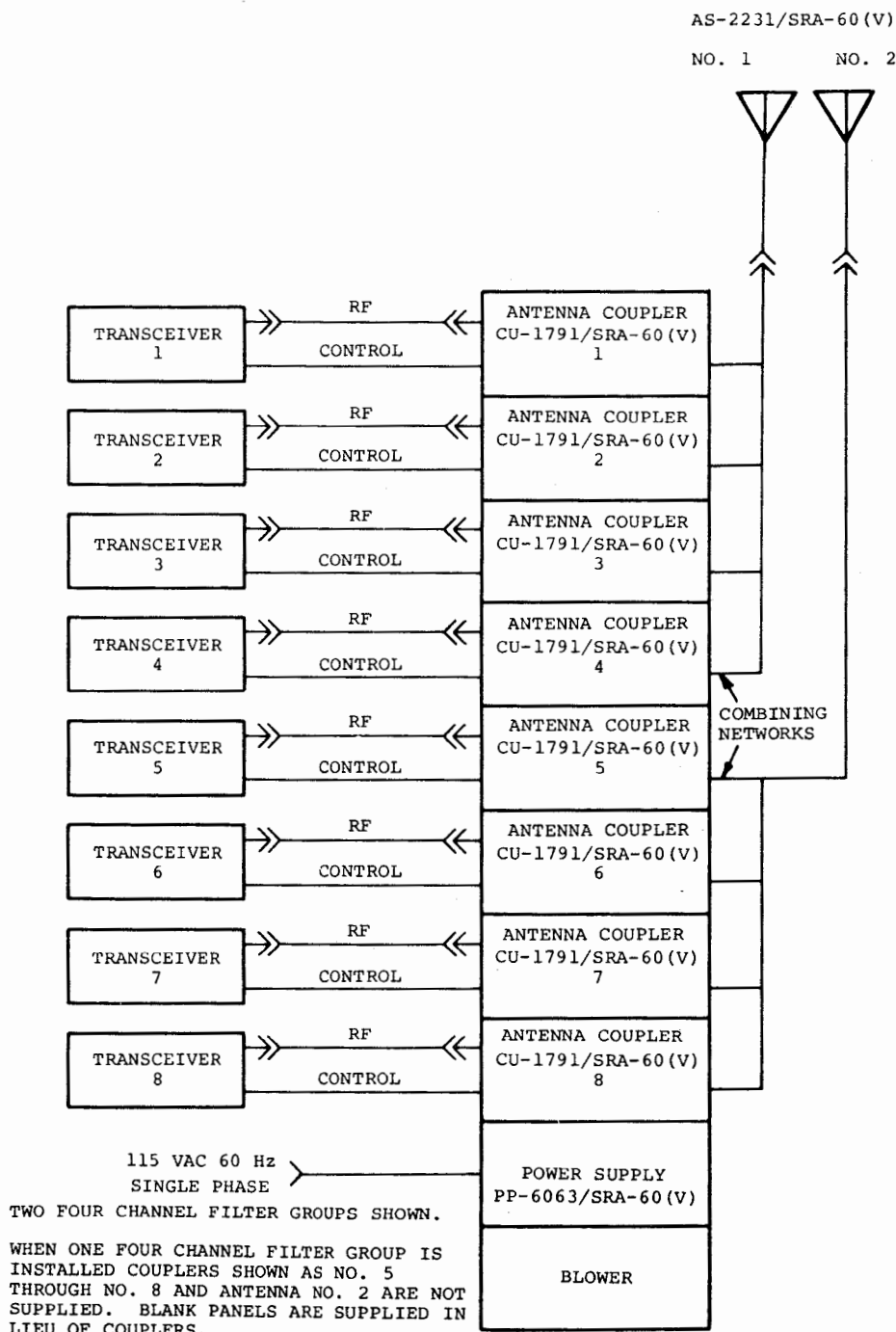


Figure 3-3 Antenna Coupler Group AN/SRA-60 (V)
Interconnection Diagram

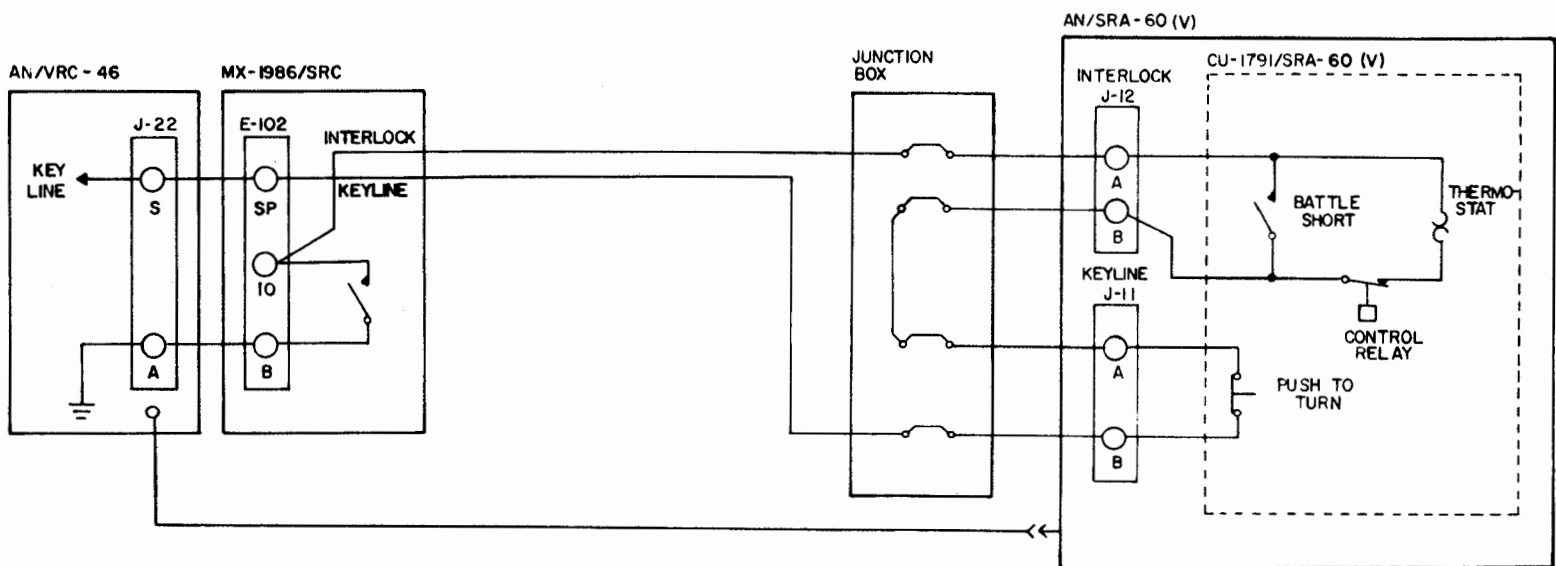


Figure 3-4 Antenna Coupler Group AN/SRA-60 (V)
Interconnection Diagram for AN/VRC-46

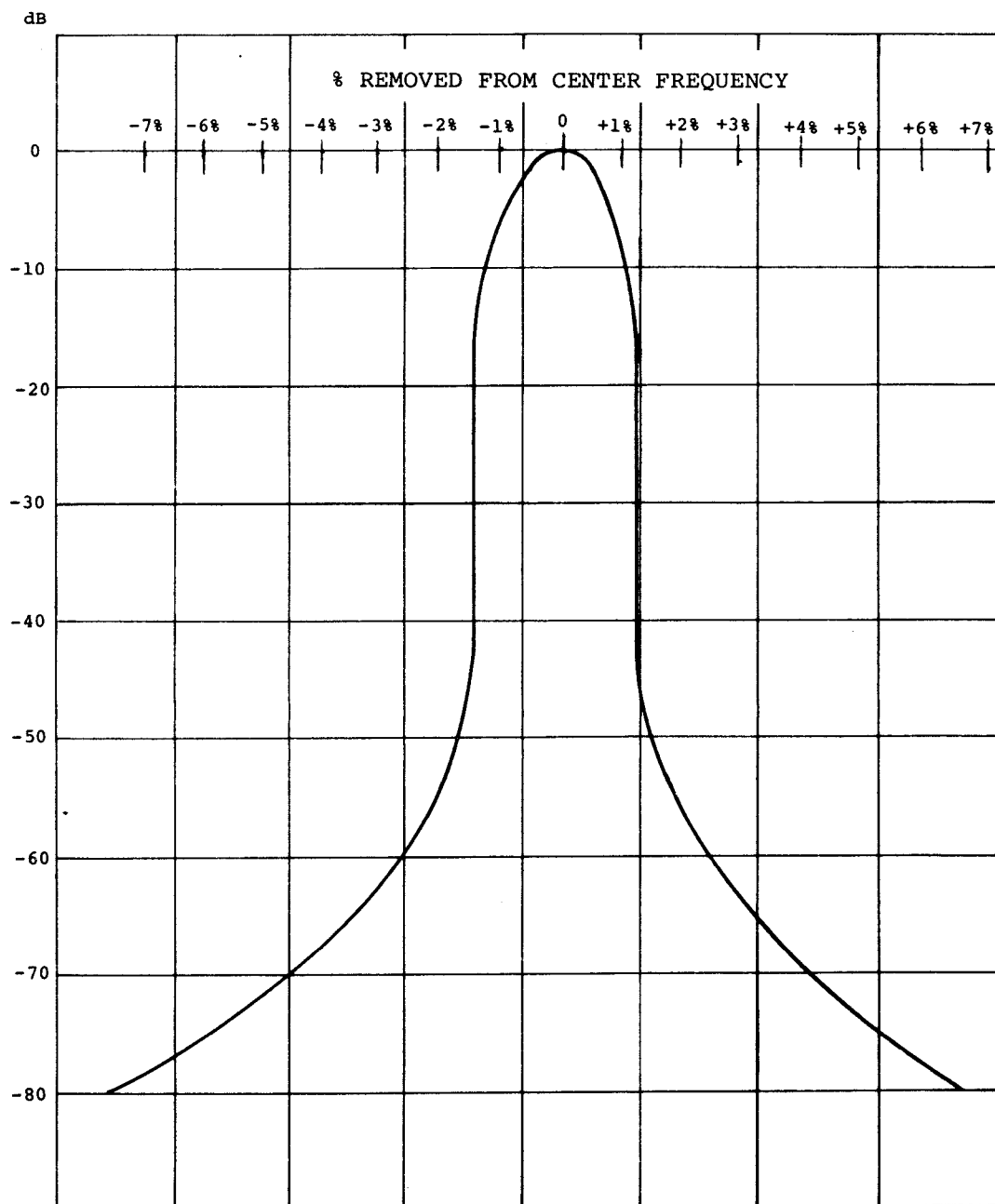


Figure 3-5 Antenna Coupler Group AN/SRA-60 (V)
Selectivity Curve (Typical).

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TABLE 3-1

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TABLE 3-1 ANTENNA COUPLER GROUP AN/SRA-60 (V)
EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERAL DIMENSIONS (IN.)			VOL (CU FT)	WEIGHT (LB)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
1	Electrical Equipment Cabinet	CY-6484/SRA- 60 (V)	72	23	32	30	560*
**	Antenna Coupler Assembly	CU-1791/SRA- 60 (V)	8.75	19	16	45	
1	Antenna	AS-2231/SRA- 60 (V)	156	48 dia.			412
2	Technical Manuals						

* Includes weight of 8 ea. CU-1791/SRA-60 (V) and Power Supply PP-6063/SRA-60 (V) couplers.

** Basic equipments supplied in single 4 channel operation or two independent four channel operation.

SECTION 4

MF/HF MULTICOUPLERS (2 to 30 MHz)

4.1 GENERAL.

MF/HF range multicouplers are generally designed for use either with transmitters or receivers. The exceptions are the AN/SRA-34(V) Coupler Group and the coupler group supplied with the AN/SRC-16 system. These groups are used for both transmitting and receiving. The multicoupler filters all use lumped LC resonators. Lumped LC resonators provide the necessary values of unloaded Q for the least volume. Since the volume of the inductors is proportional to Q^3 while the volume of the capacitors is approximately proportional to the power in the resonator, the volume required for the receiver multicoupler is still considerable despite the low power involved.

Because of the large size of the antennas (particularly in the 2 to 12 MHz range) and the circuit requirements, the number of channels in the mf/hf multicouplers is usually made as large as practical. These multicouplers are normally designed for use with antennas that present a vswr of 3:1 or less throughout the operating frequency range of the couplers.



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Paragraph 4.2

4.2 ANTENNA COUPLER GROUPS AN/SRA-38, AN/SRA-39, AN/SRA-40, AN/SRA-49, and AN/SRA-50.

a. TYPE/USE. - Antenna Coupler Groups AN/SRA-38, -39, -40, -49, and -50 are designed to connect up to twenty medium frequency and high frequency receivers to a single antenna. Each coupler group consists of fourteen to twenty individual couplers and a single power supply module in a special electronic equipment cabinet. An antenna input distribution termination and provisions for patching the outputs to the external receivers are also supplied. The AN/SRA-38 -39-40 group is supplied with a single SB-3333/SR Signal Distribution Panel for receiver distribution. The SB-3333/SR may be installed at a remote location. The AN/SRA-49 and AN/SRA-50 groups are each supplied with an SB-3332/SR Signal Distribution Panel installed in the group equipment cabinet. The AN/SRA-38, -39, and -40 are supplied as a complete group while the AN/SRA-49 and -50 are individual groups.

b. PHYSICAL CONFIGURATION. - See Figure 4-1.

c. INTERCONNECTION CABLING DIAGRAM. - See Figure 4-2.

d. FREQUENCY RANGE. -

(1) AN/SRA-38.	2 to 6 MHz.
(2) AN/SRA-39.	4 to 12 MHz.
(3) AN/SRA-40.	10 to 30 MHz.
(4) AN/SRA-49.	2 to 30 MHz.
(5) AN/SRA-50.	4 to 30 MHz.

e. NUMBER OF CHANNELS. -

(1) AN/SRA-38.	Twenty.
(2) AN/SRA-39.	Twenty.
(3) AN/SRA-40.	Twenty.
(4) AN/SRA-49.	Twenty.
(5) AN/SRA-50.	Fourteen.

The AN/SRA-38-39-40 group furnishes a total of 60 channels, 20 channels from 2 to 6 MHz, 20 channels 4 to 12 MHz, 10 channels 10 to 17 MHz and 10 channels 17 to 30 MHz. The AN/SRA-49 furnishes 6 channels 2 to 6 MHz, 6 channels 4 to 12 MHz, 4 channels 10 to 17 MHz, and 4 channels 17 to 30 MHz. The AN/SRA-50 furnishes 6 channels 4 to 12 MHz, 4 channels 10 to 17 MHz, and 4 channels 17 to 30 MHz.

f. TYPE OF TUNING. - Manual.

g. POWER RATING. - The power handling capability varies between 450 watts at 2 MHz to 18 watts at 30 MHz.

h. ANTENNA IMPEDANCE REQUIRED. - 50 ohms nominal, unbalanced; vswr not greater than 15:1.

i. ANTENNA CONNECTOR. - Type N (UG-22B/U).

j. INDIVIDUAL CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

k. CHANNEL CONNECTOR. - BNC (UG-291A/U).

l. PROTECTIVE CIRCUITS. - Input power to the receivers is limited to one volt. Recovery from an overloaded condition is automatic within a one-second recovery time.

- m. PRIMARY POWER REQUIRED. - 105-125 vac 60 Hz single phase 35 watts normal, 134 watts maximum. These requirements are for each group.
- n. HEAT DISSIPATION. - 20 watts normal per group.
- o. TEMPERATURE RANGE. - 0° to 50°C (32° to 122° F).
- p. COOLING. - Natural convection.
- q. SELECTIVITY. - See Figure 4-3.
- r. ISOLATION. - (5 PERCENT FREQUENCY SEPARATION).
- | | |
|----------------|---------------------|
| (1) AN/SRA-38. | Greater than 69 dB. |
| (2) AN/SRA-39. | Greater than 63 dB. |
| (3) AN/SRA-40. | Greater than 54 dB. |
| (4) AN/SRA-49. | Greater than 54 dB. |
| (5) AN/SRA-50. | Greater than 54 dB. |
- s. INSERTION LOSS.
- | | |
|----------------|--------------------------|
| (1) AN/SRA-38. | Not greater than 15 dB. |
| (2) AN/SRA-39. | Not greater than 11 dB. |
| (3) AN/SRA-40. | Not greater than 8.1 dB. |
| (4) AN/SRA-49. | Not greater than 15 dB. |
| (5) AN/SRA-50. | Not greater than 11 dB. |
- t. INSTALLATION REQUIREMENTS. - Clearance of 4 feet at the front of the equipment cabinets is required for chassis withdrawal and maintenance area. The DA-515/U Dummy Load must be mounted horizontally and the distance between the coupler equipment cabinet and the dummy load must not exceed 60 inches. A minimum of six inches on all sides of the dummy load is required for heat dissipation by convection.
- u. SPECIAL CONSIDERATIONS. - The SB-3333/SR Signal Distribution Panel supplied with the AN/SRA-38-39-40 group is designed for mounting in a standard CY-4516/U cabinet. This cabinet is not supplied with the coupler group. Audio output from the receivers is required at the coupler group for use in tuning the couplers. Output connections for remote overload indication are provided. The protective circuit printed circuit board also contains a white noise generator for use in tuning the couplers in the absence of an atmospheric signal.
- v. MEAN TIME BETWEEN FAILURES. (MTBF). - 1000 hours.
- w. EQUIPMENT SUPPLIED. - See Table 4-1.

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Figure 4-1

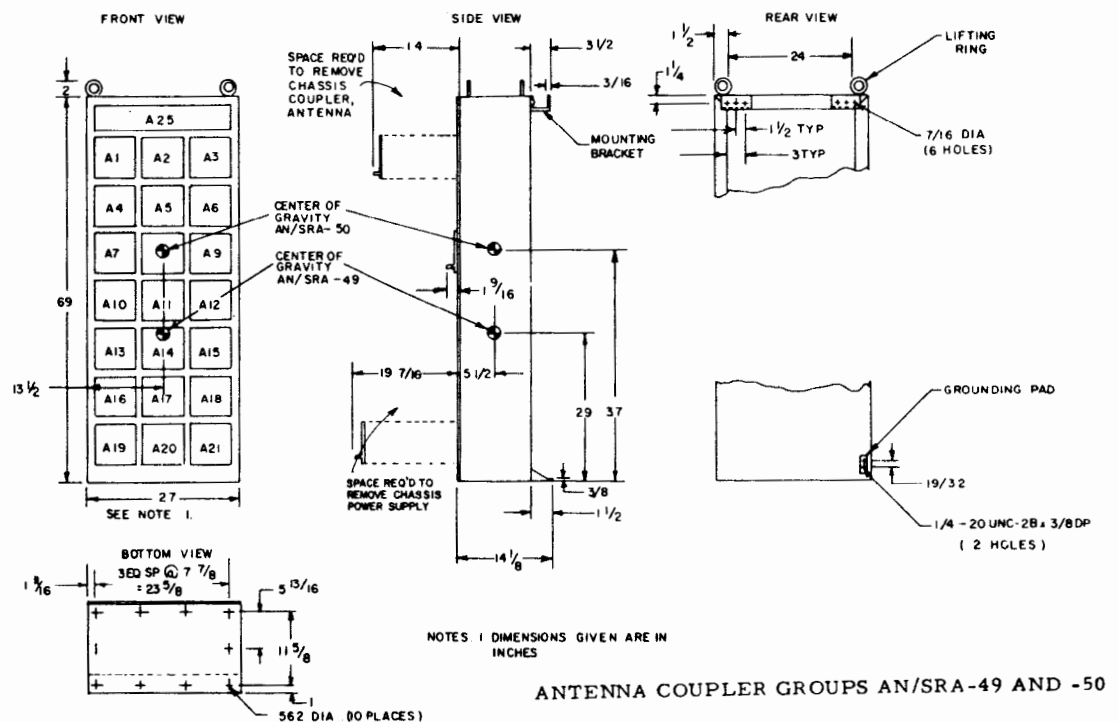
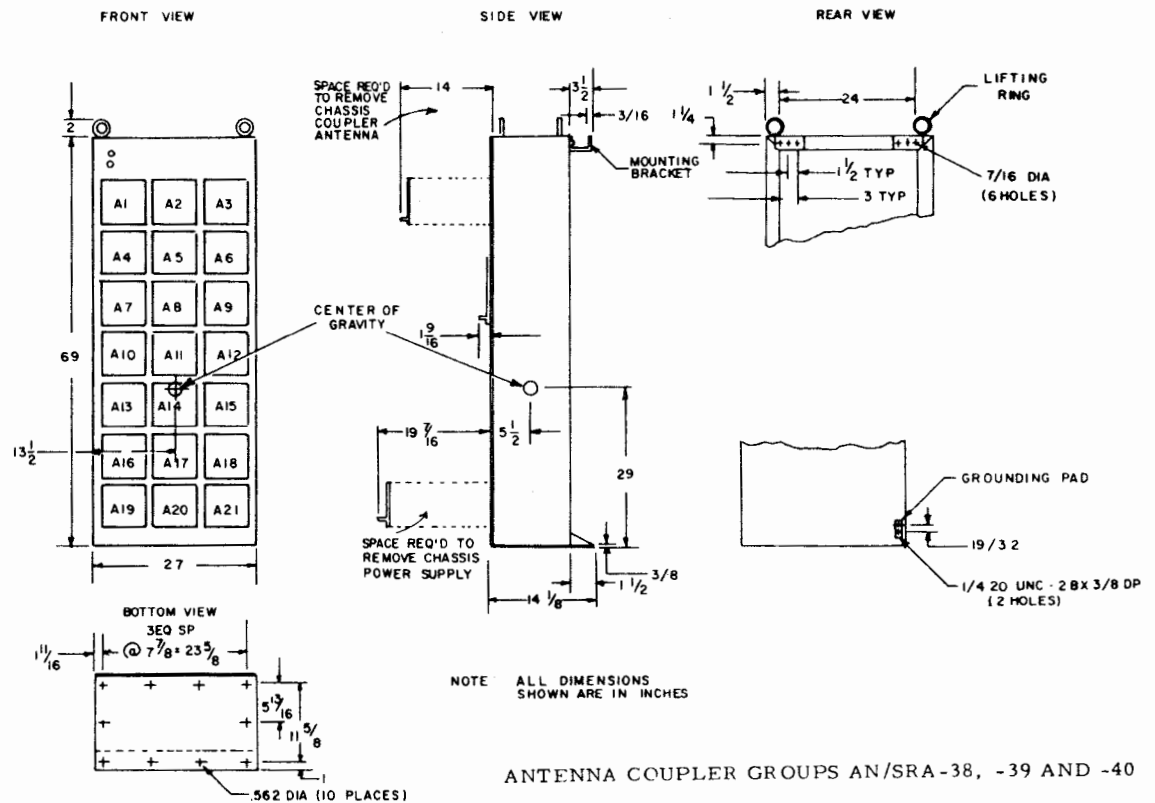


Figure 4-1 Antenna Coupler Groups AN/SRA-38, -39, -40, -49 and -50

ORIGINAL

Physical Configuration

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Figure 4-2

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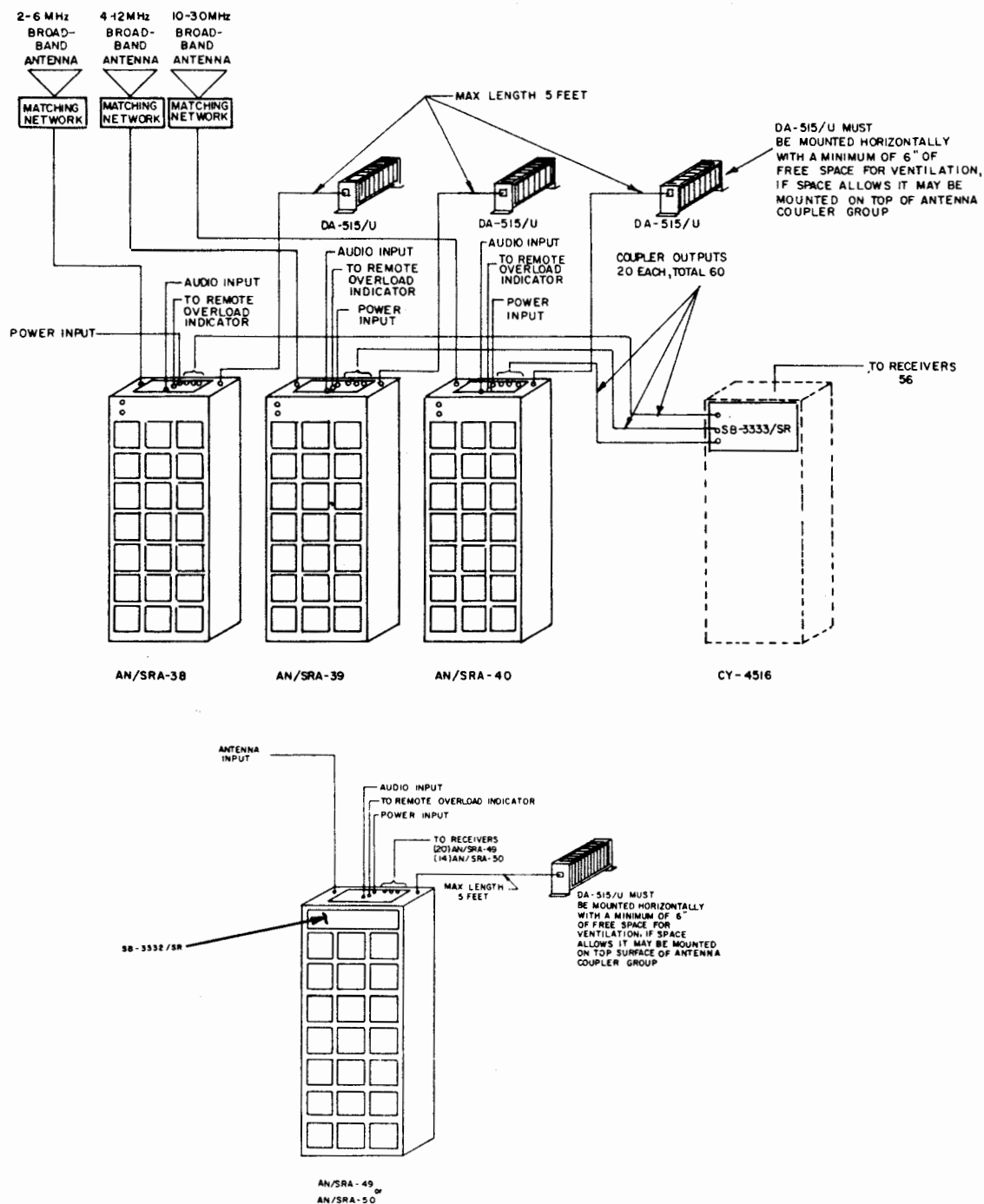


Figure 4-2 Antenna Coupler Groups AN/SRA-38, -39, -40, -49 and -50
Interconnection Cabling Diagram

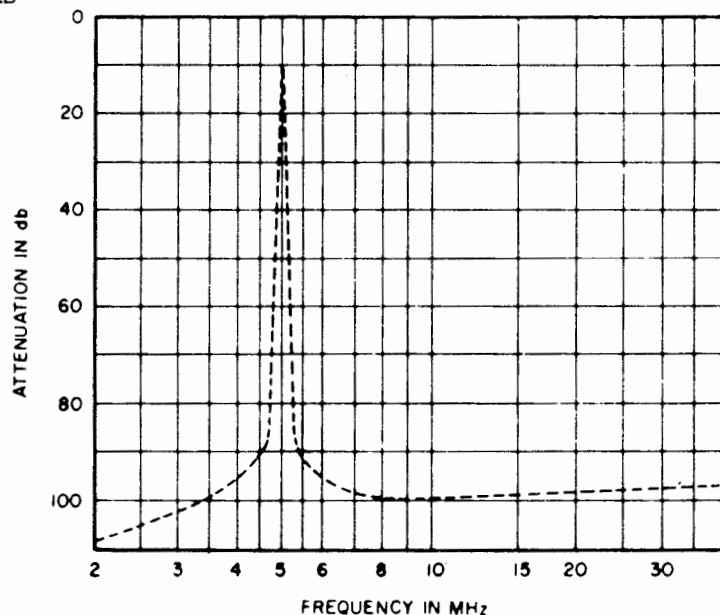


Figure 4-3 Antenna Coupler Groups AN/SRA-38, -39, -40, -49 and -50
 Selectivity Curve (Typical).

TABLE 4-1 ANTENNA COUPLER GROUPS AN/SRA-38, -39, -40, -49 AND -50
 EQUIPMENT SUPPLIED

QUANTITY					NOMENCLATURE	PART OR MODEL NO.
AN/SRA						
-38	-39	-40	-49	-50		
20			6		Coupler, Antenna	CU-1799/SRA
	20		6	6	Coupler, Antenna	CU-1800/SRA
		10	4	4	Coupler, Antenna	CU-1801/SRA
		10	4	4	Coupler, Antenna	CU-1802/SRA
1	1	1	1	1	Power Supply	PP-4846/SRA
			1		Cabinet, Electrical Equipment	CY-6507/SRA
1	1	1			Cabinet, Electrical Equipment	CY-6573/SRA
				1	Cabinet, Electrical Equipment	CY-6574/SRA
1	1	1	1	1	Dummy Load, Electrical	DA-515/U
			1	1	Panel, Signal Distribution, Radio	SB-3332/SR
1					Panel, Signal Distribution, Radio	SB-3333/SR

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Table 4-1

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TABLE 4-1 ANTENNA COUPLER GROUPS AN/SRA-38, -39, -40, -49 and -50
EQUIPMENT SUPPLIED, - CONTINUED

QTY PER EQUIP	NOMENCLATURE		OVER-ALL DIMENSIONS (INCHES)			VOLUME	WEIGHT
	NAME	DESIG.	HEIGHT	WIDTH	DEPTH	(CU FT)	(LB)
1	Coupler Group	AN/SRA-38	71	27	17-11/16	19-1/2	465
1	Coupler Group	AN/SRA-39	71	27	17-11/16	19-1/2	465
1	Coupler Group	AN/SRA-40	71	27	17-11/16	19-1/2	465
3	Dummy Load, Electrical	DA-515/U	8-1/2	5-5/16	17	1/2	20
1	Panel, Signal Distri- bution Radio	SB-3333/SR	15- $\frac{23}{32}$	19	5-1/8	.9	18-1/2
50	Patch Cords	20-37184					
176	Connectors	M39012/16- 0001 (UG88 G/U)					
3	Connectors	M39012/06- 0002 (UG573 C/U)					
3	Test Fixture Assembly	02-13501-1					
3	Extender Cable	13-13548-1					
6	Technical Manual	NAVSHIPS 0967-303-8610					

EQUIPMENT SUPPLIED WITH AN/SRA-38, -39, -40

QTY PER EQUIP	NOMENCLATURE		OVER-ALL DIMENSIONS (INCHES)			VOLUME	WEIGHT
	NAME	DESIG.	HEIGHT	WIDTH	DEPTH	(CU FT)	(LB)
1	Coupler Group	AN/SRA-49	71	27	17-11/16	19-1/2	500
1	Dummy Load, Electrical	DA-515/U	8-1/2	5-5/16	17	1/2	20
20	Patch Cords	20-37184					
27	Connectors	M39012/06- 0002 (UG573 C/U)					
1*	Test Fixture Assembly	02-13501-1					
1*	Extender Cable	13-13548-1					
2	Technical Manual	NAVSHIPS 0967-303-8610					

EQUIPMENT SUPPLIED WITH AN/SRA-49

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 Table 4-1

TABLE 4-1 ANTENNA COUPLER GROUPS AN/SRA-38, -39, -40, -49 and -50
 EQUIPMENT SUPPLIED, - CONTINUED

QTY PER EQUIP	NOMENCLATURE		OVER-ALL DIMENSIONS (INCHES)			VOLUME	WEIGHT
	NAME	DESIG.	HEIGHT	WIDTH	DEPTH	(CU FT)	(LB)
1	Coupler Group	AN/SRA-50	71	27	17-11/16	19-1/2	415
1	Dummy Load, Electrical	DA-515/U	8-1/2	5-5/16	17	1/2	20
20	Patch Cords	20-37184					
21	Connectors	M39012/06- 0002 (UG573 C/U)					
2	Technical Manual	NAVSHIPS 0967-303-8610					
1*	Test Fixture Assembly	02-13501-1					
1*	Extender Cable	13-13548-1					

EQUIPMENT SUPPLIED WITH AN/SRA-50



4.3 BANDPASS FILTER F-1039/U.

- a. TYPE/USE. - Bandpass Filter F-1039/U is a remotely tuned sharply selective bandpass filter with integral rf amplifiers. The F-1039/U receives and amplifies desired signals in the passband in the presence of very strong out of band signals such as those from nearby transmitters. The sensitivity of the integral rf amplifiers maintains the receive weak signal performance. The F-1039/U is a single channel system, however methods have been developed to combine several units operating from a single antenna into a multicoupler system.
- b. PHYSICAL CONFIGURATION. - See Figure 4-4 and Figure 4-5.
- c. INTERCONNECTION CABLING DIAGRAM. - See Figure 4-6.
- d. FREQUENCY RANGE. - 2 to 30 MHz.
- e. NUMBER OF CHANNELS. - One. As many as twelve units may be connected to form a multicoupler.
- f. TYPE OF TUNING. - Remote; manual in 1 KHz. steps. A remote control is required for each channel.
- g. POWER RATING. - Input circuitry is capable of withstanding an on frequency signal of 2 volts.
- h. ANTENNA IMPEDANCE REQUIRED. - 50 ohms nominal, unbalanced.
- i. ANTENNA CONNECTOR. - Type C. (UG-571/U).
- j. INDIVIDUAL CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.
- k. CHANNEL CONNECTOR. - Collins Radio Part No. 370-2207-00.
- l. PROTECTIVE CIRCUITS. - The antenna is automatically disconnected if the filter off resonance input voltage exceeds 1400 volts peak or input to the second amplifier exceeds 2 volts at resonance. The input sensor protects against strong off frequency signals. The amplifier sensor protects primarily against excessive signals on frequency or near the passband. The antenna is also disconnected during band switching. Operation of the overload circuit is indicated at the respective control unit. The protective circuit must be manually reset following an overload before normal operation is restored.
- m. PRIMARY POWER. - 115 vac 50/400 Hz. 140 watts per channel maximum.
- n. HEAT DISSIPATION. - 140 watts per channel maximum.
- o. TEMPERATURE RANGE. - Minus 40° to +50° C (-40° to +120° F).
- p. COOLING. - Forced air. Integral blower each channel.
- q. SELECTIVITY. - See Figure 4-7.
- r. ISOLATION. - When used as a multicoupler, -65 dB at 5 percent frequency separation on adjacent channel.
- s. GAIN. - Normal, 6 dB minimum 16 dB maximum. Low, -35 dB from normal.

t. SENSITIVITY. - 0.25 uv input at 2.0 MHz. and 0.6 uv input at 30 MHz. for 10 dB. s+n/n ratio in 2.7 KHz. bandwidth.

u. INTERMODULATION. - Normal gain, no more than -30 dB for two equal input signals of 0.1 volts rms. Low gain, no more than -30 dB for two equal signals of 1.0 volts rms.

v. CROSS MODULATION. - No more than -30 dB for two equal input signals 500 volts rms each at $\pm$ 10 percent from nominal frequency (SSB test).

w. INSTALLATION REQUIREMENTS. - A remote control cable is required between each control unit and its associated bandpass filter. The individual bandpass filters are each contained in a 1/2 ATR case. Normally three in a row are mounted in a standard rack. For this purpose Mounting Tray MT-3652/U must be ordered separately. See Figure 4-4.

x. SPECIAL CONSIDERATIONS.- The F-1039/U is designed for use in aircraft. Suitable mounting panels must be supplied by the installing activity for the remote control units when installed on board ships.

Instructions for installation and use as a multicoupler are contained in Technical Manual NAVSHIPS 0967-120-9010, Supplement No. 1 and below.

The use of the combining and distribution circuitry described in Supplement No. 1 of the technical manual imposes restrictions on both the frequency range and the number of filters that can be operated simultaneously from a common antenna. System degradation appears as notched response or as highly attenuated input circuits of the individual filters at some frequency within the normal operating range. The frequency at which the low impedance or short circuit occurs is dependent on the number of filters being used, their position in the distribution line and the frequency to which they are tuned. As the number of filters are increased and/or the frequencies to which they are tuned (in any given sub-band) are lowered, the short circuit for an individual filter occurs at progressively lower frequencies. Therefore it is possible that signal loss values of more than 40 dB can occur under certain conditions. In operation the selection of frequencies and the number of filters in use will have to be rigidly controlled to prevent near short circuits within the frequency band. These restrictions severely limit the flexibility and usefulness of the system.

The Naval Research Laboratory has developed a terminated transmission line combining technique that overcomes the restrictions encountered above. This technique has been implemented in the AN/SRA-38, -39, -40, -49 and -50 Antenna Coupler Groups.

The terminated distribution circuitry for the F-1039/U is basically different in form to that employed in the AN/SRA-38 series. The energy transfer medium to the input resonator is a variable capacitor in lieu of an input coupling loop. Therefore out of band impedance of the F-1039/U is capacitive and variable depending on the frequency to which the filter is tuned in any of the four sub-bands. The F-1039/U distribution circuitry utilizes the input capacitance characteristics of the filters as the shunt element of a "T" section network. The series elements are small inductances arranged on either side of the filter input terminal. The characteristic impedance of this network is designed to be 50 ohms for the nominal value of the shunt capacitance presented by the filter. The actual value of the input capacitance will vary above and below the design value depending on the frequency to which the filter is tuned. Therefore a unity insertion vswr is not practical over the complete frequency range.

Figure 4-8 illustrates the method of grouping of up to four trays (12 filters) that may be series connected between a common antenna and a 50 ohm termination. The connection between filters on each tray is accomplished by a 50 ohm strip transmission line. Physically the distribution circuitry is housed in a rectangular cross section enclosure that extends over the full width of the back of the mounting tray. Type "N" coaxial receptacles on each end of the combiner enclosures permit the trays to be series connected by means of thirteen inch lengths of 50 ohm RG-225/U coaxial cable.

The electrical performance of both six and twelve unit filter systems over the 2 to 30 MHz. frequency range are shown in Figure 4-9. The levels indicated are relative to a single filter performance operated apart from the distribution circuitry. A convergence of the maximum and minimum amounts of signal degradation to a value of approximately 4.0 dB is noted at the 2 MHz end of the frequency range. As frequency is raised, the range between maximum and minimum signal degradation increases because of an increasing vswr on the distribution transmission line. The higher vswr is due to increased transformation effects of the input impedance of the filters. This effect cannot be compensated for without sacrificing performance at the lower frequencies.

The implementation of the terminated distribution circuitry will require a rearrangement of the wiring to the vacuum switch in the input circuitry of the F-1039/U and the installation of an appropriate compensation capacitor. These modifications are required to preserve the vswr on the distribution line when a filter is placed in the "OFF" position. In the "OFF" position the vacuum relay, K-1, is normally arranged to provide an open circuit input condition, this removes the shunt element of the "T" section of the distribution line and disturbs the vswr. Rearrangement of the wiring to the vacuum relay can be made to switch in an auxillary compensation capacitor. The compensation capacitor simulates the presence of the filter when it is placed in the "OFF" position. Figure 4-10 describes the vacuum relay contact connections before and after the installation of the compensation capacitor. Through the use of the compensation capacitors the vswr on the distribution line for a six filter system in the "OFF" position is less than 1:1 throughout the 2 to 30 MHz frequency range.

- y. MEAN TIME BETWEEN FAILURE (MTBF). - 800 hours.
- z. EQUIPMENT SUPPLIED. - See Table 4-2.

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Figure 4-4

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SHIPBOARD ANTENNA SYSTEMS
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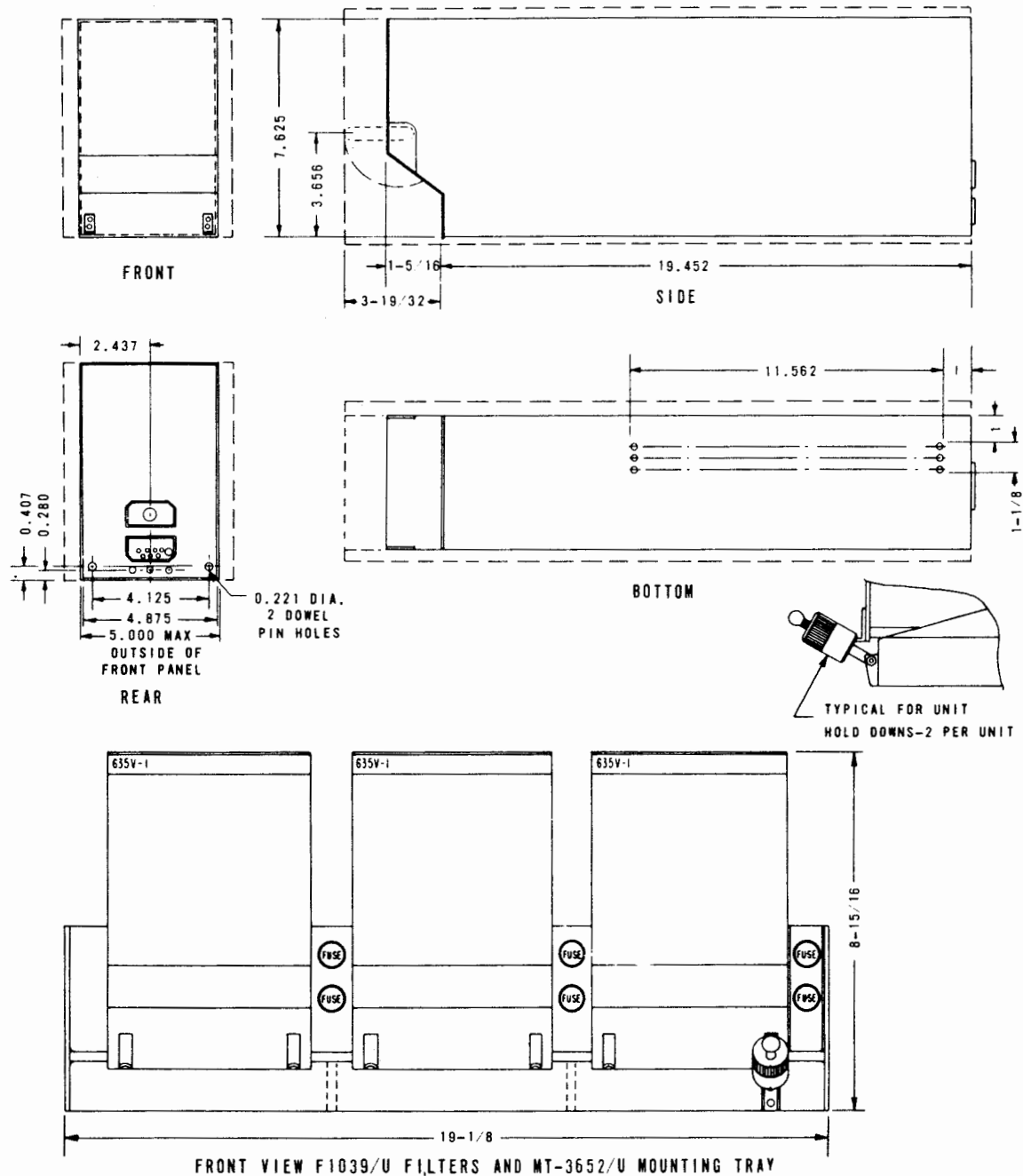


Figure 4-4 Bandpass Filter F-1039/U Physical Configuration

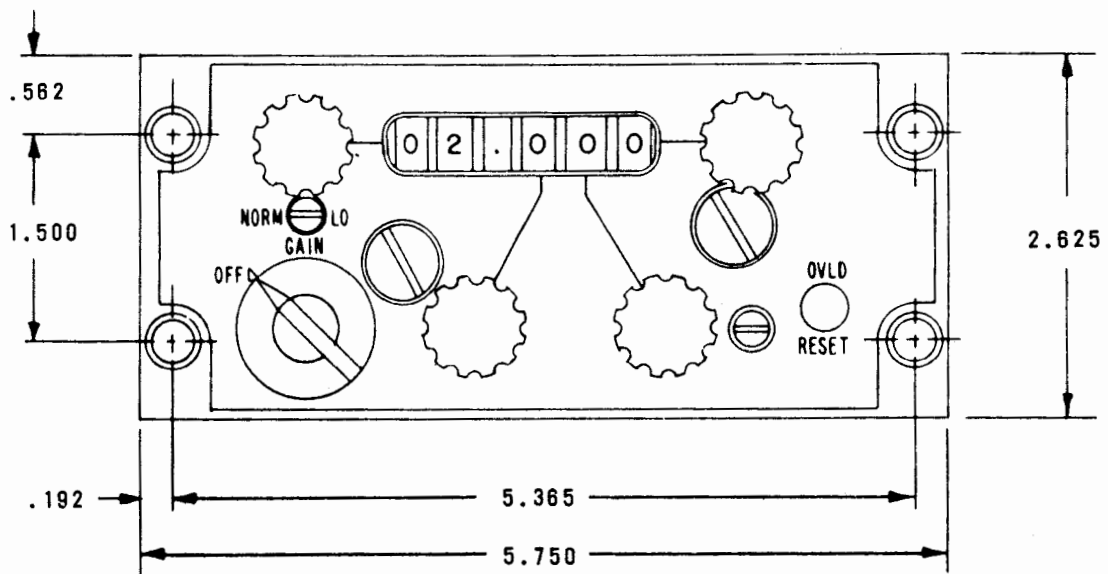
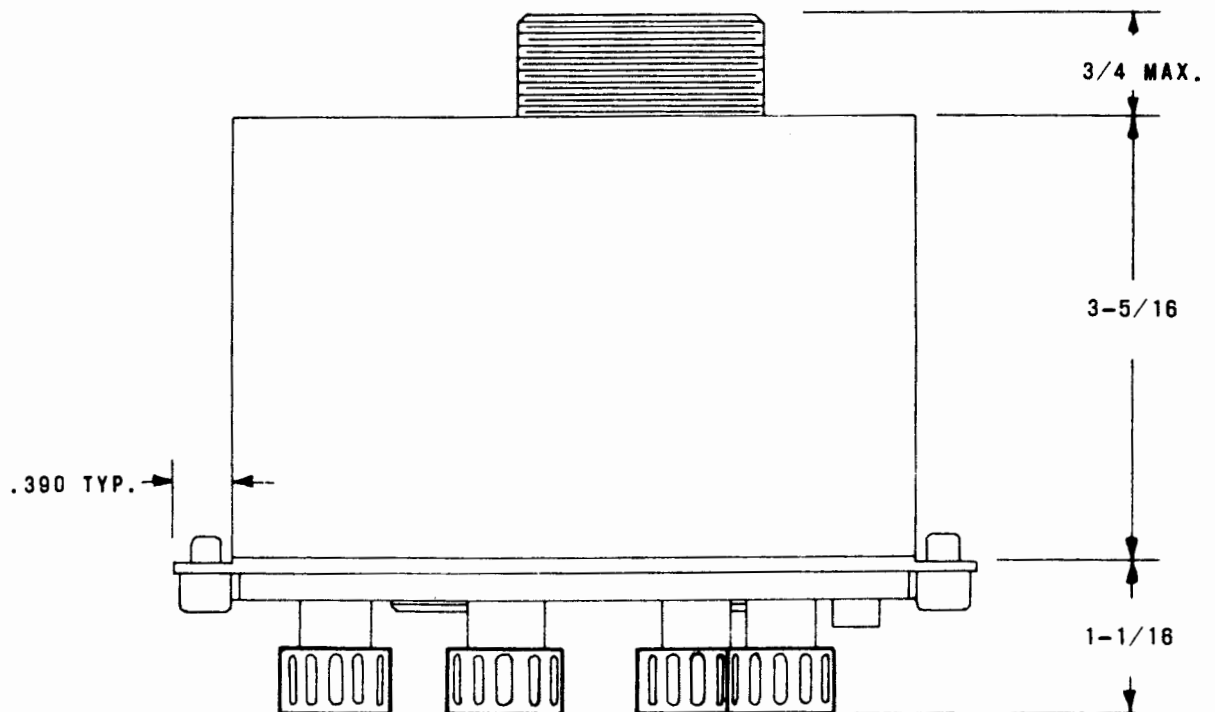


Figure 4-5 Filter Control C-7082/U, Physical Configuration

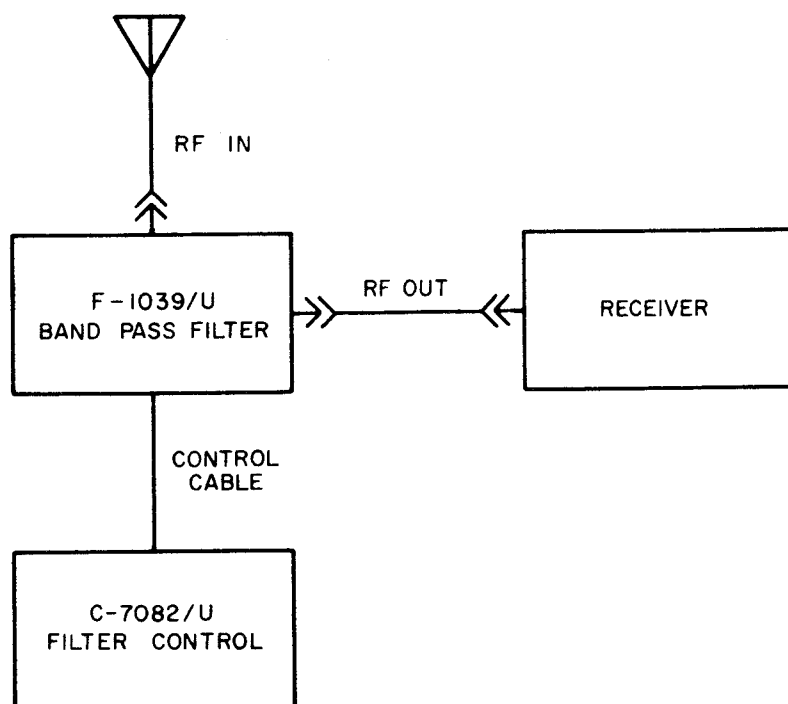


Figure 4-6 Bandpass Filter F-1039/U Interconnection Diagram

TABLE 4-2 BANDPASS FILTER F-1039/U EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERAL DIMENSIONS (IN.)			VOL (CU FT)	WEIGHT (LB)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
1	Bandpass Filter	F-1039/U	7.6	4.8	19.6	.05	23.7
1	Filter Control	C-7082/U	2.3	5.75	5.25	.075	2.5
1	Monitor Tray	MT-3652/U	3.0	5.25	23.5	.3	1.0
1	Tech Manual	NAVSHIPS 0967-120-9010 NAVSHIPS 0967-120-9012					

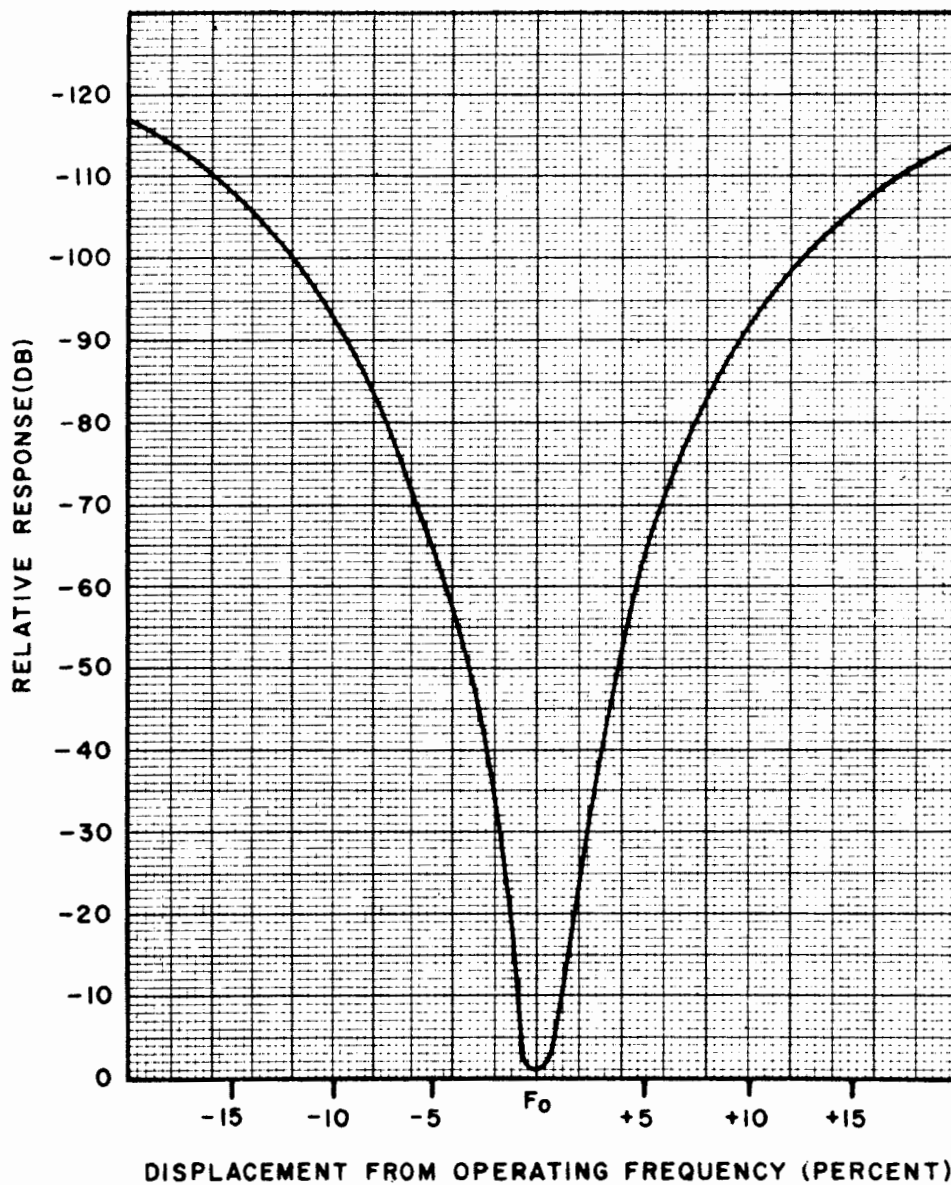


Figure 4-7 Bandpass Filter F-1039/U Selectivity Curve

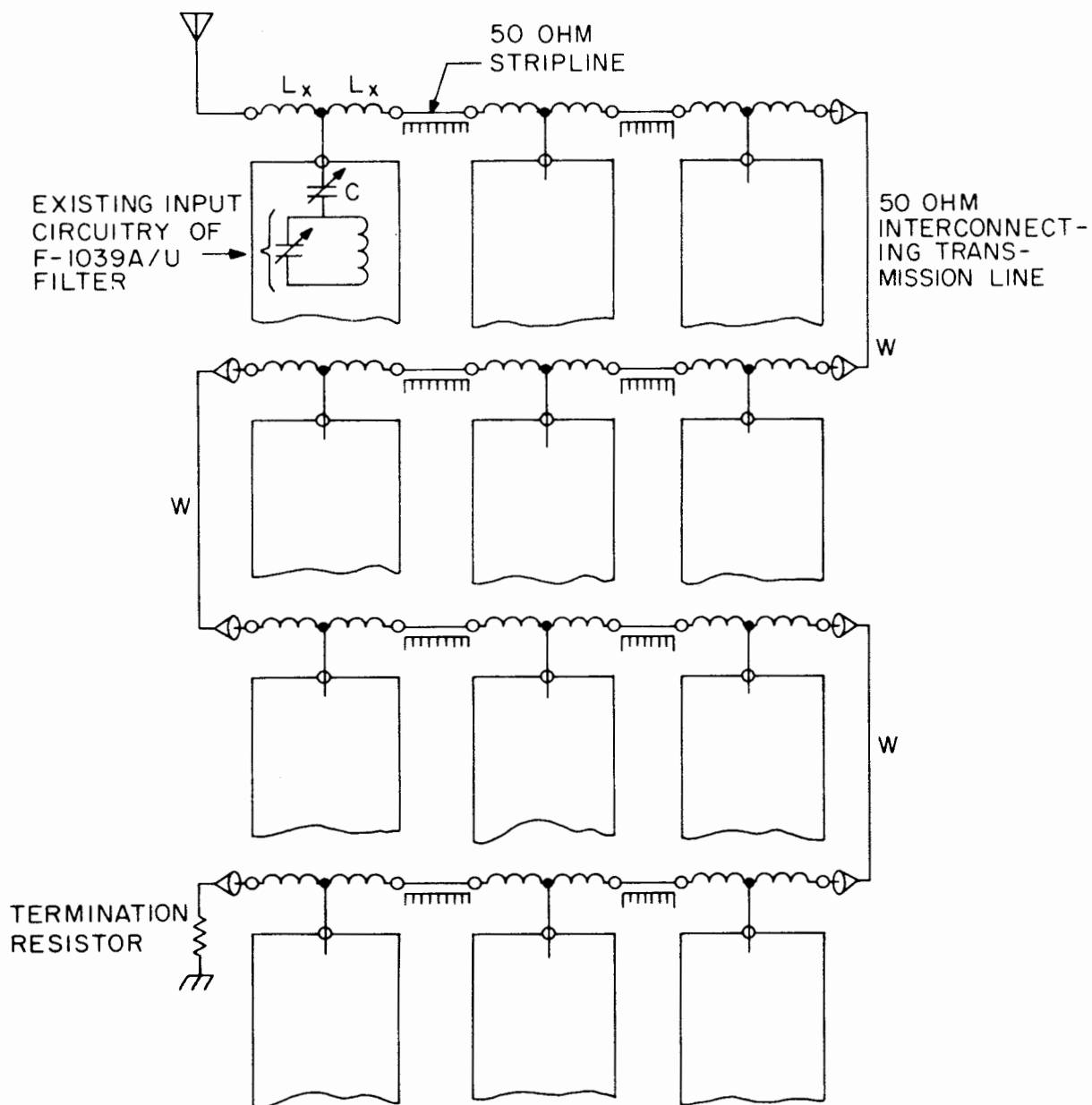


Figure 4-8 Bandpass Filter F-1039/U Terminated Distribution Circuitry

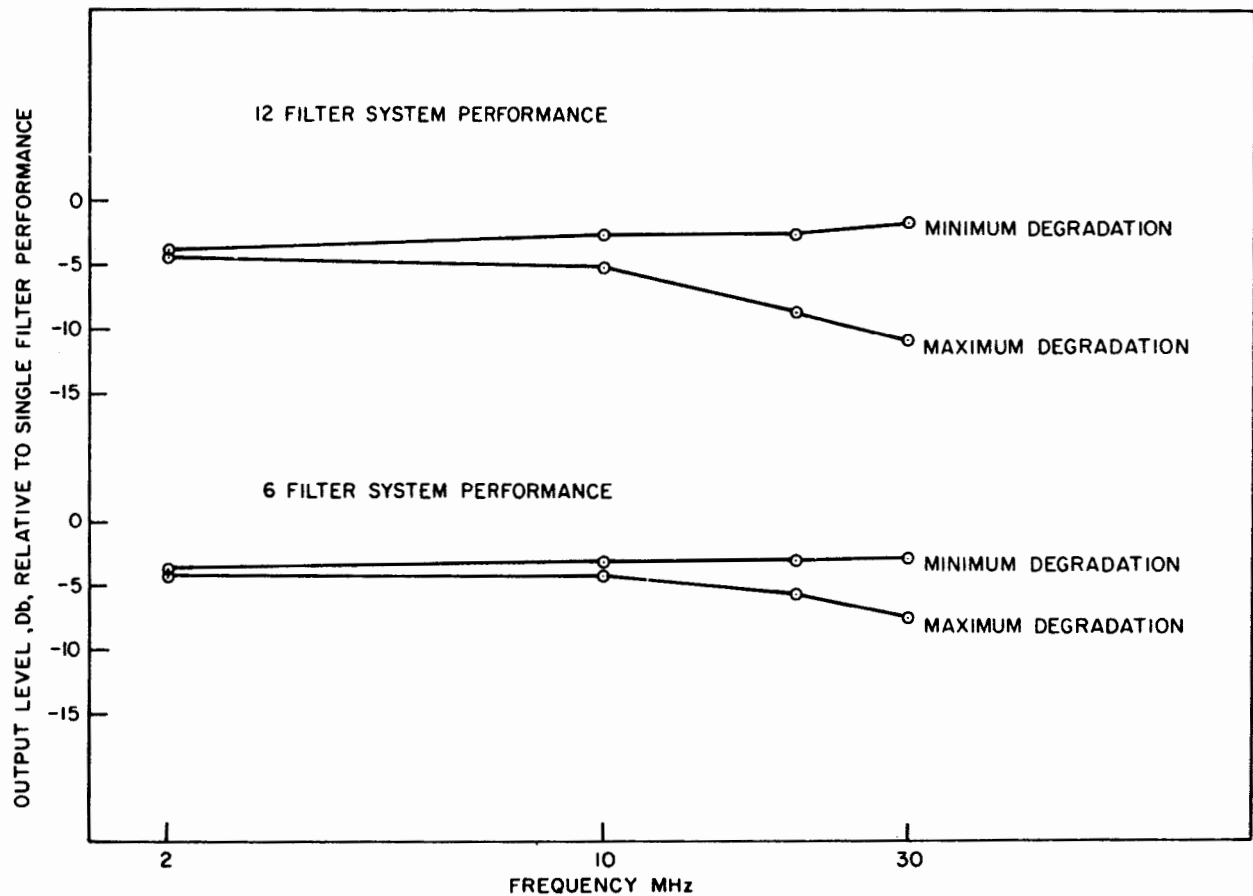
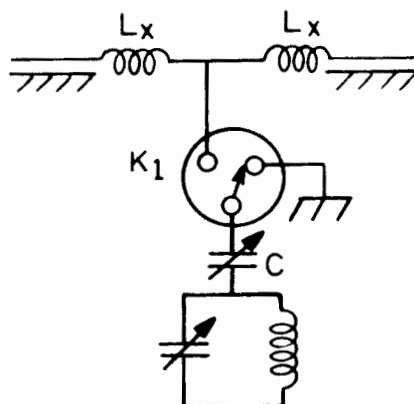
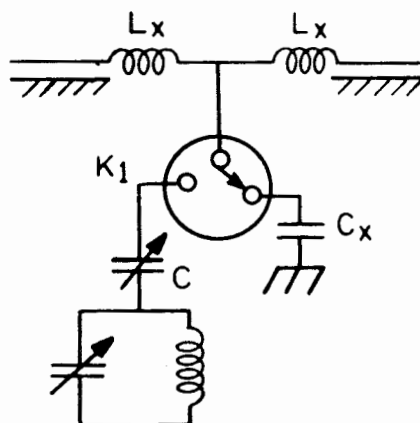


Figure 4-9 Bandpass Filter F-1039/U Terminated Distribution Circuitry Performance

INPUT STAGE OF F-1039A/U WITH NEW DISTRIBUTION
CIRCUITRY BEFORE REARRANGEMENT OF WIRING TO
VACUUM RELAY K_1 . K_1 CONTACTS SHOWN IN "OFF"
POSITION



INPUT STAGE OF F-1039A/U WITH NEW DISTRIBUTION
CIRCUITRY AFTER REARRANGEMENT OF WIRING TO
VACUUM RELAY K_1 AND INSTALLATION OF COMPENSATION
CAPACITOR C_x . K_1 CONTACTS SHOWN IN "OFF" POSITION.



