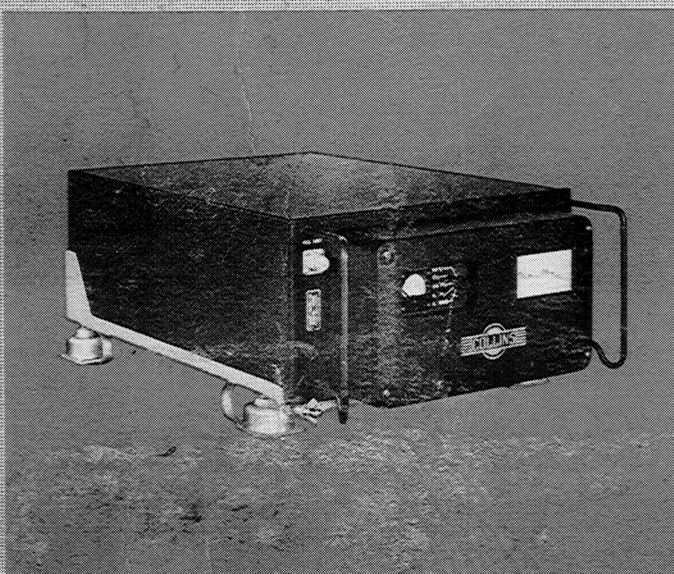
Instruction Book



TRANSCEIVER

618S-1 & 618S-4

Collins RADIO COMPANY

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INSTRUCTION BOOK

TRANSCEIVER 618S-1 AND 618S-4

Cedar Rapids, Iowa

This instruction book includes the modification numbers currently used on Transceiver 618S-1 and 618S-4, Power Supply 416W-1, and Shockmounts 350S-1 through 350S-4. The most recent modification numbers are listed below.

618S-1 and 618S-4 Transceiver:

Front Panel	MOD 1
Autopositioner Assembly	MOD 3
Servo Drive Motor Assembly	MOD 1
Main Chassis Assembly	MOD 5
R-F Crystal Oscillator	MOD 5
Tuning Servo Amplifier	MOD 3
Relay Assembly	MOD 3
250 Kc I-F Amplifier	MOD 5
250 Kc I-F Amplifier with Squelch and Selcal	MOD 1
R-F Tuner	MOD 9
250 Kc Oscillator	MOD 3
A-F Amplifier	MOD 1
Modulator	MOD 5
Power Amplifier	MOD 4

416W-1 Power Supply:	MOD 6
350S-1 Shockmount:	MOD 3
350S-2 Shockmount:	MOD 3
350S-3 Shockmount:	MOD 3
350S-4 Shockmount:	MOD 3

Printed in the United States of America

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Collins agrees to repair or replace, without charge, any equipment, parts, or accessories which are defective as to design, workmanship or material, and which are returned to Collins at its factory, transportation prepaid, provided

(a) Notice of the claimed defect is given Collins within one (1) year from date of delivery and goods are returned in accordance with Collins' instructions.

(b) Equipment, accessories, tubes, and batteries not manufactured by Collins or from Collins' designs are subject to only such adjustments as Collins may obtain from the supplier thereof.

(c) No equipment or accessory shall be deemed to be defective if, due to exposure or excessive moisture in the atmosphere or otherwise after delivery, it shall fail to operate in a normal or proper manner.

Collins further guarantees that any radio transmitter described herein will deliver full radio frequency power output at the antenna lead when connected to a suitable load, but such guarantee shall not be construed as a guarantee of any definite coverage or range of said apparatus.

The guarantee of these paragraphs is void if equipment is altered or repaired by others than Collins or its authorized service center.

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(B) Date of delivery of equipment
(C) Date placed in service
(D) Number of hours of service
(E) Nature of trouble
(F) Cause of trouble if known
(G) Part number (9 or 10 digit number) and name of part thought to be causing trouble
(H) Item or symbol number of same obtained from parts list or schematic
(I) Collins' number (and name) of unit sub-assemblies involved in trouble
(J) Remarks

HOW TO ORDER REPLACEMENT PARTS. When ordering replacement parts, you should direct your order as indicated below and furnish the following information insofar as applicable. To enable us to give you better replacement service, please be sure to give us complete information.

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Sales Service Department
Cedar Rapids, Iowa

INFORMATION NEEDED:

(A) Quantity required
(B) Collins' part number (9 or 10 digit number) and description
(C) Item or symbol number obtained from parts list or schematic
(D) Collins' type number, name, and serial number of principal equipment
(E) Unit sub-assembly number (where applicable)

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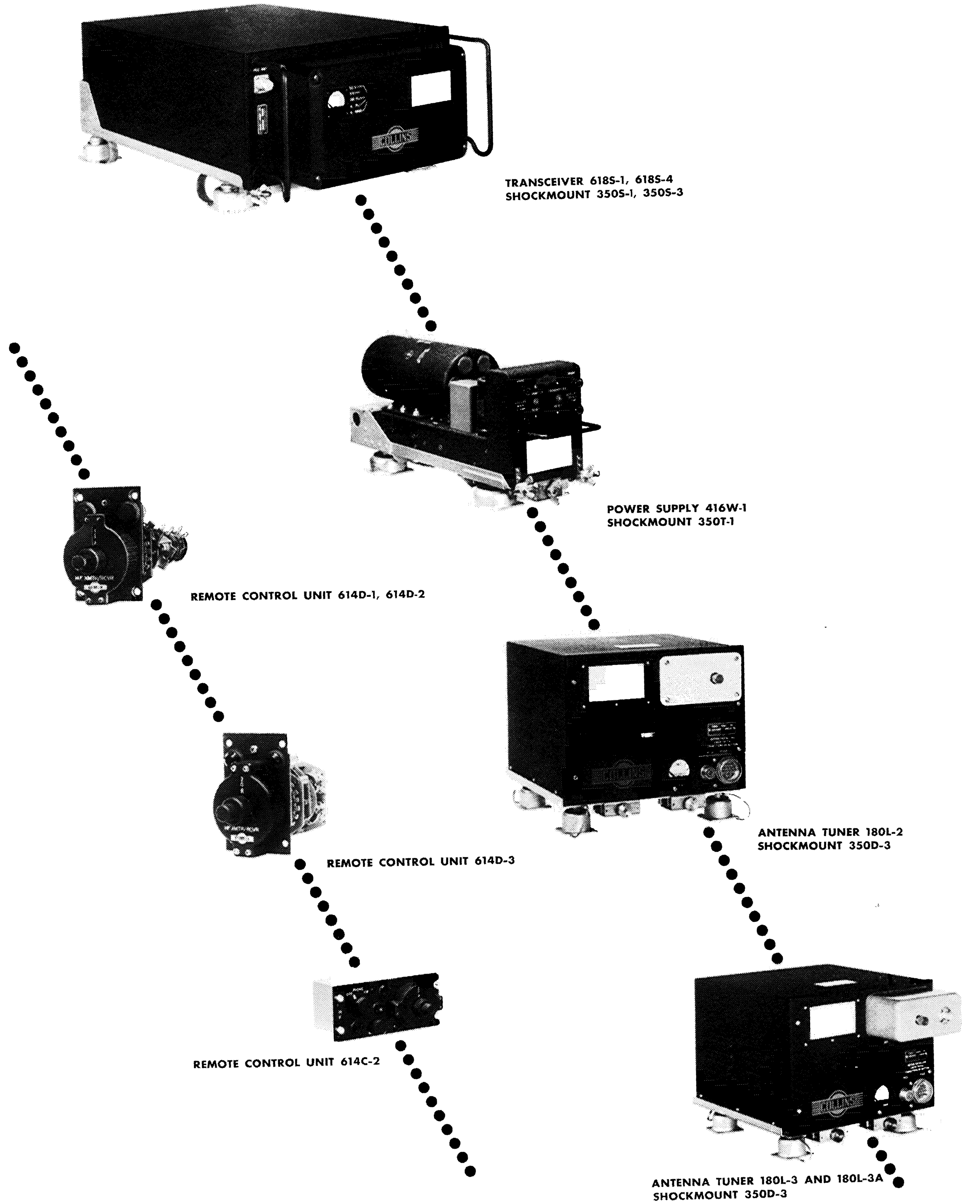

Figure 1-1. Transceivers 618S-1 or 618S-4, System Components

SECTION I
GENERAL DESCRIPTION

1.1 PURPOSE OF HANDBOOK.

The 618S-1 and 618S-4 Transceiver and associated system components are covered in this handbook. The handbook includes a description of the equipment, information on installation and initial adjustment, including performance checks, operation, principles of operation, inspection and preventive maintenance, corrective maintenance, parts list, and schematic diagrams.

1.2 PURPOSE OF EQUIPMENT.

The Collins 618S-1 and 618S-4 Transceiver, see figure 1-1, is designed to provide both transmitting and receiving facilities for high-frequency communication in the 2.0- to 25.0-megacycle range. Incorporated within the equipment are a number of design considerations. These are discussed in the following paragraphs.

1.2.1 CHANNELS.

The 618S-1 and 618S-4 provides communication facilities for a maximum of 144 crystal-controlled frequencies within the 2.0- to 25.0-mc range of the equipment. The frequency control system used provides for common usage of crystals for both transmitting and receiving. When used with the 614D-1 Remote Control Unit, the band-selector information is contained within the wiring of the r-f crystal oscillator. When the 614D-2 Remote Control Unit is used, the band-selector information is obtained from a switch section of the 614D-2.

1.2.2 SYSTEM FLEXIBILITY.

The 618S-1 and 618S-4 Transceiver normally is used with a Collins 180L-2 or 180L-3 Antenna Tuner. This tuner is designed for automatic tuning of open, fixed-wire antennas between 45 and 100 feet in length and the coupling of the 52-ohm output circuit of an aircraft transmitter to such antennas over a frequency range of 2 to 25 megacycles. The tuning and matching operations are entirely automatic after a grounding pulse is received from the Transceiver through the operation of the channel selector control. The Transceiver also contains circuits to tune the transmitter-receiver circuits automatically to the proper frequency whenever a new channel is selected. No installation adjustments are necessary when a new channel or frequency is desired. Since completely automatic tuning is used, a highly flexible system of channel selection is possible.

1.2.3 PROVISIONS FOR FUTURE REQUIREMENTS.

A low-frequency (250 kc) source of injection voltage is also designed into the equipment. This source can be replaced by one which is modulated for FSK teletype or single-sideband transmission. Modification or replacement of some of the existing units would be necessary.

1.3 MODEL DIFFERENCES.

Transceiver 618S-1 is the same as Transceiver 618S-4 except the 250 kc i-f amplifier unit used in the 618S-1 is replaced by the 250 kc i-f amplifier with squelch and selcal unit in the 618S-4 Transceiver. All other units of Transceiver 618S-4 are the same as those of Transceiver 618S-1. It should be understood that Transceiver 618S-4 contains the most recent modifications as listed on the title page of this instruction book. All references to Transceiver 618S-1 apply equally to Transceiver 618S-4 unless specifically noted in the text.

1.4 EQUIPMENT SUPPLIED.

Equipment supplied is listed in table 1-1.

TABLE 1-1. EQUIPMENT SUPPLIED

NAME OF UNIT	COLLINS PART NO.	DESCRIPTION
Transceiver 618S-1	522 0060 006	15-7/16 in. w x 7-51 /64 in. h x 23-7/16 in. lg Weight not more than 55 pounds.
or		
Transceiver 618S-4	522 1020 006	Same as 618S-1

TABLE 1-1. EQUIPMENT SUPPLIED (Cont)

NAME OF UNIT	COLLINS PART NO.	DESCRIPTION
*Shockmount 350S-1	522 0059 005	Provides shock type mounting facilities for 618S-1 16-3/8 in. w x 6-13/16 in. h x 25-3/16 in. lg Weight not more than 9 pounds.
*Shockmount 350S-3	522 0184 005	Same as 350S-1.
*Mounting 350S-2	522 0076 005	Provides rack type mounting facilities for 618S-1. 15-5/8 in. w x 5-33/64 in. h x 20-15/16 in. lg. Weight not more than 7.6 pounds.
*Mounting 350S-4	522 0183 005	Same as 350S-2.
*Alternate components in a normal installation.		

1.4.1 EQUIPMENT REQUIRED BUT NOT SUPPLIED.

The following equipment is required in a normal installation of the 618S-1 Transceiver. This equipment is not supplied as part of the 618S-1 Transceiver but is available as existing accessories or as existing facilities on the aircraft. The accessory equipments required will depend on the particular installation.

TABLE 1-2. EQUIPMENT REQUIRED BUT NOT SUPPLIED

NAME OF UNIT	COLLINS PART NO.	DESCRIPTION
Power Supply 416W-1	522 0053 006	Supplies all power required by 618S-1 and 180L-( ). 4-7/8 in. w x 6-3/4 in. h x 18-1/16 in. lg. Weight not more than 22.0 pounds.
*Shockmount 350T-1	522 0052 004	Provides shock type mounting facilities for 416W-1. 5-7/8 in. w x 3-15/16 in. h x 17-9/16 in. lg. Weight not more than 4.0 pounds.
*Mounting 350T-3	522 0148 004	Provides rack type mounting facilities for 416W-1. 5-7/8 in. w x 3-5/8 in. h x 16-1/8 in. lg. Weight not more than 1.25 pounds.
*Antenna Tuner 180L-2	506 1199 004	Provides automatic matching and loading of antenna. 10-15/16 in. w x 7-23/32 in. h x 11-3/8 in. lg. Weight not more than 17.3 pounds.
*Antenna Tuner 180L-3	522 0092 004	Provides automatic matching and loading of antenna. 10-15/16 in. w x 7-23/32 in. h x 11-3/8 in. lg. Weight not more than 18.3 pounds.

TABLE 1-2. EQUIPMENT REQUIRED BUT NOT SUPPLIED (Cont)

NAME OF UNIT	COLLINS PART NO.	DESCRIPTION
*Antenna Tuner 180L-3A	522 0093 004	The same as Antenna Tuner 180L-3 except for the addition of an internal antenna grounding relay.
Shockmount 350D-3	505 2782 002	Provides shock type mounting facilities for 180L-( ). 10-3/8 in. w x 1-1/2 in. h x 10-5/8 in. lg. Weight not more than 1.25 pounds.
*Remote Control Unit 614D-1	522 0061 004	Provides channel-selecting facilities for 618S-1 installation. 2-1/4 in. w x 3-9/16 in. h x 6-7/16 in. lg (including volume control and on-off switch) Weight not more than 1.5 pounds.
*Remote Control Unit 614D-2	522 0096 004	Same as 614D-1
*Remote Control Unit 614D-3	522 0171 004	Provides channel-selecting facilities for 618S-1 installation. 2-1/4 in. w x 3-9/16 in. h x 4-11/16 in. lg Weight not more than 1.5 pounds.
*Remote Control Unit 614C-2	522 0147 005	Provides channel-selecting facilities for 618S-1 installation (including selection of Phone-CW operation on any one of 144 crystal-controlled channels). 5-3/4 in. w x 2-5/8 in. h x 4-5/8 in. lg. Weight not more than 1.75 pounds.
Primary Power		See paragraph 1.9.
A-C Power		See paragraph 1.9.
Antenna		Fixed wire, 45- to 100-foot length.
1 R-F Cable	424 0006 00 (RG-8/U)	Coaxial cable between J110 and J101.
1 R-F Cable	425 0011 00 (RG-58/U)	Coaxial cable between J109 and J103.
2 Connectors (P110 and P101)	UG-21B/U (CPN) 357 9040 00	Coaxial connectors for RG-8/U.
2 Connectors (P109 and P103)	UG-88/U 357 9018 00	Coaxial connectors for RG-58/U.
**Adapter (from P109 to 618S-1)	UG-201/U (CPN) 357 9056 00	Adapter, from UG-88/U to UG-21B/U.
1 Connector (P102)	SK-C-16-23C1/2 or SK-C-16-21C1/2 (CPN) 371 0012 00 or 371 3070 00	Power connector for 180L-( ).

TABLE 1-2. EQUIPMENT REQUIRED BUT NOT SUPPLIED (Cont)

NAME OF UNIT	COLLINS PART NO.	DESCRIPTION
Power and Control Cables		See section II.
Headset	H-1/AR, or equal	300-ohm impedance.
Microphone	ANB-M-C1, or equal	Hand held microphone with push-to-talk switch.
Jacks, potentiometers, switches, etc. as required for remote control position. Volume control may be part of accessory kit ordered with 614D-( )	For part number of 614D-( ) accessory kits, see section II, Installation.	Provides controls for operation of equipment from remote control position.
Crystals	May be ordered from Collins by stating frequencies desired.	

*Alternate components in a normal installation.
**Refer to paragraph 9.2.1a.

NOTE

The 180L-3 is used where separate receiving facilities are desired with a common antenna.

1.5 DESCRIPTION OF EQUIPMENT.

1.5.1 MECHANICAL.

The 618S-1 Transceiver consists of a main chassis and panel which form the mounting base for a number of plug-in units. These units, shown in figure 1-2, are all removable from the top of the chassis. Captive hold-down screws hold the individual units in place. The front panel is constructed to make good electrical contact with a dust cover that is removable from the rear of the equipment.

All electrical connections to the plug-in units are made through receptacles mounted on the main chassis. Antenna input is coupled to the Transceiver through coaxial connectors located on the front panel. The connections to the external power supply and control boxes are made through two connectors mounted in the rear of the main chassis and making contact with mating plugs mounted on the shock-mount. Refer to figure 1-3.

An easily removable dust cover on the front panel houses the blower motor, sidetone and volume controls, and the positioning and tuning mechanism needed for remote control of the Transceiver.

Individual plug-in units which require mechanical linkage to each other or to the front panel are built with quick disconnect, Oldham couplers to allow removal of the units from the main chassis. Once these linkages are synchronized and the proper procedure is followed, it is possible to remove and replace units without additional mechanical alignment.

A blower located on the front panel draws air in through a filter and distributes the air to various parts of the equipment. The direction of airflow is determined by the positioning of holes in various portions of the chassis.

1.5.2 ELECTRICAL.

The 618S-1 Transceiver uses a number of circuits in both the transmit and receive positions. A block diagram is shown in figure 1-4 (the 250 kc i-f amplifier with squelch and selcal unit of the 618S-4 is not illustrated). Output of the r-f crystal oscillator unit in the range of 1.75 to 3.5 mc is applied to a phase discriminator (V1001). The tuning slug in the plate of this discriminator is mechanically ganged with all of the low-level tuned circuits of the equipment. Output of the discriminator controls a servo system which drives the tuning elements of these circuits. The discriminator is in a static condition only when the plate is tuned to resonance or when the plate and grid voltages of the discriminator tube are 180 degrees out of phase. In this manner, the low-level circuits of the Transceiver are automatically resonated when excitation is applied.

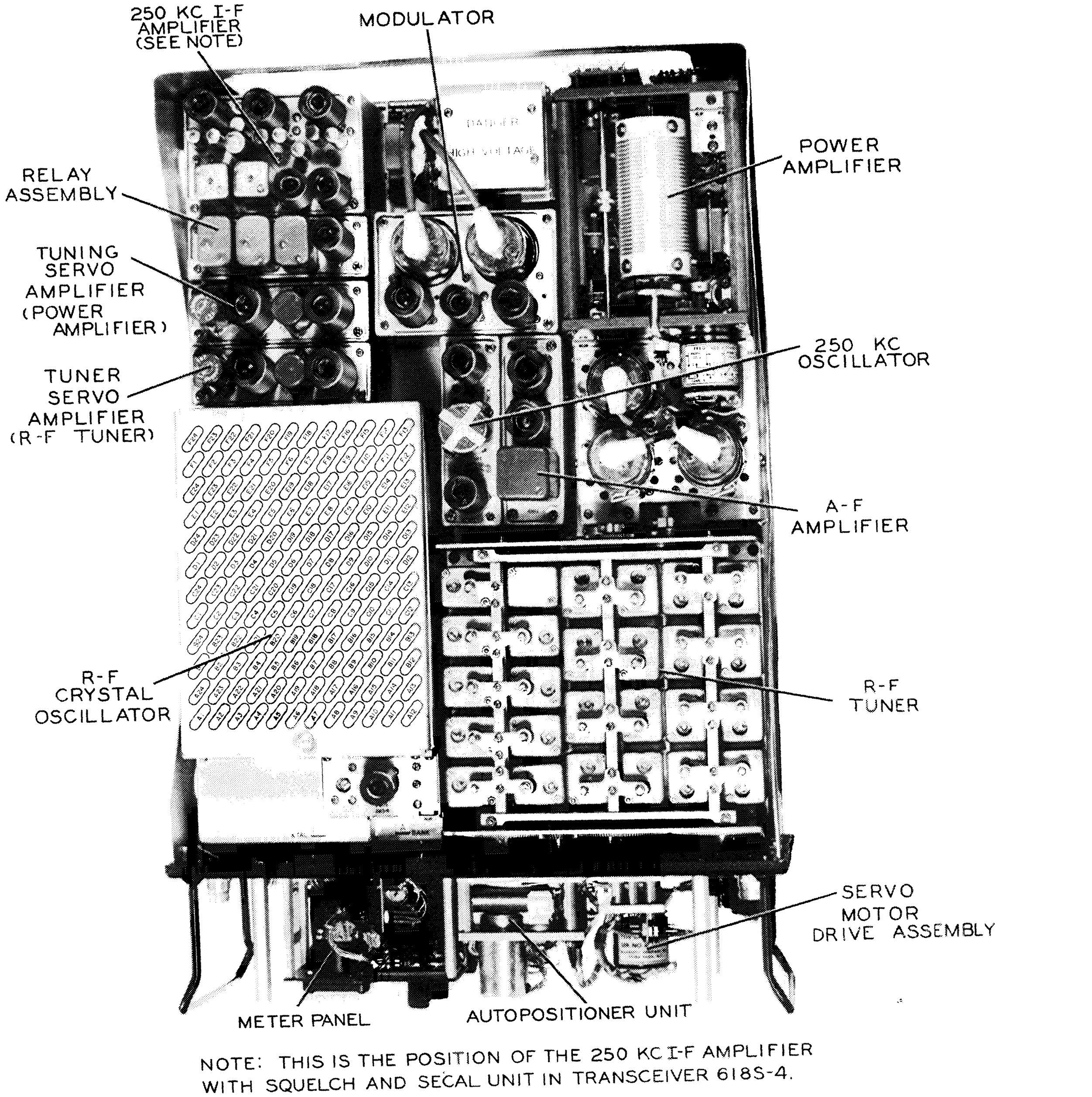

Figure 1-2. Transceiver 618S-1, Top View, Cover Removed

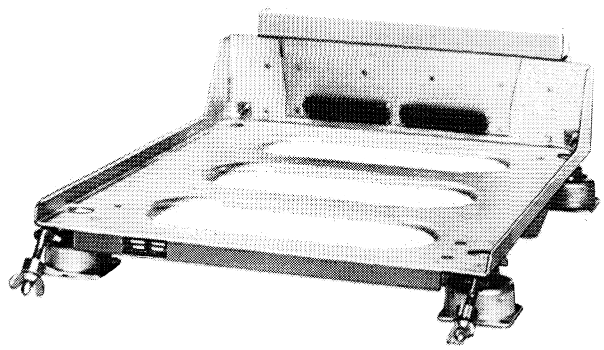

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Figure 1-3. Shockmount 350S-1, 350S-3

When transmitting, the oscillator output is mixed with a 250-kc injection voltage to provide a variable intermediate frequency of 2.0 to 3.75 mc on all bands. The variable i-f output is then added in the second transmitter mixer to various multiples of the oscillator frequency, depending upon the band selected. The resultant frequency is amplified and used to drive the power amplifier.

The power amplifier utilizes three type 6159 tubes connected in parallel. Its tank circuit consists of band-switched fixed capacitors and a variable inductance operated by a servomotor. This motor is supplied information by a phase discriminator operating around the power amplifier stage. The tank circuit is a pi network and automatically tunes and loads into a 52-ohm load.

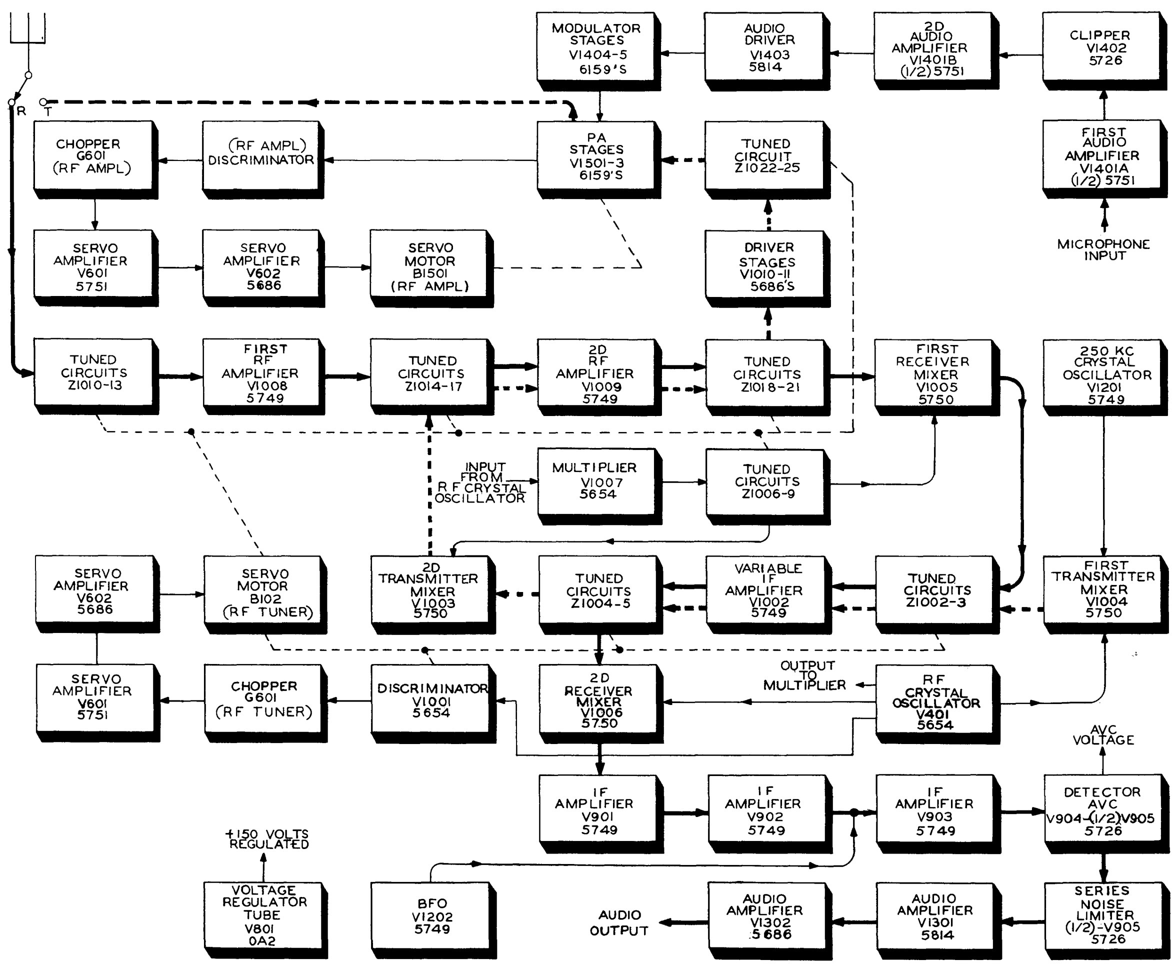

Figure 1-4. Transceiver 618S-1, Block Diagram

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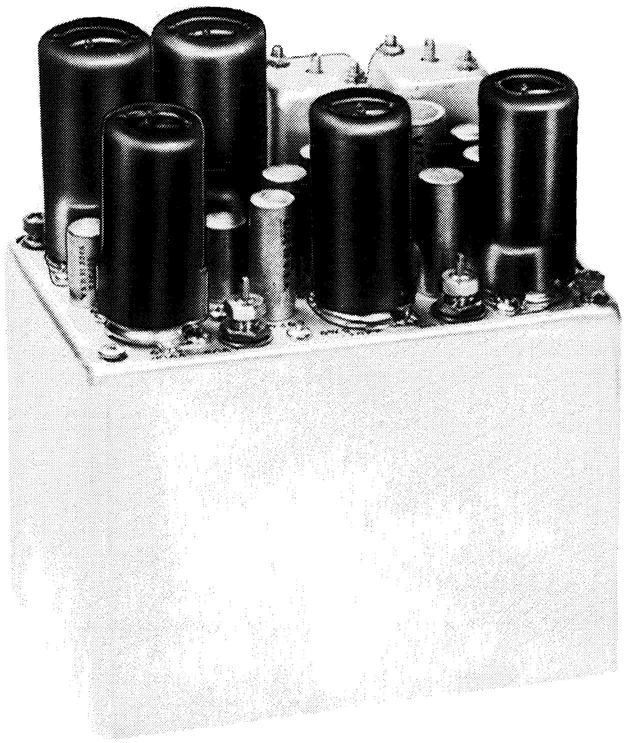

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Figure 1-5. 250 Kc I-F Amplifier with Squelch and Selcal Module

The process is reversed in the receive position. Signal from the antenna is amplified and applied to the first receiver mixer. A multiple of the oscillator frequency is injected to produce the 2.0- to 3.75-variable i-f frequency. Output of the variable i-f stage is combined with the 1.75- to 3.5-mc oscillator frequency to produce the 250-kc fixed intermediate frequency of the receiver. The 250-kc signal is amplified and detected to produce the desired audio frequency.

1.5.3 250 KC I-F AMPLIFIER WITH SQUELCH AND SELCAL OF 618S-4 TRANSCEIVER.

The 250 kc i-f amplifier with squelch and selcal is directly interchangeable with the 250 kc i-f amplifier of the 618S-1 Transceiver, with the exception of the squelch controls which must be added to the remote control circuits. Addition of the squelch controls requires the addition of one wire to the aircraft wiring (see figure 2-16). The 250 kc i-f amplifier with squelch and selcal is illustrated in figure 1-5. For further discussion of this module, refer to paragraph 4.9.7.

1.6 ACCESSORIES.

1.6.1 POWER SUPPLY 416W-1. See figure 1-6.

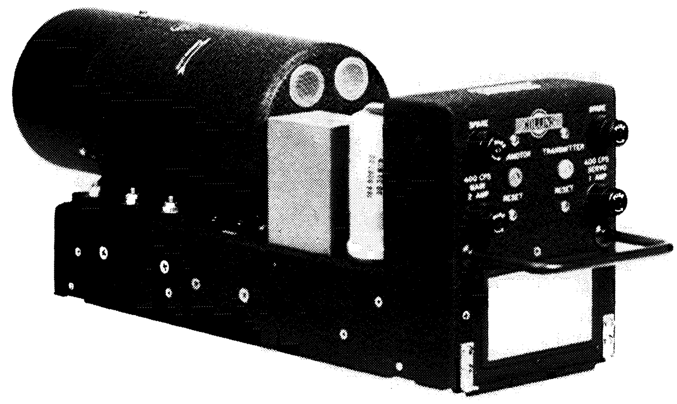

Figure 1-6. Power Supply 416W-1 A29-271-P

1.6.1.1 MECHANICAL DESCRIPTION. The 416W-1 Power Supply conforms to case size MT-A1-B as outlined in RTCA paper 46/57/EC-14. The weight of the unit complete with mounting does not exceed 26 pounds. The weight of the unit alone is 22.0 pounds.

Fuse holders and spare fuses are mounted on the front panel of the power supply. These fuses provide overload protection for the high-voltage circuits of the Transceiver. Also mounted on the front panel are two manual reset buttons controlling thermal cutout switches in the +27.5-volt d-c input leads of the power supply.

The power plug for this unit is mounted in the rear and engages a mating plug on Shockmount 350T-1. See figure 1-7.

1.6.1.2 ELECTRICAL DESCRIPTION. A dynamotor mounted on the 416W-1 provides high voltage for the modulator and power amplifier and also provides +250 volts for various tubes in the 618S-1. This dynamotor operates only on key-down phone position or on CW position of the transmitter.

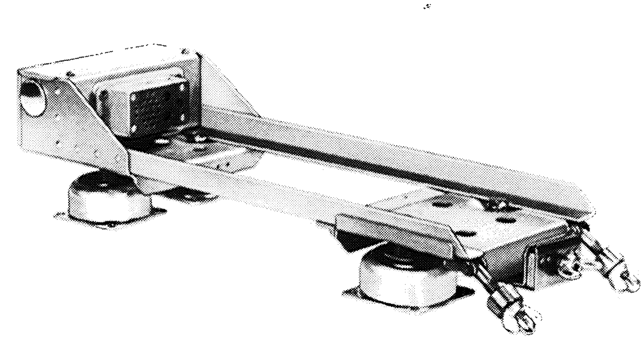

Figure 1-7. Shockmount 350T-1 A29-163-P

Figure 1-8. Antenna Tuner 180L-2 A29-272-P

In addition to the dynamotor, the 416W-1 utilizes two selenium rectifier circuits, one to furnish high voltage for receiver operation and the other to furnish bias for the modulator and power amplifier tubes.

1.6.2 ANTENNA TUNER 180L-2, 180L-3, OR 180L-3A. Refer to figures 1-8 and 1-9.

1.6.2.1 MECHANICAL DESCRIPTION. Antenna Tuner 180L-2, 180L-3, or 180L-3A is enclosed in a single aluminum case, secured to the main mounting frame by machine screws. Power and control cable connections are made through a multicontact fixed plug at the lower right of the mounting frame. The plug extends through a front panel cutaway area, as does the 52-ohm r-f line connection which is adjacent to the left. An swr indicator is also adjacent to the r-f line connector and is viewed through a cutaway area. The antenna connector is located on a ceramic plate at the upper right of the front panel. The entire Antenna Tuner assembly is retained in Shockmount 350D-3 (see figure 1-10). Knurled fasteners at the front of the shockmount tighten clamps into a flange on the base plate of the Antenna Tuner case, bringing pressure against fixed mating flanges at the rear of the base plate and shockmount. Vibration isolators and grounding straps are provided by the shockmount. Attachment or removal of Antenna Tuner is accomplished without the use of special tools.

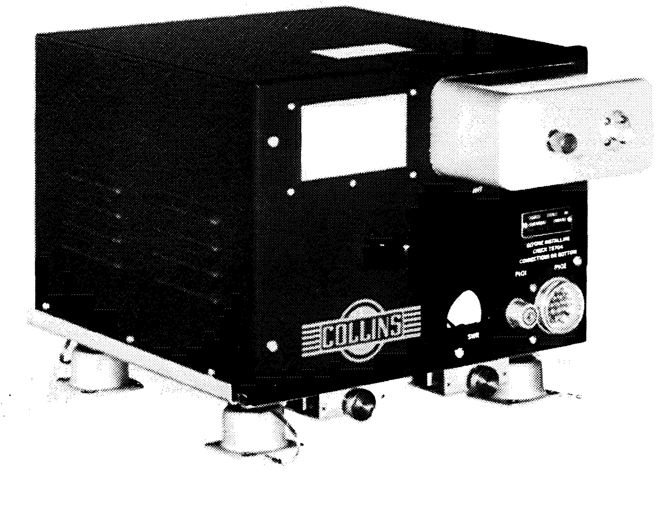

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Figure 1-9. Antenna Tuner 180L-3, 180L-3A

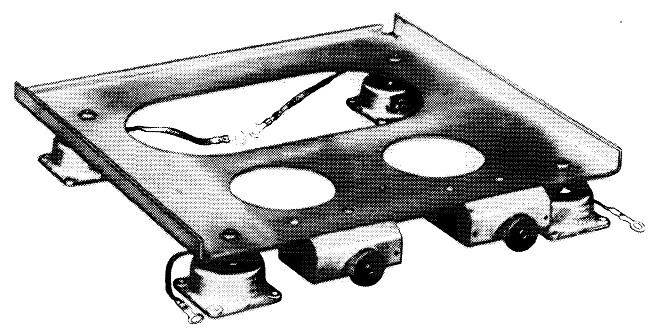

Figure 1-10. Shockmount 350D-3 A29-166-P

1.6.2.2 ELECTRICAL DESCRIPTION. Antenna Tuner 180L-2, 180L-3, or 180L-3A contains components and assemblies capable of producing electrical configurations which will tune out inductive or capacitive reactances encountered in standard fixed-wire aircraft antennas within a general range of 45 to 100 feet in length, 2 to 25 mc in frequency. Antennas of shorter dimensions may not be fully tunable in frequency regions below 4 mc; the limiting factor is the maximum available inductance for series-resonating the reactance of the antenna. Use of extremely short antennas is not recommended since efficiency of the equipment and the associated transmitter will be reduced. The Antenna Tuner also contains apparatus to match the antenna resistance to the 52-ohm output impedance of the transmitter. Phasing and loading operations are completely automatic after an r-f signal is received from the transmitter. The control circuits consist of two discriminators which determine the course of action to follow in phasing and loading the antenna circuit, two servo amplifiers to build up information received from the discriminators, and suitable relays and switches to control the phasing system motors. The Antenna Tuner receives its power from the primary power source (27.5 volts), a B+ source of 400 or 250 volts, and 115 volts, 400 cps, from an aircraft source, or from a transmitter power unit.

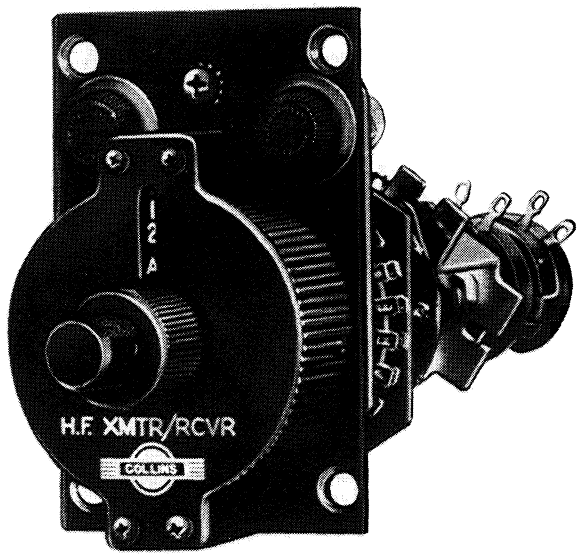

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Figure 1-11. Remote Control Unit 614D-1, 614D-2

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Figure 1-12. Remote Control Unit 614D-3

1.6.2.3 DIFFERENCES IN MODELS. Antenna Tuners 180L-2 and 180L-3 are identical in purpose and design with the exception of an additional antenna transfer relay circuit included in the 180L-3. Antenna Tuner 180L-3 is used where separate receiving facilities are to be used with a common antenna. A separate antenna input connector (AUX REC ANT) for the 618S-1 receiver is provided on the front panel of the Transceiver for direct connection to the antenna (through the 180L-3 transfer relay) if desired. Antenna Tuner 180L-3A is the same as Antenna Tuner 180L-3, except that 180L-3A provides an antenna grounding relay. This relay may be used in a dual installation to ground the unused antenna and the receiver input circuits of Transceiver 618S-1. For more information on Antenna Tuner 180L-3A and dual installation, refer to instruction book, Automatic Antenna Tuner 180L-2/3.

1.6.3 REMOTE CONTROL UNITS 614D-1, 614D-2, 614D-3, AND 614C-2. See figures 1-11 through 1-13.

The 614D-( ) Remote Control Unit provides remote selection of any of the 144 frequency channels in the range of 2.0 to 25.0 mc. Frequencies are selected on the basis of previous channel assignment; that is, A1, A2, A3, . . . A24, B1, B2, . . . B24, etc. Two concentric knobs are used to set the desired channel into the vertical window. The large outer knob is used to select the proper numeral, and a smaller inner knob is used to select the proper letter. These channel assignments correlate with the crystal mounting positions of the r-f crystal oscillator unit. The 614D-( ) is designed according to ARINC specification 524, and wire-saving techniques are employed.

A volume control and on-off switch are available as accessory kits. (Refer to table 2-4.) The 614D-( ) Remote Control Unit is illuminated internally. Two lamps, replaceable from the front panel, illuminate the vertical window.

The 614D-1 is used where it is desired to have the band-selector information wired directly into the r-f crystal oscillator unit. In this case, switch S416 is wired for proper band-selector operation. (Refer to paragraph 2.4.1.1.) The 614D-2 is used when it is desired to have the band-selector information available at the remote control position. In this instance, the wiring information for the band-selector circuit is contained within the Remote Control Unit.

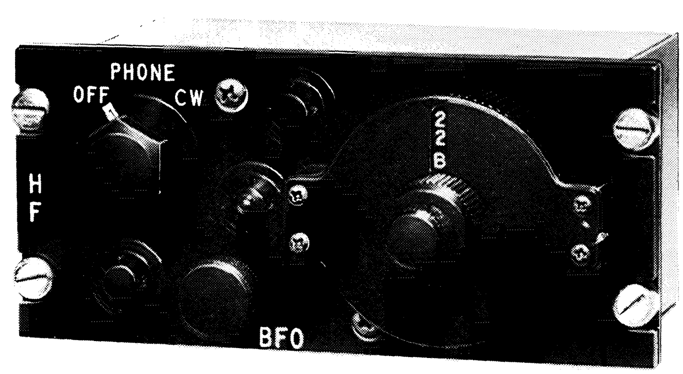

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Figure 1-13. Remote Control Unit 614C-2

The 614D-3 is electrically identical to the 614D-2 in its method of frequency selection. The 614D-3 differs in that it contains an extra switch, S102, which performs two functions in a 618S-1 Transceiver installation. The front section of S102 disables the 180L-( ) Antenna Tuner and breaks the transmitter keying circuit in the 618S-1 so that transmission is impossible on certain predetermined channels. The rear section of S102 automatically activates a relay in the 180L-( ) which places a shunt capacitor in Antenna Tuner circuitry. This shortens the time required for tuneup on predetermined frequencies selected upon installation in the aircraft. Refer to the instruction book for the 614D-3 Remote Control Unit (Collins part no. 520 5346 00) for complete information on this unit.

Remote Control Unit 614C-2 is the most complete of the four units discussed. Controls made available on the 614C-2 include the following: frequency selector, receiver sensitivity, function selector, and beat frequency oscillator control. Included, in addition, are two panel lamps and a tuning indicator light. The method of frequency selection employed in the 614C-2 Remote Control Unit is identical to that of the 614D-2 and 614D-3 Remote Control Units. Refer to figure 1-13.

1.7 TECHNICAL DATA.

1.7.1 GENERAL.

1. Frequency Range: 2.0 to 25.0 mc.

2. Number of Channels: Up to 144.

3. Type of Frequency Control: Quartz Crystal CR-18/U. Only one crystal required for both transmitting and receiving. Crossband operation possible only by changing frequency selection control.

4. Frequency Change Method: Autopositioner* type remotely controlled switching mechanism. Automatic resonating of exciter, power amplifier, and antenna matching networks. Frequency selector system in accordance with ARINC characteristic no. 524.

5. Size: C1-D case size per RTCA paper 46-57/EC-14, as amended by Paper 44-47/EC-28.

6. Weight: 64 pounds including shockmount.
55 pounds excluding shockmount.

1.7.2 TRANSMITTER SECTION.

1. R-F Power Output: 100 watts minimum from 2.0 mc to 14.2495 mc and 90 watts minimum from 14.25 mc to 25.0 mc.

2. R-F Output Impedance: 52 ohms.

3. Types of Emission: A-1 (CW Telegraphy).
A-3 (AM Radiotelephony).

4. Modulation Capacity: 95%.

5. Altitude Range: Full power up to 50,000 ft.

6. Audio Characteristics:

a. Input: 100-ohm input from standard aircraft microphone., at 0.25 volt rms.

b. Speech Clipping: Up to 15 db.

c. Frequency Response: +1.5, -3.5 db from 300 to 3500 cps.

d. Distortion: Less than 10% at 60% modulation.

e. Frequency Stability: ±0.007%.

7. Channeling Time: 8 seconds maximum, excluding 180L-( ).

8. Spurious Radiation: The strength of any signal other than the desired frequency or its second harmonic will be at least 45 db below the desired frequency. The second harmonic will be at least 35 db below the desired frequency. (Additional attenuation is provided by associated antenna coupler.)

9. Sidetone: Developed by rectification of the carrier for voice operation. Keyed 400 cps audio for monitoring of CW transmissions. Up to 20 mw available from sidetone output into 300-ohm load or may be fed through receiver audio stages.

10. Keying: Break-in operation up to 30 words per minute using a common antenna for transmitting and receiving.

1.7.3 RECEIVER SECTION.

1. Sensitivity: 5 uv maximum for 6 db signal plus noise-to-noise ratio with standard test signal modulated 30% at 1000 cps, or for 10 db signal plus noise-to-noise ratio on CW reception.

2. Sensitivity Control: 60 db range of control with 5000 ohm external control.

3. AVC: Maximum output variation of 3.5 db for signal input of 10 to 100,000 microvolts. No overload below 1-volt signal input.

4. Selectivity: 5.5 kc minimum, 6 db down; 14 kc maximum, 60 db down.

5. I-F and Image Rejection: 80 db minimum.

6. Audio Ouptut:

a. Power: 300 mw into 300-ohm load.

b. Distortion: ±10% maximum.

c. Response: 3.5 db from 300 to 2500 cps. Not more than 10 db at 3000 cps.

* Registered in U.S. Patent Office

7. Noise Limiting: Series type carrier biased peak noise limiter.

8. CW Reception: Remote BFO control with ±2000 cps minimum, ±4000 cps maximum control range.

1.8 TUBE COMPLEMENT.

A list of tubes, crystal diodes, and indicator lamps required by the 618S-1 and 618S-4 Transceiver, and their system components is provided by table 1-3.

TABLE 1-3. TYPES OF TUBES, CRYSTAL DIODES, AND INDICATOR LAMPS

SYMBOL	TYPE	DESCRIPTION	FUNCTION
Transceiver 618S-1 and 618S-4, R-F Crystal Oscillator			
V401	5654	Pentode	Oscillator
Transceiver 618S-1 and 618S-4, Tuning Servo Amplifier			
V601	5751	Dual Triode	Amplifier
V602	5686	Pentode	Amplifier
Transceiver 618S-1 and 618S-4, Relay Assembly			
V801	OA2	Diode, Gas	Voltage Regulator
Transceiver 618S-1, 250 Kc I-F Amplifier			
V901	5749	Pentode	Amplifier
V902	5749	Pentode	Amplifier
V903	5749	Pentode	Amplifier-Mixer
V904	5726	Dual Diode	AVC - Detector
V905	5726	Dual Diode	AVC - Noise Limiter
Transceiver 618S-4, 250 Kc I-F Amplifier with Squelch and Selcal			
V901	5749	Pentode	Amplifier
V902	5749	Pentode	Amplifier
V903	5749	Pentode	Amplifier
V904	5751	Dual Triode	Detector - Amplifier
V905	5751	Dual Triode	Amplifier - Impedance Match
CR901	HD6007	Silicon Diode	AVC Detector
CR902	HD6007	Silicon Diode	AVC Gate
CR903	HD6007	Silicon Diode	Squelch Diode
CR904	HD6007	Silicon Diode	Squelch Diode
CR905	HD6007	Silicon Diode	Noise Limiter Diode
Transceiver 618S-1 and 618S-4, R-F Tuner			
V1001	5654	Pentode	Discriminator
V1002	5749	Pentode	I-F Amplifier
V1003	5750	Pentagrid	2nd Transmitter Mixer
V1004	5750	Pentagrid	1st Transmitter Mixer
V1005	5750	Pentagrid	1st Receiver Mixer
V1006	5750	Pentagrid	2nd Receiver Mixer
V1007	5654	Pentode	Multiplier
V1008	5749	Pentode	1st R-F Amplifier
V1009	5749	Pentode	2nd R-F Amplifier
V1010	5686	Pentode	Driver
V1011	5686	Pentode	Driver

TABLE 1-3. TYPES OF TUBES, CRYSTAL DIODES, AND INDICATOR LAMPS (Cont)

SYMBOL	TYPE	DESCRIPTION	FUNCTION
Transceiver 618S-1 and 618S-4, R-F Tuner (Cont)			
CR1001	1N198	Germanium Crystal	Discriminator
CR1002	1N198	Germanium Crystal	Discriminator
CR1003	1N198	Germanium Crystal	Discriminator
CR1004	1N198	Germanium Crystal	Discriminator
CR1005	1N198	Germanium Crystal	Discriminator
CR1006	1N458	Germanium Crystal	AVC Rectifier
Transceiver 618S-1 and 618S-4, 250 Kc Oscillator			
V1201	5749	Pentode	Oscillator
V1202	5749	Pentode	BFO
CR1201	1N137A	Silicon Crystals	BFO Rectifier
Transceiver 618S-1 and 618S-4, A-F Amplifier			
V1301	5814	Dual Triode	Audio Amplifier
V1302	5686	Pentode	Audio Amplifier
Transceiver 618S-1 and 618S-4, Modulator			
V1401	5751	Dual Triode	Amplifier
V1402	5726	Dual Diode	Clipper
V1403	5814	Dual Triode	Driver
V1404	6159	Pentode	Modulator
V1405	6159	Pentode	Modulator
Transceiver 618S-1 and 618S-4, Power Amplifier			
V1501	6159	Pentode	Amplifier
V1502	6159	Pentode	Amplifier
V1503	6159	Pentode	Amplifier
CR1501	1N198	Crystal Diode	Discriminator
CR1502	1N198	Crystal Diode	Discriminator
CR1503	1N198	Crystal Diode	Sidetone Rectifier
Remote Control Unit 614D-1, 614D-2			
I2301	T-1-3/4	Lamp	Panel Lighting
I2302	T-1-3/4	Lamp	Panel Lighting
Remote Control Unit 614D-3			
I101	T-1-3/4	Lamp	Panel Lighting
I102	T-1-3/4	Lamp	Panel Lighting
Remote Control Unit 614C-2			
I2601	T-1-3/4	Lamp	Panel Lighting
I2602	T-1-3/4	Lamp	Panel Lighting
I2603	T-1-3/4	Lamp	Tuning Indicator

1.9 POWER REQUIREMENTS.

1.9.1 VOLTAGE REQUIREMENTS.

1. D-C Supply Voltage: 27.5 volts.
2. A-C Supply Voltage: 115 volts, 380-420 cps, single phase.
   115 volts, 320-1000 cps, single phase.

1.9.2 CURRENT REQUIREMENTS AT SPECIFIED RATED VOLTAGE.

1. Power drawn from 115 v a-c, 380-420 cps line: 30 watts.

2. Power drawn from 115 v a-c, 320-1000 cps line: 150 watts.

3. Normal operating current on 27.5 v d-c line, PHONE position, 95% modulation: 30 amperes.

4. Standby current on 27.5 v d-c line: 6 amperes.

NOTE

A regulated 115 volts, 380-420 cps may be used throughout the entire equipment if desired.

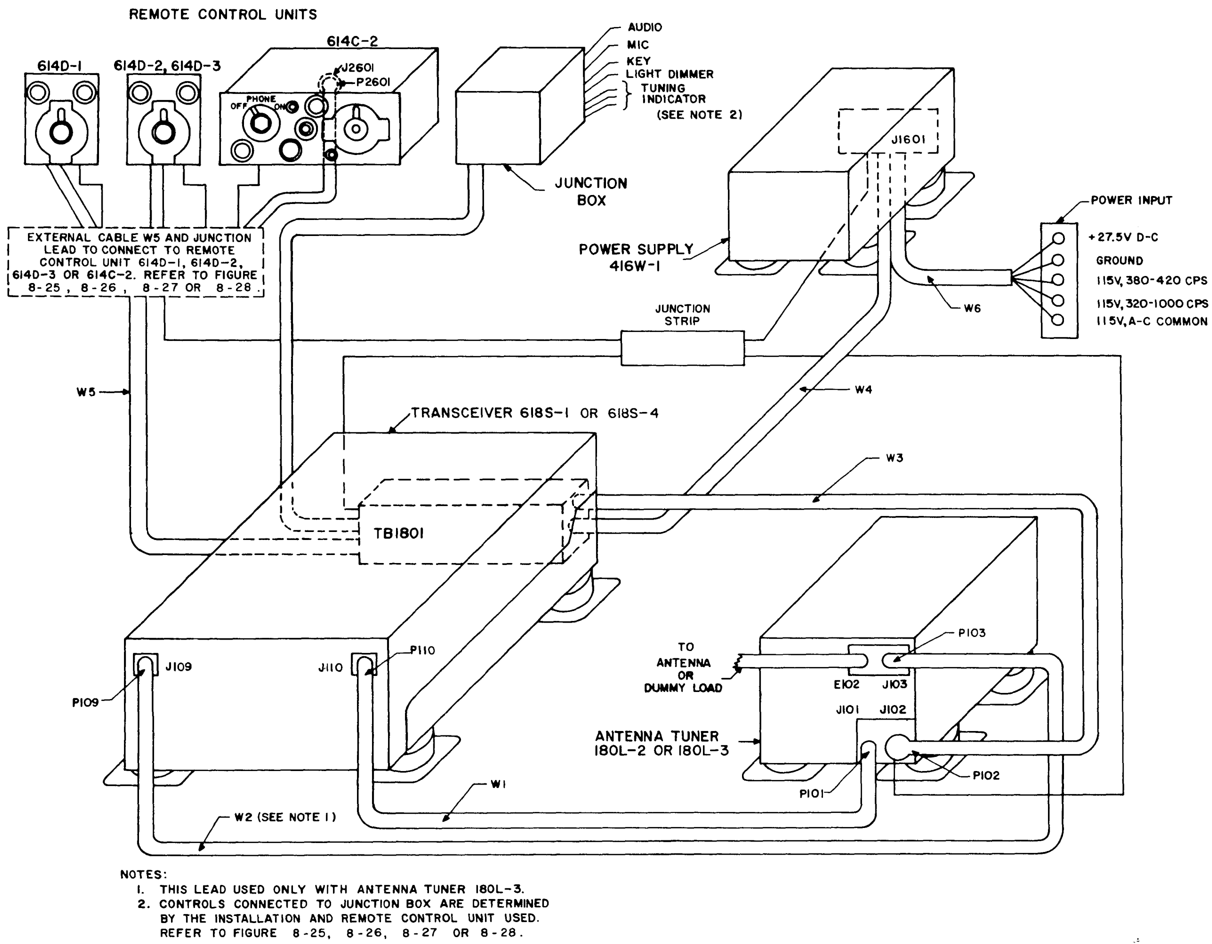

Figure 2-1. Transceiver 618S-1, System Cabling

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SECTION II
INSTALLATION

2.1 UNPACKING AND INSPECTING THE EQUIPMENT.

Carefully unpack the equipment. Inspect each component for evidence of damage during shipment. Check mechanical operation by rotating control knobs on control units, and inspect the components for broken panel glass. Remove the components from their cases, and determine that all tubes are in proper position. All claims for damage in shipment must be filed promptly with the transportation company. If claims for damage are to be filed, the original packing cases and material should be preserved.

2.1.1 VISUAL INSPECTION.

2.1.1.1 TRANSCEIVER 618S-1 AND 618S-4. Inspect the 618S-1 and 618S-4 according to the following steps of procedure:

a. Rotate the two Dzus fasteners located at the rear of the component, and pull the chassis from the cover.

b. Inspect all tubes for proper seating in their sockets, and check the tube shields for mechanical security.

c. Inspect the redheaded captive screws of each subassembly for tightness.

d. Inspect mechanical parts such as gears and rollers for evidence of damage.

e. Remove the front panel cover by removing four screws.

f. Inspect the main chassis and front panel units for dirt, metal scraps, or condensation.

g. Inspect the roller coil (E1513), and adjust if necessary. Refer to paragraph 6.7.1.2c.

h. Replace the front panel cover and the main chassis cover.

2.1.1.2 POWER SUPPLY 416W-1. Inspect the 416W-1 Power Supply for the following:

a. Remove the bottom plate from Power Supply 416W-1. The bottom plate is secured by four screws.

b. Inspect for loose or broken parts, dirt, metal scraps, and condensation.

c. Replace the bottom plate.

2.1.1.3 ANTENNA TUNER 180L-2, 180L-3, OR 180L-3A. Inspect Antenna Tuner 180L-2, 180L-3, or 180L-3A for the following:

a. Loosen the five Phillips head retaining screws on the front panel.

b. Remove the main chassis assembly of Antenna Tuner 180L-2, 180L-3, or 180L-3A from the dust cover by removing the six Phillips head retaining screws (three on each side).

c. Inspect to see that tubes and plug-in relays are seated fully in the proper sockets. Tube shields should be in place.

d. Inspect to see that the small roller follower on coil T301 remains on the coil winding when the coil is slowly rotated manually between the mechanical stops.

e. Replace the dust cover and the front panel.

2.1.1.4 REMOTE CONTROL UNITS 614D-1, 614D-2, 614D-3, OR 614C-2. Inspect Remote Control Units for the following:

a. Remove the rear cover of the Remote Control Unit 614C-2 by rotating the two Dzus fasteners.

b. Inspect Remote Control Units for loose or broken parts, dirt, metal scraps, and condensation.

c. Operate all controls and check mechanical operation.

d. Replace the rear cover of the 614C-2 Remote Control Unit.

2.2 PREINSTALLATION BENCH TEST.

A test bench should be provided to accommodate the components to be tested and the various test instruments. The cabling between components should simulate that of an actual aircraft and should be in accordance with figures 2-1 and 8-25 through 8-28, depending on which Remote Control Unit is used. Jacks should be included in the bench wiring for connecting the microphone and headset when needed. For aural monitoring, the monitor may be connected to terminal b of P2601/J2601 when Remote Control 614C-2 is used or to terminal 43 of TB1801 when Remote Control Units 614D-( ) are used. When monitoring with headphones connected to the PHONE jack on Transceiver 618S-1, the volume is not variable. The power source should be connected into the test

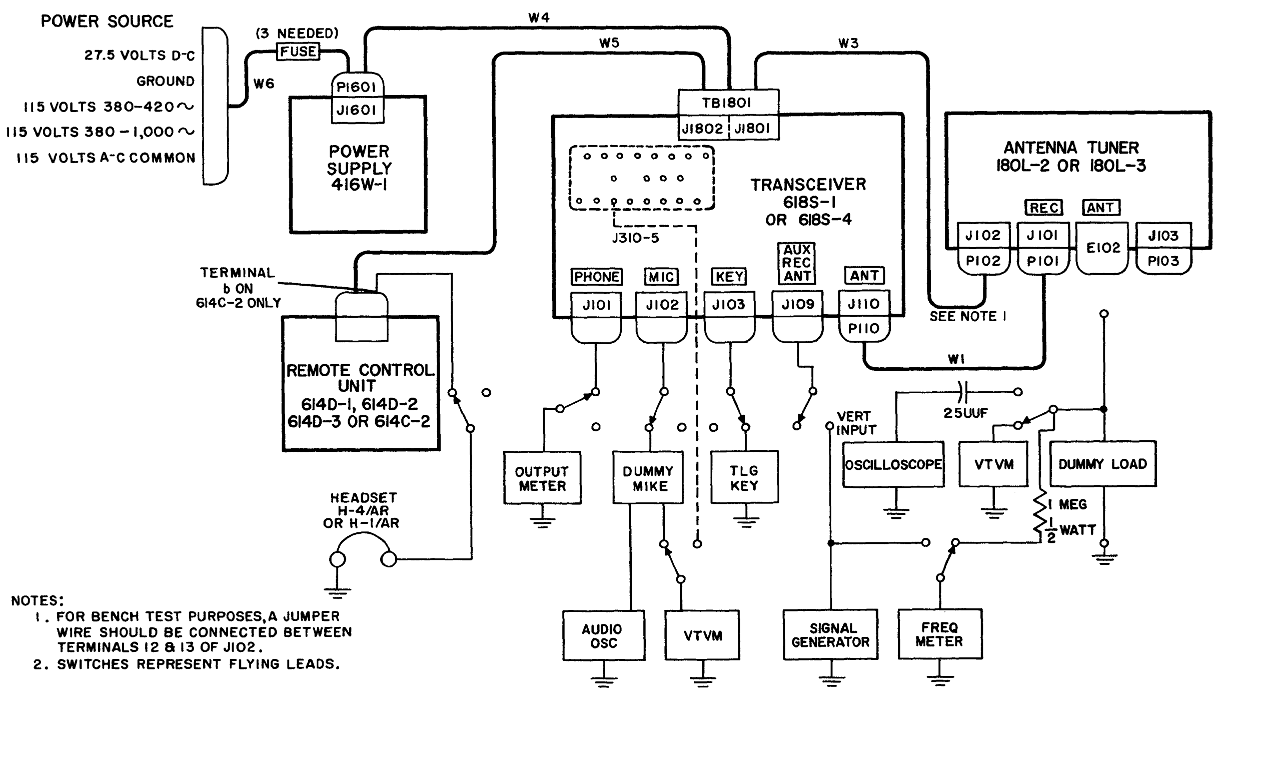


Figure 2-2. Transceiver 618S-1, Bench Test Setup

bench wiring and should be protected by suitable fuses or circuit breakers. A control panel should be provided which simulates the particular installation for mounting of required controls which may or may not be a part of the particular control unit in use.

2.2.1 CONNECTIONS.

Connect all components to be tested to a test bench harness which is wired for use with one of the Remote Control Units. A typical test bench setup for Transceiver 618S-1 and its associated system components is illustrated by block diagram in figure 2-2. Table 5-1 lists test equipment required for testing of Transceiver 618S-1. Perform the following operations:

a. Connect the dummy load and vtvm to E102 of the Antenna Tuner. If the Antenna Tuner is not used, the dummy load and vtvm should be connected to J110 of Transceiver 618S-1. Adjust the vtvm to the 300-volt a-c range.

b. Connect the frequency meter to a 1-megohm 1/2-watt resistor, and connect the 1-megohm resistor to E102. Ground the other lead of the frequency meter.

c. Connect the output meter between J101 and ground.

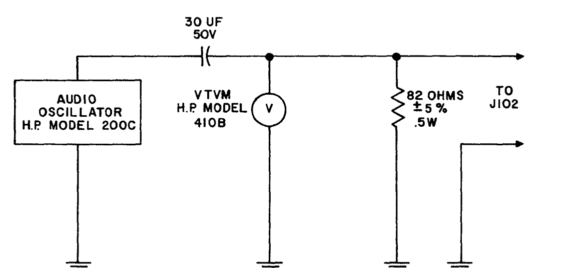


Figure 2-3. Dummy Microphone Circuit, Schematic Diagram

d. Connect the dummy microphone, audio oscillator, and vtvm between J102 and ground, as illustrated in figure 2-2.

e. Connect a telegraph key to J103.

f. Complete cabling to components as shown in figure 2-1 and 2-2 as required for the particular installation. (Refer to figures 8-25 through 8-28.)

2.2.2 FREQUENCY SELECTION TESTS.

Perform the following operations:

a. Connect the ten test crystals to the r-f crystal oscillator assembly, and remove all other crystals. Refer to table 2-1A or 2-1B, depending on the control unit used, for crystal placement.

b. Connect the dummy load, vtvm, the 1-megohm resistor, and frequency meter to E102 as illustrated in figure 2-2. All other test equipment should be disconnected at this time.

c. Press the RESET switches of Power Supply 416W-1, and operate the PHONE-CW switch on the control panel or the OFF-PHONE-CW switch of Remote Control Unit 614C-2 to the PHONE position. Allow at least ten minutes for warmup.

d. Operate the channel selector switches to each position listed in table 2-1 for the particular Remote Control Unit in use, key transmitter, and observe output frequencies as indicated on the frequency meter. Frequencies should not vary over 0.007% of those listed in tables 2-1A and 2-1B.

TABLE 2-1A. TEST CRYSTAL POSITIONS AND OPERATING FREQUENCIES FOR USE WITH REMOTE CONTROL 614D-1

CRYSTAL FREQ	BAND 1		BAND 2		BAND 3		BAND 4	
	CRYSTAL POSITION	TEST FREQ	CRYSTAL POSITION *	TEST FREQ	CRYSTAL POSITION *	TEST FREQ	CRYSTAL POSITION *	TEST FREQ
1.75	A1	2.00	A7	3.75	A13	7.25	A19	14.25
2.00	A2	2.25	A8	4.25	A14	8.25	A20	16.25
2.25	A3	2.50	A9	4.75	A15	9.25	A21	18.25
2.50	A4	2.75	A10	5.25	A16	10.25	A22	20.25
2.75	A5	3.00	A11	5.75	A17	11.25	A23	22.25
3.00	A6	3.25	A12	6.25	A18	12.25	A24	24.25
3.25	B1	3.50	B7	6.75	B13	13.25	B19	
3.50	B2	3.75	B8	7.25	B14	14.25	B20	
3.09375	B3		B9		B15		B21	25.00
2.05	B4	2.30	B10	4.35	B16	8.25	B22	16.65

*Crystals used in band 1 crystal position are to be reinserted consecutively in bands 2 through 4 when it is desirable to select channels in these bands.

TABLE 2-1B. TEST CRYSTAL POSITIONS AND OPERATING FREQUENCIES FOR USE WITH REMOTE CONTROL UNIT 614D-2, 614D-3, OR 614C-2

CRYSTAL FREQ	BAND 1		BAND 2		BAND 3		BAND 4	
	CRYSTAL POSITION	TEST FREQ	CRYSTAL POSITION	TEST FREQ	CRYSTAL POSITION	TEST FREQ	CRYSTAL POSITION	TEST FREQ
1.75	A1	2.0	G1	3.75	*M1	7.25	U1	14.25
2.00	A2	2.25	G2	4.25	M2	8.25	U2	16.25

TABLE 2-1B. TEST CRYSTAL POSITIONS AND OPERATING FREQUENCIES FOR USE WITH REMOTE CONTROL UNIT 614D-2, 614D-3, OR 614C-2 (Cont)

CRYSTAL FREQ	BAND 1		BAND 2		BAND 3		BAND 4	
	CRYSTAL POSITION	TEST FREQ	CRYSTAL POSITION	TEST FREQ	CRYSTAL POSITION	TEST FREQ	CRYSTAL POSITION	TEST FREQ
2.25	A3	2.50	G3	4.75	M3	9.25	U3	18.25
2.50	A4	2.75	G4	5.25	M4	10.25	U4	20.25
2.75	A5	3.00	G5	5.75	M5	11.25	U5	22.25
3.00	A6	3.25	G6	6.25	M6	12.25	U6	24.25
3.25	A7	3.50	G7	6.75	M7	13.25	U7	
3.50	A8	3.75	G8	7.25	M8	14.25	U8	
3.09375	A9		G9		M9		U9	25.00
2.05	A10	2.30	G10	4.35	M10	8.25	U10	16.65

*In band 3 select N1, N2, N3, etc., when using 614D-3 Remote Control Unit.

e. Check the time interval required for the tuning cycle to complete when operating from the 2.0- to 25.0-megacycle positions. Transceiver 618S-1 should complete its tuning cycle in eight seconds or less. Antenna Tuner 180L-( ) should complete the tuning cycle in 22 seconds or less.

NOTE

Do not attempt to channel the 618S-1 more than once a minute. If channeled too frequently, a time-delay relay (K711) in the 180L-( ) will heat and prevent the 618S-1 system from completing its tuning cycle. Relay K711 also will operate if the total tuning time, following the centering cycle of the R-F Tuner, exceeds 45 seconds. If relay K711 does operate, wait at least one minute before rechanneling the equipment.

CAUTION

The maximum duty cycle of Antenna Tuner 180L-( ) is five minutes "R-F ON" and five minutes "R-F OFF." To insure reliable operation, do not exceed this duty cycle.

2.2.3 TRANSMITTER TESTS.

2.2.3.1 R-F POWER OUTPUT. Perform the following operations:

a. Remove P110 of cable W1 from J110. Connect the dummy load and the r-f probe of the vtvm from J110 to ground. Remove the 1-megohm resistor and the frequency meter.

b. Connect a telegraph key to J103 on Transceiver 618S-1 or a microphone to J102 on Transceiver 618S-1. All other test equipment should not be connected.

c. Operate the PHONE-CW switch on the control panel or the OFF-PHONE-CW switch of Remote Control Unit 614C-2 to the CW position, and allow at least ten minutes for warmup.

d. Set the channel selection on the 614D-( ) or the 614C-2 to the A1 (2.0 megacycles) position, and allow the 618S-1 to complete its tuning cycle.

e. Depress the telegraph key on microphone push-to-talk button, and observe the indication on the vtvm. The reading should be not less than 71.8 volts a-c, which corresponds to 100 watts power output.

f. Operate the meter selector on the 618S-1 Transceiver to the P.A. PL. position, and observe the indication. Meter should indicate within the red area.

g. Repeat steps e. and f. for all positions and frequencies listed in table 2-2. In each case, the vtvm should indicate as listed in table 2-2.

TABLE 2-2. R-F POWER OUTPUT TESTS

BAND	POSITION OF 614D-1	614D-2 OR 614C-2	614D-3	FREQUENCY (MC)	R-F POWER VOLTS A-C	OUTPUT WATTS
1	A1	A1	A1	2.00	71.8	100
	B2	A8	A8	3.75	71.8	100
2	A7	G1	G1	3.75	71.8	100
	B8	G8	G8	7.25	71.8	100
3	A13	M1	N1	7.25	71.8	100
	B14	M8	N8	14.25	68.2	90
4	A19	U1	U1	14.25	68.2	90
	B21	U9	U9	25.00	68.2	90

2.2.3.2 MODULATION. Perform the following operations:

a. Connect the dummy microphone circuit to J102 on the front panel of Transceiver 618S-1. Refer to figures 2-2 and 2-3.

b. Connect the vtvm and audio oscillator to the dummy microphone as illustrated in figure 2-3. Adjust the audio oscillator to 0.25 volt a-c at 1000 cps.

c. Connect the oscilloscope across the dummy load through a 25-micromicrofarad capacitor, and connect to E102 on the Antenna Tuner. Adjust the oscilloscope for a horizontal sweep capable of reproducing two or three modulated cycles at 1000 cps.

d. Connect a telegraph key to J103 on the front panel of the 618S-1.

e. Operate the PHONE-CW switch on the control panel or the OFF-PHONE-CW switch of Remote Control Unit 614C-2 to the PHONE position, and allow at least ten minutes for warmup.

f. Operate the channel selector to the A1 (2.0 megacycles) position.

g. Key the 618S-1 Transceiver by operating the telegraph key.

h. Adjust the CLIPPING control (R1404 on the bottom of the modulator assembly; accessible on the bottom of the main chassis of the 618S-1) to the maximum clockwise position. Refer to figure 7-37.

i. Adjust the GAIN control (R1403 on the bottom of the modulator assembly; accessible on the bottom of

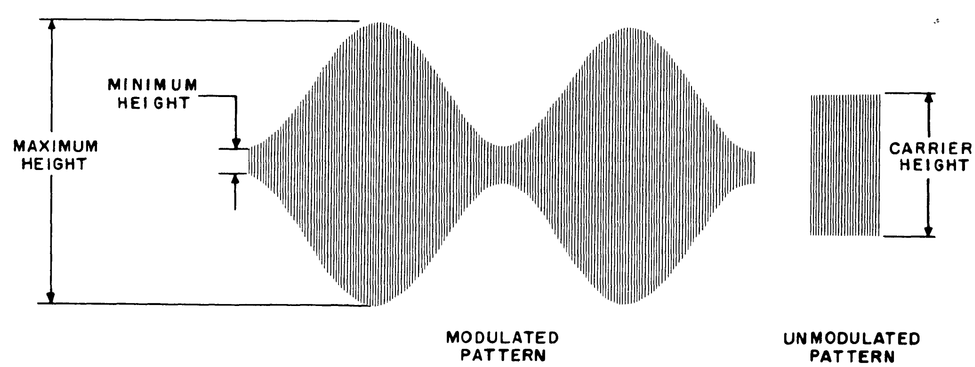


Figure 2-4. Oscilloscope Modulation Pattern

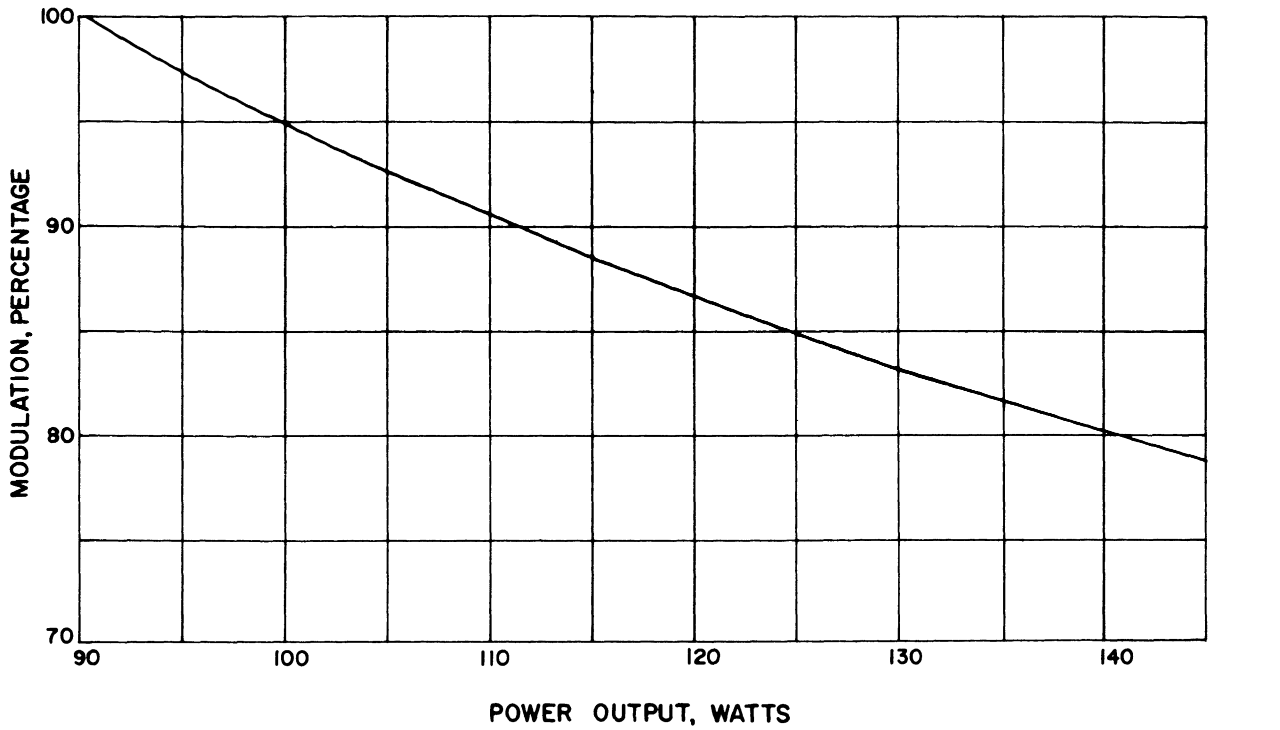


Figure 2-5. Transceiver 618S-1, Modulation Characteristics

the main chassis of the 618S-1) for 95% modulation. Refer to figure 7-37. Use the following formula to calculate the percentage of modulation, and refer to figure 2-4.

$$\% \text{ Modulation} = \frac{\text{Maximum - Minimum}}{2 \times \text{Carrier}} \times 100$$

NOTE

The percentage of modulation obtainable depends upon the r-f power output and therefore upon the band of operation. Refer to figure 2-5 for the modulation characteristics for a varying r-f power output. Examination of figure 2-5 will illustrate that a modulation percentage of 95% is obtainable with 100 watts r-f power output.

j. Adjust the GAIN control for 80% modulation and CLIPPING control for threshold at this modulation point.

k. Increase the output level of the audio oscillator by 12 db. This may be accomplished by increasing the output voltage of the audio oscillator to 1 volt a-c. The waveform, as observed on the oscilloscope, should be clipped at the 80% modulation point.

l. Lock the CLIPPING and GAIN controls in position.

m. Reduce the output level of the audio oscillator to that required for 60% modulation.

n. Vary the frequency of the audio oscillator between 300 and 3500 cps holding the audio input level constant. The modulation percentage should remain between 40% and 70%.

o. Adjust the frequency of the audio oscillator to 5000 cps. The modulation percentage should be not less than 22%.

2.2.3.3 SIDETONE. With the equipment setup as described in the preceding paragraph, perform the following operations:

a. Connect a headset to the PHONE jack (J101) to terminal b of P2601/J2601 of 614C-2 or to terminal

43 of TB1801, and monitor the signal as the level and frequency of the audio oscillator is varied. Signal should be audible.

b. Vary the PHONE SIDETONE control (R106 on the front panel of the 618S-1 Transceiver), and notice if the amplitude of the sidetone signal is variable.

c. With the audio oscillator set for 0.25 volt at 1000 cps, adjust R106 for a comfortable headset level.

d. Operate the OFF-PHONE-CW switch to the CW position, and listen for a 400-cps signal.

e. Vary the CW SIDETONE control (R107 on the front panel of the 618S-1 Transceiver), and notice if the amplitude of the sidetone signal is variable.

f. Adjust R107 for a comfortable headset level.

2.2.4 RECEIVER TESTS.

2.2.4.1 SENSITIVITY. Perform the following operations:

NOTE

To assure reliability of the sensitivity tests outlined in the following steps, all procedures should be performed in a screen room to prevent manmade noise signals from interfering with results.

a. Connect the signal generator to J109 on the front panel of the 618S-1. Adjust for an output of 2.75 megacycles at 1000 microvolts, modulated 30% at 1000 cps. Use the frequency meter to set the signal generator to the correct frequency.

b. Connect the output meter to J101 on the front panel of the 618S-1, and adjust it to the 500-milliwatt range with an internal impedance of 300 ohms.

c. Operate the OFF-PHONE-CW switch to the PHONE position, and allow at least ten minutes for warmup.

d. Operate the channel selector to the A4 (2.75 megacycles) position. Refer to table 2-1.

e. Adjust the R-F Gain and Volume controls for maximum output. The R-F Gain control is furnished as part of an accessory and located concentric to the band-bank selector control on Remote Controls 614D-( ). The Volume and R-F Gain control for 614D-( ) Control Units is located on the control panel. The R-F Gain (Phone) control is a screw driver adjustment at the rear of the 614C-2, and the R-F Gain (CW) and Volume control is the small knob on the 614C-2 front panel.

f. Adjust the AUDIO control (R109 on the front panel of the 618S-1) for an audio power output of 300 milliwatts as read on the output meter.

g. Reduce the output level of the signal generator to 5 microvolts. The output meter should indicate not less than 100 milliwatts.

h. Remove the modulation. The signal-plus-noise to noise ratio should be at least 6 db (modulation-on to modulation-off ratio of 4 to 1 as read on the output meter).

i. Operate the OFF-PHONE-CW switch to the CW position, and remove the modulation.

j. Remove the output meter, and connect a headset to terminal b of P2601/J2601 if 614C-2 is used or to terminal 43 of TB1801 if 614D-( ) is used.

NOTE

When a 300-ohm headset such as the H-1/AR is connected to either the PHONE jack or to terminal b of P2601 on 614C-2, the output meter should be removed from the PHONE jack. The output meter and a low-impedance headset should not be connected across the audio output terminals at the same time or transformer T1301 will be mismatched and the test results will be inaccurate. A high-impedance monitor, such as described in table 5-1, may be used in parallel with the output meter if it is desired to monitor the audio signal during test procedures.

k. Adjust the BFO control on the 614C-2 or on the control panel when using 614D-( ) Remote Control Units for a signal of approximately 1000 cps.

l. Remove the headset, and replace the output meter. Observe the power output indication on the output meter with the signal generator adjusted to 5 microvolts output. The output meter should indicate at least 100 milliwatts.

m. Remove the r-f input signal, and observe the indication on the output meter. The reading should change at least 10 db (indication in the r-f "on" position at least 10 times that in the r-f "off" position).

n. Repeat the sensitivity measurements outlined in steps a. through m. (excluding step f.) for frequencies listed in table 2-3.

TABLE 2-3. RECEIVER SENSITIVITY MEASUREMENTS

BAND	POSITION OF 614D-1	POSITION OF 614D-2 OR 614C-2	POSITION OF 614D-3	CRYSTAL FREQUENCY (MC)	OPERATING FREQUENCY (MC)
1	A1	A1	A1	1.75	2.00
	A4	A4	A4	2.50	2.75
	A6	A6	A6	3.00	3.25
	B2	A8	A8	3.50	3.75
2	A7	G1	G1	1.75	3.75
	A10	G4	G4	2.50	5.25
	A12	G6	G6	3.00	6.25
	B8	G8	G8	3.50	7.25
3	A13	M1	N1	1.75	7.25
	A16	M4	N4	2.50	10.25
	A18	M6	N6	3.00	12.25
	B14	M8	N8	3.50	14.25
4	A19	U1	U1	1.75	14.25
	A22	U4	U4	2.50	20.25
	B21	U9	U9	3.09375	25.00

2.2.4.2 TRANSCEIVER 618S-4, SQUELCH. Perform the following operations:

a. Place Transceiver 618S-4 into the bench test setup. (Refer to paragraph 2.2.1 and figures 2-1 and 2-2.) Connect the audio output meter to PHONE jack (J101). Connect the vtvm to pin 5 of J310 (avc output). Connect the signal generator to the input (J109) of Transceiver 618S-4. Remove all other test equipment.

b. Set Transceiver 618S-4 to 2 megacycles. Adjust the OFF-PHONE-CW switch to PHONE with the Transceiver unkeyed (receive position).

c. Adjust the Squelch Control for zero resistance.

d. Adjust the signal generator to 2 megacycles, 5 microvolts output at 1000 cps modulated 30 percent.

e. Adjust the R-F Gain (Phone) to the point where the value of avc begins to increase.

f. Increase the Squelch Control until the audio output just starts to decrease.

g. Decrease the output of the signal generator to 2.5 microvolts. The audio output should have decreased not less than 20 db.

2.2.4.3 TRANSCEIVER 618S-4, SELCAL. Perform the following operations:

a. Place Transceiver 618S-4 into the bench test setup. (Refer to paragraph 2.2.1 and figures 2-1 and 2-2.) Connect the vtvm to pin 10 of J310 (Selcal output). Connect the signal generator to the input (J109) of Transceiver 618S-4. Remove all other test equipment.

b. Set Transceiver 618S-4 to 2 megacycles. Adjust the OFF-PHONE-CW switch to PHONE with the Transceiver unkeyed (receive position).

c. Adjust the signal generator for 2 megacycles, 5 microvolt output at 1000 cps modulated 30 percent.

d. Measure the selcal output with the vtvm. The output should be 0.6 ±0.15 volt.

2.3 INSTALLATION.

The 618S-1 Transceiver and its associated system components must be mounted in a location convenient to the existing facilities of the aircraft. Every consideration must be given in the location of equipment and the design of installation details to promote operator efficiency, ease of adjustment, and component replacement. No attempt is made in this handbook to present complete installation instructions since the particular type of aircraft involved will determine the installation procedure. A general procedure is outlined in subsequent paragraphs. Figure 2-6 illustrates a typical 618S-1 Transceiver installation.

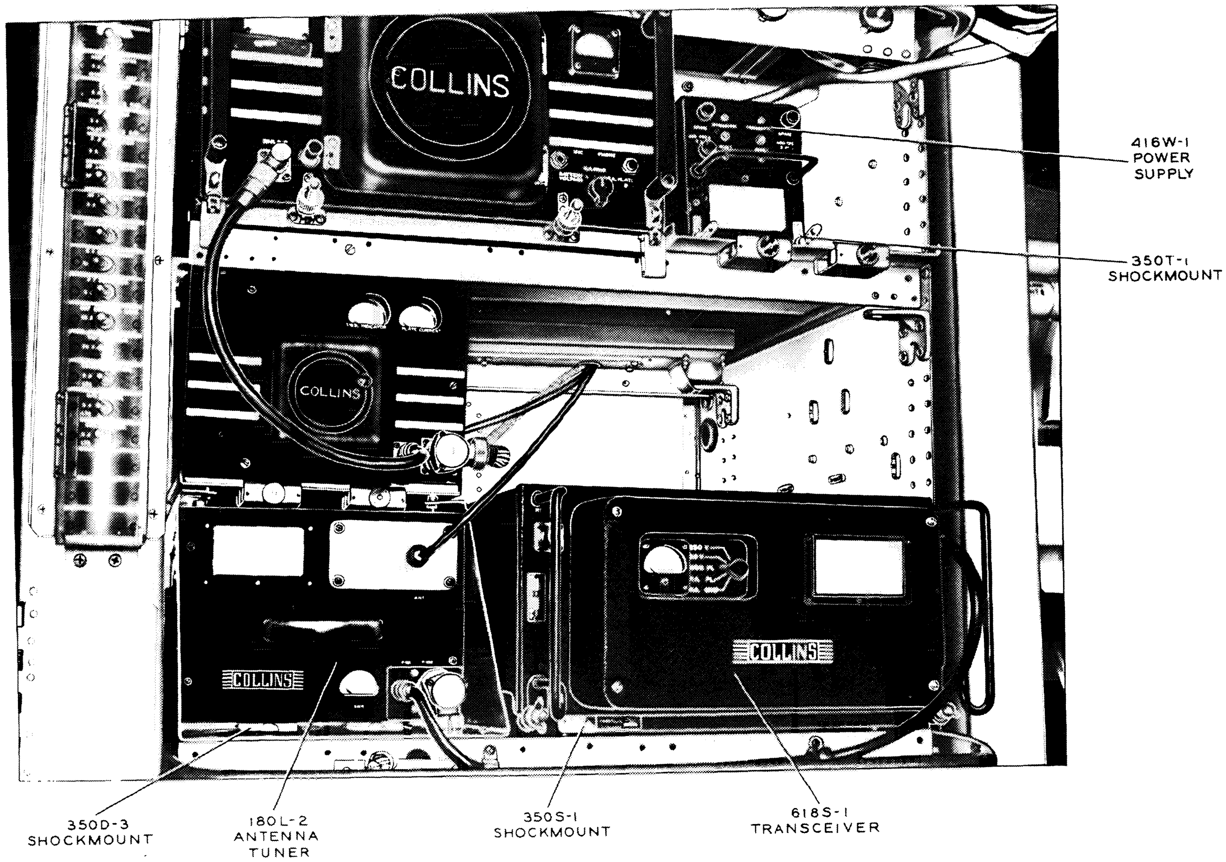


Figure 2-6. Transceiver 618S-1, Typical System Installation

A29-277-P

2.3.1 LOCATION AND MOUNTING OF TRANSCEIVER 618S-1.

2.3.1.1 CHOOSING LOCATION. Transceiver 618S-1 should be located in a position that is reasonably accessible and well ventilated. Adequate clearance for the mounting of the Transceiver on its shockmount must be provided. Access to the front panel is necessary to permit removal of the unit from the shockmount and to permit checking operation of the Transceiver by observation of the meter panel. Two antenna connectors are located on the front panel.

2.3.1.2 MOUNTING. The 618S-1 Transceiver normally is mounted on a Collins type 350S-1 or 350S-3 Shockmount. Figure 2-7 shows the outline and mounting dimensions of the Transceiver mounted on the 350S-( ) Shockmount. Note that all power and control connections are made to terminals located in a filter unit mounted on the rear of the shockmount. The 350S-1 differs from the 350S-3 in the method of filter removal. The filter is removable only from the top in the 350S-1; whereas, it is removable from the top and front in the 350S-3. Therefore, less height is required in a 618S-1 installation using a 350S-3 Shockmount. The 350S-2 and 350S-4 listed as alternate components are rack-type mountings, that is, without the isolating feet. The method of filter removal is again the primary difference in the mountings, the 350S-1 corresponding to the 350S-2 and the 350S-3 to the 350S-4. Refer to figure 2-8 for outline and mounting dimensions of the 350S-2 and 350S-4.

2.3.1.3 MOUNTING SHOCKMOUNT. The shockmount should be mounted to the radio shelf by means of no. 8 screws, nuts, and lock washers. Note that the filter unit is held in place by four screws in the rear of the shockmount. Therefore, the cabling may be connected to the proper terminals with the filter unit removed from the shockmount.

2.3.1.4 INSTALLATION ON SHOCKMOUNT. To install the Transceiver on the shockmount:

a. Loosen the locking mechanisms by rotating the thumbscrews as far as possible in a counterclockwise direction.

b. Place the Transceiver on the shockmount, and push toward the rear making sure that the plugs on the Transceiver mesh properly with the receptacles in the shockmount.

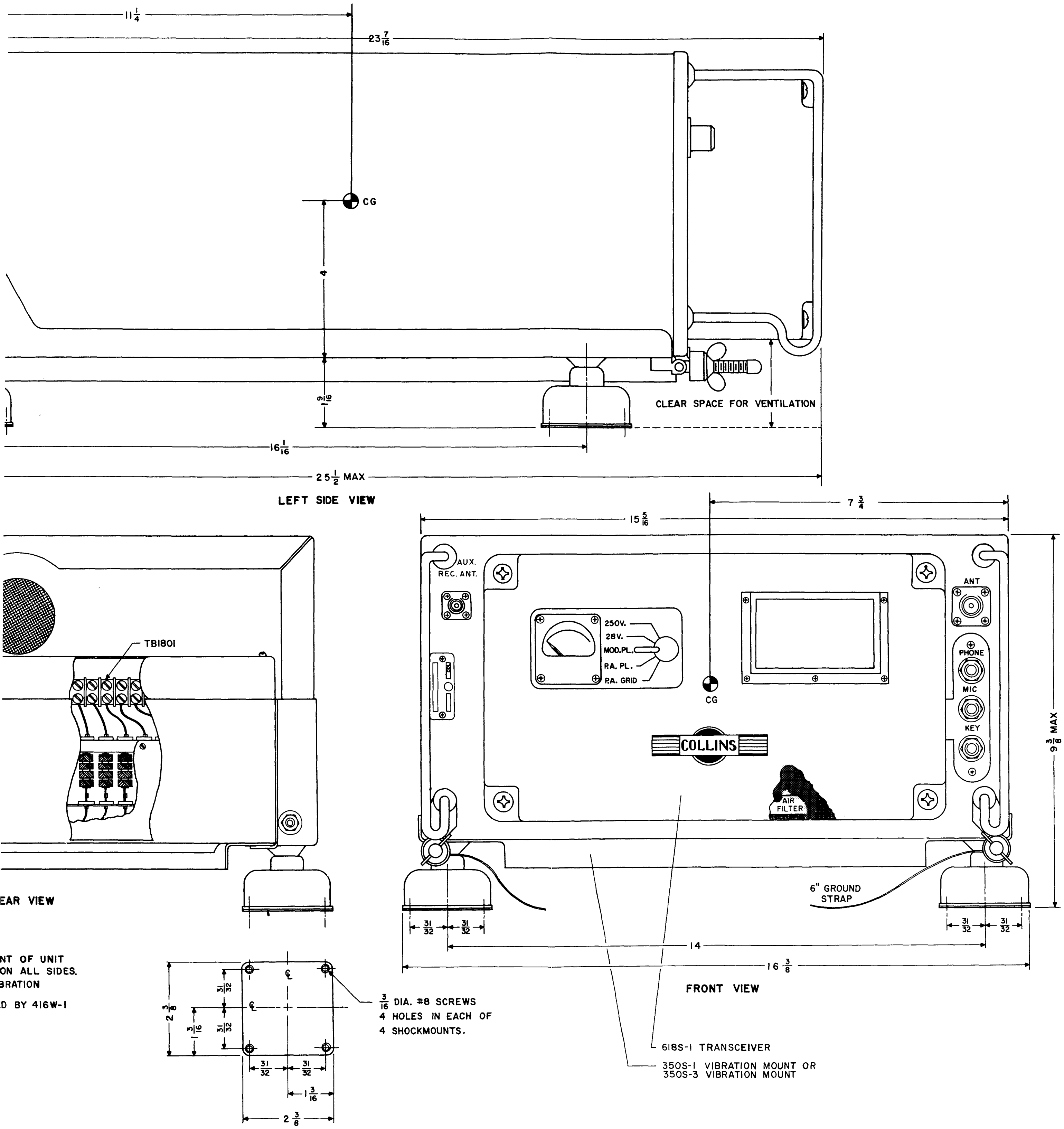
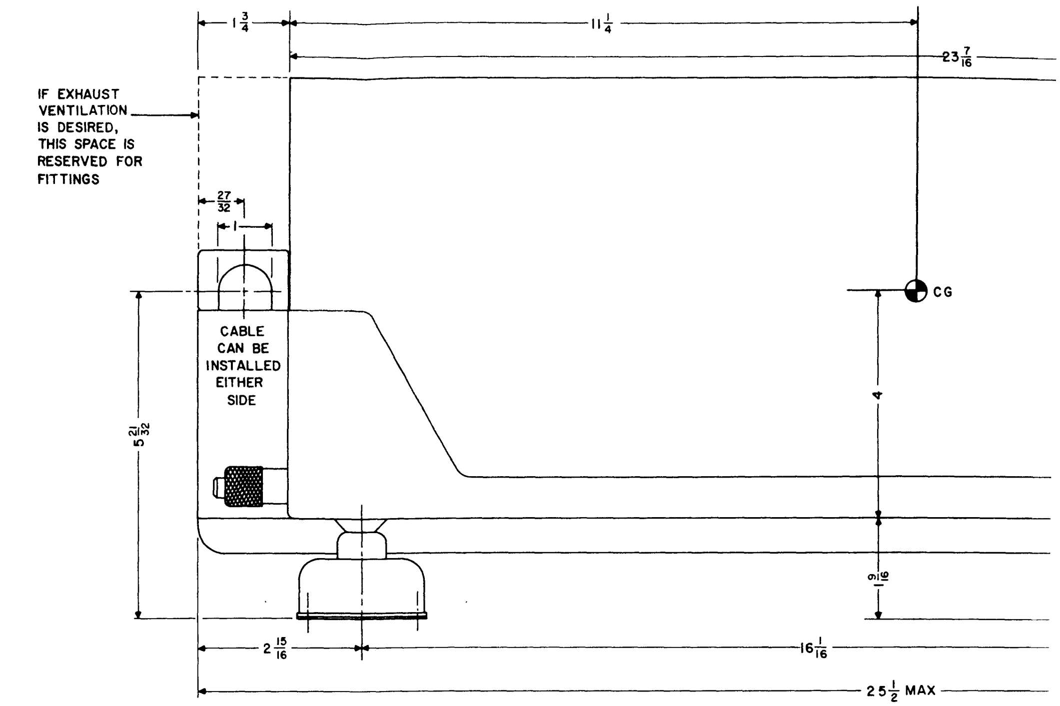
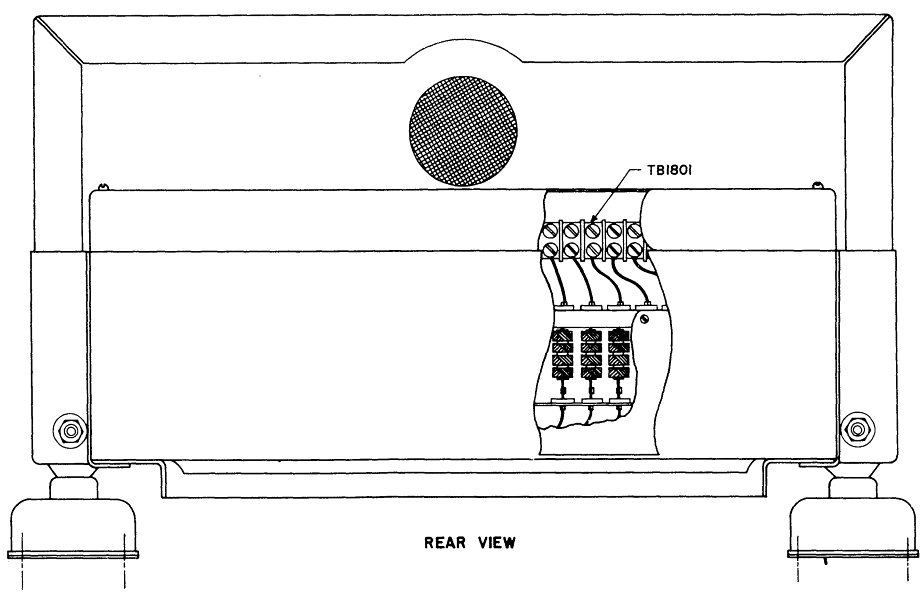
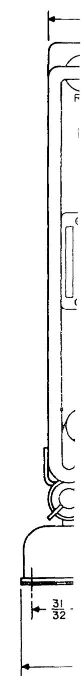


Figure 2-7. Transceiver 618S-1 or 618S-4, Outline and Mounting Dimensions

A29-237-6







NOTES:
1. CLEARANCE FOR FREE MOVEMENT OF UNIT ON VIBRATION MOUNT = $\frac{1}{2}$ INCH ON ALL SIDES.
2. WEIGHT OF UNIT INCLUDING VIBRATION MOUNT = 64 LBS. MAXIMUM.
3. POWER REQUIREMENTS FURNISHED BY 416W-1 POWER SUPPLY.

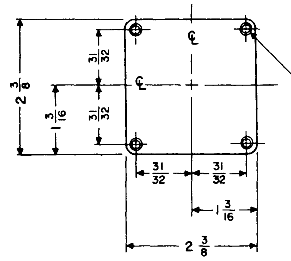
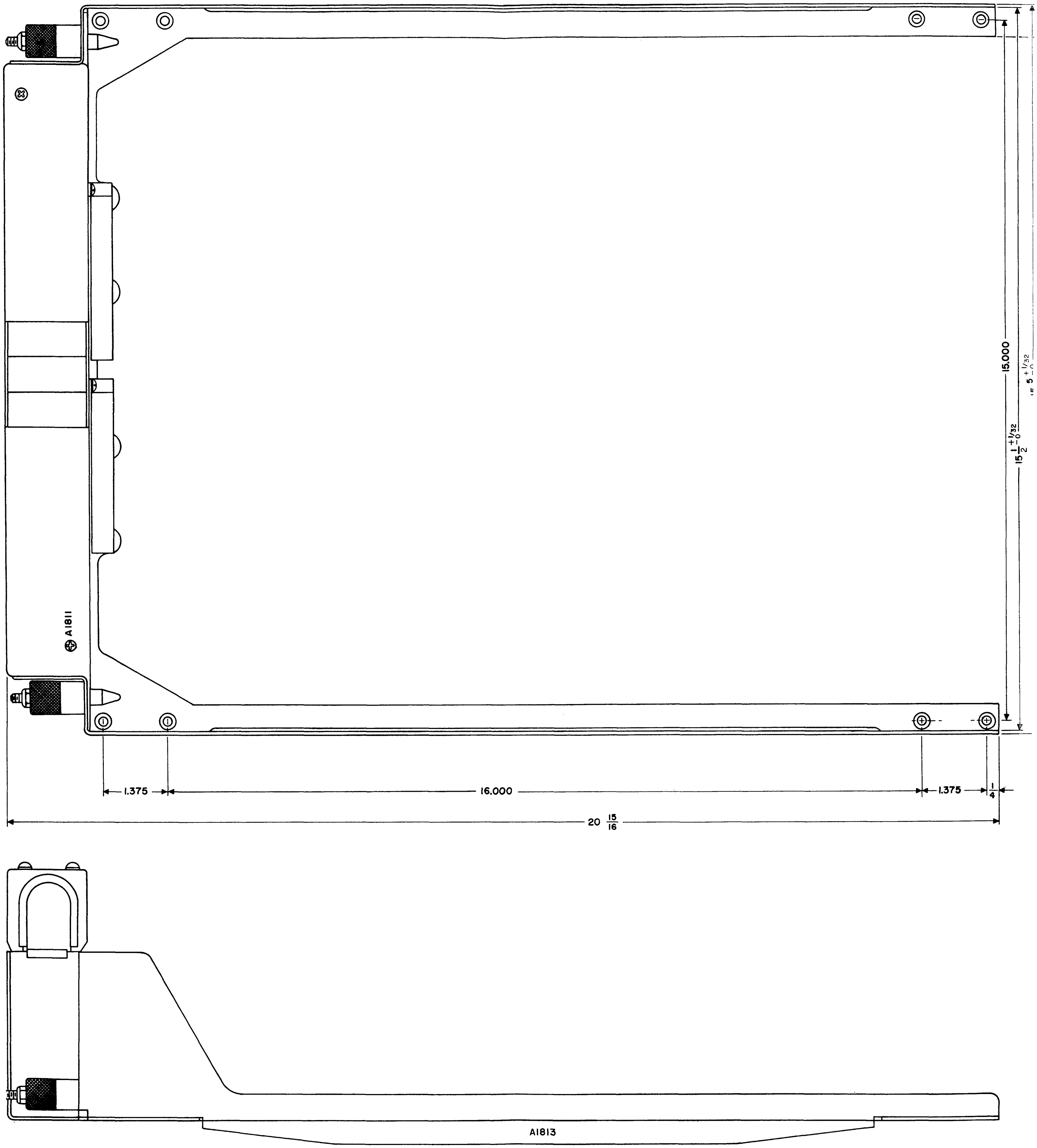
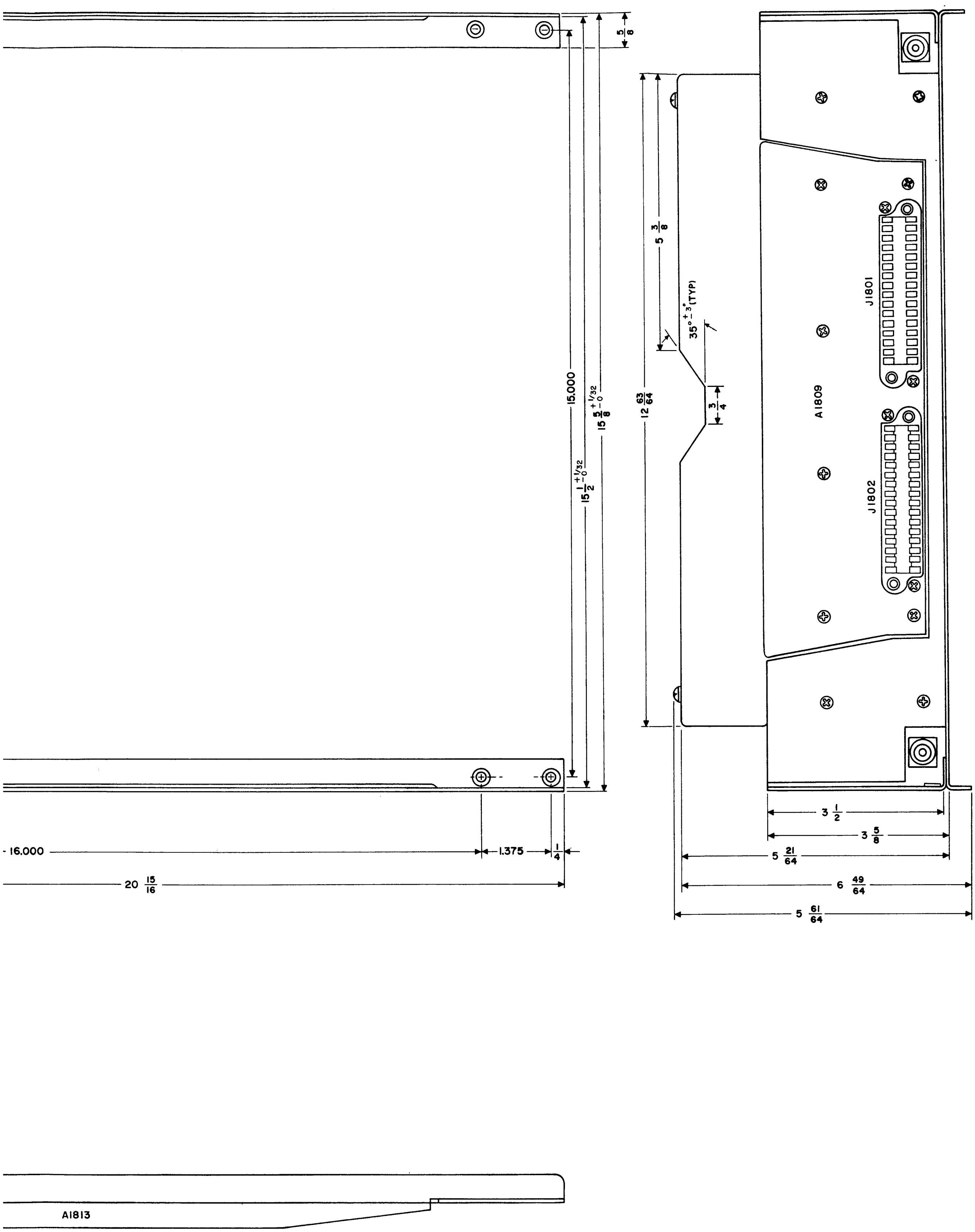


Figure 2-7. Trans



A29-243-5

Figure 2-8. Mounting 350S-2, 350S-4, Outline and Mounting Dimensions



ł, Outline and Mounting Dimensions

c. Engage, tighten, and safety-wire the two hold-down clamps.

2.3.2 LOCATION AND MOUNTING OF POWER SUPPLY.

2.3.2.1 CHOOSING LOCATION. The power supply can be placed at any convenient location that is accessible and reasonably well ventilated. Cabling requirements should be taken into account in choosing the locations since 416W-1 Power Supply provides power to both the Transceiver and Antenna Tuner.

2.3.2.2 MOUNTING. The power supply normally is mounted on a Collins type 350T-1 Shockmount. Figure 2-9 shows the outline and mounting dimensions of the power supply mounted on the shockmount. A rack-type mounting, 350T-3, also is available. The 350T-3 has the same outline and mounting dimensions as the 350T-1.

2.3.2.3 MOUNTING SHOCKMOUNT. The shockmount should be mounted on the radio shelf by means of no. 8 screws, nuts, and lock washers. The grounding straps on the shockmounts should be grounded under the four mounting feet of the shockmount, using one of the no. 8 screws at each mounting foot.

2.3.2.4 INSTALLATION ON SHOCKMOUNT. To install the power supply on the shockmount:

a. Operate the extractor mechanism by rotating the thumbscrew as far as possible in a counterclockwise direction.

b. Place the power supply on the shockmount, and push toward the rear so that the front panel drops into the extractor slot.

c. Rotate the thumbscrew clockwise until the rear connector is fully engaged.

d. Engage, tighten, and safety-wire the hold-down clamps.

NOTE

When removing 416W-1 Power Supply from its shockmount by using the extractor mechanism, be sure that the hold-down clamps are disengaged before rotating the extractor thumbscrew.

2.3.3 LOCATION AND MOUNTING OF ANTENNA TUNER.

2.3.3.1 CHOOSING LOCATION. Since Antenna Tuner 180L-( ) requires no adjustment after installation, it may be mounted some distance from the 618S-1 Transceiver, in a space which is convenient to the antenna feedthrough insulator, or mast, and will allow easy removal of the unit from the mounting. Clearance of four inches from all surfaces and areas is recommended for the antenna connection. Refer to figures 2-10 and 2-11 for outline and mounting dimensions of the Antenna Tuners.

2.3.3.2 MOUNTING. Four no. 6 screws, nuts, and lock washers are used to attach each foot of Shockmount 350D-3 to the aircraft structure. Grounding straps should be attached at the isolator feet, and the structural surface spot-faced to insure good electrical contact.

2.3.3.3 SECURING EQUIPMENT. Place Antenna Tuner 180L-( ) within the side rails of Shockmount 350D-3, and push it to the rear to engage the fixed flanges on the base of equipment and shockmount. Place the two clamps below the front panel so they engage the fixed flanges at that position. Tighten the knurled fasteners on both clamps. Secure the knurled fasteners with safety wire through holes in the clamps and fasteners.

2.3.4 MOUNTING OF CONTROL UNIT.

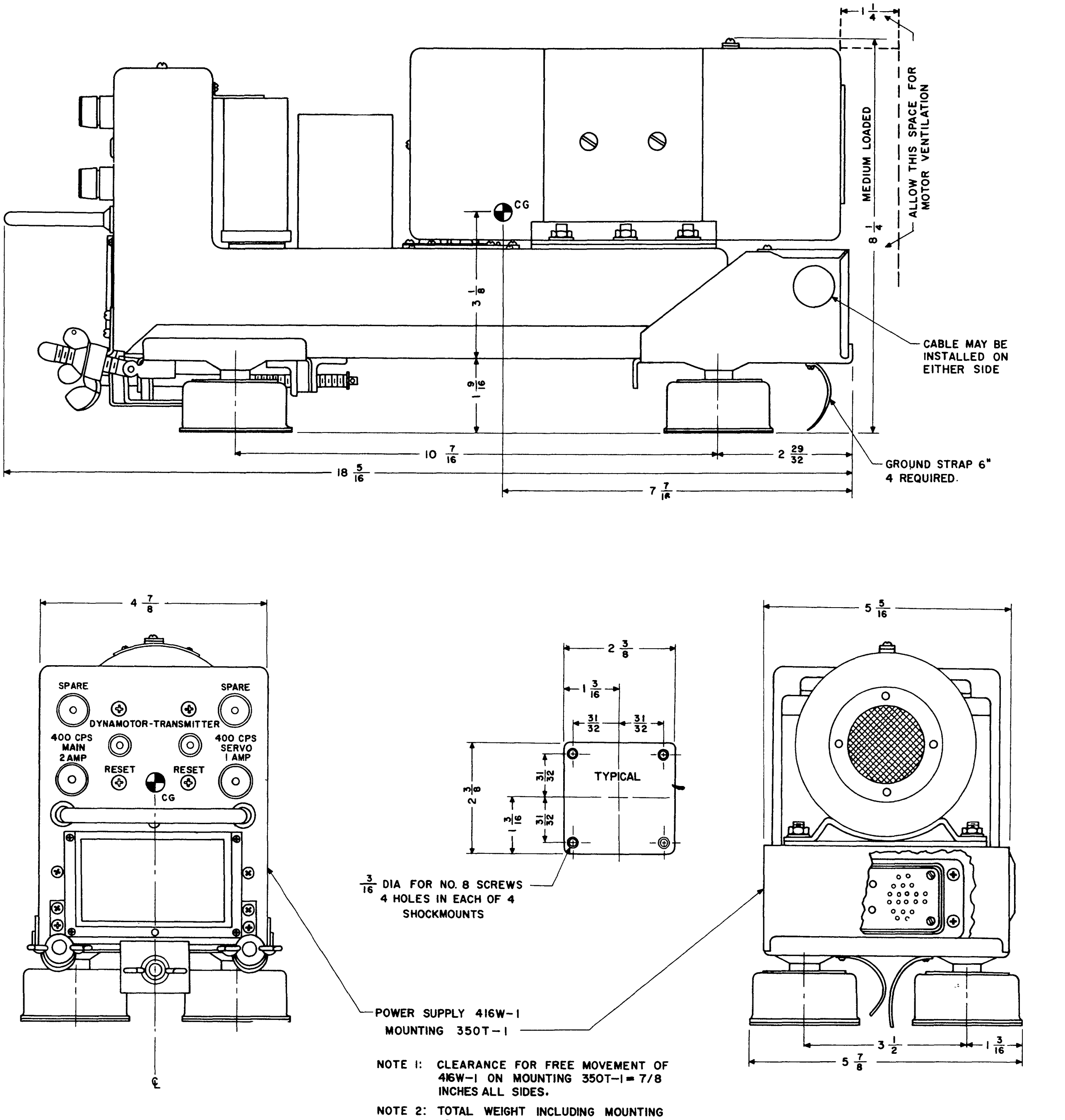
2.3.4.1 SELECTION OF CONTROL UNIT. Four types of control units have been designed for use with the 618S-1 Transceiver. The 614D-1 Remote Control Unit is used where it is not necessary to have complete selection of the 144 channels. (Refer to paragraph 3.3 for a discussion of the differences in the Remote Control Units.)

The 614D-2 is used where 144 separate channels are required, each controllable from the remote control position. The physical differences in the two units consist of the following: one of the rotary wafer switches is different, since different functions are performed; the bank-selector dial on the 614D-1 contains the figures A through J, while the 614D-2 contains A through Z (excluding O and Q). Physical dimensions of the two units are identical. Outline and mounting dimensions are shown in figure 2-12.

The 614D-3 is used when shunt C information is desired. Refer to paragraph 4.8.3 in this book and the 614D-3 instruction book for complete information.

The 614C-2 is the most complete of the four control units. Refer to paragraph 4.8.4 in this book and to the 614C-2 instruction book for complete information.

2.3.4.2 MOUNTING. The control unit may be mounted in either of two ways. The control unit may be mounted to the rear of the control panel using the front panel supplied and layout A of figure 2-13 or, as an alternative, the control unit may be mounted as an integral part of the control panel in the aircraft. If the second method is used, the front panel supplied with the control unit should be discarded and layout B of figure 2-13 used.



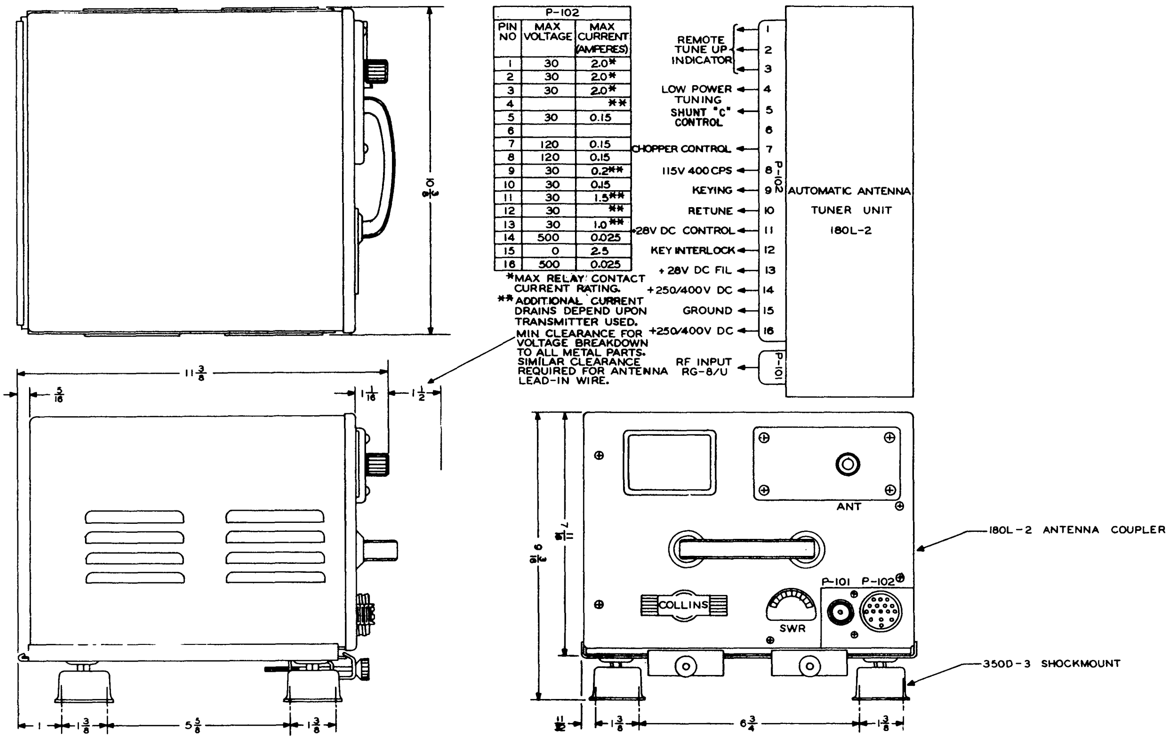
NOTE 1: CLEARANCE FOR FREE MOVEMENT OF 416W-1 ON MOUNTING 350T-1 = 7/8 INCHES ALL SIDES.

NOTE 2: TOTAL WEIGHT INCLUDING MOUNTING 350T-1 = 26 POUNDS MAXIMUM.

NOTE 3: PRIMARY POWER SOURCE REQUIREMENTS; 27.5 VOLTS D-C, 115 VOLTS 380 TO 420 CPS.

A29-239-6

Figure 2-9. Power Supply 416W-1, Outline and Mounting Dimensions



NOTES:
1. APPROXIMATE WEIGHT 17.4 LBS.
2. 16 MTG HOLES .196 DIA.
3. ALL DIMENSIONS ARE IN INCHES.
4. CLEARANCE OF 1/2 REQUIRED ON ALL SIDES AND TOP. FOR FREE MOVEMENT OF UNIT ON SHOCKMOUNT.
5. SPOT FACE 4 OF 16 MOUNTING HOLES FOR CONTACT WITH GROUNDING STRIPS.
6 6 INCH CLEARANCE REQUIRED AT FRONT FOR REMOVAL OF CONNECTOR AND FRONT PANEL.

Figure 2-10. Antenna Coupler 180L-2, Outline and Mounting Dimensions

A29-228-4

The 614C-2 is mounted as part of the aircraft, convenient to either the pilot or radio operator. This unit is secured by means of four Dzus fasteners. Cable connections are made at the rear through an AN3102A-28-15P type connector. Refer to figure 2-15 for outline and mounting dimensions of the 614C-2 Remote Control Unit.

2.4 INTERCONNECTION BETWEEN COMPONENTS.

The location of the Transceiver 618S-1 and 618S-4 and its associated system components is dependent upon the aircraft type; therefore, the interconnecting cables must be fabricated for the particular installation. Interconnecting wiring for any particular installation will vary, depending upon the Remote Control Unit used, the accessory kits included, and the Antenna Tuner to be used. The external wiring diagrams of figures 8-25 through 8-28 provide interconnecting wiring information required for an installation using any one of the Remote Control Units or Antenna Tuners. An additional simplified wiring diagram for Transceiver 618S-4 is included as figure 2-16. The size and function of the interconnecting wire is included on these illustrations. Figure 8-24 illustrates the wiring of the remote controls of a typical installation. The following general steps should be carried out when installing the cables between components:

a. Allow sufficient slack in cables to avoid restricting movement on mountings and to permit easy removal and replacement of the cable connectors.

b. Check the wires entering multiple connectors to be sure the insulation has not been cut back too far causing wires to short together.

c. Check mountings to ascertain if the components are mounted securely and the locking mechanisms tight.

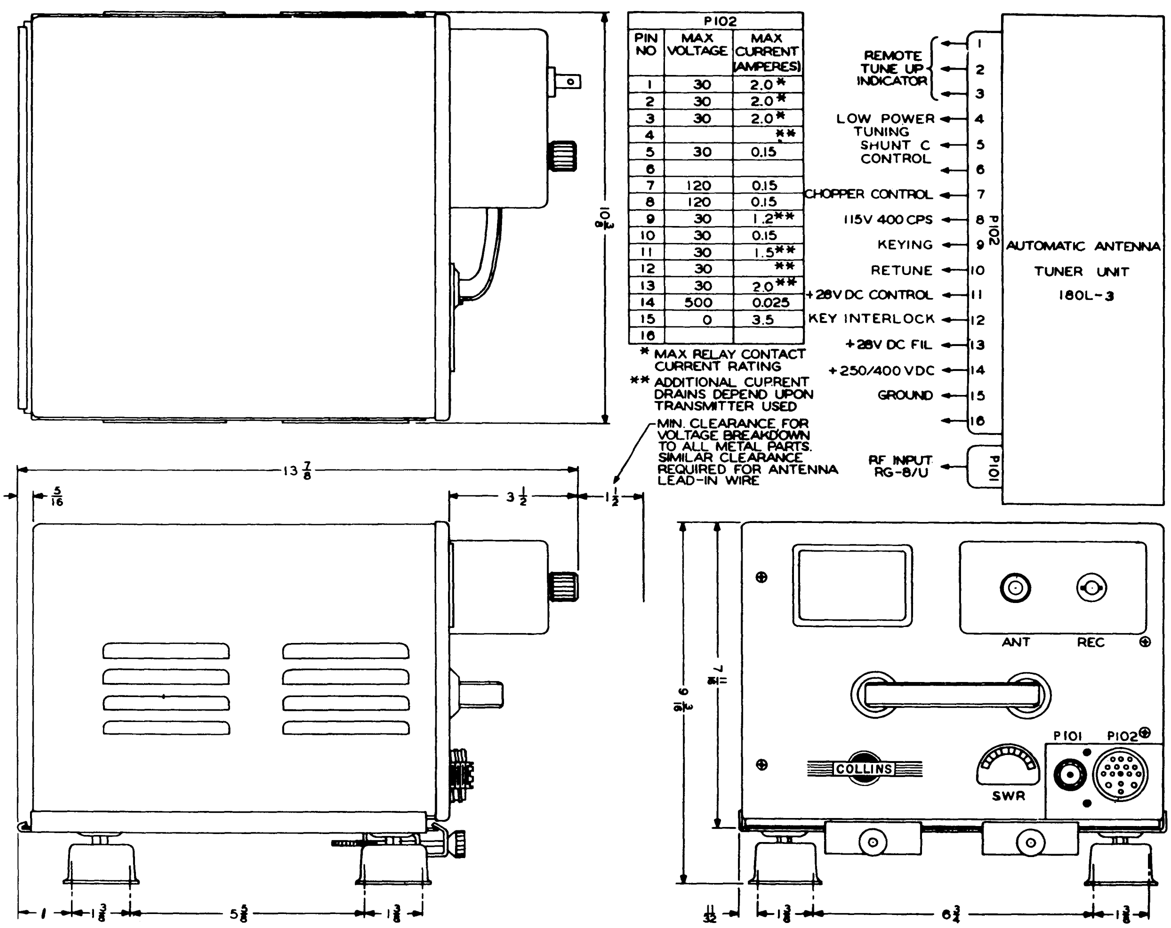
d. Check cabling to ascertain if it will sustain severe and prolonged vibration.

e. Check primary power source connections to make certain that no short circuits exist in the input power lines.

2.4.1 REMOTE CONTROL UNIT CONNECTIONS.

Either Remote Control Unit 614D-1, 614D-2, 614D-3, or 614C-2 may be used with the 618S-1 Transceiver. The 614D-1 is used when it is desirable to have the band-selector information wired directly into the r-f crystal oscillator unit. Refer to paragraph 2.4.1.1. The 614D-2, 614D-3, or 614C-2 is used when it is desirable to have the band-selector information available at the remote control position. Refer to figures 8-25 through 8-28.

A simplified schematic of the channel-selector system using the 614D-1 is shown in figure 2-17. Control wires A through F and R through W are connected as indicated. The ground wire for the control unit is connected to terminal 4 of TB1801. Power to the panel is supplied by connecting a wire to terminal 25 of TB1801. Connections to S2301 and S2302 of the 614D-1 also are shown on the complete interwiring diagram, figure 8-25.

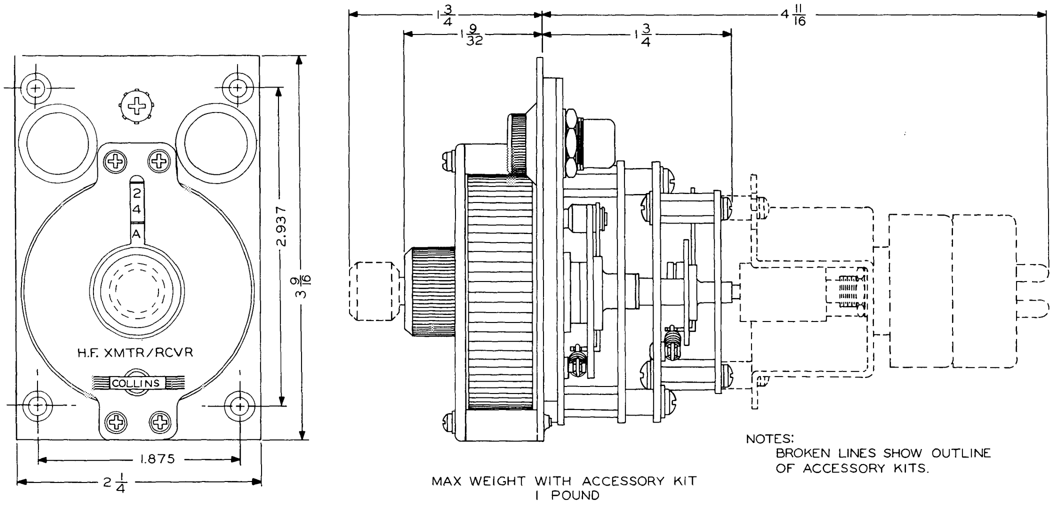


P102		
PIN NO	MAX VOLTAGE	MAX CURRENT (AMPERES)
1	30	2.0*
2	30	2.0*
3	30	2.0*
4		**
5	30	0.15
6		
7	120	0.15
8	120	0.15
9	30	1.2**
10	30	0.15
11	30	1.5**
12	30	**
13	30	2.0**
14	500	0.025
15	0	3.5
16		

NOTES:
1. APPROXIMATE WEIGHT 20 LBS
2. 16 MTG HOLES .196 DIA
3. ALL DIMENSIONS ARE IN INCHES
4. CLEARANCE OF ½ INCH REQUIRED ON ALL SIDES AND TOP FOR FREE MOVEMENT OF UNIT ON SHOCKMOUNT
5. SPOT FACE 4 OF 16 MOUNTING HOLES FOR CONTACT WITH GROUNDING STRIPS
6. 8 INCH CLEARANCE REQUIRED AT FRONT FOR REMOVAL OF CONNECTOR AND FRONT PANEL
7. PINS 6 AND 16 OF P102 ARE USED ONLY ON 180L-3A.

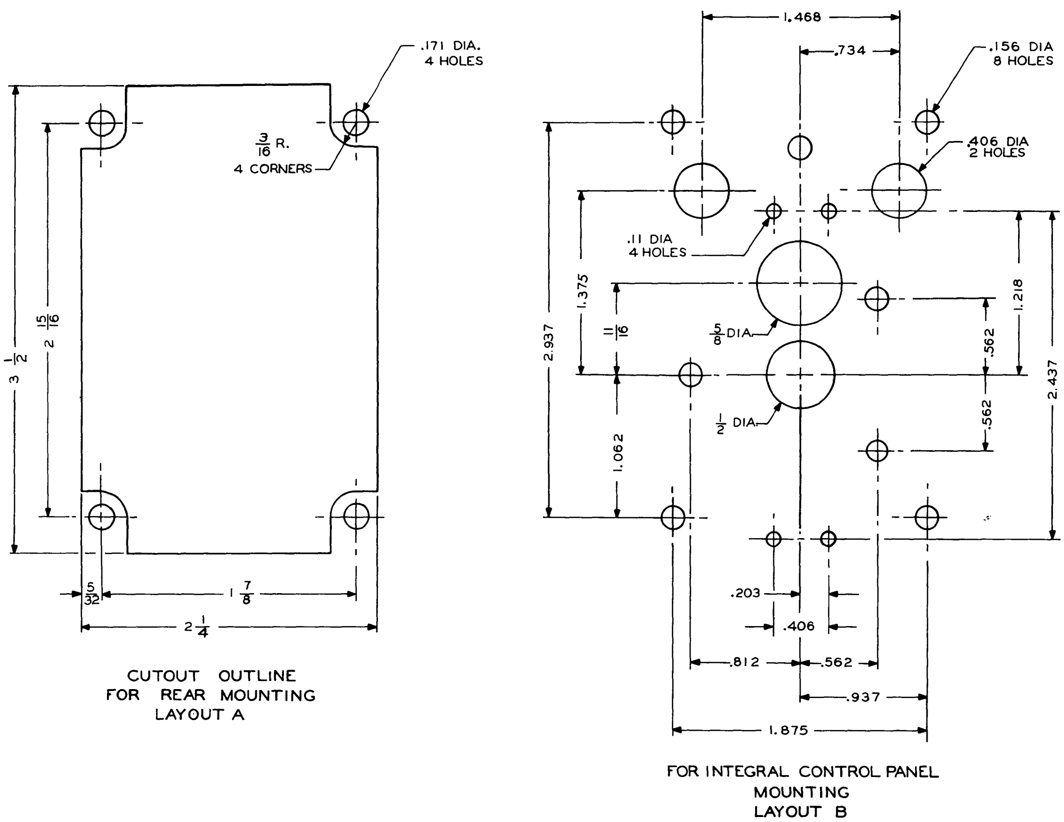
A29-227-4

Figure 2-11. Antenna Coupler 180L-3, 180L-3A, Outline and Mounting Dimensions



A29-870-4

Figure 2-12. Remote Control Units 614D-1, 614D-2, Outline and Mounting Dimensions



A29-456-4

Figure 2-13. Remote Control Unit 614D-1, 614D-2, Mounting Layouts

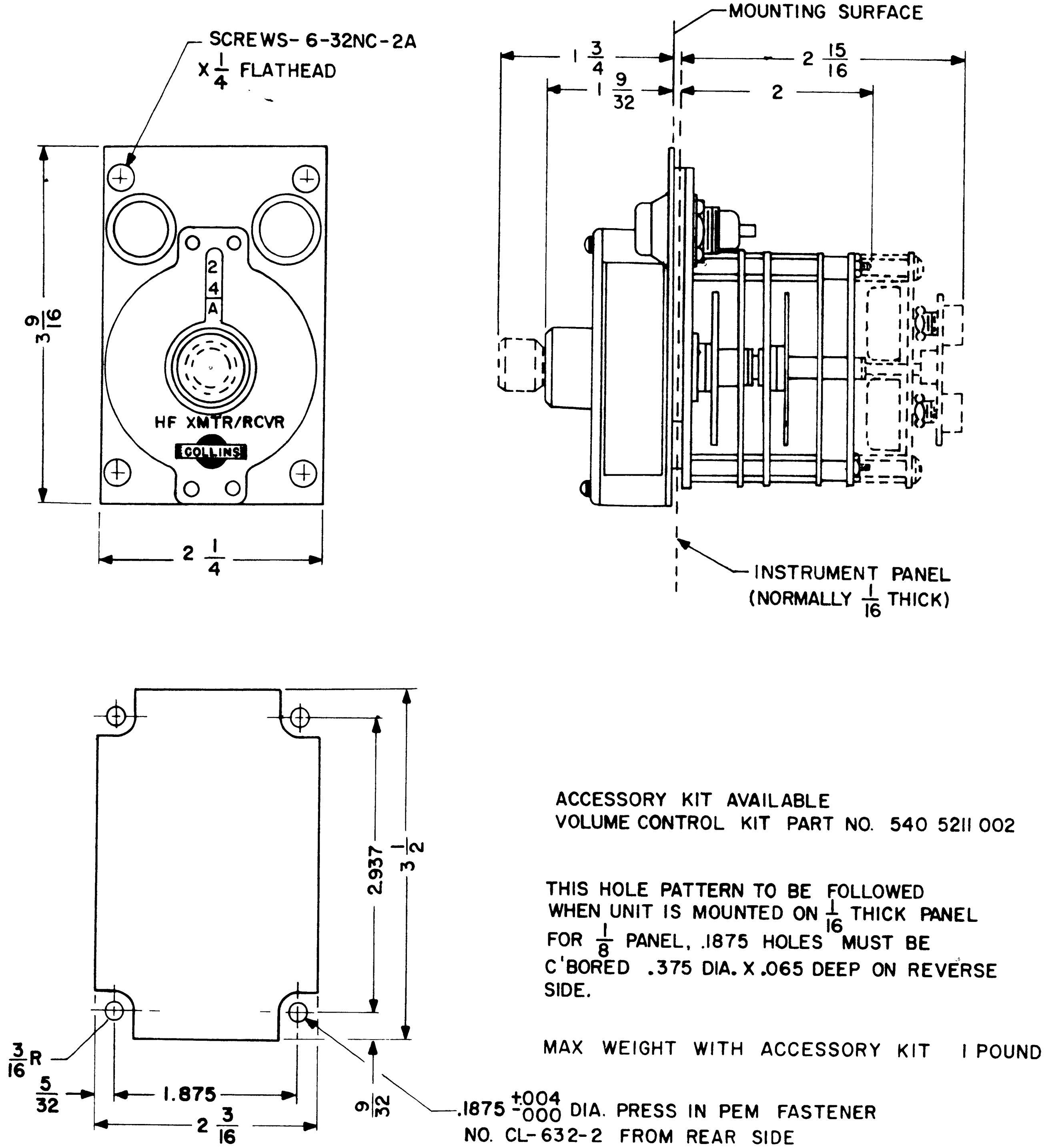


Figure 2-14. Remote Control Units 614D-3, Outline and Mounting Dimensions

A29-224-3

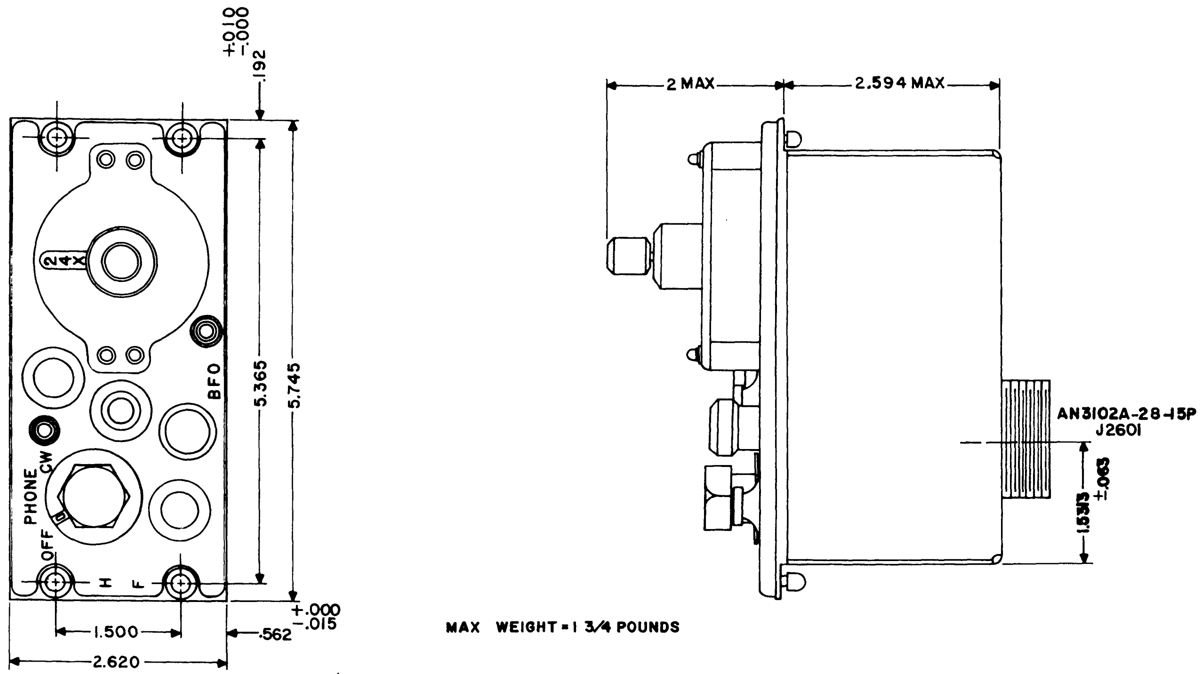
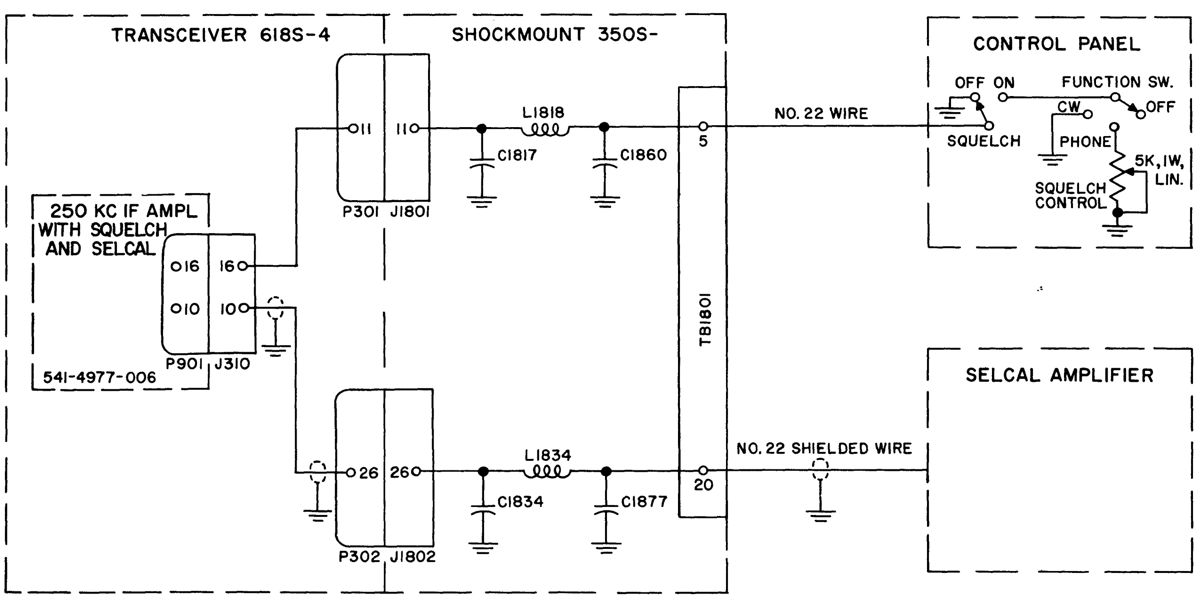


Figure 2-15. Remote Control Unit 614C-2, Outline and Mounting Dimensions

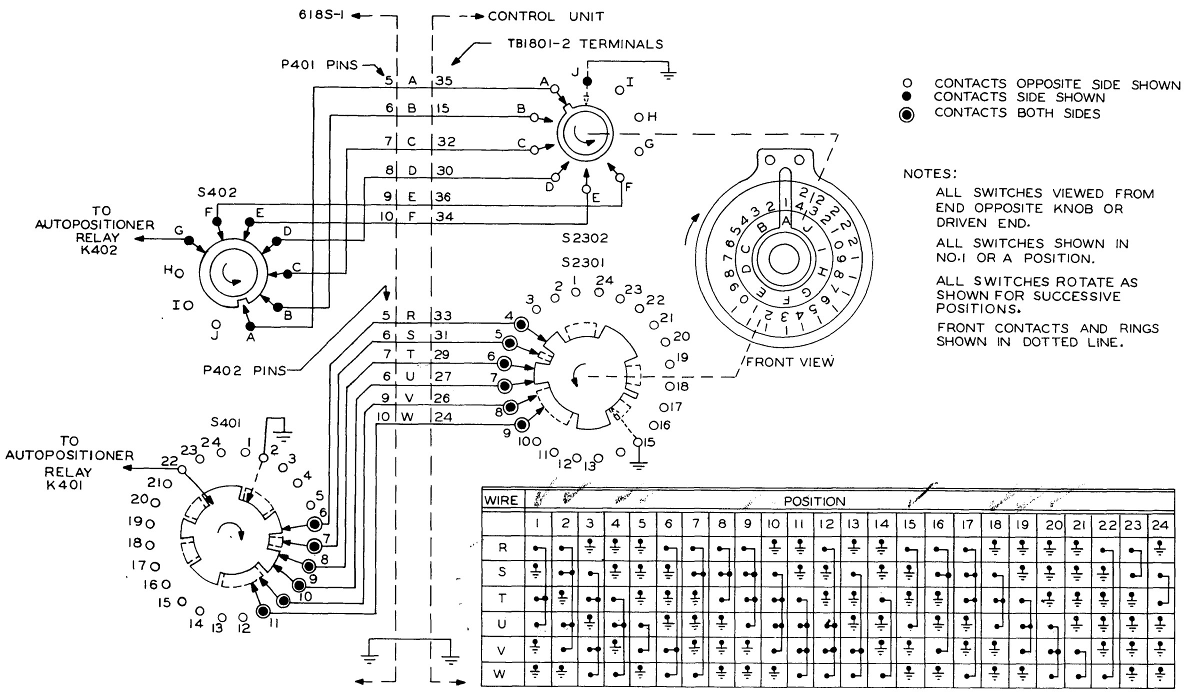
A29-244-3



NOTES:
1. THE CONTROLS SHOWN ON THE CONTROL PANEL ARE IN ADDITION TO THOSE LISTED IN TABLE 3-2.

A29-269-3

Figure 2-16. 250 Kc I-F Amplifier with Squelch and Selcal, Control Wiring Diagram



A29-434-3

Figure 2-17. Channel Selector System Using Remote Control Unit 614D-1

2.4.1.1 WIRING OF BAND-SELECTOR SWITCH S416. When the 614D-1 Remote Control Unit is used, band-selector switch S416 must be wired for proper band operation. The wiring of switch S416 is determined by the needs of the particular installation. Typical examples of switch wiring are shown in figure 2-18. In this control system, wiring of crystal A1 in band 1 automatically results in the placement of crystal 1 in banks B through F in band 1. Wiring of crystal A1, A2, and A3 for the band 1 position (refer to figure 2-18) results in the placement of crystals 1 through 3 positions in banks B through F being also in band 1. If crystals were so placed in band 1, there would be three crystals in each bank and six banks, making a total of 18 crystals. As shown in figure 2-18 there would be a total of 18 crystals in band 1, 12 in band 2, 108 in band 3, and 6 in band 4, making a total of 144 crystal positions. If but a single channel is desired in band 1, the five remaining banks cannot be used. Carrying this to the extreme . . . if a single channel is desired in three of the four bands and all of the remaining channels are used in the fourth band, we would have 1 crystal in band 1, 1 crystal in band 2, 1 crystal in band 3, and 126 crystals in band 4, making a total of 129 channels available. Fifteen channels would have been sacrificed, five in each of the three bands, in order to have only one channel in each of those three bands. The function of S416 is discussed in paragraph 4.6.1.

2.4.1.2 REMOTE CONTROL 614D-2 CONNECTIONS. A wiring diagram of the 614D-2 Remote Control Unit is given in figure 2-19. Control wires R through W and a ground wire are connected to S2501 in exactly the same manner as those connected to S2301 in the 614D-1. Switch wafer S2502 is different, however, since the band-selector information now is provided on this switch rather than on S416 of the r-f crystal oscillator unit when the 614D-1 is used. The front rotor blades of S2502 perform the same function as S2301 in the 614D-1, and control wires A through F are connected in the same manner as indicated in figure 2-19. Control wires K through M also are used, however, to perform the band-selector operation. This provides 144 separate channels, all operative from the remote control position. The frequency bands now are divided in the following manner:

Band 1 . . . . .Banks A through F, crystals 1 through 24.

Band 2 . . . . .Banks G through L, crystals 1 through 24.

Band 3 . . . . .Banks M through T, crystals 1 through 24.

Band 4 . . . . .Banks U through Z, crystals 1 through 24.

NOTE

It should be understood that the 144 crystal mounting positions of the crystal oscillator have not been changed to include letters G through Z. The positions remain A through F with the understanding that banks G to L, M to T, and U to Z, as stenciled on the 614D-2 Remote Control Unit, correspond to crystal positions A through F, but with the output frequency in bands 2, 3, or 4.

Assume, for instance, that a crystal with a basic frequency of 2.0 mc has been placed in position A5. If A5 is selected on the Remote Control Unit, the output frequency will be 2.25 mc. If a frequency within the range of 7.25 to 14.25 mc is desired, then M5 must be selected. This gives an output frequency of 8.25 mc in this example. The 614D-2 thus performs all band-selecting functions, making it unnecessary to wire switch S416 as indicated in paragraph 2.4.1.1. Switch S416 is not used when the Remote Control Unit 614D-2, 614D-3, or 614C-2 is used.

2.4.1.3 TERMINAL BOARD CONNECTIONS FOR 614D-1 AND 614D-2. Since the 614D-2 Remote Control Unit performs an additional function, its connections to the terminal board of the Transceiver are different from those of the 614D-1. When the 614D-2 is used, the following additional connections are made:

614D-2		TB1801
Wire K	connect to	17
Wire L	connect to	18
Wire M	connect to	14
Wire N	connect to	16

When the 614D-1 Remote Control Unit is used, control wires K, L, M, and N are not part of the Remote Control Unit. In this case band switching is accomplished by switch S416, and wires K, L, M, and N are wired internally to terminal board TB1801. In this instance, it becomes necessary to parallel wires K, L, M, and N of band switch S416 with terminals 17, 18, 14, and 16 of TB1801. When using the 614D-1 Remote Control Unit, jumper the following terminals on TB1801:

17 to 1	14 to 37
18 to 3	16 to 48

2.4.1.4 ACCESSORY KITS FOR REMOTE CONTROL UNITS. Two accessory kits are available for the 614D-1 and 614D-2 Remote Control Units. One accessory kit is available for the 614D-3. Collins part numbers are shown in table 2-4.

TABLE 2-4

ACCESSORY KIT PART NUMBERS

Accessory Kit	Collins Part Number
Kit No. 1, 614D-1	506 8794 002
Kit No. 2, 614D-1	506 8795 002
Kit No. 1, 614D-2	506 9933 002
Kit No. 2, 614D-2	506 9928 002
Kit No. 1, 614D-3	540 5211 002

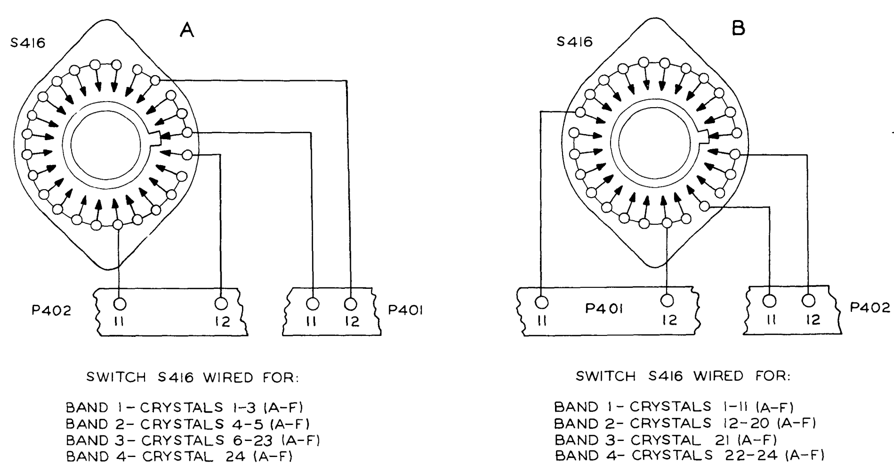


Figure 2-18. Band Switch S416, Typical Wiring Connections

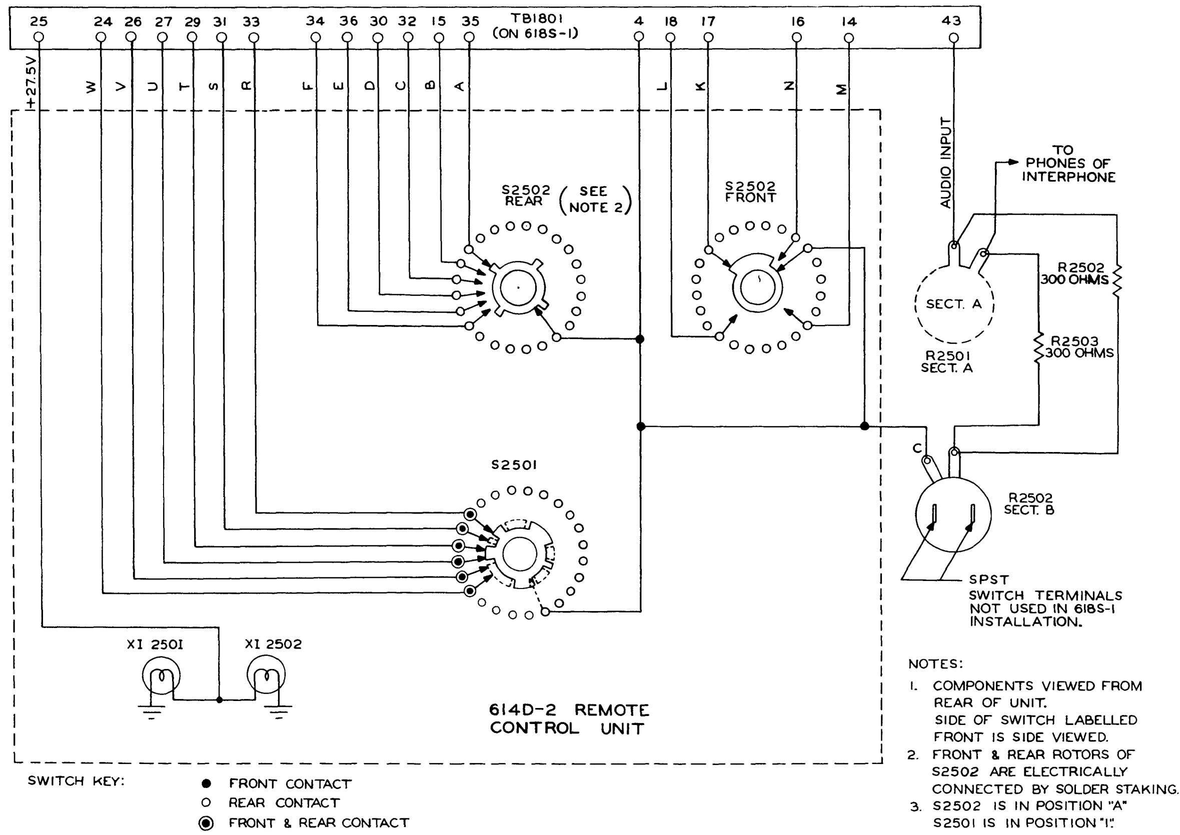


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Figure 2-19. Remote Control Unit 614D-2, Schematic Diagram

The accessory kits provide a dual potentiometer, resistors, volume control, and all hardware necessary to mount the controls to an existing 614D-1 or 614D-2 Remote Control Unit. The only difference between Kit No. 1 and Kit No. 2 is in the addition of an spst switch mounted on the rear of the dual potentiometer in Kit No. 2. This switch is not needed in most 618S-1 installations since the ON-OFF control is a part of the OFF-PHONE-CW switch. Wiring information for the volume control is shown in figures 8-25 through 8-28. Refer to figure 4 in the 614D-3 instruction book for a suggested schematic using the 614D-3 accessory kit.

2.4.1.5 WIRING SQUELCH FOR 618S-4.

Two additional controls must be added for operation of Transceiver 618S-4. These controls are "Squelch Off On" and "Squelch Control." Refer to table 3-2. The Squelch Off On and Squelch Control are not supplied with the Transceiver 618S-4 system. These controls must be added and installed (refer to figure 2-16) on the pilot's control panel.

2.4.2 ANTENNA CONNECTIONS.

Antenna connections include those from the antenna feedthrough insulator or mast and Antenna Tuner 180L-( ) and from the Antenna Tuner to the 618S-1 Transceiver. The antenna lead-in should be flexible, should clear all surrounding surfaces and areas by four inches, and should have sufficient slack to permit free movement of the Antenna Tuner on its shockmount. The cable normally used is RG-8/U coaxial cable, or equivalent. Each end of the coaxial cable should be terminated in Navy type connectors such as CPH 49190 (PL-259) or CPH 49195 (PL-259A), Collins part number 357 9006 00 or 359 9014 00. Connector UG-21B/U also may be used, Collins part number 357 9040 00. The correct method of assembling the connectors to the cable is given in figure 2-20. The assembled cable is connected to J101 of the Antenna Tuner and J110 (ANT) of the Transceiver. In the case of the 180L-3 Antenna Tuner, an additional connector labeled AUX REC ANT is located on the front of the unit. This is a BNC type connector, and the coaxial cable must be terminated in a connector such as UG-88/U or UG-260/U at the Antenna Tuner end.

This connector also may be used on the Transceiver end of the coaxial cable. Refer to paragraph 9.2.1a. Connections for a system using the 180L-3 Antenna Tuner without the auxiliary receiver are shown in figures 8-25 through 8-28. Figure 2-21 indicates the correct assembly method for placing a type BNC connector on coaxial cable such as RG-58/U.

2.4.2.1 ADAPTATION OF ANTENNA TUNER FOR 250- OR 400-VOLT OPERATION. Antenna Tuner 180L-( ) is designed for operation with a 400-volt plate supply obtained from the associated transmitter. The Antenna Tuner may be operated from a 250-volt supply, such as the 416W-1 Power Supply, by short-circuiting R713 and R714 (see figures 8-31 and 8-32) and either removing R715 or breaking its ground connection.

In the recent 180L-( ), a terminal board (TB704) has been located at the bottom of the unit. See figure 2-22. For 250-volt operation, strap pins 3 to 7 and 4 to 7 on the terminal board.

2.4.2.2 ADAPTATION OF ANTENNA TUNER TO TRANSCEIVER 618S-1. Resistor R716 in Antenna Tuner 180L-( ) should be removed when the Antenna Tuner is used with Transceiver 618S-1. The resistor is used when the Antenna Tuner is part of other systems.

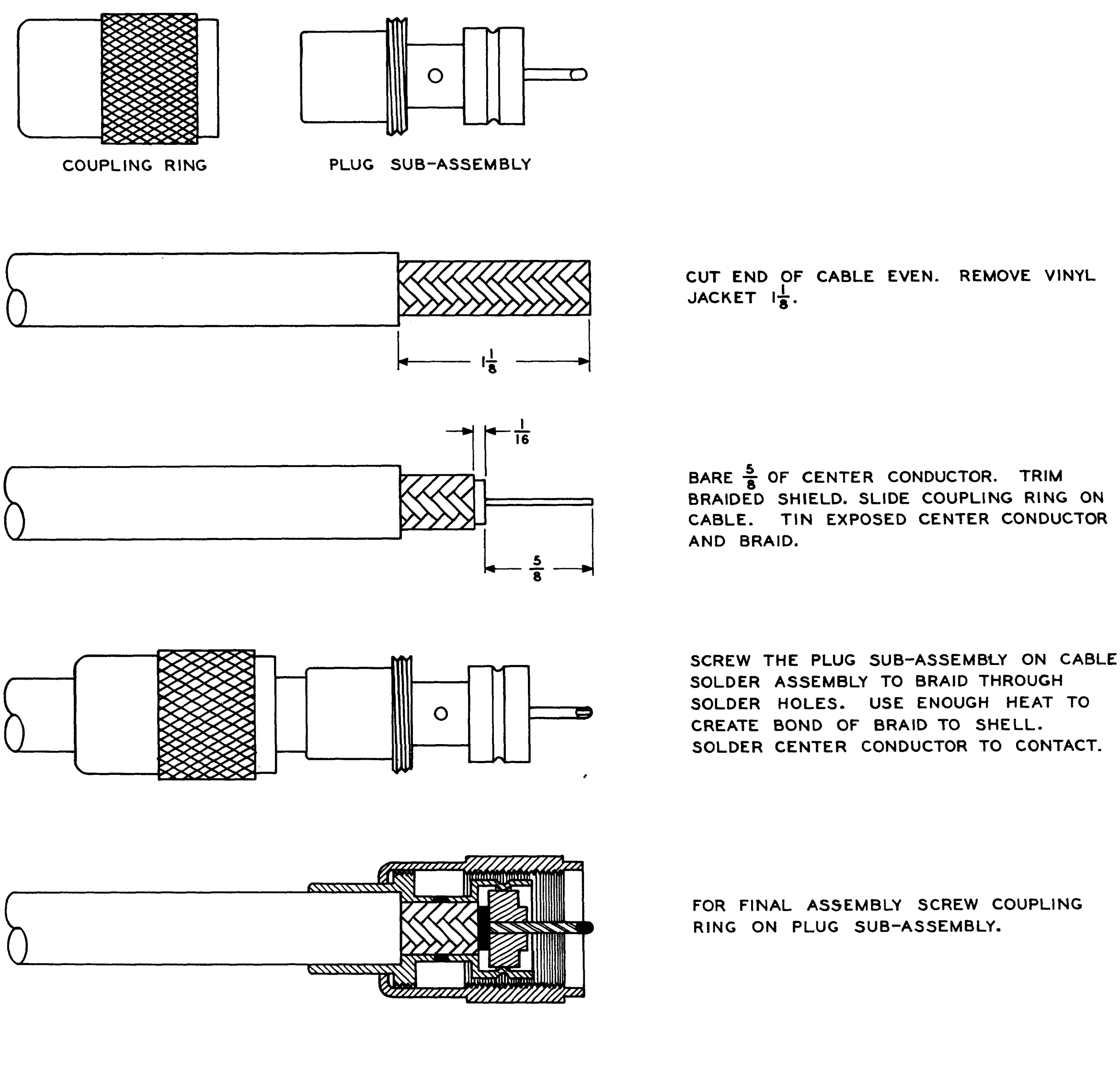

Figure 2-20. Assembly of PL-259 Connectors to Coaxial Cable

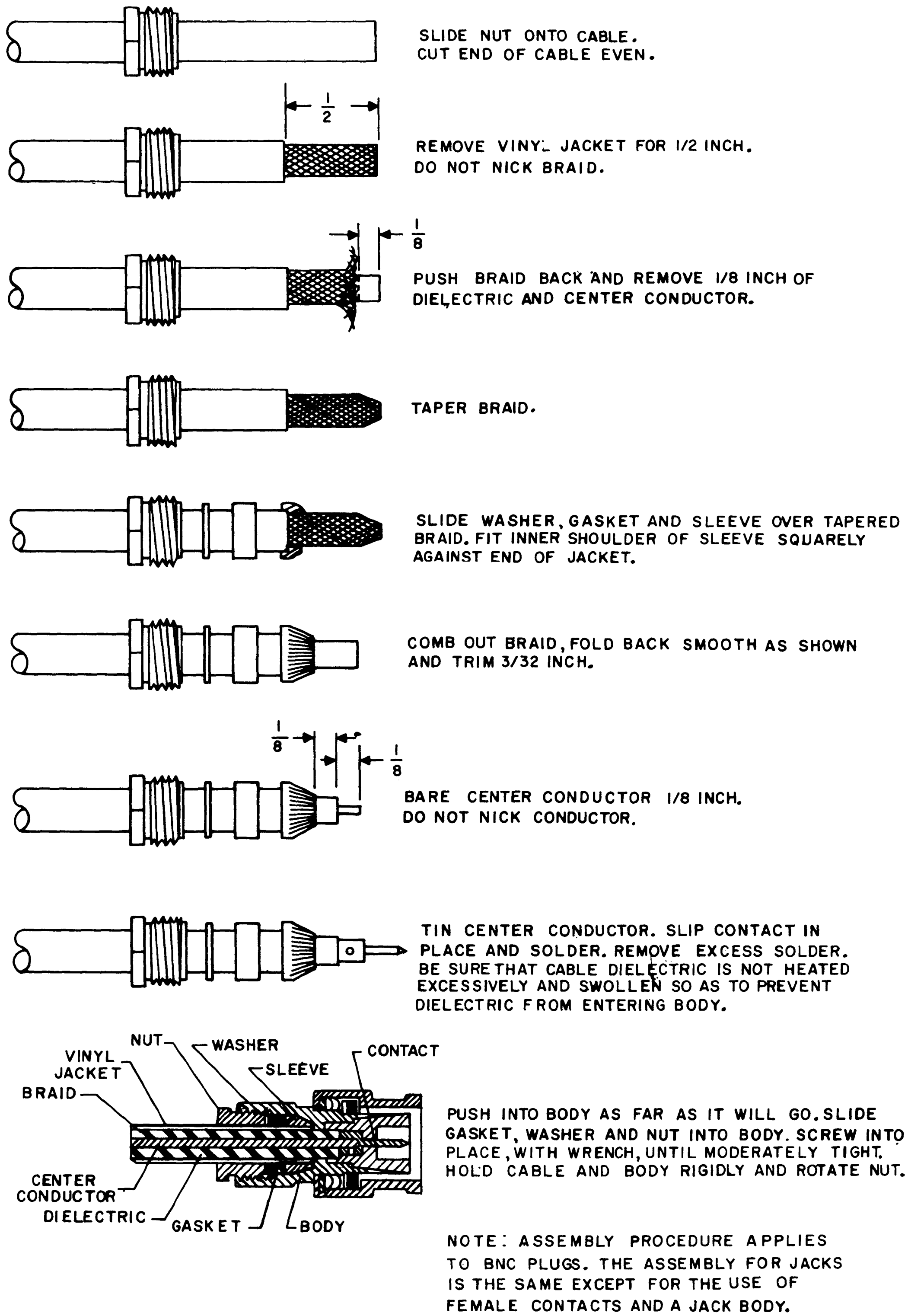

Figure 2-21. Assembly of UG-88/U Connector to Coaxial Cable

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2.4.2.3 ADAPTATION OF ANTENNA TUNER FOR "RADIO SILENCE" OPERATION. Antenna Tuner 180L-( ) is designed so that operation of the channel selector on the Remote Control Unit provides fully automatic keying of the Transceiver during the tuning cycle of the equipment over a period of 22 seconds or less. If it is desirable to maintain "radio silence" during the period of channel selection, the Antenna Tuner may be modified for manual-start transmitter keying. Thus, the transmitter channel may be selected in advance by operation of the Remote Control Unit, but the Antenna Tuner will not begin its tuning cycle until the microphone push-to-talk button or key is closed. Refer to schematic diagrams of figures 8-31 and 8-32.

a. For normal operation, providing automatic keying of the transmitter when a new channel is selected, wire A is connected to terminal 8 of relay K708.

b. For "radio silence" operation, providing manual-start operation of the transmitter after a new channel is selected, wire A is connected to terminal 9 of relay K708.

For Antenna Tuner 180L-( ) using terminal board TB704, follow the procedure described below. Refer to figure 2-22.

a. For normal operation, providing automatic keying of the transmitter when a new channel is selected, pin 5 of terminal board TB704 should be strapped to pin 1.

b. For "radio silence" operation, providing manual-start operation of the transmitter after a new channel is selected, pin 5 of terminal board TB704 should be strapped to pin 2.

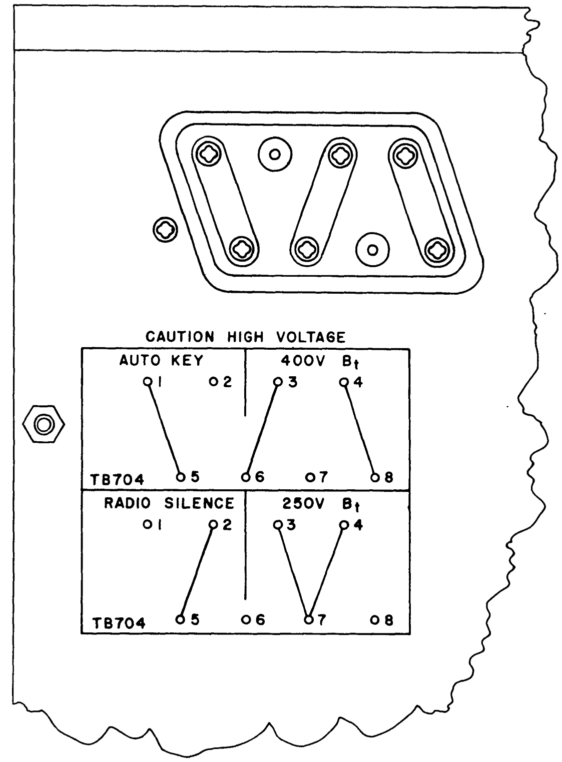

Figure 2-22. Terminal Board, TB704

2.5 INITIAL ADJUSTMENTS.

The AUDIO, PHONE SIDETONE, and CW SIDETONE controls on Transceiver 618S-1 are the only controls which require adjustment at the time of installation. Each is a potentiometer with a slotted shaft for screw driver adjustment. All three are located on a plate mounted just behind the meter panel. Remove the front cover of the transceiver, and adjust the controls for proper reception: the AUDIO control determines the audio output of the audio amplifier; the PHONE SIDETONE control determines sidetone signal available during voice operations; and CW SIDETONE determines the sidetone signal available during CW operation.

NOTE

Twenty milliwatts of sidetone power is available for connection to the input of an interphone circuit (500-ohm input). If sidetone is not used on the interphone circuit, jumper terminals 22 and 23 of TB1801. This connects the sidetone to the input circuit of the audio amplifier unit. Effective with MOD 1, terminals 22 and 23 on TB1801 were used for FSK connections. Sidetone is connected to 30 and 31 on P302 and 30 is shorted to 31 on J1802. Refer to figure 8-29.

There are no initial adjustments required during installation since the Antenna Tuner is an automatic tuning device.

2.6 POSTINSTALLATION INSPECTION.

A thorough check of the complete installation should be made before power is applied to the equipment and before adjustments or tests are begun.

a. Check connections. Make sure the locking rings on connectors are tight.

b. Check the wires entering multiple connectors to be sure the insulation has not been cut back too far causing wires to short together.

c. Check mountings to ascertain if the components are mounted securely and the locking mechanisms are tight.

d. Check cabling to ascertain if it will sustain severe and prolonged vibration.

e. Check primary power source connections to make certain that no short circuits exist in the input power lines.

2.7 POSTINSTALLATION TEST.

The following tests should be performed with the equipment completely installed in the aircraft in accordance with applicable installation and interconnection diagrams. Throughout the following procedures, the aircraft should be outside the hangar with the engines running.

NOTE

Extreme care should be taken to avoid interference with any local communication channel. After each new channel selection, listen in the headset to determine if the channel is in use before proceeding with further tests.

a. Operate the OFF-PHONE-CW switch to the PHONE position, and allow at least ten minutes for warmup.

b. Depress the microphone push-to-talk button or the telegraph key.

c. Operate the meter selector to the 250 V. position. The meter should indicate within the red area.

d. Operate the meter selector to the 28 V. position. The meter should indicate within the red area.

e. Operate the meter selector to the P.A. GRID position. Meter should indicate above the 3 mark.

f. Operate the meter selector to the P.A. PL. position. The meter should indicate within the red area.

g. Operate the meter selector to the MOD. PL. position. Speak normally into the microphone, and watch the meter indication. The meter should show an increased indication. Speech should be heard in the headset through the sidetone circuits.

h. Operate the OFF-PHONE-CW switch to the CW position. Key the 618S-1 by operation of the telegraph key. A 400-cps sidetone signal should be heard in the headset when the telegraph key is depressed.

i. Operate the OFF-PHONE-CW switch to the PHONE position, and release the telegraph key. Characteristic hiss should be heard.

j. Operate the channel selector of Transceiver 618S-1 to an active channel. With the sensitivity control, determine if the sensitivity is variable.

k. With the OFF-PHONE-CW switch in the CW position, select an active CW channel. Adjust the BFO control to determine that the pitch of the CW signal is variable.

l. Repeat steps c. through i. for at least one channel within each band of operations. Refer to table 2-1.

2.8 DEMOUNTING AND REPACKAGING.

Removal of the installed components of Transceiver 618S-1 is accomplished by disconnecting cables and reversing the installation procedures. Refer to paragraphs 2.3 through 2.4. No special provisions for repacking the equipment are necessary beyond use of reasonable care. It is recommended that packing cases be used which are similar to those in which the equipment was received.

SECTION III
OPERATION

3.1 INTRODUCTION.

This section provides information for the operation of Transceiver 618S-1 and 618S-4. A detailed description of the Remote Control Units, control functions, operating checks and adjustments, emergency operation, and emergency repair are included in this section.

3.2 EQUIPMENT FUNCTION.

Transceiver 618S-1 provides both transmitting and receiving facilities for up to 144 crystal-controlled frequencies in the range of 2.0 to 25.0 megacycles. The 618S-1 and its accessories provide both voice and CW communication between an aircraft and a ground station or another aircraft. The selection of a new frequency simply requires that the channel selector control be rotated to a new channel designation. All circuits in the 618S-1 are automatically tuned, and the Collins 180L-2 or 180L-3 Antenna Tuner will automatically perform all the antenna adjustments required. Transceiver 618S-1 is remotely controlled by any one of four Remote Control Units. Each Remote Control Unit performs one or all of several functions. The controls available to this system are listed in table 3-2.

3.2.1 FREQUENCY COVERAGE.

The spectrum from 2.0 to 25.0 mc is divided into four bands. These are listed in table 3-1.

TABLE 3-1. FREQUENCY BANDS

Band	Frequency
1	2.00 - 3.75 mc
2	3.75 - 7.25 mc
3	7.25 - 14.25 mc
4	14.25 - 25.00 mc

The actual frequency of the output as a function of the crystal frequency is indicated as follows (output in megacycles).

Band 1 . . . . . . Crystal frequency +.250 mc
Band 2 . . . . . . 2 times crystal frequency +.250 mc
Band 3 . . . . . . 4 times crystal frequency +.250 mc
Band 4 . . . . . . 8 times crystal frequency +.250 mc

Assignment of any one channel to a particular band of frequencies is dependent upon the wiring of the band-selector switch, located in either the r-f crystal oscillator or in the 614D-2, 614D-3, or 614C-2 Remote Control Unit. For a complete discussion, refer to paragraphs 2.4.1, 2.4.1.1, and 2.4.1.2.

