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TECHNICAL MANUAL

for

ANTENNA COUPLER GROUP AN/SRA-22

DEPARTMENT OF THE NAVY

NAVAL SHIP SYSTEMS COMMAND

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CHAPTER 1

GENERAL INFORMATION

1-1. INTRODUCTION.

This technical manual contains operating instructions and principles, scheduled tests, servicing information, troubleshooting, and yard and tender repair information for Antenna Coupler Group AN/SRA-22.

The AN/SRA-22 (figure 1-1) is designed primarily for operation with the AN/URC-32 series radio equipment, but may be used with any radio equipment in the 2.0 to 30.0 megacycle frequency range, provided the transmitter power output is not more than 1000 watts on a short-term duty cycle or 350 watts continuously. Figure 1-2 illustrates a typical relationship of the AN/SRA-22 with other radio equipment. Antenna Coupler Group AN/SRA-22 requires 115 volts ac, 50-60 cycles for operation, which may be derived from its associated equipment or supplied separately. Its function is to provide an impedance match between a 50-ohm coaxial transmission line and a wire or whip antenna 35 to 50 feet in length. Difficulty may be experienced on some frequencies obtaining an adequate match to antennas of greater or lesser length. In addition to its basic function of providing an impedance match, the equipment also provides the following features:

a. Automatic transfer of antenna from receiver to transmitter on keying associated transmitter.
b. Manual switching of transmitter output between antenna and dummy load.
c. Determination of VSWR on coaxial transmission line.
d. Measurement of power output of associated transmitter.
e. Interruption of keying circuit of associated transmitter if transmission line VSWR becomes excessive (30 watts reflected).
f. Reduction of power output of associated transmitter during TUNE operation.

1-2. FUNCTIONAL DESCRIPTION.

Antenna Coupler Group AN/SRA-22 consists of Coupler Control C-2698/SRA-22 and Antenna Coupler CU-714/SRA-22, and interconnection terminal board TB-5. Refer to figures 1-1 and 1-3.

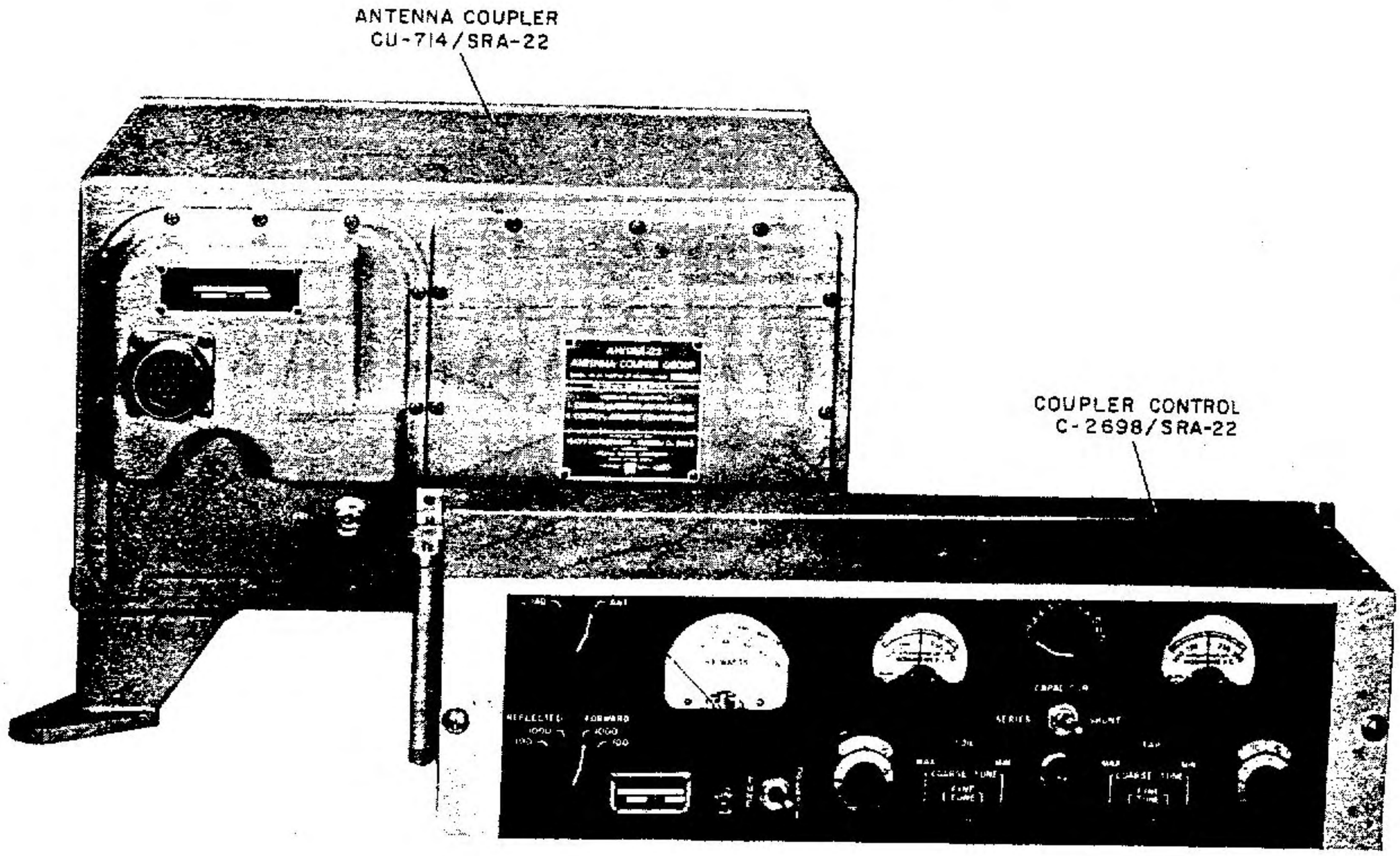


Figure 1-1. Antenna Coupler Group AN/SRA-22

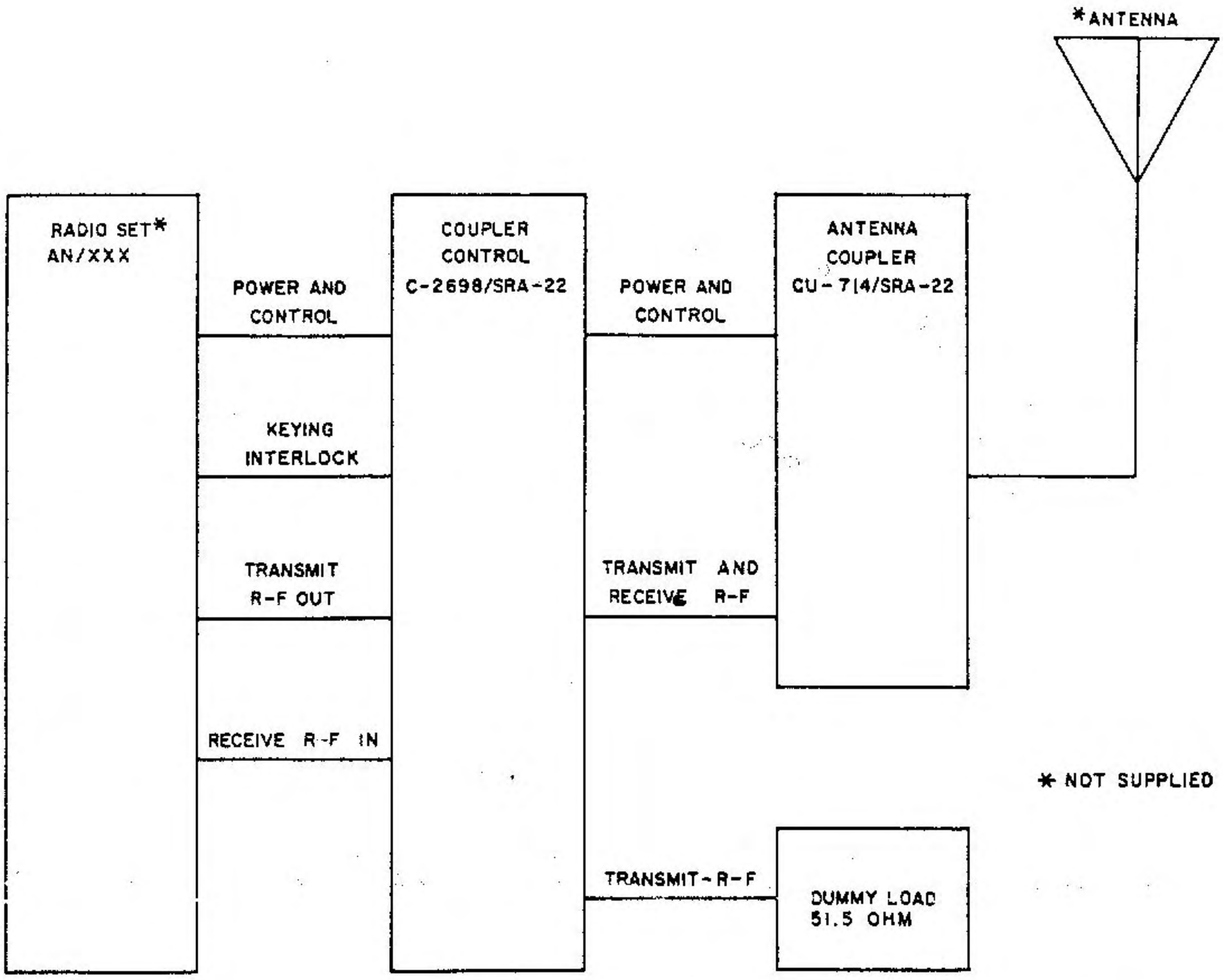


Figure 1-2. Antenna Coupler Group AN/SRA-22, Relationship of Units

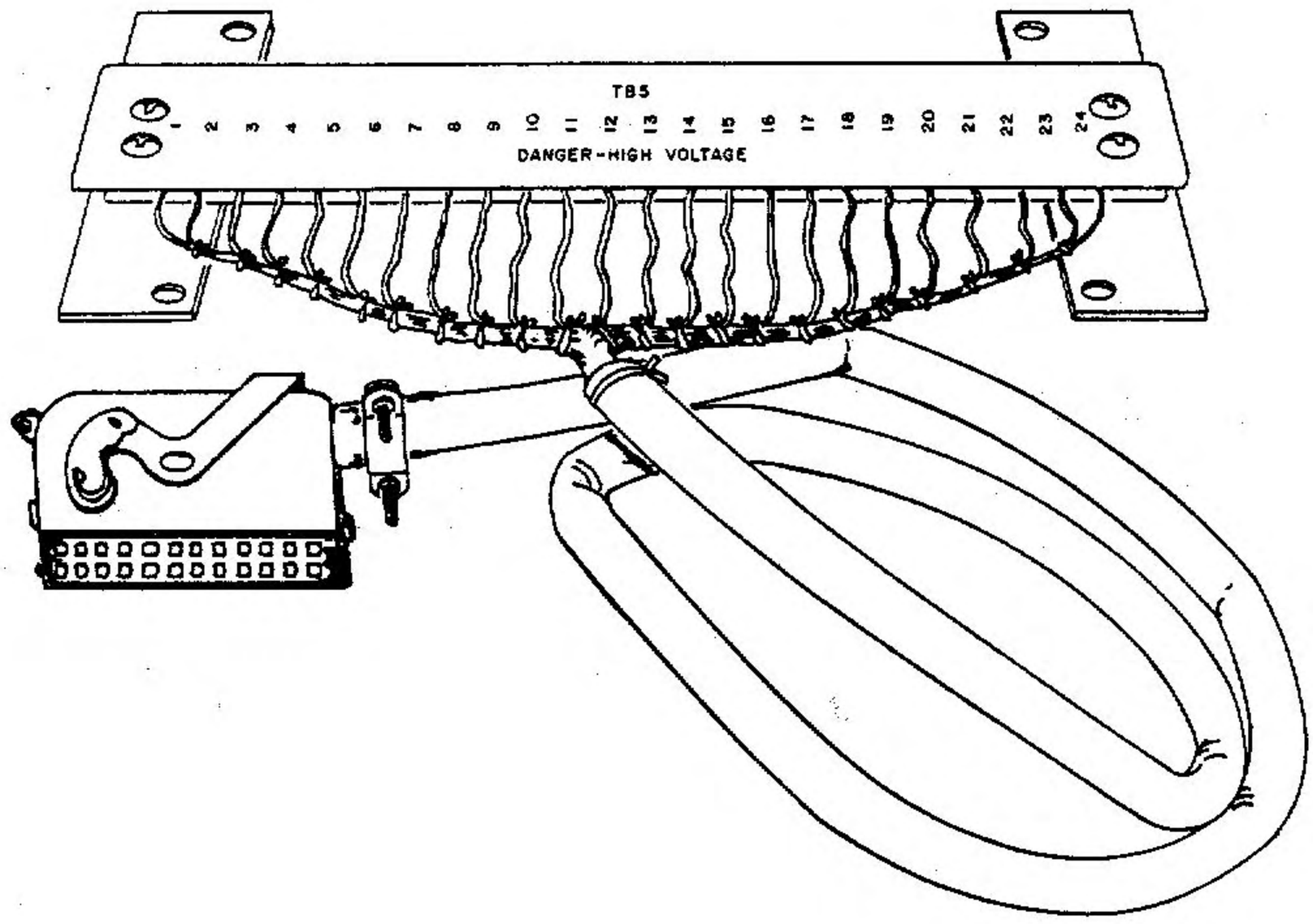


Figure 1-3. Interconnection Terminal Board TB-5

a. COUPLER CONTROL C-2698/SRA-22. - This unit contains all controls and indicators for complete operation of Antenna Coupler CU-714/SRA-22. The controls and indicators are as follows:

(1) Tap motor and coil motor drive and position indicators consist of sending potentiometers in Antenna Coupler CU-714/SRA-22 and receiving potentiometers in Coupler Control C-2698/SRA-22. The sending potentiometers are connected to the tap and coil drives in such a manner that tap and coil positions are immediately determined when the respective meters are nulled.

(2) The 12-position CAPACITOR switch drives the variable vacuum capacitor.

(3) The LOAD-ANT switch is used to connect the associated transmitter r-f power output to the antenna coupler or to a 50-ohm load.

(4) The REFLECTED-FORWARD switch selects either forward or reflected power which is read on the r-f power meter.

(5) The SERIES-SHUNT switch places the variable vacuum capacitor either in series or shunt with the antenna.

(6) The red indicator CAPACITOR run lamp lights when the variable vacuum capacitor motor runs and blinks when the VSWR protector circuit is actuated by excessive reflected power.

(7) The TUNE-OPERATE switch interlocks Coupler Control C-2698/SRA-22 so that 115 volts, 60 cps is applied to the coupler control only in the TUNE position. Also, in the TUNE position, the AN/XXX output power is reduced to minimize the possibility of damage to the coupler control or transmitter.

b. ANTENNA COUPLER CU-714/SRA-22. - This unit consists of two variable elements, a variable tapped coil and a variable capacitor. The inductor of the network consists of a windup coil in which a silver ribbon is wound from a metal drum onto a ceramic drum to increase inductance and from the ceramic drum to the metal drum to decrease inductance. Using this type of variable inductive element, it is possible to secure an extremely wide range of high Q inductance values without self-resonances.

The metal and the ceramic drums making up the windup coil are driven through a gear train from a single motor. A coil tap driven by a second motor is provided with a contact which makes a sliding connection with the ribbon on the ceramic drum. It is mounted on a ring assembly which rotates around the coil, using the ribs of the ceramic drum as a helical guide. With the two motors driving the two drums and the tap, it is possible to secure a variable inductor having a variable tap position.

A third control motor drives a variable vacuum capacitor having a range of 5 to 465 pf. Phase control is accomplished when capacitive current from the tap through the portion of the coil above the tap to the antenna equals the inductive current through the portion of the coil from tap to ground. Proper load or resistance presented to the coaxial transmission line is accomplished when the tap is at a position on the coil so that the resistive component of the antenna is transformed to 50 ohms. In some cases where tuning cannot be accomplished by operation of the coil alone, the variable vacuum capacitor is inserted either in shunt or in series with the antenna to obtain a tuning point.

With carrier power applied, the coil, tap, and capacitor motor drives are adjusted to obtain minimum reflected power as indicated on the r-f power meter. After a tune has been obtained, the coil and tap receiving dials on Coupler Control C-2698/SRA-22 are adjusted for a null on the respective meters. The dial readings and capacitor switch settings are then recorded for future use on the tuning chart located on the dust cover of Coupler Control C-2698/SRA-22.

c. INTERCONNECTION TERMINAL BOARD TB-5. - Interconnection terminal board TB-5 consists of a 24 connection terminal board with mounting brackets, cover and cable assembly. Purpose: To provide a convenient connection for D5 cable assembly and shipboard cable.

1-3. FACTORY OR FIELD CHANGES.

a. Field change information available as of date of publication is set forth in table 1-1.

b. Production modification A added a VSWR protective device and improved the terminal board TB-5 cover to Coupler Control C-2698/SRA-22.

c. Powdered iron tuning core 1H-7 was replaced with a new type (Collins Radio Company part number 553-4440-003) in production beginning with serial number 1495.

TABLE 1-1. FIELD CHANGE INFORMATION

FIELD CHANGE	APPLICABLE	REFERENCE	PURPOSE	IDENTITY
1	Serials 1-353	NS-981259	Elimination of continuing equipment failures caused by operator tuning errors. FC-19/URC-32, FC-5/URC-32A, FC-2/URC-32B required concurrently.	Toggle switch marked TUNE-OPERATE mounted on C-2698/SRA-22 panel next to fuse holder.
2	Serials 1-1133	NS-981711	Protection of Antenna Coupler CU-714/SRA-22 against damage by installation of VSWR protective device.	Presence of VSWR protective device circuit board mounted on terminals of meter M3.
3	Serials 1-1132	EIB 614	Elimination of fuse failure in AN/XXX equipments.	Ground removed from pin 6-6 in C-2698/SRA-22.
4	All	EIB 629	Pressurization to reduce moisture and to aid cooling in Antenna Coupler CU-714/SRA-22.	Presence of 0-30 PSI gauge on front of CU-714/SRA-22.
5	All	NS-0285-081-0800	Improve protection against coil damage by installation of electrical limit switch for coil and tap motors.	Presence of wafer switches mounted on shaft of coil and tap potentiometers in the CU-714/SRA-22. Removal of capacitors C-1 and C-2 from C-2698/SRA-22.
6	All	EIB 644	Reduction of heat accumulation in CU-714/SRA-22 tuning slug 1H-7.	Brass bolt 1H-58 supporting slug 1H-7 changed to nylon.
7	All	EIB 658	Prevent equipment damage through being tuned in OPERATE condition.	TUNE-OPERATE switch changed to 4PDT; COIL and CAPACITOR positioning controls disabled except in TUNE.
8	Serials 1-350	EIB 659	Provide protective cover for terminal board TB-5.	Protective cover 12-1/2 inches x 1-1/2 inches mounted over terminal board TB-5.

1-4. REFERENCE DATA.

R-f input impedance	50 ohms.
Number of channels	Continuous tuning.
Frequency range	2.0 to 30.0 megacycles.
R-f power input	1000 watts PEP (SSB). 500 watts average (CW or AM). 350 watts continuous (FSK, beacon, and such).
Matching capabilities	35-foot whip, or wire antenna 35 to 50 feet in length.
Matching efficiency	Approximately $\frac{0.85 \times 250}{250+Q_a} \times 100\%$ Q_a = antenna $\frac{X_a}{R_a}$
Maximum SWR	1.3:1
Power requirements	115/230 volts, 50-60 cps, 1 phase, 130 watts maximum.
Ambient temperature limits	-28° C to 65° C (-18° F to 149° F).
Pressurization	10 PSIG dry nitrogen.
Weight (coupler control)	17 lb.
Weight (antenna coupler)	42 lb.
Total weight (antenna coupler and coupler control)	59 lb.
Volume in cubic feet (antenna coupler)	2.4

1-5. SAFETY PRECAUTIONS.

Supply voltage as high as +400 volts dc is present in Antenna Coupler Group AN/SRA-22 when the high voltage power supply of the associated transmitter is energized. High r-f potential may be exposed at the output of Antenna Coupler CU-714/SRA-22 when the associated transmitter is transmitting. Normal prudence and safety precautions should be exercised.

1-6. EQUIPMENT LIST.

a. EQUIPMENT SUPPLIED. - Equipment supplied is listed in table 1-2.

b. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED. - No additional equipment or publications are required for proper operation and repair of Antenna Coupler Group AN/SRA-22. However, the Electronic Supply Office publication, Allowance Parts List, provides support information and equipment component federal stock number assignments.

c. DIODE COMPLEMENT. - Antenna Coupler Group AN/SRA-22 uses no tubes; however, 12 diodes are used in Coupler Control C-2698/SRA-22. Diodes used are listed in table 1-3.

d. SHIPPING DATA. - Shipping data are listed in table 1-4.

TABLE 1-2. ANTENNA COUPLER GROUP AN/SRA-22, EQUIPMENT SUPPLIED

QTY PER EQUIP	NOMENCLATURE		*OVER-ALL DIMENSIONS				
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH	*VOLUME	*WEIGHT
**1	Coupler Control	C-2698/SRA-22	5-1/4	19	6-7/8	0.39	17
**1	Antenna Coupler	CU-714/SRA-22	11-1/2	18-7/8	19-15/16	2.4	42
1	Terminal Board TB-5	Collins Radio Part No. 367-0932-00					
1	Terminal Board Cover	Collins Radio Part No. 547-1299-002					
1	Cable Assembly	Collins Radio Part No. 547-1289-00					
2	Technical Manual	NAVSHIPS 0967-136-6010					
1	Operator's Chart	NAVSHIPS 93286.21(B)					

* Unless otherwise stated, dimensions are in inches, volume in cubic feet, weight in pounds.
** Mating connectors are supplied with the antenna coupler and coupler control units.

TABLE 1-3. ANTENNA COUPLER GROUP AN/SRA-22, DIODE COMPLEMENT

UNIT	NUMBER OF DIODES, TYPES INDICATED							
	1N108	1N536	1N82A	1N647	1N457	1N963B	2N886	TOTAL
Coupler Control C-2698/SRA-22	2	4						6
Directional Coupler (subassembly A1 of coupler control unit)			2					2
VSWR Protector (subassembly A2 of coupler control unit)				1	1	1	1	4
	2	4	2	1	1	1	1	12

TABLE 1-4. ANTENNA COUPLER GROUP AN/SRA-22, SHIPPING DATA

BOX NO.	NOMENCLATURE		*OVER-ALL DIMENSIONS			*VOLUME	*WEIGHT
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
1	**Coupler Control	C-2698/SRA-22	22	8	10	1.2	25
2	**Antenna Coupler	CU-714/SRA-22	20	14-1/2	20	3.4	53
3	Terminal Board TB-5 and Cover						
	Cable Assembly						
	Technical Manual	NAVSHIPS 0967-136-6010					
	Operator's Chart	NAVSHIPS 93286.21(B)					

* Unless otherwise stated, dimensions are in inches, volume in cubic feet, and weight in pounds; equipment coated and ready for shipment.
** Mating connectors are supplied with the antenna coupler and coupler control units.

CHAPTER 2

OPERATION

2-1. FUNCTIONAL DESCRIPTION.

The efficiency of a shipboard high-frequency transmitting antenna is directly affected by its location, length (impedance characteristics), and the impedance characteristics of the associated antenna coupler, as well as by how intelligently the coupler is tuned by operating personnel. Figure 2-1 (Smith Chart) is typical of impedance characteristics measured on an isolated 35-foot whip antenna. It should be recognized that this impedance can change materially when the antenna is installed in various locations on a ship so that, even on the same ship, two 35-foot whips will not present exactly the same impedance to Antenna Coupler Group AN/SRA-22.

A careful study of the fundamentals of the antenna coupler impedance characteristics associated with the operation of the AN/SRA-22 will assist operating personnel to achieve maximum antenna system efficiency. Further, it will permit an understanding of the capabilities of the AN/SRA-22 when used with antennas other than the 35-foot whip.

2-2. CAPABILITIES AND LIMITATIONS.

Radio frequency currents passing through the coil cause heat to be generated in the coil, especially in the tuning slug which comes into play when large amounts of coil are used. The fewer turns of coil ribbon on the ceramic drum, the less heat will be generated. Each 20 divisions on the coil dial represents one additional turn of ribbon on the ceramic drum. The tuning procedure has placed limits, which should not be exceeded, for coil settings when tuned to various frequency ranges:

FREQUENCY RANGE	LIMITING DIAL SETTING
2 to 6 megacycles	500
6 to 12 megacycles	350
12 to 16 megacycles	250
16 to 30 megacycles	200

Since the ribbon on the ceramic drum is placed in series with the antenna, the addition of coil ribbon to the drum is the equivalent of adding inductance (coil) in series with the antenna, or, in effect, making the antenna electrically longer. Note from figure 2-1 that in the frequency range of 2 to 6 mc, this antenna presents a large amount of capacitive reactance, requiring large amounts of added inductance in the antenna coupler for compensation in order to resonate the antenna system. Visualize the AN/SRA-22 tuned into an antenna, for example, at 2.5 megacycles. The coil reading should be 500 or less. There would be approximately 500/20 (or 25) turns of coil ribbon on the ceramic drum. This is a considerable amount of inductance added to the antenna in order to compensate for the high capacitive reactance of an antenna much less than a quarter wavelength long. This situation causes reduced efficiency and increased heating, but it cannot be avoided when using an antenna requiring this high a coil setting, such as a 35-foot whip antenna in the 2- to 6- megacycle frequency range. Under no circumstances should the coil be allowed to exceed the dial reading of 500 for frequencies of 2 to 6 mc. As stated before, this represents 25 turns of coil ribbon on the ceramic drum and is a potential source of excessive heat for the coupler to dissipate.

When excessive capacity is used and compensated for by adding inductance (more coil ribbon on the ceramic drum), high heat or voltage arcing within the coupler may result.

In the higher frequency regions, coil limits are imposed for an additional reason. If more coil turns are used than the value for the limiting dial setting, it is possible for the coil and capacitor to reach self-resonance and absorb large amounts of transmitter power, with resultant damage to the coupler.

The maximum coil limits established in the AN/SRA-22 tuning procedure are to force the operator to limit the amount of coil ribbon that is put on the ceramic drum. If a dip in reflected power cannot be obtained within these limits, the antenna is already inductive (antenna too long at the applied frequency), and series capacity must be used.

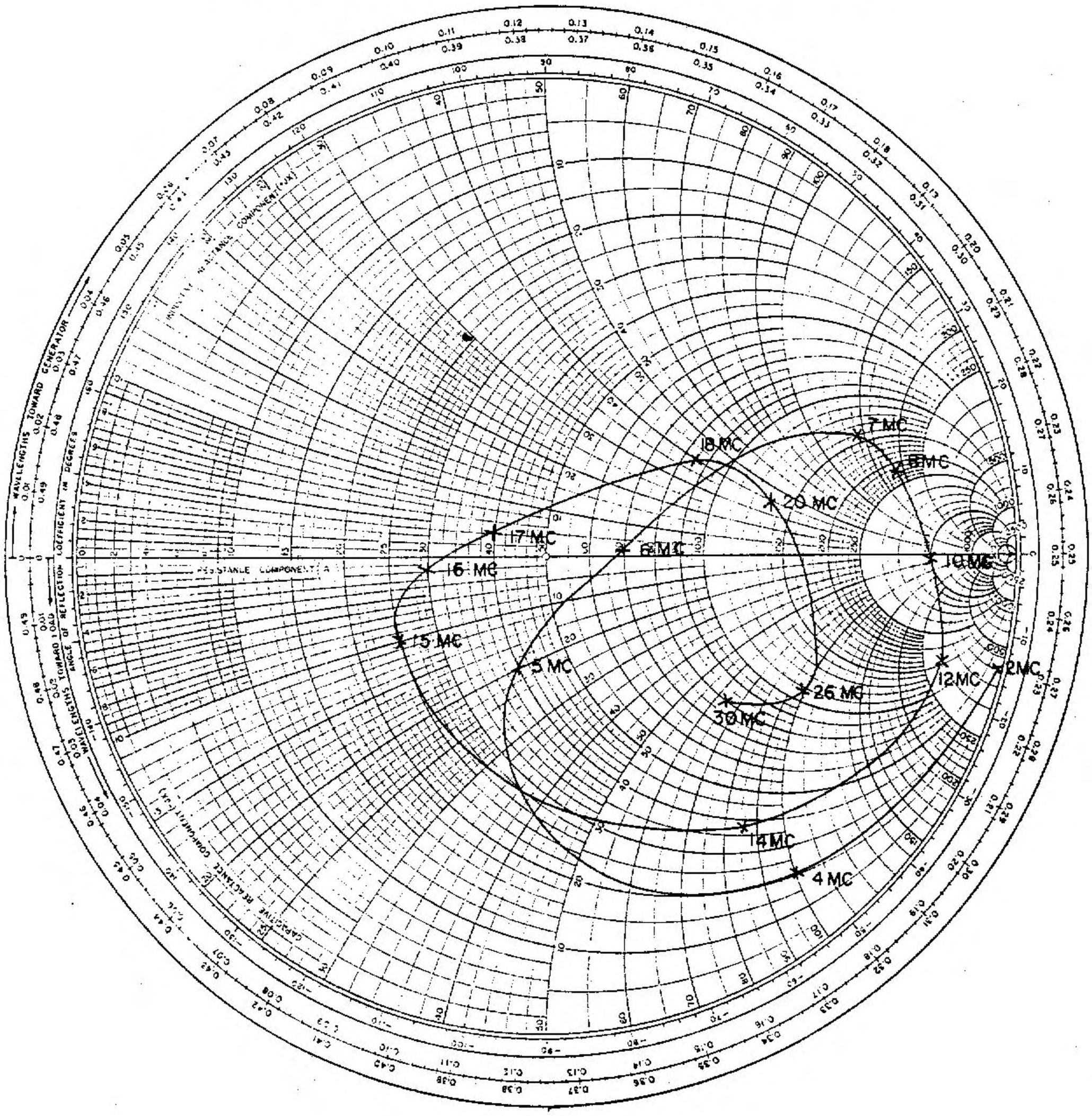


Figure 2-1. Impedance Characteristics of Typical 35-Foot Whip Antenna

The transmitter "tune power" must not exceed 125 watts when the AN/SRA-22 is being tuned. Operation of the TUNE-OPERATE switch to the TUNE position is designed to reduce the power output of the associated transmitter to a safe value for tuning. In addition, the power output of SSB transmitters such as the AN/XXX and AN/WRT-2 can be reduced by varying the excitation to the power amplifier. Use only the necessary power (below 125 watts) when tuning the AN/SRA-22 into an antenna (do not key the transmitter in OPERATE) until the tuning positions of the antenna coupler have been verified as good and efficient. Thereafter, normal OPERATE power may be used except where antenna lengths less than 35 feet are used (refer to paragraph 2-3. c). Appropriately less transmitter power must then be employed to compensate for increased coupler heating caused by lowered efficiency at shorter antenna lengths.

2. 3. OPERATING PROCEDURES.

In order to have an antenna coupler capable of compensating for the complex impedance of the 35-foot whip such as that shown in figure 2-1, a variable tapped coil is placed in series with the antenna being tuned. Also, a variable capacitor is placed either in series or shunt with the antenna. The variable tap on the AN/SRA-22 coupler is used to find the point nearest to 50 ohms for matching the coaxial feedline.

a. DESCRIPTION OF CONTROLS. - All of the controls and indicators used to operate the antenna coupler are located on the coupler control. Table 2-1 describes the operating controls and indicators, and figure 2-2 identifies them.

TABLE 2-1. CONTROLS/INDICATORS AND FUNCTIONS

CONTROL OR INDICATOR	FUNCTION
Coil dial and TAP dial	COIL and TAP dials are referred to as the receiving potentiometers. Potentiometers in the antenna coupler are referred to as the sending potentiometers. The sending potentiometer is connected to the coil and tap drives in such manner that the coil and tap positions are immediately determined.
COIL COARSE TUNE-FINE TUNE switch	To position the coil to obtain a null on the COIL meter.
TAP COARSE TUNE-FINE TUNE switch	To position the tap to obtain a null on the TAP meter.
CAPACITOR SERIES-SHUNT toggle switch	Places the capacitor either in series or shunt with the antenna.
Twelve-position CAPACITOR switch	A 12-position wafer switch which drives the variable vacuum capacitor to a predesignated position.
REFLECTED-FORWARD switch (r-f power meter switch)	Selects forward or reflected power which may be read on the r-f power meter.
LOAD-ANT switch	Used to switch r-f power to the antenna coupler or to a dummy load.
R-f power meter	Reads the forward or reflected power which is selected by the REFLECTED-FORWARD switch.
COIL meter	Indicates position of the coil in relation to the coil sending potentiometers.
TAP meter	Indicates position of the tap in relation to the tap sending potentiometers.

Table 2-1. (Continued)

CONTROL OR INDICATOR	FUNCTION
CAPACITOR run light	Lights when variable capacitor is running, and blinks when VSWR protector circuit is actuated.
TUNE-OPERATE switch	Applies 115 volts ac to coupler while tuning, and holds Radio Set AN/XXX in tune power while tuning.

b. SEQUENCE OF OPERATION. - The operator's sequence of operation for tuning the AN/SRA-22 into any antenna, whether it be a 35-foot whip or long-wire antenna, is always to start from the "home" position.

(1) CONTROL SETTINGS PRIOR TO STARTING. - To operate the positioning controls of Coupler Control C-2698/SRA-22, it is necessary to hold the TUNE-OPERATE switch in the TUNE position. The original model of the coupler control did not have the TUNE-OPERATE switch. It was added by a Field Change 1 and modified by Field Change 7.

"Home" positions for the AN/SRA-22 controls are as follows:

(a) CAPACITOR SERIES-SHUNT switch in SHUNT.
(b) CAPACITOR 12-position switch in position 1.
(c) REFLECTED-FORWARD power switch in 1000 FORWARD.
(d) LOAD-ANT switch to LOAD.
(e) COIL and TAP dials to 100.
(f) COIL and TAP meter indications zeroed.

Note

To set the COIL and TAP to the "home" position, the COIL and TAP dials are set to 100, as shown in figure 2-3, and the COARSE TUNE-FINE TUNE switches are operated in the direction in which the meter pointer must move in order to reach a center zero indication. If the meter pointer must move right to reach center, move the COARSE TUNE-FINE TUNE switch to the right; if the pointer must move left to reach center, move the switch to the left. This applies for both COIL and TAP COARSE TUNE-FINE TUNE switches.

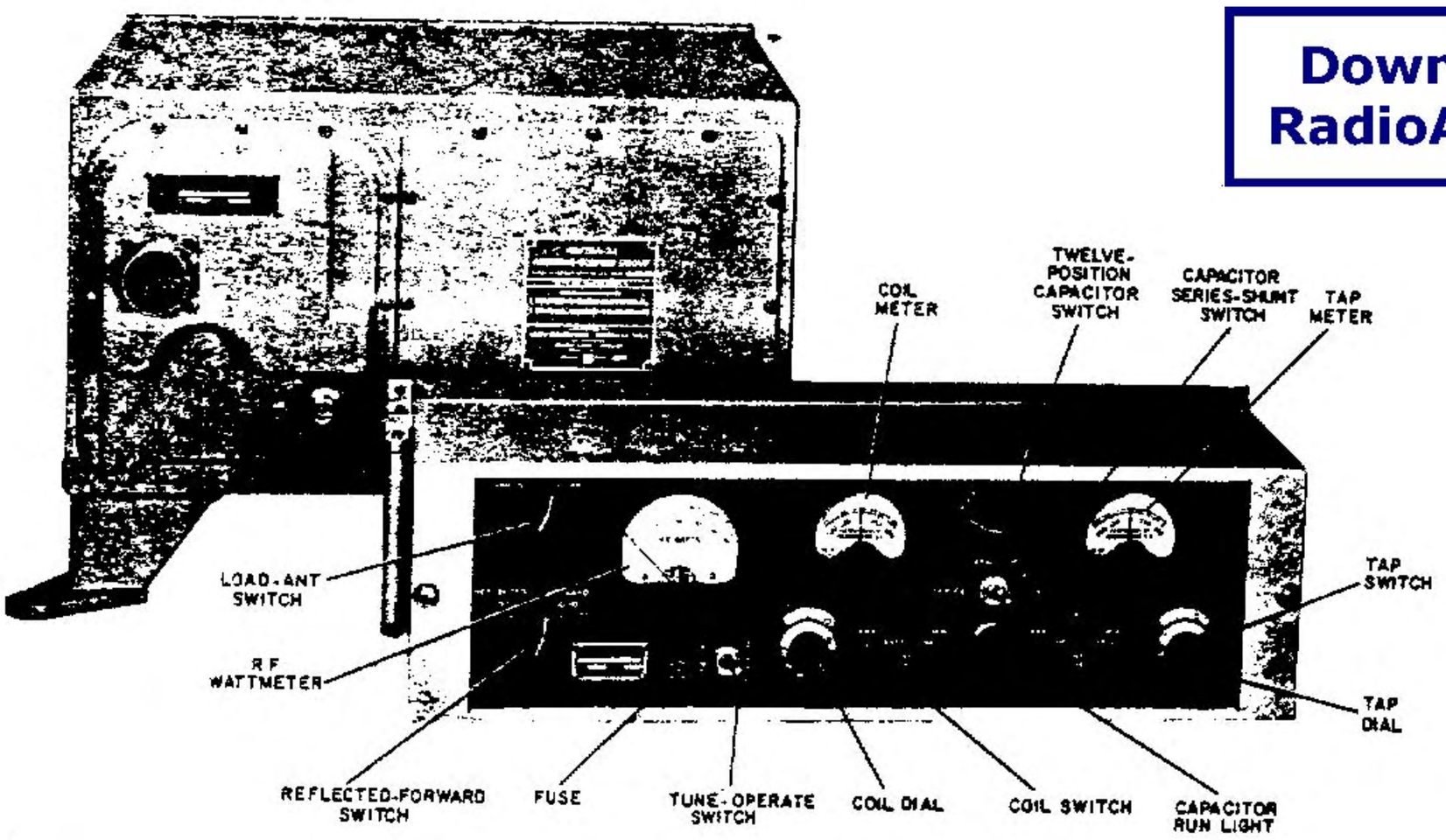


Figure 2-2. Antenna Coupler Group AN/SRA-22, Front Panel Control Location

(2) TUNING PROCEDURE WHERE A DUMMY LOAD IS AVAILABLE. - For transmitter tuning procedures, refer to the technical manual for the transmitter being used.

Note

It is recommended that the LOAD-ANT switch on the coupler control be set to the LOAD position, which will feed the r-f amplifier of the transmitter being used into an external dummy load.

Tune the associated transmitter, in accordance with the technical manual, to the desired frequency. Reduce the transmitter output by operating the exciter or driver gain control to its minimum position.

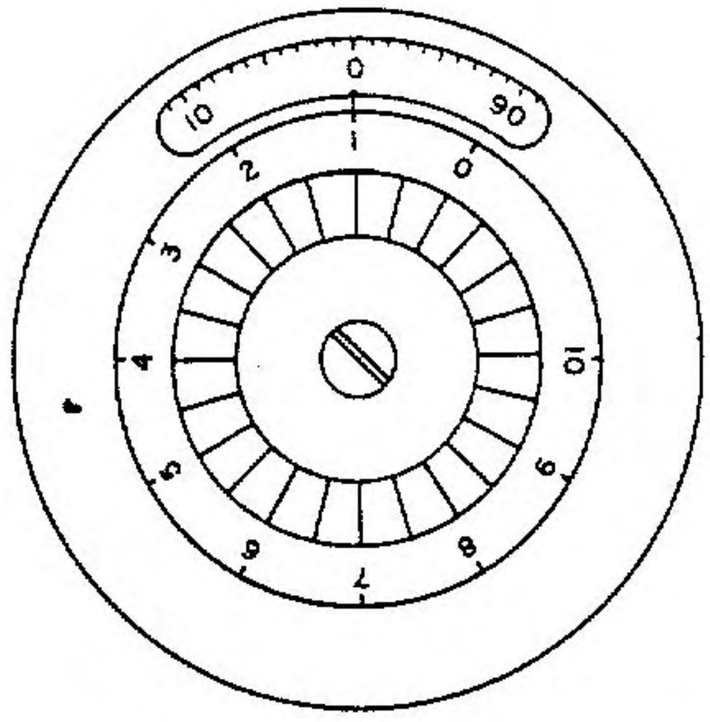


Figure 2-3. Dial Set to 100

CAUTION

To protect the transmitter and tuner against possible damage, do not key the transmitter until loading controls are set to approximately correct positions. DO NOT OPERATE THE LOAD-ANT SWITCH WHEN THE TRANSMITTER IS KEYED.

(a) With the transmitter unkeyed, operate the LOAD-ANT switch to the ANT position.
(b) Set the COIL dial to the following limiting values for frequency range:

FREQUENCY	COIL DIAL SETTING
2 to 6 megacycles	500
6 to 12 megacycles	350
12 to 16 megacycles	250
16 to 30 megacycles	200

CAUTION

Do not exceed the above settings. Damage to the coupler or the transmitter may result.

(c) Key transmitter and slowly advance transmitter output power (exciter or driver gain control) to obtain a minimum useful meter reading not to exceed 125 watts of forward power.
(d) Antenna Coupler Group AN/SRA-22 must now be tuned for minimum reflected power. Set the REFLECTED-FORWARD power switch to 1000 REFLECTED (or 100 REFLECTED when reflected power is below 100 watts).

Note

All C-2698/SRA-22 coupler controls are equipped with the VSWR protective device which will automatically disable transmitter output if the TUNE-OPERATE switch is in the OPERATE position and the reflected power exceeds approximately 30 watts. This is reset and inoperative when the TUNE-OPERATE switch is in the TUNE position.

(e) Operate the COIL COARSE TUNE-FINE TUNE switch in the direction required to zero the COIL meter (lever in direction in which meter pointer must move) while watching the r-f power meter for a dip. This dip occurs when the reflected power is decreasing and suddenly starts increasing. It may be a sharp or broad dip. If a dip on the r-f power meter is not obtained before the pointer of the COIL meter reaches zero, unkey the transmitter. release the COIL COARSE TUNE-FINE TUNE switch, and proceed to (f). If a dip on the r-f power meter is obtained, proceed to (j).

(f) If a dip is not obtained, set the COIL dial to 130 and operate the COIL TUNE switch to zero the COIL meter. TAP meter should remain centered for a dial reading of 100.

CAUTION

Do not key transmitter (apply r-f power to tuner) while capacitor run lamp is lighted.