$L_x = .0625 \mu h$
 $C_x = 33 \text{ PF, AEROVOX}$
TYPE AC3ST

Figure 4-10 Bandpass Filter F-1039/U Modification-Input Relay Circuitry

4.4 RADIO-FREQUENCY PRESELECTOR AMPLIFIER AM-4823/U.

a. TYPE/USE. - Radio Frequency Preselector Amplifier AM-4823/U is a sharply selective active bandpass filter with integral linear rf amplifiers. The AM-4823/U is used to permit normal operation of communications receivers in the proximity of strong off frequency rf voltages from nearby hf transmitters, radar equipment, etc. Desired weak signals in the passband are amplified and fed to the connected receiver. Off frequency signals are sharply attenuated by the filter circuits and do not distort the desired signals. The AM-4823/U helps to eliminate cross modulation and intermodulation products commonly associated with receiver operation in a strong signal environment. The AM-4823/U may be used with R-1051/URR and equivalent receivers capable of operating in the 2.0 to 30 MHz frequency range.

b. PHYSICAL CONFIGURATION. - See Figure 4-11.

c. INTERCONNECTION DIAGRAM. - See Figure 4-12.

d. FREQUENCY RANGE. - 2.0 to 31.999 MHz.

e. NUMBER OF CHANNELS. - One.

f. TYPE OF TUNING. - Manual. The control unit may be detached from the amplifier and located at a remote location.

g. POWER RATING. - Not applicable, receive only capability.

h. ANTENNA IMPEDANCE REQUIRED. - 50 ohms nominal, unbalanced.

i. ANTENNA CONNECTOR. - Type N (UG-22B/U).

j. INDIVIDUAL CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

k. CHANNEL CONNECTOR. - Type N (UG-22B/U).

l. PROTECTIVE CIRCUITS. - When internal rf voltages approach damaging levels, protection is provided by opening a relay at the antenna input. This occurs when rf voltages exceed 500 volts on frequency. In addition an overload is indicated when the on frequency input exceeds 2 volts which overloads the rf amplifiers. The antenna relay is not opened under this condition. Overloaded conditions are indicated by an overload indicator on the control unit. If an overload occurs the indicator will light, then go out automatically when the overload is removed. In certain conditions the overload indicator will remain on after the overload has been removed. An overload reset pushbutton is located on the control unit to restore to normal conditions.

m. PRIMARY POWER. - 115 vac 60/400Hz. Single phase, 50 watts.

n. HEAT DISSIPATION, - 50 watts.

o. TEMPERATURE RANGE. - Minus 40°C to +50°C (-40°F to 120°F).

p. COOLING. - Natural convection.

q. SELECTIVITY. - See Figure 4-13.

Section 4
Paragraph 4.4r

NAVSHIPS
0967-177-3030

SHIPBOARD ANTENNA SYSTEMS
ANTENNA COUPLERS
COMMUNICATIONS ANTENNA SYSTEMS
MF/HF MULTICOUPLERS

- r. ISOLATION. - Not applicable, single channel.
- s. GAIN. - 8 dB minimum.
- t. SENSITIVITY. - 3.66 uv for 20 dB signal to noise ratio in 3 KHz bandwidth.
- u. INTERMODULATION. - Second order - 40 dB from either of two input signals of 0.25 volts rms. Third Order - 50 dB same conditions.
- v. CROSS MODULATION. - No more than - 40 dB for two equal input signals of 500 volts rms each at 110 percent from nominal frequency (SSB Test).
- w. INSTALLATION REQUIREMENTS. - The AM-4823/U may be bench or rack mounted. Rack mounting brackets are furnished with the basic equipment. Six inch clearance is required at the back of the unit for cable connections.
- x. SPECIAL CONSIDERATIONS. - The frequency selection control unit may be removed from the amplifier and operated from a remote location. The distance from the amplifier is limited to 150 feet. A 32 conductor No. 18 AWG shielded cable is required between the units when the control unit is used remotely. Connectors for the cable are furnished with the basic equipment.
- y. MEAN TIME BETWEEN FAILURE (MTBF). - 800 hours.
- z. EQUIPMENT SUPPLIED. - See Table 4-3.

SHIPBOARD ANTENNA SYSTEMS
ANTENNA COUPLERS
COMMUNICATIONS ANTENNA SYSTEMS
MF/HF MULTICOUPLERS

NAVSHIPS
0967-177-3030

Section 4
Figure 4-11

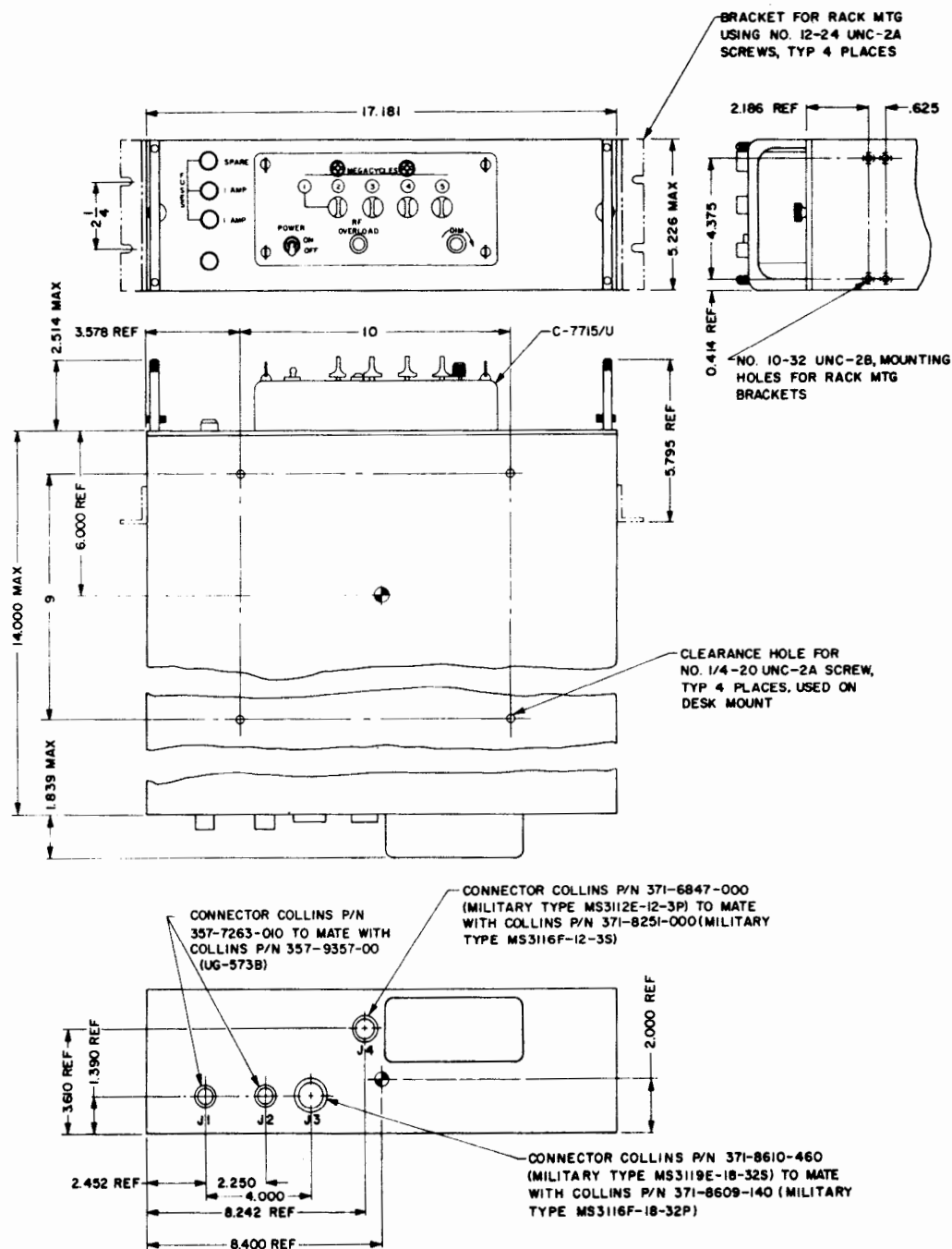


Figure 4-11 Radio Frequency Preselector Amplifier AM-4823/U
Physical Configuration

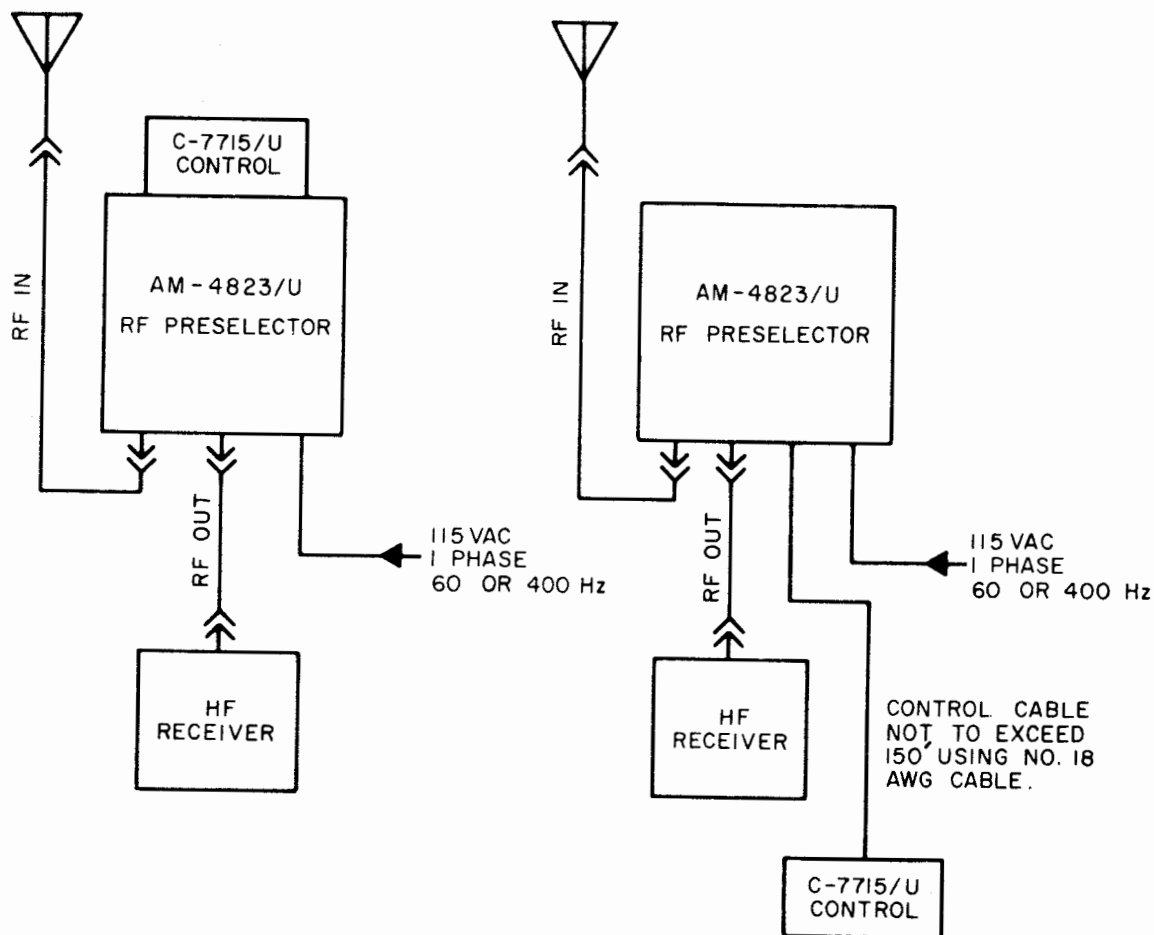


Figure 4-12 Radio Frequency Preselector Amplifier AM-4823/U Interconnection
Diagram

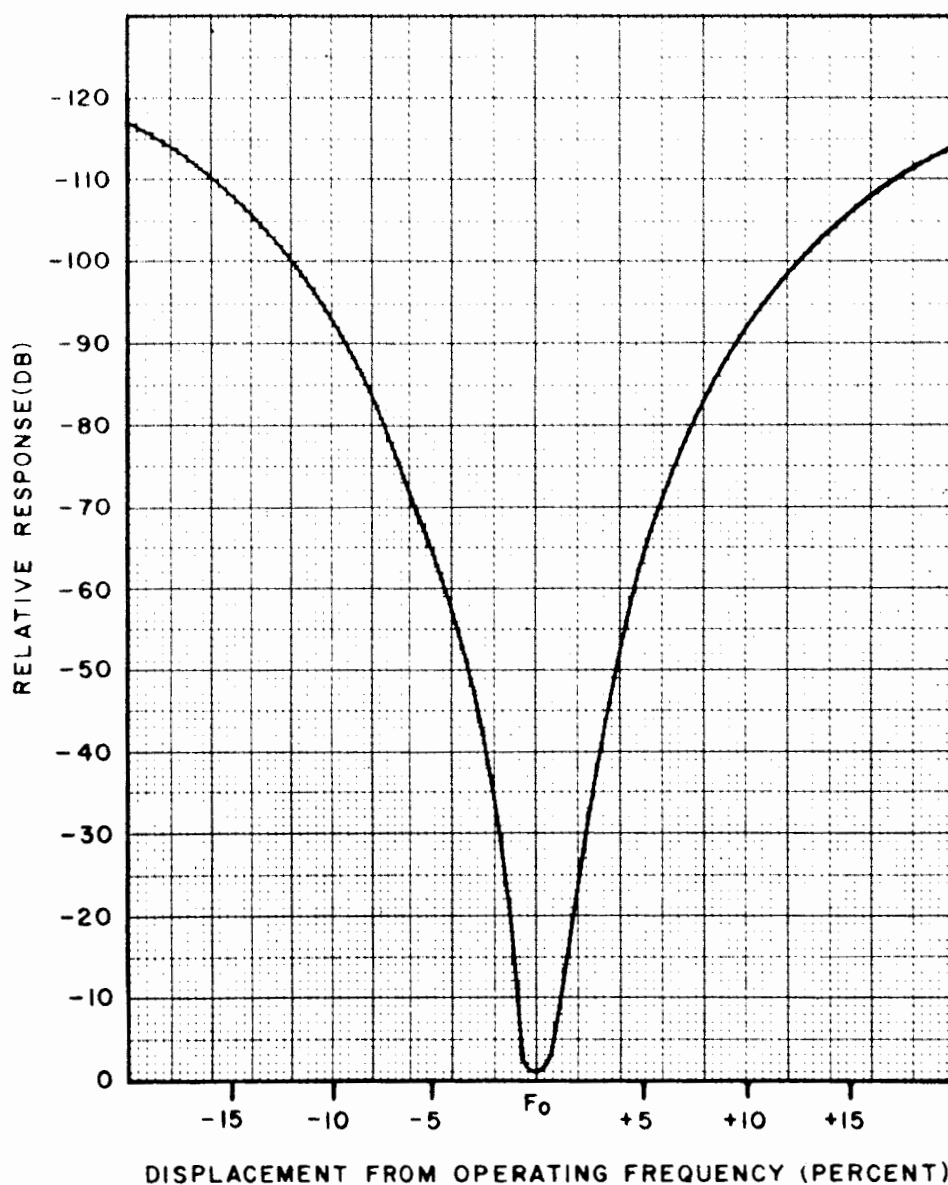


Figure 4-13 Radio Frequency Preselector Amplifier AM-4823/U
Selectivity Curve

Section 4
Table 4-3

NAVSHIPS
0967-177-3030

SHIPBOARD ANTENNA SYSTEMS
ANTENNA COUPLERS
COMMUNICATIONS ANTENNA SYSTEMS
MF/HF MULTICOUPLERS

TABLE 4-3 RADIO FREQUENCY PRESELECTOR AMPLIFIER AM-4823/U EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERALL DIMENSIONS (IN.)			VOL (CU FT)	WEIGHT (LB)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
1	Preselector Amplifier	AM-4823/U	5.22	17.18	14.0	.9	41.2
2	Tech Manual	NAVSHIPS 0967-285-3010					

4.5 ANTENNA COUPLER GROUPS AN/SRA-13, AN/SRA-14 and AN/SRA-15.

a. TYPE/USE. - Antenna Coupler Groups AN/SRA-13, -14 and -15 are designed to permit simultaneous operation of four transmitters, operating with a frequency separation of 10 percent or greater, into a common broadband antenna. Isolation is achieved by the use of tuneable bandpass filters. The coupler groups are similar with regard to operating features and electrical performance, differing only in operating frequency range. Modifications have been developed to increase the couplers average power capacity, improve their antenna matching capabilities, and allow the parallel operation of two identical couplers to increase the number of available channels.

b. PHYSICAL CONFIGURATION. - See Figure 4-14.

c. INTERCONNECTION CABLING DIAGRAM. - See Figure 4-16 and Figure 4-17.

d. FREQUENCY RANGE. -

- | | |
|----------------|--------------|
| (1) AN/SRA-13. | 2 to 6 MHz. |
| (2) AN/SRA-14. | 4 to 12 MHz. |
| (3) AN/SRA-15. | 6 to 18 MHz. |

e. NUMBER OF CHANNELS. - Four per antenna coupler group. An eight-channel 2 to 6 MHz multicoupler group can be formed from two AN/SRA-13 groups modified to include a balun combining network in accordance with Naval Research Laboratory Drawing D4535. An eight-channel 4 to 12 MHz multicoupler group can be formed from two AN/SRA-14 groups modified to include a balun combining network in accordance with Naval Research Laboratory Drawing 50D468.

f. TYPE OF TUNING. - Manual.

g. POWER RATING (MAXIMUM). - 750 watts rf average, 2-kw rf peak. A modification to increase the power rating of these couplers to 1-kw rf average, 2-kw rf peak, is outlined in Puget Sound Naval Shipyard Drawing Type 409-273MC1.

h. ANTENNA IMPEDANCE REQUIRED. - 50 ohms nominal, unbalanced; vswr not greater than 2:1. Impedance compensation circuits to permit matching antennas presenting a vswr of not greater than 3:1, referenced to 50 ohms, have been developed for this series of couplers. The details for fabrication and assembly of these networks are contained in the following drawings:

- | | |
|------------|---|
| AN/SRA-13. | Puget Sound Naval Shipyard Drawing 409-273M2. |
| AN/SRA-14. | Puget Sound Naval Shipyard Drawing 409-273M4. |
| AN/SRA-15. | Naval Research Laboratory Drawing 5506. |

i. ANTENNA CONNECTOR. - Type LC. (UG-352A/U).

j. INDIVIDUAL CHANNEL IMPEDANCE. 50 ohms nominal, unbalanced.

k. CHANNEL CONNECTOR. - Type N. (UG-22A/U).

l. PROTECTIVE CIRCUITS. - The vacuum tuning capacitors are protected by spark gaps. No circuits are provided for transmitter protection.

m. PRIMARY POWER REQUIRED. - 115 vac single phase 60 Hz 230 watts.

- n. HEAT DISSIPATION (MAXIMUM). -
 - (1) AN/SRA-13. 1.0-kw.
 - (2) AN/SRA-14. 1.2-kw.
 - (3) AN/SRA-15. 1.4-kw.
- o. TEMPERATURE RANGE. - 0° to $+50^{\circ}$ C. ($+32^{\circ}$ to $+120^{\circ}$ F).
- p. COOLING. - Forced air.
- q. SELECTIVITY. - See Figure 4-18.
- r. ISOLATION. - Not less than 24 dB at 10 percent frequency separation.
- s. INSERTION LOSS. -
 - (1) AN/SRA-13. Less than 1.5 dB.
 - (2) AN/SRA-14. Less than 1.7 dB.
 - (3) AN/SRA-15. Less than 2.2 dB.

t. INSTALLATION REQUIREMENTS. - The coupler groups are designed for deck or bench mounting. The coupler groups should be located in the radio transmitter room near the transmitters to which they are connected. A clearance of 15 inches is required on the right side of the cabinet for ventilation and access to the antenna transmission line connector. A minimum of 3 inches is required on the left side of the cabinet for ventilation.

u. SPECIAL CONSIDERATIONS. - The modification to allow parallel operation of two identical couplers into a common antenna requires the installation of combiner networks in the section of the coupler cabinet occupied by the SB-406/SRA Fuse Panel. This is required in only one of the couplers. The ventilation blower is retained. The modified coupler group should be located to the right of the unmodified coupler to keep the transmission line between the groups as short as possible. The physical configuration of an eight-channel coupler group is shown in Figure 4-15.

The impedance compensation modification requires the installation of a matching network on the outside of the cabinet. This network is contained in a 9" x 12" x 5" box installed over the antenna connector. The additional box is equipped with a connector for connecting the antenna transmission line. The 15-inch clearance required on the right side of the coupler for ventilation will allow sufficient area for the network. The physical location of the network is shown on Figure 4-14.

The modification to increase the average rf power capability requires the substitution of components and is accomplished within the coupler group cabinet.

"C" versions of these equipments should be replaced with either "A" or "B" versions or, preferably with "C" versions that have been restored by Puget Sound Naval Shipyard.

- v. MEAN TIME BETWEEN FAILURE (MTBF). - 8000 hours.
- w. EQUIPMENT SUPPLIED. - See Table 4-4.

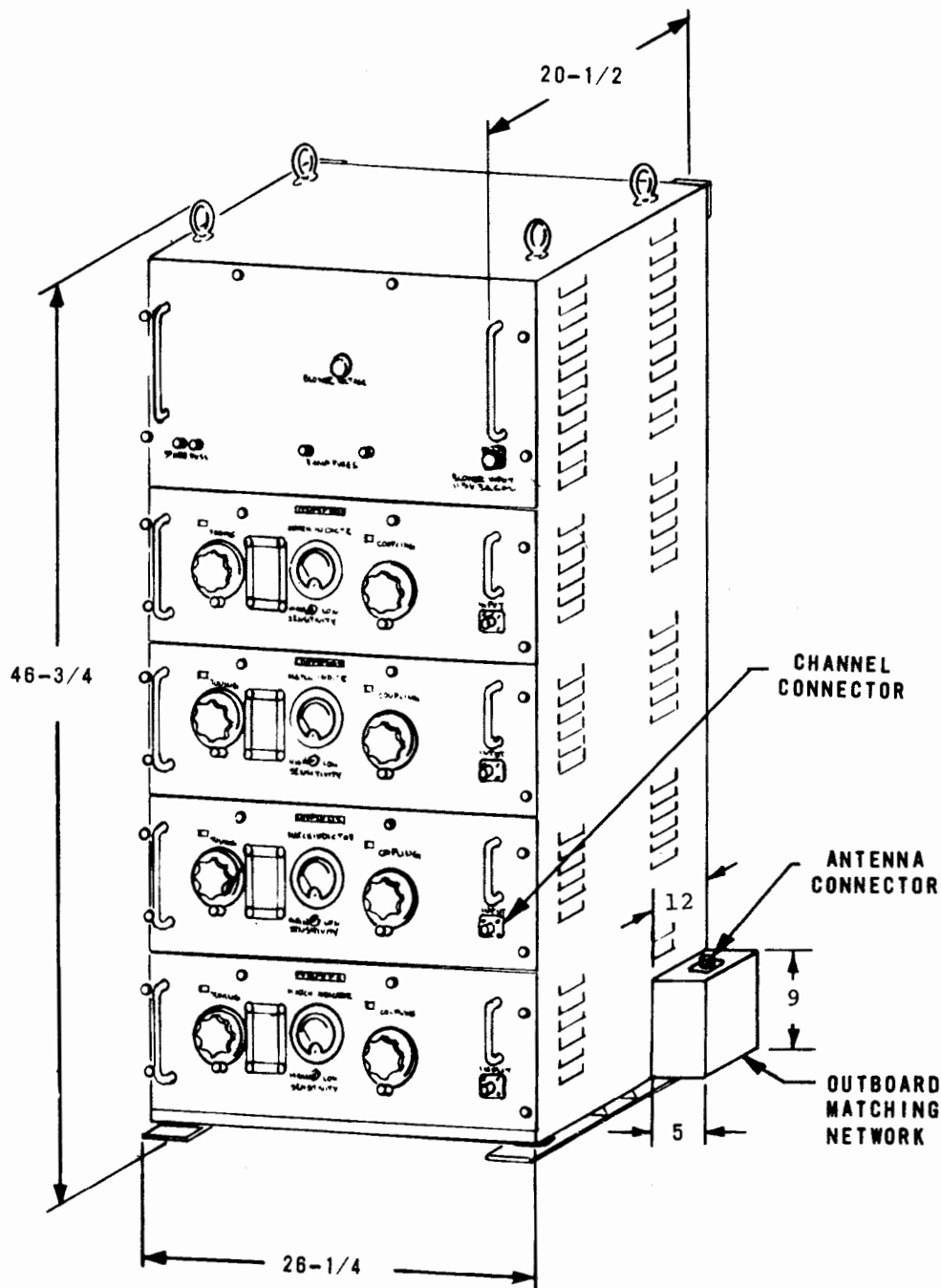
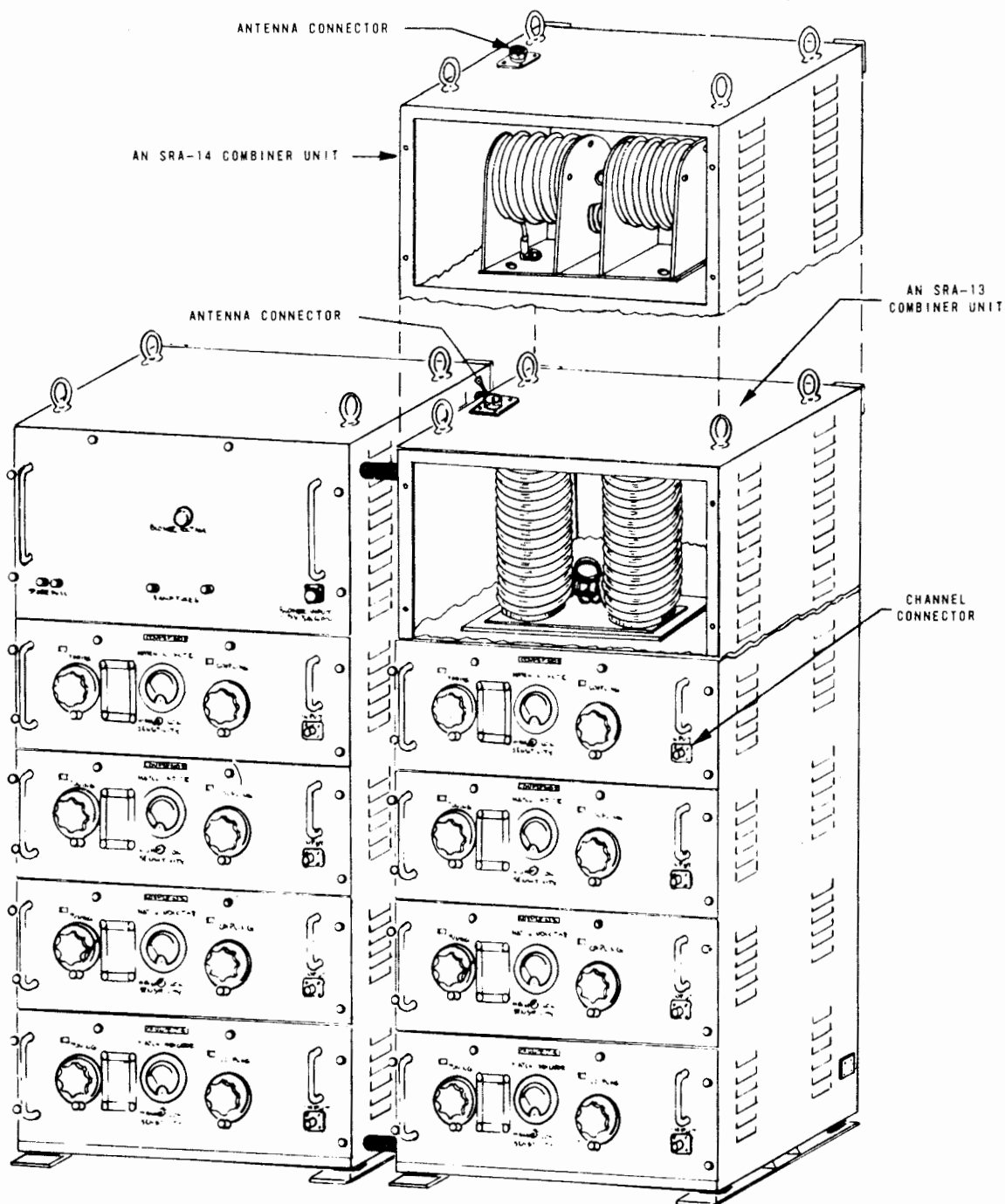


Figure 4-14 Antenna Coupler Groups AN/SRA-13, -14 and -15 Physical Configuration (Single Operation)



Note: Compensation capacitors are located in the Channel 4 compartment of each cabinet.

Figure 4-15 Antenna Coupler Groups AN/SRA-13 and -14 Physical Configuration (Parallel Operation)

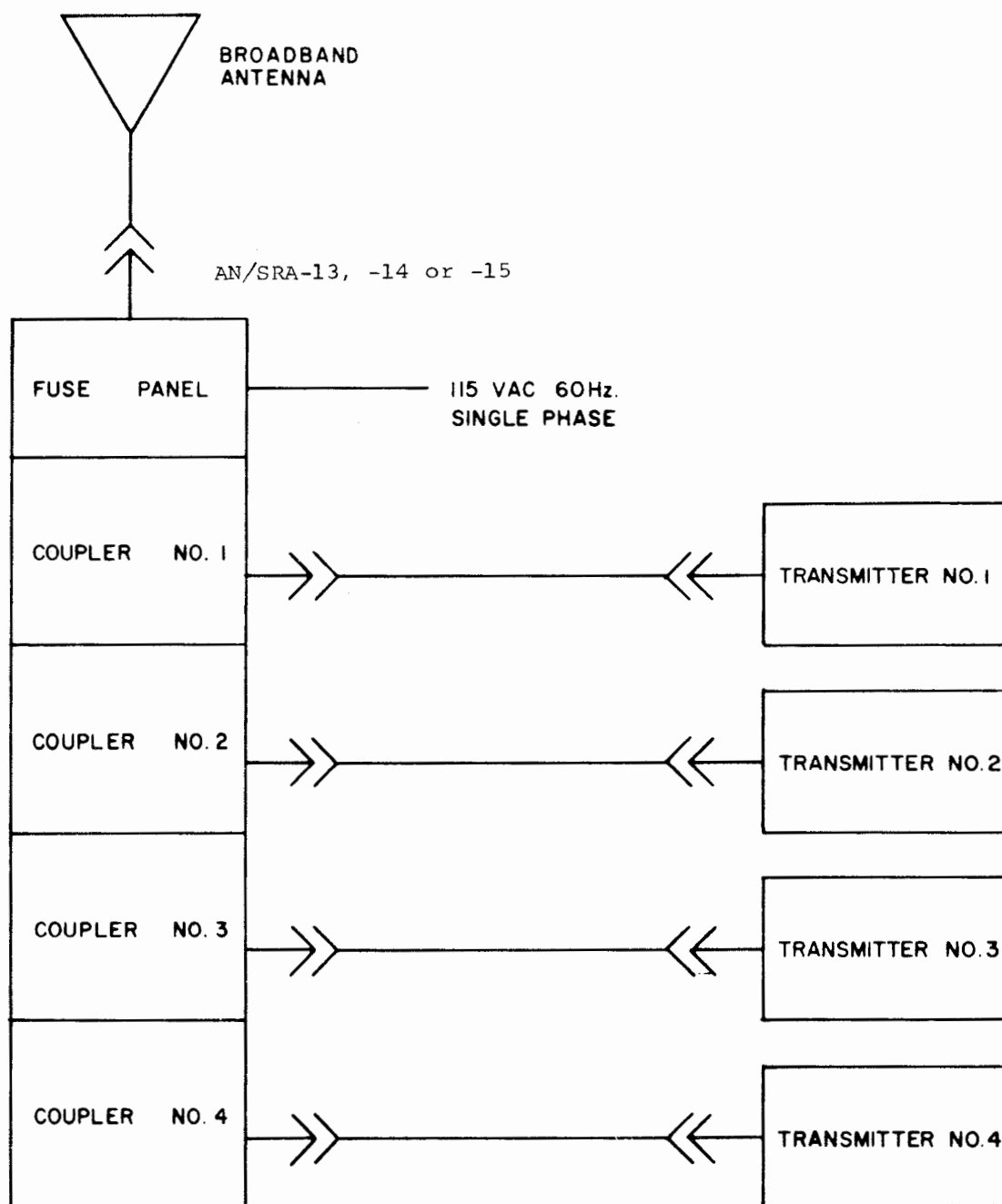


Figure 4-16 Antenna Coupler Groups AN/SRA-13, -14 and -15 Interconnection Diagram (Single Operation)

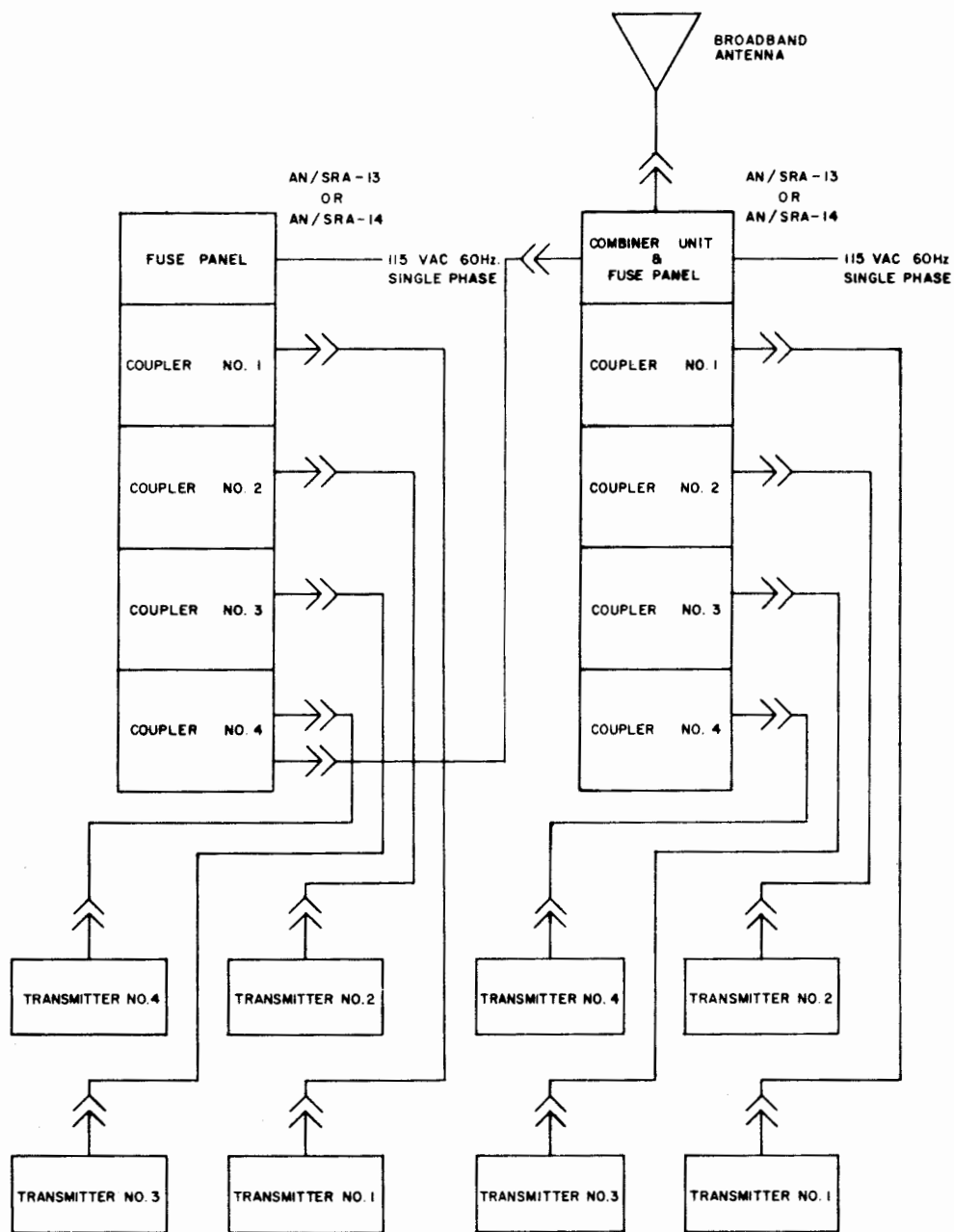


Figure 4-17 Antenna Coupler Groups AN/SRA-13 and -14 Interconnection Diagram (Parallel Operation)

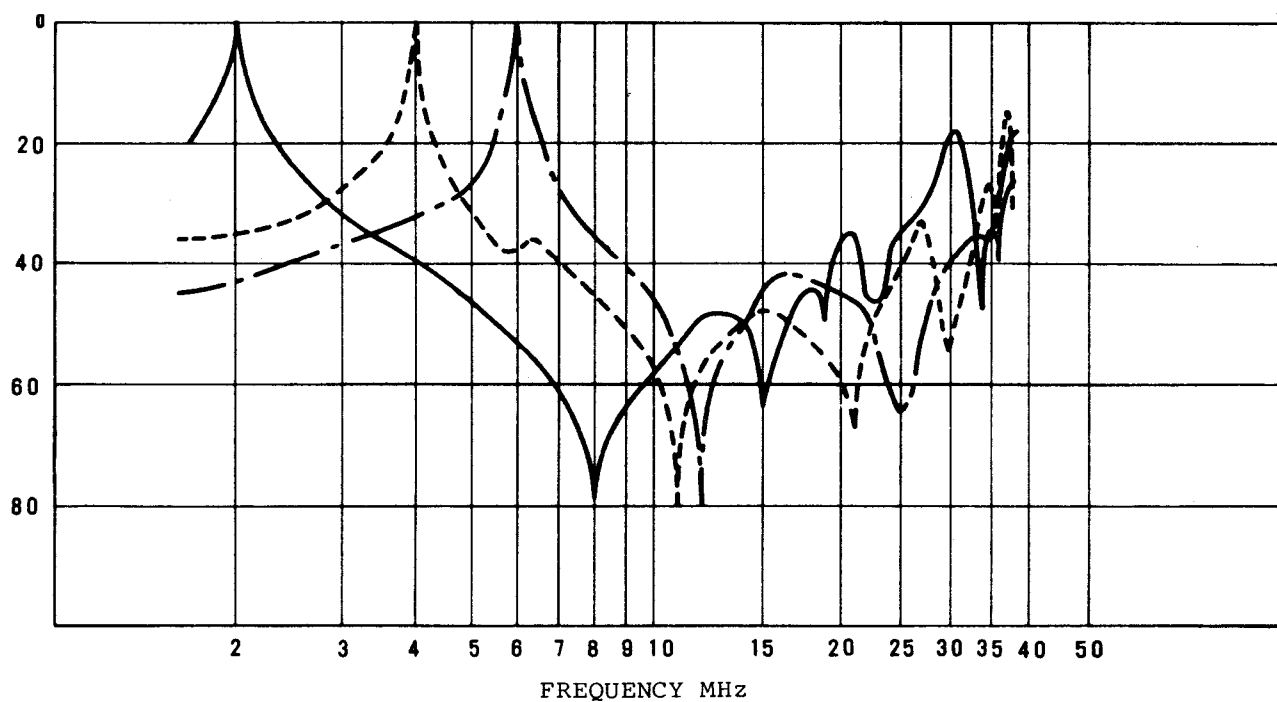
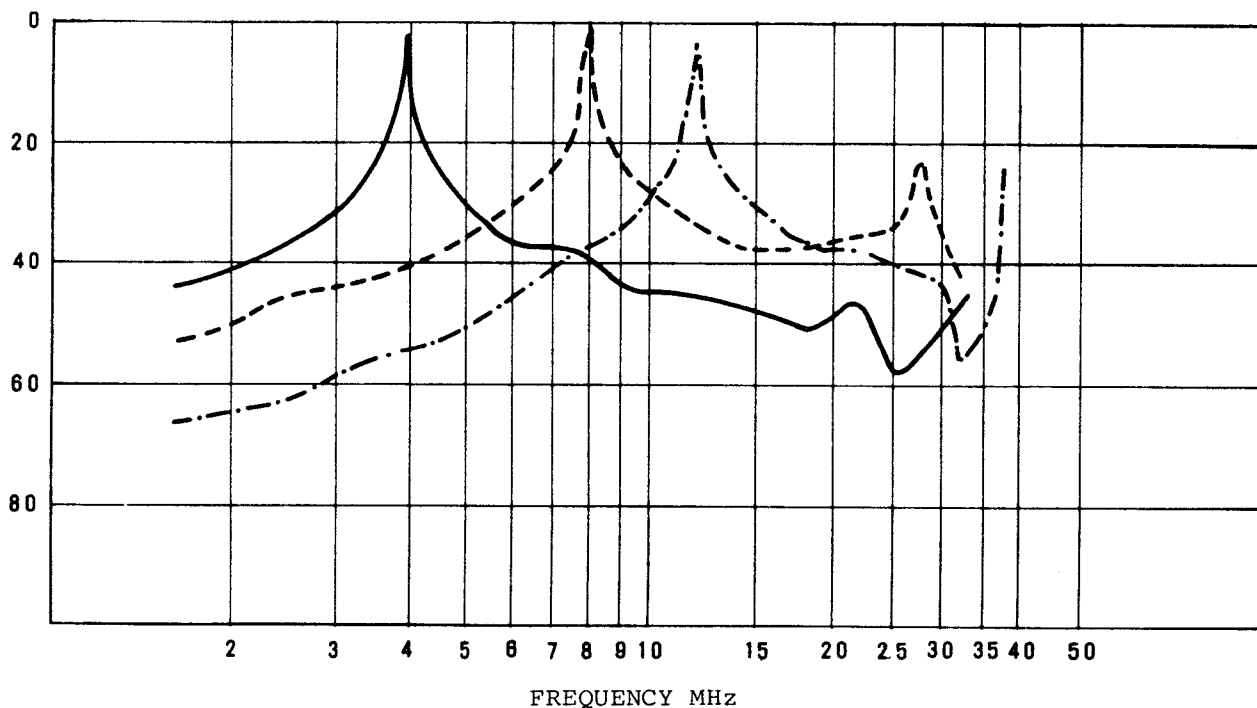


Figure 4-18 Antenna Coupler Groups AN/SRA-13, -14, and 15
Selectivity Curves (Typical)

Section 4
Table 4-4

NAVSHIPS
0967-177-3030

SHIPBOARD ANTENNA SYSTEMS
ANTENNA COUPLERS
COMMUNICATIONS ANTENNA SYSTEMS
MF/HF MULTICOUPLERS

TABLE 4-4 ANTENNA COUPLER GROUPS AN/SRA-13, -14, AND -15
EQUIPMENT SUPPLIED

Qty Per Equip.	Nomenclature		Overall Dimensions (In.)			Vol. (Cu Ft)	Weight (Lb)
	Name	Designation	Height	Width	Depth		

WITH ANTENNA COUPLER GROUP AN/SRA-13

1	Antenna Coupler Group	AN/SRA-13	46.75	26.25	20.5	14.5	306
4	Antenna Coupler	CU-419/SRA-13	7.72	24.75	18.18	2	43 ea.
1	Fuse Panel	SB-406/SRA	11.22	24.75	10.37	1.7	11.5
1	Electrical Cabinet Equipment	CY-1670/SRA	46.75	26.25	20.5	14.5	122.5
2	Tech Manual	NAVSHIPS 92746	(Supplied with all three Antenna Coupler Groups)				

WITH ANTENNA COUPLER GROUP AN/SRA-14

1	Antenna Coupler Group	AN/SRA-14	46.75	26.25	20.5	14.5	280
4	Antenna Coupler	CU-420/SRA-14	7.72	24.75	18.18	2	36.5 ea.
1	Fuse Panel	SB-406/SRA	11.22	24.75	10.37	1.7	11.5
1	Electrical Equipment Cabinet	CY-1670/SRA	46.75	26.25	20.5	14.5	122.5

WITH ANTENNA COUPLER GROUP AN/SRA-15

1	Antenna Coupler Group	AN/SRA-15	46.75	26.25	20.5	14.5	276
4	Antenna Coupler	CU-421/SRA-15	7.72	24.75	18.18	2	35.5 ea.
1	Fuse Panel	SB-406/SRA	11.22	24.75	10.37	1.7	11.5
1	Electrical Equipment Cabinet	CY-1670/SRA	46.25	26.25	20.5	14.5	122.5

4.6 ANTENNA COUPLER GROUP AN/SRA-16.

a. TYPE/USE. - Antenna Coupler Group AN/SRA-16 is designed to permit the simultaneous operation of four transmitters, operating with a frequency separation of 10 percent or greater, into a common broadband antenna. A modification has been developed to increase the average power handling capability of the coupler group. The group may be used with any hf transmitter capable of operating within the frequency and power ratings of the couplers.

b. PHYSICAL CONFIGURATION. - See Figure 4-19.

c. INTERCONNECTION CABLING DIAGRAM. - See Figure 4-20.

d. FREQUENCY RANGE. - 9 to 26 MHz.

e. NUMBER OF CHANNELS. - Four.

f. TYPE OF TUNING. - Manual.

g. POWER RATING (MAXIMUM). - 750 watt rf average, 2-kw rf peak. A modification to increase the power rating to 1-kw rf average, 2-kw peak is outlined in Puget Sound Naval Shipyard Drawing Type 409-273MC5.

h. ANTENNA IMPEDANCE REQUIRED. - 50 ohms nominal, unbalanced; vswr not greater than 3:1.

i. ANTENNA CONNECTOR. - Type LC (UG-352A/U).

j. INDIVIDUAL CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

k. CHANNEL CONNECTOR. - Type N (UG-22A/U).

l. PROTECTIVE CIRCUITS. - The vacuum tuning capacitors are protected by spark gaps.

m. PRIMARY POWER REQUIRED. - 115 vac single phase 60 Hz 230 watts.

n. HEAT DISSIPATION (MAXIMUM). - 1.5-kw.

o. TEMPERATURE RANGE. - 0° to 50°C. (+32° to 120°F).

p. COOLING. - Forced air.

q. SELECTIVITY. - See Figure 4-21.

r. ISOLATION. - Not less than 24 dB at 10 percent frequency separation.

s. INSERTION LOSS. - Less than 1 dB.

t. INSTALLATION REQUIREMENTS. - The coupler is designed for deck or bench mounting. The coupler should be located in the radio transmitter room near the transmitters to which it is connected. A clearance of 15 inches is required on the right side of the cabinet for ventilation and access to the antenna transmission line connector. A minimum of 3 inches is required on the left side of the cabinet for ventilation.

Section 4
Paragraph 4.6u

NAVSHIPS
0967-177-3030

SHIPBOARD ANTENNA SYSTEMS
ANTENNA COUPLERS
COMMUNICATIONS ANTENNA SYSTEMS
MF/HF MULTICOUPLERS

u. SPECIAL CONSIDERATIONS. - The modification to increase the average rf power handling capability requires the substitution of components and is accomplished within the coupler cabinet.

"C" versions of this equipment should be replaced with either "A" or "B" versions or, preferably with "C" versions that have been restored by Puget Sound Naval Shipyard.

v. MEAN TIME BETWEEN FAILURES. (MTBF). - 8000 hours.

w. EQUIPMENT SUPPLIED. - See Table 4-5.

