NAVSHIPS 91745 RESTRICTED

MANUSCRIPT FORM
INSTRUCTION BOOK
for

COUPLER, ANTENNA CU-255/UR

and

COUPLER, ANTENNA CU-332A/UR

ELECTRIC SERVICE CO.
3825 STONEWAY
SEATTLE 3, WASH. EV. 0095

HOFFMAN RADIO CORPORATION

Los Angeles 7, California

BUREAU OF SHIPS NAVY DEPARTMENT

Contracts: NObsr-52220 &
NObsr-57073

Approved by BuShips
29 August 1952

DEPARTMENT OF THE NAVY
BUREAU OF SHIPS
WASHINGTON 25, D. C.

IN REPLY REFER TO
Code 993-100
26 August 1952

From: Chief, Bureau of Ships
To: All Activities Concerned with the Installation, Operation and Maintenance of the Subject Equipment

Subj: Instruction Book for Antenna Couplers CU-255/UR and CU-332A/UR NAVSHIPS 91745

1. This is the instruction book for the subject equipment and is in effect upon receipt.

2. When superseded by a later edition, this publication shall be destroyed.

3. Extracts from this publication may be made to facilitate the preparation of other Department of Defense Publications.

4. All Navy requests for NAVSHIPS Electronics publications should be directed to the nearest District Publications and Printing Office. When changes or revised books are distributed, notice will be included in the Bureau of Ships Journal and in the Index of Bureau of Ships General and Electronics Publications, NAVSHIPS 250-020.

H. N. WALLIN
Chief of Bureau

RECORD OF CORRECTIONS MADE

CHANGE NO.	DATE	SIGNATURE OF OFFICER MAKING CORRECTION

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GUARANTEE TO BE SUPPLIED

BY BUSHIPS

INSTALLATION RECORD

Contract Number NObsr-57073 Date of Contract, 14 Nov.1951
Contract Number NObsr-52220 Date of Contract, 17 Jan.1952

Serial Number of equipment. . . . . .

Date of acceptance by the Navy. . . . . .

Date of delivery to contract destination. . . . . .

Date of completion of installation. . . . . .

Date placed in service. . . . . .

REPORT OF FAILURE

Report of failure of any part of this equipment, during its entire service life, shall be made at the Bureau of Ships in accordance with current regulations using form NAVSHIPS NBS 383 (revised) except for Marine Corps equipment, in which case the "Signal Equipment Failure Report" form shall be used and distributed in accordance with instructions pertaining thereto. The report shall cover all details of the failure and give the date of installation of the equipment. For procedure in reporting failures see Chapter 67 of the *Bureau of Ships Manual* or superseding instructions.

ORDERING PARTS

All requests or requisitions for replacement material should include the following data:

1. Federal stock number or, when ordering from a Marine Corps or Signal Corps supply depot, the Signal Corps stock number.
2. Name and short description of part.

If the appropriate stock number is not available the following shall be specified:

1. Equipment model or type designation, circuit symbol, and item number.
2. Name of part and complete description.
3. Manufacturer's designation.
4. Contractor's drawing and part number.
5. JAN or Navy type number.

DESTRUCTION OF ABANDONED MATERIAL IN THE COMBAT ZONE

In case it should become necessary to prevent the capture of this equipment, and when ordered to do so, DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED, OR USED BY THE ENEMY. BURN ALL PAPERS AND BOOKS.

Means:

1. Explosives, when provided.
2. Hammers, axes, sledges, machetes, or whatever heavy object is readily available.
3. Burning by means of incendiaries such as gasoline, oil, paper or wood.
4. Grenades and shots from available firearms.
5. Burying all debris, where possible and when time permits.
6. Throwing overboard or disposing of in streams or other bodies of water.

Procedure:

1. Obliterate all identifying marks. Destroy nameplates and circuit labels.
2. Demolish all panels, castings, switch and instrument boards.
3. Destroy all controls, switches, relays, connections and meters.
4. Rip out all wiring and cut interconnections of electrical equipment. Smash gas, oil, and water cooling systems in gas engine generators, etc.
5. Smash every electrical or mechanical part, whether rotating, moving or fixed.
6. Break up all operating instruments such as keys, phones, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.
8. Bury or scatter all debris.

DESTROY EVERYTHING!

SAFETY NOTICE

The attention of officers and operating personnel is directed to Chapter 67 of the Bureau of Ships Manual or superceding instructions on the subject of radio-safety precautions to be observed.

This equipment employs voltages which are dangerous and may be fatal is contacted by operating personnel. Extreme caution should be exercised when working with the equipment.

RESUSCITATION

AN APPROVED POSTER ILLUSTRATING THE RULES FOR RESUSCITATION BY THE PHONE PRESSURE METHOD SHALL BE PROMINENTLY DISPLAYED IN EACH RADIO, RADAR OR SONAR ENCLOSURE. POSTERS MAY BE OBTAINED UPON REQUEST TO THE BUREAU OF MEDICINE AND

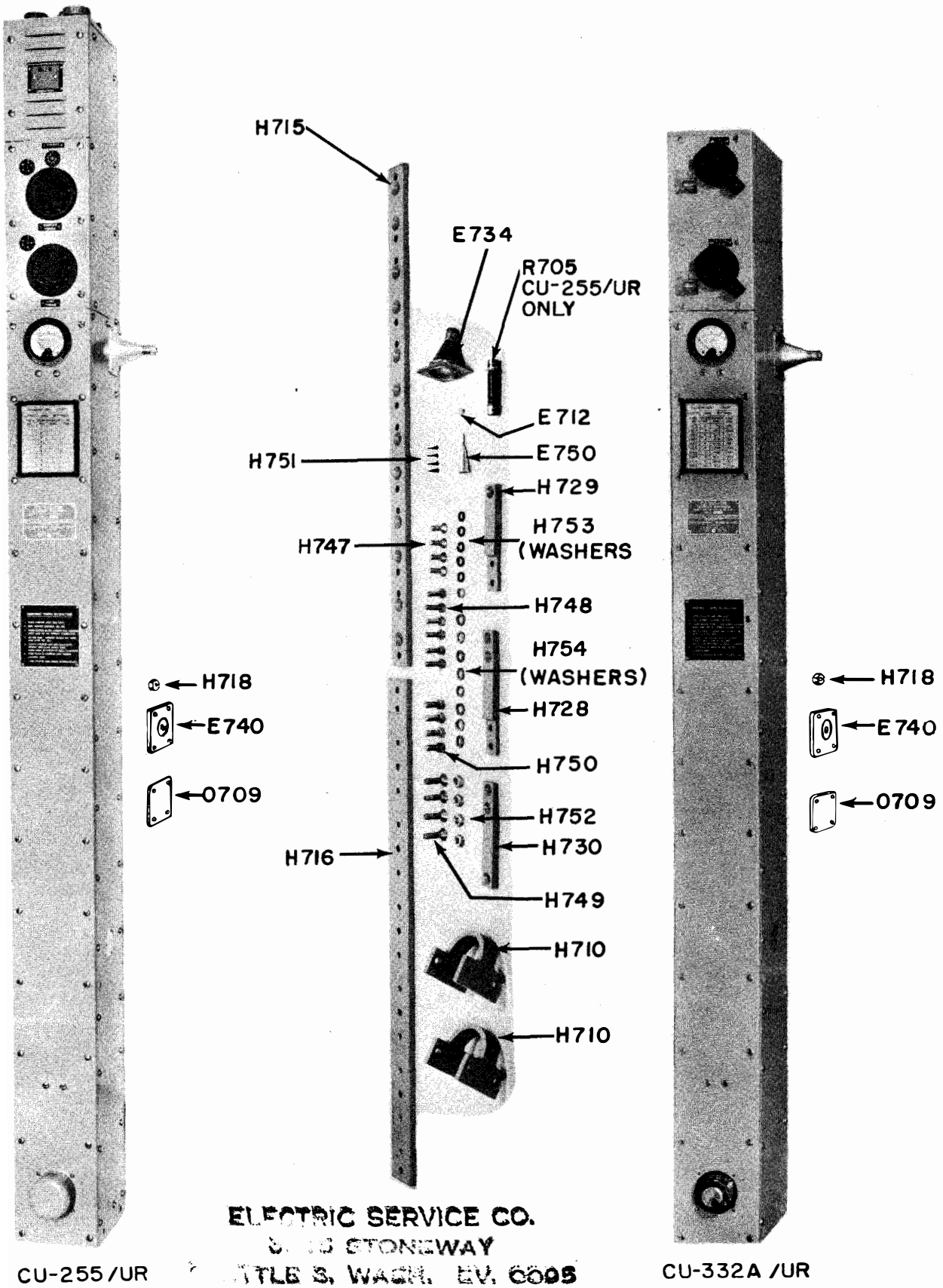


Figure 1-1. Antenna Coupler CU-255/UR and Antenna Coupler CU-332A/UR and One Set of Installation Hardware

S E C T I O N 1

G E N E R A L D E S C R I P T I O N

1. PURPOSE AND FUNCTION OF EQUIPMENT

Antenna Coupler CU-255/UR and Antenna Coupler CU-332A/UR (see figure 1-1) are coupling units which, when arranged in a group of from two to six units, provide a system whereby from two to six radio transmitters, receivers or transmitter-receiver systems can be operated simultaneously on a single antenna. The Couplers, when properly adjusted, provide optimum antenna matching for any frequency within the range of 230-390 megacycles.

The CU-255/UR Coupler is entirely automatic in its selection of correct matching positions which have been pre-set manually for any one of ten operating frequencies within its range. Subsequent automatic selection of these frequencies is determined by the channel dial system of the associated transmitter or receiver.

The CU-332A/UR Coupler is the same as the CU-255/UR Coupler except it is manually operated and must be manually reset for each change of channel in the associated transmitter or receiver.

The CU-255/UR is designed for use with Model TDZ Radio Transmitting Equipment or with Model RDZ Radio Receiving Equipment and its control equipment, as noted in table 1-2. However, either Coupler may be used with any transmitting and/or receiving equipment having equivalent antenna-circuit characteristics and supplying the required automatic control voltages for the CU-255/UR Coupler.

These Antenna Couplers have little advantage in being used for a single transmitter or receiver installation and therefore most of the discussion of this instruction book will consider their use in a coupler system comprising a single Coupler may be used to advantage with a transmitter or receiver if there is no provision within the transmitter or receiver for matching its impedance to the antenna system.

2. DESCRIPTION OF EQUIPMENT

There are two main divisions of the Couplers; the RF Coupling Section and the Tuning Head Section. Dial pulses

from the control equipment actuate the automatic tuning section of the CU-255/UR which adjusts the RF Coupling Section to the desired frequency setting. The tuning indicator is used for tuning of the CU-332A/UR Coupler and manual pretuning of the CU-255/UR Coupler and also serves as a check of the correctness of the automatic tuning.

The Automatic Tuning Head section at the top of the CU-255/UR unit comprises two standard autotune Drive Mechanisms, a driving motor, and a system of switches, gears and shafts. This section controls the positioning, (or tuning) of the adjustable elements in the RF Coupling Section and automatically returns them to the position which has been preset for each channel. The automatic action takes place in response to pulses originating at the dial of the associated control equipment when a particular channel is dialed.

Coupler Tuning and Line Tuning dials are provided on the control panel of the Couplers. The CU-255/UR controls have a Main Dial, a smaller auxiliary revolution-counting dial and another small dial which indicates the channel at which the Coupler mechanism has stopped. The CU-332A/UR Coupler controls each have a Veeder-Root type counter which indicates the positioning of the line tuning and coupler tuning.

The Manual Tuning Head at the top of the Coupler unit comprises two crank type knobs in place of the Drive Mechanisms for tuning the coupler. This section is completely manually operated for positioning the adjustable elements in the RF Coupling Section as compared to the Tuning Head of the CU-255/UR Coupler which may be manual or fully automatic in its operation.

The RF Coupling Section of either Coupler is identical to the other, hence their functions are the same. They both provide for transfer of signal between two coaxial lines; one of which, called the Antenna Transmission Line, is connected in series with the coaxial line to the antenna. The other is called the Transmitter-Receiver Feedline and is connected to the associated transmitter or receiver. The Transmitter-Receiver Feedline is terminated in a tunable Quarter-wave Element which is located adjacent and Half of the outer conductor of the antenna line is cut away exposing the inner conductor, thus permitting coupling between it and the Quarter-wave Element. Tuning is accomplished by varying the length of the Quarter-wave element (with the coupler tuning control) and moving it up or down along the exposed antenna line (with the line tuning control) to find the point of optimum coupling to the antenna system. Shorting Cap E740 is provided for use on the opposite end

of the Antenna Line from the antenna. This causes all the signal energy coupled into the units to flow to the antenna. The variable distance along the Antenna Transmission Line of the Quarter-wave Element from the shorting cap serves as an adjustment which tends to neutralize the reactance presented by the coupling system.

The tuning indicator circuit (reflectometer), which is an integral part of the RF Coupling Section, is made up of a dc microammeter connected to a rectifier circuit which gives a relative indication of the magnitude of the rf energy flowing in one direction only. The reflectometer is oriented to detect the energy which is reflected from the coupling unit back to the transmitter and in so doing gives a relative indication of the standing wave ratio. When the coupler is properly adjusted for matching the impedance of the antenna system to the 50-ohms impedance of the transmitter, there are no reflected waves and the tuning indicator reads nearly zero.

The complete Coupler units are built within steel frameworks which are enclosed by removable aluminum alloy panels, finished in Navy gray enamel. In coupler systems, the Coupler units are mounted together by common mounting bars which are attached to bulkhead mounting bars by "U" shaped shockmounts. The group is strengthened by additional tiebars bolted across the back.

Connectors are provided at the sides for the antenna transmission line and/or for interconnection of adjacent units in series. Also, a connector is located on the bottom of the rf coupling unit for the transmitter-receiver transmission line. The CU-255/UR has two connectors on the top of the Tuning Drive for the automatic control voltage cables.

3. INSTALLATION HARDWARE.

When several couplers are installed in a group, certain items are required regardless of the number of couplers used. These items are contained in a box which is shipped with each equipment box and are listed in table 1-3 and illustrated in figure 1-1. One set of installation hardware will be necessary for each coupler. The application of the installation hardware parts is discussed in section 3.

4. REFERENCE DATA.

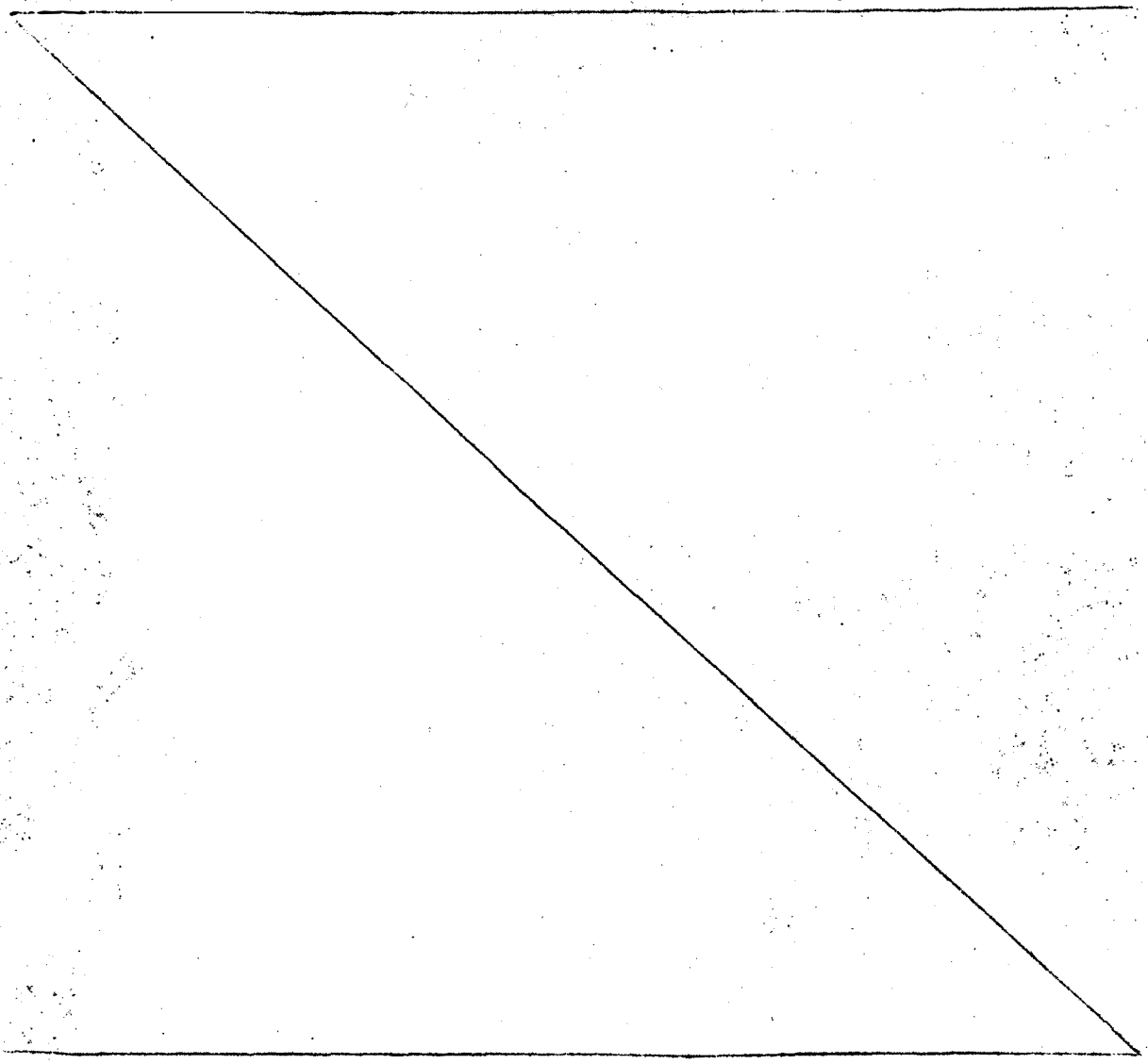
a. NOMENCLATURE.-Coupler, Antenna CU-255/UR and Coupler, Antenna CU-332A/UR.

b. LETTER CONTRACT AND DATE.-NObsr-52220, 17 January, 1951 and NObsr-57073, November, 1951.

c. CONTRACTOR.-Hoffman Radio Corporation, 3761 South Hill Street, Los Angeles 7, California.

d. COGNIZANT NAVAL INSPECTOR.-Inspector of Naval Material, Los Angeles District, 1206 Santee Street, Los Angeles, California.

e. NUMBER OF PACKAGES PER COMPLETE EQUIPMENT.-One.



f. TOTAL CUBICAL CONTENTS.- CU-255/UR 2.5 cu. ft. crated, 1.785 cu. ft. uncrated; CU-332A/UR 2.0 cu. ft. crated, 1.44 cu. ft. uncrated.

g. TOTAL WEIGHT.- CU-255/UR 130.1 lbs. crated, 90.1 lbs. uncrated; CU-332A/UR 115.9 lbs. crated, 79.9 lbs. uncrated.

h. OPERATING FREQUENCY RANGE.- 230 to 390 megacycles.

i. NUMBER OF PRE-SET FREQUENCIES.- Antenna Coupler CU-255/UR - ten, Antenna Coupler CU-332A/UR - none.

j. TYPE OF FREQUENCY CONTROL.- CU-255/UR - automatic, CU-332A/UR - manual.

k. MAXIMUM RF POWER INPUT.- 100 watts.

l. MAXIMUM INSERTION LOSS.- Between Receiver-Transmitter Line Connector and Antenna Transmission Line - 1.1 db.

m. COUPLER ANTENNA TRANSMISSION LINE LOSS. - Negligible for six interconnected couplers.

n. CHARACTERISTIC LINE IMPEDANCE.- 50 ohms.

o. ELECTRICAL CHARACTERISTICS OF RECOMMENDED ANTENNA.- Broad-band dipole, operating frequency 230-390 megacycles, 50 ohms characteristic impedance.

p. OPERATING POWER REQUIREMENTS.- Antenna Coupler CU-255/UR - 115 vac, 4 amps max during tuning cycle and 48 vdc pulses to initiate tuning cycle. Power supplied by Navy Model TDZ Transmitter or Power Supply Unit, Navy Type CQC-20409 used in conjunction with Selector Control Unit, Navy Type CQC-23497 and Remote Channel Selector Unit, Navy Type CQC-23445. Antenna Coupler CU-332A/UR - none.

q. HEAT DISSIPATION.- CU-255/UR or CU-332A/UR - Negligible.

r. TABLES.

(1) EQUIPMENT LISTS.-- Tables 1-1a, 1-1b and 1-2 list the equipment supplied and the equipment required but not supplied.

(2) INSTALLATION HARDWARE.-- Table 1-3 itemizes the installation hardware. One complete set will be required in any installation of two or more couplers up to a maximum of six.

(3) BASIC SIMILARITIES AND DIFFERENCES BETWEEN CU-255/UR AND CU-332A/UR ANTENNA COUPLERS.-- Table 1-4 gives

the basic similarities and differences between the CU-255/UR and the CU-332A/UR Antenna Couplers.

(4) SHIPPING DATA.-- Table 1-5 gives information on the equipment as packed for shipment.

TABLE 1-1a. CU-255/UR EQUIPMENT SUPPLIED

QUANTITY PER EQUIPMENT	NAME OF UNIT	NAVY TYPE DESIGNATION	OVER-ALL DIMENSIONS IN INCHES			VOLUME	WEIGHT
			HEIGHT	WIDTH	DEPTH		
1	ANTENNA COUPLER	CU-255/UR	69.1	5.74	7.78	1.785 cu ft	90.1
1 Set	INSTALLATION HARDWARE	- - -					
2	INSTRUCTION BOOKS	NAVSHIPS 91745					

TABLE 1-1b. CU-332A/UR EQUIPMENT SUPPLIED

QUANTITY PER EQUIPMENT	NAME OF UNIT	NAVY TYPE DESIGNATION	OVER-ALL DIMENSIONS IN INCHES			VOLUME	WEIGHT
			HEIGHT	WIDTH	DEPTH		
1	ANTENNA COUPLER	CU-332A/UR	62.52	4-7/8	8-5/16	1.44	79.9
1 Set	INSTALLATION HARDWARE	- - -					
2	INSTRUCTION BOOKS	NAVSHIPS 91745					

TABLE 1-2. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED

QUANTITY PER EQUIPMENT	NAME OF UNIT	NAVY TYPE DESIGNATION	REQUIRED USE	REQUIRED CHARACTERISTICS
1	For Transmitter Installations			
	Standard Navy Transmitter and Instruction Book	Model TDZ or equivalent NAVSHIPS 900,809	To Transmit Communications	Frequency range 230-390 megacycles. Automatic tuning to ten frequencies. 115v ac and 48v dc Source
	For Receiver Installations			
1	Standard Navy Radio Receiver	Model RDZ or equivalent NAVSHIPS 900,617	To Receive Communications	Frequency range of 230-390 megacycles. Automatic tuning to ten frequencies.
1	Power Supply Unit	Model CQC-20409	Supply Voltages for Coupler	115v ac, 48v dc
1	Selector Control Unit	Model CQC-23479	Control Voltages for Coupler	48v dc pulsed for channel selection
1	Remote Channel Selector Unit	Model CQC-23496 NAVSHIPS 900,777	Dial Station for Channel Selection	Breaker circuit for Selector Control Unit
	For Both Type Installations			
1	Antenna	AT-150/SRC or AS-390/SRC	Antenna	Broad band, 230 to 390 megacycles
As required	Interconnecting Cable and Coaxial Cable	MSCA-10 MSCA-19 RG-10/U		See Installation
1 each	Fittings	AN3102-22-14P AN3102-22-14S UG-21A/U UG-167A	Connect RG-10/U Connect RG-18/U	See Installation

TABLE 1-3. INSTALLATION HARDWARE

QUANTITY SUPPLIED PER EQUIPMENT	NAME OF PART	REFERENCE SYMBOL DESIG-NATION	QUANTITY SUPPLIED PER EQUIPMENT	NAME OF PART	REFERENCE SYMBOL DESIG-NATION
1	Shell, Electrical Connector	E734	4	Bolt	H747
			6	Bolt	H748
1	Line Section (Adapter Inner Contact)	E750	4	Bolt	H749
1	Insulator, Bushing (for Adapter)	E752	4	Bolt	H750
1	Mounting Bar (Equipment)	H715	4	Nut	H752
1	Mounting Bar (Bulkhead)	H716	6	Washer	H753
1	Nut (for Shorting Cap)	H718	8	Washer	H754
1	Tiebar (Center)	H728	1	Dust Cover	0709
1	Tiebar (Left)	H729	2	Mounting Bracket	H710
1	Tiebar (Right)	H730	1	Resistor (used with CU-255/UR only)	R705

TABLE 1-4. BASIC SIMILARITIES AND DIFFERENCES IN MODELS CU-255/UR AND CU-332A/UR

ITEM	MODEL	
	CU-255/UR	CU-332A/UR
Dimensions	69-1/4" x 5-1/2" x 7-7/8"	62-1/2" x 5-1/2" x 8-1/2"
Frequencies	230-390 mc	230-390 mc
Receptacles	Two additional external connectors	
RF Coupling Section	Same for both	Same for both
Maximum RF Power	Same for both	Same for both
Tuning	Automatic	Manual
Voltages	110 AC, 48 VDC	None
Weight	90.10 lbs.	79.90 lbs.

TABLE 1-5. SHIPPING DATA*

CONTENTS		OVER-ALL DIMENSIONS			VOLUME	WEIGHT
NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
Antenna Coupler (automatic)	CU-255/UR					
Antenna Coupler (manual)	CU-332A/UR					
Installation Hardware						

Dimensions are feet, volume cubic feet, weight pounds.

*Each item is shipped independently.

SECTION 2

THEORY OF OPERATION

1. GENERAL.

The Antenna Coupler CU-255/UR and Antenna Coupler CU-332A/UR are used in receiver or trnasmitter installations to permit simultaneous operation of several transmitters or several receivers at different frequencies on one antenna.

The CU-255/UR Coupler (automatic) is designed primarily for use with TDZ transmitter or RDZ receiver and an AT-150/SRC or AS-390/SRC antenna; however, it may be used with other similar equipment which has the required control system for determining the ten preset frequencies within its frequency range of 230-390 megacycles. It may also be tuned manually for each change of channel frequency within its range.

The CU-332A/UR Coupler, which must be tuned manually, may be used with the TDZ transmitter, RDZ receiver, or any other equipment within the frequency range of 230-390 megacycles providing that the rf power to be transferred does not exceed 100 watts.

These mounting accessories designed to permit mounting of from two to six units together in a group and allow operation of as many as six transmitters, six receivers or six transmitter-receiver systems simultaneously on one common antenna. This gives the advantage of materially reducing the number of antennas required at a communications center where this equipment is to be used.

The automatic control circuits of the CU-255/UR Coupler are actuated and controlled by 48 vdc pulses from the transmitter or receivor control circuits as determined by the channel-selecting dial. One hundred fifteen volt ac power is required for the drive motor and its control relay.

The CU-255/UR and CU-332A/UR are each divided basically into two main sections: the Tuning Head Section and the RF Coupling Section. For relationship of these units, refer to the Functional Block Diagrams, figures 2-1 and 2-2.

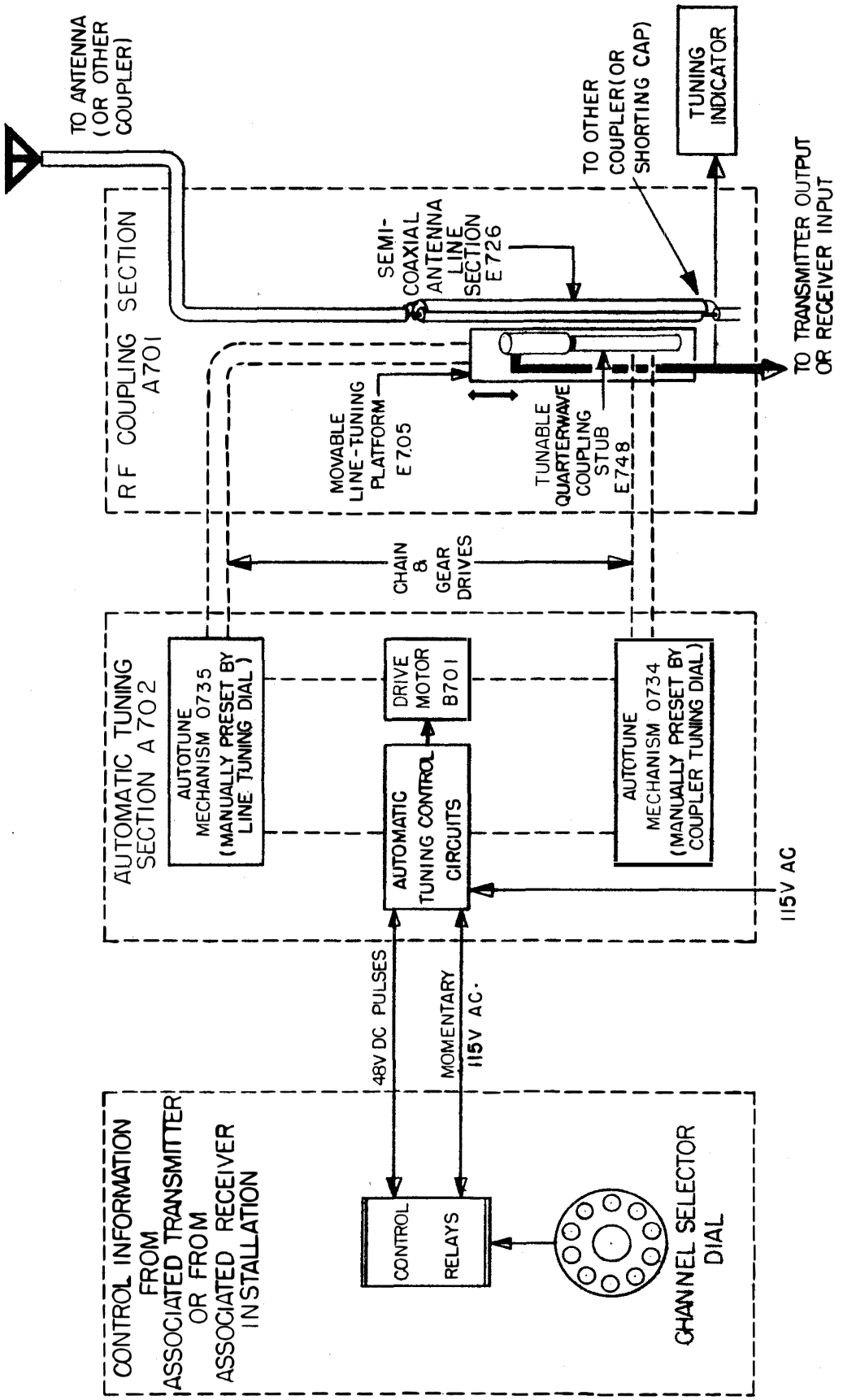


Figure 2-1. Antenna Coupler CU-255/UR, Functional Block Diagram

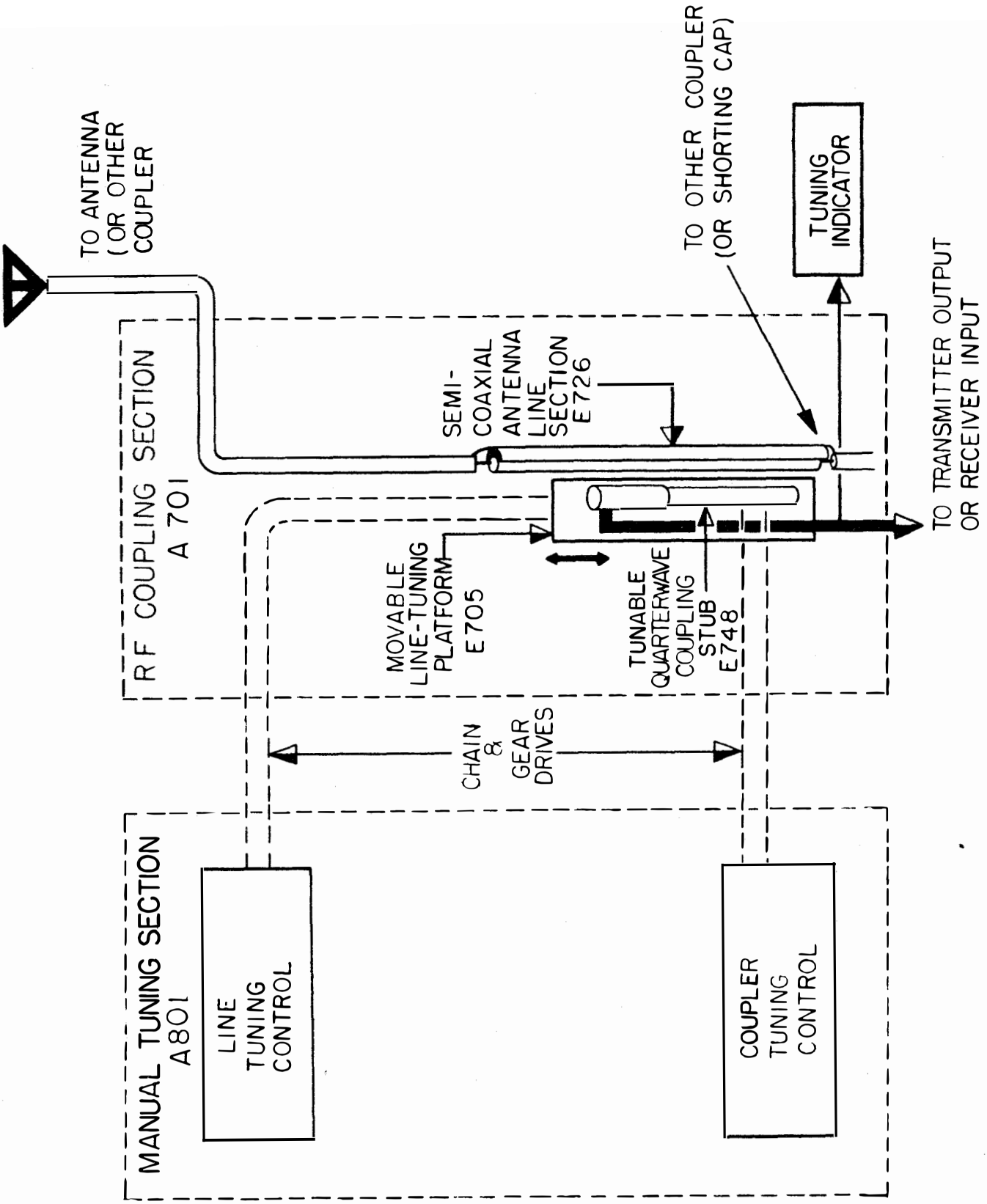


Figure 2-2. Antenna Coupler CU-332A/UR, Functional Block Diagram

2. TUNING HEAD SECTIONS.

a. AUTOMATIC TUNING HEAD SECTION.--The automatic Tuning Head of CU-255/UR includes two standard autotune drive mechanisms, their driving motor, and control circuits. A series of 48 vdc pulses from the receiver or transmitter channel selector system actuates a stepping switch in the automatic tuning-control circuit registering the channel which has been dialed. This energizes the drive motor through a relay. The motor drives two standard autotune drive mechanisms in the counterclockwise direction until all the tuning adjustments are at their zero position (reference point for starting automatic positioning cycle).

At this time the carriage is in its upper limit of travel and the quarter-wave element is in its fully extended position. At this home position, a switch is opened in the relay holding circuit and the motor continues to turn the drive mechanisms until a circuit seeking switch, S701, driven by the drive mechanism channel indicating drum, reaches a position corresponding to the channel dialed. This opens the circuit supplying voltage to the motor relay. The relay is de-energized, allowing contacts in the motor circuit to return to their normal position, which reverses the motor.

Just before reversal of the motor, one finger of a three finger pawl drops into a notch on the channel indicator drum corresponding to the channel selected. This pawl is designed so that it will drop in only when the drum rotates in a counterclockwise direction.

After reversal, the motor turns the drive mechanisms clockwise until the second finger of the pawl selected by the channel indicator drum drops into a notch in the revolution counter drum and the third pawl drops into a notch in the stop drum. The revolution counter drum indicates the number of rotations of the main dial.

Rotation continues until the up-limit switch is opened, stopping the motor and completing the tuning cycle. The stops on the revolution counter drum and the main stop drum which are geared together by means of a reduction gear train, are adjustable with respect to their individual shafts when locking bars are loosened, constituting the method of manual tuning or presettings for automatic tuning. For a detailed description of the Automatic Tuning Head, refer to figure 2-3 and the schematic diagram, figure 5-37.

b. MANUAL TUNING HEAD SECTION.--The manual Tuning Head of the CU-332A/UR Coupler consists of two main control knobs with individual counters for indicating the correct knob

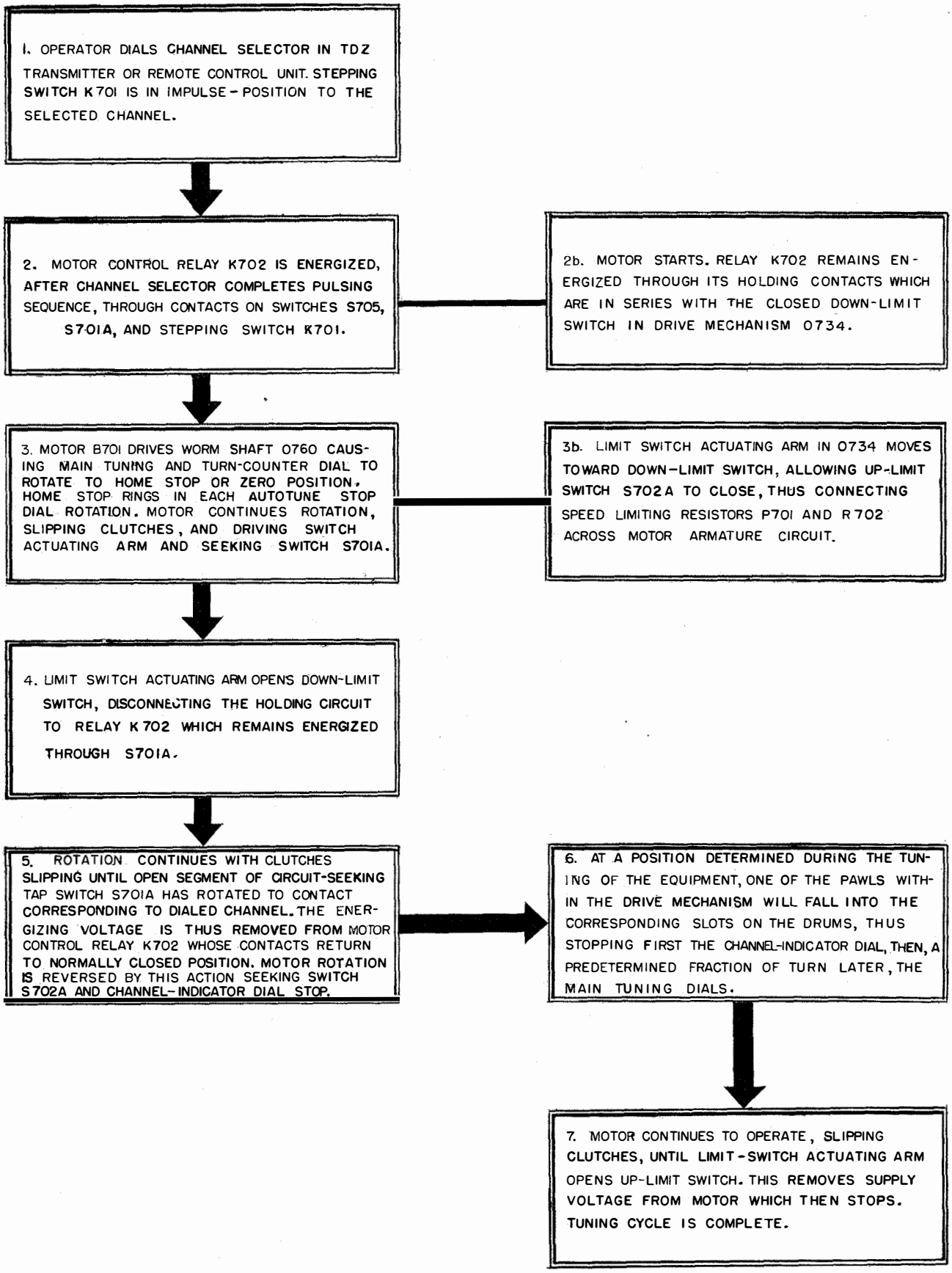


Figure 2-3. Operational Block Diagram of Automatic Tuning Section

settings. The top control knobs with individual counters for LINE TUNING and the bottom one is for COUPLER TUNING. The drive is transferred from the control knobs through a system of gears and shafts to the associated parts of the RF Cou;ling Section. The two main drive shafts of the Tuning Head are equipped with coupling spiders which mate with identical spiders in the RF Coupling Section The actual functions of the two controls will be discussed in paragraph 3.b. and 3.c., this section.

3. RF COUPLING SECTION.

The RF Coupling Section is enclosed by the fr mework nd side shields and contains all components of the coupling circuit, including the following major items:

(1) A section of the main Antenna Transmission Line, cut away lengthwise so as to expose the inner conductor;
(2) A Quarter-wave Element, adjustable to a quarter wavelength at any frequency in the operating band;
(3) A movable platform which supports the quarter-wave element and carries it parallel to the cut-away section of Antenna Transmission line;
(4) A contact spring and an apron extension of the cutaway outer conductor of the Antenna Transmission Line to provide a sliding contact between the platform and the line;
(5) Quarter-wave element and platform drive gear trains;
(6) A Transmitter-Receiver telescoping feedline to permit motion of the platform;
(7) A counter-balancing spring assembly; and
(8) A Reflectometer, which provides a tuning indication by detecting standing waves in the transmitter-receiver line.

a. ANTENNA TRANSMISSION LINE.--The ends of the cutaway section of the Antenna Transmission Line are provided with elbow fittings so as to bring the line out through the sides of the unit. At one side of unit No. 1, in a Coupler system (see figure 2-4) the elbow is fitted with a shorting plate which short-circuits the Transmission Line. All the other Transmission Line elbows in the system have alternating male and female type fittings which plug together when the units are arranged into a group so that the line is continuous from the short circuit to the antenna. See figure 2-4.

b. QUARTER-WAVE ELEMENT.--This element consists of two telescoping sections of tubing with the outer member

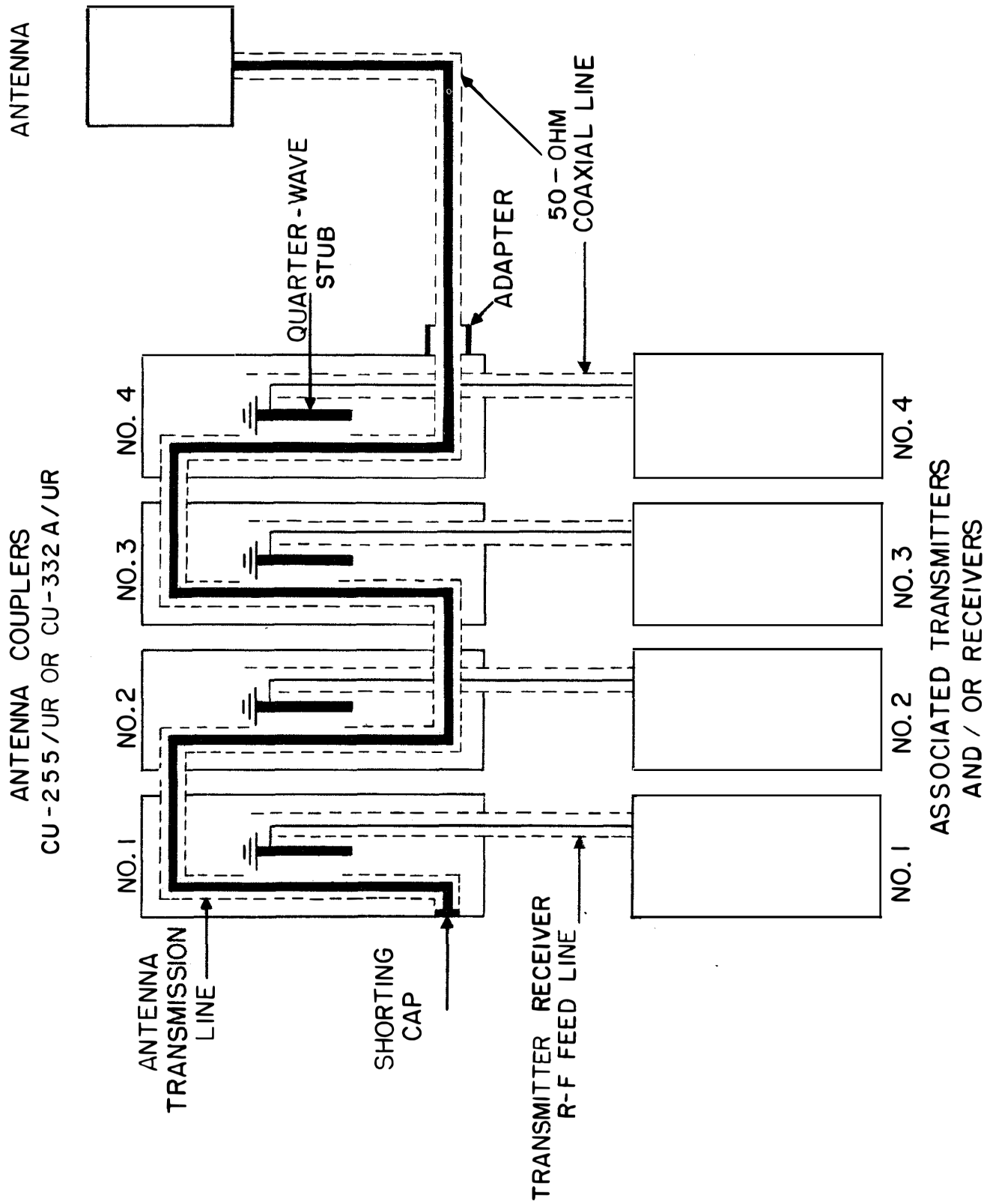


Figure 2-4. Antenna Coupler Group, R.F. Block Diagram

secured to the platform by a short post. A "finger" spring, located at one end of the stationary part, provides electrical contact between the two sections. The mounting post projects at right angles to the element, and thus serves to secure the element to the platform and to hold it parallel to the Antenna Transmission Line.

Furthermore, this post provides a rf ground for the Quarter-wave Element and a point of attachment for the telescoping feedline inner conductor. The movable portion of the Element is driven by a lead screw which, in turn, is driven by a train of bevel gears and shafts passing down through the ground post and the platform to a pinion gear. The latter is driven by a pinion gear which extends the length of the platform travel, thus providing a means for supplying drive for the Quarter-wave Element regardless of the position of the platform in the RF Coupling Section. The adjustment for this Element is the "Coupler Tuning" control in either the CU-255/UR or CU-332A/UR Couplers.

c. PLATFORM.--The Platform is supported by four rollers which engage with a pair of guide rails. It is capable of moving 20 inches, or approximately 0.4 wavelength at 230 mc. Thus the Quarter-wave Element of coupling point in nay unit in the system can be shifted by this amount with respect to the short circuit on the Antenna Transmission Line. Positioning of the Platform is effected by the "Line Tuning" control.

d. CONTACT SPRING.--The platform serves as a ground for rf in the coupling circuit and hence must make positive electrical contact with the outer conductor of the cutaway Line. This is accomplished by means of a Contact Spring E703 which is mounted along one side of the Platform and makes contact with the apron extension of the Antenna Transmission Line. See figure 2-5. This spring is specially designed to produce sufficient contact pressure on the apron to give a low-resistance contact without over-burdening the Tuning Head.

e. PLATFORM DIRVE MECHANISM.--The portion of the drive mechanism in the RF Coupling Section consists of a system of gears, shafts, sprockets, and a chain. The platform and Quarter-wave Element main drive shafts are coupled to the Tuning Head by means of multi-jaw spider type couplings so that the Head can be readily disengaged from the RF Coupling Section.

f. TRANSMITTER-RECEIVER FEEDLINE.--Since one end of the Transmitter-Receiver feedline is attached to the movable platform, the length of this line must be variable. This line is, therefore, made up of two telescoping sections of approximately 50 ohms to match the other lines in the system. The inner conductor of the feedline attaches to the supporting post on the Quarter-wave Element at a point approximately 9/32-inch above the platform. This feed-point approximension is fixed, and presents a resistive load of 50 ohms at the input terminal of the feedline when the coupler is properly tuned to an operating frequency.

When the coupler is used for transmission, energy in the 230 to 390 mc band is fed into the unit through a 50-ohm coaxial cable which attaches to a fitting at the lower end of the unit. This energy is then conducted through the Transmitter-Receiver feedline to the feedpoint on the Quarter-wave Coupling element; the latter is adjustable to a quarter-wavelength at any frequency between 230 to 390 mc and is grounded at one end to a movable platform. This platform carries the Quarter-wave Element along a section of the cutaway Antenna Transmission Line. The inner conductor and the Quarter-wave Element are parallel and spaced a short distance apart. See figure 2-5.

Transfer of energy from the Quarter-wave Element to the Line is accomplished through mutual coupling when the coupling circuit is properly tuned. The end of the Antenna Line is the No. 1 unit in a group (farthest from the antenna) is short-circuited. In order to couple energy into this line, the Quarter-wave Element must be adjusted to approximately a quarter-wavelength at the operating frequency and must be properly positioned along the main line with respect to the short circuit. The electrical length and the position of the Quarter-wave Element determine respectively the resistance and the reactance presented at the feedline input terminal. These two variables make possible accurate impedance matching between the coupling circuit and the line to the transmitter or receiver even though the antenna may present a two-to-one mismatch with respect to the 50-ohm line used in the system. Proper tuning results in maximum transfer of power from transmitter to antenna or from antenna to receiver.

When used with a transmitter, the unit is tuned to a frequency by adjusting the length of the Quarter-wave Element and its position with reference to the short circuit until the reflectometer output meter shows a reading of almost zero. This indicates that the coupling-circuit impedance matches the 50-ohm line to the transmitter; hence, no energy is reflected back to the transmitter. This condition is also optimum for transfer of energy from the antenna to a receiver.

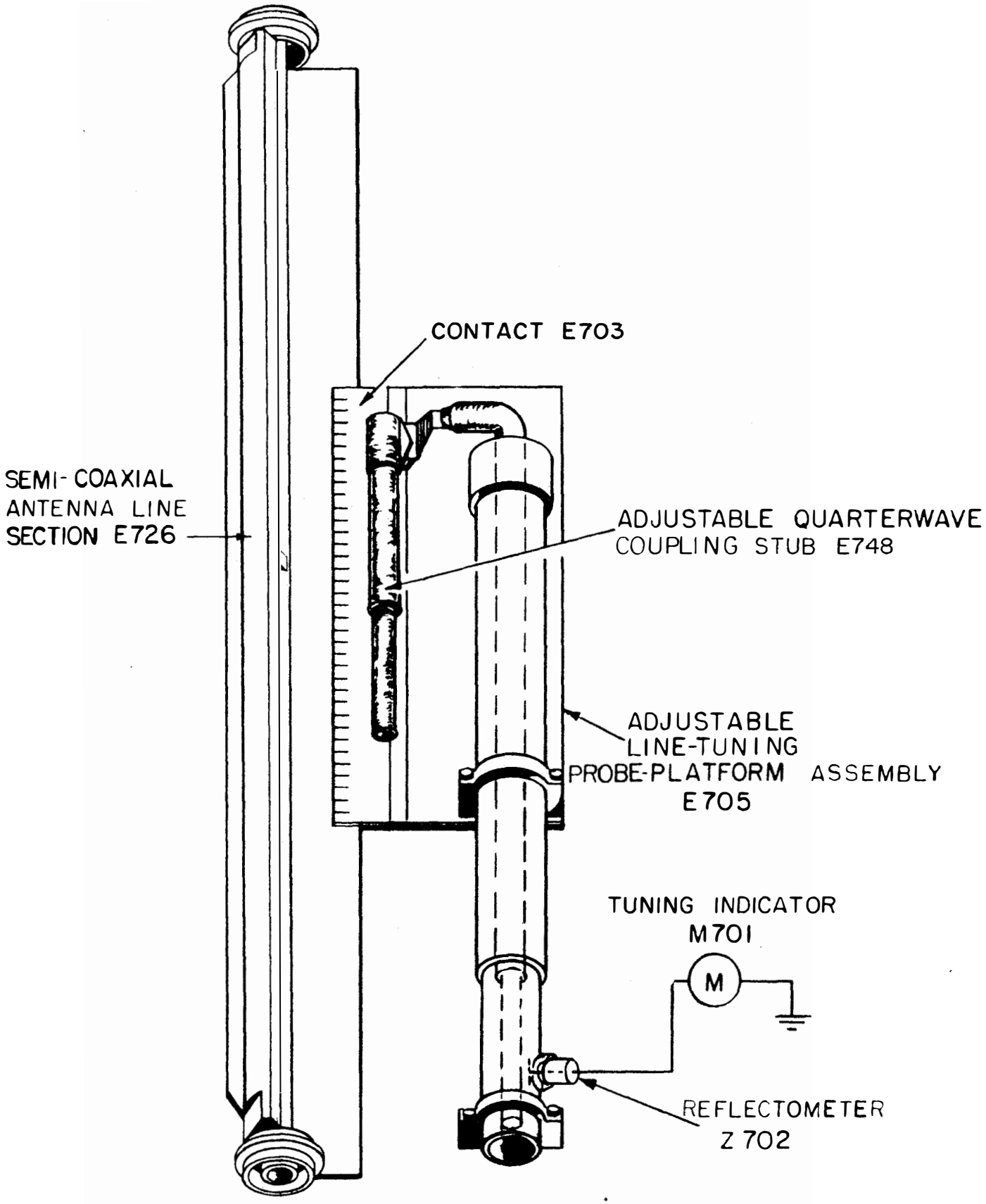


Figure 2-5. Relationship of Probe-Platform and Antenna Transmission Line

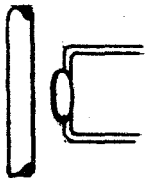
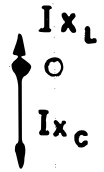
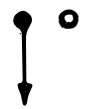
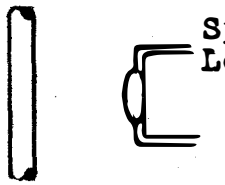
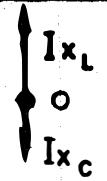
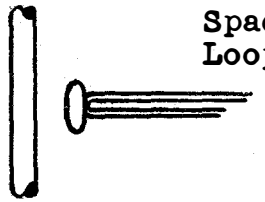
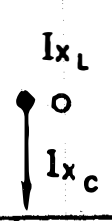
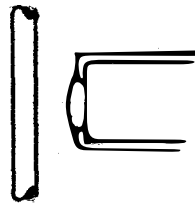
g. COUNTER-BALANCE SPRING ASSEMBLY.--This spring assists the Automatic Tuning or Manual Tuning Head in lifting the mass of the platform against gravitational force and against friction of the sliding contacts. It is of the flat, spiral type which is wound up for energy storage when the platform descends inside the RF Coupling Section. The energy so stored is used whenever the platform travels upward.

h. REFLECTOMETER.--This device, located in the Transmitter-Receiver Feedline between the input terminal and the telescoping section is a detector with directional qualities which, when properly oriented in its mounting, will pick up and rectify the reflected, or standing waves, in the line. A DC indication is given on the Tuning Indicator Meter when a Coupler is energized at some operating frequency and the reflectometer output meter reads minimum (i.e., 2 to 5 ua), then there is a minimum reflected wave and the Antenna Coupler is properly tuned and presents a 50-ohm resistive load to the transmitter or receiver.

Probe E733 is a pickup loop which couples capacitively and inductively to the inner conductor of the Transmitter-Receiver Feedline. The plane of this U-shaped loop is normally parallel to the axis of the Feedline, one end being connected to ground through balancing resistor R703 while the other connects to crystal detector Y701 and thence through current-limiting resistor R704 to dc microammeter M701 and to ground. See schematic, figure 5-37 or 5-38. Capacitor C702 is an rf by-pass for meter M701. A small disc, which is part of the Probe, adds capacitance to provide the correct amount of capacitive coupling.

The voltage applied to the detector is the vector sum of the components due to inductive and to capacitive coupling. See table 2-1. R703 controls the relative magnitudes of these two components. As the angle which the loop makes with the axis of the line changes, the amplitude of the inductive component varies from zero to a maximum while the capacitive component remains constant. The phase of the inductive component is reversed by rotating the loop through 180 degrees. Therefore, when the Coupler is accurately tuned and there are no reflected waves in the transmitter-receiver feedline, the currents due to the two components will cancel at some orientation of the loop, provided that resistor R703 is the correct value. Cancellation which is independent of frequency occurs when there is no reflected wave on the line. Thus, when the loop is correctly oriented and when the coupling-circuit impedance in the Coupler is adjusted to match the 50-ohm feedline, the reflected wave is negligible and meter M701 will read very nearly zero.

TABLE 2-1. ORIENTATION OF REFLECTOMETER PROBE

POSITION OF PROBE	VECTORS REPRESENTING CURRENTS DUE TO INDUCED VOLTAGES	RESULTANT CURRENT IN LOOP	TUNING INDICATOR	POSITION OF ARROW ON REFLECTOMETER CASE	REMARKS
 Spaced close Loop vertical			High Reading		Too much capacitive coupling. Disc too close to inner conductor.
 Spaced wide Loop vertical			High Reading		Not enough capacitive coupling. Disc too far from inner conductor.
 Spaced normal Loop turned			High Reading		No inductive coupling. Loop of probe too far displaced from plane of inner conductor axis.
 Spaced normal Loop vertical			Minimum reading less than 10 micro-amps	 *	The induced currents are equal and opposite, hence cancellation. Reflectometer is properly oriented.

* Position of arrow should never have to be displaced more than a few degrees, if any, from straight up when reflectometer is properly adjusted.

I_{x_C} represents the current induced into the loop due to the capacitance of the disc.

I_{x_L} represents the current induced into the loop due to the inductance of the loop.

Coupler must be energized and accurately tuned for these conditions to hold.

S E C T I O N 3

I N S T A L L A T I O N A N D O P E R A T I O N

1. UNPACKING

Antenna Coupler CU-255/UR or CU-332A/UR is overseas packed in one wood shipping box and the necessary installation hardware supplied is shipped in another wood box. See figure 3-1. The shipping boxes each have a waterproof liner. The equipment is packaged with a moisture-vaporproof barrier and desiccant, and should not be unpacked until ready for use. The items of Installation Hardware are each packaged with a moisture-vaporproof barrier and the individual packages should not be opened until ready for installation

Shipping box #1 contains one equipment, two instruction books and a packing list. Open the equipment box by breaking the steel straps and removing the top cover. A small claw hammor may be used if more readily available. Next, remove the bolts which hold the Antenna Coupler package to the bottom of the box. The equipment package is a vaporproof bag with inner cushioning material; tear open the bag and remove all of the packing material from around the equipment. Lift out and carefully inspect the equipment for any damange that may have occurred during shipment.

Shipping box #2 contains all of the items of table 1-3 and a packing list. Open this box the same as box #1 by breaking the steel straps and removing the lid of the box. Tear open the flaps of the inner cardboard box and take out the individual items which are wrapped separately. Unwrap the parts and discard the wrappings and packing materila bei g carefùl not to throw away any of the small mounting bolts which are included.

The CU-255/UR and CU-332A/UR Antenna Couplers are shipped ready for use. They must be prepared for installation as described in paragraph 3.

2. GENERAL

Determine what type of system is to be used. The CU-332A/UR manual Coupler may be used in a system with the TDZ Transmitter, RDZ Receiver or similar system without requiring any special adjustments or interconnecting control cables. With the CU-255/UR Automatic Coupler, it must be decided as to whether the control system of the TDZ Transmitter orthe external control equipments used with the RDZ.

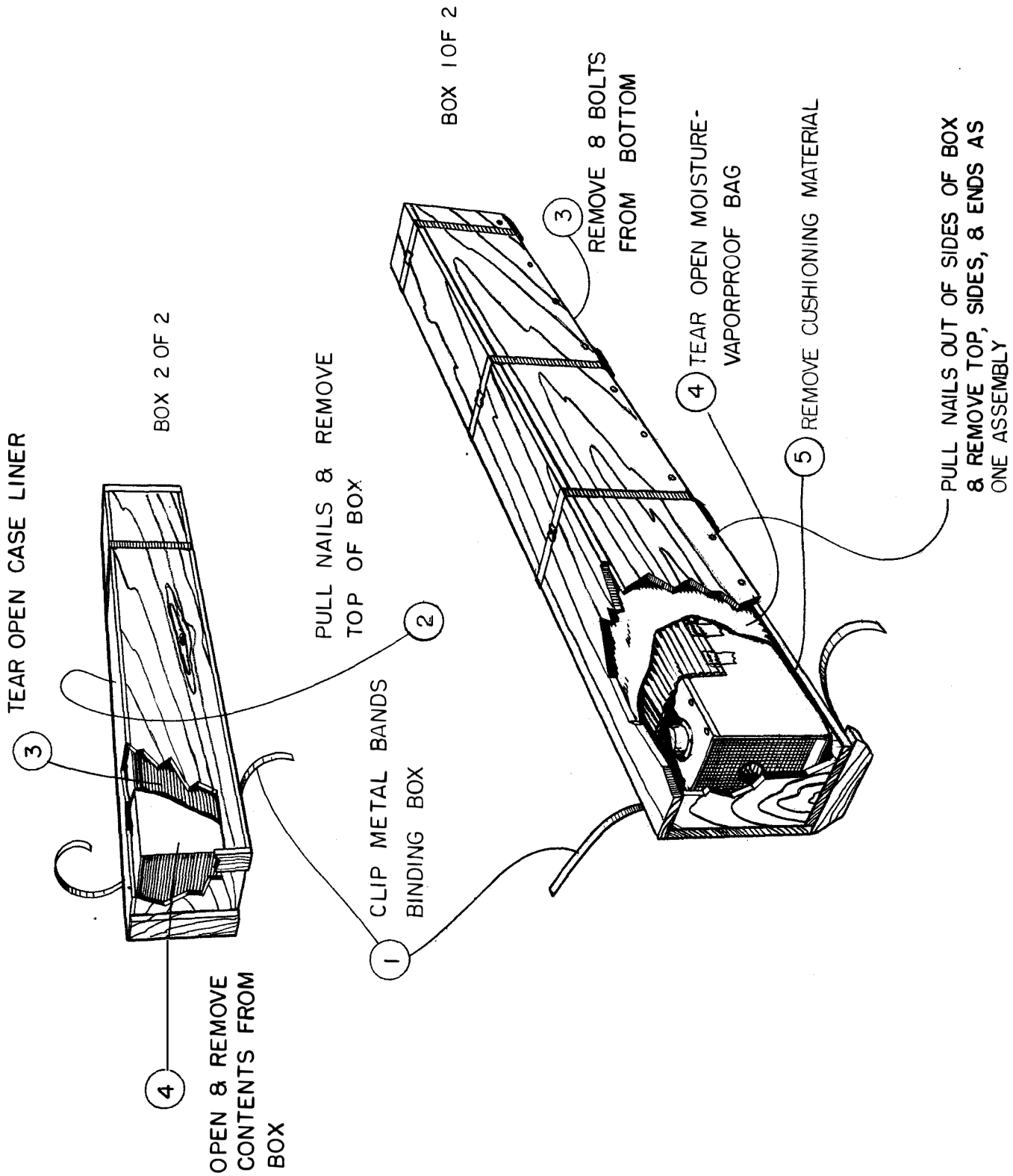


Figure 3-1. Unpacking of Antenna Coupler CU-255/UR or CU-332A/UR

Receiver are to be used for automatic channel selection in the Coupler. The "RDZ-TDZ Operation Indicator" on the front of the CU-255/UR equipment must then be correctly set to correspond to the system to be used. This is done by removing the two screws which hold it in place, removing it and replacing it upside down.

a. Both automatic and manual Couplers may be used in a single installation group. See Figure 3-2. It must be decided, however, which units in the group may be used to the greatest advantage with the available automatic control systems. The manual Couplers in the group should be used with any transmitter-receiver equipments which either do not have automatic control circuits or with the equipments which are required to change channels least frequently.

3. PREPARING COUPLERS FOR GROUP INSTALLATION.

It will be necessary in any installation group to arrange the male and female adapters on the antenna transmission lines in the equipments so that the units can be successively interconnected. See Figure 3-3. When the equipments are shipped from the factory, the top elbow sections of the antenna transmission line will be orientated to the right side of the equipment and terminated with male adapters. Therefore, the bottom elbows will be orientated to the left and terminated with female adapters. Half of the units in the group will need to have the elbows and adapters re-arranged. Figure 3-4 shows the possible terminations for the elbows. The antenna transmission line adapter E751 must be mounted to a male adapter E725/E722 as shown in Figure 3-5. This adapter should not be mounted until it has been decided which equipment is to be the last unit in the group. The step by step procedure for arranging the adapters is as follows:

Step 1. Remove the two side panels and the rear panel of the RF coupling section. Also remove the elbow receptacle dust covers 0709.

Step 2. Remove the male and female adapters from the elbows of the antenna transmission line. The outer conductor of the adapters E725, male, and E727, female, are each held in place by four No. 10 bolts 1/2 inch long. The center conductors can usually be unscrewed by hand but a pair of pliers may be used to loosen them if necessary.

