COLLINS

instruction book

Collins Radio Company

30L-1
RF Linear Amplifier

Collins Amateur Equipment Guarantee

The Collins Amateur Equipment described herein is sold under the following guarantee:

Collins agrees to repair or replace, without charge, any equipment, parts, or accessories which are defective as to workmanship or materials and which are returned to Collins at its factory or its designated Service Agency, transportation prepaid, provided:

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(b) Notice of the claimed defect is given Collins or an authorized Service Agency, or an authorized Distributor, in writing, within 180 days from the date of purchase and goods are returned in accordance with Collins instructions.

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On the opposite page are listed the Service Agencies authorized to perform warranty repair on Collins Amateur Equipments.

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Collins Radio Company
Amateur Product Office
Cedar Rapids, Iowa

INFORMATION NEEDED:

(A) Type number, name and serial number of equipment
(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) Name of distributor from whom the equipment was purchased.

Equipment returned to the Service Agency or Collins for warranty repair must be accompanied with the Warranty Verification Certificate.

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(1) Complete instructions detailing work to be performed.
(2) Your return address.
(3) Method of shipment by which the equipment should be returned.
(4) Special instructions.

DIRECT YOUR CORRESPONDENCE TO:

Collins Radio Company
Product Support Division
Cedar Rapids, Iowa

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When ordering replacement parts, please furnish the following information insofar as applicable:

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 subassembly number (where applicable)

Collins Authorized Service Agencies

ALABAMA

Beddow Engineering Services
1501 Seventh Street SE
Decatur 35601

CALIFORNIA

Amrad Electronics
999 Howard Avenue
Burlingame 94101

Amrad Supply, Inc.
3425 Balboa Street
San Francisco 94121

Communication Receiver Service
5016 Maplewood
Los Angeles 90004

Henry Radio Inc.
931 N. Euclid
Anaheim 92801

Henry Radio Co., Inc.
(P.O. Box 64398)
11240 W. Olympic Blvd.
Los Angeles 90064

COLORADO

Burstein-Applebee Co. of Colorado
800 Lincoln Street
Denver 80202

FLORIDA

Ogilvie Electronics, Inc.
3101 Spring Park Road
Jacksonville 32207

Aero Maintenance Radio, Inc.
82 Fairway Drive
Miami Springs 33166

Grice Electronics, Inc.
330 East Wright Street
(P.O. Box 1911)
Pensacola 32501

Kinkade Radio Supply, Inc.
1719 Grand Central Avenue
Tampa 33606

GEORGIA

Commercial Communications
2752 Church Street
East Point

12-1-67

HAWAII

Honolulu Electronics
819 Keeaumoku Street
Honolulu 96814

LOUISIANA

Radio Parts, Inc.
1112 Magazine Street
New Orleans 70113

MARYLAND

Electronic International Service Corp.
11305 Elkin Street
(P.O. Box 1813)
Wheaton

MASSACHUSETTS

Two-Way Radio Engineers, Inc.
1100 Tremont Street
Roxbury 01969

MINNESOTA

Electronic Center, Inc.
107 3rd Avenue North
Minneapolis 55404

MISSISSIPPI

Coker Radio & TV Service
724 Lawrence Road
Jackson 39206

NEW JERSEY

Communication Service Co.
456 Elm Avenue
Maple Shade 08052

NEW MEXICO

Simms Communications Inc.
217 Camino Encantado
Santa Fe 87501

NEW YORK

Electronic Servicenter of New York
65-37 Queens Blvd.
Woodside 13789

NORTH CAROLINA

Freck Radio & Supply Co., Inc.
38 Biltmore Avenue
Asheville 28801

OHIO

Universal Service
114 N. Third Street
Columbus 43215

OKLAHOMA

Radio, Inc.
1000 South Main
Tulsa 74119

OREGON

Portland Radio Supply Co.
1234 S. W. Stark Street
Portland 97205

TEXAS

Electronic Center, Inc.
2929 N. Haskell
Dallas 75204

Electronic Equipment &
Engineering Company
2606 Westheimer
Houston 77006

Electronic Equipment &
Engineering Company
805 South Staples St.
Corpus Christi 78404

Howard Radio Company
1475 Pine Street
Abilene 79601

Douglas Electronics
1118 South Staples St.
Corpus Christi 78404

UTAH

Dwyer's TV & Communications
5455 Knollcrest Street
Murray 84647

WASHINGTON

HCJ Electronics
6904 East Sprague
Spokane 99206

WISCONSIN

Amateur Electronic Supply
4828 W. Fond du Lac Ave
Milwaukee 53208

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RF Linear Amplifier

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Record of Revisions

30L-1 R-F Linear Amplifier	LOCATION
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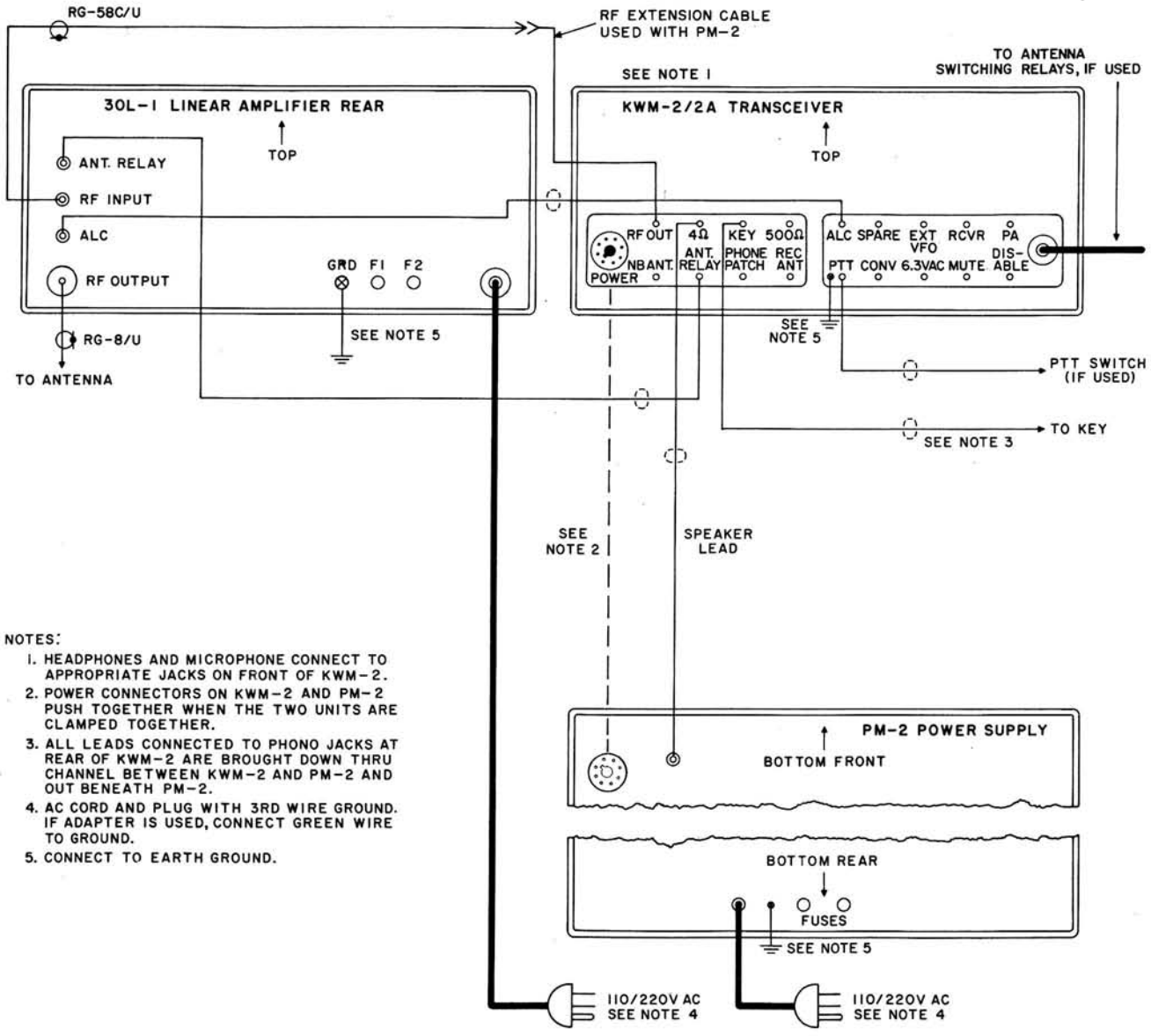


NOTES:

1. HEADPHONES AND MICROPHONE CONNECT TO APPROPRIATE JACKS ON FRONT OF KWM-2.
2. POWER CONNECTORS ON KWM-2 AND PM-2 PUSH TOGETHER WHEN THE TWO UNITS ARE CLAMPED TOGETHER.
3. ALL LEADS CONNECTED TO PHONO JACKS AT REAR OF KWM-2 ARE BROUGHT DOWN THRU CHANNEL BETWEEN KWM-2 AND PM-2 AND OUT BENEATH PM-2.
4. AC CORD AND PLUG WITH 3RD WIRE GROUND. IF ADAPTER IS USED, CONNECT GREEN WIRE TO GROUND.
5. CONNECT TO EARTH GROUND.

Figure 1-1. Interconnections with KWM-2/2A Traveling Station

SECTION I
INSTALLATION

1.1 UNPACKING.

Carefully lift the amplifier out of the packing material. Examine for visible damage. If the amplifier has been damaged in shipment, save box and packing material, and notify the transportation company. Fill out and mail the equipment registration card.

Lift the amplifier cabinet lid. Loosen the ten screws in the r-f compartment cover, slide it forward, and lift off. Remove the packing material around the tubes. Replace the cover, and tighten screws. Lower the lid.

Check tuning controls and switches for freedom of action. Check the equipment included with the amplifier against table 1-1.

TABLE 1-1. EQUIPMENT FURNISHED WITH 30L-1

QUANTITY	DESCRIPTION	FUNCTION	PART NUMBER
2	Shielded cables, 4 feet long, with phono plug on each end	Alc and antenna relay cables	426-2027-00
1	RG-58C/U cable, 4 feet long, with phono plug on each end	R-f input cable	426-5076-00
6	Fuses, 8-ampere	Spares	264-4110-00
1	A-c power plug adapter	A-c power	368-0138-00
1	UG-21D/U coaxial plug	R-f output connector	357-9261-00
1	Number 6 Bristo wrench	Knob removal	024-9730-00
1	Number 8 Bristo wrench	Knob removal	024-0019-00
1	Coaxial plug (Amphenol type 82-835)	Right-angle cable plug	357-9113-00
1	Instruction book	Instruction book	523-0122-00
1	Log book	Station log	523-0755-820

1.2 POWER TRANSFORMER CONNECTIONS.

The 30L-1 is shipped with the transformer primary connected for 115 volts a-c. If 230-volt a-c operation is desired, the primary connections must be changed on terminal board TB1. Refer to figure 7-2. This board is located at the bottom of the power supply compartment, and the a-c power cord is connected to it. To obtain access, refer to paragraph 4.2.