SHIPBOARD ANTENNA SYSTEMS
 ANTENNA COUPLERS
 COMMUNICATIONS ANTENNA SYSTEMS
 MF/HF MULTICOUPLERS

NAVSHIPS
 0967-177-3030

Section 4
 Figure 4-19

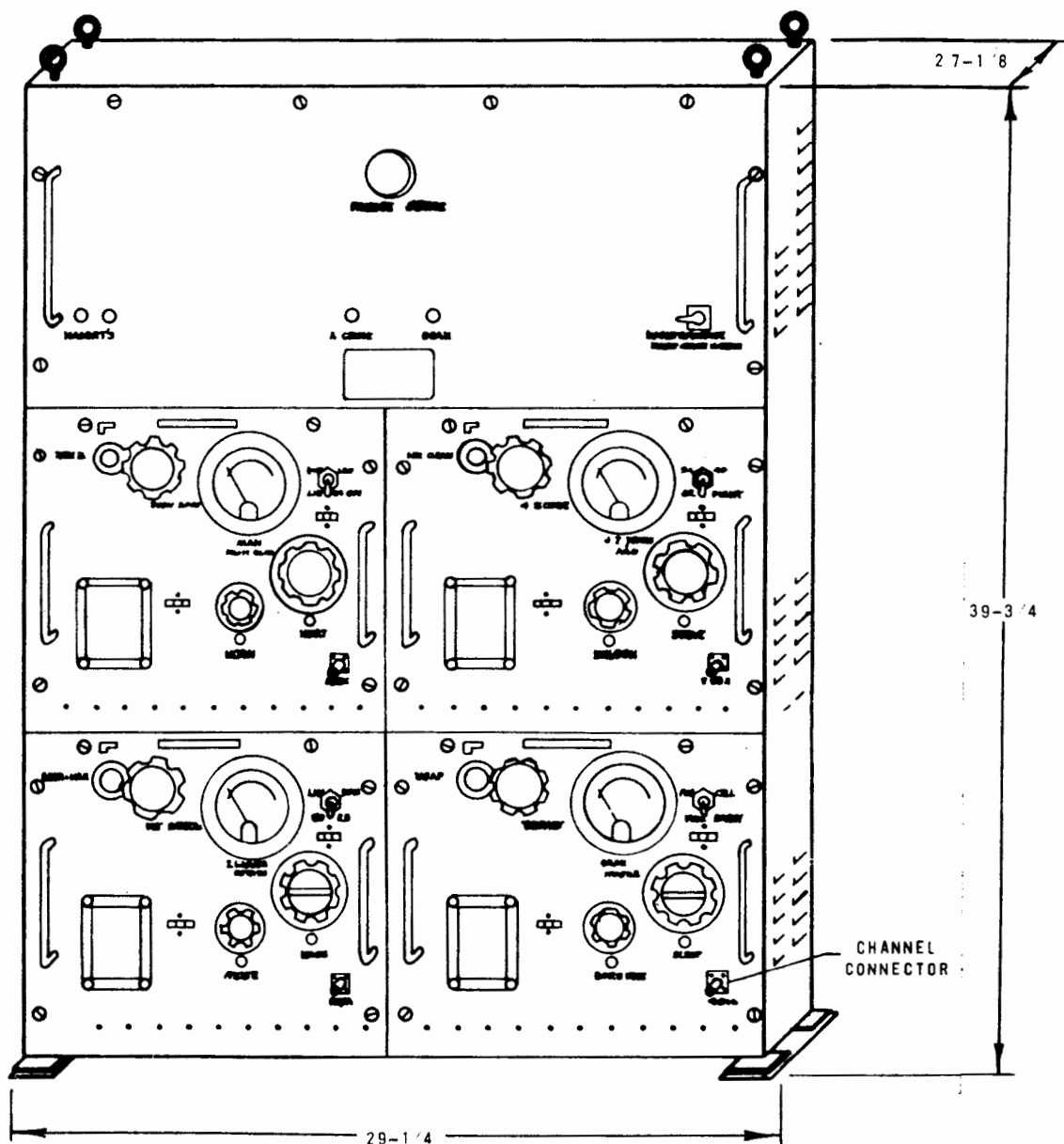


Figure 4-19 Antenna Coupler Group AN/SRA-16 Physical Configuration

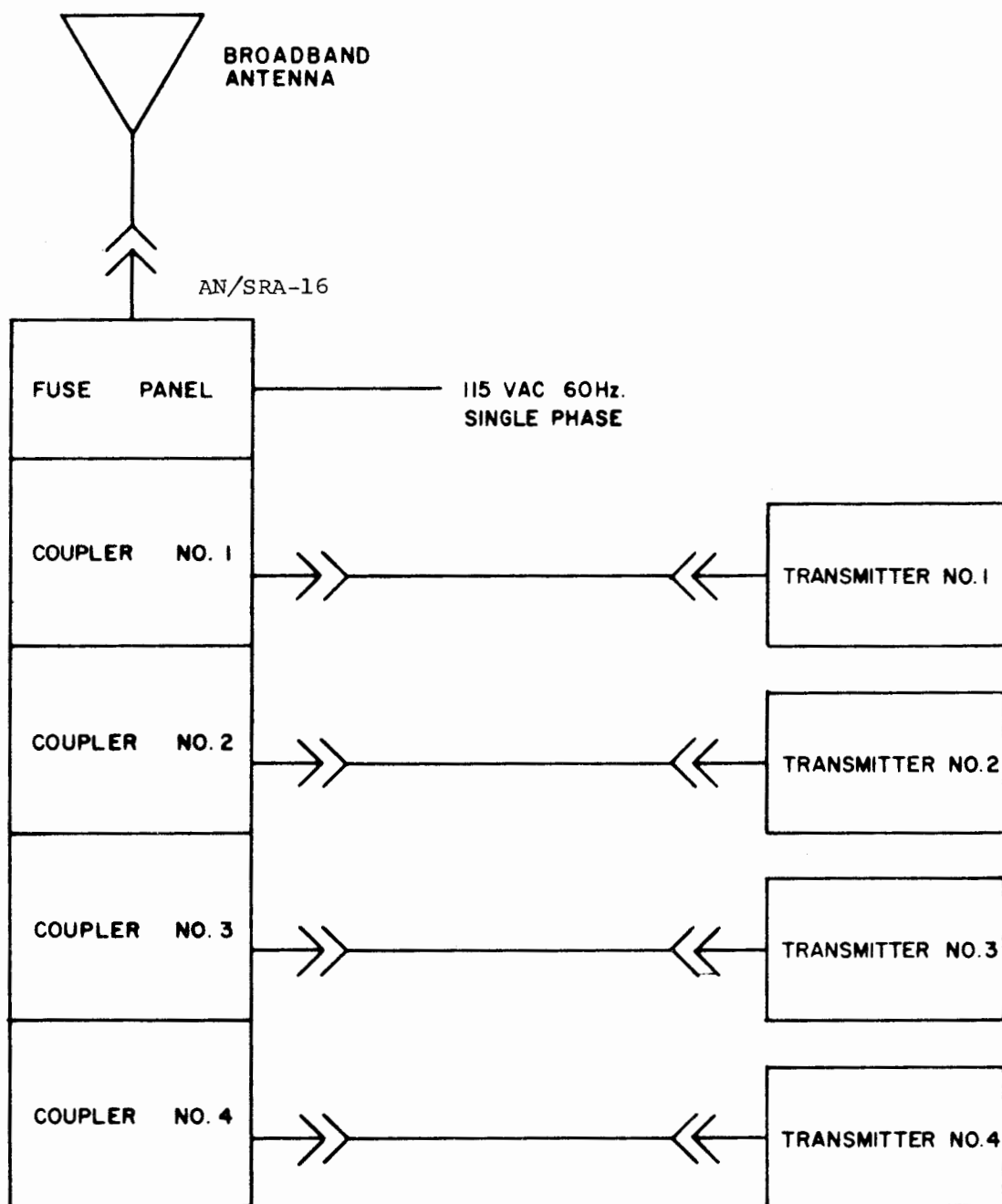


Figure 4-20 Antenna Coupler Group AN/SRA-16 Interconnection Diagram

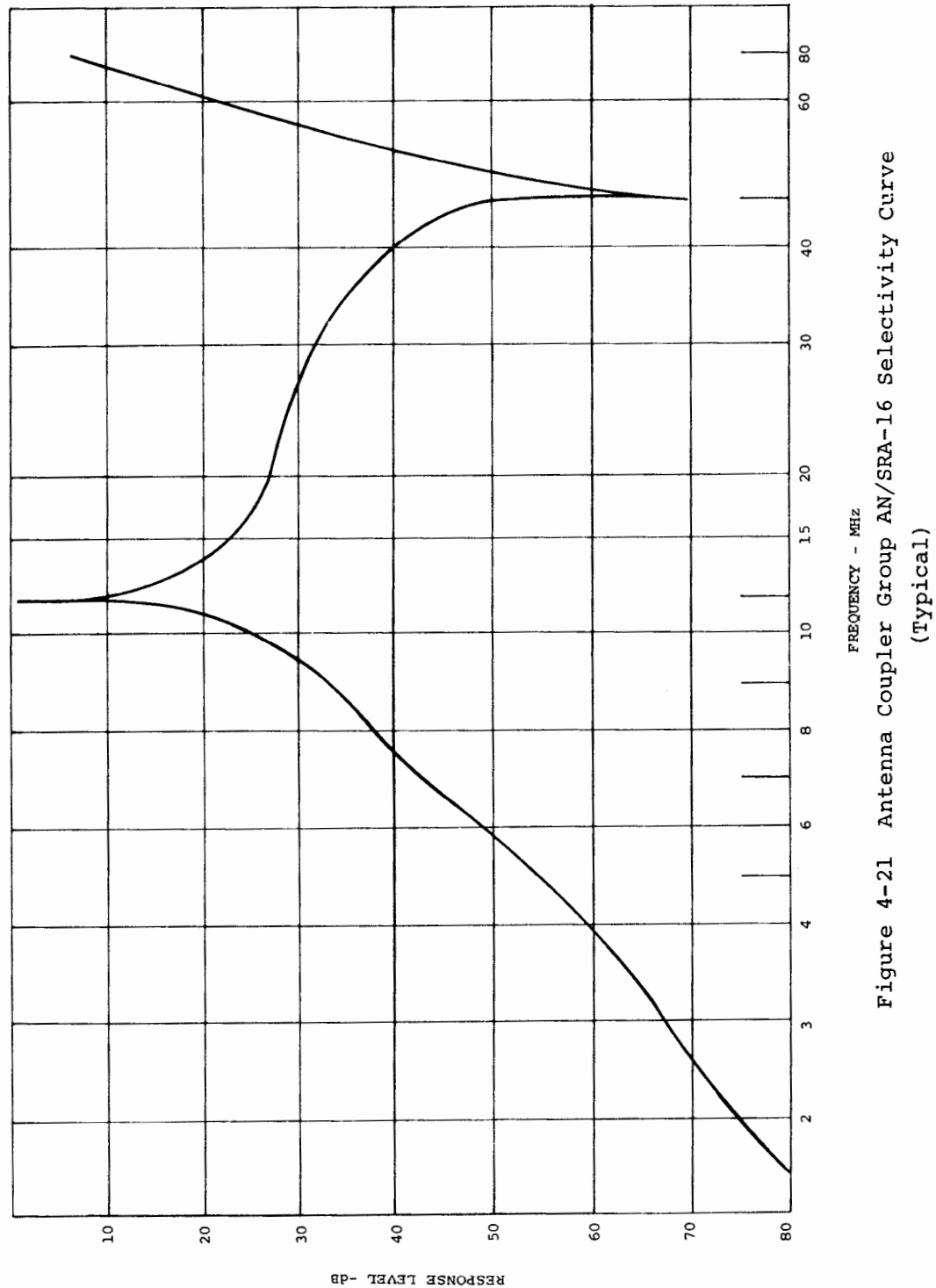


Figure 4-21 Antenna Coupler Group AN/SRA-16 Selectivity Curve
 (Typical)

Section 4
Table 4-5

NAVSHIPS
0967-177-3030

SHIPBOARD ANTENNA SYSTEMS
ANTENNA COUPLERS
COMMUNICATIONS ANTENNA SYSTEMS
MF/HF MULTICOUPLERS

TABLE 4-5 ANTENNA COUPLER GROUP AN/SRA-16 EQUIPMENT SUPPLIED

Qty Per Equip.	Nomenclature		Overall Dimensions (In.)			Vol. (Cu Ft)	Weight (Lb)
	Name	Designation	Height	Width	Depth		
1	Antenna Coupler Group	AN/SRA-16	39.75	29.25	25.12	17	320
4	Antenna Coupler	CU-422/ SRA-16	12.37	13.75	24.75	2.4	42
1	Fuse Panel	SB-407/ SRA-16	10.87	27.75	9.87	1.7	13
1	Electrical Equipment Cabinet	CY-1671/ SRA-16	29.75	29.25	25.12	12.5	139
2	Tech Manual	NAVSHIPS 92839					

4.7 ANTENNA COUPLER GROUPS AN/SRA-35(V), AN/SRA-36(V), and AN/SRA-37(V).

a. TYPE/USE. - Antenna Coupler Groups AN/SRA-35(V), -36(V), and -37(V) are designed to permit simultaneous operation of two or more transmitters, operating with a frequency separation of 5 percent or greater, into a common broadband antenna. The coupler groups are suitable for installation on shore stations or surface ships. They are identical with regard to operating features and electrical performance and differ only in frequency range and channel capacity. Each group requires a broadband antenna which presents a vswr of less than 3:1 referenced to 50 ohms across the respective frequency range. The groups may be operated with rf transmitters capable of operating with the frequency and power ratings of the couplers.

b. PHYSICAL CONFIGURATION. - See Figures 4-22, -23, and -24.

c. INTERCONNECTION CABLING DIAGRAM. - See Figures 4-25, -26, and -27.

d. FREQUENCY RANGE. -

- | | | |
|-----|---------------|---------------|
| (1) | AN/SRA-35(V). | 2 to 6 MHz. |
| (2) | AN/SRA-36(V). | 4 to 12 MHz. |
| (3) | AN/SRA-37(V). | 10 to 30 MHz. |

e. NUMBER OF CHANNELS. -

- | | | |
|-----|---------------|--------|
| (1) | AN/SRA-35(V). | Six. |
| (2) | AN/SRA-36(V). | Eight. |
| (3) | AN/SRA-37(V). | Four. |

f. TYPE OF TUNING. - Manual.

g. POWER RATING. - 5.0-kw average; 10.0-kw peak.

h. ANTENNA IMPEDANCE REQUIRED. - 50 ohms nominal, unbalanced, vswr not greater than 3:1.

i. ANTENNA CONNECTOR. - 3-1/8 inch EIA flanged connector.

j. INDIVIDUAL CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

k. CHANNEL CONNECTOR. - Type LC (UG-352A/U modified).

l. CHANNEL CONNECTOR. - The transmitter interlocks are opened automatically by protective circuits whenever excessive resonator voltages, excessive vswr levels or loss of primary power occurs. Cooling water temperature and flow sensors actuate aural and visual alarms whenever their specified levels are exceeded. The vacuum capacitors in the resonators are protected by spark gaps.

m. PRIMARY POWER REQUIRED. -

- | | | | | | |
|-----|---------------|---------|--------------|--------|------------|
| (1) | AN/SRA-35(V). | 115 vac | single phase | 60 Hz. | 700 watts. |
| (2) | AN/SRA-36(V). | 115 vac | single phase | 60 Hz. | 900 watts. |
| (3) | AN/SRA-37(V). | 115 vac | single phase | 60 Hz. | 500 watts. |

n. HEAT DISSIPATION. - Maximum.

- (1) AN/SRA-35(V). 2.5-kw to air; 10.5-kw to water.
- (2) AN/SRA-36(V). 3.4-kw to air; 14.0-kw to water.
- (3) AN/SRA-37(V). 1.7-kw to air; 7.0-kw to water.

o. TEMPERATURE RANGE. - 0° to $+50^{\circ}$ C ($+32^{\circ}$ to $+120^{\circ}$ F).

p. COOLING. - Forced air, natural radiation and convection and circulating water.

q. SELECTIVITY. - See Figures 4-28, -29 and -30.

r. ISOLATION. - Five percent frequency separation, -40 dB nominal.

s. INSERTION LOSS. - 2.1 dB maximum.

t. INSTALLATION REQUIREMENTS. - Clearance of six feet is required at front of the coupler for removal of channel drawer assemblies and servicing. Clearance of two feet is required at rear of unit for connection of antenna, transmitter inputs, control cables, and cooling water lines.

u. SPECIAL CONSIDERATIONS. - A source of fresh water is required for cooling each diplexer of the coupler group. The fresh water lines must be provided with suitable valves so that each inlet and outlet line may have an individual shutoff. This permits complete isolation from the ship's water source during maintenance and repairs. The ship's water source must meet the following characteristics:

- (1) Minimum flow. 13.6 gpm.
- (2) Maximum inlet temperature. 105° F.
- (3) Maximum pressure. 155 psi.

v. MEAN TIME BETWEEN FAILURES (MTBF). - 4000 hours.

w. EQUIPMENT SUPPLIED. - See Table 4-6.

Section 4
Figure 4-22

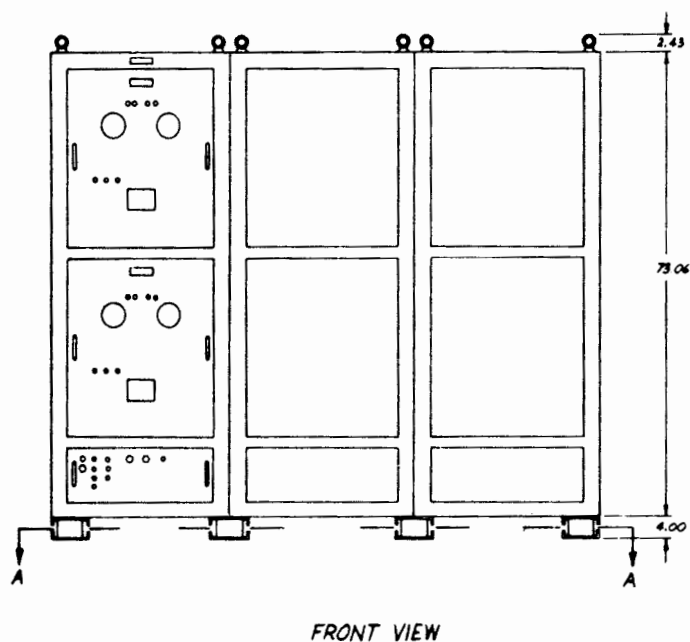
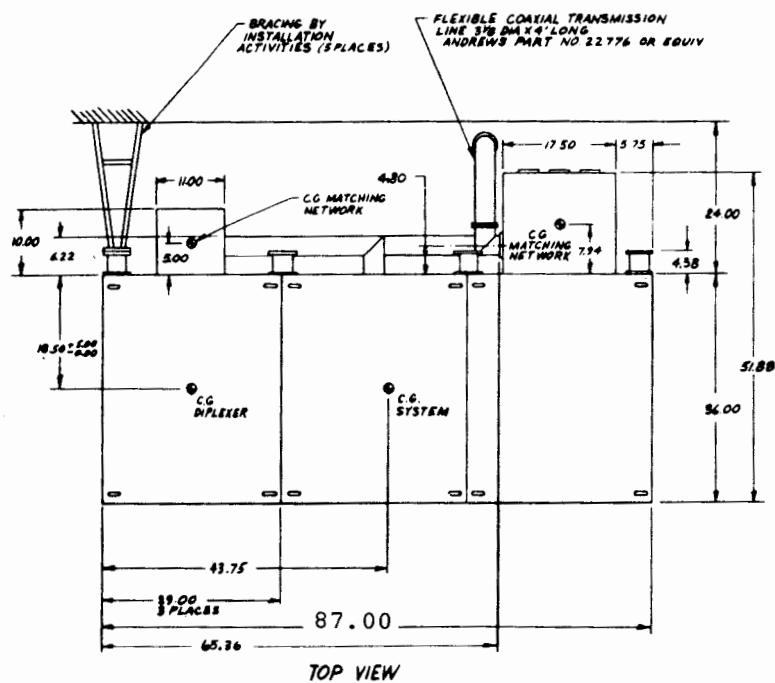


Figure 4-22 Antenna Coupler Group AN/SRA-35(V) Physical Configuration

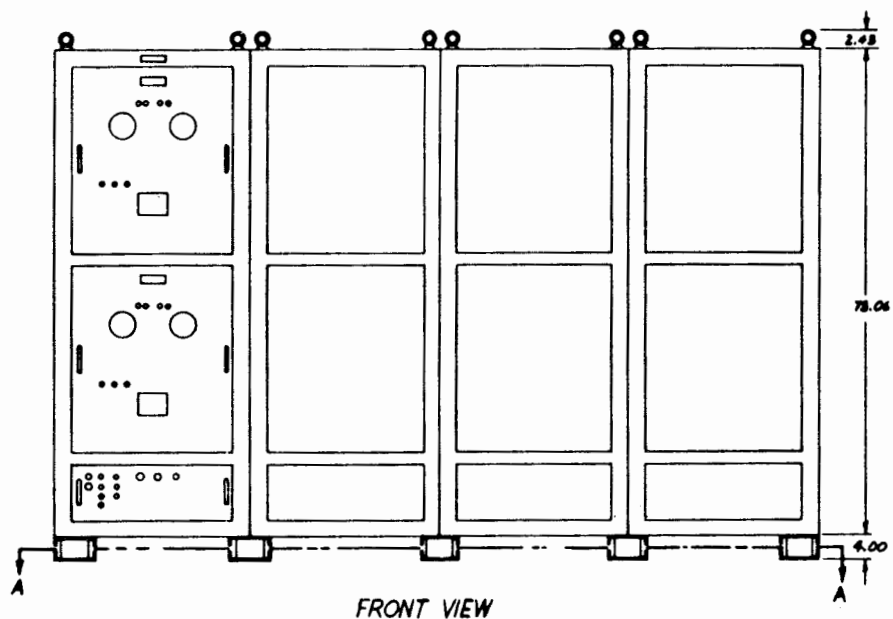
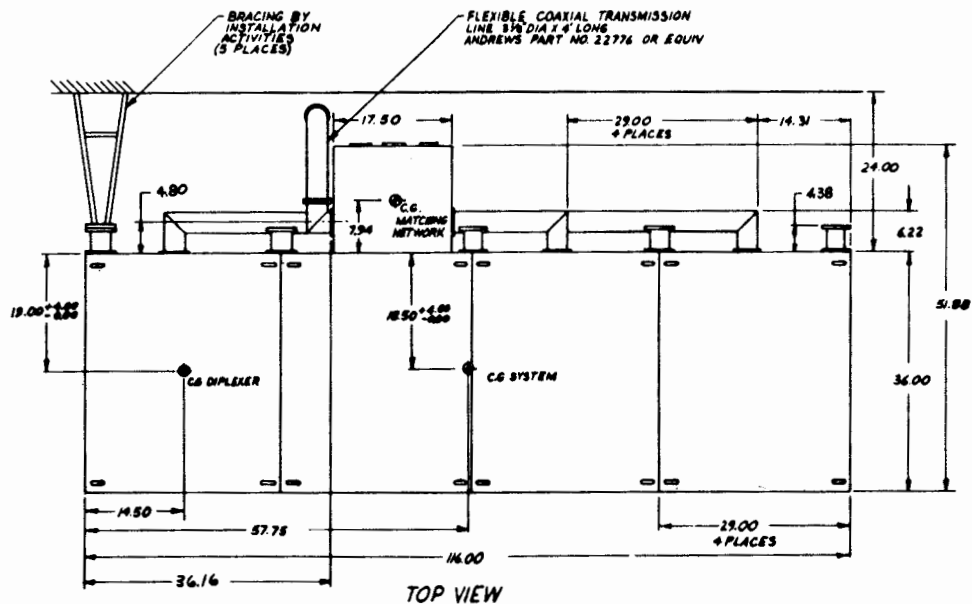
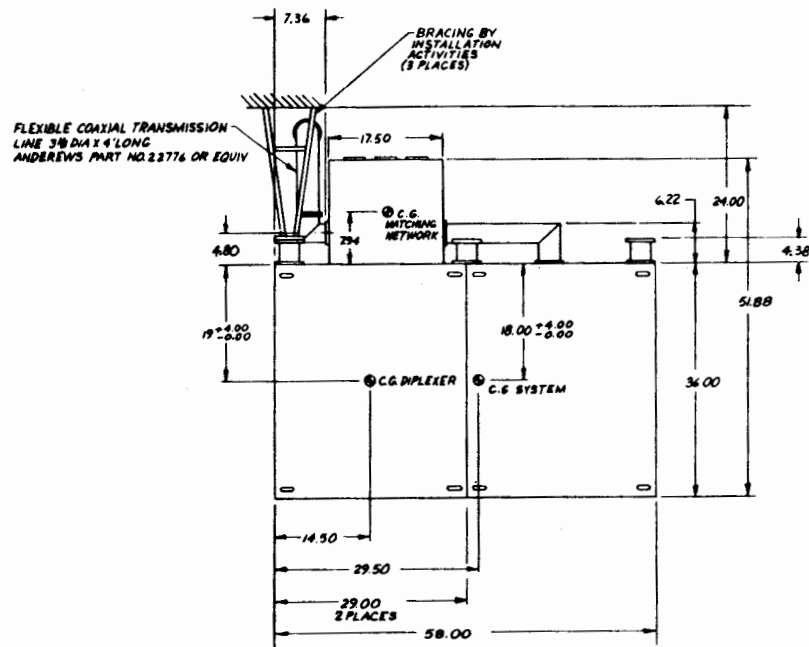


Figure 4-23 Antenna Coupler Group AN/SRA-36(V) Physical Configuration

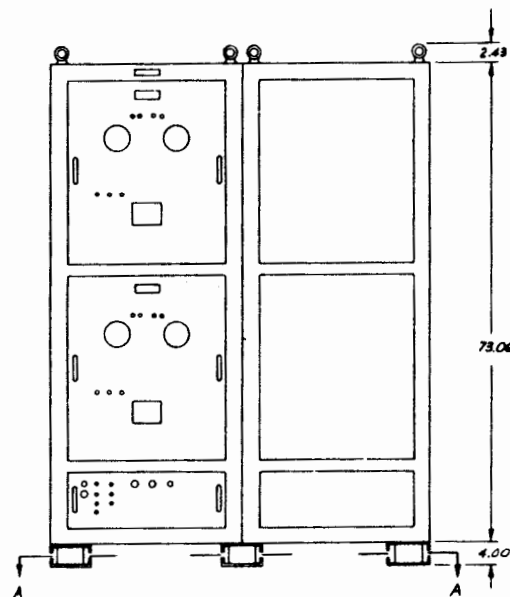
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TOP VIEW



FRONT VIEW

Figure 4-24 Antenna Coupler Group AN/SRA-37(V) Physical Configuration

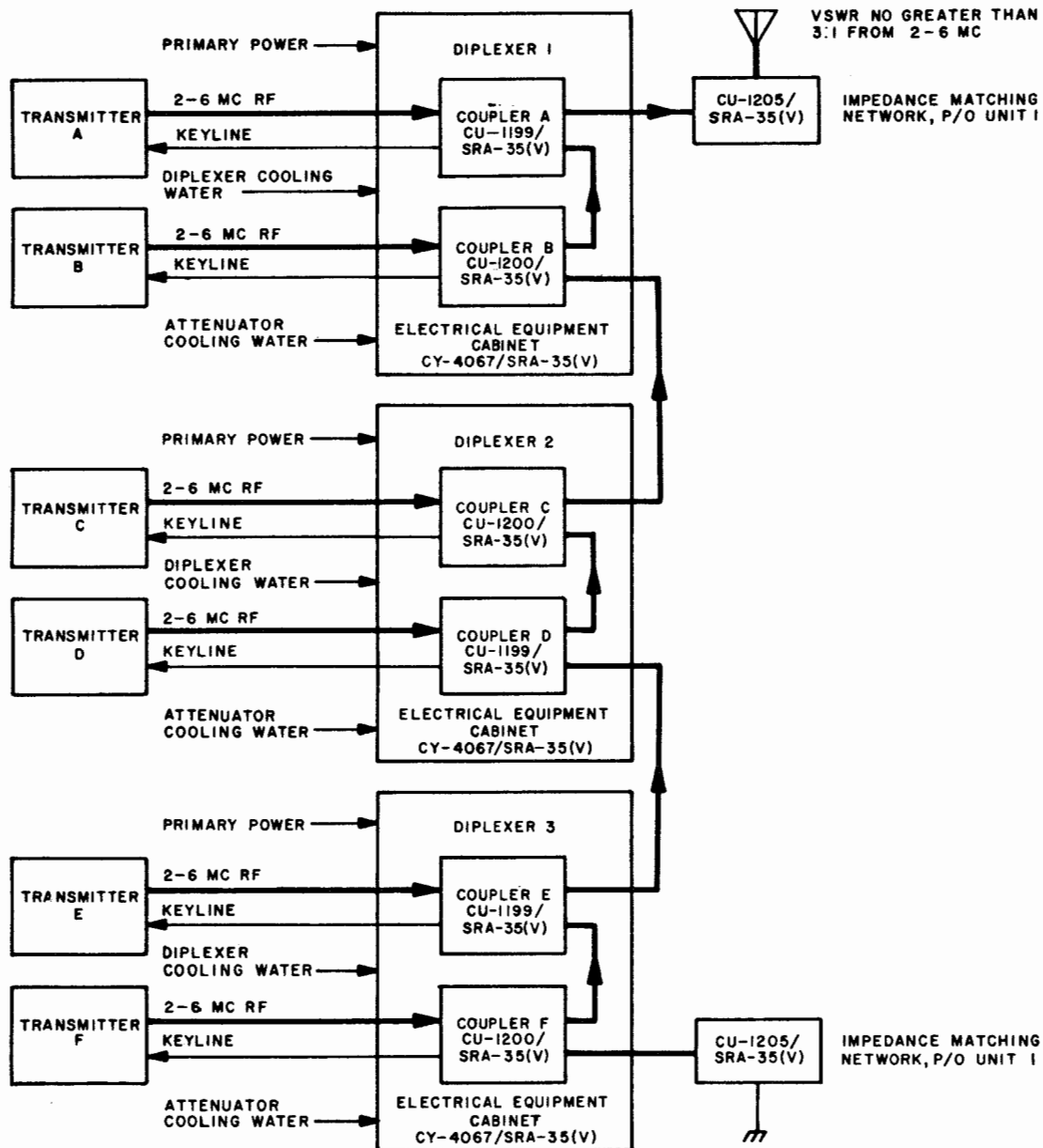


Figure 4-25 Antenna Coupler Group AN/SRA-35(V) Interconnection Diagram

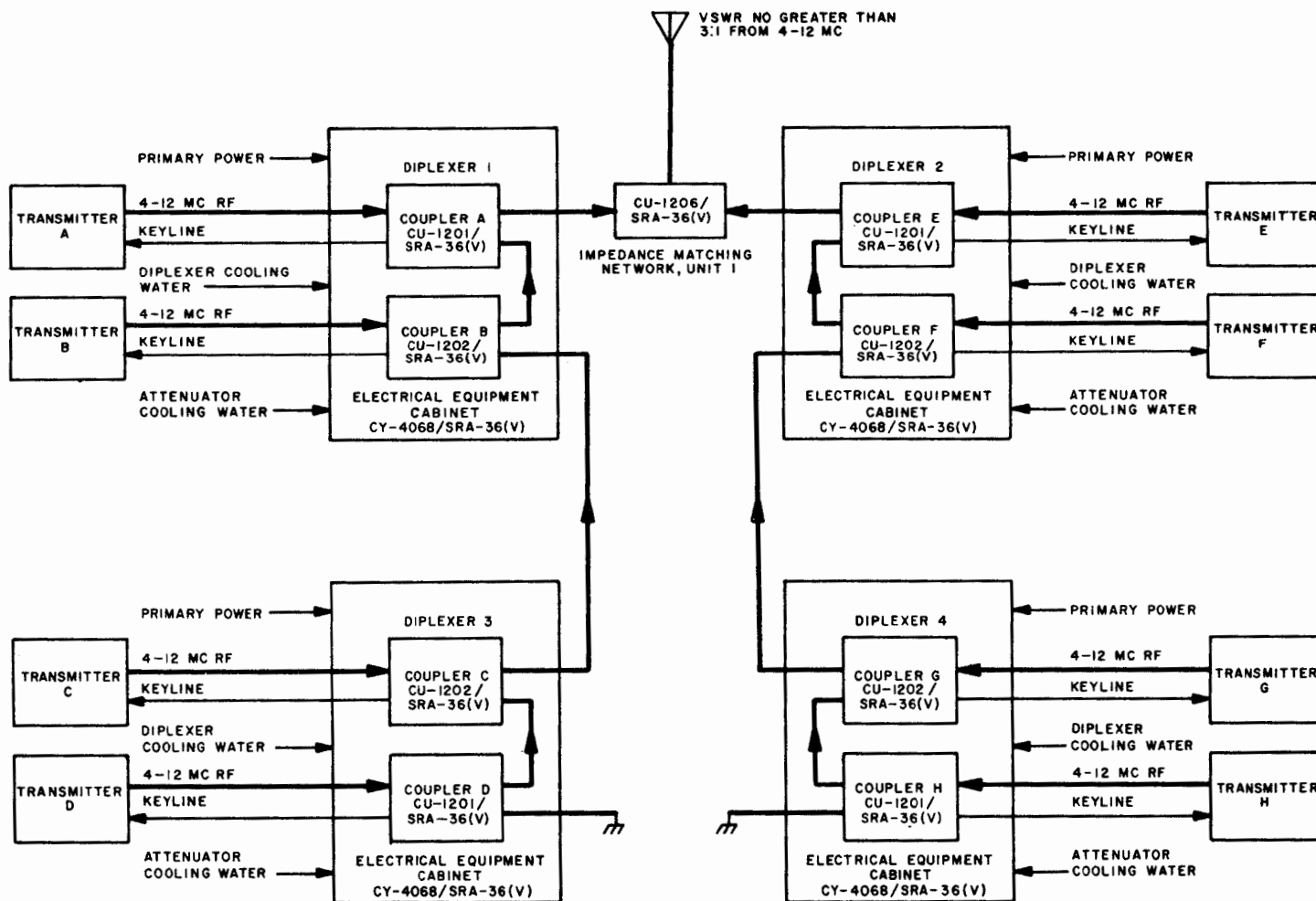


Figure 4-26 Antenna Coupler Group AN/SRA-36(V) Interconnection Diagram

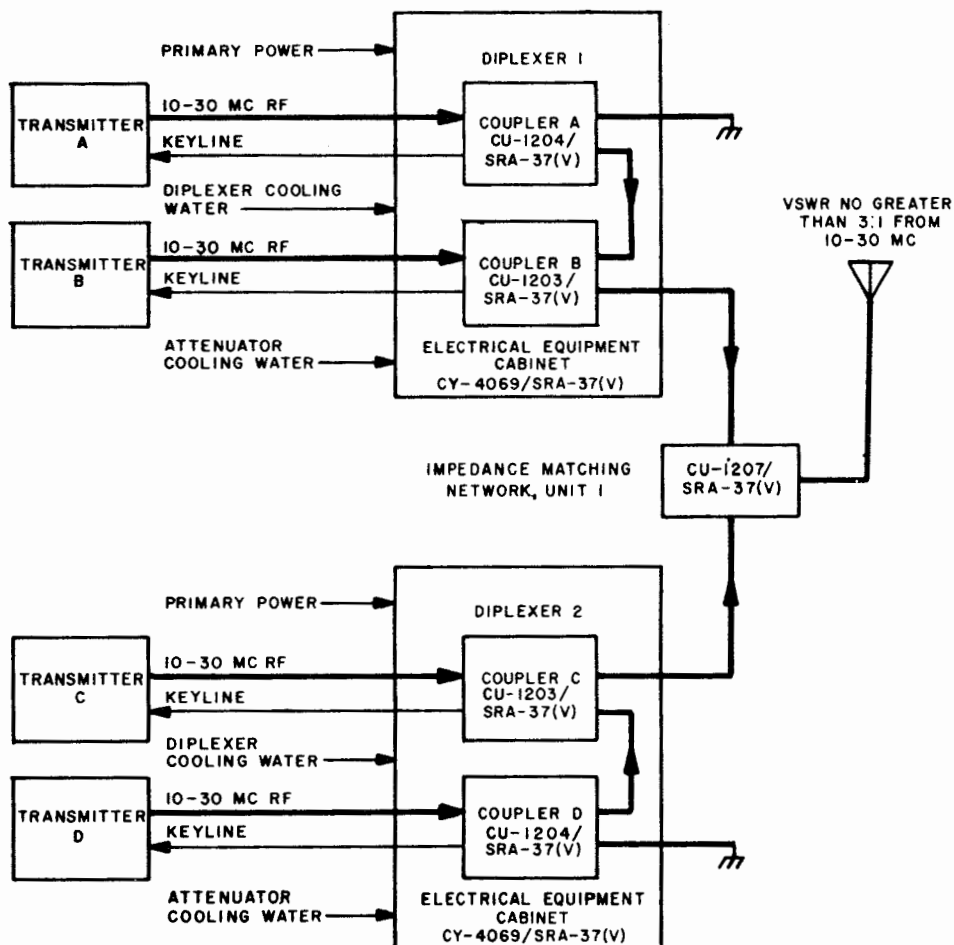


Figure 4-27 Antenna Coupler Group AN/SRA-37(V) Interconnection Diagram

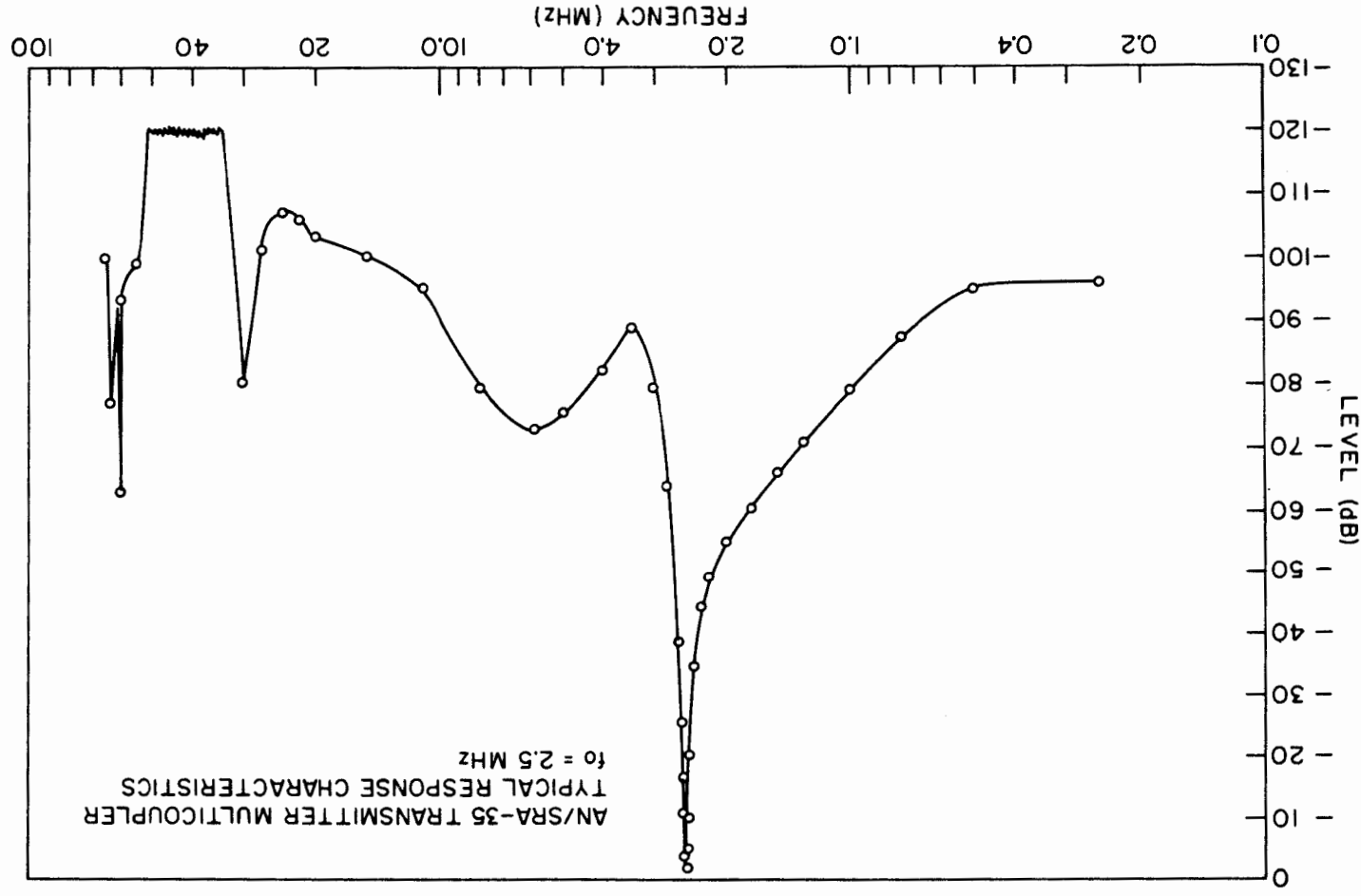


Figure 4-28 Antenna Coupler Group AN/SRA-35 (V) Selectivity Curve

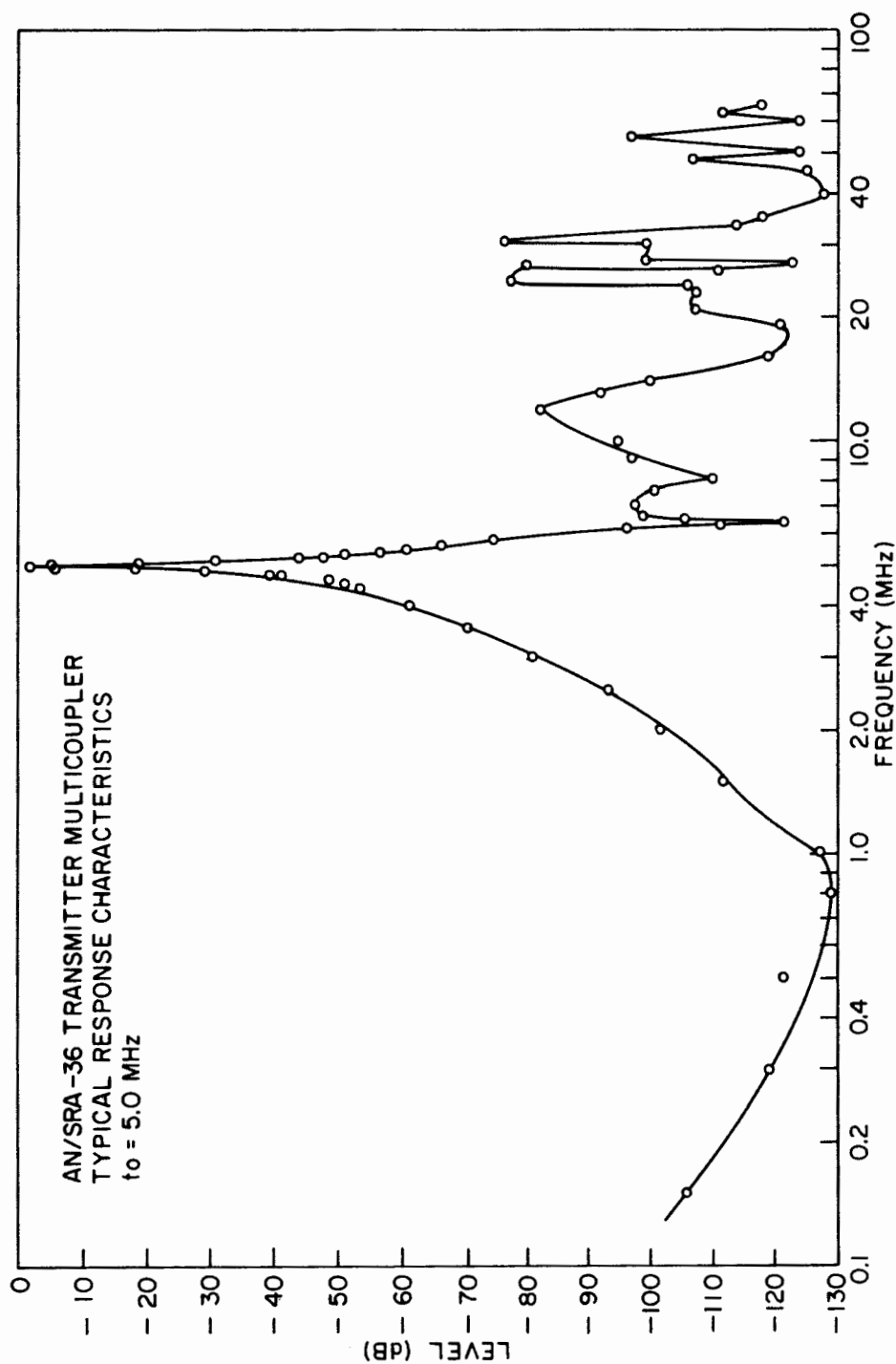


Figure 4-29 Antenna Coupler Group AN/SRA-36 (V) Selectivity Curve

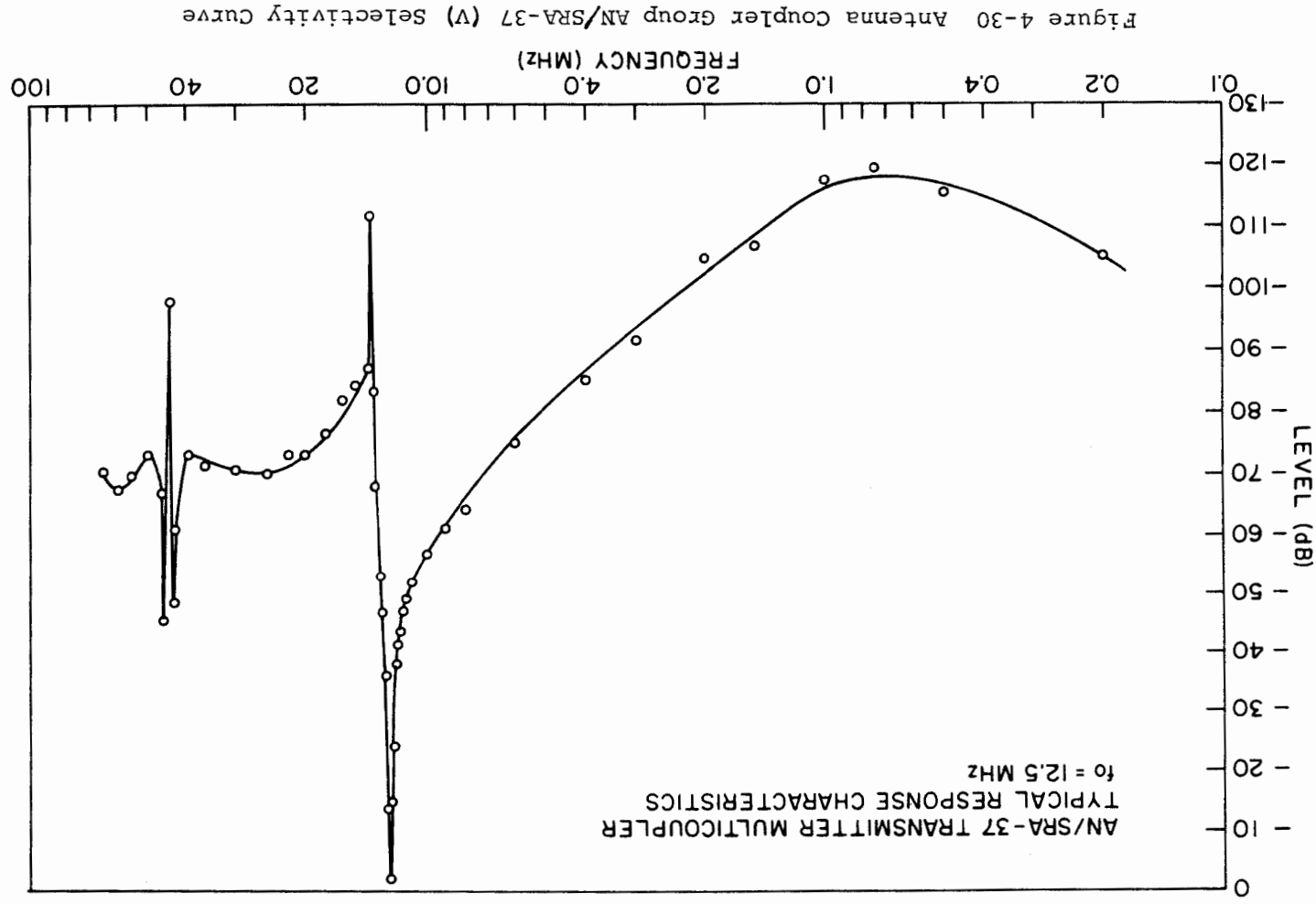


Figure 4-30 Antenna Coupler Group AN/SRA-37 (V) Selectivity Curve

TABLE 4-6 ANTENNA COUPLER GROUPS AN/SRA-35(V), -36(V), AND -37(V)
EQUIPMENT SUPPLIED

QTY PER EQUIP.	NAME	DESIGNATION	HEIGHT (inches)	WIDTH (inches)	DEPTH (inches)	VOLUME (CU FT)	WEIGHT (LB)
WITH ANTENNA COUPLER GROUP AN/SRA-35(V)							
-	Antenna Coupler Group	AN/SRA-35(V)	79.5	87.0	51.9	208.2	3100
3	Electrical Equipment Cabinet	CY-4067/ SRA-35(V)	73.0	29.0	36.0	44.1	599.5
3	Ant. Coupler (upper)	CU-1199/ SRA-35(V)	28.0	24.0	34.0	13.2	177.5
3	Ant. Coupler (lower)	CU-1200/ SRA-35(V)	28.0	24.0	34.0	13.2	177.5
1	Impedance Matching Network	CU-1205/ SRA-35(V)	18.0 27.0	11.0 21.0	10.0 16.5	1.14 5.25	14 54
4	Shock Mounts	6135-0100-1*	4.0	6.0	35.0	0.48	36
4	Sway Braces	6135-0100-2*	4.4	5.2	5.2	0.07	6
2	Cable Assy. (W2,W3)	6135-5146*					
1	Cable Assy. (W1)	6135-1200*					
1	Hardware Kit, Rack Mtg.	6135-1204-1*					
1	Hardware Kit, Shock Mtg.	6135-1205-1*					
1	Hardware Kit, Matching Network	6135-1206-1*					
3	Keyline Connector, Upper	RE49D769-10- 109618-4SX					
3	Keyline Connector, Lower	RE49D769-10- 109618-4SY					
3	Power Input Connector	RE49D769-10- 109620-6S					
2	Technical Manuals	NAVSHIPS 0967-324-3010					

* RF Communications, Inc., Part Number.

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TABLE 4-6 ANTENNA COUPLER GROUPS AN/SRA-35(V), -36(V), AND -37(V)
 EQUIPMENT SUPPLIED (CONT'D)

QTY PER EQUIP.	NAME	DESIGNATION	HEIGHT (inches)	WIDTH (inches)	DEPTH (inches)	VOLUME (CU FT)	WEIGHT (LB)
WITH ANTENNA COUPLER GROUP AN/SRA-36(V)							
-	Antenna Coupler Group	AN/SRA-36(V)	79.5	116.0	51.9	277.5	4000
4	Electrical Equipment Cabinet	CY-4068/ SRA-36(V)	73.0	29.0	36.0	44.1	599.5
4	Ant. Coupler (upper)	CU-1201/ SRA-36(V)	28.0	24.0	34.0	13.2	172.5
4	Ant. Coupler (lower)	CU-1202/ SRA-36(V)	28.0	24.0	34.0	13.2	172.5
1	Impedance Matching Network	CU-1206/ SRA-36(V)	27.0	21.0	16.5	5.2	54
5	Shock Mounts	6135-0100-1*	4.0	6.0	35.0	0.48	36
5	Sway Braces	6135-0100-2*	4.4	5.2	5.2	0.07	6
1	Cable Assy. (W1)	6135-1200*					
2	Cable Assy. (W2,W4)	6135-5146*					
1	Cable Assy. (W3)	6135-7090*					
1	Hardware Kit, Rack Mtg.	6135-1204-2*					
1	Hardware Kit, Shock Mtg.	6135-1205-2*					
1	Hardware Kit, Matching Network	6135-1206-2*					
4	Keyline Connector, Upper	RE49D769-10- 109618-4SX					
4	Keyline Connector, Lower	RE49D769-10- 109618-4SY					
4	Power Input Connector	RE49D769-10- 109620-6S					
2	Technical Manuals	NAVSHIPS 0967-324-3010					

* RF Communications, Inc., Part Number.

TABLE 4-6 ANTENNA COUPLER GROUPS AN/SRA-35(V), -36(V), AND -37(V)
EQUIPMENT SUPPLIED (CONT'D)

QTY PER EQUIP.	NAME	DESIGNATION	HEIGHT (inches)	WIDTH (inches)	DEPTH (inches)	VOLUME (CU FT)	WEIGHT (LB)
WITH ANTENNA COUPLER GROUP AN/SRA-37(V)							
-	Antenna Coupler Group	AN/SRA-37(V)	79.5	58.0	51.9	139	1950
2	Electrical Equipment Cabinet	CY-4069/ SRA-37(V)	73.0	29.0	36.0	44.1	599.5
2	Ant. Coupler (upper)	CU-1203/ SRA-37(V)	28.0	24.0	34.0	13.2	167.5
2	Ant. Coupler (lower)	CU-1204/ SRA-37(V)	28.0	24.0	34.0	13.2	167.5
1	Impedance Matching Network	CU-1207/ SRA-37(V)	27.0	21.0	16.5	5.2	48.5
3	Shock Mounts	6135-0100-1*	4.0	6.0	35.0	0.48	36
3	Sway Braces	6135-0100-2*	4.4	5.2	5.2	0.07	6
1	Cable Assy. (W1)	6135-1200*					
1	Cable Assy. (W2)	6135-7090*					
1	Hardware Kit, Rack Mtg.	6135-1204-3*					
1	Hardware Kit, Shock Mtg.	6135-1205-3*					
1	Hardware Kit, Matching Network	6135-1206-3*					
2	Keyline Connector, Upper	RE49D769-10- 109618-4SX					
2	Keyline Connector, Lower	RE49D769-10- 109618-4SY					
2	Power Input Connector	RE49D769-10- 109620-6S					
2	Technical Manuals	NAVSHIPS 0967-324-3010					

* RF Communications, Inc., Part Number.

4.8 ANTENNA COUPLER GROUPS AN/SRA-56, AN/SRA-57 and AN/SRA-58.

a. TYPE/USE. - Antenna Coupler Groups AN/SRA-56, -57, and -58 are designed to permit simultaneous operation of as many as four transmitters, operating with a frequency separation of 5 percent or greater, into a common broadband antenna. Antenna Coupler Groups AN/SRA-56 or -57 can each be operated alone in the four-channel configuration, or two of the same groups can be combined by use of an impedance matching combiner network to form an eight-channel configuration. The AN/SRA-58 can be used in a four-channel configuration only. The coupler groups are designed primarily for shipboard operation. They are identical with regards to operating features and electrical performance and differ only in frequency range. Each group requires a broadband antenna which presents a vswr of not greater than 3:1 referenced to 50 ohms across the respective range.

b. PHYSICAL CONFIGURATION. - See Figures 4-31 and -32.

c. INTERCONNECTION CABLING DIAGRAM. - See Figures 4-33 and -34.

d. FREQUENCY RANGE. -

- | | |
|----------------|--------------------|
| (1) AN/SRA-56. | 1.95 to 6.15 MHz. |
| (2) AN/SRA-57. | 3.90 to 12.30 MHz. |
| (3) AN/SRA-58. | 9.75 to 30.75 MHz. |

e. NUMBER OF CHANNELS. -

- (1) Each group. Four.
- (2) Two AN/SRA-56 or AN/SRA-57 groups may be configured to operate as eight-channel groups by the addition of CU-1773/SRA-56 or CU-1775/SRA-57 Impedance Matching Networks to the respective group.

f. TYPE OF TUNING. - Manual.

g. POWER RATING. - 1-kw average; 2-kw peak per channel.

h. ANTENNA IMPEDANCE REQUIRED. - 50 ohms nominal unbalanced, vswr not greater than 3:1.

i. ANTENNA CONNECTOR. -

- (1) Four-Channel Configuration. Type LC (UG-352B/U).
- (2) Eight-Channel Configuration. Andrew No. 15069. (Mates with Andrew 87R for use with RG-319A/U Semi-Rigid Coax).

j. INDIVIDUAL CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

k. CHANNEL CONNECTOR. - Type C (UG-569A/U).

l. PROTECTIVE CIRCUITS. - Each antenna coupler is equipped with monitoring, control and protective circuits that shut down the coupler and its associated transmitter whenever an equipment malfunction or an abnormal operating level occurs. The transmitter interlocks are opened when excessive vswr levels exist, there is a loss of primary power or the supply of forced air for cooling is inadequate. The control circuitry also prevents the tuning of more than one coupler at a time since all couplers share the same power attenuation and tune reflectometer circuits.

- m. PRIMARY POWER REQUIRED. - Each coupler group 115 vac 60 Hz single phase 200 watts.
- n. HEAT DISSIPATION (MAXIMUM). - Each coupler group 1.4-kw.
- o. TEMPERATURE RANGE. - 0° to 50°C (32° to 122°F).
- p. COOLING. - Forced air. Each coupler is equipped with an integral blower.
- q. SELECTIVITY. - See Figures 4-35, -36 and -37.
- r. ISOLATION. - Greater than 35 dB between channels separated 5 percent in frequency.
- s. INSERTION LOSS. -
 - (1) Each Coupler. Not greater than 1.8 dB.
 - (2) Each Group. Not greater than 2.0 dB.
- t. INSTALLATION REQUIREMENTS. - The coupler groups should be located as close as possible to the associated transmitters, rf and control patching facilities and antenna feeds. A minimum clearance of 18" is required at the rear of the coupler group for rf cable connection. Clearance of 38 inches is required in front of the equipment for drawer removal and service area.
- u. SPECIAL CONSIDERATIONS. - None.
- v. MEAN TIME BETWEEN FAILURES (MTBF). - 4000 hours.
- w. EQUIPMENT SUPPLIED. - See Table 4-7.