Step 3. Remove insulator E715 and the elbow inner conductor E729 which can be taken out readily by moving it back and forth.

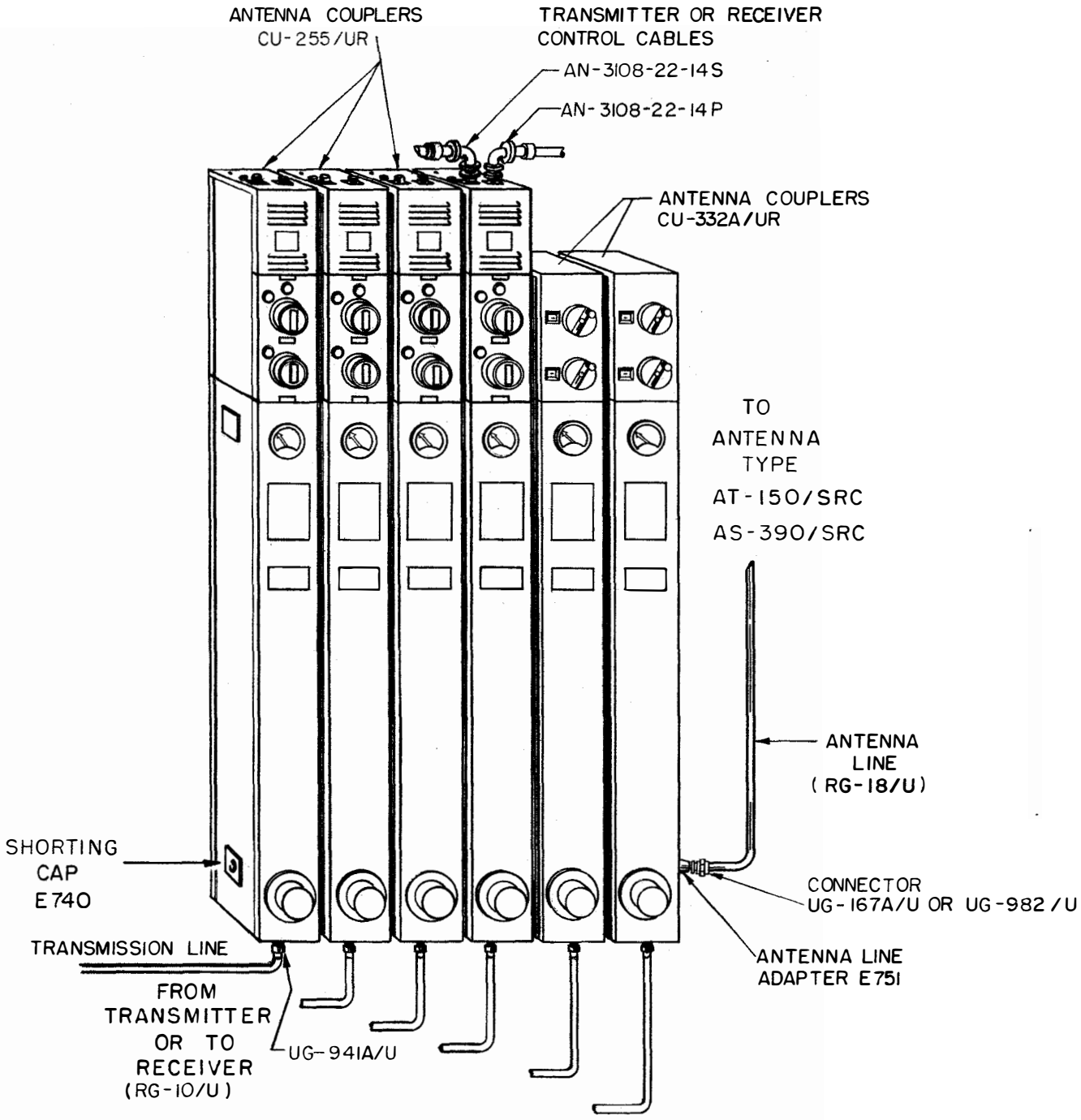


Figure 3-2. Multiple Installation of Antenna Couplers CU-255/UR and CU-332/UR, Typical

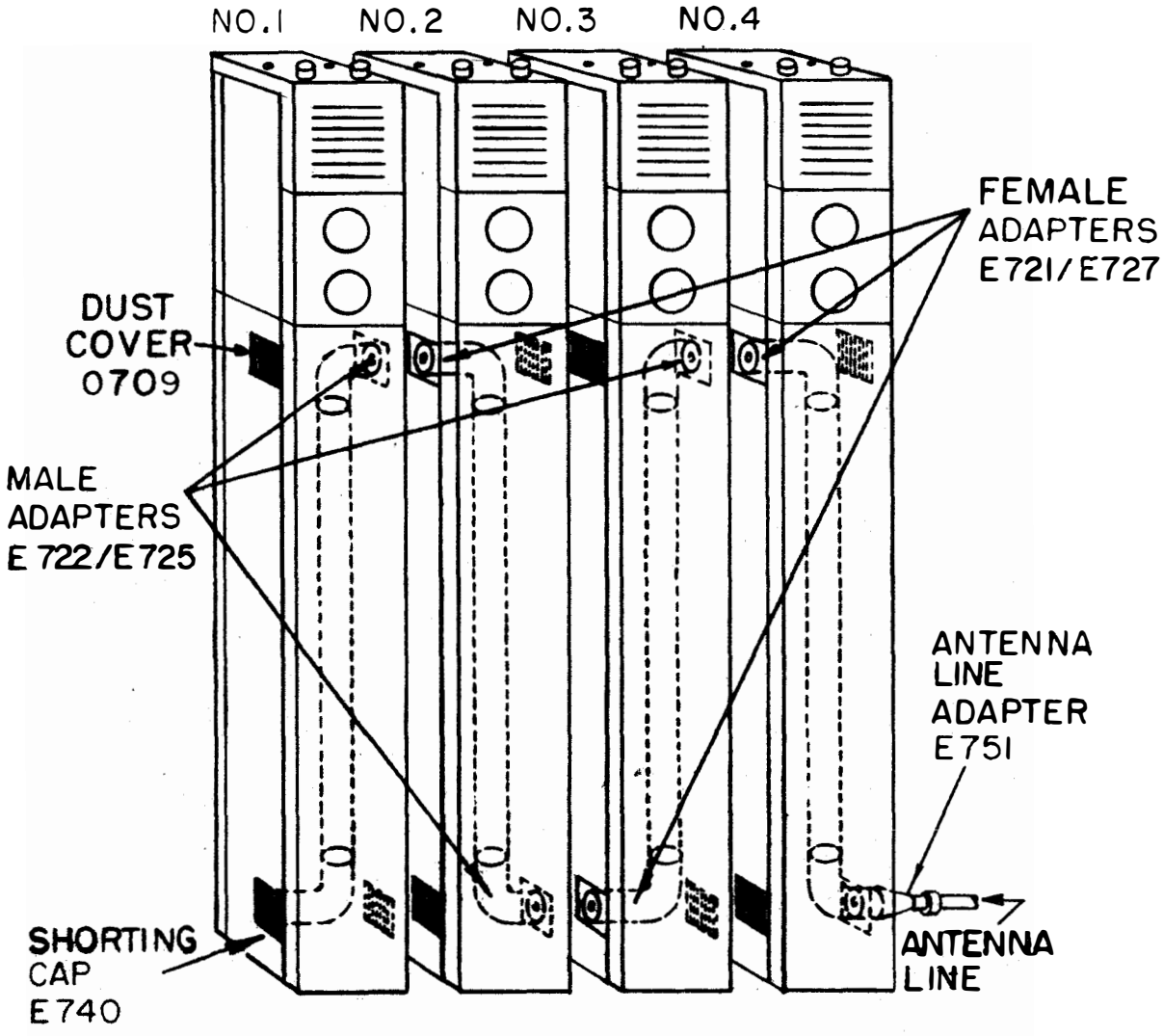


Figure 3-3. Antenna Line Adapter Arrangement for CU-255/UR and/or CU-332A/UR Installations

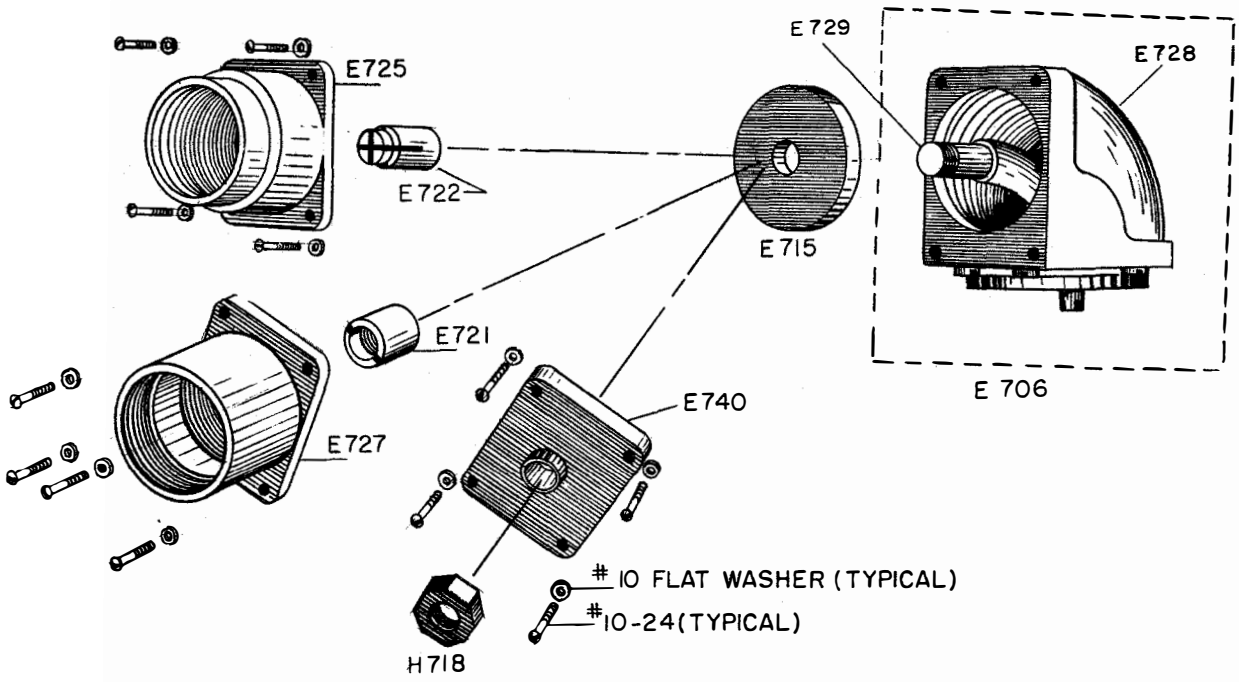


Figure 3-4. Adapters and Shorting Cap For Elbow E706

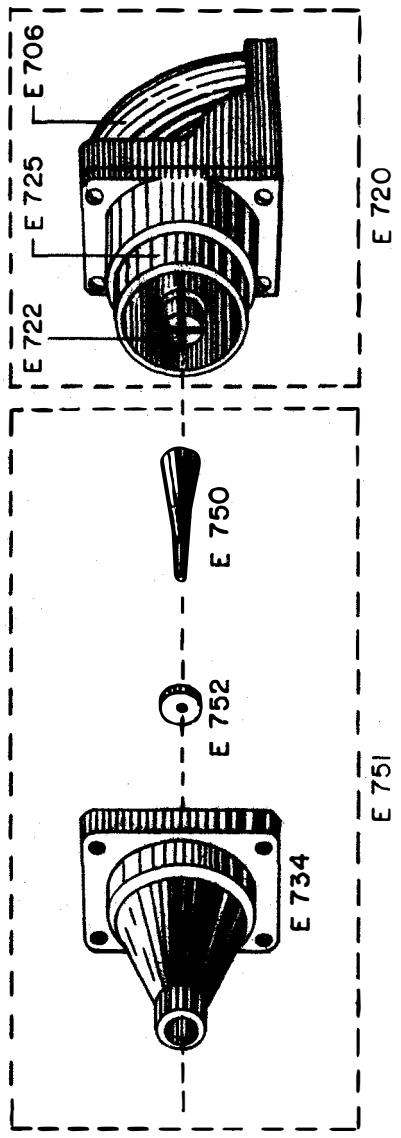


Figure 3-5. Elbow E732 and Components of Adapter E751

Step 4. Reach inside the RF Coupling Section with a screwdriver and remove screws labeled "A" in Figure 3-6 (4 elbow mounting screws for each elbow).

Step 5. Remove the elbow outer shell by rotating and pulling away from its seat in the casting. Turn it 180 degrees and replace the inner conductor E729 and insulator E715. Do this for the elbow on each end of the transmission line.

Step 6. Pick the desired set of conductors for each elbow. E722 and E725 are male; E721 and E727 are female.

Step 7. Screw the inner conductors to the inner elbow Section E729 and then secure each of the outer conductors with their four screws.

Step 8. Replace the rear and side panels and the dust covers.

4. INSTALLATION

The installation details of a group of CU-255/UR and/or CU-332A/UR Antenna Couplers are shown in figure 3-7. The mounting bars, tiebars, line terminations, and other installation hardware parts are furnished with the equipment. The step-by-step installation procedure is as follows:

Step 1. Bolt mounting bars H716 to the upper and lower bulkhead mounting bars (not supplied), which are to have been fabricated and welded to the bulkhead as illustrated in Figure 3-7.

Step 2. Attach pairs of "U" brackets H710 to the H716 bars, one at top and one at bottom, one pair for each unit to be mounted. Bolt a H715 bar to these brackets at the top and one at the bottom using the flathead bolt indicated.

Step 3. Mount the center unit first, attaching to top and bottom mounting bars H715. Bolt the necessary tiebars (H729, H728, H730) in place as indicated in Figure 3-7. An offset screwdriver may be necessary for this operation. Mount each unit in the same way, making sure the mating contacts join together properly. Work from the center unit to each end.

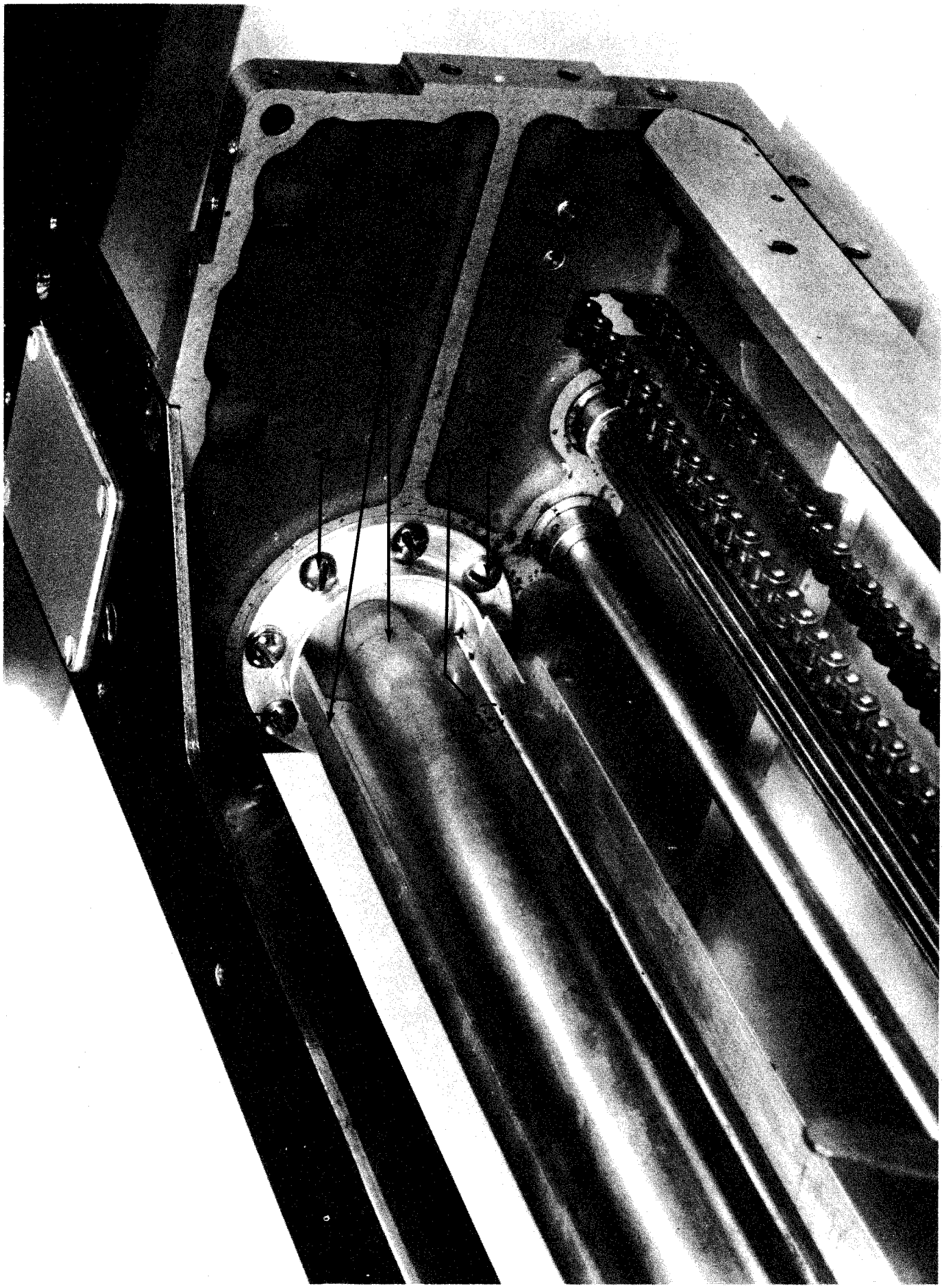
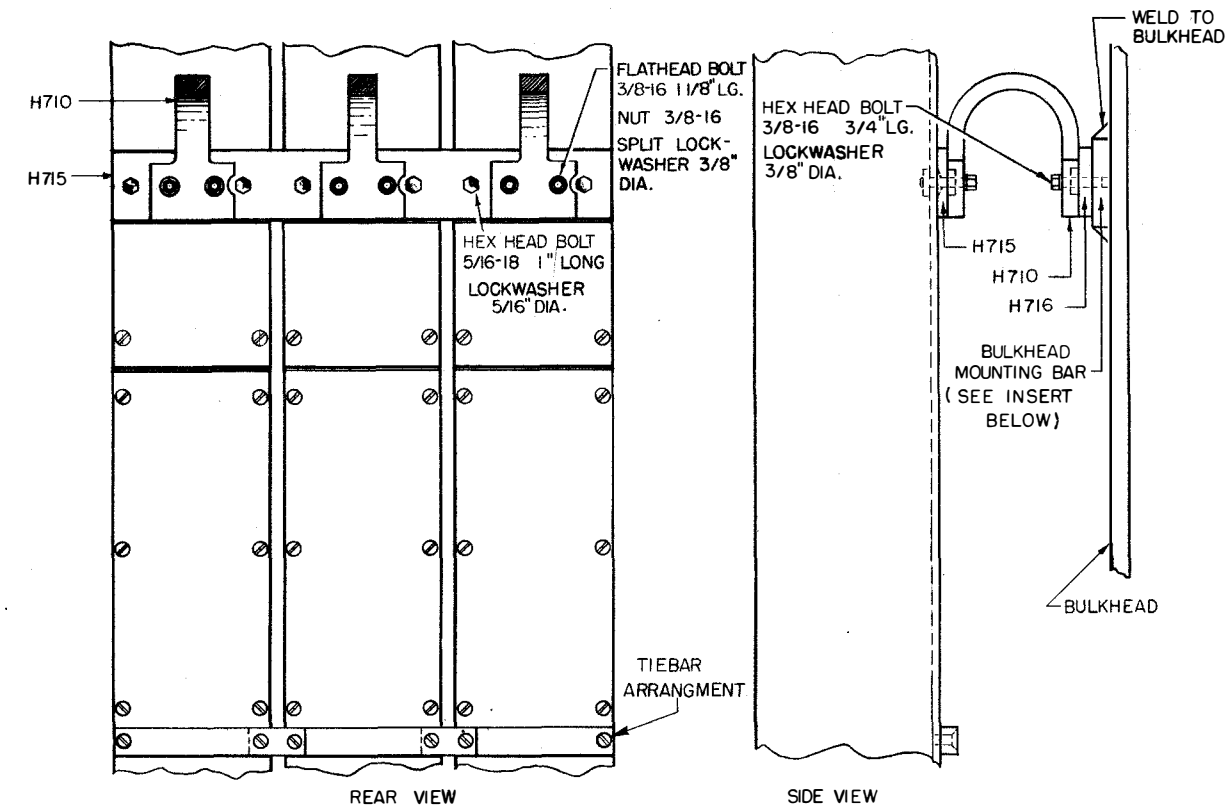
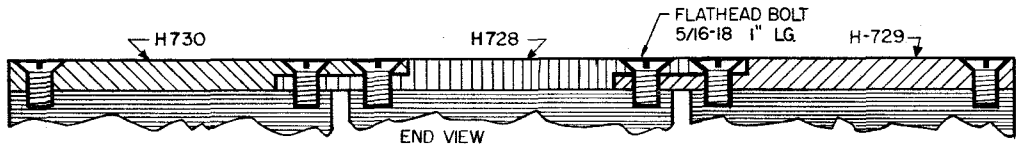


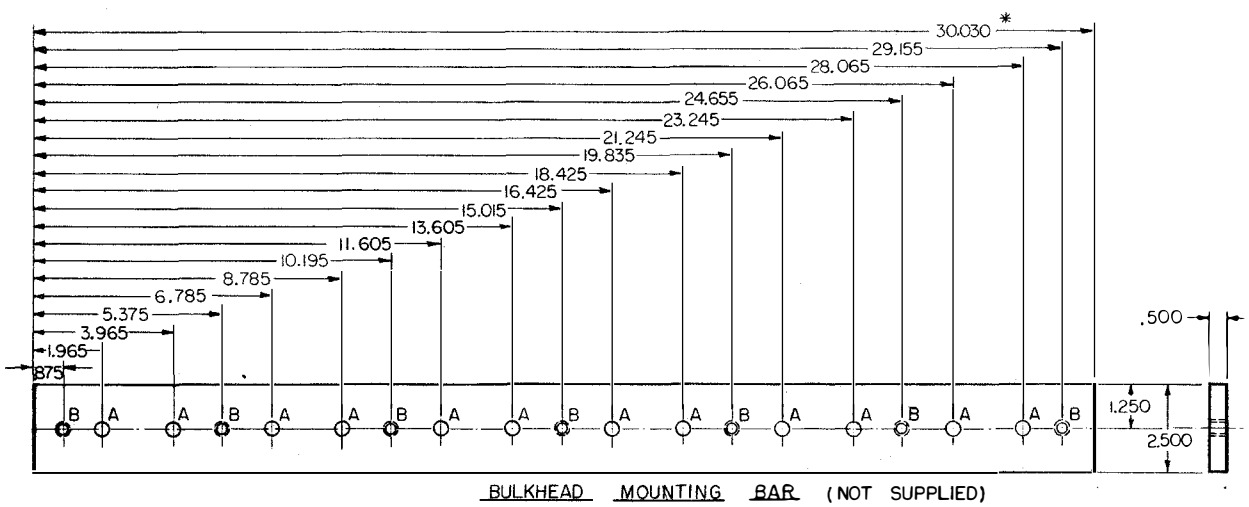
Figure 3-6. View of Elbow Mounting Screws

NOTE

INSTALLATION MAY BE MADE WITH FROM 2 TO 6 UNITS
INSTALLATION SHOWN BELOW IS THE UPPER HALF VIEW FOR THREE UNITS MOUNTED TOGETHER.



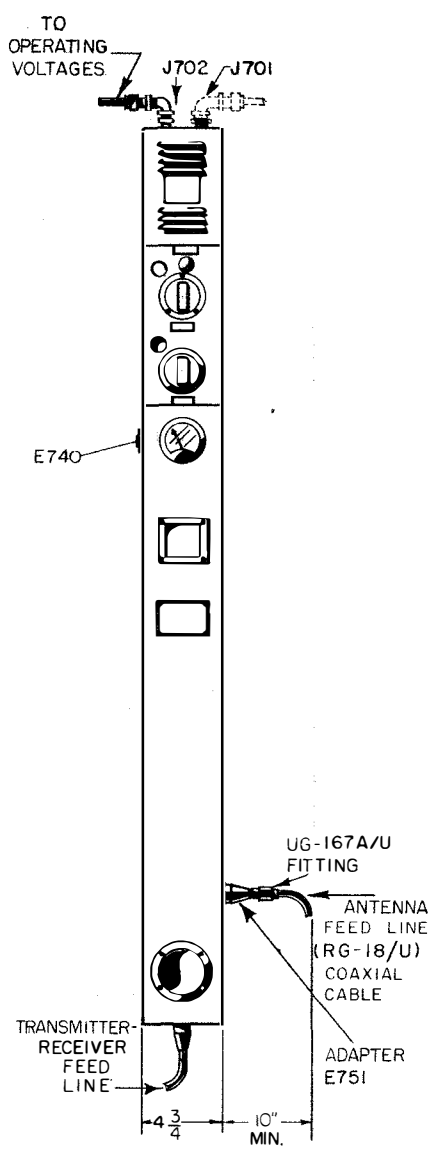


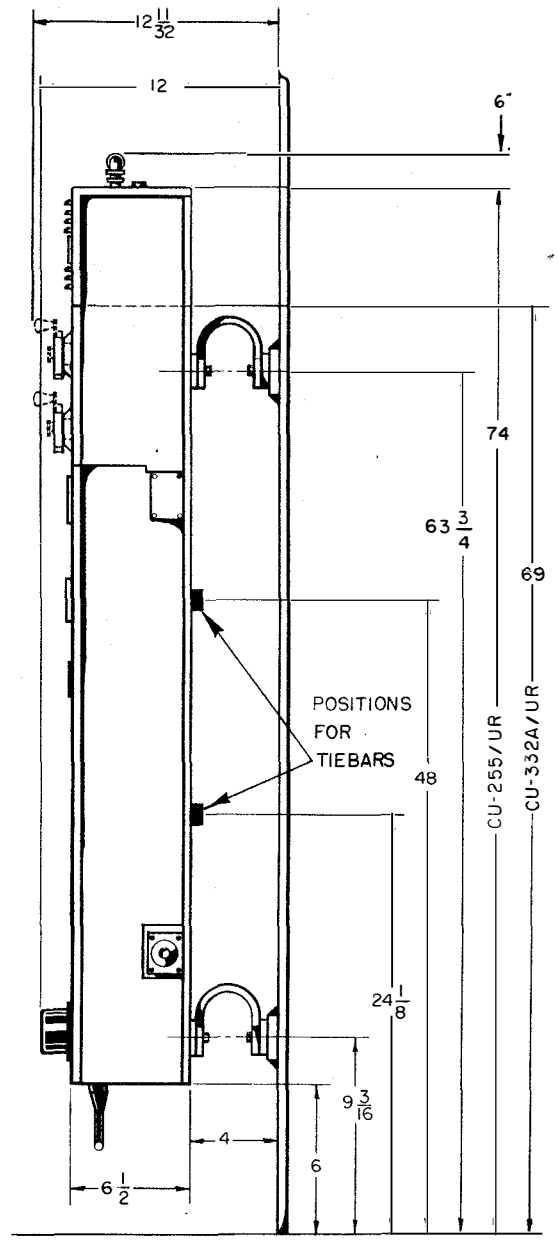


BULKHEAD MOUNTING BAR (NOT SUPPLIED)

NOTE:

1. COLD ROLLED STEEL STOCK.
2. DRILL AND TAP "B" HOLES FOR 3/8-16 BOLT.
3. DRILL "A" HOLES 7/16 DIA. X 3/8 DEEP.
4. * MAXIMUM LENGTH SHOWN. CUT TO PROPER SIZE FOR LESS THEN 6 UNITS





ALL EQUIPMENT MOUNTING DIMENSIONS APPLY TO COUPLERS CU-255/UR AND CU-332A/UR EXCEPT FOR LENGTH. FOR EACH ADDITIONAL EQUIPMENT MOUNTED, ADD 4 15/16" TO WIDTH DIMENSIONS SHOWN ABOVE.

RATINGS	CU-255/UR (AUTOMATIC)	CU-332A/UR (MANUAL)
POWER CONSUMPTION	0.4 KVA (MAX)	0 KVA
WEIGHT OF EACH UNIT	90.1 LBS	80.0 LBS
HEAT DISSIPATION	NEGLIGIBLE	NEGLIGIBLE

Figure 3-7. Antenna Coupler Cu-255/UR or CU-332A/UR, Installation Drawing

5. MODIFICATION OF COUPLER CONTROL EQUIPMENT.

Antenna Couplers CU-255/UR or CU-332A/UR are designed to operate with either RDZ receiver and/or TDZ transmitter, however, any transmitter, receiver or transmitter-receiver system operating in the same frequency range, having the same impedance match, and rated not higher than 100 watts rf power may be used with either Coupler. The CU-255/UR Coupler requires 48v dc pulses and momentary 115 vac voltages from the channel selector unit of the control equipment, in addition to line 115 vac for the drive motor and relay if automatic operation is desired. When the CU-255/UR Coupler is used in an automatic tuning setup, modifications are necessary to the control equipment to provide proper control voltages. See Figure 3-8. For RDZ receiver operation a supplementary power supply, remote channel indicator and channel selector unit are required to supply voltages for each Coupler. The Coupler in turn supplies voltages to the receiver tuning control circuits.

a. TDZ MODIFICATION.--TDZ modifications are shown in figure 3-8. For information on the transmitter, see NAVSHIPS 900,809 instruction book.

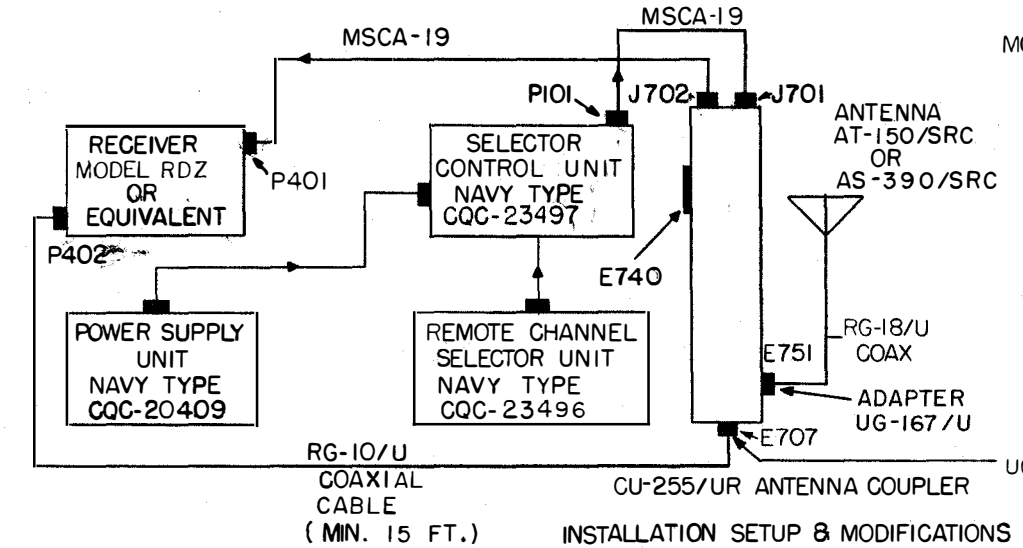
b. RDZ MODIFICATION.--For modifications refer to figure 3-8. For information on the receiver and control equipment see NAVSHIPS 900.617 and NAVSHIPS 900,777 instruction books.

6. INTERCONNECTING CABLE

All necessary information about the required control cables, antenna transmission line cable and transmitter-receiver feedline is shown in figure 3-8. The length of the cables is not critical except for the transmitter-receiver feedline which must be no less than 15 feet in length.

a. The control cable receptacles J701 and J702 are shown in Figure 3-9. Both of these are in sue with the RDZ setup as shown in Figure 3-8. J702 is not used with the TDZ setup so it should be covered with the E744 to keep out dirt and dust.

b. The transmitter-receiver feedline should be connected to the adapter E707 on the bottom of the equipment. See Figure 3-10.



MODIFICATIONS:

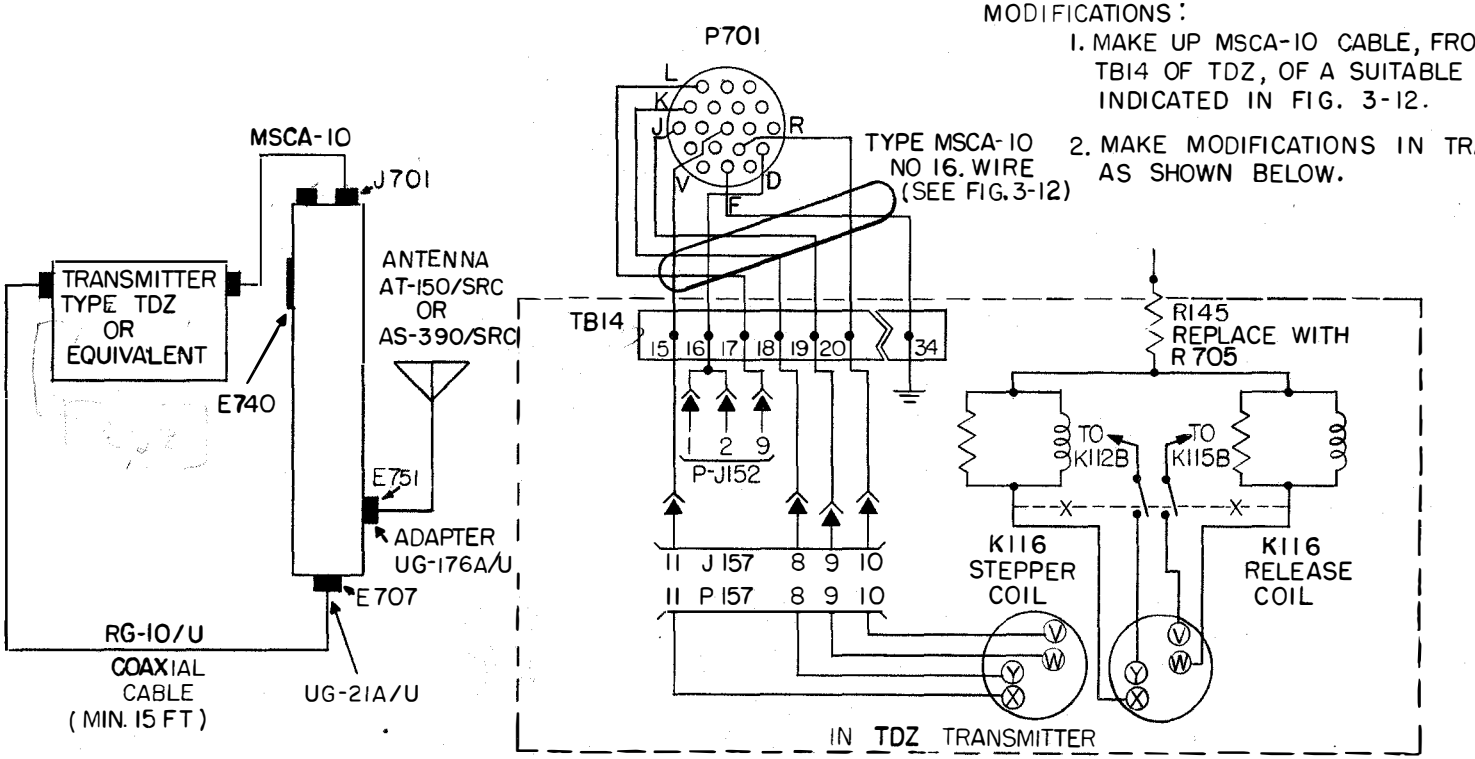
CQC-23497 UNIT

1. CONNECT WIRE FROM PIN "F" OF J101 TO TERMINAL BOARD CONTACT #19.
2. CONNECT WIRE FROM PIN "D" OF J101 TO TERMINAL BOARD CONTACT #18.

CABLES:

1. MAKE UP MSCA-19 CABLE, FROM P401 TO J702, OF A SUITABLE LENGTH AS INDICATED IN FIGURE 3-12.
2. MAKE UP COAXIAL CABLE, FROM P402 TO E707, OF A SUITABLE LENGTH AS INDICATED IN FIGURE 3-11.

INSTALLATION SETUP & MODIFICATIONS FOR RECEIVER OPERATION (ONE UNIT)



MODIFICATIONS:

1. MAKE UP MSCA-10 CABLE, FROM P701 TO TB14 OF TDZ, OF A SUITABLE LENGTH AS INDICATED IN FIG. 3-12.
2. MAKE MODIFICATIONS IN TRANSMITTER AS SHOWN BELOW.

INSTALLATION SETUP & MODIFICATIONS FOR TRANSMITTER OPERATION (ONE UNIT)

Figure 3-8. Modifications of TDZ Transmitter or RDZ Receiver for Use with Antenna Coupler CU-255/UR

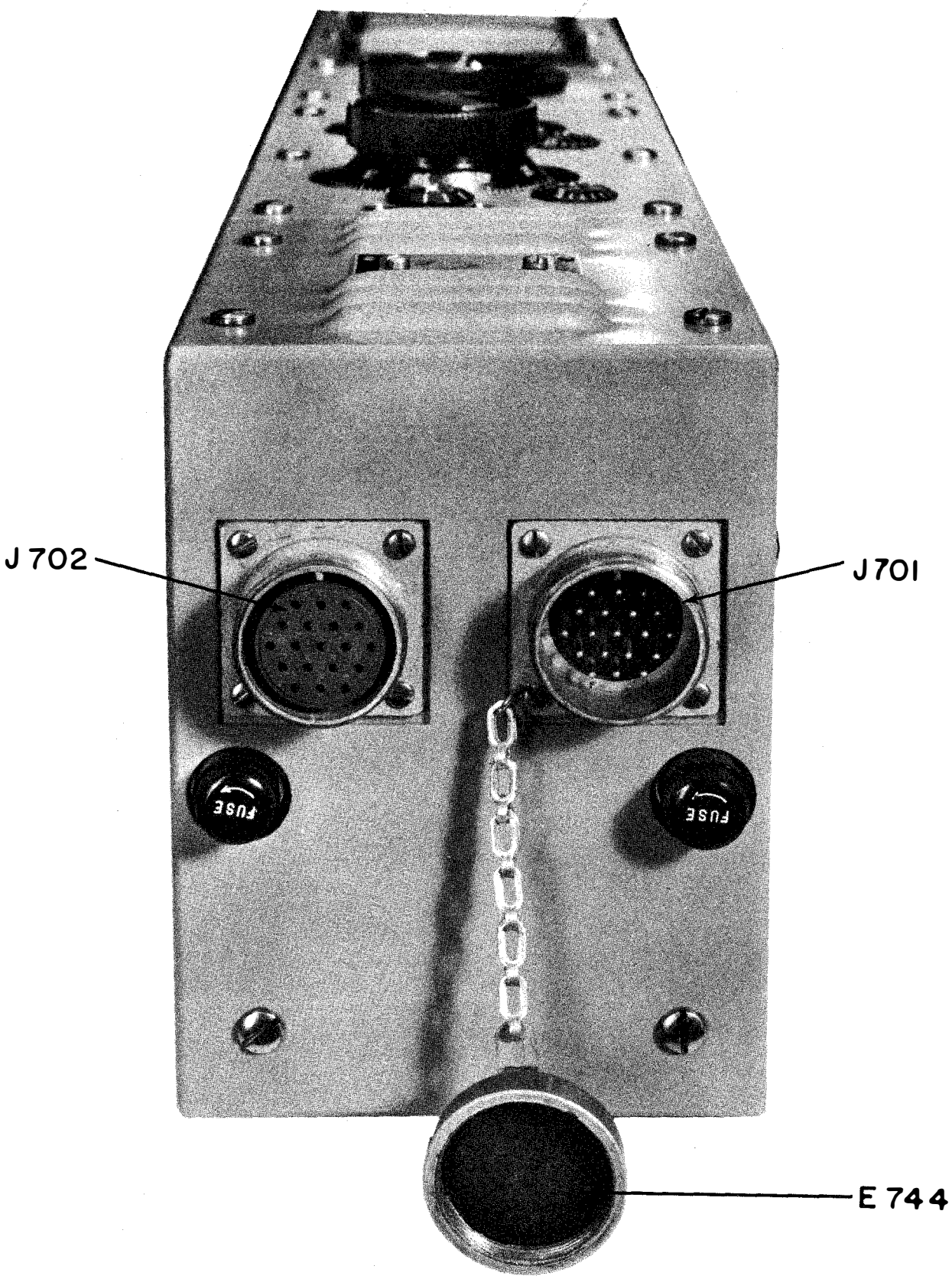


Figure 3-9. Top View of Antenna Coupler CU-255/UR

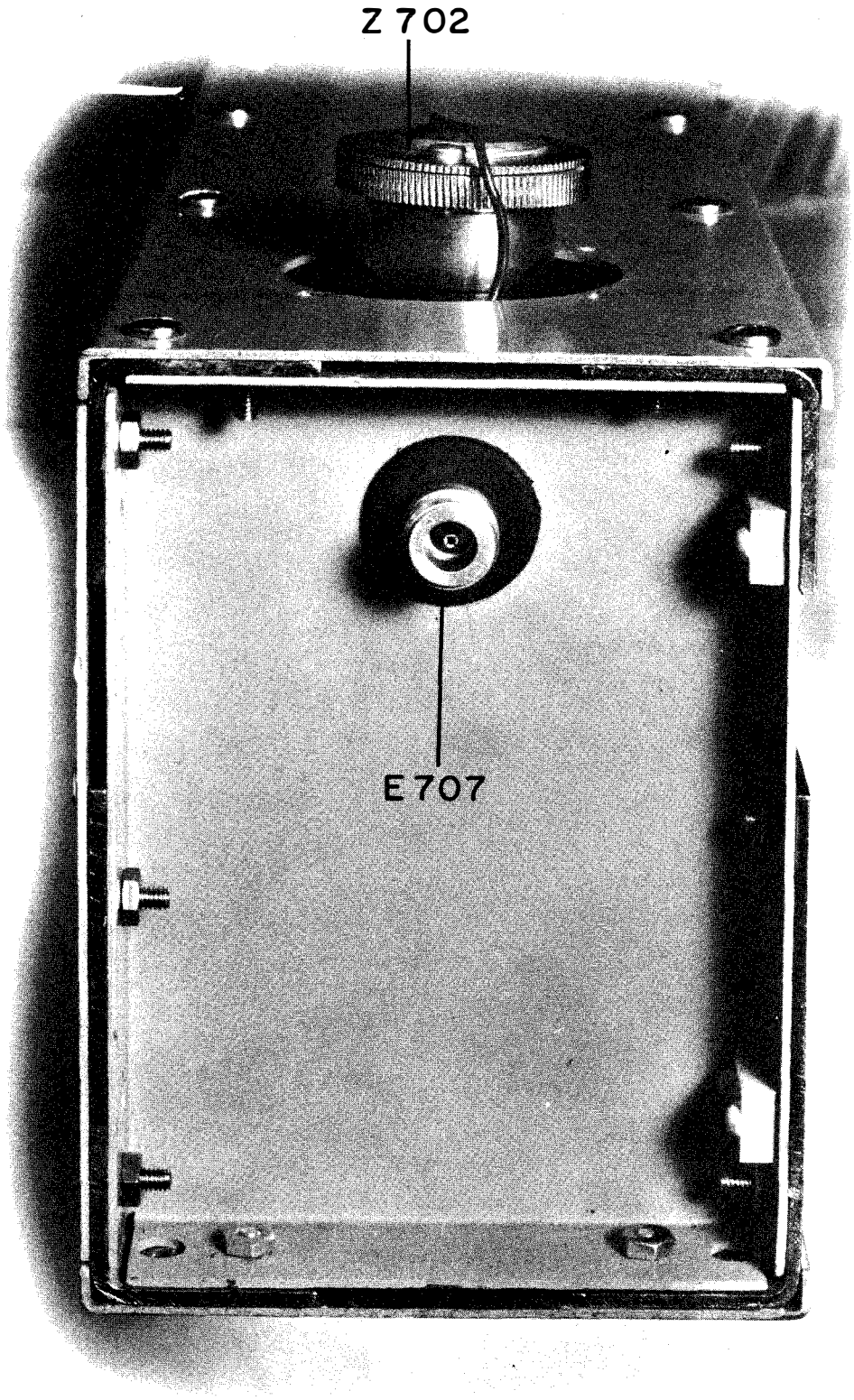


Figure 3-10. Bottom View of Antenna Couplers CU-255/UR and CU-332A/UR

c. The types of cables and connectors necessary are shown in Figure 3-8 and the instructions for installating the connectors on the cables are given in Figures 3-11 and 3-12.

7. INITIAL ADJUSTMENT

After the installation is complete, the equipment should be tuned according to the TUNING PROCEDURE given in paragraph 2a, Section 5, and the calibration charts should be filled out for the ten channel frequencies. Also, each chart should be marked to indicate which unit in the group it belongs to because the calibration of a particular equipment is dependent upon where it is located in a group. The units should be numbered successively, starting with the shorted end as the number one unit.

8. PRELIMINARY CHECK.

a. After the CU-255/UR Coupler has been installed, connected to the desired equipment and tuned, it should be checked using the following procedure on all ten channels.

Step 1. Turn the transmitter or receiver on using operating procedure outlined in their respective instruction books. Allow adequate warm-up.

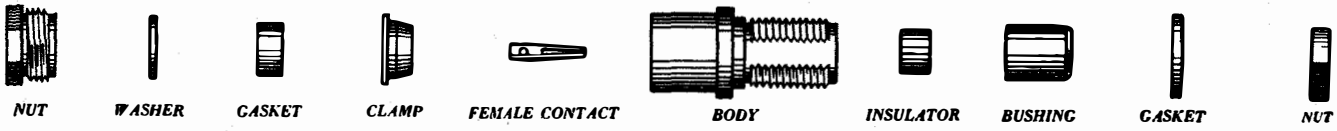
Step 2. Dial channel 1 on the control unit. Note the action of the Coupler tuning dials. Check to make sure that they stop at the position noted on the calibration chart on the Coupler. If they do not, or if the frequency of the control unit channel 1 is different from that noted on the Coupler chart, reset tuning according to the instruction in paragraph 2a, Section 5.

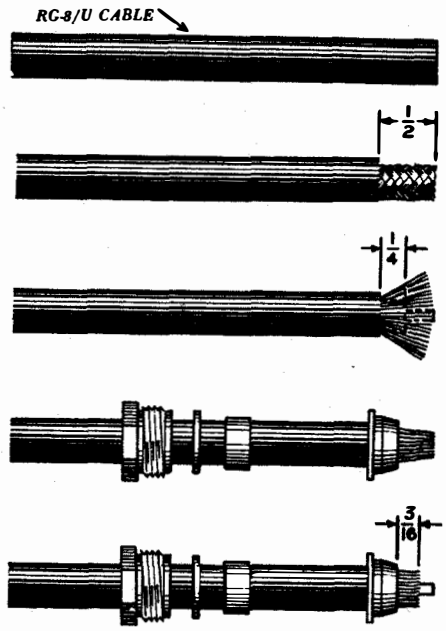
Step 3. Repeat step two for all ten channels. When the Coupler tunes properly, it is ready for operation. If trouble occurs, refer to Section 5, Corrective Maintenance.

b. The CU-332A/UR Coupler needs no preliminary check. After it has been tuned and calibrated it is ready for operation.

9. OPERATION.

a. Normal operation of Antenna Coupler CU-255/UR is





Cut end of cable even.

Remove vinyl jacket ½" — *don't nick braid.*

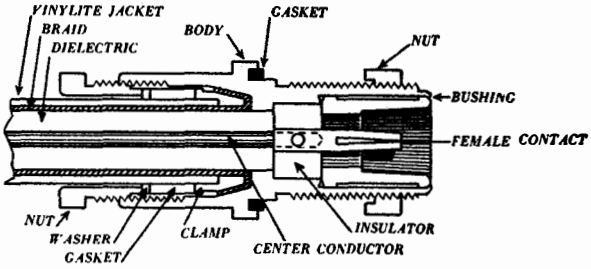
Comb out copper braid as shown. Bare ¼" of center conductor — *don't nick conductor.*

Taper braid as shown. Slide nut, washer and gasket on vinyl jacket. Slide clamp on braid.

With clamp in place, trim braid as shown.

Fold copper braid back on clamp. Tin center conductor using minimum amount of heat.

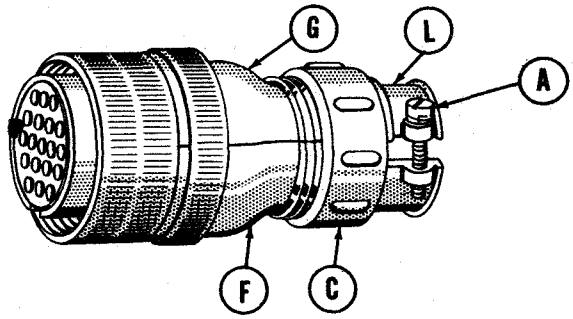
Holding contact with pliers, soft solder contact to center conductor. *It is imperative that back end of contact be flush with polyethylene dielectric.* Do not use excess solder. Wipe clean — see that end of cable insulator is clean and free of solder, resin and foreign material.

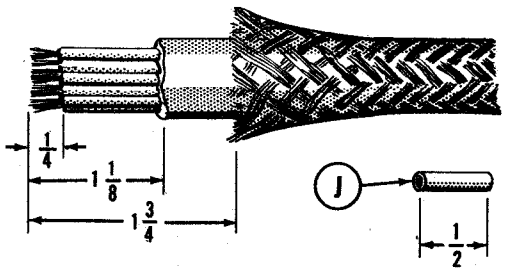


Slide body into place carefully so that center conductor contact enters hole in insulator. Face of cable dielectric must fit flush against insulator. Properly tighten body and nut with wrenches.

Figure 3-11. Installation of Connector on Coaxial Cable

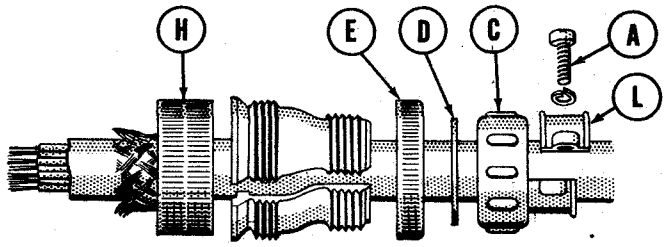
1. Disassemble the plug as follows: Unscrew the cable clamp "C," and remove screws "A" and "B" to take off the cable clamp cap "L." Remove the rubber washer "D." Unscrew the split shell clamping ring "E," and remove the halves of the split shell, "F" and "G." Remove the coupling ring "H."

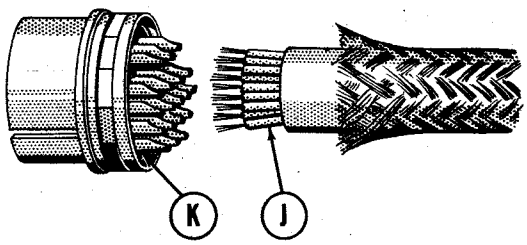




2. Strip the metal braid back 1¾ inches. Remove 1⅛ inches of the rubber sheath and insulating filler. Strip the color-coded rubber insulation off the wires for ¼ inch and tin the end of each wire. Slide a ½ inch length of sleeving "J" back on each wire.

3. Slide the following items over the prepared end of the cable in the order named: cable clamp "C," rubber washer "D," split shell clamping ring "E," and coupling ring "H." Each part must face in the correct direction for final assembly of the plug.





4. Solder the end of each wire into its proper terminal on the insert "K." Move the sleeves "J" forward to cover each soldered connection.

5. Slide the coupling ring "H" forward on the plug. Assemble the split shell ("F" and "G") in place, and secure the halves by screwing on the split shell clamping ring "E." Slide the rubber washer "D" into position against the end of the split shell. Screw the cable clamp "C" onto the rear end of the split shell. Hold the cable firmly during this operation to prevent unnecessary strain on the soldered wire connections. Reassemble the cable clamp cap "L" by means of the screws "A" and "B."

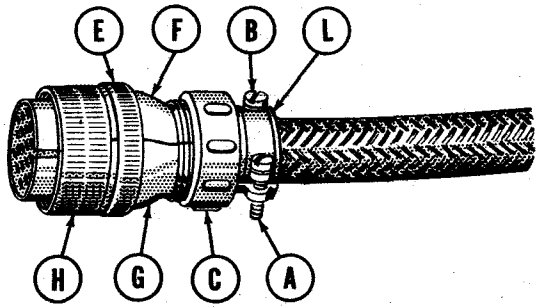


Figure 3-12. Installation of AN3102-22-14P (or-14S) Connector on MSCA-19 Cable

automatic and therefore, the operator has no duty with this equipment.

b. The manual Coupler CU-332A/UR requires operator attention every ti e the channel or operating frequency is changed. The operator must set the "Line" and "Coupler" tuning controls to the correct settings for the particula r frequency. These settings are logged on the calibration chart on the front of the equipment. See Figure3-13. The step by step precedure for setting the controls is as follows:

Step 1. Unlock the tuning controls by lifting the dial lock lever on the rear of the control dials.

Step 2. Observe Coupler Dial Setting given on the Calibration Chart for the desired channel and set the "Coupler Tuning " control so that number appears on the Coupler Tuning Counter.

Step 3. Observe Line Dial Setting on the Calibration Chart for the same channel and set the "Line Tuning" control so that number appears on the Line Tuning Counter.

Step 4. Lock both controls by pushing down the dial lock lever. Take care not to disturb the dial settin s while locking the controls.

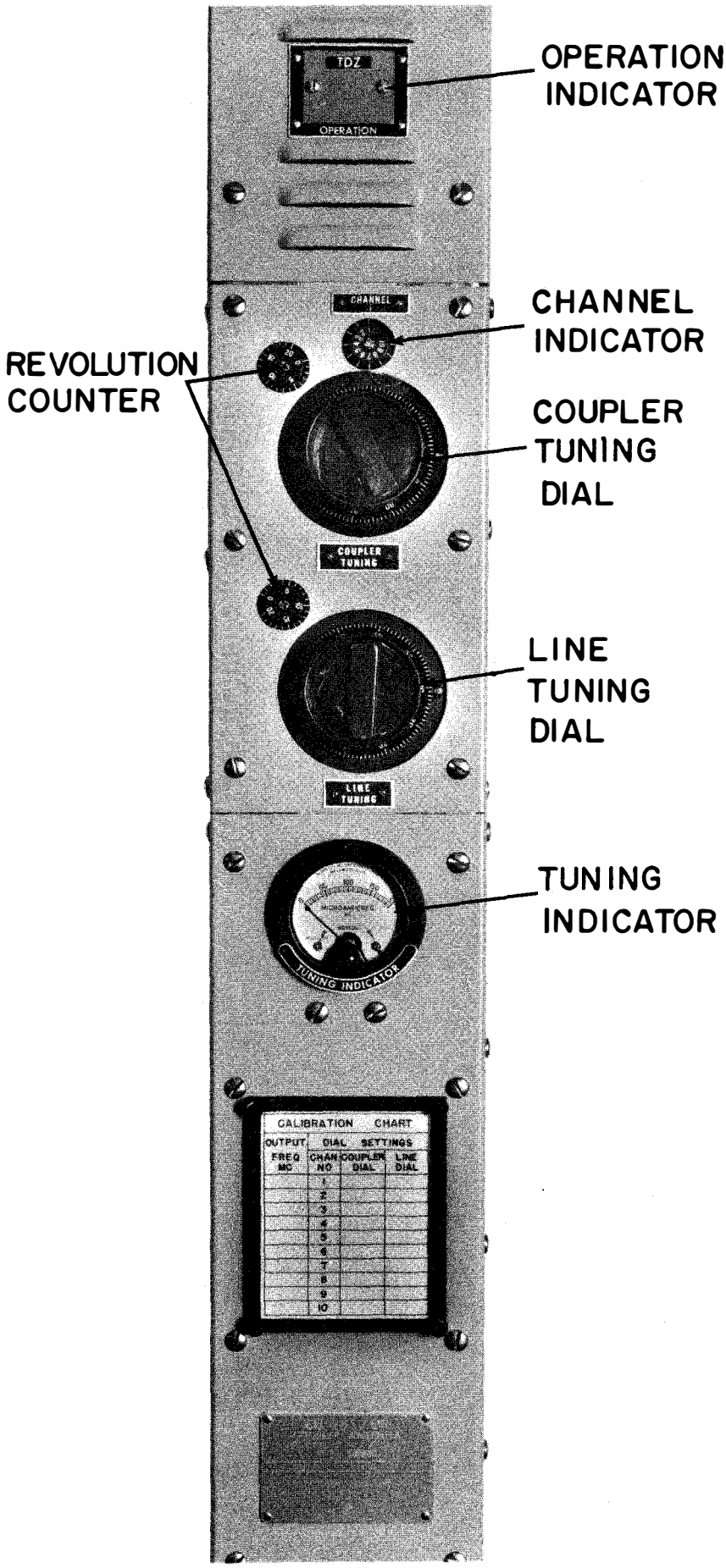
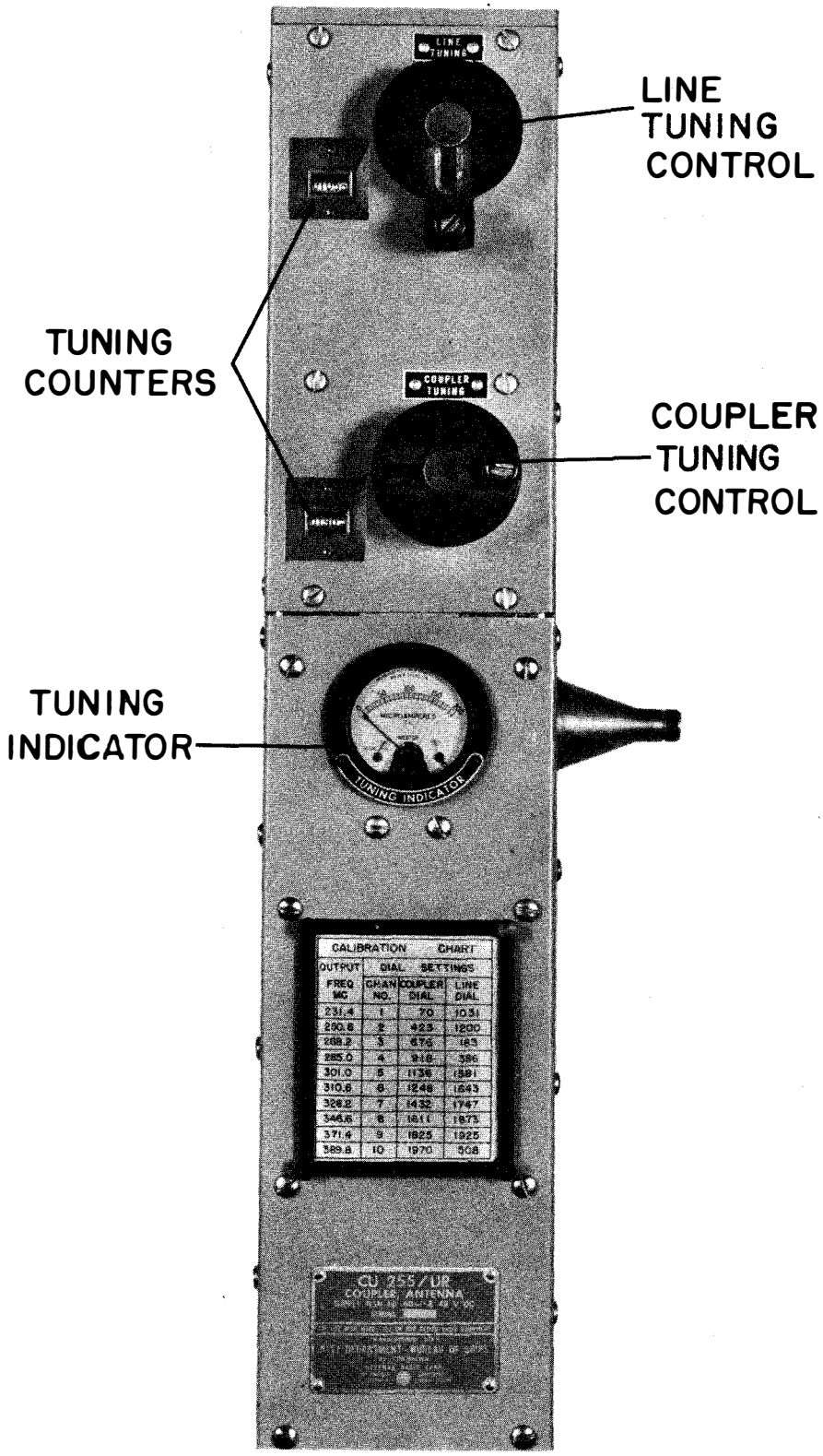


Figure 3-13. Operating Controls of Antenna Couplers CU-255/UR and CU-332A/UR. See Page 3-19A



LINE TUNING CONTROL

TUNING COUNTERS

COUPLER TUNING CONTROL

TUNING INDICATOR

Figure 3-13. Continued

SECTION 4

OPERATOR'S AND PREVENTIVE MAINTENANCE

1. GENERAL

This section deals with maintenance which may be performed on Antenna Couplers CU-255/UR and CU-332a/UR by the operator, and with preventive maintenance which is to be done only by technicians.

Operator's maintenance is limited to fuse replacement, checking of cables, plugs, other connectors and, in case of emergency, tuning the equipment.

Preventive maintenance consists primarily of cleaning, lubricating and replacing components which will obviously malfunction before the next routine maintenance check. Inasmuch as these operations require removal of the equipment from the group installation, and some disassembly, they should be performed only by technicians.

2. OPERATOR'S EMERGENCY MAINTENANCE

NOTICE TO OPERATORS

Operators shall not perform any of the following emergency maintenance procedures without proper authorization.

a. FUSE REPLACEMENT. -- Table 4-1 below lists indications of fuse failure and correct replacement values. See table 4-2 for fuse locations. Obtain replacement fuses from general stores.

The fuses are in retractable holders marked "fuse" located on the top of the CU-255/UR. Remove the fuse by pressing on the cap, turning counterclockwise to release, and pulling out the cap containing the fuse. Place a new fuse in the cap, reinsert in holder and lock in place by turning clockwise.

WARNING

Never replace a fuse with one of higher rating unless continued operation of the equipment is more important than probable damage. If a fuse burns out immediately after replacement, do not replace it a second time until the cause has been corrected.

TABLE 4-1. SYMPTOMS OF FUSE FAILURE

MOTOR OPERATION WHEN CYCLED	BLOWN FUSE	VALUE (AMPS.)	STANDARD NAVY STOCK NUMBER	COMMENTS
Motor runs dials to extreme counter-clockwise position	F701	5	G17-F-16302-140	Also check power cable from controlling equipment
Motor does not run.	F702	5	G17-F-16302-140	Make sure that controlling equipment is operational. check power cables.

TABLE 4-2. FUSE LOCATIONS.

SYMBOL		PROTECTS	AMPS	VOLTS	NUMBER
F701	On top of Automatic Tuning Head	Control Circuits and Motor	5	250	MTH-5
F702	On top of Automatic Tuning Head nearest connectors	Motor and Control Circuits	5	250	MTH-5

b. CHECKING CABLES.--In most cases, cables, plugs and connectors will not be subject to frequent failure. If it is suspected that the cables are at fault, however, they

may be checked by substituting a cable known to be good.

c. EMERGENCY TUNING OF THE CU-255/UR AUTOMATIC COUPLER.--If the Automatic Tuning Head for the Coupler fails and no technician is available, with authorization from the officer in charge, operating personnel may manually adjust the dials to the settings listed on the Calibration Chart on the front of the equipment for the channel being used. It is necessary only to loosen the locking bar on each dial by turning the bar one-fourth of a turn counterclockwise, after which the dials may be turned manually to the correct settings.

CAUTION

DO NOT DIAL THE EQUIPMENT
FOR AUTOMATIC OPERATION
WITH THE LOCKING BARS
RELEASED.

If the equipment still does not function correctly, the tuning procedure listed in paragraphs 2.a(4) of section 5 may be attempted, if authorized.

d. EMERGENCY TUNING OF THE CU-332A/UR MANUAL COUPLER.--If the frequency of the manual coupler must be changed and the dial settings for the desired frequency do not appear on the Calibration Chart, the tuning procedure in paragraph 2.a.(3) of section 5 may be attempted. This may be done only if no technician is available and then only with authorization from the officer in charge.

e. RETUNING AFTER EMERGENCY.--If any emergency retuning of the CU-255/UR Coupler is done, the equipment should be completely retuned and rechecked by a technician after the emergency is over.

Any emergency tuning of the CU-332A/UR Coupler should be rechecked and relogged after the emergency by a technician.

3. PREVENTIVE MAINTENANCE

a. ROUTINE CHECKS.--Tables 4-3 and 4-4 list periodic preventive checks to be made quarterly or as noted. It is important that the technician remember that the equipments require regular, thorough checking if they are to operate properly. It is far better to correct troubles BEFORE they occur than afterwards.