NOTE

When the 30L-1 is operated on 115 volts a-c, the wiring between fuse box and the a-c outlet should be heavy enough to provide the required current without a large drop in voltage. For example, number 12 wire should be used for a long run across a house, but for an installation close to the fuse box, the regular house wiring should serve.

WARNING

DO NOT BLOCK INTERLOCK SWITCHES. Dangerous voltages are present in this equipment. The high voltage is interlocked with the amplifier covers. Make no attempt to put the amplifier into service until all compartment covers are in place.

1.3 CABLING.

Interconnections with other station equipments are described in the following paragraphs. Assembly instructions for type N connectors, such as the UG-21D/U, are shown in figure 7-1.

1.3.1 TRAVELING STATION.

The 30L-1 is particularly applicable to traveling station use in conjunction with portable transceivers

such as the KWM-2/2A. Refer to figure 1-1. IN THIS SERVICE, MAKE SURE THE TRANSFORMER PRIMARY IS CONNECTED FOR PROPER LINE VOLTAGE.

1.3.2 HOME STATION.

Connect to KWM-2/2A, KWM-1, or S-Line as shown in figures 1-2, 1-3, and 1-4.

1.3.3 KWM-1 SERIAL NUMBERS ABOVE 861.

If KWM-1 models above serial number 861 are used with the 30L-1, it will be necessary to bring out alc and "ground-on-transmit" connections from the 516F-1 power cable plug, P-1, as shown in figure 1-3. Make the alc connection to terminal 19, and the "ground-on-transmit" connection to terminal 20. Use a shielded wire, and connect to 30L-1 ALC and ANT. RELAY jacks with phono plugs.

1.3.4 KWM-1 SERIAL NUMBERS BELOW 861.

If models below serial number 861 are used with the 30L-1, it is necessary to make connections inside the KWM-1 for alc and antenna relay control.

a. Use an ohmmeter to locate the feedthrough capacitor, C169, which is connected to pin 19 of J5.
b. Connect a wire from this feedthrough capacitor to pin 7 of tube socket XV10.
c. Using an ohmmeter to trace the wiring, locate the feedthrough capacitor, C206, which is connected to terminal 20 of J5 in KWM-1.
d. Connect a wire from terminal 8 of TB1 in KWM-1 to C206.
e. Make corresponding breakout connection to P1 terminal 19 with shielded wire, and connect to the 30L-1 ALC jack with a phono plug.
f. Refer to figure 1-3, Detail A. External to the KWM-1, connect a 10,000-ohm, 5-watt resistor and a relay coil in series from J5 terminal 20 to a ground on the rear of the KWM-1 chassis. Use a relay, such as Collins part number 972-1346-00, with a 10,000-ohm, 10-ma coil, and a set of normally open contacts.
g. Connect the normally open contacts through a piece of shielded wire and a phono plug to the 30L-1 ANT. RELAY jack.

WARNING

BE CAREFUL to avoid contact with the 260-volt B+ present on the relay coil and resistor connections. It is recommended that this circuitry be enclosed in a suitable shield box.

1.4 INSTALLATION WITH OTHER MAKES OF EXCITERS.

Connect the r-f output of the exciter to the RF INPUT jack on the 30L-1. Existing antenna switching equipment between receiver and exciter can be left intact. To transmit, a ground must be supplied to the ANT. RELAY jack on the 30L-1. This removes blocking bias from the 811A tubes and energizes the internal antenna relay. Due to the variety of circuits involved, specific instructions for use of alc cannot be given. A detailed study of paragraph 3.7 will be helpful if it is desired to utilize the alc provisions in the 30L-1.

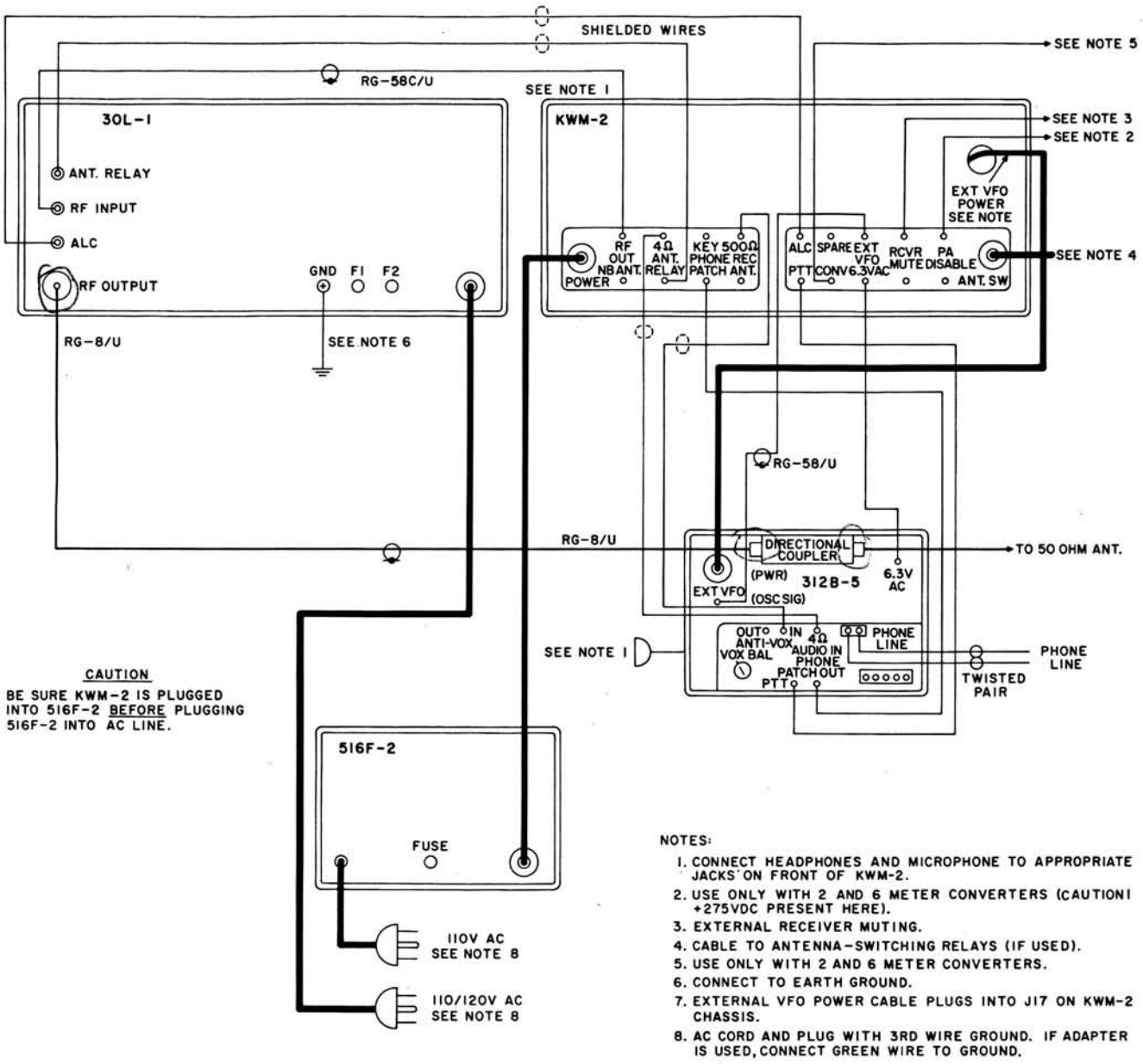
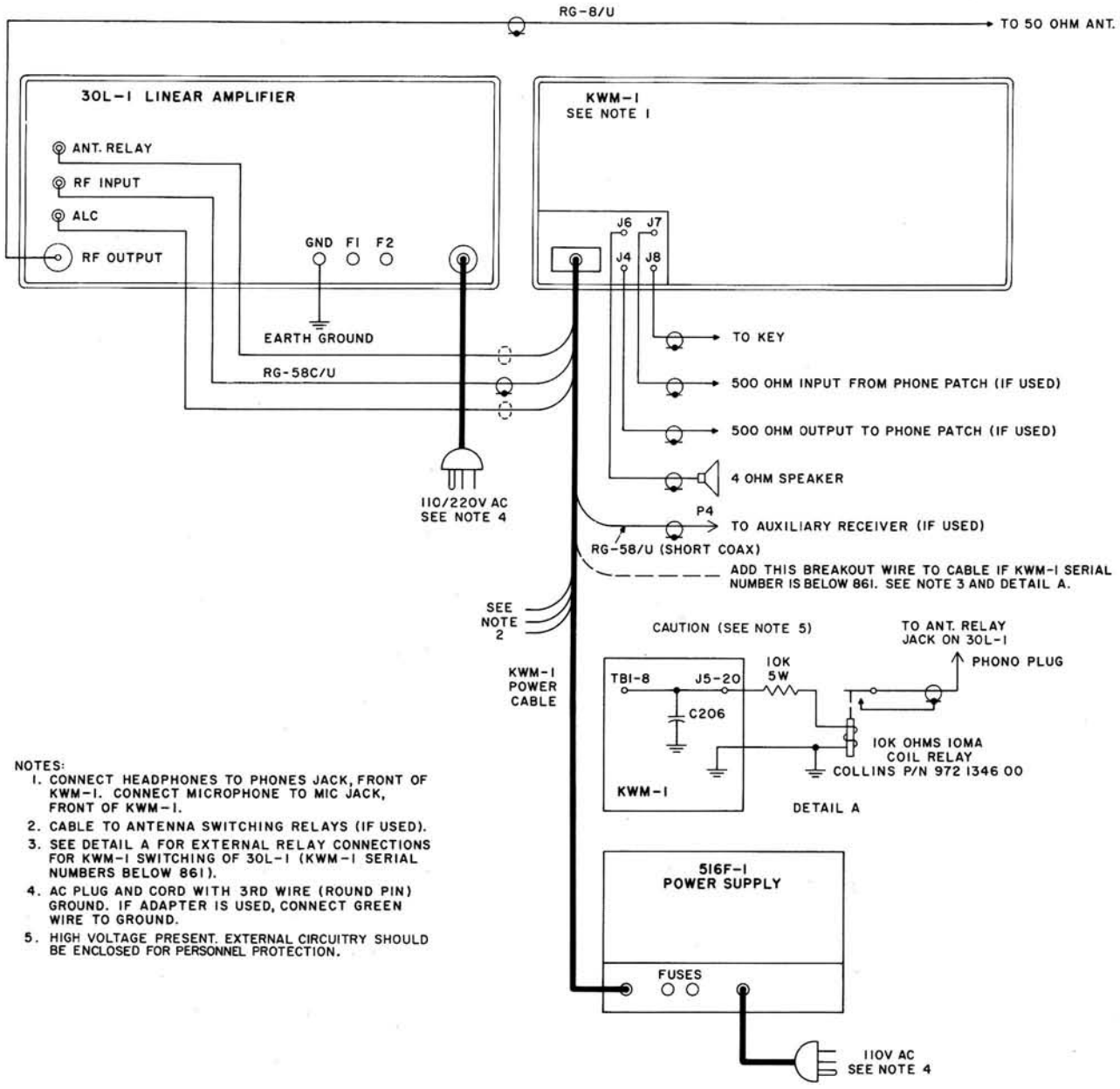


Figure 1-2. Interconnections with KWM-2/2A Home Station



NOTES:
1. CONNECT HEADPHONES TO PHONES JACK, FRONT OF KWM-1. CONNECT MICROPHONE TO MIC JACK, FRONT OF KWM-1.
2. CABLE TO ANTENNA SWITCHING RELAYS (IF USED).
3. SEE DETAIL A FOR EXTERNAL RELAY CONNECTIONS FOR KWM-1 SWITCHING OF 30L-1 (KWM-1 SERIAL NUMBERS BELOW 861).
4. AC PLUG AND CORD WITH 3RD WIRE (ROUND PIN) GROUND. IF ADAPTER IS USED, CONNECT GREEN WIRE TO GROUND.
5. HIGH VOLTAGE PRESENT. EXTERNAL CIRCUITRY SHOULD BE ENCLOSED FOR PERSONNEL PROTECTION.

