COLLINS

instruction book

Collins Radio Company

831G-1
20-kW FM Transmitter

BROADCAST EQUIPMENT GUARANTEE

The equipment described herein is sold under the following guarantee:

a. Except as set forth in paragraph b. of this section, Collins agrees with Buyer to repair or replace, without charge, any properly maintained equipment, parts or accessories which are defective as to design, materials, or workmanship and which are returned in accordance with Collins instructions by Buyer to Collins factory, transportation prepaid, provided:
   1. Notice of a claimed defect in the design, materials or workmanship of the equipment manufactured by Collins is given by Buyer to Collins within five (5) years from date of delivery, with exception of rotating machinery such as blowers, motors, and fans whereby notice must be given by Buyer to Collins within two (2) years from date of delivery.
   2. Notice of a claimed defect in the design, materials or workmanship of the following described Collins manufactured equipment is given by Buyer to Collins within two (2) years from the date of delivery:

20V-3	26U-2	81M	172G-2	216C-2	313T-4	642A-2	820F-1	830D-1	830F-2A
26J-1	42E-7	144A-1	212H-1	313T-1	356H-1	786M-1	A830-2	830E-1	830H-1A
26U-1	42E-8	172G-1	212Z-1	313T-3	564A-1	820E-1	830B-1	830F-1	830N-1A

b. The above guarantee does not extend to other equipment, accessories, tubes, lamps, fuses, and tape heads manufactured by others which are subject to only adjustment as Collins may obtain from the supplier thereof.

c. 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.

d. The guarantee of this section is void if:
   1. The equipment malfunctions or becomes defective as a result of alterations or repairs by others than Collins or its authorized service center, or
   2. The equipment is exposed to environmental conditions more severe than specified by Collins in equipment manuals.

e. NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR INTENDED PURPOSE, SHALL BE APPLICABLE TO ANY EQUIPMENT SOLD HEREUNDER.

f. THE FOREGOING SHALL CONSTITUTE THE BUYER'S SOLE RIGHT AND REMEDY UNDER THE AGREEMENTS IN THESE SECTIONS. IN NO EVENT SHALL COLLINS HAVE ANY LIABILITY FOR CONSEQUENTIAL DAMAGES, OR FOR LOSS, DAMAGE OR EXPENSE DIRECTLY OR INDIRECTLY ARISING FROM THE USE OF THE PRODUCTS, OR ANY INABILITY TO USE THEM EITHER SEPARATELY OR IN COMBINATION WITH OTHER EQUIPMENT OR MATERIALS, OR FROM ANY OTHER CAUSE.

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   1. Notice of the sale of the F.C.C. license is given by Buyer to Collins in writing within thirty (30) days after the consummation of said sale; and
   2. No greater rights are granted to the purchaser of Buyer's F.C.C. license than are granted herein to Buyer.

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ADDRESS:

Collins Radio Company
Customer Returned Goods, 412-023
1225 North Alma Road
Richardson, Texas 75080

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) 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 subassemblies 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.

ADDRESS:

Collins Radio Company
Service Parts, 412-024
1225 North Alma Road
Richardson, Texas 75080

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)

1 December 1967

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COLLINS

instruction book

831G-1
20-kW FM Transmitter

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Figure 1-1. 831G-1 20-kW FM Transmitter.

section 1
general description

1.1 GENERAL DESCRIPTION

1.2 INTRODUCTION

When equipped with optional 786V-1 Stereo Generator and 786W-1 SCA Generator, the 831G-1 20-kw FM Transmitter provides continuous monophonic, stereophonic, and SCA (subsidiary communication authorization) frequency modulated service. The transmitter output frequency is determined by two crystals. The first is a 14-MHz crystal that is used in a reference oscillator to control the carrier frequency of the 14-MHz fm oscillator. The second crystal controls the oscillator that is used to heterodyne the 14-MHz fm signal to the customer-specified frequency. The transmitter operates in the fm broadcast range (88 to 108 MHz) at an output of 20,000 watts.

1.3 PHYSICAL DESCRIPTION

The transmitter is housed in a basic unistrut cabinet that contains all transmitter components. (Refer to figure 1-1.) The transmitter contains three sections. The section on the left in figure 1-1 contains the power amplifier and driver circuits. The center section houses the extended control panel, 310Z-1 Exciter, and control circuits. The section on the right in the figure contains the power supplies, the circuit breaker, and fuse panel.

Mechanical and electrical interlocks are provided on all access panels, the power amplifier plate cavity door, and grid tuning door.

1.4 FUNCTIONAL DESCRIPTION

The transmitter consists of an exciter, a driver, and power amplifier. The output of the exciter is applied to the driver. The driver stage consists of two 4CX250B tubes connected in parallel and operated class C. The input to the driver is amplified to approximately 400 watts and applied to the power amplifier that contains one 4CX15000A tube operated class C. The input to the power amplifier is amplified to 20,000 watts and applied to a 50-ohm unbalanced load. Power control circuits monitor the rf output power level. When a change in output power is detected, these circuits change the plate voltage to compensate. Other control circuits within the transmitter monitor reflected power, forward power, operating voltage, and air pressure within the driver and power amplifier section. They protect the transmitter by removing power when excessive currents or loss of air pressure occurs.

The extended control panel operation can be increased to a maximum of 250 feet with additional cabling.

1.5 TECHNICAL CHARACTERISTICS

1.5.1 Mechanical

Weight:
2000 pounds

Size:
Height
69 inches

Width
71-1/2 inches

Depth
27-1/2 inches

Ventilation (2 sources):
Squirrel-cage type blower mounted under the cavity
Axial fan that positively charges the entire cabinet

Ambient Temperature Range:
+15° to +45°C (59° to 113°F) operating

Relative Humidity Range:
0 to 95% relative humidity

Altitude:
Up to 7500 feet at 40°C (104°F)

Shock and Vibration:
Normal handling and transportation

Finish:
Cabinet Exterior
Collins gray baked enamel

Control Panel
White baked enamel

1.5.2 Electrical

Frequency Range:
88 to 108 MHz
Specified customer frequency is determined by two crystals in the exciter

Power Output:
20,000 watts into a 50-ohm unbalanced line

Standing Wave Ratio:
Not to exceed 2:1

Power Source:
208 to 240 volts, 60 Hz 3-phase
Available voltage taps on transformer:
200, 210, 220, 230, 240, and 250.
50-Hz operation available on special order

Power Line Variations:
±5% overall power line variations; in addition, the phase angle and voltage unbalance shall be within 5% of the average of all three phases.

Harmonic and Spurious Radiation:
Any emission appearing on a frequency removed from the carrier by between 120 kHz and 240 kHz inclusive, is attenuated at least 25 dB below the level of the unmodulated carrier.

Any emission appearing on a frequency removed from the carrier by more than 240 kHz and up to and including 600 kHz is attenuated at least 35 dB below the level of the unmodulated carrier.

Any emission appearing on a frequency removed from the carrier by more than 600 kHz is attenuated at least 80 dB below the level of the unmodulated carrier.

Modulation Characteristic:
Wide-band direct fm; standard audio preemphasis is incorporated

Input Power Requirements:
35,000 watts at 0.97 power factor

Excitation Source:
Collins 310Z-1 Exciter that is capable of accepting an input signal of from 30 Hz to 75 kHz

Optional:
Stereo
Add Collins 786V-1 Stereo Generator to exciter

Stereo and SCA
Add Collins 786V-1 and 786W-1 SCA Generator to exciter

Output Impedance:
50 ohms, unbalanced

Carrier Frequency Stability:
Frequency will not vary more than ±1000 Hz for an ambient temperature range of +15° to +45°C (59° to 113°F) and a line variation of ±5%

Audio Input Impedance:
600 ohms, balanced

Audio Input Level:
+10 dBm ±2 dB

Audio Frequency Response:
Complies with FCC standard 75-microsecond preemphasis curve

Audio Frequency Distortion:
Not more than 1% in the range from 50 Hz to 15 kHz

FM Noise Level:
65 dB below 100% modulation (±75 kHz)

AM Noise Level:
55 dB below equivalent 100% am modulation

section 2
installation

2.1 UNPACKING AND INSPECTING

a. The transmitter is shipped in a skid-type crate with unpacking instructions stenciled on the side. Uncrate the transmitter carefully to avoid damage. Inspect for loose screws and fasteners. Ensure that all controls operate freely. Examine the cabinet for dents or scratches. Ensure that cable and wiring connections are tight and situated clear of each other and the chassis.

b. Carefully unpack the transformers, filters, and power amplifier tube. Inspect each unit for damage.

c. File any damage claims properly with the transportation company. Retain all packing material if a claim is filed.

2.2 ASSEMBLY

a. Plan the placement of the transmitter and its external wiring carefully before beginning installation. (Refer to figure 2-1.) Four knockout holes are located on the top of the transmitter section that contains the fuse panel. The holes accommodate cabling for 3-phase input voltage, audio input signal, remote control unit, and the extended control panel.

b. If optional modulation and frequency monitoring equipment is used, remove the center rear panel before positioning the transmitter. Determine the length of cable needed to connect the transmitter sample output of the monitoring equipment. Once the length is determined, connect the cable to the monitor jacks, and run the cable out of the transmitter through a previously unused knockout hole.

c. Use the space provided in the transmitter center section to install the exciter. Connect an rf cable from the exciter output to the driver input. Attach the override voltage lead to TB1 pin 12. Connect the 117-volt ac power cable to the exciter. (See figure 2-1.) Refer to 310Z-1 Exciter Instruction Book, part number 523-0560518-001438, for installation of audio input cables. Replace the rear cover and place the transmitter in its permanent location.

d. If the extended control panel is mounted away from the transmitter, connect the extended cable from TB1 on the transmitter to TB1 and TB2 on the extended control panel.

e. Install all customer-supplied wiring.

f. Install plate power supply transformer T1, screen power supply transformer T2, plate power supply filter L1, screen power supply filter L2, and filter capacitor C3. Connect the transformers using table 2-1. Change taps if necessary to obtain correct operating parameters.

g. Install the 4CX15000A tube using the procedure outlined in paragraph 5.7.1.

h. If a remote control panel is used, run the external wiring from the remote unit into the transmitter and connect it to TB4.

i. The pa grid sliders, driver plate slider, and the driver grid slider are in their approximate locations when shipped. The plate cavity slider is shipped separately and must be installed by the customer. Use the graphs in figures 5-1 and 5-2 of section 5 to determine the approximate settings of these adjustments. (Refer to the procedure in paragraph 5.6.2 if necessary.)

j. Connect the customer-supplied 50-ohm transmission line to the rf output connector mounted on top of the transmitter cabinet.

Caution

Damage will result from an improper impedance match between the transmitter and the transmission line. Ensure that the transmission line and antenna present a 50-ohm impedance and a vswr not greater than 2:1 to the transmitter at the operating frequency.

Table 2-1. Transformer Connections.

LINE VOLTAGE	CONNECTIONS FOR DELTA PRIMARY
T1, T2, and T3	
200 volts, 3-phase	4 to 10, 13 to 19, 22 to 1
210 volts, 3-phase	5 to 10, 14 to 19, 23 to 1
220 volts, 3-phase	6 to 10, 15 to 19, 24 to 1
230 volts, 3-phase	7 to 10, 16 to 19, 25 to 1
240 volts, 3-phase	8 to 10, 17 to 19, 26 to 1
250 volts, 3-phase	9 to 10, 18 to 19, 27 to 1
T4	
200 volts, 3-phase	1 to 2
210 volts, 3-phase	1 to 3
220 volts, 3-phase	1 to 4
230 volts, 3-phase	1 to 5
240 volts, 3-phase	1 to 6
250 volts, 3-phase	1 to 7

2.3 PRIMARY POWER

The transmitter requires a 208- to 240-volt ±5%, 3-phase, 60-Hz ac power source that delivers 35 kilowatts at a 0.97 power factor. Make provisions for a fused main power disconnect switch or circuit breaker capable of handling 125 amperes. Run the main power cable from the main power disconnect switch or circuit breaker to TB3 in the transmitter.

2.4 INITIAL TURN-ON PROCEDURE

a. Ensure that the main power disconnect switch is off.

b. Ensure that all circuit breakers are off.

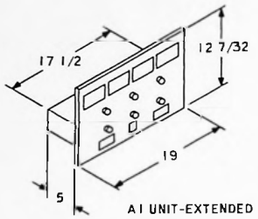
c. Ensure that the circuit breakers and fuses are the correct value.

d. Set the 28 VDC POWER SUPPLY circuit breaker to ON.

e. Set the test meter selector switch to the 28V SUPPLY 40V position.

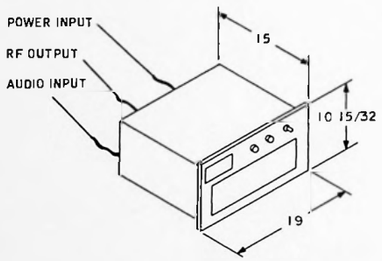
f. Set the POWER switch to the FORWARD position.

g. Set the POWER CONTROL switch to the MANUAL position.



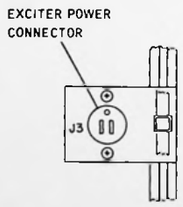
A1 UNIT-EXTENDED CONTROL PANEL

NORMALLY INSTALLED IN CUSTOMERS EQUIPMENT RACK OR CONSOLE MAXIMUM CABLE LENGTH OF 250 FT

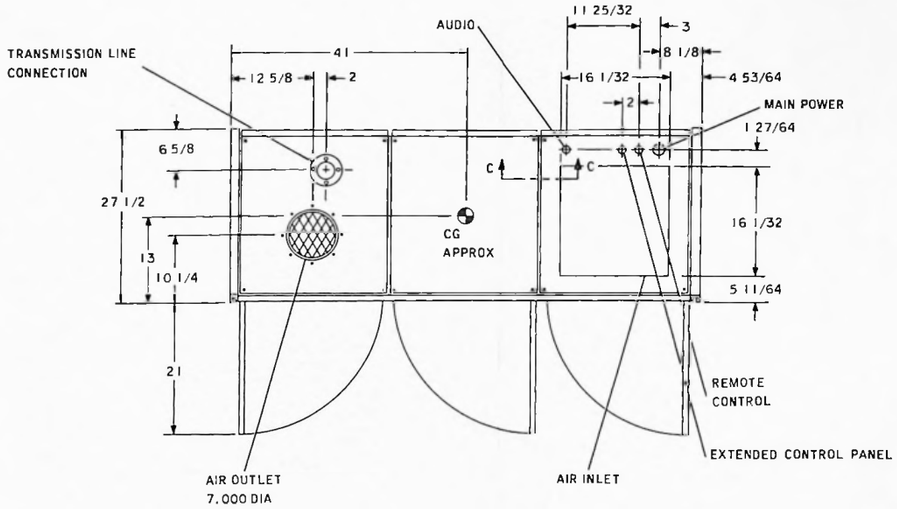


310Z-1 EXCITER

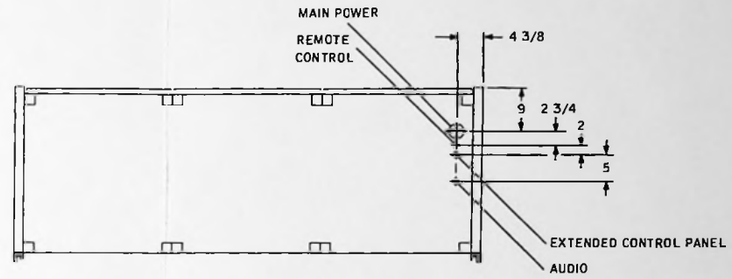
NORMALLY INSTALLED IN TRANSMITTER. MAY BE INSTALLED IN EQUIPMENT RACK OR CONSOLE



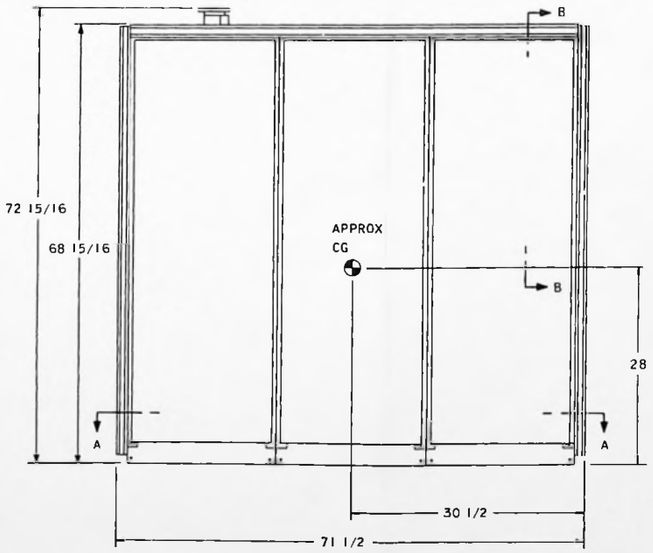
SECTION C-C



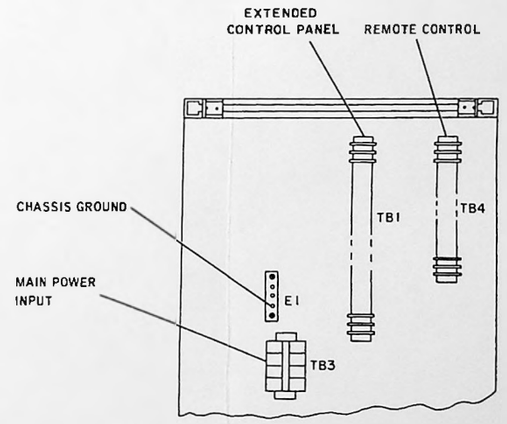
TOP VIEW



SECTION A-A



FRONT VIEW



SECTION B-B

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Figure 2-1. 831G-1 20-kW FM Transmitter, Outline and Installation Drawing.

h. Set the exciter POWER switch to OFF.

i. Set the primary disconnect switch to ON.

j. Set the BLOWERS circuit breaker to ON and press the FILAMENT ON pushbutton. The test meter should indicate 28 volts.

k. Set the test meter selector switch in the PA FIL 8V position, and observe that the test meter reads 5.8 volts.

l. Perform procedure in paragraph 5.6.3 and/or 5.6.4 if the meter fails to show 5.8 volts.

Caution

Do not perform the remainder of this procedure if the transmitter is not connected to an antenna with a 50-ohm impedance or a dummy load capable of dissipating 28 kilowatts.

m. Set all circuit breakers to ON.

n. Perform steps d. through w. of procedure in paragraph 5.6.9.1.

o. Perform procedure 5.6.8 if less than 30 mA of pa grid current is indicated on the test meter and the power amplifier output is low.

p. Perform procedure in paragraph 5.6.9.2.

q. Perform procedure in paragraph 5.6.9.3 if necessary. Compare the transmitter readings with those listed in table 5-2.

r. Run the manual POWER ADJUST switch between its two limits. If the control is too fast and cannot be adjusted to a discrete power setting, perform procedure in paragraph 5.6.11.

s. Perform procedure in paragraph 5.6.10 to ensure the adjustment on board A3 is correct.

t. Perform procedure in paragraph 5.6.11 to set the automatic power control level.

u. Perform FCC proof-of-performance tests and record normal operating voltages, currents, and power levels in table 5-2 or 5-3.

v. The transmitter is now ready for normal operation.

2.5 REMOTE OPERATION

To initiate remote operation, set the TRANSMITTER CONTROL LOCAL/REMOTE switch in the REMOTE position. When operating with the extended control panel, this switch must be in the LOCAL position.

2.6 FREQUENCY CHANGE

The transmitter operating frequency can be changed by replacing the crystal in the exciter (see 310Z-1 Exciter Instruction Manual, part number 523-0560518-001438, for details) and performing procedure in paragraph 5.6.2.

section 3
operation

3.1 GENERAL

The transmitter is operated from the extended control panel. Once the transmitter has been installed and properly tuned, it is only necessary to monitor meter indications and to make minor tuning and loading adjustment (figure 3-1).

3.2 CONTROLS AND INDICATORS

Refer to the following tables for a general description of the operational controls found on the three front panels of the transmitter: table 3-1, left; table 3-2, center; and table 3-3, right.

3.3 TURN-ON PROCEDURE

After the transmitter has been tuned, apply power as follows:

a. Be sure that all interlocked doors and panels are secured.

b. Inspect the fuse panel and ensure that all fuses are inserted.

c. Close the primary disconnect switch.

d. Set all circuit breakers on.

e. Press the FILAMENT ON pushbutton.

f. Set the test meter selector switch to both the 28V SUPPLY 40V and PA FIL 8V positions.

g. Make certain that the test meter readings agree with those in table 5-2 in section 5.

h. Press the PLATE ON pushbutton.

Note

An automatic 120-second delay occurs after the PLATE ON pushbutton has been pressed. This delay only occurs when the transmitter is started with the PLATE ON pushbutton.

i. Observe the extended control panel meters after plate voltage is applied and ensure that the transmitter readings agree with those recorded in table 5-2.

j. Adjust the PA TUNING and PA LOADING if minor tuning is required.

k. Remove all transmitter power, if major tuning is required, and perform steps c. to u. of paragraph 5.6.9.1.

3.4 SHUTDOWN PROCEDURES

3.4.1 Normal Turnoff

a. Press the PLATE OFF pushbutton and allow a few seconds for the voltage to decrease.

b. Press the FILAMENT OFF pushbutton.

c. Set the PLATE POWER SUPPLY circuit breaker, CB5, OFF.

d. Set the 28 VDC POWER SUPPLY circuit breaker, CB1, OFF.

e. Open the primary disconnect switch.

3.4.2 Emergency Turnoff

In the event of an emergency, remove power in any of the following ways: press the FILAMENT OFF pushbutton, turn 28 VDC POWER SUPPLY circuit breaker CB1 off, or open the primary disconnect switch.

3.5 POWER READINGS

The transmitter extended control panel RF WATTMETER indicates forward and reverse power. It does not indicate true power. To obtain true power, using the wattmeter, subtract reverse power from forward power.

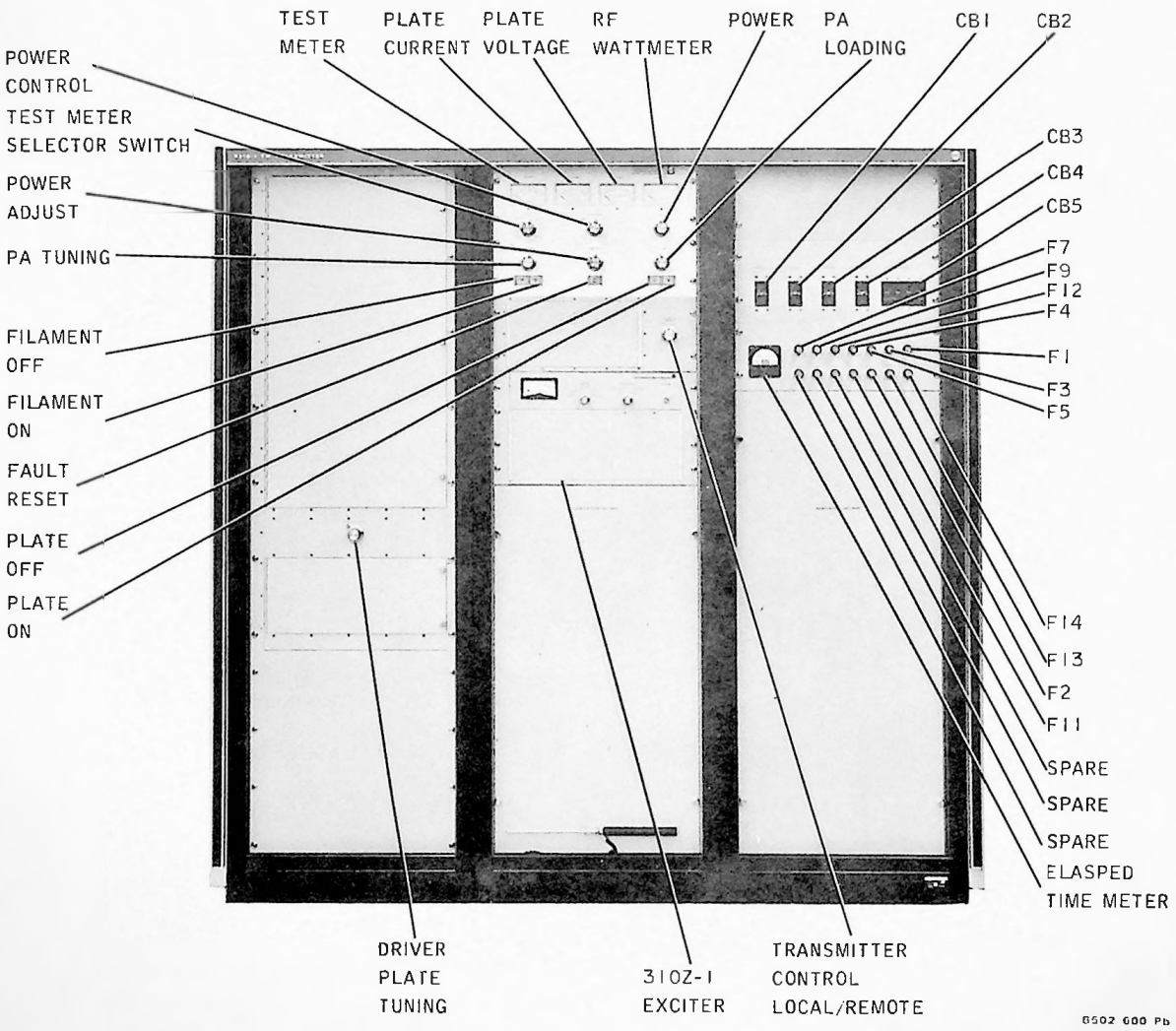


Figure 3-1. 831G-1 20-kW FM Transmitter, Controls and Indicators.

Table 3-1. Left Panel.

REF DESIG	LEFT PANEL CONTROLS	FUNCTION
C37	DRIVER PLATE TUNING	A variable capacitor that adjusts driver tuning

Table 3-2. Center Panel.

REF DESIG	EXTENDED CONTROL PANEL CONTROLS AND INDICATORS	FUNCTION
A1M1	TEST METER	Displays 12 internal operational voltage or current readings
A1S1	Test meter selector	Rotary switch that selects one of 12 readings to display on the test meter
A1M2	PLATE CURRENT	Displays power amplifier plate current
A1M3	PLATE VOLTAGE	Displays power amplifier plate voltage
A1M4	RF WATTMETER	Displays transmitter forward and reflected power
A1S2	POWER FORWARD/REFLECTED	2-position switch that selects forward or reflected power for display on the RF WATTMETER
A1S5	POWER CONTROL AUTOMATIC/MANUAL	2-position switch that selects automatic or manual power control
A1S6	POWER ADJUST LOWER/RAISE	Spring-loaded momentary switch that lowers or raises power when POWER CONTROL switch S5 is in the MANUAL position
A1S3	TUNING RAISE/LOWER	Spring-loaded momentary switch that positions tuning capacitor C50
A1S4	PA LOADING RAISE/LOWER	Spring-loaded momentary switch that positions loading capacitor C51
A1S7	PLATE OFF	Pushbutton momentary indicator switch that removes all operating voltage from the transmitter
A1S8	PLATE ON	Pushbutton momentary indicator switch that applies operating voltage to the transmitter
A1S9	FILAMENT OFF	Pushbutton momentary indicator switch that removes filament voltage from the transmitter
A1S10	FILAMENT ON	Pushbutton momentary indicator switch that applies filament voltage to the transmitter
A1S11	FAULT RESET	Pushbutton momentary indicator switch that resets the fault indicator
S10	TRANSMITTER CONTROL LOCAL/REMOTE	2-position switch that selects local or remote operation

Table 3-3. Right Panel.

REF DESIG	FUSE PANEL	FUNCTION
CB1	28 VDC POWER SUPPLY	1.0-ampere magnetic circuit breaker that protects the 28-vdc power supply
CB2	BLOWERS	10-ampere magnetic circuit breaker that protects both blowers

Table 3-3. Right Panel (Cont).

REF DESIG	FUSE PANEL	FUNCTION
CB3	DRIVER POWER SUPPLY	4.5-ampere magnetic circuit breaker that protects the driver power supply
CB4	PA SCREEN POWER SUPPLY	15-ampere magnetic circuit breaker that protects the pa screen power supply
CB5	PA PLATE POWER SUPPLY	100-ampere magnetic circuit breaker with a series trip feature that allows the circuit breaker to be tripped from a remote location
F7/F9/ F12	FAN	2-ampere fuse
F4/F5	PA BIAS POWER SUPPLY	1/2-ampere fuse
F1/F3	FILAMENTS	10-ampere fuse
F2/F11	EXCITER	3-ampere fuse
F13/F14	DRIVER FILAMENT	5-ampere fuse

section 4
principles of operation

4.1 GENERAL

The 831G-1 FM Transmitter operates in the 88- to 108-MHz range at a maximum output of 20,000 watts. A Collins 310Z-1 solid-state fm wide-band exciter, with provision for optional stereo and/or SCA operation, provides excitation. The transmitter is equipped with monitoring circuits that check and correct changes in power output and overload conditions. A remote control panel, which may be mounted up to 250 feet from the transmitter cabinet, provides complete transmitter metering and tuning controls. Refer to the overall schematic diagram (figure 7-1) for detailed circuit information.

4.2 BLOCK DIAGRAM DISCUSSION

Refer to figure 4-1. A 10-dBm signal (monaural, stereo, or SCA) input modulates a 14-MHz signal that is heterodyned with a 74- to 94-MHz signal to produce the desired output frequency (88 to 108 MHz). The output of the exciter is 10 to 20 watts, which is applied to the driver stage. The output of the driver is applied to the power amplifier. Then the signal is transmitted via a low-pass filter and directional coupler.

A small portion of the forward power in the coupler is sent to the vswr calibrate and auto power control circuit for monitoring. If a change in output power is detected, a signal is sent to the power control unit that increases or decreases the plate and screen power supply input voltage to compensate. A sample of the reflected power is also sent to the power control circuits for monitoring. If an excessive amount of reflected power is detected, the control circuits remove plate voltage from the power amplifier. The 28-volt power supply provides power for the control circuits.

4.3 RF CIRCUITS

4.3.1 Exciter

Refer to the 310Z-1 Exciter instruction manual for principles of operation.

4.3.2 RF Driver

The exciter output is applied to the driver stage that consists of two 4CX250B triodes in parallel (A11V1 and A11V2). The stage operates class C2 with adjustable cathode bus provided by R40 and R44 and grid leak bias by R50. The driver grid swamping resistor, R57, provides wide bandwidth and minimized plate to grid feedback.

The input circuit is a tuned cavity with resistance loading. Capacitor C_N is a short piece of wire with a paddle on the end physically placed in parallel with the anodes of V1 and V2. The location of the paddle provides sufficient capacitance to neutralize the stage. A sample of the screen current flows through a winding connected across pins 9 and 12 inside the Hall effect probe, A22, Z5, for screen current monitoring. Using the principle of the Hall effect, the stationary magnetic field around the transformer produces a current through the control panel meter connected across pins 3 and 4 of A22Z5. A control current that can be adjusted to calibrate the control panel meter flows through pins 1 and 2.

4.3.3 RF Power Amplifier

The driver output is capacitively coupled to the grid of the power amplifier tube A18V3. A high Q-tuned circuit composed of A21L7 and A11C37 provides impedance matching and reduces unwanted harmonics. Loading of the power amplifier is accomplished by adjusting A21L7 (tuning) and A21L8 (loading). Inductor A21L8 is used to cancel a portion of the input capacity. Capacitor A21C36, in series with inductor A21L8, is a blocking capacitor for the dc bias voltage. The cavity damping resistor A18R75 is connected behind the pa plate tuning capacitor A18C51. Strap inductance A18L14 and its distributed capacity, A18C89, to the cavity wall, form a suppressor that dampens the higher order cavity resonances that can occur near the 3rd harmonic of the output frequency. Cathode tuning (or peaking) capacitor A21C39 improves the bypass action at the operating frequency. Resistors

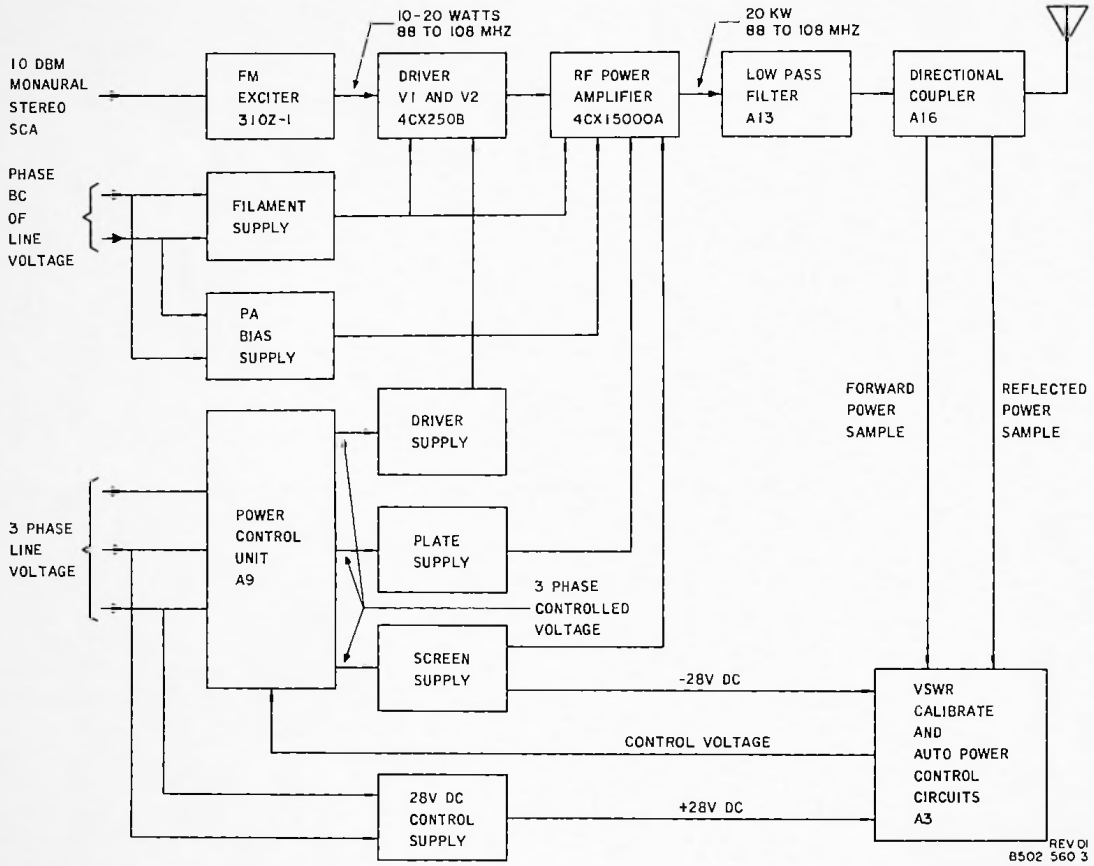


Figure 4-1. 831G-1 20-kW FM Transmitter, Block Diagram.

A21R76 and A21R77 broaden the frequency response and minimize synchronous amplitude modulation products. Inductors A11L4 and A21L5 keep rf out of the power supplies and A18LN1 and A18LN2 provide neutralization.

The power amplifier is a plate-tuned 4CX15000A that is operated class C_2. The tube screen is grounded and the cathode is placed -750 volts below ground. A fixed bias from the pa bias power supply is applied to the control grid through A22TB8-19, A22R37, and A22TB8-20. When an input signal is present, grid current flows and develops grid leak bias across R35. The increased negative potential on the grid causes the diode in the pa bias supply to reverse bias, preventing grid current flow through the supply. Hall effect probe Z4 monitors the amount of grid current for control panel metering.

The power amplifier plate circuit is tuned by an adjustable, resonant cavity. (Refer to figure 4-2.) The cavity is the area between the tube shelf and the movable plate shorting plane. The shorting plane permits course adjustment while two motor-driven capacitors, A18C50 and A18C51, provide more precise loading and tuning. Capacitor A18C50 is loading and A18C51 is tuning. The tube anode cover is separated by a thin sheet of Teflon. This physical arrangement forms blocking capacity A18C45. The electrical equivalent of the plate tuning circuit is illustrated in figure 4-3.

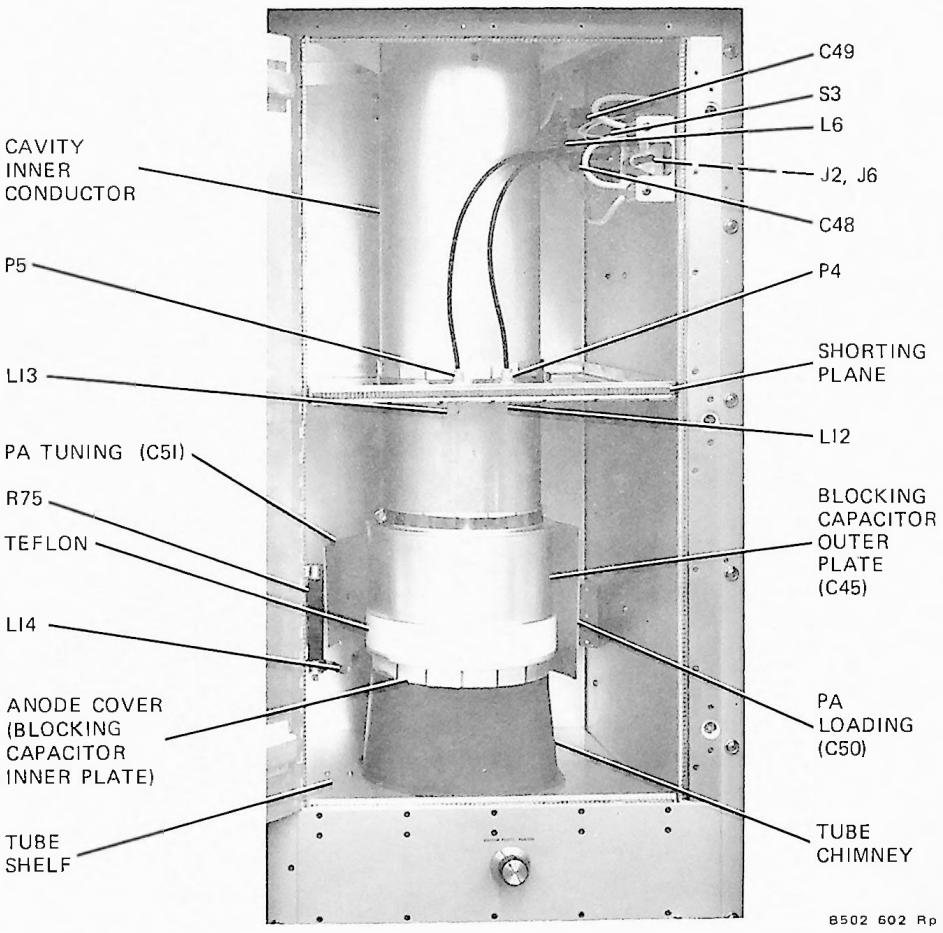


Figure 4-2. Plate Cavity.

4.3.4 Low-Pass Filter A13

Low-pass filter A13 consists of two 7-pole coaxial filters in tandem. The first filter has a cutoff of 130 megacycles, while the second has a cutoff of 300 megacycles.

4.3.5 Directional Coupler

The directional coupler A16 provides monitor samples for auto power control unit A3. Forward power from C3 is rectified by CR2, filtered, and applied to amplifier AR2 in auto power control unit A3. Reflected power is acquired in the same manner through C1 and applied to amplifier AR1.

4.3.6 Tuning Controls

The plate shorting plane in the resonant cavity of the power amplifier plate circuit provides tuning from 88 to 108 MHz. Once the slider is positioned, two motor-driven capacitors, A18C50 and A18C51, control the loading and tuning of the plate circuit. (Refer to figure 4-4.) Control panel A1 switches S3 and S4 control the raise and lower relays in tune and power control relay unit A7 to effect tuning and loading.

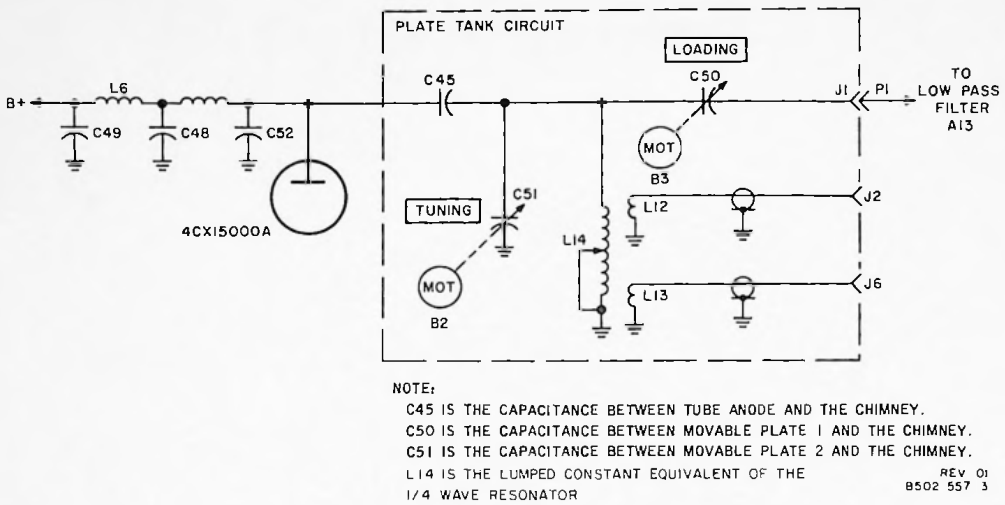


Figure 4-3. 831G-1 20-kW FM Transmitter, Schematic Diagram, Output Network.

4.4 POWER SUPPLIES

4.4.1 General

There are five separate power supplies in the transmitter. Three of the five, the plate, screen amd bias power supplies, provide voltage to the power amplifier. One of the remaining two, the driver power supply, furnishes voltage to the driver stage. The remaining one, the 28-volt dc power supply, provides power to the control circuits.

4.4.2 28-Volt DC Power Supply

The 28-volt dc supply receives its 3-phase 60-Hz input from the unregulated line voltage. The input is applied through stepdown transformer T1 to the 3-phase bridge rectifier assembly, CR1. The 28-volt dc output of the bridge is filtered by the RC circuits and applied to the control circuits through terminal connection 6 and 7 of TB1.

4.4.3 PA Bias Power Supply

The pa bias power supply provides the power amplifier with fixed grid bias that holds the tube cutoff when no signal is present on the grid. The supply receives primary power ac from phase B and C of the line voltage. The input voltage is applied through step-up transformer T1 to the bridge network. An L-section filter is formed by C1, R1, and L1.

The output of the power supply is applied to the grid of the power amplifier through CR5 that also blocks grid current flow through the supply when the grid leak bias exceeds the fixed bias. A sample of the bias voltage is also applied through R3 to front panel meter M1 for monitoring.

4.4.4 PA Plate Power Supply, Power Control Regulator and Power Control

The plate power supply provides plate voltage to the power amplifier. The input voltage to the plate supply is regulated by power control A9. The power control has three pairs of silicon control rectifiers (scr's), one pair in series with each of the three primary windings.

Control amplifier AR1 is a magnetic power control unit that contains four input control windings. In this application, three windings are used. The 500-turn winding and A8R2 regulates the upper power limit and the 1000-turn winding and A8R4 regulates the lower power limit. Once these limits are set, POWER ADJUST switch on the A1 control panel can only select values of output power between these preset limits. The circuit reacts to any change in transmitter power. For this reason, the POWER CONTROL switch must be in MANUAL when tuning the transmitter. When automatic power control is used, the control regulator A8 increases or decreases the plate supply input voltage to compensate for increases or decreases in transmitter power.

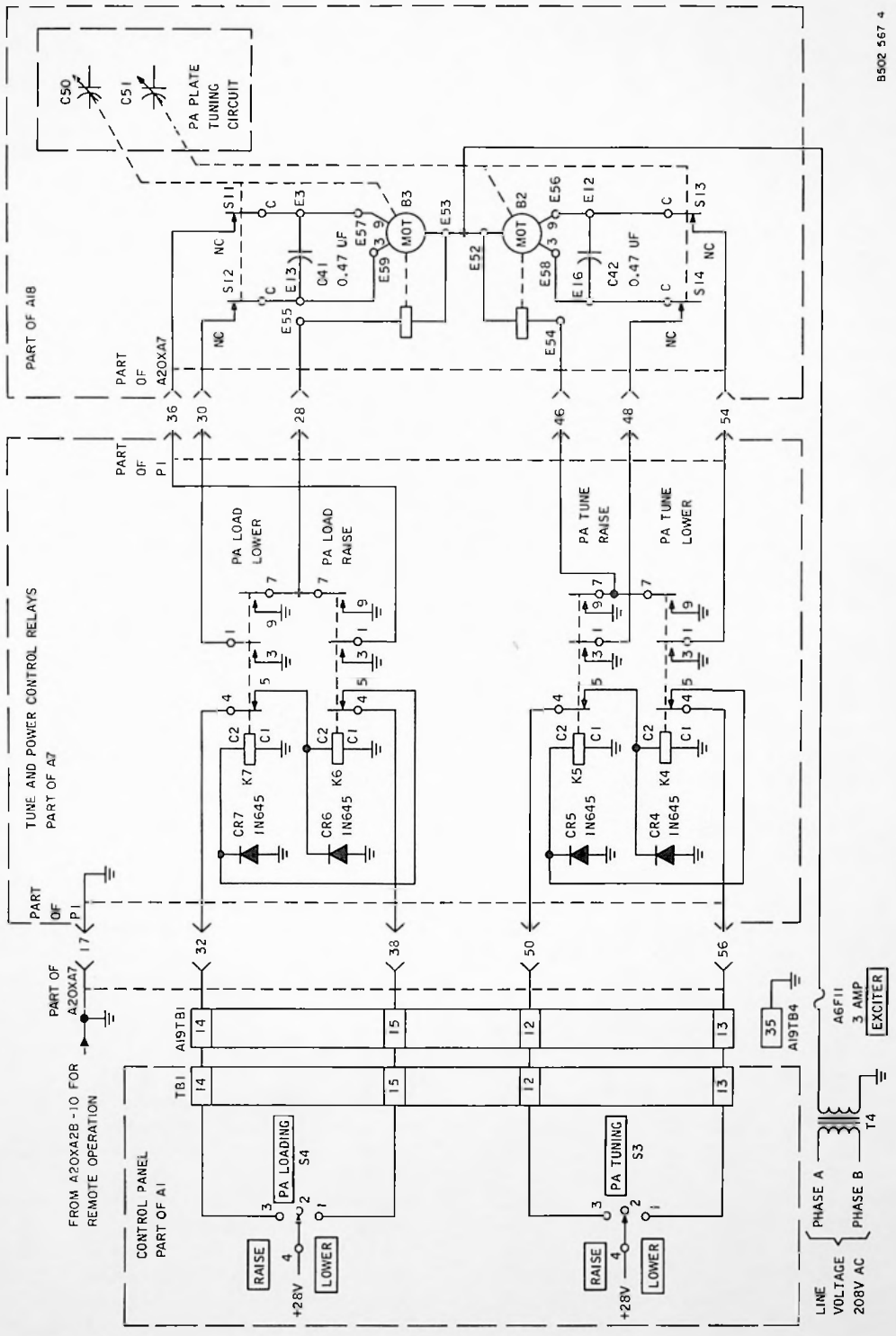


Figure 4-4. Tuning Control, Simplified Schematic.

A28-volt dc control voltage from the 28-volt dc power supply (figure 4-5) is applied to XA8-27 and K12 through the contacts of A19K3, phase-loss relays A19K10, A19K11, A19K5, and time delay relay A19K4. Power control regulator A8 provides anti-false fire and soft start features. Soft start is provided by the time constant (1.5 seconds) of R7 and C4. The RC combination controls the Q4, Q5 transistor gate that applies the slowly rising voltage to the RAISE limit resistor. The raise limit voltage (or "on" signal) is applied to the 500-turn control winding of A9AR1. With 3.8 mA into the control winding (0.25 volt at A8TP5), the control amplifier unit will be fully on.

The magnetic amplifier used in the firing circuit of A9 has a memory in that if the control signal at XA8-27 is removed and suddenly reapplied for any reason, the magnet amplifier will immediately revert to its original operating point. Transistor A8Q3 is normally biased off. When the 28-volt control voltage is removed, C1 leaks off rapidly and Q1, which is normally conducting, is shut off, turning on Q3. When Q3 conducts, a negative control signal is applied to the 200-turn winding of A9AR1 that resets the core to zero output (off). The firing circuit, therefore, must always start from a zero output operating point. The 100-turn winding of A9AR1 is short circuited to slow response time.

Open loop control (manual) of the system is provided by driving the 1000-turn winding with a negative signal. The resulting negative output moves the firing circuit operating point to correspond with the net output produced by all winding (figure 4-6). The absolute value of the negative signal is set by A8R4 LOWER limit and is adjustable to zero by the motor-driven potentiometer A20R43. The lower level is normally set to permit reduction of rf output power to some arbitrary level, usually minus 20 percent of assigned power.

Closed loop control (automatic) is provided by sampling the rf output, from directional coupler A16, which is amplified by A3AR2 and A3AR3. Loop gain is adjusted by A3R24. The automatic mode is selected by energizing A7K1. (The deenergized position is the manual mode.) Control panel A1 PA TUNING switch provides this function. The same 1000-turn winding is used for the automatic function.

The 3-phase voltage from the scr control unit is applied through transformer T1, to a silicon 3-phase, full-wave bridge assembly, Z1, with RC compensation. The bridge output is filtered and applied to the plate of the power amplifier through choke coil A18L6. The plate voltage is supplied to high-voltage meter multiplier A15 pin 12. The voltage is dropped through a network of resistors to a level suitable for monitoring. A sample for local metering is taken at pin 38, while a sample for remote metering is taken across pins 37 and 43. Zener diodes VR1 through VR4 provide meter protection. A17E2A is one portion of a 3-part gaseous protector that shorts excessive voltage to ground.

A transient surge network is formed by A14C2 and A14R5 while an L-section filter is formed by L1 and C3. Resistor A17R6 limits the charge and discharge current of C3, and A17R7 and A17R8 are bleeder resistors connected across C3 for protection should R6 become open.

4.4.5 PA Screen Power Supply

The 3-phase regulated voltage from the power control unit is applied through transformer T2 to the silicon 3-phase, full-wave bridge assembly, Z2, in the pa screen power supply. The output of Z2 is filtered and applied to feedthrough capacitor A18C54 in the cathode of the power amplifier. The screen supply also provides -28 volts to the vswr and auto power control circuits A3 from A17R4 and A17R8.

Terminal board A14TB7 provides samples of pa plate current to both the local and remote control meters. It also supplies the local control panel with a sample of the pa screen current through A14R15 and a sample of the screen voltage from A14R23.

4.4.6 Driver Power Supply

The driver power supply provides plate voltage for the driver stage. The supply receives 208-volt, 3-phase regulated voltage from the scr control unit A9, to one end of three primary windings of transformer T3 and 208-volt, 3-phase line voltage to the other end of each of the three primary windings. The output of T3 is applied to silicon full-wave bridge assembly Z3 that contains resistive and capacitive compensation. The output of the bridge is filtered and applied to the driver plate from A17R34 through S9 and from E20 to the overload and metering panel A22 and to the

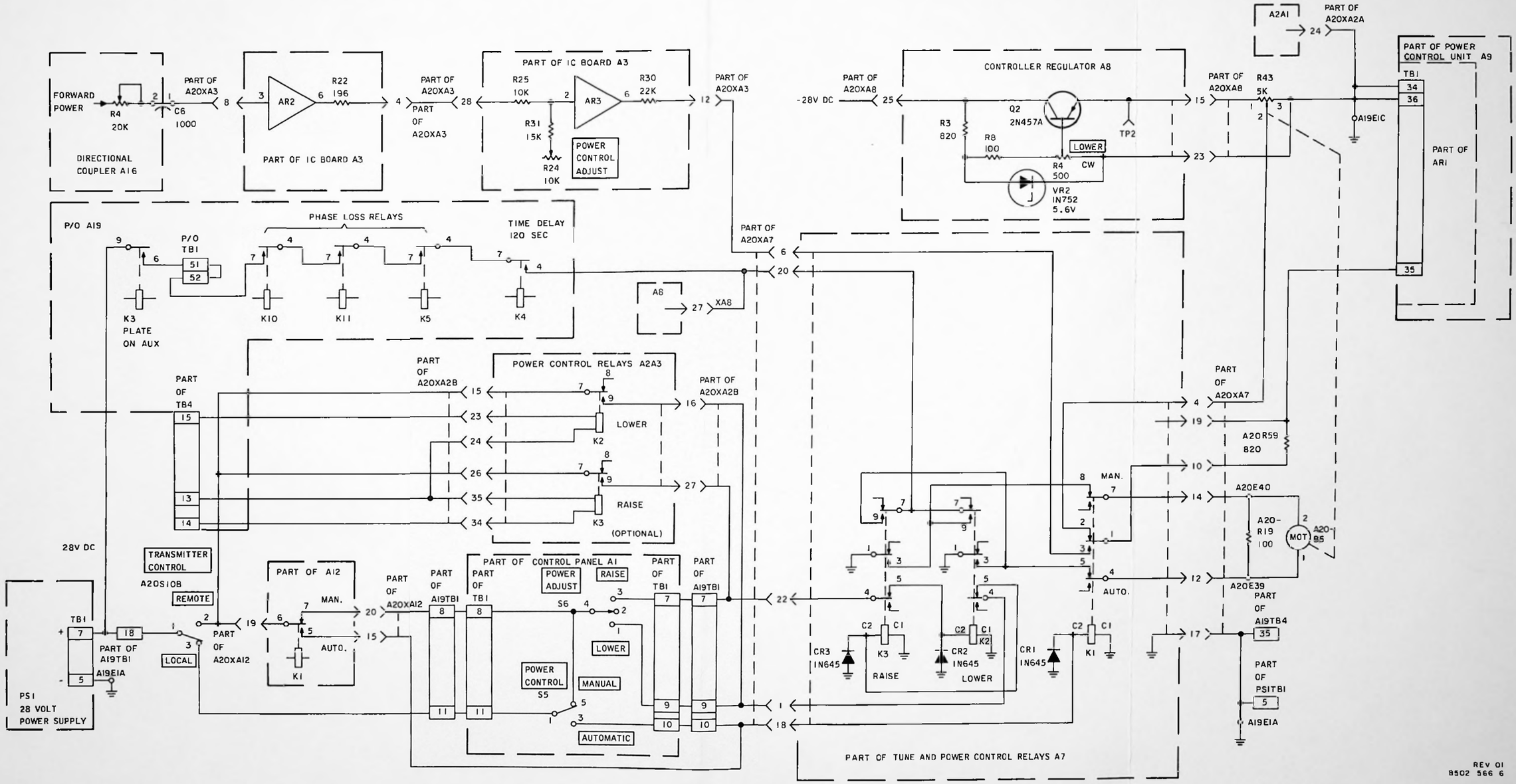


Figure 4-5. Power Control Circuits, Schematic Diagram.

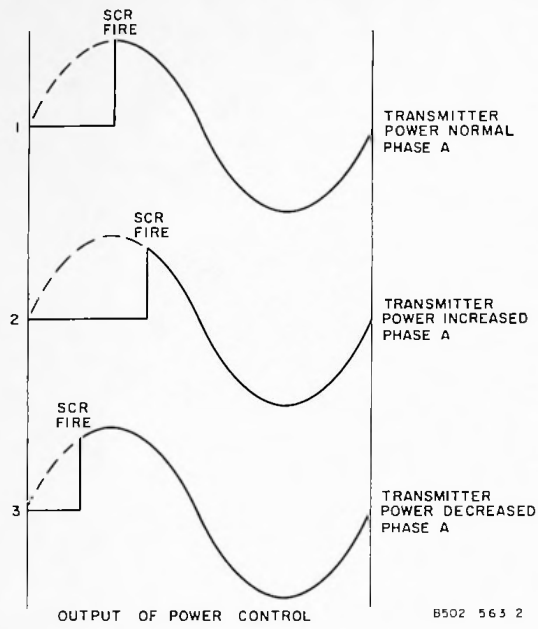


Figure 4-6. Power Control Output Waveshapes.