NOTE

THE ATTENTION OF MAINTENANCE PERSONNEL IS DIRECTED TO THE REQUIREMENTS OF CHAPTER 67 OF THE BUREAU OF SHIPS MANUAL OF THE LATEST ISSUE.

b. LUBRICATION.--Figures 4-1, 4-2 and 4-3, respectively show correct lubrication for the Manual and Automatic Tuning Heads and the RF Coupling Section. Since both the CU-332A/UR and the CU-255/UR are predominantly mechanical, regular lubrication is extremely important if the equipments are to function correctly.

c. CLEANING THE RF COUPLING SECTION CONTACT SURFACES.--Once each month the elements in the RF Coupling Section should be actuated over their entire range to keep the contact surfaces clean. In the Manual Couplers, this may be done simply by loosening the dial locks and rotating the knobs to their extreme limits at least twice. In Automatic Couplers, one channel may be dialed, the locking bars loosened with the dials set to the maximum counterclockwise position, zero. Lock the dials.

CAUTION

DO NOT DIAL A CHANNEL WHILE THE LOCKING BARS ARE LOOSENED. THIS WILL DISTURB THE SETTINGS OF ALL CHANNELS AND MAY DAMAGE THE EQUIPMENT.

Alternately dial the zeroed channel and some other channel at least twice. Reset the channel which was zeroed to the settings indicated on the Calibration Chart for that channel. Approach the final setting of each dial in the clockwise direction. After tightening the locking bars, dial the reset channel and note the dial readings to check the accuracy of resetting. Dial and check the setting of each of the other channels.

d. CHECKING MOTOR BRUSHES IN THE CU-255/UR.--The motor brushes in the Automatic Coupler installation should be removed and inspected quarterly. When the brushes are one-fourth inch long or less, they must be replaced. See figure 5-22 for brush-cap locations. To check brushes, remove the clamp which holds the cap, then remove the cap by turning counterclockwise. The brush will then be accessible.

TABLE 4-3. PERIODIC PREVENTIVE MAINTENANCE CHART FOR BOTH CU-255/UR ANTENNA COUPLER AND CU-332A/UR ANTENNA COUPLER

WHAT TO CHECK	HOW TO CHECK	PERIOD	REMARKS
Gears	Make a general check for excessive wear, binding, excessive backlash and lubrication in all gears.	Quarterly	Replace any worn or defective part. See paragraph 5.b. of Section 5 for disassembly instructions
Line Tuning Drive	Check for binding and backlash in drive gears and shafts, also for freedom of movement of Carriage rollers along rails. Check drive chain for proper tension and smooth operation.	Quarterly	
Coupler Tuning Drive	Check for binding and backlash along entire length of pinion wire. The pinion wire must rotate true and free from wobble. Check for binding and backlash in quarter-wave element and associated drive gears.	Quarterly	
Counter-Balance Spring Assembly	Check for binding gears. Check for spring tension.	Quarterly	See paragraphs 4.b. and 5.c. of Section 5.
Bearings	Check for looseness.	Quarterly	
Tuning Elements (Silver Plated Parts)	Check condition of silver plating. Inspect forwear, flaking and tarnish.	Quarterly	Replace or re-plate any worn parts.

Table 4-3. PERIODIC PREVENTIVE MAINTANCE CHART FOR BOTH CU-255/UR ANTENNA COUPLER AND CU-332A/UR ANTENNA COUPLER (continued)

WHAT TO CHECK	HOW TO CHECK	PERIOD	REMARKS
Contacts	Inspect for damaged spring contact fingers and for fit of fingers against mating parts, also for dirt and wear. Operate equipment over entire range twice. See paragraph 3.c of Section 4.	Quarterly Monthly	
Lubrication	Check for caked lubricant or dry bearing	Quarterly	See Lubrication Chart figure 4-2 through 4-3
Motor Brushes	Check each for wear	Quarterly	Replace when less than 1/4"long.
Indexing	Set both controls to zero position and check position of carriage and length of quarterwave element. See paragraph 2.f. of Section 5.	Each time Tuning Head is Removed from RF Coupling Section	
Calibration	Re-tune equipments. See paragraph 2.a. (3) of Section 5 for CU-332A/UR, paragraph 2.a. (4) of Section 5 for CU-255/ UR.	Quarterly	Uncessary if equipments are tuned to different frequencies more often

TABLE 4-4. PERIODIC PREVENTIVE MAINTENANCE CHART FOR ANTENNA COUPLER CU-255/UR ONLY

WHAT TO CHECK	HOW TO CHECK	PERIOD	REMARKS
Wiring	Inspect for burned, cracked, worn or peeling insulation. Check visually for bad solder connections.	Quarterly	Replace wires where needed and resolder bad connections.
Autotune Mechanism	Check for slipping clutch. Check positioning.	Quarterly	Clean as directed in paragraph 3.a. of Section 5.
Selector Relays	Manually depress the armatures of the stopping and release mechanisms and observe the action of the stepping relay. Be certain that power is not applied.	Quarterly	
Cycling	Dial number 1-10 progressively on TDZ or associated control equipment and observe whether the autotune mechanisms cycle properly and step on the correct settings for the position dialed. Repeat procedure using a random series. Check for double cycling.	Quarterly	
Seeking Switch	Visually check for pitting or wear of the contacts.	Quarterly	Replace if badly worn or pitted. See paragraph 3.c. of Section 5.

RESTRICTED

Oprn & Prevent. Maint.

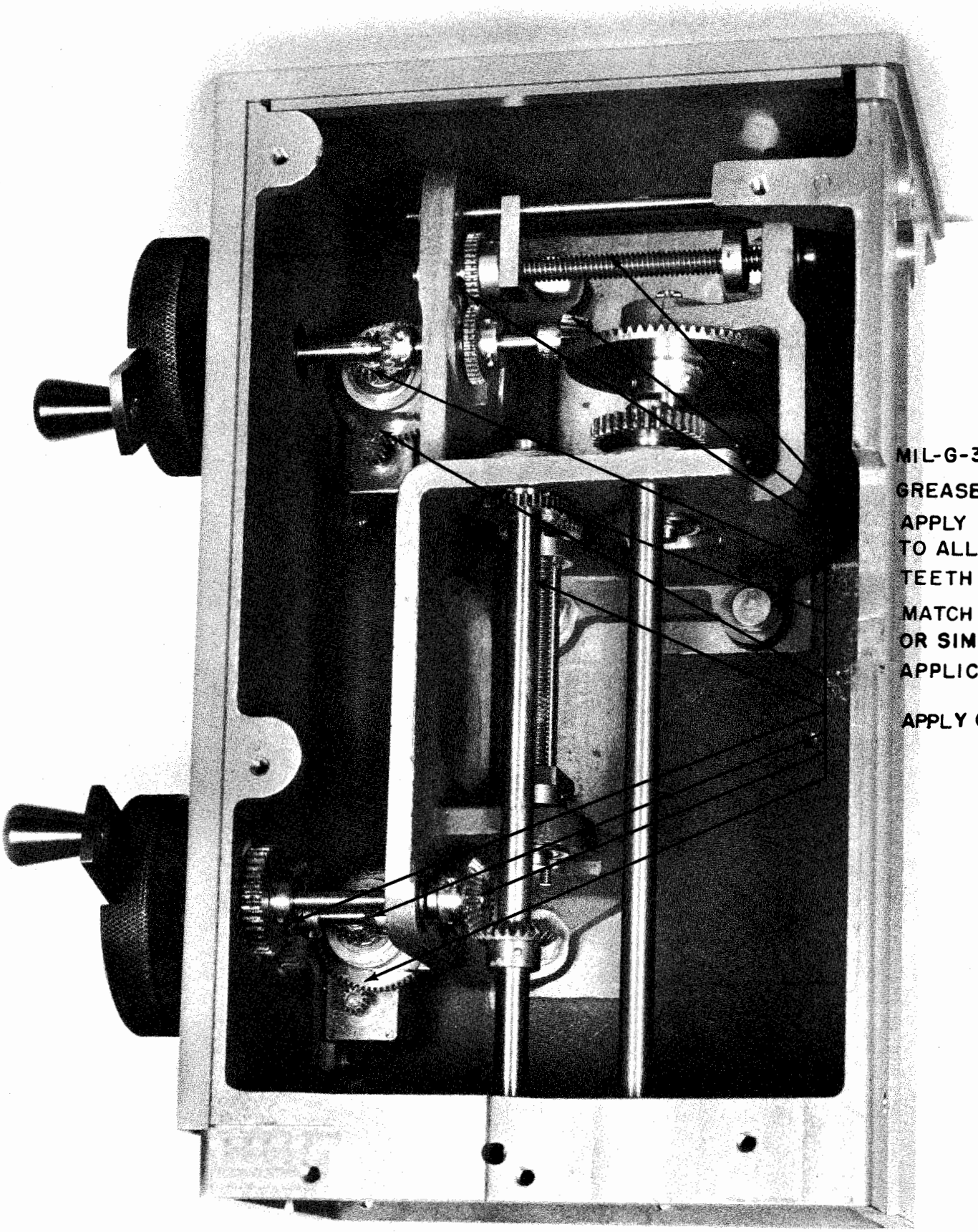
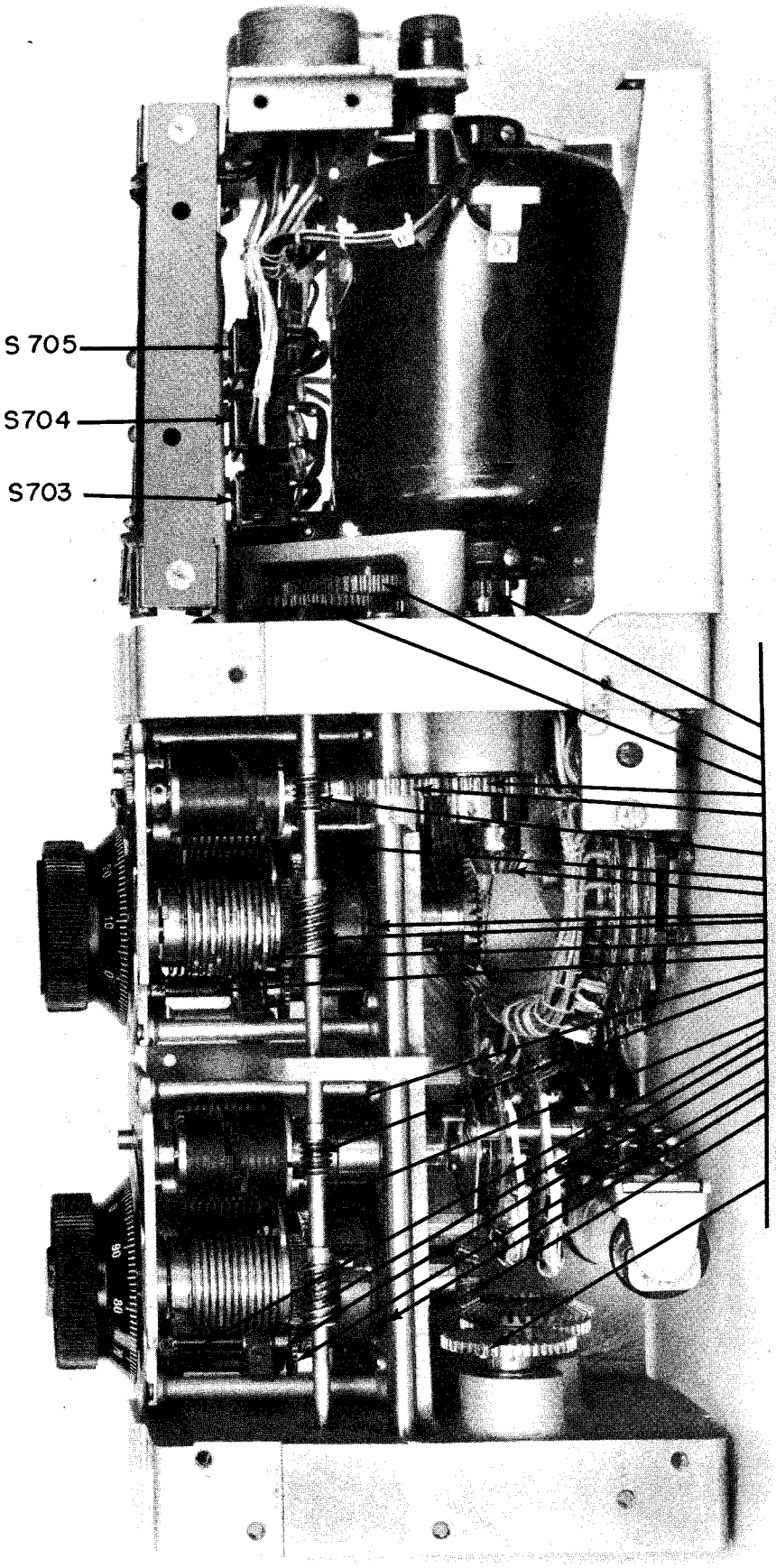


Figure 4-1. Lubrication Chart, Manual Tuning Head



MIL-G-3278 GREASE

APPLY FREELY TO ALL GEAR TEETH EXCEPT THOSE GEARS IN THE VICINITY OF THE AUTOTUNE DRIVE MECHANISMS

CAUTION

DO NOT ALLOW GREASE TO GET ON AUTOTUNE CLUTCHES OR THE MECHANISIM WILL BECOME INOPERATIVE

CAUTION

DO NOT USE ANY LUBRICANT OTHER THAN ONE SPECIFIED ABOVE OR FIBER GEARS WILL BE DAMAGED

NOTE

ALL BEARINGS ARE PERMANENTLY LUBRICATED

APPLY QUARTERLY

Figure 4-2. Lubrication Chart, Automatic Tuning Head

SOLE LUBRICANT MIL-G-3278 APPLY QUARTERLY

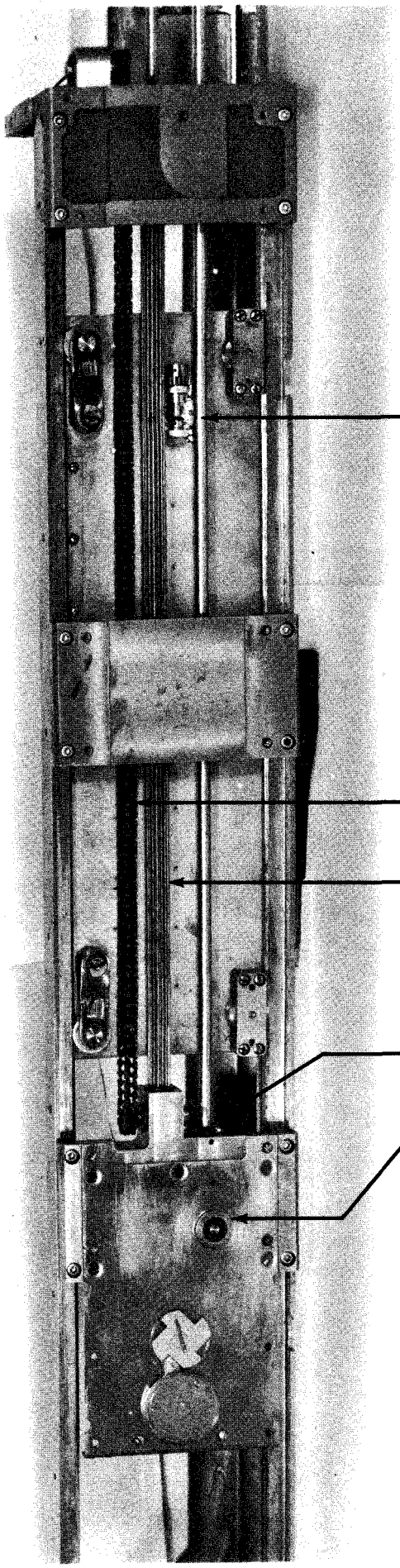


Figure 4-3. Lubrication Chart, R F Coupling Section

SOLE LUBRICANT MIL-G-3278 APPLY QUARTERLY

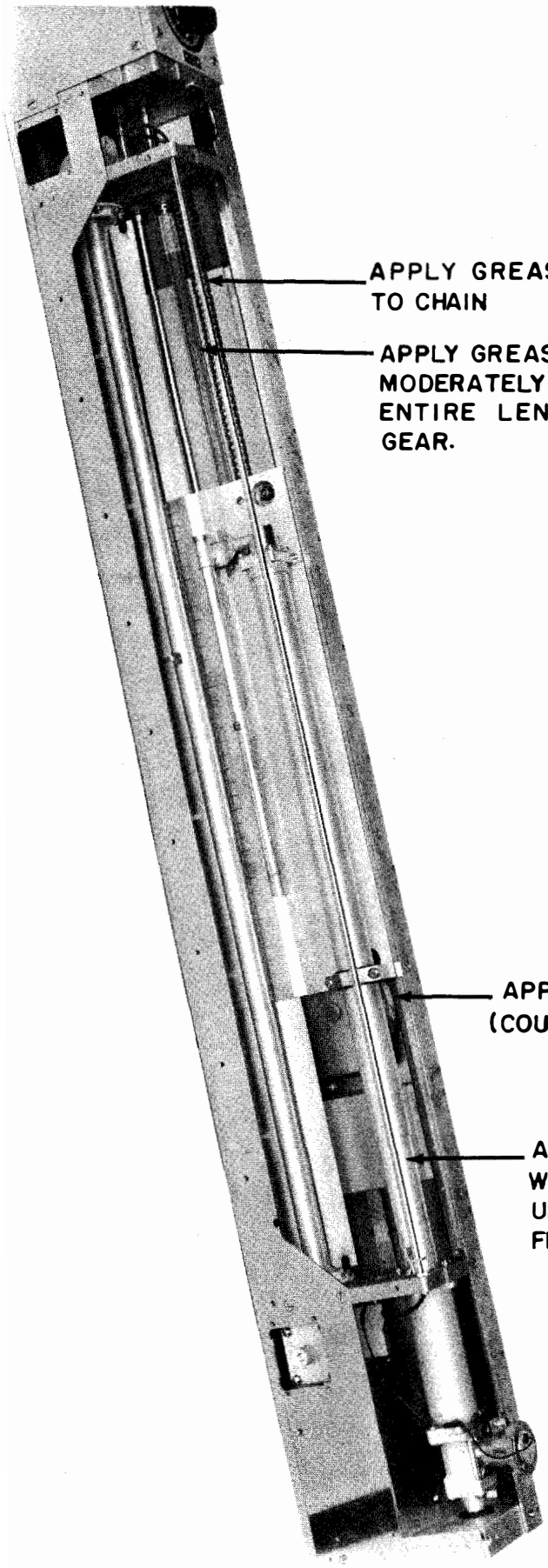


Figure 4-3. Continued

RESTRICTED

NAVY LUBRICANT		FEDERAL STANDARD STOCK CATALOG						NEAREST COMMERCIAL NAME
SPECIFICATION	TITLE	5-GAL.	55-GAL.	10-LB.	25-LB.	100-LB	400-LB	
MIL-G-3278	Light aircraft grease							Unitemp (Texaco)

NOTE: This table is an integral part of Figures 4-1, 4-2, and 4-3.

RESTRICTED

FAILURE REPORTS

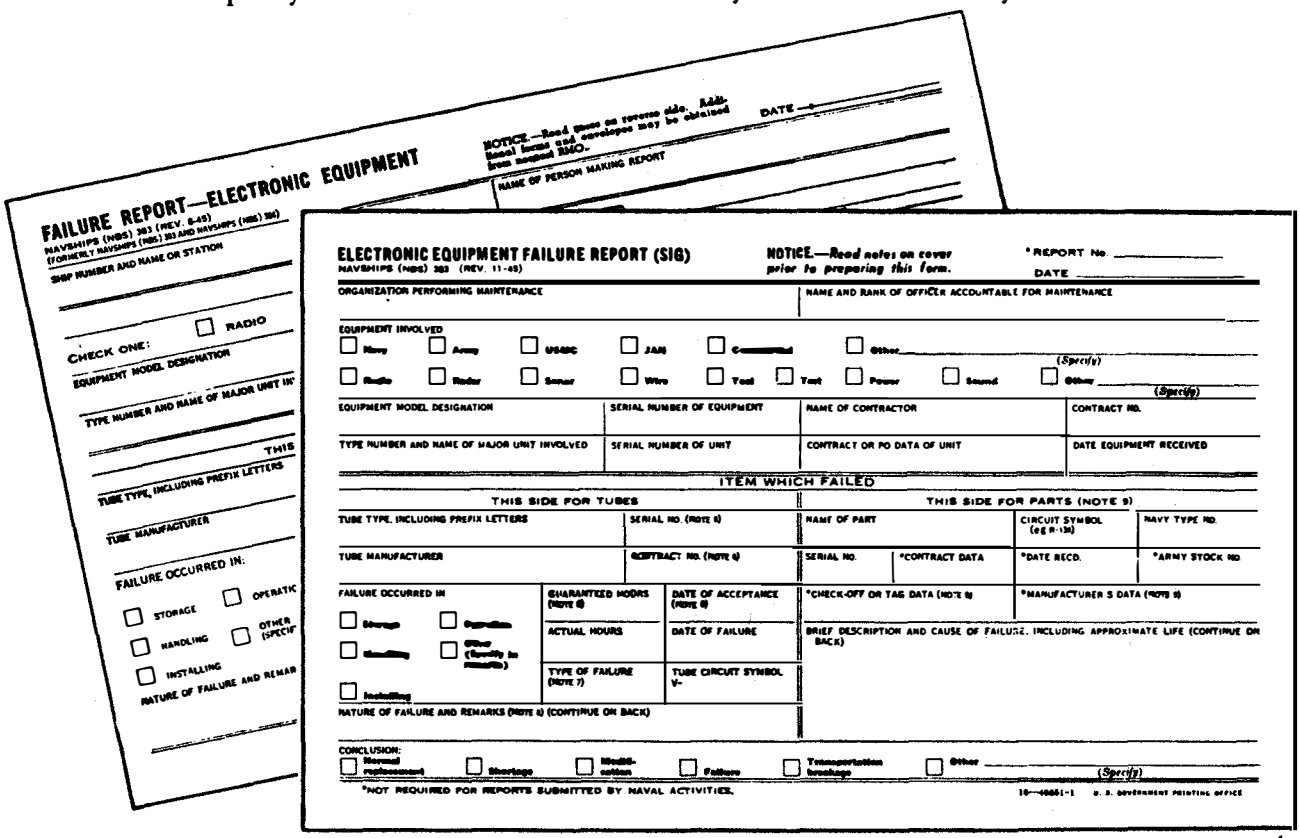
A FAILURE REPORT must be filled out for the failure of any part of the equipment whether caused by defective or worn parts, improper operation, or external influences. It should be made on Failure Report, form NBS-383, which has been designed to simplify this requirement. The card must be filled out and forwarded to BUSHIPS in the franked envelope which is provided. Full instructions are to be found on each card.

Use great care in filling the card out to make certain it carries adequate information. For example, under "Circuit Symbol" use the proper circuit identification taken from the schematic drawings, such as T-803, in the case of a transformer, or R-207, for a resistor. Do not substitute brevity for clarity. Use the back of the card to completely describe the cause of failure and attach an extra piece of paper if necessary.

The purpose of this report is to inform BUSHIPS of the cause and rate of failures. The information is used by the Bureau in the design of future equipment and in the maintenance of adequate supplies to keep the present equipment going. The cards you send in, together with those from hundreds of other ships and stations, furnish a store of information permitting the Bureau to keep in touch with the performance of all electronic equipment of the Naval Establishment.

This report is not a requisition. You must request the replacement of parts through your Officer-in-Charge in the usual manner.

Make certain you have a supply of Failure Report cards, and envelopes on board. They may be obtained from any Electronics Officer.



FAILURE REPORT—ELECTRONIC EQUIPMENT

NAVSHIPS (NBS) 383 (REV. 8-45)
(FORMERLY NAVSHIPS (NBS) 383 AND NAVSHIPS (NBS) 384)

SHIP NUMBER AND NAME OR STATION

CHECK ONE: ☐ RADIO

EQUIPMENT MODEL DESIGNATION

TYPE NUMBER AND NAME OF MAJOR UNIT IN

THIS

TUBE TYPE, INCLUDING PREFIX LETTERS

TUBE MANUFACTURER

FAILURE OCCURRED IN:

☐ STORAGE ☐ OPERATIC
☐ HANDLING ☐ OTHER (SPECIF
☐ INSTALLING

NATURE OF FAILURE AND REMAR

NOTICE—Read notes on reverse side. Additional forms and envelopes may be obtained from nearest BMO.

DATE

NAME OF PERSON MAKING REPORT

ELECTRONIC EQUIPMENT FAILURE REPORT (SIG)
NAVSHIPS (NBS) 383 (REV. 11-45)

NOTICE.—*Read notes on cover prior to preparing this form.*

*REPORT No.

DATE

ORGANIZATION PERFORMING MAINTENANCE

NAME AND RANK OF OFFICER ACCOUNTABLE FOR MAINTENANCE

EQUIPMENT INVOLVED

☐ Navy ☐ Army ☐ USAAC ☐ JAN ☐ Commercial ☐ Other _____ (Specify)

☐ Radio ☐ Radar ☐ Sonar ☐ Wire ☐ Test ☐ Test ☐ Power ☐ Sound ☐ Other _____ (Specify)

EQUIPMENT MODEL DESIGNATION	SERIAL NUMBER OF EQUIPMENT	NAME OF CONTRACTOR	CONTRACT NO.
TYPE NUMBER AND NAME OF MAJOR UNIT INVOLVED	SERIAL NUMBER OF UNIT	CONTRACT OR PO DATA OF UNIT	DATE EQUIPMENT RECEIVED

ITEM WHICH FAILED

THIS SIDE FOR TUBES

TUBE TYPE, INCLUDING PREFIX LETTERS	SERIAL NO. (NOTE 6)
TUBE MANUFACTURER	CONTRACT NO. (NOTE 6)

FAILURE OCCURRED IN
☐ Storage ☐ Operation ☐ Handling ☐ Other (Specify in Remarks) ☐ Installing

GUARANTEED HOURS (NOTE 6) | DATE OF ACCEPTANCE (NOTE 6)
ACTUAL HOURS | DATE OF FAILURE
TYPE OF FAILURE (NOTE 7) | TUBE CIRCUIT SYMBOL V-

NATURE OF FAILURE AND REMARKS (NOTE 8) (CONTINUE ON BACK)

THIS SIDE FOR PARTS (NOTE 9)

NAME OF PART	CIRCUIT SYMBOL (eg R-136)	NAVY TYPE NO.
SERIAL NO. / *CONTRACT DATA	*DATE RECD.	*ARMY STOCK NO.
*CHECK-OFF OR TAG DATA (NOTE 6)	*MANUFACTURER'S DATA (NOTE 9)	

BRIEF DESCRIPTION AND CAUSE OF FAILURE, INCLUDING APPROXIMATE LIFE (CONTINUE ON BACK)

CONCLUSION:
☐ Normal replacement ☐ Shortage ☐ Modification ☐ Failure ☐ Transportation breakage ☐ Other _____ (Specify)

*NOT REQUIRED FOR REPORTS SUBMITTED BY NAVAL ACTIVITIES.

16—40681-1 U. S. GOVERNMENT PRINTING OFFICE

Figure 5-1. Failure Report, Sample Form

SECTION 5

CORRECTIVE MAINTENANCE

1. GENERAL.

Antenna Coupler CU-255/UR and Antenna Coupler CU-332A/UR are ntermediate equipments used in receiver and transmitter installations to provide multiple operation of equipments on a single antenna. The associated equipments should be tested, adjusted, and maintained according to their individual maintenance instructions.

It is important that maintenance personnel be throughly acquainted with the operation of the over-all system and the function of each equipment involved. The other sections of this book should be consulted and studied for information regarding the CU-255/UR and CU-332A/UR equipments. It is assumed that maintenance personnel are experienced in the standard methods of testing and repairing Naval electronic equipment, and therefore detailed descriptions of simple, common tests are not given here.

2. MAINTENANCE PROCEDURES COMMON TO CU-255/UR & CU-332A/UR

The RF Coupling Sections of antenna Couplers CU-255/UR and CU-332A/UR are identical, and so all maintenance procedures involving the RF Section are common to both equipments.

Although the Tuning Head section of the CU-255/UR operates automatically and the CU-332A/UR Head is operated manually, the procedure for tuning and logging either equipment of each of its operating frequencies is a manual operation which is basically the same for both equipments. The tuning procedures of paragraphs 2.a. (3) and 2.a. (4) below, are essentially the same, differing only in details.

Other paragraphs that follow in this subsection cover material common to both equipments.

a. REGULAR ANTENNA COUPLER TUNING PROCEDURE

The Tuning or retuning of Antenna Couplers to the operating frequencies is required during initial installation, when operating frequencies are reassigned, and whenever there is maintenance work done on the equipment which might affect the tuning adjustments. This is a

comparatively simple procedure, but because of the frequency considerations and the precautions necessary, it should be performed only by experienced, qualified technicians.

(1) FREQUENCY RELATIONSHIPS BETWEEN COUPLERS.--For each installation of Antenna Couplers a suitable plan for the assignment of operating frequencies to the complete system is necessary.

The principal consideration in such a plan is to arrange the system so that no two Couplers will be on the same frequency or tuned to within 15 mc of each other at the same time. This is necessary to prevent detrimental effects the system due to interaction between Couplers which are not sufficiently separated in frequency. If one unit is tuned to a frequency less than 15 mc from the frequency of another operating unit, the absorption by the unenergized unit will considerably reduce the transfer of power through the other unit to (or from) the antenna. Furthermore, if a unit is tuned onto, or very near, the frequency of another Coupler which is operating with a transmitter, the absorption, along with a reflected detuning effects in the transmitter output circuits, will endanger burn-out of the transmitters output tubes.

A second consideration in planning the assignment of operating frequencies is to arrange them so that it will not be necessary to manually tune either a CU-255/UR or CU-332A/UR unit over the frequency of another operating unit. This is important in regular operation of the CU-332A/UR manual Coupler and is important in any returning of the CU-255/UR. It is true that automatic operation of the CU-255/UR results in it sweeping through a wide band of frequencies each time it is cycled; however, the rate of travel in automatic operation is so rapid that the momentary effects of crossing an operating channel are not detrimental.

A suggested plan is to assign a portion of the frequency range of the system to each Coupler. The transmitter and/or receiver connected to a given Coupler would then handle all communication within the frequency band assigned to that Coupler. Approximately 15 mc of separation will be required between adjacent bands. In the 230 to 390 mc coverage of the Antenna Couplers there is a total range of 160 mc which leaves a limited amount of operating frequency range when several 15 mc separation bands are subtracted. However, this is compensated for by the narrow bandwidth of about 0.4 to 0.8 mc required for each communication channel, allowing quite a number of operating frequencies in a few megacycles.

Table 5-1. Suggested Assignments of Regular RDZ - TDZ Frequencies

To maintain adequate frequency separation

TWO ANTENNA COUPLERS		THREE ANTENNA COUPLERS		FOUR ANTENNA COUPLERS		FIVE ANTENNA COUPLERS		SIX ANTENNA COUPLERS		TDZ AND RDZ CHANNEL FREQUENCIES
No.	FREQ.	NO.	FREQ.	NO.	FREQ.	NO.	FREQ.	NO.	FREQ.	
	231.4		231.4		231.4		231.4	1	231.4	231.4
	233.8		233.8		233.8	1	233.8		233.8	233.8
	234.6		234.6		234.6		234.6		234.6	234.6
	236.2		236.2	1	236.2		236.2		236.2	236.2
	237.8		237.8		237.8		237.8		237.8	237.8
	249.8		249.8		249.8		249.8		249.8	249.8
	250.6		250.6		250.6		250.6			250.6
	251.4		251.4		251.4		251.4			251.4
	253.8		253.8		253.8					253.8
	255.4		255.4		255.4				14.4 mc Separation	255.4
	256.2	1	256.2		256.2		14.4mc Separation			256.2
	257.8		257.8		257.8					257.8
	258.6		258.6		258.6					258.6
	262.6		262.6							262.6
	263.4		263.4							263.4
	264.2		264.2						264.2	264.2
	265.0		265.0						265.0	265.0
	265.8		265.8		14.4 mc Separation		265.8		265.8	265.8
	267.4		267.4				267.4	2	267.4	267.4
	268.2		268.2				268.2		268.2	268.2
	269.8		269.8				269.8		269.8	269.8
	270.6		270.6				270.6		270.6	270.6
	271.4		271.4				271.4		271.4	271.4
	273.0		273.0	273.0			273.0		273.0	273.0
	273.8		273.8	273.8			273.8		273.8	273.8
	274.6		274.6	274.6			274.6		274.6	274.6
	275.4		275.4	275.4			275.4		275.4	275.4
	277.0		277.0	277.0			277.0		277.0	277.0
	277.8			277.8			277.8			277.8
	279.4			279.4			279.4			279.4
	280.2			280.2			280.2			280.2
	283.4		14.4 mc Separation	283.4			283.4		14.4 mc Separation	283.4
	285.0			285.0			285.0			285.0
	285.8			285.8			285.8			285.8
	289.8			289.8						289.8
	291.4		291.4	291.4			15.2 mc Separation		291.4	291.4
	299.4		299.4	299.4				3	299.4	299.4
	301.0		301.0	301.0		301.0			301.0	301.0
			302.6			302.6			302.6	302.6
			304.2			304.2			304.2	304.2
			305.0			305.0				305.0
	16 mc Separation		305.8		16 mc Separation	305.8				305.8
			307.4			307.4	3			307.4
		2	309.0			309.0			16 mc Separation	309.0
			310.6			310.6				310.6
			312.2			312.2				312.2
			313.8			313.8				313.8
			315.4			315.4				315.4
	317.0		317.0	317.0		317.0				317.0
	318.6		318.6	318.6		318.6				318.6
	320.2		320.2	320.2		320.2			320.2	320.2
	321.8		321.8	321.8				4	321.8	321.8
	323.4		323.4	323.4					323.4	323.4
	325.0		325.0	325.0			16 mc Separation		325.0	325.0
	326.7		326.7	326.7					326.7	326.7
	328.2		328.2	328.2					328.2	328.2
	329.8		329.8	329.8					329.8	329.8
	330.6		330.6	330.6					330.6	330.6
	333.0		333.0	333.0					333.0	333.0
	334.6			334.6						334.6
	336.2			336.2		336.2				336.2
	337.8			337.8		337.8				337.8
	339.4			339.4		339.4				339.4
	341.0		16 mc Separation	341.0		341.0			16 mc Separation	341.0
	342.6			342.6		342.6				342.6
	344.2			344.2		344.2	4			344.2
	345.8					345.8				345.8
	346.6					346.6				346.6
	349.0		349.0			349.0			349.0	349.0
	349.8		349.8			349.8			349.8	349.8
	350.6		350.6			350.6			350.6	350.6
	352.2		352.2			352.2		5	352.2	352.2
	353.0		353.0			353.0			353.0	353.0
	354.6		354.6			354.6			354.6	354.6
	355.4		355.4		20 mc Separation				355.4	355.4
	356.2		356.2						356.2	356.2
	357.0		357.0						357.0	357.0
	357.8		357.8						357.8	357.8
	358.6		358.6						358.6	358.6
	359.4		359.4						359.4	359.4
	361.0		361.0						361.0	361.0
	361.8	3	361.8				16 mc Separation		361.8	361.8
	362.6		362.6							362.6
	363.4		363.4							363.4
	364.2		364.2	364.2						364.2
	365.8		365.8	365.8						365.8
	367.4		367.4	367.4					20 mc Separation	367.4
	368.2		368.2	368.2						368.2
	369.8		369.8	369.8						369.8
	370.6		370.6	370.6		370.6				370.6
	371.4		371.4	371.4		371.4				371.4
	373.8		373.8	373.8		373.8				373.8
	381.8		381.8	381.8		381.8			381.8	381.8
	383.4		383.4	383.4	5	383.4		6	383.4	383.4
	384.2		384.2	384.2		384.2			384.2	384.2
	385.0		385.0	385.0		385.0			385.0	385.0
	385.8		385.8	385.8		385.8			385.8	385.8
	386.6		386.6	386.6		386.6			386.6	386.6
	387.4		387.4	387.4		387.4			387.4	387.4
	389.8		389.8	389.8		389.8			389.8	389.8

Suggested divisions of the regular operating frequencies of the TDZ and RDZ equipments are given in table 5-1 for groups of two to six couplers. These are typical examples which can be varied considerably to meet the needs of a particular installation. Operating frequencies of other types of transmitters and receivers should be handled in a similar pattern. The position of the 15 mc separation band between Couplerscan be moved, as necessary, to make ither operating frequencies fall within assigned bands; however, it is advisable to maintain the full amount of approximately 15 mc separation between Couplers, if at all practicable. Due to the inherent selectivity is somewhat sharper at the low frequencies andbroader at the high frequencies; and, as will be noticed in the table 5-1, this can be taken into consideration in setting up the frequency divisions.

If cases where operating frequencies are required which do not allow the proper (15 mc) separation between all the assigned ranges in a group. The required frequencies may be set up; but a rigid schedule must be established which will prevent setting or manually tuning any Coupler to less than 15 mc (approximately) separation from an operating unit at any time.

From this it can be seen that the suggested plan of 15 mc. separation between assigned bands will permit the greatest freedom in operation and retuning of each Coupler without interfering with the communications being handled by other units of thw group.

(2) TUNING POWER REQUIREMENTS.---Antenna Coupler tuning requires a signal input to the Transmitter-Receiver Feedline of at least five watts from a 50 ohms source to give a proper indication on the TUNING INDICATOR, meter M701, and, in most cases, a transmitter is the only signal source with sufficient power output. In transmitter installations, use the transmitter associated with the Coupler to be tuned, but for receiver installations, connect a separate transmitter-receiver feedline connector, E707, in place of the receiver. Use the following step-by-step procedures for tuning.

(3) TUNING MANUAL COUPLER CU-332A/UR.

Step 1. The Coupler CU-332A/UR should be connected in a standard transmitter installation according to the instructions given in section 3, Installation. If another signal source is to be used (see paragraph 2.a.(2) above), connect it to E707.

Step 2. Check the coupler system and make sure that no other Coupler is tuned on or within 15 mc of the frequency being set.

CAUTION

Burn-out of the transmitter output tubes may occur if any other coupler in the system is tuned to the frequency of an operating transmitter and Coupler. Absorption of power and false tuning occur within 15 mc.

Step 3. Turn on the transmitter (or other signal source) and allow a minimum of 15 minutes for a warm-up period (carrier off).

Step 4. Unlock the dial locks and set the Coupler approximately to the desired frequency. See figures 3-13. Consult the calibration curves of figures 5-2 to 5-7 and adjust to the corresponding reading on each counter. The "coupler" curve for setting the Coupler Tuning, is the same in each figure. The family of "line" curves, for setting the LINE TUNING, is different in each figure. The corresponding figure should be used by unit number, for each unit in any setup from one to six couplers. Coupler number one is always the unit with the shorting plate, the others number consecutively toward the antenna.

CAUTION

Do not tune across the frequency of any other operating equipment in a group installation.

Step 5. Set the transmitter to the desired frequency. If the transmitter frequency must be reset, bypass the Coupler and connect the transmitter directly to a correct output load (50 ohms for the TDZ). If the antenna is the correct impedance for the transmitter according to the instruction book for that equipment and then reconnect to the Coupler.

Step 6. With the transmitter carrier on, adjust the COUPLER TUNING to give a sharp "dip" on the TUNING INDICATOR. Turn back and forth and leave it at the setting which gives minimum reading.

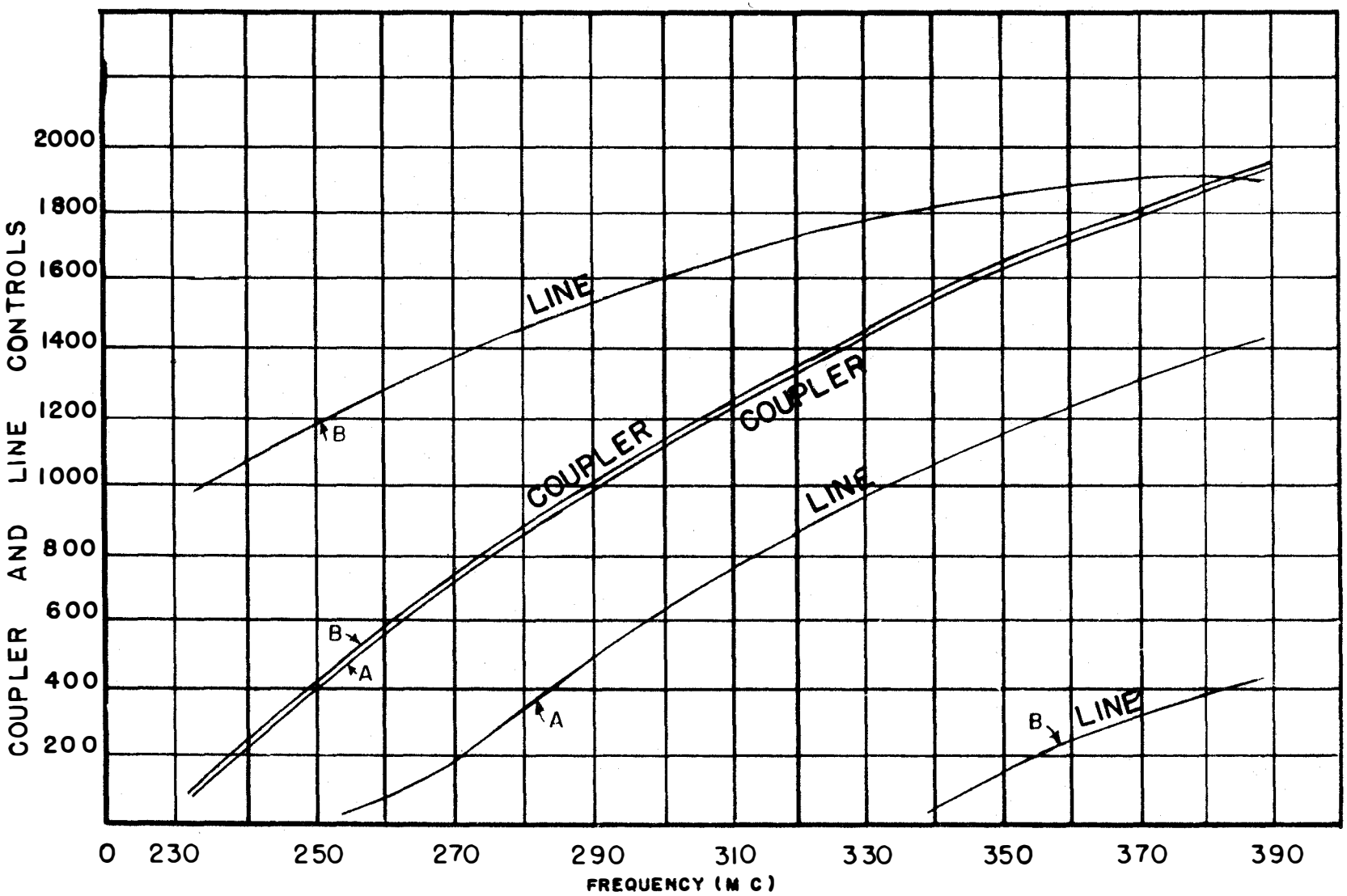


FIGURE 5-2 - TYPICAL CALIBRATION CURVES FOR COUPLER NO.1 (LEFT TO RIGHT)

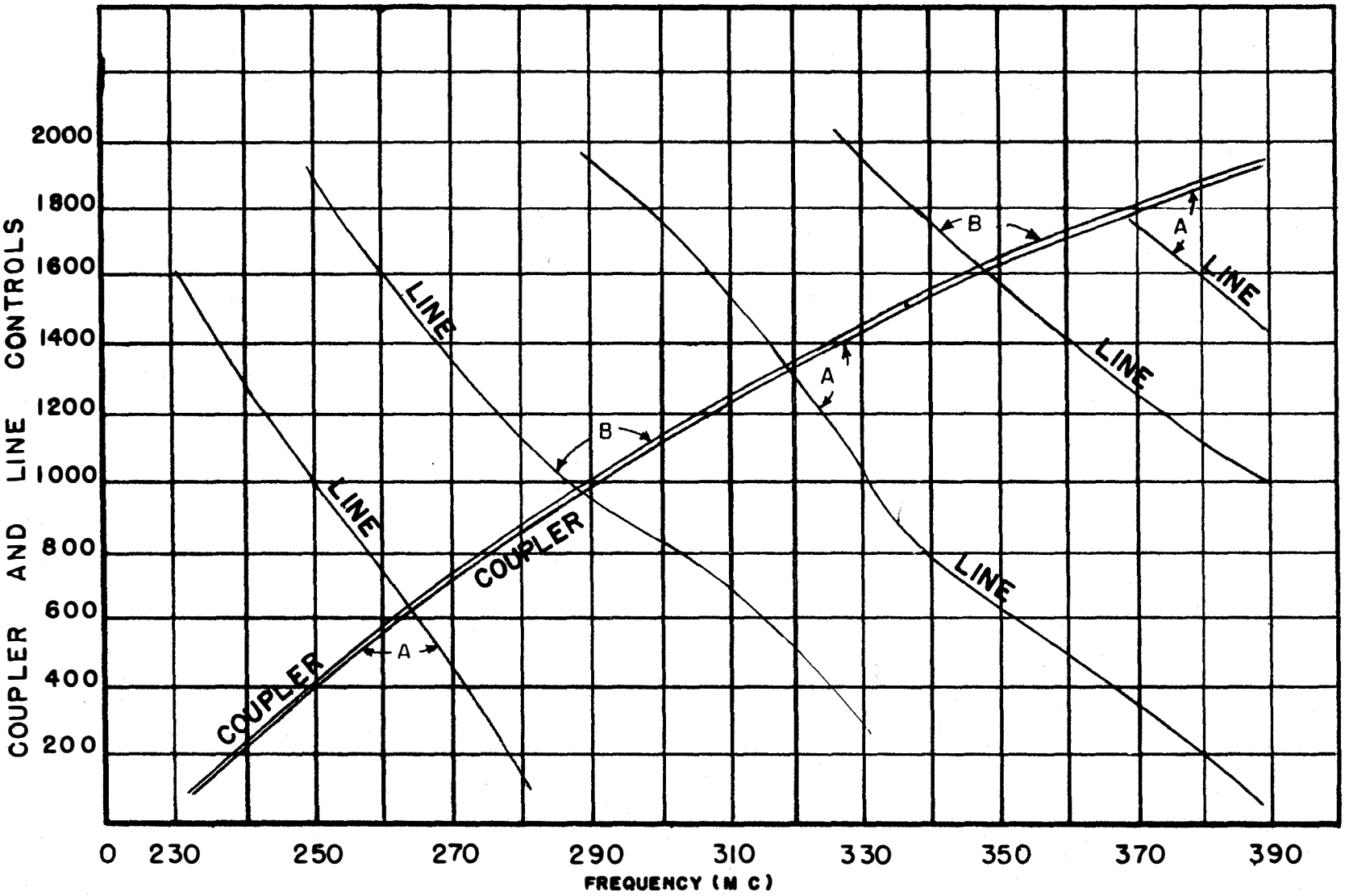


FIGURE 5-3 - TYPICAL CALIBRATION CURVES FOR COUPLER NO2 (LEFT TO RIGHT)

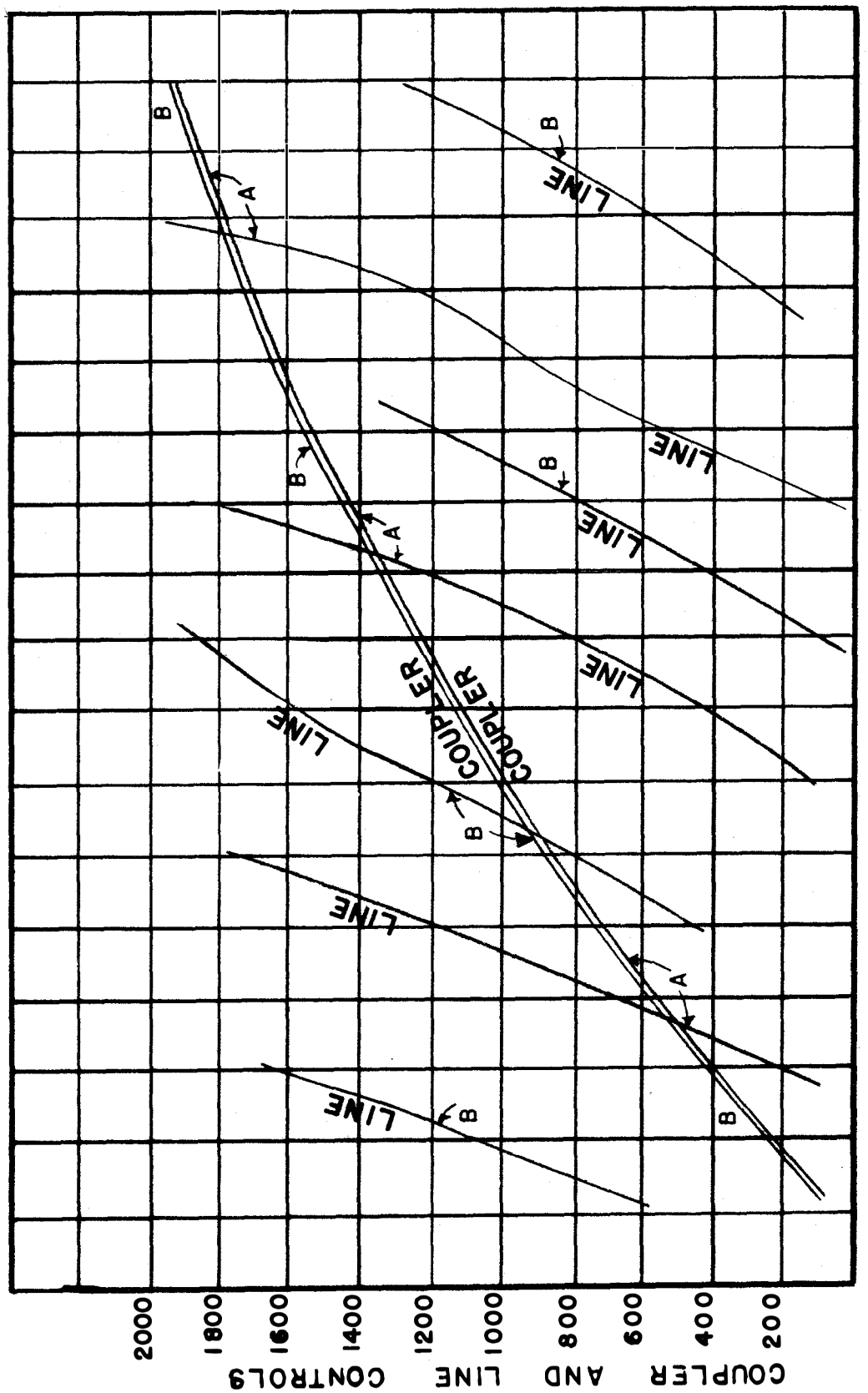


FIGURE 5-4 - TYPICAL CALIBRATION CURVES FOR COUPLER NO3 (LEFT TO RIGHT)

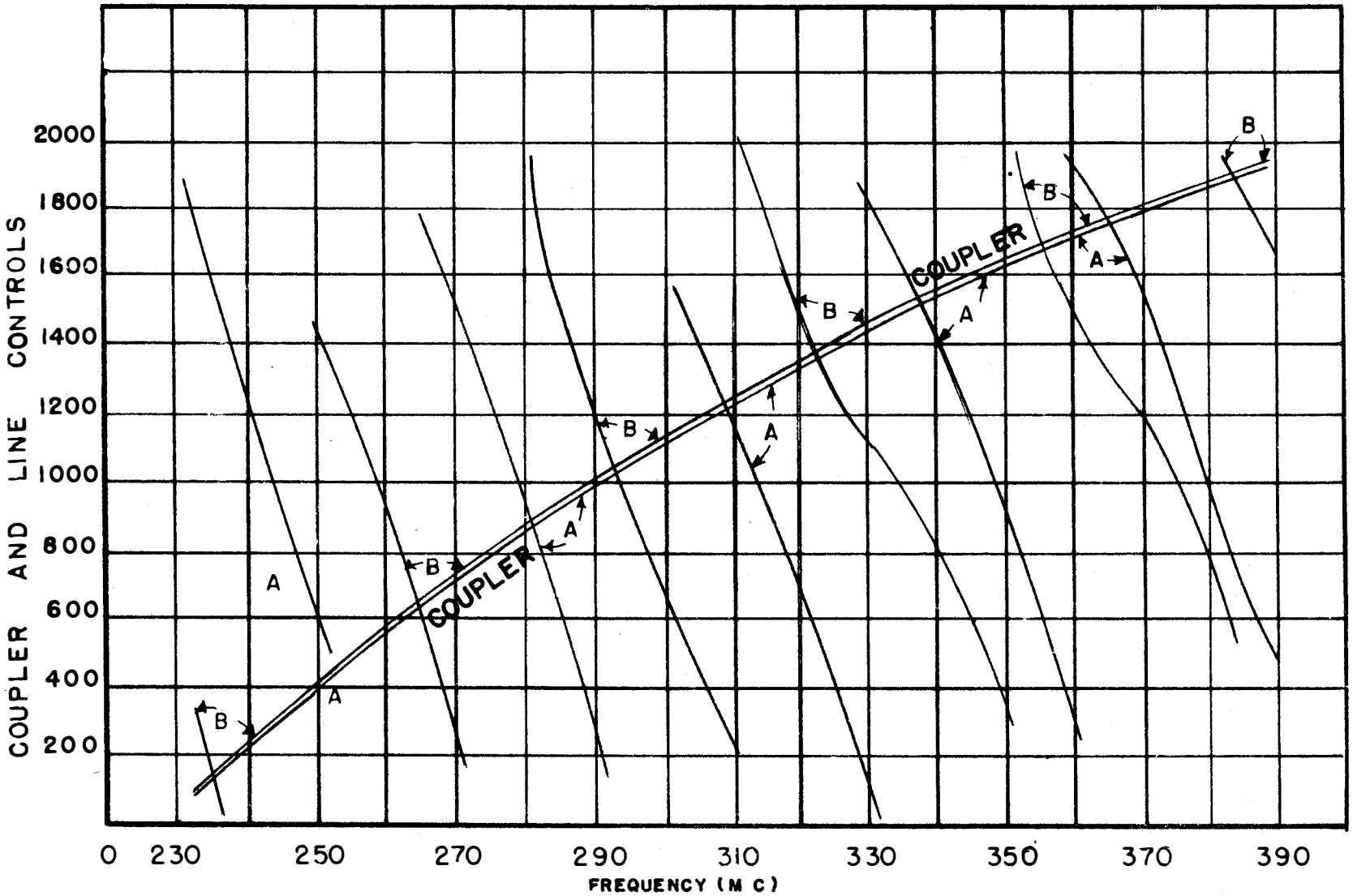


FIGURE 5-5 - TYPICAL CALIBRATION CURVES FOR COUPLER NO 4 (LEFT TO RIGHT)

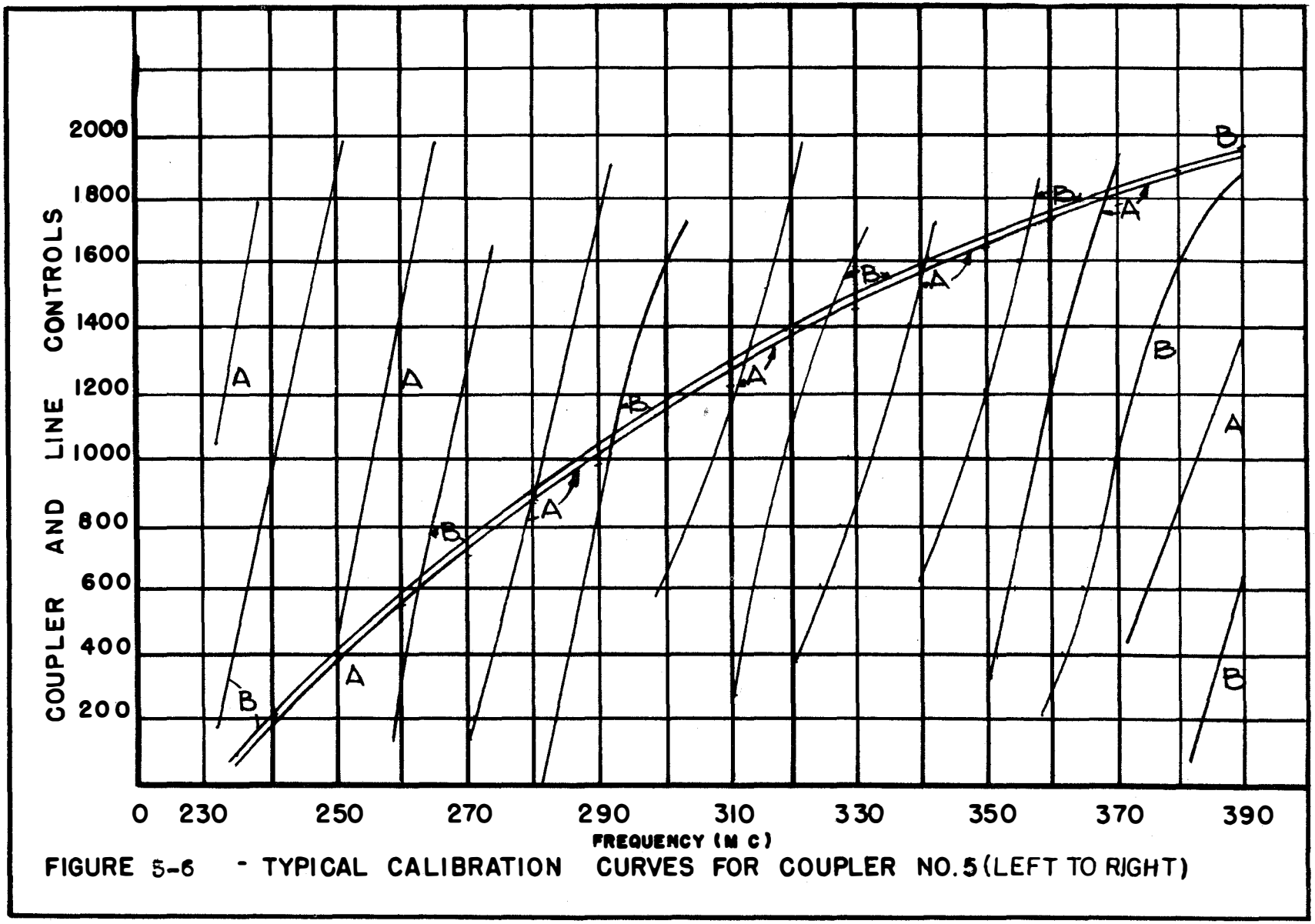


FIGURE 5-6 - TYPICAL CALIBRATION CURVES FOR COUPLER NO. 5 (LEFT TO RIGHT)

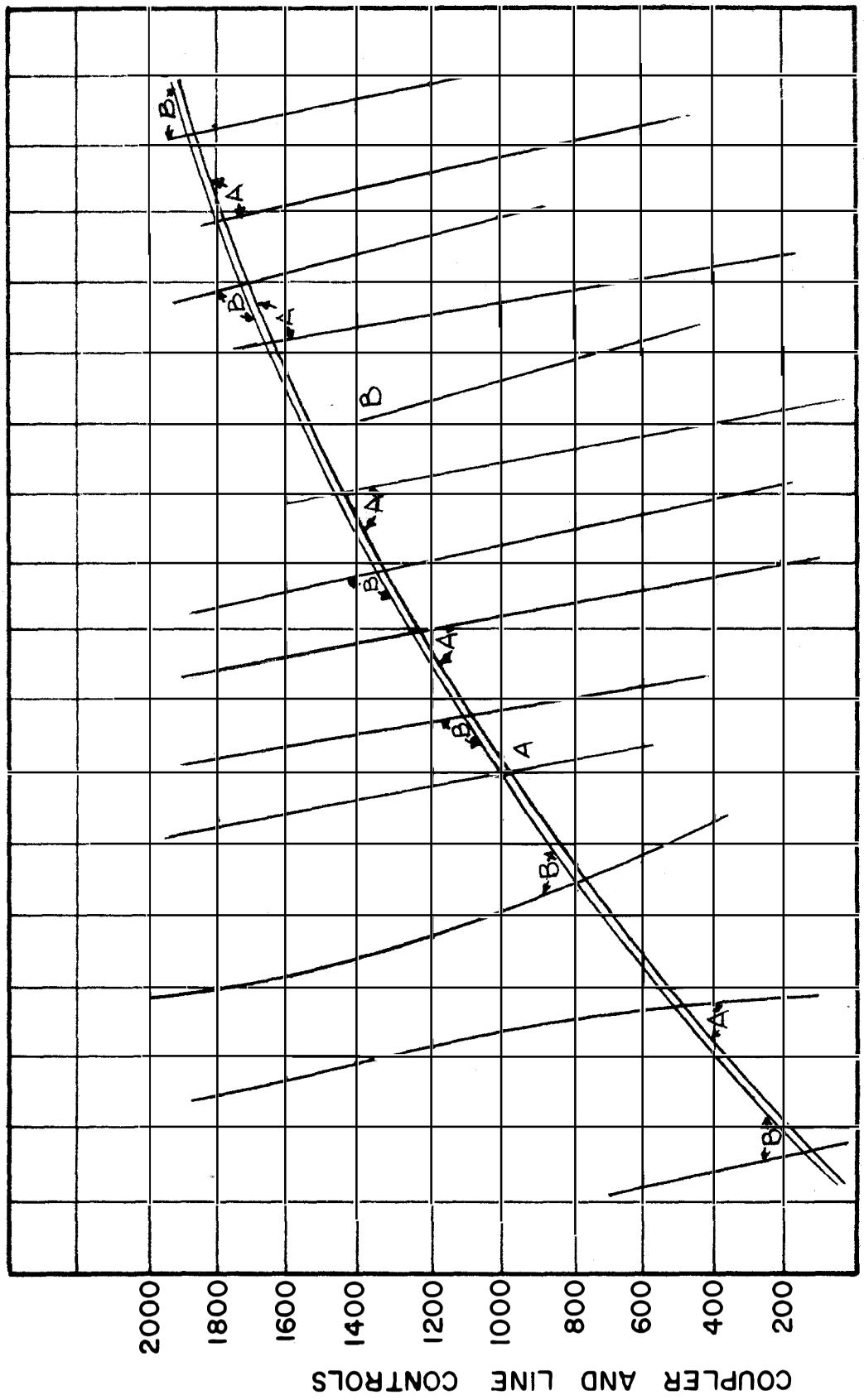


FIGURE 5-7 -TYPICAL CALIBRATION CURVES FOR COUPLER NO. 6 (LEFT TO RIGHT)

Step 7. Adjust the LINE TUNING similarly to give an even lower reading.

Step 8. Readjust the Coupler Tuning and LINE TUNING alternately or simultaneously until an absolute minimum is obtained.

Step 9. Make sure the final movement of the controls is in a clockwise direction.

Step 10. Secure the dial locks without disturbing their setting so that the tuning controls cannot be accidentally knocked out of correct position.

Step 11. Mark the counter dial settings and frequency for this channel in the spaces provided on the Calibration Chart on the front of the equipment.

Step 12. Repeat the procedure for every required frequency on each CU-332A/UR to be tuned.

(4) MANUAL TUNING OF COUPLER CU-255/UR

The tuning procedure for the automatic unit is basicall the same as for tuning the manual unit, the only difference being that the Automatic Tuning Head requires extra steps so that the tuning controls may be tuned and locked at their settings for the subsequent automatic selection during operation.

Step 1. The Coupler CU-255/UR should be connected in a standard installation according to the instructions given in section 3, Installation (see figure 3-8, etc.). The installation may be for transmitter or receiver operation. In either case, the control equipment connected to the Coupler will be used for selecting the Coupler channel during the tuning procedure; but in both cases a transmitter, or other suitable source (see paragraph 2.a.(2) of this section), must supply the signal for tuning. In a transmitter; in a receiver installation, disconnect the receiver feedline from E707 at the bottom of the Coupler and connect a transmitter, or other signal source, in its place.

Step 2. Make certain that the OPERATION indicator on the front of the equipment is set correctly for the type of control equipment being used. This indicator will show either RDZ or TDZ, i.e. RDZ for receiver control circuits, TDZ for transmitter control circuits. If it does not indicate the

correct type of control, it should be reversed. To do this, first remove the cover plate of the indicator by taking out the two mounting screws. Throw the three gang TDZ-RDZ switch (S703, S704 & S705) to the opposite side; turn the cover upside down and replace it so that the other designation will appear when it is replaced. A stud on the rear of the operation-indicator cover provides an automatic check of the switches being in the desired position, when the correct designation shows through the window.

Step 3. Turn on the transmitter, or other signal source, and allow a minimum of 15 minutes for a warm-up period (carrier off). Dial the transmitter to the desired channel and note its frequency. If the transmitter frequency must be reset, bypass the Coupler and connect the transmitter directly to a correct output load (50 ohms for TDZ). If the antenna is the proper impedance for the transmitter, the antenna may be used. Align the transmitter according to the instruction book for that equipment and then reconnect to the Coupler. If another signal source is used, set it to the desired frequency.

Step 4. If receiver control circuits are connected to the Coupler, dial them to put the Coupler on the correct channel.

Step 5. Check the Coupler system and make sure that no other Coupler is tuned on or within 15 mc of the frequency being used.

CAUTION

Burn-out of the transmitter output tubes may occur if any other Coupler in the system is tuned to the frequency of an operating transmitter and Coupler. Absorption of power and false tuning occur within 15 mc.

Step 6. Loosen the locking bars on both Coupler TUNING and LINE TUNING dials by rotating them counterclockwise one quarter of a turn.