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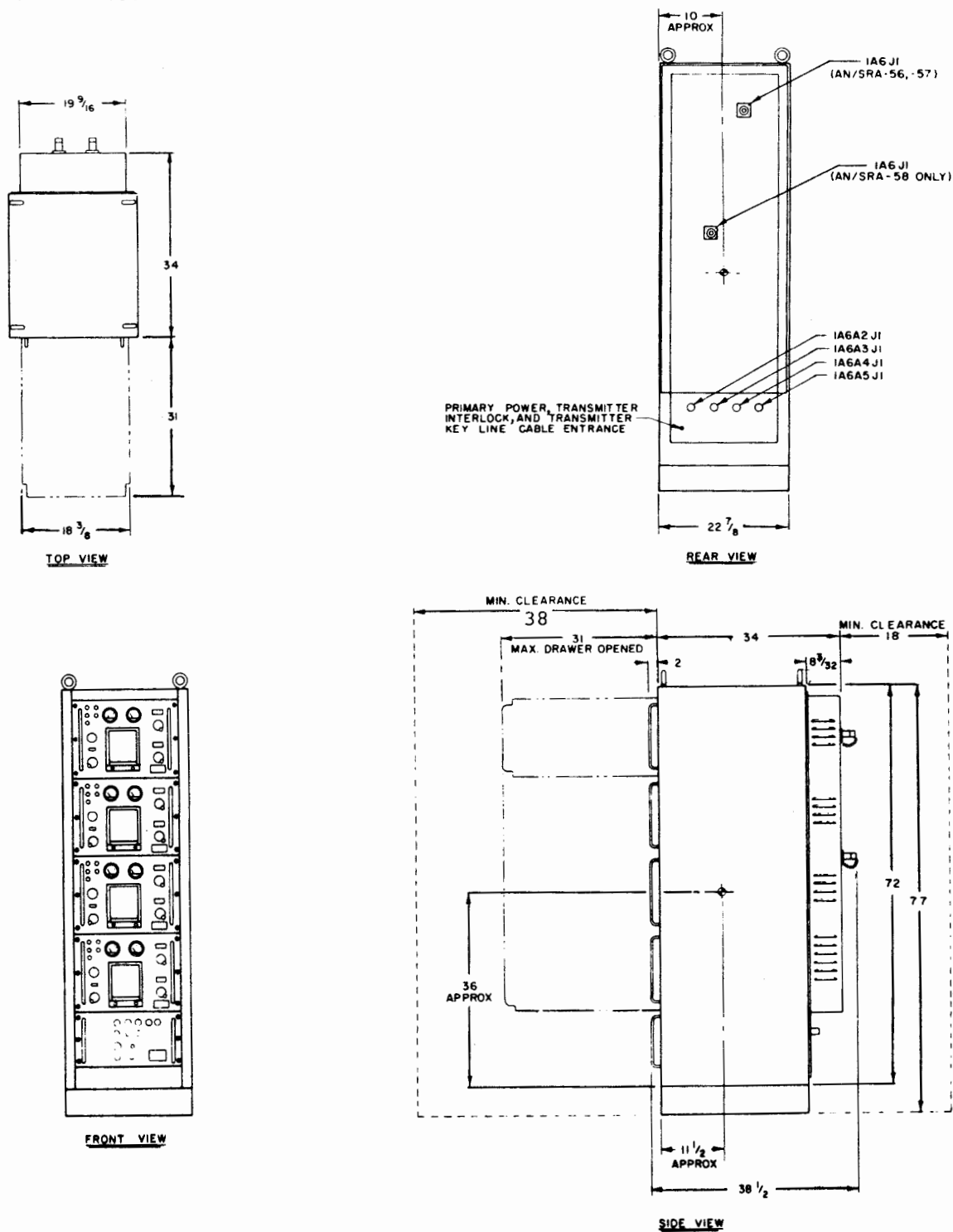


Figure 4-31 Antenna Coupler Groups AN/SRA-56, -57 and -58 Physical Configuration

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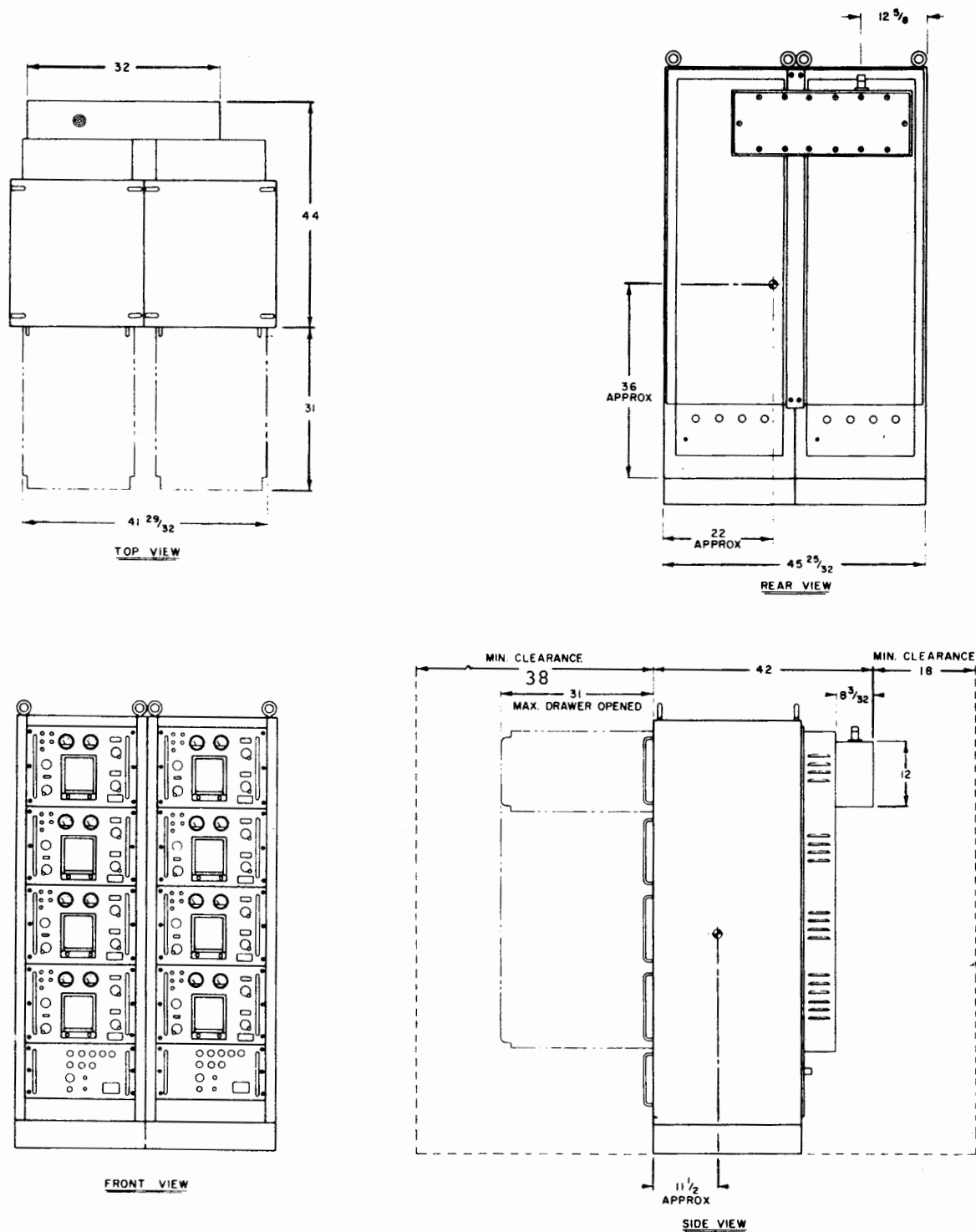
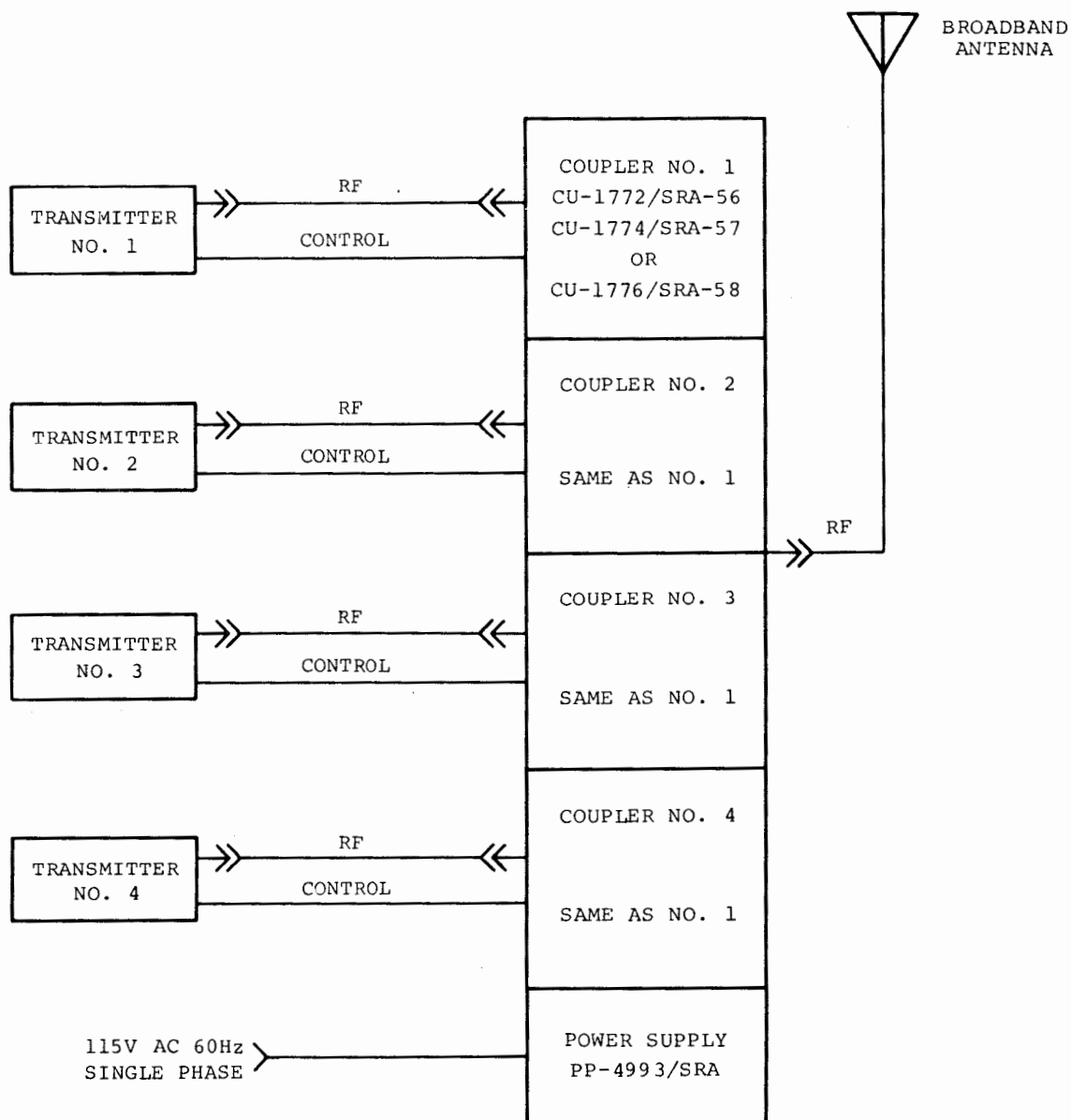


Figure 4-32 Antenna Coupler Groups AN/SRA-56 and -57 Physical Configuration (Eight-Channel)

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AN/SRA-56, AN/SRA-57 OR AN/SRA-58 ANTENNA GROUP
 FOUR CHANNEL CONFIGURATION
 (ALL COUPLERS IN SYSTEM MUST BE FROM SAME GROUP)

Figure 4-33 Antenna Coupler Groups AN/SRA-56, AN/SRA-57 or AN/SRA-58
 Interconnection Diagram

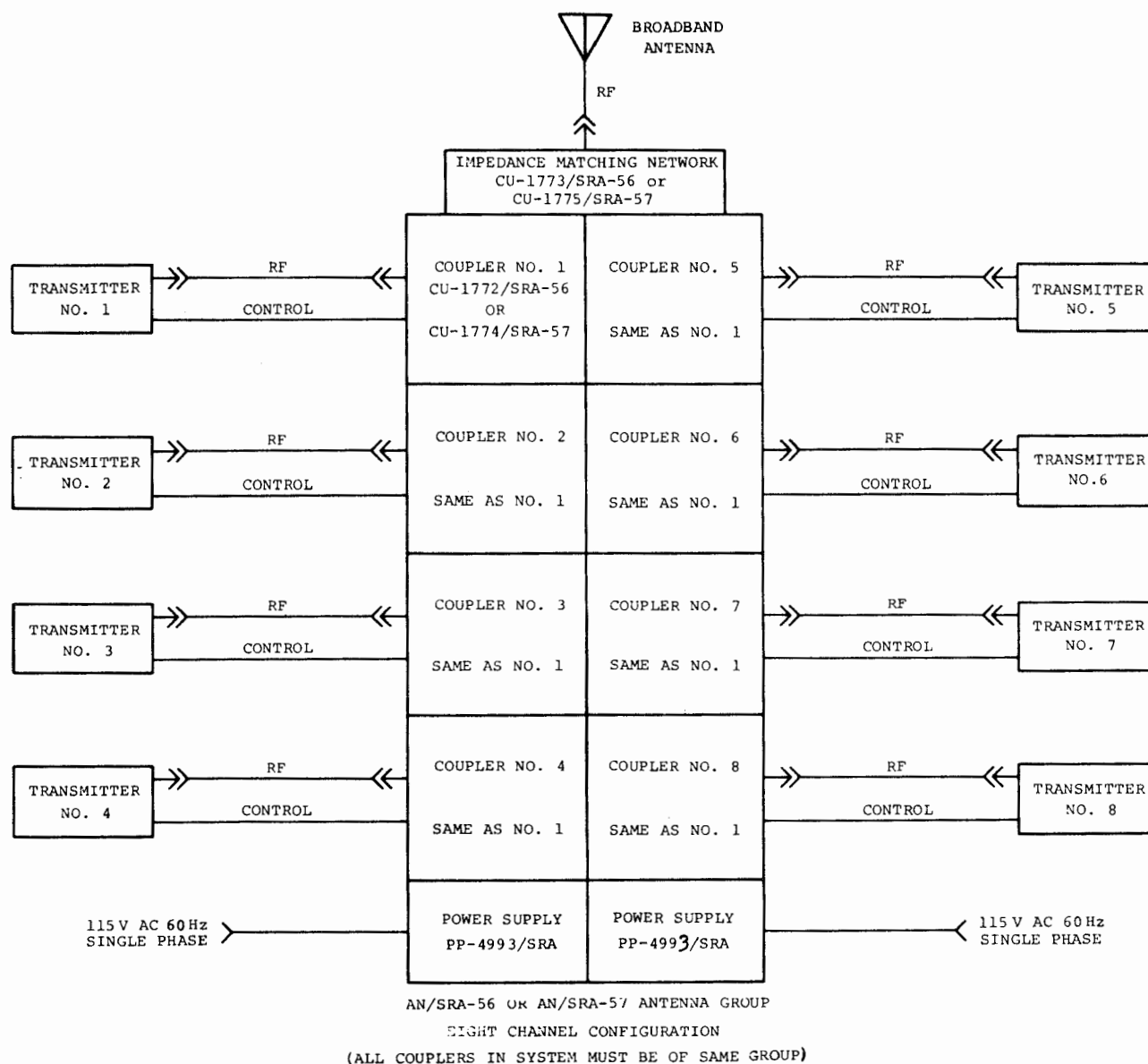


Figure 4-34 Antenna Coupler Groups AN/SRA-56 or AN/SRA-57 Interconnection Diagram

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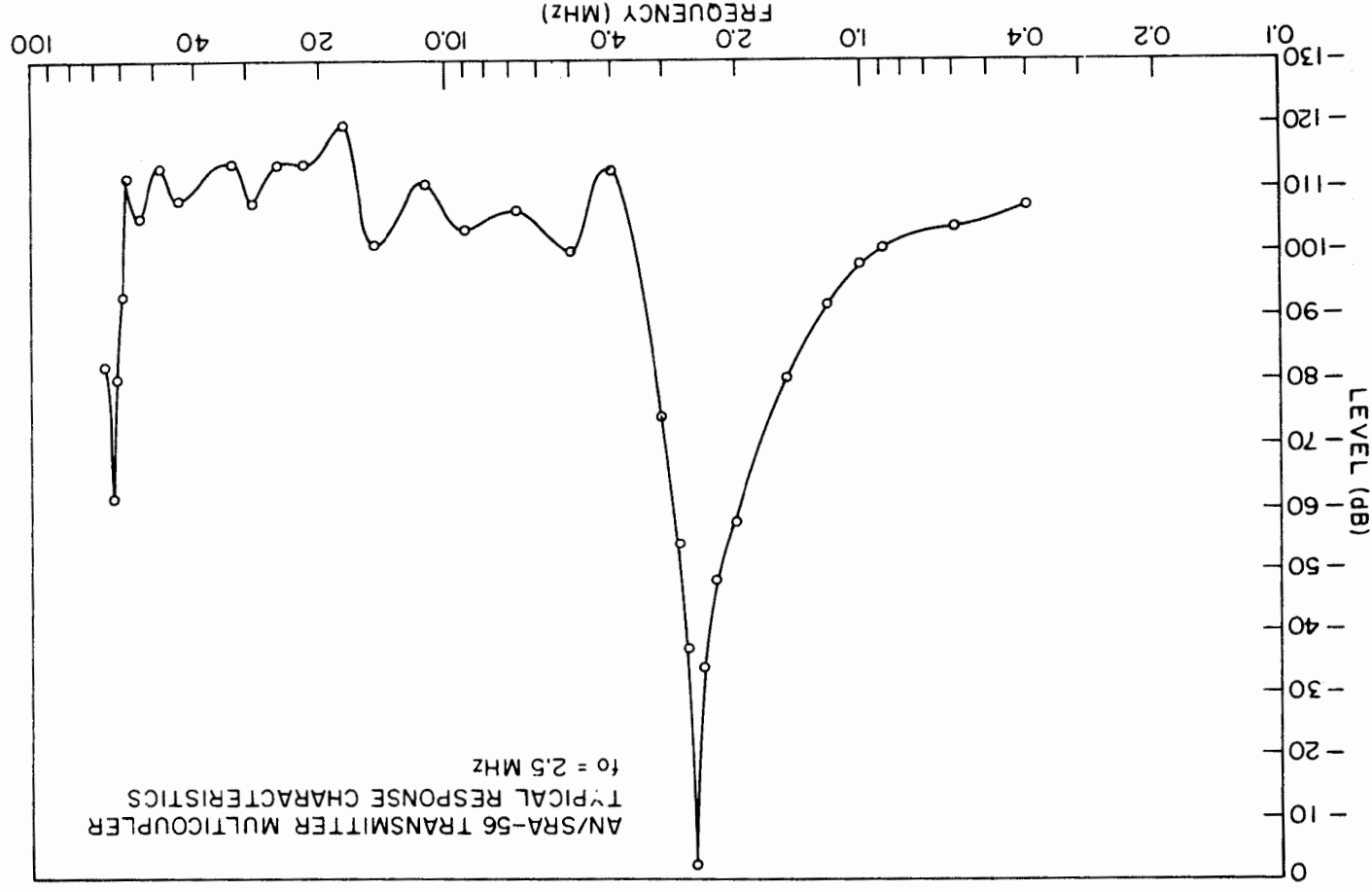


Figure 4-35 Antenna Coupler Group AN/SRA-56 Selectivity Curve

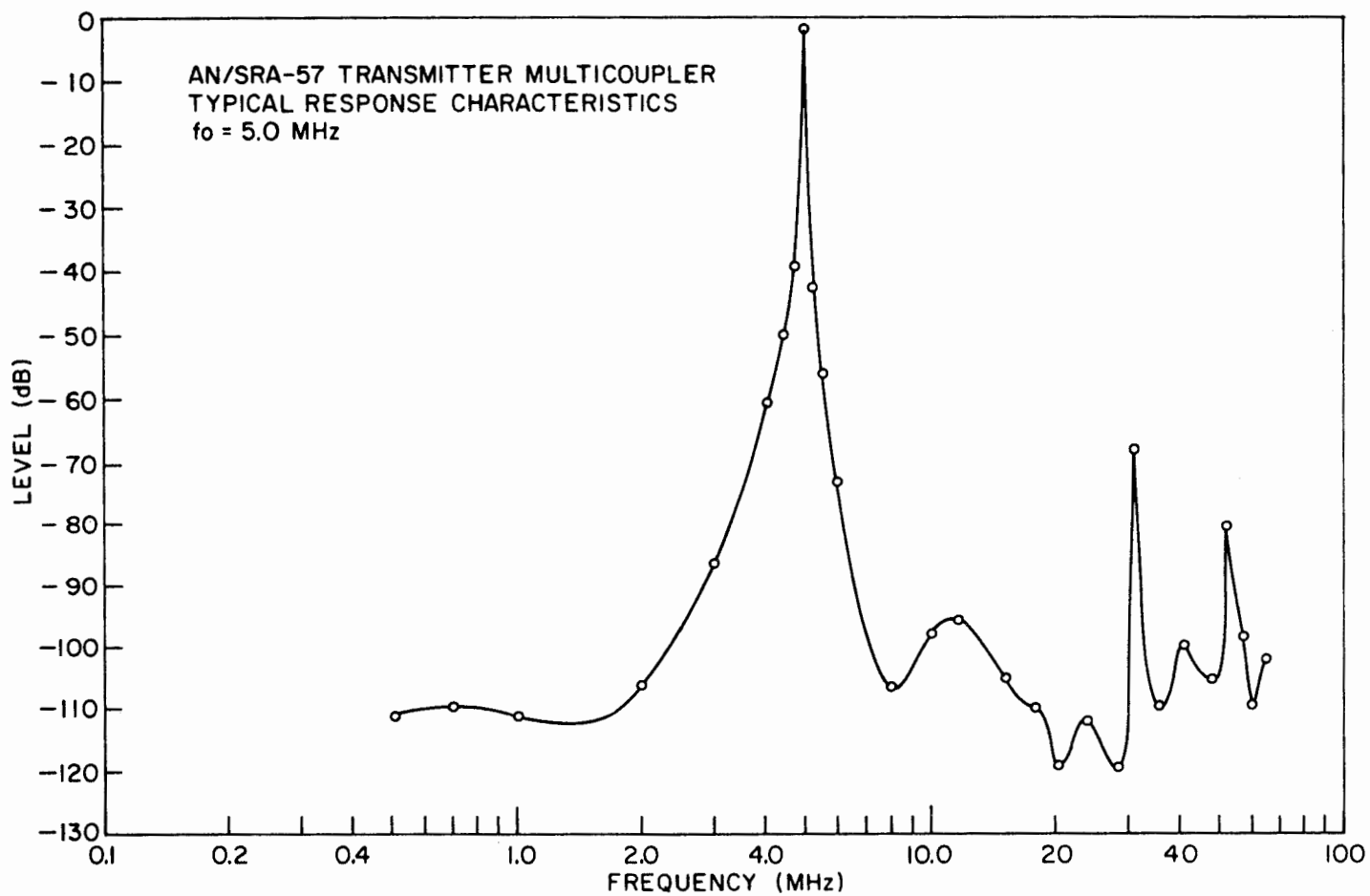


Figure 4-36 Antenna Coupler Group AN/SRA-57 Selectivity Curve

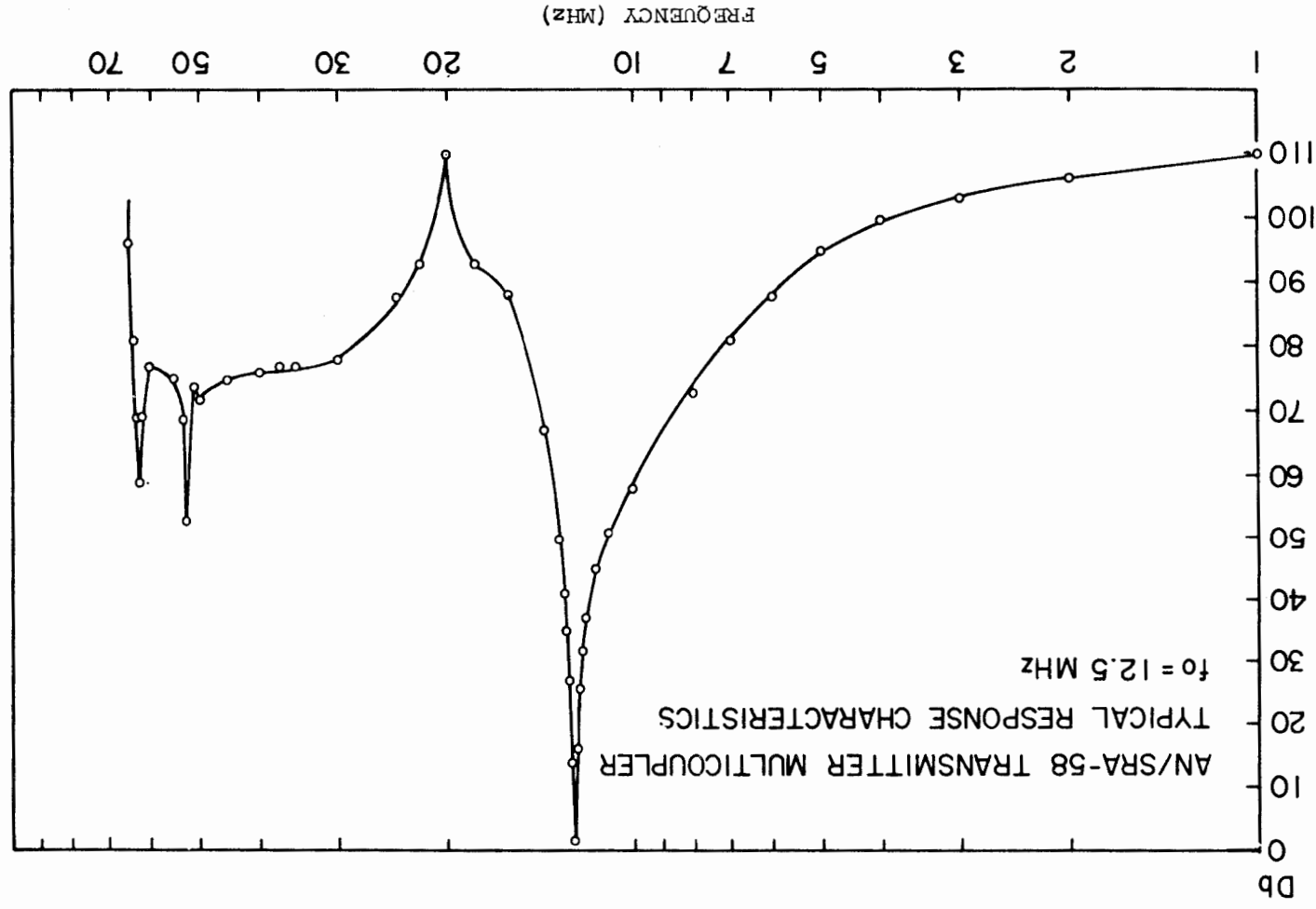


Figure 4-37 Antenna Coupler Group AN/SRA-58 Selectivity Curve

TABLE 4-7 ANTENNA COUPLER GROUPS AN/SRA-56, -57 AND-58 EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERALL DIMENSIONS (IN.)			VOLUME (CU. FT.)	WEIGHT (LB.)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		

WITH ANTENNA COUPLER GROUP AN/SRA-56

1	Electrical Equipment Cabinet	CY-6422/ SRA-56	77.00	22.88	38.50	39.24	735*
4	Antenna Coupler	CU-1772/ SRA-56	14.00	19.00	29.00	4.46	87
1	Power Supply	PP-4993/ SRA	9.75	19.00	7.00	0.75	22
**	Impedance Matching Network	CU-1773/ SRA-56	13.12	32.00	8.09	1.97	29
	Technical Manual	NAVSHIPS 0967-284-6010					

* Weight of equipment cabinet includes antenna couplers and power supply installed.
Weight of cabinet without these units is 365 pounds.

** Impedance Matching Network CU-1773/SRA-56 supplied only with 8-channel configurations
(two coupler groups).

WITH ANTENNA COUPLER GROUP AN/SRA-57

1	Electrical Equipment Cabinet	CY-6423/ SRA-57	77.00	22.88	38.50	39.24	703*
4	Antenna Coupler	CU-1774/ SRA-57	14.00	19.00	29.00	4.46	79
1	Power Supply	PP-4993/ SRA	9.75	19.00	7.00	0.75	22
**	Impedance Matching Network	CU-1775/ SRA-57	13.12	38.00	8.09	1.97	29

* Weight of equipment cabinet includes antenna couplers and power supply installed.
Weight of cabinet without these units is 365 pounds.

** Impedance Matching Network CU-1775/SRA-57 supplied only with 8-channel configurations
(two coupler groups).

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TABLE 4-7 ANTENNA COUPLER GROUPS AN/SRA-56, -57 AND -58

EQUIPMENT SUPPLIED - CONTINUED

QTY PER EQUIP	NOMENCLATURE		OVERALL DIMENSIONS (IN.)			VOLUME (CU. FT.)	WEIGHT (LB.)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		

WITH ANTENNA COUPLER GROUP AN/SRA-57 (Continued)

	Technical Manual	NAVSHIPS 0967-284-6010					

WITH ANTENNA COUPLER GROUP AN/SRA-58

1	Electrical Equipment Cabinet	CY-6424/ SRA-58	77.00	22.88	38.50	39.24	699*
4	Antenna Coupler	CU-1776/ SRA-58	14.00	19.00	29.00	4.46	78
1	Power Supply	PP-4993/ SRA	9.75	19.00	7.00	0.75	22
	Technical Manual	NAVSHIPS 0967-284-6010					

* Weight of equipment cabinet includes couplers and power supply installed. Weight of cabinet without these units is 365 pounds.



4.9 ANTENNA COUPLER GROUP FORMED FROM COMPONENTS OF COMMUNICATION CENTRAL
AN/SRC-16.

a. TYPE/USE. - Antenna Coupler Group OA-4625/SRC-16, Antenna Coupler Group OA-4624/SRC-16 and Antenna Coupler Control C-4658/SRC-16 are basic components of the Communication Central AN/SRC-16. One OA-4624/SRC-16, two OA-4625/SRC-16, and eight C-4658/SRC-16 units are supplied with each AN/SRC-16 system. The coupler groups provide facilities to couple the four channels of the AN/SRC-16 and eight channels of auxiliary hf transmitters or transceivers such as AN/URC-32, AN/WRT-2, AN/SRT-14, and AN/SRT-15 equipments to three broadband antennas. The selection of individual couplers and specific antennas is accomplished through Radio Frequency Switching Unit SA-1042/SRC-16 a part of OA-4624/SRC-16. Control of multicoupler selection and tuning through the switching unit in the AN/SRC-16 system is automatic and is accomplished by diplexing control information on the individual transmitter rf. The C-4658/SRC-16 Coupler Control is used to adapt manually tuned hf transmitters to the system. The four AN/SRC-16 channels may be operated as simplex/duplex while the auxiliary channels are limited to simplex operation. The switching unit has the total capability of connecting 12 transmitter channels to 20 couplers. There are terminals on the switching unit for four auxiliary antenna couplers (not supplied) that require manual selection by front panel pushbuttons.

b. PHYSICAL CONFIGURATION. - See Figures 4-38, -39 and -40 (Limited to multicoupler and antenna coupler control units).

c. INTERCONNECTION CABLING DIAGRAM. - See Figure 4-41 (Limited to multicoupler and antenna coupler control units).

d. FREQUENCY RANGE. -

- (1) OA-4625/SRC-16. 2 to 6 MHz.
- (2) OA-4624/SRC-16. 6 to 30 MHz.

e. NUMBER OF CHANNELS. - Twelve, total.

- (1) 2 to 6 MHz. Eight.
- (2) 6 to 30 MHz. Four.

f. TYPE OF TUNING. - Automatic or Manual.

g. POWER RATING. -

(1) OA-4625/SRC-16 (Antenna Coupler CU-1169/SRC-16). Each coupler has a power rating of 3-kw rf average, 6-kw peak. When used with other than AN/SRC-16 transmitters, power is limited by Antenna Coupler Control C-4658/SRC-16 to 600 watts average. The adapter also limits power during tuning to 200 watts rf maximum with a duty cycle of 2 minutes on and 5 minutes off. A minimum of 100 watts rf average power is required for automatic tuning.

(2) OA-4624/SRC-16 (Antenna Coupler CU-1170/SRC-16). Each coupler has a power rating of 300 watts average, 1200 watts rf peak. Antenna Coupler Control C-4658/SRC-16 limits the power during tuning to 200 watts rf maximum with a duty cycle of 2 minutes on and 5 minutes off. A minimum of 100 watts rf average power is required for automatic tuning. Operation of the AN/SRC-16 system with 1-kw average power rated transmitters such as the AN/URT-23 is possible by accomplishing the modification to the OA-4624/SRC-16 and C-4658/SRC-16 as described in NAVSHIPS 0967-086-3210, "Supplement Technical Manual for OA-4624/SRC-16 and C-4658/SRC-16 Modified for Operation with 1-kw Average Power Rated Transmitters."

- h. ANTENNA IMPEDANCE REQUIRED. - 50 ohms nominal, unbalanced, vswr not greater than 4:1.
- i. ANTENNA CONNECTOR. - Type LC. (UG-352A/U).
- j. INDIVIDUAL CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced, vswr not greater than 1.3:1.
- k. CHANNEL CONNECTOR. -
- (1) OA-4625/SRC-16 (CU-1169/SRC-16). Type HN (UG-496/U).
 - (2) OA-4624/SRC-16 (CU-1170/SRC-16). Type C (UG-568/U).
 - (3) C-4658/SRC-16 Type N (UG- 58/U).
- l. PROTECTIVE CIRCUITS. - When the reflected power on a channel exceeds a preset level, the coupler automatically recycles and retunes. Spark gaps are provided for excessive voltages that may develop in the coupler. Aural and visual alarms are activated under the following conditions:
- (1) Loss of primary power.
 - (2) Loss of 28-volt dc control voltage.
 - (3) Excessive tuning time (more than 1 minute).
 - (4) Thermal overload.
 - (5) Spark-gap breakdown.
- Under these conditions, rf power is removed and the channel remains in the alarm state until the coupler is reset.
- m. PRIMARY POWER REQUIRED. -
- (1) OA-4624/SRC-16. - 115 vac 400 Hz 3 phase delta 655 - watts.
 - (2) OA-4625/SRC-16. - 115 vac 400 Hz 3 phase delta 465 - watts.
 - (3) C-4658/SRC-16. - 28 vdc 5 amp.
- n. HEAT DISSIPATION. -
- (1) OA-4624/SRC-16. - 1455 watts total, water and air.
 - (2) OA-4625/SRC-16. - 4800 watts total, water and air.
 - (3) C-4658/SRC-16. - Negligible.
- o. TEMPERATURE RANGE. - 0° to 50° C (+32° to +122° F).
- p. COOLING. - Forced air from a central blower in each electrical cabinet. An auxiliary blower is also furnished for cooling individual couplers when the coupler drawer is extended from cabinet. Ships water is required for cooling OA-4624/SRC-16 and OA-4625/SRC-16 coupler groups.
- q. SELECTIVITY. - See Figures 4-42 and -43.
- r. ISOLATION. - 50 dB with 15 percent frequency separation.
- s. INSERTION LOSS. - Each coupler 2 dB.

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t. INSTALLATION REQUIREMENTS. - The two OA-4625/SRC-16 cabinets must be mounted side by side with not more than 2 inches of space between the two cabinets. Cable No. W-284 supplied with the AN/SRC-16 is critical, therefore this distance must be maintained. The OA-4624/SRC-16 should be located within one foot of the OA-4625/SRC-16 units. It may be located on either the right or left of the OA-4625/SRC-16. The cabinets of all groups may be fastened together. Clearance of 24 inches is required at the rear of the cabinets for access to water connections and cabling and a minimum of 40 inches in front for drawer removal and servicing. The OA-4624/SRC-16 requires 20 inches clearance on one side for maintenance. The C-4658/SRC-16 coupler control unit is designed for bulkhead mounting or multiple units in a 19-inch rack.

u. SPECIAL CONSIDERATIONS. - The distance between individual C-4658/SRC-16 coupler control and its associated transmitter should be kept to a minimum as should the distance between the control unit and the OA-4624/SRC-16. The ships water source for equipment cooling must meet the following characteristics:

- (1) OA-4624/SRC-16 - 2.5 GPM at 95° F maximum.
- (2) OA-4625/SRC-16 - 3.2 GPM at 95° F maximum.

The water pressure drop across each cabinet is 10 psi at rated flow.

v. MEANTIME BETWEEN (MTBF). - 1000 hours.

w. EQUIPMENT SUPPLIED. - See table 4-8.

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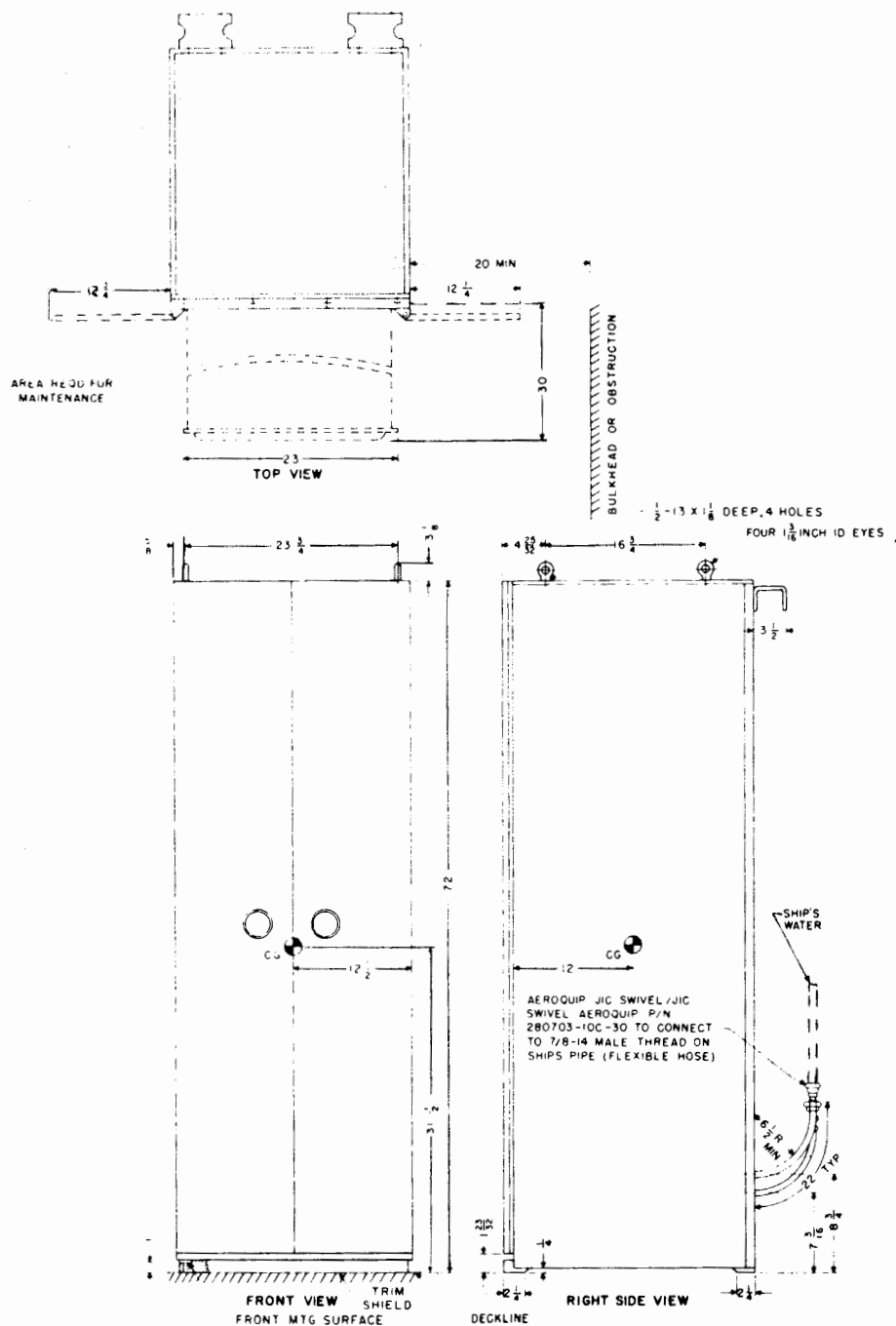


Figure 4-38 Antenna Coupler Group OA-4624/SRC-16 Physical Configuration

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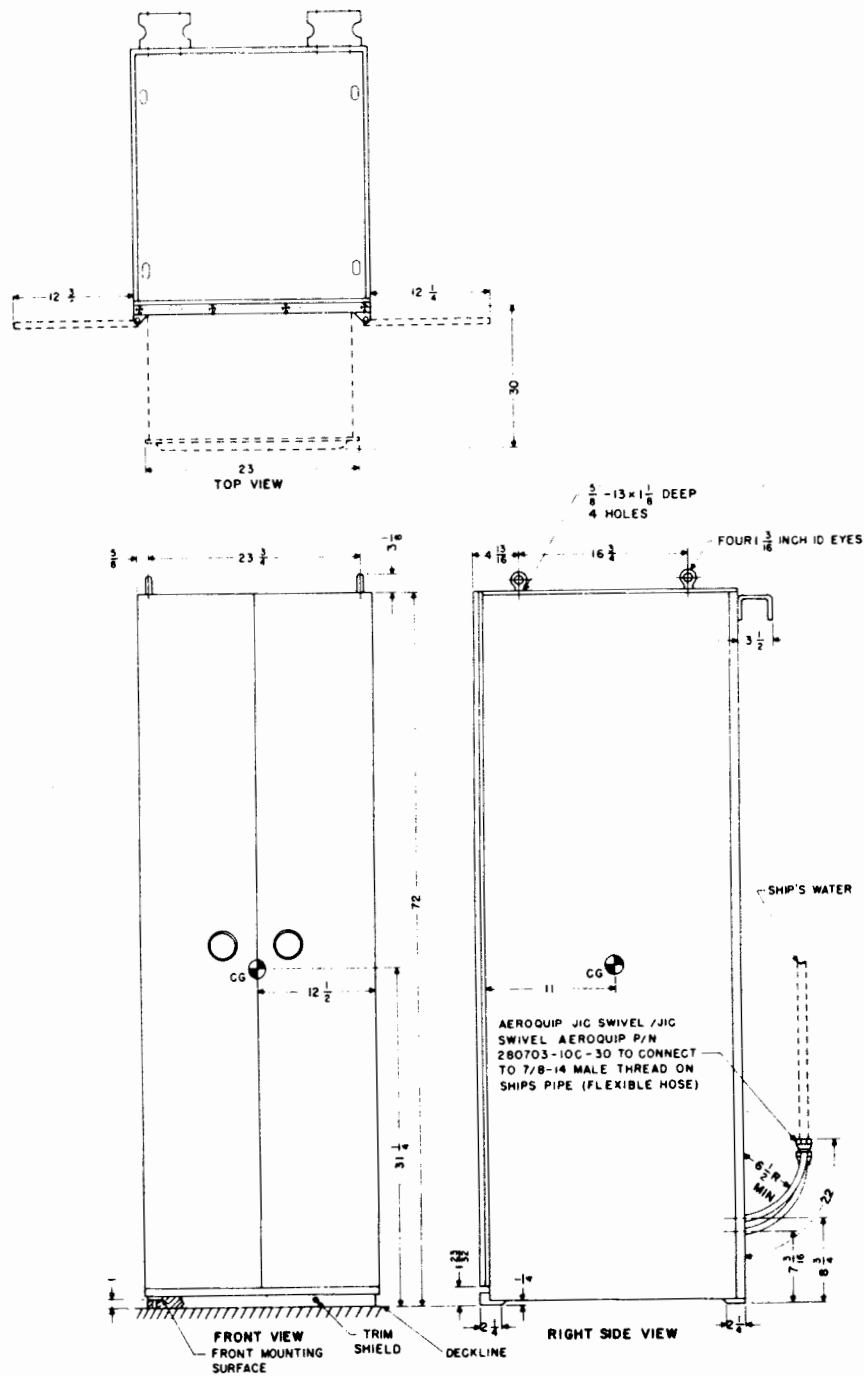


Figure 4-39 Antenna Coupler Group OA-4625/SRC-16 Physical Configuration

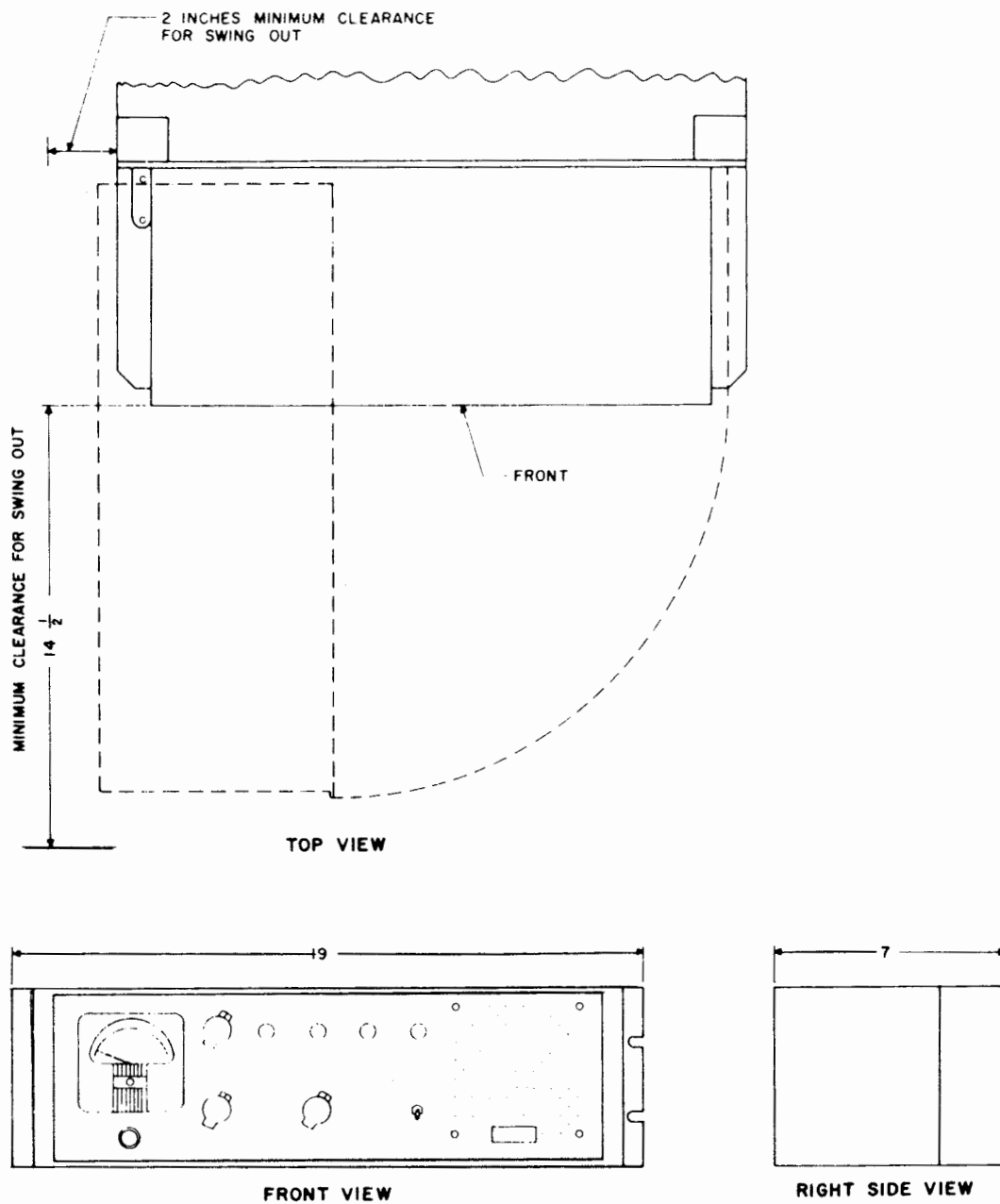
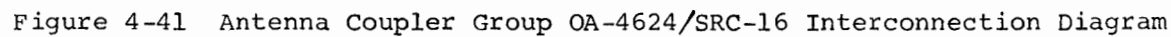


Figure 4-40 Antenna Coupler Control C-4658/SRC-16 Physical Configuration



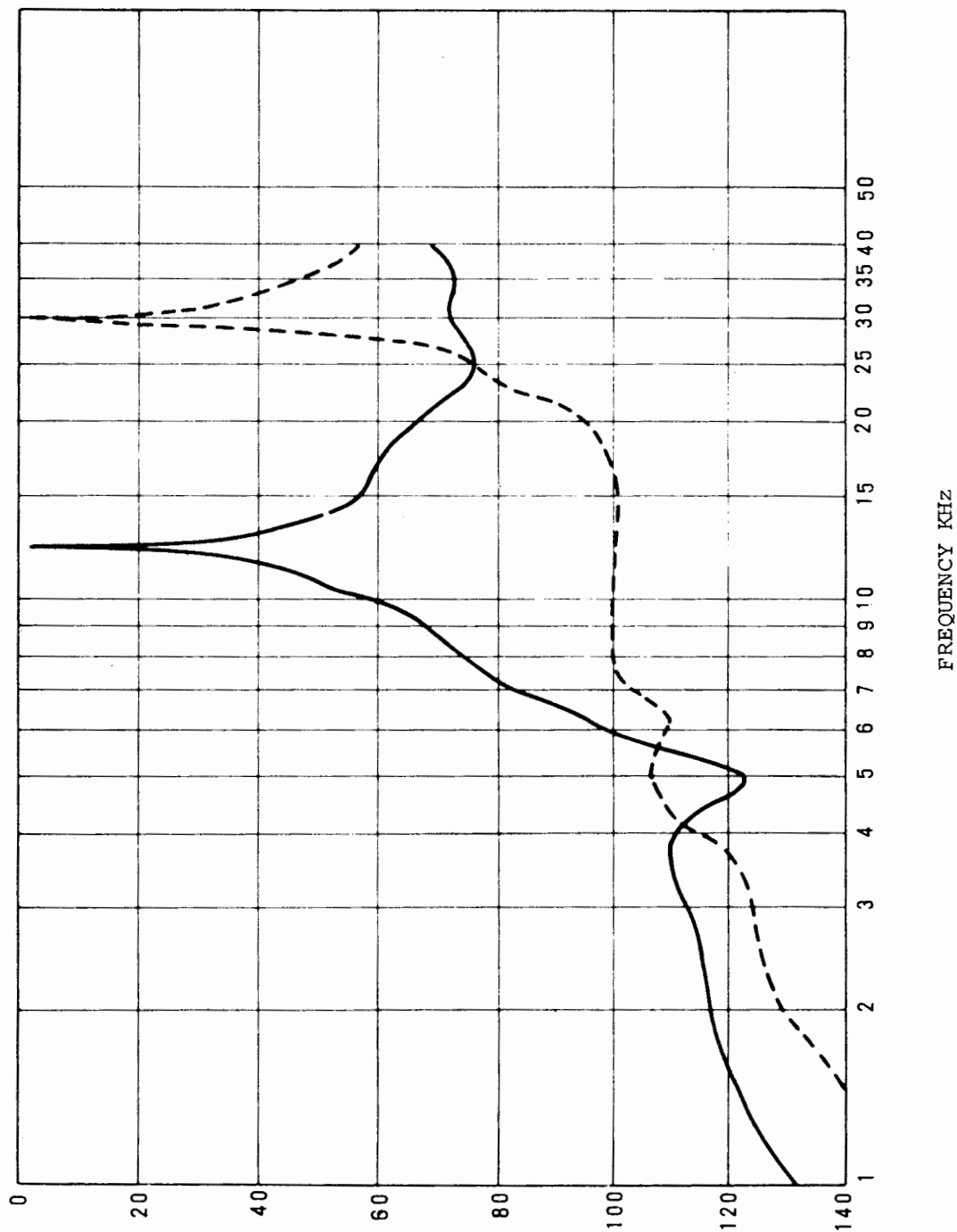
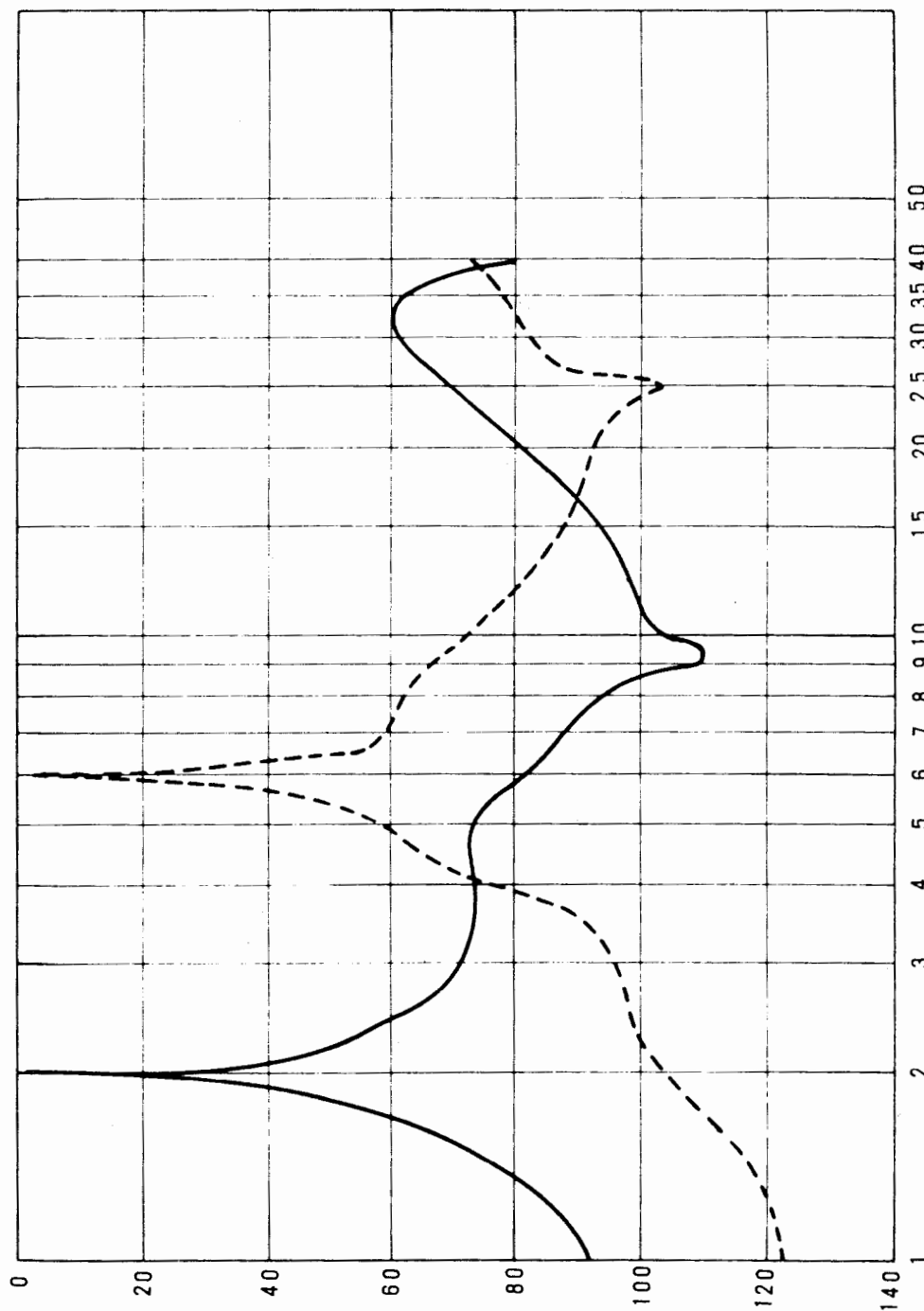


Figure 4-42 Antenna Coupler Group OA-4624/SRC-16 Selectivity Curve

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FREQUENCY KHz

Figure 4-43 Antenna Coupler Group OA-4625/SRC-16 Selectivity Curve

TABLE 4-8 ANT COUPLER GROUP FORMED FROM COMPONENTS OF
COMMUNICATION CENTRAL AN/SRC-16 EQUIPMENT
SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERALL DIMENSIONS (IN.)			VOL (CU FT)	WEIGHT (LB)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
2	Electrical Equipment Cabinet	CY-3930/ SRC-16	72	25	27	28	1130*
8	Antenna Coupler	CU-1169/ SRC-16	13.5	22.87	21.75	4	
1	Electrical Equipment Cabinet	CY-3929/ SRC-16	72	25	27	28	1400*
4	Antenna Coupler	CU-1170/ SRC-16	7.87	22.87	21.75	2.2	
As Re- quired	Antenna Coupler	C4658/ SRC-16	5.25	19	7	0.4	12
1	RF Switch- ing Matrix	SA-1042/ SRC-16					
1	Relay Assembly	RE-757/ SRC-16					
1	Relay Assembly	RE-758/ SRC-16					
1	Tech Manual	NAVSHIPS 94717 (A)					

** Weight of Electrical Equipment Cabinet CY-3929/SRC-16 includes four couplers, switching matrix, and relays.

4.10 ANTENNA COUPLER GROUPS AN/SRA-34(V) AND AN/SRA-34A(V).

a. TYPE/USE. - Antenna Coupler Groups AN/SRA-34(V) and AN/SRA-34A(V) consist of antenna couplers, adapters and switching equipments providing facilities for coupling automatically controlled or manually tuned receiver-transmitters to shipboard antennas in the 2 to 6 MHz frequency range. Both groups are similar and units of the AN/SRA-34(V) may be replaced with units from the AN/SRA-34A(V) but the opposite is not true. Antenna Couplers CU-1169/SRC-16 are identical to and interchangeable with units included in Antenna Coupler Group OA-4624/SRC-16, a part of Communications Central AN/SRC-16. The Coupler Group OA-4794A/SRA-34(V) provides automatically controlled antenna coupling between AN/SRC-23A(V) equipment and manually controlled transmitters such as AN/URC-32, AN/WRT-2, AN/SRT-15, AN/URT-23 and broadband antennas covering the 2 to 6 MHz range. Automatic tuning of the couplers and switching unit is accomplished by diplexing tuning information on the transmission line rf. Each manually tuned transmitter requires a type MX-4847A/SRA-34(V), Transmitter Adapter for operation with the system. Manually controlled antenna couplers such as the AN/SRA-58 may be used with the system by use of a MX-4845/SRA-34(V) Coupler Adapter. The RF Switching Units SA-1070/SRA-34(V) functions as an rf matrix between the transmitting/receiving equipments and the antenna couplers. One rf switching unit is required for every five rf sources. The CY-4033/SRA-34(V) electronic equipment cabinet will accommodate four SA-1070/SRA-34(V) units to provide a total of 20 rf sources to a maximum of 25 loads on a 1 for 1 basis. The rf switching unit may be controlled locally (manually) or remotely by use of the C-4787/SRA-34(V) Remote Switching Control. Each switching control will control up to five inputs to the switching matrix. Additional remote switching controls (total of four) may be interconnected to provide switching for additional transmitters. The exact number of specific equipments in an individual system vary depending on system requirements.

b. PHYSICAL CONFIGURATION. - See Figures 4-44 through 4-48.

c. INTERCONNECTION DIAGRAM. - See Figure 4-49.

d. FREQUENCY RANGE. - 2 to 6 MHz.

e. NUMBER OF CHANNELS. - Four per antenna couplers group. A special coaxial tee is supplied to permit operation of two OA-4794/SRA-34(V) Antenna Coupler Groups providing a total of eight channels to a single antenna.

f. TYPE OF TUNING. - Automatic.

g. POWER RATING. - 5-kw pep, 2.5-kw average.

h. ANTENNA IMPEDANCE. - 50 ohms nominal, unbalanced; vswr not to exceed 3:1.

i. OUTPUT CONNECTOR. - Type LC (UG-352A/U).

j. INDIVIDUAL CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

k. CHANNEL CONNECTOR. - Type HN. (UG-469/U).

1. PROTECTIVE CIRCUITS. - When the reflected rf power on a channel exceeds a predetermined level, the individual coupler automatically recycles and retunes. Tuning status is indicated by TUNE/READY and ANT. CPLR. fault indicator lights on the coupler and the coupler adaptor. Spark gaps are provided for excessive voltages that may develop in the couplers. Aural and visual alarms are activated under the following conditions:

- (1) Loss of primary power.
- (2) Loss of 28 volt dc control voltage.
- (3) Thermal overload.
- (4) Excessive tuning time (more than 1 minute).
- (5) Spark gap breakdown.