Figure 1-3. Interconnections with KWM-1

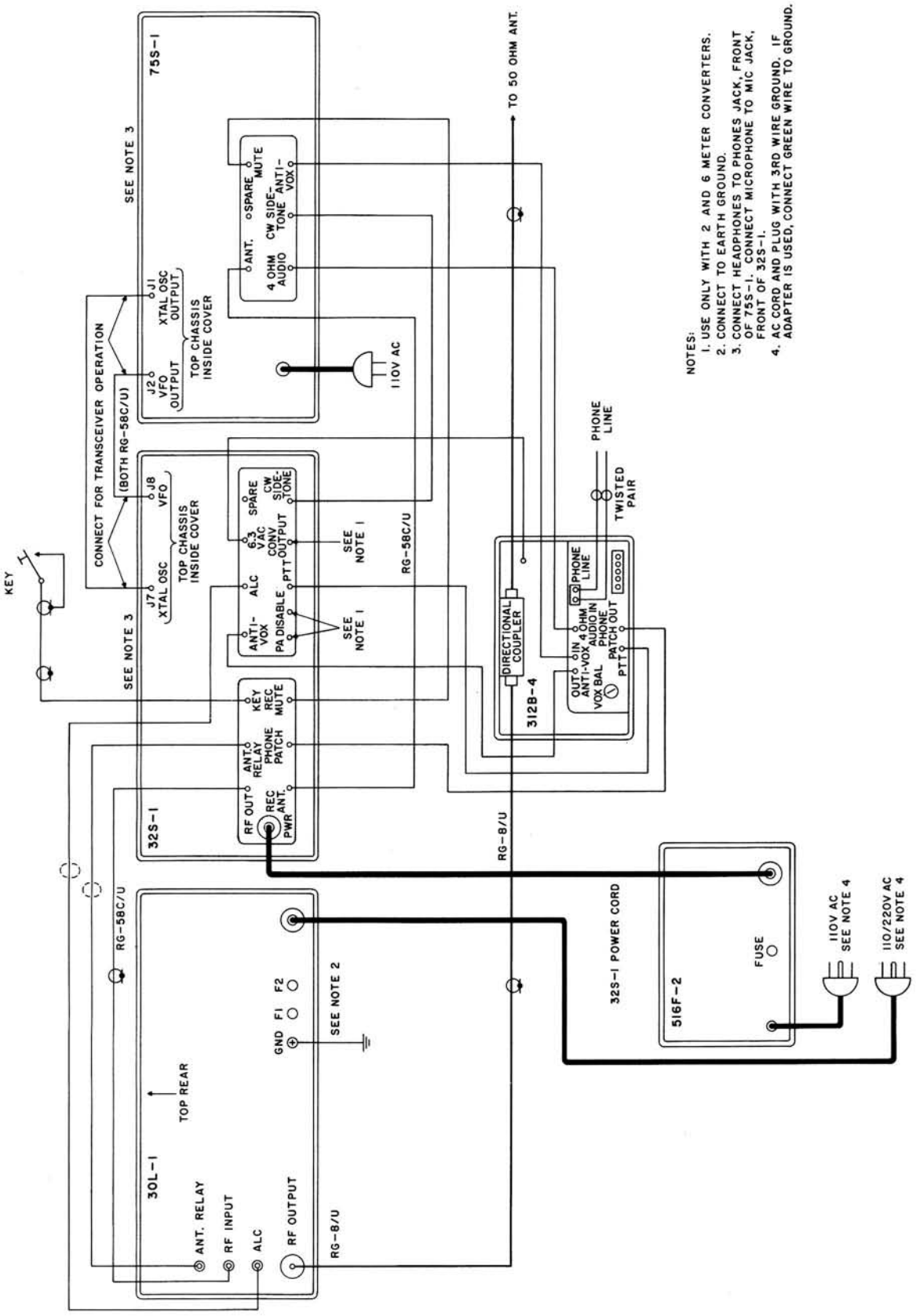


Figure 1-4. Interconnections with S-Line

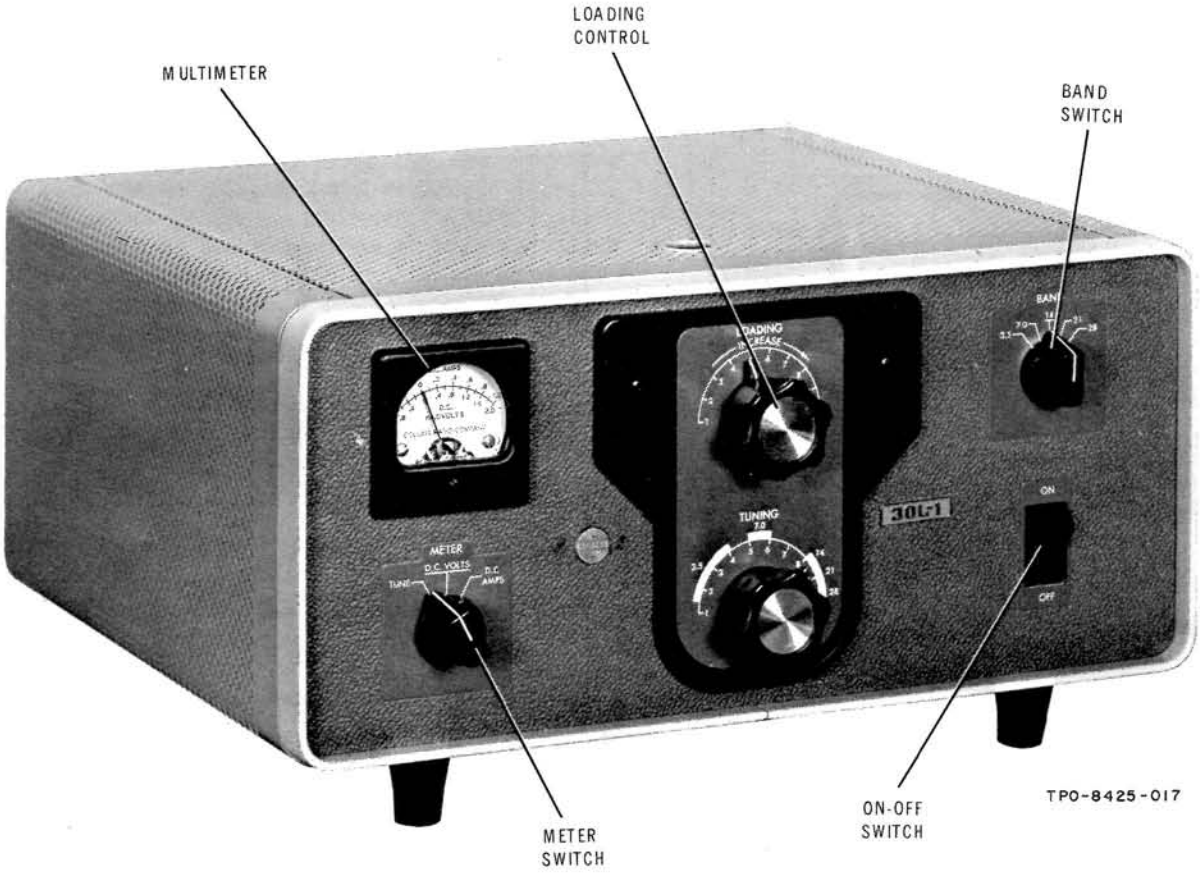


Figure 2-1. 30L-1 Operating Controls

SECTION II
OPERATION

2.1 OPERATION IN AMATEUR BANDS.

Table 2-1 shows normal and full-scale meter readings. If the exciter is a KWM-2/2A or S-line, set exciter BIAS ADJUST to produce an idling plate current of 50 ma. Tune and load according to exciter instruction book.

a. Connect the antenna for the band in use to the RF OUTPUT jack on the 30L-1. (When the ON-OFF switch is in the OFF position, the transfer relay in the 30L-1 connects the antenna to the exciter.)

b. Make sure the ON-OFF switch in the 30L-1 is in the OFF position as shown in figure 2-1.

c. Tune and load the exciter into the antenna. If the antenna does not present a nearly 50-ohm resistive load, the exciter can be tuned and loaded into a 50-ohm dummy load, such as the DL-1. When switched to the input of the 30L-1, the exciter will then remain in tune.

d. If using a Collins exciter, switch back to TUNE position, and set MIC GAIN to OFF position.

e. Set the 30L-1 METER switch to the TUNE position.

f. Set BAND switch to same band as that of the exciter, LOADING control to 1 on the dial, and TUNING control to white area for the band in use.

g. Press the 30L-1 ON-OFF switch to the ON position.

h. Set MIC GAIN control to about 3/4 scale. (When using exciters other than KWM-2/2A or S-Line types, set microphone gain or carrier insertion control to drive 30L-1 to approximately 300 ma for tuneup. Apply drive for short periods only to prevent overloading power supply or overheating tubes.

i. Immediately adjust TUNING control for multimeter dip.

j. Alternately adjust TUNING and LOADING controls for zero multimeter reading. The meter will indicate zero at the dip when the amplifier is properly tuned and loaded. Always make the TUNING adjustment for meter dip as the last adjustment.

k. Switch the exciter to the desired sideband or to CW, and set the exciter MIC GAIN control to provide 6-db alc indication. The station is now ready to operate at rated power input.

l. Once the equipment has been tuned up on a given frequency, the 30L-1 may be switched in or out of the circuit at will by operating the ON-OFF switch. Output power from the amplifier is available instantly with no warm-up period required.