A114CX250B driver screen. A portion of the output is supplied to the control panel A1 for plate and screen voltage monitoring from E32 and E41. The negative terminal of Z3 is connected to CVR PLATE O/L ADJ A22R60 in the control circuits. An excessive voltage from the bridge circuit causes A22K8 to energize, thus removing power from the transmitter. The second portion of gaseous protector A17E2B (refer to paragraph 4.4.4) is also connected to the negative terminal of Z3 for protection.

4.4.7 Filament Voltage Regulator

The filament voltage regulator maintains a constant rms voltage on the filaments of the driver and power amplifier. One of the two scr's is triggered on each alternation of the input line voltage. (Refer to figure 4-7.) When the amplitude of the input voltage increases, the regulator prevents the scr's (A20Q1 and A20Q2) from firing until later in the cycle. The resultant rms voltage on the tube filaments remains constant. When the line voltage decreases, the scr's fire sooner and permit more of the input alternation to appear on the filaments. Again the rms voltage on the filaments is unchanged. When input voltage is first applied, a soft start feature gradually applies the filament voltage through a period determined by the charge time of C3, CR5, and R7. When the potential at the top of C3 equals the potential on the collector of Q2, the path is opened and normal operation begins.

The bridge circuit rectifies the incoming ac and supplies the unfiltered voltage to R11 and R12. During normal operation, C2 charges through CR6, R9, and R7. When the top of C2 becomes sufficiently positive, unijunction transistor Q3 fires and triggers the scr. When C2 has discharged through Q3, the action begins again. The circuit is timed so that Q3 fires on each alternation of the incoming ac.

When an increase in line voltage occurs, the current through RV1 increases thus decreasing the resistance from the base of Q1 to ground. When this occurs, Q1 conducts less, causing Q2 to conduct more. The collector of Q2 becomes less positive, increasing the RC charge time of C2.

The delay prevents Q3 from firing until a larger portion of the input alternation has occurred. The resulting output voltage on T1 is thus maintained at its preset value. If a decrease in line

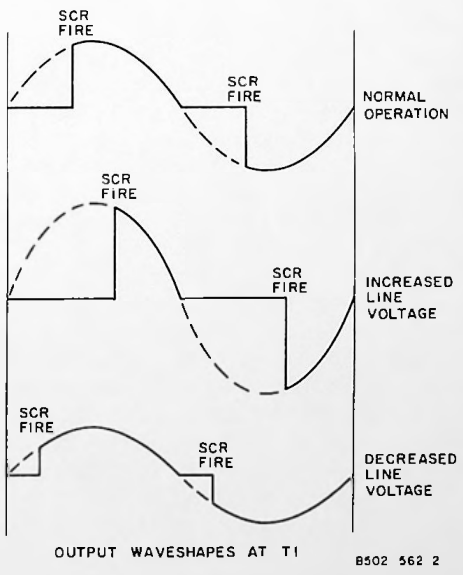


Figure 4-7. Filament Regulator Output Waveshapes.

voltage occurs, C2 charges faster and fires Q3 when a smaller amount of the input alternation has occurred.

4.4.8 Filament Voltage Distribution

The filament voltage distribution is shown in figure 4-8. The input ac voltage to the filament voltage regulator maintains a constant rms voltage on the filaments as discussed in paragraph 4.4.7.

4.5 PRIMARY POWER DISTRIBUTION CONTROL AND OVERLOAD CIRCUITS

4.5.1 Primary Power Distribution

The 3-phase 60-Hz line voltage is applied to the power control, the 28-volt dc power supply, the cabinet blowers, the pa bias power supply and A19R5, A19R18, and A19K11. Line voltage is always present at the input of the 28-volt power supply and is applied to the blowers and bias supply through relay contacts that close during normal turn-on. Power control A9 is energized during the turn-on sequence by control regulator A8. The positive dc voltage that operates the central amplifier AR1 in the power control is applied to A8Q1 in the control regulator during the turn-on sequence through the following relays; plate on auxiliary relay A19R3, phase loss relays A19K5, A19K10, A19K11, and time delay relay A19R4. Relays A19K5, A19K10, and A19K11 are connected across the three ac input phases. Loss of a phase will drop out the relay across that phase and remove the 28-volt control signal to power control regulator A8. In addition, K12 will be deenergized and the ac power to A9AR1 will be disconnected. A blown current limiting fuse, F15, F16, or F17, will also result in phase failure action. F15, F16, and F17 limit the total energy applied to the scr's.

The transmitter is energized by pressing the FILAMENT-ON switch S10 in the A1 control panel. (Refer to figure 4-9.) Relay A19K2 is energized and power is applied to the blower meters. After sufficient air pressure is created in the power amplifier cabinet, air switch A18S1 is closed and relay A19K1 is energized. The closed contacts of A19K1 supply line voltage to the pa bias power supply and to the exciter. When the PLATE ON switch is pressed, a time delay of 120 seconds occurs before relay A19K4 is energized. This delay permits the tube filaments to warm before plate voltage is applied. After the FILAMENT ON switch is pressed, PLATE ON switch is pressed and relay A19K3 is energized. After the 120-second delay, relay A19K4 is energized and a +28 volts is supplied to the base of transistor A8Q3. This turns on the control amplifier AR1 that applies input voltage to the plate, screen, and driver power supplies.

4.5.2 Exciter Power Control Override

An output override voltage is supplied to the 310Z-1 exciter when the plate voltage is turned off. This turns off the output of the exciter while the pa plates are off. (Refer to figure 4-9.) The voltage is applied from the 28-volt power supply through contacts 7 and 8 of relay A19K3 to the 310Z-1 exciter power supply regulator.

4.5.3 VSWR Calibrate and Auto Power Control Unit

The vswr calibrate and auto power control unit A3 monitors the forward and reflected power received from directional coupler A16. Forward power is applied to pin 3 of operational amplifier AR2 through R18. A portion of the forward power is also applied to the control panel RF WATTMETER through R7, that is used to calibrate the control panel meter. The forward power on pin 3 of AR2 is compared with a dc reference level on pin 2. This reference is the output of AR2 supplied as feedback through R15. The output on pin 6 of AR2 is supplied to A19TB4-34 for remote monitoring and to pin 2 of amplifier AR3.

Operational amplifier A3AR3 is connected as an integrator. Feedback is supplied by the parallel combination of capacitor C5 and resistor R8. During automatic power operation, the output of A3AR3 is connected to power control A9 through relay A7K1-3 in the tune and auto central relay unit A7. Resistor R24 in the input of AR3 increases or decreases the transmitter output power during automatic power operation by increasing or decreasing the output of AR3.

Reflected power is applied to pin 3 of AR1 through R3. A portion of the reflected power is also applied to the control panel RF WATTMETER through meter calibrate resistor R1. The output of AR1 is applied to the grid of A22Q6 through A22TB8-17. When excessive reflected power exists in the transmitter and trip disable switch A351 is closed, AR1 produces an output that

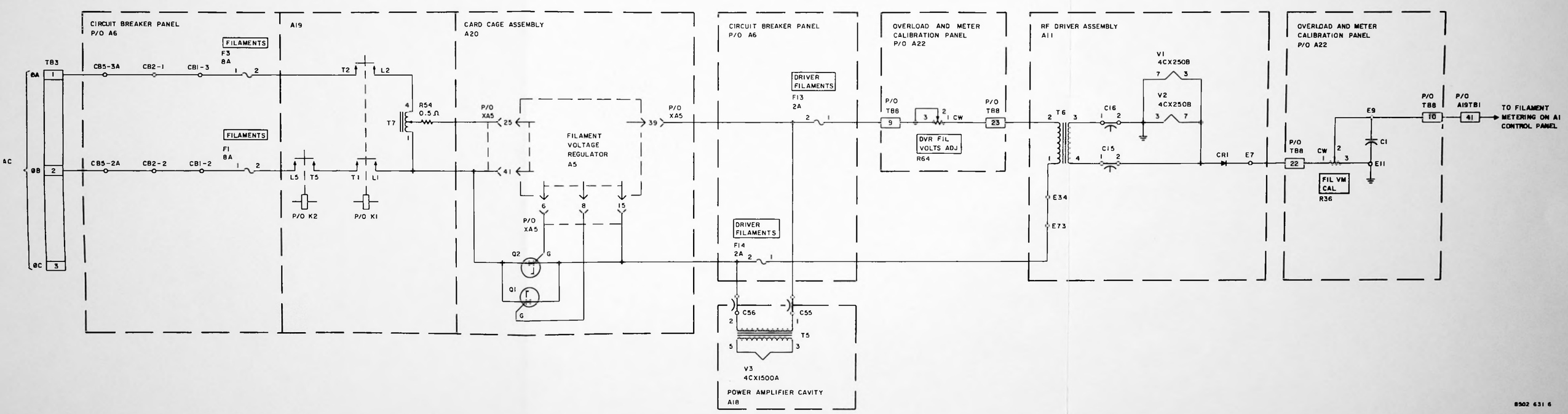
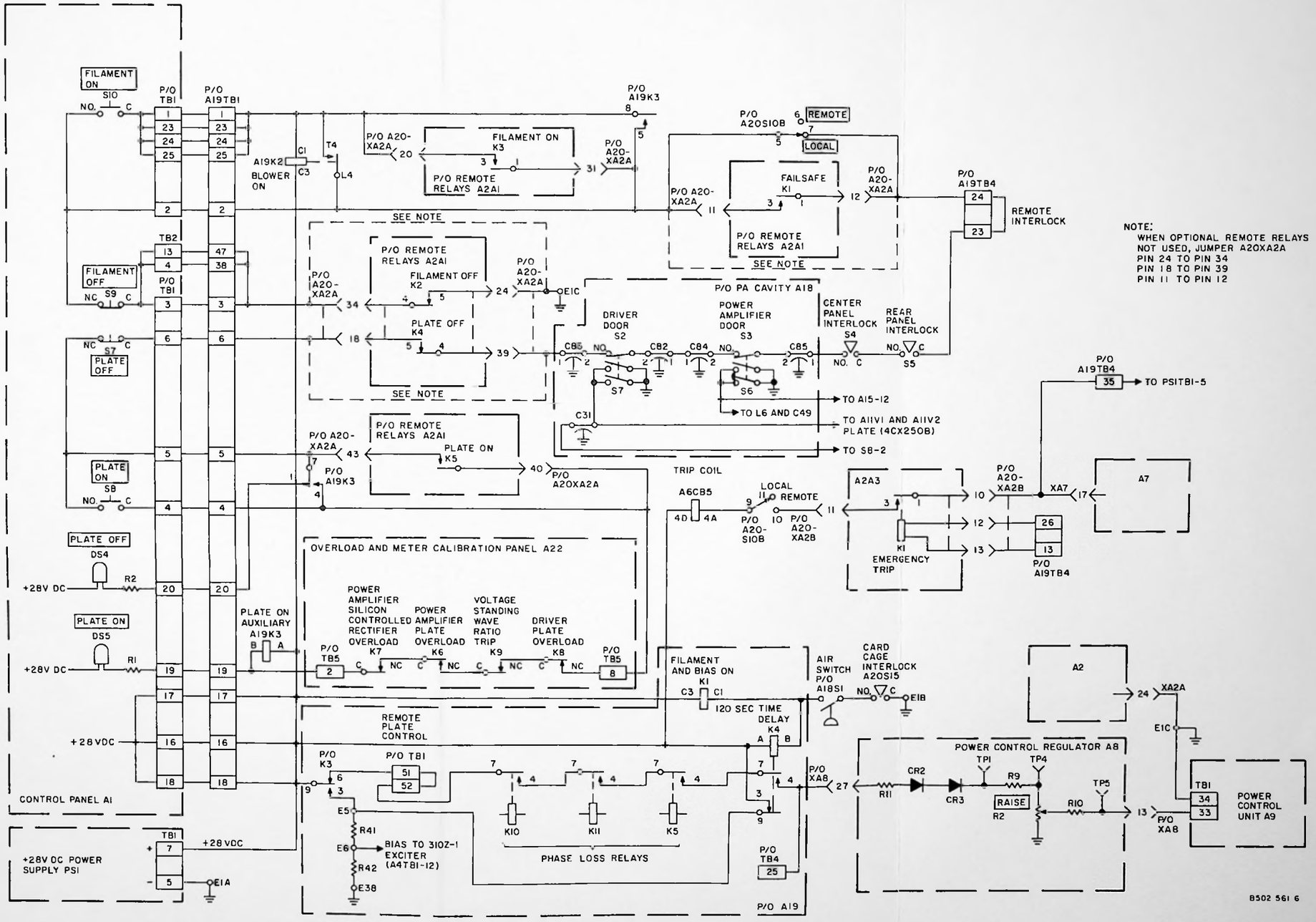


Figure 4-8. Filament Voltage Distribution.



NOTE:
WHEN OPTIONAL REMOTE RELAYS NOT USED, JUMPER A20XA2A PIN 24 TO PIN 34 PIN 18 TO PIN 39 PIN 11 TO PIN 12

Figure 4-9. Power ON-OFF Control Circuits.

triggers the scr A22Q6. Scr A22Q6 conducts and energizes relay A22K9, which removes power from the transmitter.

OFFSET ZERO controls A13R19 and A3R11 of AR1 and AR2 prevent an output on pin 6 of the amplifiers when no input exists on pin 3 of each amplifier.

4.5.4 Power Control Relays A7

The power control relays perform several functions. They select either automatic or manual power control, and in the manual mode, they control the raising and lowering of transmitter power. (Refer to figure 4-5.) When POWER CONTROL switch S5, on the control panel A1, is placed in the AUTOMATIC position, +28 volts is applied through the TRANSMITTER CONTROL switch A20S10B, LOCAL position, to relay A7K1. When A7K1 is energized, the output of A3AR3 is supplied through contacts 1 and 3 of relay A7K1 and resistor A20RJ9 to A9AR1TB1-35.

When POWER CONTROL switch A1S5 is in the MANUAL position, relay A7K1 is deenergized. Power is increased by placing switch A1S6 in the RAISE position. The +28 volts from A20S10B pin 3 is applied through A155 pin 5, A1S6 pin 3, and relay contacts 4 and 5 of A2K3 to energize relay A7K2. When A7K2 is energized, +28 volts is applied to motor A20B5 at point E40 through relays A19K3, A19K10, A19K11, A19K5, and A19K4. Ground is applied at point E39 through contacts 1 and 3 of A7K2. Motor A20B5 is turned on and adjusts the resistance of A20R43 to increase the transmitter power output.

When switch A156 is placed in the LOWER position, relay A7K3 is energized and +28 volts is applied to motor A20B5 at point E39 through contacts 7 and 9 of A7K3. Ground is applied at point E40 through contacts 1 and 3 of A7K3. The motor direction is reversed and the transmitter output is decreased.

4.5.5 Remote Control Relays

Latching relays A12, power control relays A2A3, and remote relays A2A1 are optional units that provide transmitter control from a remote location. The latching relays permit the transmitter to interface with remote control panels that operate on 28/48 volts dc, negative or positive common, or 117 volts ac. Unit A12 also provides remote selection of normal or automatic power control and remote selection of stereo and monaural excitation. Unit A2A3 controls the remote manual raising or lowering of power. It also provides an emergency trip feature that removes power from the transmitter in an emergency. Unit A2A1 provides the holding relays for filament and plate remote on/off controls. The unit also provides a fail-safe feature that removes power from the transmitter when the external control voltage is lost.

4.5.5.1 Latching Relay A12

Unit A12 is connected to the remote control panel through TB4. Refer to figure 4-10. When S10B on the transmitter is in the remote position, +28 volts is applied to contact 6, relay A12K1. If the remote control MANUAL-AUTOMATIC switch is in the AUTOMATIC position, +28 volts is applied to energize relay K1 in unit A7. When relay A7K1 is energized, the transmitter power is controlled automatically (paragraphs 4.5.3 and 4.5.4). When the remote control MANUAL-AUTOMATIC switch is in the MANUAL position, relay A7K1 is deenergized and the transmitter responds to manual power control.

Unit A12 also provides remote selection of monaural or stereo excitation to the exciter.

4.5.5.2 Power Control Relays A2A3

Unit A2A3 provides remote manual power lower and raise control. Refer to figure 4-11. When power is decreased at the remote control panel, relay A2A3K2 is energized and closed contacts 7 and 9 provide +28 volts to relay A7K2 contacts 4 and 5. When the power is increased at the remote control panel, relay A2A3K3 is energized and closed contacts 7 and 9 provide +28 volts to relay A7K3 contacts 4 and 5. (The operation of unit A7 is discussed in paragraph 4.5.4).

The emergency trip relay A2A3K1 provides the remote location with an alternate means of removing power in the event of an emergency. (Refer to figure 4-9.) During abnormal operation, A2A3K1 is energized from the remote control panel and trips circuit breaker CB5 that removes power from the transmitter.

4.5.5.3 Remote Relays A2A1

Remote relays unit A2A1 parallels the front panel control operations. All relays and switches are momentary in operation. The function of each

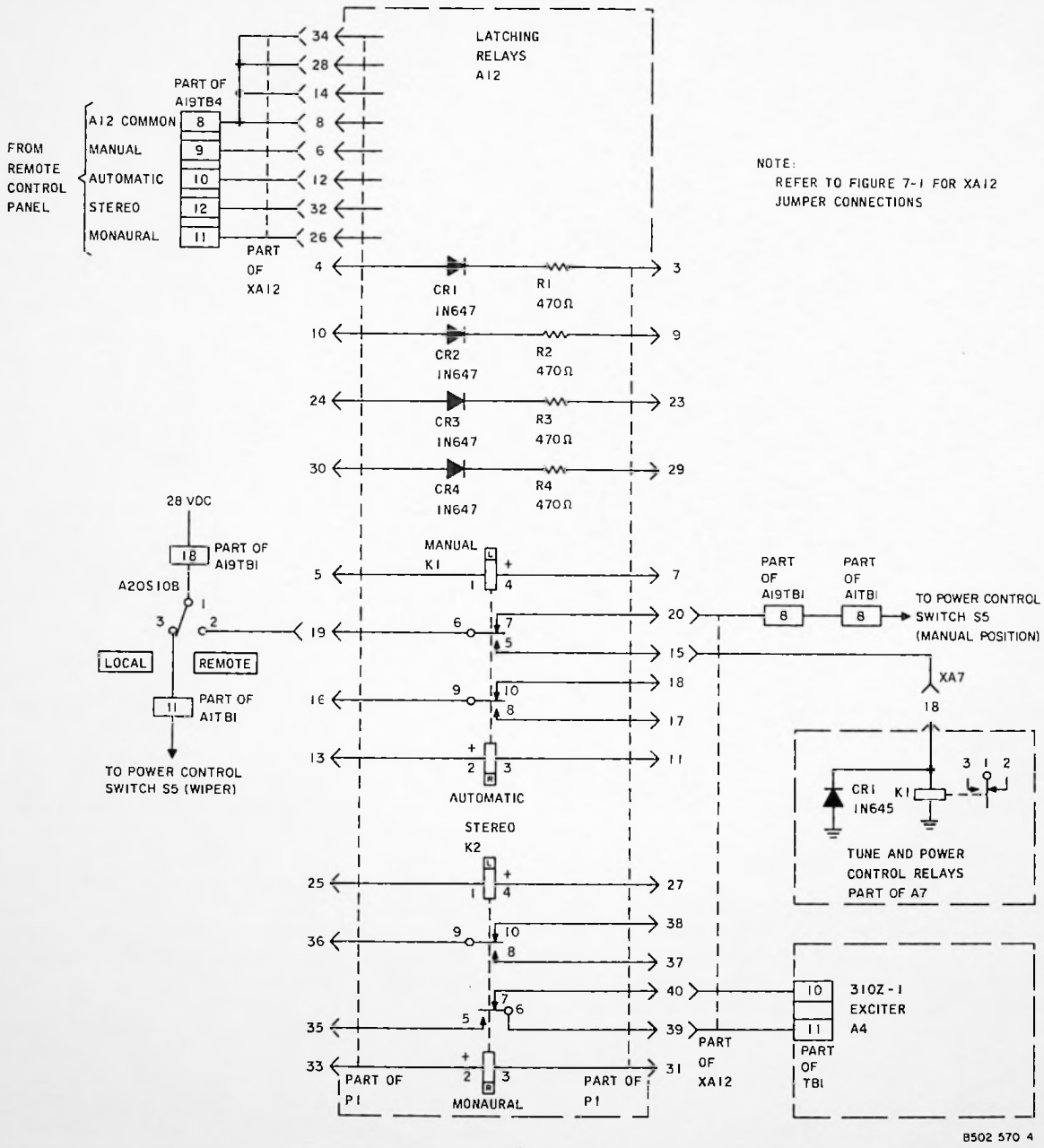


Figure 4-10. Latching Relays A12, Simplified Schematic.

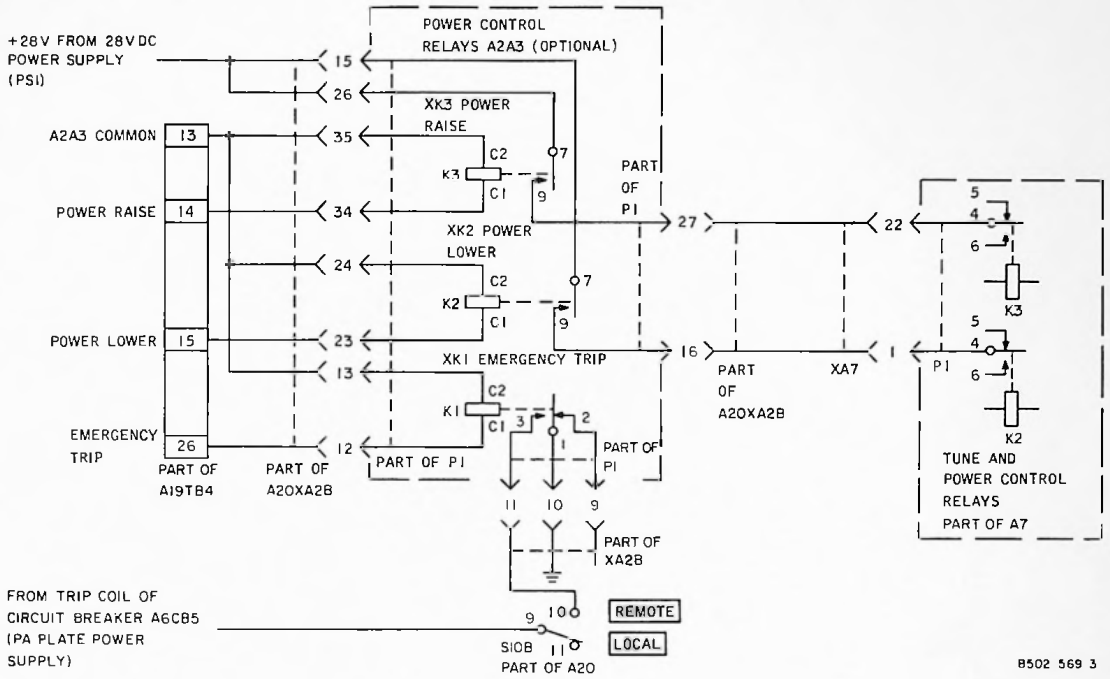


Figure 4-11. Power Control Relays A2A3, Simplified Schematic.

relay is illustrated in figure 4-9. Fail-safe relay A2K1 is energized only when +28 volts is present in the control circuit. If +28 volts is lost, the relay deenergizes and removes power from the transmitter.

4.5.5.4 Plate and Driver Overload Protection

Relays A22K6, A22K7, and A22K8 are adjusted to energize and remove power from the transmitter when an overload occurs in the plate, screen, or driver power supply. Screen current at the junction of A14R14 and A14R15 is applied to relay A22K7 through resistor A22R65. Plate current at the junctions of A14R13 and A14R16 is applied to relay A22K6. Driver current, from the negative terminal of A10Z3 in the driver power supply, is applied to relay A22K8 through resistor A22R60. Each relay is adjusted to trip after detecting a certain current level. (Refer to figure 4-9.) The relay contacts are in series with relay A19K3. If an overload occurs in the plate, screen, or driver supply, the corresponding relay trips and removes power from the transmitter.

section 5
maintenance

5.1 GENERAL

The transmitter has been carefully inspected and adjusted at the factory to reduce maintenance to a minimum. To ensure peak performance, adhere to a regular schedule of periodic checks and maintenance procedures. Refer to the parts list, section 6, for component location in the transmitter.

Warning

Remove primary power before working inside the transmitter, unless otherwise instructed. Use the shorting stick to discharge all large capacitors.

5.2 CLEANING

Clean the transmitter when dust accumulation occurs anywhere inside the equipment. A solvent composed of 25% methylene chloride, 5% perchloroethylene, and 70% dry cleaning fluid may be used as a cleaning material.

5.2.1 General Cleaning Procedures

a. Remove dust from chassis, panels, and components with a soft-bristled brush.

b. Remove foreign matter from flat surfaces and accessible areas with a lintless cloth with solvent. Dry with a clean, dry, lintless cloth.

c. Wash switch and relay contacts with relay contact cleaner and less accessible areas with solvent lightly applied with a small soft-bristled brush.

5.2.2 Air Filter

The air filter should be cleaned whenever a perceptible quantity of dust and dirt accumulates on the filter element. Remove and clean the filter as follows:

a. Remove the cross-wire brace that holds the filter in place.

b. Remove the filter.

c. Use a vacuum cleaner to remove heavy dust accumulation from the filter.

d. Blow a stream of air through the filter in a direction opposite to normal airflow.

e. Wash the filter in a solution of hot water and detergent.

f. Replace the filter when dry.

5.2.3 Tube Cleaning

The power amplifier and driver tubes should be cleaned when a visible quantity of dust accumulates on the cooling fins of the tubes. Carefully remove the tubes from their sockets and clean each with a dry, oil-free jet of air.

5.3 INSPECTION

Inspect the transmitter at least once a week. Check all metal parts for corrosion and general deterioration. Examine wiring and components for signs of overheating. Ensure that all controls are operating smoothly. Inspect all connections and tighten any nuts, screws, or bolts found loose. Examine the blower and cabinet fans for normal operation.

5.4 LUBRICATION

The tuning and loading motor, the manual power increase/decrease motor, and pa cavity blower motor are all sealed and do not require lubrication. The cabinet inlet motor should be lubricated after 1 year of heavy use or 3 years of normal use. Use one teaspoon of SAE 10 oil. Lubrication should continue annually for normal use and semiannually for heavy use or as required.

5.5 TROUBLESHOOTING

If the transmitter fails to operate properly, check each circuit in the order that it is made operative. Use the simplified schematics in section 4 and the

overall schematic in section 7 when needed. Tables of nominal meter readings for rated and reduced power operation and a graph illustrating plate efficiency are supplied in adjustment procedure 5.6.9.

5.5.1 Access Panel Interlock Switch

The access panel interlock switches must be blocked open to perform certain adjustment procedures. To block the panel switch open, push in on the plunger and insert two insulated blocks between the switch contactors. Remove the insulated blocks before replacing the panel.

Table 5-1 lists the test equipment necessary to maintain the transmitter.

5.6 ADJUSTMENTS

Caution

The 28-volt power supply is on when both the filament and plate voltage is removed.

5.6.1 Switch Adjustments

5.6.1.1 Air Interlock Switch S1

a. Press the PLATE OFF and FILAMENT ON switches on control panel A1.

b. Remove the side panel next to the plate cavity.

c. Adjust the tension bolt on switch S1 so that the green filament light goes out when the pa grid compartment door is opened approximately 1 inch.

5.6.1.2 Tuning Motor Limit Switches S11, S12, S13, and S14

a. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.

b. Remove the rear panel behind the plate cavity; or, if the unit is against the wall, remove the side panel next to the cavity. If the transmitter is located in a corner, there is no access to the limit switch.

c. Loosen the mounting screws on the limit switch.

d. Position the limit switch so that the peg mounted to the rack gear causes the switch to trip before the peg runs into the stop. The loading paddle must be approximately five-eighths inch from the blocking capacitor at this point.

5.6.2 Cavity, Shorting Bar, and PA Neutralization Adjustment

a. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.

Table 5-1. Required Test Equipment.

NAME	DESCRIPTION	MANUFACTURER AND MODEL
Volt-ohm-milliammeter		Triplett 630-N
Ac voltmeter	0 to 10 volts, 1% tol	Weston 433
Power supply	0 to 28 volts dc, 5 amperes	
Rf wattmeter	2.5- and 25-kW elements, 50 to 125 MHz	Bird 460
Thruline wattmeter	25 watts	Bird 43
Dc voltmeter	0 to 10 kV	
Dc ammeter	0 to 5 amperes	

b. Open the plate cavity and grid compartment doors.

c. Use the graph in figure 5-1 and adjust the plate cavity shorting plane to the desired frequency.

Note

The pa plate shorting plane location may be different than the location used in the factory due to variations in the antenna characteristic impedance.

d. Use the graph in figure 5-2 and adjust the pa grid slider A21L8 and the driver plate slider A21L7 to the desired frequency. Adjust the pa neutralization bar in accordance with the chart in figure 5-3.

e. Remove the panel located beneath the exciter.

Warning

Voltages hazardous to life exist in this compartment.

f. Discharge all large capacitors.

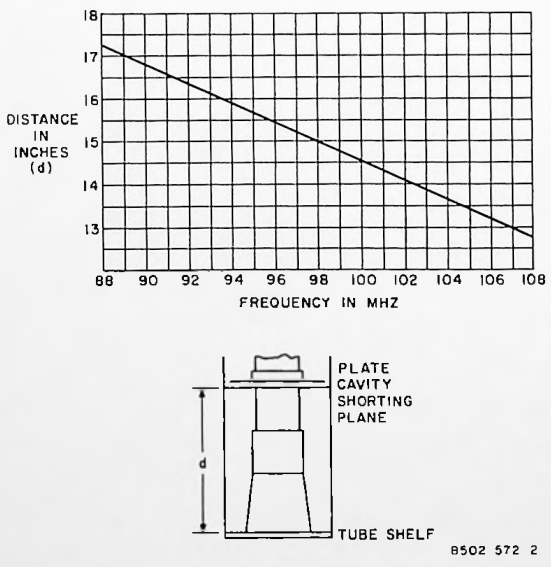


Figure 5-1. PA Plate Cavity Shorting Plane Approximate Adjustment.

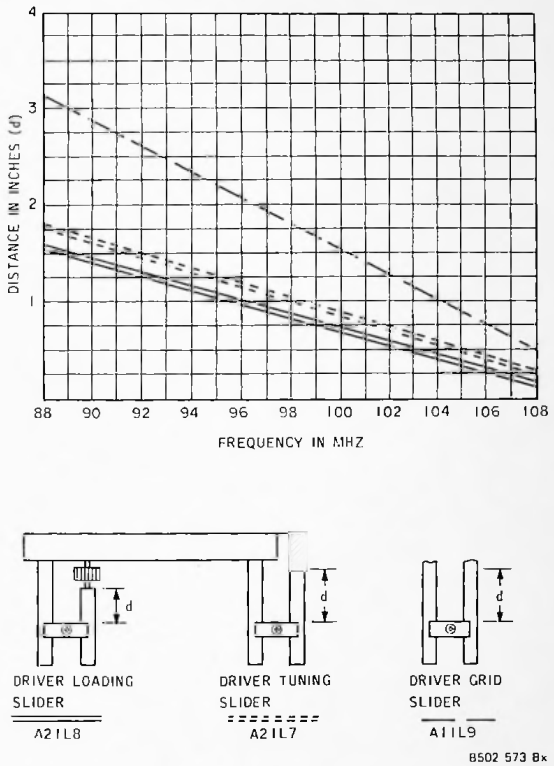


Figure 5-2. Graph for Approximate Setting of Driver Loading, Driver Tuning, and Driver Grid Slider.

g. Remove the driver box access panel.

h. Use the graph in figure 5-2 and adjust the driver grid slider to the desired frequency.

5.6.3 Filament Voltage Adjustment

a. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.

b. Open the pa grid compartment and connect a 0- to 10-volt true rms ac 1% meter to the pa filament rings on the tube socket.

Note

The filament voltage regulator is an scr phase-controlled circuit. The ac voltmeter used must be a true rms indicating device.

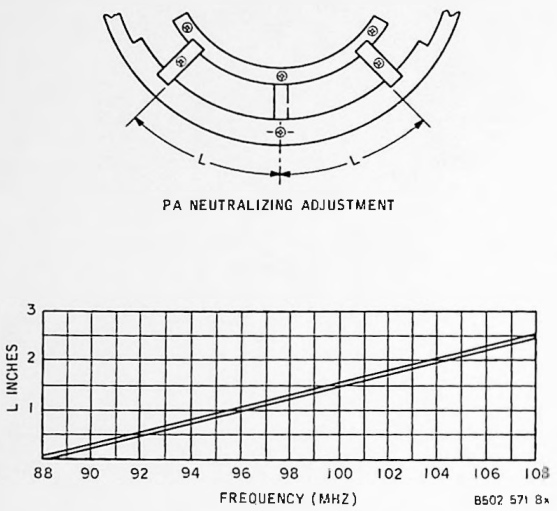


Figure 5-3. PA Neutralizing Adjustment.

c. Run the meter leads out the corner of the compartment and close the pa compartment door.

d. Remove the control circuits cover and pull the plunger on the card cage interlock all the way out.

e. Short across A5C4 and A5R16.

f. Press FILAMENT ON switch on control panel A1.

g. Adjust variable transformer A19T7 of an indication of 6.6 volts ac.

h. Press FILAMENT OFF switch on control panel A1.

i. Remove the jumpers across A504 and A5R16.

j. Press FILAMENT ON switch on control panel A1.

k. Adjust A5R4 for an indication of 6.0 volts ac.

5.6.4 Filament Voltmeter Adjustment

Note

This procedure should be performed only after procedure 5.6.3 has been completed.

a. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.

b. Remove the front panel beneath the grid compartment door on control panel A1.

c. Set the TEST METER selector switch on control panel A1 to the PA FIL 8V position.

d. Press the FILAMENT ON switch.

e. Adjust FIL VM CAL control A22R36 to produce an indication of 5.8 volts on the TEST METER.

Note

Because the TEST METER is a peak reading detector, its indication increases approximately 0.2 volt when the transmitter is at rated power.

f. Connect an ac voltmeter across terminals 3 and 4 of driver filament transformer A11T6 and adjust DVR FIL VOLTS ADJUST control A11R64 to produce an indication of 5.6 to 5.8 volts on the ac voltmeter.

5.6.5 DC Overload Adjustment

a. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.

b. Remove the front panel beneath the pa grid compartment door.

c. Turn the pa PLATE OVLD ADJ A22R66, PA SCREEN OVLD ADJ A22R65, and DVR (driver) PLATE OVLD ADJ A22R60 to their full ccw position.

d. Connect a milliammeter from the positive terminal of a 28-volt power supply to TB8-6 on the transmitter.

e. Connect the negative terminal of the power supply to the transmitter chassis.

f. Adjust the power supply current to 600 mA.

g. Adjust DVR OVLD ADJ A22R60 to trip relay A22K8 at this current. (The FAULT RESET indicator on the extended control panel lights when the relay trips.)

h. Remove the power supply and reset the FAULT RESET indicator.

i. Connect an ammeter from the positive terminal of the 28-volt power supply to TB8-5.

j. Connect the negative terminal of the power supply to TB8-7.

k. Adjust the power supply current to 4.5 amperes.

l. Adjust PA PLATE OVLD ADJ A22R66 to trip relay A22K6 at this current.

m. Remove the power supply and reset the FAULT RESET indicator.

n. Connect the milliammeter from the positive terminal of the 28-volt power supply to TB8-5.

o. Connect the negative terminal of the power supply to TB8-4.

p. Adjust the power supply current to 900 mA.

q. Adjust PA SCREEN OVLD ADJ A22R65 to trip relay A22K7 at this current.

r. Remove the power supply and reset the FAULT RESET indicator (on control panel A1).

5.6.6 PA Grid Current and Driver Screen Current Meter Calibration

a. Turn the -28-volt dc power supply on (28 V).

b. Press PLATE OFF and FILAMENT OFF switches on control panel A1.

c. Remove the front panel beneath the pa grid compartment door.

d. Connect the negative terminal of a dc power supply to A22TB8-20 and the positive terminal to A22TB8-19.

e. Adjust the power supply current to 80 mA.

f. Set the TEST METER selector switch to the PA GRID 80 mA position.

g. Adjust PA GRID MTRG CAL control A22R72 for an 80-mA reading on the test meter.

h. Remove the power supply test leads.

i. Attach the positive terminal of the dc power supply to A22TB8-11 and the negative terminal to A22TB8-21.

j. Set the TEST METER selector switch to the DVR SCREEN 80 MA position.

k. Adjust the DVR SCREEN MTRG CAL control A22R73 for an 80-mA driver screen current reading on the TEST METER.

l. Remove the power supply test leads.

Warning

The access panel for the driver box area must be removed and the panel interlock grounding switch must be blocked open. Voltage hazardous to life is present in the driver box area. Use extreme caution when performing the following procedure.

5.6.7 Power Control Regulator Adjustment

a. Press the FILAMENT OFF and PLATE OFF switches on control panel A1. Set the TEST METER switch to PA SCREEN 800V.

b. Remove the control circuits cover and pull the plunger on the card cage interlock all the way out.

c. Remove the access panel below the exciter and block the interlock grounding switch open.

d. Discharge all large capacitors.

e. Ensure that all other panels and doors are closed.

Caution

The transmitter should not be operated with a static plate current of 1 ampere or more when the exciter is turned off. Monitor the plate current meter and remove transmitter power when excessive plate current occurs.

f. Adjust A8R2 fully ccw; adjust A8R4 fully cw.

g. Set DRIVER power supply circuit breaker A6CB3 to OFF.

h. Set POWER CONTROL switch to MANUAL position.

i. Press the FILAMENT ON and PLATE ON switches on control panel A1 and wait for time delay of approximately 120 ±20 seconds.

j. Slowly rotate RAISE control A8R2 fully cw. The plate voltage should increase to approximately 8000 volts and the screen voltage should be approximately 750 volts when the maximum cw position is obtained.

k. Adjust the POWER ADJUST switch on the control panel to RAISE, and hold until the motor has run to the end of its travel. Rotate RAISE control A8R2 ccw until a slight decrease in plate voltage is observed. This indicates that the control range has been reached.

l. Rotate the POWER ADJUST switch on the control panel in the LOWER direction and hold until the motor has run to the end of its travel. Rotate LOWER control A8R4 in the ccw direction until a plate voltage of 7300 volts is indicated.

Note

A8R2 and A8R4 may require readjusting to set proper output power limits under normal operating conditions. The time required for limit-to-limit motor travel is approximately 30 seconds.

m. Set DRIVER power supply circuit breaker A6CB3 to ON.

n. Set the TEST METER selector switch to the DVR SCREEN 400V position. The TEST METER should indicate 280 ±10 volts.

o. Set the TEST METER selector switch to the LEFT DVR K 400 MA position.

p. Adjust the LEFT BIAS control on the driver box A11 until the TEST METER indicates 150 mA.

q. Set the TEST METER selector switch to the RIGHT DVR K 400 MA position.

r. Adjust the RIGHT BIAS control on the driver box A11 until the TEST METER indicates 150 mA.

Note

The two bias controls interact and should be adjusted several times to acquire a constant 150 mA in both tubes.

s. Set the TEST METER selector switch to the DVR PLATE 4000V position. The TEST METER should indicate between 1800 to 2000 volts.

t. Refer to table 5-2 and ensure the transmitter readings are approximately the same.

5.6.8 Driver Grid Tuning

a. Press the FILAMENT OFF and PLATE OFF switches on control panel A1.

b. Perform steps e., f., g., and h. in paragraph 5.6.2, Cavity, Shorting Bar, and PA Neutralization Adjustment, before proceeding.

c. Mount on top of the driver box a Bird wattmeter, model 43, that contains a 25-watt, 50- to 125-MHz element.

d. Attach the shortest possible length of coaxial cable between the wattmeter output and driver rf input jack J1.

Warning

The access panel for the driver area (center bay) must be removed. Voltage hazardous to life is present in the driver box area. Use extreme caution when performing the following procedure.

e. Block the interlock grounding switch open.

f. Set PA SCREEN POWER SUPPLY circuit breaker A6 CB4 to OFF.

g. Remove the exciter cover and set the exciter POWER switch to ON.

Table 5-2. Typical Meter Readings With No Excitation and Manual Power Control at Maximum.

METERS	READINGS
Pa PLATE VOLTAGE	8100 volts
Pa PLATE CURRENT	100 to 300 mA
TEST METER positions	
PA SCREEN 800 MA	0 mA
PA SCREEN 800 V	800 volts
PA FIL 8 V	5.84 volts
LEFT DVR K 400 MA	150 mA
RIGHT DVR K 400 MA	150 mA
DVR SCREEN 400 V	310 volts
DVR GRID 80 MA	0
DVR PLATE 4000 V	2140 volts
28 V SUPPLY 40V	27 volts

h. Press the FILAMENT ON and PLATE ON switches.

i. Adjust exciter POWER OUTPUT control A4R15 cw until 15-watt forward power is indicated on the Bird wattmeter.

j. Turn the wattmeter element to indicate reflected power and adjust the TUNE and COUPLE controls, A11C33 and A11C34, on the driver box for minimum reflected power.

k. Repeat the adjustment several times to reduce interaction between controls.

Note

Reflected power should be less than 1/2 watt when the forward power is 15 watts.

l. Check that the TUNE and COUPLING controls are approximately one-half mesh when they are adjusted for minimum reflected power.

m. Remove power from the transmitter, adjust grid inductor A11L9, and repeat steps j. and k. if either control is not approximately one-half mesh.

5.6.9 PA Tuning Procedure

Warning

Voltage hazardous to life is present in the pa plate cavity and grid compartment. Use extreme caution when performing the following procedure.

5.6.9.1 PA Tuning

a. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.

b. Perform steps a. through h. in paragraph 5.6.2, Cavity, Shorting Bar, and PA Neutralization Adjustment, before proceeding.

c. Attach to the transmitter output terminals a Bird rf wattmeter, model 460, that contains a 25-kilowatt, 50- to 125-MHz element and an rf dummy load capable of dissipating 25 kilowatts.

d. Adjust DRIVER PLATE TUNING control A11C37 to one-half mesh.

e. Set the exciter POWER switch to ON; remove the exciter cover and adjust the POWER OUTPUT control (A4R15) until approximately 5 watts is indicated on the Bird in-line wattmeter.

f. Press the FILAMENT ON switch.

g. Set the POWER CONTROL to the MANUAL position.

h. Adjust the PA TUNING and PA LOADING controls to position the tune and load capacitors, A18C50 and A18C51, approximately midrange.

Caution

Do not exceed the following maximum ratings:

Left driver cathode current	250 mA
Right driver cathode current	250 mA
Pa screen current	600 mA
Pa plate current	4.0 amperes

i. Press the PLATE ON switch.

j. Quickly adjust PA TUNING and PA LOADING controls for a maximum power output indication on the RF WATTMETER if an rf output from the transmitter is indicated when power is applied.

Caution

Prolonged operation with the plate poorly tuned may damage the power amplifier.

k. Adjust the DRIVER PLATE TUNING control until an rf output is indicated if one is not present when power is applied.

l. Repeat steps j. and k. until maximum output power is obtained.

m. Increase the exciter output to produce 10 mA of grid current. Retune as necessary. The driver loading adjustment is correct when from 15 to 40 mA of positive driver screen current is obtained. Trim the driver tuning and loading inductors until the driver and pa screen current peaks coincide.

n. Adjust driver neutralization capacitor C_N so that the driver screen current peaks at the point of minimum driver cathode current.

o. If the screen peak does not occur at the same time maximum output is obtained, adjust the two screen sliders L7 and L8 in approximately one-sixteenth-inch increments until the screen current and rf output peak together. A minimum value of pa plate current will also be noted when neutralization is correct. Pa neutralization is not critical and the required adjustment should not deviate more than one-fourth inch from that given on figure 5-3.

Note

Because of the relatively high output capacity of the 4CX15000A and the resulting low cavity inductance, NO plate current dip will be noted at higher power levels. Tuning and loading should be adjusted in steps for maximum output power. Adjust pa plate voltage for 7500 volts using manual control.

p. Tuning and neutralization checks are conventional. The driver loading is critical if minimum synchronous am is desired. Observe the driver screen current peak and adjust loading until it coincides with the pa screen peak. Driver screen current should be between 15 and 40 mA. During adjustment, and as final check, observe the heating effect on the filament bypass capacitors, particularly C36. If C36 heats noticeably, increase the inductance L8. Work the two inductors, L7 and L8, until the above condition is found.

If the driver tank circuit Q is too high (too much capacitance), excessive drift will be noted on starting up after the circuit has cooled. Full power should be noted in 15

to 30 seconds and the pa screen current should stabilize in from 30 to 60 seconds. To minimize this drift, increase inductance to decrease the circuit Q.

q. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.

r. Open the pa cavity door and ensure that the plate tuning capacitor A18C50 is approximately halfway between its limits.

s. If the plate tuning capacitor A18C50 is not approximately halfway between its limits, adjust the pa plate cavity shorting plane (paragraph 5.6.2) and repeat steps 1. through r. of this paragraph.

t. With the transmitter operating in the MANUAL mode, adjust the grid-leak bias resistor A18035 for proper output currents. The PA grid drive level determines the amount of bias required, and with higher drive levels an increase in bias results in greater amplifier efficiency.

u. With the transmitter operating in the MANUAL mode, observe the plate current and output power meters and adjust A21C39 for maximum power output with minimum plate current.

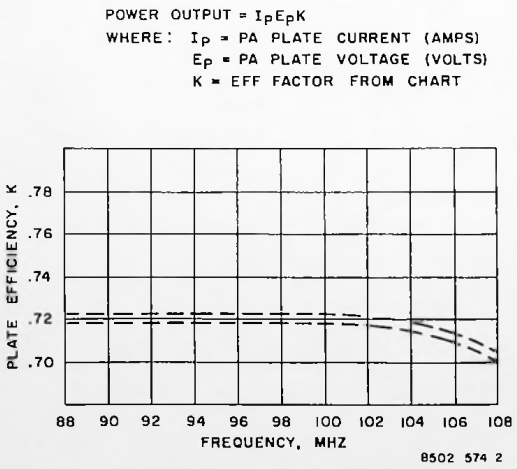


Figure 5-4. 831G-1 Amplifier Efficiency Vs Frequency Graph.

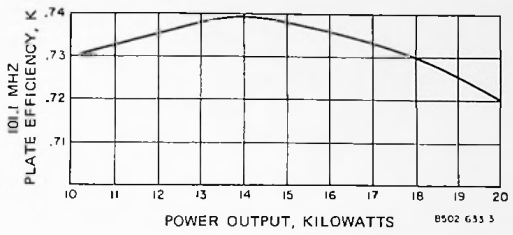


Figure 5-5. 831G-1 Amplifier Efficiency Vs Power Output Graph.

A significant loss of efficiency will result if this capacitor is adjusted to the point at which the power output and plate current start decreasing.

Note

The pa plate efficiency with the above indications is 70 to 76 percent. Refer to figure 5-4 for the graph of plate efficiency versus frequency. Figure 5-5 is the graph of plate efficiency versus power output. Figure 5-6 is the power-to-vswr conversion graph.

v. Refer to tables 5-3 and 5-4 for a list of typical meter readings.

Note

The nominal voltages for the reduced power levels should be brought as close to the tabulated values as possible by adjusting the transformer primary taps. The secondaries may be reconnected in delta if necessary.

Note

The taps on the transformers should be selected in such a manner that the output power control circuit will not phase back the power too far (refer to figure 4-8). Best method is to allow +10% of licensed power for peak to allow for automatic power control. Failure to do this will cause fm noise with an excessive phase angle retardation.

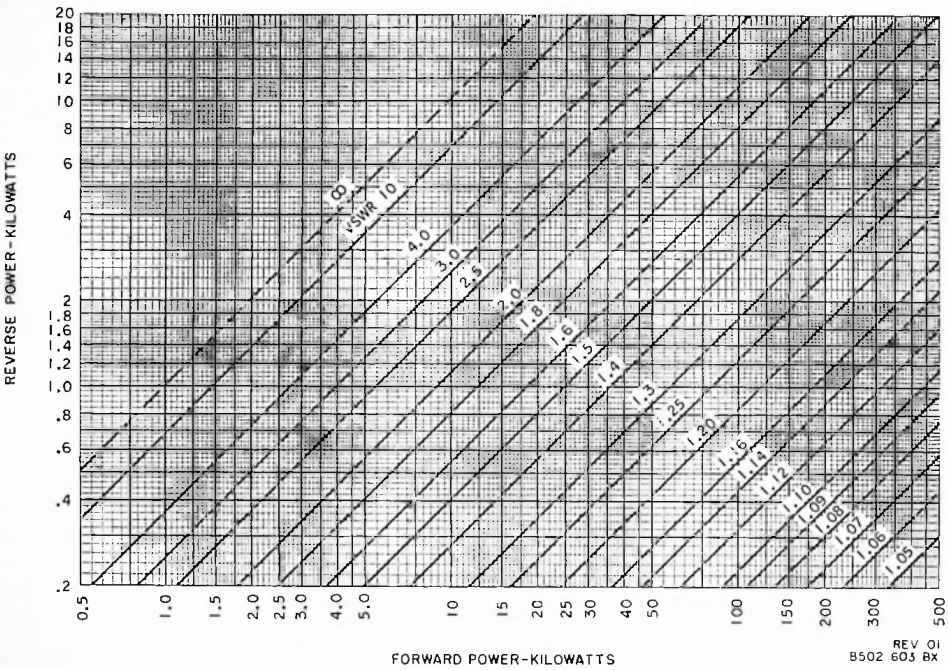


Figure 5-6. Power to VSWR Conversion Graph.

Table 5-3. Nominal Indications, 20-Kilowatt Power Output.

TYPICAL METER READINGS	
Power output	20.0 kilowatts
Pa plate volts	7600 to 7900 volts
Pa plate current	3.40 to 3.65 amperes
Pa screen current	350 to 500 mA
Pa grid current	50 to 65 mA
Left dvr. cath. I	180 to 200 mA
Right dvr. cath. I	180 to 200 mA
Dvr. screen I	5 to 30 mA
Dvr. grid I	10 mA
Dvr. plate volts	1800 to 2000 volts
Dvr. screen volts	290 to 310 volts
310Z-1 Output Power	20 watts
Pa plate efficiency	70 to 76%
Control V	28 volts

Table 5-4. Nominal Readings, Reduced Power Operation.

POWER OUTPUT	PLATE VOLTAGE		PLATE CURRENT		SCREEN VOLTAGE		SCREEN CURRENT		CONTROL GRID CURRENT		EFFICIENCY (%)	
	Recorded	Nominal	Recorded	Nominal	Recorded	Nominal	Recorded	Nominal	Recorded	Nominal	Recorded	Nominal
18,000		7450		3.3		690		400		50		73.0
16,000		7200		3.0		670		380		50		73.5
14,000		6950		2.7		640		370		50		74.0
12,000		6750		2.4		610		350		50		73.5
10,000		6500		2.1		580		330		50		73.0

Note: The above are approximations. The individual transmitters will vary with source voltage and installation.

5.6.9.2 Driver Bias Adjust

Warning

The access panel for the driver box area must be removed and the panel interlock grounding switch must be blocked open. Voltage hazardous to life is present in the driver box area. Use extreme caution when performing the following procedure.

a. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.

b. Remove the front panel below the exciter.

c. Discharge all large capacitors.

d. Block the interlock grounding switch open.

e. Press FILAMENT ON and PLATE ON switches and observe the left and right driver plate current on the test meter.

f. Adjust the driver bias controls R40 and R44 for equal left and right driver cathode currents (180 to 200 mA).

Note

The controls may need to be adjusted several times before the current is the same in both tubes.

e. At this time, be certain that the PA bias supply, PS2 is gated off. Remove F5 to turn off the protective bias. Observe the reaction on the pa screen current. If it rises, more drive is needed to the pa. Recheck tuning and grid-leak setting.

5.6.9.3 PA Neutralization

a. Check the transmitter for proper neutralization by tuning the transmitter for a pa screen current power peak and observing that maximum output power occurs at the same time.

Note

A minimum value of pa plate current also occurs when neutralization is correct.

Warning

The cavity door must be opened to perform this procedure. Remove all power from the transmitter before opening the cavity door.

b. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.

c. Open the pa cavity door.

d. Slide the blocking capacitor and the tube anode cover up to expose screen sliders.

e. Refer to figure 5-3. The sliders should not require an adjustment greater than ±1/4 inch from the initial setting.

f. Slide the blocking capacitor and tube anode cover back into place.

g. Close the cavity door and apply power to the transmitter.

h. Check for proper neutralization again. If incorrect, repeat steps a. through g.

5.6.10 Control Regulator Final Adjustment

a. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.

b. Set the POWER CONTROL switch to the MANUAL position.

c. Remove the control circuits cover and pull the plunger on the card cage interlock all the way out.

d. Press the FILAMENT ON and PLATE ON switches.

e. Adjust RAISE control A8R2 on control regulator board A8 until pa PLATE VOLTAGE meter indicates maximum.

f. Adjust A8R2 until a small decrease in plate voltage is observed.

g. Hold the POWER ADJUST switch on the extended control panel in the LOWER position until the minimum limit of the control is reached.

h. Adjust LOWER control A8R4 on control regulator board A8 for an 18-kilowatt power output.

i. Run the POWER ADJUST control between its maximum and minimum limits (18-21 kilowatts) and note the rate of change in power output.

j. Readjust A8R4 if the control is too fast and cannot be adjusted to a distinct power setting.

5.6.11 Board A3, Offset Zero Adjustment

a. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.

b. Remove the control circuits cover and pull the plunger on the card cage interlock all the way out.

c. Set the exciter POWER switch to OFF.

d. Place board A3 on a card extender.

e. Press the FILAMENT ON and PLATE ON switches.

f. Connect a high-impedance voltmeter from A3AR1 pin 6 and ground. Set TRIP DISABLE switch to OFF.

g. Adjust OFFSET REFL control A3R11 until 0 volt is indicated on the vtvm.

h. Remove the voltmeter from A3AR1 pin 6 and connect it to A3AR2 pin 6.

i. Adjust FWD OFFSET control A3R19 until 0 volt is indicated on the vtvm.

5.6.12 Automatic Power Control

a. Press the FILAMENT OFF and PLATE OFF switches on control panel A1.

b. Remove the control circuits cover and pull the plunger on the card cage interlock all the way out.

c. Set the POWER CONTROL switch to the MANUAL position.

d. Depress the FILAMENT ON and PLATE ON switches.

e. Adjust the POWER ADJUST switch for 20-kilowatt output.

f. Set the POWER CONTROL switch to the AUTOMATIC position.

g. Adjust PWR CONT ADJ A3R24 until the transmitter output power is 20 kilowatts.

h. Set the POWER CONTROL switch to the MANUAL position.

Note

If the transmitter trips the dc plate overload relay A22K6 when switching from manual to automatic power control, adjust PA PLATE OVLD ADJ A22R66 for a slightly higher trip current.

i. Hold the POWER ADJUST switch in the LOWER position until the minimum limit of the control is reached.

j. Set the POWER CONTROL switch to the AUTOMATIC position.

Note

The automatic power control should return the transmitter output to 20 kilowatts.

k. Replace the control circuits cover and observe the RF WATTMETER for an indication of power change.

l. Readjust PWR CONT ADJ A3R24 if a power change should occur.

Note

The high velocity airflow through the card cage when the card cage cover is removed has a slight effect on the setting of A3R24.

Note

Any adjustment of A8R2 will change the automatic power control calibration.