3.3 REMOTE CONTROL UNIT DETAIL DESCRIPTION.

Refer to paragraphs 4.8 through 4.8.4 for a detailed electrical discussion of Remote Control Units.

3.3.1 REMOTE CONTROL UNIT 614D-1.

Remote Control Unit 614D-1 provides remote selection of any of the 144 frequency channels in the range of 2.0 to 25.0 megacycles. Frequencies are selected on the basis of previous channel assignment; that is, A1, A2, A3, . . . A24, B1, B2, . . . B24, etc. Two concentric knobs are used to place the desired channel in the vertical window. The large outer knob is used to select the proper numeral, and the small inner knob is used to select the proper letter. These channel assignments correlate with the crystal mounting positions in the r-f crystal oscillator unit.

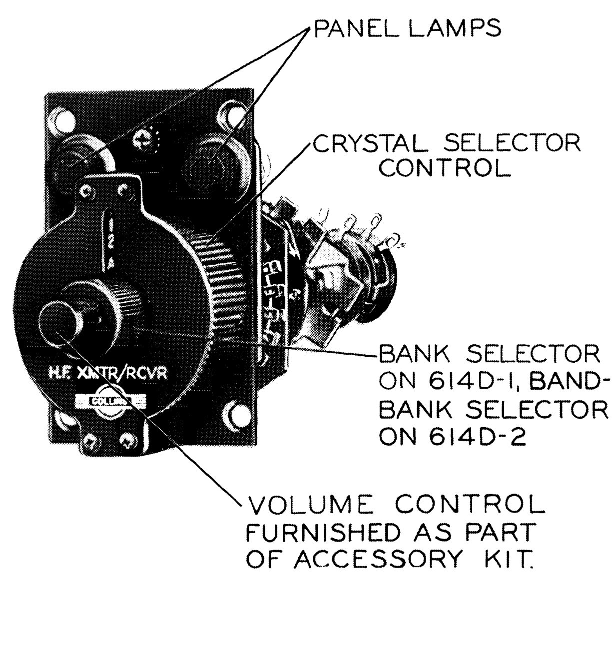

Figure 3-1. Remote Control Unit 614D-1, 614D-2

Band-selector information is wired directly into the r-f crystal oscillator unit when using the 614D-1. Switch S416, located in the 618S-1, is wired for proper band-selector operation. A volume control, concentric with the two large frequency knobs, and an on-off switch, are available as accessory kits. Refer to paragraph 2.4.1.4. Two lamps, replaceable from the front panel, illuminate the vertical window. Refer to figure 3-1.

3.3.2 REMOTE CONTROL UNIT 614D-2.

The 614D-2 Remote Control Unit is used when it is desired to have the band-selector information available at the remote control position. In this instance, unlike the 614D-1, the wiring information for the band-selector circuit is contained within the Remote Control Unit. The band-selector switch is ganged with the bank-selector switch and changes bands one per every six banks. A volume control and on-off switch are available as accessory kits. Refer to paragraph 2.4.1.4. Two lamps illuminate the vertical readout window as in the 614D-1. Refer to figure 3-1.

3.3.3 REMOTE CONTROL UNIT 614D-3.

The 614D-3 Remote Control Unit is electrically identical to the 614D-2 in its method of frequency selection. Remote Control Unit 614D-3 differs in that it contains an extra switch, S102, which performs two extra functions in a 618S-1 Transceiver installation. The front section of S102 disables 180L-( ) Antenna Tuner and breaks the transmitter keying circuit in the 618S-1 so that transmission is impossible on certain predetermined channels. The rear section of S192 automatically activates a relay in 180L-( ) which places a shunt capacitor in the Antenna Tuner circuitry. This shunt capacitor prevents the 180L-( ) from recycling on predetermined frequencies selected upon installation in the aircraft. Refer to section IV for a more complete discussion of these features. A volume control is available as an accessory kit. As in the 614D-1 and 614D-2, two lamps illuminate the vertical window. Refer to figure 3-2.

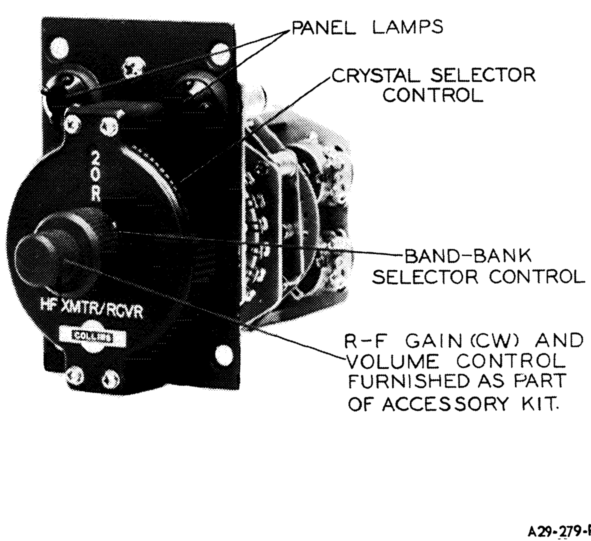

Figure 3-2. Remote Control Unit 614D-3

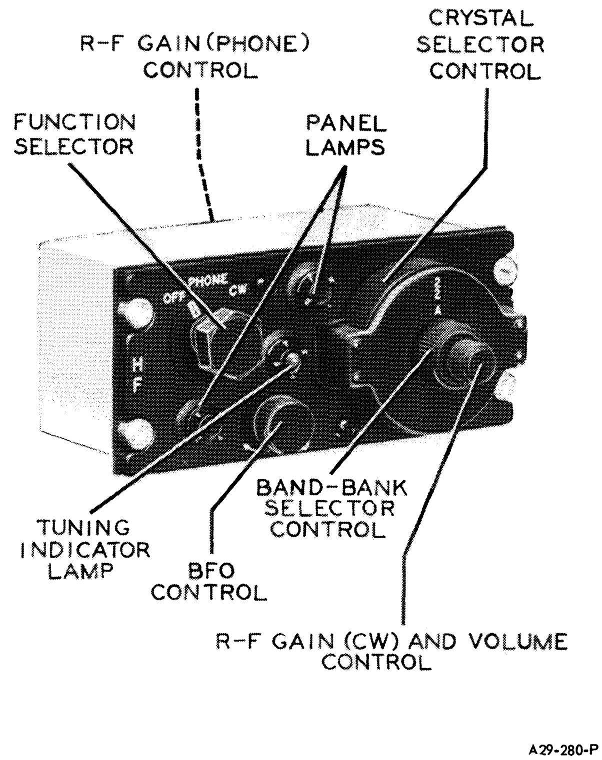

Figure 3-3. Remote Control Unit 614C-2

3.3.4 REMOTE CONTROL UNIT 614C-2.

Remote Control Unit 614C-2 is the most complete of the four units discussed. Controls made available on the 614C-2 include the following: frequency selector, receiver sensitivity, function selector, and beat frequency oscillator control. Included, in addition, are two panel lamps and a tuning indicator light.

The smallest of the three concentric knobs on the right side of the front panel varies the signal strength from the receiver, controlling r-f gain in CW operation, and audio output volume in phone operation. The two larger concentric knobs are used to select the required operating frequency. The largest knob positions the proper numeral in the vertical window, and the smaller knob selects the proper letter. The function selector switch, labeled OFF-PHONE-CW, controls application of power to the Transceiver and determines the class of operation of the 618S-1. The BFO control varies the pitch of a received signal during CW operation. This control affords a minimum pitch range of ±2000 cps. A tuneup time indicator is located in the center of the front panel. If use of this indicator is desired, wire Antenna Tuner 180L-( ) for the external tuning indication, and connect terminal e of plug P2601 to terminal 3 of plug P102. The lamp will then light during the tuning cycle of the Antenna Tuner 180L-( ) . . . approximately twenty seconds. Refer to figure 3-3.

3.4 FUNCTIONS OF CONTROLS.

A list of controls, their function, and their location is given below in table 3-2.

TABLE 3-2. FUNCTION OF CONTROLS

CONTROL	FUNCTION	LOCATION
(The following controls are used with Transceiver 618S-1 and 618S-4.)		
Transceiver Primary Power Circuit Breaker	Controls application of primary power to dynamotor and Transceiver installation.	Not furnished as part of 618S-1 or 618S-4. Located on air frame.
*PHONE-CW	Controls application of power to dynamotor start relays. Selects operating service-voice or CW.	Not furnished as part of 618S-1 or 618S-4. Located at pilot's control position.
*OFF-PHONE-CW	Controls application of power to dynamotor start relays. Selects operating service-voice or CW.	Remote Control Unit 614C-2.
R-F GAIN (CW)	Controls gain of various tubes in r-f tuner and i-f units during CW operation.	On the 614D-3 and 614C-2, this control is ganged to the Volume control and is a small knob located concentric to the Band-Bank Selector.
R-F GAIN (PHONE)	Controls gain of various tubes in r-f tuner and i-f units during voice operation.	A screw driver adjustment at the rear of Remote Control Unit 614C-2.
BFO	Varies the pitch of the received CW signal in the CW position.	Remote Control Unit 614C-2 or at pilot's control position on 614D-( ).
Volume (Phone Audio Attenuator)	Varies volume of signal.	On the 614D-1, this control is located concentric to the Bank Selector. On the 614D-2, this control is located concentric to the Band-Bank Selector. On the 614D-3 and 614C-2, this control is located concentric to the Band-Bank Selector and is ganged electrically to the R-F Gain (CW).
Channel selector, band-bank, small inner knob	Selects band-bank in which individual crystal is to be selected.	Remote Control Unit 614D-2, 614D-3, or 614C-2.
Bank selector, small inner knob	Selects bank in which individual crystal is to be selected.	Remote Control Unit 614D-1.
Crystal selector control	Selects individual crystal within band-bank	Remote Control Unit 614D-( ) and 614C-2.

TABLE 3-2. FUNCTION OF CONTROLS (Cont)

CONTROL	FUNCTION	LOCATION
PHONE jack	Connection for headset at Transceiver position.	Transceiver 618S-1 or 618S-4.
MIC jack	Connection for microphone at Transceiver position.	Transceiver 618S-1 or 618S-4.
KEY jack	Connection for key at Transceiver position.	Transceiver 618S-1 or 618S-4.
Headset, microphone, and key jacks	Connections for audio output, input, and keying circuits at the remote control position.	Located at pilot's control position.
250 V., 28 V., MOD. PL., P.A. PL., P.A. GRID switch	Selects function of multiple-use meter on front panel of Transceiver.	Transceiver 618S-1 or 618S-4.
(The following controls are required, in addition, for Transceiver 618S-4. These controls are not supplied but must be added and wired into the Transceiver 618S-4 installation.)		
Squelch Off On	With the OFF-PHONE-CW switch in the PHONE position squelch may be shut off.	On the pilot's control panel in a 618S-4 installation.
Squelch Control	Used to set the level of squelch.	On the pilot's control panel in a 618S-4 installation.
*In the following text this control will be referred to as "OFF-PHONE-CW" regardless of the location of this control or the Remote Control Unit in use with the particular installation.		

Other controls, located within Antenna Tuner 180L-( ) or Transceiver 618S-1, are not referred to or adjusted during regular operation in flight and will not be easily accessible at such time. An exception may exist for the following three controls: AUDIO, CW SIDETONE, and PHONE SIDETONE. These control the volume of the audio and sidetone signals and are screw driver adjustments located behind the meter panel on the Transceiver. Under normal conditions the signal level will be adjusted before flight operation. If it should become necessary to readjust the controls, the front panel dust cover must be removed first.

3.5 OPERATING PROCEDURE.

Plug headset, microphone, and key into appropriate jacks at the pilot's control position. Place the OFF-PHONE-CW switch in the OFF position. Turn the primary power circuit breakers to the "ON" position. Place the OFF-PHONE-CW switch in the PHONE position.

3.5.1 RECEPTION.

a. Operate the channel-selecting controls to proper channels, according to a frequency vs channel chart prepared during installation. Voice signals should be heard at appropriate frequencies. Regulate signal with volume control.

b. Set the OFF-PHONE-CW switch to the CW position. Operate the channel-selecting controls. The CW signals should be heard at appropriate channels. Allow 5 to 15 seconds for channel change mechanisms to operate, both in this position and in the PHONE position. Regulate signal pitch with the BFO control. Regulate signal volume with the R-F Gain (CW) control.

3.5.2 TRANSMISSION.

After Transceiver 618S-1 has been operated as described above, the equipment is ready for transmission. With the OFF-PHONE-CW switch set to the PHONE position, press the microphone push-to-talk button, and speak into the microphone. The dynamotor will operate, and voice signals will be produced on the transmitter carrier. Signals should be heard in the headset. Release the microphone push-to-talk button at the close of the transmission to hear incoming signals. With the OFF-PHONE-CW switch in the CW position, press the key to produce CW transmissions; 400-cps sidetone is monitored in this case. Release the key to receive incoming signals.

NOTE

If operating conditions or tactical restrictions make "radio silence" desirable or necessary prior to actual communications when using Antenna Tuner 180L-2 or 180L-3 as modified by "radio silence" operation, do not close the microphone push-to-talk button or key immediately after selecting a new channel. When communication is desirable or permissible, close the push-to-talk button or key for a brief interval to start the tuning cycle in the Antenna Tuner.

CAUTION

Under the above operating conditions, do not speak into the microphone or use the key until the tuning cycle is complete when making the first transmission after a channel change. Operate briefly the push-to-talk button or key as described above; wait approximately 20 seconds; then use the microphone or key as desired. Subsequent transmissions on the same channel may be made without waiting.

CAUTION

The maximum duty cycle of Antenna Tuner 180L-2 or 180L-3 is five minutes "R-F ON" and five minutes "R-F OFF." To insure reliable operation, do not exceed this cycle when operating the equipment.

3.5.3 OPERATION FROM TRANSCEIVER POSITION.

Transceiver 618S-1 also may be operated from the Transceiver location after the class of service and channel have been selected at the remote control position and power has been applied. Plug a microphone or key into the appropriate jack on the Transceiver front panel. Plug a headset into the PHONE jack. The microphone may then be used to produce radiotelephone signals and the key used for CW operation, depending upon the type of service selected previously at the remote control position. The headset will monitor incoming signals.

3.5.4 SQUELCH AND SELCAL OPERATION OF TRANSCEIVER 618S-4.

The operation of Transceiver 618S-4 is the same as that of the 618S-1 with the exception of the differences required by squelch and selcal. For squelch operation, place the OFF-PHONE-CW switch in the PHONE position, and set the Squelch Off On switch to On. Adjust the Squelch Control to the point where the noise level is just past being audible. Readjustment of the Squelch Control during operation may be required. The output of the amplifier stage V905B (refer to figure 4-33) provides an audio input to separate selcal (selective calling) equipment. The operation of selcal equipment is not included in this instruction book. If selcal facilities are included in the 618S-4 installation, the audio output must be taken from the selcal equipment.

3.5.5 STOPPING THE EQUIPMENT.

To stop operation of Transceiver 618S-1, turn the OFF-PHONE-CW switch to the OFF position, and turn the primary power circuit breakers to "OFF."

3.6 OPERATING CHECKS AND ADJUSTMENTS.

3.6.1 GENERAL.

Certain operating checks must be made by the pilot or radio operator prior to or during actual operation to insure full utilization of Transceiver 618S-1. Careful observance of these procedures will reduce the chance of equipment failure in service since any abnormal condition may be quickly reported to maintenance personnel if correction of the fault is beyond the scope of the operator. Removal of any of the major components of a 618S-1 installation for repair normally is not accomplished during air operations.

3.6.2 VISUAL INSPECTION.

Make the following visual inspection:

a. Antenna and terminal connections to the Antenna Tuner must be secure.

b. Connections between the Antenna Tuner and Transceiver must be secure.

c. Shockmounts must be securely fastened and grounded to air frame. Clamps and safety wiring on the shockmounts must be secure.

d. Cable connectors must be tightened properly. Tighten locking rings by hand if necessary. Inspect cables for broken wires or loose connections at terminals.

e. Microphone headset and key cords must be unbroken and securely in place.

3.6.3 PREFLIGHT CHECK.

The preflight check will make certain that the equipment is operating properly. The aircraft should be located outside the hangar with aircraft engines running during actual transmission and reception.

a. Turn the primary power circuit breaker switch "ON." Turn the OFF-PHONE-CW switch to PHONE.

b. Set the meter switch on the meter panel to 28 V. The meter on the panel should indicate in the red area of its scale.

c. Select a proper channel. Operate the meter switch to the various positions, pressing the microphone while the switch is in each position. The panel meter should indicate in the red area of its scale at 28 V., 250 V., and P.A. PL. positions, and within a 3-7 range on other positions. The MOD. PL. position will read in the 3-7 scale only if there is a microphone input. Operate the channel switches to all appropriate frequencies, and repeat current indication tests. Output can be monitored in the headset.

CAUTION

Do not exceed the maximum duty cycle of the Antenna Tuner during the preflight test.

d. Place the OFF-PHONE-CW switch in the CW position. Repeat the tests of step c., using the key instead of the microphone. The CW signals can be monitored in the headset. Check the equipment over the entire appropriate frequency range.

e. The swr indicator on the front panel of the Antenna Tuner may vary in reading during channel cycles, but the indicator should rest at 4.5 or lower during transmissions.

f. When tactical restrictions permit, check the complete system by two-way communication with a ground station or other aircraft.

g. Check to make certain that the equipment can be operated by key and microphone from pilot's position.

3.7 EMERGENCY OPERATION.

If Transceiver 618S-1 fails to operate during flight, the basic procedures listed below should be employed in an attempt to restore communication.

a. Check the 28 V. indication on the meter switch to determine whether adequate power is being applied to the equipment. Check switches, fuses, circuit breakers, and connections in the primary power supply lines.

NOTE

Make certain to check thermal reset buttons located on front panel of Power Supply 416W-1.

b. Attempt operation at a different frequency by selecting another channel.

c. Attempt operation from both the pilot's position and the Transceiver location.

d. Replace microphone, key, or headset, as may be appropriate, with similar equipment from another operating position.

e. Make certain that all external connections are securely in place and that cables and connectors are not broken.

f. Check to see that the antenna is not shorted to the aircraft skin or carried away. Should tuneup of the Antenna Tuner take more than 45 seconds, a thermal time-delay relay will open and prevent further operation of the Antenna Tuner. Allow at least 45 seconds for restoration of the relay before attempting another channel change. Check the Antenna Tuner for faults.

3.8 EMERGENCY REPAIRS.

Since components of a 618S-1 installation normally will not be readily accessible for removal during flight, emergency repair procedures are not stipulated. If a cable has been damaged visibly, it may be repaired by splicing, making certain to match color codes and tape the exposed wires.

SECTION IV
PRINCIPLES OF OPERATION

4.1 INTRODUCTION.

In order to trouble shoot and properly maintain Transceiver 618S-1 or 618S-4, a complete understanding of the principles of operation used in the equipment is essential. This section describes the operating principles of the 618S-1 and 618S-4 Transceiver. The operation is first described from an over-all or block diagram point of view; this is followed by a more complete detailed discussion of the circuitry of Transceiver 618S-1. Throughout this section, frequent reference should be made to the main schematic and interwiring diagrams of the various system components, 8-25, 8-26, 8-27, and 8-28, as well as the simplified schematic diagrams of this section. Use the illustrations of section VII for aid in identification of detailed parts within a module or unit.

4.2 GENERAL OPERATION.

Transceiver 618S-1 provides transmitting and receiving facilities within the frequency range of 2.0

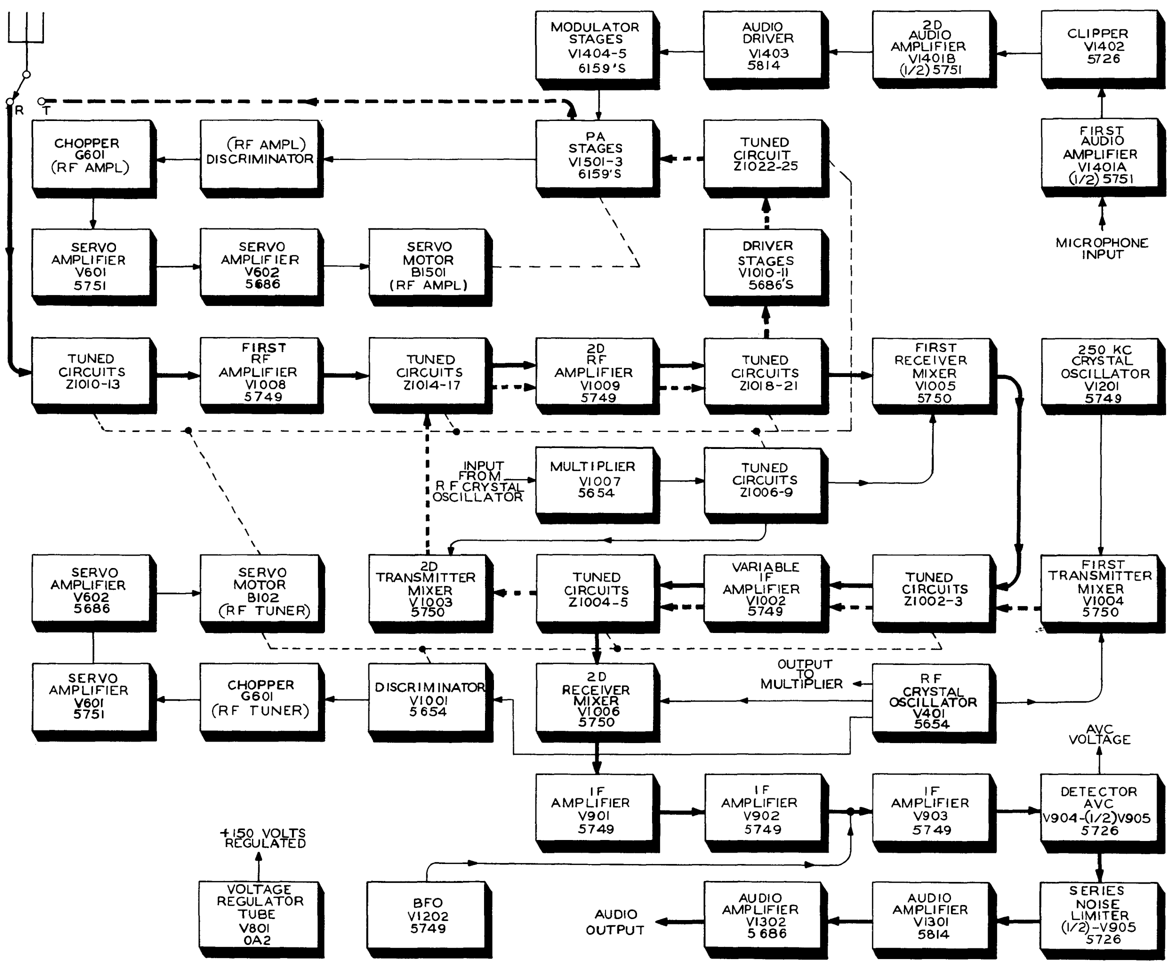

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Figure 4-1. Transceiver 618S-1, Block Diagram to 25.0 mc. Circuits incorporated within the Transceiver function to tune automatically the equipment to the proper frequency whenever a new channel is selected.

A block diagram of the Transceiver is given in figure 4-1. Fundamental frequencies in the range of 1.75 to 3.5 mc are generated in the r-f crystal oscillator. Oscillations generated in this unit are coupled to various stages in the r-f tuner. A phase discriminator in the r-f tuner functions to tune all of the low-level circuits to the proper frequency by means of a servo system. In the transmitter section of the tuner, output of the r-f crystal oscillator (1.75 to 3.5 mc) is combined with various signals in two separate mixer stages to give an output within the frequency range of 2.0 to 25.0 mc. This output is amplified and applied to the grid circuit of the power amplifier. The power amplifier uses three tubes operated in parallel to obtain a minimum of 100 watts output from 2.0 mc to 14.2495 mc and 90 watts output from 14.25 mc to 25.0 mc. Automatic tuning of the power amplifier is accomplished by means of a phase discriminator and servo system.

The receiver section of the r-f tuner uses several tubes in common with the transmitter section. Signal from the antenna is applied to the tuner where it is amplified and mixed with various signals in two separate mixer stages to give an i-f output signal of 250 kc. This i-f signal is then applied to the 250 Kc I-F Amplifier unit where it is amplified and detected to provide audio and avc voltages. Audio voltage is further amplified to provide the audio output of the equipment.

Modulation for voice operation is provided by a separate modulator unit. Microphone voltage is amplified, clipped if desired, and applied to a phase inverter. Output of the phase inverter drives push-pull tubes that modulate the power amplifier stages.

4.2.1 SYSTEM OPERATION.

Transceiver 618S-1 can be used only as part of a complete system. Included in a typical system are the following units of equipment: 618S-1 Transceiver, 180L-2 or 180L-3 Antenna Tuner, 416W-1 Power Supply, and 614D-1, 614D-2, 614D-3 or 614C-2 Remote Control Unit. An auxiliary receiver may be added when Antenna Tuner 180L-3 is used. Refer to the system wiring diagrams of 8-25 through 8-28.

4.3 SEQUENCE OF OPERATION.

4.3.1 AUTOMATIC KEYING.

The sequence of operation using automatic keying is indicated by the solid lines in figure 4-2. Selection of a new channel on 614D-( ) or 614C-2 Remote Control Unit provides a ground circuit for relays K401 and K402 (a complete schematic diagram of 618S-1 is given in figure 8-34). These relays operate, and contacts on the relays close to provide a ground return for motor B401, relay K801, and the table centering circuit of the r-f tuner.

Autopositioner motor B401 rotates until the correct bank and crystal in the r-f crystal oscillator have been selected. At the same time, the motor drives switch S416. This switch contains the band-selector information and supplies a ground circuit for band Autopositioner relay K101.

NOTE

> As described in paragraphs 2.4.1 through 2.4.1.2, the band-selector information is contained on switch S416 when Remote Control Unit 614D-1 is used, but is an integral part of the Remote Control Unit when 614D-2 is used. In the case of 614D-2, the ground return circuit for relay K101 is supplied by switch S2502 at the time a new channel is selected. (Refer to figure 2-19 for a schematic diagram of Remote Control Unit 614D-2.) The 614D-3 is similar to the 614D-2 in this respect. Refer to paragraph 4.8.

Relay K101 operates, and contacts on the relay perform two functions: provide the ground return circuit for Autopositioner motor B103, and supply a ground return for relay K1502 in the power amplifier thus operating the centering circuit of the power amplifier. When relay K1502 operates, contacts on the relay switch the input circuit of a servo amplifier to the centering circuit of the power amplifier. The centering circuit functions to center the roller of input inductor L1502 (see complete schematic) in the proper part of the inductor, the centering position depending upon the band in use. Relay K1502 then de-energizes, and the input circuit of the servo amplifier is returned to the phase discriminator of the power amplifier. Autopositioner motor B103 rotates until the proper band has been selected, and K101 then de-energizes. (Refer to paragraph 4.6 for a complete discussion of the Autopositioner system.)

Operation of relay K801 results in the following: a ground pulse is supplied to the Antenna Tuner to initiate action in that unit; the keying circuit of the transmitter is broken so that transmissions are not permitted during channeling; the starting circuit of the dynamotor is opened as a further precaution in preventing transmissions during tuning. From an examination of the complete schematic of the 618S-1 (figure 8-34), it can be seen that the keying circuit is broken in one place during the channeling cycle by contacts of relay K801. Therefore, all three Autopositioner circuits (band, bank, and crystal selection) must be in the open-circuit or de-energized position before the transmitter can be keyed.

The ground pulse supplied to the Antenna Tuner causes retune information relay K707 and automatic keying relay K708 to operate. Contacts of relay K708 then provide a keying ground to the Transceiver, and the equipment remains in the transmit position.

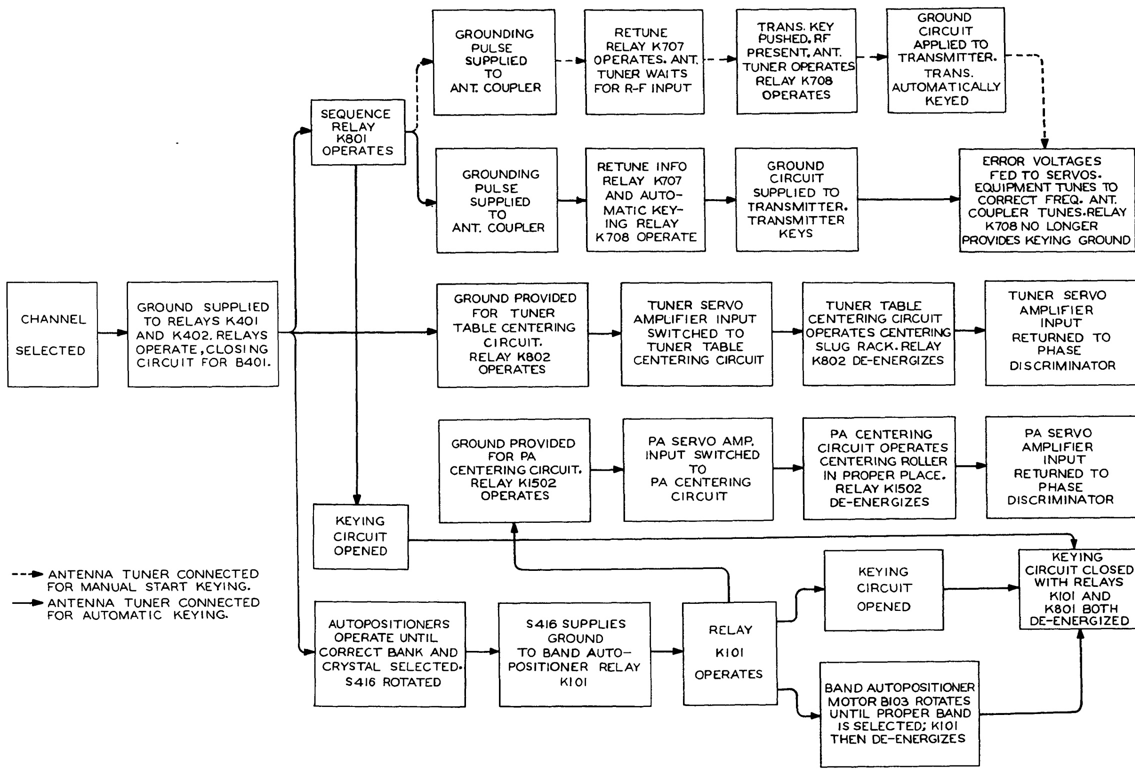

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Figure 4-2. Transceiver 618S-1, Sequence of Operation, Block Diagram

The ground supplied to the r-f tuner table centering circuit causes relay K802 to operate. Contacts on this relay switch the input circuit of a servo amplifier to the table centering circuits. The centering circuit functions to center the slug rack of the r-f tuner. This precaution is necessary to prevent the r-f tuner from possible tuning to the second harmonic of the desired frequency. After the centering circuit has completed its operation, relay K802 is de-energized, and the input of the servo system is returned to the phase discriminator output of the r-f tuner.

The keying circuit of the Transceiver is now complete, and the servo amplifiers are ready to function. Error voltages are applied to the servo amplifiers, and the r-f tuner and power amplifier tune to the proper frequency. With the application of r-f signal to the Antenna Tuner, it also tunes to the proper position. As soon as the Antenna Tuner is tuned, relay K708 de-energizes and the Transceiver is no longer keyed. The equipment is now ready for operation.

4.3.2 MANUAL START KEYING.

The system may be connected for "radio silence" operation. In this case, the following operation results: a ground pulse is supplied to the Antenna Tuner as in automatic keying. Retune relay K707 operates as before, but automatic keying relay K708 does not operate. When the Transceiver key is closed, relay K708 then operates supplying the ground for the Transceiver, and the circuits function as before. In this case, the Transceiver key must be closed after selecting the new channel before the Antenna Tuner will function.

4.4 USE WITH AUXILIARY RECEIVER.

In some cases it may be desirable to use an auxiliary receiver as part of the complete system. When this auxiliary receiver is used, Antenna Tuner 180L-3 must be used. This can be seen by referring to figure 4-3. If the 180L-2 were connected into the system, output would be coupled directly into the input of the auxiliary receiver. This assumes, of course, the use of a common antenna for both the Transceiver and the auxiliary receiver.

4.5 MECHANICAL OPERATION.

All of the automatic tuning operations in Transceiver 618S-1 are operated by one of two methods: by means of servo system or by an Autopositioner mechanism. The r-f tuner and the power amplifier

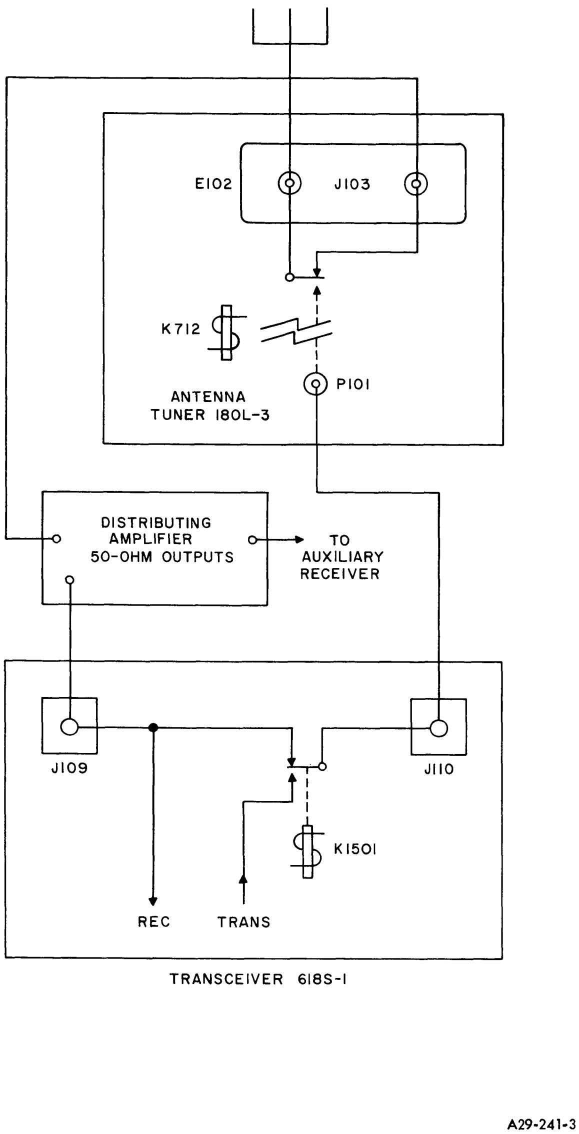

Figure 4-3. Transceiver 618S-1, Antenna Connectors with Auxiliary Receiver

both depend upon servo systems for tuning. All of the crystal selecting is accomplished through three Autopositioners: one system for crystal, bank, and band selection. Since the selection of the crystal and bank are limited to a single unit, the r-f crystal oscillator, these two Autopositioners are not included as part of the functional diagram given in figure 4-4. A complete discussion of the Autopositioner system is given in paragraphs 4.6 through 4.7.

4.5.1 BAND-SELECTOR OPERATION.

Refer to figure 4-4. Selection of a particular band is dependent upon operation of either S416 in the r-f crystal oscillator or S2502 in Remote Control Unit 614D-2. This is discussed in paragraphs 2.4.1 through 2.4.1.2. When one of these switches operates depending upon the system of frequency control employed, a circuit is completed through S102 to energize Autopositioner relay K101. This relay operates, lifting pawl O107 out of the stop-wheel slot of O130 and provides a ground return for Autopositioner motor B103. The motor rotates, driving clutch gear O129 through gear assemblies O103 and O105. This causes both stop wheel O130 and gear O112 to rotate. Gear O113 meshes with gear O112, driving switch S102 and coupler O131. Switch S102 and stop wheel O130 continue to rotate until the proper band has been selected. At this time the circuit through S102 is no longer complete, relay K101 is de-energized, pawl O107 falls in a notch on the stop wheel, and motor B103 is de-energized. Any carry-over or coasting is dissipated in clutch slippage.

The rotational motion of coupler O131 is coupled to switches S1002, S1001, S1003 through S1006, S1503, S1501, S1502, and S1506 by a system of gear and coupling arrangements as indicated in figure 4-4. This places all of these switches in the proper band position. Cam gear O1503 functions to close switch S1504 in bands 2, 3, and 4 positions, placing C1523 in the circuit. (Refer to paragraph 4.9.4.)

4.5.2 R-F TUNER OPERATION.

Refer to figure 4-4. The low-level circuits of the r-f tuner are tuned automatically by means of a servo system. When a new channel is selected, the slug rack is first centered as described in paragraph 4.9.3. The centering circuit functions when switch S1007 is rotated by means of gears O1026 and O1027. After the slug rack has centered, error control voltage from the r-f tuner discriminator is fed to servomotor B102. The motor rotates driving coupler O132 through a series of gears (O124-O128). The rotational motion of O132 is coupled to the r-f tuner through clamp O1032 driving gears O1018 and O1026. This rotational motion converted to vertical motion continues until the circuits in the r-f tuner are properly tuned. When this occurs, the control voltage to operate motor B102 no longer exists, and tuning ceases.

4.5.3 POWER AMPLIFIER OPERATION.

Refer to figure 4-4. Tuning operations in the power amplifier also depend upon a servo system. When a new channel is selected, a ground is supplied to K1502. This operates the band centering circuit in the power amplifier. Motor B1501 rotates, driving inductor L1502 and thus drives gears O1518 and O1519, rotating S1505. This switch (and S1506) functions to keep motor B1501 rotating until contact wheel E1513 is moved to that portion of L1502 corresponding to the center of the band being used. (Refer to paragraph 4.9.4 for a complete discussion of the band centering circuit.) Upon completion of the centering operation, motor B1501 then drives inductor L1502 to position contact wheel E1513 in

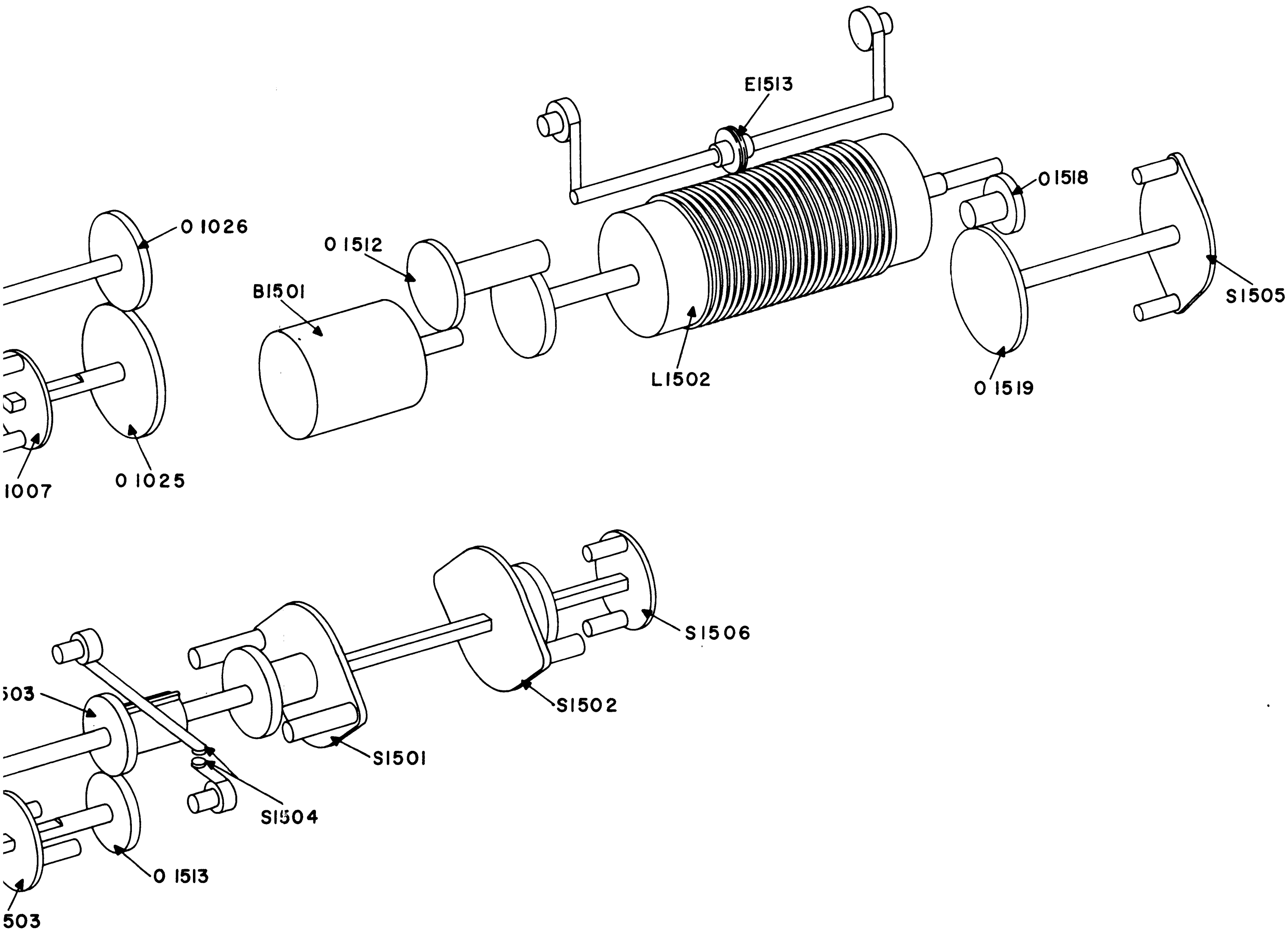

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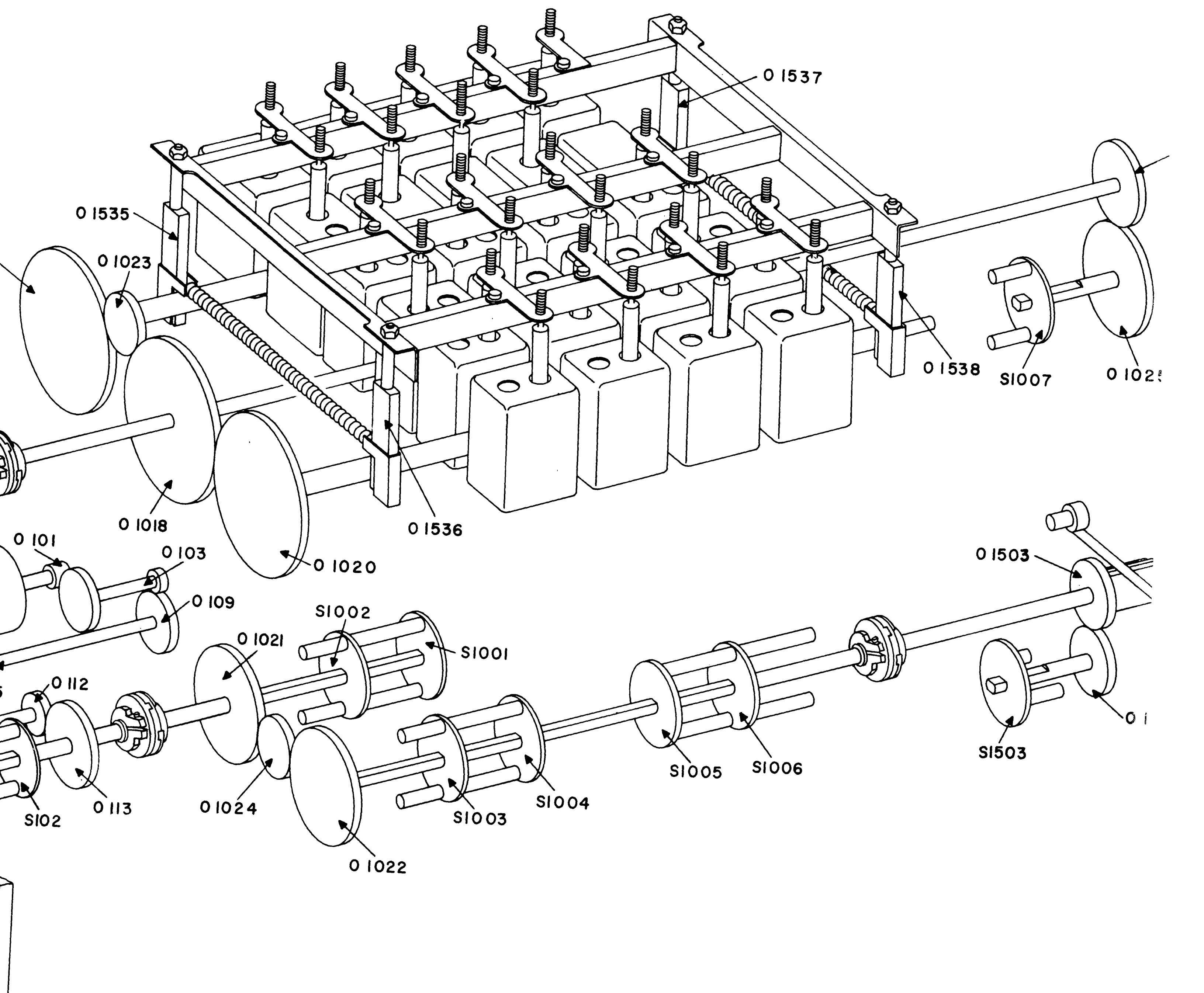
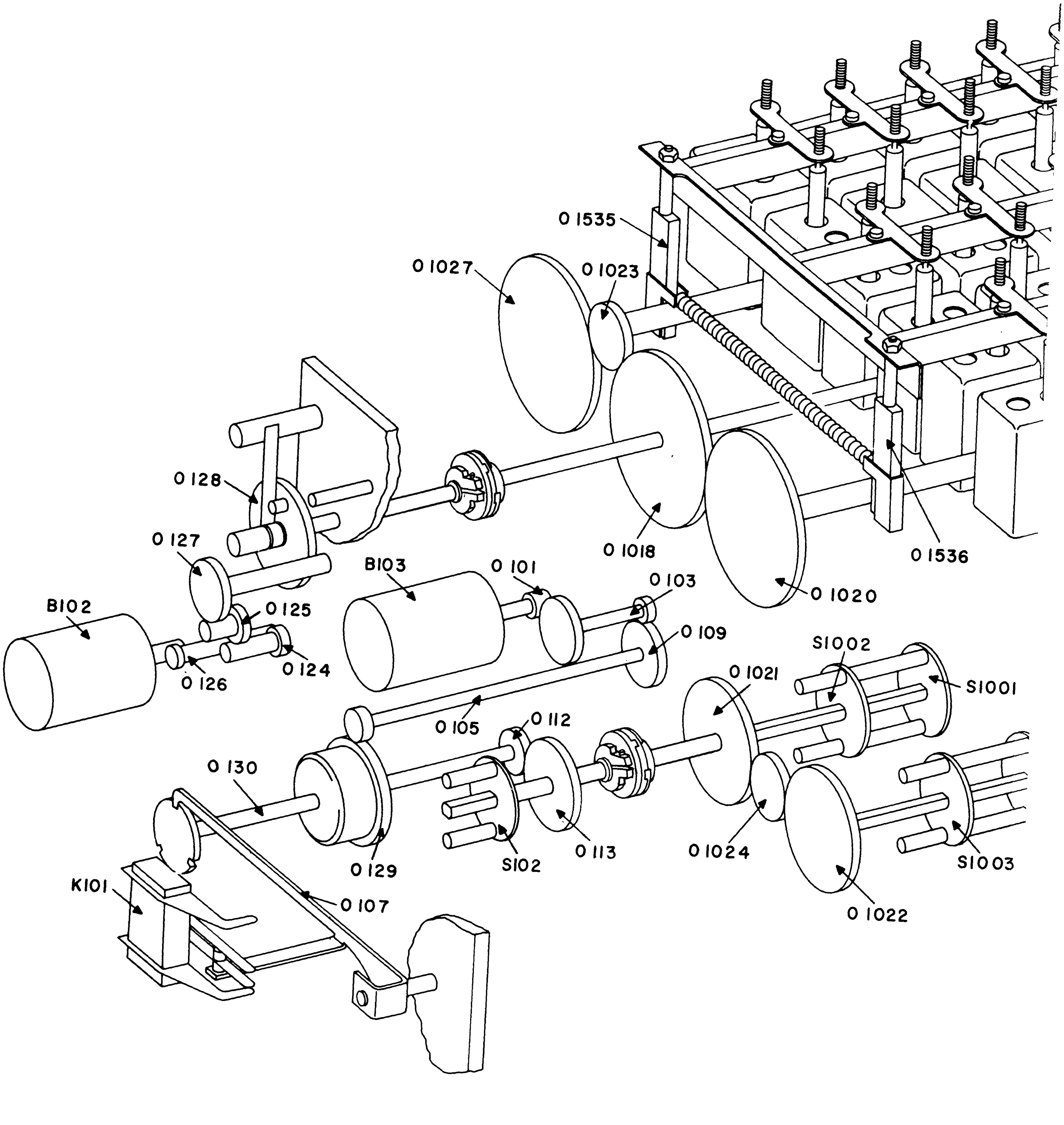
Figure 4-4. Transceiver 618S-1, Mechanical System, Functional Diagram


0 1537
0 1535
0 1023
0 1538
S1007
0 1018
0 1536
0 101
0 103
0 1020
0 1503
0 109
S1002
0 1021
S1001
0 112
S1503
S1005
S1006
S102
0 113
0 1024
S1004
S1003
0 1022


O 1535
O 1027
O 1023
O 128
O 127
O 1018
O 1536
B103
O 101
O 103
O 1020
B102
O 125
O 109
O 126
O 124
S1002
O 1021
S1001
O 105
O 112
O 130
O 129
S102
O 113
O 1024
S1003
K101
O 107
O 1022

the correct position to tune the power amplifier to resonance. The proper capacitors are selected by switches S1501, S1502, S1503, and S1504 whose positioning is previously described in paragraph 4.5.1.

4.6 AUTOPOSITIONER SYSTEM.

To provide automatic selection of channels, Transceiver 618S-1 is equipped with an Autopositioner rotary positioning system. The system consists of three Autopositioner units. Two of the Autopositioner units are driven by a common motor and utilize six-wire control systems. The third Autopositioner unit is driven by a separate motor and uses a four-wire system operating in conjunction with a switch section of another Autopositioner unit when Remote Control Unit 614D-1 is used or in conjunction with a switch section of the 614D-2, 614D-3, or 614C-2 when these are used. One Autopositioner unit is controlled by the bank-selecting switch of the 614D-( ) Remote Control Unit (S2302 or S2502) and operates the crystal bank selector switch (S403) associated with the r-f crystal oscillator. A second Autopositioner unit is controlled by the crystal-selecting switch on the 614D-( ) Remote Control Unit (S2301 or S2501) and operates the crystal-selector switch (S404-S405) in the r-f crystal oscillator. The third Autopositioner functions to select the proper band of frequencies in which the equipment will operate. The band selected depends upon the wiring of switch

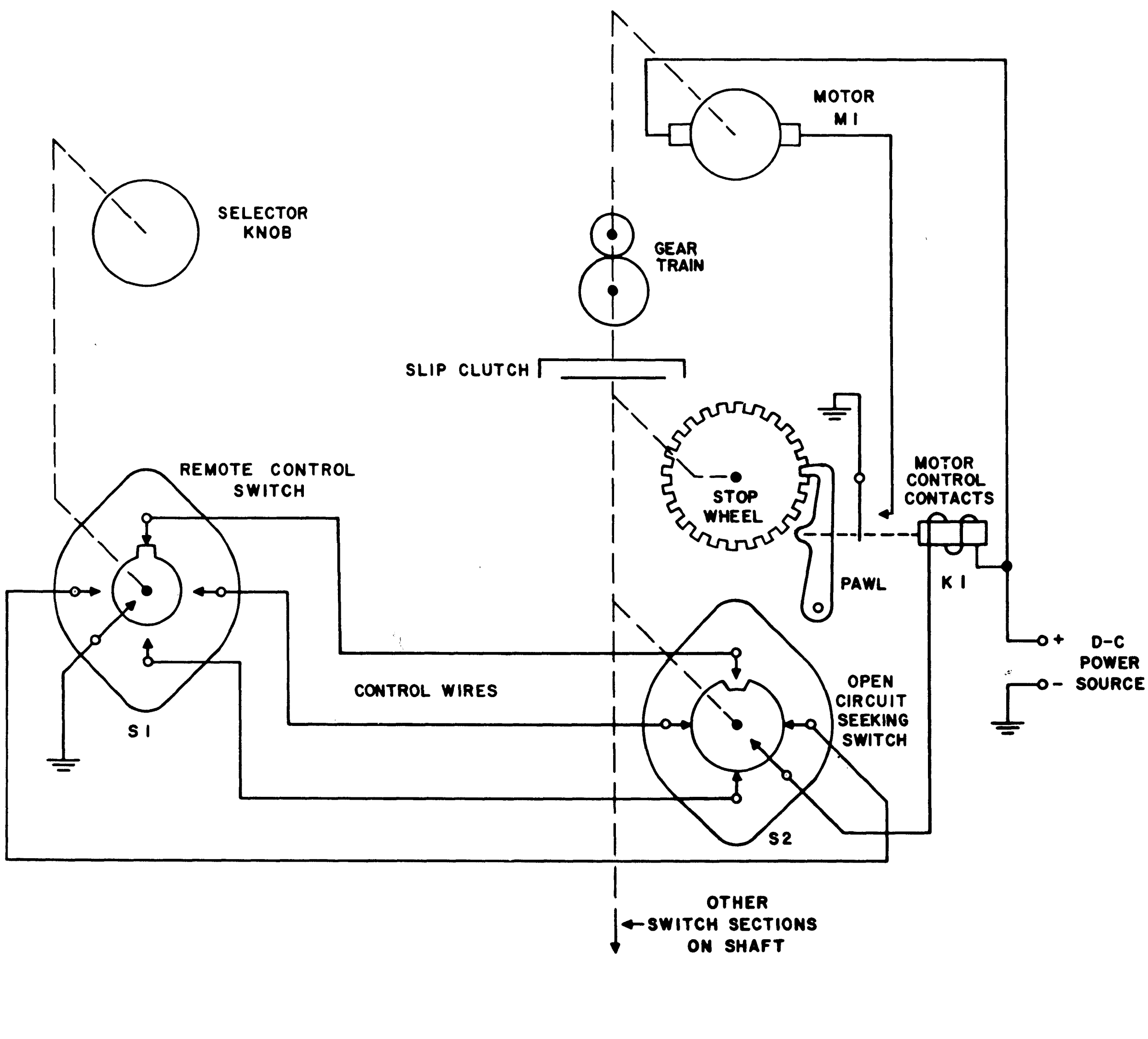


Figure 4-5. Autopositioner System Basic Elements

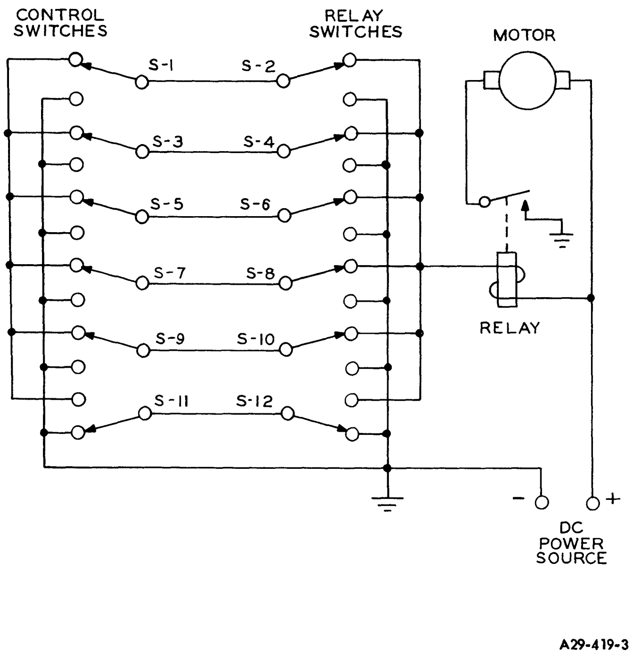


Figure 4-6. Autopositioner System, Functional Diagram

S416 when the 614D-1 is used (as discussed in paragraph 2.4.1.1) or upon the positioning of switch S2502 when the 614D-2 is used (as discussed in paragraph 2.4.1.2). The bank- and crystal-selecting Autopositioners, motor, and drive gears are mounted on the front of the r-f crystal oscillator. The band-selector Autopositioner and its associated parts are located on the front panel board of the Transceiver.

4.6.1 AUTOPOSITIONER OPERATION.

An Autopositioner is a motor-driven rotary positioning mechanism providing automatic selection of any one of a given number of positions, each position being a fixed function of the switch combinations of the system. The basic elements of the Autopositioner, as shown in figure 4-5, consist of a motor and its gear reduction train, a slip clutch, a rotary shaft to which is fastened a notched stop wheel, a pawl which engages the notches of the stop wheel, and a relay which actuates the pawl and also operates a set of electrical contacts to start and stop the motor. Associated with each Autopositioner unit is an electrical control system consisting of a remotely located control switch actuated by a selector knob and a similar seeking switch driven by the Autopositioner shaft. In the case of the band-selecting Autopositioner, the selector knob is replaced by switch S416 or S2502. This control system is of the open circuit seeking type designed so that whenever the control switch and seeking switch are not set to the same electrical position, the Autopositioner unit is energized and operates to drive its shaft (and the driven elements to which it is coupled) to the proper position to restore the symmetry of the control system.

4.6.2 CYCLE OF OPERATION.

The cycle of operation of the Autopositioner is as follows:

a. The system is at rest with the control and seeking switches in corresponding positions (open circuit), relay in de-energized position, pawl engaging a stop-wheel notch, and motor not energized.

b. The operator changes the setting of the remote control selector switch.

c. The control system energizes the relay, lifting the pawl out of the stop-wheel notch and closing the motor control contacts.

d. The motor starts, driving the Autopositioner shaft and the rotor of the seeking switch.

e. The seeking switch reaches the point corresponding to the new position of the remote switch, opening the relay circuit, permitting the pawl to drop into the corresponding stop-wheel notch to stop the shaft rotation.

f. The motor control contacts open, and the motor coasts to a stop dissipating its kinetic energy in the slip clutch.

The seeking switch of the control circuit is adjusted to open the relay circuit shortly before the stop wheel reaches the point where the pawl engages the proper notch. The relay contacts controlling the motor are mechanically operated by the pawl arm so that they do not open until the pawl does drop into the notch. Note that the slip clutch between the motor and Autopositioner not only absorbs the energy of the motor as it coasts to a stop but also permits the same motor to drive more than one Autopositioner, either simultaneously or independently. The motor control contacts of the Autopositioner relays are connected in parallel to keep the motor operating as long as any of the Autopositioners are energized.

4.6.3 AUTOPOSITIONER CONTROL SYSTEM.

Two wiring systems are used in the Autopositioner control system of Transceiver 618S-1. Six wires, designated R through W, are used in a re-entrant system of simplified control for the 24-position crystal selector circuit. Six wires, designated A through F, are grounded individually in sequence in the crystal bank selector circuit. Four wires, designated K through N, are used in the band-selector Autopositioner circuit.

4.6.4 CONTROL CIRCUITS.

This system is most readily explained by considering a system composed of single-pole, double-throw switches as shown in figure 4-6. Note that when the switches are set symmetrically (S-1 in the same position as S-2, etc., as shown), there is no current path from the relay coil to ground, and the relay and motor remain de-energized. If, however, any one of the control switches is set to a position opposite to that of the corresponding seeking switch, a path to ground will be closed, energizing the relay and motor until the seeking switches are repositioned (by means discussed below) to positions symmetrical to the remote switches, which will again open the relay circuit. The total number of different combinations of switch positions in such a system is 2^n, where n is the number of control wires used. In the four-wire system shown, $2^4 = 16$ different combinations exist. However, one particular combination is not usable in this application. As can be seen in figure 4-6, if all the seeking switches are set to the B position, there can be no path from the relay coil to ground no matter how the remote switches are set, and the system is dead. Hence the maximum number of usable combinations in such a system is $2^n - 1$. A 3-wire system can control 7 positions, 4 wires 15 positions, and 5 wires 31 positions.

Instead of using the minimum five wires theoretically possible, the 618S-1 makes use of the six-wire system recommended in ARINC characteristic no. 524. This system is the re-entrant type discussed above and follows the same theory. To make the system of figure 4-6 physically usable for controlling rotary switch positions, leaf-type single-pole, double-throw switches could be used, actuated by means of a group of cams mounted on the rotary shaft, the cams being cut to actuate the switches to a different combination for each shaft position, identical cams and switches being used on the remote control shaft and on the motor-driven shaft. To eliminate the bulk and complexity of such an arrangement, special rotary wafer-type switches are used to perform the same function. These switches are shown in figure 4-7. Each switch consists of two rotor blades mounted on opposite sides of the switch rotor and insulated from each other. These take the place of the parallel-bus connections of figure 4-6.

Looking at switch S2301 in figure 2-16 for example, control wires R, S, T, U, V, and W terminate in contacts 4, 5, 6, 7, 8, and 9. These contacts consist of clips on both sides of the switch. Since the two blades are cut to complementary patterns, each control wire is connected to either the front or rear blade of the switch as the switch rotor is turned. The clips and blades co-operate, therefore, to produce a system of two-position switches analogous to the system shown in figure 4-6.

4.6.5 SEEKING SWITCH.

The seeking switch, S401, in figure 2-16 is similar to remote switch S2301 in that it presents the same sequence of front and rear blade connections to clips 6, 7, 8, 9, 10, and 11 which are the other terminal points of control wires R-W. When the two switches are on corresponding positions, both ends of each control wire contact the same side (front or rear) of the respective switches. In this position the Autopositioner relay circuit is open since the front blades of both switches are grounded by means of the long clips shown, and the rear blade of S401 is connected to the Autopositioner relay by the long clip at position 22. In any other positioning arrangement of the switches, a circuit for the relay is completed which closes the motor circuit and allows the motor to turn its shaft until corresponding switch positions are again reached.

4.7 DETAILED SEQUENCE OF OPERATION.

A detailed sequence of operation of the channel-selecting circuits is shown in figure 4-7.

NOTE

B103 band Autopositioner motor.
K101 band relay.
B401 bank and crystal Autopositioner motor.
K401 crystal relay.
K402 bank relay.
Wires carrying current shown in heavy lines.
Switches are viewed from end of shaft opposite knob or driven end.
○ contact opposite side shown.
● contact side shown.
◉ contact both sides.

In step 7, b, all switches mounted on shaft of crystal-selector Autopositioner (switches S404 through S415) actually rotate, but only those mentioned are connected in the circuit.

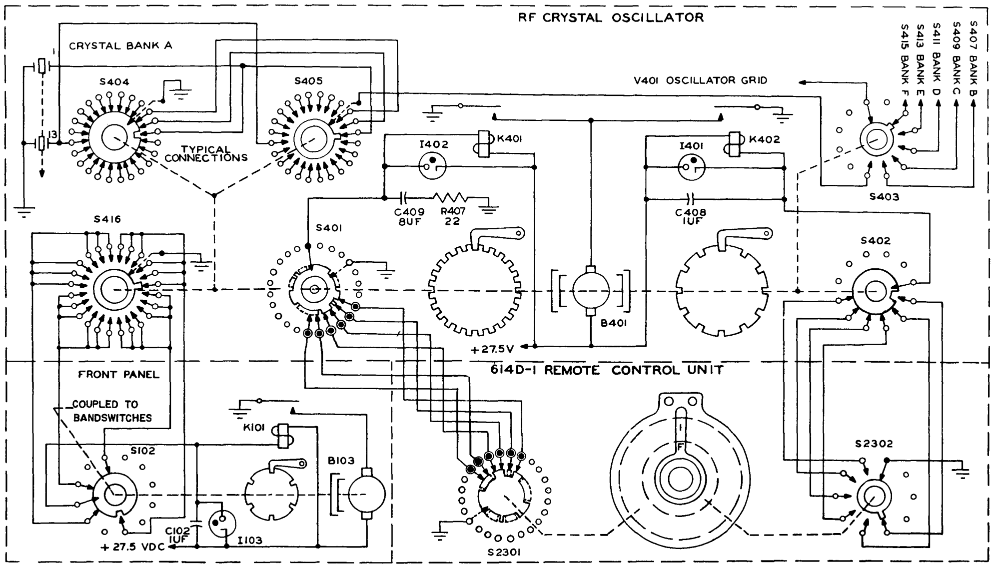


Figure 4-7. Autopositioner Sequence of Operation (Step 1 of 13 steps) A29-472-4

a. It is desired to select a frequency corresponding to channel A-13.
b. The Autopositioners are at rest in the previously selected position of channel F-1. Note that the crystal-selecting switch for Bank F, switch S414, is not shown, and bank F switch S415 is only indicated.
c. Voltage is available to control system. A ground must be supplied before system will operate.

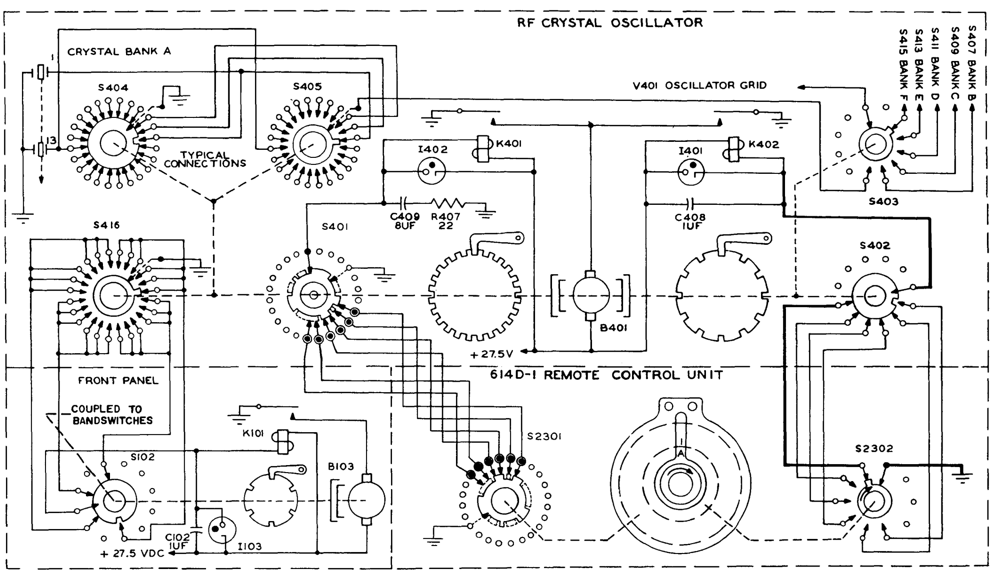
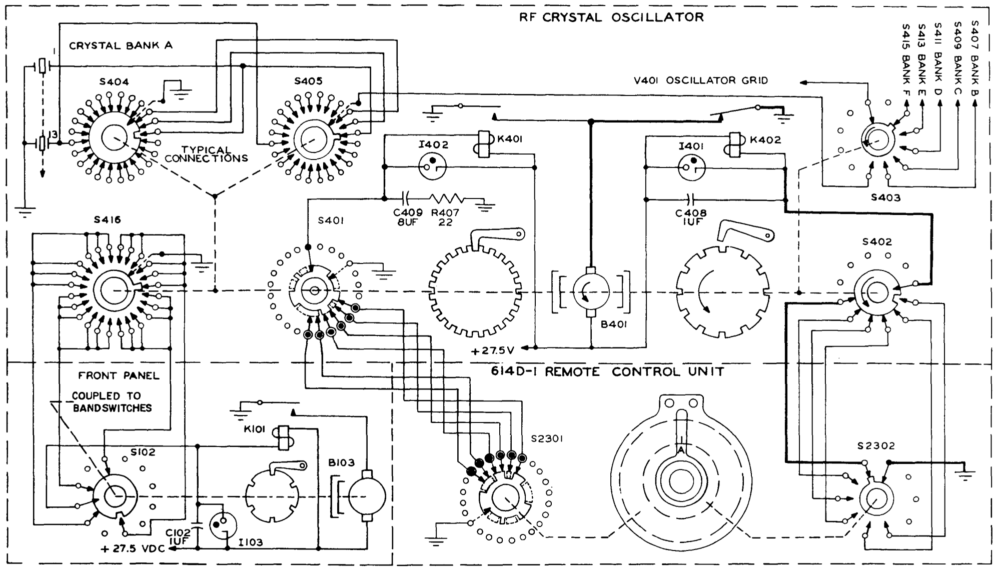


Figure 4-7. Autopositioner Sequence of Operation (Step 2 of 13 steps) A29-473-4

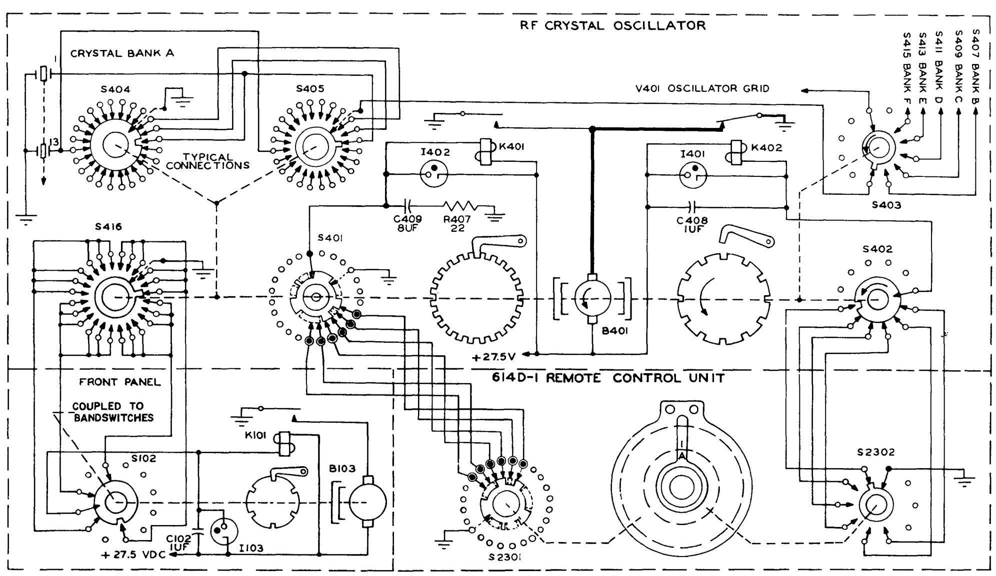
a. Bank selector on 614D-1 Remote Control Unit is rotated to the A position.
b. Switches S2302 and S402 co-operate to place ground on coil of bank-selector Autopositioner relay K402 energizing the relay.



A29-474-4

Figure 4-7. Autopositioner Sequence of Operation (Step 3 of 13 steps)

a. Contacts of relay K402 operate closing motor energizing circuit of B401 and lifting pawl out of toothed wheel of bank-selector Autopositioner.
b. Motor B401 rotates driving toothed wheel of bank-selector Autopositioner and switches S402 and S403 through clutch.
c. Clutch of crystal-selector Autopositioner slips.



A29-475-4

Figure 4-7. Autopositioner Sequence of Operation (Step 4 of 13 steps)

a. Bank-selector Autopositioner reaches position where switches S402 and S2302 are in corresponding positions.
b. Continuity is broken between the coil of relay K402 and ground.

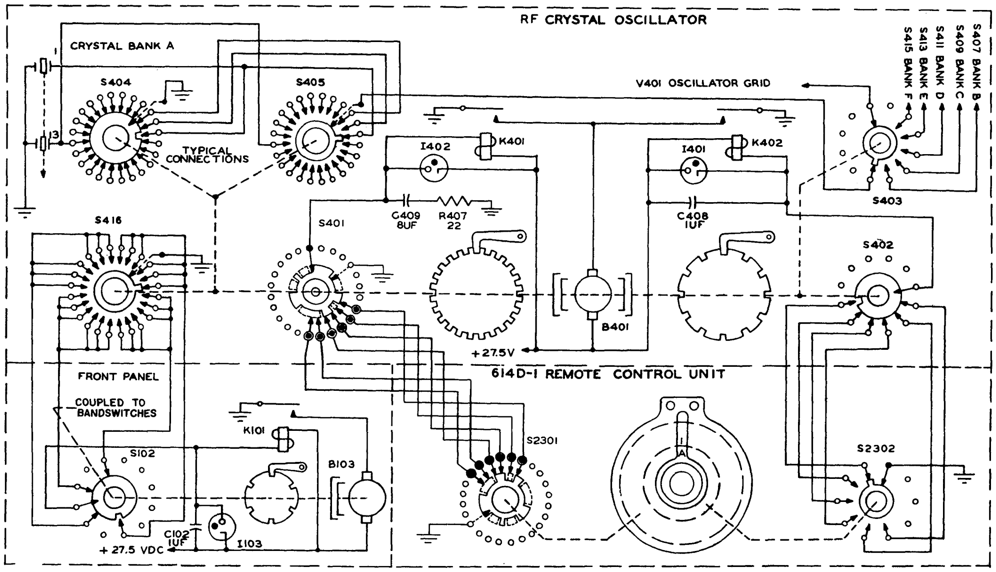


Figure 4-7. Autopositioner Sequence of Operation (Step 5 of 13 steps) A29-476-4

a. Relay K402 releases dropping the pawl into a slot of the toothed wheel and removing voltage from motor B401.
b. System comes to rest at channel A-1.

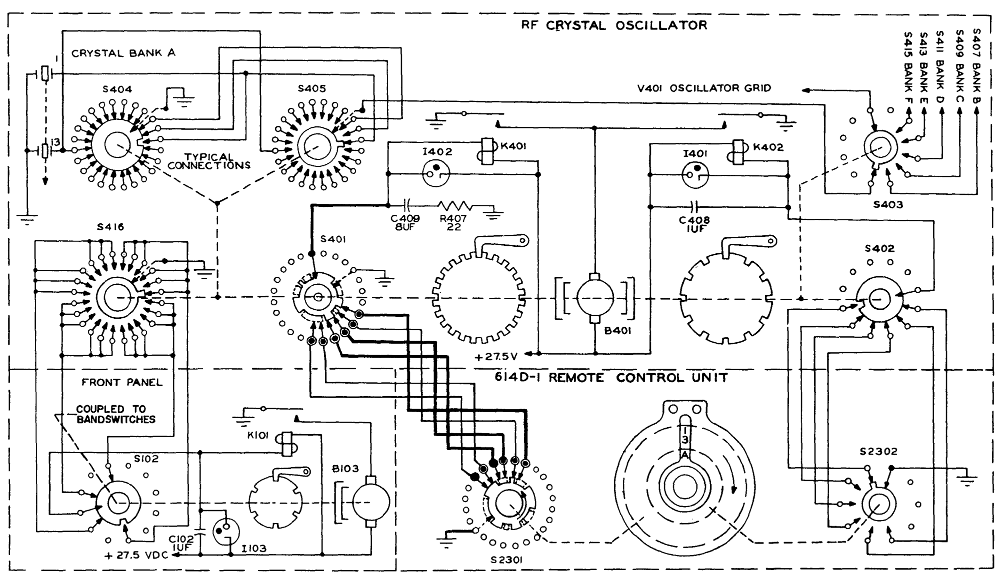


Figure 4-7. Autopositioner Sequence of Operation (Step 6 of 13 steps) A29-477-4

a. Crystal selector on 614D-1 Control Unit is rotated to crystal 13 position.
b. Switches S2301 and S401 co-operate to place ground on coil of crystal-selector Autopositioner relay K401 energizing relay.

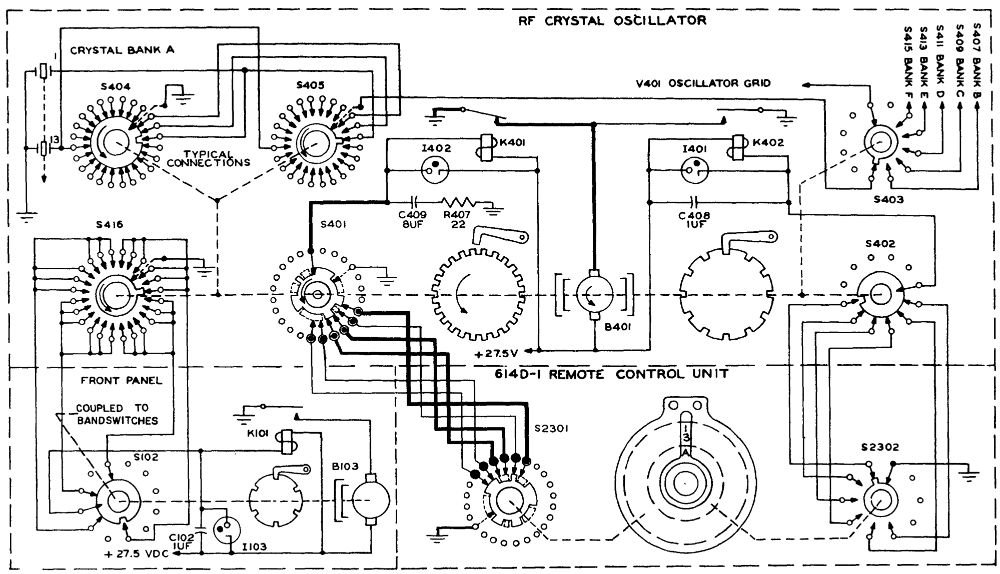


Figure 4-7. Autopositioner Sequence of Operation (Step 7 of 13 steps)

A29-478-4

a. Contacts of relay K401 operate closing motor-energizing circuit of B401 and lifting pawl out of toothed wheel of crystal-selector Autopositioner.
b. Motor B401 rotates driving toothed wheel of crystal-selector Autopositioner and switches S401, S404, S405, and S416 through clutch.
c. Clutch of bank-selector Autopositioner slips.

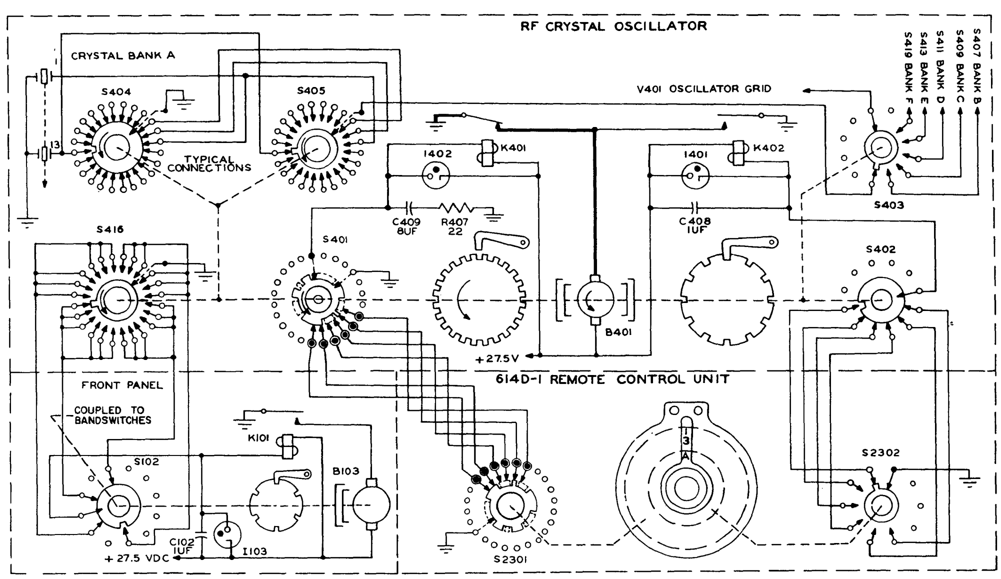
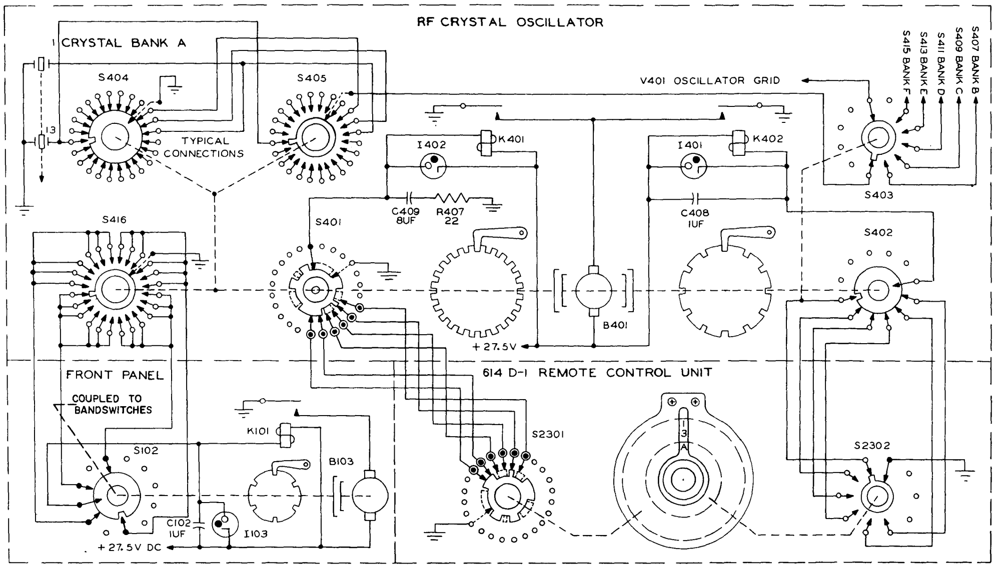


Figure 4-7. Autopositioner Sequence of Operation (Step 8 of 13 steps)

A29-479-4

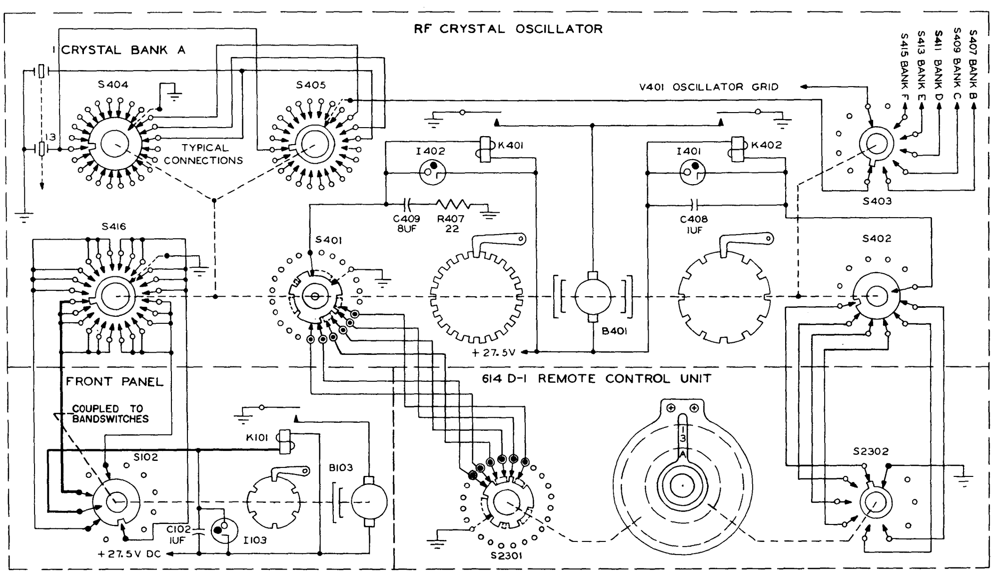
a. Crystal-selector Autopositioner reaches position where switches S401 and S2301 are in corresponding positions.
b. Continuity between the coil of relay K401 and ground is broken.



A29-480-4

Figure 4-7. Autopositioner Sequence of Operation (Step 9 of 13 steps)

a. Relay K401 releases dropping the pawl into a slot of the toothed wheel and removing voltage from motor B401.
b. System comes to rest at channel A-13.



A29-481-4

Figure 4-7. Autopositioner Sequence of Operation (Step 10 of 13 steps)

a. At the same time, band-assignment switch S416 has been rotated to a new position by the operation of the crystal-selector Autopositioner.
b. Switches S416 and S102 co-operate to place ground on coil of band-selector Autopositioner relay K101 energizing the relay.

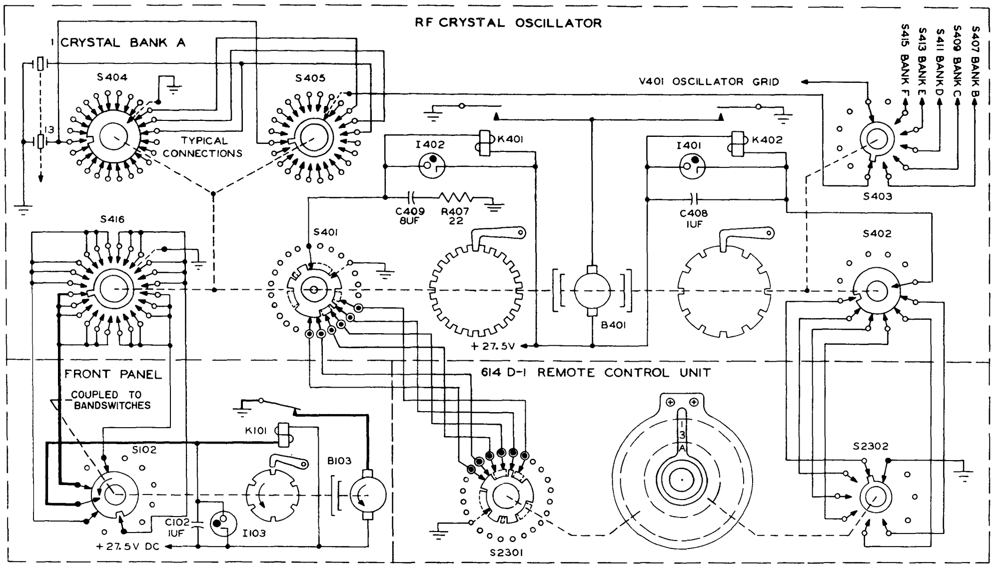


Figure 4-7. Autopositioner Sequence of Operation (Step 11 of 13 steps) A29-482-4

a. Contacts of relay K101 operate closing motor-energizing circuit of B103 and lifting pawl out of toothed wheel of band-selector Autopositioner.
b. Motor B103 rotates driving toothed wheel of band-selector Autopositioner and switch S102 through clutch.

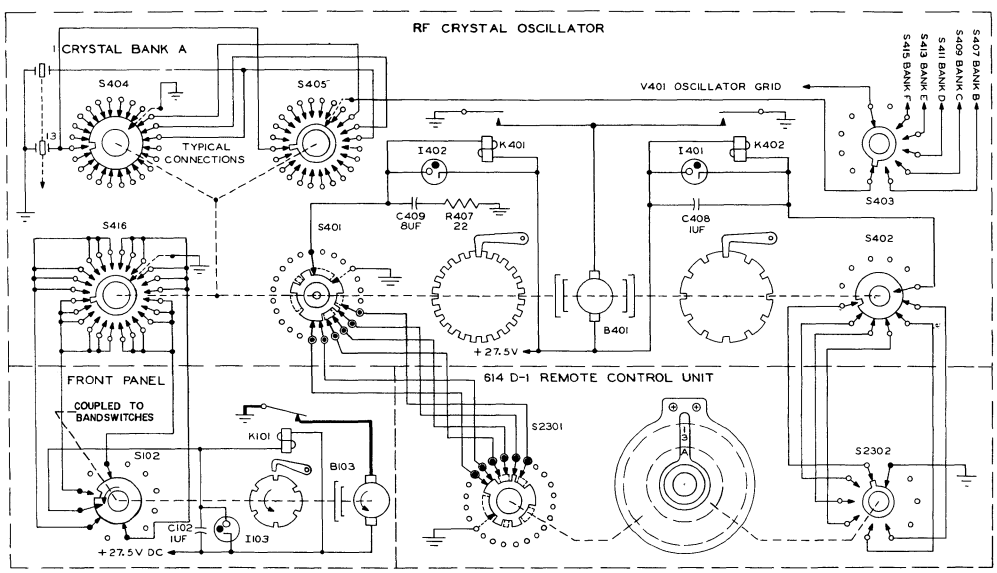


Figure 4-7. Autopositioner Sequence of Operation (Step 12 of 13 steps) A29-483-4

a. Band-selector Autopositioner reaches position where switches S102 and S416 are in corresponding positions.
b. Continuity is broken between the coil of relay K101 and ground.

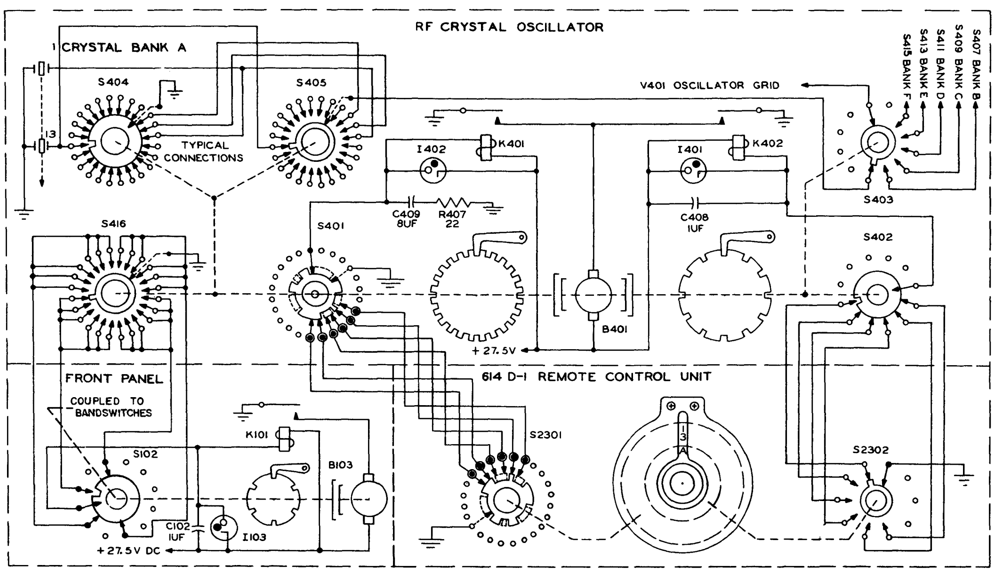


Figure 4-7. Autopositioner Sequence of Operation (Step 13 of 13 steps)

A29-484-4

a. Relay K101 releases dropping the pawl into a slot of the toothed wheel and removing voltage from motor B103.
b. System is at rest in channel A-13 with band switches in proper band position.

4.8 REMOTE CONTROL DETAILED ELECTRICAL DISCUSSION.

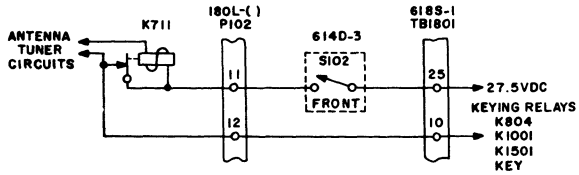
4.8.1 REMOTE CONTROL UNIT 614D-1.

Remote Control Unit 614D-1, consisting of crystal-control switch S2301, bank-selector switch S2302, and the mechanical drive control provides for remote channel selection of the various 618S-1 frequencies. Refer to figure 8-25.

The inner knob of the channel selector is a mechanical drive whose function is to operate bank-selector switch S2302 and indicate the proper bank of crystals by means of a letter. Operation of this control results in switch S2302 changing positions, thereby providing a ground circuit for a motor in the 618S-1 r-f crystal oscillator, and thus operating the bank-selector switch to the correct bank of crystals. An open-seeking switch in the crystal oscillator unit removes the ground from the motor circuit by operation of a relay. This motor, B401 in the r-f crystal oscillator, is equipped with a clutch assembly. This clutch assembly performs the functions of compensating for the inertia of the motor and allowing the crystal-selector switches and band switches to operate independently of the bank-selector switches.

The larger outer knob is mechanically ganged to the crystal-control switch, S2301. Operation of this control to the proper numbered crystal, visible above the bank letter, results in switch S2301 changing positions. This provides a ground for motor B401 by activation of a relay in the crystal oscillator unit of the 618S-1. Ganged to the motor gear train are a clutch assembly whose function is similar to that above, an open-seeking switch whose function is to open the relay ground when the proper crystal is selected, a crystal-selector switch, a crystal-shorting switch which shorts out all unused crystals, and a band-selector switch. The proper crystal is selected and the ground circuit for motor B401 is removed. The band-selector switch may have been operated to a new position, thus providing a ground return for a second motor, B103, by operation of a relay in this circuit. The gear train of motor B103 is coupled to the band switches throughout the 618S-1 Transceiver, performing the function of switching the 618S-1 to the various bands of operation. The rotation of motor B103 is stopped by an open-seeking switch which removes the motor ground circuit when the proper band is selected. Two stop wheels are employed in the r-f crystal oscillator unit. They serve the purpose of preventing the various switches from operating except when the control relays are energized as a result of the channel-selector switch being rotated.

When the 614D-1 Remote Control Unit is used, the band-selector switch is wired into the r-f crystal oscillator as a permanent installation. Switch S416 is wired using six crystals in each bank for four bands. Using this system of wiring, 36 crystal



A29-265-2

Figure 4-8. Remote Control Unit 614D-2, Transmission Disabling Diagram

positions are available in each of four bands resulting in a possible 144 frequencies. If it is desired to have more than 36 crystal positions in any one band, S416 will have to be rewired. Also, crystal positions may be sacrificed in the other bands. This is because crystal positions selected are in multiples of six. For example, if 37 frequencies are desired in bands 1, 2, and 3, band 4 will be left with only 18 crystal positions. The choice of 1 crystal in each of 5 banks, 3 bands, or 15 crystal positions has been sacrificed. The five remaining crystal positions in bands 1, 2, and 3 make up the multiple of 42 possibles and may not be used. Remote Control Unit 614D-1 is, therefore, somewhat limited due to the method of band selection employed.

4.8.2 REMOTE CONTROL UNIT 614D-2.

Refer to figure 8-26. Operation of Remote Control Unit 614D-2 is basically the same as the 614D-1 without the disadvantage of sacrificing any of the 144 channels. This is accomplished by removing the band selection functions from the r-f crystal oscillator unit and incorporating it within the Remote Control Unit. An extra switch, S2502 front, which performs the function of band selection for the 618S-1 installation is included within the 614D-2 Remote Control Unit. This switch operates independently of the crystal-selector open-seeking switch. All of the 144 channels may be used as a result of this modification.

4.8.3 REMOTE CONTROL UNIT 614D-3.

Refer to figure 8-27. Switches S101 and S103 in 614D-3 Remote Control Unit perform identical functions to switches S2501 and S2502 in 614D-2 Remote Control Unit. An additional switch, S102, is ganged to switch S103 in 614D-3. This switch performs two functions: the front section breaks the keying circuit in Transceiver 618S-1 so that transmission is impossible on certain predetermined channels, and the rear section places a shunt capacitor in the antenna circuit on the channels where the Antenna Tuner would otherwise fail to tune on its first cycle. A simplified schematic of the transmission disabling switch, S102 front, is shown in figure 4-8. One crystal bank in each band may be disabled for transmission as is illustrated. Figure 4-9 illustrates the position and function of switch S102 rear for one crystal bank in each band. Relay K710 in the Antenna Tuner is activated as shown, and the shunt C capacitor connected from antenna to ground. Frequencies requiring shunt C information will vary with each unit and is determined upon installation in the aircraft.

When Remote Control Unit 614D-3 is used, placement of the crystals within the crystal oscillator positions are as shown in tables 4-1, 4-2, and 4-3.

TABLE 4-1

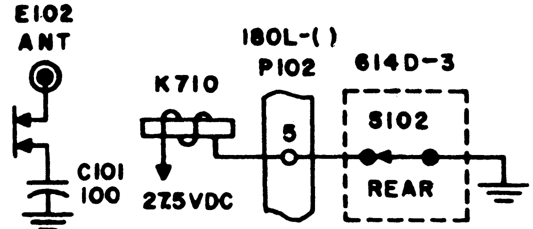
TRANSMISSION DISABILITY CRYSTAL PLACEMENT

BAND	CRYSTAL BANK	CHANNEL SELECTION
1	A	A1-A24
2	B	H1-H24
3	C	Q1-Q24
4	D	X1-X24

TABLE 4-2

SHUNT C CRYSTAL PLACEMENT

BAND	CRYSTAL BANK	CHANNEL SELECTION
1	B	B1-B24
2	C	J1-J24
3	D	R1-R24
4	E	Y1-Y24



A29-264-2

Figure 4-9. Remote Control Unit 614D-3, Shunt C Diagram

TABLE 4-3

PLACEMENT OF REMAINING CRYSTALS

BAND	CRYSTAL BANK
1	C, D, E, or F
2	A, D, E, or F
3	A, B, E, or F
4	A, B, C, or F

NOTE

It should be understood that the crystal mounting positions of the crystal oscillator have not been changed to include the letters G through Z. The positions remain A through F with the understanding that banks G to M, N to T, and U to Z correspond to crystal positions A through F with the output frequency in bands 2, 3, or 4.

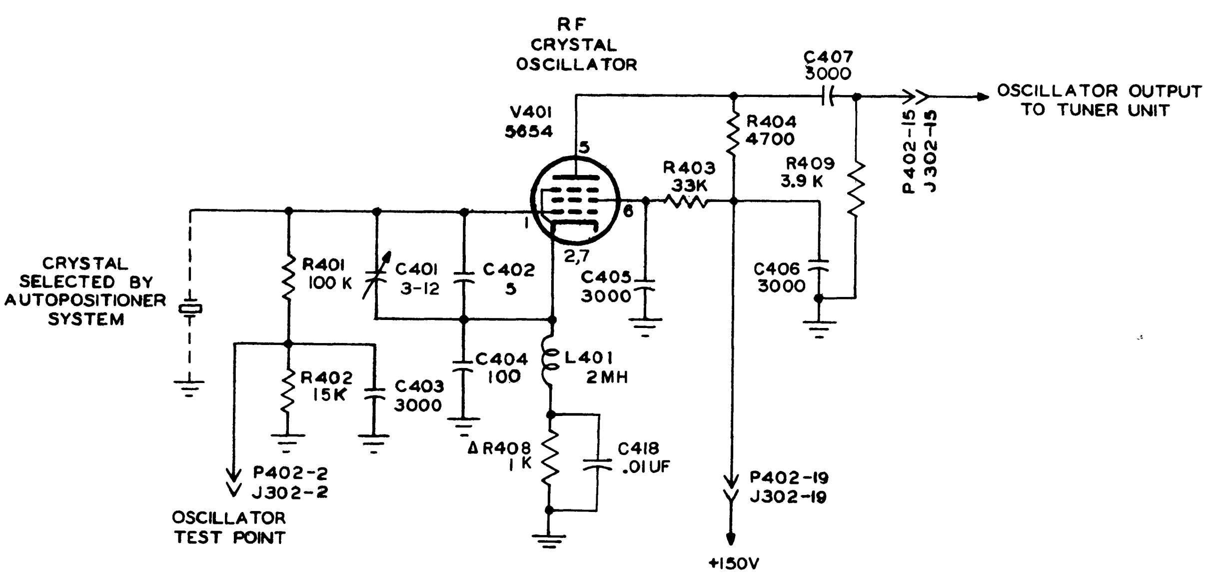
4.8.4 REMOTE CONTROL UNIT 614C-2.

Refer to figure 8-28. The method of frequency selection employed in the 614C-2 Remote Control Unit is identical to that of the 614D-2 and 614D-3 Remote Control Units. Switches S2601 and S2602 correspond to S101 and S103 in the 614D-2, and to S2501 and S2502 in the 614D-2. In addition to these controls, the 614C-2 contains the OFF-PHONE-CW switch, the gain control, and the BFO control. Shunt C and transmission disabling functions are not included with the 614C-2 Remote Control Unit.

4.9 CIRCUIT DESCRIPTION.

4.9.1 R-F CRYSTAL OSCILLATOR.

The r-f crystal oscillator, V401, uses a type 5654 pentode in a Colpitts-type circuit. The arrangement used is equivalent to a grounded-plate Colpitts. As can be seen in figure 4-10, excitation depends upon the capacitance ratio of C401-C402 and C404. Variable capacitor C401 adjusts this ratio. Inductor L401 serves as a d-c path for tube current. Resistor R402 is connected in series with grid leak resistor R401 to obtain a test point to check operation of the oscillator. Resistor R408 is to provide bias, and C418 is the cathode bypass. Output of the oscillator circuit



NOTE:
1. UNLESS OTHERWISE INDICATED RESISTANCE VALUES ARE IN OHMS AND CAPACITANCE VALUES ARE IN MICROMICROFARADS.

Figure 4-10. R-F Crystal Oscillator, Simplified Schematic Diagram

A29-127-3

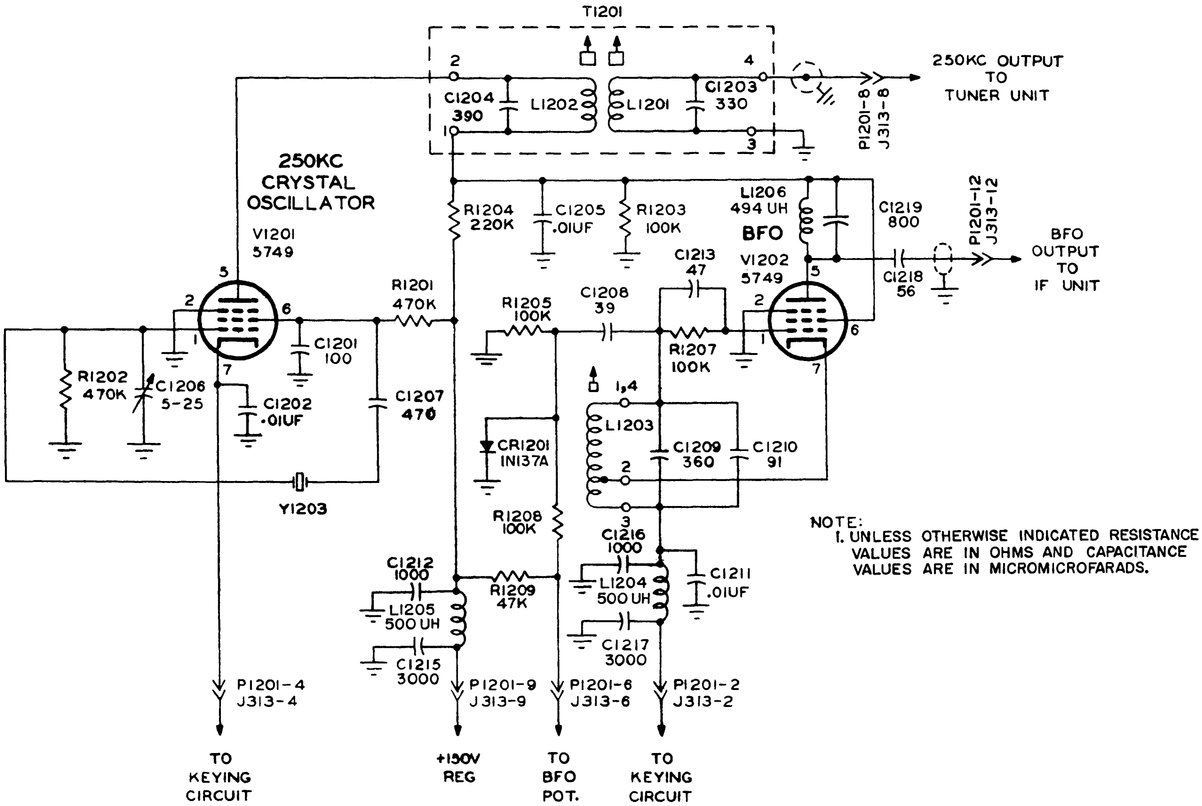


Figure 4-11. 250 Kc Crystal Oscillator and BFO, Simplified Schematic Diagram

is coupled through the electron stream to the plate of V401. Output voltage is developed across plate loading resistor R404 while R409 loads down the circuit and serves to attenuate the output. The output voltage is applied to the r-f tuner through coupling capacitor C407. Any one of the available 144 crystals can be selected by means of the Remote Control Unit used in the system.

4.9.2 250 KC OSCILLATOR AND BFO.

4.9.2.1 250 KC OSCILLATOR. See figure 4-11. The 250 kc oscillator, V1201, utilizes a 5749 pentode in a Colpitts-type crystal-controlled oscillator circuit. The LC or 250-kc tuned tank is furnished by crystal Y1201. The cathode is grounded through P1201-4, contacts of relay K804 and relay K1502 during transmission. During reception, the cathode is open, and V1201 does not oscillate. The screen grid of V1201 functions as the plate of the triode oscillator, with excitation adjusted by the capacitance ratio of C1201 and C1206. Capacitor C1206 is made variable in order to set the oscillator to exact frequency. Coupling between the oscillator plate and the tube plate of V1201 is obtained through the electron stream within the tube. Inductors L1201 and L1202 are used to couple the oscillator output to the r-f tuner unit. Capacitors C1203 and C1204 tune the primary and secondary to 250 kc to reduce harmonic output. Crystal Y1201 is mounted in a dummy oven in the 618S-1.

4.9.2.2 BEAT FREQUENCY OSCILLATOR. Refer to figure 4-11. The bfo tube V1202 also uses a 5749 pentode but utilizes a Hartley-type oscillator circuit. During CW reception, terminal 3 of inductor L1203 is grounded through contacts of relays K803 and K802 to permit oscillations. Excitation is determined by the inductance ratio of the two sections of L1203. Capacitor C1209 tunes the tank circuit to its approximate operating frequency while C1210 is a temperature-compensating capacitor to minimize frequency drift. A crystal (type 1N137A) is paralleled with R1205 to ground. This parallel branch is in series with C1208, and the entire network is shunted across L1203. A change in voltage at the anode of CR1201, which acts as a nonlinear resistance, results in an effective change in capacitive reactance. This reactance change is shunted across L1203 and therefore alters the bfo frequency. Capacitor C1212, inductor L1205, and capacitor C1215 comprise a B+ decoupling circuit; C1216, L1204, and C1217 make up a decoupling circuit network for the keying circuit. Resistor R1204 is

TABLE 4-4. FREQUENCIES INVOLVED IN VARIOUS BANDS (TRANSMIT)

BAND	OSCILLATOR	FIXED INJECTION	VARIABLE I-F	MULTIPLIER	OUTPUT
1	1.75-3.5	0.250	2.0-3.75	Not used	2.0-3.75
2	1.75-3.5	0.250	2.0-3.75	1.75-3.5	3.75-7.25
3	1.75-3.5	0.250	2.0-3.75	5.25-10.5	7.25-14.25
4	1.75-3.09375	0.250	2.0-3.34375	12.25-21.656	14.25-25.00

the common plate load resistor for V1201 and V1202 while R1203 and C1205 provide filtering. Inductor L1206 and capacitor C1219 make up the plate-tuned circuit for V1202, and C1218 couples the signal to the fixed i-f unit.

4.9.3 R-F TUNER.

4.9.3.1 TRANSMIT CIRCUITS.

NOTE

In the following discussion, the particular impedances shown in the simplified schematic diagrams are used for purposes of illustration. It should be understood that other impedances will be selected in the event the band switches are rotated to a band other than band 1.

4.9.3.1.1 BLOCK DIAGRAM. Refer to figure 4-12. In transmit position, the output of the r-f crystal oscillator unit is mixed with a 250-kc injection voltage to provide a variable intermediate frequency of 2.0 - 3.75 mc on bands 1 through 3 and 2.0 - 3.34375 megacycles on band 4. The variable i-f output is then mixed with various multiples of the fundamental, 1.75 - 3.5 mc, depending upon the band selected. The resultant signal is the required output; this output is then amplified by the second r-f amplifier and two parallel-connected driver tubes and used to drive the power amplifier. Table 4-4 shows the frequencies (in mc) involved in the various frequency bands.

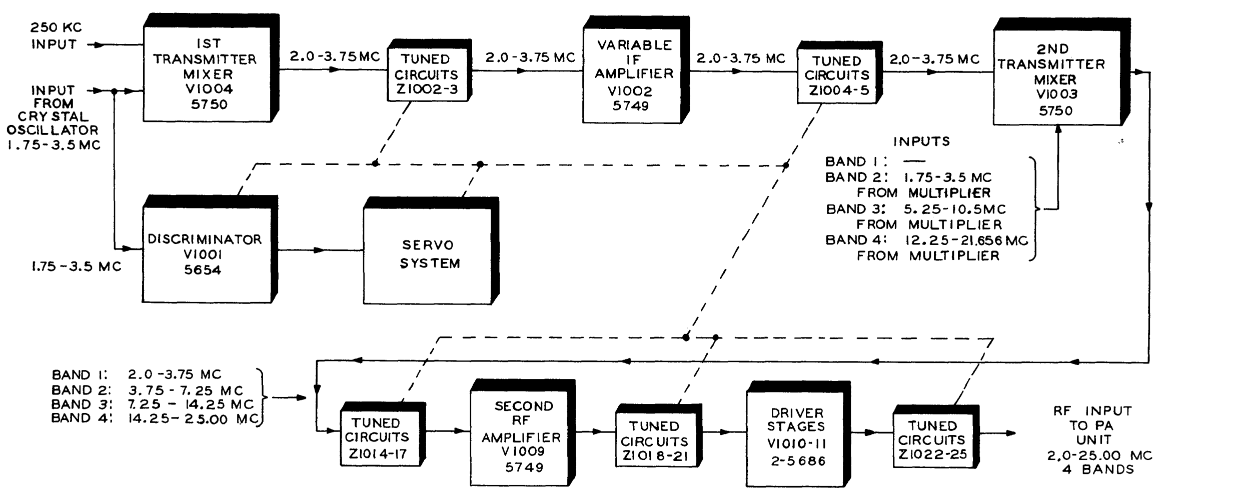


Figure 4-12. R-F Tuner, Transmit Position, Block Diagram

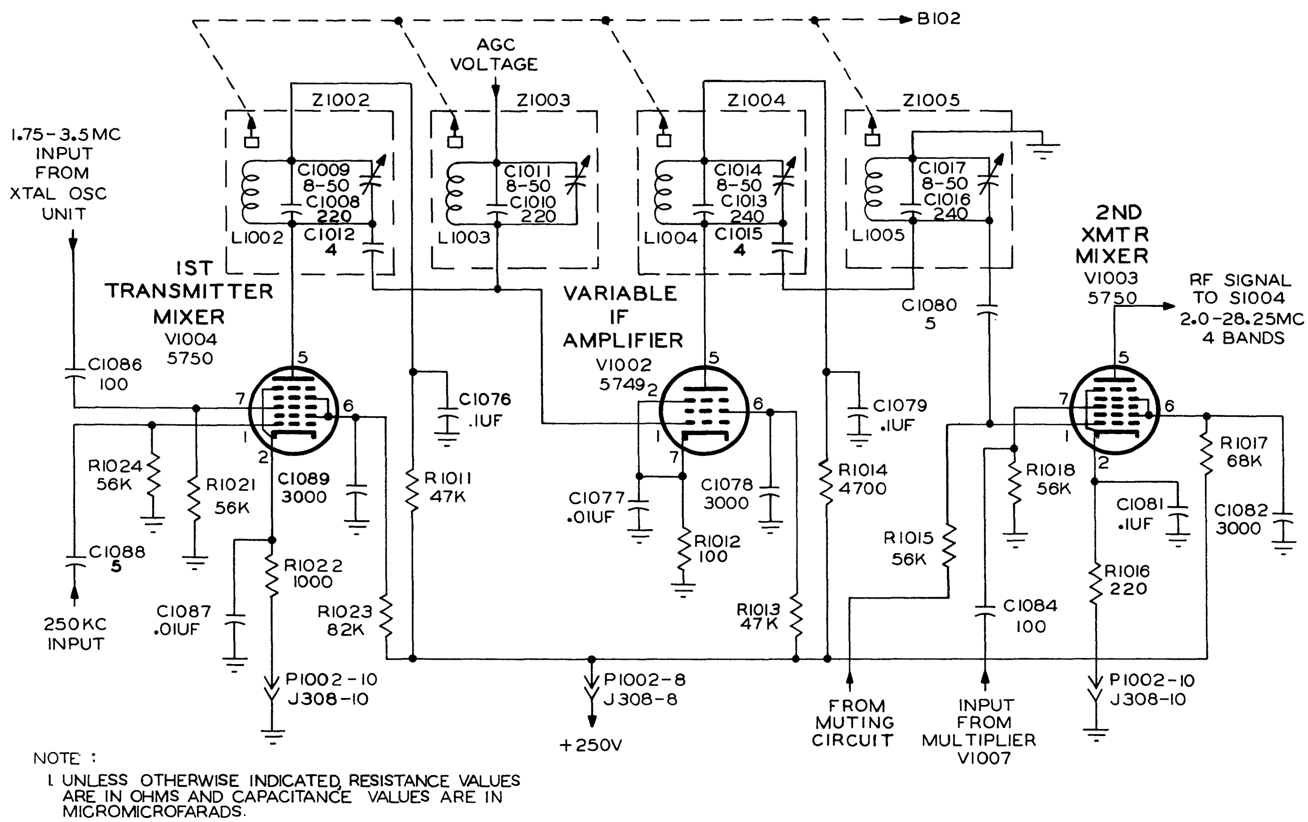


Figure 4-13. Transmit Position, Mixers and I-F Amplifiers, Simplified Schematic Diagram

A29-422-31

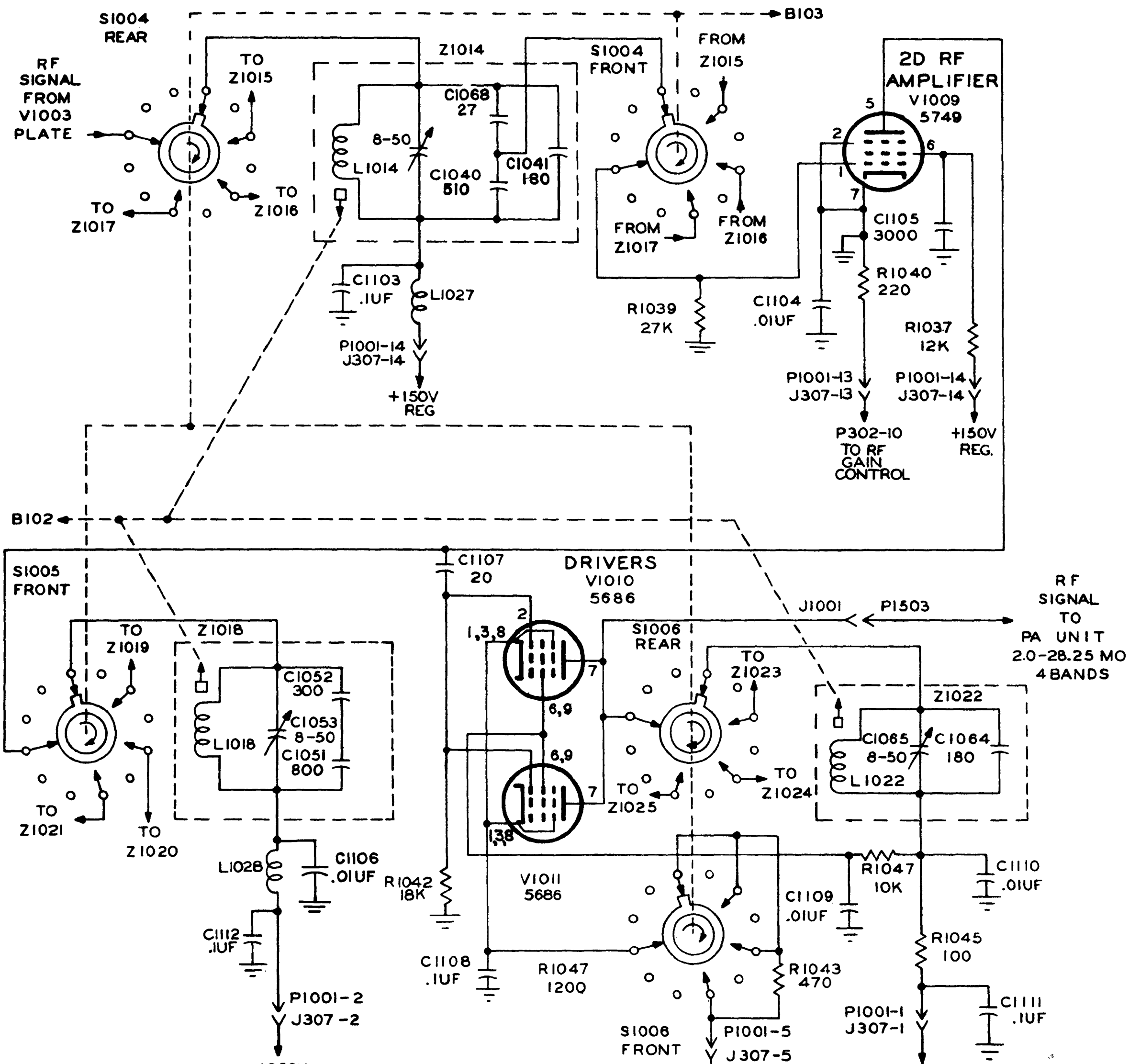
4.9.3.1.2 MIXERS AND I-F AMPLIFIER. Refer to figure 4-13. Output of the r-f crystal oscillator unit is coupled through capacitor C1086 to pin 7 of V1004, the first transmitter mixer. Output of the 250 kc oscillator is applied to the control grid (pin 1) through capacitor C1088. During transmit conditions, cathode resistor R1022 is grounded through operation of keying relay K804 (refer to paragraph 4.9.11.4).

The two input signals are mixed, and the sum frequency is used. The plate circuit of V1004 contains a parallel circuit, Z1002, tuned to the sum frequency of 2.0 - 3.75 mc. Capacitor C1009 is a trimmer capacitor used for tracking purposes. Output is capacity coupled through C1012 to a similar tuned circuit (Z1003) in the grid of variable i-f amplifier V1002. Amplification is provided by V1002, and voltage is coupled through Z1004 and Z1005 to the second transmitter mixer, V1003. Input from multiplier V1007 also is applied to mixer V1003; the resultant sum frequency covers the range of 2.0 to 25.0 mc in four bands.

4.9.3.1.3 SECOND R-F AMPLIFIER AND DRIVERS. Refer to figure 4-14. The plate circuit of the second transmitter mixer is completed through contacts of switch S1004 to impedance Z1014. Signal voltage developed across Z1014 is applied through S1004 contacts to the control grid of V1009, the second r-f amplifier. During transmit conditions cathode resistor R1040 is shorted by contacts or relay K1001 and the cathode connected directly to ground. Refer to paragraph 4.9.11.3. This increases the gain of V1009 during transmit conditions. The plate circuit of V1009 consists of impedance Z1018 in series with inductor L1028. Voltage developed across Z1018 is capacity coupled to the grids of parallel-connected driver stages V1010 and V1011. In order to obtain proper drive on all four bands, the cathode resistance of V1010 and V1011 is varied by means of S1006. In band 4 position, the cathode is connected directly to ground. Z1022 is the plate impedance for the driver tubes, and voltage developed across it is applied to the power amplifier grid circuit.

4.9.3.2 RECEIVE CIRCUITS.

4.9.3.2.1 BLOCK DIAGRAM. Refer to figure 4-15. In the receive condition, signal from the antenna is



NOTES:

1. SWITCHES ARE VIEWED FROM OPPOSITE THE KNOB OR DRIVEN END. SECTIONS LABELED REAR ARE NEAREST TO DRIVEN END.
2. SWITCHES ARE SHOWN IN BAND I POSITION.
3. UNLESS OTHERWISE INDICATED RESISTANCE VALUES ARE IN OHMS AND CAPACITANCE VALUES ARE IN MICROMICROFARADS.

Figure 4-14. Transmit Position 2nd R-F Amplifiers and Drivers, Simplified Schematic Diagram

A29-113-4

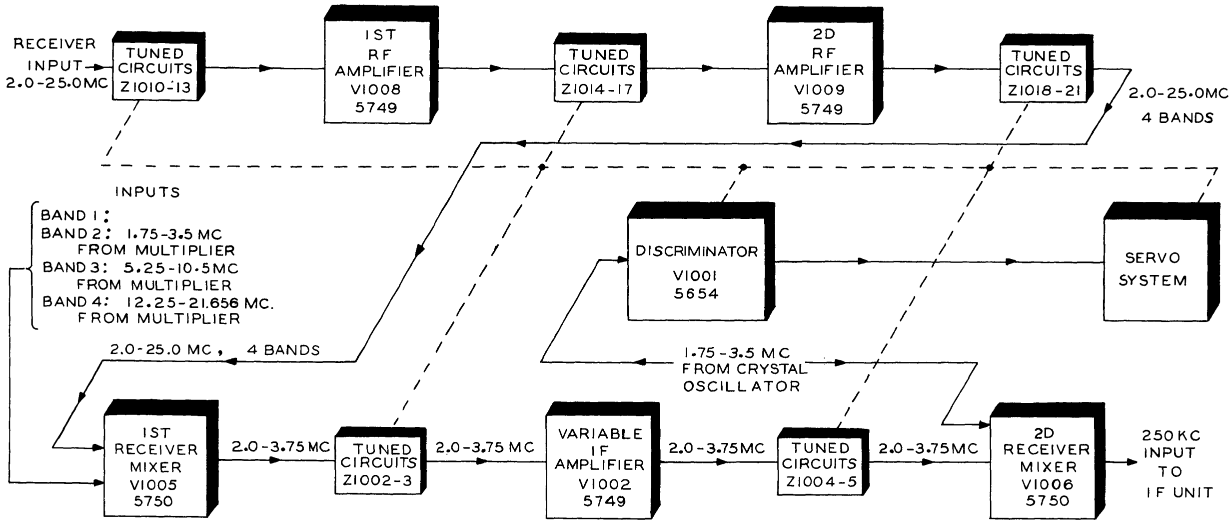


Figure 4-15. Tuner Unit, Receive Position, Block Diagram

A29-403-3

amplified by two r-f stages and applied to the first receiver mixer, V1005. A multiple of the oscillator frequency is injected to produce an output of 2.0 - 3.75 mc. This is amplified by the i-f amplifier stage (V1002) and applied to the second receiver mixer, V1006. Here it is combined with the output of the r-f crystal oscillator to produce the 250-kc fixed intermediate frequency of the receiver. The 250-kc signal is then applied to the 250-kc i-f amplifier. Table 4-5 shows frequencies involved in various bands.

TABLE 4-5. FREQUENCIES INVOLVED IN VARIOUS BANDS (RECEIVE)

BAND	OSCILLATOR	MULTIPLIER	INPUT	VARIABLE I-F	RECEIVER I-F
1	1.75-3.5	Not used	2.0-3.75	2.0-3.75	0.25
2	1.75-3.5	1.75-3.5	3.75-7.25	2.0-3.75	0.25
3	1.75-3.5	5.25-10.5	7.25-14.25	2.0-3.75	0.25
4	1.75-3.09375	12.25-21.656	14.25-25.0	2.0-3.34375	0.25

4.9.3.2.2 R-F AMPLIFIERS. Refer to figure 4-16. Input from the antenna is applied through contacts of switch S1003 to impedance Z1010. Voltage developed across this impedance is directly coupled to the grid of the first r-f amplifier, V1008, through contacts of switch S1003. The cathode returns of the two r-f stages are tied together to the r-f gain control circuit. Refer to paragraph 4.9.11.4. The screen of V1008 is connected to a regulated 150 volts through resistor R1041 in order to obtain better operation of the avc circuit. The plate circuit consists of impedance Z1014 in series with inductor L1027. The r-f voltage in the plate circuit of V1008 is applied through contacts of switch S1004 to the control grid of second r-f amplifier V1009. The screen of V1009 also is connected to a regulated 150 volts through resistor R1037. The plate of V1009 is connected to switch S1005.

4.9.3.2.3 MIXERS AND I-F AMPLIFIER. Refer to figure 4-17. The plate circuit of the second r-f amplifier is completed through contacts of switch

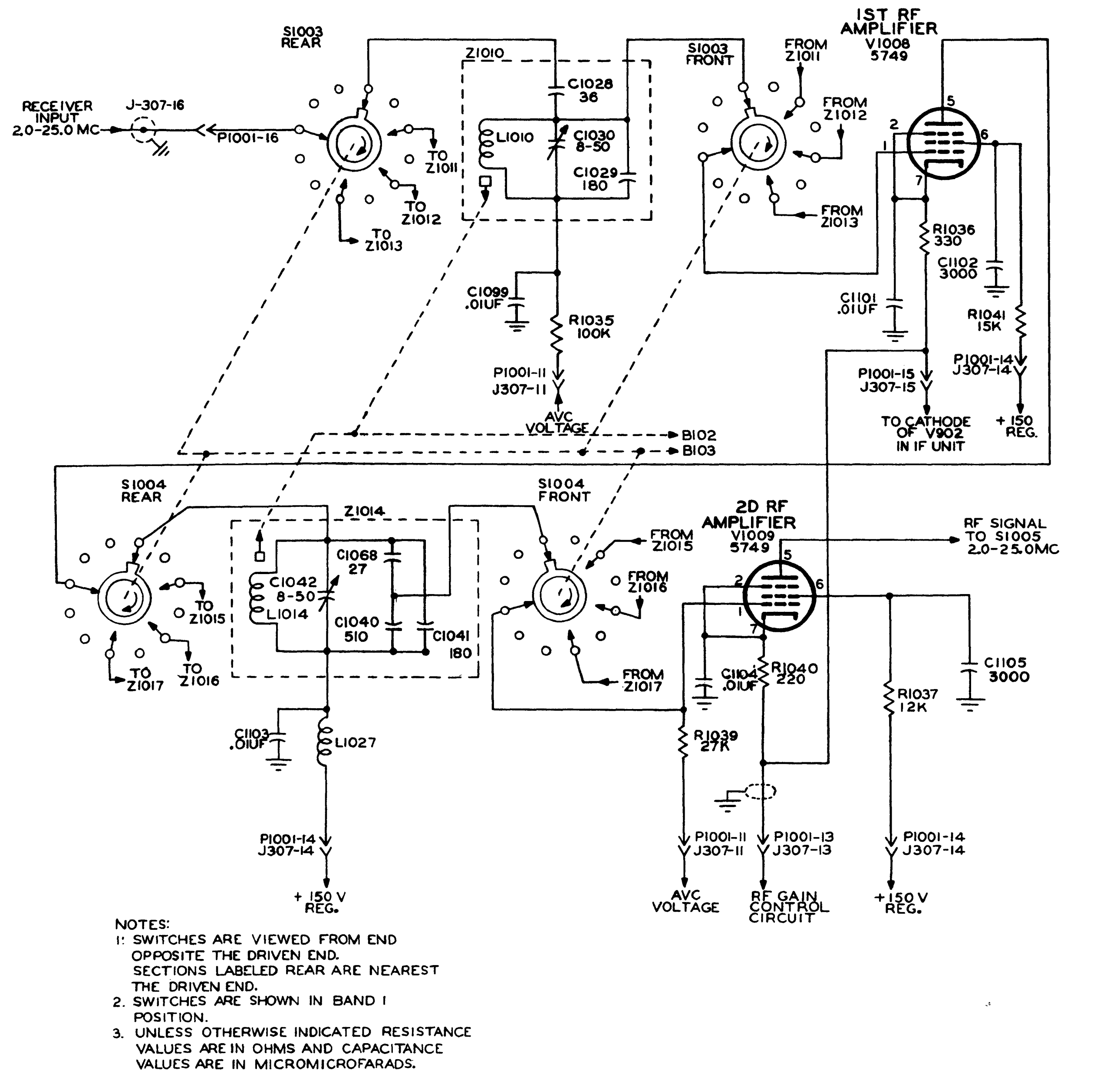


Figure 4-16. Receive Position, R-F Amplifier, Simplified Schematic Diagram

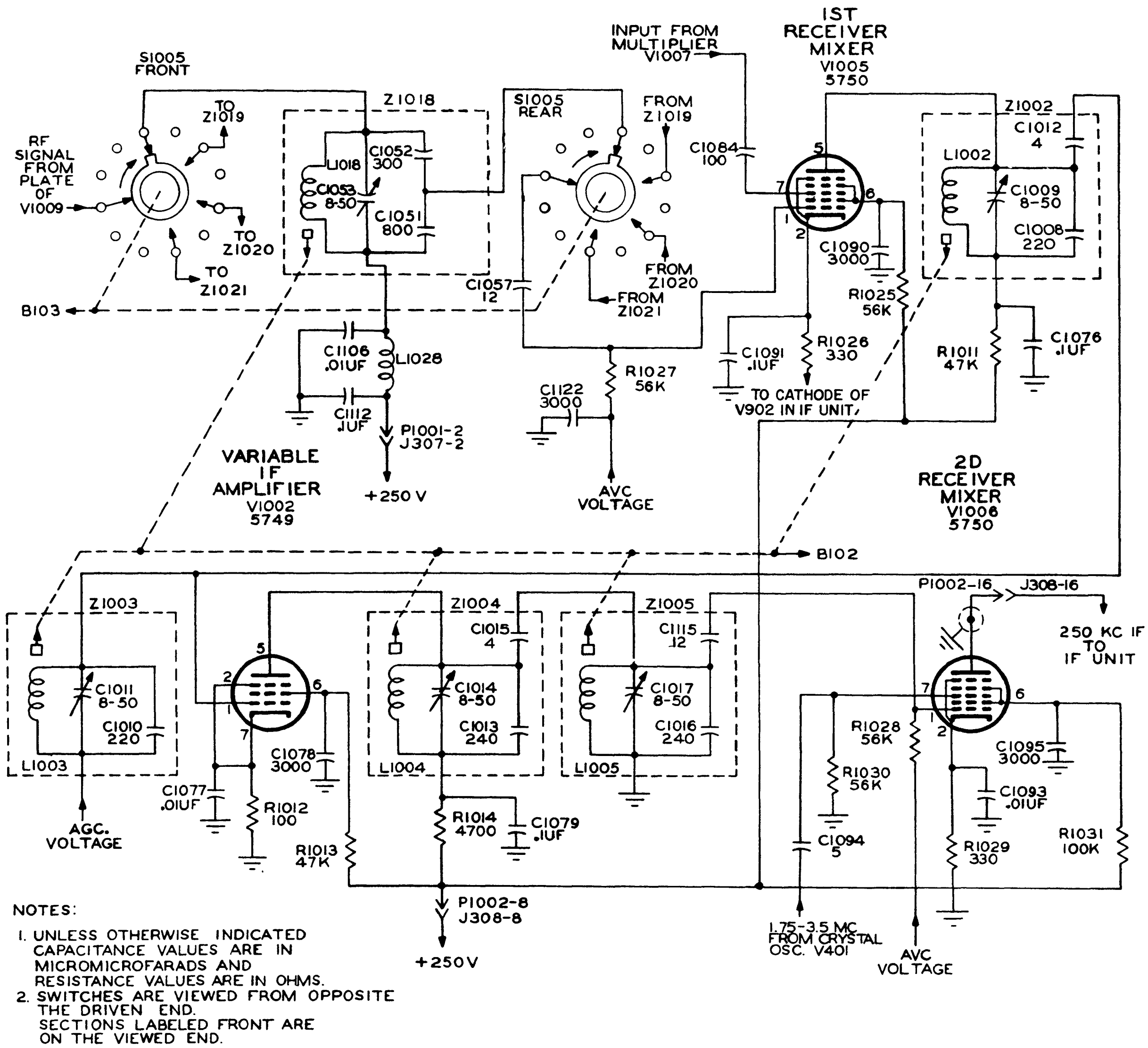


Figure 4-17. Receive Position, Mixers and I-F Amplifier, Simplified Schematic Diagram

A29-114-4

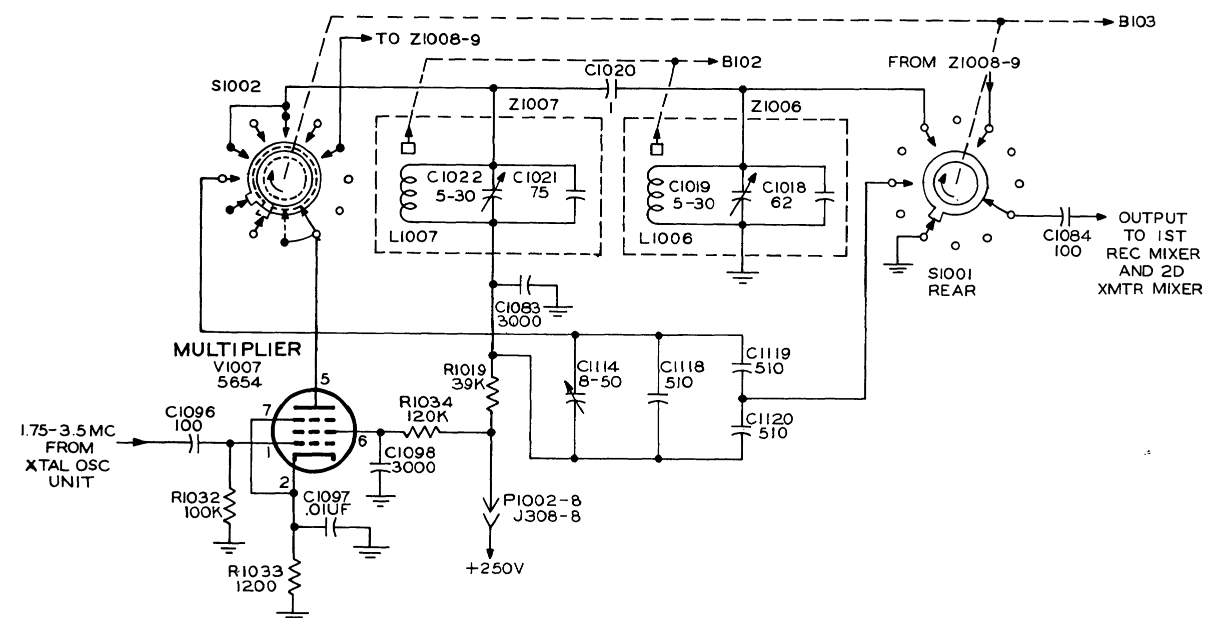
S1005. The plate circuit consists of impedance Z1018 in series with inductor L1028. The plate return is bypassed by capacitor C1106, and B+ is decoupled by capacitor C1112. Signal voltage is coupled through contacts of S1005 and capacitor C1057 to the control grid of the first receiver mixer, V1005. Input signal from the multiplier stage (V1007) is coupled through capacitor C1084 to the injection grid (pin 7) of the first receiver mixer, V1005. The two inputs are mixed in V1005, and the difference frequency is used. This appears as a 2.0- to 3.75-mc voltage across impedance Z1002 in the plate circuit of V1005. The variable i-f signal is coupled through capacitor C1012 to the grid circuit of V1002, the i-f amplifier. The grid impedance is Z1003. The i-f input to V1002 is amplified and appears across Z1004 in the plate circuit. The i-f voltage then is coupled through capacitor C1115 to the control grid of the second receiver mixer, V1006. Impedance Z1005 is the grid impedance for this stage. Input from multiplier V1007 is coupled through C1094 to the injection grid (pin 7) of the second receiver mixer, V1006. The two inputs to V1006 are mixed, and the difference frequency of 250 kc appears in the plate circuit. Plate impedance for the second receiver mixer is provided by the input impedance of a 250-kc mechanical filter located in the i-f unit.

4.9.3.3 MULTIPLIER STAGE. Refer to figure 4-18. Multiplier stage V1007 is common to both the transmitter and receiver circuits. Input to V1007 is coupled from the output of the r-f crystal oscillator through C1096 to the control grid of V1007. The multiplier is not used on band 1, and contacts on switch S1002 open the plate circuit on this band. On bands 2 and 3, the plate circuit is completed through contacts of S1002 and consists of impedance Z1007 in series with voltage-dropping resistor R1019. In the band 2 position, an additional capacitor network is connected across Z1007 to load the impedance (Z1007) to give the proper frequency range. This capacitor network, consisting of C1114, C1118, C1119, and C1120, is removed from the circuit by contacts of S1002 when band 3 is in use. Output developed across Z1007 is capacity coupled through C1020 to Z1006, which is connected to the injection grid circuits of the second transmitter mixer (V1003) and first receiver mixer (V1005) through S1001 and C1084. In band 4 position, impedances Z1009 and Z1008 are substituted for Z1007 and Z1006.

In band 1 position, the multiplier is not necessary since the signal input to the second transmitter mixer or first receiver mixer is already within the desired range of 2.0 through 3.75 mc. In band 2 position, no multiplication is necessary since a 1.75- through 3.5-mc signal is needed and the multiplier is operated straight through, the capacitor network loading the band 3 impedance so that it tunes to the fundamental frequency range of 1.75 through 3.5 mc. In band 3 position, impedances Z1007 and Z1006 are tuned to the third harmonic of the input frequency, and multiplier output is 5.25 through 10.5 mc. Similarly, in band 4 position, Z1009 and Z1008 are tuned to the seventh harmonic giving a multiplier output whose frequency is 12.25 through 21.656 mc.

4.9.3.4 AGC-AVC CIRCUITS. Refer to figure 4-19. The agc voltage is applied to the variable i-f amplifier in both transmit and receiver positions. Signal voltage from the plate of discriminator V1001 is coupled through capacitor C1071 to crystal diode CR1005. Inductor L1026 acts as the diode plate impedance. Rectified output voltage is developed across resistor R1007. Capacitor C1072 filters the negative output voltage.

The avc voltage is applied to both receiver mixers, first r-f amplifier, and second r-f amplifier in receive position. The receiver mixers and the first and second r-f amplifiers are not operative during transmit conditions. The avc voltage is developed in the i-f unit.



NOTES:
1. SWITCHES ARE VIEWED FROM END OF SHAFT OPPOSITE THE DRIVEN END
SECTIONS LABELED REAR ARE NEAREST DRIVEN END OF SHAFT.
2. SWITCHES SHOWN IN BAND 1 POSITION.
3. UNLESS OTHERWISE INDICATED RESISTANCE VALUES ARE OHMS, AND CAPACITANCE VALUES ARE IN MICROMICROFARADS.

Figure 4-18. Tuner Unit, Multiplier, Simplified Schematic Diagram

A29-424-32

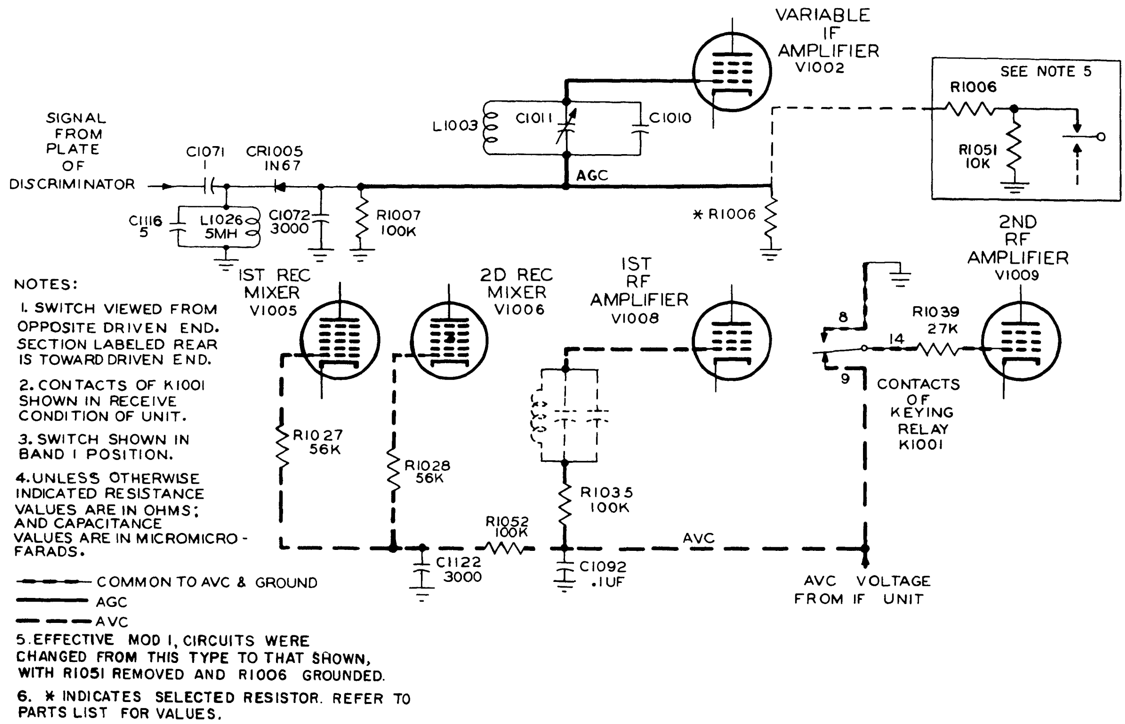


Figure 4-19. Tuner Unit, AGC-AVC Circuits, Simplified Schematic Diagram

A29-132-3

4.9.3.5 AUTOMATIC TUNING. All of the low-level circuits of the Transceiver are automatically tuned through the action of the phase discriminator circuit. Each of the tuning slugs in the low-level circuits is mechanically ganged with the plate tuning slug of the discriminator. Under some circumstances it would be possible for the equipment to tune to the second harmonic of the crystal frequency if precautions were not taken. The center tuning circuit operates to prevent this from happening.

4.9.3.5.1 TABLE CENTERING CIRCUIT. The table (or slug rack) centering circuit consists of switch S1007 in the tuner unit, relay K802 and associated resistors in the relay unit, contacts of relay K801 in the relay unit, and contacts of relays K401 and K402 in the r-f crystal oscillator unit. A simplified schematic is given in figure 4-20. The schematic shows the centering circuit operated to the position where the slug rack is centered. Under normal conditions the slug rack will be in some other position, and the rotor blades of switch S1007 will short a set of contacts on each switch section. Assume, for example, that the switch is rotated one position clockwise. A circuit now exists from the +27.5-volt supply through the front switch section, through the winding of relay K802, through the rear section of switch S1007, to the contacts of relay K801. If a new channel is now selected through the operation of the Remote Control Unit, relays K401 and/or K402 will operate during the tuning cycle of the r-f crystal oscillator. The contacts of either relay provide an operating circuit for sequence relay K801 and, at the same time, provide the ground for the circuit through switch S1007. Tuner-centering relay K802 operates, providing its own ground circuit. The contacts of the chopper in the tuner servo unit are connected through contacts of relay K802 to the resistors in the relay unit. One chopper contact is grounded through the parallel combination of resistors R805 and R806. The other chopper contact is connected to the junction of resistors R803 and R804 thus applying a positive voltage to this contact. This operates the tuner servo system and causes the tuner servomotor, B102, to rotate in the direction necessary to return table centering switch S1007 to the centered position. When this position is reached, the circuit for relay K802 is opened, and the chopper contacts are returned to their normal operating circuit. With switch S1007 rotated counterclockwise, a similar circuit is set up with the chopper contacts reversed, and the servomotor turns in the opposite direction in operating the table centering switch.

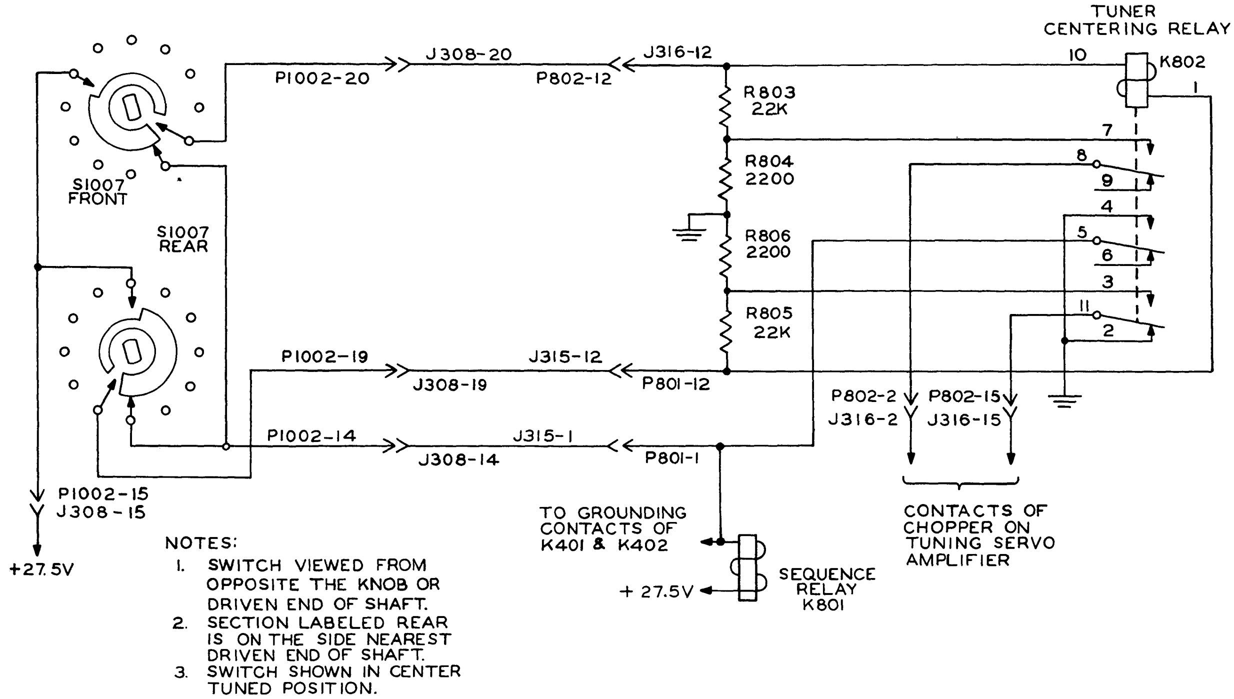


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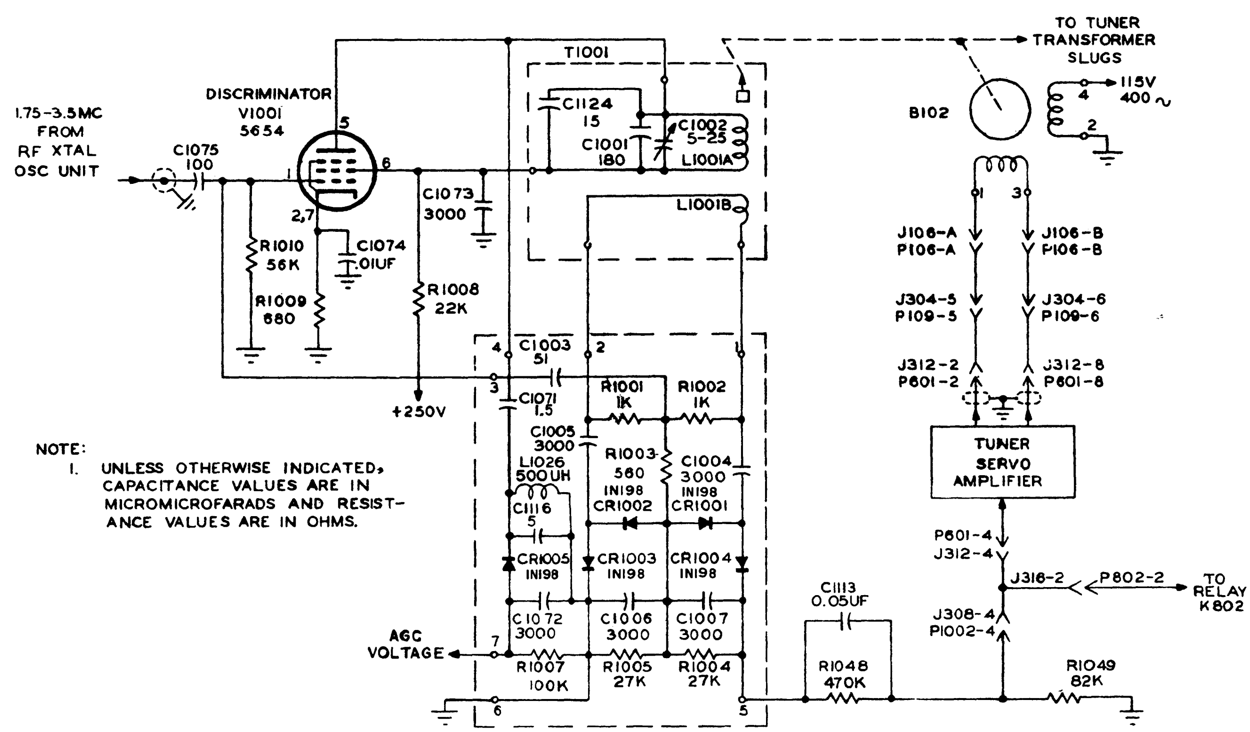
Figure 4-20. Tuner Unit, Table Centering Circuit, Simplified Schematic Diagram



A29-122-3

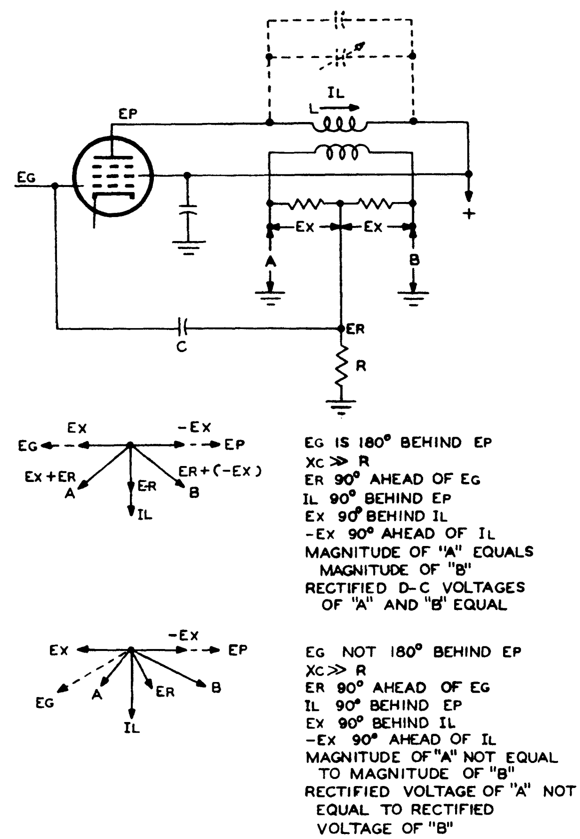
Figure 4-21. Tuner Unit, Phase Discriminator Circuit, Simplified Schematic Diagram

4.9.3.5.2 PHASE DISCRIMINATOR CIRCUIT. With the slug rack centered, the phase discriminator circuit now functions. A simplified schematic diagram of the circuit is given in figure 4-21. One of the crystals in the r-f crystal oscillator has been selected previously by operation of the Remote Control Unit. Oscillator output for this particular crystal is fed through capacitor C1075 to the control grid of discriminator tube V1001. This voltage is amplified and appears across a tuned circuit in the plate of V1001. A Foster-Seeley type discriminator circuit is coupled to the grid and plate of V1001. Operation of this discriminator circuit is based upon the fact that the grid and plate voltages of V1001 are 180 degrees out of phase at resonance. The circuit consists of the secondary of transformer T1001 (L1001B), crystal diodes CR1001 through CR1004, and associated resistors and capacitors. The phase relationship of the grid and plate voltages is sampled, and variations from 180 degrees appear as a d-c control voltage in the discriminator output. A functional diagram of the discriminator and of its phase relationships is shown in figure 4-22.

In this illustration C represents C1003, the capacitor through which a phase shift of approximately 90 degrees is obtained. When the tuning slug in the primary of transformer T1001 (L1001A) is not in the position to tune the transformer to resonance, a difference in amplitude between d-c voltages A and B will result. The larger voltage is determined by the side of resonance to which the circuit is tuned. In the phase discriminator circuit, resistors R1001 and R1002 act as a center-tapping device across L1001B. Resistor R1003 is the load resistor for the grid reference voltage. Cascade voltage doublers are used rather than half-wave rectifiers in order to obtain increased d-c voltage. One doubler includes C1004, CR1001, CR1004, C1007, and R1004. The other doubler consists of C1005, CR1002, CR1003, C1006, and R1005.

The d-c control voltage from the discriminator is applied through a resistor-capacitor network to contacts of chopper G601 in the tuner servo amplifier unit. This network consisting of capacitor C1113, resistor R1048, and resistor R1049 forms a lead or derivation network. The lead network is added to counteract any hunting tendency in the servo system. The network operates to obtain as much phase lead as possible without destroying sensitivity of the circuit.

Chopper G601 converts the d-c control voltage into a 400-cycle a-c signal which is in phase quadrature with the 400-cycle line voltage. The servo amplifier utilizes the 400-cycle a-c signal to control the rotation of a two-phase servomotor, B102. (See paragraph 4.9.9 for a discussion of the servo amplifier.) Since one winding of motor B102 is connected directly to the 400-cycle voltage source, a 400-cycle voltage in phase quadrature will cause the motor to rotate if it is connected to the second winding. The direction of rotation of B102 depends upon the phase of the control voltage, which is determined by the polarity of the d-c signal applied to the chopper contacts. Since



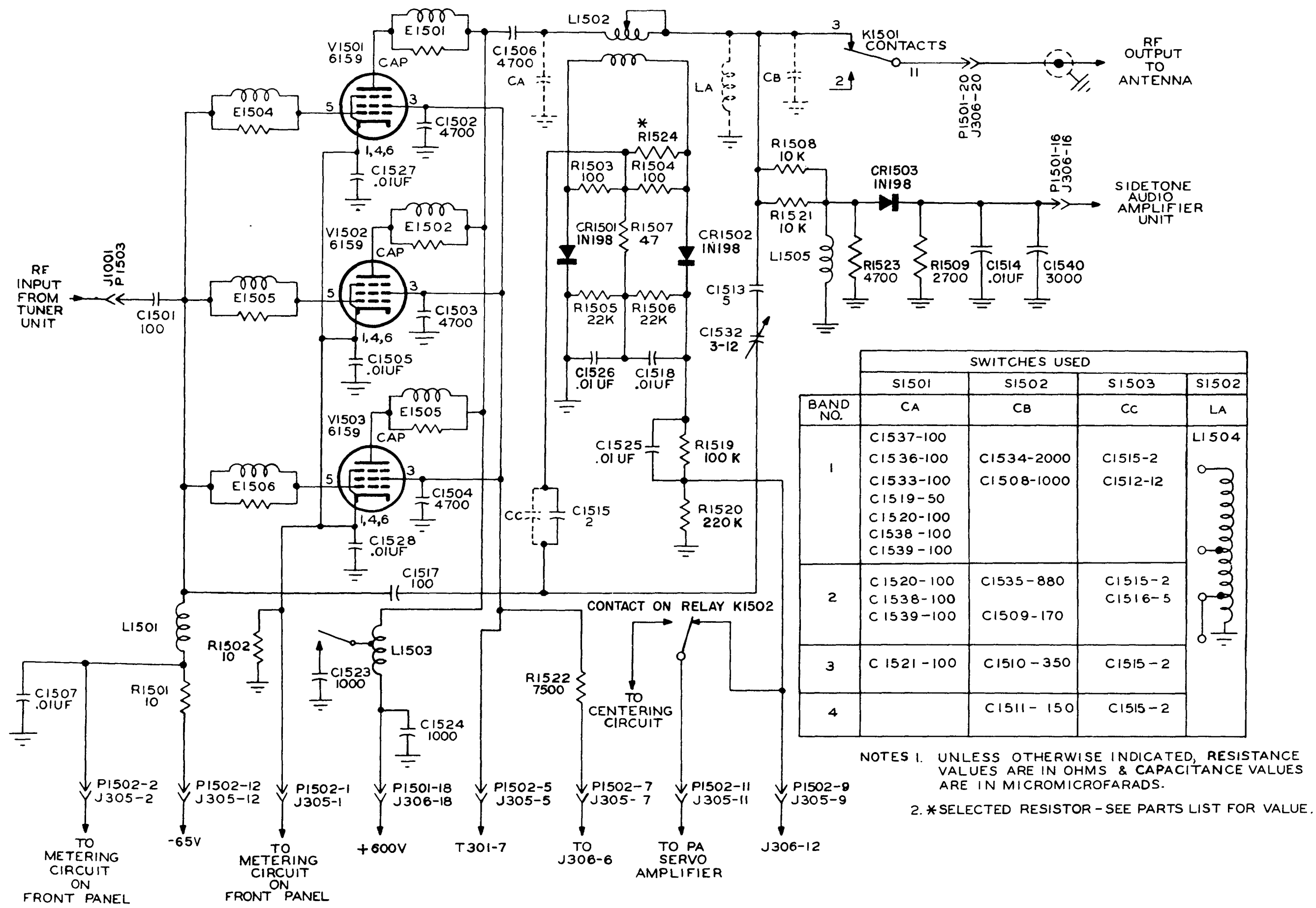
A29-118-3

Figure 4-22. Tuner Unit Phase Discriminator, Functional Diagram

the polarity of the d-c voltage is determined by the side of resonance to which the discriminator plate circuit is tuned, the motor will rotate in such a direction as to tune the plate circuit to resonance. When the plate circuit condition of resonance is satisfied, the motor will stop since the discriminator is balanced and control voltage is no longer applied to the servo amplifier. The slug rack is connected mechanically to the servomotor; thus, tuning the discriminator to resonance also tunes all of the low-level circuits in the tuner unit to resonance.

4.9.4 POWER AMPLIFIER.

4.9.4.1 R-F CIRCUITS. Refer to figure 4-23. Three type 6159 tubes (V1501-3) are operated in parallel to obtain the required r-f output power. These stages shunt feed a pi network in the plate circuit. The r-f input signal is coupled from the tuner unit through a plug and jack assembly (J1001 and P1503) and through capacitor C1501 to the parallel-connected grid circuits of the three output tubes. Each grid lead contains a



	SWITCHES USED			
	S1501	S1502	S1503	S1502
BAND NO.	CA	CB	CC	LA
1	C1537-100 C1536-100 C1533-100 C1519-50 C1520-100 C1538-100 C1539-100	C1534-2000 C1508-1000	C1515-2 C1512-12	L1504
2	C1520-100 C1538-100 C1539-100	C1535-880 C1509-170	C1515-2 C1516-5	
3	C1521-100	C1510-350	C1515-2	
4		C1511-150	C1515-2	

NOTES 1. UNLESS OTHERWISE INDICATED, RESISTANCE VALUES ARE IN OHMS & CAPACITANCE VALUES ARE IN MICROMICROFARADS.

2. * SELECTED RESISTOR - SEE PARTS LIST FOR VALUE.

Figure 4-23. Power Amplifier, Simplified Schematic Diagram

A29-129-4

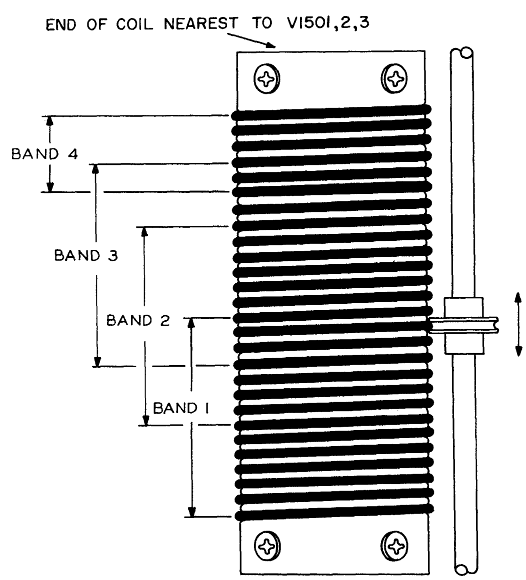


Figure 4-24. Inductor L1502, Approximate Tuning Ranges

A29-406-2

parasitic suppressor (E1504 through E1506) as does each plate lead (E1501 through E1503). Negative grid bias is applied through resistor R1501 and inductance L1501 to the grids. Capacitor C1507 is the grid return bypass capacitor. Resistor R1501 is included to provide a source of voltage for metering purposes. The meter is calibrated in terms of milliamperes of grid current. The cathode circuit uses a similar resistor (R1502) for metering cathode current. Each cathode is bypassed directly at the cathode pin of the tube socket by a capacitor (C1527, C1505, and C1528). Output signal is developed across plate load inductor L1503. On the three highest bands, a portion of L1503 is bypassed to ground through the operation of switch S1504 and capacitor C1523. Output voltage developed across L1503 is coupled through capacitor C1506 to a pi network consisting of C_A, C_B, and L_A (refer to figure 4-23 for values of C_A, C_B, and L_A in each band). The r-f output is applied then to the antenna through contacts of relay K1501 and contacts of plug P1501 and receptacle J306. Capacitors C1513, C1532, and C1517 are series-connected neutralizing capacitors.

4.9.4.2 AUTOMATIC TUNING CIRCUITS. Rough tuning of the power amplifier consists of selecting proper network values of inductance and capacitance for the band to be tuned. Switch sections S1501, S1502, S1503, and S1504 perform this function. The switches are operated through the action of the band-selector Autopositioner. Selection of a channel operates the band-selector Autopositioner, and this, in turn, places switches S1501 through S1504 in the proper position. Switch S1506, mounted on the same shaft as switches S1501 through S1504, functions to place the shorting roller on L1502 in band center position before allowing the power amplifier phase discriminator to operate.

4.9.4.2.1 BAND CENTERING CIRCUIT. The approximate tuning range on inductor L1502 is shown for the four bands in figure 4-24. The band centering circuit functions to place the shorting roller in the center of the appropriate band. A detailed sequence of operation of the band centering circuit is given in figure 4-25, steps 1 through 4. The rear section of switch S1505 functions as a protective stop mechanism. If, for some reason, servomotor B1501 continues to rotate until the shorting roller approaches either end of L1502, the rotor blade shorts one of the two sets of contacts indicated in figure 4-25. This provides a ground for relay K1502, and the band centering mechanism recycles.

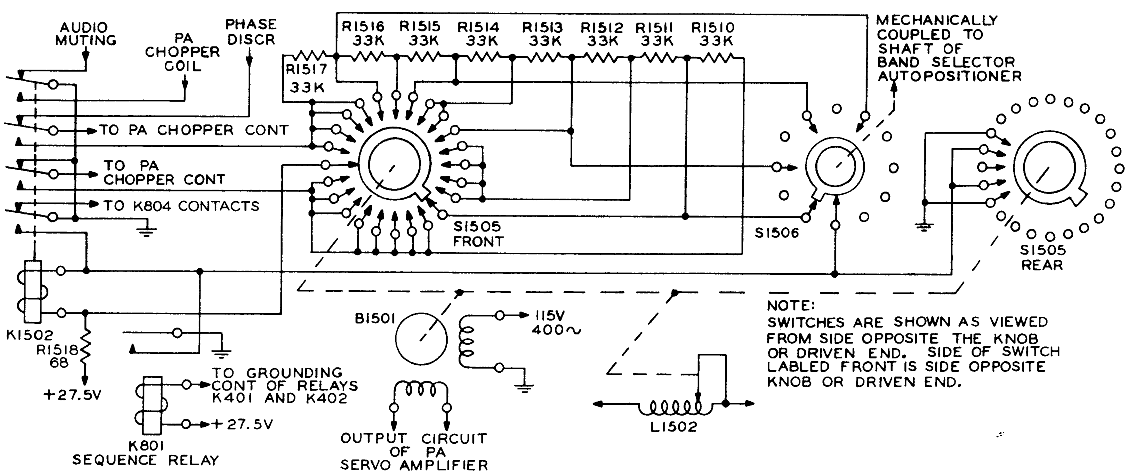


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Figure 4-25. Power Amplifier, Band Centering Circuit, Sequence of Operation (Step 1 of 4 steps)

a. A frequency in band 3 is to be selected.

b. System is at rest with switches in a position corresponding to the previously selected band: band 1 in this example.

c. Voltage is available to control system. A ground must be supplied before system will operate.

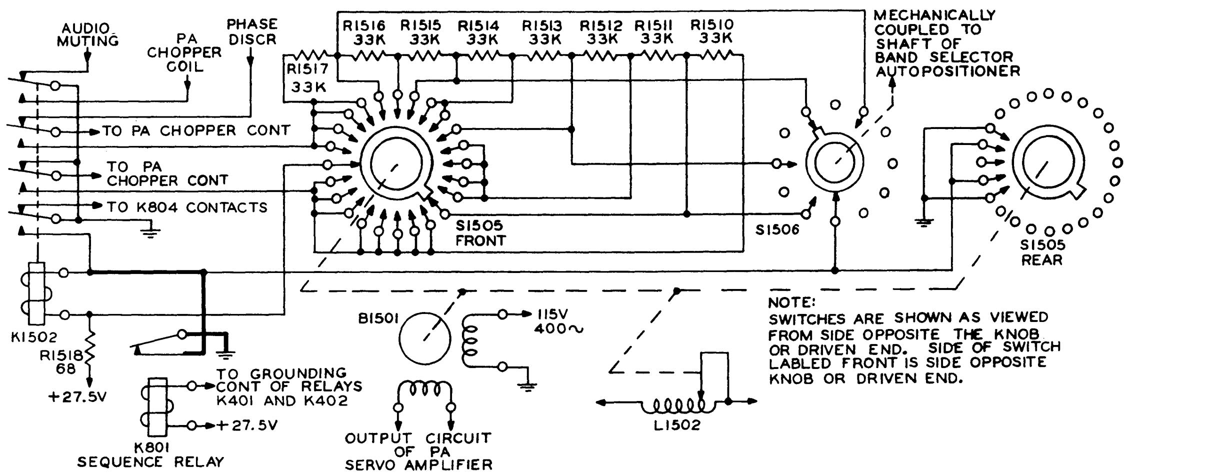

Figure 4-25. Power Amplifier, Band Centering Circuit, Sequence of Operation (Step 2 of 4 steps)

a. Channel is selected by operation of Remote Control Unit. This operates relays K801 and K101 to provide a ground for sequence relay K801.

b. Contacts on sequence relay K801 close to supply a ground to relay K1502.

NOTE

A parallel ground circuit is provided by grounding contacts of relay K101 whenever the band Autopositioner operates. This parallel circuit is not indicated on this figure.

c. Switch S1506 is rotated to band 3 position by operation of band-selector Autopositioner on the front panel.

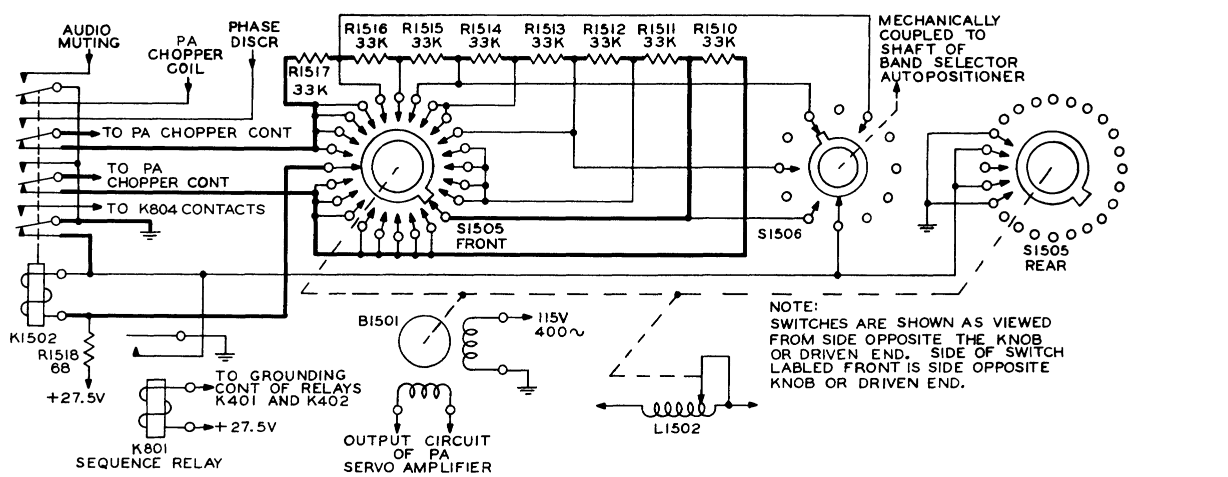

Figure 4-25. Power Amplifier, Band Centering Circuit, Sequence of Operation (Step 3 of 4 steps)

a. Relay K1502 operates, supplying its own ground through one of its sets of contacts. The ground supplied by relay K801 is removed when the correct bank and crystal are selected in the r-f crystal oscillator.

b. One side of the PA chopper coil is grounded by contacts of relay K1502.

c. An unbalanced voltage is fed to the PA chopper contacts through the action of switch S1505 (front section) and its resistor network.

d. The audio amplifier output amplifier cathode is ungrounded through the action of one set of contacts of relay K1502 muting the audio system.

e. The transmitter keying circuit is opened by action of one set of contacts of relay K1502 thus preventing accidental emissions during the centering operation.