CAUTION

DO NOT operate the 30L-1 into a load presenting a vswr greater than 2 to 1. The equipment might not function properly and damage can result. DO NOT operate the amplifier in continuous key-down condition at full input for more than 30 seconds. The power supply can be damaged. DO NOT use the 30L-1 in FSK, AM, or FM service. DO NOT use slow-blow fuses, or fuses larger than the 8-ampere type supplied.

2.2 OPERATION WITH OTHER MAKES OF EXCITERS.

Tune according to the procedure outlined in paragraph 2.1. If alc is not used, do not overdrive either the exciter or the final amplifier. Normal plate current meter readings for the 30L-1 are from 300 to 350 ma on voice peaks. Actual plate current under these conditions will peak at approximately 600 to 700 ma. Be sure the exciter is capable of producing the required drive without excessive distortion. If not, the amplifier should be operated at reduced level.

2.3 OPERATION OUTSIDE AMATEUR BANDS.

Operation outside amateur band limits requires retuning of the 30L-1 input circuits. This is necessary to present the proper load impedance to the exciter. For procedure, refer to paragraph 4.4.

TABLE 2-1. MULTIMETER SCALE VALUES

METER SWITCH SETTING	FULL-SCALE INDICATION	NORMAL INDICATION
Tune	Not applicable	Zero when 30L-1 is properly loaded
D. C. VOLTS	2000 volts	1800 volts (No modulation) 1600 volts (At rated load)
D. C. AMPS	1.0 amp (1000 ma)	600 ma (Key down CW) 300-350 ma (SSB voice peaks) 110 ma (Keyed, no excitation)

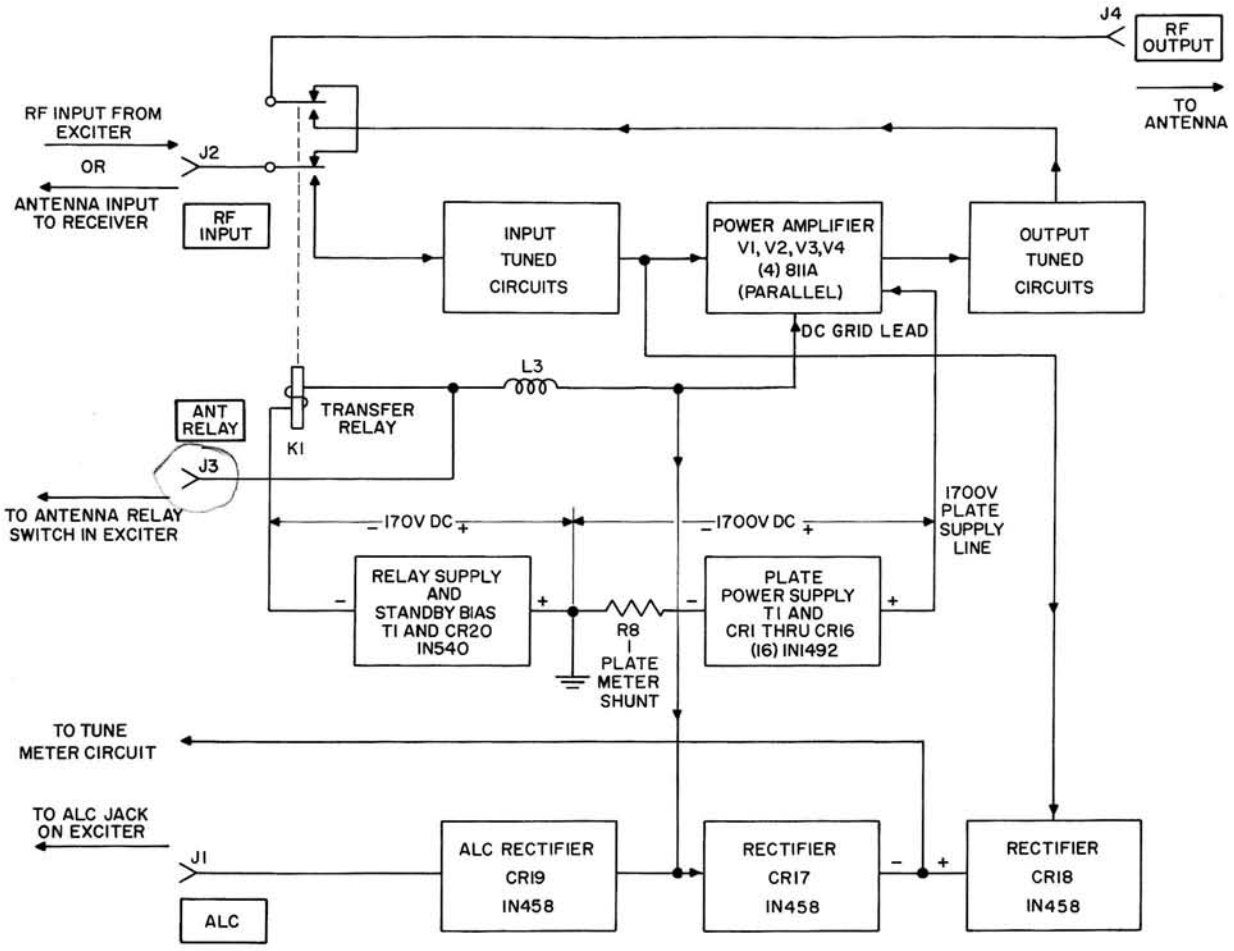


Figure 3-1. 30L-1 Block Diagram

SECTION III
PRINCIPLES OF OPERATION

3.1 GENERAL.

The 30L-1 is a portable r-f linear power amplifier, and includes its own solid state plate power and bias supplies. It is capable of 1000 watts PEP input power in SSB or 1000 watts d-c input in CW service with any exciter (such as the 32S-( ) or KWM-( )) capable of 70 watts PEP nominal output. It covers the amateur bands between 3.5 and 29.7 mc. In addition, the amplifier may be operated outside the amateur bands over certain ranges of frequency. These ranges are specified in table 4-1. The power amplifier stage uses four 811A triodes connected in parallel with cathode drive.

3.2 INPUT CIRCUITS.

Refer to figures 3-1 and 7-2. Broadband pi-network circuits couple the exciting signal into the cathode circuits of the power amplifier tubes. The tuned input circuits provide increased efficiency, reduced distortion, and a better impedance match for the exciter than normally would be obtained with an untuned input. Tuning adjustments are not required except for operation outside the amateur bands.

3.3 OUTPUT CIRCUITS.

The plate circuit of the power amplifier is tuned by a pi network consisting of C32, L9, L10, and C33. Capacitor C32 resonates the tank circuit at the frequency in use. It is adjusted by the TUNING control on the front panel. The four-gang capacitor, C33, is adjusted by the LOADING control to match the pi-network circuit to the impedance presented by the antenna and feed system in use. Output from the plate tank circuit is connected through the contacts of antenna changeover relay, K1, to the antenna when the control circuits are energized.

3.4 POWER SUPPLY CIRCUITS.

Two d-c power supplies and one a-c filament supply are included in the 30L-1. Tne amplifier may be connected to a 115-volt single-phase or to a 230-volt,. three-wire, single-phase source. Power transformer T1 has two primary windings. These windings are connected in parallel for 115-volt operation, and in series for 230-volt operation. The 6.3-volt secondary winding provides filament power for the 811A tubes through r-f choke L8. It also powers the pilot lamp in the meter. Another secondary winding applies voltage through surge resistor R9 to semiconductor rectifier CR20. This is a half-wave circuit connected to furnish blocking bias to the amplifier tubes under receive conditions and operating bias when transmitting. It also furnishes power for changeover relay K1. Voltage from the third secondary winding is applied to two semiconductor rectifier strings connected in a full-wave voltage doubler configuration. These strings consist of CR1-CR8, C44-C51 in one string, and CR9-CR16, C52-C59 in the other. The parallel capacitors equalize the reverse voltages impressed across the diode junctions and protect against damage by transients. This supply provides approximately 1600 volts d-c under load for the amplifier tube plates, and approximately 1800 volts unloaded.

3.5 SAFETY INTERLOCK CIRCUITS.

The r-f and power supply compartment covers operate safety interlock switches. Switches S5 and S7 are located in the power supply compartment and switch S6 is located in the r-f compartment. Cover removal closes these switches and shorts the high voltage to ground. This prevents accidental contact with high-voltage d-c which is present in either compartment.

WARNING

DO NOT BLOCK INTERLOCK SWITCHES. Contact with voltages in this equipment can be fatal. Disconnect the a-c power plug before removing any of the covers.

3.6 POWER CONTROL CIRCUITS.

Refer to figure 3-2. The front-panel ON-OFF switch breaks one side of the a-c line in the OFF position. When operated to the ON position, a-c power is applied to the power transformer primaries and the tube-cooling fan B1. Overload protection is provided by eight-ampere fuses F1 and F2. These are used for both 115-volt a-c and 230-volt a-c operation.

3.7 ALC CIRCUITS.

Automatic load control (alc) is a compressor circuit operating at radio frequencies. In the 30L-1, the grid-to-plate capacitances of the amplifier tubes in conjunction with capacitors C22, C23, C24, and C25 form capacitive voltage dividers. Under modulation, an r-f voltage is developed across these dividers and L3. It is coupled to the alc rectifier CR19 through capacitor C72. The r-f voltage is rectified and filtered to produce a negative d-c control voltage which is proportional to the modulation level. (The load resistor for CR19 must be provided by the exciter alc circuits.) This voltage is applied to the control grid of a low-level r-f amplifier tube or tubes in the exciter. The time constants of these circuits have a fast

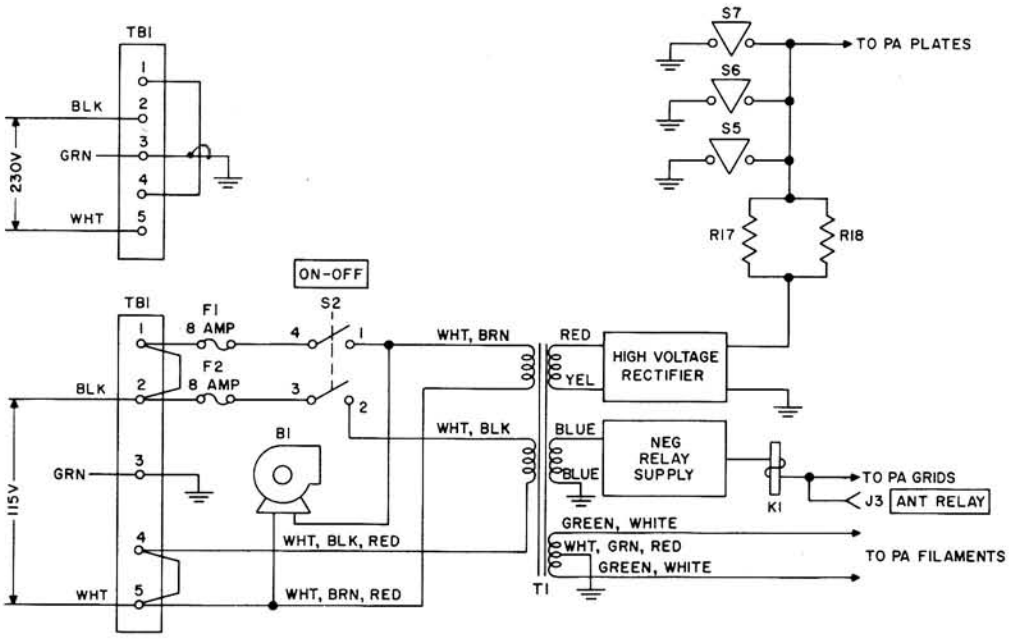


Figure 3-2. Control and Interlock Circuits

attack, slow-release characteristic. The alc threshold is controlled by the amount of reverse bias on CR19. This voltage is developed across R7 in the plate supply bleeder network, and varied by potentiometer R16. It is adjusted at the factory for optimum operation in conjunction with the internal alc circuits of exciters such as the KWM-( ), or 32S-( ). Normally it will not need readjustment.