CAUTION

1. The locking bars should always be loosened before attempting to manually turn the dials.

2. Do not dial a channel while the locking bars are loosened. This will disturb the settings of all channels and may damage the equipment.

Step 7. Set the tuning dials of the Coupler approximately to the desired frequency. See figure 3-13. Consult the calibration curves of figures 5-2 to 5-7, and adjust each dial to the corresponding reading. The dial reading on the equipment is a combination of the "revolution counter" indicatio and the "tuning dial" indication; i.e. a reading of 13 on the small indicator and a reading of 97 on the large dial is a dial reading of 1397. The "coupler" curve in the figures is for setting the LINE TUNING, is different in each figure. The corresponding figures should be used by unit number for each unit in any setup from one to six Couplers. Coupler number on is always the unit with the shorting plate; the others number consecutively toward the antenna.

CAUTION

Do not tune manually across the frequency of any operating equipment in a group installation.

Step 8. Key the transmitter. The Coupler Tuning should then be adjustee to give a sharp "dip" on the Tuning Indicator and left at the setting which gives a minimum reading.

Step 9. Adjust the Line Tuning to give an even lower reading.

Step 10. Re-adjust the Coupler Tuning and Line Tuning alternately or simultaneously until an absolute minimum is obtained.

Step 11. Make sure that the last movement of both dials is in a clockwise direction.

Step 12. The locking bars on both tuning dials should then be secured. Do this by turning clockwise until they are tight. Do not allow the dials to turn off adjustment when tightening the locking bars.

CAUTION

Lock the locking bars before dialing a channel. Make it a practice to lock them immediately after making any tuning adjustments and to keep them always locked except when absolutely necessary to loosen them for tuning or maintenance adjustments.

Step 13. Mark the tuning control settings by the correct channel on the Calibration Chart on the front of the equipment.

Step 14. Dial another channel on the associated TDZ or other control equipments and repeat steps 1 through 13 until all channels have been tuned and logged on the Calibration Chart.

b. BRIDGE METHOD OF TUNING AND TESTING.

One of the most comprehensive and accurate methods of testing the RF Couplings Section of either Antenna Coupler is by use of the VHF bridge. The bridge method allows very precise tuning and matching of circuits and also provides for an accurate measurement of insertion loss. The test setup for this type of measurement is shown in Figure 5-8.

(1) Equipment Required.

1. Hewlett-Packard Audio Oscillator Model 200B
2. TDZ Transmitter or Equivalent or VHF Signal Generator with Output of at least 5 watts
3. Navy Type CAWY-53349 Low Pass Filter
4. Hewlett-Packard VHF Bridge Model 803A
5. RDZ or Equivalent Receiver with "S"-meter
6. Hewlett-Packard Square Law Detector Model 415A
7. 130 feet of RG-21/U Cable
8. 5 feet of RG-58/U Cable
9. 10 feet of RG-8/U Cable
10. One PL-68 Plug
11. Nine UG-18B/U or Equivalent Plugs
12. Three UG-88/U Plugs
13. One UG-29/U Adapter

(2) TUNING PROCEDURE, BRIDGE METHOD.--The step-by-step procedure for tuningby the bridge method is as follows:

Step 1. Remove the equipment from the group installation and interconnect as shown in figure 5-8 with

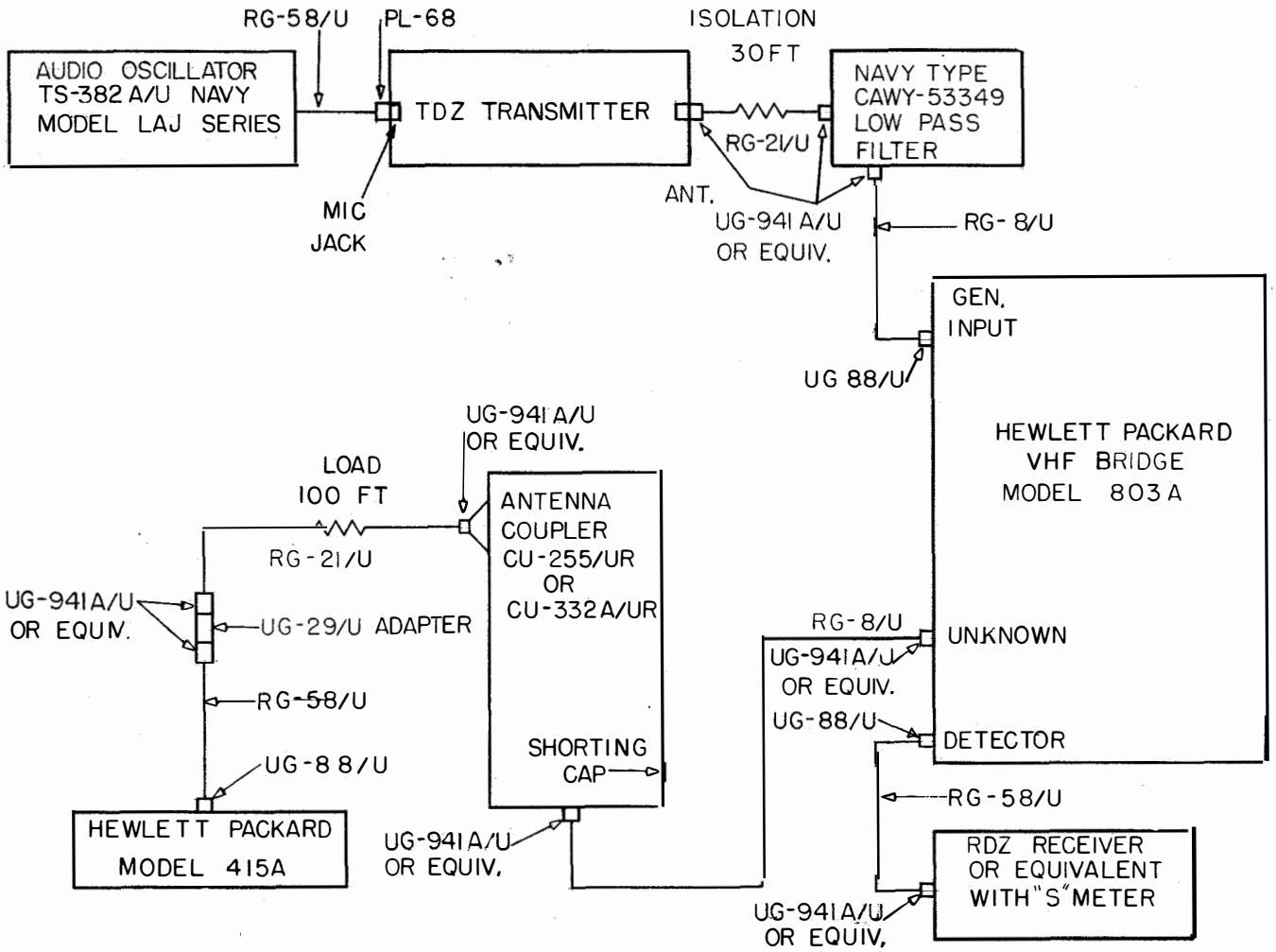


Figure 5-8. Interconnections for Tuning and Measurement of Insertion Loss by Use of VHF Bridge

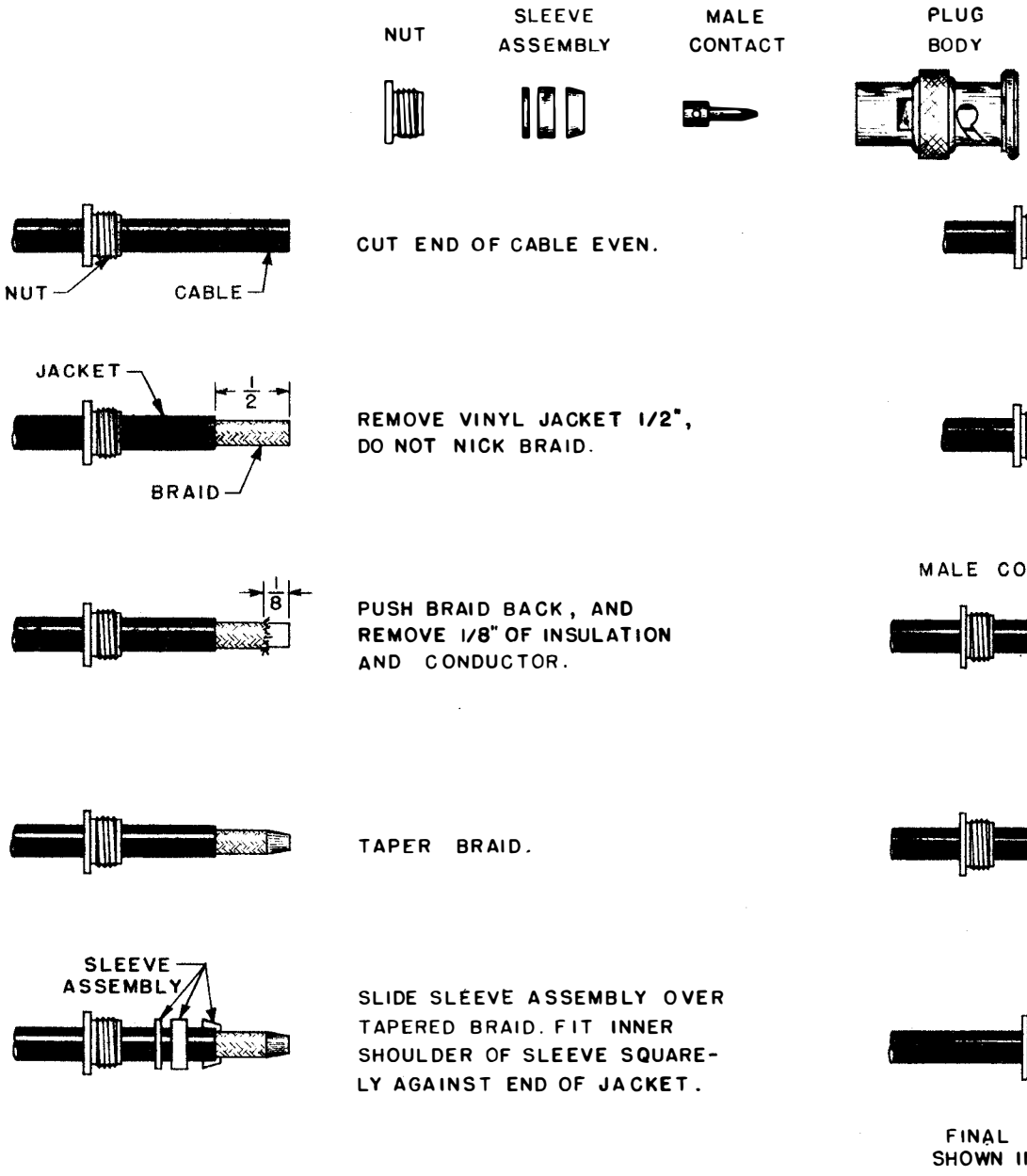


Figure 5-9. Assembly of Type BNC Connectors

one exception. For the first steps, bypass the Coupler by connecting the RG-21/U lead directly to the "UNKNOWN" Terminal of the 803A Bridge. Figure 5-9 shows assembly of BNC type connectors used in fabrication of test cables.

Step 2. Turn on TDZ (carrier off), RDZ, Audio Oscillator and Bridge and allow at least 15 minutes for warm-up.

Step 3. The TDZ should be tuned to the desired frequency. This should be done according to the instruction book for the transmitter, NAVSHIPS 900.809, using the test setup without the Coupler as the transmitter output load.

Step 4. Turn on the transmitter carrier, with the "carrier" switch at "lock."

Step 5. Modulate the TDZ transmitter with a 1000 cps signal from the Audio Oscillator. Normally a satisfactory percentage of modulation is obtained with the Model 200B Audio Oscillator set at 10 to 15.

NOTE

Do not overmodulate the transmitter.

Step 6. Peak the meter reading on the Model 415A Detector by adjusting the modulating frequency. There is a 1000 cps filter in the 415A and peaking the signal insures that the 415A is operating at the tip of its selectivity curve. It is desirable to peak the meter in this way at frequent intervals in order to make certain that the modulating frequency does not drift.

Step 7. Tune in the channel frequency on the RDZ, or other receiver being employed; and tune to maximum indication on the "S"-meter.

Step 8. Adjust impedance and phase angle controls on Bridge for maximum indication on receiver "S" meter.

Step 9. Set the 415A meter controls to give a zero db indication.

Step 10. Turn the TDZ carrier off.

Step 11. Disconnect the RG-21/U load from the Bridge and insert the Coupler between the load and bridge as shown in figure 5-8.

Step 12. Set the controls of the Couplers to the desired frequency according to the calibration curves of figures 5-2.

Step 13. Turn on the TDZ carrier again.

Step 14. Adjust COUPLER TUNING on the Antenna Coupler until a sharp "dip" occurs on the receiver "S" -meter.

Step 15. Adjust LINE TUNING on the Antenna Coupler to give an even lower reading.

Step 16. Readjust the COUPLER TUNING and LINE TUNING alternately or simultaneously until an absolute minimum is obtained. Make the last rotation in a clockwise direction, to take up any backlash.

Step 17. Adjust the impedance and phase angle controls on the 803A Bridge for minimum reading on the receiver "S" - meter. If the Coupler is properly tuned, the impedance value obtained from the bridge should be 51.5 ohms ±.2 ohms and the phase angle should be zero degrees ±3 degrees. If these values are not obtained, it may be necessary to adjust the Coupler controls further. First recheck to see that they are both adjusted for the lowest possible dip on the "S" -meter. Sometimes a better adjustment can be made by rotating the LINE TUNING control one turn counterclockwise and then advancin it a few divisions clockwise. After this, retune the COUPLER TUNING for minimum. IF a lower reading is obtained, advance the LINE TUNING a few more divisions clockwise and readjust the Coupler TUNING for minimum again. Do this until the lowest possible reading is obtained. This is a fine adjustment which may be used successfully with this sensitive bridge method of tuning but in meter reading on the COUPLER TUNING INDICATOR for it to be practiced in the regular tuning procedure.

After these steps have been completed satisfactorily, the Coupler is tuned to a high degree of accuracy, which forms the basis for accurately reading the insertion loss, as given in the next paragraphs, and is the best standard condition for adjusting the reflectometer to zero, as given in paragraph 2.c. of this section.

The bridge method of tuning and measuring is recommended for general check of a Coupler whenever close measurements of its condition are desired; such as, after replacement of major rf parts in the RF Couplings section, after replating of rf contact surfaces, checking a Coupler that has been used a long time or under adverse conditions, etc.

(3) BRIDGE MEASUREMENT OF INSERTION LOSS.--After the procedures of paragraph 2.b.(2) above have been carried through step 17, the amount of insertion loss introduced by the Coupler is indicated directly in decibels (db) on the meter of the 415A Detector. This is contingent upon the reading having been carefully set to zero in step 9. The insertion loss must not exceed -1.1 db. The measurements should be made at both ends of the frequency range of the coupler, namely, at about 231.4 mc and 389.8 mc, and at any other frequency that may have questionable efficiency. If the loss is excessive, check all external connections and cables for possible poor connections or according to paragraph 5.a.(1) of this section. Inspect all contracts and replace or replate any which are worn through the silver plating; see paragraph 5.a.(2) of this section for procedures.

(a) ALTERNATE MEASUREMENT OF INSERTION LOSS BY WATTMETER.--The insertion loss may also be measured in a practical simple, though less exacting way, by use of the Navy Type ME-11/URR Wattmeter. The correct procedure for using this instrument will be found in the instruction book for the Wattmeter, measuring the insertion loss essentially is loading the TDZ (or other) transmitter with the Wattmeter, through Navy Type CAWY -53349 Low Pass Filter and properly adjusting the transmitter for normal rf output at the desired frequency. The Coupler is then inserted between the Wattmeter and Los Pass Filter, and the Coupler tuned according to the applicable steps (see figures 5-10) of the regular tuning procedure (paragraph 2.a. (3) or (4) of this section), except that tuning is for maximum indication on the Wattmeter (This will normally coincide with minimum reading on the Coupler TUNING INDICATOR when the reflectometer adjustment in the Coupler is at optimum setting, but the Wattmeter reading is the standard in this case.) When properly tuned a normal Antenna Coupler will introduce some loss, but this must not exceed -1.1 db. In other words, the power out of the Coupler must be 77.5%, or more, of the measured transmitter power.

(c) REFLECTOMETER Z702 ADJUSTMENT

The reflectometer should rarely need any adjustment; however, after replacement of the reflectometer subassembly Z701 or any of its component parts, adjustment will be necessary for proper functioning. This should be undertaken by experienced maintenance personnel only.

The TUNING METER indication of reflectometer current is the basis for all regular tuning of the Antenna Coupler. The accuracy and reliability of the TUNING METER reading depends upon the Coupler being very accurately tuned under proper load conditions when the reflectometer Z701 is adjuste

The bridge method of tuning the Coupler is the most exacting and hence most desirable, but the simpler wattmeter method is satisfactory and the wattmeter may be more readily available.

Adjust the reflectometer as follows:

Step 1. Connect the Antenna Coupler in the complete test setup for bridge method or wattmeter method of tuning as shown in figure 5-8 or 5-10, respectively.

Step 2. Carefully tune the transmitter and Coupler according to the bridge method of paragraph 2.b.(1) and (2) of this section and measure the insertion loss according to paragraph 2.b.(3); or carefully tune the transmitter and Coupler by the wattmeter method per paragraph 2.b(3)(a) and measure the insertion loss. When the Coupler is correctly tuned and within tolerance proceed with the reflectometer adjustment.

Step 3. If the reflectometer is already installed, loosen the clamp E741 and pull the reflectometer out of its case. See figure 5-11.

Step 4. With the Coupler Controls on the correct settings for 389.8 mc. key the TDZ Transmitter. The Coupler should be tuned by the bridge method of paragraph 2.b., this section before attempting to adjust the reflectometer.

Step 5. Insert reflectometer into housing. Make sure the arrow on the reflectometer case is pointing toward the top of the Coupler. Push in until a slight indication is noticed on the Tuning Indicator meter. Correct operation of the reflectometer is indicated by a slight rise in the microammeter reading at the correct orientation. This can be observed easily by rotating the reflectometer back and forth in its sleeve mounting.

CAUTION

Under no circumstances should the reflectometer be rotated so that the arrow is turned more than 90° either direction from the upward direction or the meter M701 may be burned out. The arrow should not be displaced more than just a few degrees, if any, from the straight up position when the reflectometer is properly adjusted.

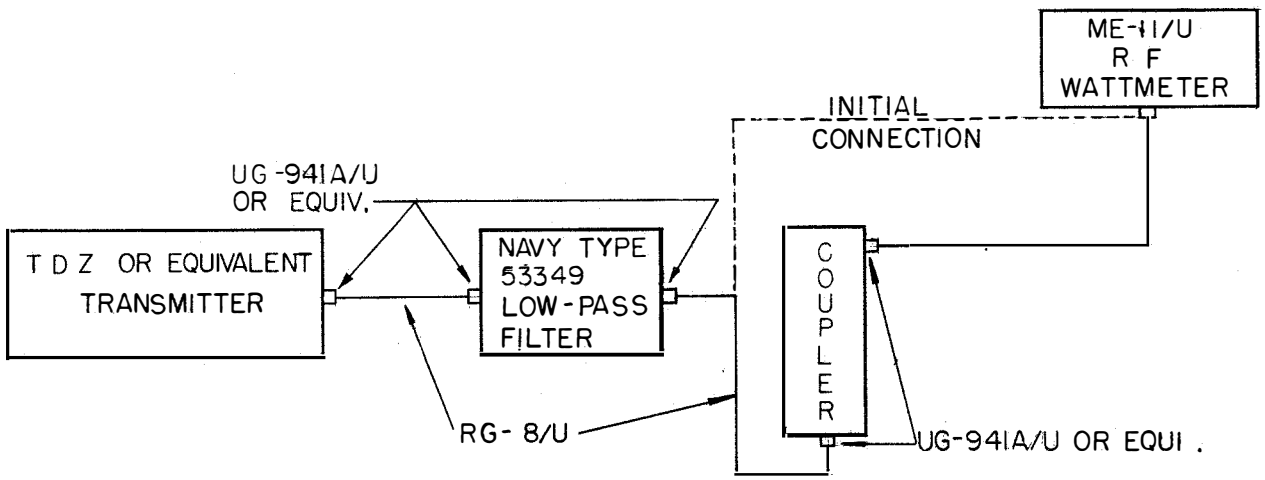


Figure 5-10. Interconnections for Tuning and Measurement of Insertion Loss by Use of RF Wattmeter

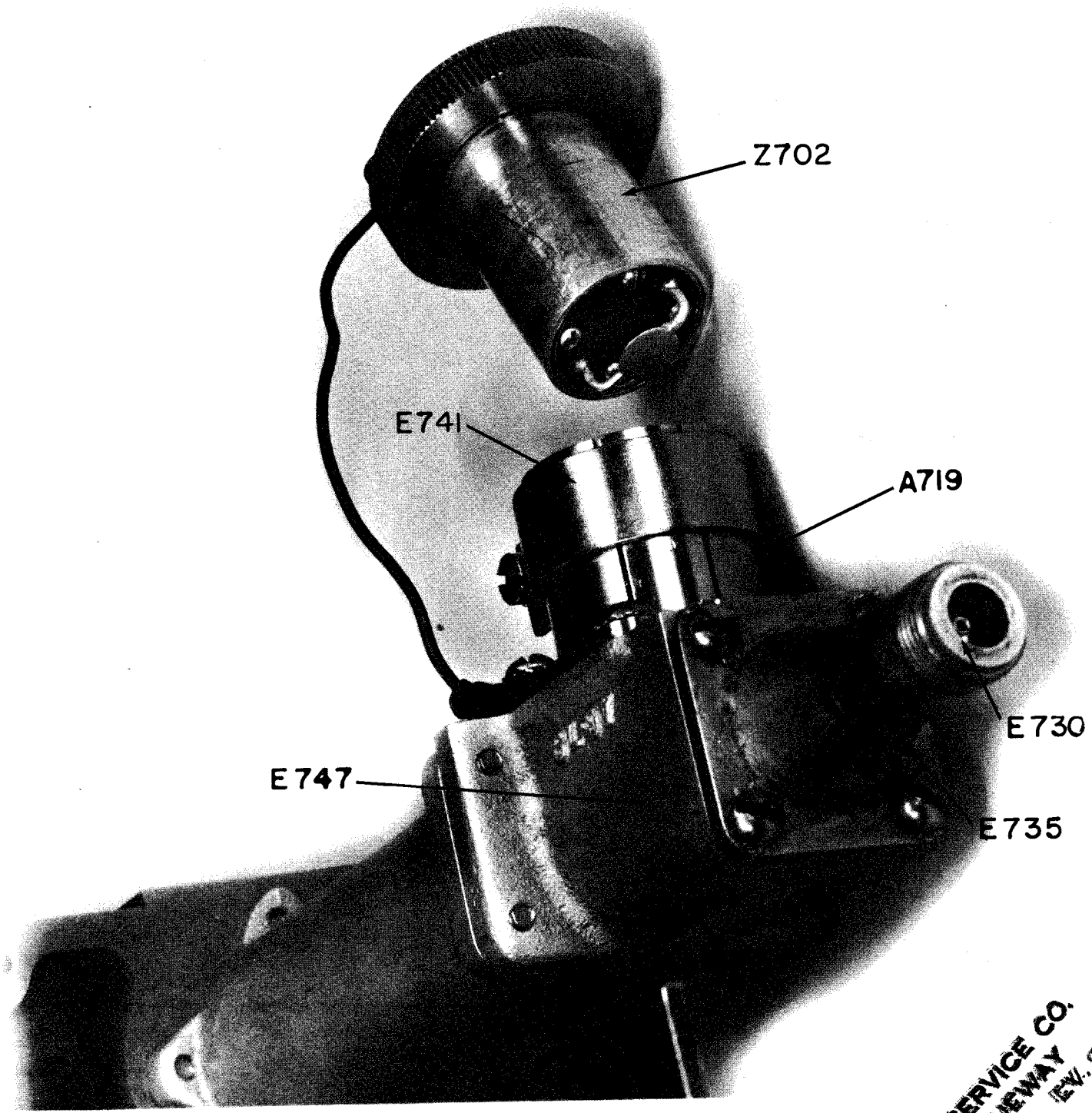


Figure 5-11. Removal of Reflectometer Z702

It should show a double minimum reading with a slight rise between. See figure 5-12. This rise should be no greater than 3% (microamperes) of full-scale reading at the high and (389.8 mc) of the frequency range. An exact zero reading is unnecessary, hence the 1 to 3% of full scale reading is considered satisfactory for indicating a "tuned" condition for the Coupler.

Step 6. If the Tuning Indicator reads more than 10 microamperes when the Coupler is known to be tuned and the arrow is in the upward position, the reflectometer has been pushed in too close to the inner conductor of the transmitter-receiver feedline and should be pulled out far enough to reduce the reading to less than 10 microamperes. If there is one broad zero indication when the reflectometer is rotated, the reflectometer has not been pushed in far enough. Loosen the set-screw in the knurled reflectometer nut and unscrew the nut until the reflectometer can be inserted just far enough to give a proper indication as described above. Tighten the set-screw.

Step 7. After the reflectometer has been correctly oriented as indicated in figure 5-13, the clamping screw on A741 must be tightened. If the reflectometer nut is not flush with the housing, A719, loosen set-screw and turn the knurled nut until this condition exists. This will facilitate proper re-orientation should the reflectometer need removal at a later date. Adjustment is complete.

Step 8. Note Coupler and Line Tuning settings and turn each control enough to detune Coupler. Then retune according to the Tuning Indicator. If the reflectometer has been properly adjusted, the Coupler Control settings will be the same as those noted before.

d. TROUBLE SHOOTING.--Trouble shooting in the Antenna Couplers may be broken down into two parts. It is first necessary to determine whether the trouble lies in the Tuning Head or in the RF Coupling Section. Next the malfunctioning component in either section must be found. Example: The TDZ Transmitter is known to be operating correctly, yet when it is keyed, there is no indication on the Coupler Tuning meter. The interconnecting rf cables are known to be in good condition. Immediately it is apparent that the trouble is within the Coupler and further,

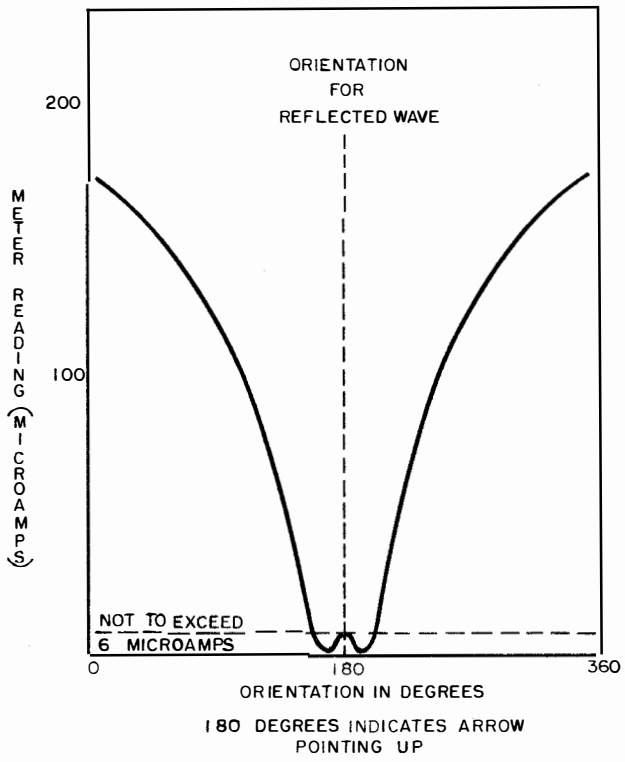


Figure 5-12. Reflectometer Response Curve

within the RF Coupling Section. Checks of the meter and leads prove these components to be all right. As the transmitter is indicating normal P.A. Plate and Antenna current, it may be assumed that the Coupler proper is functioning and that the trouble is within the reflectometer circuit. Simple resistance checks will quickly localize the defective part. See schematic diagram, figure 5-37 or 5-38.

Usually, the Manual Tuning Head will cause little trouble as long as it is lubricated as indicated in the Lubrication Chart, figure 4-1 and the tuning knobs are rotated at a moderate rate. Any malfunctions of the Tuning Head will be purely mechanical and readily diagnosed after visual inspection. See paragraph 4., this section.

The Automatic Tuning Head is subject to both mechanical and electrical trouble. Little of the former will be experienced if the Tuning Head is properly lubricated and the Drive Mechanisms are kept clean. Determination of t. defective part, if the trouble is mechanical, may be made by visual inspection. Electrical malfunction diagnosis depends upon the ability of the technician and familiarity with the cycling process and with the Tuning Head and control equipment circuitry. Carefully study the schematic diagram, figure 5-37, this section, section 2, and paragraph 3. of this section.

Visual inspection will also reveal the majority of the troubles in the RF Coupling Section. High power loss is usually the result of dirty or corroded contact surfaces. Improper reading of the Tuning Indicator meter will most frequently be the result of improper adjustment of the reflectometer circuit which may cause the crystal diode to become damaged or destroyed. The reflectometer may be checked by loosening the clamp E741 on the reflectometer mount and rotating the case. This should be done only when the Coupler is known to be accurately tuned and operating at optimum conditions. If the meter indication follows the curve given in figure 5-12, proper operation is indicated. The correct position for the reflectometer is determined in the adjustment instructions which appear in paragraph 2.c., this section.

Reference is made to tables 5-2 to 5-4, Trouble Shooting Charts, from which major component failure diagnoses may be made. The general layout of these Trouble Shooting Charts is as follows. The boxes along the right side list the symptoms of various troubles in the equipment. The lines leading off to the left give the troubles and the boxes on the left give the faulty components and possible corrections. Follow these charts in servicing the equipments in order that any troubles may be located quickly and repaired.

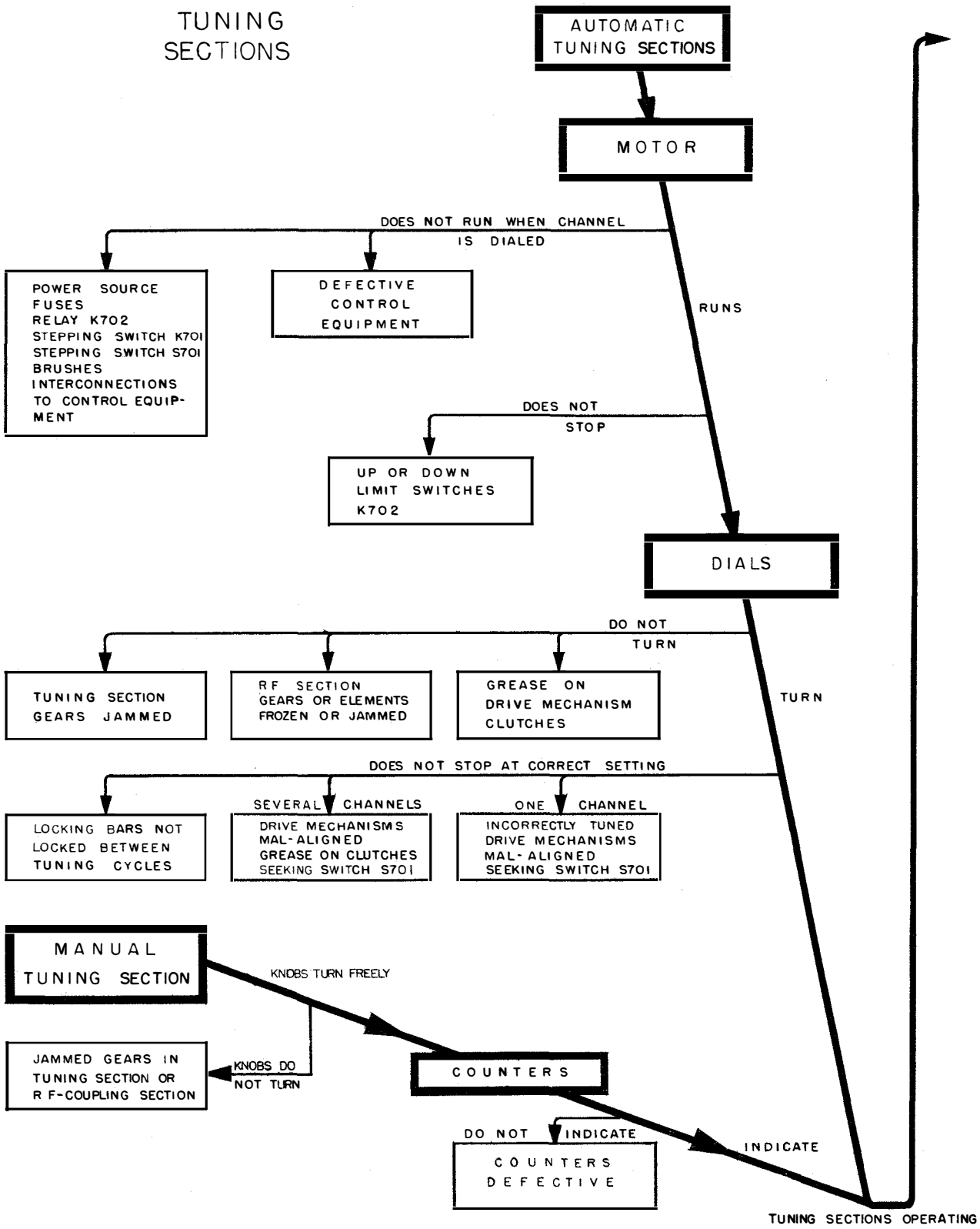


Table 5-2. Trouble Shooting Chart, Tuning Heads

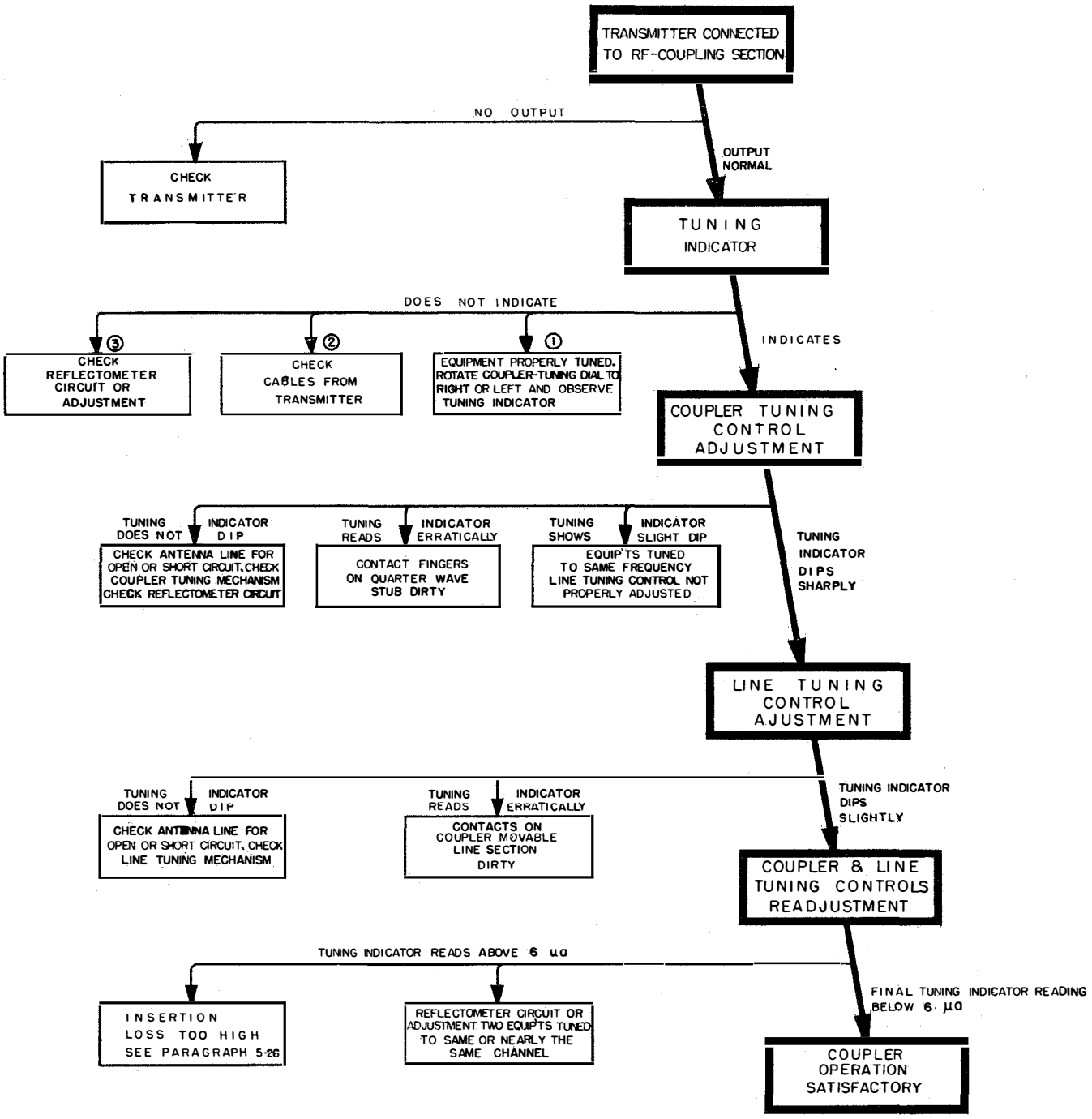


Table 5-3. Trouble Shooting Chart, RF-Coupling Section, Transmitter Installation

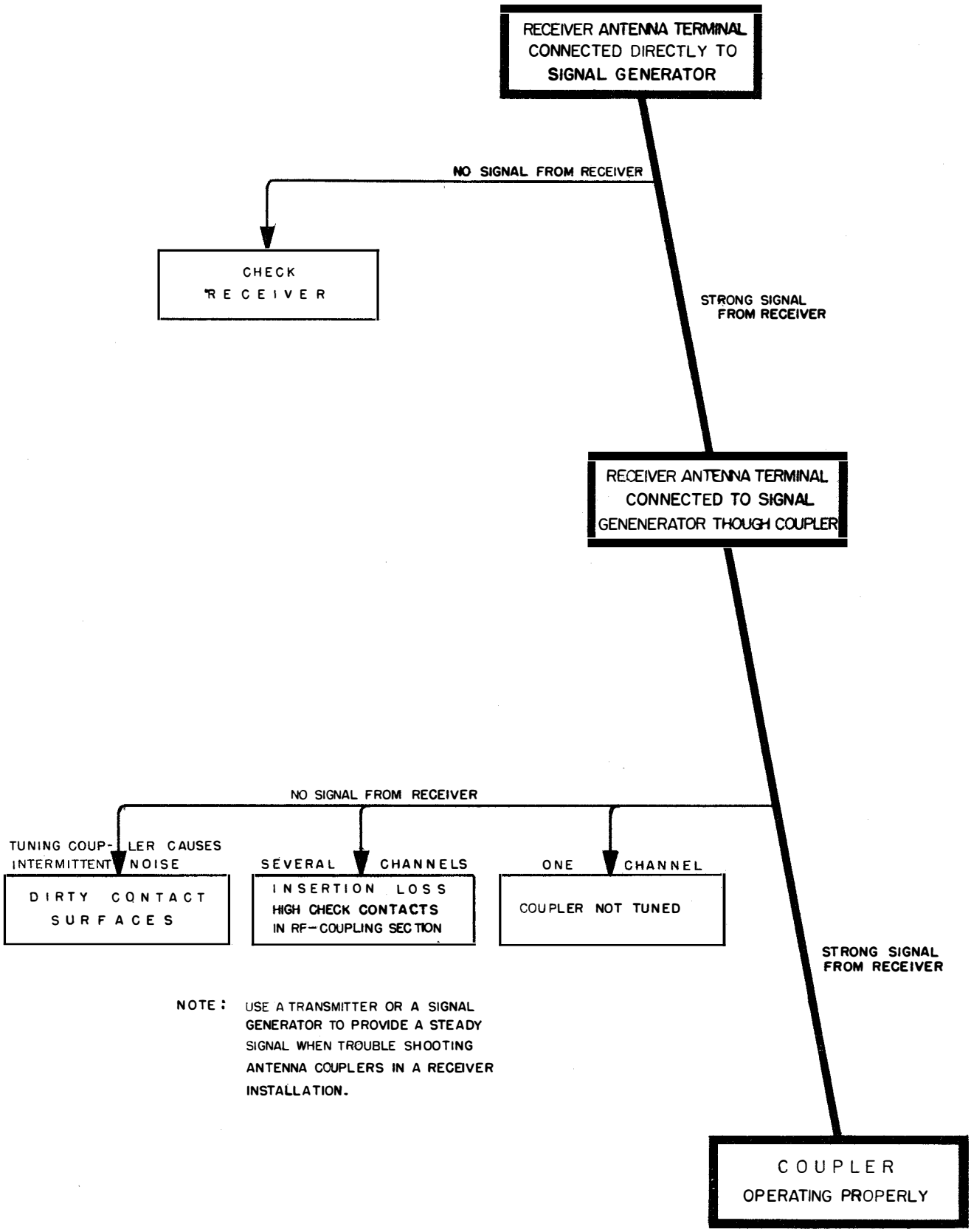


Table 5-4. Trouble Shooting Chart, RF Coupling Section (Receiver Installation)

e. REMOVAL OF THE TUNING HEADS.

For some of the maintenance operations on the Tuning Heads, it will be necessary to remove them from the Coupler proper. The following procedure will be used in removing the Tuning Heads.

Step 1. Turn both tuning knobs or dials to zero stop position (fully counterclockwise) manually. It will first be necessary to loosen the locking bars or dial locks.

Step 2. Remove the Coupler from the group installation, It will be necessary to remove one end unit in the group and dismount the Couplers one at a time until the faulty unit can be removed. Place on its side on a bench.

Step 3. Remove the panel mounting screws for all panels except the one panel at the front of the Tuning Head.

Step 4. Remove twelve flat-head Tuning Head mounting screws which pass through the main corner supports.

Step 5. Remove the Tuning Head from the RF. Coupling Section by tilting toward front of equipment slightly as it is slid out away from the RF Coupling Section.

f. INDEXING THE TUNING HEAD TO THE RF COUPLING SECTION.

If the Tuning Head is removed from the RF Coupling Section for any reason, it will be necessary to index both units before the Tuning Head is re-installed. Indexing is the process of aligning all the mechanical compoments of the Tuning Head to those of the RF Coupling Section. It consists essentially of having the Platform in its upper limit of travel and the control dials on zero stop positions. In the case of the Automatic Tuning Head, it must be determined that the Drive Mechanisms have been aligned correctly according to paragraph 3.c of this section before attempting to index. The following procedure will be used.

Step 1. Manually turn the dials on the Tuning Head to zero stop position. In the case of the Automatic Tuning Head, be certain that a full tuning cycle is completed before power is removed. If the Automatic Tuning Head is indexed with the tuning cycle only partially completed, serious damage will result to the RF Coupling Section when a channel is dialed.

Step 2. Turn the coupling spider 0748 nearest the front of the RF Coupling Section until the Quarter-wave Element is fully extended. Reverse rotation until the element moves back approximately 1/64 inch.

Step 3. Turn the rear coupling spider 0748 until the sliding contact on the movable platform is 1/32 inch from the top flange on the antenna line. The movable platform is spring loaded, hence the Coupling Section must not be jarred lest the platform "creep" before the Tuning Head is installed.

Step 4. Place the Tuning Head against the supports at the rear of the unit and slide toward the RF Coupling Section until it stops about an inch away from the seated position. Check to make sure the control dial settings have not moved from their zero positions. Tilt the Tuning Head toward the front of the equipment slightly and continue to slide toward the RF Coupling Section until it seats. Should the coupling spiders fail to mesh, the Coupler units have not been properly indexed and the procedure should be repeated.

3. MAINTENANCE OF THE AUTOMATIC TUNING HEAD

The Automatic Tuning Head is a very complex piece of equipment and must be cared for accordingly. See figures 5-13, 5-14 and 5-15. Should the unit fail to function properly, it is important that corrective measures be taken as quickly as practicable to prevent damage to the Tuning Head, RF Coupling Section, or both. Failure, in most cases, will be due to malfunctioning drive mechanisms or blown fuses. Faulty operation may also result from corrosion, wear or pitting of the contacts of K701, K702 or S701 in which case these parts should be replaced.

After removing the Tuning Head for servicing, it is vital that both the Tuning Head and the RF Coupling Section be properly indexed before the Tuning Head is re-installed in the equipment. See paragraph 2.f., this section.

Generally, little trouble will be encountered in the Drive Mechanisms. Should the clutches or gears become worn, the Mechanisms will have to be replaced. If the clutches become contaminated with grease or mal-aligned, cleaning or alignment will be necessary. Cleaning instructions appear in paragraph 3.a., this section, while removal, alignment and installation information appears in paragraph 3.b., c., and d. respectively.

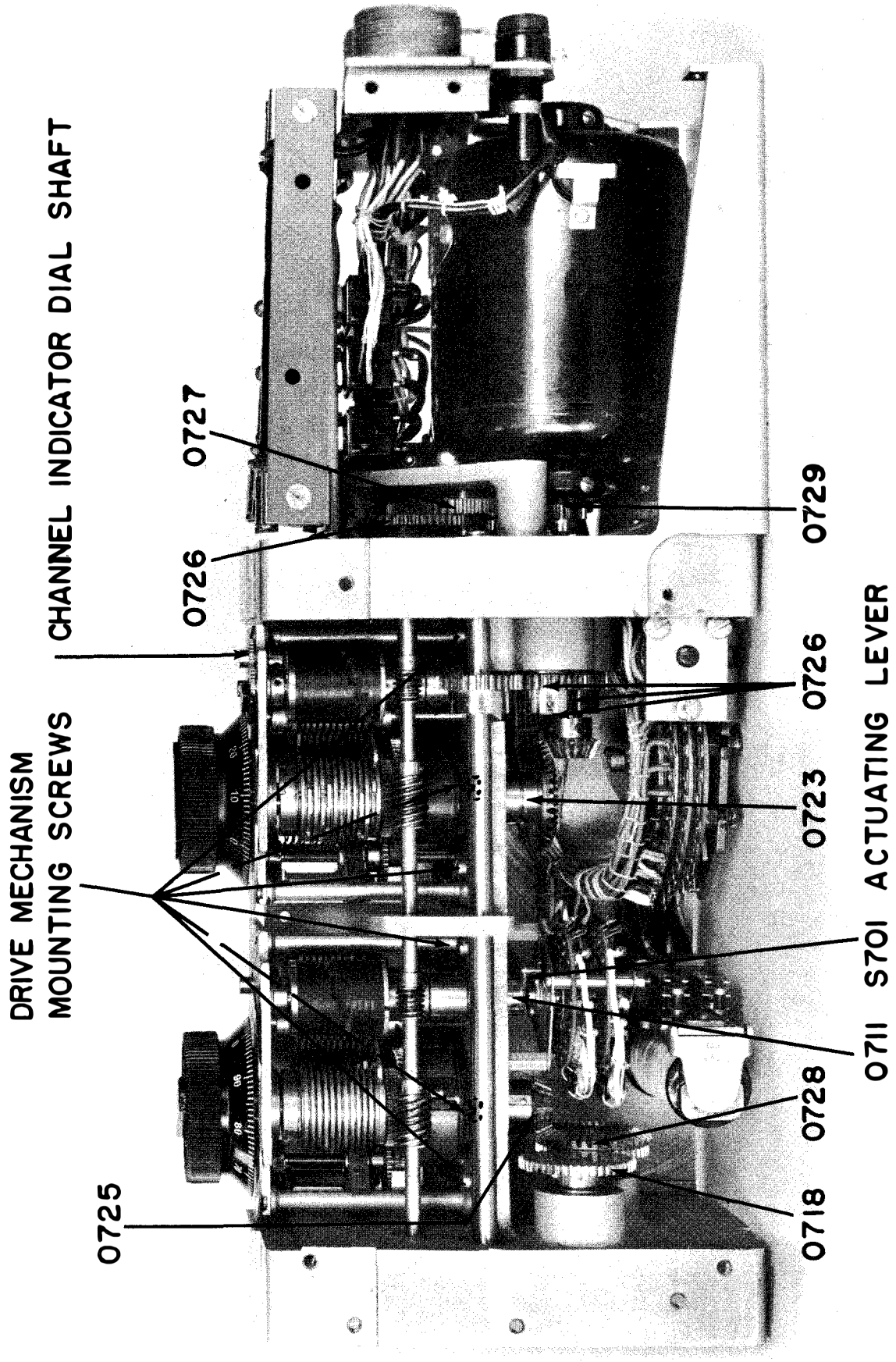


Figure 5-13. Automatic Tuning Head, Right Side View

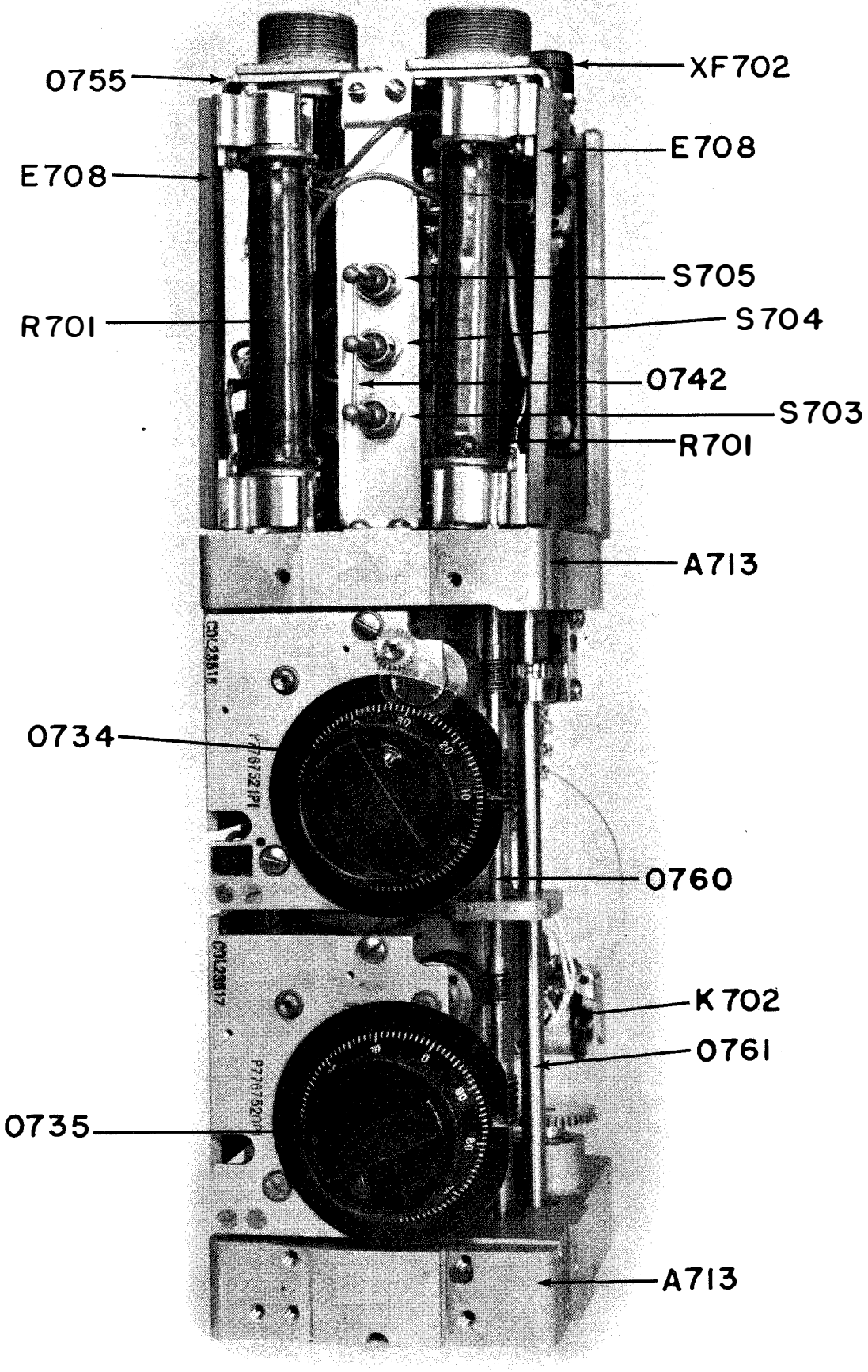


Figure 5-14. Automatic Tuning Head, Front View

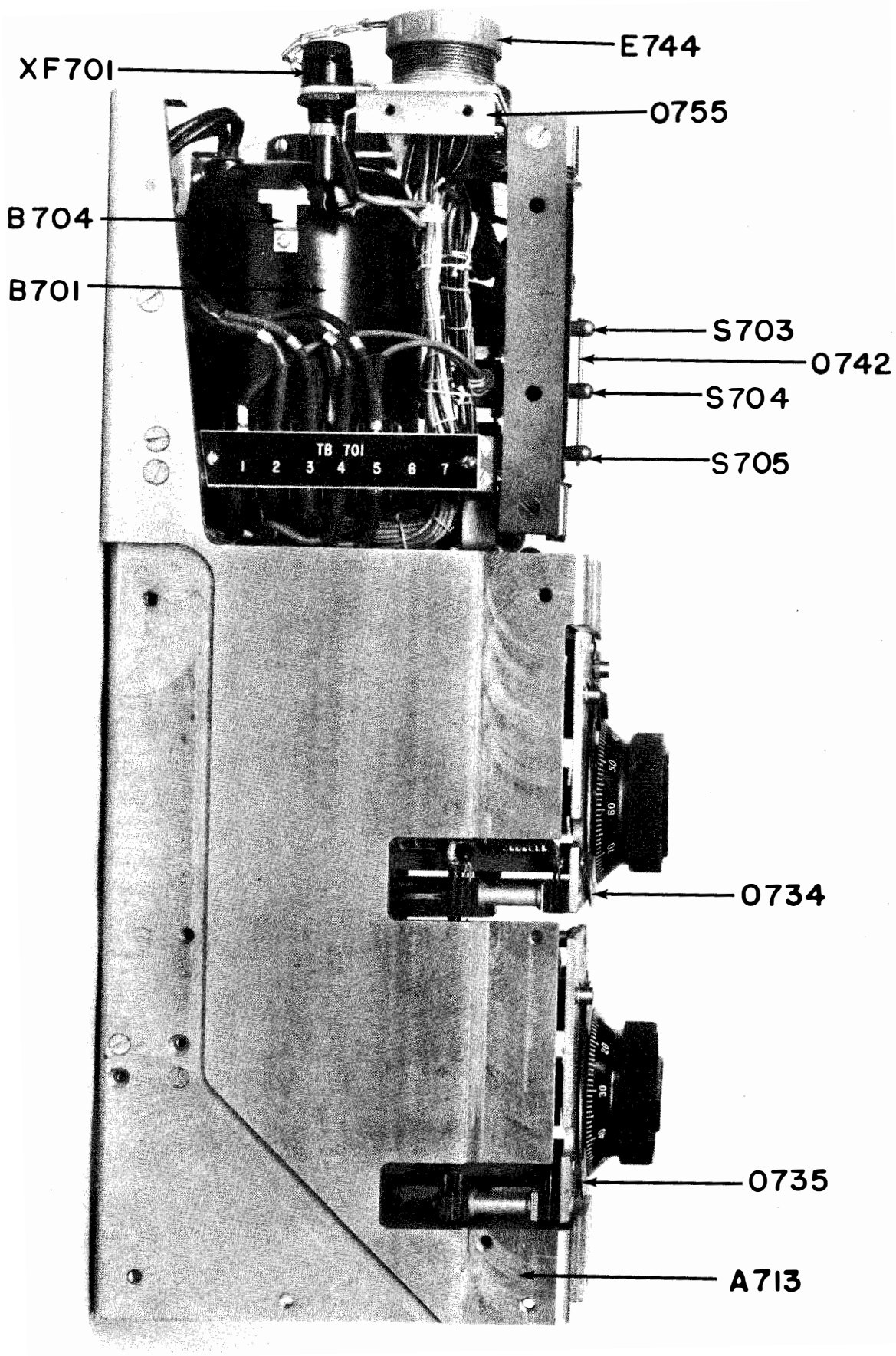


Figure 5-15. Automatic Tuning Head, Left Side View

UNDER ANY conditions, performing any of the repairs listed in this section, other than those pertaining to cleaning or replacement of the motor, relays, or fusses, makes necessary the re-tuning of the Coupler on all channels.

a. CLEANING THE DRIVE MECHANISM.

In the event that the Drive Mechanisms, 0734 and 0735 malfunction and it is determined by visial inspection that worn worm wheels are not the cause, it is probable that the mechanism clutches have become contaminated with grease, possibly as the result of excessive lubrication on the worm gears or wheels. If such is the case, the mechanism clutch should be throughly flushed with ethyl alcohol (per spec JAN-A-463) and further cleaned with a small brush. Also, wash the grease off the worms. During the cleaning process, work the main dial back and forth with the locking bar unlocked.

CAUTION

Do not use carbon tetrachloride.
This solvent produces toxious fumes.
and deteriorates wiring insulation.

After cleaning, re-lubricat as indicated in LUBRUCATION CHART, figure 4-2; APPLY LUBRICANT SPARINGLY.

If the clutch continues to slip, when the tuning head is cycled after cleaning, the Drive Mechanism should be replaced. See paragraph 3.b.,c.and d., below.

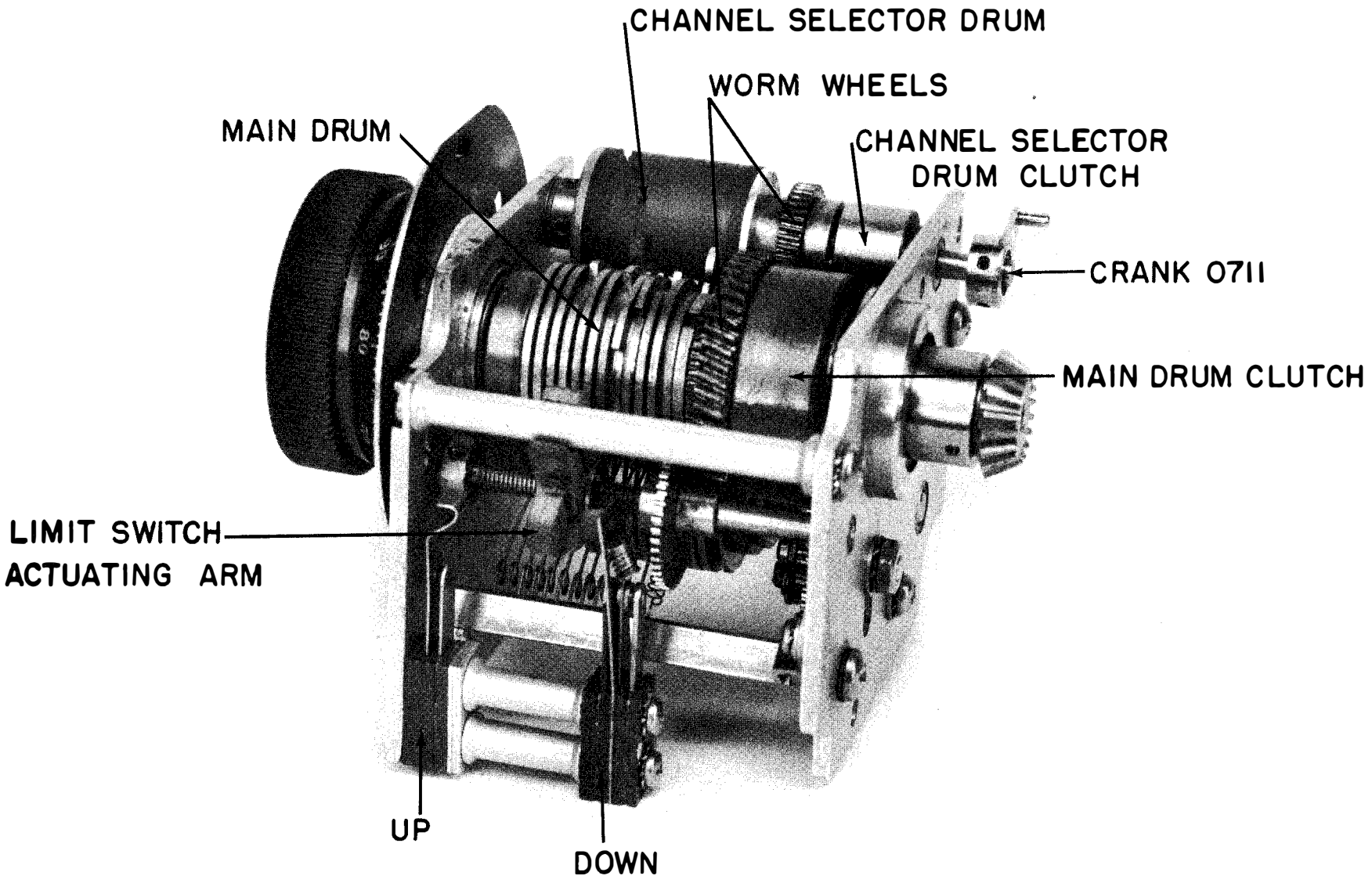
b. REMOVAL OF DRIVE MECHANISM.

Drive Mechanisms 0734 and 0735 may need replacement should the clutches or worm wheels become worn or the limit switches become inoperative. Drive Mechanism 0734 is identical to 0735, except for the lack of a shaft for crank 0711 and the addition of the channel indicator dial. All figures which apply to 0735 apply to 0734, also with the exceptions noted above.

(1) Dial channel "1 on TDZ or other control equipment. Hand-turn the LINE and COUPLER TUNING knobs to their zero home-stop (maximum counterclockwise) settings with the locking-bars unlocked. See figure 5-17. Lock the Locking bars.