(g) Advance the 12-position CAPACITOR switch one position at a time, watching the r-f power meter for a dip. At each switch position, wait until indicator light goes out before keying transmitter. If no dip is obtained by the time position 12 is reached, switch CAPACITOR SERIES-SHUNT switch to SERIES. Turn the 12-position CAPACITOR switch one step at a time toward position 1, watching the r-f power meter for a dip.

(h) When a dip is obtained, switch the REFLECTED-FORWARD switch to FORWARD to see if the forward power is still good. Return the REFLECTED-FORWARD switch to the 100 REFLECTED position.

(j) After a dip is obtained, use the FINE TUNE positions on the COIL and TAP TUNE switches to reduce the reflected power to a minimum.

(k) Release the TUNE-OPERATE switch to OPERATE position and increase the transmitter output (exciter or driver gain control) to obtain the desired forward power. Do not exceed the power limitations for the type of emission and type of antenna employed (see table 2-2).

Note

When excessive series capacity is used, the operator must compensate by adding inductance (more coil ribbon on the ceramic drum). This, as stated before, may result in high heat or voltage arcing within the coupler.

(3) VSWR PROTECTIVE DEVICE.

(a) If, during normal operation, the reflected power exceeds approximately 30 watts, the transmitter power output will be automatically disabled. When this condition occurs, the indicator light (which indicates capacitor running during tune-up) will blink a warning, and the r-f power meter will have a nearly full-scale deflection in the 100 REFLECTED position.

(b) To reset the protective device, place the TUNE-OPERATE switch in the TUNE position and check the tuning of the coupler. If necessary, retune the coupler according to the tuning procedure. Release the TUNE-OPERATE switch.

(c) If the protective device repeatedly disables the transmitter during normal operation, but a good tune-up is indicated when the TUNE-OPERATE switch is in the TUNE position, a fault probably exists in the r-f coaxial cable, Antenna Coupler CU-714/SRA-22, or in the antenna.

c. OPERATING PROCEDURES FOR ANTENNAS LESS THAN 35 FEET IN LENGTH. - Operators who understand and use the correct AN/SRA-22 tuning procedure should have no difficulty in operating with antennas of lengths other than 35 feet. It is essential that the limiting inductance values set forth in paragraph 2-2 be observed. For antennas shorter than 35 feet, power limitations must be observed as well.

Short antennas, that is, those less than 35 feet, when used in the 2- to 6-megacycle range, are the most difficult to use with any antenna coupler because of the high inductance (coil) values required to resonate the antenna system. In this frequency range, the major difficulty is the dissipation of heat generated in the inductance. For this reason, it is wise to use reduced power to keep heat dissipation at a safe level.

The AN/SRA-22 is capable of dissipating 300 watts at 65° C (149° F) ambient temperature. At 2 megacycles, the coupler efficiency can be expected to be as shown in table 2-2. At the reduced efficiency, less power is delivered to the antenna and more power must be dissipated as heat by the antenna coupler. For this reason, the total power delivered by the transmitter must be limited to safe values to avoid damage to Antenna Coupler Group AN/SRA-22. Since coupler efficiency increases as less inductance is used, these power limitations need apply only in the 2- to 6-megacycle range.

TABLE 2-2. AN/SRA-22 EFFICIENCY WITH VARIOUS ANTENNA LENGTHS

ANTENNA LENGTH	EFFICIENCY	MAX POWER (CONTINUOUS)	MAX POWER (INTERMITTENT)
35 feet	65%	500 watts	1000 watts
25 feet	50%	300 watts	600 watts
15 feet	20%	150 watts	300 watts

d. STOPPING THE EQUIPMENT. - Refer to transmitter operating instructions. Antenna Coupler Group AN/SRA-22 normally receives its power from the transmitter.

e. TUNING CHART. - Figure 2-4 is a typical tuning chart for pretuning Antenna Coupler Group AN/SRA-22. A chart of this type should be prepared and placed on the dust cover of the coupler control unit. All of the commonly used frequencies should be listed in the FREQUENCY MC column. In the CAPACITOR column, the position to which the CAPACITOR SERIES-SHUNT switch and 12-position CAPACITOR switch are set for each frequency should be recorded. In the COIL column, the position in which the COIL receiving potentiometer is set for "0" indication on the COIL meter should be recorded for each frequency, and, in the TAP column, the position in which the TAP receiving potentiometer is set to "0" indication on the TAP meter should be recorded for each frequency. This chart then provides the operator with a guide to pretuning the antenna coupler for each of the commonly used frequencies.

f. PRECAUTIONS. - Do not attempt to load the transmitter into the antenna coupler group with the antenna disconnected from the antenna coupler, or the antenna coupler disconnected from the coupler control. The antenna coupler, coupler control, or transmitter might be seriously damaged. Do not use a standard tuning chart from other installations; calibrate for each antenna used. Antenna electrical characteristics vary, and similar antennas installed in the same location will not always provide the same impedance. Refer to Section 5-3 for possible troubles and correction of the troubles.

FREQUENCY MC	CAPACITOR	COIL	TAP

Figure 2-4. Typical Tuning Chart

g. SUMMARY: ABBREVIATED PROCEDURE FOR TUNING AN/SRA-22.

(1) Set LOAD-ANT switch to LOAD; tune transmitter into dummy load.
(2) Unkey transmitter, set power output to minimum, and operate LOAD-ANT switch to ANT.
(3) Set COIL and TAP potentiometers and CAPACITOR switches to "home" positions:

COIL potentiometer	100
TAP potentiometer	100
CAPACITOR 1-12	1
SERIES-SHUNT	SHUNT

(4) Operate COIL and TAP TUNE controls to zero respective meters. Do not key transmitter.
(5) Reset COIL potentiometer to limit position for frequency range:

FREQUENCY	COIL DIAL SETTING
2 to 6 megacycles	500
6 to 12 megacycles	350
12 to 16 megacycles	250
16 to 32 megacycles	200

(6) Key transmitter and advance transmitter power output to obtain minimum useful meter reading. Do not exceed 125 watts forward power.

(7) Hold TUNE-OPERATE switch in TUNE position, key transmitter, and operate COIL TUNE control to left, stopping when REFLECTED power dips or COIL meter reaches center zero (limit value), whichever occurs first.

(8) If dip occurs first, check that FORWARD power is still good, then operate COIL and TAP FINE TUNE controls for minimum REFLECTED power. Use minimum coil necessary.

(9) If COIL limit value is reached first, unkey transmitter, reset COIL potentiometer to 130, and zero COIL meter. Return COIL potentiometer to limit value.

(10) With CAPACITOR in SHUNT, key transmitter and advance CAPACITOR 1-12 switch one step at a time, watching REFLECTED power meter for a dip. Use minimum capacitor necessary.

WARNING

DO NOT RETURN TOWARD POSITION 1 OR SWITCH TO SERIES WHILE TRANSMITTER IS KEYED.

(11) If no dip is found on reaching CAPACITOR position 12, unkey transmitter and switch capacitor to SERIES. Wait until CAPACITOR run lamp goes out.

(12) Key transmitter and reduce CAPACITOR 1-12 switch one step at a time, watching REFLECTED power meter for a dip.

WARNING

DO NOT RETURN TOWARD POSITION 12 OR SWITCH TO SHUNT WHILE TRANSMITTER IS KEYED.

(13) When a dip is found, check that FORWARD power is still good, then operate COIL and TAP FINE TUNE controls to reduce REFLECTED power to minimum. Do not let COIL exceed limit value.

(14) When minimum REFLECTED power is reached, release TUNE-OPERATE switch to OPERATE position and set transmitter FORWARD power to intended operating level. Do not exceed power limitations for emission to be used.

EMISSION	35-FOOT ANTENNA	25-FOOT ANTENNA	15-FOOT ANTENNA
FSK	500 watts	300 watts	150 watts
BEACON (locked key)	500 watts	300 watts	150 watts
AM (with carrier)	400 watts	275 watts	200 watts
CW (on-off)	1000 watts	600 watts	300 watts
SSB	1000 watts	600 watts	300 watts

(15) If VSWR protective device now trips when transmitter is keyed, tuning is not satisfactory. Return to step (6) and repeat.

2-4. OPERATOR'S MAINTENANCE.

a. OPERATOR'S CHECK. - Table 2-3 contains routine checks to be performed by the operator.

TABLE 2-3. ROUTINE CHECK CHART

WHAT TO CHECK	HOW TO CHECK	CHECK RESULTS
Complete equipment.	Inspect visually.	Equipment should be mounted properly, and knobs and dials should be intact.
LOAD-ANT switch, REFLECTED-FORWARD switch, 12-position CAPACITOR switch, CAPACITOR SERIES-SHUNT switch, TAP COARSE TUNE-FINE TUNE switch, COIL COARSE TUNE-FINE TUNE switch, and TUNE-OPERATE switch.	Operate controls.	Detent action should be positive, and the knobs should be secure on shafts.
R-f power meter, COIL meter, TAP meter, COIL dial, and TAP dial.	Visually inspect meters and operate dials.	The three meters should read zero. Lock mechanism on the dials should lock and unlock properly. The dials should operate smoothly when turned.

b. EMERGENCY MAINTENANCE. - The only emergency maintenance that can be performed is the replacement of the fuse in Coupler Control C-2698/SRA-22. Refer to figure 2-2 for fuse location. This fuse is in one side of the 115-volt ac line which supplies power to the antenna coupler system. Table 2-4 contains symptoms indicating probable fuse failures.

TABLE 2-4. SYMPTOMS OF PROBABLE FUSE FAILURES

CONTROL SETTINGS AND INSTRUCTIONS	SYMPTOMS
Set COIL COARSE TUNE-FINE TUNE switch to COARSE TUNE.	If fuse is open, COIL meter will remain at zero.
Set TAP COARSE TUNE-FINE TUNE switch to COARSE TUNE.	If fuse is open, TAP meter will remain at zero.
Switch 12-position CAPACITOR switch one position at a time.	If fuse is open, the CAPACITOR run light will not not light.

CHAPTER 3

SCHEDULED TESTS AND SERVICING

3-1. INTRODUCTION.

This chapter contains scheduled tests and servicing information necessary to ensure optimum performance and reliability of Antenna Coupler Group AN/SRA-22.

Section 3-2 contains a maintenance requirement index that schedules the procedure for regular periods (daily, weekly, and such). In addition to scheduling the procedures, the maintenance requirement index specifies the rate and time expected to perform the procedures, as well as any related procedures pertaining to other equipment that should be performed at the same time.

Section 3-3 contains the scheduled tests and servicing procedures. These procedures include the following:

a. A list of special tools, test equipment, and materials necessary.

b. Preliminary procedures or initial set-up of equipment, associated equipment, and test equipment.

c. A step-by-step test procedure containing maintenance standard test indications that represent optimum performance.

d. Corrective measures to be taken when the maintenance standard test requirements cannot be fulfilled.

Note

This equipment should not be energized daily for the sole purpose of making daily checks. The equipment should, however, be energized at least twice a week and at least two days before getting underway.

3-2. MAINTENANCE REQUIREMENT INDEX.

Table 3-1 is a maintenance requirement index that schedules maintenance procedures for regular periods.

TABLE 3-1. MAINTENANCE REQUIREMENT INDEX

FREQ CODE	MAINTENANCE REQUIREMENT	CARD NO.	RATE REQ'D	MAN HRS	RELATED MAINT.
*D-1	(1) Measure forward power, reflected power, and VSWR for frequency in use.		RM3	0.05	
W-1	(1) Check Antenna Coupler CU-714/SRA-22 pressurization. (2) Inspect cables and hardware.		RMSN	0.05	
**W-2	(1) Record forward power, reflected power, and VSWR over frequency range.		RM3	0.02	C-25, Q1
M-1	(1) Record input voltage to Antenna Coupler Control C-2698/SRA-22.		ET3	0.1	
M-2	(1) Clean and inspect interior and exterior of Antenna Coupler Control C-2698/SRA-22.		RMSN	0.01	C-25, M9

* Requires operation of associated transmitter.
** Readings obtained will be used in AN/XXX check C-25, Q1.

TABLE 3-1. (Continued)

FREQ CODE	MAINTENANCE REQUIREMENT	CARD NO.	RATE REQ'D	MAN HR'S	RELATED MAINT.
Q-1	(1) Record control voltages at terminal board TB-5.		ET3	0.2	
*A-1	(1) Verify calibration of forward and reflected power indication of r-f power meter.		ET3	0.1	
A-2	(1) Lubricate gear assembly of Antenna Coupler CU-714/SRA-22. (2) Clean and inspect Antenna Coupler Cu-714/SRA-22.		ET3	1.0	

* Requires operation of associated transmitter.

3-3. MAINTENANCE REQUIREMENT DESCRIPTION.

SYSTEM	COMPONENT		M. R. NUMBER
Communications	AN/SRA-22		C-26 D-1
SUB-SYSTEM	RELATED M. R.	RATE	TIME(HR)
Radio		RM3	0.05

MAINTENANCE REQUIREMENT:
Measure forward and reflected power for frequency in use.

PRELIMINARY:

1. Energize the associated transmitter in order to apply power to Antenna Coupler Group AN/SRA-22.
2. Place LOAD-ANT switch in the LOAD position and tune the associated transmitter to the designated frequency.
3. Unkey the transmitter. Turn the EXCITER GAIN control to minimum (CCW) position. Turn the LOAD-ANT switch to the ANT position.

TEST PROCEDURE:

1. Pre-set the AN/SRA-22 COIL and TAP dials, the CAPACITOR 12-position switch, and the SERIES-SHUNT switch to the values previously determined to be correct for the frequency in use.
2. Hold the TUNE-OPERATE switch in the TUNE position until the CAPACITOR RUN light goes out.
3. Holding the TUNE-OPERATE switch in the TUNE position, operate the COIL and TAP levers to zero the position meters.
4. Place the FORWARD-REFLECTED switch in the FORWARD 1000 position. Place the transmitter in CW (or AM with no modulation). Key the transmitter and advance the EXCITER GAIN control to produce an indication of 500 watts on the r-f power meter.
5. Operate the FORWARD-REFLECTED power switch to the REFLECTED position (first 1000, then 100) and record the reflected power.
6. Determine the VSWR from the chart, figure 3-1. VSWR should not exceed 1.3 to 1.

CORRECTIVE MEASURES:

1. If FORWARD power does not reach 500 watts*, trouble is indicated in the transmitter.
2. If the VSWR is more than 1.3 to 1, the AN/SRA-22 should be retuned, and new tuning chart values entered. The change may be related to difference of position of objects in proximity to the antenna.
3. If the VSWR cannot be reduced below 1.3 to 1, or the VSWR protective device trips repeatedly, check for open or shorted leads to the coupler and antenna, grounded antenna, or inadequate ground on the coupler case. Otherwise trouble is indicated inside the coupler or coupler control.

*When used with AN/XXX transmitter or similar.

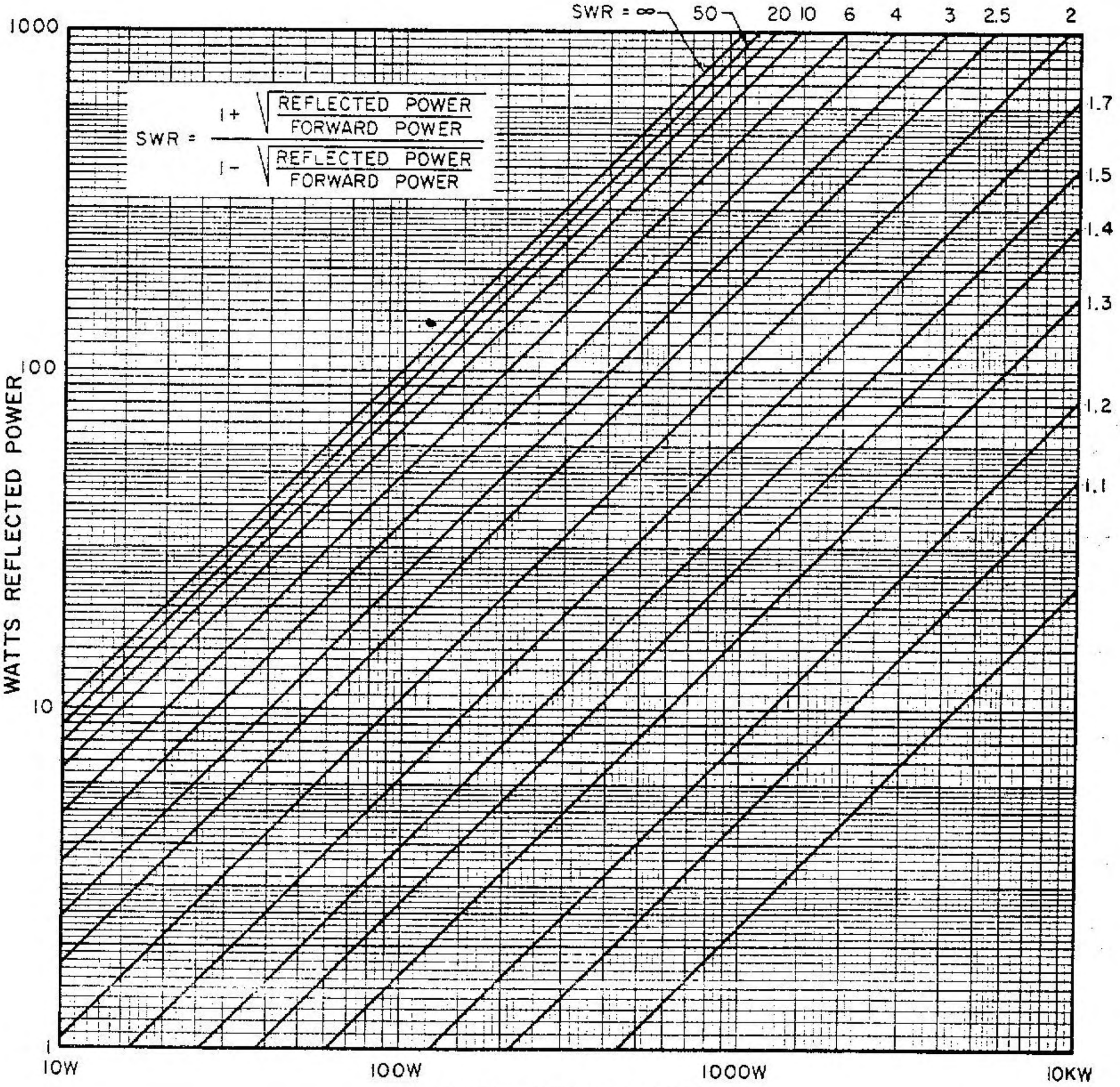


Figure 3-1. Relationship of SWR to Incident and Reflected Power

SYSTEM	COMPONENT		M. R. NUMBER
Communications	AN/SRA-22		C-26 W-1
SUB-SYSTEM	RELATED M. R.	RATE	TIME (HR)
Radio		RMSN	0.05

MAINTENANCE REQUIREMENT:
Clean and inspect Antenna Coupler CU-714/SRA-22.

PRELIMINARY:

De-energize and tag associated transmitter before performing work on the antenna coupler group.

TEST PROCEDURE:

1. Check pressure gauge on front of Antenna Coupler CU-714/SRA-22. Gauge should indicate approximately 10 pounds per square inch gauge pressure.
2. Inspect cables and plugs on front of CU-714/SRA-22 for visible signs of breaks or damage. Check gaskets for evidence of damage.
3. Inspect bowl insulator for cracks, paint, or dirt. Clean bowl insulator with a detergent and water solution, exercising care to avoid damaging glazed surface.
4. Check that ground strap on case is properly installed and not loose or broken (see figure 7-5).

CORRECTIVE MEASURES:

If corrective measures other than cleaning are needed, notify the appropriate electronic repair force.

SYSTEM	COMPONENT		M. R. NUMBER
Communications	AN/SRA-22		C-26 W-2
SUB-SYSTEM	RELATED M. R.	RATE	TIME (HR)
Radio			0.1

MAINTENANCE REQUIREMENT.
Over operating frequency range: (1) record forward power; (2) record reflected power.

TOOLS, TEST EQUIPMENT, MATERIALS:
DA-91A/U Dummy Load.

PRELIMINARY:

1. Energize the associated transmitter to apply power to Antenna Coupler Group AN/SRA-22.
2. Place LOAD-ANT switch in LOAD position and tune the associated transmitter in accordance with Technical Manual to designated frequency.

Test 1. Approximately 2.0 megacycles.
Test 2. Approximately 4.3 megacycles.
Test 3. Approximately 8.9 megacycles.
Test 4. Approximately 18.1 megacycles.

3. Unkey transmitter and turn EXCITER GAIN on transmitter to minimum (CCW) position.

CAUTION

To protect transmitter and coupler against damage, do not key transmitter again until loading is approximately correct.

TEST PROCEDURE:

1. Set C-2698/SRA-22 controls to the following initial positions:
   a. LOAD-ANT switch to ANT.
   b. CAPACITOR SERIES-SHUNT switch to SHUNT.
   c. CAPACITOR 12-position switch to 1.
   d. R-i power meter switch to 1000 REFLECTED.
   e. TUNE-OPERATE switch to TUNE.
   f. COIL and TAP dial at 100.
   g. Operate COIL and TAP TUNE levers to center meters.

2. Set COIL dial to proper limiting value for frequency range:

FREQUENCY	COIL DIAL SETTING
2 to 6 megacycles	500
6 to 12 megacycles	350
12 to 16 megacycles	250
16 to 32 megacycles	200

3. Key transmitter and slowly advance EXCITER GAIN control on transmitter to obtain an r-f power meter reading. Meter switch may be reduced to 100 REFLECTED for more sensitive reading. KEEP TRANSMITTER POWER LOW: DO NOT EXCEED 125 WATTS FORWARD POWER.

4. Operate the COIL COARSE TUNE-FINE TUNE lever in the direction required to obtain a dip in reflected power as indicated by the r-f power meter. DO NOT GO ABOVE CENTER ZERO ON COIL METER. If no dip is found before the coil meter reaches zero, adjust the coil tuning to 130 on COIL dial and proceed to the next step.

5. Advance the 12 position CAPACITOR switch one position at a time, waiting for the CAPACITOR run lamp to go out before keying the transmitter. Watch for a dip in reflected power. If no dip is detected by the time position 12 is reached, operate the CAPACITOR SERIES-SHUNT switch to SERIES, and reduce the CAPACITOR switch one position at a time, watching the reflected power for a dip.

6. When a dip is noticed, switch the r-f power meter to FORWARD and verify that forward power is still good. Return the r-f power meter switch to REFLECTED.

7. Once the dip is found, operate the COIL and TAP TUNE switches to reduce the reflected power to less than 100 watts (100 REFLECTED position).

8. Place the TUNE-OPERATE switch in OPERATE, r-f power meter switch to 1000 FORWARD. Advance EXCITER GAIN control on the transmitter to produce a reading of 500 watts*.

9. Operate the r-f power meter switch to the REFLECTED position. Observe and record the reflected power and refer to chart (figure 3-1) to determine VSWR.

10. Repeat steps 1 through 9 for each frequency range.

CORRECTIVE MEASURES:

1. If FORWARD power does not reach an indicated 500 watts* on advancing the transmitter EXCITER GAIN, verify that r-f power meter calibration is correct (see M. R. C. Step A-1). Otherwise, trouble is indicated in the transmitter*.

2. If VSWR cannot be reduced below 1.3 to 1, or protective device trips out, trouble is indicated in the antenna, antenna lead, CU-714 coupler, or coupler ground connection.

SYSTEM	COMPONENT		M. R. NUMBER
Communications	AN/SRA-22		C-26 M-1
SUB-SYSTEM	RELATED M. R.	RATE	TIME (HR)
Radio		ET3	0.1

MAINTENANCE REQUIREMENT:
Record input voltage to Antenna Coupler Control C-2698/SRA-22.

TOOLS, TEST EQUIPMENT, MATERIALS:
AN/PSM-4 or equivalent.

PRELIMINARY:

Remove screws which secure the cover of terminal board TB-5.

TEST PROCEDURE:

1. Set multimeter to the 200-volt (or equivalent) scale, ac function.
2. Turn on transmitter low voltage power supply and allow 40 seconds warm-up.

CAUTION

Do not let hand come in contact with terminals on TB-5 or bare test equipment leads test.

*When AN/SRA-22 is used with AN/XXX transmitter. Other values may apply when used with other equipments.

3. Measure voltage between terminals 13 and 24 of terminal board TB-5. Voltage should be 115 volts ac ± 12 volts.

CORRECTIVE MEASURES:

If voltage is not present, check fuse 2F1, plug 2P6, and transmitter fuses and ac supply.

SYSTEM	COMPONENT	M. R. NUMBER
Communications	AN/SRA-22	C-26 M-2

SUB-SYSTEM	RELATED M. R.	RATE	TIME (HR)
Radio	C-25 M-9	RMSN	0.1

MAINTENANCE REQUIREMENT:
Clean and inspect interior and exterior of Antenna Coupler Control C-2698/SRA-22.

TOOLS, TEST EQUIPMENT, MATERIALS:
1. Vacuum cleaner
2. Duster brush
3. Wiping cloth
4. Cleaning solvent

PRELIMINARY:

1. De-energize and tag associated transmitter to remove power before performing work on antenna coupler control.
2. Remove the two screws which mount the right side of the coupler control to the transmitter rack. Swing coupler control out.

CAUTION

Exercise care to avoid damaging cables attached to rear of coupler control. Cables may be disconnected temporarily to facilitate servicing.

3. Remove dust cover from coupler control by releasing Dzus fasteners on each side and lifting cover clear.

PROCEDURE:

1. Inspect for dust or lint accumulation. Loosen dirt with duster brush and remove with vacuum cleaner, being careful to avoid damaging wires and components.
2. Inspect interior of coupler for loose or frayed insulation, damaged components, and wear caused by operation or vibration.
3. Wipe panel clean with a soft cloth moistened with detergent and water.

CAUTION

Do not let cleaning solution wash dirt into switch contacts and insulation.

4. Inspect panel knobs and switches for looseness or improper indexing. Check panel meters for broken glass, damaged pointers, or movements.
5. On completion, replace dust cover, latch Dzus fasteners. Secure coupler control to transmitter rack.

CORRECTIVE MEASURES:

For any action required other than cleaning or tightening loose knobs and hardware, notify the appropriate repair personnel.

SYSTEM	COMPONENT		M. R. NUMBER
Communications	AN/SRA-22		C-26 Q-1
SUB-SYSTEM	RELATED M. R.	RATE	TIME (HR)
Radio		ET3	0.2

MAINTENANCE REQUIREMENT:
Record control voltages at terminal board TB-5 of Antenna Coupler Group AN/SRA-22.

TOOLS, TEST EQUIPMENT, MATERIALS:
AN/PSM-4 or equivalent.

PRELIMINARY:

1. Remove the two screws which mount the right side of Antenna Coupler Control C-2698/SRA-22 to the transmitter rack; swing antenna coupler out.
2. Remove cover from terminal board TB-5.

TEST PROCEDURE:

1. Energize the transmitter low voltage power supply; allow 40 seconds for warm-up.
2. Operate the capacitor 12-position switch to each position. Hold the TUNE-OPERATE switch in the TUNE position and measure the control voltage between terminal 24 (ac common) and each of the TB-5 terminals indicated. Voltage should measure 115 volts ac ± 12 volts.

SWITCH POSITION	TERMINALS
1	2, 3
2	1, 2
3	1, 4
4	3
5	2
6	1
7	4
8	3, 4
9	2, 3, 4
10	1, 2, 3
11	1, 2, 4
12	1, 3, 4

3. Operate the CAPACITOR SERIES-SHUNT switch and measure the control voltage at TB-5 between terminal 24 (ac common) and the terminals indicated. Voltage should be 115 volts ac ± 12 volts. Hold TUNE-OPERATE switch in TUNE.

SWITCH POSITION	TERMINALS
SHUNT	6
SERIES	7

4. Operate the COIL and TAP control levers and measure the control voltage at TB-5 between terminal 24 and the terminals indicated. Voltage should measure 115 volts ac ± 12 volts. Hold TUNE-OPERATE switch in TUNE.

SWITCH POSITION	TERMINALS
COIL (MAX OR MIN)	22, 23
TAP (MAX OR MIN)	20, 21

5. Set the multimeter to the 50-volt dc scale and measure the voltage between terminals 12 (ground) and 5 (+24 volts) of TB-5. Voltage should measure 24 volts dc ± 4 volts.
6. Set the multimeter to the 25-volt dc scale and measure the voltage between terminal 12 (ground) and terminal 9 (+ 12 volts) of TB-5. Voltage should measure 12 volts dc ± 3 volts.

CORRECTIVE MEASURES:

1. If ac values are absent, check fuse 2F1, TUNE-OPERATE switch, and transmitter fuses.
2. If ac values are absent only on some pins, check associated control switches.
3. If dc values are absent (or read ac), check 2CR1, 2CR2, and related power supply circuitry.

SYSTEM	COMPONENT		M. R. NUMBER
Communications	AN/SRA-22		C-26 A-1
SUB-SYSTEM	RELATED M. R.	RATE	TIME (HR)
Radio		ET3	0.1

MAINTENANCE REQUIREMENT:
Verify calibration of FORWARD and REFLECTED power indication of R-F WATTMETER.

TOOLS, TEST EQUIPMENT, MATERIALS:
1. Dummy Load DA-91A/U or DA-88A/U.
2. Electronic Voltmeter AN/USM-143 or Hewlett-Packard 400H.

PRELIMINARY:

1. Connect antenna coupler control to dummy load through coaxial T-connector.
2. Energize electronic voltmeter.

TEST PROCEDURE:

1. Operate LOAD-ANT switch 2S1 to LOAD position. Energize and tune transmitter into dummy load according to standard tuning procedure.
2. Operate FORWARD-REFLECTED power switch 2S7 to 1000 FORWARD. Key transmitter and note power reading.
3. Operate electronic voltmeter to AC VOLTS position. Key transmitter and measure r-f voltage on open branch of coaxial T-connector. Calculate power using formula $P = \frac{E^2}{51.5}$ and compare with reading of r-f power meter 2M3.
4. Unkey the transmitter and interchange input connector 2P1 with output connector 2P2. Operate FORWARD-REFLECTED power switch 2S7 to the REFLECTED position.
5. Key transmitter and note power reading. The r-f power meter should read the same as in step 2.
6. Unkey the transmitter and restore input and output connections to proper jacks; remove T-connector from the output cable.

CORRECTIVE MEASURES:

1. If the r-f power meter reading obtained in step 5 does not agree with the reading obtained in step 2, check diodes 2CR-1, 2CR-2; metering resistors 2R-4 and 2R-5; and switch 2S-5. Otherwise 2C-1 and 2C-2 may be out of adjustment and require laboratory calibration.
2. If the power readings obtained in steps 2 and 5 above do not agree with the calculated value of step 3, check switch 2S-1, relay 2K-3, coaxial cables, and connectors.

SYSTEM	COMPONENT		M. R. NUMBER
Communications	AN/SRA-22		C-26 A-2
SUB-SYSTEM	RELATED M. R.	RATE	TIME (HR)
Radio		ET3	1.0

MAINTENANCE REQUIREMENT:
1. Clean and inspect Antenna Coupler CU-714/SRA-22.
2. Lubricate gear assembly of Antenna Coupler CU-714/SRA-22.

TOOLS, TEST EQUIPMENT, MATERIALS:
1. Cleaning solvent.
2. Lubricating oil, MIL-L-7870a.

PRELIMINARY:

1. De-energize and tag associated transmitter before performing work on Antenna Coupler CU-714/SRA-22.
2. Remove plug 1P7 and coaxial plug 1P8 from connections on antenna coupler unit.
3. Free the 12 captive screws holding the antenna coupler in the case. Pull the unit out of the case and remove it to a suitable work location.

PROCEDURE:

1. Make a visual check for loose, worn, or broken hardware; heat damage; and corrosion.
2. Check electrical connections to 1J7 and 1J8 on front, and 1P10 at rear of coupler unit for evidence of damage. Clean as necessary.
3. Apply two drops of MIL-L-7870a oil to the oil wick (373) (see figure 6-1) in small hole on planetary gear assembly of potentiometer R6.

Note

Only the gears and bearings lubricated by the oil wick require lubrication.

4. On completion of cleaning and lubricating:
   a. Return the antenna coupler unit to the case, making sure that 1P9 and 1P10 line up properly and cable to blower motor section is dressed clear of coupler unit.
   b. Secure unit to the case with the 12 captive screws, making sure that gasket seats properly.
   c. Replace 1P7 and 1P8 in their connections and seal securely against moisture.
   d. Pressurize the coupler unit and check for leaks (refer to Section 7-4).

CORRECTIVE MEASURES:

1. If inspection indicates need for replacement of a part, refer to appropriate sections of instruction book for procedure.
2. If leaks exist on checking pressurization, gaskets may be sealed with Adhesive Sealant RTV-102 (FSN KE 8040-225-4548) or replaced with 1/8-inch gasket material (KZ 5330-244-9277). See figure 7-7.

CHAPTER 4

FUNCTIONAL DESCRIPTION

4-1. OVER-ALL FUNCTIONAL DESCRIPTION.

Antenna Coupler Group AN/SRA-22 is designed to provide an impedance match between a 50-ohm coaxial transmission line and a wire or whip antenna 35 to 50 feet in length. The antenna coupler group is limited to use with radio equipment operating in the 2- to 32-megacycle frequency range and with transmitter power output of not more than 1000 watts on a short-term duty cycle or 350 watts continuously. Figure 4-1 is a block diagram of the antenna coupler group. Antenna Coupler Group AN/SRA-22 consists of Antenna Coupler CU-714/SRA-22 and Antenna Coupler Control C-2698/SRA-22. The Antenna Coupler AN/SRA-22 consists of Antenna Coupler CU-714/SRA-22, Antenna Coupler Control C-2698/SRA-22 and interconnection terminal board TB-5. The antenna coupler depends entirely on the coupler control sequence to accomplish tuning and loading operation.

Operation of COIL, TAP, and CAPACITOR drives is enabled by holding the TUNE-OPERATE switch in the TUNE position. The coil drive switch in the coupler control unit energizes the coil motor in the antenna coupler unit and drives a variable tapped coil. The variable tapped coil consists of a windup coil in which a silver ribbon is wound from a metal drum onto a ceramic drum. To increase the inductance, the number of turns of the silver ribbon on the ceramic drum is increased; to decrease the inductance, the silver ribbon is wound from the ceramic drum to the metal drum. The tap drive switch in the coupler control unit energizes a second motor in the antenna coupler unit which drives a contact that makes a sliding connection with the ribbon on the ceramic drum. The contact is mounted on a ring assembly which rotates around the coil, using the ribs of the ceramic drum as a helical guide. With the two motors driving the drums and the tap, it is possible to secure a variable inductor having a variable tap position. Using this type of variable inductive element, an extremely wide range of high Q inductance can be obtained without self-resonances. The relative positions of the coil and tap are indicated by position circuits consisting of meters and receiving potentiometers in the coupler control, and sending potentiometers in the antenna coupler unit. The sending potentiometers are connected to the tap and coil drives in such a manner that a voltage is developed which is a function of the coil and tap positions. The relative displacement of sending and receiving potentiometers is compared on panel meters of the coupler control unit. By operating the tap and coil drive switches until the sending potentiometers produce a null or "0" reading on their respective meters, the coil and tap positions can be read out on their receiving potentiometers.

The 12-position CAPACITOR switch in the coupler control unit energizes a third motor which drives a variable vacuum capacitor in the antenna coupler unit to a predetermined position. The variable vacuum capacitor has a range of 5 to 465 picofarads and is placed in shunt or series with the antenna.

Resonance of the antenna system is accomplished when the capacitive current from the tap through the portion of the coil above the tap to the antenna equals the inductive current through the portion of the coil from tap to ground. Proper load impedance is presented to the coaxial transmission line when the coil and capacitor in the antenna coupler unit reduce the phase angle to unity and the tap is at a position on the coil so that the impedance of the antenna system (which may reach several thousand ohms) is transformed to 50 ohms.

In cases where tuning cannot be accomplished by operation of the coil alone, the variable vacuum capacitor is placed either in shunt or in series with the antenna and operated through its range to obtain a tuning point.

4-2. FUNCTIONAL SECTIONS.

a. COUPLER CONTROL C-2698/SRA-22.

(1) TAP AND COIL INDICATORS. - Refer to figure 4-2 for the simplified schematic diagram. The position indicators (TAP AND COIL) consist of receiving potentiometers in the coupler control and sending potentiometers in the antenna coupler. The sending potentiometers are connected to individual tap and coil drives by gears so that tap and coil positions are immediately determined. When resistance settings of potentiometers 2R1 and 1R6, or 2R2 and 1R7 are equal, indicator meters 2M1 or 2M2 will read zero. Diodes 2CR3 and 2CR4 on TAP indicator meter, and diodes 2CR5 and 2CR6 on COIL indicator meter are used to prevent excessive overload current from damaging the meters. Resistors 2R4 on TAP indicator meter and 2R5 on COIL indicator meter provide bias for the diodes. Capacitors 2C8 and 2C9 are used for r-f protection for meters 2M1 and 2M2.

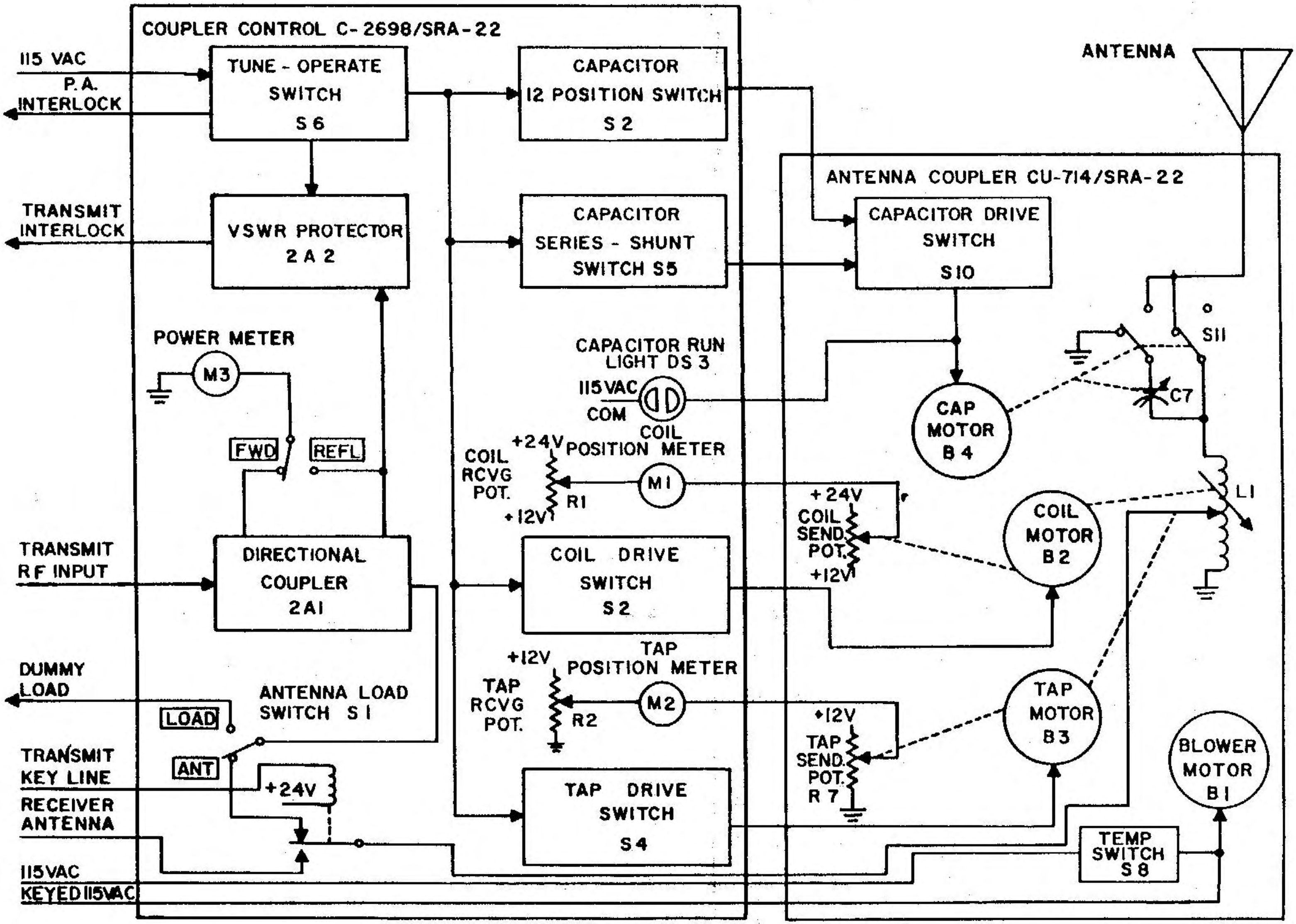


Figure 4-1. Antenna Coupler Group AN/SRA-22, Block Diagram

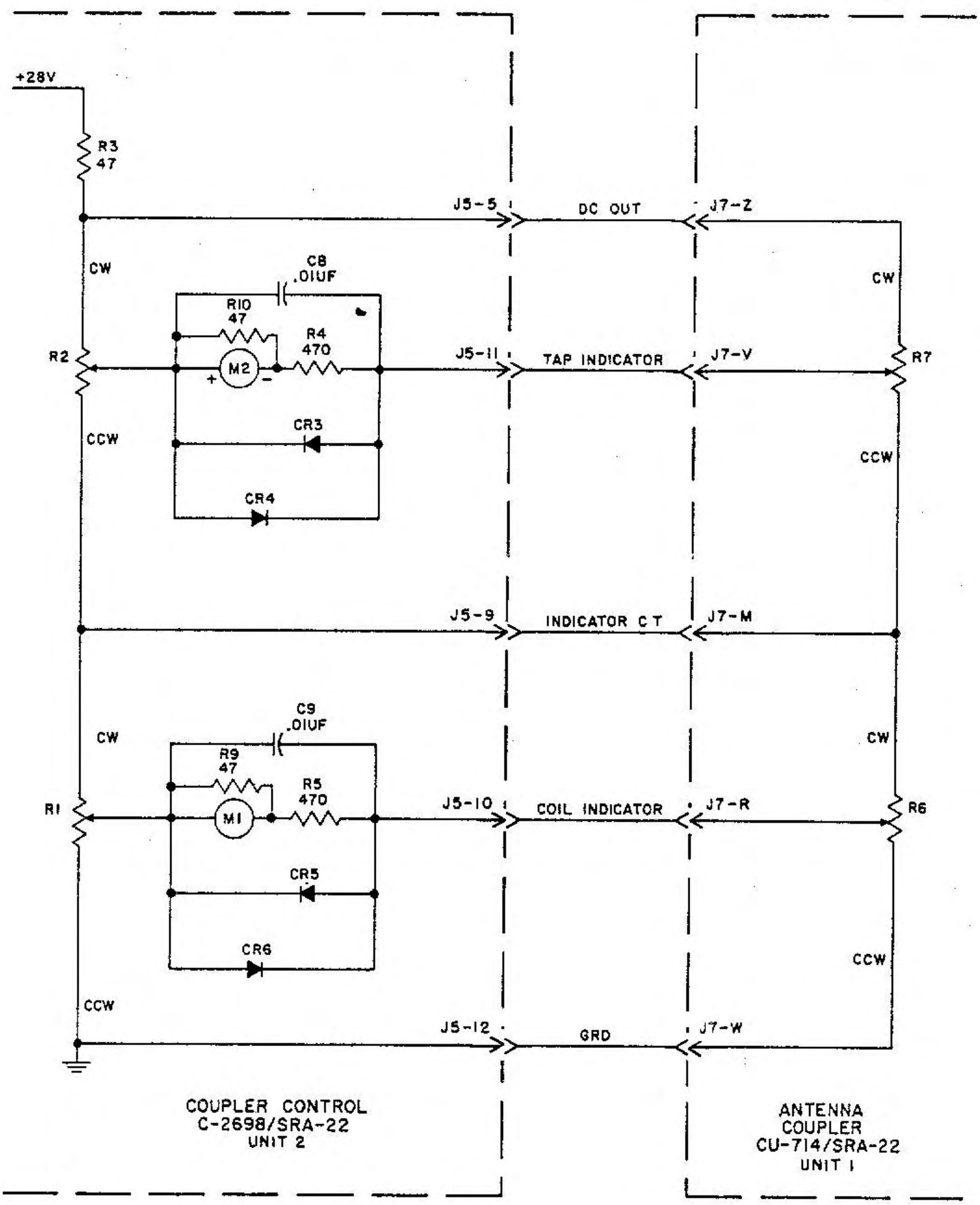


Figure 4-2. TAP and COIL Indicator Meter Circuits, Simplified Schematic Diagram

(2) COIL COARSE TUNE-FINE TUNE. - Refer to figure 4-3 for simplified schematic diagram. When switch 2S3 is set to COARSE TUNE (switch contacts 4 and 9, or 5 and 18), 115 volts ac is applied through contacts 4 and 12 of relay 2K2 to common of switch 2S3, either through contact 5 of switch 2S3 and limit switch 1S12B to terminal 4 of coil motor 1B2 and phase-shifted through capacitor 1C9 to terminal 3, or through contact 9 of switch 2S3 and limit switch 1S12A to terminal 3 of coil motor 1B2 and phase-shifted through capacitor 1C9 to terminal 4. When switch 2S3 is set to FINE TUNE (switch contacts 1 and 6, or 3 and 8), one end of capacitor 2C3 receives a ground through contacts 1 or 3 of switch 2S3. Relay coil 2K2 receives +28 volts through contacts 4 and 12 of relay 2K1, causing relay 2K2 to be energized by the charging current of capacitor 2C3. When capacitor 2C3 is fully charged, relay 2K2 will become de-energized, causing the charge present in 2C3 to be applied through contacts 2 and 11 of relay 2K2 to the coil of relay 2K1, energizing relay 2K1 by discharging capacitor 2C3 through the coil. When contacts 3 and 11 of relay 2K1 complete the circuit, resistor 2R8 accelerates the discharge of capacitor 2C3.