Under these conditions rf power is removed and the channel remains in the alarm state until the coupler is reset.

m. PRIMARY POWER REQUIRED. -

- (1) OA-4794A/SRA-34(V). 115 vac 400 Hz 3 phase 525 watts.
- (2) MX-4845/SRA-34(V). 115 vac 400 Hz 3 phase 50 watts.
- (3) MX-4847A/SRA-34(V). 115 vac 400 Hz 3 phase 50 watts.
- (4) CY-4033/SRA-34(V). 115 vac 400 Hz 3 phase 1000 watts.

n. HEAT DISSIPATION (MAXIMUM). -

- (1) OA-4794A/SRA-34(V). 1.0-kw to air, 3.5-kw to water.
- (2) CY-4033/SRA-34(V). 1.0-kw to air, 3.0-kw to water.

o. TEMPERATURE RANGE. - 0° to $+50^{\circ}$ C ($+32^{\circ}$ to $+122^{\circ}$ F).

p. COOLING. - Each electrical cabinet is equipped with a forced air blower. An auxiliary blower is also furnished for cooling individual couplers when the coupler drawer is extended from the cabinet. Ships water is required for cooling the heat exchanges in the OA-4794A/SRA-34(V) and CY-4033/SRA-34(V) cabinets.

q. SELECTIVITY. - See Figure 4-43.

r. ISOLATION. - 50 dB with 15 percent frequency separation.

s. INSERTION LOSS. - Each coupler, not greater than 2 dB.

t. INSTALLATION REQUIREMENTS. - Clearance of 24 inches is required at the rear of the antenna coupler and rf switching group. Cabinets for access to water connections and cabling and a minimum of 40 inches in front for drawer removal and servicing. The transmitter and coupler adapter units should be mounted as close as possible to their respective transmitters and couplers in order to keep the rf leads as short as possible.

u. SPECIAL CONSIDERATIONS. - The distance between the two OA-4794A/SRA-34(V) in an eight channel configuration is governed by the length of the coaxial TEE section furnished. This distance is critical and must be maintained.

The ships water source for equipment cooling must meet the following characteristics.

- (1) OA-4794A/SRA-34(V). 4.5 GPM at 105° F maximum.
- (2) CY-4033/SRA-34(V). 4.2 GPM at 105° F maximum.

The water pressure across each cabinet is 10 psi at rated flow.

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- v. MEAN TIME BETWEEN FAILURE (MTBF). - 1000 hours.
- w. EQUIPMENT SUPPLIED. - See Table 4-9.

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Figure 4-44

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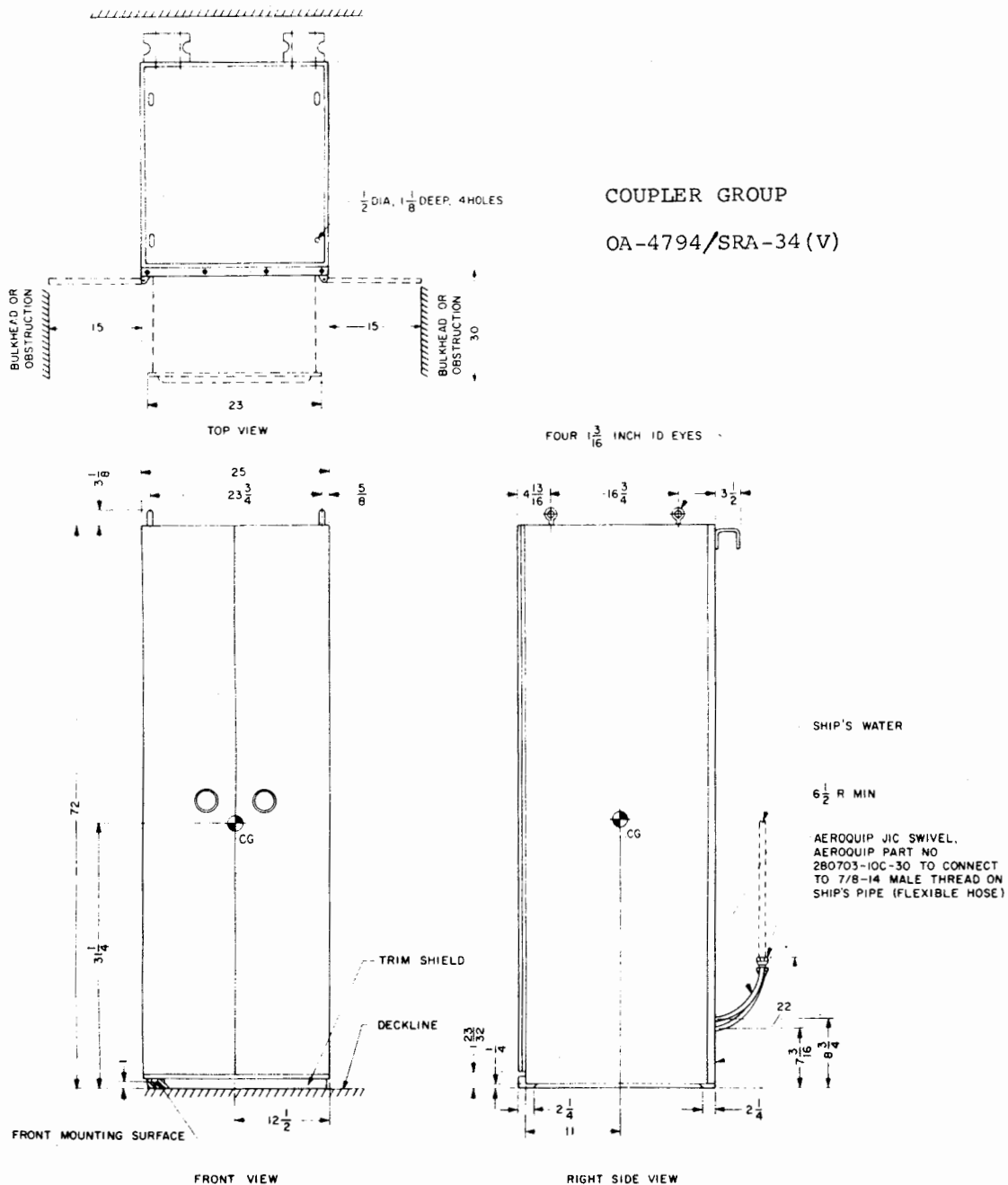
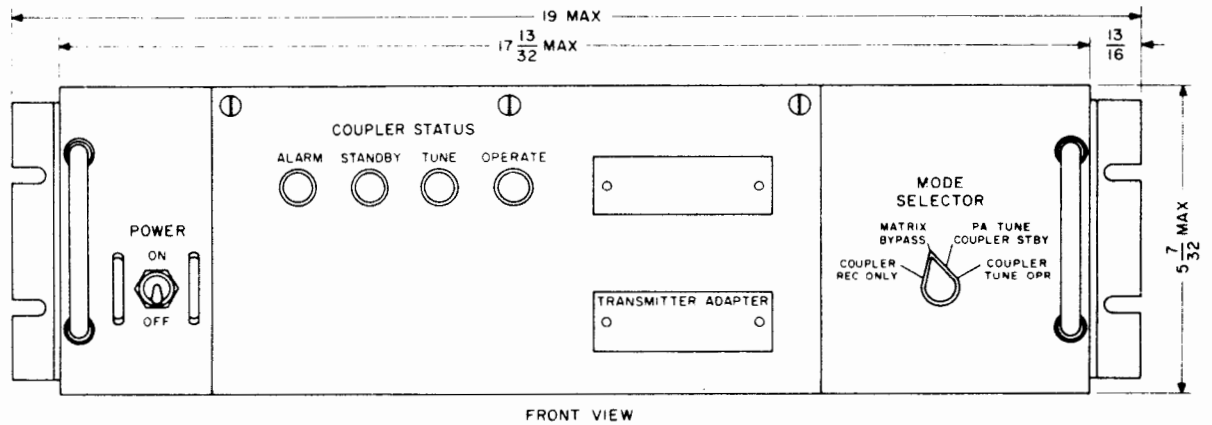


Figure 4-44 Antenna Coupler Groups AN/SRA-34(V) and AN/SRA-34A(V)
Physical Configuration

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 Figure 4-45



TRANSMITTER ADAPTER
 MX-4847A/SRA-34(V)

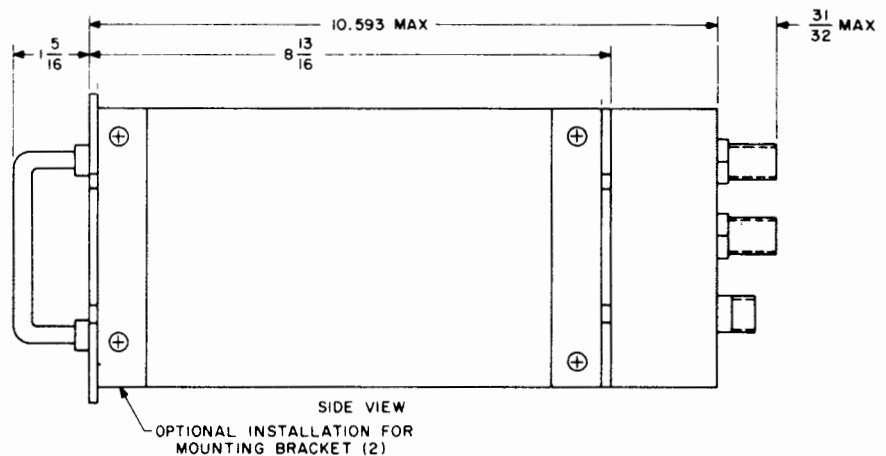
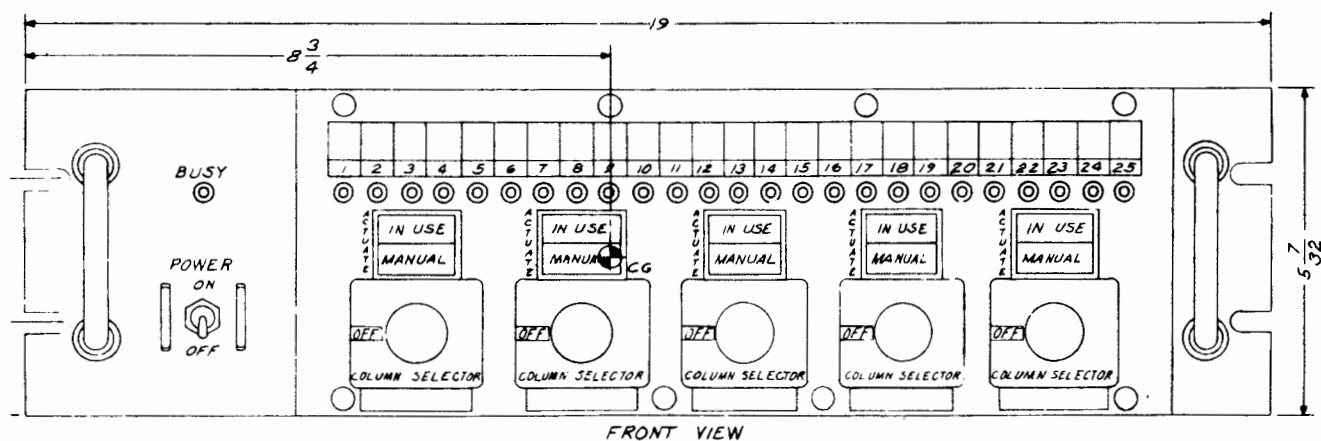


Figure 4-45 Antenna Coupler Groups AN/SRA-34(V) and AN/SRA-34A(V)
 Physical Configuration

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Figure 4-46

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REMOTE SWITCHING CONTROL

C-4787/SRA-34(V)

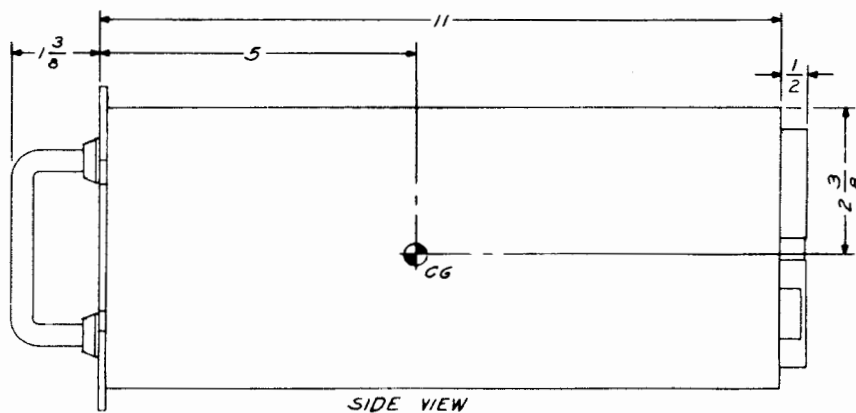


Figure 4-46 Antenna Coupler Groups AN/SRA-34(V) and AN/SRA-34A(V)
Physical Configuration

RF SWITCHING UNIT
 CY-4033/SRA-34 (V)

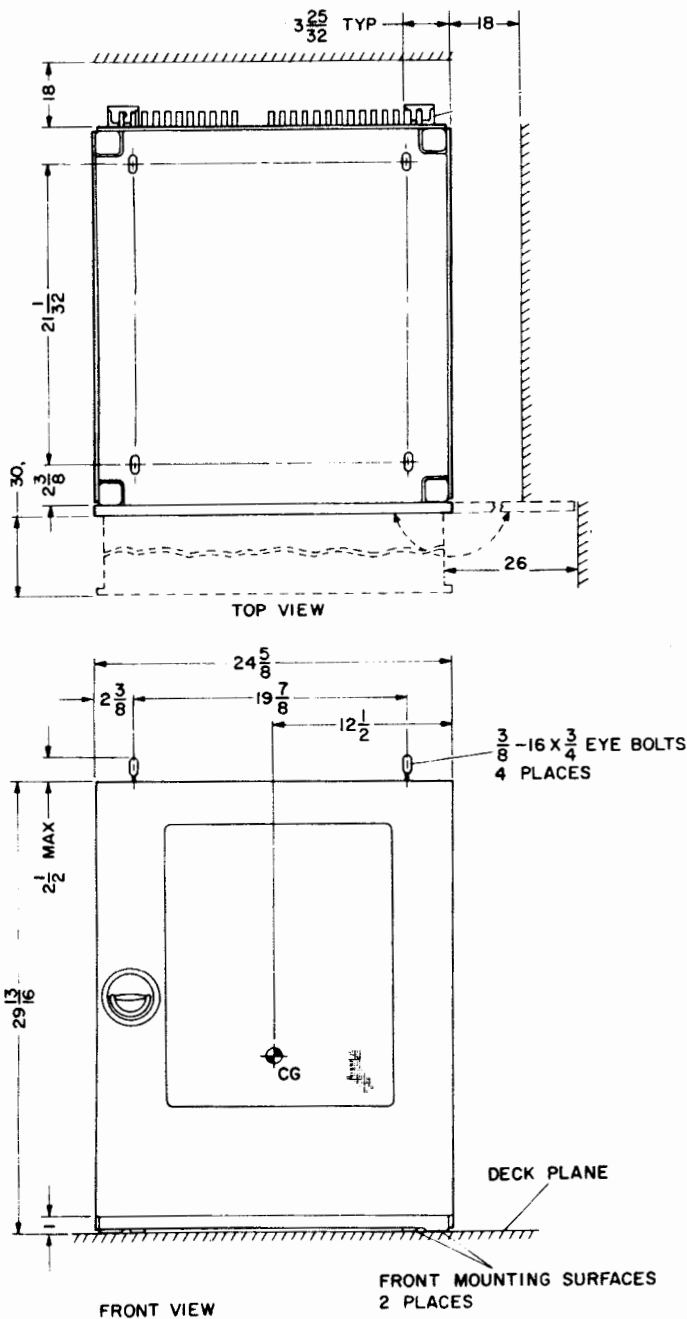
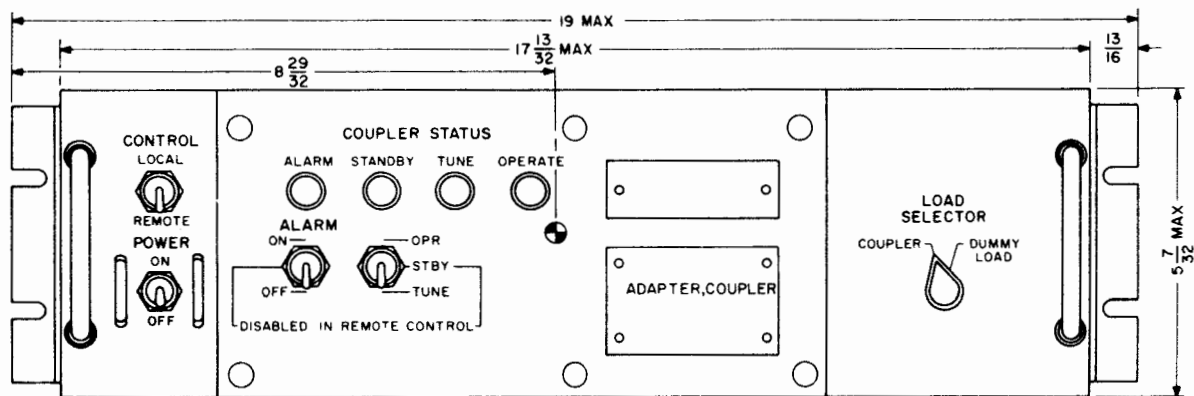


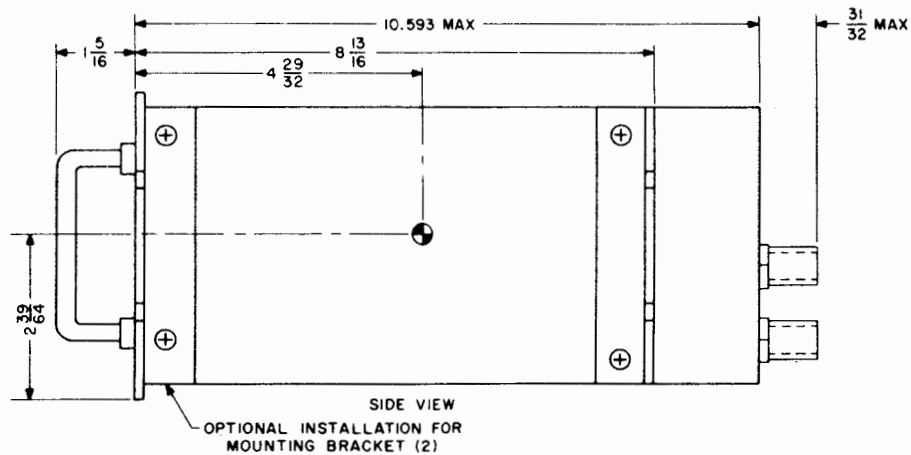
Figure 4-47 Antenna Coupler Groups AN/SRA-34(V) and AN/SRA-34A(V)
 Physical Configuration



FRONT VIEW

COUPLER ADAPTER

MX-4845/SRA-34 (V)



SIDE VIEW

OPTIONAL INSTALLATION FOR
MOUNTING BRACKET (2)

Figure 4-48 Antenna Coupler Groups AN/SRA-34 (V) and AN/SRA-34A (V)
Physical Configuration

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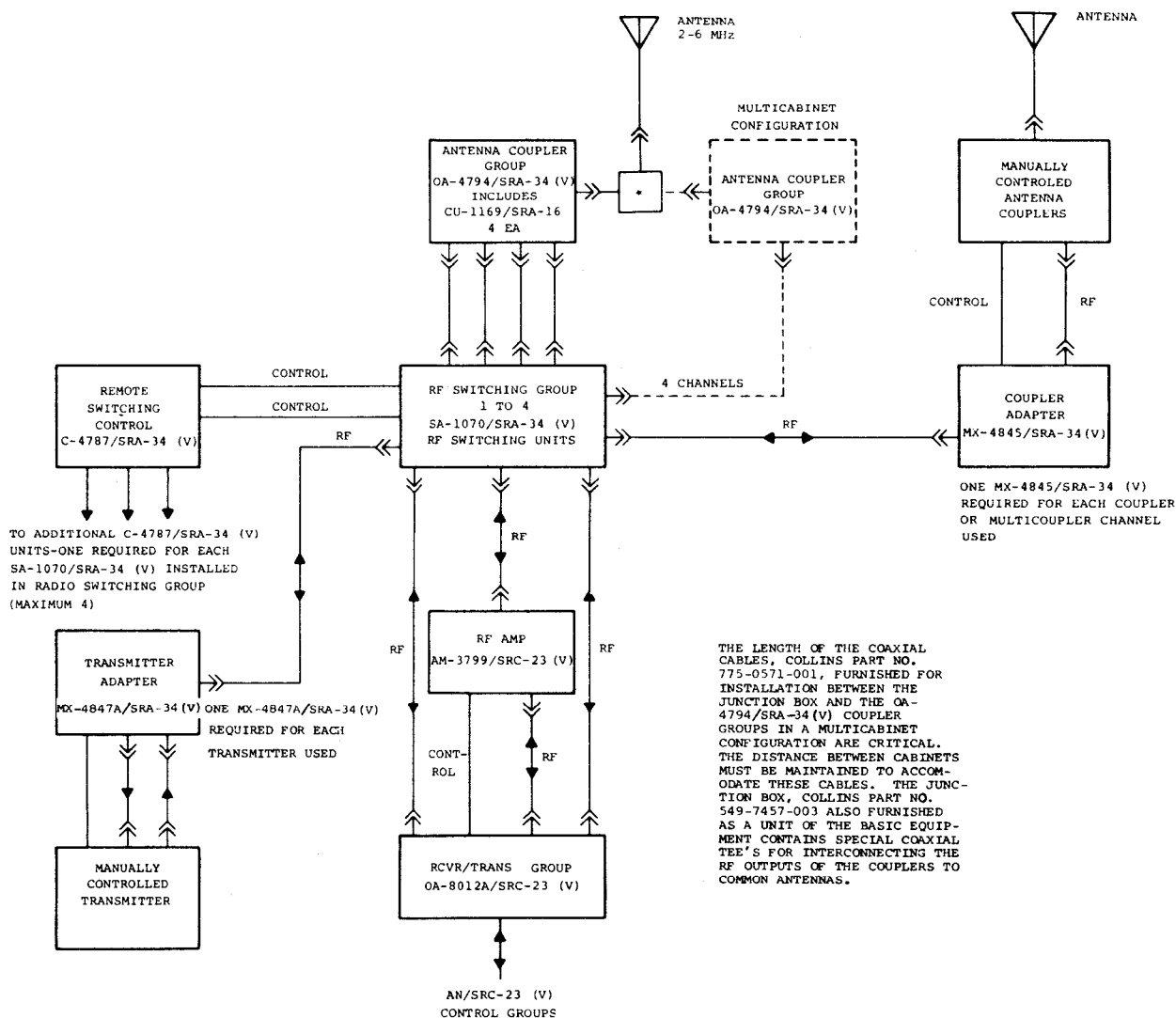


Figure 4-49 Antenna Coupler Groups AN/SRA-34(V) and AN/SRA-34A(V) Interconnection Diagram

TABLE 4-9 ANTENNA COUPLER GROUPS AN/SRA-34 (V) AND AN/SRA-34A (V)
EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERALL DIMENSIONS (IN.)			VOL (CU FT)	WEIGHT (LB)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
*	Antenna cou- pler group includes:	OA-4794A/SRA- 34 (V)	75.125	25.0	30.5	33.1	**1056
1	Electrical Equipment Cabinet	CY-4032A/SRA- 34 (V)	75.125	25.0	30.5	33.1	496
4	Antenna Coupler	CU-1169/SRC- 16	13.5	22.875	21.75	4.08	140
*	Coupler adapter	MX-4845/SRA- 34 (V)	5.22	19.0	12.875	0.74	13.5
*	Transmitter adapter	MX-4847A/SRA- 34 (V)	5.22	19.0	12.875	0.74	16.5
*	RF switching group in- cludes:						
1	Electrical Equipment cabinet	CY-4033/SRA- 34 (V)	30	25	27	12.25	425 (empty)
*	RF Switching Unit	SA-1070/SRA- 34 (V)	3	21	15	1	35
*	Remote switching control	C-4787/SRA- 34 (V)	5.25	19	12	0.75	15
1	Technical Manual for Antenna Cou- pler Group	NavShips 0967-176-3010					
	AN/SRA-34 (V)						

*Quantities depend upon requirement of individual installations.

**Includes weight of separable CU-1169/SRC-16 units.

4.11 ANTENNA COUPLERS CU-1780/SRA-34A(V) AND CU-1781/SRA-34A(V).

a. TYPE/USE. - Antenna Couplers CU-1780/SRA-34A(V) and CU-1781/SRA-34A(V) are currently under development. These couplers are for use with Antenna Coupler Group AN/SRA-34A(V) to extend the operating range to 30 MHz. The couplers will be mechanically and electrically compatible for installation in the Electrical Equipment Cabinet CY-4032A/SRA-34(V). Tuning and control will be accomplished by diplexing the control information on the transmission line rf in the same manner as the CU-1169/SRC-16 Couplers furnished with the AN/SRA-34A(V).

b. FREQUENCY RANGE. -

- | | |
|-------------------------|---------------|
| (1) CU-1780/SRA-34A(V). | 4 to 12 MHz. |
| (2) CU-1781/SRA-34A(V). | 10 to 30 MHz. |

c. NUMBER OF CHANNELS. - One.

d. TYPE OF TUNING. - Automatic.

e. POWER RATING. - 6-kw pep, 3-kw average.

f. INPUT IMPEDANCE. - 50 ohms unbalanced; 1.3:1 vswr maximum when tuned to operating frequency.

g. LOAD IMPEDANCE. - 50 ohms unbalanced. 4:1 vswr maximum.

h. INPUT AND OUTPUT CONNECTORS. - The power and rf connectors will be compatible with the mating connectors in Electrical Equipment Cabinet CY-4032A/SRA-34A(V).

i. COOLING. - Cooling duct connections will be compatible with cooling system in Electrical Equipment Cabinet CY-4032A/SRA-34A(V).

k. HEAT DISSIPATION. - AC power 100 watts. Rf heating is dependent on vswr. The CY-4032A/SRA-34A(V) is supplied with cooling water to dissipate rf heating generated in the couplers.

l. TEMPERATURE RANGE. - 0° to +50° C (+32° to +122° F).

m. ISOLATION. - 50 dB with 15 percent frequency separation.

n. INSERTION LOSS. - Not greater than 2 dB.

o. INSTALLATION REQUIREMENTS. - The couplers will be mounted on slides compatible with the hardware in the CY-4032A/SRA-34A(V). Input, output, power and cooling connections will match the cabinet connections.



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Paragraph 5.1

5.1 GENERAL

The equipments described in this section are generally used to satisfy special or peculiar requirements. The AN/SRA-12 Electrical Filter Assembly is used to provide a receiver antenna distribution system wherever a more elaborate multicoupler system is not practical due to operational requirements or onboard space limitations. The LP-101 Lowpass Filter is used to reduce interference to mf/hf communication and navigation receivers from adjacent high power radar systems.

ORIGINAL



5.2 ELECTRICAL FILTER ASSEMBLY AN/SRA-12.

a. TYPE/USE. - Electrical Filter Assembly AN/SRA-12 is used with communications receivers as an auxiliary antenna source when tuneable bandpass multi-couplers are not installed. The AN/SRA-12 employs plug-in low-pass/high-pass filter subassemblies to cover the frequency spectrum between 14 KHz and 32 MHz. Within this spectrum, a maximum of seven bands of frequencies are available by employing combinations of six different filter subassemblies. The cross-over frequencies of the various filter sub-assemblies are as follows: 50, 150, 300, 530, 1500, 2000, 3500, 7000 and 14,000 KHz. A single antenna input is required. The AN/SRA-12A, -12B and -12C are interchangeable electrically but differ slightly in types of coaxial front panel receptacles.

b. PHYSICAL CONFIGURATION. - See Figure 5-1.

c. INTERCONNECTION DIAGRAM. - See Figure 5-2.

d. FREQUENCY RANGE. - 14 KHz to 32 MHz.

e. NUMBER OF CHANNELS. - 21. The frequency spectrum is divided into seven bands each containing four channel inputs consisting of one direct and three decoupled outputs. Simultaneous use of direct and decoupled outputs should not be attempted.

f. TYPE OF TUNING. - Fixed.

g. POWER RATING. - The filter assemblies will withstand impressed rf signals of up to 50 volts without damage if the equipment is terminated in a resistive load no greater than 180 ohms.

h. ANTENNA IMPEDANCE REQUIRED. - 180 ohms nominal, unbalanced.

i. ANTENNA CONNECTOR. - Type QDS (UG-1319/U).

j. CHANNEL IMPEDANCE. - 180 ohms nominal, unbalanced.

k. CHANNEL CONNECTOR. - Type QDS (UG-1318-1319/U).

l. PROTECTIVE CIRCUITS. - None.

m. PRIMARY POWER REQUIRED. - None.

n. HEAT DISSIPATION. - None.

o. TEMPERATURE RANGE. - 0° to +50° C (+32° to +120° F).

p. COOLING. - None.

q. ISOLATION. - See Figures 5-3 and 5-4.

(1) Filter to filter (direct outputs). 40 dB maximum.

(2) Direct output to associated outputs. 6 dB nominal.

r. INSERTION LOSS. - 2 dB at direct outputs when terminated into 180 ohms. Approximately 2 dB additional mismatch when terminated in 50 ohms.

s. INSTALLATION REQUIREMENTS. - The filter panel is designed for installation in a 19 inch relay rack. The assembly may be rack mounted by four machine screws with the front panel in place or by removing the front panel and mounting the main chassis in the relay rack, the front panel is then attached with four additional machine screws.

t. SPECIAL CONSIDERATIONS. - Filter assemblies should be arranged in decreasing frequencies from left to right as viewed from front panel. Painted jack (red) indicates that this jack is connected directly to the subassembly. Unpainted output jacks indicate that these jacks are decoupled from direct input by a 300 ohm resistor.

u. MEAN TIME BETWEEN FAILURES (MTBF). - 8000 hours.

v. EQUIPMENT SUPPLIED. - See Table 5-1.

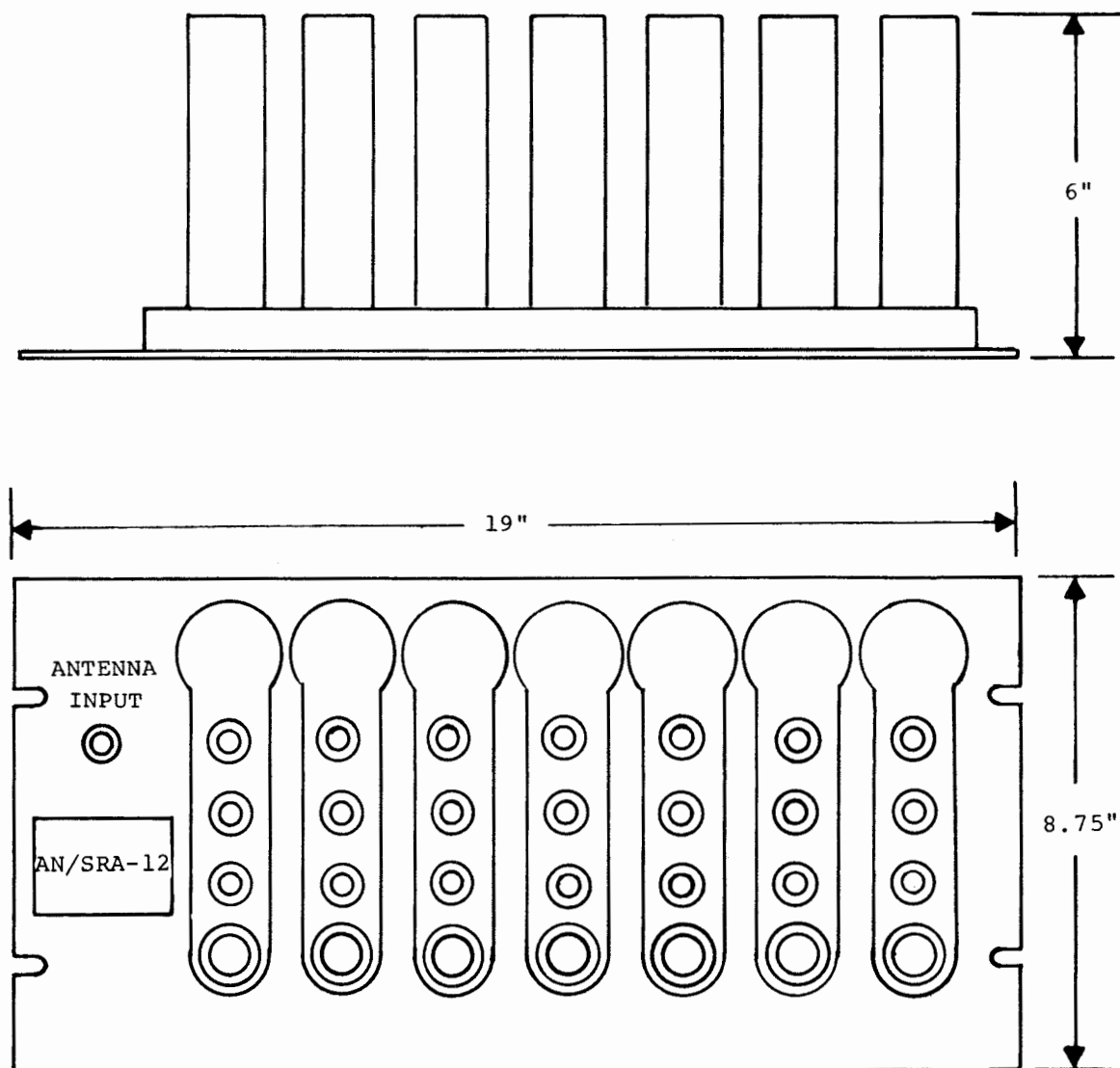


Figure 5-1 Electrical Filter Assembly AN/SRA-12
Physical Configuration

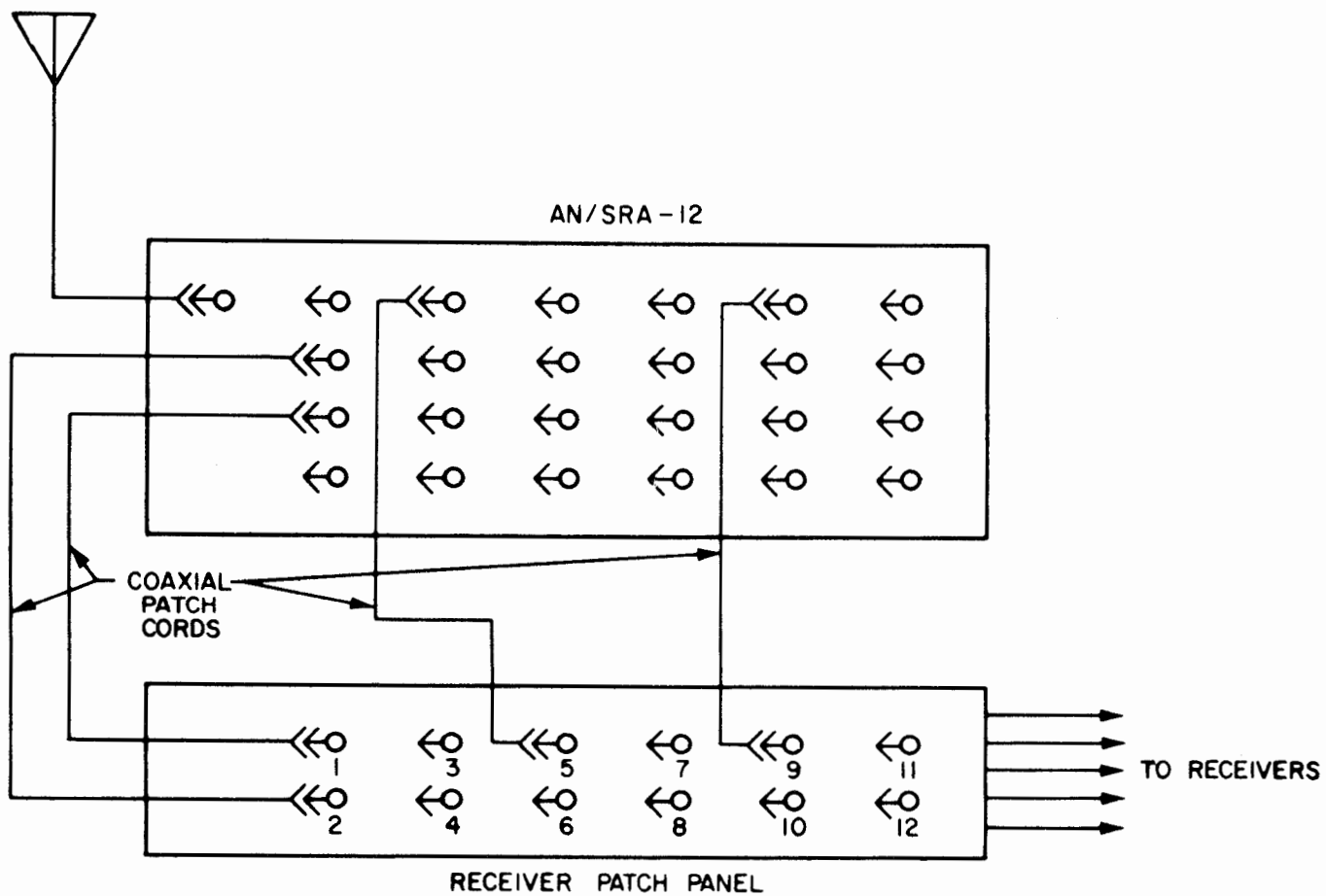


Figure 5-2 Electrical Filter Assembly AN/SRA-12
Interconnection Diagram

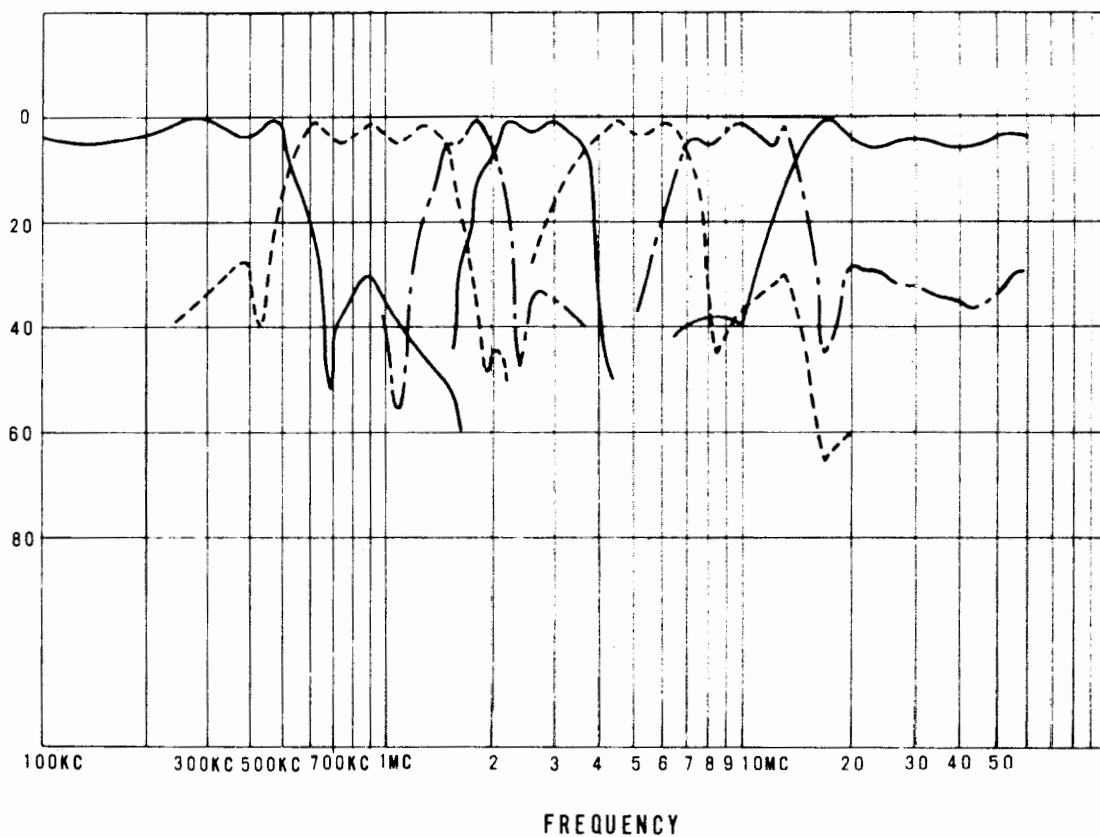


Figure 5-3 Electrical Filter Assembly AN/SRA-12
Direct Output Isolation

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Figure 5-4

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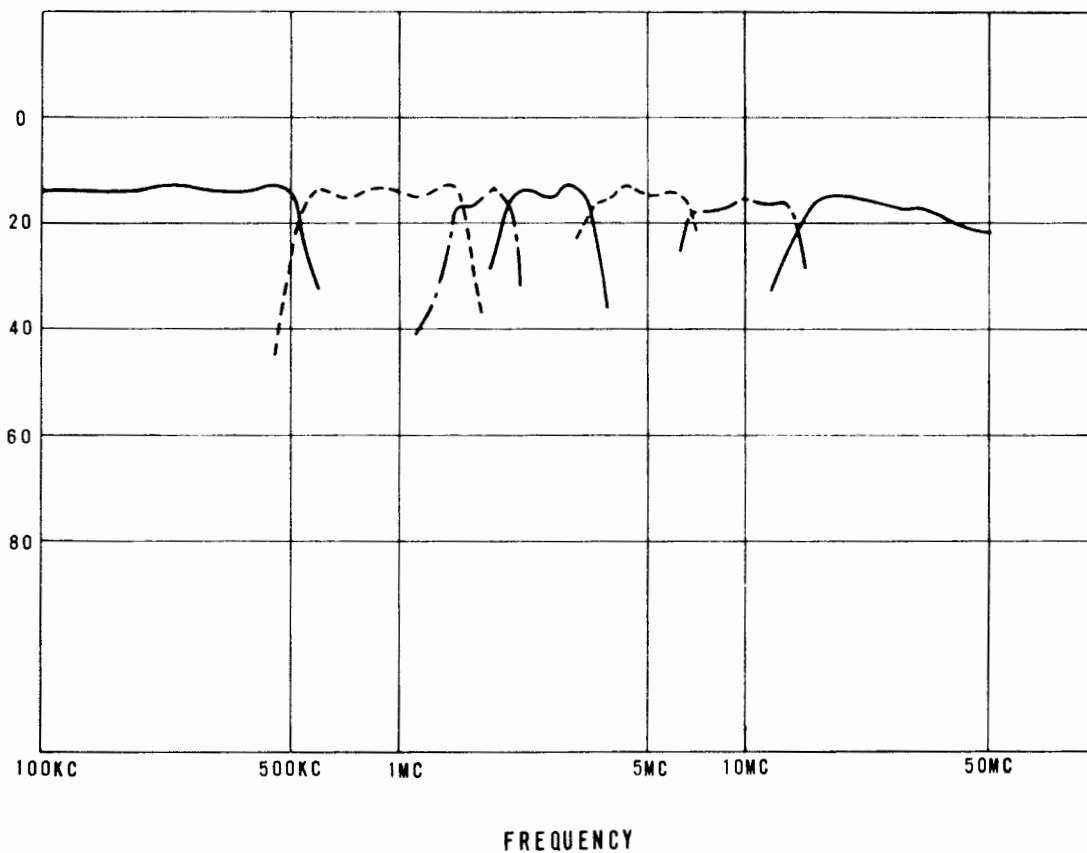


Figure 5-4 Electrical Filter Assembly AN/SRA-12
Decoupled Output Isolation

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 Table 5-1

TABLE 5-1 ELECTRICAL FILTER ASSEMBLY AN/SRA-12
 EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERALL DIMENSIONS (IN.)			VOL (CU FT)	WEIGHT (LB)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
1	Panel, Filter	SB-404/ SRA-12	8.75	19	2.125	.20	10.25
9	Filter Sub- assemblies		4	2.062	2.437	.165	18 total 2 (avg.)
3	Shorting Plugs		1.780	1.25 dia			
29	Connector, Plug	UG-968/U	1.785	1 dia			
1	Tech Manual	NAVSHIPS 92206					

ORIGINAL



5.3 LOWPASS NETWORKS LP-101.

- a. TYPE/USE. - Lowpass Network LP-101 is an m-derived type low power lowpass filter for use between an antenna and associated receiver. Communications and navigational receiving equipments operating in the frequency spectrum below 32 MHz are susceptible to interference from high power radars operating above 200 MHz. The LP-101 is designed to provide high values of attenuation to unwanted signals above 40 MHz thus reducing the interference to receiving equipment operating in close proximity to these sources. The LP-101-C filter is generally used since it is fitted with type N coaxial connectors.
- b. PHYSICAL CONFIGURATION. - See Figure 5-5.
- c. INTERCONNECTION DIAGRAM. - See Figure 5-6.
- d. FREQUENCY RANGE. - Pass frequency 0 to 32 MHz with maximum passband attenuation of 0.5 dB.
- e. NUMBER OF CHANNELS. - One.
- f. TYPE OF TUNING. - Pretuned and sealed.
- g. POWER RATING. - 100 watts rf.
- h. ANTENNA IMPEDANCE REQUIRED. - 50 ohms nominal, unbalanced.
- i. ANTENNA CONNECTOR. - Type N (UG-680/U).
- j. CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.
- k. CHANNEL CONNECTOR. - Type N (UG-680/U).
- l. PROTECTIVE CIRCUITS. - None.
- m. PRIMARY POWER REQUIRED. - None.
- n. HEAT DISSIPATION. - None.
- o. TEMPERATURE RANGE. - Minus 40 to +70°C (-40° to +160°F).
- p. COOLING. - None.
- q. PASSBAND. - See Figure 5-7.
- r. INSTALLATION REQUIREMENTS. - The filter should be installed in close proximity to the associated receiver. The filter is nondirectional.
- s. SPECIAL CONSIDERATIONS. - The LP-101 is currently being manufactured by Honeywell Inc. and may be supplied under the designation FLP-1032. The electrical and mechanical characteristics of the FLP-1032 are equivalent to the LP-101.

t. MEAN TIME BETWEEN FAILURES (MTBF). - 8000 hours.

u. EQUIPMENT SUPPLIED. - The filter is supplied as a sealed unit. A specification sheet outlining the electrical and mechanical characteristics is furnished with each filter.

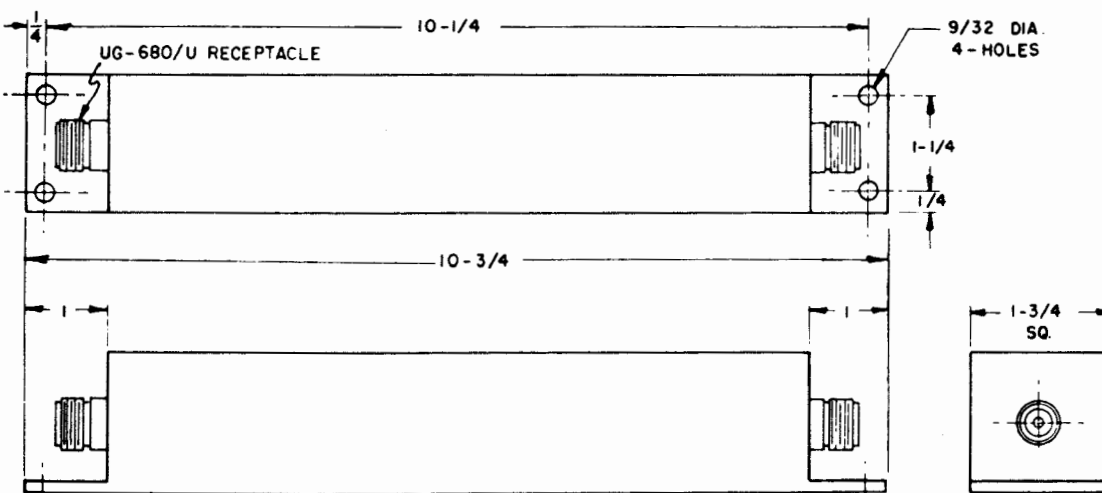


Figure 5-5 Lowpass Filter LP-101
Physical Configuration

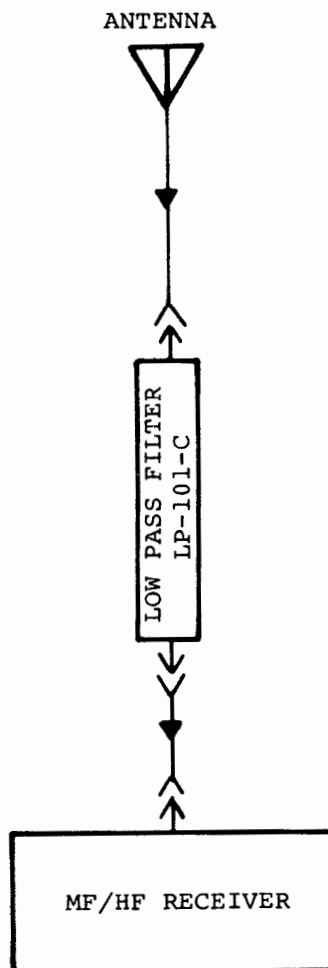


Figure 5-6 Lowpass Filter LP-101
Interconnection Diagram

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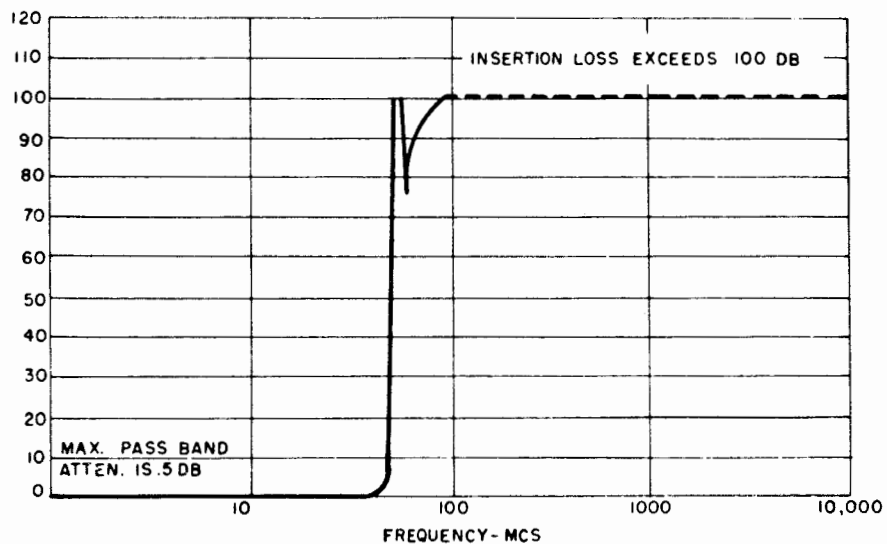


Figure 5-7 Lowpass Filter LP-101
Passband Characteristics

5.4 ANTENNA COUPLER CU-2061/SRC

a. TYPE/USE - Antenna Coupler CU-2061/SRC is a combiner/divider assembly for use with 30-76 MHz broadband antennas. The unit consists of four fixed quarter-wavelength long coaxial matching transformer sections. In the transmit mode it will divide a single 50-ohm input from the transmitter to two 50-ohm outputs to two broadband antennas. In the receive mode it will combine the inputs from two broadband antennas and transform the resulting impedance to a single 50-ohm output. The coupler is used to provide improved omnidirectional coverage by the use of antennas installed on opposite sides of the ship's structure. This coupler may be used with VHF transmitting and/or receiving equipment and antennas designed to operate within the frequency range and rf power handling limitations of the coupler.

b. PHYSICAL CONFIGURATION - See Figure 5-8.

c. INTERCONNECTION DIAGRAM - See Figure 5-9.

d. FREQUENCY RANGE - 30 to 76 MHz.

e. TYPE OF TUNING - Fixed.

f. POWER RATING - 250 watts with 3:1 load VSWR.

g. ANTENNA IMPEDANCE REQUIRED - 50 ohms.

h. OUTPUT CONNECTORS - TYPE N, 2 ea.

i. INPUT IMPEDANCE - 50 ohms. VSWR is 1.2:1 maximum with matched loads at output connectors.

j. INPUT CONNECTOR - 7/8" EIA Coaxial Flange.

k. PROTECTIVE CIRCUITS - None.

l. PRIMARY POWER REQUIRED - None.

m. HEAT DISSIPATION -

n. TEMPERATURE RANGE - -28° to $+65^{\circ}\text{C}$ (-20° to 150°F).

o. COOLING - Natural radiation.

p. INSERTION LOSS - 0.25 dB maximum from input to either output. The power division is 3 dB $\pm$ 0.2 dB into matched loads.

q. INSTALLATION REQUIREMENTS - The location of the coupler should be equidistant from each antenna so as to keep the coaxial cables to the antennas as close to the same length as possible. The coupler must be protected from physical damage.

r. SPECIAL CONSIDERATIONS - None.

s. MEAN TIME BETWEEN FAILURES (MTBF) - Not determined.

t. EQUIPMENT SUPPLIED - See Table 5.2

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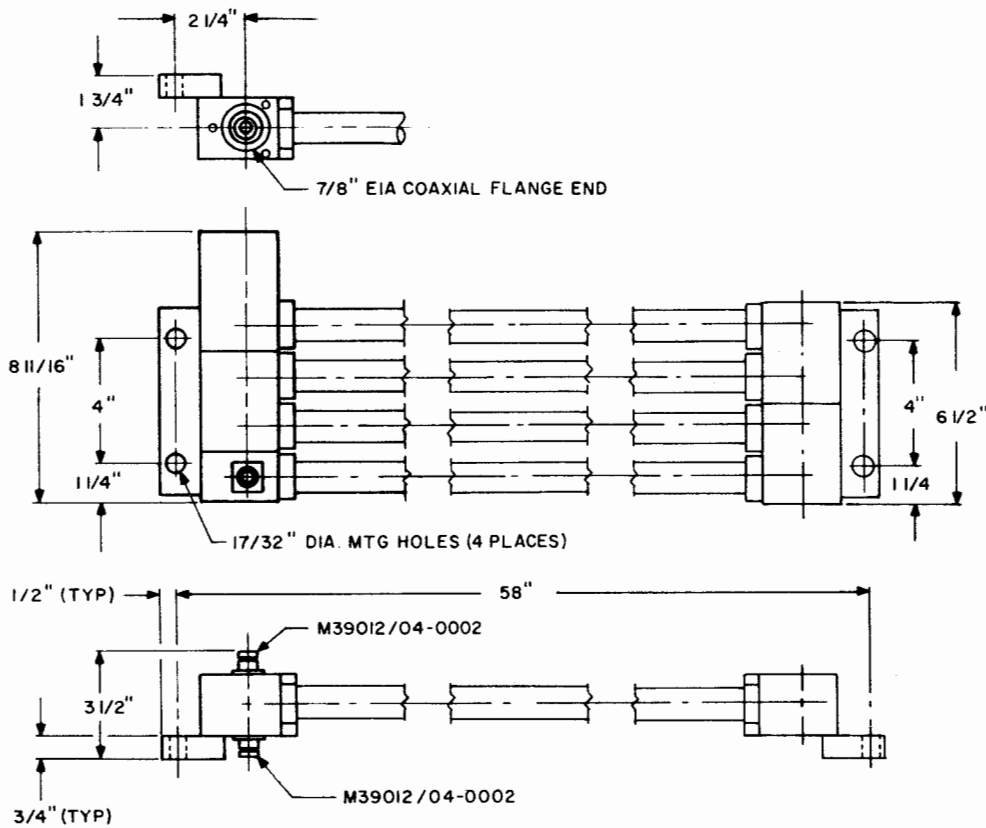


Figure 5-8 Antenna Coupler CU-2061/SRC

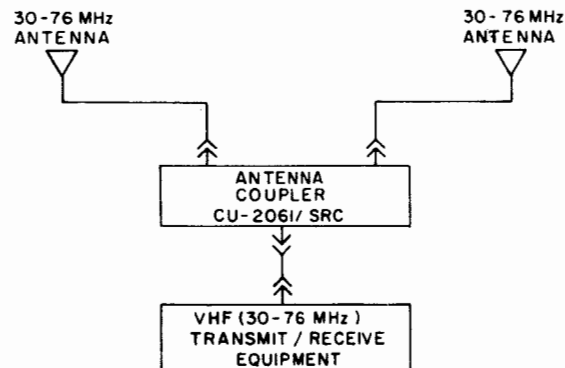


Figure 5-9 Antenna Coupler CU-2061/SRC Interconnection Diagram

TABLE 5-2. ANTENNA COUPLER CU-2061/SRC EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERALL DIMENSIONS (IN.)			VOL CU FT	WEIGHT LB
	NAME	DESTINATION	HEIGHT	WIDTH	DEPTH		
1	Antenna Coupler	CU-2061/SRC	58	8 11/16	3 1/3	.90	18
1	Technical Manual	NAVSHIPS 0967-475-8010					

6.1 GENERAL

The couplers described within this section are grouped as receiving, transmitting and transceiving types. These couplers cover various portions of the vlf through hf frequency ranges.

Antennas used with these couplers usually have high values of vswr particularly in the vlf to mf regions. Most of these couplers can be classified as antenna tuners since they are located at the base of the antenna and are used to improve power transfer between a transmission line and an antenna. In general the couplers employ LC networks in various configurations for matching the line to the antenna.

The majority of these couplers are capable of being remotely tuned and therefore require control cabling between the coupler and the remote control station. The selection of the proper type of cable for control is dependent on the number of functions, the allowable voltage drop and such special requirements as shielding.

Single channel transmitter couplers do not have adequate selectivity to prevent serious interaction when installed on ships. These couplers are generally used as a back-up system to the primary broadband antenna system.