5.6.13 VSWR Trip

a. Press the FILAMENT ON and PLATE ON switches on control panel A1.

b. Place the POWER CONTROL switch in the MANUAL position.

c. Reduce the plate voltage with A8R2 until the output power is reduced to 2000 watts.

d. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.

e. Carefully loosen the base clamps on the directional coupler A16 and reverse the assembly.

f. Remove the control circuits cover and pull out the plunger on the card cage interlock.

g. Set the DISABLE switch on A3 to ON.

h. Press the FILAMENT ON and PLATE ON switches on control panel A3.

i. Adjust TRIP LEV A3R23 until vswr trip relay A22K9 is energized and plate voltage is removed.

j. Set the TRIP DISABLE switch to OFF and press the PLATE ON switch.

k. Set the TRIP DISABLE switch to ON. If the transmitter fails to turn off, repeat steps a. through j.

l. Press the FILAMENT OFF switch, if plate power has been removed.

m. Replace the directional coupler in its normal position.

n. Adjust A8R2 for 20,000 watts output. Refer to paragraph 5.6.12.

5.7 PARTS REPLACEMENT

5.7.1 4CX15000A PA Tube

a. Slide the blocking capacitor and the anode cover up (figure 4-2) (also the cavity slides if the operating frequency is at the lower end of the fm band) to expose the tube.

b. Remove the anode lead.

c. Carefully lift the tube out of its socket.

d. Reverse the procedure to replace the tube, however, do not slide the blocking capacitor all the way down on the chimney. This allows some air to escape and positively charge the plate compartment. The air also cools the low-pass filter in the transmission line.

5.7.2 Extended Control Panel Indicator Lamps

a. Pull the switch out and rotate it 90° ccw; the lamp assembly should pop out.

b. Remove the defective lamp by pressing down on the bulb.

c. Reinsert new bulb and replace the assembly.

5.7.3 Fuses

Fuses F15, F16, and F17 are current limiting type fuses that protect the scr's on power control unit A9. When one of these fuses blows, the links in the remaining two may have been weakened, and as a result, their ratings may have been changed to a lower value. For this reason, all three fuses should be replaced when one is blown.

5.7.4 Replacement Parts

Order replacement parts from the following address:

Collins Radio Company
Service Parts, 412-012
1200 N Alma Rd.
Richardson, Texas 75080

section 6
parts list

6.1 GENERAL

This section contains a list of all repairable/replaceable electrical, electronic, and critical mechanical parts for the 831G-1 20-kW FM Transmitter.

6.2 SYMBOL

This column contains the electrical symbols of all parts that have been assigned to schematics on wiring diagrams, and/or index numbers for all parts for which symbols have not been assigned. When a symbol, within a series of symbols, has not been assigned a part number, the unassigned symbol will be reflected as "NOT USED" in the DESCRIPTION column.

6.3 DESCRIPTION

This column contains the identifying noun or item name followed by a brief description. The description for electrical/electronic parts includes the applicable ratings and tolerances. For consecutively listed identical parts within an assembly, "SAME AS - - -" is reflected in the description of subsequent listings, referencing to the first listing within the assembly.

6.4 MANUFACTURERS PART NUMBER

The part number for each item not manufactured by Collins Radio Company is reflected in the column.

6.5 MFR CODE

The manufacturers codes, in accordance with Federal Supply Codes for Manufacturers Handbook H4-1, are reflected in this column. Manufacturers not listed in Handbook H4-1 are assigned a 5-letter code. This column is left blank for items manufactured by Collins Radio Company. Refer to paragraph 6.9, Manufacturers Code and Name Index.

6.6 COLLINS PART NUMBER

The Collins Radio Company Specification or drawing number, for each item in the parts list, is reflected in this column.

6.7 ILLUSTRATIONS

All parts listed in the SYMBOL column are located on corresponding illustrations. The illustration always precedes the parts list. When a replaceable electrical item is hidden from view by structural parts or wiring, a dotted leader line is used to show the location of the item on the illustration.

6.8 LIST OF EQUIPMENT

6.9 MANUFACTURERS CODE AND NAME INDEX

CODE	NAME AND ADDRESS
ASSOC	Associated Electrical Ind. Eugene Munsell, Distributor Box 126 Ho Ho Kus, NJ 07423
FIRIN	Firing Circuits, Inc. Div. of Marathon Electric Muller Ave. Norwalk, CT
POWER	Power Semiconductors, Inc. Munson St. Devon, CT 06460
00141	Pic Design Corp. 477 Atlantic Ave. East Rockaway, NY 11518
01002	General Electric Co. Industrial and Power Capacitor Dept. John St. Hudson Falls, NY 12839
01295	Texas Instruments, Inc. Semiconductor and Components Div. 13500 N Central Expwy. Dallas, TX 75231
03508	General Electric Co. Semiconductor Products Dept. Electronics Park Syracuse, NY 13201
03877	Transitron Electronic Corp. 168-186 Albion St. Wakefield, MA 01880
04009	Arrow-Hart and Hegeman Electric Co. 103 Hawthorne St. Hartford, CT 06106
04713	Motorola Semiconductor Products, Inc. 5005 E McDowell Rd. Phoenix, AZ 85008
05277	Westinghouse Electric Corp. Semiconductor Dept. Youngwood, PA 15697
06751	Components, Inc. Semcor Div. Phoenix, AZ
06978	Aladdin Electronics Div. of Aladdin Industries, Inc. 705 Murfreesboro Rd. Nashville, TN 37210
06980	Varian Eimac Div. 301 Industrial Way San Carlos, CA 94070
07263	Fairchild Camera and Instrument Corp. Semiconductor Div. 464 Ellis St. Mountain View, CA 94040
07716	IRC, Div. of TRW, Inc. Burlington Plant 2850 Mt. Pleasant Burlington, IA 52601
08289	Blinn Delbert Co., Inc. 1678 E Fifth Ave. PO Box 2007 Pomona, CA 91766
08466	General Instrument of Canada, Ltd. 151 Weber South Waterloo, Ontario, Canada
08510	Magnetics, Inc. Kemco Div. Sandy Lake, PA 16145
09023	Cornell-Dubilier Electronics Div. Federal Pacific Electric Co. 2562 Dalrymple Sanford, NC 27330
09214	General Electric Co. Semiconductor Products Dept. West Genesee St. Auburn, NY 31022
10108	Hurst Mfg. Corp. Road 64 East Princeton, IN 47570

CODE	NAME AND ADDRESS
10646	Carborundum Co. PO Box 337 Niagara Falls, NY 14302
11502	IRC, Div. of TRW, Inc. Boone Plant Greenway Rd. Boone, NC 28607
12066	Ohio Semitronics, Inc. 1205 Chesapeake Ave. Columbus, OH 43212
13103	Thermalloy Co. 8717 Diplomacy Row Dallas, TX 75247
14433	ITT Semiconductors Div. of International Telephone and Telegraph Corp. 3301 Electronics Way West Palm Beach, FL 33401
19070	Eastern Air Devices, Inc. 385 Central Ave. Dover, NH 38022
19701	Electra/Midland Corp. PO Box 760 Mineral Wells, TX 76067
33173	General Electric Co. Tube Dept. 316 E Ninth St. Owensboro, KY 42301
35844	Andrew Antenna Corp, Ltd. 606 Beech St. Whitby, Ontario, Canada
37942	P.R. Mallory and Co., Inc. 3029 E Washington St. Indianapolis, IN 46206
41197	Modine Mfg. Co. 1500 Dekoven Ave. Racine, WI 53401
44655	Ohmite Mfg. Co. 3601 W Howard St. Skokie, IL 60076
49671	RCA Corp. 30 Rockefeller Plaza New York, NY 10020
52090	Rowan Controller Co. PO Box 306 Westminster, MD 21157
53021	Sangamo Electric Co. 1301 N 11th Springfield, IL 62705
56289	Sprague Electric Co. North Adams, MA 01247
56365	Square D Co. Executive Plaza Park Ridge, IL 60068
58474	Superior Electric Co. 383 Middle St. Bristol, CT 06010
59730	Thomas and Betts Co. 36 Butler St. Elizabeth, NJ 07207
60399	Torrington Mfg. Co. 100 Franklin Dr. Torrington, CT 06790
65092	Weston Instruments, Inc. Weston Instruments Div. 614 Frelinghuysen Ave. Newark, NJ 07114
70309	Allied Control Co., Inc. 2 East End Ave. New York, NY 10021
70371	American Lava Corp. Cherokee Blvd. and Manufacturers Rd. Chattanooga, TN 37405
70674	ADC Products Div. of Magnetic Controls Co. 6405 Cambridge St. Minneapolis, MN 55426
71313	Cardwell Condenser Corp. 80 E Montauk Highway Lindenhurst, Long Island, NY 11757

CODE	NAME AND ADDRESS
71400	Bussman Mfg. Div. of McGraw & Edison Co. 2536 W University St. St. Louis, MO 63017
71424	Chase Shawmut Co. 374 Merrimac St. Newburyport, MA 01950
71450	CTS Corp. 1142 W Beardsley Ave. Elkhart, IN 46514
71590	Globe-Union, Inc. Centralab Div. PO Box 591 Milwaukee, WI 53201
71785	Cinch Mfg. Co. Howard B. Jones Div. 1026 S Homan Ave. Chicago, IL 60624
72136	Electro Motive Mfg. Co., Inc. South Park and John St. Willimantic, CT 06226
72699	General Instrument Corp. Automatic Manufacturing Div. 65 Gouverneur St. Newark, NJ 07104
72962	Elastic Stop Nut Div. of Amerace Esna Corp. 2330 Vauxhall Rd. Union, NJ 07083
72982	Erie Technological Products, Inc. 644 W 12th St. Erie, PA 16512
73293	Hughes Aircraft Co. Electron Dynamics Div. PO Box 2999 Torrance, CA 90509
73445	Amperex Electronic Corp. 230 Duffy Ave. Hicksville, Long Island, NY 11801
74193	Heinemann Electric Co. 2612 Brunswick Pike Trenton, NJ 08602
74545	Hubbell Harvey, Inc. State St. and Bostwick Ave. Bridgeport, CT 06602
74970	E.F. Johnson Co. 299 10th Ave. SW Waseca, MN 56093
75042	IRC, Div. of TRW, Inc. 401 N Broad St. Philadelphia, PA 19108
75382	Kulka Electronic Corp. 520 S Fulton Ave. Mt. Vernon, NY 10550
76487	James Millen Mfg. Co., Inc. 150 Exchange St. Malden, MA 02148
76854	Oak Mfg. Co. Div. of Oak Electro/Netics Corp. S Main Crystal Lake, IL 60014
77342	American Machine and Foundry Co. Potter and Brumfield Div. 1200 E Broadway PO Box 522 Princeton, IN 47570
78277	Sigma Instruments, Inc. 170 Pearl St. South Braintree, MA 02185
79136	Waldes Kohinoor, Inc. 47-16 Austel Place Long Island City, NY 11101
80008	Electro Engineering Works, Inc. 6555 Covey Rd. PO Box 338 Forestville, CA 95436
80058	Military Standards
80089	Essex Wire Corp. Controls Div. 131 Godfrey St. Logansport, IN 46947
80583	Hammarlund Mfg. Co. 73-88 Hammarlund Dr. Mars Hill, NC 28754

CODE	NAME AND ADDRESS
81349	Military Standards
81350	Military Standards
81483	International Rectifier Corp. 233 Kansas St. El Segundo, CA 90245
82227	A.W. Haydon 232 N Elm St. Waterbury, CT 06720
82386	Sun Electric Corp. 6321 Avondale Ave. Chicago, IL 60631
83330	Herman H. Smith, Inc. 812 Snediker Ave. Brooklyn, NY 11207
83781	National Electronics, Inc. PO Box 269 Geneva, IL 60134
84147	Andrew Corp. 10500 W 153rd. St. Oland Park, IL 60462
86151	Genisco Technology Corp. Illinois Div. 9367 William St. Rosemont, IL 60018
87216	Philco-Ford Corp. Lansdale Div. Church Rd. Lansdale, PA 19446
88422	General Electric Co. General Purpose Motor Dept. 2000 Taylor St. Fort Wayne, IN 46804
88797	Robintech, Inc. Electro Mechanical Div. PO Box 714 Binghamton, NY 13902
90634	Gulton Industries, Inc. Gulton St. Metuchen, NJ 08840
91637	Dale Electronics, Inc. PO Box 609 Columbus, NB 68601
91662	Elco Corp. Maryland Rd. and Computer Ave. Willow Grove, PA 19090
91929	Honeywell, Inc. Micro Switch Div. Chicago and Spring St. Freeport, IL 61032
93790	Cornell-Dubilier Electronics Div. Federal Pacific Electric Co. 1605 Rodney French Blvd. New Bedford, MA 02741
94154	Wagner Electric Corp. Tung Sol Div. 630 W Mount Pleasant Ave. Livingston, NJ 07039
94375	Automatic Metal Products Corp. 315-323 Berry St. Brooklyn, NY 11211
96095	Aerovox Corp. Seneca Ave. Olean, NY 14760
96182	Master Specialties Co. 1640 Monrovia Costa Mesa, CA 92627
96502	Henry G. Dietz Co., Inc. 14-26 28th Ave. Long Island City, NY 11102
96906	Military Standards
98978	International Electronic Research Corp. 135 W Magnolia Ave. Burbank, CA 91502
99934	Renbrandt, Inc. 6 Parmelee St. Boston, MA 02118
99942	Globe-Union, Inc. Centralab Semiconductor Div. 4501 N Arden Drive El Monte, CA 91734
99971	General Electric Co. Aerospace Electronics Dept. French Rd. Utica, NY 13503

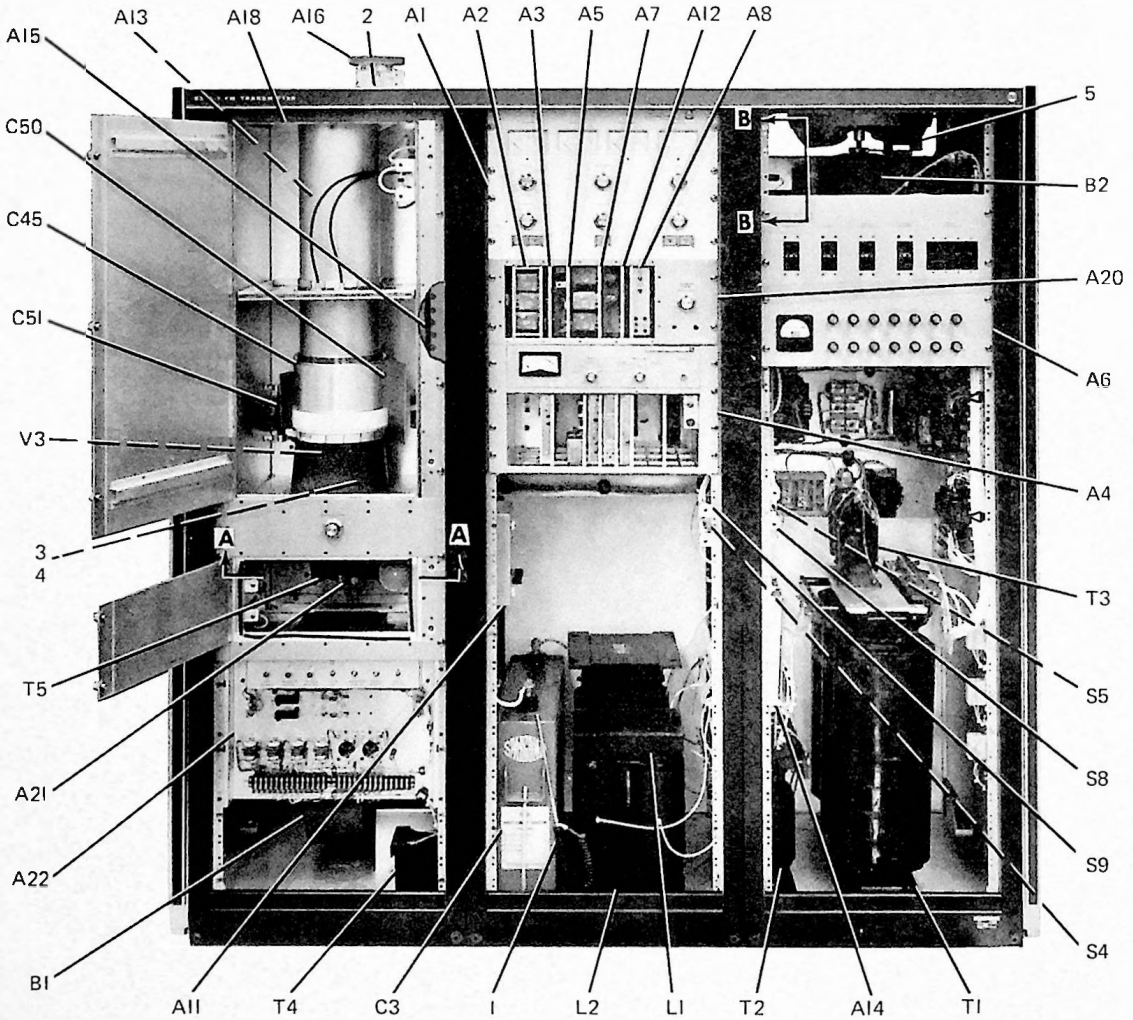


Figure 6-1. 831G-1 20-kW FM Transmitter (Sheet 1 of 3).

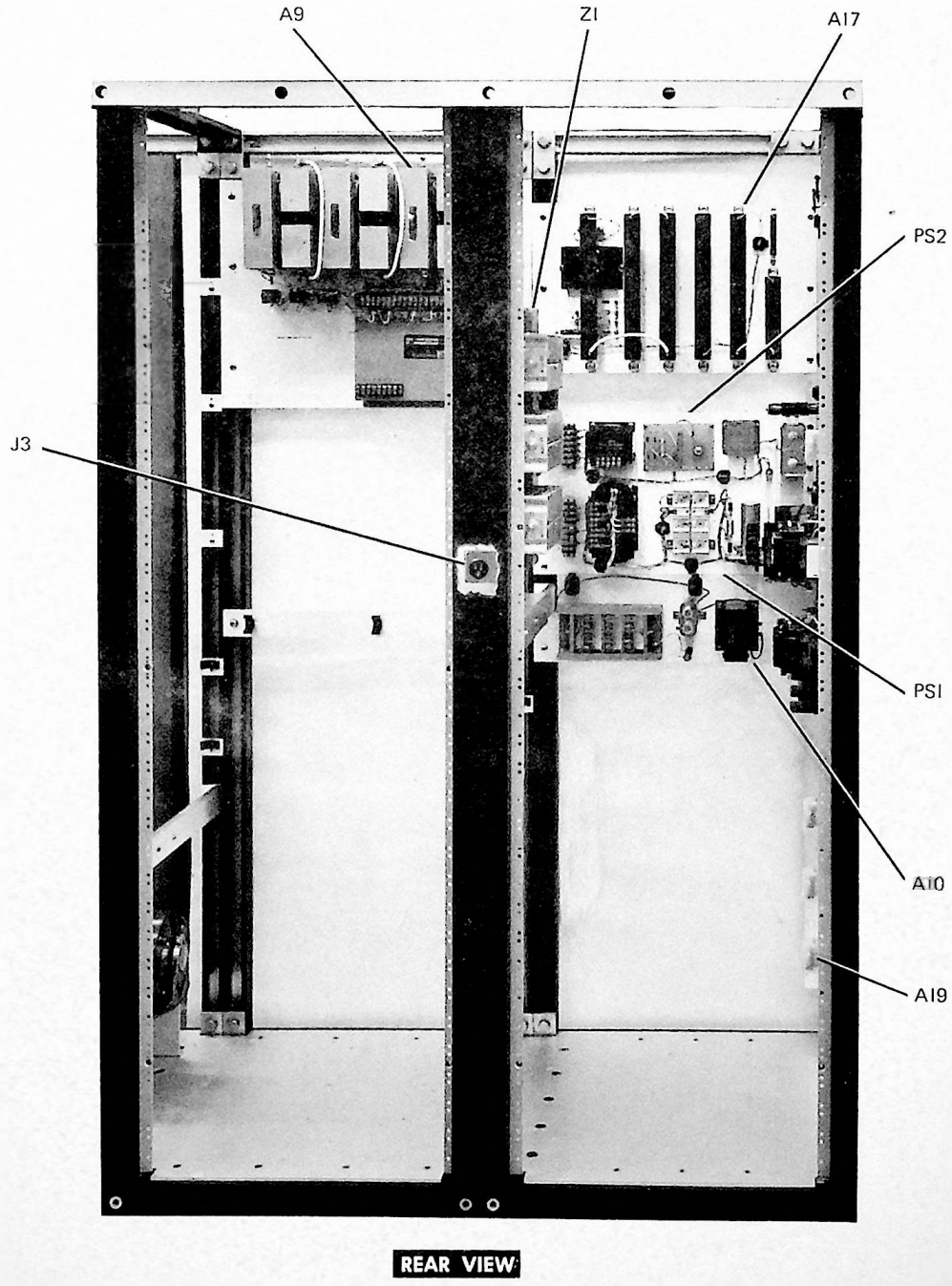


Figure 6-1. 831G-1 20-kW FM Transmitter (Sheet 2 of 3).

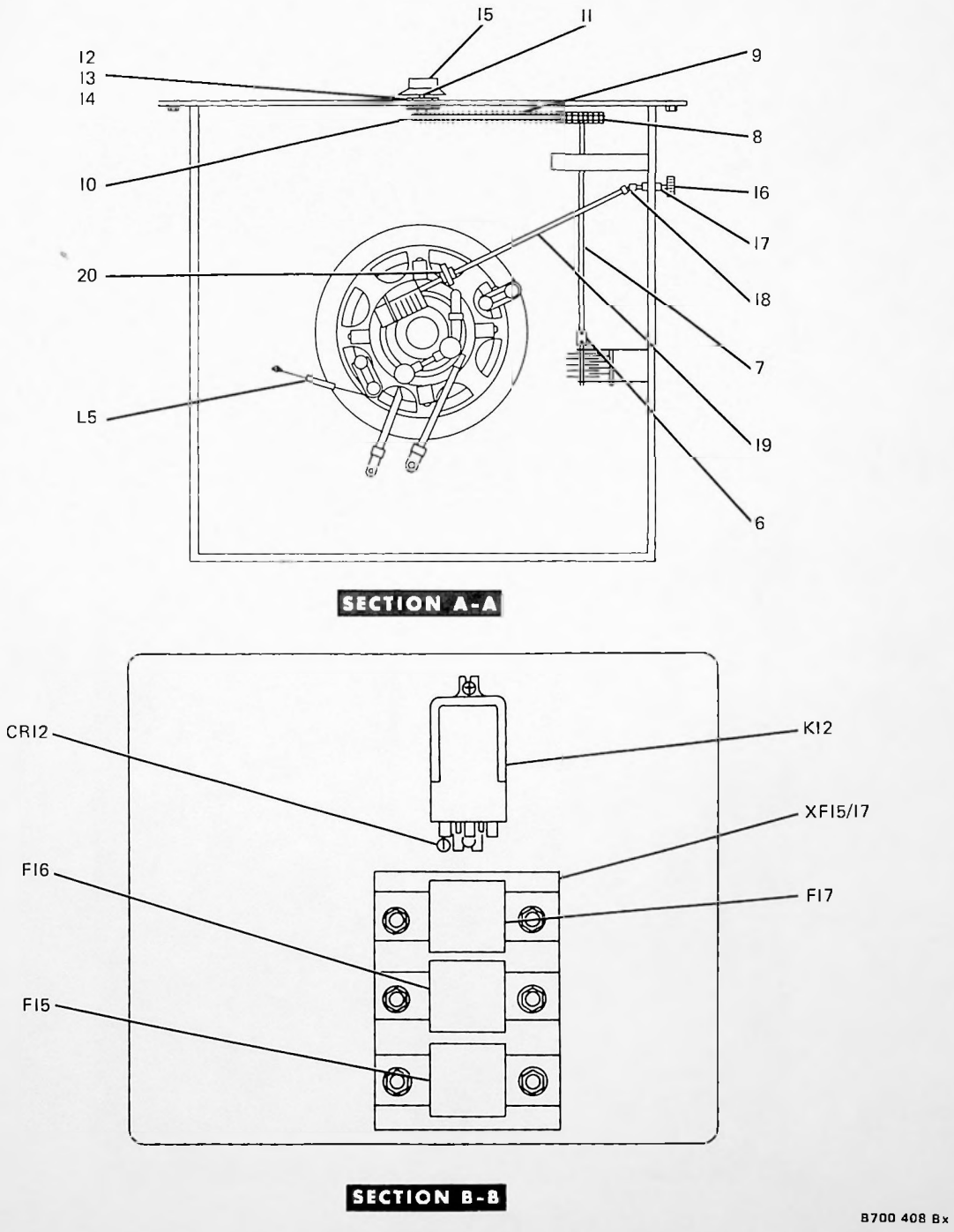
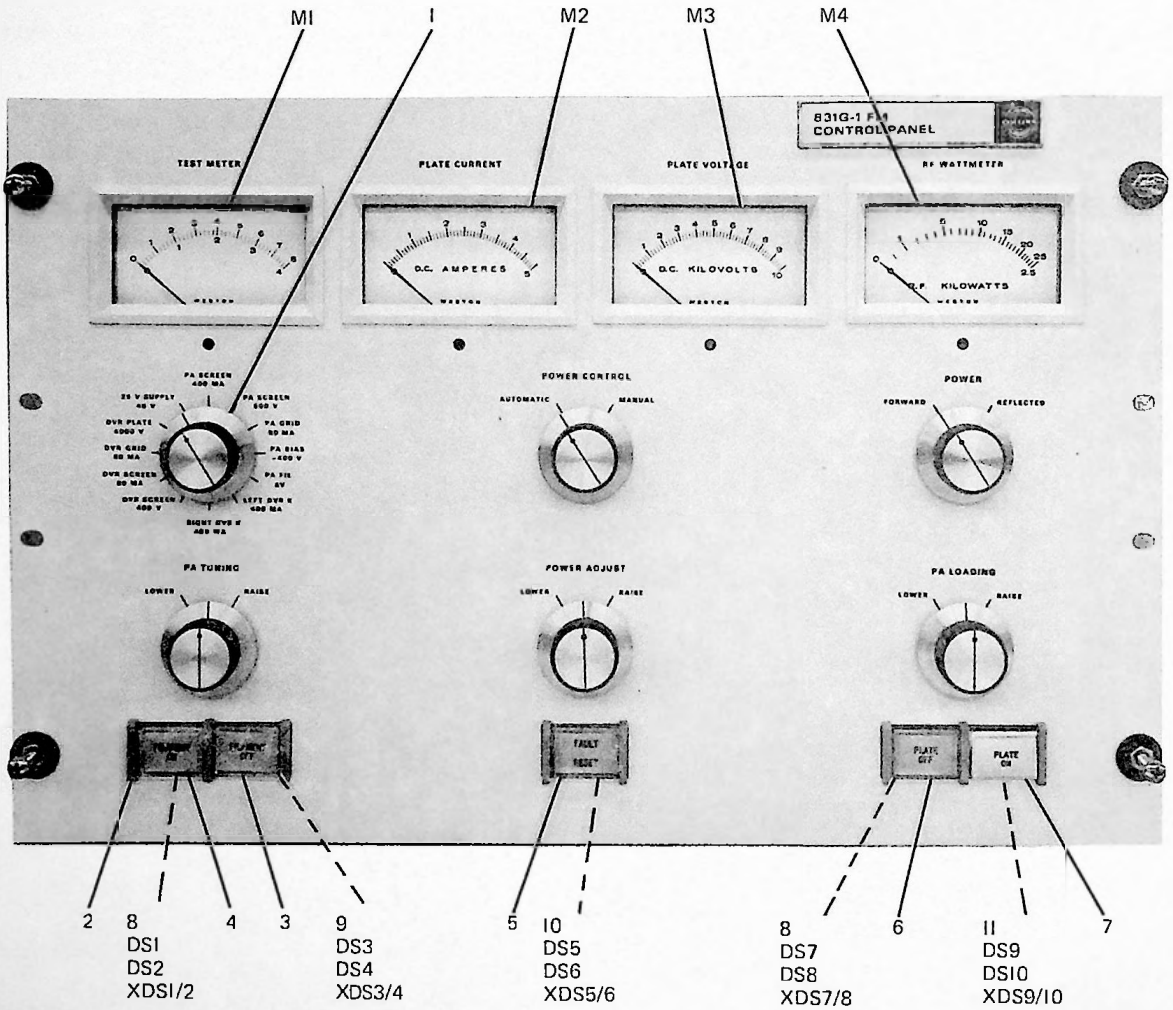


Figure 6-1. 831G-1 20-kW FM Transmitter (Sheet 3 of 3).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	831G-1 20-KW FM TRANSMITTER			522-4685-XXX
A1	CONTROL PANEL SEE BREAKDOWN ON PAGE 6-12			786-3243-001
A2	REMOTE CONTROL ASSEMBLY -OPTIONAL EQUIPMENT- SEE BREAKDOWN ON PAGE 6-16			786-3327-001
A3	IC BOARD SEE BREAKDOWN ON PAGE 6-18			786-3499-C01
A4	310Z-1 FM EXCITER SEE SEPARATE PUBLICATION			522-4687-C02
A5	FILAMENT REGULATOR SEE BREAKDOWN ON PAGE 6-21			786-3085-C01
A6	CIRCUIT BREAKER PANEL SEE BREAKDOWN ON PAGE 6-23			786-3416-001
A7	TUNING/POWER CONTROL RELAY BOARD SEE BREAKDOWN ON PAGE 6-25			786-3018-001
A8	POWER CONTROL REGULATOR SEE BREAKDOWN ON PAGE 6-27			789-4327-001
A9	POWER CONTROL PANEL SEE BREAKDOWN ON PAGE 6-29			789-4342-001
A10	2 KV POWER SUPPLY SEE BREAKDOWN ON PAGE 6-31			789-4358-001
A11	RF DRIVER ASSEMBLY SEE BREAKDOWN ON PAGE 6-33			786-3309-001
A12	REMOTE CONTROL LATCHING RELAY BOARD -OPTIONAL EQUIPMENT- SEE BREAKDOWN ON PAGE 6-37			778-2538-C01
A13	RF OUTPUT LOW-PASS FILTER SEE BREAKDOWN ON PAGE 6-39			786-3451-001
A14	POWER SUPPLY FILTER SEE BREAKDOWN ON PAGE 6-41			786-3583-001
A15	METERING MULTIPLIER BOARD SEE BREAKDOWN ON PAGE 6-45			786-3168-C01
A16	DIRECTIONAL COUPLER SEE BREAKDOWN ON PAGE 6-47			786-3264-001
A17	BLEEDER RESISTOR PANEL SEE BREAKDOWN ON PAGE 6-49			786-3154-001
A18	POWER AMPLIFIER CAVITY SEE BREAKDOWN ON PAGE 6-51			786-3335-001
A19	INPUT TERMINAL PANEL SEE BREAKDOWN ON PAGE 6-56			786-3333-C01
A20	CARD CAGE ASSEMBLY SEE BREAKDOWN ON PAGE 6-58			786-3301-001
A21	POWER AMPLIFIER SOCKET SEE BREAKDOWN ON PAGE 6-60			786-3686-C01
A22	OVERLOAD AND METER CALIBRATE PANEL SEE BREAKDOWN ON PAGE 6-62			786-3666-001
A23	EXTENDER CARD NOTE--ACCESSORY ITEM NOT SHOWN INCLUDES CONNECTOR, ELECTRICAL 4 CONTACTS	375430904501	91662	771-9168-C01 372-2425-040
B1	FAN, CENTRIFUGAL	879A10R7	19070	009-0167-010
B2	MOTOR, ALTERNATING CURRENT 0.5A, 208/220 VAC	5K33GG102	88422	230-0593-010
C1	NOT USED			
C2	NOT USED			
C3	CAPACITOR, FXD, PAPER 30 UF, 10% TOL, 7.5 VDCW	702013-5703	53021	930-0781-030
C4 THROUGH C44	NOT USED			
C45	BLOCKING CAPACITOR			786-3597-001

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
C46 THROUGH C49	NOT USED			
C50	PA LOADING CAPACITOR			786-3048-001
C51	PA TUNING CAPACITOR			786-3049-001
CR1 THROUGH CR11	NOT USED			
CR12	DIODE	1N645	14433	353-2607-000
F1 THROUGH F14	NOT USED			
F15	FUSE, CARTRIDGE 350A CURRENT RATING	A25X350	71424	264-0917-750
F16	SAME AS F15			
F17	SAME AS F15			
J1	NOT USED			
J2	NOT USED			
J3	CONNECTOR, ELECTRICAL 1 CONTACT	5258BLK	74545	368-0136-010
K1 THROUGH K11	NOT USED			
K12	RELAY, ARMATURE 3 FORM C CONTACT ARRANGEMENT	KUP14D5124V	77342	970-0007-250
L1	REACTOR 4H INDUCTANCE	E16437	80008	668-0199-010
L2	REACTOR 1H INDUCTANCE	E16439	80008	668-0200-010
L3	NOT USED			
L4	NOT USED			
L5	COIL, RF 4.7 UH, 10% TOL,			240-0178-000
PS1	28 VOLT POWER SUPPLY SEE BREAKDOWN ON PAGE 6-65			786-3013-001
PS2	PA BIAS POWER SUPPLY SEE BREAKDOWN ON PAGE 6-67			786-3081-001
S1	NOT USED			
S2	NOT USED			
S3	NOT USED			
S4	SWITCH, SENSITIVE SPDT CONTACT ARRANGEMENT INCLUDES	MS25253-4	96906	260-0025-000
	ACTUATOR, SWITCH	JV9	91929	260-0026-000
S5	SAME AS S4			
S6	NOT USED			
S7	NOT USED			
S8	SHORTING SWITCH INCLUDES			786-3156-001
	SPRING, SHORTING SWITCH			540-5342-002
	STRAP, GROUNDING			542-1768-002
	STRIP, SHORTING			542-1770-002
	CONTACT, SHORTING			542-1773-002
	SHAFT, FLAT, STRAIGHT			542-2242-003
	INSULATOR, STANDOFF	3BX3841	71590	190-0026-000
S9	SAME AS S8			
T1	TRANSFORMER, PWR, STEP-UP	E16436	80008	664-0124-010
T2	TRANSFORMER, PWR, STEP-UP	E16438	80008	664-0123-010
T3	TRANSFORMER, PWR, STEP-UP	E16445	80008	664-0125-010
T4	TRANSFORMER, PWR, STEP-DOWN	E12322	80008	662-0043-000
T5	TRANSFORMER, PWR, STEP-DOWN	3-18174	70674	662-0410-020
XF1 THROUGH XF14	NOT USED			
XF15/17	FUSEHOLDER 225 - 600A CURRENT RATING	3515	71400	265-1269-020
V1	NOT USED			
V2	NOT USED			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
V3	ELECTRON TUBE	8281-4CX15000A	06980	256-0157-000
Z1	COMPLETE RECTIFIER	67-7226	81483	353-6241-000
	INCLUDES			
	RECTIFIER COLUMN	67-7329	81483	353-6242-000
	-QTY 3-			
	INCLUDES			
	MODULE	67-7468	81483	353-6243-000
	-QTY 31-			
	MODULE , AC CONNECT	67-7469	81483	353-6244-000
	-QTY 3-			
1	SHORTING STICK			786-3553-001
	INCLUDES			
	ROD, SHORTING			547-6574-002
	SPRING, COMPRESSION			547-6575-002
	CORD, SHORTING STICK			786-3550-001
2	CONDUCTOR, CENTER	24216-2	84147	013-1331-040
3	CLAMP, NEUTRALIZING			786-3236-001
	-QTY 2-			
4	CLAMP, NEUTRALIZING			786-3237-001
	-QTY 2-			
5	IMPELLER, FAN	009-3118-010	60399	009-3118-010
6	COUPLING, SHAFT	39003	76487	015-0257-000
7	SHAFT			786-3688-001
8	SPROCKET, WHEEL	FC6-88	00141	233-0255-150
9	BELT, POSITIVE DRIVE	FA189	00141	233-0254-110
10	SPROCKET, WHEEL	FC6-24	00141	233-0255-040
11	SHAFT, KNOB			789-4375-001
12	NUT, PLAIN, HEX	MS25082B10	96906	313-0479-000
	5/8-18 THD			
13	RING, RETAINING	5100-25C	79136	340-0038-000
14	BUSHING			789-4374-001
15	KNOB			757-0233-003
16	KNOB			757-0228-001
17	BEARING ASSEMBLY, PANEL	148	83330	015-3437-010
18	JOINT, UNIVERSAL	MB360	88797	233-0132-000
19	SHAFT			789-4365-001
20	COUPLING, INSULATOR	FC46-5	80583	015-3438-010
	NOTE THE FOLLOWING ITEMS ARE NEITHER SHOWN NOR DESIGNATED IN THIS PARTS LIST DUE TO THEIR OPTIONAL CHARACTER			
	CABLE, CONTROL PANEL			786-3454-001
	-LENGTH OPTIONAL-			
	50 HZ CONVERSION KIT			786-3440-001
	-OPTIONAL EQUIPMENT-			
	INCLUDES			
	AMPLIFIER, MAGNETIC	270-0102-020	08510	270-0102-020
	AMPLIFIER, MAGNETIC	R633A374-208V	FIRIN	270-0122-020
	METER, TIME-TOTALIZING	458-0190-010	82386	458-0190-010
	METER, TIME-TOTALIZING	K42203P10	82227	458-0839-300



B700 405 Pb

Figure 6-2. Control Panel, A1 (Sheet 1 of 2).

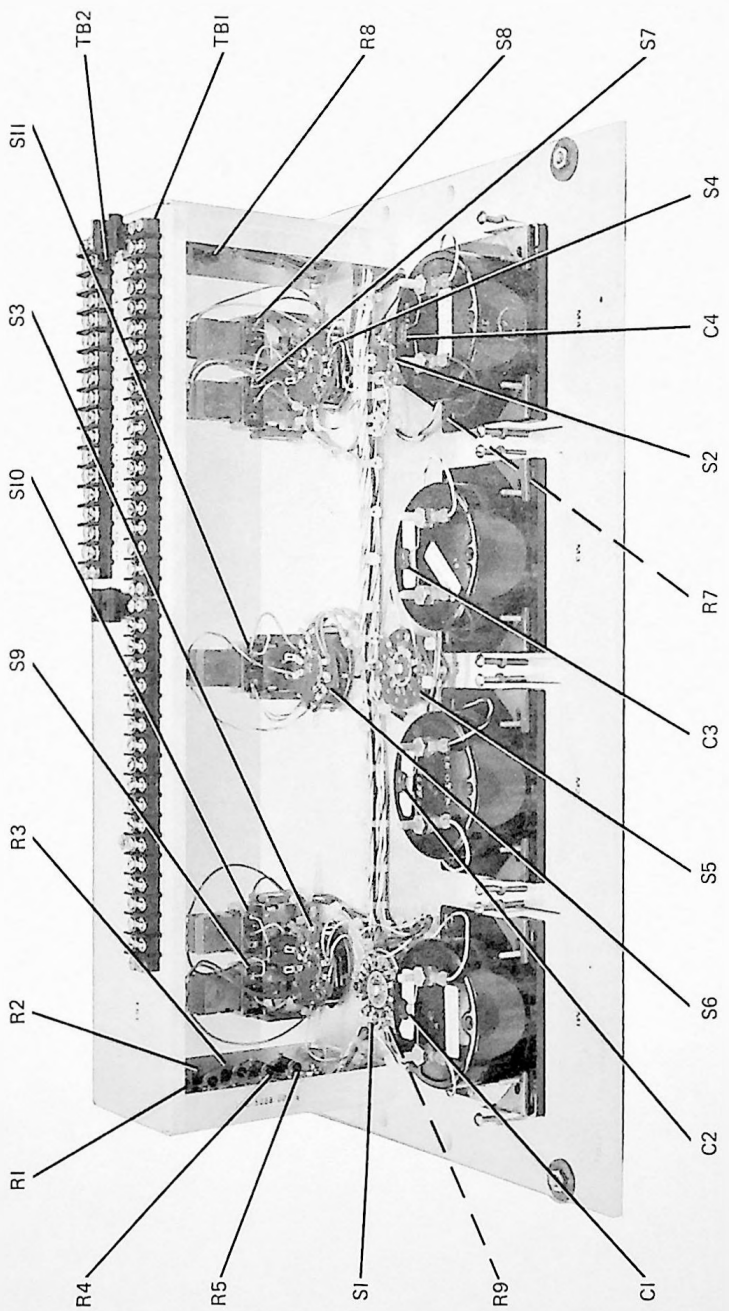


Figure 6-2. Control Panel, A1 (Sheet 2 of 2).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	CONTROL PANEL, A1			786-3243-001
C1	CAPACITOR, FXD, MICA 100 PF, 5% TOL, 500 VDCW	CM05FD101J03	81349	912-2816-000
C2	SAME AS C1			
C3	SAME AS C1			
C4	SAME AS C1			
DS1	LAMP, INCANDESCENT 0.04A, 28 VOLTS	MS25237-327	96906	262-0179-000
DS2 THROUGH DS10	SAME AS DS1			
M1	AMMETER, DC TEST 0 TO 1 MA	260842	65092	458-0783-160
M2	AMMETER, DC PLATE CURRENT 0 TO 1 MA	260840	65092	458-0783-150
M3	AMMETER, DC PLATE VOLTAGE 0 TO 2 MA	260841	65092	458-0783-170
M4	AMMETER, DC WATTMETER 0 TO 100 MA	265202	65092	458-0821-020
R1	RESISTOR, FXD, COMPOSITION 39 OHMS, 10% TOL, 1 WATT	RCR32G390KS	81349	745-3293-000
R2 THROUGH R5	SAME AS R1			
R6	NOT USED			
R7	RESISTOR, FXD, FILM 1740 OHMS, 1% TOL, 1/4 WATT	RN60D1741F	81349	705-6758-000
R8	RESISTOR, FXD, COMPOSITION 39 KILOHMS, 10% TOL, 1 WATT	RCR32G393KS	81349	745-3419-000
R9	RESISTOR, FXD, FILM 301 OHMS, 1% TOL, 1/2 WATT	RN65D3010F	81349	705-7071-000
S1	SWITCH, ROTARY DP12T CONTACT ARRANGEMENT	271711K2	76854	259-2219-010
S2	SWITCH, ROTARY DPDT CONTACT ARRANGEMENT	271016K1	76854	259-2759-010
S3	SWITCH, ROTARY DP3T CONTACT ARRANGEMENT	242752H1	76854	259-1980-000
S4	SAME AS S3			
S5	SWITCH, ROTARY SPDT CONTACT ARRANGEMENT	210786H1	76854	259-1321-000
S6	SAME AS S3			
S7	SWITCH, PUSH, ILLUMINATED SPDT CONTACT ARRANGEMENT	12-327	96182	266-6806-100
S8 THROUGH S11	SAME AS S7			
TB1	STRIP, TERMINAL 17 TERMINALS -QTY 2-	353-18-17-001	71785	367-0025-000
TB2	STRIP, TERMINAL 16 TERMINALS	353-18-16-001	71785	367-0024-000
XDS1/2 XDS3/4	SWITCH, PUSH, ILLUMINATED	12-1	96182	266-6806-010
THROUGH XDS9/10	SAME AS XDS1/2			
1	KNOB, ROUND, SKIRTED -QTY 6-			757-0233-003
2	BARRIER, VERTICAL MOUNTING -QTY 8-	12S2	96182	266-6806-030
3	LENS, ENGRAVED FILAMENT OFF	12-240-13FILAMENTOFF	96182	266-6806-270
4	LENS, ENGRAVED FILAMENT ON	12-240-13FILAMENTON	96182	266-6806-280
5	LENS, ENGRAVED FAULT/RESET	12-240-16	96182	266-6806-800

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
6	LENS, ENGRAVED PLATE OFF	12-240-13PLAT EOFF	96182	266-6806-740
7	LENS, ENGRAVED PLATE ON	12-240-13PLAT EON	96182	266-6806-790
8	BOOT, BULB WHITE -QTY 4-	10W	96182	266-6268-000
9	BOOT, BULB GREEN -QTY 2-	12G	96182	266-6806-040
10	BOOT, BULB YELLOW -QTY 2-	12Y	96182	266-6806-050
11	BOOT, BULB RED -QTY 2-	12R	96182	266-6806-060

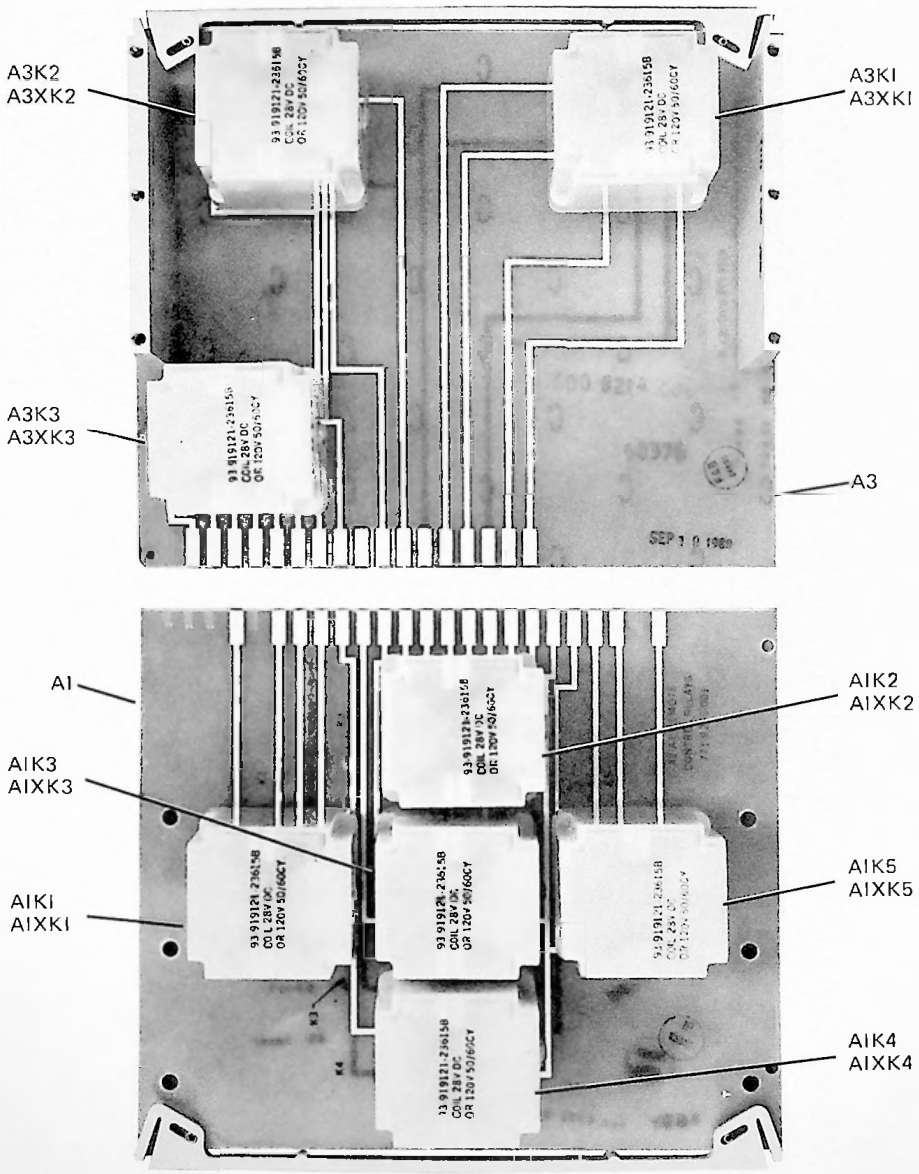


Figure 6-3. Remote Control Assembly, A2.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	REMOTE CONTROL ASSEMBLY, A2			786-3327-001
A1	REMOTE CONTROL RELAY BOARD			771-9256-001
	INCLUDES			
	RELAY, ARMATURE	93-919454-23615A	80089	970-2454-440
	2A, 1B CONTACT ARRANGEMENT			
	-A1K1 THRU A1K5-			
	SOCKET, RELAY	93-153-31	80089	220-1399-020
	INCLUDES			
	PIN, SOCKET -QTY 8-	93-46-101	80089	220-1399-030
	-A1XK1 THRU A1XK5-			
A2	NOT USED			
A3	POWER CONTROL RELAY ASSEMBLY			778-2539-001
	INCLUDES			
	RELAY, ARMATURE	93-919454-23615A	80089	970-2454-440
	2A, 1B CONTACT ARRANGEMENT			
	-A3K1, A3K2, A3K3-			
	SOCKET, RELAY	93-153-31	80089	220-1399-020
	INCLUDES			
	PIN, SOCKET -QTY 11-	93-46-101	80089	220-1399-030
	-A3XK1, A3XK2, A3XK3-			

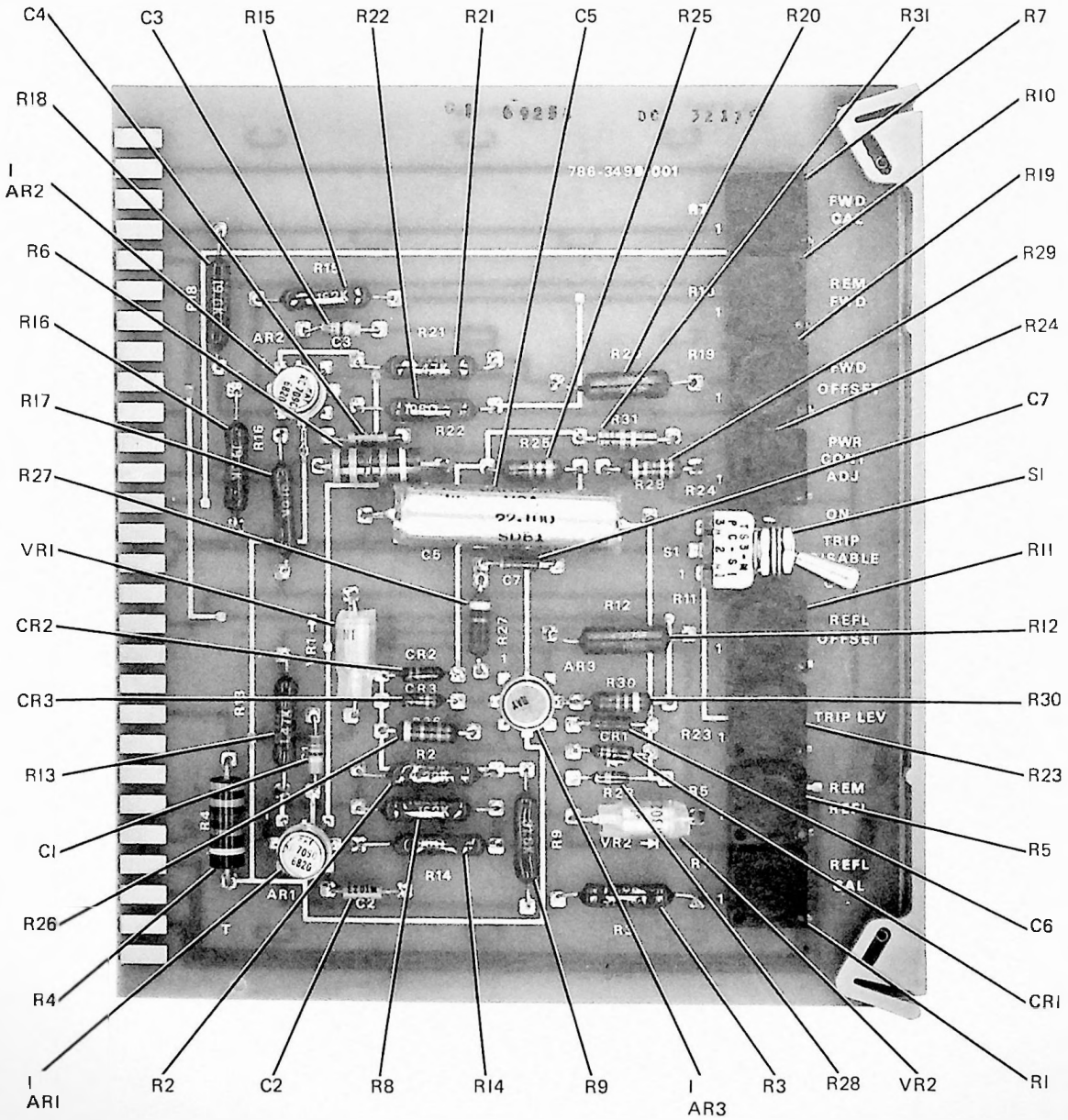


Figure 6-4. IC Board, A3.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	IC BOARD, A3			786-3499-001
AR1	AMPLIFIER, OPERATIONAL	U5B770939	07263	351-7140-010
AR2	SAME AS AR1			
AR3	SAME AS AR1			
C1	CAPACITOR, FXD, CERAMIC 5600 PF, 10% TOL, 100 VDCW	CT10-562K	90634	913-5661-090
C2	CAPACITOR, FXD, CERAMIC 200 PF, 20% TOL, 100 VDCW	CT10-201M	90634	913-5661-540
C3	SAME AS C1			
C4	SAME AS C2			
C5	CAPACITOR, FXD, PAPER 0.22 PF, 20% TOL, 100 VDCW	SDB1KD1224M	53021	931-4492-000
C6	CAPACITOR, FXD, CERAMIC 22 PF, 20% TOL, 100 VDCW	CT10-220M	90634	913-5661-310
C7	CAPACITOR, FXD, CERAMIC 4700 PF, 20% TOL, 100 VDCW	CT10-472M	90634	913-5661-080
CR1	DIODE	1N645	14433	353-2607-000
CR2	SAME AS CR1			
CR3	SAME AS CR1			
R1	RESISTOR, VAR, WIRE-WOUND 10 KILOHMS, 5% TOL, 3/4 WATT	RT22C2P103	81349	381-1721-130
R2	RESISTOR, FXD, FILM 4220 OHMS, 1% TOL, 1/2 WATT	RN65D4221F	81349	705-7126-000
R3	RESISTOR, FXD, FILM 19.6 KILOHMS, 1% TOL, 1/2 WATT	RN65D1962F	81349	705-7158-000
R4	RESISTOR, FXD, COMPOSITION 330 OHMS, 5% TOL, 1 WATT	RCR32G331JS	81349	745-3330-000
R5	SAME AS R1			
R6	SAME AS R4			
R7	SAME AS R1			
R8	RESISTOR, FXD, FILM 162 KILOHMS, 1% TOL, 1/2 WATT	RN65D1623F	81349	705-7202-000
R9	RESISTOR, FXD, FILM 31.6 KILOHMS, 1% TOL, 1/2 WATT	RN65D3162F	81349	705-7168-000
R10	SAME AS R1			
R11	RESISTOR, VAR, WIRE-WOUND 20 KILOHMS, 5% TOL, 3/4 WATT	RT22C2P203	81349	381-1721-150
R12	RESISTOR, FXD, FILM 287 KILOHMS, 1% TOL, 1/2 WATT	RN65D2873F	81349	705-7214-000
R13	RESISTOR, FXD, FILM 1470 OHMS, 1% TOL, 1/2 WATT	RN65D1471F	81349	705-7104-000
R14	RESISTOR, FXD, FILM 196 OHMS, 1% TOL, 1/2 WATT	RN65D1960F	81349	705-7062-000
R15	SAME AS R8			
R16	SAME AS R3			
R17	SAME AS R9			
R18	SAME AS R3			
R19	SAME AS R11			
R20	SAME AS R12			
R21	SAME AS R13			
R22	SAME AS R14			
R23	SAME AS R1			
R24	SAME AS R1			
R25	RESISTOR, FXD, FILM 10 KILOHMS, 5% TOL, 1/2 WATT	RL20S103J	81349	745-2661-000
R26	RESISTOR, FXD, FILM 6800 OHMS, 5% TOL, 1/2 WATT	RL20S682J	81349	745-2651-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R27	RESISTOR, FXD, FILM 1500 OHMS, 5% TOL, 1/2 WATT	RL20S152J	81349	745-2610-000
R28	RESISTOR, FXD, COMPOSITION 470 KILOHMS, 10% TOL, 1/2 WATT	RCR20G474KS	81349	745-1464-000
R29	RESISTOR, FXD, FILM 3900 OHMS, 5% TOL, 1/2 WATT	RL20S392J	81349	745-2636-000
R30	RESISTOR, FXD, FILM 22 KILOHMS, 5% TOL, 1/2 WATT	RL20S223J	81349	745-2681-000
R31	RESISTOR, FXD, COMPOSITION 15 KILOHMS, 10% TOL, 1/2 WATT	RCR20G153KS	81349	745-1401-000
S1	SWITCH, TOGGLE SPDT CONTACT ARRANGEMENT	TS3PCMSI	04009	266-5032-030
VR1	DIODE	1N3022A	03877	353-1317-000
VR2	SAME AS VR1			
1	INSULATOR, DISC -QTY 3-	7717-19N	13103	352-9552-020