When capacitor 2C3 is discharged, relay 2K1 will become de-energized. Each time relay 2K2 is de-energized, coil motor 1B2 in the antenna coupler unit will have 115 volts ac applied to it in pulses through contacts 6 or 8 of switch 2S3 and the applicable limit switch. The short pulses allow the coil motor to operate for short durations, giving fine-tune control over the coil. Capacitor 2C4, which is across contacts 4 and 12 of relay 2K2, is used as an arc suppressor for the relay contacts.

Operation of the circuit with COIL switch 2S3 on FINE TUNE MIN (contacts 1 and 6) is the same as for FINE TUNE MAX (contacts 3 and 8) except that pulsed 115 volts ac is applied directly to terminal 4 instead of terminal 3 on coil motor 1B2. This causes the coil motor, operating through phase-shift capacitor 1C9, to reverse direction of rotation.

(3) ELECTRICAL LIMIT SWITCHES. - Coil electrical limit switch 1S12 consists of two sets of circuit-opening contacts mechanically driven through a gear train by coil motor 1B2. It is set to interrupt the energizing path of coil motor 1B2 just prior to when the coil reaches its mechanical limits. These limit switches protect the motor from being damaged should control switch 2S3 be held in the energized position after the coil has reached its mechanical limit. To drive the motor off the limit switch, it is necessary only to hold control switch 2S3 in the opposite direction. This will apply the 115 volts ac to the motor through the opposite limit switch and through phase-shift capacitor 1C8 in the opposite direction, causing the motor to rotate in the reverse direction.

Tap electrical limit switch 1S13 operates in a similar manner, except that it is driven through a gear train by tap motor 1B3 and is set to open the energizing path to the motor as the tap reaches its lower limit. Tap electrical limit switch 1S14 is a microswitch that is opened by the tap assembly as it reaches its upper limit.

(4) TAP COARSE TUNE-FINE TUNE. - The operation of the circuit with switch 2S4 on TAP COARSE TUNE-FINE TUNE is the same as for COIL COARSE TUNE-FINE TUNE, except that tap motor 1B3 is operated in conjunction with phase-shift capacitor 1C8 and limit switches 1S13 and 1S14.

(5) TWELVE-POSITION CAPACITOR SWITCH 2S2 AND CAPACITOR SERIES-SHUNT SWITCH 1S9. - For the operation of the 12-position CAPACITOR switch and the CAPACITOR SERIES-SHUNT switch, refer to paragraph 4-2b(1).

(6) DIRECTIONAL COUPLER. - Refer to figure 4-4 for the simplified schematic diagram. Transmission line current I flows through the line center conductor and through the center of a toroid core. The conductor forms the primary and the coil the secondary of a toroidal transformer 2A1T1. Induced toroid current produces a voltage that divides equally across resistors 2A1R1 and 2A1R2. This results in two equal voltages, E_1 and E_2, across the resistors. Since the junction of resistors 2A1R1 and 2A1R2 is grounded, E_1 and E_2 are opposite in phase and proportional to line current I. Line voltage E_1 is applied across two capacity dividers, 2A1C1-C3 and 2A1C2-C4, resulting in two equal voltages of the same phase, E_3 and E_4.

When the transmission is mismatched (terminated in an impedance other than to 50 ohms), E_1 and E_2 represent the vector sum of two components, one proportional to the current of the forward wave, and the other proportional to the current of the reflected wave. Similarly, E_3 and E_4 represent the vector sum of forward and reflected wave voltage components. Capacitors 2A1C1 and 2A1C2 are factory adjusted so that the magnitude of the forward voltage and current components are identical; also, the reflected components are equal. The settings of 2A1C1 and 2A1C2 are correct for a 50-ohm transmission line only.

The phase relationship among the various components is such that the r-f voltages across rectifier 2A1CR1 (E_f) are equal to the arithmetic sum of the two equal forward components, while the r-f voltages across rectifier 2A1CR2 (E_r) are equal to the arithmetic sum of the two equal reflected components.

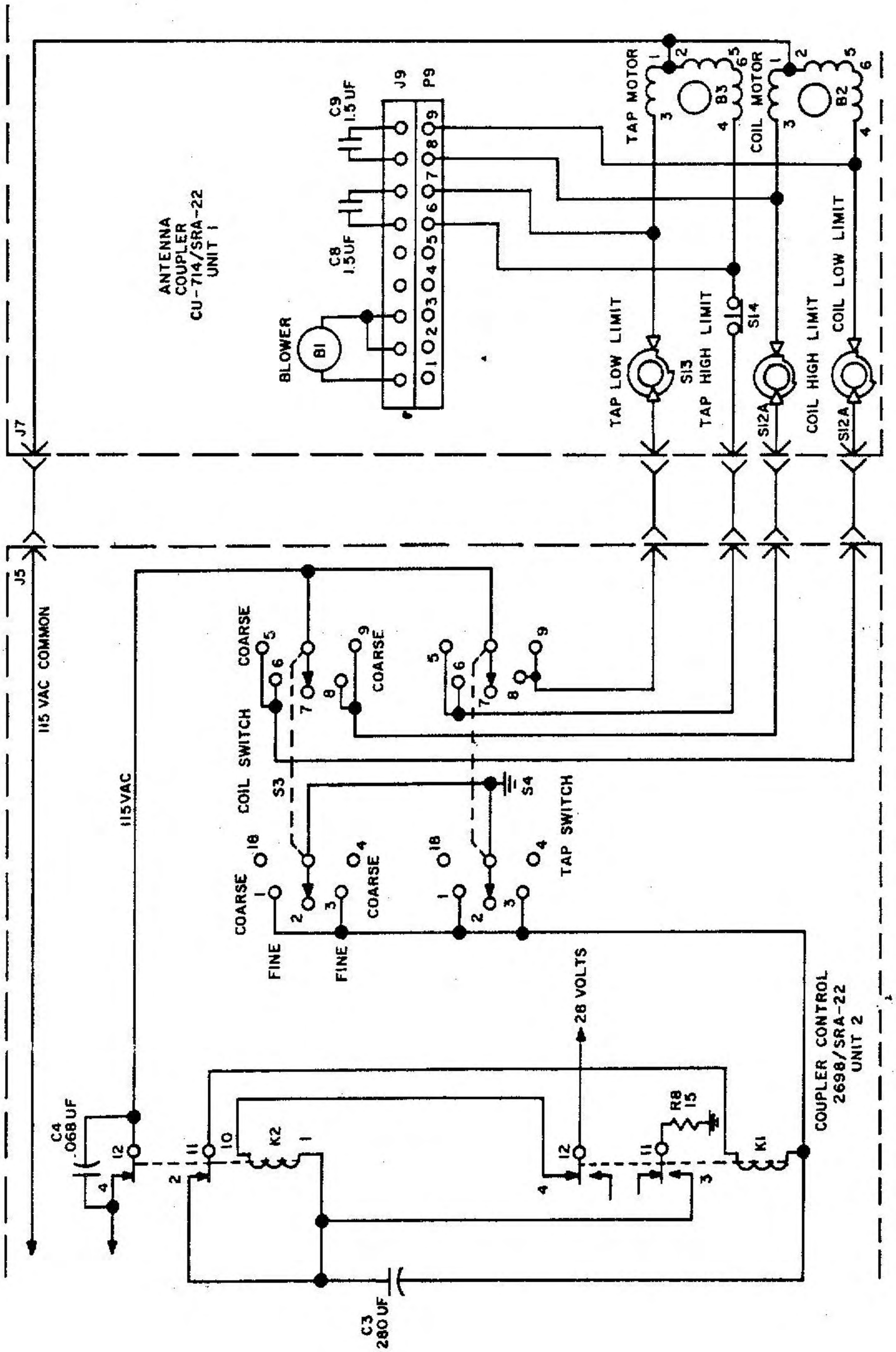


Figure 4-3. Coil-Tap Tuning Circuit, Simplified Schematic Diagram

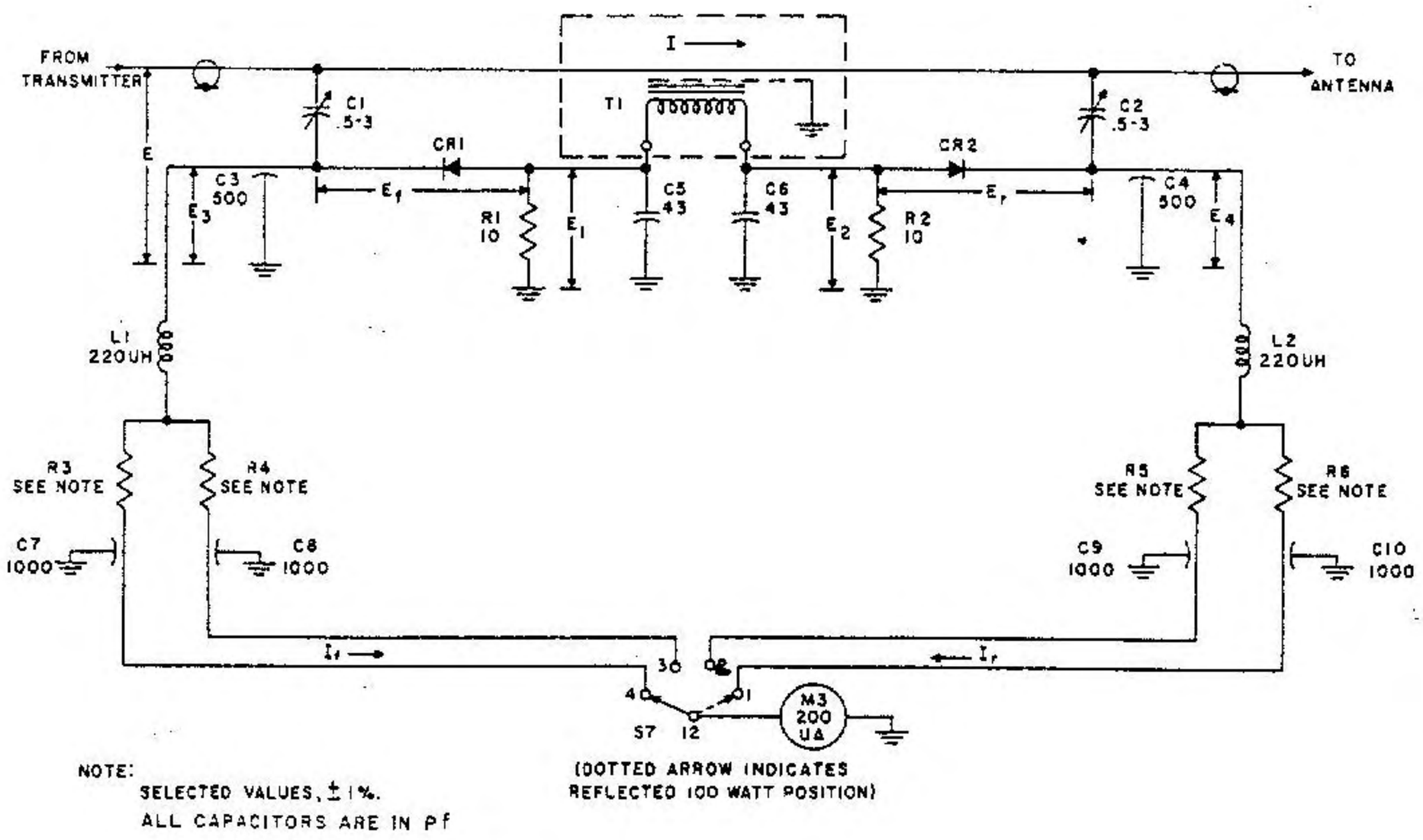


Figure 4-4. - Directional Coupler 2A1, Simplified Schematic Diagram

The r-f voltages, E_f and E_r, are rectified and filtered by 2A1CR1, 2A1CR2, 2A1C3, and 2A1C4 to produce dc currents I_f and I_r through meter 2M3. The meter scale is calibrated in such a way that I_f produces a scale reading proportional to forward power, while I_r produces a scale reading proportional to reflected power. Calibrating resistors 2A1R4-R5 (1000-watt scale), 2A1R3-R6(100-watt scale) are selected so that I_f and I_r give accurate indications of the two power levels. Accuracy of the r-f power meter is maintained over a frequency range of 2.0 to 30.0 megacycles on both the inductive coupled and capacitively coupled elements. In the inductive element, the increase with frequency of the induced voltage is canceled by the voltage drop in the toroidal coil because of the increase with frequency of the inductive reactance. In the directly coupled capacitive element, the ratio of the capacitive reactances in the voltage divider remains constant even though the reactance varies with frequency. Capacitors 2A1C5 and 2A1C6 compensate for the residual series inductance of resistors 2A1R1 and 2A1R2.

Real power is the output of the transmitter. When a transmission line is perfectly matched, reflected power is zero and real power is equal to forward power. When the line is mismatched, the phase relationship between the forward power and the reflected wave components causes the apparent forward power to increase by an amount equal to the magnitude of the reflected power. Since the reflected power cancels a portion of the forward power at the transmitter terminals, the real power in the line is equal to the difference between forward and reflected power or: REAL POWER=FORWARD POWER - REFLECTED POWER.

(7) TRANSFER RELAY AND LOAD-ANT SWITCH. - The antenna is connected to the receiver through the tuned circuit in Antenna Coupler CU-714/SRA-22 to normally closed contacts on the transfer relay, 2K3, which is in Coupler Control C-2698/SRA-22. Radio Set AN/XXX feeds through the r-f power meter coupler to the common contact of LOAD-ANT switch 2S1. When switch 2S1 is in the LOAD position, the transmitter will feed into an external load. When in ANT position, the transmitter will feed the antenna through transfer relay 2K3 contacts through tuned circuit to the antenna. Transfer is provided by transfer relay 2K3 which is operated by grounding the key line in Radio Set AN/XXX.

When the keying circuits are released, 2K3 de-energizes and returns the antenna circuit to the receiver. Contacts 3 and 4 on transfer relay 2K3 are connected in the bias circuit of the r-f driver amplifier of Radio Set AN/XXX. When Radio Set AN/XXX is keyed, transfer relay 2K3 is energized and contacts 3 and 4 on the transfer relay are closed, removing the blocking bias to the driver amplifier and allowing r-f output. If Radio Set AN/XXX is keyed and the transfer relay should not energize, the power amplifier of the radio set will have no r-f input or output, thus protecting the transmitter from damage that would result by operating with a no-load condition.

(8) TUNE-OPERATE SWITCH. - When the TUNE-OPERATE switch is held in the TUNE position, the antenna coupler positioning circuits are enabled by the application of 115 volts ac. In addition, when the TUNE-OPERATE switch is in the TUNE position, the AN/XXX output is limited to a reduced "tune power." When the TUNE-OPERATE switch is released to the OPERATE position, the antenna coupler positioning circuits are disabled to prevent accidental de-tuning.

(9) VSWR PROTECTOR. - If, during full operation, the reflected power exceeds approximately 30 watts, the VSWR protector circuit will automatically disable the transmitter and cause the CAPACITOR run light to blink. Refer to figure 4-5 for the simplified schematic diagram.

Positive 28 volts is applied through relay 2A2K1 to the anode of Silicon Controlled Rectifier (SCR) 2A2CR4. Even though the SCR is forward biased, it remains non-conducting (acting as a thyratron) until triggered. Diode 2A2CR1, Zener diode 2A2CR2, resistors 2A2R1 through 2A2R4, and thermistor 2A2RT1 constitute a regulated negative power supply that applies -0.5 volt with respect to ground to the SCR cathode. When the reflected power seen by the directional coupler exceeds approximately 30 watts, sufficient voltage is developed in the directional coupler 2A1 and applied to the SCR gate, through transient filter consisting of resistor 2A2R5 and capacitor 2A2C1, to trigger the SCR into conduction. This energizes relay 2AK1, which will remain energized until the +28 volt supply is interrupted by placing the TUNE-OPERATE switch in TUNE. Energized relay 2A2K1 opens contacts 2 and 8, breaking transmitter interlock number 2 line. The keying path for driver stage blocking bias is thereby opened, causing the driver stage to remain cut off so that transmitter power output falls to zero.

Diode 2A2CR3, capacitor 2A2C2, resistor 2A2R6, and CAPACITOR run lamp 2DS3 (a neon lamp) constitute a relaxation oscillator circuit. Energized contacts 4 and 7 of relay 2A2K1 switch CAPACITOR run lamp across capacitor 2A2C2, causing the CAPACITOR run lamp to blink. This indicates that the reflected power reached approximately 30 watts and the VSWR protector circuit has been actuated. The transmitter will remain disabled and the CAPACITOR run lamp will continue to blink until the VSWR protective circuit has been reset.

To reset the VSWR protective circuit, the TUNE-OPERATE switch is held in the TUNE position. This interrupts the energizing current to relay 2A2K1 and SRC diode 2A2CR4 and permits the transmitter to function in a TUNE condition. At the same time, the antenna coupler can be retuned to eliminate the excessive VSWR which caused the protector device to be tripped initially. After the antenna coupler is retuned, release the TUNE-OPERATE switch to the OPERATE position to place the VSWR protective device back in operation.

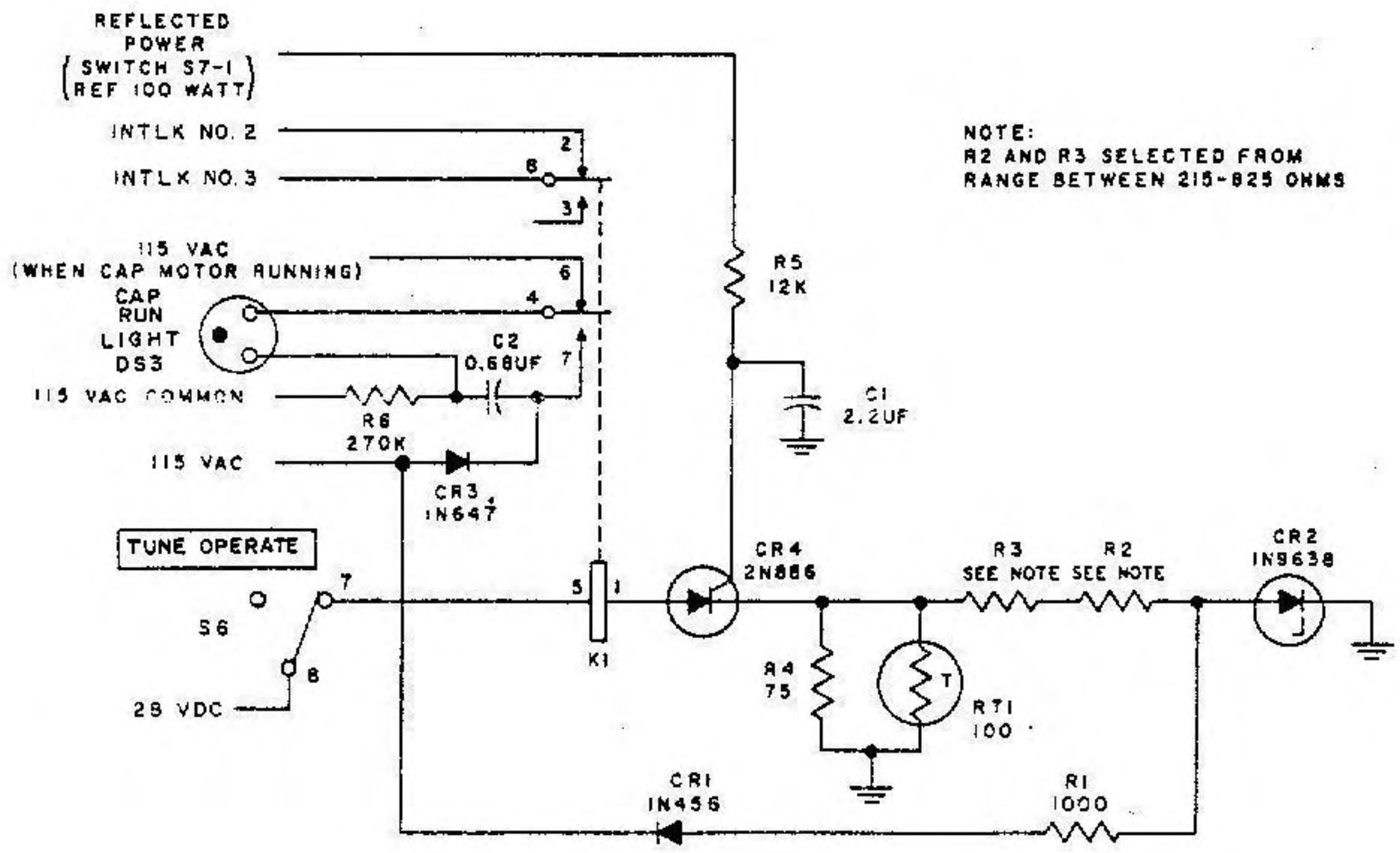


Figure 4-5. VSWR Protector 2A2, Simplified Schematic Diagram

b. ANTENNA COUPLER CU-714/SRA-22.

(1) CAPACITOR DRIVE CIRCUIT. - The CAPACITOR switch, located in the coupler control unit, is a 12-position wafer switch which causes the variable vacuum capacitor to be driven to a predesignated position. Refer to figure 4-6 for the simplified schematic diagram.

When one of the 12-positions on the switch is selected, 115 volts ac is applied through the common contact of switch 2S2, through binary combinations of contacts 7, 8, 9, and 10, depending upon which position is selected, to switch 1S10 contacts 7, 8, 9, or 10 in the antenna coupler unit. From the common contacts of switch 1S10, the 115 volts ac is applied to the two common contacts of limit switch 1S11 through contacts 2 or 3 to capacitor motor 1B4. The position of limit switch 1S11, in conjunction with phase shift capacitor 1C5, will determine the direction in which capacitor motor 1B4 will rotate.

The capacitor is driven from minimum to maximum capacitance, or the reverse, by capacitor drive motor 1B4. Switch 1S9, which is mounted on the same shaft as limit switch 1S11, determines whether the capacitor is in series or shunt with the antenna. The switch shaft is spring operated by a cam on the 192° sector gear. When shunt capacitance is selected, the capacitor is driven by the motor from minimum to maximum in shunt with the antenna. On reaching position 12, if series capacitance is selected by switch 2S5, the motor will run beyond position 12 in the maximum capacitance direction until the sector gear cam operates limit switch 1S11. This causes SERIES-SHUNT switch 1S9 to operate and place the capacitor in series with the antenna, and, at the same time, reverse the direction of capacitor drive motor 1B4. The motor will run toward the minimum capacitance until the selected capacitor position is reached. As CAPACITOR switch 2S2 is operated toward position 1, capacitor motor 1B4 drives capacitor 1C7 toward minimum capacitance. Selection of the SHUNT position of switch 2S5 causes the capacitor motor to run below position 1 until switches 1S9 and 1S11 operate, placing the capacitor in shunt with the antenna and reversing the direction of capacitor motor 1B4.

If the capacitor is in shunt with the antenna and a lesser value of capacitance is selected, or the capacitor is in series with the antenna and a greater value of capacitance is selected, the capacitor motor must drive in the direction opposite to that selected to its extreme limit, operate switches 1S9 and 1S11, reverse direction, and drive to the opposite limit. This will cause limit switch 1S11 to operate again, returning series-shunt switch 1S9 to its original position and again reversing direction of motor 1B4. Drive motor 1B4 will now run to the new position selected by CAPACITOR switch 2S2.

CAPACITOR RUN light 2DS3 is connected from the 115-volt ac common through a 270K resistor to the common contact of switch 1S10 on the antenna coupler. Capacitor drive switch 1S10 is driven through the 192° sector gear by capacitor drive motor 1B4. When switch 1S10 is driven to the position to break the circuit, the capacitor drive motor 1B4 will stop and the CAPACITOR RUN light will go out.

(2) TUNING AND LOADING. - In general, the following conditions apply to Antenna Coupler CU-714/SRA-22 operation. When the antenna appears capacitive and less than 50 ohms, no additional capacity is necessary to resonate the antenna. When the antenna appears inductive and less than 50 ohms, series capacity is necessary to resonate the antenna. When the antenna appears inductive and more than 50 ohms, shunt capacity is necessary to resonate the antenna. Wire and whip antenna reactance periodically changes sign many times through the frequency range of 2.0 to 30.0 megacycles. Refer to figure 2-1. Observe that, at 6.0 megacycles (in this particular example), the antenna presents nearly 50 ohms resistive impedance with no reactance. If means were provided to bypass the tuner, it could be eliminated at this frequency. At all other frequencies, various combinations of inductance and capacitance are required.

Tuning and loading are performed by manually operating the controls on the front panel of Coupler Control C-2698/SRA-22 for a minimum of reflected power and a high forward power as indicated on the r-f power meter in the coupler control. Refer to figure 3-1 for relationship of SWR to incident and reflected power.

CAUTION

Keying the transmitter during any operation that causes series-shunt switch 1S9 to be operated can result in damage to the transmitter or tuner. The series-shunt switch is operated in the following circumstances.

1. Operating Coupler Control SERIES-SHUNT switch 2S5 from SERIES to SHUNT or vice versa.
2. While in SERIES, selecting a larger value of capacity.
3. While in SHUNT, selecting a smaller value of capacity.

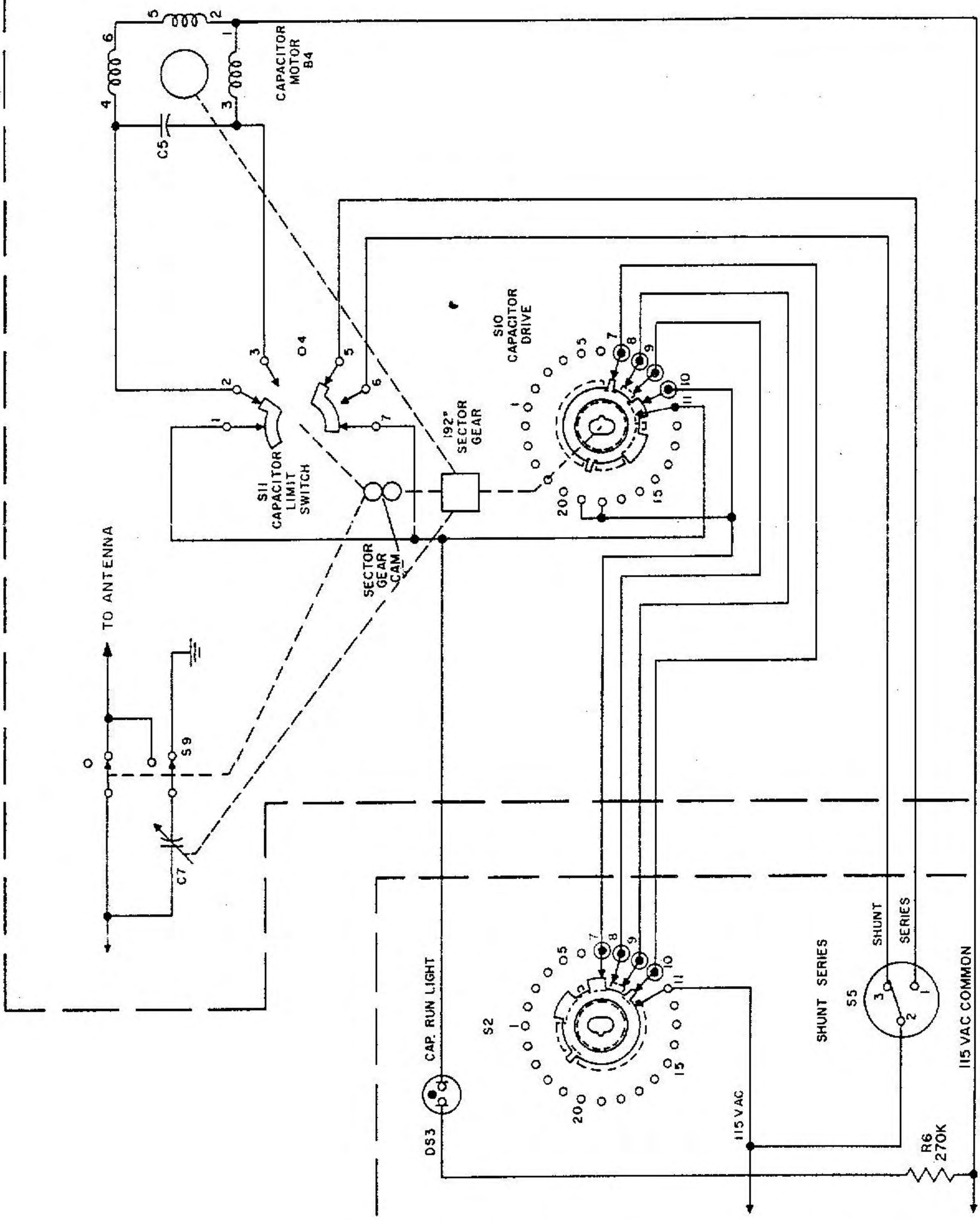


Figure 4-6. Capacitor Drive, Simplified Schematic Diagram

(3) BLOWER. - Keyed 115 volts ac is applied to pin 3 of jack 1J9 on the blower assembly when Radio Set AN/XXX is transmitting. Pin 2 of jack 1J9 is supplied with 115 volts ac through a temperature switch, 1S8. This switch does not operate until the temperature in the antenna coupler unit reaches 65° C (149° F), completing the circuit to the blower motor. The enclosed air of the antenna coupler is circulated by the blower when the transmitter is keyed (P. A. plate voltage applied) or when the temperature inside the antenna coupler exceeds 65° C (149° F). The enclosed air is forced through the double wall of the case and cooled by natural radiation and convection.

CHAPTER 5

TROUBLESHOOTING AND REPAIR

5-1. GENERAL INFORMATION.

This section contains over-all troubleshooting, functional section troubleshooting, and maintenance information for Antenna Coupler Group AN/SRA-22. When performing troubleshooting outlined in this section, refer to the following schematic diagrams:

Figure 5-7. Coupler Control C-2698/SRA-22, Schematic Diagram.
Figure 5-8. Antenna Coupler CU-714/SRA-22, Schematic Diagram.
Figure 7-3. Interconnecting Diagram of Antenna Coupler Group AN/SRA-22 with Radio Set AN/XXX.
Figure 7-4. Interconnecting Diagram of Antenna Coupler Group AN/SRA-22 for Use as Separate Unit.

5-2. TEST EQUIPMENT AND SPECIAL TOOLS.

Table 5-1 lists the test equipment required. All special test assemblies required to test Antenna Coupler Group AN/SRA-22 are listed in table 5-2.

TABLE 5-1. TEST EQUIPMENT REQUIRED

NAME	JAN TYPE DESIGNATION	ALTERNATE	USE
Multimeter	AN/PSM-4	Simpson 260	Voltage and resistance measurement
Electronic Voltmeter	AN/USM-143	Hewlett-Packard 400H	R-f volts measurement
R-f Load	DA-91A/U	DA-88A/U	Non-reactive transmitter load

TABLE 5-2. SPECIAL TEST ASSEMBLIES

BUSHIPS DRAWING	NOMENCLATURE	APPLICATION
RE66C2145	Antenna Simulator (35-ft whip)	Non-radiating antenna substitute
	Radio Set AN/XXX	Power and control testing

5-3. OVER-ALL TROUBLESHOOTING.

a. PRELIMINARY CHECK. - The following sensory observations should be made as the first step in localizing the cause of trouble.

(1) Check fuse on Coupler Control C-2698/SRA-22 front panel. Refer to figure 2-2 for fuse location and table 2-3 for symptoms of probable fuse failure.

(2) Inspect plugs to connectors 2J1 through 2J6 on rear of coupler control for proper contact to connectors.

(3) Inspect plugs to connectors 1J7 and 1J8 on antenna coupler for proper contact to connectors.

(4) Inspect terminal board TB-5 for loose or poor connections.

(5) Inspect connection from antenna to antenna coupler terminal.

(6) Look for any physical damage to cables or equipment.

b. CONTROL SETTINGS. - All controls on the front panel of Coupler Control C-2698/SRA-22 should be set to the "home" positions indicated in paragraph 2-3b(1).

c. TYPICAL MALFUNCTIONS. - Before performing troubleshooting checks on the AN/SRA-22, some initial tests should be made to ascertain whether the difficulty lies in the antenna coupler or in related equipments and cables. Typical malfunctions, and diagnostic checks to isolate the cause, are outlined below:

(1) High VSWR indicated on reflected power meter; AN/SRA-22 cannot reduce.

(a) If high VSWR persists while on dummy load, check:

1. Coaxial connector 2P12 and cable for shorts and opens.
2. LOAD-ANT switch 2S1 for operation, defective contacts.

(b) If VSWR is low in LOAD position but remains high in ANT position, check:

1. Coaxial connector 2J3 and cable for shorts and opens.
2. Antenna transfer relay 2K3 proper switching contacts and coaxial connections.
3. Antenna, antenna insulator, and antenna lead from coupler to antenna.
4. Ground strap to CU-714/SRA-22 case and grounding spring (36) to metallic drum (see figure 6-1).

(2) AN/SRA-22 inoperative; COIL, TAP, and CAPACITOR drives do not work.

(a) If fuse 2F1 is good, check:

1. Ac power being supplied by associated transmitter (low voltage power supply turned on).
2. Plugs 2P5 and 2P6 making proper contact in rear of coupler control (115 volts ac between terminals 13 and 24 on TB-5).

(b) If fuse 2F1 blows repeatedly, check:

1. If fuse blows immediately, pull plug 2P5 free. If this clears fuse trouble, look for defective blower or shorted internal and external cables of antenna coupler. Otherwise, trouble is in the coupler control.
2. If fuse blows on operating TUNE-OPERATE switch 2S6 to TUNE position (plug 2P5 in place), trouble is indicated in COIL, TAP, or CAPACITOR drive circuits, or cable to antenna coupler.

5-4. FUNCTIONAL SECTION TROUBLESHOOTING.

a. ANTENNA COUPLER GROUP AN/SRA-22. - A malfunction exists either in Antenna Coupler Group AN/SRA-22 or in the antenna when a high VSWR persists, as indicated on the reflected r-f power meter, which the antenna coupler group cannot reduce. When it is determined that a malfunction exists in the antenna coupler group, the next step is to localize the trouble to a functional section. The functional sections of the antenna coupler group are the indicating sections, motor control sections, r-f power section, and low voltage power supply section. However, since the functional sections are distributed between the coupler control unit and the antenna coupler unit, it is simpler to make sure that the trouble is not in the coupler control unit before depressurizing and dismantling the antenna coupler unit.

To localize the faulty functional section, apply power to Antenna Coupler Group AN/SRA-22 by energizing the associated transmitter low voltage supply.

b. INDICATING CIRCUITS. - On Coupler Control Unit C-2698/SRA-22, hold the TUNE-OPERATE switch in the TUNE position and operate the COIL COARSE TUNE switch in the COARSE TUNE MAX position. The meter should swing from right deflection to left deflection to indicate coil movement. If the meter remains centered, power supply trouble is indicated. First verify that the primary is satisfactory by checking fuse 2F1, then operating CAPACITOR 12-position switch and noting that CAPACITOR run lamp lights. Further isolate the trouble by checking with a multimeter for the following dc voltages on terminal board TB-5 between terminal 12 (ground) and the indicated terminals.

Note

On all units fitted with terminal board TB-5, remove the protective cover to make measurements. Pin 1 of plug P5 corresponds to terminal 1 of TB-5, and so on.

CAUTION

This terminal board (TB-5) has 115 volts ac applied.

TERMINAL	INDICATION	PROBABLE CAUSE IF INDICATION IS ABSENT
5	+24 volts dc	Bad +24 volts dc rectifier (check 2CR1, 2CR2, 2R7, 2R3, and 2C12 in coupler control). Also check for grounds on cable and plugs.
9	+12 volts dc	If high, check coil receiving potentiometer 2R1; if low, check tap receiving potentiometer 2R2 in coupler control. If absent (and terminal 5 is all right), check for grounds on cable and plugs.
10	0 to +12 volts dc, varied by COIL COARSE TUNE switch	If voltage is not varied by COIL TUNE controls, trouble is indicated in the coil drive circuits in the coupler control. If voltage is absent (and terminal 5 is all right), trouble is indicated in coil transmitting potentiometer 1R6 in antenna coupler unit.
11	+12 to +24 volts dc, varied by TAP COARSE TUNE switch	If voltage is not varied by TAP TUNE controls, trouble is indicated in tap drive circuits in the coupler control. If voltage is absent (and terminal 5 is all right), trouble is indicated in tap transmitting potentiometer 1R7 in antenna coupler unit.

If the above checks are normal and the meter (one or both) remains centered, check the meter itself for an open, and the overload protective diodes 2CR3 through 2CR6 in the coupler control. If the meter remains fully deflected, try centering with the receiving potentiometer in the coupler control. A sudden "flop-over" indicates an open receiving potentiometer. Centering at a receiving potentiometer extremity indicates a possible open transmitting potentiometer in the antenna coupler.

c. MOTOR CONTROL CIRCUITS. - On Coupler Control C-2698/SRA-22, hold TUNE-OPERATE switch in TUNE position and set COIL COARSE TUNE-FINE TUNE switch to COARSE TUNE MAX position. The coil meter should swing from right deflection to left deflection to indicate coil movement. If no deflection is obtained and both the primary power supply and indicating circuits are satisfactory, check for 115 volts ac between terminal 24 (ac common) and the following terminals of terminal board TB-5.

TERMINAL	INDICATION	PROBABLE CAUSE IF INDICATION IS ABSENT
22 and 23	115 volts ac	If voltage is absent, check coil switch 2S3, relay 2K2, switch 2S6, and fuse 2F1. If voltage is present, check connector 1J7 and cable between TB-5 and antenna coupler. If cable is all right, check switch 1S12, capacitor 1C9, and meter 1B2. If trouble still exists, check for excessive mechanical friction or damage in gear train.
22 and 23	Pulsed 115 volts ac when COIL COARSE TUNE-FINE TUNE switch is in FINE TUNE position.	If voltage is absent, check capacitor 2C3, relays 2K1 and 2K2, and the components listed in the previous step.
20 and 21	115 volts ac when TAP COARSE TUNE-FINE TUNE switch is in COARSE TUNE position.	If voltage is absent, check tap switch 2S4, relay 2K2, switch 2S6, and fuse 2F1. If voltage is present, check connector 1J7 and cable between TB-5 and antenna coupler. If cable is all right, check switches 1S13 and 1S14, capacitor 1C8, and motor 1B3. If trouble still exists, check for excessive mechanical friction or damage in gear train.

TERMINAL	INDICATION	PROBABLE CAUSE IF INDICATION IS ABSENT
20 and 21	Pulsed 115 volts ac when TAP COARSE TUNE-FINE TUNE switch is in COARSE TUNE position.	If voltage is absent, check capacitor 2C3, relays 2K1 and 2K2, and the components listed in the previous step.