6.2 ANTENNA GROUPS AN/SRA-17B and AN/SRA-17C.

a. TYPE/USE. - Antenna Groups AN/SRA-17B and 17C are physically small but efficient receiving antenna systems for use on small craft where long wire antennas are not available or on ships where large, closely spaced antennas would interact. The antenna groups are designed for use with any receiver tuneable over the vlf/lf frequency spectrum.

b. PHYSICAL CONFIGURATION. - See Figures 6-1 and 6-2.

c. INTERCONNECTION DIAGRAM. - See Figure 6-3.

d. FREQUENCY RANGE. - 14 KHz to 600 KHz.

e. TYPE OF TUNING. - Remote, manual.

f. POWER RATING. - Not applicable, receive only.

g. ANTENNA IMPEDANCE REQUIRED. - Whip antenna is integral to tuner unit.

h. ANTENNA CONNECTOR. - Integral to tuner unit.

i. CHANNEL IMPEDANCE. - 72 ohms nominal, unbalanced.

j. CHANNEL CONNECTOR. -

(1) AN/SRA-17B. Solder connection to terminal board.

(2) AN/SRA-17C. Type N (UG-58A/U).

k. PROTECTIVE CIRCUITS. - None.

l. PRIMARY POWER REQUIRED. - 115 vac 60 Hz single phase 30 watts.

m. HEAT DISSIPATION. - Negligible.

n. TEMPERATURE RANGE. -

(1) RF Tuner. -28° to $+65^{\circ}\text{C}$ (-20° to $+150^{\circ}\text{F}$).

(2) Remote Control Unit. 0° to $+50^{\circ}\text{C}$ ($+32^{\circ}$ to $+120^{\circ}\text{F}$).

o. COOLING. - Natural radiation.

p. INSTALLATION REQUIREMENTS. - For optimum performance the antenna and the radio frequency tuner must be mounted near the top of a mast, king post, stack or other vertical member of the superstructure. The distance between the radio frequency tuner and its associated receiver should not exceed 150 feet for satisfactory operation. The antenna control unit should be located adjacent to the associated receiver for ease in adjusting the system. A multi-conductor cable capable of supplying a minimum of 9 conductors is required between the rf tuner and the remote control unit.

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q. SPECIAL CONSIDERATIONS. - The antenna tuner is equipped with a diode noise generator controlled from the remote control unit. The noise generator permits peaking the system in the absence of incoming signals. Ships equipped with radars operating in the 200-400 MHz range should remove the 1N21B noise diode from the antenna tuner and install a low pass filter as shown on NAV-SHIPS Dwg RE 47D 111A.

r. MEAN TIME BETWEEN FAILURES (MTBF). - 6000 hours.

s. EQUIPMENT SUPPLIED. - See Table 6-1.

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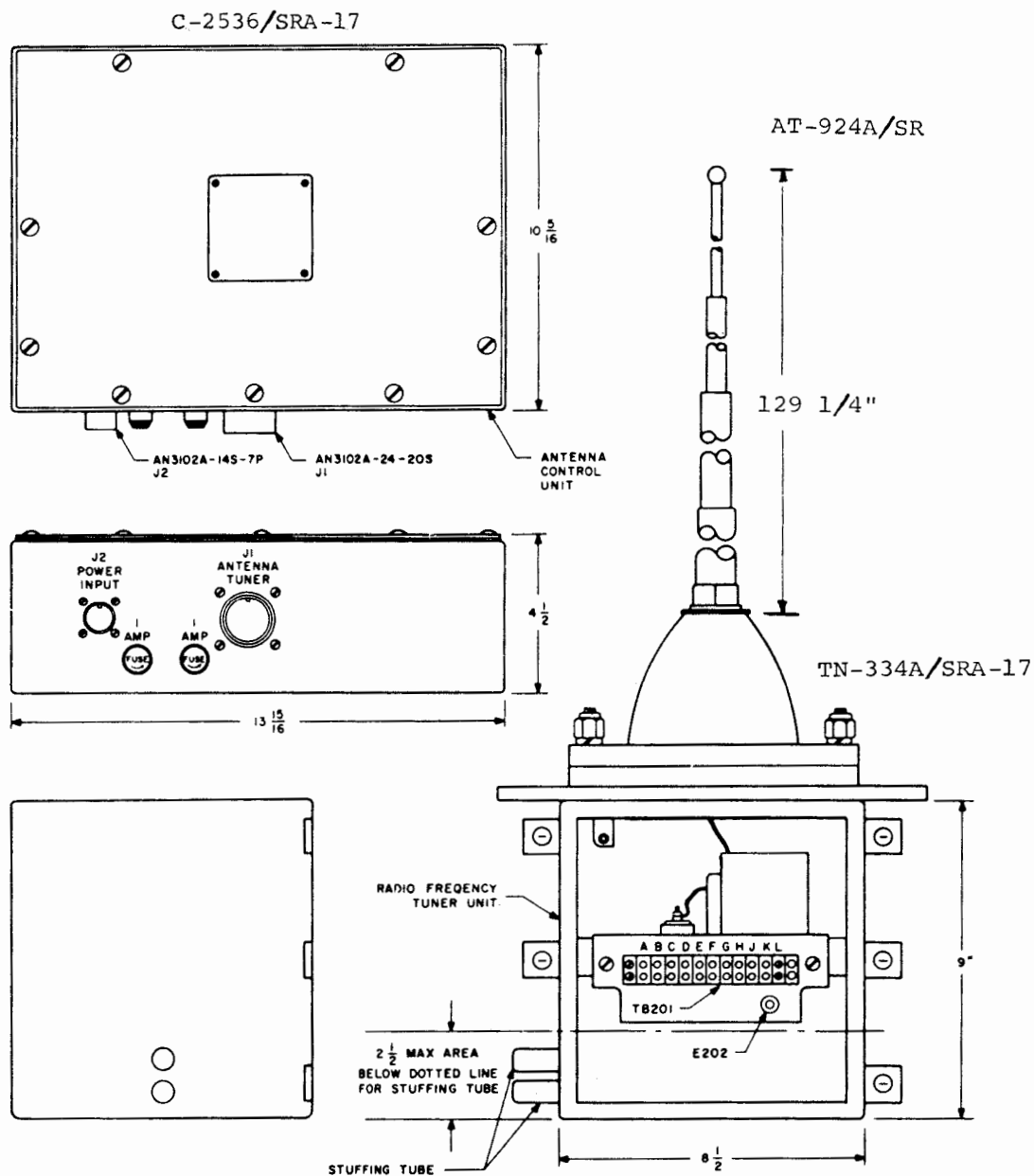
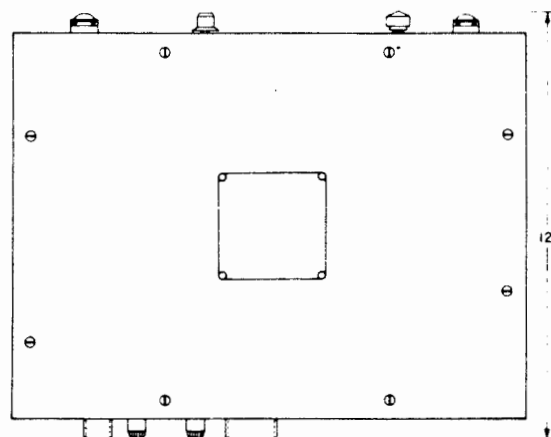
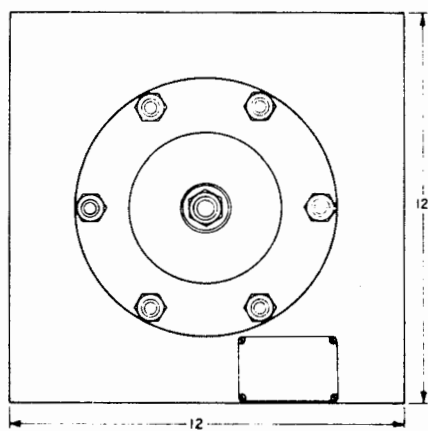
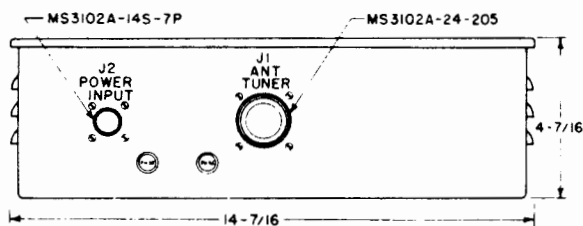


Figure 6-1 Antenna Group AN/SRA-17B Physical Configuration



C-6193/SRA-17C



TN-418/SRA-17C

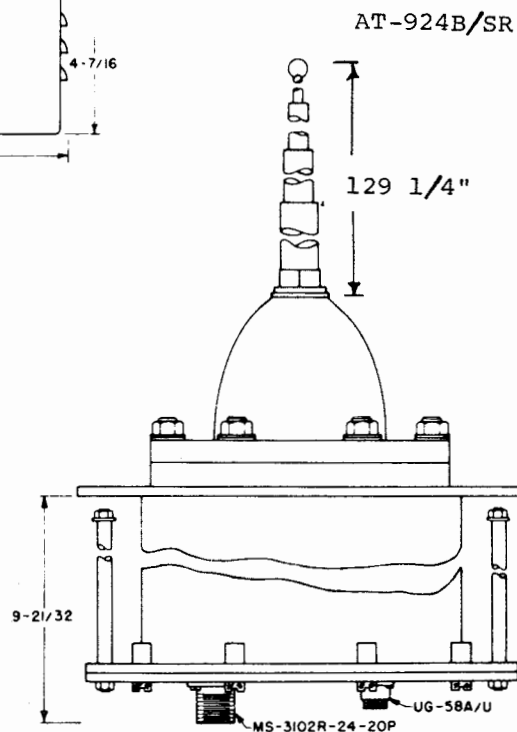


Figure 6-2 Antenna Group AN/SRA-17C Physical Configuration

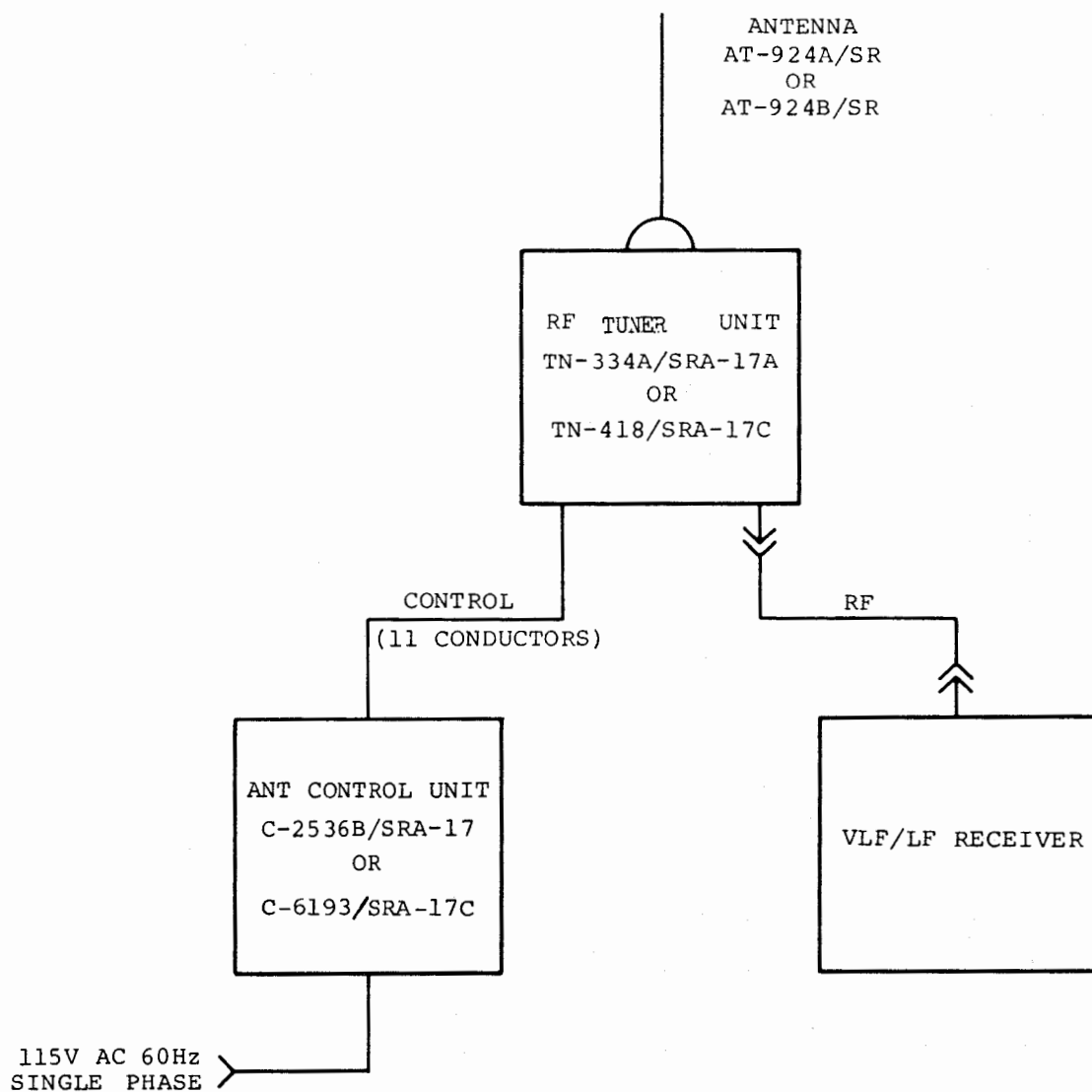


Figure 6-3 Antenna Groups AN/SRA-17B and AN/SRA-17C Interconnection Diagram

TABLE 6-1 ANTENNA GROUPS AN/SRA-17B AND AN/SRA-17C EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERAL DIMENSIONS (IN.)			VOL (CU FT)	WEIGHT (LB)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
		AN/SRA-17B					
1	Antenna	AT-924A/SR	129.25				5.5
1	Radio Fre- quency Tuner	TN-334/SRA-17	9.5	12	12	.79	37.5
1	Antenna Con- trol Unit	C-2536B/SRA- 17	4.5	14	10.3	.38	18
2	Technical Manual	NAVSHIPS 94127					
		AN/SRA-17C					
1	ANTENNA	AT-924 B/SR	129.25				5.5
1	Radio Fre- quency Tuner	TN-418/SRA- 17	16.6	12	12	1.46	36
1	Antenna Con- trol Unit	C-6193/SRA- 17	4.3	14.5	12.25	.58	16
2	Technical Manual	NAVSHIPS 94127					

6.3 ANTENNA GROUP AN/SRA-43.

a. TYPE/USE. - Antenna Group AN/SRA-43 is designed for use with ship-board communication receivers operating in the frequency range 2 to 8 MHz. The AN/SRA-43 is a physically small system and is used as a secondary receiving system to the primary receiving multicoupler system. It may also be used as a primary receiving system where there is insufficient space for larger antennas or where the installation of several antennas for receiving is not feasible. The group is also used to provide antenna input for individual receivers that are not connected through the ship's receiving multicoupler system. The AN/SRA-43 may be used with R-390A/URR, AN/WRR-2, R-1051/URR or equivalent receivers.

b. PHYSICAL CONFIGURATION. - See Figures 6-4 and 6-5.

c. INTERCONNECTION DIAGRAM. - See Figure 6-6.

d. FREQUENCY RANGE. - 2 MHz to 8 MHz.

e. TYPE OF TUNING. - Remote, manual.

f. POWER RATING. - Not applicable, receive only.

g. ANTENNA IMPEDANCE REQUIRED. - Whip antenna is integral to tuner unit.

h. ANTENNA CONNECTOR. - Integral to tuner unit.

i. CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

j. CHANNEL CONNECTOR. - Type N. (UG-58A/U).

k. PROTECTIVE CIRCUITS. - None.

l. PRIMARY POWER REQUIRED. - 115 vac 60 Hz single phase 45 watts.

m. HEAT DISSIPATION. - Negligible.

n. TEMPERATURE RANGE. -

(1) RF Tuner. -28° to $+65^{\circ}\text{C}$ (-20° to $+150^{\circ}\text{F}$).

(2) Remote Control Unit. 0° to $+50^{\circ}\text{C}$ ($+32^{\circ}$ to $+120^{\circ}\text{F}$).

o. COOLING. - Natural radiation.

p. INSTALLATION REQUIREMENTS. - The radio frequency tuner must be mounted as high as possible, at top of a mast, king post, stack or other vertical member of the superstructure for optimum performance. The distance between the radio frequency tuner and its associated receiver should not exceed 150 feet for satisfactory operation. The antenna control unit should be located adjacent to the associated receiver for ease in adjusting the system. A multi-conductor cable capable of supplying a minimum of 11 conductors is required between the rf tuner and the remote control unit.

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q. SPECIAL CONSIDERATIONS. - A diode noise generator is provided as an aid in tuning the system in the absence of incoming signals. The noise generator is located and controlled from the remote control unit. Its output is fed to the rf tuner through a coaxial cable.

r. MEAN TIME BETWEEN FAILURES (MTBF) . - 6000 hours.

s. EQUIPMENT SUPPLIED. - See Table 6-2.

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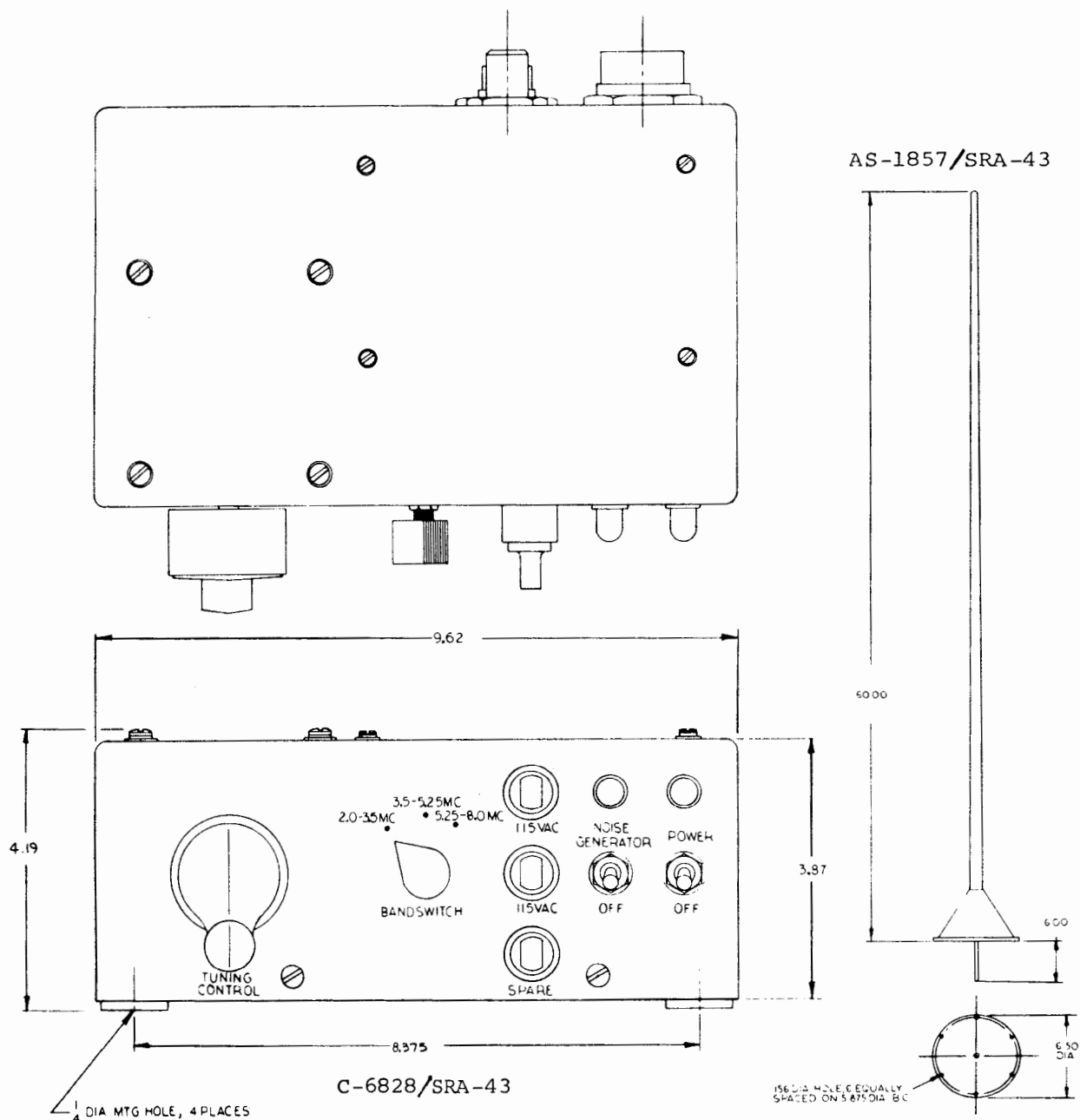


Figure 6-4 Antenna Group AN/SRA-43 Physical Configuration

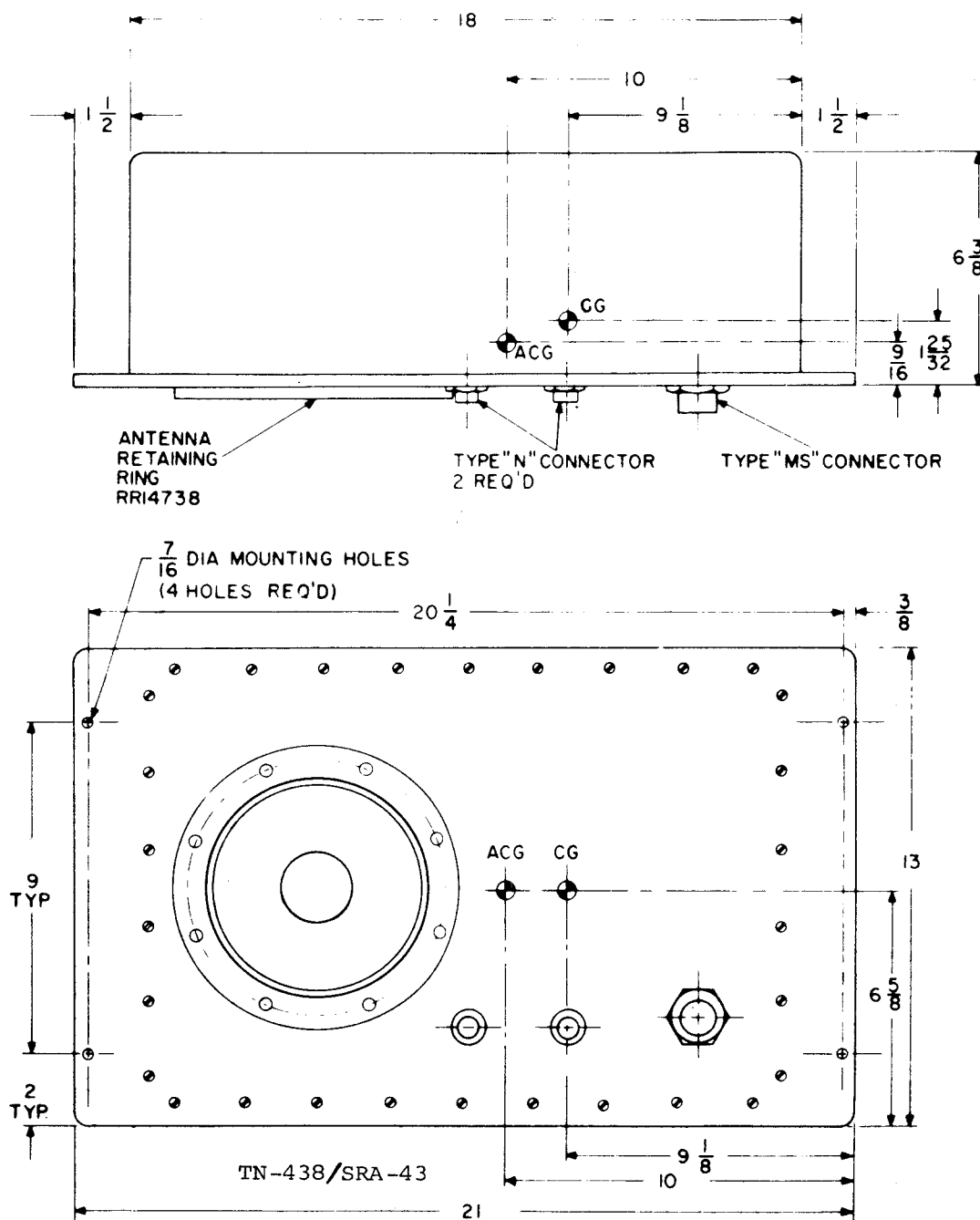


Figure 6-5 Antenna Group AN/SRA-43 Physical Configuration

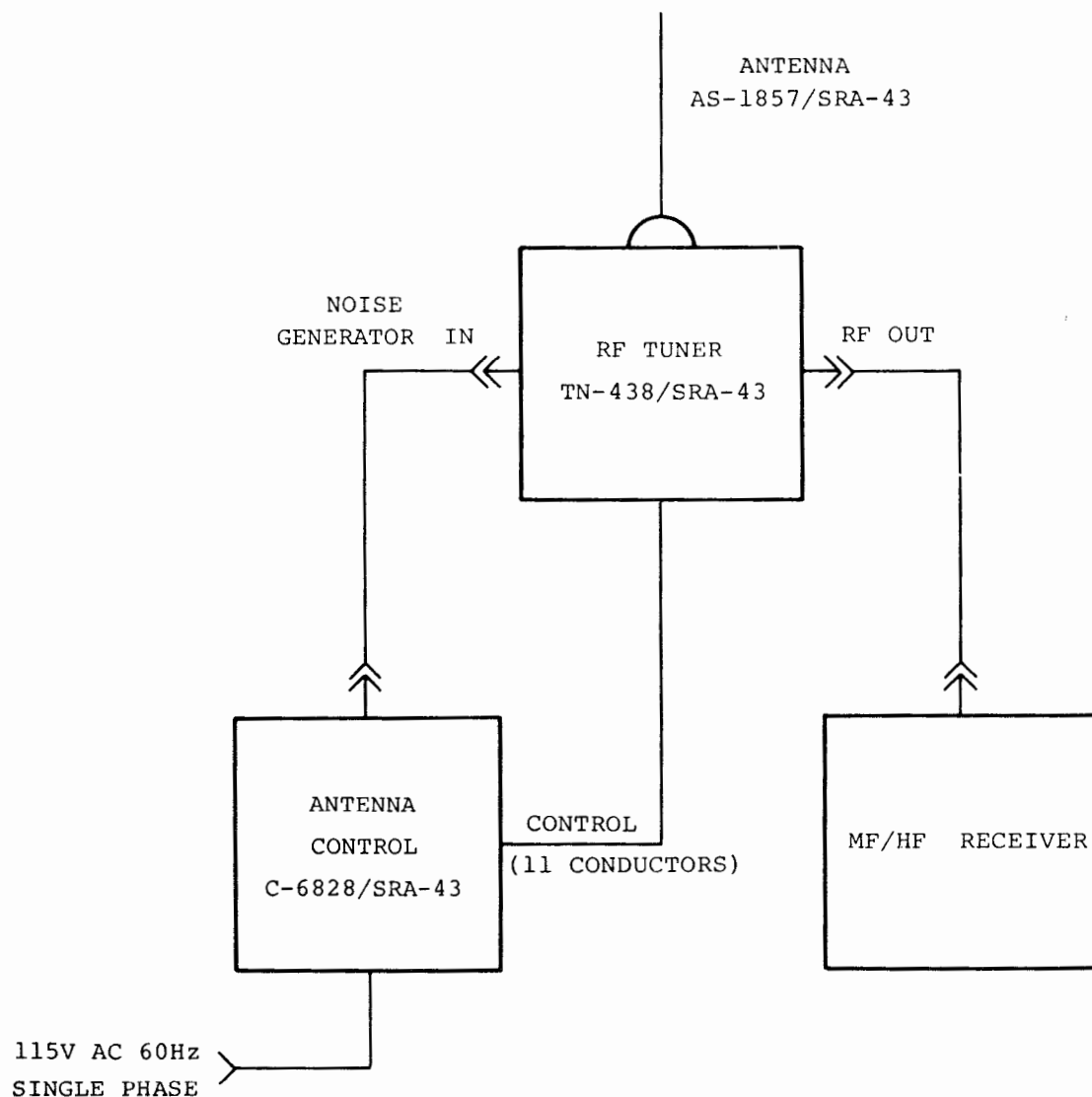


Figure 6-6 Antenna Group AN/SRA-43 Interconnection Diagram

TABLE 6-2 ANTENNA GROUP AN/SRA-43 EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERAL DIMENSIONS (IN.)			VOL (CU FT)	WEIGHT (LB)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
1	Antenna	AS-1857/SRA-43	60.0			0.06	2.5
1	Tuner Radio Frequency	TN-438/SRA-43	13.0	21.0	6.4	0.95	30.0
1	Control Antenna	C-6828/SRA-43	4.2	9.7	6.0	0.14	8.0
2	Technical Manual	NAVSHIPS 0967-269-4010					

6.4 ANTENNA GROUP AN/SRA-51.

a. TYPE/USE. - Antenna Group AN/SRA-51 is a remotely controlled antenna coupler preselector for use with receivers operating in the 2 to 16 MHz frequency range. The AN/SRA-51 consists of an antenna coupler preselector unit with an integral antenna, bandpass filters and rf amplifiers and an antenna control unit. It is used to improve the performance of the receiving system by permitting normal operation of receivers in the proximity of strong off frequency rf voltages from nearby hf transmitters, radar equipment, etc. and by reducing the parasitic effects from closely coupled shipboard antennas. The AN/SRA-51 may be used with R-390A/URR, AN/WRR-2, R-1051/URR or equivalent receivers.

b. PHYSICAL CONFIGURATION. - See Figure 6-7 and 6-8.

c. INTERCONNECTION DIAGRAM. - See Figure 6-9.

d. FREQUENCY RANGE. - 2 to 16 MHz.

e. TYPE OF TUNING. Remote, manual.

f. POWER RATING. - Not applicable, receive only.

g. ANTENNA IMPEDANCE REQUIRED. - The whip antenna is integral to coupler unit.

h. ANTENNA CONNECTOR. - Integral to coupler unit.

i. CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

j. CHANNEL CONNECTOR. - Type N (UG-30D/U).

k. PROTECTIVE CIRCUITS. - An overload detector is connected to the second resonator which provides a dc trigger to actuate the overload keyer. During periods of rf overload the keyer actuates a decoupling circuit that places a resistive load across the first resonator of the selected band thus lowering the Q and eliminating the possibility of burnout. Overload reset is automatic. Overload condition is indicated by an indicator on the antenna control unit.

l. PRIMARY POWER REQUIRED. - 115 vac 60 Hz single phase 50 watts

m. HEAT DISSIPATION. - Negligible.

n. TEMPERATURE RANGE. -

(1) Antenna Coupler Control. 0° to $+50^{\circ}\text{C}$ ($+32^{\circ}$ to $+120^{\circ}\text{F}$).

(2) Antenna Coupler and Antenna. - 28° to $+65^{\circ}\text{C}$ (-20° to $+150^{\circ}\text{F}$).

o. COOLING. - Natural radiation.

p. SENSITIVITY. - A receiver with a noise figure of 15 dB and a 12 KHz bandwidth will require a tangential sensitivity of 0.60 uv per meter rms from 2 to 16 MHz and 0.75 uv per meter rms from 2 to 3 MHz above 50°C for satisfactory operation.

q. ISOLATION. - At least 75 dB between 2 to 4 MHz and 80 dB between 4-16 MHz (relative to receive signal strength at center of passband) with separation of 15 percent from desired frequency.

r. BANDWIDTH. - Greater than 12 KHz between the 3 dB points.

s. INSTALLATION REQUIREMENTS. - The remote control unit should be located as close as possible to the associated receiver to facilitate tuning procedures. The antenna coupler-preselector should be deck mounted to facilitate maintenance. It may be mounted on masts on other portions of the superstructures however maintenance may require removal and lowering to deck levels. Placing the unit within a nominal 15 feet of metal structure or beneath overload metal structures should be avoided. The cabling between the remote control unit and the preselector should be kept to a minimum and shall not exceed 1200 feet. A multi-conductor cable capable of supplying a minimum of 13 conductors is required between the antenna coupler and the control unit. The minimum allowable distance between the preselector antenna and antennas of a 1-kw transmitter is 20 feet.

t. SPECIAL CONSIDERATIONS. - A source of dry air is required to purge and pressurize the preselector each time the interior is exposed to the environment. A humidity indicator is located inside the unit and must be replaced each time the cabinet has been opened. The exhaust valve on the cabinet has an opening pressure of 5 to 18 psi. The dry air supply must be able to supply pressure within this range for a period of approximately 30 minutes during each purging cycle. The remote control unit is designed for mounting in a standard 19 inch rack. The rack or electrical cabinet for mounting the control unit must be furnished by the installing activity.

u. MEAN TIME BETWEEN FAILURES (MTBF). - 4000 hours.

v. EQUIPMENT SUPPLIED. - See Table 6-3.

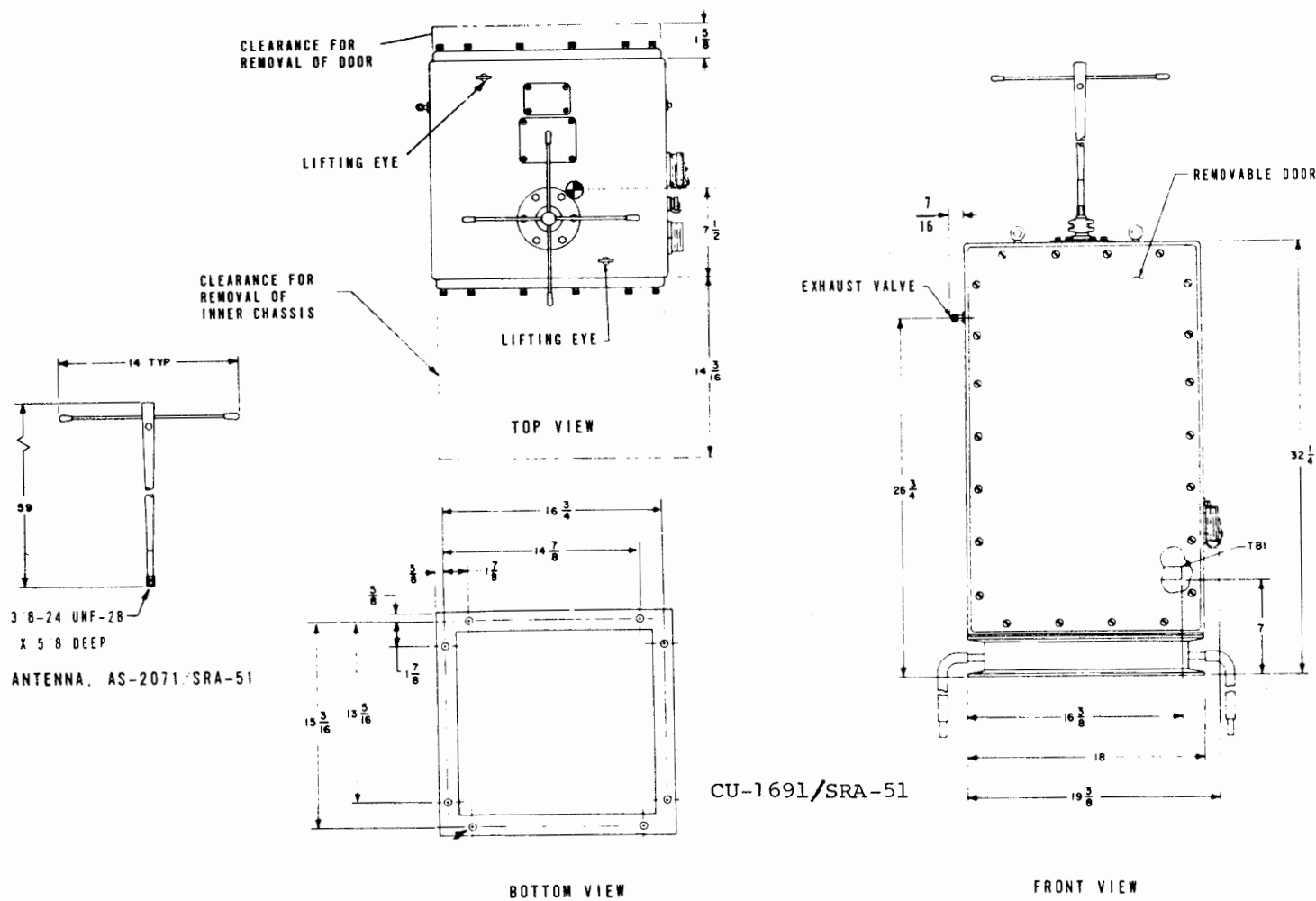


Figure 6-7 Antenna Group AN/SRA-51 Physical Configuration

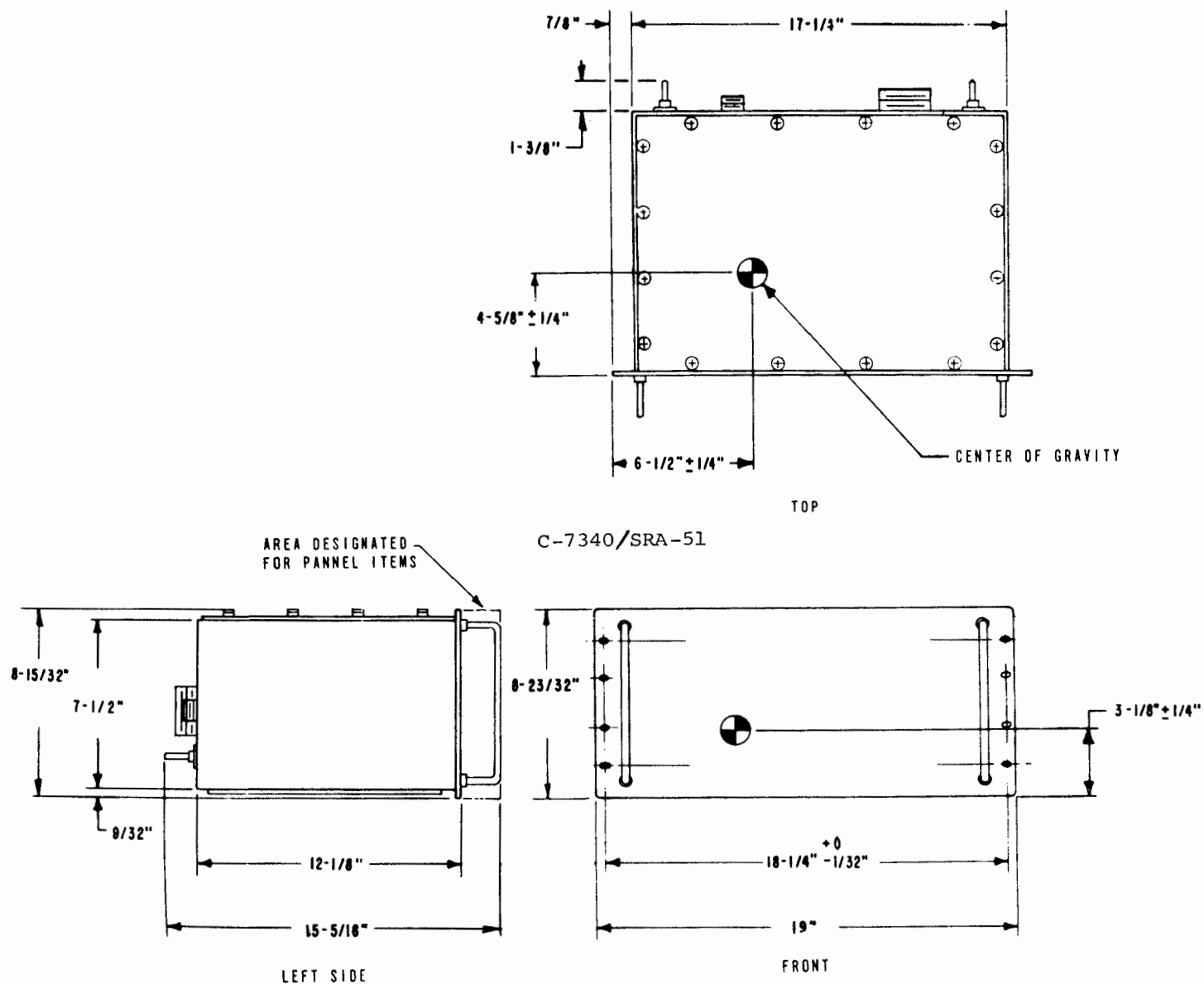


Figure 6-8 Antenna Group AN/SRA-51 Physical Configuration

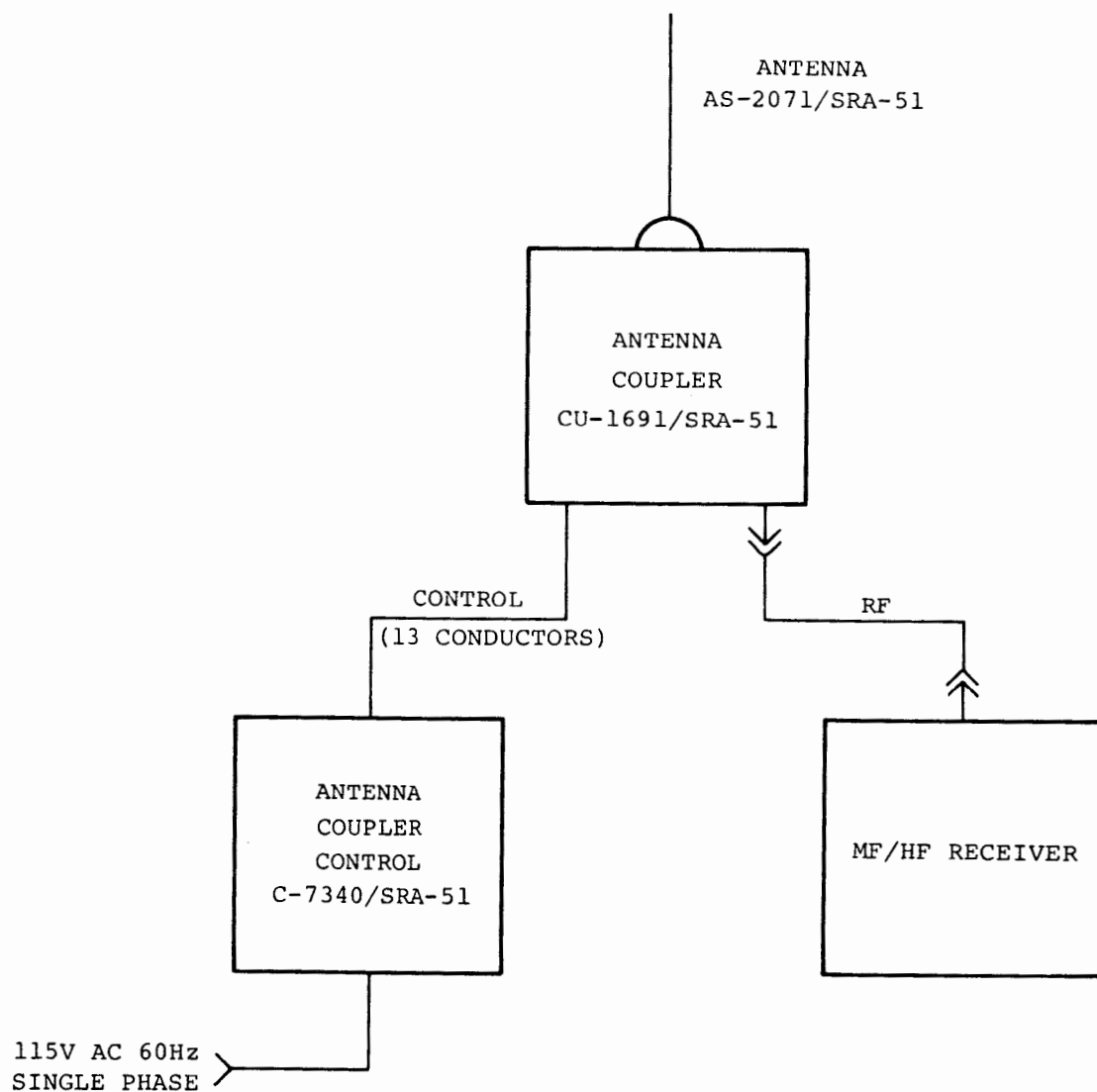


Figure 6-9 Antenna Group AN/SRA-51 Interconnection Diagram

TABLE 6-3 ANTENNA GROUP AN/SRA-51 EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERALL DIMENSIONS			VOLUME (cu in.)	WEIGHT (lb)
	NAME	DESIGNATION	HEIGHT (in.)	WIDTH (in.)	DEPTH (in.)		
1	Antenna	AS-2071/SRA-51	59 (Length)	Taper		4.49	2
1	Antenna Coupler	CU-1691/SRA-51	35	19-13/16	18-3/4	28,168	115
1	Antenna Coupler Control	C-7340/SRA-51	8-23/32	19	15-5/16	4,454	32
2	Technical Manual for Antenna Group AN/SRA-51	NAVSHIPS 0967-299-4010	11-1/2	9-1/2	1-1/2		

6.5 ANTENNA TUNING GROUP AN/SRA-18.

a. TYPE/USE. - Antenna Tuning Group AN/SRA-18 provides facilities to match the transmitter output impedance to the characteristic impedance of the transmission line and to match the line to the antenna. The system is referenced to a 50 ohm transmission line and is capable of obtaining a vswr of less than 4:1 over the frequency range of 0.3 MHz to 30 MHz when used with a 35 foot whip or a wire antenna at least 60 feet long. The AN/SRA-18 is intended for use with TBK, TBL, TBM, TDE, AN/URT-2, -3 and -4 and AN/SRA-14, -15 and -16 transmitting equipments. It may also be used with any transmitter operating in the frequency band with rf power limitations of 500 watts from 2 MHz to 30 MHz and 200 watts from 0.3 MHz to 2 MHz. After initial tuning has been accomplished the C-1360/SRT Control Monitor provides monitoring and automatic adjustment of the tuner and coupler to keep the system in resonance. When AN/SRT-14, -15, and -16 transmitters are used with the AN/SRA-18 the transmitter is also automatically kept in resonance by an output from a transmission line monitor in the CU-402/SRT Transmitter Coupler.

b. PHYSICAL CONFIGURATION. - See Figure 6-10, 6-11, 6-12 and 6-13.

c. INTERCONNECTION DIAGRAM. - See Figure 6-14.

d. FREQUENCY RANGE. - 0.3 to 30 MHz.

e. TYPE OF TUNING. - Manual or automatic. Complete automatic tuning is only available with AN/SRT-14, -15 and -16 transmitters.

f. POWER RATING. -

- | | |
|-------------------|------------|
| (1) 0.3 to 2 MHz. | 200 watts. |
| (2) 2 to 30 MHz. | 500 watts. |

g. ANTENNA IMPEDANCE REQUIRED. - Antenna coupler CU-372/SRT will match antenna impedance of between 12.5 and 200 ohms to a 50 ohm line with a vswr of 4:1 or less.

h. ANTENNA CONNECTOR. - Feedthrough insulator.

i. CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

j. CHANNEL CONNECTOR. - Type LC (UG-352A/U).

k. PROTECTIVE CIRCUITS. - Excessive vswr (greater than 4:1) on input rf line at power levels exceeding 100 watts disables the associated transmitter. Excessive heating or blower failure in radio frequency tuner TN-229/SRT operates indicator on front panel of Control Monitor C-1630/SRT. The vacuum capacitor in antenna coupler CU-372/SRT is protected by a spark gap.

l. PRIMARY POWER REQUIRED. - 115 vac 60 Hz single phase 250 watts.

m. HEAT DISSIPATION (Maximum). - (Includes rf and 60 Hz).

- | | |
|----------------------------|------------|
| (1) Radio Frequency Tuner. | 300 watts. |
| (2) Antenna Coupler. | 300 watts. |
| (3) Control Monitor Unit. | 145 watts. |

n. TEMPERATURE RANGE. -

- (1) RF tuner and antenna coupler. -28° to $+65^{\circ}\text{C}$ (-20° to $+150^{\circ}\text{F}$).
- (2) Control monitor and transmitter coupler. 0° to $+50^{\circ}\text{C}$ ($+32^{\circ}$ to $+120^{\circ}\text{F}$).

o. COOLING. - Natural convection and radiation.

p. INSERTION LOSS. - Less than 1 dB.

q. INSTALLATION REQUIREMENTS. - The antenna coupler and rf tuner may be mounted either horizontally or vertically. Both ends of these units must be accessible for cable connections and checking and replacing the charge of nitrogen. The rf output connection between the tuner and the coupler and between the coupler and the antenna are made from RG-17/U coaxial cable with the outer sheath and braid removed. The tuner and coupler should be mounted so that these cables are as short as possible, and combined should not exceed 5 feet. Any length over 18 inches will require additional support. The rf cable from the transmitter to the transmitter coupler should not exceed 12 feet.

The control cables between the control monitor and the antenna coupler should not exceed 450 feet. The control cables between the antenna coupler and tuner should not exceed 7 feet.

r. SPECIAL CONSIDERATIONS. - Transmitter rf power is required to indicate when correct tuning is achieved. Tuning power should be limited to 100 watts to prevent damage to the tuner and coupler. A minimum of 50 watts is required for automatic tuning.

s. MEAN TIME BETWEEN FAILURES (MTBF). - 4000 hours.

t. EQUIPMENT SUPPLIED. - See Table 6-4.