This system allows a high average level of modulation and optimum power output from the amplifier, within the rated limits of distortion.

3.8 METERING CIRCUITS.

One section of the METER switch, S3, selects the output voltage from a tuning and loading bridge circuit. This circuit consists of the power amplifier tubes, CR17, CR18, and the associated load resistors and filter networks. The bridge is balanced when the plate circuit TUNING and LOADING controls are adjusted to present the proper load impedance to the power amplifier plates. The meter then will read zero.

The second section of the meter switch connects the meter to the plate supply through a four-megohm multiplier resistor to indicate the d-c voltage output. It is read on the D.C. KILOVOLT scale.

The third section of the meter switch connects the meter, through R10, across shunt, R8. This indicates power amplifier plate current. It is read on the D.C. AMPS scale.

SECTION IV
MAINTENANCE

4.1 GENERAL.

Adjustment of the 30L-1 r-f input circuits requires the following equipment.

a. R-f wattmeter and directional coupler, such as are included in the 312B-4 or 312B-5 Station Controls, or the 302C-3 Directional Wattmeter.

b. 50-ohm, 500-watt, nonreactive dummy load. (For short tests where key-down conditions do not exceed 30 seconds, the DL-1 Dummy Load can be used when applicable.)

A fuse consisting of a number 28 wire in the center-tap ground return of the filament winding of T1 is included to protect the PA tubes from excessive plate current. The fuse is connected between the two outer lugs of a terminal strip located near R11 in the power supply compartment (refer to figure 6-1). Under some conditions, the amplifier may appear to function normally even though this fuse has blown; however, this causes hum to appear on the output signal. Check for shorts in the filament circuit.

4.2 REMOVAL OF CABINET AND COVERS.

a. Lift the cabinet lid, and remove the two Phillips-head screws located at the top-front edge of the cabinet. Remove the four feet and the Phillips-head screw located midway between the rear feet. Push the amplifier forward from the rear until the front panel projects from the cabinet about a half inch. Grasping the front panel at the edges, carefully slide the amplifier out of the cabinet, making sure the a-c power cord clears.

b. To remove the r-f compartment upper cover, loosen the ten screws about three turns, slide the cover toward the front panel, and lift off.

c. To remove the power supply compartment upper cover, remove screws located about the edges of the cover.

d. To remove the bottom cover, remove two round Phillips-head screws from each end of the cover and three flat-head screws near the middle of the cover, and lift off.

4.3 BLOWER LUBRICATION.

Every 1000 hours of operation (or 6 months, whichever comes first), lubricate the blower motor bearings with three or four drops of sewing machine oil. Do not overlubricate.

4.4 ALIGNMENT OF R-F INPUT CIRCUITS.

a. Remove the amplifier from its cabinet as outlined in paragraph 4.2. Do not remove any of the covers. To align for amateur band coverage, proceed as follows:

b. Connect a directional wattmeter (312B-4/5 station control wattmeter, 302C-3 directional wattmeter, or equivalent) between the exciter output and the RF INPUT jack, J2, on the 30L-1. Connect a 50-ohm, 1000-watt dummy load to R-F OUTPUT jack, J4.

c. Tune and load the 30L-1 at 28.5 mc. Position the 30L-1 METER switch to the TUNE position.

d. Apply 30 watts of forward drive power to the 30L-1 (as monitored on the wattmeter installed in step b above.) When using the KWM-2/2A or S-Line

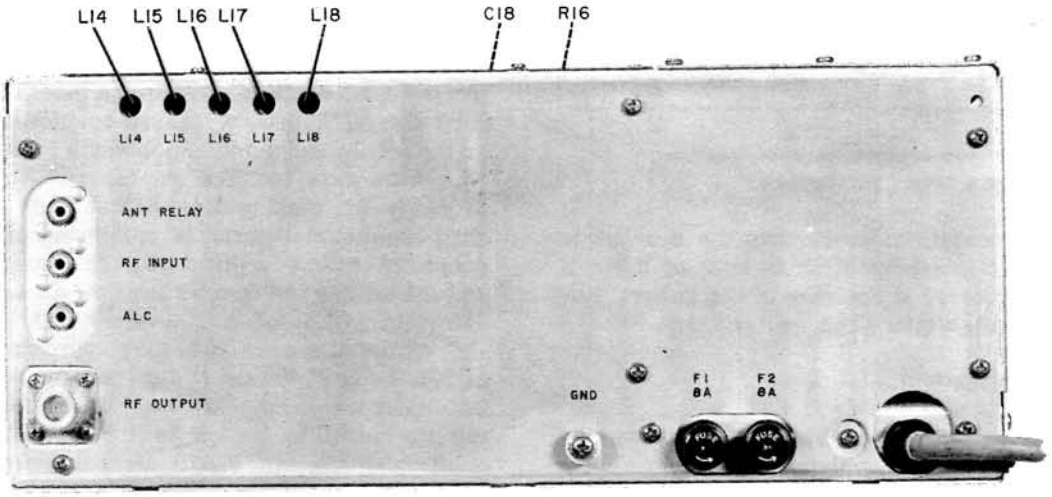


Figure 4-1. Location of Adjustments

equipment, this can be done by positioning the EMISSION switch to the LOCK KEY position and adjusting the MIC GAIN control to the desired level.

e. Tune L14 until minimum reflected power is indicated on the wattmeter installed in step b above, readjusting the exciter as necessary to maintain 30 watts of forward drive power. Continue adjusting L14 for minimum reflected power (the reflected power level should not exceed 3.3 watts). Refer to figure 4-1 for location of L14.

f. Repeat the above procedure at the middle frequency of each band, adjusting L15, L16, L17, and L18 when aligning the 21.0-, 14.0-, 7.0-, and 3.5-mc bands respectively.

For general coverage, use the same procedure as above, except set the exciter to a frequency which is in the middle of the desired band. Useful bandwidth at the new alignment frequencies is approximately the same as that for the amateur bands. Do not attempt alignment to place the new operating bands outside the ranged listed in table 4-1 for the BAND switch positions indicated. Also, do not attempt amateur band operation on a BAND switch position for which the tuned circuits have been realigned for out-of-band operation.

TABLE 4-1
FREQUENCY COVERAGE ALLOWABLE BY REALIGNMENT

BAND SWITCH SETTINGS	LOWER LIMIT (mc)	UPPER LIMIT (mc)
3.5	3.4	6.0
7.0	6.0	9.5
14	9.5	16.0
21	16.0	22.0
28	22.0	30.0

4.5 METER LAMP REPLACEMENT.

To replace the meter lamp, remove the bracket to which the socket is fastened. It is held by a small machine screw located at the rear of the meter. Replace the lamp with a type 47 or equivalent.

4.6 TUBE REPLACEMENT.

The tubes may be replaced without removing the amplifier cabinet by removing the r-f compartment top cover and installing new tubes from the top. The following is an alternate method which provides better access to the tube sockets.

Remove the cabinet, r-f compartment top cover, and bottom cover as outlined in paragraph 4.2. Disconnect plate connectors and remove old tubes. Install the upper pair of replacements from the top of the amplifier. Install the lower pair from the bottom. The locating pin on the base of each of the tubes should point away from the power supply compartment. Attach plate leads, making sure they clear other components. Replace covers and cabinet.

WARNING

DO NOT BLOCK INTERLOCK SWITCHES. Dangerous voltages are present in this equipment. The high voltage is interlocked with the amplifier covers. Make no attempt to put the amplifier into service until the procedure outlined above has been completed.

4.7 TUNE METER ADJUSTMENT.

a. Make normal connections between the exciter and 30L-1.

b. Connect a 50-ohm, 1000-watt dummy load to RF OUTPUT jack J4.

c. Connect the vertical input of a wide-band oscilloscope across the dummy load.

d. Introduce a two-tone audio input signal (1200 and 1900 cps at approximately 15 mv) to the exciter microphone input jack.

e. Tune and load the 30L-1 at 14.3 mc.

f. Position the 30L-1 METER switch to the TUNE position, and decrease the drive level to zero (when using the KWM-2/2A or S-Line equipment this can be done by positioning the MIC GAIN control completely counterclockwise).

g. Set up the exciter for upper sideband operation (when using the KWM-2/2A or S-Line equipment this can be done by positioning the function switch to the USB position).

h. Monitoring the output waveform on the oscilloscope, increase the exciter output (when using the KWM-2/2A or S-Line equipment, this is done by turning the MIC GAIN control in the clockwise direction) until the 30L-1 output ceases to increase, or peaks on the oscilloscope indication begin to flatten.

i. Make sure that the exciter and 30L-1 are tuned properly by making fine adjustments to both units until maximum output, as monitored on the oscilloscope, is obtained without peak flattening. The output voltage across the dummy load should be not less than 450 volts peak to peak (160 volts rms).

j. Adjust the exciter to give approximately 300 ma of 30L-1 plate current at dip (when using the KWM-2/2A or S-Line equipment, this can be done by positioning the function switch to the TUNE position and positioning the MIC GAIN control approximately 3/4 fully clockwise). An access hole is provided to adjust C18 through the top cover of the 30L-1 with the cabinet lid raised. Refer to figure 6-2 for location of C18.

Adjust C18 with an alignment tool to produce a reading of zero on the 30L-1 multimeter.

4.8 ALC THRESHOLD ADJUSTMENT.

a. Perform steps a, b, d, and e of paragraph 4.7. Omit step c.

b. Disconnect alc cable between exciter and 30L-1.

c. Using USB or LSB emission, increase drive until indicated alc is about 4 db (S-4) on exciter meter.

d. Reconnect alc cable, and adjust R16 with insulated tuning tool for a 3-db (one S-unit) increase in alc.