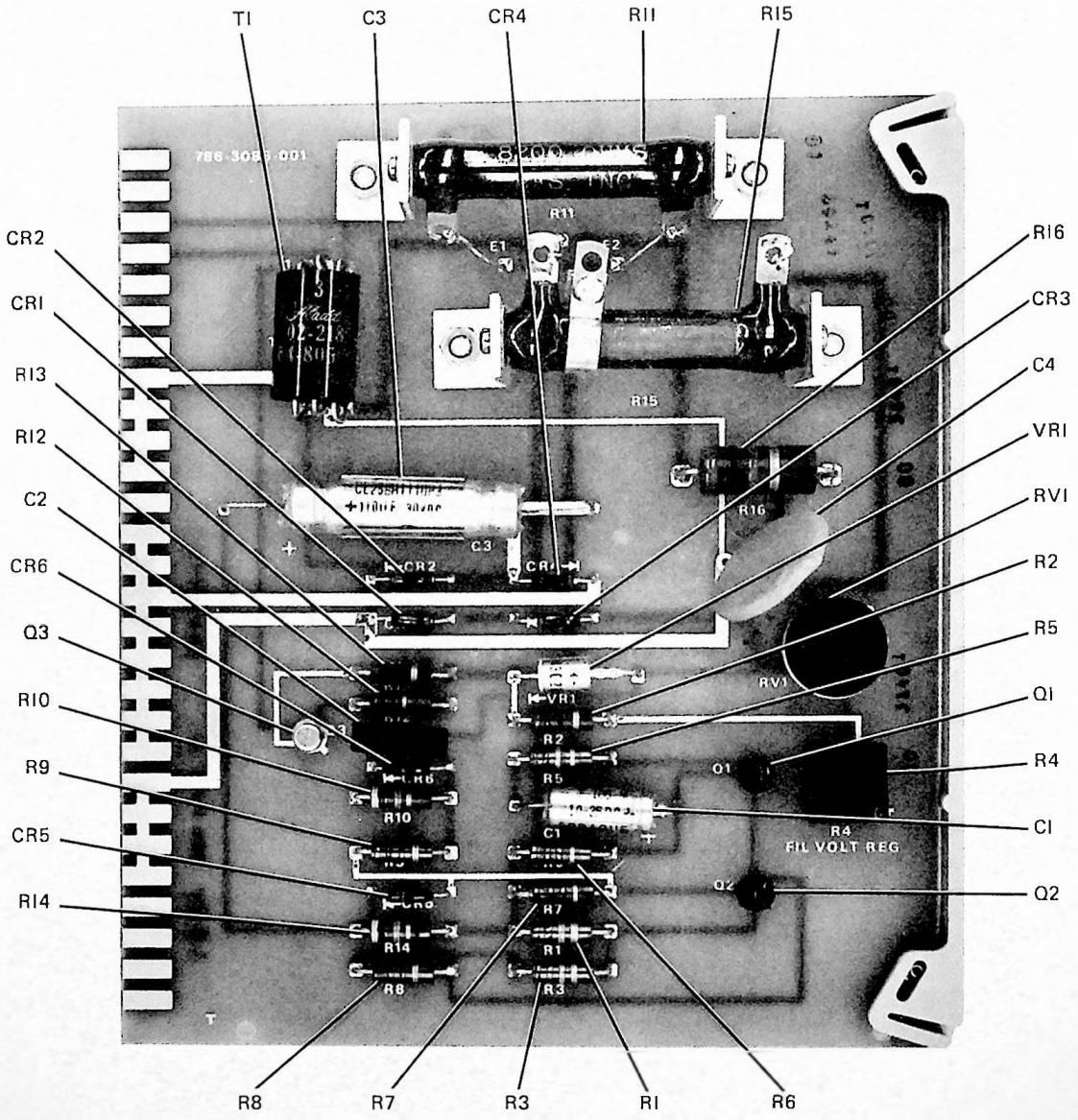


Figure 6-5. Filament Regulator, A5.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	FILAMENT REGULATOR, A5			786-3085-001
C1	CAPACITOR, FXD, ELECTROLYTIC 10 UF, 20% TOL, 35 VDCW	CS13BF106M	81349	184-6219-000
C2	CAPACITOR, FXD, FILM 0.22 UF, 10% TOL, 50 VDCW	65F15AA224	99971	933-0870-000
C3	CAPACITOR, FXD, ELECTROLYTIC 110 UF, PLUS 75% MINUS 15%, 30 VDCW	CL25BH111UP3	81349	184-8012-000
C4	CAPACITOR, FXD, CERAMIC 0.1 UF, PLUS 80% MINUS 20%, 50 VDCW	3857X5V0-104Z	72982	913-3234-000
CR1	DIODE	1N647	08466	353-2596-000
CR2	SAME AS CR1			
CR3	SAME AS CR1			
CR4	SAME AS CR1			
CR5	DIODE	1N645	14433	353-2607-000
CR6	SAME AS CR5			
Q1	TRANSISTOR	2N3390	03508	352-0731-010
Q2	SAME AS Q1			
Q3	TRANSISTOR	2N2646	04713	352-0712-010
R1	RESISTOR, FXD, COMPOSITION 22 KILOHMS, 10% TOL, 1/2 WATT	RCR20G223KS	81349	745-1408-000
R2	RESISTOR, FXD, COMPOSITION 1000 OHMS, 10% TOL, 1/2 WATT	RCR20G102KS	81349	745-1352-000
R3	RESISTOR, FXD, COMPOSITION 18 KILOHMS, 10% TOL, 1/2 WATT	RCR20G183KS	81349	745-1405-000
R4	RESISTOR, VAR, WIRE-WOUND 10 KILOHMS, 5% TOL, 3/4 WATT	RT22C2P103	81349	381-1721-130
R5	RESISTOR, FXD, COMPOSITION 10 KILOHMS, 10% TOL, 1/2 WATT	RCR20G103KS	81349	745-1394-000
R6	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/2 WATT	RCR20G222KS	81349	745-1366-000
R7	SAME AS R6			
R8	SAME AS R6			
R9	SAME AS R2			
R10	RESISTOR, FXD, COMPOSITION 27 KILOHMS, 10% TOL, 1/2 WATT	RCR20G273KS	81349	745-1412-000
R11	RESISTOR, FXD, WIRE-WOUND 8200 OHMS, 5% TOL, 10 WATTS	0324	44655	710-0246-000
R12	RESISTOR, FXD, COMPOSITION 1500 KILOHMS, 10% TOL, 1/2 WATT	RCR20G155KS	81349	745-1485-000
R13	SAME AS R2			
R14	SAME AS R10			
R15	RESISTOR, ADJ, WIRE-WOUND 7500 OHMS, 10% TOL, 25 WATTS	0384	44655	716-0055-150
R16	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 2 WATTS	RC42GF101K	81349	745-5610-000
RV1	CELL, PHOTOELECTRIC	PL581	33173	714-3219-010
T1	TRANSFORMER, PULSE ENCAPSULATED, LEAD 1 TO 2 5.5 OHMS RESISTANCE, LEAD 3 TO 4 5.5 OHMS RESISTANCE LEAD 5 TO 6 5.5 OHMS RESISTANCE	02-2185	06978	664-8050-010
VR1	DIODE	1N3028A	06751	353-1323-000

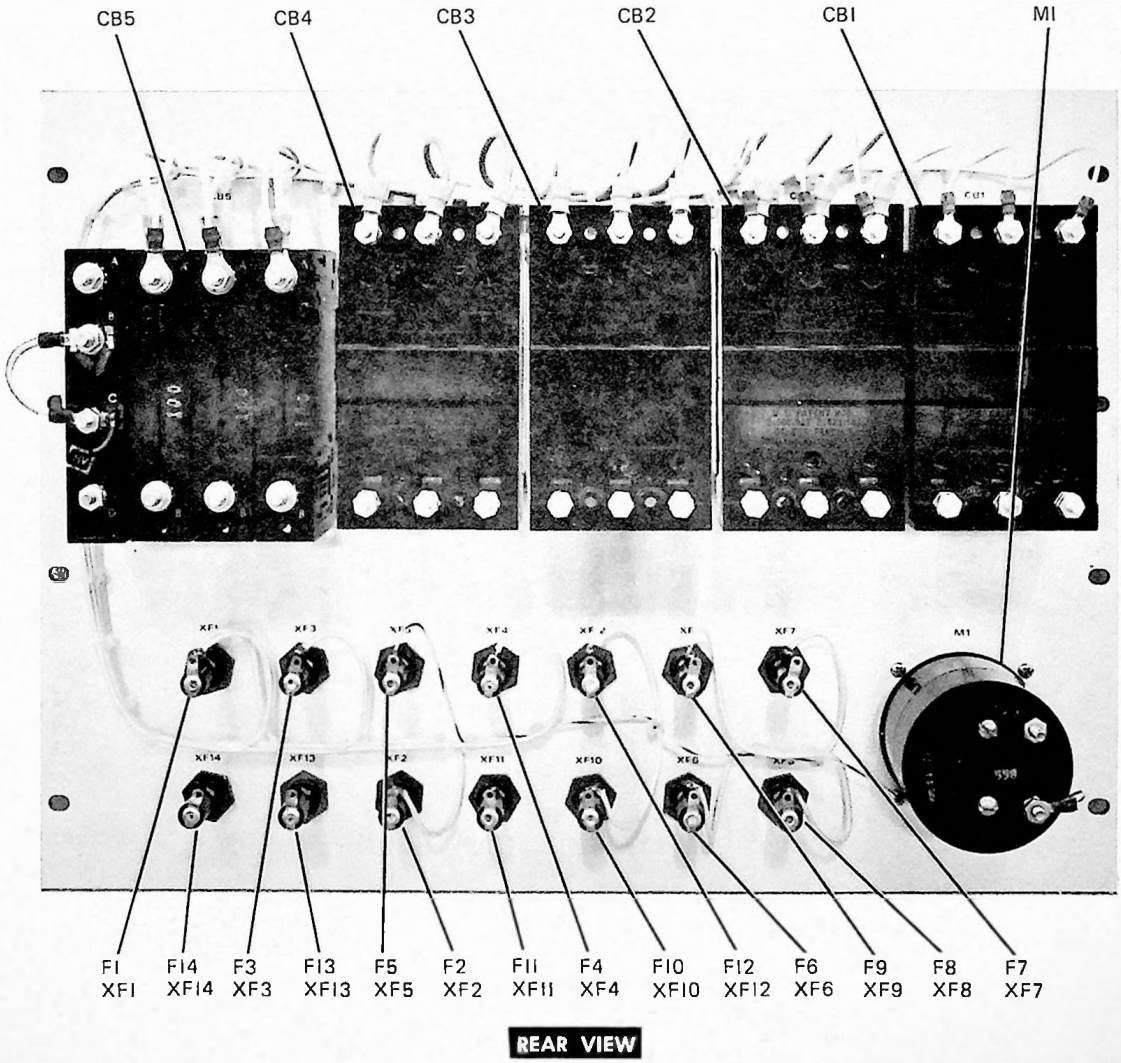


Figure 6-6. Circuit Breaker Panel, A6.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	CIRCUIT BREAKER PANEL, A6			786-3416-C01
CB1	CIRCUIT BREAKER 0.55A CURRENT RATING	3363SHK-55-250-6 0-3	74193	260-4038-030
CB2	CIRCUIT BREAKER 10A CURRENT RATING	3363SMG410-230-6 0-3	74193	260-0407-000
CB3	CIRCUIT BREAKER 4.5A CURRENT RATING	3363SMG4-0-4-5-2 50-60-3	74193	260-4038-090
CB4	CIRCUIT BREAKER 15A CURRENT RATING	3363SMG415-230-6 0-3	74193	260-0409-000
CB5	CIRCUIT BREAKER 100A CURRENT RATING	CD4A3A3B6	74193	264-0972-010
F1	FUSE, CARTRIDGE 8A CURRENT RATING	MDA8	71400	264-0912-320
F2	FUSE, CARTRIDGE 3A CURRENT RATING	F02B125V3AS	81349	264-0009-000
F3	SAME AS F1			
F4	FUSE, CARTRIDGE 1/8A CURRENT RATING	F02B250V8AS	81349	264-4230-000
F5	SAME AS F4			
F6	SAME AS F1			
F7	FUSE, CARTRIDGE 2A CURRENT RATING	F02B125V2AS	81349	264-0008-000
F8	SAME AS F2			
F9	SAME AS F7			
F10	SAME AS F7			
F11	SAME AS F2			
F12	SAME AS F7			
F13	SAME AS F7			
F14	SAME AS F7			
M1	METER, TIME TOTALIZING	458-0190-000	82386	458-0190-000
XF1	FUSEHOLDER 20A CURRENT RATING	HKLEX	71400	265-1241-090
XF2 THROUGH XF14	SAME AS XF1			

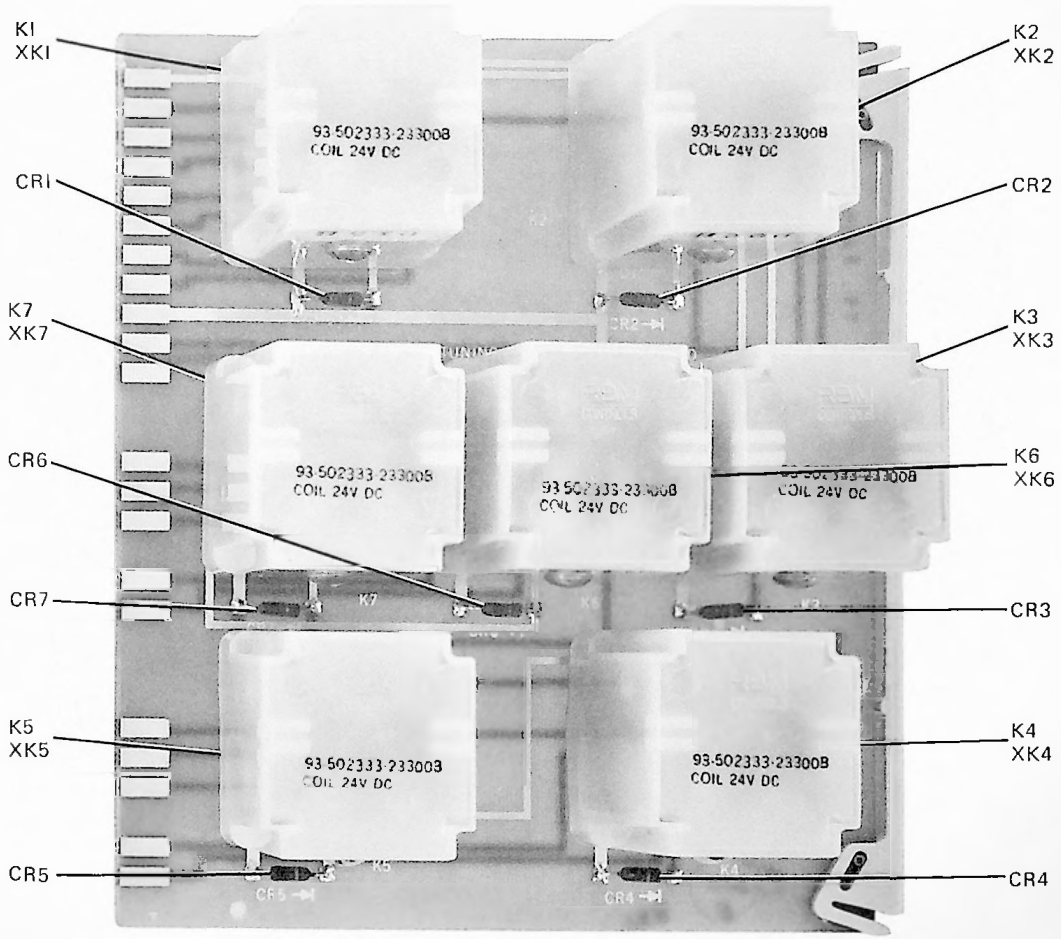


Figure 6-7. Tuning/Power Control Relay Board, A7.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	TUNING/POWER CONTROL RELAY BOARD, A7			786-3018-C01
CR1	DIODE	1N645	14433	353-2607-C00
CR2 THROUGH CR7	SAME AS CR1			
K1	RELAY, ARMATURE 3C CONTACT ARRANGEMENT	93-502333-233008	80089	970-2454-270
K2 THROUGH K7	SAME AS K1			
XK1	SOCKET, RELAY	93-153-1	80089	220-1399-020
	INCLUDES PIN -QTY 11-	93-46-101	80089	220-1399-030
XK2	SOCKET, RELAY	93-153-1	80089	220-1399-020
	INCLUDES PIN -QTY 8-	93-46-101	80089	220-1399-030
XK3 THROUGH XK7	SAME AS XK2			

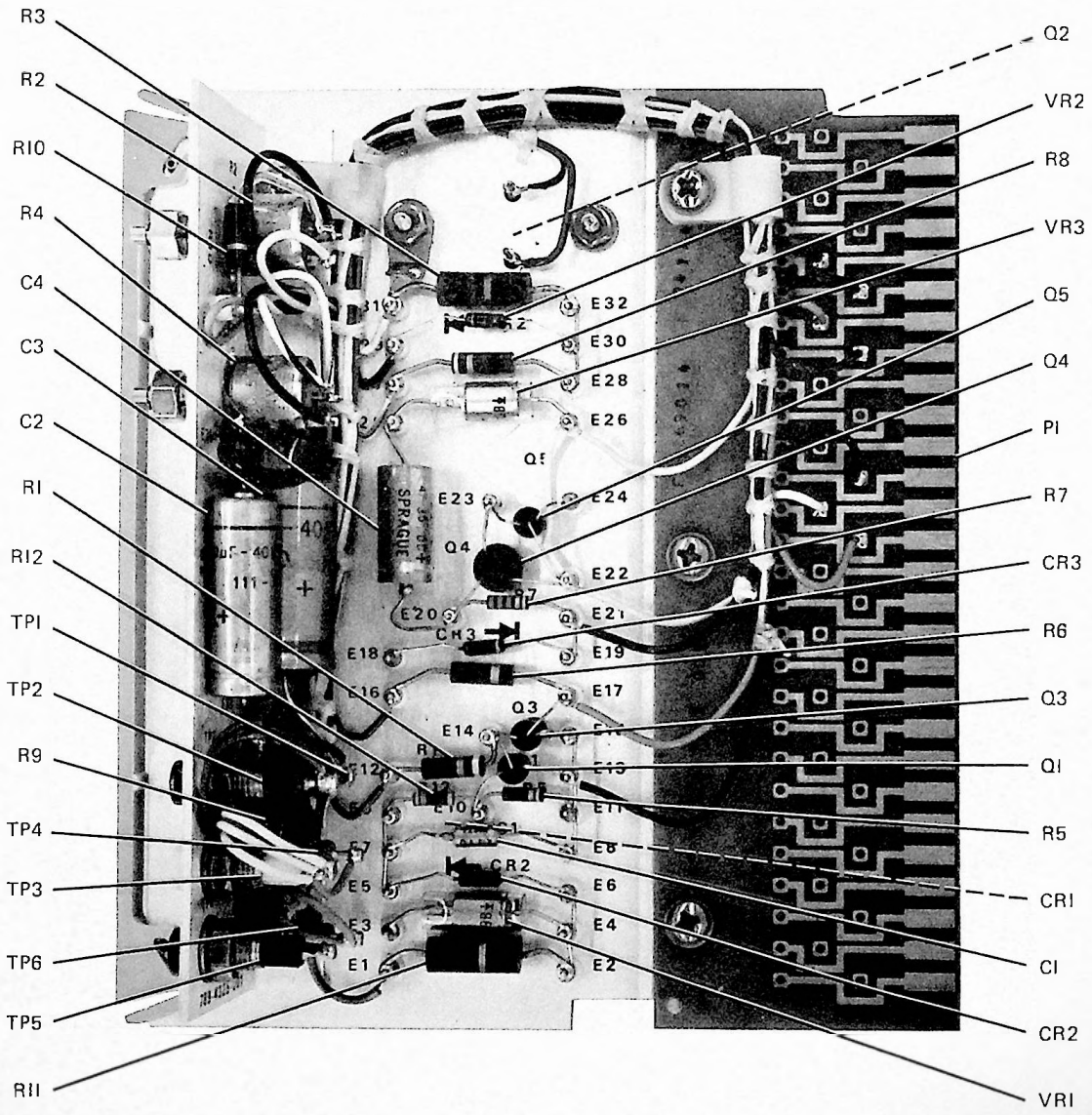


Figure 6-8. Power Control Regulator, A8.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	POWER CONTROL REGULATOR, A8			789-4327-C01
C1	CAPACITOR, FXD, ELECTROLYTIC 1 UF, 10% TOL, 50 VDCW	M39003-01-2116	81349	184-9084-430
C2	CAPACITOR, FXD, ELECTROLYTIC 100 UF, PLUS 50% MINUS 10%, 40 VDCW	C437ARG100	73445	183-2355-140
C3	CAPACITOR, FXD, ELECTROLYTIC 250 UF, PLUS 50% MINUS 10%, 40 VDCW	C437ARG250	73445	183-2355-150
C4	CAPACITOR, FXD, ELECTROLYTIC 47 UF, 20% TOL, 35 VDCW	150D476X0035S2	56289	184-7411-000
CR1	DIODE	1N4586	01295	353-6467-050
CR2	DIODE	1N645	14433	353-2607-000
CR3	SAME AS CR2			
P1	BOARD, PRINTED CIRCUIT			770-7482-001
Q1	TRANSISTOR	2N3390	03508	352-0731-010
Q2	TRANSISTOR	2N457A	01295	352-0134-000
Q3	SAME AS Q1			
Q4	TRANSISTOR	2N3638	87216	352-0636-010
Q5	SAME AS Q1			
R1	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/2 WATT	RCR20G222KS	81349	745-1366-000
R2	RESISTOR, VAR, COMPOSITION 1000 OHMS, 20% TOL, 1/2 WATT	RV61AYSA102B	81349	380-2261-000
R3	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 1 WATT	RCR32G821KS	81349	745-3349-000
R4	RESISTOR, VAR, COMPOSITION 500 OHMS, 10% TOL, 1/2 WATT	RVLAYSA501A	81349	380-2287-000
R5	RESISTOR, FXD, COMPOSITION 1000 OHMS, 10% TOL, 1/4 WATT	RCR07G102KS	81349	745-0749-000
R6	RESISTOR, FXD, COMPOSITION 150 OHMS, 10% TOL, 1/2 WATT	RCR20G151KS	81349	745-1317-000
R7	RESISTOR, FXD, COMPOSITION 33 KILOHMS, 10% TOL, 1/4 WATT	RCR07G333KS	81349	745-0803-000
R8	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1/2 WATT	RCR20G101KS	81349	745-1310-000
R9	RESISTOR, FXD, COMPOSITION 470 OHMS, 10% TOL, 1 WATT	RCR32G471KS	81349	745-3338-000
R10	RESISTOR, FXD, COMPOSITION 1000 OHMS, 10% TOL, 1/2 WATT	RCR20G102KS	81349	745-1352-000
R11	RESISTOR, FXD, COMPOSITION 22 OHMS, 10% TOL, 1 WATT	RCR32G220KS	81349	745-3282-000
R12	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/4 WATT	RCR07G472KS	81349	745-0773-000
TP1	JACK, TIP BROWN	MS16108-4A	96906	360-0152-000
TP2	JACK, TIP RED	MS16108-2A	96906	360-0150-000
TP3	JACK, TIP ORANGE	MS16108-6A	96906	360-0154-000
TP4	JACK, TIP YELLOW	MS16108-8A	96906	360-0156-000
TP5	JACK, TIP GREEN	MS16108-5A	96906	360-0153-000
TP6	JACK, TIP BLACK	MS16108-3A	96906	360-0151-000
VR1	DIODE	1N3029B	99942	353-3134-000
VR2	DIODE	1N752A	81350	353-2979-000
VR3	DIODE	1N3020B	99942	353-3125-000

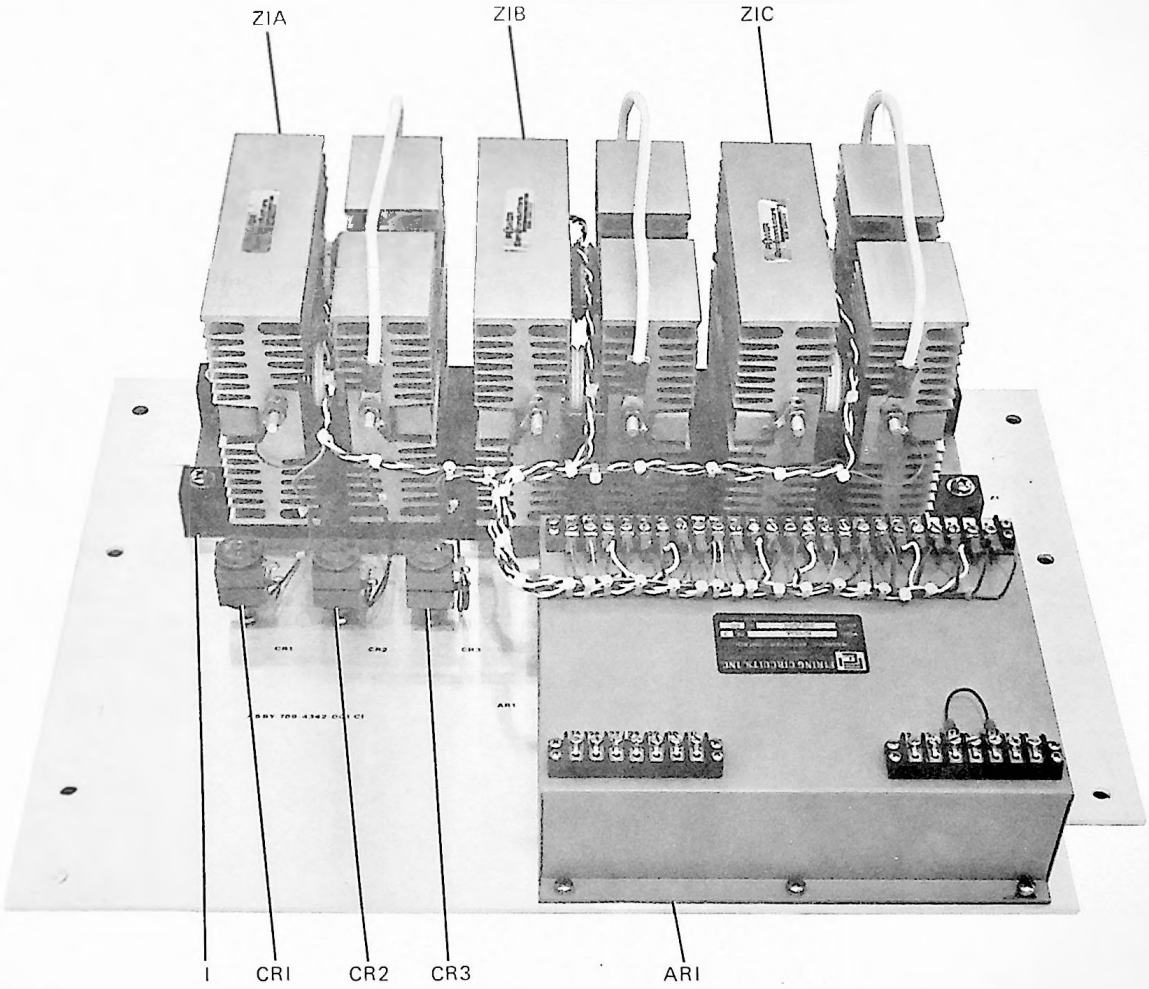


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Figure 6-9. Power Control Panel, A9.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	POWER CONTROL PANEL, A9			789-4342-C01
AR1	AMPLIFIER, MAGNETIC	R633A372-208V	POWER	270-0122-010
CR1	ABSORBER, OVERVOLTAGE	6RS2LSA11H11	09214	353-0283-100
CR2	SAME AS CR1			
CR3	SAME AS CR1			
Z1A	SCR ASSEMBLY	PS160066	POWER	353-6551-010
Z1B	SAME AS Z1A			
Z1C	SAME AS Z1A			
1	STRIP, INSULATOR			789-4349-001

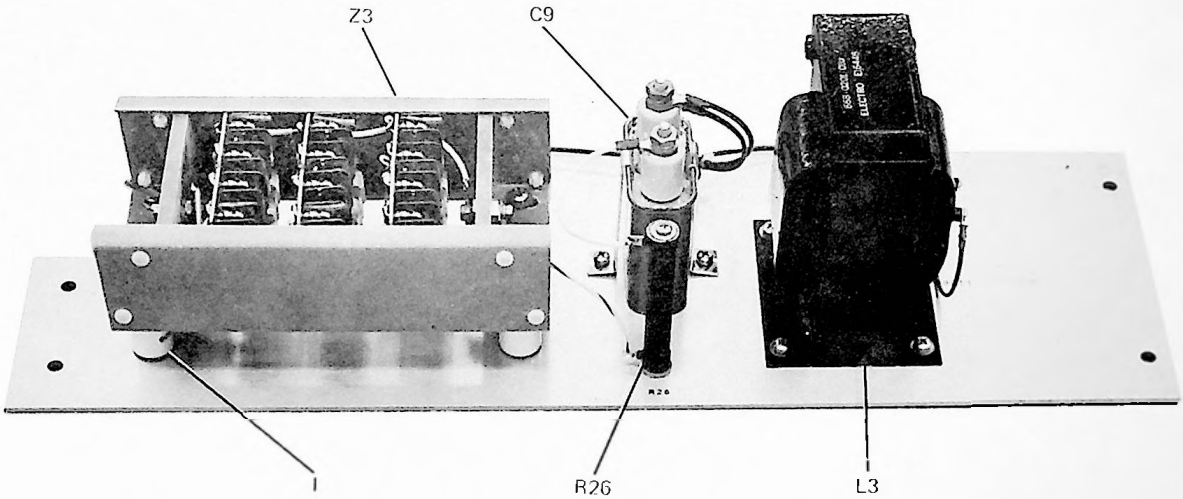

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Figure 6-10. 2-kV Power Supply, A10.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	2 KV POWER SUPPLY, A10			789-4358-001
C1 THROUGH C8	NOT USED			
C9	CAPACITOR, FXD, PAPER 0.05 UF, 10 % TOL, 5000 VDCW	23F1129G2	01002	930-0728-000
L1	NOT USED			
L2	NOT USED			
L3	CHOKE, RF 1.5H INDUCTANCE	E16446	80008	668-0201-010
R1 THROUGH R25	NOT USED			
R26	RESISTOR, FXD, WIRE-WOUND 3900 OHMS, 5% TOL, 26 WATTS	RW33V392	81349	747-1808-000
Z1	NOT USED			
Z2	NOT USED			
Z3	RECTIFIER	6-1-2M1B398BS	05277	353-0435-010
1	INSULATOR, STANDOFF -QTY 4-	E1010	70371	190-1156-000

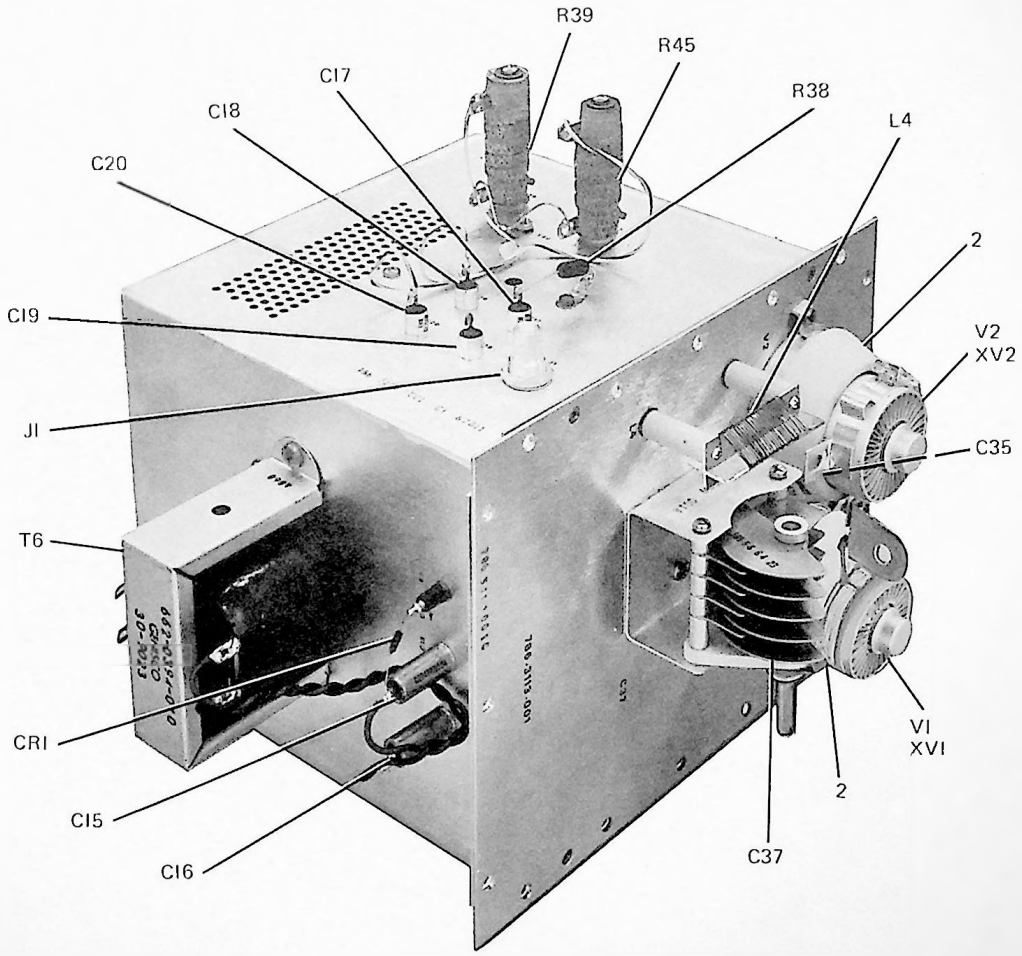

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Figure 6-11. RF Driver Assembly, A11 (Sheet 1 of 2).

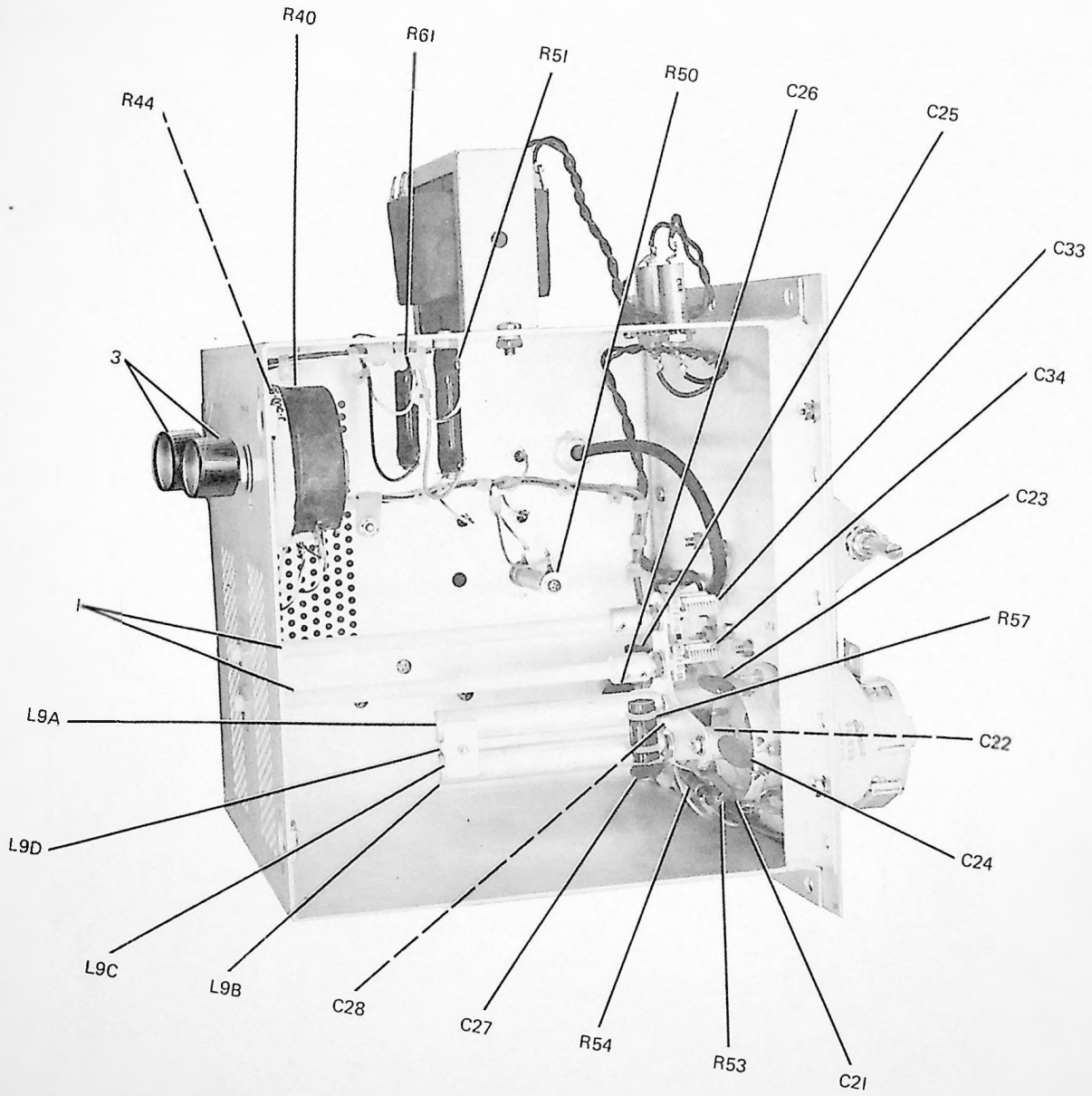

Figure 6-11. RF Driver Assembly, A11 (Sheet 2 of 2).

B700 344 Pb

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	RF DRIVER ASSEMBLY, A11			786-3309-001
C1 THROUGH C14	NOT USED			
C15	CAPACITOR, FXD, PAPER 0.1 UF, 10% TOL, 100 VDCW	CZ248KB104	81349	241-0088-000
C16	SAME AS C15			
C17	CAPACITOR, FXD, CERAMIC 1000 PF, 20% TOL, 500 VDCW	CK70AW102M	81349	913-4064-000
C18	SAME AS C17			
C19	SAME AS C17			
C20	SAME AS C17			
C21	CAPACITOR, FXD, CERAMIC 0.02 UF, 20% TOL, 500 VDCW	58C40	56289	913-2142-000
C22 THROUGH C28	SAME AS C21			
C29 THROUGH C32	NOT USED			
C33	CAPACITOR, VAR, AIR 2.2 PF TO 34 PF, 650 VDCW	193-10-1	74970	922-1020-070
C34	SAME AS C33			
C35	SAME AS C17			
C36	NOT USED			
C37	CAPACITOR, VAR, AIR 6 PF TO 20.7 PF, 4500 VDCW	PL1752	71313	922-0571-000
CR1	DIODE	1N645	14433	353-2607-000
J1	CONNECTOR, ELECTRICAL 1 CONTACT	UG909BU	80058	357-9248-010
L1	NOT USED			
L2	NOT USED			
L3	NOT USED			
L4	COIL			786-3527-001
L5 THROUGH L8	NOT USED			
L9	COIL INCLUDES ROD -A, B- BAR -C- BAR -D-			 786-3110-001 786-3283-003 786-3283-004
R1 THROUGH R37	NOT USED			
R38	RESISTOR, FXD, WIRE-WOUND 5 OHMS, 1% TOL, 2.5 WATTS	RS2C62-5R000F	91637	746-9441-000
R39	RESISTOR, FXD, WIRE-WOUND 1 OHM, 1% TOL, 36 WATTS	2K46C1-1PCT	44655	710-5076-010
R40	RESISTOR, VAR, WIRE-WOUND 500 OHMS, 10% TOL, 50 WATTS	J500S553E	44655	735-1013-410
R41	NOT USED			
R42	NOT USED			
R43	NOT USED			
R44	SAME AS R40			
R45	SAME AS R39			
R46 THROUGH R49	NOT USED			
R50	RESISTOR, FXD, WIRE-WOUND 820 OHMS, 5% TOL, 11 WATTS	RW29V821	81349	746-6158-000
R51	RESISTOR, FXD, WIRE-WOUND 160 OHMS, 5% TOL, 10 WATTS	1-3-4D57F160PORM 5PCT	44655	710-2921-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R52	NOT USED			
R53	RESISTOR, FXD, COMPOSITION 47 OHMS, 10% TOL, 1 WATT	RCR32G470KS	81349	745-3296-C00
R54	SAME AS R53			
R55	NOT USED			
R56	NOT USED			
R57	RESISTOR, FXD, COMPOSITION 50 OHMS, 10% TOL, 16.5 WATTS	780SP2	10646	712-0129-000
R58 THROUGH R60	NOT USED			
R61	SAME AS R51			
T1 THROUGH T5	NOT USED			
T6	TRANSFORMER, PWR, STEP-DOWN	40-9023	86151	662-0394-010
V1	ELECTRON TUBE	7203-4CX250B	49671	256-0138-000
V2	SAME AS V1			
XV1	SOCKET, ELECTRON TUBE 8 PINS	SK620A	06980	220-1294-000
XV2	SAME AS XV1			
1	ROD, EXTENSION -QTY 2-			786-3312-C01
2	CHIMNEY, AIR SOCKET -QTY 2-	SK626	06980	220-1466-000
3	KNOB, PLASTIC -QTY 2-	MS91528-1D2B	96906	281-0122-C00

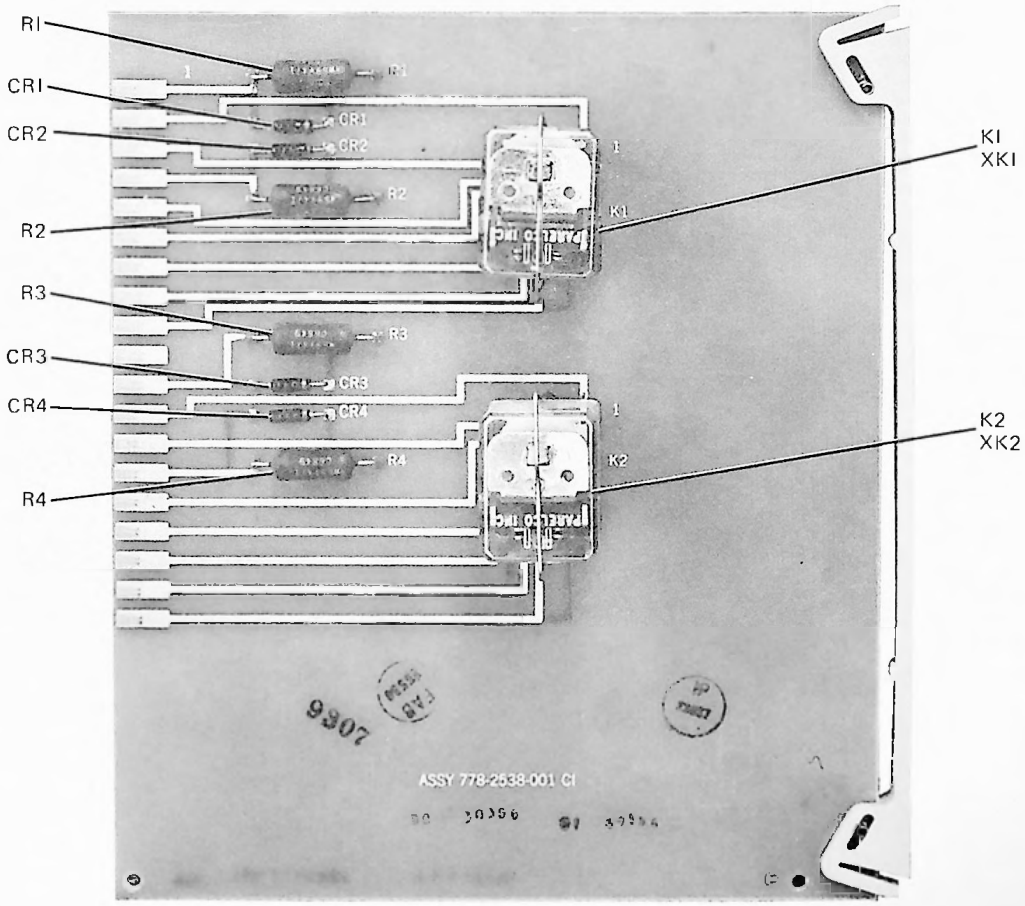

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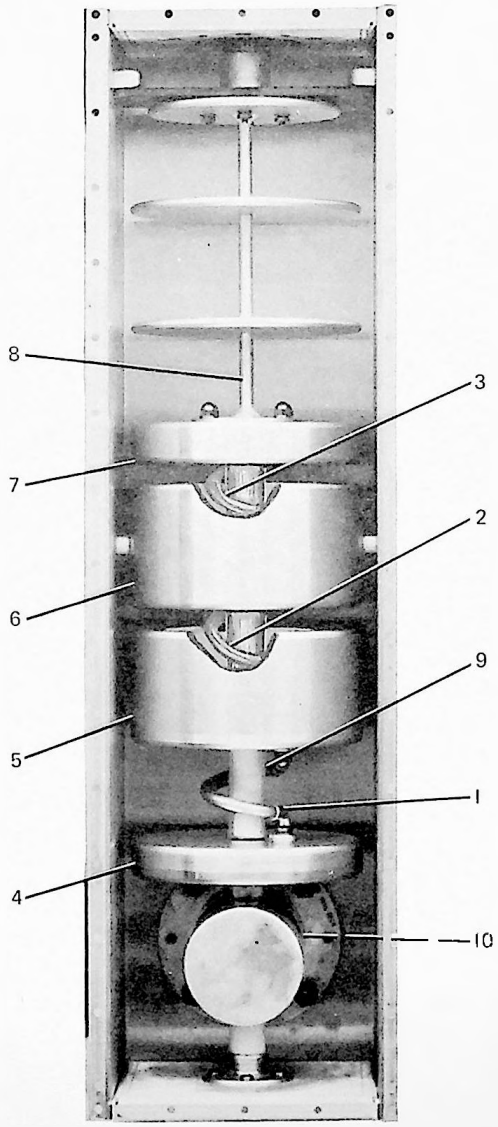
Figure 6-12. Remote Control Latching Relay Board, A12.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	REMOTE CONTROL LATCHING RELAY BOARD, A12			778-2538-001
CR1	DIODE	1N647	01295	353-2596-000
CR2	SAME AS CR1			
CR3	SAME AS CR1			
CR4	SAME AS CR1			
K1	RELAY, ARMATURE 2C CONTACT ARRANGEMENT	TF351CC2-24	70309	970-0004-030
K2	SAME AS K1			
R1	RESISTOR, FXD, WIRE-WOUND 470 OHMS, 5% TOL, 3 WATTS	RW69V471	81349	747-5391-000
R2	SAME AS R1			
R3	SAME AS R1			
R4	SAME AS R1			
XK1	SOCKET, RELAY 10 PINS	30054-3	70309	220-1520-000
	INCLUDES PIN, GROUNDING	99-018-078-0250	72962	311-0605-000
XK2	SAME AS XK1			



B700 387 Pb

Figure 6-13. RF Output Low-Pass Filter, A13.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	RF OUTPUT LOW-PASS FILTER, A13			786-3451-001
1	COIL ASSY			786-3367-001
2	COIL ASSY			786-3369-001
3	COIL ASSY			786-3371-001
4	CAPACITOR			786-3372-001
5	CAPACITOR			786-3373-001
6	CAPACITOR			786-3374-001
7	CAPACITOR			786-3375-001
8	CAPACITOR			786-3448-001
9	CAPACITOR, ROD			786-3435-001
10	INSULATOR, DISC			786-3469-001

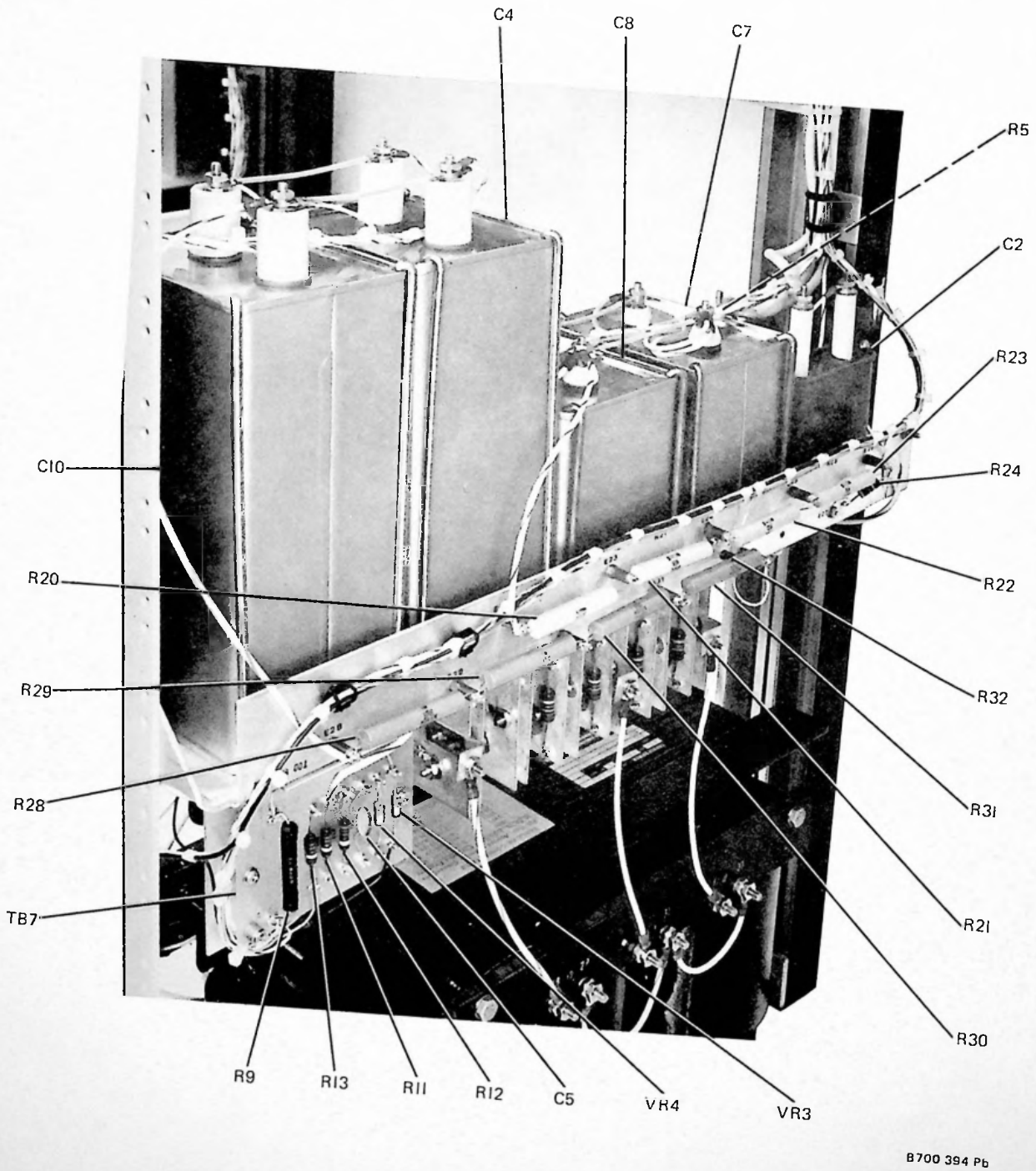


Figure 6-14. Power Supply Filter, A14 (Sheet 1 of 2).