Consecutively operate the 12-position CAPACITOR switch 2S2 on the coupler control to each position, holding the TUNE-OPERATE switch in the TUNE position. Measure the control voltage between terminal 24 (ac common) and each of the following terminal board TB-5 terminals:

TERMINAL	INDICATION	PROBABLE CAUSE IF INDICATION IS ABSENT
	CAPACITOR RUN light should momentarily light at each position and the control voltage should measure 115 volts ac:	If voltage is present on some terminals but not on others, check switch 2S2 contacts. If voltage is absent on all terminals, check switch 2S6 and fuse 2F1. If voltage is normal, check switches 1S9, 1S10, 1S11, capacitor 1C5, and motor 1B4. If trouble still exists, check for excessive mechanical friction or damage in gear train.
2, 3	2S2 in position 1	
1, 2	2S2 in position 2	
1, 4	2S2 in position 3	
3	2S2 in position 4	
2	2S2 in position 5	
1	2S2 in position 6	
4	2S2 in position 7	
3, 4	2S2 in position 8	
2, 3, 4	2S2 in position 9	
1, 2, 3	2S2 in position 10	
1, 2, 4	2S2 in position 11	
1, 3, 4	2S2 in position 12	

d. R-F POWER SECTION. - The r-f power section consists of directional coupler subassembly 2A1, VSWR protector subassembly 2A2, r-f power meter 2M3, antenna switch 2S1, antenna transfer relay 2K3, coil 1L1, and switch 1S9.

(1) DIRECTIONAL COUPLER SUBASSEMBLY 2A1 AND R-F POWER METER 2M3. - Energize the equipment as described in the operating procedures, paragraph 2-3(b). Key the transmitter and observe the r-f power meter indication. With the transmitter unkeyed, reverse the cable to 2J1 and 2J2 on the coupler control. Hold TUNE-OPERATE switch in TUNE position. Key the transmitter and observe that the r-f power meter indication is the same as before. This indicates that the directional coupler and metering circuits are balanced and functioning properly. If the indication is not the same, remove directional coupler subassembly 2A1, check components, and replace ones defective. If no indication is obtained on the r-f power meter, check diodes 2A1CR1, 2A1CR2, REFLECTED-FORWARD switch 2S7, and r-f power meter 2M3.

(2) VSWR PROTECTIVE SUBASSEMBLY 2A2. - With the transmitter unkeyed, remove coaxial connector 2J3. Decrease the transmitter power output by minimizing the R-F EXCITER drive. Place the REFLECTED-FORWARD switch to 100 REFLECTED. Key the transmitter and slowly increase the R-F EXCITER drive until the system is automatically disabled.

CAUTION

DO NOT EXCEED 40 WATTS REFLECTED POWER.

The VSWR protective device should trip approximately 30 watts ±10 watts reflected power. The CAPACITOR run light should blink. If the system is not automatically disabled when a maximum of 40 watts reflected power is applied, check for proper operation of relay 2A2K1. If relay 2A2K1 is not energized, check for +28 volts dc between terminal 1 of relay 2A2K1 and ground. If absent, check relay coil 2A2K1, TUNE-OPERATE switch 2S6, and the 28 volts dc power supply. If the +28 volts dc between terminal 1 of relay 2A2K1 and ground is present, check for -0.5 volt dc across resistor 2A2R4. If this voltage is present, check rectifier 2A2CR4, resistor 2A2R5, and capacitor 2A2C1. If the -0.5 voltage is absent, check resistors 2A2R1 through

2A2R4, thermistor 2A2RT1, Zener diode 2A2CR2, and diode 2A2CR1. If relay 2A2K1 is energized and the system is not disabled, or the CAPACITOR run light does not blink, check contacts of relay 2A2K1.

(3) ANTENNA SWITCH 2S1, ANTENNA TRANSFER RELAY 2K3, COIL 1L1, AND SERIES-SHUNT SWITCH 1S9. - If a high VSWR is encountered when switching from the dummy load to the antenna that the antenna coupler cannot reduce, check for proper operation of relay 2K3 and its contacts. If relay 2K3 is functioning normally, check for continuity between plugs 2P11 and 2P12 with LOAD-ANT switch 2S1 in the ANT position. If an open or high resistance exists, replace switch 2S1. Check coil 1L1 and the transmission line between the coupler control and the antenna coupler by making a resistance check between the center conductor of the transmission line at plug 2P3 and ground. Vary the coil from maximum to minimum. If an open or high resistance exists, trouble is indicated in the transmission line or coil 1L1. If a large variation in resistance occurs as the coil is varied from maximum to minimum, trouble is indicated in coil 1L1. Check switch 1S9 and the antenna by making a resistance check between the antenna and ground. A ground should be indicated when the SERIES-SHUNT switch on the coupler control is in the SHUNT position. An open should be indicated when the SERIES-SHUNT switch is operated to the SERIES position. If a ground exists at both switch positions, disconnect the antenna at jack 1J10 and check the antenna for a ground. If an open exists at both switch positions, check switch 1S9.

5-5. CHECKOUT AND ALIGNMENT PROCEDURE.

a. INTRODUCTION. - This procedure is intended to provide the technician with a detailed, step-by-step procedure in checking the mechanical alignment and performing mechanical and electrical adjustments on Antenna Coupler Group AN/SRA-22.

At first glance, the gearing and drive mechanism of the antenna coupler group appears complex. However, the average technician can effect repairs and perform the necessary alignment of components if a few simple rules are observed.

1- READ INSTRUCTIONS CAREFULLY: Read and re-read pertinent instructions until you understand what is to be accomplished and how to go about it.

2- FOLLOW INSTRUCTIONS CAREFULLY: Use a systematic procedure one step at a time. DO NOT ATTEMPT SHORT CUTS!

3- WORK CAREFULLY: Take your time. Do not force any gears, as they are easily stripped.

b. PROCEDURE. - The alignment of the TAP and COIL receiving potentiometers is the only alignment procedure necessary in Coupler Control C-2698/SRA-22. Run the COIL and TAP potentiometers in the coupler control unit to their counterclockwise end stop. If the COIL and TAP dials on the front panel do not read zero, loosen the setscrews on the dials and, being careful not to turn the potentiometer shafts, set the dials to zero and tighten the setscrews.

After components have been replaced in Antenna Coupler CU-714/SRA-22, or if misalignment is suspected, the technician should perform the following steps.

(1) PRELIMINARY STEPS.

(a) Remove coupler from its case and place it in a cleared work space.

(b) Remove all black plastic shrouds from coupler to permit view and access to all moving parts.

(c) Turn to figure 6-1. Use this exploded view for locating and identifying components as directed in the following steps.

WARNING

IF NEW COIL OR TAP ASSEMBLIES ARE BEING INSTALLED, LEAVE POTENTIOMETER COUPLINGS LOOSE UNTIL STOPS ARE SET. OTHERWISE, THE POTENTIOMETER MAY BE INADVERTENTLY RUN THROUGH ITS OWN STOPS AND DAMAGED.

Note

When removing screws or setscrews, a 100-watt soldering iron should be used to apply heat to the sealant until it becomes soft. The screws can then be removed (while part is still hot) without stripping the threads or breaking the screw head.

(2) COIL STOP ADJUSTMENT.

(a) Manually rotate the coil until maximum ribbon is wound on the metallic drum. The coil stop should engage with approximately one-third turn left on the ceramic drum.

(b) If the coil stop is not set properly, as noted in step (a), it must be adjusted as follows.

1. Operate coil drums until coil stop cam (258) is clear of coil stop actuator (261).
2. Loosen two setscrews (260) in coil stop actuator (261). Adjust stop arm (282) so that stop pin (103) attached to gear (102) will miss stop mechanism on both sides as coil is rotated.
3. Carefully retighten setscrews (260) on coil stop actuator (261), making sure that coil stop assembly (282) remains as positioned in step 2.
4. Loosen setscrews (505) on coil stop cam (258).
5. Wind coil until exactly 1-1/2 turns of ribbon are left on ceramic drum.
6. Position coil stop cam (258) counterclockwise as viewed from rear of tuner until leading edge of cam (258) barely touches pin on coil stop actuator (261). See figure 5-1. Retighten setscrews (505) in coil stop cam (258).
7. Verify that coil stop action is positive by winding ribbon onto metallic drum and checking that coil comes to a stop with approximately 1/3 turn of ribbon left on ceramic drum.
8. Now wind coil onto ceramic drum and verify that coil stop engages with approximately 1/2 turn of ribbon remaining on metallic drum.
9. If coil stop action is not correct at each end of ribbon, repeat steps 5, 6, 7, and 8 until coil stop cam (258) is correctly positioned.

(c) Alignment of coil stop cam (258) also positions electrical limit switch 1S12 (506). It is necessary only to verify that the limit switch is functioning properly.

1. With an ohmmeter connected to the two terminals of switch 1S12 front (red wire and white-red-orange wire), wind ribbon onto ceramic drum. The contacts of switch 1S12 should open approximately 1/4 turn before the mechanical stop is reached.
2. With an ohmmeter connected to the two terminals of switch 1S12 rear (orange wire and white-green-brown wire), wind ribbon onto metallic drum. The contacts should open approximately 1/4 turn before the mechanical stop is reached.

(3) TAP STOP ADJUSTMENT.

(a) Rotate the coil until approximately 10 turns of ribbon are on the ceramic drum.

(b) Rotate the tap assembly until the tap approaches the point where the ribbon leaves the ceramic drum. The tap should stop within 1/3 turn from the point where the ribbon leaves the ceramic drum. The tap should never ride on the ribbon beyond the point where the ribbon leaves the ceramic drum as this might break or permanently damage the silver ribbon.

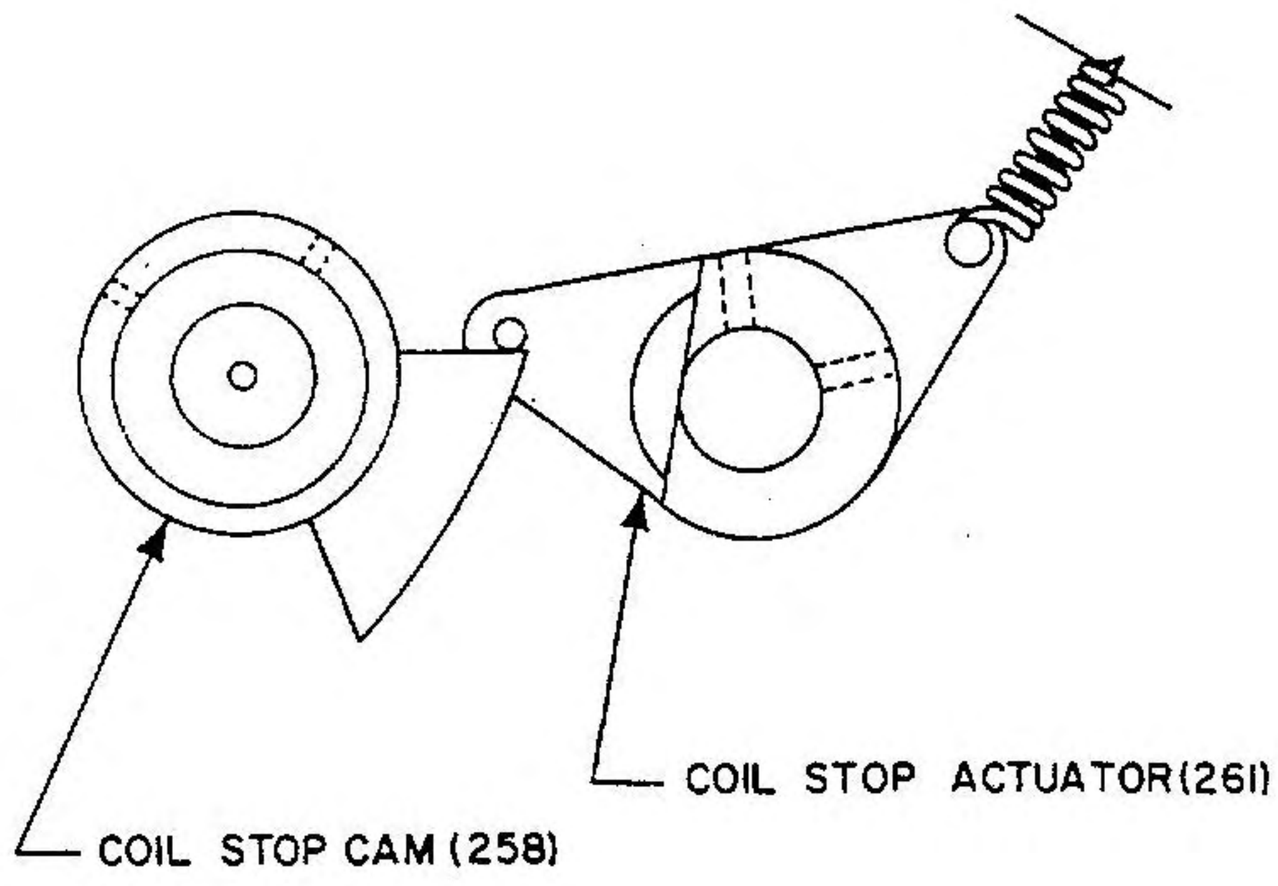


Figure 5-1. Coil Stop Cam Positioning

(c) If the tap stop does not function properly as noted in step (b), adjust the tap stop as follows.

1. Back off tap assembly until tap is approximately two turns from the point where ribbon leaves ceramic drum.

2. Remove the switch plate assembly (490) containing switches 1S13 and 1S14 by removing four screws (83 and 492) and sliding switch 1S13 carefully forward off shaft (356).

3. Loosen setscrews (355) on gear (359) and pull shaft (356) forward out of gear, being careful not to rotate gear.

4. Carefully disengage gear (359) from gear train and rotate it one tooth at a time clockwise or counterclockwise as necessary to properly set the stop. Reinsert shaft into gear (359) after each increment of adjustment and verify tap lower stop adjustment. Continue this procedure until tap stop is properly set.

5. Replace electrical limit switch plate assembly by sliding switch 1S13 carefully over flat portion of shaft (356) and secure switch plate (490) with four screws (83 and 492). Do not tighten setscrews (355) until electrical limit switches have been set.

(4) TAP ELECTRICAL LIMIT SWITCH ADJUSTMENT.

(a) Check that tap mechanical stop is functioning properly as described in step (3)(b) above. Setscrews (355) on gear (359) should be loose. Tap electrical lower limit switch 1S13 is set as follows.

1. Move tap 3/4 inch from the mechanical stop point checked in step (3)(b) above. With an ohmmeter or similar indicator connected to contacts of rotary switch 1S13, rotate switch shaft (356) until switch just opens, as indicated by ohmmeter. Tighten setscrew (355).

2. Verify adjustment by moving tap away from lower limit point, then back toward limit. Watch ohmmeter; when it just opens, the tap slider (129) should be 1/2 to 3/4 inch away from the point where the tap mechanical stop engages. If not correct, repeat adjustments until electrical limit switch functions properly. Tighten setscrews (355).

(b) Tap upper limit switch 1S14 is set in the following manner.

1. Connect an ohmmeter between contacts 3 and 4 on microswitch 1S14. Run the tap assembly against switch 1S14, using tap drive pinion (81). Switch 1S14 should open at a point where there is approximately 1/4 turn of ribbon left before the mechanical stop engages.

2. If upper limit switch 1S14 setting is wrong, adjust screw in microswitch arm (496) until setting is correct.

(5) COIL POTENTIOMETER 1R6 ADJUSTMENT.

(a) Loosen two setscrews (246) on potentiometer coupler (254). These are the two setscrews nearest to coil stop cam (258). Refer to figure 6-1.

(b) Connect test cable between coupler and coupler control units. Energize antenna coupler and run coil until maximum ribbon is wound onto metallic drum and minimum electrical limit stop operates. (Note direction of rotation of coil stop cam (258).)

(c) With coil in minimum stop position, gently rotate coil potentiometer 1R6 by turning coupler (254) in same direction that coil stop cam was rotating prior to engaging coil limit stop. Continue rotating coil potentiometer in this direction until its stop is reached. DO NOT FORCE POTENTIOMETER BEYOND ITS STOP!

(d) Now set coil dial on coupler control to 70 and back-rotate potentiometer 1R6 until coupler control coil meter reads 0. Lock setscrews (246).

(6) TAP POTENTIOMETER 1R7 ADJUSTMENT.

(a) Rotate coil until approximately 10 turns of ribbon are on the ceramic drum.

(b) Loosen the two setscrews (84) in coupler (85) on tap potentiometer shaft (90). Refer to figure 6-1. These are the two setscrews nearest the primary gear plate.

(c) Connect test cable between coupler and coupler control units. Energize coupler and run tap until minimum electrical limit stop operates (tap closest to point where ribbon leaves ceramic drum). Observe direction of rotation of gear (360) which is the tap potentiometer driven gear.

(d) With fingers, gently turn coupler in same direction that gear (360) was turning before minimum tap stop was reached. Continue rotating tap potentiometer in this direction until its stop is reached. DO NOT FORCE POTENTIOMETER BEYOND ITS STOP!

(e) Now set tap dial on coupler control to 70 and back-rotate potentiometer 1R7 until coupler control tap meter reads 0. Lock setscrews (84).

(7) VARIABLE CAPACITOR 1C7 ALIGNMENT.

(a) Operate variable vacuum capacitor 1C7 by rotating fiber gear (348) until plates are far apart (bellows compressed) as needed to disengage sector gear (381) from gear train.

(b) At this point, check setting of switch 1S10 as follows (see figure 5-2).

1. Rotate sector gear (381) until leading edge of sector aligns with outer edge of gear (383).

2. Verify that rotating contact of switch 1S10 is in alignment with contact 11, as shown in figure 5-2.

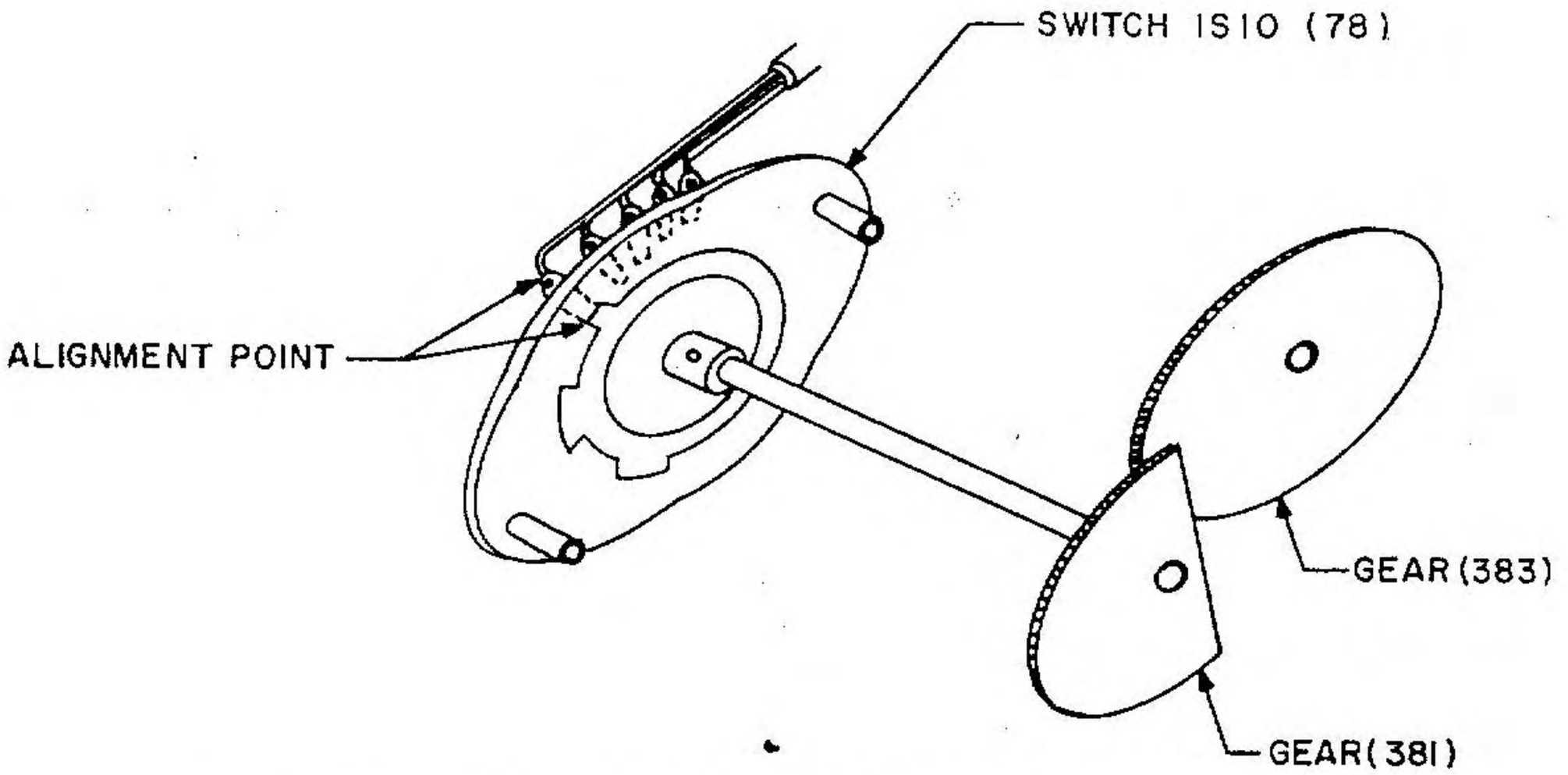


Figure 5-2. Capacitor Drive Switch 1S10 Alignment

(c) With sector gear (381) disengaged, turn fiber gear (348) to run capacitor toward maximum until plates are just beginning to engage. Mark the lead screw gear (179) with a non-conducting pencil to indicate its position.

(d) Now run capacitor gear train by hand toward minimum capacity (bellows compressed) exactly seven turns.

(e) Engage sector gear and run capacitor by hand toward maximum capacity (bellows expanded) until lead screw has completed three revolutions. This completes capacitor alignment.

c. FINAL CHECK.

(1) With test cable made up using plugs furnished with Field Change 5, connect Antenna Coupler CU-714/SRA-22 to Coupler Control C-2698/SRA-22.

(2) Energize the equipment and check all controls, electrical limit stops, and transmitting potentiometers for proper operation.

(3) De-energize the equipment and check that all setscrews and securing screws are properly tightened. A drop of varnish (glyptol) ion screws not provided with lockwashers is useful in preventing loosening of screws with vibration.

(4) EXERCISE EXTREME CARE THAT CABLE TO BLOWER UNIT IS ROUTED WELL CLEAR OF R-F ASSEMBLY. Replace black fiberglass shrouds and return unit to its case.

5-6. REMOVAL, ADJUSTMENT, REPAIR, AND REASSEMBLY OF PARTS AND SUBASSEMBLIES.

This section contains essential instructions for removal and disassembly of Coupler Control C-2698/SRA-22 and removal and replacement of tap assembly and coil assembly of Antenna Coupler CU-714/SRA-22. For complete overhaul and disassembly procedures, refer to Chapter 7.

a. REMOVAL AND DISASSEMBLY OF COUPLER CONTROL C-2698/SRA-22.

(1) Radio Set AN/XXX or associated transmitter should be de-energized and tagged.

(2) Release two fasteners on dust cover of coupler control and remove dust cover.

(3) Remove two screws that mount right side of coupler control to rack. This will allow unit to swing out.

(4) Remove coaxial connectors 2P1, 2P2, 2P3, and 2P4, and plugs 2P5 and 2P6 from connectors on rear panel of unit.

(5) Remove two screws that mount hinge to rack, holding unit to keep weight off hinge. Carefully lay unit on a bench.

(6) Remove coaxial plug 2P12 from directional coupler and plug 2P11 from relay 2K3.

(7) With a suitable wrench, remove nut and lockwasher from connector 2J1.

(8) Remove the 14 screws and lockwashers holding rear panel to chassis. This will allow the rear panel to swing down. Care should be taken not to damage the cable.

(9) Viewing coupler control from front, remove nine screws that mount front panel to chassis. This will allow front panel to swing down. Care should be taken not to damage cables.

(10) With front and rear panels removed, the disassembly or removal of components is obvious. Refer to figures 5-3, 5-4, 5-5, and 5-6 for location of components. The only adjustment necessary in this unit is that of potentiometers 2R1 and 2R2. Refer to paragraph 5-5b of this section for complete alignment.

(11) Perform the steps of paragraph 5-6a in reverse order for reassembly of front and rear panels.

b. REMOVAL AND REPLACEMENT OF ANTENNA COUPLER CU-714/SRA-22 COMPONENTS. - These procedures are presented in the order for complete disassembly of Antenna Coupler CU-714/SRA-22. However, for the removal procedures for any one component, refer to the applicable section of the procedure.

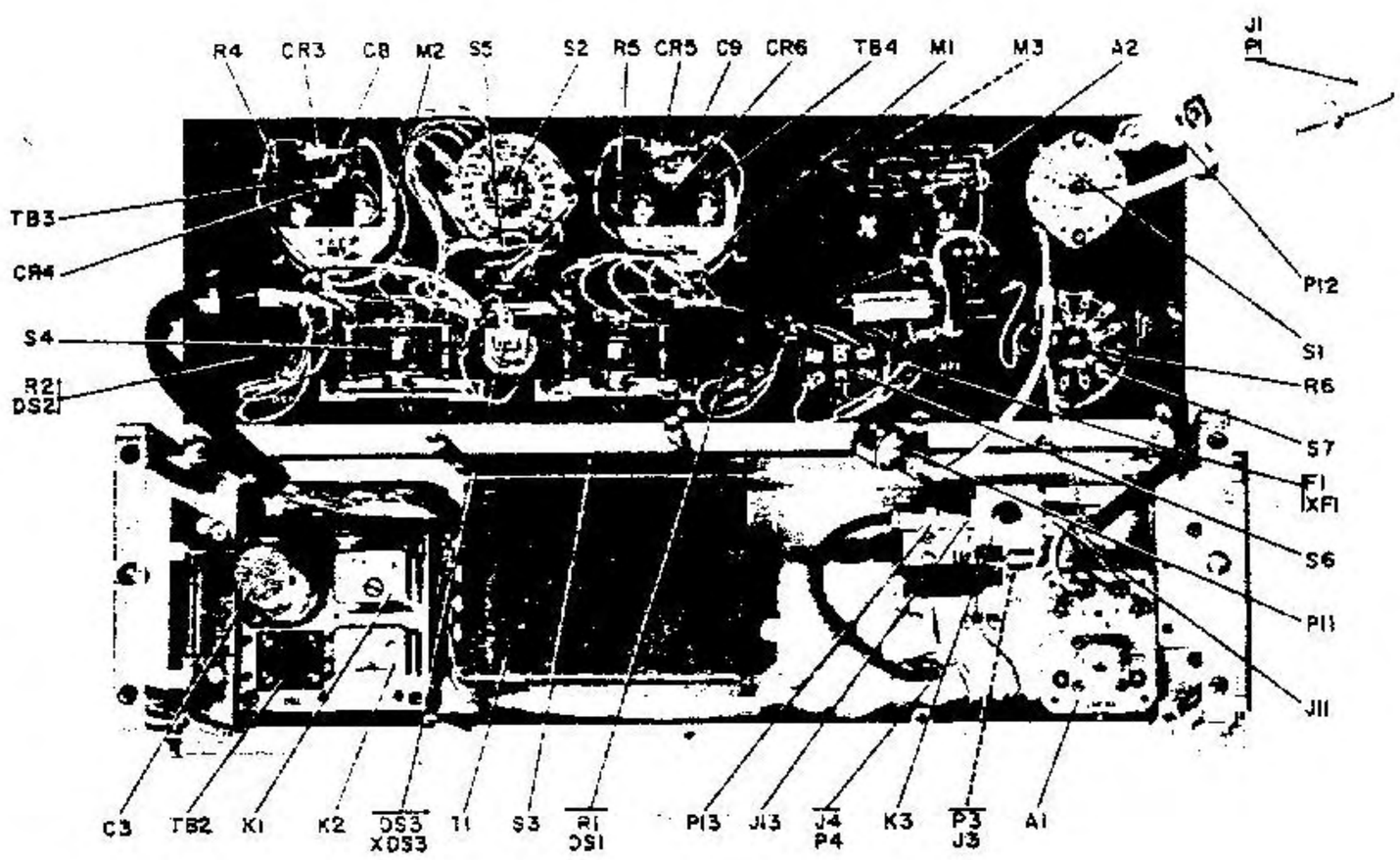


Figure 5-3. Coupler Control C-2698/SRA-22, Front Panel Removed

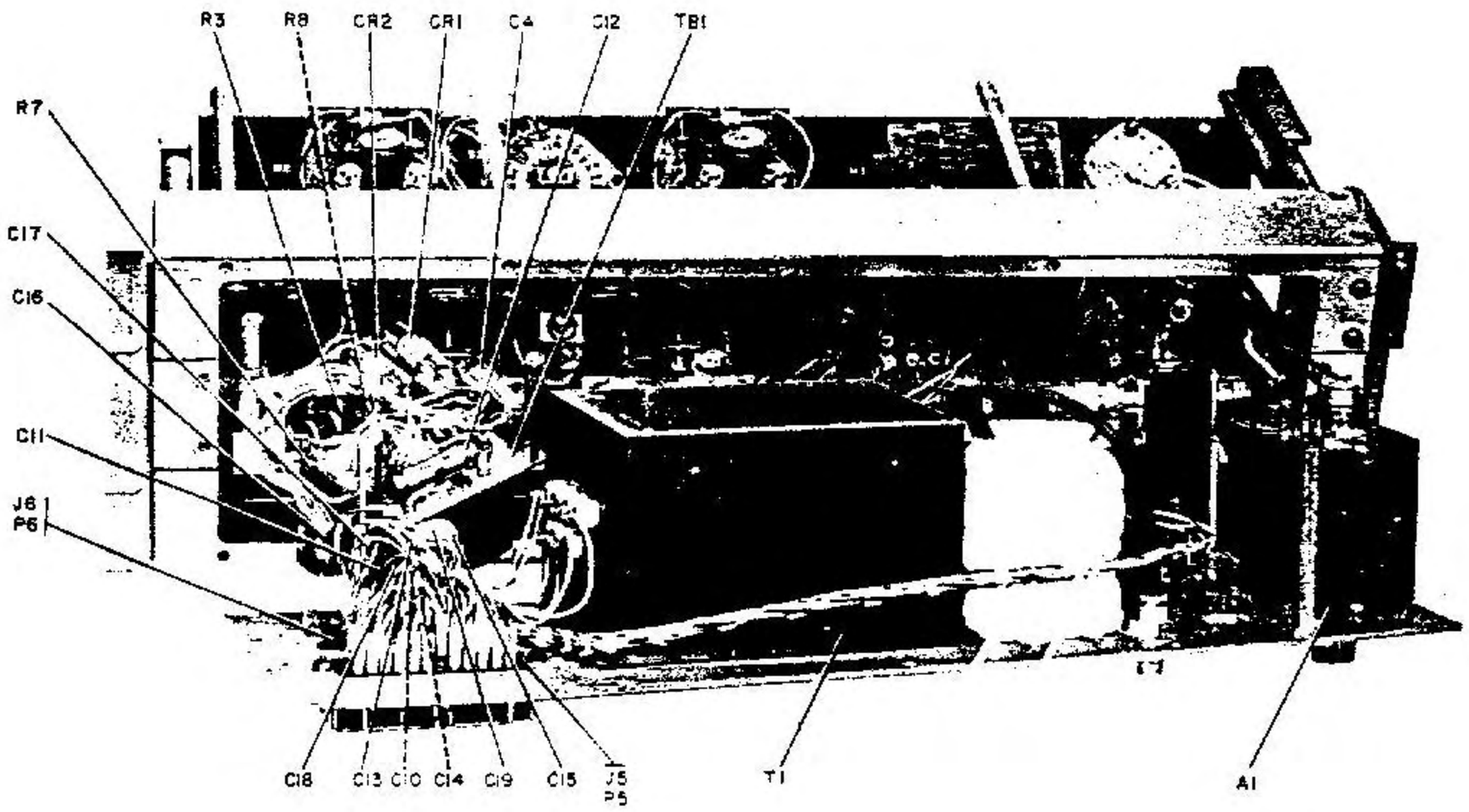


Figure 5-4. Coupler Control C-2698/SRA-22, Rear Panel Removed

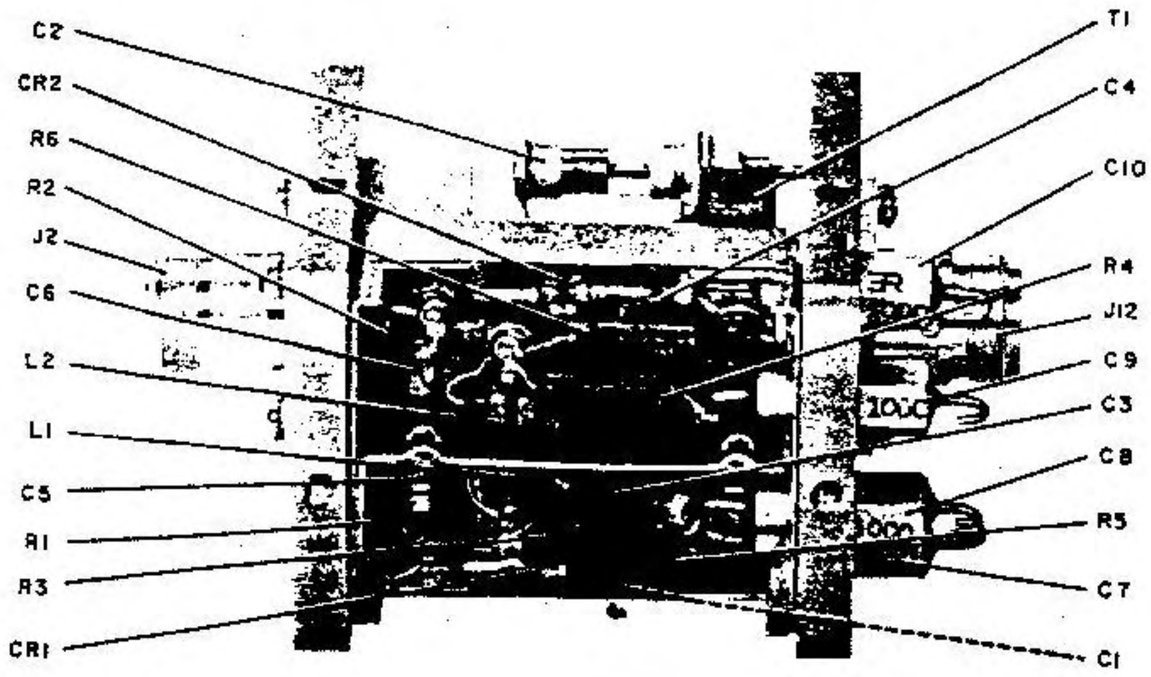


Figure 5-5. Coupler Control C-2698/SRA-22, Directional Coupler

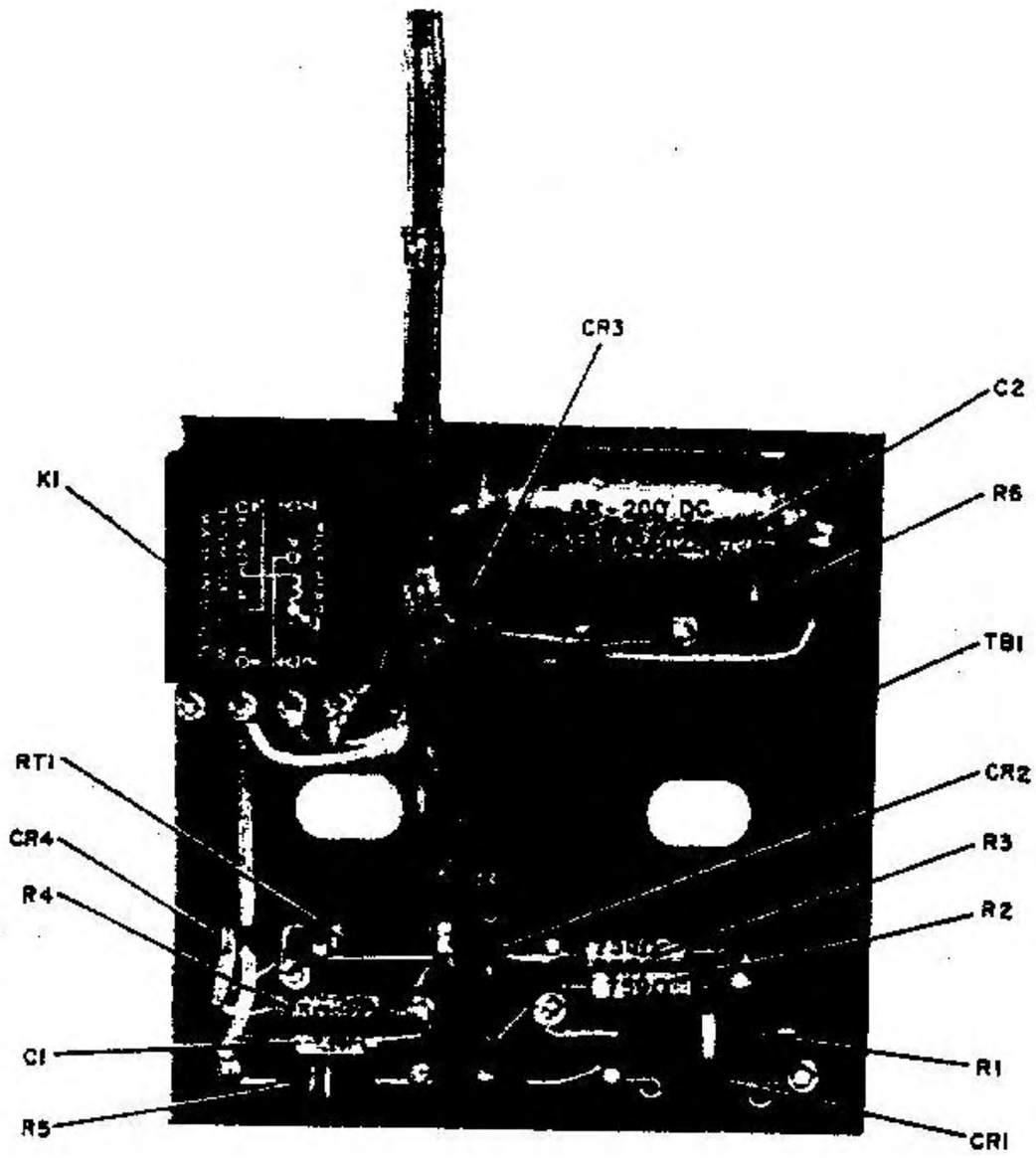


Figure 5-6. Coupler Control C-2698/SRA-22, VSWR Protector

(1) REMOVAL OF ANTENNA COUPLER UNIT FROM CASE. - Refer to figure 6-1 and proceed as follows.

(a) Remove plug 1P7 and coaxial connector 1P8 from connectors 1J7 and 1J8 (41 and 45) on antenna coupler unit.

(b) Disengage 12 captive screws (1) holding antenna coupler unit in its case.

(c) Pull unit out slowly from case, and disconnect jack 1J9 (460) from plug 1P9 (269). Remove gasket (2) and 28 screws (3, 6, 8, 11, and 14) holding shrouds (5, 10, 13, and 15) over coil drum assembly. Washers (7) and nuts (9 and 12) will also be removed by this procedure.

(2) TAP ASSEMBLY AND COIL ASSEMBLY REMOVAL AND REPLACEMENT. - Refer to figure 6-1 and proceed as follows.

(a) Remove antenna coupler unit from its case as outlined in paragraph 5-6b(1).

(b) Manually run coil and tap to maximum (all of coil ribbon wound on ceramic drum and tap assembly run toward capacitor end of drum). Secure ribbon to ceramic drum with tape. Holding drums securely, disengage ribbon from metallic drum by removing screw (105) and release tension carefully. Tape free end of ribbon to ceramic drum to prevent ribbon damage.

(c) Unsolder bus wire on connector 1J8 (45). Remove screws (19) (1 panhead and 5 flathead) from front plate. Pull plate straight forward until coil slug (28) clears ceramic drum, then allow front casting (49) to swing down. Care should be taken not to damage ceramic coil form or wires.

(d) Check core slug (28) for heat damage. Replace if necessary by removing nylon bolt (25) and core slug (28).

(e) Remove five screws (70) and three screws (70A) holding front plate (71). Swing front plate (71) to one side.

(f) Loosen three setscrews (73) to free collar (74) and gently remove ceramic coil assembly by sliding shaft out of collar (74).

(g) If ceramic drum is to be replaced, remove screw (145) from center of drum. Remove the drive assembly by removing six screws (157) along with washers (155 and 156) and nuts (154).

Note

When replacing drum drive assembly, make sure that assembly end-stop block is positioned in such a manner that tap contacts stop within 1/2 inch from hole where ribbon enters ceramic drum.

(h) To replace ribbon (144), solder new ribbon end to stud in ceramic drum hole and run ribbon onto drum in grooves provided. Tape loose end of ribbon to ceramic drum to prevent uncoiling.

(j) To remove aluminum drum (107), remove roll pin (75) and slide drum off shaft (103).

(k) Perform coil stop adjustments in paragraph 5-5b(2) and tap stop adjustments in paragraph 5-5b(3).

(m) Replace front plate (71) and front casting (49).

CAUTION

Be sure that grounding spring (36) of aluminum shorting drum is properly seated and making good mechanical contact.

(3) REMOVAL AND REPLACEMENT OF MOTORS AND GEARS. - Refer to figure 6-1 and proceed as follows.

(a) Remove coil and tap assemblies as outlined in paragraph 5-6b(2) (a through j).

(b) Remove switch 1S10 (78) from shaft of sector gear (381) by removing screws (76) and spacers (79).

(c) Remove gear (102) by removing roll pin (100).

(d) Using a spring hook, remove spring (303) from switch drive arm (304).

(e) Loosen two setscrews (260) in coil actuator stop (261).

Note

When separating primary and secondary gear plates, be careful that actuator stop (261) remains connected to spring (259) and is not lost.

(f) Disengage the capacitor lead screw (180) by rotating gear (277) clockwise or toward maximum capacitance.

(g) Unsolder h-v lead (181) from solder lug (228).

(h) Separate primary gear plate (419) from secondary gear plate (346) by removing screws (298), (310), (297), (492), and (305A) and carefully pulling the gear plates apart, keeping as many of the gears in place as possible.

Note

For easier separation of the gear plates, it has been found to be convenient to notch the primary gear plate at the hole where the cable from potentiometer 1R7 passes through the primary gear plate. This enables the cable to be freed from the gear plate without unsoldering each lead, and allows more freedom between the gear plates.

(j) With the secondary gear plate separated from the primary gear plate, any gear, motor, or other damaged part in the gear train can be replaced.

(k) To reassemble the gear plates, position the antenna coupler so that the secondary gear plate can be guided straight down on top of the primary gear plate. Line up the gear plates, placing coil actuator stop (261) in position on stop assembly shaft (282). Using a spring hook, position the gear shafts into their respective sleeves, making sure that all gears are free and that each section works freely.