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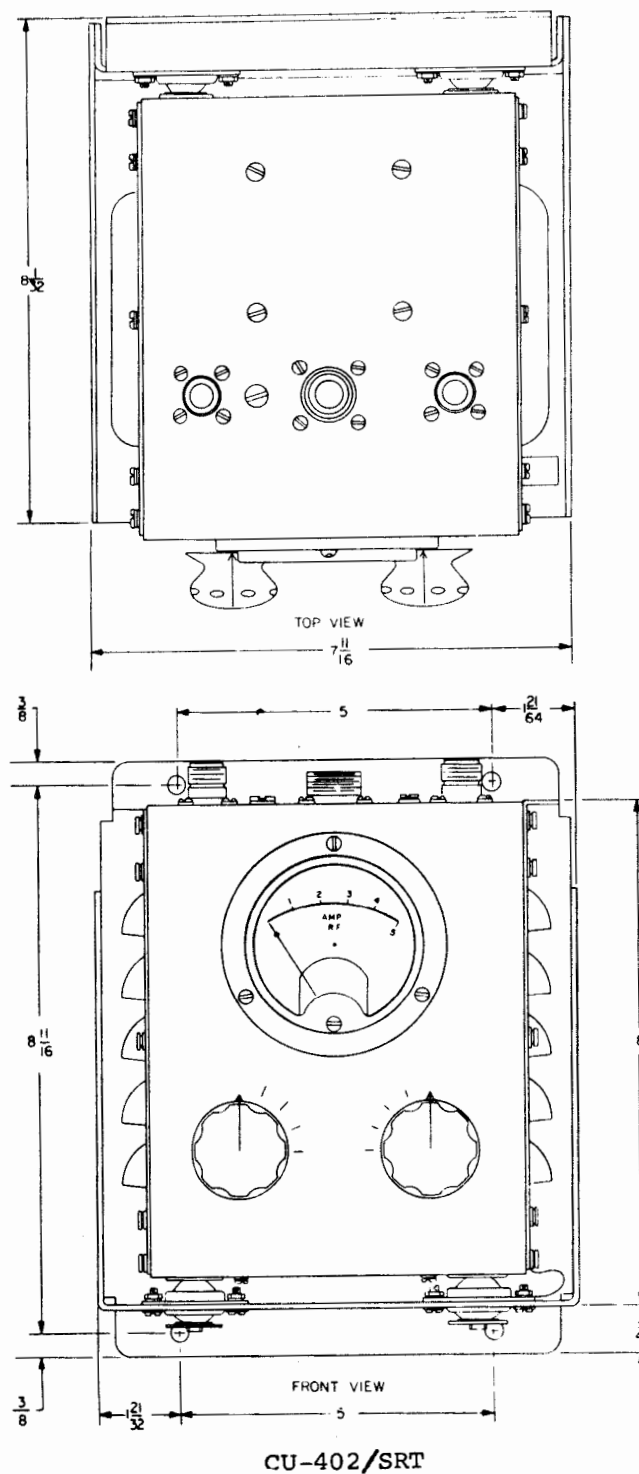


Figure 6-10 Antenna Tuning Group AN/SRA-18
 Physical Configuration

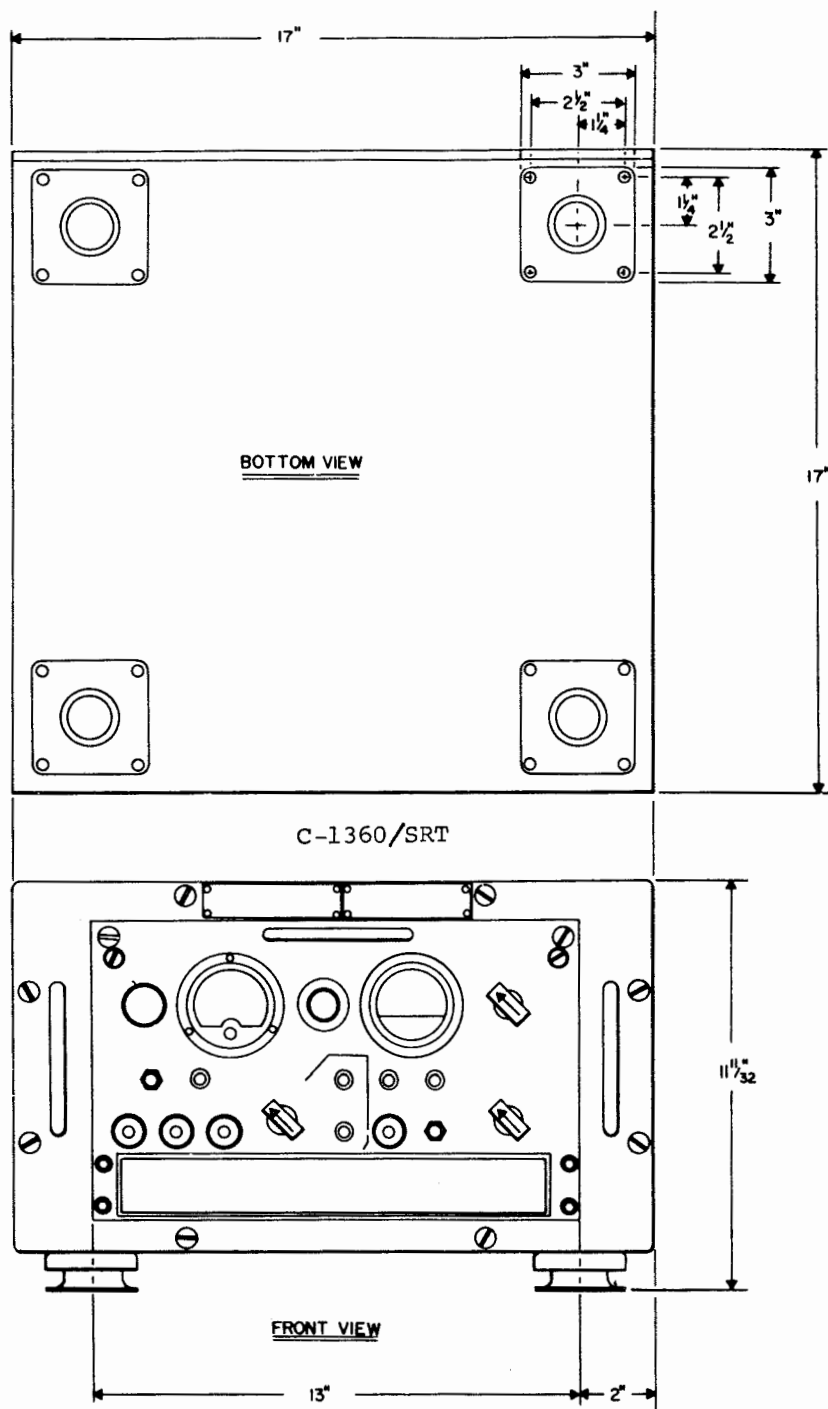


Figure 6-11 Antenna Tuning Group AN/SRA-18
Physical Configuration

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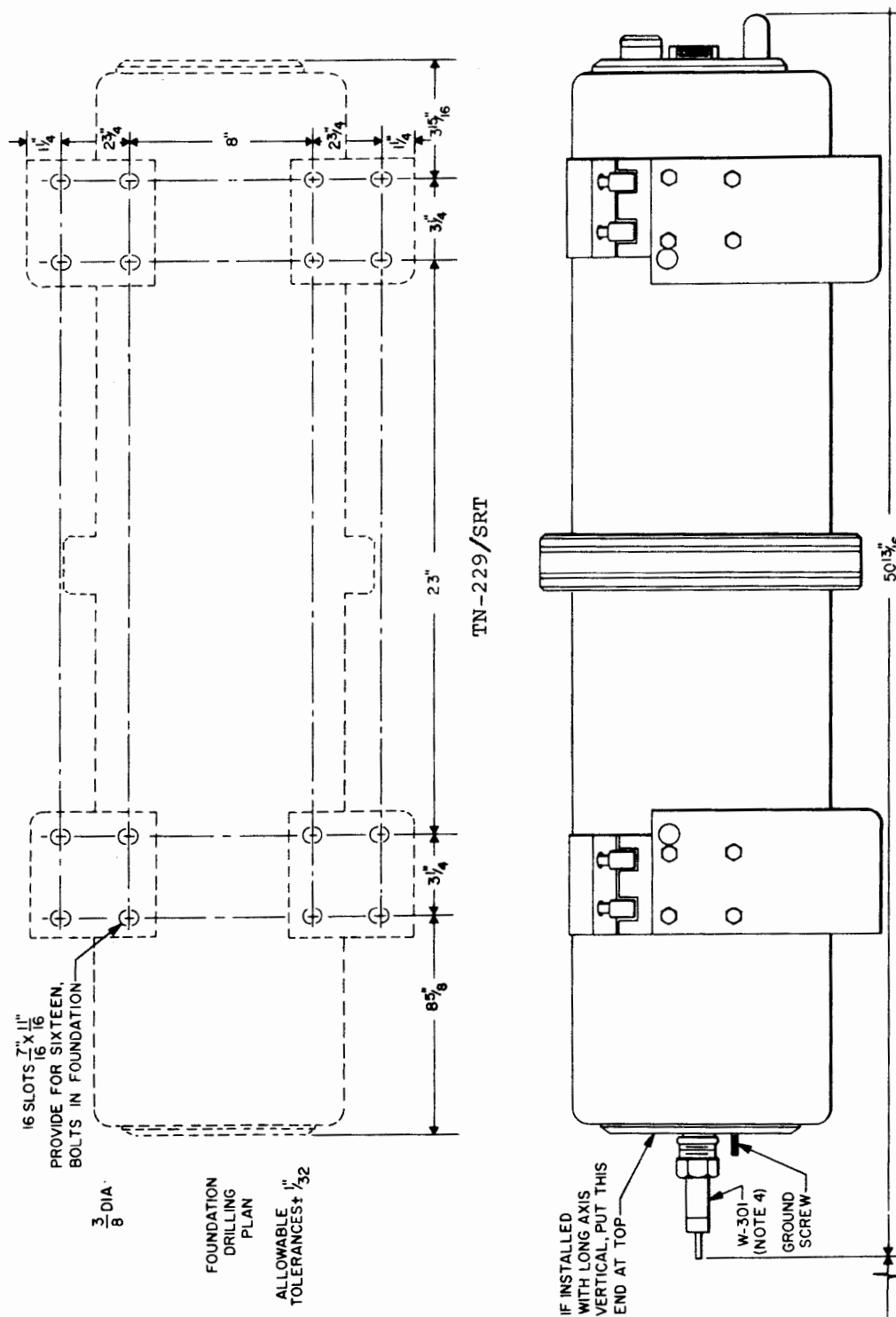


Figure 6-12 Antenna Tuning Group AN/SRA-18
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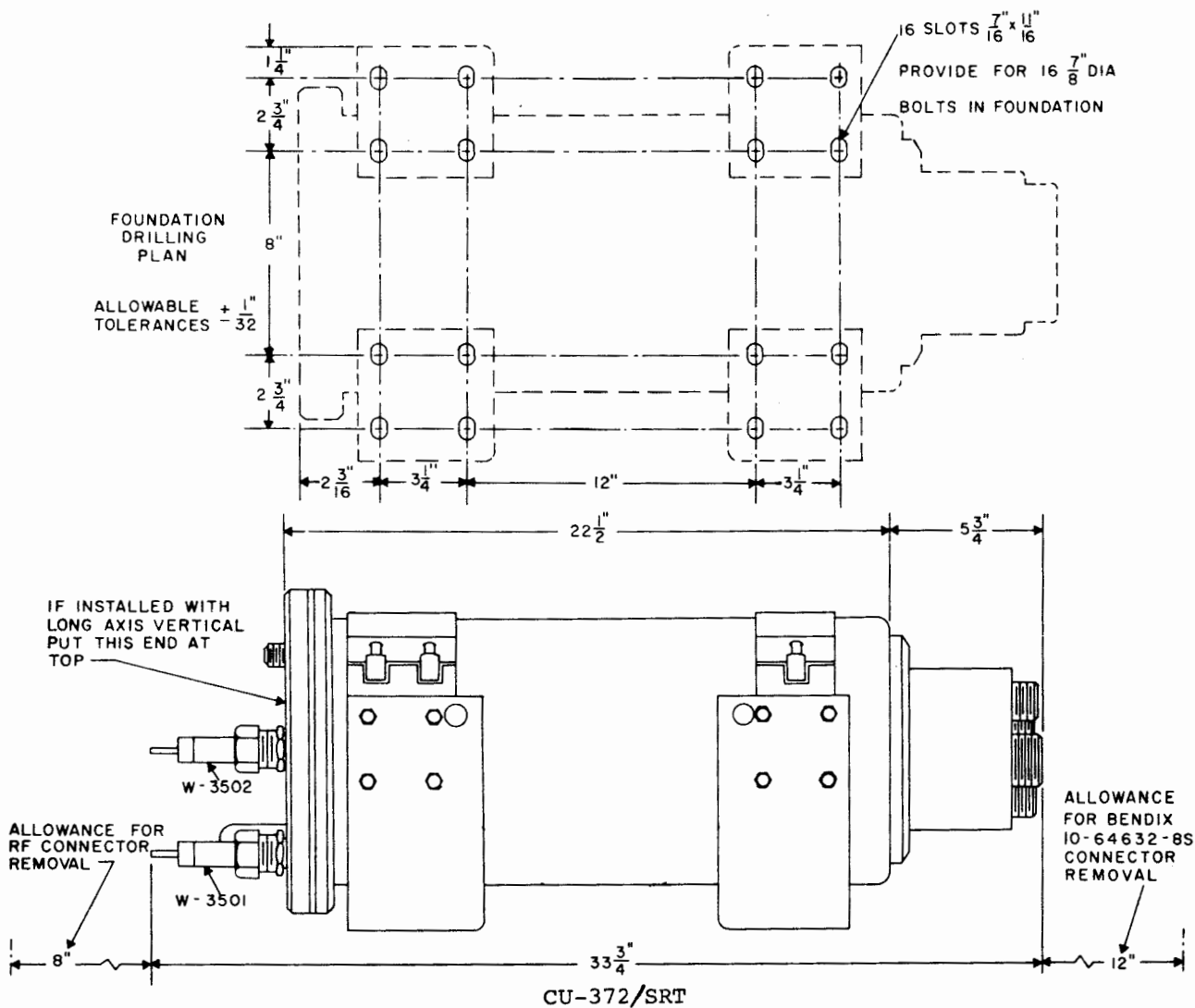


Figure 6-13 Antenna Tuning Group AN/SRA-18
Physical Configuration

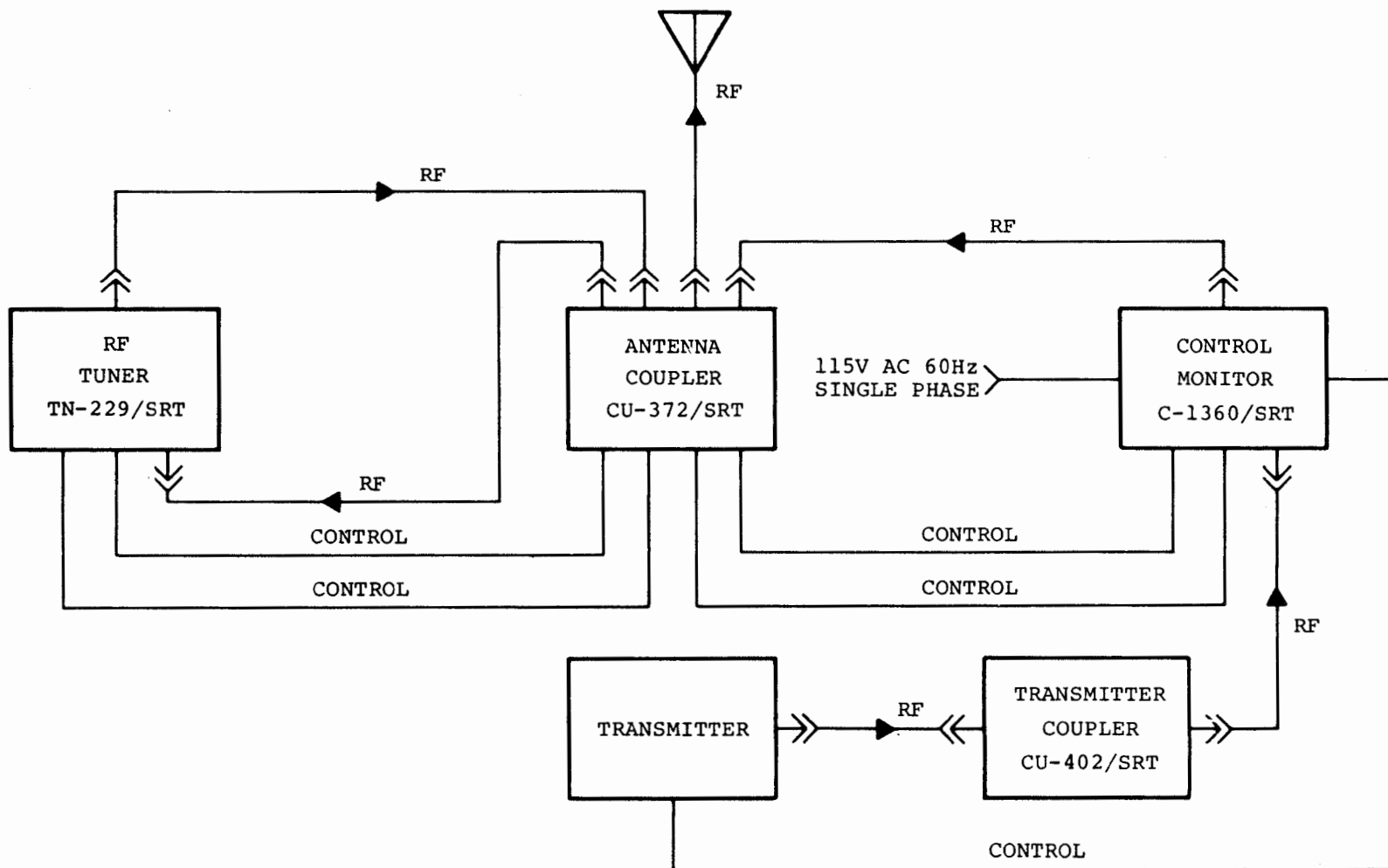


Figure 6-14 Antenna Tuning Group AN/SRA-18 Interconnection Diagram

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TABLE 6-4 ANTENNA TUNING GROUP AN/SRA-18
EQUIPMENT SUPPLIED

QTY PER EQUIP	NAME OF UNIT	NAVY TYPE DESIGNATION	OVER-ALL DIMENSIONS						
			LENGTH	HEIGHT	DIAME- TER	WIDTH	DEPTH	APPROX VOLUME	WT
1	Radio Frequency Tuner	TN-229/SRT	50-13/16		12-5/8			3.09	108
1	Antenna Coupler	CU-372/SRT	34-5/8		12-5/8			2.9	66
1	Control Monitor	C-1360/SRT		17		19	11	1.98	55
1	Transmitter Coupler	CU-402/SRT		8-1/2		7-1/2	8-1/2	.49	9
1	Equipment Spares			--	--	--	--	--	9
2	Instruction Book	NAVSHIPS 92540		12		9			

6.6 ANTENNA COUPLER GROUPS AN/URA-38 AND AN/URA-38A.

a. TYPE/USE. - Antenna Coupler Groups AN/URA-38 and AN/URA-38A are automatic antenna tuning systems designed primarily for surface ship and shore use with the AN/URT-23(V) transmitter. The coupler group design includes provisions for manual and semi-automatic tuning making them adaptable for use with other transmitters such as the AN/URC-32 and AN/WRT-2. The system can also be tuned without the use of transmitter power (silent tuning). Full automatic tuning of the AN/URC-32 and AN/WRT-2 can be accomplished by the addition of an MX-8316/UR interface unit to the basic system. The MX-8316/UR provides the necessary functions to control these transmitters in the same manner as the AN/URT-23(V) when operating in automatic mode. The AN/URA-38 and AN/URA-38A are similar with minor internal mechanical and electrical differences. The C-3698A/URA-38 control unit supplied with the AN/URA-38A has additional circuitry to provide slow tuning-element motor speed for improved control during manual operation. The AN/URA-38 and AN/URA-38A are electrically and mechanically interchangeable and the operating procedures are the same.

b. PHYSICAL CONFIGURATION. - See Figure 6-15.

c. INTERCONNECTION DIAGRAM. - See Figure 6-16.

d. FREQUENCY RANGE. - 2 to 30 MHz.

e. TYPE OF TUNING. - Automatic, semi-automatic or remote manual.

f. POWER RATING. - 1-kw pep and average.

g. ANTENNA IMPEDANCE REQUIRED. - Antenna Coupler CU-938/URA-38 or CU-938A/URA-38 will match the impedances presented by a 15', 25', 28' or 35' whip or similar wire antennas to a 50 ohm line with a maximum vswr of 1.5:1.

h. ANTENNA CONNECTOR. - Feedthrough insulator.

i. CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

j. CHANNEL CONNECTOR. - Type N. (UG-536B/U).

k. PROTECTIVE CIRCUITS. - The keyline of the associated transmitter is opened if excessive pressure or temperature exists in the antenna coupler unit. The aural overload alarm and overload indicator on the coupler control unit are actuated when this condition exists. A retune cycle is initiated whenever potentially damaging rf voltages occur.

l. PRIMARY POWER REQUIRED. - 115 vac 60/400 Hz single phase 80 watts continuous, 130 watts during tuning cycle.

m. HEAT DISSIPATION (MAXIMUM). -

(1) Coupler Control.	60 watts.
(2) Antenna Coupler.	70 watts.

Heat dissipation is dependent on the frequency in use and may vary between 50 to 500 watts.

n. TEMPERATURE RANGE. -

(1) Antenna Coupler.	-28° to +65°C	(-20° to +150°F).
(2) Coupler Control.	0° to +50°C	(+32° to 120°F).

o. COOLING. - Natural convection and radiation. The antenna coupler is equipped with a circulating fan that distributes the internal dry nitrogen over heat sinks located in the enclosure shell.

p. INSTALLATION REQUIREMENTS. - The antenna control unit should be installed adjacent to the associated transmitter. The antenna coupler unit should be installed at the base of whip or as close to the feedpoint of wire antennas as possible.

q. SPECIAL CONSIDERATIONS. - The CU-938/URA-38 or CU-938A/URA-38A require pressurization with dry nitrogen at 4 to 6 psig. A pressurization kit, type MK-260, is furnished for the connection and regulation of the nitrogen supply to the coupler. The MX-8316/UR is supplied with connectors for the cabling between the transmitter and the control unit. The MX-8316/UR should be located in close proximity to its associated transmitter and control unit. Adequate antenna isolation is required for multiple installation to decrease the possibility of the coupling unit tuning on strong external signals.

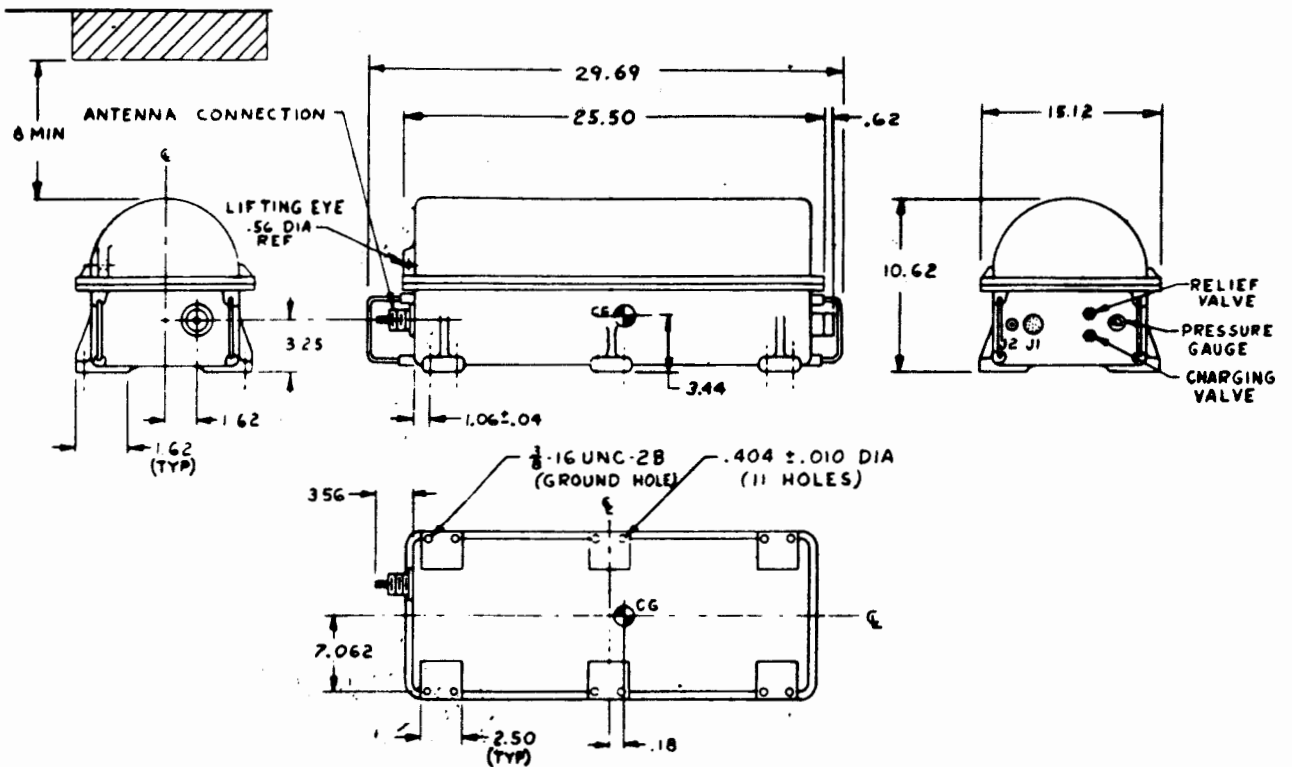
r. MEAN TIME BETWEEN FAILURES (MTBF). - 3000 hours.

s. EQUIPMENT SUPPLIED. - See Table 6-5.

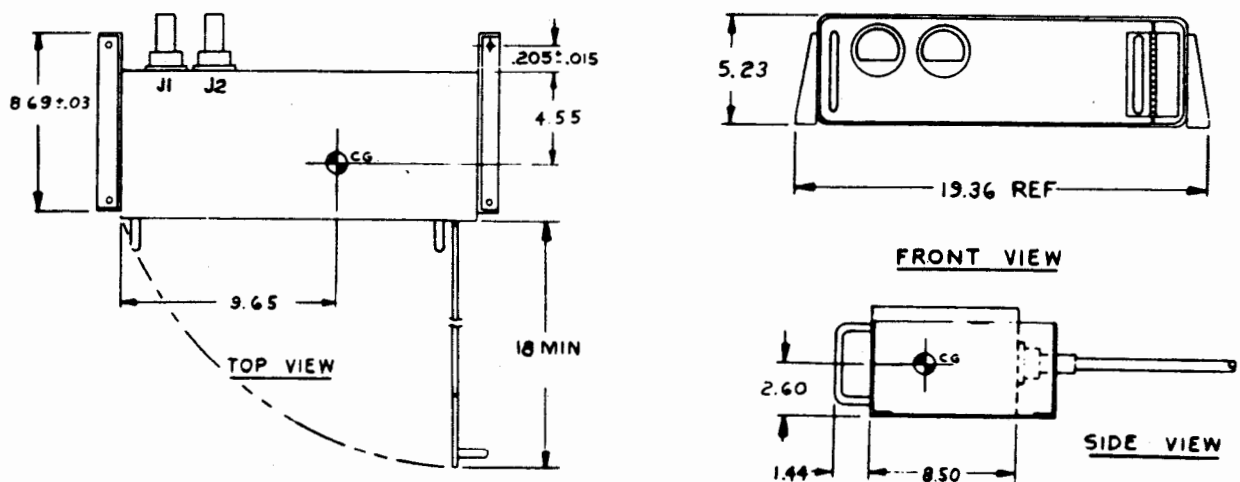
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Figure 6-15



CU-938/URA-38 and CU-938A/URA-38



C-3698/URA-38 and C-3698A/URA-38

Figure 6-15 Antenna Coupler Groups AN/URA-38 and AN/URA-38A
Physical Configuration

ORIGINAL

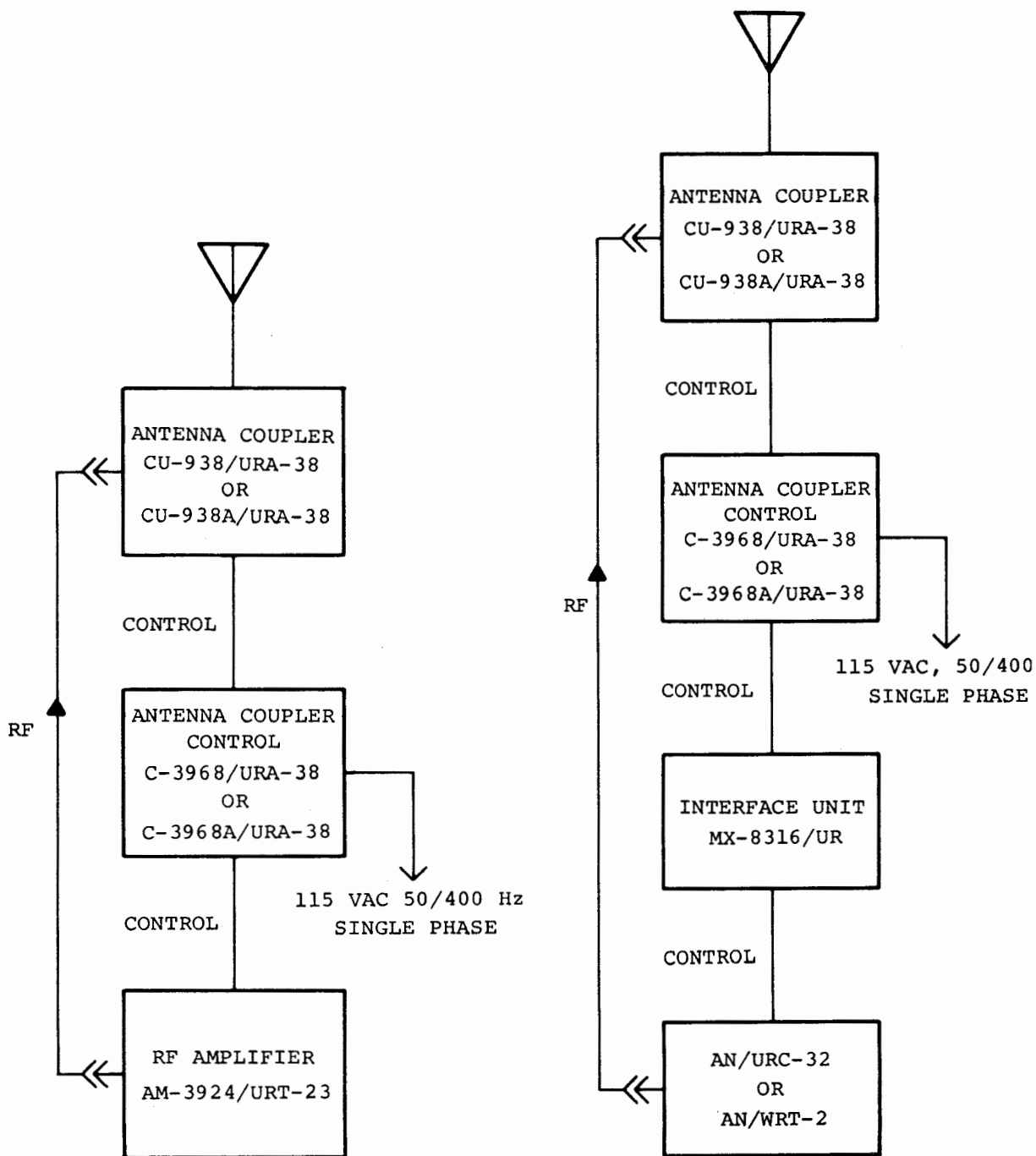


Figure 6-16 Antenna Coupler Groups AN/URA-38 And -38A
Interconnection Diagram

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TABLE 6-5 ANTENNA COUPLER GROUPS AN/URA-38 AND AN/URA-38A
 EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERAL DIMENSIONS (IN.)			VOL (CU FT)	WEIGHT (LB)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
		AN/URA-38					
1	Antenna Coupler	CU-938/URA- 38	10.62	15.12	25.50	2.37	75.0
1	Antenna Coupler Control	C-3698/URA- 38	5.23	19.36	8.69	0.51	25.0
2	Technical Manual	NAVSHIPS 0967-204-0010					
		AN/URA-38A					
1	Antenna Coupler	CU-938A/URA- 38	10.62	15.12	29.69	2.37	75.0
1	Antenna Coupler Control	C-3698A/URA- 38	5.23	19.36	8.69	0.51	23.0
2	Technical Manual	NAVSHIPS 0967-297-6010					
		MX-8316/UR					
1	Interface Unit	MX-8316/UR	5.25	17.36	8.5	0.477	20
1	Technical Manual						



6.7 COUPLER MONITOR CU-737/URC.

a. TYPE/USE. - Coupler Monitor CU-737/URC provides facilities to match a transmitter 50 ohm output to a 50 ohm transmission line having a vswr not greater than 2:1 over the frequency range of 2 to 30 MHz. The CU-737/URC employs a reversible L-network and is designed for use with AN/URC-32 transmitters onboard submarines and on surface ships where the AN/URC-32 is used with antenna coupler groups AN/SRA-13, -14, -15, and -16.

b. PHYSICAL CONFIGURATION. - See Figure 6-17.

c. INTERCONNECTION DIAGRAM. - See Figure 6-18.

d. FREQUENCY RANGE. - 2 to 30 MHz.

e. TYPE OF TUNING. - Manual.

f. POWER RATING. - 1-kw maximum.

g. ANTENNA IMPEDANCE. - 50 ohms nominal, unbalanced, vswr not greater than 2:1.

h. ANTENNA CONNECTOR. - Type N (UG-58A/U).

i. CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

j. CHANNEL CONNECTOR. - Type N (UG-58A/U).

k. PROTECTIVE CIRCUITS. - The output selector switch opens the interlock line to the transmitter when the power output switch moves between the antenna and dummy load positions.

l. PRIMARY POWER REQUIRED. - None. The transmitter/receiver relay requires a 28 vdc input from the associated transmitter.

m. HEAT DISSIPATION. - Negligible.

n. TEMPERATURE RANGE. - 0° to +50°C (+32° to 120°F).

o. COOLING. - Natural convection.

p. INSTALLATION REQUIREMENTS. - The CU-737/URC is designed for mounting in a standard 19 inch rack. The AN/URC-32 rack is generally configured to provide space for the CU-737/URC.

q. SPECIAL CONSIDERATIONS. - None.

r. MEAN TIME BETWEEN FAILURES (MTBF). - 8000 hours.

s. EQUIPMENT SUPPLIED. - See Table 6-6.

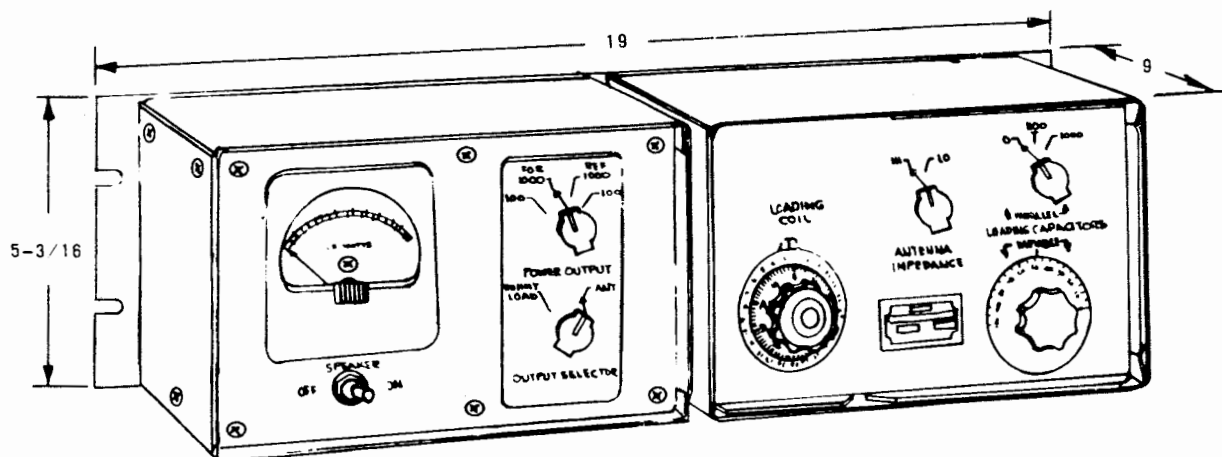


Figure 6-17 Coupler Monitor CU-737/URC Physical Configuration

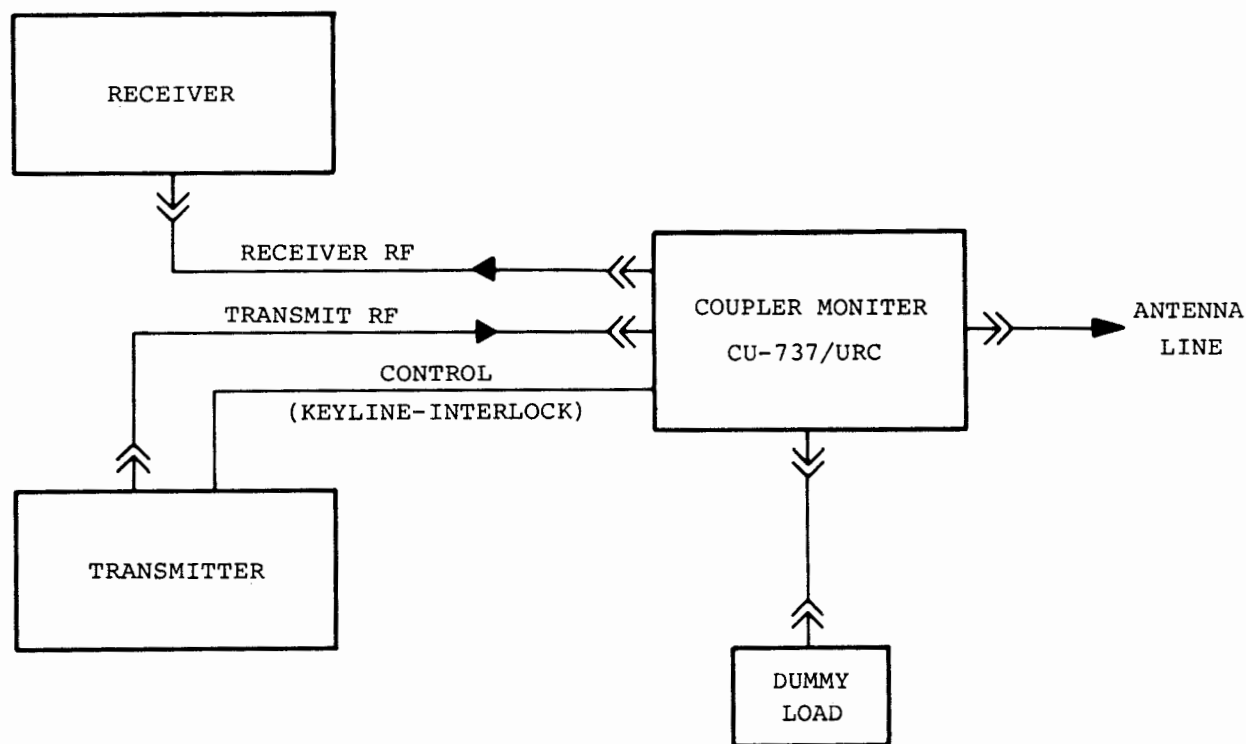


Figure 6-18 Coupler Monitor CU-737/URC Interconnection Diagram

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TABLE 6-6 COUPLER MONITOR CU-737/URC EQUIPMENT SUPPLIED

Qty Per Equip.	Nomenclature		Overall Dimensions (In.)			Vol. (Cu Ft)	Weight (Lb)
	Name	Designation	Height	Width	Depth		
1	Coupler Monitor	CU-737/URC	5.187	19	9	0.515	12.25
2	Tech Manual	NAVSHIPS 93628					



6.8 COUPLER CU-837/URC

a. TYPE/USE.- Coupler CU-837/URC provides facilities to match the output of the TCS series transmitters to a 50 ohm coaxial transmission line. The CU-837/URC employs an L-network and permits the use of TCS equipments with the Antenna Coupler Group AN/SRA-22, equivalent couplers, or multicouplers.

b. PHYSICAL CONFIGURATION. - See Figure 6-19.

c. INTERCONNECTION DIAGRAM. - See Figure 6-20.

d. FREQUENCY RANGE. - 2 to 12 MHz.

e. TYPE OF TUNING. - Manual.

f. POWER RATING. - 100 watts rf.

g. ANTENNA IMPEDANCE. - 50 ohms nominal, unbalanced.

h. ANTENNA CONNECTOR. - Type N (UG-58A/U).

i. CHANNEL IMPEDANCE. - Adjustable to match TCS transmitter.

j. CHANNEL CONNECTOR. - Type N (UG-58A/U).

k. PROTECTIVE CIRCUITS. - None.

l. PRIMARY POWER. - None.

m. HEAT. - Negligible.

n. TEMPERATURE RANGE. - 0° to +50°C (+32° to 120°F).

o. COOLING. - Natural radiation. The dummy load is cooled by natural convection.

p. INSTALLATION REQUIREMENTS. - The impedance matching network should be mounted on top or as close to the TCS transmitter as possible. The dummy load should be mounted close to the input of the antenna coupler to be used with the TCS.

q. SPECIAL CONSIDERATIONS. - The 50 ohm dummy load duty cycle is 100 watts for 1 minute, 50 watts for 5 minutes and 25 watts continuous.

r. MEAN TIME BETWEEN FAILURES (MTBF). - 8000 hours.

s. EQUIPMENT SUPPLIED. - See Table 6-7.

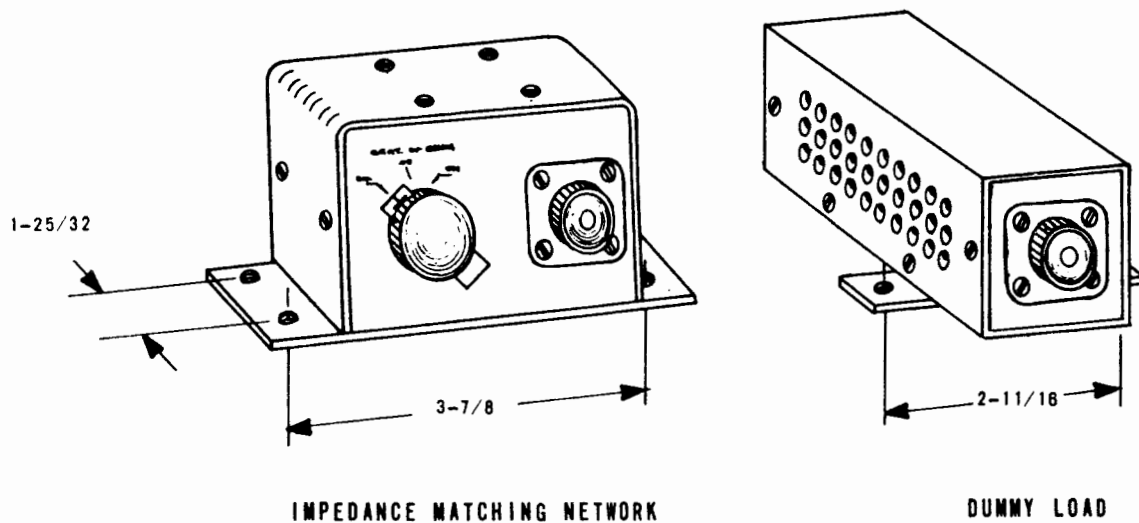


Figure 6-19 Coupler CU-837/URC Physical Configuration

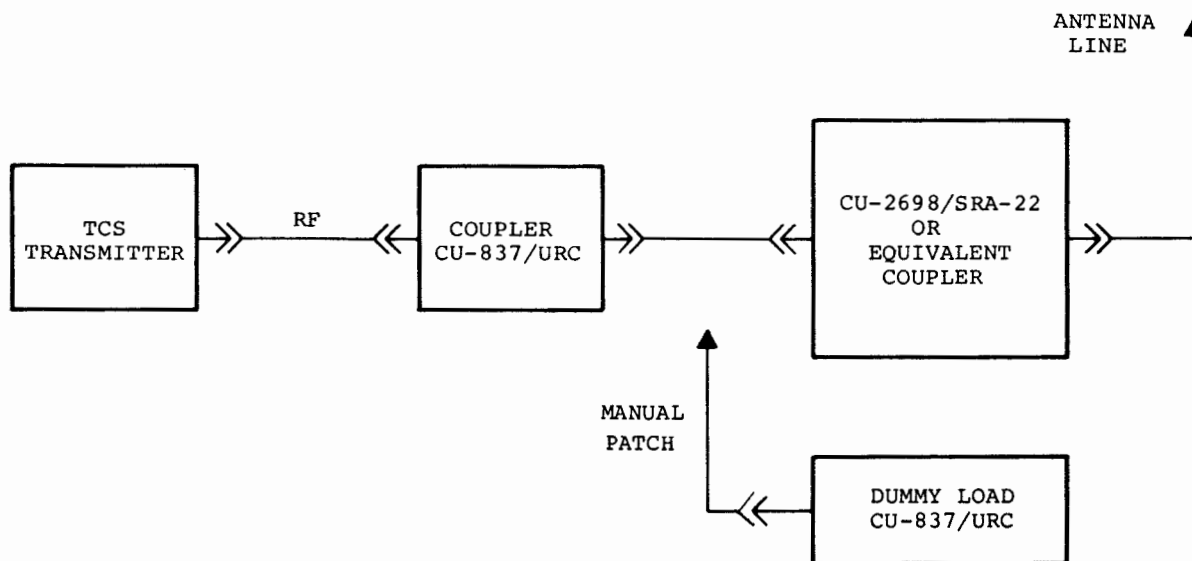


Figure 6-20 Coupler CU-837/URC Interconnection Diagram

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TABLE 6-7 COUPLER CU-837/URC EQUIPMENT SUPPLIED

Qty Per Equip.	Nomenclature		Overall Dimensions (In.)			Vol. (Cu Ft)	Weight (Lb)
	Name	Designation	Height	Width	Depth		
1	Impedance Matching Network		2.187	4.625	3.87		0.5
1	Dummy Load		3.187	6.75	1.187		0.5
2	RF Cable with connector on each end		11.50 long				
1	RF Connector	Type N					
1	Tech Manual	NAVSHIPS 93645					



6.9 RADIO FREQUENCY TUNER TN-345/WRT-1 AND ANTENNA COUPLER CU-760/WRT-1.

a. TYPE/USE. - Radio frequency Tuner TN-345/WRT-1 and Antenna Coupler CU-760/WRT-1 are components of the AN/WRT-1 Radio Transmitting Set. The tuner and coupler are remotely tuned matching networks and impedance transformation devices. They provide facilities for matching the characteristic impedance output of the AN/WRT-1 to a 35 foot whip or 60 to 130 foot wire antennas with a vswr of not more than 4:1. The controls for operation of the tuner and coupler are located on the AM-2197/WRT-1 in the main cabinet of the AN/WRT-1.

b. PHYSICAL CONFIGURATION. - See Figure 6-21.

c. INTERCONNECTION DIAGRAM. - See Figure 6-22.

d. FREQUENCY RANGE. - 300 KHz to 1.5 MHz.

e. TYPE OF TUNING. - Manual.

f. POWER RATING. - 500 watts rf pep and average.

g. ANTENNA IMPEDANCE REQUIRED. - The tuner and coupler will match the impedance presented by a 35 foot whip or single wire shipboard antennas 60 to 130 feet long to a 50 ohm transmission line with a vswr of less than 4:1.

h. ANTENNA CONNECTOR. - Feed through insulator.

i. CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

j. INPUT CONNECTOR. - Type LC (UG-287A/U modified).

k. PROTECTIVE CIRCUITS. - The high voltage interlock circuit of the transmitter will open whenever there is excessive heating or blower failure in the tuner or coupler or excessive vswr on the rf output line at the transmitter.

l. PRIMARY POWER REQUIRED. - 115 vac 60 Hz and 24 vdc, both supplied by control cable from transmitter.

m. HEAT DISSIPATION (MAXIMUM). - Heating from 60 Hz and dc sources is negligible. RF heating is dependent on vswr.

n. TEMPERATURE RANGE. - 28° to +65°C (-20° to +150°F).

o. COOLING. - Internal blower circulates dry nitrogen within tuner and coupler, natural radiation from shell and conduction from mounts.

p. INSTALLATION REQUIREMENTS. - The rf cable between the output of the coupler and the antenna should be as short as possible. The rf cable between the tuner output and the coupler should not exceed 5 feet and the rf cable between the tuner input and the coupler should not exceed 10 feet. Both ends of the tuner and the coupler must be accessible for cable connections and for checking and replacing charges of nitrogen. A clearance of 8 inches is required on the ends having feedthrough insulators and 12" on the opposite ends. A 19 conductor control cable is required between the transmitter and coupler and between the transmitter and tuner. The length of these cables and the rf cable between the transmitter and coupler should not exceed 450 feet.

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q. SPECIAL CONSIDERATIONS. - The TN-345/WRT-1 and CU-760/WRT-1 require pressurization with dry nitrogen at 25 psig.

r. MEAN TIME BETWEEN FAILURES (MTBF). - 4000 hours.

s. EQUIPMENT SUPPLIED. - See Table 6-8.

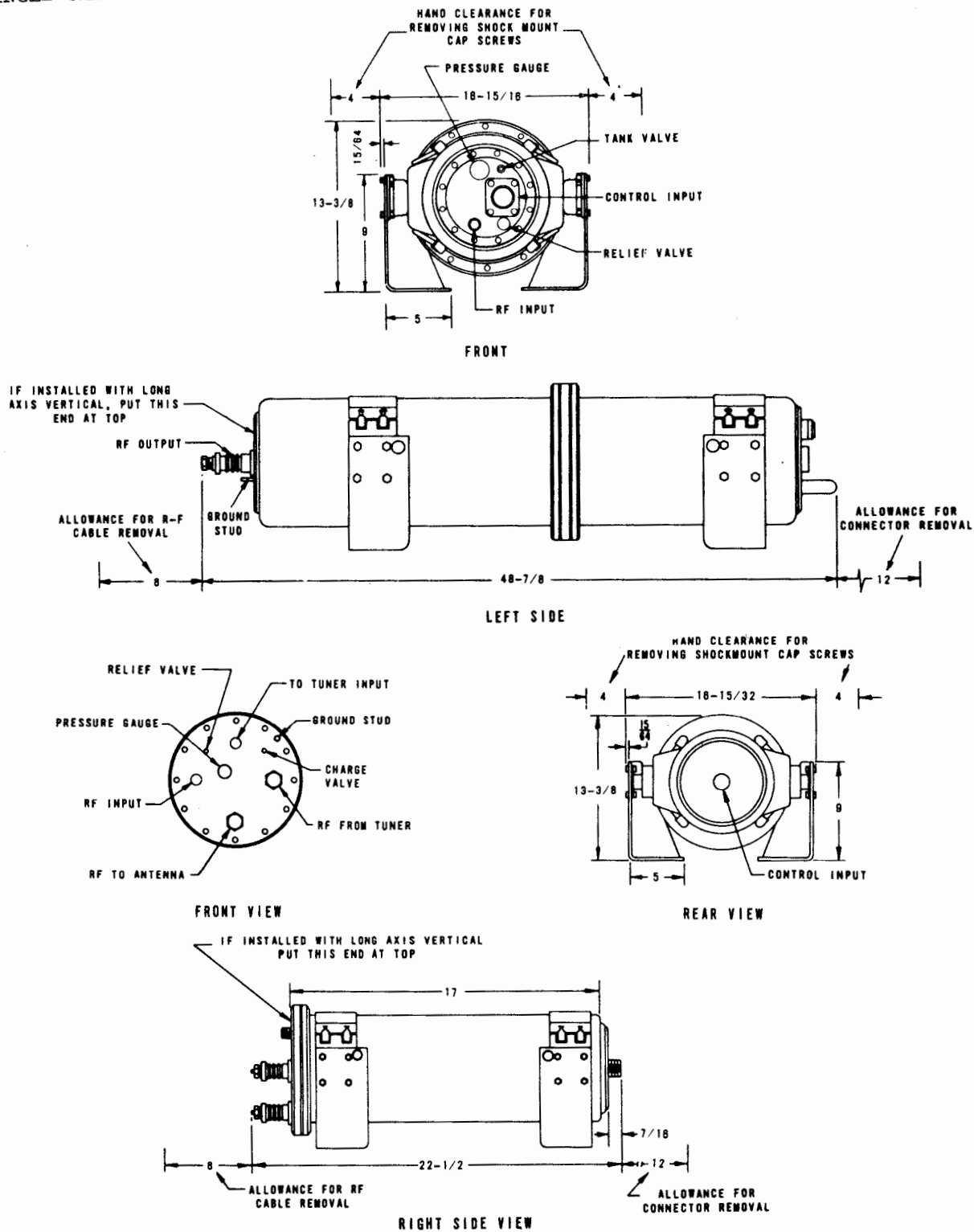


Figure 6-21 RF Tuner TN-345/WRT-1 and Antenna Coupler CU-760/WRT-1
 Physical Configuration

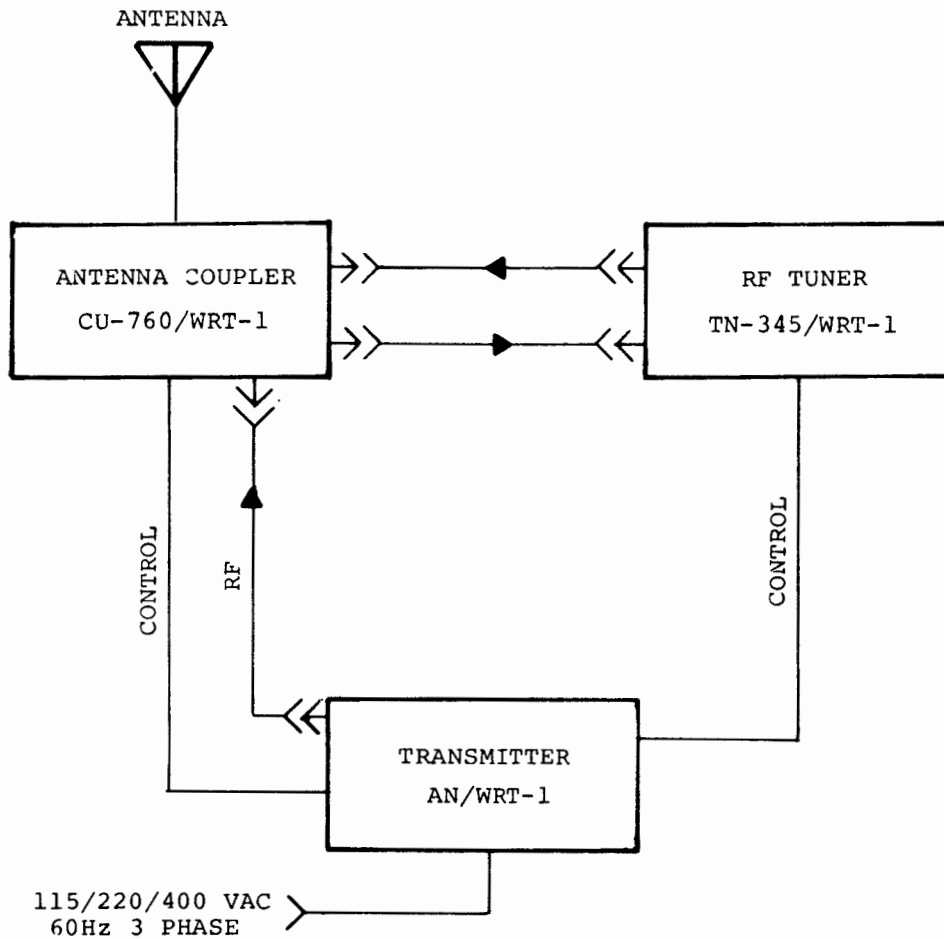


Figure 6-22 RF Tuner TN-345/WRT-1 and Antenna Coupler CU-760/WRT-1
Interconnection Diagram

TABLE 6-8 RF TUNER TN-345/WRT-1 AND ANTENNA COUPLER CU-760/WRT-1
EQUIPMENT SUPPLIED

Qty Per Equip.	Nomenclature		Overall Dimensions (In.)			Vol. (Cu Ft)	Weight (Lb)
	Name	Designation	Height	Width	Depth		
1	Radio Frequency Tuner	TN-345/ WRT-1	13.375	48.87	16.937	6.75	120
1	Antenna Coupler	CU-760/ WRT-1	13.375	22.50	16.937	3.25	80
2	Tech Manual	NAVSHIPS 93483					

6.10 RADIO FREQUENCY TUNER TN-342/WRT-2.

- a. TYPE/USE. Radio Frequency Tuner TN-342/WRT-2 is a component of the AN/WRT-2 Radio Transmitter set. The tuner is a remotely tuned impedance matching device used to match the impedance presented by the system antenna to the characteristic output impedance of the AN/WRT-2 with a vswr of not more than 4:1. The controls for operation of the tuner are located on the AM-2121/WRT-2 in the main cabinet of the AN/WRT-2.
- b. PHYSICAL CONFIGURATION. - See Figure 6-23.
- c. INTERCONNECTION DIAGRAM. - See Figure 6-24.
- d. FREQUENCY RANGE. - 2 to 30 MHz.
- e. TYPE OF TUNING. - Manual.
- f. POWER RATING. - 1-kw rf pep, 500 watts rf average.
- g. ANTENNA IMPEDANCE REQUIRED. - The tuner will match the impedance presented by a 35 foot whip or a single wire antenna and ground system having a length between 60 and 130 feet and being at least 40 feet high.
- h. ANTENNA CONNECTOR. - Feedthrough insulator.
- i. CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.
- j. INPUT CONNECTOR. - Type LC (UG-287A/U modified).
- k. PROTECTIVE CIRCUITS. - The high voltage interlock circuit of the transmitter will open whenever there is excessive heating or blower failure in the tuner or excessive vswr on the rf output line at the transmitter. The vacuum capacitor in the tuner is protected by a spark gap.
- l. PRIMARY POWER REQUIRED. - 115 vac 60 Hz and 24 vdc both supplied by control cable from the transmitter.
- m. HEAT DISSIPATION (MAXIMUM). - Heating from 60 Hz and dc sources is negligible. RF heating is dependent on vswr.
- n. TEMPERATURE RANGE. - -28° to $+65^{\circ}\text{C}$ (-20° to $+150^{\circ}\text{F}$).
- o. COOLING. - Internal blower circulates dry nitrogen within tuner, natural radiation from shell and conduction from mounts.
- p. INSTALLATION REQUIREMENTS. - The rf cable between the output of the tuner and the antenna should not exceed 5 feet in length. Both ends of the tuner must be accessible for cable connections and for checking and replacing the charge of nitrogen. A clearance of 8 inches is required at the antenna connector end and 12 inches at the other end. A 24 conductor control cable is required between the tuner and the transmitter. The length of the control cable and the rf cable should not exceed 450 feet.

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Paragraph 6.10q

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q. SPECIAL CONSIDERATIONS. - The tuner requires pressurization with dry nitrogen at 25 psig.

r. MEAN TIME BETWEEN FAILURES (MTBF). - 4000 hours.

s. EQUIPMENT SUPPLIED. - See Table 6-9.

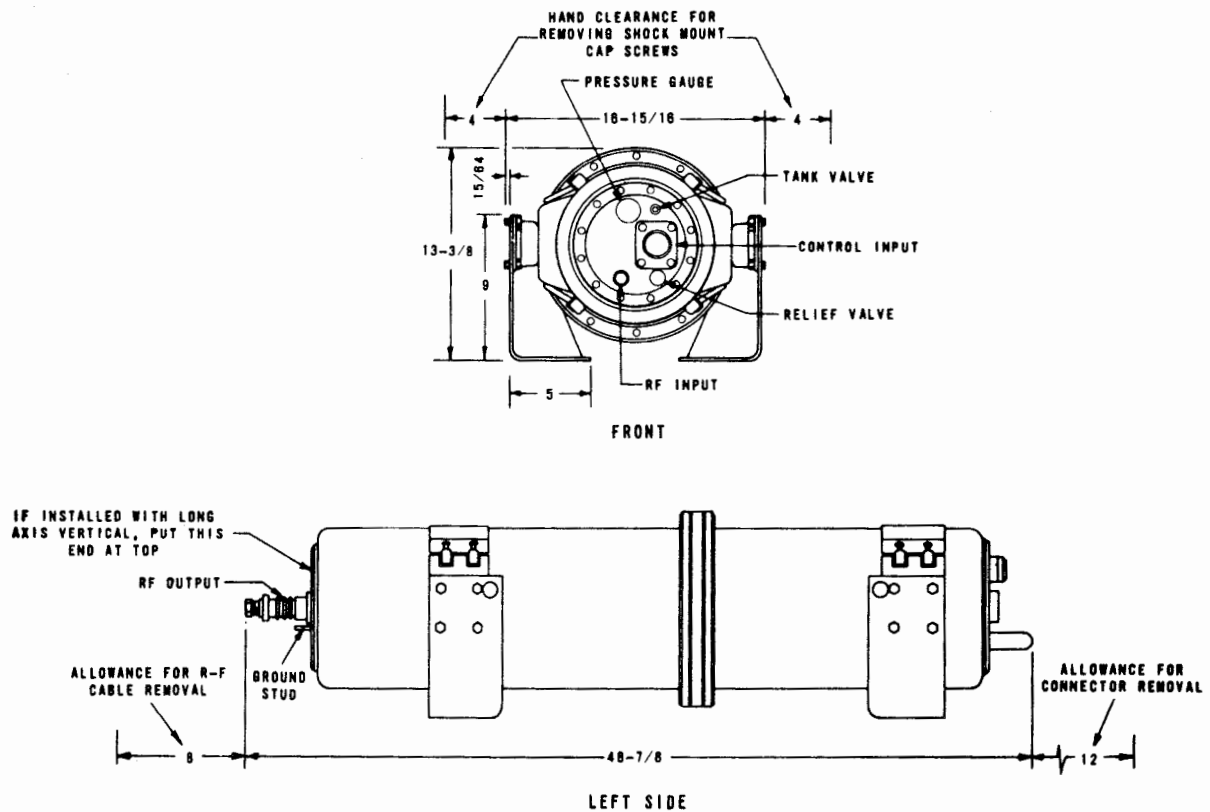


Figure 6-23 Radio Frequency Tuner TN-342/WRT-2
 Physical Configuration

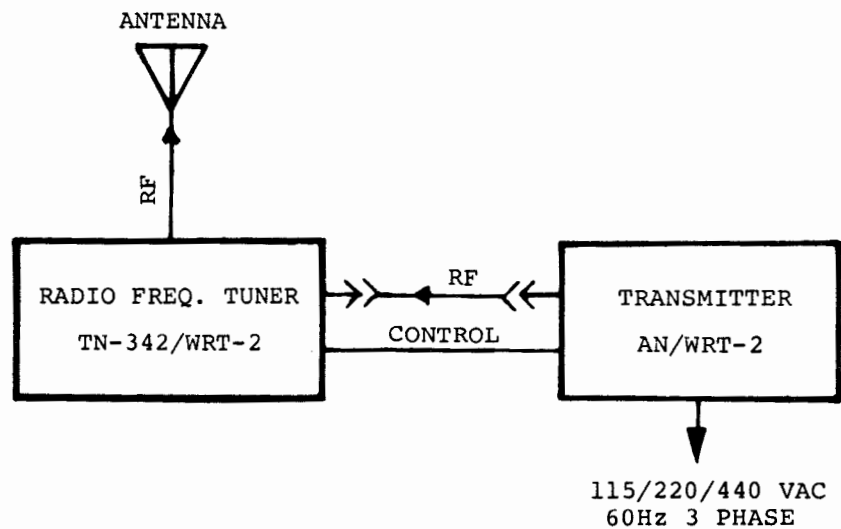


Figure 6-24 Radio Frequency Tuner TN-342/WRT-2
 Interconnection Diagram

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TABLE 6-9

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TABLE 6-9 RADIO FREQUENCY TUNER TN-342/WRT-2
EQUIPMENT SUPPLIED

Qty Per Equip.	Nomenclature		Overall Dimensions (In.)			Vol. (Cu Ft)	Weight (Lb)
	Name	Designation	Height	Width	Depth		
1	Radio Frequency Tuner	TN-342/ WRT-2	13.375	16.937	48.87	8	135
2	Tech Manual	NAVSHIPS 93319					

6.11 ANTENNA COUPLER GROUP AN/SRA-22.

- a. TYPE/USE. - Antenna coupler group AN/SRA-22 is designed primarily for operation with the AN/URC-32 series equipments. It may be used with other transmitter/receivers operating in the 2 to 30 MHz range with power output limited to 1-kw PEP, 500 watts average. Its function is to provide an impedance match between a 50 ohm coaxial transmission line and a 35 foot whip or a wire antenna 35 to 50 feet in length with a vswr of 1.3:1.
- b. PHYSICAL CONFIGURATION. - See Figure 6-25 and 6-26.
- c. INTERCONNECTION DIAGRAM. - See Figure 6-27.
- d. FREQUENCY RANGE. - 2 to 30 MHz.
- e. TYPE OF TUNING. - Remote, manual.
- f. POWER RATING. - 1-kw rf PEP, 500 watts rf average.
- g. ANTENNA IMPEDANCE REQUIRED. - The Antenna Coupler CU-714/SRA-22 is capable of matching the impedance presented by a 35 foot whip or a wire antenna 35 to 50 feet length to a 50 ohm coaxial line with a maximum vswr of 1.3:1.
- h. ANTENNA CONNECTOR. - Porcelain feedthrough bowl insulator.
- i. CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.
- j. CHANNEL CONNECTOR. - Type N (UG-680/U).
- k. PROTECTIVE CIRCUITS. - The vacuum tuning capacitor is protected by a spark gap. The keying circuit of the associated transmitter is interrupted if transmission line vswr exceeds 30 watts of reflected power.
- l. PRIMARY POWER REQUIRED. - 115/230 vac 50-60 Hz Single phase 130 watts maximum.
- m. HEAT DISSIPATION. - Negligible.
- n. TEMPERATURE RANGE. -
- | | | |
|--------------------|--|--|
| (1) CU-714/SRA-22. | -28 ^o to +65 ^o C | (-18 ^o to +149 ^o F). |
| (2) C-2698/SRA-22. | 0 ^o to +50 ^o C | (+32 ^o to +120 ^o F). |
- o. COOLING. - Natural radiation. The antenna coupler is a sealed unit equipped with a circulating fan.
- p. INSTALLATION REQUIREMENTS. - The coupler group should be mounted as close as possible to the feed point of the associated antenna. A minimum of 19 inches clearance is required in front of the coupler for maintenance and chassis removal. When used with AN/URC-32 series equipments space is generally available on the AN/URC-32 equipment rack for mounting the C-2698/SRA-22 Coupler Control. When used with other transmitting equipments the coupler control should be located adjacent to the transmitter. A 24 conductor control cable is required between the control unit and the coupler.