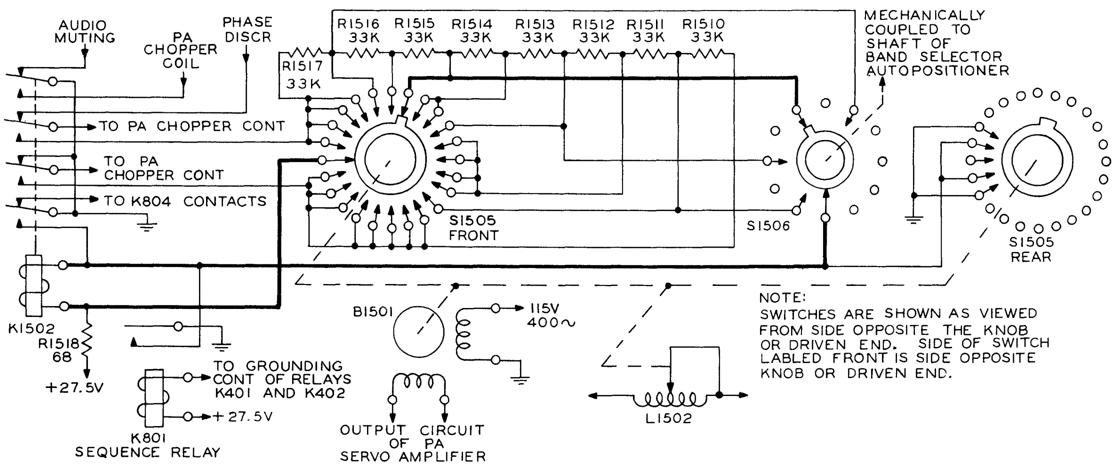

Figure 4-25. Power Amplifier, Band Centering Circuit, Sequence of Operation (Step 4 of 4 steps)

a. The unbalance voltage fed to the PA chopper contacts causes the PA servo system to function.

b. Operation of the PA servo system includes rotation of motor B1501.

c. Rotation of motor B1501 causes switch S1505 to rotate until the band 3 position indicated is reached.

d. Relay K1502 is shorted effectively and is no longer operative.

e. At the same time switch S1505 is rotating, the shorting roller on inductor L1502 is moved to the band center position.

f. System is now in position for operation of the phase discriminator to begin.

4.9.4.2.2 PHASE DISCRIMINATOR CIRCUIT. Once the power amplifier components have been selected by the band switches and the band centering circuit has functioned, the phase discriminator circuit is free to operate. This circuit is similar to the tuner discriminator circuit described in paragraph 4.9.3.5.2. A Foster-Seeley type discriminator circuit is coupled to the PA tank coil and PA grid. The discriminator consists of a shielded loop placed near L1502, crystal diodes CR1501 and CR1502, and associated resistors and capacitors. The basic circuit of the discriminator and its phase relationships are shown in figure 4-26.

In this illustration, C represents C1515 the capacitor through which the 90-degree phase shift is obtained. In band 1 position, C1512 is switched in parallel with C1515 by the action of switch S1503; in band 2 position, capacitor C1516 replaces C1512; in band 3 position, capacitor C1517 replaces C1512; and in band 4 position, only C1515 is used.

When the power amplifier is tuned incorrectly, d-c voltages A and B (figure 4-26) will differ in amplitude. The larger voltage is determined by the side of resonance to which the PA network is tuned. This discriminator differs from the one in the r-f tuner in that no voltage doubler circuits are used.

A d-c voltage output of the discriminator is fed through a lead network to the contacts of chopper G601 in the PA servo amplifier unit. The lead network consists of capacitor C1525, resistor R1519, and resistor R1520. This d-c voltage is used to control rotation of servomotor B1501 which rotates in such a direction as to tune the pi network to resonance.

4.9.4.3 LOW-POWER TUNEUP CIRCUIT. The screen grids of the power amplifier tubes are operated at reduced voltage during automatic tuning. This is accomplished by connecting the screen grids to normally open contacts of relay K708 in the Antenna Tuner (see figure 8-31 or 8-32) through resistor R1522. During tuning operations, the relay contacts close connecting R1522 from screen grids to ground and lowering the screen voltage sufficiently to reduce power output to approximately one half of normal output.

4.9.5 MODULATOR.

4.9.5.1 FIRST AUDIO STAGE. Refer to figure 4-27. Microphone exciting current is obtained from the 25.2-volt d-c line through dropping resistor R1401 and a filter circuit consisting of R1402 and C1401. A d-c potential of approximately six volts exists across the microphone. The output of the microphone is coupled to the microphone GAIN control (R1403) through capacitor C1402. The gain control is available as a screw driver adjustment on the bottom of the unit. Microphone input voltage is amplified in the first audio amplifier, V1401A, and coupled to the next stage.

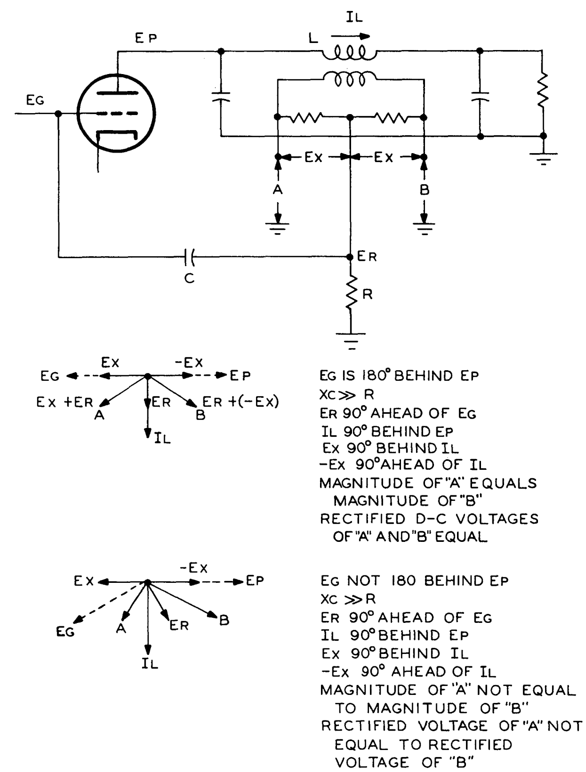

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Figure 4-26. Power Amplifier, Discriminator, Functional Diagram

4.9.5.2 CLIPPER. Refer to figure 4-27. The output of the first audio stage is coupled to a biased series clipper, V1402, through C1402. Resistors R1407 and R1408 serve as clipper input and output resistors respectively. Clipper plates are connected together and tied to potentiometer R1404 through series resistor R1410. Resistor R1404 acts as a voltage divider and connects to the +250-volt line through a filter consisting of C1414 and R1422. The exact point at which clipping will occur is set by R1404 which controls the positive potential that is applied to the plates of V1402.

Under static conditions, a d-c voltage is tapped off on voltage divider R1404 and applied through R1410 to both plates of V1402. Current flows through each cathode resistor of V1402, through the tube, through R1410, and through R1404 to the power supply. The voltage drop between the plate and cathode of each diode section of V1402 is very small compared to the drop across resistor R1410 in series with the plates. The plate and cathode of the individual diodes are maintained at approximately equal potential as long as there is current flow between them.

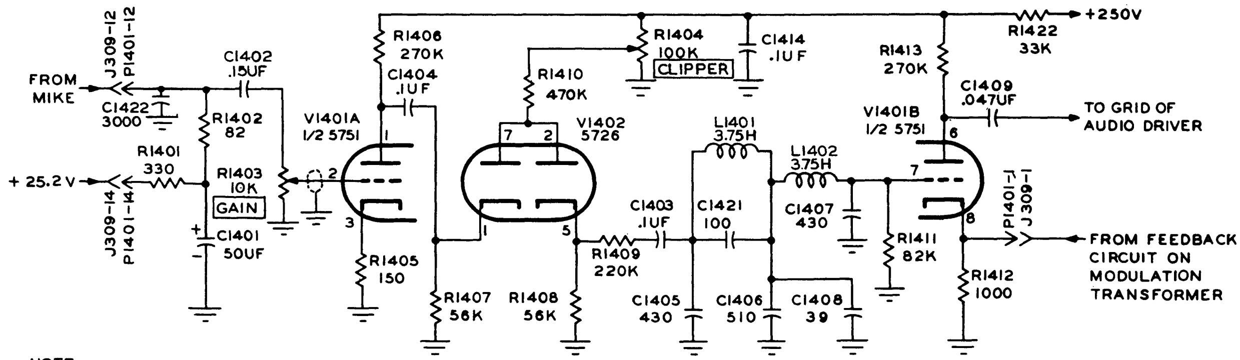

Figure 4-27. Modulator Unit, Audio Amplifier and Clipper, Simplified Schematic Diagram A29-131-3

Clipping does not occur until the peak audio input voltage reaches a value greater than the voltage at the plates of the diodes. Assume that voltage divider R1404 has been set to a point that will give 10 volts at the plates of V1402. When the peak audio input voltage is less than 10 volts, both halves of V1402 conduct at all times. As long as V1402 conducts, its resistance is very low compared with resistor R1410. Whenever a voltage change occurs across input resistor R1407, the voltage on all the tube elements increases or decreases by the same amount as the input voltage change, and the voltage drop across R1410 changes by an equal amount. This action permits all tube elements to be at the same d-c level above ground. As long as the peak input voltage does not exceed the value of 10 volts to which the plates are set by R1404, V1402 acts merely as a conductor, and the output cathode is permitted to follow faithfully all voltage changes at the input cathode.

If, under static conditions, 10 volts appear at the diode plates, twice this voltage, or 20 volts, will appear when one of the diode circuits opens so as to interrupt current flow and remove its d-c load from the circuit. As long as one of the diode sections continues to conduct, as is always the case with a clipper of this type, voltage at the diode plates cannot rise above twice the voltage to which it was set by R1404. In this example, the voltage cannot rise above 20 volts.

If the audio input voltage through C1404 is increased to any peak value between zero and plus 10 volts, the first cathode of V1402 will increase by the same amount to the proper amount between 10 and 20 volts. Remaining tube elements will assume the same value as the first cathode. However, the plates of V1402 cannot increase more than 10 volts above their 10-volt static level. When the input voltage through C1404 increases to more than plus 10 volts, the input cathode potential increases to more than 20 volts, and the plates and the output cathode increase to 20 volts and remain there until the input voltage drops below 10 volts.

When the input voltage swings in a negative direction, it will subtract from the 10-volt drop across R1407 and decrease the voltage on the input cathode by an amount equal to the input voltage. The plates and output cathode will follow the voltage level at the input cathode as long as the input voltage does not swing more than 10 volts negative. If the input voltage descreases more than 10 volts in a negative direction, the plates also will become negative. The potential at the output cathode will follow the voltage at the input cathode from its normal value of 10 volts positive until it reaches zero potential. As the input cathode voltage decreases to less than zero, the plates will follow. However, the output cathode, which is connected to ground through R1408, will stop at zero potential as the plate becomes negative. Conduction is impossible under these conditions. The output cathode remains at zero potential until the voltage at the input cathode swings back up to zero.

Voltage across output resistor R1408 follows the voltage variation across input resistor R1407 as long as the input voltage does not swing to a peak value greater than the static voltage at which the plates are set by voltage divider R1404. When the static plate voltage is set to 10 volts, input voltage peaks greater than 10 volts in either direction cause the output voltage to swing 10 volts in the direction of the peak and to remain at that level during the time the peak is above 10 volts. Thus effective clipping may be obtained at any desired level.

4.9.5.3 SECOND AUDIO STAGE. Refer to figure 4-27. The clipper output is fed through series resistor R1409 and capacitor C1403 to a two-section, low-pass filter consisting of C1421, C1405, C1406, C1407, C1408, L1401, L1402, and R1411. The filter is designed for a cutoff frequency of 3500 cps, a minimum attenuation of 15 db at 6500 cps, and a maximum attenuation of 7 db at 3500 cps. Output of the filter is applied to the grid of the second audio stage, amplified, and appears across plate load resistor R1413. Feedback from the output of the modulation transformer (T301) also is applied to the cathode. Output of V1401B is coupled through capacitor C1409 to the audio driver stage.

4.9.5.4 AUDIO DRIVER. Refer to figure 4-28. The phase inverter of the driver stage uses a type 5814 duotriode. Resistor R1414 is the input grid resistor, and R1415 serves as a common cathode resistor. Plate load resistors are R1418 and R1419. The grids of the two triode sections must be 180 degrees out of phase with each other. Signal voltage at the plate of the first section is coupled through capacitor C1411 and resistor R1416 to the grid of the second. At audio frequencies, the reactance of capacitor C1411 is negligible compared to the resistance of R1416; therefore, the voltage appearing at the second grid is essentially in phase with the signal voltage at the first plate and 180 degrees out of phase with input signal voltage.

4.9.5.5 MODULATOR STAGE. Refer to figure 4-28. Capacitors C1410 and C1412 are coupling capacitors for the two 6159 modulator tubes, V1404 and V1405. The modulator tube grid resistors, R1420 and R1421, are bypassed for high frequencies by capacitors C1417 and C1418. A bias source of negative 50 volts is connected to the junction of the two grid resistors, R1420 and R1421. A common cathode resistor, R1423, is used for the two tubes. The voltage drop across this resistor is proportional to the cathode current of the two modulation tubes and is connected through multiplying resistor R103 and switch S101 to the test meter on the front panel. The modulator tubes operate under class AB_2 conditions. Approximately 100 volts (grid to grid) of audio signal drives the tubes to full output. The cathodes of the two modulator tubes are bypassed at the tube socket by capacitors C1415 and C1416. The screens are bypassed by common capacitor C1420. Heavy clipping at V1402 results in a square wave being applied to the primary of the modulation transfomer. In order to avoid nonlinear phase shift and tilting of the square wave in the transformer, a feed-back voltage is taken from the secondary of the modulation transformer and fed back to cathode of V1401B through a feed-back network consisting of resistor R305 and capacitor C301. The negative feedback supplied by this network decreases amplifier gain considerably. In the event that a portion of the feed-back network should fail, considerable overmodulation and distortion will result.

4.9.6 250 KC I-F AMPLIFIER.

4.9.6.1 I-F AMPLIFIERS. Refer to figure 4-29. The plate circuit of second receiver mixer V1006, located

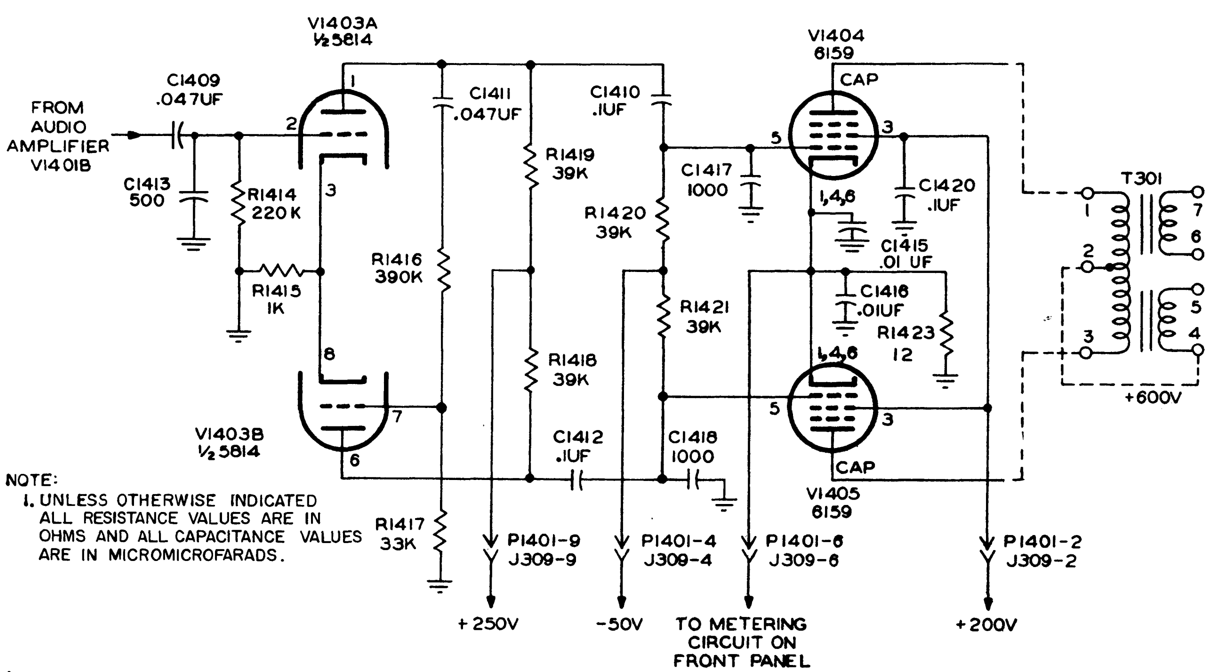

Figure 4-28. Modulator Unit, Audio Drive and Modulator, Simplified Schematic Diagram

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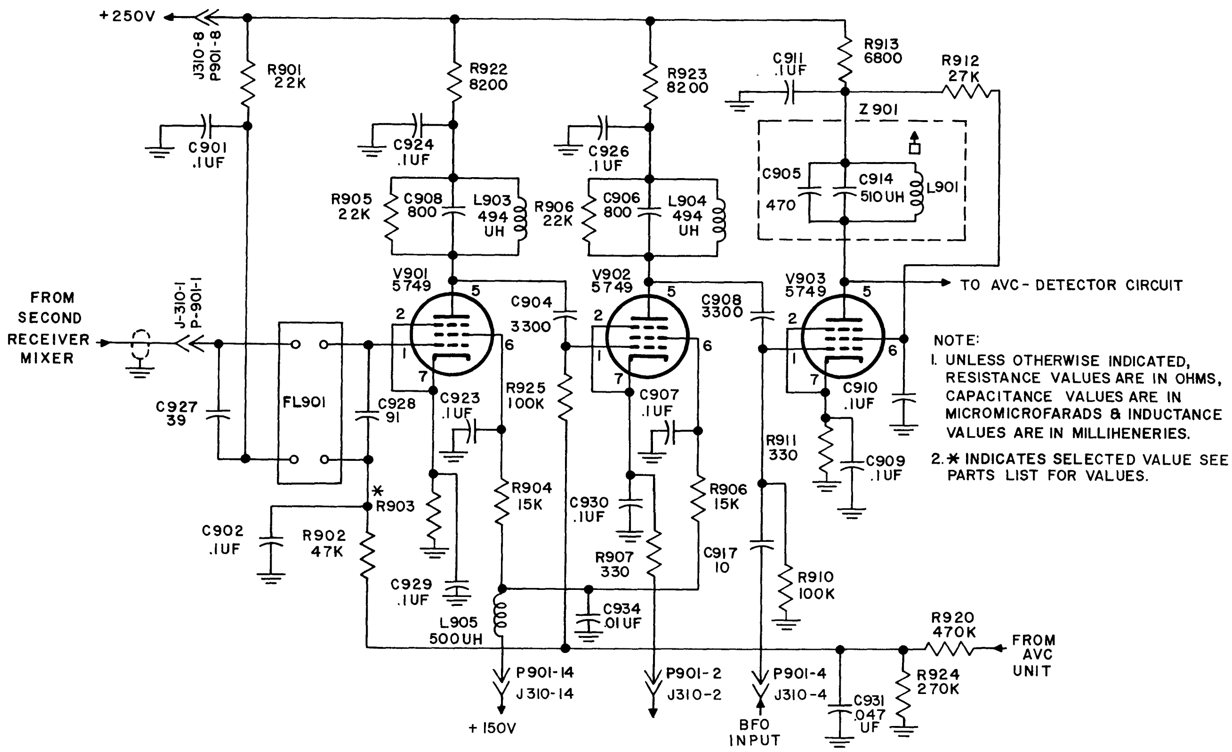

Figure 4-29. 250 Kc I-F Amplifier, Simplified Schematic Diagram

in the tuner unit, is completed through a mechanical filter, FL901. This filter has a center frequency of approximately 250 kc and a bandwidth of 6 kc. Output of the filter is coupled to the grid circuit of V901. Tubes V901 and V902 provide two stages of i-f amplification, and output is coupled to a third amplifier, V903. Input from bfo tube V1202 also is coupled to the grid circuit of V903. The i-f voltage developed in the plate circuit of V903 is then applied to a detector-avc circuit. The plate impedance of each i-f amplifier is tuned to 250 kc. Loading resistors are added in the first and second i-f amplifier plate circuits to obtain proper bandwidth. The avc bias is applied to V901 and V902; V903 operates with the grid return grounded. The cathode return of V902 is brought out to terminal 2 of plug P901 to provide a connection for an external sensitivity control.

4.9.6.2 MECHANICAL FILTER. Refer to figure 4-30. The mechanical filter, FL901, utilizes the principle of magnetostriction to convert oscillating magnetic energy to mechanical vibrations. The magnetostriction transducer input coil is resonated at 250 kc. A nickel wire within this coil vibrates and transmits mechanical energy to the first of a series of nickel alloy disks. The mechanical vibration of this first disk is coupled to succeeding disks by means of nickel-wire coupling elements. Biasing magnets at either end of the mechanical filter polarize the filter elements to prevent frequency doubling, in much the same manner that biasing magnets in a headphone prevent the diaphragm from bending in the same direction for both halves of an a-c cycle. The mechanical vibration of the last disk is coupled to a magnetostriction transducer element identical to the one used at the filter input. Mechanical vibrations of the output transducer nickel-wire core then are converted to electrical impulses.

Each of the disks employed in the mechanical filter has a mechanically resonant Q exceeding 2000. Six of these disks are overcoupled to produce a mechanically shaped response curve with a flat top and straight, almost vertical sides. Thus, the filter passes a band of frequencies very little wider than the flat top of the selectivity curve.

4.9.6.3 DETECTOR - AVC CIRCUIT. Refer to figure 4-31. One half of duodiode V904 is used as the detector. Signal voltage is coupled through C912 and applied to cathode of V904A. Rectified voltage appears

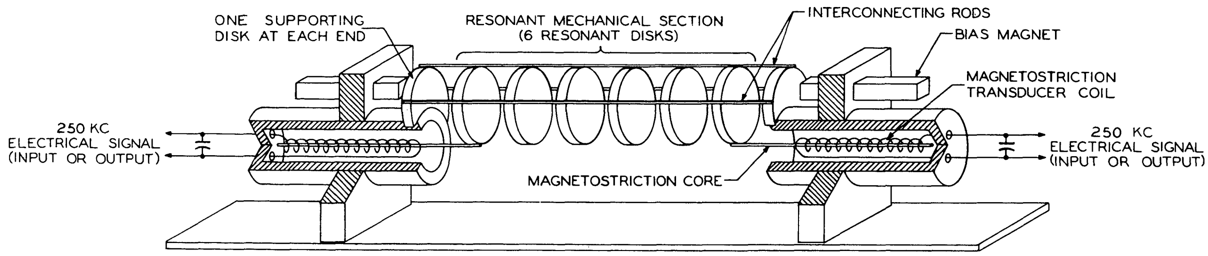

Figure 4-30. 250 Kc I-F Amplifier, Mechanical Filter, Functional Diagram

A29-242-4

across series resistors R909 and R916. A series-type noise limiter is employed. One half of duo-diode V905 is connected in series with the first audio amplifier stage (V1301A) in the a-f amplifier. Normal audio signals are coupled from the detector output to V1301A control grid. Sharp, high-amplitude noise impulses are limited in amplitude to a nominal 60 per cent.

In operation, rectified voltage from the detector load resistors (R909 and R916) is applied to pins 1 and 7 of V905. The plate of the limiter tube is positive and the cathode is negative. Capacitor C919 and resistors R917 and R918 form a filter network to prevent audio voltage from reaching the cathode of the limiter tube; therefore, the cathode is held at a steady potential. Audio voltage reaches the plate of V905A through C920 and modulates current flowing through the tube. Modulated current flowing through the limiter stage develops a voltage across R918. This voltage is coupled through C921 to the first a-f amplifier stage.

Tubes V904B and V905B are employed in a delayed avc circuit. The plate of V904B is coupled to the plate circuit of V903, the third i-f amplifier, through C918. A voltage divider consisting of resistors R914 and R915 is connected between +150 volts and ground. The cathode of V904B is connected to the junction of these resistors through isolating resistors R927 and R926, thus providing a delay bias to the avc rectifier. A second diode (V905B) is connected from the plate of V903 (through C912) to the junction of resistors R927 and R926. During weak or no-signal conditions, the junction of these resistors is approximately +25 volts, preventing V904B from conducting until the peak signal voltage at the plate of the third i-f amplifier exceeds 25 volts. As the signal voltage at the plate of the third i-f amplifier increases, the conductance of

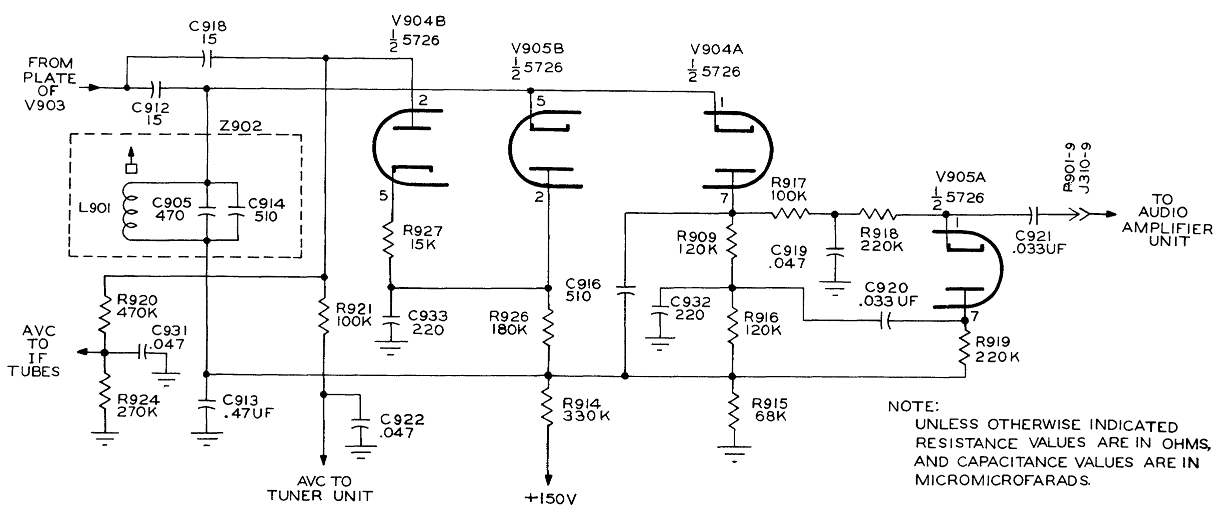

Figure 4-31. 250 Kc I-F Amplifier, Detector AVC Circuit, Simplified Schematic Diagram

A29-450-41

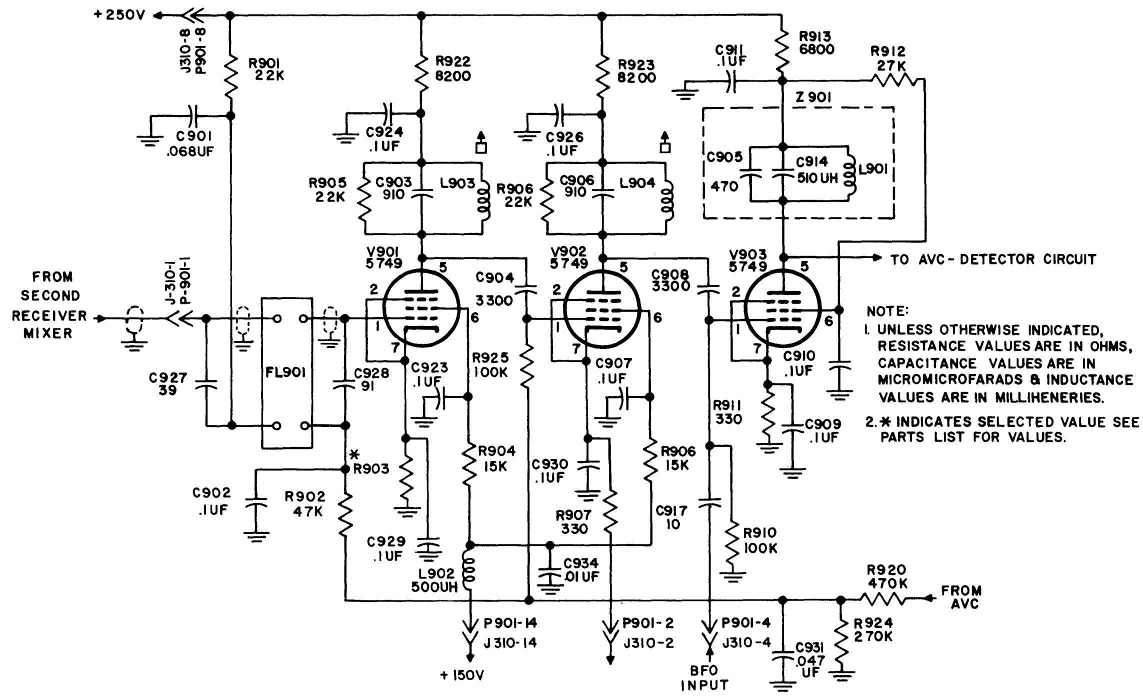

Figure 4-32. 250 Kc I-F Amplifier with Squelch and Selcal, I-F Amplifier, Simplified Schematic Diagram

V905B also will increase. This results in the voltage at the junction of R927 and R926 becoming less positive, allowing the avc diode to conduct. A more than normally sensitive avc circuit is thus obtained using only the avc diode. The d-c voltage obtained from the avc rectifier is supplied to various tubes in the equipment. The avc voltage supplied to V901 and V902 is filtered by R920, C931, and R924. The avc voltage supplied to the tuner unit is filtered by R921 and C922.

4.9.7 250 KC I-F AMPLIFIER WITH SQUELCH AND SELCAL. (FOR USE WITH 618S-4.)

The 250 kc i-f amplifier with squelch and selcal is directly interchangeable with the 250 kc i-f amplifier, with the exception of the squelch controls which must be added to the pilot's control circuits. Refer to figures 8-25 through 8-28 and figure 2-16.

4.9.7.1 I-F AMPLIFIERS. Refer to figure 4-32. The i-f amplifier stages of a 250 kc i-f amplifier assembly are the same as were described under paragraph 4.9.6.1 except for the variations caused by the addition of squelch and selcal circuits. The plate circuit of the second receiver mixer, V1006, located in the tuner unit is completed through a mechanical filter, FL901. This filter has a center frequency of approximately 250 kc and a bandwidth of 6 kc. Output of the filter is coupled to the grid circuit of V901. Tubes V901 and V902 provide two stages of i-f amplification, and output is coupled to a third amplifier V903. Input from bfo tube V1202 also is coupled to the grid circuit of V903. The i-f voltage developed in the plate circuit of V903 is applied then to detector-avc circuits. The plate impedance of each i-f amplifier is tuned to 250 kc. Loading resistors are added in the first and second i-f amplifier plate circuits to obtain proper bandwidth. The avc bias is applied to V901 and V902; V903 operates with the grid return grounded. The cathode return of V902 is brought out to terminal 2 of plug P901 to provide a connection for an external sensitivity control.

4.9.7.2 DETECTOR-AVC CIRCUIT. Refer to figure 4-33. One half of duotriode V904 is used as the detector. The signal voltage is coupled through C916 and applied to the cathode of V904A. The rectified voltage appears across the series resistors R909 and R916. A series-type noise limiter is employed by use of CR905. One half of duotriode V904B is connected in series with the first audio amplifier stage (V1301A) in the a-f amplifier. Normal audio signals are coupled from the detector output to V1301A control grid. Sharp, high-amplitude noise impulses are limited in amplitude to a nominal 60 per cent.

In operation, rectified voltage from the detector load resistors (R909 and R916) is applied to the anode of

CR905. The anode of CR905 is positive, and the cathode is negative. Capacitor C919 and resistors R917 and R918 form a filter network to prevent audio voltage from reaching the cathode of the crystal noise limiter diode CR905; therefore, the cathode is held at a steady potential. Audio voltage reaches the anode of CR905 through C920 and modulates current flowing through the crystal. Modulation current flowing through the noise limiter diode, CR905, develops a voltage across R918. This voltage is coupled through C921 to the first a-f amplifier stage (V904B).

Diodes CR901 and CR902 are employed in a delayed avc circuit. The anode of CR902 is coupled to the plate circuit of V903, the third i-f amplifier, through C918. A voltage divider consisting of resistors R914 and R915 is connected between +150 volts and ground. The cathode of diode CR902 is connected to the junction of these resistors through isolating resistors R927 and R926, thus providing a delay bias to the avc rectifier, CR902. A second diode CR901 is connected from the plate of V903 (through C912) to the junction of resistors R927 and R926. During weak or no-signal conditions, the junction of these resistors is approximately +25 volts preventing CR902 from conducting until the peak signal voltage at the plate of the third i-f amplifier exceeds 25 volts. Since CR901 also will start conducting, the voltage at the junction of R927 and R926 will become less positive, allowing the avc diode to conduct even more. This results in a more sensitive avc circuit than normally would be obtained using only the avc diode CR902. The d-c voltage obtained from the avc rectifier CR902 is supplied to various tubes in the equipment. The avc voltage supplied to V901 and V902 is filtered by R920, C931, and R924. The avc voltage supplied to the tuner unit is filtered by R921 and C922. Capacitor C902 and resistor R902 are decoupling for the avc.

4.9.7.3 SQUELCH CIRCUIT. Refer to figure 4-33. A positive d-c voltage is applied to the grid of the squelch control tube, V905A, through voltage dividing resistors R930, R937, R938 and a Squelch Control located on the control panel. Under no-signal conditions this causes the tube to conduct, increasing the bias on the first audio amplifier stage V904B to cut off, thereby disabling the audio output to the audio amplifier module. When a signal is present, r-f voltage is coupled to the squelch control circuit through coupling capacitor C915. The rectifying action of diode CR904 applies a negative d-c voltage to the squelch control grid, V905A, through resistor R936. When the magnitude of this voltage becomes great

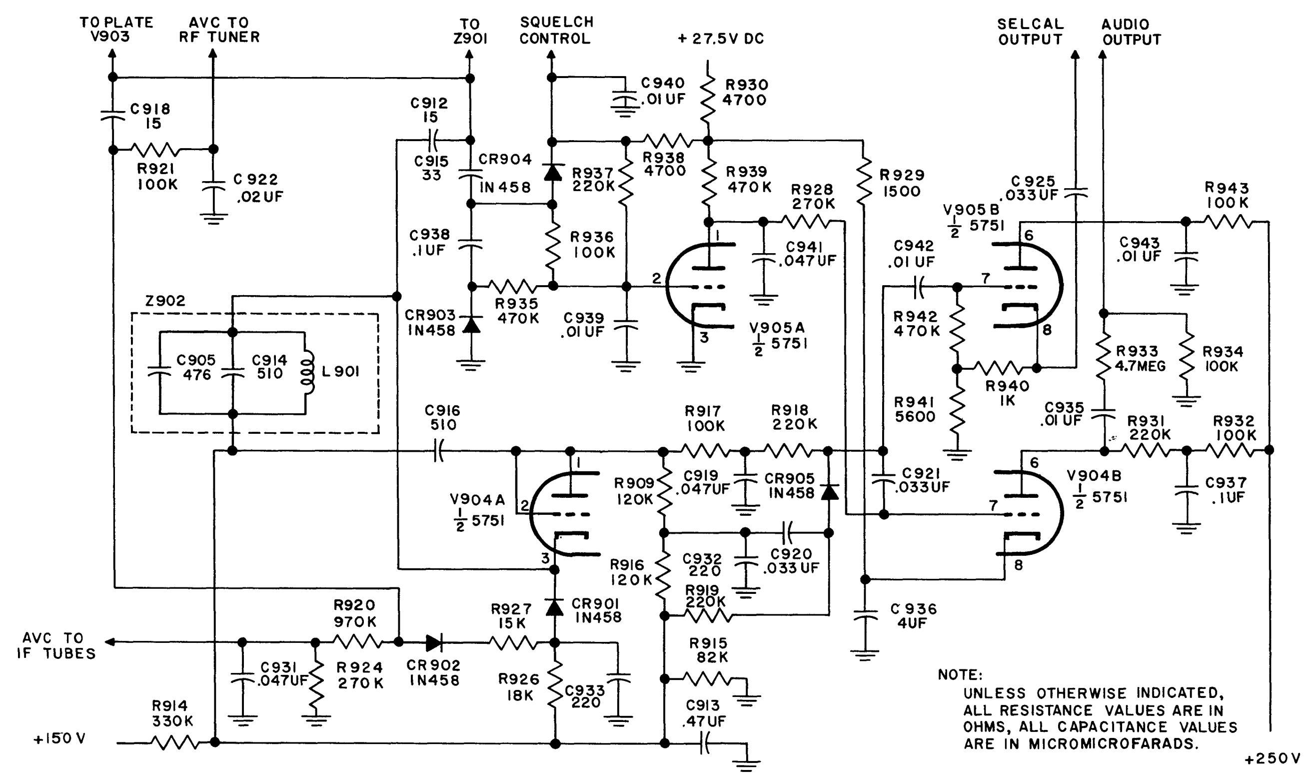

Figure 4-33. 250 Kc I-F Amplifier with Squelch and Selcal Detector AVC, Squelch and Selcal Circuit, Simplified Schematic Diagram

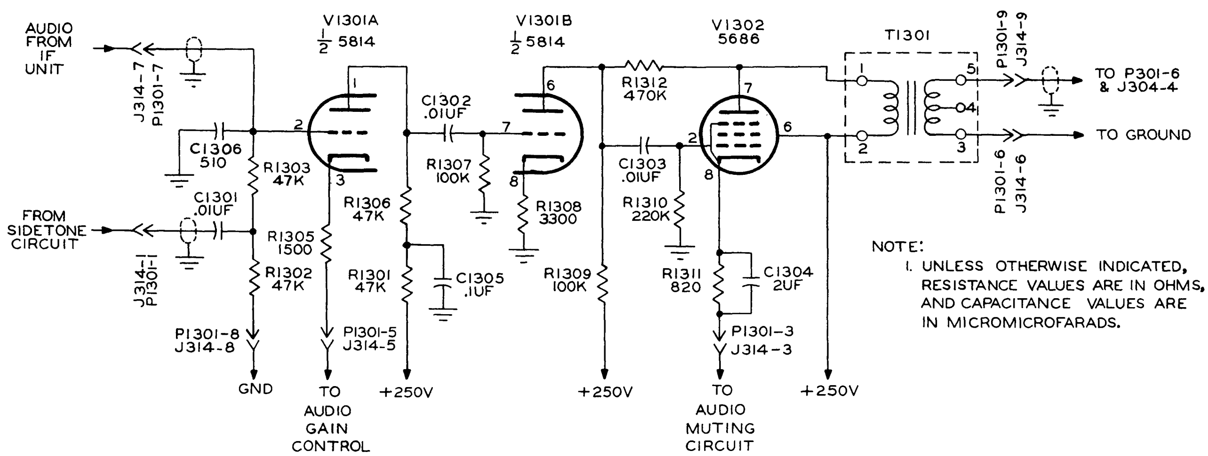

Figure 4-34. A-F Amplifier, Simplified Schematic Diagram

A29-413-31

enough to cancel the positive bias on the grid, the tube ceases to conduct lowering the bias on the first audio amplifier stage V904B and allowing the tube to conduct normally. Audio signal to the grid of tube V904B is obtained from the series noise limiter diode through coupling capacitor C921.

The circuit also provides signal-to-noise squelch of noise in the lower frequency noise spectrum through the action of diode CR904 operating as an average carrier detector and diode CR903 operating as a peak audio noise detector. With strong low-frequency noise peaks, the detector action of diode CR903 adds to the positive d-c bias voltage at the squelch control grid. When this voltage exceeds the d-c negative voltage furnished by the average detector diode, CR904, the tube conducts disabling the first audio stage as described in the opening paragraph of paragraph 4.9.7.3. The Squelch Control is adjusted by varying the level of positive bias applied to the squelch control grid, V905A, through the action of a control located on the pilot's control panel.

4.9.7.4 SELCAL CIRCUIT. Refer to figure 4-33. The selcal output is obtained by coupling to the noise limiter diode through coupling capacitor C942. This signal is connected to the high-impedance grid circuit of a cathode follower stage, V905B, to obtain an impedance transformation to a lower impedance. Output is taken from the cathode through coupling capacitor C925. Output level is maintained at 0.25-volt minimum. Since the selcal circuit is coupled to the noise limiter stage, output is maintained at full sensitivity regardless of squelch setting.

4.9.8 A-F AMPLIFIER.

As shown in figure 4-34, the audio amplifier unit consists of two conventional a-f voltage amplifier stages driving a type 5686 pentode. Output of the detector circuit in the i-f unit is applied to the grid of V1301A. The cathode return of V1301A is connected to AUDIO control R109 located on the front panel. Audio voltage is amplified in the two triode sections of V1301 and applied to V1302.

Approximately 300 milliwatts of audio power is available from power pentode V1302. This audio power is coupled to various circuits through transformer T1301. One side of T1301 (pin 3) is connected to P1301-6 where it normally is grounded. The cathode return of V1302 is connected to a contact of relay K1502 in the power amplifier unit. This contact is grounded except during operation of the PA centering circuit thus muting the audio system during centering.

The audio output at the secondary of T1301 is applied to a phone jack on the front panel (PHONE) and to P301-6. Connection from a remote control position can be made to P301-6.

Sidetone input to the audio amplifier is made through isolating resistor R1303. Sidetone voltage is obtained from two sources: during voice operation, sidetone voltage is developed by rectification of the carrier; during the CW operation, 400-cycle line voltage is keyed by relay K804. For a discussion of the sidetone circuit, see paragraph 4.9.11.1.

4.9.9 TUNING SERVO AMPLIFIERS.

4.9.9.1 GENERAL. For each servo a d-c signal proportional to the displacement error of the driven element (slug rack or PA tuning coil) is fed into a chopper which converts it into a 400-cycle a-c signal in phase quadrature with the line. This signal is amplified by V601A and mixed with a derived rate signal in the grid circuit of V601B. The combined signal is amplified by V601B and V602. The control winding of the servomotors are driven directly by signal in the plate circuit of V602. The direction of rotation of the motor depends upon the phase of the control voltage which is determined by the polarity of the d-c signal applied to the chopper.

4.9.9.2 CIRCUIT DESCRIPTION. The following description covers the simplified schematic diagram of the PA servo amplifier shown in figure 4-35. The circuit elements of the tuner servo amplifier are identical except for external components. The differences will be discussed in paragraph 4.9.9.4. Output from the phase discriminator operating around the power amplifier stages is fed to chopper G601. Capacitors C612, C613, and C601 are bypass capacitors to keep stray pickup on the input leads at a minimum. The chopper acts to convert the input signal into approximately square pulses of 400-cycle signal. This signal is coupled to the grid of V601A through capacitor C602. Capacitor C602 isolates the grid of V601A from the ground reference of the chopper. This allows the grid of V601A to swing either way from the average value or center line of the square wave input from the chopper. This doubles the signal amplitude which can be applied to V601A without exceeding its grid base. The signal is amplified and appears across plate load resistor R607. The signal voltage then is coupled through capacitor C605 to the grid circuit of V601B. Resistor R603 is the grid resistor for V601B. Also in the grid circuit of V601B, a derived rate signal is mixed with the error signal. This derived rate signal is coupled from the output stage through transformer T601. Resistor R608 acts as a load and matching resistor for T601. Resistor R602 is the cathode resistor for V601B. The combined signals are amplified and appear across plate load resistor R605. This voltage then is coupled through capacitor C606 to the grid of V602. The signal voltage is amplified in V602 and appears across the bridge circuit in the output. Capacitor C610 tunes the servomotor to 400 cycles. Servomotor B1501 (located in the PA amplifier unit) rotates in the proper direction until the phase discriminator is balanced again and has no output error signal to drive the servo amplifier unit. The system then is in balance.

4.9.9.3 RATE BRIDGE. In order to have a smoothly functioning system, the feedback from the output stage should be proportional to motor speed. An effective method of deriving a signal proportional to motor speed is illustrated in figure 4-36. This method is based upon the fact that the two-phase servomotor may be treated electrically equivalent to a series combination of its stalled impedance and a generator representing the counter emf. This counter emf is closely proportional to the motor speed. In the bridge circuit of figure 4-36, it can be shown that the two independent conditions for balance are as follows:

$$R_1R_4 = R_2R_3 \text{ and } R_1R_4C_2 = L_3$$

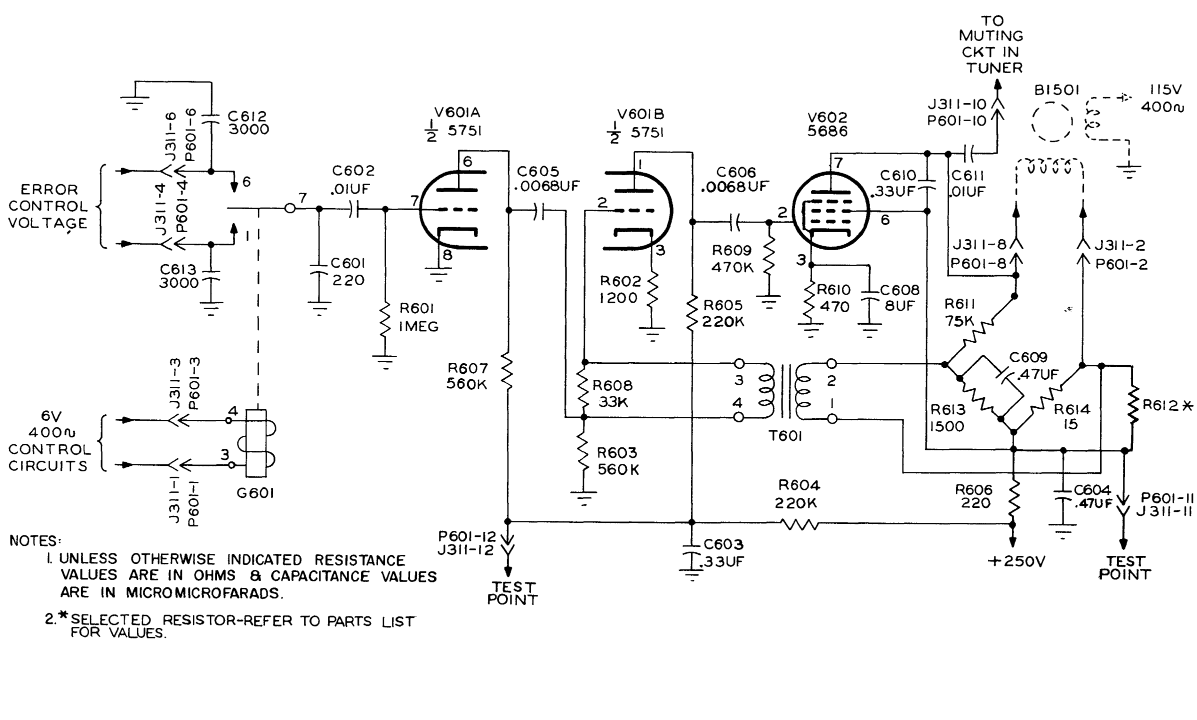

Figure 4-35. PA Servo Amplifier, Simplified Schematic Diagram

A29-430-31

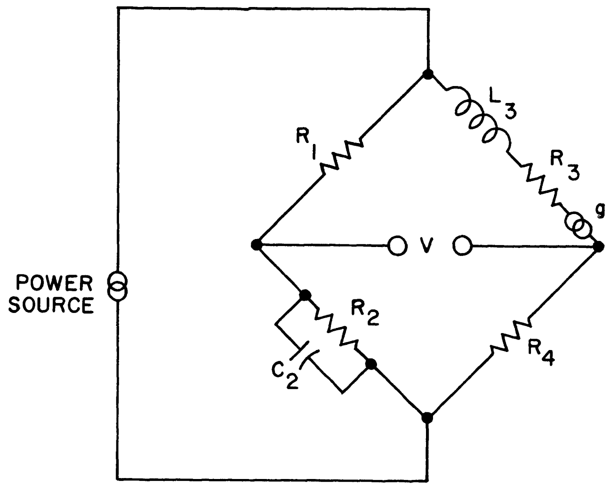

Figure 4-36. Servo Amplifier Bridge A29-407-2

Notice that the two equations have no frequency terms. Theoretically, the bridge is balanced ideally at all frequencies. With the bridge balanced, no voltage from the power source can appear at V, since the power is applied across the other diagonal of the bridge. However, since g is in one leg only, a voltage proportional to motor speed will appear at V, which is the bridge output. It was pointed out in connection with the balance equations given above that ideal balance is independent of frequency. However, R_3 and L_3 do vary with frequency, and the bridge can be made to balance only at 400 cps. This limits the loop gain that can be utilized through V601B and V602, the output bridge, and T601.

4.9.9.4 TUNER SERVO AMPLIFIER. As mentioned above in paragraph 4.9.9.2, the two servo amplifiers are identical internally. In the case of the tuner servo amplifier, the error voltage is derived from a discriminator circuit in the tuner unit, and the servo amplifier drives motor B102 located on the front panel. The servo amplifier unit plugs into J312 instead of J311.

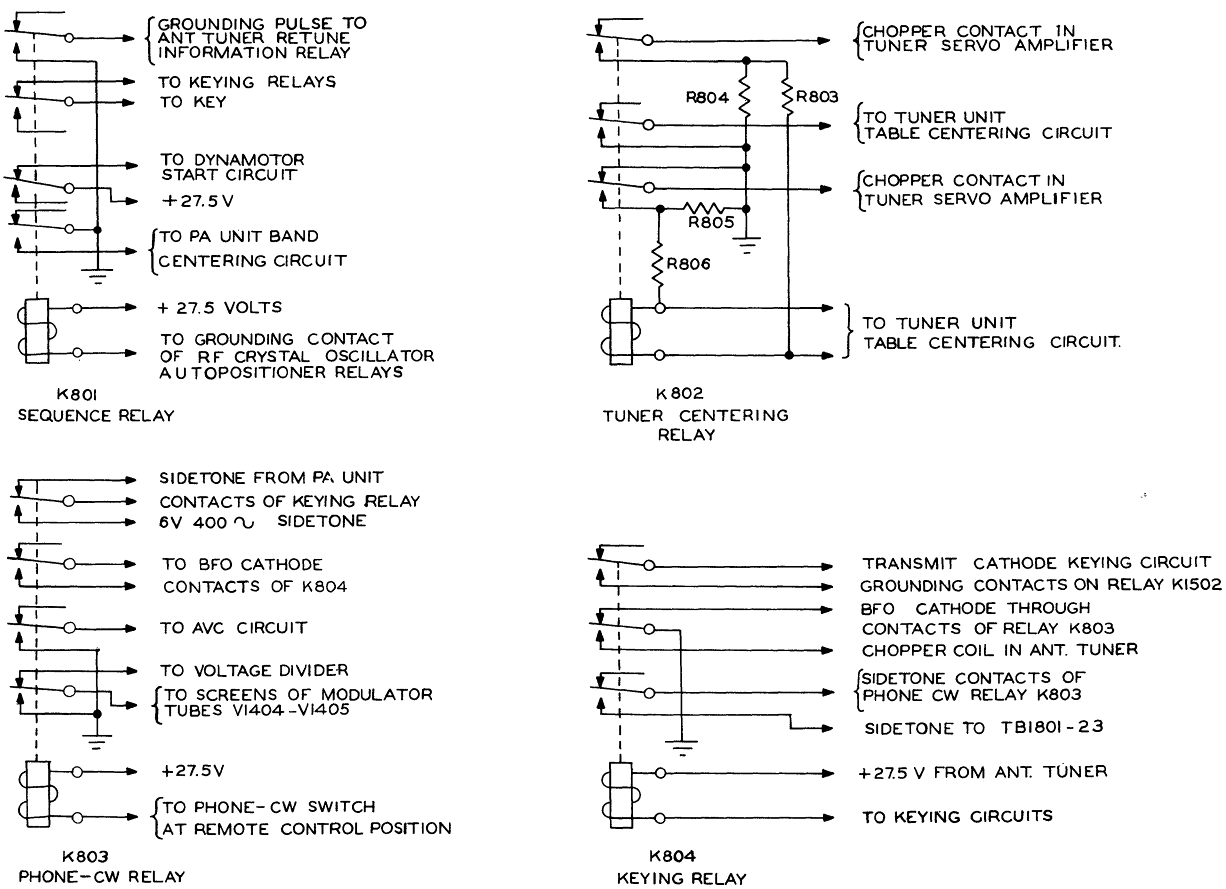

Figure 4-37. Relay Unit, Functional Diagram A29-409-3

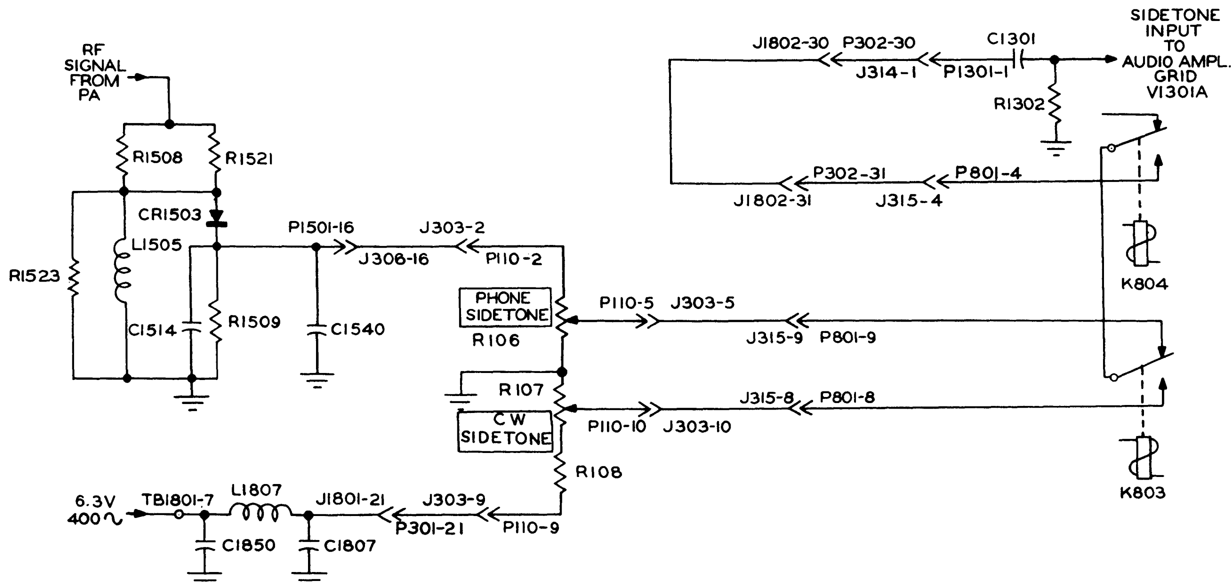

Figure 4-38. Sidetone Circuits, Simplified Schematic Diagram

A29-130-3

4.9.10 RELAY UNIT.

Refer to figure 4-37. The relay unit consists of four relays and voltage regulator tube. The function of each relay is discussed below. The plate of voltage regulator tube V801 is connected through current-limiting resistor R801 to +250 volts. A regulated +150 volts is developed across tube V801 and used to supply various screen-grid voltages in the equipment.

4.9.10.1 SEQUENCE RELAY K801. Relay K801 is energized during the channeling sequence. Contacts of the relay perform the following functions:

a. Energize the PA band centering circuit.

b. Open dynamotor start circuit during channeling.

c. Open the keying circuit.

d. Provide a ground pulse to the antenna coupler.

4.9.10.2 TUNER CENTERING RELAY K802. Relay K802 is energized through contacts of relay K801 when a new channel is selected. Contacts of the relay perform the following functions:

a. Provide a self-locking ground during table centering operation.

b. Connect the table centering information to input of tuner servo amplifier.

4.9.10.3 PHONE-CW RELAY K803. Relay K803 is energized by the PHONE-CW switch at the remote control position. (In the energized position, the equipment is operating on CW.) Contacts of the relay perform the following functions:

a. Remove voltage from screen grids of modulator tubes V1404-V1405, and ground the screen grids.

b. Ground avc voltage supplied to the tuner unit.

c. Provide operating ground for bfo tube V1202.

d. Complete sidetone circuits.

4.9.10.4 KEYING RELAY K804. Relay K804 is energized by either a key or microphone. Contacts of the relay perform the following functions:

a. Complete sidetone circuit to TB1801.

b. Open bfo cathode circuit.

c. Provide chopper ground to antenna coupler.

d. Complete cathode keying circuits for tubes V1201, V1003, V1004, V1010, and V1011.

4.9.11 CONTROL CIRCUITS.

4.9.11.1 SIDETONE CIRCUIT. See figure 4-38. Sidetone is provided in both the phone and CW positions to supply monitoring information on all transmission. During CW transmissions, a keyed 400-cps voltage indicates that keying relay K804 has operated. A 6.3-volt, 400-cps voltage is applied to the CW SIDETONE control (R107) as shown in figure 4-38. The desired voltage level is taken from the control and applied to the input of audio amplifier V1301A through contacts of phone-cw relay K803 and keying relay K804. (Relay K803 is shown in the phone position in figure 4-38.)

Sidetone is provided during voice transmissions by rectification of the carrier. The rectifier circuit is shown in figure 4-38. Voltage then is applied to the audio amplifier through a circuit similar to that used for CW sidetone. In this case, R106 is the PHONE SIDETONE control.

Note that the sidetone voltage in both cases is applied to terminal 23 of TB1801. If desired, the sidetone can be coupled then to the input of an interphone circuit. If this is not done, a jumper must be connected between terminals 22 and 23 of TB1801, as shown, in order to supply sidetone input to V1301A.

Effective with the serial numbers noted on figure 8-10, sidetone connections are made to 30 and 31 on P302, and 30 and 31 are shorted together on J1802. Pins 22 and 23 are used for FSK connections.

4.9.11.2 CHOPPER DISABLING CIRCUIT. See figure 4-39. A disabling circuit prevents operation of the power amplifier servo amplifier unless the transmitter is keyed or the PA centering circuit is operating. Under either of these conditions, a grounding circuit is supplied to the chopper coil (G601) of the PA servo amplifier unit through contacts of keying relay K1501 or centering relay K1502.

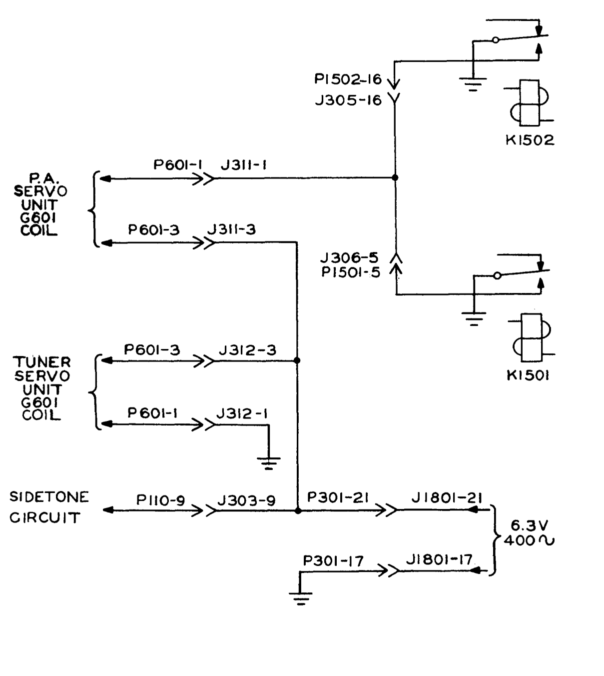

Figure 4-39. Chopper Disabling Circuit, Simplified Schematic Diagram

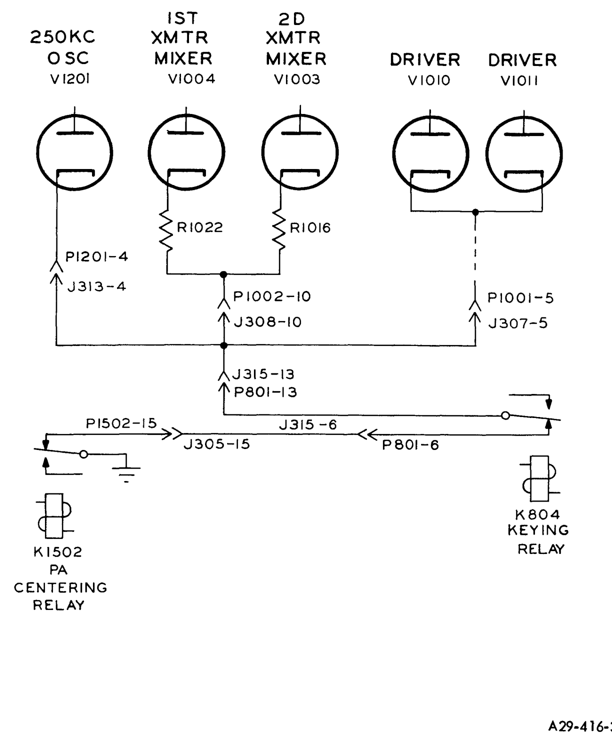

Figure 4-40. Keying Circuits, Transmit, Simplified Schematic Diagram

4.9.11.3 KEYING CIRCUITS. See figures 4-40 and 4-41. Three keying relays are used to provide the various keying functions: K804, K1001, and K1501. All three relays operate when either the key or microphone button is operated. Relay K804, located in the relay unit, provides a ground return for the transmitter tubes of the tuner unit. As indicated in figure 4-40, this circuit is opened by contacts of relay K1502 during centering operations in the power amplifier.

Relay K1001, located in the tuner unit, performs several functions, as shown in figure 4-42. One set of contacts grounds the receiver input circuit during the transmit position. A second set of contacts connects the cathode of second r-f amplifier V1009 directly to ground for increased gain and opens the cathode circuit of first receiver mixer V1005 and first r-f amplifier V1008. A third set of contacts opens the cathode circuits of second receiver mixer V1006. The fourth set of contacts removes avc voltage from the grid of V1009 and transfers the grid to ground.

The bfo tube, V1202, is operated by grounding the cathode through contacts of phone-cw relay K803 and keying relay K804. See figure 4-41.

Relay K1501, located in the power amplifier unit, switches the antenna from receiver input to transmitter output, grounds the receiver input, removes

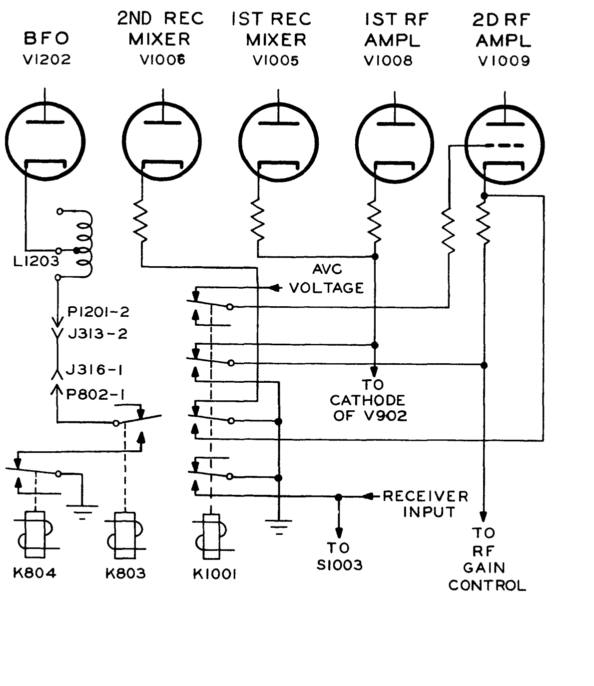

Figure 4-41. Keying Circuits, Receive, Simplified Schematic Diagram

the ground from the PA discriminator output allowing the automatic tuning circuit to function, and provides a ground for the PA servo amplifier chopper.

4.9.11.4 TUNER MUTING CIRCUIT. Refer to figure 4-42. Under certain conditions, the r-f tuner unit could supply drive to the power amplifier and operate the Antenna Tuner during channeling operations if precautions were not taken to prevent this. This would allow the Antenna Tuner to tune up on a random frequency and then break the automatic keying circuit of the Transceiver resulting in improper tuning. To prevent this from occurring, the second transmitter mixer, V1003, is biased to cutoff when the tuner servo amplifier is in operation.

A fixed positive voltage is applied to crystal diode CR1006 through resistor R1044. Signal voltage from the plate of tuner servo amplifier tube V602 also is applied to the crystal diode. During tuner channeling operations, the a-c voltage from V602 is sufficient to overcome the positive d-c voltage, and CR1006 conducts. The resultant negative voltage developed across R1050 is filtered by capacitor C1123 and applied to the control grid of mixer tube V1003 through isolating resistor R1015, biasing the mixer and preventing drive voltage from reaching the power amplifier.

4.9.12 POWER SUPPLY.

All power necessary to operate Transceiver 618S-1 is obtained through the operation of Power Supply 416W-1 in conjunction with the main power source. The power input requirements for the 416W-1 are as follows:

27.5 volts - 30 amperes

115 volts - 380-420 cps, single phase - 30 watts

115 volts - 320-1000 cps, single phase - 150 watts

The 27.5-volt d-c input to the power supply is applied through the operation of the OFF-PHONE-CW switch at the remote control position. Placing this switch in either PHONE or CW position provides a circuit for operating relays K1602 and K1603. When the contacts of K1602 and K1603 close, all of the power supply circuits except the dynamotor are completed. Switches S1601 and S1602 are manually operated thermal cutout switches in the +27.5-volt input leads to the start relays and the dynamotor.

4.9.12.1 DYNAMOTOR. A dynamotor provides plate and screen voltage to the modulator and power amplifier units. To prevent operation of the dynamotor during channeling, the dynamotor start relay (K1601) coil is connected to 27.5 volts d-c through contacts of sequence relay K801. This relay, which is energized during channeling, opens the circuit from 27.5 volts to K1601. Also, to prevent operation of the dynamotor before bias has been applied to the power amplifier and modulator tubes, relay K1604 has been added to the bias supply. Relay K1604 is not energized until

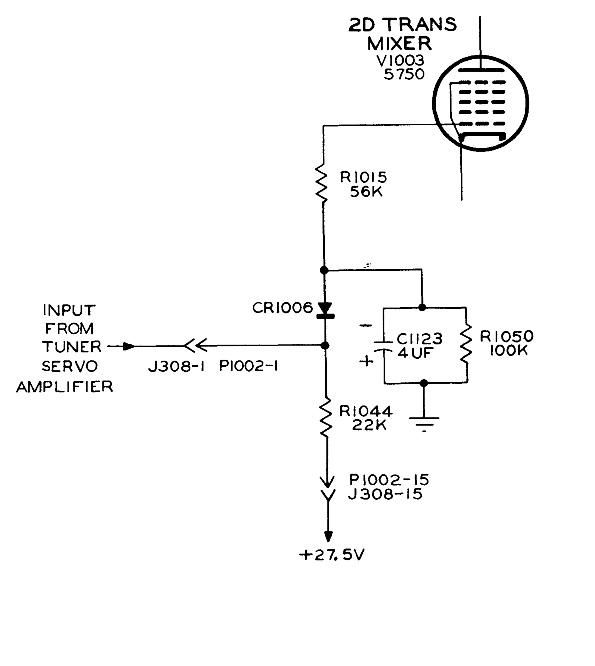

Figure 4-42. Tuner Muting Circuit, Simplified Schematic Diagram

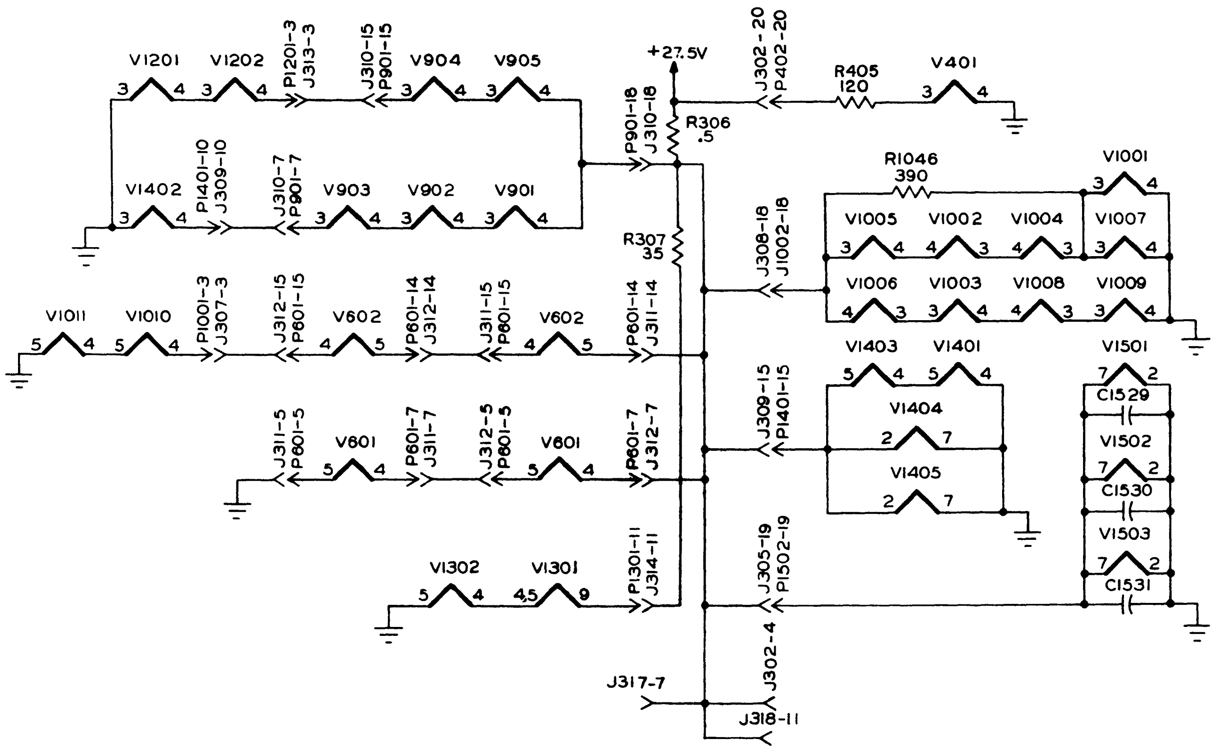

Figure 4-43. Transceiver 618S-1, Filament Circuits, Simplified Schematic Diagram

A29-124-3

bias has been produced. When this relay is energized, contacts close which allow completion of the K1601 relay coil through the OFF-PHONE-CW switch at the remote control position. If, for any reason, bias should be cut off, K1604 and K1601 will open, and the high-voltage supply will be removed from the transmitter.

In the CW position, relay K1601 is energized at all times. In the PHONE position, relay K1601 is energized only when the push-to-talk button on the microphone is closed. The 27.5-volt input lead to the dynamotor is filtered by capacitors C1603, C1604, and inductor L1603. The negative side of the dynamotor is grounded to the chassis. Two high-voltage outputs are taken from the dynamotor, +600 volts and +250 volts. The 600-volt output is filtered by inductor L1605 and capacitor C1607 and supplies plate voltage to the power amplifier and modulator tubes. The 250-volt output is filtered by inductors L1604 and L1601 and dual capacitor C1608. This output supplies screen voltage to the power amplifier and modulator tubes and plate and screen voltage to the audio driver in the modulator and drivers V1010 and V1011.

4.9.12.2 A-C VOLTAGES. The a-c input voltage supplied by the primary source is applied through contacts of starting relay K1603 to circuits in the power supply and directly to the 618S-1. The 115-volt, 400-cps voltage is connected directly to the Transceiver to supply one winding of each servomotor, B102 or B1501. This voltage also is applied through dropping resistor R1606 to transformer T1601. The secondary voltage of 6.3 volts is used to supply both the chopper coils in the servo amplifier units and sidetone voltage during CW operation. The L1606 is an autotransformer used to obtain an 18-volt, 400-cps supply. This voltage is not used in the 618S-1 installation. The 115-volt, 400-cps input lead is used by F1602, which is mounted on the front panel of the power supply. The 115-volt, 380-1000-cps voltage is supplied to two selenium rectifier circuits in the 416W-1 and to blower motor B101 on the front panel of the transmitter-receiver. This voltage is protected by fuse F1601 which is mounted on the front panel of the power supply.

4.9.12.3 SELENIUM RECTIFIER CIRCUITS. Two selenium rectifier circuits are included in Power Supply 416W-1. The 115-volt, 320-1000-cps voltage is applied to a voltage doubler circuit to obtain 250 volts d-c. The doubler circuit includes dual capacitor C1601 and selenium rectifiers CR1601 and CR1603. Resistor R1601 limits surge current when power is

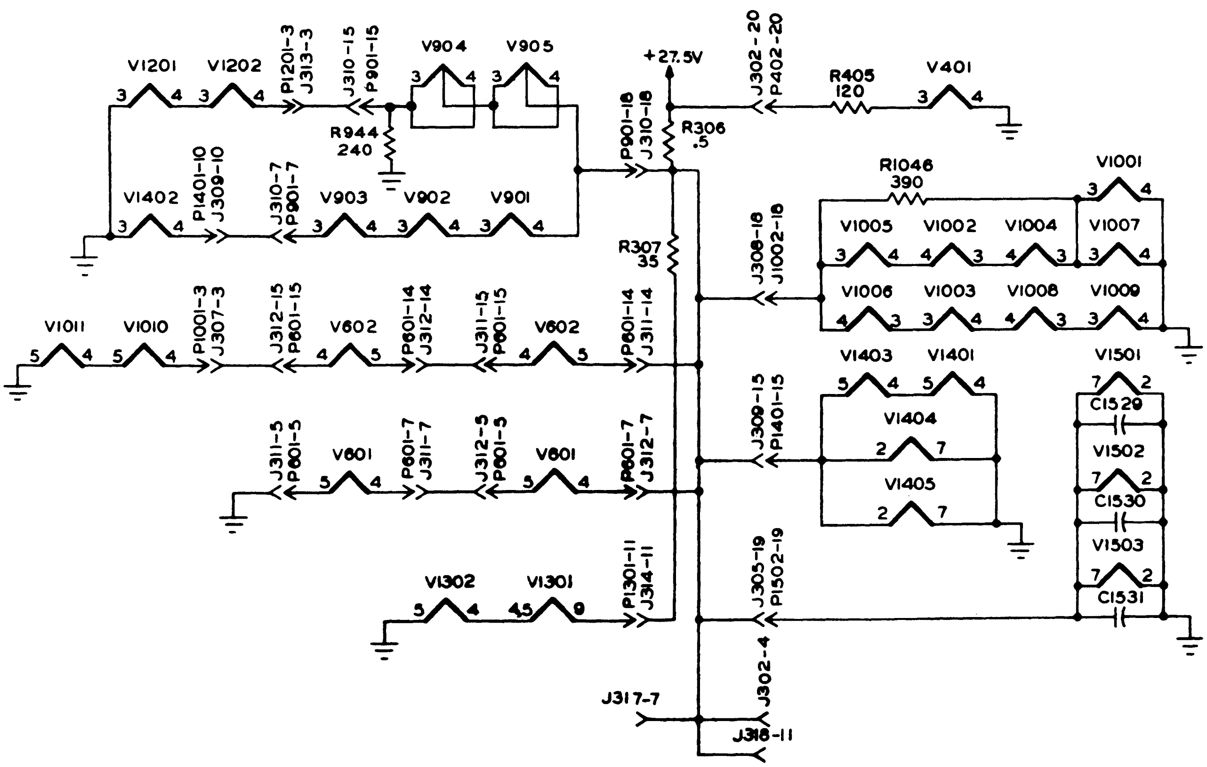

Figure 4-44. Transceiver 618S-4, Filament Circuit, Simplified Schematic Diagram

A29-326-3

applied to the circuit. Output of the doubler is filtered by inductor L1602 and dual capacitor C1602. Resistor R1602 is a bleeder resistor. The 250-volt d-c supplies plate and screen voltage to various tubes in the 618S-1. The 115-volt, 320-1000-cps voltage also is supplied to a low-voltage selenium rectifier circuit. Voltage is applied to rectifier CR1602 through current-limiting resistor R1603. Two diode load circuits are connected across the output. One circuit, consisting of load resistors R1604-R1605 and filter capacitor C1606, supplies a -65-volt d-c bias voltage to the PA tubes. The second circuit, consisting of resistors R1609 and R1607, potentiometer R1608, and filter capacitor C1611, supplies an adjustable negative voltage to bias modulator tubes V1404 and V1405. Capacitor C1605 is a filter capacitor common to both output circuits.

4.9.13 FILAMENT VOLTAGE.

The +27.5-volt d-c filament voltage is supplied by the primary power source. The filament voltage is applied to the series-parallel connected filaments of the 618S-1 through contacts of starting relay K1602. A simplified diagram of the filament circuit of the 618S-1 is shown in figure 4-43. A simplified diagram of the filament circuit of the 618S-4 is shown in figure 4-44. Series-dropping resistors are used to obtain correct operating voltages in the various filament circuits.

SECTION V
INSPECTION AND PREVENTIVE MAINTENANCE

5.1 INTRODUCTION.

This section provides information for the inspection and preventive maintenance of Transceiver 618S-1 and 618S-4 and their associated system components. Before attempting to service and test this equipment, it is essential that maintenance personnel be thoroughly familiar with the make-up of the equipment and reasonably familiar with its principles of operation (refer to section IV). Throughout this section, references are made to meter indications, attenuator settings, etc. of various pieces of test equipment. These indications are not necessarily equipment specifications but are approximate values encountered on a large number of properly operating components. It is possible that the equipment will operate properly with varied indications from those stated since many variable factors are involved. It is absolutely essential, however, that the test equipment in use be calibrated properly, terminated properly, and otherwise in excellent condition.

5.2 TEST EQUIPMENT AND SPECIAL TOOLS.

5.2.1 TEST EQUIPMENT.

The test equipment listed in table 5-1 or equipment of equal or superior characteristics must be in the performance of the tests required by this handbook.

TABLE 5-1. TEST EQUIPMENT REQUIRED

ITEM NO.	ITEM AND TYPE OF EQUIPMENT	CHARACTERISTICS OR DESCRIPTION
1	Signal Generator, Measurements Corporation Model 65B or equivalent	Frequency Range - 75 kc to 30 mc. Frequency Accuracy - ±0.5%. Output Voltage - Continuously variable from 0.1 uv to 2.2 volts. Output Impedance - 50 ohms.
2	Audio Oscillator, Hewlett-Packard Model 200C or equivalent	Frequency Range - 20 to 20,000 cps. Output Voltage - 22.5 volts into 500-ohm load.
3	A-C Vacuum-Tube Voltmeter Ballantine Model 300A or equivalent	Frequency Range - 10 to 150,000 cps. Voltage Range - 0.001 to 100 volts rms. Input Impedance - 500,000 ohms, 30 uf.
4	R-F Vacuum-Tube Voltmeter, General Radio Model 726A or equivalent	Frequency Range - 20 cps to 50 mc. Voltage Range - 0.1 to 150 volts. Input Impedance - 6 megohms, 6.6 uf.
5	D-C Voltmeter, Electronics Design Model 100 or equivalent	Input Impedance - 11 megohms. Ranges - 0/3/10/30/100/300/1000.

TABLE 5-1. TEST EQUIPMENT REQUIRED (Cont)

ITEM NO.	ITEM AND TYPE OF EQUIPMENT	CHARACTERISTICS OR DESCRIPTION
6	Oscilloscope DuMont Model 304A or equivalent	Input Impedance - 2.0 megohms, 50 uuf.
7	Noise and Distortion Analyzer, Hewlett-Packard Model 330D or equivalent	
8	Frequency Measuring Device, 51J-4 Receiver or equivalent	Accuracy - 0.015%.
9	Dummy Load, Bird Model 67 or equivalent	
10	Primary Power Source	27.5 volts d-c at 300 amp continuous and 100 amp on starting; 115 volts, 380-420 cps at 180 watts.
11	Power Supply 416W-1	Capable of delivering 250 v, 600 v, -50 v, and -65 v; 6.3 v 500 cps.
12	Telegraph Key	
13	Carbon Microphone	Hand-held microphone with push-to-talk switch, cord, and plug.
14	Dummy Microphone	A device for connecting the audio oscillator to the microphone terminals of the Transceiver in such a manner as to simulate the action of a real microphone. It shall consist of a matching transformer or pad having a low-impedance output circuit capable of carrying the microphone current and having a resistance of 82 ohms in the audio output lead. Refer to figure 2-3.
15	Monitor	A headset or loud-speaker with amplifier and volume control, if desired, including a transformer or other means for making the input impedance at least 10,000 ohms.
16	High-Impedance Headphones	Approximately 300 ohms impedance.
17	Audio Load, Daven Model OP182	
18	Decade Box	Range - at least 18-56 ohms.
19	Set of Ten Test Crystals	May be ordered from Collins, part no. 540 5855 002.
20	Two coaxial cables for connection between Transceiver, dummy load, and signal generator	RG-8/U and RG-58/U coaxial cable. Refer to table 1-2 and section II.
21	Necessary interconnecting cables between components	Refer to section II.
22	614D-1, 614D-2, 614D-3, or 614C-2 Remote Control Unit	
23	Alignment Tool	Must be of nonconducting material.
24	Gauge Block	Must be nonmagnetic metal exactly 1.375 inches wide, thin enough to slide between the coil shields of the r-f tuner and long enough to be placed under the tuning rack.

5.2.2 SPECIAL TOOLS.

Table 5-2 lists special tools available and recommended for the proper maintenance of Transceiver 618S-1. These tools are included in a maintenance kit which may be acquired as a unit. Figure 5-1 illustrates the equipment included in the kit.

TABLE 5-2. SPECIAL TOOLS AVAILABLE FOR MAINTENANCE

NAME	MANUFACTURER AND PART NUMBER		APPLICATION
Maintenance Kit for 618S-1 which contains the following items:	Collins Radio Company (CPN) 540 6649 003		Maintenance of Transceiver 618S-1.
Gauge Block	Collins Radio Company (CPN) 540 5369 002		Alignment of R-F Tuner Unit.
Dial Gauge, Mounting Bracket	Collins Radio Company (CPN) 540 9984 003		Alignment of R-F Tuner Unit.
Dial Gauge, Model 665-F1	L.S. Starrett Company (CPN) 024 0160 00		Alignment of R-F Tuner Unit.
7-Pin Tube Socket Adapter	Alden Products Company Catalog no. 977STMIN		Voltage and Resistance Measurements.
9-Pin Tube Socket Adapter	Alden Products Company Catalog no. 999STMIN		Voltage and Resistance Measurements.
Octal Tube Socket Adapter	Alden Products Company Catalog no. 988STTO		Voltage and Resistance Measurements.
Alignment Tool, Kleer Aligner	Insuline Corp. of America Catalog no. 1006		Alignment of Transceiver 618S-1.
Set of Ten Test Crystals	Midland Manufacturing Co. (CPN) 540 5855 002		Test over-all alignment of Transceiver 618S-1.
	Part no. and frequency of crystals		
	(CPN)	Frequency	
	290 2482 00	2250 kc	
	290 2483 00	3250 kc	
	290 2487 00	1750 kc	
	290 2738 00	3093.75 kc	
	290 2866 00	2500 kc	
	290 2867 00	3000 kc	
	290 2869 00	2000 kc	
	290 2870 00	2750 kc	
	290 2479 00	2050 kc	
	291 8168 00	3500 kc	
Maintenance Kit Case	Collins Radio Company (CPN) 540 5849 005		Container for special tools.
Tube, Pins Straightener (Not included in kit)	Star Expansion Bolt Co. (CPN) 024 0025 00		Straighten tube pins.

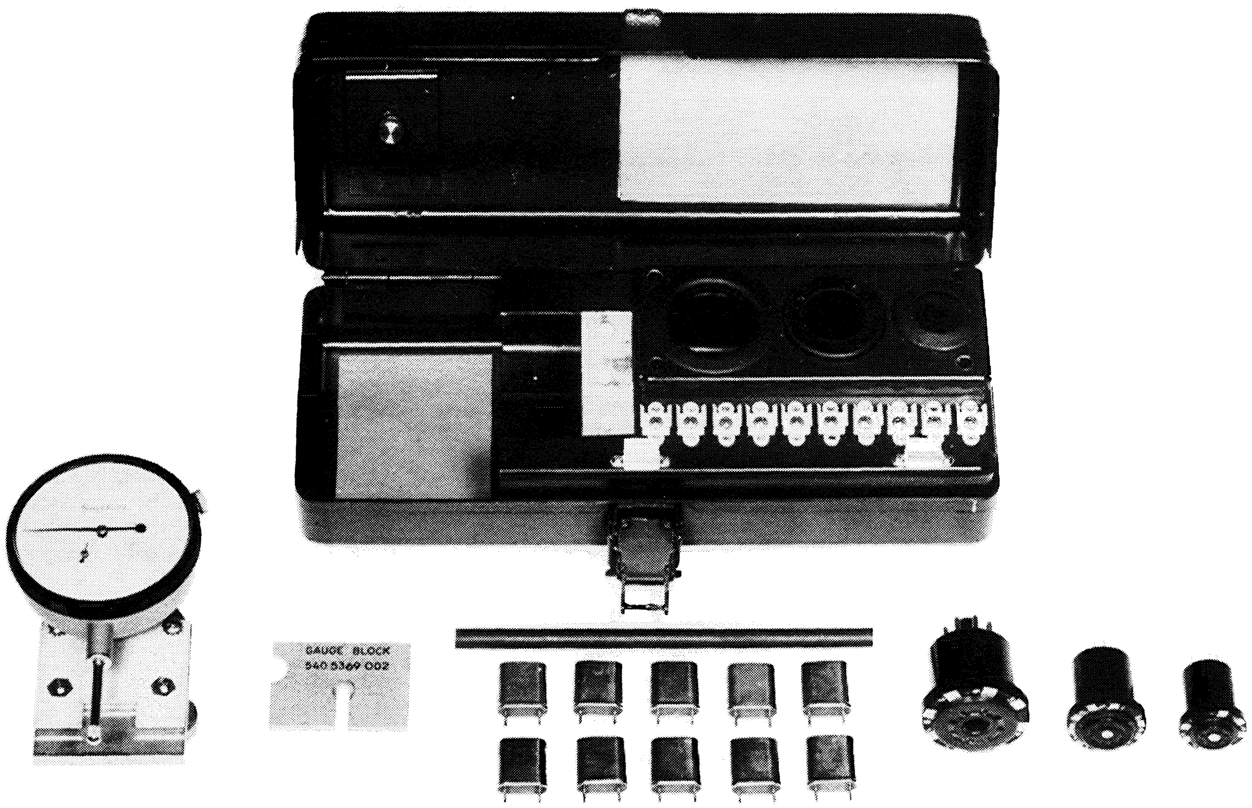

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Figure 5-1. Tools Included in 618S-1 Maintenance Kit

5.2.3 TEST SET 478H-1.

Available in addition to the maintenance kit is the 478H-1 Test Set which was specifically designed for trouble analysis and alignment of Transceiver 618S-1. It consists of a chassis with a main panel on which are mounted jacks which mate with plugs for all modules of the 618S-1. The 478H-1 is capable of making a "go-no go" check and aligning each unit. Also, a band switch is provided and a method of checking continuity on switch and relay contacts. Since the units are exposed (figure 5-2), when plugged into the 478H-1, voltage and resistance measurements and trouble shooting are made quite convenient.

A maintenance kit also is available. The equipment listed in table 5-2 may be purchased separately, if desired.

Power is supplied to the 478H-1 by associated Power Supply 413F-1. The 413F-1 operates from 115 volts, 60 cps. Output of the power supply is transferred to the test set by means of a cable which is attached permanently to the test set and plugged into the rear of the 413F-1. The unit is supplied with detachable mounting brackets for use in standard test rack mounting if desired.

5.3 MINIMUM PERFORMANCE STANDARDS.

5.3.1 PREFLIGHT INSPECTION AND TEST.

Certain operating checks must be made by the pilot or radio operator prior to actual operation. Careful observance of these procedures will reduce the chance of equipment failure in service since any abnormal conditions may be reported quickly to maintenance personnel if correction is beyond the scope of the operator. A thorough inspection of the complete installation should be made before power is applied to the equipment and before any adjustments or tests are begun.

5.3.1.1 PREFLIGHT INSPECTION. Inspect the 618S-1 installation for the following:

a. Antenna and terminal connections to Antenna Tuner 180L-( ) must be secure.

b. Connections between Antenna Tuner 180L-( ), Power Supply 416W-1, Remote Control Unit 614D-( ), or 614C-2, and Transceiver 618S-1 or 618S-4 must be secure.

c. Cable connectors must be tightened properly. Tighten locking rings by hand if necessary. Inspect cables for broken wires and loose connections.

d. Inspect installation Shockmount 350S-1 or 350S-3, 350D-3, and 350T-1 to make certain they are anchored securely to the radio equipment shelf and capable of sustaining severe vibration.

e. Make sure the component cover fasteners are tight.

f. Microphone, headset, and key cords must be unbroken and securely in place.

g. Check primary power source connections to make certain that no short circuits exist in the input power lines.

5.3.1.2 PREFLIGHT TEST. Test the 618S-1 Transceiver installation according to the procedures listed in steps a. through m.

a. Place the OFF-PHONE-CW switch in the PHONE position. Allow approximately 10 minutes warmup time for the equipment before beginning this portion of the test.

b. Set the meter selector on the front panel of the 618S-1 to the 28 V. position. The meter should indicate in the red portion of the scale. Check the 250 V. position. Indication should be within the red area.

c. Select a band 1 channel (2 to 3.75 megacycles). Allow the equipment to complete its tuning cycle.

NOTE

Extreme care should be taken to avoid interference with any local communication channel. After each new channel is selected, listen in the headphones to determine if the channel is in use before proceeding with the preflight test.

d. Turn the meter switch to the P.A. GRID position. Press the microphone push-to-talk button, and check to see that the meter reading is 3 or greater.

e. Turn the meter selector to the P.A. PL. position, and press the microphone push-to-talk button. The meter should read within the red area of the scale.

f. Turn the meter selector to the MOD. PL. position, and press the push-to-talk button. The meter should read below 2 on its scale without modulation. Talk normally into the microphone, and watch the meter for higher indications. Modulation peaks may show a

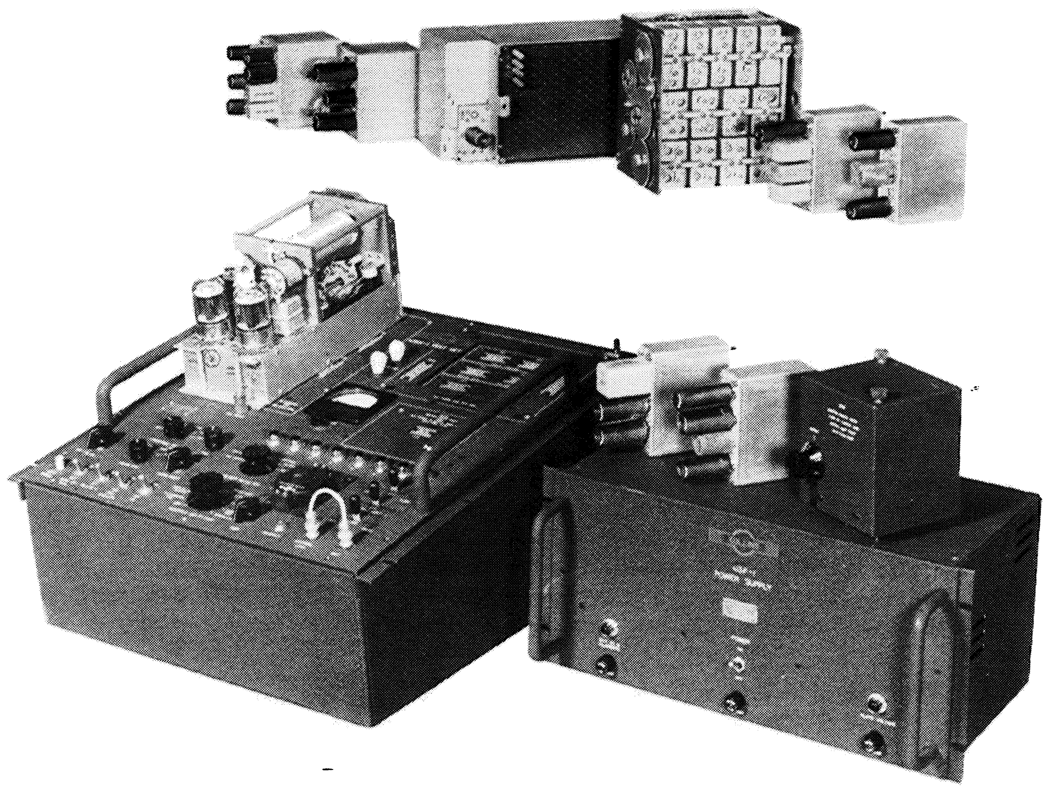

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Figure 5-2. Test Set 478H-1 and Power Supply 413F-1 meter indication of 6 or more. Listen in the headphones to monitor sidetone while talking.

g. Release the microphone push-to-talk button, and listen in the headset for background noise, an indication of normal receiver sensitivity. The Volume and R-F Gain controls should be at maximum output for this check.

h. Repeat the steps outlined above, selecting a channel in each of the remaining three bands.

i. If Antenna Tuner 180L-( ) is located in a position where the swr meter on its front panel can be observed, check this meter on each channel tested. The meter reading should be 3.5 or lower.

j. Operate the channel selector from the 2.0-mc channel to the 25.0-mc channel. Transceiver 618S-1 should tune in 8 seconds or less; Antenna Tuner 180L-( ) should complete its tuning cycle in 22 seconds or less.

NOTE

When checking cycling time, remember that the 618S-1 must be keyed manually before the 180L-( ) will function if the system is connected for "radio silence" operation.

k. If any tuning cycle continues 45 seconds or more without obtaining correct tuning conditions, a time-delay relay (K711) in the 180L-( ) will operate thermally preventing further operation of the 618S-1 system. If this occurs, wait for at least 60 seconds before attempting to start a new tuning cycle. If the system will not tune, check the antenna circuit for faults. Do not change channels more than once a minute. If channeling occurs at too frequent intervals, heat will build up in relay K711 preventing the 180L-( ) from completing its tuning cycle.

CAUTION

The maximum duty cycle of Antenna Tuner 180L-( ) is five minutes "R-F ON" and five minutes "R-F OFF." To insure reliable operation, do not exceed this duty cycle.

l. Place the OFF-PHONE-CW switch in the CW position, and select an active CW channel. Operate the BFO control to determine if the CW tone is variable in frequency.

m. When tactical restrictions permit, check the 618S-1 installation by two-way communication with a ground station or another aircraft.

5.3.2 DAILY INSPECTION.

The daily inspection is included to determine the general condition of the equipment and detect any major maladjustments. The inspection is not designed to show slight wear or aging of components. Perform a preflight inspection as outlined in paragraph 5.3.1.1 for the daily inspection.

5.3.3 50 HOUR INSPECTION.

Periodic inspections of the equipment require removal of the various units from the aircraft to a test bench for visual inspection and tests by maintenance technicians. For a complete inspection procedure for Antenna Tuner 180L-( ), refer to the instruction book shipped with the Antenna Tuner.

a. Remove Transceiver 618S-1 from Shockmount 350S-1. Loosen the fasteners holding the case in place, and slide the Transceiver from the case.

b. Remove the servomotor drive assembly and Autopositioner assembly from the front panel, taking care to prevent damage to the couplers.

c. Inspect gears and bearings. If lubrication is necessary, lubricate according to instructions given in paragraph 5.5.

d. Inspect other components for deterioration or other defects, and replace as necessary.

e. Remove each plug-in unit, and inspect for loose connections, undue heating of components, deterioration, etc. If lubrication appears necessary in any unit, lubricate according to instructions given in paragraph 5.5.

f. Repeat the above procedures for Power Supply 416W-1 and Remote Control Unit 614D-( ) or 614C-2.

5.3.4 150-200 HOUR INSPECTION.

The 150-200 hour inspection includes a thorough inspection of all mechanical and electrical parts within the 618S-1 Transceiver and its associated system components. Following a maximum of 200 hours but not less than 150 hours service, the 618S-1 and its associated system components should be removed from the aircraft and placed in a well-equipped maintenance shop for complete bench checks. Steps a. through p. list the inspection procedures to be followed during each 150-200 hour inspection.

a. Remove all major components from the aircraft, and place them on the test bench. To remove the 618S-1, 180L-( ), and 416W-1 from their mountings, disconnect all cables and unfasten the safety wires. Loosen the knurled fasteners or wing nuts, and pull the equipment forward. Remote Control Units also should be removed at this time.

b. Check mechanical operation of selector knobs and switches.

c. Remove the covers from the 618S-1, 180L-( ), and 614C-2 (if in use). To remove the 618S-1 from its cover, loosen the two Dzus fasteners at the rear of the cover, and pull the chassis forward. The 614C-2 cover is secured with two Dzus fasteners at the rear of the unit. The 180L-( ) is removed from its case by loosening six machine screws located at the lower edges of the cover. The front panel cover of the 618S-1 Transceiver is secured by four machine screws. The bottom plate of Power Supply 416W-1 should be removed by extracting four machine screws.

d. Remove dust from the inside of the components with a jet of clean, dry air.

e. Examine resistors, capacitors, wiring insulation, and cabling for evidence of overheating and cracking.

f. Check wiring and terminals for loose connections.

g. Remove the air filter from the 618S-1 cover. Wash the filter in hot water and a solvent of strong soap solution. Rinse with clear water and dry. Dip the filter in (SAE-20) oil, and drain for 24 hours.

h. Inspect gears and bearings for wear. If lubrication is necessary, follow the procedure outlined in paragraph 5.5.

i. Unfasten and remove the end bell covers of dynamotor D1601.

j. Remove dust and dirt from the dynamotor and end bell covers using clean, dry air or a soft cloth.

k. Remove and inspect dynamotor brushes being extremely careful not to nick or mark the edges of the brushes. Note the position and location from which each of the brushes is removed so that they may be replaced in the same position.

l. Check dynamotor commutators for excessive wear, dirt, and other defects. A highly polished commutator is desirable. However, a dark-colored commutator surface should not be mistaken for one which is burned. If the surface of the commutator is dirty, clean with a lint-free cloth moistened in carbon tetrachloride, and wipe dry. If the commutator is grooved, replace the dynamotor. Avoid finger marks on the commutator.

m. Secure dynamotor brushes in their holders making certain that they are replaced in exactly the same position from which they were removed.

NOTE

Replace brushes which are worn to approximately one fourth inch or less. Check each new brush in its holder to see that it can move freely without being excessively loose.

n. Check dynamotor bearings to see that they are lubricated properly. If grease is needed, pack one third of ball race with MIL-G-3278 grease.

o. Reassemble the 618S-1 Transceiver components, and replace in the aircraft.

p. Perform a preflight test, paragraph 5.3.1.2.

5.3.5 DETAILED PERFORMANCE TEST.

The following tests present a method of checking each function of the 618S-1 Transceiver and its system components. The detailed performance tests may be used to verify defects of functions within a particular component and as a final test after isolation and correction of trouble. The tests are designed for use with the test equipment listed in paragraph 5.2.1. The main chassis of the 618S-1 should be removed from its cover and placed in a bench test setup similar to that illustrated in figure 2-2. The cabling between the 618S-1 and its associated system components should simulate that of an actual aircraft and should be in accordance with figure 8-25, 8-26, 8-27, or 8-28 depending on the Remote Control Unit in use with the particular installation. Refer to figures 2-1 and 2-2, and table 5-1.

WARNING

Certain plate voltages used in the 618S-1 equipment are dangerous to life (600 volts). When operating the 618S-1 Transceiver removed from the dust cover, special care must be taken to avoid contact with tube plate caps and circuit wiring carrying high voltage. Keep clothing, cleaning rags, etc., away from the mechanical drive of the 618S-1 where there is a chance of these items being caught in the gear mechanisms. Always discharge high-voltage filter capacitors before attempting work on any of the 618S-1 system.

5.3.5.1 RECEIVER SENSITIVITY. Perform the following operations:

a. Connect test crystals to the r-f crystal oscillator subassembly as listed in table 5-2.

b. Connect the signal generator to jack J109. Adjust for an output of 2.75 megacycles at 1000 microvolts, modulated 30% at 1000 cps. Use the frequency meter to calibrate the signal generator.

c. Connect an output meter to J101, and adjust to the 500-milliwatt range with an internal impedance of 300 ohms.

d. Operate the OFF-PHONE-CW switch to the PHONE position, and allow at least ten minutes for warmup.

e. Operate the channel selectors to the A4 position (2.75 megacycles).

f. Adjust the Volume and R-F Gain (Phone) controls for maximum output. The R-F Gain (Phone) control (R2602 on Remote Control Unit 614C-2) is a screw driver adjustment at the rear of the 614C-2 Remote Control Unit, and the Volume control is the small knob on the 614C-2 front panel. Volume controls for the 614D-( ) Remote Control Units are accessory kit controls located concentric to the channel selector controls. Refer to paragraph 2.4.1.4.

g. Adjust the AUDIO control (R109 on the 618S-1 front panel) for an audio power output of 300 milliwatts as read on the output meter.

h. Reduce the output level of the signal generator to 5 microvolts. The output meter should indicate not less than 100 milliwatts.

i. Remove the modulation. The signal-plus-noise to noise ratio should be at least 6 db (modulation on to modulation off ratio of 4 to 1 as read on output meter).

j. Operate the OFF-PHONE-CW switch to the CW position, and remove the modulation.

k. Remove the output meter from J101. Connect a headset to terminal b of P2601 if 614C-2 is in use or to pin 43 of TB1801 if 614D-( ) is in use.

NOTE

When a 300-ohm headset such as the H-1/AR is connected to either the PHONE jack or to terminal b of P2601 on 614C-2, the output meter should be removed from jack J101. The output meter and a low-impedance headset should not be connected across the audio output terminals at the same time, or transformer T1301 will be mismatched, and the test results will be inaccurate. A high-impedance monitor such as described in table 5-1 may be used in parallel with the output meter if it is desired to monitor the audio signal during test procedures.

l. Adjust the BFO control for a signal of approximately 1000 cps.

m. Remove the headset, and replace the output meter. Observe the power output indication on the output meter with the signal generator adjusted to 5 microvolts output. The output meter should indicate at least 100 milliwatts.

n. Remove the r-f input signal, and observe the indication of the output meter. The reading should change at least 10 db (indication in the "R-F ON" position at least 10 times that in the "R-F OFF" position).

o. Repeat the sensitivity measurements outlined in steps a. through m. for frequencies listed in table 2-1. It is not necessary to rotate the AUDIO control (step g.) after it has been set correctly.

5.3.5.2 RECEIVER SELECTIVITY. The test crystals listed in table 5-2 should be inserted for the following procedures. Perform the following operations:

a. Connect the output meter to the PHONE jack, and adjust it to the 500-milliwatt range with an internal impedance of 300 ohms.

b. Operate the OFF-PHONE-CW switch to the PHONE position, and allow at least ten minutes for warmup.

c. Connect a vacuum-tube voltmeter to terminal 5 of jack J310. Adjust the vtvm to read on the negative 3-volt scale.

d. Connect the signal generator to jack J109. Adjust the signal generator to 2.75 megacycles with the frequency meter and the output level to minimum r-f unmodulated.

e. Operate the channel selectors to the A4 position (2.75 megacycles).

f. Adjust the signal generator output level for a reading of exactly negative 1 volt d-c on the vtvm.

g. Double the signal generator output level, and detune both above and below 2.75 megacycles. Observe the frequencies on the frequency meter where the reading on the vtvm returns to negative 1 volt d-c. The difference between the two frequencies is an indication of the receiver bandwidth at the 6-db point and should be at least 5.5 kilocycles.

h. Increase the output level of the signal generator to 1000 times that determined in step f., and detune both above and below 2.75 megacycles. Observe the frequencies on the frequency meter where the reading on the vtvm returns to negative 1 volt d-c. The difference between the two frequencies is an indication of the receiver bandwidth at the 60-db point and should be not greater than 14 kilocycles.

i. Repeat steps f. through h. with the channel selectors set to the following frequencies: 5.25 megacycles, 10.25 megacycles, and 20.25 megacycles. For each position, the signal generator should be adjusted to the operating frequency with the frequency meter.

5.3.5.3 FREQUENCY SELECTION. The test crystals listed in table 5-2 should be inserted for the following procedures. Perform the following operations:

a. Connect the dummy load, the vtvm, a 1-megohm resistor, a key or microphone, and the frequency meter to E102 on Antenna Tuner 180L-( ). All other test equipment should be disconnected.

b. Operate the OFF-PHONE-CW switch to the PHONE position, and allow at least ten minutes for warmup.

c. Refer to table 2-1, and operate the channel selector switches to each position listed, key the 618S-1, and observe the output frequencies as read on the frequency meter. Frequencies should not vary over 0.007% of those listed in table 2-1.

NOTE

Do not attempt to channel the 618S-1 more than once a minute. If channeled too frequently, a time-delay relay (K711) in the 180L-( ) will heat and prevent the 618S-1 from completing its tuning cycle. Relay K711 will operate also if the total tuning time, following the centering cycle of the tuner subassembly, exceeds 45 seconds. If this happens, wait at least one minute before rechanneling.

d. Check the time interval required for the tuning cycle to complete when the channel selectors are operated from 2.0 to 25.0 megacycles. Transceiver 618S-1 should complete its tuning cycle in 8 seconds or less, and Antenna Tuner 180L-( ) should complete its tuning cycle in 22 seconds or less.

5.3.5.4 SQUELCH AND SELCAL OF TRANSCEIVER 618S-4. Test Squelch according to the procedures of paragraph 2.2.4.2. Test Selcal according to the procedures of paragraph 2.2.4.3.

5.3.5.5 TRANSMITTER R-F POWER OUTPUT. The ten crystals listed in table 5-2 should be inserted for the following test. Perform the following operations:

a. Remove P110 of cable W1 from J110. Connect the dummy load and the r-f probe of the vtvm from J110 to ground.

b. Connect a telegraph key to J103 or a microphone to J101. All other test equipment should be removed for this test.

c. Operate the OFF-PHONE-CW switch to the PHONE position, and allow at least 10 minutes for warmup. After warmup, rotate the OFF-PHONE-CW switch to the CW position.

d. Operate the remote control channel selectors to the A1 position (2.0 megacycles), and allow the 618S-1 to complete the tuning cycle.

e. Depress the telegraph key or microphone push-to-talk button, and observe the indication on the vtvm. The reading should be not less than 71.8 volts a-c which corresponds to 100 watts r-f power output.

f. Repeat step e. for each frequency listed in table 2-2. The test results also are listed in table 2-2.

5.3.5.6 MODULATION. The test crystals listed in table 5-2 should be inserted for the following test. Remove all test equipment except as called out in the following procedures:

a. Connect the dummy microphone circuit to the MIC jack. Refer to figures 2-1 and 2-2.

b. Connect the vtvm and audio oscillator to the dummy microphone as illustrated in figure 2-3. Adjust the audio oscillator to 0.25 volt a-c at 1000 cps.

c. Connect the oscilloscope across the dummy load through a 25-micromicrofarad capacitor, and connect to E102. Adjust the oscilloscope for a horizontal sweep capable of reproducing two or three modulated cycles at 1000 cps.

d. Connect a telegraph key to the KEY jack.

e. Operate the OFF-PHONE-CW switch to the PHONE position, and allow at least ten minutes for warmup.

f. Operate the remote control channel selectors to the A1 position (2.0 megacycles).

g. Key the 618S-1 by operating the telegraph key.

h. Adjust the CLIPPING control (R1404 on the bottom of the modulator assembly) to the maximum clockwise position.

i. Adjust the GAIN control (R1403 on the bottom of the modulator assembly) for 95% modulation. Use the following formula to calculate the percentage of modulation:

$$\%\ \text{Modulation} = \frac{\text{Maximum} - \text{Minimum}}{2 \times \text{Carrier}} \times 100$$

Refer to figure 2-4.

NOTE

The percentage of modulation obtainable depends upon the r-f power output and, therefore, upon the band of operation. Refer to figure 2-5 for the modulation characteristics for a varying r-f power output. Examination of figure 2-5 will illustrate that a modulation percentage of 95% is obtainable with 100 watts r-f power output.

j. Adjust the GAIN control for 80% modulation and CLIPPING control for threshold at this modulation point.

k. Increase the output level of the audio oscillator by 12 db. This may be accomplished by increasing the output voltage of the audio oscillator to 1 volt a-c. The waveform, as observed on the oscilloscope, should be clipped at the 80% modulation point.

l. Lock the CLIPPING and GAIN controls in position.

m. Reduce the audio oscillator output level to that required for 60% modulation.

n. Vary the frequency of the audio oscillator between 300 and 3500 cps while maintaining the audio input signal constant. The modulation percentage should remain between 40% and 70%.

o. Adjust the frequency of the audio oscillator to 5000 cps. The modulation percentage should be not less than 22%.

5.3.5.7 SIDETONE. With the equipment setup as described in the preceding paragraph, perform the following operations:

a. Connect a headset to the PHONE jack or to terminal b of P2601 if Remote Control Unit 614C-2 is in use.

b. Vary the level and frequency of the audio oscillator, and notice if the varying signal can be heard in the headset.

c. Vary the PHONE SIDETONE control (R106 on the 618S-1 Transceiver front panel), and notice if the amplitude of the sidetone signal is variable.

d. With the audio oscillator set for an output level of 0.25 volt at 1000 cps, adjust R106 for a comfortable headset level.

e. Operate the remote control OFF-PHONE-CW switch to the CW position, and listen for a 400-cps signal in the headset.

f. Adjust the CW SIDETONE control (R107) for a comfortable headset level.

5.4 ASSEMBLY REMOVAL AND REPLACEMENT.

Transceiver 618S-1 consists of a group of 13 assemblies which plug into receptacles on the main chassis frame. The individual plug-in assemblies which require mechanical linkage to each other or to the front panel assembly are built with quick disconnect, flexible Oldham, or pin-type couplers to allow removal of the assemblies from the main chassis. Once these linkages are synchronized and the proper procedure is followed, it is possible to remove and replace assemblies without additional mechanical alignment. All electrical connections to the plug-in assemblies are made through receptacles mounted on the main chassis which facilitates easy removal without unsoldering wires. Captive hold-down screws hold the individual units and assemblies in place. The front panel assembly is constructed to make good electrical contact with a dust cover which is removable from the rear of the equipment.

When removing the main chassis from the case, disengage the two Dzus fasteners at the rear of Transceiver 618S-1. Place the 618S-1 in a standing position on the floor with the back plate flat against the floor. The main chassis then can be lifted out of the case by pulling straight up on the two front handles. The main chassis normally is not fitted into a jig since all plug-in units are accessible from the top. To aid the technician in removing assemblies, the screws which secure the assemblies are painted red. They must be loosened, but should not be removed completely, to free assemblies. It is important that a Phillips screw driver of the proper size be used to prevent damage to the heads of the screws. When the screws are loosened, they cause some extraction of the plugs and jacks which connect the assemblies to the main chassis. This is desirable to prevent bending of pins during removal. It is important to rock assemblies loose as they are extracted from the chassis. Insert the plugs carefully when returning assemblies to the main chassis, checking for proper alignment between the pins and sockets.

5.4.1 GENERAL.

When removing the 250 kc oscillator, 250 kc i-f amplifier, a-f amplifier, relay, tuning servo amplifier, modulator, or r-f cyrstal oscillator, the following procedure should be followed. Refer to paragraphs 5.4.2 through 5.4.8 for removal and replacement procedures of all other modules.

a. Loosen the redheaded captive screws until they turn freely. It will be observed that loosening the screws causes the connecting plug and jack to separate.

b. Lift the assembly straight up.

c. The plate caps of the modulator tubes must be removed to free the modulator assembly.

d. When reinstalling any of the above-mentioned assemblies, carefully line up the pins of the plug with the mating jack. Make certain that the assembly is not reversed by 180 degrees.

e. Push the assembly straight down firmly until it is fully seated.

f. Tighten the redheaded captive screws alternately to secure the assembly to the main chassis.

5.4.2 R-F TUNER (WITH OLDHAM COUPLERS).

Perform the following operations when removing and replacing the r-f tuner (with Oldham couplers). Refer to paragraph 5.4.3 for removal and replacement procedures of the r-f tuner having pin-type couplers.

a. Channel the 618S-1 Transceiver to the position corresponding to 2.0 megacycles.

b. The red identification dots on the two front Oldham couplers should be straight up.

c. Loosen the four redheaded captive screws until they turn freely.

d. Disconnect plug P1503 from jack J1001.

e. Lift the r-f tuner straight up and out of the main chassis.

f. When reinstalling the r-f tuner, the red dots on the two front Oldham couplers attached to the r-f tuner should be straight up with the slug rack at the bottom. The long cutout on the slider portion of the couplers attached to the Autopositioner assembly and the servomotor drive assembly should be vertical and the pin toward the bottom. The rear coupler, attached to the power amplifier, should have the slider portion of the coupler vertical and the pin toward the bottom.

g. Insert the r-f tuner carefully, observing that all couplers are meshed properly.

NOTE

The pin on the slider portion of the Oldham coupler must match the 90-degree cutout of the fixed portion of the Oldham coupler when installing the assembly.

h. Tighten the four redheaded captive screws alternately to seat the r-f tuner properly.

i. Reinsert plug P1503 in J1001.

5.4.3 R-F TUNER (WITH PIN-TYPE COUPLERS).

Perform the following operations when removing and replacing the r-f tuner (with pin-type couplers). Refer to paragraph 9.2.12.

a. Channel the 618S-1 Transceiver to the position corresponding to 2.0 megacycles.

b. The fork and pin of the two front couplers should be in a downward position.

c. Loosen the four redheaded captive screws until they turn freely.

d. Disconnect plug P1503 from jack J1001.

e. Lift the r-f tuner straight up and out of the main chassis.

f. When reinstalling the r-f tuner, the pins on the Autopositioner assembly, servomotor drive assembly, and power amplifier couplers should be pointing downward. The three forks on the couplers of the r-f tuner also should point down with the slug rack near the bottom.

g. Insert the r-f tuner carefully, observing that all couplers are meshed properly.

h. Tighten the four redheaded captive screws alternately to seat the r-f tuner properly.

i. Reinsert plug P1503 in J1001.

5.4.4 POWER AMPLIFIER (WITH OLDHAM COUPLERS).

Perform the following operations when removing and replacing the power amplifier (with Oldham coupler). Refer to paragraph 5.4.5 for removal and replacement procedures for the power amplifier with pin-type coupler.

a. To remove the power amplifier, the 618S-1 must be channeled to band 4. Any frequency in band 4 may be used.

b. In this position, the green dot on the rear Oldham coupler should be straight up.

c. Loosen the four redheaded captive screws until they turn freely.

d. Disconnect plug P1503 from jack J1001.

e. Lift the assembly straight up and out of the main chassis.

f. When reinstalling the power amplifier, the green dots of the Oldham couplers on the power amplifier and r-f tuner should be up.

g. Carefully insert the power amplifier, observing that the couplers mesh properly.

h. Tighten the four redheaded captive screws, taking each side up a little at a time in order to seat assembly properly.

i. Insert plug P1503 into jack J1001.

5.4.5 POWER AMPLIFIER (WITH PIN-TYPE COUPLER).

Perform the following operations when removing and replacing the power amplifier (with pin-type coupler). Refer to paragraph 9.2.12.

a. To remove the power amplifier, the equipment must be channeled to band 4. Any frequency in band 4 may be used.

b. In this position, the fork and pin of the coupler are straight up.

c. Loosen the four redheaded captive screws until they turn freely.

d. Disconnect plug P1503 from jack J1001.

e. Lift the subassembly straight up and out of the main chassis.

f. When reinstalling the power amplifier assembly, the pin of the power amplifier coupler and the fork on the r-f tuner coupler should be pointing up.

g. Carefully insert the power amplifier, observing that the couplers mesh properly.

h. Tighten the four redheaded captive screws, taking each side up a little at a time in order to seat the assembly properly.

i. Insert plug P1503 into jack J1001.

5.4.6 SERVOMOTOR DRIVE AND AUTOPOSITIONER ASSEMBLIES (WITH OLDHAM COUPLERS).

Perform the following operations when removing and replacing the Autopositioner or servomotor drive assemblies (with Oldham couplers). Refer to paragraph 5.4.7 for removal and replacement procedures of Autopositioner or servomotor drive assemblies with pin-type couplers.

a. Channel the 618S-1 to the A1 position (2.0 megacycles).

b. To gain access to the Autopositioner or servomotor drive assemblies, remove the four screws in the front panel cover, and lift off the cover.

c. Disconnect the plug or jack of the assembly being removed from the front panel plug or jack. Disconnect P106 from J106 when removing servomotor drive assembly, and disconnect P107 from J107 when removing the Autopositioner assembly.

d. Loosen the three redheaded captive screws, and lift the unit free.

e. When reinstalling servomotor drive assembly, hold the assembly so that the back plate with the silk-screened TUNING DRIVE is facing you. Turn the coupler clockwise as far as possible; then back off slightly until the grooved portion of the coupler is in line with the line on the plate of the assembly.

f. When reinstalling the Autopositioner assembly, the pin on the slider portion of the coupler must match the 90-degree cutout of the fixed portion of the coupler.

g. After the assemblies have been replaced, tighten the redheaded captive screws alternately.

h. Replace the applicable plug in the jack from which it was removed.

5.4.7 SERVOMOTOR DRIVE AND AUTOPOSITIONER ASSEMBLIES (WITH PIN-TYPE COUPLERS).

Perform the following operations when removing and replacing the Autopositioner or servomotor drive assemblies (with pin-type couplers). Refer to paragraph 9.2.12.

a. Channel the 618S-1 to the A1 position (2.0 megacycles).

b. To gain access to the Autopositioner or servomotor drive assemblies, remove the four screws in the front panel cover and lift off the cover.

c. Disconnect the plug or jack of the assembly being removed from the front panel plug or jack. Disconnect P106 from J106 when removing servomotor drive assembly, and disconnect P107 from J107 when removing the Autopositioner assembly.

d. Loosen the three redheaded captive screws and lift the assembly free.

e. When reinstalling servomotor drive assembly, hold the assembly so that the back plate with the silk-screened TUNING DRIVE is facing you. Turn the coupler clockwise as far as possible; then back off slightly until the coupler is vertical. This is the proper position for reinsertion.

f. When reinstalling the Autopositioner assembly, the fork and pin of the r-f tuner coupler should be down and the Autopositioner assembly coupler properly mated in this position.

g. After the assemblies have been replaced, tighten the redheaded captive screws alternately.

h. Replace the applicable plug in the jack from which it was removed.

5.4.8 BLOWER MOTOR B101.

a. To remove blower motor B101 from the 618S-1 front panel, first remove the front panel cover to gain access to B101.

b. Remove plug P105 from jack J105.

c. Remove four Phillips head screws securing blower motor B101 to the front panel.

d. To reinstall blower motor B101, reverse steps a. through c.

5.5 LUBRICATION.

Components or assemblies requiring lubrication, listed in table 5-3, should be inspected at 1000-hour intervals. If the parts appear to be clean, sufficiently lubricated, and free running, lubrication may be omitted until the following lubrication period. If old lubricant has become hard or dirty, clean the parts to be lubricated with carbon tetrachloride 0-C-141(4) or Stoddard solvent, and dry with compressed air. Refer to table 5-3 and figures 5-3 through 5-10.

CAUTION

The equipment should not be operated after having been cleaned with carbon tetrachloride until relubrication procedures have been performed.

TABLE 5-3. LUBRICATION EQUIPMENT

UNIT	COMPONENT	REFERENCE NUMBER	FIGURE NO.	LUBRICANT	AMOUNT
TRANSCEIVER 618S-1					
Blower Motor	Ball bearings	1	5-3	Grease: MIL-G-3278	Fill one third of ball race.
Servomotor Drive Assembly	Gears	2	5-4	Grease: MIL-G-7421	Light film on all gear teeth.
	Ball bearings (also motor bearings)	3	5-4	Oil: MIL-L-7870	One drop.
Autopositioner Assembly	Gears	4	5-5	Grease: MIL-G-7421	Light film on all gear teeth.
	Ball bearings and porous bearings	5	5-5	Oil: MIL-L-7870	One drop.
R-F Crystal Oscillator	Gears	6	5-6, 5-7	Grease: MIL-G-7421	Light film on all gear teeth.
	Porous bearings	7	5-6, 5-7	Oil: MIL-L-7870	One drop.
R-F Tuner	Gears	8	5-8, 5-9	Grease: MIL-G-7421	Light film on all teeth; light film on teeth, back, and sides of linear gears.
	Porous bearings	9	5-8, 5-9	Oil: MIL-L-7870	One drop.
Power Amplifier	Metal-to-metal gears	10	5-10	Grease: MIL-G-7421	Light film on all teeth.
	Porous bearings and ball bearings	11	5-10	Oil: MIL-L-7870	One drop.
SHOCKMOUNT 350S-1, 350S-3					
	Extractor screw shaft	12		Grease: MIL-G-7421 or MIL-G-3278	Light film on threads and bearing portion of shaft.
POWER SUPPLY 416W-1					
	Dynamotor ball bearings	16		Grease: MIL-G-3278	Fill one third of ball race. See paragraph 6.4.20.
ANTENNA TUNER 180L-( )					
R-F Auto-transformer	Bearings, gear hubs	17		Oil: MIL-L-7870	One drop.

TABLE 5-3. LUBRICATION EQUIPMENT (Cont)

UNIT	COMPONENT	REFERENCE NUMBER	FIGURE NO.	LUBRICANT	AMOUNT
		ANTENNA TUNER 180L-( ) (Cont)			
Variable Inductor	Gear post oil wicks, bearings	18		Oil: MIL-L-7870	One drop or soak wick.
Variable Capacitor	Bearings and gear posts	19		Oil: MIL-L-7870	One drop.
	Worm gears	20		Grease: MIL-G-7421 80% and Molykote Z (Collins no. 005 0320 00) 20%.	Light film on all gear teeth.
		REMOTE CONTROL UNIT 614D-( )			
	Gears	21		Grease: MIL-G-7421	Light film on all teeth.
	Bearings	22		Oil: MIL-L-7870	One drop.
		REMOTE CONTROL UNIT 614C-2			
	Gears	23		Grease: MIL-G-7421	Light film on all teeth.
	Bearings	24		Oil: MIL-L-7870	One drop.

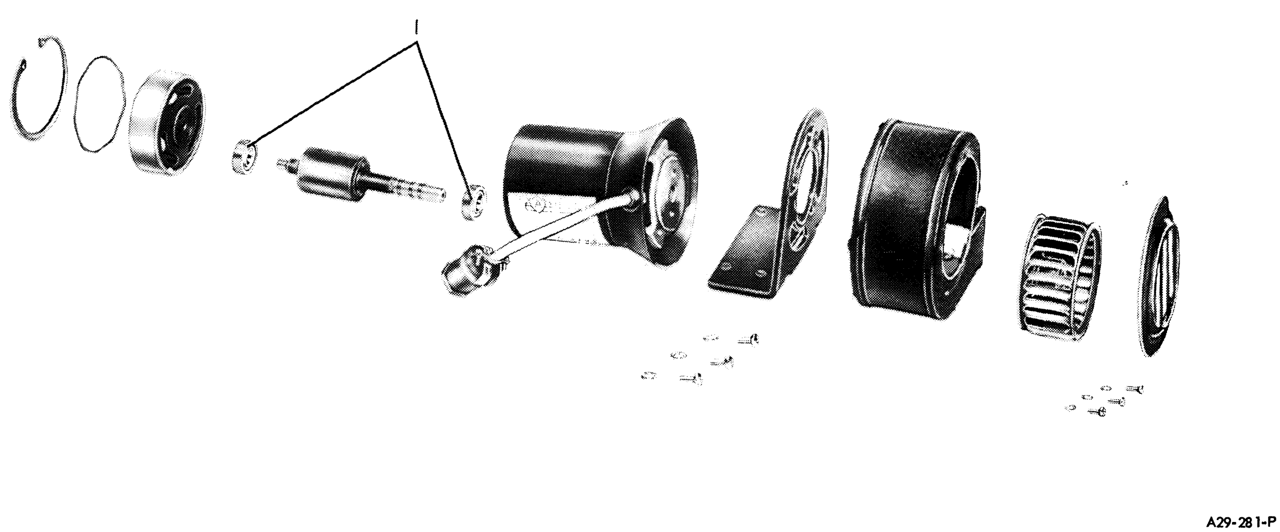

Figure 5-3. Blower Motor B101, Lubrication Points

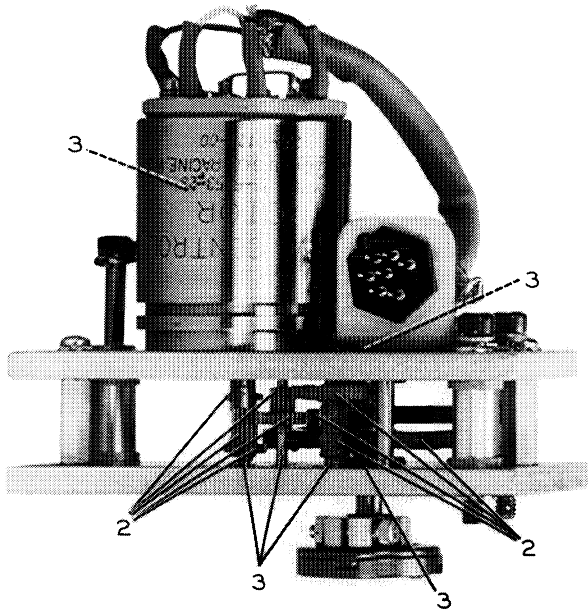

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Figure 5-4. Servomotor Drive Assembly, Lubrication Points

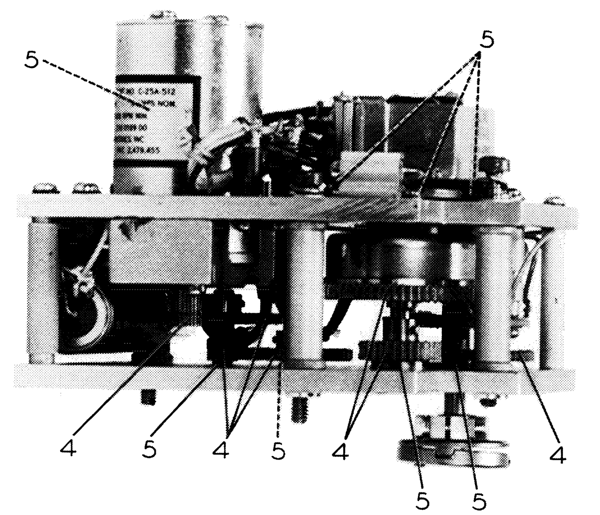

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Figure 5-5. Autopositioner Assembly, Lubrication Points

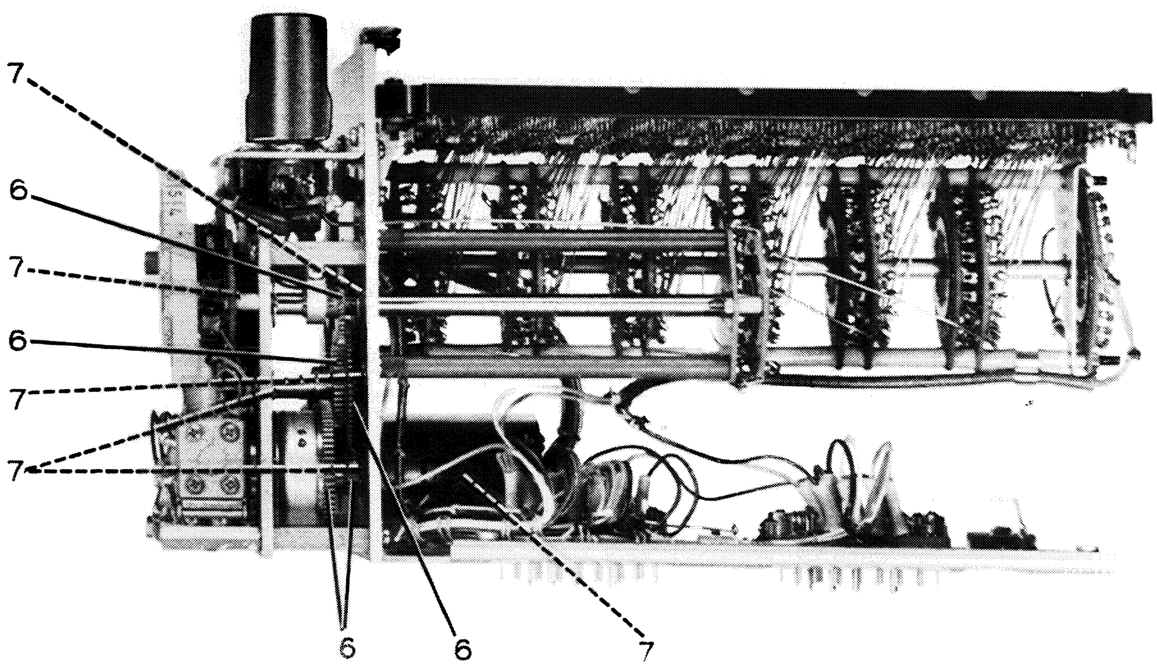

Figure 5-6. R-F Crystal Oscillator, Right Side View, Lubrication Points

A29-284-P

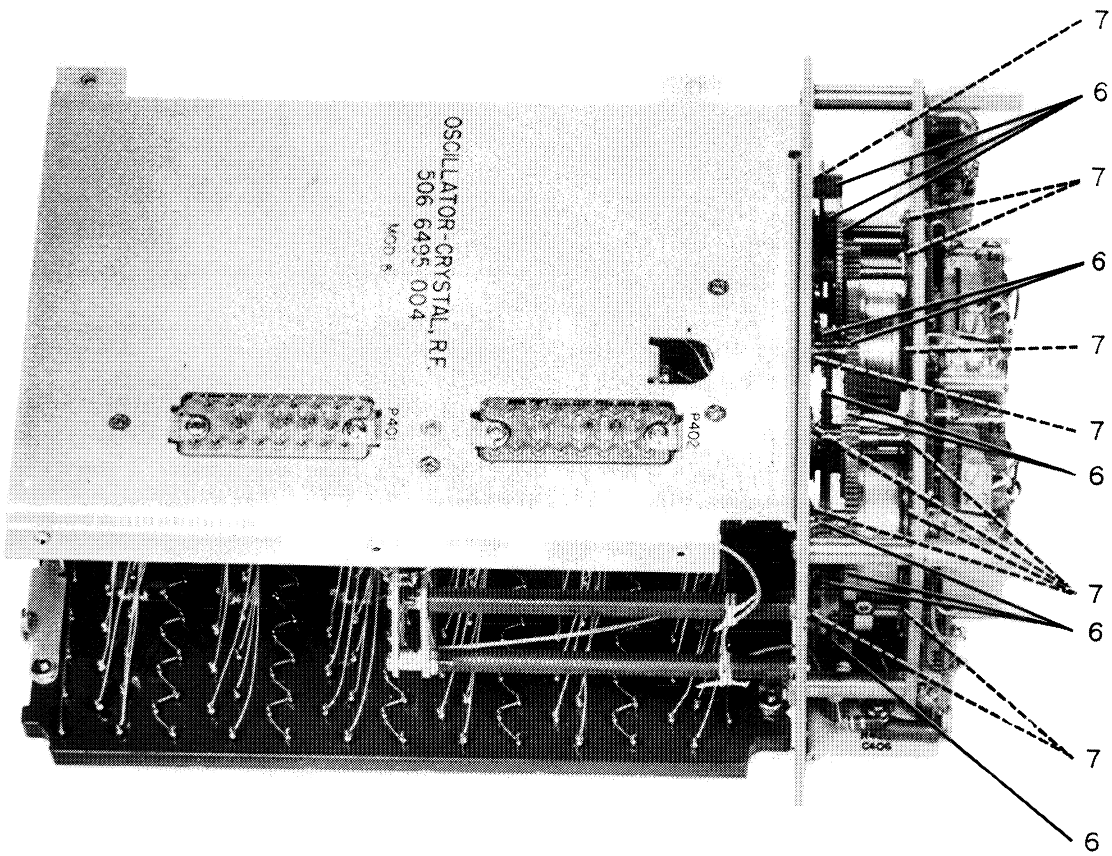

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Figure 5-7. R-F Crystal Oscillator, Bottom Oblique View, Lubrication Points

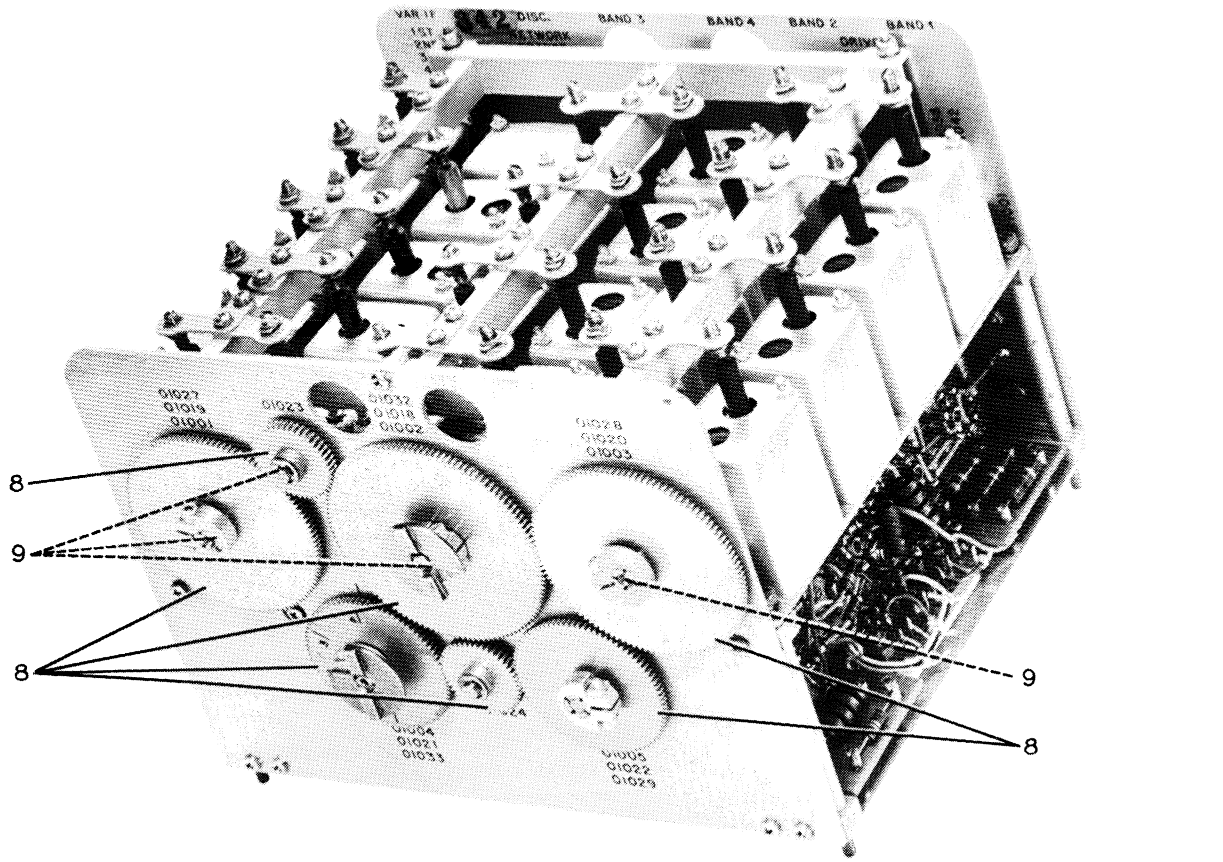

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Figure 5-8. R-F Tuner, Front Oblique View, Lubrication Points

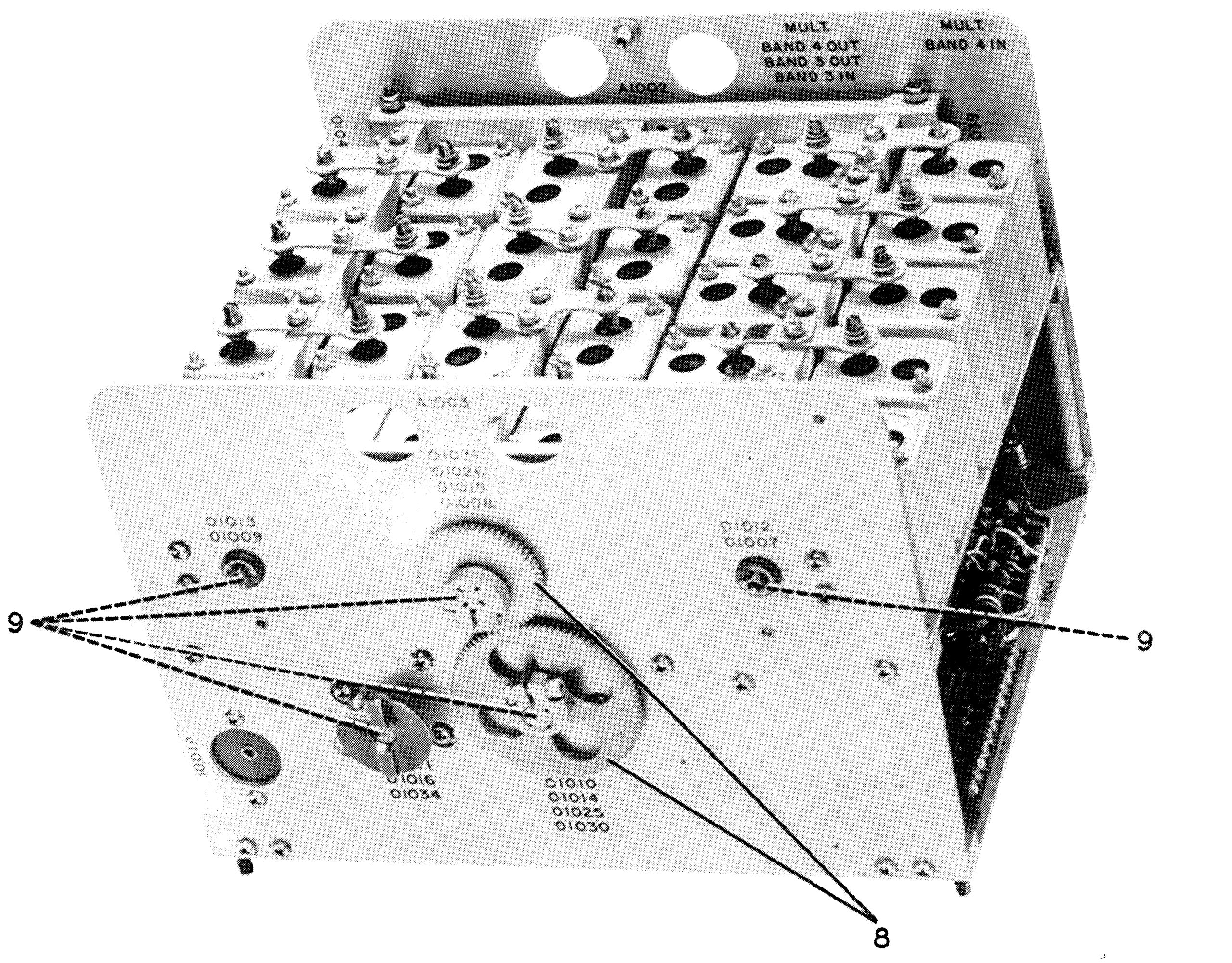


Figure 5-9. R-F Tuner, Rear Oblique View, Lubrication Points

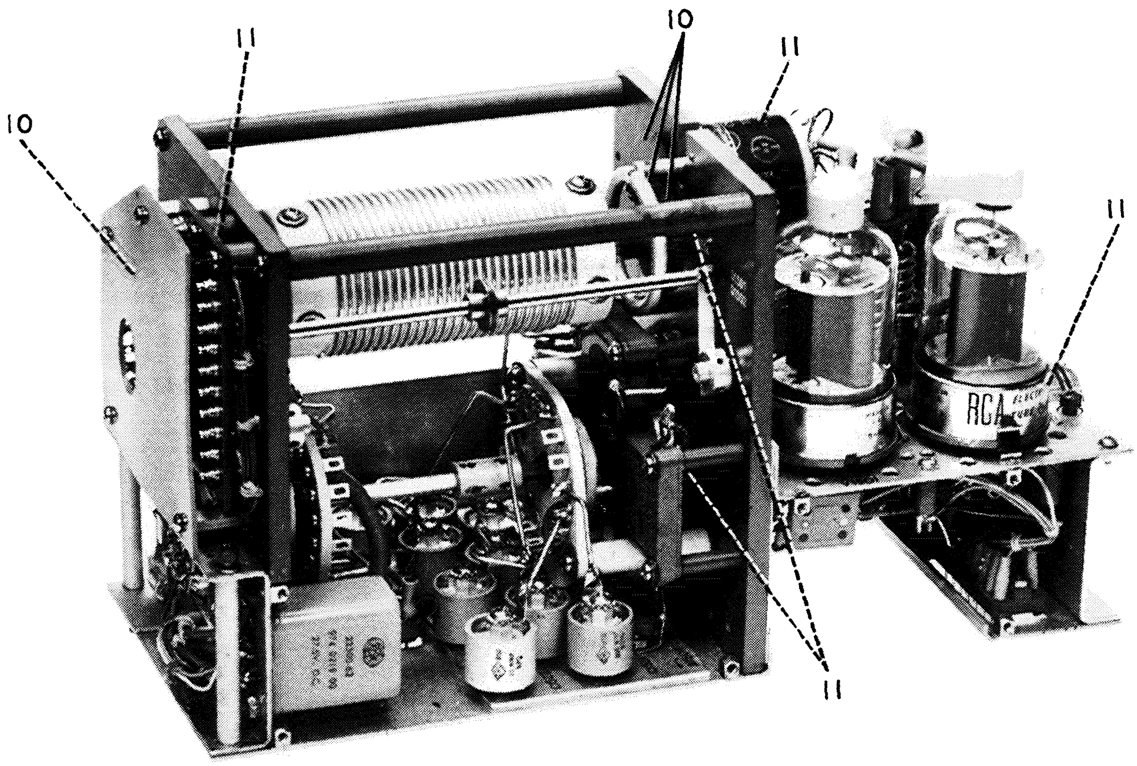


Figure 5-10. Power Amplifier, Lubrication Points

SECTION VI
CORRECTIVE MAINTENANCE

6.1 GENERAL.

This section provides corrective maintenance information for Transceiver 618S-1 and 618S-4 and their associated system components. Defects disclosed during the detailed performance tests should be corrected immediately by use of the trouble isolation tables or by adjustment or alignment procedures. A detailed alignment and tracking procedure for all assemblies is presented in paragraph 6.5 and subsequent paragraphs. Alignment and tracking procedures should not be attempted unless it has been established definitely that malfunction exists because an assembly is misaligned. Always check other possibilities before attempting to perform alignment or tracking procedures on an assembly. When reference is made to meter indications, attenuator settings, etc. on various pieces of test equipment, it should be remembered that these readings are only approximate values encountered on a large number of properly operating units. It is possible that the equipment will operate normally if the indications vary slightly from those stated. It is absolutely essential that the test equipment be calibrated properly, terminated properly, and otherwise in excellent condition.

WARNING

Operation of Transceiver 618S-1 and its associated system components involves voltages that are dangerous to life. When performing maintenance operations, special care must be taken to avoid contact with circuits carrying plate voltages. Also, clothing, rags, and test equipment should be kept free from the moving mechanical parts during the channeling cycle.

6.2 MINIMUM PERFORMANCE STANDARDS.

6.2.1 GENERAL.

The test procedures outlined in paragraphs 6.2.2 through 6.2.8 provide minimum standards of performance for a complete Transceiver 618S-1 installation. The tests may be used as a means to analyze suspected trouble or to test the equipment after trouble-shooting procedures have been completed. The detailed performance tests differ from the detailed performance tests outlined in paragraph 5.3 of this handbook in that they provide a more comprehensive and detailed check. The following tests are designed to supplement the performance tests in section V. Perform all minimum performance test procedures of section V before performing the test procedures in this section.

6.2.2 PREPARATORY.

Place Transceiver 618S-1 and its associated system components in a bench test setup in accordance with the procedures outlined in paragraphs 2.2 through 2.2.1 and figures 2-1 and 2-2. Table 5-1 provides a list of test equipment required for testing the 618S-1 Transceiver and its associated system components. When performing the tests outlined in paragraphs 6.2.3 through 6.2.8, the R-F Gain and Volume controls should be in the maximum clockwise position unless otherwise indicated.

6.2.3 AVC CHARACTERISTICS.

Perform the following operations:

a. Install the test crystals listed in table 2-1 in the r-f crystal oscillator assembly.

b. Connect the output meter to J101. Adjust to the 500-milliwatt range with an internal impedance of 300 ohms.

c. Connect the signal generator to J109, and adjust to 2.75 megacycles with the frequency meter.

d. Adjust the signal generator output level to 10 microvolts, modulated 30% at 1000 cps.

e. Operate the OFF-PHONE-CW switch to the PHONE position, and allow at least ten minutes for warmup.

f. Operate the channel selectors to the A4 (2.75 megacycles) position. Increase the output level of the signal generator to 100,000 microvolts, and observe the change in power output as read on the output meter. The power output for 100,000 microvolts input should be not greater than 2.24 times that for 10 microvolts input which corresponds to a 3.5-db change.

g. Set the signal generator level to 1000 microvolts and then increase to 1 volt. The indication on the output meter should decrease not more than 4 to 1 which corresponds to a 6-db change.

h. Perform the avc tests outlined in steps f. and g. for the following frequencies: 5.25 megacycles, 10.25 megacycles, and 20.25 megacycles.

6.2.4 FREQUENCY RESPONSE.

Perform the following operations:

a. Install the test crystals listed in table 2-1 in the r-f crystal oscillator assembly.

b. Connect the output meter to J101. Adjust to the 500-milliwatt range with an internal impedance of 300 ohms.

c. Connect the signal generator to J109, and adjust to 2.0 megacycles with the frequency meter.

d. Adjust the signal generator output level to 100 microvolts, modulated 30% at 300 cps.

e. Operate the channel selectors to the A1 (2.0 megacycles) position.

f. Record the reading of the output meter.

g. Change the modulation frequency to 2500 cps, and observe the indication on the output meter. The indication should change not more than 3.5 db (2.24 to 1) from the recorded reading.

h. Change the modulation frequency to 3000 cps, and observe the indication on the output meter. The indication should change not more than 10 db (10 to 1) from the recorded reading.

i. Repeat the frequency response tests outlined in steps a. through i. for at least one frequency on each band of operations.

6.2.5 CW FREQUENCY RANGE.

Perform the following steps of procedure:

a. Install the test crystals listed in table 2-1 in the r-f crystal oscillator assembly.

b. Connect the output meter to J101. Adjust to the 500-milliwatt range with an internal impedance of 300 ohms.

c. Connect the signal generator to J109, and adjust to 2.0 megacycles with the frequency meter.

d. Adjust the signal generator output level to 50 microvolts unmodulated.

e. Operate the OFF-PHONE-CW switch to the PHONE position, and allow at least 10 minutes for warmup. After warmup, operate the OFF-PHONE-CW switch to the CW position.

f. Connect the frequency meter to J101 through a 1-megohm isolating resistor.

g. Operate the channel selectors to the A1 (2.0 megacycles) position.

h. Vary the BFO control throughout its range, and observe the indication of the frequency meter. The frequency meter should read between 2000 and 4000 cps on both sides of zero beat.

6.2.6 CW GAIN CONTROL.

Perform the following operations:

a. Install the test crystals listed in table 2-1 in the r-f crystal oscillator assembly.

b. Connect the output meter to J101. Adjust to the 500-milliwatt range with an internal impedance of 300 ohms.

c. Connect the signal generator to J109, and adjust to 2.0 megacycles with the frequency meter.

d. Adjust the signal generator output level to 10 microvolts unmodulated.

e. Operate the OFF-PHONE-CW switch to the CW position.

f. Operate the channel selectors to the A1 (2.0 megacycles) position.

g. Connect the frequency meter to J101 through a 1-megohm isolating resistor, and adjust the BFO control for a reading 1000 cps on the frequency meter.

h. Observe the indication on the output meter with the Volume control at the maximum clockwise position.

i. Increase the signal generator output level to 10,000 microvolts, and rotate the Volume control to the maximum counterclockwise position.

j. The output meter should indicate less power than observed in step h.

6.2.7 SIDETONE POWER.

Perform the following operations:

a. Install the test crystals listed in table 2-1 in the r-f crystal oscillator assembly.

b. Connect the dummy microphone (figure 2-3) to J102.

c. Connect the audio oscillator to the dummy microphone circuit. Set the audio oscillator frequency to 1000 cps with the frequency meter.

d. Connect the dummy load and oscilloscope to E102 or J110.

e. Connect the output meter to J101, and adjust to the 500-milliwatt range with an internal impedance of 300 ohms.

f. Operate the OFF-PHONE-CW switch to the PHONE position, and allow at least 10 minutes for warmup.

g. Operate the channel selectors to the A1 (2.0 megacycles) position.

h. Insert a telegraph key into J103, and depress.

i. Adjust the output level of the audio oscillator for 80% modulation of the carrier. Refer to step i. of paragraph 2.2.3.2 and figure 2-4.

j. Adjust the front panel PHONE SIDETONE control (R106) for a power output of 300 milliwatts as read on the output meter.

k. Remove the audio oscillator, and operate the OFF-PHONE-CW switch to the CW position.

l. Adjust the front panel CW SIDETONE control (R107) for a power output of 300 milliwatts as read on the output meter.

6.2.8 MODULATION FIDELITY.

Perform the following operations:

a. Install the test crystals listed in table 2-1 in the r-f crystal oscillator assembly.

b. Perform steps b. through h. of paragraph 6.2.7.

c. Adjust the output level of the audio oscillator for 60% modulation of the carrier. Refer to step i. of paragraph 2.2.3.2 and figure 2-4.

d. Keeping the output level of the audio oscillator to that determined in step c., vary the audio oscillator frequency between the limits of 300 and 3500 cps. The percentage of modulation should remain within the limits of 40% to 70%.

e. Keeping the audio oscillator output level constant, change the modulation frequency to 5000 cps. The percentage of modulation should be not less than 21.8%.

f. Keeping the audio oscillator output level constant, change the modulation frequency to 6500 cps. The percentage of modulation should be not more than 11.5%.

g. Perform the modulation fidelity tests outlined in steps a. through f. for at least one frequency on each band of operation.

6.3 TROUBLE ISOLATION.

In order to locate trouble in the shortest possible time, a logical testing routine should be followed. First, isolate the trouble to one of the following sections of the equipment: one of the plug-in assemblies, power supply, control system, antenna system, servo system, or Autopositioner system. Trouble isolation to an assembly or unit may be accomplished by use of the detailed performance tests given in this section and in section V. If, however, the isolation of the trouble to an assembly or unit has not been accomplished after performing these tests, refer to table 6-1. Trouble should be known to exist in a particular assembly or unit before the procedures for trouble isolation of this section are used to locate the trouble to a detail part. Troubles in the control servo, or Autopositioner systems generally manifest themselves in faulty tuning, and somewhat like power supply troubles, are seldom obscure. Troubles in the r-f and i-f sections of the equipment generally are concealed to the extent that a careful check must be made in order to locate the trouble. Trouble shooting is simplified in the sense that a suspected plug-in assembly can be removed and replaced by one known to be functioning properly. If the trouble disappears, the replaced assembly is faulty.

NOTE

In removing and replacing any of the plug-in assemblies of Transceiver 618S-1, loosen and tighten only those screws with red heads. These screws are captive hold-down screws painted red to indicate their purpose.

CAUTION

Discretion must be exercised in replacing a suspected plug-in assembly with a good one. In some instances, replacement of the suspected assembly may result in a second faulty unit. The nature of the trouble normally will indicate where precautions should be taken. Examine the suspected assembly for obvious faults, such as burned or scorched parts,etc., and check their circuit location on the main schematics before replacing the assembly.

6.3.1 GENERAL.

Some of the possible faults are listed in tables 6-1 through 6-12. Table 6-1 is used to isolate the trouble to a particular portion of the system. Further reference to the table dealing with the particular section of the equipment is made by paragraphs 6.3.2 through 6.3.13.4 which generally locate the more common troubles. Trouble isolation in Power Supply 416W-1 may be accomplished by use of table 6-7. If Remote Control Units 614D-( ) or 614C-2 are not functioning properly, refer to tables 6-9 through 6-12. For trouble isolation of Antenna Tuner 180L-( ), refer to the instruction book supplied with that equipment. Since each assembly of Transceiver 618S-1 is an integral part of the complete equipment, an individual test for each assembly cannot be given; but by performing the trouble isolation procedures in tables 6-1 through 6-12, trouble can be isolated to a detail part.

CAUTION

All tubes in Transceiver 618S-1 are connected in series-parallel arrangements across the 27.5-v d-c supply. For this reason, all tubes and plug-in units should be in the equipment before power is applied.

Because of this series-parallel arrangement, power to the unit should be turned off before replacing a tube. When the equipment is already energized, a visual inspection is possibly the quickest method of finding a tube with an open heater. By referring to figure 4-43 or 4-44 (filament circuits for 618S-1 and 618S-4 respectively) it can be determined quickly which tubes will be unlighted when one of a string is open. When the heater of one tube in a parallel string is open, the other tubes will burn brighter than normal. Do not leave the equipment energized for extended periods with a burned out tube in the circuit. After a defective tube has been located in a parallel-connected circuit, all tubes in the same circuit should be tested by a tube tester for proper emission.

6.3.2 SYSTEM TROUBLE ISOLATION.

If the trouble has not been located after the performance tests of this section and section V, refer to table 6-1.

TABLE 6-1. SYSTEM TROUBLE ISOLATION

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. No r-f or audio output, neither 180L-( ) or 618S-1 tunes.	a. No power input.	a. Refer to power supply trouble-shooting chart, table 6-7.
	b. Defective filter unit.	b. Correct defect. Refer to figures 8-10 and 8-29 for wiring and schematic diagrams.
	c. Defective r-f crystal oscillator.	c. Refer to paragraph 6.3.3.
2. R-f output, but no audio output.	a. Defective a-f amplifier.	a. Refer to table 6-6.
	b. Defective 250 kc i-f amplifier.	b. Refer to table 6-4.
	c. Defective bfo (V1202).	c. Try both CW and phone reception. If phone reception satisfactory, trouble is in bfo circuit.
3. Audio output, but no r-f output.	a. Defective power amplifier.	a. Refer to table 6-2.
	b. Transmit circuits of r-f tuner defective.	b. Refer to paragraph 6.3.4.
	c. Defective Antenna Tuner.	c. Refer to instruction book furnished with Antenna Tuner.
4. Audio output, r-f output, no voice operation in transmit position.	a. Defective modulator.	a. Refer to table 6-3.
	b. Modulation transformer T301 defective.	b. Replace transformer. Refer to table 6-13 for proper winding resistance.
5. Equipment will not channel properly.	a. Defective Autopositioner system.	a. Refer to table 6-8.
	b. Defective servo system.	b. Refer to paragraph 6.3.10.

6.3.3 R-F CRYSTAL OSCILLATOR.

If trouble is known to exist in the r-f crystal oscillator, proceed according to the following:

a. Check operation of the r-f crystal oscillator, V401, by measuring the r-f voltage at pin 15 of J302. This voltage will vary with crystal activity and with crystal frequency. Readings of from 2 to 6 volts should be obtained at pin 15 of J302.

b. If no reading is obtained in one channel position, try other channels. If readings are obtained in other positions, the crystal for the nonoperating channel is probably defective.

c. If no reading is obtained in any channel position, tube V401 is probably at fault. Replace tube.

d. If replacement of tube does not correct fault, make voltage and resistance checks of the stage, and check the wiring of the various switches in the circuit. A wiring diagram of the r-f crystal oscillator is given in figure 8-12.

6.3.4 R-F TUNER.

If trouble is known to exist in the r-f tuner, proceed according to the following:

NOTE

Before undertaking any of the trouble-shooting steps below for the r-f tuner, make a visual inspection for obvious mechanical faults, such as a sticky slug rack, weak or broken wires on the slugs, broken slugs, loose or unmeshing gears, broken leads, solder shorts, and overheated components. Check tubes V1001 through V1011. If low sensitivities appear to be the only trouble, realign before proceeding further.

a. In trouble shooting the r-f tuner, remember that several stages are common to both receiving and transmitting circuits. This fact can be used in isolating troubles. If, for instance, the equipment functions properly in receive position but lacks drive to the power amplifier in the transmit position, then the driver stages, V1010 and V1011, or the transmit mixers, V1004 and V1003, are probably at fault since the preceding r-f amplifier stages, V1008 and V1009, could not be defective, and the equipment still functions in receive position. By a similar process of elimination, other troubles can be isolated to particular stages.

b. Measure r-f voltages at the grids and plates of the various tubes. Compare these values with those of figure 8-3. This will isolate the trouble to the defective stage in the r-f tuner. After isolating the trouble to a particular stage, make voltage and resistance checks to determine faulty component.

c. Check the operation of the discriminator circuit by measuring the d-c voltage at terminal 4 of J308. During channeling operation, a d-c voltage varying in amplitude and polarity should be measured. After the tuning cycle is complete, a zero reading should be obtained. If slug rack centers when a new channel is selected and remains centered, trouble is not in centering circuit. If slug rack will move in one direction only, a portion of the discriminator network, Z1001, is defective.

d. In isolating the trouble to a particular component, try to operate the equipment on several bands. This will aid in isolating troubles to particular impedances (Z1002 through Z1025) since most of them are common to one band and one stage.

6.3.5 POWER AMPLIFIER.

Trouble in the power amplifier can be located more readily by reference to table 6-2.

TABLE 6-2. POWER AMPLIFIER TROUBLE ISOLATION

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. Tubes do not light.	a. No power input.	a. Check power supply. Refer to table 6-7.
	b. Resistor R306 open.	b. Replace R306.

TABLE 6-2. POWER AMPLIFIER TROUBLE ISOLATION (Cont)

SYMPTOM	POSSIBLE CAUSE	REMEDY
2. R-f drive present at J1001/P1503 (85 volts minimum) but reverse grid current (P.A. GRID position meter) with transmitter keyed.	a. Grid-to-cathode short on V1501, V1502, or V1503.	a. Replace defective tube.
	b. Filaments not lighted.	b. See step 1.
3. Low current reading on P.A. PL. position of meter and no output.	a. Plate or screen voltage not getting to tubes.	a. Locate source of trouble, and repair.
	b. Defective contacts on relay K1501.	b. Replace relay.
	c. Sliding contacts on L1502 dirty.	c. Clean and burnish contacts.
	d. Coaxial cable to J110 (ANT) open or shorted to ground.	d. Repair or replace cable.
4. Power amplifier not automatically tuning to resonance.	a. The d-c information from discriminator is not being supplied to servo amplifier.	a. Locate and correct fault.
	b. Defective component in discriminator circuit.	b. Replace defective component.
	c. No output from servo amplifier.	c. Refer to paragraph 6.3.10.
	d. No 400-cps voltage at terminal 4 of B1501.	d. Locate break in 400-cycle line, and repair.
5. Power amplifier does not set up to proper band.	a. Band switch S1501, S1502, S1503, S1504, or S1506 defective.	a. Locate defective switch, and repair or replace.
	b. Mechanical coupling between band-switch drive and band switches loose.	b. Tighten loose coupling.
	c. Misaligned band switches.	c. Refer to alignment procedures, paragraph 6.5.
	d. Defective band selector Autopositioner system.	d. Refer to paragraph 6.3.12.
6. Parasitics in power amplifier.	a. Defective parasitic suppressor, E1501 through E1506.	a. Replace defective component.
	b. Open screen or cathode bypass capacitor.	b. Replace capacitor.

6.3.6 MODULATOR.

Trouble in the modulator normally will appear as no modulation of the r-f output, low modulation, or as excessive distortion of the output. A summary of the possible troubles are listed in table 6-3.

TABLE 6-3. MODULATOR TROUBLE ISOLATION

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. No modulation; low current reading at MOD. PL. position of meter.	a. No microphone d-c supply voltage.	a. Locate break in supply, and repair.
	b. Controls misaligned.	b. Refer to alignment procedures, paragraph 6.5.
	c. Open coupling capacitor.	c. Replace defective capacitor.
	d. Defective tube.	d. Replace tube.
	e. Open modulation transformer, T301.	e. Replace T301. Refer to table 6-13 for winding resistances.
	f. Open connection between terminals 2 and 4 of transformer T301.	f. Repair connection.
2. No modulation; no current reading at MOD. PL. position of meter.	a. No filament voltage.	a. Locate and repair break in filament supply.
3. Insufficient modulation.	a. Controls misaligned.	a. Refer to alignment procedures, paragraph 6-5.
	b. Low B+ voltage or voltages.	b. Refer to power supply trouble-shooting chart, table 6-7.
	c. Defective tube or tubes.	c. Replace tube or tubes.
	d. Defective microphone.	d. Replace microphone.
	e. Low microphone supply voltage.	e. Locate defect and correct.
4. Excessive distortion.	a. Misaligned controls.	a. Refer to alignment procedures, paragraph 6-5.
	b. Feed-back circuit open.	b. Check R305, C301, and circuit connections. Replace defective component, or repair defective connections.
	c. Low B+ voltage or voltages.	c. Refer to power supply trouble-shooting chart, table 6-7.
	d. Defective microphone.	d. Replace microphone.
	e. Defective tube or tubes.	e. Replace tube or tubes.

6.3.7 250 KC I-F AMPLIFIER.

If trouble within Transceiver 618S-1 has been isolated to the 250 kc i-f amplifier, location of trouble to a detail part within this module may be accomplished more readily by reference to the procedure given in table 6-4.

TABLE 6-4. 250 KC I-F AMPLIFIER TROUBLE ISOLATION

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. No audio output, but normal avc voltage.	a. Defective tube.	a. Replace V904 or V905.
	b. Series noise limiter not opening.	b. Check C919 and replace.
	c. Defective output coupling capacitor.	c. Check C921 and replace.
2. No avc voltage; audio output normal.	a. Defective tube.	a. Check V904 and V905. Replace defective tube.
	b. Open coupling capacitor.	b. Check C918, and replace if necessary.
3. Avc voltage in i-f unit, but not in r-f tuner; audio output normal.	a. Capacitor C922 shorted.	a. Replace capacitor.
4. Avc voltage in r-f tuner, but not in i-f unit; audio output normal.	a. Capacitor C931 shorted.	a. Replace capacitor.
5. Low i-f sensitivity.	a. Defective tubes.	a. Check V901, V902, and V903. Replace if necessary.
	b. Improper screen grid voltages.	b. Check regulated 150-volt circuit, and correct defects.
	c. I-f transformers misaligned.	c. Refer to alignment procedures, paragraph 6-5.
6. Distortion at high-signal levels.	a. Avc line grounded or open.	a. Check avc line in this unit and in r-f tuner.

6.3.8 TRANSCEIVER 618S-4, 250 KC I-F AMPLIFIER WITH SQUELCH AND SELCAL.

If trouble within Transceiver 618S-4 has been isolated to the 250 kc i-f amplifier with squelch and selcal, location of trouble to a detail part within this module may be accomplished more readily by reference to the procedures given in table 6-5.

TABLE 6-5. 250 KC I-F AMPLIFIER WITH SQUELCH AND SELCAL (OF TRANSCEIVER 618S-4) TROUBLE ISOLATION

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. No audio output, but normal avc voltage.	a. Defective tube.	a. Replace V904 or V905.
	b. Series noise limiter not opening.	b. Check C920, and replace if necessary.
	c. Defective output coupling capacitor.	c. Check C921 and replace.
	d. High setting of Squelch Control or open in Squelch Control line.	d. Change Squelch Control setting or locate and repair open circuit.
2. No avc voltage; audio output normal.	a. Defective tube.	a. Check crystal diode CR901 and CR902.
	b. Open coupling capacitor.	b. Check C918, and replace if necessary.
3. Avc voltage in i-f unit, but not in r-f tuner; audio output normal.	a. Capacitor C922 shorted.	a. Replace capacitor.
4. Avc voltage in r-f tuner, but not in i-f unit; audio output normal.	a. Capacitor C931 shorted	a. Replace capacitor.
5. Low i-f sensitivity.	a. Defective tubes.	a. Check V901, V902, and V903. Replace if necessary.
	b. Improper screen grid voltages.	b. Check regulated 150-volt circuit and correct defects.
	c. I-f transformers misaligned.	c. Refer to alignment procedures, paragraph 6.5.
6. Distortion at high-signal levels.	a. Avc line grounded or open.	a. Check avc line in this unit and in r-f tuner.
7. Increasing Squelch Control does not eliminate noise.	a. Short to ground on the squelch control line.	a. Locate short and correct.
8. No selcal output, but avc and audio are normal.	a. Defective V905B.	a. Replace V905B.

6.3.9 A-F AMPLIFIER.

If trouble within Transceiver 618S-1 has been isolated to the a-f amplifier, location of trouble to a detail part within this module may be accomplished more readily by reference to the procedure given in table 6-6.

TABLE 6-6. A-F AMPLIFIER TROUBLE ISOLATION

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. No audio output of any kind.	a. Defective tube.	a. Check V1301 and V1302. Replace defective tube.
	b. No B+ voltage.	b. Refer to power supply trouble-shooting chart, table 6-7.
	c. Open coupling capacitor.	c. Check C1302 and C1303. Replace defective component.
	d. Open winding on transformer T1301.	d. Replace T1301. Refer to table 6-13 for winding resistances.
	e. Defective contacts on relay K1502 (audio muting circuit).	e. Replace K1502.
2. Audio output from receiver circuits. No sidetone output.	a. Defective coupling capacitor.	a. Check C1301; replace if necessary.
	b. No sidetone input.	b. Refer to figure 4-38. Correct defect.

6.3.10 TUNING SERVO AMPLIFIERS.

If trouble is known to exist in the tuning servo amplifiers, proceed according to the following:

a. In trouble shooting the servo amplifiers, the complete servo system must be taken into account. If, for example, the slug rack in the r-f tuner remains at rest when a new channel has been selected, the servo amplifier may have no output, or the input from the discriminator may be missing. In general, follow a logical sequence in determining where the trouble is located.

b. Assuming that the servo amplifier is at fault, the most logical fault is a defective chopper or tube. Remove the tube shield, and feel the chopper during channeling. If no vibration is apparent, replace the chopper.

c. Observe the tube filaments. If unlighted, refer to figure 4-43 or 4-44 (depending on the transceiver in use), and determine the filament arrangement. Check the tubes of the defective string, and replace the defective tube or tubes.

d. If a replaced chopper does not operate, check the 6.3-v a-c, 400 cps source.

e. Other troubles in the servo amplifiers normally are of a more subtle nature, generally resulting from improper feed-back conditions. An unbalanced bridge, for example, may result in feedback through transformer T601 and a consequent drive to the servomotor at a time when it normally is at rest. The motor then may oscillate.

f. Conditions of other than normal feedback also may result with improper B+ decoupling. Check the resistance of capacitors C603 and C604, and replace if defective.

g. Balance the bridge circuit according to steps h. through n.

h. h. Remove the servo unit to be balanced from the chassis.

i. Connect the vtvm to terminals 3 and 4 of T601.

j. Remove R612, and connect a decade box containing values of R612 (18 - 56 ohms) across R612 location in circuit.

k. Procure values of R612 indicated in the parts list of section VII.

l. Replace servo unit in chassis.

m. Operate the channel selector, and stall the servomotor by blocking the gear coupler with a screw driver.

n. Adjust the decade box for minimum voltage reading on the vtvm. Read the decade box, and insert resistor R612 of equal value into circuit.