(m) Replace all hardware and mount components that have been removed.

(n) Reconnect spring (303) on switch drive arm (304).

(p) Perform the replacement adjustments outlined in paragraph 5-6b(2) (k and m).

(4) REPLACEMENT OF ITEMS NOT REQUIRING THE SEPARATION OF GEAR PLATES. - Various items mounted on the primary and secondary gear plates can be replaced without the necessity of separating or unfastening the gear plates. Refer to figure 6-1 and proceed as follows.

(a) REPLACEMENT OF COIL INDICATOR POTENTIOMETER 1R6 AND COIL LIMIT SWITCH 1S12. - Remove coil indicator potentiometer 1R6 (255) by loosening setscrews (246) and removing four screws (252) that secure clamps (253). Unsolder the green-white-blue wire from potentiometer W (wiper) terminal, the two orange-white-brown wires from the CCW (counterclockwise) terminal, and the white-black-orange-red wire from the CW (clockwise) terminal.

Remove coil limit switch 1S12 (506) by loosening setscrews (246) and removing bracket (256), screws (247) and (248), and sliding switch 1S12 (506) off switch drive shaft (258). Unsolder white-red-orange wire from switch 1S12B terminal 10, white-brown-green wire from switch 1S12A terminal 3, red wire from switch 1S12B terminal 12, and orange wire from switch 1S12A terminal 8. Next, remove screws (499) to free switch wafer from bracket.

Replacement of coil indicator potentiometer 1R6 (255) and coil limit switch 1S12 (506) is the reverse of removal. However, when replacing switch 1S12 wafer, make sure that the red dot at terminal 1 of the wafer faces potentiometer 1R6.

CAUTION

Do not tighten setscrews (246) on coupler (254) until the potentiometer adjustment outlined in paragraph 5-5b(5) is performed.

(b) REPLACEMENT OF TAP INDICATOR POTENTIOMETER 1R7 AND TAP LIMIT SWITCHES 1S13 AND 1S14. - Remove tap indicator potentiometer 1R7 (90) by loosening setscrews (84) and removing four screws (88) that secure clamps (89). Unsolder red-white-green wire from the potentiometer W (wiper) terminal, orange-white-brown wire from the CCW (counterclockwise) terminal, and black wire from the CW (clockwise) terminal.

Remove tap limit switches 1S13 (495) and 1S14 (496) by loosening setscrews (84) on coupler (85) and removing four screws (492 and 83) that mount potentiometer bracket (498) and tap limit switch bracket (490) to primary gear plate (419). Switch 1S13 (495) may be replaced by unsoldering brown wire from terminal 10 (wiper arm) and orange-white-blue wire from terminal 12. Remove switch 1S13 wafer (495) from tap limit switch bracket (490) by removing screws (491). Switch 1S14 (496) may be replaced by unsoldering white-green-orange wire from terminal NC-2 and red-white-blue wire from terminal NC-1. Remove switch 1S14 (496) by grinding or drilling out two rivets holding switch to arm actuator bracket. When replacing switch 1S14 (496), use two Phillips panhead 2-56 NC-2A, 1/2-inch length machine screws (Collins part no. 343-0128-00), lockwashers (Collins part no. 310-6320-00), and hexagon nuts (Collins part no. 313-0037-00) in place of the rivets removed.

Replacement of tap indicator potentiometer 1R7 (90) and tap limit switches 1S13 (495) and 1S14 (496) is the reverse of removal.

CAUTION

Do not tighten setscrews (84) on coupler (85) until potentiometer adjustment outlined in 5-5b(6) is performed.

(c) REPLACEMENT OF VACUUM VARIABLE CAPACITOR 1C7. - To remove vacuum variable capacitor 1C7 (171), first run the capacitor by turning gear (348) until plates are as far apart (bellows compressed) as needed to disengage sector gear (381) from gear train. With sector gear (381) disengaged, run capacitor to maximum (plates meshed, bellows extended) until lead screw assembly (180) disengages. Remove bus wire connection screw (161) from top of capacitor (171) and three screws (164) from mounting flange. Lift capacitor 1C7 (171) up off lead screw (180) and corona shield (176).

Note

If ceramic standoffs (319) are to be replaced, follow procedure for replacing vacuum variable capacitor 1C7, except that four screws (172) holding corona shield are removed instead of three capacitor mounting flange screws (164). Standoff (319) may now be removed by unscrewing them from studs (318) and replaced.

Replace capacitor 1C7 (171) by placing it on corona shield (176) and rotating gear (348) until lead screw (180) engages into capacitor. Replace three screws (164), making sure that spark gap contact (166) and terminal lug (167) are in their proper place. Connect top terminal lug (163) to top of capacitor with screw (161). Perform adjustments outlined in paragraph 5-5b(7).

(d) REPLACEMENT OF CAPACITOR LIMIT SWITCH 1S11. - To remove capacitor limit switch 1S11 wafer (192), unsolder the leads listed in table 5-3.

TABLE 5-3. CAPACITOR LIMIT SWITCH 1S11 WIRE CONNECTIONS

CONTACT NO.	WIRE COLOR	NUMBER OF WIRES
1	White	2
2	Brown-white	2
3	Black-white	2
4	Not used	0
5	White-red-brown	1
6	White-blue-black	1
7	White	1

Remove self-locking nuts (190) and slide switch 1S11 wafer (192) off switch shaft (304). Replacement of the capacitor limit switch 1S11 wafer (192) is the reverse of removal.

(e) REPLACEMENT OF CAPACITOR SERIES-SHUNT SWITCH 1S9 AND CAPACITOR DRIVE SWITCH 1S10. - To remove capacitor series-shunt switch 1S9, remove three round nuts (196) from fiber standoff studs (236). Remove screw (200) from ground return standoff (233). Remove round nut (225) securing high voltage output lug (215) and screw (224) securing high voltage capacitor output lug (220). Exercise care not to damage round nuts (225) since they function as corona balls. Remove retainer ring (205) and slide switch plate (231) off switch shaft (304). Remove switch contact plate (245) from coupler (240) by removing screws (239). All switch contacts are now accessible and can be replaced by removing their respective retaining screws.

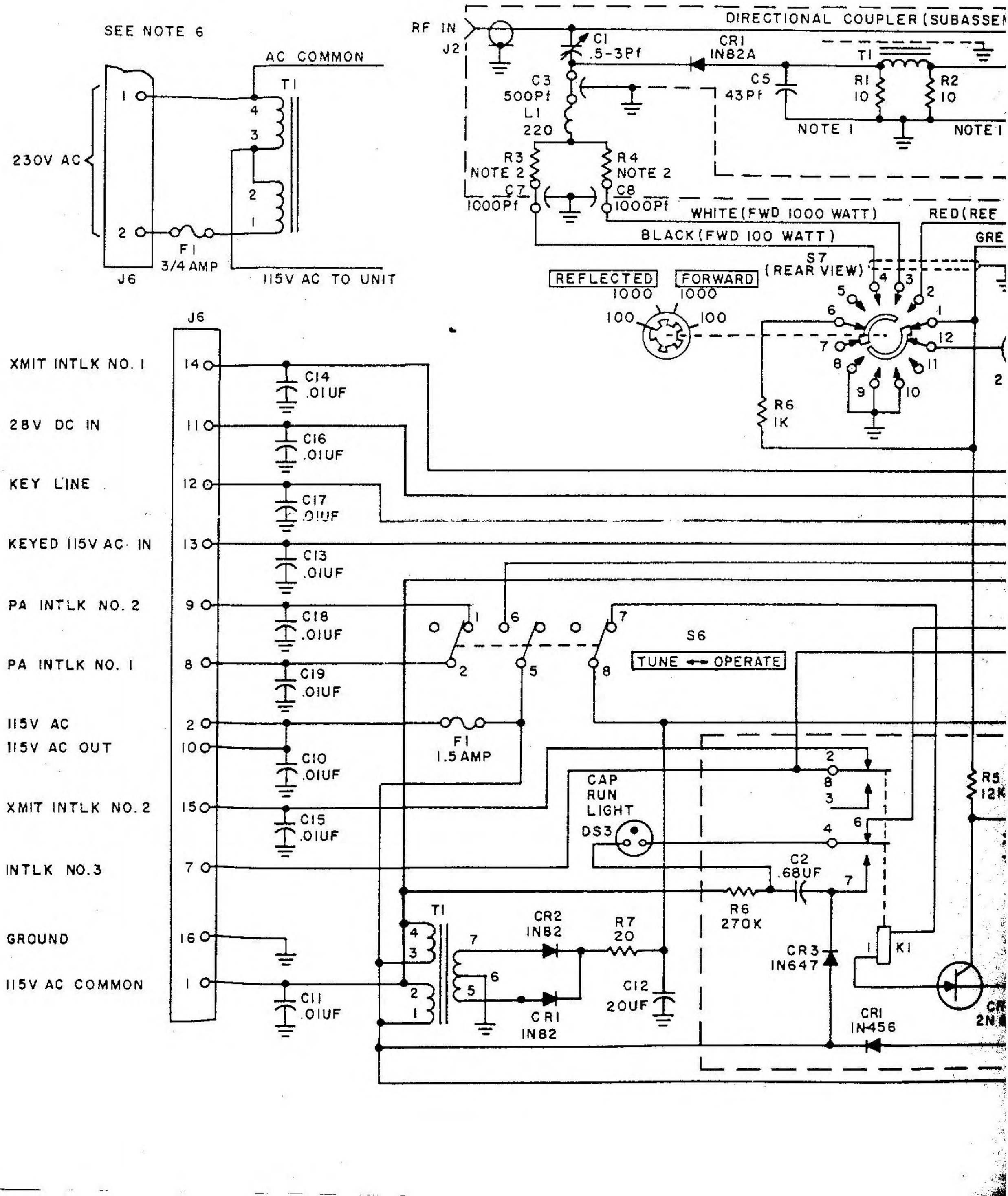
Replacement of capacitor series-shunt switch 1S9 is the reverse of removal.

To remove capacitor drive switch 1S10 (78) from shaft of sector gear (381), remove screws (76) and spacers (79). Unsolder the leads from the 1S10 switch contacts shown in table 5-4.

TABLE 5-4. CAPACITOR DRIVE SWITCH 1S10 WIRE CONNECTIONS

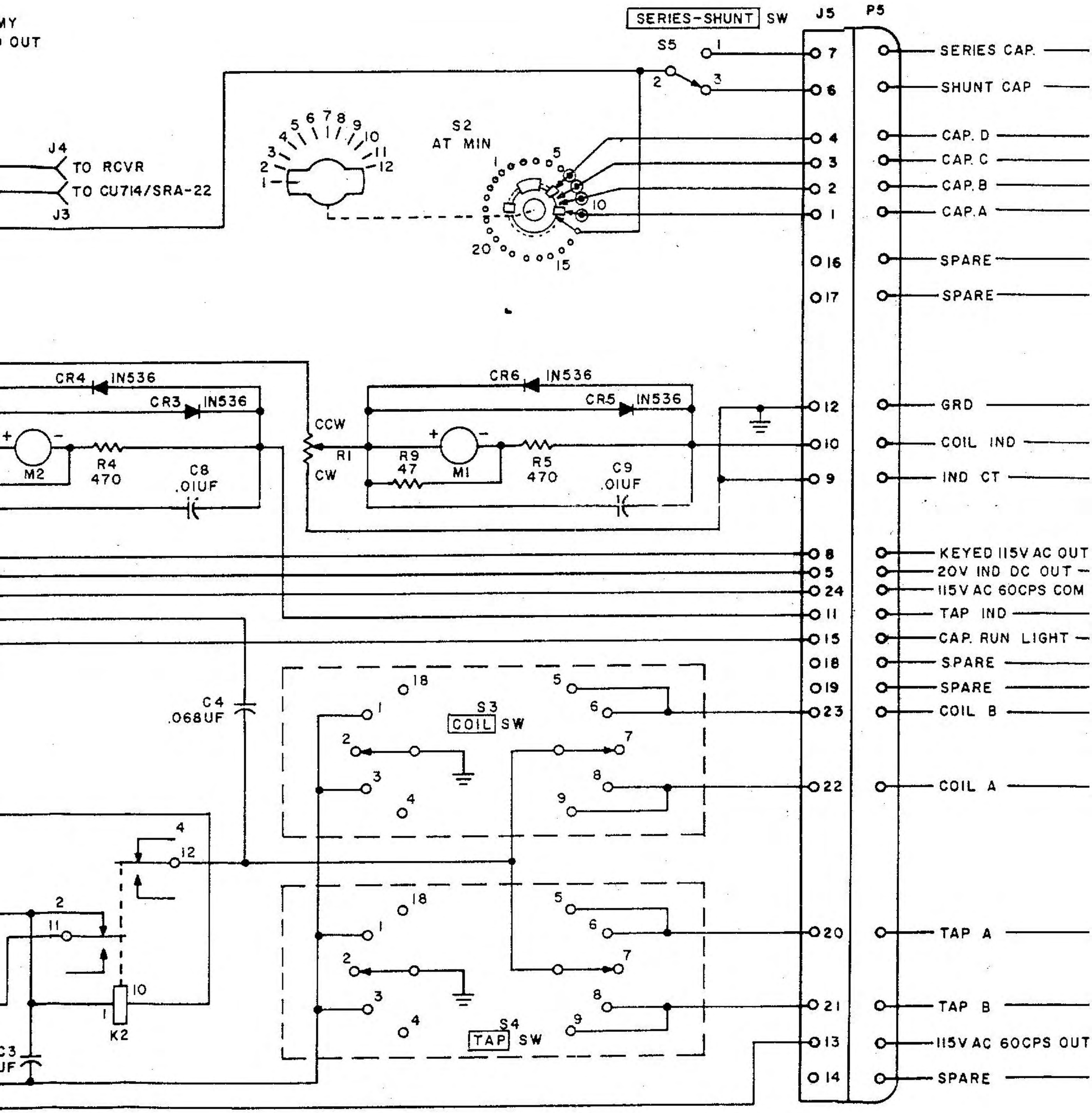
CONTACT NO.	WIRE COLOR	NUMBER OF WIRES
7	Blue-white	1
8	Black-red-white	1
9	Black-orange-white	1
10	Black-green-white and gray jumper to contacts 18 and 19	2
11	Red-orange-white-brown and white	2

Replacement of capacitor drive switch 1S10 is the reverse of removal.

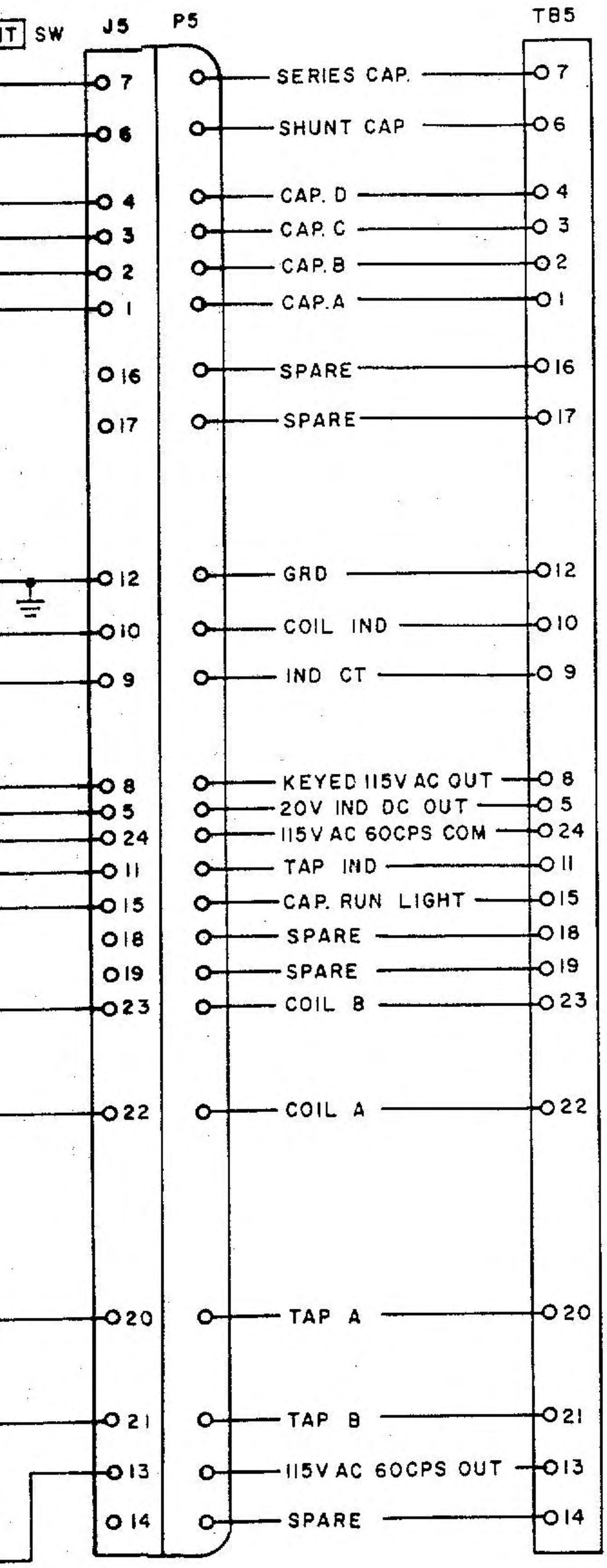

SEE NOTE 6
AC COMMON
T1
230V AC
1
2
4
3
2
1
F1
3/4 AMP
J6
115V AC TO UNIT
RF IN
J2
C1
.5-3Pf
CR1
IN82A
C3
500Pf
L1
220
C5
43Pf
R1
10
R2
10
NOTE 1
NOTE 1
R3
NOTE 2
R4
NOTE 2
C7
1000Pf
C8
1000Pf
WHITE (FWD 1000 WATT)
BLACK (FWD 100 WATT)
S7
(REAR VIEW)
REFLECTED
1000
FORWARD
1000
100
100
R6
1K
J6
XMIT INTLK NO. 1
14
C14
.01UF
28V DC IN
11
C16
.01UF
KEY LINE
12
C17
.01UF
KEYED 115V AC IN
13
C13
.01UF
PA INTLK NO. 2
9
C18
.01UF
PA INTLK NO. 1
8
C19
.01UF
115V AC
2
115V AC OUT
10
C10
.01UF
XMIT INTLK NO. 2
15
C15
.01UF
INTLK NO. 3
7
GROUND
16
115V AC COMMON
1
C11
.01UF
F1
1.5 AMP
S6
TUNE ↔ OPERATE
CAP
RUN
LIGHT
DS3
C2
.68UF
R6
270K
T1
CR2
IN82
R7
20
CR1
IN82
C12
20UF
CR3
IN647
K1
CR1
IN456
R5
12K

AL COUPLER (SUBASSEMBLY A1)

T1
R1 10
R2 10
NOTE 1
NOTE 1
C6 43Pf
CR2 IN82A
C2 .5-3Pf
C4 500Pf
L2 220
R5 NOTE 2
R6 NOTE 2
C9 1000Pf
C10 1000Pf
P12
J12
P11
J11
S1
J1
DUMMY LOAD OUT
J13 P13
J4
TO R
TO C
J3
O WATT)
RED (REF 1000 WATT)
GREEN (REF 100 WATT)
ANTENNA TRANSFER RELAY
K3
M3
UA
2-200
CR4
CCW
R2
CW
R10 47
M2
R 47
R3 47
VSWR PROTECTOR
(SUBASSEMBLY A2)
R5 12K
C1 2.2UF
R4 75
RT1 100
R3 NOTE 13
R2 NOTE 13
R1 1000
CR4 2N886
CR1 IN456
CR2 IN963B
K1
R8 15
C3 280UF


MY
OUT
J4
TO RCVR
TO CU714/SRA-22
J3
S2
AT MIN
SERIES-SHUNT SW
S5
J5
P5
SERIES CAP.
SHUNT CAP
CAP. D
CAP. C
CAP. B
CAP. A
SPARE
SPARE
GRD
COIL IND
IND CT
KEYED 115V AC OUT
20V IND DC OUT
115V AC 60CPS COM
TAP IND
CAP. RUN LIGHT
SPARE
SPARE
COIL B
COIL A
TAP A
TAP B
115V AC 60CPS OUT
SPARE
CR4 IN536
CR3 IN536
CR6 IN536
CR5 IN536
CCW
CW
R1
R4 470
R5 470
R9 47
C8 .01UF
C9 .01UF
M1
M2
C4 .068UF
S3
COIL SW
S4
TAP SW
K2
C3 UF

ORIGINAL



NOTES:

1. AIR1 AND AIR2 SELECTED TO MATCH WITHIN 1%.
2. AIR3, AIR4, AIR5 AND AIR6 SELECTED VALUES ±1% AIR3-AIR4 SELECTED FROM RANGE BETWEEN 4750-6980 OHMS. AIR5-AIR6 SELECTED FROM RANGE BETWEEN 51.1 AND 1000 OHMS.
3. R9 AND R10 USED WITH MARION NULL INDICATOR METER ONLY.
4. MARION NULL INDICATOR METER IS NOT USED ON EQUIPMENT FROM SERIAL NUMBER 97 UP, EXCEPT FOR SERIAL NUMBERS 98,99,104 AND 108.
5. COMPONENTS R7 AND C12 ADDED SERIAL NUMBER 125 UP.
6. TRANSFORMER PRIMARY WIRED FOR 115V OPERATION. SEE BELOW FOR 230V OPERATION.
   a. REMOVE BUS JUMPERS FROM TRANSFORMER TERMINALS (1,3 AND 2,4).
   b. REMOVE THE TAPS WIRE (WHITE-GREEN TRACER) THAT GOES FROM T1-2 TO C4-1 (ON THE TERMINAL BOARD TB1) FROM T.1-1 AND PLACE IT ON T1-3.
   c. JUMPER TERMINALS T1-2 AND T1-3 TOGETHER WITH BUS WIRE.
   d. CHANGE F1 TO 3/4 AMP.
7. R8 CHANGED TO 15 OHMS AND PLACED FROM K1 PIN 11 TO GROUND EFFECTIVE SERIAL NUMBER 217 AND UP.
8. S6 AND PA INTERLOCK NO.1 AND PA INTERLOCK NO.2 ADDED SERIAL NUMBER 336 AND UP.
9. TERMINAL BOARD TB5, CABLE AND PLUG P5 ASSEMBLY ADDED SERIAL NUMBER 336 AND UP.
10. C18 AND C19 ADDED SERIAL NUMBER 336 AND UP.
11. F1 CHANGED TO 1.5 AMP FAST-BLO SERIAL NUMBER 336 AND UP.
12. BUSHIPS HAS AUTHORIZED AN EIB FIELD CHANGE FOR EARLIER SERIAL NUMBER EQUIPMENT.
13. A2R2 AND A2R3 SELECTED FROM RANGE BETWEEN 215-825 OHMS.
14. ADD UNIT DESIGNATION "2" TO COMPONENT DESIGNATION FOR COMPLETE REFERENCE DESIGNATION. EXAMPLE: 2A2CR1

Figure 5-7. Coupler Control C-2698/SRA-22, Schematic Diagram

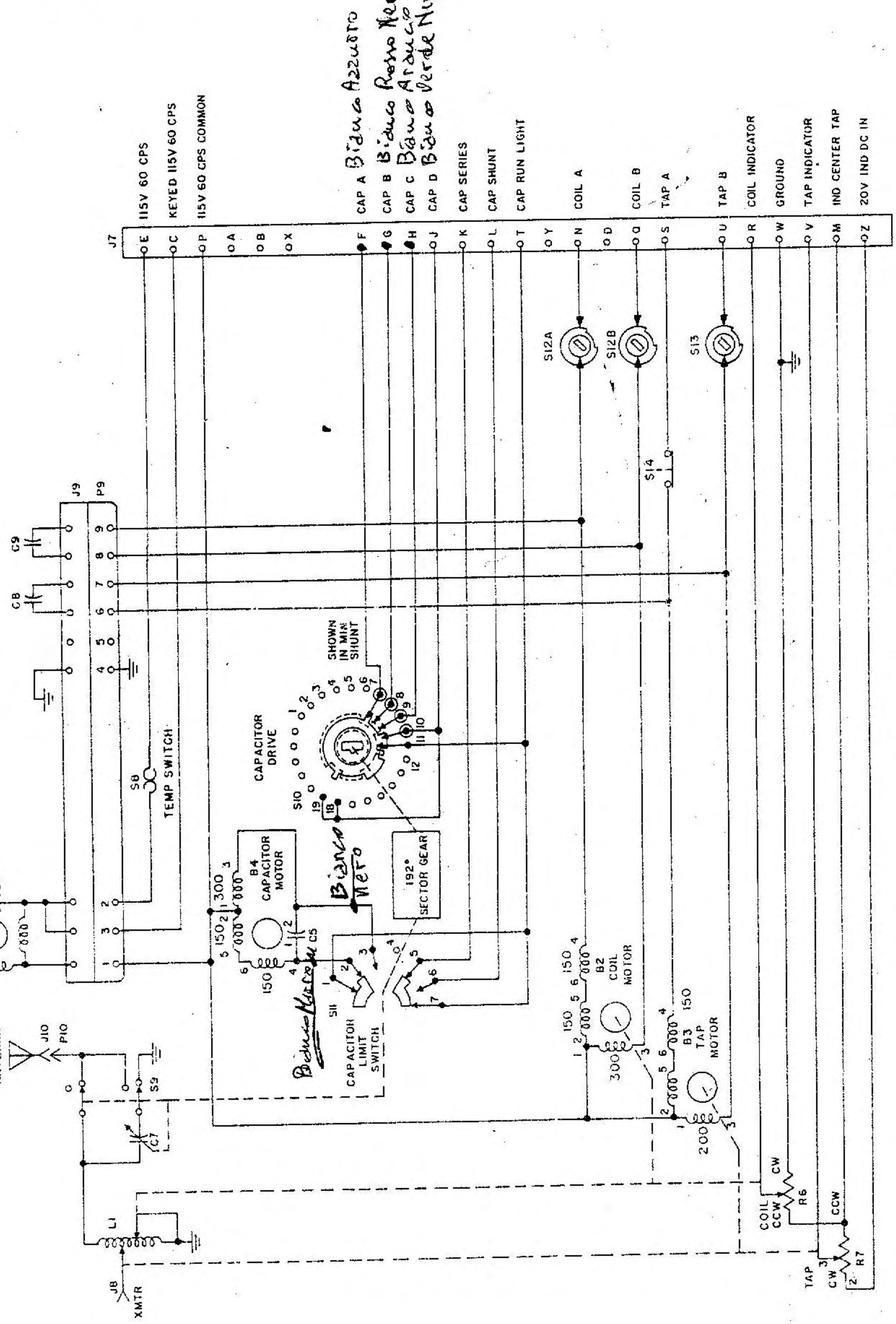
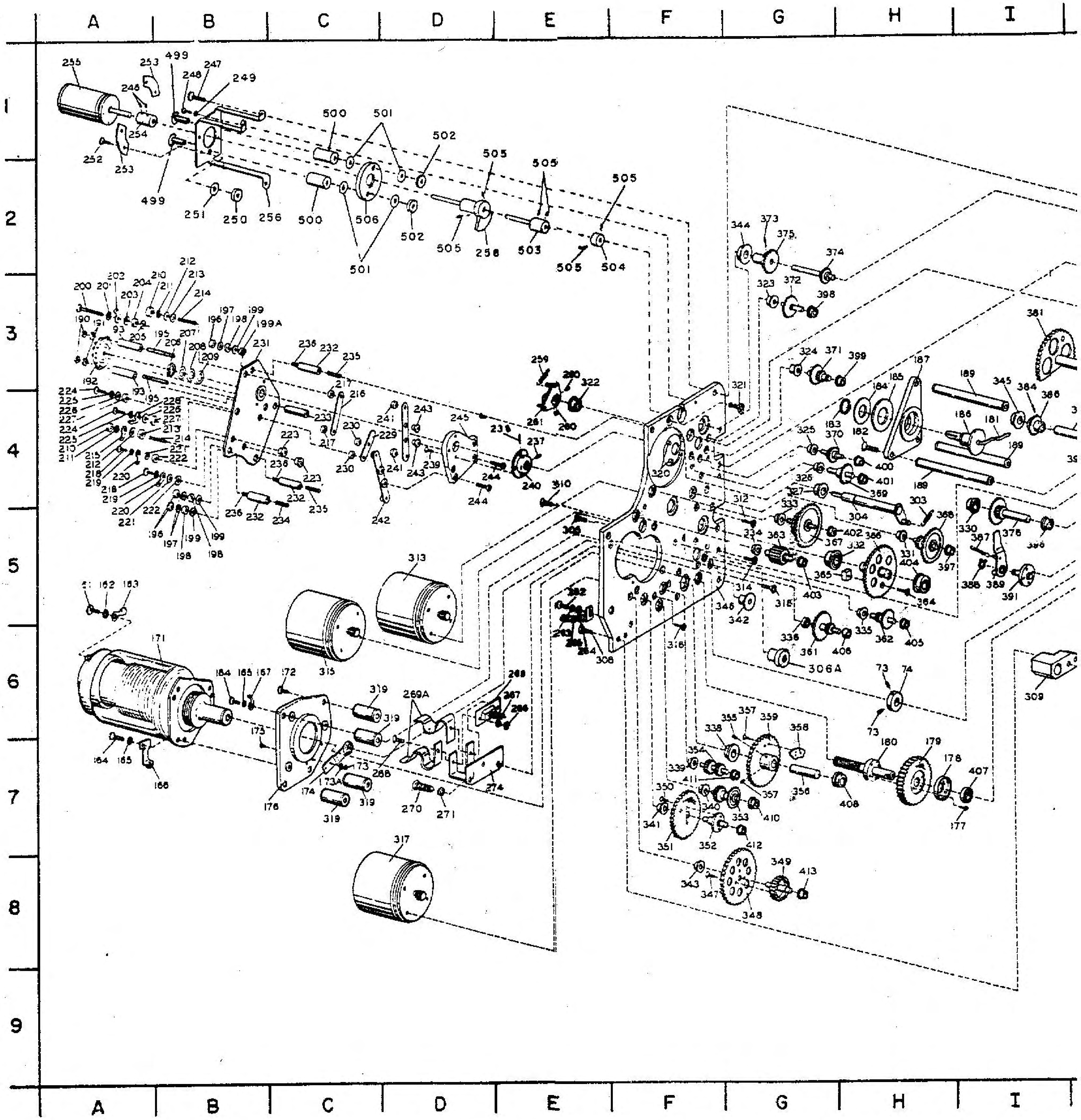


Figure 5-3. Antenna Coupler CU-714/SRA-22, Schematic Diagram

ITEM NO.	REF. DESIG.	LOCATION
232	1H38	3C,4C,5B SH 1
233	1H174	4C SH 1
234	1H175	5B SH 1
235	1H176	3C,4C SH 1
236	1H177	3C,4B,5B SH 1
237	1H178	4E SH 1
238	1H179	4E SH 1
239	1H180	4D SH 1
240	1MP125	4E SH 1
241	1E13	4C,4D SH 1
242	1E14	5C SH 1
243	1H41	4D SH 1
244	1H148	4D SH 1
245	1MP126	4D SH 1
246	1H181	1A SH 1
247	1H182	1B SH 1
248	1H183	1B SH 1
249	1H184	1B SH 1
250	1H185	2B SH 1
251	1H186	2B SH 1
252	1H187	1A SH 1
253	1H188	1A SH 1
254	1MP8	1A SH 1
255	1R6	1A SH 1
256	1H189A	2B SH 1
257	1H190	3E SH 1
258	1MP127A	2D SH 1
259	1MP68	3E SH 1
260	1H191	4E SH 1
261	1MP128	4E SH 1
262	1H192	6E SH 1
263	1H193	6E SH 1
264	1H194	6E SH 1
265	1E16	6E SH 1
266	1H195	6E SH 1
267	1H196	6E SH 1
268	1H197	7D SH 1
269	1P9	6E SH 1
269A	1H198	6D SH 1
270	1H199	7D SH 1
271	1H200	7D SH 1
272	Not Used	
273	Not Used	
274	1H201	7D SH 1
275	1H202	5M SH 1
276	1H203	5M SH 1
277	1MP2	5M SH 1
278	1H204	5N SH 1
279	1H205	5N SH 1
280	1MP29	5N SH 1
281	1H293	5N SH 1
282	1MP129	4M SH 1
283	Not Used	
283A	Not Used	
284	Not Used	
285	1H206	5O SH 1
286	1H207	5O SH 1
287	1H208	4L SH 1
288	1H209	1U SH 1
289	1H210	3J SH 1
290	1H211	2T SH 1
291	1MP142	3K SH 1
292	1H212	2U SH 1
293	1H213	3T SH 1
294	1H214	3T SH 1
295	1H215	5T SH 1
296	1H216	4V SH 1
297	1H217	6L SH 1
298	1H218	3L SH 1
299	1H43	3L SH 1
300	1H219	4M SH 1
301	1H220	5M SH 1
302	1H221	4M SH 1
303	1MP69	5H SH 1
304	1MP12	5H SH 1
305	1H222	5E SH 1
305A	1H223	5E SH 1
306	1H44	4J SH 1
306A	1H224	6G SH 1
307	1H45	4K SH 1
308	1H225	6E SH 1
309	1H42	6I SH 1
310	1H226	5E SH 1
311	1H227	2J SH 1
312	1H228	5G SH 1
313	1B3	5D SH 1
314	1H229	5G SH 1
315	1B4	6C SH 1
316	1H230	6F SH 1
317	1B2	8D SH 1
318	1H231	6G SH 1
319	1H46	7C SH 1
320	1H232	4F SH 1
321	1H47	4G,5M SH 1
322	1MP70	4E SH 1
323	1MP71	3G SH 1
324	1MP72	3G SH 1
325	1MP73	4G SH 1
326	1MP74	4G SH 1
327	1MP75	5G SH 1
328	1MP41	3J SH 1
329	1MP43	4J SH 1
330	1MP37	5I SH 1
331	1MP76	5H SH 1
332	1MP39	5H SH 1
333	1MP35	5G SH 1
334	1MP77	5G SH 1
335	1MP31	6H SH 1
336	1MP33	6H SH 1
337	1MP78	5J SH 1
338	1MP79	7F SH 1
339	1MP80	7F SH 1
340	1MP81	7F SH 1
341	1MP82	7F SH 1
342	1MP48	6G SH 1
343	1MP83	8F SH 1
344	1MP84	2G SH 1
345	1MP85	4I SH 1
346	1MP133	6G SH 1
347	1H233	8F SH 1
348	1MP24	8G SH 1



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196 197 198 199 199A 231 236 232 235
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217 216 233 217 230 229 241 243 241 243 239 245 242 223 236 223 232 235 236 232 234
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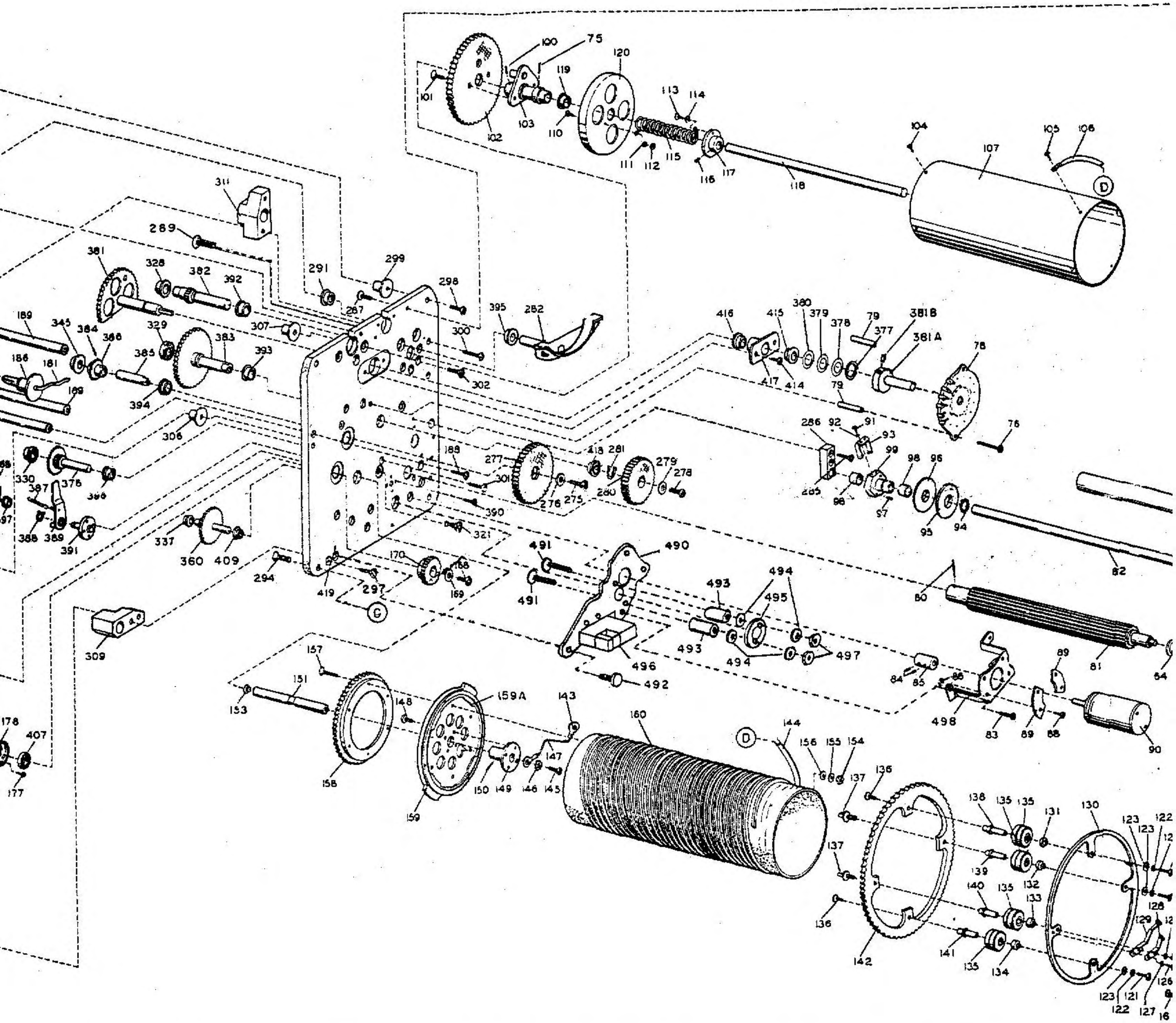
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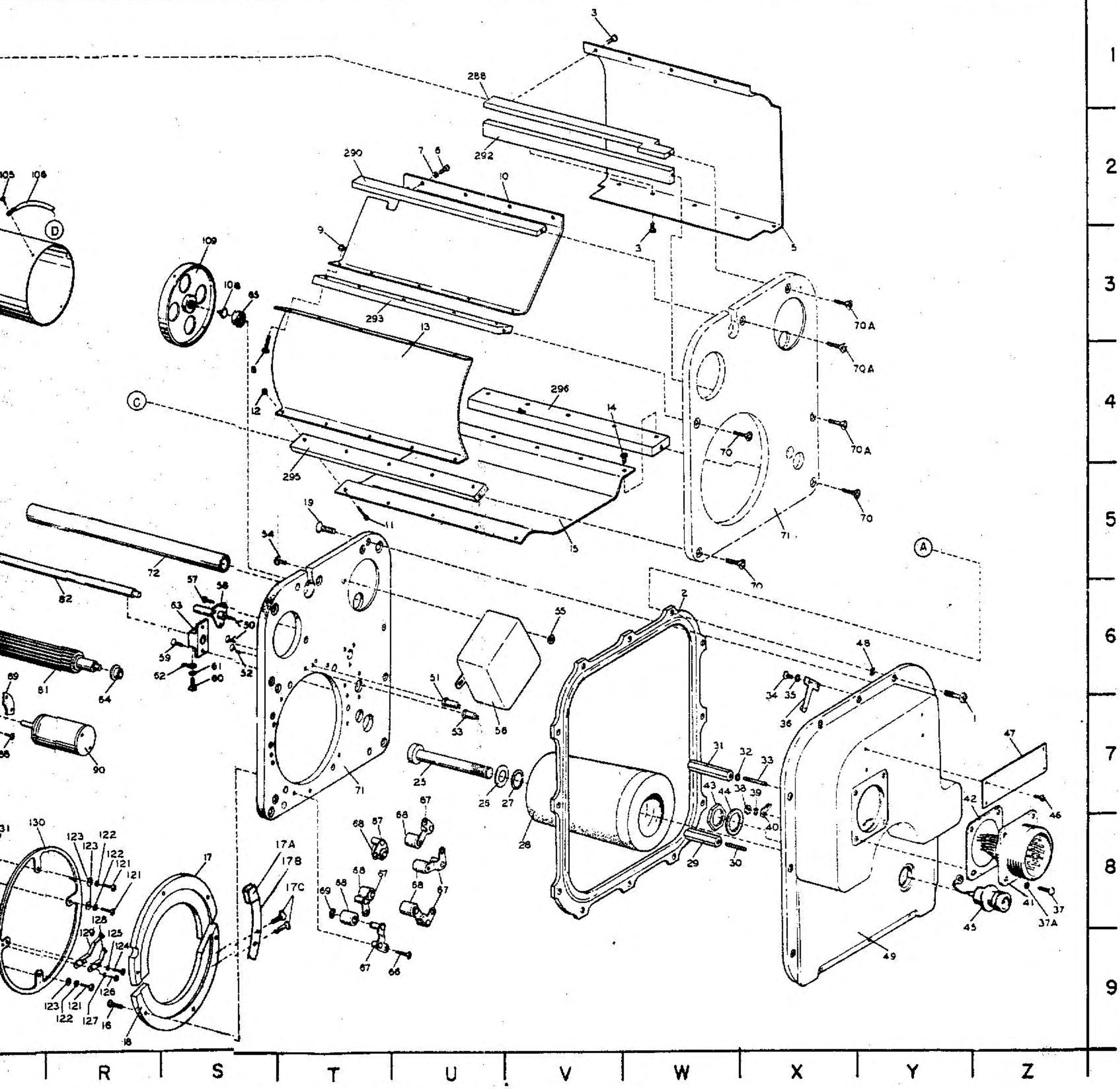
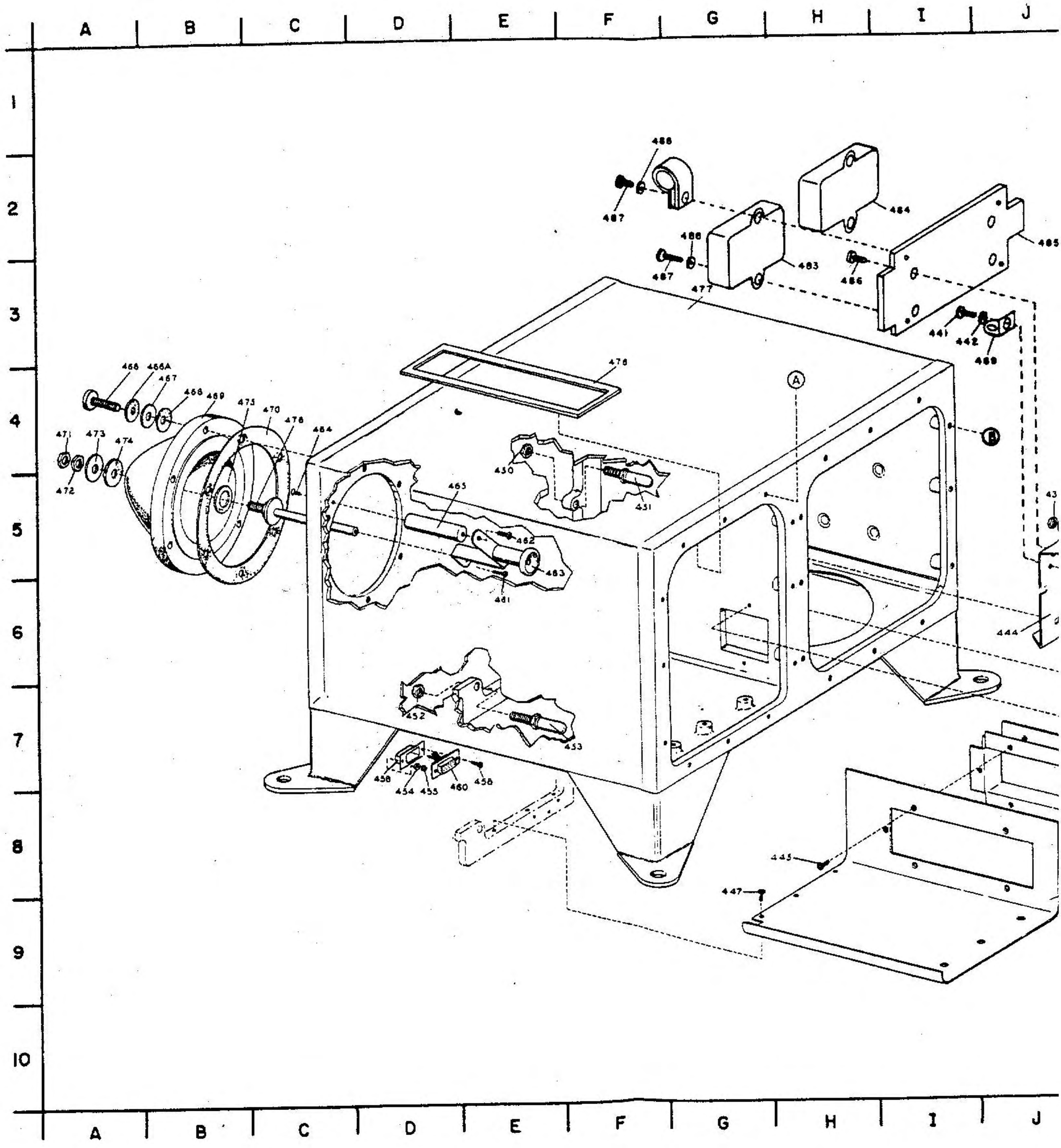