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q. SPECIAL CONSIDERATIONS. - Ten psig dry nitrogen is required for pressurization of the CU-714/SRA-22 Antenna Coupler. The coupler must be pressurized each time it is opened.

r. MEAN TIME BETWEEN FAILURES (MTBF). - 3000 hours.

s. EQUIPMENT SUPPLIED. - See Table 6-10.

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 Figure 6-25

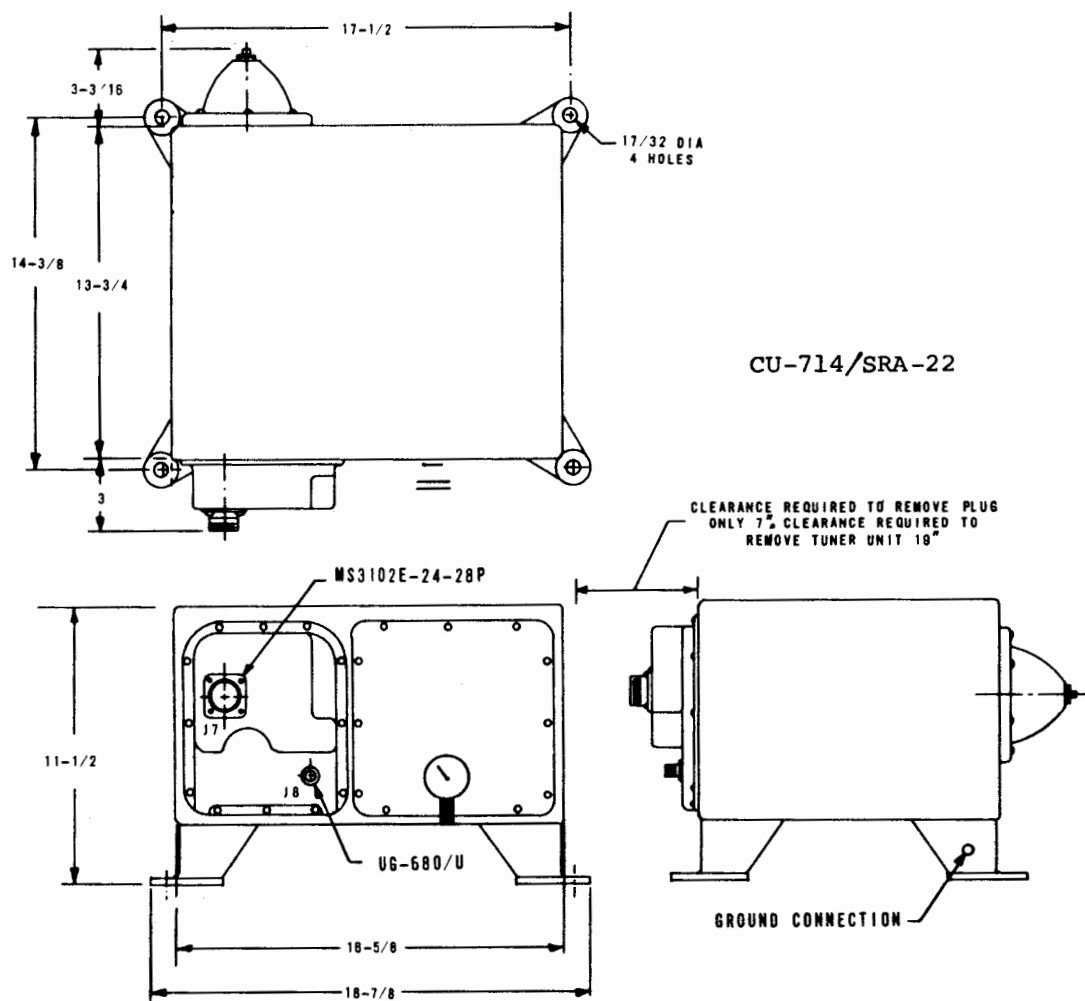


Figure 6-25 Antenna Coupler Group AN/SRA-22
 Physical Configuration.

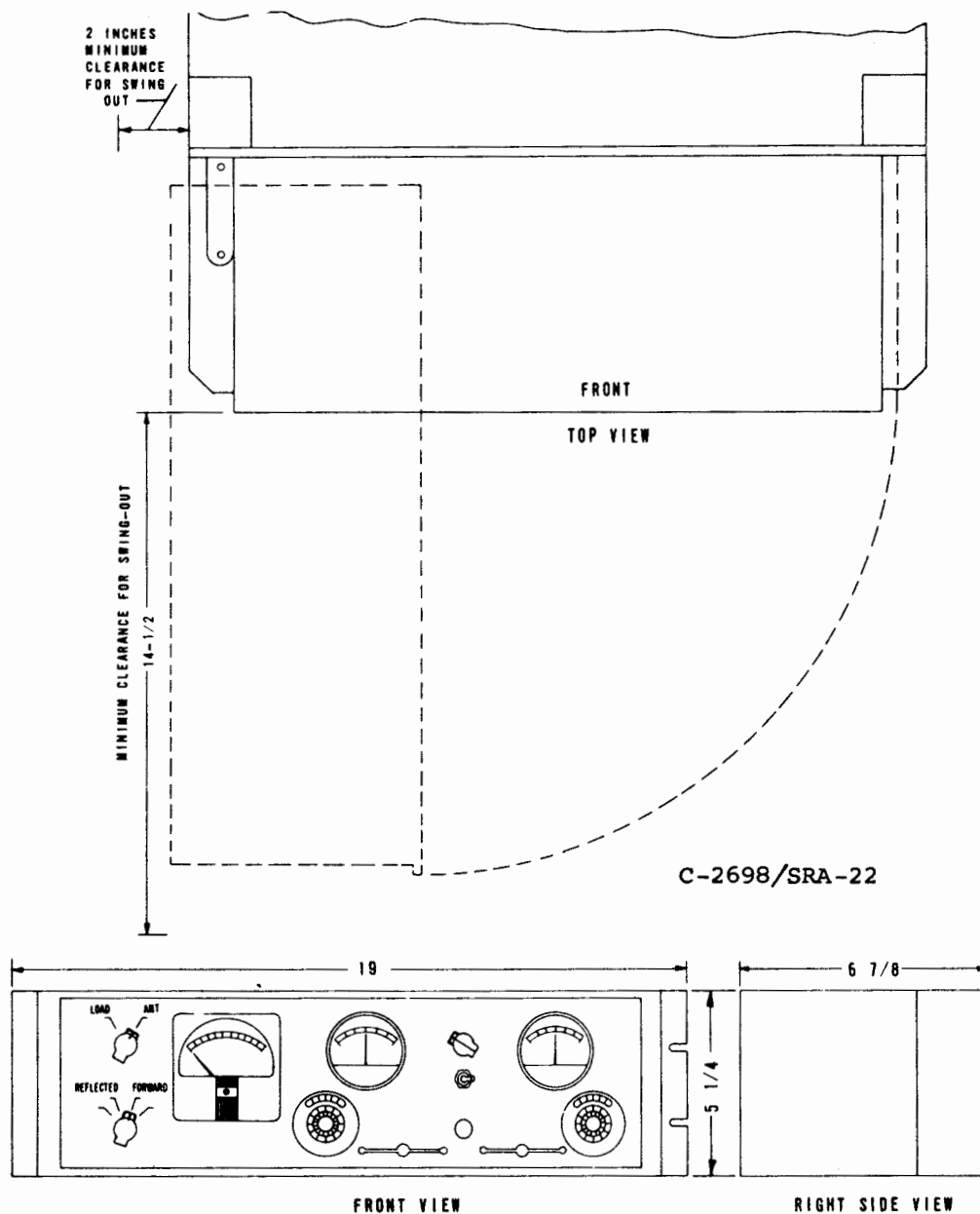


Figure 6-26 Antenna Coupler Group AN/SRA-22
Physical Configuration

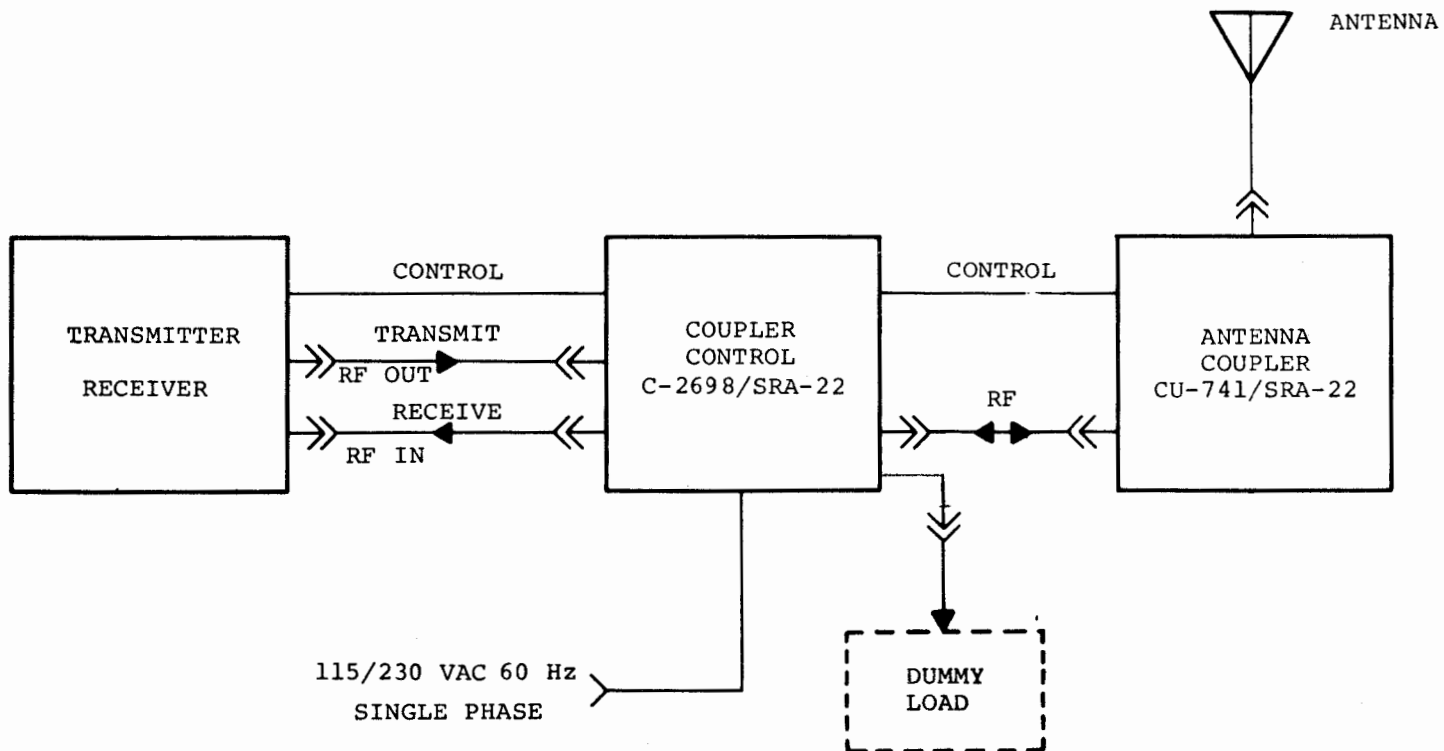


Figure 6-27 Antenna Coupler Group AN/SRA-22
 Interconnection Diagram

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TABLE 6-10 ANTENNA COUPLER GROUP AN/SRA-22
EQUIPMENT SUPPLIED

Qty Per Equip.	Nomenclature		Overall Dimensions (In.)			Vol. (Cu Ft)	Weight (Lb).
	Name	Designation	Height	Width	Depth		
1	Antenna Coupler	CU-714/ SRA-22	11.50	18.87	19.937	2.4	42
1	Coupler Control	C-2698/ SRA-22	5.25	19	6.87	0.39	17
2	Tech Manual	NAVSHIPS 0967-136-6010					
1	Operators Chart	NAVSHIPS 93286.21(B)					

6.12 ANTENNA COUPLER CU-937/UR.

- a. TYPE/USE. - Antenna Coupler CU-937/UR is designed for use with the AN/WRC-1 Radio Set. It is supplied as a component of the AN/WRC-1 when that equipment is installed on surface ships or shore installations. The coupler is not used with submarine, multicoupler or 50 ohm antenna systems. The function of the CU-937/UR is to match the 50 ohm rf output of the AM-3007/URT amplifier to shipboard whip antennas with minimum vswr levels. The coupler is remotely tuned from the AM-3007/URT.
- b. PHYSICAL CONFIGURATION. - See Figure 6-28.
- c. INTERCONNECTION DIAGRAM. - See Figure 6-29.
- d. FREQUENCY RANGE. - 2 to 30 MHz.
- e. TYPE OF TUNING. - Manual.
- f. POWER RATING. - 100 watt pep, 50 watts average.
- g. ANTENNA IMPEDANCE REQUIRED. - The coupler will match the impedances presented by 15, 25 or 35 foot whip antennas to the 50 ohm rf output of the AM-3007/URT amplifier with better than 1.5:1 vswr.
- h. ANTENNA CONNECTOR. - Feedthrough insulator.
- i. CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.
- j. INPUT CONNECTOR. - Type N (UG-22B/U).
- k. PROTECTIVE CIRCUITS. - Transmitter emission is prevented during the coupler tuning cycle by interruption of the interlock system. The rf power applied to the tuner is determined by monitoring circuits in the AN/WRC-1. These circuits prevent the development of excessive rf voltages in the coupler due to high vswr in the system.
 - l. PRIMARY POWER REQUIRED. - 28 vdc supplied by AN/WRC-1.
 - m. HEAT DISSIPATION (MAXIMUM). - Negligible.
 - n. TEMPERATURE RANGE. - -28° to $+65^{\circ}\text{C}$ (-20° to $+150^{\circ}\text{F}$).
 - o. COOLING. - Natural radiation.
- p. INSTALLATION REQUIREMENTS. - The CU-937/UR should be placed as close as possible to the base of the associated antenna to permit the connection between the coupler and the antenna to be kept to less than 12 inches. The distance between the coupler and the transmitter should not exceed 300 feet.

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- q. SPECIAL CONSIDERATIONS. - None.
- r. MEAN TIME BETWEEN FAILURES (MTBF). - 8000 hours.
- s. EQUIPMENT SUPPLIED. - See Table 6-11.

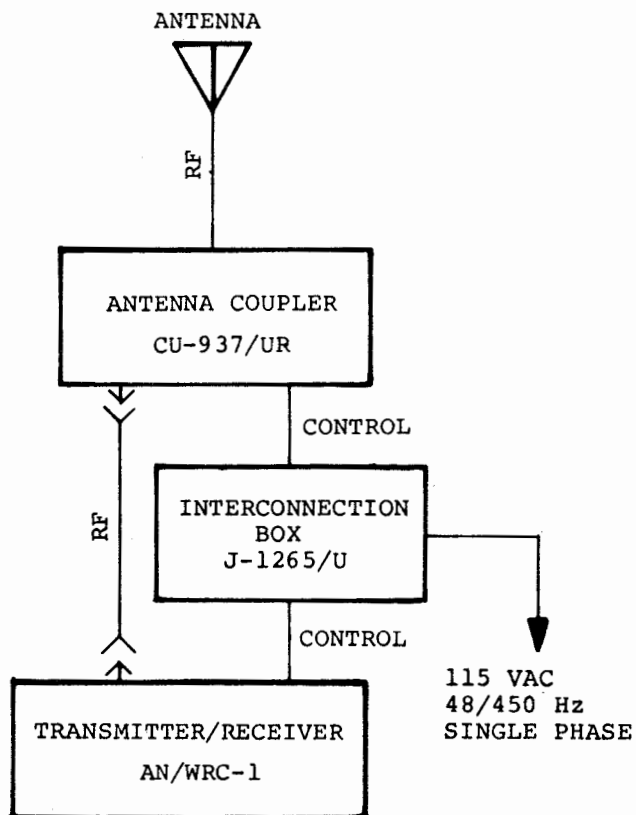


Figure 6-29 Antenna Coupler CU-937/UR Interconnection Diagram

TABLE 6-11 ANTENNA COUPLER CU-937/UR EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERALL DIMENSIONS (IN.)			VOL (CU FT)	WEIGHT (LB)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
1	Antenna Coupler	CU-937/UR	9.58	diameter	20.8	0.82	26
2	Technical Manual	NAVSHIPS 0967-971-0010					

6.13 ANTENNA COUPLER GROUP AN/SRA-47.

a. TYPE/USE. - The AN/SRA-47 is an antenna tuning system designed to match the system antenna to the 50 ohm transmission line from the associated transmitter. The coupler is an impedance transfer network consisting of a tapped transformer and motor driven tuning elements of inductance and capacity. The coupler group consists of an antenna coupler unit, CU-1493/SRA-47 and an antenna coupler control unit C-6763/SRA-47. The coupler control is used to automatically tune the coupler to 10 preset channels or to permit manual adjustment to any individual frequency within its range. The coupler group may be used with the AN/URT-23(V) or any transmitter capable of operating within the frequency range and a power rating of 1-kw average, 1.5-kw pep. The group was specifically designed for use aboard 378' Coast Guard cutters.

b. PHYSICAL CONFIGURATION. - See Figure 6-30.

c. INTERCONNECTION DIAGRAM. - See Figure 6-31.

d. FREQUENCY RANGE. - 2 to 30 MHz.

e. TYPE OF TUNING. - Automatic on 10 preset channels; manual throughout frequency range.

f. POWER RATING. - 1.5-kw pep, 1-kw average.

g. ANTENNA IMPEDANCE. - The coupler unit will match the impedance presented by a 35 foot whip antenna, a single ended multi-element grounded dipole which uses the ships masts as part of the radiating element across the 2 to 30 MHz range, or a single ended multi-element fan grounded to the mast over 8 to 30 MHz range.

h. OUTPUT CONNECTOR. - Feedthrough insulator.

i. INDIVIDUAL CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

j. CHANNEL CONNECTOR. - Type N (UG-556B/U).

k. PROTECTIVE CIRCUITS. - High vswr is indicated on the control unit by an audible alarm and indicator light. The tuning elements in the coupler are protected from high voltages by a spark gap.

l. PRIMARY POWER REQUIRED. - 115 vac 60 Hz, single phase 230 watts.

m. HEAT DISSIPATION (MAXIMUM). -

- | | |
|---|------------|
| (1) Control Unit. | 80 watts. |
| (2) Antenna Coupler. | 140 watts. |
| during tuning. RF dissipation is dependent on vswr. | |

n. TEMPERATURE RANGE. -

- | | | |
|----------------------|---------------|-------------------|
| (1) Control unit. | 0° to +50°C | (+32° to 120°F). |
| (2) Antenna Coupler. | -28° to +65°C | (-20° to +150°F). |

o. COOLING. -

- (1) Control unit. Natural convection.
- (2) Antenna coupler. A thermostatically controlled blower motor circulates air within the unit. The cast case acts as a heat sink cooling the unit by conduction and radiation.

p. INSTALLATION REQUIREMENTS. - The antenna coupler should be installed so that the length of wire to the antenna feed point does not exceed 1 foot. The coupler control unit is designed for mounting in a standard rack. The rack is not furnished with the equipment. The control unit should be located in close proximity to the associated transmitter. The maximum length of the multi-conductor control cable and the rf transmission line between the control unit and transmitter and the coupler is 300 feet.

q. SPECIAL CONSIDERATIONS. - The coupler unit is not pressurized. A desiccant unit is installed in the coupler case. This unit requires periodic monitoring and replacement.

r. MEAN TIME BETWEEN FAILURES (MTBF). - 4000 hours.

s. EQUIPMENT SUPPLIED. - See Table 6-12.

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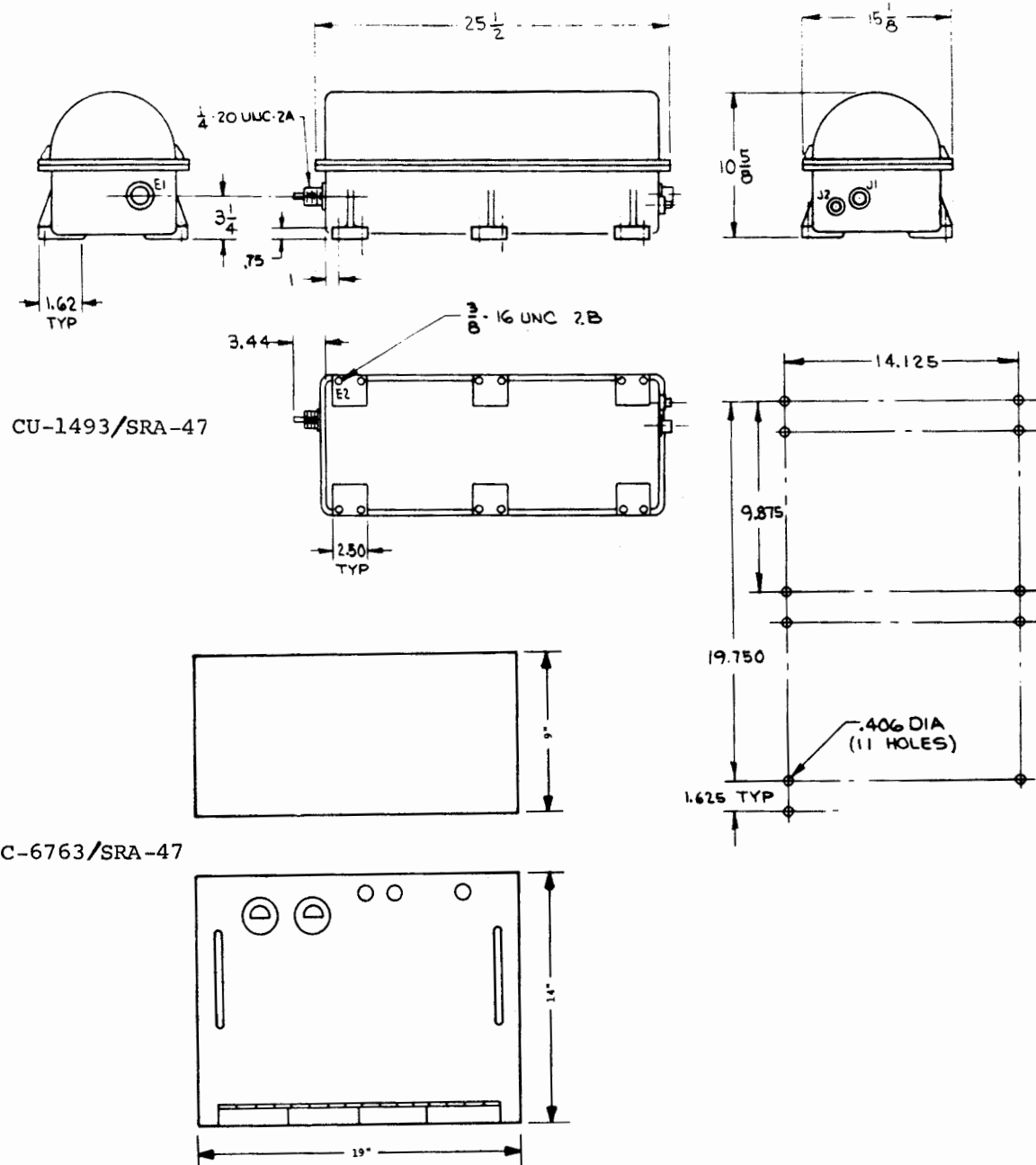


Figure 6-30 Antenna Coupler Group AN/SRA-47
 Physical Configuration

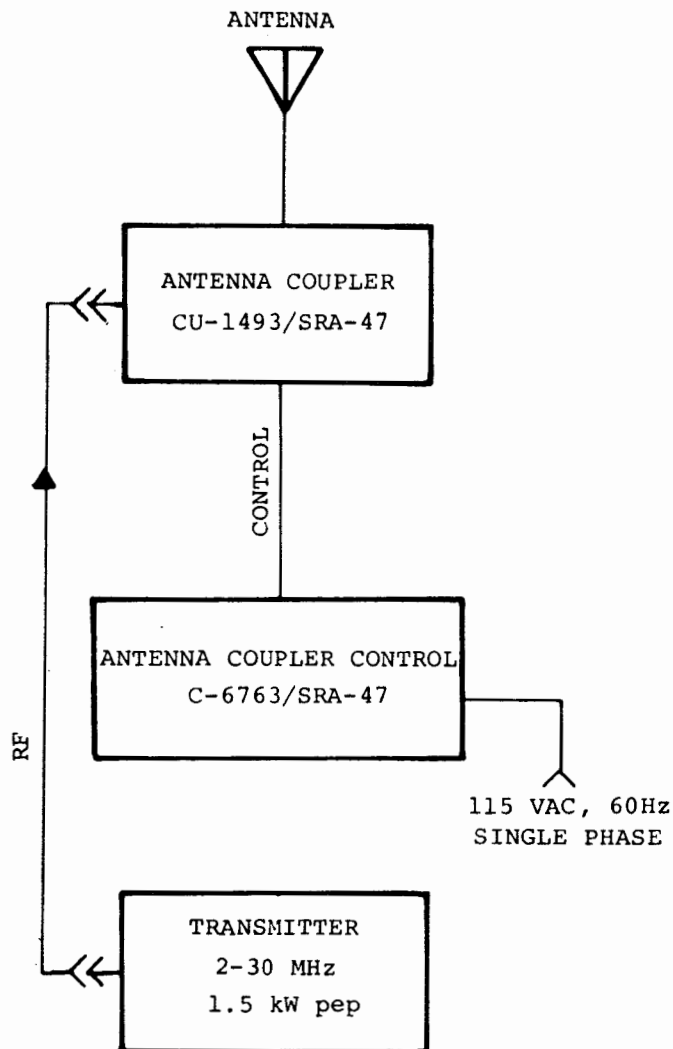


Figure 6-31 Antenna Coupler Group AN/SRA-47 Interconnection Diagram

TABLE 6-12 ANTENNA COUPLER GROUP AN/SRA-47 EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERALL DIMENSIONS (IN.)			VOL (CU FT)	WEIGHT (LB)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
1	Antenna Coupler	CU-1493/SRA-47	25.5	15.12	10.6	1.2	78
1	Antenna Coupler Control	C-6763/SRA-47	14.0	19.0	9.0	0.5	23
2	Technical Manual						

6.14 ANTENNA COUPLER GROUP OA-8364/URC-58(V).

a. TYPE/USE. - Antenna Coupler Group OA-8364/URC-58(V) is designed to match the impedance presented by the system antenna to a 50 ohm transmission line. The group consists of Antenna Coupler CU-1726/URC-58(V) and Antenna Coupler Control C-7439/URC-58(V). The group is a unit of the AN/URC-58(V) transceiver but can be used with any transmitter or transceiver operating within the frequency range and power limitations of the coupler. The group may be used on ship or shore stations.

b. PHYSICAL CONFIGURATION. - See Figure 6-32.

c. INTERCONNECTION DIAGRAM. - See Figure 6-33.

d. FREQUENCY RANGE. - 2 to 26 MHz.

e. TYPE OF TUNING. - Remote, Manual.

f. POWER RATING. - 150 watts rf.

g. ANTENNA IMPEDANCE REQUIRED. - The coupler is capable of matching the impedance presented by a 15, 25, or 35 foot whip or a 75 foot long-wire antenna to a 50 ohm coaxial line with vswr of less than 4:1.

h. ANTENNA CONNECTOR. - Feedthrough insulator.

i. CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

j. CHANNEL CONNECTOR. - Type N (UG-556B/U).

k. PROTECTIVE CIRCUITS. - The input power line voltages are protected by fuses.

l. PRIMARY POWER REQUIRED. - 115/220 vac 50-60 Hz single phase or 22-30 vdc, 20 watts.

m. HEAT DISSIPATION. - Negligible.

n. TEMPERATURE RANGE. -

- (1) Antenna Coupler. -28°C to $+65^{\circ}\text{C}$ (-18°F to $+150^{\circ}\text{F}$).
- (2) Coupler Control. 0°C to $+50^{\circ}\text{C}$ ($+32^{\circ}\text{F}$ to $+120^{\circ}\text{F}$).

o. COOLING. - Natural radiation.

p. INSTALLATION REQUIREMENTS. - The coupler unit should be mounted as close as possible to the feed point of the associated antenna. The lead-in wire between the coupler antenna terminal and the antenna should be less than 1 foot. The coupler may be mounted in any plane but for maintenance purposes it should be mounted so that the cover is readily accessible. The control unit should be mounted in close proximity to the associated transmitter and the coupler should not exceed 500 feet. A 14 conductor cable is required between the control unit and the coupler for control functions.

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q. SPECIAL CONSIDERATIONS. - The coupler unit is equipped with an integral dummy load for use in tuning the system. Selection of antenna or dummy load is made from the control unit. An indicator light is actuated on the control unit when the dummy load is in use.

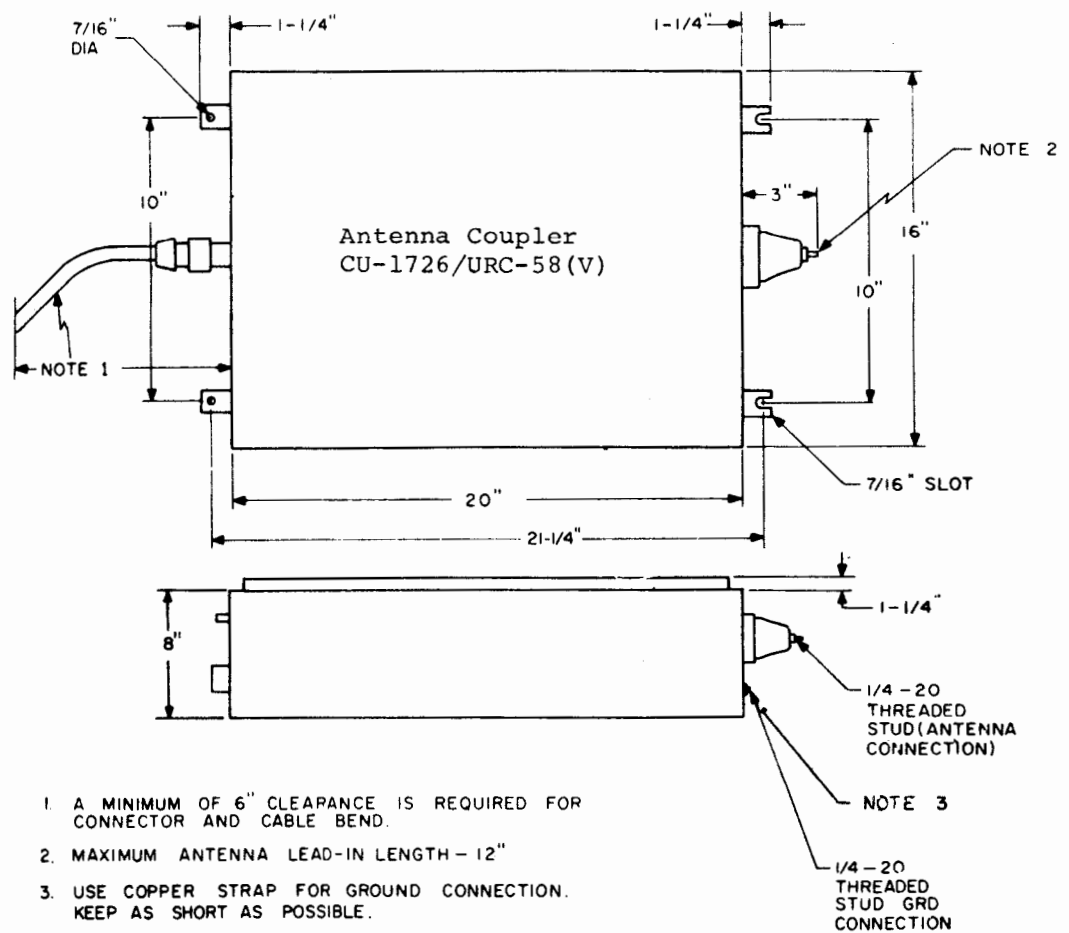
r. MEAN TIME BETWEEN FAILURES (MTBF). - 4000 hours.

s. EQUIPMENT SUPPLIED. - See Table 6-13.

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1. A MINIMUM OF 6" CLEARANCE IS REQUIRED FOR CONNECTOR AND CABLE BEND.
2. MAXIMUM ANTENNA LEAD-IN LENGTH - 12"
3. USE COPPER STRAP FOR GROUND CONNECTION. KEEP AS SHORT AS POSSIBLE.

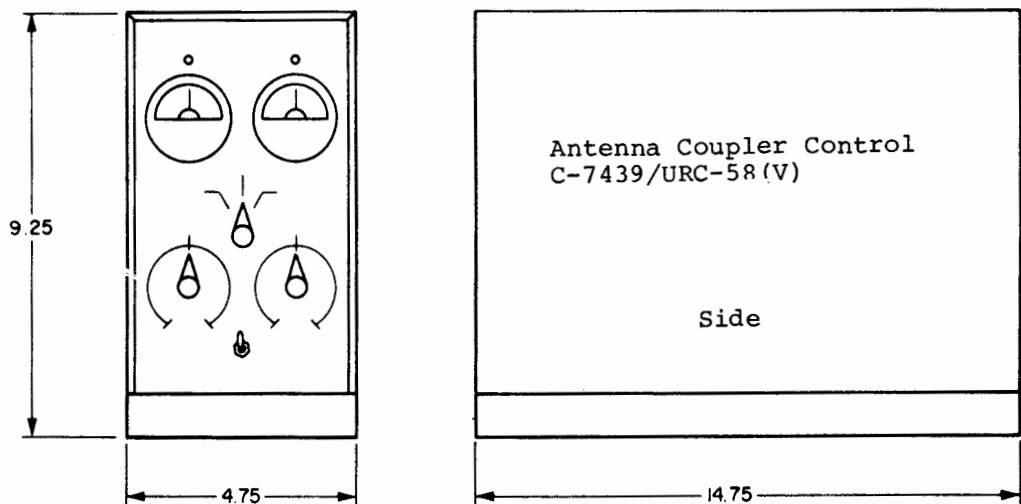


Figure 6-32 Antenna Coupler Group OA-8364/URC-58(V)
 Physical Configuration

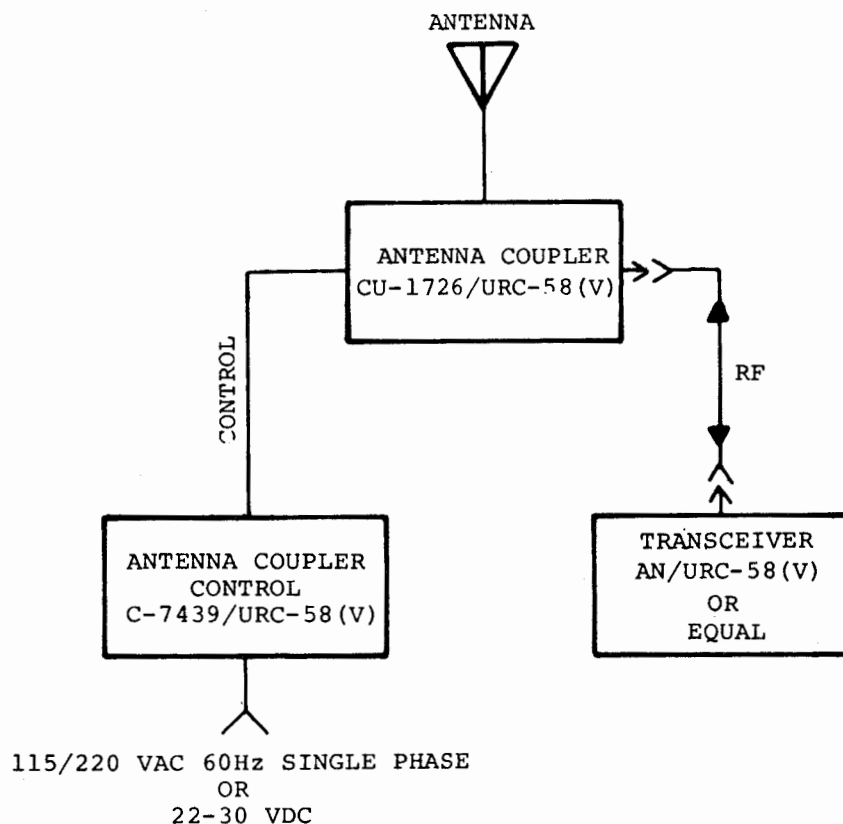


Figure 6-33 Antenna Coupler Group OA-8364/URC-58(V)
Interconnection Diagram

TABLE 6-13 ANTENNA COUPLER GROUP OA-8364/URC-58(V)
EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		OVERALL DIMENSIONS (IN.)			VOL (CU FT)	WEIGHT (LB)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
1	Antenna Coupler	CU-1726/URC- 58(V)	24.25	16.0	9.25	0.92	45
1	Antenna Coupler Control	C-7439/URC- 58(V)	9.25	4.75	14.75	0.25	9
2	Technical Manual						

6.15 ANTENNA COUPLER CU-1457/URC-58(V).

a. TYPE/USE. - Antenna Coupler Group CU-1457/URC-58(V) is designed for use with the AN/URC-58(V) transceiver when the antenna feedpoint is located within close proximity to the basic equipment. The coupler consists of a single unit with controls and monitoring facilities to match the transmitter output to the impedance presented by the antenna system. The coupler is a unit of the AN/URC-58(V) but can be used with any transmitter or transceiver operating within the frequency range and power limitations of the coupler. The group may be used on ship or shore stations.

b. PHYSICAL CONFIGURATION. - See Figure 6-34.

c. INTERCONNECTION DIAGRAM. - See Figure 6-35.

d. FREQUENCY RANGE. - 2 to 15 MHz.

e. TYPE OF TUNING. - Manual.

f. POWER RATING. - 150 watts rf.

g. ANTENNA IMPEDANCE REQUIRED. - The coupler is capable of matching the impedance presented by standard whip and short wire antennas to the 50 ohm load impedance of the transceiver with vswr of less than 4:1.

h. ANTENNA CONNECTOR. - Feedthrough insulator.

i. CHANNEL IMPEDANCE. - 50 ohms nominal, unbalanced.

j. CHANNEL CONNECTOR. - Type N (UG-58B/U).

k. PROTECTIVE CIRCUITS. - None.

l. PRIMARY POWER REQUIRED. - None.

m. HEAT DISSIPATION. - Negligible.

n. TEMPERATURE RANGE. - 0° to +50°C (+32° to +120°F).

o. COOLING. - Natural radiation.

p. INSTALLATION REQUIREMENTS. - The coupler unit should be mounted adjacent to the associated transceiver for ease in the adjustment of the system. The feedpoint of the antenna should be as close as possible to the coupler output terminal to keep the length of any radiating element within the compartment to a minimum.

q. SPECIAL CONSIDERATIONS. - The shockmount supplied with the AN/URC-58(V) has space for mounting the CU-1457/URC-58(V) adjacent to the transceiver.

r. MEANTIME BETWEEN FAILURES (MTBF). - 4000 hours.

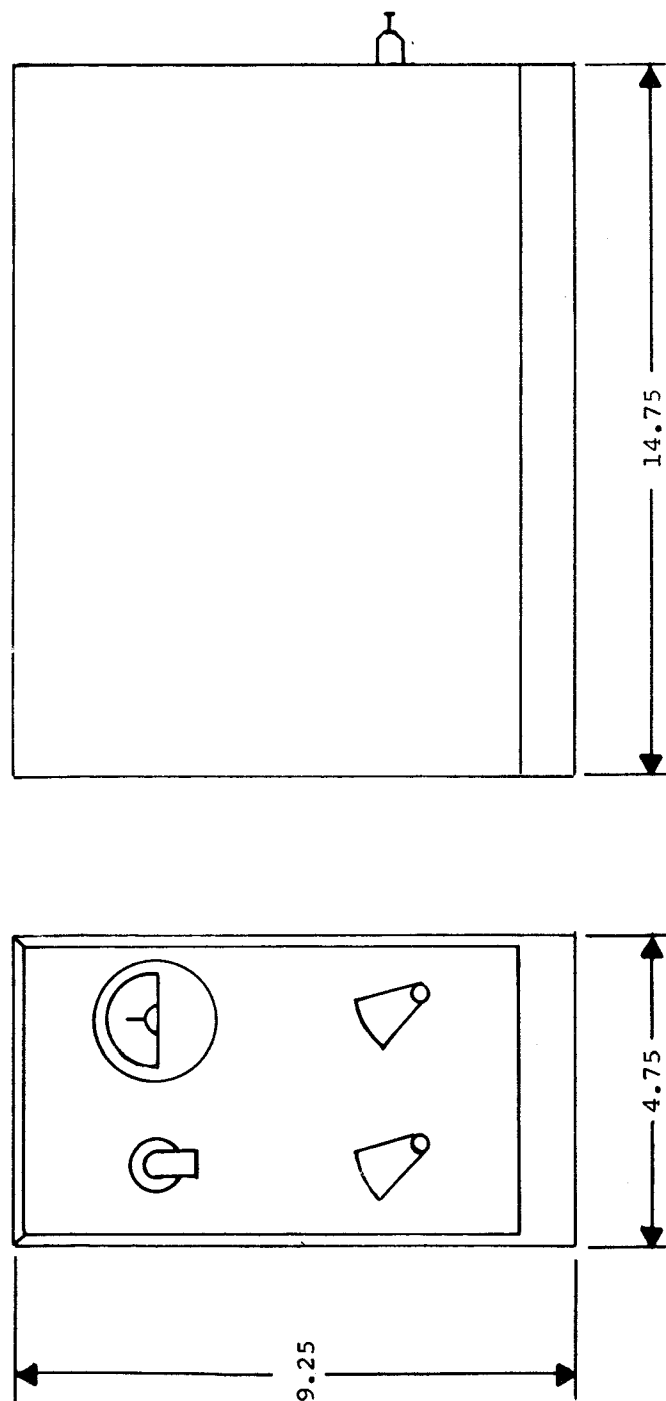


Figure 6-34 Antenna Coupler CU-1457/URC-58 (V)
Physical Configuration

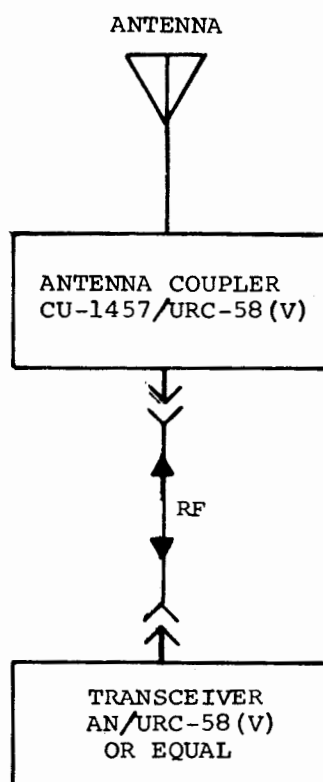


Figure 6-35 Antenna Coupler CU-1457/URC-58 (V)
Interconnection Diagram



6.16 ANTENNA COUPLER AND ANTENNA AS-1729/VRC.

a. TYPE/USE. - The AS-1729/VRC Antenna is a center-fed, remote step-tuned antenna for use with AN/VRC-46 transceivers on board small boats such as PBR types and on various military ground vehicles for communication in the 30 - 76 MHz range. It is also used on large ships equipped with AN/VRC-46 for amphibious operations. The AS-1729/VRC consists of a whip antenna element and a MX-6707 Base Mount. The coupling unit is enclosed in the mounting base and the whip element is mounted directly to the base.

The mounting base contains ten LC tuned circuits to match the transmission line to the antenna over the operating range of the AN/VRC-46. Selection of the individual tuned circuits is automatic from the channel selector switch on the transceiver. The coupler circuits require alignment during initial transceiver channel tune-up.

b. PHYSICAL CONFIGURATION. - See Figure 6-36.

c. FREQUENCY RANGE. - 30 to 76 MHz.

d. NUMBER OF CHANNELS. - One.

e. TYPE OF TUNING. - Automatic - activated by transceiver.

f. POWER RATING. - 70 watts.

g. PHYSICAL CHARACTERISTICS. -

(1) Length of whip.	10 feet.
(2) Length of base.	7.75 inches.
(3) Weight.	8.8 lbs.
(4) Diameter of coupler below mounting base.	3.25 inches.
(5) Mounting base diameter.	5.5 inches.
(6) Mounting bolts.	3/8 - 24 4 ea.
(7) Mounting bolt circle diameter.	4.5 inches.

h. INPUT IMPEDANCE. - 50 ohms unbalanced.

i. INPUT CONNECTOR. - Type C (UG-631/U modified).

j. ANTENNA IMPEDANCE. - 125 ohms. The coupling unit is designed to match this impedance to a 50 ohm line over the frequency range 30 to 76 MHz with a vswr not greater than 3:1.

k. INSTALLATION REQUIREMENTS. - The base may be mounted through the small boat's skin or on an "L" shaped bracket attached to the ship's superstructure or mast. The location for the antenna should be as clear from surrounding objects as possible.

l. SPECIAL CONSIDERATIONS. - This antenna was originally procured by the U. S. Army for use on land or amphibious vehicles. A spring base whip was provided to furnish the flexibility required for vehicular operations where contact between the antenna and overhead obstructions could be expected. When

AN/VRC-46 equipment was installed on large ships, the spring base whip was retained because the antenna, antenna base, and remotely tuned antenna tuner comprised an integral unit. Also there is no electrically equivalent antenna in the Navy equipment inventory that is specifically designed for use in the shipboard environment. In the marine environment the AS-1729/VRC antenna base spring shows evidence of dissimilar metal corrosion and stress corrosion that has resulted in structural failure. The spring is also subjected to fatiguing forces as a result of superstructure vibration. The total failure of the spring results in the loss of a communication channel and possible danger to equipment and personnel.

The spring mount, Figure 6-37, has press-fit attachments to the mating fittings and the unit cannot be conveniently disassembled for inspection and maintenance. Preventative maintenance effort would have to consist of periodic replacement of the base unit. The best solution to this problem is to replace the spring with a rigid section for shipboard installations. A suitable rigid section has been designed, fabricated and tested by the Naval Electronics Laboratory Center.

The physical characteristics of this rigid section are shown in Figure 6-38. The new section has the same overall dimensions and identical mechanical and electrical interface characteristics as the spring mount. It is fabricated from type 304 corrosion resistant steel. The coaxial fittings used in the original equipment spring are non-standard and are a possible procurement problem. The replacement section is designed to permit the transfer of the coaxial fittings and associated interconnecting cable, as an integral assembly, from a spring to a rigid section.

NELC has thoroughly tested, both electrically and mechanically, the rigid section. There was no significant difference in the impedance measurements of the spring and rigid types. The dimensions of the rigid section were satisfactory and no difficulty was experienced in mating the section to the tuning unit and to the whip, or with the assembly of the coaxial cable and connectors.

Structural integrity was proven by vibration and shock test in accordance with MIL-STD-167. No failures or damage occurred during the tests.

All AS-1729/VRC antennas used aboard ships should have the rigid section installed in lieu of the spring for safety and dependability.

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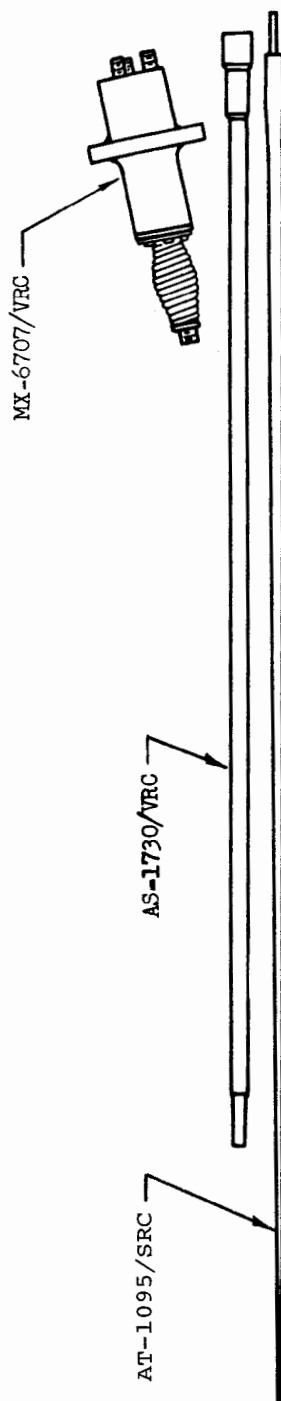


Figure 6-36 Antenna AS-1729/VRC Physical Configuration

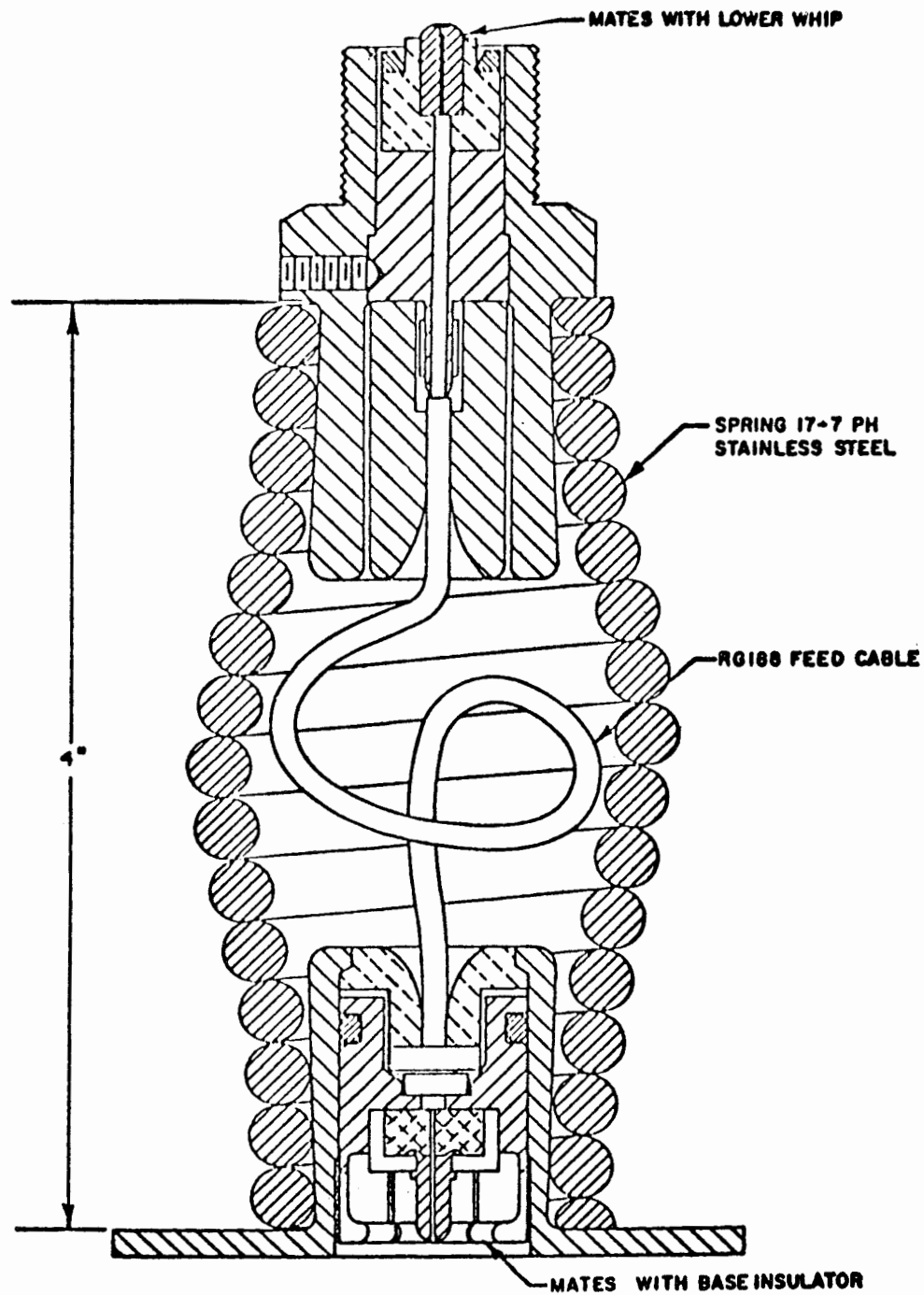


Figure 6-37 Antenna AS-1729/VRC, Spring Mount

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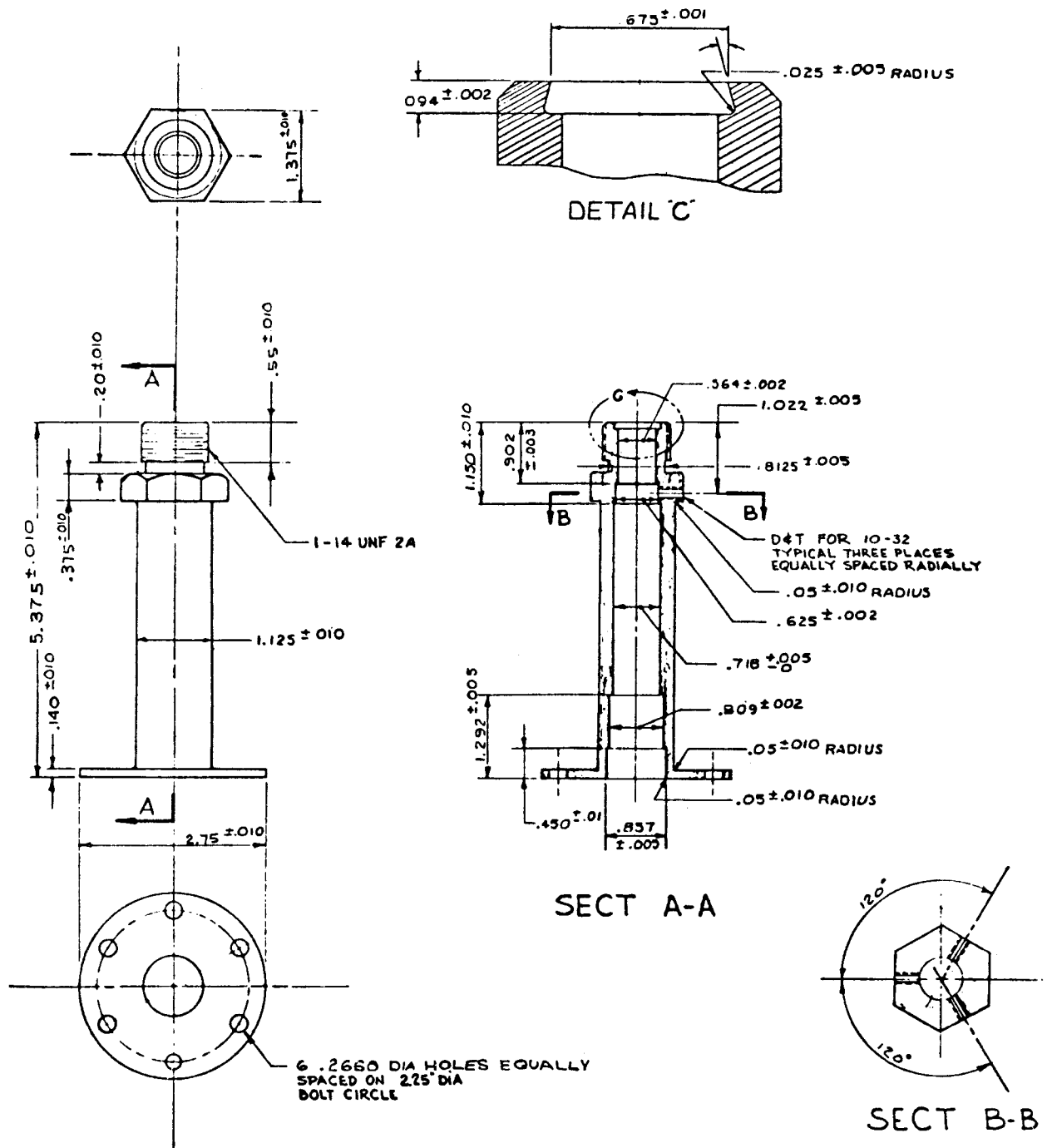


Figure 6-38 Antenna AS-1729/VRC, Rigid Replacement Section, Mechanical Details

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