6.3.11 POWER SUPPLY 416W-1.

Troubles in the power supply may be located more readily by reference to table 6-7.

TABLE 6-7. POWER SUPPLY 416W-1 TROUBLE ISOLATION

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. Failure to start.	a. No voltage or improper input voltage.	a. Check input voltage sources and correct defect.
	b. Open in input circuit wiring.	b. Repair defective wiring.
	c. Defective start switch.	c. Replace or repair switch.
	d. Relay K1604 defective.	d. Replace relay.
	e. Relay K1601 defective.	e. Replace relay.
	f. Open armature winding.	f. Return dynamotor to qualified maintenance depot.
	g. Worn low-voltage brushes.	g. Replace brushes as outlined in paragraph 6.4.20.
	h. Dirty low-voltage commutator.	h. Clean commutator. Refer to paragraph 6.4.20.
2. No output or low output.	a. Poor commutation resulting from a dirty commutator.	a. Clean commutator. Refer to paragraph 6.4.20.
	b. Low-input voltage.	b. Check input circuit for loose connections. Check power source.
	c. Shims "end loading" bearings.	c. Refer to paragraph 6.4.20.
	d. Defective armature.	d. Replace armature.
	e. Broken or sticky brushes.	e. Replace brushes.
3. Dynamotor noisy mechanically.	a. Dry bearings.	a. Remove bearings and lubricate or replace as necessary. Refer to paragraph 6.4.20.
	b. Bent shaft.	b. Replace armature.
	c. High commutator bar.	c. Refer to paragraph 6.4.20.
	d. Dynamotor mounting not secure.	d. Tighten mounting screws.
4. Overheating.	a. Bearings dry or damaged.	a. Remove bearings and lubricate or replace as necessary. Refer to paragraph 6.4.20.
	b. Shims "end loading" bearings.	b. Refer to paragraph 6.4.20.
	c. Bent shaft.	c. Replace armature.
	d. Sticking brushes.	d. Replace brushes.

TABLE 6-7. POWER SUPPLY 416W-1 TROUBLE ISOLATION (Cont)

SYMPTOM	POSSIBLE CAUSE	REMEDY
5. Dynamotor noisy electrically.	a. Arcing at brushes.	a. Replace brushes.
	b. Broken or cracked brushes.	b. Replace brushes.
	c. Brushes sticking in holder.	c. Correct trouble.
	d. High commutator bar.	d. Refer to paragraph 6.4.20.
	e. Dirty commutator.	e. Clean commutator. Refer to paragraph 6.4.20.
6. Vibration.	a. Bent shaft.	a. Replace armature.
	b. Loose mounting.	b. Tighten mounting screws.

6.3.12 AUTOPOSITIONER SYSTEM.

Troubles in the Autopositioner system may be located more readily by reference to table 6-8. A thorough study of the Autopositioner system, section IV, paragraphs 4.6 through 4.7, should be made before Autopositioner trouble shooting is undertaken.

TABLE 6-8. AUTOPOSITIONER TROUBLE ISOLATION

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. Motor continues to run after Autopositioner sets up.	a. Contacts bent on K401, K402, or K101. Spring weak, pawl does not seat fully.	a. Straighten contacts. Replace relay, replace spring, or remove and bend spring to increase tension.
	b. Seeking switch out of synchronization, causing pawl to drop late and catch on far side of notch and not seat fully.	b. Adjust switch. Refer to paragraph 6.4.10.
	c. Intermittent or continuous short on negative side of motor.	c. Remove cause of short.
2. Autopositioner sets up on wrong channel occasionally.	a. Broken wire or poor connection on one or more control wires.	a. Note which channels give ambiguous results. Check control wires for those channels, and correct defect.
3. Autopositioner sets up on one channel, but continues to run on others.	a. Control wire shorted to ground.	a. Note which channel sets up correctly, and check control wire for that channel. Correct fault.
	b. Switch out of synchronization, allowing pawl to drop too early or too late.	b. Check visually when set up. Realign as necessary. Refer to paragraph 6.4.10.

TABLE 6-8. AUTOPOSITIONER TROUBLE ISOLATION (Cont)

SYMPTOM	POSSIBLE CAUSE	REMEDY
4. Autopositioner does not set up on any channel; stop wheel turns freely; relay opens momentarily each revolution of shaft.	a. Spring bent, pawl does not engage stop wheel with sufficient force to hold.	a. Replace relay, replace spring, or remove and bend spring to increase tension.
	b. Switch out of synchronization.	b. Realign switch. Refer to paragraph 6.4.10.
	c. Pawl sticks on its pivot.	c. Remove relay. Remove pawl, and clean pivot pin. Reassemble pawl, and lubricate pivot with MIL-L-644A oil. Replace and realign relay.
	d. Relay shifted. Does not allow pawl to seat properly.	d. Realign relay. Refer to paragraph 6.4.7.
	e. Pawl tip shape severely altered; does not hold.	e. Remove relay. Replace pawl with new pawl. Reassemble and readjust relay.
5. Autopositioner does not set up on any channel; stop wheel turns freely; relay remains energized continuously.	a. Wire from relay to seeking switch grounded.	a. Find and remove cause of ground.
6. Autopositioner does not set up; stop wheel does not turn freely; relay energized; motor runs.	a. Pawl does not lift clear of notch. Relay shifted away from pawl.	a. Realign relay. Refer to paragraph 6.4.7.
	b. Pawl does not lift clear of notch. Relay has insufficient travel.	b. Readjust.
	c. Driven elements jammed by physical obstruction.	c. Find and remove obstruction.
	d. Gear jammed.	d. Find and remove cause of jam.
	e. Pawl sticks on its pivot.	e. Remove relay and pawl. Clean pawl and pivot pin. Replace pawl, and lubricate pivot with MIL-L-644A oil. Replace and realign relay.
	f. Improper lubrication on bearings at low temperature.	f. Disassemble, and clean bearings as required. Lubricate in accordance with instructions of paragraph 5.5.
	g. Insufficient clutch torque due to broken clutch springs.	g. Disassemble. Replace spring. Reassemble and realign. Refer to paragraph 6.4.9.
	h. Insufficient clutch torque due to glazing of clutch surfaces.	h. Disassemble. Replace clutch drum and clutch shoe assembly. Reassemble and realign.

TABLE 6-8. AUTOPOSITIONER TROUBLE ISOLATION (Cont)

SYMPTOM	POSSIBLE CAUSE	REMEDY
7. Autopositioner sets up, then recycles by itself.	a. Spring bent; does not hold pawl in notch properly.	a. Remove spring. Carefully bend spring to increase tension. Reassemble and readjust relay air gap.
	b. Relay shifted. Pawl does not seat fully.	b. Realign relay. Check, and readjust air gap if necessary.
	c. Pawl tip altered; excessive slope or radius causes pawl to be pushed out of slot.	c. Remove relay. Replace pawl with new pawl. Reassemble and adjust relay.
	d. Intermittent short circuit between control wires or from wires or switch to ground.	d. Find and remove cause of short.
	e. Switch out of synchronization; operation marginal.	e. Realign switch.
8. Autopositioner relay closes, motor does not operate.	a. Relay contacts bent, not closing motor circuit.	a. Adjust contacts.
	b. Open circuit from relay to motor.	b. Find and correct cause of open circuit.
	c. Contacts dirty.	c. Clean or replace contacts. Check contact adjustment and readjustment to obtain proper contact spacing and pressure.
	d. No power on positive side of motor.	d. Find and correct cause of open circuit.
	e. Motor armature burned out.	e. Replace motor. Refer to paragraph 6.4.6.
	f. Reduction gears jammed.	f. Find and remove obstruction.
9. Autopositioner relay does not operate.	a. No power on positive side of relay.	a. Find and correct cause of open circuit.
	b. Open circuit from relay to seeking switch.	b. Find and correct cause of open circuit.
	c. Control wire circuit open.	c. Find and correct cause of open circuit.
	d. Relay coil burned out.	d. Replace relay coil.
	e. No air gap on relay.	e. Readjust air gap.

6.3.13 REMOTE CONTROL UNITS.

Refer to the applicable paragraph or paragraphs 6.3.13.1 through 6.3.13.4 depending upon the Remote Control Unit in use with the particular installation for trouble isolation procedures.

6.3.13.1 REMOTE CONTROL UNIT 614D-1. If Remote Control Unit 614D-1 is in use with either Transceiver 618S-1 or 618S-4 and the trouble has been isolated to this component, location of trouble to a detail part within the 614D-1 may be accomplished by use of the procedures given in table 6-9.

TABLE 6-9. REMOTE CONTROL UNIT 614D-1 TROUBLE ISOLATION

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. Channel selected within the r-f crystal oscillator does not correspond to the setting of 614D-1.	a. Switch S2301 defective.	a. Replace S2301.
	b. Switch S2302 defective.	b. Replace S2302.
	c. Switch S2301 or S2302 misaligned.	c. Realign switches. Refer to figure 6-20 and paragraph 6.10.
2. Motor B401 runs continuously.	a. Switch S2301 or S2302 shorted to ground.	a. Replace defective switch, or repair as necessary.
	b. Control wire shorted to ground.	b. Locate and repair as necessary. Refer to figure 8-25.
3. Rotation of the channel selectors do not energize the Autopositioner system.	a. Switch S2301 or S2302 defective.	a. Replace defective switch.
	b. Control wire or wires open.	b. Locate and repair as necessary. Refer to figure 8-25.

6.3.13.2 REMOTE CONTROL UNIT 614D-2. If Remote Control Unit 614D-2 is in use with either Transceiver 618S-1 or 618S-4 and the trouble has been isolated to this component, location of trouble to a detail part within the 614D-2 may be accomplished by use of the procedures given in table 6-10.

TABLE 6-10. REMOTE CONTROL UNIT 614D-2 TROUBLE ISOLATION

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. Channel selected within the r-f crystal oscillator does not correspond to the setting of 614D-2.	a. Switch S2501 defective.	a. Replace S2501.
	b. Switch S2502 defective.	b. Replace S2502.
	c. Switch S2501 or S2502 misaligned.	c. Realign switches. Refer to figure 6-21 and paragraph 6.10.
2. Motor B401 runs continuously.	a. Switch S2501 or S2502 shorted to ground.	a. Replace defective switch, or repair as necessary.
	b. Control wire shorted to ground.	b. Locate and repair as necessary. Refer to figure 8-26.
3. Rotation of the channel selectors do not energize the Autopositioner system.	a. Switch S2501 or S2502 defective.	a. Replace defective switch.
	b. Control wire or wires open.	b. Locate and repair as necessary. Refer to figure 8-26.

6.3.13.3 REMOTE CONTROL UNIT 614D-3. If Remote Control Unit 614D-3 is in use with either Transceiver 618S-1 or 618S-4 and the trouble has been isolated to this component, location of trouble to a detail part within the 614D-3 may be accomplished by use of the procedures given in table 6-11.

TABLE 6-11. REMOTE CONTROL UNIT 614D-3 TROUBLE ISOLATION

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. Channel selected within the r-f crystal oscillator does not correspond to the setting of 614D-3.	a. Switch S101 defective.	a. Replace S101.
	b. Switch S102 defective.	b. Replace S102.
	c. Switch S101 or S102 misaligned.	c. Realign switches. Refer to figure 6-22 and paragraph 6.10.
2. Motor B401 runs continuously.	a. Switch S101 or S102 shorted to ground.	a. Replace defective switch, or repair as necessary.
	b. Control wire shorted to ground.	b. Locate and repair as necessary. Refer to figure 8-27.
3. Rotation of the channel selectors do not energize the Autopositioner system.	a. Switch S101 or S102 defective.	a. Replace defective switch.
	b. Control wire or wires open.	b. Locate and repair as necessary. Refer to figure 8-27.
4. Transmission disability and shunt C information functions inoperable.	a. Switch S102 defective.	a. Replace S102.

6.3.13.4 REMOTE CONTROL UNIT 614C-2. If Remote Control Unit 614C-2 is in use with either Transceiver 618S-1 or 618S-4 and the trouble has been isolated to this component, location of trouble to a detail part within the 614C-2 may be accomplished by use of the procedures given in table 6-12.

TABLE 6-12. REMOTE CONTROL UNIT 614C-2 TROUBLE ISOLATION

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. Channel selected within the r-f crystal oscillator subassembly does not correspond to the setting of the 614C-2.	a. Switch S2601 defective.	a. Replace S2601.
	b. Switch S2602 defective.	b. Replace S2602.
	c. Switch S2601 or S2602 misaligned.	c. Realign switch. Refer to figure 6-23 and paragraph 6-10.
2. Motor B401 runs continuously.	a. Switch S2601 or S2602 shorted to ground.	a. Replace defective switch, or repair as necessary.
	b. Control wire shorted to ground.	b. Locate and repair as necessary. Refer to figure 8-28.
	c. Jack J2601 defective.	c. Replace or repair as necessary.

TABLE 6-12. REMOTE CONTROL UNIT 614C-2 TROUBLE ISOLATION (Cont)

SYMPTOM	POSSIBLE CAUSE	REMEDY
3. Rotation of the 614C-2 channel selectors does not energize Autopositioner system.	a. Switch S2601 or S2602 defective.	a. Replace defective switch.
	b. Jack J2601 defective.	b. Replace or repair as necessary.
	c. Control wire or wires open.	c. Locate and repair as necessary. Refer to figure 8-28.
4. Dynamotor D1601 will not start.	a. Switch S2603 defective.	a. Replace S2603.
	b. Jack J2601 defective.	b. Replace or repair as necessary.
5. Beat signal not variable during CW reception.	a. Potentiometer R2601 defective.	a. Replace R2601.
	b. Jack J2601 defective.	b. Replace or repair as necessary.
6. Audio volume not variable.	a. Switch S2603 defective.	a. Replace S2603.
	b. Potentiometers R2603 and/or R2604 of three-ganged potentiometer defective.	b. Replace three-ganged potentiometer.
	c. Resistor R2606 or R2607 defective.	c. Replace defective resistor.
	d. Jack J2601 defective.	d. Replace or repair as necessary.
7. Gain not variable during CW reception.	a. Switch S2603 defective.	a. Replace S2603.
	b. Potentiometer R2605 of three-ganged potentiometer defective.	b. Replace three-ganged potentiometer.
	c. Jack J2601 defective.	c. Replace or repair as necessary.

6.3.14 VOLTAGE AND RESISTANCE MEASUREMENTS.

Voltage and resistance measurements for the various plug-in assemblies are given in figures 8-1 through 8-9. Since the pins of the tubes are not readily accessible while the units are in place, tube socket adapters were used to obtain most of the measurements. By plugging the tube under measurement into the adapter and then plugging the adapter into the tube socket, measurements can then be made from the top of the unit. In figures 8-1 through 8-9, voltages are indicated above the line and resistances below. Table 6-13 lists d-c resistances of transformers and inductors used in Transceiver 618S-1. These resistance values are for information in case of emergency replacement or for trouble-shooting procedures and are not intended to be absolutely correct in measurement. Variations may occur when making measurements with equipment still in excellent operating condition.

TABLE 6-13. D-C RESISTANCE VALUES OF TRANSFORMERS AND INDUCTORS

SYMBOL NUMBER	LOCATION	TERMINALS	D-C RESISTANCE (ohms)
B102	Front Panel	1-3, 2-4*	150
T301	Main Chassis	1-2, 2-3 4-5 6-7	85 40 150
L401	R-F Crystal Oscillator		43
T601	Tuner Servo Amplifier	1-2 3-4	550 6500
FL901	250 Kc I-F Amplifier (Transceiver 618S-1)	Input and Output	170
L901, L903, L904			7
L905			7.5
FL901	250 Kc I-F Amplifier with Squelch and Selcal (Transceiver 618S-4)	Input and Output	170
L901			7
L902			7
L903, L904			10
L1026	R-F Tuner		7.5
L1027, L1028			18
L1201, L1202	250 Kc Oscillator		17
L1203			15
L1204, L1205			9
T1301	A-F Amplifier	1-2 3-4, 4-5	1000 11
L1401, L1402	Modulator		450
L1501, L1505	Power Amplifier		17
B1501		1-3 2-5, 4-6	160 80
L1601, L1602	Power Supply 416W-1		10
L1604			11
L1605			4
T1601		1-2 3-4, 4-5	120 4

*Terminals 5 and 6 must be jumpered.

6.3.15 VOLTAGE DISTRIBUTION OF TRANSCEIVER 618S-1.

6.3.15.1 PRIMARY VOLTAGE DISTRIBUTION. All voltages are supplied to Transceiver 618S-1 through P1601/J1601 of Power Supply 416W-1. Figure 6-1 illustrates the distribution of voltages for the various connectors and relays. Measure voltages at the jacks when attempting to isolate trouble. Compare with the voltages indicated in figure 6-1. Careful study of this diagram will indicate that certain voltages are supplied to jacks and relays through contacts of other relays. The proper use of this information will reduce the time required for trouble isolation.

The +27.5-volt d-c is available to Power Supply 416W-1 at J1601-23/P1601-23 and is connected to one side of switches S1601 and S1602 (silk-screened RESET). The other contact of S1601 is connected to one contact of K1601, and the other contact of S1602 is connected to one contact of K1602 and to one side of relays K1602 and K1603. When the OFF-PHONE-CW switch is in the PHONE or CW position, one side of K1602 and K1603 is grounded thus energizing K1602 and K1603. Contacts of relay K1602 supply voltage to the filament circuit while contacts of relay K1603 complete the a-c circuits in Power Supply 416W-1. Operation of the a-c circuits permits K1604 to operate, its contacts completing the circuit for K1601. Relay K1604 is, therefore, a type of bias relay which prevents K1601 and dynamotor D1601 from operating until sufficient voltage has been supplied for proper operation of the equipment.

Dynamotor D1601 will operate only when three conditions are satisfied. First, the OFF-PHONE-CW switch must be in the PHONE or CW position. If in the PHONE position, the microphone push-to-talk button must be depressed. Secondly, K1604 and K1601 must be energized. In addition, 27.5 volts d-c must be supplied to P1601-19, the dynamotor interlock voltage point. The 27.5-volt d-c is supplied to this point from the keying relay interlock in the 180L-( ) through contacts of relay K801 located in the relay subassembly of the 618S-1. Make sure to check these points if the dynamotor fails to operate. Also check F1601 and F1602 to make certain a-c voltage is being applied.

The a-c primary power source consists of 115 volts, 400 cps and 115 volts, 320-1000 cps. The variable frequency power source (115 volts, 320-1000 cps) is optional, and may be replaced with the 115-volt, 400-cps power source. The 115-volt power source supplies the following voltage to the 618S-1 system: 6.3 volts, 400 cps; 18 volts, 400 cps; 115 volts, 400 cps; 250 volts d-c; -50 volts d-c; and -65 volts d-c. The 250-volt d-c supply is used within Transceiver 618S-1 during both transmission and reception differing from the 250-volt d-c supplied by dynamotor D1601 which is used only during transmission. Transformer T1601 steps down the 115-volt a-c to 6.3 volts, and autotransformer L1606 steps down the 115-volt a-c to 18 volts a-c. The 6.3-volt a-c is used within the 618S-1 as a reference voltage to the chopper coils. The 18-volt a-c is not used in the 618S-1 installation. The -50- and -65-volt d-c provides bias to the modulator and power amplifier tubes respectively.

NOTE

The functions of all relays and circuits of Power Supply 416W-1 are covered in detail in the principles of operation section of this handbook, paragraphs 4.9.12 through 4.9.12.3.

6.3.15.2 b-PLUS VOLTAGE DISTRIBUTION. Two 250-volt d-c supplies are employed as stated in the preceding paragraph. One originates with the 27.5-volt d-c power source which is stepped up by dynamotor D1601 to 250 volts d-c and applied through terminal 20 of P1601/J1601, through terminal 12 of TB1801, and through terminal 15 of J1801/P301 to assemblies in Transceiver 618S-1. The other 250-volt supply originates in the 115-volt, 400-cps power source. This supply is rectified and filtered through circuits within Power Supply 416W-1 and applied through terminal 8 of P1601/J1601, through terminal 11 of TB1801, and through terminal 14 of J1801/P301 to assemblies in Transceiver 618S-1.

The 600-volt d-c supply originates in the 27.5-volt d-c power source. The voltage is stepped up by dynamotor D1601 and applied through terminal 22 of P1601/J1601, through terminal 2 of TB1801, and through terminal 1 of J1801/P301 to the modulator and power amplifier plates.

The 150-volt regulated supply originates in the 115-volt, 400-cps power source. The 250-volt d-c rectifier supply, is applied through terminal 13 of J316/P802 to dropping resistor R801 and voltage regulator V801. The resultant 150-volt d-c supply is applied to jacks J302, J310, J313, and J307.

6.4 REPAIR AND OVERHAUL.

6.4.1 GENERAL.

Repair and overhaul instructions are provided for various components in the equipment. A series of complete and partial exploded views is included to aid in the disassembly of the units. These views are included chiefly to show the mechanical construction of the equipment although nonmechanical parts are shown in some instances.

6.4.2 DISASSEMBLY OF SERVOMOTOR DRIVE ASSEMBLY.

Refer to figure 6-2 for an exploded view of the servomotor drive assembly. Items referred to in the procedure refer to callouts in figure 6-2. Use the following procedure to disassemble the servomotor drive assembly:

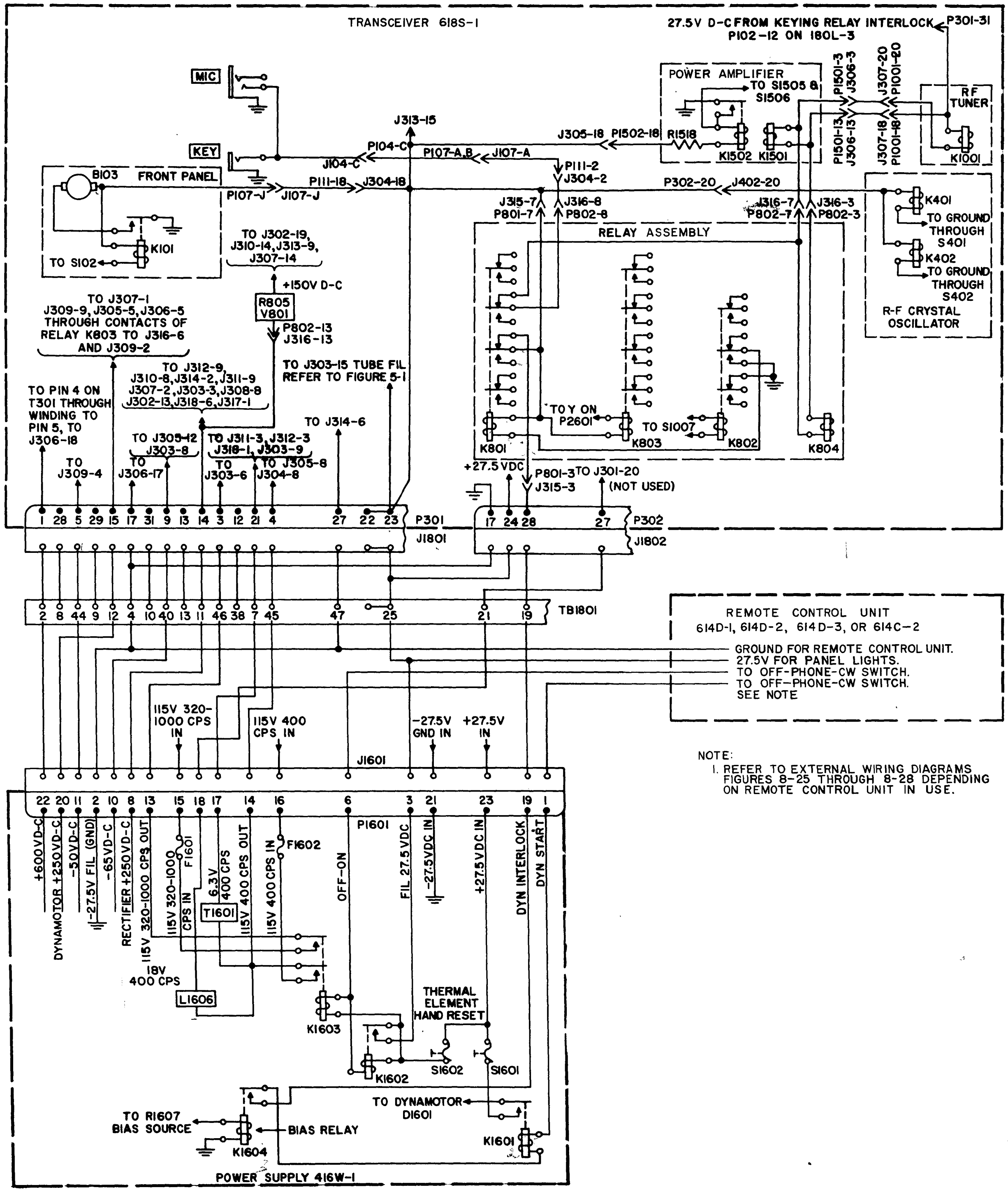
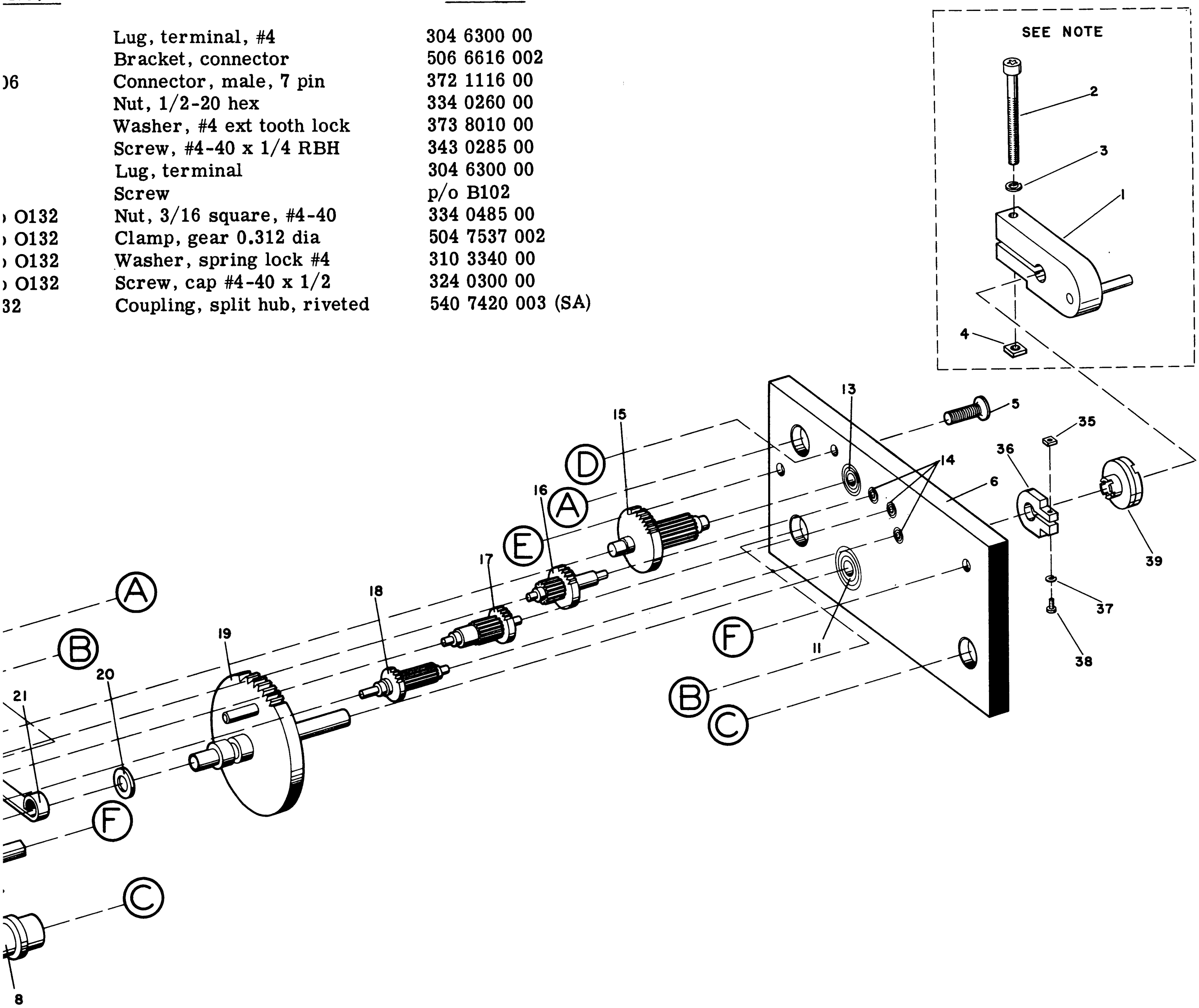


Figure 6-1. Transceiver 618S-1, Voltage Distribution

ʼMBOL NO.	DESCRIPTION	PART NUMBER
	Lug, terminal, #4	304 6300 00
	Bracket, connector	506 6616 002
)6	Connector, male, 7 pin	372 1116 00
	Nut, 1/2-20 hex	334 0260 00
	Washer, #4 ext tooth lock	373 8010 00
	Screw, #4-40 x 1/4 RBH	343 0285 00
	Lug, terminal	304 6300 00
	Screw	p/o B102
) O132	Nut, 3/16 square, #4-40	334 0485 00
) O132	Clamp, gear 0.312 dia	504 7537 002
) O132	Washer, spring lock #4	310 3340 00
) O132	Screw, cap #4-40 x 1/2	324 0300 00
32	Coupling, split hub, riveted	540 7420 003 (SA)



NOTE:

PIN-TYPE COUPLER REPLACED WITH OLDHAM COUPLER; MOD I OF SERVO MOTOR DRIVE ASSEMBLY.

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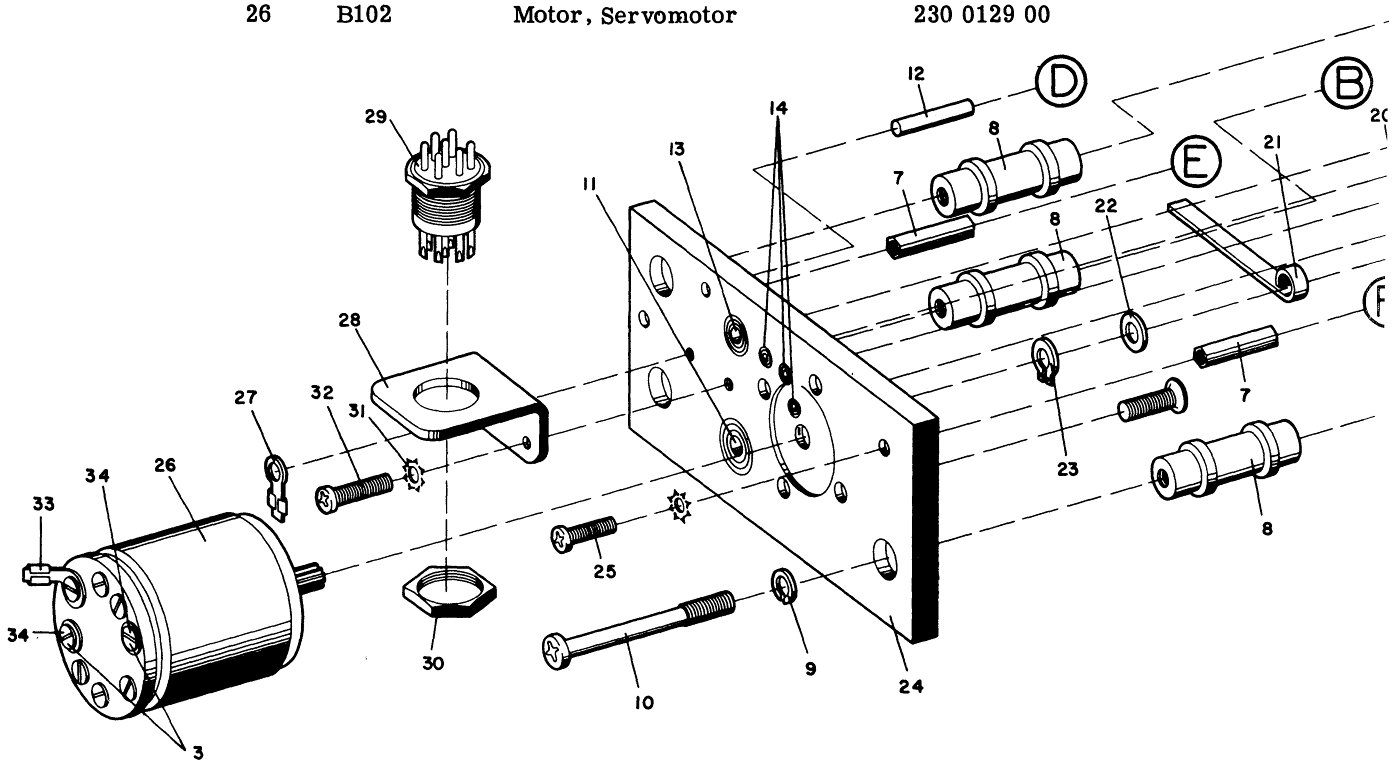
Figure 6-2. Transceiver 618S-1, Servomotor Drive Assembly, Exploded View

ITEM NO.	SYMBOL NO.	DESCRIPTION	PART NUMBER	ITEM NO.	SYMBOL NO.
1	p/o O132	Clamp	506 6617 002	27	
2	p/o O132	Screw, #4-40 x 9/16 SHC		28	
3	p/o O132	Washer, #4 spring lock	310 0279 00	29	P106
4	p/o O132	Nut, #4-40 square	334 0485 00	30	
5		Screw, #4-40 x 3/8 RBH	343 0287 00	31	
6	A117	Plate, bearing	506 6623 003	32	
7		Post, supporting	506 6613 002	33	
8	p/o A117	Post, spacing	506 6612 002	34	
9		Washer, #8 spring lock	310 0072 00	35	p/o O132
10	H103	Screw, captive, #8-32 x 1-1/4	506 6614 002	36	p/o O132
11	O116, O117	Bearing, ball	309 0002 00	37	p/o O132
12	p/o A117	Stop, spring	506 6615 002	38	p/o O132
13	O114, O115	Bearing, ball	309 0370 00	39	O132
14	O118-O123	Bearing, ball	309 0349 00		
15	O127	Gear, composite	506 6603 002		
16	O125	Gear, composite	506 6597 002		
17	O124	Gear, composite	506 6610 002		
18	O126	Gear, composite	506 6600 002		
19	O128	Gear, composite	506 6622 003		
20		Washer, flat	506 6619 002		
21		Spring, drive	506 6611 002		
22		Washer, flat	506 6619 002		
23		Ring, retaining	340 0025 00		
24	A121	Plate, bearing	506 6620 003		
25		Screw, #4-40 x 1/4 RBH	342 0154 00		
26	B102	Motor, Servomotor	230 0129 00		



a. Loosen screw (item 2), and remove clamp O132 (item 1).

b. Remove completely captive screws H103 (item 10) from unit.

c. Remove two screws and lock washers (item 25).

d. Hold the drive assembly in the left hand with the motor firmly in the palm, and gently remove bearing plate A117 (item 6).

e. Remove large gear O128 (item 19) with its two ball bearings O117 and O116 (item 11) and associated spring assembly (items 20 through 23).

CAUTION

Use the proper tools to remove the ball bearings from the plates. The gears may be removed without removing the bearings.

f. Remove gear O126 (item 18) and its ball bearings O123 and O119 (item 14).

g. Remove gear O124 and its associated bearings O122 and O120 (items 17 and 14).

h. Remove gear O127 (item 15) and its ball bearings O115 and O114 (item 13).

i. Remove gear O125 and its associated bearings O121 and O118 (items 16 and 14).

j. Remove four screws and washers (items 34 and 3) from the rear of motor B102 (item 26), and remove the wires to the motor.

k. Remove four screws (not shown), and remove the motor (item 26).

6.4.3 CLEANING OF BALL BEARINGS AND METAL GEARS.

When cleaning ball bearings, perform work in an air-conditioned or air-filtered room. All tools, equipment, fixtures, and the area in general should be maintained at a very high level of cleanliness.

CAUTION

Permanent damage may result from forcibly spinning a bearing before it is thoroughly cleansed of all foreign matter. Bearings must not be handled with bare hands during and after cleaning. Handling should be kept to a minimum.

NOTE

It is recommended that a cleaning solvent consisting of 3 to 4 parts of ethyl alcohol plus 1 part oil MIL-L-7870 be used throughout the following disassembly procedures. Do not use carbon tetrachloride.

Place the bearings in a bath of dry-cleaning solvent. Move the bearings up and down several times to circulate the solvent. Remove the bearings from bath, and direct air jet at side of bearings opposite from bearing holder until dry; take care not to allow blow of air jet to spin the bearing. Immerse metal gears in a bath of dry-cleaning solvent or other proper cleansing agent, and agitate bath. Remove gears, and dry with a soft, clean, lint-free cloth.

6.4.4 REASSEMBLY OF SERVOMOTOR DRIVE ASSEMBLY.

Clean all gears and bearings according to instructions given in paragraph 6.4.3. Lubricate the bearings of motor B102 according to instructions given in section V. If trouble develops in motor B102, it is recommended that the entire motor be replaced. Reassemble the components of the servomotor drive assembly in the reverse order of that given in paragraph 6.4.2 except that the gears and associated bearings are replaced in the following order: O127, O125, O124, O126, and O128.

6.4.5 DISASSEMBLY OF AUTOPOSITIONER ASSEMBLY.

An exploded view of the switch drive assembly is given in figure 6-3. Follow a similar procedure to that given for the servomotor drive assembly (paragraph 6.4.2) in disassembling the unit. Further instructions are given below in paragraphs 6.4.6 through 6.4.10.

6.4.6 REPLACEMENT OF AUTOPOSITIONER MOTOR B103.

The only maintenance to be undertaken on the Autopositioner motor B103 is replacement of the motor brushes. All other troubles generally require replacement of the motor as follows:

a. Disassemble the switch drive assembly to the extent that front plate A114 (item 26) is removed.

b. Remove two screws (item 31), and slide motor B103 (item 8) out of the front plate.

c. Replace the brushes, if necessary, according to instructions given in paragraph 6.4.15.

d. Reassemble the motor using a reverse procedure.

6.4.7 AUTOPOSITIONER RELAY ADJUSTMENT.

When it becomes necessary to readjust Autopositioner relay K101 without removing it from the unit, proceed as follows:

a. Loosen relay mounting screws.

b. With pawl engaged in one of the notches of the stop wheel, hold the pawl fully seated in the notch.

c. Rotate the relay clockwise about the mounting screws so that the frame and armature contact the pawl projection to eliminate all lost motion in the relay.

d. Tighten relay mounting screws in this position.

e. Depress the relay armature, and check to see that the pawl lifts clear of the notch to allow free rotation of the stop wheel. Pawl should clear the stop-wheel teeth by about 1/64 of an inch. More than 1/32 of an inch of clearance indicates excessive relay travel with a corresponding loss of power. Relay travel can be adjusted, if necessary, by loosening the two screws near the hinge and sliding the hinge plate up or down slightly as required.

f. The motor-operating contacts on the relay should be adjusted to maintain contact when the pawl is resting on top of a stop-wheel tooth between positions with the relay de-energized. This is to insure that the motor will continue to drive until the pawl engages the proper notch which opens the contacts by at least 0.025 inch. Contacts can be adjusted, if necessary, by bending the stationary contact arm.

6.4.8 AUTOPOSITIONER RELAY REPLACEMENT AND ADJUSTMENT.

If for any reason it is necessary to replace an Autopositioner relay and align it, the following procedure should be used:

a. Seat the pawl in a notch of the stop wheel. Turn the gear train by hand to allow the pawl to seat fully.

b. Place the relay so that the pawl finger comes between the relay spring and frame at about the middle of the spring.

c. Line up the mounting hole farthest from the pawl, and start this mounting screw without applying any pull to the relay spring. That is, let the relay turn clockwise slightly.

d. Turn the relay counterclockwise about this screw. This will let the pawl finger slide between the spring and relay arm. Start the second screw.

e. Hold the pawl firmly seated in the stop-wheel notch, and hold the relay frame against the pawl finger. Tighten mounting screws. See that the pawl is seated fully and the relay armature and arm have no appreciable free play. If necessary, reposition to meet these conditions.

f. Depress the relay armature, and manually turn the Autopositioner to check the clearance between the pawl tip and the stop wheel. This should be 1/64 inch or less. If adjustment is required, loosen the screws near the hinge point, and slide the hinge plate up or down as required. Adjustment may be aided by placing a 0.020-inch feeler gauge between the armature and coil core. Be careful that the frame arm does not rub on the side of the frame and that the spring does not shift closer to the contacts when tightening the screws.

g. Check the operation of the motor contacts. With power off, depress the armature of the relay, and turn the gearing to let the pawl tip rest on the stop wheel between notches. In this position, the motor-operating contacts should be closed, and the armature and arm should have a small amount of free play to permit full contact pressure at the contact points.

h. If necessary, bend the stationary contacts in or out. Failure to make contact in this position may allow the Autopositioner to set up at the wrong position with the seeking-switch circuit open but with the pawl between notches. Excessive free play of the armature in this position indicates insufficient contact opening in the de-energized position.

6.4.9 AUTOPOSITIONER CLUTCH MAINTENANCE.

a. To gain access to the clutch, remove Truarc retaining ring using Truarc pliers, and slide the clutch gear off the shaft.

b. To remove the clutch from the drum, press the ends of the clutch toward each other using wire bending pliers, and slide the clutch out of the drum.

c. To remove the clutch drum from the shaft, remove the Truarc ring with Truarc pliers; and while holding the shaft, loosen the nut with pliers or a wrench, and proceed to slip the spacer and drum from the shaft.

CAUTION

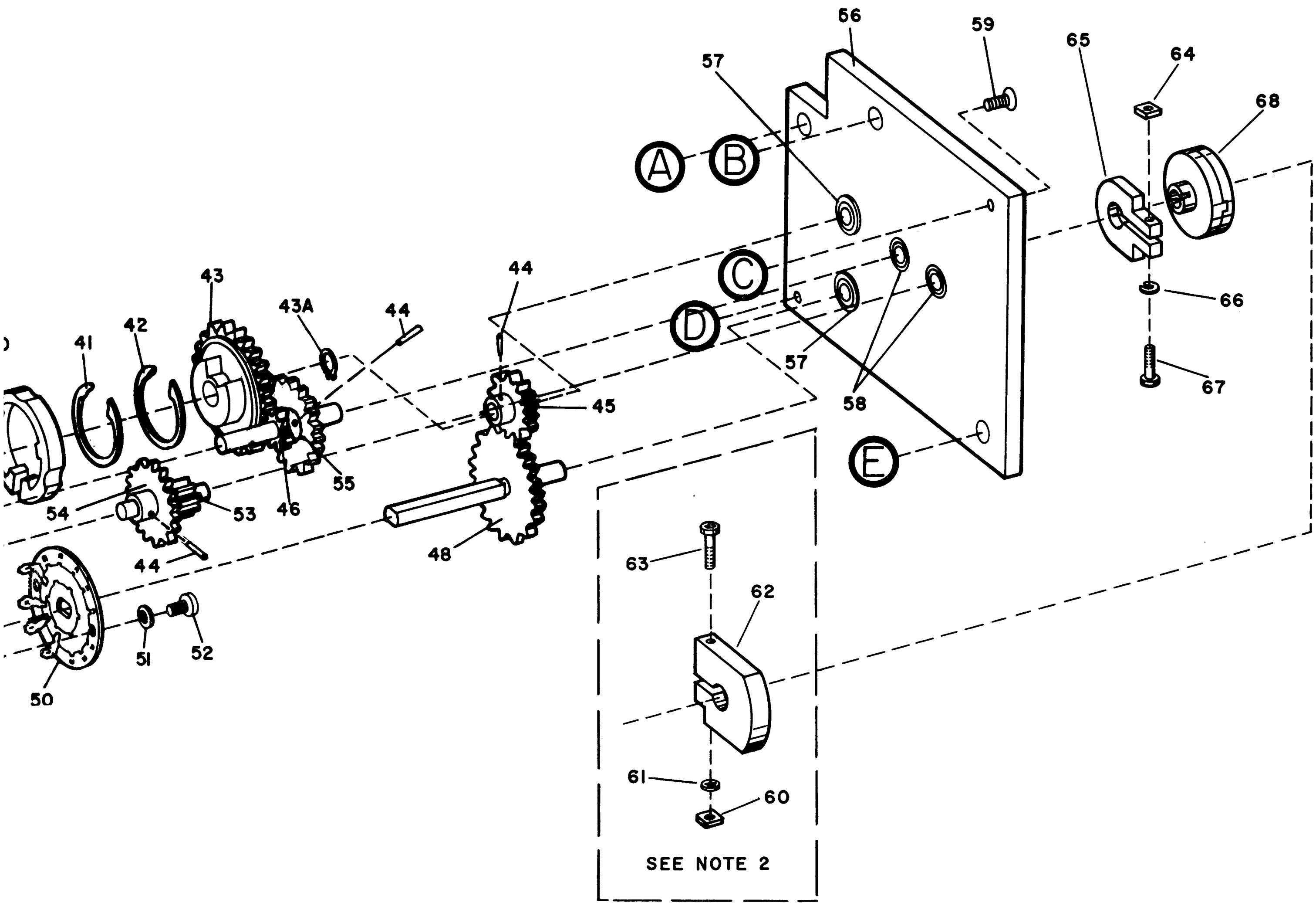
Do not use the pawl to hold the shaft. Doing so may bend pawl or shear pawl pivot pin.

d. Before replacing the clutch ring in the drum, carefully wipe the inside of the drum to remove oil and grease. Inspect the drum surface for scoring.

e. Lubricate the bearings according to instructions in section V.

CAUTION

Caution must be exercised in reassembling the clutch drum to the shaft to insure that the retaining nut is tightened sufficiently to insure against slippage.



NNECTIONS OF RELAY K101 CHANGED; MOD 1
RIVE ASSEMBLY.

PLER REPLACED BY OLDHAM COUPLER; MOD 2
IONER ASSEMBLY. OLD PARTS ILLUSTRATED
OX.

HANGED; MOD 3 OF SWITCH DRIVE ASSEMBLY.

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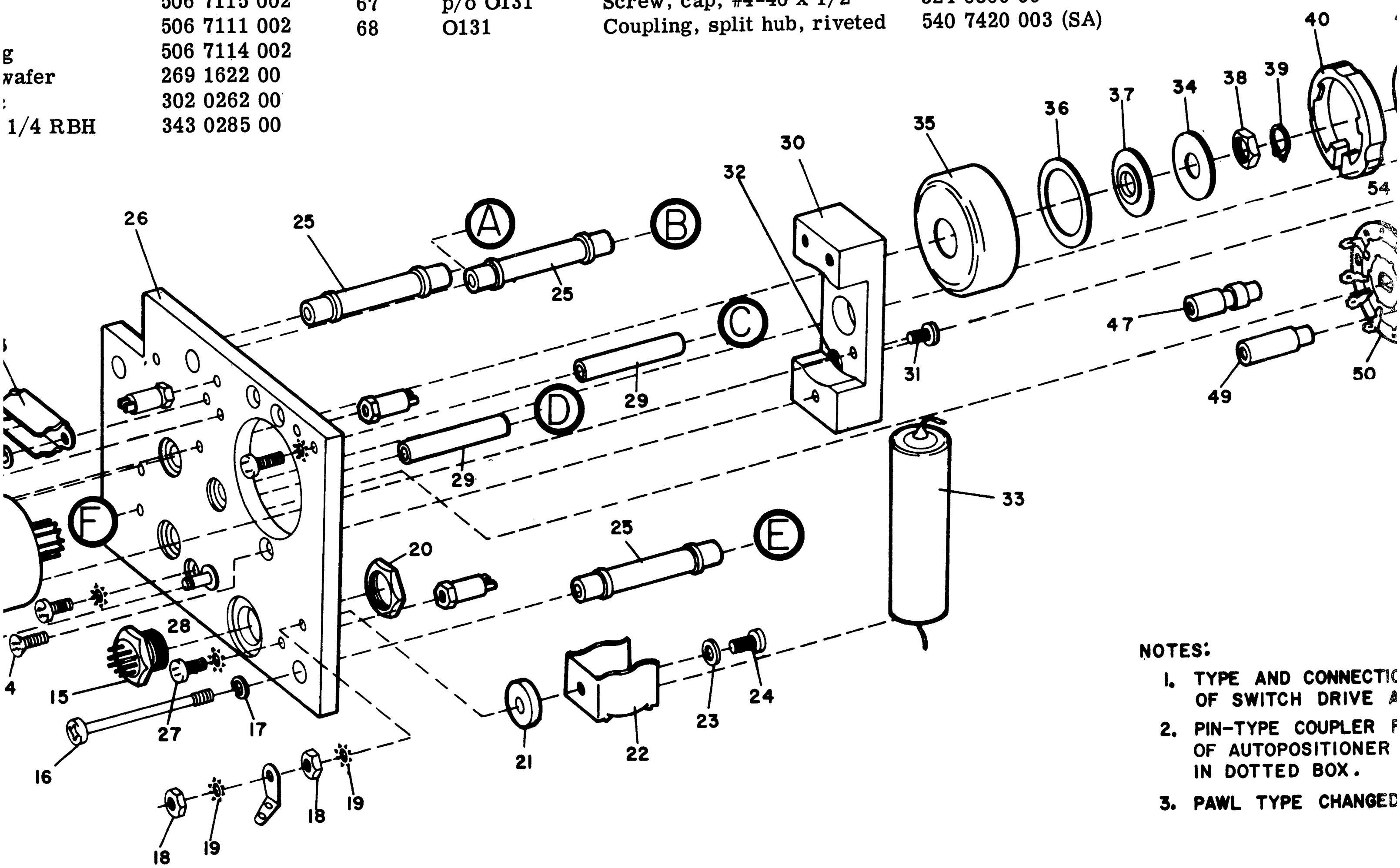
Figure 6-3. Transceiver 618S-1, Autopositioner Assembly, Exploded View

...TION	PART NUMBER
	931 0429 00
	503 9725 002
	502 1132 002
	502 1164 002
	503 4920 001
ex	334 0264 00
	340 0025 00
	502 1825 002
	502 7029 002
	502 7030 002
. clutch	503 7091 002
	311 1122 30
	506 7108 002
d	506 7107 002
	506 7115 002
	506 7111 002
g	506 7114 002
wafer	269 1622 00
:	302 0262 00
1/4 RBH	343 0285 00

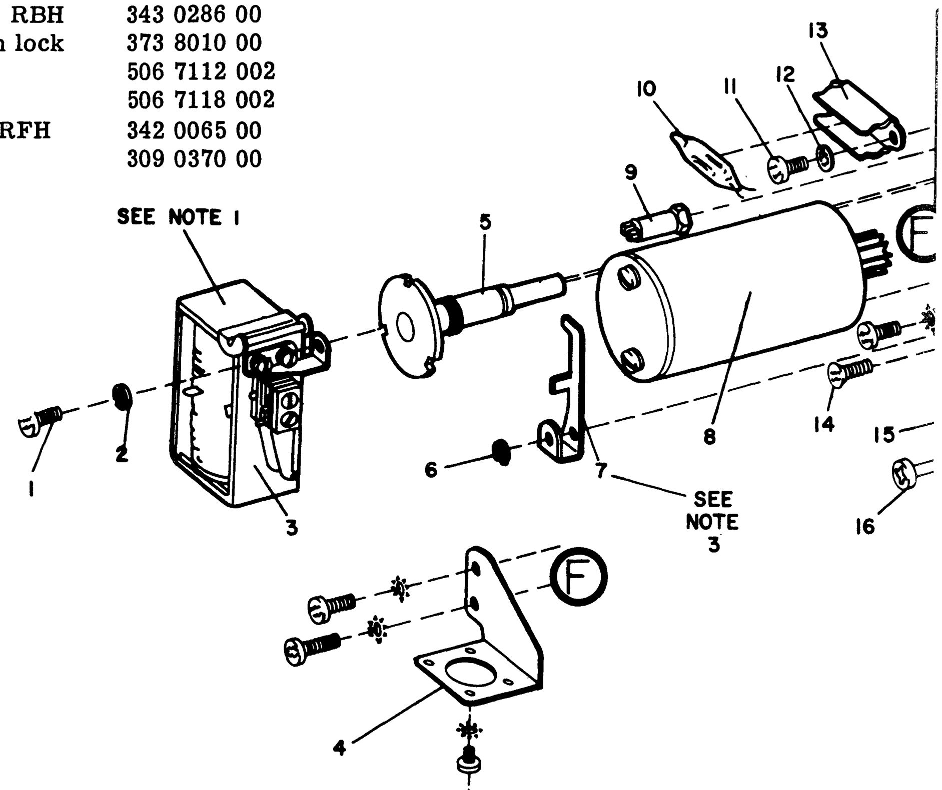
ITEM NO.	SYMBOL NO.	DESCRIPTION	PART NUMBER
53	p/o O103	Gear, fabricated	506 7106 002
54	p/o O103	Gear	506 7105 002
55	p/o O105	Gear	506 7105 002
56	A113	Plate, rear	506 7123 003
57	O110, O111	Bearing, ball	309 0002 00
58	O108, O109	Bearing, ball	309 0370 00
59		Screw, #4-40 x 5/16 RFH	342 0153 00
60	p/o O131	Nut, #4-40 square	334 0485 00
61	p/o O131	Washer, #4 spring lock	310 0279 00
62	p/o O131	Clamp	506 6617 002
63	p/o O131	Screw, #4-40 x 9/16 SHC	324 0303 00
64	p/o O131	Nut, 3/16 square, #4-40	334 0485 00
65	p/o O131	Clamp, gear 0.0312 dia	504 7537 002
66	p/o O131	Washer, spring lock #4	310 3340 00
67	p/o O131	Screw, cap, #4-40 x 1/2	324 0300 00
68	O131	Coupling, split hub, riveted	540 7420 003 (SA)



NOTES:

1. TYPE AND CONNECTI...
OF SWITCH DRIVE A...
2. PIN-TYPE COUPLER F...
OF AUTOPOSITIONER...
IN DOTTED BOX.
3. PAWL TYPE CHANGED...

ITEM NO.	SYMBOL NO.	DESCRIPTION	PART NUMBER
1		Screw, #4-40 x 5/16 RBH	343 0286 00
2		Washer, #4 ext tooth lock	373 8010 00
3	K101	Relay, armature	410 0109 00
4		Bracket, relay	506 7129 002
5	O130	Shaft, stop wheel	506 7102 002
6		Ring, retaining	340 0087 00
7	O107	Pawl	504 7789 002
8	B103	Motor, permanent magnet	230 0199 00
9	E103, 5, 6, 7	Terminal, standoff	306 0234 00
10	E101	Bulb, neon	262 0025 00
11		Screw, #2-56 x 3/16 RBH	343 0298 00
12		Washer, #2 int tooth lock	373 8500 00
13		Clip, tube	139 0369 00
14		Screw, #6-32 x 5/8 RFH	342 0065 00
15	P107	Connector, male	372 1123 00
16	H104	Screw, #8-32 x 1-7/8 captive	506 7113 002
17		Washer, #8 spring lock	310 0072 00
18		Nut, #6-32 hex	313 0053 00
19		Washer, #6 ext tooth lock	373 8020 00
20		Nut, #1/2-20 hex	334 0260 00
21		Plate, capacitor clip	506 7120 002
22		Clip, capacitor	265 5010 00
23		Washer, #6 flat	310 0055 00
24		Screw, #6-32 x 3/4 RBH	343 0334 00
25		Post, spacing	506 7104 002
26	A114	Plate, front	506 7128 005
27		Screw, #4-40 x 5/16 RBH	343 0286 00
28		Washer, #4 ext tooth lock	373 8010 00
29		Post, supporting	506 7112 002
30		Pad, motor	506 7118 002
31		Screw, #6-32 x 5/8 RFH	342 0065 00
32	O102	Bearing, ball	309 0370 00
33	C102	Capacitor	
34		Flange	
35		Drum, clutch	
36		Spacer, clutch	
37		Flange, clutch	
38		Nut, #5/16-32 hex	
39		Ring, retaining	
40		Clutch	
41		Spring, clutch	
42		Spring, clutch	
43	O129	Gear assembly, clutch	
44		Pin, groove	
45	O112	Gear	
46	p/o O105	Gear, fabricated	
47		Post, spacing	
48	O113	Gear, switch	
49		Post, supporting	
50	S102	Switch, rotary wafer	
51		Washer, plastic	
52		Screw, #4-40 x 1/4 RBH	



6.4.10 SYNCHRONIZATION OF AUTOPOSITIONER SWITCHES.

Synchronization of the Autopositioner switches can be made by visual inspection. Alignment is not critical, but the switches should be positioned so that the blade segments are well centered on the switch positions. The unit should be run under power, and each switch should be checked at several positions to eliminate any errors caused by backlash and eccentricity.

6.4.11 DISASSEMBLY OF BLOWER MOTOR ASSEMBLIES.

Two blower motors are interchangeable for use within Transceiver 618S-1. These are: the American Electric Company motor, illustrated in figure 6-4, and the Induction Motors Corporation motor, illustrated in figure 6-5. The following disassembly procedure is identical with either blower motor:

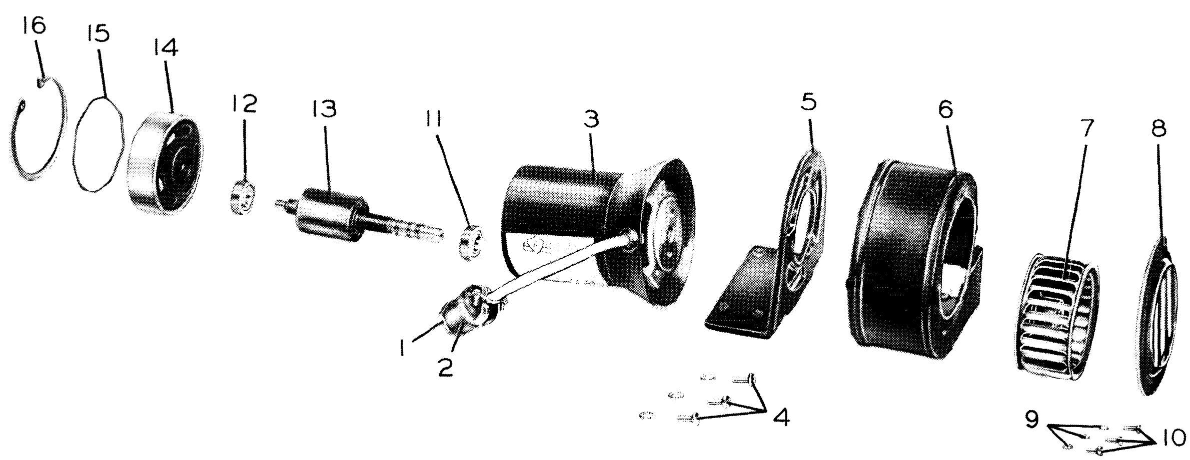
Remove three screws and lock washers (items 9 and 10), and remove the impeller housing cover (item 8). Loosen the setscrews in the impeller (item 7), and withdraw the impeller from its housing (item 6). Remove three screws and lock washers (item 4), and remove the impeller housing (item 6) and blower motor bracket (item 5) from the blower motor housing (item 3).

The Induction Motors Corporation motor is further disassembled by removing the screws (item 19 of figure 6-5) and releasing the retaining ring (item 16 of figure 6-5).

The bearings, shims, retaining rings, armatures, etc. now are removable from both blower motors as illustrated in figures 6-4 and 6-5. All part names and numbers are given in the blower motor assembly tables.

6.4.12 BLOWER MOTOR ASSEMBLY OVERHAUL.

The plug (item 1) or connector hood (item 2) may be replaced by unsoldering the leads from the motor.



ITEM NO.	ITEM	PART NUMBER	ITEM NO.	ITEM	PART NUMBER
	Blower Motor Assembly	009 1289 00	10	Screw, No. 2-56 x 1/4 RBH	343 0299 00
1	P105, Connector, 7 pin	372 1116 00	11	Bearing	234 0598 00
2	Hood Connector	372 1159 00	12	Bearing	234 0599 00
3	B101, Motor, Blower	230 0190 00	13	Armature	234 1005 00
4	Screw, No. 4-40 x 5/16 RBH	343 0286 00	14	End Bell	234 0612 00
5	Bracket, Blower Motor		15	Shim	234 1002 00
6	Housing, Impeller	234 0596 00		Shim	234 1003 00
7	Impeller	009 1277 00		Shim	234 1004 00
8	Cover, Impeller Housing	234 0597 00	16	Retaining Ring	234 1611 00
9	Washer, No. 2 Int. Tooth Lock	373 8500 00			

A29-289-P

Figure 6-4. Transceiver 618S-1, American Electric, Blower Motor Assembly, Exploded View

If this is done, be sure to tag the motor leads for proper identification. It is recommended that each motor be replaced as a unit if any serious trouble is encountered. The blower motors, figures 6-4 and 6-5, are interchangeable as complete units; however, separate parts within each motor are not interchangeable. Under emergency conditions, either motor may be repaired from salvage parts of another motor.

6.4.13 DISASSEMBLY OF R-F CYRSTAL OSCILLATOR.

A partial exploded view of the r-f crystal oscillator is given in figure 6-6. Included in the figure are the mechanical drive assemblies for the various crystal, bank, and band switches. Follow the general procedures outlined in previous paragraphs of this section in disassembling the unit. When unsoldering any wires to remove a component, always tag the wire for identification purpose when reassembling the unit.

Maintenance instructions applicable to the Autopositioner assemblies are included in paragraph 6.4.7 through 6.4.10.

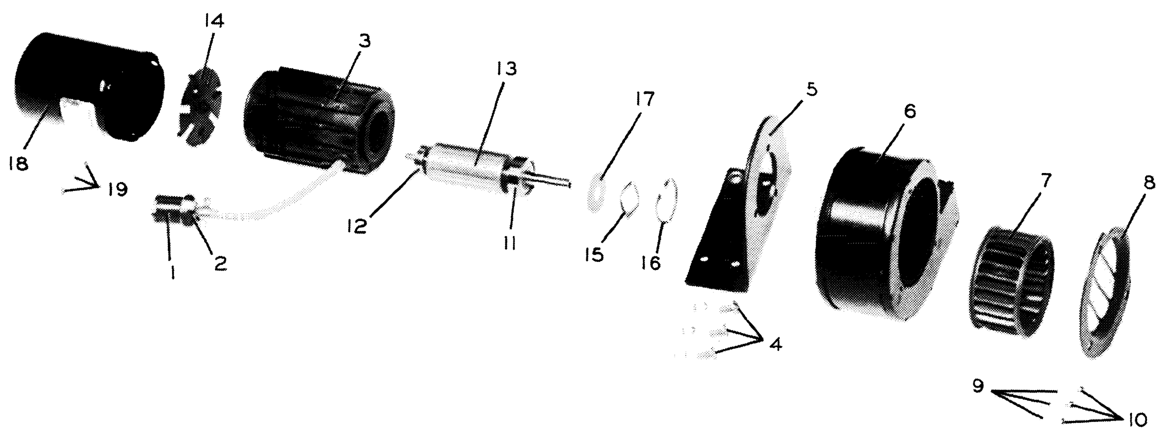
6.4.14 REPLACEMENT OF AUTOPOSITIONER MOTOR B401.

Use the following procedure in removing Autopositioner motor B401:

a. Remove three screws and lock washers (items 20 and 65) holding motor mounting bracket (item 68) in position.

b. Remove two screws (items 20 and 65) holding bracket to motor B401 (item 69).

c. Assemble and mount new motor in reverse order.



ITEM NO.	ITEM	PART NUMBER	ITEM NO.	ITEM	PART NUMBER
	Blower Motor Assembly	009 1304 00	11	Bearing	234 0399 00
1	P105, Connector, 7 pin	372 1116 00	12	Bearing	234 0400 00
2	Hood Connector	372 1159 00	13	Armature	234 0746 00
3	B101, Motor, Blower	230 0241 00	14	Motor Impeller	234 0748 00
4	Screw, Housing	343 0329 00	15	Shim, Tension Washer	234 0801 00
5	Bracket, Blower Motor	506 8095 003	16	Retaining Ring	234 0800 00
6	Housing, Impeller	234 0747 00	17	Shim Washer 0.01 inch	234 0401 00
7	Impeller	009 1277 00		Shim Washer 0.015 inch	234 0402 00
8	Cover, Impeller Housing	234 0597 00		Shim Washer 0.035 inch	234 0404 00
9	Washer, Impeller Cover	373 8500 00	18	Motor Cover	234 0802 00
10	Screw, Impeller Cover	343 0299 00	19	Screw, Motor Cover	343 0284 00

A29-290-P

Figure 6-5. Transceiver 618S-1, Induction Motors Corporation, Blower Motor Assembly, Exploded View

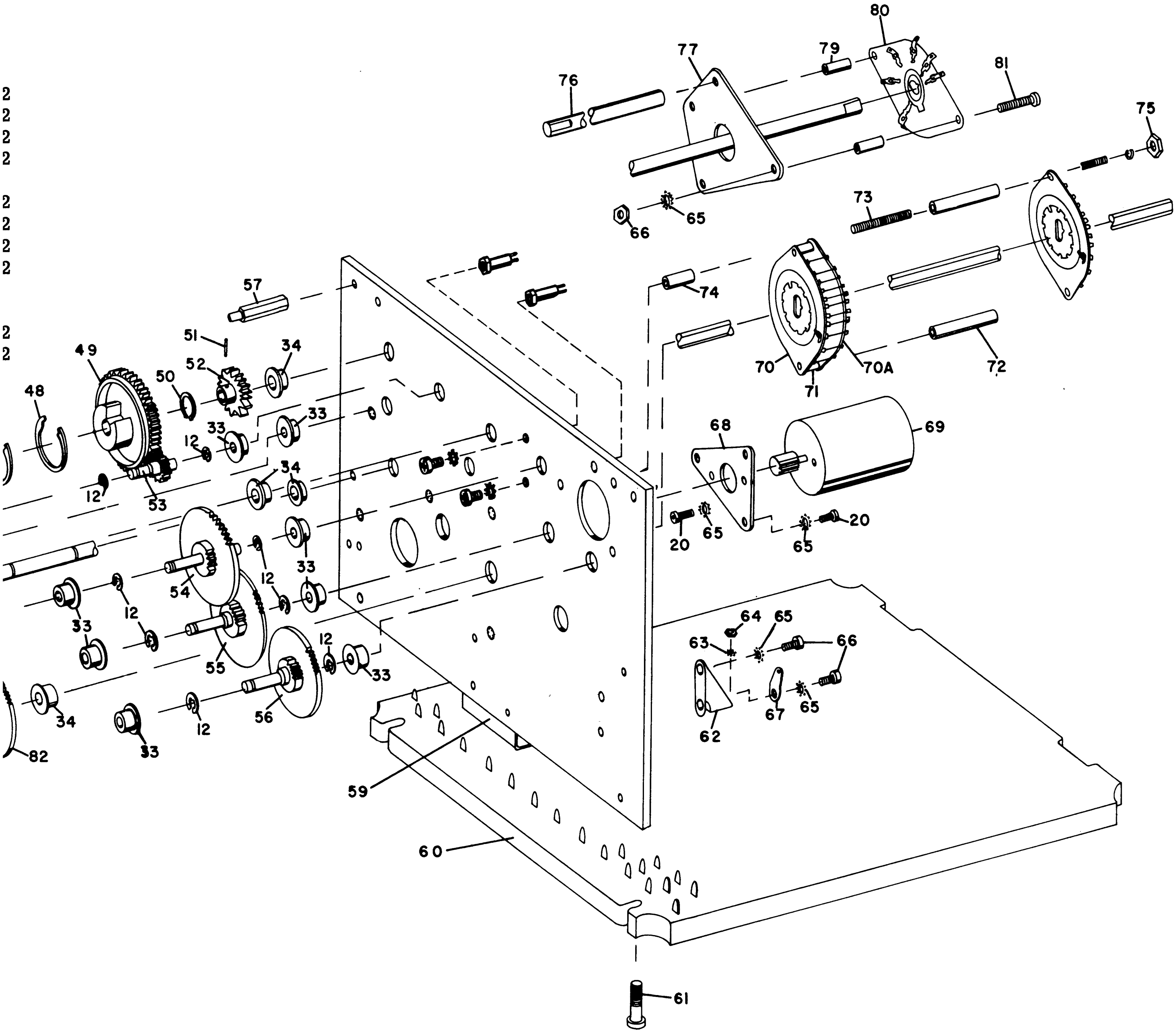
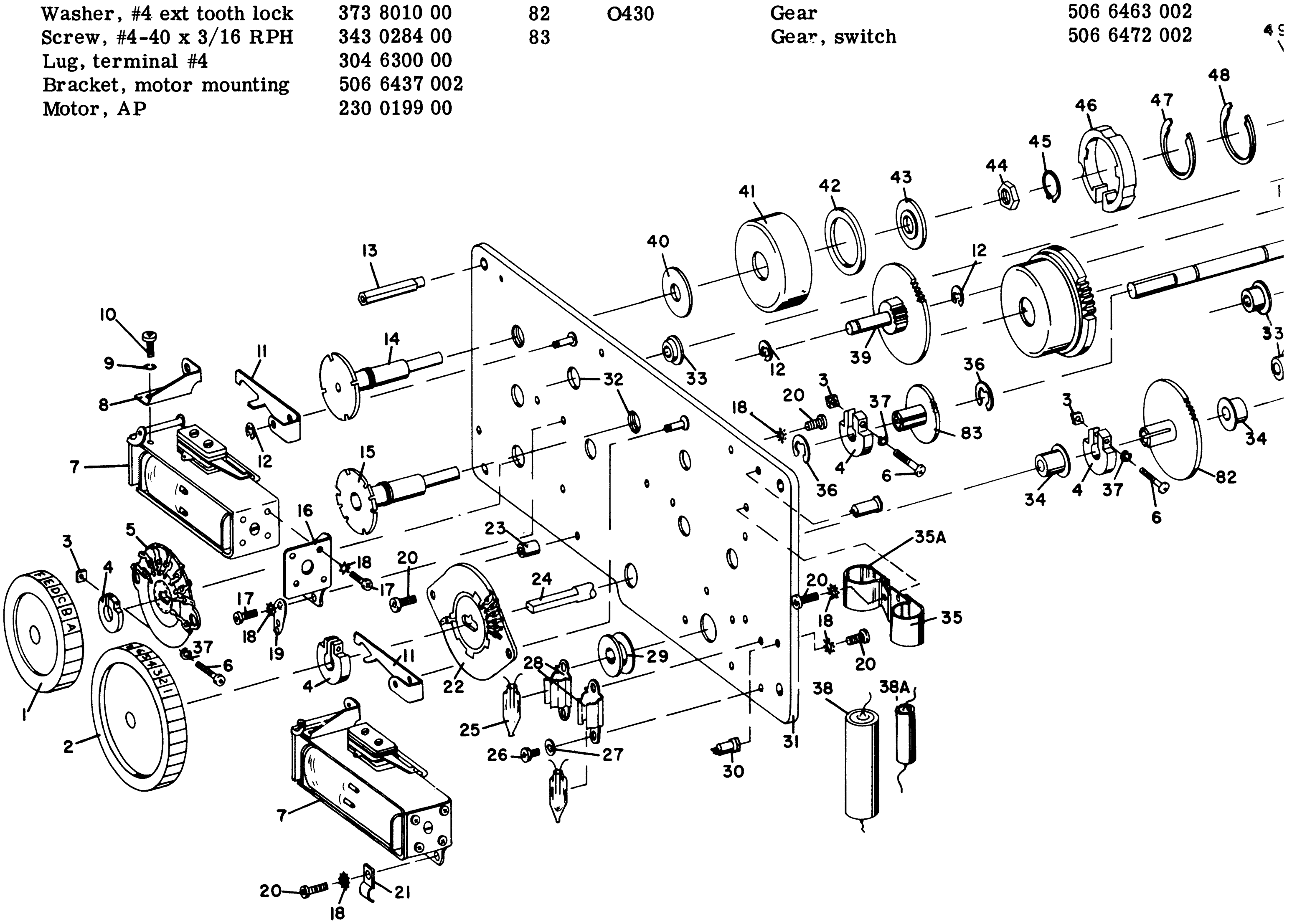


Figure 6-6. Transceiver 618S-1, R-F Crystal Oscillator, Exploded View

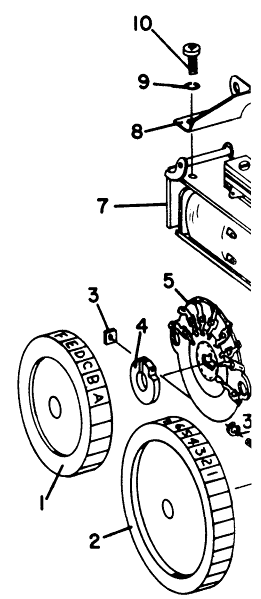
OL	DESCRIPTION	PART NUMBER
	Pin, roll	311 0418 00
	Gear	506 6445 002
	Gear	506 6444 002
	Gear	506 6466 002
	Gear	506 6457 002
	Gear	506 6455 002
	Gear	506 6450 002
	Post, gear plate	506 6439 002
	Plate, gear	506 6492 00
	Bracket, fastener	506 6442 002
	Socket, crystal	506 6481 003
	Screw, #4-40 x 5/8 RPH	343 0290 00
	Bracket, socket	506 6436 002
	Washer, #4	506 5902 003
	Nut, #4-40 hex	313 0051 00
	Washer, #4 ext tooth lock	373 8010 00
	Screw, #4-40 x 3/16 RPH	343 0284 00
	Lug, terminal #4	304 6300 00
	Bracket, motor mounting	506 6437 002
	Motor, AP	230 0199 00

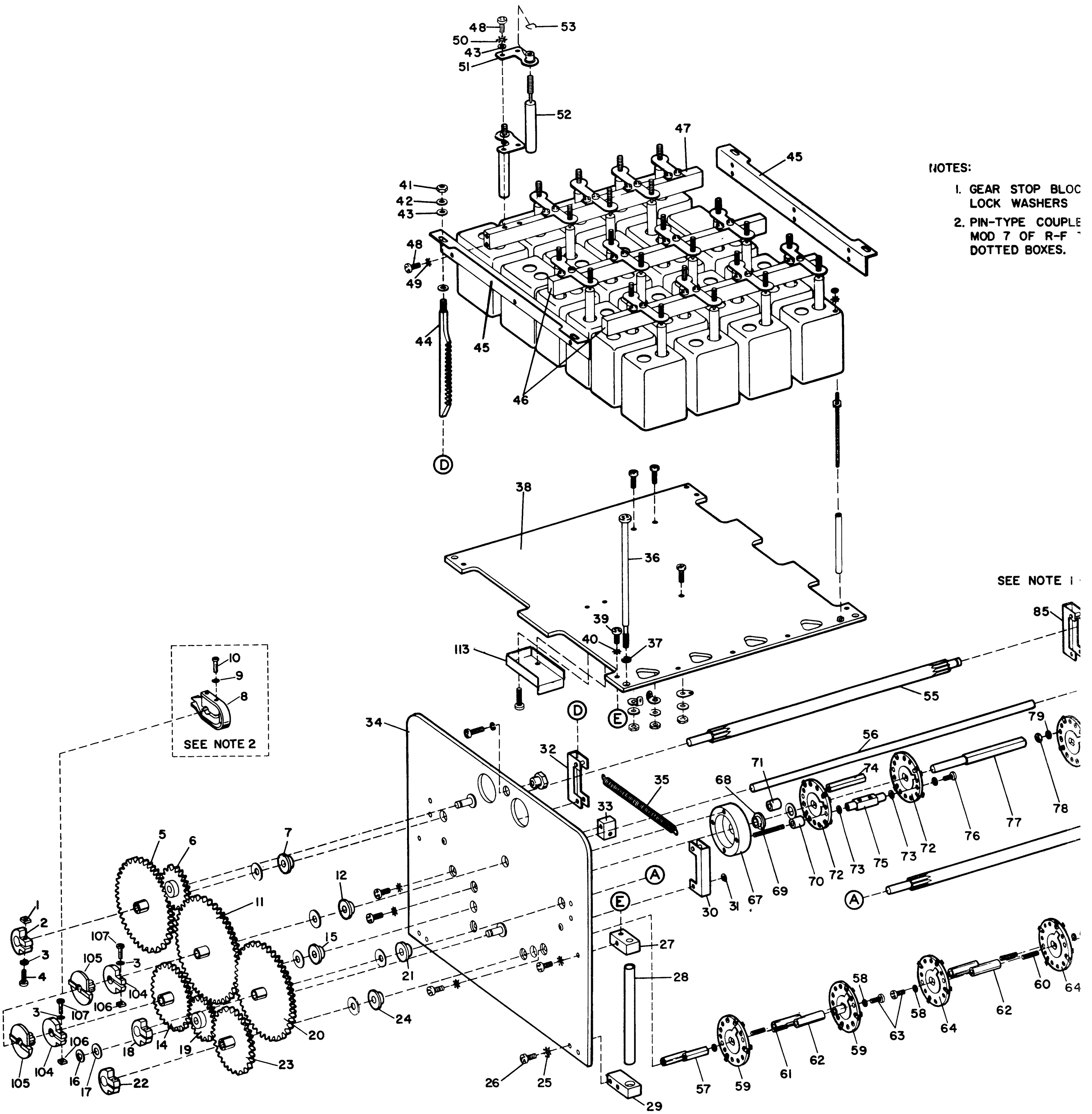
ITEM NO.	SYMBOL NO.	DESCRIPTION	PART NUMBER
70	S404, 6, 8, 10, 12, 14	Switch, crystal	269 1619 00
70A	S405, 7, 9, 11, 13, 15	Switch, crystal	269 1618 00
71		Spacer	506 6421 002
72		Spacer	506 6422 002
73		Stud, switch	506 6424 002
74	p/o A402	Post, supporting	506 6440 002
75		Nut, #5-40 spcl.	334 0251 00
76		Post, supporting	506 6441 002
77		Plate, switch mtg	506 6418 002
78		Shaft, bank switch	506 6434 002
79		Spacer	506 6419 002
80	S403	Switch, rotary wafer	269 1615 00
81		Screw, #4-40 x 3/16 RPH	343 0284 00
82	O430	Gear	506 6463 002
83		Gear, switch	506 6472 002



ITEM NO.	SYMBOL NO.	DESCRIPTION	PART NUMBER
1	I402	Drum, bank indicator	506 6483 003
2	I401	Drum, crystal indicator	506 6482 003
3		Nut, #4-40 square	334 0485 00
4		Clamp	504 7537 002
5	S402	Switch, bank	269 1614 00
6		Screw, #4-40 x 1/2 SH	324 0300 00
7	K401, K402	Relay, armature	410 0075 00
8		Bracket, relay	504 5729 002
9		Screw, #4-40 x 1/4 RFH	347 0090 00
10		Washer, #4 spring lock	310 3340 00
11	O401	Pawl	503 5070 002
12		Ring, retaining	340 0090 00
13		Post, mounting	506 6435 002
14		Shaft, AP	506 6449 002
15		Shaft, AP	506 6446 002
16		Bracket, relay	506 7129 002
17		Screw, #4-40 x 3/16 RBH	343 0284 00
18		Washer, #4 ext tooth lock	373 8010 00
19		Lug, terminal	304 3110 00
20		Screw, #4-40 x 1/4 RBH	343 0285 00
21		Clamp, cable	139 0264 00
22	S401	Switch, crystal	269 1617 00
23		Spacer, #4	506 6419 002
24		Shaft, crystal switch	506 6433 002
25	E401, E402	Bulb, neon	262 0025 00
26		Screw, #2-56 x 3/16 RPH	343 0298 00
27		Washer, #2 int tooth lock	373 8500 00
28		Clip, mounting	139 0369 00
29		Grommet	201 0075 00
29A		Grommet	201 0020 00
30		Terminal, insulated	306 0091 00
31	A401	Plate, AP	506 6501 004
32	O402-3	Bearing, Oilite	309 0121 00
33	O404-O415	Bearing, Oilite	309 0125 00
34	O416-O421	Bearing, Oilite	309 0124 00
35A		Clamp, capacitor	540 5845 002
35B		Clamp, capacitor	507 6860 00
36		Ring, retaining	340 0091 00
37		Washer, #4 spring lock	310 3340 00
38A	C408	Capacitor	931 0410 00
38B	C409	Capacitor	184 7022 00
39	O422	Gear	506 6468 002
40		Flange	503 9725 002
41		Drum, clutch	502 1132 002
42		Spacer, clutch	502 1164 002
43		Flange, clutch	503 4920 002
44		Nut, #5/16-32 hex	334 0264 00
45		Ring, retaining	340 0025 00
46		Clutch	502 1825 00
47		Spring, light, clutch	502 7029 002
48		Spring, medium, clutch	502 7030 002
49	O423	Gear, clutch	504 7200 002
50		Washer, flat	500 1098 003

ITEM NO.	SYMBOL NO.	DESCRIPT
51		Pin, roll
52	O424	Gear
52A	O425	Gear
53	O426	Gear
54	O427	Gear
55	O428	Gear
56	O429	Gear
57		Post, gear plate
58	A402	Plate, gear
59		Bracket, fasten
60	XY401	Socket, crystal
61		Screw, #4-40 x
62		Bracket, socket
63		Washer, #4
64		Nut, #4-40 hex
65		Washer, #4 ext
66		Screw, #4-40 x
67		Lug, terminal #
68		Bracket, motor
69	B401	Motor, AP

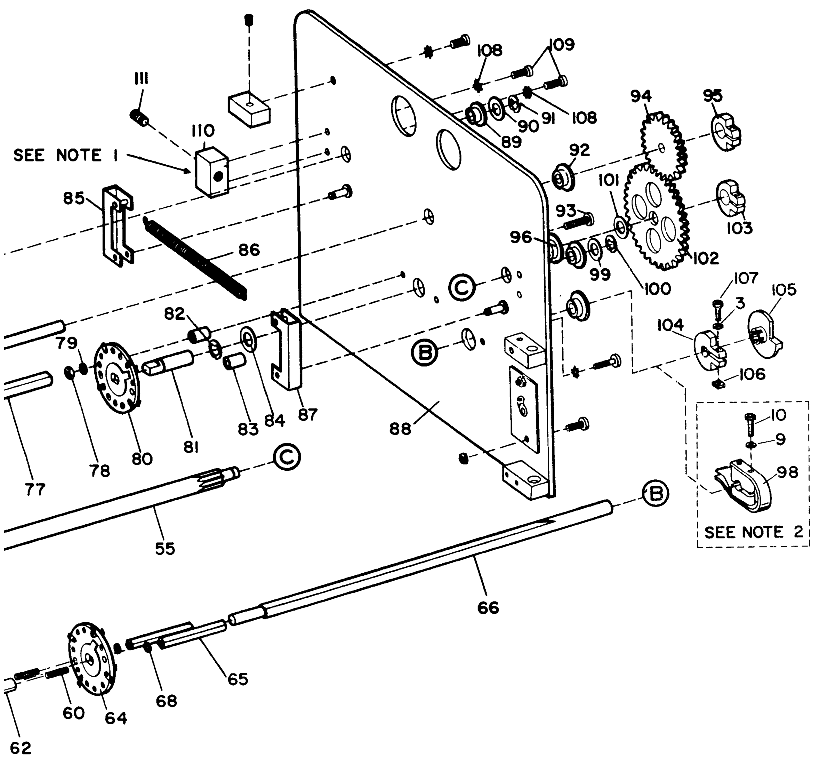




A29-240-5

Figure 6-7. Transceiver 618S-1, R-F Tuner, Exploded View

ıR STOP BLOCKS, SET SCREWS, MACHINE SCREWS AND
:K WASHERS ADDED; MOD 5 OF R-F TUNER.
-TYPE COUPLERS REPLACED BY OLDHAM COUPLERS ;
) 7 OF R-F TUNER. OLD PARTS ILLUSTRATED IN
TTED BOXES.



ITEM NO.	SYMBOL NO.	DESCRIPTION	PA NUM
1	p/o O1027	Nut, #4-40 square	334 04
2	p/o O1027	Clamp	504 75
3	p/o O1027	Washer, #4 spring lock	310 33
4	p/o O1027	Screw, #4-40 x 1/2 SHC	324 03
5	O1019	Gear	506 69
6	O1023	Gear	506 69
7	O1001	Bearing	309 55
8	p/o O1032	Coupling, spring loaded	506 69
9	p/o O1032	Washer, #4 spring lock	310 33
10	p/o O1032	Screw, #4-40 x 1/2 SHC	324 03
11	O1018	Gear	506 69
12	O1002	Bearing	309 55
14	O1021	Gear	506 69
15	O1004	Bearing	309 55
16		Ring, retaining	340 0C
17		Washer	506 59
18	O1028	Clamp	504 75
19	O1024	Gear	506 69
20	O1020	Gear	506 69
21	O1003	Bearing	309 55
22	O1029	Clamp	504 75
23	O1022	Gear	506 69
24	O1005	Bearing	309 55
25		Washer, #4 ext tooth lock	373 80
26		Screw, #4-40 x 3/8 RBH	343 02
27		Block, mounting	506 69
28		Tube	506 69
29		Block, mounting	506 69
30	O1040	Carriage, linear gear	506 69
31		Ring, retaining	340 0C
32	O1039	Carriage, linear gear	506 69
33		Block, mounting	506 69
34	A1002	Plate, front	506 69
35	O1047	Spring, extension	506 69
36	H1001	Screw, #8-32 x 3.046 captive	506 6(
37		Washer, #8 spring lock	310 0(
38	A1001	Plate, coil, tuner	506 6(
39		Screw, #4-40 x 5/16 RBH	343 0
40		Washer, #4 ext tooth lock	373 8
41		Nut, #4-40 nylon lock	333 0
42		Washer, tension	506 6
43		Washer, 0.116 ID	506 5
44	O1035-8	Gear, linear	506 7
45		Bracket-angle, rack	506 6
46		Bar-rack, 4 coil	506 6
47		Bar-rack, 5 coil	506 6
48		Screw, #4-40 x 5/16 RBH	343 0
49		Washer, #4 spring lock	310 0
50		Washer, #4 spring lock	310 3
51		Tab, core adjusting	506 6
52		Core	506 6
53		Spring, locking	502 6
54		Screw, #4-40 x 7/16 RBH	343 0
55	O1012-3	Shaft, rack drive	506 6
56	O1015	Shaft, switch	506 6
57		Post, spacing	500 6
58		Washer, plastic	302 0
59	S1003-4	Switch, rotary wafer	269 1

DESCRIPTION	PART NUMBER	ITEM NO.	SYMBOL NO.	DESCRIPTION	PART NUMBER
Nut, #4-40 square	334 0485 00	60		Stud, #4-40 x 3/4	312 0067 00
Clamp	504 7537 002	61		Collar	506 6966 002
Washer, #4 spring lock	310 3340 00	62		Post, ceramic	190 1105 00
Screw, #4-40 x 1/2 SHC	324 0300 00	63		Screw, #4-40 x 1/2 RFH	347 0094 00
Gear	506 6958 002	64	S1005-6	Switch, rotary wafer	269 1623 00
Gear	506 6963 002	65		Post, spacing	500 6225 001
Bearing	309 5540 00	66		Shaft, switch	506 6953 002
Coupling, spring loaded	506 6928 002	67	A1006	Block, bearing	506 6964 002
Washer, #4 spring lock	310 3340 00	68	O1006	Bearing	309 5540 00
Screw, #4-40 x 1/2 SHC	324 0300 00	69		Stud, #4-40 x 1	312 0069 00
Gear	506 6957 002	70		Collar	506 6967 002
Bearing	309 5540 00	71		Washer, 0.192 ID	506 5910 003
Gear	506 6960 002	72	S1001-2	Switch, rotary wafer	269 1623 00
Bearing	309 5540 00	73		Washer, plastic	302 0262 00
Ring, retaining	340 0090 00	74		Post, spacing	500 6224 001
Washer	506 5910 003	75		Post, support	540 1886 002
Clamp	504 7537 002	76		Screw, #4-40 x 5/16 RFH	347 0091 00
Gear	506 6963 002	77	O1017	Shaft, switch	506 6954 002
Gear	506 6958 002	78		Nut, #4-40 x 3/16 hex	313 0039 00
Bearing	309 5540 00	79		Washer, #4 ext tooth lock	373 8010 00
Clamp	504 7537 002	80	S1007	Switch, rotary wafer	269 1624 00
Gear	506 6961 002	81	O1014	Shaft, switch	506 6955 002
Bearing	309 5540 00	82		Ring, retaining	340 0091 00
Washer, #4 ext tooth lock	373 8010 00	83		Collar	506 6967 002
Screw, #4-40 x 3/8 RBH	343 0287 00	84		Washer, 0.255 ID	506 5908 003
Block, mounting	506 6938 002	85	O1041	Carriage, linear gear	506 6947 002
Tube	506 6940 002	86	O1048	Spring, extension	506 6950 002
Block, mounting	506 6937 002	87	O1042	Carriage, linear gear	506 6947 002
Carriage, linear gear	506 6947 002	88	A1003	Plate, rear	506 6979 003
Ring, retaining	340 0087 00	89	O1007	Bearing	309 5540 00
Carriage, linear gear	506 6947 002	90		Washer, 0.192 ID	506 5910 003
Block, mounting	506 6939 002	91		Ring, retaining	340 0090 00
Plate, front	506 6977 003	92	O1008	Bearing	309 5540 00
Spring, extension	506 6950 002	93		Screw, #4-40 x 5/8 RBH	343 0290 00
Screw, #8-32 x 3.046 captive	506 6087 002	94	O1026	Gear	506 6926 002
Washer, #8 spring lock	310 0072 00	95	O1031	Clamp	504 7537 002
Plate, coil, tuner	506 6069 004	96	O1010	Bearing	309 0120 00
Screw, #4-40 x 5/16 RBH	343 0286 00	97	O1009	Bearing	309 5540 00
Washer, #4 ext tooth lock	373 8010 00	98	O1034	Coupling, spring loaded	506 6928 003
Nut, #4-40 nylon lock	333 0349 00	99		Washer, 0.192 ID	506 6910 002
Washer, tension	506 6946 00	100		Ring, retaining	340 0090 00
Washer, 0.116 ID	506 5906 003	101		Washer, 0.255 ID	506 5908 003
Gear, linear	506 7023 003	102	O1025	Gear	506 6959 002
Bracket-angle, rack	506 6942 002	103	O1030	Clamp	504 7537 002
Bar-rack, 4 coil	506 6944 002	104	p/o O1034	Clamp, gear 0.312 dia	504 7537 002
Bar-rack, 5 coil	506 6943 002	105	O1034	Coupling, split hub, 1 dia,	540 7421 003
Screw, #4-40 x 5/16 RBH	343 0286 00			notched	
Washer, #4 spring lock	310 0095 00	106	p/o O1034	Nut, 3/16 square, #4-40	334 0485 00
Washer, #4 spring lock	310 3340 00	107	p/o O1034	Screw, cap, #4-40 x 1/2	324 0300 00
Tab, core adjusting	506 6925 002	108		Washers, ext #4	373 8010 00
Core	506 6926 002	109		Screw, #4-40 x 5/16	343 0286 00
Spring, locking	502 6005 002	110		Block, gear stop	540 5364 002
Screw, #4-40 x 7/16 RBH	343 0287 00	111		Setscrew, #6-40 x 1/4	335 0023 00
Shaft, rack drive	506 6951 002	112		Screw, #4-40 x 1/4	343 0285 00
Shaft, switch	506 6952 002	113		Shield, antenna coil	540 5116 002
Post, spacing	500 6222 001				
Washer, plastic	302 0262 00				
Switch, rotary wafer	269 1623 00				

CAUTION

Motor must be positioned so that there is between 0.003- to 0.005-inch backlash between the motor pinion and gear O429 (item 56). Serious damage will result to gears if this caution is not exercised.

6.4.15 REPLACEMENT OF AUTOPOSITIONER MOTOR BRUSHES.

When brushes are worn to less than one-fourth inch in length, they should be replaced with new brushes in the following manner:

a. Remove motor housing.

b. Unsolder leads to brushes.

c. Lift the spring off the brushes, and remove the brushes from the holders.

d. Replace with new brushes, and reverse the above procedure in reassembling the motor.

6.4.16 DISASSEMBLY OF R-F TUNER.

A partial exploded view of the r-f tuner is given in figure 6-7. Follow the general procedures outlined in previous paragraphs of this section in disassembling the unit. If it becomes necessary to remove the slug rack, remove the mechanical stop at the top of the plate and pull the slug rack upward. When replacing, remove the slugs, and replace them one by one. Realign the unit according to instructions in paragraph 6-6. Lubricate according to instructions in section V.

6.4.17 DISASSEMBLY OF POWER AMPLIFIER.

A partial exploded view of the power amplifier is given in figure 6-8. Follow the general procedures outlined in the previous paragraphs of this section in disassembling the unit. Realign the unit according to instructions given in paragraph 6.7. Lubricate according to instructions given in section V.

6.4.18 REPLACEMENT OF SERVOMOTOR B1501.

To replace motor B1501, remove the three screws and clamps (items 41A and 42) holding the motor in position, and remove the motor. When replacing the new motor, apply blue varnish or glyptal to the screws to insure a firm mounting for the motor.

6.4.19 DISASSEMBLY OF DYNAMOTOR D1601.

Refer to figure 6-9 for an exploded view of dynamotor D1601. Items mentioned in the procedure refer to callouts in figure 6-9. Use the following procedure to disassemble the dynamotor:

Remove or loosen screw (item 1) from input end bell (item 4). Slide end bell off dynamotor. Loosen hex nut (item 5) and lock washer (item 6), and remove fan blade (item 7) from shaft. Remove two screws, lock washers, and flat washers (items 8, 9, and 10), and slide output end bell (item 11) off dynamotor. Unscrew brush caps (items 12 through 17). Remove brushes (items 18 through 23). Remove screws and lock washers holding lugs (item 24) in place. Unsolder connections to jack board (item 24) in place. Unsolder connections to jack board (item 26) tagging wires for identification. Remove four screws (item 25), and remove jack board (item 26). Remove hex nuts and lock washers (item 28) from through bolts (item 27), and remove through bolts. Lightly tap end castings (items 29 and 30) to loosen them. Withdraw end castings (items 29 and 30) from field housing (item 31). Remove armature (item 32). Loosen six setscrews (item 33), and slide brush holders (items 34 through 39) out of end castings. It may be necessary to remove capacitors connected between brush holders before they can be removed from end castings. Remove two screws (item 40), and remove bearing inspection plate (item 43) and shim (item 47). Remove four screws and lock washers (items 41 and 42), and remove felt washer (item 49), bearing inspection plate (item 50), and shim (item 51). Remove bearings (item 45 and 46) from shaft of armature (item 32). Remove two screws (item 53), and slide field coils (item 54), from field housing (item 31).

6.4.20 DYNAMOTOR OVERHAUL PROCEDURE.

a. Disassemble the unit as indicated in paragraph 6.4.19, and discard the old bearings and brushes if excessive wear is apparent.

CAUTION

To prevent damage to armature shaft and commutator ends, use the proper tools in removing the old bearings. Armatures should never be rolled nor should they be permitted to rest on their coils or commutators. They should be handled by their shafts whenever possible.

b. Preliminary cleaning of dust and other loose dirt from the components may be done with compressed air and/or a soft brush.

c. Check all windings and commutator segments for shorts and open windings. Be sure the voltage used in these tests is not high enough to damage the insulation on the armature windings.

d. Check the armature shaft for mechanical straightness.

CAUTION

All further steps in the overhaul and build-up procedure should be done in a dust- and dirt-free area under reasonable humidity conditions.

e. Wipe the bearings with a soft, clean, lint-free cloth. Place the bearings in a clean, corrosion-resistant wire basket, and suspend the basket in a container of filtered benzene. Agitate the basket to aid the cleansing process. Use of stiff brushes and high-pressure air streams to clean the bearing and races can be detrimental.

f. Lubricate the bearings with MIL-G-3278 grease. Do not use stiff brushes or wooden or metal paddles. Wipe off excess grease.

CAUTION

Ball bearings should be lubricated as soon as possible after cleaning and inspection. Never spin a ball bearing which is not lubricated. Do not handle ball bearings with fingers. Doing so may cause corrosion. Use tweezers or gloves.

CAUTION

Do not jam bearings full of grease. Only enough grease to fill one side of the ball race is necessary.

g. Replace the bearings on the shaft using the proper tools. Be sure that excess pressure is not placed on the outer race, resulting in distortion.

h. Slight grooving of the commutators is not unusual after 1500 hours of operation. If, however, it is desired to repolish the commutators, they may be polished with grade 000 or finer sandpaper.

CAUTION

Do not use emery cloth on the commutators. The abrasive is conductive and may cause short circuits in the armature by becoming imbedded in the slots between the bars.

i. If necessary, commutators should be turned down and polished. Care should be taken to keep the cut light enough that undue strain is not placed on the bearings during the cutting process. Caution should be exercised when undercutting to prevent severing or otherwise damaging the armature wires where connections are made to the commutator segments.

j. The armature should be thoroughly tested again and inspected for shorts and open windings.

k. After thorough cleaning of all housing, end bells, etc., the unit should be reassembled. If brushes are less than one-fourth-inch long, replace.

6.5 ALIGNMENT PROCEDURES.

6.5.1 ALIGNMENT OF OSCILLATOR UNITS.

6.5.1.1 R-F CRYSTAL OSCILLATOR. Variable capacitor C401, located adjacent to tube V401, is adjusted at the factory for proper operation. Further adjustment in the field is not recommended.

6.5.1.2 250 KC OSCILLATOR. See figure 6-10.

a. Operate the equipment in the transmit condition.

b. Connect an r-f vtvm between terminal 8 of P1201 (J313) and ground.

c. Adjust L1201 and L1202 (figure 6-10) for maximum output as indicated on the voltmeter, then detune L1201 until the output is 1.75 volts. Inductors L1201 and L1202 are slug-tuned inductors both adjustable from the bottom. Two holes are placed in the main chassis to enable screw driver adjustment with the unit mounted in its normal position on the chassis.

d. XTAL TRIM capacitor C1206 is adjusted at the factory for proper operation. Further adjustment in the field is not recommended.

6.5.1.3 BFO.

a. Place the equipment in the receive condition.

b. Place OFF-PHONE-CW switch in the CW position.

c. Select a channel, and couple the output of a signal generator into the receiver input (ANT or AUX REC ANT). Adjust the signal generator for the proper frequency, depending upon the channel selected. The signal should be unmodulated.

d. Place the BFO control in approximately center position.

e. Adjust L1203 (BFO ADJ) for zero beat at the receiver output. See figure 6-10.

6.6 ALIGNMENT OF R-F TUNER.

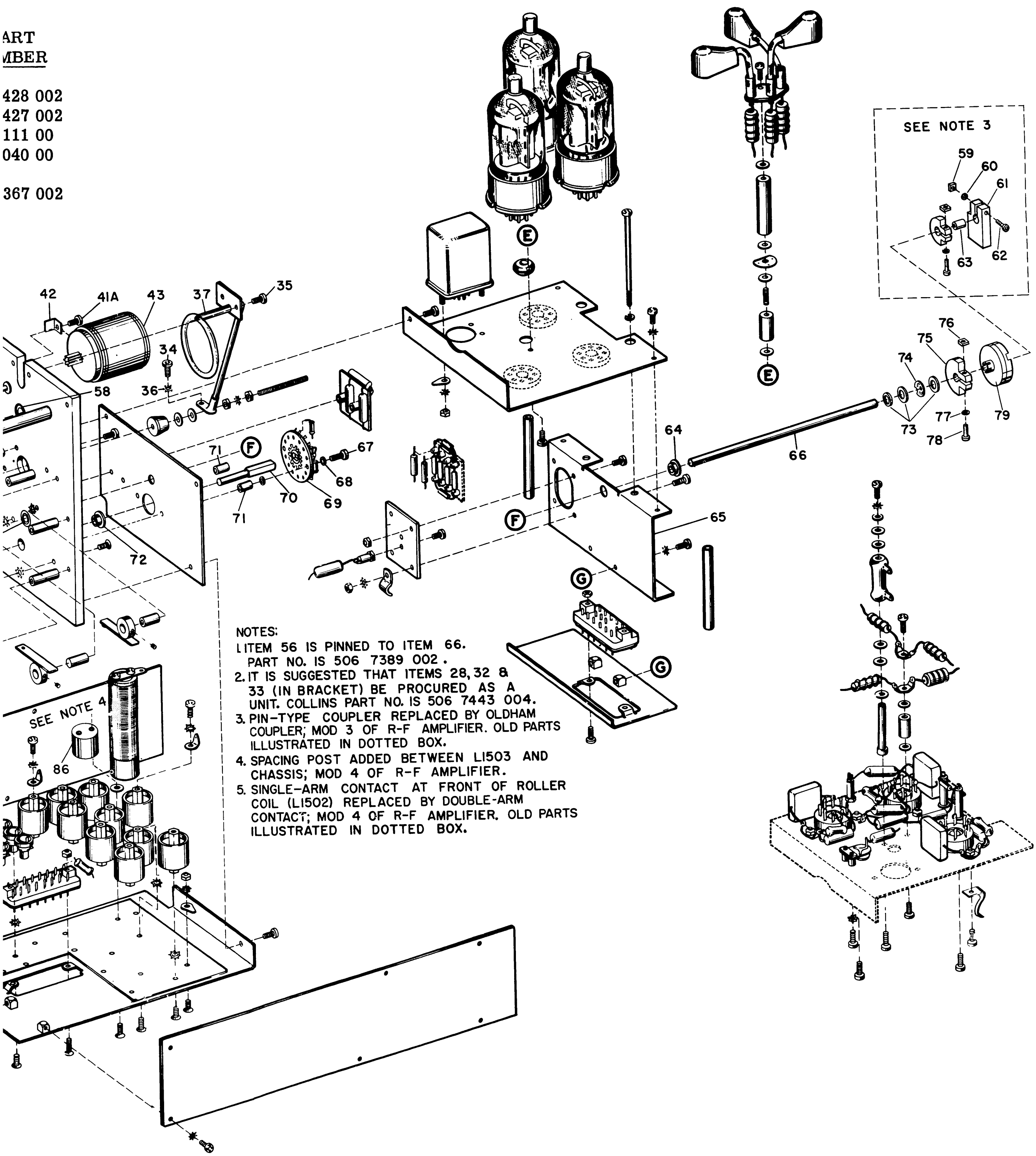
6.6.1 MECHANICAL ALIGNMENT.

Use the following procedure in aligning the r-f tuner mechanically. All symbol number references are

ART
MBER

428 002
427 002
111 00
040 00

367 002



NOTES:

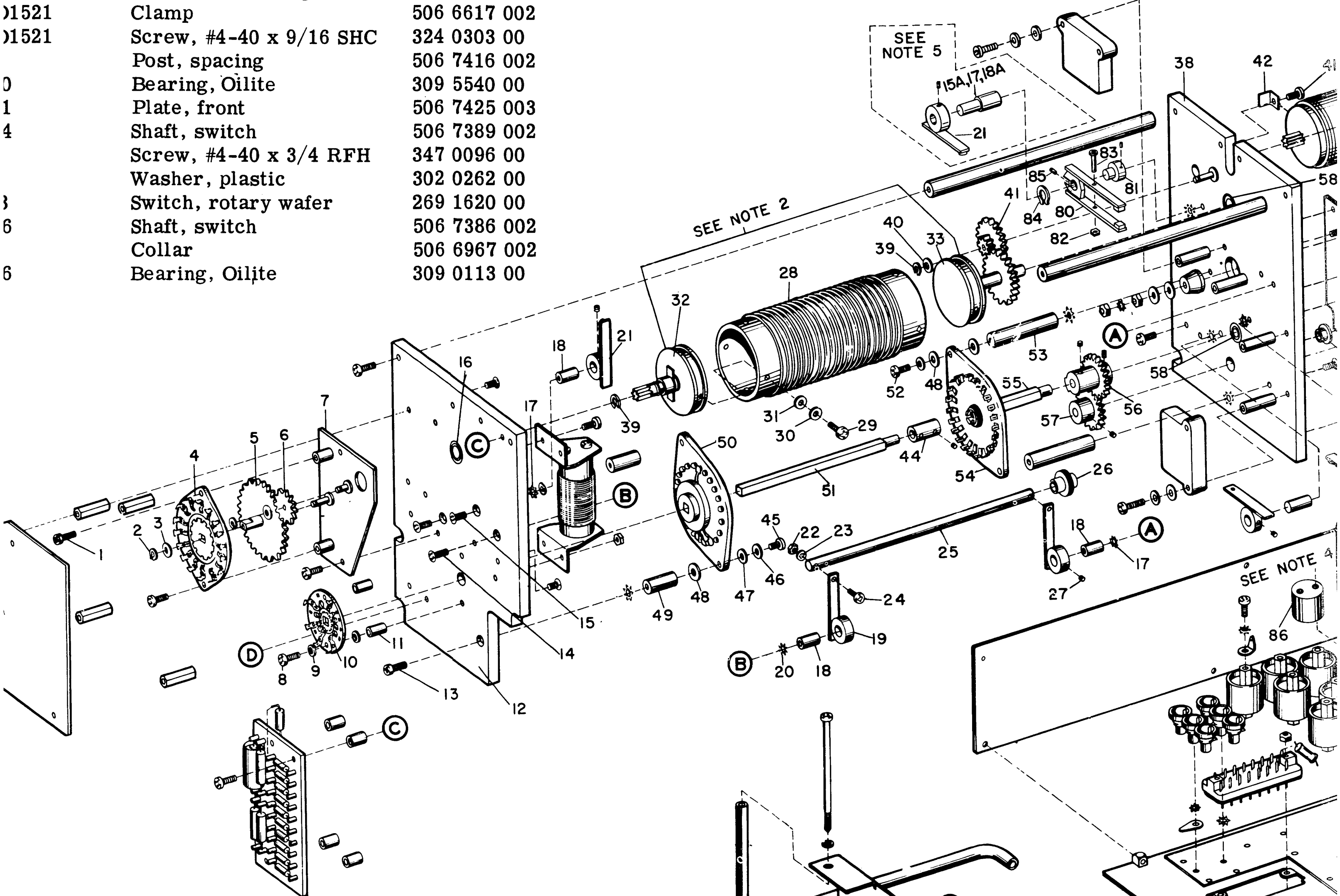
1. ITEM 56 IS PINNED TO ITEM 66. PART NO. IS 506 7389 002.
2. IT IS SUGGESTED THAT ITEMS 28, 32 & 33 (IN BRACKET) BE PROCURED AS A UNIT. COLLINS PART NO. IS 506 7443 004.
3. PIN-TYPE COUPLER REPLACED BY OLDHAM COUPLER; MOD 3 OF R-F AMPLIFIER. OLD PARTS ILLUSTRATED IN DOTTED BOX.
4. SPACING POST ADDED BETWEEN L1503 AND CHASSIS; MOD 4 OF R-F AMPLIFIER.
5. SINGLE-ARM CONTACT AT FRONT OF ROLLER COIL (L1502) REPLACED BY DOUBLE-ARM CONTACT; MOD 4 OF R-F AMPLIFIER. OLD PARTS ILLUSTRATED IN DOTTED BOX.

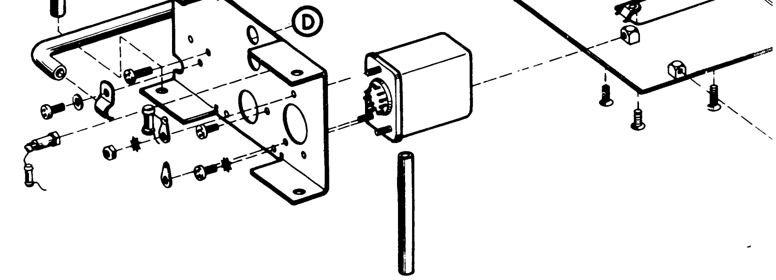
A29-230-6

Figure 6-8. Transceiver 618S-1, Power Amplifier, Exploded View

MBOL NO.	DESCRIPTION	PART NUMBER
	Post, spacing	190 0014 00
l	Switch, rotary	269 1627 00
3	Shaft, switch	506 7377 002
3	Cam, switch	506 7343 002
3	Gear	506 7344 002
4, O1515	Bearing, ball	309 0002 00
)1521	Nut, #4-40 square	334 0285 00
)1521	Washer, #4 spring lock	310 0279 00
)1521	Clamp	506 6617 002
)1521	Screw, #4-40 x 9/16 SHC	324 0303 00
	Post, spacing	506 7416 002
0	Bearing, Oilite	309 5540 00
1	Plate, front	506 7425 003
4	Shaft, switch	506 7389 002
	Screw, #4-40 x 3/4 RFH	347 0096 00
	Washer, plastic	302 0262 00
3	Switch, rotary wafer	269 1620 00
6	Shaft, switch	506 7386 002
	Collar	506 6967 002
6	Bearing, Oilite	309 0113 00
)1521	Washer, flat #10	310 0059 00
)1521	Washer, tension	310 0148 00
)1521	Clamp, graduated	540 9956 002
)1521	Nut, 3/16 square, #4-40	334 0485 00
)1521	Washer, spring lock #4	310 3340 00
)1521	Screw, cap, #4-40 x 1/2	324 0300 00
1	Coupling, split hub, riveted	540 7420 003 (SA)
4	Contact, double arm	540 7429 003 (SA)

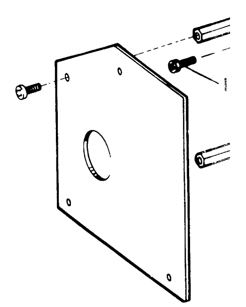
ITEM NO.	SYMBOL NO.	DESCRIPTION	PART NUMBER
81	p/o E1514	Sleeve, contact	540 7428 002
82	p/o E1514	Nut, 156 square	540 7427 002
83	p/o E1514	Screw, #2-56 x 3/4	347 0111 00
84	p/o E1514	Ring, retaining	340 0040 00
85	p/o E1514	Setscrew	
86		Post, spacing	540 5367 002





ITEM NO.	SYMBOL NO.	DESCRIPTION	PART NUMBER
1		Screw, #4-40 x 1/4 RBH	343 0825 00
2		Ring, retaining	340 0086 00
3		Washer, #4 flat	506 7367 002
4	S1505	Switch, rotary wafer	369 1621 00
5	O1519	Gear	506 7366 002
6	O1518	Gear, composite	506 7368 002
7	A1513	Plate, switch	506 7353 002
8		Screw, #4-40 x 1/2 PFH	347 0094 00
9		Washer, composition	302 0262 00
10	S1506	Switch, rotary wafer	269 1628 00
11		Collar	506 6967 00
12	A1509	Plate, rear	506 7447 005
13		Screw, #6-32 x 1/2 RBH	343 0332 00
14		Screw, #6-32 x 7/16 RFH	342 0169 00
15		Screw, #4-40 x 7/16 RFH	342 0155 00
15A		Screw, #4-40 x 1/2 RFH	342 0156 00
16	O1517	Bearing, ball	309 0002 00
17		Washer, #4 ext tooth lock	373 8010 00
18		Post, supporting	506 7359 002
18A		Post, supporting	506 7415 002
19	O1524	Support, contact wheel	506 7383 002
20		Washer, #6 ext tooth lock	373 8020 00
21	E1512	Contact, slip ring	506 7382 002
22		Nut, #2-56 hex	313 0050 00
23		Washer, #2 ext tooth lock	373 3120 00
24		Screw, #2-56 x 5/16 RBH	343 0300 00
25	O1502	Shaft, contact wheel	506 7342 002
26	E1513	Wheel, contact	506 7341 002
27		Screw, #4-48 x 1/4 set	328 0005 00
28	L1502	Coil, r-f	506 7429 003
29		Screw, #4-40 x 3/8 RBH	343 0287 00
30		Washer, #4 flat	310 0054 00
31		Washer, #4 Corprene	302 0024 00
32		Hub, coil form	506 7354 002
33		Hub, coil form	506 7371 002
34		Screw, #4-40 x 5/16 RBH	343 0286 00
35		Screw, #4-40 x 5/16 RBH	343 0286 00
36		Washer, #4 ext tooth lock	373 8010 00
37	CP1501	Loop, discriminator	506 7391 002
38	A1506	Plate, front	506 7446 004
39		Ring, retaining	340 0087 00
40		Washer, 0.312 flat	506 7402 002
41	O1512	Gear, composite	506 7398 002
41A		Screw, #4-40 x 1/2 RBH	343 0289 00
42		Clamp, long	505 5213 001
43	B1501	Motor, Servomotor	230 0129 00
44	O1525	Coupler, rigid	506 4382 002
45		Screw, #6-32 x 5/16 RBH	343 0329 00
46		Washer, #6 ext tooth lock	
47		Washer, #6 flat	310 0055 00
48		Washer, #6 composition	302 0026 00
49		Post, spacing	190 0010 00
50	S1502	Switch, rotary	269 1627 00
51	O1522	Shaft, switch	506 4381 002
52		Screw, #6-32 x 1/2 RBH	343 0332 00

ITEM NO.	SYMBOL NO.
53	
54	S1501
55	O1523
56	O1503
57	O1513
58	O1514, O1515
59	p/o O1521
60	p/o O1521
61	p/o O1521
62	p/o O1521
63	
64	O1520
65	A1501
66	O1504
67	
68	
69	S1503
70	O1526
71	
72	O1516
73	p/o O1521
74	p/o O1521
75	p/o O1521
76	p/o O1521
77	p/o O1521
78	p/o O1521
79	O1521
80	E1514



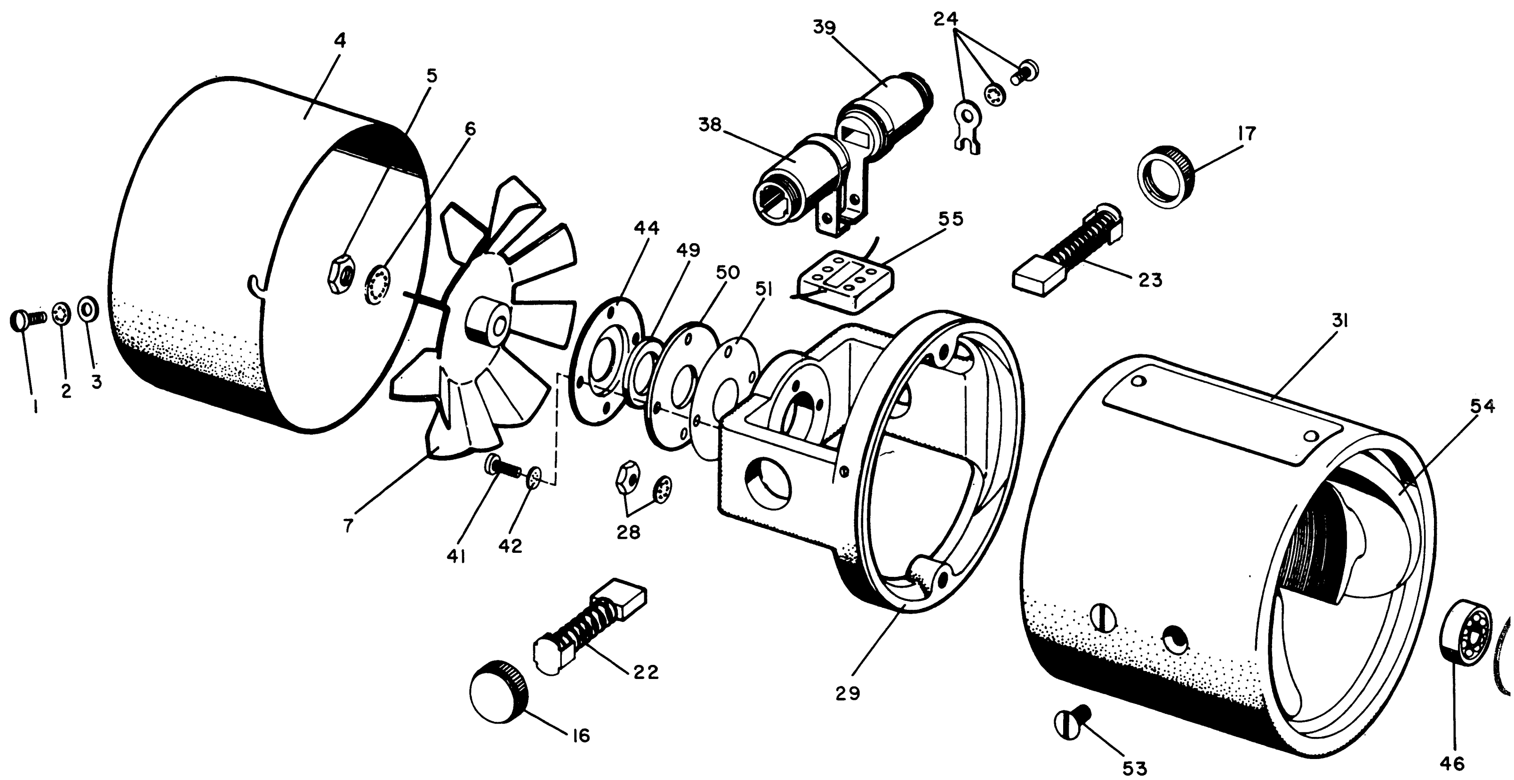


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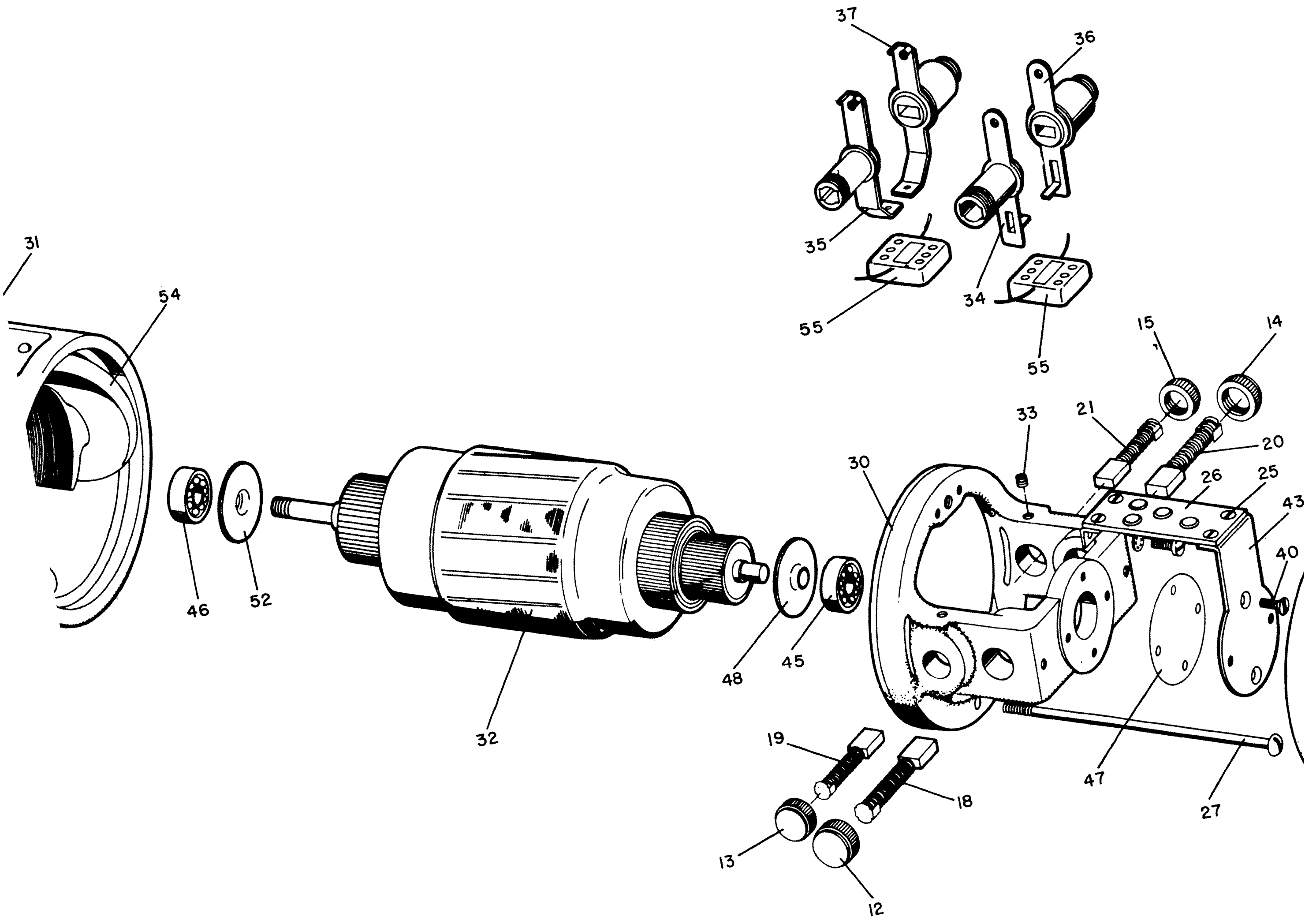
Figure 6-9. Power Supply 416D-1, Dynamotor D1601, Exploded View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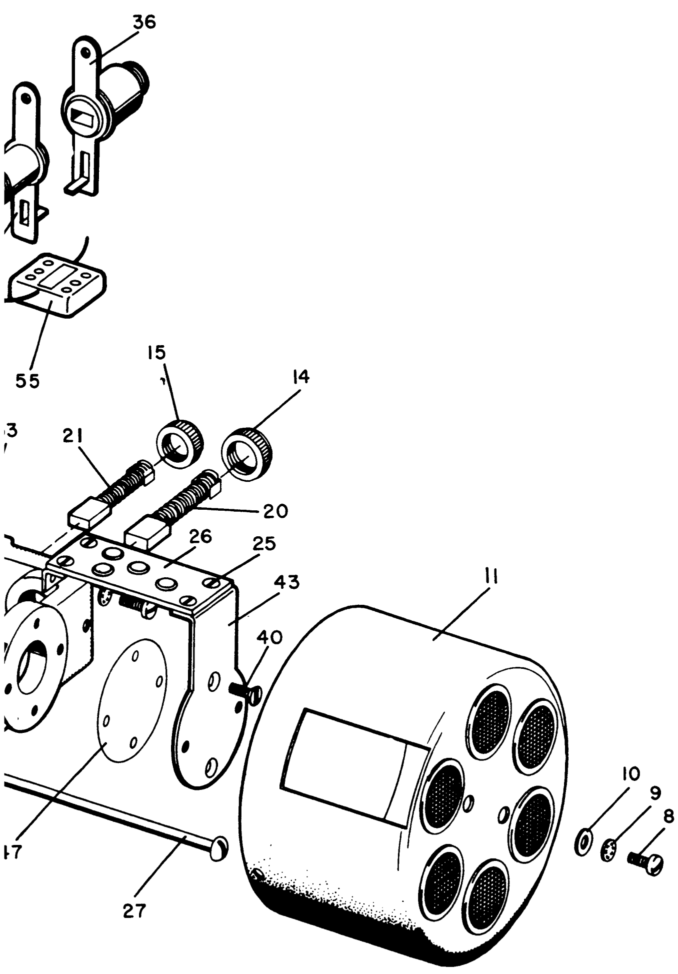

ITEM NO.	ITEM	PART NUMBER
1	Fillister head screw	
2	Lock washer	
3	Flat washer	
4	End bell, input	
5	Hex nut	
6	Lock washer	
7	Fan blade	234 0516 00
8	Fillister head screw	
9	Lock washer	
10	Flat washer	
11	End bell, output	
12	Brush cap (-250 v)	234 4090 00
13	Brush cap (-600 v)	234 0278 00
14	Brush cap (+250 v)	234 4090 00
15	Brush cap (+600 v)	234 0278 00
16	Brush cap (+27.5 v)	234 4120 00
17	Brush cap (-27.5 v)	234 4120 00
18	250-v brush (-)	234 0094 00
19	600-v brush (-)	234 0089 00
20	250-v brush (+)	234 0093 00
21	600-v brush (+)	234 0090 00
22	27.5-v brush (+)	234 0091 00
23	27.5-v brush (-)	234 0092 00
24	Screw, lock washer, and lug	
25	Recessed flathead screw	
26	Jack board	
27	Thru bolt	
28	Lock washer and hex nut	
29	End casting, input	
30	End casting, output	
31	Field housing	
32	Armature	234 0513 00
33	Setscrew	
34	Brush holder (-250 v)	234 0106 00
35	Brush holder (-600 v)	234 0103 00
36	Brush holder (+250 v)	234 0105 00
37	Brush holder (+600 v)	234 0104 00
38	Brush holder (+27.5 v)	234 0517 00
39	Brush holder (-27.5 v)	234 0518 00
40	Recessed flathead screw	
41	Round head screw	
42	Lock washer	
43	Bearing inspection plate-support	
44	Oil retainer holder	
45	Ball bearing	234 0593 00
46	Ball bearing	234 0593 00
47	Shim washer	
48	Oil guard	234 0514 00
49	Felt oil retainer	
50	Bearing inspection plate	
51	Shim washer	234 0519 00
51	Shim washer	234 0520 00
51	Shim washer	234 0521 00
52	Oil guard	234 0514 00
53	Recessed flathead screw	
54	Field coils	
55	Capacitors (3)	234 0512 00

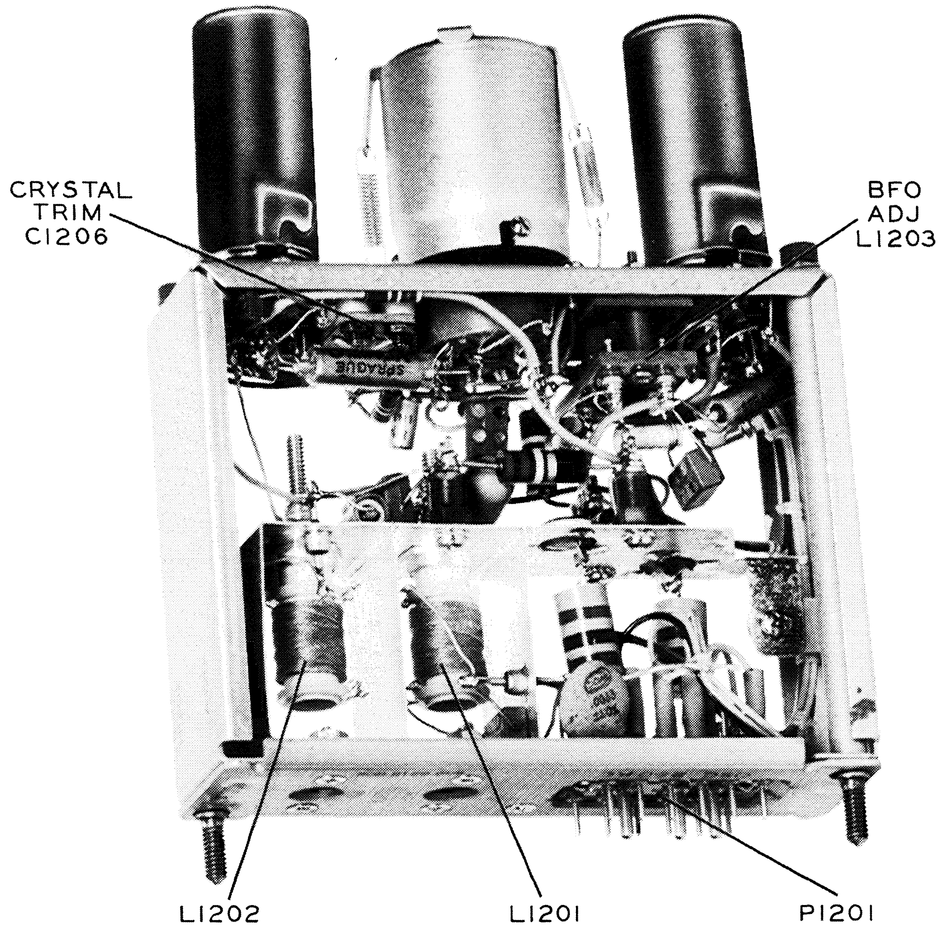

Figure 6-10. 250 Kc Crystal Oscillator and BFO, Alignment Points

given as callouts in figure 6-11. The tuner unit is aligned mechanically with the unit removed from the transceiver.

NOTE

When either removing or replacing the r-f tuner unit, the equipment must be in the band one position. Refer to figure 6-12.

a. Place the Transceiver in the band one position. Remove the captive hold-down screws retaining the unit. The captive hold-down screw heads are painted red. Lift the tuner unit straight up, and place on test bench.

b. If pin-type couplers are in use, insert a 0.125/0.130-inch diameter test pin in the forks of spring-loaded couplers O1032, O1033, and O1034.

c. Position the couplers as indicated in figure 6-12. The tuning rack should be in its bottom position. The center line of keyway on the Oldham couplers and each test pin and its associated shaft should be in line, perpendicular ±1 degree to the plane of the r-f tuner bottom.

NOTE

The tuning rack is in its bottom position when the bottom side of the tuning rack is 1.375 (1-3/8) inch from the top side of the coil plate. The gauge block may be used to measure this distance. Refer to figure 6-13 for positioning of the gauge block.

d. All switch rotors should align in the positions indicated in figure 6-12.

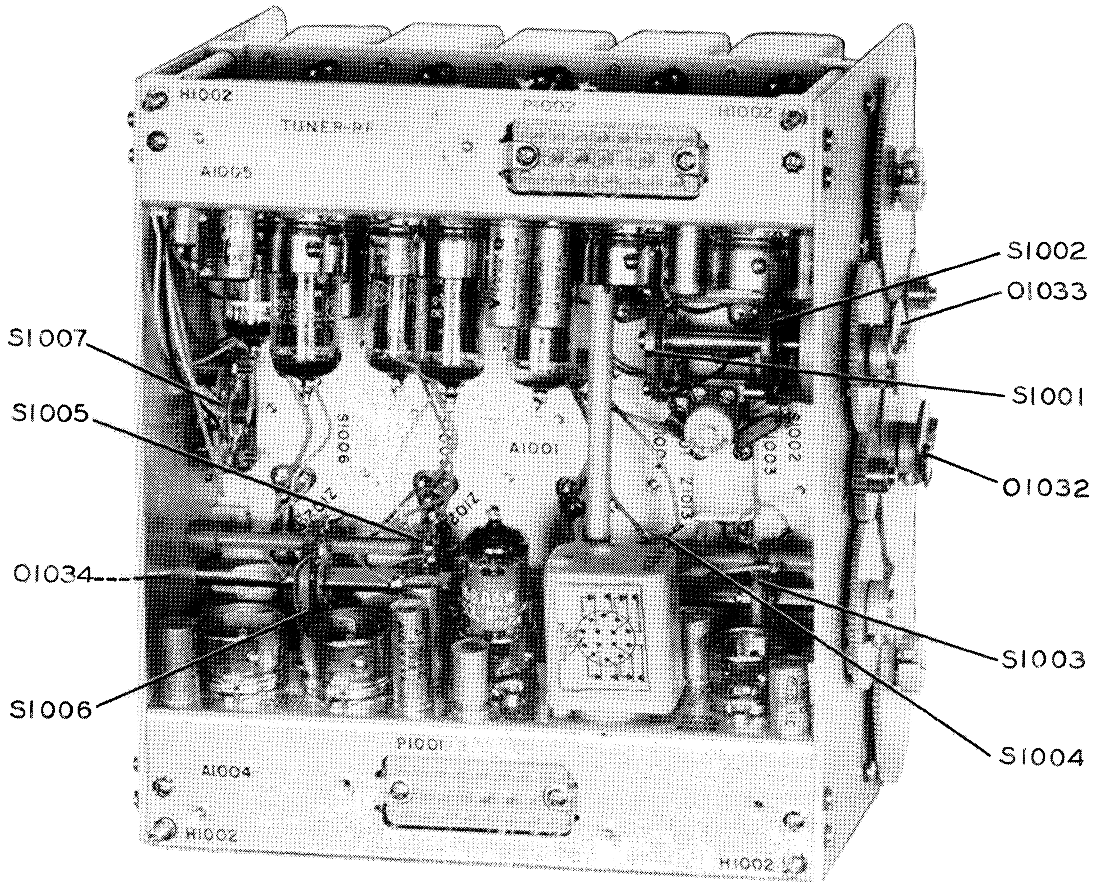

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Figure 6-11. R-F Tuner, Mechanical Alignment Points

e. If either the tuning rack or one or more of the switch rotors are misaligned, rotate the coupler with respect to its shaft until the ±1-degree perpendicular is obtained. The one degree may be determined by using a right angle with the tuner resting level on the test bench.

CAUTION

This ±1-degree tolerance must be maintained if complete interchangeability between units of various equipments is to be achieved.

6.6.2 ADDITIONAL MECHANICAL ADJUSTMENTS.

Certain mechanical adjustments are necessary in addition to the coupler and switch alignment described above. These adjustments are very important and should be completed before advancing to the electrical alignment.

a. Excessive slug drag: To remedy excessive slug drag, place the tuning rack in its bottom position; then center the misaligned slug in its coil form by adjusting the slug tab. Refer to figure 6-13.

b. Tight tuning rack lock nuts: The four 4-40 lock nuts (nylon) should be tightened until the tension washers are approximately one half compressed. The linear gears must have freedom to slide in slots of the tuning rack.

c. Plane of tuning rack: The plane of the tuning rack should not differ from the plane of the plate of the coil assembly by more than 1/32 inch when measured at any two corners. If either side is off, loosen the clamp on the drive shaft gear, and adjust the rack for correct height. If any one corner is off, disengage the linear gear from the pinion gear, and move sufficiently to correct the height.

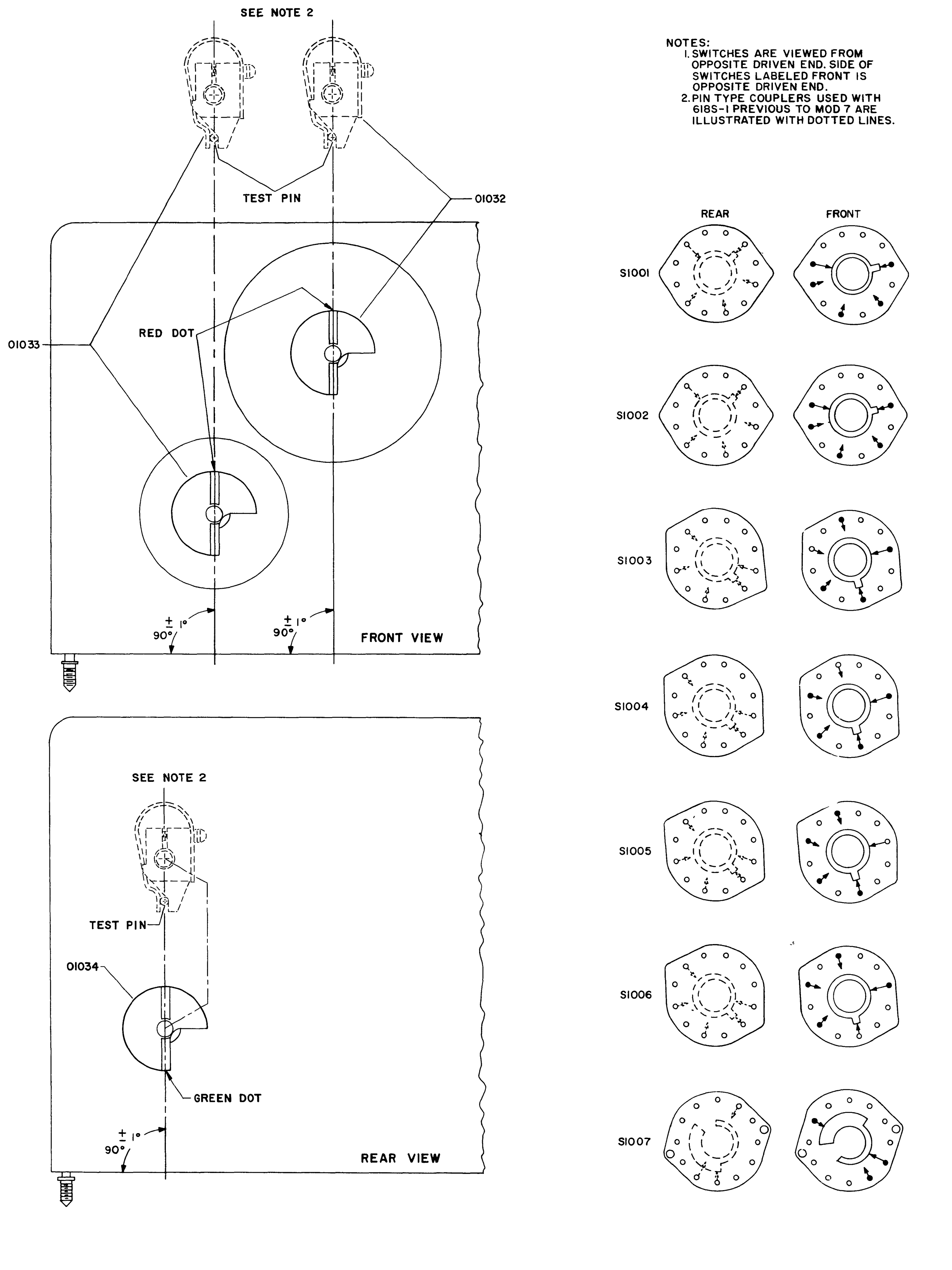

Figure 6-12. R-F Tuner, Position of Couplers and Correct Switch Alignment, Band 1

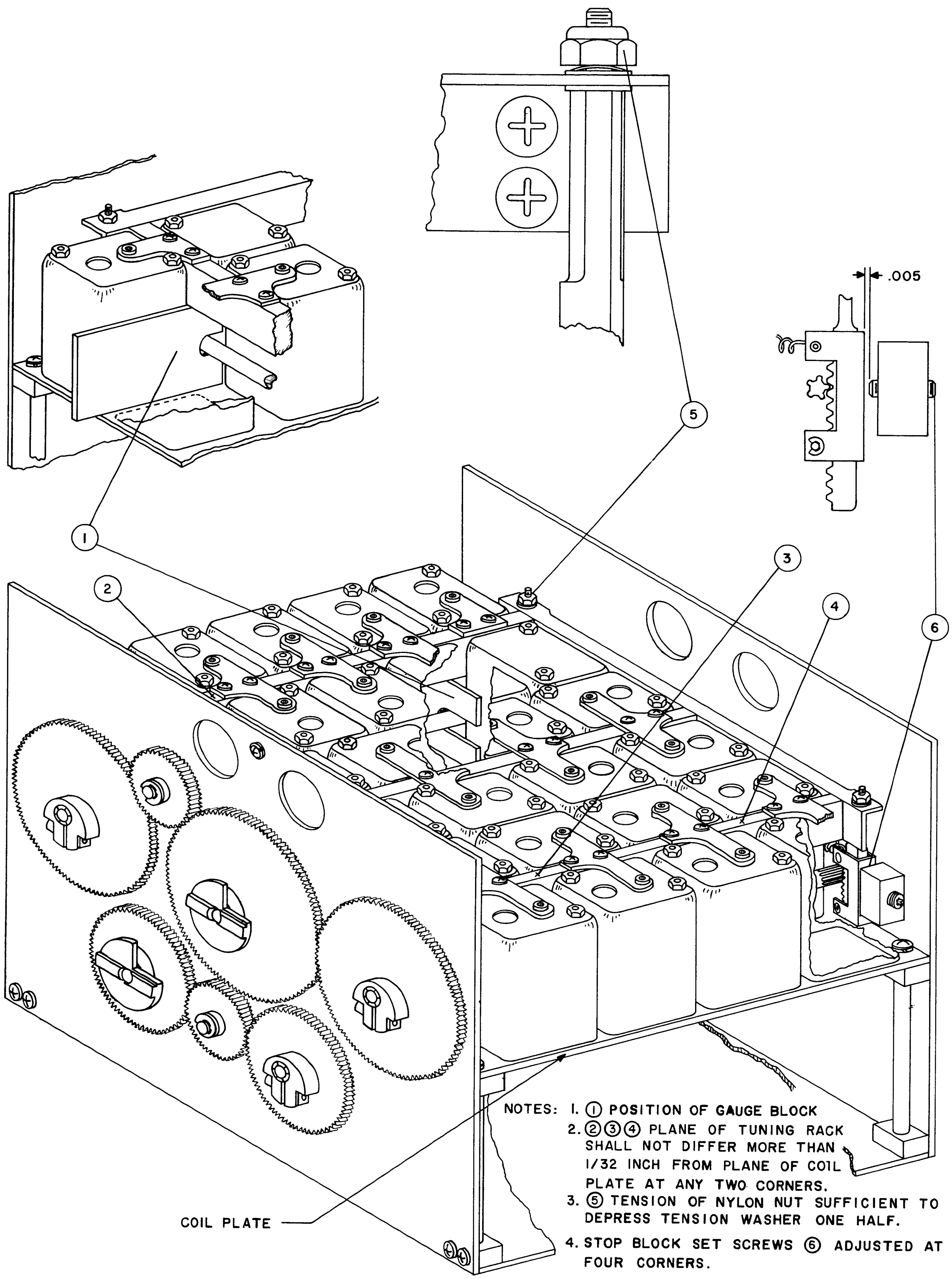

Figure 6-13. R-F Tuner, Special Alignment Points

NOTE

In order to disengage the linear gear from the pinion gear, it is first necessary to loosen the stopblock setscrew. Refer to figure 6-13 for location of these parts.

d. Adjustment of stopblock setscrews: To prevent the linear gear from slipping a tooth with respect to the pinion gear in the event of severe jarring, a stopblock with a setscrew has been placed on the tuner frame. The setscrew in the stopblock limits the distance that the linear gear carriage may move. Spacing between the setscrew and the linear gear carriage should be 0.005 inch. This 0.005-inch spacing may be accomplished by using a shim or spacer. Make this adjustment on all four corners. Refer to figure 6-13.

6.6.3 ALIGNMENT OF TUNING RACK AND DISCRIMINATOR.

a. Operate equipment to receive condition, and select the necessary channel to give 2.0-mc operation (band 1, 1.75-mc crystal).

b. Check the tuner servomotor, B102 (figure 7-2), to see that it is not hitting against an end stop.

c. Slip the gauge block into place between the coil shields as indicated in figures 6-13 and 6-14.

NOTE

If the slug rack is positioned so that the gauge block will not slip into place, turn the discriminator slug clockwise a few turns. This will raise the slug rack.

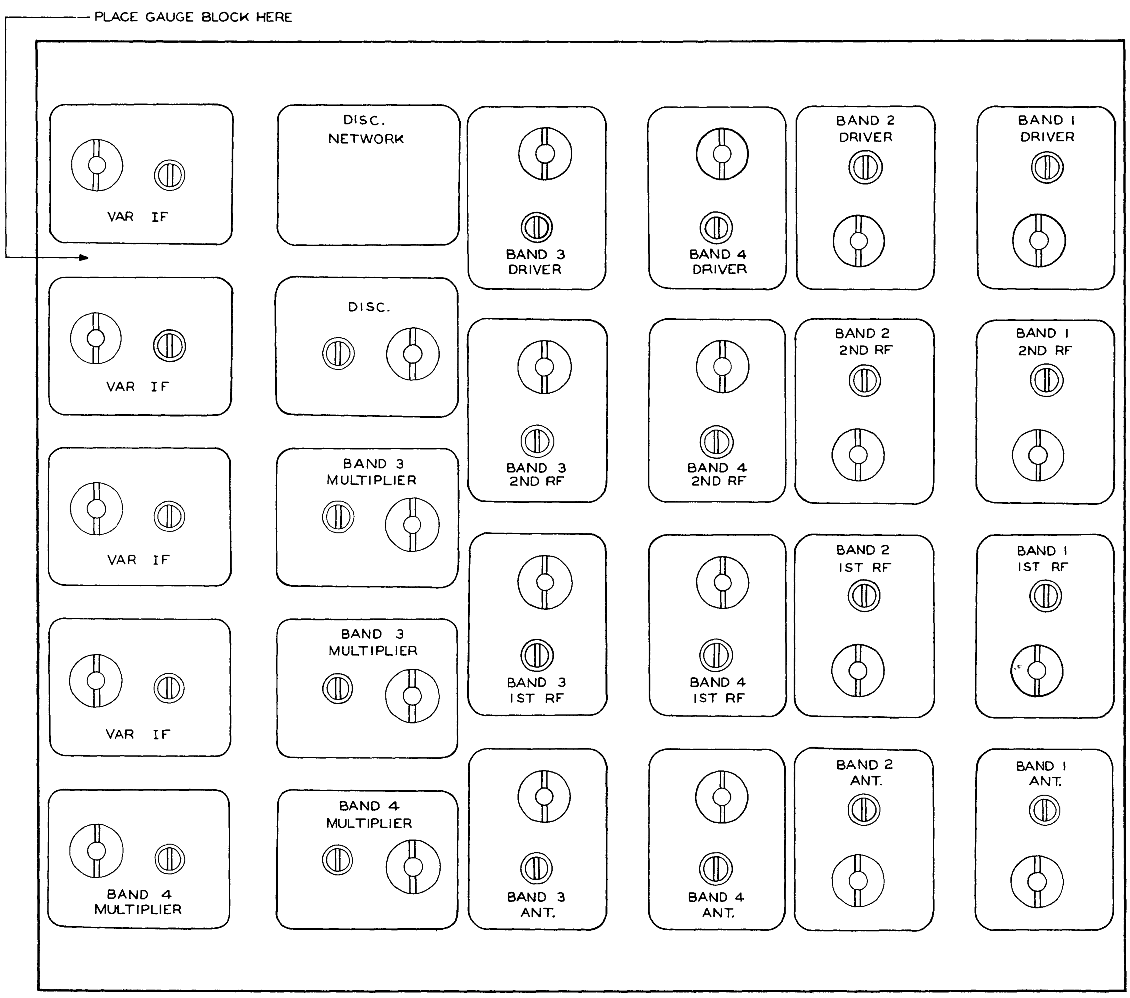

Figure 6-14. R-F Tuner, Electrical Alignment Points

d. Adjust the discriminator slug until the slug rack just touches the gauge block.

e. Clamp the dial gauge to the rear panel with the measuring shaft resting on the slug rack near the discriminator coil. Refer to figure 6-15 for positioning.

f. Zero the dial gauge.

g. Select a channel to give 3.75-mc operation (band 1, 3.5-mc crystal). Dial gauge should read 0.798 inch (798 thousandths). If not, discriminator capacitor C1002 should be adjusted to give the correct reading.

h. Check the servomotor end stop for proper operation.

i. Select the low-end crystal again, and readjust discriminator coil L1001A for zero.

j. Repeat this procedure until the end readings are 0.000 ±0.0005 inch and 0.798 ±0.0005 inch.

k. Check the linearity of the slug rack against the following crystal positions in band 1, receive position (reading in thousandths of an inch). Tolerance of ±0.004 inch.

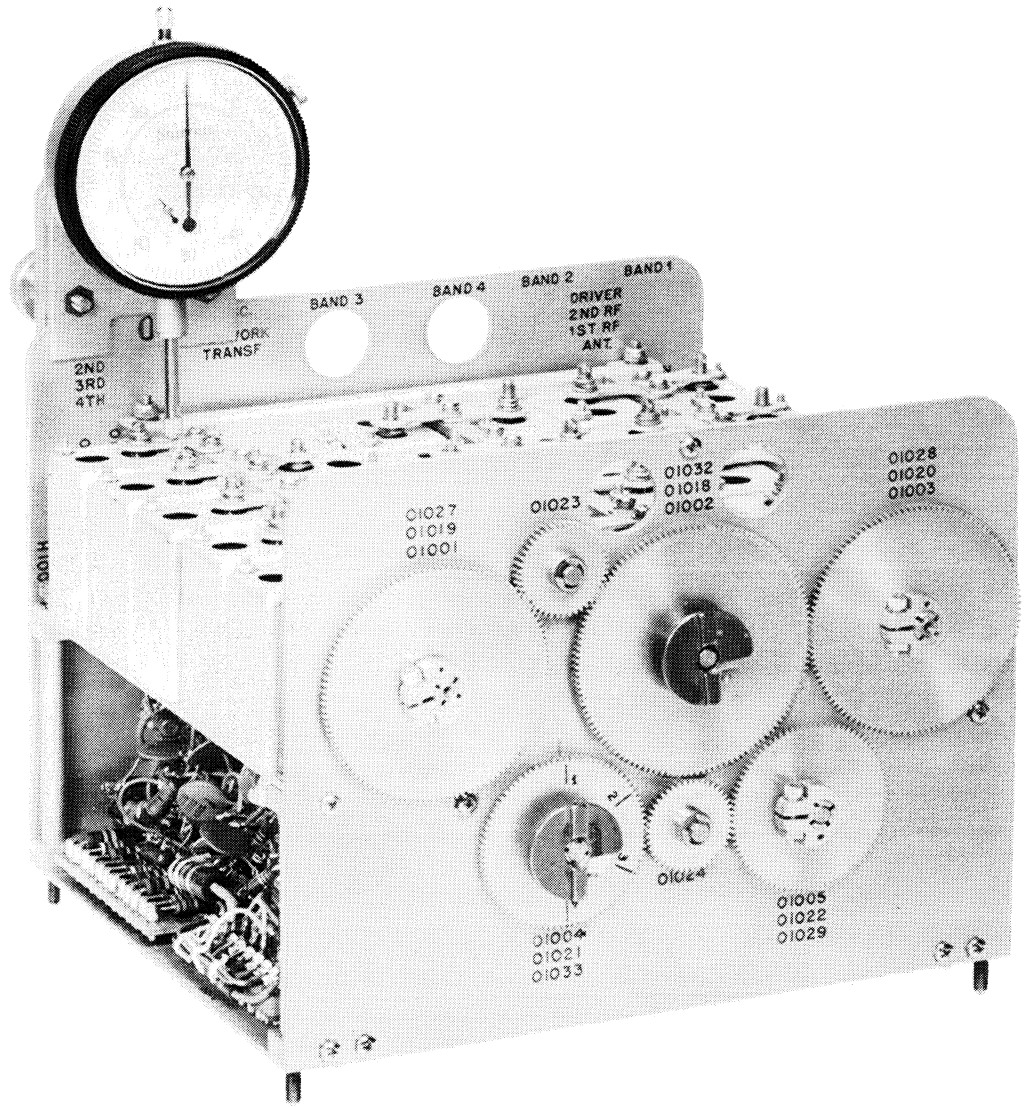

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Figure 6-15. R-F Tuner, With Alignment Gauge in Position

Crystal	Reading
1.75 mc	0
2.00	114
2.25	228
2.50	342
2.75	456
3.00	570
3.25	684
3.50	798

6.6.4 ALIGNMENT OF VARIABLE I-F STAGE.

Refer to figure 6-14 for location of the i-f coils.

NOTE

In this and following procedures, an r-f vtvm must be connected to pins of various tubes in the equipment. In order to do this, the use of a tube socket adapter is suggested. Removal of the unit and use of a test cable is not recommended. This may result in regeneration, etc. Tubes of the r-f tuner unit may be reached by removing a plate on the bottom of the chassis.

a. Connect a vtvm to pin 1 of second transmitter mixer V1003. Select a 3-volt a-c range.

b. Place the OFF-PHONE-CW switch in CW position, and select a channel to give 2.0-mc operation (band 1, 1.75-mc crystal). Key the transmitter.

c. Adjust the slugs of the four variable i-f coils for maximum output as indicated by the vtvm.

d. Select a channel to give 3.75-mc operation (band 1, 3.5-mc crystal).

e. Adjust the capacitors of the four variable i-f coils for maximum output reading on the vtvm.

f. Repeat the above procedure until further adjustment does not increase the reading of the vtvm. The meter should indicate a minimum of one volt.

NOTE

The agc voltage should hold the voltage reasonably level at pin one of the second transmitter mixer tube.

6.6.5 ALIGNMENT OF MULTIPLIER.

6.6.5.1 BAND 3 MULTIPLIER COILS.

a. Connect a vtvm to pin 7 of second transmitter mixer tube V1003. Select the 3-volt a-c range.

b. Select the channel corresponding to 7.25-mc operation (band 3, 1.75-mc crystal).

c. Equipment should be in transmit condition.

d. Adjust slugs of the two band 3 multiplier coils (see figure 6-14) for maximum reading on the vtvm.

e. Select the channel corresponding to 14.25-mc operation (band 3, 3.5-mc crystal).

f. Adjust the capacitors of both band 3 multiplier coils for a maximum reading on the vtvm.

g. Meter readings should be not less than 2.5 volts.

6.6.5.2 BAND 4 MULTIPLIER COILS.

a. Select the channel corresponding to 14.25 mc (band 4, 1.75-mc crystal).

b. Adjust the slugs of the two band 4 multiplier coils (see figure 6-14) for maximum meter reading.

c. Select the channel corresponding to 25.0-mc operation (band 4, 3.09375-mc crystal).

d. Adjust the capacitors of the band 4 multiplier coils for maximum meter reading.

e. The meter readings should be at least one volt.

NOTE

Do not attempt to use a 3.5-mc crystal for the band 4 high end frequency. The equipment is designed for operation only within the frequency range of 2.0 through 25.0 mc.

NOTE

The slug-adjusting screws should be approximately centered in the slug-holding nuts to be tuned to the correct harmonic. If possible, use an accurately calibrated wavemeter to check the tuning.

6.6.6 ALIGNMENT OF R-F AND DRIVER STAGES.

a. Connect an r-f vtvm between J1001 (P1503) and ground. Select the 150-volt a-c range.

b. Select the channel corresponding to 2.0 mc (band 1, 1.75-mc crystal).

c. Adjust the first r-f, second r-f, and driver slugs for a maximum reading on the vtvm. See figure 6-14 for location of coils.

d. Select the channel corresponding to 3.75 mc (band 1, 3.5 mc crystal), and operate the equipment in transmit position.

e. Adjust the first r-f, second r-f, and driver capacitors for maximum reading on the vtvm.

f. The meter should indicate at least 85 volts.

g. Repeat the procedure for the low and high end points of bands 2, 3, and 4 using 25.0 mc as the high end point of band 4.

h. A meter reading of at least 85 volts should be obtained on all three bands.

i. Check the output at the middle of each band.

j. Touch up adjustments with probe off by observing peak in PA grid current (front panel meter).

6.6.7 ALIGNMENT OF ANTENNA COILS.

a. Operate the equipment in receive position.

b. Connect a d-c vtvm between terminal 11 of plug P1001 (J307) and ground.

c. Connect a signal generator to the antenna input connector (J109) using a matching network if necessary to obtain the proper impedance match.

d. Select the channel corresponding to 2.0-mc operation (band 1, 1.75-mc crystal).

e. Adjust the frequency of the signal generator to 2.0 mc, and set its output level to approximately 3000 microvolts.

f. Adjust the band 1 antenna coil slug for maximum avc voltage. Refer to figure 6-14 for the location of the antenna coils.

g. Select the channel corresponding to 3.75-mc operation (band 1, 3.5-mc crystal). Set the generator frequency to 3.75 mc, and adjust its output to approximately 3000 microvolts.

h. Adjust the band antenna coil capacitor for maximum avc voltage.

i. Repeat the above procedure for the low and high end points of bands 2, 3, and 4 using 25.0 mc as the high end point on band 4.

6.6.8 SELECTION OF R1006.

a. Connect a d-c vtvm from the topside of R1006 to ground.

b. Procure values of R1006 indicated in the parts list.

c. Select a value of R1006 which will give voltage readings at corresponding frequencies stated in table 6-14.

TABLE 6-14. FREQUENCIES AND VOLTAGES FOR SELECTION OF R1006

CRYSTAL FREQUENCY	OUTPUT FREQUENCY	VOLTAGE RANGE
1.750 mc	2.000 mc	6 ±2 (4-8)
2.000 mc	2.250 mc	6 ±2 (4-8)
2.250 mc	2.500 mc	5 ±2 (3-7)
3.500 mc	3.750 mc	2 ±1 (1-3)

6.7 ALIGNMENT OF POWER AMPLIFIER.

6.7.1 MECHANICAL ALIGNMENT.

Use the following procedure in aligning the power amplifier unit mechanically. All symbol number references are given as callouts in figures 6-16, 6-17, and 6-18.

6.7.1.1 BAND-SWITCH POSITIONING.

a. The contact pressure on S1504 should be 80-120 grams. Adjust the setscrews on both switch arms for this pressure using a gram gauge or similar instrument for measurement. The long switch arm of S1504 should clear the cam gear by 1/64 inch when this switch is in the closed position.

b. Synchronize S1503 and S1504 as shown in figure 6-18 so that S1504 is open when S1503 is in the band 1 position and closed in band positions 2, 3, and 4. It may be necessary to loosen the setscrew in gear O1513. Refer to figures 6-16 and 6-18 for location of this gear.

NOTE

It may be necessary to move capacitor C1523 in order to place a Bristo wrench in the setscrews. This can be accomplished by removing the screws, nuts, and spacers used to mount C1523 and the screw and nut holding the capacitor ground lead in place. Capacitor C1523 then can be pushed aside during alignment.

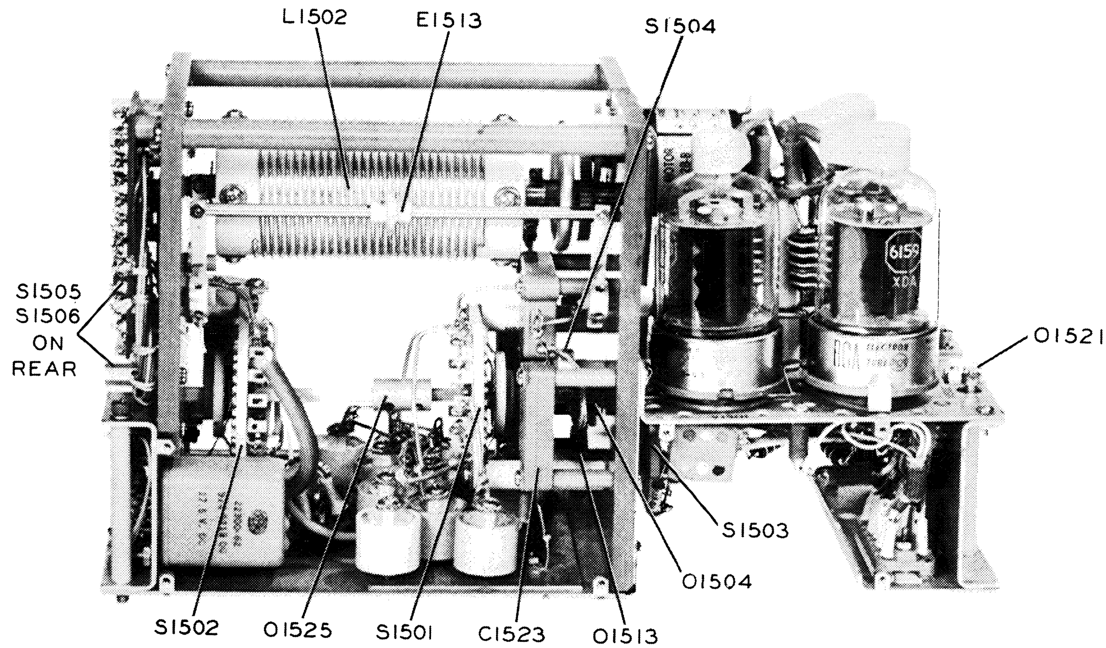

Figure 6-16. Power Amplifier, Alignment Points

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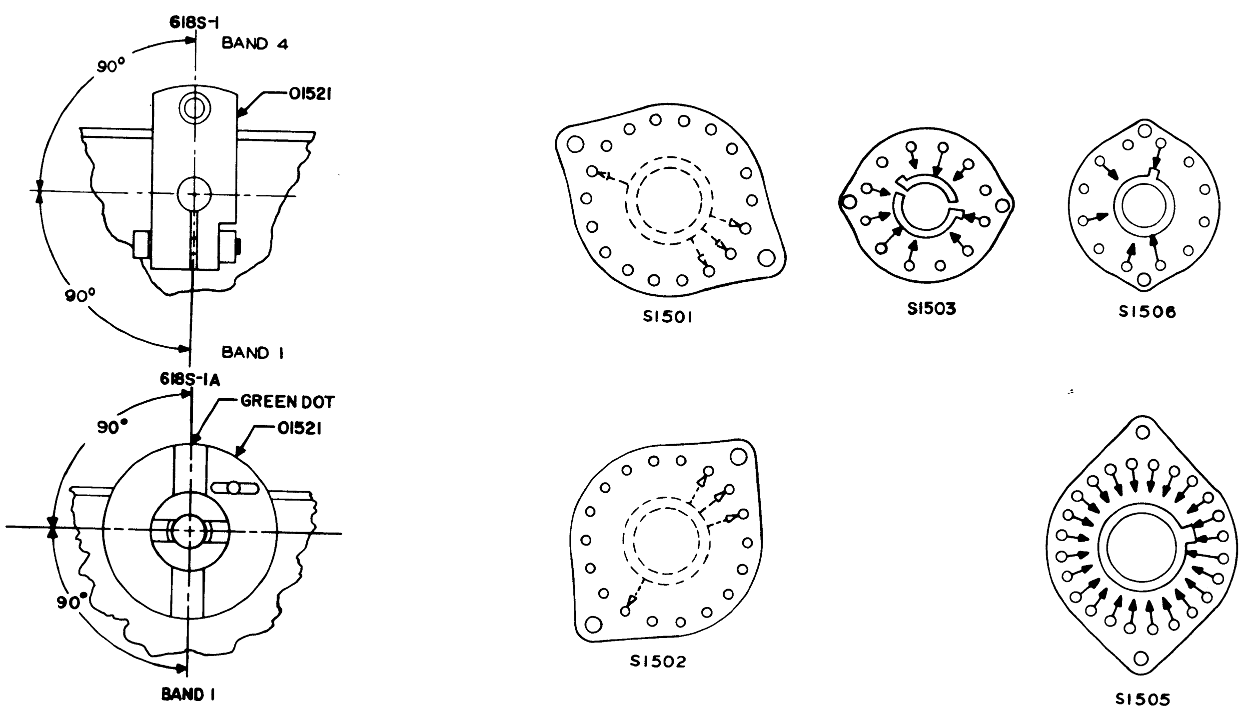

Figure 6-17. Power Amplifier, Correct Switch Alignment, Band 4

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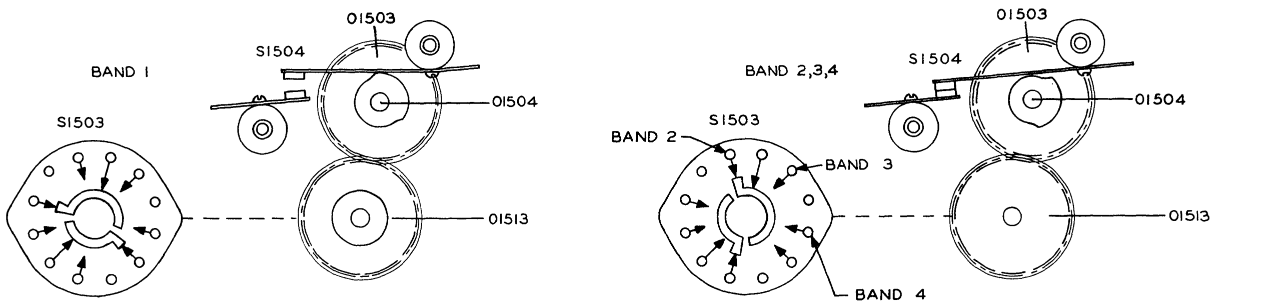


Figure 6-18. Power Amplifier, Alignment of Switch S1504

c. Set S1503 in the band 4 position. Refer to figure 6-17. Position clamp O1521 end switches S1501, S1502, and S1506 as indicated in figure 6-17. To accomplish this, it may be necessary to loosen setscrews in clamp O1521, gear O1513, and coupler O1525.

d. Tighten permanently all setscrews after this synchronization.

6.7.1.2 ROLLER COIL - SWITCH POSITIONING.

a. The contact pressure on the front and back slip rings on L1502 should be 80-120 grams. Adjust the setscrews of each contact for this pressure using a gram gauge or similar instrument for measurement. The pressure at the point of contact between the roller coil and the roller wheel should be 12-14 ounces. Adjust for this pressure with the roller wheel at each end of the coil.

b. Rotate inductor L1502 until switch S1505 is in the position shown in figure 6-17.

c. Roller E1513 should make contact with L1502 approximately one turn from the end of the inductor (end toward S1505). Adjust the position of the roller by applying pressure to the roller shaft in a direction away from the inductor and moving the roller along the shaft.

6.7.2 ELECTRICAL ALIGNMENT.

Since the power amplifier utilizes automatic tuning, no adjustments are necessary. Neutralizing capacitor C1532 is adjusted at the factory, and further adjustment in the field is not recommended.

6.7.3 SELECTION OF R1524.

Use the following procedure in choosing the value of R1524:

a. Select a channel in band 4.

b. Key the transmitter.

c. Observe the PA plate current.

d. Remove the PA chopper.

e. Rotate the roller coil (L1502) using an insulated material; observe if PA plate current can be reduced.

f. If current can be reduced more than one-fifth scale division, a new value of R1524 must be selected.

CAUTION

An insulated material must be used to rotate L1502. Do NOT use a material which will draw r-f or short out the roller coil.

Procure values of R1524 indicated in the parts list.

g. Place a value of R1524 in parallel with R1503 or R1504 as required to give a reduction in plate current of less then one-fifth-scale division.

6.8 ALIGNMENT OF 250 KC I-F AMPLIFIER.

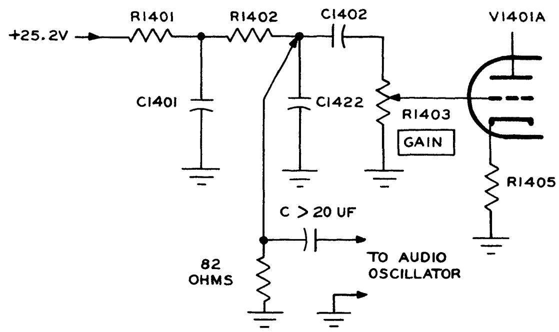
6.8.1 GENERAL.

Use the following procedure in aligning the 250 kc i-f amplifier of Transceiver 618S-1. Refer to figure 7-19 for symbol callouts.

a. Connect the output of an accurately calibrated signal generator supplying a 250-kc signal to pin 1 of the second receiver mixer, V1006, located in the r-f tuner unit.

b. Apply a 500-microvolt signal modulated 30% at 1000 cps.

c. Connect a d-c vtvm to terminal 5 of P901 (J310).



A29-465-3

Figure 6-19. Modulator, Alignment Setup

d. Adjust Z901 for a maximum reading on the vtvm.

e. Reduce the input signal to 200 microvolts, and peak Z902 for maximum audio output.

6.8.2 SELECTION OF R903.

a. Inject a 250-kc, 200-microvolt signal at pin 1 of V1006.

b. Connect a d-c vtvm from terminal 5 of J310 to ground.

c. Operate all gain controls for maximum gain.

d. Procure values of R903 indicated in the parts list.

e. Select a value of R903 which will give a reading of one volt on the vtvm.

6.9 TRANSCEIVER 618S-4, 250 KC I-F AMPLIFIER WITH SQUELCH AND SELCAL.

6.9.1 GENERAL.

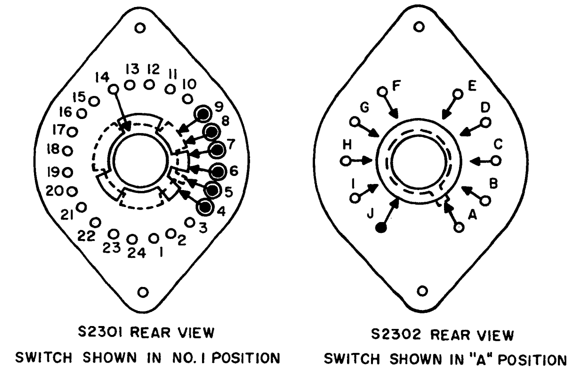
Use the following procedures for the alignment of the 250 kc i-f amplifier with squelch and selcal of Transceiver 618S-4. Refer to the symbol callouts of figures 7-22 through 7-25.

a. Connect the output of an accurately calibrated signal generator supplying a 250-kc signal to pin 1 of the second receiver mixer, V1006, located in the r-f tuner unit.

b. Apply a 500-microvolt signal modulated 30% at 1000 cps.

c. Connect a d-c vtvm to terminal 5 of P901 (J310).

d. Adjust Z901, L903, and L904 for maximum reading on the vtvm.