Figure 6-1. Antenna Coupler CU-714/SRA-22, Exploded View (Sheet 1 of 2)

ITEM NO.	REF. DESIG.	LOCATION	ITEM NO.	REF. DESIG.	LOCATION
349	1MP24	8G SH 1	407	1MP45	7I SH 1
350	1H234	7F SH 1	408	1MP95	7H SH 1
351	1MP27	8F SH 1	409	1MP140	6J SH 1
352	1MP27	8F SH 1	410	1MP97	7G SH 1
353	1MP23	7G SH 1	411	1MP98	7F SH 1
354	1MP5	7F SH 1	412	1MP99	8G SH 1
355	1H235	7G SH 1	413	1MP100	8G SH 1
356	1MP28A	7G SH 1	414	1H247	4O SH 1
357	1H236	7G SH 1	415	1MP101	4O SH 1
358	1H237	7G SH 1	416	1MP102	4N SH 1
359	1MP18	7G SH 1	417	1H248	4O SH 1
360	1MP17	6J SH 1	418	1MP44	5M SH 1
361	1MP16	6G SH 1	419	1MP134	6K SH 1
362	1MP30	6H SH 1	420	1H249	6P SH 2
363	1MP6	5G SH 1	421	1H250	6P SH 2
364	1H238	5H SH 1	422	1MP122A	8P SH 2
365	1H239	5G SH 1	423	1MP123A	8P SH 2
366	1MP130	5H SH 1	424	1MP52	5O SH 2
367	1MP25	5G SH 1	425	1H251	7Q SH 2
368	1MP13	5H SH 1	426	1MP137	7Q SH 2
369	1MP15	5H SH 1	427	1H252	8O SH 2
370	1MP19	4H SH 1	428	1H253	6K SH 2
371	1MP20	3G SH 1	429	1H254	6K SH 2
372	1MP21	3G SH 1	430	Not Used	
373	1H240	2G SH 1	431	Not Used	
374	1MP7	2G SH 1	432	Not Used	
375	1MP14	2G SH 1	433	1H257	4K SH 2
376	1MP4	5I SH 1	434	1H258	4K SH 2
377	1H294	4P SH 1	435	1H52	6L SH 2
378	1H49	4O SH 1	436	1B1	7M SH 2
379	1H242	4O SH 1	437	1H259	5J SH 2
380	1H243	4O SH 1	438	1H260	5J SH 2
381	1MP11	3I SH 1	439	1H261	5M,6M SH 2
381A	1MP141	5P SH 1	440	1C6	5M SH 2
381B	1H316	5P SH 1	441	1H262	3I SH 2
382	1MP10	3J SH 1	442	1H263	3J SH 2
383	1MP22	4J SH 1	443	1H264	6K SH 2
384	1H241	4I SH 1	444	1H265	6J SH 2
385	1H50	4I,4J SH 1	445	1H266	8H SH 2
386	1MP26	4I SH 1	446	1H267	8K SH 2
387	1MP86	5I SH 1	447	1H268	8H,7K SH 2
388	1H244	5I SH 1	448	1H269	6L SH 2
389	1H245	5I SH 1	449	1MP104	8L SH 2
390	1H246	5M SH 1	450	1H270	4E SH 2
391	1H51	5I SH 1	451	1H53	5F SH 2
392	1MP42	3K SH 1	452	1H271	7D SH 2
393	1MP87	4K SH 1	453	1H272	7F SH 2
394	1MP131	4J SH 1	454	1H273	7D SH 2
395	1MP88	4M SH 1	455	1H274	7D SH 2
396	1MP38	5I SH 1	456	1H275	7E SH 2
397	1MP89	5I SH 1	457	Not Used	
398	1MP90	3G SH 1	458	1H276	7D SH 2
399	1MP91	3H SH 1	459	Not Used	
400	1MP92	4H SH 1	460	1J9	7E SH 2
401	1MP93	4H SH 1	461	1H277	5E SH 2
402	1MP36	5H SH 1	462	1H278	5E SH 2
403	1MP94	5G SH 1	463	1J10	5E SH 2
404	1MP40	5H SH 1	464	1H279	4C SH 2
405	1MP32	6H SH 1	465	1H54	5E SH 2
406	1MP34	6H SH 1	466	1H280	4B SH 2

ITEM NO.	REF. DESIG.	LOCATION	ITEM NO.	REF. DESIG.	LOCATION
466A	1H55	4B SH 2	487	1H299	2F SH 2
467	1H281	4B SH 2	488	1H300	2F SH 2
468	1H282	4B SH 2	489	1E20	3J SH 2
469	1E17	4B SH 2	490	1MP139	6N SH 1
470	1MP105	4C SH 2	491	1H301	6M SH 1
471	1H283	4A SH 2	492	1H302	7M SH 1
472	1H284	4A SH 2	493	1H303	6N SH 1
473	1H56	4A SH 2	494	1H304	6N SH 1
474	1H57	4A SH 2	495	1S13	6N SH 1
475	1MP106	4B SH 2	496	1S14	6N SH 1
476	1MP103	4C SH 2	497	1H305	6O SH 1
477	1MP135	3G SH 2	498	1H287A	7P SH 1
478	1MP107	4F SH 2	499	1H306	1B SH 1
479	1H295	8Q SH 2	500	1H307	2C SH 1
480	1H296	8Q SH 2	501	1H308	2D SH 1
481	1U1	9Q SH 2	502	1H309	3D SH 1
482	1MP138	9R SH 2	503	1H310	2E SH 1
483	1C8	2H SH 2	504	1H311	2F SH 1
484	1C9	2H SH 2	505	1H312	2E SH 1
485	1H297	2J SH 2	506	1S12	2D SH 1
486	1H298	3H SH 2			



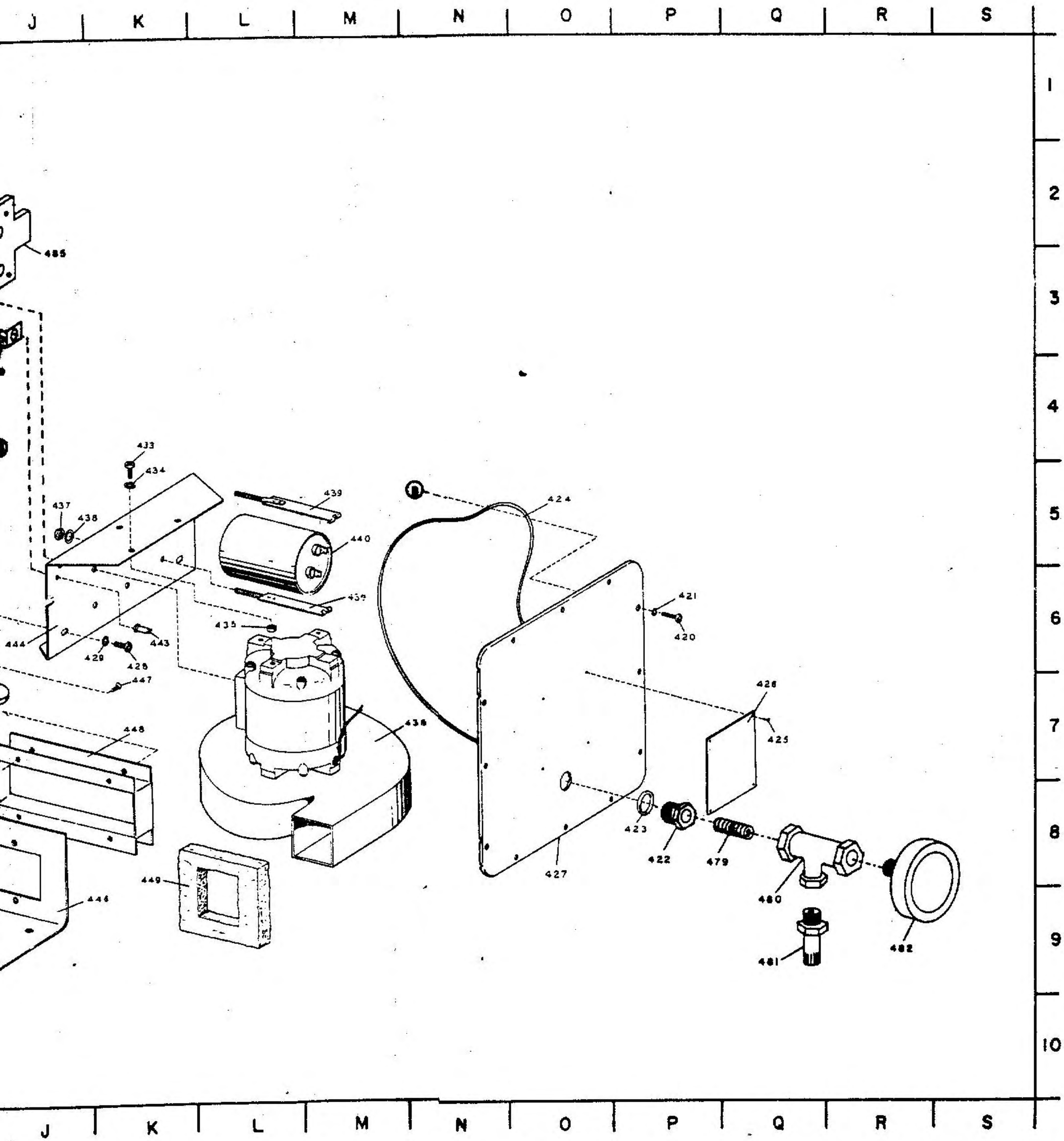


Figure 6-1. Antenna Coupler CU-714/SRA-22, Exploded View (Sheet 2 of 2)

CHAPTER 7

YARD AND TENDER INFORMATION

7-1. INSTALLATION.

a. UNPACKING AND HANDLING. — Carefully unpack Antenna Coupler CU-714/SRA-22 and Coupler Control C-2698/SRA-22, and inspect for evidence of shipping damage. If damage is evident, notify the transportation agency immediately. Packing material must be retained to substantiate claims.

b. INSTALLATION REQUIREMENTS.

(1) INSTALLATION POINTERS. — Coupler Control C-2698/SRA-22 is designed for rack mounting. When using the coupler control with Radio Set AN/XXX, remove the blank panel, which is below interconnection box J-1007/U, and mount the coupler control in this space. Antenna Coupler CU-714/SRA-22 is sealed and uses waterproof connectors. The antenna coupler shall be mounted adjacent to the base of the antenna. A distance of 19 inches minimum should be left for removing the antenna coupler from its case. It is important to have a good ground to the ship or the ship grounding system.

(2) OUTLINE DRAWING. — Figure 7-1 shows outline and mounting installation dimensions for the antenna coupler, and figure 7-2 shows outline and installation dimensions for the coupler control .

(3) INTERCONNECTING DIAGRAMS. — Figure 7-3 is an interconnecting diagram of Antenna Coupler Group AN/SRA-22 for use with Radio Set AN/XXX. Figure 7-4 shows an interconnecting diagram of the antenna coupler group for use as a separate unit with other transmitters. Cable requirements are given in table 7-1.

(4) CABLE ASSEMBLY. — Install type-N connectors on the RG-213/U and/or RG-215/U type cables. Install 16-pin plug 2P6 on one end of No. 22 AWG multiconductor interconnection cable when Antenna Coupler Group AN/SRA-22 is used with equipment other than Radio Set AN/XXX. Cut cable to the required length for specific installation. Install 24-pin plug 2P5 on one end of cable, and terminate the other end of the cable to terminal board TB-5. Install a 24-pin round plug 1P7 on another 22-AWG multiconductor interconnection cable, and terminate the other end of this cable to terminal board TB-5. For instructions on installing the connectors and plugs to the cables, refer to Electronics Installation and Maintenance Book, NAVSHIPS 0967-000-0113.

(5) WEATHERPROOFING. — The 24-pin round plug 1P7 and the type-N connector that terminate at the antenna coupler must be weatherproofed. Figure 7-5 weatherproof procedures. Cut the armor back 4 inches from back of plug 1P7. Wrap completely with two layers of plastic tape with 50-percent overlay between turns from armor to wires connected to the plug. Hand-tighten the connector to the antenna coupler. Wrap completely with several layers of plastic tape with 50-percent overlay between turns. Extend plastic tape 5 inches beyond end of the connector. Seal the taped connector with one coat of electrical insulating compound. Extend 1 inch beyond the plastic tape impregnating the armor.

The type-N connector is weatherproofed in the same manner as the plug 1P7, except that armor is not cut back.

c. INSPECTION AND ADJUSTMENTS.

Note

To operate controls of Coupler Control C-2698/SRA-22, it is necessary to hold the TUNE-OPERATE switch in the TUNE position.

(1) Check grounding of the antenna coupler case to the ship or ship grounding system. It is most important to have a good ground for the antenna coupler. A solid copper strap, illustrated in figure 7-5, not less than 3/4-inch wide and secured with 1/4-20 (or larger) bolts, should be installed for bonding the case to the ship hull. See Shipboard Interference Reduction, NAVSHIPS 900,171, for grounding specifications.

(2) Set TAP COARSE TUNE-FINE TUNE switch on coupler control to COARSE TUNE and note if TAP indicator meter changes reading.

(3) Set COIL COARSE TUNE-FINE TUNE switch on coupler control to COARSE TUNE and note if COIL indicator meter changes reading.

(4) Set LOAD-ANT switch on coupler control to LOAD position. (Make sure that a dummy load is connected to the coupler control.) Refer to paragraph 2-3b(1) and perform the procedures as outlined.

d. PREPARATION FOR RESHIPMENT. — No disassembly of Antenna Coupler Group AN/SRA-22 is necessary for reshipment. Coupler Control C-2698/SRA-22 should be wrapped in neutral paper and put into a carton padded with corrugated padding, along with five 1-pound bags (16-unit bag) of desiccant. The carton should be wrapped with vapor-proof barrier and put into a final carton that measures 22 by 8 by 10 inches.

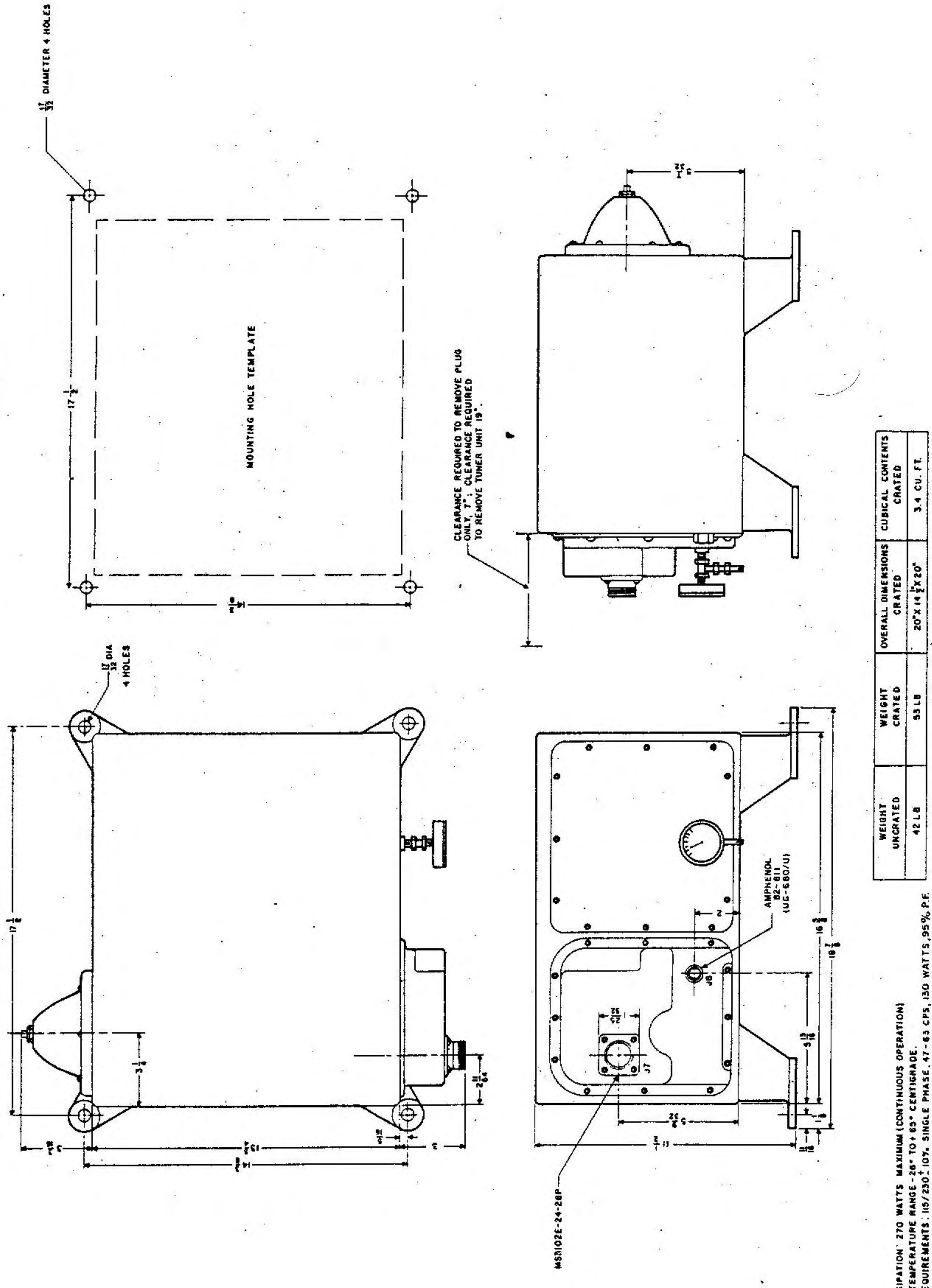
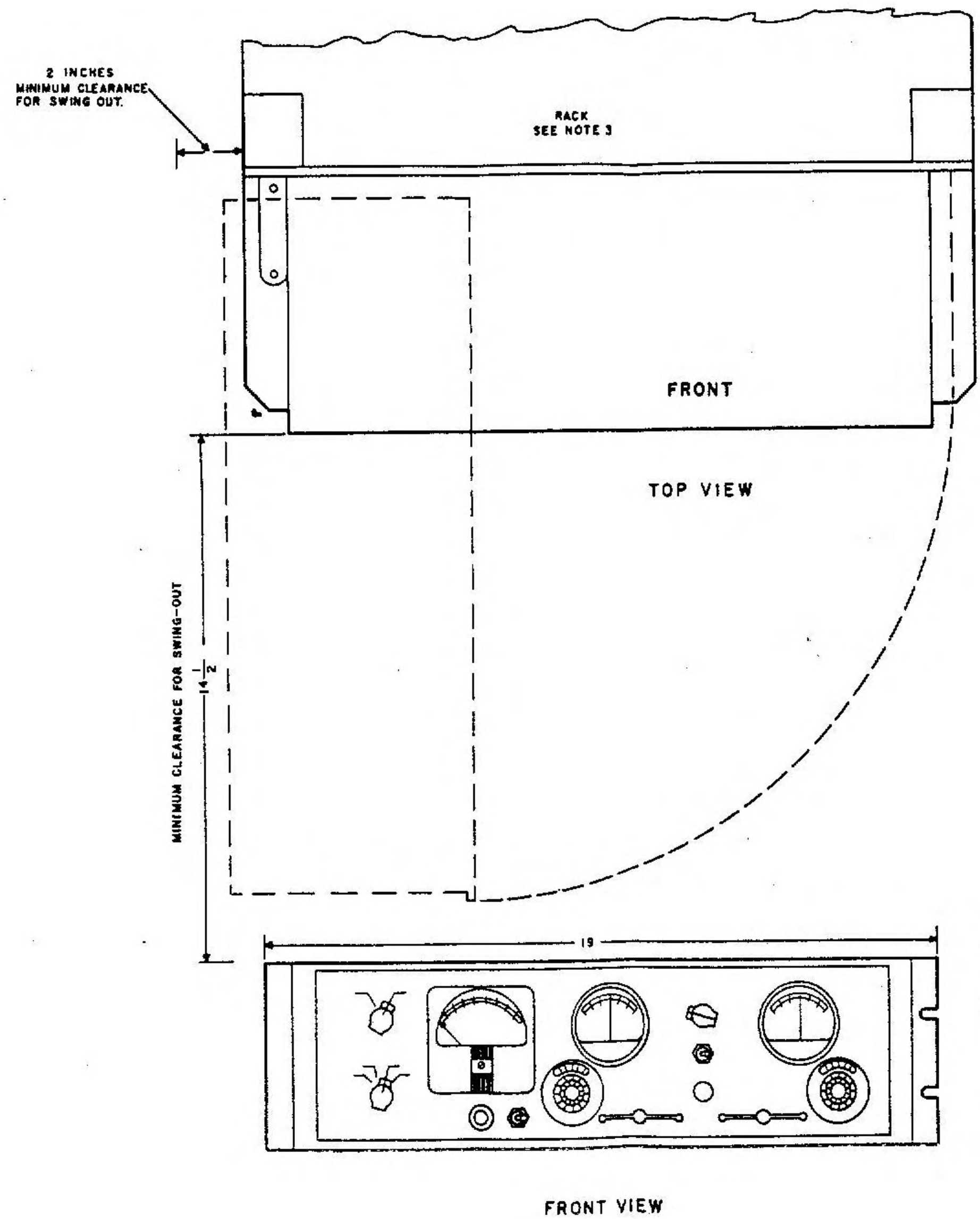
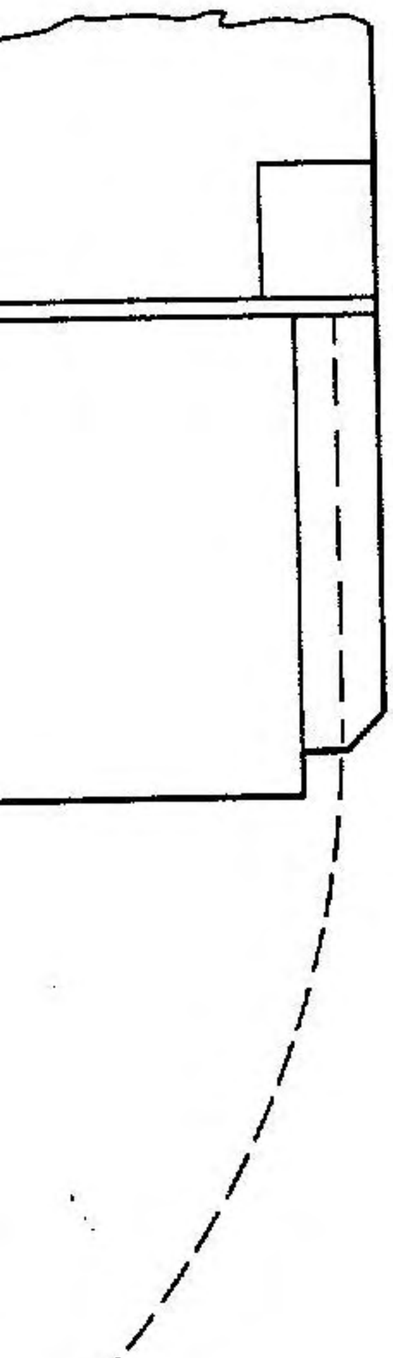


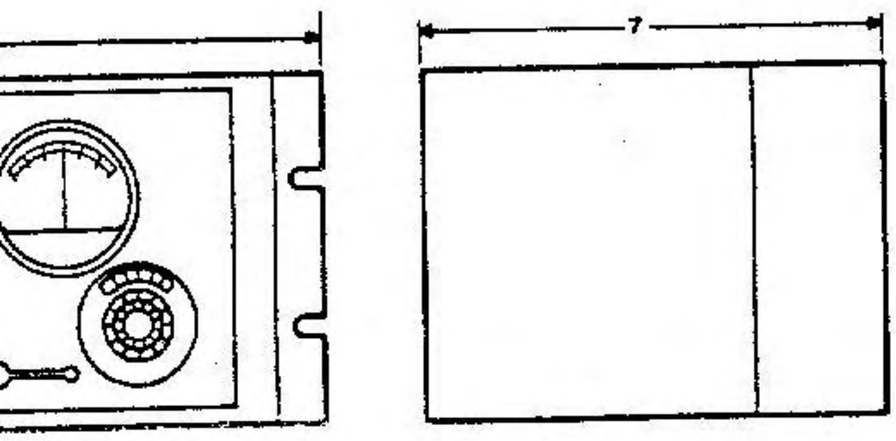
Figure 7-1. Antenna Coupler CU-714/SRA-22, Outline and Mounting Dimensions


2 INCHES
MINIMUM CLEARANCE
FOR SWING OUT.
RACK
SEE NOTE 3
FRONT
TOP VIEW
MINIMUM CLEARANCE FOR SWING-OUT
14 1/2
19
FRONT VIEW
RIGHT

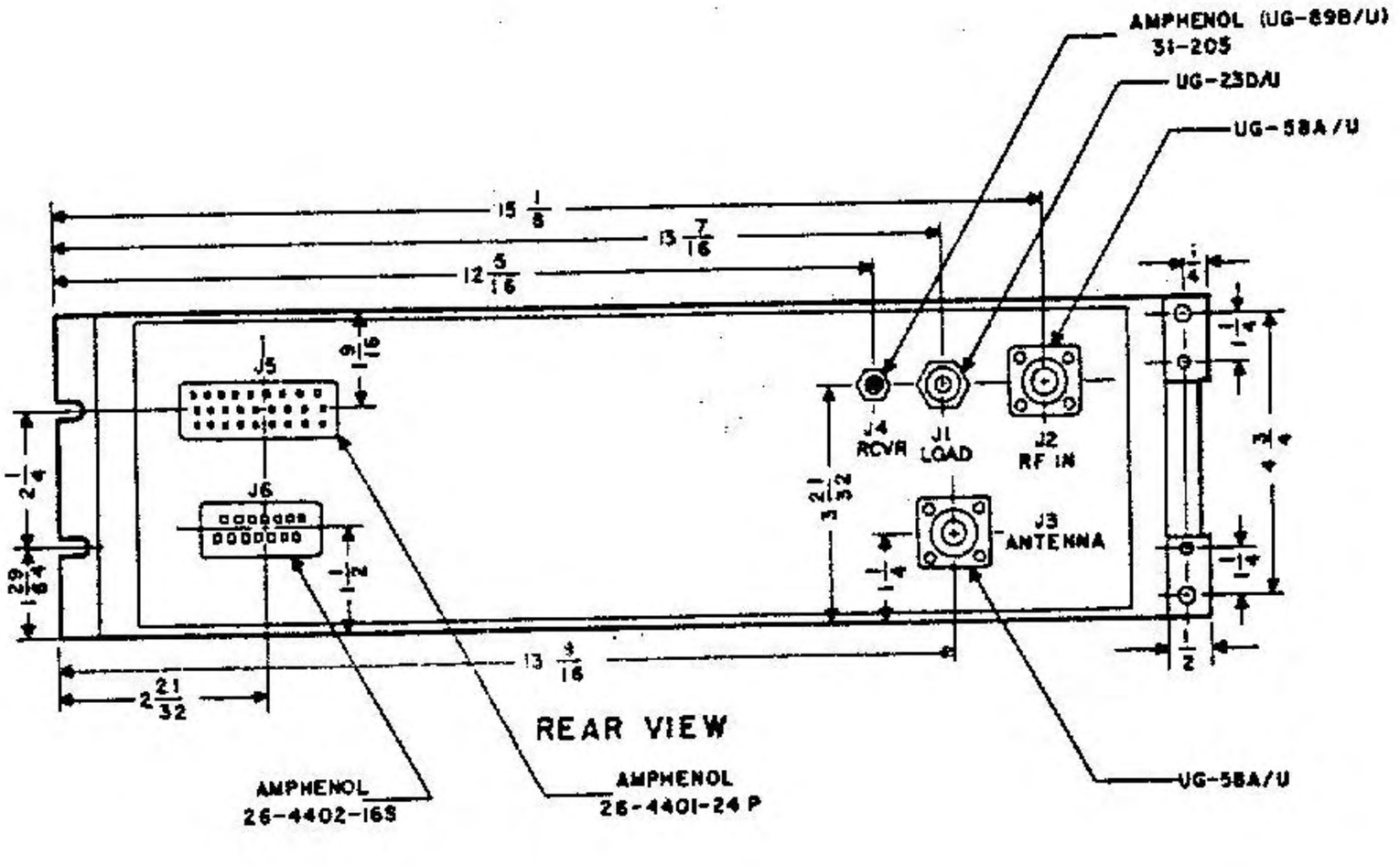


NOTES:
1. POWER REQUIREMENTS: 115/230 VOLTS ±10% SINGLE PHASE, 47–63 CYCLES, 20 WATTS, 95% P.F.
2. AMBIENT TEMPERATURE RANGE –28° TO +65° CENTIGRADE.
3. THIS EQUIPMENT IS DESIGNED TO BE MOUNTED IN AN ELECTRICAL EQUIPMENT RACK.
4. ALL DIMENSIONS GIVEN IN INCHES.

WEIGHT UNCRATED	WEIGHT CRATED	OVERALL DIM. CRATED	CUBICAL CONT. CRATED
17LB.	25LB.	22"X8"X10"	1.2FT.

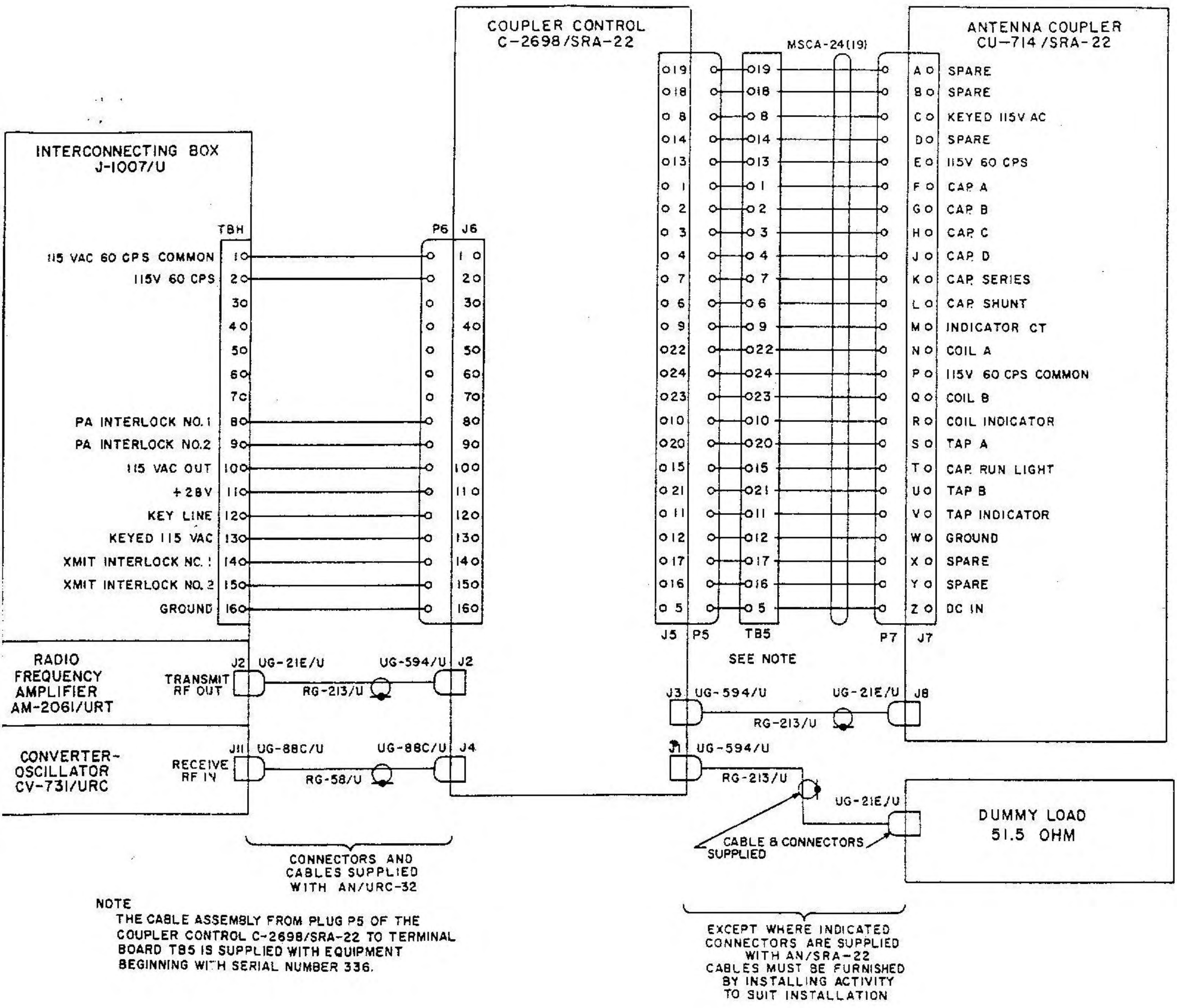


RIGHT SIDE VIEW



REAR VIEW

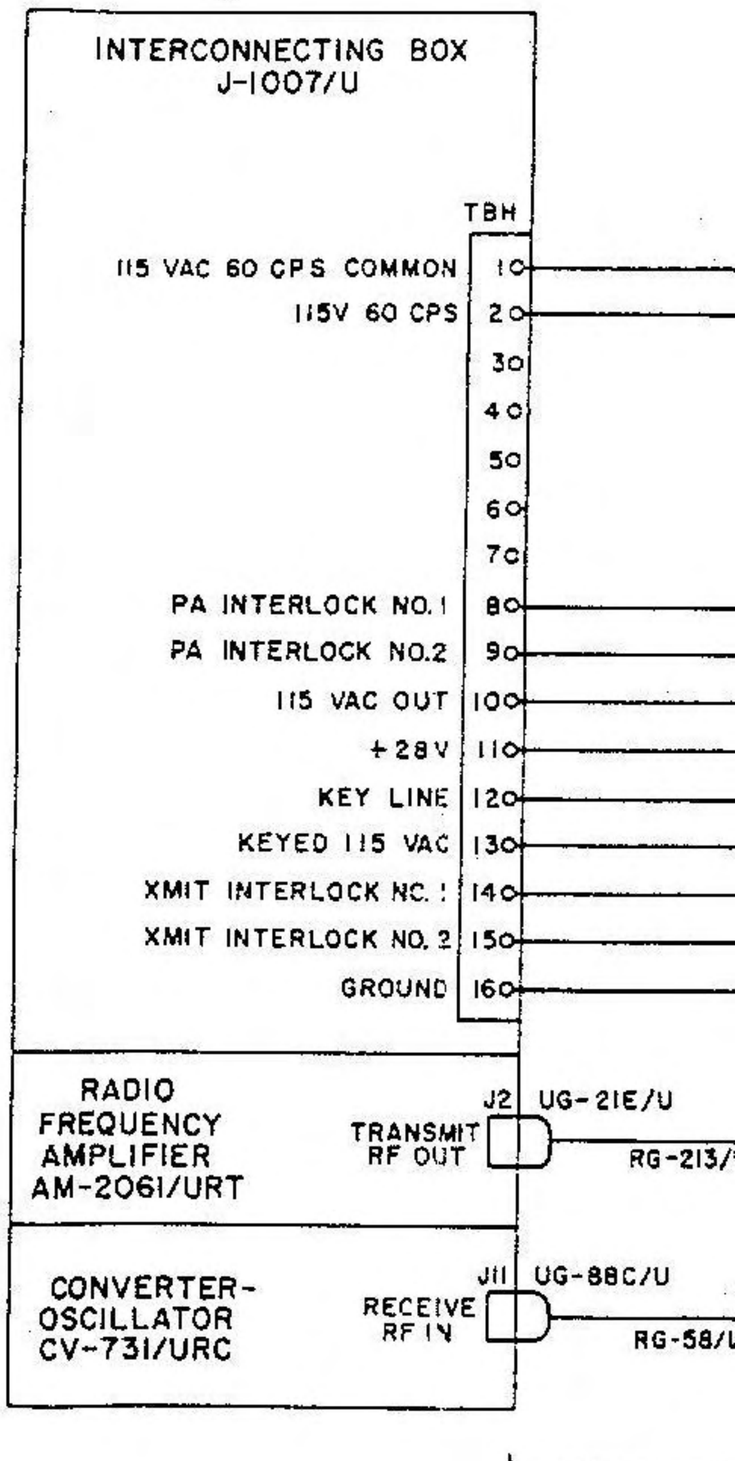
Figure 7-2. Coupler Control C-2698/SRA-22,
Outline and Mounting Dimensions



NOTE

THE CABLE ASSEMBLY FROM PLUG P5 OF THE COUPLER CONTROL C-2698/SRA-22 TO TERMINAL BOARD T85 IS SUPPLIED WITH EQUIPMENT BEGINNING WITH SERIAL NUMBER 336.

Figure 7-3. Interconnecting Diagram of Antenna Coupler Group AN/SRA-22 with Radio Set AN/URC-32



NOTE
THE CABLE ASSEMBLY FROM PLUG P
COUPLER CONTROL C-2698/SRA-22
BOARD TB5 IS SUPPLIED WITH EQUI
BEGINNING WITH SERIAL NUMBER 33

ORIGINAL

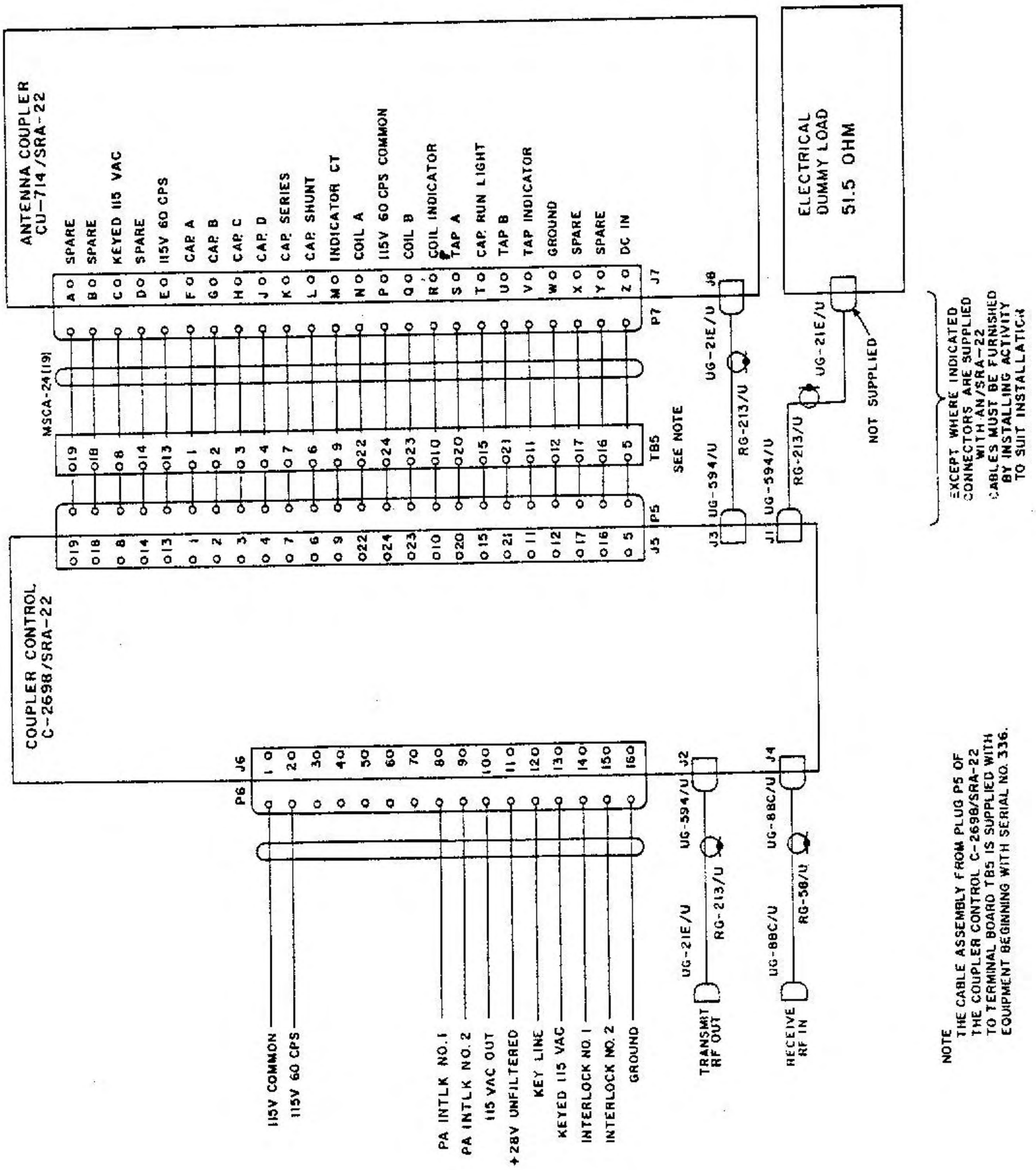


Figure 7-4. Interconnecting Diagram of Antenna Coupler Group AN/SRA-22 for Use as Separate Unit

NOTE
THE CABLE ASSEMBLY FROM PLUG P5 OF THE COUPLER CONTROL C-2698/SRA-22 TO TERMINAL BOARD TB5 IS SUPPLIED WITH EQUIPMENT BEGINNING WITH SERIAL NO. 336.