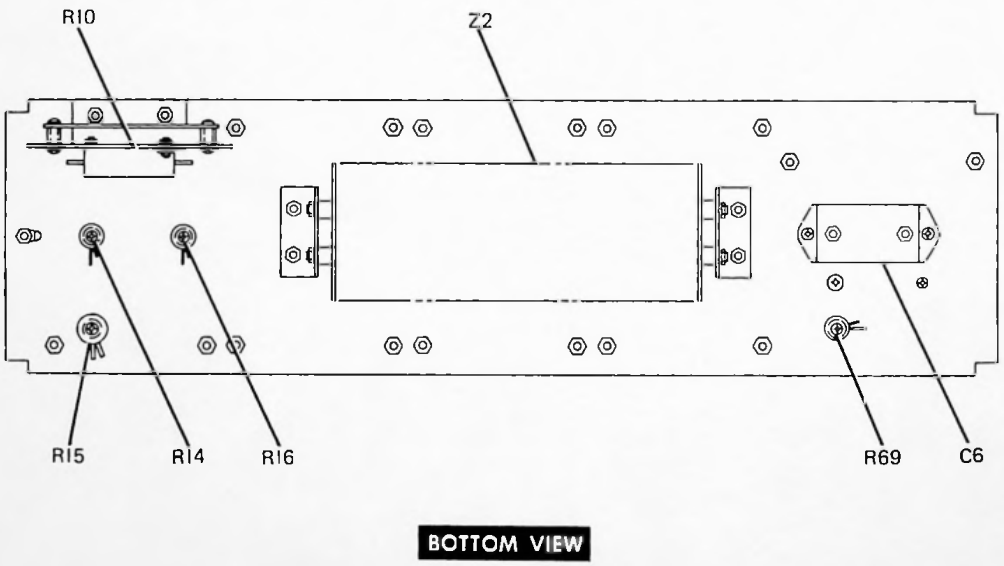


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Figure 6-14. Power Supply Filter, A14 (Sheet 2 of 2).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	POWER SUPPLY FILTER, A14			786-3583-001
C1	NOT USED			
C2	CAPACITOR, FXD, PAPER 0.05 UF, 10% TOL, 10,000 VDCW	Y48960	56289	930-0610-000
C3	NOT USED			
C4	CAPACITOR, FXD, PAPER 10 UF, 10% TOL, 2500 VDCW	CP70E1EK106K1	81349	962-4204-000
C5	CAPACITOR, FXD, CERAMIC 0.01 UF, 20% TOL, 500 VDCW	CK6AW103M	81349	913-1188-000
C6	CAPACITOR, FXD, MICA 0.022 UF, 2% TOL, 2000 VDCW	CM708223GM1	81349	938-2129-000
C7	CAPACITOR, FXD, PAPER 12 UF, 10% TOL, 1500 VDCW	CP70E1EH126K1	81349	962-4246-000
C8	SAME AS C7			
C9	NOT USED			
C10	SAME AS C4			
R1 THROUGH R4	NOT USED			
R5	RESISTOR, FXD, WIRE-WOUND 330 OHMS, 5% TOL, 26 WATTS	RW33V331	81349	747-1790-000
R6	NOT USED			
R7	NOT USED			
R8	NOT USED			
R9	RESISTOR, FXD, WIRE-WOUND 0.25 OHMS, 1% TOL, 10 WATTS	RS1DX41DER250F	91637	747-9451-000
R10	RESISTOR, FXD, WIRE-WOUND 2.5 OHMS, 3% TOL, 50 WATTS	RH50-2R500G	91637	747-8697-000
R11	RESISTOR, FXD, FILM 1200 OHMS, 5% TOL, 1 WATT	RL32S122J	81349	745-3946-000
R12	RESISTOR, FXD, FILM 3600 OHMS, 5% TOL, 1 WATT	RL32S362J	81349	745-3974-000
R13	SAME AS R11			
R14	RESISTOR, FXD, WIRE-WOUND 5 OHMS, 1% TOL, 36 WATTS	2K46C5-1PCT	44655	710-5076-030
R15	RESISTOR, FXD, WIRE-WOUND 4 OHMS, 10% TOL, 100 WATTS	3-1-2M45CE4	44655	710-5076-060
R16	RESISTOR, FXD, WIRE-WOUND 1 OHM, 1% TOL, 36 WATTS	2K46C1-1PCT	44655	710-5076-010
R17	NOT USED			
R18	NOT USED			
R19	NOT USED			
R20	RESISTOR, FXD, FILM 200 OHMS, 1% TOL, 2 WATTS	MEH200K1PCTT1	07716	705-1493-050
R21	SAME AS R20			
R22	SAME AS R20			
R23	SAME AS R20			
R24	RESISTOR, FXD, COMPOSITION 47 KILOHMS, 10% TOL, 1 WATT	RCR32G473KS	81349	745-3422-000
R25	NOT USED			
R26	NOT USED			
R27	NOT USED			
R28	RESISTOR, FXD, FILM 1000 KILOHMS, 1% TOL, 2 WATTS	RN80B1004F	81349	705-4254-000
R29	SAME AS R28			
R30	SAME AS R28			
R31	SAME AS R28			
R32	SAME AS R24			
R33 THROUGH R68	NOT USED			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R69	RESISTOR, FXD, WIRE-WOUND 310 OHMS, 5% TOL, 14 WATTS	HL15-3100HMS5PCT	91637	747-0754-C00
TB1 THROUGH TB6	NOT USED			
TB7	BOARD, TERMINAL			786-3126-001
VR1	NOT USED			
VR2	NOT USED			
VR3	DIODE	1N30168	99942	353-3121-000
VR4	SAME AS VR1			
Z1	NOT USED			
Z2	RECTIFIER	6-2-1B404S3X3	05277	353-0434-010

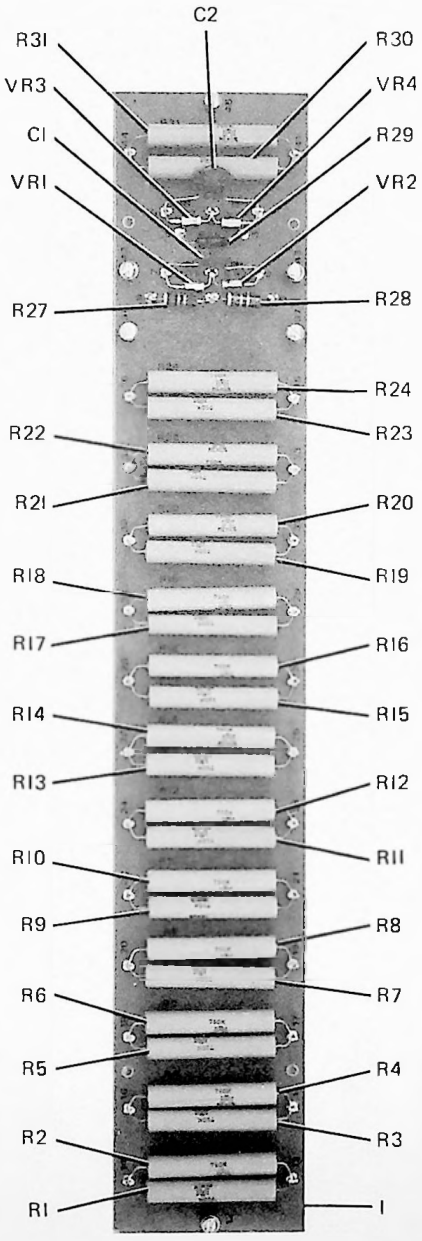

Figure 6-15. Metering Multiplier Board, A15.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	METERING MULTIPLIER BOARD, A15			786-3168-001
C1	CAPACITOR, FXD, CERAMIC 0.01 UF, 20% TOL, 500 VDCW	CK63AW103M	81349	913-1188-000
C2	SAME AS C1			
R1	RESISTOR, FXD, FILM 750 KILOHMS, 1% TOL, 2 WATTS	MEH750K1PCTT2	07716	705-1493-020
R2 THROUGH R24	SAME AS R1			
R25	NOT USED			
R26	NOT USED			
R27	RESISTOR, FXD, COMPOSITION 47 KILOHMS, 10% TOL, 1 WATT	RCR32G473KS	81349	745-3422-000
R28	SAME AS R27			
R29	RESISTOR, FXD, FILM 5110 OHMS, 1% TOL, 1/2 WATT	RN65D5111F	81349	705-7130-000
R30	RESISTOR, FXD, FILM 1000 KILOHMS, 1% TOL, 2 WATTS	RN80B1004F	81349	705-4254-000
R31	SAME AS R30			
VR1	DIODE	1N3044A	06751	353-1339-000
VR2	SAME AS VR1			
VR3	SAME AS VR1			
VR4	SAME AS VR1			
1	BOARD, TERMINAL			786-3015-001

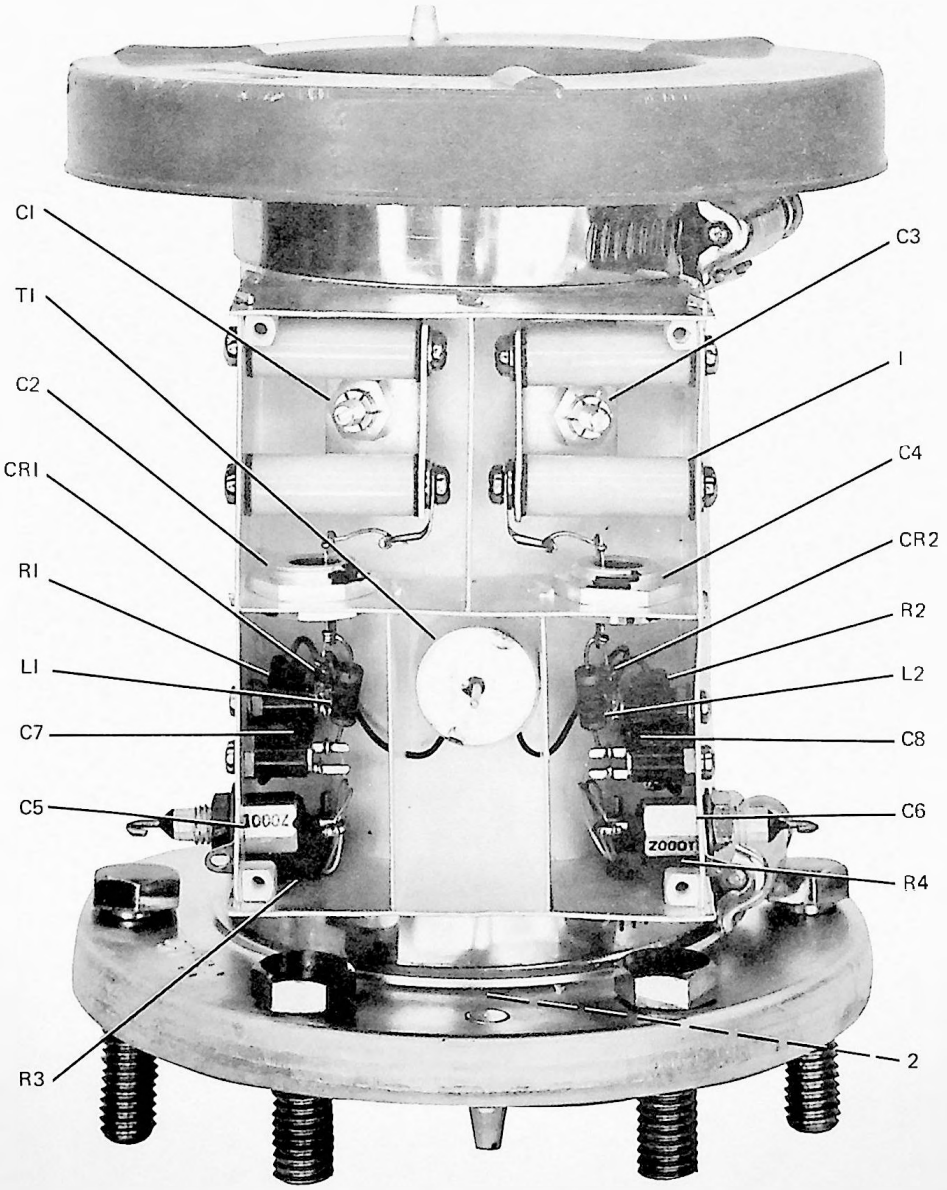

Figure 6-16. Directional Coupler, A16.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	DIRECTIONAL COUPLER, A16			786-3264-C01
C1	CAPACITOR			786-3059-C01
C2	CAPACITOR, FXD, MICA 250 PF, 2% TOL, 1000 VDCW	66901314A0-251G	72982	912-4133-C30
C3	SAME AS C1			
C4	SAME AS C2			
C5	CAPACITOR, FXD, CERAMIC 1000 PF, PLUS 80% MINUS 20%, 500 VDCW	327-029X5T01027	72982	913-1292-C00
C6	SAME AS C5			
C7	CAPACITOR, FXD, MICA 10 PF, 10% TOL, 500 VDCW	DM15C100K500WV4C R	72136	912-2754-000
C8	SAME AS C7			
CR1	DIODE	HD1811	73293	353-2057-C00
CR2	SAME AS CR1			
L1	COIL, RF 3.3 MH, 10% TOL	MS18130-14	81349	240-0791-000
L2	SAME AS L1			
R1	RESISTOR, FXD, COMPOSITION 22 OHMS, 10% TOL, 1 WATT	RCR32G220KS	81349	745-3282-C00
R2	SAME AS R1			
R3	RESISTOR, VAR, WIRE-WOUND 20 KILOHMS, 5% TOL, 3/4 WATT	RT22C2L203	81349	381-1721-160
R4	SAME AS R3			
T1	TOROID			786-3075-001
1	STANDOFF, INSULATOR -QTY 4-	E1706	70371	190-1144-C00
2	CONNECTOR ASSY, ELECTRICAL	15093	35844	013-1876-020

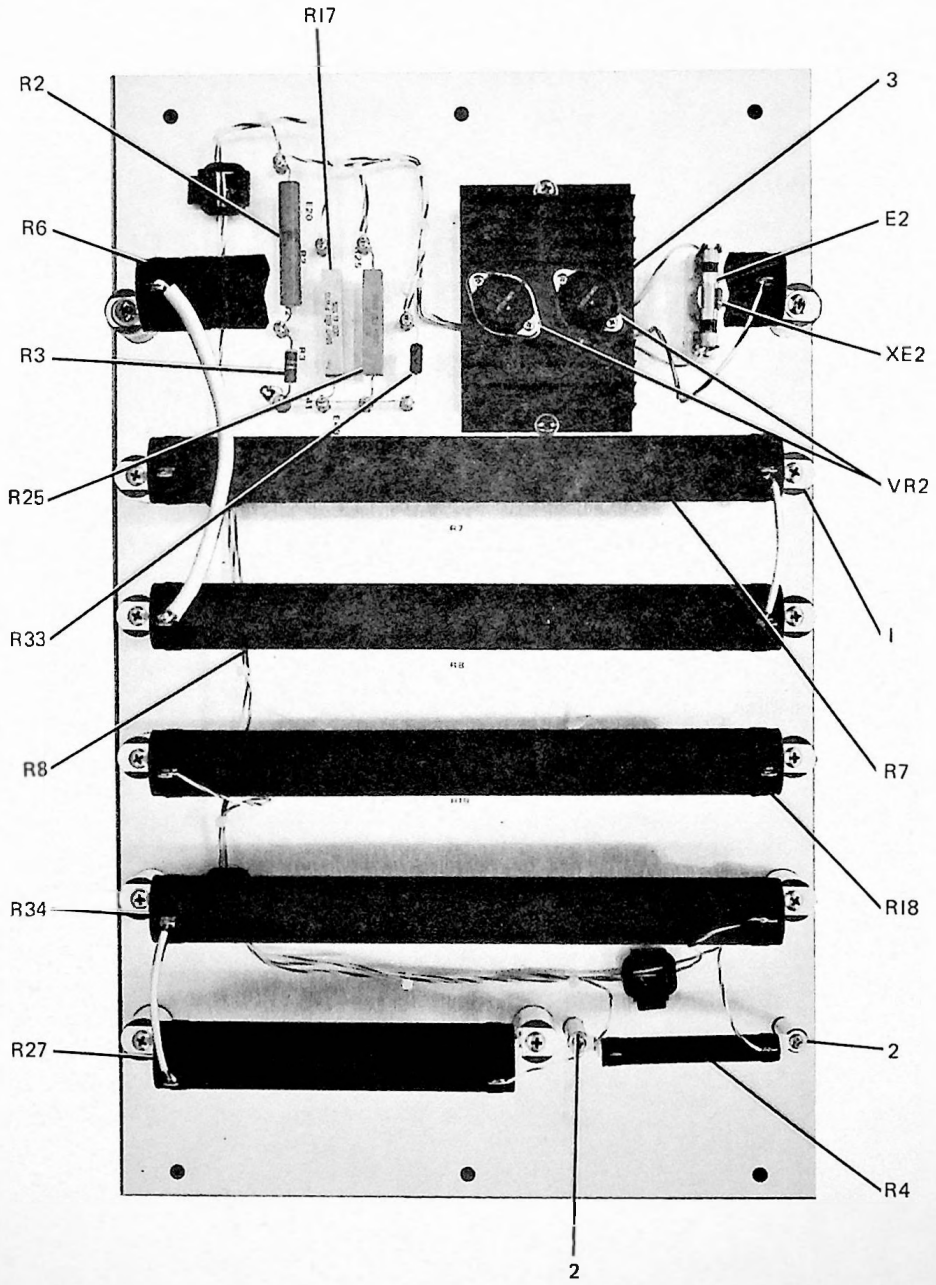

Figure 6-17. Bleeder Resistor Panel, A17.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	BLEEDER RESISTOR PANEL, A17			786-3154-001
E1	NOT USED			
E2	ARRESTOR, LIGHTNING	16A	ASSOC	013-1332-020
R1	NOT USED			
R2	RESISTOR, FXD, FILM 400 KILOHMS, 1% TOL, 2 WATTS	MF9AD4003F	19701	705-1457-210
R3	RESISTOR, FXD, COMPOSITION 47 KILOHMS, 10% TOL, 1 WATT	RCR32G473KS	81349	745-3422-000
R4	RESISTOR, FXD, WIRE-WOUND 330 OHMS, 5% TOL, 26 WATTS	RW33V331	81349	747-1790-000
R5	NOT USED			
R6	RESISTOR, FXD, WIRE-WOUND 18 OHMS, 5% TOL, 210 WATTS	RW47V180	81349	746-6662-000
R7	RESISTOR, FXD, WIRE-WOUND 100 KILOHMS, 5% TOL, 210 WATTS	RW47V104	81349	746-6737-000
R8	SAME AS R7			
R9 THROUGH R16	NOT USED			
R17	RESISTOR, FXD, WIRE-WOUND 200 OHMS, 10% TOL, 10 WATTS	PW1020010PCT	11502	710-9054-000
R18	RESISTOR, FXD, COMPOSITION 39 KILOHMS, 5% TOL, 1 WATT	GBT1-39K5	75042	745-6817-000
R19 THROUGH R24	NOT USED			
R25	RESISTOR, FXD, WIRE-WOUND 20 KILOHMS, 10% TOL, 10 WATTS	PW1020K10PCT	11502	710-9067-000
R26	NOT USED			
R27	RESISTOR, FXD, WIRE-WOUND 82 KILOHMS, 5% TOL, 113 WATTS	RW37V823	81349	747-3834-000
R28 THROUGH R32	NOT USED			
R33	RESISTOR, FXD, WIRE-WOUND 5 OHMS, 1% TOL, 2.5 WATTS	RS2C62-5R000F	91637	746-9441-000
R34	RESISTOR, FXD, WIRE-WOUND 20 KILOHMS, 5% TOL, 210 WATTS	RW47V203	81349	746-6723-000
VR1	NOT USED			
VR2	SEMICONDUCTOR DEVICE, SET	50M140Z85	04713	353-6015-000
XE1	NOT USED			
XE2	ARRESTOR, LIGHTNING, MTG	53	ASSOC	013-1332-010
1	STANDOFF, INSULATOR -QTY 12-	3BX3822	71590	190-0025-000
2	STANDOFF, INSULATOR -QTY 2-	E1708	70371	190-1145-000
3	HEAT SINK	1E1155B3033	41197	352-9866-000

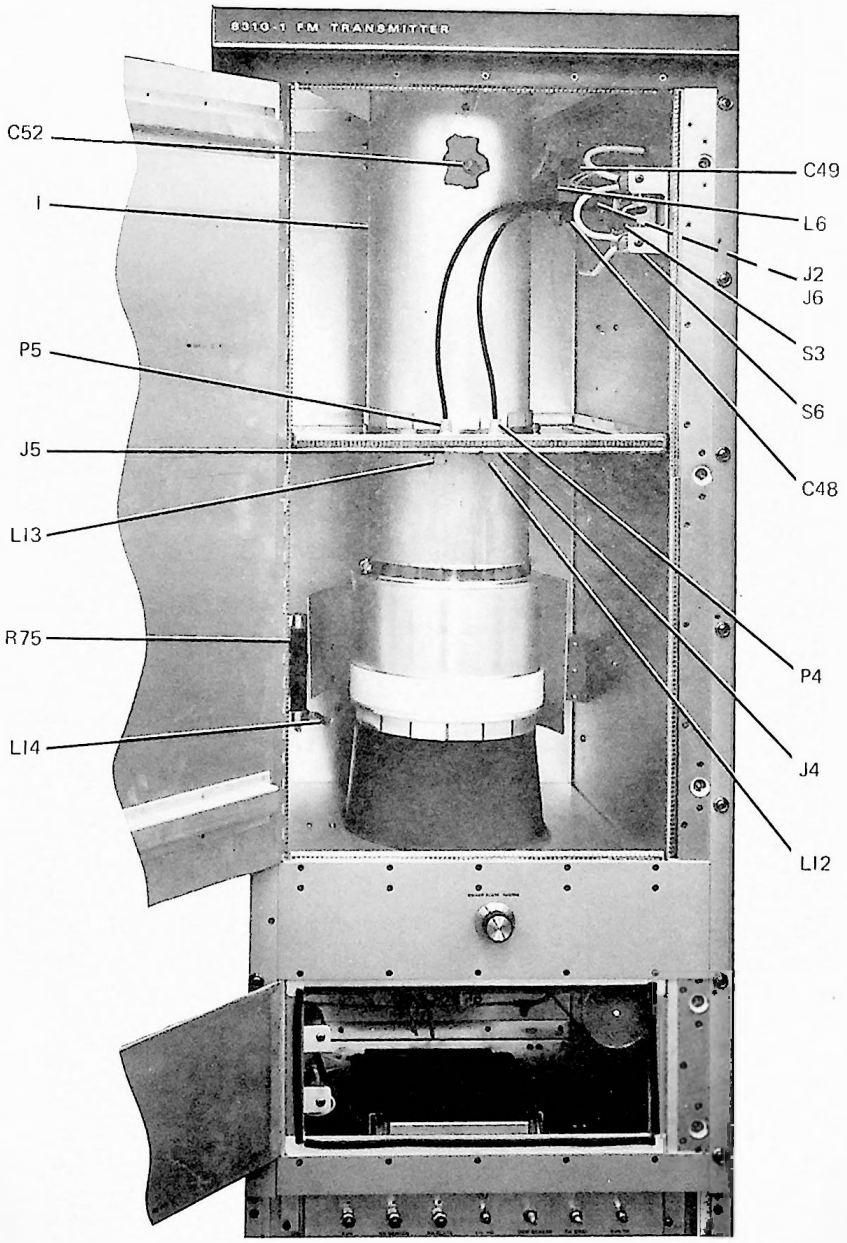

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Figure 6-18. Power Amplifier Cavity, A18 (Sheet 1 of 3).

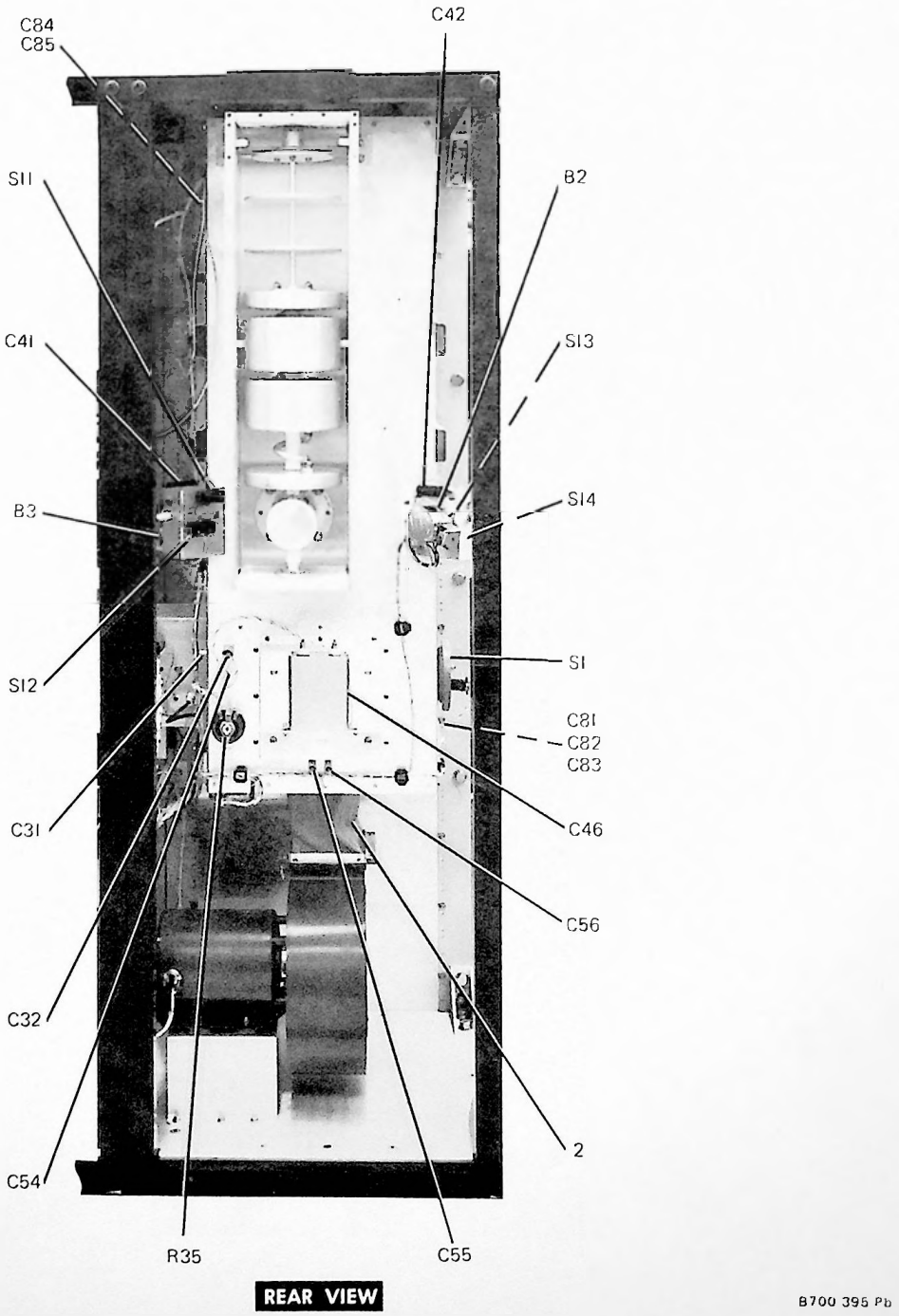

Figure 6-18. Power Amplifier Cavity, A18 (Sheet 2 of 3).

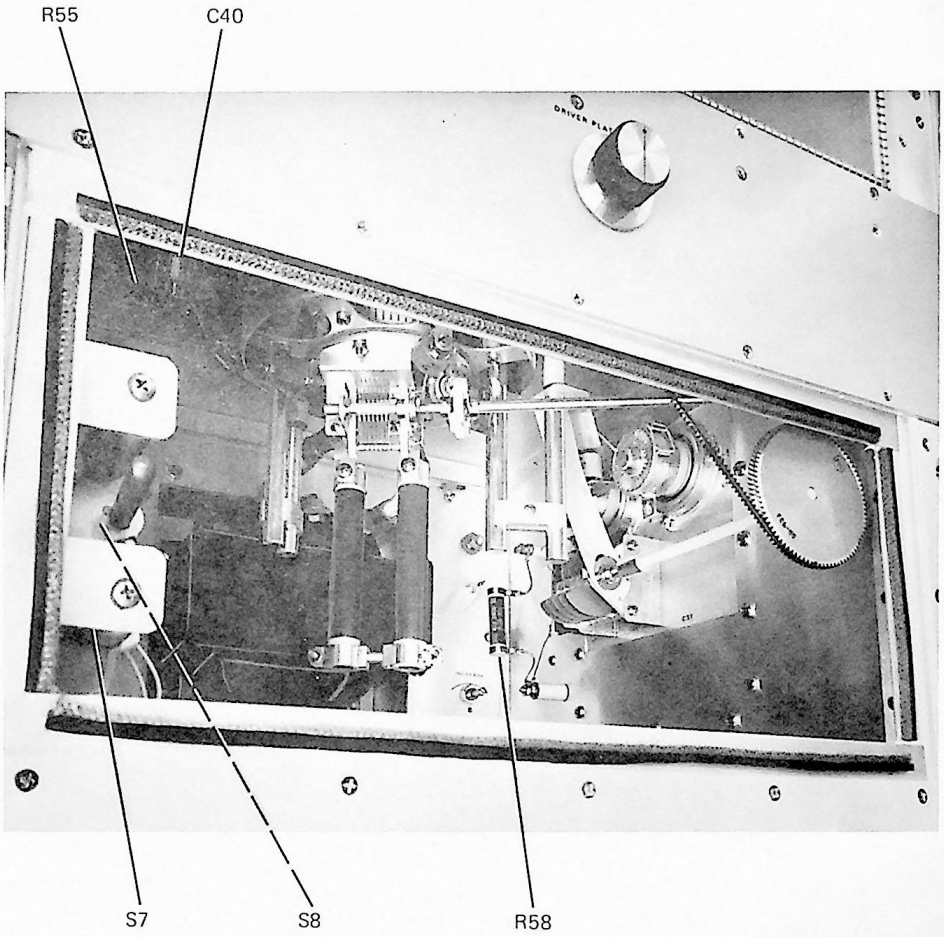

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Figure 6-18. Power Amplifier Cavity, A18 (Sheet 3 of 3).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	POWER AMPLIFIER CAVITY, A18			786-3335-001
B1	NOT USED			
B2	MOTOR, AC 115 VAC	PCDA1	10108	230-0581-010
B3	SAME AS B2			
C1 THROUGH C30	NOT USED			
C31	CAPACITOR, FXD, CERAMIC 1000 PF, 20% TOL, 4000 VDCW	2498-002X50-102M	72982	913-3120-020
C32	CAPACITOR, FXD, PAPER 0.1 UF, PLUS 30% MINUS 20%, 1250 VDCW	JN17-304A	56289	241-0334-000
C33 THROUGH C39	NOT USED			
C40	CAPACITOR, FXD, CERAMIC 310 PF, 5% TOL, 2500 VDCW	850S310N	71590	913-0845-000
C41	CAPACITOR, FXD, PAPER 0.47 UF, 20% TOL, 400 VDCW	160P47404	56289	913-6849-000
C42	SAME AS C41			
C43	NOT USED			
C44	NOT USED			
C45	NOT USED			
C46	CAPACITOR, FXD, PAPER 10 UF, 10% TOL, 1000 VDCW	T10100	93790	930-0038-000
C47	NOT USED			
C48	CAPACITOR, FXD, CERAMIC 500 PF, PLUS 50% MINUS 20%, 20,000 VDCW	HV50020KV	96095	913-1101-000
C49	NOT USED			
C50	NOT USED			
C51	NOT USED			
C52	CAPACITOR, FXD, CERAMIC 100 PF, 10% TOL, 15,000 VDCW	857-100N	71590	913-5113-050
C53	NOT USED			
C54	CAPACITOR, FXD, CERAMIC 1000 PF, 20% TOL, 1000 VDCW	2432002X5S0102M	72982	913-4843-000
C55	CAPACITOR, FXD, PAPER 0.1 UF, 10% TOL, 600 VDCW	CZ24BKF104	81349	241-0090-000
C56	SAME AS C55			
C57 THROUGH C80	NOT USED			
C81	CAPACITOR, FXD, CERAMIC 1000 PF, 20% TOL, 5000 VDCW	DA858-003	71590	913-0101-000
C82	CAPACITOR, FXD, CERAMIC 1000 PF, 20% TOL, 500 VDCW	CK70AW102M	81349	913-4064-000
C83	SAME AS C82			
C84	SAME AS C82			
C85	SAME AS C82			
J1	NOT USED			
J2	CONNECTOR, ELECTRICAL 1 CONTACT	10083000C75	94375	357-9248-010
J3	NOT USED			
J4	CONNECTOR, ELECTRICAL 1 CONTACT	UG625BU	80058	357-9670-000
J5	SAME AS J4			
J6	SAME AS J2			
L1 THROUGH L5	NOT USED			
L6	CHOKE, RF			786-3548-001

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
L7 THROUGH L11	NOT USED			
L12	FERRULE, RF, GROUNDING	GSB165	59730	304-0160-000
L13	SAME AS L12			
L14	STRAP			786-3673-001
P1	NOT USED			
P2	NOT USED			
P3	NOT USED			
P4	CONNECTOR, ELECTRICAL 1 CONTACT	UG88EU	80058	357-9292-000
P5	SAME AS P4			
R1 THROUGH R34	NOT USED			
R35	RESISTOR, FXD, WIRE-WOUND 10 KILOHMS, 10% TOL, 50 WATTS	RP151SD103KK	81349	749-1032-000
R36 THROUGH R54	NOT USED			
R55	RESISTOR, FXD, COMPOSITION 22 OHMS, 10% TOL, 2 WATTS	RC42GF220K	81349	745-5582-000
R56	NOT USED			
R57	NOT USED			
R58	RESISTOR, FXD, COMPOSITION 22 OHMS, 20% TOL, 15 WATTS	772SP2	10646	712-0002-000
R59 THROUGH R74	NOT USED			
R75	RESISTOR, FXD, COMPOSITION 50 OHMS, 20% TOL, 60 WATTS	218SP9	10646	712-0070-000
S1	SWITCH, PRESSURE SPDT CONTACT ARRANGEMENT	146B	96502	266-8384-090
S2	SENSITIVE SWITCH SPDT CONTACT ARRANGEMENT INCLUDES	MS25253-4	96906	260-0025-000
	ACTUATOR	JV9	91929	260-0026-000
S3	SAME AS S2			
S4	NOT USED			
S5	NOT USED			
S6	SHORTING SWITCH INCLUDES			786-3156-001
	SPRING, SHORTING SWITCH			540-5342-002
	STRAP, GROUNDING			542-1768-002
	STRIP, SHORTING			542-1770-002
	CONTACT, SHORTING			542-1773-002
	SHAFT, FLAT, STRAIGHT			542-2242-003
	INSULATOR, STANDOFF	3BX3841	71590	190-0026-000
S7	SAME AS S6			
S8	NOT USED			
S9	NOT USED			
S10	NOT USED			
S11	SWITCH, SENSITIVE SPDT CONTACT ARRANGEMENT	SS05A20	81350	266-3081-000
S12	SAME AS S11			
S13	SAME AS S11			
S14	SAME AS S11			
1	CONDUCTOR, CENTER, CAVITY			786-3124-001
2	DUCT, BLOWER			786-3026-001
3	SHIELD, RF			786-3095-001

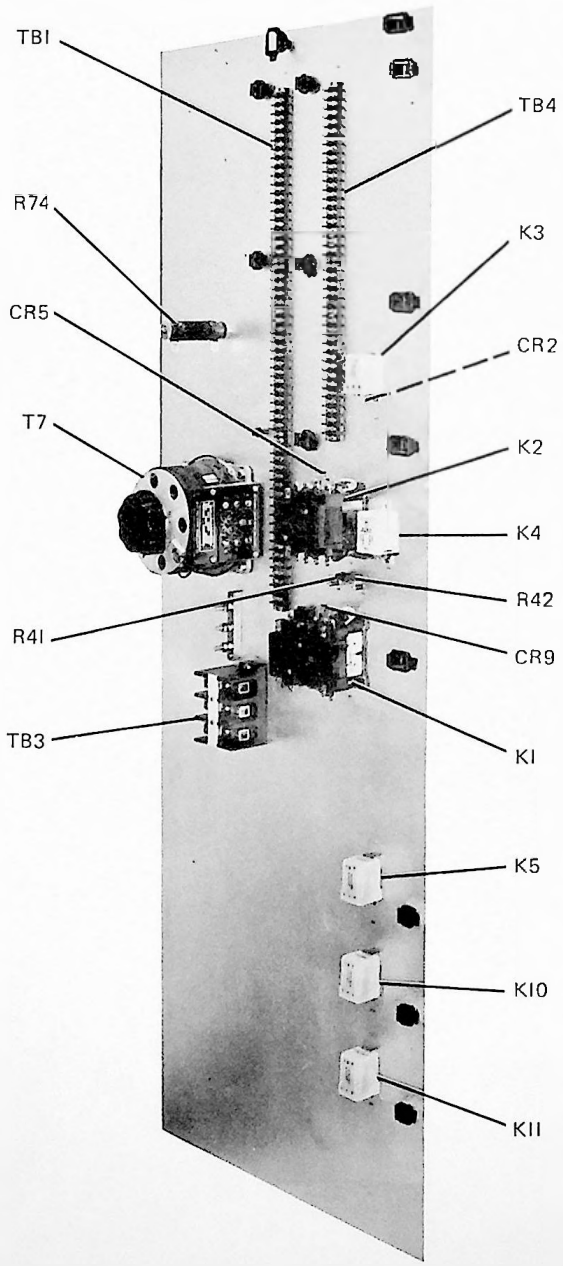


Figure 6-19. Input Terminal Panel, A19.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	INPUT TERMINAL PANEL, A19			786-3333-001
CR1	NOT USED			
CR2	DIODE	1N645	14433	353-2607-000
CR3	NOT USED			
CR4	NOT USED			
CR5	SAME AS CR2			
CR6 THROUGH CR8	NOT USED			
CR9	SAME AS CR2			
K1	RELAY, CONTACTOR 3A CONTACT ARRANGEMENT	2160B430QA3-4-22 -41X81860	52090	401-1607-000
K2	RELAY, MAGNETIC 1C CONTACT ARRANGEMENT	2195R50QAXR1920	52090	401-1614-C00
K3	RELAY, ARMATURE 3C CONTACT ARRANGEMENT	KUP14D5124V	77342	970-0007-250
K4	RELAY, TIME DELAY 2C CONTACT ARRANGEMENT	CUC43-30120	77342	402-0489-490
K5	RELAY, ARMATURE 3C CONTACT ARRANGEMENT	KUP14A51240V	77342	970-0007-270
K6 THROUGH K9	NOT USED			
K10	SAME AS K5			
K11	SAME AS K5			
R1 THROUGH R40	NOT USED			
R41	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 2 WATTS	RC42GF821K	81349	745-5649-C00
R42	SAME AS R41			
R43 THROUGH R73	NOT USED			
R74	RESISTOR, FXD, WIRE-WOUND 0.5 OHMS, 10% TOL, 100 WATTS	3-1-2M45C5	44655	710-5076-050
T1 THROUGH T6	NOT USED			
T7	TRANSFORMER, PWR, VARIABLE	226U	58474	664-4020-020
TB1	BOARD, TERMINAL 18 TERMINALS -QTY 3-	18-141	71785	367-4180-000
TB2	NOT USED			
TB3	BOARD, TERMINAL 6 TERMINALS	9080U3	56365	367-1188-000
TB4	BOARD, TERMINAL 18 TERMINALS -QTY 2-	18-141	71785	367-4180-000

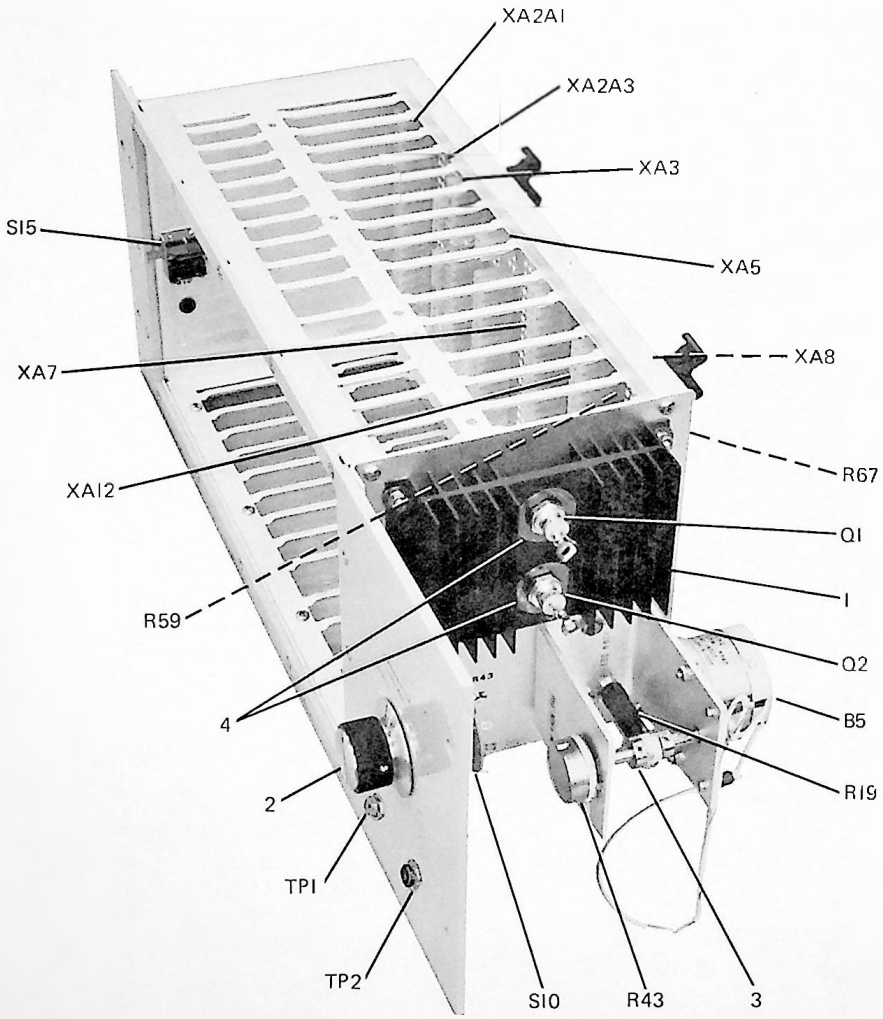
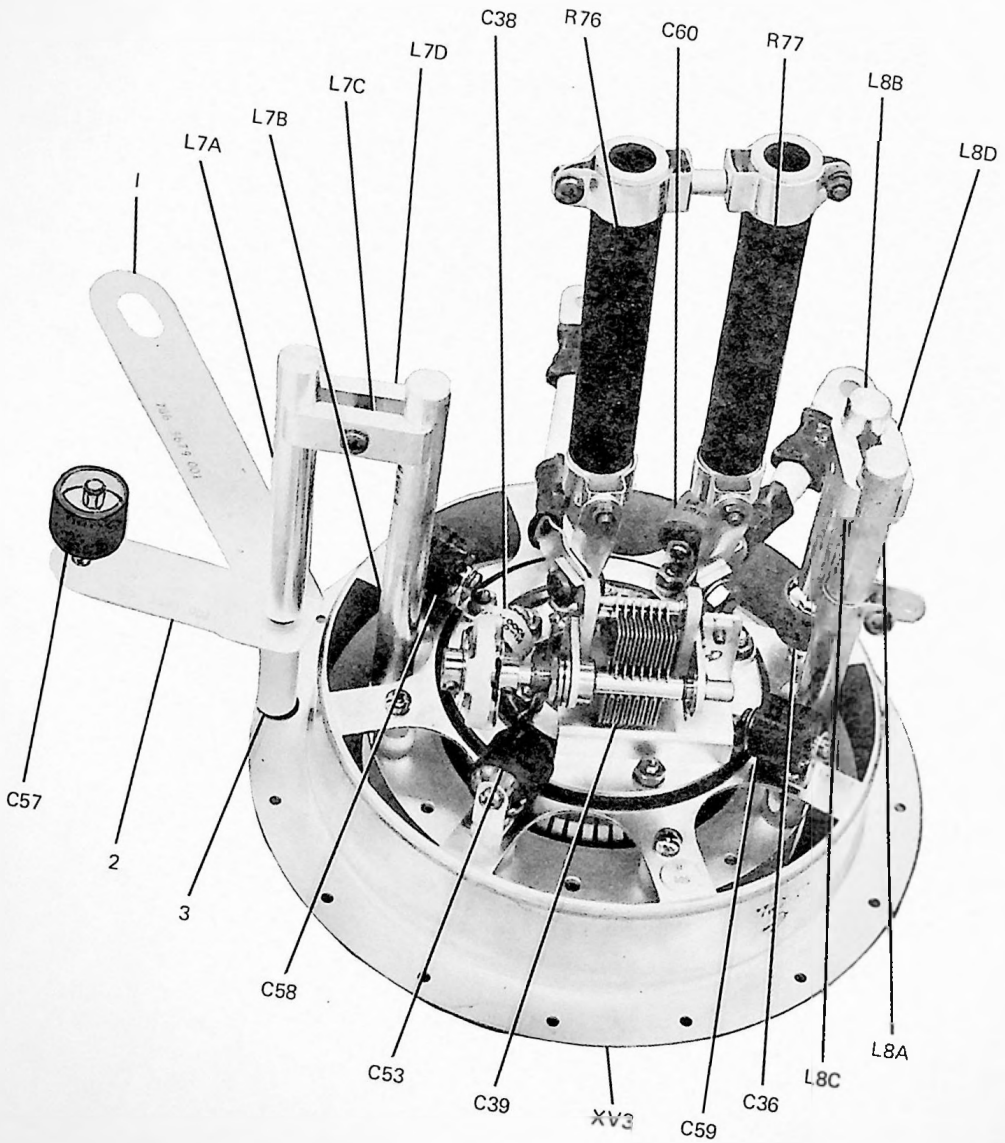


Figure 6-20. Card Cage Assembly, A20.

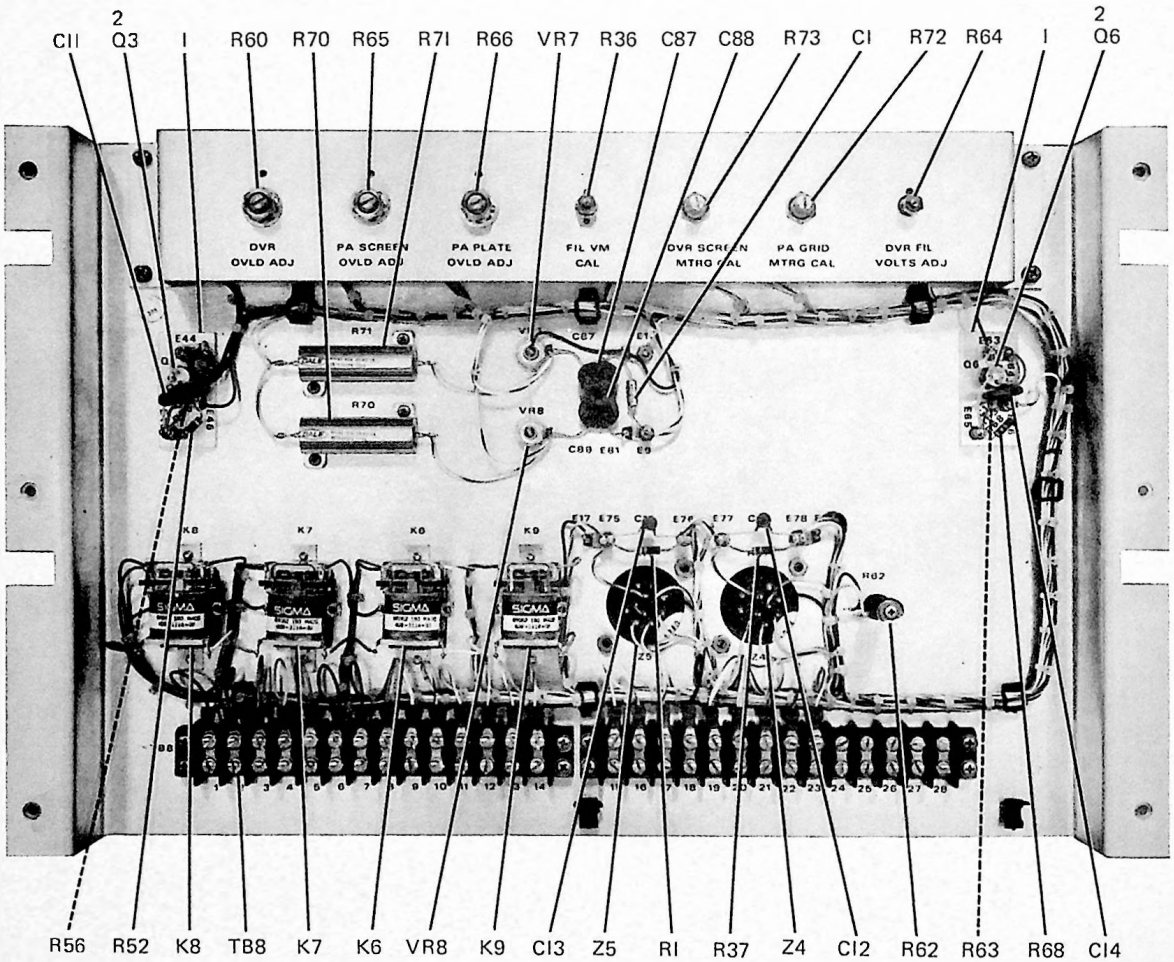
SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	CARD CAGE ASSEMBLY, A20			786-3301-001
B1 THROUGH B4	NOT USED			
B5	MOTOR	J6322	82227	230-0515-000
Q1	DIODE	NL461E	83781	353-3490-090
Q2	SAME AS Q1			
R1 THROUGH R18	NOT USED			
R19	RESISTOR, FXD, WIRE-WOUND 100 OHMS, 5% TOL, 11 WATTS	RW29V101	81349	746-6060-000
R20 THROUGH R42	NOT USED			
R43	RESISTOR, VAR, COMPOSITION 250 OHMS, 10% TOL, 2 WATTS	RV4NAYSD254A	81349	380-2678-000
R44 THROUGH R58	NOT USED			
R59	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 1/2 WATT	RCR20G821KS	81349	745-1349-000
S1 THROUGH S9	NOT USED			
S10	SWITCH, ROTARY DPDT CONTACT ARRANGEMENT	262344K1	76854	259-2694-010
S11 THROUGH S14	NOT USED			
S15	SWITCH, INTERLOCK SPDT CONTACT ARRANGEMENT	MS16106-4	96906	266-8000-000
TP1	JACK, TIP RED	M39024-1-22	81349	360-0439-120
TP2	JACK, TIP BLACK	M39024-1-23	81349	360-0439-130
XA1	NOT USED			
XA2	NOT USED			
XA2A1	CONNECTOR, ELECTRICAL 4 CONTACTS -QTY 10-	375430904501	91662	372-2425-040
XA2A2	NOT USED			
XA2A3	CONNECTOR,ELECTRICAL 4 CONTACTS -QTY 5-	375430904501	91662	372-2425-040
XA3	CONNECTOR, ELECTRICAL 4 CONTACTS -QTY 11-	375430904501	91662	372-2425-040
XA4	NOT USED			
XA5	SAME AS XA2A1			
XA6	NOT USED			
XA7	CONNECTOR, ELECTRICAL 4 CONTACTS -QTY 13-	375430904501	91662	372-2425-040
XA8	SAME AS XA2A3			
XA9	NOT USED			
XA10	NOT USED			
XA11	NOT USED			
XA12	SAME AS XA2A1			
1	HEAT SINK	640037B	13103	352-9597-030
2	KNOB, ALUMINUM			757-0233-003
3	COUPLING, SHAFT, FLEXIBLE	A201-5N	99934	015-0514-000
4	KIT, MOUNTING -QTY 2-	PK22-31M	08289	352-9573-020



8700 389 Pb

Figure 6-21. Power Amplifier Socket, A21.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	POWER AMPLIFIER SOCKET, A21			786-3686-001
C1 THROUGH C35	NOT USED			
C36	CAPACITOR, FXD, CERAMIC 310 PF, 5% TOL, 2500 VDCW	850S310N	71590	913-0845-000
C37	NOT USED			
C38	CAPACITOR, FXD, CERAMIC 1000 PF, PLUS 40% MINUS 20%, 2500 VDCW	HPB20-BC1000PF	96095	913-2831-000
C39	CAPACITOR, VAR, AIR 7 PF TO 100 PF	9404-18-00036	80583	922-0025-000
C40 THROUGH C52	NOT USED			
C53	CAPACITOR, FXD, CERAMIC 100 PF, 10% TOL, 5000 VDCW	850S100N	71590	913-0821-000
C54	NOT USED			
C55	NOT USED			
C56	NOT USED			
C57	CAPACITOR, FXD, CERAMIC 1000 PF, 20% TOL, 5000 VDCW	DA858-003	71590	913-0101-000
C58	SAME AS C53			
C59	CAPACITOR, FXD, CERAMIC 75 PF, 5% TOL, 3500 VDCW	850S75Z	71950	913-0830-000
C60	CAPACITOR, FXD, CERAMIC 500 PF, 20% TOL, 5000 VDCW	858-500	71590	913-5113-250
R1 THROUGH R75	NOT USED			
R76	RESISTOR, FXD, COMPOSITION 22 OHMS, 10% TOL, 15 WATTS	216SP3	10646	712-0007-000
R77	SAME AS R76			
L1 THROUGH L6	NOT USED			
L7	DRIVER PLATE INDUCTOR INCLUDES			
	ROD -A-			786-3110-005
	ROD -B-			786-3110-002
	BAR -C-			786-3283-006
	BAR -D-			786-3283-005
L8	DRIVER LOADING INDUCTOR INCLUDES			
	ROD -A-			786-3110-002
	ROD -B-			786-3110-006
	BAR -C-			786-3283-002
	BAR -D-			786-3283-001
XV1	NOT USED			
XV2	NOT USED			
XV3	SOCKET, ELECTRON TUBE	Y291	06980	220-1491-000
1	STRAP			786-3679-001
2	STRAP			786-3685-001
3	STANDOFF, INSULATOR	E1002	70371	190-1152-000

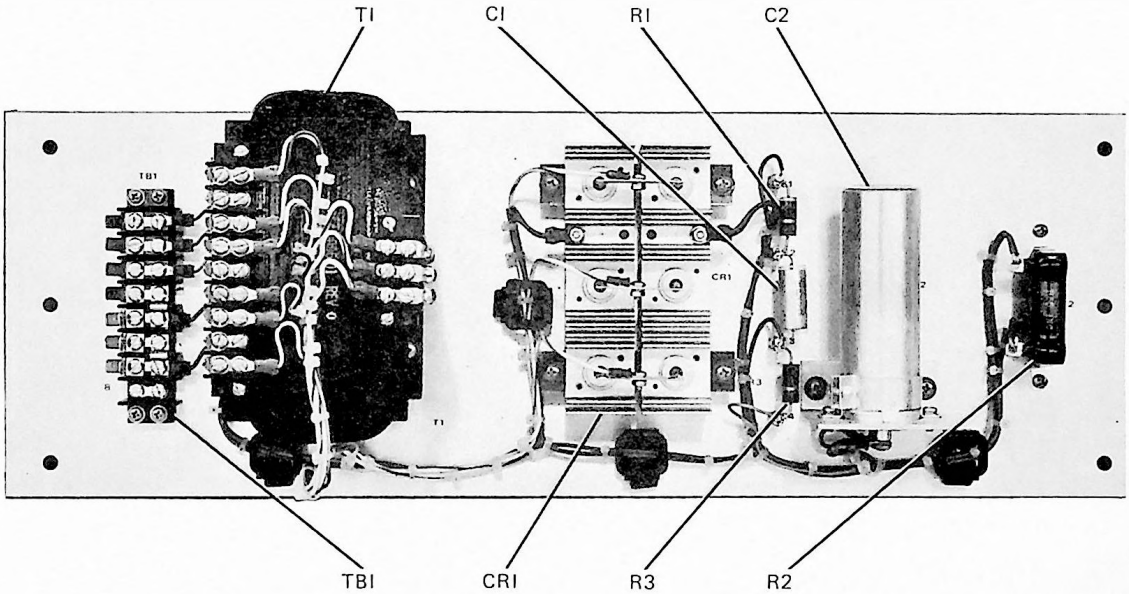


B700 388 Pb

Figure 6-22. Overload and Meter Calibrate Panel, A22.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	OVERLOAD AND METER CALIBRATE PANEL, A22			786-3666-001
C1	CAPACITOR, FXD, ELECTROLYTIC 33 UF, 20% TOL, 10 VDCW	150D336X001082	56289	184-7382-000
C2 THROUGH C10	NOT USED			
C11	CAPACITOR, FXD, CERAMIC 0.1 UF, PLUS 80% MINUS 20%, 200 VDCW 200 VDCW	825-213X5V0104Z	72982	913-3681-000
C12	CAPACITOR, FXD, CERAMIC 1000 PF, 20% TOL, 1000 VDCW	CK60AW102M	81349	913-1186-000
C13	SAME AS C12			
C14	SAME AS C11			
C15 THROUGH C86	NOT USED			
C87	SAME AS C11			
C88	SAME AS C11			
K1 THROUGH K5	NOT USED			
K6	RELAY, ARMATURE 1C CONTACT ARRANGEMENT	95062	78277	408-1114-000
K7	SAME AS K6			
K8	SAME AS K6			
K9	SAME AS K6			
Q1	NOT USED			
Q2	NOT USED			
Q3	RECTIFIER	C6F	03508	353-6468-010
Q4	NOT USED			
Q5	NOT USED			
Q6	SAME AS Q3			
R1	RESISTOR, FXD, COMPOSITION 1000 OHMS, 10% TOL, 1/2 WATT	RCR20G102KS	81349	745-1352-000
R2 THROUGH R35	NOT USED			
R36	RESISTOR, FXD, COMPOSITION 25 KILOHMS, 10% TOL, 1/2 WATT	RV6LAYSA253A	81349	380-2292-000
R37	SAME AS R1			
R38 THROUGH R51	NOT USED			
R52	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/2 WATT	RCR20G472KS	81349	745-1380-000
R53	NOT USED			
R54	NOT USED			
R55	NOT USED			
R56	RESISTOR, FXD, COMPOSITION 220 OHMS, 20% TOL, 1/2 WATT	RCR20G221KS	81349	745-1324-000
R57	NOT USED			
R58	NOT USED			
R59	NOT USED			
R60	RESISTOR, VAR, WIRE-WOUND 50 OHMS, 10% TOL, 2 WATTS			377-0619-000
R61	NOT USED			
R62	RESISTOR, FXD, WIRE-WOUND 150 OHMS, 5% TOL, 1 WATT	RW29V151	81349	746-6145-000
R63	RESISTOR, FXD, COMPOSITION 10 KILOHMS, 10% TOL,	RCR20G103KS	81349	745-1394-000

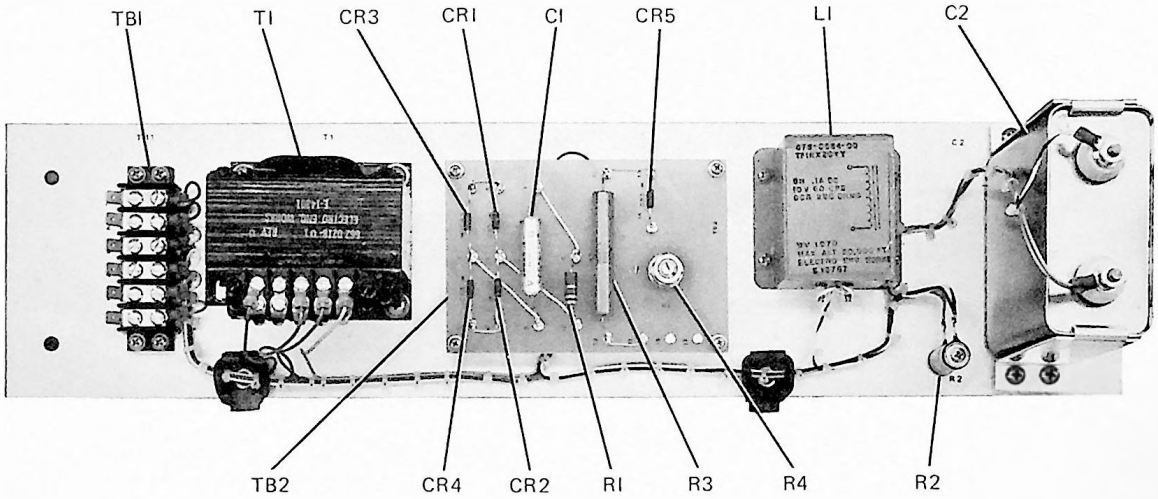
SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	1/2 WATT			
R64	RESISTOR, VAR, WIRE-WOUND 100 OHMS, 10% TOL, 12.5 WATTS	44968-100	44655	749-4512-000
R65	SAME AS R60			
R66	SAME AS R60			
R67	NOT USED			
R68	SAME AS R63			
R69	NOT USED			
R70	RESISTOR, FXD, WIRE-WOUND 4 OHMS, 1% TOL, 30 WATTS	RE75G60R4	81349	747-0990-730
R71	SAME AS R70			
R72	RESISTOR, VAR, WIRE-WOUND 30 OHMS, 10% TOL, 4 WATTS	M30PX	37942	377-0032-000
R73	SAME AS R72			
T81 THROUGH T87	NOT USED			
T88	BOARD, TERMINAL 14 TERMINALS	14-141	71785	367-4140-000
VR1 THROUGH VR6	NOT USED			
VR7	DIODE	3Z4-7T10	81483	353-1849-000
VR8	SAME AS VR7			
Z1	NOT USED			
Z2	NOT USED			
Z3	NOT USED			
Z4	MAGNETIC CIRCUIT, HALLTRON	MC103	12066	270-0080-020
Z5	SAME AS Z4			
1	HEAT SINK -QTY 2-	TX0506-18	98978	352-9555-010
2	INSULATOR -QTY 2-			796-9889-001



B700 397 Pb

Figure 6-23. 28-Volt Power Supply, PS1.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	28 VOLT POWER SUPPLY, PS1			786-3013-001
C1	CAPACITOR, FXD, PAPER 0.68 UF, 20% TOL, 200 VDCW	118P68402S1	56289	951-0087-000
C2	CAPACITOR, FXD, ELECTROLYTIC 1400 UF, PLUS 100% MINUS 10%, 50 VDCW	CE71C142G	81349	184-2516-000
CR1	RECTIFIER	27A611810H2	94154	353-6327-000
R1	RESISTOR, FXD, COMPOSITION 47 OHMS, 10% TOL, 2 WATTS	RC42GF470K	81349	745-5596-000
R2	RESISTOR, FXD, WIRE-WOUND 150 OHMS, 5% TOL, 25 WATTS	0200G	44655	710-3150-100
R3	RESISTOR, FXD, COMPOSITION 10 OHMS, 10% TOL, 2 WATTS	RC42GF100K	81349	745-5568-000
T1	TRANSFORMER, PWR, STEP-DOWN	E14331	80008	664-0096-010
TB1	BOARD, TERMINAL 8 TERMINALS	601-8	75382	367-4080-000



B700 453 Pb

Figure 6-24. PA Bias Power Supply, PS2.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	PA BIAS POWER SUPPLY, PS2			786-3081-001
C1	CAPACITOR, FXD, PAPER 0.047 UF, 20% TOL, 600 VDCW	186P47306S1	56289	931-8592-000
C2	CAPACITOR, FXD, PAPER 10 UF, 10% TOL, 1000 VDCW	T10100	09023	930-0038-000
CR1	DIODE	1N4586	72699	353-6467-050
CR2 THROUGH CR5	SAME AS CR1			
L1	REACTOR 5H INDUCTANCE	18892	80089	678-0584-000
R1	RESISTOR, FXD, COMPOSITION 330 OHMS, 10% TOL, 1 WATT	RCR32G331KS	81349	745-3331-000
R2	RESISTOR, FXD, WIRE-WOUND 10 KILOHMS, 5% TOL, 14 WATTS	RW31V103	81349	746-9131-000
R3	RESISTOR, FXD, FILM 1000 OHMS, 1% TOL, 2 WATTS	RN80B1004F	81349	705-4254-000
R4	RESISTOR, VAR, COMPOSITION 25 KILOHMS, 10% TOL, 2 WATTS	RVLAYSA252A	81349	380-2768-000
T1	TRANSFORMER, PWR, STEP-UP	F14301	80008	662-0218-010
TB1	BOARD, TERMINAL 6 TERMINALS	6-141	71785	367-4060-000
TB2	TERMINAL BOARD			786-3139-001

section 7
illustrations

Refer to overall schematic diagram supplied in the back of manual.