A29-268-2

Figure 6-20. Remote Control Unit 614D-1, Switch Alignment

e. Reduce the input signal to 200 microvolts, and peak Z902 for maximum audio output.

6.10 ALIGNMENT OF MODULATOR UNIT.

a. Connect an audio oscillator to a dummy microphone which is, in turn, connected to the microphone jack on the 618S-1 or to the remote microphone jack. Refer to table 5-1 for a description of the dummy microphone.

b. Place the OFF-PHONE-CW switch in the PHONE position.

c. Key the transmitter.

d. Monitor the r-f output with an oscilloscope.

e. Set the frequency of the audio oscillator to 1000 cps, and adjust the oscillator output to measure 0.25-volt input at the microphone jack.

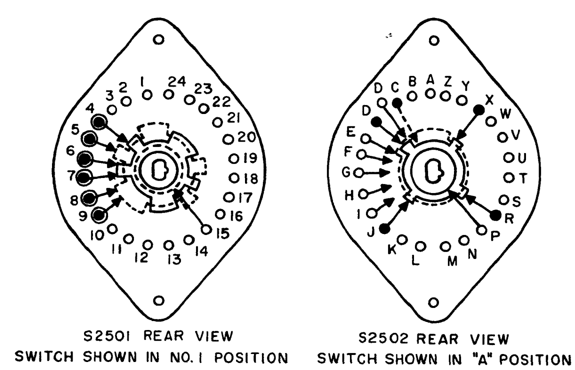


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Figure 6-21. Remote Control Unit 614D-2, Switch Alignment

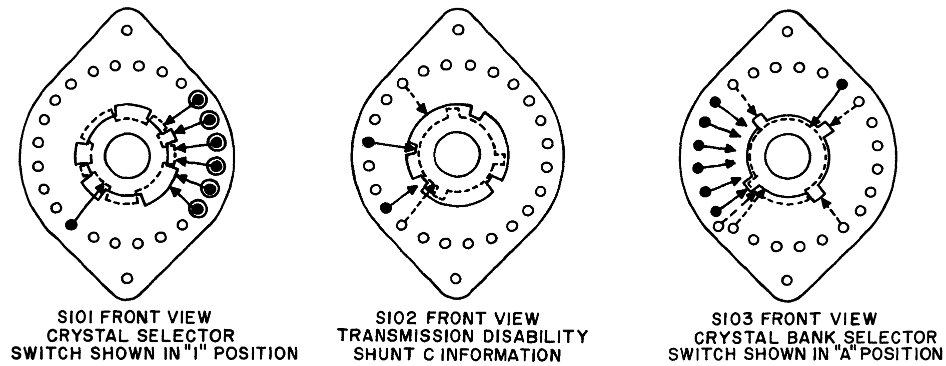


Figure 6-22. Remote Control Unit 614D-3, Switch Alignment

f. Adjust the modulator clipping control (R1404) to maximum clockwise position.

g. Adjust the modulator gain control (R1403) for 80 per cent modulation which can be determined by the oscilloscope waveform.

h. Adjust the clipping control so that the clipping threshold just occurs at this 80-per cent modulation point.

6.11 ALIGNMENT OF REMOTE CONTROL UNITS.

Alignment of the Remote Control Units involves the adjustment of switch contacts to correspond to the

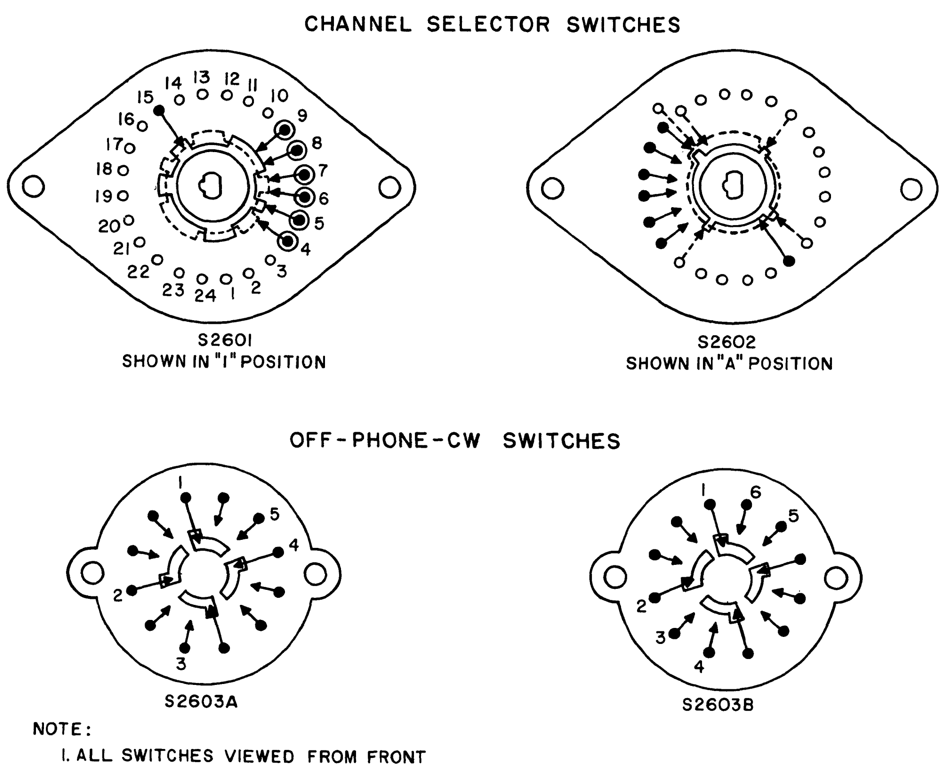


Figure 6-23. Remote Control Unit 614C-2, Switch Alignment

setting of the channel selectors. Figures 6-20 through 6-23 illustrate the switch wafers of the respective Remote Control Units in the A1 position (2.0 megacycles) as viewed from the front of the unit. Align the Remote Control Units according to the following procedure:

a. Set the Remote Control Unit in the A1 position (2.0 megacycles), and compare the switches to either figure 6-20, 6-21, 6-22, or 6-23, depending on the Remote Control Unit being aligned.

b. If the switch contacts when viewed from the front of the unit in the 2.0-megacycle position are comparable, the Remote Control Unit is aligned properly. If switches do not compare, proceed to step c.

c. Rotate the channel selectors of the particular Remote Control Unit in use so that the switch wafers compare with either figure 6-20, 6-21, 6-22, or 6-23 (depending on the control being aligned).

d. Loosen the setscrews of the channel selectors, and rotate them to the A1 position (2.0 megacycles).

e. Tighten the setscrews on the channel selectors. The Remote Control Unit now is properly aligned.

6.12 CONVERSION TO OLDHAM COUPLINGS.

Refer to paragraph 9.2.12.

6.12.1 DESCRIPTION.

The couplings in use are very similar to couplings which have been used on many equipments. They differ from regular Oldham couplings in that the center guide (or slider) is held captive to one of the couplings by a pin. This pin and a notch in the other coupling serve to assure nonambiguity of coupling engagement. Refer to figures 7-2, 7-26, and 7-40 for views of the present couplings as used in the 618S-1.

6.12.2 SUBUNITS AFFECTED.

The subunits involved in the coupling change are listed in table 6-15. New part numbers and MOD numbers have been assigned to the units incorporating these changes. Refer to paragraph 9.2.12.

TABLE 6-15. SUBUNIT COUPLER CHANGES

SUBUNIT	OLD CPN	NEW CPN	MOD NO.
Servomotor Drive Assembly	506 6624 005	540 9965 002	1
Autopositioner Assembly	506 7127 005	540 9966 002	2
R-F Tuner	506 7041 006	540 9967 002	7
Power Amplifier	506 7450 006	540 9968 002	3

6.12.3 INTERCHANGEABILITY.

The four above-named subunits with Oldham couplings can not be plugged individually into an equipment whose subunits have pin-type couplings. However, with the proper parts (listed in paragraph 6.12.4) and a hack saw, grinder or file, etc., field conversion can be accomplished without too much difficulty.

6.12.4 COMPONENT CHANGES.

Refer to table 6-16 for a list of parts required to convert from pin-type couplers to Oldham couplers.

TABLE 6-16. COMPONENT CHANGES

(1) Parts required for conversion to Oldham couplings.

ITEM	QTY	CPN	DESCRIPTION
A	3	540 7421 003	Coupling - Split Hub, 1 Dial, Notched
B	3	540 7420 003	Coupling - Split Hub, Riveted
C	5	504 7537 002	Clamp - Gear, .312 Dia
D	6	310 3340 00	Washer - Spring Lock No. 4
E	2	310 0148 00	Washer - Tension
F	3	310 0059 00	Washer - Flat No. 10
G	6	324 0300 00	Screw - Cap, 4-40 x 1/2
H	6	334 0485 00	Nut - 3/16 Square, 4-40
J	1	540 9956 002	Clamp - GRADUATED

TABLE 6-16. COMPONENT CHANGES (Cont)

(2) Parts to be removed.			
ITEM	QTY	CPN	DESCRIPTION
K	3	506 6928 002	Coupling - Spring Loaded
L	3	506 6618 002	Clamp - Special
M	1	506 7416 002	Post - Spacing, 5/16 x .200
N	2	506 5908 003	Washer - .0156 thick x .255 ID
(3) Use of the following parts is optional.			
P	1	540 7426 002	Gear - Switch, 64
R	1	506 6607 002	Gear - Shaft, 136
S	1	506 7389 002	Shaft - Switch, Cam

6.12.5 FIELD CONVERSION.

Reduce shaft lengths as follows, or install new parts. Using new shaft parts listed would require quite a bit of disassembly whereas shafts may be shortened without removing them from the subunits.

a. Servo Drive Shaft - Cut off 3/32 inch, or replace with 506 6607 002.

b. Autopositioner Drive Shaft - Cut off 5/64 inch, or replace with 540 7426 002.

c. R-F Tuner Shaft - No changes.

d. PA Shaft - Cut off one-eighth inch, or replace with 506 6389 002.

NOTE

Pin-type couplings can be reinstalled on these subunits even after shafts are shortened. A new number listed above has been given to the shortened Autopositioner drive since spare parts under the old number 506 7111 002 already have been delivered to various units.

Remove old parts, and install new parts as follows. Refer to paragraph 6.12.4 and figures 6-24 through 6-27 throughout these procedures.

6.12.5.1 SERVOMOTOR DRIVE ASSEMBLY. Remove clamp (L), and install coupling (B) on shaft using clamp (C), washer (D), screw (G), and nut (H). Position coupling as shown in figure 6-24.

6.12.5.2 AUTOPOSITIONER DRIVE ASSEMBLY. Follow the same procedure as for the servomotor drive assembly. Position coupling as shown in figure 6-25.

6.12.5.3 R-F TUNER. Remove three couplings (K) and two of the three washers (N) on the rear of the tuner. Install three couplings (A) using clamps (C), washers (D), screws (G), and nuts (H). Position couplings as shown in figure 6-26 and by referring, if necessary, to figure 6-12 for band 1 switch positions.

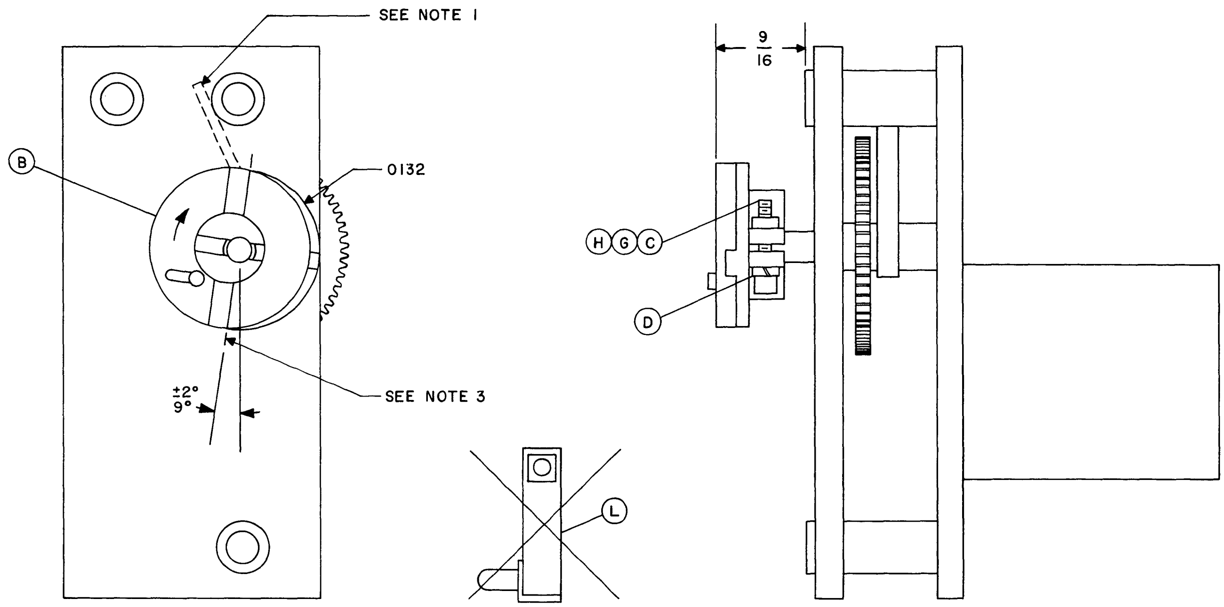
6.12.5.4 POWER AMPLIFIER. Remove clamp (L), post (M), and gear clamp. Install three washers (F), two washers (E), and coupling (B) on shaft using clamp (J), washer (D), screw (G), and nut (H). Position coupling as shown in figure 6-27 and by referring, if necessary, to figure 6-17 for band 4 switch positions.

6.12.6 REINSTALLATION PROCEDURES TO BE OBSERVED.

a. Tighten all screws (G) to 10-12 inch-pounds.

b. The 90 ±1-1/2-degree angular setting of the couplings indicated in figures 6-24 through 6-27 may be obtained with sufficient accuracy by using any reasonably square object as a gauge or by eye if sufficient care is taken and if initial switch positioning is good. The 9 ±2-degree setting on the servo drive assembly, figure 6-24, will require a simple tool or protractor.

c. Tuning rack on tuner should be in bottom position (refer to paragraph 6.6.1), and the servo drive coupling should be turned all the way clockwise (when viewed from the shaft end) and then rotated



NOTES: 1. ROTATE GEAR SHAFT ALL THE WAY CLOCKWISE UNTIL STOP SPRING TOUCHES POST.
2. POSITION AND SECURE COUPLING (B) AS SHOWN.
3. ALL FUTURE SUB UNITS WILL HAVE A LINE MARKED ON GEAR PLATE FOR COUPLING ALIGNMENT.

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Figure 6-24. Installation of Oldham Coupler on Servomotor Drive Assembly

counterclockwise nine degrees when installing subunits in equipment.

d. Couplings on the tuner should be color coded (refer to notes on figures 6-24 through 6-27) to indicate proper angular positions when inserting or removing the tuner or power amplifier.

When the RED DOTS on FRONT TUNER couplings are UP, the tuner may be inserted or removed with all other subunits in place (band 1 switch position and tuning rack in bottom position).

When GREEN DOT on REAR TUNER coupling is UP, the power amplifier may be inserted or removed with all other subunits in place (band 4 position).

CAUTION

Failure to have couplings properly positioned (pin engaged in notch) will prevent equipment from operating properly and may damage tubes. Also, couplings may be damaged when inserting or removing subunits.

e. Locating dimensions shown in figures 6-24 through 6-27 are approximate, and couplings may have to be adjusted axially for proper engagement (approximately 0.010-inch running clearance) after subunits are installed in radio. In doing this, care should be taken not to rotate couplings out of positions.

6.13 PRELIMINARY FINAL CHECKS.

The following should be checked before application of power to the equipment:

a. Check tubes for proper seating. Check tube plate cap connections.

b. Check for proper grounding of the equipment.

c. Check for proper connection of coaxial leads to dummy load and signal generator.

d. Check for proper seating of all plugs.

The following should be checked after equipment is turned on and placed in phone-receive position:

a. R-f cyrstal oscillator operates and sets up on correct channel.

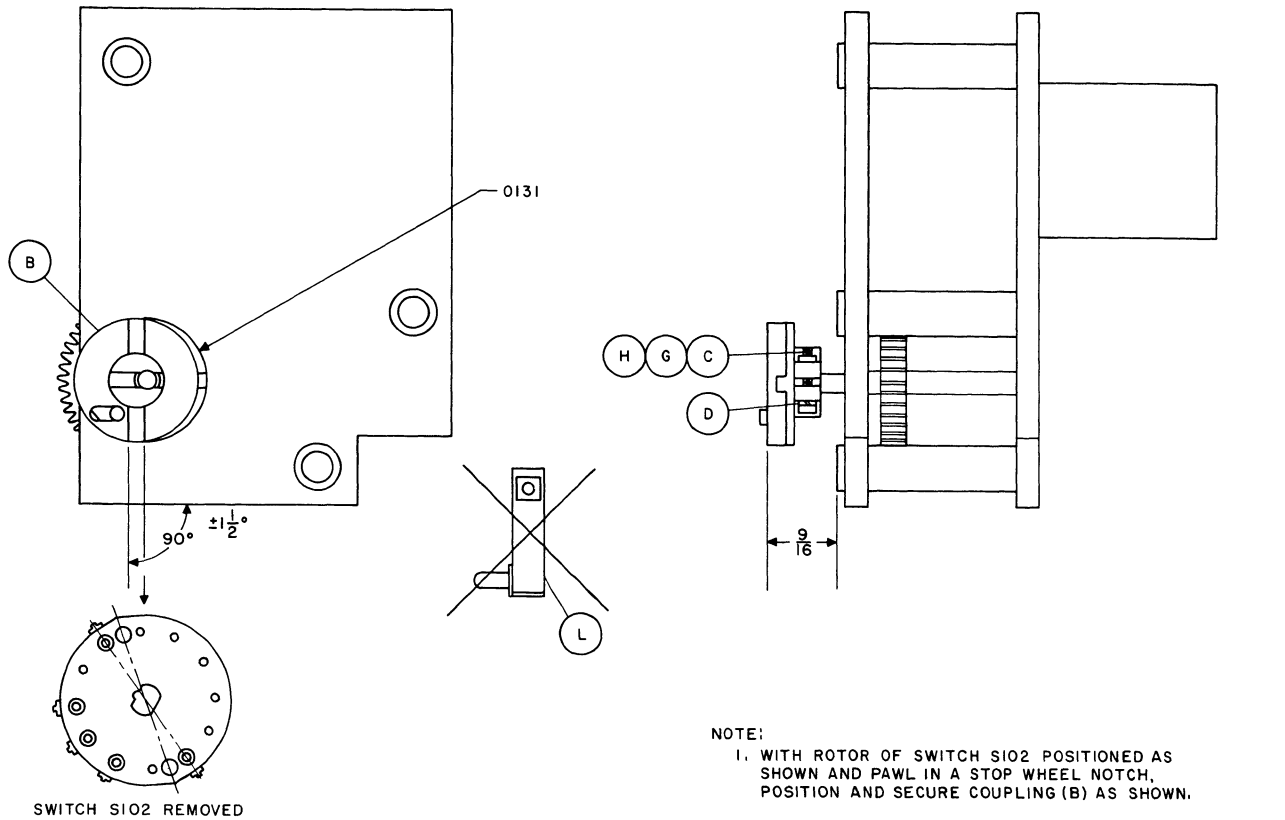

Figure 6-25. Installation of Oldham Coupler and Autopositioner Assembly

b. Band switch operates and sets up properly.

c. Blower operates properly.

d. R-f tuner operates to center before setting up on crystal frequency.

e. Power amplifier roller coil operates to center on each band.

6.14 FINAL ADJUSTMENTS.

The adjustment procedures described in paragraphs 6.14.1 through 6.14.4 should be performed following completion of the alignment and testing procedures outlined in this section. The final adjustments consist of setting the AUDIO, PHONE SIDETONE, and CW SIDETONE controls of Transceiver 618S-1 and setting of the R-F Gain (Phone) control for Remote Control Unit 614C-2. The AUDIO, PHONE SIDETONE, and CW SIDETONE controls each are located on the sidetone unit of the front panel assembly. The R-F Gain (Phone) control is adjustable from the rear of the 614C-2.

6.14.1 ADJUSTMENT OF AUDIO CONTROL (R109).

Perform the following operations:

a. Connect the 618S-1 in a test bench setup. Refer to figure 2-1.

b. Connect the output meter to J101. Adjust the output meter to the 500-milliwatt range with an internal impedance of 300 ohms.

c. Connect the signal generator to J109. Adjust to 1000 microvolts at 2.0 megacycles, modulated 30% at 1000 cps. Use the frequency meter to calibrate the signal generator to the correct frequency.

d. Set the Volume and R-F Gain controls to the maximum clockwise positions.

e. Operate the OFF-PHONE-CW switch to the PHONE position, and allow at least 10 minutes for warmup.

f. Select a channel corresponding to 2.0 megacycles.

g. Adjust R109 for an indication of exactly 300 milliwatts on the output meter.

6.14.2 ADJUSTMENT OF CW SIDETONE CONTROL (R107).

Perform the following operations:

a. Connect the dummy load to E102 or J110 as illustrated in figure 2-2.

b. Perform steps a., b., e., and f. of paragraph 6.14.1.

c. Insert a microphone into J101 or a telegraph key into J103.

d. Operate the OFF-PHONE-CW switch to the CW position.

e. Depress the telegraph key or microphone push-to-talk button.

f. Adjust R107 for an indication of exactly 300 milliwatts on the output meter.

6.14.3 ADJUSTMENT OF PHONE SIDETONE CONTROL (R106).

Perform the following operations:

a. Connect the dummy load and oscilloscope to E102 or J110. Refer to figure 2-2.

b. Connect the dummy microphone (figure 2-3) to J102.

c. Connect the audio oscillator to the dummy microphone, as illustrated in figure 2-2.

d. Perform steps a., b., e., and f. of paragraph 6.13.1.

e. Adjust the audio oscillator to 1000 cps. Set the level to that necessary for 80% modulation. Refer to paragraph 2.2.3.2 step i. and figure 2-4.

f. Adjust R106 for an indication of exactly 300 milliwatts on the output meter.

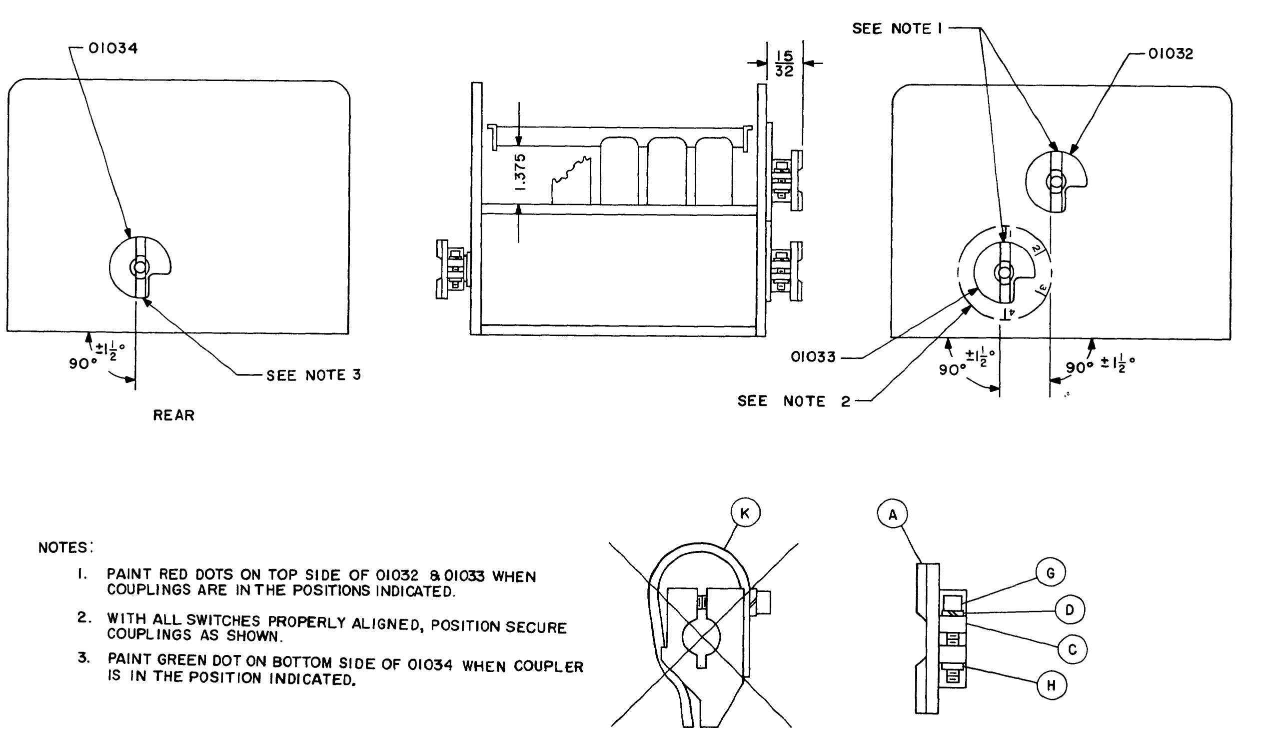

Figure 6-26. Installation of Oldham Couplers on R-F Tuner

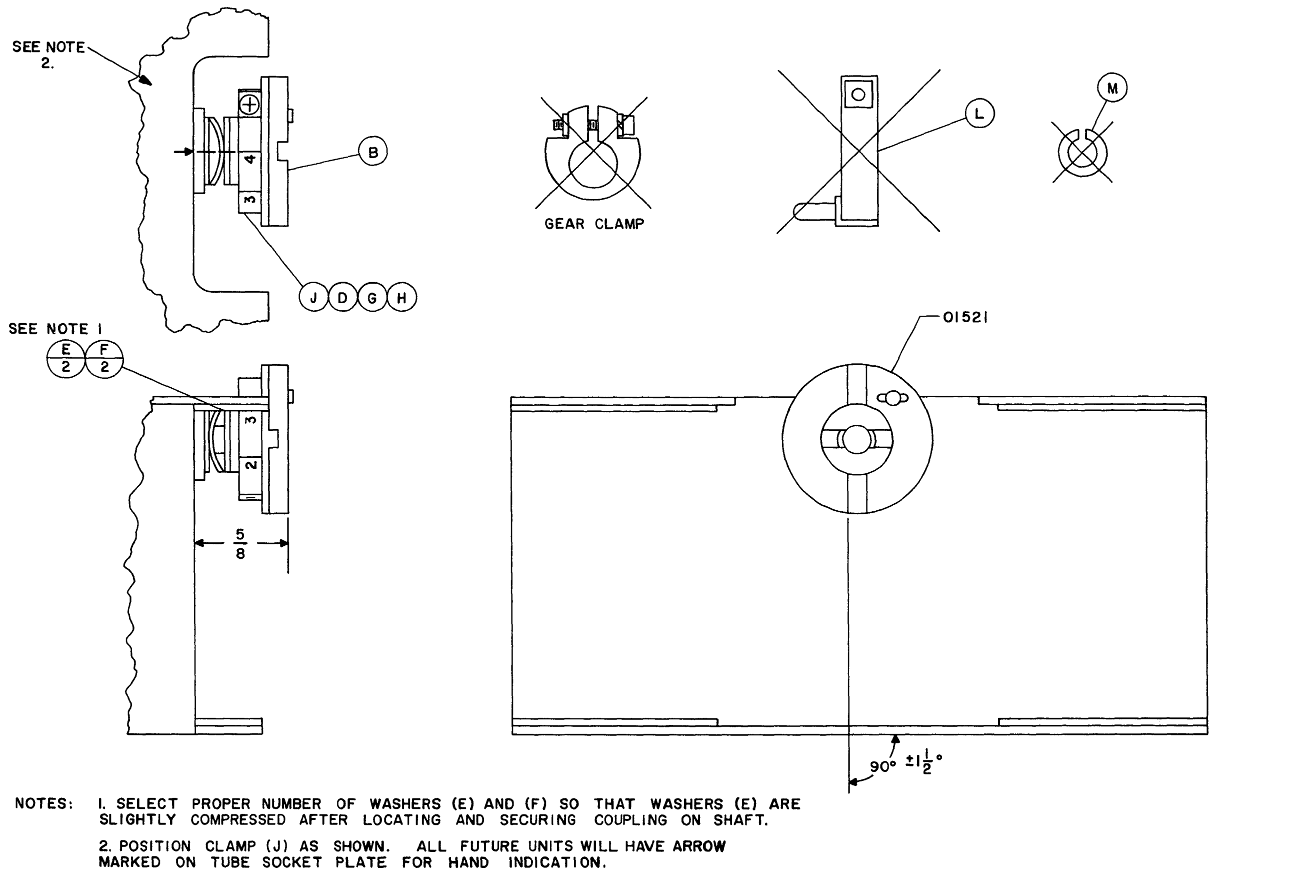

Figure 6-27. Installation of Oldham Couplers on Power Amplifier

6.14.4 ADJUSTMENT OF R-F GAIN CONTROL (R2602).

Perform the following operations:

a. Connect the headphones to terminal b of J2601.

b. Perform steps a., c., e., and f. of paragraph 6.14.1.

c. Monitor the signal in the headphones, and adjust the 614C-2 Volume control (small knob) for a comfortable level.

d. Disconnect the headphones, and connect the output meter to J101.

e. Adjust R2602 for maximum signal-plus-noise to noise ratio. The signal-plus-noise to noise ratio may be measured by removing the modulation and observing the indication on the output meter.

SECTION VII
PARTS LIST

TRANSCEIVER 618S-1 522 0060 006
TRANSCEIVER 618S-4 522 1020 006

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
1-99 Series	FRONT COVER		506 6095 004
101-199 Series	FRONT PANEL BOARD		506 6517 004
	Blower motor assembly	MOTOR: variable freq; impeller; impeller housing	009 1289 00
	Blower motor assembly	MOTOR: variable freq; impeller; impeller housing	009 1304 00
B101	Blower motor	MOTOR: variable freq; nominal input 115 v rms, input freq 320 to 1000 cps, single phase	230 0190 00
	Blower motor	MOTOR: variable freq; nominal input 115 v rms, input freq 320 to 1000 cps, single phase	230 0241 00
B102	Servomotor	MOTOR: servo, 2 phase 400 cps input 115 v, output 4.0 to 6.0 w per phase	230 0129 00
B103	Band switch	MOTOR: permanent magnet, nominal input 27.5 v dc, nominal output 0.01 hp at 0.6 in. oz.	230 0199 00
C101	Blower motor capacitor	CAPACITOR: paper, 0.47 uf ±20%, 300 wv	931 2520 00
C102	Arc suppressor	CAPACITOR: paper, 1.0 mv ±20%, 200 wv	931 0429 00
C103	Microphone bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
E101	Discharge tube across relay coil	BULB: neon, above 90 v dc or 65 v ac, 1/25 w	262 0025 00
E102	Tie point	TERMINAL: stud, 1/4 in. dia x 9/16 in. lg o/a	306 0091 00
E103	Tie point	Same as E102	306 0091 00
E104	Meter switch knob	KNOB: wing	506 6101 002
E105	Tie Point	Same as E102	306 0091 00
E106	Tie Point	Same as E102	306 0091 00
E107	Tie Point	Same as E102	306 0091 00
E108	Tie Point	Same as E102	306 0091 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
E109	Tie point	Same as E102	306 0091 00
J101	PHONE jack	JACK: phone, midget	358 1040 00
J102	MIC jack	JACK: phone, midget	358 1050 00
J103	KEY jack	Same as J101	358 1040 00
J104	Jack assembly connector	CONNECTOR: receptacle, 7 contact front panel pin insert	372 1116 00
J105	Blower motor connector	CONNECTOR: receptacle, 7 contact front panel socket insert	372 1124 00
J106	Servomotor connector	Same as J105	372 1124 00
J107	AP motor, relay, and switch connector	CONNECTOR: receptacle, 9 contact, front panel socket panel insert	372 1125 00
J108	Meter panel connector	Same as J105	372 1124 00
J109	AUX REC ANT connector	TYPE N: UG-58A/U	357 9003 00
	Effective MOD 1	TYPE BNC: UG-447/U	357 9129 00
J110	ANT input connector	Same as J109	357 9003 00
K101	AP relay	RELAY: armature, 27.5 v dc, 20 ohms ±10%	410 0109 00
	Effective MOD 1	RELAY: armature, 27.5 v dc, 20 ohms ±10%	410 0074 00
M101	Voltmeter	METER: dc milliammeter, permanent magnet moving coil type	458 0164 00
P101-P103	Not used		
P104	Jack assembly connector	CONNECTOR: receptacle, 7 contact, front panel socket insert	372 1124 00
P105	Blower motor connector	Same as J104	372 1116 00
P106	Servomotor connector	Same as J104	372 1116 00
P107	AP connector	CONNECTOR: receptacle, 9 contact, front panel pin insert	372 1123 00
P108	Meter panel connector	Same as J104	372 1116 00
P109	Not used		
P110	Not used		

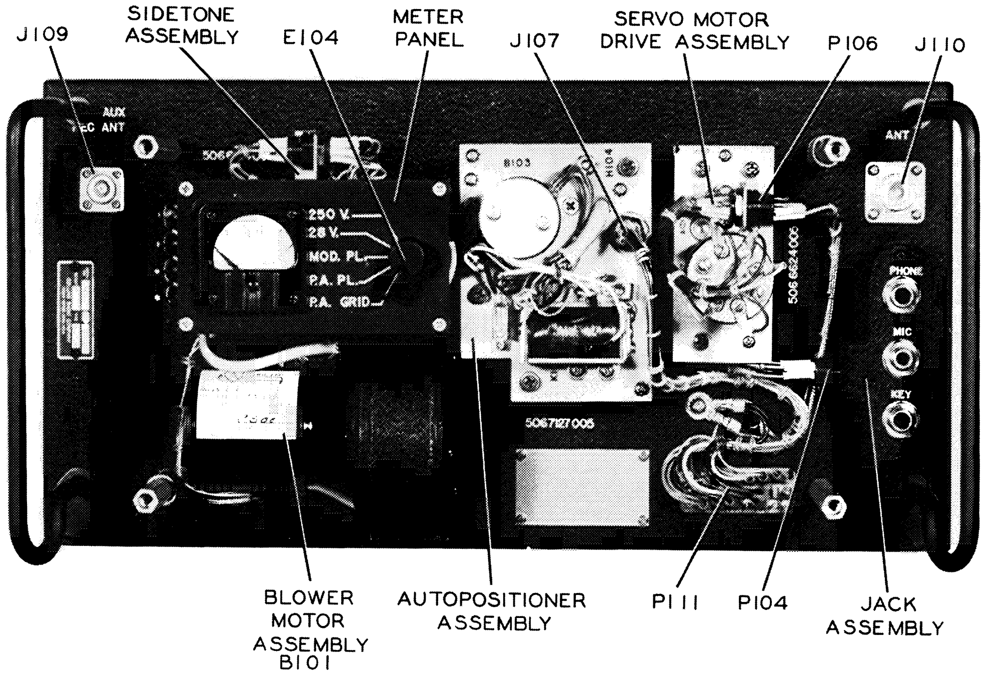

Figure 7-1. Transceiver 618S-1, Front Panel, Front View, Front Cover Removed

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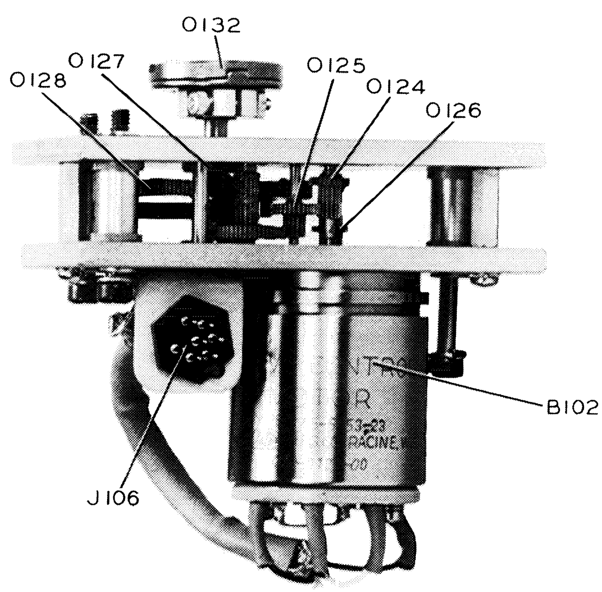

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Figure 7-2. Transceiver 618S-1, Front Panel, Servomotor Drive Assembly, Left Side View

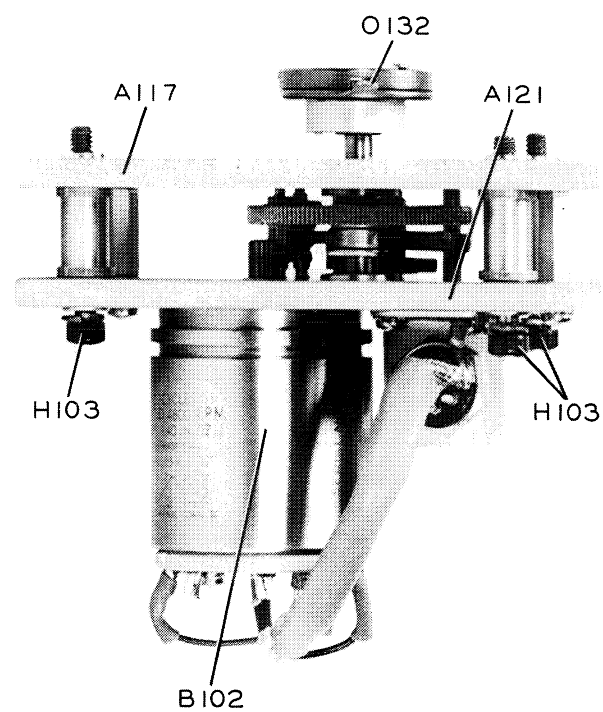

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Figure 7-3. Transceiver 618S-1, Front Panel, Servomotor Drive Assembly, Right Side View

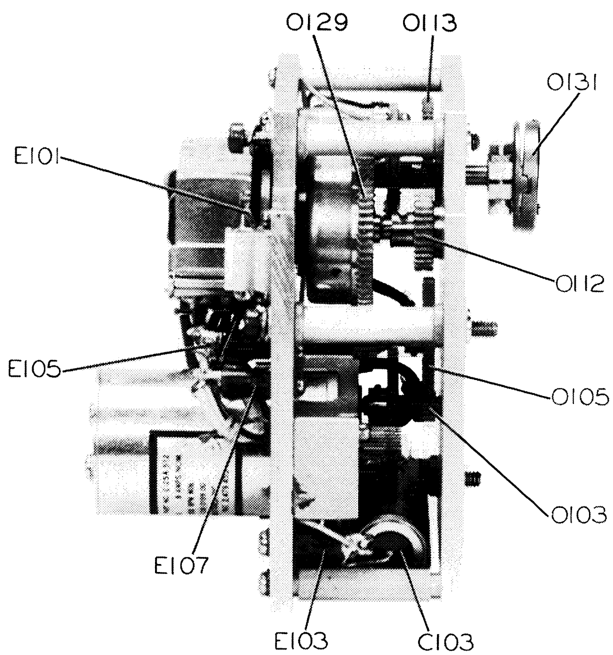

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Figure 7-4. Transceiver 618S-1, Front Panel, Autopositioner Assembly, Right Side View

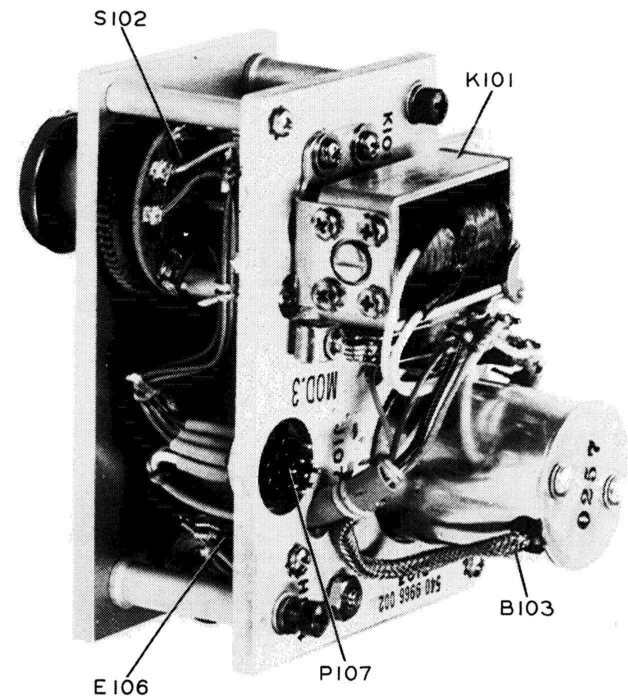

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Figure 7-5. Transceiver 618S-1, Front Panel, Autopositioner Assembly, Oblique View

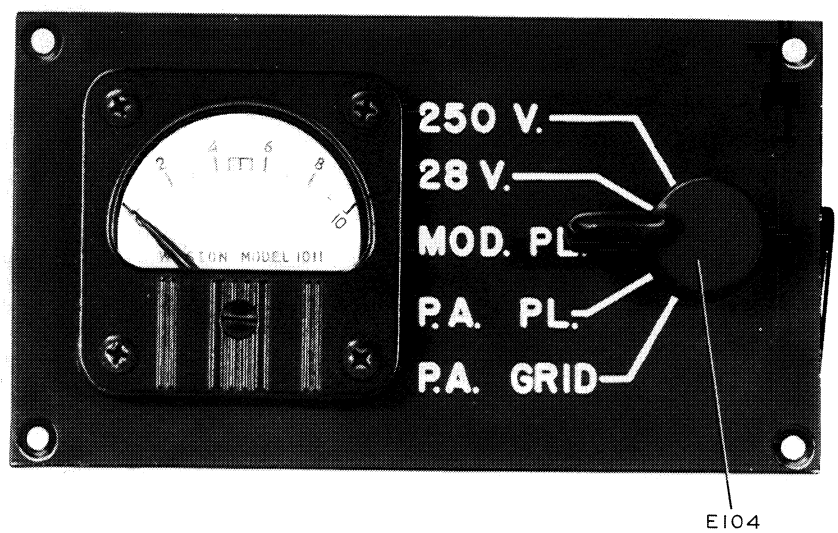

Figure 7-6. Transceiver 618S-1, Front Panel, Meter Panel Front View

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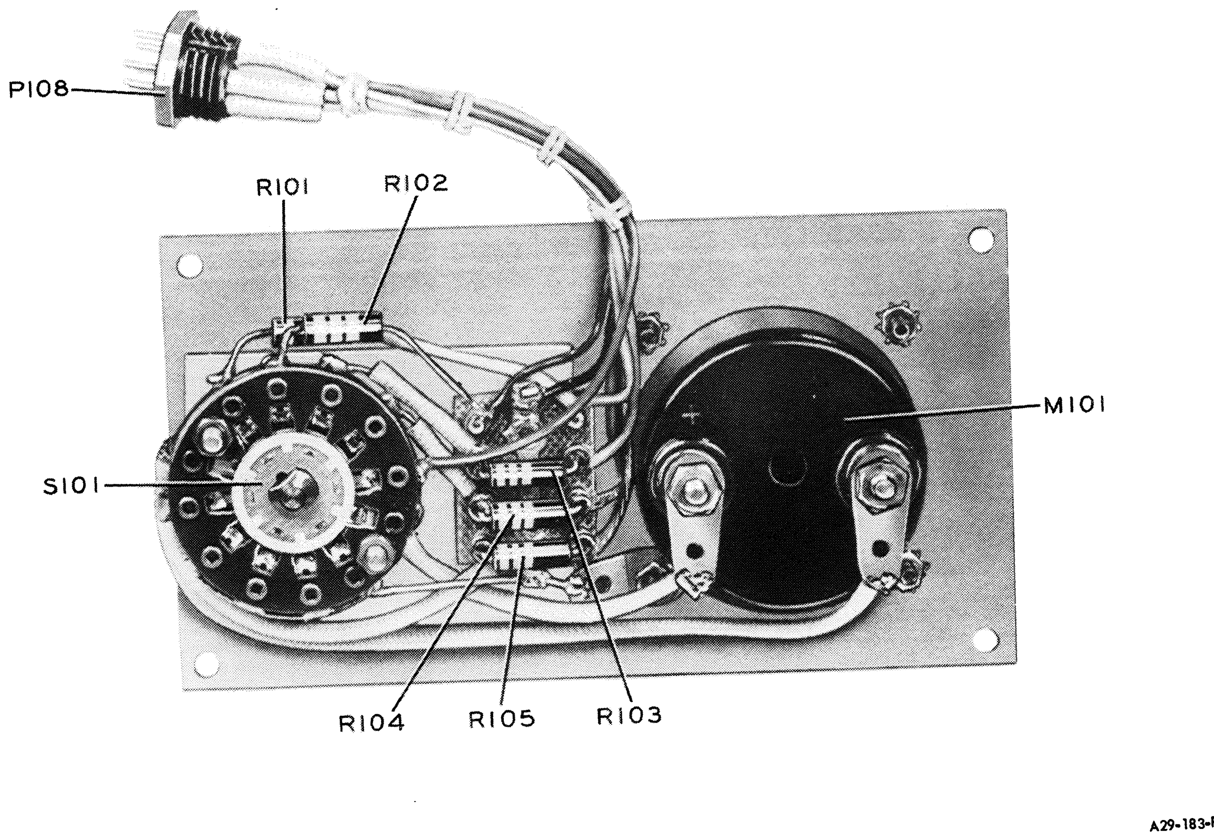


Figure 7-7. Transceiver 618S-1, Front Panel, Meter Panel, Rear View

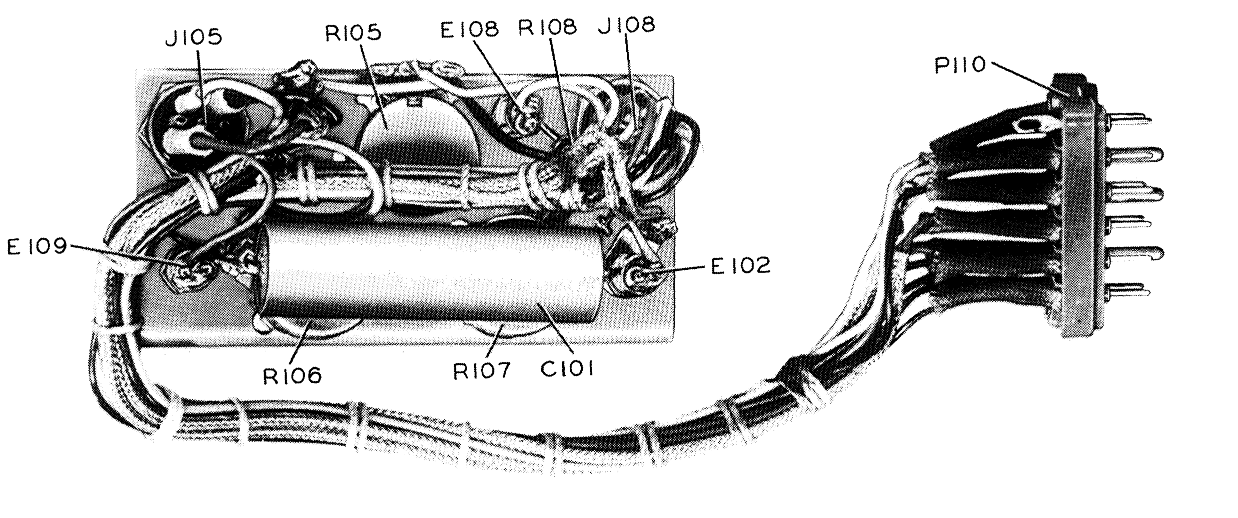


Figure 7-8. Transceiver 618S-1, Front Panel, Sidetone Control Assembly

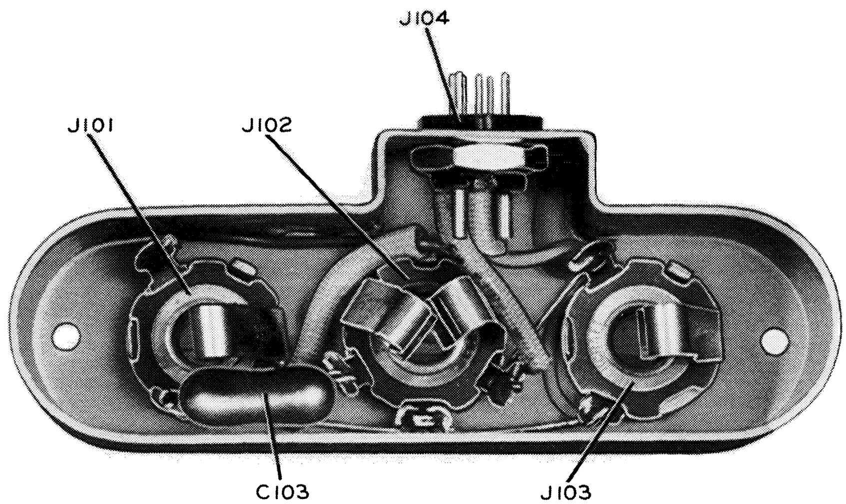


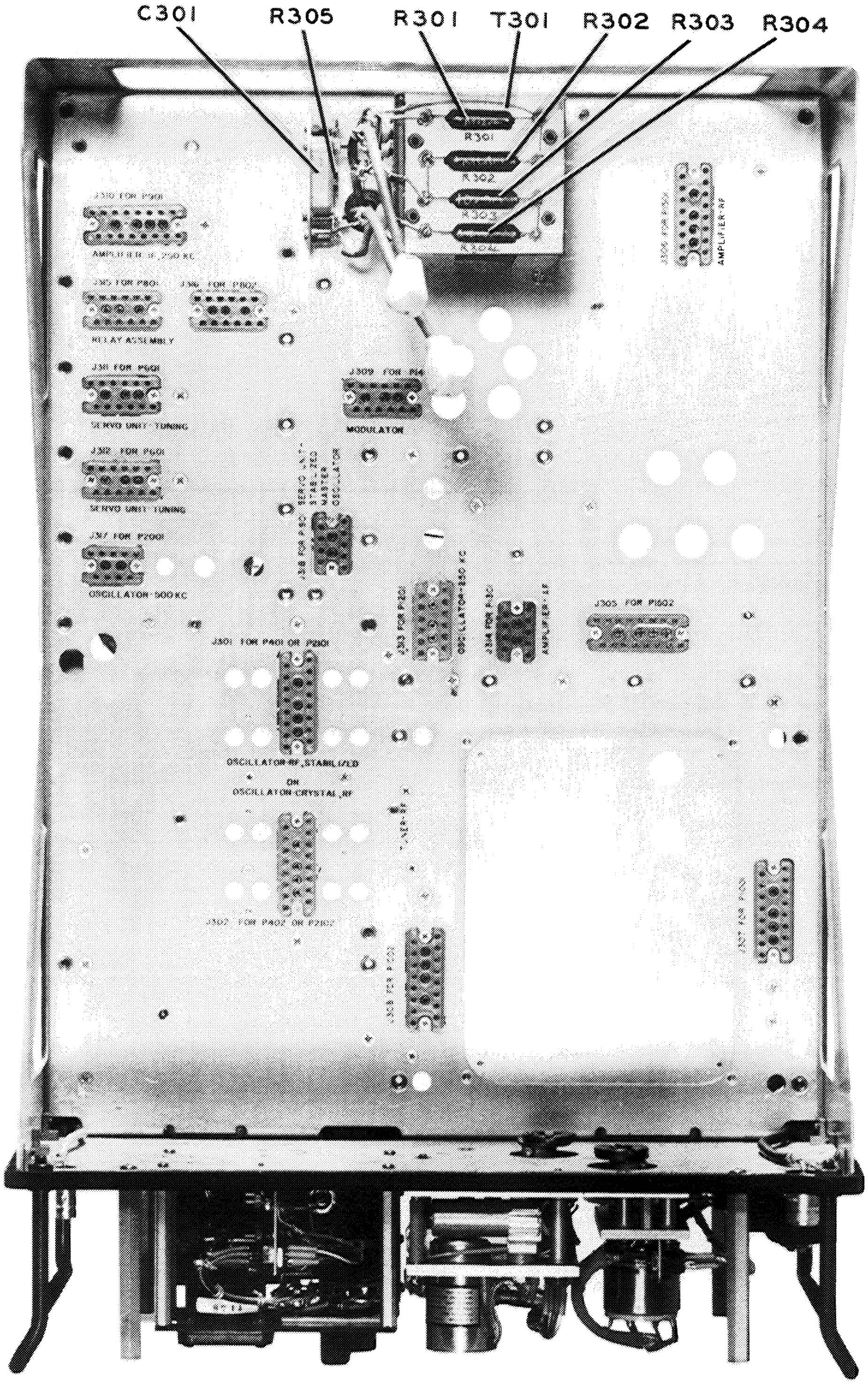
Figure 7-9. Transceiver 618S-1, Front Panel, Jack Assembly Rear View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
P111	Front panel connector	CONNECTOR: male plug, 20-prong wall or cable mounting	372 1069 00
P112	Front panel connector	CONNECTOR: male plug, 15-prong wall or cable mounting	372 1079 00
R101	Meter resistor (250 V.)	RESISTOR: 270,000 ohm, ±5%, 1/2 w	745 1453 00
R102	Meter resistor (28 V.)	RESISTOR: 27,000 ohm, ±5%, 1/2 w	745 1411 00
R103	Meter resistor (MOD. PL.)	RESISTOR: 2200 ohm, ±5%, 1/2 w	745 1365 00
R104	Meter resistor (P.A. PL.)	RESISTOR: 3300 ohm, ±5%, 1/2 w	745 1372 00
R105	Meter resistor (P.A. GRID)	RESISTOR: 47 ohm, ±5%, 1/2 w	745 1295 00
R106	PHONE SIDE-TONE control	RESISTOR: variable 10,000 ohm, ±10%, 1/2 w	380 6262 00
R107	CW SIDETONE control	Same as R106	380 6262 00
R108	CW SIDETONE voltage divider	RESISTOR: comp, 10,000 ohm, ±10%, 1/2 w	745 1394 00
R109	AUDIO control	Same as R106	380 6262 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
S101	Meter selector	SWITCH: rotary wafer, 2 circuit, 2 pole, 5 position	259 0611 00
S102	AP seeking switch	SWITCH: rotary wafer, 1 circuit, 1 pole, 12 position	269 1622 00
TB101	Resistor terminal mounting	TERMINAL BOARD, hollow lug terminal board with double grounding lug and two mounting posts	306 0293 00
201-299 Series	DUST COVER		506 6080 003
301-399 Series	MAIN CHASSIS ASSEMBLY		506 6651 005
C301	Feedback	CAPACITOR: ceramic, 4700 uuf, ±5%, 2500 wv	936 1103 00
C302	Filtering	CAPACITOR: paper, 0.5 uf, +40% -15%, 600 wv	961 4314 00
C303	Filtering	CAPACITOR: paper, 0.5 uf, +40% -15%, 600 wv	961 4314 00
C304	Not used on 618S-1		
	Effective MOD 1	CAPACITOR: electrolytic, 8 uf, -40°C to +80°C, 350 wv	184 6533 00
C305	Not used on 618S-1		
	Effective MOD 1	CAPACITOR: mica, 200 uuf ±5%, 500 wv	935 0118 00
C306	Not used on 618S-1		
	Effective MOD 1	CAPACITOR: paper, 0.10 uf ±20%, 100 wv	931 0496 00
C307	Not used on 618S-1		
	Effective MOD 1	Same as C306	931 0496 00
J301	R-f crystal oscillator connector	CONNECTOR: female plug, 20-prong wall or cable mounting	372 1071 00
J302	R-f crystal oscillator connector	Same as J301	372 1071 00
J303	Front panel connector	CONNECTOR: female plug, 15-prong wall or cable mounting	372 1081 00
J304	Front panel connector	Same as J301	372 1071 00
J305	Power amplifier connector	Same as J301	372 1071 00
J306	Power amplifier connector. No MOD through MOD 3	Same as J301	372 1071 00
	Effective MOD 4	Same as J301 with pin 19 removed	372 1616 00



A29-299-P

Figure 7-10. Transceiver 618S-1, Main Chassis and Front Panel, Top View

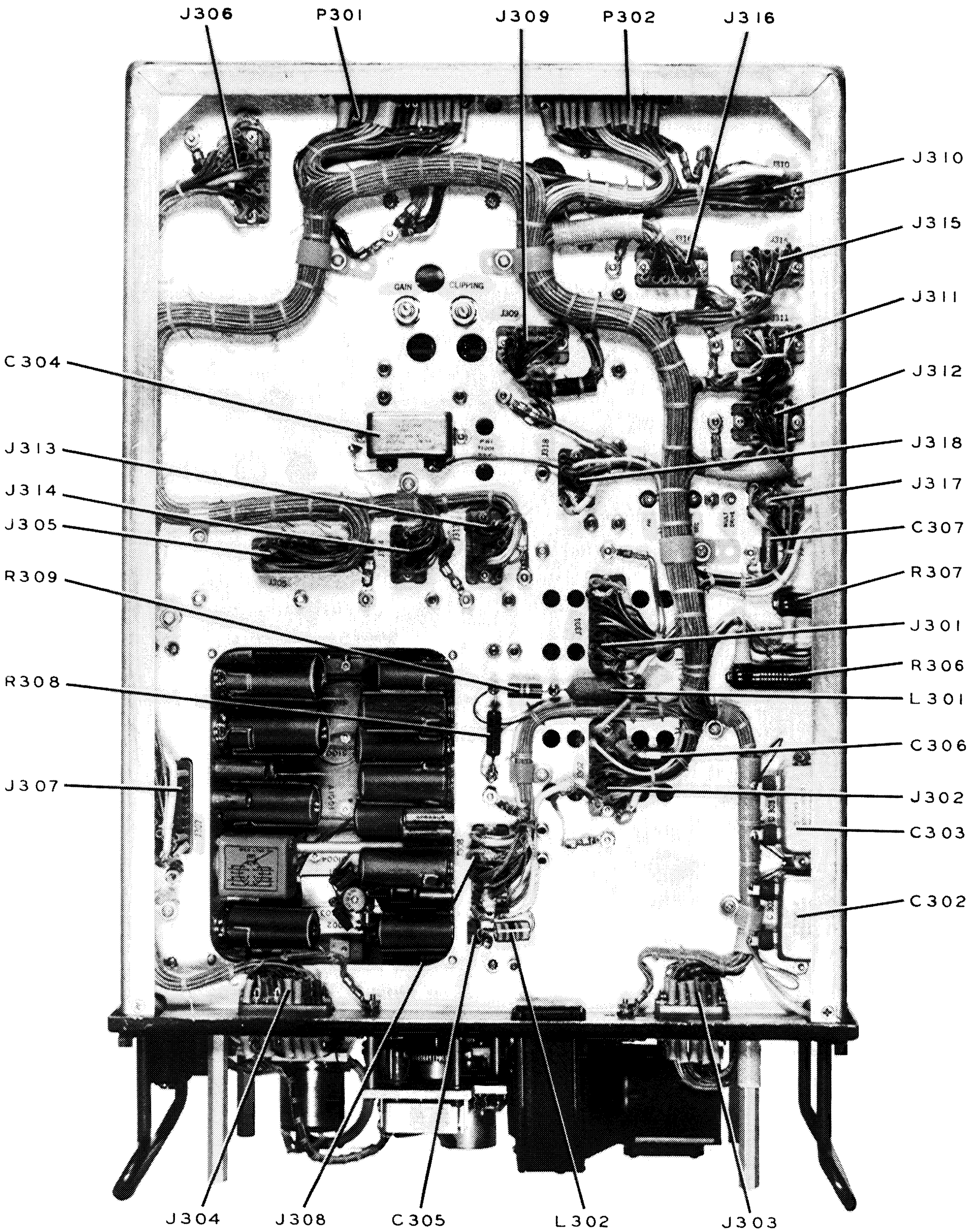


Figure 7-11. Transceiver 618S-1, Main Chassis and Front Panel, Bottom View

A29-300-P

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
J307	R-f tuner connector	Same as J301	372 1071 00
J308	R-f tuner connector	Same as J301	372 1071 00
J309	Modulator connector	Same as J303	372 1081 00
J310	250 kc i-f amplifier connector	Same as J301	372 1071 00
J311	Tuning servo amplifier (power ampl) connector	Same as J303	372 1081 00
J312	Tuning servo amplifier (power ampl) connector	Same as J303	372 1081 00
J313	250 kc oscillator connector	Same as J303	372 1081 00
J314	A-f amplifier connector	CONNECTOR: female, 11-prong wall or cable mounting	372 1076 00
J315	Relay assembly connector	Same as J303	372 1081 00
J316	Relay assembly connector	Same as J303	372 1081 00
J317	Not used on 618S-1	Same as J314	372 1076 00
J318	Not used on 618S-1	Same as J314	372 1076 00
L301	Not used on 618S-1		
	Effective MOD 1	CHOKE, RF: approx 12.0 mh ±20% at 150 kc	240 0125 00
L302	Not used on 618S-1		
	Effective MOD 1	CHOKE, RF: approx 2.0 mh ±10% at 350 kc	240 0084 00
P301	Transceiver connector	CONNECTOR: plug, 32 contacts 5 amp, 600 v dc	372 1138 00
P302	Transceiver connector	Same as P301	372 1138 00
R301	PA screen dropping	RESISTOR: ww, 4000 ohm, ±3%, 7 w	747 9864 00
R302	Modulator screen	RESISTOR: ww, 830 ohm, ±3%, 7 w	747 9862 00
R303	Voltage divider	RESISTOR: ww, 2500 ohm, ±3%, 7 w	747 9863 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R304	Voltage divider	Same as R303	747 9863 00
R305	Feedback	RESISTOR: 820,000 ohm, ±10%, 1/2 w	745 1475 00
R306	Filament dropping	RESISTOR, 0.5 ohm, 12 w	747 1101 00
R307	Filament dropping	RESISTOR: 35 ohm, 10 w	747 0108 00
R308	Not used on 618S-1		
	Effective MOD 1	RESISTOR: comp, 4000 ohm ±3%; 5 w	747 9431 00
R309	No MOD only	RESISTOR: comp, 1800 ohm ±10%; 2 w	745 5705 00
	Effective MOD 1	RESISTOR: comp, 1800 ohm ±10%; 2 w	745 5663 00
T301	Modulation transformer	TRANSFORMER: hermetically sealed, input 5500 ohm 3000 v rms, output 4 and 5, 2000 ohm 3000 v rms, 6 and 7, 200 ohm 750 v rms	677 0537 00
	Effective MOD 5	TRANSFORMER: hermetically sealed, input 5500 ohm 300 v rms, output 4 and 5, 2000 ohm 3000 v rms, 6 and 7, 200 ohm 750 v rms (Differences between 677 0537 00 and 677 0923 00 are physical differences)	677 0923 00
401-499 Series	R-F CRYSTAL OSCILLATOR		506 6495 004
B401	Crystal selector	MOTOR: permanent magnet, nominal input 27.5 v dc, nominal output 0.01 hp at 0.6 in. oz.	230 0199 00
C401	Adjust input capacitance	CAPACITOR: ceramic, variable, 2-7 uuf, 500 wv	917 1013 00
	Effective MOD 1	CAPACITOR: ceramic, variable, 3.0 to 12.0 uuf 500 wv	917 1029 00
C402	Adjust input capacitance	CAPACITOR: ceramic, 5 uuf, ±1/4 uuf, 500 wv	916 0117 00
C403	R-f bypass	CAPACITOR: ceramic, 3300 uuf, guar min, 500 wv	913 2750 00
C404	Feedback	CAPACITOR: ceramic, 100 uuf, ±5%, 500 wv	916 4059 00
C405	V401 screen bypass	CAPACITOR: ceramic, 3300 uuf, guar min, 500 wv	913 2750 00
C406	V401 plate decoupling	CAPACITOR: ceramic, 3300 uuf, guar min, 500 wv	913 2750 00
C407	V401 plate blocking	CAPACITOR: ceramic, 3300 uuf, guar min, 500 wv	913 2750 00
C408	To suppress arcing at S402	CAPACITOR: paper, 1.0 uf, ±20%, 100 wv	931 0410 00
C409	To suppress arcing at S401	Same as C408	931 0410 00

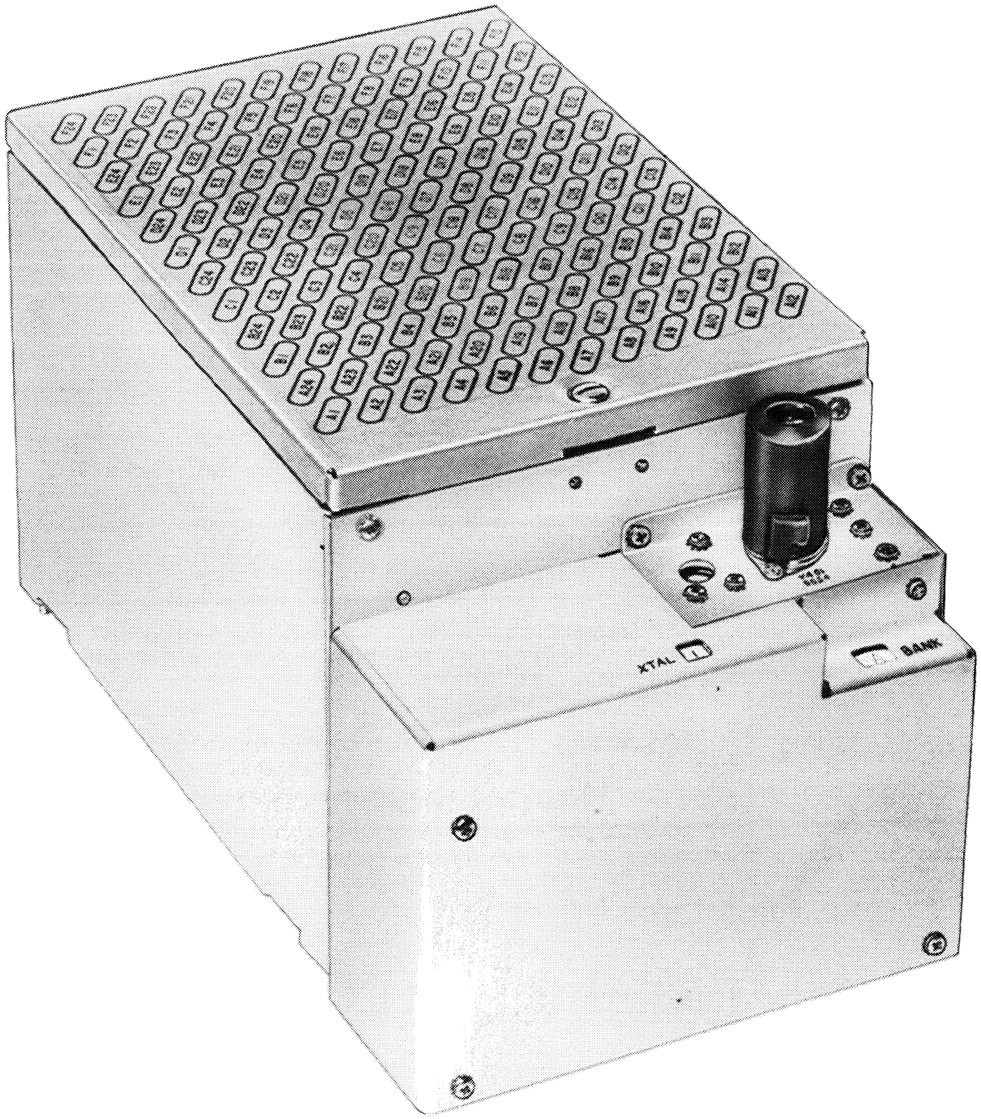


Figure 7-12. Transceiver 618S-1, R-F Crystal Oscillator, Front Oblique View with Cover A29-185-P

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
	Effective MOD 4	CAPACITOR: electrolytic, 8 uf, ±20%, 100 wv	184 7022 00
C410-C415	Input capacitance correction	CAPACITOR: ceramic, 1.0 uuf, ±1/4 uuf, 500 wv	916 0070 00
C416	Input capacitance correction	CAPACITOR: ceramic, 0.5 uuf, ±1/4 uuf, 500 wv	916 0067 00
C417	Input capacitance correction	Same as C416	916 0067 00

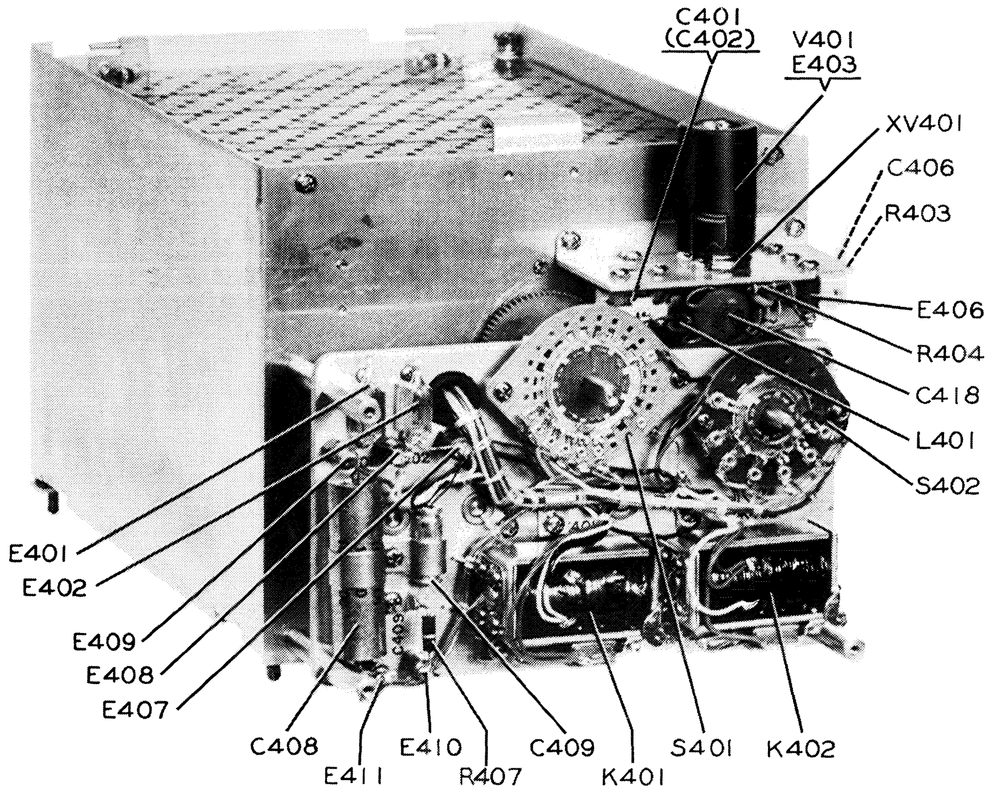


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Figure 7-13. Transceiver 618S-1, R-F Crystal Oscillator, Front View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C418	Cathode bypass Added effective MOD 3	CAPACITOR: dielectric, 10,000 uuf, 500 wv	913 1188 00
E401	Discharge tube across relay coil	BULB: neon, above 90 v dc or 65 v ac, 1/25 w	262 0025 00
E402	Discharge tube across relay coil	Same as E401	262 0025 00
E403	V401 tube shield	SHIELD: electron tube, 0.810 in. dia x 1-3/8 in. lg	541 6550 003
E404-E411	Tie point	TERMINAL: stud, 1/4 in. dia x 9/16 in. lg	306 0091 00
K401	AP relay for 24-position switch	RELAY: armature, 5 amp dc at 32 v dc, 5 mh inductive load	410 0075 00

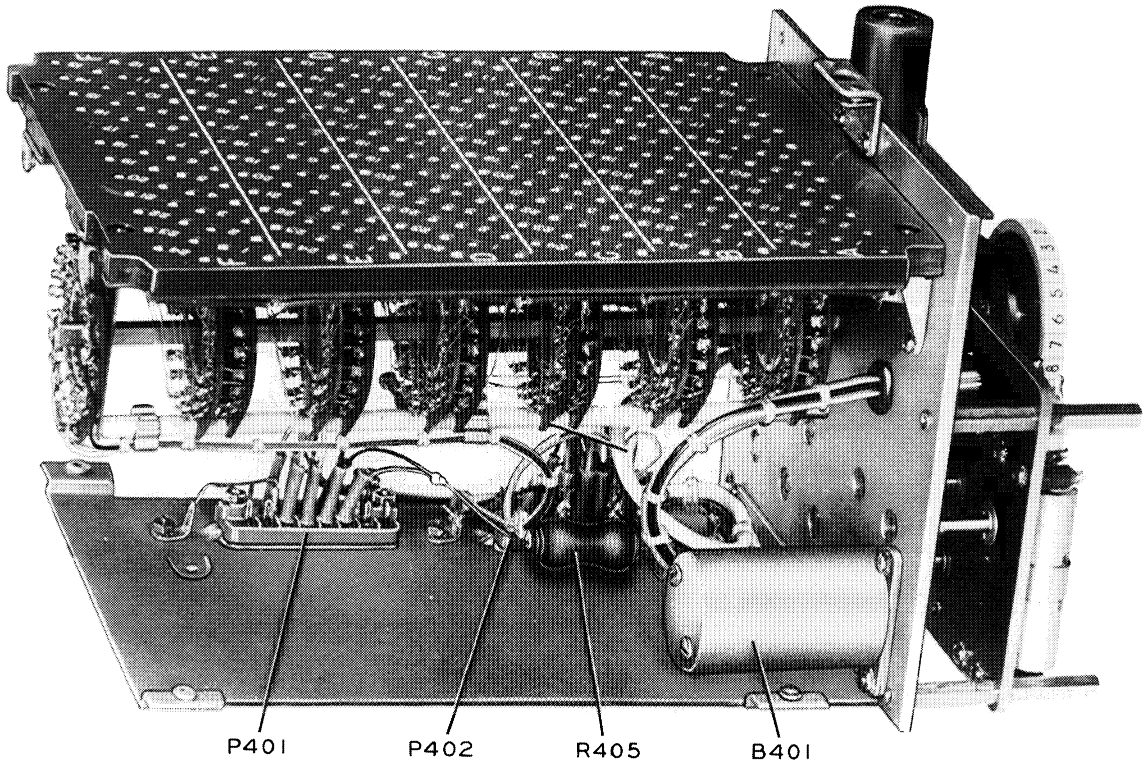

Figure 7-14. Transceiver 618S-1, R-F Crystal Oscillator, Right Side View

A29-187-P

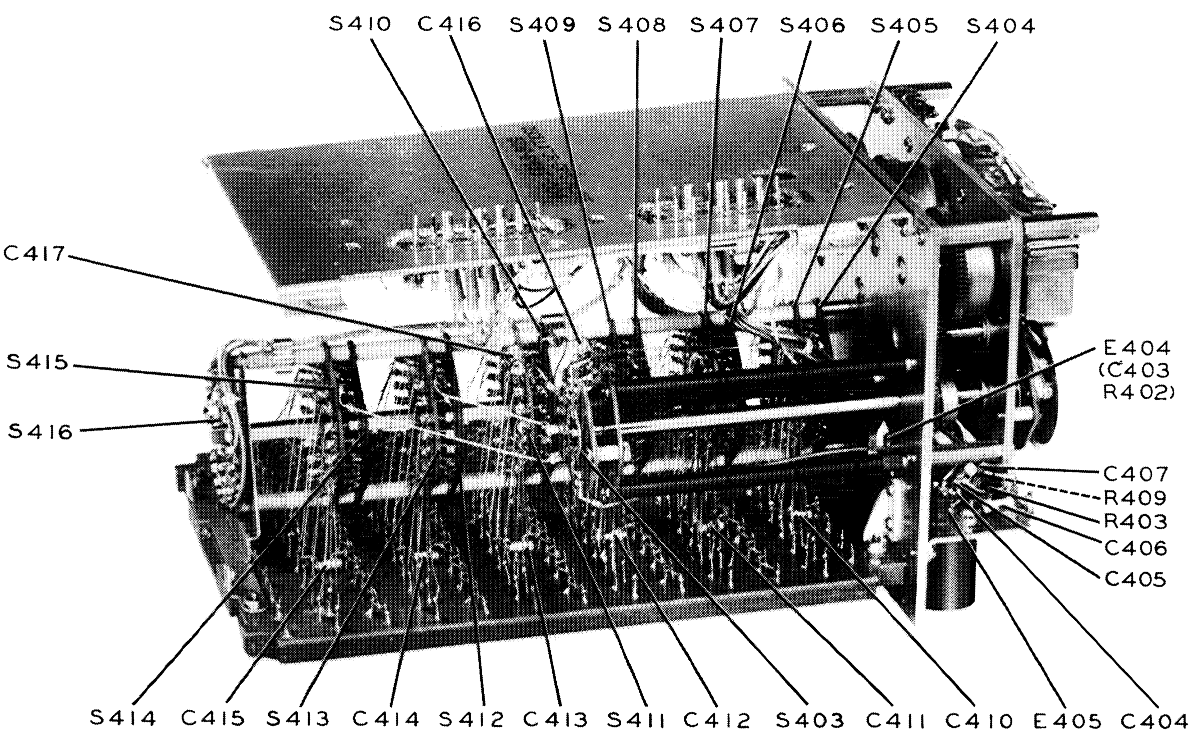

Figure 7-15. Transceiver 618S-1, R-F Crystal Oscillator, Left Side View

A29-302-P

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
K402	AP relay for 12-position switch	Same as relay K401	410 0075 00
L401	Feed-back choke	CHOKE, R-F: powdered iron core, 2.0 mh ±10% at 350 kc	240 0084 00
P401	R-f crystal oscillator connector	CONNECTOR: male plug, 20 prong wall or cable mounting	372 1069 00
P402	R-f crystal oscillator connector	Same as P401	372 1069 00
R401	V401 grid resistor. No MOD through MOD 2	RESISTOR: 1.0 megohm, ±10%, 1/2 w	745 1212 00
	Effective MOD 3	RESISTOR: 0.10 megohm ±10%, 1/2 w	745 1436 00
R402	Test point voltage divider. No MOD through MOD 2.	RESISTOR: 56,000 ohm, ±10%, 1/2 w	745 1160 00
	Effective MOD 3	RESISTOR: 15,000 ohm, ±10%, 1/2 w	745 1401 00
R403	Screen dropping	RESISTOR: 33,000 ohm, ±10%, 1/2 w	745 1415 00
R404	Plate load	RESISTOR: 4700 ohm, ±10%, 1/2 w	745 1380 00
R405	Filament dropping	RESISTOR: 100 ohm, ±5%, 8 w	747 0072 00
	Effective MOD 2	RESISTOR: 120 ohm, ±5%, 8 w at 275°C	747 0073 00
R406	Not used		
R407	Filter	RESISTOR: 22 ohm ±10%, 1/2 w	745 1282 00
	Effective MOD 4		
R408	Cathode bias added effective MOD 3	RESISTOR: 1000 ohm, ±10%, 1/2 w	745 1352 00
R409	Output loading added effective MOD 3	RESISTOR, 3900 ohm, ±10%, 1/2 w	745 1377 00
S401	AP switch	SWITCH: rotary wafer, 2 circuit 2 pole, 24 position	269 1617 00
S402	AP switch	SWITCH: rotary wafer, 1 circuit 1 pole, 12 position	269 1614 00
S403	Bank selecting	SWITCH: rotary wafer, 1 circuit 1 pole, 12 position	269 1615 00
S404	Shorting crystal bank A	SWITCH: rotary wafer, 1 circuit 1 pole, 24 position	269 1619 00
S405	Shorting crystal bank A	SWITCH: rotary wafer, 1 circuit 1 pole, 24 position	269 1618 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
S406	Shorting crystal bank B	Same as S404	269 1619 00
S407	Crystal selector bank B	Same as S405	269 1618 00
S408	Shorting crystal bank C	Same as S404	269 1619 00
S409	Crystal selector bank C	Same as S405	269 1618 00
S410	Shorting crystal bank D	Same as S404	269 1619 00
S411	Crystal selector bank D	Same as S405	269 1618 00
S412	Shorting crystal bank E	Same as S404	269 1619 00
S413	Crystal selector bank E	Same as S405	269 1618 00
S414	Shorting crystal bank F	Same as S404	269 1619 00
S415	Crystal selector bank F	Same as S405	269 1618 00
S416	Switch band assignment	SWITCH: rotary wafer 1 circuit 1 pole, 24 position	269 1616 00
V401	Crystal oscillator	TUBE: 5654	253 0001 00
XV401	V401 holder	SOCKET: tube	220 1111 00
601-699 Series	TUNING SERVO AMPLIFIER		506 5777 005
C601	R-f bypass	CAPACITOR: mica, 220 uuf ±2%, 500 wv	912 0517 00
C602	V601 grid coupling	CAPACITOR: paper, 0.01 uf ±20%, 300 wv	931 2556 00
C603	V601 plate decoupling	CAPACITOR: paper, 0.33 uf ±20%, 300 wv	931 0629 00
C604	V601 plate decoupling	CAPACITOR: paper, 0.47 uf ±20%, 300 wv	931 0630 00
C605	Grid coupling	CAPACITOR: paper, 0.0068 uf ±20%, 300 wv	931 2555 00
C606	V602 grid coupling	CAPACITOR: paper, 0.0068 uf ±20%, 300 wv	931 2555 00
C607	Not used		
C608	Cathode bypass	CAPACITOR: electrolytic, 8 uf -15% +50%, 30 wv	184 7003 00

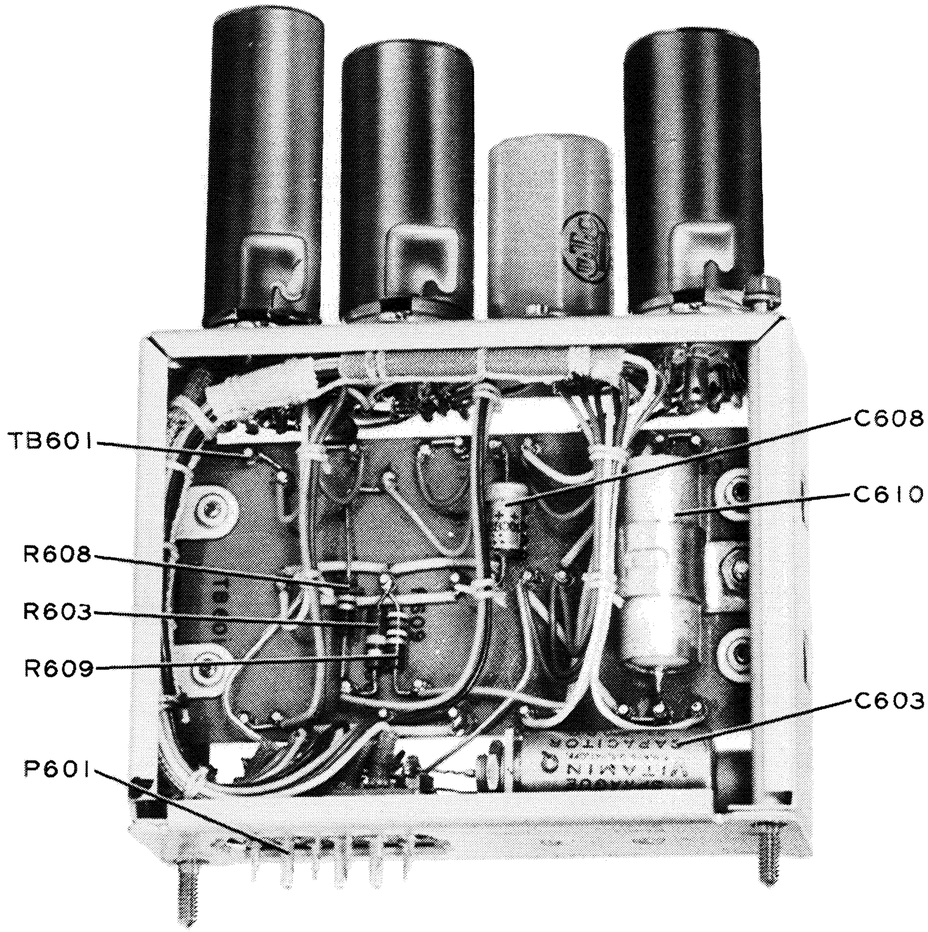

Figure 7-16. Transceiver 618S-1, Tuning Servo Amplifier, Front View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C609	Bridge circuit	CAPACITOR: paper, 0.47 uf ±5%, 100 wv	931 0753 00
C610	Servomotor tuning	CAPACITOR: paper, 0.33 uf 120 vacw, 400 cycles	931 2391 00
C611	Test point coupling	CAPACITOR: paper, 0.01 uf ±20%, 300 wv	931 2556 00
C612	Chopper contact	CAPACITOR: ceramic, 3000 uuf, guar min, 500 wv	913 0996 00
	Effective MOD 3	CAPACITOR: ceramic, 3300 uuf, ±20%, 500 wv	913 2750 00
C613	Chopper contact	CAPACITOR: ceramic, 3000 uuf, guar min, 300 wv	913 0996 00
	Effective MOD 3	CAPACITOR: ceramic, 3300 uuf, ±20%, 500 wv	913 2750 00

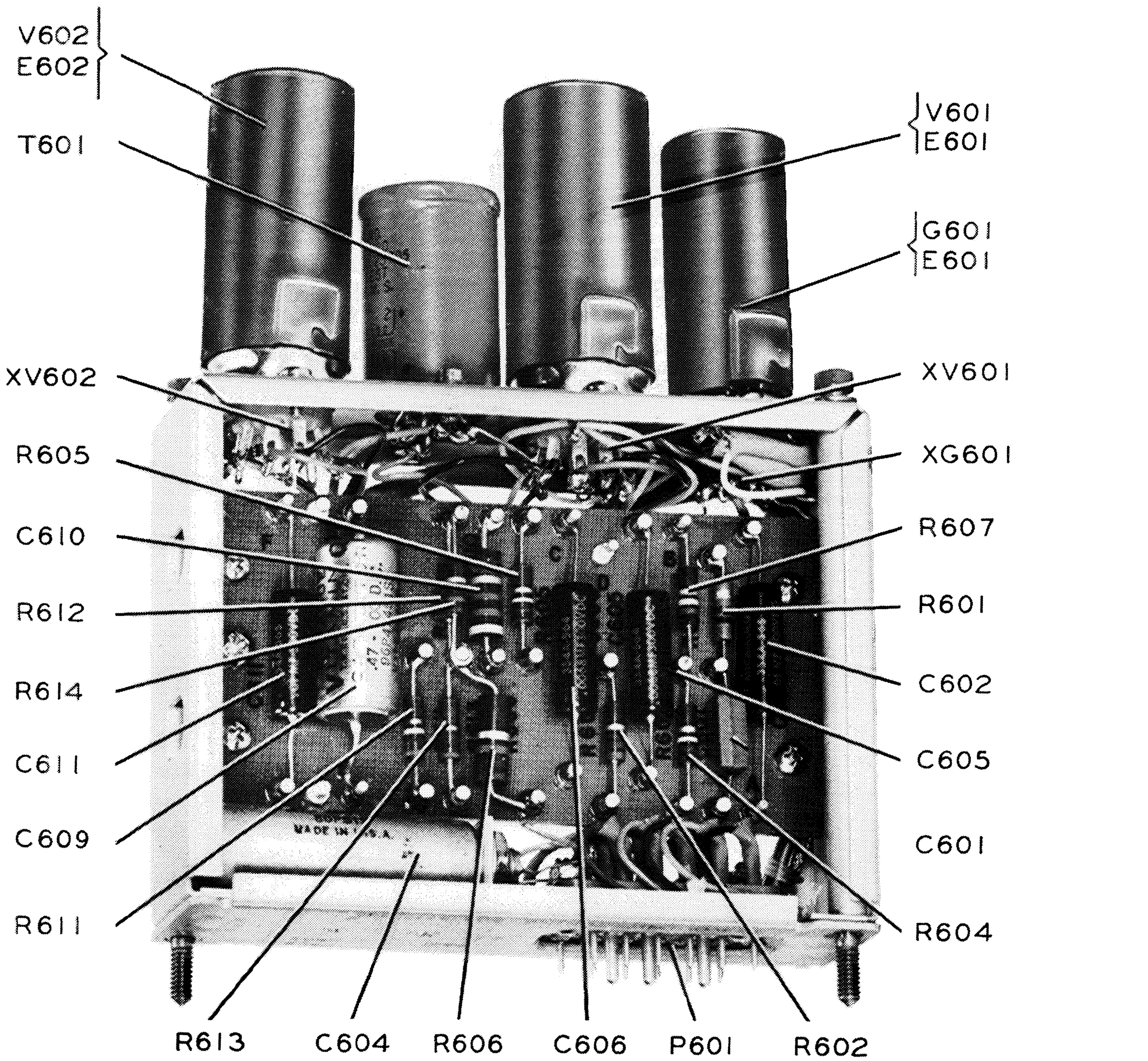

Figure 7-17. Transceiver 618S-1, Tuning Servo Amplifier, Rear View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
E601	V601 shield	SHIELD: electron tube, 0.950 in. dia x 1-13/16 in. lg	541 6550 003
E602	V602 shield	Same as E601	541 6551 003
E603	G601 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/4 in. lg	541 6551 003
G601	Servo amplifier chopper	VIBRATOR: synchronous, input 6.3 v rms ±7%, 400 cps ±20 cps	354 1021 00
P601	Tuning servo amplifier connector	CONNECTOR: male plug, 15-prong wall or cable mounting	372 1079 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R601	V601 grid	RESISTOR: comp, 1.0 megohm ±10%, 1/2 w	745 1478 00
R602	V601 cathode	RESISTOR: comp, 1200 ohm ±10%, 1/2 w	745 1356 00
R603	V601 grid return	RESISTOR: comp, 0.56 megohm ±10%, 1/2 w	745 1468 00
R604	V601 plate resistor	RESISTOR: comp, 0.22 megohm ±10%, 1/2 w	745 1450 00
R605	V601 plate decoupling	RESISTOR: comp, 0.22 megohm ±10%, 1/2 w	745 1450 00
R606	V601 plate decoupling	RESISTOR: comp, 220 ohm ±10% 1 w	745 3324 00
R607	V601 plate resistor	RESISTOR: comp, 0.56 megohm ±10%, 1/2 w	745 1468 00
R608	T601 loading. No MOD, MOD 1	RESISTOR: comp, 68,000 ohm ±10%, 1/2 w	745 1163 00
	Effective MOD 2	RESISTOR: comp, 33,000 ohm ±10%, 1/2 w	745 1415 00
R609	V602 grid	RESISTOR: comp, 0.47 megohm ±10%, 1/2 w	745 1464 00
R610	V602 cathode	RESISTOR: comp, 470 ohm ±10%, 1 w	745 3338 00
R611	Bridge circuit	RESISTOR: comp, 75,000 ohm ±5%, 1/2 w	745 1431 00
*R612	Bridge balance Effective MOD 1	RESISTOR: comp, 18 ohm ±10%, 1/2 w	745 1279 00
		RESISTOR, comp, 20 ohm ±5%, 1/2 w	745 1280 00
		RESISTOR: comp, 22 ohm ±10%, 1/2 w	745 1282 00
		RESISTOR: comp, 24 ohm ±5%, 1/2 w	745 1284 00
		RESISTOR: comp, 27 ohm ±10%, 1/2 w	745 1286 00
		RESISTOR: comp, 33 ohm ±10%, 1/2 w	745 1289 00
		RESISTOR: comp, 33 ohm ±5%, 1/2 w	745 1288 00
		RESISTOR: comp, 39 ohm ±10%, 1/2 w	745 1293 00
		RESISTOR: comp, 47 ohm ±10%, 1/2 w	745 1296 00
		RESISTOR: comp, 56 ohm ±10%, 1/2 w	745 1300 00
R613	Bridge circuit No MOD, MOD 1,2	RESISTOR: comp, 1500 ohm ±5%, 1/2 w	745 1092 00

*Choose 1 for individual requirement

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
	MOD 3	RESISTOR: comp, 1500 ohm ±5%, 1/2 w	745 1358 00
R614	Bridge circuit	RESISTOR: comp, 10 ohm ±5%, 1/2 w	745 1001 00
	Effective MOD 1	RESISTOR: comp, 15 ohm ±10%, 1/2 w	745 1275 00
T601	Isolation transformer	TRANSFORMER: hermetically sealed, input 150 ohm 750 v rms, output 2200 ohm 750 v rms	674 0635 00
V601	Two stage voltage amplifier	TUBE: 5751	253 0012 00
V602	Power amplifier	TUBE: 5686	253 0009 00
XG601	G601 holder	SOCKET: tube	220 1111 00
XV601	V601 holder	SOCKET: tube	220 1103 00
XV602	V602 holder	SOCKET: tube	220 1103 00
801-899 Series	RELAY ASSEMBLY		506 6625 006
C801	B+ decoupling	CAPACITOR: paper, 0.47 uf, ±20%, 300 wv	931 0630 00
C802	R-f bypass Effective MOD 1	CAPACITOR: ceramic fixed, 0.001 uf, 500 wv	913 1188 00
E801	V801 shield	SHIELD: electron tube, 0.810 in. dia x 2-1/4 in. lg	541 6552 003
K801	Sequence relay	RELAY: armature, hermetically sealed, 3A, 1B, 1.0 amp at 27.5 v d-c, resistive load	974 0220 00
K802	Tuner centering relay	RELAY: armature, hermetically sealed, 3C, 1.0 amp at 27.5 v d-c, resistive load	974 0219 00
K803	Phone-cw relay	RELAY: armature, hermetically sealed, 3A, 1B, 1.0 amp at 27.5 v d-c resistive load	974 0220 00
K804	Keying relay	RELAY: armature, hermetically sealed, 3C, 1.0 amp at 27.5-v d-c resistive load	974 0219 00
P801	Relay assembly connector	CONNECTOR: male plug, 15-prong wall or cable mounting	372 1079 00
P802	Relay assembly connector	CONNECTOR: male plug, 15-prong wall or cable mounting	372 1079 00
R801	V801 plate dropping	RESISTOR: ww, 3300 ohm ±3%, 5 w	747 9426 00
	Effective MOD 3	RESISTOR: ww, 3300 ohm ±5%, 8 w	747 9150 00

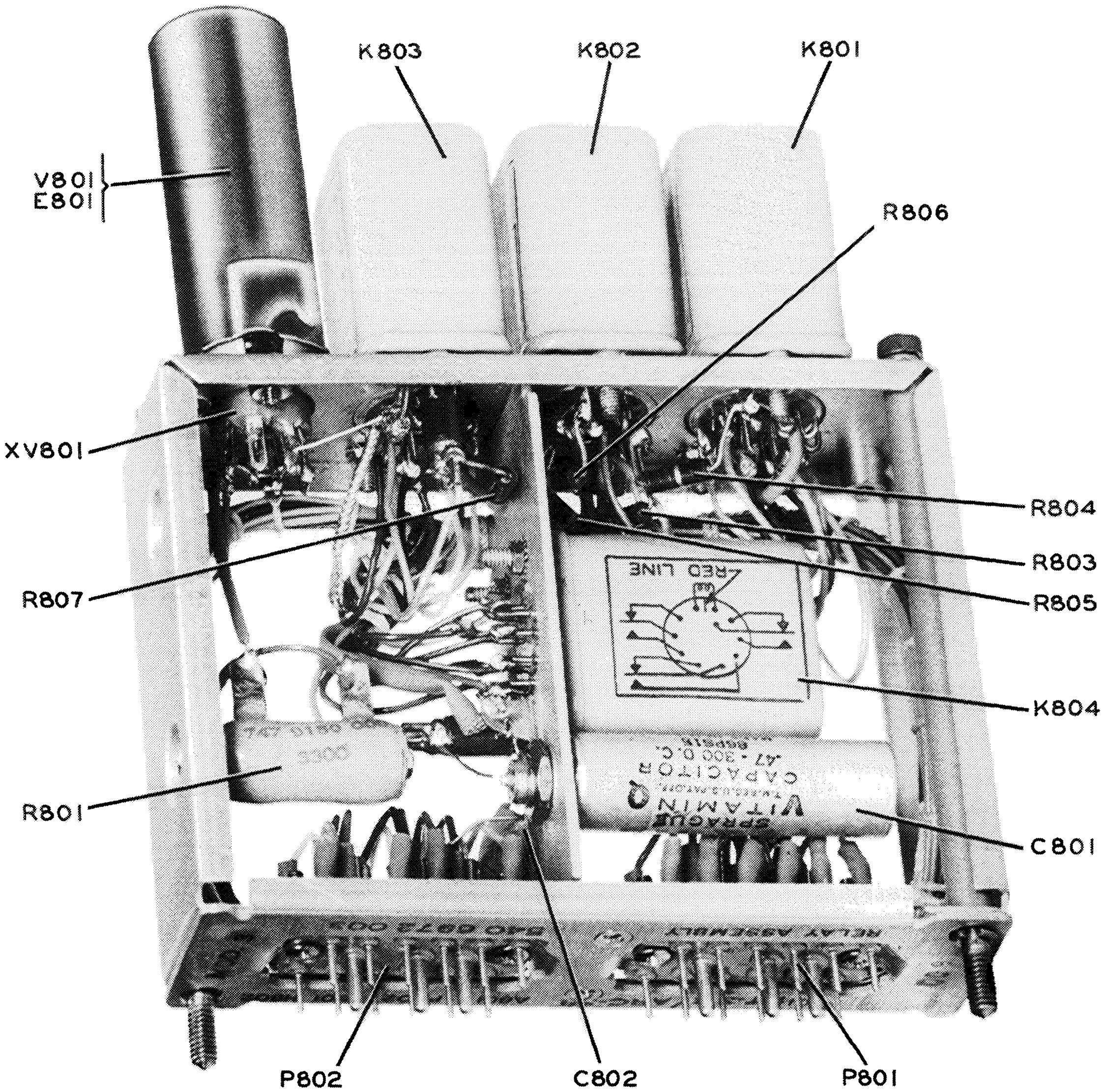

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Figure 7-18. Transceiver 618S-1, Relay Assembly, Rear View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R802	Not used		
R803	Tuner centering voltage divider	RESISTOR: comp, 22,000 ohm ±10%, 1/2 w	745 1408 00
R804	Tuner centering voltage divider	RESISTOR: comp, 2200 ohm ±10%, 1/2 w	745 1366 00
R805	Tuner centering voltage divider	RESISTOR: comp, 22,000 ohm ±10%, 1/2 w	745 1408 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R806	Tuner centering voltage divider	RESISTOR: comp, 2200 ohm ±10%, 1/2 w	745 1366 00
R807	Effective MOD 2	RESISTOR: comp, 47,000 ohm ±10%, 1/2 w	745 1422 00
V801	Voltage regulator	TUBE: voltage regulator OA2	257 0052 00
XV801	V801 holder	SOCKET: tube	220 1111 00
901-999 Series	250 KC IF AMPLIFIER (Used only with Transceiver 618S-1)		506 6919 006
C901	Plate decoupling	CAPACITOR: paper, 0.10 uf ±20%, 300 wv	931 0626 00
C902	Avc decoupling	CAPACITOR: paper, 0.10 uf ±20%, 100 wv	931 0588 00
C903	1st i-f tuning	CAPACITOR: mica, 800 uuf ±2%, 300 wv	935 5016 00
C904	V902 grid coupling	CAPACITOR: ceramic, 3000 uuf, guar min, 500 wv	913 0996 00
	Effective MOD 5	CAPACITOR: ceramic, 3300 uuf, ±20%, 500 wv	913 2750 00
C905	Z901, Z902 tuning	CAPACITOR: mica, 470 uuf ±2%, 300 wv	912 0541 00
C906	2nd i-f coil tuning	CAPACITOR: mica, 800 uuf ±2%, 300 wv	935 5016 00
C907	V902 screen bypass	CAPACITOR: paper, 0.10 uf ±20%, 300 wv	931 0626 00
C908	V903 grid coupling	CAPACITOR: ceramic, 3000 uuf, guar min, 500 wv	913 0996 00
	Effective MOD 5	CAPACITOR: ceramic, 3300 uuf, ±20%, 500 wv	913 2750 00
C909	V903 cathode bypass	CAPACITOR: paper, 0.10 uf ±20%, 100 wv	931 0588 00
C910	V903 screen bypass	CAPACITOR: paper, 0.10 uf ±20%, 300 wv	931 0626 00
C911	V903 plate bypass	CAPACITOR: paper, 0.10 uf ±20%, 300 wv	931 0626 00
C912	Z901 and Z902 coupling	CAPACITOR: mica, 15 uuf ±10%, 500 wv	912 0438 00
C913	Detector return bypass	CAPACITOR: paper, 0.47 uf ±20%, 200 wv	931 0611 00
C914	Z901, Z902 tuning	CAPACITOR: mica, 510 uuf ±2%, 300 wv	912 0544 00
C915	Not used		
C916	Diode load filter	CAPACITOR: mica, 510 uuf ±2%, 300 wv	912 0544 00
C917	Bfo coupling	CAPACITOR: mica, 10 uuf ±10%, 500 wv	912 0432 00

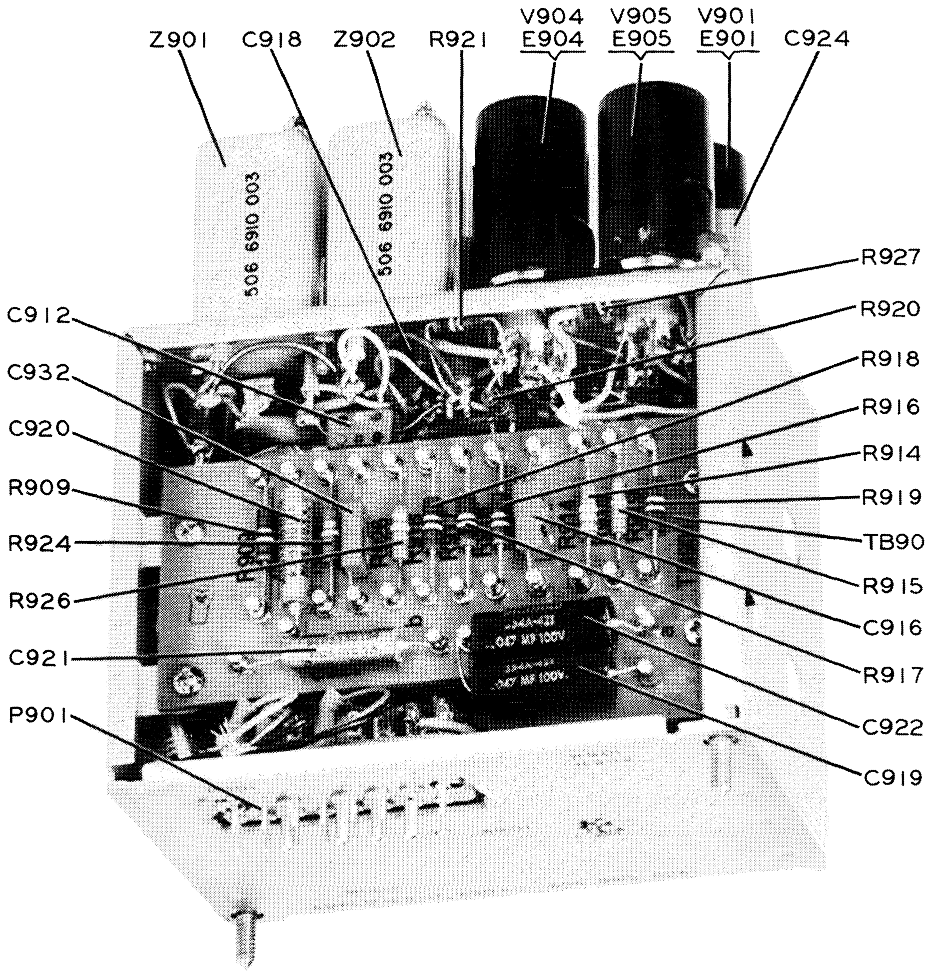


Figure 7-19. Transceiver 618S-1, 250 Kc I-F Amplifier, Front View

TRANSCEIVER 618S-1

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
	Effective MOD 1,2	CAPACITOR: mica, 15 uuf ±10%, 500 wv	912 0438 00
	Effective MOD 3	CAPACITOR: mica, 10 uuf ±10%, 500 wv	912 0432 00
C918	Avc i-f coupling	CAPACITOR: mica, 15 uuf ±10%, 500 wv	912 0438 00
C919	Noise limiter audio filter	CAPACITOR: paper, 0.047 uf ±20%, 100 wv	931 2501 00
C920	Noise limiter audio filter	CAPACITOR: paper, 0.033 uf ±20%, 100 wv	931 2500 00
C921	Audio coupling	CAPACITOR: paper, 0.033 uf ±20%, 100 wv	931 2500 00

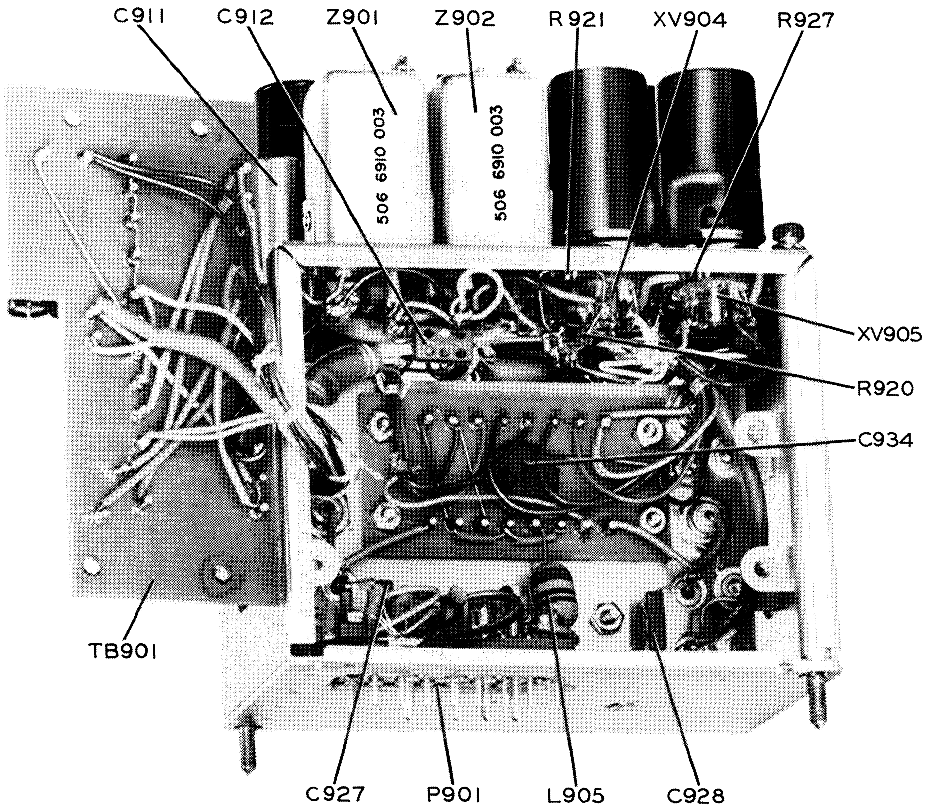


Figure 7-20. Transceiver 618S-1, 250 Kc I-F Amplifier, Front View TB901 Removed

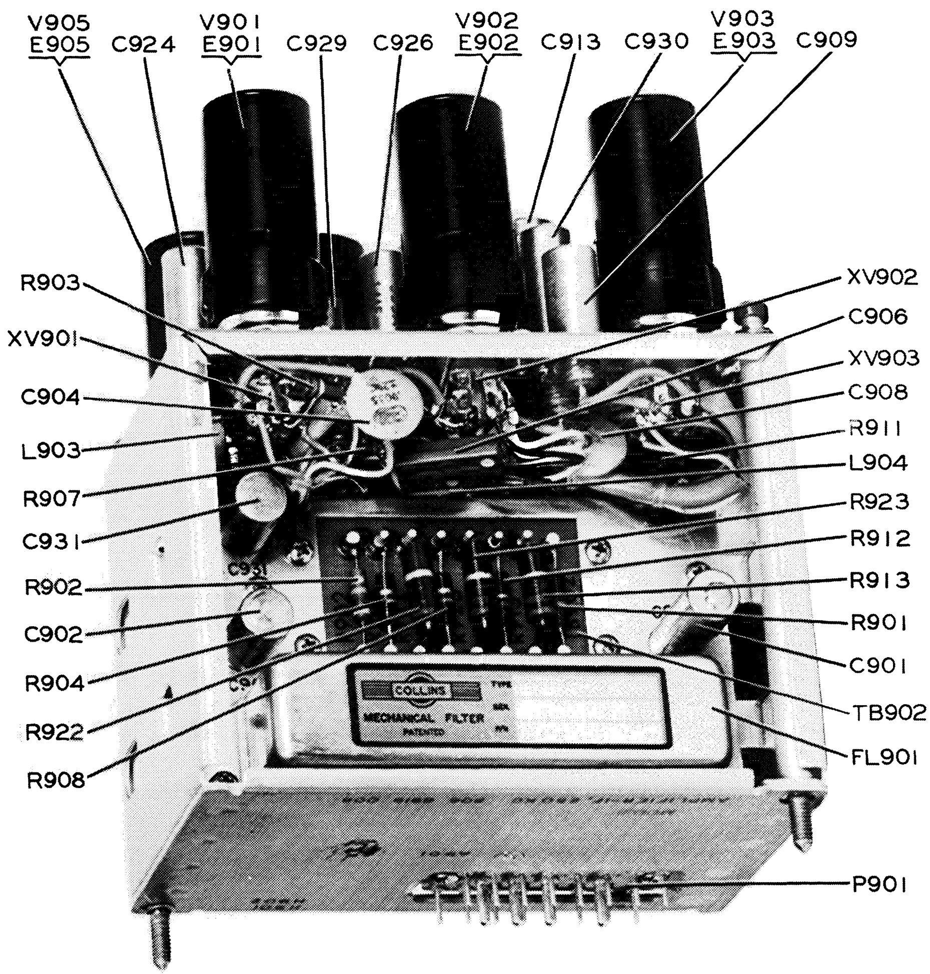
A29-306-P

TRANSCEIVER 618S-1

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C922	Avc decoupling	CAPACITOR: paper, 0.047 uf ±20%, 100 wv	931 2501 00
C923	V901 screen decoupling	CAPACITOR: paper, 0.10 uf ±20%, 300 vdcw	931 0626 00
C924	V901 plate decoupling	CAPACITOR: paper, 0.10 uf ±20%, 300 vdcw	931 0626 00
C925	Not used		
C926	V902 plate decoupling	CAPACITOR: paper, 0.10 uf ±20%, 300 wv	931 0626 00
C927	FL901 input tuning. No MOD, MOD 4	CAPACITOR: mica, 39 uuf ±20%, 500 wv	912 0463 00
	MOD 5	CAPACITOR: mica, 47 uuf ±2%, 500 wv	912 0469 00
C928	FL901 output tuning	CAPACITOR: mica, 91 uuf ±2%, 500 vdcw	912 0490 00

TRANSCEIVER 618S-1

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C929	V901 cathode bypass	CAPACITOR: paper, 0.10 uf ±20%, 100 vdcw	931 0588 00
C930	V902 cathode bypass	CAPACITOR: paper, 0.10 uf ±20%, 300 vdcw	931 0626 00
C931	Avc decoupling	CAPACITOR: paper, 0.047 uf ±20%, 100 vdcw	931 0586 00
C932	Noise limiter filter	CAPACITOR: mica, 220 uuf ±10%, 500 wv	912 0519 00
C933	Avc decoupling	CAPACITOR: mica, 220 uuf ±10%, 500 wv	912 0519 00
C934	B+ decoupling	CAPACITOR: ceramic, 0.01 uf guar min, 500 wv	913 1188 00
E901	V901 shield	SHIELD: tube, 0.810 in. dia x 1-3/4 in. lg	541 6551 003
E902	V902 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/4 in. lg	541 6551 003
E903	V903 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/4 in. lg	541 6551 003
E904	V904 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/8 in. lg	541 6550 002
E905	V905 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/8 in. lg	541 6550 002
FL901	250-kc filter	FILTER: mechanical, 250 kc	526 9039 002
L901	250-kc i-f coil	COIL: 195 turn	506 6901 002
L902	Not used		
L903	250-kc i-f coil	CHOKE, RF: approx 494 uh ±2% at 790 kc	240 0196 00
L904	250-kc i-f coil	CHOKE, RF: approx 494 uh ±2% at 790 kc	240 0196 00
L905	B+ decoupling	CHOKE, RF: approx 500 uh ±10% at 1000 kc	240 0073 00
P901	250-kc i-f power plug	CONNECTOR: male plug, 20-prong wall or cable mounting	372 1069 00
R901	Plate decoupling	RESISTOR: comp, 22,000 ohm ±10%, 1/2 w	745 1408 00
R902	Avc decoupling	RESISTOR: comp, 47,000 ohm ±10%, 1/2 w	745 1422 00
*R903	V901 cathode	RESISTOR: comp, 330 ohm ±10%, 1/2 w	745 1065 00
	Effective MOD 2	RESISTOR: comp, 150 ohm ±10%, 1/2 w	745 1317 00
		RESISTOR: comp, 180 ohm ±10%, 1/2 w	745 1321 00
		RESISTOR: comp, 220 ohm ±10%, 1/2 w	745 1324 00
		RESISTOR: comp, 270 ohm ±10%, 1/2 w	745 1328 00
		RESISTOR: comp, 330 ohm ±10%, 1/2 w	745 1331 00
		RESISTOR: comp, 390 ohm ±10%, 1/2 w	745 1335 00
		RESISTOR: comp, 470 ohm ±10%, 1/2 w	745 1338 00
		RESISTQR: comp, 560 ohm ±10%, 1/2 w	745 1342 00



A29-307-P

Figure 7-21. Transceiver 618S-1, 250 Kc I-F Amplifier, Rear View

TRANSCEIVER 618S-1

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
		RESISTOR: comp, 680 ohm ±10%, 1/2 w	745 1345 00
		RESISTOR: comp, 820 ohm ±10%, 1/2 w	745 1349 00
R904	V901 screen MOD 1 through 4	RESISTOR: comp, 15,000 ohm ±10%, 1/2 w	745 1135 00
	MOD 5	RESISTOR: comp, 15,000 ohm ±10%, 1/2 w	745 1401 00
R905	L903 de-Q	RESISTOR: comp, 22,000 ohm ±10%, 1/2 w	745 1408 00
R906	L904 de-Q	RESISTOR: comp, 22,000 ohm ±10%, 1/2 w	745 1408 00
R907	V902 cathode	RESISTOR: comp, 330 ohm ±10%, 1/2 w	745 1331 00

TRANSCEIVER 618S-1

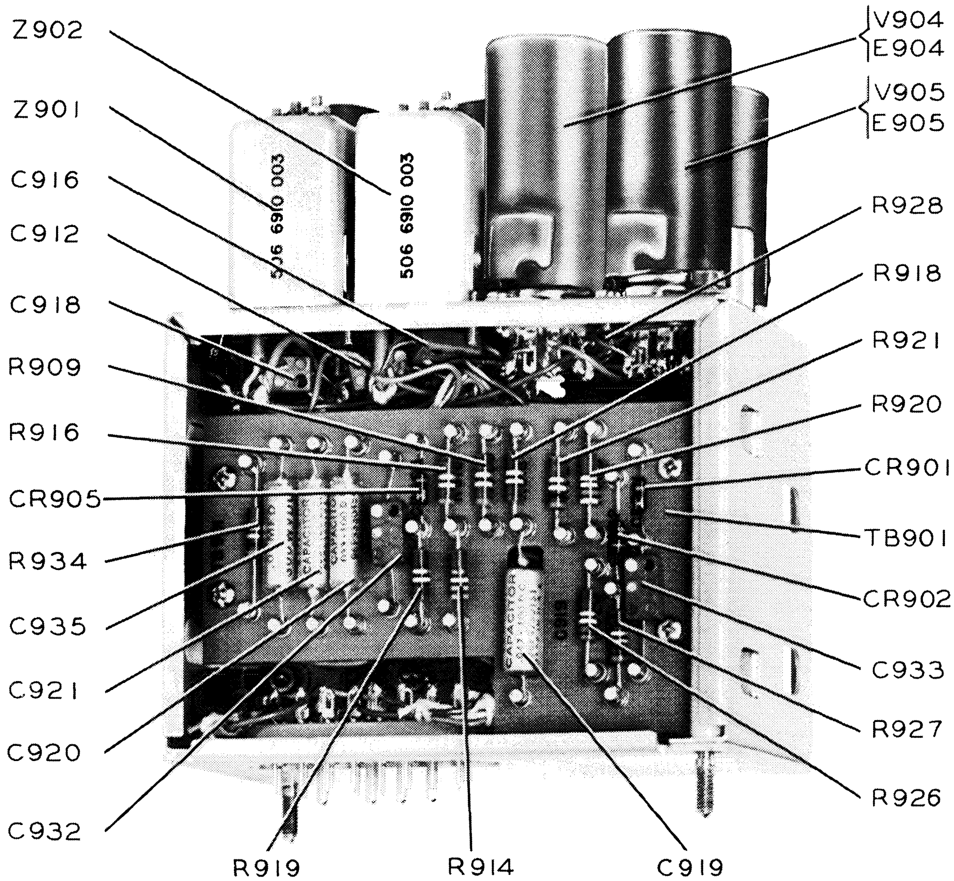
ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R908	V902 screen	RESISTOR: comp, 15,000 ohm ±10%, 1/2 w	745 1401 00
R909	Voltage divider noise limiter coupling	RESISTOR: comp, 0.12 megohm ±10%, 1/2 w	745 1440 00
R910	V903 grid	RESISTOR: comp, 0.10 megohm ±10%, 1/2 w	745 1436 00
R911	V903 cathode	RESISTOR: comp, 330 ohm ±10%, 1/2 w	745 1331 00
R912	V903 screen	RESISTOR: comp, 22,000 ohm ±10%, 1/2 w	745 1142 00
	Effective MOD 2	RESISTOR: comp, 27,000 ohm ±10%, 1/2 w	745 1412 00
R913	V903 plate decoupling	RESISTOR: comp, 10,000 ohm ±10%, 1 w	747 3128 00
	Effective MOD 2	RESISTOR: comp, 6800 ohm ±10%, 1 w	745 3387 00
R914	Delay bias voltage divider	RESISTOR: comp, 330,000 ohm ±10%, 1/2 w	745 1191 00
	Effective MOD 4	RESISTOR: comp, 330,000 ohm ±5%, 1/2 w	745 1456 00
R915	Delay bias voltage divider	RESISTOR: comp, 68,000 ohm ±10%, 1/2 w	745 1163 00
	Effective MOD 4	RESISTOR: comp, 82,000 ohm ±5%, 1/2 w	745 1432 00
R916	Voltage divider noise limiter coupling	RESISTOR: comp, 0.12 megohm ±10%, 1/2 w	745 1440 00
R917	Delay bias voltage	RESISTOR: comp, 0.10 megohm ±10%, 1/2 w	745 1436 00
R918	Noise limiter filter	RESISTOR: comp, 0.22 megohm ±10%, 1/2 w	745 1450 00
R919	Noise limiter decoupling	RESISTOR: comp, 0.22 megohm ±10%, 1/2 w	745 1450 00
R920	Avc decoupling	RESISTOR: comp, 0.47 megohm ±10%, 1/2 w	745 1464 00
R921	Avc voltage divider	RESISTOR: comp, 0.10 megohm ±10%, 1/2 w	745 1436 00
R922	V901 plate decoupling	RESISTOR: comp, 15,000 ohm ±10%, 1/2 w	745 1135 00
	Effective MOD 2	RESISTOR: comp, 8200 ohm ±10%, 1 w	745 3391 00
R923	V902 plate decoupling	RESISTOR: comp, 15,000 ohm ±10%, 1/2 w	745 1135 00
	Effective MOD 2	RESISTOR: comp, 8200 ohm ±10%, 1 w	745 3391 00
R924	Avc load	RESISTOR: comp, 0.27 megohm ±10%, 1/2 w	745 1454 00

TRANSCEIVER 618S-1

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R925	V902 grid resistor	RESISTOR: comp, 0.10 megohm ±10%, 1/2 w	745 1436 00
R926	V905 plate load	RESISTOR: comp, 0.18 megohm ±10%, 1/2 w	745 1447 00
R927	Avc decoupling	RESISTOR: comp, 15,000 ohm ±10%, 1/2 w	745 1401 00
TB901	Resistor-capacitor term mtg	BOARD: terminal, 25-post terminals	506 6903 003
TB902	Resistor term mtg	BOARD: terminal, 16-post terminals	506 6905 003
V901	1st i-f amplifier	TUBE: 5749	253 0005 00
V902	2nd i-f amplifier	TUBE: 5749	253 0005 00
V903	3rd i-f amplifier	TUBE: 5749	253 0005 00
V904	Detector and avc diode	TUBE: 5726	253 0003 00
V905	Avc and noise limiter diode	TUBE: 5726	253 0003 00
XV901	V901 holder	SOCKET: tube	220 1111 00
XV902	V902 holder	SOCKET: tube	220 1111 00
XV903	V903 holder	SOCKET: tube	220 1111 00
XV904	V904 holder	SOCKET: tube	220 1111 00
XV905	V905 holder	SOCKET: tube	220 1111 00
Z901	250-kc i-f transformer	COIL: i-f, 250 kc	506 6910 003
Z902	250-kc i-f transformer	COIL: i-f, 250 kc	506 6910 003
901-999 Series	250 KC I-F AMPLIFIER WITH SQUELCH AND SELCAL (This unit is a part of Transceiver 618S-4.)		541 4877 006
C901	Plate decoupling	CAPACITOR: paper, 0.068 uf ±20%, 300 wv	931 0625 00
C902	Avc decoupling	CAPACITOR: paper, 0.10 uf ±20%, 100 wv	931 0588 00
C903	1st i-f tuning	CAPACITOR: mica, 1500 uuf ±2%, 500 wv	935 5078 00
C904	V902 grid coupling	CAPACITOR: ceramic, 3300 uuf ±20%, 500 wv	913 2750 00
C905	Z901, Z902 tuning	CAPACITOR: mica, 470 uuf, ±2%, 300 wv	912 0541 00
C906	2nd i-f coil tuning	CAPACITOR: mica, 1500 uuf, ±2%, 500 wv	935 5078 00
C907	V902 screen bypass	CAPACITOR: paper, 0.10 uf ±20%, 300 wv	931 0626 00

TRANSCEIVER 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C908	V903 grid coupling	CAPACITOR: ceramic, 3300 uuf ±20%, 500 wv	913 2750 00
C909	V903 cathode bypass	CAPACITOR: paper, 0.10 uf ±20%, 100 wv	931 0588 00
C910	V903 screen bypass	CAPACITOR: paper, 0.10 uf ±20%, 300 wv	931 0626 00
C911	V903 plate bypass	CAPACITOR: paper, 0.10 uf ±20%, 300 wv	931 0626 00
C912	Z901, Z902 coupling	CAPACITOR: mica, 15 uuf, ±5%, 500 wv	912 0437 00
C913	Detector return bypass	CAPACITOR: paper, 0.47 uf, ±20%, 200 wv	931 0611 00
C914	Z901, Z902 tuning	CAPACITOR: mica, 510 uuf, ±2%, 300 wv	912 0544 00
C915	Squelch control coupling	CAPACITOR: mica, 33 uuf, ±5%, 500 wv	912 0458 00
C916	D-c blocking	CAPACITOR: mica, 510 uuf, ±5%, 300 wv	912 0545 00
C917	Bfo coupling	CAPACITOR: mica, 10 uuf, ±5%, 500 wv	912 0431 00
C918	Avc i-f coupling	CAPACITOR: mica, 15 uuf, ±5%, 500 wv	912 0437 00
C919	Noise limiter audio filter	CAPACITOR: paper, 0.047 uf, ±20%, 100 wv	931 0494 00
C920	Noise limiter audio filter	CAPACITOR: paper, 0.033 uf, ±20%, 100 wv	931 2500 00
C921	Audio coupling	CAPACITOR: paper, 0.033 uf, ±20%, 100 wv	931 2500 00
C922	Avc decoupling	CAPACITOR: ceramic, 0.02 +100% -20%, 500 wv	913 2142 00
C923	V901 screen decoupling	CAPACITOR: paper, 0.10 uf, ±20%, 300 wv	931 0626 00
C924	V901 plate decoupling	CAPACITOR: paper, 0.10 uf, ±20%, 300 wv	931 0626 00
C925	Selcal, coupling	CAPACITOR: paper, 0.033 uf, ±20%, 100 wv	931 2500 00
C926	V902 plate decoupling	CAPACITOR: paper, 0.10 uf, ±20%, 300 wv	931 0626 00
C927	FL901 input tuning	CAPACITOR: mica, 39 uuf, ±5%, 500 wv	912 0464 00
C928	FL901 output tuning	CAPACITOR: mica, 91 uuf, ±2%, 500 wv	912 0490 00
C929	V901 cathode bypass	CAPACITOR: paper, 0.10 uf, ±20%, 100 wv	931 0588 00



A29-308-P

Figure 7-22. Transceiver 618S-4, 250 Kc I-F Amplifier with Squelch and Selcal, Front View

TRANSCEIVER 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C930	V902 cathode bypass	CAPACITOR: paper, 0.10 uf, ±20%, 300 wv	931 0626 00
C931	Avc decoupling	CAPACITOR: paper, 0.047 uf, ±20%, 100 wv	931 0586 00
C932	Noise limiter filter	CAPACITOR: mica, 220 uuf, ±5%, 500 wv .	912 0518 00
C933	Avc decoupling	CAPACITOR: mica, 220 uuf, ±5%, 500 wv	912 0518 00
C934	B+ decoupling	CAPACITOR: ceramic, 10,000 uuf, +100% -20%, 500 wv	913 1188 00
C935	DC Blocking	CAPACITOR: paper, 0.01 uf ±20%, 300 wv	931 2556 00
C936	Control voltage filter	CAPACITOR: electrolytic, 4 uf, +50% -15%, 60 wv	184 7000 00
C937	V904B plate bypass	CAPACITOR: paper, 0.10 uf, ±20%, 300 wv	931 0626 00

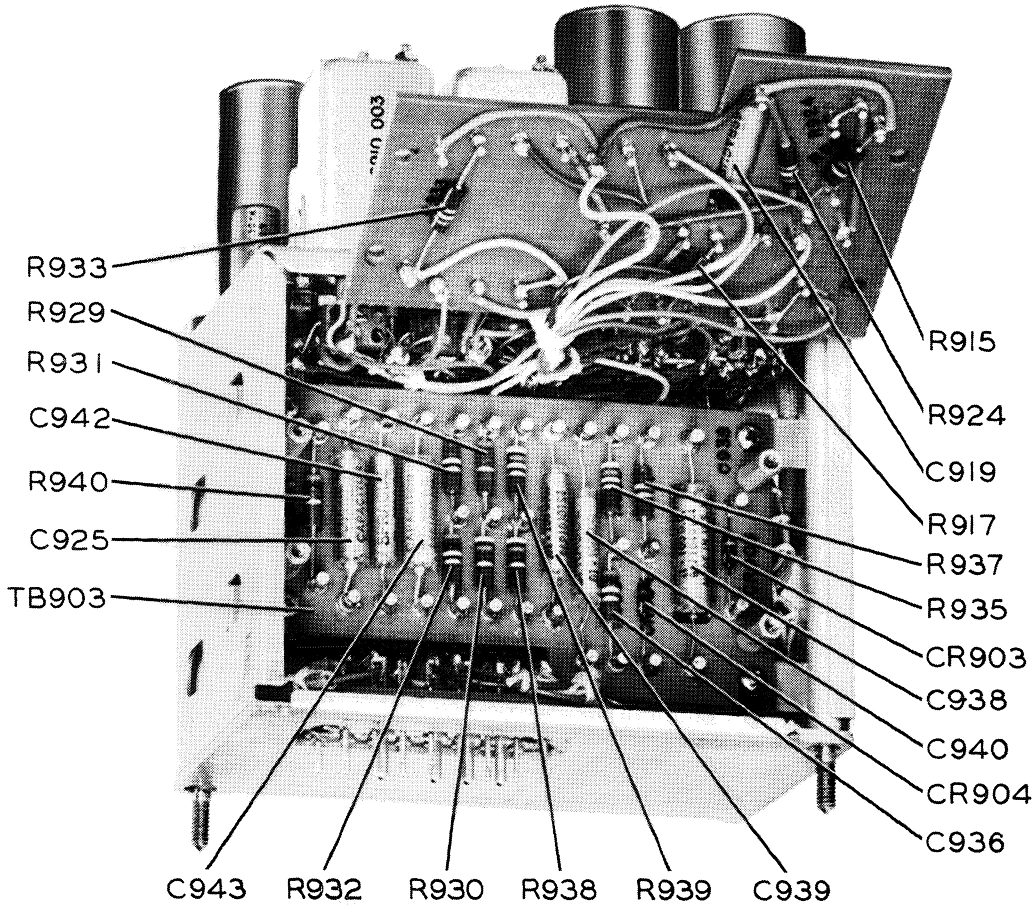


Figure 7-23. Transceiver 618S-4, 250 Kc I-F Amplifier with Squelch and Selcal, Front View TB901 Removed

TRANSCEIVER 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C938	Squelch coupling	CAPACITOR: paper, 0.10 uf, ±20%, 100 wv	931 2503 00
C939	Noise filter	CAPACITOR: paper, 0.01 uf, ±20%, 100 wv	931 2497 00
C940	Squelch control line filter	CAPACITOR: paper, 0.01 uf, ±20%, 100 wv	931 2497 00
C941	V905A plate bypass	CAPACITOR: paper, 0.047 uf, ±20%, 100 wv	931 0586 00
C942	Audio coupling	CAPACITOR: paper, 0.01 uf, ±20%, 100 wv	931 2497 00
C943	V905B plate bypass	CAPACITOR: paper, 0.01 uf ±20%, 300 3 v	931 2556 00
CR901	Avc detector	DIODE: silicon type HD 6007	353 0205 00

TRANSCEIVER 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
CR902	Avc gate	DIODE: silicon type HD 6007	353 0205 00
CR903	Squelch diode	DIODE: silicon type HD 6007	353 0205 00
CR904	Squelch diode	DIODE: silicon type HD 6007	353 0205 00
CR905	Noise limiter diode	DIODE: silicon type HD 6007	353 0205 00
E901	V901 shield	SHIELD: electron tube, copper, 0.810 in. x 1-3/4 in. lg	541 6551 003
E902	V902 shield	SHIELD: electron tube, copper, 0.810 in. dia x 1-3/4 in. lg	541 6551 003
E903	V903 shield	SHIELD: electron tube, copper, 0.810 in. dia x 1-3/4 in. lg	541 6551 003
E904	V904 shield	SHIELD: electron tube, copper, 0.810 in. dia x 1-3/8 in. lg	541 6550 003
E905	V905 shield	SHIELD: electron tube, copper, 0.810 in. dia x 1-3/8 in. lg	541 6550 003
FL901	250-kc i-f filter	FILTER: mechanical, 250 kc	526 9039 002
L901	250-kc i-f coil	COIL: 195 turn	506 6901 002
L902	B+ decoupling	CHOKE: r-f 500 mh ±10%	240 0073 00
L903	p/o V901 plate tuned circuit	INDUCTOR: variable, 225 to 275 kc with 1435 uuf shunting capacitance	242 0074 00
L904	p/o V902 plate tuned circuit	INDUCTOR: variable, 225 to 275 kc with 1435 uuf shunting capacitance	242 0074 00
P901	250-kc i-f power plug	CONNECTOR: male plug, 20-prong wall or cable mounting	372 1069 00
R901	B+ decoupling	RESISTOR: comp, 22K ohm ±10%, 1/2 w	745 1408 00
R902	Avc decoupling	RESISTOR: comp, 47K ohm ±10%, 1/2 w	745 1422 00
*R903	V901 cathode	RESISTOR: comp, 150 ohm ±10%, 1/2 w	745 1317 00
		RESISTOR: comp, 180 ohm ±10%, 1/2 w	745 1321 00
		RESISTOR: comp, 220 ohm ±10%, 1/2 w	745 1324 00
		RESISTOR: comp, 270 ohm ±10%, 1/2 w	745 1328 00
		RESISTOR: comp, 330 ohm ±10%, 1/2 w	745 1331 00
		RESISTOR: comp, 390 ohm ±10%, 1/2 w	745 1335 00
		RESISTOR: comp, 470 ohm ±10%, 1/2 w	745 1338 00
		RESISTOR: comp, 560 ohm ±10%, 1/2 w	745 1342 00
		RESISTOR: comp, 680 ohm ±10%, 1/2 w	745 1345 00
		RESISTOR: comp, 820 ohm ±10%, 1/2 w	745 1349 00

*Choose 1 for individual requirement

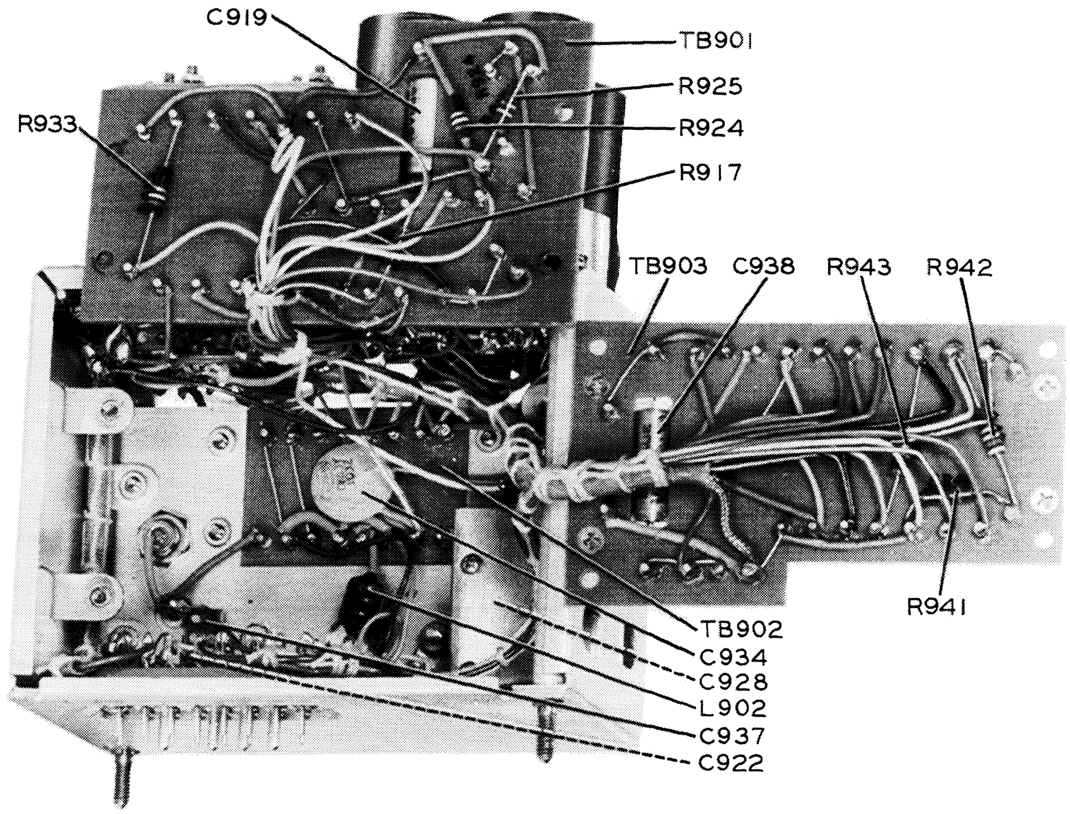


Figure 7-24. Transceiver 618S-4, 250 Kc I-F Amplifier with Squelch and Selcal, Front View, TB901 and TB903 Removed

TRANSCEIVER 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R904	V901 screen	RESISTOR: comp, 15K ohm ±10%, 1/2 w	745 1401 00
R905	L903 de-Q	RESISTOR: comp, 22K ohm ±10%, 1/2 w	745 1408 00
R906	L904 de-Q	RESISTOR: comp, 22K ohm ±10%, 1/2 w	745 1408 00
R907	V902 cathode	RESISTOR: comp, 330 ohm ±10%, 1/2 w	745 1331 00
R908	V902 screen	RESISTOR: comp, 15K ohm ±10%, 1/2 w	745 1401 00
R909	V904A diode load	RESISTOR: comp, 120K ohm ±10%, 1/2 w	745 1440 00
R910	V903 grid	RESISTOR: comp, 100K ohm ±10%, 1/2 w	745 1436 00
R911	V903 cathode	RESISTOR: comp, 330 ohm ±10%, 1/2 w	745 1331 00
R912	V903 screen	RESISTOR: comp, 27K ohm ±10%, 1/2 w	745 1412 00
R913	V903 plate decoupling	RESISTOR: comp, 6.8 ohm ±10%, 1 w	745 3387 00

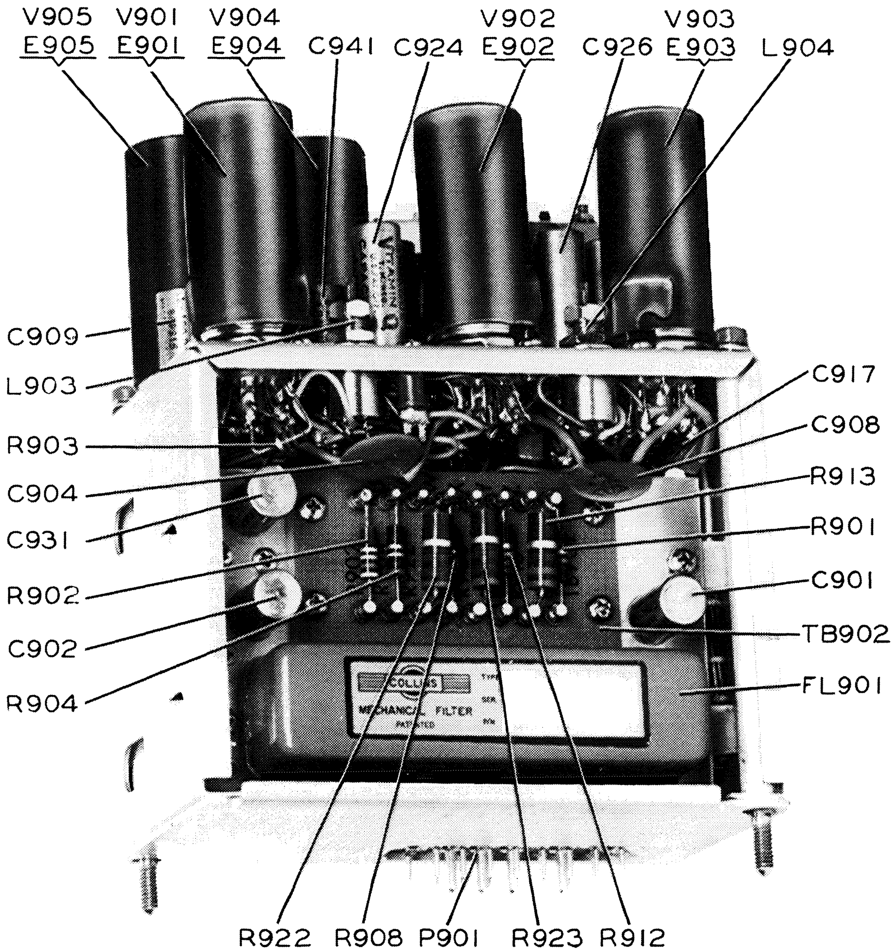


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Figure 7-25. Transceiver 618S-4, 250 Kc I-F Amplifier with Squelch and Selcal, Rear View

TRANSCEIVER 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R914	Voltage divider, delay bias	RESISTOR: comp, 330K ohm ±5%, 1/2 w	745 1456 00
R915	Voltage divider, delay bias	RESISTOR: comp, 82K ohm ±5%, 1/2 w	745 1432 00
R916	V904A diode load	RESISTOR: comp, 120K ohm ±10%, 1/2 w	745 1440 00
R917	Noise limiter filter	RESISTOR: comp, 100K ohm ±10%, 1/2 w	745 1436 00
R918	Noise limiter filter	RESISTOR: comp, 220 ohm ±10%, 1/2 w	745 1450 00
R919	Noise limiter decoupling	RESISTOR: comp, 220K ohm ±10%, 1/2 w	745 1450 00

TRANSCEIVER 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R920	Avc decoupling	RESISTOR: comp, 470K ohms ±10%, 1/2 w	745 1464 00
R921	Avc voltage divider	RESISTOR: comp, 100K ohm ±10%, 1/2 w	745 1436 00
R922	V901 plate decoupling	RESISTOR: comp, 8.2K ohms ±10%, 1 w	745 3391 00
R923	V902 plate decoupling	RESISTOR: comp, 8.2K ohm ±10%, 1 w	745 3391 00
R924	Avc load	RESISTOR: comp, 270K ohms ±10%, 1/2 w	745 1454 00
R925	V902 grid resistor	RESISTOR: comp, 100K ohm ±10%, 1/2 w	745 1436 00
R926	Avc detector load	RESISTOR: comp, 180K ohm ±10%, 1/2 w	745 1447 00
R927	Avc gate decoupling	RESISTOR: comp, 15K ohm ±10%, 1/2 w	745 1401 00
R928	Squelch control, isolation resistor	RESISTOR: comp, 270K ohm ±10%, 1/2 w	745 1454 00
R929	Squelch control, isolation resistor	RESISTOR: comp, 1.5K ohm ±10%, 1/2 w	745 1359 00
R930	Squelch control, voltage divider	RESISTOR: comp, 4.7K ohm ±10%, 1/2 w	745 1380 00
R931	V904B plate load	RESISTOR: comp, 220K ohm ±10%, 1/2 w	745 1450 00
R932	V904B plate decoupling	RESISTOR: comp, 100K ohm ±10%, 1/2 w	745 1436 00
R933	Audio attenuation	RESISTOR: comp, 560K ohm ±10%, 1/2 w	745 1468 00
	Effective MOD 1	RESISTOR: comp, 4.7 megohms ±10%, 1/2 w	745 1506 00
R934	Audio attenuation	RESISTOR: comp, 10K ohm ±10%, 1/2 w	745 1394 00
	Effective MOD 1	RESISTOR: comp, 100K ohm, ±10%, 1/2 w	745 1436 00
R935	P/o filter circuit	RESISTOR: comp, 470K ohm ±10%, 1/2 w	745 1464 00
R936	CR904 load	RESISTOR: comp, 100K ohm ±10%, 1/2 w	745 1436 00
R937	CR903 and CR904 load	RESISTOR: comp, 220K ohm ±10%, 1/2 w	745 1450 00
R938	Squelch control, voltage divider	RESISTOR: comp, 4.7K ohm ±10%, 1/2 w	745 1380 00
R939	V905A plate load	RESISTOR: comp, 470K ohm ±10%, 1/2 w	745 1464 00
R940	V905B bias	RESISTOR: comp, 1.0K ohm ±10%, 1/2 w	745 1352 00

TRANSCEIVER 618S-4

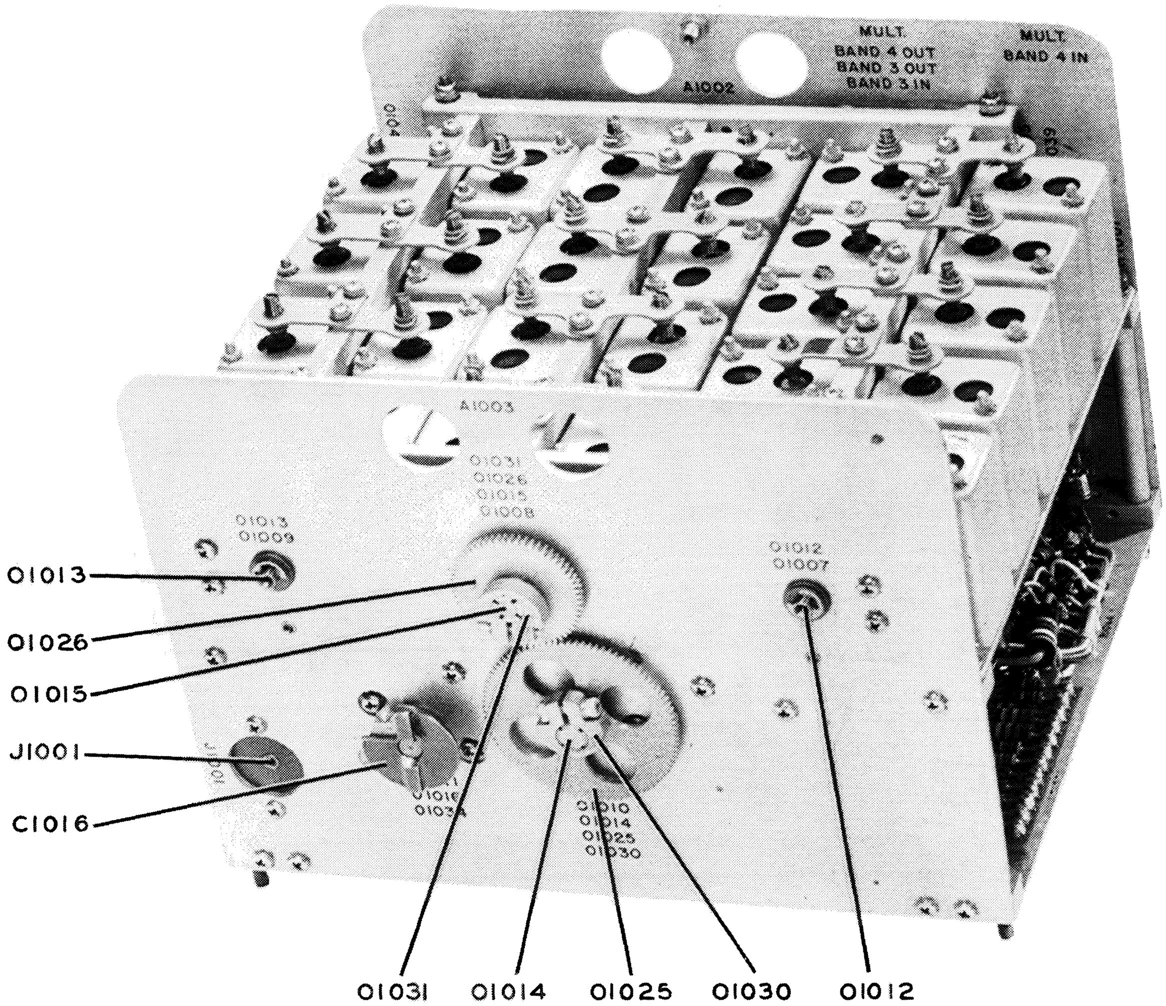
ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R941	V905B load	RESISTOR: comp, 5.6K ohm ±10%, 1/2 w	745 1384 00
R942	V905B grid isolation	RESISTOR: comp, 470K ohm ±10%, 1/2 w	745 1464 00
R943	B+ decoupling	RESISTOR: comp, 100K ohm ±10%, 1/2 w	745 1436 00
R944	Filament line resistor	RESISTOR: comp, 240 ohm ±5%, 1 w	745 3326 00
TB901	Resistor, capacitor, diode mtg	BOARD: terminal, 33 post terminals	541 4959 004
TB902	Resistor, capacitor, mtg	BOARD: terminal, 16 post terminals	506 6906 003
TB903	Resistor, capacitor, diode mtg	BOARD: terminal, 31 post terminals	541 4960 004
V901	1st i-f amplifier	TUBE: 5749	253 0005 00
V902	2nd i-f amplifier	TUBE: 5749	253 0005 00
V903	3rd i-f amplifier	TUBE: 5749	253 0005 00
V904	Detector-amplifier	TUBE: 5751	253 0012 00
V905	Amplifier-impedance match	TUBE: 5751	253 0012 00
XV901	V901 holder	SOCKET: tube	220 1111 00
XV902	V902 holder	SOCKET: tube	220 1111 00
XV903	V903 holder	SOCKET: tube	220 1103 00
XV904	V904 holder	SOCKET: tube	220 1103 00
XV905	V905 holder	SOCKET: tube	220 1103 00
Z901	250-kc i-f transformer	COIL: i-f, 250 kc	506 6910 003
Z902	250-kc i-f transformer	COIL: i-f, 250 kc	506 6910 003
TRANSCEIVER 618S-1, 618S-4			
1001-1199 Series	R-F TUNER		506 7041 006
C1001	T1001 tuning	CAPACITOR: mica, 180 uuf ±2%, 500 wv	912 0511 00
C1002	T1001 var tuning	CAPACITOR: ceramic, variable, 5 to 37.5 uuf, 350 wv	917 1073 00
C1003	Discriminator phasing	CAPACITOR: ceramic, 51 uuf, ±5%, 500 wv	912 0473 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1004	Discriminator coupling	CAPACITOR: ceramic, 3000 uuf guar min, 500 wv	913 0996 00
C1005	Discriminator coupling	CAPACITOR: ceramic, 3000 uuf guar min, 500 wv	913 0996 00
C1006	Discriminator r-f bypass	CAPACITOR: ceramic, 3000 uuf guar min, 500 wv	913 0996 00
C1007	Discriminator r-f bypass	CAPACITOR: ceramic, 3000 uuf guar min, 500 wv	913 0996 00
C1008	Z1002 tuning	CAPACITOR: mica, 220 uuf, ±2%, 500 wv	912 0517 00
C1009	Z1002 var tuning	CAPACITOR: ceramic, variable, 8 to 75 uuf max, 350 wv	917 1075 00
C1010	Z1003 tuning	CAPACITOR: mica, 220 uuf, ±2%, 500 wv	912 0517 00
C1011	Z1003 var tuning	CAPACITOR: ceramic, variable, 8.0 to 75.0 uuf max, 350 wv	917 1075 00
C1012	V1002 grid coupling	CAPACITOR: ceramic, 7.0 uuf, ±1/2 uuf, 500 wv	928 0126 00
	Effective MOD 3	CAPACITOR: ceramic, fixed, 4.0 uuf, ±1/2 uuf, 500 wv	928 0114 00
C1013	Z1004 tuning	CAPACITOR: mica, 240 uuf, ±2%, 500 wv	912 0520 00
C1014	Z1004 var tuning	CAPACITOR: ceramic, variable, 8.0 to 75.0 uuf max, 350 wv	917 1075 00
C1015	Z1004 and Z1005 coupling	CAPACITOR: ceramic, 7.0 uuf, ±1/2 uuf, 500 wv	928 0126 00
	Effective MOD 3	CAPACITOR: ceramic, fixed, 4.0 uuf, ±1/2 uuf, 500 wv	928 0114 00
C1016	Z1005 tuning	CAPACITOR: mica, 240 uuf, ±2%, 500 wv	912 0520 00
C1017	Z1005 var tuning	CAPACITOR: ceramic, variable, 8.0 to 75.0 uuf max, 350 wv	917 1075 00
C1018	Z1006 tuning	CAPACITOR: mica, 62 uuf, ±2%, 500 wv	912 0478 00
		CAPACITOR: mica, 75 uuf, ±5%, 500 wv	912 0485 00
	Effective MOD 3	CAPACITOR: mica, 62 uuf, ±5%, 500 wv	912 0479 00
C1019	Z1006 var tuning	CAPACITOR: ceramic, variable, 5.0 to 25.0 uuf, 350 wv	917 1073 00
	Effective MOD 3	CAPACITOR: ceramic, variable, 5.0 to 30.0 uuf, 350 wv	917 1074 00
C1020	Z1006 and Z1007 coupling	CAPACITOR: ceramic, 1.0 uuf, ±1/4 uuf, 500 wv	928 0070 00
C1021	Z1007 tuning	CAPACITOR: mica, 75 uuf, ±2%, 500 wv	912 0484 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1022	Z1007 var tuning	CAPACITOR: ceramic, variable, 5.0 to 25.0 uuf, 350 wv	917 1073 00
	Effective MOD 3	CAPACITOR: ceramic, variable, 5.0 to 30.0 uuf, 350 wv	917 1074 00
C1023	Z1019 tuning	CAPACITOR: mica, 100 uuf, ±2%, 500 wv	912 0493 00
	Effective MOD 3	CAPACITOR: ceramic, fixed, 120 uuf, ±2%, 500 wv	928 7266 00
C1024	Z1008 var tuning	CAPACITOR: ceramic, variable, 5.0 to 37.5 uuf max, 350 wv	917 1073 00
C1025	Z1009 tuning	CAPACITOR: mica, 10 uuf, ±5%, 500 wv	912 0431 00
	Effective MOD 3	CAPACITOR: ceramic, fixed, 10.0 uuf, ±1/2 uuf, 500 wv	916 1298 00
C1026	Z1009 var tuning	CAPACITOR: ceramic, variable, 5.0 to 37.5 uuf max, 350 wv	917 1073 00
C1027	Z1008 and Z1009 coupling	CAPACITOR: ceramic, 1.0 uuf, ±1/4 uuf, 500 wv	928 0070 00
C1028	Z1010 coupling	CAPACITOR: ceramic, 36 uuf, ±2%, 500 wv	912 0460 00
C1029	Z1010 tuning	CAPACITOR: mica, 180 uuf, ±2%, 500 wv	912 0511 00
C1030	Z1010 var tuning	CAPACITOR: ceramic, variable, 8.0 to 75.0 uuf max, 350 wv	917 1075 00
C1031	Z1011 coupling	CAPACITOR: ceramic, 12 uuf, ±5%, 500 wv	928 0141 00
C1032	Z1011 tuning	CAPACITOR: mica, 82 uuf, ±2%, 500 wv	912 0487 00
	Effective MOD 3	CAPACITOR: ceramic, fixed, 100 uuf, ±5%, 500 wv	928 7256 00
C1033	Z1011 var tuning	CAPACITOR: ceramic, variable, 8.0 to 50.0 uuf, 350 wv	917 1075 00
	Effective MOD 3	CAPACITOR: variable, ceramic, 5.0 to 30.0 uuf, 350 wv	917 1074 00
C1034	Z1012 coupling	CAPACITOR: ceramic, 10 uuf, ±1/2 uuf, 500 wv	928 0138 00
C1035	Z1012 tuning	CAPACITOR: mica, 24 uuf, ±2%, 500 wv	912 0449 00
C1036	Z1012 var tuning	CAPACITOR: ceramic, variable, 5.0 to 25.0 uuf, 350 wv	917 1073 00
	Effective MOD 3	CAPACITOR: variable, ceramic, 5.0 uuf to 30.0 uuf, 35 wv	917 1074 00
C1037	Z1013 tuning	CAPACITOR: mica, 51 uuf, ±2%, 500 wv	912 0472 00
C1038	Z1013 coupling	CAPACITOR: ceramic, 4 uuf, ±1/4 uuf, 500 wv	928 0114 00
C1039	Z1013 var coupling	CAPACITOR: ceramic, variable, 5.0 to 25.0 uuf, 350 wv	917 1073 00
	Effective MOD 3	CAPACITOR: variable, ceramic, 5.0 uuf to 30.0 uuf, 35 wv	917 1074 00
C1040	Z1014 tuning	CAPACITOR: ceramic, 2000 uuf, ±20%, 500 wv	913 0871 00
	Effective MOD 3	CAPACITOR: mica, 510 uuf, ±5%, 300 wv	912 0545 00
C1041	Z1014 tuning	CAPACITOR: mica, 220 uuf, ±2%, 500 wv	912 0517 00



A29-312-P

Figure 7-26. Transceiver 618S-1, R-F Tuner, Rear Oblique View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	PART NUMBER
	Effective MOD 3	CAPACITOR: mica, fixed, 180 uuf, ±5%, 500 wv	912 0512 00
C1042	Z1014 var tuning	CAPACITOR: ceramic, variable, 8.0 to 75.0 uuf max, 350 wv	917 1075 00
C1043	Z1015 tuning	CAPACITOR: mica, 800 uuf, ±2%, 300 wv	935 5016 00
C1044	Z1015 tuning	CAPACITOR: mica, 100 uuf, ±2%, 500 wv	912 0493 00
	Effective MOD 3	CAPACITOR: ceramic, fixed, 100 uuf, ±5%, 500 wv	928 7256 00
C1045	Z1015 var tuning	CAPACITOR: ceramic, variable, 8.0 to 50.0 uuf, 350 wv	917 1075 00
	Effective MOD 3	CAPACITOR: variable, ceramic, 5.0 uuf to 30.0 uuf, 35 wv	917 1074 00
C1046	Z1016 tuning	CAPACITOR: mica, 150 uuf, ±2%, 500 wv	912 0505 00
C1047	Z1016 tuning	CAPACITOR: mica, 10 uuf, ±5%, 500 wv	912 0431 00

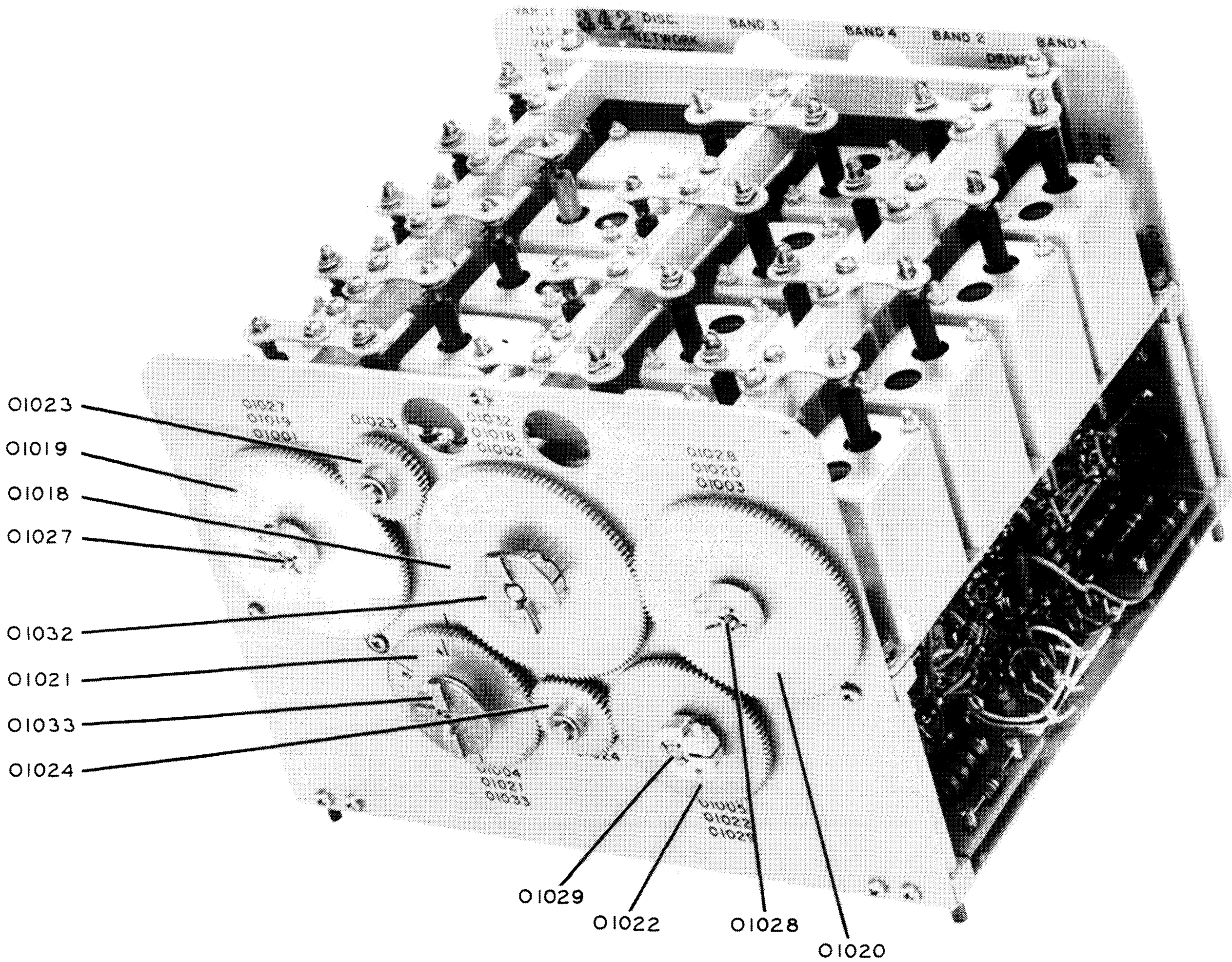
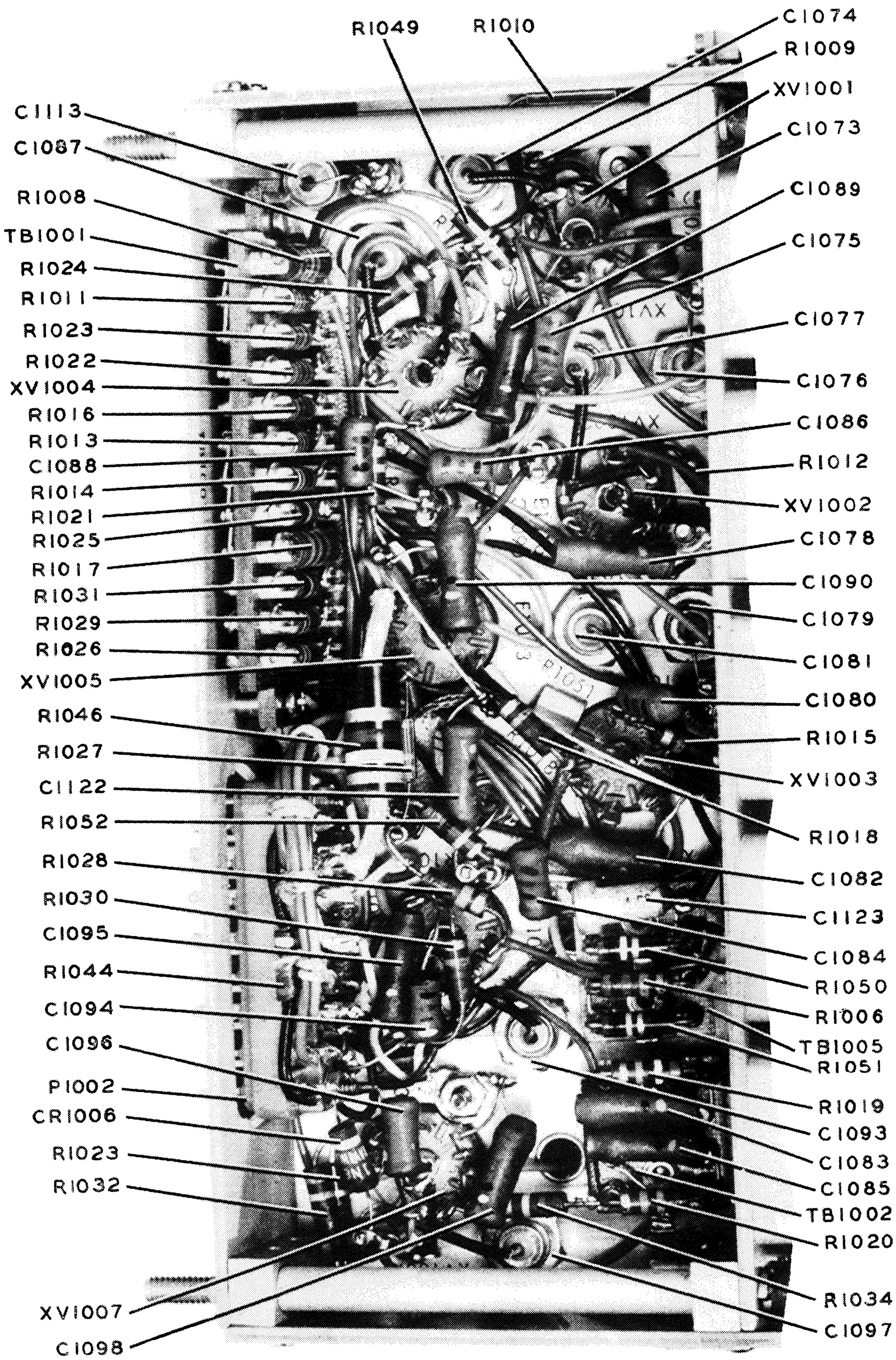


Figure 7-27. Transceiver 618S-1, R-F Tuner, Front Oblique View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	PART NUMBER
	Effective MOD 3	CAPACITOR: ceramic, fixed, 10.0 uuf, ±1/2 uuf, 500 wv	928 0413 00
C1048	Z1016 var tuning	CAPACITOR: ceramic, variable, 5.0 to 25.0 uuf, 350 wv	917 1073 00
	Effective MOD 3	CAPACITOR: variable, ceramic, 5.0 uuf to 30.0 uuf, 350 wv	917 1074 00
C1049	Z1017 tuning	CAPACITOR: mica, 10 uuf, ±5%, 500 wv	912 0431 00
C1050	Z1017 var tuning	CAPACITOR: ceramic, variable, 5.0 to 25.0 uuf, 350 wv	917 1073 00
	Effective MOD 3	CAPACITOR: variable, ceramic, 5.0 uuf to 30.0 uuf, 350 wv	917 1074 00



A29-193-P

Figure 7-28. Transceiver 618S-1, R-F Tuner, Left Side View, I-F Chassis

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1051	Z1018 tuning	CAPACITOR: mica, 470 uuf, ±2%, 500 wv	912 0541 00
	Effective MOD 3	CAPACITOR: mica, fixed, 800 uuf, ±2%, 300 wv	935 5016 00
C1052	Z1018 tuning	CAPACITOR: mica, 300 uuf, ±2%, 500 wv	912 0526 00
C1053	Z1018 var tuning	CAPACITOR: ceramic, variable, 8.0 to 75.0 uuf max, 350 wv	917 1075 00
C1054	Z1019 tuning	CAPACITOR: mica, 510 uuf, ±2%, 500 wv	912 0544 00
C1055	Z1025 tuning	CAPACITOR: mica, 470 uuf, ±2%, 300 wv	912 0541 00
	Effective MOD 3	CAPACITOR: mica, fixed, 10 uuf, ±5%, 500 wv	912 0431 00
C1056	Z1019 var tuning	CAPACITOR: ceramic, variable, 8.0 to 50.0 uuf, 350 wv	917 1075 00
	Effective MOD 3	CAPACITOR: variable, ceramic, 5.0 uuf to 30.0 uuf, 350 wv	917 1074 00
C1057	V1005 grid coupling	CAPACITOR: ceramic, 12 uuf, ±5%, 500 wv	928 0141 00
C1058	Z1020 tuning	CAPACITOR: mica, 180 uuf, ±2%, 500 wv	912 0511 00
C1059	Z1020 var tuning	CAPACITOR: ceramic, variable, 5.0 to 37.5 uuf max, 350 wv	917 1073 00
C1060	Z1020 tuning	CAPACITOR: mica, 24 uuf, ±2%, 500 wv	912 0449 00
	Effective MOD 3	CAPACITOR: ceramic, fixed, 30.0 uuf, ±5%, 500 wv	928 0381 00
C1061	Z1021 tuning	CAPACITOR: mica, 330 uuf, ±2%, 500 wv	912 0529 00
C1062	Z1021 tuning	CAPACITOR: mica, 56 uuf, ±2%, 500 wv	912 0475 00
C1063	Z1021 var tuning	CAPACITOR: ceramic, variable, 5.0 to 25.0 uuf, 350 wv	917 1073 00
	Effective MOD 3	CAPACITOR: variable, ceramic, 5.0 uuf to 30.0 uuf, 350 wv	917 1074 00
C1064	Z1022 tuning	CAPACITOR: mica, 180 uuf, ±2%, 500 wv	912 0511 00
C1065	Z1022 var tuning	CAPACITOR: ceramic, variable, 8.0 to 75.0 uuf max, 350 wv	917 1075 00
C1066	Z1023 tuning	CAPACITOR: mica, 47 uuf, ±2%, 500 wv	912 0469 00
	Effective MOD 3	CAPACITOR: ceramic, fixed, 56 uuf, ±5%, 500 wv	928 4965 00
C1067	Z1023 var tuning	CAPACITOR: ceramic, variable, 8.0 to 50.0 uuf, 350 wv	917 1075 00
	Effective MOD 3	CAPACITOR: variable, ceramic, 5.0 uuf to 30.0 uuf, 350 wv	917 1074 00
C1068	Z1014 tuning	CAPACITOR: mica, 2000 uuf, ±2%, 500 wv	913 0871 00
	Effective MOD 3	CAPACITOR: mica, fixed, 27 uuf, ±5%, 500 wv	912 0452 00
C1069	Z1024 var tuning	CAPACITOR: ceramic, variable, 5.0 to 25.0 uuf, 350 wv	917 1073 00
	Effective MOD 3	CAPACITOR: variable, ceramic, 5.0 uuf to 30.0 uuf, 350 wv	917 1074 00