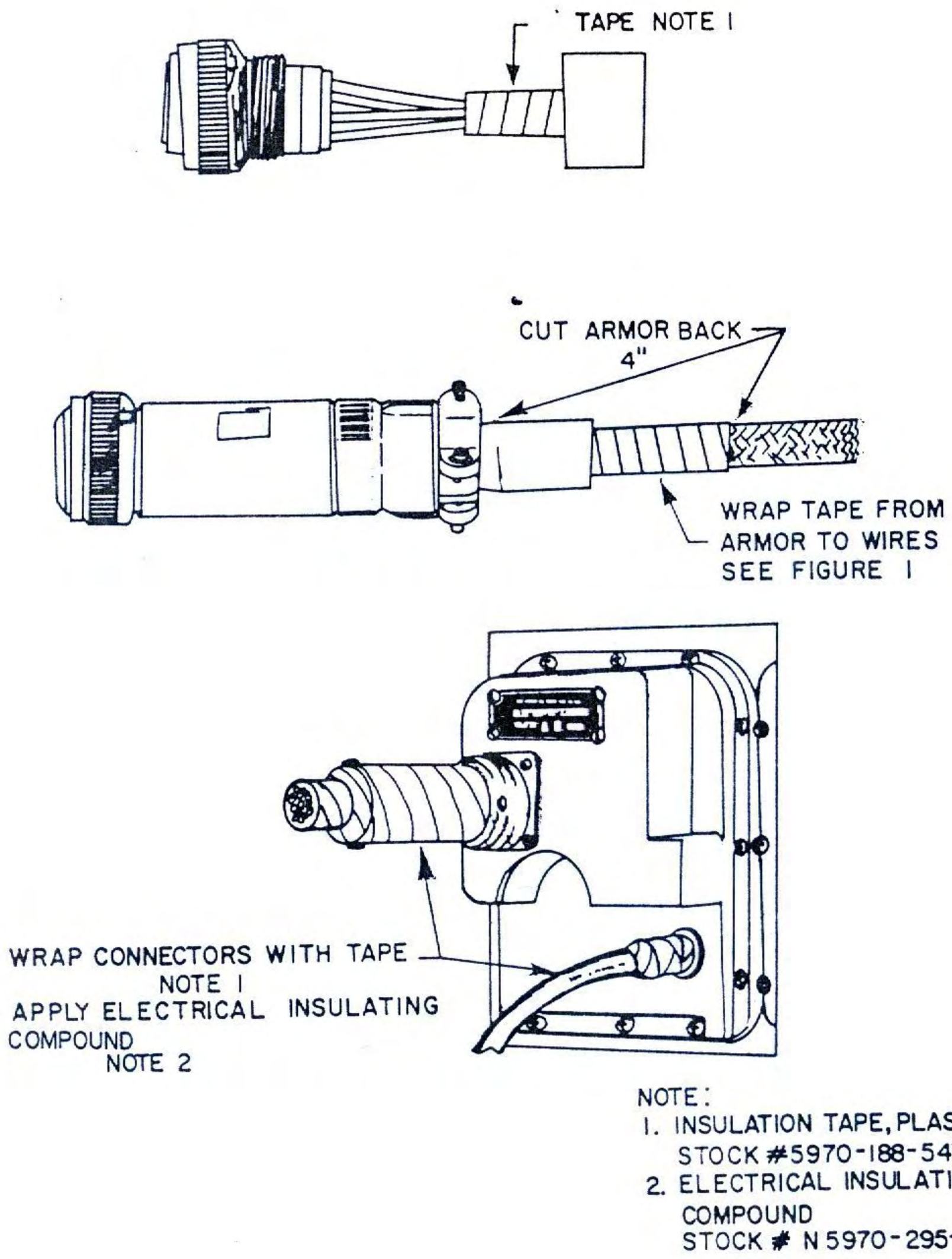


Figure 7-5. Antenna Coupler CU-714/SRA-22 Weatherproofing Procedures

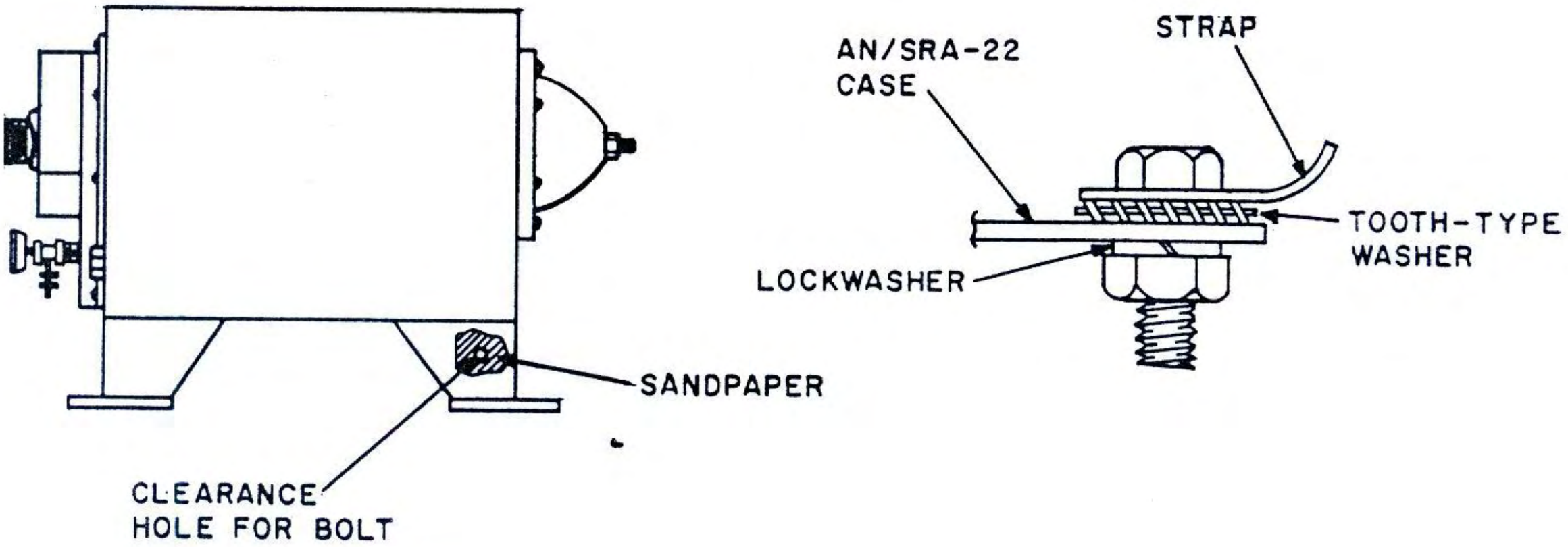


Figure 7-6. Antenna Coupler CU-714/SRA-22 Ground Recommendations

TABLE 7-1. CABLE REQUIREMENTS

NO. OF CABLES	TYPE OF CABLE	TERMINATION AT ANTENNA COUPLER	TERMINATION AT COUPLER CONTROL	TERMINATION AT DUMMY LOAD
1	MSCA-24	24-contact round male MS3106E24-28S(c)	To terminal strip TB-5	
1	RG-213/U or RG-215/U	Series N plug, straight UG-21E/U	Series N plug, right angle UG-594/U	
1	RG-213/U or RG-215/U		Series N plug, right angle UG-594/U	Series N plug, straight UG-21E/U
1	RG-213/U or RG-215/U		Series N plug, right angle (from transmitter) UG-594/U	
1	RG-58/U		Series BNC plug (from receiver) UG-88C/U	
1	No. 22 AWG multiconnection cable (from AN/URC-32)		16-contact male plug (from AN/URC-32) Amphenol 26-4502-16F	
1	No. 22 AWG multiconnection cable (from TB-5)		24-contact female plug (from TB-5) Amphenol 26-4501-24S (cable assembly, incl. plug 2P5 CPN 547-1289-00)	

Antenna Coupler CU-714/SRA-22 should be wrapped in neutral paper and put into a carton padded with corrugated padding, along with three 1-pound bags (16-unit bag) of desiccant. This carton should be wrapped with a vapor-proof barrier and put into a final carton that measures 20 by 14-1/2 by 20 inches.

7-2. MAJOR OVERHAUL.

This section contains the major overhaul procedures for Antenna Coupler Group AN/SRA-22. These procedures are usually employed by overhaul activities when repairs are necessary beyond the capabilities of the ship force.

a. REMOVAL AND DISASSEMBLY OF COUPLER CONTROL C-2698/SRA-22. — Same as paragraph 5-6a (1 through 11).

b. REMOVAL AND DISASSEMBLY OF ANTENNA COUPLER CU-714/SRA-22. — Refer to figure 6-1 and proceed as follows.

Note

If components such as switches, plugs, jacks, and terminal posts are to be removed, unsolder leads and tag them for aid in reassembly. Where it is not necessary to replace the component, do not remove the leads unless necessary to complete the disassembly.

(1) Remove plug 1P7 and coaxial plug 1P8 from connectors 1J7 and 1J8 (41 and 45) on antenna coupler unit.

(2) Disengage the 12 captive screws (1) holding antenna coupler in its case.

(3) Pull unit slowly out of case and disconnect jack 1J9 (460) from plug 1P9 (269). Remove gasket (2) and 28 screws (3, 6, 8, 11, and 14) holding shrouds (5, 10, 13, and 15) over coil drum assembly. Washers (7) and nuts (9 and 12) will also be removed by this procedure.

(4) Unsolder bus wire on connector 1J8 (45).

(5) Remove screws (19) (1 panhead and 5 flathead) from front plate. Pull front casting (49) straight forward until coil slug (28) clears ceramic drum, then allow front casting (49) to swing down. Care should be taken not to damage ceramic drum coil form or wires.

(6) Remove nylon bolt (25) and slug (28).

(7) Remove standoffs (29 and 31), lockwashers (32), and solder lug (40) from studs (30 and 33).

(8) Remove two screws (34), two lockwashers (35), and ground contact (36) from front casting (49).

(9) Remove four screws (37) and gasket washers (37A) holding connector 1J7 (41) and gasket (42) to front casting (49). Also remove nuts (38) and lockwashers (39). Connector 1J7 (41) can now be replaced if necessary. Clearly mark all wires removed to ensure correct reassembly.

(10) Remove hex nut (43), lockwasher (44), and connector 1J8 (45) if replacement is necessary.

(11) Manually run coil and tap to maximum (all of the coil ribbon wound on ceramic drum and tap assembly run toward capacitor end of drum). Secure ribbon to ceramic drum with tape. Holding drums securely, disengage ribbon from metallic drum by removing screw (105) and release tension carefully. Tape free end of ribbon to ceramic drum to prevent ribbon damage.

(12) Remove five screws (70) and three screws (70A) holding front plate (71). Swing front plate (71) to one side.

(13) Remove six screws (16) holding cover (17 and 18) to front plate (71).

(14) Remove two screws (54) and nuts (55) and unsolder capacitor leads if capacitor 1C5 (56) is to be replaced.

(15) Unsolder leads from terminals (51 and 53) and remove three screws (57) to free switch 1S8 (58) from front plate (71).

(16) Remove terminals (51 and 53) by removing screws (50 and 52).

(17) Remove two screws (59), screw (60), lockwasher (61), solder lug (62), and variable tap mount (63).

Note

Be careful not to lose the round nut in shaft 1MP-51 (82).

(18) Slide ball bearing (64) off pinion (81) shaft.

(19) Remove ball bearing (65) from around button contact (108).

(20) Remove six screws (66) and six retaining rings (69). Remove six rollers (68) from six roller arms (67).

(21) Loosen three setscrews (73) on collar (74). Remove ceramic coil assembly.

(22) Remove two screws (76), switch 1S10 (78), and spacers (79) from primary gear plate (419). Swing switch 1S10 away from gear (102).

(23) Remove roll pin (80) (pin closest to primary gear plate (419) from tap drive pinion (81), and remove tap drive pinion from primary gear plate (419).

(24) Remove shaft (82).

(25) Remove two screws (91), two lockwashers (92), and contacts (93).

(26) Remove retaining ring (94) and spacers (95 and 96). Be extremely careful not to lose four springs (97) which also may be removed at this time.

(27) Remove spacer (98) and tap hub (99).

(28) Remove roll pin (100) from stop assembly (103) and slide 1-v drum assembly off shaft (382)

(29) Remove two screws (101), 1-v drum driven gear (102), roll pin (75), four screws (105), and stop assembly (103).

(30) Remove button contact (108), four screws (105), and 1-v drum end assembly (109).

(31) Remove four screws (104) and drum end assembly (120) from drum (107).

(32) Remove screw (110), washer (111), and nut (112) holding spring (115) to 1-v drum end assembly.

(33) Remove screw (113) and washer (114) from flange coupler (117).

(34) Remove spring (115).

(35) Loosen setscrew (116) and slide flange coupler (117) off 1-v drum shaft (118).

(36) Remove Oilite bearing (119) from 1-v drum end assembly (120).

(37) Remove tap ring assembly from coil form.

(38) Remove three screws (121), three lockwashers (122), and three washers (123).

(39) Remove screw (124), lockwasher (125), screw (126), lockwasher (127), and two strip contacts (128 and 129).
(40) Remove slip ring (130).
(41) Remove four spacers (131, 132, 133, 134) and four rollers (135).
(42) Remove two screws (136) and two stop screws (137) from roller shafts (138, 139, 140, and 141) and plastic spur gear (142).
(43) Unsolder ribbon from bus wire connection (143) and remove silver coil ribbon (144), being careful not to kink or damage ribbon.
(44) Remove screw (145) and lockwasher (146) that secure lead (147).
(45) Remove roll pin (150) and slide out ceramic drum (160).
(46) Remove six screws (157), washers (155 and 156), nuts (154), and end assembly (159).
(47) Remove four screws (148) and flange coupler (149).
(48) Separate plastic spur gear (158), h-v drum stop assembly (159 and 159A), and h-v drum (160).
(49) Loosen setscrews (73) on coupler (74) and slide out h-v output shaft (151).

Note

Be careful not to lose h-v contact (153) and coupler (74).

(50) Remove screw (160), lockwasher (162), and solder lug (163) from variable capacitor (171).
(51) Remove three screws (164), three lockwashers (165), h-v spark gap contact (166), and solder lug (167).
(52) Remove screw (168), washer (169), and teflon spur gear (170).
(53) Remove four screws (172) from capacitor plate (176).
(54) Remove variable capacitor (171) from capacitor plate (176) by backing out leadscrew (180).
(55) Remove small nut (173), lockwasher (173A), h-v contact (174), and screw (175) from capacitor plate (176).
(56) Remove four screws (177) holding h-v collar (178) and gear (179) to capacitor lead screw (180). Separate these parts.
(57) Remove three screws (182) holding h-v output plate (187).
(58) Remove retaining ring (183) and spacers (184, 185).
(59) Separate 1P10 (186) and h-v output plate (187)
(60) Remove three screws (188) and three h-v posts (189).
(61) Remove two nuts (190) and spacers (191) from switch 1S11.
(62) Remove switch 1S11 (192) and two spacers (193).
(63) Remove two studs (195).
(64) Remove three nuts (196), three lockwashers (197), three washers (198), three washers (199), and spacers (199A).
(65) Remove screw (200), lockwasher (201), solder lug (202), washer (203), washer (204), and spacer (205).
(66) Remove retaining ring (206) and washers (207, 208, 209) from h-v rotor shaft (304).
(67) Remove two nuts (210), lockwashers (211), solder lug (215), and four washers (212, 213).
(68) Remove two studs (214), and separate h-v contact (216) and two spacers (217).
(69) Remove two screws (218), two lockwashers (219), two solder lugs (220), four washers (221, 222), and two contact buttons (223).
(70) Remove two screws (224), two lockwashers (225), solder lug (228), two washers (226), and two washers (227).
(71) Separate strip contact (229), two spacers (230), and h-v plate (231).
(72) Remove four standoffs (232, 233) and six studs (234, 235, 236).
(73) Loosen setscrew (237) and remove roll pin (238) from h-v rotor collar (240).
(74) Remove three screws (239) that secure h-v rotor collar (240) to h-v rotor plate (245).
(75) Carefully remove two nylon screws (244) and h-v rotor strip (242). Replace contacts (241 and 243) if necessary.
(76) Loosen four setscrews (246) from coupler (254).
(77) Remove three screws (247, 248) and two lockwashers (249).
(78) Remove four nuts (250), four lockwashers (251), four screws (252), and two potentiometer clamps (253).
(79) Slip coupler (254) off shaft of potentiometer 1R6 (255). Also remove mounting bracket (256).
(80) Remove screws (499), spacers (500), washers (501), and nuts (502). This frees switch 1S12 (506).

(81) Loosen two setscrews (505) and remove coil stop cam (258).
(82) Loosen two setscrews (505) and remove coupler (504).
(83) Loosen two setscrews (505) and remove shaft extender (503).
(84) Remove spring (259).
(85) Loosen two setscrews (260) from coil stop (261).
(86) Remove screw (262), lockwasher (263), washer (264), and h-v spark gap contact (265) from secondary gear plate (346).
(87) Remove two nuts (266), two lockwashers (267), two screws (268), and two clamps (269A) that secure plug 1P9 (269) to bracket (274).
(88) Remove two screws (271) that secure bracket (274) to secondary gear plate (346). Also remove screw (270) and spacer (296).
(89) Remove screw (275), washer (276), and teflon spur gear (277) from primary gear plate (419).
(90) Remove screw (278), washer (279, teflon spur gear (280), and retainer ring (281) from primary gear plate (419).
(91) Remove coil stop assembly (282).
(92) Remove two screws (285) and center tap block (286).
(93) Remove screw (287) and spacer bar (288).
(94) Remove screw (289) and spacer bar (290).
(95) Remove spacer bar (292).
(96) Remove screw (305A), spacer (306A), and spacer bar (293).
(97) Remove screw (294) and spacer bar (295).
(98) Loosen four setscrews (84) in coupler (85).
(99) Remove four screws (88), nuts (86), and potentiometer clamps (89).
(100) Slide potentiometer 1R7 (90) out of coupler (85).
(101) Remove three screws (83) and potentiometer bracket (498).
(102) Remove screw (492) and switch plate (490).
(103) Remove screws (491), spacers (493), washers (494), and nuts (497). Remove switch 1S13 wafer (495).
(104) Remove screws (297).
(105) Remove screw (298) and spacer (299).
(106) Remove two screws (300).
(107) Remove screw (301).
(108) Remove screw (302) and spacer (307).
(109) Remove spring (303) connected to h-v rotor shaft (304).
(110) Remove screw (305) and spacer (306).
(111) Remove two screws (308) and guide pin block (309).
(112) Remove two screws (310) and guide pin block (311).
(113) Remove h-v rotor shaft (304).
(114) Remove secondary gear plate (346).
(115) Remove four screws (312) and coil motor (313).
(116) Remove four screws (314) and tap motor (315).
(117) Remove four screws (316) and capacitor motor (317).
(118) Remove four screws (318) and four h-v posts (319).
(119) Remove two capacitor drive pin stops (320).
(120) Remove two stop pin screws (321).
(121) Remove Oilite bearings (322, 323, 324, 325, 326, 327).
(122) Remove ball bearings (328, 329, 330) from gear shafts (382, 383, and 376), respectively.
(123) Remove Oilite bearing (331) from gear shaft (368).
(124) Remove ball bearings (332 and 333) from gear shafts (366 and 367), respectively.
(125) Remove Oilite bearing (334) from gear shaft (363).
(126) Remove ball bearings (335, 336, and 337) from gear shafts (362, 361, and 367), respectively.
(127) Remove Oilite bearings (338, 339, 340, and 341) from gear shafts (356, 354, 353, and 352), respectively.
(128) Remove spacer (342).
(129) Remove Oilite bearings (343, 344, and 345) from gear shafts (349, 375, and 386), respectively.
(130) Remove three screws (347) that secure gear (348) to gear (349).
(131) Remove two screws (350) that secure gear (351) to hub (352).
(132) Remove gear assemblies (353, 354).
(133) Loosen two setscrews (355) and remove shaft (356) from gear (359).
(134) Remove two screws (357) and stop block (358) from gear (359).
(135) Remove gear assemblies (360, 361, and 362).

(136) Remove spur gear shaft (363).
(137) Remove screw (364) and stop block (365) from gear (366).
(138) Remove gear (366).
(139) Remove gear assemblies (367 and 368).
(140) Remove gear-shaft assembly (369).
(141) Remove gear assemblies (370, 371, and 372).
(142) Remove roll pin (373) and separate gear-shaft assembly (374) and spur gear (375).
(143) Remove gear assembly (376).
(144) Remove retainer ring (377) and three washers (378, 379, and 380).
(145) Remove sector gear assembly (381).
(146) Remove spur gear shaft (382).
(147) Remove gear-shaft assembly (383).
(148) Remove roll pin (384), shaft (385), and gear-shaft assembly (386).
(149) Remove spring (387), retainer ring (388), and stop arm (389).
(150) Remove four screws (390) that secure pin stop (391) to primary gear plate.
(151) Remove ball bearing (392) and Oilite bearing (393) from primary gear plate.
(152) Remove bearing (394).
(153) Remove Oilite bearing (395) and ball bearing (396) from parimary gear plate.
(154) Remove Oilite bearing (397).
(155) Remove Oilite bearing (398).
(156) Remove three Oilite bearings (399, 400, and 401).
(157) Remove ball bearing (402) and Oilite bearing (403).
(158) Remove four ball bearings (404, 405, 406, and 407).
(159) Remove six Oilite bearings (408, 409, 410, 411, 412, 413).
(160) Remove two screws (414), two Oilite bearings (415, 416), and hub support (417).
(161) Remove ball bearing (418) from primary gear plate (419).
(162) Disengage 12 captive screws (420) and remove blower front cover (427) from right-hand side of the antenna coupler case.
(163) Remove pressure gauge (422), filler valve (481), T-fitting (480), nipple (479), connector (422), and 0-ring (423).
(164) Remove rubber gasket (424).
(165) Remove six screws (428) and six lockwashers (429).
(166) Remove blower assembly from antenna coupler case (477).
(167) Remove capacitors 1C8 (483) and 1C9 (484) by removing four screws (487) and lock-washers (488).
(168) Remove screws (486) and capacitor mounting plate (485).
(169) Remove three screws (433), lockwashers (434), spacers (435), and blower (436).
(170) Remove nuts and capacitor mounting brackets (437, 439), lockwashers (438), and capacitor 1C6 (440).
(171) Remove terminal (443) and solder lug (489) by removing screw (441) and lockwasher (442).
(172) Remove cradle (446) by removing 11 screws (445).
(173) Remove five screws (447) and remove plenum (448) and blower gasket (449).
(174) Remove nut (450) and guide pin (451).
(175) Remove nut (452) and guide pin (453).
(176) Remove two screws (461, 462) and connector 1J10 (463).
(177) Remove 6 screws (466) and 18 washers (466A, 467, 468).
(178) Remove h-v output insulator (469) and gasket (470).
(179) Remove two nuts (471, 472), two washers (473, 474), gasket (475), and h-v output shaft (476).
(180) Remove screw (464) and h-v post (465).
(181) Remove two screws (456), lockwashers (455), and nuts (454) holding jack 1J9 (460) in cover (458).

c. CLEANING. — This section contains instructions and procedures for cleaning the dismantled and disassembled components of Antenna Coupler Group AN/SRA-22. All parts requiring particular methods of cleaning are considered separately, and parts which are of such similar nature as to permit identical cleaning procedures are grouped. Instructions are given for cleaning finished surfaces to permit immediate repairs to minor finish damage by brush touch-up after the surface has been cleaned. Reference to the word "solvent" shall be understood as indicating a mixture comprising methylene chloride, 25 percent; perchloro-ethylene, 5 percent; and dry-cleaning solvent, 70 percent, by volume. All referenced cleaning materials and protective agents are listed and identified in table 7-2.

TABLE 7-2. CLEANING MATERIALS AND PROTECTIVE AGENTS

MATERIAL	SPECIFICATION	ASO STOCK NO.
Solvent; a mixture by volume of: Methylene chloride, 25 percent Perchloroethylene, 5 percent Dry-cleaning solvent, 70 percent	 ANA Spec AN-M-37 Fed. Spec O-T-236 Fed. Spec P-S-661a	 R51-M-950-20 R51-T-4459-200 R51-C-1326-75
Chamois skin		
Cloth, cotton; lintless		
Detergent, powder		
Oil, lubricating	MIL-L-7870	R14-0-2405-20
Oil, lubricating; refrigerating machine	Fed. Spec VV-0-581	
Paper, lens tissue		
Paper, tissue; fine grade		
Solvent, dry-cleaning	Fed. Spec P-S-661a	R51-C-1326-75
Tool, burnishing		R41-T-3080
Trichloroethylene	AN-O-T-631	R51-T-5780

WARNING

Perform operations involving cleaning solvent under a ventilated hood. Avoid breathing solvent vapor; wear a suitable mask when necessary. Avoid continuous contact with a solvent. Use goggles, gloves, and apron to prevent irritiation caused by prolonged contact. Change clothing that has become saturated with solvents.

References to air jet signify a hand-operated air nozzle supplied with clean, dry, compressed air at a pressure of 25 to 28 psi maximum.

(1) CLEANING NONSEALED BALL BEARINGS. — Nonsealed ball bearings can be cleaned in a bearing cleaning machine, such as ASO Stock No. V40C969, using the cleaning agents and procedures recommended by its manufacturer. Otherwise, clean these bearings according to the following hand-washing procedures.

(a) Perform cleaning work in an air-conditioned or air-filtered area. All tools, equipment, fixtures, and the area in general must be maintained at a very high level of cleanliness. For air jets used in the area, compressed air from a source outside the area should be again filtered and dehydrated, even though the source has those facilities. All cloth used in these procedures must be lint free and clean. Dry-cleaning solvent Federal Spec P-S-661a must be filtered through clean chamois skin or filter paper before use, and periodically thereafter.

(b) Insert a bearing holder into bore securely, and immerse bearing in cleaning solvent Federal Spec P-S-661a. Move bearing up and down several times to circulate dry-cleaning solvent.

(c) Remove bearing from bath, and direct air jet at side of bearing opposite from holder until dry; take care not to allow flow from air jet to spin the bearing.

(d) Again wash and dry bearing as directed in steps (b) and (c).

(e) Repeat wash as directed under step (b) and, while so doing, gently rotate outer race with gloved finger to dislodge any foreign particles from balls, retainer, and races; then dry as directed in step (c).

(f) Demagnetize bearing by passing it through throat of a suitable demagnetizer, once in a forward direction, then in reverse direction; while so doing, slightly rotate bearing in order that balls within it will be rotated one or two revolutions.

(g) Using a second bath of freshly filtered dry-cleaning solvent, repeat washing and drying operations of step (e). Repeat this operation until bearing is completely free of all foreign matter as ascertained by step (h).

(h) Gently rotate outer race with gloved finger, and observe whether action is smooth all the way around without resistance or grinding. Smooth action of a dry bearing is accepted as an indication that is is clean.

(j) Bake bearing for approximately one-half hour in suitable electric or infrared ventilated oven at approximately 43° C (110° F) until all remaining dry-cleaning solvent is evaporated.

(k) Remove from oven and place in clean, dry, suitable container for protection from dust, moisture, and handling while in transit to inspector. Attach a slip to container identifying contents.

(2) CLEANING COVERED CABLE.

(a) Clean outer surface of flexible vinylite conduit by wiping dirt from surfaces with solvent-moistened, lintless cloth.

(b) Wipe dry using dry, clean, lintless cloth.

(c) Treat any connector terminations as directed in paragraphs 7-2c(5); wipe clean any lug terminations with solvent-moistened, lintless cloth; and dry them with dry, clean, lintless cloth.

(3) CLEANING CASTINGS. — Unfinished, finished, or partly finished castings are cleaned as follows.

(a) Remove bulk of any surface grease with rags.

(b) Blow dust from surfaces, holes, and recesses with air jet.

(c) Immerse casting in washing bath of solvent and scrub until clean, working over all surfaces and into all holes and recesses with suitable nonmetallic brushes. Flat, woodbacked brushes with soft fiber bristles are recommended for surfaces; round brushes, similar to those used for washing bottles and test tubes, are recommended for holes and recesses.

(d) Raise from bath and permit solvent to drain into bath.

(e) Immerse in rinsing bath of clean solvent, rinse, and raise from bath. Position to drain dry, so that solvent is not trapped in holes or recesses. Where practical positioning will not permit complete drainage, use air jet to remove any trapped solvent.

(f) When thoroughly dry, touch up minor damage to finish. Extensive damage to finish may require complete refinishing.

(g) Protect from dust and moisture pending inspection.

(4) CLEANING WIRED CHASSIS. — The following cleaning procedure is used for chassis containing terminal boards, resistors, capacitors, switches, inductors, transformers, or other wired parts.

(a) Remove dust and dirt from all surfaces, including parts and wiring, using soft-bristled brushes in conjunction with an air jet.

Note

When necessary to disturb the dress of wiring and cables, dressing should be noted, and upon completion of cleaning operations, wiring and cables should be restored to their proper positions or dress.

(b) Clean jacks as instructed in paragraph 7-2c(11).

(c) With minimum possible disturbance of wiring, clean connectors as prescribed in paragraph 7-2c(5).

(d) Clean switches as directed in paragraph 7-2c(18).

(e) Complete chassis cleaning by wiping down all finished surfaces with solvent-moistened, lintless cloth.

(f) Dry and polish finished surfaces using dry, clean, lintless cloth.

(g) Make touch-up repairs to minor damage to finish.

(h) Protect from dust, moisture, and physical damage pending inspection.

(5) CLEANING CONNECTORS.

(a) Wipe dust and dirt from bodies, shells, and cable clamps using solvent-moistened, lintless cloth. Wipe dry with clean, dry, lintless cloth.

(b) Remove dust from inserts using small soft-bristled brush in conjunction with air jet.

(c) Wash dirt and any traces of lubricant from insert insulation and contacts with solvent applied sparingly with small camel's-hair brush.

(d) Dry insert with air jet.

(6) CLEANING COVERS AND SHIELDS. — Clean all unfinished, partly finished, and finished sheet-metal covers and shields, such as dust covers, inspection covers, chassis covers, and housings, according to applicable steps of procedure used for cleaning castings. Refer to paragraph 7-2c(3).

(7) CLEANING DIALS AND KNOBS. — Clean all dials and knobs by gently wiping their surfaces with clean, soft, lintless cloth which has been slightly moistened with solvent. When clean, polish with tissue paper.

(8) CLEANING NEOPRENE OR RUBBER GASKETS AND SEALS.

(a) Remove any grease from surfaces with dry, lintless cloth.

(b) Make up a washing bath of 2 ounces of detergent powder per gallong of warm water.

(c) Immerse gaskets and seals in bath and wash clean with lintless cloth.

(d) Rinse well in clean, warm water, dry with air jet, and protect from dust, lubricants, and high temperatures pending inspection.

(9) CLEANING GASKETS AND SHIM WASHERS (PAPER OR FIBER).

(a) Remove any grease from surfaces with dry, lintless cloth.

(b) With clean, lintless cloth moistened with solvent, quickly wipe all surfaces until clean.

(c) Immediately dry all surfaces using clean, dry, lintless cloth.

(d) Protect from dust and lubricants pending inspection.

(10) CLEANING INSULATORS.

(a) Wipe clean with solvent-moistened, clean, lintless cloth.

(b) Dry and polish using dry, clean, lintless cloth.

(11) CLEANING JACKS.

(a) Remove dust from exteriors with camel's-hair brush and air jet.

(b) Blow dust from interior of each female contact with air jet.

(12) CLEANING LAMP HOLDERS.

(a) Clean exteriors with soft-bristled brush and air jet.

(b) Clean interiors of socket types with air jet.

(13) CLEANING LAMPS. — Clean all lamps by wiping with solvent-moistened, lintless cloth; then dry and polish with clean, dry, lintless cloth.

(14) CLEANING LAMP-HOLDER LENS.

(a) Wipe all surfaces clean with solvent-moistened, lintless cloth.

(b) Wipe all surfaces with dry, clean, lintless cloth.

(c) Polish glass lens with clean, fine, tissue paper or lens tissue paper.

(15) CLEANING MACHINED METAL PARTS. — Detached gears, shafts, keys, pins, collars, worms, springs, and similar machined parts should be cleaned in a suitable machine if available; otherwise, proceed as follows.

(a) Clean as directed in steps (a), (c), (d), and (e) of paragraph 7-2c(3) and in steps (b), (c), and (d) of this paragraph.

Note

Split-gear or spring-loaded assemblies require cleaning between twin gears. Accomplish this while washing assemblies by moving gears with fingers.

(b) Dry in dust-free, dry area. The use of radiant heat in a ventilated enclosure is recommended for drying, particularly where humidity is high.

(c) When dry, immediately apply light coat of MIL-L-7870 lubricating oil to any bare steel surfaces.

(d) Protect from dust and moisture pending inspection.

(16) CLEANING MECHANICAL METAL PARTS. — The detached miscellaneous mechanical parts include mounting plates, mounting clamps and brackets, blower fan, nuts, bolts, screws, washers, handles, fasteners, and hardware. These are handled in a suitable cleaning machine, or according to applicable steps of procedure used for castings. Refer to paragraph 7-2c(3).

(17) CLEANING RECEPTACLES. — Clean all receptacles according to applicable steps of procedure used for connectors. Refer to paragraph 7-2c(5).

(18) CLEANING ROTARY SWITCHES. — Clean all special switches with button contacts and switches of the phenolic-wafer type as follows.

(a) Remove all dust with air jet while turning switch rotor back and forth several times.

(b) Wash all contacts and insulation with solvent lightly applied with small camel's-hair brush.

(c) Dry with air jet, then repeat wash using clean solvent. Rotate switch rotor several times during this wash.

(d) Dry gently, but thoroughly, with air jet.

(19) CLEANING FUSE HOLDERS AND FUSES. — Clean fuse holders and fuses according to procedures used for lamps and lamp holders. Refer to paragraph 7-2c(12) and (13).

(20) CLEANING TOGGLE SWITCHES.

(a) Using air jet, blow dust from surfaces and crevices of switch bodies and any attached activating mechanisms.

(b) Wipe all surfaces with solvent-moistened, lintless cloth and dry with air jet.

(21) CLEANING MOTORS AND RELAYS. — All motors and relays are sealed, and only the exterior surfaces can be cleaned. Clean all surfaces according to applicable steps of procedure used for cleaning castings. Refer to paragraph 7-2c(3).

(22) CLEANING CERAMIC DRUM.

(a) Wipe clean with solvent-moistened, clean, lintless cloth.

(b) Dry and polish using dry, clean, lintless cloth.

(23) CLEANING SILVER RIBBON.

(a) Clean silver ribbon with an artgum eraser to remove foreign material.

(b) Wipe lightly with solvent-moistened, lintless cloth to remove any grease or oil.

(c) Use an approved silver polish to remove any tarnish.

(d) Polish with a clean, lintless cloth and use air jet to remove any polish residue or dust.

(24) CLEANING METAL, FIBER, OR FABRIC GEARS. — If gear trains are disassembled for replacement of defective gears, the gears should be cleaned according to the following procedures.

(a) Metal gears should be cleaned according to applicable steps of paragraph 7-2c(15).

(b) Composition or plasticized gears and nylon friction clutches should be cleaned according to procedures given in steps (c) and (d) following.

(c) Remove all surface dust and dirt using soft-bristled brush in conjunction with air jet.

(d) Using a clean, lintless cloth lightly moistened with solvent, clean the composition gears by wiping clean.

(25) CLEANING NONSEALED NEEDLE BEARINGS. — These bearings are cleaned using the same procedures given in paragraph 7-2c(1) for nonsealed ball bearings.

(26) CLEANING BRONZE OILITE BEARINGS. — Bronze Oilite bearings are impregnated with oil by the manufacturer. Normally, cleaning is unnecessary, and service is limited to application of a small amount of MIL-L-7870 oil with a dropper.

(27) CLEANING SEALED OR SHIELDED BEARINGS. — Normally, sealed or shielded bearings require no cleaning or lubrication since they are lubricated and sealed by the manufacturer for lifetime operation. Replace sealed bearing if faulty.

(28) CLEANING CERAMIC COIL FORMS.

(a) Make up a washing bath of two ounces of detergent powder per gallon of water.

(b) Where possible, immerse ceramic coil form in washing bath and work over all surfaces using a suitable nonmetallic brush, preferably with soft fiber bristles. Round brushes, similar to those used for washing bottles and test tubes, are recommended for holes and recesses.

(c) Rinse coil forms in warm-water bath; drain and dry with air jet.

(29) CLEANING MOLDED PLASTIC PARTS. — Plastic parts include insulating members, terminal boards, mounting blocks, and such. These should be cleaned in the following manner.

(a) Using an air jet, blow loose dust and dirt from surfaces, holes, and crevices.

(b) Wipe clean using a detergent and water solution with a lintless cloth.

(c) Dry and polish with a clean, dry, lintless cloth.

d. INSPECTION. — This section presents procedures designed to determine, by inspection, the condition of the disassembled and cleaned components of Antenna Coupler Group AN/SRA-22. Defects resulting from wear, physical damage, deterioration, or other such causes, are discovered by these inspection techniques.

(1) INSPECTING BEARINGS. — The following inspection procedure applies to all ball bearings of the open, sealed, and special types found in this equipment. After the bearing has been cleaned, inspect it to determine whether it is serviceable or is to be rejected because of a defect. Replace the bearing if it is defective. If determined serviceable, clean the bearing again. After final cleaning, lubricate the bearing, if it is to be installed in the equipment, or treat it with a preservative, if it is to be stored. Wrap and package the bearing. Clearly mark the outside of the package with the proper nomenclature of the bearing and its lubrication or preservative material.

CAUTION

All inspection work must be performed under conditions of extreme cleanliness. Operators must wear rubber gloves or fingerstalls to prevent corrosion caused by fingerprint contamination when handling bearings.

Inspect all bearings as outlined below.

(a) Check for blue or purple discoloration of any part of bearing caused by burning.

(b) Check for tarnished external surfaces. This is indicated by a light discoloration of highly finished surfaces.

(c) Check for rust.

(d) With emphasis on bearing balls and races, check for pitted, scarred, scuffed, or galled surfaces.

(e) Check for flat bearing balls, broken ball separators, flaking or spalling of load carrying surfaces. and other abnormal conditions.

In addition to the above inspection, check for undersize OD caused by creepage of outer race in its housing. This applies to all ball bearings whose races do not separate when the bearing is removed from its companion part. Also check for oversize or defective bore caused by the inner race having turned on its shaft and for excessive radial play. Use a suitable radial gauge equipped with a dial indicator calibrated in ten-thousandths of an inch when checking radial play of each bearing. Each bearing must be clean and dry. A noise inspection of this type of bearing can be accomplished by manual or mechanical rotation. If motor driven, the bearing should be lightly lubricated with oil only, such as Feder Spec VV-0-581, and rotated at 500 to 1000 rpm. A dental lathe can be used to drive the inner race while the outer race is held in gloved fingers. A used, but serviceable, bearing will develop a certain amount of noise. A slight uniform noise is to be expected, but loud noise, uniform noises such as clicks or buzzes, and vibration originating in the bearing indicate that it is unfit for service. If manually rotated, the bearing must be clean and dry (unlubricated), and the outer race should be spun with the gloved finger while the bearing is held by a bearing holder inserted in its bore. Hold the bearing in several positions while making the check and listen for any vibration or intermittent resistance.

(2) INSPECTING CASTINGS. — Unfinished, finished, or partly finished castings are inspected as follows. Inspect for cracks or breaks and marred or damaged machined surfaces, holes, counterbores, or threades. Also inspect the casting finish. If it is damaged beyond practical touch-up, repairs, forward the casting to the finishing department.

(3) INSPECTING COVERS AND SHIELDS. — Inspect covers and shields for deformation, punctures, deep dents, and badly worn surfaces. Also check for damaged fastener devices or handles. Examine the fastener devices and handles for corrosion and damage to finish. Forward them to the finishing department if extensively damaged or corroded.

(4) INSPECTING DIALS AND KNOBS. — Inspect all dials and knobs for physical damage and deformation, marred surfaces, and impairment of markings.

(5) INSPECTING GASKETS AND SEALS. — Inspect gaskets and seals for deformation and for damage such as tears, creases, folds or elongations, rough surfaces, and imbedded foreign materials. Check for loss of resiliency of all rubber or neoprene gaskets and seals by stretching or compressing moderately and noting any failure to spring back to shape.

(6) INSPECTING FIBER GASKETS. — Inspect fiber gaskets for deformation and for damage such as tears, rough surfaces, imbedded foreign matter, and other abnormal conditions.