CAUTION

Adjustments to tune meter and alc circuits should not be made unless the need has been clearly determined. If trouble is experienced, check PA tubes and exciter first. Improper adjustments can result in damage to amplifier and a distorted output signal. Do not attempt to make adjustments without proper test equipment.

SECTION V
SPECIFICATIONS

Size	6-9/16 in. high, 14-3/4 in. wide, 13-3/4 in. deep (overall).
Weight	38 pounds.
Frequency range	3.5-29.7 mc, covering all amateur bands. By retuning input coils as necessary, the following general-coverage bands may be covered:

FREQUENCY BAND	TOTAL COVERAGE
3.5 mc	3.4-6.0 mc
7.0 mc	6.0-9.5 mc
14 mc	9.5-16.0 mc
21 mc	16.0-22.0 mc
28 mc	22.0-30.0 mc

Mode	SSB or CW
Type of Service	SSB - continuous voice modulation. CW - 50-percent duty cycle (continuous key-down conditions not to exceed 30 seconds duration).
Plate power input	CW - 1000 watts. SSB - Nominal PEP input of 1000 watts with speech. Third order distortion products at this level are at least 30 db down from signal.
Drive power requirements	70 watts.
Primary power requirements	230 volts a-c ±10%, 3-wire, single phase, at 7.5 amperes max, or 115 volts a-c ±10% at 15 amperes max, 50-400 cps. Operation from a line frequency other than 50-60 cps requires an auxiliary 60-cps supply for fan motor.
Input impedance	52 ohms.
Output impedance	52 ohms unbalanced with vswr not to exceed 2 to 1 on the amateur bands.
Noise level	40 db down from output signal with 1-kw single-tone input.
Harmonic output	All harmonics at least 40 db down from output signal.
Vacuum tubes	Type 811A triodes (4).
Available accessories	Model 351E-4 mounting plate (Collins part number 522-1482-003). This plate can be used when installing the 30L-1 in an airplane, boat, or similar location requiring a rigid mount. A luggage-type carrying case is also available.

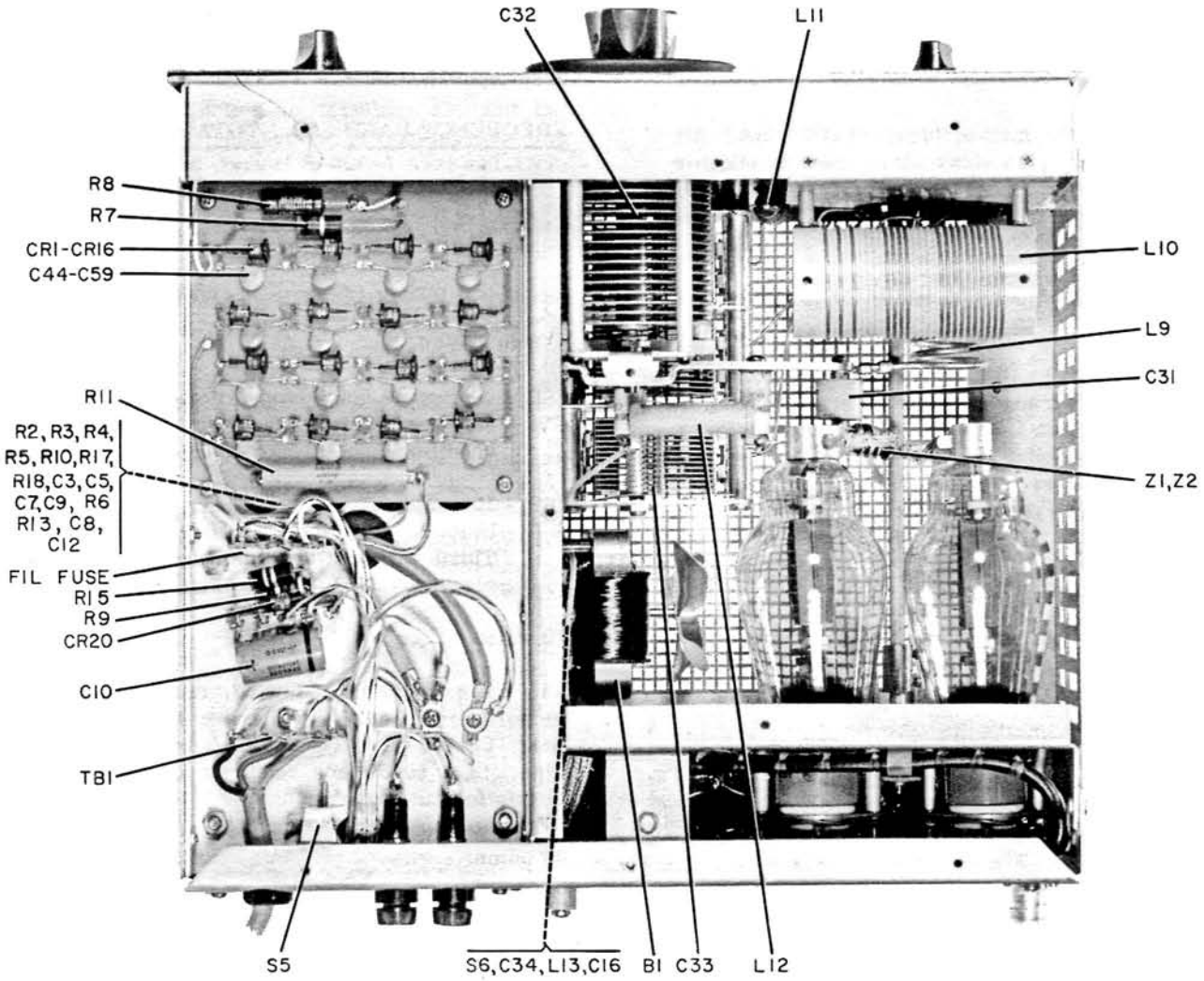


Figure 6-1. R-F and Power Supply Compartments, Parts Location

SECTION VI
PARTS LIST

30L-1 R-F Linear Amplifier

M	DESCRIPTION	COLLINS PART NUMBER
	30L-1 R-F LINEAR AMPLIFIER	522-2375-00
B1	FAN, AXIAL: 4 blades; 115 v a-c, 60 cps, single phase, 3200 rpm; cw rotation	547-3702-00
C1	CAPACITOR, FIXED, CERAMIC: 10,000 uuf +100% -20%, 500 v d-c; Sprague Electric of Wisconsin	913-3013-00
C2	CAPACITOR, FIXED, CERAMIC: same as C1	913-3013-00
C3	CAPACITOR, FIXED, ELECTROLYTIC: 100 uf -10% +100%, 450 v d-c; Sprague Electric Co. part no. D33647	183-1567-00
C4	CAPACITOR, FIXED, CERAMIC: 10,000 uuf ±20%, 100 v d-c; Centralab Division of Globe Union part no. DA134-048CB	913-3922-00
C5	CAPACITOR, FIXED, ELECTROLYTIC: same as C3	183-1567-00
C6	CAPACITOR, FIXED, CERAMIC: same as C4	913-3922-00
C7	CAPACITOR, FIXED, ELECTROLYTIC: same as C3	183-1567-00
C8	CAPACITOR, FIXED, ELECTROLYTIC: same as C3	183-1567-00
C9	CAPACITOR, FIXED, ELECTROLYTIC: same as C3	183-1567-00
C10	CAPACITOR, FIXED, ELECTROLYTIC: 10 uf -10%, +100%, 250 v d-c; Sprague Electric Co. part no. D34441	183-1563-00
C11	CAPACITOR, FIXED, CERAMIC: same as C1	913-3013-00
C12	CAPACITOR, FIXED, ELECTROLYTIC: same as C3	183-1567-00
C13	CAPACITOR, FIXED, MICA: 47 uuf ±5%, 500 v d-c; Electro Motive part no. DM15E470-01J	912-2792-00
C14	CAPACITOR, FIXED, MICA: 100 uuf ±5%, 500 v d-c; Electro Motive part no. DM15F101-01J	912-2816-00
C15	CAPACITOR, FIXED, CERAMIC: same as C1	913-3013-00
C16	CAPACITOR, FIXED, CERAMIC: 0.005 uf ±20%, 3000 v d-c; Centralab	913-4329-00
C17	CAPACITOR, FIXED, CERAMIC: same as C1	913-3013-00
C18	CAPACITOR, VARIABLE, CERAMIC: 8.0 uuf min 75.0 uuf max, 350 v d-c; Erie Resistor Corp. part no. 557018 V2P034R	917-1075-00
C19	CAPACITOR, FIXED, MICA: 270 uuf ±5%, 500 v d-c; Electro Motive part no. DM15F271-01J	912-2846-00
C20	CAPACITOR, FIXED, CERAMIC: same as C1	913-3013-00
C21	CAPACITOR, FIXED, CERAMIC: same as C1	913-3013-00
C22	CAPACITOR, FIXED, MICA: 220 uuf ±5%, 500 v d-c; Electro Motive part no. DM15F221-01J	912-2840-00
C23	CAPACITOR, FIXED, MICA: same as C22	912-2840-00
C24	CAPACITOR, FIXED, MICA: same as C22	912-2840-00
C25	CAPACITOR, FIXED, MICA: same as C22	912-2840-00
C26 thru C30	CAPACITOR, FIXED, CERAMIC: same as C1	913-3013-00
C31	CAPACITOR, FIXED, CERAMIC: 1000 uuf ±20%, 5000 v d-c; Centralab Division of Globe Union part no. 71590	913-0101-00
C32	CAPACITOR, VARIABLE AIR: 15 uuf min 353.0 uuf max; E. F. Johnson part no. 154-2	920-0066-00
C33	CAPACITOR, VARIABLE AIR: 30,000 megohms, 14 uuf min 432 uuf max; Radio Condenser Co. part no. CN-817319	921-0018-00
C34	CAPACITOR, FIXED, CERAMIC: same as C16	913-4329-00
C35	CAPACITOR, FIXED, CERAMIC: 1000 uuf +80% -20%, 500 v d-c; Erie Resistor Corp. part no. 327047 X5T0 1027	913-1292-00
C36 thru C43	CAPACITOR, FIXED, CERAMIC: same as C35	913-1292-00
C44	CAPACITOR, FIXED, CERAMIC: 1000 uuf +100% -20%, 500 v d-c; Erie Resistor Corp. part no. 851000 X5U0 1022	913-3009-00
C45 thru C59	CAPACITOR, FIXED, CERAMIC: same as C44	913-3009-00
C60	CAPACITOR, FIXED, MICA: 82 uuf ±5%, 500 v d-c; Electro Motive part no. DM15E820-01J	912-2810-00
C61	NOT USED	
C62	CAPACITOR, FIXED, MICA: 510 uuf ±5%, 300 v d-c; Electro Motive Mfg. Co. part no. DM15F510J03	912-2867-00
C63	CAPACITOR, FIXED, MICA: same as C22	912-2840-00
C64	CAPACITOR, FIXED, MICA: same as C22	912-2840-00
C65	CAPACITOR, FIXED, MICA: 180 uuf ±5%, 500 v d-c; Electro Motive part no. DM15F111-01J	912-2834-00
C66	CAPACITOR, FIXED, MICA: 330 uuf ±5%, 500 v d-c; Electro Motive part no. DM15331-01J	912-2852-00
C67	CAPACITOR, FIXED, MICA: same as C22	912-2840-00
C68	CAPACITOR, FIXED, MICA: 220 uuf ±5%, 500 v d-c; Electro Motive part no. DM15F221-01J	912-2840-00
C69	CAPACITOR, FIXED, MICA: 150 uuf ±5%, 500 v d-c; Electro Motive part no. DM15F151-01J	912-2828-00
C70	CAPACITOR, FIXED, MICA: same as C65	912-2834-00
C71	CAPACITOR, FIXED, CERAMIC: same as C35	913-1292-00
C72	CAPACITOR, FIXED, MICA: same as C13	912-2792-00
C73	CAPACITOR, FIXED, MICA: same as C14	912-2816-00
C74	CAPACITOR, FIXED, CERAMIC: same as C1	913-3013-00
C75	CAPACITOR, FIXED, MICA: same as C69	912-2828-00
C76	CAPACITOR, FIXED, MICA: same as C14	912-2816-00
CR1	SEMICONDUCTOR DEVICE, DIODE: silicon; JEDEC type 1N1492	353-1661-00
CR2 thru CR16	SEMICONDUCTOR DEVICE, DIODE: same as CR1	353-1661-00
CR17	SEMICONDUCTOR DEVICE, DIODE: silicon; JEDEC type 1N458	353-0205-00
CR18	SEMICONDUCTOR DEVICE, DIODE: same as CR17	353-0205-00
CR19	SEMICONDUCTOR DEVICE, DIODE: same as CR17	353-0205-00
CR20	SEMICONDUCTOR DEVICE, DIODE: silicon; JEDEC type 1N540	353-1546-00
DS1	LAMP: incandescent, pilot light bulb with miniature bayonet base, 6.3v, 0.15 amp #47	262-3240-00
F1	FUSE, CARTRIDGE: 8 amp, 250 v d-c; glass body ferrule type terminal; Littelfuse Inc. part no. 314008	264-4110-00
F2	FUSE, CARTRIDGE: same as F1	264-4110-00
J1	JACK, TIP: accommodates 1/8 in. plug; ceramic insulation brass contacts; Howard B. Jones Division of Cinch Mfg. Corp. part no. 201-11-01-018	360-0088-00
J2	JACK, TIP: same as J1	360-0088-00
J3	JACK, TIP: same as J1	360-0088-00
J4	CONNECTOR, RECEPTACLE, ELECTRICAL: 1 contact, 1 mating end; straight shape; 0.731 in. lg. by 1.000 in. w by 1.000 in. h; Communication Electronic Nomenclature Subpanel part no. UG-58A/U	357-9003-00
K1	RELAY, ARMATURE: dpdt; 2 C; 2 amp, 175 w; 2-30 mc; 1-11/16 in. lg by 1-9/16 in. h; Potter and Brumfield, Inc. part no. KRP2565-1	970-2140-00
L1	NOT USED	
L2	NOT USED	
L3	COIL, RADIO FREQUENCY: single layer wound, solenoid, #21 or #22 AWG copper wire 39.0 uh, 0.80 ohms dc, 760 ma current; Electro Assemblies Inc. part no. 18-366	240-0189-00
L4	P/O Z1	
L5	P/O Z2	
L6	NOT USED	
L7	NOT USED	
L8	COIL, RADIO FREQUENCY: single layer wound, no. 14 AWG, Formvar insulation; 7.5 uh; Electro Assemblies Inc. part no. 18-401	240-1244-00
L9	COIL, RADIO FREQUENCY: single layer wound; 6.5 turns no. 8 AWG	547-3718-002