Figure 7-1. 831G-1, Schematic Diagram

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TECHNICAL BULLETIN

COLLINS RADIO COMPANY

Printed in United States of America

523-0560518-011438
20 March 1971

310Z-1 FM EXCITER

CHANGE NOTICE NO. 1
to Instruction Book 523-0560518-001438

1. REASON FOR CHANGE

This addendum provides the following:

a. New parts list for section 6.

b. New schematic diagrams for section 7.

2. EFFECTIVITY

The new pages are effective upon receipt and should be used in place of the material contained in the instruction book.

section 6
parts list

6.1 GENERAL

This section contains a list of all replaceable electrical, electronic, and critical mechanical parts for the 310Z-1 FM EXCITER.

The manufacturers' codes appearing in the MFR CODE column of the parts list are listed in numerical order at the end of the parts list. The code list provides the manufacturer's name and address as shown in the Federal Supply Code for Manufacturers' Handbook H4-1. Manufacturers not listed in Handbook H4-1 are assigned a 5-letter code and appear first in the code list.

6.2 LIST OF EQUIPMENT

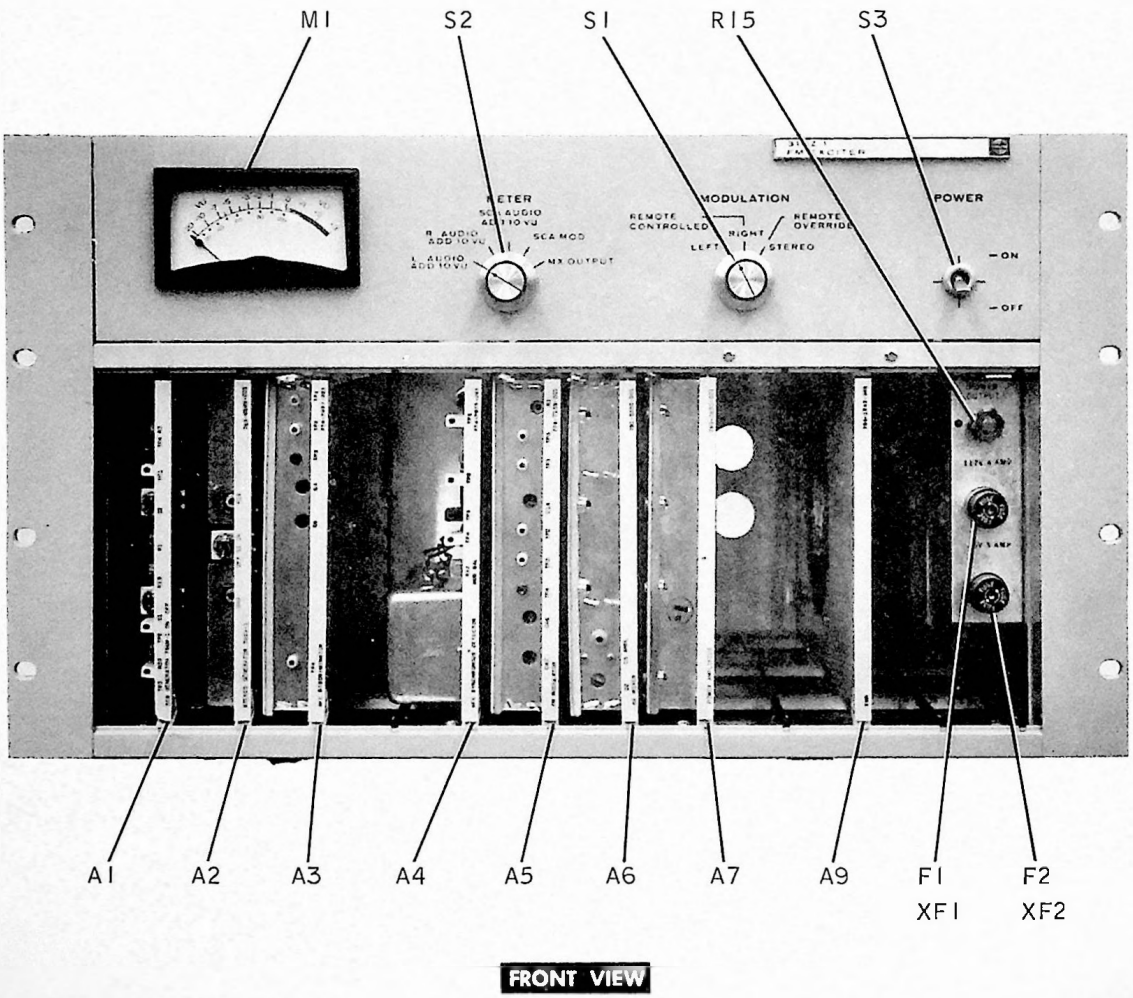

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Figure 6-1. 310Z-1 FM Exciter (Sheet 1 of 3).

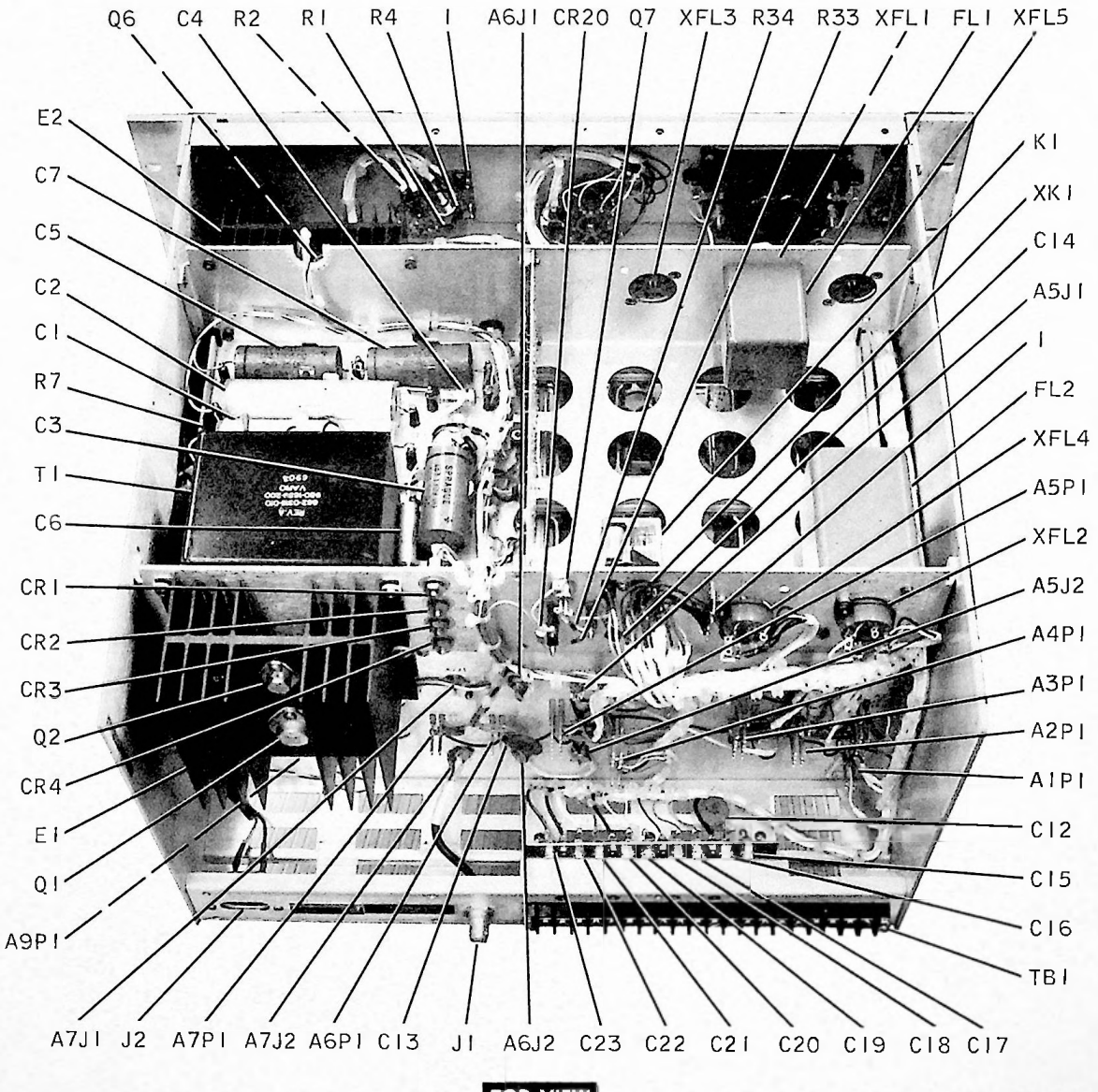

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Figure 6-1. 310Z-1 FM Exciter (Sheet 2 of 3).

DELETED

Figure 6-1. 310Z-1 FM Exciter (Sheet 3 of 3).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	310Z-1 FM EXCITER			522-4687-001
A1	SCA GENERATOR 786W-1 SEE BREAKDOWN ON PAGE 6-7			772-5338-001
A1P1	CONNECTOR, ELECTRICAL -QTY 3- 4 CONTACTS	375430-9010	91662	372-2425-010
A2	STEREO GENERATOR 786V-1 SEE BREAKDOWN ON PAGE 6-13			772-5336-001
A2P1	SAME AS A1P1			
A3	AFC DISCRIMINATOR SEE BREAKDOWN ON PAGE 6-18			774-7097-001
A3J1	CONNECTOR, ELECTRICAL 1 CONTACT	UG1050AU	80058	357-9211-000
A3P1	CONNECTOR, ELECTRICAL -QTY 4- 4 CONTACTS	375430-9010	91662	372-2425-010
A4	AFC SYNCHRONOUS DETECTOR 6-23 SEE BREAKDOWN ON PAGE			774-7075-001
A4P1	CONNECTOR, ELECTRICAL -QTY 5- 4 CONTACTS	375430-9010	91662	372-2425-010
A5	FM MODULATOR SEE BREAKDOWN ON PAGE 6-28			774-7160-001
A5J1	SAME AS A3J1			
A5J2	SAME AS A3J1			
A5P1	SAME AS A1P1			
A6	RF MIXER SEE BREAKDOWN ON PAGE 6-36			781-5380-001
A6J1	SAME AS A3J1			
A6J2	SAME AS A3J1			
A6P1	CONNECTOR, ELECTRICAL 4 CONTACTS	375430-9010	91662	372-2425-010
A7	POWER AMPLIFIER SEE BREAKDOWN ON PAGE 6-40			769-0830-001
A7J1	SAME AS A3J1			
A7J2	SAME AS A3J1			
A7P1	SAME AS A6P1			
A8	POWER SUPPLY REGULATOR SEE BREAKDOWN ON PAGE 6-43			774-7216-001
A9	FAN SEE BREAKDOWN ON PAGE 6-46			783-7049-001
A9P1	SAME AS A6P1			
A10	EXTENDER BOARD SEE BREAKDOWN ON PAGE 6-48			781-5365-001
C1	CAPACITOR, FXD, ELECTROLYTIC 2300 UF, PLUS 75% MINUS 10%, 40 VDCW	601D238G040JT4	56289	183-1282-050
C2	SAME AS C1			
C3	CAPACITOR, FXD, ELECTROLYTIC 500 UF, PLUS 100% MINUS 10%, 50 VDCW	D50447	56289	183-1309-000
C4	CAPACITOR, FXD, ELECTROLYTIC 500 UF, PLUS 100% MINUS 10%, 25 VDCW	D25447	56289	183-1306-000
C5	SAME AS C4			
C6	CAPACITOR, FXD, ELECTROLYTIC 50 UUF, PLUS 75% MINUS 10%, 50 VDCW	D29238	56289	183-1170-000
C7	CAPACITOR, FXD, MICA 4700 UUF, 5%,TOL, 500 VDCW	CM06F472J03	81349	912-3052-000
C8 THROUGH C11	NOT USED			
C12	CAPACITOR, FXD, CERAMIC 10,000 UUF, 20% TOL, 500 VDCW	36C175A	01939	913-3013-000
C13	CAPACITOR, FXD, CERAMIC 0.1 UF, PLUS 80% MINUS 20%, 500 VDCW	41C92	01939	913-3152-000
C14	CAPACITOR, FXD, CERAMIC 1 UF, 10% TOL, 50 VDCW	CK06BX105K	81349	913-5019-560

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
C15	CAPACITOR, FXD, CERAMIC 1000 PF, 20% TOL, 500 VDCW	CK70AW102M	81349	913-4064-000
C16 THROUGH C23	SAME AS C15			
CR1	SEMICONDUCTOR DEVICE, DIODE	1N1200	07688	353-1721-000
CR2	SAME AS CR1			
CR3	SAME AS CR1			
CR4	SAME AS CR1			
CR5 THROUGH CR19	NOT USED			
CR20	DIODE	1N3030B	81349	353-3135-000
E1	HEATSINK			776-1855-001
E2	HEATSINK, TRANSISTOR	640382	13103	352-9597-010
F1	FUSE, CARTRIDGE, (SLOW BLOW) 4 AMP, 250 VAC MAXIMUM	F02A250V4AS	81349	264-0449-000
F2	FUSE CARTRIDGE, (NORMAL BLOW) 3 AMP, 250 VAC MAXIMUM	F02A250V3AS	81349	264-4080-000
FL1	NETWORK, PRE-EMPHASIS	526-0016-010	95105	673-1158-010
FL2	FILTER, HIGH PASS	D11193	70674	673-1159-010
J1	NOT USED			
J2	CONNECTOR, ELECTRICAL 1 CONTACT	UG1050AU	80058	357-9211-000
J3	CONNECTOR, ELECTRICAL 1 CONTACT	100B3000C75	94375	357-9248-000
K1	RELAY, ARMATURE 4C CONTACT ARRANGEMENT	T154CCCC24VDC	70309	970-2106-000
M1	METER, AUDIO LEVEL	36-0276-0000	80105	456-0056-000
Q1	TRANSISTOR	2N3055	07688	352-0583-010
Q2	TRANSISTOR	2N3740	07688	352-0695-010
Q3	NOT USED			
Q4	NOT USED			
Q5	NOT USED			
Q6	SAME AS Q1			
Q7	DIODE	2N4168	04713	353-6485-020
R1	RESISTOR, FXD, FILM 261 OHMS 1% TOL, 1/4 WATT	RN60D2610F	81349	705-6568-000
R2	SAME AS R1			
R3	RESISTOR, FXD, FILM 562 OHMS, 1% TOL, 1/4 WATT	RN60D5620F	81349	705-6584-000
R4	SAME AS R1			
R5	RESISTOR, FXD, COMPOSITION 100K OHMS, 10% TOL, 1/4 WATT	RC07GF104K	81349	745-0821-000
R6	RESISTOR, FXD, FILM 21.5K OHMS 1% TOL, 1/4 WATT	RN60D2152F	81349	705-6660-000
R7	RESISTOR, FXD, WIRE-WOUND 0.2 OHM, 3% TOL, 3 WATTS	RSM2-0.2 OHM	91637	747-9651-000
R8 THROUGH R15	NOT USED			
R16	RESISTOR, FXD, FILM 5620 OHMS, 1% TOL, 1/2 WATT	RN65D5621F	81349	705-7132-000
R17	RESISTOR, VAR, COMPOSITION 5K OHMS, 20% TOL, 1/4 WATT	LL6059	71450	376-4729-000
R18 THROUGH R32	NOT USED			
R33	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1.4 WATT	RCR07G101KS	81349	745-0713-000
R34	RESISTOR, FXD, COMPOSITION 1K OHMS, 10% TOL, 1/4 WATT	RCR07G102KS	81349	745-0749-000
S1	SWITCH, ROTARY, WAFER 3 POLE, 3 POSITION, 1 SECTION	233065A1	76854	259-1866-010
S2	SWITCH, ROTARY, WAFER 2 POLE, 5 POSITION 2 SECTIONS	264752N1	76854	259-2328-030
S3	SWITCH, TOGGLE DPST CONTACT ARRANGEMENT	81024SP	04009	266-5376-010

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
T1	TRANSFORMER, AF, STEP-DOWN 115/230 VOLTS TO 28 VOLTS	950-1669-200	83003	662-0318-010
TB1	BOARD, TERMINAL 20 TERMINALS	670A3000-20	75382	367-1852-200
XF1	FUSEHOLDER 30-AMP CURRENT RATING	HKPH	71400	265-1171-000
XFL1	SOCKET, ELECTRON TUBE 8 CONTACTS	88-8TM	02660	220-1005-000
XFL2 THROUGH XFL5	SAME AS XFL1			
XK1	SOCKET, RELAY 16 CONTACTS	30055-2	02288	220-1471-000
	BOARD, TERMINAL -QTY 2-	1532	71785	306-2230-000

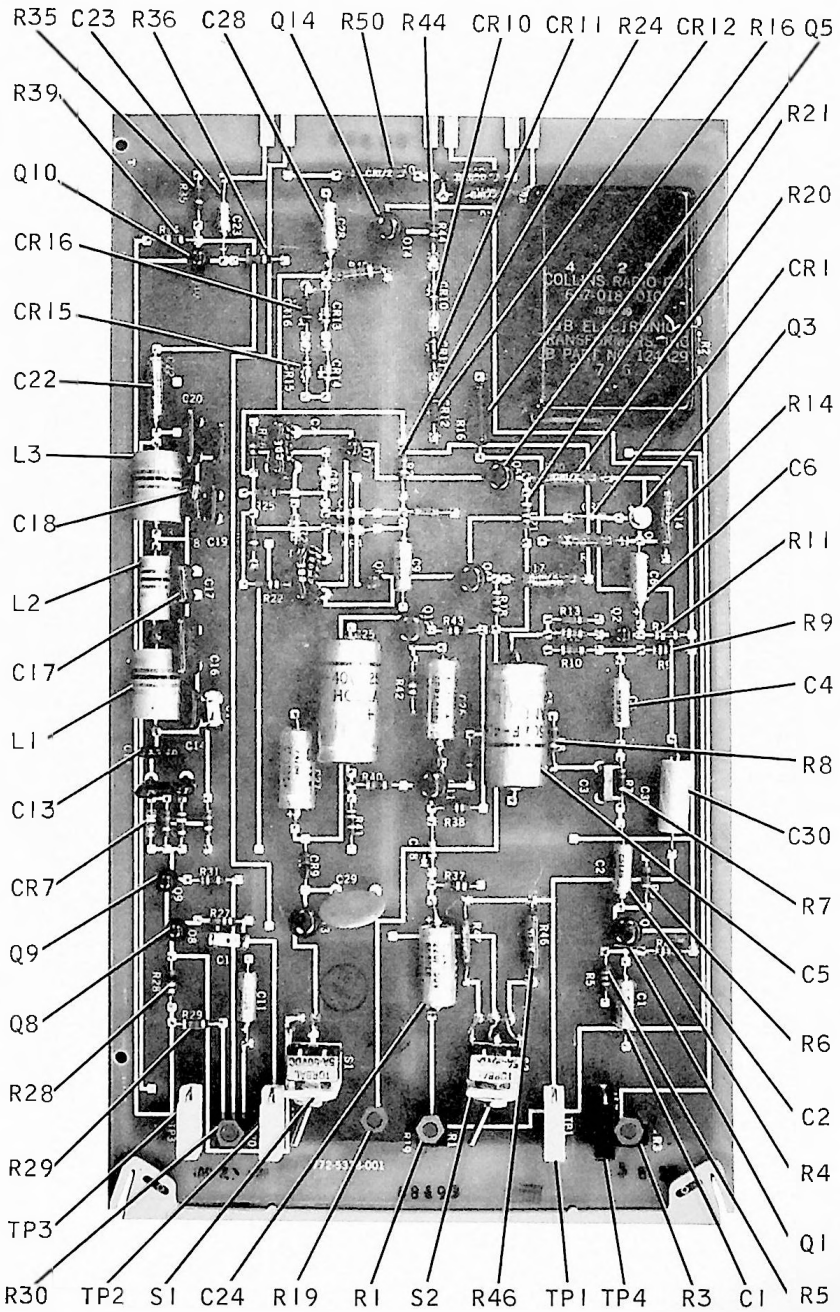

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Figure 6-2. SCA Generator 786W-1 (Sheet 1 of 2).

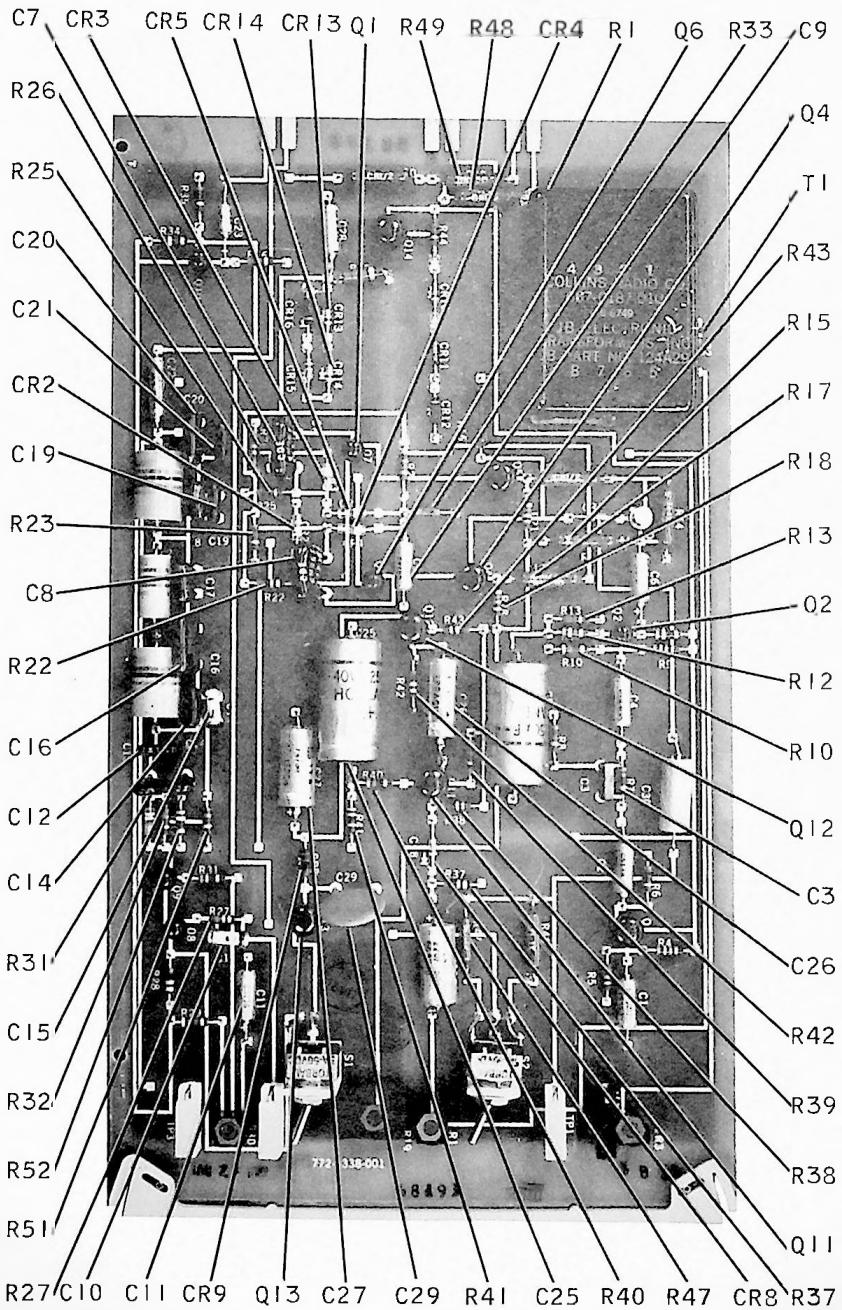

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Figure 6-2. SCA Generator 786W-1 (Sheet 2 of 2).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	SCA GENERATOR 786W-1			772-5338-001
C1	CAPACITOR, FXD, ELECTROLYTIC 6.8 UF, 20% TOL, 35 VDCW	CS13BF685M	81349	184-6216-000
C2	SAME AS C1			
C3	CAPACITOR, FXD, FILM 0.01 UF, 10% TOL, 50 VDCW	65F10AA103	01002	933-0854-000
C4	SAME AS C1			
C5	CAPACITOR, FXD, ELECTROLYTIC 250 UF, PLUS 50%, MINUS 10%, 40 VDCW	C437ARG250	73445	183-2355-150
C6	SAME AS C1			
C7	CAPACITOR, FXD, MICA 3900 UUF, 5% TOL, 500 VDCW	CM06FD392J03	81349	912-3046-000
C8	SAME AS C7			
C9	SAME AS C1			
C10	CAPACITOR, FXD, CERAMIC 2 UUF, 1/2 UUF TOL, 500 VDCW	CC20CK020D	81349	916-0076-000
C11	SAME AS C1			
C12	CAPACITOR, FXD, MICA 500 UUF, 5% TOL, 500 VDCW	DM19E501J03	72136	912-2977-000
C13	CAPACITOR, FXD, MICA 100 UUF, 5% TOL, 500 VDCW	CM05F101J03	81349	912-2816-000
C14	CAPACITOR, FXD, MICA 47 UUF, 5% TOL, 500 VDCW	CM05F470J03	81349	912-2792-000
C15	CAPACITOR, FXD, CERAMIC 5 UUF, 1/2 UUF TOL, 500 VDCW	CC20CH050D	81349	916-0118-000
C16	CAPACITOR, FXD, MICA 820 UUF, 5% TOL, 500 VDCW	CM06F821J03	81349	912-2995-000
C17	CAPACITOR, FXD, MICA 22 UUF, 5% TOL, 500 VDCW	CM05E220J03	81349	912-2768-000
C18	CAPACITOR, FXD, MICA 120 UUF, 5% TOL, 500 VDCW	CM05F121J03	81349	912-2822-000
C19	CAPACITOR, FXD, MICA 18 UUF, 10% TOL, 500 VDCW	CM05C180K03	81349	912-2763-000
C20	CAPACITOR, FXD, MICA 470 UUF, 5% TOL, 500 VDCW	CM06F471J03	81349	912-2974-000
C21	SAME AS C14			
C22	CAPACITOR, FXD, ELECTROLYTIC 0.0075 UF, 20% TOL, 75 VDCW	151D752X0075W2	56289	184-9062-040
C23	CAPACITOR, FXD, ELECTROLYTIC 0.033 UF, 20% TOL, 100 VDCW	CS13BJ333M	81349	184-6326-580
C24	CAPACITOR, FXD, ELECTROLYTIC 22 UF, 20% TOL, 50 VDCW	CS13BG226M	81349	184-6257-000
C25	SAME AS C5			
C26	CAPACITOR, FXD, ELECTROLYTIC 47 UF, 20% TOL, 35 VDCW	CS13BF476M	81349	184-6231-000
C27	CAPACITOR, FXD, ELECTROLYTIC 68 UF, 20% TOL, 30 VDCW	109D686X0030F2	56289	184-7782-000
C28	SAME AS C1			
C29	CAPACITOR, FXD, CERAMIC 0.01 UF, 20% TOL, 500 VDCW	36C175A	01939	913-3013-000
C30	CAPACITOR, FXD, ELECTROLYTIC 15 UF, 20% TOL, 35 VDCW	CS13BF156M	81349	184-6222-000
CR1	SEMICONDUCTOR DEVICE, DIODE	1N914	07688	353-2906-000
CR2	SEMICONDUCTOR DEVICE, DIODE	1N995	07688	353-2042-000
CR3	SAME AS CR2			
CR4	SAME AS CR2			
CR5	SAME AS CR2			
CR6	NOT USED			
CR7	SAME AS CR2			
CR8	SAME AS CR1			
CR9	SEMICONDUCTOR DEVICE, DIODE	1N758	07688	353-2723-000
CR10	SAME AS CR1			
CR11	SEMICONDUCTOR DEVICE, DIODE	1N756	07688	353-2719-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
CR12	SAME AS CR11			
CR13	SAME AS CR1			
CR14	SAME AS CR1			
CR15	SAME AS CR1			
CR16	SEMICONDUCTOR DEVICE, DIODE	1N754A	07688	353-2981-000
L1	CHOKE, RF 5000 UH, 10% TOL	3500-40	99800	240-0843-000
L2	COIL, RF 1000 UH, 10% TOL	3500-32	99800	240-0839-000
L3	SAME AS L1			
Q1	TRANSISTOR	2N3569	07688	352-0629-030
Q2	TRANSISTOR	2N3565	07688	352-0638-010
Q3	TRANSISTOR	2N718A	07688	352-0318-000
Q4	TRANSISTOR	2N3638A	07688	352-0636-020
Q5	SAME AS Q4			
Q6	TRANSISTOR	2N3563	07688	352-0630-010
Q7	SAME AS Q6			
Q8	SAME AS Q6			
Q9	TRANSISTOR	2N3646	07688	352-0680-010
Q10	SAME AS Q2			
Q11	TRANSISTOR	2N3643	07688	352-0713-030
Q12	SAME AS Q11			
Q13	SAME AS Q11			
Q14	SAME AS Q11			
R1	RESISTOR, VAR, CERAMIC 50K OHMS, 10% TOL, 3/4 WATT	3069P-1-503	73138	382-0012-130
R2	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/4 WATT	RC07GF472K	81349	745-0773-000
R3	RESISTOR, VAR, CERAMIC 5K OHMS, 10% TOL, 3/4 WATT	3069P-1-502	73138	382-0012-090
R4	RESISTOR, FXD, COMPOSITION 39K OHMS, 10% TOL, 1/4 WATT	RC07GF393K	81349	745-0806-000
R5	RESISTOR, FXD, COMPOSITION 56K OHMS, 10% TOL, 1/4 WATT	RC07GF563K	81349	745-0812-000
R6	RESISTOR, FXD, COMPOSITION 1K OHMS, 10% TOL, 1/4 WATT	RC07GF102K	81349	745-0749-000
R7	RESISTOR, FXD, COMPOSITION 6800 OHMS, 10% TOL, 1/4 WATT	RC07GF682K	81349	745-0779-000
R8	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 1/4 WATT	RC07GF821K	81349	745-0746-000
R9	SAME AS R4			
R10	SAME AS R2			
R11	RESISTOR, FXD, COMPOSITION 3900 OHMS, 10% TOL, 1/4 WATT	RC07GF392K	81349	745-0770-000
R12	RESISTOR, FXD, COMPOSITION 390 OHMS, 10% TOL, 1/4 WATT	RC07GF391K	81349	745-0734-000
R13	RESISTOR, FXD, COMPOSITION 270 OHMS, 10% TOL, 1/4 WATT	RC07GF271K	81349	745-0728-000
R14	RESISTOR, FXD, FILM 7500 OHMS, 1% TOL, 1/2 WATT	RN65D7501F	81349	705-7138-000
R15	RESISTOR, FXD, FILM 6190 OHMS, 1% TOL, 1/2 WATT	RN65D6191F	81349	705-7134-000
R16	RESISTOR, FXD, FILM 1780 OHMS, 1% TOL, 1/2 WATT	RN65D1781F	81349	705-7108-000
R17	RESISTOR, FXD, FILM 2.15K OHMS, 1% TOL, 1/2 WATT	RN65D2151F	81349	705-7112-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R18	RESISTOR, FXD, COMPOSITION 33K OHMS, 10% TOL, 1/4 WATT	RC07GF333K	81349	745-0803-000
R19	SAME AS R3			
R20	SAME AS R17			
R21	SAME AS R18			
R22	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/4 WATT	RC07GF103K	81349	745-0785-000
R23	SAME AS R6			
R24	RESISTOR, FXD, COMPOSITION 1.96K OHMS, 10% TOL, 1/4 WATT	RN60D1961F	81349	705-6610-000
R25	SAME AS R6			
R26	SAME AS R22			
R27	RESISTOR, FXD, COMPOSITION 27K OHMS, 10% TOL, 1/4 WATT	RC07GF273K	81349	745-0800-000
R28	SAME AS R22			
R29	RESISTOR, FXD, COMPOSITION 470 OHMS, 10% TOL, 1/4 WATT	RC07GF471K	81349	745-0737-000
R30	SAME AS R1			
R31	RESISTOR, FXD, COMPOSITION 3300 OHMS, 10% TOL, 1/4 WATT	RC07GF332K	81349	745-0767-000
R32	RESISTOR, FXD, COMPOSITION 1800 OHMS, 10% TOL, 1/4 WATT	RC07GF182K	81349	745-0758-000
R33	RESISTOR, FXD, COMPOSITION 1.62K OHMS, 10% TOL, 1/4 WATT	RN60D1621F	81349	705-6606-000
R34	SAME AS R11			
R35	RESISTOR, FXD, COMPOSITION 8200 OHMS, 10% TOL, 1/4 WATT	RC07GF822K	81349	745-0782-000
R36	SAME AS R8			
R37	SAME AS R22			
R38	RESISTOR, FXD, COMPOSITION 220K OHMS, 10% TOL, 1/4 WATT	RC07GF224K	81349	745-0833-000
R39	RESISTOR, FXD, COMPOSITION 2700 OHMS, 10% TOL, 1/4 WATT	RC07GF272K	81349	745-0764-000
R40	RESISTOR, FXD, COMPOSITION 68 OHMS, 10% TOL, 1/4 WATT	RC07GF680K	81349	745-0707-000
R41	RESISTOR, FXD, COMPOSITION 33 OHMS, 10% TOL, 1/4 WATT	RC07GF330K	81349	745-0695-000
R42	SAME AS R22			
R43	RESISTOR, FXD, COMPOSITION 62K OHMS, 5% TOL, 1/8 WATT	RCR05G623J5	81349	745-1863-920
R44	RESISTOR, FXD, COMPOSITION 180 OHMS, 10% TOL, 1/4 WATT	RC07GF181K	81349	745-0722-000
R45	RESISTOR, FXD, COMPOSITION 180 OHMS, 10% TOL, 1/2 WATT	RCR20G181KS	81349	745-1321-000
R46	RESISTOR, FXD, FILM 82.5K OHMS, 1% TOL, 1/4 WATT	RN60D8252F	81349	705-6688-000
R47	RESISTOR, FXD, FILM 26.1 OHMS, 1% TOL, 1/4 WATT	RN60D2612F	81349	705-6664-000
R48	RESISTOR, FXD, FILM 5110 OHMS, 1% TOL, 1/2 WATT	RN65D5111F	81349	705-7130-000
R49	SAME AS R48			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R50	RESISTOR, FXD, FILM 1330 OHMS, 1% TOL, 1/2 WATT	RN65D1331F	81349	705-7102-000
R51	SAME AS R32			
R52	SAME AS R11			
S1	SWITCH, TOGGLE SPST CONTACT ARRANGEMENT	SP4	60418	266-5064-000
S2	SWITCH, TOGGLE SPDT CONTACT ARRANGEMENT	SP5	60418	266-5065-000
T1	TRANSFORMER, AF OPEN FRAME, LEAD BROWN TO ORANGE 1.9K OHMS IMPEDANCE, LEAD YELLOW TO BLUE 600 OHMS IMPEDANCE, LEADS RED AND GREEN CENTER TAP, LEAD WHITE STATIC SHIELD	A16940	70674	677-0187-010
TP1	JACK, TIP WHITE	4877-125-9	17117	360-0434-100
TP2	SAME AS TP1			
TP3	SAME AS TP1			
TP4	JACK, TIP BLACK	11J1043	82389	360-0434-010

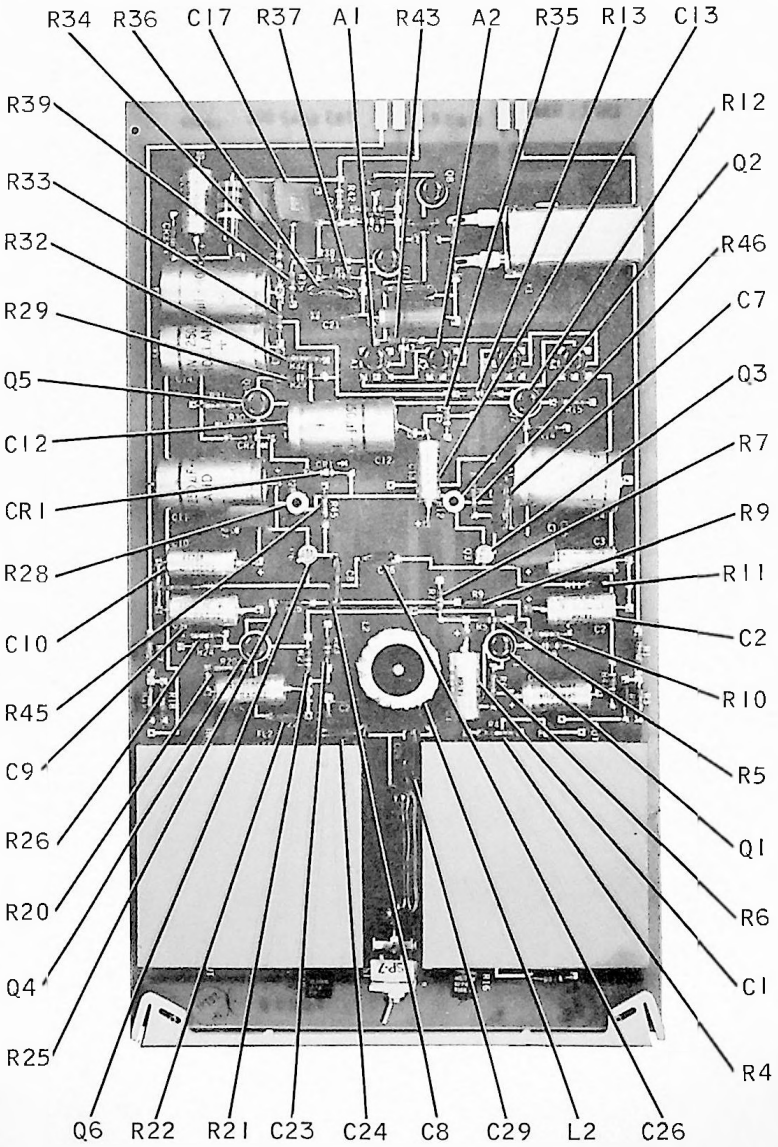

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Figure 6-3. Stereo Generator 786V-1 (Sheet 1 of 2).

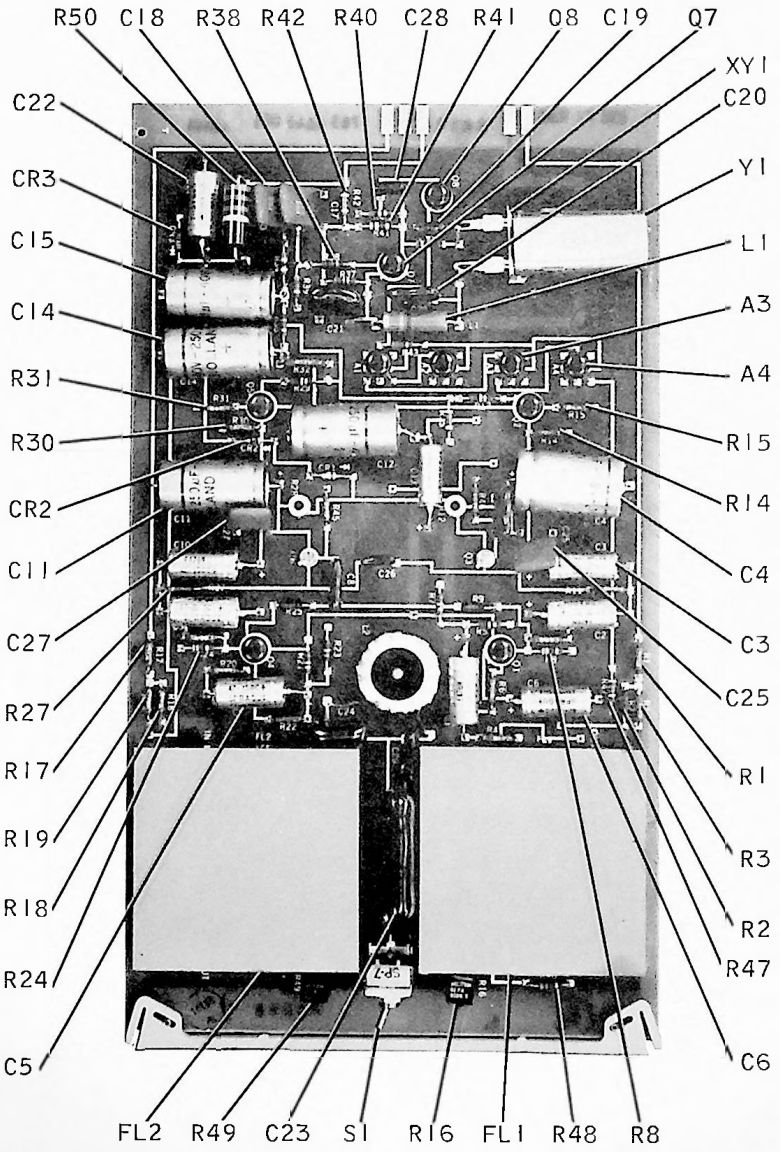

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Figure 6-3. Stereo Generator 786V-1 (Sheet 2 of 2).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	STEREO GENERATOR 786V-1			772-5336-001
A1	INTERGRATED CIRCUIT	SL3977	07263	351-7121-010
A2	INTERGRATED CIRCUIT	SL3979	07263	351-7121-030
A3	SAME AS A2			
A4	SAME AS A1			
C1	CAPACITOR, FXD, ELECTROLYTIC 47 UF, 20% TOL, 35 VDCW	CS13BF476M	81349	184-6231-000
C2	SAME AS C1			
C3	SAME AS C1			
C4	CAPACITOR, FXD, ELECTROLYTIC 1000 UF, PLUS 50% MINUS 10%, 16 VDCW	C437ARE1000	73445	183-2355-090
C5	SAME AS C1			
C6	SAME AS C1			
C7	CAPACITOR, FXD, MICA 1000 UUF, 5% TOL, 500 VDCW	CM06F102J03	81349	912-3001-000
C8	SAME AS C7			
C9	SAME AS C1			
C10	SAME AS C1			
C11	SAME AS C4			
C12	CAPACITOR, FXD, ELECTROLYTIC 250 UF, PLUS 50% MINUS 10%, 40 VDCW	C437ARG250	73445	183-2355-150
C13	CAPACITOR, FXD, ELECTROLYTIC 22 UF, 20% TOL, 35 VDCW	CS13BF226M	81349	184-6225-000
C14	SAME AS C12			
C15	SAME AS C12			
C16	NOT USED			
C17	CAPACITOR, FXD, CERAMIC 2.2 UF, PLUS 80% MINUS 20%, 25 VDCW	5C15A	56289	913-3812-000
C18	SAME AS C17			
C19	CAPACITOR, FXD, MICA 33 UUF, 5% TOL, 500 VDCW	CM05E330J03	81349	912-2780-000
C20	CAPACITOR, FXD, MICA 820 UUF, 5% TOL, 500 VDCW	CM06F821J03	81349	912-2995-000
C21	CAPACITOR, FXD, MICA 3300 UUF, 5% TOL, 500 VDCW	CM06F332J03	81349	912-3040-000
C22	SAME AS C1			
C23	CAPACITOR, FXD, MICA 30,000 UUF, 1% TOL, 500 VDCW	CM08FD303F03	81349	912-3131-000
C24	CAPACITOR, FXD, MICA 3900 UUF, 1% TOL, 500 VDCW	CM06FD392F03	81349	912-3044-000
C25	SAME AS C17			
C26	SAME AS C19			
C27	SAME AS C17			
C28	CAPACITOR, FXD, MICA 47 UUF, 5% TOL, 500 VDCW	CM05F470J03	81349	912-2792-000
C29	CAPACITOR, FXD, MICA 1800 UUF, 2% TOL, 500 VDCW	CM06F182G03	81349	912-3018-000
CR1	SEMICONDUCTOR DEVICE, DIODE	1N914	07688	353-2906-000
CR2	SAME AS CR1			
CR3	SEMICONDUCTOR DEVICE, DIODE	1N747A	07688	353-2702-000
FL1	FILTER, LOW PASS 15 KHZ CENTER FREQUENCY	28-1240	06978	673-1167-010
FL2	SAME AS FL1			
FL3	NETWORK, PRE-EMPHASIS	526-0016-010	95105	673-1158-010
FL4	FILTER, HIGH PASS	D11193	70674	673-1159-010
FL5	FILTER, LOW PASS	5220	17857	673-1162-020
L1	CHOKE, RF 6800 UH, 5% TOL	MS90541-07	96906	240-2560-000
L2	INDUCTOR, RF 2.055 MH			781-5329-001
Q1	TRANSISTOR	2N3642	07688	352-0713-030
Q2	SAME AS Q1			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
Q3	TRANSISTOR	2N3153	12040	352-0776-010
Q4	SAME AS Q1			
Q5	SAME AS Q1			
Q6	SAME AS Q2			
Q7	SAME AS Q1			
Q8	SAME AS Q1			
R1	RESISTOR, FXD, FILM 226 OHMS, 1% TOL, 1/8 WATT	RN55D2260F	81349	705-0965-000
R2	SAME AS R1			
R3	RESISTOR, FXD, FILM 681 OHMS, 1% TOL, 1/8 WATT	RN55D6810F	81349	705-0988-000
R4	RESISTOR, FXD, FILM 649 OHMS, 1% TOL, 1/8 WATT	RN55D6490F	81349	705-0987-000
R5	RESISTOR, FXD, COMPOSITION 22K OHMS, 10% TOL, 1/4 WATT	RC07GF223K	81349	745-0797-000
R6	RESISTOR, FXD, FILM 100 OHMS, 1% TOL, 1/8 WATT	RN55D1000F	81349	705-0948-000
R7	SAME AS R5			
R8	RESISTOR, FXD, COMPOSITION 3300 OHMS, 10 TOL, 1/4 WATT	RC07GF332K	81349	745-0767-000
R9	RESISTOR, FXD, FILM 10K OHMS, 1% TOL, 1/8 WATT	RN55D1002F	81349	705-1044-000
R10	RESISTOR, FXD, FILM 464 OHMS, 1% TOL, 1/8 WATT	RN55D4640F	81349	705-0980-000
R11	RESISTOR, FXD, FILM 61.9 OHMS, 1% TOL, 1/8 WATT	RN55D61R9F	81349	705-0938-000
R12	RESISTOR, VAR, CERAMIC 1K OHMS, 30% TOL, 1/2 WATT	62PR1K	73138	382-0008-070
R13	RESISTOR, FXD, COMPOSITION 120K OHMS, 10% TOL, 1/4 WATT	RC07GF124K	81349	745-0824-000
R14	RESISTOR, FXD, FILM 21.5K OHMS, 1% TOL, 1/8 WATT	RN55D2152F	81349	705-1060-000
R15	RESISTOR, FXD, FILM 348 OHMS, 1% TOL, 1/8 WATT	RN55D3480F	81349	705-0974-000
R16	RESISTOR, VAR, CERAMIC 20K OHMS, 30% TOL, 1/2 WATT	62PAR20K	73138	382-0008-450
R17	SAME AS R1	RN55D2150F	81349	705-0964-000
R18	SAME AS R1			
R19	SAME AS R3	RN55D7150F	81349	705-0989-000
R20	SAME AS R4			
R21	SAME AS R5			
R22	SAME AS R6			
R23	SAME AS R5			
R24	SAME AS R8			
R25	SAME AS R9			
R26	SAME AS R10			
R27	SAME AS R11			
R28	SAME AS R12			
R29	SAME AS R13			
R30	SAME AS R14			
R31	SAME AS R15			
R32	RESISTOR, FXD, FILM 619 OHMS, 1% TOL, 1/4 WATT	RN60D6190F	81349	705-6586-000
R33	RESISTOR, FXD, COMPOSITION 560 OHMS, 10% TOL, 1/4 WATTS	RC07GF561K	81349	745-0740-000
R34	RESISTOR, FXD, COMPOSITION 56 OHMS, 10% TOL, 1/4 WATT	RC07GF560K	81349	745-0704-000
R35	RESISTOR, FXD, COMPOSITION 470 OHMS, 10% TOL, 1/4 WATT	RC07GF471K	81349	745-0737-000
R36	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/4 WATT	RC07GF103K	81349	745-0785-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R37	RESISTOR, FXD, COMPOSITION 68K OHMS, 10% TOL, 1/4 WATT	RC07GF683K	81349	745-0815-000
R38	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1/4 WATT	RC07GF101K	81349	745-0713-000
R39	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 1/4 WATT	RC07GF821K	81349	745-0746-000
R40	RESISTOR, FXD, COMPOSITION 100K OHMS, 10% TOL, 1/4 WATT	RC07GF104K	81349	745-0821-000
R41	RESISTOR, FXD, COMPOSITION 3900 OHMS, 10% TOL, 1/4 WATT	RC07GF392K	81349	745-0770-000
R42	SAME AS R35			
R43	RESISTOR, FXD, COMPOSITION 680 OHMS, 10% TOL, 1/4 WATT	RC07GF681K	81349	745-0743-000
R44	NOT USED			
R45	RESISTOR, FXD, FILM 147 OHMS, 1% TOL, 1/8 WATT	RN55D1470F	81349	705-0956-000
R46	SAME AS R45			
R47	SAME AS R35			
R48	RESISTOR, FXD, COMPOSITION 330 OHMS, 10% TOL, 1/4 WATT	RC07GF331K	81349	745-0731-000
R49	RESISTOR, VAR, CERAMIC 50 OHMS, 30% TOL, 1/2 WATT	62PAR50	73138	382-0008-370
R50	RESISTOR, FXD, COMPOSITION 180 OHMS, 10% TOL, 2 WATTS	RC42GF181K	81349	745-5621-000
S1	SWITCH, TOGGLE SPDT CONTACT ARRANGEMENT	SP7	60418	266-5059-000
XY1	SOCKET, CRYSTAL 2 CONTACTS	8000AG2	91506	292-0215-000
Y1	CRYSTAL UNIT, QUARTZ	289-7095-020	71034	289-7095-020

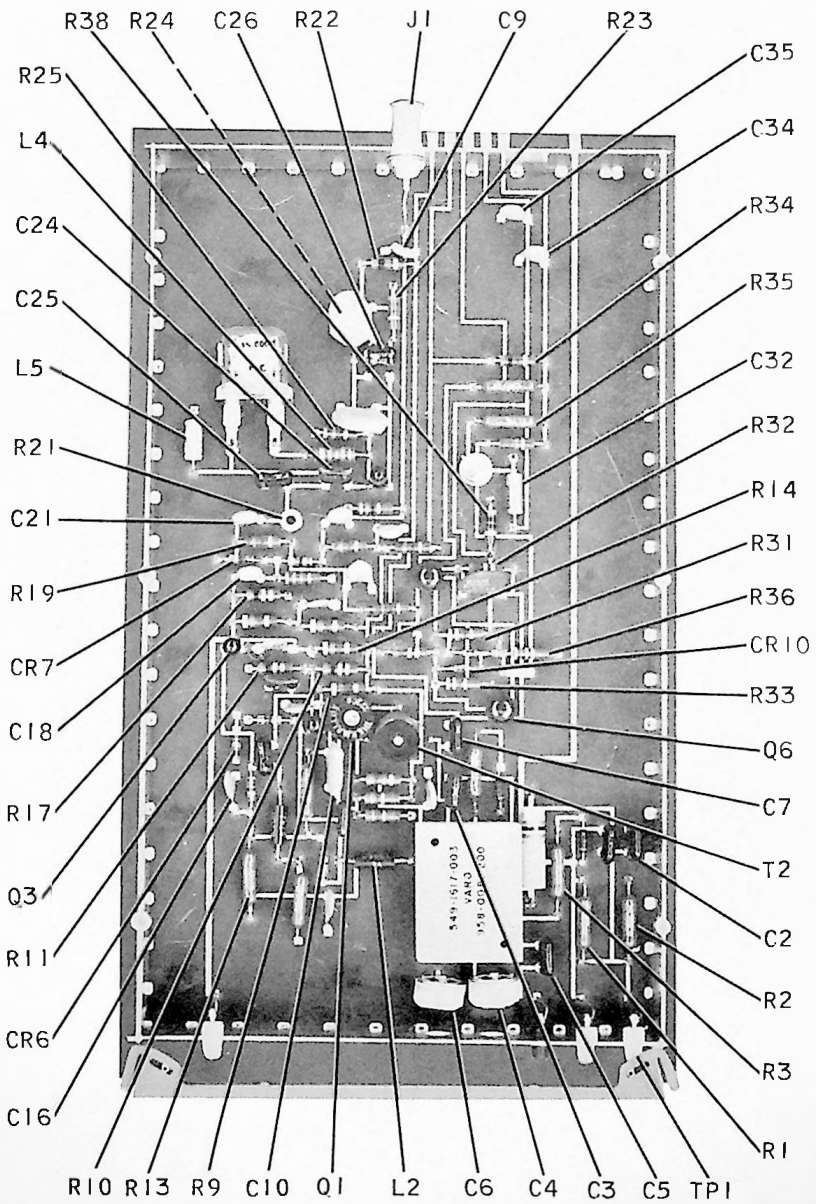

Figure 6-4. AFC Discriminator (Sheet 1 of 2).