CAUTION

Do not dial any channel after removing a drive mechanism until the new unit has been installed



LIMIT SWITCHES
S702A & S702B

Figure 5-16. Drive Mechanism 0735, Rear Top View

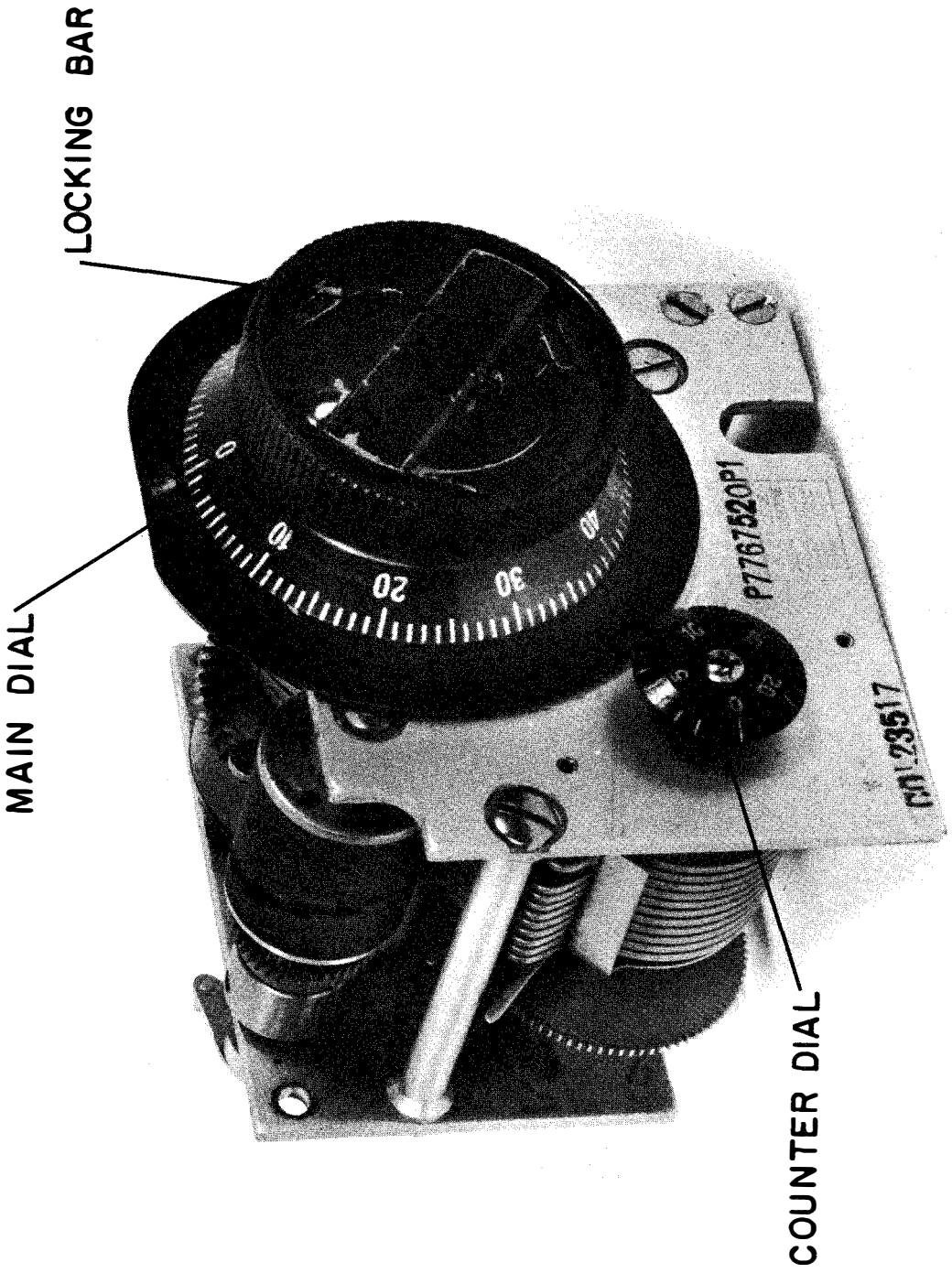


Figure 5-17. Drive Mechanism 0735 at Zero Home-Stop Position

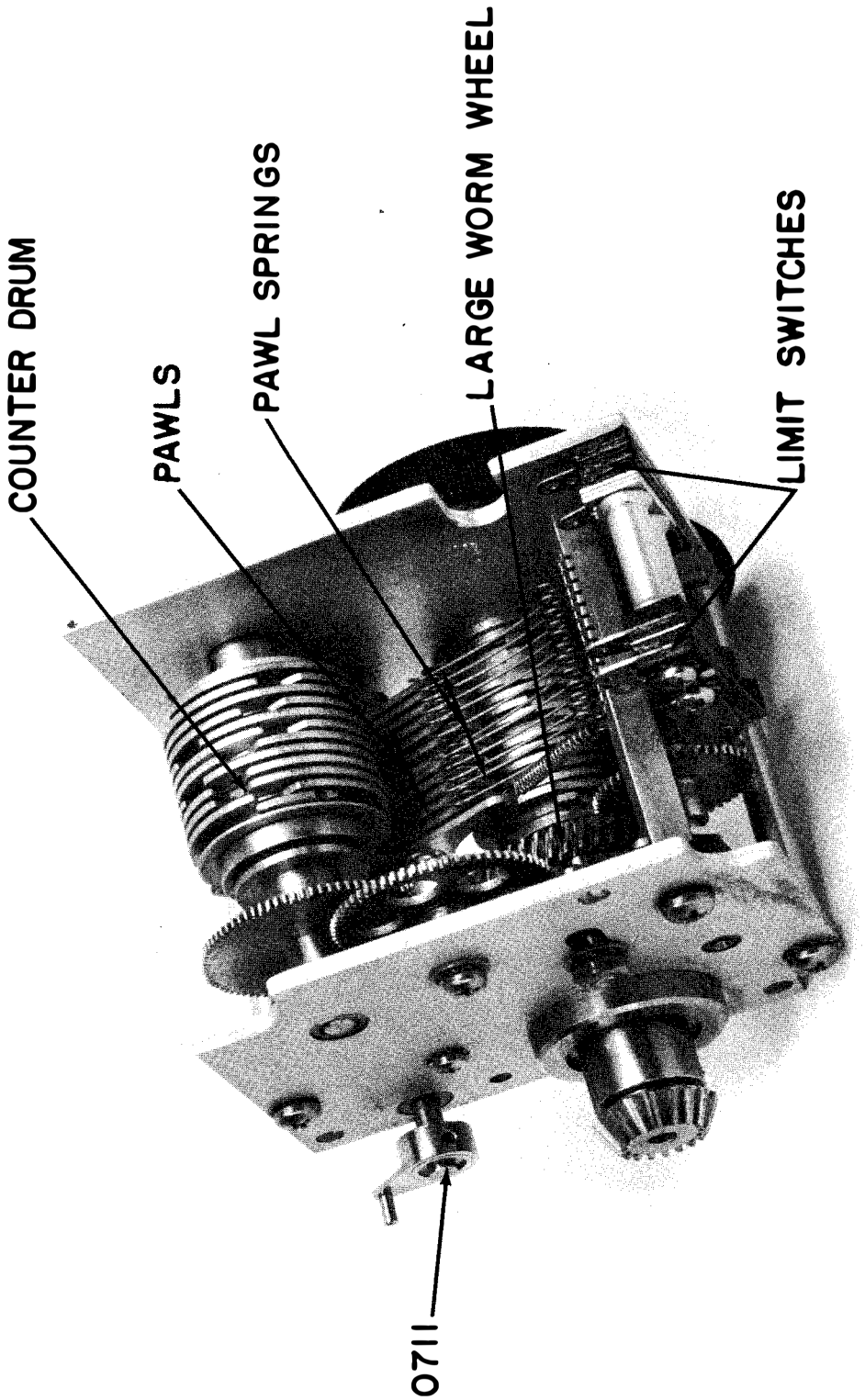


Figure 5-18. Drive Mechanism 0735, Bottom View

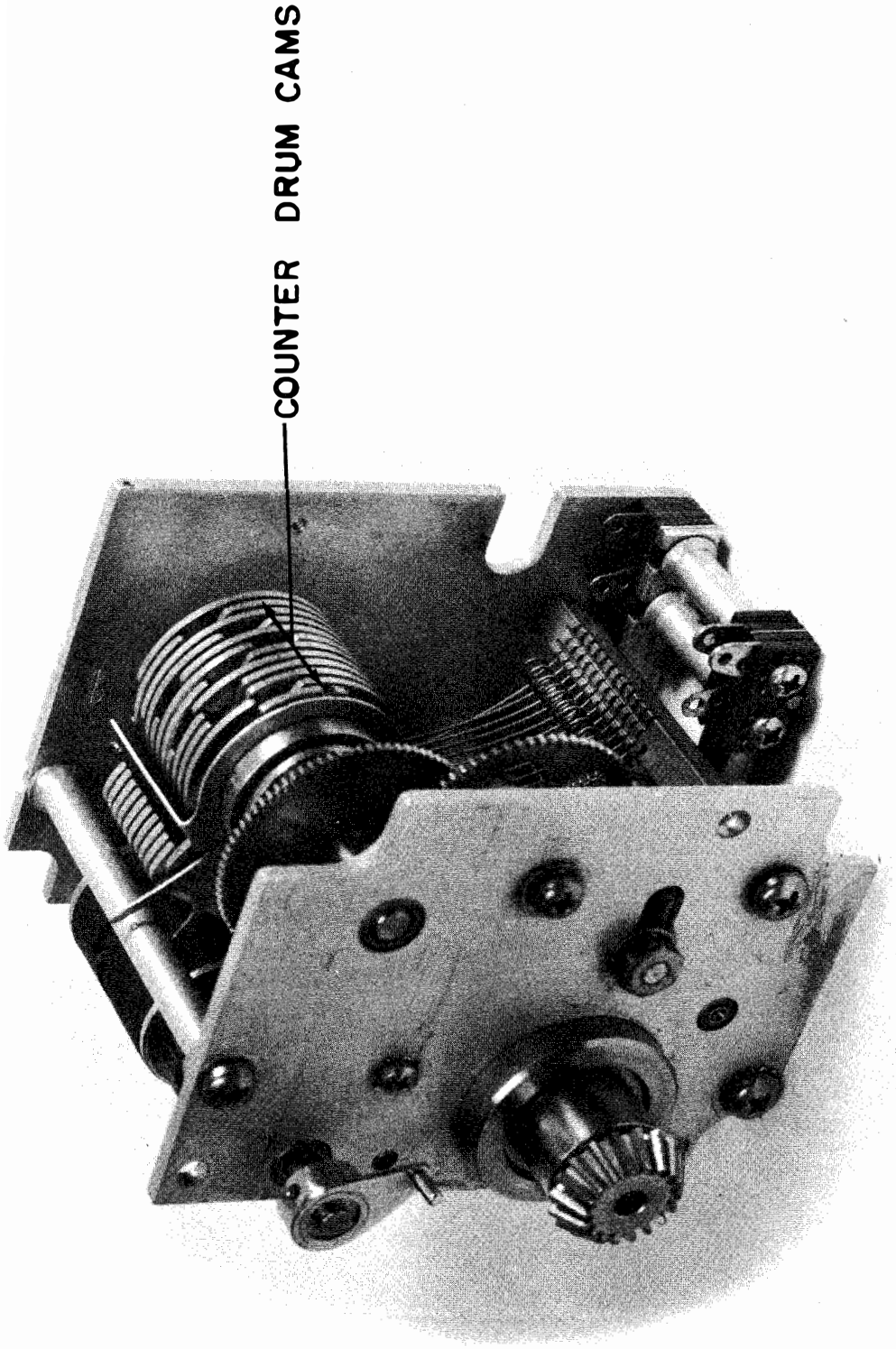


Figure 5-19. Positions of Counter Drum Cams in 0735 Before Alignment

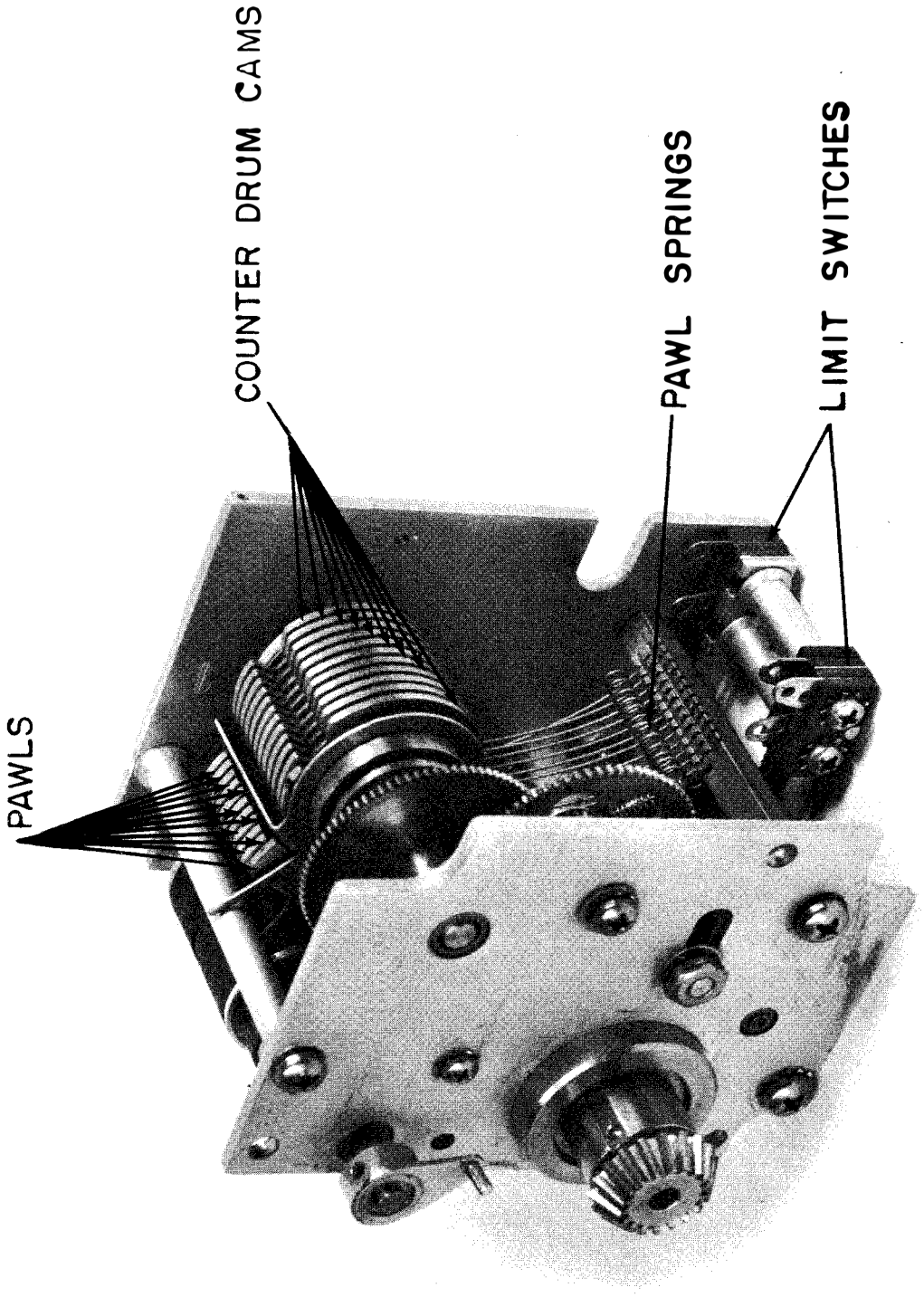


Figure 5-20. Correct Alignment of Counter Drum Cams in 0735

(2) Remove Tuning Head in accordance with instruction in paragraph 2.e. of this section.

(3) Remove Channel Indicator and Counter dials. The front panel may now be removed.

(4) Remove the front supports, resistors R701 and R702 and resistor holders E708.

(5) For removal of 0734, continue as follows:

Step 1. Disconnect limit switches S702A and S702B by unsoldering leads. Do not dismantle the switch.

CAUTION

The exact position of Gears 0726 must be resettable. These gears should be marked as indicated in figure 5-21 prior to removal of unit so that correct alignment may be checked before inserting the new unit. If these precautions are not taken, improper indexing and subsequent damage to the RF Coupling Section, Tuning Head, or both, may result.

Step 2. Remove the three drive mechanism mounting screws. See Figure 5-13.

Step 3. Carefully pull the unit out as far as possible. Be certain that no gears remain meshed; then, remove the taper pin which holds gear 0723 in place. Drive the pin back with a small punch and hammer to loosen it, and pull out with long nose pliers. The main dial may be unlocked and turned to facilitate pin removal if care is exercised and gear settings are not disturbed. The gear should be worked off after which the Drive Mechanism may be pulled clear of the housing. The operation is complete.

(6) For removal of 0735, continue as follows:

CAUTION

The exact positions of Gears 0728 and 0718 must be resettable. These gears should be

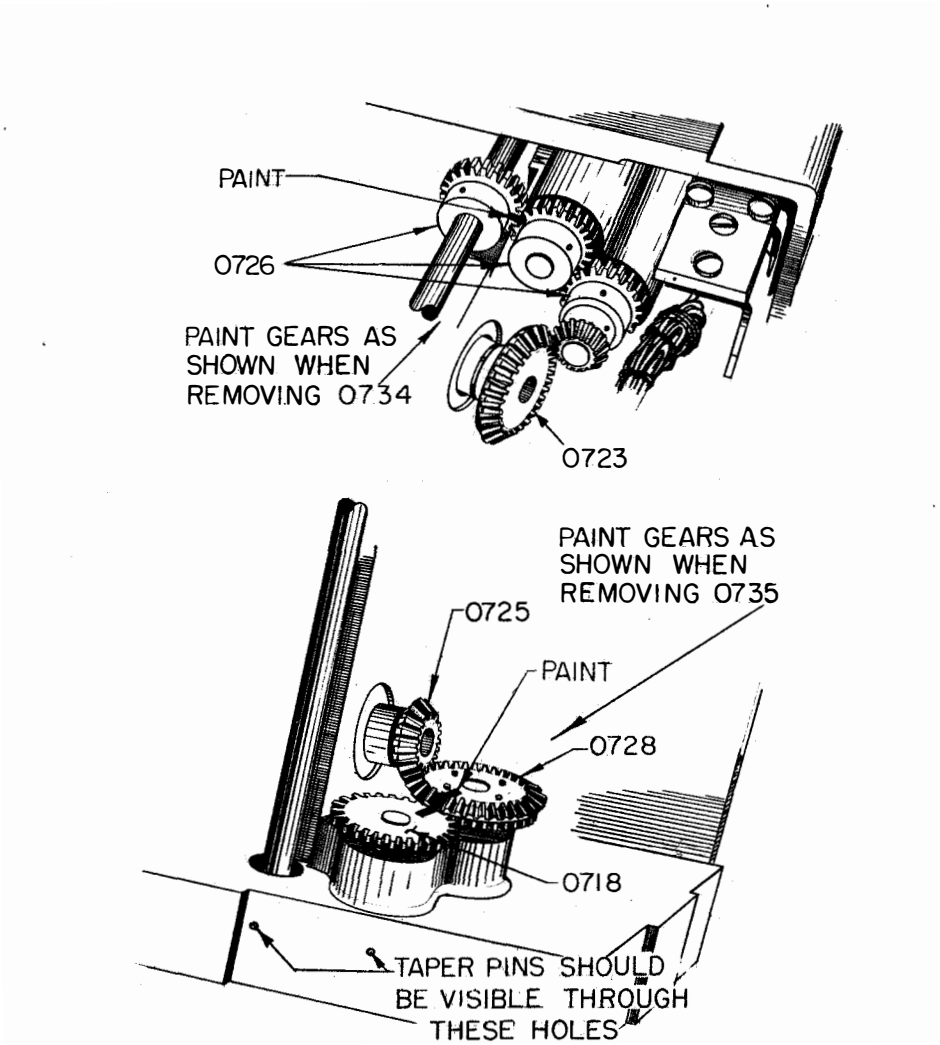


Figure 5-21. Marking Gears Prior to Autotune Removal

marked as indicated in figure 5-21 to assure correct alignment prior to installation of the new unit. If this precaution is not taken, inproper indexing and subsequent damange to the RF Coupling Section, Tuning Head, or both, may result.

Step 1. Using an 050 Allen wrench, loosen the set-screws on crank 0711.

Step 2. Remove the three drive mechanism mounting screws. See figure 5-12. The unit may now be pulled out as the crank is worked free.

c. ALIGNMENT OF DRIVE MECHANISM.

(1) If the Drive Mechanisms, 0734 and 0735, function correctly on two or more channels and do not function on some other channels and it has been visially determined that stripped or worn gears, bent or broken pawls and springs, or a slipping clutch are not at fault, the unit may be malaligned and the procedure below must be followed. Figure 5-19 shows a Drive Mechanism before alignment.

Step 1. Remove the defective mechanism from the Tuning Head, per paragraph 3.b., above.

Step 2. Turn channel selector drum (as indicated in figure 5-19) counterclockwise until the tail of the pawl second from the main dial falls into the cam slot on the drum cams. All pawl reference will be in terms of engagement of the pawl with the channel selector drum. Turn drum clockwise as far as the pawl tail permits.

Step 3. With the locking bar locked, rotate, the main dial clockwise as far as possible. If the pawl drops into the main and counter drum slots during this operation, go on to step 4. If it does not, turn the dial counterclockwise. At some point during the course of travel, the pawl should drop as indicated above. If it fails to do so, turn the channel selector drum counterclockwise to the next pawl position and repeat this step. Continue this precedure until one of the pawls is properly engaged in the corresponding main and counter drum cam slots.

If no pawl engages, rotate each counter drum cam 1/2 inch and repeat this step

Step 4. After the pawl is seated, the locking bar should be unlocked and the main dial rotated counterclockwise until the step position is reached. The dials (except for the channel indicator dial if 0734 is being aligned) should now read zero. Lock the locking bar. The main dial should travel no more than ten dial increments. If greater travel is noted, the unit is defective and must be replaced.

Step 5. Note which cam slot on the counter drum has seated the pawl. This slot will be the reference point for alignment of the remaining cams.

Step 6. Rotate the channel selector drum until the pawl nearest the main dial falls. The main dial will now be free to rotate through its entire travel. Using a small screwdriver, carefully move all cams on the counter drum against their frication clutch until their slots are approximately in line with the slot on the reference cam as shown in figure 5-20.

Step 7. Reset the channel selecter drum so that the secon pawl from the main dial is engaged. Repeat step 4 until all pawls drop within the ten increment main dial limit as the channel selector drum is turned to successive positions. The Drive Mechanism is now correctly aligned.

d. INSTALLATION OF THE DRIVE MECHANISM.

(1) Installation of 0734- Before installing Drive Mechanism 0734, gears 0726 must be aligned to the exact positions they were in at the time the unit was removed. See paragraph 3.b. (6), above, and figure 5-21. If this precaution is not taken, improper indexing and subsequent damange to the RF Coupling Section, Tuning Head, or both, may result

Step 1. Be sure that the Drive Mechanism is correctly aligned and that Channel 1 has been manually set to the zero position (per paragraph 3.c., above).

Step 2. Be sure that Drive Mechanism 0735 has not been moved from the zero position.

Step 3. Rotate the 0734 channel selector drum counter-

clockwise until the second pawl from the front of the unit is engaged and seated in the cam slots on the counter and main drums. Reverse rotation until the stop position is reached. Loosen set-screws on the channel-selector drum clutch with a #2 Bristol key. The internal spring loading should cause the clutch to move away from the small worm wheel. Prevent the clutch from rotating and turn the small worm wheel counterclockwise until it hits the clutch stop pin. Maintain the relative positions of the wheel and clutch while rotating both until one of the clutch set-screws is accessible from the top of the Drive Mechanism. Do not tighten the set-screw.

Step 4. Insert the unit into the Tuning Head. Use care to avoid moving any of the aligned gears in the Head. Simultaneously, slip the large spur gear, 0723, over the Drive Mechanism shaft. Install mounting screws, but do not tighten them.

Step 5. IIt will be noted that there is a small amount of "play" in the mounting arrangement. This facilitates adjustment of the worm wheel mesh. The drive Mechanism should be set so that there is a minimum amount of looseness at the gears, yet no binding. Tighten mounting screws.

Step 6. Turn the clutch clockwise to within 1/64 inch of the stop position, move laterally against spring pressure toward worm wheel as far as possible without binding, then tighten the set-screws.

Step 7. Re-connect limit switches S702A and S702B. See wiring diagram, figure 5-39.

(2) INSTALLATION OF 0735.--Before installing Drive Mechanism 0735, Gears 0718 and 0728 must be in the exact positions they were in at the time the Drive Mechanism was removed. Failure to observe this precaution will result in improper indexing and subsequent damage to the RF Coupling Section, Tuning Head, or both.

Step 1. Be sure that the 0735 unit is properly aligned (all channels zeroed). See paragraph 3.c., this section, for alignment instructions.

Step 2. Be sure that Drive Mechanism 0734 and associated gears have not been moved from the zero position.

Step 3. Rotate the channel selector drum counterclockwise until the second pawl from the front of the drive unit is engaged and seated in the cam slots

on the channel and main drums, then reverse direction and turn to the stop position. Loosen set-screws on the channel-selector drum clutch with a #2 Bristol key. The internal spring loading should cause the clutch to move away from the small worm wheel. Prevent the clutch from moving and turn the small worm wheel counterclockwise until it hits the clutch stop pin. Maintain the relative positions of the wheel and clutch while rotating both until one of the clutch set-screws is accessible from the top of the Drive Mechanism.

Step 4. Insert the Drive Mechanism into the Tuning Head. Carefully avoid moving any of the aligned gears. Simultaneously, slip crank 0711 over the channel-selector drum shaft. Install mounting screws, but do not tighten them.

Step 5. It will be noted that there is a small amount of "play" when the mounting screws are partially tightened. This facilitates adjustment of the worm gear and worm wheel mesh. The Drive Mechanism should be placed so that there is a minimum amount of looseness in the mesh, yet no binding. The mounting screws should then be tightened.

Step 6. Turn the clutch clockwise to within 1/64 inch of the stop position, move laterally against spring pressure as far as possible without causing binding, then tighten set-screws.

e. REMOVAL, INSTALLATION, AND ADJUSTMENT OF SEEKING SWITCH S701.

(1) The rotary seeking switch, S701, in conjunction with the stepping relay and the external dialing circuits, is primarily responsible for the correct channeling of the Tuning Head. Should its contacts become worn or pitted, improper channel selection may result, necessitating replacement of the switch. In such cases, the procedures described below should be followed.

(2) REMOVAL OF S701.

Step 1. Dial channel 1 on the TDZ or other control equipment. Loosen the locking bars and set the dials to the zero-stop position. Lock the dials. If the equipment is inoperative on channel 1, any other operable channel may be used. Difficulty may be encountered during adjustment if any other channel is used, however, as the proper contacts of the switch may not be readily accessible for continuity checking.

Step 2. Remove the Tuning Head in accordance with instructions in paragraph 2.e., this section.

Step 3. Remove Drive Mechanism 0735 as outlined in paragraph 3.b. of this section.

Step 4. Un-solder all connections to the switch.

Step 5. Remove the two flat-head mounting screws and withdraw the switch.

(3) INSTALLATION AND ADJUSTMENT OF S701.

Step 1. Position switch in Tuning Head and insert the two flat-head mounting screws.

Step 2. Re-solder all connections to the switch. Check continuity with an ohmmeter. See wiring diagram, figure 5-39.

Step 3. Connect an ohmmeter across contacts "C" and 1 of S701A if channel 1 is being used as the reference channel. See the schematic, figure 5-37. If any other channel has been used, the meter should be placed across contact "C" and the contact for the appropriate channel.

Step 4. With a pair of pliers, rotate the inner contact of the switch clockwise (as viewed)from the rear) until the switch barely opens. Continue rotation 1/64 inch beyond this point and the switch will be properly adjusted. Crank 0711 may now be set as indicated in paragraph 3.d.(2) step 7, above.

f. CLEANING RELAY AND SWITCH CONTACTS.

Equipment failure or improper channeling may be the result of dirty, pitted, corroded or worn contacts on

S701, S702, K701 or K702. Contacts of S701 and K701 may be cleaned with ethyl alcohol (per spec JAN-A-463) and a small stiff brush. Contacts of K702 and S702 should be cleaned with #0000 Crocus cloth (spec P-C-458) or a burnishing tool. Do not allow filings to drop into equipment.

Note

Do not use emery cloth. Emery cloth contains metallic particles which may cause arcing or shorting of the contacts.

g. RELAY REPLACEMENT.

Stepping switch K701 and relay K702 must be replaced when the energizing coils become open or the contacts become too worn or pitted to give a good electrical connection. If the energizing coil of K701 is open, the switch will not step and the equipment will not cycle. If the release coil is open, the equipment will not channel correctly. When a channel is dialed the switch will not drop back to home-stop position but will only step up, one step for each control pulse. This will continue until channel ten is reached, after which no further operation of the equipment will be possible, except on channel ten. The energizing coil of the switch will click characteristically but the rotor of the switch will remain in position ten.

If any of the contacts of K701 are so badly pitted or worn that there is no electrical continuity through them, the equipment will not operate on the channels to which the contacts correspond; the motor will not run. The equipment will cycle normally on all other channels.

If the energizing coil in the motor control relay K702 is open, the relay contacts will remain unenergized and the dials will turn clockwise (if at all) until the up limit switch S702A is opened. Inertia will carry the motor through the open contact of the seeking switch S701A. Poor contacts in K701 will cause improper, intermittent or no operation of the Tuning Head. A shorted coil will cause fuse F702 to blow.

To correct any of the difficulties listed above, the relays or coils must be replaced. K701 is replaceable after the Tuning Head has been removed from the equipment. Remove the two mounting screws on the motor side of the casting with a long screwdriver and unsolder all connections. Reverse the procedure to install the new relay. See the wiring diagram, figure 5-39 for wiring details.

K702 can be removed by taking out the three mounting screws which are accessible from the top of the relay. Unsolder all connections, reverse the procedure to install the new relay.

h. MOTOR MAINTENANCE AND REPLACEMENT.

The prime indication of motor failure is non-operation of the motor when it has been ascertained that the stepping switch K702 and relay K701 are operational and that motor wiring and brushes are in good condition. The motor may be removed from the Tuning Head by disconnecting all wires on terminal board TB701 and removing the four motor mounting screws. See figure 5-15. To install the new motor, simply reverse this procedure. Be careful of the gears when setting the motor into position.

i. GEAR AND SHAFT REPLACEMENT.

See figure 5-22.

CAUTION

Gear or shaft replacement must not be attempted by technicians. Call a machinist. Improper installation of gears or shafts can cause serious equipment damage.

All gears in the manual Tuning Head are attached to their respective shafts with standard taper pins. Coupling spiders 0829 are affixed in the same amnner. All shafts are held at one or both ends with retaining rings. It is absolutely vital that, when gears are replaced on any shaft, the new gear be installed with its teeth in the same position relative to the other gears as were the factory installed gears. This must be done to retain the critical relationships required throughout the Coupler gear trains to prevent overtravel of the Quarter-wave Element and Line Tuning Platform, to maintain proper indexing between the two drive mechanisms, etc. If it is necessary to re-drill the taper pin holes in the shaft, the new holes should be drilled 90 degrees around from the old holes. If this is done for one gear on any shaft, all other gears on the shaft (except those with multiples of four teeth) must be rotated 90 degrees as well in order to maintain the position relationship.

If any of the shafts need replacing, it will be necessary to fabricate the replacement. The new shaft must be machined to a tolerance of $\pm$0.0000",-0.0005". Linearity

(straightness) must be within ±0.003". Shaft dimensions are given in the Table of Replaceable Parts, table 6-2.

When the coupling spiders 0748 are replaced, it is important that the shaft, after re-work or fabrication, be installed in the Tuning Head and pulled snug against its retaining ring before the new spider is pinned on. This will help to keep the axial motion of the shaft at a minimum which in turn will minimize the loss of motion due to poor gear fit. Be sure to lubricate the Tuning Head after replacing gears. See figure 4-2.

After replacing any gear other than the motor drive gear 0719, the entire coupler must be synchronized; i.e., both drive mechanisms aligned (paragraphs 3.a., b. and c.), S701 adjusted (paragraph 3.e.(3) steps 3 and 4), and the RF Coupling Section reindexed (paragraphs 2.e. and f.). All references are to this section.

When the Coupler is reinstalled, all operating channels must be retuned according to paragraphs 2.a.(1), (2) and (4) of this section.

4. MAINTENANCE OF THE MANUAL TUNING HEAD.

Generally, very little trouble will be encountered with the Manual Tuning Head if the Head is lubricated as specified in the Lubrication Chart of figure 4-1 and the tuning knobs are turned at a moderate rate. If the knobs are turned too fast the counter will be damaged and will have to be replaced.

a. REPLACEMENT OF COUNTER 1801/

Step 1. Turn the LINE and COUPLER TUNING knobs counter-clockwise to the stop position. Set the dial locks. Remove the tuning head from the coupler as outlined in paragraph 2.e. of this section.

Step 2. Remove the panels on the left-hand side and top of the Tuning Head.

Step 3. The upper counter may now be removed by unscrewing the Allen head screws with a #332 Allen key. The lower counter may be removed by using the key through the elongated access hole to remove one screw. It will be necessary to fabricate a ~~screwdriver-type key~~ at least 7 inches long to remove the other screw.

Step 4. After the counter has been removed, a new one may be installed by first setting the counter to read zero all the way across and then reversing steps 1, 2 and 3 above. After installing the counter, check to see that it reads zero when the knob is turned counterclockwise to the stop. See paragraph 2.f. of this section for reinstalling the Tuning Head.

Step 5. If the new counter is properly installed, the log of operating frequencies on the Calibration Chart will still be correct; however, it is advisable to spot-check or completely check the operating frequencies. See paragraphs 2.a.(1), (2) and (3) of this section.

b. REPLACEMENT OF GEARS AND SHAFTS.

(See figure 5-23.)

CAUTION

Gear or shaft replacement must not be attempted by technicians. Call a machinist. Improper installation of gears or shafts can cause serious equipment damage.

All gears in the manual Tuning Head are attached to their respective shafts with standard taper pins. Coupling spiders 0829 are affixed in the same manner. All shafts are held at one or both ends with retaining rings. It is absolutely vital that, when gears are replaced on any shaft, the new gear be installed with its teeth in the same position relative to the other gears as were the factory installed gears. This must be done to retain the critical relationships throughout the Coupler to prevent overtravel of the quarter-wave element and the line-tuning platform when each tuning drive reaches its stop positions. If it is necessary to re-drill the taper pin holes in the shaft, the new holes should be drilled 90 degrees around from the old holes. If this is done for one gear on any shaft, all other gears (except those with multiples of four teeth) on the shaft must be rotated 90 degrees as well in order to maintain the position relationship.

If any of the shafts need replacing, it will be necessary to fabricate the replacement. The new shaft must be machined to a tolerance of +0.0000", -0.0005". Linearity (straightness) must be within ±0.003". Shaft dimensions are given in the Table of Replaceable Parts, table 6-2.

When the coupling spiders (0829) are replaced, it is important that the shaft, after re-work or fabrication, be installed in the Tuning Head and pulled snug against its retaining ring before the new spider is pinned on. This will help to keep the axial motion of the shaft at a minimum which in turn will minimize the loss of motion due to poor gear fit. Be sure to lubricate the Tuning Head after replacing gears. See figure 4-1.

After gear or shaft replacement, the Tuning Head must be properly indexed when it is remounted on the RF Coupling Section; see paragraph 2.f. of this section.

When the Coupler is reinstalled, retune and relog all operating frequencies per the regular tuning procedure of paragraphs 2.a.(1), (2) and (3) of this section.

5. MAINTENANCE OF THE RF COUPLING SECTION.

a. INSPECTION AND CARE OF CONTACT SURFACES.--The most important factor in determining the rf efficiency of the Antenna Coupler is the electrical contact made by the various moving components of the RF Coupling Section. If poor continuity exists through any of the contacts at any point along their course of travel, the Coupler will not function, or, at best, will operate with high losses. A simple, effective method of checking the RF Section is to visually inspect all points at which there is any electrical contact, even though that contact may be for ground bonding only. Due to the high frequencies at which the Coupler operates, ohmmeter checks are not likely to be indicative. The best method of determining the rf efficiency is to measure the insertion loss by the bridge method, or the rf wattmeter method according to paragraph 2.b. of this section. This is recommended whenever practicable after a Coupler has had repairs to the RF Coupling Section or has been in use for a long time.

Dirt, corrosion, wear of plating, bent or broken contacts, will all contribute to poor operation of the equipment. Dirt and corrosion can be removed as indicated in paragraph 5.a.(1), below. Worn contacts are discussed in paragraph 5.a.(2), below.

(1) CLEANING DIRTY CONTACTS.--If the equipment is to function correctly, it is vital that all contact surfaces be clean and free from dirt and other injurous material. If the visual inspection has revealed galling of the surfaces, the burrs must be removed with a sharp tool and finished with #0000 Crocus cloth (spec P-C-458). During this procedure, care must be taken not to wear away the

silver plating any more than necessary. Flood the surface with Ethyl alcohol (per spec JAN-A-463) and scrub with a moderately stiff brush until clean. Polish the contact surfaces with a good grade of silver polish (spec MIL-P-15423 or MIL-P-15423A). Wash clean, and dry with soft clean cloth. Make sure that there is no polish remaining on the metal as the polish is mildly abrasive, and, in time, will wear the silver away.

(2) WORN CONTACTS.--The silver plated contacts are subject to wear and in time will wear through, causing inefficiency, intermittent operation and introducing noise and instability. When this occurs the parts having the worn contacts must be replaced or the contacts must be replated. Plating should be of the best grade of contact silver 0.0005 inch thick. See the following paragraphs for the general disassembly procedure for the RF Coupling Section.

b. DISASSEMBLY OF RF COUPLING SECTION.--In order to remove or replace any of the major sub-assemblies of the RF Coupling Section, complete disassembly is required, a standard procedure follows. See exploded views, figures 5-24 through 5-28, and photographs, figures 5-29 through 5-35.

Step 1. Remove the cover plates and Tuning Drive as outlin in paragraph 2.e. of this section.

Step 2. Remove three of the main structural angle irons leaving the one of the left rear for support. The left-front angle is removed and the left-rear angle indentified in figure 5-29.

Step 3. Remove the screws holding the top end of the antenna line, E726 (semi-coaxial). Four of these screws marked "Z" in figure 3-6, are for holding the top elbow E706 (E719 with female adaptor, E720 with male adaptor). The top elbow will come off after these screws are replaced; the other four screws must also be taken out to release the antenna line E726.

Step 4. The contact strip E703 should be removed from the platform (figure 5-29). This may best be done by using an offset screwdriver to reach the screws under the quarter-wave element (E748).

Step 5. The movable section of the telescoping transmitter-receiver line (E738) must be removed by taking out the four screws which hold it to the movable platform (A714, figure 5-29 and

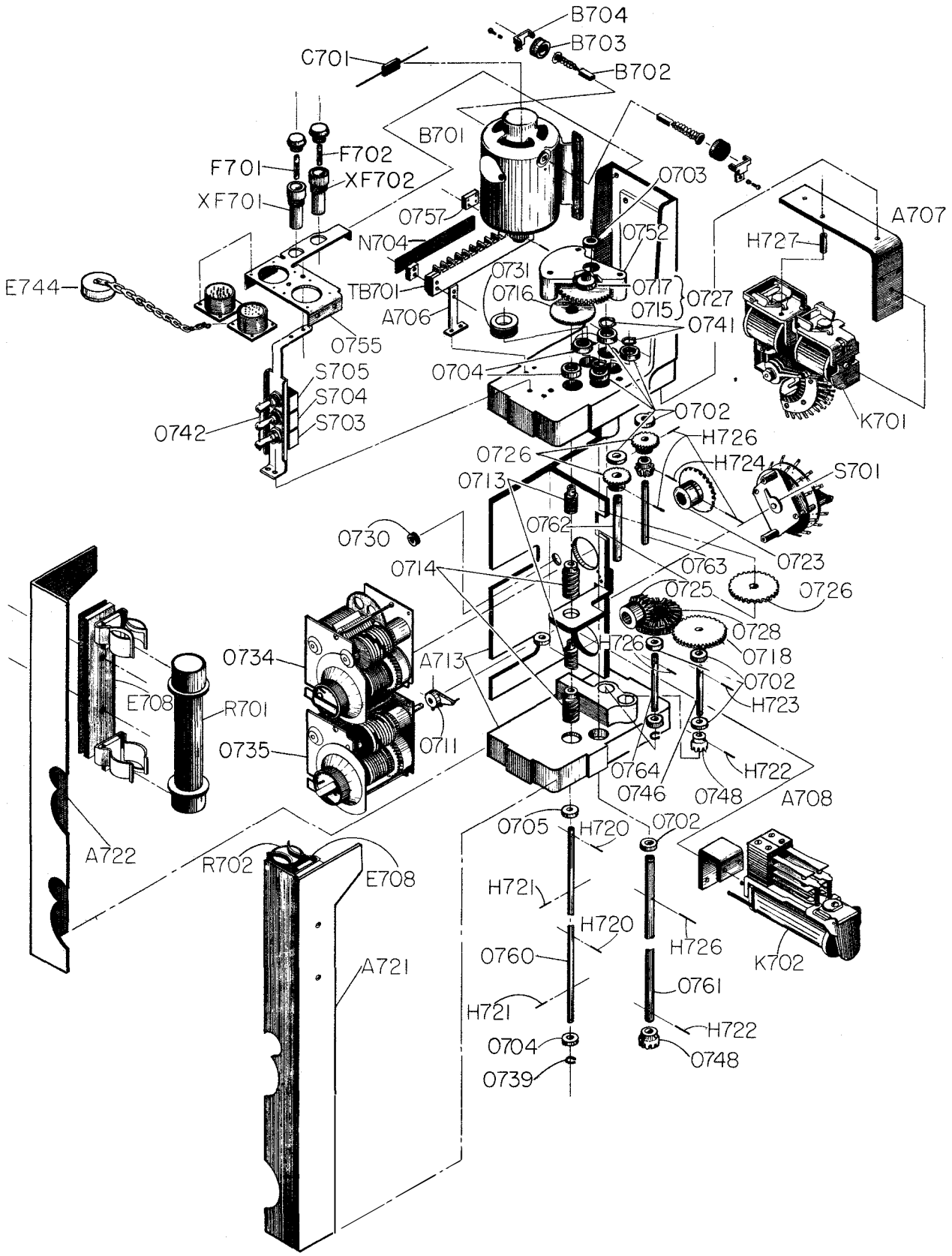


Figure 5-22. Automatic Tuning Head, A702, Exploded View

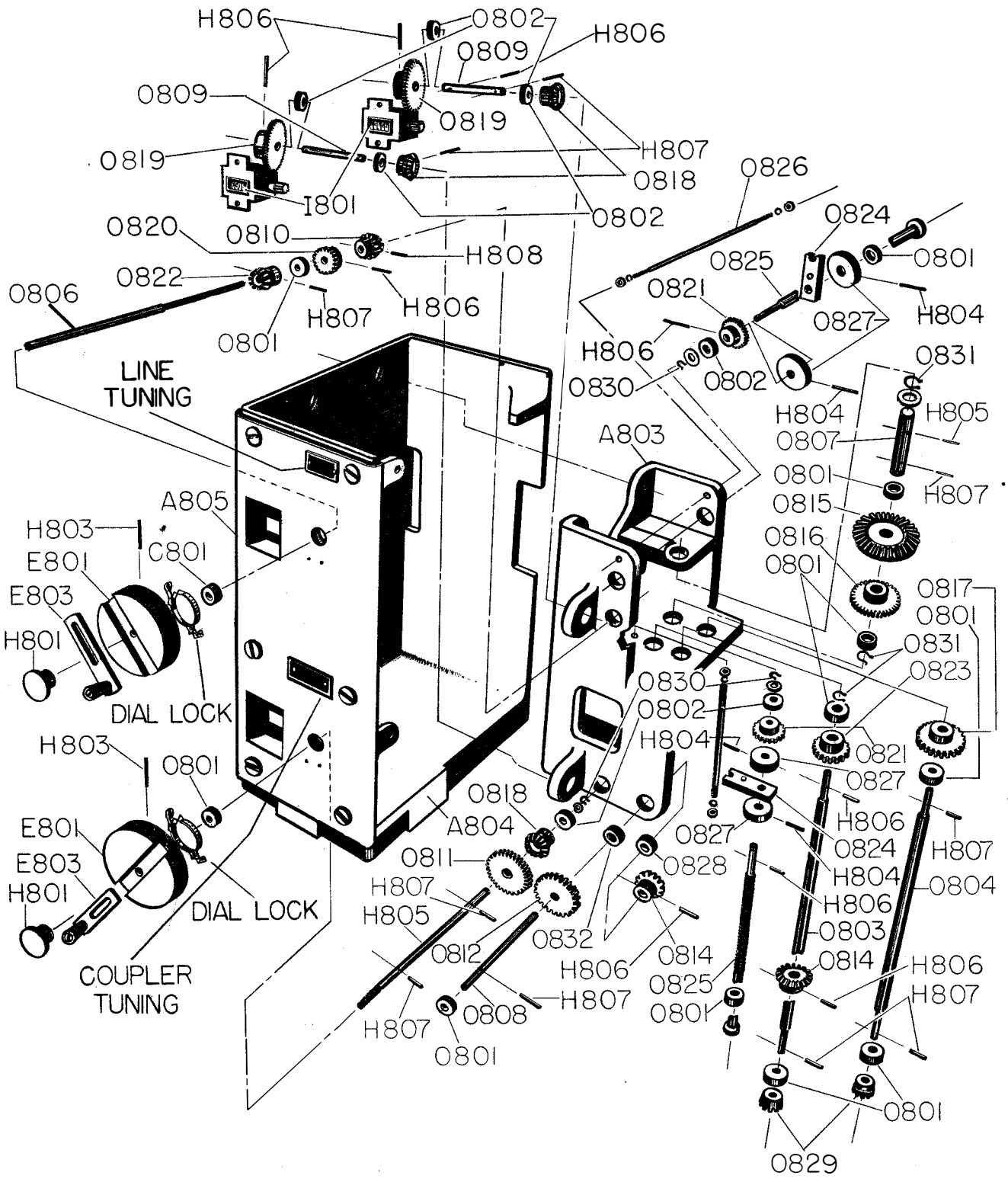


Figure 5-23. Manual Tuning Head, A801, Exploded View

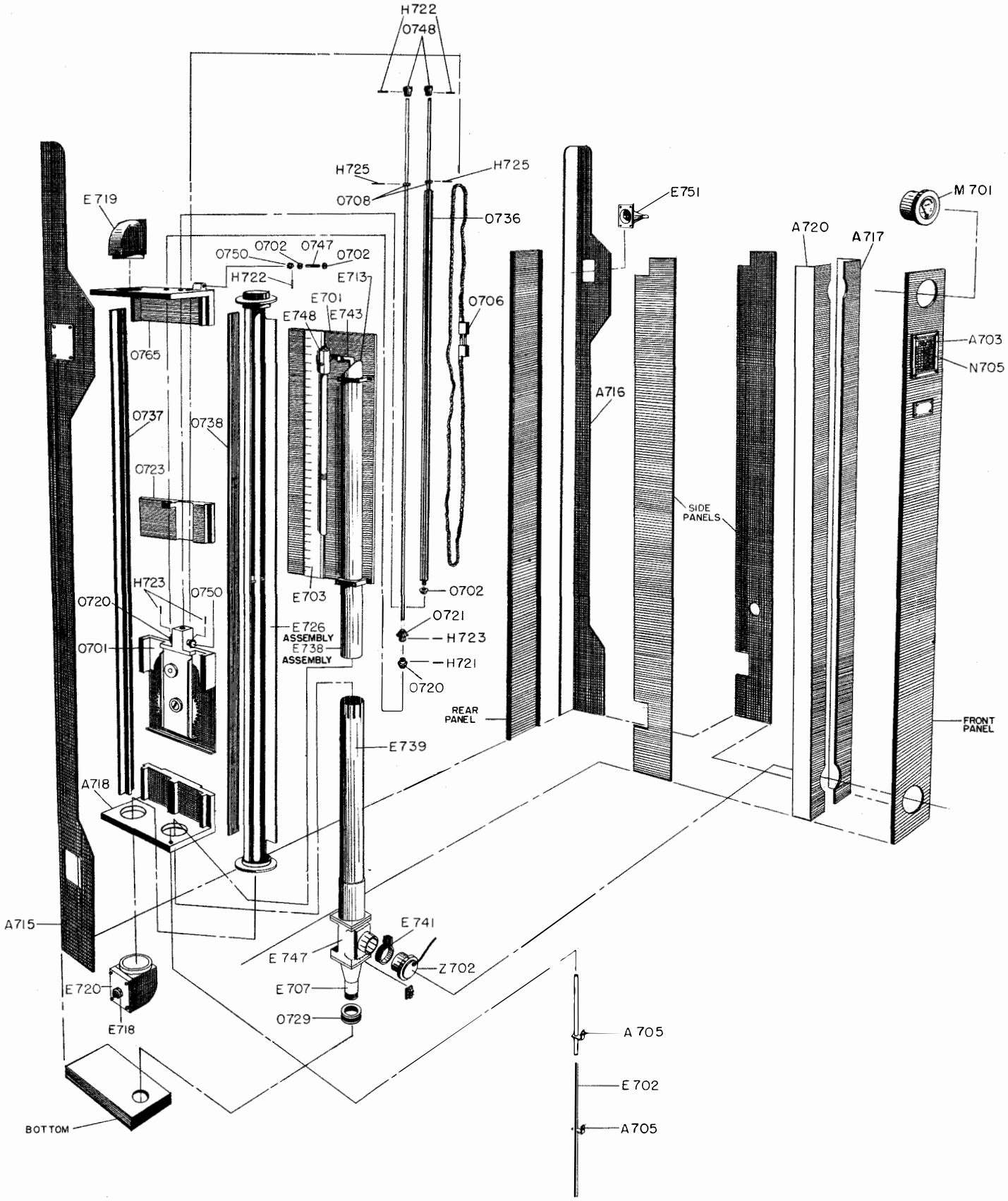


Figure 5-24. RF Coupling Section, A701, Exploded View

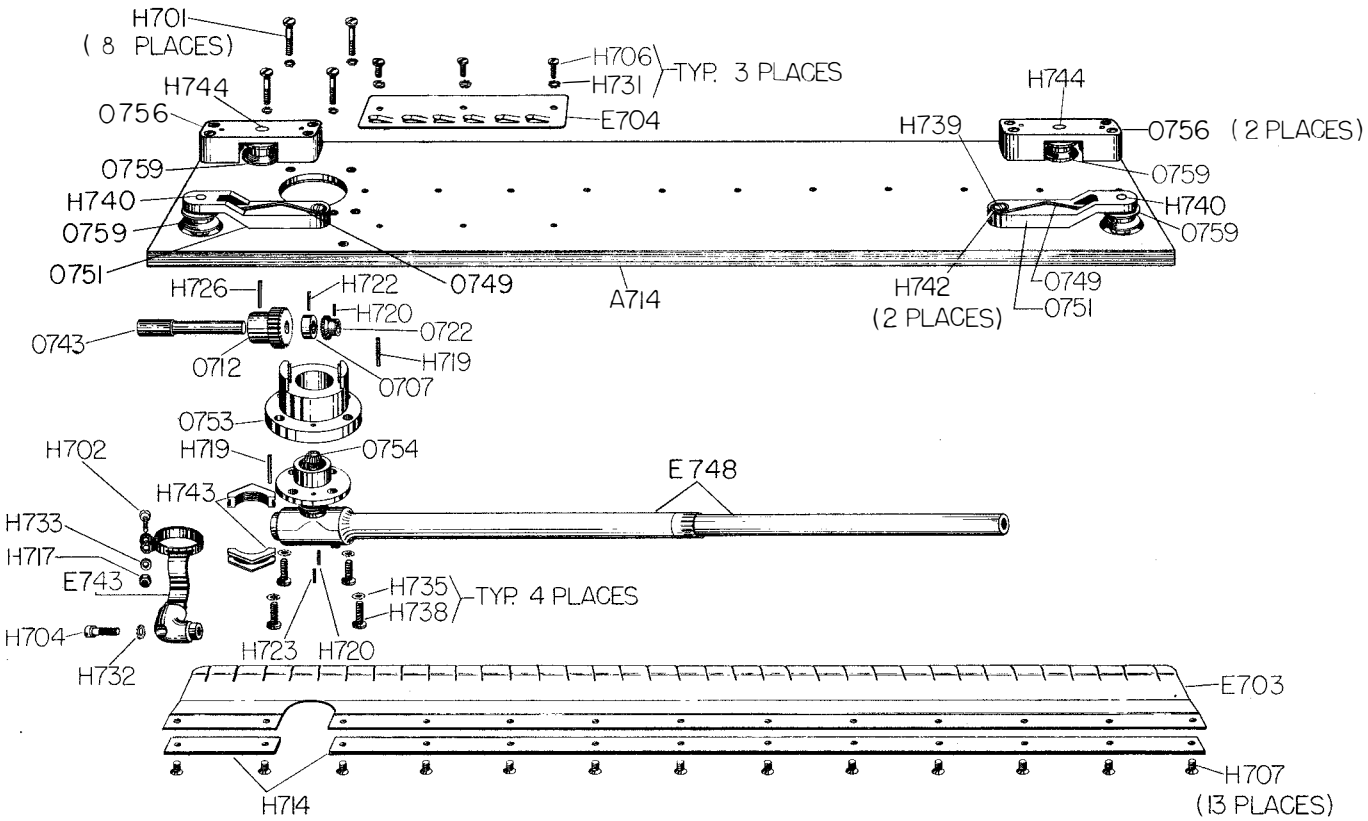


Figure 5-25. Probe-Platform Assembly, Exploded View

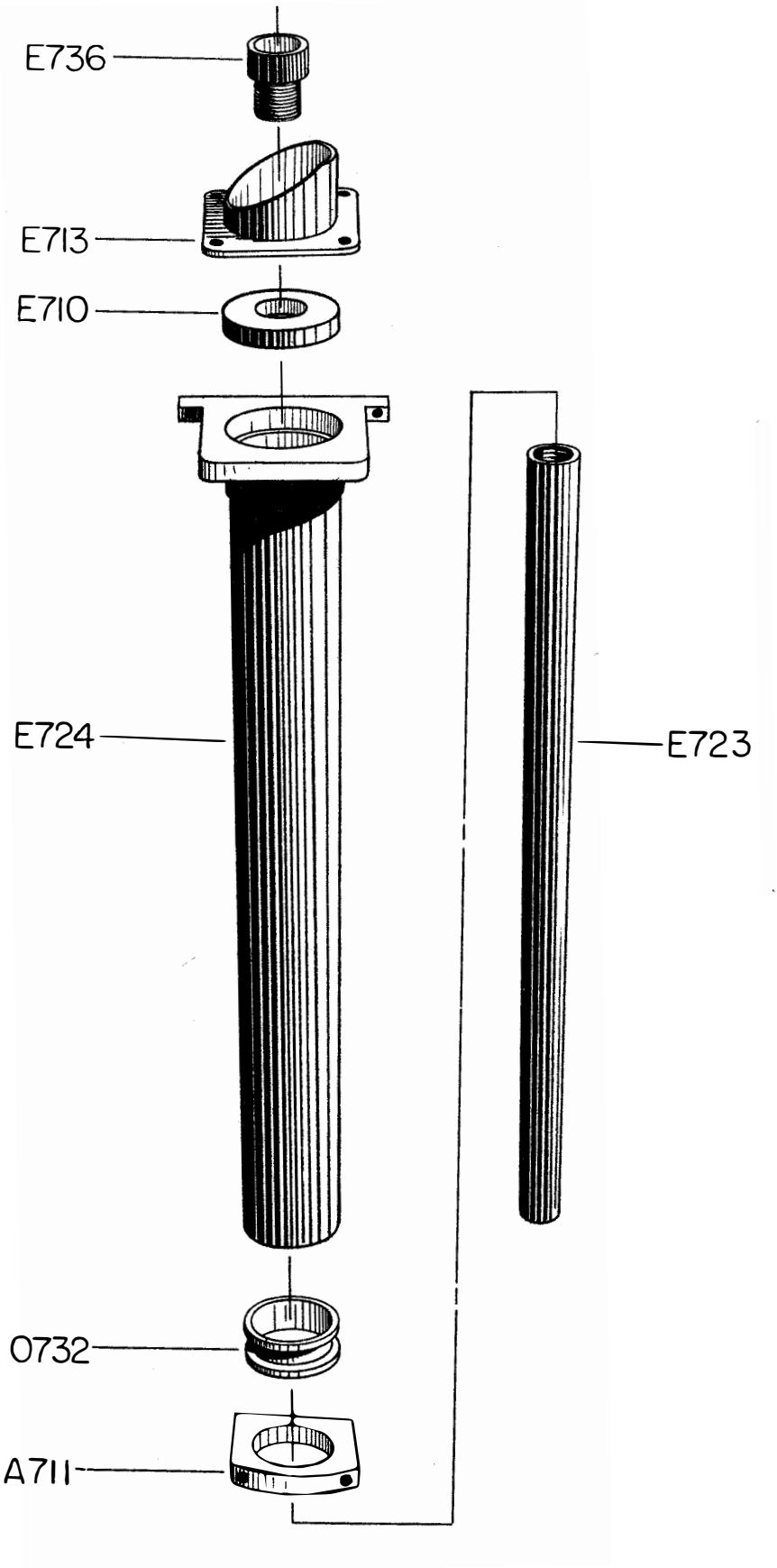


Figure 5-26. Movable Feedline Assembly, E738, Exploded View

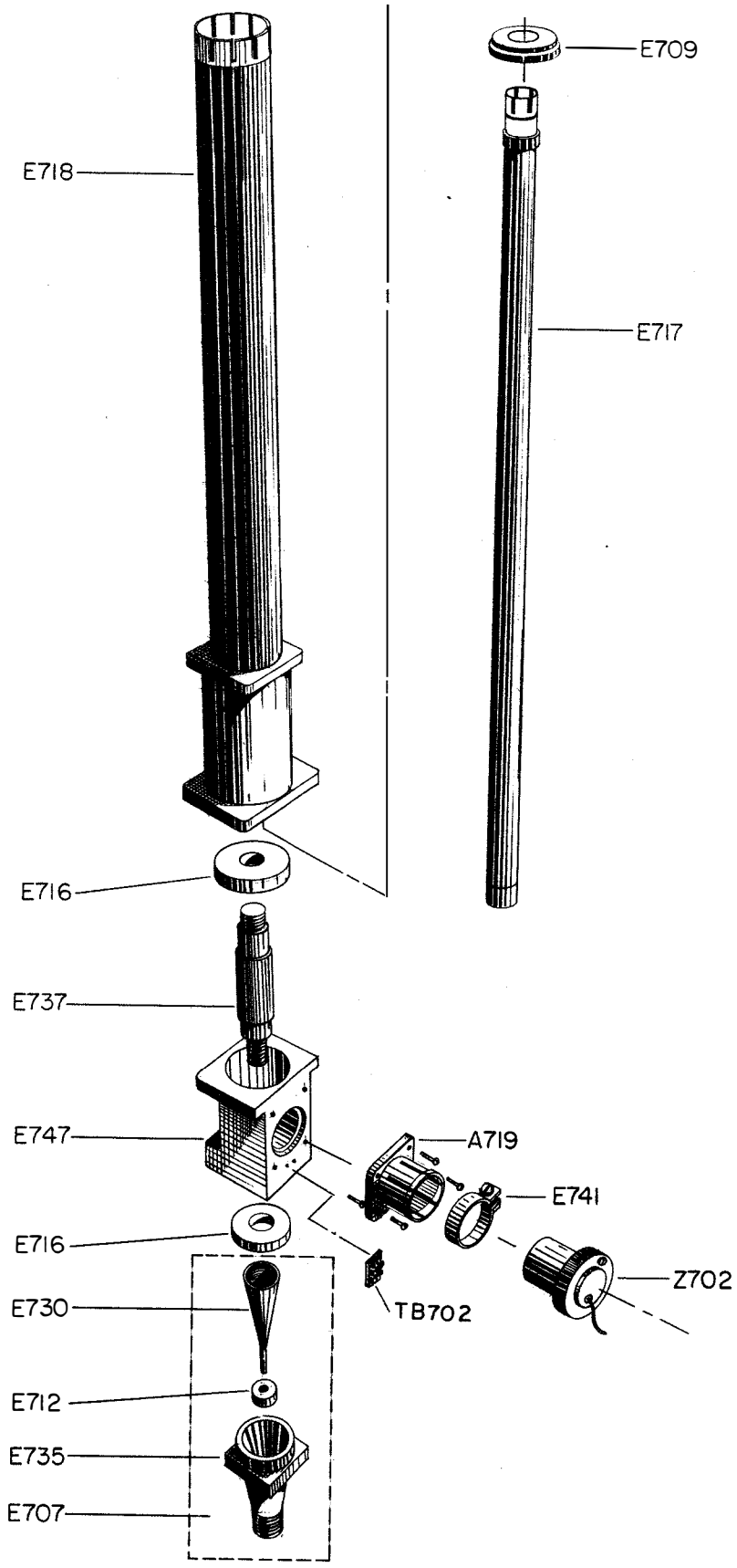


Figure 5-27. Fixed Feedline Assembly, E739, Exploded View

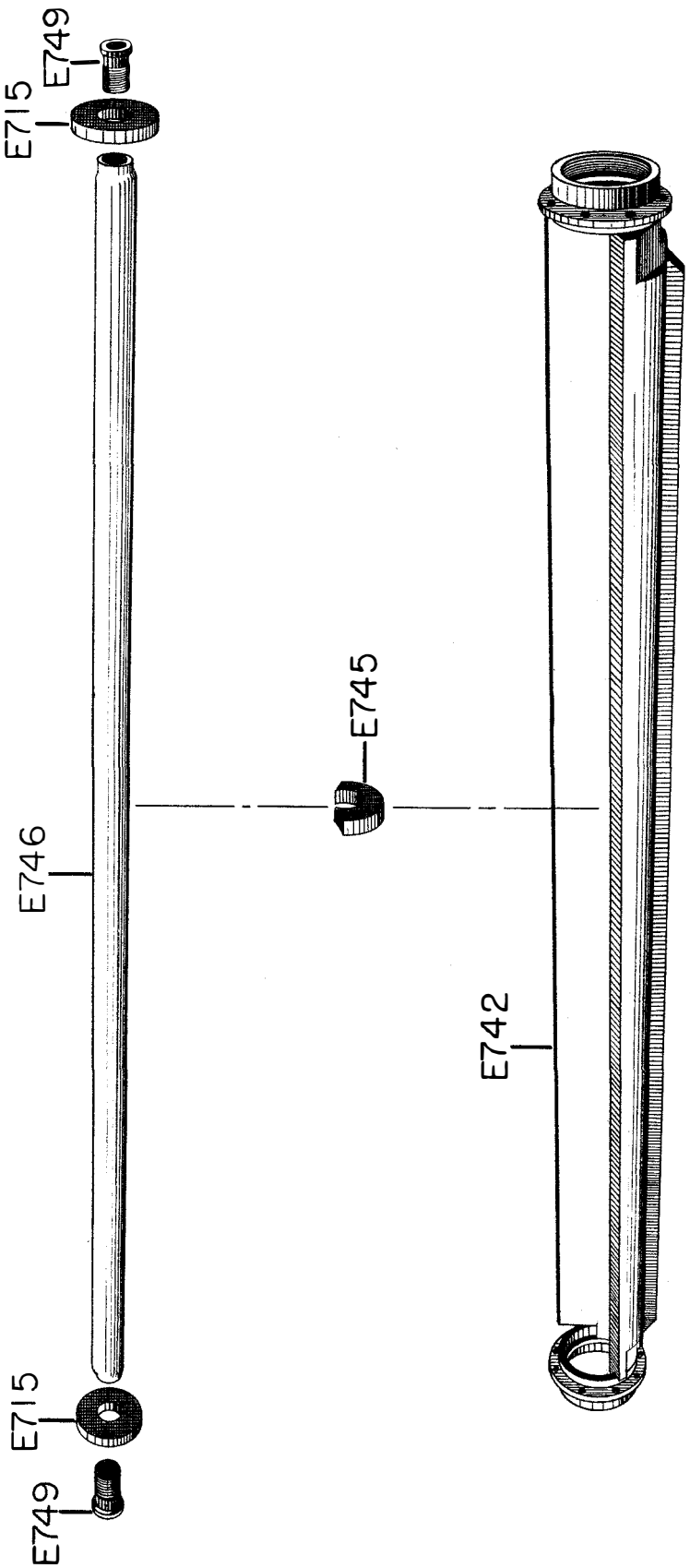


Figure 5-28. Antenna Transmission Line E726, Exploded View

loosening the elbow connector E743 (figure 5-35. The telescoping section can then be pulled toward the top end of the equipment and removed. The mitered line section (E713) must be removed in order to take the insulator (E710) or inner conductor (E723) out (figure 5-33).

Step 6. Remove the four allen screws and the flat countersuck screws which hold the bottom-end casting (A718, figure 5-29 to the guide rails and angle iron. The end casting with the fixed portion of the transmitter-receiver line section (E739) and the antenna line (E726) may now be pulled away from the remainder of the equipment. This stage of disassembly is hown in figure 5-33. This can be further disassembled if necessary.

Step 7. Next, the platform-probe assembly E705 can be removed (figure 5-34). First of all, remove the two screws which hold the drive chain tightener (0769) on the platform (figure 5-35). Be sure to hold the chain when removing the two screws so that the spring tension on the chain will not cause it to slip back suddenly and damage the counter-balance spring assembly. Next, press the two roller arms (0751) away from the rails and tilt the probe-platform as shown in figure 5-34 to lift it out.

Step 8. To remove the quarter-wave element, E748, the two dowl pins marked "A" on figure 5-35 should be knocked out with a center punch. Then, the four screws holding the base of the quarter-wave element must be removed. The element may then be pulled away from the platform. For replacement of a quarter-wave element, see paragraph 5.f., this section.

The transmitter-receiver feedline assembly E739 is shown exploded figure 5-27, indicating further disassembly to be made, if required. The exploded view of E705 is shown in figure 5-25.

Other exploded views in figures 5-24 through 5-28 indicate possible disassembly of various divisions of the RF Coupling Section.

c. COUNTERBALANCE SPRING ASSEMBLY

(1) ADJUSTMENT OF COUNTERBALANCE SPRING TENSION.-- If the motor in the Automatic Tuning Head seems to labor or if it is difficult to turn the knobs in the Manual Coupler as the movable platform moves in either direction (but not both), it is probable that the counterbalance spring is out of adjustment in assembly 0701. If it is too tight the platform will move up more easily than it will move down. If the spring is too loose, the opposite condition will prevail. To adjust, it is necessary that the Coupler be in a vertical position. The right side panel on the RF Coupling Section must be removed. See figure 5-30. Insert a large screwdriver with a heavy,

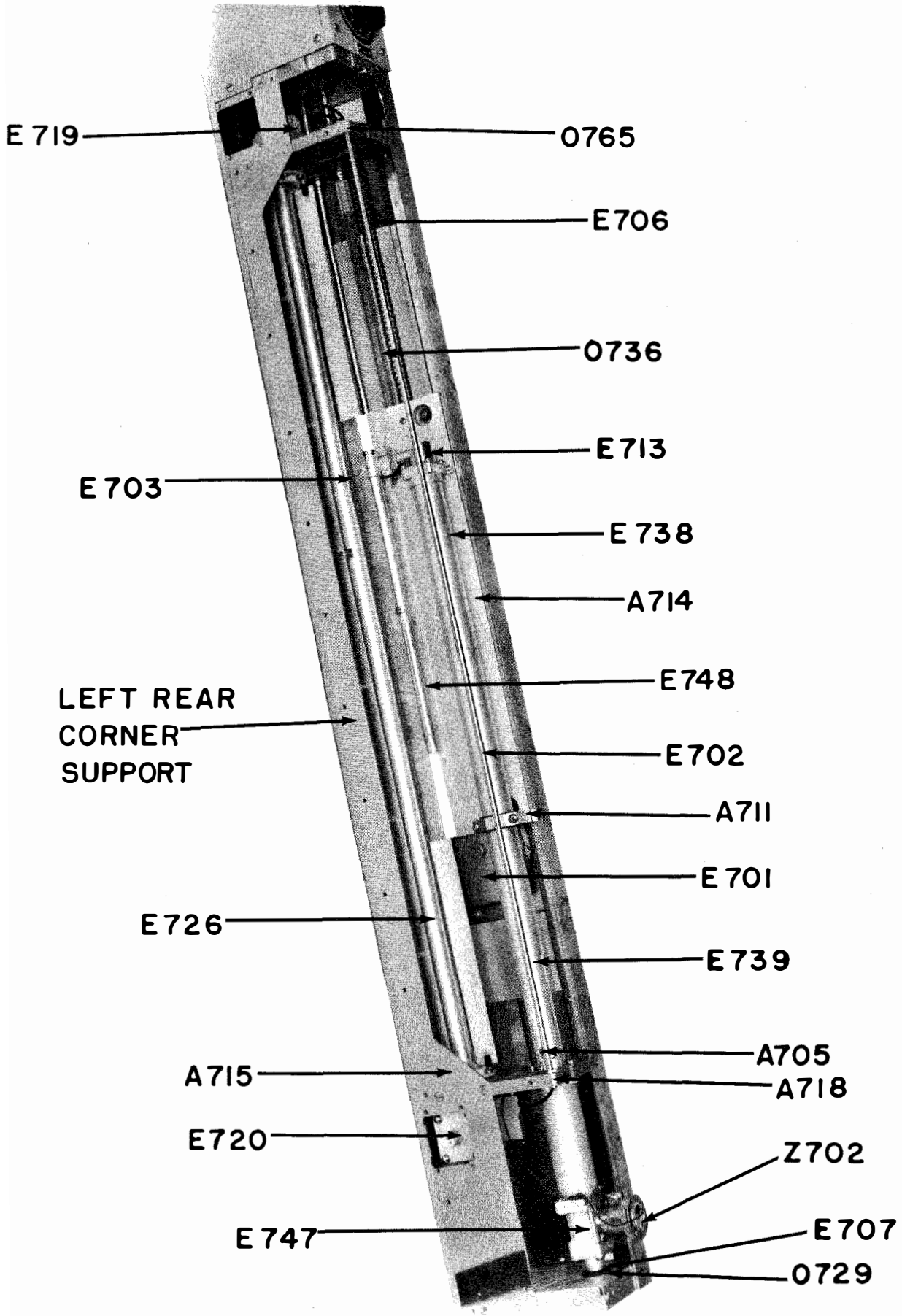


Figure 5-29. RF Coupling Section, Left Front View with Panels and Support A720 Removed

wide blade into the slot in the side of the counterbalance spring "ratchet" and turn clockwise until the "ratchet pawl" can be moved free of the ratchet notches. Turn the screwdriver clockwise to tighten the spring, counterclockwise to loosen. The direction can be determined by noting the torque necessary to operate the platform up and down. When the spring is properly adjusted, the ratchet pawl may be reset in the pawl notch. The platform should move with equal ease in either direction when the correct tension has been set.