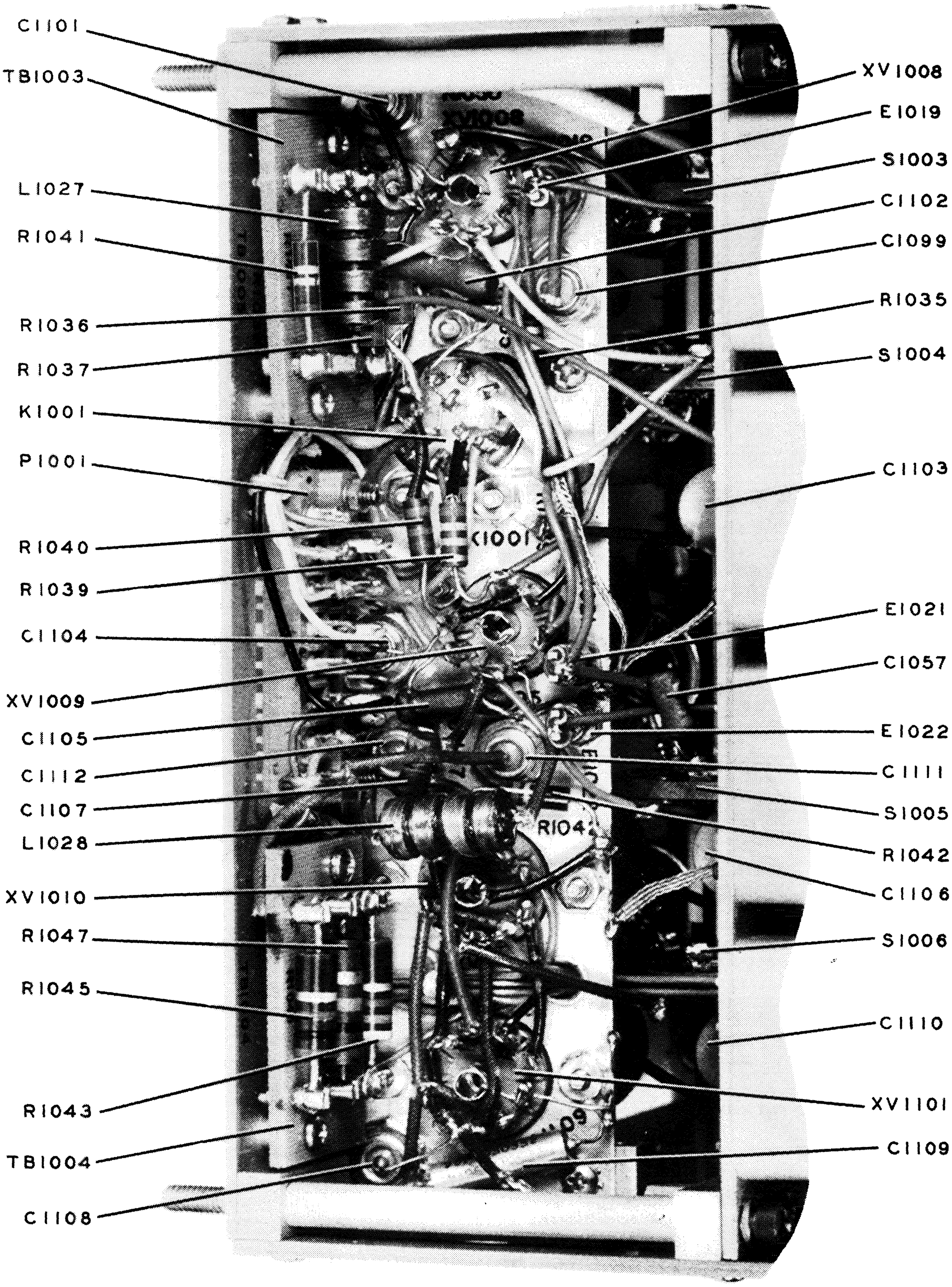


Figure 7-29. Transceiver 618S-1, R-F Tuner, Right Side View, R-F Chassis

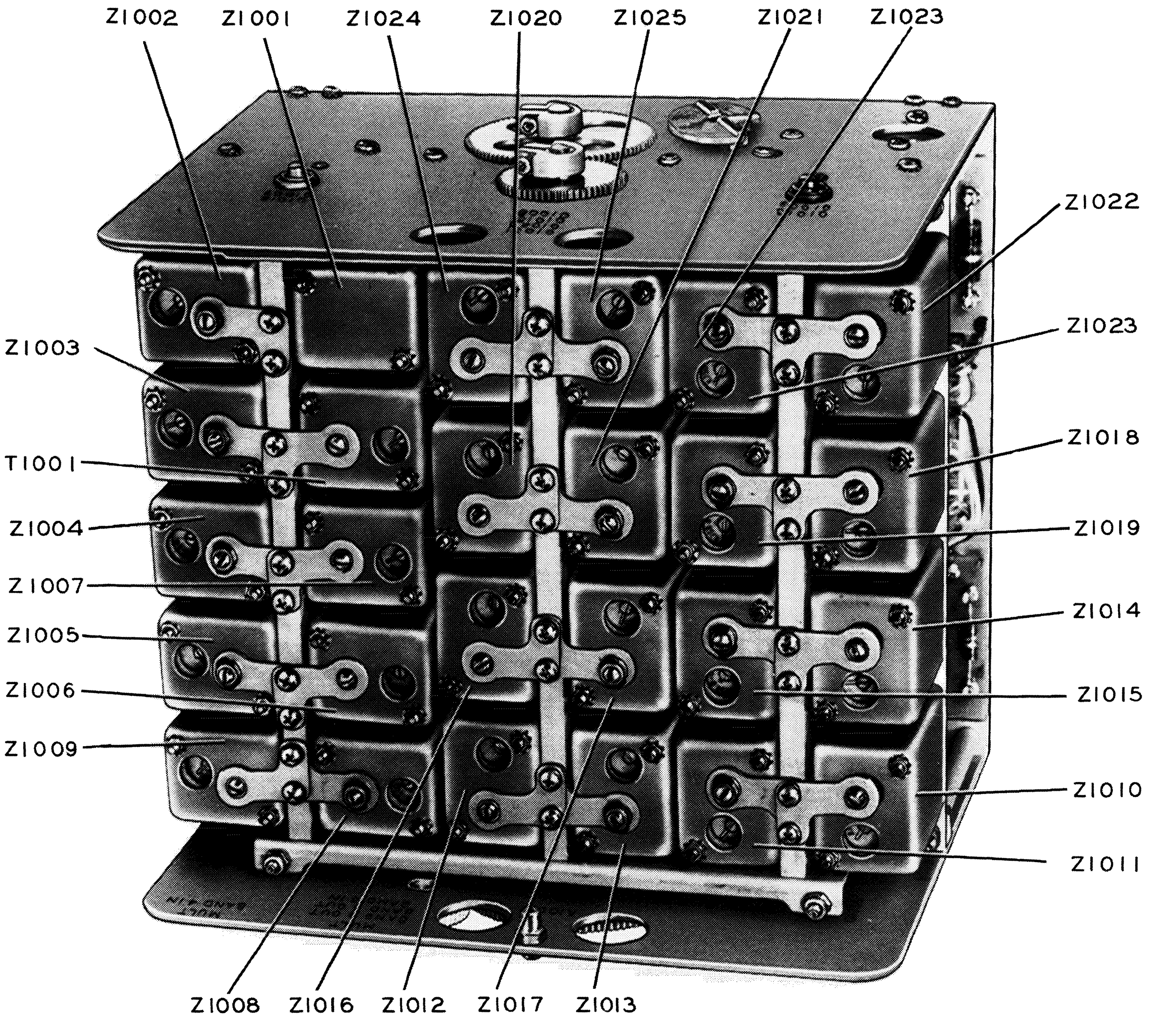


Figure 7-30. Transceiver 618S-1, R-F Tuner, Top View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1070	Z1025 var tuning	CAPACITOR: ceramic, variable, 5.0 to 25.0 uuf, 350 wv	917 1073 00
	Effective MOD 3	CAPACITOR: variable, ceramic, 5.0 uuf to 30.0 uuf, 350 wv	917 1074 00
C1071	Agc coupling	CAPACITOR: ceramic, 1.0 uuf ±1/4 uuf, 500 wv	916 0070 00
	Effective MOD 6	CAPACITOR: ceramic, 1.5 uuf, ±1/4 uuf, 500 wv	916 0072 00
C1072	Agc r-f bypass	CAPACITOR: ceramic, 3000 uuf guar min, 500 wv	913 0996 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1073	V1001 screen bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
C1074	V1001 cathode bypass	CAPACITOR: paper, 0.01 uf, ±20%, 300 wv	931 0620 00
C1075	V1001 grid coupling	CAPACITOR: ceramic, 100 uuf, ±5%, 500 wv	928 4922 00
C1076	V1004 and V1005 plate decoupling	CAPACITOR: paper, 0.10 uf, ±20%, 300 wv	931 0626 00
C1077	V1002 cathode bypass	CAPACITOR: paper, 0.01 uf, ±20%, 300 wv	931 0620 00
C1078	V1002 screen bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
C1079	V1002 plate bypass	CAPACITOR: paper, 0.10 uf, ±20%, 300 wv	931 0626 00
C1080	V1003 grid coupling	CAPACITOR: ceramic, 5 uuf, ±1/2 uuf, 500 wv	928 0119 00
C1081	V1003 cathode bypass	CAPACITOR: paper, 0.10 uf, ±20%, 300 wv	931 0626 00
C1082	V1003 screen bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
C1083	V1007 plate bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
C1084	V1003 grid coupling	CAPACITOR: ceramic, 100 uuf, ±5%, 500 wv	928 4922 00
C1085	Z1009 decoupling	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
C1086	V1004 grid coupling	CAPACITOR: ceramic, 100 uuf, ±5%, 500 wv	928 4922 00
C1087	V1004 cathode bypass	CAPACITOR: paper, 0.01 uf, ±20%, 300 wv	931 0620 00
C1088	V1004 grid coupling	CAPACITOR: ceramic, 5 uuf, ±5%, 500 wv	928 0119 00
C1089	V1004 screen bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
C1090	V1005 screen bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
C1091	V1005 cathode bypass	CAPACITOR: paper, 0.10 uf, ±20%, 300 wv	931 0626 00
C1092	Avc decoupling	CAPACITOR: paper, 0.10 uf, ±20%, 300 wv	931 0626 00

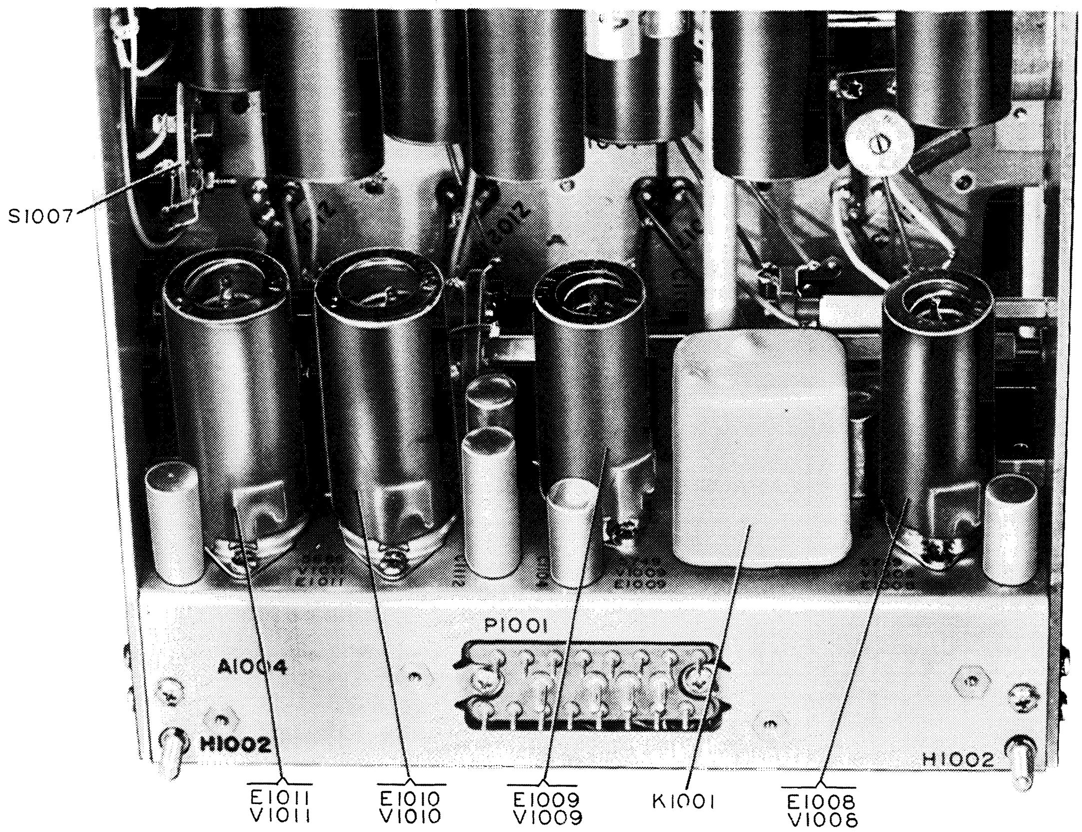


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Figure 7-31. Transceiver 618S-1, R-F Tuner, Bottom View, I-F Chassis

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1093	V1006 cathode bypass	CAPACITOR: paper, 0.01 uf ±20%, 300 wv	931 0620 00
C1094	V1006 grid coupling	CAPACITOR: ceramic, 5.0 uuf ±1 uuf, 500 wv	928 0119 00
C1095	V1006 screen bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
C1096	V1007 grid coupling	CAPACITOR: ceramic, 100 uuf ±5%, 500 wv	928 4922 00
C1097	V1007 cathode bypass	CAPACITOR: paper, 0.01 uf ±20%, 300 wv	931 0620 00
C1098	V1007 screen bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
C1099	Avc decoupling	CAPACITOR: paper, 0.01 uf ±20%, 300 wv	931 0620 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1100	Not used		
C1101	V1008 cathode bypass	CAPACITOR: paper, 0.01 uf ±20%, 300 wv	931 0620 00
C1102	V1008 screen bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
C1103	V1008 plate decoupling	CAPACITOR: paper, 0.01 uf +100% -20%, 500 wv	913 1188 00
C1104	V1009 cathode bypass	CAPACITOR: paper, 0.01 uf ±20%, 300 wv	931 0620 00
C1105	V1009 screen bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
C1106	V1009 plate decoupling	CAPACITOR: paper, 0.01 uf, +100% -20%, 500 wv	913 1188 00
C1107	V1010 and V1011 grid coupling	CAPACITOR: ceramic, 20 uuf, ±5%, 500 wv	916 4188 00
C1108	V1010 and V1011 cathode bypass	CAPACITOR: paper, 0.10 uf, ±20%, 200 wv	931 0607 00
C1109	V1010 and V1011 screen bypass	CAPACITOR: paper, 0.01 uf, ±20%, 300 wv	931 0436 00
C1110	V1010 and V1011 decoupling	CAPACITOR: paper, 0.01 uf, +100%, -20%, 500 wv	913 1188 00
C1111	B+ decoupling	CAPACITOR: paper, 0.10 uf, ±20%, 300 wv	931 0626 00
C1112	B+ decoupling	CAPACITOR: paper, 0.10 uf, ±20%, 300 wv	931 0626 00
C1113	Lead network no MOD - MOD 8	CAPACITOR: paper, 0.10 uf, ±20%, 100 wv	931 0404 00
	MOD 9	CAPACITOR: paper, 47,000 uuf, ±20%, 100 wv	931 0402 00
C1114	Z1007 tuning	CAPACITOR: ceramic, variable, 8.0 to 75 uuf, 350 wv	917 1075 00
C1115	V1006 grid coupling	CAPACITOR: ceramic, 12.0 uuf, ±5%, 500 wv	928 0141 00
C1116	Tuning capacitor	CAPACITOR: ceramic, 5 uuf, ±5%, 500 wv	916 0117 00
	Effective MOD 3	CAPACITOR: ceramic, fixed, 5.0 uuf, ±1/2 uuf, 500 wv	928 0393 00
C1117	V1009 grid coupling	CAPACITOR: mica, 56 uuf, ±2%, 500 wv	912 0475 00
C1118	Z1007 tuning	CAPACITOR: mica, 510 uuf, ±2%, 500 wv	912 0544 00
C1119	Z1007 tuning	CAPACITOR: mica, 510 uuf, ±2%, 500 wv	912 0544 00
C1120	Z1007 tuning	CAPACITOR: mica, 510 uuf, ±2%, 500 wv	912 0544 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1121	Z1024 tuning	CAPACITOR: mica, 10 uuf, ±5%, 500 wv	912 0431 00
	Effective MOD 3	CAPACITOR: ceramic, fixed, 10 uuf, ±1/2 uuf, 500 wv	928 0413 00
C1122	Avc decoupling	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
C1123	Muting bias filter	CAPACITOR: electrolytic 4 uf -15% +50%, 30 wv	184 7000 00
C1124	T1001 tuning This capacitor added. Effective MOD 3	CAPACITOR: fixed, ceramic, 15 uuf ±5%, 500 wv	928 0420 00
CR1001 CR1004	P/o discriminator	CRYSTAL UNIT: rectifying, type 1N198, matched pairs	353 0185 00
CR1005	P/o discriminator	CRYSTAL UNIT: rectifying, type 1N198	353 0113 00
		CRYSTAL UNIT: rectifying, type 1N198	353 0147 00
		CRYSTAL UNIT: rectifying, type 1N198	353 0160 00
CR1006	Muting bias rectifier	CRYSTAL UNIT: rectifying, type 1N458	353 0205 00
		CRYSTAL UNIT: rectifying, type 1N67A	353 0147 00
		CRYSTAL UNIT: rectifying, type 1N198	353 0160 00
		CRYSTAL UNIT: rectifying, 150 v, 7 ma, 10 uuf	353 0205 00
E1001	V1001 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/8 in. lg	541 6550 003
E1002	V1002 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/4 in. lg	541 6551 003
E1003	V1003 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/4 in. lg	541 6551 003
E1004	V1004 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/4 in. lg	541 6551 003
E1005	V1005 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/4 in. lg	541 6551 003
E1006	V1006 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/4 in. lg	541 6551 003
E1007	V1007 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/8 in. lg	541 6550 003
E1008	V1008 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/4 in. lg	541 6551 003
E1009	V1009 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/4 in. lg	541 6551 003
E1010	V1010 shield	SHIELD: electron tube, 0.950 in. dia x 1-13/16 in. lg	541 6554 003
E1011	V1011 shield	SHIELD: electron tube, 0.950 in. dia x 1-13/16 in. lg	541 6554 003
E1012	Tie point	TERMINAL: insulated, 1/4 in. hex x 0.78825 in. lg	306 0234 00
E1022			

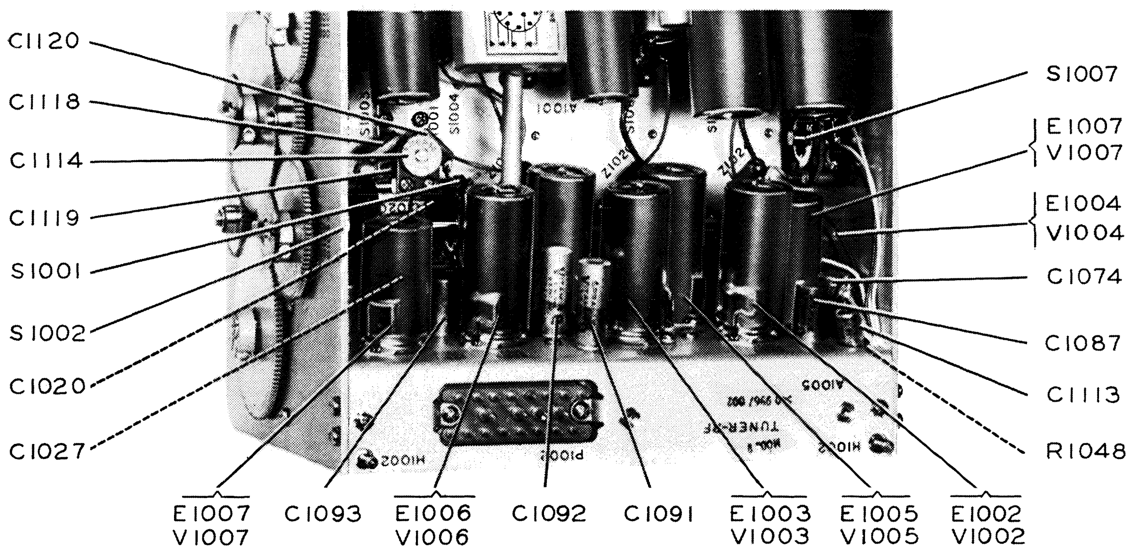

Figure 7-32. Transceiver 618S-1, R-F Tuner, Bottom View, I-F Chassis

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
J1001	R-f output plug	CONNECTOR: female, single	506 6924 002
K1001	Keying relay	RELAY: armature, hermetically sealed, 4 C, 1.0 amp at 27.5 v dc resistive load	974 0220 00
L1001A	Discriminator coil	COIL: 65 turn	506 7014 003
L1001B	Discriminator coil pickup loop	COIL: secondary, 25 turn	506 7012 003
L1002	Var i-f coil	COIL: 55 turn	506 7015 003
L1003	Var i-f coil	COIL: 55 turn	506 7015 003
L1004	Var i-f coil	COIL: 55 turn	506 7015 003
L1005	Var i-f coil	COIL: 55 turn	506 7015 003
L1006	Multiplier coil	COIL: 30 turn	506 7021 003
L1007	Multiplier coil	COIL: 30 turn	506 7021 003
L1008	Multiplier coil	COIL: 18.5 turn	506 7022 003
L1009	Multiplier coil	COIL: 18.5 turn	506 7022 003
L1010	Band #1 ant. coil	COIL: 55 turn	506 7015 003

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
L1011	Band #2 ant. coil	COIL: 38 turn	506 7016 003
L1012	Band #3 ant. coil	COIL: 26 turn	506 7017 003
L1013	Band #4 ant. coil	COIL: 14 turn	506 7019 003
L1014	2nd r-f grid coil band #1	COIL: 55 turn	506 7015 003
L1015	2nd r-f grid coil band #2	COIL: 38 turn	506 7016 003
L1016	2nd r-f grid coil band #3	COIL: 36 turn	506 7017 003
L1017	2nd r-f grid coil band #4	COIL: 10 turn	506 7019 003
L1018	2nd r-f plate coil band #1	COIL: 55 turn	506 7015 003
L1019	2nd r-f plate coil band #2	COIL: 38 turn	506 7016 003
L1020	2nd r-f plate coil band #3	COIL: 26 turn	506 7017 003
L1021	2nd r-f plate coil band #4	COIL: 14 turn	506 7019 003
L1022	PA driver plate coil band #1	COIL: 55 turn	506 7015 003
L1023	PA driver plate coil band #2	COIL: 38 turn	506 7016 003
L1024	PA driver plate coil band #3	COIL: 20.5 turn	506 7018 003
L1025	PA driver plate coil band #4	COIL: 10 turn	506 7020 003
L1026	Tuning coil	CHOKE, RF: approx 500 uh ±10%, at 1000 kc	240 0073 00
L1027	B+ decoupling	CHOKE, RF: powdered iron core, 2.2 mh min Q of 70 at 350 kc	240 0134 00
L1028	B+ decoupling	Same as L1027	240 0134 00
P1001	R-f tuner connector	CONNECTOR: male plug, 20 prong wall or cable mounting	372 1069 00
P1002	R-f tuner connector	CONNECTOR: male plug, 20 prong wall or cable mounting	372 1069 00
R1001	Loop balance discriminator	RESISTOR: carbon, 1000 ohm ±1%, 1/2 w	705 2131 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R1002	Loop balance discriminator	RESISTOR: carbon 1000 ohm ±1%, 1/2 w	705 2131 00
R1003	Phasing discriminator	RESISTOR: comp, 560 ohm ±10%, 1/2 w	745 1342 00
R1004	Discriminator load	RESISTOR: carbon 27,000 ohm ±1%, 1/2 w	705 2165 00
R1005	Discriminator load	RESISTOR: carbon 27,000 ohm ±1%, 1/2 w	705 2165 00
R1006	Agc plate diode return	RESISTOR: comp, 22K ohms ±10%, 1/2 w	745 1142 00
*R1006	Agc voltage divider Effective MOD 1	RESISTOR: comp, 10K ohms ±10%, 1/2 w	745 1394 00
		RESISTOR: comp, 12K ohms ±10%, 1/2 w	745 1398 00
		RESISTOR: comp, 15K ohms ±10%, 1/2 w	745 1401 00
		RESISTOR: comp, 18K ohms ±10%, 1/2 w	745 1405 00
		RESISTOR: comp, 22K ohms ±10%, 1/2 w	745 1408 00
		RESISTOR: comp, 27K ohms ±10%, 1/2 w	745 1412 00
		RESISTOR: comp, 33K ohms ±10%, 1/2 w	745 1415 00
	Effective MOD 6	RESISTOR: comp, 4700 ohm ±10%, 1/2 w	745 1380 00
		RESISTOR: comp, 5600 ohm ±10%, 1/2 w	745 1384 00
		RESISTOR: comp, 6800 ohm ±10%, 1/2 w	745 1387 00
		RESISTOR: comp, 8200 ohm ±10%, 1/2 w	745 1391 00
		RESISTOR: comp, 10,000 ohm ±10%, 1/2 w	745 1394 00
		RESISTOR: comp, 12,000 ohm ±10%, 1/2 w	745 1398 00
		RESISTOR: comp, 15,000 ohm ±10%, 1/2 w	745 1401 00
R1007	Agc load	RESISTOR: comp, 100,000 ohm ±10%, 1/2 w	745 1436 00
R1008	Discriminator plate	RESISTOR: comp, 22,000 ohm ±10%, 1 w	745 3408 00
R1009	V1001 cathode	RESISTOR: comp, 680 ohm ±10%, 1/2 w	745 1345 00
R1010	V1001 grid	RESISTOR: comp, 56,000 ohm ±10%, 1/2 w	745 1426 00
R1011	V1004 and V1005 plate decoupling	RESISTOR: comp, 47,000 ohm ±10%, 1/2 w	745 1422 00

*The value of R1006 is determined by the requirements of each transceiver. When replacing the resistor, make sure that the value of the new component equals that of the resistor in the transceiver.

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R1012	V1002 cathode	RESISTOR: comp, 100 ohm ±10%, 1/2 w	745 1310 00
R1013	V1002 screen	RESISTOR: comp, 47,000 ohm ±10%, 1/2 w	745 1422 00
R1014	V1002 plate decoupling	RESISTOR: comp, 20 ohm ±5%, 1/2 w	745 1380 00
R1015	V1003 grid	RESISTOR: comp, 56,000 ohm ±10%, 1/2 w	745 1426 00
R1016	V1003 cathode	RESISTOR: comp, 220 ohm +10%, 1/2 w	745 1324 00
R1017	V1003 screen	RESISTOR: comp, 68,000 ohm ±10%, 1 w	745 3429 00
R1018	V1003 grid	RESISTOR: comp, 56,000 ohm ±10%, 1/2 w	745 1426 00
R1019	V1007 plate decoupling	RESISTOR: comp, 39,000 ohm ±10%, 1/2 w	745 1419 00
R1020	V1007 plate decoupling	RESISTOR: comp, 27,000 ohm ±10%, 1/2 w	745 1412 00
R1021	V1004 grid	RESISTOR: comp, 56,000 ohm ±10%, 1/2 w	745 1426 00
	Effective MOD 4	RESISTOR: comp, 1000 ohm ±10%, 1/2 w	745 1352 00
R1022	V1004 cathode	RESISTOR: comp, 2200 ohm ±10%, 1/2 w	745 1100 00
		RESISTOR: comp, 1000 ohm, 1/2 w	745 1352 00
R1023	V1004 screen	RESISTOR: comp, 82,000 ohm ±10%, 1/2 w	745 1433 00
R1024	V1004 grid	RESISTOR: comp, 56,000 ohm ±10%, 1/2 w	745 1426 00
R1025	V1005 screen	RESISTOR: comp, 56,000 ohm ±10%, 1/2 w	745 3426 00
R1026	V1005 cathode	RESISTOR: comp, 330 ohm ±10%, 1/2 w	745 1331 00
R1027	V1005 grid	RESISTOR: comp, 56,000 ohm ±10%, 1/2 w	745 1426 00
R1028	V1006 grid	RESISTOR: comp, 56,000 ohm ±10%, 1/2 w	745 1426 00
R1029	V1006 cathode	RESISTOR: comp, 330 ohm ±10%, 1/2 w	745 1331 00
R1030	V1006 grid	RESISTOR: comp, 56,000 ohm ±10%, 1/2 w	745 1426 00
R1031	V1006 screen	RESISTOR: comp, 0.10 megohm ±10%, 1/2 w	745 1436 00
R1032	V1007 grid	RESISTOR: comp, 0.10 megohm ±10%, 1/2 w	745 1436 00
R1033	V1007 cathode	RESISTOR: comp, 1200 ohm ±10%, 1/2 w	745 1356 00
R1034	V1007 screen	RESISTOR: comp, 0.12 megohm, ±10%, 1/2 w	745 1440 00
R1035	Avc decoupling	RESISTOR: comp, 0.10 megohm ±10%, 1/2 w	745 1436 00
R1036	V1008 cathode	RESISTOR: comp, 330 ohm ±10%, 1/2 w	745 1331 00
R1037	V1009 screen	RESISTOR: comp, 12,000 ohm ±10%, 1/2 w	745 1398 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R1038	Not used		
R1039	V1009 grid	RESISTOR: comp, 27,000 ohm ±10%, 1/2 w	745 1412 00
R1040	V1009 cathode	RESISTOR: comp, 220 ohm ±10%, 1/2 w	745 1324 00
R1041	V1008 screen	RESISTOR: comp, 15,000 ohm ±10%, 1/2 w	745 1401 00
R1042	V1010 and V1011 grid	RESISTOR: comp, 18,000 ohm ±10%, 1/2 w	745 1405 00
R1043	V1010 and V1011 cathode	RESISTOR: comp, 470 ohm ±10%, 1 w	745 3338 00
R1044	V1010 and V1011 plate decoupling	RESISTOR: comp, 2200 ohm ±10%, 1/2 w	745 1408 00
R1045	V1010 and V1011 cathode	RESISTOR: comp, 100 ohm ±5%, 1 w	745 3310 00
R1046	V1009 plate decoupling	RESISTOR: comp, 390 ohm ±10%, 2 w	745 5635 00
R1047	V1010 and V1011 screen	RESISTOR: comp, 10,000 ohm 5%, 1 w	745 3394 00
R1048	Lead network series No MOD, MOD 1	RESISTOR: comp, 0.33 megohm ±10%, 1/2 w	745 1191 00
	MOD 2 through MOD 7	RESISTOR: fixed, comp, 0.47 megohm ±10%, 350 wv, 1/2 w	745 1464 00
	Effective MOD 8	RESISTOR: comp, 0.47 megohm ±10%, 1/2 w	745 1198 00
R1049	Lead network shunt	RESISTOR: comp, 180,000 ohm ±10%, 1/2 w	745 1181 00
	Effective MOD 2	RESISTOR: fixed, comp, 0.12 megohm ±10%, 245 wv, 1/2 w	745 1174 00
	Effective MOD 4	RESISTOR: comp, 0.10 megohm ±10%, 1/2 w	745 1170 00
	Effective MOD 9	RESISTOR: comp, 82K ohms ±5%, 1/2 w	745 1432 00
R1050	Muting bias diode load	RESISTOR: comp, 100,000 ohm, ±10%, 1/2 w	745 1436 00
R1051	Agc voltage divider. Deleted Effective MOD 1	RESISTOR: comp, 10,000 ohm, ±10%, 1/2 w	745 1128 00
R1052	Avc decoupling	RESISTOR: comp, 100,000 ohm ±10%, 1/2 w	745 1436 00
S1001	Multiplier	SWITCH: rotary wafer, 2 circuit, 2 pole, 12 position	269 1623 00
S1002	Multiplier	SWITCH: rotary wafer, 2 circuit, 2 pole, 12 position	269 1623 00
S1003	Antenna coil band	SWITCH: rotary wafer, 2 circuit, 2 pole, 12 position	269 1623 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
S1004	2nd r-f grid coil band	SWITCH: rotary wafer, 2 circuit, 2 pole, 12 position	269 1623 00
S1005	2nd r-f plate coil band	SWITCH: rotary wafer, 2 circuit, 2 pole, 12 position	269 1623 00
S1006	PA driver plate coil band	SWITCH; rotary wafer, 2 circuit, 2 pole, 12 position	269 1623 00
S1007	Table centering	SWITCH: rotary wafer, 2 circuit, 2 pole, 12 position	269 1624 00
T1001	Discriminator tube plate coil	TRANSFORMER: includes L1001A, L1001B, C1001, and C1002	506 6987 003
TB1001	Resistor terminal mtg	BOARD: terminal, 24-post terminals, component mtg	506 6921 002
TB1002	Resistor-capacitor term mtg	BOARD: terminal, hollow lug terminal board with double ground lug and two mounting posts	306 0293 00
TB1003	Resistor term mtg	BOARD: terminal, 6 post terminals	506 6922 002
TB1004	Resistor term mtg	BOARD: terminal, 6 post terminals	506 6923 002
TB1005	Resistor-capacitor term mtg	Same as TB1002	306 0293 00
V1001	Discriminator	TUBE: 5654	253 0001 00
V1002	Var i-f amplifier	TUBE: 5749	253 0005 00
V1003	No. 2 transmitter mixer	TUBE: 5750	253 0007 00
V1004	No. 1 transmitter mixer	TUBE: 5750	253 0007 00
V1005	No. 1 receiver mixer	TUBE: 5750	253 0007 00
V1006	No. 2 receiver mixer	TUBE: 5750	253 0007 00
V1007	Multiplier amplifier	TUBE: 5654	253 0001 00
V1008	1st r-f amplifier	TUBE: 5749	253 0005 00
V1009	2nd r-f amplifier	TUBE: 5749	253 0005 00
V1010	PA driver	TUBE: 5686	253 0009 00
V1011	PA driver	TUBE: 5686	253 0009 00
XV1001	V1001 holder	SOCKET: tube	220 1111 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
XV1002	V1002 holder	SOCKET: tube	220 1111 00
XV1003	V1003 holder	SOCKET: tube	220 1111 00
XV1004	V1004 holder	SOCKET: tube	220 1111 00
XV1005	V1005 holder	SOCKET: tube	220 1111 00
XV1006	V1006 holder	SOCKET: tube	220 1111 00
XV1007	V1007 holder	SOCKET: tube	220 1111 00
XV1008	V1008 holder	SOCKET: tube	220 1111 00
XV1009	V1009 holder	SOCKET: tube	220 1111 00
XV1010	V1010 holder	SOCKET: tube	220 1103 00
XV1011	V1011 holder	SOCKET: tube	220 1103 00
Z1001	Discriminator components	NETWORK, RF: includes C1003, 04, 05, 06, 07, 71, 72, C1116, CR1001, 02, 03, 04, 05, R1001, 02, 03, 04, 05, 06, and 07	506 7033 004
Z1002	Var i-f tuned circuit	COIL: 1st i-f, 2.00-3.75 mc, includes C1008, C1009, C1012, and L1002	506 6988 003
Z1003	Var i-f tuned circuit	COIL: 2nd i-f, 2.00-3.75 mc, includes C1010, C1011, and L1003	506 6989 003
Z1004	Var i-f tuned circuit	COIL: 3rd i-f, 2.00-3.75 mc, includes C1013, C1014, C1015, and L1004	506 6990 003
Z1005	Var i-f tuned circuit	COIL: 4th i-f, 2.00-3.75 mc, includes C1016, C1017, C1115, and L1005	506 6991 003
Z1006	Multiplier tuned circuit	COIL: output band, 3 multiplier, includes C1018, C1019, and L1006	506 6992 003
Z1007	Multiplier tuned circuit	COIL: input band, 3 multiplier, includes C1021, C1022, and L1007	506 6993 003
Z1008	Multiplier tuned circuit	COIL: output band, 4 multiplier, includes C1024 and L1008	506 6994 003
Z1009	Multiplier tuned circuit	COIL: input band, 4 multiplier, includes C1025, C1026, and L1009	506 6995 003
Z1010	Band no. 1 antenna tuned circuit	COIL: antenna, 2.00-3.75 mc, includes C1028, C1029, C1030, and L1010	506 6996 003
Z1011	Band no. 2 antenna tuned circuit	COIL: antenna, 3.75-7.25 mc, includes C1031, C1032, C1033, and L1011	506 6997 003
Z1012	Band no. 3 antenna tuned circuit	COIL: antenna, 7.25-14.25 mc, includes C1034, C1035, C1036, and L1012	506 6998 003

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
Z1013	Band no. 4 antenna tuned circuit	COIL: antenna, 14.25-25 mc, includes C1037, C1038, C1039, and L1013	506 6999 003
Z1014	2nd r-f grid tuned circuit band no. 1	COIL: 1st rf, 2.00-3.75 mc, includes C1040, C1041, C1042, C1068, and L1014	506 7000 003
Z1015	2nd r-f grid tuned circuit band no. 2	COIL: 1st rf, 3.75-7.25 mc, includes C1043, C1044, C1045, and L1015	506 7001 003
Z1016	2nd r-f grid tuned circuit band no. 3	COIL: 1st rf, 7.25-14.25 mc, includes C1046, C1047, C1048, and L1016	506 7002 003
Z1017	2nd r-f grid tuned circuit band no. 4	COIL: 1st rf, 14.25-25 mc, includes C1049, C1050, C1117, and L1017	506 7003 003
Z1018	2nd r-f plate tuned circuit band no. 1	COIL: 2nd rf, 2.00-3.75 mc, includes C1051, C1052, C1053, and L1018	506 7004 003
Z1019	2nd r-f plate tuned circuit band no. 2	COIL: 2nd rf, 3.75-7.25 mc, includes C1054, C1023, C1056, and L1019	506 7005 003
Z1020	2nd r-f plate tuned circuit band no. 3	COIL: 2nd rf, 7.25-14.25 mc, includes C1058, C1059, C1060, and L1020	506 7006 003
Z1021	2nd r-f plate tuned circuit band no. 4	COIL: 2nd rf, 14.25-25 mc, includes C1061, C1062, C1063, and L1021	506 7007 003
Z1022	PA driver plate tuned circuit band no. 1	COIL: driver, 2.00-3.75 mc, includes C1064, C1065, and L1022	506 7008 003
Z1023	PA driver plate tuned circuit band no. 2	COIL: driver, 3.75-7.25 mc, includes C1066, C1067, and L1023	506 7009 003
Z1024	PA driver plate tuned circuit band no. 3	COIL: driver, 7.25-14.25 mc, includes C1121, C1069, and L1024	506 7010 003
Z1025	PA driver plate tuned circuit band no. 4	COIL: driver, 14.25-25 mc, includes C1070, C1055, and L1025	506 7011 003

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
1201-1299 Series	250 KC OSCILLATOR		506 6215 004
C1201	V1201 screen feedback	CAPACITOR: mica, 100 uuf, ±10%, 500 wv	912 0495 00
C1202	V1201 cathode bypass	CAPACITOR: paper, 0.01 uf, ±20%, 200 wv	931 2537 00
C1203	L1201 tuning	CAPACITOR: mica, 240 uuf, ±2%, 500 wv	912 0521 00
	Effective MOD 1	CAPACITOR: mica, 330 uuf, ±5%, 500 wv	912 0530 00
C1204	L1202 tuning	CAPACITOR: mica, 390 uuf, ±5%, 500 wv	912 0536 00
C1205	Plate decoupling	CAPACITOR: paper, 0.01 uf, ±20%, 200 wv	931 2537 00
C1206	V1201 trimmer	CAPACITOR: ceramic, variable, 5.0 to 37.5 uuf, 350 wv	917 1073 00
C1207	V1201 grid coupling	CAPACITOR: mica, 470 uuf, ±10%, 300 wv	912 0543 00
C1208	Frequency shift	CAPACITOR: ceramic, 36 uuf, ±5%, 500 wv	916 4347 00
	Effective MOD 3	CAPACITOR: ceramic, 43 uuf, ±1%, 500 wv	916 4355 00
C1209	L1203 tuning	CAPACITOR: mica, 430 uuf, ±2%, 300 wv	912 0538 00
	Effective MOD 3	CAPACITOR: mica, 360 uuf, ±2%, 500 wv	912 0532 00
C1210	Bfo temperature compensation	CAPACITOR: ceramic, 20 uuf, ±1.0 uuf, 500 wv	913 0057 00
	Effective MOD 3	CAPACITOR: ceramic, 91 uuf, ±2%, 500 wv	916 4918 00
C1211	Bfo key lead bypass	CAPACITOR: paper, 0.01 uf, ±20%, 200 wv	931 2537 00
C1212	V1202 plate coupling	CAPACITOR: mica, 1000 uuf, ±10%, 500 wv	913 1476 00
C1213	V1202 grid	CAPACITOR: ceramic, 47 uuf	916 4363 00
C1214	Not used		
C1215	Plate supply decoupling	CAPACITOR: ceramic, 3300 uuf, guar min, 500 wv	913 2750 00
C1216	Bfo key lead filter	CAPACITOR: mica, 1000 uuf, ±10%, 500 wv	913 1476 00
C1217	Bfo key lead filter	CAPACITOR: ceramic, 3300 uuf, guar min, 500 wv	913 2750 00
C1218	Bfo output coupling	CAPACITOR: mica, 56 uuf, ±2%, 300 wv	912 0476 00
	Effective MOD 1		

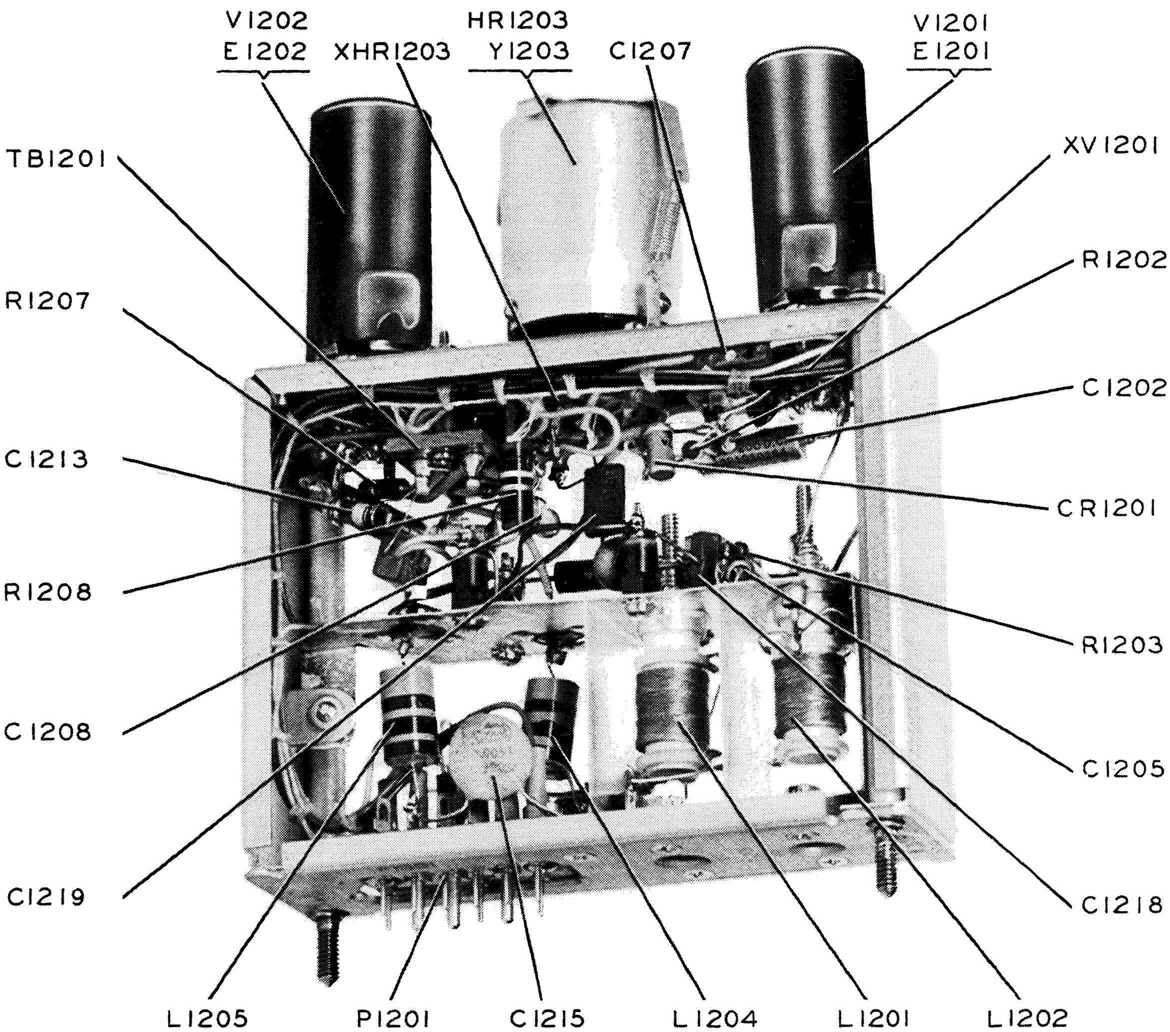

Figure 7-33. Transceiver 618S-1, 250 Kc Oscillator, Right Side View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1219	Bfo plate fixed tuned circuit	CAPACITOR: mica, 56 uuf, ±5%, 500 wv	912 0476 00
	Effective MOD 1	CAPACITOR: mica, 800 uuf, ±2%, 300 wv	935 5016 00
CR1201	Bfo control diode	CRYSTAL UNIT: rectifying, type 1N67A	353 0147 00
	Effective MOD 2	SILICON JUNCTION DIODE: rectifying, 1N137A	353 0152 00
E1201	V1201 shield	SHIELD: electron tube, 0.810 in. dia. x 1-3/4 in. lg	541 6551 003
E1202	V1202 shield	Same as E1201	541 6551 003
HR1201	Not used		

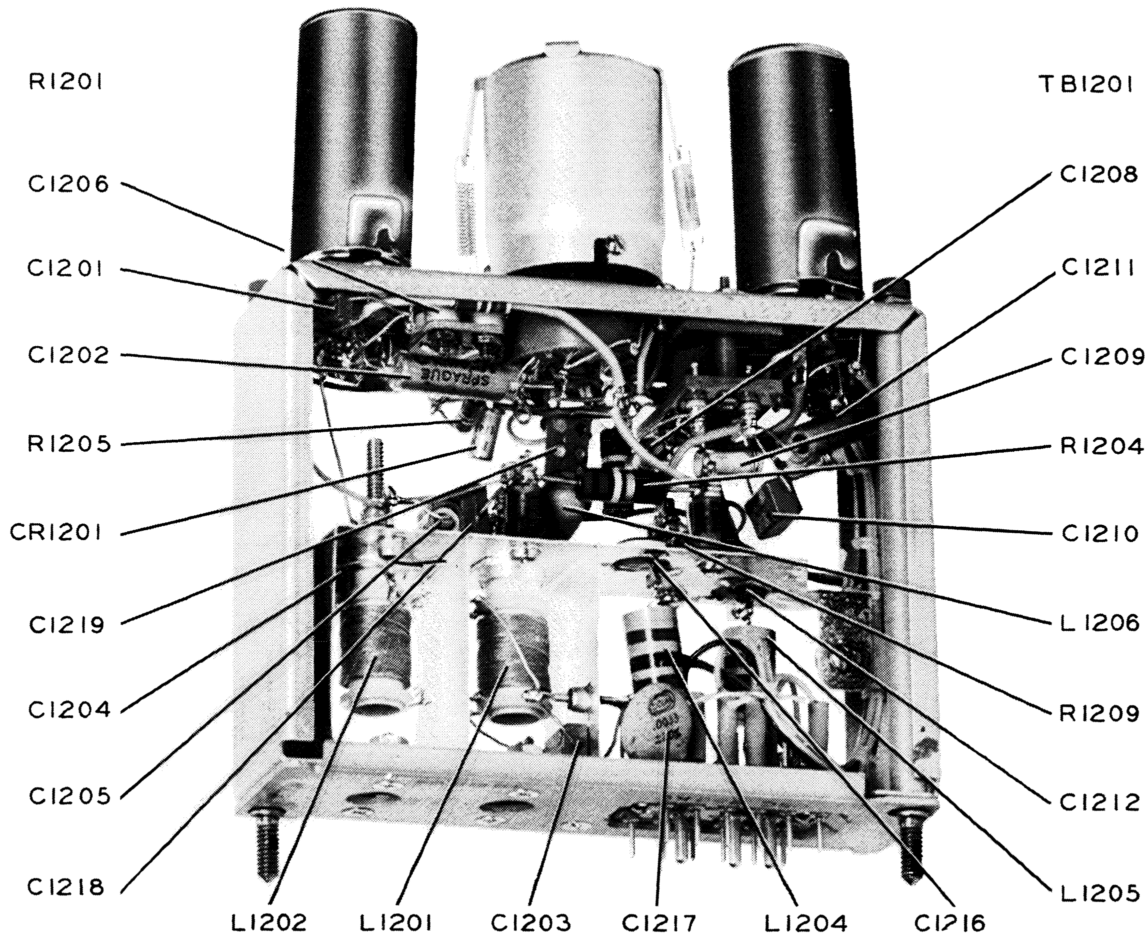

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Figure 7-34. Transceiver 618S-1, 250 Kc Oscillator, Left Side View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
HR1202	Not used		
HR1203	Crystal oven	OVEN: crystal, dummy	292 0102 00
L1201	Crystal osc plate coil	COIL: 250 kc	506 6192 002
L1202	Crystal osc coupling coil	COIL: 250 kc	506 6192 002
L1203	Bfo oscillator coil	COIL: osc, 250 kc	506 6211 003
L1204	Key lead filter	CHOKE, RF: approx 500 uh, ±10% at 1000 kc	240 0073 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
L1205	B+ filter Effective MOD 1	CHOKE, RF: approx 500 uh, ±10% at 1000 kc	240 0073 00
L1206	Bfo plate fixed tuned circuit. This coil added to 618S-1. Effective MOD 1	COIL, RF: 494 uf, ±2%, at 790 kc	240 0196 00
P1201	250 kc oscillator connector	CONNECTOR: male plug, 15 prong wall or cable mounting	372 1079 00
R1201	Screen resistor	RESISTOR: comp, 0.47 megohm ±10%, 1/2 w	745 1464 00
R1202	V1201 grid	RESISTOR: comp, 0.47 megohm ±10%, 1/2 w	745 1464 00
R1203	Voltage divider	RESISTOR: comp, 0.10 megohm ±10%, 1/2 w	745 1436 00
R1204	Plate decoupling	RESISTOR: comp, 220,000 ohm ±10%, 1/2 w	745 3450 00
R1205	Diode swamping	RESISTOR: comp, 0.10 megohm ±10%, 1/2 w	745 1436 00
R1206	Not used		
R1207	V1202 grid	RESISTOR: comp, 0.10 megohm ±10%, 1/2 w	745 1436 00
R1208	R-f isolating	RESISTOR: comp, 0.10 megohm ±10%, 1/2 w	745 3436 00
R1209	Voltage divider circuit	RESISTOR: comp, 47,000 ohm ±10%, 1 w	745 3422 00
T1201	250 kc oscillator output	TRANSFORMER, IF: 250 kc includes C1203, C1204, L1201, and L1202	506 6204 003
TB1201	Term mtg	BOARD: terminal, component mounting	506 6209 003
V1201	250 kc Crystal oscillator	TUBE, 5749	253 0005 00
V1202	250 kc-bfo	TUBE, 5749	253 0005 00
XHR1201	Not used		
XHR1202	Not used		
XHR1203	HR1203 holder	SOCKET: tube	220 1005 00
XV1201	V1201 holder	SOCKET: tube	220 1111 00
XV1202	V1202 holder	SOCKET: tube	220 1111 00
Y1201	Not used		
Y1202	Not used		
Y1203	250-kc osc crystal	CRYSTAL: type CR-46/U 250 kc per second	290 1599 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
1301-1399 Series	A-F AMPLIFIER		506 6106 006
C1301	V1301A grid coupling	CAPACITOR: paper, 33,000 uuf ±20%, 100 wv	931 0401 00
C1302	V1301B grid coupling	CAPACITOR: paper, 0.01 uf ±10%, 200 wv	931 0436 00
C1303	V1302 grid coupling	CAPACITOR: paper, 0.01 uf ±10%, 200 wv	931 0436 00
C1304	V1302 cathode bypass	CAPACITOR: paper, 2 uf, -20% +30%, 100 wv	931 0034 00
C1305	V1301A plate decoupling	CAPACITOR: paper, 0.1 uf, ±20%, 300 wv	931 0442 00
C1306	V1301A r-f bypass	CAPACITOR: mica, 510 uuf, ±5%, 500 wv	935 0222 00

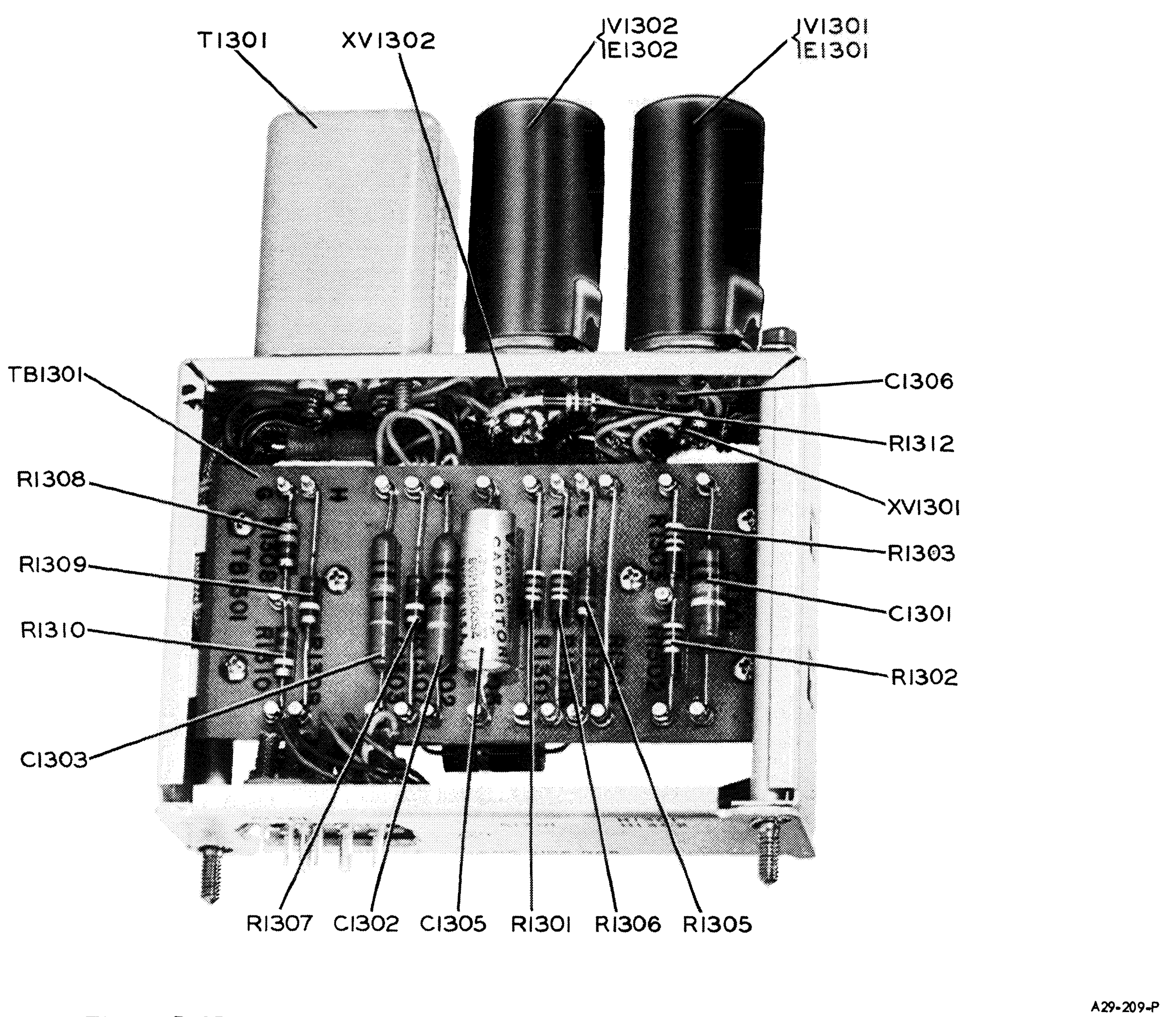

Figure 7-35. Transceiver 618S-1, A-F Amplifier, Right Side View

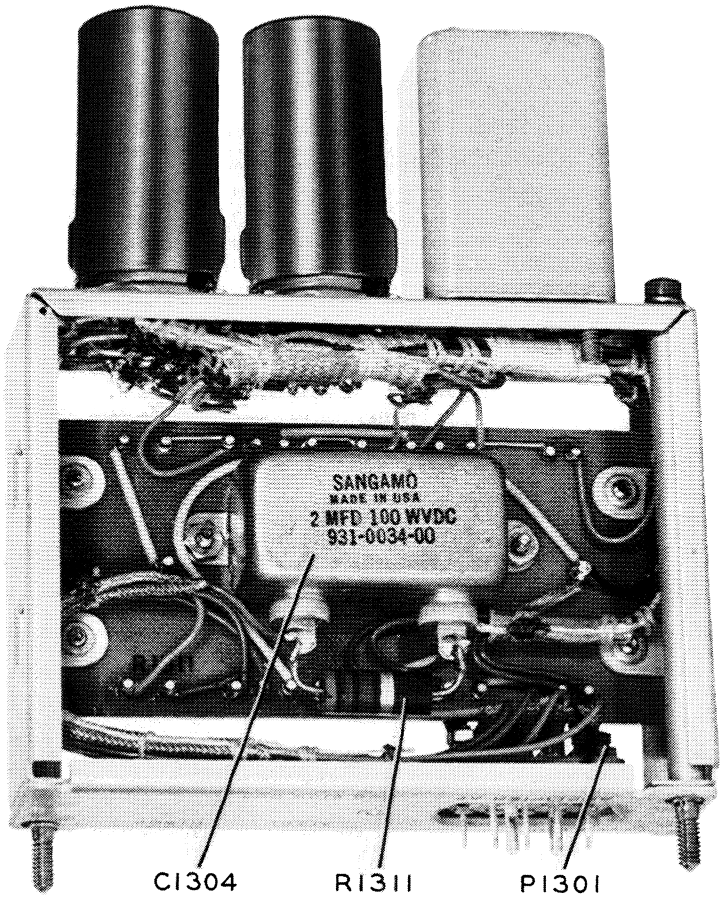

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Figure 7-36. Transceiver 618S-1, A-F Amplifier, Left Side View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
E1301	V1301 shield	SHIELD: tube, 0.950 in. dia x 1-15/16 in. lg	141 0147 00
E1302	V1302 shield	Same as E1301	
P1301	A-f amplifier connector	CONNECTOR: male plug, 11 prong wall or cable mounting	372 1074 00
R1301	V1301A plate decoupling	RESISTOR: comp, 47,000 ohm ±10%, 1/2 w	745 1422 00
R1302	V1301A grid and voltage divider	RESISTOR: comp, 47,000 ohm ±10%, 1/2 w	745 1422 00
R1303	V1301A grid	RESISTOR: comp, 47,000 ohm ±10%, 1/2 w	745 1422 00
R1304	Not used		

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R1305	V1301A cathode	RESISTOR: comp, 1500 ohm ±10%, 1/2 w	745 1359 00
R1306	V1301A plate resistor	RESISTOR: comp, 47,000 ohm ±10%, 1/2 w	745 1422 00
R1307	V1301B grid resistor	RESISTOR: comp, 0.10 megohm ±10%, 1/2 w	745 1436 00
R1308	V1301B cathode resistor	RESISTOR: comp, 3300 ohm ±10%, 1/2 w	745 1373 00
R1309	V1301B plate resistor	RESISTOR: comp, 0.10 megohm ±10%, 1/2 w	745 1436 00
R1310	V1302 grid resistor	RESISTOR: comp, 0.22 megohm ±10%, 1/2 w	745 1450 00
R1311	V1302 cathode resistor	RESISTOR: comp, 820 ohm ±10%, 2 w	745 5649 00
R1312	V1301B feedback	RESISTOR: comp, 470,000 ohm ±10%, 1/2 w	745 1464 00
T1301	Audio output	TRANSFORMER: hermetically sealed, input 14,500 ohm 1000 v rms, output 300 ohm 1000 v rms	677 0527 00
TB1301	Component mtg	BOARD: terminal, component mounting	506 6107 003
V1301	Class A audio amplifier	TUBE: 5814	253 0013 00
V1302	Class A audio amplifier	TUBE: 5686	253 0009 00
XV1301	V1301 holder	SOCKET: tube	220 1103 00
XV1302	V1302 holder	SOCKET: tube	220 1103 00
1401-1499 Series	MODULATOR		506 6667 006
C1401	Noise filter	CAPACITOR: electrolytic, 50 uf, -15% +75%, 50 wv	184 7010 00
C1402	V1401A grid coupling	CAPACITOR: paper, 0.22 uf ±20%, 100 wv	931 0406 00
	Effective MOD 1	CAPACITOR: paper, fixed, 0.15 uf ±20%, 100 wv	931 0405 00
C1403	Filter coupling	CAPACITOR: paper, 0.10 uf ±20%, 100 wv	931 0404 00
C1404	V1401A plate coupling	CAPACITOR: paper, 0.10 uf ±20%, 100 wv	931 0442 00
		CAPACITOR: paper, fixed, 0.10 uf ±20%, 300 wv	931 2516 00

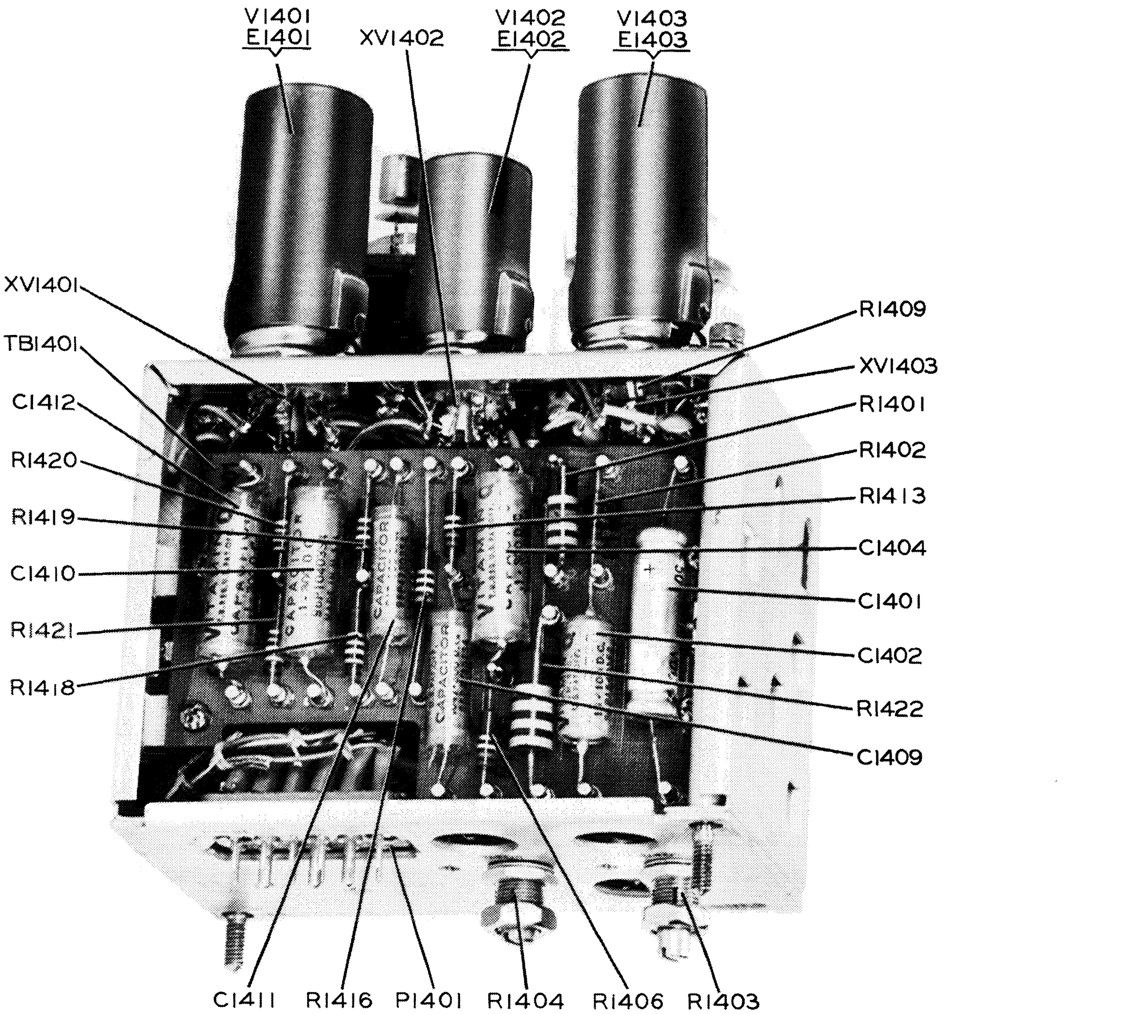


Figure 7-37. Transceiver 618S-1, Modulator, Front View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1405	P/o low-pass filter	CAPACITOR: mica, 430 uuf ±2%, 300 wv	912 0538 00
C1406	P/o low-pass filter	CAPACITOR: mica, 510 uuf ±2%, 300 wv	912 0544 00
C1407	P/o low-pass filter	CAPACITOR: mica, 430 uuf ±2%, 300 wv	912 0538 00
C1408	P/o low-pass filter	CAPACITOR: mica, 39 uuf ±2%, 500 wv	912 0463 00
C1409	V1403 grid coupling	CAPACITOR: paper, 0.047 uf ±20%, 300 wv	931 0440 00
		CAPACITOR: paper, fixed, 0.047 uf ±20%, 300 wv	931 2560 00

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1410	V1404 grid coupling	CAPACITOR: paper, 0.10 uf ±20%, 100 wv	931 0442 00
		CAPACITOR: paper, fixed, 0.10 uf ±20%, 300 wv	931 2516 00
C1411	V1403 plate coupling	CAPACITOR: paper, 0.047 uf ±20%, 300 wv	931 0440 00
		CAPACITOR: paper, fixed, 0.047 uf ±20%, 300 wv	931 2560 00
C1412	V1405 grid coupling	CAPACITOR: paper, 0.10 uf ±20%, 100 wv	931 0442 00
		CAPACITOR: paper, fixed, 0.10 uf ±20%, 300 wv	931 2516 00
C1413	Added effective MOD 2	CAPACITOR: ceramic, 500 uuf ±10%, 500 wv	913 0998 00
		CAPACITOR: ceramic, 470 uuf ±20%, 500 wv	913 2749 00
C1414	V1401A plate decoupling	CAPACITOR: paper, 0.10 uf ±20%, 300 wv	931 0442 00

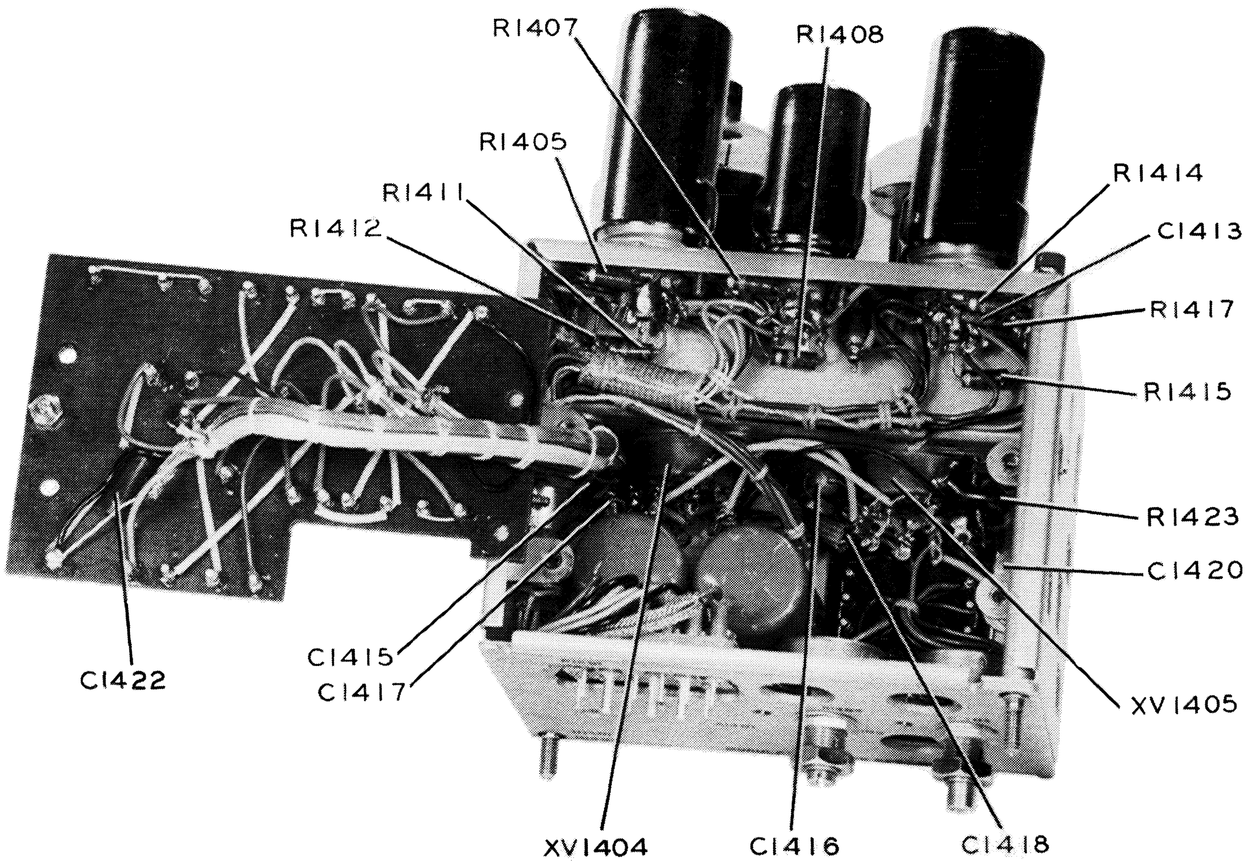


Figure 7-38. Transceiver 618S-1, Modulator, Front View, TB1401 Removed

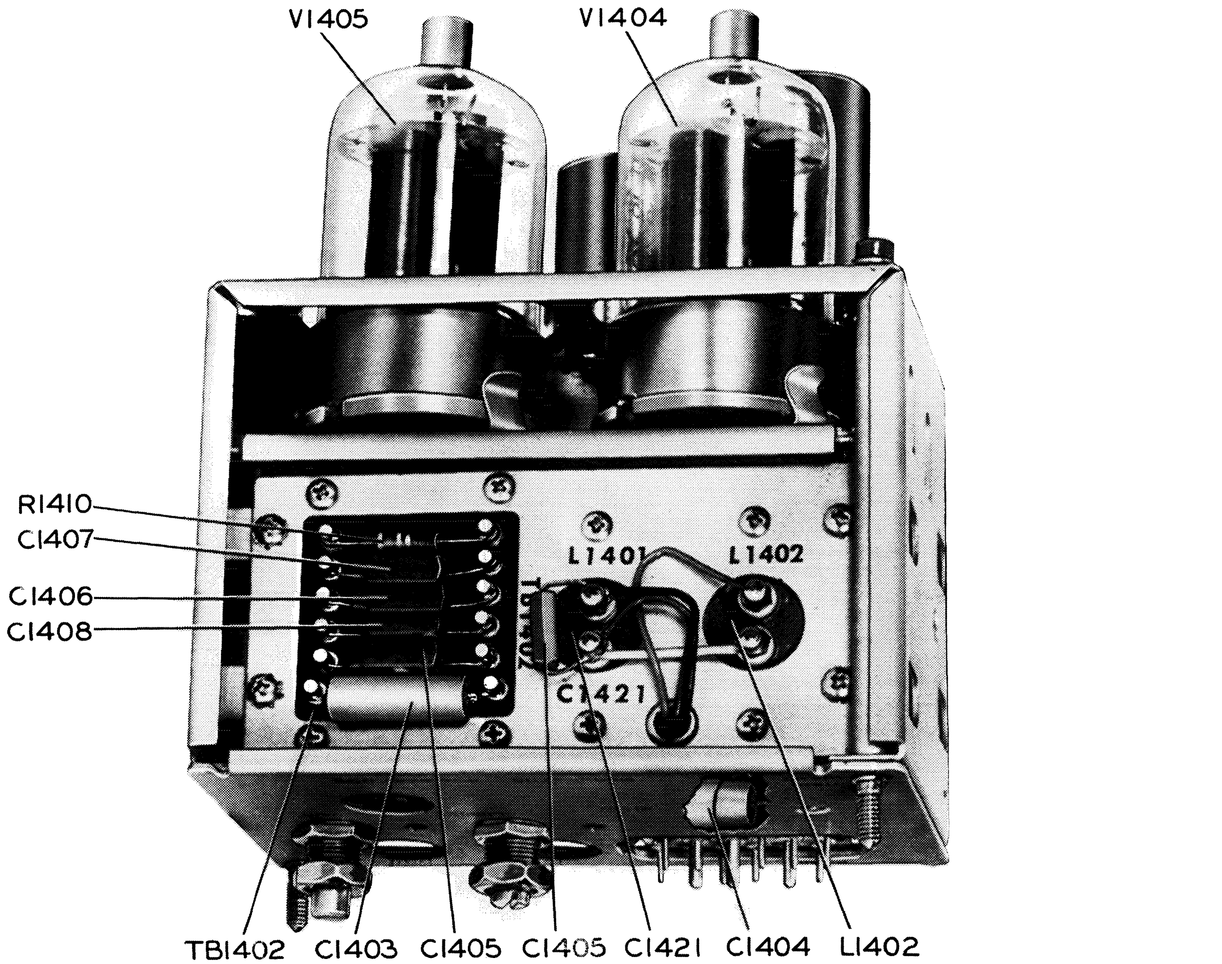


Figure 7-39. Transceiver 618S-1, Modulator, Rear View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1415	V1404 cathode bypass	CAPACITOR: paper, 0.01 uf ±20%, 200 wv	931 2537 00
C1416	V1405 cathode bypass	CAPACITOR: paper, 0.01 uf ±20%, 200 wv	931 2537 00
C1417	V1404 grid bypass	CAPACITOR: ceramic, 1000 uuf guar min, 500 wv	913 0146 00
	Effective MOD 2	CAPACITOR: ceramic, 0.001 uf +100 -20%, 500 wv	913 1186 00
	Effective MOD 5	CAPACITOR: ceramic, 470 uuf ±20%, 500 wv	913 2749 00
C1418	V1405 grid bypass	CAPACITOR: ceramic, 1000 uuf guar min, 500 wv	913 0146 00
	Effective MOD 2	CAPACITOR: ceramic, 0.001 uf +100 -20%, 500 wv	913 1186 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
	Effective MOD 5	CAPACITOR: ceramic, 470 uuf ±20%, 500 wv	913 2749 00
C1419	Not used		
C1420	V1404 and V1405 screen bypass	CAPACITOR: paper, 0.10 uf ±20%, 300 wv	931 0626 00
C1421	P/o low-pass filter	CAPACITOR: mica, 100 uuf ±2%, 500 wv	912 0493 00
C1422	R-f bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
E1401	V1401 shield	SHIELD: electron tube, 0.950 in. dia x 1-13/16 in. lg	541 6554 003
E1402	V1402 shield	SHIELD: electron tube, 0.810 in. dia x 1-3/8 in. lg	541 6550 003
E1403	V1403 shield	Same as E1401	541 6554 003
L1401	Low-pass filter	REACTOR: audio freq, 300 to 4000 cps, min Q of 15 at 1000 cps	678 0536 00
L1402	Low-pass filter	Same as L1402	678 0536 00
R1401	Voltage dropping and noise filter. No MOD to MOD 3	RESISTOR: comp, 330 ohm ±10%, 1/2 w	745 1065 00
	Effective MOD 4	RESISTOR: comp, 330 ohm ±10% 1 w	745 3331 00
R1402	Voltage dropping and noise filter	RESISTOR: comp, 82 ohm ±10%, 1/2 w	745 1307 00
R1403	Audio gain control	RESISTOR: variable, comp, 10,000 ohm ±20%	380 5259 00
R1404	Clipper control	RESISTOR: variable, comp, 100,000 ohm ±20%	380 5266 00
R1405	V1401A cathode	RESISTOR: comp, 150 ohm ±10%, 1/2 w	745 1317 00
R1406	V1401A plate	RESISTOR: comp, 0.27 megohm ±10%, 1/2 w	745 1454 00
R1407	V1402 diode load	RESISTOR: comp, 56,000 ohm ±10%, 1/2 w	745 1426 00
R1408	V1402 diode load	RESISTOR: comp, 56,000 ohm ±10%, 1/2 w	745 1426 00
R1409	Audio filter impedance matching	RESISTOR: comp, 0.22 megohm ±10%, 1/2 w	745 1450 00
R1410	V1402 diode plate	RESISTOR: comp, 0.47 megohm ±10%, 1/2 w	745 1464 00
R1411	V1401B grid	RESISTOR: comp, 82,000 ohm ±10%, 1/2 w	745 1433 00
R1412	V1401B cathode	RESISTOR: comp, 1000 ohm ±10%, 1/2 w	745 1352 00
R1413	V1401B plate	RESISTOR: comp, 0.27 megohm ±10%, 1/2 w	745 1454 00
R1414	V1403 grid	RESISTOR: comp, 0.22 megohm ±10%, 1/2 w	745 1450 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R1415	V1403 cathode	RESISTOR: comp, 1000 ohm ±10%, 1/2 w	745 1352 00
R1416	Phase inverter grid voltage divider	RESISTOR: comp, 0.27 megohm ±10%, 1/2 w	745 1188 00
	MOD 1	RESISTOR: comp, 0.39 megohm ±10%, 1/2 w	745 1195 00
	Effective MOD 2	RESISTOR: fixed, comp, 0.39 megohms ±10%, 1/2 w	745 1461 00
R1417	V1403 grid	RESISTOR: comp, 33,000 ohm ±10%, 1/2 w	745 1415 00
R1418	V1403 plate	RESISTOR: comp, 39,000 ohm ±10%, 1/2 w	745 1419 00
R1419	V1403 plate	RESISTOR: comp, 39,000 ohm ±10%, 1/2 w	745 1419 00
R1420	V1404 grid	RESISTOR: comp, 39,000 ohm ±10%, 1/2 w	745 1419 00
R1421	V1405 grid	RESISTOR: comp, 39,000 ohm ±10%, 1/2 w	745 1419 00
R1422	B+ decoupling	RESISTOR: comp, 33,000 ohm ±10%, 2 w	745 5715 00
R1423	V1404 and V1405 cathode	RESISTOR: comp, 12 ohm ±10%, 2 w	745 5572 00
TB1401	Resistor-capacitor term mtg	BOARD: terminal, 29 post terminals	506 6670 003
TB1402	Resistor-capacitor term mtg	BOARD: terminal, 12 post terminals	506 6672 003
V1401	Class A audio amplifier	TUBE: 5751	253 0012 00
V1402	Clipper diode	TUBE: 5726	253 0003 00
V1403	Phase inverter	TUBE: 5814	253 0013 00
V1404	Transmitter modulator	TUBE: electron, 6159	256 0102 00
V1405	Transmitter modulator	TUBE: electron, 6159	256 0102 00
XV1401	V1401 holder	SOCKET: tube	220 1103 00
XV1402	V1402 holder	SOCKET: tube	220 1111 00
XV1403	V1403 holder	SOCKET: tube	220 1103 00
XV1404	V1404 holder	SOCKET: tube	220 1005 00
XV1405	V1405 holder	SOCKET: tube	220 1005 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
1501-1599 Series	POWER AMPLIFIER		506 7450 006
B1501	PA servomotor	MOTOR: servo, 2 phase 400 cps, input 115 v, output 4.0 to 6.0 w per phase	230 0129 00
		MOTOR: servo, single phase 400 cps, input 115 v, output 0.85 in. oz. at 2800 rpm	229 0126 00
C1501	PA grid coupling	CAPACITOR: mica, 100 uuf ±2%, 500 wv	912 0493 00
	Effective MOD 1	CAPACITOR: ceramic, fixed, 100 uuf ±5%, 500 wv	928 4059 00
C1502	V1501 screen bypass	CAPACITOR: ceramic, 4700 uuf ±20%, 500 wv	913 2751 00
C1503	V1502 screen bypass	CAPACITOR: ceramic, 4700 uuf ±20%, 500 wv	913 2751 00
C1504	V1503 screen bypass	CAPACITOR: ceramic, 4700 uuf ±20%, 500 wv	913 2751 00
C1505	V1502 cathode bypass	CAPACITOR: paper, 0.10 uf ±20%, 100 wv	931 0404 00
C1506	Plate circuit coupling	CAPACITOR: mica, 4700 uuf ±10%, 600 wv	936 1104 00
C1507	V1501, 02, 03 grid coupling	CAPACITOR: paper, 0.01 uf ±10%, 300 wv	931 0417 00
C1508	Pi network output	CAPACITOR: mica, 1000 uuf ±2%, 500 wv	912 0735 00
C1509	Pi network output	CAPACITOR: mica, 1100 uuf ±2%, 500 wv	912 0744 00
	Effective MOD 1	CAPACITOR: mica, fixed, 170 uuf ±2%, 500 wv	912 0730 00
C1510	Pi network output	CAPACITOR: mica, 480 uuf ±2%, 500 wv	912 0727 00
	Effective MOD 1	CAPACITOR: fixed, mica 350 uuf ±2%, 500 wv	912 0733 00
C1511	Pi network output	CAPACITOR: mica, 170 uuf ±2%, 500 wv	912 0730 00
	Effective MOD 1	CAPACITOR: fixed, mica, 150 uuf ±2%, 500 wv	912 0752 00
C1512	Discriminator phasing	CAPACITOR: ceramic, 12 uuf ±5%, 500 wv	916 0141 00
C1513	Neutralizing capacitor	CAPACITOR: ceramic, 5 uuf ±5%, 500 wv	916 0118 00
C1514	Sidetone r-f bypass	CAPACITOR: paper, 0.01 uf ±10%, 100 wv	931 0398 00
		CAPACITOR: paper, fixed, 0.01 uf ±20%, 100 wv	931 2497 00
C1515	Discriminator phasing	CAPACITOR: ceramic, 2.0 uuf ±1/4 uuf, 500 wv	916 0075 00

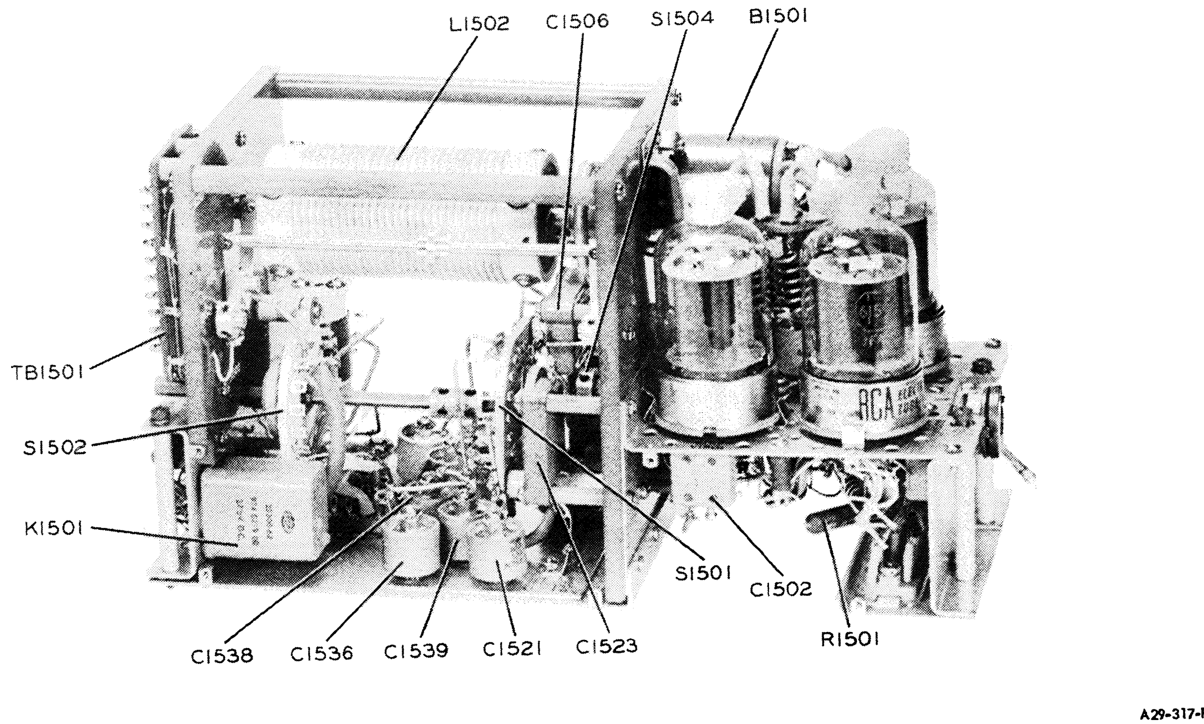


Figure 7-40. Transceiver 618S-1, Power Amplifier, Right Side View

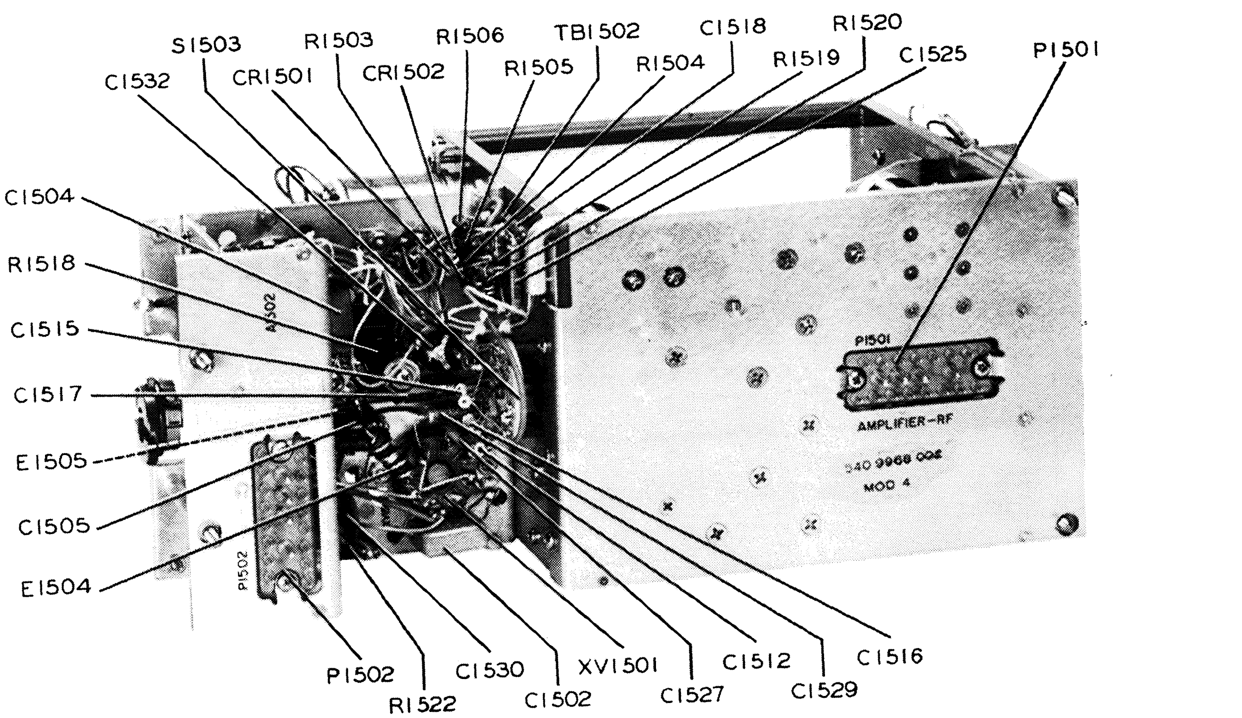
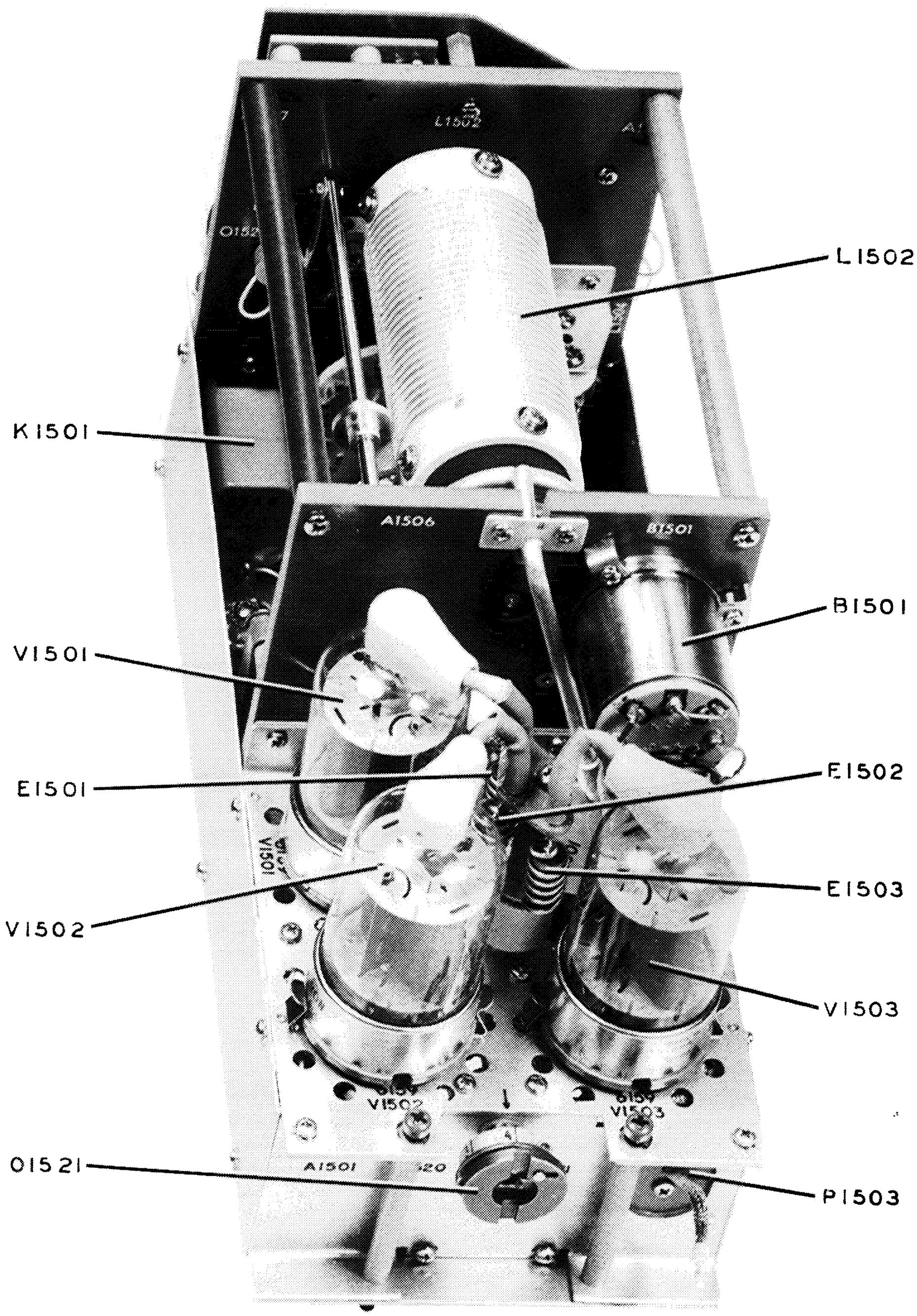
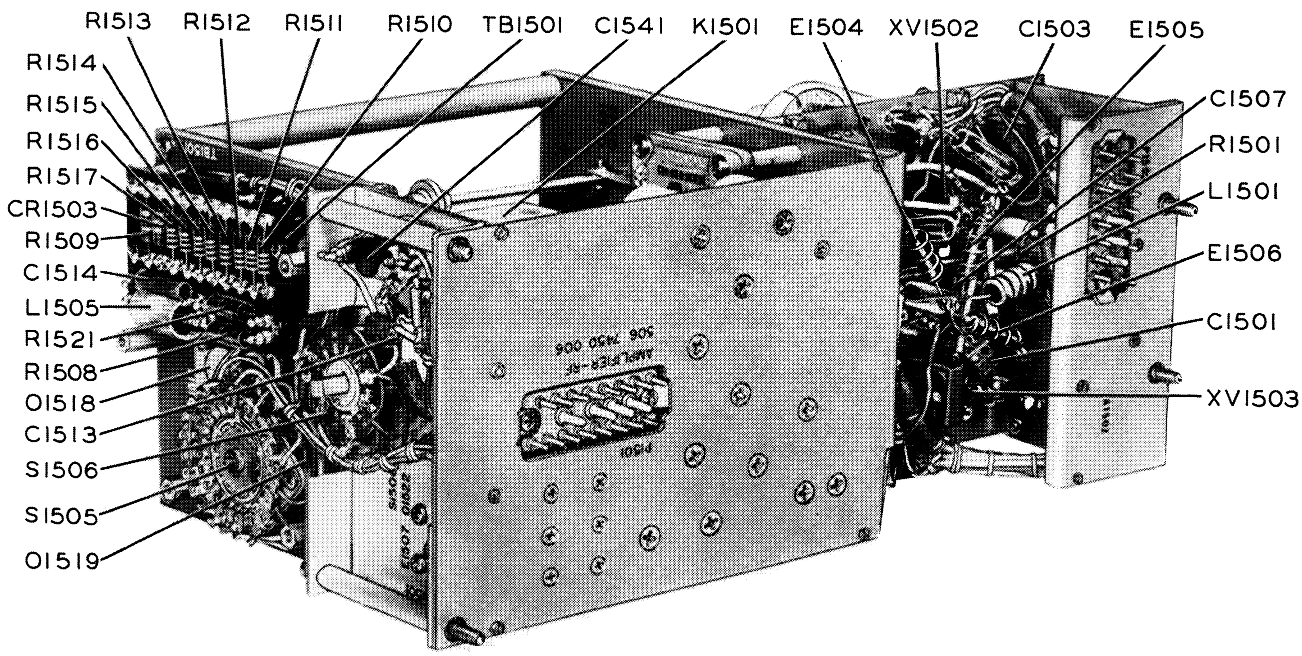


Figure 7-41. Transceiver 618S-1, Power Amplifier, Bottom View



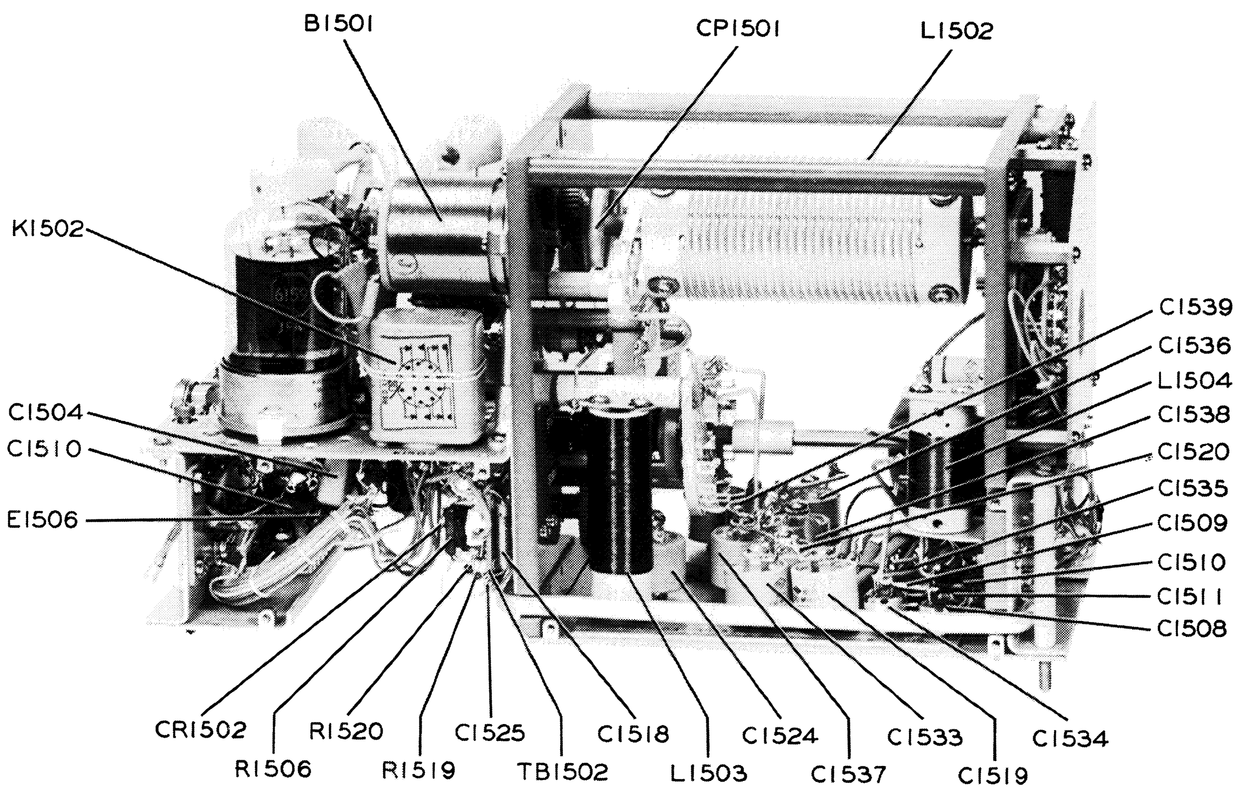
A29-319-P

Figure 7-42. Transceiver 618S-1, Power Amplifier, Front View



A29-320-P

Figure 7-43. Transceiver 618S-1, Power Amplifier, Bottom View



A29-321-P

Figure 7-44. Transceiver 618S-1, Power Amplifier, Left Side View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1516	Discriminator phasing	CAPACITOR: ceramic, 5 uuf ±1/4 uuf 500 wv	916 0117 00
C1517	Discriminator phasing	CAPACITOR: mica, 100 uuf ±2%, 500 wv	912 0493 00
C1518	Discriminator bypass	CAPACITOR: paper, 0.01 uf ±20%, 100 wv	931 2497 00
C1519	Pi network input	CAPACITOR: ceramic, 50 uuf ±5%, 5000 wv	913 0834 00
C1520	Pi network input	CAPACITOR: ceramic, 100 uuf ±5%, 5000 wv	913 0833 00
C1521	Pi network input	CAPACITOR: ceramic, 63 uuf ±5%, 5000 wv	913 0835 00
	Effective MOD 1	CAPACITOR: fixed, ceramic, 100 uuf ±5%, 5000 wv	913 0833 00
C1522	Pi network input	CAPACITOR: ceramic, 10 uuf ±5% uuf 5000 wv	913 0832 00
C1523	L1503 shorting	CAPACITOR: mica, 1000 uuf ±10%, 2500 vdcw	936 0249 00
C1524	Plate bypass	CAPACITOR: ceramic, 1000 uuf ±20%, 5000 vdcw	913 0101 00
C1525	Lead network series capacitor	CAPACITOR: paper, 0.01 uf ±20%, 100 wv	931 2497 00
C1526	Discriminator bypass	CAPACITOR: paper, 0.01 uf ±20%, 100 wv	931 2497 00
C1527	V1501 cathode bypass	CAPACITOR: paper, 0.01 uf ±10%, 100 wv	931 0417 00
C1528	V1503 cathode bypass	CAPACITOR: paper, 0.01 uf ±10%, 100 wv	931 0417 00
C1529	V1501 filament bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 vdcw	913 2750 00
C1530	V1502 filament bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
C1531	V1503 filament bypass	CAPACITOR: ceramic 3300 uuf guar min, 500 wv	913 2750 00
C1532	Neutralizing capacitor	CAPACITOR: ceramic, variable, 3.0 to 12.0 uuf, 350 wv	917 1072 00
C1533	Pi network input	CAPACITOR: ceramic, 100 uuf ±5%, 5000 wv	913 0833 00
C1534	Pi network output	CAPACITOR: mica, 2000 uuf ±2%, 500 wv	912 1135 00
C1535	Pi network output	CAPACITOR: mica, 400 uuf ±2%, 500 wv	912 0748 00
	Effective MOD 1	CAPACITOR: fixed, mica 880 uuf ±2%, 500 wv	912 0743 00
C1536	Pi network input	CAPACITOR: ceramic, 100 uuf ±5%, 5000 wv	913 0833 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1537	Pi network input	CAPACITOR: ceramic, 100 uuf ±5%, 5000 wv	913 0833 00
C1538	Pi network input	CAPACITOR: ceramic, 100 uuf ±5%, 5000 wv	913 0833 00
C1539	Pi network input	CAPACITOR: ceramic, 100 uuf ±5%, 5000 wv	913 0833 00
C1540	Sidetone bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
C1541	Keying relay bypass	CAPACITOR: ceramic, 3300 uuf guar min, 500 wv	913 2750 00
CP1501	Discriminator loop		506 7391 002
CR1501-CR1502	Discriminator rectifiers	CRYSTAL UNIT: rectifying, type 1N67, matched pair	353 0127 00
		CRYSTAL UNIT: rectifying, type 1N198, matched pair	353 0185 00
CR1503	Sidetone rectifier	CRYSTAL UNIT: rectifying, type 1N67	353 0113 00
		CRYSTAL UNIT: rectifying, type 1N198	353 0160 00
E1501-E1503	Parasitic choke	CHOKE: parasitic, 5 turn	506 7393 002
E1504-E1506	Parasitic choke	CHOKE: parasitic, 7 turn	506 7392 002
K1501	Keying relay	RELAY: armature, hermetically sealed, 3C, 1.0 amp at 27.5 v dc resistive load	974 0219 00
K1502	Coil centering	RELAY: armature, hermetically sealed, 4C, 3.0 amp at 32 v dc or 115 v ac, noninductive	974 0365 00
L1501	PA grid RFC	CHOKE, RF: powdered iron core, 2.2 mh, min Q of 70 at 350 kc	240 0134 00
L1502	PA tuning	COIL, RF: ceramic core with 12.8 ft #14 bus wire	506 7443 004
L1503	R-f plate choke	COIL: choke, tapped, 144 turn #22 wire magnet	506 7408 002
L1504	Pi network output	COIL, RF: ceramic, core with 7.0 ft of #22 bus wire	506 7406 002
L1505	Sidetone diode load	CHOKE, RF: powdered iron core, 2.2 mh, min Q of 70 at 350 kc	240 0134 00
P1501	Power amplifier connector	CONNECTOR: male plug, 20 prong wall or cable mounting	372 1069 00
P1502	Power amplifier connector	Same as P1501	372 1069 00
P1503	R-f input plug	PLUG: banana spring	361 0006 00
R1501	Grid meter shunting	RESISTOR: comp, 10 ohm ±10%, 1/2 w	745 1268 00
R1502	V1501, 02 and 03 cathode	RESISTOR: ww, 10 ohm ±3%, 5 w	747 9433 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
R1503	Discriminator balancing	RESISTOR: fixed, 100 ohm ±1%, 1/2 w	705 2107 00
R1504	Discriminator balancing	RESISTOR: fixed, 100 ohm ±1%, 1/2 w	705 2107 00
R1505	Discriminator load	RESISTOR: fixed, 22,100 ohm ±1%, 1/2 w	705 2163 00
R1506	Discriminator load	RESISTOR: fixed, 22,100 ohm ±1%, 1/2 w	705 2163 00
R1507	Discriminator phasing	RESISTOR: comp, 47 ohm ±10%, 1/2 w	745 1296 00
R1508	Sidetone coupling	RESISTOR: comp, 10,000 ohm ±10%, 1/2 w	745 3394 00
R1509	Sidetone load	RESISTOR: comp, 2700 ohm ±10%, 1/2 w	745 1370 00
R1510	Coil centering shunt	RESISTOR: comp, 33,000 ohm ±10%, 1/2 w	745 1415 00
R1511	Coil centering shunt	RESISTOR: comp, 33,000 ohm ±10%, 1/2 w	745 1415 00
R1512	Coil centering shunt	RESISTOR: comp, 33,000 ohm ±10%, 1/2 w	745 1415 00
R1513	Coil centering shunt	RESISTOR: comp, 33,000 ohm ±10%, 1/2 w	745 1415 00
R1514	Coil centering shunt	RESISTOR: comp, 33,000 ohm ±10%, 1/2 w	745 1415 00
R1515	Coil centering shunt	RESISTOR: comp, 33,000 ohm ±10%, 1/2 w	745 1415 00
R1516	Coil centering shunt	RESISTOR: comp, 33,000 ohm ±10%, 1/2 w	745 1415 00
R1517	Coil centering shunt	RESISTOR: comp, 33,000 ohm ±10%, 1/2 w	745 1415 00
R1518	Coil centering series	RESISTOR: ww, 80 ohm ±5%, 8 w	747 0071 00
R1519	Lead network series	RESISTOR: comp, 100,000 ohm ±10%, 1/2 w	745 1436 00
R1520	Lead network shunt	RESISTOR: comp, 220,000 ohm ±10%, 1/2 w	745 1450 00
R1521	Sidetone coupling	RESISTOR: comp, 10,000 ohm ±10%, 1/2 w	745 3394 00
R1522	V1501, 02, 03 screen	RESISTOR: ww, 7500 ohm ±3%, 5 w	747 9399 00
R1523	Voltage divider	RESISTOR: fixed, comp, 4700 ohms ±10%, 1/2 w	745 1380 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
*R1524	Balance resistor	RESISTOR: fixed, comp, 1200 ohm ±10%, 1/2 w	745 1356 00
		RESISTOR: fixed, comp, 1500 ohms ±10%, 1/2 w	745 1359 00
		RESISTOR: fixed, comp, 1800 ohms ±10%, 1/2 w	745 1363 00
		RESISTOR: fixed, comp, 2200 ohms ±10%, 1/2 w	745 1366 00
		RESISTOR: fixed, comp, 2700 ohms ±10%, 1/2 w	745 1370 00
		RESISTOR: fixed, comp, 3300 ohms ±10%, 1/2 w	745 1373 00
		RESISTOR: fixed, comp, 3900 ohms ±10%, 1/2 w	745 1377 00
		RESISTOR: fixed, comp, 5600 ohms ±10%, 1/2 w	745 1384 00
		RESISTOR: fixed, comp, 8200 ohms ±10%, 1/2 w	745 1391 00
S1501	Pi network input	SWITCH: rotary wafer, 1 circuit, 1 pole, 18 position	269 1627 00
S1502	Pi network output	SWITCH: rotary wafer, 1 circuit, 1 pole, 18 position	269 1627 00
S1503	Discriminator phasing	SWITCH: rotary wafer, 2 circuit, 1 pole, 18 position	269 1620 00
S1504	Adds C1523 to circuit	Consists of two contact supports	506 7387 002 506 7388 002
S1505	Coil centering	SWITCH: rotary wafer, 1 circuit, 1 pole, 24 position	269 1621 00
S1506	Coil centering	SWITCH: rotary wafer, 1 circuit, 1 pole, 12 position	269 1628 00
TB1501	Component mtg	BOARD TERMINAL: component mounting	506 7440 004
TB1502	Resistor-capacitor term mtg	BOARD TERMINAL: assembly, includes C1518, 25, 26, CR1501, 02, R1503, 04, 05, 06, 07, 19, and 20	506 7434 003
V1501	PA class C amplifier	TUBE: electron, 6159	256 0102 00
V1502	PA class C amplifier	TUBE: electron, 6159	256 0102 00
V1503	PA class C amplifier	TUBE: electron, 6159	256 0102 00
XV1501	V1501 holder	SOCKET: tube	220 1005 00
XV1502	V1502 holder	SOCKET: tube	220 1005 00
XV1503	V1503 holder	SOCKET: tube	220 1005 00

*Choose one for individual requirement

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
1601-1699 Series	POWER SUPPLY	416W-1	522 0053 006
C1601	Voltage doubler no MOD, MOD 1	CAPACITOR: electrolytic 30 uf -10% +250%, 400 wv	184 0072 00
	Effective MOD 2	CAPACITOR: electrolytic, 30 uf -10% +250%, 400 wv	184 9007 00
C1602	Filter for 250 v line	CAPACITOR: electrolytic, 30 uf -10% +250%, 400 wv	184 0072 00
	Effective MOD 2	CAPACITOR: electrolytic 30 uf -10% +250%, 400 wv	184 9007 00
C1603	28 v line filter	SUPPRESSOR: paper, 0.1 uf +20% -10%, 400 wv	241 0076 00
C1604	28 v line filter	CAPACITOR: electrolytic 4 uf -15% +50%, 60 wv	184 7000 00
C1605	Bias filter	CAPACITOR: paper, 2 x 2 uf ±20%, 200 wv	931 2733 00
C1606	Bias filter	CAPACITOR: electrolytic 20 uf -30% +250%, 150 wv	184 6527 00
C1607	600 v line filter	CAPACITOR: paper, 1 uf +40% -15%, 1000 wv	962 4005 00
		CAPACITOR: paper, 2 uf ±10%, 1000 wv	930 0524 00
C1608	250 v line filter	CAPACITOR: electrolytic 30 uf -10% +250%, 400 wv	184 0072 00
	Effective MOD 2	CAPACITOR: electrolytic, 30 uf -10% +250%, 400 wv	184 9007 00
C1609	Not used		
C1610	Not used		
C1611	Bias filter	CAPACITOR: electrolytic, 20 uf -30% +250%, 150 wv	184 6527 00
C1612	Phase shifting	CAPACITOR: paper, 0.068 uf ±20%, 300 wv	931 0533 00
C1613	Filter capacitor	CAPACITOR: paper, 0.01 uf, ±20%, 400 wv	931 1847 00
	Effective MOD 5		
C1614	Filter capacitor	CAPACITOR: paper, 0.01 uf, ±20%, 400 wv	931 1847 00
	Effective MOD 5		
C1615	Filter capacitor	CAPACITOR: paper, 0.01 uf, ±20%, 400 wv	931 1847 00
	Effective MOD 5		
CR1601	Voltage doubling	RECTIFIER: metallic, single phase half-wave	353 0121 00
CR1602	Bias rectifier	RECTIFIER: metallic, single phase half-wave	353 0123 00
CR1603	Voltage doubling	RECTIFIER: metallic single phase half-wave	353 0121 00
D1601	Power supply	DYNAMOTOR: 8500 rpm, 27.5 v dc input, #1 600 ±5% v dc at 55 ma, #2 250 ±5% v dc at 150 ma output	231 0062 00

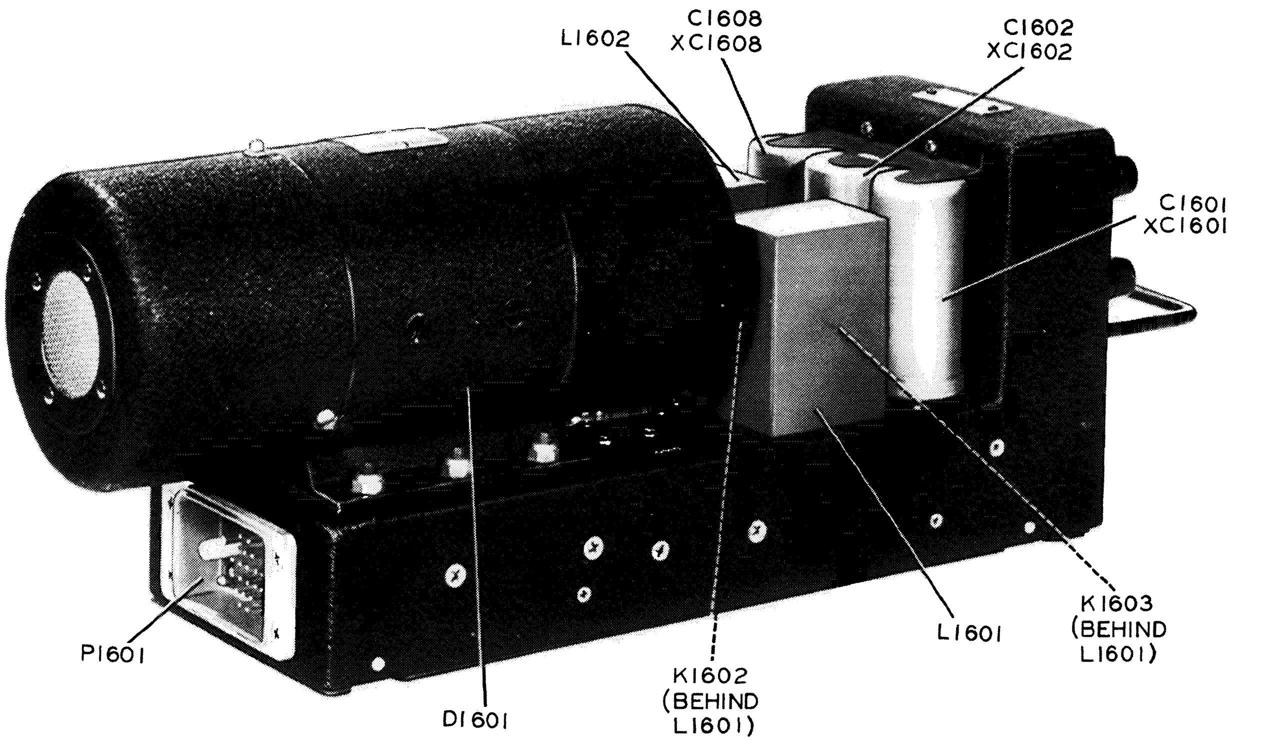
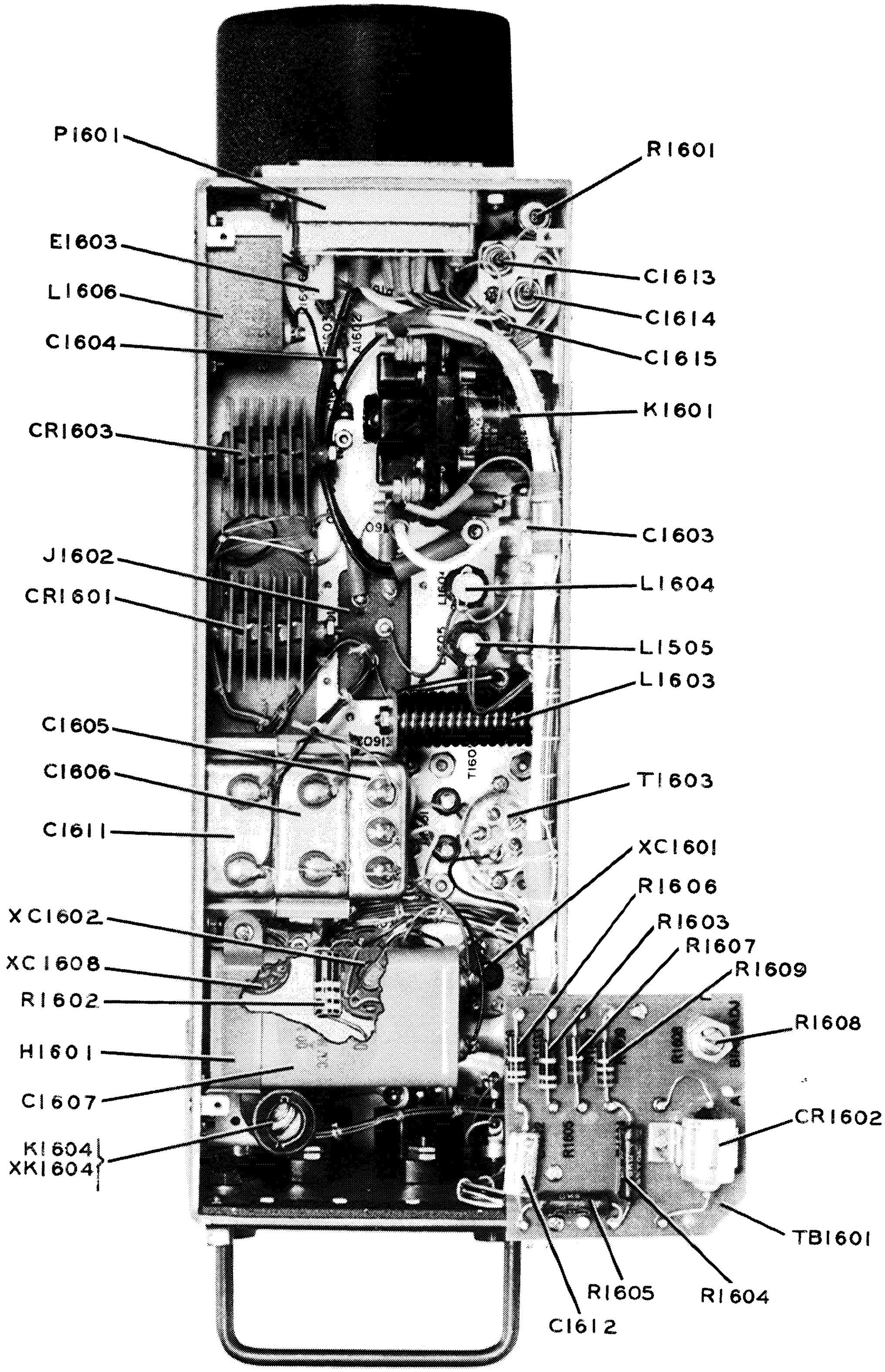


Figure 7-45. Power Supply 416W-1, Side View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
E1601	Not used		
E1602	Not used		
E1603	Terminal for C1604	TERMINAL: insulated, 3/8 in. x 3/32 in.	306 0234 00
F1601	115 v variable frequency	FUSE: 2 amp 250 v	264 4070 00
F1602	115 v 400 cycle	FUSE: 1/2 amp 500 v	264 4030 00
	Effective MOD 1	FUSE: 1 amp 500 v	264 4050 00
F1603	Spare	FUSE: 2 amp 250 v	264 4070 00
F1604	Spare	FUSE: 1/2 amp 500 v	264 4030 00
	Effective MOD 1	FUSE: 1 amp 500 v	264 4050 00
J1602	Dynamotor receptacle	CONNECTOR: plug, single banana contact	506 6874 003



A29-322-P

Figure 7-46. Power Supply 416W-1, Bottom View

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
K1601	Dynamotor start relay	RELAY POWER CONTACTOR: single-pole single-throw double break, normally open, 50 amp 29 v dc	401 1255 00
K1602	Filament relay	RELAY: armature, hermetically sealed, cont arrangement 2 amp series connected internally, 5 amp at 27.5 v dc resistive load	974 0216 00
K1603	A-c input relay	RELAY: armature, hermetically sealed, cont arrangement 2 amp 1.0 amp at 27.5 v dc resistive load	974 0215 00
K1604	Time delay relay	RELAY: thermal, 6 amp at 115 v ac	402 0219 00
	Effective from MOD 5	RELAY: armature, 0.25 amp at 28 v dc	974 0510 00
L1601	Dynamotor filter	REACTOR: filter, 0.4 h, 10 v rms, 60 cps	678 0528 00
L1602	Rectifier output filter	REACTOR: filter, 0.4 h, 10 v rms, 60 cps	678 0528 00
L1603	28-v line filter	CHOKE, RF: 5.5 uh ±20% at 7.9 mc, powdered iron core, 15-3/4 turns #9 AWG	240 0138 00
L1604	Dynamotor r-f choke	COIL: 1 mh ±10%, 3 sect, #32 SSE or equiv	240 0020 00
L1605	Dynamotor r-f choke	CHOKE, RF: 0.5 mh ±10%, 3 sect #29 SSE or SCE	240 0013 00
L1606	Not used on 618S-1	AUTOTRANSFORMER: input 115 ±5 v 400 cps, output 18 ±5% v at 0.287 amp rms	674 0576 00
P1601	Cable connector	CONNECTOR: plug, 23 contact pin insert	370 2051 00
R1601	Current limiting	RESISTOR: ww, 5 ohm ±10%, 8 w	747 0059 00
R1602	Bleeder resistor	RESISTOR: comp, 82,000 ohm ±10%, 2 w	745 5733 00
R1603	Current limiting	RESISTOR: comp, 33 ohm ±10%, 1 w	745 3289 00
R1604	Filter resistor	RESISTOR: ww, 5000 ohm ±3%, 5 w	747 9397 00
R1605	Filter resistor	RESISTOR: ww, 5000 ohm ±3%, 5 w	747 9397 00
R1606	Phase shift	RESISTOR: comp, 3900 ohm ±10%, 1 w	745 3377 00
R1607	Voltage divider	RESISTOR: comp, 15,000 ohm ±10%, 1 w	745 3135 00
	Effective MOD 3	RESISTOR: comp, 3300 ohm ±10%, 1 w	745 3373 00
	Effective MOD 4	RESISTOR: comp, 5600 ohm ±10%, 1 w	745 3384 00
R1608	Bias adjust	RESISTOR: var, comp, 2500 ohm ±20%, 1 w	380 5257 00
R1609	Bias filter	RESISTOR: comp, fixed 22,000 ohm ±10%, 1 w	745 3142 00
	Effective MOD 3	RESISTOR: comp, 18,000 ohm ±10%, 1 w	745 3405 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
S1601	Dynamotor thermal cutout	CIRCUIT BREAKER: thermal 40 amp, 28 v dc	260 4550 00
S1602	Filament thermal cutout	CIRCUIT BREAKER: thermal 10 amp, 28 v dc	260 4560 00
T1601	Chopper transformer	TRANSFORMER: filament, input 115 v 400 cps, output 7.5 v ac, ±0.2 v ac, 0.20 amp rms	672 1103 00
TB1601	Terminal board	BOARD: terminal, power supply	506 6869 003
XC1601	Holder for C1601	SOCKET: octal	220 1005 00
XC1602	Holder for C1602	SOCKET: octal	220 1005 00
XC1603	Not used		
XC1604	Not used		
XC1605	Not used		
XC1606	Not used		
XC1607	Not used		
XC1608	Holder for C1608	SOCKET: octal	220 1005 00
XF1601	Holder for F1601	HOLDER: fuse, extractor post	265 1019 00
XF1602	Holder for F1602	HOLDER: fuse, extractor post	265 1019 00
XF1603	Holder for F1603	HOLDER: fuse, extractor post	265 1019 00
XF1604	Holder for F1604	HOLDER: fuse, extractor post	265 1019 00
XK1604	Tube socket	SOCKET: tube, 7 pin	220 1111 00
1701-1799 Series	SHOCKMOUNT 350T-1		522 0052 004
A1701-A1704	Vibration isolator	MOUNT: vibration	200 0384 00
J1701	Connector	CONNECTOR: plug, 23 contacts	370 2052 00
1801-1899 Series	SHOCKMOUNT 350S-1		522 0059 005
C1801	Line filter	CAPACITOR: ceramic, 1000 uuf, ±20%, 5000 wv	913 0101 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
C1802-C1843	Line filter	CAPACITOR: ceramic feedthrough, 1000 uuf, guar min, 500 wv	913 1476 00
C1844	Line filter	CAPACITOR: ceramic, 1000 uuf, ±20%, 5000 wv	913 0101 00
C1845-C1886	Line filter	CAPACITOR: ceramic, feedthrough, 1000 uuf, guar min, 500 wv	913 1476 00
J1801	Filter unit connector	CONNECTOR: receptacle, 32 contacts, 5 amps 600 v dc	372 1133 00
J1802	Filter unit connector	Same as J1801	372 1133 00
L1801	Line filter	CHOKE, RF: 2 pi windings, approx 105 turns of #28 DSC per pi, 200 uh	240 6000 00
L1802-L1834	Line filter	CHOKE, RF: powdered iron core, 4 pi, 400 uh min at 1 mc	240 0023 00
L1835	Line filter	CHOKE, RF: powdered iron core, 9 uh ±20% at 7.9 mc	240 0026 00
L1836-L1839	Line filter	Same as L1802	240 0023 00
L1840	Line filter	Same as L1836	240 0026 00
L1841-L1843	Line filter	Same as L1802	240 0023 00
TB1801	Shockmount terminal board	BOARD: terminal barrier type, 12 double screw terminal c/o four boards	367 0518 00

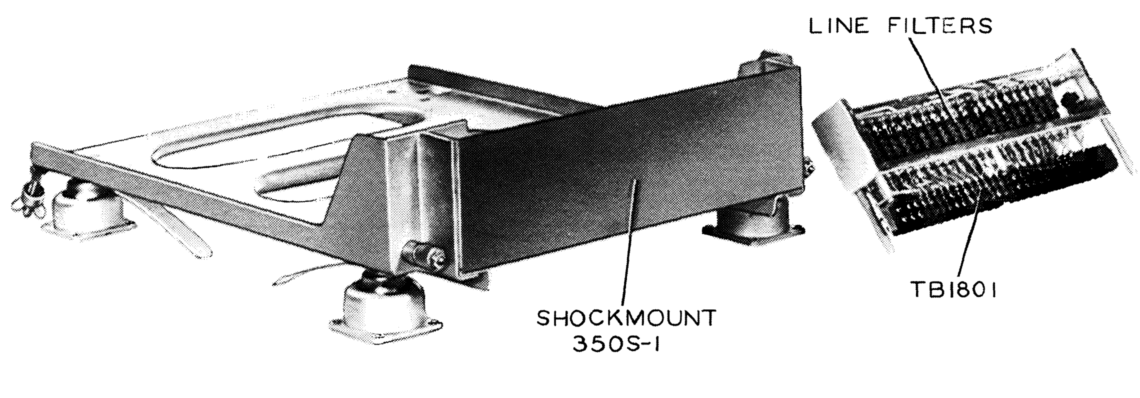


Figure 7-47. Shockmount 350S-1, Rear View with Filter Unit Removed

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
1801-1899 Series	MOUNT RACK 350S-3		522 0184 005
C1801	Line filter	CAPACITOR: ceramic, 1000 uuf ±20%, 5000 wv	913 0101 00
C1802-C1843	Line filter	CAPACITOR: ceramic, feedthrough, 1000 uuf, guar min, 500 wv	913 1476 00
C1844	Line filter	CAPACITOR: ceramic, 1000 uuf ±20%, 5000 wv	913 0101 00
C1845-C1886	Line filter	CAPACITOR: ceramic, feedthrough, 1000 uuf, guar min, 500 wv	913 1476 00
J1801	Filter unit connector	CONNECTOR: receptacle, 32 contacts, 5 amps 600 v dc	372 1133 00
J1802	Filter unit connector	Same as J1801	372 1133 00
L1801	Line filter	CHOKE, RF: 2 pi windings, approx 105 turns of #28 DSC per pi, 200 uh	240 6000 00
L1802-L1834	Line filter	CHOKE, RF: powdered iron core, 4 pi, 400 uh min at 1 mc	240 0023 00
L1835	Line filter	CHOKE, RF: powdered iron core, 9 uh ±20% at 7.9 mc	240 0026 00
L1836-L1839	Line filter	Same as L1802	240 0023 00
L1840	Line filter	Same as L1835	240 0026 00
L1841-L1843	Line filter	Same as L1802	240 0023 00
TB1801	Shockmount terminal board	BOARD: terminal barrier type, 12 double screw terminal c/o four boards	367 0518 00
1801-1899 Series	SHOCKMOUNT 350S-2		522 0076 005
C1801	Line filter	CAPACITOR: ceramic 1000 uuf, ±20%, 5000 wv	913 0101 00
C1802-C1843	Line filter	CAPACITOR: ceramic, feedthrough, 1000 uuf, guar min 500 wv	913 1476 00
C1844	Line filter	CAPACITOR: ceramic, 1000 uuf ±20%, 5000 wv	913 0101 00
C1845-C1886	Line filter	CAPACITOR: ceramic, feedthrough, 1000 uuf, guar min, 500 wv	913 1476 00
J1801	Filter unit connector	CONNECTOR: receptacle, 32 contacts, 5 amps, 600 v dc	372 1133 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
J1802	Filter unit connector	Same as J1801	372 1133 00
L1801	Line filter	CHOKE, RF: 2 pi windings, approx 105 turns of #28 DSC per pi, 200 uh	240 6000 00
L1802-L1834	Line filter	CHOKE, RF: powdered iron core, 4 pi, 400 uh min at 1 mc	240 0023 00
L1835	Line filter	CHOKE, RF: powdered iron core, 9 uh ±20% at 7.9 mc	240 0026 00
L1836-L1839	Line filter	Same as L1802	240 0023 00
L1840	Line filter	Same as L1835	240 0026 00
L1841-L1843	Line filter	Same as L1802	240 0023 00
TB1801	Shockmount terminal board	BOARD: terminal barrier type, 12 double screw terminal c/o four boards	367 0518 00
	Mount, Vibration (4)	not required; straps ground (4) not required.	
2301-2399 Series	REMOTE CONTROL	UNIT 614D-1	522 0061 004
A2301		PLATE: plastic	506 8797 003
I2301-I2302	Lighting	LAMP: midget, 28 v 0.04 amp	262 0179 00
I2303-I2304		CAP: light	262 0301 00
I2305		DIAL: outer	506 8803 003
I2306		DIAL: fine frequency	506 8793 003
O2301		ARM: front detent	506 8792 002
O2302		SPRING: front detent	506 7779 002
O2303		ARM: rear detent	506 8791 002
O2304		SPRING: rear detent	506 7778 002
S2301	Crystal selecting switch	SWITCH: rotary wafer, 2 circuit, 2 pole, 24 position	269 1635 00
S2302	Bank selecting switch	SWITCH: rotary wafer, 1 circuit, 1 pole, 10 position	269 1630 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
XI2301-XI2302		SOCKET: lamp	262 0234 00
2501-2599 Series	REMOTE CONTROL UNIT 614D-2		522 0096 004
A2501		PLATE: plastic	506 8797 003
I2501-I2502	Lighting	LAMP: midget, 28 v 0.04 amp	262 0179 00
I2503-I2504		CAP: light	262 0301 00
I2505		DIAL: outer	506 8803 003
I2506		DIAL: fine frequency	506 9934 002
O2501		ARM: front detent	506 8792 002
O2502		SPRING: front detent	506 7779 002
O2503		Same as O2501	506 8792 002
O2504		Same as O2502	506 7779 002
S2501	Crystal selecting switch	SWITCH: rotary wafer, 2 circuit, 2 pole, 24 position	269 1635 00
S2502	Bank and band selecting switch	SWITCH: rotary wafer, circuit pole, 24 position	269 1652 00
XI2501-XI2502		SOCKET: lamp	262 0234 00
101-199 Series	REMOTE CONTROL UNIT 614D-3. Refer to Instruction Book 614D-3		522 0171 004
A101	Panel lighting plate	PLATE: plastic	540 5217 003
I101-I102	Lighting	LAMP: midget, 28 v 0.04 amp	262 0179 00
I103-I104	Lighting		262 0335 00
I105	Crystal bank selector dial	DIAL: outer	506 8803 003
I106	Crystal selector dial	DIAL: fine frequency	540 5209 002

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
O101-O102	Switch selector and arm	ARM: front detent	540 4043 002
O103		ARM: rear detent	540 5207 002
O104		SPRING: front detent	506 7779 002
S101	Crystal selecting switch	SWITCH: rotary wafer, 2 circuit, 2 pole, 24 position	269 1635 00
S102	Shunt C and transmission disability switch	SWITCH: rotary wafer, 2 circuit, 2 pole, 24 position	269 1702 00
S103	Crystal bank selector	SWITCH: rotary wafer, circuit pole, 24 position	269 1652 00
XI101-XI102	Crystal bank selector	SOCKET: lamp	262 0348 00
2601-2699 Series	REMOTE CONTROL UNIT 614C-2		522 0147 005
A2601	Front panel plate	PLATE: plastic lighting	540 2579 004
I2601	Panel lighting	LAMP: incandescent; AN3140-327; 28 v, 0.04 amp; bulb T-1-3/4; 5/8 in. lg max; miniature flange base	262 0179 00
I2602	Panel lighting	LAMP, INCANDESCENT: same as I2601	262 0179 00
I2603	Tuning indicator	LAMP, INCANDESCENT: same as I2601	262 0179 00
I2604	Lamp holder assembly	LIGHT, INDICATOR: w/lens; for T-1-3/4 midget flange base bulb; identification red lens; encl shell; metal, dull black finish, cad pl bushing; 3/4 in. lg x 9/16 in. OD o/a; single 3/8 in. -24 NF-2A, 3/8 in. d bushing for mtg; horizontally mtd	262 0335 00
I2605	Lamp holder assembly	LIGHT, INDICATOR: same as I2604	262 0335 00
I2606	Lamp holder assembly	LIGHT, INDICATOR: same as I2604	262 0335 00
I2607	Bank selector dial	DIAL: outer	506 8803 003
I2608	Dial, crystal selector	DIAL: fine, c/o screws, dial and varnish; irregular shape; 1-1/4 in. dia 5/8 in. thk o/a; mtd by three screws spaced on 120° angle, holes 0.120 in. dia	506 9934 002
O2601	Front detent arm for frequency selector switches	ARM, DETENT: includes post and roller; steel, cad pl; irregular shape; 2-3/8 in. lg x 5/8 in. wd; mtd by roller	540 4043 002

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
O2602	Rear detent arm for frequency selector switches	ARM, DETENT: same as O2601	540 4043 002
O2603	Front detent spring	SPRING: torsion type, for 24 position switch detent; steel type 302; 0.812 in. max free lg, 0.156 in. ID; 22 turns, wind either hand; two round end hook term; hook ends; mtd by hook term	540 7779 002
O2604	Rear detent spring	SPRING: torsion type; for 24 position switch detent; steel type #302; 0.812 in. max free lg; 0.156 in. OD; 20 turns, wind either hand; 2 round end hook term; hook ends; mtd by hook term	540 4024 002
R2601	BFO control	RESISTOR, VARIABLE: comp; 10,000 ohm ±10%; 1/2 w; 3 solder lug term; metal cover 25/32 in. dia x 3/8 in. d max; encl case; round metal shaft, 0.125 in. dia x 3/4 in. lg fms; 10 counterclockwise rotation; ins cont art, w/o off position; normal torque	380 0891 00
R2602	Threshold gain control	RESISTOR, VARIABLE: comp; 150 ohm ±10%; 1/2 w; three solder lug term; 25/32 in. dia x 3/8 in. d metal case; round metal shaft, 0.125 in. dia x 3/8 in. lg fms; linear taper, ins cont arm, w/o off position	380 6883 00
R2603	Volume control, bridge T pad	RESISTOR, VARIABLE: comp; 5,000 ohm ±20%; 1/2 w; 25/32 in. dia x 3/8 in. d metal case; round metal shaft, 0.125 in. dia x 1/2 in. lg fms; linear taper; ins cont arm, w/o off position	380 6885 00
R2604	Volume control, bridge T pad	RESISTOR, VARIABLE: comp; 5,000 ohm ±20%; 1/2 w; three solder lug term; 25/32 in. dia x 3/8 in. d metal case; round metal shaft, 0.125 in. dia x 1/2 in. lg fms; linear taper; w/o off position, ins cont arm	380 6886 00
R2605	R-F Gain control	RESISTOR, VARIABLE: same as R2604	380 6886 00
R2606	Volume control, bridge T pad	RESISTOR, FIXED: comp; 300 ohm ±5%; 1/2 w; characteristic letter F; 0.406 in. lg x 0.175 in. dia; 2 axial wire lead term	745 1329 00
R2607	Volume control, bridge T pad	RESISTOR, FIXED: same as R2606	745 1329 00
S2601	Frequency selection	SWITCH SECTION, ROTARY: 2 pole, 24 position; phenolic, clips spring silver alloy, rotor blades coin silver alloy; 1-3/4 in. wd x 2-5/16 in. lg; mtd by two holes to pass #5 screw; shorting type	269 1635 00
S2602	Frequency selection	SWITCH SECTION, ROTARY: 2 pole, 24 position; phenolic, clips spring silver alloy, rotor blades coin silver alloy; 1-3/4 in. wd x 2-5/16 in. lg; two holes to pass #5 screw; shorting type	269 1652 00

TRANSCEIVER 618S-1, 618S-4

ITEM	CIRCUIT FUNCTION	DESCRIPTION	COLLINS PART NO.
S2603	Function selector	SWITCH, ROTARY: 8 pole, 3 position; 2 sections; phenolic case; 2-1/4 in. lg x 1-1/4 in. dia; nonshorting type; mounted by two 3/16 in. dia mtg holes spaced on 1-5/16 in. mtg center	259 0652 00
XI2601	Lamp socket	LIGHT, INDICATOR: without lens; to accom T-1-3/4 midget flange base bulb; brass, cad pl; 29/32 in. lg x 0.531 in. dia mtg hole; horizontally mtd lamp, replaceable from front	262 0348 00
XI2602	Lamp socket	LIGHT, INDICATOR: same as XI2601	262 0348 00
XI2603	Lamp socket	LIGHT, INDICATOR: same as XI2601	262 0348 00

ANTENNA TUNER 180L-2/3. Refer to Instruction Book Antenna Tuner 180L-2/3.

SECTION VIII
ILLUSTRATIONS

8.1 WIRE CODE LEGEND.

8.2 The characteristics of the hookup wire used in this equipment are indicated by groups of symbols on the diagrams. Each symbol group consists of a maximum of three letters followed by a maximum of three numerals. When three letters are used, the first indicates the type of wire, the second represents the size of wire, and the third is the letter "S," used only when the wire is shielded. When two letters are used, the first and second letters indicate either the type and size of wire or the size of wire and shielding, respectively. When one letter is used, it indicates the wire size only. The first numeral indicates the color of the wire body, and the second and third numerals, if any, represent the colors of tracers, all numerals being in accordance with the standard RTMA and JAN-C-76 color code. The symbols are assigned according to the following chart.

D A S 9 2 3 5

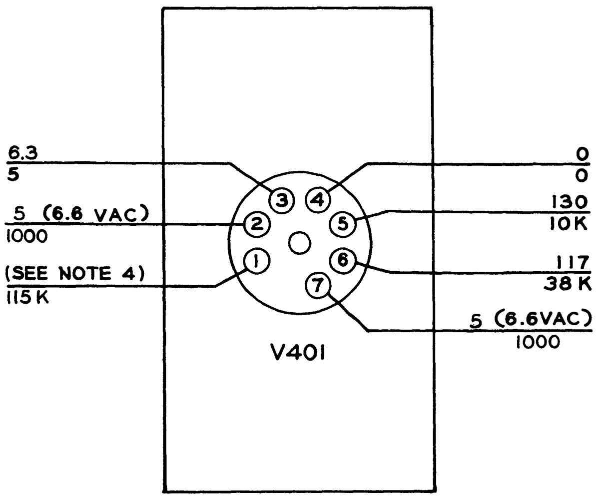
WIRE TYPE (D)
WIRE SIZE (A)
LETTER "S" INDICATES SHIELD (S)
BODY COLOR (9)
FIRST TRACER COLOR (2)
SECOND TRACER COLOR (3)
THIRD TRACER COLOR (5)

FIRST LETTER	TYPE OF WIRE
A	AN-J-C-48
B	Busbar round tinned copper
C	JAN type WL (600 volts)
D	Miniature JAN wire (Prodelin)
F	Extra flexible varnished cambric
G	General Electric Deltabeston
H	KEL-F (Monochloro-trifluoroethylene)
K	Neon sign cable (15,000 volts)
L	Silicone
N	Single conductor stranded (not rubber covered)
P	Single conductor stranded (rubber covered)
R	JAN type SRIR (1000 volts)
T	Teflon (Polytetra-fluoroethylene)
V	JAN type SRHV (2500 volts)

SECOND LETTER	AWG # WIRE SIZE
A	22
B	20
C	18
D	16
E	14
F	12
G	10
H	8
J	6
K	4
L	2
M	1
N	0
P	00
Q	000
R	0000
T	28
V	26

THIRD LETTER	
S	Shielded
None	Unshielded

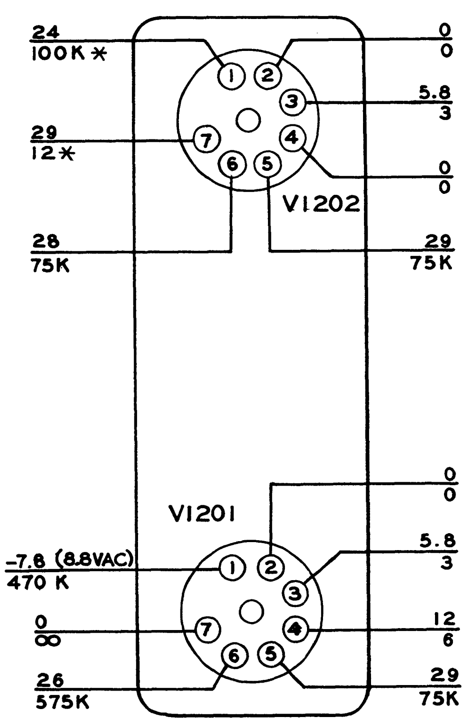
BODY OR TRACER COLOR	NUMERAL
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Gray (slated)	8
White	9
Clear	a
Tan	b
Pink	c
Maroon	d
Light green	e
Light blue	f



NOTES:
1. VOLTAGE MEASUREMENTS TAKEN IN CW TRANSMIT POSITION.
2. RESISTANCE MEASUREMENTS TAKEN WITH UNIT REMOVED FROM SHOCKMOUNT AND P301-14 GROUNDED TO CHASSIS
3. ALL MEASUREMENTS, WITH RESPECT TO CHASSIS GROUND.
4. THIS VOLTAGE VARIES WITH CRYSTAL ACTIVITY AND WITH CRYSTAL FREQUENCY.

A29-97-2

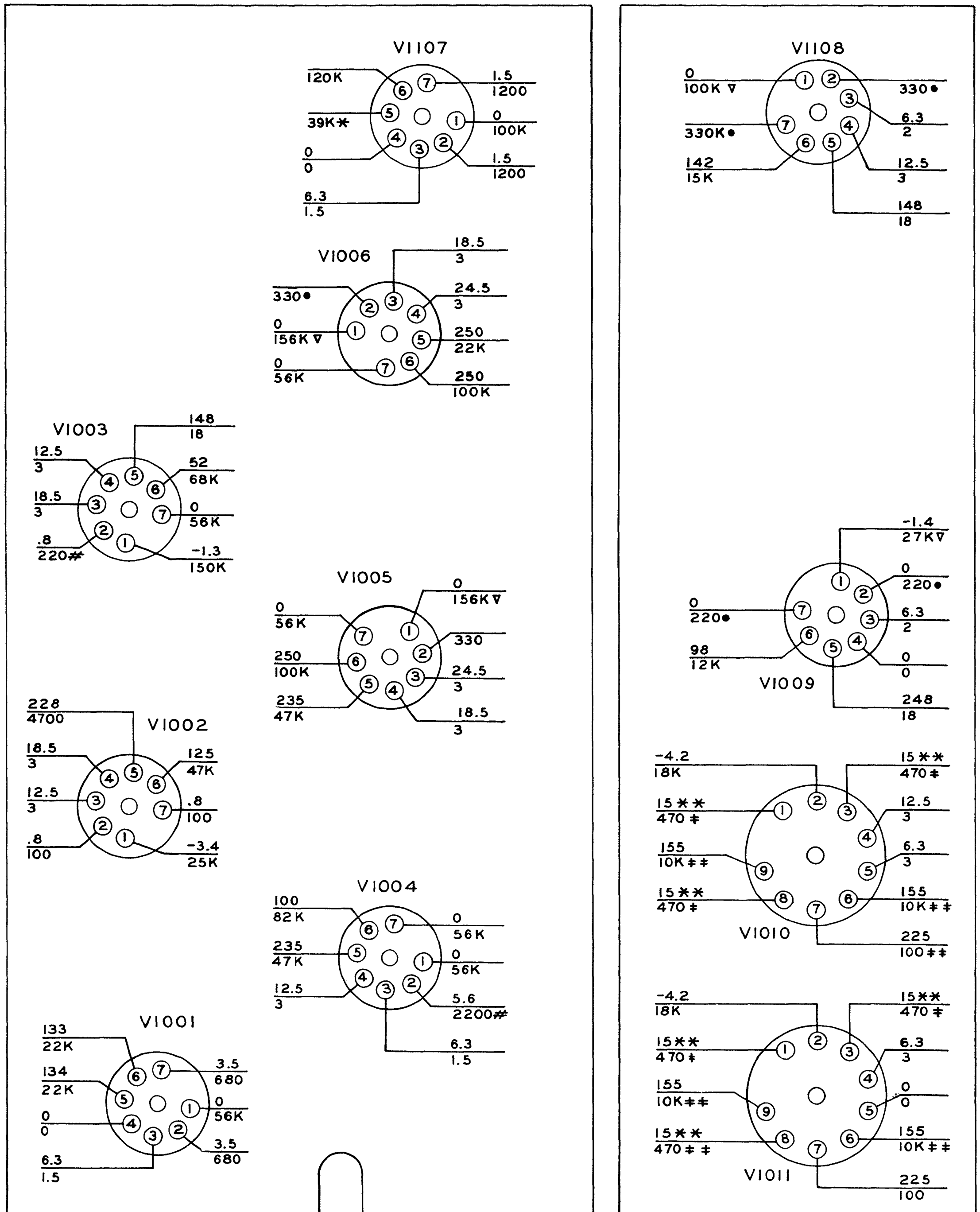
Figure 8-1. Transceiver 618S-1, R-F Crystal Oscillator, Voltage and Resistance Measurements



NOTES:
1. VOLTAGES MEASUREMENTS TAKEN IN CW TRANSMIT POSITION
2. RESISTANCE MEASUREMENTS TAKEN WITH UNIT REMOVED FROM MOUNTING AND P301-14 GROUNDED TO CHASSIS.
3. ALL MEASUREMENTS WITH RESPECT TO CHASSIS GROUND.
4. * INDICATES MEASUREMENT MADE WITH J313-2 GROUNDED.

A29-95-2

Figure 8-2. Transceiver 618S-1, 250 Kc Oscillator, Voltage and Resistance Measurements



NOTES:
1. VOLTAGE MEASUREMENTS TAKEN IN CW TRANSMIT POSITION.
2. RESISTANCE MEASUREMENTS TAKEN WITH UNIT REMOVED FROM MOUNTING AND P301-14 GROUNDED TO CHASSIS.
3. ALL MEASUREMENTS WITH RESPECT TO CHASSIS GROUND.
4. # MEASUREMENT TAKEN WITH J308-10 GROUNDED TO CHASSIS.
5. ∇ MEASUREMENT TAKEN WITH J307-11 GROUNDED TO CHASSIS.
6. ● MEASUREMENT TAKEN WITH J307-15 GROUNDED TO CHASSIS.
7. * MEASUREMENT TAKEN IN BAND 3 POSITION.
8. ** MEASUREMENT TAKEN IN BAND 1 POSITION.
9. ‡ MEASUREMENT TAKEN IN BAND 1 POSITION WITH J307-5 GROUNDED TO CHASSIS.
10. ‡‡ MEASUREMENT TAKEN WITH J307-1 GROUNDED TO CHASSIS.

Figure 8-3. Transceiver 618S-1, R-F Tuner, Voltage and Resistance Measurements

A29-102-4

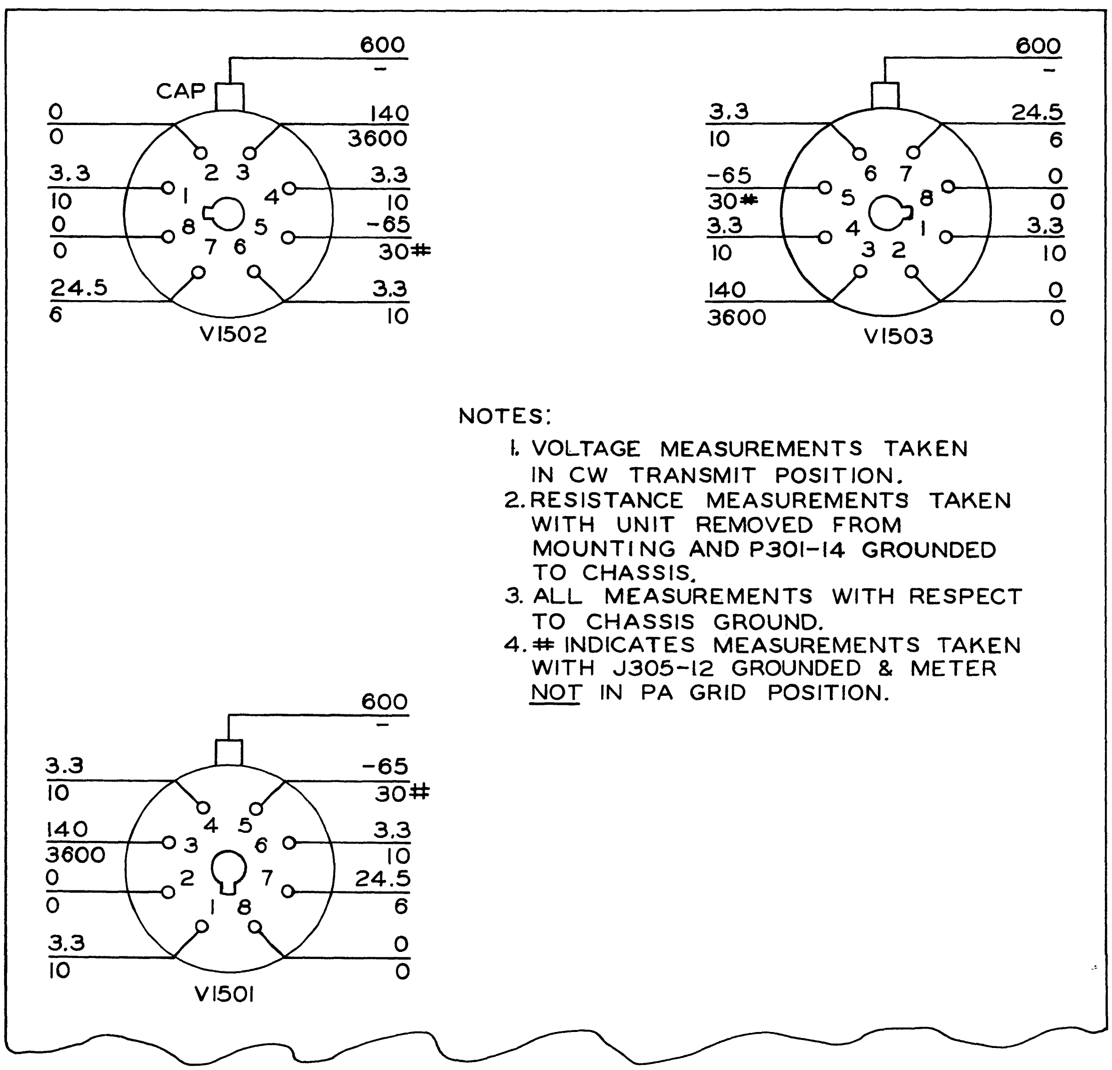
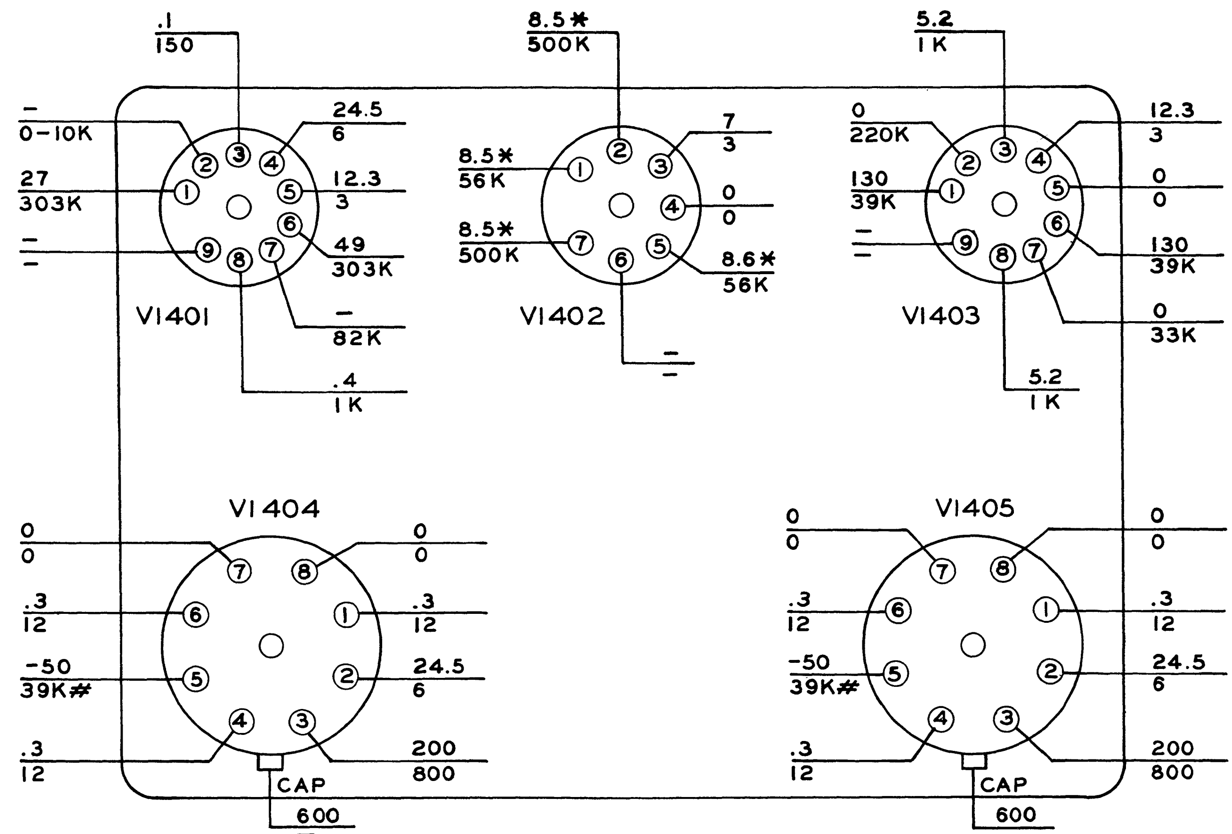


Figure 8-4. Transceiver 618S-1, Power Amplifier, Voltage and Resistance Measurements

A29-94-3

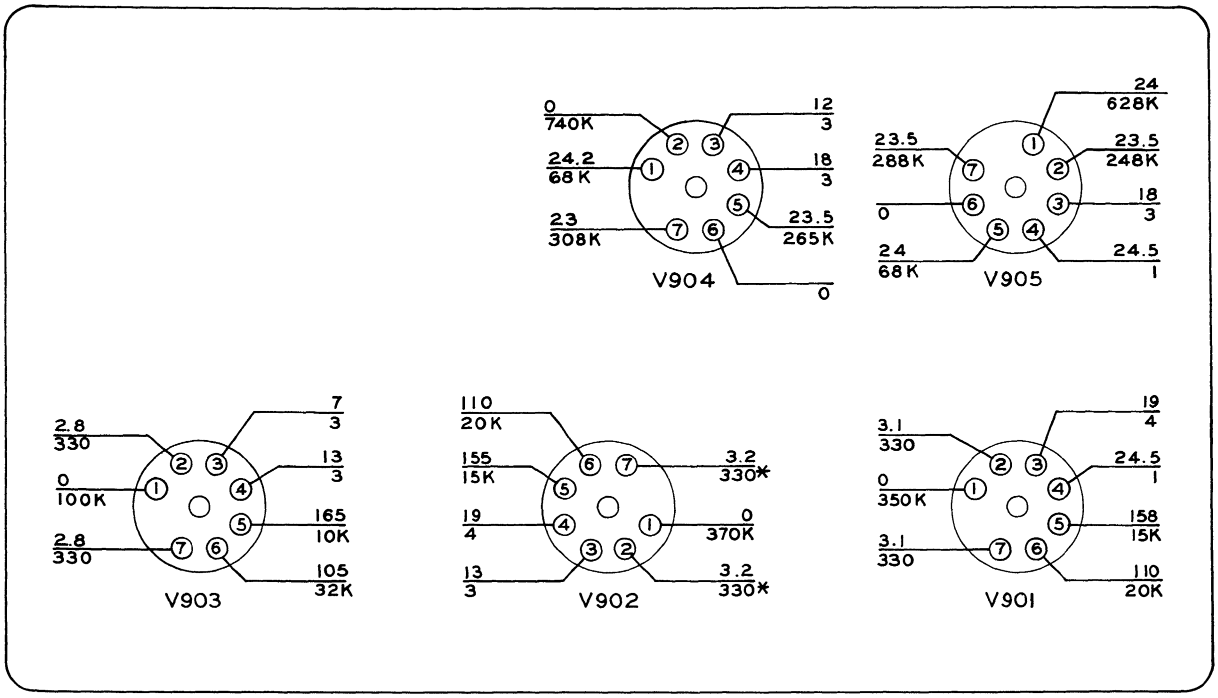


NOTES:

1. VOLTAGE MEASUREMENTS TAKEN IN CW TRANSMIT POSITION.
2. RESISTANCE MEASUREMENTS TAKEN WITH UNIT REMOVED FROM MOUNTING & P301-14 GROUNDED TO CHASSIS.
3. ALL MEASUREMENTS WITH RESPECT TO CHASSIS GROUND.
4. ✱INDICATES MEASUREMENTS DEPEND UPON ADJUSTMENT OF CLIPPER CONTROL R1404.
5. #INDICATES MEASUREMENT MADE WITH J309-4 GROUNDED.

Figure 8-5. Transceiver 618S-1, Modulator, Voltage and Resistance Measurements

A29-101-3

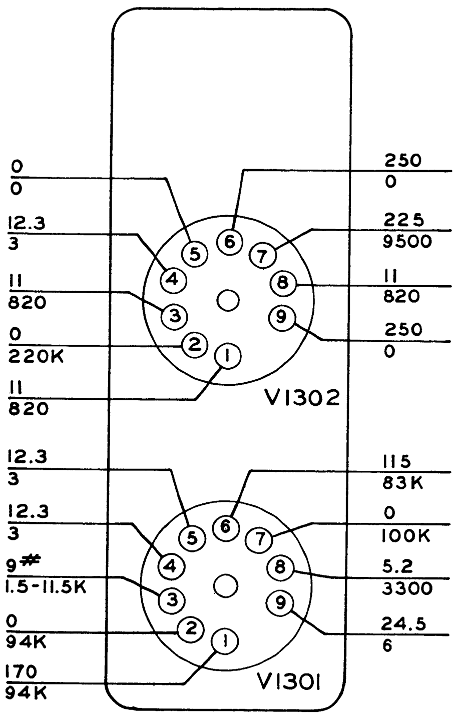


NOTES:

1. VOLTAGE MEASUREMENTS TAKEN IN CW TRANSMIT POSITION.
2. RESISTANCE MEASUREMENTS TAKEN WITH UNIT REMOVED FROM SHOCKMOUNT AND P301-14 GROUNDED TO CHASSIS.
3. ALL MEASUREMENTS WITH RESPECT TO CHASSIS GROUND.
4. * INDICATES P302-10 GROUNDED DURING MEASUREMENTS.

Figure 8-6. Transceiver 618S-1, 250 Kc I-F Amplifier, Voltage and Resistance Measurements

A29-99-3

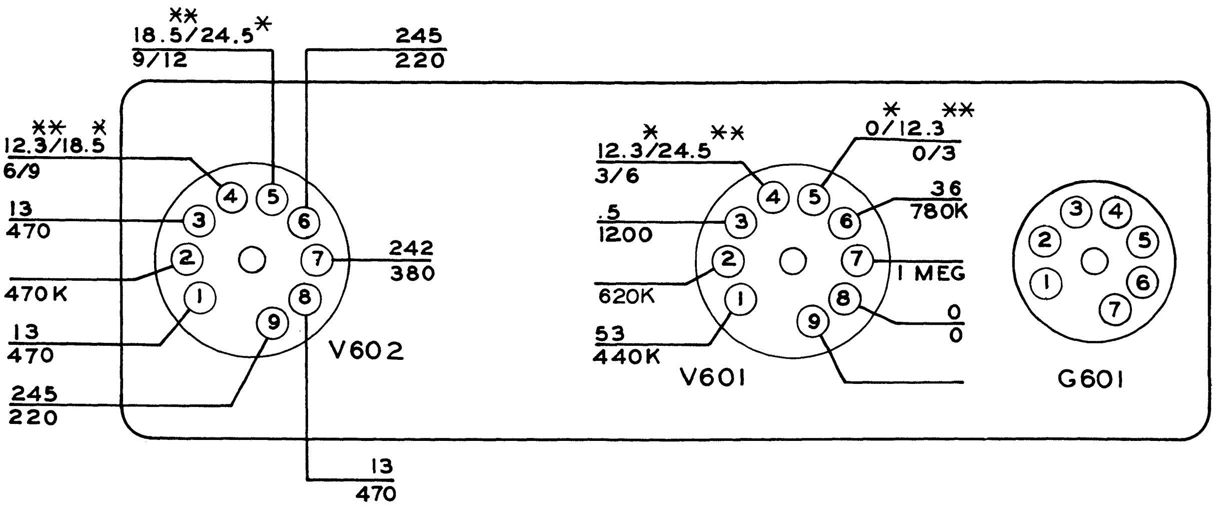


NOTES:

1. VOLTAGE MEASUREMENTS TAKEN IN CW TRANSMIT POSITION.
2. RESISTANCE MEASUREMENTS TAKEN WITH UNIT REMOVED FROM MOUNTING AND P301-14 GROUNDED TO CHASSIS.
3. ALL MEASUREMENTS WITH RESPECT TO CHASSIS GROUND.
4. # INDICATES MEASUREMENTS DEPENDS UPON ADJUSTMENT OF AUDIO GAIN CONTROL R109.

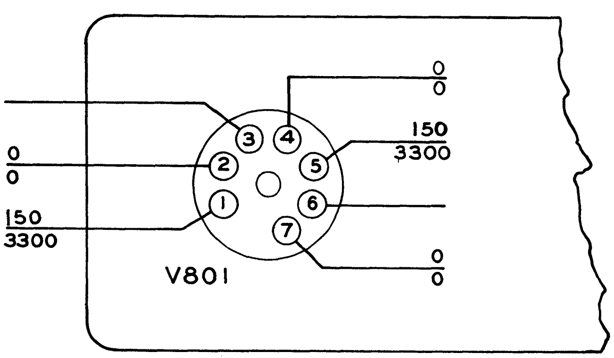
Figure 8-7. Transceiver 618S-1, A-F Amplifier, Voltage and Resistance Measurements

A29-100-3



NOTES:
1. VOLTAGE MEASUREMENTS TAKEN IN CW TRANSMIT POSITION.
2. RESISTANCE MEASUREMENTS TAKEN WITH UNIT REMOVED FROM MOUNTING AND P301-14 GROUNDED TO CHASSIS.
3. ALL MEASUREMENTS WITH RESPECT TO CHASSIS GROUND.
4. * INDICATES RF TUNER SERVO AMPLIFIER.
5. ** INDICATES RF AMPLIFIER SERVO AMPLIFIER.

Figure 8-8. Transceiver 618S-1, Tuning Servo Amplifier Voltage and Resistance Measurements A29-98-3



NOTES:
1. VOLTAGE MEASUREMENTS TAKEN IN CW TRANSMIT POSITION.
2. RESISTANCE MEASUREMENTS TAKEN WITH UNIT REMOVED FROM MOUNTING AND P301-12 GROUNDED TO CHASSIS.
3. ALL MEASUREMENTS WITH RESPECT TO CHASSIS GROUND.