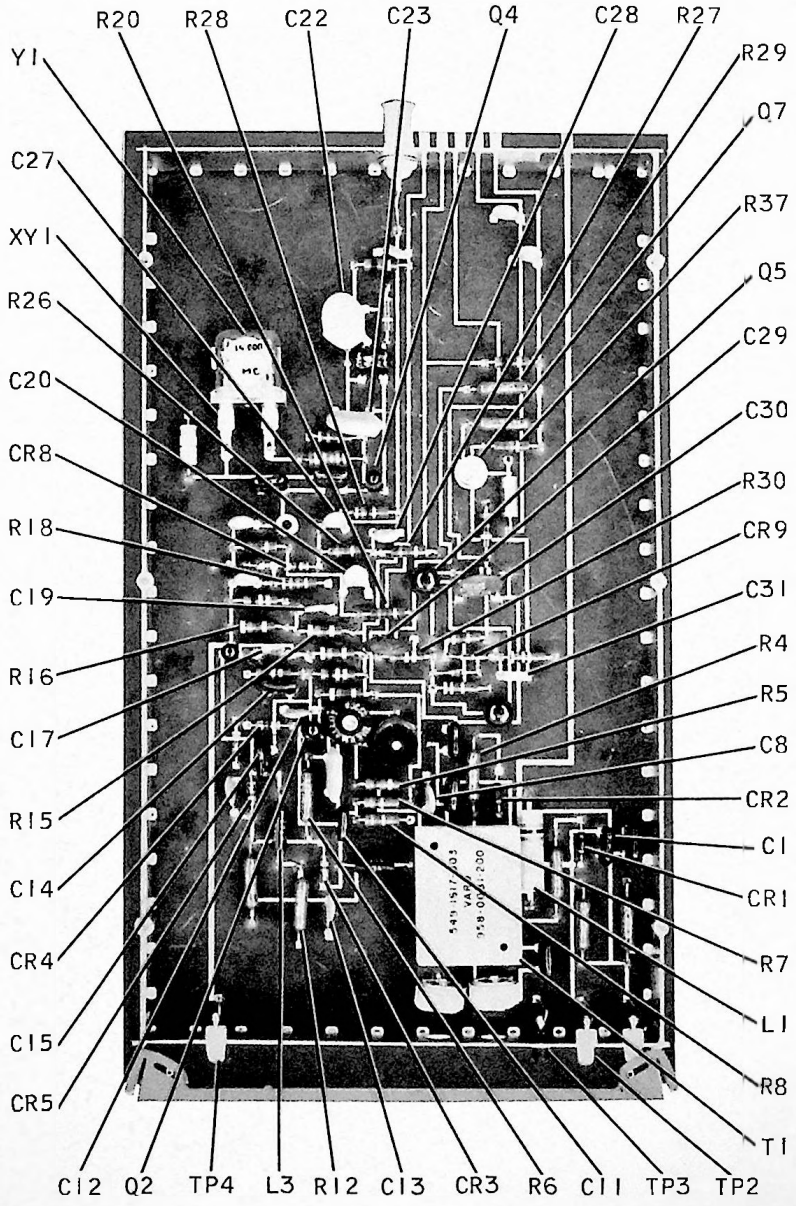

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Figure 6-4. AFC Discriminator (Sheet 2 of 2).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	AFC DISCRIMINATOR			774-7097-001
C1	CAPACITOR, FXD, MICA 470 UUF, 5% TOL, 300 VDCW	DM15F471J03	72136	912-2864-000
C2	SAME AS C1			
C3	CAPACITOR, FXD, MICA 220 UUF, 5% TOL, 500 VDCW	CM05F221J03	81349	912-2840-000
C4	CAPACITOR, VAR, CERAMIC 4-12 UUF, 350 VDCW	3192-000-C0P0-15R	72982	917-1253-020
C5	CAPACITOR, FXD, MICA 22 UUF, 5% TOL, 500 VDCW	CM05E220J03	81349	912-2768-000
C6	CAPACITOR, VAR, CERAMIC 6-25 UUF, 350 VDCW	3192-000-C0P0-32R	72982	917-1253-030
C7	CAPACITOR, FXD, MICA 75 UUF, 5% TOL, 500 VDCW	CM05ED750J03	81349	912-2807-000
C8	CAPACITOR, FXD, CERAMIC 0.01 UF, PLUS 80% MINUS 20%, 100 VDCW	805-014X5V0103Z	72982	913-3680-000
C9	SAME AS C8			
C10	CAPACITOR, FXD, CERAMIC 0.1 UF, PLUS 80% MINUS 20%, 50 VDCW	33C41	56289	913-3886-000
C11	SAME AS C5			
C12	SAME AS C8			
C13	SAME AS C8			
C14	CAPACITOR, FXD, MICA 82 UUF, 5% TOL, 500 VDCW	CM05F820J03	81349	912-2810-000
C15	CAPACITOR, FXD, MICA 10 UUF, 5% TOL, 500 VDCW	DM15C100J01	72136	912-2753-000
C16	SAME AS C8			
C17	SAME AS C8			
C18	CAPACITOR, FXD, CERAMIC 1000 UUF, 20% TOL, 500 VDCW	40C73A1	01939	913-3009-000
C19	SAME AS C8			
C20	SAME AS C18			
C21	SAME AS C18			
C22	SAME AS C10			
C23	SAME AS C10			
C24	CAPACITOR, FXD, MICA 68 UUF, 5% TOL, 500 VDCW	CM05E680J03	81349	912-2804-000
C25	CAPACITOR, FXD, MICA 510 UUF, 5% TOL, 300 VDCW	DM15F511J03	72136	912-2867-000
C26	CAPACITOR, FXD, MICA 180 UUF, 5% TOL, 500 VDCW	CM05F181J03	81349	912-2834-000
C27	SAME AS C18			
C28	SAME AS C18			
C29	CAPACITOR, FXD, CERAMIC 3300 UUF, 20% TOL, 500 VDCW	CK62AW332M	81349	913-1193-000
C30	SAME AS C29			
C31	CAPACITOR, FXD, CERAMIC 10,000 UUF, 20% TOL, 200 VDCW	CK06CW103M	81349	913-4001-000
C32	CAPACITOR, FXD, ELECTROLYTIC 2.2 UF, 10% TOL, 35 VDCW	CS12BF225K	81349	184-6077-000
C33	NOT USED			
C34	SAME AS C18			
C35	SAME AS C18			
CR1	SEMICONDUCTOR DEVICE, DIODE	FA2311U	07263	353-3593-010
CR2	SAME AS CR1			
CR3	SEMICONDUCTOR DEVICE, DIODE	1N270	07688	353-2018-000
CR4 THROUGH CR8	SAME AS CR3			
CR9	SEMICONDUCTOR DEVICE, DIODE	1N626	07688	353-2857-000
CR10	SAME AS CR9			
J1	CONNECTOR, ELECTRICAL 1 CONTACT	UG1051U	80058	357-9210-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
L1	CHOKE, RF 100 UH, 10% TOL	LT7K209	81349	240-0193-000
L2	COIL, RF 6.8 UH, 5% TOL	13950	03550	240-1996-110
L3	COIL, RF 6.2 UH, 5% TOL	13949	03550	240-1996-100
L4	COIL, RF 3.3 UH, 10% TOL	C7307	42190	240-0065-000
L5	COIL, RF 4.7 UH, 10% TOL	LT4K042	81349	240-0145-000
Q1	TRANSISTOR	2N708	07688	352-0322-000
Q2	TRANSISTOR	2N4121	07688	352-0743-010
Q3	SAME AS Q2			
Q4	SAME AS Q2			
Q5	TRANSISTOR	2N3643	07688	352-0713-030
Q6	SAME AS Q5			
Q7	TRANSISTOR	2N491	07688	352-0116-000
R1	RESISTOR, FXD, FILM 6810 OHMS, 1% TOL, 1/2 WATT	RN65D6811F	81349	705-7136-000
R2	SAME AS R1			
R3	RESISTOR, FXD, FILM 110 OHMS, 1% TOL, 1/2 WATT	RN65D1100F	81349	705-7050-000
R4	SAME AS R3			
R5	RESISTOR, FXD, COMPOSITION 150 OHMS, 10% TOL, 1/2 WATT	RC20GF151K	81349	745-1317-000
R6	RESISTOR, FXD, FILM 261 OHMS, 1% TOL, 1/2 WATT	RN65D2610F	81349	705-7068-000
R7	RESISTOR, FXD, COMPOSITION 1800 OHMS, 10% TOL, 1/2 WATT	RC20GF182K	81349	745-1363-000
R8	SAME AS R7			
R9	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/2 WATT	RC20GF472K	81349	745-1380-000
R10	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/2 WATT	RC20GF103K	81349	745-1394-000
R11	SAME AS R10			
R12	RESISTOR, FXD, FILM 42.2 OHMS, 1% TOL, 1/2 WATT	RN65D42R2F	81349	705-7030-000
R13	RESISTOR, FXD, FILM 51.1 OHMS, 1% TOL, 1/2 WATT	RN65D51R1F	81349	705-7034-000
R14	SAME AS R9			
R15	SAME AS R9			
R16	SAME AS R9			
R17	SAME AS R10			
R18	RESISTOR, FXD, COMPOSITION 680 OHMS, 10% TOL, 1/2 WATT	RC20GF681K	81349	745-1345-000
R19	RESISTOR, FXD, COMPOSITION 2700 OHMS, 10% TOL, 1/2 WATT	RC20GF272K	81349	745-1370-000
R20	SAME AS R19			
R21	RESISTOR, VAR, CERMET 500 OHMS, 30% TOL, 1/2 WATT	62PR500	73138	382-0008-060
R22	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1/2 WATT	RC20GF101K	81349	745-1310-000
R23	RESISTOR, FXD, COMPOSITION 8200 OHMS, 10% TOL, 1/2 WATT	RC20GF822K	81349	745-1391-000
R24	RESISTOR, FXD, COMPOSITION 18K OHMS, 5% TOL, 1/2 WATT	RC20GF183J	81349	745-1404-000
R25	RESISTOR, FXD, COMPOSITION 6800 OHMS, 10% TOL, 1/2 WATT	RC20GF682K	81349	745-1387-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R26	SAME AS R19			
R27	SAME AS R19			
R28	RESISTOR, FXD, COMPOSITION 68 OHMS, 10% TOL, 1/2 WATT	RC20GF680K	81349	745-1303-000
R29	RESISTOR, FXD, FILM 1.33K OHMS, 1% TOL, 1/2 WATT	RN65D1331F	81349	705-7102-000
R30	RESISTOR, FXD, COMPOSITION 15K OHMS, 10% TOL, 1/2 WATT	RC20GF153K	81349	745-1401-000
R31	RESISTOR, FXD, COMPOSITION 3300 OHMS, 10% TOL, 1/2 WATT	RC20GF332K	81349	745-1373-000
R32	SAME AS R30			
R33	SAME AS R31			
R34	RESISTOR, FXD, COMPOSITION 1K OHMS, 10% TOL, 1/2 WATT	RC20GF102K	81349	745-1352-000
R35	RESISTOR, FXD, FILM 56.2K OHMS, 1% TOL, 1/2 WATT	RN65D5622F	81349	705-7120-000
R36	RESISTOR, FXD, COMPOSITION 47K OHMS, 10% TOL, 1/2 WATT	RC20GF473K	81349	745-1422-000
R37	RESISTOR, FXD, COMPOSITION 220 OHMS, 10% TOL, 1/2 WATT	RC20GF221K	81349	745-1324-000
R38	RESISTOR, FXD, COMPOSITION 10 OHMS, 10% TOL, 1/2 WATT	RC20GF100K	81349	745-1268-000
T1	TRANSFORMER			549-1617-003
T2	TRANSFORMER			549-1589-002
TP1	JACK, TIP WHITE	SL490-458WHT	12615	306-2241-100
TP2	SAME AS TP1			
TP3	JACK, TIP BLACK	SL490-458BLK	12615	306-2241-010
TP4	SAME AS TP1			
XY1	SOCKET, CRYSTAL	8000AG2	91506	292-0215-000
Y1	CRYSTAL UNIT, QUARTZ 14 MHZ FREQUENCY RANGE	S289-2743-00	94148	289-2743-000

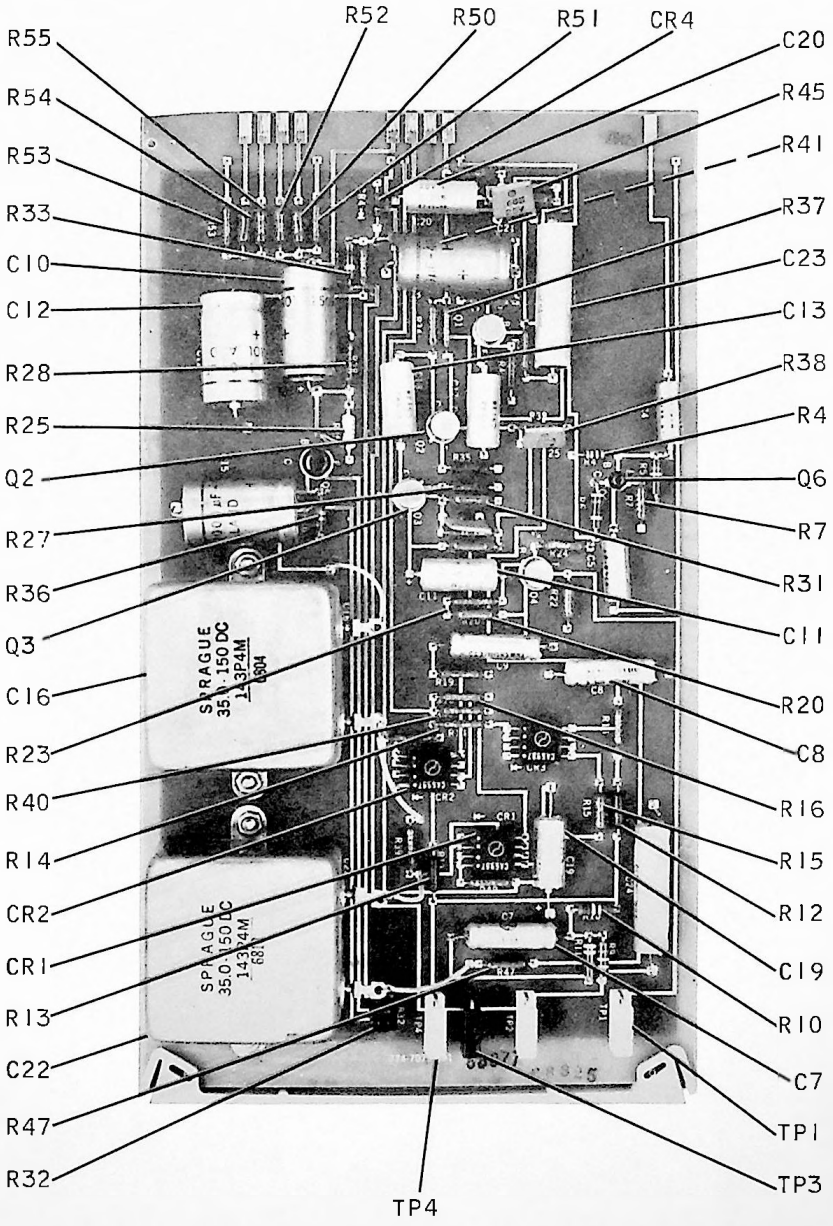

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Figure 6-5. AFC Synchronous Detector (Sheet 1 of 2).

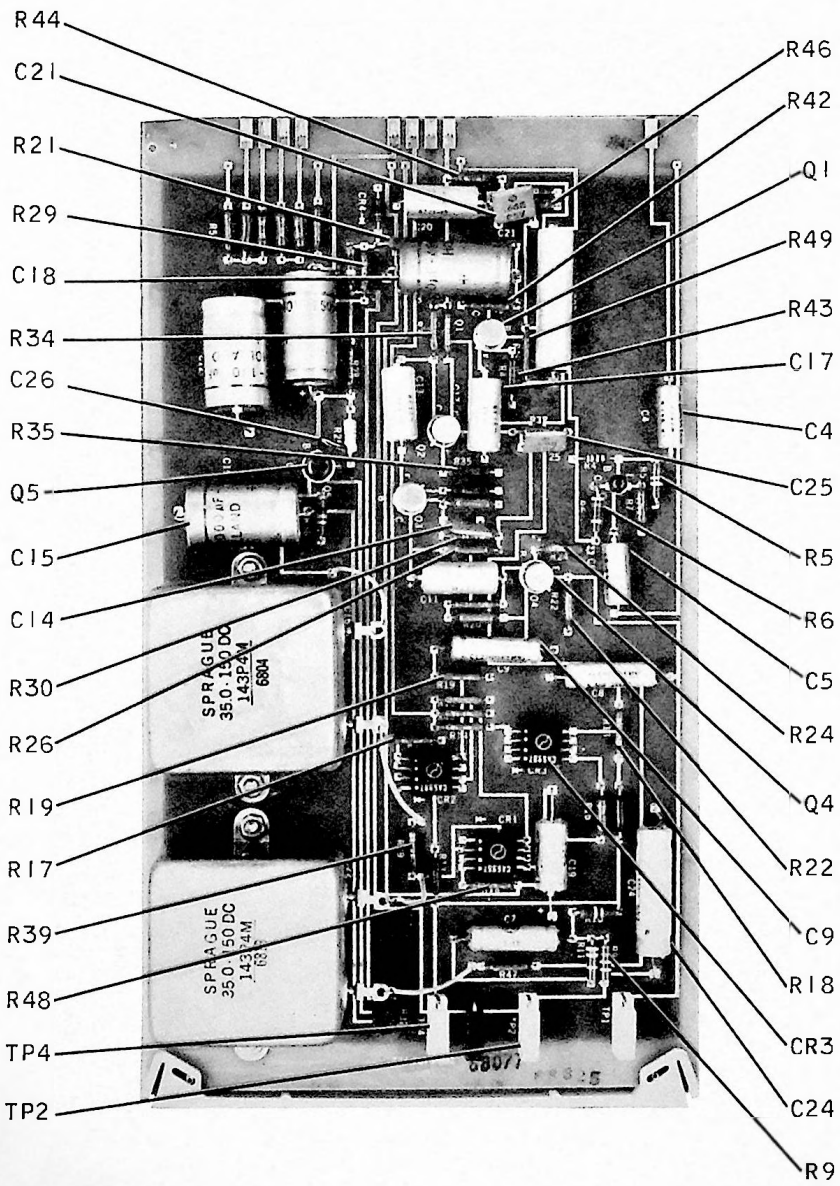

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Figure 6-5. AFC Synchronous Detector (Sheet 2 of 2).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	AFC SYNCHRONOUS DETECTOR			774-7075-001
C1	NOT USED			
C2	NOT USED			
C3	NOT USED			
C4	CAPACITOR, FXD, ELECTROLYTIC 15 UF, 20% TOL, 35 VDCW	CS13BF156M	81349	184-6222-000
C5	SAME AS C4			
C6	NOT USED			
C7	CAPACITOR, FXD, ELECTROLYTIC 2 UF, 20% TOL, 75 VDCW	CL37BL020MN3	81349	184-7929-000
C8	CAPACITOR, FXD, ELECTROLYTIC 5.5 UF, 20% TOL, 30 VDCW	CL37BN5R5MN3	81349	184-7918-000
C9	SAME AS C8			
C10	CAPACITOR, FXD, ELECTROLYTIC 1000 UF, PLUS 50% MINUS 10%, 16 VDCW	C437ARE1000	73445	183-2355-090
C11	CAPACITOR, FXD, ELECTROLYTIC 100 UF, 20% TOL, 20 VDCW	CS13BE107M	81349	184-6190-000
C12	SAME AS C10			
C13	SAME AS C11			
C14	CAPACITOR, FXD, CERAMIC 0.68 UF, PLUS 80% MINUS 20%, 25 VDCW	5C12A	56289	913-3809-000
C15	SAME AS C10			
C16	CAPACITOR, FXD, PAPER 35 UF, 20% TOL, 150 VDCW	143P4M	56289	951-2003-000
C17	SAME AS C11			
C18	CAPACITOR, FXD, ELECTROLYTIC 250 UF, PLUS 50% MINUS 10%, 40 VDCW	C437ARG250	81349	183-2355-150
C19	CAPACITOR, FXD, ELECTROLYTIC 220 UF, 20% TOL, 10 VDCW	CS13BC227M	81349	184-6154-000
C20	SAME AS C11			
C21	SAME AS C14			
C22	SAME AS C16			
C23	CAPACITOR, FXD, ELECTROLYTIC 100 UF, PLUS 100% MINUS 10%, 10 VDCW	S13691	56289	183-2151-000
C24	CAPACITOR, FXD, ELECTROLYTIC 20 UF, 20% TOL, 25 VDCW	CL37BG200MN3	81349	184-7258-000
C25	SAME AS C14			
C26	CAPACITOR, FXD, MICA 100 UUF, 5% TOL, 500 VDCW	CM05F101J03	81349	912-2816-000
CR1	SEMICONDUCTOR DEVICE, DIODE	FA4000	07263	353-3271-000
CR2	SAME AS CR1			
CR3	SAME AS CR1			
CR4	SEMICONDUCTOR DEVICE, DIODE	1N718	07688	353-2734-000
Q1	TRANSISTOR	2N1613	07688	352-0349-000
Q2	SAME AS Q1			
Q3	SAME AS Q1			
Q4	SAME AS Q1			
Q5	TRANSISTOR	2N4250	07263	352-0773-030
Q6	TRANSISTOR	2N3565	07688	352-0638-010
R1	NOT USED			
R2	NOT USED			
R3	NOT USED			
R4	RESISTOR, FXD, COMPOSITION 330K OHMS, 10% TOL, 1/4 WATT	RC07GF334K	81349	745-0839-000
R5	RESISTOR, FXD, COMPOSITION 27K OHMS, 10% TOL, 1/2 WATT	RC20GF273K	81349	745-1412-000
R6	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/2 WATT	RC20GF472K	81349	745-1380-000
R7	RESISTOR, FXD, FILM 287 OHMS, 1% TOL, 1/8 WATT	RN60C2870F	81349	705-6260-000
R8	NOT USED			
R9	RESISTOR, FXD, COMPOSITION 180K OHMS, 10% TOL, 1/2 WATT	RC20GF184K	81349	745-1447-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R10	RESISTOR, FXD, COMPOSITION 120K OHMS, 10% TOL, 1/2 WATT	RC20GF124K	81349	745-1440-000
R11	SAME AS R5			
R12	RESISTOR, FXD, FILM 100K OHMS, 1% TOL, 1/4 WATT	RN60D1003F	81349	705-6692-000
R13	SAME AS R12			
R14	RESISTOR, FXD, FILM 9090 OHMS, 1% TOL, 1/4 WATT	RN60D9091F	81349	705-6642-000
R15	RESISTOR, FXD, FILM 8250 OHMS, 1% TOL, 1/4 WATT	RN60D8251F	81349	705-6640-000
R16	RESISTOR, FXD, FILM 5620 OHMS, 1% TOL, 1/4 WATT	RN60D5621F	81349	705-6632-000
R17	SAME AS R14			
R18	RESISTOR, FXD, FILM 2870 OHMS, 1% TOL, 1/4 WATT	RN60D2871F	81349	705-6618-000
R19	SAME AS R18			
R20	RESISTOR, FXD, FILM 1470 OHMS, 1% TOL, 1/4 WATT	RN60D1471F	81349	705-6604-000
R21	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 1/2 WATT	RC20GF821K	81349	745-1349-000
R22	SAME AS R20			
R23	RESISTOR, FXD, FILM 38.3K OHMS, 1% TOL, 1/4 WATT	RN60D3832F	81349	705-6672-000
R24	RESISTOR, FXD, FILM 19.6K OHMS, 1% TOL, 1/4 WATT	RN60D1962F	81349	705-6658-000
R25	RESISTOR, FXD, FILM 31.6K OHMS, 1% TOL, 1/4 WATT	RN60D3162F	81349	705-6668-000
R26	RESISTOR, FXD, FILM 7500 OHMS, 1% TOL, 1/4 WATT	RN60D7501F	81349	705-6638-000
R27	RESISTOR, FXD, FILM 422 OHMS, 1% TOL, 1/4 WATT	RN60D4220F	81349	705-6578-000
R28	RESISTOR, FXD, FILM 2610 OHMS, 1% TOL, 1/4 WATT	RN60D2611F	81349	705-6616-000
R29	RESISTOR, FXD, FILM 3160 OHMS, 1% TOL, 1/4 WATT	RN60D3161F	81349	705-6620-000
R30	RESISTOR, FXD, FILM 196K OHMS, 1% TOL, 1/4 WATT	RN60D1963F	81349	705-6706-000
R31	RESISTOR, FXD, FILM 14.7K, 1% TOL, 1/4 WATT	RN60D1472F	81349	705-6652-000
R32	RESISTOR, VAR 1K OHMS, 30% TOL, 1/2 WATT	62PAR1K	73138	382-0008-410
R33	RESISTOR, FXD, COMPOSITION 1K OHMS, 10% TOL, 1/2 WATT	RC20GF102K	81349	745-1352-000
R34	SAME AS R26			
R35	SAME AS R27			
R36	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/2 WATT	RC20GF103	81349	745-1394-000
R37	SAME AS R30			
R38	SAME AS R31			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R39	RESISTOR, FXD, FILM 34.8K OHMS, 1% TOL, 1/4 WATT	RN60D3482F	81349	705-6670-000
R40	RESISTOR, FXD, FILM 3480 OHMS, 1% TOL, 1/4 WATT	RN60D3481F	81349	705-6622-000
R41	RESISTOR, FXD, FILM 2150 OHMS, 1% TOL, 1/4 WATT	RN60D2151F	81349	705-6612-000
R42	SAME AS R26			
R43	SAME AS R27			
R44	RESISTOR, FXD, FILM 10K OHMS, 1% TOL, 1/4 WATT	RN60D1002F	81349	705-6644-000
R45	RESISTOR, FXD, FILM 178K OHMS, 1% TOL, 1/4 WATT	RN60D1783F	81349	705-6704-000
R46	SAME AS R31			
R47	SAME AS R39			
R48	RESISTOR, FXD, FILM 4640 OHMS, 1% TOL, 1/4 WATT	RN60D4641F	81349	705-6628-000
R49	SAME AS R39			
R50	RESISTOR, FXD, FILM 5110 OHMS, 1% TOL, 1/4 WATT	RN60D5111F	81349	705-6630-000
R51	RESISTOR, FXD, FILM 1330 OHMS, 1% TOL, 1/4 WATT	RN60D1331F	81349	705-6602-000
R52	SAME AS R50			
R53	SAME AS R51			
R54	SAME AS R50			
R55	SAME AS R50			
TP1	JACK, TIP WHITE	4877-125-9	17117	360-0434-100
TP2	SAME AS TP1			
TP3	JACK, TIP BLACK	4877-125-0	17117	360-0434-010
TP4	SAME AS TP1			

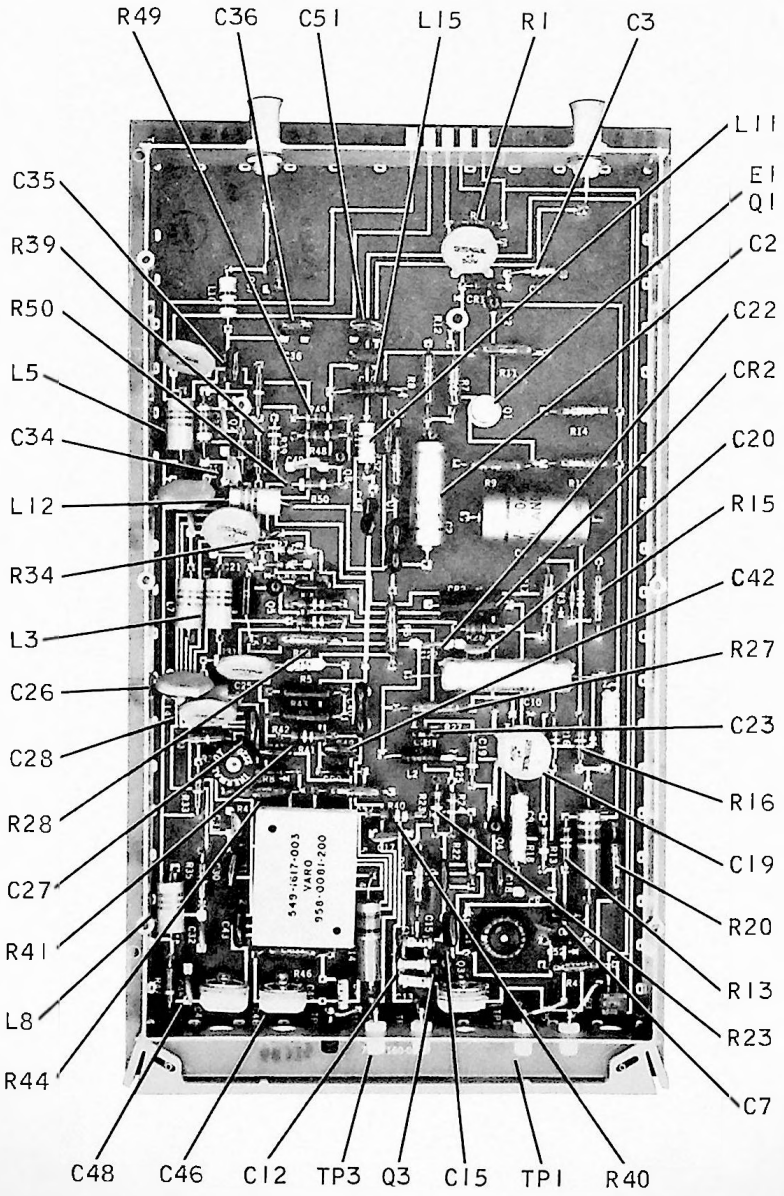

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Figure 6-6. FM Modulator (Sheet 1 of 3).

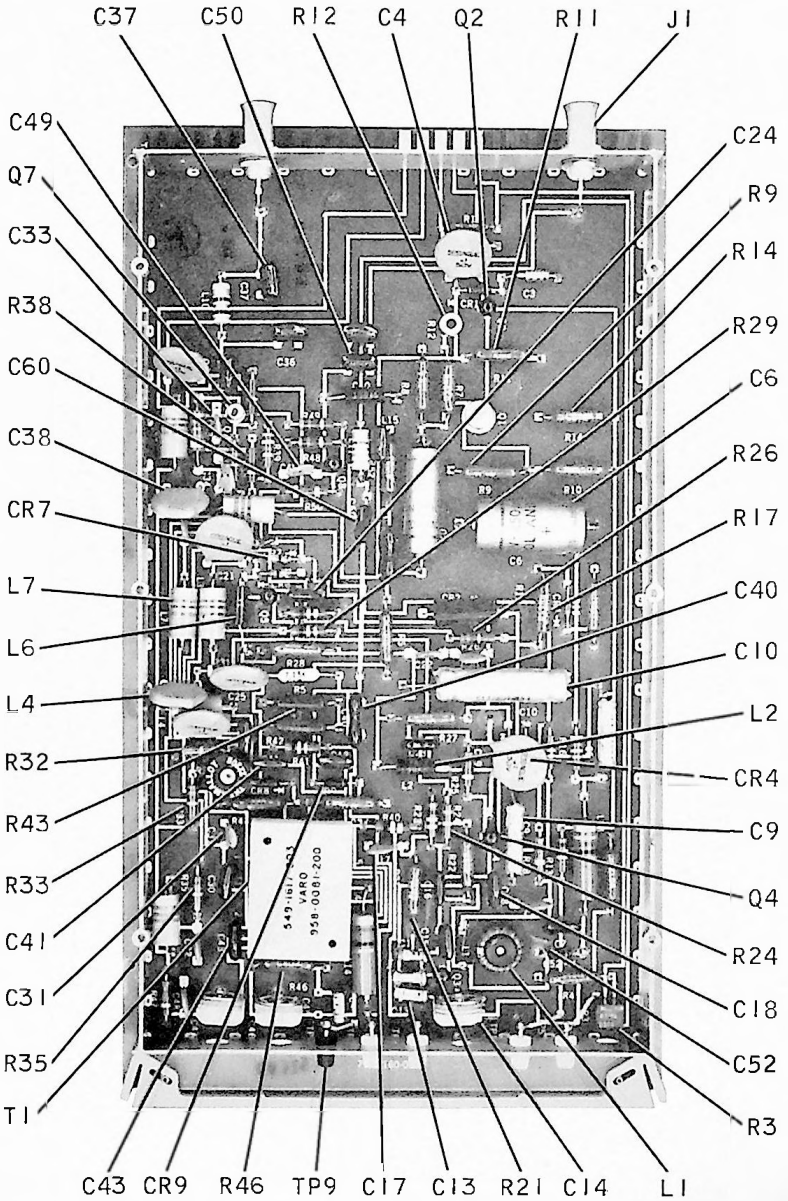

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Figure 6-6. FM Modulator (Sheet 2 of 3).

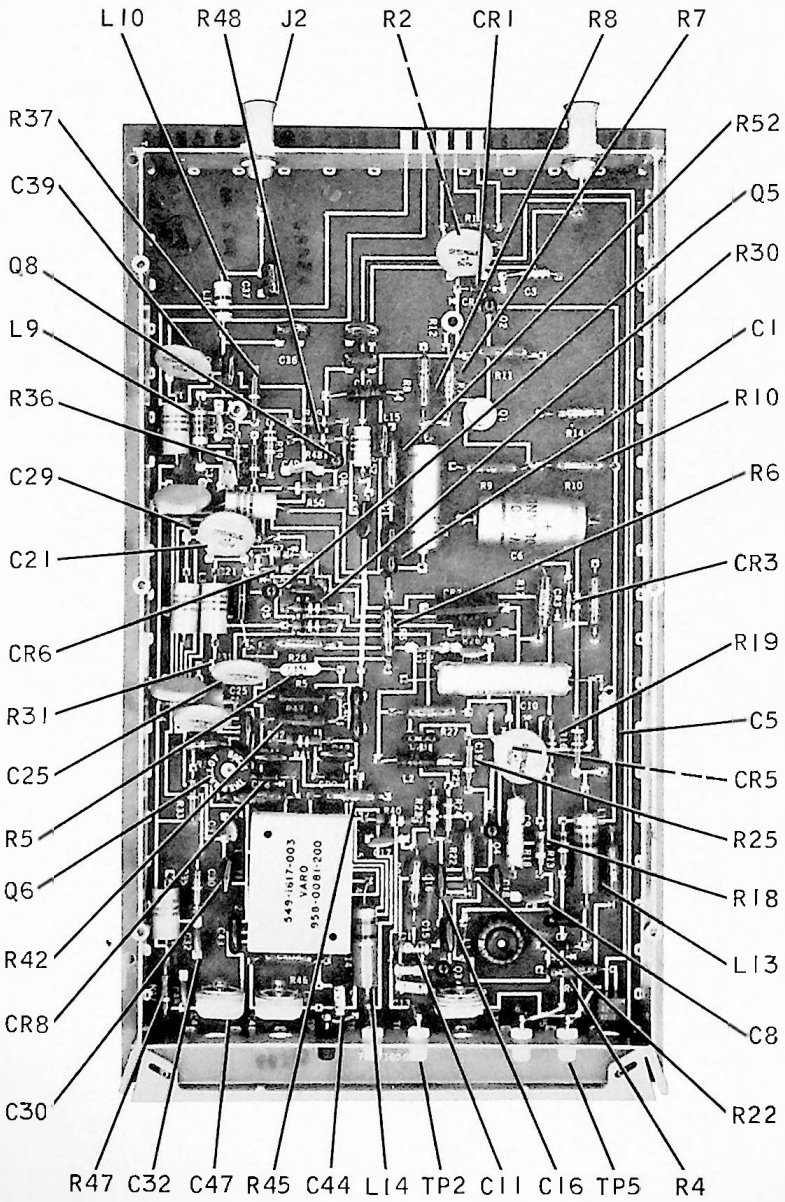

Figure 6-6. FM Modulator (Sheet 3 of 3).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	FM MODULATOR			774-7160-001
C1	CAPACITOR, FXD, MICA 2200 UUF, 5% TOL, 500 VDCW	CM06F222J03	81349	912-3025-000
C2	CAPACITOR, FXD, ELECTROLYTIC 100 UF, PLUS 50% MINUS 10% 40 VDCW	C437ARG100	73445	183-2355-140
C3	CAPACITOR, FXD, ELECTROLYTIC 1 UF, 10% TOL, 35 VDCW	CS12BF105K	81349	184-6071-000
C4	CAPACITOR, FXD, CERAMIC 0.1 UF, PLUS 80% MINUS 20%, 50 VDCW	33C41	56289	913-3886-000
C5	CAPACITOR, FXD, ELECTROLYTIC 1 UF, PLUS 50% MINUS 15%, 150 VDCW	CL25BQ010SP3	81349	184-7227-000
C6	CAPACITOR, FXD, ELECTROLYTIC 250 UF, PLUS 50% MINUS 10%, 40 VDCW	C437ARG250	73445	183-2355-150
C7	CAPACITOR, FXD, MICA 100 UUF, 5% TOL, 500 VDCW	CM05F101J03	81349	912-2816-000
C8	CAPACITOR, FXD, CERAMIC 0.01 UF, PLUS 80% MINUS 20%, 100 VDCW	805-014X5V0103Z	72982	913-3680-000
C9	CAPACITOR, FXD, ELECTROLYTIC 0.5 UF, PLUS 50% MINUS 15% TOL, 75 VDCW	CL378L0R5MN3	81349	184-7220-000
C10	CAPACITOR, FXD, ELECTROLYTIC 20 UF, PLUS 75% MINUS 20%, 25 VDCW	CL378G200MN3	81349	184-7258-000
C11	CAPACITOR, FXD, CERAMIC 20 UUF, 2% TOL, 500 VDCW	CC20SH200G	81349	916-0362-000
C12	SAME AS C11			
C13	CAPACITOR, FXD, CERAMIC 10 UUF, 1/4% TOL, 500 VDCW	CC20UJ100C	81349	916-0412-000
C14	CAPACITOR, VAR, CERAMIC 6-25 UUF, 350 VDCW	3192-000C0P0-32R	72982	917-1253-030
C15	CAPACITOR, FXD, MICA 68 UUF, 5% TOL, 500 VDCW	CM05E680J03	81349	912-2804-000
C16	SAME AS C15			
C17	SAME AS C8			
C18	CAPACITOR, FXD, MICA 220 UUF, 5% TOL, 500 VDCW	CM05F221J03	81349	912-2840-000
C19	SAME AS C4			
C20	SAME AS C8			
C21	SAME AS C4			
C22	SAME AS C8			
C23	CAPACITOR, FXD, MICA 10 UUF, 5% TOL, 500 VDCW	DM15C100J01	72136	912-2753-000
C24	CAPACITOR, FXD, MICA 82 UUF, 5% TOL, 500 VDCW	CM05E820J03	81349	912-2810-000
C25	SAME AS C4			
C26	SAME AS C4			
C27	CAPACITOR, FXD, MICA 22 UUF, 5% TOL, 500 VDCW	CM05E220J03	81349	912-2768-000
C28	SAME AS C4			
C29	SAME AS C8			
C30	SAME AS C15			
C31	CAPACITOR, FXD, CERAMIC 1000 UUF, 20% TOL, 1000 VDCW	CK604W102M	81349	913-1186-000
C32	SAME AS C8			
C33	SAME AS C8			
C34	SAME AS C8			
C35	CAPACITOR, FXD, MICA 39 UUF, 5% TOL, 500 VDCW	CM05E390J03	81349	912-2786-000
C36	CAPACITOR, FXD, MICA 150 UUF, 5% TOL, 500 VDCW	CM05F151J03	81349	912-2828-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
C37	SAME AS C36			
C38	SAME AS C4			
C39	SAME AS C4			
C40	CAPACITOR, FXD, MICA 560 UUF, 5% TOL, 500 VDCW	CM06F561J03	81349	912-2983-000
C41	CAPACITOR, FXD, MICA 33 UUF, 5% TOL, 500 VDCW	CM05E330J03	81349	912-2780-000
C42	SAME AS C41			
C43	SAME AS C18			
C44	SAME AS C11			
C45	NOT USED			
C46	CAPACITOR, VAR, CERAMIC 4-12 UUF, 300 VDCW	3192-000C0P0-20R	72982	917-1253-020
C47	SAME AS C14			
C48	SAME AS C8			
C49	SAME AS C8			
C50	SAME AS C27			
C51	CAPACITOR, FXD, MICA 270 UUF, 5% TOL, 500 VDCW	CM05F271J03	81349	912-2846-000
C52	SEMIDONDUCTOR DEVICE, DIODE	1N5146A	07688	922-6095-160
C53 THROUGH C59	NOT USED			
C60	SAME AS C24			
CR1	SEMICONDUCTOR DEVICE, DIODE	1N751A	07688	353-2710-000
CR2	SEMICONDUCTOR DEVICE, DIODE	SV3173	03877	353-3304-000
CR3	SEMICONDUCTOR DEVICE, DIODE	1N626	07688	353-2857-000
CR4	SEMICONDUCTOR DEVICE, DIODE	1N270	07688	353-2018-000
CR5	SAME AS CR4			
CR6	SAME AS CR4			
CR7	SAME AS CR4			
CR8	SEMICONDUCTOR DEVICE, DIODE	FA2311U	07263	353-3593-010
CR9	SAME AS CR8			
E1	HEATSINK	22208	13103	352-9950-060
J1	CONNECTOR, ELECTRICAL 1 CONTACT	UG1051U	09408	357-9210-000
J2	SAME AS J1			
L1	INDUCTOR, RF 2.25 UH, 2% TOL	1666-1734	81815	240-1529-010
L2	COIL, RF 6.8 UH, 5% TOL	13950	03550	240-1996-110
L3	COIL, RF 220 UH, 5% TOL	8S217	99800	240-0198-000
L4	SAME AS L3			
L5	SAME AS L3			
L6	COIL, RF 6.2 UH, 5% TOL	13949	03550	240-1996-100
L7	SAME AS L3			
L8	SAME AS L3			
L9	COIL, RF 3.3 UH, 5% TOL	13958	03550	240-1996-050
L10	COIL, RF 1 UH, 10% TOL	LT4K034	81349	240-0062-000
L11	SELECT L11 FROM THE FOLLOWING LIST			
L11	COIL, RF 1.5 UH, 10% TOL	LT4K036	81349	240-0063-000
	INDUCTOR, RF 2.4 UH, 2% TOL	526-6799-00	95105	240-1529-000
	COIL, RF 82 UH, 10% TOL	LT7K208		240-0192-000
L12	SAME AS L3			
L13	COIL, RF 82 UH, 10% TOL	LT7K208	81349	240-0192-000
L14	COIL, RF 56 UH, 10% TOL	LT4K275	96906	240-2715-340
L15	COIL, RF 4.3 UH, 10% TOL	13956	13946	240-1996-070
Q1	TRANSISTOR	2N1711	07263	352-0373-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
Q2	TRANSISTOR	2N4121	07688	352-0743-010
Q3	SAME AS Q2			
Q4	SAME AS Q2			
Q5	SAME AS Q2			
Q6	TRANSISTOR	2N708	04713	352-0322-000
Q7	SAME AS Q6			
Q8	SAME AS Q2			
R1	RESISTOR, FXD, FILM 12.1K OHMS, 1% TOL, 1/4 WATT	RN60D1212F	81349	705-6648-000
R2	RESISTOR, FXD, COMPOSITION 680 OHMS, 10% TOL, 1/2 WATT	RC20GF681K	81349	745-1345-000
R3	RESISTOR, VAR, CERAMIC 500 OHMS, 30% TOL, 1/2 WATT	62PAR500	73138	382-0008-400
R4	RESISTOR, FXD, FILM 348 OHMS, 1% TOL, 1/2 WATT	RN65D3480F	81349	705-7074-000
R5	SELECT R5 FROM THE FOLLOWING LIST			
	RESISTOR, FXD, FILM 3480 OHMS, 1% TOL, 1/2 WATT	RN65D3481F	81349	705-7122-000
	RESISTOR, FXD, FILM 4220 OHMS, 1% TOL, 1/2 WATT	RN65D4221F	81349	705-7126-000
	RESISTOR, FXD, FILM 5110 OHMS, 1% TOL, 1/2 WATT	RN65DS111F	81349	705-7130-000
	RESISTOR, FXD, FILM 10K OHMS, 1% TOL, 1/2 WATT	RN65D1002F	81349	705-7144-000
R6	RESISTOR, FXD, FILM 1210 OHMS, 1% TOL, 1/2 WATT	RN65D1211F	81349	705-7100-000
R7	RESISTOR, FXD, FILM 100K OHMS, 1% TOL, 1/2 WATT	RN65D1003F	81349	705-7192-000
R8	RESISTOR, FXD, FILM 7.5K OHMS, 1% TOL, 1/2 WATT	RN65D7501F	81349	705-7138-000
R9	RESISTOR, FXD, FILM 316 OHMS, 1% TOL, 1/2 WATT	RN65D3160F	81349	705-7072-000
R10	RESISTOR, FXD, FILM 13.3K OHMS, 1% TOL, 1/2 WATT	RN65D1332F	81349	705-7150-000
R11	RESISTOR, FXD, FILM 5110 OHMS, 1% TOL, 1/2 WATT	RN65D5111F	81349	705-7130-000
R12	RESISTOR, VAR, CERAMIC 50K, 30% TOL, 1/2 WATT	62PR50K	73138	382-0008-130
R13	RESISTOR, FXD, COMPOSITION 100K OHMS, 10% TOL, 1/2 WATT	RC20GF104K	81349	745-1436-000
R14	RESISTOR, FXD, FILM 2870 OHMS, 1% TOL, 1/2 WATT	RN65D2871F	81349	705-7118-000
R15	RESISTOR, FXD, FILM 19.6K OHMS, 1% TOL, 1/2 WATT	RN65D1902F	81349	705-7158-000
R16	RESISTOR, FXD, COMPOSITION 47K OHMS, 10% TOL, 1/2 WATT	RC20GF473K	81349	745-1422-000
R17	SELECT R17 FROM THE FOLLOWING LIST			
	RESISTOR, FXD, FILM 1K OHMS, 1% TOL, 1/2 WATT	RN65D1001F	81349	705-7096-000
	RESISTOR, FXD, FILM 1960 OHMS, 1% TOL, 1/2 WATT	RN65D1961F	81349	705-7110-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	RESISTOR, FXD, FILM 3160 OHMS, 1% TOL, 1/2 WATT	RN65D3161F	81349	705-7120-000
	RESISTOR, FXD, FILM 4220 OHMS, 1% TOL, 1/2 WATT	RN65D4221F	81349	705-7126-000
R18	RESISTOR, FXD, COMPOSITION 1K OHMS, 10% TOL, 1/2 WATT	RC20GF102K	81349	745-1352-000
R19	RESISTOR, FXD, COMPOSITION 27K OHMS, 10% TOL, 1/2 WATT	RC20GF273K	81349	745-1412-000
R20	RESISTOR, FXD, FILM 21.5K OHMS, 1% TOL, 1/2 WATT	RN65D2152F	81349	705-7160-000
R21	RESISTOR, FXD, FILM 12.1K OHMS, 1% TOL, 1/2 WATT	RN65D1212F	81349	705-7148-000
R22	RESISTOR, FXD, FILM 2610 OHMS, 1% TOL, 1/2 WATT	RN65D2611F	81349	705-7116-000
R23	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/2 WATT	RC20GF103K	81349	745-1394-000
R24	RESISTOR, FXD, COMPOSITION 5600 OHMS, 10% TOL, 1/2 WATT	RC20GF562K	81349	745-1384-000
R25	RESISTOR, FXD, COMPOSITION 1500 OHMS, 10% TOL, 1/2 WATT	RC20GF152K	81349	745-1359-000
R26	RESISTOR, FXD, COMPOSITION 1800 OHMS, 10% TOL, 1/2 WATT	RC20GF182K	81349	745-1363-000
R27	RESISTOR, FXD, FILM 51.1 OHMS, 1% TOL, 1/2 WATT	RN65D51R1F	81349	705-7034-000
R28	RESISTOR, FXD, FILM 42.2 OHMS, 1% TOL, 1/4 WATT	RN65D42R2F	81349	705-7030-000
R29	SAME AS R23			
R30	SAME AS R23			
R31	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/2 WATT	RC20GF472K	81349	745-1380-000
R32	SAME AS R26			
R33	SAME AS R26			
R34	RESISTOR, FXD, FILM 261 OHMS, 1% TOL, 1/2 WATT	RN65D2610F	81349	705-7068-000
R35	RESISTOR, FXD, FILM 220 OHMS, 10% TOL, 1/2 WATT	RC20GF221K	81349	745-1324-000
R36	SAME AS R26			
R37	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/2 WATT	RC20GF222K	81349	745-1366-000
R38	RESISTOR, FXD, COMPOSITION 22 OHMS, 10% TOL, 1/2 WATT	RC20GF220K	81349	745-1282-000
R39	RESISTOR, FXD, COMPOSITION 390 OHMS, 10% TOL, 1/2 WATT	RC20GF391K	81349	745-1335-000
R40	SAME AS R13			
R41	SAME AS R13			
R42	RESISTOR, FXD, FILM 1100 OHMS, 1% TOL, 1/2 WATT	RN65D1101F	81349	705-7098-000
R43	SAME AS R42			
R44	RESISTOR, FXD, FILM 1960 OHMS, 1% TOL, 1/2 WATT	RN65D1961F	81349	705-7110-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R45	SAME AS R44			
R46	RESISTOR, FXD, FILM 8250 OHMS, 1% TOL, 1/2 WATT	RN65D8251F	81349	705-7140-000
R47	RESISTOR, FXD, COMPOSITION 150 OHMS, 10% TOL, 1/2 WATT	RC20GF151K	81349	745-1317-000
R48	RESISTOR, FXD, COMPOSITION 6800 OHMS, 10% TOL, 1/2 WATT	RC20GF682K	81349	745-1387-000
R49	SAME AS R48			
R50	SAME AS R31			
R51	NOT USED			
R52	RESISTOR, FXD, FILM 68.1 OHMS, 1% TOL, 1/2 WATT	RN65D68R1F	81349	705-7040-000
T1	TRANSFORMER			549-1617-003
TP1	JACK, TIP WHITE	SL490-458	12615	306-2241-100
TP2	SAME AS TP1			
TP3	SAME AS TP1			
TP4	JACK, TIP BLACK	SL490-468	12615	306-2241-010
TP5	SAME AS TP1			

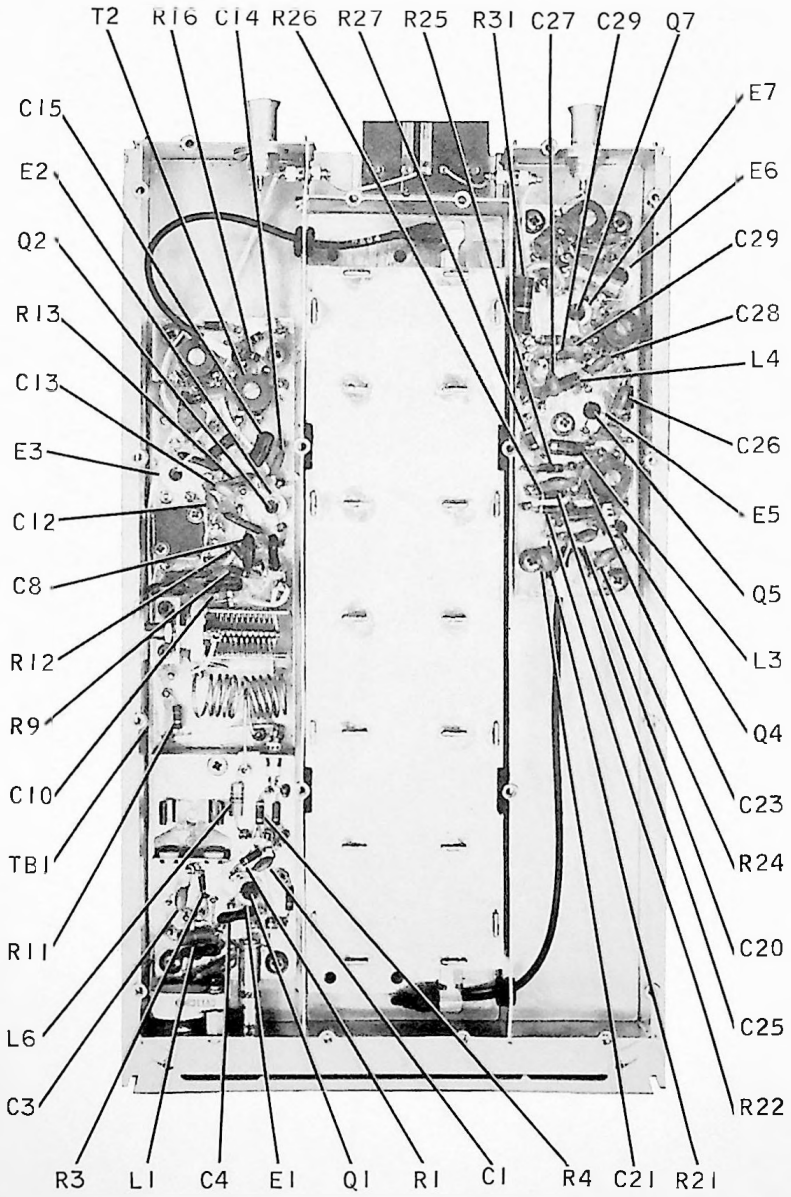

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Figure 6-7. RF Mixer (Sheet 1 of 2).