(2) REPLACEMENT OF THE COUNTERBALANCE SPRING ASSEMBLY.-- If the tension cannot be adjusted to give a proper counterbalancing effect or if the spring is broken, it will be necessary to replace the entire assembly, (0701). To do this, first complete steps 1 and 2 of paragraph 5.b., this section.

Relieve the tension on the spring by inserting a large screwdriver with a heavy, wide blade into the slot in the side of the counterbalance spring "ratchet" (see figure 5-30 and turning clockwise until the "ratchet pawl" can be moved free of the ratchet notches. Hold the pawl out and allow the ratchet to turn until the spring tension is expended.

Remove the taper pins in gears 0720 and 0721. See figure 5-24. Taper pins may be punched out through access holes shown in fugure 5-30. Next, remove the chain from the sprocket on the spring assembly. This may be done by removing one of the chain's coupling links at the chain tightener (0769). See figure 5-32. The spring assembly (0701) can now be moved away from the top of the equipment until the pinion wire (0736) and drive shaft (0744) are cleared. To insert the new assembly, simply reverse this procedure. Readjust the tension accoding to paragraph 5.c.(1), above. Check the tightness of the drive chain per the following paragraph.

d. ADJUSTMENT OF CHAIN TIGHTENER 0769.

The chain tightener may need adjustment if there is excessive backlash in the motion of the movable platform and it has been determined that worm gears are not at fault. Loosen the two locking nuts on the chain tightener 0769 (figure 5-32) and turn the center rod-nut to increase or decrease the chain tension, as needed. The chain is correctly tightened when all slack has been removed yet no binding occurs. Be sure that the locking nuts are clamped down after adjustment of the chain.

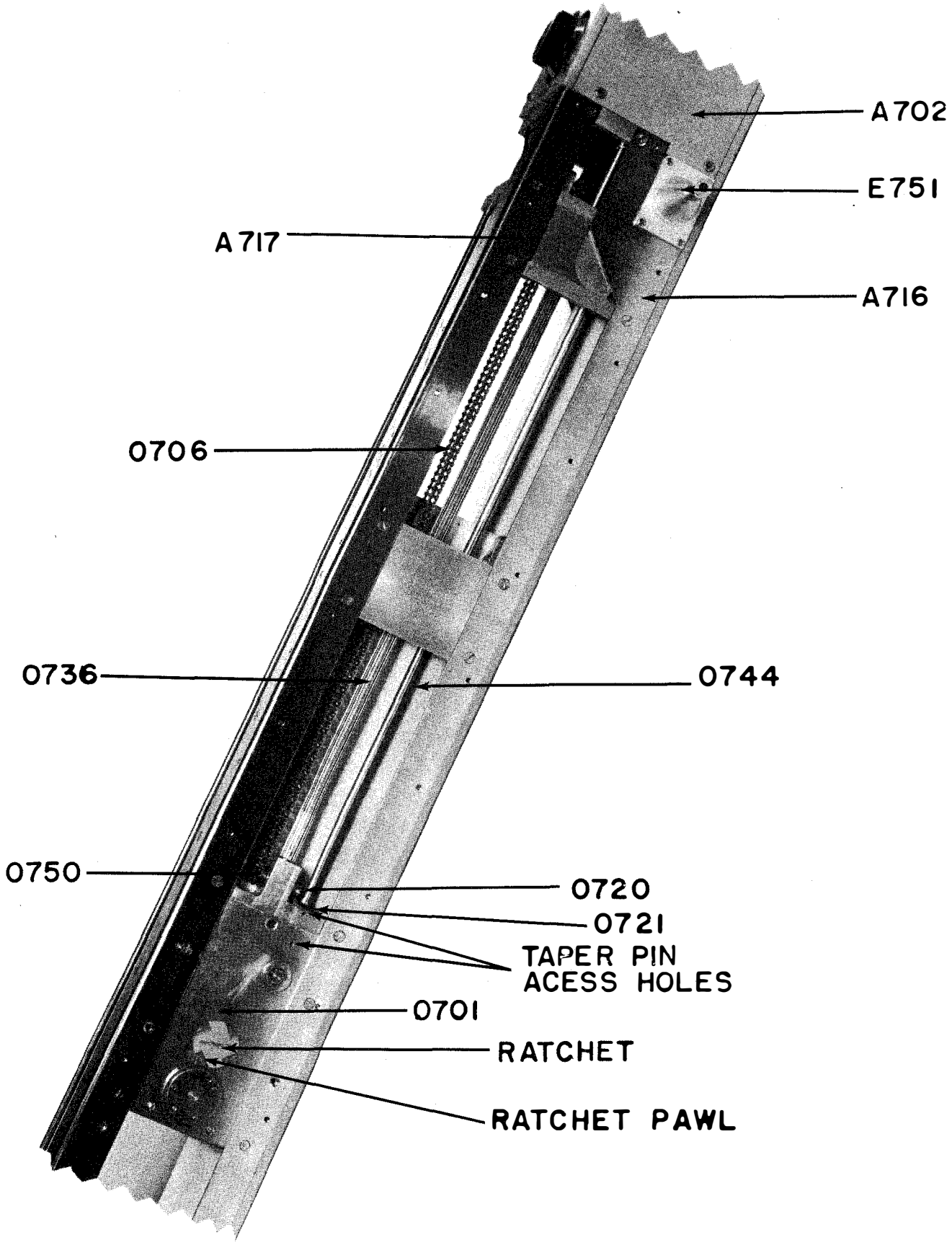


Figure 5-30. RF Coupling Section Showing Counter Balance Spring Assembly

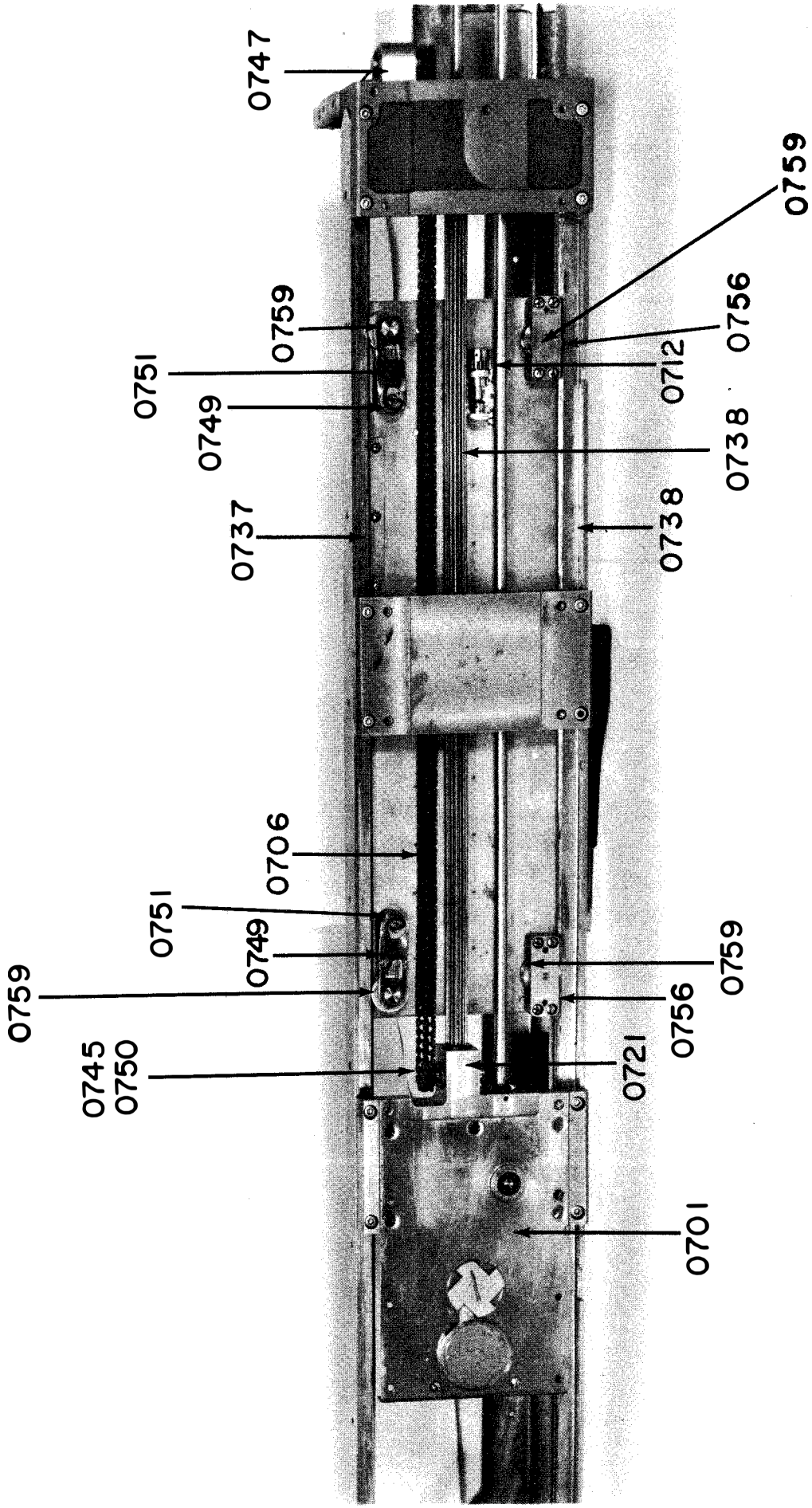


Figure 5-31. RF Coupling Section, Right Side View, Panels Removed

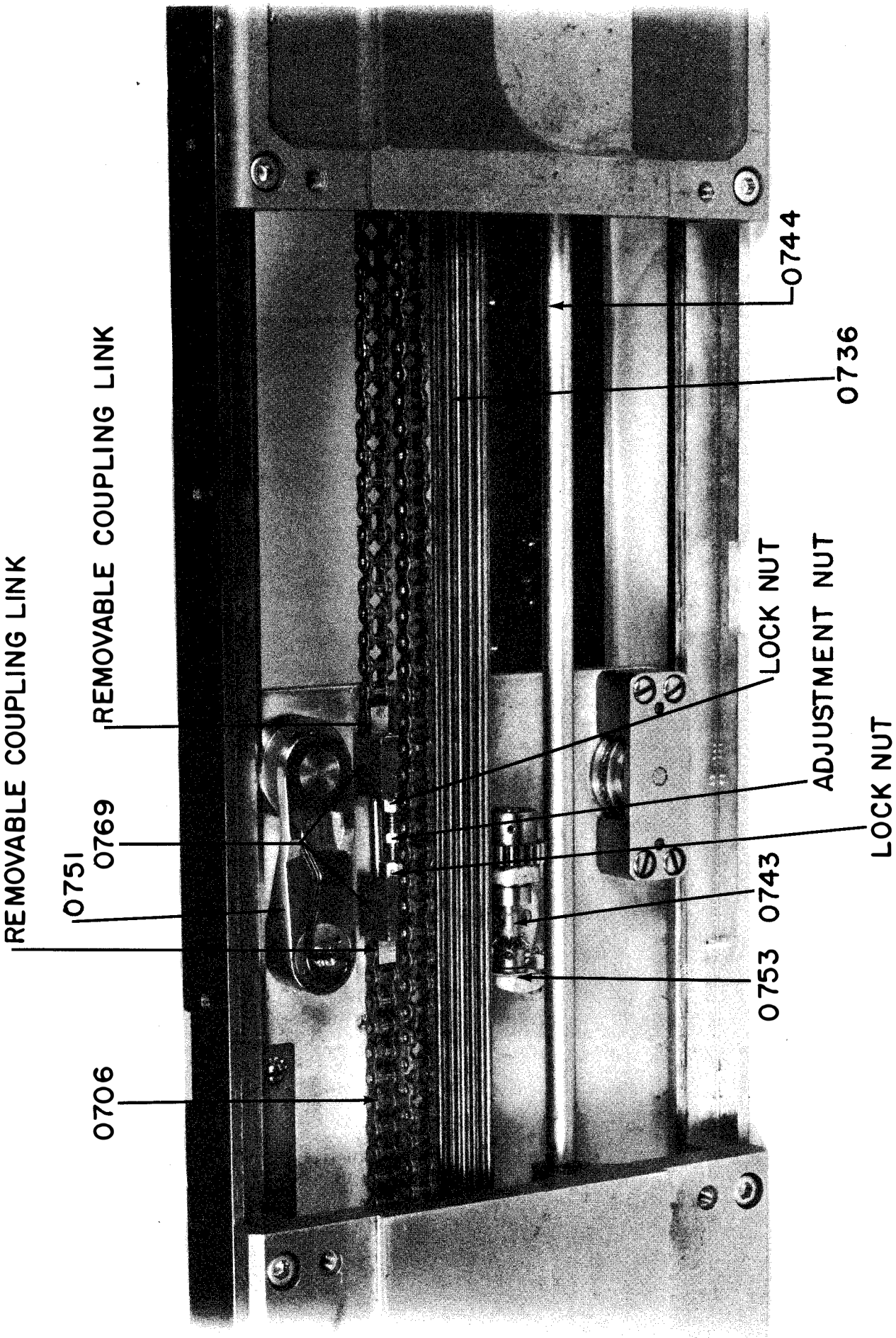


Figure 5-32. Portion of RF Coupling Section Showing Chain 0706 and Tightener 0769

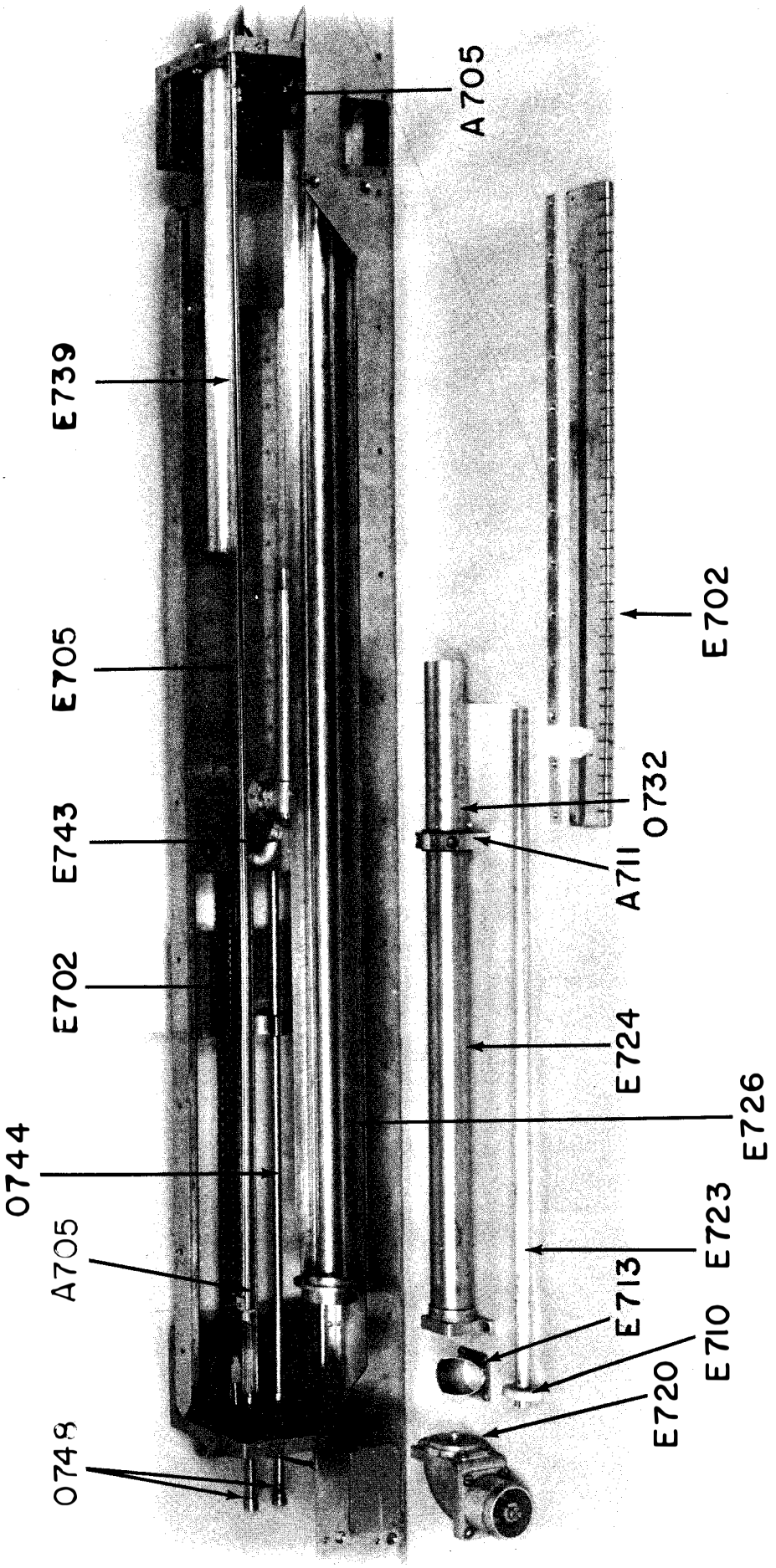


Figure 5-33. RF Subassembly Partially Disassembled

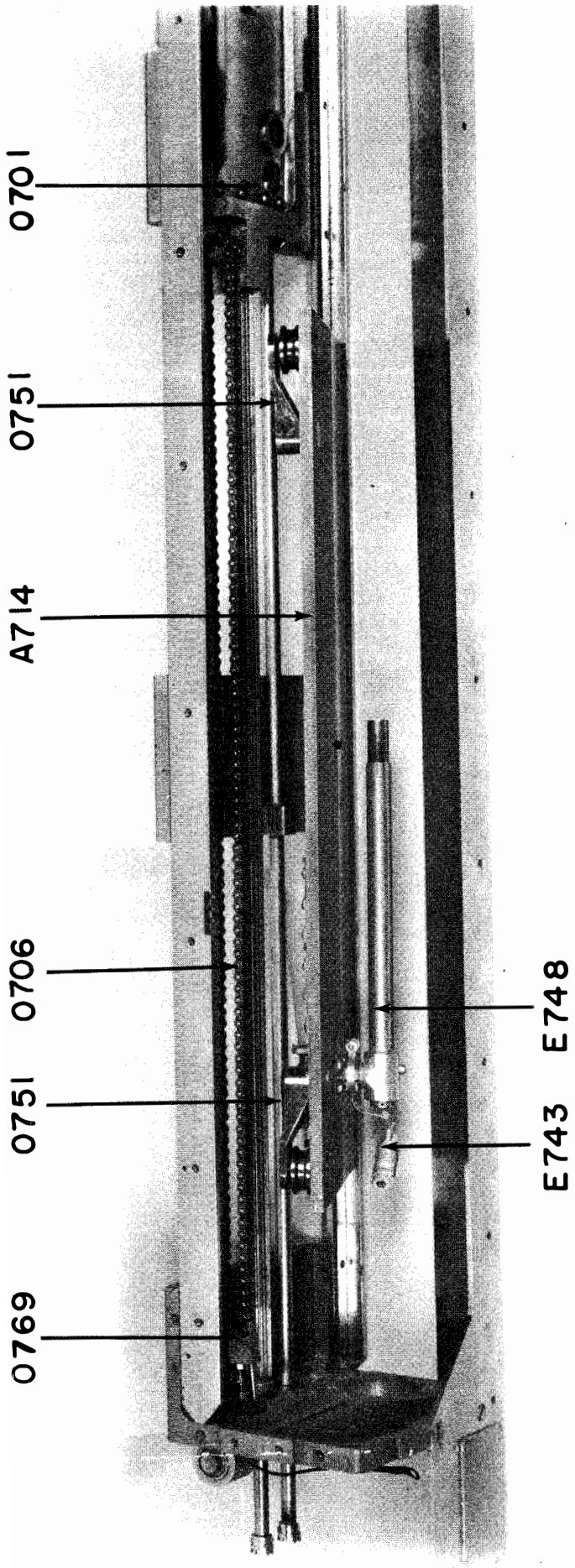


Figure 5-34. Removal of the Probe-Platform Assembly

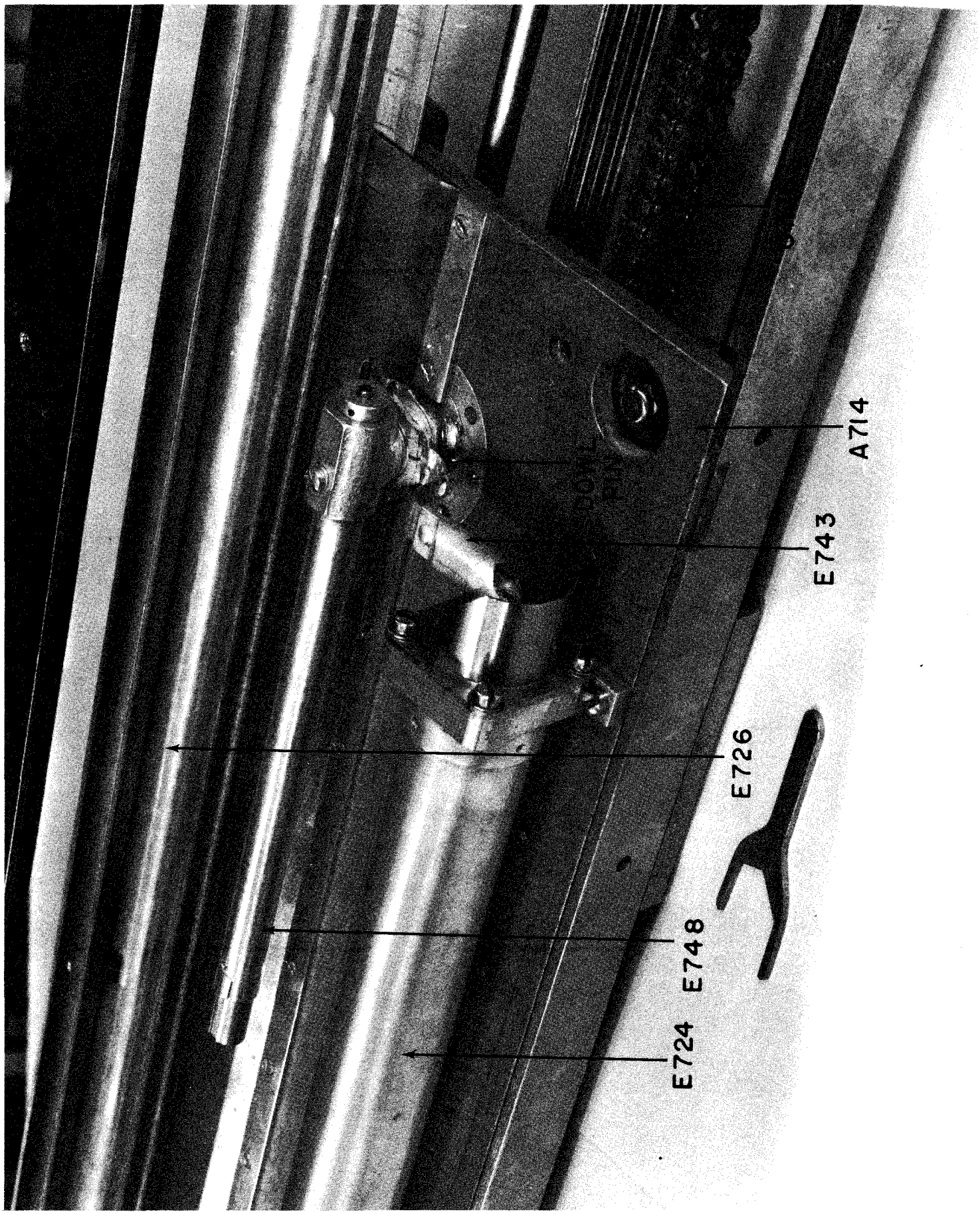


Figure 5-35. Carriage Subassembly Showing Quarter-Wave Element E748

e. CHECKING AND REPLACEMENT OF REFLECTOMETER COMPONENTS

The Reflectometer will be subject to damage primarily due to mechanical abuse, improper adjustment, or change in value of its internal resistors. The circuit may be given semi-conclusive ohmmeter checks which will assist in determining proper operation. The following procedure will be used.

Step 1. Remove the cup on the front panel which covers the reflectometer. Disconnect the reflectometer lead from the terminal board within the equipment. An access cutaway is provided for this purpose.

Step 2. Remove the reflectometer assembly from its mount, as shown in figure 5-11.

Step 3. Remove retaining ring 0740 and carefully pull reflectometer from its case, as shown in figure 5-37.

Step 4. Place an ohmmeter across test point "A" and test point "B", of figure 5-36. A reading of either 200-300 ohms or 20000-30000 ohms should be obtained.

Step 5. Reverse the meter leads. If the initial reading was between 200-300 ohms, the meter should now indicate 20000-30000 ohms. If the first measurement gave the higher indication, the reading should now be the lower. A ratio between the two readings of 95 to 1 or more will usually indicate that the reflectometer crystal CR701 is satisfactory. See schematic, figures 5-37 and 5-38.

Step 6. Place the ohmmeter leads across Test Point "A" and Test Point "C". The reading should be 6800 ohms ±5% (R704).

Step 7. Place a resistance bridge across Test Point "B" and Test Point "D". The reading should be exactly 86 ohms (R703). If this resistor is not exactly 86 ohms, too high an indication will be obtained on the Tuning Indicator meter during equipment operation. It may be necessary to acquire a stock of the 82 ohm resistors described in the parts list for R703 as 82 ohms ±5% and select one at the high end of the 5% tolerance, e.g., 86 ohms.

The capacitor, C702, may be checked for shorting with an ohmmeter after it has been disconnected from the circuit. The capacity may be checked with a capacitor bridge. It is not, however, critical that the capacity be exactly 270 mmfd. If no capacitor bridge is available, a new capacitor may be substituted for the old one and the reflectometer tried in actual operation.

Replacement of components within the reflectometer requires an especial amount of care, particularly the crystal CR701. The crystal is inside the bakelite housing and requires unsoldering of all connections to the bakelite dish at the capacitor end to gain access. Structural support for the unit is provided by the leads of the components. It is important that the soldering iron be applied to the connections only as long as is necessary during replacement of the parts. The crystal, in particular, may be damaged by excessive heat. In addition, resistors are subject to change in value from the same cause.

After removing the reflectometer from its mount for checking or replacement of parts, it will usually be necessary to readjust it as outlined in paragraph 2.c. of this section.

f. REPLACEMENT OF QUARTER-WAVE ELEMENT E748

If the quarter-wave element E748 has been damaged, or must be removed for replating or any other reason, it should be removed according to the disassembly instructions of paragraph 5.b. of this section. After the quarter-wave element has been repaired, replated or substituted by a new one from stock it may be re-installed on the platform as follows:

CAUTION

This procedure for replacement of the quarter-wave element should only be done by an experienced machinist.

Step 1. Seat the quarter-wave element in its bearing block C753.

Step 2. Carefully line the element perfectly parallel to the edge of the platform and clamp it in this position. This may be done by any method the machinist may devise according to what tools he has available.

Step 3. Replace the four mounting screws.

Step 4. Next the two dowel pins must be replaced. If the same quarter-wave element is being replaced and it has never been removed prior to this removal, it may be possible to use the original dowel pins; however, if they are not tight enough to provide a stress fit, new dowel pins must be used. They may be fabricated from standard drill stock and should be 1/4" long and from .005" to .001" larger than the hole diameter. If this size is not available the holes must be redrilled and reamed to 0.001" less than the next dowel size available.

If a new quarter-wave element is being installed its pilot holes must be drilled to the same size as the dowel holes in the block 0753. This drilling should be done from the rear of the platform using the dowel holes in the block for guides. It may be that the pilot holes and the dowel holes are off center. If this is the case, great care must be taken to keep the drill from "walking" when drilling out the pilot holes. Always use a sharp drill and go very slowly so that the holes will be perfectly round and that they "line up". The dowel size should always be from 0.005" to 0.001" larger in diameter than the hole size to provide the proper fit. A hole size within this tolerance may not be held in actually drilling so it must be first drilled undersize and then reamed to the proper size.

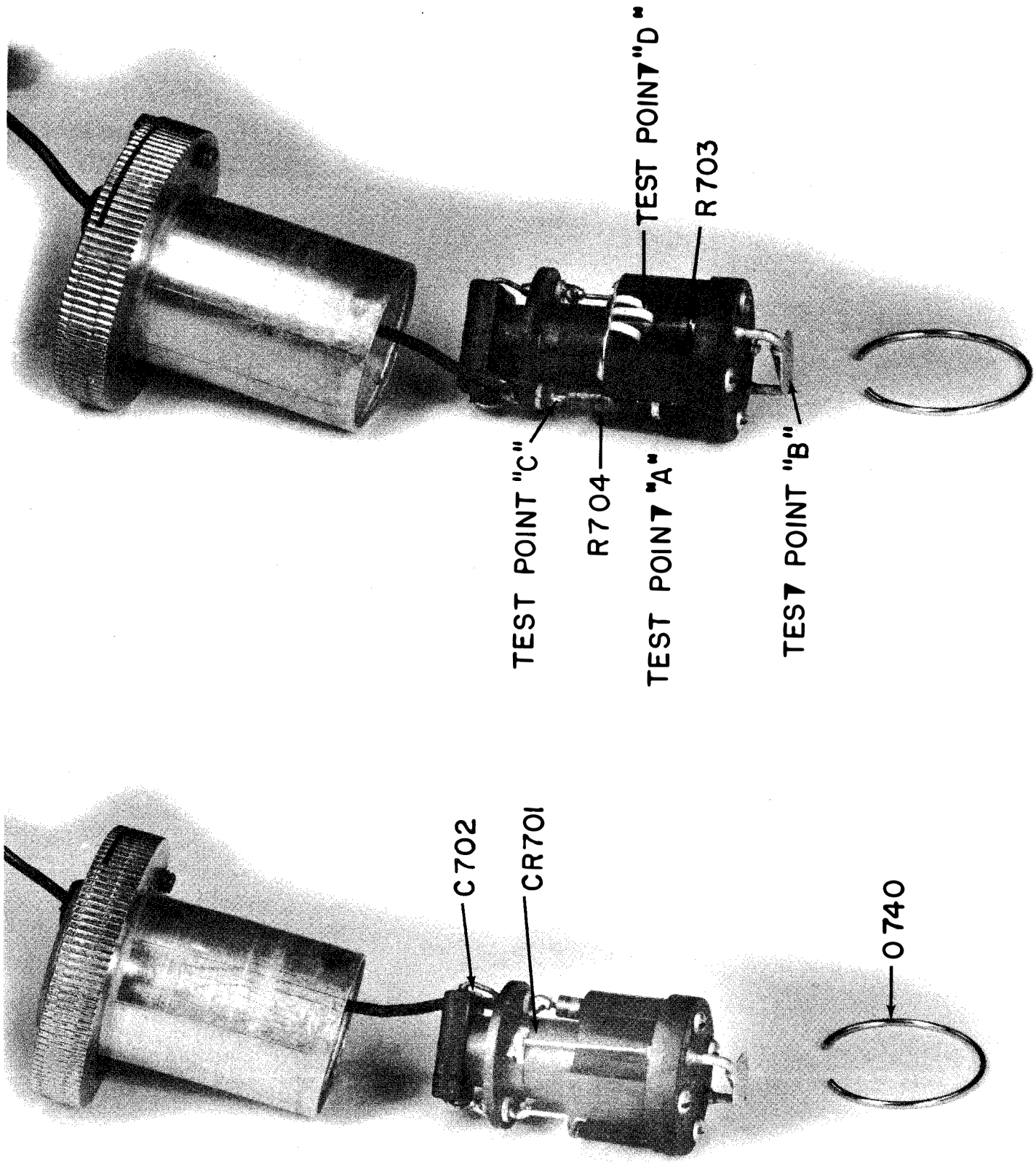
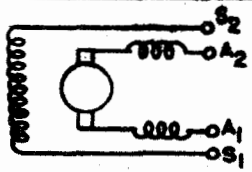
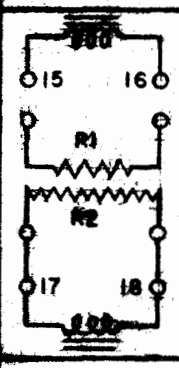


Figure 5-36. Reflectometer Z702 Removed From Case

TABLE 5-5. WINDING DATA

DESIGNATION SYMBOL	HOFFMAN PART NO.	DIAGRAM	WINDING	WIRE SIZE AWG.	TURNS	DC RESISTANCE IN OHMS	HI-POT AC VOLTS	REMARKS
B701	BM-11		Armature: 26 wdg Field: Split Series & Compensated wdg	#28 #24 #24	24 ea wdg 100 68	5.7 3.54 2.97	1000	Impregnate with Universal #27275 varnish. Bake.
K701	KR-21		15-16 17-18 R1 R2	#34SSC #36SSC #40DSAR #40DSAR	3550 4200 71 74	155 275 900 900	500	Impregnation Thermostat varnish. Coil for 48V, dc operation.
K702	KR-25		Single	#30HF	3500	70	500V	Impregnation Thermostat varnish. 115V, ac operation.

L E G E N D

HF Heavy Formex
SSC Single Silk Copper
DSAR Double Silk Resistance Wire

J702 NOT USED FOR TRANSMITTER OPERATION. FOR RECEIVER OPERATION, CONNECT OUTPUT OF J702 TO P401 OF RECEIVER. (FOR RECEIVER MODIFICATION, SEE PARAGRAPH 3b OF SECTION 3.)

FOR TRANSMITTER OPERATION, CONNECT PLUG P701 TO J701, (SEE TRANSMITTER MODIFICATION, PARAGRAPH 3a OF SECTION 3.)

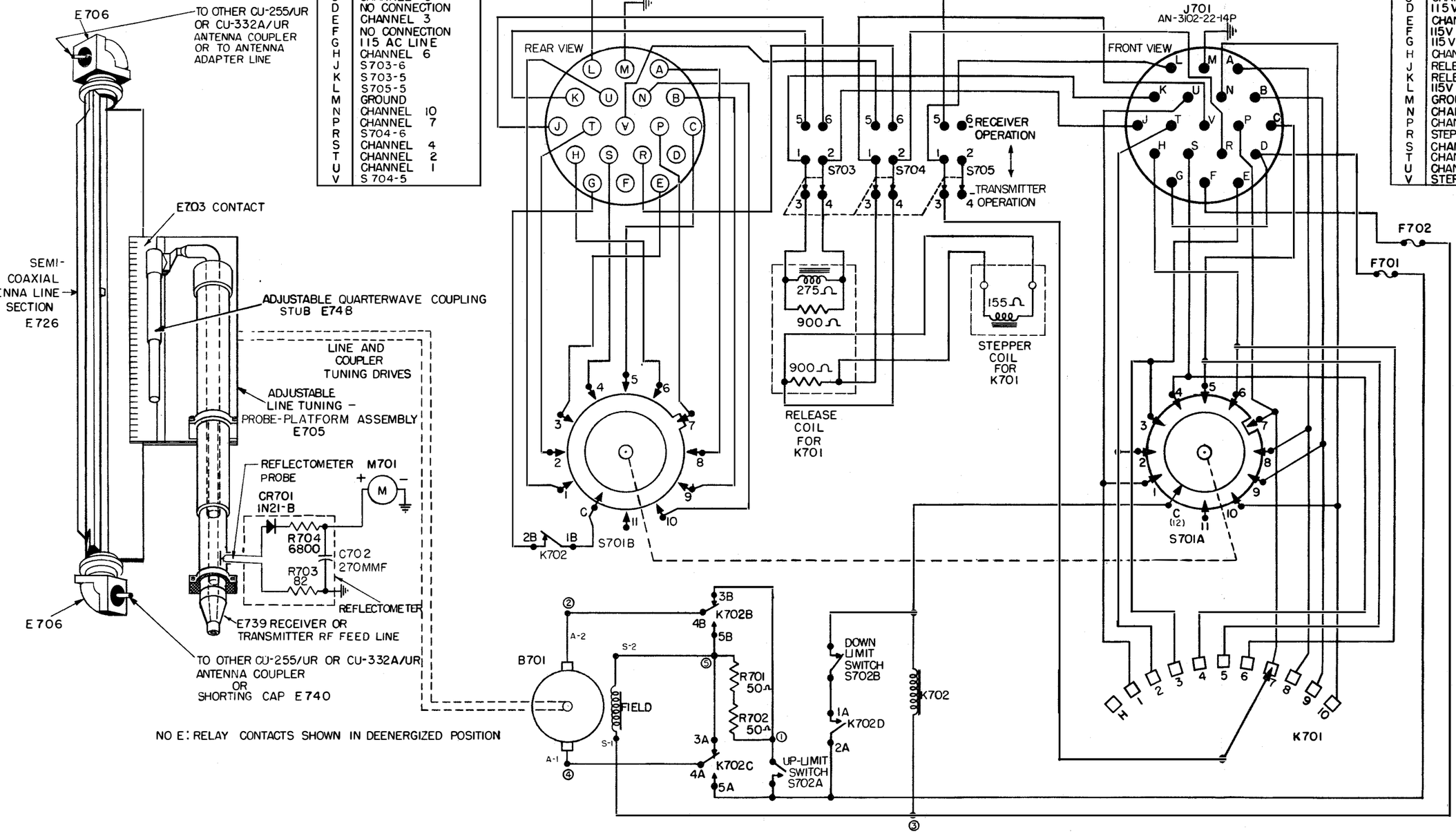
FOR RECEIVER OPERATION, CONNECT OUTPUT OF CQC-23497 CONTROL UNIT (P101) TO J701.

J702 OUTPUT

TERMINAL	CIRCUIT
A	CHANNEL 8
B	CHANNEL 9
C	CHANNEL 5
D	NO CONNECTION
E	CHANNEL 3
F	NO CONNECTION
G	115 AC LINE
H	CHANNEL 6
J	S703-6
K	S703-5
L	S705-5
M	GROUND
N	CHANNEL 10
P	CHANNEL 7
R	S704-6
S	CHANNEL 4
T	CHANNEL 2
U	CHANNEL 1
V	S704-5

J701

TERMINAL	CIRCUIT
A	CHANNEL 8
B	CHANNEL 9
C	CHANNEL 5
D	115V AC COMMON
E	CHANNEL 3
F	115V AC LINE
G	115V AC COMMON
H	CHANNEL 6
J	RELEASE COIL
K	RELEASE COIL
L	115V AC CONTROL
M	GROUND
N	CHANNEL 10
P	CHANNEL 7
R	STEPPER COIL
S	CHANNEL 4
T	CHANNEL 2
U	CHANNEL 1
V	STEPPER COIL



NOTE: RELAY CONTACTS SHOWN IN DEENERGIZED POSITION

Figure 5-37. Antenna Coupler CU-255/UR, Schematic Diagram

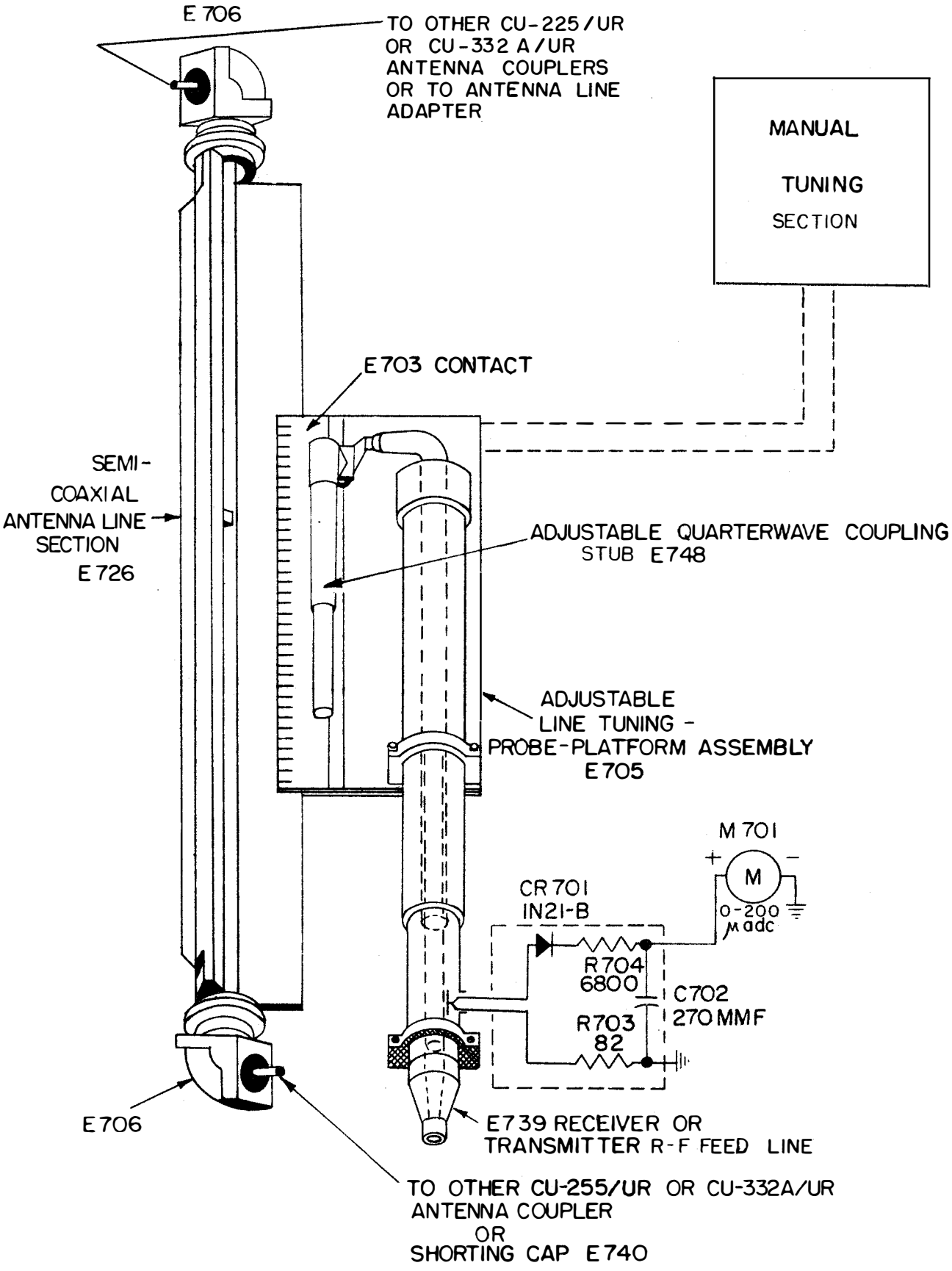
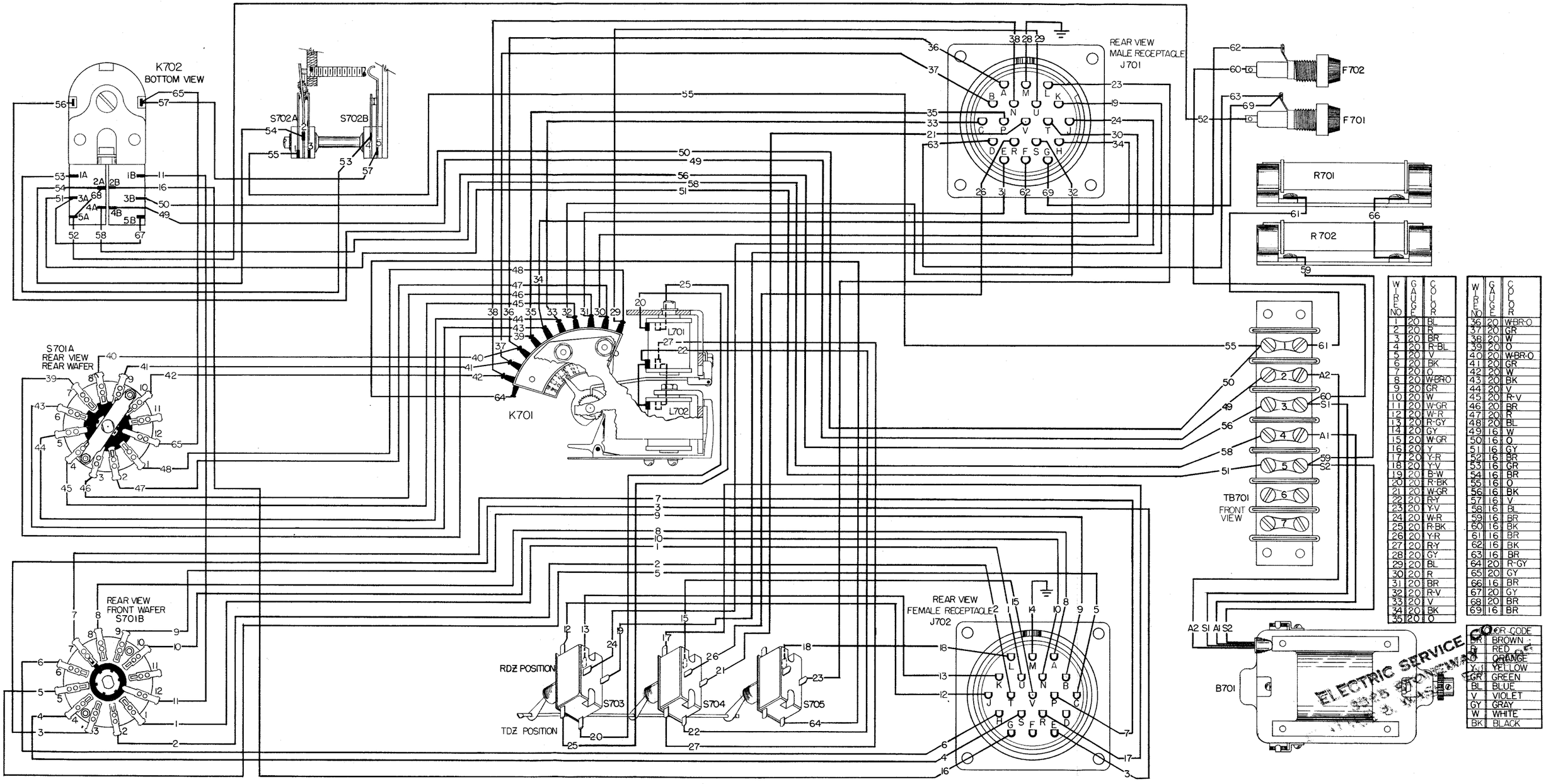


Figure 5-38. Antenna Coupler CU-322A/UR, Schematic Diagram



WIRE NO	GAUGE	COLOR
1	20	BL
2	20	R
3	20	BR
4	20	R-BL
5	20	V
6	20	BK
7	20	O
8	20	W-BR-O
9	20	GR
10	20	W
11	20	W-GR
12	20	W-R
13	20	R-GY
14	20	GY
15	20	W-GR
16	20	Y
17	20	Y-R
18	20	Y-V
19	20	B-W
20	20	R-BK
21	20	W-GR
22	20	R-Y
23	20	Y-V
24	20	W-R
25	20	R-BK
26	20	Y-R
27	20	R-Y
28	20	GY
29	20	BL
30	20	R
31	20	BR
32	20	R-V
33	20	V
34	20	BK
35	20	O

WIRE NO	GAUGE	COLOR
36	20	W-BR-O
37	20	GR
38	20	W
39	20	O
40	20	W-BR-O
41	20	GR
42	20	W
43	20	BK
44	20	V
45	20	R-V
46	20	BR
47	20	R
48	20	BL
49	16	W
50	16	O
51	16	GY
52	16	BR
53	16	GR
54	16	BR
55	16	O
56	16	BK
57	16	V
58	16	BL
59	16	BR
60	16	BK
61	16	BR
62	16	BK
63	16	BR
64	20	R-GY
65	20	GY
66	16	BR
67	20	GY
68	20	BR
69	16	BR

COLOR CODE	
BR	BROWN
R	RED
O	ORANGE
Y	YELLOW
GR	GREEN
BL	BLUE
V	VIOLET
GY	GRAY
W	WHITE
BK	BLACK

Figure 5-39. Automatic Tuning Head A702, Wiring Diagram

SECTION 6

PARTS LISTS

TABLE 6-1. LIST OF MAJOR UNITS

REFERENCE DESIGNATION GROUP	NAME OF MAJOR UNIT	DESIGNATION
701 to 799	Coupler, Antenna (Automatic)	CU-255/UR
701 to 899	Coupler, Antenna (Manual)	CU-332A/UR
801 to 899	Assigned to manual control head of manual coupler	

TABLE 6-2. TABLE OF REPLACEABLE PARTS

P/O CU-255/UR P/O CU-332A/UR	REFERENCE DESIGNATION	STANDARD NAVY, SIGNAL CORPS, AIR FORCE STOCK NUMBERS	NAME AND DESCRIPTION	LOCATING FUNCTION
			NOTE: Fold out this page as the COMMON HEADING for all pages in this list. (*) in STANDARD NAVY STOCK NUMBER column indicates a Part Peculiar per 16E6(SHIPS).	

X		701 to 799	F16-C-91733-5481	COUPLER, ANTENNA: inductive coupling; 230-390 megacycles frequency range; tuned either by autotune mechanism or manually; operating power requirements (obtained from TDZ transmitter)--AC--110v, 60 cycles, single phase, 0.09 kva normal, 0.44 kva peak, DC--48v, 0.35 amps max; impedance data--50 ohms input, 50 ohms output; termination data--2 terminations, coaxial plug type, one mounted at top, and one mounted at bottom, swivel based to permit outlets on either side of equipment; case data--aluminum alloy gray enamel; over-all dim excluding cables--69.1" H 5.74" wd, 7.784" d, mts at top and bottom by special mounting brackets supplied with equipment; nameplate mounted on front panel; Hoffman Radio Corp part/dwg #AU-39; used to match transmitter or receiver.	See General Description Section 1
X	X	A701	F16-A-57849-1003	ANTENNA COUPLER SUB-ASSEMBLY; matches characteristic impedance of antenna system to that of transmitter or receiver when used with control mechanism; c/o concentric feedline, open transmission line, adjustable quarterwave matching stub on movable platform with chain drive and counter-balance spring assembly; frequency range 230 - 390 mcs, 50 watts input and output rf power rating; long rectangular shape; approx o/a dim--61.843" lg, 5.74" wd, 7.784" d; Hoffman Radio Corp part/dwg #AA-547.	Used with Tuning Drive to Match Impedance of Antenna System to Transmitter or Receiver

X	A702	F16-D-901161-171	DRIVE, TUNING: electrically and mechanically operated; 10 positions; selector knob actuation; AC, 110v, 60 cycles single phase, 0.090 kva normal 0.44 kva peak; DC 48v, 0.35 a max; o/a dim-- 17-3/16" lg, 7-5/16" h, 4-11/16" wd; mts to frame by bolts; Hoffman Radio Corp part/dwg #AA-451; drives RF transmission line matching section.	Complete Automatic Control Unit for Line Tuning and Coupler Tuning
X	A703	N16-H-62001-1015	FRAME; CU-255/UR; for holding protective window and calibration chart in place; alum alloy, black dull enamel finish; rectangular; 4.187" lg, 3.352" wd, and 0.187" thk; four 0.128" diam mtg holes on 2.937" by 3.102" mtg/c; Hoffman Radio Corp part/dwg #AS-909	Frame for Calibration Chart N701 and Window N705 on Front Panel

X		A704 N16-B-750001-816	BRACKET; mts switch; "Z" shaped; alum alloy 52S, 1/2 hard per Navy Spec 47-A-11c (064) 1/2 hard, anodized per spec AN-WW-A-696a; 5.981" lg. x 2" h x 1" wd o/a; mts by two .177" holes on 3/4" mts/c; equipped w/ two PEM #CL8-32-2 fasteners; 3/4" c to c, three 1/2" diam and one 0.177" diam holes; mfr and contr: Hoffman Radio Corp part/dwg #AA-637	Provide Mounting for SWITCHES S703, S704 and S705
X	X	A705 N16-B-750001-848	BRACKET: mts meter-lead conduit; "L" shaped; .083" thk steel material per spec AN-QQ-S-636, cond 2, cadmium pl per spec QQ-P-416, type I, class A; 1/2" wd x 1/2" lg x .340" thk; has one mtg screw hole tapped #8-32 NC-2; mfr and contr: Hoffman Radio Corp part/dwg #AS-872	Mounts Meter Lead CONDUIT E702
X		A706 N16-B-750001-850	BRACKET: mts terminal strip; "L" shaped; 3/32" thk commercial brass per spec MIL-B-895 cond 1/2 hard, cadmium pl per spec QQ-P-416 type I, class A; 2-9/16" x 3/4" wd x 17/32" d; mts-by two #8-32 NC-2 holes spaced 0.437" apart; two #14 (0.182" diam) holes on other leg 0.437" apart; mfr and contr: Hoffman Radio Corp part/dwg #AS-900	Mounts TERMINAL BOARD TB702 in TUNING DRIVE A702
X		A707 N17-B-700001-271	BRACKET: mts relay; "L" shaped; .125" thk commercial brass per spec MIL-B-895 cond 1/2 hard, cadmium pl per spec QQ-P-416 type I, Class A; 3-1/2" lg x 2-1/8" wd x 1" wd; mts by two #8-32 NC-2 holes spaced 2.812" apart; has 3 #14 drill holes, one 3/8" diam hole and one #25 drill hole; mfr and contr: Hoffman Radio Corp part/dwg #AS-903	Mounts STEPPING SWITCH RELAY K701 in TUNING DRIVE A702

X		A708	N17-B-700001-272	BRACKET: mts relay; "U" shaped; 1/8" thk commerical brass per spec MIL-B-895 cond 1/2 hard, cadmium pl per spec QQ-P-416 type I, class A; 1" lg. x .968" wd x .800" h; mts by three #6-32 NC-2 holes on 3/4" x .577" x .577" mtg/c; two holes #16 (0.177" dia) spaced 0.750" c to c: mfr and contr: Hoffman Radio Corp part/dwg #AS-906	Mounts Motor Control RELAY K702
		A709		Not used	
	X	A710	N16-B-750001-843	BRACKET: mts to louvre cover; "L" shaped; commercial brass per spec MIL-B-895 cond 1/2 hard, cadmium pl per spec QQ-P-416 type I, class A, .093" thk; 5/8" h x .687" lg x 1/2" wd o/a; mts by one #10-24 NC-2 holes in 5/8" lg leg; #4 (0.209" dia) hole in 0.687" lg leg; mfg and contr: Hoffman Radio Corp part/dwg #AS-912	Mounts MOUNTING 0755 to Drive Unit HOUWING A713
	X	X	A711	N16-S-858111-104	SUPPORT, TRANSMISSION LINE: mts coaxial feedline; rectangular shaped; alum alloy 24ST per Navy spec 47-A-10c cond T, anodized per spec QQ-A-696a; 1.980" lg x 1.680" wd x 1/2" thk, 1.450" diam hole thru center; mts by screws thru two .177" diam holes counterbored .180" on 1.687" mts/C; mfr and contr: Hoffman Radio Corp part/dwg #OM-701

X	X	A712	N16-C-170001-459	CASE: encases component parts of reflectometer; silver plated brass; empty; 1.780" lg, 1.060" OD except 1.125-32 NS-2 threads 0.312" lg at one end; interior compartment has 0.937" ID w/ counterbore 0.969" diam by 0.250" deep at end opposite end plate; end plate at threaded end marked with engraved arrow; mfr and contr: Hoffman Radio Corp part/ dwg #0A-221	Encases REFLECTOMETER Z701
X		A713		HOUSING: supports, encases and provides bearing surfaces for Antenna Coupler tuning drive; cast and machined aluminum, acid anodized finish; box shaped, w/7" flange, extending from one end, width of housing; approx 16.250" lg, 6-5/16" h, 4-5/8" wd o/a; contains 9 shielded ball bearing units which accommodate moving shafts of Antenna Coupler tuning drive; mfr & contr: Hoffman Radio Corp part/dwg AA-648 (Consists of three parts which must be matched in manufacture); (Listed for reference only)	Part of TUNING DRIVE Unit A702
X	X	A714	N16-R-404101-370	PLATFORM: carriage platform for mounting probe assy and part of feedline; silver plated alum alloy; rectangular shape; 18.440" lg, 5.815" wd, 0.250" thk o/a; mounts to guide rails thru special rollers; has 1.250" diam hole w/ 1.845" diam x 0.125" deep counterbore for mtg probe assy, and other necessary holes for mtg accessories; mfr & contr: Hoffman Radio Corp part/dwg #0M-757	Mounts Movable LINE SECTION and Quarter-Wave PROBE E748

X	X	A715	N16-B-750001-844	BRACKET: left rear support for tuning mechanism; 1.045" thk vitreous enameling sheet steel, Albuloy pl; "L" shaped bar; 61.843" lg. x 3.50" wd x 1.500" d o/a; has twelve .199" diam csk mtg holes irregularly spaced along length of flanges; has 18 variously sized holes, irregularly spaced, for mounting protective panels and other internal equipment components, 4 tapped nutplates; mfr & contr: Hoffman Radio Corp part/dwg #AA-459	Left-Rear SUPPORT for TUNING DRIVE A702 (Automatic) and TUNING DRIVE A801(Manual)
X	X	A716	N16-B-750001-845	BRACKET: right rear support for turning mechanism; .1045" thk vitreous enameling sheet steel, Albuloy pl; "L" shaped bar; 61.843" lg x 3.50" max wd x 1.500" d o/a; has twenty-five .199" diam csk mtg holes irregularly spaced along length of flanges; has 22 variously sized holes, irregularly spaced for mounting protective panels and other internal equipment components, 4 tapped nutplates; mfr & contr: Hoffman Radio Corp part/dwg #AA-459	Right-Rear SUPPORT for TUNING DRIVE A702 (Automatic) and TUNING DRIVE A801 (Manual)
X	X	A717	N16-B-750001-847	BRACKET: vitreous enameling sheet (SAE 1010) w/ .0002 Albuloy finish over .0003 copper strike; shape is that of a long rectangular strip of sheet metal, bent to an angle of 90° along its entire length w/ the vertex of the angle at the mid-point of its width; 52.265" lg x 1.500" x 1.500"; mts by 20 # 8 (0.199") diam holes; includes 3.840" lg, 0.500" wd, 0.250" thk nut plate which is drilled 5/16" and tapped 18-NC-2, riveted on inside 14.625" from one end; has 39 various sized holes irregularly spaced for mounting protective panels and other internal equipment components; mfr & contr: Hoffman Radio Corp part/dwg #AA-463	Lower-Right-Front SUPPORT for TUNING DRIVE A702 (Automatic) and TUNING DRIVE A801 (Manual)

X	X	A718	N16-S-858111-105	SUPPORT, RADIO FREQUENCY TRANSMISSION LINE: o/a dims-- 6.375" lg, 4.625" wd, 3.250" h; alum alloy casting; machined mtg surfaces; mounted by thirteen #10-24 NC-2 tap 0.500" deep mtg holes spaced irregularly around casting edge; "L" shaped with two tubing mtg surfaces, one c/o four 0.180" diam mtg holes spaced 90° apart centered on 1.750" diam, other c/o four 0.209" diam mtg holes and four #10-24 NC-2 tap mtg holes alternately spaced 45° apart centered on 2.125" diam; Hoffman Radio Corp part/dwg #AC-75; supports transmission and feedline assys	Supports Lower End of Antenna Transmission LINE SECTION E726
X	X	A719	N16-F-650431-142	FLANGE, MOUNTING: dim data-- 1.218" max diam excluding flange, 1.281" h o/a, 1-1/2" square x 0.094" thk flange; brass casting; nickel plated finish; four 0.182" diam mtg holes in flange on 1.125" by 1.125" mtg/c; has eight 0.030" wd x 1.060" deep slots equally spaced 45° apart for locking reflectometer in place: Hoffman Radio Corp part/dwg #AC-104; supports reflectometer and allows it to be positioned and locked in place.	Supports REFLECTOMETER Z702
X	X	A720	N16-B-750001-849	BRACKET, SUPPORT: viteous enameling sheet (SAE 1010) w/ .0002 Albuloy finish over .0003 copper strike; shape is that of a long rectangular strip of sheet metal bent to an angle of 90° along its entire length w/ the vertex of the angle at the mid-point of its width; 52.265" lg x 1.500" x 1.500"; mounts to the components, which it helps support through six #8 (0.199" diam) holes; has 39 other various sized holes irregularly spaced: mfr and contr: Hoffman Radio Corp part/dwg #AS-894	Lower Left Front SUPPORT for TUNING DRIVE A702 (Automatic) and TUNING DRIVE A801 (Manual)

X	X	A721	N16-B-750001-842	BRACKET: right front support on tuning mechanism; 0.1045" thk vitreous enameling sheet steel with Albuloy 0.0002" thk over 0.0003" copper strike finish; shape is essentially an "L" shaped channel; o/a dim 15.547" lg, 3-1/16" h, 1-1/2" wd; four 0.199" diam mtg holes csk 100° by 0.372" diam, and two 0.182" diam mtg holes csk 82° by 0.332" diam, irregularly spaced; eleven #10-24 NC-2 tap holes irregularly spaced for front plate; mfr & contr: Hoffman Radio Corp part/dwg #AS-938	Upper Right Front SUPPORT for TUNING DRIVE A702 (Automatic)
X	X	A722	N16-B-750001-841	BRACKET: left front angle support on tuning mechanism; 0.1045" thk vitreous enameling sheet with Albuloy 0.0002" thk over 0.0003" copper strike finish; shape is essentially an "L" shaped channel; o/a dim 15.547" lg, 3-1/16" h, 1-1/2" wd; four 0.199" diam mtg holes csk 100° by 0.372" diam, and two 0.182" diam mtg holes csk 82° by 0.332" diam, irregularly spaced; eleven #10-24 NC-2 tap holes irregularly spaced for front plate; mfr & contr: Hoffman Radio Corp part/dwg #AS-939	Upper Left Front SUPPORT for TUNING DRIVE A702 (Automatic)
X	X	A723		SUPPORT; rail: center support for carriage rails; c/o support and rail shape; 6.156" lg, 3-1/2" wd, 1.062" thk o/a; four #10-24 NC-2 tap mtg holes on 2.750" by 4.468" mtg/c; rail bushing 5/8" lg, 0.376" OD, and 0.3125" ID; mfr and contr: Hoffman Radio Corp part/dwg #0A-175 (Listed for reference only)	SUPPORT for GUIDE RAILS 0737 and 0738

X	B701		MOTOR, ALTERNATING CURRENT: compensated series wound type; operating power requirements--AC, 110v, 50-60 cps, single phase, 253 w, 90% power factor min; mechanical power output data--1/10 hp, 45 inch--ounces min starting torque, shaft data--single take-off, 8,500 rpm, CW and CCW (reversible); open frame; temp data-- 28° C + 65° C operating temp range; intermittent operation per hour--7 minutes "Max time on", with up to fifteen 30 sec open cycles; 53 minutes "min time off"; power take-off data--plain shaft; motor dimensional data--5-5/16" lg, excl shaft, 3-13/16" wd. incl. brush cap holders, 3-15/32" h, 1/4" diam shaft, shaft extends 1/2" from frame, center of shaft 1.796" to 1.812" from mtg surface; terminal data-4, flexible, insulated, 3/8" stripped and tinned wire lead; fixed mtg base; mtg data-- 4 mtg holes, 7/32" diam, spaced 2-13/16" by 3-1/4" mtg centers, 3-1/4" centers parallel to shaft; anti-fungus treated; terminals have band markings A-1, A-2, S-1 and S-2 attached 4-1/2" from end cap; Hoffman Radio Corp part/dwg #BM-11 (GE Model 5FH56HC-2 modified by shortening leads); govt spec data-Navy Spec No. 17M10	Drive Motor Automatic TUNING DRIVE A702
		9		