Figure 8-9. Transceiver 618S-1, Relay Assembly, Voltage and Resistance Measurements A29-96-2

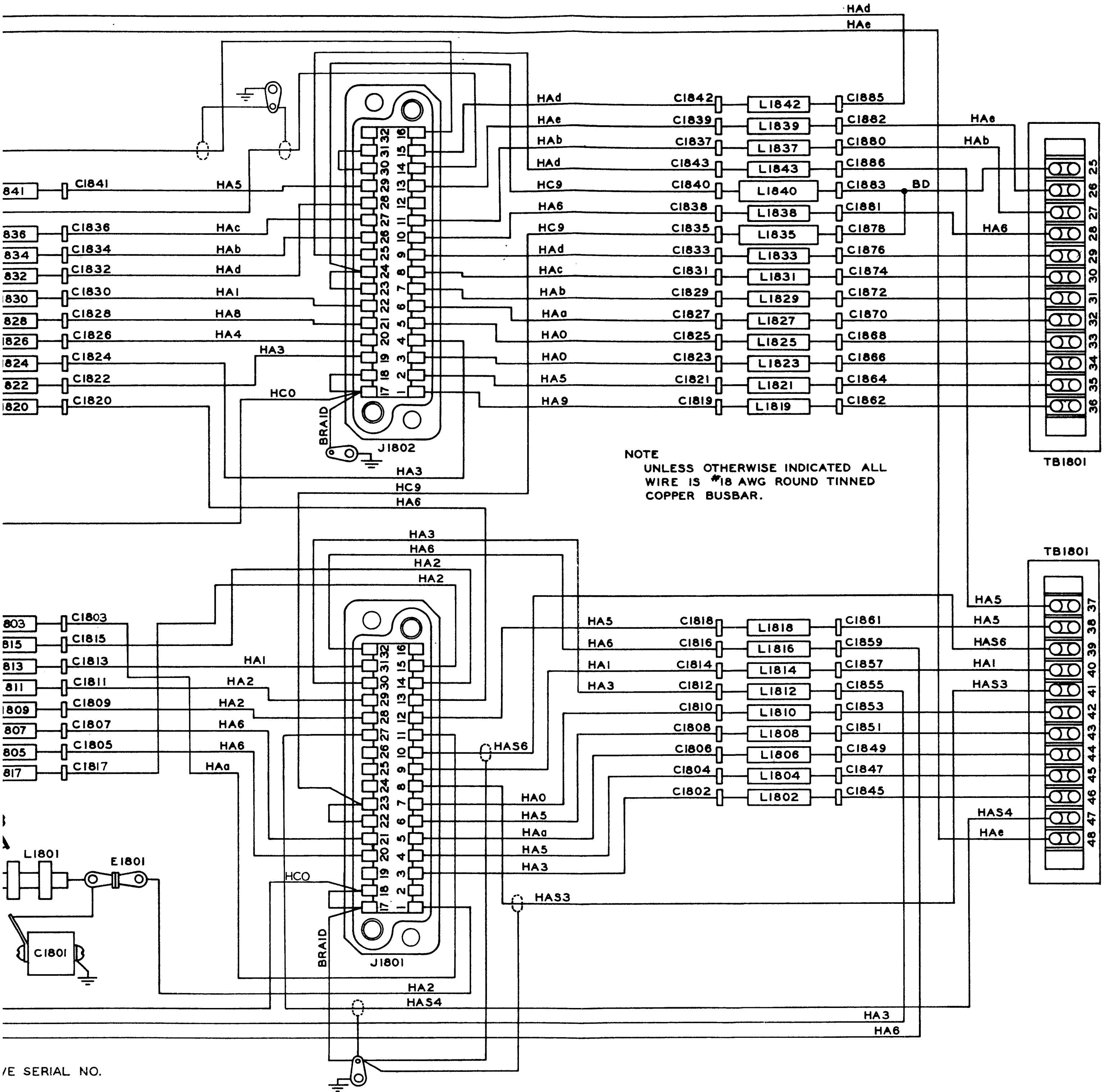
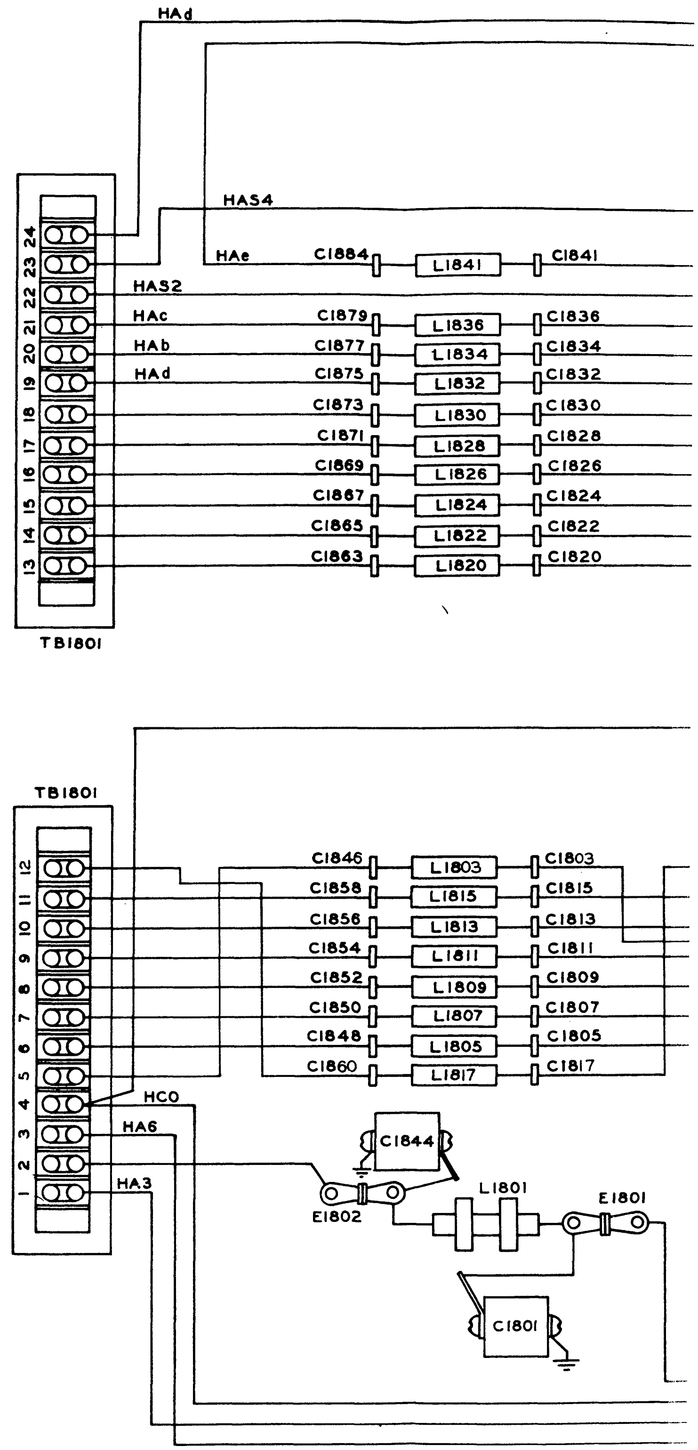
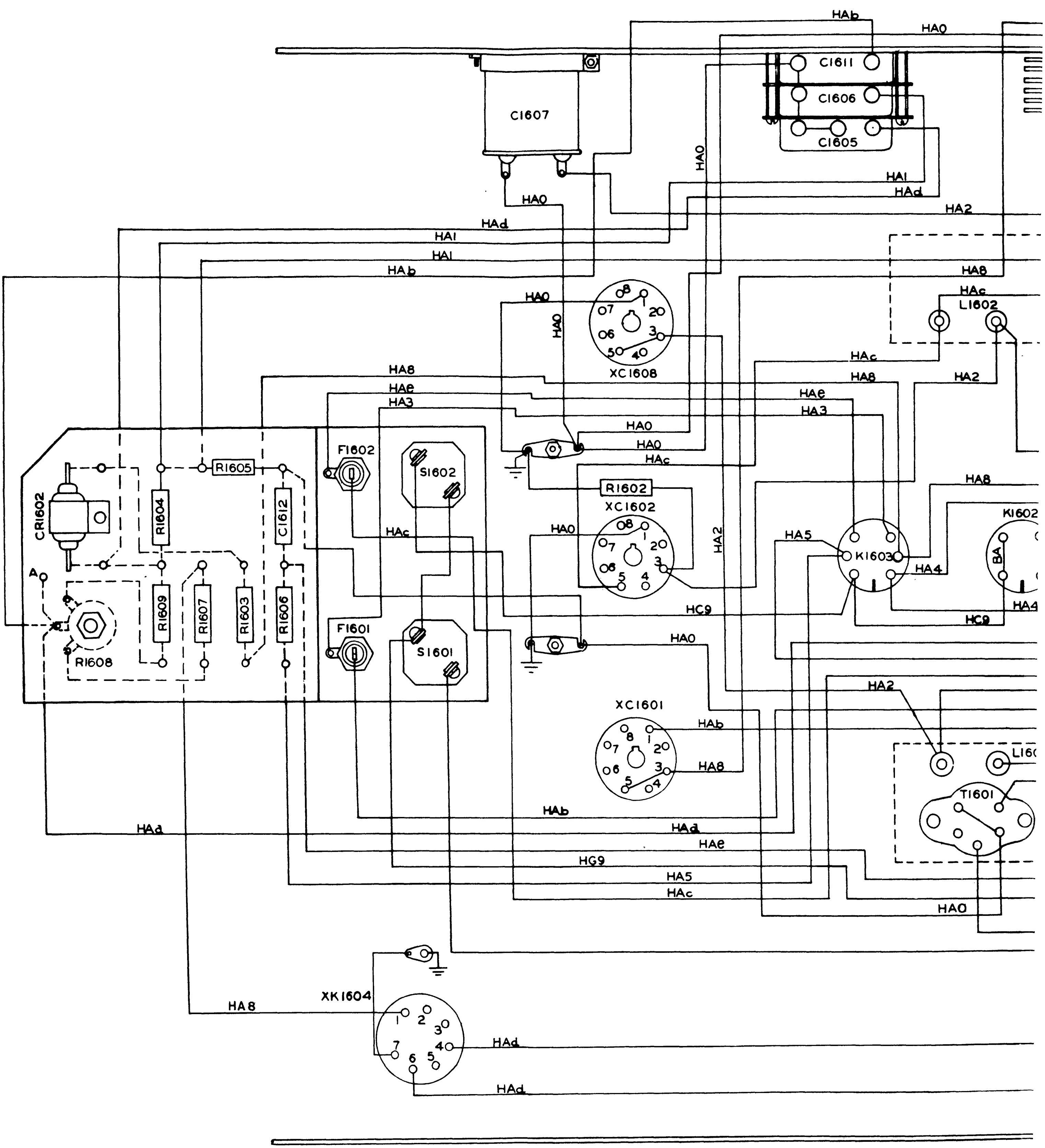


Figure 8-10. Shockmount 350S-1, Filter Unit, Wiring Diagram

A29-142-4

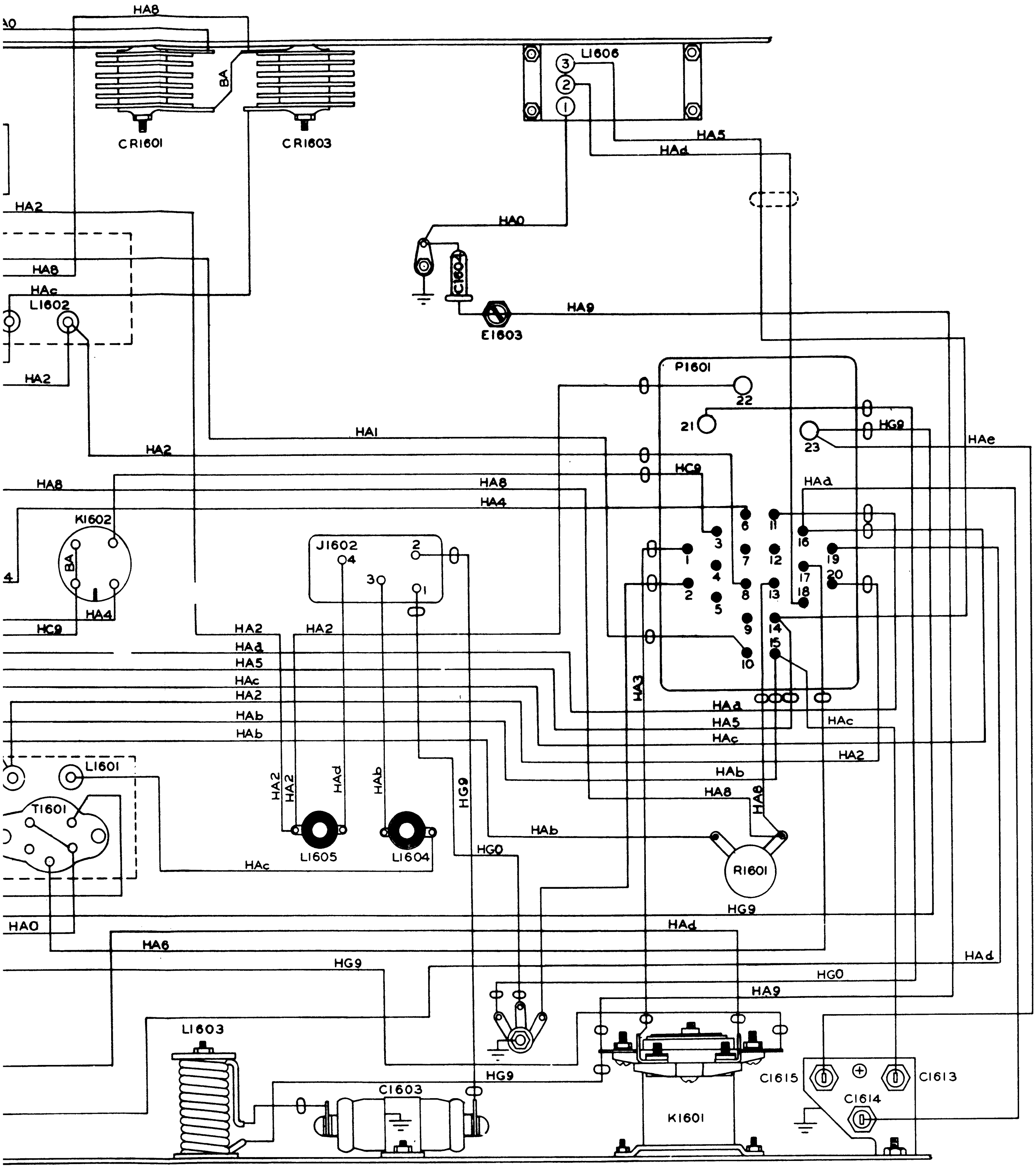


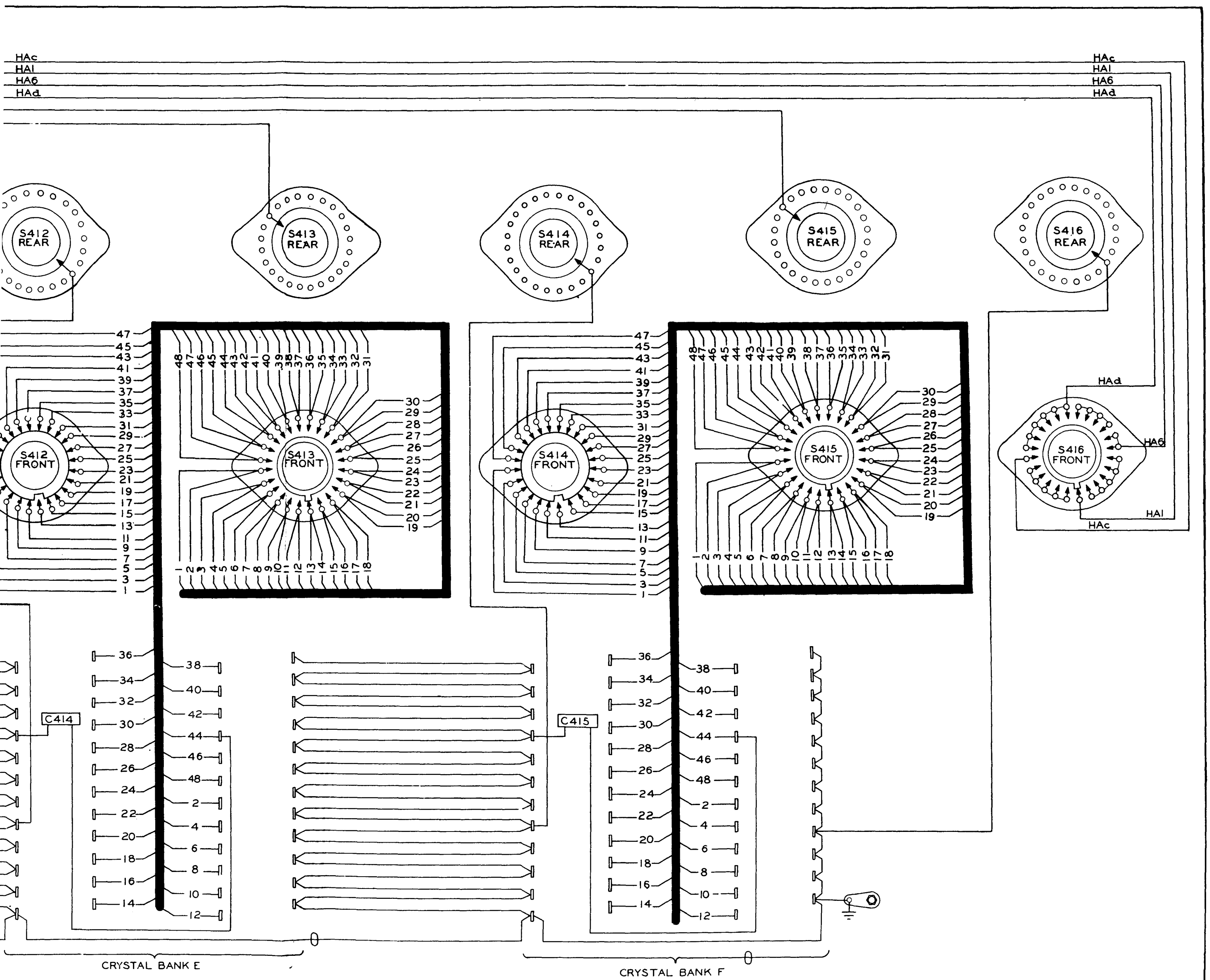
FILTER UNIT REVISED EFFECTIVE SERIAL NO.
350S-1, 863
350S-2, 301
350S-3, 1999
350S-4, 1



A29-248-5

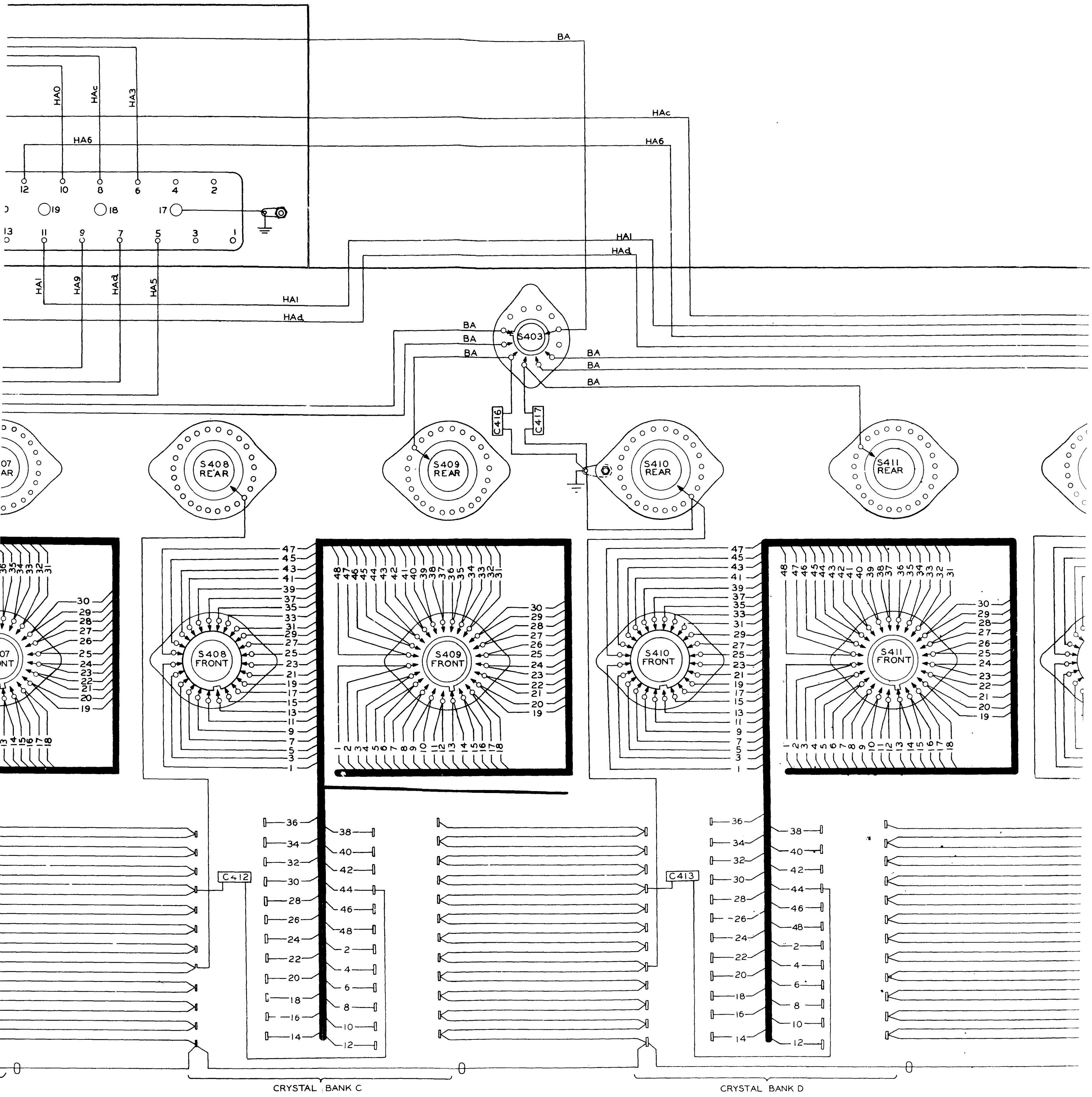
Figure 8-11. Power Supply 416W-1, Wiring Diagram

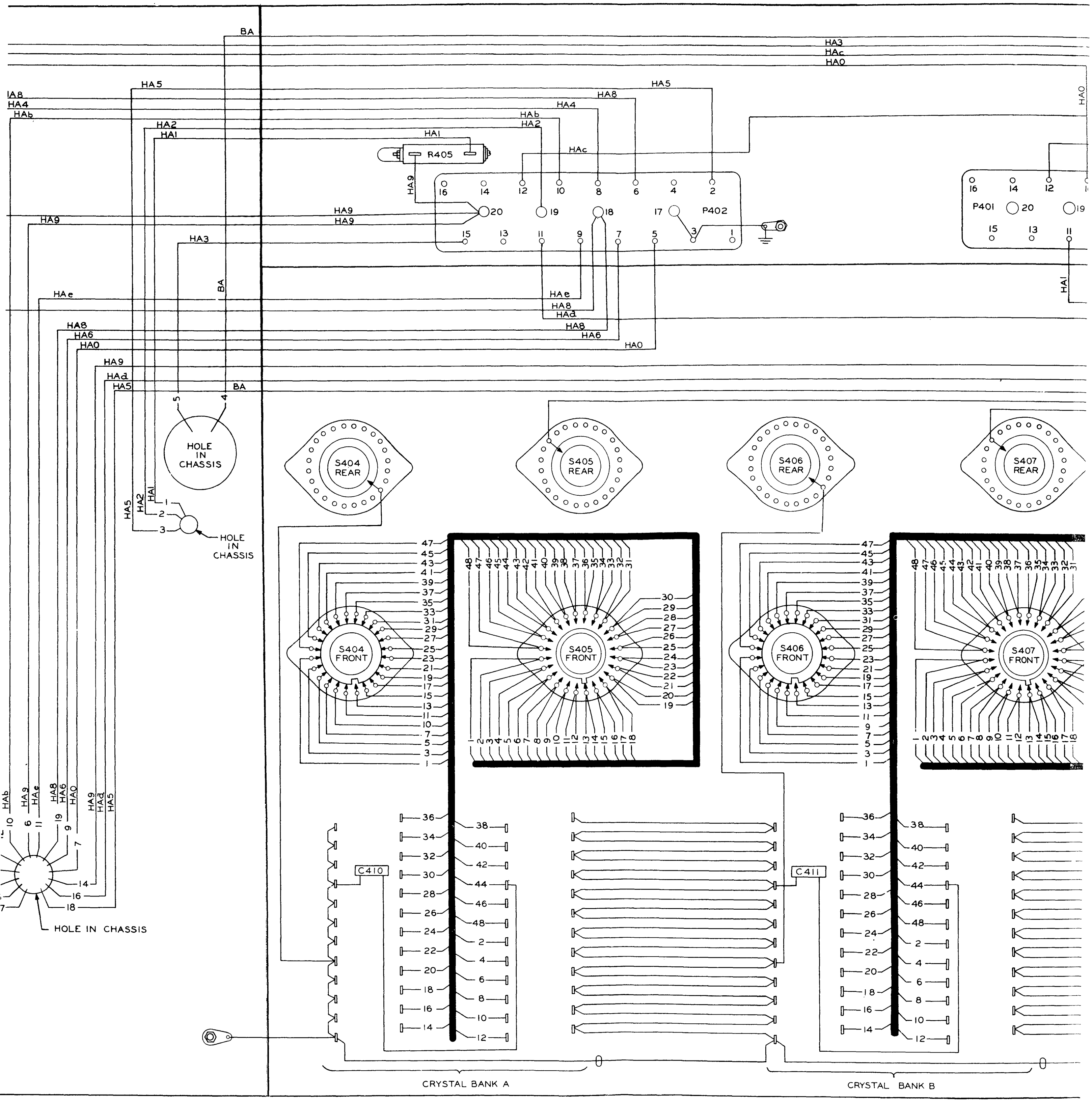

HA8
HA0
BA
CR1601
CR1603
L1606
HA5
HAd
HA2
HA8
HAc
L1602
HA0
C1604
HA9
E1603
P1601
22
21
23
HG9
HAe
HA1
HA2
HC9
HA8
HA4
HAd
K1602
BA
HA4
HC9
J1602
HA2
HAd
HA5
HAc
HAb
L1601
T1601
L1605
L1604
HG9
HA3
HAb
HG0
HAc
R1601
HA0
HA6
HG9
HAd
HG0
HA9
L1603
C1603
K1601
C1615
C1613
C1614



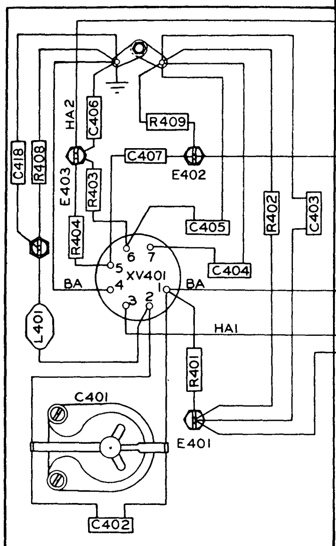
A29-134-6

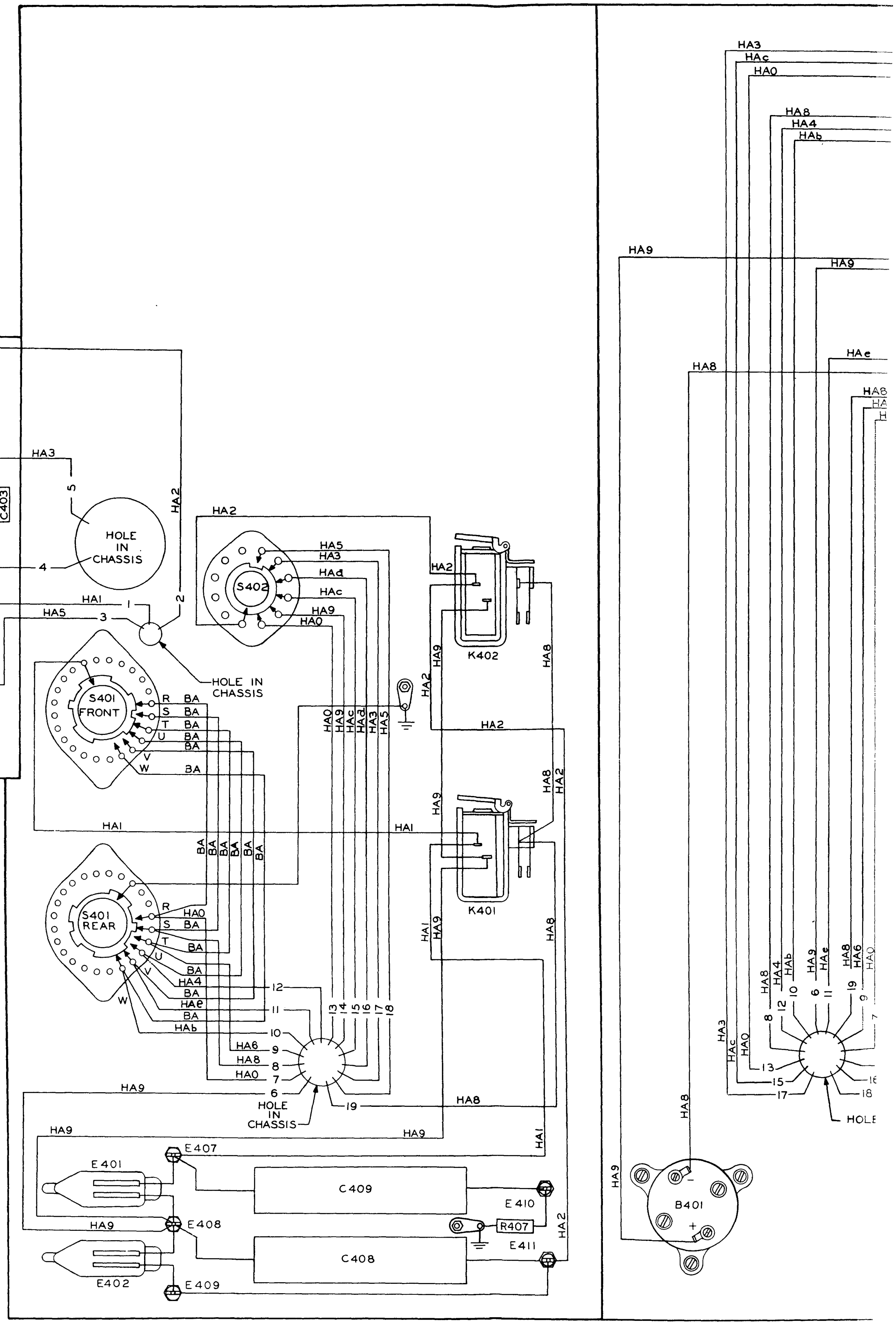
Figure 8-12. Transceiver 618S-1, R-F Crystal Oscillator, Wiring Diagram


BA
HA0
HAc
HA3
HA6
HA1
HA9
HAd
HA5
S403
C416
C417
S408 REAR
S409 REAR
S410 REAR
S411 REAR
S408 FRONT
S409 FRONT
S410 FRONT
S411 FRONT
C412
C413
CRYSTAL BANK C
CRYSTAL BANK D



BA
HA3
HAc
HA0
HA5
HA8
HA4
HAb
HA2
HA1
R405
HA9
P402
P401
HA6
HAd
HAe
HOLE IN CHASSIS
S404 REAR
S405 REAR
S406 REAR
S407 REAR
S404 FRONT
S405 FRONT
S406 FRONT
S407 FRONT
C410
C411
CRYSTAL BANK A
CRYSTAL BANK B





NOTES:

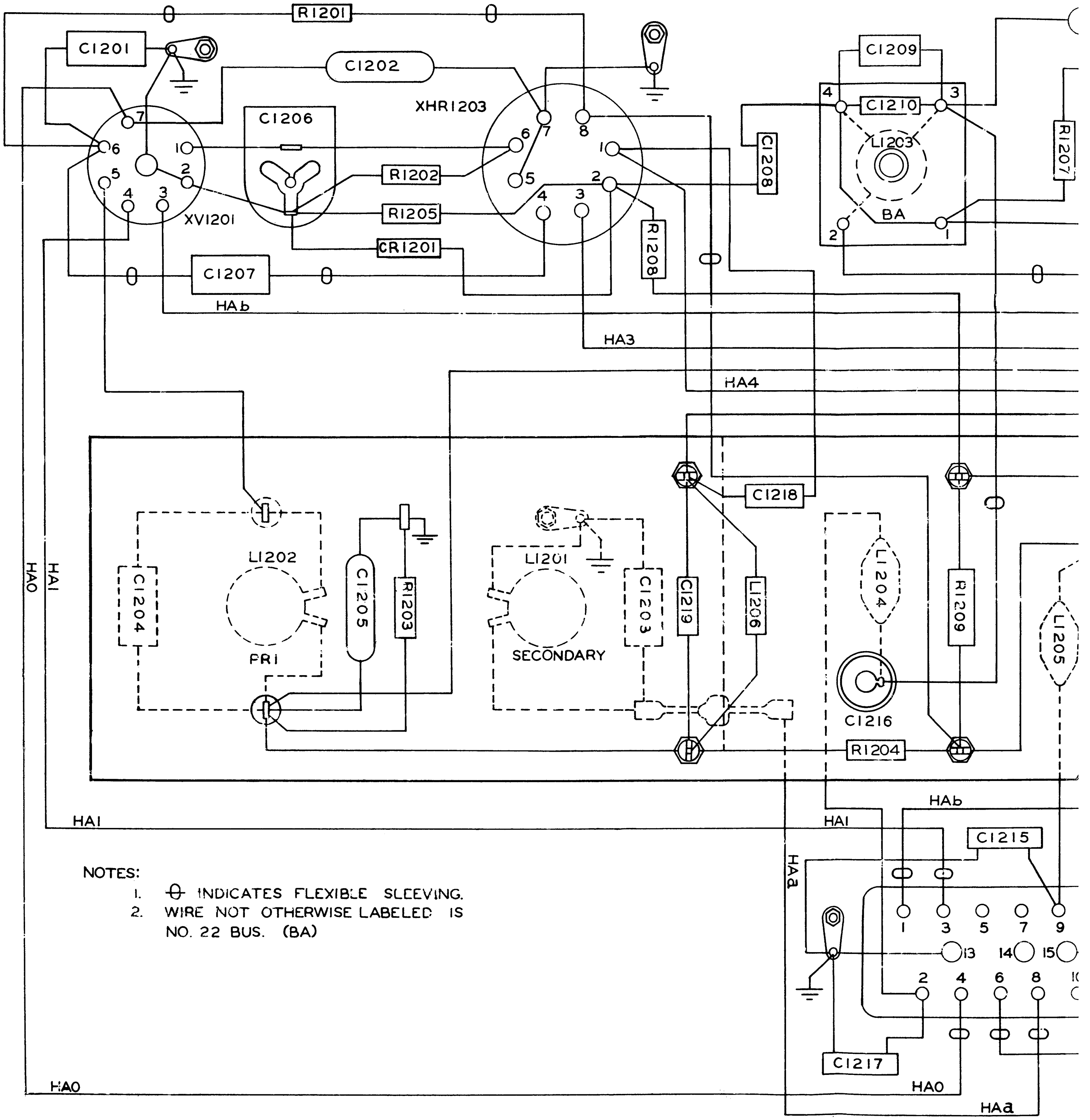
1 SWITCHES ARE VIEWED FROM OPPOSITE THE KNOB OR DRIVEN END.

2 SIDE OF SWITCH LABELED FRONT IS SIDE OPPOSITE KNOB OR DRIVEN END.

3. IN EACH OF THE 12 SWITCHES, S404 THROUGH S416, THE FRONT ROTOR IS ELECTRICALLY CONNECTED TO THE REAR ROTOR BY SOLDER STAKING.

4. -0- INDICATES FLEXIBLE SLEEVING.

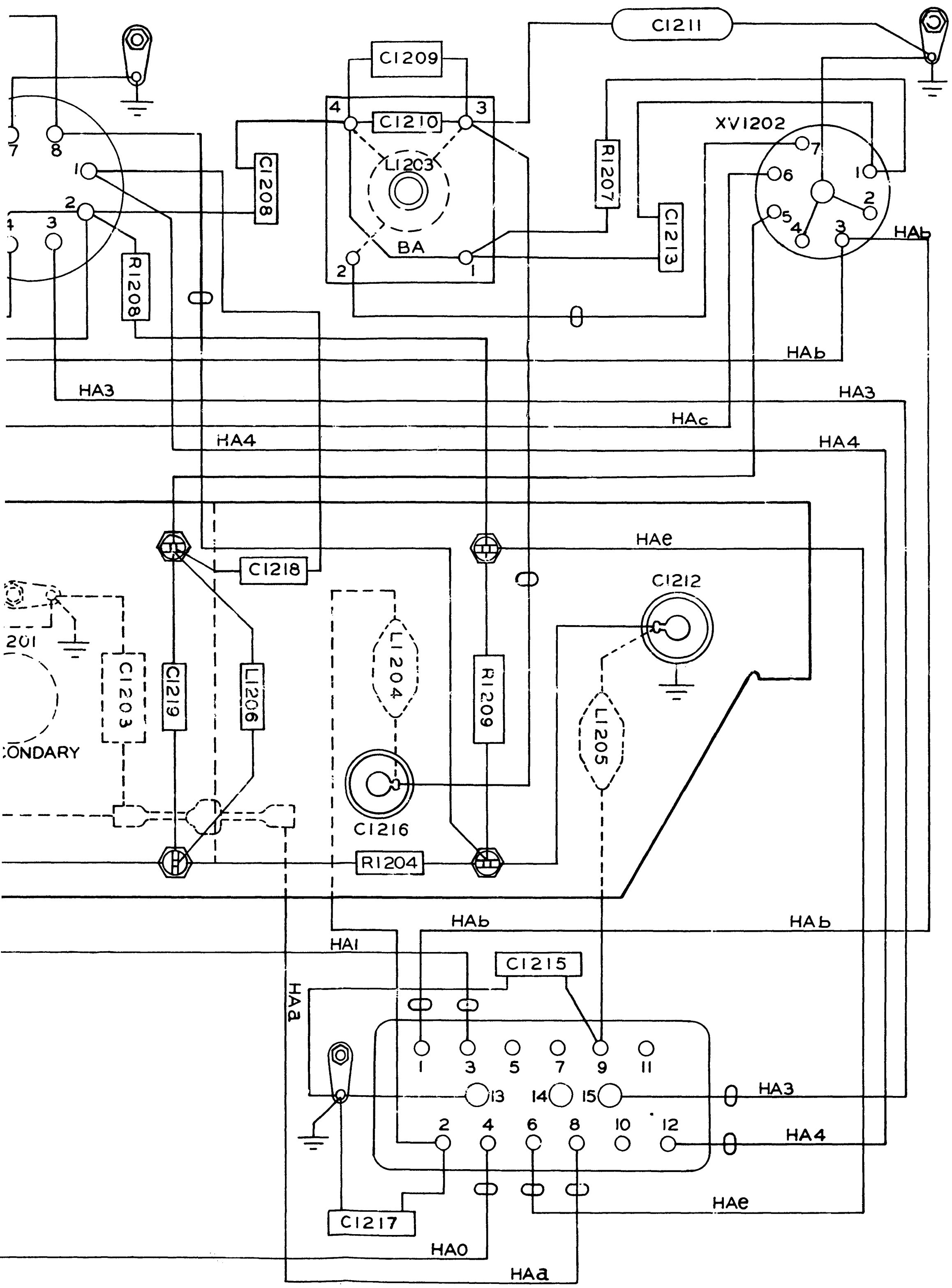
5. WIRE NOT OTHERWISE LABELED IS NO. 22 BUS. (BA).



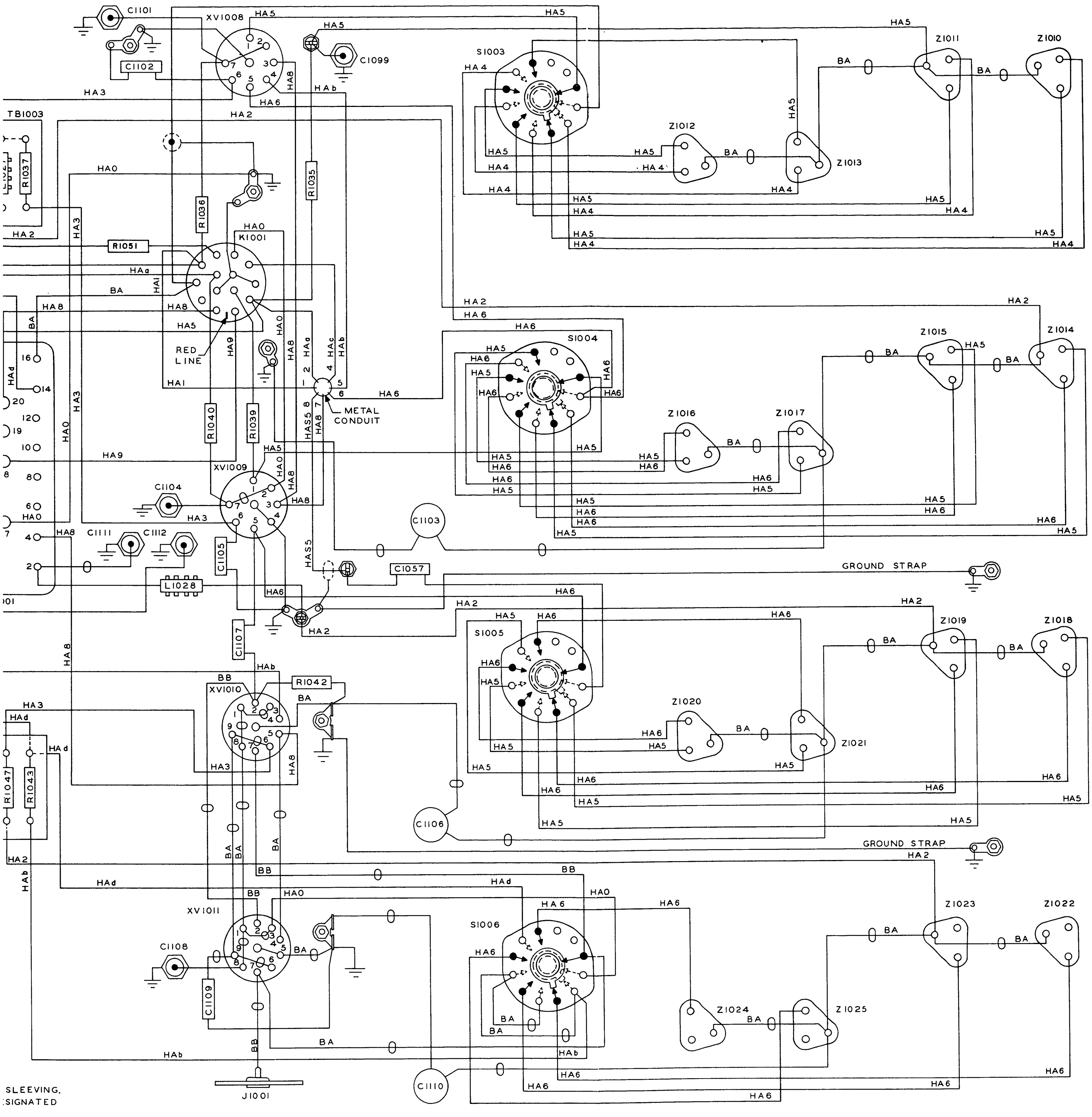
NOTES:
1. ⊖ INDICATES FLEXIBLE SLEEVING.
2. WIRE NOT OTHERWISE LABELED IS NO. 22 BUS. (BA)

A29-845-4

Figure 8-13. Transceiver 618S-1, 250 Kc Oscillator, Wiring Diagram

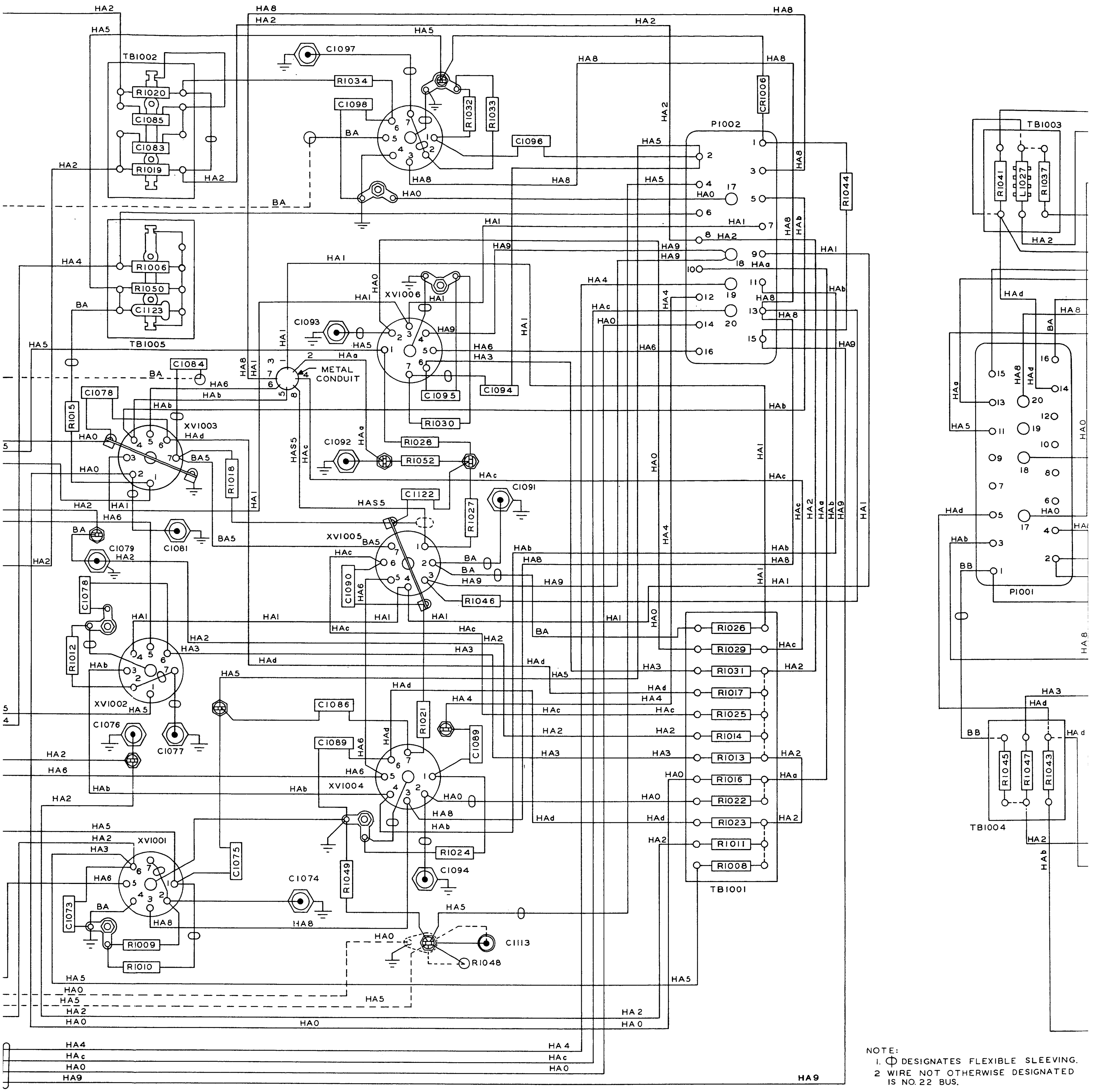


Oscillator, Wiring Diagram

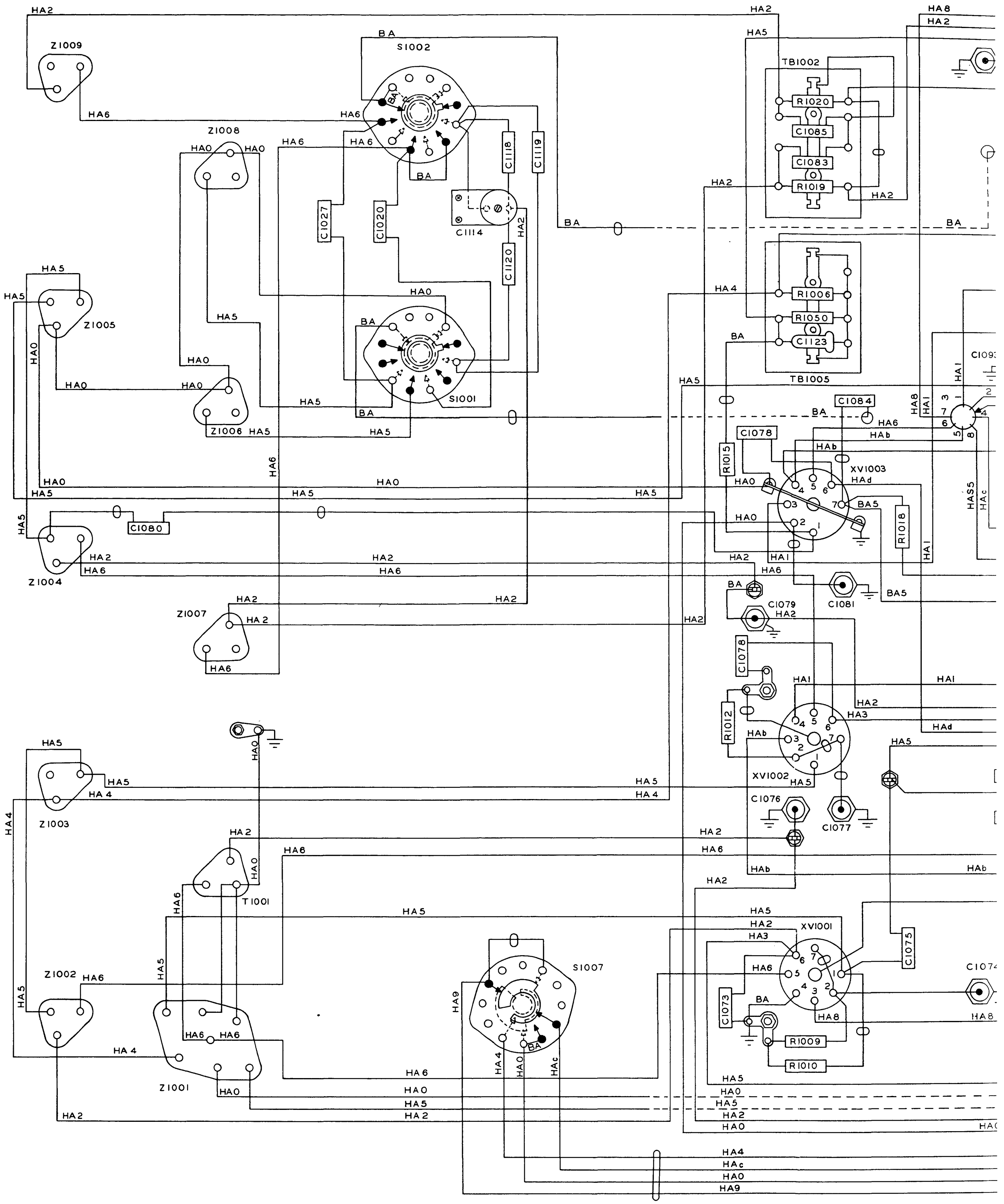


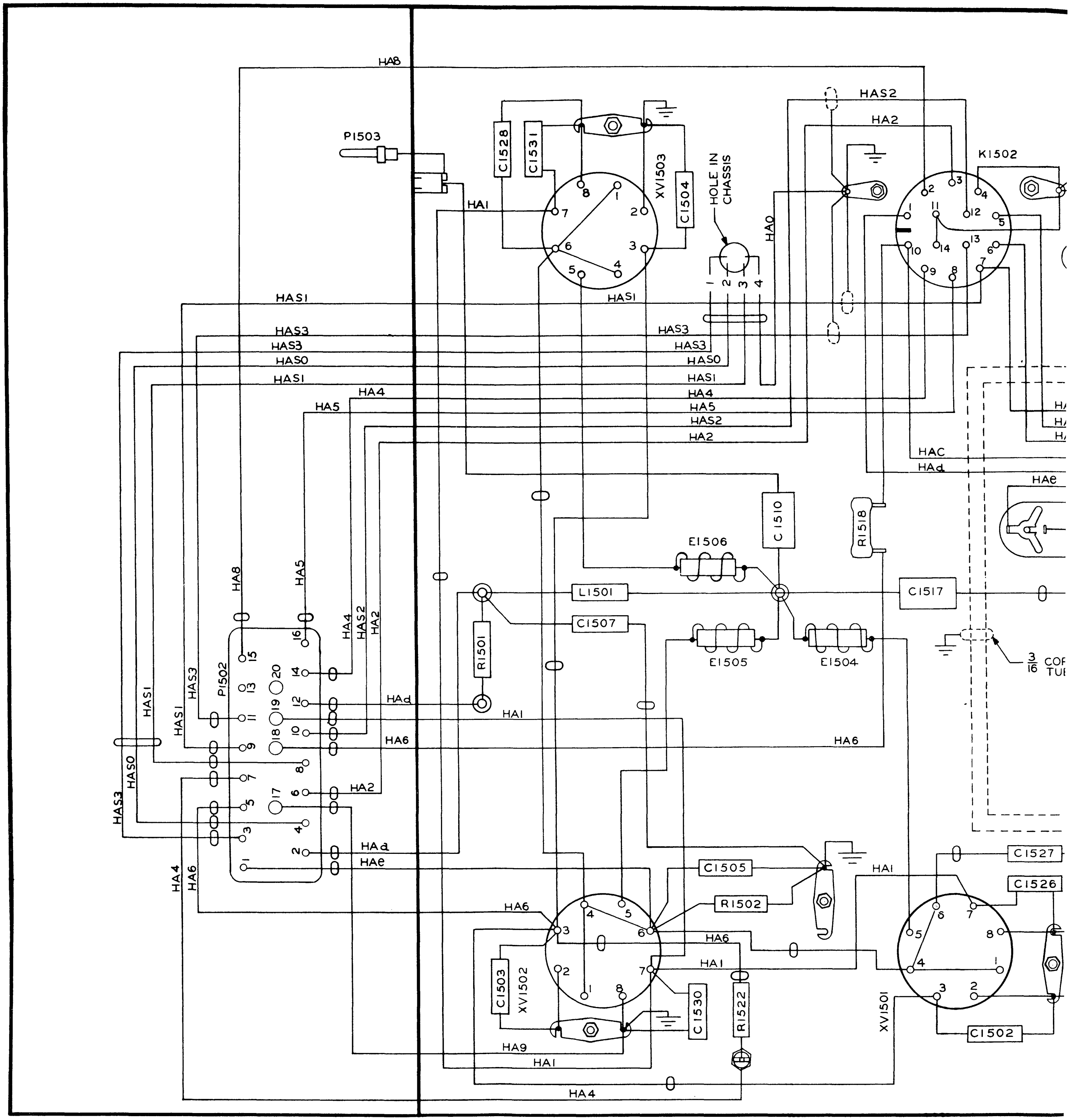
A29-93-6

Figure 8-14. Transceiver 618S-1, R-F Tuner, Wiring Diagram



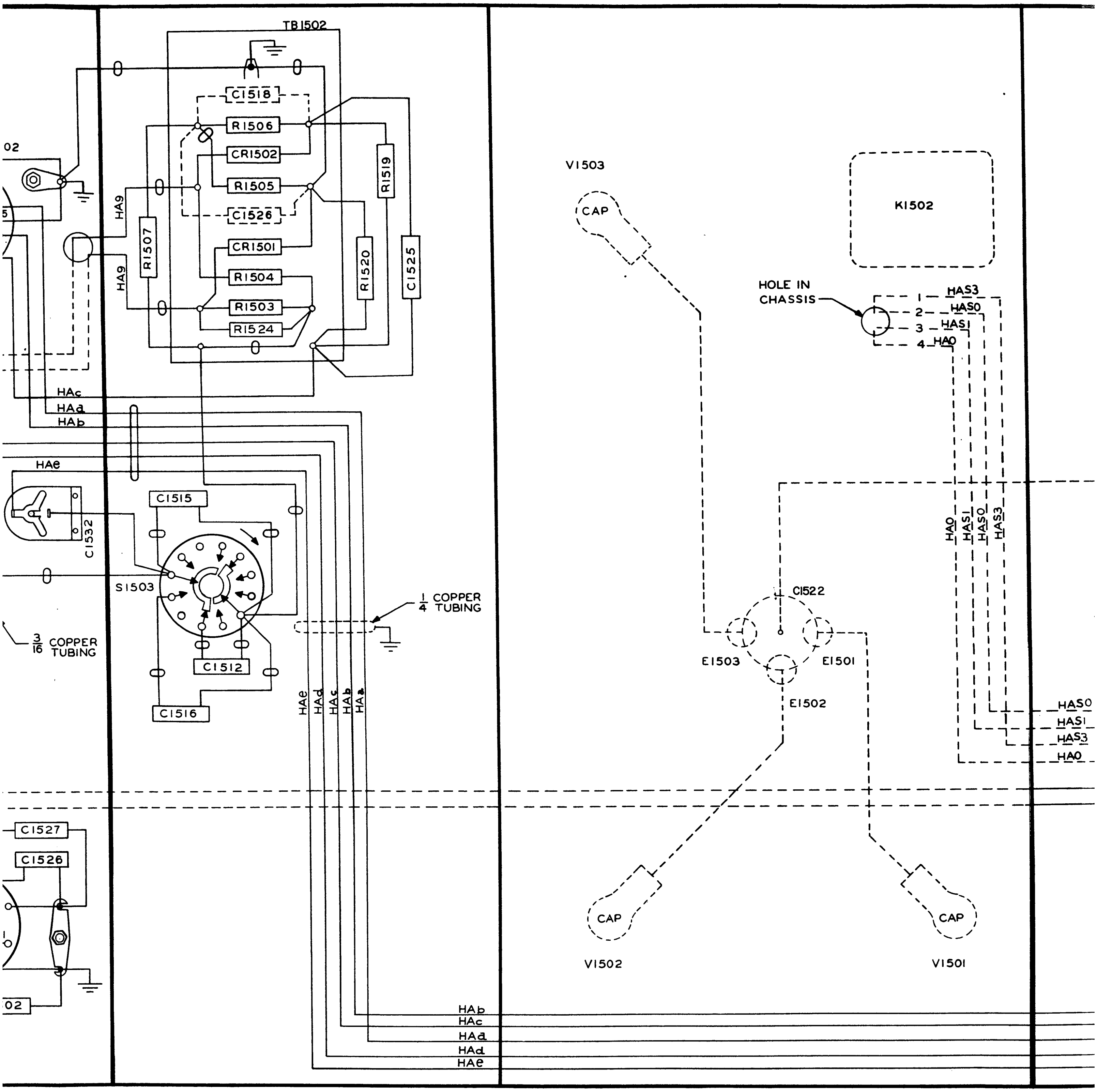
NOTE:
1. ⏀ DESIGNATES FLEXIBLE SLEEVING.
2 WIRE NOT OTHERWISE DESIGNATED IS NO. 22 BUS.


Z1009
S1002
Z1008
C1027
C1020
C1114
C1118
C1119
C1120
Z1005
S1001
Z1006
Z1004
C1080
Z1007
TB1002
R1020
C1085
C1083
R1019
R1006
R1050
C1123
TB1005
C1084
C1078
R1015
XV1003
R1018
C1079
C1081
R1012
XV1002
C1076
C1077
Z1003
T1001
Z1002
Z1001
S1007
XV1001
C1073
R1009
R1010
C1075
HA0
HA1
HA2
HA3
HA4
HA5
HA6
HA8
HA9
HAb
HAc
HAd
BA
BA5
HAS5

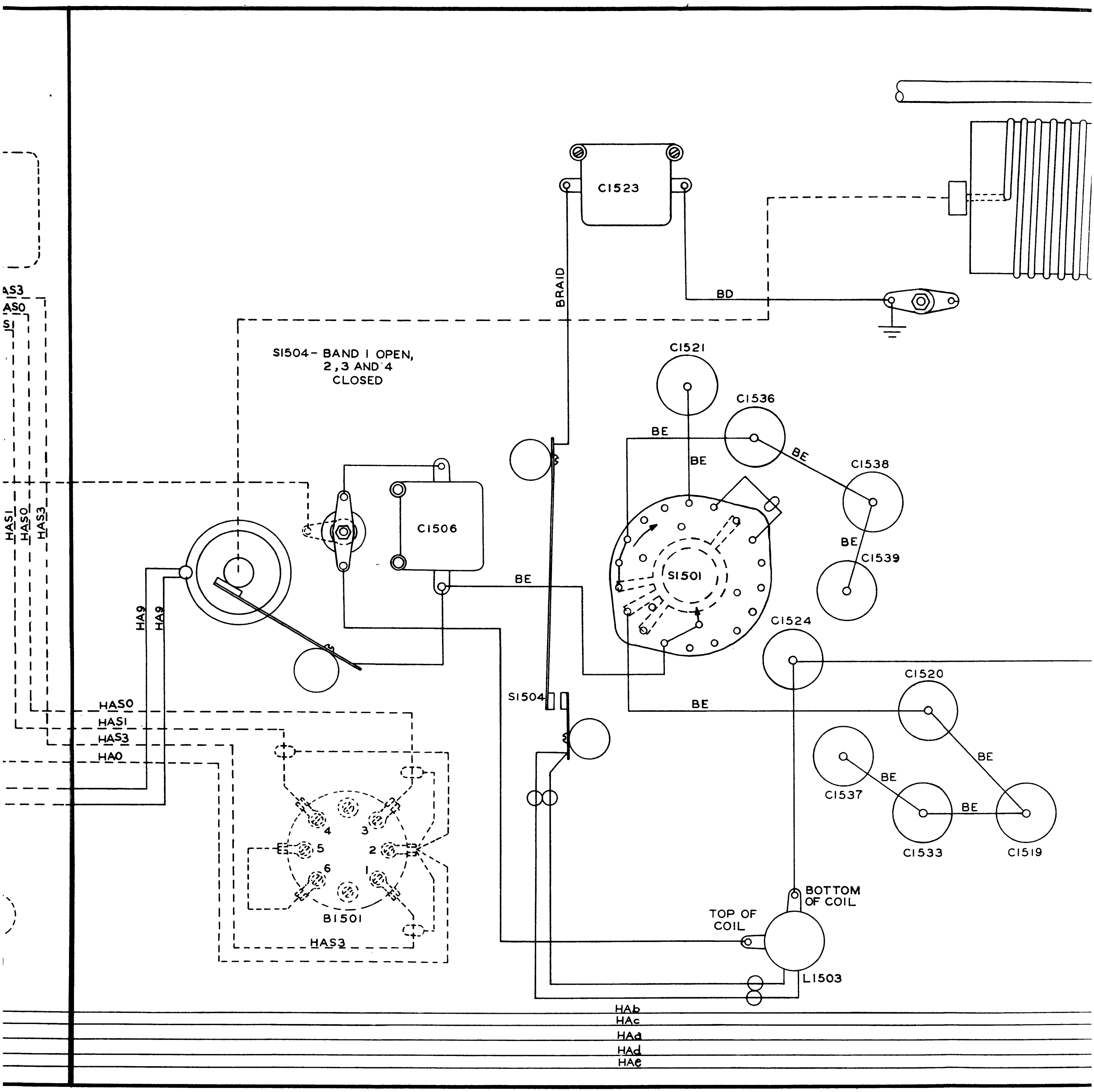


A29-143-6

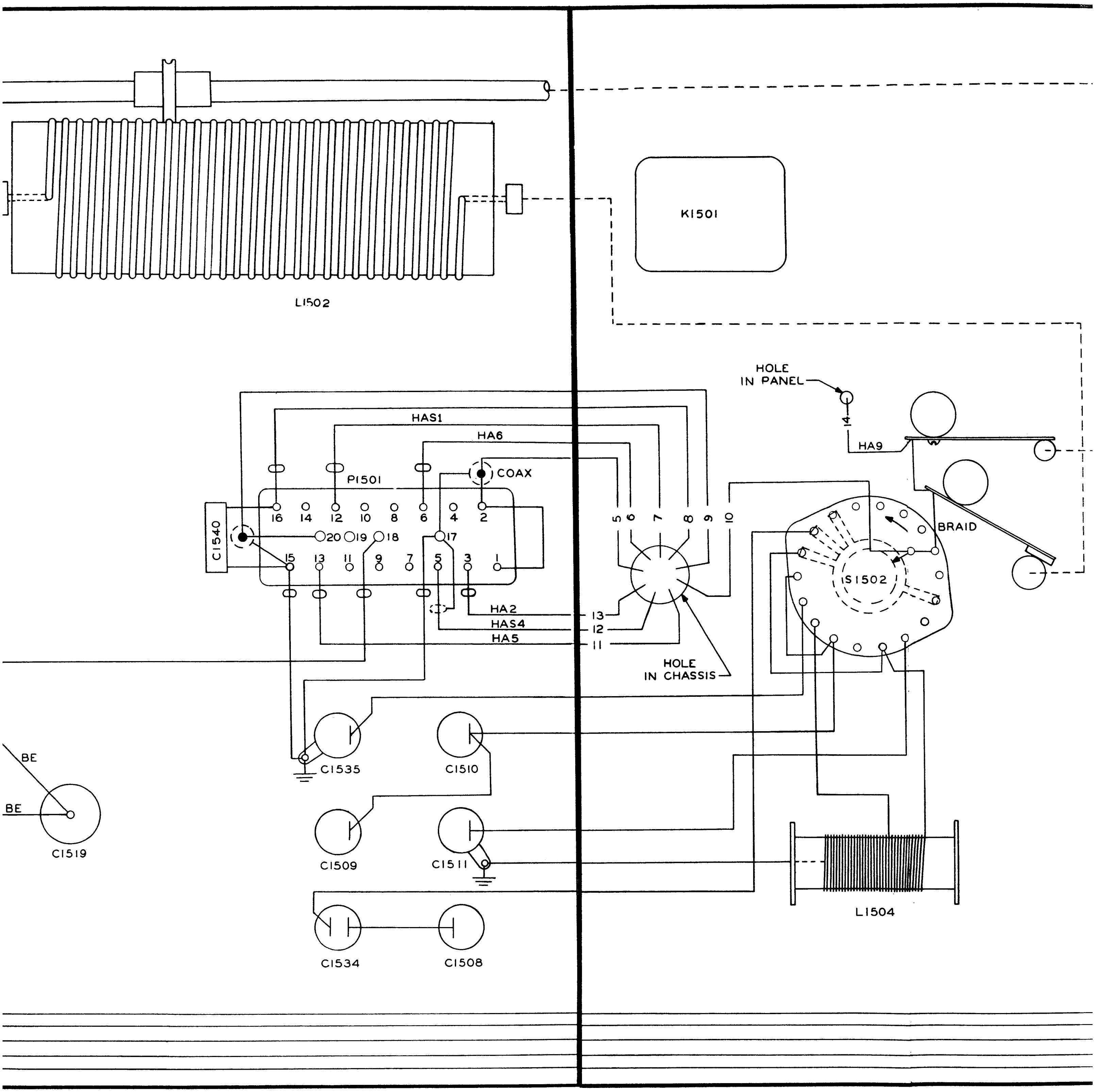
Figure 8-15. Transceiver 618S-1, Power Amplifier, Wiring Diagram



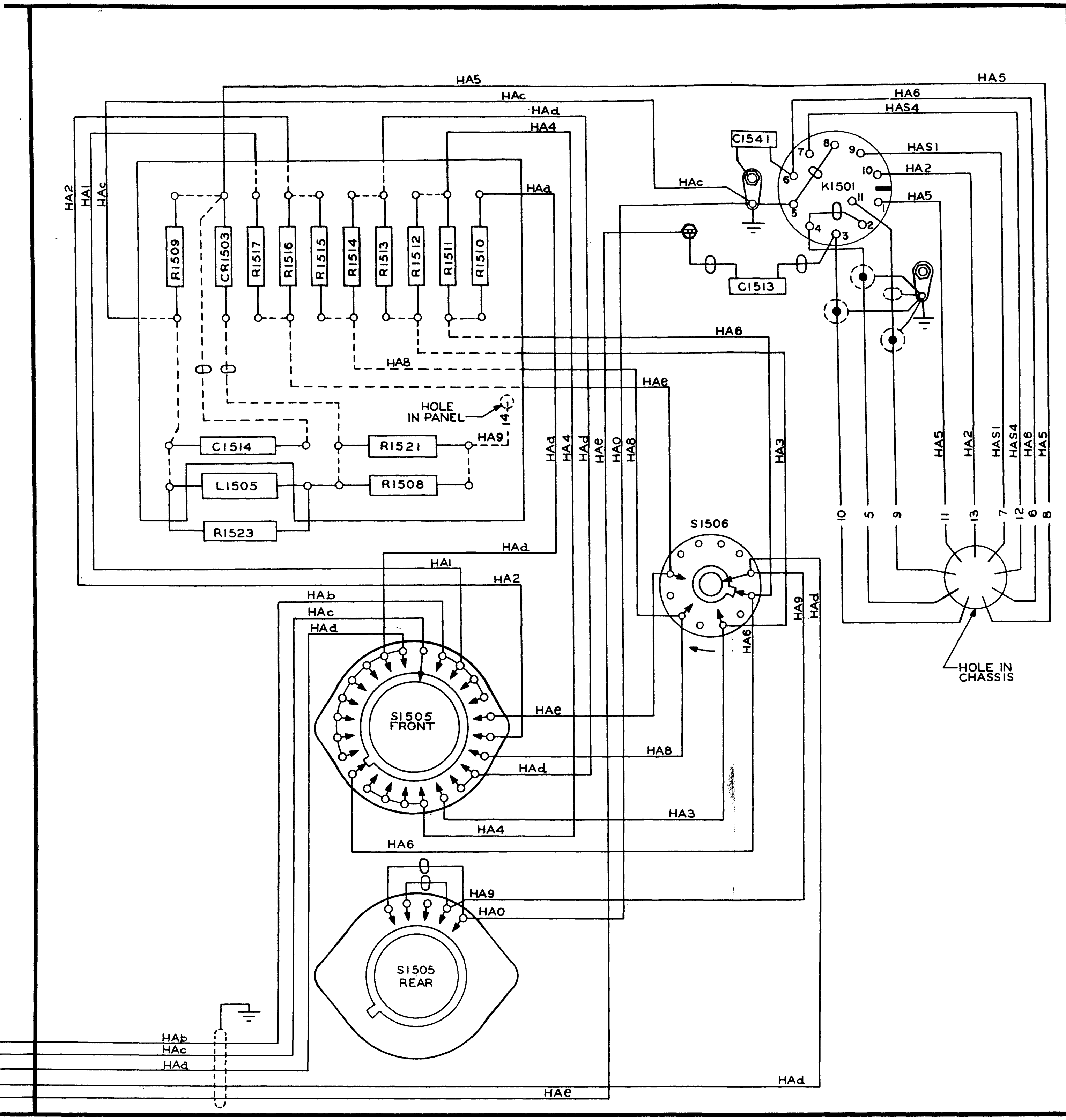
TB1502
C1518
R1506
CR1502
R1505
C1526
CR1501
R1504
R1503
R1524
R1507
R1519
R1520
C1525
HA9
HAc
HAa
HAb
HAe
HAd
C1515
C1532
S1503
C1512
C1516
1/4 COPPER TUBING
3/16 COPPER TUBING
C1527
C1526
V1503
CAP
K1502
HOLE IN CHASSIS
HAS3
HAS0
HAS1
HA0
C1522
E1503
E1501
E1502
V1502
V1501



C1523
BRAID
BD
S1504- BAND I OPEN,
2,3 AND 4
CLOSED
C1521
C1536
BE
C1538
C1506
S1501
C1539
C1524
C1520
S1504
C1537
C1533
C1519
B1501
HAS3
HAS0
HAS1
HA0
HA9
BOTTOM
OF COIL
TOP OF
COIL
L1503
HAb
HAc
HAa
HAd
HAe



L1502
K1501
HOLE
IN PANEL
14
HA9
BRAID
HAS1
HA6
P1501
COAX
C1540
16 14 12 10 8 6 4 2
20 19 18 17
15 13 11 9 7 5 3 1
5 6 7 8 9 10
S1502
HA2
HAS4
HA5
13
12
11
HOLE
IN CHASSIS
BE
BE
C1519
C1535
C1510
C1509
C1511
L1504
C1534
C1508


HA5
HAc
HAd
HA4
HA6
HAS4
HAS1
HA2
HA5
C1541
K1501
HAc
HAd
HA2
HA1
HAc
R1509
CR1503
R1517
R1516
R1515
R1514
R1513
R1512
R1511
R1510
C1513
HA6
HA8
HAe
HOLE IN PANEL
14
HA9
C1514
R1521
L1505
R1508
R1523
HAd
HA4
HAd
HAe
HA0
HA8
HA3
S1506
HA5
HA2
HAS1
HAS4
HA6
HA5
10
5
9
11
13
7
12
6
8
HOLE IN CHASSIS
HAd
HA1
HA2
HAb
HAc
HAd
S1505 FRONT
HAe
HA8
HAd
HA3
HA4
HA6
HA9
HAd
HA6
HA9
HA0
S1505 REAR
HAb
HAc
HAd
HAd
HAe

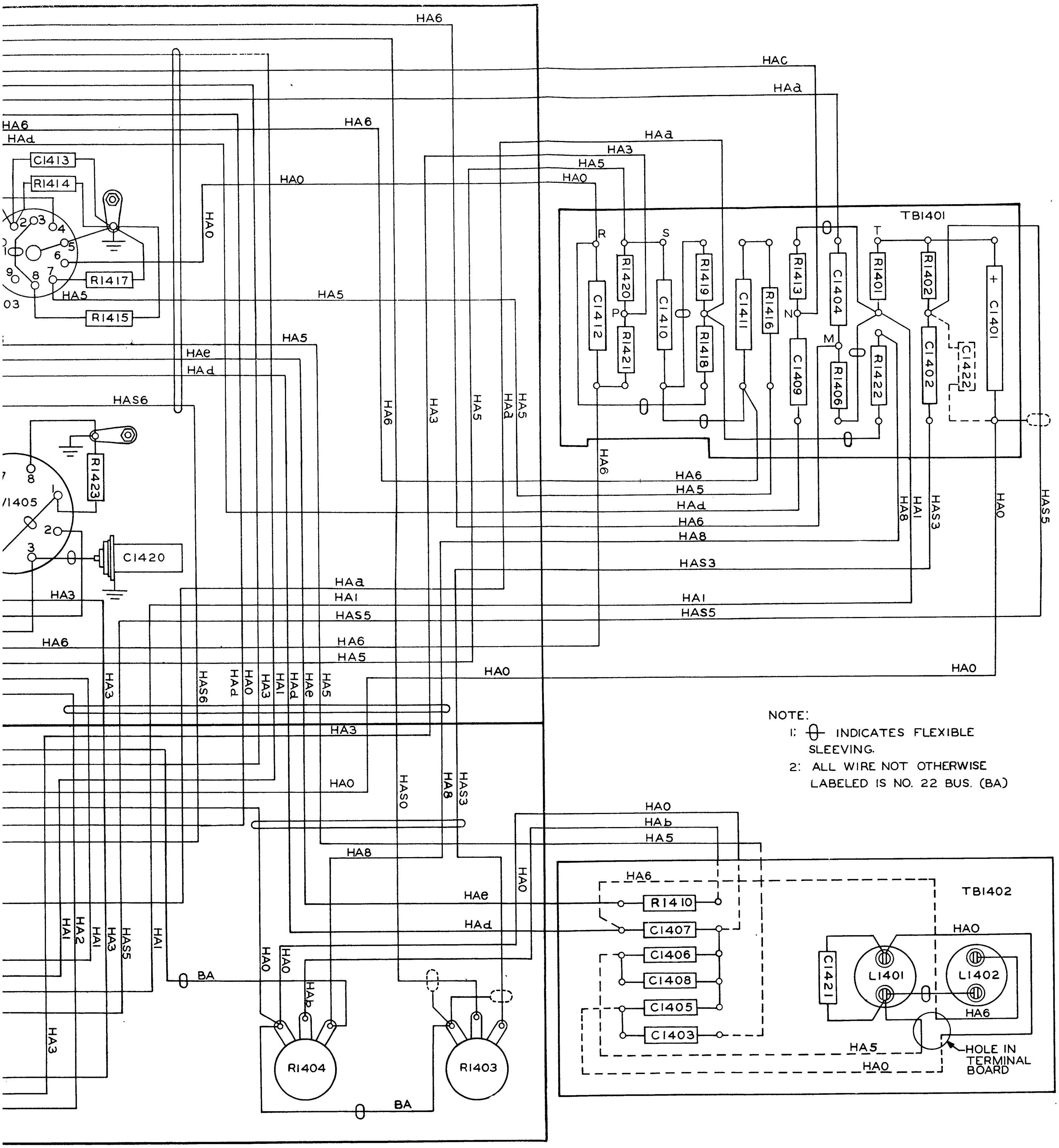


Figure 8-16. Transceiver 618S-1, Modulator, Wiring Diagram

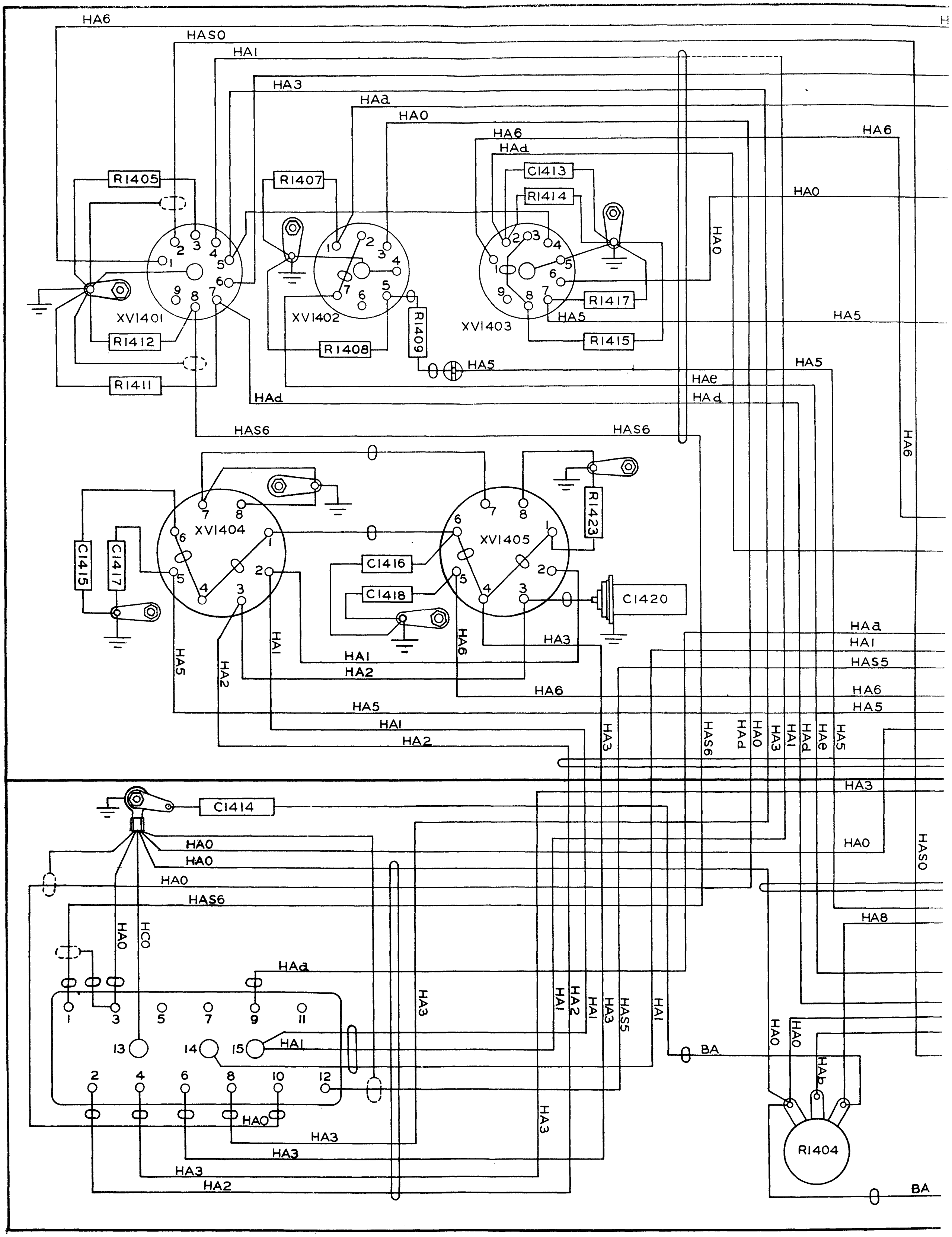
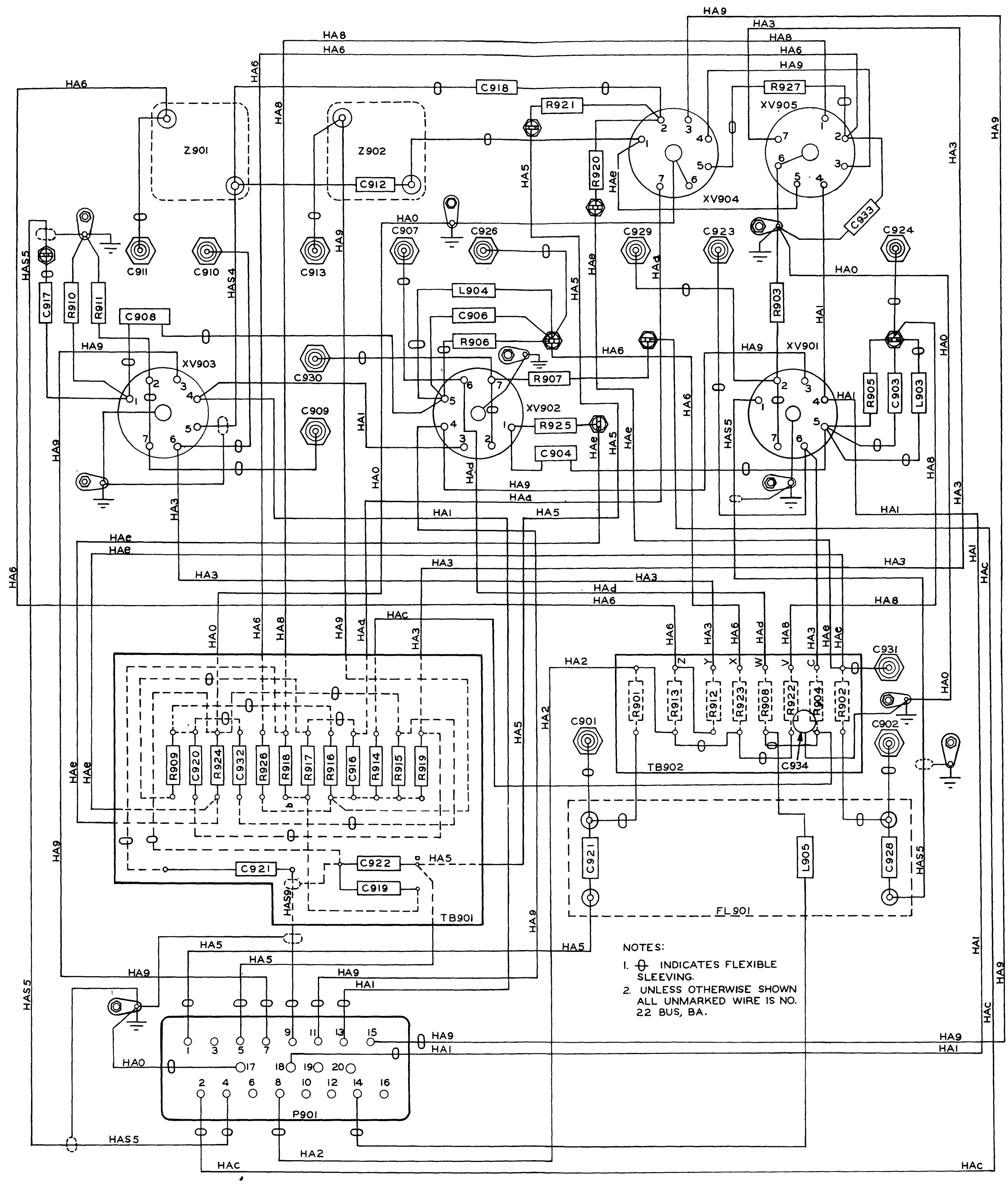
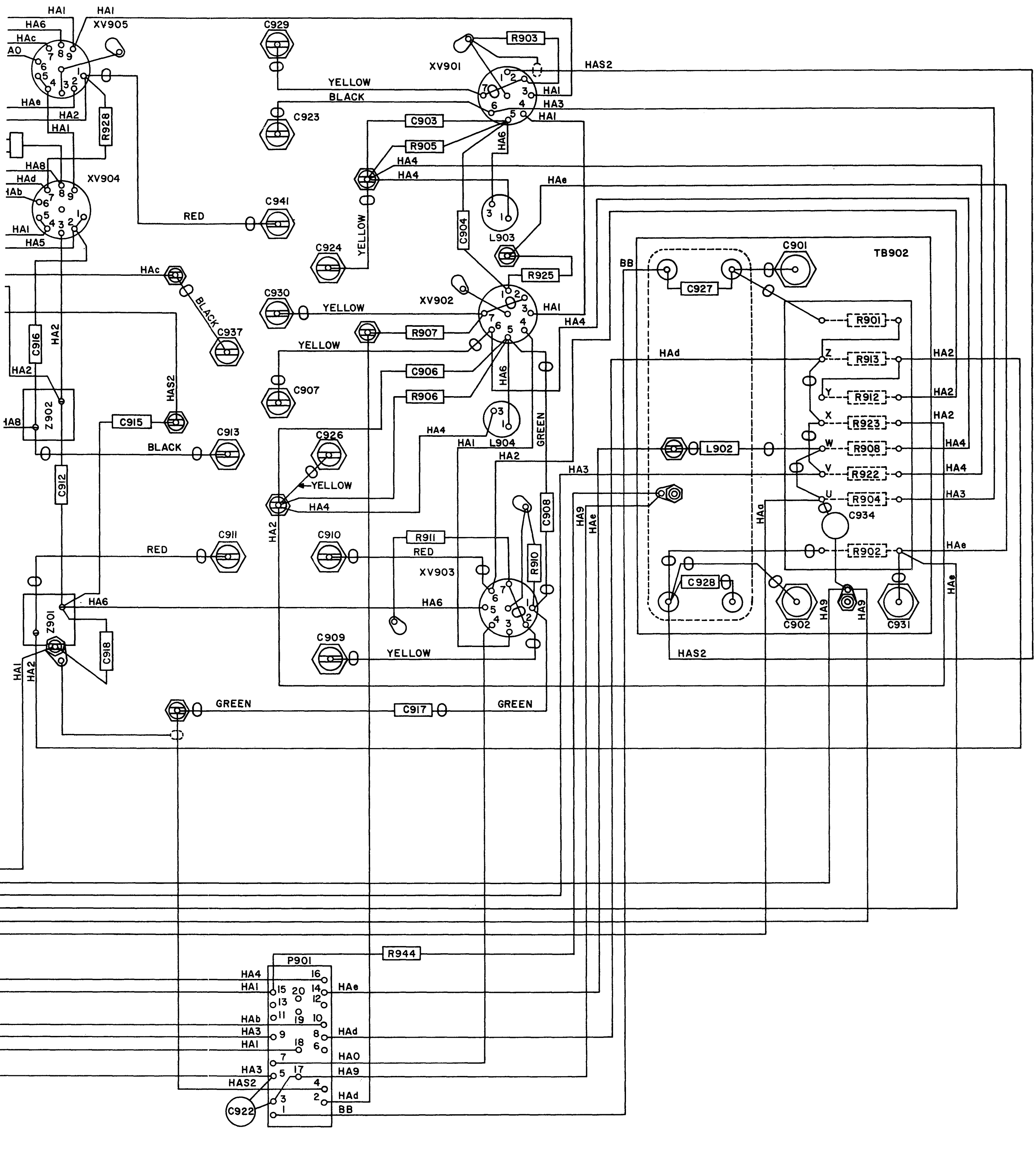


Figure 8-



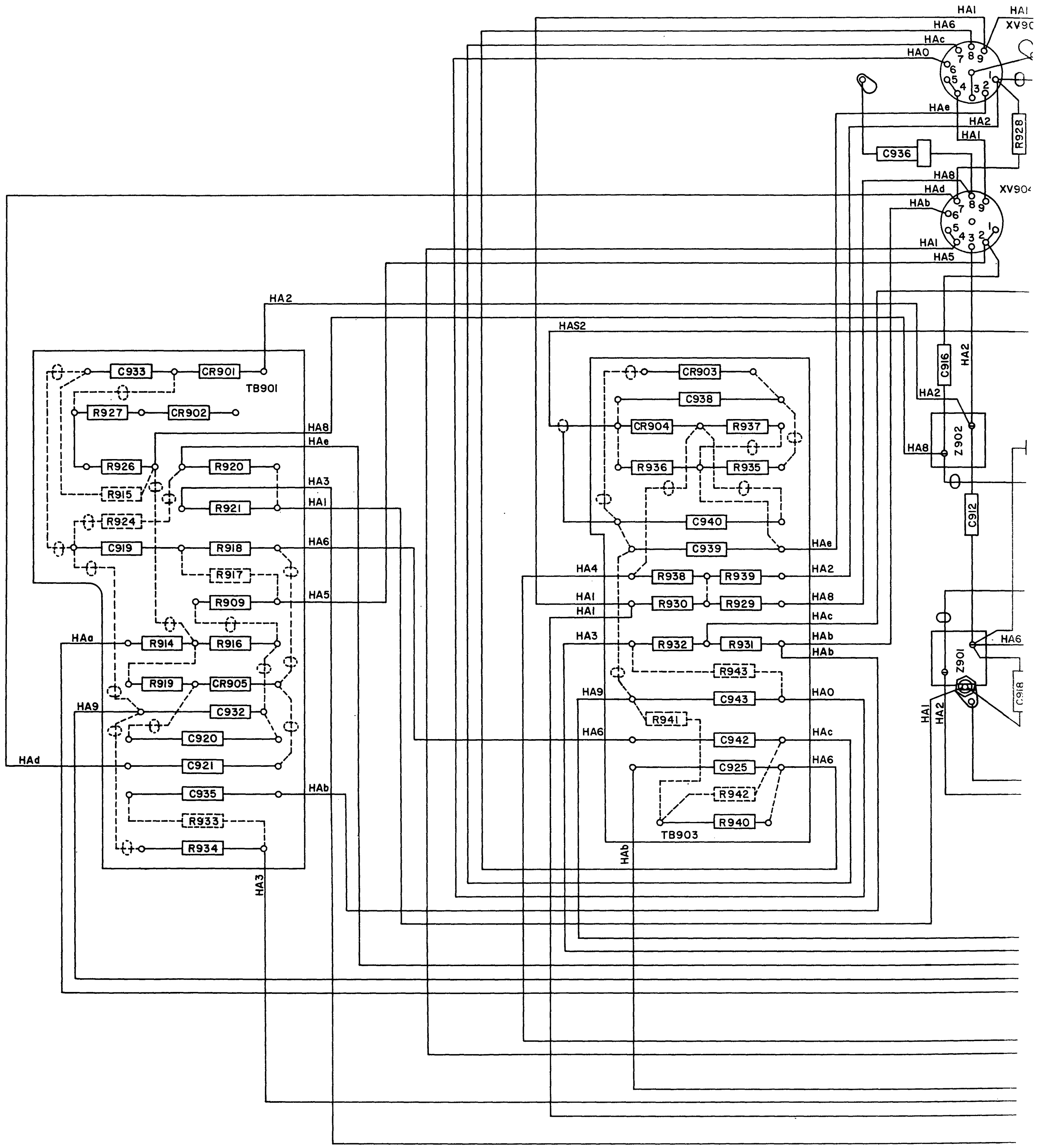
A29-841-5

Figure 8-17. Transceiver 618S-1, 250 Kc I-F Amplifier, Wiring Diagram



A29-263-5

Figure 8-18. Transceiver 618S-4, 250 Kc I-F Amplifier with Squelch and Selcal, Wiring Diagram



XV90
XV904
TB901
TB903
Z901
Z902
C933
CR901
R927
CR902
R926
R920
R915
R921
R924
C919
R918
R917
R909
R914
R916
R919
CR905
C932
C920
C921
C935
R933
R934
CR903
C938
CR904
R937
R936
R935
C940
C939
R938
R939
R930
R929
R932
R931
R943
C943
R941
C942
C925
R942
R940
C936
R928
C916
C912
C918
HA1
HA2
HA3
HA4
HA5
HA6
HA8
HA9
HA0
HAa
HAb
HAc
HAd
HAe
HAS2

NOTES: WIRES NOT LABELED ARE
22 BUS (BA).
INDICATES FLEXIBLE SLEEVING.

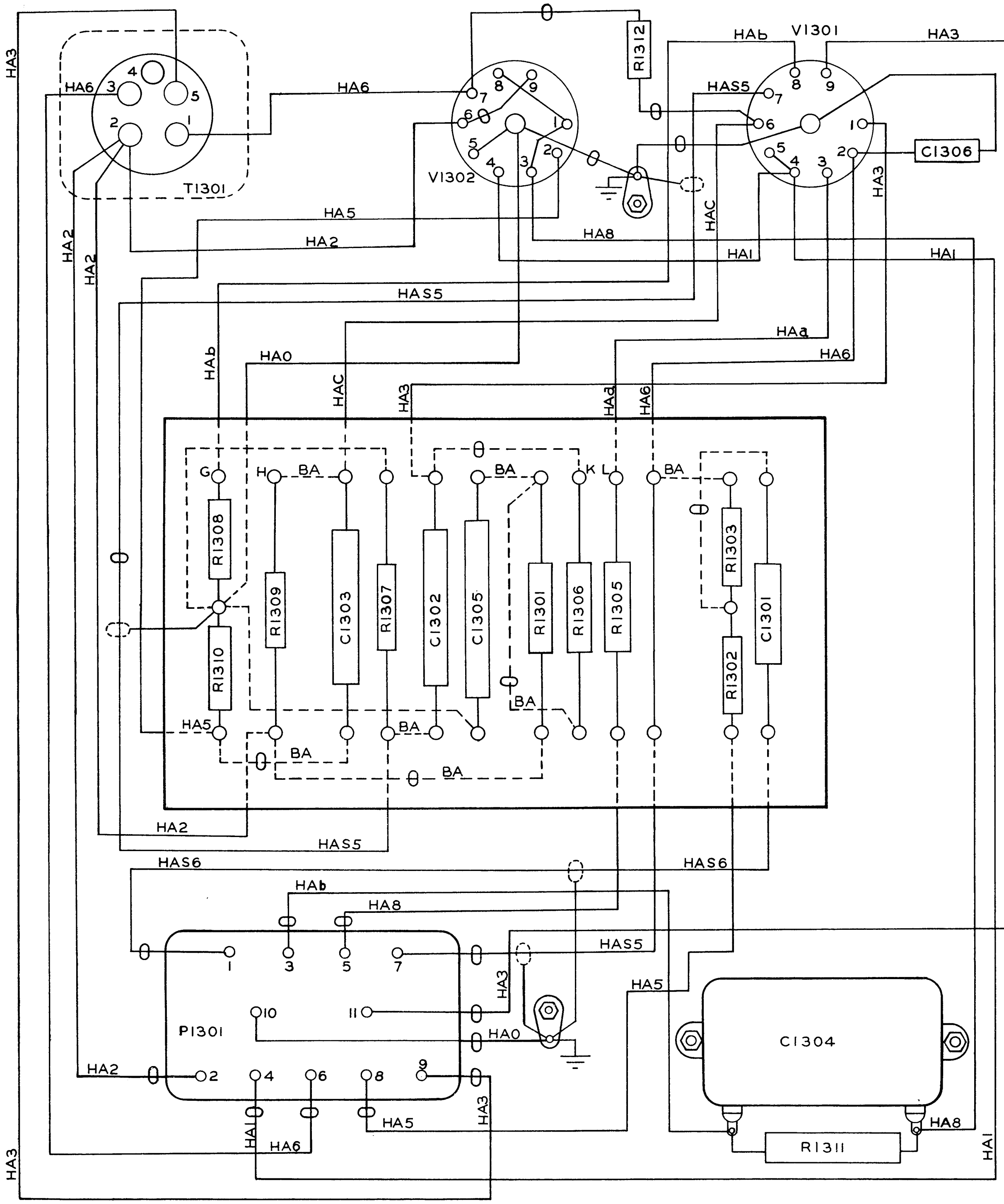


Figure 8-19. Transceiver 618S-1, A-F Amplifier, Wiring Diagram

A29-842-4

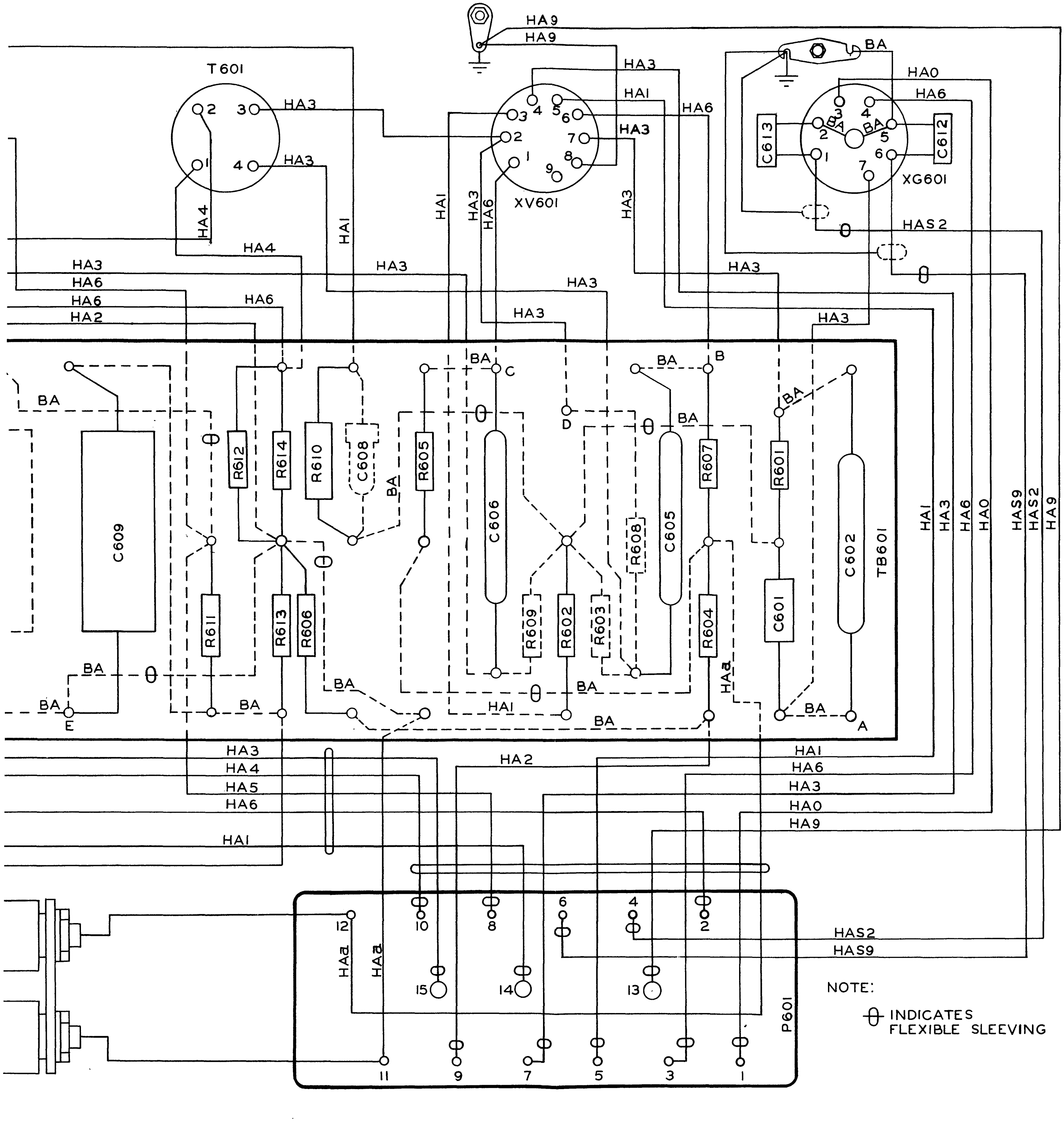


Figure 8-20. Transceiver 618S-1, Tuning Servo Amplifier, Wiring Diagram

A29-832-4

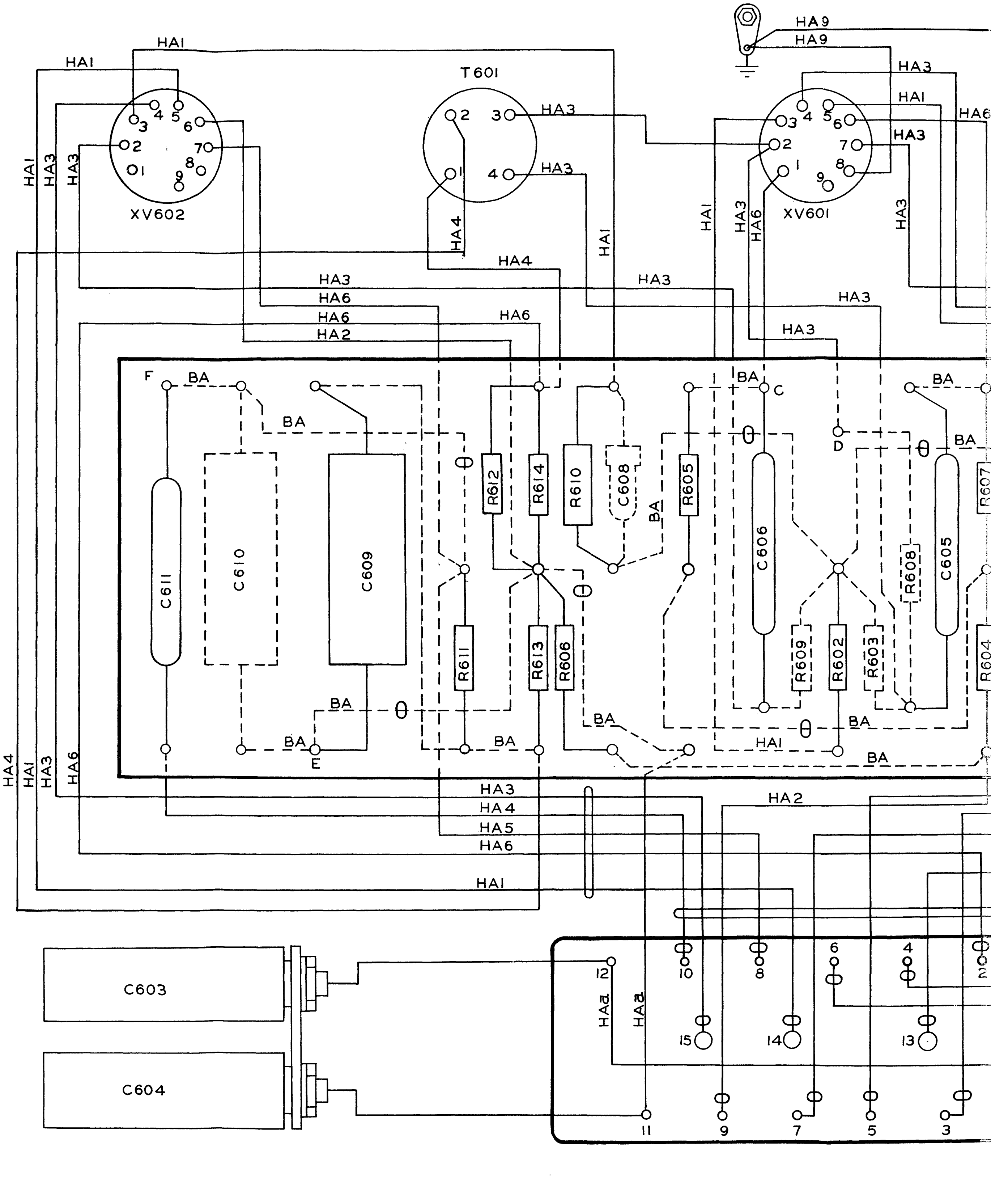
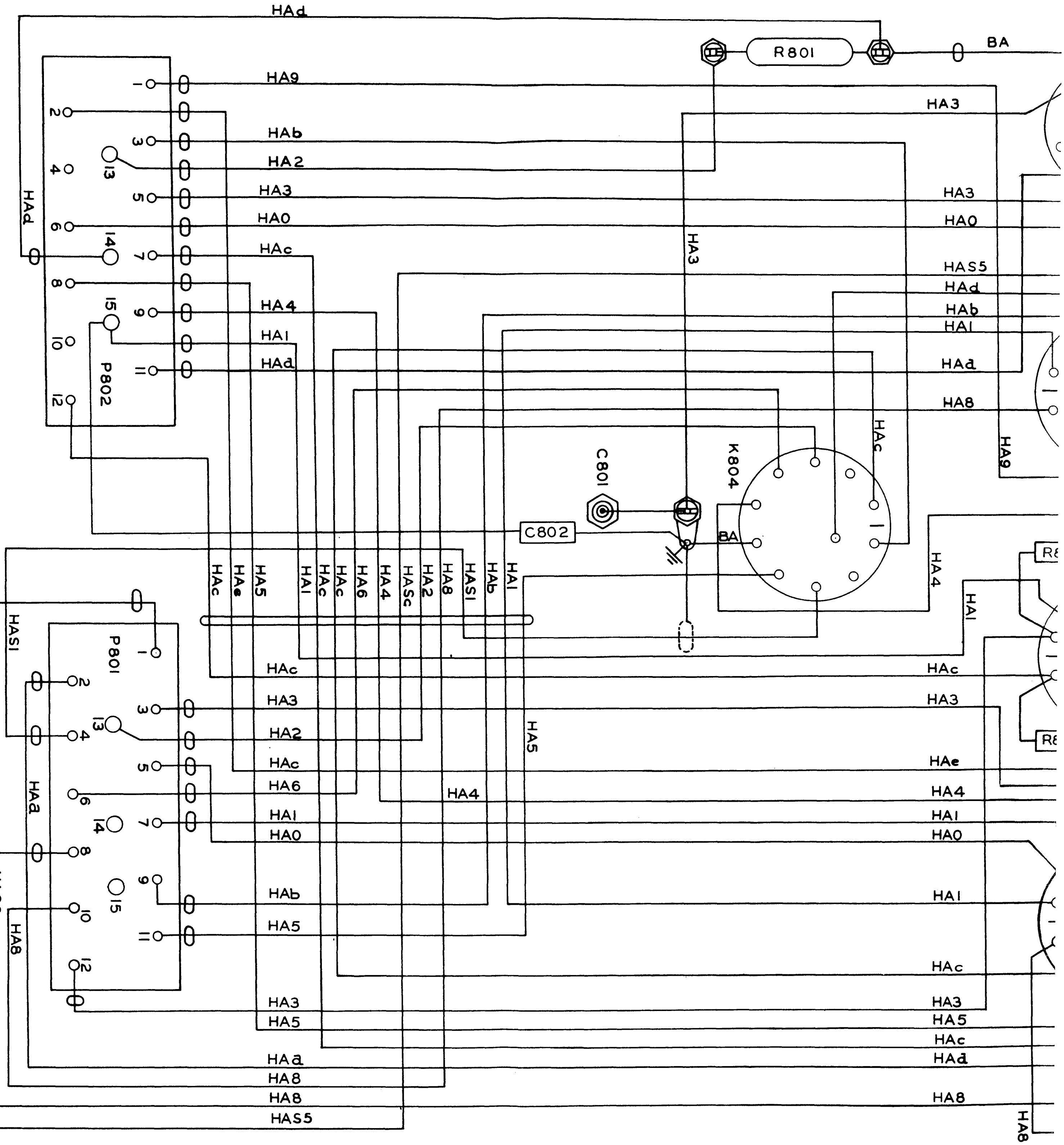


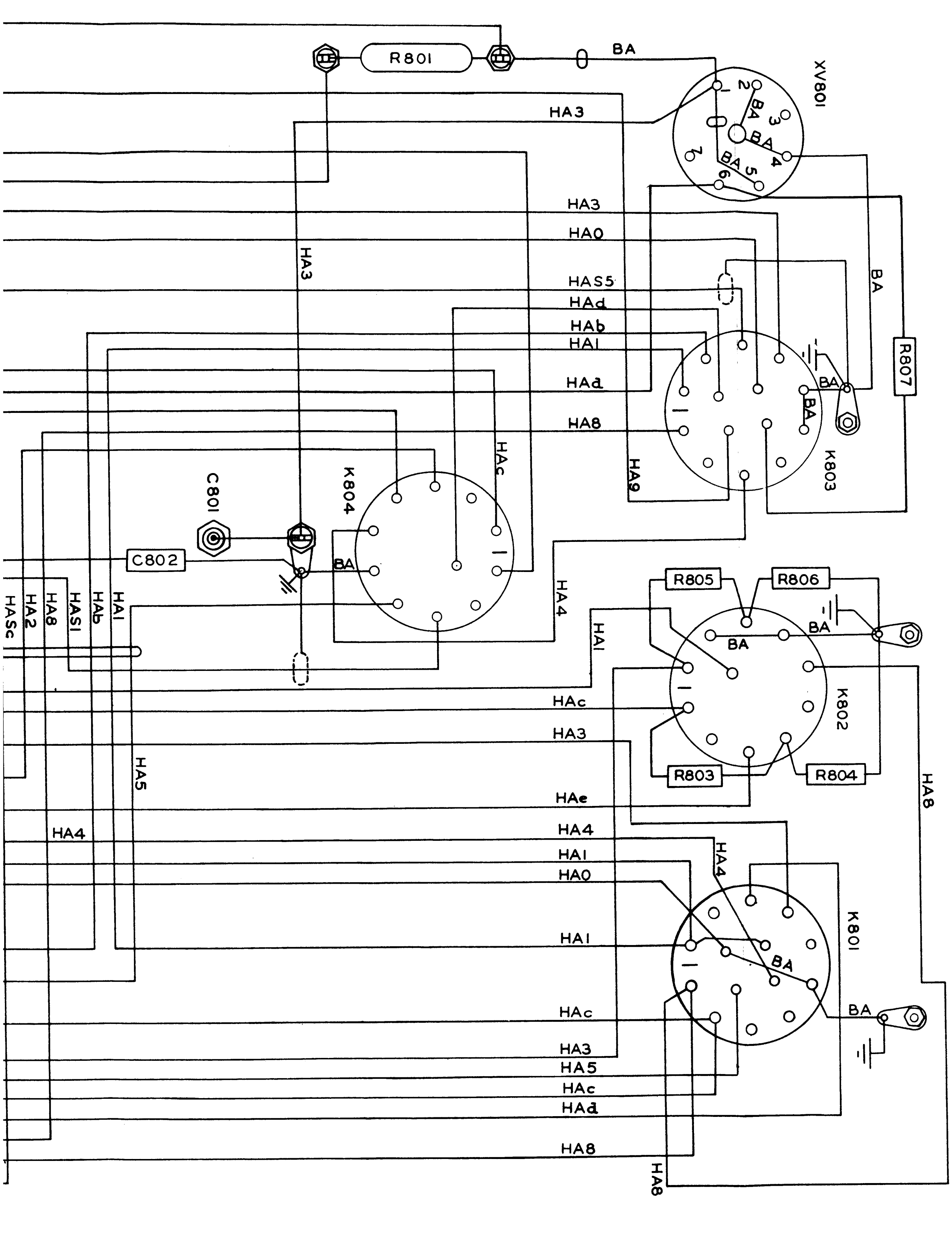
Figure 8-20. Transceiver 618S-1, Tuning Servo A

NOTE: ⊕ INDICATES FLEXIBLE SLEEVING.

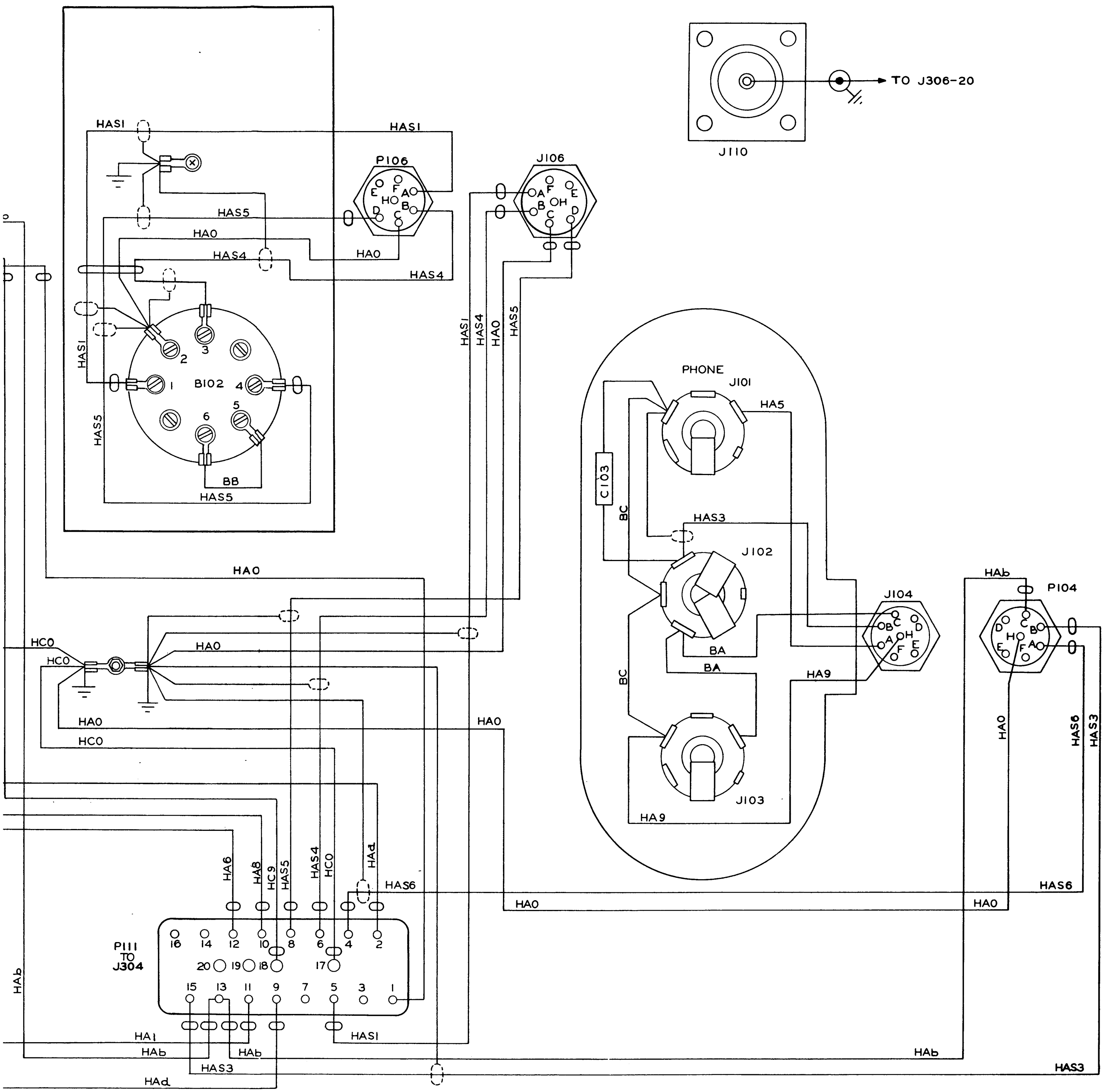


A29-136-4

Figure 8-21. Transceiver 618S-1, Relay Assembly, Wiring Diagram

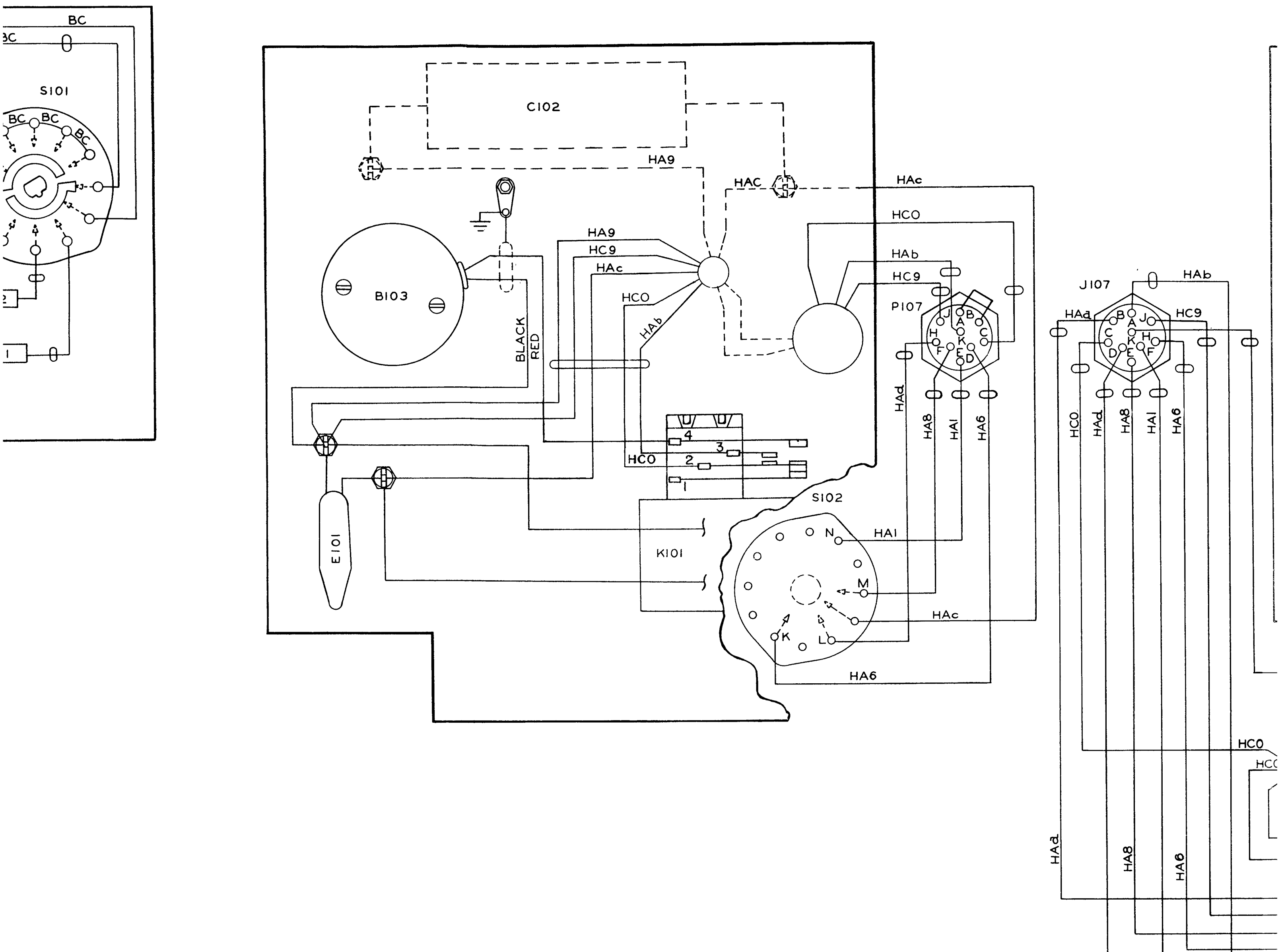


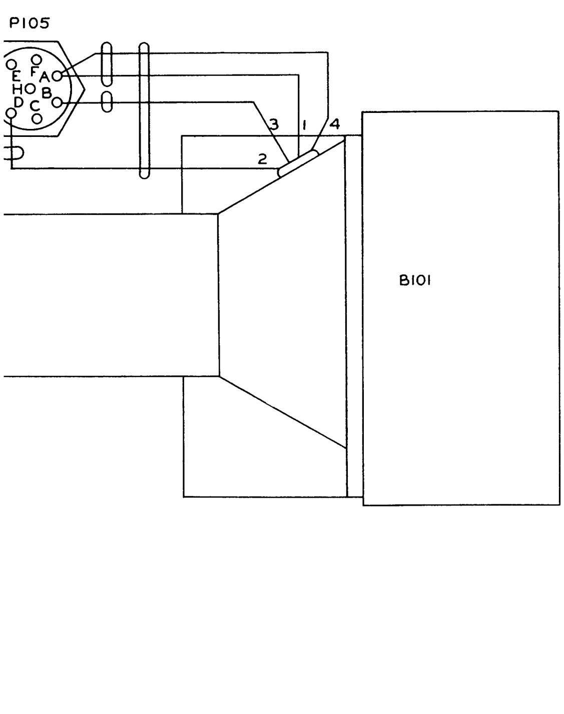
8S-1, Relay Assembly, Wiring Diagram



A29-869-6

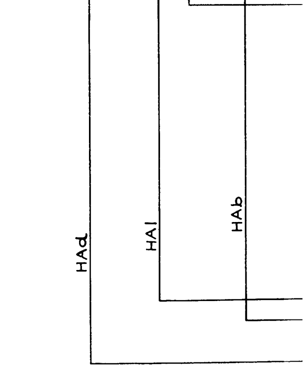
Figure 8-22. Transceiver 618S-1, Front Panel Assembly, Wiring Diagram

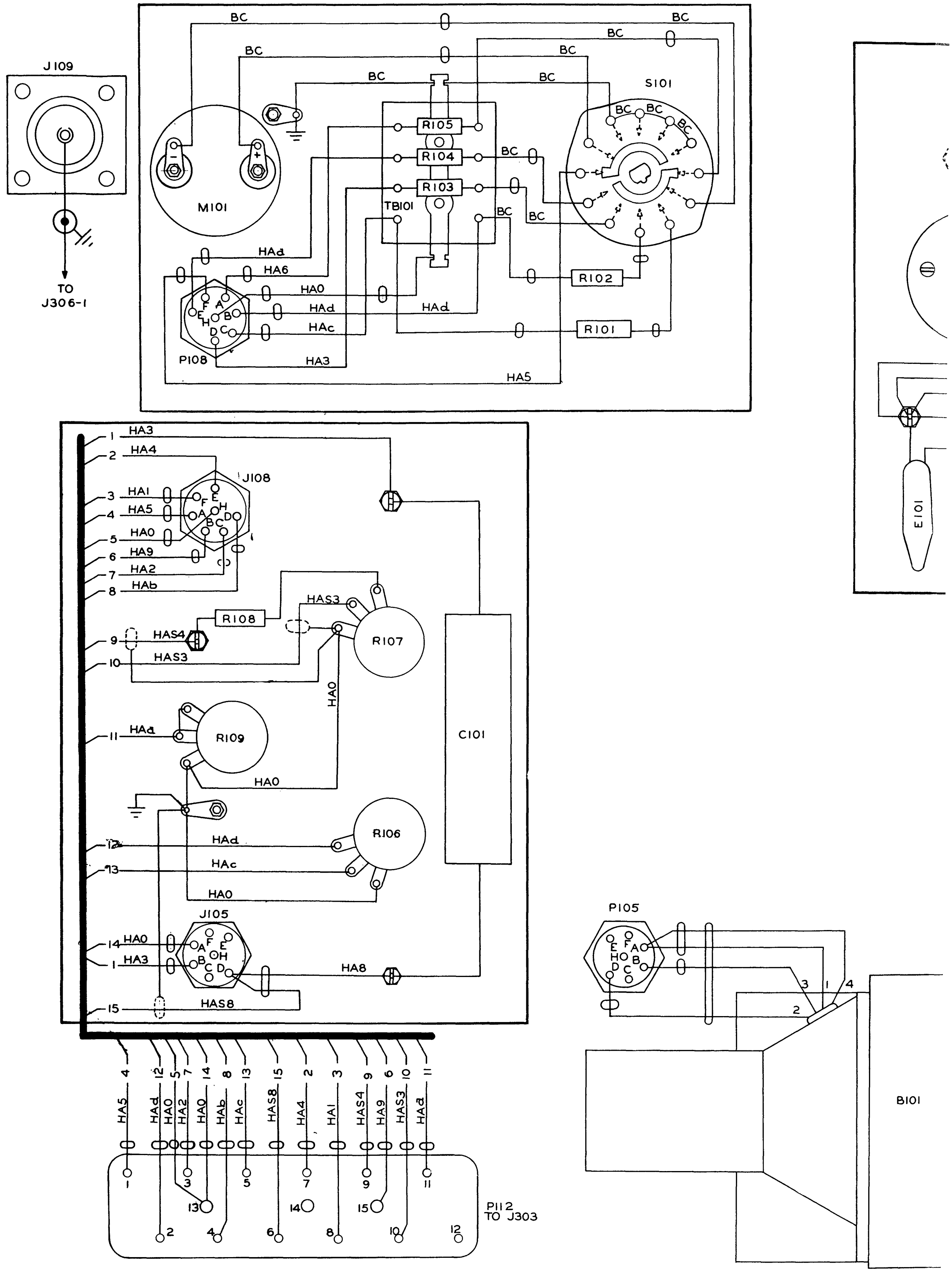


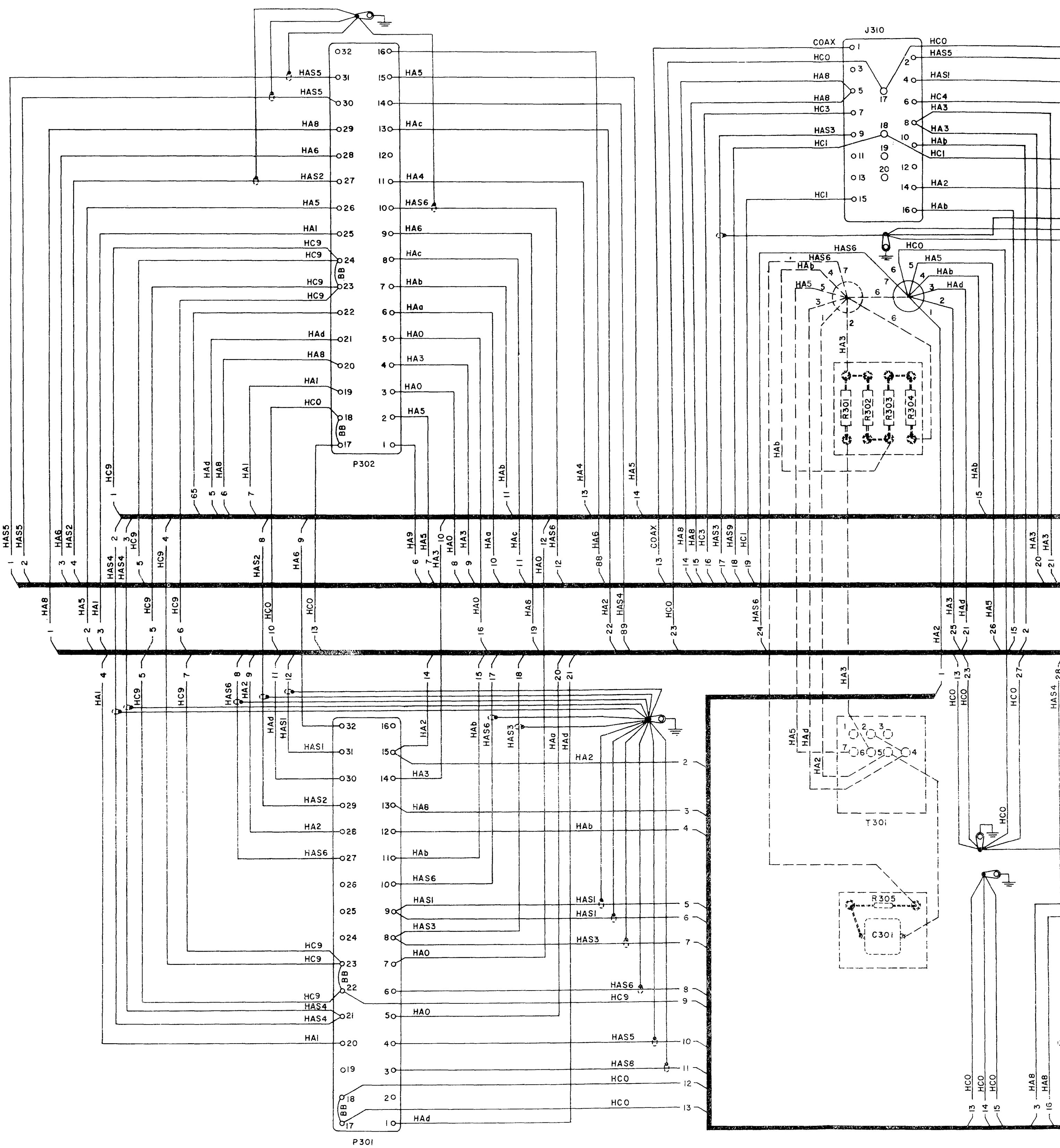


NOTES:

1. -θ- INDICATES FLEXIBLE SLEEVING.
2. SWITCHES ARE VIEWED FROM OPPOSITE THE DRIVEN END.
3 S101 IS SHOWN IN PA GRID POSITION.
4. CONNECTORS ARE VIEWED FROM WIRED SIDE.

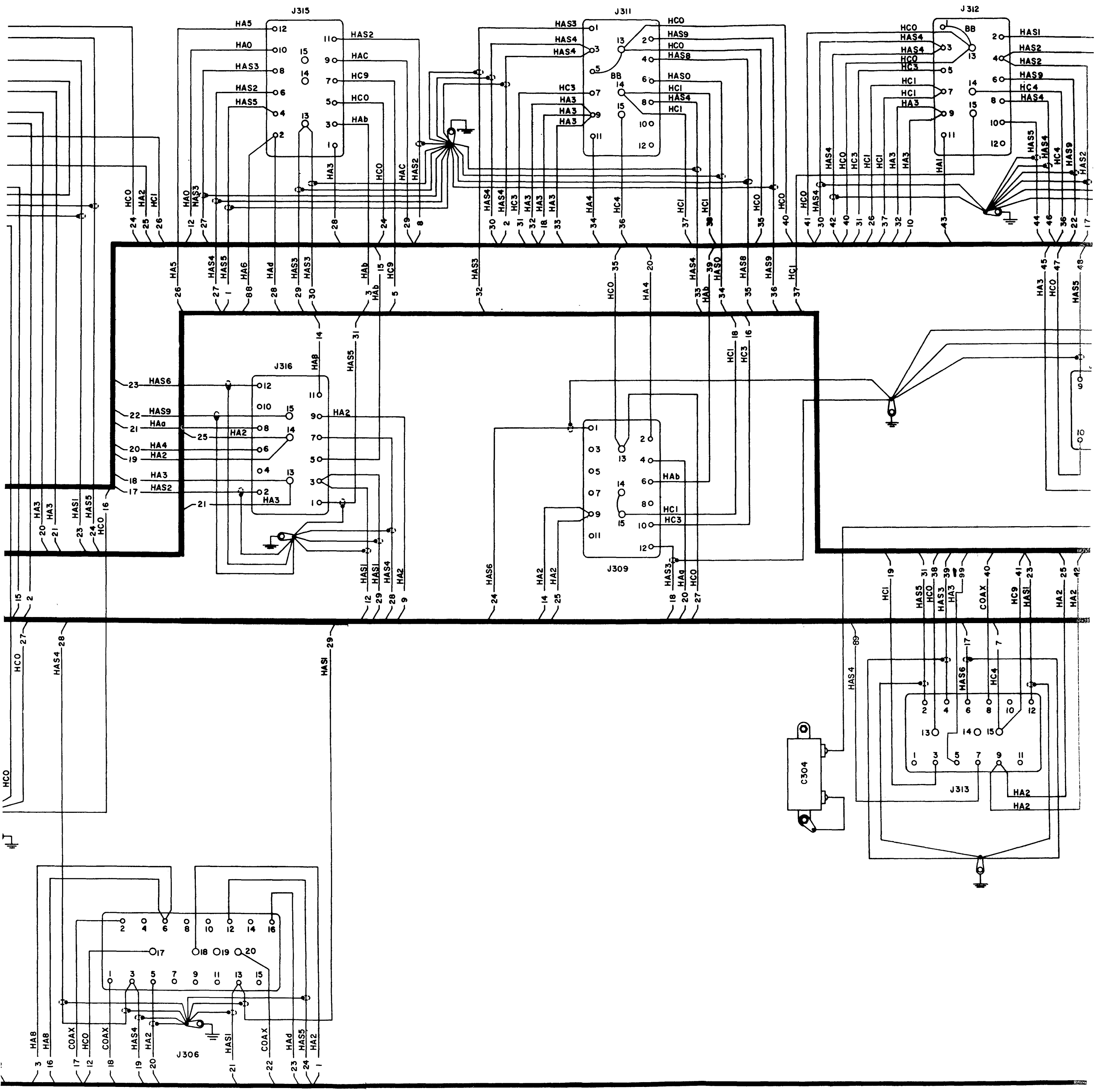



J109
TO
J306-1
M101
S101
BC
R105
R104
R103
TB101
R102
R101
P108
HAd
HA6
HA0
HAc
HA3
HA5
J108
HA4
HA1
HA9
HA2
HAb
R108
HAS4
HAS3
R107
R109
C101
R106
J105
HA8
HAS8
P112
TO J303
P105
B101
E101

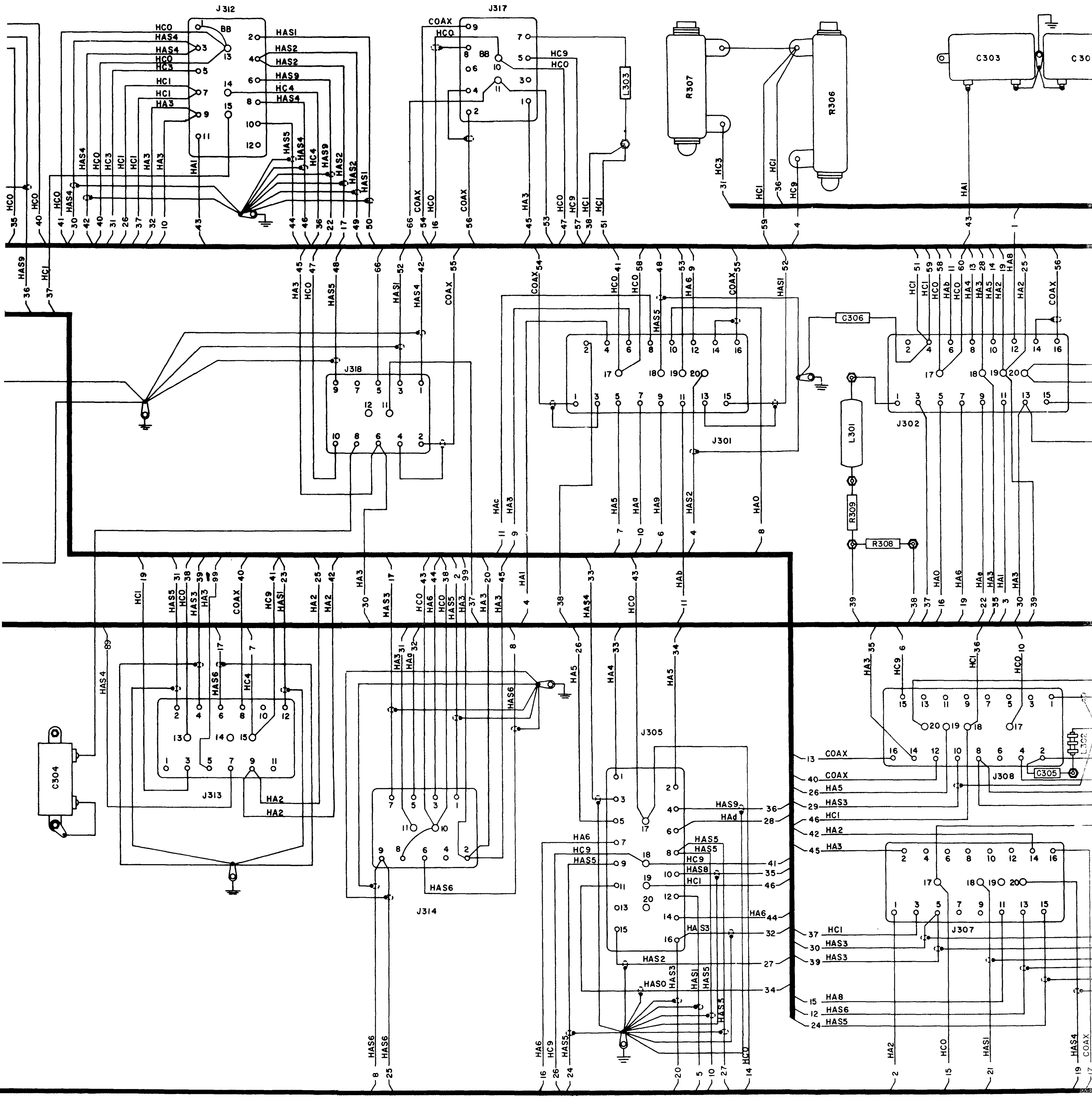


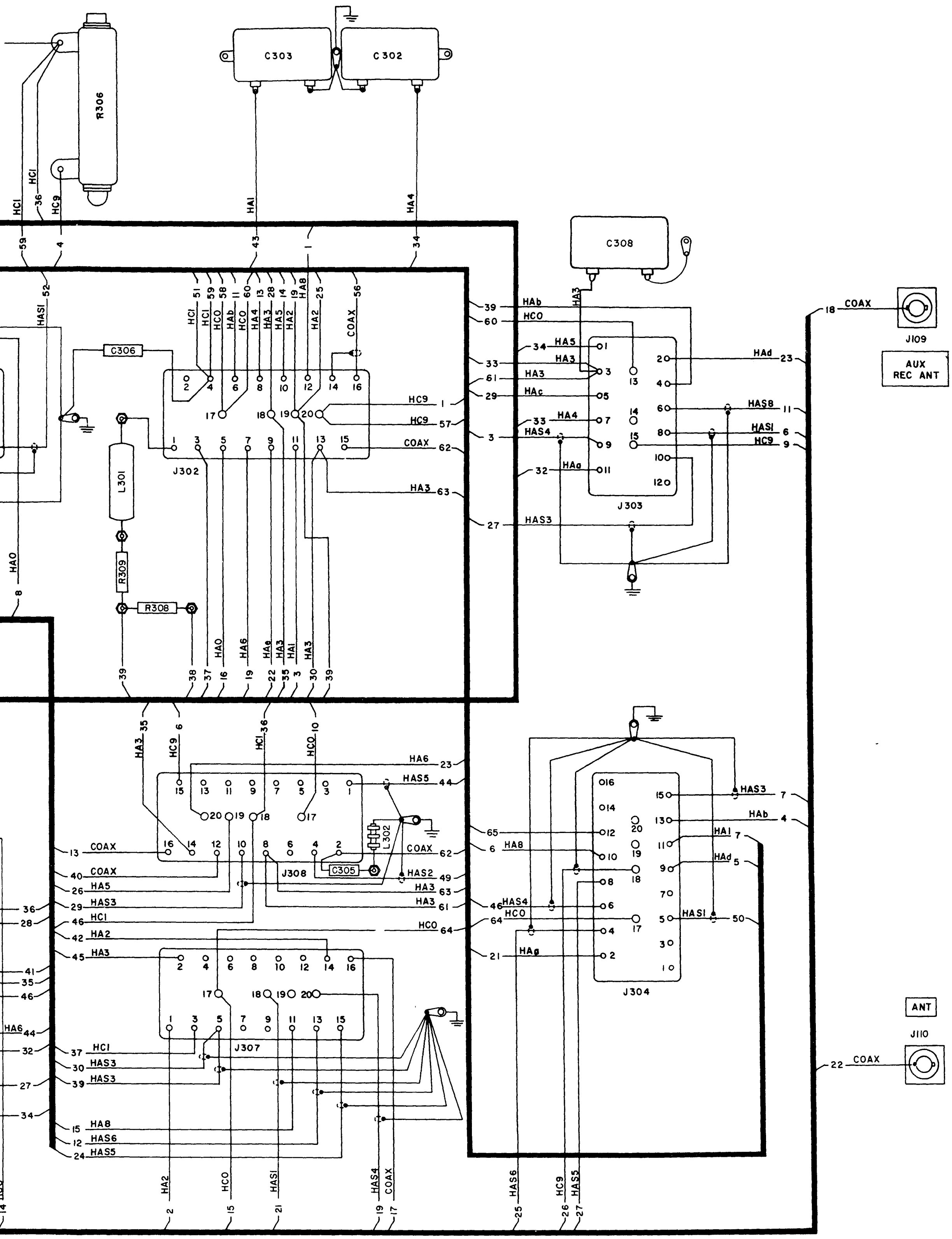
A29-229-6

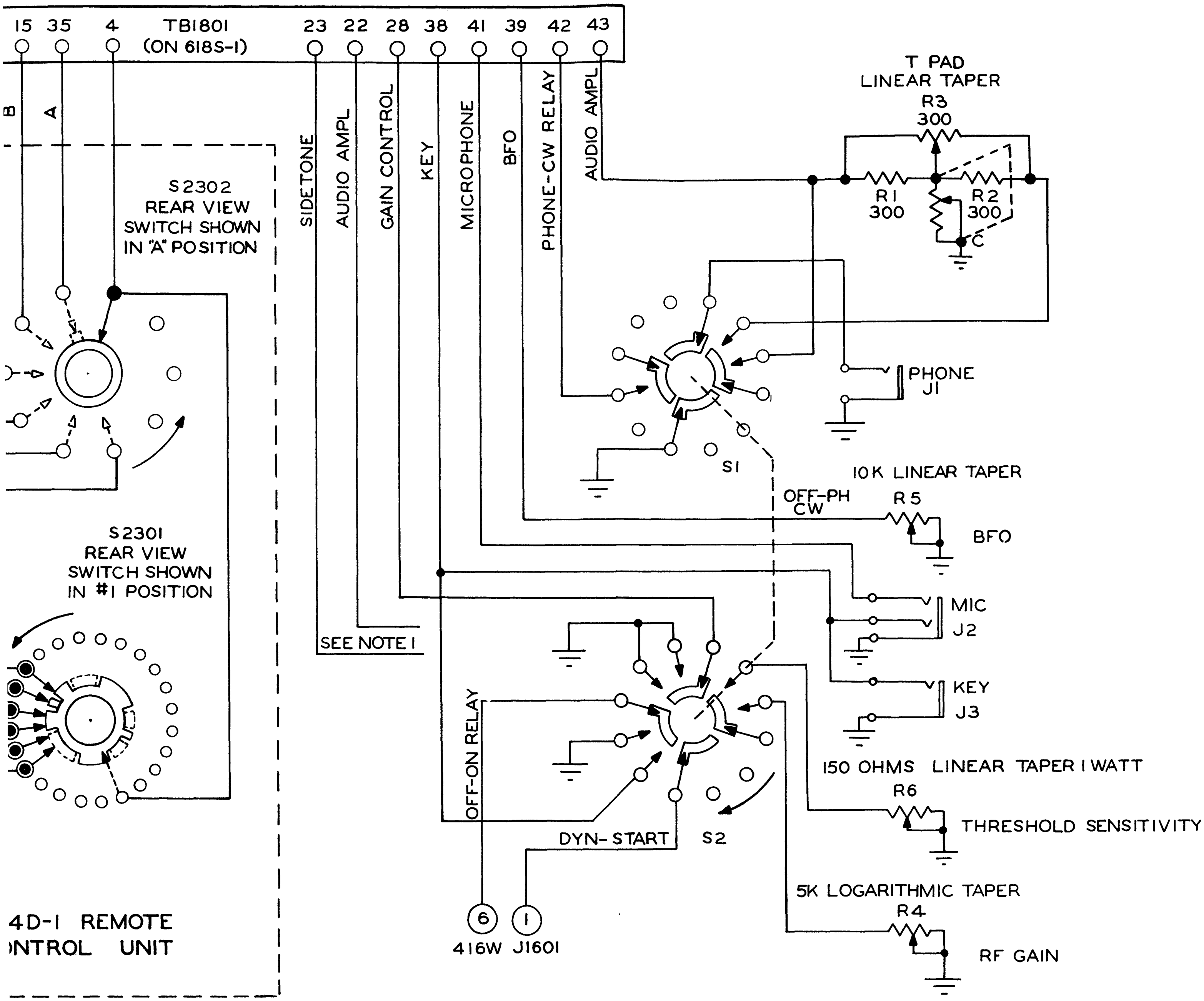
Figure 8-23. Transceiver 618S-1, Main Chassis, Wiring Diagram



J315
J311
J312
J316
J309
J313
J306
C304


J312
J317
L303
R307
R306
C303
C302
J318
J301
C306
J302
L301
R309
R308
C304
J313
J314
J305
J308
C305
J307


R306
C303
C302
C308
J109
AUX REC ANT
C306
J302
L301
R309
R308
J303
J308
L302
C305
J307
J304
ANT
J110



ONE FOR CONNECTION TO 500 OHMS
, CAN BE FED BACK THROUGH AUDIO

N.
ESISTANCE VALUES ARE IN OHMS.

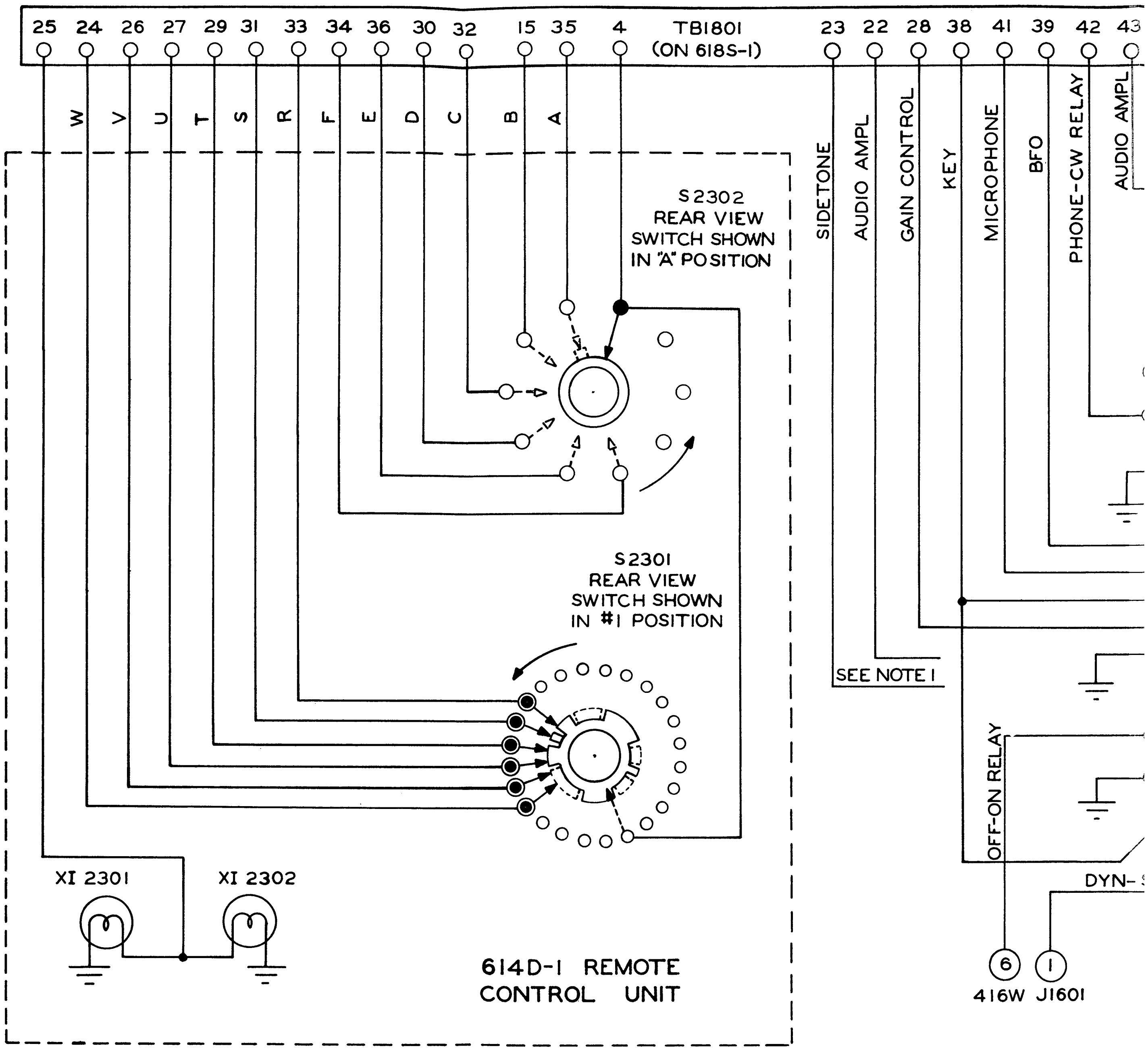
RS ARE ELECTRICALLY CONNECTED

SWITCH KEY:

- ● CONTACT SIDE SHOWN
- ○ CONTACT OPPOSITE SIDE SHOWN
- ◉ CONTACT BOTH SIDES

A29-454-4

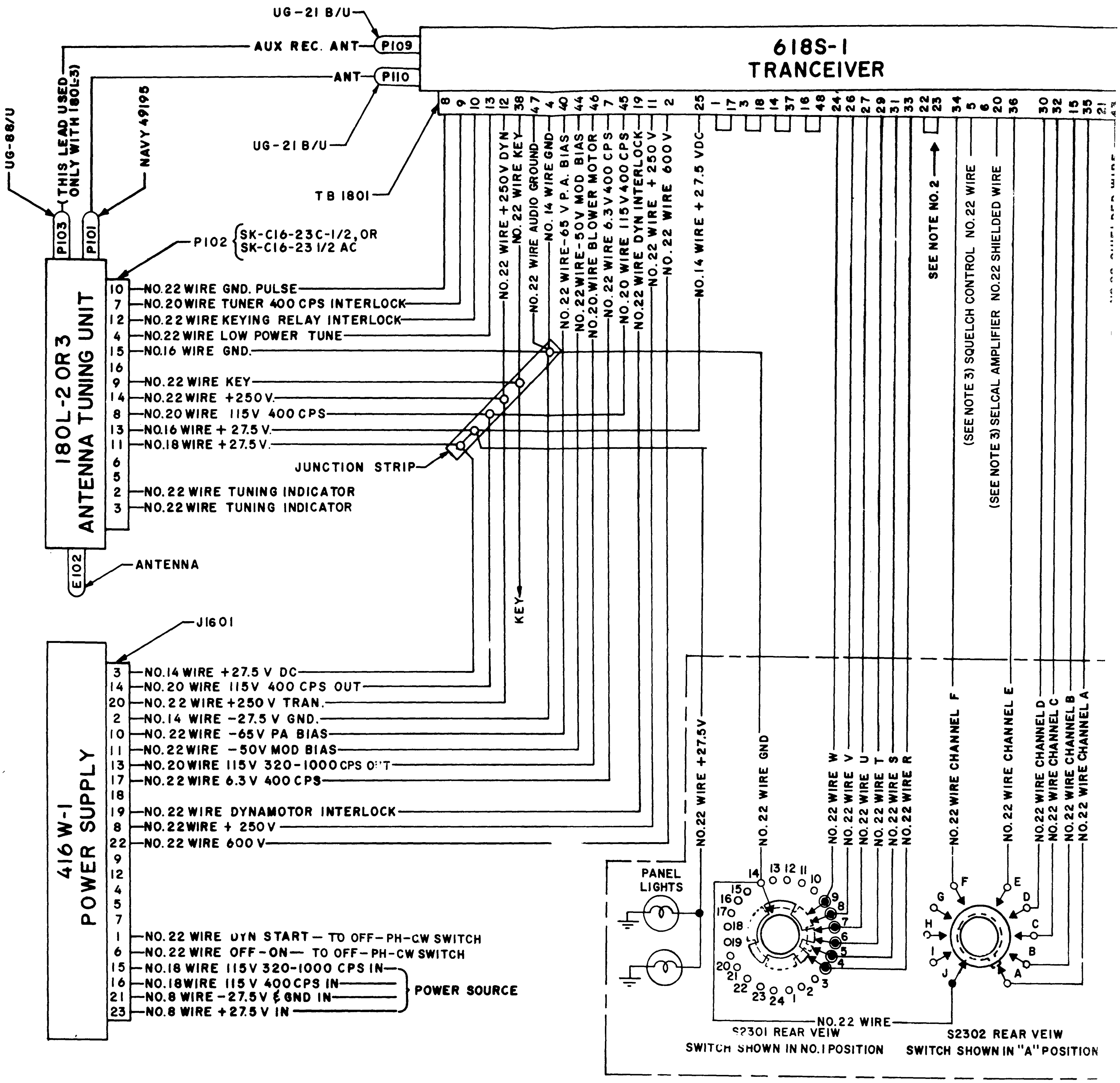
Figure 8-24. Transceiver 618S-1, Typical Installation, Wiring Diagram



NOTES:

1. 20 MW AVAILABLE FROM SIDETONE FOR CONNECTION TO 500 OHMS INTERPHONE INPUT OR, IF DESIRED, CAN BE FED BACK THROUGH AUDIO AMPLIFIER IN RECIEVER.
2. SWITCHES SHOWN IN OFF POSITION.
3. UNLESS OTHERWISE INDICATED, RESISTANCE VALUES ARE IN OHMS. K= 1000 OHMS.
4. ON S2302 FRONT & REAR ROTORS ARE ELECTRICALLY CONNECTED BY SOLDER STAKING.

Figure 8-24. Transceiver 6



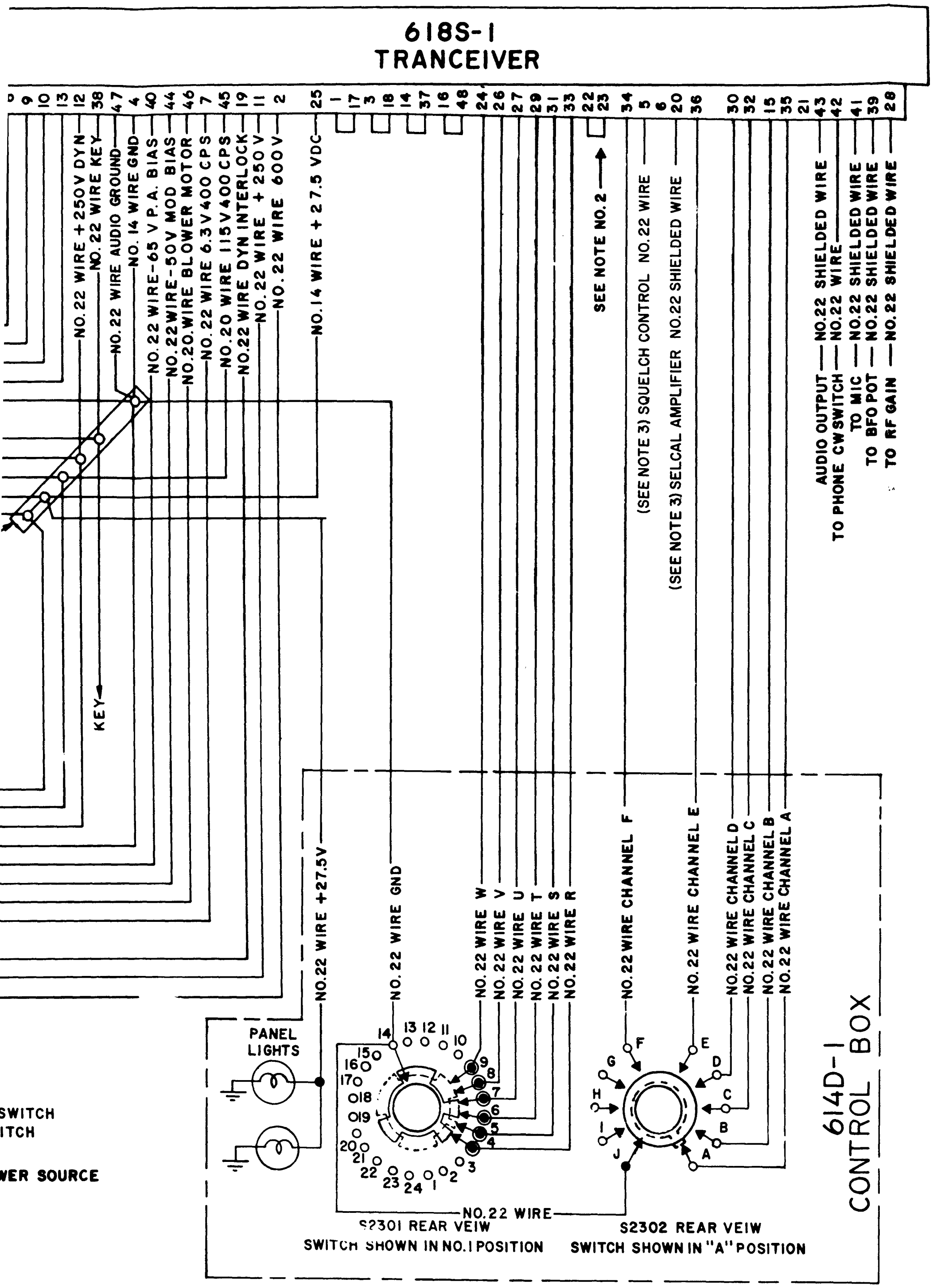
NOTES: 1. UNUSED TERMINALS ON TB1801 SHALL NOT BE USED AS TIE POINTS OR CABLE JUNCTION POINT

2. JUMPER BETWEEN TERMINALS 22 AND 23 OF TB1801 IS NECESSARY ON THE FOLLOWING SERIAL NO. SHOCKMOUNTS 350S-1 SERIAL NO. 1-862, 350S-2 SERIAL NO. 1-200 PROVIDED THAT THE SIDETONE IS TO BE FED INTO THE AUDIO AMPLIFIERS. THIS JUMPER SHOULD NOT BE MADE WHEN THE FOLLOWING SERIAL NO. SHOCKMOUNTS ARE USED:
350S-1 SERIAL NO. 863 & UP
350S-2 SERIAL NO. 201 & UP
350S-3 SERIAL NO. 1 & UP
350S-4 SERIAL NO. 1 & UP

3. CONNECTIONS TO TERMINALS 5 AND 20 OF TB1801 ARE MADE ONLY WHEN THE 250 KC IF AMPLIFIER WITH SQUELCH AND SELCAL IS USED.

A29-249-5

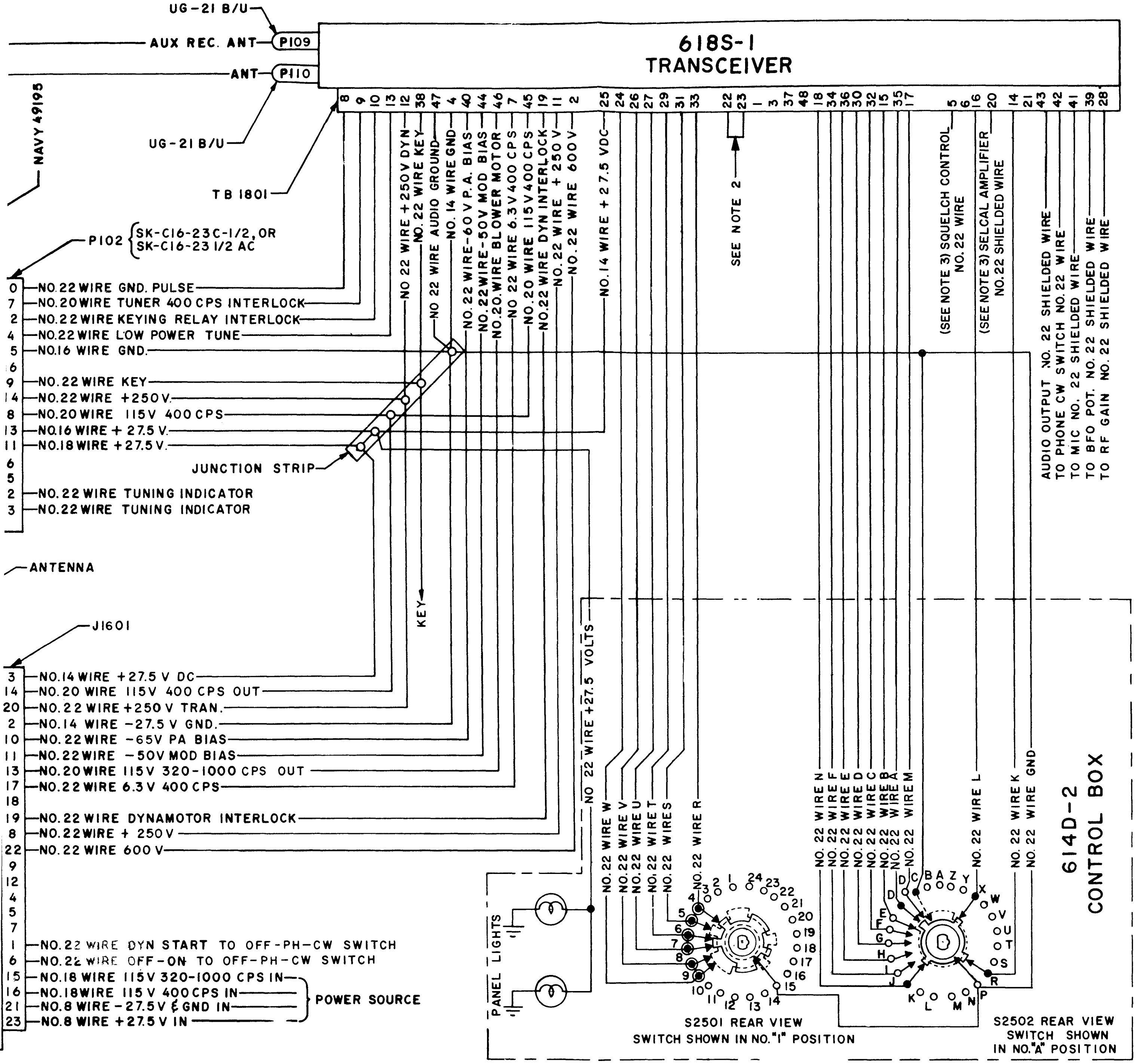
Figure 8-25. External Wiring Diagram Using Remote Control Unit 614D-1



ED AS TIE POINTS OR CABLE JUNCTION POINT
B1801 IS NECESSARY ON THE FOLLOWING SERIAL NO.
-2 SERIAL NO. 1-200 PROVIDED THAT THE SIDETONE IS TO BE FED INTO THE AUDIO
E WHEN THE FOLLOWING SERIAL NO. SHOCKMOUNTS ARE USED:

ARE MADE ONLY WHEN THE 250 KC IF AMPLIFIER WITH SQUELCH AND SELCAL IS USED.

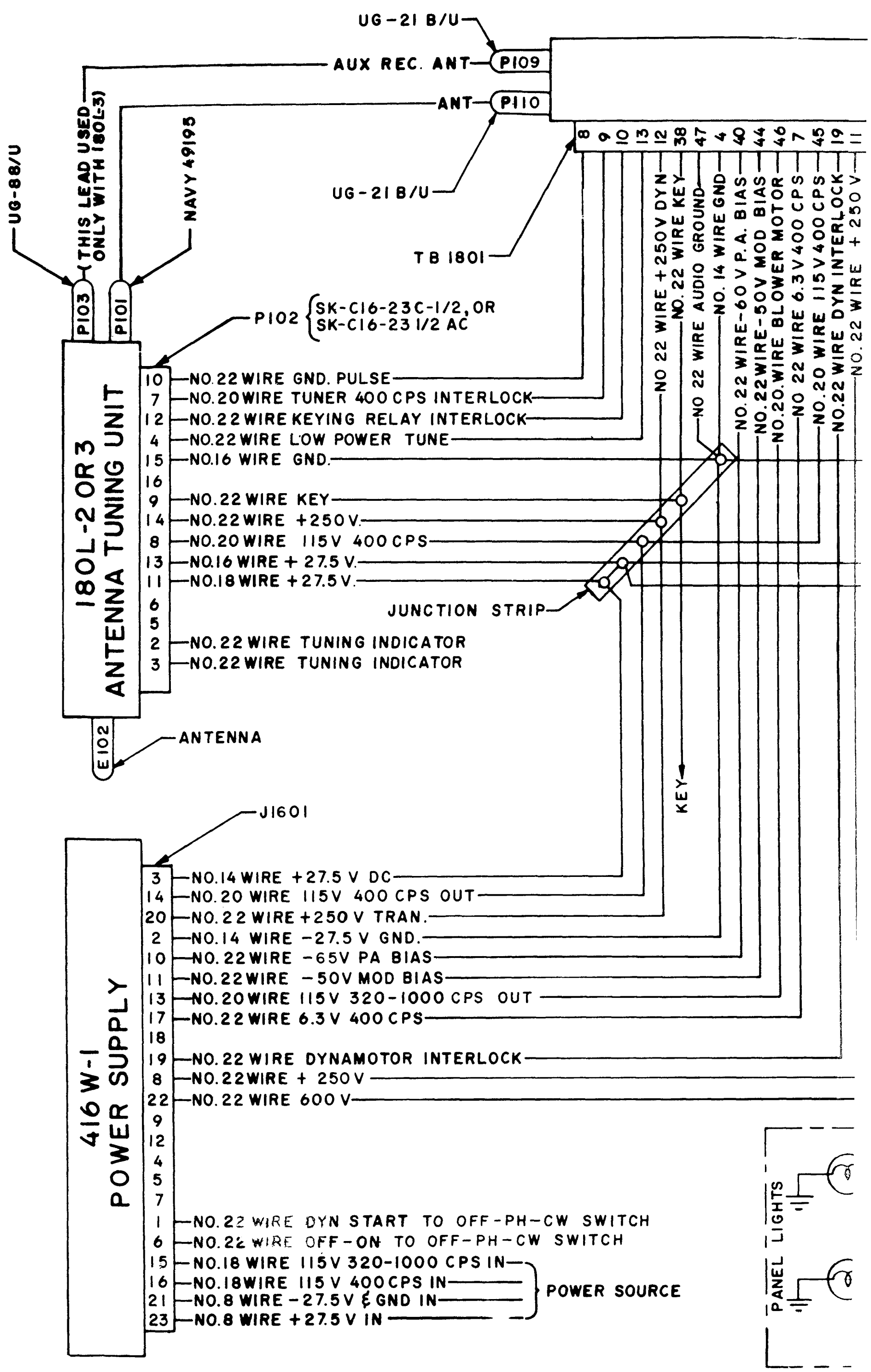
iagram Using Remote Control Unit 614D-1



1. UNUSED TERMINALS ON TB1801 SHALL NOT BE USED AS TIE POINTS OR CABLE JUNCTION POINT
2. JUMPER BETWEEN TERMINALS 22 AND 23 OF TB1801 IS NECESSARY ON THE FOLLOWING SERIAL NUMBER SHOCKMOUNTS 350S-1 SERIAL NO. 1-862, 350S-2 SERIAL NO. 1-200 PROVIDED THAT THE SIDETONE IS TO BE FED INTO THE AUDIO AMPLIFIERS. THIS JUMPER SHOULD NOT BE MADE WHEN THE FOLLOWING SERIAL NUMBER SHOCKMOUNTS ARE USED:
350S-1 SERIAL NO. 863 & UP
350S-2 SERIAL NO. 201 & UP
350S-3 SERIAL NO. 1 & UP
350S-4 SERIAL NO. 1 & UP
3. CONNECTIONS TO TERMINALS 5 AND 20 OF TB1801 ARE MADE ONLY WHEN THE 250 KC IF AMPLIFIER WITH SQUELCH AND SELCAL IS USED.