SECTION VI
Parts List
30L-1 R-F Linear Amplifier

ITEM	DESCRIPTION	COLLINS PART NUMBER
L10	COIL, RADIO FREQUENCY: single layer wound; 17 turns no. 14 AWG	547-3708-003
L11	COIL, RADIO, FREQUENCY: 4 sections; 2.5 mh, 60 ohms, 1.75 uuf 500 v d-c; James Millen Mfg. Co., Inc. part no. 34103	240-0059-00
L12	COIL, RADIO FREQUENCY: single layer wound, 44 uh at 2.5 mc inductance, 3.54 ohm d-c resistance, 1.6 amp current capacity; Ohmite Mfg. Co., part no. Z-14PBM17	240-0807-00
L13	COIL, RADIO FREQUENCY: single layer wound; 2.2 uh, 1980 ma current; 0.20 ohm; Electro Assemblies Inc. part no. 18-351	240-0174-00
L14	COIL, RADIO FREQUENCY: single layer wound; 2 turns	547-3659-00
L15	COIL, RADIO FREQUENCY: single layer wound; 7 turns no. 22 AWG	547-3660-003
L16	COIL, RADIO FREQUENCY: single layer wound; 9 turns no. 22 AWG	547-3661-003
L17	COIL, RADIO FREQUENCY: single layer wound; 14 turns no. 22 AWG	547-3662-003
L18	COIL, RADIO FREQUENCY: single layer wound; 9 turns no. 22 AWG	547-3663-003
L19	COIL, RADIO FREQUENCY: 1.5 uh, 0.12 ohm d-c resistance ±20%, 2600 MA d-c current 9/32 in. dia 15/16 in. lg. two wire leads no. 21 & no. 22; Electro Assemblies Inc. part no. 18-350	240-0173-00
M1	METER, ELECTRICAL: 200-0-500 ua meter range, 190 ohms, ±2%, 2-1/2 in. sq, molded thermosetting plastic; Sun Electric Corp. part no. 521L	458-0592-00
O1	KNOB, FLUTED, NO. 25: phenolic; 1.50 in. dia.	544-0764-004
O2	KNOB, FLUTED, NO. 25: same as O1	544-0764-004
O3	KNOB, POINTER, NO. 25: phenolic; 1.50 in. dia.	547-3656-002
O4	KNOB, POINTER, NO. 25: same as O3	547-3656-002
R1	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%, 1/2 w; Allen-Bradley type EB	745-1380-00
R2	RESISTOR, FIXED, WIRE-WOUND: 25,000 ohms ±5%, 26 w; Clarostat Mfg. Co. Inc. part no. CM28047	746-9155-00
R3	RESISTOR, FIXED, WIRE-WOUND: same as R2	746-9155-00
R4	RESISTOR, FIXED, WIRE-WOUND: same as R2	746-9155-00
R5	RESISTOR, FIXED, WIRE-WOUND: same as R2	746-9155-00
R6	RESISTOR, FIXED, WIRE-WOUND: same as R2	746-9155-00
R7	RESISTOR, FIXED, COMPOSITION: 1500 ohms ±10%, 2 w; Allen-Bradley type HB	745-5659-00
R8	RESISTOR, FIXED, WIRE-WOUND: 1.0 ohm ±1%, 5 w; OPTO Mechanisms, Inc. part no. 1550S1.0-1PCT	747-9716-00
R9	RESISTOR, FIXED, COMPOSITION: 47 ohms ±10%, 2 w; Allen-Bradley type HB	745-5596-00
R10	RESISTOR, FIXED, FILM: 1780 ohms ±1%, 1/4 w; IRC type MDB	705-7108-00
R11	RESISTOR, FIXED, FILM: 4,000,000 ohms ±1%, 2 w; IRC type MDH	705-4260-00
R12	RESISTOR, FIXED, WIRE-WOUND: 2000 ohms ±10%, 7 w at +40° C to 3.5 w at +150° C; IRC type PW7	710-9010-00
R13	RESISTOR, FIXED, WIRE-WOUND: same as R2	746-9155-00
R14	NOT USED	
R15	RESISTOR, FIXED, COMPOSITION: 10,000 ohms ±10%, 2 w; Allen-Bradley type HB	745-5694-00
R16	RESISTOR, VARIABLE: composition; 5000 ohms ±20%, 0.3 w; CTS Corp. part no. 376-0205-00	376-0205-00
R17	RESISTOR, FIXED, COMPOSITION: 10 ohms ±10%, 2 w; Allen-Bradley type HB	745-5568-00
R18	RESISTOR, FIXED, COMPOSITION: same as R17	745-5568-00
R19	RESISTOR, FIXED, COMPOSITION: 39,000 ohms ±10%, 1/2 w; Allen-Bradley type No. EB	745-1419-00
R20	RESISTOR, FIXED, COMPOSITION: same as R19	745-1419-00
R21	RESISTOR, FIXED, COMPOSITION: 47 ohms ±10%, 1 w; Allen-Bradley type GB	745-3296-00
R22	RESISTOR, FIXED, COMPOSITION: same as R21	745-3296-00
R23	RESISTOR, FIXED, COMPOSITION: same as R21	745-3296-00
R24	RESISTOR, FIXED, COMPOSITION: same as R21	745-3296-00
R25	P/O Z1	
R26	P/O Z2	
R27	NOT USED	
R28	RESISTOR, FIXED, COMPOSITION: 39 ohms ±10%, 1/2 w; Allen-Bradley Type EB	745-1293-00
S1	SWITCH, ROTARY: 2 circuit (2 pole), 18 position, 1 section, 2 moving, 12 fixed contacts; Oak Mfg. Co. part no. 214093-LK1	259-1385-00
S2	SWITCH, ROCKER: dpst; 20 amp, 250 v a-c non-inductive, 20 amp, 125 v a-c, 10 amp, 250 v a-c; McGill Mfg. Co. Inc. part no. 0811-113010109	266-6020-00
S3	SWITCH, ROTARY: 2 circuit (2 pole), 3 position, 1 section, 2 moving, 8 fixed contacts, Oak Mfg. Co., part no. 215870-F1	259-1368-00
S4	SWITCH, ROTARY: 3 circuit (3 pole), 5 position, 1 section; Centralab Division of Globe Union Inc., part no. PA230-1005	259-1386-00
T1	TRANSFORMER, POWER, STEP-DOWN AND STEP-UP: 115 v a-c, 115 v a-c primaries, 50 to 60 cps; 1600 v d-c at 600 ma, 120 v a-c at 20 ma, 6.3 v a-c at 16 amp secondaries; 4-7/16 in. by 5-1/4 in. by 5-3/8 in.; Stancor Electronics, Inc. part no. 30175	662-0010-00
TB1	TERMINAL BOARD: phenolic, 5 solder lug terminals; 1/16 in. by 3/8 in. by 1-7/8 in.; Cinch Mfg. Corp. part no. 1542-A	306-0550-00
TB2	TERMINAL BOARD: same as TB1	306-0550-00
TB3	TERMINAL BOARD: phenolic; incls 4 solder lug terminals; 1/16 in. by 3/8 in. 1-1/2 in.; Cinch Mfg. Corp. part no. 1909	306-0838-00
TB4	TERMINAL BOARD: same as TB1	306-0550-00
TB5	TERMINAL BOARD: phenolic; 3 terminals; solder lug type, 1-1/8 in. lg. by 3/8 in. w by 1/16 in. thk; Cinch Mfg. Corp. part no. 1520-A	306-9033-00
TB6	TERMINAL BOARD: same as TB5	306-9033-00
V1	ELECTRON TUBE: glass envelope, triode; Radio Corp. of America part no. 811	256-0053-00
V2 thru V4	ELECTRON TUBE: same as V1	256-0053-00
XF1	FUSEHOLDER: 15 amp-250 v; 11/16 in. w by 2-9/64 in. lg; Bussmann Fuse Division of McGraw-Edison Co. part no. HKP-HJR-22	265-1019-00
XF2	FUSEHOLDER: same as XF1	265-1019-00
XV1	SOCKET, ELECTRON TUBE: 5 amp 2000 v rms, 1-3/8 in. w by 2-5/32 in. h.; Amphenol-Borg Electronics Corp. part no. 49-RSS4	220-1451-00
XV2 thru XV4	SOCKET, ELECTRON TUBE: same as XV1	220-1451-00
Z1	SUPPRESSOR, PARASITIC: 6 turns no. 16 AWG wire, 100 ohms, 2 w resistor	547-3654-002
Z2	SUPPRESSOR, PARASITIC: same as Z1	547-3654-002