X	B702	N17-B-86231-4417	BRUSH, ELECTRICAL CONTACT: physical data-- rectangular shape, o/a dim-- 3/4" lg, 1/4" square; w/ pressure spring-- approx 1-7/16" lg; brush contact data;; concave contact face; mts in brush holder w/ 5/16" square mtg hole; brush composition data-- carbon; commutator brush; for general purpose use; Hoffman Radio Corp part/dwg #BA-4	BRUSHES for MOTOR B701
X	B703	N17-C-200607-911	CAP, ELECTRICAL BRUSH-HOLDER: bakelite; o/a dim-- 5/16" OD, 3/8" h; has 1/2-20 threads for mtg; top of cap slotted 0.062" wd by 0.062" deep, also 1/8" wd straight knurl around top OD; screw on cap for holding brushes in place; for general purpose use; Hoffman Radio Corp part/dwg #BA-5	CAP to Retain Each BRUSH B702
X	B704	N17-C-780895-101	CLAMP: locking clamp for motor brush cap; aluminum 0.062" thk; anodized finish; has 0.104" diam hole for mtg bolt; 0.812" lg, 0.750" wd, 0.250" h o/a; holds 5/16" diam brush cap;GE part # contr: Hoffman Radio Corp part/dwg #BA-6	CLAMP to Retain Each CAP B703

X	C701	16-C-31908-1564	CAPACITOR, FIXED, MICA DIELECTRIC: case style no. 22, MBCA Ref Dwg Group 1; capacitance data-- 2200 mmf, ± 10% tol; working voltage data-- 500 vdc; molded bakelite case; case dim-- 53/64" lg, 53/64" wd, 9/32" thk; terminal data-2, wire lead type, 1-1/8" lg min, located one on each end; mtg data--terminal mtg; govt spec data--JAN-C-5, type CM30B222K; Cornell Dubilier part #CD-CM30B222K; for general purpose use; Hoffman Radio Corp part/dwg #CM-219	Filter for MOTOR B701

X	C702	N16-C-29613-2681	CAPACITOR, FIXED, MICA DIELECTRIC: case style no. 22, MBCA Ref Dwg Group 1; capacitance data-- 270 mmf, ± 10% tolerance; working voltage-- 500 vdc; molded phenolic case; case dim-- 51/64" lg, 15/32" wd, 7/32" h; 2 axial wire leads; govt spec data-- JAN, JAN-C-5, CM20C271K; Arco Electronics, Inc., (El Monco) type designation CM-20-271; for general purpose use; Hoffman Radio Corp part #CM-198	Filter capacitor-used in REFLECTO-METER Z701
X	X E701		CRYSTAL UNIT, RECTIFYING: Silicon type; 125v peak invers voltage; dim (excluding pin)-- 0.630" h, 0.294" dim o/a; mts with standard JAN 124 or 125 holder; terminations-- 1, pin, at top; rectified crystal current 0.4 madc, freq range 3060 ± 5 mc; government spec data-- JAN, spec no. JAN-1A, spec type no. JAN-IN21-B; Sylvania Electric type IN21B; for general purpose use; Hoffman Radio Corp part #YC-81	Diode rectifier in REFLECTOMETER Z701
X	X E701		CARRIAGE, SUB-ASSEMBLY: major components consist of-- 1 alum alloy platform, silver plated 0.0005" thk, 2 adjustable roller assemblies using stainless steel self-adjusting rollers, brass adjustable roller arms nickle plated 0.0005" thk and silite bronze bushing, 2 fixed stainless steel roller assemblies, 1 drive gear assembly using phosphor bronze gear on steel shaft, R.F. line sections and probe assembly; o/a dims--23/752" lg, 5.815" wd, 2-5/8" h; mts RF line sections and probe assembly; Hoffman Radio Corp part/dwg #OA-159 (Listed for reference only)	Movable Line Tuning Platform which positions Quarterwave PROBE E748

X	X	E702	N17-C-66835-6351 For replacement, use G44-T-80075-1875	CONDUIT, ELECTRICAL: rigid type; dimensions--0.190" ID, 0.250" OD; seamless brass tubing; nickel flash finish; carries motor loads; special features data--40.312" lg; Hoffman Radio Corp part/dwg #AS-892; for replacement, use G44-T-80075-1875 and cut to length	Conduit for Lead from REFLECTOMETER Z701 to Tuning Indicator METER M701

X	X	E703	N17-C-77417-8875	CONTACT, ELECTRICAL: p/o sliding platform; contact made with spring fingers; beryllium copper; silver plated finish over rhodium flash; o/a dim-- 18.44" lg, 1-3/4" wd, 0.020" thk, 0.133" h; contact surface located on opposite side of mtg holes; thirteen 0.116" diam mtg holes 0.137" from edge; 36 slots 3/64" wd spaced 1/2" apart except on ends, U-shaped cutaway of 0.922" diam near one end of mtg side; Hoffman Radio Corp part/dwg #AS-913	Contact on Carriage E701 Provides Positive Contact to Apron of Open Concentric Line E742
X	X	E704	N17-C-77417-1564	CONTACT, ELECTRICAL: p/o sliding platform; includes punchouts of contact material as conducting points; point data-- 6 points, beryllium copper, silver plated over rhodium flash; dims-- 7/16" lg, 7/32" wd, 0.010" thk; beryllium copper; silver pl finish; o/a dims-- 4" lg, 29/32" wd, 0.010" thk; contact surface location data-- approx 11/16" from first mtg hole to one contact surface; contacts below mtg holes; mts by three 0.149" holes spaced 1.750" apart in straight line; used only as a ground-bond; Hoffman Radio part/dwg #AS-1011	Contact on Carriage E701, Provides Contact to Guide Rail 0738
X	X	E705		PROBE-PLATFORM ASSEMBLY: consists of Carriage E701 without movable Line Section E733 (Listed for reference only)	Quarter-wave Element E733 Mounted on Platform A714

X	X	E706		ELBOW, RF LINE SECTION: c/o Reference Symbol #E728, #E714 #E729 and #E715, one ea (Listed for reference only)	Elbow Portion of RF Transmission Line. May be Used with E731 to Form Female Connector, E732 to Form Male Connector, E751 to Form Coaxial Connector, or E740 SHORTING PLUG for Termination of Line
X	X	E707		FEEDLINE ADAPTER: coaxial fitting for connecting to receiver or transmitter feedline; c/o Reference Symbol #E712, E730 and #E735, one ea (Listed for reference only)	Coaxial Fitting for Receiver-Transmitter Feedline

X		E708		HOLDER ASSEMBLY, RESISTOR: ferrule type; accommodates resistor, 1 cartridge type, o/a dim-- 4-1/8" lg, 1-1/16" max diam; phenolic body strip; contact data-- bronze contacts, clip type; o/a dim-- 5.562" lg, 7/8" wd, 1.343" h; terminal data-- 2 terminals, solder lug type; two 0.209" diam countersunk mounting holes approx 2" apart 1.843" from one end; Hoffman Radio Corp part/dwg #EA-338	Mounting for Resistor R701 and R702 in TUNING DRIVE A702 (Automatic)
X		E708A	N17-I-64294-4758	INSULATOR, PLATE: phenolic material 5" lg, 3/4" wd, 0.187" thk o/a; has four 0.182" diam holes countersunk 82° x 0.332" diam; counterbored from each side; holes spaced 0.300", 1.127", 3.216" and 5.170" from one end in center of width dimension; holes nearest ends mount clips, other mount assembled holder; spec JAN-P-13, type LTS-M-1; Hoffman part/dwg #EL-219	Base for Holder E708
X		E708B		CLIP: phosphor bronze material, nickle pl; ferrule type; 7/8" wd, 23/32" lg, 1-5/32" h o/a; holds 7/8" diam resistor ferrule nut plate soft-soldered to bottom of clip is m/o comm brass; 1-1/16" lg, 9/16" wd, 3/32" thk o/a; plate has two #8-32 NC-2 tapped holes on 9/32" centers; to fabricate assembly, make nutplate, solder to clip (SNSN G17-C-11220); Hoffman Radio Corp part/dwg #EA-414 from SNSN G17-C-11220. For reference make	Clips for Holder E708
X	X			INSULATOR, DISC: material data-- teflon, white; round flat with flange MBCA Ref Dwg Group 9; item code no. 210; dim-- B - 1.009" diam shoulder, D - 1.073" OD, E - 0.176" depth of shoulder, H - 0.485" ID, T - 0.250" thk o/a; Hoffman Radio Corp part/dwg #EM-211 (Listed for reference only)	Upper End Spacer Between Transmitter Receiver Fixed Outer LINE SECTION E718 and Fixed Inner LINE SECTION E717

X	X	E710		INSULATOR, DISC: material data-teflon, white; round counterbore shape, MBCA Ref Dwg Group 9, item code no. 127, dim-- D - 1.188" OD, E - 0.056" depth of counterbore, F - 0.500" diam of counterbore, H - 0.373" ID min, K - 0.193" hole depth, 0.249" thk o/a; Hoffman Radio Corp part/dwg #EM-209 (Listed for reference only)	Spaces Inner Conductor E723 and SPLICE E737 at Upper End of Movable LINE SECTION E724
X	X	E711		INSULATOR, BUSHING: material data-- teflon, white: round flat shape, MBCA Ref Dwg Group 9, item code no. 209, dim-- D - 1.626" OD, H - 0.404" ID, T - 0.500" thk; Hoffman Radio Corp part/dwg #EM-208 (Listed for reference only)	Coaxial Line Spacer, Part of Female Junction E731 and Male Junction E732
X	X	E712	N17-I-48980-1685	INSULATOR, BUSHING: teflon; round flat shape; item code #259, MBCA Ref Dwg Group 9 (except not chamfered); dim-0.448" d , 0.120" h, 0.264" thk; fits snugly into feedline adapter; Hoffman Radio Corp part/dwg #EM-215 (Listed for reference only)	Insulator for FEEDLINE ADAPTER E707
X	X	E713	N16-T-25301-1423	RF TRANSMISSION: used to retain symmetry of current distribution in the outer conductor at the termination of the coaxial feedline; brass, silver plated; frequency range 230 to 390 mc; short section of tuning cut off at an angle, with square flange; 1.440" square (flange) by 1.060" lg, 1.184" diam of tube; four 0.180" diam mtg holes on 1.140" by 1.140" mtg/c 0.300" from flange edge; Hoffman Radio Corp part/dwg #AC-93 (Listed for reference only)	Termination of Outer Conductor of Feedline at the Quarter-wave Element E748

X	X	E714	N16-R-651091-425	RING, RETAINER: positions and retains insulator; brass, silver plated; circular w/protruding mtg flanges; 2-13/16" lg, 1.748" wd, and 0.535" thk o/a; four 0.147" diam mtg holes on 1.875" by 0.875" mtg/c; Hoffman Radio Corp part/dwg #AC-96 (Listed for reference only)	Retains INSULATOR E715 in ELBOW E706. Part of E706
X	X	E715		INSULATOR, WASHER: material data-- teflon, white; round flat shape, MBCA Ref Dwg Group 9; item code no. 209; dim-- D - 1.625", H - 0.404", T - 0.311"; Hoffman Radio Corp part/dwg #EM-207 (Listed for reference only?	Part of ELBOW E706 and part of Antenna Line E726
X	X	E716		INSULATOR, WASHER: teflon; washer shape; item code #209, MBCA Ref Dwg Group 9; dim-- 1.126" OD, .375" ID, .249" thk; fits snugly into feedline adapter; Hoffman Radio Corp part/dwg #EM-210 (Listed for reference only)	Insulates and Spaces Inner Conductor E737 from Reflectometer Outer LINE SECTION and Mounts E747
X	X	E717	N16-T-25301-1426	LINE SECTION, RADIO FREQUENCY TRANSMISSION: brass; silver plated finish; mounts one end 1/4-28-NF-2 tap, other end telescopes over insulator; tubular; o/a dim-- 20.753" lg, Hoffman Radio Corp part/dwg #AA-441; large inner tube for transmission feedline assy	Transmitter-Receiver Fixed Inner LINE SECTION

X	X	E718	N16-T-25301-1220	LINE SECTION, RADIO FREQUENCY TRANSMISSION: brass; silver plated finish; four 0.180" diam mtg holes on 0.875" by 1.812" mtg/c on flange at one end, other end has slotted telescoping fitting; tubular with double flange casting at one end; o/a dim-- 20.963" lg, 2-3/16" h, 1-9/16" wd (1.125" diam tube); Hoffman Radio Corp part/dwg #AA-443; small outer tube in feedline assy	Transmitter-Receiver Fixed Outer LINE SECTION
X	X	E719		LINE, RADIO FREQUENCY TRANSMISSION: coaxial type; coaxial type line-- single inner rf conductor, beryllium copper, silver plated 0.0005" thk, tubing, 5/8" OD, 0.404" ID; outer conductor-- 1.751" OD, beryllium copper, silver plated 0.0003" to 0.0005" thk; insulation spacer data-- 2 round, washer type, teflon, 1ms of each, slotted end 1.622" OD x 0.405" ID x .312" thk, threaded end 1.624" OD x 0.405" ID x .502" thk; 3.685" lg o/a; terminated on one end with slotted plug and other end with threaded collar; Hoffman Radio Corp part/dwg #0A-177 (Listed for reference only)	Complete Elbow with Female Adapter PLUG E731 for Antenna Transmission Line
X	X	E720		LINE, RADIO FREQUENCY TRANSMISSION: coaxial type; coaxial type line--single inner rf conductor, beryllium copper, silver plated 0.0005" thk, tubing 5/8" OD, 0.404" ID; outer conductor--1.751" OD, beryllium copper, silver plated 0.0003" to 0.0005" thk; insulation spacer data-- 1.622" OD x 0.405" ID x .312" thk, threaded end 1.624" OD x 0.405" ID x .502" thk; 3.865" lg o/a; terminated on one end with slotted plug and other end with male pin; Hoffman Radio Corp part/dwg #0A-178 (Listed for reference only)	Complete Elbow with Male Adapter PLUG E732 for Antenna Transmission Line

X	X	E721	N16-T-25301-1408	LINE SECTION, RADIO FREQUENCY TRANSMISSION: brass; silver plated 0.005" thk; mts with internal axial 3/8-32 NS-2 thds; cylindrical; o/a dim-- 0.687" lg, 5/8" diam; "E721" stenciled on side; Hoffman Radio Corp. part/dwg #0M-690; removable female contact for inner conductor of transmission line elbow.	Inner contact of Female outlet, PLUG E731. Mounts on Elbow E719
X	X	E722	N16-T-25301-1407	LINE SECTION, RADIO FREQUENCY TRANSMISSION: brass; silver plated 0.005" thk; mts with 3/8"-32 NS-2 tapped thd 0.312" d; cylindrical; o/a dim-- 1.180" lg, 5/8" diam; two slots 3/4" lg x 0.020" wd for tension mtg to transmission line; "E722" stenciled on side; Hoffman Radio Corp part/dwg #0M-691; removable male contact pin for inner conductor of transmission line elbow.	Inner Contact of Male Outlet, PLUG E732. Mounts on Elbow E720

X	X	E723	N16-T-25301-1419	LINE SECTION, RADIO FREQUENCY TRANSMISSION: brass; silver plated finish; mounting data-- staked and soldered by three equally spaced 0.094" diam holes; cylindrical shape; o/a dim-- 20.042" lg, 0.427" diam; Hoffman Radio Corp part/dwg #AA-444; inner tube	Transmitter-Receiver Movable Inner LINE SECTION on PLATFORM A714
X	X	E724	N16-T-25301-1427	LINE SECTION, RADIO FREQUENCY TRANSMISSION; silver plated finish; four #35 (.110) drill holes, sweated and punched to mtg which is bolted to platform through two drill #16 (.177) holes; cylindrical except mtg; o/a dim-- 20-1/4" lg, 1.562" wd, 1.940" h; Hoffman Radio Corp part/dwg #AA-442; outer tube for transmission line;	Transmitter-Receiver Movable Outer LINE SECTION on PLATFORM A714

X	X	E725	N16-T-25301-1422	LINE SECTION, RADIO FREQUENCY TRANSMISSION: brass, silver plated 0.0005" thk" mts with four 0.209" diam holes with 1-3/8" and 1-5/8" centers; cylindrical except plate; o/a dim-- 2" lg, 1-3/4" wd, 1.540" d; Hoffman Radio Corp part/ dwg #AC-90; contact for outer male conductor	Outer Contact of Male Outlet Mounted on ELBOW E720
X	X	E726		LINE SECTION, RADIO FREQUENCY TRANSMISSION: c/o Reference Symbol Numbers E742, E746, E715, E749 and E745; Hoffman Radio Corp part/dwg #AA-438 (Listed for reference only)	Antenna Semi-Coaxial Transmission Line
X	X	E727	N16-T-25301-1421	LINE SECTION, RADIO FREQUENCY TRANSMISSION: brass; silver plated 0.0005" thk; mts w/ four 0.209" diam holes w/ 1-3/8" and 1-5/8" centers; cylindrical except plate; o/a dim-- 2" lg, 1-3/4" wd, 1.530" d; Hoffman Radio Corp part/ dwg #AC-89; contact for outer female conductor	Outer Contact of Female Outlet PLUG E731 Mounted on ELBOW E706
X	X	E728	N16-T-25301-1412	LINE SECTION, RADIO FREQUENCY TRANSMISSION: beryllium copper; silver plated finish; one side has four 10-24 NC-2 drilled and tapped mtg holes on 1.502" by 1.502" mtg/c, two are thru holes and two are tapped 1/2" d; other side has four 10-24 NC-2 drilled and tapped mtg holes on 1.625" x 1.375" mtg/c, two are thru holes and two are tapped 3/8" deep; elbow shape; o/a dim-- 2-3/8" lg, 1.858" wd, 1.280" h; Hoffman Radio Corp part/dwg #AC-85; outer conductor in connector assy (Listed for reference only)	Outer Conductor of ELBOWS E706

X	X	E729	NIC-T-28001-1424	LINE SECTION, RADIO FREQUENCY TRANSMISSION; beryllium copper; silver plated finish; mounts in insulators of coaxial line, friction fit one end and 3/8 - 32 NS-2 x 0.250" lg thd other end; elbow shape; o/a dim--2.3045" lg, 2.187" wd, 0.625" diam; Hoffman Radio Corp part/dwg #AC-103; inner conductor in connector assy; (Listed for reference only)	Inner Conductor of ELBOW E706
X	X	E730		LINE SECTION, RADIO FREQUENCY TRANSMISSION: brass; silver plated 0.0005" thk; mts using 1/4-28 NF-3 tap; conical tapered; o/a dim-- 1.838" lg, 0.437" diam; Hoffman Radio Corp part/dwg #EA-343; contact for inner feedline	Inner Conductor of FEEDLINE ADAPTER E707
X	X	E731		ADAPTER, RF LINE SECTION: female; c/o Reference Symbol #E727, #E711 and #E721, one ea (Listed for reference only)	Female Adapter for ELBOW E706
X	X	E732		ADAPTER, RF LINE SECTION: male; c/o Reference Symbol #E725, #E711 and #E722, one ea (Listed for reference only)	Male Adapter for ELBOW E706

X	X	E733	N17-P-87007-6431	PROBE, WAVEGUIDE: 230 to 390 mc frequency range; copper wire loop w/ brass disc; silver plated finish; o/a dim-- 0.687" lg, 0.375" diam, 0.312" h, 0.057" diam of wire; terminal data-- 2 terminals ends of loop serve as terminals; Hoffman Radio Corp part/dwg #AA-436; picks up rf energy inductively and capacitively from the center conductor of a rigid coaxial line (Listed for reference only)	Part of Z701 to Inductively and Capacitively Couple REFLECTO-METER to CONDUCTO E737
X	X	E734	N16-T-25301-1414	LINE SECTION, RF TRANSMISSION: brass; nickel plated 0.0005" thk; funnel shaped except mtg; o/a dim-- 2.647" lg 1.906" wd, 2-3/4" h; mts with four 0.152" diam holes on 1.532" and 2.376" centers; 5/8-24-NS-2 thds near end opposite mounting; Hoffman Radio Corp part/dwg #AC-88; adapter from Coupler to antenna feedline	Outer Shell for Adapter E751 Hardware
X	X	E735	N16-T-25301-1416	LINE SECTION, RF TRANSMISSION: brass, silver plated 0.0005" thk; funnel shaped except mtg; o/a dim-- 2.031" lg, 1-3/8" wd, 1-3/8" thk ; mtd by four 0.180" diam holes centered 1" apart; 5/8-24 NS-3 thds near end opposite mounting; Hoffman Radio Corp part/dwg #AC-100; adapter from Coupler to signal input feedline; (Listed for reference only)	Outer Part of FEEDLINE Adaptor E707 between Coupler and Transmitter-Receiver Line

X	X	E736	SPLICE, CONDUCTOR: threaded type; brass-material per spec MIL-B-895 cond, 1/2 hard; silver plated finish; o/a dim-- 1.030" lg, 0.476" max diam; splices inner conductor of RF feedline to special elbow; Hoffman Radio Corp part/dwg #OM-921	Splices Transmitter-Receiver Movable Inner LINE SECTION E723 to CONNECTOR E743
X	X	E737	LINE SECTION, RF TRANSMISSION: threaded screw type; brass material per spec MIL-B-895, cond 1/2 hard; silver plated; o/a dim-- 2.560" lg, 0.437" max diam; used to connect VHF coaxial line tuner inner tubing to special reducer fitting conductor and to support inner conductor; Hoffman Radio Corp part/dwg #OM-708	Splices Transmitter-Receiver Fixed Inner LINE SECTION E717 to Adapter Inner Conductor E730
X	X	E738	LINE SECTION, RADIO FREQUENCY TRANSMISSION: movable transmitter-receiver feedline assembly; c/o Reference Symbol nos. E724, E723, E713, E736, E710 and A711 (Listed for reference only)	Transmitter-Receiver Movable LINE SECTION
X	X	E739	LINE SECTION, RADIO FREQUENCY TRANSMISSION: fixed transmitter-receiver feedline assembly; c/o Reference Symbol nos. E717, E718, E709, E710, E747, A719, E741, Z702 and E707; includes entire reflectometer assembly (Listed for reference only)	Transmitter-Receiver Fixed LINE SECTION with REFLECTOMETER and coaxial cable adapter

X	X	E740	N16-T-25301-1415	LINE SECTION, R.F. TRANSMISSION: cast brass material per Navy spec 46B31 type 1; silver pl finish; o/a dims-- 2" lg, 1-3/4" wd, 11/16" thk; four .209" diam mtg holes on 1.625" x 1.375" mtg/c; serves as shorting stub for end of tuning line when from two to six antenna couplers are continuously connected; Hoffman Radio Corp part/dwg #AC-91	Serves as Termination Stub for Interconnected Antenna Transmission Lines E726 Mounts to Outer SHELL E728 on Last Unit of Coupler Hardware
X	X	E741	N16-C-302286-389	CLAMP, ELECTRICAL: brass; nickel plated finish; fastering device data-- 1 bolt type; o/a dim--1.749" lg, 1.311" wd, 0.562" h; no mtg facilities; designed to hold material 1.187" max diam; has sq brass #10-32 nut 3/8" wd x 1/8" thk silver soldered to fastening flange; Hoffman Radio Corp part/dwg #0A-185; used as locking clamp around reflectometer support	Clamp around Reflectometer SUPPORT A719 to Prevent Slippage After Adjustment
X	X	E742	N16-T-25301-1418	LINE SECTION, RF TRANSMISSION: open side of line allows for electrical coupling to a quarterwave matching stub; mtg flange on each end and a flat apron which extends the length of the line; alum, silver plated; 52 ohms characteristic impedance through range to 230 to 390 mcs, 50 watts rf power rating; o/a dim-- 40.195" lg, 2.440" diam; mtd by eight 0.209" diam mtg holes in each end flange; includes rectangular cross section ground rail along one side; mfr and contr; Hoffman Radio Corp part/dwg #AA-457	Outer Conductor of Antenna Transmission Line E726
X	X	E743	N16-T-25301-1417	LINE SECTION, R.F. TRANSMISSION: inner coaxial connector from feedline to quarterwave element; c/o elbow, strap, and clamp; brass clamp, elbow brass casting, beryllium copper strap; frequency range 230 to 390 mc; 90° elbow connected to circular hose type clamp by soft copper strap; approx o/a dim 2.900" lg, 0.875" wd, 0.800" h; has 0.180" diam hole w/ counterbore 0.281" diam x 0.420" deep thru top of elbow for mtg to feedline splice connector, other end clamps to quarterwave element; mfr and contr: Hoffman Radio Corp part/dwg #AA-495	Connects-Transmitter-Receiver Inner LINE SECTION E723 to Quarter-wave Element E748

X		E744	N17-C-200872-951	COVER, ELECTRICAL CONNECTOR: anodized aluminum; o/a dim-7/16" lg, 1-1/16" diam; mts by means of internal 7/8"-20 threading; "Amphenol" and "22" in raised letters on outer face; has waterproofing rubber seal, non-loss chain; covers AN connectors not in use; govt spec data-- type AN2209-8; American Phenolic Corp type 9760-14; for general purpose use; Hoffman Radio Corp part/dwg #HM-358	Covers J701 or J702, whichever is Not in Use. Mounted to J701
X	X	E745		INSULATOR, SPACER: material data-- teflon, white; "C" shape; o/a dim-- 1.491" lg, 7/8" wd, 3/8" thk; two 0.086" diam, 3/32" deep holes drilled to receive mtg screws after insulator is mtd in place; Hoffman Radio Corp part/dwg #EM-216	Spaces and Insulator Antenna Inner LINE SECTION E746 from Antenna Open Outer LINE SECTION E742
X	X	E746	N16-T-25301-1425	LINE SECTION, RADIO FREQUENCY TRANSMISSION: brass, silver plate finish; both ends tapped 3/8-32 NS-2 thread for mtg connectors, has insulator bushing for center support; straight tubular shape; o/a dim-- 39.312" lg, 3/4" OD; Hoffman Radio Corp part/dwg #AA-439; inner conductor of transmission line assy	Inner Conductor of Antenna LINE SECTION E726
X	X	E747	N16-T-25301-1413	LINE SECTION, RADIO FREQUENCY TRANSMISSION: electrical ratings (part of concentric rated line)-- 230-390 mcs, 50 ohms impedance, 50 watts; commercial brass casting; silver plated 0.0005" thk inside and outside; mtd to adjacent rf feedline sections using four #8-32 tap thru holes with 1.812" and 7/8" mtg/c and four #15 (.180) tap holes with 1" mtg/c; cylindrical shaped with flanges; 2-3/16" lg, 2" wd and 1-3/8" thk; four #8-32 NC-2 tap 3/8" deep holes 1-1/8" c to c for mtg reflectometer; Hoffman Radio Corp part/dwg #AC-79; contric rf feedline (Listed for reference only)	Transmitter-Receiver Outer Conductor LINE SECTION Casting Where REFLECTOMETER SUPPORT A719 is Mounted

X	X	E748	N16-P-87007-6851	PROBE, QUARTER-WAVE: 230 to 390 mcs frequency range: 50 ohms impedance; brass body, aluminum movable element; silver plated finish on body; approx o/a dims-- 13-9/16" collapsed length, 1-1/4" wd, 1-1/8" h; terminal data-- 1 terminal, special elbow type connector; has internal gear arrangement for adjusting o/a length; Hoffman Radio Corp part/dwg #OA-235; quarter-wave matching stub which provides inductive coupling to open concentric line	Adjustable Quarter-wave Coupling Element on PLATFORM A714
X	X	E749		SPLICE, CONDUCTOR: screw type; accommodates 2 splice fittings; brass; silver plated finish; o/a dim--- 1.290" lg, 0.625" diam; hole bored 0.309" diam, 0.560" deep in head end, has 3/8-32 NS-2 thds 0.540" lg at other end; Hoffman Radio Corp part/dwg #HM-222	Splices on Each End of Center Conductor of Antenna LINE SECTION E726 Mates with Center Conductor of ELBOW E706

X	X	E750	N16-T-25301-1410	LINE SECTION, RADIO FREQUENCY TRANSMISSION: brass; silver plated; pressed into elbow adapter; conical shape; o/a dim-- 2.179" lg, 5/8" diam; Hoffman Radio Corp part/ dwg #EA-362; inner contact for coaxial adapter (Listed for reference only)	Inner Contact for Adapter E751
X	X	E751		ADAPTER, RADIO FREQUENCY LINE SECTION: female coaxial type; c/o Reference Symbol #E711, #E750, #752 and E734 (Listed for reference only)	Adapter between Coupler and Antenna Transmission Line. Used on First of a Band of Interconnected Couplers

X	F701	G17-F-16302-140	FUSE, CARTRIDGE: 5 amp, 250v; carry 110%, open at 135% in 1 hr; terminal data-- ferrule type, dim-- 1/4" lg, 1/4" dia; enclosed type, glass body; one time; visual indication; o/a dim-- 1-1/4" lg, 1/4" dia; Bussman Mfg Co, part #MTH-5; for general purpose use-- Hoffman Radio Corp part/dwg #FU-37	Line fuse mounts in XF701
X	F702		Same as F701	Line fuse mounts in XF702

X	X H701	N43-S-9415-2550	SCREW, MACHINE: brass; nickel plated; semi-finished; head data-- filister binding head, style No. 6, MBCA Ref Dwg slotted, style no. 48, dim-- H - 0.114", W - 0.399", undercut 0.312" diam x 0.020" deep; 10-32 NF-2 threads; 5/16" nominal length; Hoffman Radio Corp part #HSB-970N, dwg #HHS-400F	Secures BEARING BLOCK 0753 to PLATFORM A714
X	X H702	N43-S-7678-2150	SCREW, MACHINE: brass; nickel plated; semi-finished; heat data--filister, style no. 6, MBCA Ref Dwg Group 29, slotted style no. 48, dim-- H - 0.095" o/a W - 0.161"; 3-48 NC-2 threads; 5/16" nominal length; Hoffman Radio Corp part #HSB-365N, dwg #HHS-1000C	Secures Quarter-wave Element Coupling Clamp CONNECTOR E743 Around SPLIT NUT H743
X	X H703	N43-S-7678-4175	SCREW, MACHINE: brass; nickel plated; semi-finished; head data--filister, style no. 6, MBCA Ref Dwg Group 29, slotted style no. 48, dim-- H - 0.156" o/a, W - 0.270"; 8-32 NC-2 threads; 3/4" nominal length; Hoffman Radio Corp part #HSB-320N, dwg #HHS-1000C	Secures Quarter wave Element Coupling Clamp CONNECTOR E743 to Transmitter-Receiver Movable Line
X	X H704	N43-S-7678-4160	SCREW, MACHINE: brass; nickel plated; semi-finished; head data--filister, style no. 6, MBCA Ref Dwg Group 29, slotted, style no. 48, dim-- H - 0.156" o/a, W - 0.270"; 8-32 NC-2 threads; 1/2" nominal length; Hoffman Radio Corp part #HSB-319N, dwg #HHS-1000C	Secures MITERED LINE SECTION E713 to Transmitter-Receiver Movable Outer LINE SECTION E724

X	X	H705	N43-S-7678-41500	SCREW, MACHINE: brass; nickel plated; semi-finished; head data-- filister style no. 6 MBCA Ref Dwg Group 29, slotted, style no. 48, dim-- H - 0.156" o/a, W - 0.270"; 8-32 NC-2 threads; 7/16" nominal length; Hoffman Radio Corp part #HSB-304N, dwg #HHS-1000C	Secures Upper End of Transmitter-Receiver Movable Line to PLATFORM A714
X	X	H706	N43-S-9404-5510	SCREW, MACHINE: brass; nickel plated; semi-finished; head data--round, style no. 16, MBCA Ref Dwg Group 29, slotted, style no. 48, dim-- H - 0.103", W - 0.260"; 6-32 NC-2 threads; 1/4" nominal length; Hoffman Radio Corp part #HSB-8N, dwg #HHS-300C	Secures Grounding CONTACT E704 to PLATFORM A714
X	X	H707	N43-S-8387-4970	SCREW, MACHINE: brass; nickel plated; semi-finished; head data-- flat, style no. 11, MBCA Ref Dwg Group 29, slotted, style no. 48; dim-- H - 0.059", W - 0.199"; 3-48 NC-2 threads; 5/16" nominal length; Hoffman Radio Corp part #HSB-599N, dwg #HHS-200C	Secures CONTACT HOLDER H714
		H708		Not used	
		H709		Not used	

X	X	H710	N16-B-750001-840	BRACKET: 5/16" stainless steel stock; gray enamel finish over zinc chromate primer; o/a dims-- 2-7/8" lg, 3-1/8" h, 2-3/4" d; mtg data-- holds items by screws thru two 25/64" holes on 2" mtg/c on either side, mounts to items held only, shock mounting provided by "U" shaped construction and reduced-width section of mounting; used to separate and shock-mount closely banked equipments; Hoffman Radio Corp part/dwg #AS-914	Shock Mount for Mounting Equipment on Bulkhead Part of Installation Hardware
X		H711	N17-C-780940-898	CLAMP, ELECTRICAL; plastic; fastering device data-- 1 fastener, bolt type; o/a dim-- 27/32" lg, 3/8" wd, 0.392" h; 0.173" diam hold for mtg; designed to hold material 5/16" max; used as cable clamp; Burndy Engr. Co. Bulletin 6040A part #HP755-5; for general purpose use; Hoffman Radio Corp part #WK-1	Secures Motor Leads
X		H712	N17-C-780598-222	CLAMP, ELECTRICAL: plastic; fastening device data-- 1 fastener, bolt type; o/a dim-- 21/32" lg, 3/8" wd, 0.205" h; 0.173" diam hole for mtg; designed to hold material 1/8" max; used as cable clamp; Burndy Engr. Co. Bulletin 6040A part #HP755-2; for general purpose use; Hoffman Radio Corp part/dwg #WK-3	Secures R701 Lead to Frame
X	X			CLAMP, ELECTRICAL: plastic; fastening device data-- 1 fastener, bolt type ; o/a dim-- 23/32" lg, 3/8" wd, 0.267" h; 0.173" diam hole for mtg; designed to hold material 3/16" max; used as cable clamp; Burndy Engr. Co. Bulletin 6040A part #HP755-3; for general purpose use; Hoffman Radio Corp part/dwg #WK-5	Clamps Reflectometer Motor Lead to SUPPORT A719

X	X	H714	N17-M-79992-3566	MOUNTING, CONTACT: brass material per spec MIL-B-895 cond 1/2 hard; silver pl finish; o/a dims-- long section 15.5" lg, short section 1.953" lg, both sections 3/8" wd, .062" thk; mtg data-- holds contact strip by means of screws thru eleven .116" diam holes in long section, two .116" diam holes in short section spaced 1.5" apart in straight line, mts to platform by same screws; holder mounts cut-away contact, comes in two sections; Hoffman Radio Corp part/dwg #AS-898 and #AS-899	Mounts CONTACT E703 to PLAT-FORM A714
X	X	H715	N16-B-23876-1006	MOUNTING, BAR: carbon steel, cadmium plated; 28.912" lg x 1-1/2" wd x 0.370" thk o/a; mts to bulkhead with twelve 25/64" diam countersunk holes for 3/8" flat head screws, spaced irregularly along center line; twelve 25/64" drill holes arranged alternately 3.562" and 1.258" c to c beginning 0.625" from each end; mfr and contr: Hoffman Radio Corp part/dwg #OM-791	Mounting Bar which Bolts Equipments together. Part of install-ation Hardware
X	X	H716	N16-B-23876-1007	BAR, BULKHEAD MOUNTING: carbon steel, cadmium plated; 29.530" lg x 2" wd x 1" thk o/a; mts to bulkhead with seven 25/64" diam holes on center axis systematically spaced beginning 0.625" from each end 4-1/2" between holes at ends and remaining holes 4.82" apart c to c; twelve 3/8-16 NC-2 drill and tap holes paired between mtg holes on 2" centers and beginning 1.715" from each end; mfr and contr: Hoffman Radio Corp part/dwg #OM-792	Bulkhead mounting Bar. Part of Installation Hardware
X	X	H717	N43-N-4740-34	NUT, PLAIN, HEXAGON: brass, spec data-- Fed Std. Stock Catalog, spec no. QQ-B-611a, 20,000 lb per sq. in. min yield strength; nicked plated; semi-finished machining; thread data-- #3-48 NC class 2 fit; dim-- 3/16" wd across flats, 1/16" thk o/a; Hoffman Radio Corp part #HNB-30N-ST, dwg #HHS-500	Used with BOLT H702 to Secure Quarter-wave Element Coup-ling Clamp CONNECTOR E743 Around SPLIT NUT H743

X	X	H718	N43-N-4802-225	NUT, PLAIN, HEXAGON: brass, spec data-- Fed. Std. Stock Catalog, spec no. QQ-B-611a, 20,000 lg per sq in. min yield strength; nickel plated; semi-finished matching; thread data-- 3/8-32, NEF class 2 fit; dim-- 17/32" wd across flats, 17/32" thk o/a; Hoffman Radio Corp part #HNB-81N-SP, dwg #HHS-501	Mounts SHORTING CAP E740 at Termination of Antenna Line
X	X	H719		PIN, DOWEL: corrosion resistant steel, passivated; 1/4" lg, 0.1260" - 0.0002" diam o/a; Hoffman Radio Corp part/ dwg #HDS-55P	Two Position Quarter-wave Element in BEARING BLOCK 0753. Two Position 0753. Two Position 0753 on PLATFORM A714. Two Position Roller Arm Post Bolts H739
X		H720	G42-P-14141-58	PIN, TAPER: stainless steel; standard #6/0 taper; 0.078" largest diam, 5/16" lg; passivate finish; Hoffman Radio Corp part #HPS-16P, dwg #HHS-1800	One Used for GEAR 0722 and Two for Each GEAR 0713
X	X	H721	G42-P-14141-60	PIN, TAPER: stainless steel; standard #6/0 taper; 0.078" largest diam, 3/8" lg; passivate finish; Hoffman Radio part #HPS-17P, dwg #HHS-1800	Used for Each GEAR 0714

X	X	H722	G42-P-14141-64	PIN, TAPER: stainless steel; standard #6/0 taper; 0.078" largest diam, 7/16" lg; passivate finish; Hoffman Radio Corp part #HPS-18P, dwg #HHS-1800	For Each of Two COUPLING SPIDERS 0748 and COLLAR 0707
X	X	H723	G42-P-14141-68	PIN, TAPER: stainless steel; standard #6/o taper; 0.078" largest diam, 1/2" lg; passivate finish; Hoffman Radio Corp part #HPS-19P, dwg #HHS-1800	For GEAR 0721, SPROCKET 0750, GEAR 0719, GEAR 0721 and GEAR ASSEMBLY 0727
X		H724	G42-P-14141-72	PIN, TAPER: stainless steel; standard #6/0 taper; 0.078" largest diam, 9/16" lg; passivate finish; Hoffman Radio Corp part #HPS-20P, dwg #HHS-1800	For GEAR 0724

X		H725	G42-P-14141-76	PIN, TAPER: stainless steel; standard #6/0 taper; 0.078" largest diam, 5/8" lg; passivate finish; Hoffman Radio Corp part #HPS-21P, dwg #HHS-1800	For COLLARS 0708
X	X	H726	G42-P-14141-84	PIN, TAPER: stainless steel; standard #6/0 taper; 0.078" largest diam, 3/4" lg; passivate finish; Hoffman Radio Corp part #HPS-23P, dwg #HHS-1800	GEARS 0726, 0716, 0723, 0728
X	X	H727		POST, SPACING: used as spacer in mtg stepper relay; comm brass annealed per MIL-T-694S, nickel plate finish .0003" thk; tubular shape; o/a dim-- .468" lg, .312" OD, .182" ID, mtd between relay and panel w/6-32 screw; Hoffman Radio Corp part/dwg #OS-49	Supports STEPPING RELAY K701

X	X	H728	N16-B-23876-1004	TIEBAR: #1020 carbon steel, cad plated; zinc chromate primed and painted grey 6.702" lg x 0.875" wd x 0.437" thk o/a; mts w/ four 11/32" diam holes, 2 countersunk for 5/16-18 NC FH screws; holes paired on center axis on 1.008" mtg/c 0.437" from each end; mfr and contr: Hoffman Radio Corp part/dwg #OM-789	Center Mounting Bar for Multiple Installations. Part of Installation Hardware
X	X	H729	N16-B-23876-1005	TIEBAR: #1020 carbon steel, cad plated zinc chromate primed and painted grey 0.0005" thk; 5.695" lg x 0.870" wd x 0.437" thk o/a; mts with three 11/32" diam holes, one countersunk for 5/16-18 NC-FH screw; holes on center axis, countersunk hole 0.438" from one end, other two holes on 1.008" mtg/c 0.437" from other end; mfr and contr: Hoffman Radio Corp part/dwg #OM-790	Left Side Tiebar for Multiple Installations. Part of Installation Hardware
X	X	H730	N16-B-23876-1008	TIEBAR: #1020 carbon steel, cad plated zinc chromate primed and painted grey 0.0005" thk; 5.695" lg x 0.870" wd x 0.437" thk o/a; mts w/three 5/16-18 NC FH screws through 11/32" countersunk holes; holes on center axis, two on 1.008" mtg/c 0.437" from end, and other 0.438" from opposite end; mfr and contr: Hoffman Radio Corp part/dwg #OM-793	Right Side Tiebar for Multiple Installations. Part of Installation Hardware

X	X	H731	N43-W-5740-335	WASHER, LOCK: type data-- round, slit helical ring; phosphor bronze material; finish data-- nickel plated; dimensions-- center hole 0.157" diam, 0.251" OD, 0.031" thk; no. 6 nominal screw size; Hoffman Radio Corp part# HWP-5N-M, dwg #HHS-100C	For BOLTS H706
X	X	H732	N43-W-5740-3430	WASHER, LOCK: type data-- rd, slit helical ring; phosphor bronze material; finish data-- nickel plated; dim-- center hole 0.186" diam, 0.280" OD, 0.031" thk; no. 8 nominal screw size; Hoffman Radio Corp part #HWP-6N-L, dwg #HHS-100	For BOLTS H703
X	X	H733	N43-W-5740-307	WASHER, LOCK: type data-- rd, slit helical ring; phosphor bronze material; finish data-- nickel plated; dim-- center hole 0.118" diam, 0.188" OD, 0.020" thk; no. 3 nominal screw size; Hoffman Radio Corp part #HWP-2N-L, dwg #HHS-100	For BOLT H702

X	X	H734	N43-W-5740-6120	WASHER, LOCK: type data--rd, toothed outer edge; phosphor bronze material; finish data--nickel plated; dim-- center hole 0.195" diam, 0.406" OD, 0.022" thk; no. 10 nominal screw size; Hoffman Radio Corp part #HWP-305-N, dwg #HHS-600E	For BOLTS H701
X	X	H735	N43-W-5740-6054	WASHER, LOCK: type data--rd, toothed outer edge; phosphor bronze material; finish data-- nickel plated; dim-- center hole 0.142" diam, 0.317" OD, 0.020" thk; no. 6 nominal screw size; Hoffman Radio Corp part #H WP-328-N, dwg #HHS-600E	For BOLTS H738
X	X	H736	N43-W-7520-568	WASHER, SPRING TENSION: type data-- rd, dish style bend; beryllium copper-- spec data-- MIL-C-947, 175,000 lb per sq in. min yield strength, C-38 min Rockwell hardness; finish data-- chrome flash; dim-- center hole 0.313" dia m, 3/4" OD, 0.010" thk, 0.031" thk o/a; has 6 slots, 1/32" wd, 1/8" deep, equally spaced at outer edge; Hoffman Radio Corp part/dwg #HM-233	Used with COLLAR 0708
		H737		Not used

X	X	H738	N43-S-8769-155	SCREW, MACHINE: brass, spec data -- Fed. Std. Stock Catalog, spec no. QQ-B-611a, 25,000 lb per sq in. min yield strength; nickel plated finish; head data-- pan head, style no. 13, MBCA Ref Dwg Group 29, slot drive, style no. 48, dim-- 0.270" diam, 0.082" h; thread data-- 6-32 NC class 2 fit; 0.230" moninal length; Hoffma n Radio Corp pa rt/ dwg #HM-477	Pan Head Bolts for Mounting Quarter-wave Element to PLATFORM A714
X	X	H739	N16-B-651501-107	MACHINE: corrosion resistant steel, spec data-- BuShips, Spec No. MIL-S-853 (SHIPS), 50,000 lb per sq in.min yield strength; passivate finish; finished machining; head data-- flat,style no. 8, MBCA Ref Dwg Group 29, dim,-- 0.094" h, 0.562" diam; thread data-- 1/4-28, NF thread, class 2 fit, 0.290" min length; 0.811" nominal length; threaded end slotted 0.033" wd by 0.109" deep for roller arm spring; Hoffman Radio Corp part/dwg #OM-748 Rev. A	Forms Post for Spring Adjustable Roller Arm
X	X	H740	N43-S-19119-1320	BOLT, SHOULDER SCREW: corrosion resistant steel, spec data-- BuShips, Spec No. MIL-S-353 (SHIPS) 50,000 lb per sq in. min yield strength; passivate finish; finished machining; head data-- flat, style no. 8 MBCA Ref Dwg Group 29, dim-- 0.080" h, 0.436" diam; thread data-- #10-32, NF thread, class 2 fit, 0.188" min length; 0.771" nominal length; Hoffman Radio Corp, part/dwg #OM-749	Adjustable Arm Roller Axle

X	X	H741	NUT, SELF LOCKING, KNURLED: brass; nickel plated finish; finished machining; one edge slotted 0.030" wd, 0.695" deep, 0.060" from top and has #8-32 NC-2 tap hole near outer edge for locking screw; drive data--medium cross knurled edges for thumb drive; thread data -- 1.125-32 NS thread, class 2 fit; dim-- 1.750" OD, 0.312" o/a h; Hoffman Radio Corp part/dwg #HM-229 (Listed for reference only)	Reflectometer Positioning Nut
X	X	H742	NUT, PLAIN ROUND: brass, spec data-- MIL-B-895; nickel plated; finished machining; drive data-- spanner type, 7/16", two 1/16" diam, 3/32" deep holes 180° apart; thread data-- 1/4-28, NF thread, class 2 fit; dim-- 0.610" OD, 0.181" l/a h; Hoffman Radio Corp part/dwg #OM-752	Retains Adjustable Roller Arm
X	X	H743	NUT, SPLIT, HEXAGON: brass, spec data-- MIL spec MIL-B-895 cond 1/2 hard; silver pl finish; finished machining; drive data-- hexagonal drive, 27/32" across flats; thread data-- 5/8"-24, NEF class 2; dims-- 27/32" wd across flats, .251" h; special features data--nut cut in half, externally relieved to .159" wd on .3695" radius from center of bolt-hole leaving one .031" wide flat, other flat .061" wd; held together by special retaining ring; Hoffman Radio Corp split hex nut, part/dwg #OM-928; made from 27/32" hex bar stock (Listed for reference only)	Provides for Impedance Match Between Clamp CONNECTOR E743 and Quarter-Wave Element

X	X	H744	N16-P-310001-105	PIN, GROOVED, HEADLESS: fixed pin serving as center post for roller assy; corrosion resistant steel, passivate finish; 0.806" lg, 0.250" diam o/a; mounts by 0.187" diam, 0.115" lg shoulder at one end and 0.187" diam, 0.186" lg shoulder at other end pressed into receiving holes; has 1/64" by 45° chamfer both ends; mfr & contr: Hoffman Radio Corp part/dwg #0M-753	Axle for Fixed Rollers

X	X	H747	SCREW MACHINE: Flat hd, 82 degree; 5/16-18 NC-2 thd 1" lg; cad pl; m/o brass; Hoffman Part #HSB-1612c, dwg HHS-200c	Used to mount Tiebar to Coupler
X	X	H748	SCREW, MACHINE: hex head cap screw; 5/16-18 NC-2 thd, 1" lg; m/o carbon steel, cad pl; Hoffman Part # H S-1122c, dwg HHS-1100c	Mounts H715 to coupler

X	X	H749	SCREW, MACHINE: flat hd, 82° taper; 3/8-16 NC-2 thd; 1-1/8 lg; m/o carbon steel, cad pl; Hoffman part #HS-1644C, dwg #HHS-200C	Attaches H710 to H715
X	X	H750	SCREW, MACHINE: hex head cap screw; 3/8-16 NC-2 thd; 3/4" lg; m/o carbon steel, cad pl; Hoffman part #HS-1111C, dwg #HHS-1100C	Attaches H710 to Mounting H716
X	X	H751	SCREW, MACHINE: fillister head; 6-32 NC-2 thd; 9/32" lg; m/o brass nickel pl; Hoffman part #HSB-399N, dwg #HHS-1000C	Used to Mount E706
X	X	H752	NUT: hex head; 3/8-16 thd; 5/8" wide across flats; 1/4" thk; carbon steel material, cad pl; Hoffman Part #HN-84C, dwg HHS-500	Used with H749 to Mount H710
X	X	H753	WASHER, LOCK: split type; for 5/16" diam screw; m/o carbon steel, cad pl; Hoffman Part #HW-10C, dwg #HHS-100	Used with H748
X	X	H754	WASHER, LOCK: split type; for 3/8" diam screw; m/o carbon steel, cad pl; Hoffman part #HN-11C, dwg #HHS-100	Used with H750

X	J701	N17-C-72641-6098	CONNECTOR, RECEPTACLE: contact data-- 19, male, round polarized; straight; o/a dim-- 2-3/16" lg, 1-5/8" wd, 1-5/8" h; contacts electrical rating-- 10 amp max, 200 vdc at sea level; body data-- cylindrical, die cast alum alloy, unfinished; brass inserts, silver plated; mtg data-- 4 holes, 0.120" diam, 1-7/16" x 1-1/4" mtg/c; govt spec data--MIL-C-5015, AN connector #3102A-22-14P; Cannon Electric part #3102A-22-14P; for general purpose use; Hoffman Radio Corp part/dwg #PL-93	Receptacle for Transmitter Control
X	J702	N17-C-72277-6098	CONNECTOR, RECEPTABLE: contact data-- 19, female, round; polarized; straight; o/a dim-- 2-3/16" lg, 1-5/8" wd, 1-5/8" h; contact electrical rating-- 10 amp max, 200 vdc at sea level; body data-- cylindrical, die cast alum alloy, unfinished; brass inserts, silver plated; mtg data-- 4 holes, 0.120" diam, 1-7/16" x 1-1/4" mtg/c; govt spec data-- MIL-C-5015, AN Connector #3102A-22-14S; Cannon Electric part #3102A-22-14S; for general purpose use; Hoffman Radio Corp part/dwg #PL-98	Receptacle for Receiver Control

X	K701 N17-R-69633-9961	RELAY, ROTARY: remote-controlled; bank contact assembly data-- 3 levels, 10 contacts and one off position per level, 0.10 amp contact rating; wiper contact assembly data-- 3 wiper contacts, 0.10 amp contact rating; magnet coil data-- 115 vdc operating voltage, 0.364 max operating current, coil #1- inductive winding, 155 ohms dc resistance paralleled with 900 ohm non-inductively would coil #2, coil #3, inductive winding, 275 ohms dc resistance shunted internally by 900 ohm non-inductive resistor (equivalent resistance of 211 ohms); o/a dim-- 4-3/8" lg, 3-23/32" wd, 1-11/32" h; three #8-32 thd mtg holes forming an isosceles triangle with 3/4" base and 1-1/16" altitude mtg/c; impregnated for tropical use and prevention of fungus growth; Hoffman Radio Corp part/dwg #KR-21	Registers Channel Dialed on Control Equipment. Mounted by Bracket A707 in TUNING DRIVE A702

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X	K702	N17-R-64097-4025	RELAY, ARMATURE: contact arrangement per MBCA Ref Dwg Group 4-- one 1A1C and one 1B1C; A and B contacts rated at 110 v 3 amp 60 cps ac, C contacts rated at 110 v 5 amp 60 cps ac inductive load; 3/16" silver tungsten contacts; coil data-- single wnd, 110 v 50/60 cps ac, 70 ohms ± 10% dc resistance, insulated; 12 solder lug terminals for coil anc contacts; 3-29/32" lg, 1-7/8" wd, and 1-1/32" h o/a; two #8-32 tap holes in heel piece 3/4" c to c; fast acting; impregnated for tropical use and fungus growth; Hoffman Radio Corp part/dwg #KR-25; Navy spec no. 17R6	Motor Control Relay. Mounted Automatic Tuning Unit A702
X	L701	N17-C-64660-9361	COIL, TELEPHONE SWITCH: coil #1 - 900 ohms DC resistance, non-inductively wound, coil #2 - 211 ohms DC resistance, inductively wound; coil #1 - 0.78 amps, coil #2 - 0.42 amps; terminal data-- 4 solder lug terms located two on each end plate; over-all dims (excl terms)-- 1-9/32" lg, 1-1/16" diam: single 8-32 mtg hole in core end; moisture and fungus proofed, coil #1 used as shunt for another coil in switch; Automatic Electric Sales Corp part #H77670-3; release coil in telephone switch; for general purpose use; Hoffman Radio Corp part/dwg #LM-51	Release Coil for K701
X	L702	N17-C-64637-2036	COIL, TELEPHONE SWITCH: 155 ohms DC resistance (Note: normally connected in parallel with resistance element of second coil to provide a resistance of 132 ohms ± 10% 0.742 amps normal current; terminal data-- 2 solder lug terminals located on end plate; o/a dims (excl terms)-- 1-9/32" lg, 1-1/16" diam; single 8-32 tapped hole in core end; moisture and fungus proofed; Automatic Electric Sales Corp part #H77670-2; stepping coil in telephone switch; for general purpose use; Hoffman Radio Corp part/dwg #LM-50	Stepper Coil for K701

X	X	M701	N17-M-19052-1051	AMMETER: panel mtd; dc; scale data-- marked microamperes, range 0-200, graduated in 40 divisions; case data-- rd, molded phenolic case, style no. 15, NRCA Ref Dwg Group 27; dim data-- flange size - 2.695" outer diam max; 5/32" thk; 2.21" body diam max, 0.38" body d max; accuracy ± 2%; sensitivity data-- 150 millivolts max drop across terms; calibration or shielding data-- calibrated for non-magnetic panel; color data-- black numerals on white background; self-contained; three 1/8" diam mtg holes on 1.22" max radius spaced 120° apart; terminal data-- 2 stud type screws, 1/4-28 NF-2 thd, 0.69" ± 0.07 lg max; govt spec data-- JAN-I-6, JAN type MR25 2000DCUA; estinghouse Elec & Mfg Co Catalog MR25 2000DCUA, type 0X-33, style 1164121-A; for general purpose use; Hoffman Radio Corp part/dwg #ME-27	Part of Reflectometer Circuit. Gives Relative Indications of Standing Wave Ratio
X	X	N701	N16-C-260021-155	CHART: calibration chart for dial settings and frequency for each of ten channels; white card stock, 4-3/32" lg, 3-17/64" wd, and 0.015" thk; black print on white background; 11/32" x 45° cut all four corners; Hoffman Radio Corp part/dwg #NP-105	Calibration Chart Located on Front Panel

	N702		Not used	
	N703		Not used	
X	N704		PLATE, IDENTIFICATION: 1 plate; laminated phenolic, black on white; black finish; color data-- white letters, inscription engraved through black; 1/8" regular characters engraved "TB701" centered lengthwise, base of characters 5/16" from top edge 13/64" h numbers 1 through 7 spaced 7/16" c to c 1/16" below "TB701"; o/a dim-- 3-3/4" lg, 3/4" wd, 1/16" thk; two 0.128" diam mtg holes on 3.344" by 3/8" mtg/c; one end has 6° 45' cutaway top to bottom 1/32" x 45° chamfer all around; Hoffman Radio Corp part/dwg #EL-221	Terminal Locating Nameplate for TERMINAL BOARD TB701
X	X N705	N16-W-63667-8761	WINDOW: transparent protective covering for calibration chart; polystyrene water clear; rectangular; 4-1/8" lg, 3.29" wd, 0.046" thk; corners have 11/32" by 45° cutoff; Hoffman Radio Corp part/dwg #NM-11	Calibration chart Window

X	X	0701	N16-A-57849-1002	ANTENNA COUPLER SUBASSEMBLY: spring counterbalance for platform; consists of counterbalance base assembly, bracket assembly, pinion mount assembly, spring housing, pawl cover, arbor collar, pawl, arbor filler, spur-gear, spring retaining pin, power spring and misc hardware; primarily steel material, nickel pl finish; irregular shape; approx 8-1/16" lg x 5" wd x 1-9/32" h o/a; mts by 4 screws thru four 7/32" holes on approx 2-7/8" x 5-1/2" mtg/c; assembly balances out vertical motion of coupling unit motor driven platform, degree of counterbalance adjustable; Hoffman Radio Corp part/dwg #OA-140	Spring Counter-balance for PLATFORM A714
X	X	0702	N77-B-991-15183-0000	BEARING, ball: single row axial; double removable shield light duty cartridge type; 0.3125" bore, 0.6882" OD tapered 0.068"/ft, .250" wd; 8 balls; packed per AN-G-25 with light instrument grease; std fit; flanged; Fafnir Bearing Co type #F5DDC1	Bearing for SHAFTS 0744, 0745 and for PINION WIRE 0736
X	X	0703	N77-B-991-15081-0000	BEARING, ball: single row axial; double removable shield; light duty cartridge type; 0.2500" bore, 0.6527" max OD tapered .068"/ft, .249" wd; 7 balls; packed per AN-G-25 with light instrument grease; std fit; std tolerance; flanged; Fafnir Bearing Co type #F4DDC1-FS10160X; Hoffman Radio Corp part/dwg #HM-623	For BEARING BLOCK 0752 and GUIDE ROLLERS 0759
X	X	0704	N77-B-991-15080-0000	BEARING, ball: single row axial; double removable shield light duty cartridge type; 0.1875" bore, 0.5632" max OD tapered .068"/ft, .250" wd; 6 balls; packed per AN-G-25 with light instrument grease; std fit; std tolerance; flanged; Fafnir Bearing Co type #F3DDC1-FS10160X; Hoffman Radio Corp part/dwg #HM-624	End Bearings for SHAFT 0760

X		0705	N17-B-115-00319-2004	BEARING, ball: single row axial; double removable shield; light duty cartridge type; .1875" bore, .5000" OD, .1969" wd; 7 balls; packed per AN-G-25 with light instrument grease; std fit; std tolerance; Fafnir Bearing Co #33KDD5; Hoffman Radio Corp part/dwg #HM-626	Center Bearing for SHAFT 0760 in Automatic TUNING DRIVE A702
X	X	0706	N17-C-480858-862	CHAIN: link type, rollerless 1/4" pitch, 1/8" bushing width; corrosion resistant steel; 51" lg; riveted links; average tensile strength 975 lbs; ends of chain are link coupled to adjustable tightener assy. links are included with chain; mfr: Diamond Chain Co, Inc #09; contr: Hoffman Radio Corp part/dwg #HM-629	Platform Positioning Chain
X	X	0707	N16-C-599931-187	COLLAR, shaft: corrosion resistant steel (type 303) per spec MIL-S-853, class 7, type C, passivate finish; min tensile strength 100,000 psi; cylindrical w/ concentric hole, pin accommodating hole; 7/16" OD, .187" ID, .180" thk, .063" hole thru center of one side perpendicular to concentric axis; mts on 3/16" shaft; Hoffman Radio Corp part/dwg #OM-715	Prevents Lateral Motion of SHAFT 0743. Part of CARRIAGE E701
X	X	0708	N16-C-599931-196	COLLAR, drive shaft: thrust type; corrosion resistant steel, passivate finish; cylindrical shape, concentrically bored; 1/4" lg x 5/8" OD, 0.313" ID, 0.063" hole thru center of one side perpendicular to axial center line; Hoffman Radio Corp part/dwg #OM-761	Prevents Lateral Motion of Pinion Wire and Platform Drive Shaft

X	X	0709	N17-C-945002-195	COVER, ELECTRICAL CONNECTOR: alum alloy; enamel grey over primer-zinc chromate; o/a dim-- 2.750" lg, 1.906" wd, 0.064" thk; four 0.157" diam holes csk 100° x 0.268" diam on 2.375" by 1.532" mtg/c 0.187" from edge; corners have 0.175" rad; cover plate for antenna line panel outlets; Hoffman Radio Corp part/dwg #AS-885	Cover for Antenna Line Panel Outlets.
X	X	0710	N16-C-650001-746	COVER, REFLECTOMETER: alum alloy; enamel grey over primer-zinc chromate; o/a dim-- 3-1/8" diam o/a, 2-3/8" ID, 1-1/2" h; four 0.156" diam mtg holes spaced 90° apart on 2-3/4" diam circle; protective cover; Hoffman Radio Corp part/dwg #AS-886 (Listed for reference only)	Outer Cover for Reflecto-meter
X		0711	N16-C-920001-152	CRANK, HAND: p/o Navy Antenna Coupler CU-255/UR; engages and rotates selector switch arm; commercial brass material, nickel pl; approx 53/64" lg x 1/2" wd x 0.477" thk; mtd to shaft thru rotary drum hub using two drilled and tapped 4-40 NC-2 right angle holes with centers .187" from hub end; 5/16" lg x 3/32" diam pin reduced to .063" diam x 1/4" lg; acts as handle of rotary arm; mfr and contr: Hoffman Radio Corp part/dwg #OA-196	Activates ROTARY SWITCH S701
X	X	0712	N16-G-431330-401	GEAR: spur type; phosphor bronze bar stock per spec MIL-B-892; probe drive; straight teeth, 14-1/2 deg P.A.; 22 teeth; 32 pitch, 0.687" pitch diam; 0.749" OD, 1/2" thk, bore diam 0.250"; straight face; hub 9/16" diam, 3/16" wd, .313" thk; mts to probe drive shaft with taper pin thru .063" hole with center 0.150" from hub end; mfr and contr: Hoffman Radio Corp part/dwg #OM-713	Quarter-wave Element Drive Gear. Meshes With Pinion Wire

X	0713	N16-W-900001-250	GEAR: worm type; corrosion resistant steel (type 303) per MIL-S-853 (Ships) type C, class 7; autotune worm gear; straight teeth; 40 teeth; pitch diam .333" (-0.0015) x 48 pitch; 3/8" OD x 0.1875" (+.0005) ID x 5/8" lg; straight face; hub 0.312" diam x 3/16" thk; mtd using taper pin thru 0.063" diam hole with center 3/32" from hub end; p/o Navy Antenna Coupler CU-255/UR; mfr and contr: Hoffman Radio Corp part/dwg #0M-758	Two Small Worm Gears for Main Drive Shaft in Automatic TUNING DRIVE A702
X	0714	N16-W-900001-249	GEAR: worm type; stainless steel; autotune worm gear; straight teeth; 50 teeth; pitch diam 0.4375" x 32 pitch; 1/2" OD x 0.1875" (+.0005) ID x 7/8" lg, gear teeth 11/16" lg; straight face; hub 0.359" diam x 3/16" thk; mtd using taper pin thru 0.063" diam hole with center 3/32" from hub end; mfr and contr: Hoffman Radio Corp part/dwg #0M-765	Two Large Worm Gears for Main Drive Shaft in Automatic TUNING DRIVE A702
X	0715	N16-G-432170-402	GEAR: p/o Navy Antenna Coupler CU-255/UR; ~~spur type;~~ laminated phenolic (fabric base) .375" thk per spec JAN-P-13 Type LTS-M-3; main drive assembly; straight teeth; 64 teeth; 32 pitch, 2 pitch diameter; 2.039" OD, 0.361" thk; straight face; hub 1/2" diam, .174" thk; mts to pinion shaft Hoffman part/dwg #0M-777 using taper pin thru 0.063" hole with center .093" from hub end; fungus resistant and moisture proof per JAN-C-173 class 1; mfr and contr: Hoffman Radio Corp part/dwg #0M-775	Large Main Drive Gear. Part of 0727 in Automatic TUNING DRIVE A702
X	0716	N16-G-431850-281	GEAR: spur type; laminated phenolic per spec JAN-P-13, type LTS-M-3; autotune drive gear; straight teeth; 48 teeth; pitch diam 1.500" x 32 pitch; 1.562" OD x 0.1875" (+.0005) ID x .250" thk; straight face; hub 0.750" diam x 0.125" thk; mtd using taper pin thru 0.063" diam hole drilled on one side with center 0.062" from hub end; p/o Navy Antenna Coupler CU-255/UR; mfr and contr: Hoffman Radio Corp part/dwg #0M-776	Autotune Drive Spur Gear in Automatic TUNING DRIVE A702