A29-250-5

Figure 8-26. External Wiring Diagram Using Remote Control Unit 614D-2

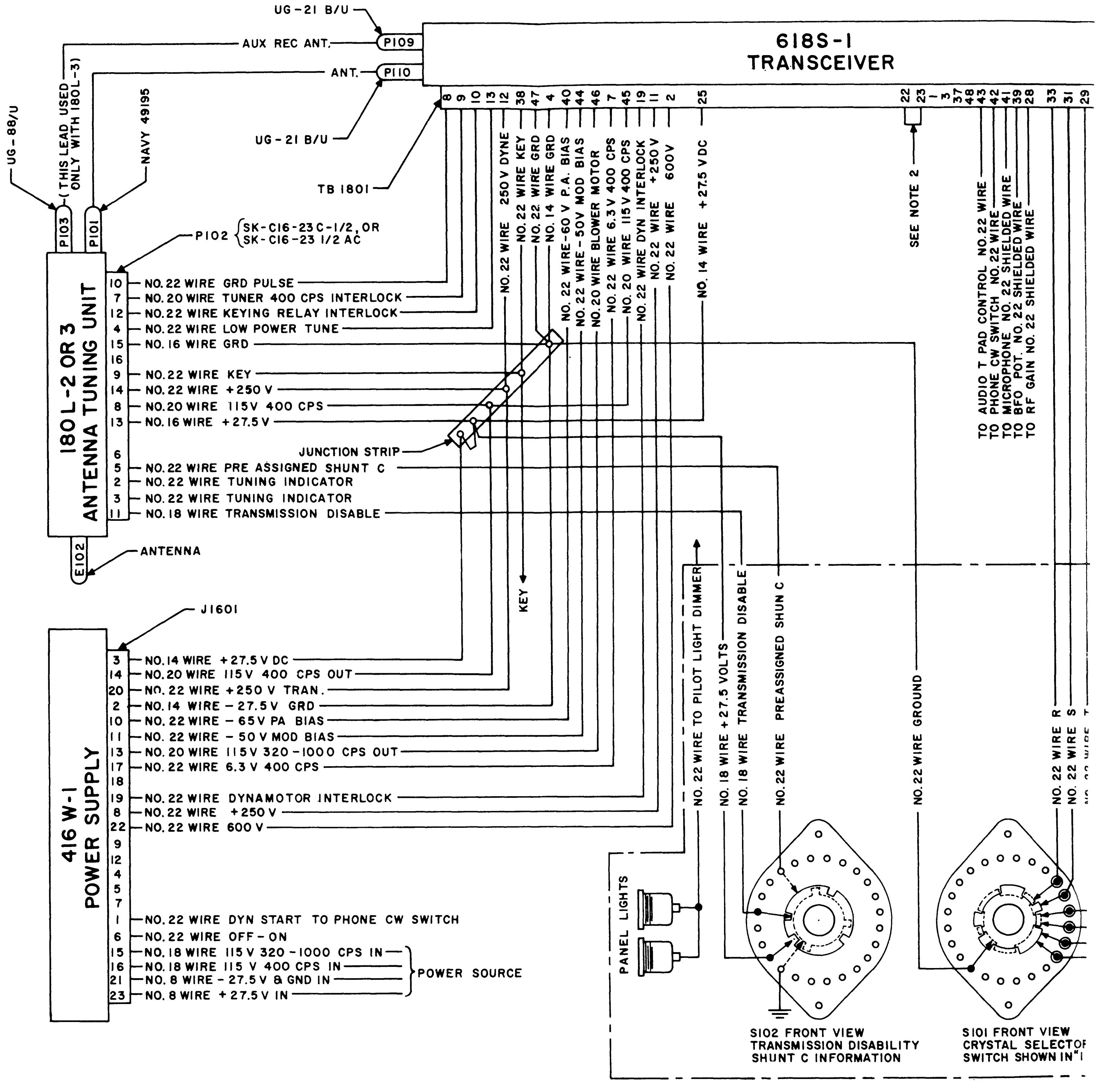


NOTES. 1. UNUSED TERMINALS ON TB1801 SHALL NOT BE USED AS TIE POINTS OR CABLE JUNC

2. JUMPER BETWEEN TERMINALS 22 AND 23 OF TB1801 IS NECESSARY ON TH
SHOCKMOUNTS 350S-1 SERIAL NO. 1-862, 350S-2 SERIAL NO. 1-200 PR
AMPLIFIERS. THIS JUMPER SHOULD NOT BE MADE WHEN THE FOLLOWING
350S-1 SERIAL NO. 863 & UP
350S-2 SERIAL NO. 201 & UP
350S-3 SERIAL NO. 1 & UP
350S-4 SERIAL NO. 1 & UP

3. CONNECTIONS TO TERMINALS 5 AND 20 OF TB1801 ARE MADE ONLY WHEN THE 25

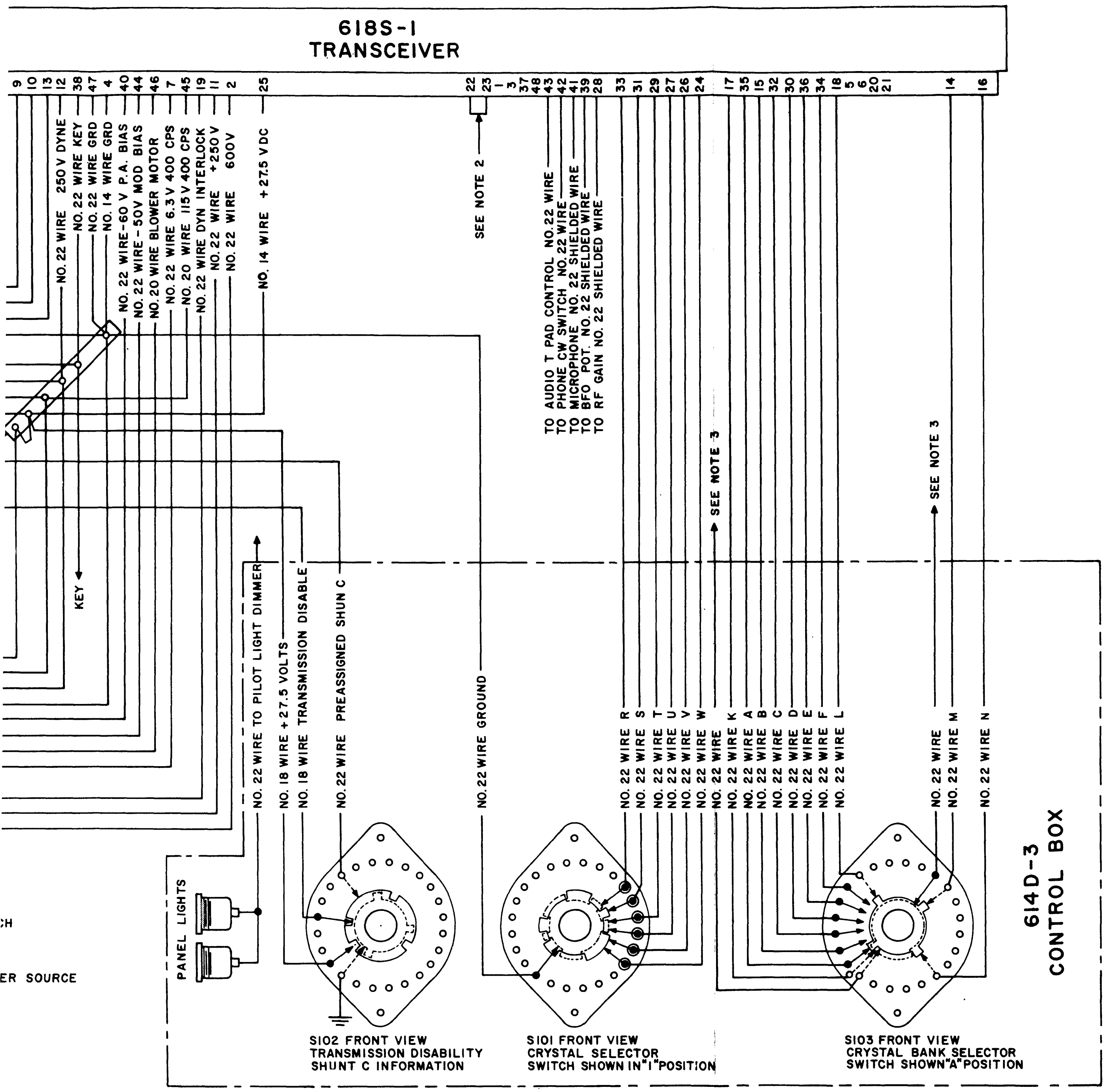
Figure 8-26. External Wir



NOTES.
1. UNUSED TERMINALS ON TB1801 SHALL NOT BE USED AS TIE POINTS OR CABLE JUNCTION POINT
2. THIS JUMPER IS NECESSARY ON THE FOLLOWING SERIAL NUMBER SHOCKMOUNTS 350S-1 SERIAL NO. 1-862 PROVIDED THAT THE SIDESTONE IS TO BE FED INTO THE AUDIO AMPLIFIER : 350S-2 SERIAL NO. 1-200
THIS JUMPER SHOULD NOT BE MADE WHEN THE FOLLOWING SERIAL NUMBER SHOCKMOUNTS ARE USE: 350S-1 SERIAL NO. 863 AND UP
350S-2 SERIAL NO. 201 AND UP
350S-3 SERIAL NO. 1 AND UP
350S-4 SERIAL NO. 1 AND UP
3. TERMINALS TO BE GROUNDED FOR NORMAL 614D-3 OPERATION, THESE TERMINALS TO BE OPEN WHEN DISTRESS CALL SWITCHING IS OPERATED.
4. KEY TO SWITCHES, ◉→ FRONT AND REAR CONTACT, o→ REAR CONTACT, •→ FRONT CONTACT,

A29-154-5

Figure 8-27. External Wiring Diagram Using Remote Control Unit 614D-3

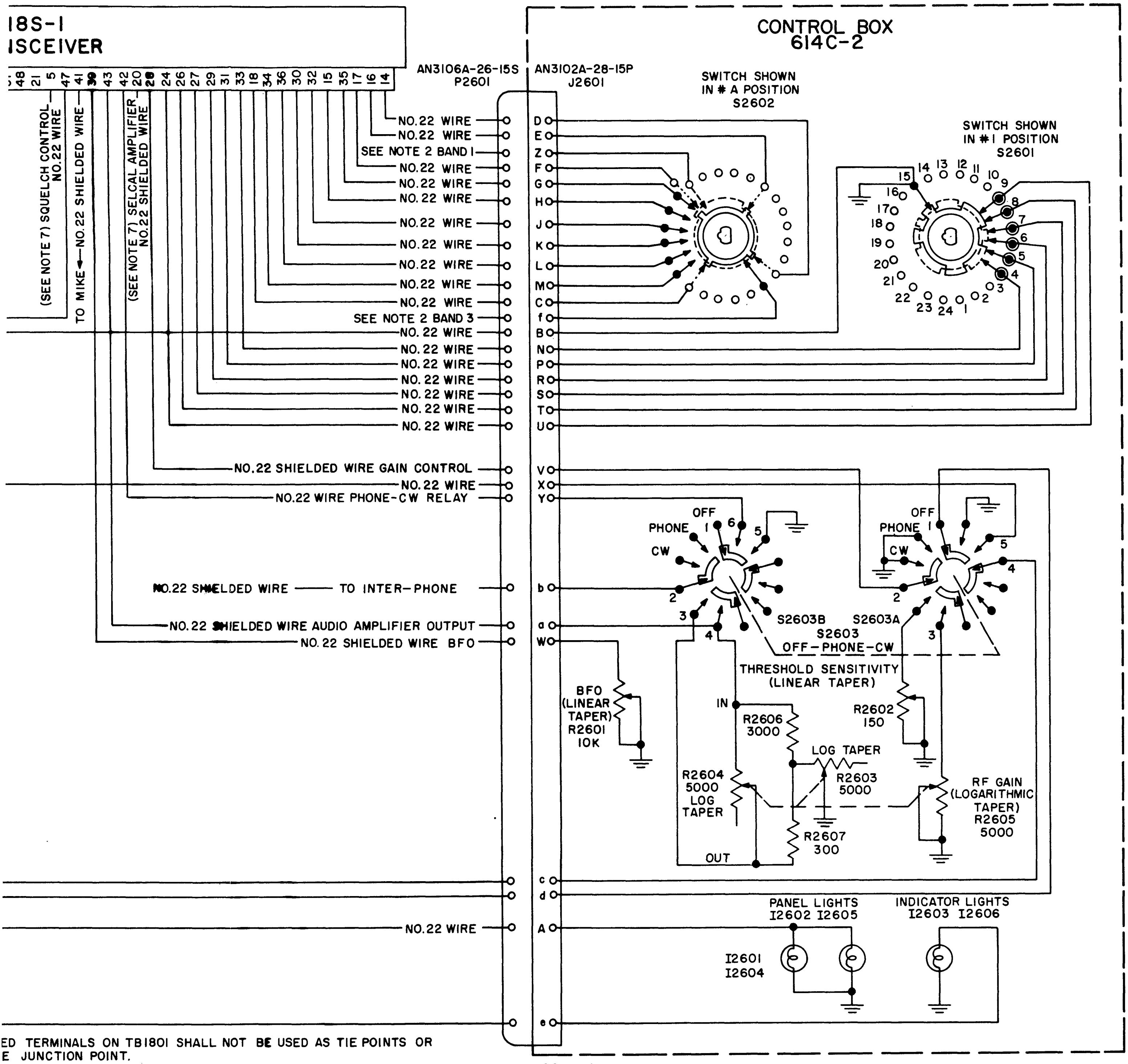


SED AS TIE POINTS OR CABLE JUNCTION POINT
SERIAL NUMBER SHOCKMOUNTS 350S-1 SERIAL NO. 1-862
TO THE AUDIO AMPLIFIER : 350S-2 SERIAL NO. 1-200
OLLOWING SERIAL NUMBER SHOCKMOUNTS ARE USE: 350S-1 SERIAL NO. 863 AND UP
350S-2 SERIAL NO. 201 AND UP
350S-3 SERIAL NO. 1 AND UP
350S-4 SERIAL NO. 1 AND UP

-3 OPERATION, THESE TERMINALS TO BE OPEN

T, O--▶ REAR CONTACT, ●—▶ FRONT CONTACT,

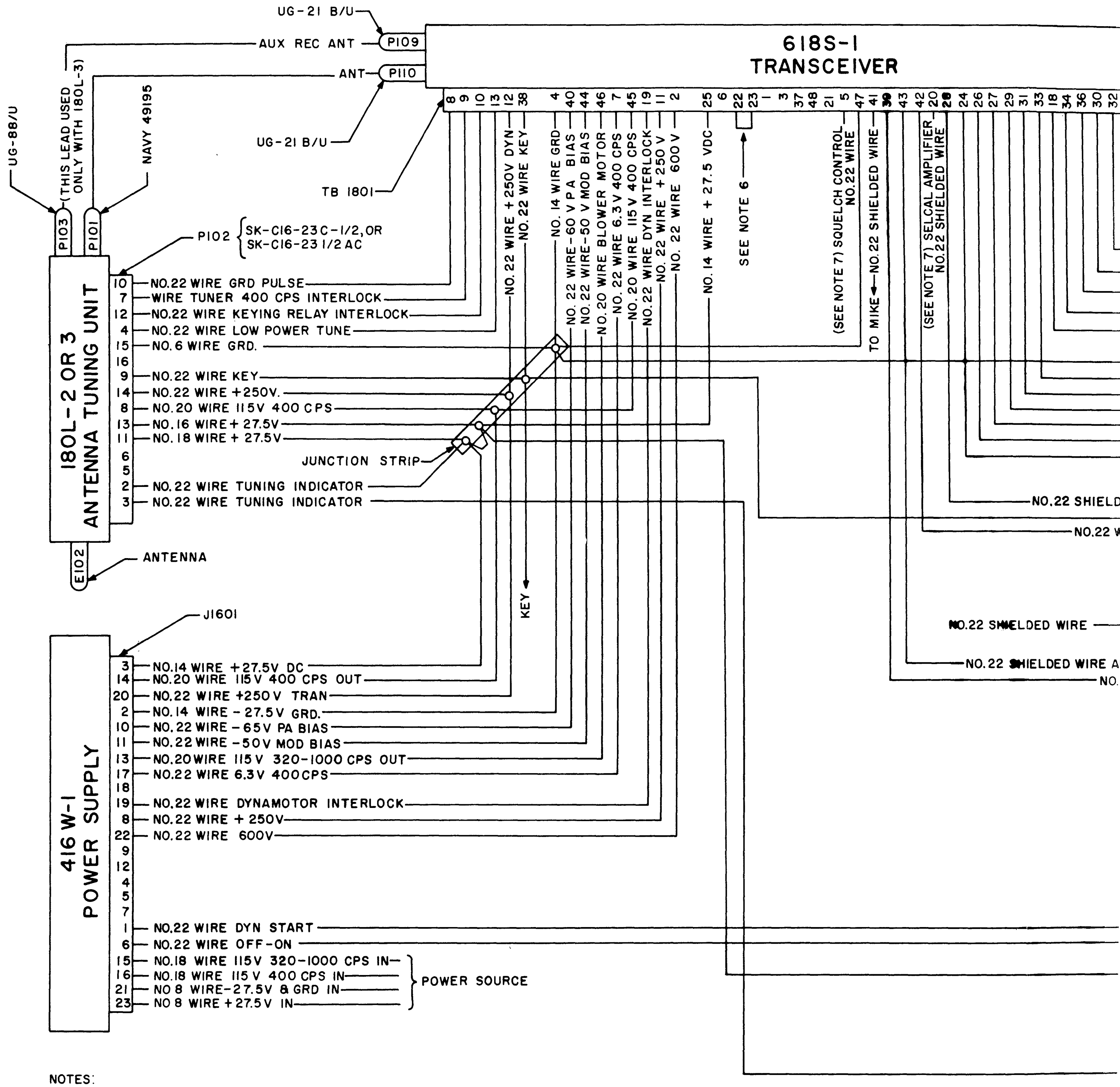
iagram Using Remote Control Unit 614D-3



ED TERMINALS ON TB1801 SHALL NOT BE USED AS TIE POINTS OR
E JUNCTION POINT.
ER BETWEEN TERMINALS 22 AND 23 OF TB 1801 IS NECESSARY ON THE FOLLOWING SERIAL NO.
KMOUNTS PROVIDED THAT THE SIDETONE IS TO BE FED INTO THE AUDIO AMPLIFIER:
-1 SERIAL NO'S. 1-862, 350S-2 SERIAL NO'S. 1-200. THIS JUMPER SHOULD NOT BE
: WHEN THE FOLLOWING SERIAL NUMBER SHOCKMOUNTS ARE USED: 350S-1 SERIAL NO'S. 863 & UP
350S-2 SERIAL NO'S. 201 & UP
350S-3 SERIAL NO'S. 1 & UP
350S-4 SERIAL NO'S. 1 & UP
ECTIONS TO TERMINALS 5 AND 20 OF TB1801 ARE MADE ONLY WHEN THE 250 KC IF AMPLIFIER
SQUELCH AND SELCAL IS USED.

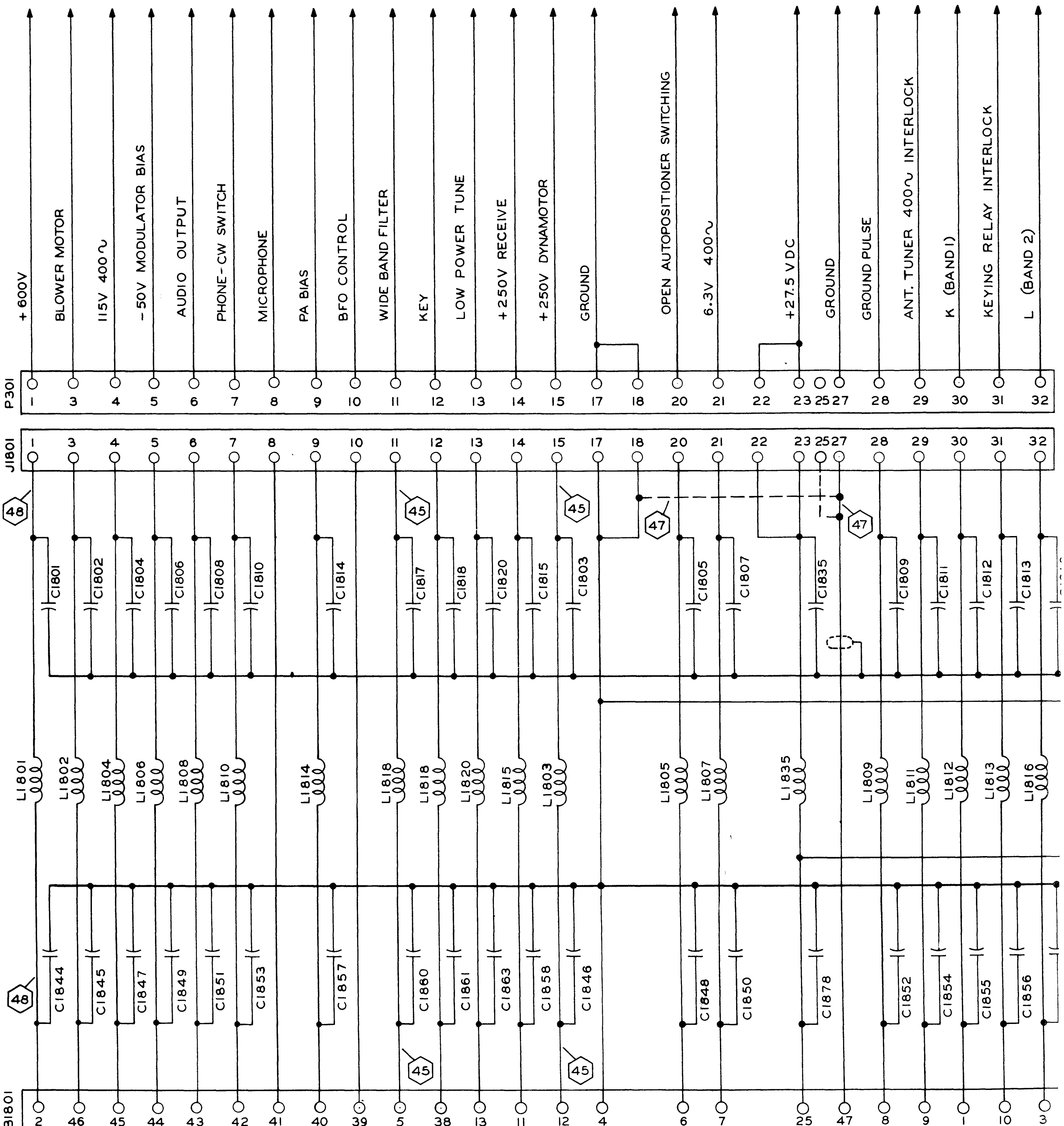
A29-261-5

Figure 8-28. External Wiring Diagram Using Remote Control Unit 614C-2



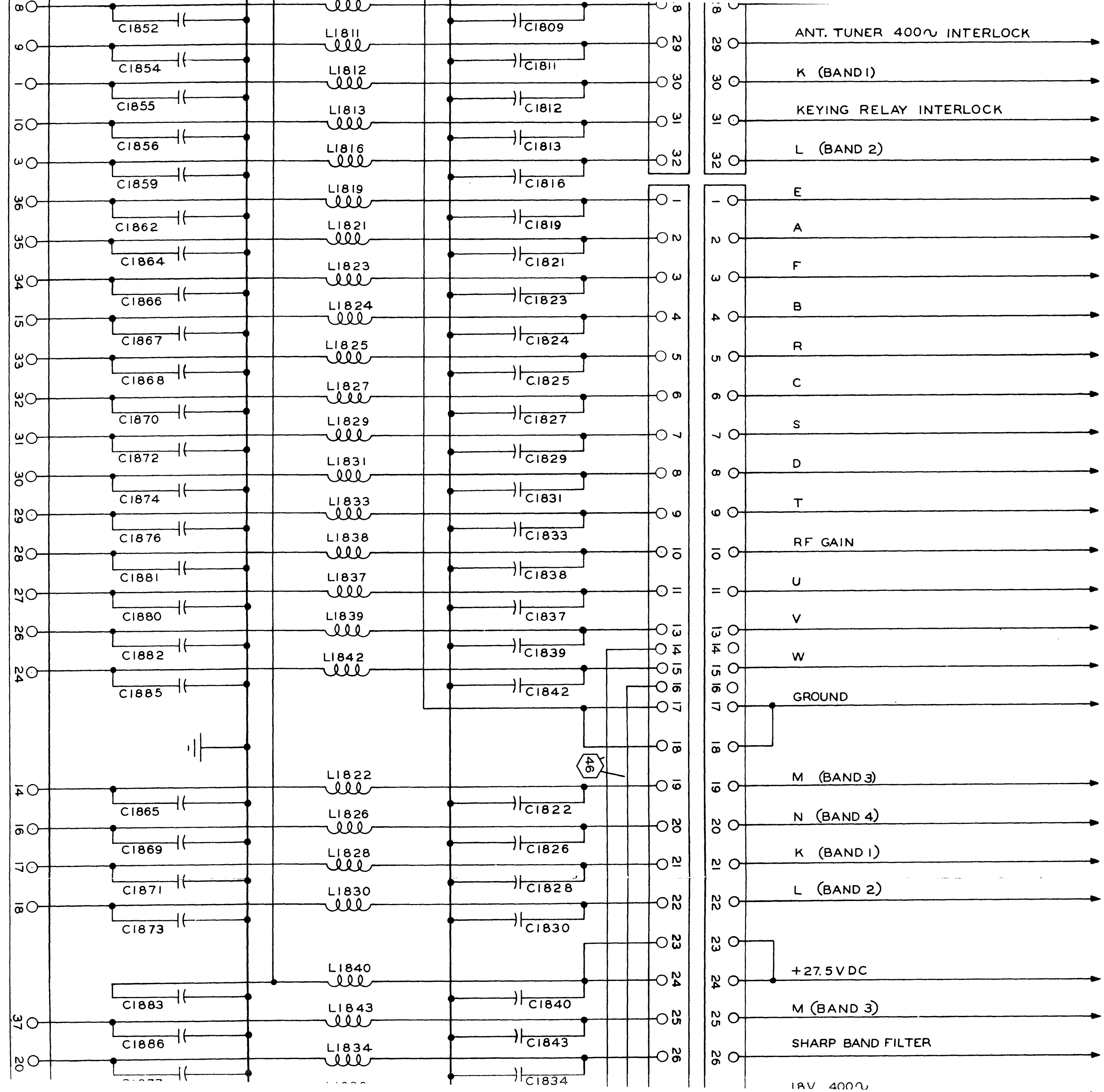
NOTES:

1. ALL RESISTANCES ARE GIVEN IN OHMS, UNLESS OTHERWISE INDICATED.
2. TERMINAL Z AND f ON P2601 ARE TO BE GROUNDED FOR NORMAL 614C-2 OPERATION. THESE TERMINALS TO BE OPENED WHEN DISTRESS CALL SWITCHING IS OPERATED.
3. KEY TO SWITCHES
   - REAR CONTACT
   - FRONT CONTACT
   - FRONT AND REAR CONTACTS ELECTRICALLY CONNECTED
4. ALL SWITCHES VIEWED FROM FRONT OR SIDE.
5. UNUSED TERMINALS ON TB1801 SHALL NOT BE USED / CABLE JUNCTION POINT.
6. JUMPER BETWEEN TERMINALS 22 AND 23 OF TB 1801 SHOCKMOUNTS PROVIDED THAT THE SIDETONE IS TO BE 350S-1 SERIAL NO'S. 1-862, 350S-2 SERIAL NO'S. 1-ż MADE WHEN THE FOLLOWING SERIAL NUMBER SHOCKM
7. CONNECTIONS TO TERMINALS 5 AND 20 OF TB1801 ARE WITH SQUELCH AND SELCAL IS USED.

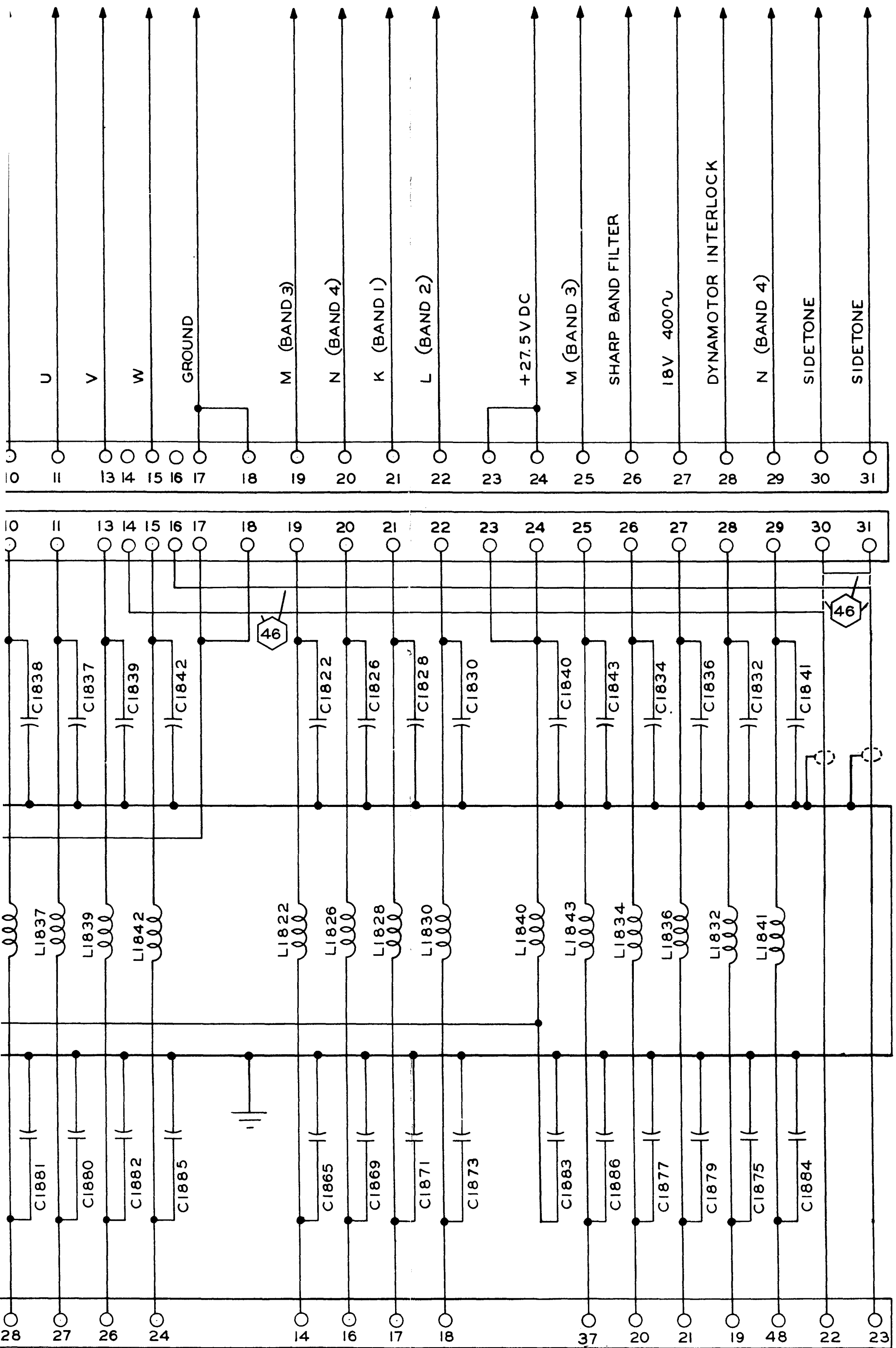


A29-145-5

Figure 8-29. Shockmount 350S-1, Filter Unit, Schematic Diagram

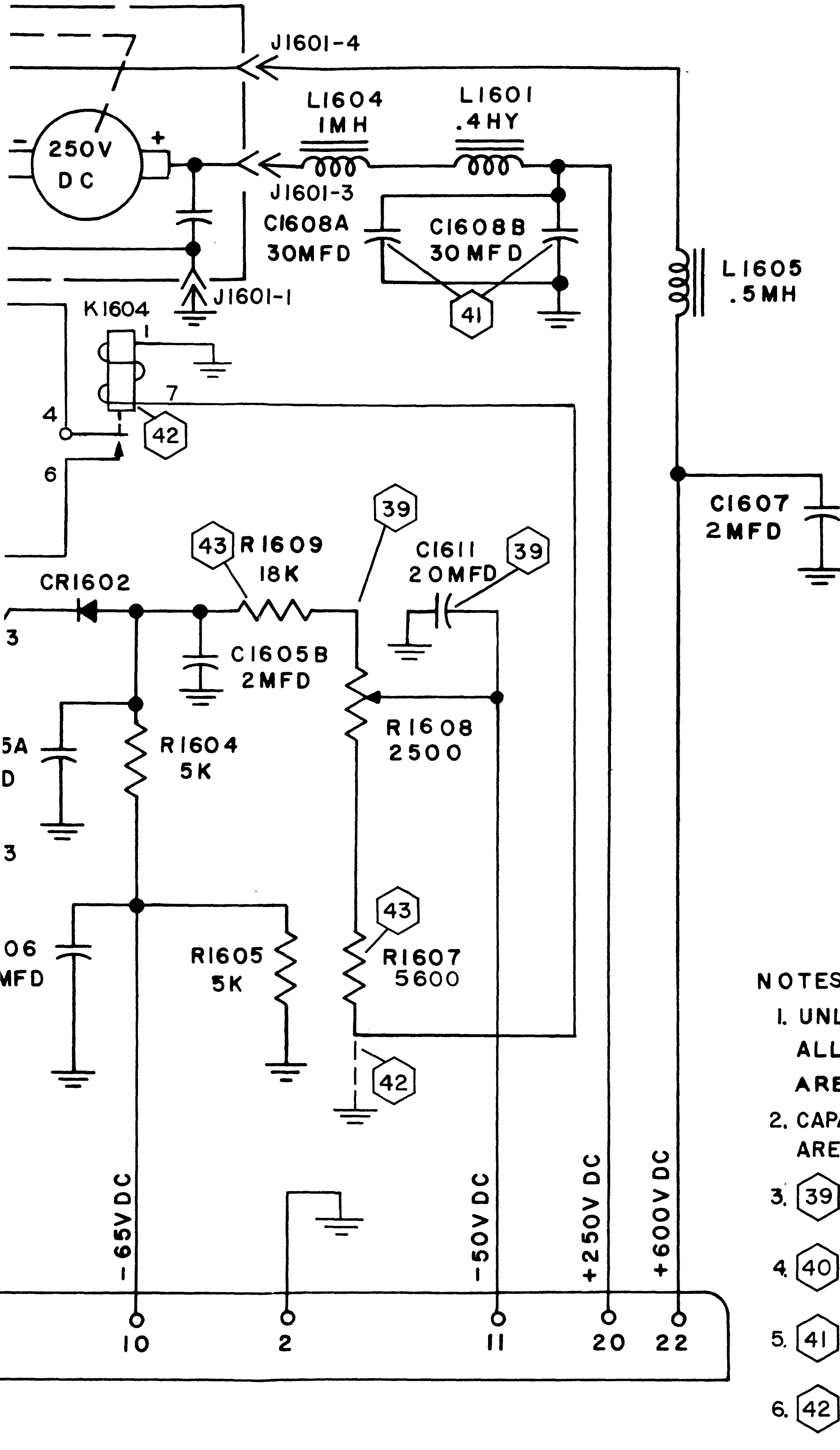


ANT. TUNER 400~ INTERLOCK
K (BAND 1)
KEYING RELAY INTERLOCK
L (BAND 2)
E
A
F
B
R
C
S
D
T
RF GAIN
U
V
W
GROUND
M (BAND 3)
N (BAND 4)
K (BAND 1)
L (BAND 2)
+27.5VDC
M (BAND 3)
SHARP BAND FILTER
C1809
C1811
C1812
C1813
C1816
C1819
C1821
C1823
C1824
C1825
C1827
C1829
C1831
C1833
C1838
C1837
C1839
C1842
C1822
C1826
C1828
C1830
C1840
C1843
C1834
L1811
L1812
L1813
L1816
L1819
L1821
L1823
L1824
L1825
L1827
L1829
L1831
L1833
L1838
L1837
L1839
L1842
L1822
L1826
L1828
L1830
L1840
L1843
L1834
C1852
C1854
C1855
C1856
C1859
C1862
C1864
C1866
C1867
C1868
C1870
C1872
C1874
C1876
C1881
C1880
C1882
C1885
C1865
C1869
C1871
C1873
C1883
C1886
46



NOTES:

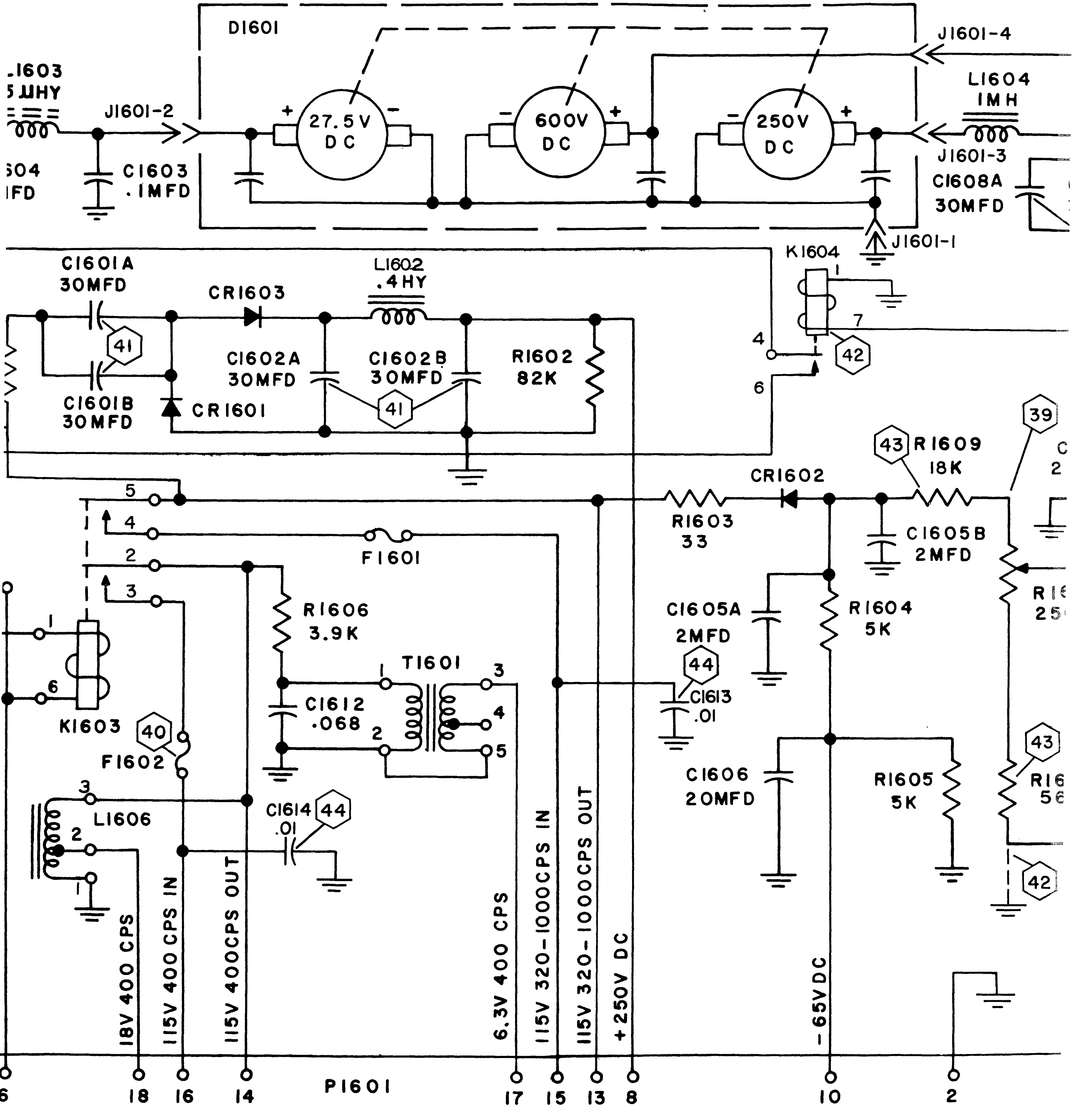
1. (45) REFER TO PARAGRAPH 9.4a
2. (46) REFER TO PARAGRAPH 9.4b
3. (47) REFER TO PARAGRAPH 9.4c
4. (48) REFER TO PARAGRAPH 9.4d



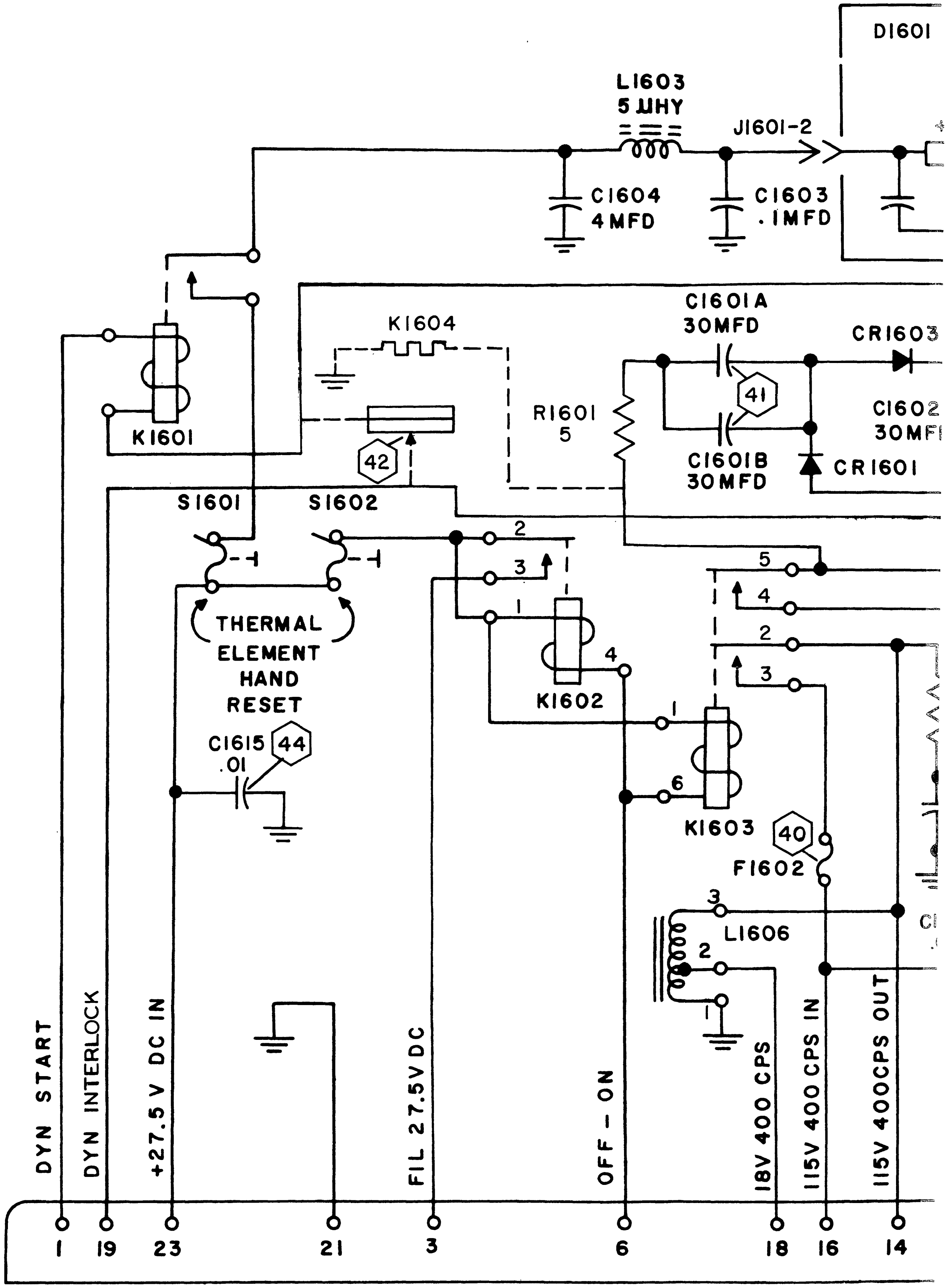
NOTES:

1. UNLESS OTHERWISE SHOWN ALL RESISTANCE VALUES ARE IN OHMS.
2. CAPACITORS WITHIN DOTTED LINES ARE WITHIN DYNAMOTOR ASSEMBLY.
3. (39) REFER TO PARAGRAPH 9.3a
4. (40) REFER TO PARAGRAPH 9.3b
5. (41) REFER TO PARAGRAPH 9.3c
6. (42) (43) REFER TO PARAGRAPH 9.3d
7. (44) REFER TO PARAGRAPH 9.3e

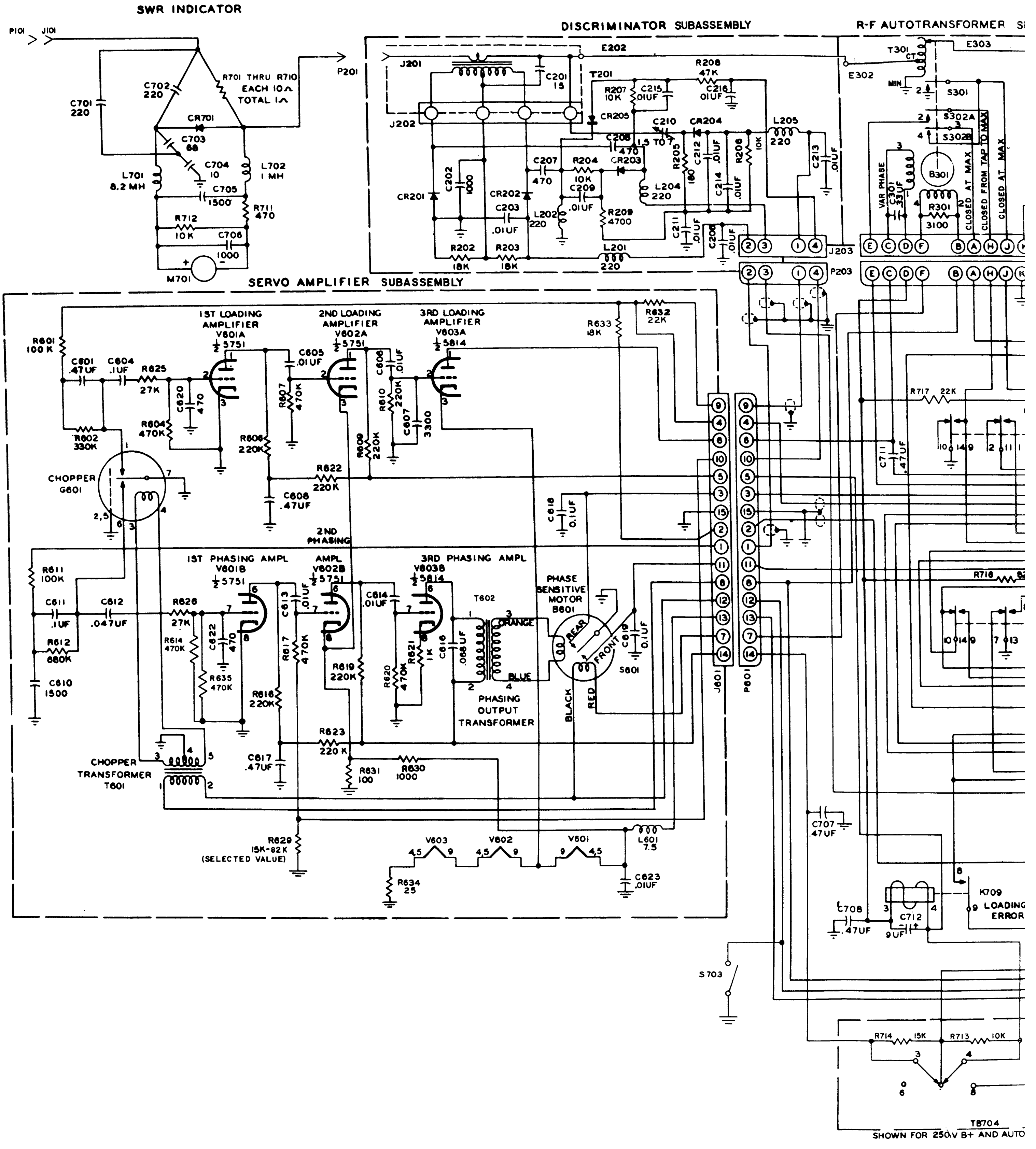
Figure 8-30. Power Supply 416D-1, Schematic Diagram



D1601
J1601-4
J1601-2
27.5V DC
600V DC
250V DC
L1604 1MH
J1601-3
C1603 .1MFD
C1608A 30MFD
J1601-1
K1604
C1601A 30MFD
CR1603
L1602 .4HY
C1602A 30MFD
C1602B 30MFD
R1602 82K
C1601B 30MFD
CR1601
39
43
R1609 18K
CR1602
R1603 33
C1605B 2MFD
F1601
R1606 3.9K
C1605A 2MFD
R1604 5K
T1601
C1613 .01
C1612 .068
K1603
F1602
C1606 20MFD
R1605 5K
L1606
C1614 .01
18V 400 CPS
115V 400 CPS IN
115V 400CPS OUT
6.3V 400 CPS
115V 320-1000CPS IN
115V 320-1000CPS OUT
+250V DC
-65VDC
P1601

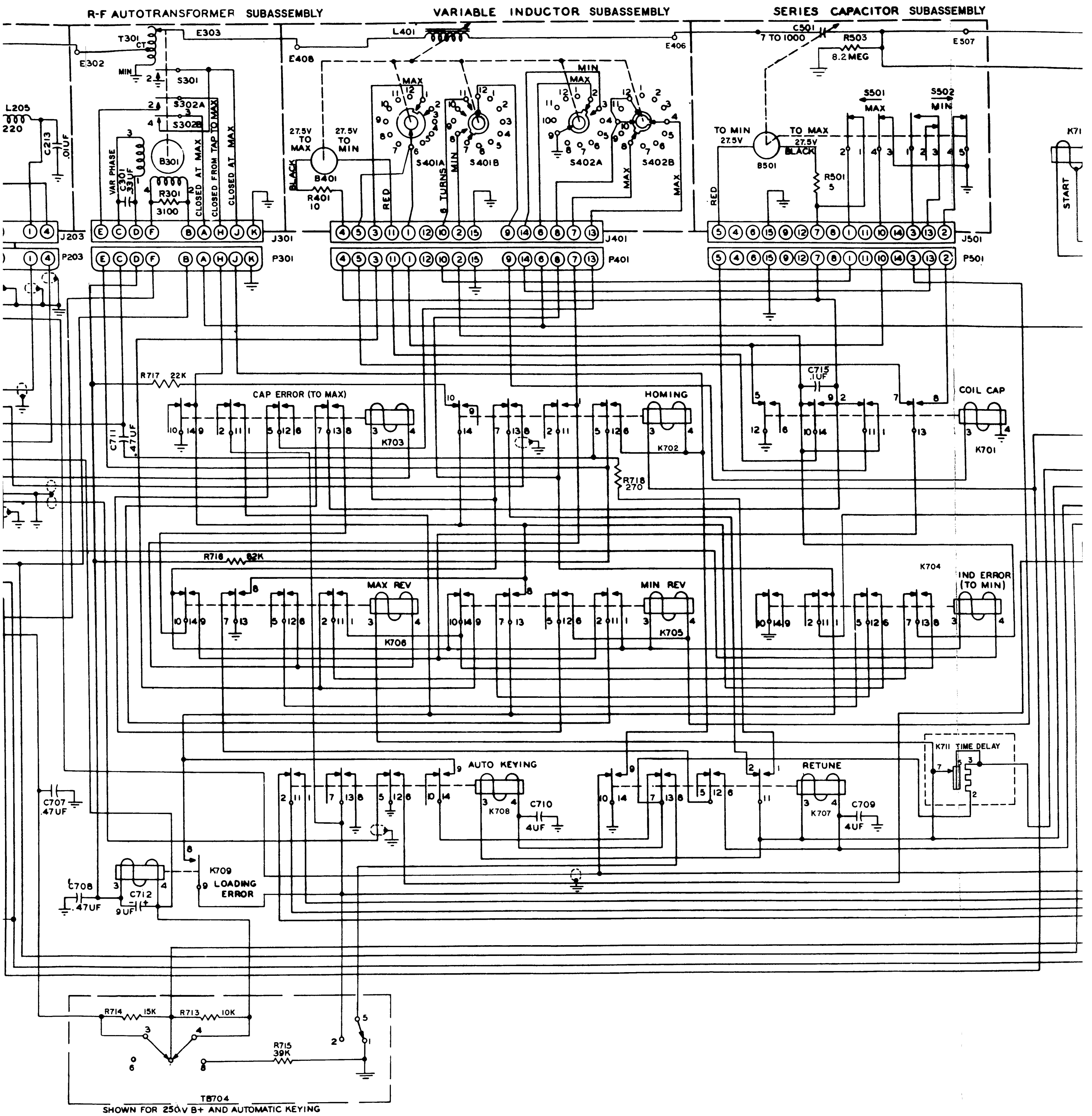


D1601
L1603
5 µHY
J1601-2
C1604
4 MFD
C1603
.1MFD
K1604
C1601A
30MFD
CR1603
41
C1602
30MF
R1601
5
C1601B
30MFD
CR1601
K1601
42
S1601
S1602
THERMAL
ELEMENT
HAND
RESET
K1602
K1603
C1615
.01
44
40
F1602
L1606
DYN START
DYN INTERLOCK
+27.5 V DC IN
FIL 27.5V DC
OFF – ON
18V 400 CPS
115V 400 CPS IN
115V 400CPS OUT
1
19
23
21
3
6
18
16
14

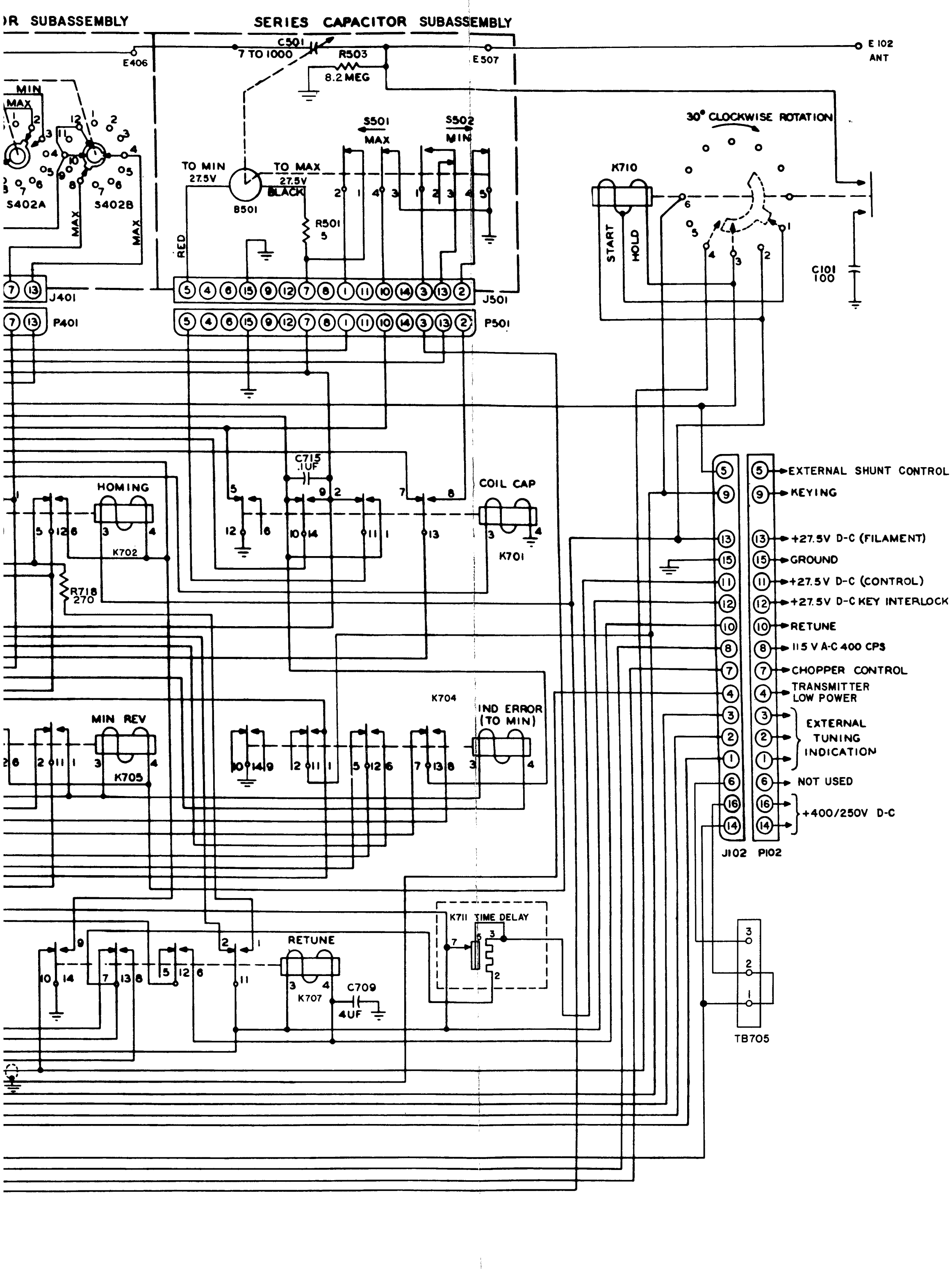


A29-232-6

Figure 8-31. Antenna Tuner 180L-2, Schematic Diagram



R-F AUTOTRANSFORMER SUBASSEMBLY
VARIABLE INDUCTOR SUBASSEMBLY
SERIES CAPACITOR SUBASSEMBLY
T301
E302
E303
S301
S302A
S302B
B301
R301 3100
C301 .33UF
VAR PHASE
CLOSED AT MAX
CLOSED FROM TAP TO MAX
CLOSED AT MAX
L205 220
C213 .01UF
J203
P203
J301
P301
L401
E408
E406
27.5V TO MAX
27.5V TO MIN
B401
R401 10
BLACK
RED
8 TURNS
S401A
S401B
S402A
S402B
J401
P401
C501 7 TO 1000
R503 8.2 MEG
E507
S501 MAX
S502 MIN
TO MIN 27.5V
TO MAX 27.5V
B501
R501 5
J501
P501
START
R717 22K
CAP ERROR (TO MAX)
K703
C711 .47UF
HOMING
K702
R718 270
C715 .1UF
COIL CAP
K701
R716 82K
MAX REV
K706
MIN REV
K705
K704
IND ERROR (TO MIN)
AUTO KEYING
K708
C710 4UF
RETUNE
K707
C709 4UF
K711 TIME DELAY
C707 .47UF
C708 .47UF
C712 9UF
K709
LOADING ERROR
R714 15K
R713 10K
R715 39K
TB704
SHOWN FOR 250V B+ AND AUTOMATIC KEYING



SERIES CAPACITOR SUBASSEMBLY
C501
7 TO 1000
R503
8.2 MEG
E406
E507
E102
ANT
S402A
S402B
S501
MAX
S502
MIN
TO MIN
27.5V
TO MAX
27.5V
BLACK
B501
R501
5
RED
J401
P401
J501
P501
30° CLOCKWISE ROTATION
K710
START
HOLD
C101
100
HOMING
K702
R718
270
C715
.1UF
COIL CAP
K701
EXTERNAL SHUNT CONTROL
KEYING
+27.5V D-C (FILAMENT)
GROUND
+27.5V D-C (CONTROL)
+27.5V D-C KEY INTERLOCK
RETUNE
115 V A-C 400 CPS
CHOPPER CONTROL
TRANSMITTER
LOW POWER
EXTERNAL
TUNING
INDICATION
NOT USED
+400/250V D-C
J102
P102
MIN REV
K705
K704
IND ERROR
(TO MIN)
K711 TIME DELAY
K707
C709
4UF
TB705

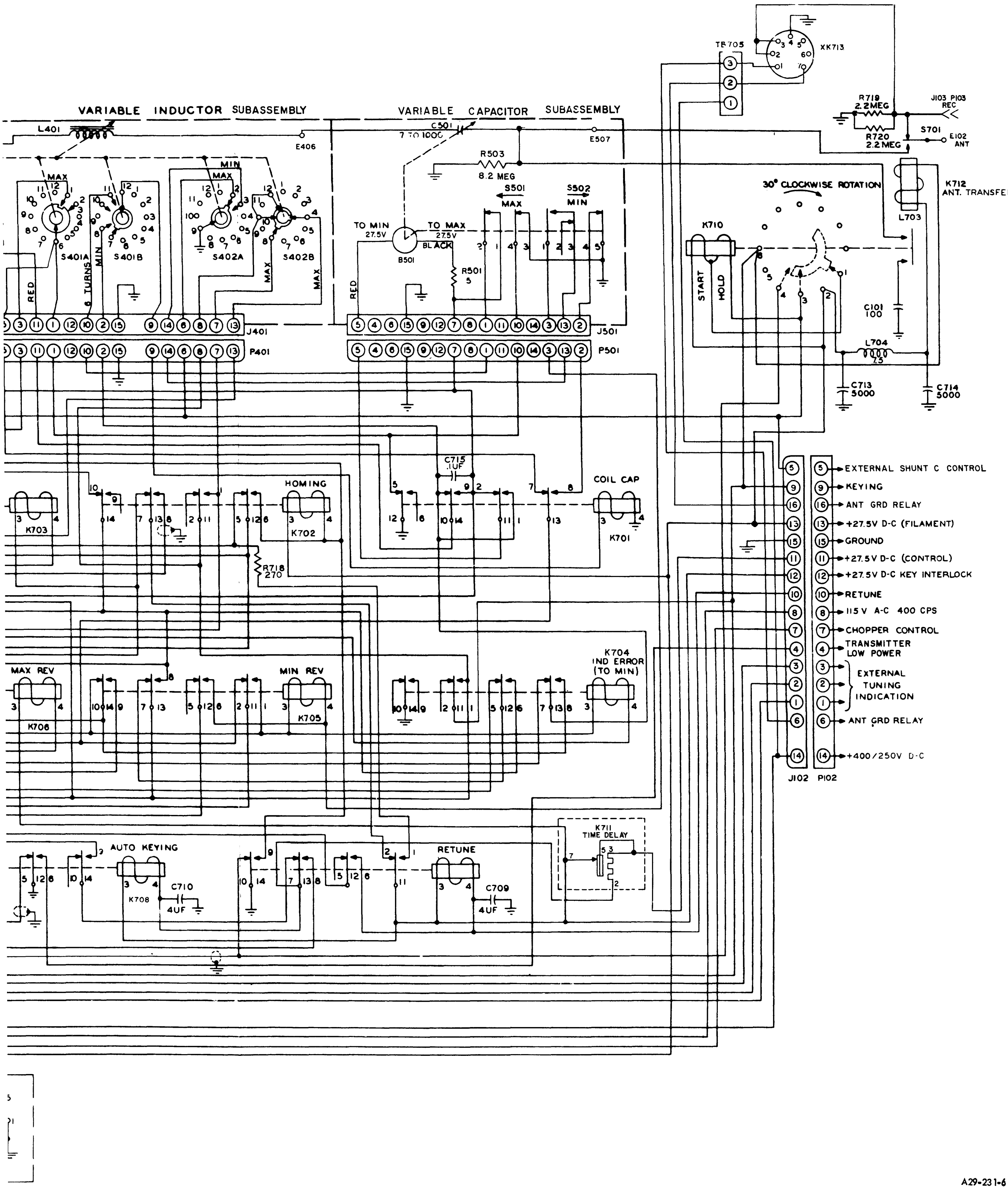
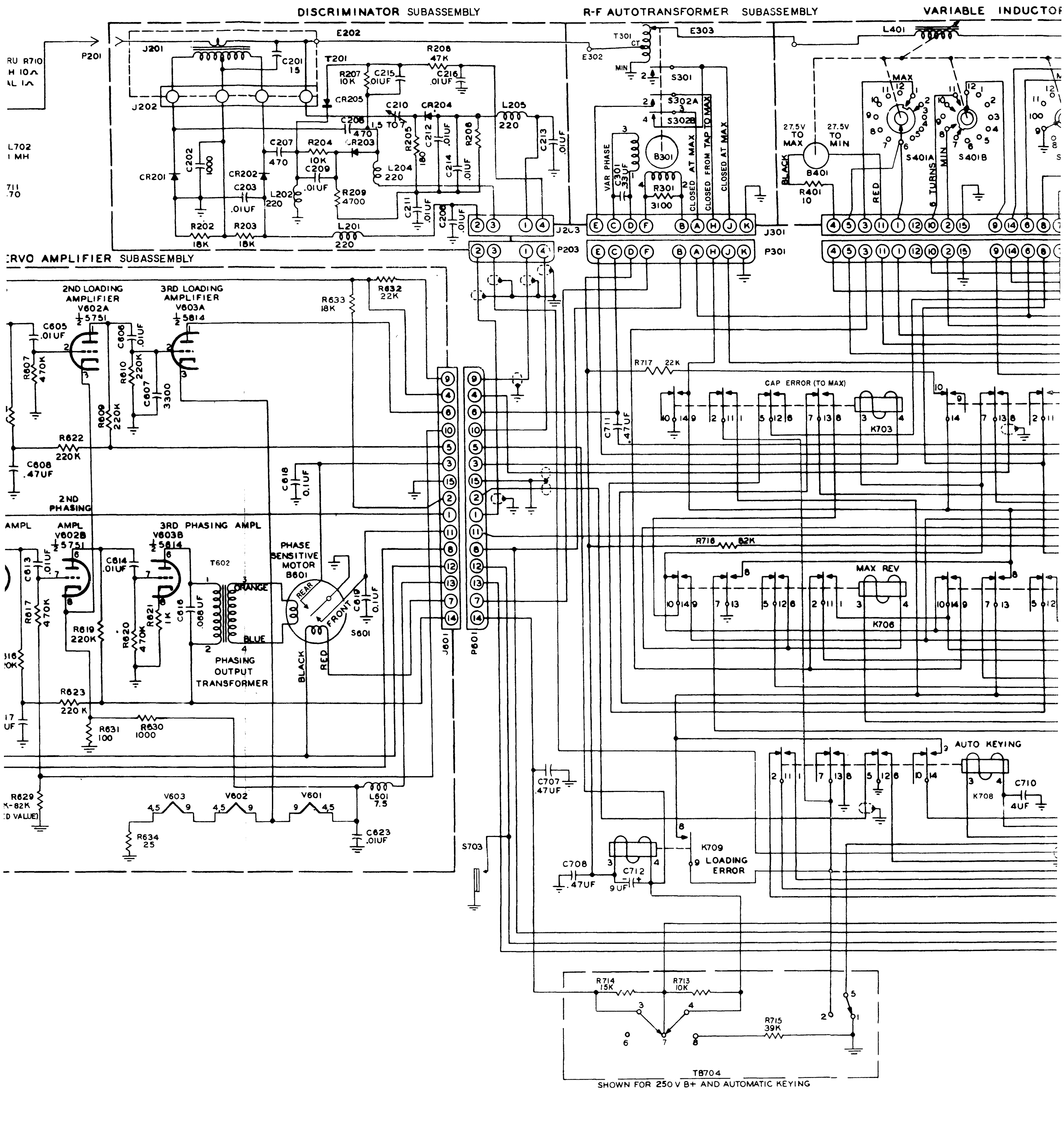
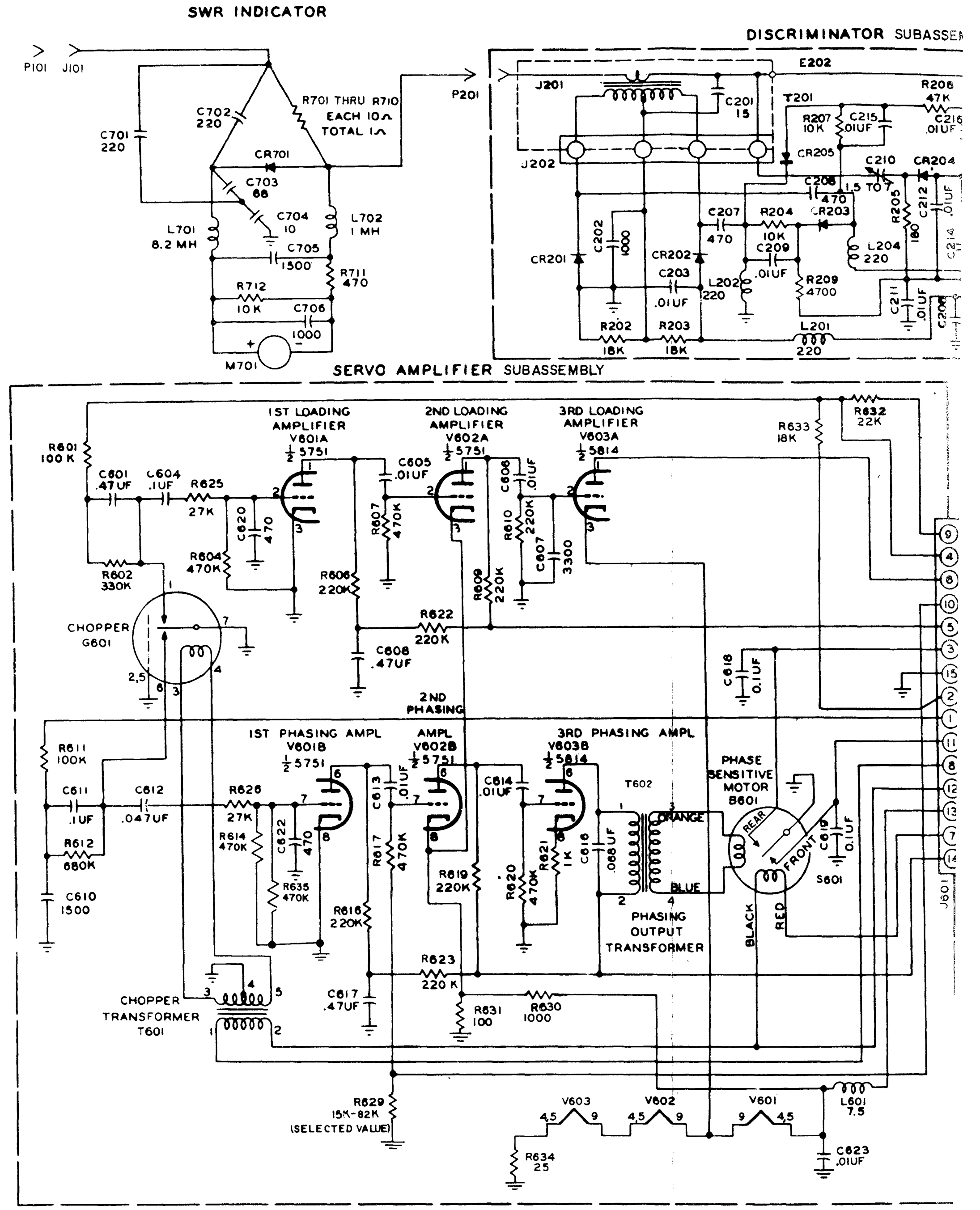
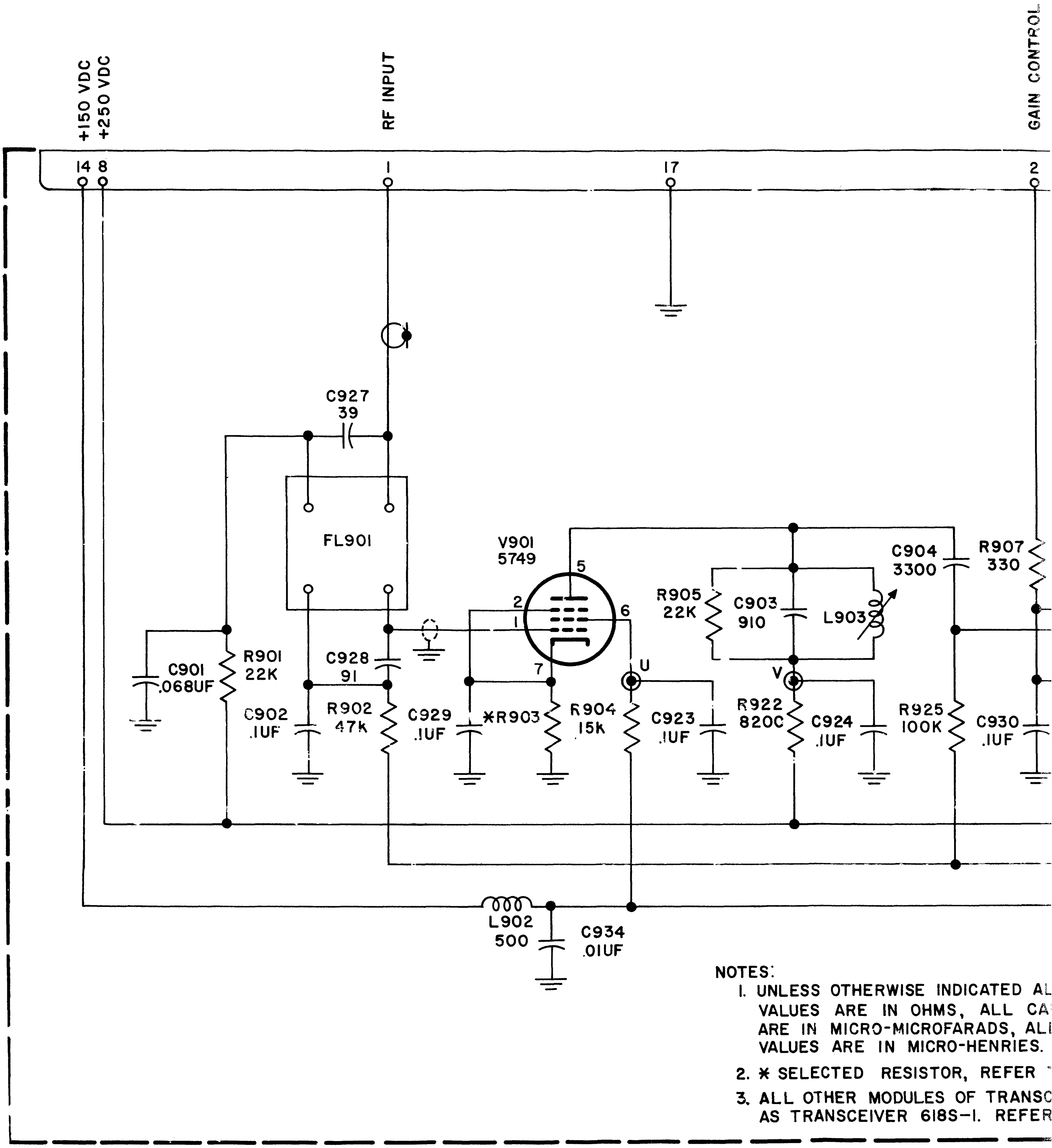


Figure 8-32. Antenna Tuner 180L-3, Schematic Diagram


DISCRIMINATOR SUBASSEMBLY
R-F AUTOTRANSFORMER SUBASSEMBLY
VARIABLE INDUCTOR
SERVO AMPLIFIER SUBASSEMBLY
P201
J201
J202
T201
E202
E302
E303
T301
L401
S301
S302A
S302B
B301
R301 3100
C301 33UF
VAR PHASE
AT MAX
CLOSED FROM TAP TO MAX
CLOSED AT MAX
B401
R401 10
27.5V TO MAX
27.5V TO MIN
S401A
S401B
6 TURNS
MIN
MAX
BLACK
RED
J203
P203
J301
P301
R208 47K
R207 10K
C215 .01UF
C216 .01UF
C201 15
CR205
C210 1.5 TO 7
CR204
L205 220
C206 470
CR203
C207 470
R204 10K
C209 .01UF
R209 4700
L204 220
R205 180
C212 .01UF
C214 .01UF
R206
C213 .01UF
C202 1000
CR201
CR202
C203 .01UF
L202 220
C211 .01UF
C208 .01UF
R202 18K
R203 18K
L201 220
2ND LOADING AMPLIFIER V602A 1/2 5751
3RD LOADING AMPLIFIER V603A 1/2 5814
C605 .01UF
R607 470K
C606 .01UF
R610 220K
C607 3300
R609 220K
R622 220K
C608 .47UF
R633 18K
R632 22K
C618 0.1UF
2ND PHASING AMPL V602B 1/2 5751
3RD PHASING AMPL V603B 1/2 5814
C613 .01UF
C614 .01UF
T602
ORANGE
BLUE
PHASING OUTPUT TRANSFORMER
PHASE SENSITIVE MOTOR B601
REAR
FRONT
C619 0.1UF
S601
BLACK
RED
R617 470K
R619 220K
R620 470K
R621 1K
C616 .068UF
R623 220K
R631 100
R630 1000
R629 K-82K
V603
V602
V601
L601 7.5
R634 25
C623 .01UF
J601
P601
S703
R717 22K
CAP ERROR (TO MAX)
C711 .47UF
K703
R718 82K
MAX REV
K706
AUTO KEYING
K708
C710 4UF
C707 .47UF
K709 LOADING ERROR
C708 .47UF
C712 9UF
R714 15K
R713 10K
R715 39K
TB704
SHOWN FOR 250 V B+ AND AUTOMATIC KEYING

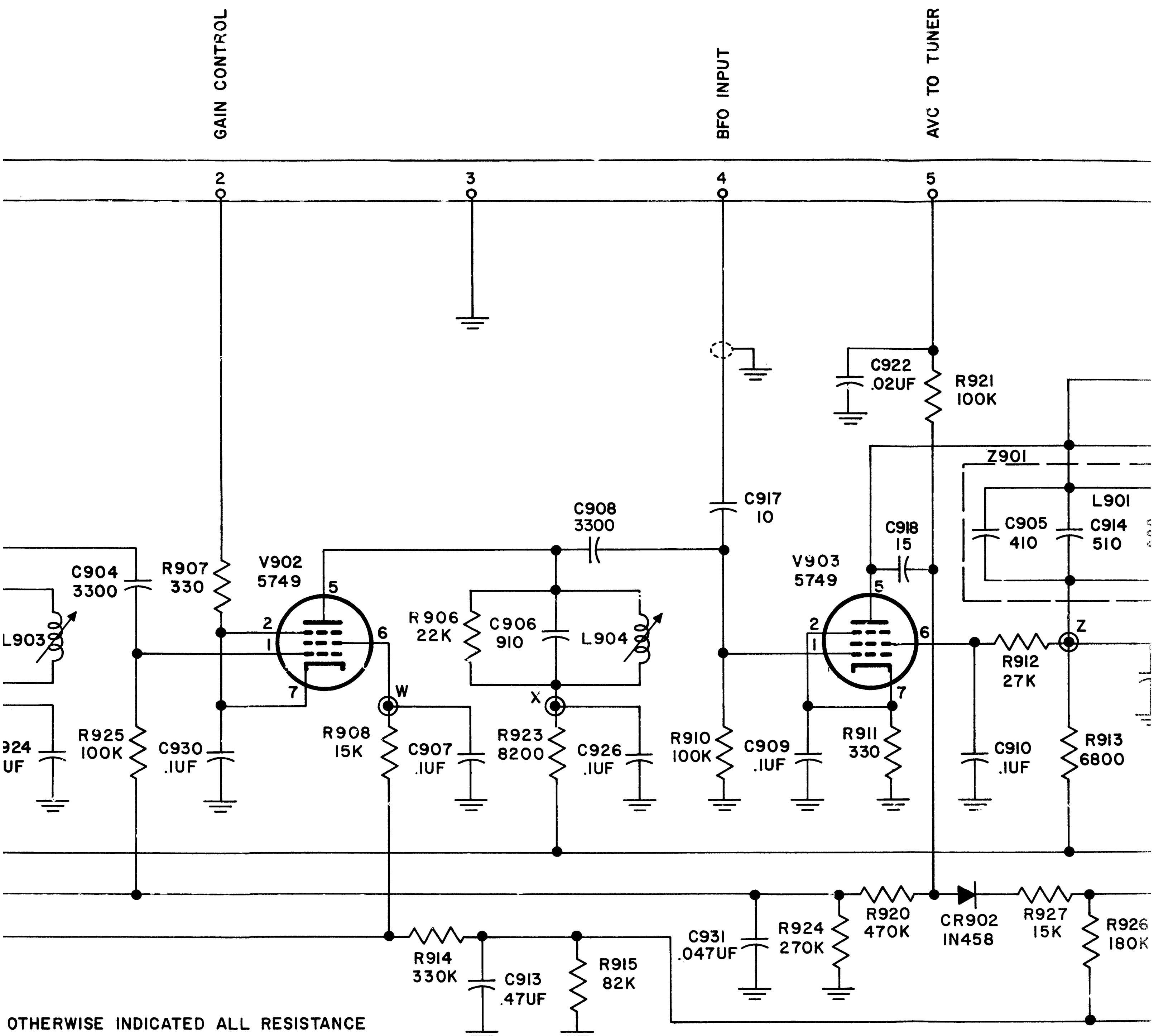

SWR INDICATOR
DISCRIMINATOR SUBASSEMBLY
SERVO AMPLIFIER SUBASSEMBLY
1ST LOADING AMPLIFIER V601A 1/2 5751
2ND LOADING AMPLIFIER V602A 1/2 5751
3RD LOADING AMPLIFIER V603A 1/2 5814
1ST PHASING AMPL V601B 1/2 5751
2ND PHASING AMPL V602B 1/2 5751
3RD PHASING AMPL V603B 1/2 5814
CHOPPER G601
CHOPPER TRANSFORMER T601
PHASING OUTPUT TRANSFORMER
PHASE SENSITIVE MOTOR B601
R701 THRU R710 EACH 10Ω TOTAL 1Ω
R629 15K-82K (SELECTED VALUE)



NOTES:
1. UNLESS OTHERWISE INDICATED AL
VALUES ARE IN OHMS, ALL CA
ARE IN MICRO-MICROFARADS, ALI
VALUES ARE IN MICRO-HENRIES.
2. * SELECTED RESISTOR, REFER
3. ALL OTHER MODULES OF TRANSC
AS TRANSCEIVER 618S-1. REFER

A29-260-6

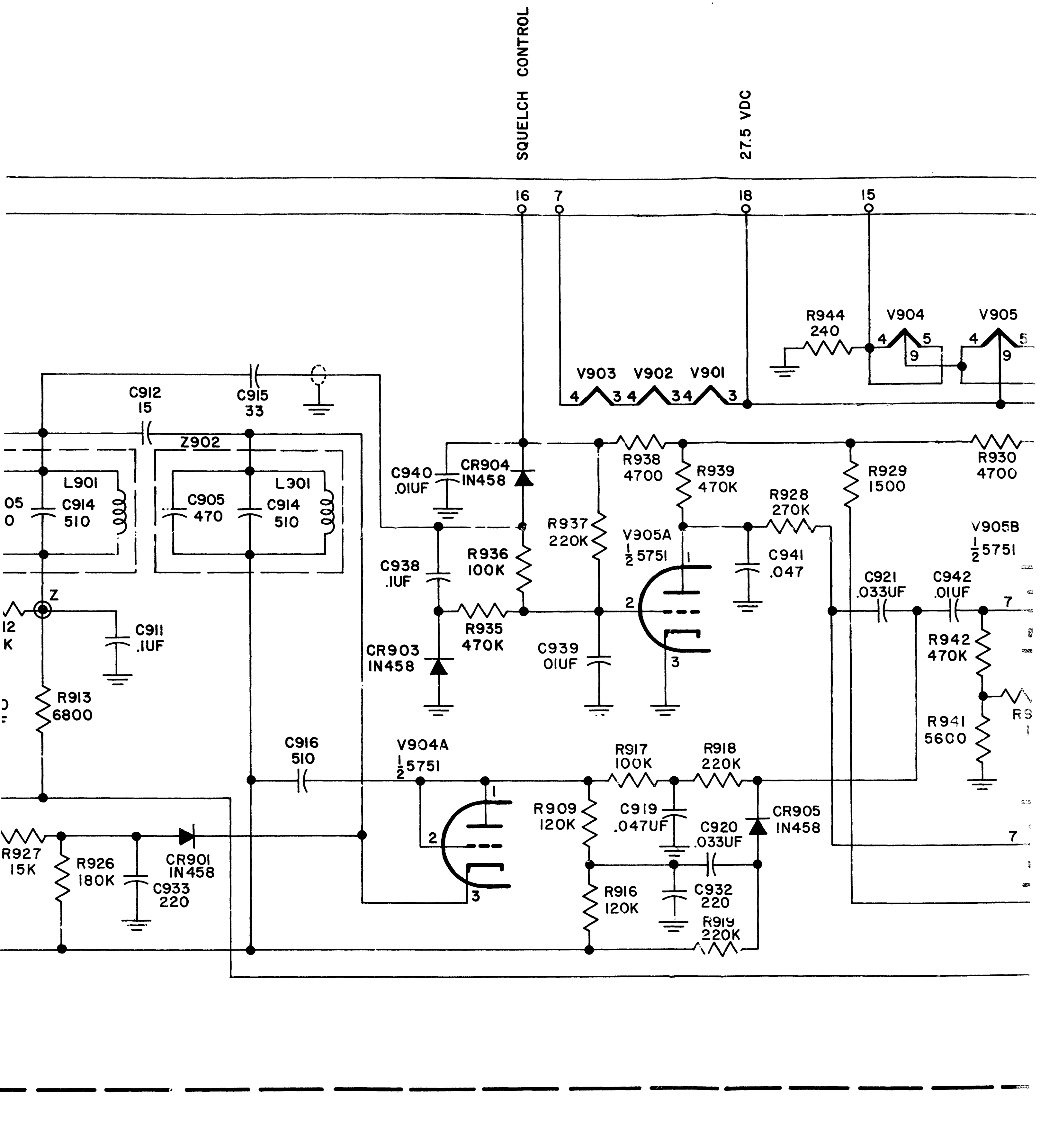
Figure 8-33. Transceiver 618S-4, 250 Kc I-F Amplifier with Squelch and Selcal, Schematic Diagram

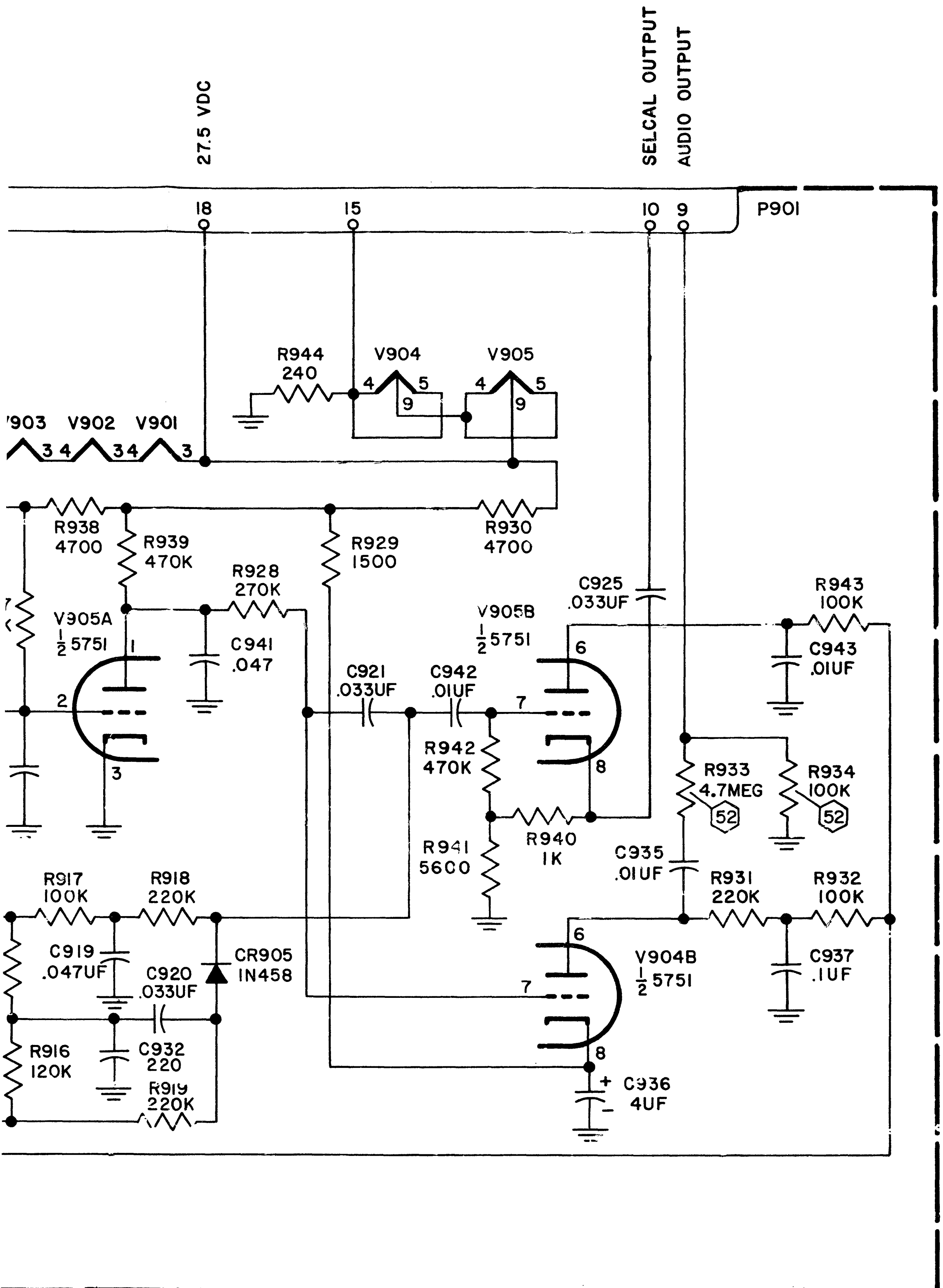


OTHERWISE INDICATED ALL RESISTANCE
ARE IN OHMS, ALL CAPACITANCE VALUES
MICRO-MICROFARADS, ALL INDUCTANCE
ARE IN MICRO-HENRIES.
:TED RESISTOR, REFER TO PARTS LIST FOR VALUES.
HER MODULES OF TRANSCEIVER 618S-4 ARE THE SAME
NSCEIVER 618S-1. REFER TO FIGURE 8-34.

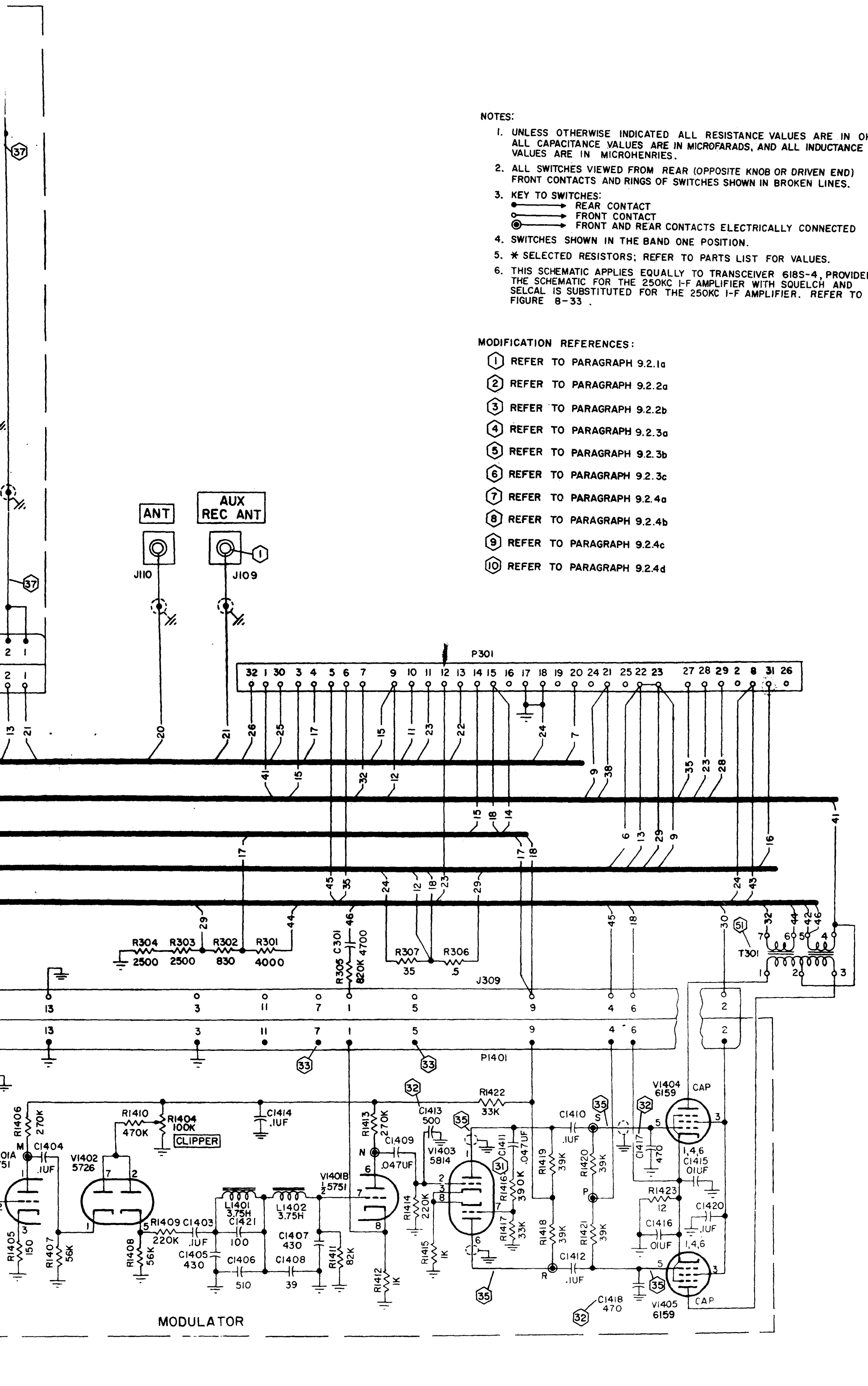
MODIFICATION REFERENCES:
52 REFER TO PARAGRAPH 9.5a

Diagram


SQUELCH CONTROL
27.5 VDC
16
7
18
15
R944
240
V904
V905
V903
V902
V901
C912
15
C915
33
Z902
L901
C914
510
C905
470
L301
C940
.01UF
CR904
IN458
R938
4700
R939
470K
R929
1500
R930
4700
R928
270K
R937
220K
V905A
½ 5751
C941
.047
V905B
½ 5751
C938
.1UF
R936
100K
C921
.033UF
C942
.01UF
C911
.1UF
R935
470K
C939
.01UF
R942
470K
CR903
IN458
R913
6800
R941
5600
C916
510
V904A
½ 5751
R917
100K
R918
220K
R909
120K
C919
.047UF
C920
.033UF
CR905
IN458
R927
15K
R926
180K
C933
220
CR901
IN458
R916
120K
C932
220
R919
220K



27.5 VDC
SELCAL OUTPUT
AUDIO OUTPUT
18
15
10
9
P901
R944
240
V904
V905
V903
V902
V901
R938
4700
R939
470K
R929
1500
R930
4700
R928
270K
V905A
1/2 5751
C941
.047
C925
.033UF
V905B
1/2 5751
R943
100K
C943
.01UF
C921
.033UF
C942
.01UF
R942
470K
R933
4.7MEG
R934
100K
52
R941
5600
R940
1K
C935
.01UF
R931
220K
R932
100K
R917
100K
R918
220K
C919
.047UF
C920
.033UF
CR905
IN458
V904B
1/2 5751
C937
.1UF
R916
120K
C932
220
R919
220K
C936
4UF



NOTES:

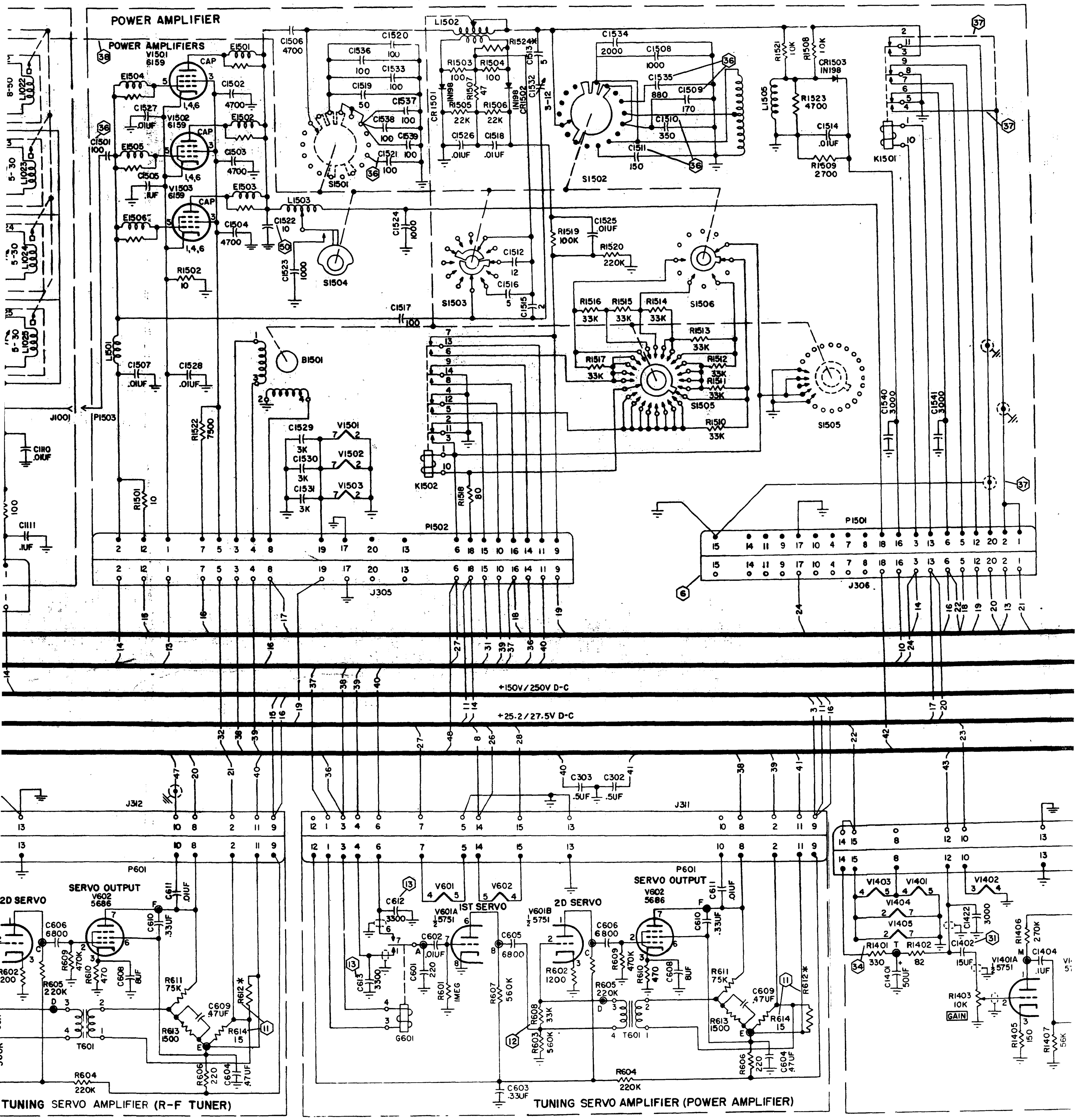
1. UNLESS OTHERWISE INDICATED ALL RESISTANCE VALUES ARE IN OHMS. ALL CAPACITANCE VALUES ARE IN MICROFARADS, AND ALL INDUCTANCE VALUES ARE IN MICROHENRIES.
2. ALL SWITCHES VIEWED FROM REAR (OPPOSITE KNOB OR DRIVEN END) FRONT CONTACTS AND RINGS OF SWITCHES SHOWN IN BROKEN LINES.
3. KEY TO SWITCHES:
   REAR CONTACT
   FRONT CONTACT
   FRONT AND REAR CONTACTS ELECTRICALLY CONNECTED
4. SWITCHES SHOWN IN THE BAND ONE POSITION.
5. * SELECTED RESISTORS; REFER TO PARTS LIST FOR VALUES.
6. THIS SCHEMATIC APPLIES EQUALLY TO TRANSCEIVER 618S-4, PROVIDED THE SCHEMATIC FOR THE 250KC I-F AMPLIFIER WITH SQUELCH AND SELCAL IS SUBSTITUTED FOR THE 250KC I-F AMPLIFIER. REFER TO FIGURE 8-33 .

MODIFICATION REFERENCES:

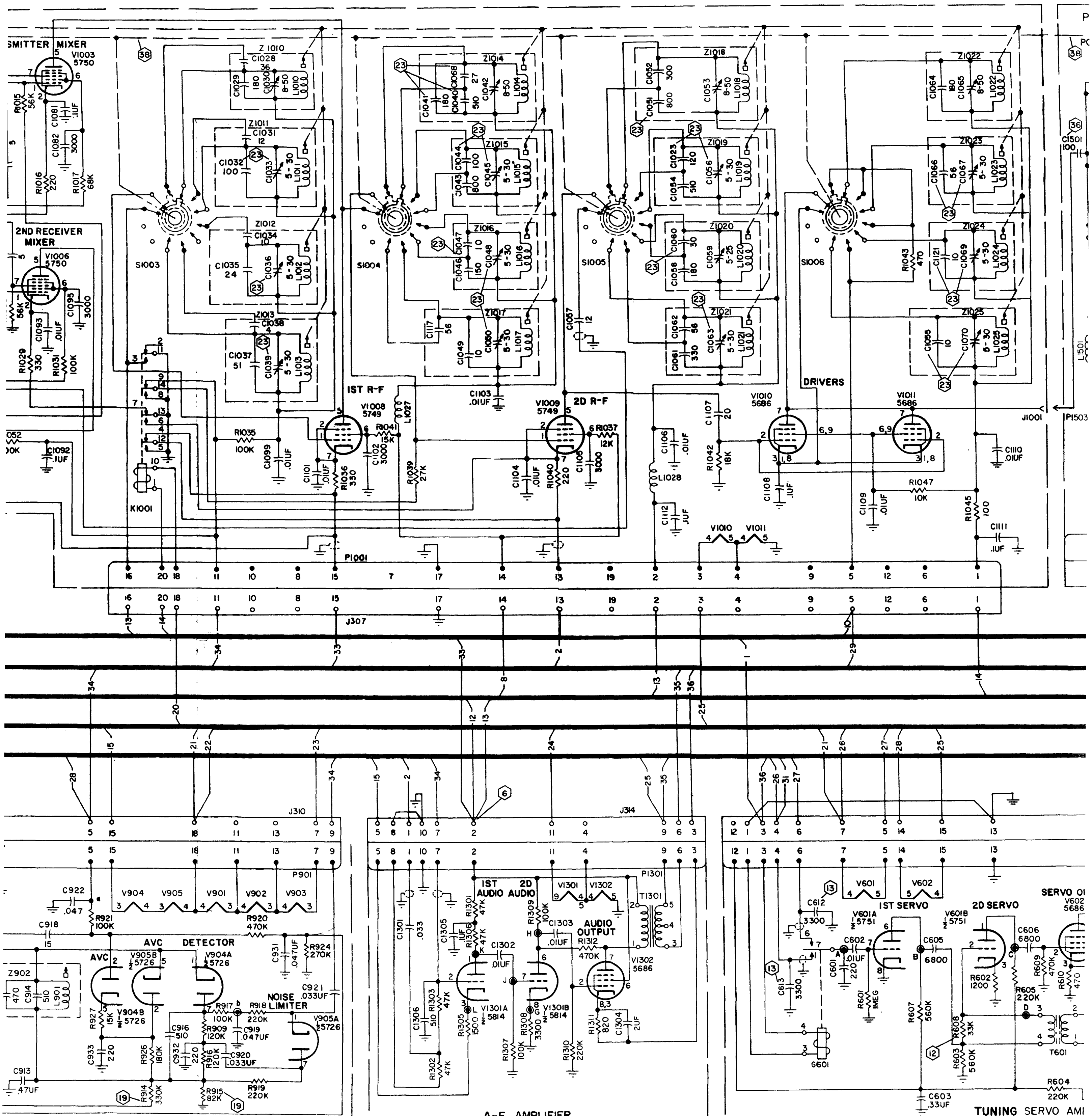
1 REFER TO PARAGRAPH 9.2.1a
2 REFER TO PARAGRAPH 9.2.2a
3 REFER TO PARAGRAPH 9.2.2b
4 REFER TO PARAGRAPH 9.2.3a
5 REFER TO PARAGRAPH 9.2.3b
6 REFER TO PARAGRAPH 9.2.3c
7 REFER TO PARAGRAPH 9.2.4a
8 REFER TO PARAGRAPH 9.2.4b
9 REFER TO PARAGRAPH 9.2.4c
10 REFER TO PARAGRAPH 9.2.4d
11 REFER TO PARAGRAPH 9.2.5a
12 REFER TO PARAGRAPH 9.2.5b
13 REFER TO PARAGRAPH 9.2.5c
14 REFER TO PARAGRAPH 9.2.6a
15 REFER TO PARAGRAPH 9.2.6b
16 REFER TO PARAGRAPH 9.2.6c
17 REFER TO PARAGRAPH 9.2.7a
18 REFER TO PARAGRAPH 9.2.7b
19 REFER TO PARAGRAPH 9.2.7c
20 REFER TO PARAGRAPH 9.2.7d
21 REFER TO PARAGRAPH 9.2.8a AND 9.2.8h
22 REFER TO PARAGRAPH 9.2.8b AND 9.2.8j
23 REFER TO PARAGRAPH 9.2.8c, 9.2.8d, 9.2.8e AND 9.2.8f
24 REFER TO PARAGRAPH 9.2.8g
25 REFER TO PARAGRAPH 9.2.8h
26 REFER TO PARAGRAPH 9.2.8i
27 REFER TO PARAGRAPH 9.2.8j
28 REFER TO PARAGRAPH 9.2.9a
29 REFER TO PARAGRAPH 9.2.9b
30 REFER TO PARAGRAPH 9.2.9c
31 REFER TO PARAGRAPH 9.2.10a
32 REFER TO PARAGRAPH 9.2.10b
33 REFER TO PARAGRAPH 9.2.10c
34 REFER TO PARAGRAPH 9.2.10d
35 REFER TO PARAGRAPH 9.2.10e
36 REFER TO PARAGRAPH 9.2.11a
37 REFER TO PARAGRAPH 9.2.11b
38 REFER TO PARAGRAPH 9.2.12a
39 REFER TO PARAGRAPH 9.3a
40 REFER TO PARAGRAPH 9.3b
41 REFER TO PARAGRAPH 9.3c
42 REFER TO PARAGRAPH 9.3d
43 REFER TO PARAGRAPH 9.3d
44 REFER TO PARAGRAPH 9.3c
45 REFER TO PARAGRAPH 9.4a
46 REFER TO PARAGRAPH 9.4b
47 REFER TO PARAGRAPH 9.4c
48 REFER TO PARAGRAPH 9.4d
49 REFER TO PARAGRAPH 9.2.4e
50 REFER TO PARAGRAPH 9.2.11c
51 REFER TO PARAGRAPH 9.2.3d

A29-245-6

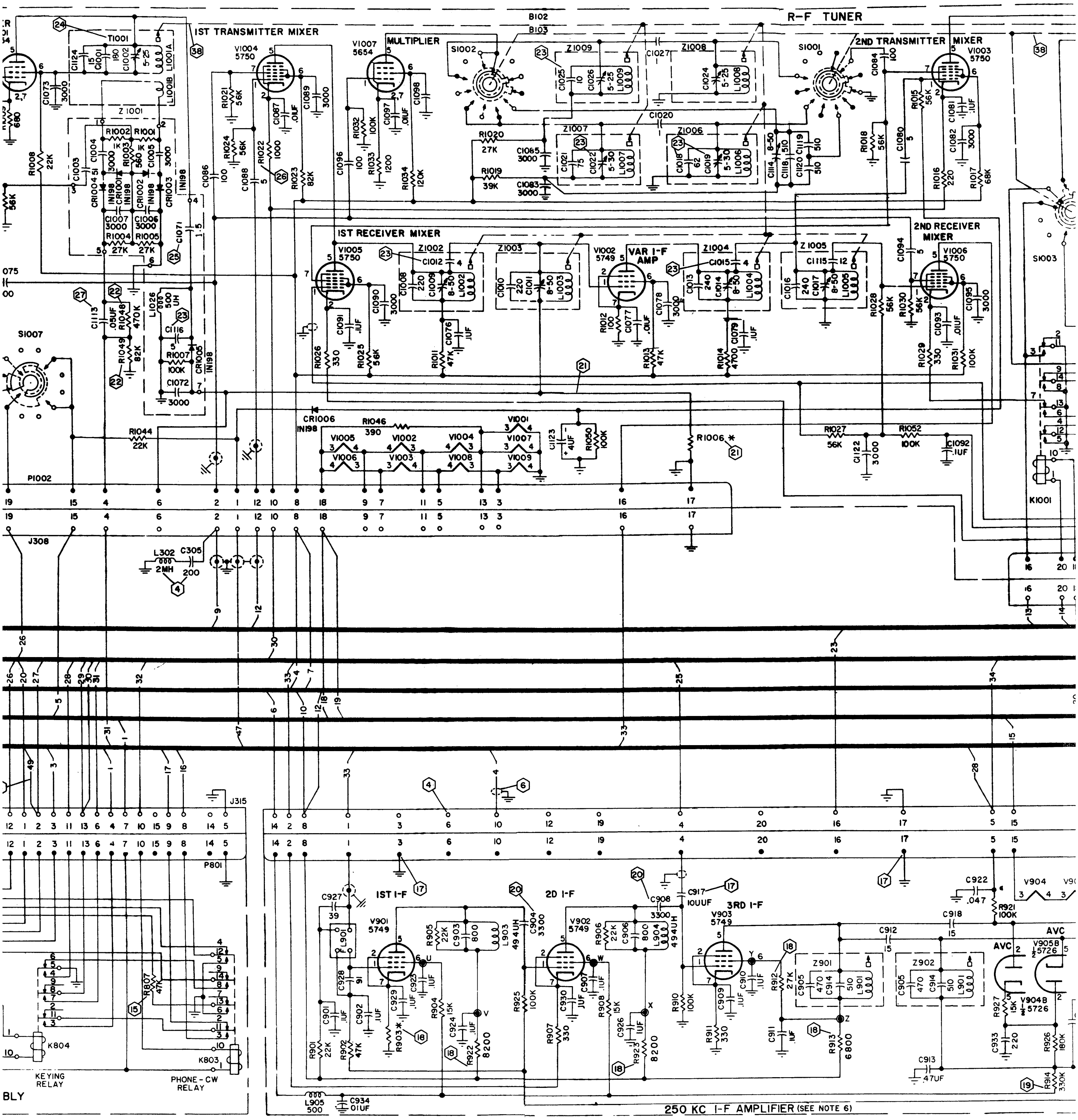
Figure 8-34. Transceiver 618S-1, Schematic Diagram



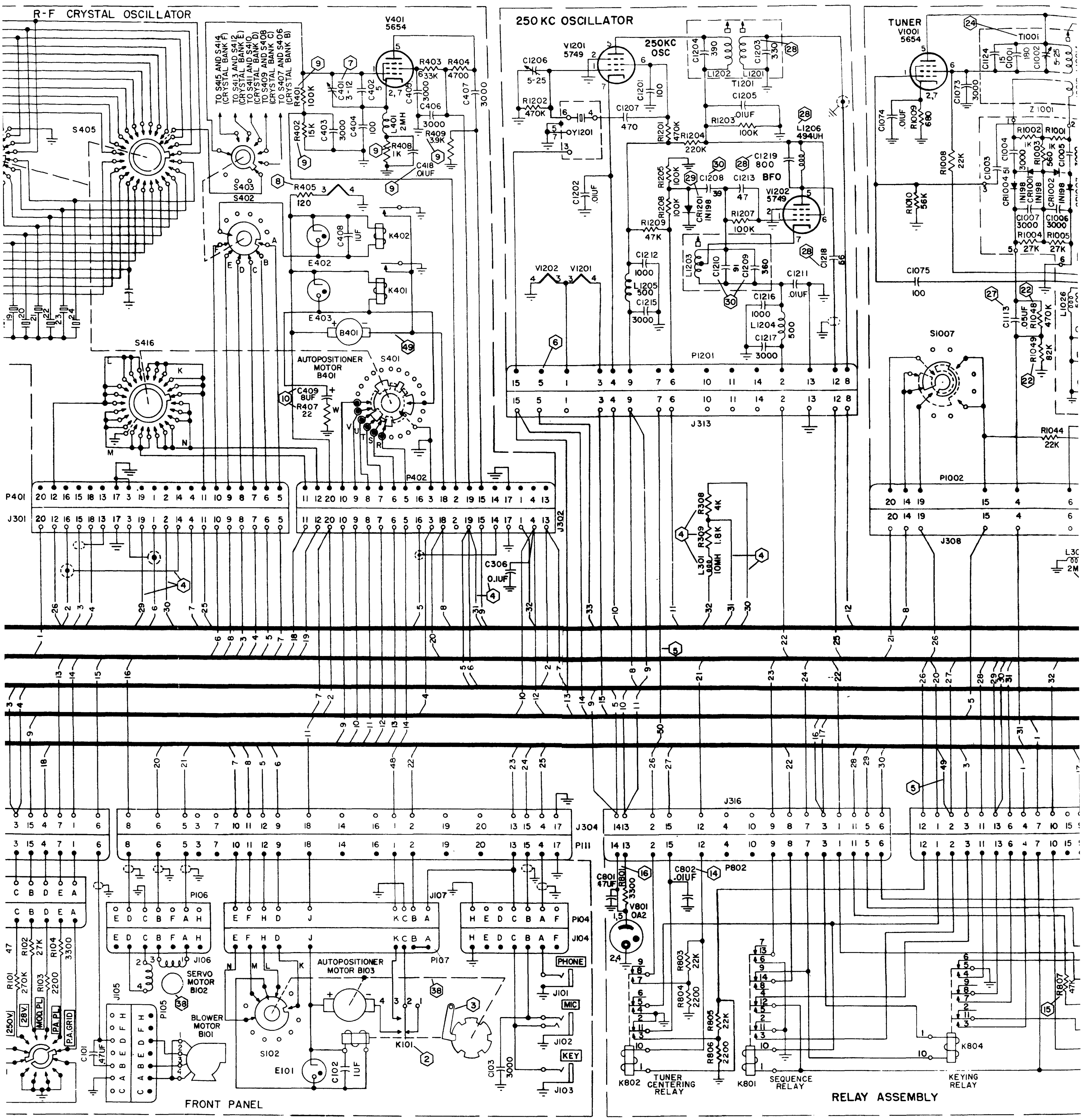
POWER AMPLIFIER
POWER AMPLIFIERS
V1501 6159
V1502 6159
V1503 6159
S1501
S1502
S1503
S1504
S1505
S1506
L1502
L1503
L1505
K1501
K1502
B1501
P1502
J305
P1501
J306
J1001
P1503
+150V/250V D-C
+25.2/27.5V D-C
J312
J311
P601
SERVO OUTPUT
V602 5686
2D SERVO
IST SERVO
V601A 1/2 5751
V601B 1/2 5751
T601
G601
V1401A 1/2 5751
GAIN
TUNING SERVO AMPLIFIER (R-F TUNER)
TUNING SERVO AMPLIFIER (POWER AMPLIFIER)

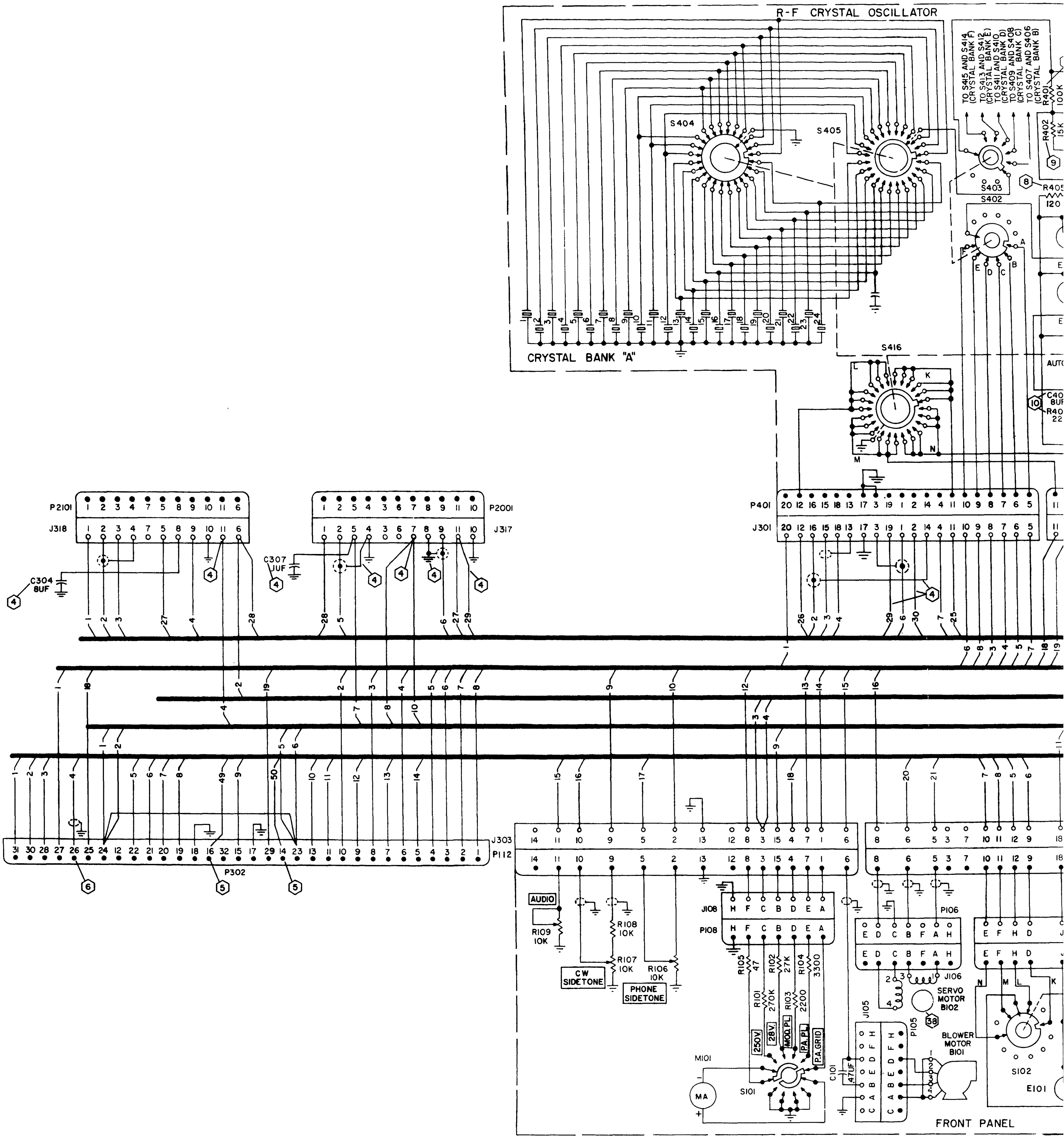


SMITTER MIXER
V1003 5750
2ND RECEIVER MIXER
V1006 5750
S1003
S1004
S1005
S1006
K1001
1ST R-F
V1008 5749
2D R-F
V1009 5749
DRIVERS
V1010 5686
V1011 5686
J1001
P1503
P1001
J307
J310
J314
P901
P1301
AVC
AVC
DETECTOR
NOISE LIMITER
V905B 1/2 5726
V904A 1/2 5726
V904B 1/2 5726
V905A 1/2 5726
1ST AUDIO
2D AUDIO
AUDIO OUTPUT
V1301A 1/2 5814
V1301B 1/2 5814
V1302 5686
T1301
A-F AMPLIFIER
1ST SERVO
2D SERVO
V601A 1/2 5751
V601B 1/2 5751
SERVO O
V602 5686
G601
T601
TUNING SERVO AMI



R-F TUNER
1ST TRANSMITTER MIXER
V1004 5750
T1001
Z1001
MULTIPLIER
V1007 5654
S1002
Z1009
Z1008
Z1007
Z1006
S1001
2ND TRANSMITTER MIXER
V1003 5750
B102
B103
1ST RECEIVER MIXER
V1005 5750
Z1002
Z1003
VAR I-F AMP
V1002 5749
Z1004
Z1005
2ND RECEIVER MIXER
V1006 5750
S1003
S1007
K1001
P1002
J308
J315
P801
K804
KEYING RELAY
K803
PHONE - CW RELAY
BLY
1ST I-F
V901 5749
2D I-F
V902 5749
3RD I-F
V903 5749
Z901
Z902
AVC
V905B 1/2 5726
V904B 1/2 5726
V904
250 KC I-F AMPLIFIER (SEE NOTE 6)


R-F CRYSTAL OSCILLATOR
V401
5654
TO S415 AND S414 (CRYSTAL BANK F)
TO S413 AND S412 (CRYSTAL BANK E)
TO S411 AND S410 (CRYSTAL BANK D)
TO S409 AND S408 (CRYSTAL BANK C)
TO S407 AND S406 (CRYSTAL BANK B)
S405
S403
S402
S416
K402
K401
E402
E403
B401
AUTOPOSITIONER MOTOR B401
S401
C409 8UF
R407 22
250 KC OSCILLATOR
V1201
5749
250KC OSC
T1201
BFO
V1202
5749
L1206 494UH
CR1201 IN198
P1201
J313
TUNER
V1001
5654
T1001
Z1001
S1007
R1044 22K
P1002
J308
P401
J301
P402
J302
C306 0.1UF
R308 4K
R309 1.8K
L301 10MH
J304
P111
J316
P802
P106
J106
J105
P105
SERVO MOTOR B102
BLOWER MOTOR B101
AUTOPOSITIONER MOTOR B103
S102
E101
K101
P107
J107
P104
J104
PHONE
J101
MIC
J102
KEY
J103
250V
28V
MOD.PL
PA.PL
PA.GRID
FRONT PANEL
C801 47UF
R801 3300
V801 OA2
C802 .01UF
R803 22K
R804 2200
R805 22K
R806 2200
K802
TUNER CENTERING RELAY
K801
SEQUENCE RELAY
K804
KEYING RELAY
RELAY ASSEMBLY



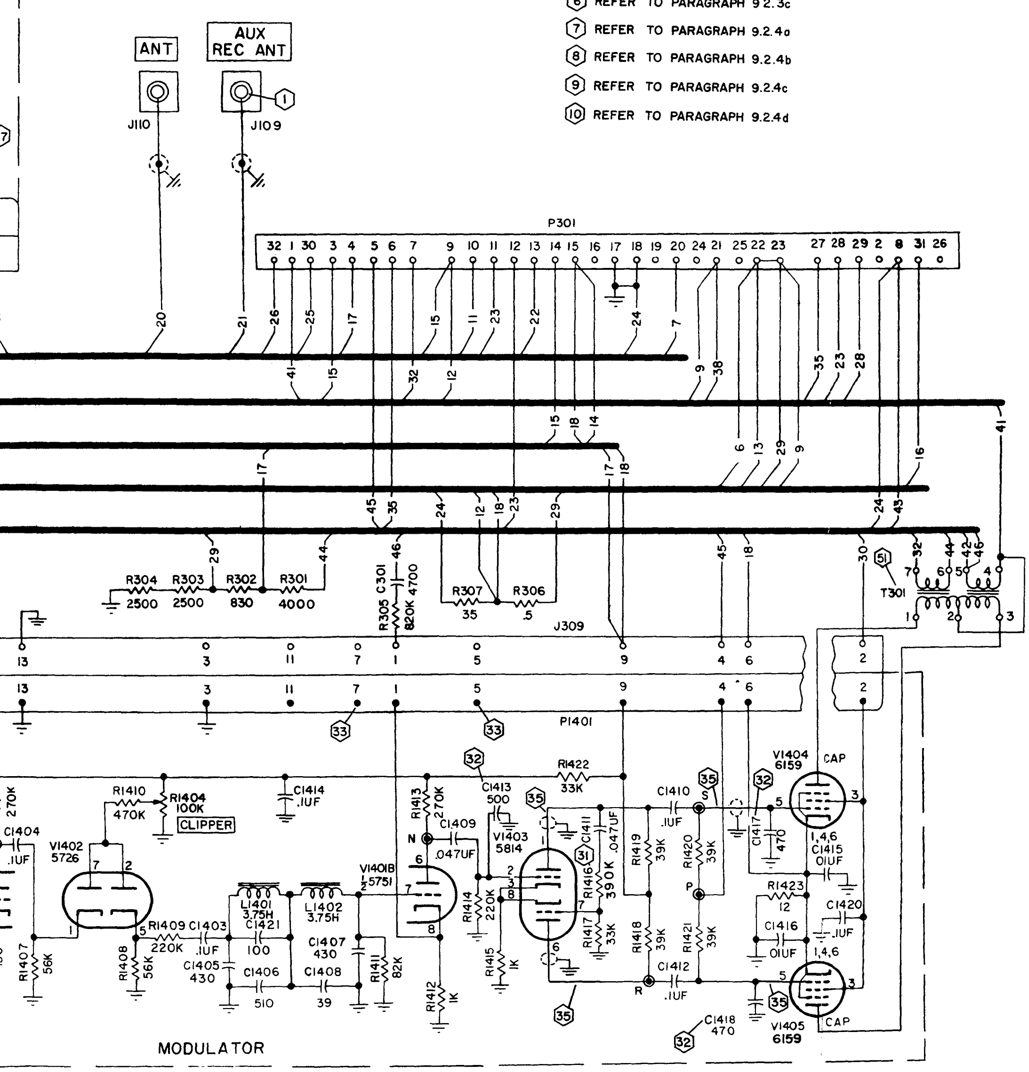
R-F CRYSTAL OSCILLATOR
S404
S405
TO S415 AND S414 (CRYSTAL BANK F)
TO S413 AND S412 (CRYSTAL BANK E)
TO S411 AND S410 (CRYSTAL BANK D)
TO S409 AND S408 (CRYSTAL BANK C)
TO S407 AND S406 (CRYSTAL BANK B)
R401 100K
R402 15K
S403
R405 120
S402
CRYSTAL BANK "A"
S416
AUTO
P2101
J318
P2001
J317
P401
J301
C304 8UF
C307 .1UF
J303
P112
P302
AUDIO
R109 10K
R108 10K
R107 10K
CW SIDETONE
R106 10K
PHONE SIDETONE
J108
P108
R105 47
R101 270K
R102 27K
R103 2200
R104 3300
250V
28V
MOD.PL
P.A.PL
P.A.GRID
M101
MA
S101
C101 .47UF
J105
P105
P106
J106
SERVO MOTOR B102
BLOWER MOTOR B101
S102
E101
FRONT PANEL

NOTES:

1. UNLESS OTHERWISE INDICATED ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN MICROFARADS, AND ALL INDUCTANCE VALUES ARE IN MICROHENRIES.
2. ALL SWITCHES VIEWED FROM REAR (OPPOSITE KNOB OR DRIVEN END) FRONT CONTACTS AND RINGS OF SWITCHES SHOWN IN BROKEN LINES.
3. KEY TO SWITCHES:
   REAR CONTACT
   FRONT CONTACT
   FRONT AND REAR CONTACTS ELECTRICALLY CONNECTED
4. SWITCHES SHOWN IN THE BAND ONE POSITION.
5. * SELECTED RESISTORS; REFER TO PARTS LIST FOR VALUES.
6. THIS SCHEMATIC APPLIES EQUALLY TO TRANSCEIVER 618S-4, PROVIDED THE SCHEMATIC FOR THE 250KC I-F AMPLIFIER WITH SQUELCH AND SELCAL IS SUBSTITUTED FOR THE 250KC I-F AMPLIFIER. REFER TO FIGURE 8-33.

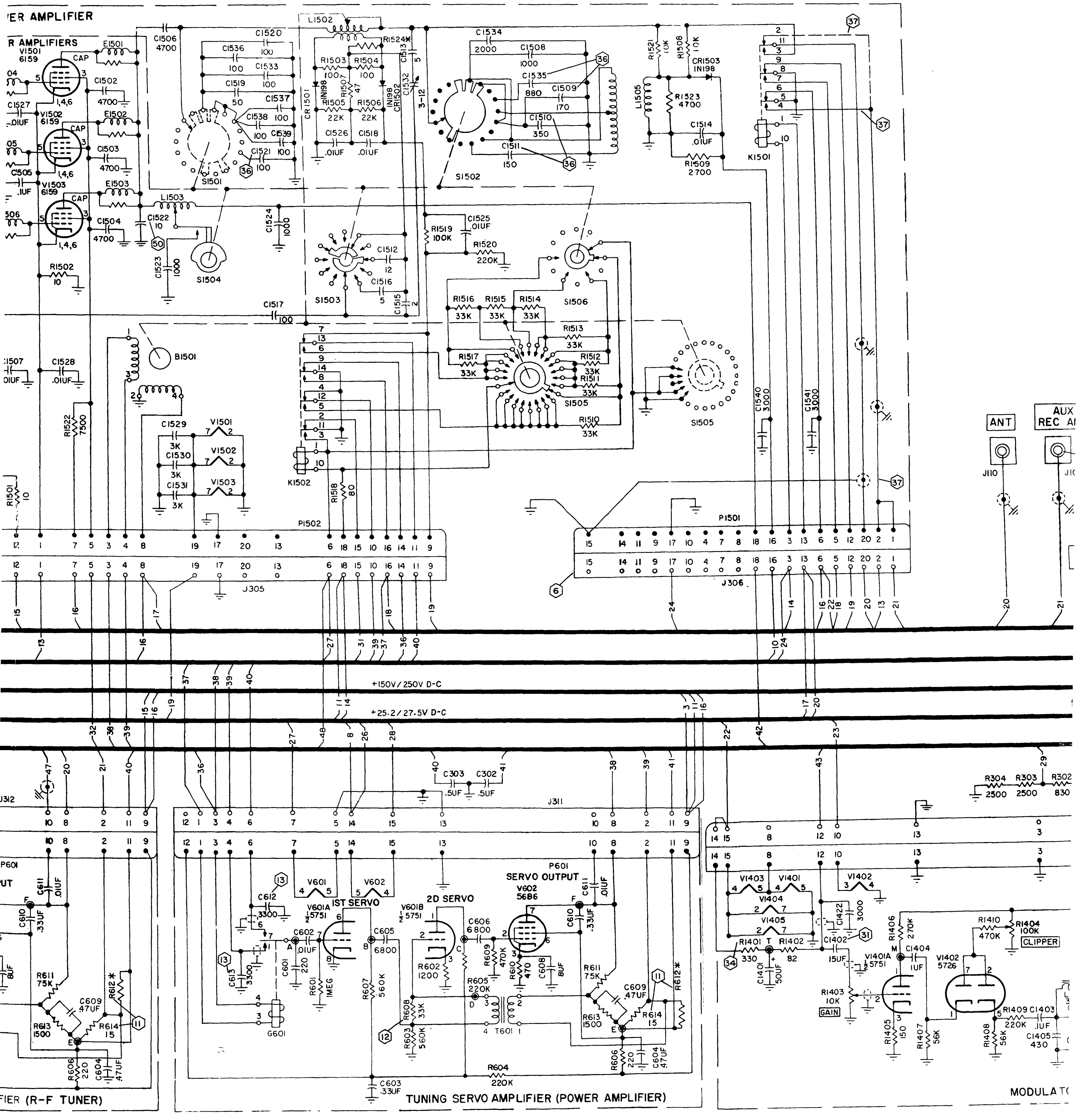
MODIFICATION REFERENCES:

1 REFER TO PARAGRAPH 9.2.1a
2 REFER TO PARAGRAPH 9.2.2a
3 REFER TO PARAGRAPH 9.2.2b
4 REFER TO PARAGRAPH 9.2.3a
5 REFER TO PARAGRAPH 9.2.3b
6 REFER TO PARAGRAPH 9.2.3c
7 REFER TO PARAGRAPH 9.2.4a
8 REFER TO PARAGRAPH 9.2.4b
9 REFER TO PARAGRAPH 9.2.4c
10 REFER TO PARAGRAPH 9.2.4d
11 REFER TO PARAGRAPH 9.2.5a
12 REFER TO PARAGRAPH 9.2.5b
13 REFER TO PARAGRAPH 9.2.5c
14 REFER TO PARAGRAPH 9.2.6a
15 REFER TO PARAGRAPH 9.2.6b
16 REFER TO PARAGRAPH 9.2.6c
17 REFER TO PARAGRAPH 9.2.7a
18 REFER TO PARAGRAPH 9.2.7b
19 REFER TO PARAGRAPH 9.2.7c
20 REFER TO PARAGRAPH 9.2.7d
21 REFER TO PARAGRAPH 9.2.8a AND 9.2.8h
22 REFER TO PARAGRAPH 9.2.8b AND 9.2.8j
23 REFER TO PARAGRAPH 9.2.8c, 9.2.8d, 9.2.8e AND 9.2.8f
24 REFER TO PARAGRAPH 9.2.8g
25 REFER TO PARAGRAPH 9.2.8h
26 REFER TO PARAGRAPH 9.2.8i
27 REFER TO PARAGRAPH 9.2.8j
28 REFER TO PARAGRAPH 9.2.9a
29 REFER TO PARAGRAPH 9.2.9b
30 REFER TO PARAGRAPH 9.2.9c
31 REFER TO PARAGRAPH 9.2.10a
32 REFER TO PARAGRAPH 9.2.10b
33 REFER TO PARAGRAPH 9.2.10c
34 REFER TO PARAGRAPH 9.2.10d
35 REFER TO PARAGRAPH 9.2.10e
36 REFER TO PARAGRAPH 9.2.11a
37 REFER TO PARAGRAPH 9.2.11b
38 REFER TO PARAGRAPH 9.2.12a
39 REFER TO PARAGRAPH 9.3a
40 REFER TO PARAGRAPH 9.3b
41 REFER TO PARAGRAPH 9.3c
42 REFER TO PARAGRAPH 9.3d
43 REFER TO PARAGRAPH 9.3d
44 REFER TO PARAGRAPH 9.3c
45 REFER TO PARAGRAPH 9.4a
46 REFER TO PARAGRAPH 9.4b
47 REFER TO PARAGRAPH 9.4c
48 REFER TO PARAGRAPH 9.4d
49 REFER TO PARAGRAPH 9.2.4e
50 REFER TO PARAGRAPH 9.2.11c
51 REFER TO PARAGRAPH 9.2.3d

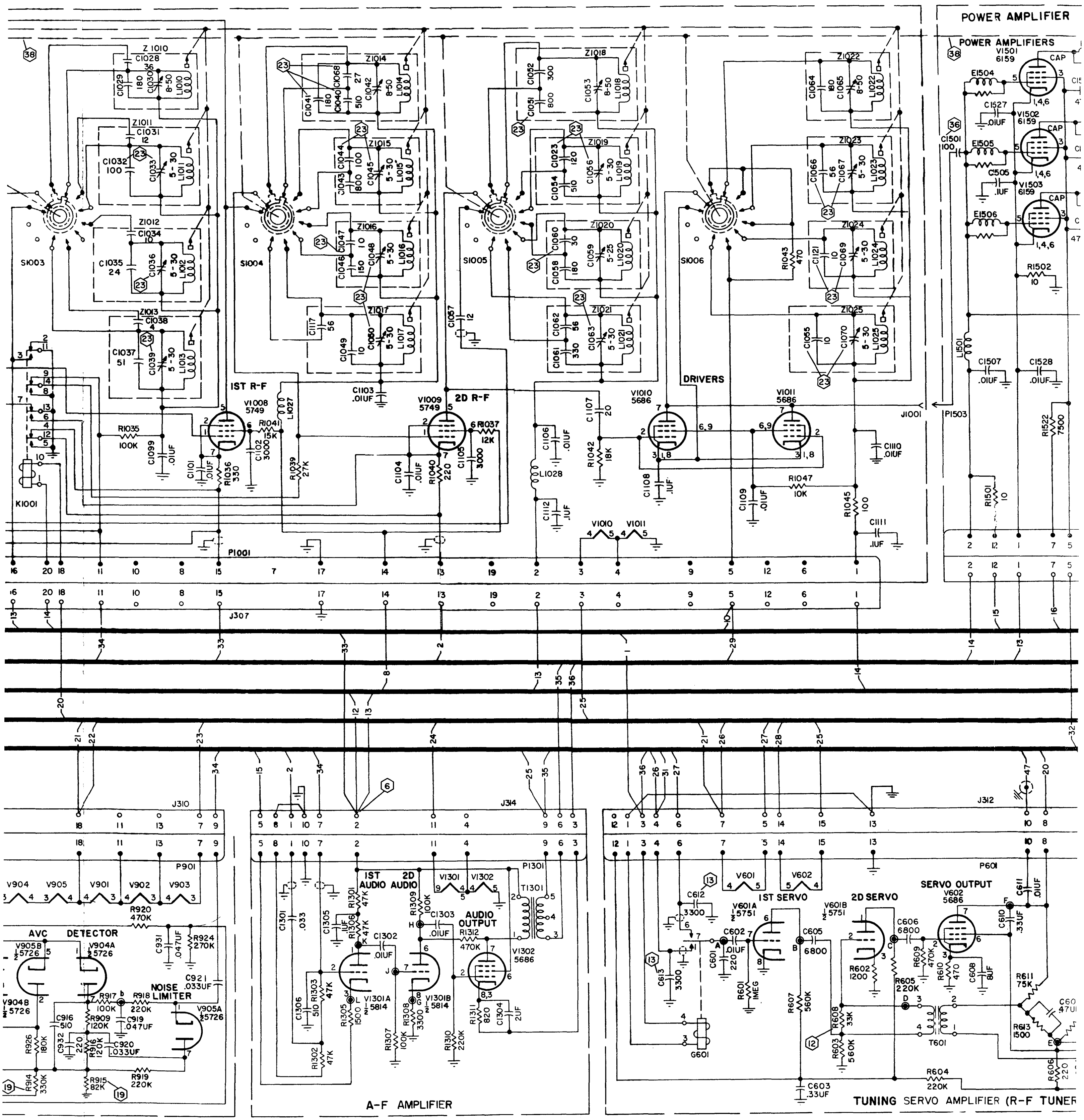


A29-245-6

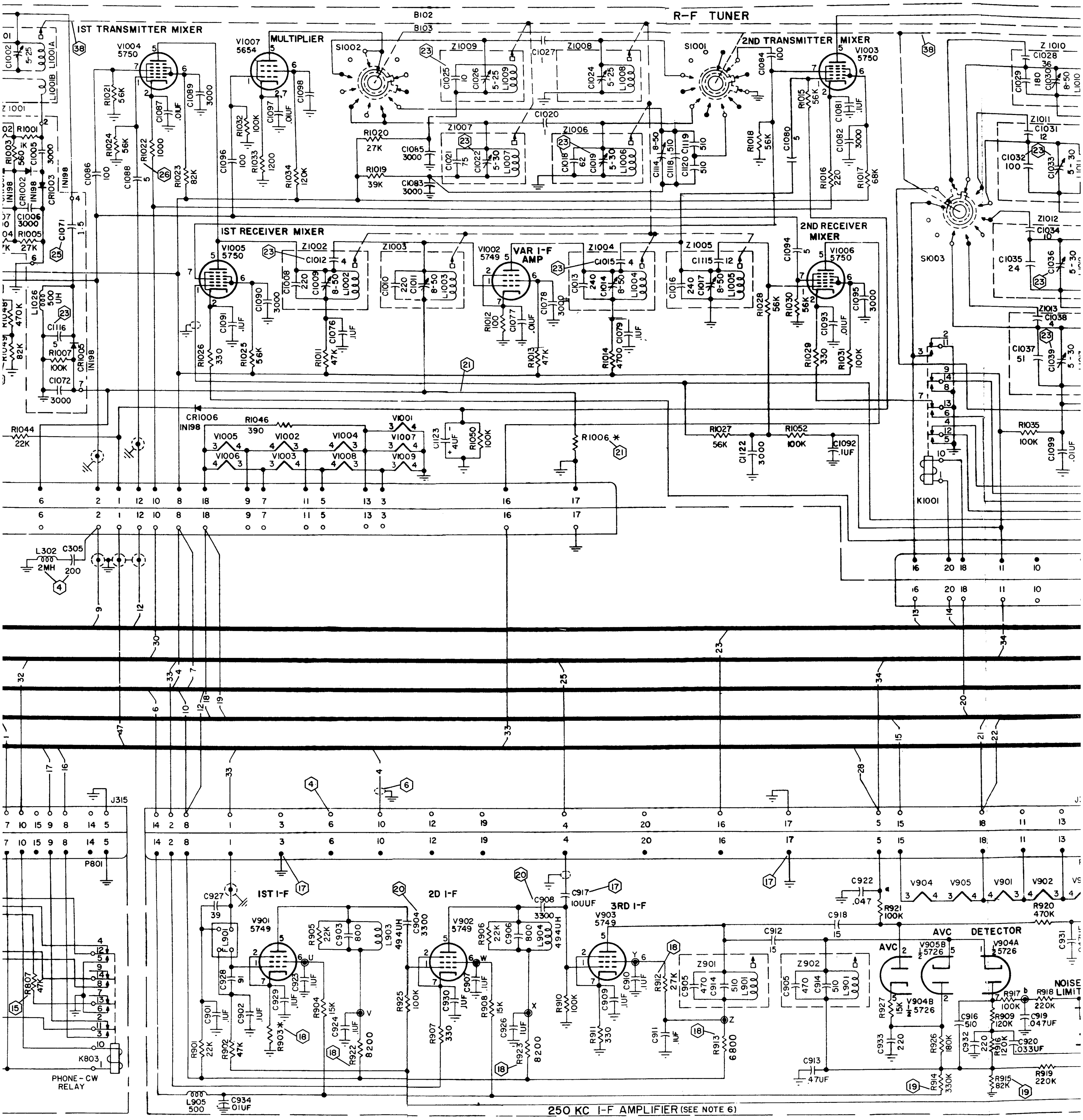
Figure 8-34. Transceiver 618S-1, Schematic Diagram

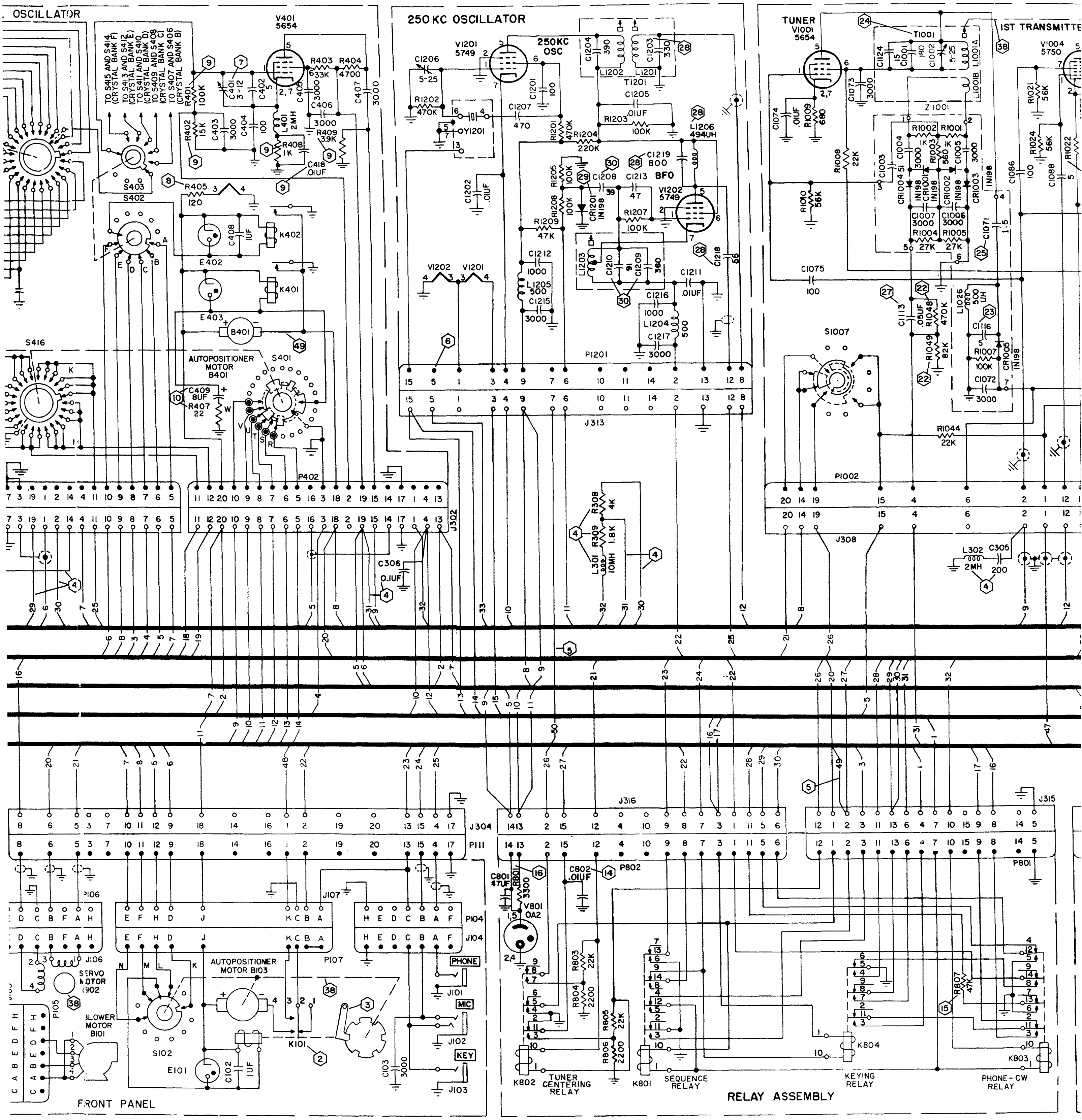


ER AMPLIFIER
R AMPLIFIERS
V1501 6159
V1502 6159
V1503 6159
S1501
S1502
S1503
S1504
S1505
S1506
K1501
K1502
B1501
P1501
P1502
J305
J306
ANT
AUX REC A
J110
+150V/250V D-C
+25.2/27.5V D-C
J311
J312
P601
SERVO OUTPUT
V602 5686
IST SERVO
V601A 1/2 5751
2D SERVO
V601B 1/2 5751
T601
G601
V1401A 1/2 5751
V1402 5726
GAIN
CLIPPER
FIER (R-F TUNER)
TUNING SERVO AMPLIFIER (POWER AMPLIFIER)
MODULATO

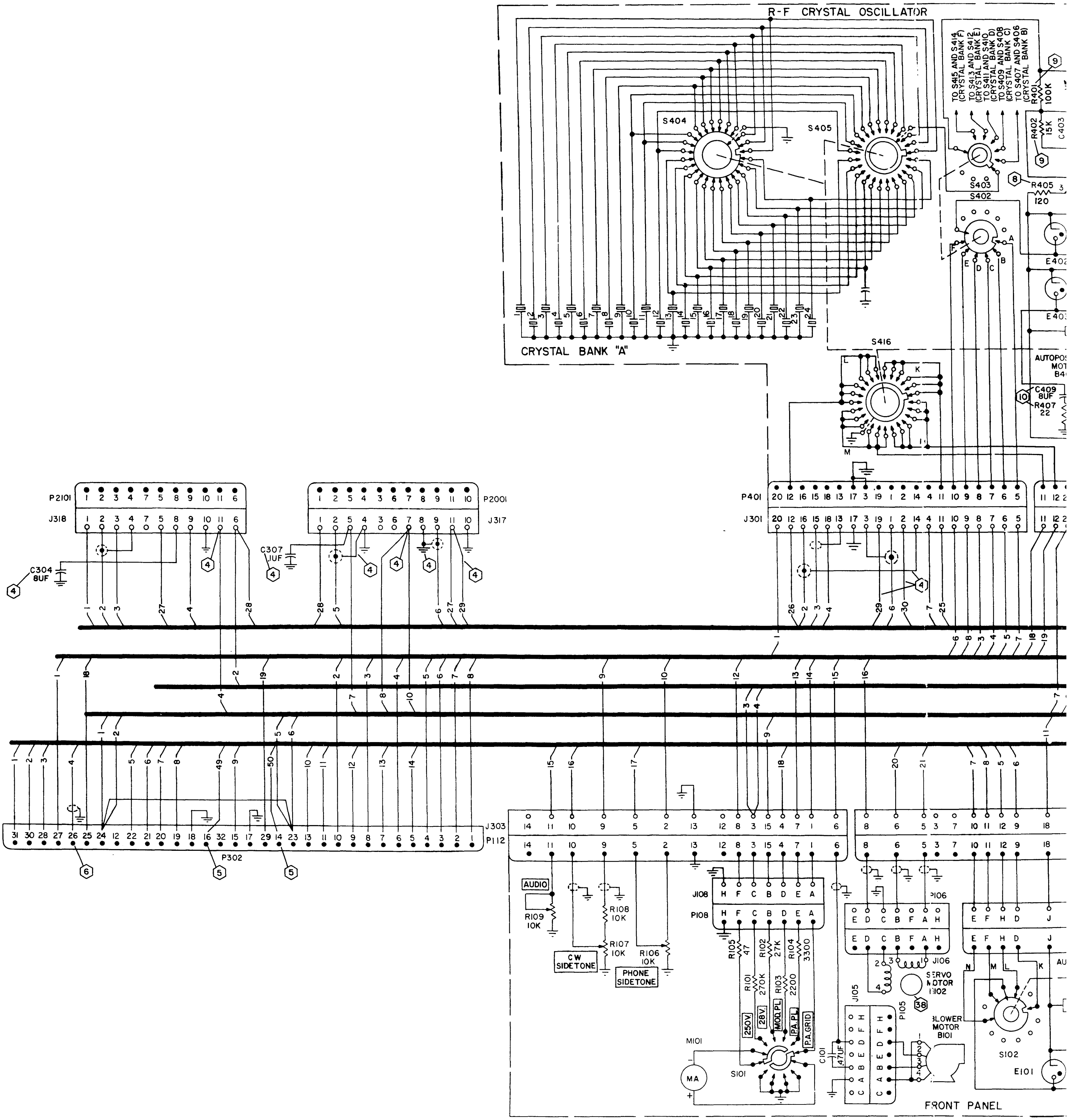


POWER AMPLIFIER
POWER AMPLIFIERS
IST R-F
2D R-F
DRIVERS
AVC
DETECTOR
NOISE LIMITER
IST AUDIO
2D AUDIO
AUDIO OUTPUT
IST SERVO
2D SERVO
SERVO OUTPUT
A-F AMPLIFIER
TUNING SERVO AMPLIFIER (R-F TUNER


R-F TUNER
IST TRANSMITTER MIXER
MULTIPLIER
2ND TRANSMITTER MIXER
IST RECEIVER MIXER
VAR I-F AMP
2ND RECEIVER MIXER
IST I-F
2D I-F
3RD I-F
AVC
DETECTOR
PHONE-CW RELAY
250 KC I-F AMPLIFIER (SEE NOTE 6)



OSCILLATOR
250 KC OSCILLATOR
TUNER
1ST TRANSMITTE
AUTOPOSITIONER MOTOR B401
AUTOPOSITIONER MOTOR B103
SERVO MOTOR B102
BLOWER MOTOR B101
FRONT PANEL
TUNER CENTERING RELAY
SEQUENCE RELAY
KEYING RELAY
PHONE - CW RELAY
RELAY ASSEMBLY
PHONE
MIC
KEY



R-F CRYSTAL OSCILLATOR
CRYSTAL BANK "A"
S404
S405
S403
S402
S416
TO S415 AND S414 (CRYSTAL BANK F)
TO S413 AND S412 (CRYSTAL BANK E)
TO S411 AND S410 (CRYSTAL BANK D)
TO S409 AND S408 (CRYSTAL BANK C)
TO S407 AND S406 (CRYSTAL BANK B)
P2101
J318
P2001
J317
P401
J301
C304 8UF
C307 .1UF
J303
P112
P302
J108
P108
AUDIO
R109 10K
R108 10K
R107 10K
R106 10K
CW SIDETONE
PHONE SIDETONE
R105 47
R102 27K
R104 3300
R101 270K
R103 2200
250V
28V
MOD.PL
P.A.PL
P.A.GRID
M101
MA
S101
C101 .47UF
J105
P105
J106
P106
SERVO MOTOR B102
BLOWER MOTOR B101
S102
E101
FRONT PANEL

SECTION IX
MODIFICATION DATA

9.1 GENERAL.

This section provides information concerning modifications made to this equipment previous to and including the most recent modifications. The modifications currently being used on this equipment are listed on the title page of this instruction book. Assemblies are considered in this section according to the ascending order of their series numbers. No attempt is made to provide instructions for making modifications to the equipment. Information is provided pertaining to the condition previous to, the change made by, and the reason for the modification. In most instances, modifications involving only minor hardware changes are not included in this section.

9.2 TRANSCEIVER 618S-1.

9.2.1 FRONT PANEL.

a. Connector J109 changed type to facilitate interconnection of Transceiver 618S-1 with Antenna Tuner 180L-3 without using an external adapter on J109 by MOD 1.

9.2.2 AUTOPOSITIONER ASSEMBLY.

a. Relay K101 changed type, and the associated circuits changed by MOD 1. Figure 9-1 shows the circuit previous to MOD 1. The changes made by MOD 1 prevent unnecessary running of Autopositioner assembly.

b. The pawl of the Autopositioner assembly changed type by MOD 3. The new type pawl has a narrower tip which allows it to drop into the stop-wheel notch sooner and eliminates troubles encountered with previous type pawl.

9.2.3 MAIN CHASSIS ASSEMBLY.

a. The detail parts C304 (8 uf), C305 (200 uuf), C306 and C307 (0.1 uf), R308 (4K ohms) and R309 (1.8K ohms), L301 (10 mh) and L302 (2 mh), and the wiring changes made by MOD 1 make the 618S-1 chassis interchangeable for use with the r-f crystal oscillator or the stabilized master oscillator.

b. Additional wiring was installed to facilitate FSK adaptation by MOD 1.

c. The following wiring changes were made by MOD 4: Terminal 19 of J306 was removed, a shielded wire was added between terminal 10 of J310 and terminal 26 of P302, and a conductor was added between terminal 5 of J313 and terminal 2 of J314. Connector J306

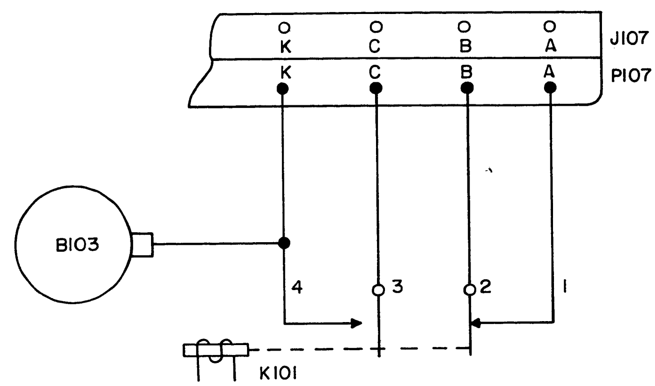


Figure 9-1. K101 Connections Previous to MOD 1

was changed to prevent arcing at 50,000 feet altitude. The wire between terminal 10 of J310 and terminal 26 of P302 needs to be shielded only if the squelch 250 kc i-f amplifier is used in place of the regular 250 kc i-f amplifier. The wire between terminal 5 of J313 and terminal 2 of J314 is necessary only if FSK is to be used.

d. Transformer T301 changed type to an improved version by MOD 5.

9.2.4 R-F CRYSTAL OSCILLATOR.

a. Capacitor C401 was 2-7 uuf previous to MOD 1. The value of C401 was changed by MOD 1 to 3-12 uuf, because 2-7 uuf provided insufficient capacity for proper excitation adjustment of the r-f crystal oscillator tube, V401. Do not modify units previous to MOD 1.

b. Resistor R403 was 100 ohms previous to MOD 2. The value of R405 was changed by MOD 2 to 120 ohms, because 100 ohms was not large enough to drop the filament voltage to the proper value. Resistor R405

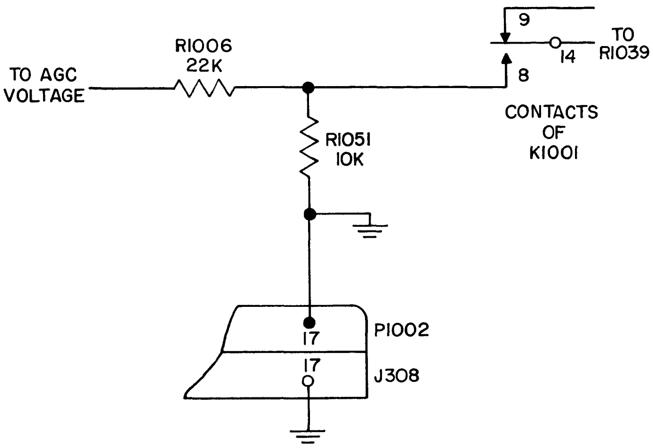


Figure 9-2. R1051-R1006 Circuit Previous to MOD 1

is a dropping resistor in series with the filament of V401.

c. Resistor R402 was 56K ohms, and R401 was 1 megohm previous to MOD 3. Resistors R408 (1K ohm) and R409 (3.9K ohms) and capacitor C418 (0.01 uf) were added by MOD 3. The value of R401 was changed to 100K ohms, and R402 was changed to 15K ohms by MOD 3. The circuit changes of MOD 3 were included, because the previous circuit would not always function with low-activity crystals, especially the lower frequency crystals.

d. Capacitor C409 was 1.0 uf ±20% previous to MOD 4. Resistor R407 (22 ohms) was added by MOD 4. The value of C409 was changed to 8 uf ±20% by MOD 4. Circuit changes of MOD 4 were included to reduce the high-surge voltage and prevent the burning of rotary switch S401.

e. Previous to MOD 5, some difficulty was encountered when it was found necessary to remove or replace motor B401. MOD 5 provides an easier method of connecting B401 to cable.

9.2.5 TUNING SERVO AMPLIFIER (R-F TUNER AND POWER AMPLIFIER.)

a. Resistor R614 was 10 ohms previous to MOD 1. Resistor R612 is a selected value (18, 20, 22, 24, 27, 33, 39, 47, or 56) added in parallel with R614 by MOD 1. Resistor R614 was changed to 15 ohms, and R612 was added by MOD 1 in order to balance the bridge circuit.

b. Resistor R608 was 68K ohms previous to MOD 2. Resistor R608 changed to 33K ohms by MOD 2. Under certain conditions, a 400-cycle hum appeared in the audio output; changing the value of R608 from 68K to 33K eliminated this difficulty.

c. Capacitors C612 and C613 were 3000 uuf previous to MOD 3. Capacitors C612 and C613 changed to 3300 uuf by MOD 3 to increase reliability.

9.2.6 RELAY ASSEMBLY.

a. Capacitor C802 (0.01 uf) was added by MOD 1. Capacitor C802 was added to filter out stray signal input to the tuning servo amplifier.

b. Resistor R807 (47K ohms) was added by MOD 2. Resistor R807 was added to provide some avc in the CW position to prevent receiver blocking.

c. Resistor R801 was 3300 ohms 5 watts previous to MOD 3. Resistor R801 was changed to 3300 ohms 8 watts by MOD 3 in order to derate properly the equipment operating at maximum duty cycle.

9.2.7 250 KC I-F AMPLIFIER.

a. The value of capacitor C917 was changed from 10 uuf to 15 uuf by MOD 1 in order to increase the bfo input at the injection point. Pins 3 and 17 of P901 were connected by MOD 1 to provide added shielding for the input to the amplifier. The value of capacitor C917 was changed back from 15 uuf to 10 uuf by MOD 3 in order to lower the bfo level which occasionally is too high due to component tolerances.

b. Resistor R903 was 330 ohms, R912 was 22K ohms, R922 and R923 were 15K ohms, and R913 was 10K ohms previous to MOD 2. Resistor R903 was changed to a selected value (150, 180, 220, 270, 330, 390, or 470 ohms) by MOD 2 in order to control the gain of the 250 kc i-f amplifier. Resistor R912 was changed to 27K ohms, R922 and R923 were changed to 8.2K ohms, and R913 was changed to 6.8K ohms by MOD 2 in order to give the proper power derating.

c. Resistor R915 was 68K ohms, and resistor R914 was 330K ohms ±10% previous to MOD 4. Resistor R915 was changed to 82K ohms, and R914 was changed to 330K ohms ±5% by MOD 4 to increase the avc delay bias which, in turn, improved the avc characteristics.

d. Capacitors C904 and C908 were 3000 uuf previous to MOD 5. Capacitors C904 and C908 changed to 3300 uuf by MOD 5 to increase the reliability.

9.2.8 R-F TUNER.

a. Resistor R1051 was 10K ohms, and R1006 was 22K ohms previous to MOD 1. Figure 9-2 shows R1051 and R1006 previous to MOD 1. Resistor R1051 was deleted, and the value of R1006 was changed to a selected value (10K, 12K, 15K, 18K, 22K, 27K, or

33K ohms) by MOD 1 in order to remove the agc from the second r-f amplifier tube, V1009. The value of R1006 is selected so that the agc voltage will be close to the following values when the associated frequencies are obtained from the r-f crystal oscillator:

1.75 mc	near 8 volts
2.00 mc	near 10 volts
2.25 mc	near 8 volts
3.50 mc	near 2 volts

The selected value of R1006 was changed to 4.7K, 5.6K, 6.8K, 8.2K, 10K, 12K, or 15K ohms by MOD 6.

b. Resistor R1048 was 330K ohms, and R1049 was 180K ohms previous to MOD 2. The value of R1048 was changed to 470K ohms, and R1049 was changed to 120K ohms by MOD 2. Resistor R1049 changed from 120K ohms to 100K ohms by MOD 4 and from 100K ohms to 82K ohms by MOD 9. These changes were made to prevent the r-f tuner from hunting.

c. The following list gives the values of capacitors previous to and effective with MOD 3. Capacitors indicated with asterisks (*) are changed in temperature compensation and/or fungi-resistant qualities only. Unless otherwise stated, all values given in the following list are in micromicrofarads:

Capacitor	Previous Value and Tolerance	MOD 3 Value and Tolerance
C1012	7 ±1/2	4 ±1/2
C1015	7 ±1/2	4 ±1/2
C1018	62 ±2%	85 ±5% refer to 9.2.8d
C1019	5-25	5-30
C1022	5-25	5-30
C1023	10 ±2%	120 ±2%
C1025*	10 ±5%	10 ±1/2 uuf
C1032	82 ±2%	100 ±5%
C1033	8-50	5-30
C1036	5-25	5-30
C1039	5-25	5-30
C1040	2000 ±20%	510 ±5%
C1044*	100 ±2%	100 ±5%
C1045	8-50	5-30
C1047*	10 ±5%	10 ±5%
C1048	5-25	5-30
C1050	5-25	5-30
C1051	470 ±2%	800 ±2%
C1055	470 ±2%	10 ±5%
C1056	8-50	5-30
C1060	24 ±2%	30 ±5%
C1063	5-25	5-30
C1066	47 ±2%	56 ±5%
C1067	8-50	5-30
C1068	2000 ±2%	27 ±5%
C1069	5-25	5-30
C1070	5-25	5-30
C1116*	5 ±5%	5 ±1/2 uuf
C1121*	10 ±5%	10 ±1/2 uuf

d. The value of capacitor C1018 was changed from 62 uuf to 75 uuf and back to 62 uuf by MOD 3 and MOD 5 respectively.

e. Capacitor C1055 was removed from Z1018 and added to Z1025 by MOD 3.

f. Capacitors C1041 and C1068 reversed by MOD 3.

g. Capacitor C1124 (15 uuf) added by MOD 3.

h. Capacitor C1071 was 1 uuf previous to MOD 6. Resistor R1006 was changed from a selected value of 4.7K, 5.6K, 6.8K, 8.2K, 10K, 12K, or 15K ohms by MOD 6. Capacitor C1071 was changed to 1.5 uuf, and the selected values of R1006 were changed by MOD 6, because the tolerance value of C1071 was too large to permit satisfactory operation. When the tolerance ran on the minus side, the agc voltage was not high enough. Changing the value of C1071 requires changing the selcted values of R1006.

i. Resistor R1022 was 2200 ohms previous to MOD 8. Resistor R1022 was changed to 1000 ohms in order to increase the gain of V1004 by MOD 8. This was done to compensate for a decrease in output from the 250 kc oscillator which was necessary to correct for spurious radiation at 250 kc each side of the carrier frequency on band 2.

j. Capacitor C1113 was 11 uuf previous to MOD 9. Resistor R1049 was changed from 100K ohms to 82K ohms by MOD 9. Capacitor C1113 was changed to 0.05 uuf, and R1049 was changed to reduce the tendency of hunting in the tuner servo system.

9.2.9 250 KC OSCILLATOR.

a. Capacitor C1203 was 240 uuf, and C1219 was 56 uuf previous to MOD 1. Capacitor C1218 (56 uuf) and coil L1205 (494 uh) were added by MOD 1. Capacitor C1203 was changed to 330 uuf by MOD 1 to increase the capacity in the tuned circuit to enable tuning to resonance. Capacitor C1219 was changed to 800 uuf, and capacitor C1218 and coil L1205 were added by MOD 1 so that the bfo would have its own tuning circuit.

b. Diode CR1201 was a type 1N67A previous to MOD 2 to improve the bfo stability due to temperature change.

c. Capacitor C1208 was 36 uuf, C1209 was 430 uuf, and C1210 was 20 uuf previous to MOD 3. Capacitor C1208 was changed to 39 uuf, C1209 was changed to 360 uuf, and C1210 was changed to 91 uuf by MOD 3 in order to increase the total frequency range of the bfo and limit the frequency drift.

9.2.10 MODULATOR.

a. Resistor R1416 was 270K ohms and, capacitor C1402 was 0.22 uf previous to MOD 1. Resistor R1416 was changed to 390K ohms by MOD 1. Resistor R1416 was changed to 390K ohms by MOD 1 to equalize grid voltages on V1404 and V1405. Capacitor C1402 was changed to 0.15 uf by MOD 1 to improve modulation distortion at 300 cps.

b. Capacitor C1413 (500 uuf) was added by MOD 2. Capacitors C1417 and C1418 were 1000 uuf guaranteed minimum value previous to MOD 2. Capacitors C1417 and C1418 changed from 1000 uuf +100% - 20% to 470 uuf by MOD 5. Capacitor C1413 was added in MOD 2 to reduce the possibility of oscillations. Capacitors C1417 and C1418 were changed to 1000 uuf +100% -20% by MOD 2 to reduce the possibility of shorting to ground pin 5 of V1404 and pin 5 of V1405.

c. The grid (pin 2) of V1403 was connected to pin 5 of P1401, and the grid (pin 7) of V1401B was connected to pin 7 of P1401 previous to MOD 3. These connections were removed by MOD 3, which formerly were used for test purposes, to help prevent oscillations in the modulator.

d. Resistor R1401 was 330 ohms 1/2 watt previous to MOD 4. Resistor R1401 was changed to 330 ohms 1 watt by MOD 4 to prevent the power rating of R1401 from being exceeded.

e. Capacitors C1417 and C1418 were 1000 uuf previous to MOD 5. Capacitors C1417 and C1418 were changed to 470 uuf, and shielded wires were added between the plates of V1403 and the control grids of V1404 and V1405 by MOD 5 to reduce the amount of regeneration.

9.2.11 POWER AMPLIFIER.

a. Capacitor C1501 was 100 uuf ±2%, C1509 was 1100 uuf, C1510 was 480 uuf, C1511 was 170 uuf, C1521 was 63 uuf, and C1535 was 400 uuf previous to MOD 1. Capacitor C1501 was changed to 100 uuf, C1509 was changed to 170 uuf, C1510 was changed to 350 uuf, C1511 was changed to 150 uuf, C1521 was changed to 100 uuf, and C1535 was changed to 880 uuf by MOD 1 to achieve temperature compensation and to improve the loading characteristics of the pi network.

b. The coaxial running from pin 2 of P1501 to K1501 was changed from terminal 2 to terminal 4 on K1501 by MOD 2 to provide an easier means for changing Transceiver 618S-1 from 180L-2 operation to 180L-3 operation. When the 180L-3 is being used, it is necessary to clip out the jumper from terminal 2 to 4 on K1501. When the 180L-2 is being used, no wiring changes are required on K1501.

c. Capacitor C1522 moved from S1501 to L1503 effective on equipment serial number 4696.

9.2.12 COUPLER MODIFICATIONS.

a. Pin-type couplers were deleted and Oldham couplers were added to the following units: Autopositioner Assembly, MOD 2; Servo motor Drive Assembly, MOD 1; R-F Tuner, MOD 7; and Power Amplifier, MOD 3. Refer to paragraph 6.11.

9.3 POWER SUPPLY 416W-1.

a. Capacitor C1611 was moved from the junction of R1609 and R1608 to the center tap of R1608 in order to better reduce the noise level on the -50-volt bias line by MOD 0.

b. Fuses F1602 and F1604 (spare) were 1/2 amp previous to MOD 1. Fuses F1602 and F1604 were changed to 1 amp by MOD 1, because former value was insufficient to handle the load.

c. The type of capacitors C1601, C1602, and C1608 changed by MOD 2. Capacitors C1601, C1602, and C1608 changed type in order to prevent blowing of fuses and to prevent personal injury if case were touched.

d. Relay K1604 changed type by MOD 3. The previous circuit for K1604 is shown in dotted lines. Resistor R1607 was 15K ohms previous to MOD 3 and 3300 ohms previous to MOD 4. Resistor R1607 was changed to 5600 ohms by MOD 4 to correct an error that was made in designing the voltage divider circuit. Resistor R1609 was 22K ohms previous to MOD 3. Resistor R1609 was changed to 18K ohms by MOD 3.

e. Capacitors C1613, C1614, and C1615 (0.01 uf) were added by MOD 5 to provide extra filtering on power leads.

9.4 MOUNTING 350S-1 THROUGH 350S-4.

a. Previous to MOD 1, capacitor C1846 was connected to terminal 5 of TB1801, C1860 was connected to terminal 12 of TB1801, C1803 was connected to terminal 11 of J1801, and C1817 was connected to terminal 15 of J1801. Capacitor C1846 was reconnected to terminal 12 of TB1801, C1860 was reconnected to terminal 5 of TB1801, C1803 was reconnected to terminal 15 of J1801, and C1817 was reconnected to terminal 11 of J1801 by MOD 1.

b. Previous to MOD 1, terminal 30 of J1802 was connected to terminal 22 of TB1801, and terminal 31 was connected to terminal 23 of TB1801. Connect terminal 14 of J1802 to terminal 22 of TB1801, and connect terminal 16 of J1802 to terminal 23 of TB1801. Connect terminal 30 of J1802 to terminal 31 of J1802 by MOD 1.

c. Terminal 47 of TB1801 was connected to terminal 27 of J1801 previous to MOD 1. Terminal 47 of TB1801 was reconnected to terminal 25 of J1801, and terminals 18 and 27 of J1801 were connected by MOD 1. The connection between 18 and 27 of J1801 was removed, and the wire from terminal 47 of TB1801 was removed from terminal 25 of J1801 and reconnected to terminal 27 of J1801 by MOD 2. The wiring changes made by MOD 1 provide for FSK, reduce 400-cps coupling to sensitive circuits, and provide audio amplifier ground in the filter box. The changes of MOD 2 remove the ground from one side of the audio output transformer and make available at TB1801 both sides of the audio output transformer.

d. The type of terminal was changed by MOD 3 to prevent arcing from terminals E1801 and E1802 to ground by using a higher voltage terminal. This arcing occurs at 50,000 feet altitude.

9.5 TRANSCEIVER 618S-4, 250 KC I-F AMPLIFIER WITH SQUELCH AND SELCAL.

a. Resistor R933 was 560K ohms, and R934 was 10K previous to MOD 1. R933 was changed to 4700K ohms and R934 was changed to 100K ohms by MOD 1 in order to increase the level of sidetone during transmission.