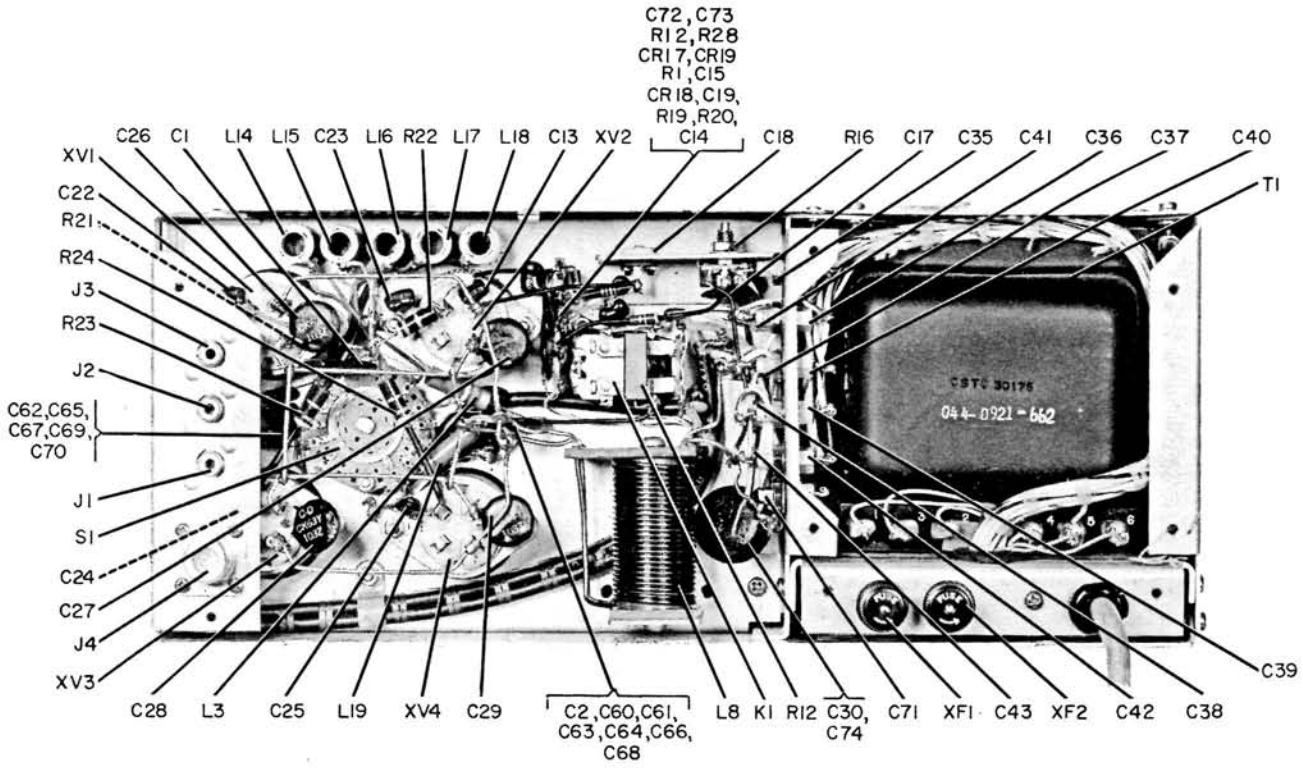
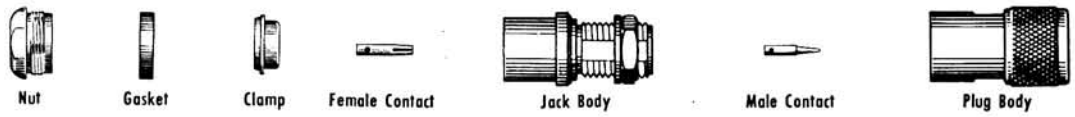


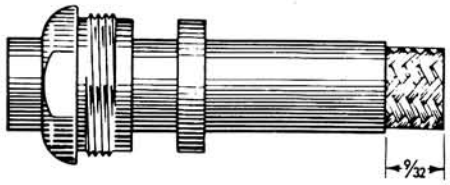
Figure 6-2. Input Circuitry, Parts Location

SECTION VII
ILLUSTRATIONS

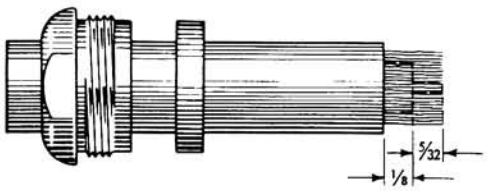
Connector Assembly Instructions

IMPROVED SERIES N

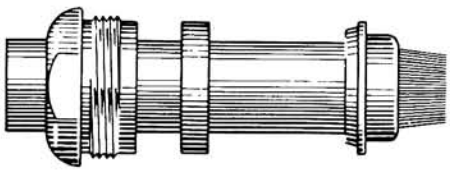




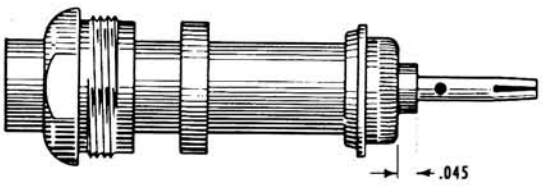
Place nut and gasket over cable and cut off jacket 9/32" from end.



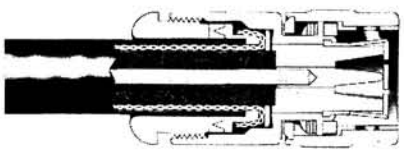
Comb out braid and fold out. Cut off cable dielectric flush 1/8" from end of jacket.



Pull braid wires forward and taper toward center conductor. Place clamp over braid and push back against cable jacket.



Fold back braid wires as shown, trim to proper length and form over clamp as shown. Solder contact to center conductor.



Insert cable and parts into connector body. Make sure sharp edge of clamp seats properly in gasket. Tighten nut.

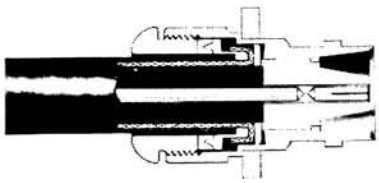


Figure 7-1. Connector Assembly Instructions

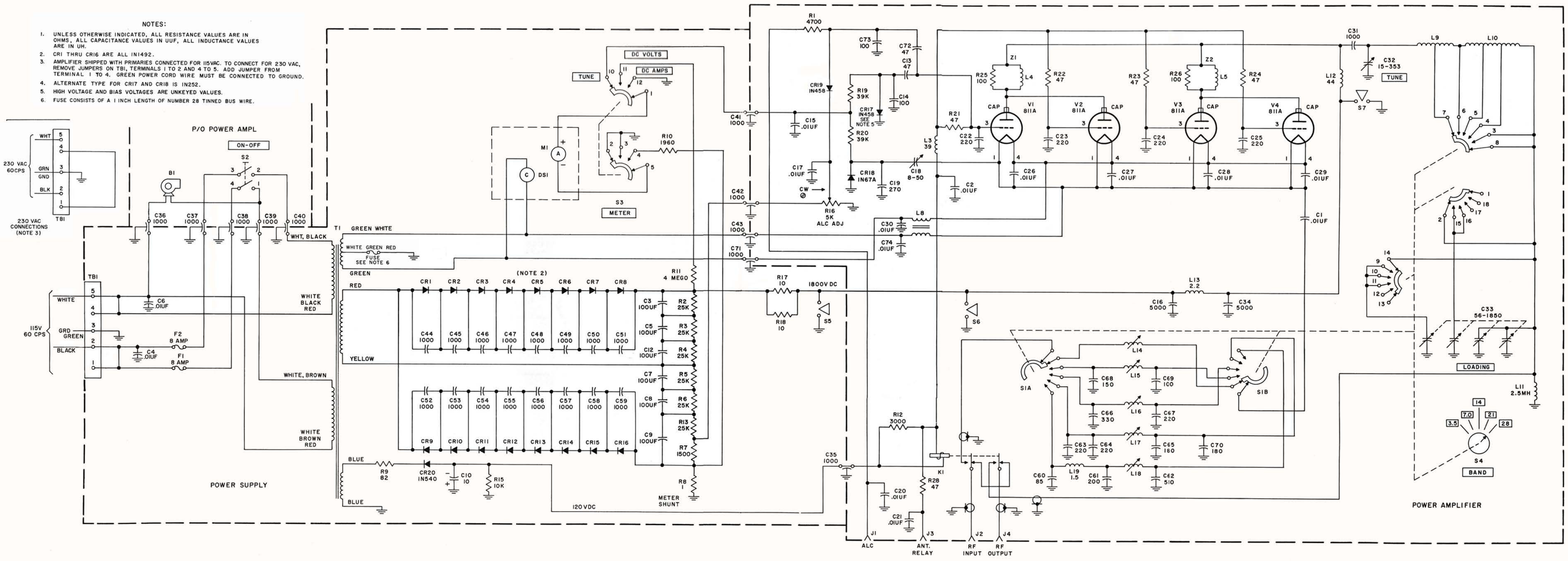


Figure 7-2. 30L-1 Schematic Diagram


COLLINS