X	0717	N16-G-431370-323	GEAR: p/o Navy Antenna Coupler CU-255/UR; spur type; brass 1/2 hd per spec MIL-B-895; main drive pinion in tuning head; straight teeth; 24 teeth; 32 pitch, 0.7500 pitch diam; 1.171" lg x 0.8125" OD; straight face; outer hub ends each 1/4" lg x 1/4" diam with shank 1/8" thk x 5/16" diam on one side and shanks .361" thk x 5/16" diam and .061" thk x 0.437" diam at other side; mtd to spur gear with taper pin and to main drive with hubs riding in ball bearings; mfr and contr: Hoffman Radio Corp part/dwg #OM-777	Small Main Drive Gear. Part of 0727 in Automatic TUNING DRIVE A702
X	0718	N16-G-431770-341	GEAR: p/o Navy Antenna Coupler CU-255/UR; spur type; commercial brass 1/2 hard per spec MIL-B-895 cond 1/2 hard; platform drive; straight teeth; 44 teeth; 32 pitch, 1.375" pitch diam; 1.4374" OD, 0.350" thk; straight face; hub 1/2" diam, .225" thk; mts platform drive shaft with taper pin thru .063" hole with center .062" from hub end; mfr and contr: Hoffman Radio Corp part/dwg #OM-778	Carriage Drive Coupling in TUNING DRIVE A702
X	0719	N16-G-431290-351	GEAR: spur type; cold rolled steel, nickel plated .0002" thk; pinion gear for motor; straight teeth; 20 teeth; pitch diam 0.625", 32 pitch; 0.7108" OD x 0.250" (+.0005) ID x 0.374" thk; straight face; hub 0.531" diam x 0.187" thk; mtd using taper pin thru 0.063" diam hole drilled on one side with center 0.093" from hub end; p/o Navy Antenna Coupler CU-255/UR; mfr and contr: Hoffman Radio Corp part/dwg #OM-779	Motor Drive Gear in Automatic TUNING DRIVE A702 Meshes with GEAR 0715
X X	0720	N16-G-402210-361	GEAR: bevel type; brass material; counterbalance drive; straight teeth; 16 teeth; pitch diam 0.500", 32 pitch; 0.562" OD x 0.219" (+.0005) ID x 33/64" thk (approx); straight face; hub 3/8" OD x 5/16" thk; mtd using taper pin thru 0.063" diam drilled hole on one side with center .125" from hub end; Boston Bear Cat. #G486 (modified); Hoffman Radio Corp part/dwg #OM-801	Small Bevel Gear on Lower End of Platform Drive SHAFT 0744

X	X	0721	N16-G-402370-412	GEAR: miter type; brass material; counterbalance drive; straight teeth; 24 teeth; pitch diam 0.750", 32 pitch; 0.812" OD x 0.313" (+.0005) ID x 27/64" thk approx; straight face; hub 1/2" diam x 7/32" thk; mts to counterbalance drive shaft with taper pin using .0.063" drilled hole on one side with center .125" from hub end; Boston Gear Cat. #G-463 (modified); Hoffman Radio Corp part/dwg #0M-802	Platform Drive Shaft Gear in A701
X	X	0722	N16-G-402256-801	GEAR: miter type; brass material; probe drive; straight teeth; 18 teeth; pitch diam 0.375", 48 pitch; 0.417" OD x 0.187" (+0.0005) ID x 19/64" approx; straight face; hub 5/16" diam x 5/32" thk; mtd to probe drive shaft with taper pin using 0.063" drilled hole 3/32" from hub end; Boston Gear Cat. #G-461 (modified); Hoffman Radio Corp part/dwg #0M-805	Quarter-wave Element Drive GEAR. Mates With Similar Gear on Bottom of Element Assembly
X		0723	N16-C-402606-883	GEAR: bevel type; brass material; autotune drive; straight teeth; 36 teeth; pitch diam 1.500", 24 pitch; 1.583" OD x 0.252" (+.0005) ID x 33/64" thk (approx); straight face; mtd to autotune shaft using taper pin thru .063" diam hole drilled after ass'y; hub 1/2" diam x 0.188" thk cutaway shoulder from 11/16" diam x 9/32" thk; Boston Gear Cat. #G-485 (modified); Hoffman Radio Corp part/dwg #0M-808	Large Autotune Drive Bevel Gear in Automatic TUNING DRIVE A702
X	X	0724	N16-G-402247-106	GEAR: bevel type; brass material; pinion wire drive; straight teeth; 18 teeth; pitch diam 0.750", 24 pitch; 0.833" OD x 5/16" ID x 35/64" thk (approx); straight face; hub 9/16" diam x 1/4" thk; mtd to pinion wire drive shaft (Hoffman part #0M-774) with taper pin thru 0.063" drilled hole w/ center .140" from hub end; Boston Gear Cat. #G-485 (modified); Hoffman Radio Corp part/dwg #0M-809	Pinion Wire Drive Gear in A701

X	0725	N16-G-402246-821	GEAR: bevel type; brass material; autotune drive; straight teeth; 18 teeth; pitch diam 0.750", 24 pitch; 0.833" OD x 3/16" ID x 35/64" thk (approx); straight face; hub 1/2" OD x .248" thk; mtd to autotune shaft using taper pin thru .063" diam hole drilled after assy; Boston Gear Cat. #G-485 (molified); Hoffman Radio Corp part/dwg #0M-810	Small Tuning Drive Gear on End of DRIVE MECHANISM 0735
X	0726	N16-G-431530-436	GEAR: spur type; steel material; pinion wire drive; straight teeth; 32 teeth; pitch diam 1", 32 pitch; 1.0624" OD x 5/16" ID x 1/2" thk; straight face; hub 3/4" diam x 0.312" thk; mtd with taper pin using #52 (.063) drilled hole w/center 1/8" from hub edge; Boston Gear Cat. #H-3232 (modified); Hoffman Radio Corp part/dwg #0M-813	Pinion Wire Drive Gears in TUNING DRIVE A702

X	0727	N16-G-500001-460	GEAR, ASSEMBLY: p/o--BuShips Antenna Coupler CU-255/UR; for main drive of tuning head principal parts c/o--spur gear (Reference Symbol #0715), shafted pinion (Reference Symbol #0717), spur gear of laminated phenolic, pinion of brass material; 1.171" lg, 2.039" OD; spur gear and pinion mtd together with taper pin thru 0.063" drilled hole with center 0.093" from hub end of spur gear against 0.437" shoulder; both ends of 1/4" diam shaft portions have .03" x 45° chamfers which terminate with bearings at each end as idler gear; mfr and contr: Hoffman Radio Corp part/dwg #0A-161	Main Drive Gear Assembly in TUNING DRIVE A702
X	0728	N16-G-500001-459	GEAR ASSEMBLY: intermediate platform drive; p/o--BuShips Antenna Coupler CU-255/UR; principal parts consist of-- spur gear, bevel gear, four #4-40 screws; approx 1.5834" diam, 33/64" thk; mtd to platform shaft with taper pin using 0.063" drilled hole with center 0.093" from hub end; gears held together with four 0.120" drilled and countersunk 82° x 0.225" diam holes on circular axis with opposite centers 3/4" apart using #4-40 NC-2 taps on Hoffman part/dwg #0M-807; mtg hole to accommodate shaft 0.5000" diam +.0005"; mfr and contr: Hoffman Radio Corp part/dwg #0A-163	PLATFORM Intermediate Drive GEAR Assembly Near RELAY K702

X	X	0729	N17-G-900264-876	GROMMET: black molded neoprene as per spec MIL-R-900A Class I; fits 7/8" diam hole; 5/8" hole diam, 1/16" groove width, 5/16" o/a width and 1-1/8" diam o/a; mfr: Rubbercraft Corp. of Calif., part #22; contr: Hoffman Radio Corp part #AN931-10-14; Army-Navy 931-10-14	Supports ADAPTER E707
X		0730	N16-G-900133-581	GROMMET: black molded neoprene as per spec MIL-R-900A, Class I; fits 7/16" diam hole; 1/4" hole diam, 1/4" groove width, 3/8" width o/a and 5/8" diam o/a; mfr: Rubbercraft Corp of Calif., part #16; contr: Hoffman Radio Corp part #AN931C4-7; Army-Navy dwg #931C4-7	GROMMET Near RELAYS K701 and K702 for Relay Wires in A702
X		0731	N16-G-900263-551	GROMMET: black molded neoprene as per spec MIL-R-900A Class I; fits into 7/8" diam hole; 5/8" hole diam, 1/4" groove width, 1/2" wide o/a and 1-1/8" diam o/a; mfr: Atlantic India Rubber Co cat #2564; contr: Hoffman Radio Corp part #AN931C10-14; Army-Navy dwg #931C10-14	GROMMET for Motor Leads in A702
X	X	0732		GROMMET: molded black neoprene as per spec MIL-R-900 Class I; fits 1.450" diam hole; 1.260" hole diam, 0.060" groove widths (4), 0.620" o/a width, 1.510" o/a diam; 4 corrugated type grooves; mfr: Kirkhill Rubber Co.; contr: Hoffman Radio Corp part/dwg #HG-37	GROMMET Between Movable Outer LINE SECTION E724 and BRACKET A711

X	X	0733	GROMMET: black molded neoprene as per spec MIL-R-900A, Class I; fits 1/4" diam hole; 1/8" hole diam, 1/16" groove width, 3/16" o/a width and 11/32" diam o/a; mfr: Atlantic India Rubber Co. cat #54G; contr: Hoffman Radio Corp part #HG-39	GROMMET on REFLECTOMETER Z701 for Meter Lead

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X	0734	MECHANISM, DRIVE, POSITION SELECTING: automatically stops output drive shaft at any one of 10 preset positions, when associated with drive motor and automatic control circuits; p/o control head of Antenna Coupler CU-255/UR; c/o a ten section cam, pawl, and drum mechanism containing a slip clutch and two limit switches, and having one large and two small dials; aluminum alloy dials, SS shafts and gears, cad pl steel framework, etc; DPST up-limit switch and SPST down-limit switch; 20 turns (max) of input drive gear required in each direction for one cycle of operation, minimum output torque 3 in-lbs at +50° C, 4 in-lbs at +23° C, 5 in-lbs at -15°C and 5-1/2 in lbs at -28° C; 3.930" wd, 3.806" h, 4-37/64" d o/a; three 1.875" diam mtg holes in back plate on 3.095", 3.52", 2.51" mtg/c; marked with contractor's part no., large dial calibrated 0 to 100 counterclockwise, one small dial calibrated 1 to 10 counterclockwise, other small dial calibrated 0 to 20 clockwise; locking bar in main knob allows manual operation and presetting of stop positions; Collins Radio Co Autotune Mechanism #96K-7; Hoffman Radio Corp part/dwg #EA-339	LINE TUNING Drive Mechanism
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X | 0735

MECHANISM, DRIVE, POSITION SELECTING: automatically stops output drive shaft at any one of 10 preset positions, when associated with drive motor and automatic control circuits; p/o control head of Antenna Coupler CU-255/UR; c/o ten section cam, pawl and drum mechanism containing a slip clutch and two limit switches, and having one large dial and one small dial; aluminum alloy dials, stainless steel shafts and gears, cad plated steel framework, etc; dpst up-limit switch and spst down-limit switch; 20 turns (maximum) of input drive gear required in each direction for one cycle of operation, minimum output torque 3 in-lbs at +50° C, 4 in-lbs at +23° C, 5 in-lbs at -15° C and 5-1/2 in-lbs at -28° C; 3.930" wd, 3.806" h, 4-37/64" deep o/a; three 1.875" diam mtg holes in back plate on 3.095", 3.52", 2.51" mtg/c; marked with contractor's part no., large dial calibrated 0 to 100 counterclockwise, small dial calibrated 0 to 20 clockwise; locking bar in main knob allows manual operation and presetting of stop positions; Collins Radio Co Autotune Mechanism; Hoffman Radio Corp part/dwg #HA-340

COUPLER TUNING Drive Mechanism

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X	X	0736	N16-G-431209-190	PINION GEAR: spur type; steel material; probe driving; straight teeth; 10 teeth; 24 pitch, 5/12" pitch diam; 23.370" lg x 0.500" diam; straight face; hub surface approx 4" lg, 1 end 5/16" diam x 1/4" lg, other end with 3 sections reduced from 3/4" lg x 5/16" diam to approx 2-5/8" lg x 0.306" diam to 0.312" lg x .250" diam at outer end; mtd to pinion block with press fit at one end, other end uses taper pin thru collar; mfr and contr: Hoffman Radio Corp part/dwg #0M-814	Drives quarter-wave Element thru GEAR 0713, SHAFT 0743 and GEAR 0722
X	X	0737		RAIL, GUIDE: holds and guides traveling platform; carbon steel (SAE 1020) per Federal spec QQ-S-633 cold finished and stress relieved, .0002" albuloy over .0003" copper strike; rail must be straight within .005" throughout total length; "T" shaped; 39.137" lg x 0.642" h overall; mts by four mtg holes tapped thru #10-24 NC-2 spaced 0.225" and 2.412" from either end on upright member of "T"; has 9 holes for mounting protective panel; Hoffman Radio Corp part/dwg #0M-786 (Listed for reference only)	GUIDE RAIL for CARRIAGE 0701
X	X	0738		RAIL, GUIDE: holds and guides traveling platform; carbon steel (SAE 1020) per Federal spec QQ-S-633 cold finished and stress relieved, .0002" albuloy over .0003" copper strike; rail must be straight within .005" throughout total length; "T" shaped; 39.137" lg x 0.642" h overall; mts by four mtg holes tapped thru #10-24 NC-2 spaced 0.225" and 2.412" from either end on upright member of "T"; has 9 holes for mounting protective panel, 2 0.155" deep x .922" lg indents on upright member of "T"; Hoffman Radio Corp part/dwg #0M-787 (listed for reference only)	GUIDE RAIL for CARRIAGE 0701

X	X	0739	N42-R-2051-3800	RING, retainer: #420 stainless steel, oil dipped; approx safety rpm limit- 80,000 rpm, min clearance from shaft to housing 0.298", allowable thrust load with safety factor to 4 is 240 lbs; 0.168" ID, 0.015" thk, max OD approx 0.243"; has two 0.025" diam holes on variable mtg/c; Waldes Kohinoor Inc., part/dwg #TRUARC 5100-18-W; Hoffman Radio Corp part/dwg #HM-312	Retaining RING on One End of Each SHAFT 0761, 0762, 0763 and 0746
X	X	0740	N16-R-651091-423	RING, retainer: music wire, nickel plated; 1.000" OD x 0.035" thk; sawcut S1 at 15° from center; Hoffman Radio Corp part/dwg #OM-744	Retaining RING for REFLECTO-METER Z701
X		0741	N42-R-2051-3835	RING, retaining: #420 stainless steel, oil dipped; approx safety rpm limit- 40,000 rpm, min clearance from shaft to housing .540", allowable thrust load with safety factor of 4 is 740 lbs; .281" ID, .025" thk, max OD approx .409"; has two .047" mtg holes on variable mtg/c; Waldes Kohinoor, Inc, part/dwg #TRUARC 5100-31-W; Hoffman Radio Corp part/dwg #HM-311	Retaining RING for SHAFT 0760
X		0742	N16-S-20928-9653	SHAFT: used to gang 3 switches; corrosion resistant steel (type 303) per spec MIL-S-853, class 7, type C, passivate finished; 2-3/16" lg from one end to swage, 3/32" diam, swage 3/16" wd; one end swaged after passing rod thru switch controls; Hoffman Radio Corp part/dwg #OM-751	Pin thru Toggle Handles of SWITCHES S703, S704, and S705

X	X	0743	N16-S-20910-3791	SHAFT: drive shaft; corrosion resistant steel, passivate finish, spec MIL-S-853, class 7, type C; min tensile strength 100,000 psi; cylindrical; 1.780" lg, .250" max diam o/a; Hoffman Radio Corp part/dwg #OM-712	Quarter-wave Element Drive Gear Shaft. Part of CARRIAGE E701
X	X	0744	N16-S-21069-5525	SHAFT: p/o driving mechanism for positioning carriage sub assy; corrosion resistant steel, passivated; shaft must be straight within 0.015"; has 0.219" diam shoulder 31/64" lg at one end and 0.249" diam shoulder 5/16" lg at other end for mtg gears; 29.937" lg, 0.3125" diam o/a; has 1/32" x 45° chamfer both ends; Hoffman Radio Corp part/dwg #OM-762	Platform Drive SHAFT Next to PINION WIRE 0736
X	X	0745	N16-S-20908	SHAFT: mounts pinion; corrosion resistant steel (type 303) per spec MIL-S-853, class 7, type C, passivate finish; min tensile strength 100,000 psi; cylindrical; 1.718" lg, 3/8" max diam; Hoffman Radio Corp part/dwg #OM-763	SHAFT for Chain SPROCKET 0750 and GEAR 0721
X		0746	N16-S-20913-5164	SHAFT: p/o driving mechanism for positioning carriage sub assy; corrosion resistant steel, passivated; has 0.250" diam shoulder 0.535" lg at one end, and locking ring groove 0.028" wd, 0.031" in from other end; 1.934" lg, 0.3125" diam o/a; Hoffman Radio Corp part/dwg #OM-771	Mounts GEAR ASSEMBLY 0728 in TUNING DRIVE A702

X	X	0747	N10-S-20099-9907	SHAFT: mounts chain sprocket; corrosion resistant steel (type 303) per spec MIL-S-853, class 7, type C, passivate finish; min tensile strength 100,000 psi; cylindrical; 1.450" lg, .390" max diam; Hoffman Radio Corp part/dwg #OM-785	Mounts Upper Chain SPROCKET 0750
X	X	0748	N17-C-98611-1177	SPIDER, coupling: mechanical rotary motion transfer coupling; untreated steel, nickel plated; for light duty; cylindrical shape with axial protruding teeth; approx .405" lg x .500" OD overall, 1/4" concentric hole ID; equipped w/provisions for .063" mtg pin; marked "BOSTON"; modified to include mtg pin hole, reduced length; Boston Gear Works part/dwg #FA5-1/4 modified; Hoffman Radio Corp part/dwg #OM-816	Used to Mechanically Couple RF SUBASSEMBLY A701 and TUNING DRIVE A702 (Automatic or A801 Manual)
X	X	0749	N17-S-46816-7750	SPRING: loop type; roller arm tension spring; .081" diam music wire, nickel plated; approx 3/16" lg x 25/32" h; Hoffman Radio Corp part/dwg #OM-732	Tension SPRING for Roller ARM 0751
X	X	0750	N17-S-500761-101	SPROCKET, chain: cold rolled steel, nickel pl; cylindrical w/protruding teeth, concentric hole; .344" lg x .754" max diam, .251' ID, one .063" retaining pin hole thru one side on axial center line, .125" from non-sprocket end; has 8 equally spaced teeth on .655" pitch diam to fit Diamond Chain Co, Inc #89 or American Standard #25 1/4" pitch rollerless chain with (.130) bushing diam; Hoffman Radio Corp part/dwg #OM-815	Chain SPROCKET

X	X	0751		ARM: adjustable arm for positioning roller; c/o roller arm and bushing; nickel plated brass casting w/bronze bushing; arm is 0.546" h at bushing end, tapering to 0.195" h at roller end; 2-1/2" lg, 3/4" wd, 0.546" h o/a; 0.359" diam hole thru bushing for mtg bolt; bushing has 0.623" diam, 0.062" wd flange, w/body 0.342" lg, 0.501" OD and 0.359" ID; mfr & contr: Hoffman Radio Corp part/dwg #0A-193 (Listed for reference only)	Adjustable Roller Arm on CARRIAGE E701
X		0752	N16-B-600081-133	BLOCK, BEARING: provides support and bearing for main drive shaft and houses main drive gear; cast alum alloy material, anodized finish; basically wedge shaped w/one end rounded, 2 protruding mtg studs; approx 3-3/8" lg x 2-7/8" wd x .986" deep o/a; mts by screws thru three .213" diam holes counterbored .376" diam x .220" deep on 2.506" x 2.522" x 2.312" mtg/c; mfr & contr: Hoffman Radio Corp part/dwg #AA-462 (Listed for reference only)	Main Drive GEAR ASSEMBLY 0727
X	X	0753		BLOCK, bearing: provides seat for probe and includes bearings for probe drive gears; c/o seat and two sleeve bearings; silver plated brass casting w/ bronze bearings; round-base 0.125" thk w/ two upright bearing mountings ea 0.835" h, 0.531" wd, and 0.341" thk; o/a dim 1.842" diam, 0.960" h; four #10-32 NF-2 tap mtg holes spaced 90° apart centered on 1.562" diam; bearings are 0.187" wd, 0.281" diam w/shoulder 0.370" diam and 0.046" wd, 0.281" ID, mfr & contr: Hoffman Radio Corp part/dwg #0A-191 (Listed for reference only)	Supports Quarter-wave Element Drive SHAFT 0743

X	X	0754	N16-G-402256-802	GEAR: bevel type; brass; probe drive; straight teeth; 18 teeth; 48 pitch, pitch diam 0.375"; 0.486" OD, 1/8" ID; 19/64" approx thk; straight face; 0.156" diam x 5/32" thk approx hub dim; mts with 0.063" diam drill hole on one side with mtg/c 0.150" from hub end; mfr & contr: Hoffman Radio Corp part/dwg #0M-806	Drive Gear on Quarter-wave Element E748
X		0755		MOUNTING: .081" thk alum alloy material per Navy spec 47-A-11c cond 1/2 hard; anodized per spec AN-QQ-A-696a; o/a dims-- 4.812" lg, 4.406" wd, 0.687" o/a thk; mtg data-- mounts two AN connectors by four holes for each connector on 1.250" x 1.250" mtg/c and two fuseholders by two .510" holes, mounts to frame by two screws through PEM-cl 8-32 fasteners on 1" mtg/c on 90° fold-over at each end; mounts two AN connectors and two fuseholders; Hoffman Radio Corp part/dwg #AC-636 (Listed for reference only)	Mounts RECEPTACLES J701 and J702, FUSEHOLDERS XF701 and XF702 at Upper End of Automatic TUNING DRIVE A702
X	X	0756	N16-M-59920-7976	MOUNTING: cast commercial brass material per spec 46-B-31, type I; nickel pl finish per spec MIL-P-6859 type I, class A; o/a dims-- 2-1/8" lg, 3/4" wd, .593" h; mtg data-- mounts roller by rod passed through 0.187" hole in center of block, mounts to frame by screws passed through four 0.180" holes counterbored 0.281" diam, 0.195" d on 1-3/4" x 3/8" mtg/c; channeled to accommodate guide-rail roller; partially mounts guide-rail roller; Hoffman Radio Corp part/dwg #AC-105 (Listed for reference only)	

X		0757	N17-M-88176-1901	MOUNTING: commercial brass per spec MIL-B-895 cond 1/2 hard; cadmium pl per spec QQ-P-416 type I, class A; o/a dims-- 15/16" lg, 3/4" wd, 3/16" thk; mtg data-- holds item by means of screws through two holes on one end, mts by two #8-32 NC-2 holes on .438" mtg/c; mts terminal strip strip; Hoffman Radio Corp part/dwg #OM-1138	Mounts TERMINAL BOARD TB701
		0758		Not used	
X	X	0759	N16-R-751251-125	ROLLER, GUIDE: guides and supports carriage along rail; stainless steel; passivate finish; 1" diam, 0.387" wd o/a; has 0.6249" diam center hole for mtg; 0.231" tapered to 0.123" wd x 0.094" deep groove is centered 0.078" from edges; mfr and contr: Hoffman Radio Corp. part/dwg #OM-747	Rollers of Fixed and Adjustable Roller Assemblies

X	0760	N16-S-21051-4601	SHAFT: master tuning drive shaft; stainless steel, passivated; rd bar w/0.017" wd, 0.0125" deep locking ring slot 0.031" from one end; 9.725" lg, 0.1875" diam o/a; mounts four multi-turn worm gears; mfr & contr: Hoffman Radio Corp part/dwg #0M-770	Main Shaft for DRIVE MECHANISMS 0734 and 0735. Mounts Four Worm Gears
X	0761	N16-S-21053-8381	SHAFT: drive shaft; corrosion resistant steel per spec MIL-S-853 (303) class 7 type C, passivate finish; 100,000 psi min tensile strength; cylindrical rod; 10.080" lg x .3125" diam; mfr & contr: Hoffman Radio Corp part/dwg #0M-772	Quarter-wave Element Drive Shaft in TUNING DRIVE A702. Mounts SPIDER 0748
X	0762	N16-S-20940-8849	SHAFT: drive shaft; corrosion resistant steel (303) per spec MIL-S-853 type C class 7, passivate finish; 100,000 psi min tensile strength; cylindrical rod; 2.371" lg x .3125" diam o/a; mfr & contr: Hoffman Radio Corp part/dwg #0M-773	Pinion Wire Intermediate Drive Shaft in TUNING DRIVE A702 (Automatic)

X		0763	N16-S-20979-8371	SHAFT: drive shaft; corrosion resistant steel (303) per spec MIL-S-853 type C class 7, passivate finish; 100,000 psi min tensile strength; cylindrical rod; 2.958" lg x .3125" diam o/a; mfr & contr: Hoffman Radio Corp part/dwg #0M-774	'Shaft Driven By Bevel Gears on Coupler Tuning DRIVE MECHANISM 0734
X		0764	N16-S-20916-8501	SHAFT: drive shaft; corrosion resistant steel per spec MIL-S-853 (303) class 7 type C, passivate finish; 100,000 psi min tensile strength; cylindrical rod; 1.968" lg x 3/8" diam o/a; mfr & contr: Hoffman Radio Corp part/dwg #0M-780	Shaft Connected Thru Gear Train From Line Tuning DRIVE MECHANISM 0735 to SPIDER 0748
X	X	0765	N16-A-57849-1001	ANTENNA COUPLER SUBASSEMBLY: houses and encases four ball bearings; one shaft and chain sprocket; includes bearings (Ref Symbol 0702), and sprocket (Ref Symbol 0750) as part of assembly; alum alloy casting material 356T-51 per Navy spec 46Alf class 3, cond HT2, anodized finish; mechanical ratings for bearings only, listed in bearing description; approximately box-frame shaped; 6.375" lg by 4.625" wd by 4.125" d o/a; mounts by screws thru 12 holes tapped #10-24 NC-2 and spaced irregularly around outer edge of casting; mfr and contr; Hoffman Radio Corp part/dwg #0A-136	Supports Upper End of Antenna LINE SECTION E726. Mounts bearings for PINION WIRE 0736 and SHAFT 0744

X	X	0769	TIGHTENER ASSEMBLY, CHAIN: c/o female hiker, male hiker, hiker adjustment screws, guide pin, left hand nut and right hand nut; used to take up slack in and adjust tension of platform positioning chain; each hiker 1.100" lg, 3/8" wd, 9/16" h; max extended length of assy-- 3", min length of assy--2.2"; m/o stainless steel; mounts to platform by screws to two #8-32 NC-2 holes on 0.424" mtg/c, chain connects to 0.101" hole at end of either hiker; Hoffman Radio Corp part/dwg #0A-279 (Listed for reference only)	Tension Adjustment for Chain 0706. Mounts to Platform E701

X		R701	RESISTOR, FIXED WIREWOUND: body style no. 26, MBCA Ref Dwg Group 2; resistance data-- 50 ohms total resistance, ±5% tolerance; 50 watts; resistance temp characteristic G; o/a body dim-- 4-1/8' lg, 13/16" diam; term data-- 2 terms, ferrule type, dim-- 1/2" lg, 3/4" diam; govt spec data-- JAN-R-26A, type RW13G500; Ohmite Mfg Co type 140; for general purpose use; Hoffman Radio Corp part/dwg #RW-56	Speed Limiting Resistor for MOTOR B701. Mounts on HOLDER E708 in Automatic TUNING DRIVE A702
X		R702	Same as R701	Speed Limiting Resistor for MOTOR B701. Mounts on HOLDER E708.
X	X	R703	RESISTOR, FIXED COMPOSITION: body style no. 14, MBCA Ref Dwg Group 2; resistance data-- 82 ohms total resistance, ±5% tolerance; 1/4 watt; resistance temp F characteristic; body dim-- 0.406" lg, 0.170" diam; insulation data-- insulated, resistant to humidity and salt-water-immersion cycling; terminal data-- 2 axial wire leads; govt spec data-- JAN-R-11, type RC10BF820J; IRC type BTR; for general purpose use; Hoffman Radio Corp part/dwg #RC-343	Balancing Resistor for REFLECTOMETER Z701.
X	X	R704	RESISTOR, FIXED COMPOSITION: body style no. 14, MBCA Ref Dwg Group 2; resistance data-- 6,300 ohms total resistance, ±10% tolerance; 1/4 watt; resistance temp characteristic F; body dim-- 0.406" lg, 0.170" diam; insulation data-- insulated, resistant to humidity and salt-water-immersion cycling; terminal data-- 2 axial wire leads; govt spec data-- JAN-R-11, type RC10BF682K; IRC, type BTR; for general purpose use; Hoffman Radio Corp part/dwg #RC-543	Filter Resistor for REFLECTOMETER Z701

X	X	R705	N16-R-61350-1955	RESISTOR, FIXED, WIRE-WOUND: body style #26, MBCA Ref Dwg Group 2; inductive winding; resistance data-- 40 ohms ±5%; power rating-- 20 watts, 275°C max cont oper temp; body dims excl terms-- 1-15/16" lg, 3/4" max diam; protective covering data-- vitreous enamel coating, resistant to moisture; term data-- 2 ferrule type, dims - 1/2" lg, 9/16" diam; mtg data-- clip mtd; govt spec data--spec JAN-R-26A, type RW15G400; Hardwick, Hindle, Inc type RW15G400; for general purpose use; Hoffman Radio Corp part/dwg #RW-80 for replacement, use JAN RW15F400, Hoffman part #RW-102, Standard Navy Stock Number N16-R-61350-1955	Modification Resistor for TDZ Transmitter

X	S701	N17-S-64701-3707	SWITCH, ROTARY: 2 sections; 12 switching positions (max); contact arrangement type-- one pole (non-"pile-up" type); coin silver contacts; phenolic body; o/a dims-- 1-3/4" lg, 2-1/8" dia; mtd with two 6-32 screws on centers 1-3/4" apart; shaft data--curved rectangular, 1-5/16" lg; solder lug terminals; special mtg using actuating arm for locking shaft; Oak Mfg Co, part #51036-DH-2; Hoffman Radio Corp part/dwg #SW-57	Circuit Seeking Switch for Motor Control Circuit. Mounted on Automatic TUNING DRIVE A702

X	S702A		SWITCH, LIMIT, ELECTRICAL: spdt; spring loaded, fast acting; momentary; serves as travel end-limit switch in, and is an integral part of, tuning drive mechanism; not replaceable; no Hoffman part no. (Listed for reference only)	"Up" Limit Switch in Drive Mechanism 0734
X	S702B		SWITCH, LIMIT, ELECTRICAL: spst; pile-up type; momentary, normally closed; serves as travel end-limit switch in, and is an integral part of, tuning drive mechanism; not replaceable; no Hoffman part no. (Listed for reference only)	"Down" Limit Switch in Drive Mechanism 0734

X	S703	N17-S-74139-7130	SWITCH, TOGGLE: DPDT: electrical data-- 3 amp, 125 v; phenolic body; o/a dim-- 2-1/8" lg. 1-25/32" wd max, 15/32" h; actuating handle data-- bat type, 11/16" lg; terminal data-- 6 terminals, solder lug type, 2 at each end, 2 on back; mounting data-- single hole mounting type, 15/32" dia bushing, 32 NS-2 thd, 15/32" lg from mounting surface; JAN, spec JAN-S-23, type ST26N; Hoffman Radio Corp part/dwg #SW-1; must be modified at time of installation to include 0.1065" hole thru side of handle 21/32" from pivot; for replacement use SNSN N17-S-74139-7130	Switches from Receiver to Transmitter Operation. Mounted on BRACKET A704 in Automatic TUNING DRIVE A702
X	S704		Same as S703	Switches from Receiver to Transmitter Operation. Mounted on BRACKET A704 in Automatic TUNING DIRVE A702
X	S705		Same as S703	Switches from Receiver to Trans - mitter Operation. Mounted on BRACKET A704 in Automatic TUNING DRIVE A702

X	TB701		TERMINAL BOARD: molded bakelite board; terminal data--includes terminals, 7 terminals, double screw type; barrier type; o/a dim-- 3-7/8" lg, 1-1/8" wd, 1/2" thk; two 1/8" diam mtg holes at each end with centers 5/16" apart 1/8" from end; terminals nickel plated brass; Cinch Mfg Corp cat #7, part #7-141; for general purpose use, Hoffman Radio Corp part/dwg EEL-225	Terminal Board for Automatic Tuning Unit
X	TB702		TERMINAL BOARD: bakelite board; terminal data--includes terminals, one terminal screw type; barrier type; o/a dim--1" lg, 7/8" wd, 13/32" thk; four 0.160" diam mtg holes on Howard B. Jones Division of Cinch Mfg Co. part #1-140; for general purpose use; Hoffman Radio Corp part/dwg #EL-233	Terminal Board for Reflectometer Meter Lead Mounted Near Z701

X	XF701		FUSEHOLDER: retainer type; electrical rating--125v, 15a; accommodates fuse, 1, cartridge type, o/a dim--1-1/4" lg, 1/4" dia; black bakelite; contact data--alloy plated contacts, coil spring type using quarter turn knob; o/a dim--2-1/16" lg, 11/16" dia; term data--2 terminals, solder lug type; holder inserted thru hole in panel and locked in place with steel locking nut; Bussman Mfg Co, part Buss HKP; for general purpose use; Hoffman Radio Corp part/dwg #FH-23	Holder for Line Fuse F701 Mounted in TUNING DRIVE A702 (Automatic)
X	XF702		Same as XF701	Holder for Line Fuse F702. Mounted in TUNING DRIVE A702 (Automatic)

X	X	Z701	N16-A-57849-1004	REFLECTOMETER, SUB-ASSEMBLY: probe and electrical components forming network which gives a relative indication of standing waves on an external meter; c/o two resistors (R703 and R704), one capacitor (C702) and one crystal type rectifier (CR701) mounted on a round bakelite chassis; integral part of coupler with rf power rating of 50 watts from 230 to 390 mcs; shaped to fit snugly in a cylindrical housing; approx o/a dim--1-7/8" lg, 31/32" diam; mtd and held in housing by steel retaining ring; one end has single wire loop with a silver plated disc mtd thereon forming rf probe; mfr and contr: Hoffman Radio Corp part/dwg #EA-348	Gives Relative Indications of Standing Wave Ratio When Used in Conjunction with Meter M701. Mounted on Lower End of Fixed Line Section
X	X	Z702		REFLECTOMETER: consists of Reflectometer Sub-assembly (Reference Symbol Z701), #8-32 locking screw, split lockwasher and case (Reference Symbol A712); no Hoffman part number (Listed for reference only)	Reflectometer Sub-assembly Z701 With Case A712

X	701 to 899	F16-C-91733-5601	COUPLER, ANTENNA: inductive coupling; 230 to 390 megacycles frequency range; tuned manually by two crank type knobs; impedance data-- 50 ohms input, 50 ohms output; termination data-- 2 terminations, coaxial plug type, one mounted at top, and one mounted at bottom, swivel based to permit outlets on either side of equipment; case data-- aluminum alloy, gray enamel; over--all dim excluding cables -- 62-17/32" h, 4-7/8" wd, 8-5/16" d; mounts at top and bottom by special mounting brackets supplied with equipment; one nameplate, one calibration plate and two control labels marked "LINE TUNING" and "COUPLER TUNING" on front panel; special features-- Tuning Indicator meter on front panel; Hoffman Radio Corp part/dwg #AU-39-2; used to match transmitter or receiver to antenna; govt identification data--BuShips Antenna Coupler (Manually-Tuned) CU-332A/UR govt spec data--BuShips spec SHIPS-A-488 for general purpose use NOTE: This manually-tuned equipment is very similar to "COUPLER, ANTENNA CU-255/UR" which has automatic tuning. Their RF cavity sections are identical.	See General Description Section 1
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X	A801	F16-D-901161-176	DRIVE, TUNING: for manual operation of Antenna Coupler; consists of housing assy, two knob assemblies, gears, shafts, collars, counters, and associated parts and hardware necessary for mtg; components primarily of steel and brass, housing of alum alloy; rectangular box shaped with handle protrusions; approx 10-7/8" lg, 3-3/8" wd (including handle), 4-3/4" h; mtd to coupler braces using #10-24 screws; internally mtd window flanges protect counters; Hoffman Radio Corp. part/dwg #AA-551	Manual Tuning Head for Antenna Coupler
X	A802		HOUSING: supports, encases and provides bearing surface for manual tuning drive; consists of two housings Ref Symbol Nos. A702 and A703) specially bored after assembly; cast and machined aluminum, acid anodized finish; irregular box shaped with spaced flanges; approx 10-11/16" lg, 6-3/8" wd, 4-5/8" h; contains 18 shielded ball bearing units which accommodate moving shafts of tuning drive; Hoffman Radio Corp part/dwg #AA-653 (Listed for reference only)	Complete Housing Assembly for TUNING DRIVE Unit
X	A802		HOUSING: inner housing for manual tuning head; cast alum alloy 356T-51 per Navy spec 46A1f, class 3, semi-machine finished; irregular box shape extensively bored and relieved, with two protruding bearing mounting flanges; approx 8-1/4" lg, 4.956" wd, 3-7/8" deep o/a; mounts to outer housing by volts thru eight irregularly spaced 5/8" holes; "AC-144" cast on mtg flange; provides surfaces for mtg 15 ball bearings; Hoffman Radio Corp part/dwg #AC-144 (Listed for reference only)	Inner Casting of HOUSING A802

X	A804		HOUSING: outer housing for manual tuning head; cast alum alloy 356T-51 per Navy spec 46Alf, class 3, semi-machine finished; approximately box shaped with one end and one side open; approx 10.688" lg, 4.625" wd and 6.375" deep; mounts to coupler frame by screws thru 14 variously located and irregularly spaced #10-24 NC-2 tapped holes; "AC-143", "MP" and "6X" cast in lower end; provides surfaces for mtg 5 ball bearings; Hoffman Radio Corp part/dwg #AC-143 (Listed for reference only)	Outer Casting of HOUSING A802
X	A805	F17-P-22366-1343	COVER, PANEL: aluminum alloy; all aluminum parts sulphuric acid anodized; o/a dim-- 9-15/16" lg, 4.758" wd, approx 7/16" thk; six 0.204" drilled mtg holes; nameplated "Line Tuning" and "Coupler Tuning"; contains two 1-25/64" x 1-11/32" Veeder-counter openings and two 11/32" diam holes for knob shafts; equipped with 2 dial locks; upper front panel of manual tuning head; for specific use; Hoffman Radio Corp part/dwg #AA-611	Front Panel for TUNING DRIVE Unit
X	A806		COVER, PANEL: cast alum alloy, anodized; gray enamel over zinc-chromate primer finish; o/a dims-- 6-1/2" lg, 4-3/4" wd, 13/32" thk; mounts by screws thru 9 holes on 3 edges of panel; protective top panel for tuning drive mechanism; Hoffman Radio Corp part/dwg #AC-99 (Listed for reference only)	Top Panel of TUNING DRIVE A801

X	E801	N16-K-700418-618	KNOB: round; die cast alum alloy; black; attachment data-- for screw attachment-- #10-24 NC-2 thd, through hole; w/o markings; 2-3/8" diam, 1-1/16" thk; 3/8" thk section with medium diamond knurl, 1/32 x 45° chamfer 3 places on knob; bottom counterbored 1/4" diam x 0.365" deep, w/ 0.0635" hole through one side for taper pin; 0.813" wd x 5/32" deep slot on top; Hoffman Radio Corp part/dwg #AC-139 Rev A	COUPLER TUNING Knob
X	E802		Same as E801	LINE TUNING Knob
X	E803	N16-C-920001-153	CRANK, HAND: for tuning unit knob; commercial brass, nickel plated; 2-3/8" lg, 0.812" wd, 15/16" h; black anodized alum alloy, tapered cylindrical grip, 13/16" lg x 5/8" diam o/a; mts with special screw through 1/4" diam hole elongated 7/8"; grip held to lever plate using special screw w/ #10 - 32 NF-2 threads; p/o knob assys; Hoffman Radio Corp part/ dwg #OA-263	Handles for KNOBS E801 and E802

X	X	H806	PIN, taper: stainless steel; standard #6/0 taper; 0.078"largest diam, 1/2" lg; passivate finish; Hoffman Radio Corp part #HPS-19P, dwg #HHS-1800 (Same as H723)	Taper Pins for Gears 0813, 0814, 0819, 0820 and 0821
X	X	H807	PIN, taper: stainless steel; standard #6/0 taper; 0.078" largest diam, 7/16" lg; passivate finish; H offman Radio Corp part #HPS-18P, dwg #HHS-1800 (Same as H722)	Taper Pins for Gears 0811, 0812, 0816, 0817, 0818, 0822, and Spiders 0829
X	X	H808	PIN, taper: stainless steel; standard #6/0 taper; 0.078" largest diam, 3/8" lg; passivate finish; Hoffman Radio Corp part #HPS-17P, dwg #HHS-1800 (Same as H721)	Taper Pin for Gear 0810
		H809	NOT USED	

X	H801	N16-S-118401-215	SCREW, thumb: knurled thumb head; brass, black nickel plated; #10-24 NC-2; 11/32" lg; full threaded; flat point; 1/64 x 45° chamfers at each end of 3/32" thk, 3/4" diam head; shoulder 3/16" thk, 7/16" diam min; Hoffman Radio Corp part/dwg #OM-1110	Mounts HANDLES E803 to KNOBS E801 and E802
X	H802		PIN, DOWEL: corrosion resistant steel, passivated; 23/32" lg, 0.1877" diam o/a; mfr and contr: Hoffman Radio Corp part/dwg #HD-89 (Listed for reference only)	Used to Position HOUSINGS A803 and A804 When Assembled to Form HOUSING A802
X	H803	N42-P-14141-89	PIN, taper: stainless steel; std #6/0 taper; 0.078" largest diam, 7/8" lg; passivate finish; Hoffman Radio Corp part #HPS-25P, dwg #HHS-1800	Retaining Pins for KNOBS E801 and E802
X	H804		PIN, taper: stainless steel; standard #6/0 taper; 0.078" largest diam, 3/4" lg; passivate finish; Hoffman Radio Corp part #HPS-23P, dwg #HHS-1800 (Same as H726)	Taper Pins for COLLARS 0827
X	H805	N42-P-14141-81	PIN, taper: stainless steel; standard #6/0 taper; 0.078" largest diam, 11/16" lg; passivate finish; Hoffman Radio Corp part #HPS-22P, dwg #HHS-1800	Taper Pin for GEAR 0815

X	1801	N18-R-269-5330	COUNTER, mechanical: direct drive; polished Veeder metal; 1-23/64" lg, 1-13/32" wd, 55/64" thk; 5 digits; non-resetting; clockwise rotation; max speed 100 rpm or 1000 counts/min; subtracts in opposite direction; two (.144") mtg holes on 1-1/16" centers; .166" high black figures on metal; Boston Gear #G-129 affixed to shaft; mfr: Veeder-Root Inc part #E114145 (modified); contr: Hoffman Radio Corp part #HM-470	LINE TUNING Reference Indicator
X	1802		Same as I801	COUPLER TUNING Reference Indicator

X	X	0801	BEARING, ball: single row axial; double removable shield; light duty cartridge type; 0.2500" bore, 0.6527" max OD tapered 0.068" per ft, 0.249" wd; 7 balls; packed per ANG-25 with light instrument grease; std fit; std tolerance; flanged; Fafnir Bearing Co type #F4DDC1-FS10160X; Hoffman Radio Corp part #HM-623 (same as 0703)	Bearings for SHAFTS 0802, 0803, 0804, 0807 and 0806
X	X	0802	BEARING, ball: single row axial; double removable shield; light duty cartridge type; 0.1875" bore, 0.5632" max OD tapered 0.068" per ft, 0.250" wd; 6 balls; packed per ANG-25 with light instrument grease; std fit; std tolerance; flanged; Fafnir Bearing Co type #F3DDC1-FS10160X; Hoffman Radio Corp part HM-624 (Same as 0704)	Bearings for Follower Screws 0825, and SHAFTS 0805 and 0809
	X	0803 N16-S-21031-3080	SHAFT: coupler driving; corrosion resistant steel Type 303 per MIL-S-853 Class 7, Type C; min tensile strength 100,000 psi; cylindrical rod; 7" lg, 0.312" diam; mts to housing casting with bearing at each end and with taper pins to gears and associated components; each end reduced to 1/4" diam with 1/64" x 45° chamfer, one end reduced 5/8" and the other 7/16" with a 0.028" wd intent of 0.250" diam 1/8" from shaft end; mfr and contr: Hoffman Radio Corp part/dwg #0M-1113	Main Tuning Head COUPLER TUNING Drive Shaft
	X	0804 N16-S-21033-3082	SHAFT: multi-jaw line tuning; corrosion resistant steel Type 303 per MIL-S-853, Class 7, Type C; min tensile strength 100,000 psi; cylindrical rod; 7-1/4" lg, 5/16" diam; held in place with bearings near each end, and taper pinned gear and spider on opposite ends; each end reduced to 7/8" lg x 0.250" diam with 1/32" x 45° chamfer; mfr and contr: Hoffman Radio Corp part/dwg #0M-1115	Main Tuning Head LINE TUNING Drive Shaft

X	0805	N16-S-20961-5726	SHAFT: coupler tuning; corrosion resistant steel Type 303 per MIL-S-853, Class 7, Type C; min tensils strength 100,000 psi; irregular cylindrical rod; 2-11/16" lg, 3/8" max diam; mts to housing casting using bearings, hold in place with retaining ring and associated gears; two principal sections, one 1.256" lg x 1/4" diam, the other 1.432" lg x .1875" diam with indent .017" wd x .175" diam. .065" from end, each end chamfered 1/64" x 45°; mfr and contr: Hoffman Radio Corp part/dwg #0M-1117	Primary Tuning Head COUPLER TUNING Drive Shaft. Drives 0803
X	0806	N16-S-20995-5626	SHAFT: line tuning drive; corrosion resistant steel Type 303 per MIL-S-853, Class 7, Type C; min tensile strength 100,000 psi; cylindrical rod; 3-49/64" lg, 3/8" diam max; held in place with bearings and attached gears; 1/4" diam section .533" from one end; mfr and contr: Hoffman Radio Corp part/dwg #0M-1116	Primary Tuning Head LINE TUNING Drive Shaft. Drives 0807
X	0807	N16-S-20949-5151	SHAFT: intermediate line tuning; corrosion resistant steel Type 303 per MIL-S-853, Class 7, Type C; min tensile strength 100,000 psi; irregular cylindrical rod; 2-1/2" lg, .312" diam o/a; mts to housing casting using 2 bearings and uses 2 retaining rings for controlling shafts axial movement; 1/4" diam shaft with 1/64" x 45° chamfer and 0.230" diam x .028" wd indent near each end with 1" lg, 0.312" diam section 0.450" from one end; mfr and contr: Hoffman Radio Corp part E0M-1114	Intermediate Tuning Head LINE TUNING Drive Shaft. Drives 0804

X	0808	N16-S-20953- * 4933	SHAFT: driven shaft for couplertuning; stainless steel Type 303 per MIL-S-853, Class 7, Type C; min tensile strength 100,000 psi; irregular cylindrical rod; 2-9/16" lg, 3/8" diam o/a; mts to housing casting with bearing near each end and to gears and associated components with taper pins; shaft sections reduced from 1/16" lg x 3/8" diam to 21/32" lg x 0.250" diam to 1-27/32" lg x 0.1875" diam with 1/32" x 45° chamfer at each end; mfr and contr: Hoffman Radio Corp part/dwg #OM-1119	Intermediate Tuning Head COUPLER TUNING Drive Shaft
X	0809	N16-S-20890- * 6501	SHAFT: counter driving; corrosion resistant steel Type 303 per MIL-S-853, Class 7, Type C; min tensile strength 100,000 psi; irregular cylindrical rod; 1-5/32" lg, 0.250" diam o/a; mts with 2 centrally located bearings and taper pin at each end; shaft reduced from 5/16" lg x 0.250" diam to 27/32" lg x 0.1875" diam with 1/64" x 45° chamfer at each end; mfr and contr: Hoffman Radio Corp part/dwg #OM-1105	Counter Gear Drive Shafts
X	0810	N16-G-402210 376	GEAR: bevel type; brass; pinion-line tuning drive; straight teeth; 16 teeth; 32 pitch, 0.500" pitch diam; 0.562" OD, 1/4" ID, 33/64" thk approx; straight face; hub 3/8" diam x 5/16" thk; mtd with drill #52 (0.063") hole thru one side with center 5/32" from hub end; mfr and contr: Hoffman Radio Corp part/dwg #OM-1047	Small LINE TUNING Bevel Gear on SHAFT 0806

X	0811	N16-G-431530-346	GEAR: spur type; commercial brass 1/2 hard per spec MIL-B-895; coupler shaft; straight teeth; 32 teeth; 32 pitch, 1" pitch diam; 1.062" OD, 0.250" ID and 3/8" thk; straight face; hub 7/16" diam x 3/16" thk; mtd with drill #52 (0.063") hole thru one side with center 3/32" from hub end; mfr and contr: Hoffman Radio Corp part/dwg #OM-1191	Spur Gear on Primary COUPLER TUNING Drive Shaft 0805
X	0812		Same as 0811	Spur Gear on Intermediate COUPLER TUNING Drive Shaft 0808
X	0813	N16-G-402370-333	GEAR: miter type; brass; coupler shaft drive; straight teeth; 24 teeth; 32 pitch, 0.750" pitch diam; 0.812" OD, 0.187" ID x 27/64" thk approx; straight face; hub 1/2" diam x 7/32" thk; mtd with drill #52 (0.063") hole thru one side with center 3/32" from hub end; mfr and contr: Hoffman Radio Corp part/dwg #OM-1042	Bevel Gear on Intermediate COUPLER TUNING Drive Shaft 0808
X	0814	N16-G-402370-387	GEAR: miter type; brass; coupler shaft drive; straight teeth; 24 teeth; 32 pitch, 0.750" pitch diam; 0.812" OD, .312" ID, 27/64" thk approx; straight face; hub 1/2" diam x 7/32" thk; mtd with drill #52 (0.063") hole thru one side with center 3/32" from hub end; mfr and contr: Hoffman Radio Corp part/dwg #OM-1051	Bevel Gear on Main COUPLER TUNING Drive Shaft 0803

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X	0815	N16-G-403179-396	GEAR: bevel type; brass tuning drive; straight teeth; 64 teeth; 32 pitch, 2" pitch diam; 2.062" OD, 0.312" ID, 15/32" thk approx; straight face; hub 11/16" diam x 5/16" thk; mtd with drill #52 (0.063") hole thru one side with center 5/32" from hub end; mfr and contr: Hoffman Radio Corp part/dwg #0M-1048	Large Bevel Gear on LINE TUNING Intermediate Drive Shaft 0807
X	0816		Same as 0811	Spur Gear on LINE TUNING Intermediate Drive Shaft 0807
X	0817		Same as 0811	Spur Gear on LINE TUNING Main Drive Shaft 0804
X	0818	N16-G-402210-137	GEAR: miter type; brass; tuning drive; straight teeth; 16 teeth; 32 pitch, 0.500" pitch diam; 0.562" OD, 0.187" ID, 11/32" thk approx; straight face; hub 13/32" diam x 3/16" thk; mtd with drill #52 (0.063") hole thru one side with center 3/32" from hub end; mfr and contr: Hoffman Radio Corp part/dwg #0M-1043	Small Counter Drive Bevel Gears on SHAFTS 0805, 0808 and 0809
X	0819	N16-G-432098-124	GEAR: spur type; brass; counter drive; straight teeth; 60 teeth; 48 pitch, 1-1/4" diam; 1.292" OD, 0.250" ID, 5/16" thk; straight face; hub 1/2" diam x 3/16" thk; mtd with drill #52 (0.063") hole thru one side with center 3/32" from hub end; mfr and contr: Hoffman Radio Corp part/dwg #0M-1045	Large Counter Drive Spur Gears on SHAFTS 0808 and 0809

X	0820	N16-G-431616-351	GEAR: spur type; commercial brass 1/2 hard per spec MIL-B-895; travel limit drive; straight teeth; 36 teeth; 48 pitch, 0.750" pitch diam; 0.792" OD, 0.250" ID and 5/16" thk; straight face; hub 1/2" diam 3/16" thk; mtd with #52 (0.063") hole thru one side with center 3/32" from hub end; mfr and contr: Hoffman Radio Corp part/ dwg #OM-1190	Spur Gear on Primary LINE TUNING Shaft 0806
X	0821	N16-G-431616-176	GEAR: spur type; commercial brass 1/2 hard per spec MIL-B-895; travel limit drive; straight teeth; 36 teeth; 48 pitch, 0.750" pitch diam; 0.792" OD, 0.187" ID and 5/16" thk; straight face; hub 1/2" diam x 3/16" thk; mtd with drill #52 (0.063") hole thru one side with center 3/32" from hub end; mfr and contr: Hoffman Radio Corp part/ dwg #OM-1192	Spur Gears on Follower Screws 0825
X	0822	N16-G-402210-356	GEAR: miter type; brass; line tuning drive; straight teeth; 16 teeth; 32 pitch, 0.500" pitch diam; 0.562" OD, 0.250" ID, 11/32" thk approx; straight face; hub 13/32" diam, 3/16" thk; mtd with drill #52 (0.063") hole thru one side with center 3/32" from hub end; mfr and contr: Hoffman Radio Corp part/dwg #OM-1186	Small Counter Drive Bevel Gear on Primary LINE TUNING Shaft 0806
X	0823	N16-G-431616-393	GEAR: spur type; commercial brass 1/2 hard per spec MIL-B-895; coupler driving; straight teeth; 36 teeth; 48 pitch, 0.750" pitch diam; 0.7916" OD, 0.312" ID and 5/16" thk; straight face; hub 1/2" diam x 3/16" thk; mtd with drill 352 (0.063") hole thru one side with center 3/32" from hub end; mfr and contr: Hoffman Radio Corp part/dwg #OM-1193	Spur Gear on Main COUPLER TUNING Shaft 0803

X	0824	N16-N-89043- * 1008	NUT, Travelling: limits rotation of shaft in conjunction with screw assembly and stops; consists of follower and pin; follower of nickel plated brass, pin of corrosion resistant steel; brass to be 1/2 hard per MIL-B-895, steel Type 303 per MIL-S-853 Class 7, Type C; 15/16" lg, 1/2" wd, 3/8" thk excluding pin; screw mtd using 1/4-20 NC-3 tapped hole on center axis 1/4" from one end; ●.080" radius half circle cutaway, elongated 3/16" at end opposite tapped hole; mfr and contr: Hoffman Radio Corp part/dwg #0A-262	TRAVEL LIMIT FOLLOWERS on Follower Screws 0825
X	0825	N16-S-21003- * 3082	SHAFT: screw for travel limit follower assembly: corrosion resistant steel Type 303 per MIL-S-853, Class 7, Type C; min tensile strength 100,000 psi; cylindrical rod; 4-1/4" lg, 5/16" diam o/a; mts thru casting using bearings near each end and retaining ring near narrow end; approx 3.01" of 1/4-20 NC-3 threads of 0.249" max diam, 0.017" wd x 0.175" diam indent 1/16" from small end; mfr and contr: Hoffman Radio Corp part/dwg #0M-1106	Follower Screws
X	0826	N16-R-683401- * 102	ROD, guide: guide for travel limit follower; corrosion resistant steel Type 303 per MIL-S-853 Class 7, Type C; min tensile strength 100,000 psi; cylindrical rod; 4-29/64" lg, 0.156" diam; mts to housing casting with a #6-32 nut at each end; each end threaded #6-32 NC-2 19/64" lg, 1/64" x 45° shamfer; mfr and contr: Hoffman Radio Corp part/dwg #0M-1109	Guide Rods for Travel Limit Followers 0824

X	0827	N16-C-600001-394	COLLAR, spacing: for limiting movement of follower; commercial brass 1/2 hard per MIL-B-895, nickel plated; 5/8" OD, 0.250" ID, 3/16" thk; mts to 0.250" diam shaft using 0.063" drilled hole thru center of one side; mfr and contr: Hoffman Radio Corp part/dwg #OM-1108	End Stop Collars for Travel Limit Followers 0824
X	0828	N16-C-600001-393	COLLAR, gear: spacer for miter gear; commercial brass material, nickel plated; 3/8" OD, 0.188" ID, 0.102" thk; fits over coupler tuning drive shaft Hoffman part #OM-1119; mfr and contr: Hoffman Radio Corp part/dwg #OM-1118	Spacer Collar for GEAR 0813
X X	0829		SPIDER, coupling: mechanical rotary motion transf er coupling; untreated steel, nickel plated; for light duty; cylindrical shape with axially protruding teeth; approx 0.405" lg x 0.500" OD o/a, 1/4" concentric hole ID; equipped with provisions for 0.063" mtg pin; marked "BOSTON"; modified to include mtg pin hole, reduced length; Boston Gear Works part #FA5-1/4 modified; Hoffman Radio Corp part/dwg #OM-816 (Same as 0748)	Coupling Spiders on Lower Ends of SHAFTS 0803 and 0804

X	X	0830		RING, retaining: #420 stainless steel, oil dipped; approx safety rpm limit -80,000 rpm, min clearance from shaft to housing 0.298", allowable thrust load with safety factor of 4 is 240 lbs; 0.168" ID, 0.015" thk, max OD approx 0.243"; has two 0.025" diam holes on variable mtg/c; Waldes Kohinoor, Inc part TRUARC 5100-18-W; Hoffman Radio Corp part #HM-312 (Same as 0739)	Retaining Rings on End of SHAFT 0805 and Follower Screws 0825
	X	0831	N42-R-2051-3820	RING, retaining: #420 stainless steel, oil dipped; approx safety rpm limit 80,000 rpm, min clearance from shaft to housing 0.450", allowable thrust load with safety factor of 4 is 90 lbs; 0.225" ID, 0.025" thk, max OD approx 0.340"; has two 0.035" diam holes on variable mtg/c; Waldes Kohinoor, Inc part #TRUARC 5100-25-W; Hoffman Radio Corp part #HM-469	Retaining Rings on Ends of SHAFTS 0803 and 0807

TABLE 6-4a. MAINTENANCE PARTS KIT, CU-255/UR

Key Designation	Quantity
B 702	2
B 703	2
O 716	1
S 701	1

TABLE 6-4b. MAINTENANCE PARTS KIT, CU-332A/UR

Key Designation	Quantity
1801	1

TABLE 6-5. CROSS REFERENCE PARTS LIST

STANDARD NAVY STOCK NO.	KEY SYMBOL
G17-F-16302-140	F701
G42-P-14141-58	H720
G42-P-14141-60	H721
G42-P-14141-64	H722
G42-P-14141-68	H723
G42-P-14141-72	H724
G42-P-14141-76	H725
G42-P-14141-84	H726
N16-C-29613-2681	C702
N16-G-402256-283	0722
N17-C-72277-6098	J702
N17-C-72698-6098	J701
N17-M-19052-1051	M701
N17-S-74139-7130	S703

JAN (OR AWS) DESIGNATION	KEY SYMBOL
CM20C271K	C702
CM30B22K	C701
IN21-B	CR701
MR25W200DCUA	M701
RC10BF682K	R704
RC10BF820J	R703
RW13G500	R701

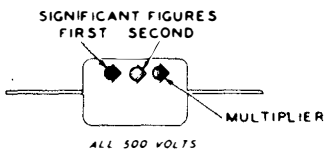
NAVY TYPE	KEY SYMBOL

ARMY-NAVY TYPE	KEY SYMBOL
AN2209-8	E744
AN3102A-22-14P	J701
AN3102A-22-14S	J702
AN931-10-14	0729
AN931C4-7	0730
AN931C10-14	0731

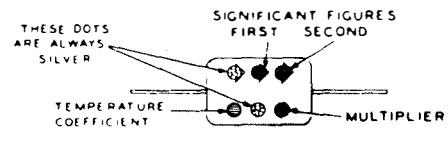
TABLE 6-6. APPLICABLE COLOR CODES AND MISCELLANEOUS DATA

CAPACITOR COLOR CODES

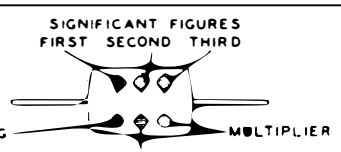
RMA 3-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



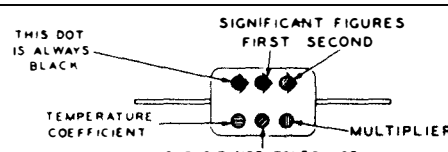
JAN 6-DOT COLOR CODE FOR PAPER-DIELECTRIC CAPACITORS



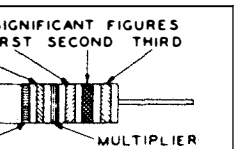
RMA 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS



JAN 6-DOT COLOR CODE FOR MICA-DIELECTRIC CAPACITORS

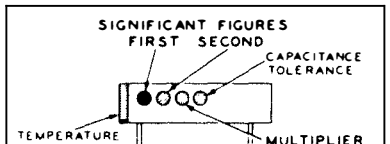


RMA COLOR CODE FOR TUBULAR CERAMIC-DIELECTRIC CAPACITORS

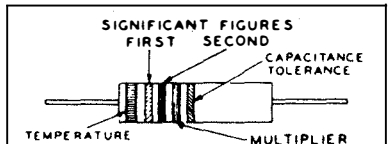


JAN COLOR CODE FOR FIXED CERAMIC-DIELECTRIC CAPACITORS

RADIAL TYPE NON-INSULATED



AXIAL TYPE INSULATED



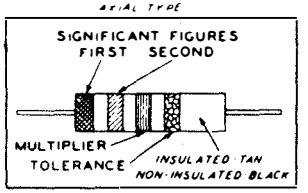
RMA: RADIO MANUFACTURERS ASSOCIATION
JAN: JOINT ARMY-NAVY

RESISTORS				CAPACITORS				
				MULTIPLIER				
TOLERANCE	MULTIPLIER	SIGNIFICANT FIGURE	COLOR	RMA MICA AND CERAMIC-DIELECTRIC	JAN MICA AND PAPER-DIELECTRIC	JAN CERAMIC DIELECTRIC	VOLTAGE RATING	TEMPERATURE COEFFICIENT
	1	0	BLACK	1	1	1		A
	10	1	BROWN	10	10	10	100	B
	100	2	RED	100	100	100	200	C
	1,000	3	ORANGE	1,000	1000	1000	300	D
	10,000	4	YELLOW	10,000			400	E
	100,000	5	GREEN	100,000			500	F
	1,000,000	6	BLUE	1000,000			600	G
	10,000,000	7	VIOLET	10,000,000			700	
	100,000,000	8	GRAY	100,000,000		0.01	800	
	1,000,000,000	9	WHITE	1,000,000,000		0.1	900	
5	0.1		GOLD	0.1	0.1		1000	
10	0.01		SILVER	0.01	0.01		2000	
20			NO COLOR				500	

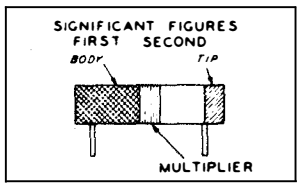
RESISTOR COLOR CODES

RMA COLOR CODE FOR FIXED COMPOSITION RESISTORS

AXIAL TYPE

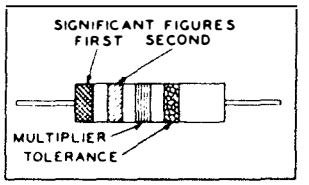


RADIAL TYPE



JAN COLOR CODE FOR FIXED COMPOSITION RESISTORS

AXIAL TYPE INSULATED



RADIAL TYPE NON-INSULATED

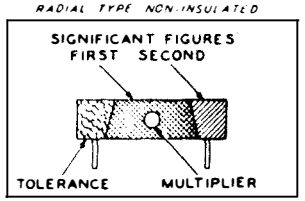


TABLE 6-7. LIST OF MANUFACTURERS

NAME	ADDRESS	PRE-FIX
American Phenolic Corp.	1830 So. 54th Ave., Chicago 50, Ill.	CPH
Atlantic India Rubber Works, Inc.	571 W. Polk St., Chicago 7, Ill.	-
Boston Gear Works	3200 Kerr St., N. Quincy 71, Mass.	CBH
Burndy Engineering Co, Inc.	107 Bruckner Blvd., New York 54, N. Y.	-
Bussman Mfg. Co.	2538 W. University St., St. Louis, Mo.	CFA
Cannon Electric Development Co.	3291 Humboldt St., Los Angeles 31, Calif.	CED
Cinch Mfg. Co.	2339 W. Van Buren St., Chicago, Ill.	CMG
Cinch-Jones Mfg. Co.	1026 So. Homan., Chicago, Ill.	-
Collins Radio Co.	Cedar Rapids, Iowa	-
Cornell-Dubilier Elec. Corp.	1000 Hamilton Blvd., So. Plainfield, N.J.	CD
Diamond Chain Co. Inc.	400 Kent Ave., Indianapolis, Indiana	-
Electro Motive Mfg. Co. Inc.	South Part & John Sts., Willimantic, Conn.	CMF
Fafnir Bearing Co.	New Britain, Conn.	-
General Electric Co.	1 River Rd., Schenectady 5, N.Y.	CG
Hoffman Radio Corp.	3761 S. Hill St., Los Angeles 7, Calif.	CKB
International Resistance Co.	401 N. Broad St., Philadelphia 8, Pa.	CIR
Kirkhill Rubber Co.	6828 McKinley Ave., Los Angeles 1, Calif.	-
Oak Manufacturing Co.	1260 No. Clybourn Ave., Chicago 10, Ill.	COC
Ohmite Manufacturing Co.	4835 W. Flourney St., Chicago 44, Ill.	-
Rubbercraft Corp. of Calif. Ltd.	112 E. 17th St., Los Angeles, Calif.	-
Sylvania Electric Products, Inc.	1740 Broadway, New York 19, N.Y.	CHS
Veeder-Root Inc.	24 Sargent St., Hartford 2, Conn.	-
Waldes Kohinoor Inc.	Austel Place., Long Island City, N.Y.	-
Westinghouse Electric Corp.	700 Braddock Ave., E. Pittsburgh, Pa.	CAY

I N D E X