(7) INSPECTING GEARS. — Gears in this equipment are identified in table 7-3. This table lists the basic dimensions of each gear in inches, the number of teeth, the diametral pitch, the type, and the material from which the gear is cut. Gear plating, if any, is also given for quick identification of the gear involved. Inspect these gears as follows.

(a) Inspect all gears for broken, chipped, or badly worn teeth.

(b) Inspect gear bodies for cracks and deformation.

(c) Inspect bore of gear for excessive wear.

(d) Inspect surfaces for corrosion or other abnormal condition.

(8) INSPECTING MACHINED METAL PARTS.

(a) Make over-all check for physical damage to surfaces, corners, and edges.

(b) Inspect closely all machined plane surfaces, holes, bores, counterbores, slots, grooves, shoulders, flanges, keyways, teeth, tapped holes, and all threaded members, both male and female, for physical damage of any sort including roughness of surface, corrosion, or presence of foreign matter.

TABLE 7-3. GEAR DATA

FIG. 6-1 ITEM NO.	TYPE	NO. OF TEETH	LENGTH (inches)	OD (inches)	FACE WIDTH (inches)	MATERIAL
81	Gear-shaft assembly	18	6.438	0.625	5.125	Aluminum gear and shaft
142	Spur gear	136			0.125	Plastic
159	Spur gear	80	0.218	2.562	0.125	Plastic
170	Spur gear	20	0.312	0.687	0.156	Teflon
277	Spur gear	52	0.271	0.169	0.125	Teflon
280	Spur gear	40	0.375	1.312	0.187	Teflon
348 349	Gear assembly	20 70	0.765	1.500	0.188 0.094	Steel plastic
351 352	Gear-shaft assembly	40	0.718	1.312	0.125	Plastic gear Steel shaft
353	Gear assembly	18 60	0.765	0.645	0.156 0.091	Steel
354	Gear assembly	24 30	0.750	0.333	0.141 0.125	Stainless steel
359	Gear-cam assembly	124	0.406	1.312	0.062	Aluminum gear Stainless steel hub
360	Gear assembly	96 18	1.00	1.020	0.091 0.125	Aluminum Steel
361	Gear assembly	84 18				Aluminum Stainless steel
362	Gear assembly	56 18	0.656	0.060	0.090 0.156	Aluminum Steel
363	Spur gear	24	0.750	0.406	0.375	Stainless steel
367	Gear assembly	24 81	0.765	1.282	0.156 0.064	Steel
368	Gear assembly	100 19	0.718	1.062	0.091 0.140	Stainless steel
369	Gear-shaft assembly	48	0.718		0.091	Aluminum
370	Gear assembly	42 20	0.655	0.456	0.091 0.156	Aluminum Steel
371	Gear assembly	20 49	0.655	0.530	0.156 0.091	Steel Aluminum
372	Gear assembly	20 54	0.655	0.583	0.156 0.091	Steel Aluminum

TABLE 7-3. (Continued)

FIG. 6-1 ITEM NO.	TYPE	NO. OF TEETH	LENGTH (inches)	OD (inches)	FACE WIDTH (inches)	MATERIAL
374	Gear-shaft assembly	30	1.265	0.333	0.090	Stainless steel
375	Spur gear	64	0.625	0.787	0.062	Aluminum
376	Gear assembly	68 30	1.250	0.729	0.094 0.141	Steel
381	Gear-shaft assembly	112	1.406	1.781	0.062	Steel gear and shaft
382	Spur gear	30	1.500		0.156	Stainless steel
383	Gear-shaft assembly	99	1.187	1.578	0.093	Steel
386	Gear-shaft assembly	35	0.827	0.578	0.078	Stainless steel gear and shaft

Note

Wear of gear bore and teeth, except in instances where it is sufficiently severe to be apparent on visual inspection, is best determined by gauge measurement. Bore wear can be ascertained by comparing plug-gauged diameter with diameter given for a new gear in table 7-3. Presence of a sharp burr on one side of gear at edges of teeth is an indication of wear of teeth.

(c) Inspect plated or finished areas for damage requiring replating or refinishing beyond touch-up repair.

(9) INSPECTING METAL PARTS. — Inspect the unmachined mechanical metal parts including mounting plates, chassis, mounting clamps and brackets, blower fan, nuts, bolts, screws, washers, handles, fasteners, and hardware for physical damage and deformation. Also check these parts for corrosion and any damage which would require replating or refinishing beyond practical touch-up.

(10) INSPECTING COVERED CABLE. — Inspect flexible vinylite conduit as follows.

(a) Inspect for physical damage throughout entire length of conduit.

(b) Inspect conduit at ends to make certain that it is not pulled loose from connectors.

(c) Inspect cable for other abnormal conditions. Treat any connector terminations as directed under paragraph 7-2d(12).

(11) INSPECTING COILS. — Inspect r-f coils for broken leads, loose, poorly soldered, or broken terminal connections, and loose mountings. Also check for crushed, scratched, cut, bruised, or charred windings; corrosion on windings, leads, terminals, and connections; and physical damage to forms and tuning-slug adjustment screws.

(12) INSPECTING CONNECTORS.

(a) Inspect connector body for broken parts, deformed shell, clamp, and other abnormal conditions, depending upon its type.

(b) Inspect connector for cracked, broken insulation, and for contacts which are broken, deformed, or out of alignment. Check also for corroded or damaged plating on contacts and for loose, poorly soldered, broken, or corroded terminal connections.

(13) INSPECTING CERAMIC DRUM. — Inspect the ceramic drum for cracks, chips, or scratches. Also check for signs of burning and other abnormal conditions.

(14) INSPECTING JACKS. — Inspect all jacks for corrosion, rust, loose or broken parts, cracked insulation, poor contacts, and other abnormal conditions.

(15) INSPECTING LAMPS. — Inspect lamps for loose, cracked, or broken glass envelope. Also check for internal darkening, corrosion of base, and damage to insulation or base.

(16) INSPECTING LAMP HOLDERS. — Inspect the lamp holders for corrosion, weak contacts, damaged insulation, and loose or broken parts. Also check for other conditions which are not normal.

(17) INSPECTING LENSES. — Inspect lenses for cracks, looseness, and deformation.

(18) INSPECTING MOLDED PLASTIC PARTS. — Inspect plastic part such as terminal boards, mounting blocks, and insulating members for signs of corrosion, cracked, broken, or charred insulation, and for loose or missing mounting hardware. Also check these parts for other abnormal indications which might be a source of future breakdown.

(19) INSPECTING RECEPTACLES. — Inspect receptacles for cracked, broken, or charred insulation. Also check for physical damage to all parts, loose or bent contacts, damage to contact plating, corrosion, and other abnormal conditions.

(20) INSPECTING FIXED COMPOSITION RESISTORS. — Inspect fixed composition resistors for cracked, broken, blistered, or charred bodies, and loose, broken, poorly soldered, or corroded terminal connections.

(21) INSPECTING FIXED FILM AND WIRE-WOUND RESISTORS. — Inspect fixed film and wire-wound resistors for signs of heating, cracked, broken, or charred insulation, loose, poorly soldered, broken, or corroded terminal connections, and loose mountings.

(22) INSPECTING VARIABLE RESISTORS. — Inspect variable resistors for corrosion of shafts, cases, and other visible parts, loose mountings, and physical damage. Rotate the shaft to determine whether action is too rough, too loose, or two tight. Precision potentiometers usually have tight tolerances.

(23) INSPECTING TERMINAL CONNECTIONS.

(a) Inspect terminal connectors for cold-soldered or "rosin" joints. These joints present a porous or dull, rough appearance. Check for strength of bond with the point of a tool.

(b) Examine for excess solder, protrusions from the joint, pieces adhering to adjacent insulation, and particles lodged between joints, conductors, or other parts.

(c) Inspect for insufficient solder and unsoldered strands of wire protruding from conductor at joint. Also look for insulation that is stripped back too far from joint, or badly frayed at joint.

(24) INSPECTING ROTARY SWITCHES.

(a) Inspect insulation for cracks or breakage and for charring.

(b) Check movable and stationary contacts for deformation, breakage, and wear, and for burning, pitting, and corrosion.

(c) Inspect terminals for loose, poorly soldered, broken, or corroded connections.

(d) Examine mechanical parts for damage or corrosion and for irregular or rough action.

(e) If applicable, examine switch for proper detent action.

(25) INSPECTING TOGGLE SWITCHES. — Inspect for cracked, broken, or charred body, rough or loose action, loose, poorly soldered, broken, or corroded terminal connections, and loose or missing mounting nuts, bolts, and other parts.

(26) INSPECTING TRANSFORMERS. — Check transformers for signs of excessive heating, physical damage to case, cracked or broken ceramic insulators, and other abnormal conditions. Also check for corroded, poorly soldered, or loose terminals and loose, broken, or missing mounting hardware.

(27) INSPECTING WIRING. — Inspect open and laced wiring of chassis, terminal boards, and parts of equipment by checking insulation for physical damage and charring, and checking wires for breakage and for improper dress in relation to adjacent wiring or chassis.

(28) INSPECTING MOTORS AND RELAYS. — The motors and relays in this equipment are sealed units, and inspection must be limited to the cases. Employ applicable procedures of paragraphs 7-2 (metal parts) and 7-2d(26) (transformers).

(29) INSPECTING INSULATORS. — Inspect all ceramic or Teflon insulators for evidence of damage, such as broken or chipped edges, burned areas, or presence of foreign material.

(30) INSPECTING SILVER COIL RIBBON. — Inspect the silver coil ribbon for kinks, tears, creases, dents, and other evidence of physical damage. Also inspect for any tarnish, corrosion, or foreign matter.

(31) INSPECTING FIXED CAPACITORS. — Inspect fixed capacitors for defects listed in table 7-4.

TABLE 7-4. INSPECTION OF FIXED CAPACITORS

DEFECT	METAL CASE	MOLDED TYPE	CERAMIC TYPE
Oil leakage (at case seams or around terminal insulation).	X		
Cracked, broken, or charred terminal insulation.	X		
Case damage (dents or holes).	X		
Case damage (cracks or breakage).		X	
Body damage (cracks or breakage).			X
Loose, broken, or corroded terminal studs, lugs, or leads.	X	X	X
Loose, broken, or poorly soldered terminal connections.	X	X	X
Loose mountings.	X	X	X

(32) INSPECTING VARIABLE CAPACITORS. — Inspect variable capacitors for corrosion of shafts, cases, and other visible parts, loose mountings, and physical damage. Rotate the shaft to determine whether action is too rough, too loose, or too tight.

(33) INSPECTING THE VARIABLE VACUUM CAPACITOR. — Inspect the variable vacuum capacitor for cracks and other physical damage. Inspect the interior of the glass for whitening, and check the plates of the capacitor for dark spots or other signs of internal arcing.

(34) INSPECTING ALUMINUM DRUM. — Inspect the aluminum shorting drum for defects, using the procedure for machined metal parts given in paragraph 7-2d(8).

7-3. REASSEMBLY AND TESTING.

This section contains instructions for the reassembly of the cleaned and inspected parts into subassemblies and assemblies, and specific tests to be made prior to reassembly into components.

Refer to figure 6-1 for aid in reassembly. The reference figure and index numbers correspond to those used during disassembly.

Note

During reassembly, use Glyptol to secure nuts, screws, and setscrews where no lockwashers are provided.

a. REASSEMBLING THE CASE AND BLOWER ASSEMBLY. - This paragraph covers the reassembly of all parts shown on sheet 2 of figure 6-1.

(1) Secure h-v post (465) to inside of case (477), using screw (464).
(2) Place gasket (475) on threaded end of h-v output shaft (476).
(3) Insert threaded end of h-v output shaft (476) through hole in center of h-v output insulator (469).
(4) Slide washer (474) onto threaded end of h-v output shaft (476).
(5) Slide washer (473) onto threaded end of h-v output shaft (476) and screw on two nuts (471, 472).
(6) Place gasket (470) on case (477) so that holes in each are in line.
(7) Place h-v output insulator (469) on gasket (470) so that holes in each are in line, and secure in place with 6 screws (466) and 18 washers (466A, 467, 468).
(8) Replace connector 1J10 (463) using two screws (461, 462).

(9) Ensure that cover (458) is flush with rear of connector 1J9 (460) and secure, using two screw (456), two lockwashers (455), and two nuts (454).

(10) Replace two guide pins (453, 451) using nuts (450, 452).

(11) Mount plenum (448) to case (477) on left side of dividing partition using five screws (447).

(12) Mount cradle (446) to case (477) using screws (445, 447).

(13) Mount terminal (443) to blower mounting bracket (444) using screw (441), solder lug (489), and lockwasher (442).

(14) Mount capacitor 1C6 (440) to blower mounting bracket (444) using two capacitor mounting brackets (439), two lockwashers (438), and two nuts (437).

(15) Mount blower (436) to blower mounting bracket (444) using three screws (433), three lockwashers (434), and three spacers (435).

(16) Mount capacitor mounting plate (485) onto blower bracket (444) using screws (486).

(17) Mount capacitors 1C8 (483) and 1C9 (484) using screws (487) and lockwashers (488).

(18) Position blower gasket (449) over end of blower opening.

(19) Mount blower mounting bracket to case (477) using six screws (428) and six lockwashers (429).

(20) Replace O-ring (423), connector (422), nipple (479), T-fitting (480), filler valve (481), and pressure gauge (482). Gaskets (423 and 424) must be lubricated with grease MIL-6-16908. All pipe fittings should be treated with a pipe thread compound to ensure air-tight fits.

(21) Carefully position gasket (424) and blower plate (427) and secure to case (477) with 12 screws (420) and lockwashers (421).

b. REASSEMBLING COUPLER CONTROL C-2698/SRA-22.

(1) Ensure that all components that were removed in step (10) of paragraph 5-6a have been replaced correctly. Refer to figures 5-3, 5-4, 5-5, and 5-6 for component location, and to Coupler Control C-2698/SRA-22 schematic diagram, figure 5-7, for wiring information.

(2) Replace front panel and secure to chassis with nine screws.

(3) Replace rear panel and secure to chassis with 14 screws.

(4) Secure type-N r-f connector to 2J1 using a lockwasher and a nut. Tighten nut using a suitable wrench.

(5) Secure coaxial plug 2P5 to directional coupler.

(6) Mount hinge to rack with two screws.

(7) Secure coaxial plugs 2P1, 2P2, 2P3, 2P4, and plugs 2P5 and 2P6 to the connectors on the rear panel.

(8) Swing C-2698/SRA-22 into rack and secure to rack with two screws.

(9) Replace dust cover and secure with thumb fasteners.

c. REASSEMBLING ANTENNA COUPLER CU-714/SRA-22. — During reassembly procedures, it will be necessary to reconnect many interconnecting wires; be certain to follow the identification markings that were made during disassembly of the unit. Refer to figures 6-1 and 5-8 for aid in reassembly. The referenced figure and index numbers correspond to those used during disassembly.

(1) GEAR SUBASSEMBLIES.

(a) Replace two capacitor drive pin stops (320) in a secondary gear plate (346).

(b) Replace two spacers (306 and 306A) using two screws (305 and 305A).

(c) Replace two guide pin blocks (309, 311) using four screws (308, 310).

(d) Secure four h-v posts (319) to secondary gear plate (346) using studs (318).

(e) Mount h-v contacts (174) on capacitor plate (176) using two nuts (173), lockwashers (173A), and screws (175).

(f) Mount capacitor plate (176) on h-v posts (319) using four screws (172).

(g) Secure capacitor 1C7 (171) to capacitor plate (176) using three screws (164) and lockwashers (165). H-v spark gap contact (166) should be secured with lower screw (164). Solder lug (167) should be secured with upper screw (164).

(h) Use four screws (177) to secure gear (179) and h-v collar (178) to capacitor lead screw (180).

(i) Screw capacitor lead screw (180) assembly into capacitor (171) and replace ball bearing (407).

(k) Secure three motors (313, 315, 317) to secondary gear plate (346) using 12 screws (312, 314, 316).

(m) Replace gear (386) on shaft (385) and secure with roll pin (384). Replace bearing (394), bearing (345), and this gear-shaft assembly.

Note

Some bearings must be pressed into gear plates (346, 419). Maintenance personnel may elect to press all bearings into place before attempting to install gears; however, in the assembly discussion, all bearings will be mentioned with gears they support.

(n) Replace two ball bearings (402, 333), and install gear (367) on secondary gear plate (346).
(p) Replace two Oilite bearings (403, 334), and install gear (363) on secondary gear plate (346).
(q) Replace sector gear-shaft assembly (381).
(r) Replace two Oilite bearings (399, 324) and install gear assembly (371) on secondary gear plate (346).
(s) Replace stop pin screw (321).
(t) Replace two bearings (344, 291), slide gear (375) onto long shaft of gear-shaft assembly (374), and slide short shaft of gear-shaft assembly (374) into primary gear plate (419). Replace two bearings (323, 398) and install gear (372) on primary gear plate (419) at same time. Replace roll pin (373) in gear (375), but do not tighten it at this time.
(u) Replace two Oilite bearings (400, 325) and replace gear assembly (370).
(v) Replace two Oilite bearings (326, 401) and install gear-shaft assembly (369).
(w) Replace two ball bearings (328, 392) and install spur gear shaft (382).
(x) Replace two Oilite bearings (331, 397) and replace gear assembly (368).
(y) Replace ball bearing (329), Oilite bearing (393), and gear-shaft assembly (383).
(z) Secure pin stop (391) to primary gear plate (419) with four screws (390). Slide stop arm (389) on pin stop (391), snap on retainer ring (388), and connect spring (387).
(aa) Replace two Oilite bearings (337, 409) and install gear assembly (360).
(ab) Secure stop block (358) to gear (359) using two screws (357). Slide gear (359) on shaft (356). Replace two setscrews (355) but do not tighten them at this time. Replace two Oilite bearings (338, 408) and install gear (359) assembly.
(ac) Replace two ball bearings (335, 405) and install gear assembly (362).
(ad) Replace two ball bearings (336, 406) and install gear assembly (361).
(ae) Secure stop block (365) on gear-shaft assembly (366) with screw (364). Replace two ball bearings (332, 404) and install gear-shaft assembly (366).
(af) Replace two ball bearings (330, 396) and install gear assembly (376).
(ag) Replace two Oilite bearings (339, 411) and install gear assembly (354).
(ah) Replace two Oilite bearings (340, 410) and install gear assembly (353).
(aj) Slide gear (351) on hub (352) shaft and secure with two screws (350). Install two Oilite bearings (341, 412) and install gear-hub assembly.
(ak) Slide gear (348) onto shaft of gear (349); secure the two gears together with three screws (347). Replace two Oilite bearings (343, 413) and install gear assembly.
(am) Replace Oilite bearing (327), h-v rotor shaft (304), and spring (303).
(an) Attach spacer bar (288) to primary gear plate (419) using screw (287).
(ap) Secure secondary gear plate (346), including motors and capacitor, to primary gear plate (419) using screws (420).

Note

To reassemble gear plates, position antenna coupler so that secondary gear plate can be guided straight down on top of primary gear plate. Line up gear plates, placing coil actuator stop (261) in position on stop assembly shaft (282). Using a spring hook, position gear shaft sleeves into their respective holes in gear plates. Make sure that all gears are free, and that each section works freely.

(aq) Connect spring (303).
(ar) Slide spur gear (170) onto capacitor lead screw (180) shaft and secure with screw (168) and washer (169).

(as) Slide spur gear (277) onto shaft (385) and secure with screw (275) and washer (276).

(at) Replace ball bearing (418). Snap retainer ring (281) on shaft (383) and secure with screw (278) and washer (279).

(au) Gear train assembly is complete; setscrews (355) and roll pin (373) will be secured during alignment procedures.

(av) Insert screw (161), lockwasher (162), and solder lug (163) in rear of capacitor (171).

(2) CAPACITOR DRIVE SWITCH 1S10.

(a) Replace two Oilite bearings (415, 416) in hub support (417).

(b) Slide hub support (417) and bearings (415, 416) over gear-shaft assembly (381) and secure in place with two screws (414).

(c) Slide three washers (378, 379, 380) over gear-shaft assembly (381) and snap on retainer ring (377). Assemble spacers (79) and switch (78) on screws (76). Slip switch onto gear-shaft assembly (381) and secure with screws (76). Gear-shaft assembly (381) should be lubricated with silicone compound, Dow Corning DC-4 (SPEC AN-C-128), CPN 005 0201 00, FSN 9-5970-159-1598.

(3) COIL STOP ASSEMBLY.

(a) Replace two Oilite bearings (395, 322) and slide coil stop assembly (282) into primary gear plate (419).

(b) Slide stop (260) onto coil stop assembly (282) and tighten setscrews (260). Connect spring (259).

(4) TAP POTENTIOMETER 1R7.

(a) Secure switch 1S13 wafer (495) to switch plate (490) using screws (491), spacers (493), washers (494), switch S13 wafer (495), and nuts (497).

(b) Attach switch plate (490) to primary gear plate (419) with screw (492).

Note

Be sure to align switch 1S13 wafer (495) so that flat portion of shaft (356) slides into wafer slot.

(c) Position potentiometer bracket (498) on switch plate (490) and secure with screws (83).

(d) Slide coupler (85) over potentiometer shaft (90) and attach potentiometer to bracket (498) with clamps (89), screws (88), and nuts (86). Slide coupler (85) over shaft (360) and tighten setscrews (84) on shaft (360) side only. Setscrews (84) on potentiometer (90) side will be tightened later.

(5) H-V OUTPUT PLATE.

(a) Replace three h-v posts (189) using three screws (188).

(b) Replace h-v output plate (187) and secure with three screws (182).

(c) Replace two spacers (184, 185) on plug 1P10 (186) and snap on retainer ring (183).

(6) COIL POTENTIOMETER 1R6 AND H-V CONTACT (265).

(a) Mount switch wafer 1S12 (506) onto potentiometer bracket (256) with screws (499), spacers (500), washers (501), and nuts (502).

(b) Attach shaft extender (503) to gear-shaft assembly (374) with setscrews (505).

(c) Slip collar (504) over shaft extender (503) onto shaft (373) and tighten setscrews (505).

(d) Place coil stop cam (258) over collar (504) and tighten setscrews (505).

(e) Align switch wafer 1S12 (506) to slide over shaft of coil stop cam (258) and attach potentiometer bracket (256) to secondary gear plate (346) with screws (247), spacer (299), and screws (298).

(f) Place coupler (254) over potentiometer shaft (255) and shaft extender (503). Secure potentiometer (255) to bracket (256) with clamps (253), screws (252), lockwashers (251), and nuts (250).

(g) Tighten setscrews on coupler (254) on shaft extender (503) side only. Other setscrews will be tightened later.

(h) Replace h-v spark gap contact (265) on secondary gear plate (346) using screw (262), lockwasher (263), and washer (264). Adjust h-v spark gap contact (265) for 0.187-inch gap between its mating parts.

(7) CAPACITOR LIMIT SWITCH 1S11, SERIES-SHUNT SWITCH 1S9, AND PLUG 1P9.

(a) Secure h-v rotor collar (240) to h-v rotor plate (245) using three screws (239).

(b) Replace two rotor strips (242) with contacts (243) on h-v rotor plate (245) using four screws (244).

(c) Replace h-v rotor plate (245) on h-v rotor shaft (304), but do not tighten setscrews (237).

(d) Secure two contact buttons (233) on h-v plate (231) using two screws (218); assemble two lockwashers (219), two solder lugs (220), and four washers (222) on screws (218), as illustrated in figure 6-1.

(e) Assemble washer (225), solder lug (228), and two washers (226, 227) on screw (224). Two such assemblies are needed. Secure strip contact (229) and spacers (230) to h-v plate (231) using screws (224). Screw assembly for center of strip contact (229) does not use solder lug (228).

(f) Replace h-v contact (216) on h-v plate (231) using two studs (214) and two spacers (217). Secure studs (214) to h-v contact (216) by placing two washers (212, 213), solder lug (215), lockwasher (211), and nut (210) on lower stud and by placing two washers (212, 213), lockwasher (211), and nut (210) on upper stud.

(g) Assemble lockwasher (201), solder lug (202), washer (203), spacer (204), and washer (205) on screw (200). Secure standoff (233) to h-v plate (231) using screw (200).

(h) Replace studs (234, 235, 236) and three standoffs (232).

(j) Replace h-v plate (231) on studs (236) and secure with three washers (199 and 199A), lockwashers (197), and nuts (196).

(k) Replace washers (207, 208, 209) and retainer ring (206) on h-v rotor shaft (304).

(m) Replace two studs (195), spacers (193), switch 1S11 (192), washers (191), and nuts (190) on h-v plate (231).

(n) Adjust h-v rotor strips (242, 243) so that they are centered on their contacts and have a contact pressure of 50 to 100 grams. The h-v collar may be adjusted to secure this contact pressure. Secure h-v rotor strips (242, 243) in place by tightening setscrew (237) and replacing roll pin (238) in h-v rotor collar (240).

(p) Mount plug 1P9 (269) on bracket (274) using two clamps (269a), two screws (268), two lockwashers (267), and two nuts (266).

(q) Secure bracket (274) to secondary gear plate (346) using screws (270) and screws (271). Replace spacer (342) when replacing screw (270).

(8) CERAMIC DRUM.

(a) Solder one end of silver ribbon (144) to bus wire connection (143) through hole in ceramic drum (160). Being careful not to kink or twist the ribbon, wind ribbon tightly in grooves of ceramic drum. Tape loose end with connector (106) to ceramic drum to prevent unraveling.

(b) Slip flange coupler (149) through h-v drum stop assembly (159). Secure in place using four screws (148).

(c) Secure spur gear (158) to h-v drum stop assembly (159) and h-v drum (160) using six screws (157), washers (155, 156), and nuts (154).

(d) Replace h-v contact (153). Slide h-v output shaft (151) into flange coupler (149) and secure with screw (145), lockwasher (146), and solder lug (147).

(e) Slide h-v output shaft (151) of h-v drum (160) assembly through primary gear plate (419), coupler (74), and secondary gear plate (346). Replace three setscrews (73) and roll pin (150).

(f) Replace four roller shafts (138, 139, 140, 141) on spur gear (142) using two screws (136) and two stop screws (137).

(g) Slide four rollers (135) and four spacers (131, 132, 133, 134) onto roller shafts (138, 139, 140, 141).

CAUTION

Replace rollers, roller shafts, and spacers in their exact original order. Placement of these components is imperative to spiral track they must follow.

(h) Secure slip ring (130) to roller shafts using three screws (121), three lockwashers (122), and three washers (123). Secure two contacts (129, 128) to slip ring (130) and roller shaft (140) using two lockwashers (127, 125) and two screws (126, 124).

(j) Replace gear (142) assembly on h-v drum (160).

CAUTION

When assembling gear (142) assembly on h-v drum (160), avoid wiping the strip contacts (128, 129) on the abrasive surface of the ceramic drum. Also, make certain that strip contact (128) makes good contact with silver ribbon (144).

(k) Replace ball bearing (65) and sliding contact (108) on 1-v drum end assembly (109).
(m) Replace 1-v drum end assembly (109) in 1-v drum (107) and secure with screws (105).
(n) Slide flange coupler (117) on 1-v drum shaft (118). Start, but do not tighten, setscrew (116).

(p) Secure spring (115) to flange coupler (117) using screw (113) and washer (114).
(q) Replace 1-v drum end assembly (120) and Oilite bearing (119) on 1-v drum shaft (118).
(r) Secure spring (115) to 1-v drum end assembly (120) using screws (110), washer (111), and nut (112).

(s) Slide stop assembly (103) onto shaft (118) and secure with roll pin (75).
(t) Compress spring (115) slightly, and tighten setscrew (116) to secure flange coupler (117) to 1-v drum shaft (118).
(u) Engage 1-v drum end assembly (120) with 1-v drum (107), and secure with screws (104).
(v) Secure 1-v driven gear (102) to stop assembly (103) using two screws (101).
(w) Slide 1-v drum (107) assembly onto spur gear shaft (382) and secure with roll pin (100).
(x) Secure solder lug (106) to 1-v drum (107) with one of the 1-v drum end assembly screws (105).

CAUTION

Before attaching silver ribbon to 1-v drum, drum should be rotated 2-1/2 to 3 turns clockwise to obtain spring loading. Tape tension must be 1 to 1.5 pounds force exerted tangentially by 1-v drum after drum has been moved 1/32-inch counterclockwise (ccw) as viewed from gear plate assembly.

(9) FRONT PLATE.
(a) Secure center tap block (286) to primary gear plate (419) using two screws (285).
(b) Slide tap drive pinion (81) over gear assembly (376) shaft and secure with roll pin (80). Replace ball bearing (64).
(c) Replace tube insulator (72).
(d) Secure spacer bars (288, 295) to primary gear plate (419) using screws (294, 287).
(e) Secure switch 1S8 (58) to front plate (71) using three screws (57).
(f) Secure center tap mount (63) to front plate (71) with two screws (59).
(g) Secure two terminals (51, 53) with screws (50, 52).
(h) Replace six rollers (68) on roller arms (67) and secure with retainer rings (69). Secure roller arms (67) to front plate (71) with six screws (66).
(j) Secure capacitor 1C5 (56) to front plate (71) with two screws (54) and nuts (55).
(k) Replace spacers (98) in center tap hub (99).

CAUTION

Spacers (98) are made of silver graphite and are very brittle; handle with extreme care.

(m) Replace springs (97) in center tap hub (99). Assemble two spacers (96, 95) and retainer ring (94) on center tap hub (99).
(n) Secure contacts (93) to center tap hub (99) with two screws (91) and washers (92).
(p) Slide center tap hub (99) assembly onto shaft (82). Fix shaft (82) in place on primary gear plate (419), making certain that one of the spacers (95, 96) is on either side of, and makes contact with, slip ring (130).
(q) Replace covers (17 and 18) on front plate with screws (16).
(r) Replace front plate (71) and secure with screws (70 and 70A). Replace screw (60), lockwasher (61), and solder lug (62).

(10) FRONT CASTING.
(a) Replace nomenclature plate (47) using four screws (46).
(b) Replace connector 1J8 (45) using lockwasher (44) and nut (43).
(c) Replace gasket (42) and connector 1J7 (41) using four screws (37), washers (37A), solder lugs (40), lockwashers (39), and nuts (38).

(d) Replace ground contact (36) using two lockwashers (35) and screws (34).
(e) Replace stud (33), lockwasher (32), and standoff (31).
(f) Replace stud (30), solder lug (40), lockwasher (32), and standoff (29).
(g) Mount slug (28) on front casting (49) using nylon bolt (25).
(h) Secure front casting (49) to front plate (71) with screws (19).
(j) Before replacing shrouds, perform tests outlined under paragraphs 7-3e(1), (2), and (3).

d. ALIGNMENT.

(1) COUPLER CONTROL C-2698/SRA-22. - The only alignments necessary in the coupler control units are the COIL and TAP potentiometers. Run the COIL and TAP potentiometers to their counterclockwise end stop. If the COIL and TAP dials do not read zero, loosen the setscrews on the dials and, being careful not to turn the shaft of the potentiometer, set the dials to zero and tighten the setscrews.

(2) ANTENNA COUPLER CU-714/SRA-22. - To align the antenna coupler unit, perform the alignment procedures outlined in Section 5-5.

e. TESTING.

(1) BACKLASH CHECKS. - The following backlash checks should be performed after reassembly of the antenna coupler unit.

(a) Total backlash of tap assembly gear (142) when tap pinion gear (81) is held stationary must be no more than 0.009 inch.

(b) Total backlash of capacitor gear (361) when capacitor motor (317) shaft is held stationary must be no more than 0.016 inch.

(c) Total backlash of h-v coil gear (158) when coil motor (313) shaft is held stationary must be no more than 0.011 inch.

(d) Total backlash of h-v coil gear (158) when l-v coil gear (102) is held stationary must be no more than 0.010 inch measured tangentially at pitch line of h-v gear (158).

(2) END PLAY AND CLEARANCES. - The following end play and clearance checks should be performed after reassembly of the antenna coupler unit.

(a) Check that end play on pinion gear (376) is between 0.010 to 0.020 inch.
(b) Check that end play of l-v drum (107) is between 0.010 to 0.020 inch.
(c) Check that end play on h-v drum shaft (151) is between 0.001 to 0.003 inch. There must be no appreciable bind when inserting 0.005 shim between h-v drum (160) and its rollers (68).

(3) OPERATING CHECK. - With test cable made up using plugs furnished with Field Change No. 5, connect Coupler CU-714/SRA-22 to Controller C-2698/SRA-22. Energize the equipment and check out all controls, electrical limit stops, and transmitting potentiometers for proper operation.

7-4. FINAL REASSEMBLY AND TEST.

This section contains instructions for final reassembly and testing.

a. FINAL REASSEMBLY.

(1) Install shrouds (5, 10, 13, 15) using screws (3, 6, 8, 11, 14), nuts (9, 12), and lockwashers (7) as illustrated in figure 6-1.

(2) Position gasket seal (2) over front of case (477) so that 12 holes in each are aligned. Gasket (2) must be lubricated with grease MIL-6-16908.

(3) Connect plug 1P9 (460) to jack 1J9 (269) and slide antenna coupler into opening in case (477), being careful that cable attached to plug 1P9 is clear of coupler r-f section.

(4) Secure front casting (49) to case (477) with 12 captive screws (1) and lockwashers (48).

(5) Connect bottle of dry nitrogen to filler valve (481) and pressurize antenna coupler to 10 psig as indicated on pressure gauge (482).

(6) Immerse entire unit in a tank of water and observe any leaks present. If any leaks are present, use correction procedure illustrated in figure 7-7.

b. FINAL TEST

(1) TEST EQUIPMENT AND SPECIAL TOOLS. - There are no special tools required to perform the tests covered in this section. The test equipment required is listed in table 5-2.

(2) TEST SETUP. - Refer to figure 7-8 for block diagram of test setup. Connect Antenna Coupler Group AN/SRA-22 to equipment as shown.

(3) TEST PROCEDURE. - Perform steps (a) through (e) using following frequencies: 2, 4, 8, 16, and 30 megacycles.

(a) Perform tuning procedure outlined in paragraph 2-3b(2) with LOAD-ANT switch in LOAD position.

(b) Increase Radio Set AN/XXX EXCITER GAIN control until a level of 500 watts is reached as indicated by VTVM (160 volts r-f across 51.5 ohms). Observe coupler control r-f power meter indication.

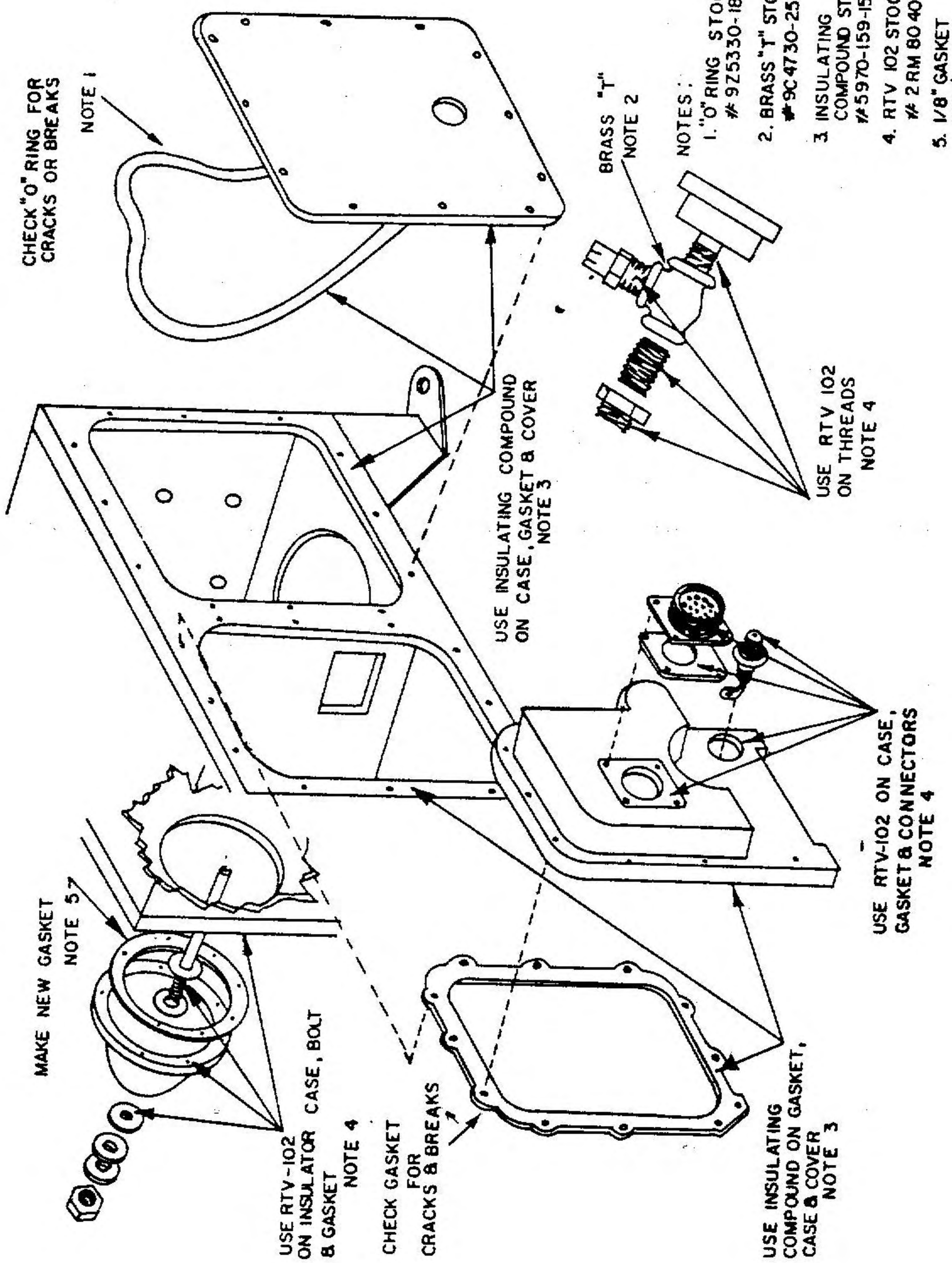


Figure 7-7. Antenna Coupler CU-714/SRA-22, Sealing Procedures

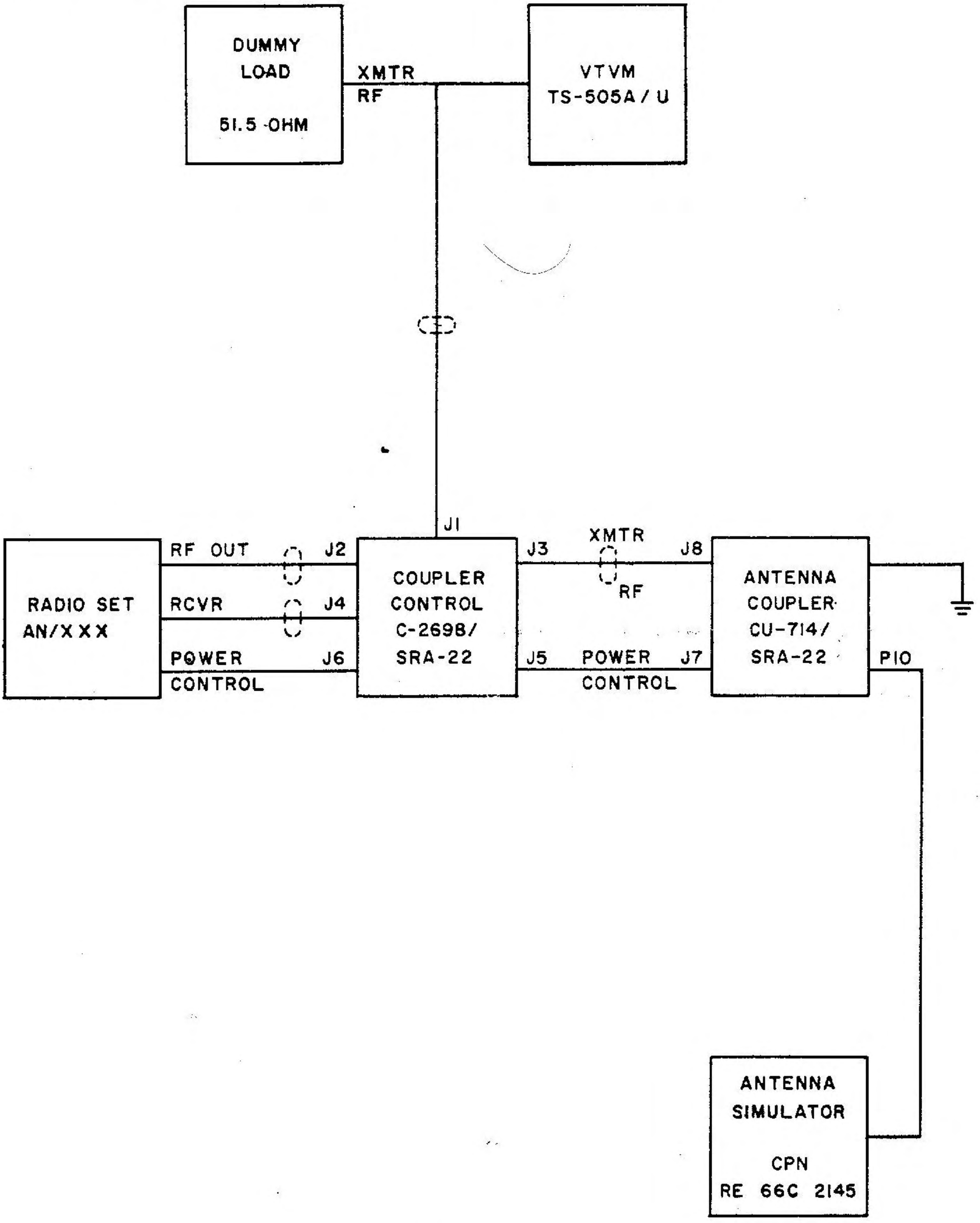


Figure 7-8. AN/SRA-22 Test Setup, Block Diagram

(c) With transmitter unkeyed, reverse cable to 2J1 and 2J2. Key transmitter and observe that coupler control r-f power meter indication is same as that obtained in step (b). This indicates that directional coupler and metering circuits are balanced and functioning properly.

(d) Restore cables reversed in step (c) and operate ANT-LOAD switch to ANT position. Tune antenna as outlined in paragraph 2-3b(2) and record CAPACITOR, COIL, and TAP control settings on a tuning chart illustrated in figure 2-4.

(e) Determine that standing wave ratio is within allowable limits (not more than 1.3:1) by reference to figure 3-1.

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SUBJECT — PARAGRAPH (Figure) *Table

C (Continued)