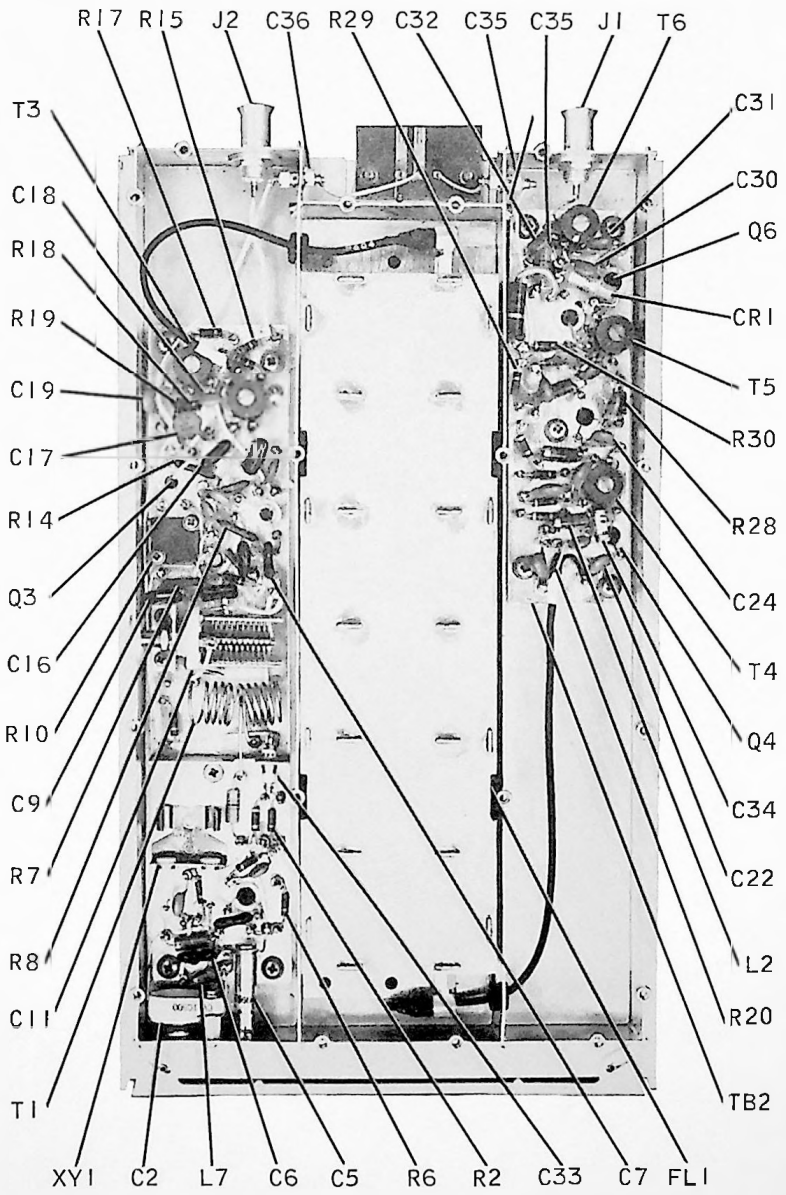

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Figure 6-7. RF Mixer (Sheet 2 of 2).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	RF MIXER			781-5380-001
C1	CAPACITOR, FXD, CERAMIC 1000 UUF, 20% TOL, 500 VDCW	40C73A1	01939	913-3009-000
C2	CAPACITOR, VAR, GLASS 1-30 UUF, 750 VDCW	PC40H300	81349	922-3036-370
C3	SAME AS C1			
C4	CAPACITOR, FXD, MICA 10 UUF, 10% TOL, 500 VDCW	CM05C100K03	81349	912-2754-000
C5	CAPACITOR, VAR, GLASS 0.8-18 UUF, 1K VDCW	VC23G	73899	922-0437-000
C6	SAME AS C4			
C7	SAME AS C4			
C8	CAPACITOR, FXD, MICA 18 UUF, 10% TOL, 500 VDCW	CM05C180K03	81349	912-2763-000
C9	SAME AS C8			
C10	SAME AS C4			
C11	CAPACITOR, VAR, AIR 3-9.8 UUF, 1250 VDCW	160-211-35	74970	922-0046-000
C12	SAME AS C1			
C13	SAME AS C1			
C14	CAPACITOR, FXD, CERAMIC 0.01 UF, PLUS 80% MINUS 20%, 100 VDCW	805-14X5V0103Z	72982	913-3680-000
C15	CAPACITOR, FXD, MICA 33 UUF, 5% TOL, 500 VDCW	CM05E330J03	81349	912-2780-000
C16	SAME AS C15			
C17	SAME AS C14			
C18 THROUGH C21	SAME AS C1			
C22	CAPACITOR, FXD, CERAMIC 3300 UUF, 20% TOL, 100 VDCW	NP12BX332M	96733	913-3278-310
C23	SAME AS C1			
C24	SAME AS C1			
C25	SAME AS C1			
C26	SAME AS C22			
C27 THROUGH C32	SAME AS C1			
C33	CAPACITOR, FXD, CERAMIC 1000 UUF, GMV TOL, 500 VDCW	2465-008W5T0102P	72982	913-3208-000
C34	CAPACITOR, FXD, CERAMIC 1.5 UUF, 33% TOL, 500 VDCW	CC20CK1R5D	81349	916-0073-000
C35	SAME AS C33			
C36	SAME AS C33			
CR1	SEMICONDUCTOR DEVICE, DIODE	1N3018B	07688	353-3123-000
E1	HOLDER, TRANSISTOR	T1533	98291	352-9509-000
E2 THROUGH E7	SAME AS E1			
FL1	SELECT FL1 FROM THE FOLLOWING LIST			
	FILTER, HIGH BAND			781-5343-001
	FILTER, LOW-BAND			781-5344-001
J1	CONNECTOR, ELECTRICAL	UG1051U	80058	357-9210-000
J2	SAME AS J1			
L1	COIL, RF 0.68 UH, 10% TOL	MS18130-6	81349	240-1566-000
L2	COIL, RF 0.22 UH, 20% TOL	MS18130-1	81349	240-1563-000
L3	SAME AS L2			
L4	SAME AS L2			
L5	COIL, RF 2.20 UH, 10% TOL	MS18130-12	81349	240-1572-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
L6	COIL, RF 0.15 UH, 20% TOL	MS18130-1	81349	240-1562-000
L7	SAME AS L6			
Q1	TRANSISTOR	2N4258	07263	352-0848-020
Q2	TRANSISTOR	2N4416	22229	352-0756-010
Q3	SAME AS Q2			
Q4	TRANSISTOR	2N3563	07688	352-0630-010
Q5	SAME AS Q4			
Q6	SAME AS Q4			
Q7	SAME AS Q4			
R1	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/4 WATT	RC07GF222K	81349	745-0761-000
R2	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/4 WATT	RC07GF472K	81349	745-0773-000
R3	RESISTOR, FXD, COMPOSITION 1800 OHMS, 10% TOL, 1/4 WATT	RC07GF182K	81349	745-0758-000
R4	RESISTOR, FXD, COMPOSITION 180 OHMS, 10% TOL, 1/4 WATT	RC07GF181K	81349	745-0722-000
R5	NOT USED			
R6	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 1/4 WATT	RC07GF821K	81349	745-0746-000
R7	RESISTOR, FXD, FILM 2150 OHMS, 1% TOL, 1/4 WATT	RN60D2151F	81349	705-6612-000
R8	SAME AS R7			
R9	RESISTOR, FXD, COMPOSITION 6800 OHMS, 10% TOL, 1/4 WATT	RC07GF682K	81349	745-0779-000
R10	RESISTOR, VAR 5K OHMS, 5% TOL, 3/4 WATT	RT22C2L502	81349	381-1721-120
R11	RESISTOR, FXD, COMPOSITION 5600 OHMS, 10% TOL, 1/4 WATT	RC07GF562K	81349	745-0776-000
R12	SAME AS R9			
R13	SAME AS R7			
R14	SAME AS R7			
R15	RESISTOR, FXD, COMPOSITION 33 OHMS, 10% TOL, 1/4 WATT	RC07GF330K	81349	745-0695-000
R16	SAME AS R15			
R17	RESISTOR, FXD, COMPOSITION 22 OHMS, 10% TOL, 1/4 WATT	RC07GF220K	81349	745-0689-000
R18	RESISTOR, FXD, COMPOSITION 680 OHMS, 10% TOL, 1/4 WATT	RC07GF681K	81349	745-0743-000
R19	RESISTOR, FXD, COMPOSITION 270 OHMS, 10% TOL, 1/4 WATT	RC07GF271K	81349	745-0728-000
R20	RESISTOR, FXD, COMPOSITION 150 OHMS, 10% TOL, 1/4 WATT	RC07GF151K	81349	745-0719-000
R21	SAME AS R2			
R22	SAME AS R2			
R23	NOT USED			
R24	SAME AS R6			
R25	SAME AS R6			
R26	SAME AS R2			
R27	SAME AS R2			
R28	SAME AS R6			
R29	SAME AS R6			
R30	SAME AS R2			
R31	RESISTOR, FXD, COMPOSITION 270 OHMS, 10% TOL, 1 WATT	RC32GF271K	81349	745-3328-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R32	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1/4 WATT	RC07GF101K	81349	745-0713-000
T1	TRANSFORMER			781-5376-001
T2	TRANSFORMER			781-5290-001
T3	TRANSFORMER			781-5371-001
T4	TRANSFORMER			781-5372-001
T5	TRANSFORMER			781-5373-001
T6	TRANSFORMER			781-5374-001
TB1	BOARD, FABRICATED			781-5358-001
TB2	BOARD, FABRICATED			781-5352-001
Y1	NOTE: REFER TO TABLE 5-4, PAGE 5-6			
XY1	SOCKET, CRYSTAL	8000AG20	91506	292-0305-010

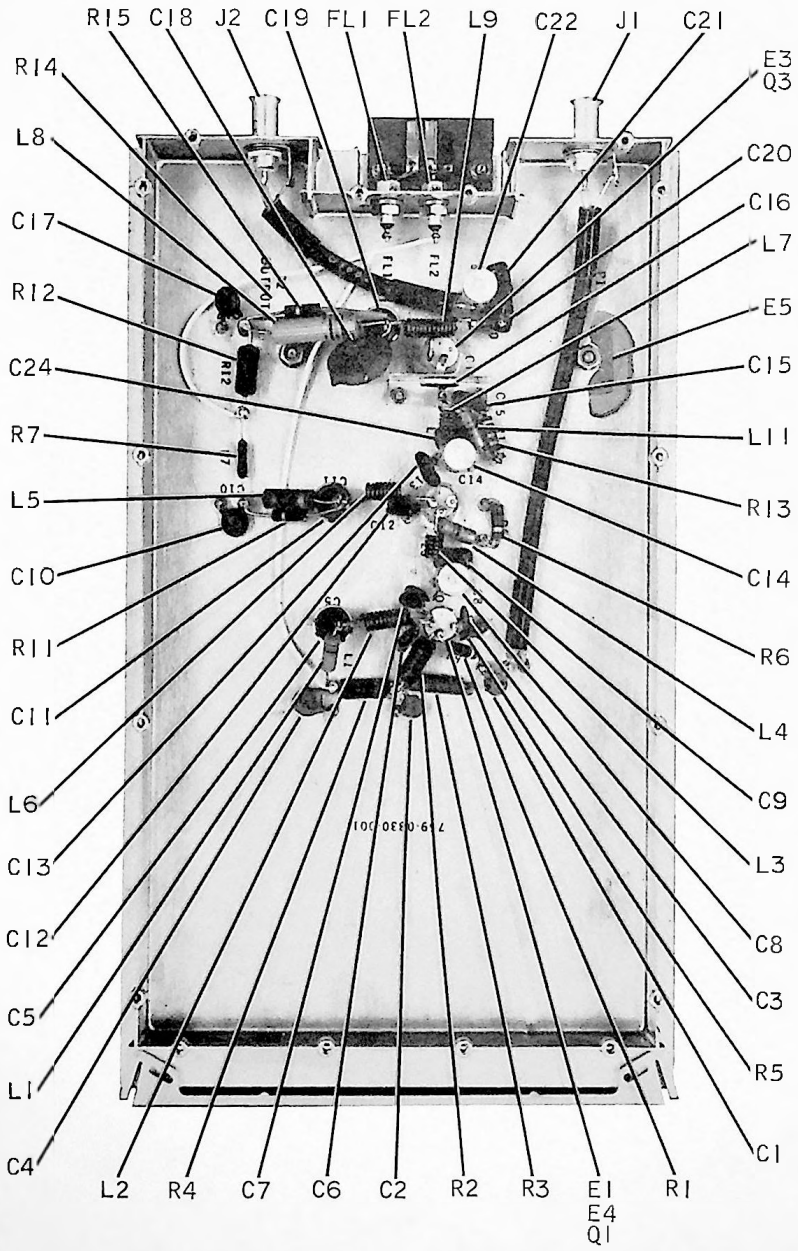

Figure 6-8. Power Amplifier.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	POWER AMPLIFIER			769-0830-001
C1	CAPACITOR, FXD, CERAMIC 680 UUF, 20% TOL, 1000 VDCW	CK60AW681M	81349	913-1194-000
C2	CAPACITOR, FXD, CERAMIC 470 UUF, 20% TOL, 500 VDCW	CK60AX471M	81349	913-1189-000
C3	SAME AS C2			
C4	CAPACITOR, FXD, CERAMIC 0.01 UF, PLUS 80 MINUS 20%, 100 VDCW	805-014X5V0103Z	72982	912-3680-000
C5	CAPACITOR, FXD, MICA 1000 UUF, 5% TOL, 500 VDCW	CB21PE102J	81349	912-4115-330
C6	CAPACITOR, FXD, MICA 15 UUF, 5% TOL, 500 VDCW	DM15C150J01	72136	912-2759-000
C7	SAME AS C6			
C8	CAPACITOR, VAR, CERAMIC 5.5-18 UUF, PLUS 2% MINUS 2.5%, 350 VDCW	538011C0P092R	72982	917-1222-000
C9	CAPACITOR, FXD, MICA 33 UUF, 10% TOL, 500 VDCW	DM30F562K03	72136	912-2781-000
C10	SAME AS C4			
C11	SAME AS C5			
C12	CAPACITOR, FXD, MICA 10 UUF, 5% TOL, 500 VDCW	DM15C100J01	72136	912-2753-000
C13	CAPACITOR, FXD, MICA 18 UUF, 5% TOL, 500 VDCW	DM15C180J01	72136	912-2762-000
C14	SAME AS C8			
C15	CAPACITOR, FXD, MICA 82 UUF, 5% TOL, 500 VDCW	CM05ED820J03	81349	912-2810-000
C16	CAPACITOR, FXD, MICA 500 UUF, 20% TOL, 500 VDCW	M23-500M	53021	912-0667-000
C17	SAME AS C4			
C18	CAPACITOR, FXD, CERAMIC 0.1 UF, PLUS 80% MINUS 20% 200 VDCW	825-213X5V0104Z	72982	913-3681-000
C19	SAME AS C5			
C20	CAPACITOR, FXD, MICA 110 UUF, 5% TOL, 500 VDCW	CM05F111J03	81349	912-2819-000
C21	CAPACITOR, FXD, MICA 27 UUF, 5% TOL, 500 VDCW	CM05E270J03	81349	912-2774-000
C22	SAME AS C8			
C23	NOT USED			
C24	CAPACITOR, FXD, MICA 22 UUF, 10% TOL, 500 VDCW	D155E220K0	00853	912-2769-000
E1	INSULATOR, TRANSISTOR	XB021667-5	98291	352-9800-070
E2	INSULATOR, TRANSISTOR	T1529	98291	352-9800-010
E3	SAME AS E2			
E4	HEATSINK	TXP0508B	98978	352-9555-030
E5	HEATSINK	6156-7	13103	352-9612-010
FL1	FILTER, RADIO INTERFERENCE 1300 UUF, GMV TOL, 200 VDCW	10201050	72982	241-0332-000
FL2	SAME AS FL1			
J1	CONNECTOR, ELECTRICAL 1 CONTACT	UG1051U	80058	357-9210-000
J2	SAME AS J1			
L1	COIL, RF 1 UH, 10% TOL	MS75008-28	96906	240-1590-000
L2	COIL, RF			776-1882-001
L3	COIL, RF			776-1910-001
L4	COIL, RF 0.15 UH, 20% TOL	MS75008-21	96906	240-1585-000
L5	COIL, RF 2.2 UH, 10% TOL	MS16222-5	96906	240-1654-000
L6	COIL, RF			776-1911-001
L7	COIL, RF			776-1912-001

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
L8	COIL, RF 1.2 UH, 10% TOL	MS16231-1	96906	240-1605-000
L9	COIL, RF			776-1883-001
L10	NOT USED			
L11	SAME AS L4			
Q1	TRANSISTOR	2N3866	07688	352-0671-010
Q2	TRANSISTOR	2N3375	07688	352-0611-010
Q3	TRANSISTOR	2N5102	02735	352-0747-010
R1	RESISTOR, FXD, COMPOSITION 39 OHMS, 10% TOL, 1/2 WATT	RC20GF390K	81349	745-1293-000
R2	RESISTOR, FXD, WIRE WOUND 22 OHMS, 5% TOL, 3 WATTS	RW69V220	81349	747-5327-000
R3	RESISTOR, FXD, FILM 23.7 OHMS, 1% TOL, 1/2 WATT	RN65D23R7F	81349	705-7018-000
R4	RESISTOR, FXD, WIRE WOUND 270 OHMS, 5% TOL, 3 WATTS	RW69V271	81349	747-5349-000
R5	RESISTOR, FXD, FILM 10 OHMS, 1% TOL, 1/4 WATT	RN60D10R0F	81349	705-6500-000
R6	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1/2 WATT	RC20GF101K	81349	745-1310-000
R7	RESISTOR, FXD, WIRE WOUND 2 OHMS, 1% TOL, 1.25 WATT	RS1A73-2R00-1PCT	91637	747-4230-300
R8	NOT USED			
R9	NOT USED			
R10	NOT USED			
R11	RESISTOR, FXD, COMPOSITION 10 OHMS, 10% TOL, 1/2 WATT	RC20GF100K	81349	745-1268-000
R12	RESISTOR, FXD, WIRE WOUND 0.5 OHM, 1% TOL, 2.5 WATT	RSM2C0R500F	91637	746-9457-000
R13	RESISTOR, FXD, COMPOSITION 4.7 OHMS, 5% TOL, 1/2 WATT	GBT1-2 4-7-5	75042	745-6279-000
R14	SAME AS R11			
R15	SAME AS R11			

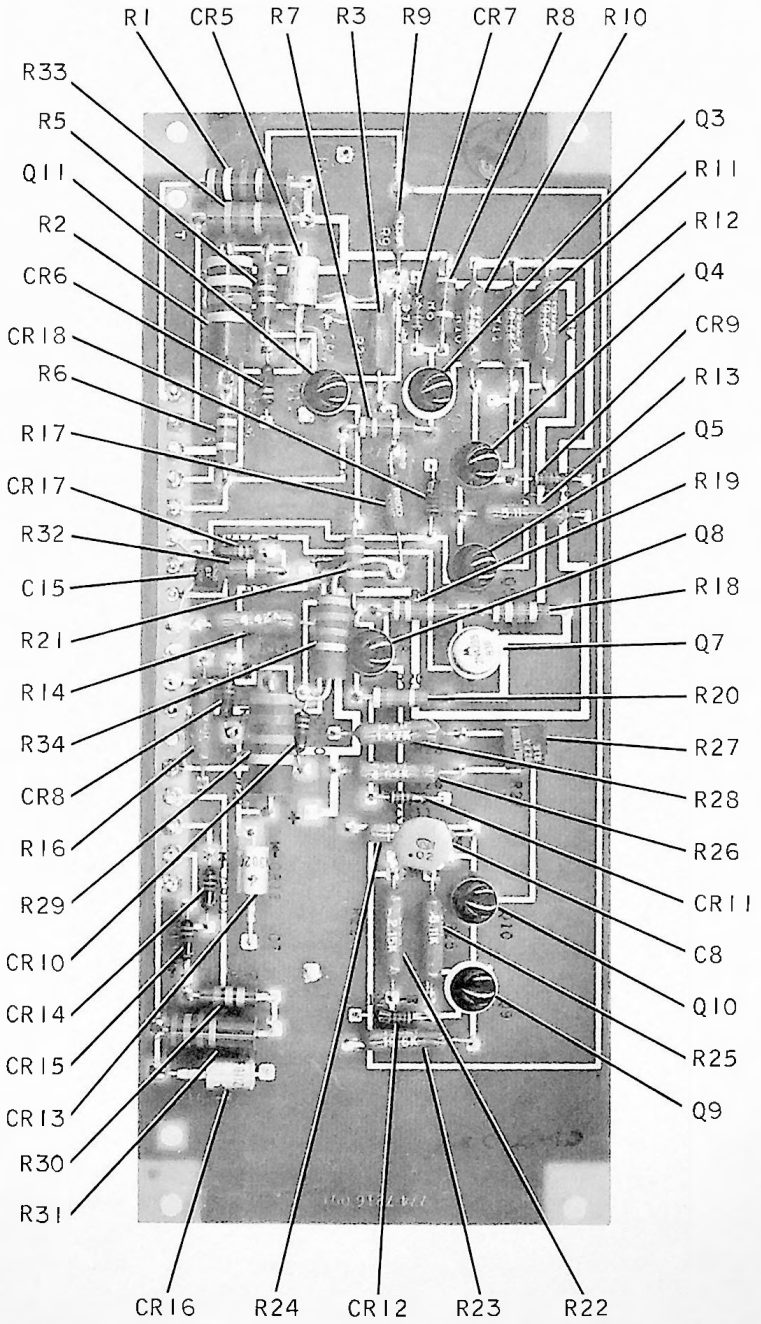

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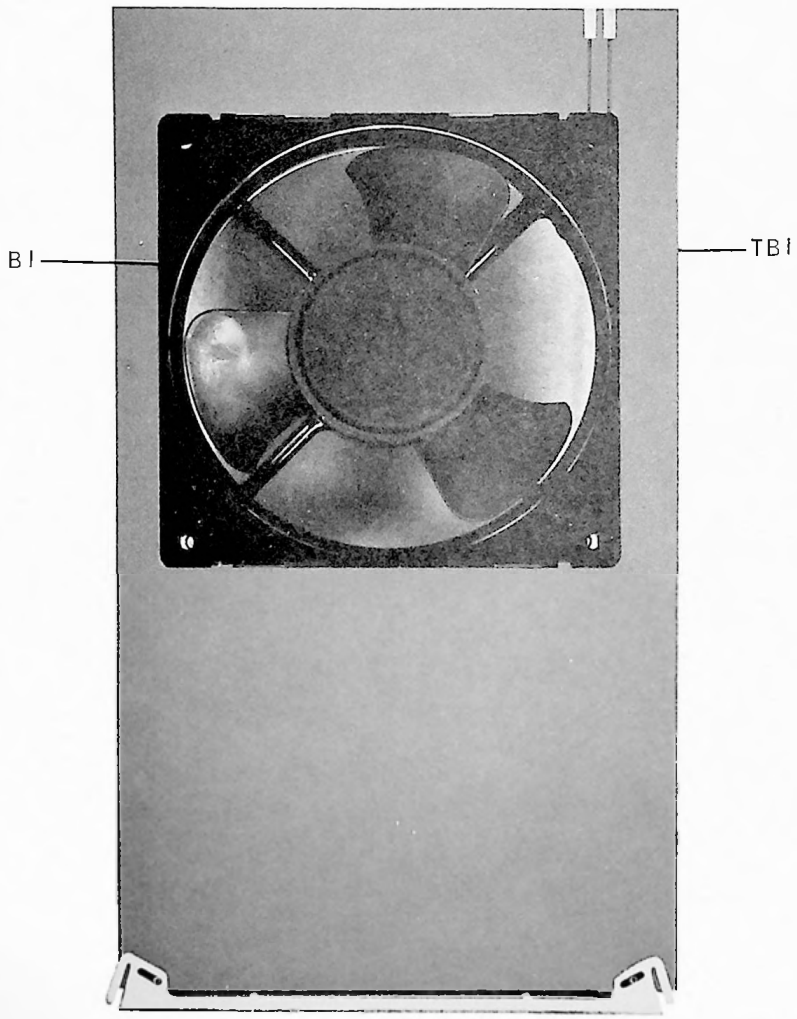
Figure 6-9. Power Supply Regulator.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	POWER SUPPLY REGULATOR			774-7216-000
C1 THROUGH C5	NOT USED			
C6	CAPACITOR, FXD, ELECTROLYTIC 56 UF, 20% TOL, 75 VDCW	109D566X0075T2	56289	184-7793-000
C7	CAPACITOR, FXD, ELECTROLYTIC 150 UF, 20% TOL, 30 VDCW	109D157X0030T2	56289	184-7796-000
C8	CAPACITOR, FXD, CERAMIC 0.02 UF, PLUS 60% MINUS 40%, 250 VDCW	20C109	01939	913-2097-000
C9	SAME AS C8			
C10 THROUGH C14	NOT USED			
C15	CAPACITOR, FXD, CERAMIC 0.1 UF, 10% TOL,	CK05BX104K	81349	913-5019-000
CR1 THROUGH CR4	NOT USED			
CR5	SEMICONDUCTOR DEVICE, DIODE	1N3027B	81349	353-3057-000
CR6	SEMICONDUCTOR DEVICE, DIODE	1N645	07688	353-2607-000
CR7	SEMICONDUCTOR DEVICE, DIODE	1N758A	07688	353-2724-000
CR8	NOT USED			
CR9	SEMICONDUCTOR DEVICE, DIODE	1N752A	07688	353-2712-000
CR10	SAME AS CR6			
CR11	SAME AS CR7			
CR12	SAME AS CR9			
CR13	SEMICONDUCTOR DEVICE, DIODE	1N3020B	07688	353-3125-000
CR14	SAME AS CR6			
CR15	SAME AS CR6			
CR16	SAME AS CR13			
CR17	SAME AS CR6			
CR18	SEMICONDUCTOR DEVICE, DIODE	1N755A	07688	353-2718-000
Q1	NOT USED			
Q2	NOT USED			
Q3	TRANSISTOR	2N3569	07688	352-0629-030
Q4	SAME AS Q3			
Q5	SAME AS Q3			
Q6	NOT USED			
Q7	TRANSISTOR	2N4235	07688	352-0695-040
Q8 THROUGH Q11	SAME AS Q3			
R1	RESISTOR, FXD, COMPOSITION 390 OHMS, 10% TOL, 1 WATT	RC32GF391K	81349	745-3335-000
R2	RESISTOR, FXD, COMPOSITION 330 OHMS, 10% TOL, 2 WATTS	RC42GF331K	81349	745-5631-000
R3	RESISTOR, FXD, FILM 46.4 OHMS, 1% TOL, 1/2 WATT	RN65D46R4F	81349	705-7032-000
R4	NOT USED			
R5	RESISTOR, FXD, COMPOSITION 27K OHMS, 10% TOL, 1/2 WATT	RC20GF273K	81349	745-1412-000
R6	RESISTOR, FXD, COMPOSITION 330 OHMS, 10% TOL, 1/2 WATT	RC20GF331K	81349	745-1331-000
R7	RESISTOR, FXD, COMPOSITION 3300 OHMS, 10% TOL, 1/2 WATT	RC20GF332K	81349	745-1373-000
R8	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/2 WATT	RC20GF472K	81349	745-1380-000
R9	RESISTOR, FXD, COMPOSITION 15K OHMS, 10% TOL, 1/2 WATT	RC20GF153K	81349	745-1401-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R10	RESISTOR, FXD, FILM 2150 OHMS, 1% TOL, 1/2 WATT	RN65D2151F	81349	705-7112-000
R11	RESISTOR, FXD, FILM 19.6K OHMS, 1% TOL, 1/2 WATT	RN65D1920F	81349	705-7158-000
R12 THROUGH R33	NOT USED			
R34	RESISTOR, FXD, FILM 681 OHMS, 1% TOL, 1/2 WATT	RN65D6810F	81349	705-7088-000



B502 532 Pb

Figure 6-10. Fan.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	FAN			783-7049-001
B1	FAN, TUBEAXIAL 0.16-AMP, 115 VAC	20-244-2301	82887	009-1829-020
TB1	BOARD, FABRICATED			786-1248-001

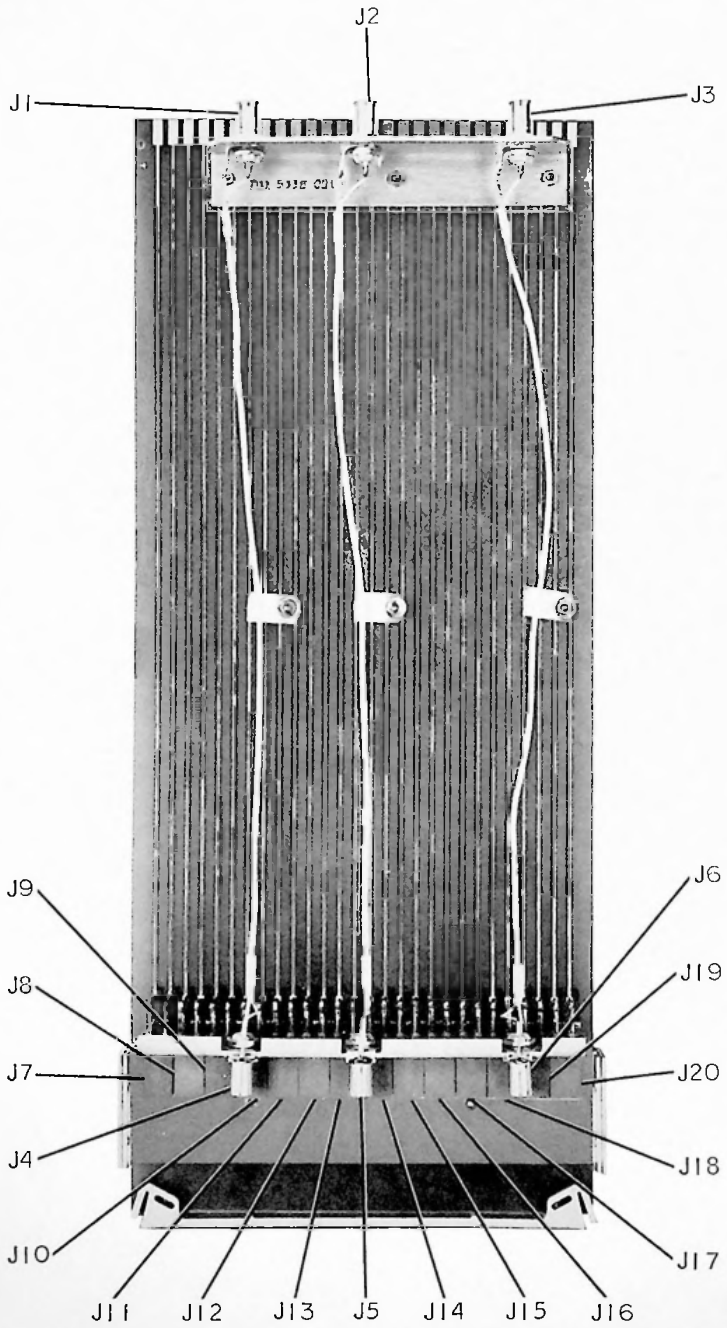
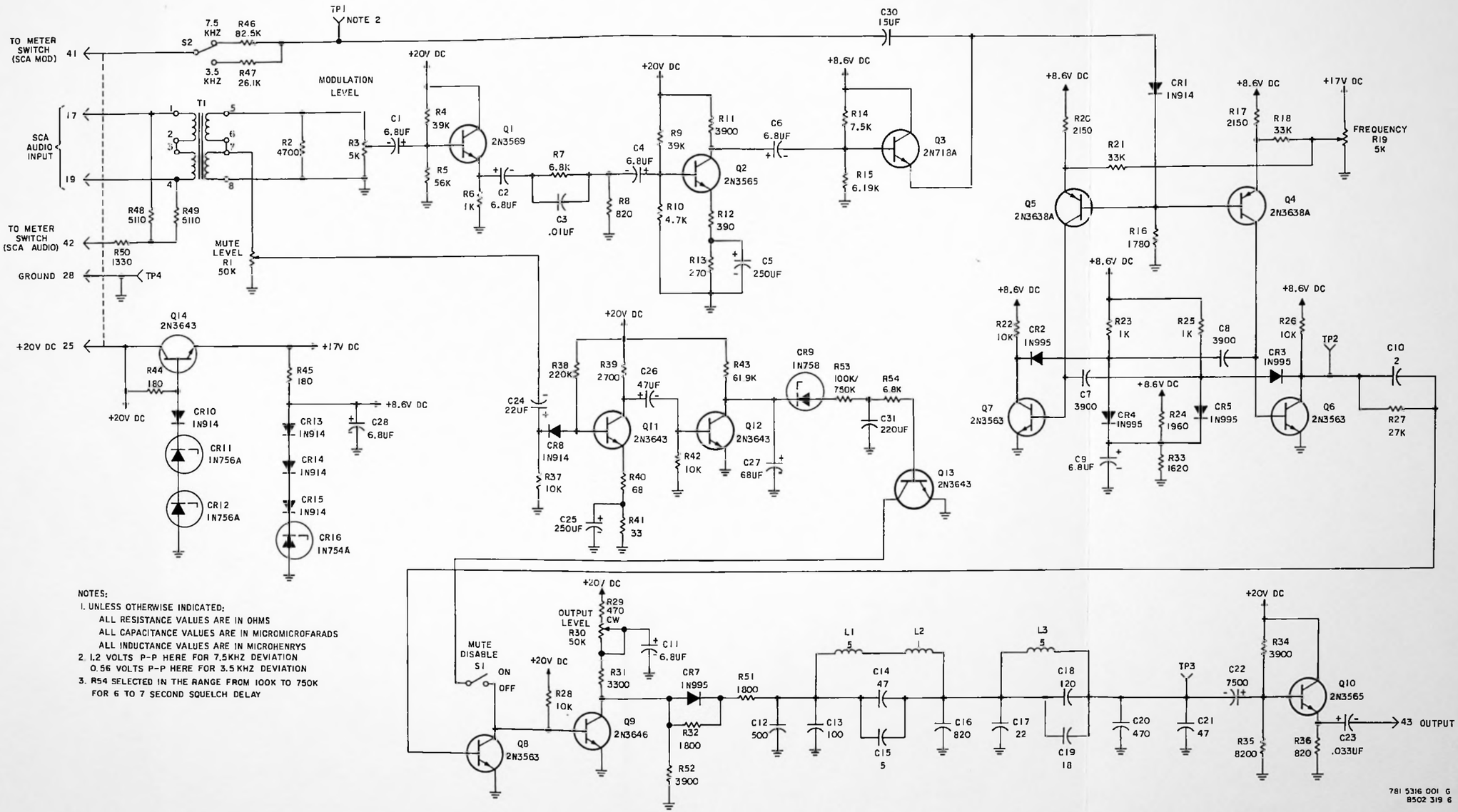


Figure 6-11. Extender Board.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	EXTENDER BOARD			781-5365-001
J1	CONNECTOR, ELECTRICAL 1 CONTACT	UG1051U	80058	357-9210-000
J2	SAME AS J1			
J3	SAME AS J1			
J4	CONNECTOR, ELECTRICAL 1 CONTACT	UG1050AU	80058	357-9211-000
J5	SAME AS J4			
J6	SAME AS J4			
J7	CONNECTOR, ELECTRICAL 2 CONTACTS	375430-9010	91662	372-2425-010
J8 THROUGH J20	SAME AS J7			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	MANUFACTURERS CODES			
CODE	MANUFACTURER			
00853	SANGAMO ELECTRIC CO S CAROLINA DIV PICKENS, S.C.			
01002	GENERAL ELECTRIC CO CAPACITOR DEPT HUDSON FALLS, N.Y.			
01939	SPRAGUE ELECTRIC CO OF WISCONSIN GRAFTON, WISC			
02288	ALLIED CONTROL CO INC PLANTSVILLE, CONN			
02660	AMPHENOL CORP BROADVIEW, ILL.			
02735	RADIO CORP OF AMERICA SOLID STATE AND RECEIVING TUBE DIVISION SOMERVILLE, N.J.			
03550	VANGUARD ELECTRONICS CO INGLEWOOD, CALIF			
03877	TRANSISTRON ELECTRONIC WAKEFIELD, MASS.			
04009	ARROW-HART AND HEGEMAN ELECTRIC CO HARTFORD, CONN			
04713	MOTOROLA SEMICONDUCTOR PRODUCTS INC PHOENIX, ARIZ			
06978	ALADDIN ELECTRONICS DIV OF ALADDIN INDUSTRIES, INC. 705 MURFREESBORO ROAD NASHVILLE, TN 37210			
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV MOUNTAINVIEW, CALIF			
07388	TOROTEL, INC. 13402 S 71 HIGHWAY GRANDVIEW, MO 64030			
07688	MILITARY SPECIFICATIONS			
09408	STAR-TRONICS INC GEORGETOWN, MASS.			
12040	NATIONAL SEMICONDUCTOR CORP DANBURY, CONN			
12615	U.S. TERMINALS INC CINCINNATI, OHIO			
13103	THERMALLOY CO DALLAS, TX			
16352	COMPUTER DIODE CORP LODI, N.J.			
17117	ELECTRONIC MOULDING CORP PANTUCKET, R.I.			
22229	UNION CARBIDE CORP LINDE DIV MOUNTAIN VIEW, CALIF			
42190	THE MUTER CO CHICAGO, ILL.			
53021	SANGAMO ELECTRIC CO SPRINGFIELD, ILL.			
56289	SPRAGUE ELECTRIC CO NORTH ADAMS, MASS.			
60418	THE TORSION BALANCE CO CLIFTON, N.J.			
70309	ALLIED CONTROL CO INC NEW YORK, N.Y.			
70674	ADC PRODUCTS INC MINNEAPOLIS, MINN			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
71400	BUSSMANN MFG DIV OF MCGRAW-EDISON CO ST LOUIS, MO			
71450	CTS CORP ELKHART, IND			
72136	THE ELECTRO MOTIVE MFG CO INC WILLIMANTIC, CONN			
72982	ERIE TECHNOLOGICAL PRODUCTS INC ERIE, PA			
73138	BECKMAN INSTRUMENTS INC HELIPOT DIVISION FULLERTON, CALIF			
73445	AMPEREX ELECTRONIC CORP HICKSVILLE LONG ISLAND, N.Y.			
73899	J F D ELECTRONICS CO A DIVISION OF STRATFORD RETREAT HOUSE BROOKLYN, N.Y.			
74970	E F JOHNSON CO WASECA, MINN			
75042	I R C INC PHILADELPHIA, PA.			
75382	KULKA ELECTRIC CORP MT VERNON, N.Y.			
76854	OAK MFG CO CRYSTAL LAKE, ILL.			
80058	MILITARY SPECIFICATIONS			
80105	BOLLER AND CHIVENS INC PASADENA, CALIF			
81349	MILITARY SPECIFICATIONS			
82389	SWITCH CRAFT INC CHICAGO, ILL.			
82887	UNITED SCREW AND BOLT CORP CLEVELAND DIV 3590 W 58TH CLEVELAND, OH 41102			
83003	VARO INC GARLAND, TEX			
87930	TOWER MFG CORP LATROBE, PA			
91506	AUGAT INC ATTLEBORO, MASS.			
91637	DALE ELECTRONICS INC COLUMBUS, NEBR			
91662	ELCO CORP WILLOW GROVE, PA.			
94148	SCIENTIFIC ELECTRONIC PRODUCTS INC LOVELAND, COLO			
94375	AUTOMATIC METAL PRODUCTS BROOKLYN, N.Y.			
95105	COLLINS RADIO CO INFORMATION SCIENCE CENTER NEWPORT BEACH, CALIF			
96906	MILITARY SPECIFICATIONS			
98291	SEALECTRIC CORP MAMARONECK, N.Y.			
98978	INTERNATIONAL ELECTRONIC RESEARCH CORP BURBANK, CALIF			
99800	DELEVAN ELECTRONICS CORP AURORA, N.Y.			



NOTES:

1. UNLESS OTHERWISE INDICATED:
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS
   ALL INDUCTANCE VALUES ARE IN MICROHENRYS
2. 1.2 VOLTS P-P HERE FOR 7.5KHZ DEVIATION
   0.56 VOLTS P-P HERE FOR 3.5 KHZ DEVIATION
3. R54 SELECTED IN THE RANGE FROM 100K TO 750K FOR 6 TO 7 SECOND SQUELCH DELAY

Figure 7-3. 786W-1 SCA Generator (A1), Schematic Diagram.

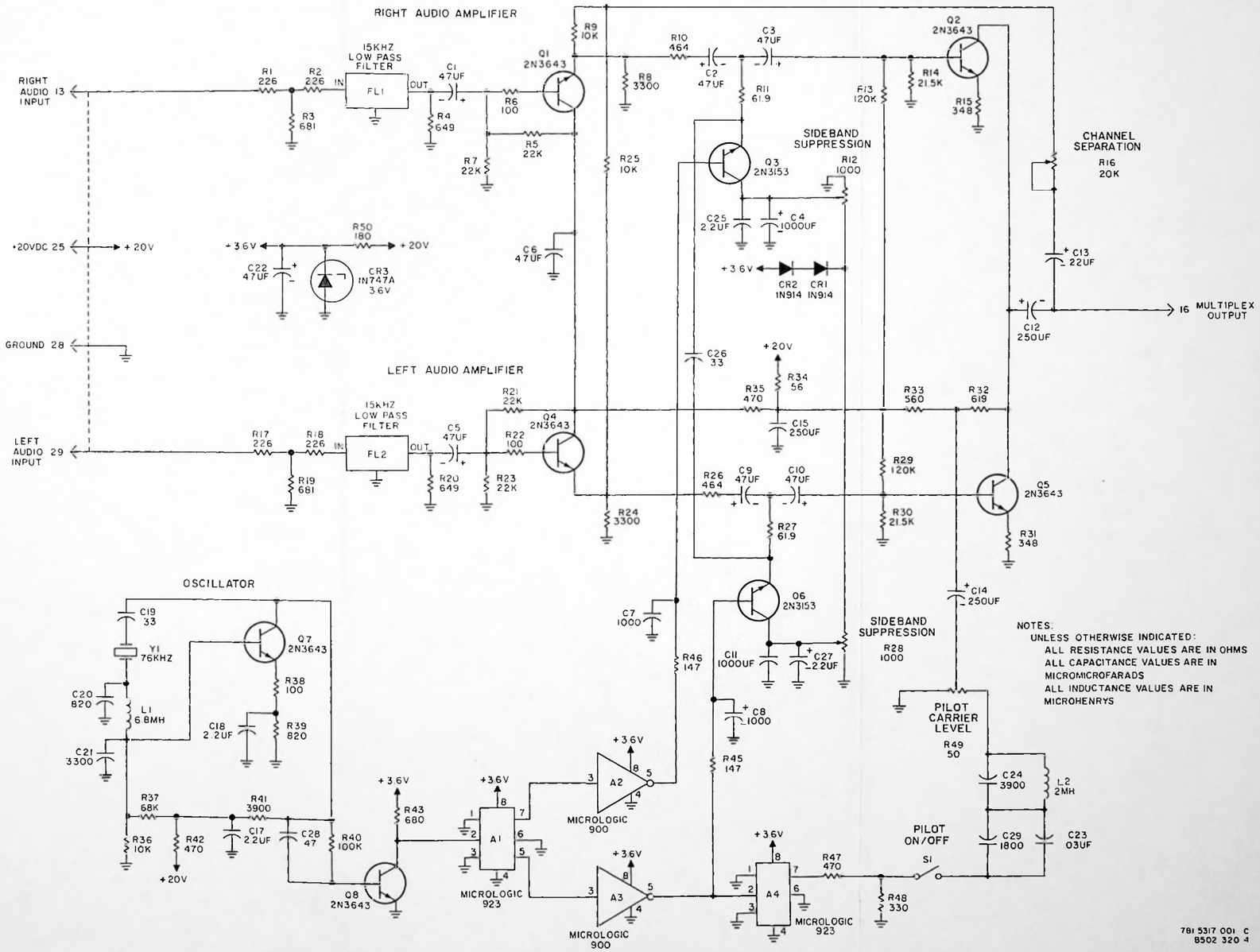
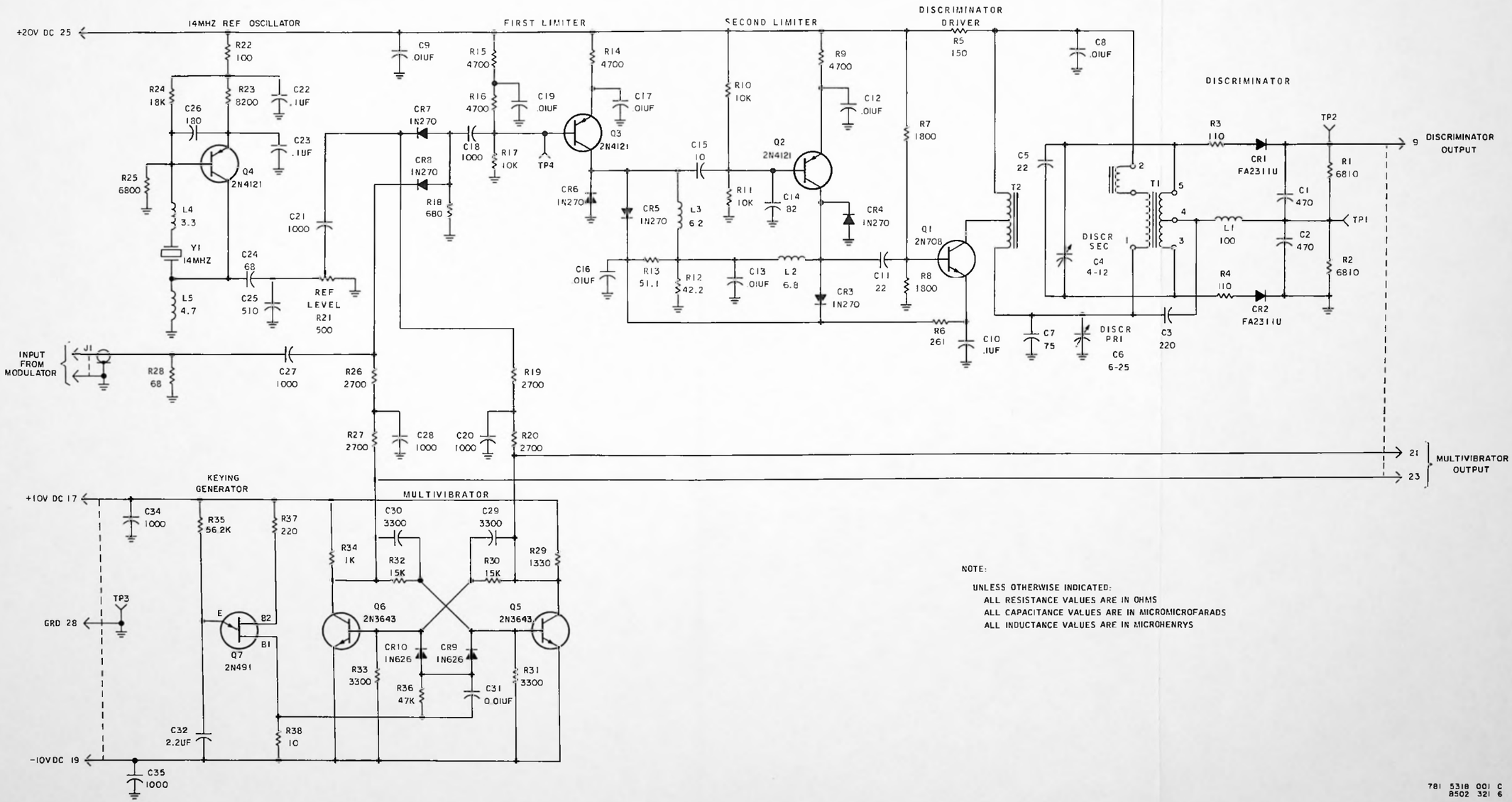


Figure 7-4. 786V-1 Stereo Generator (A2), Schematic Diagram.



NOTE:

UNLESS OTHERWISE INDICATED:
ALL RESISTANCE VALUES ARE IN OHMS
ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS
ALL INDUCTANCE VALUES ARE IN MICROHENRYS

781 5318 001 C
8502 321 6

Figure 7-5. AFC Discriminator (A3), Schematic Diagram.

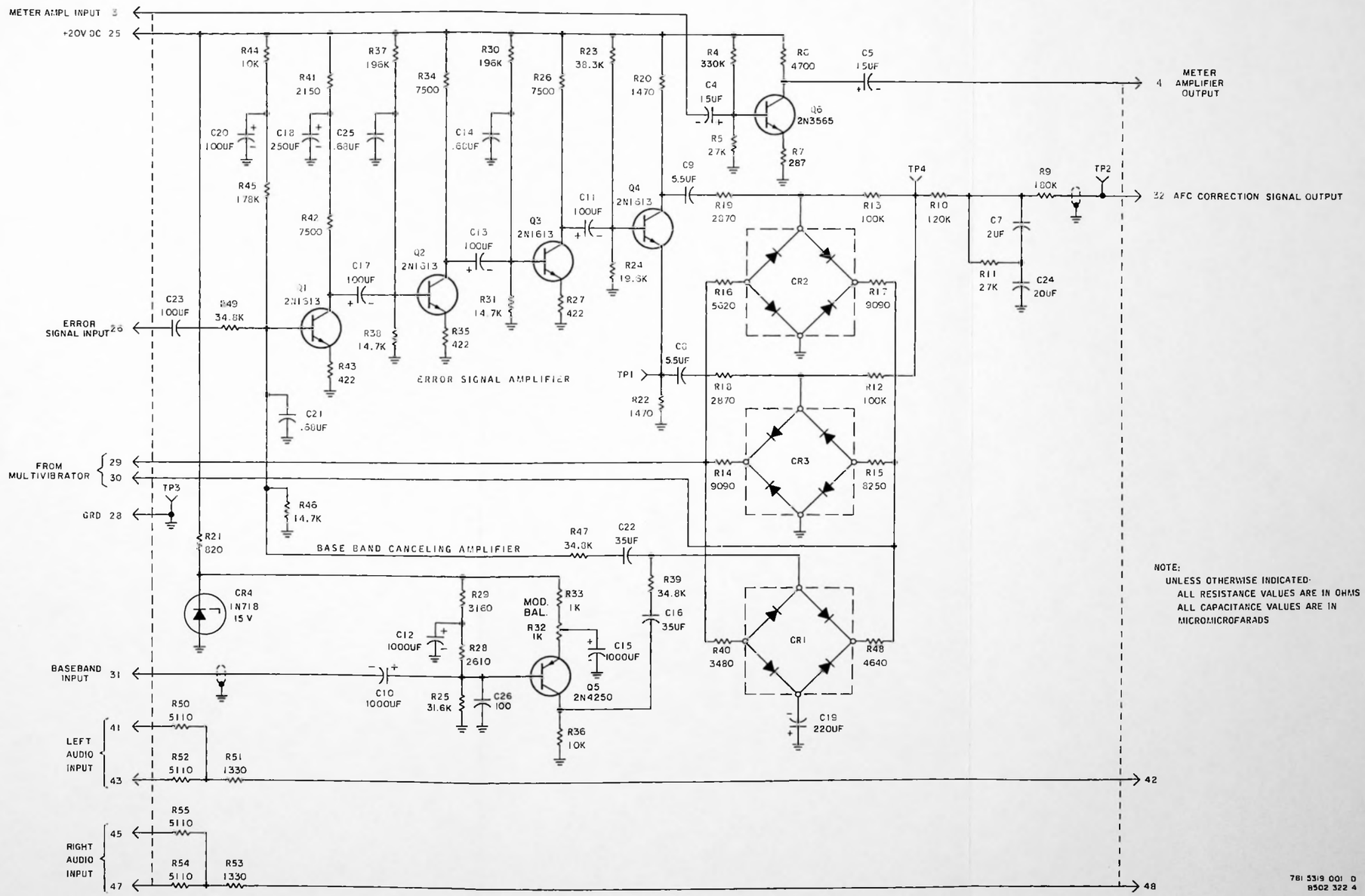


Figure 7-6. AFC Synchronous Detector (A4), Schematic Diagram.

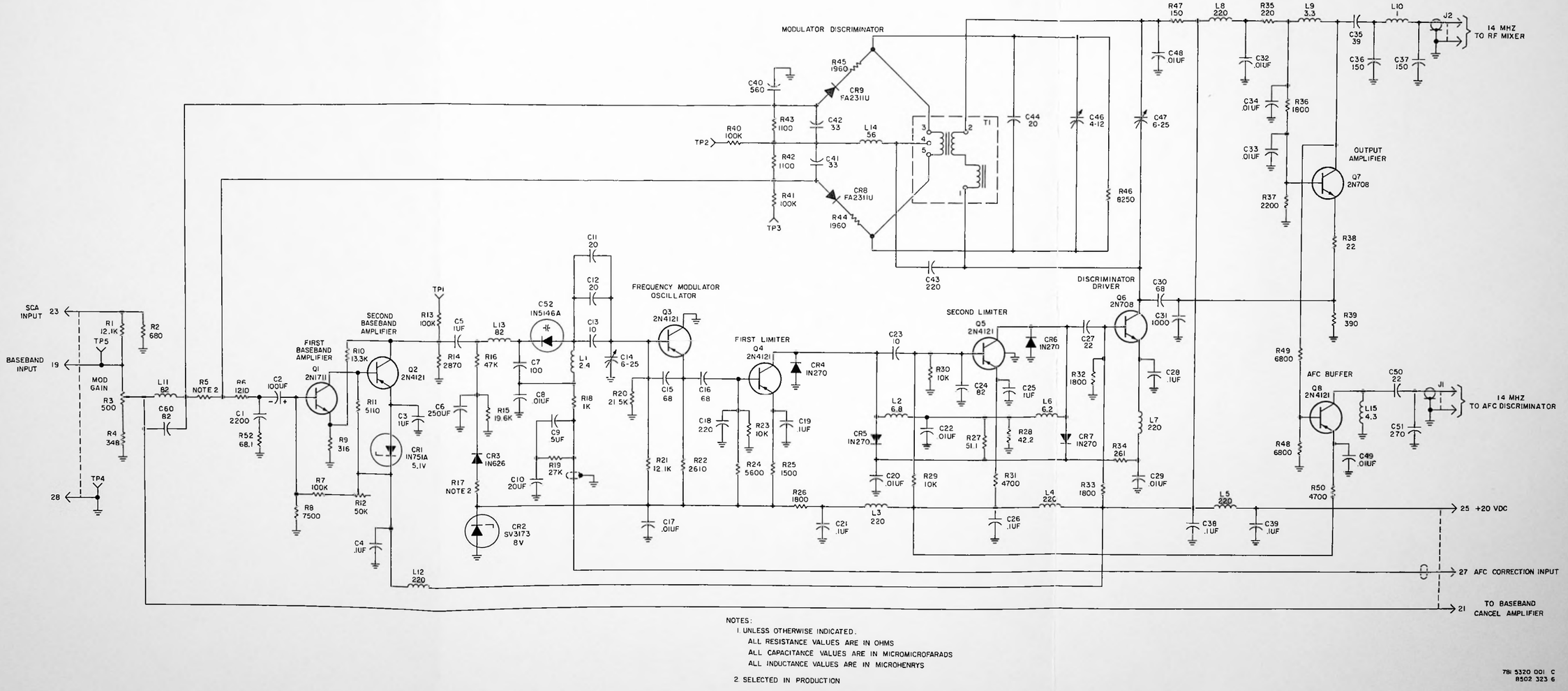
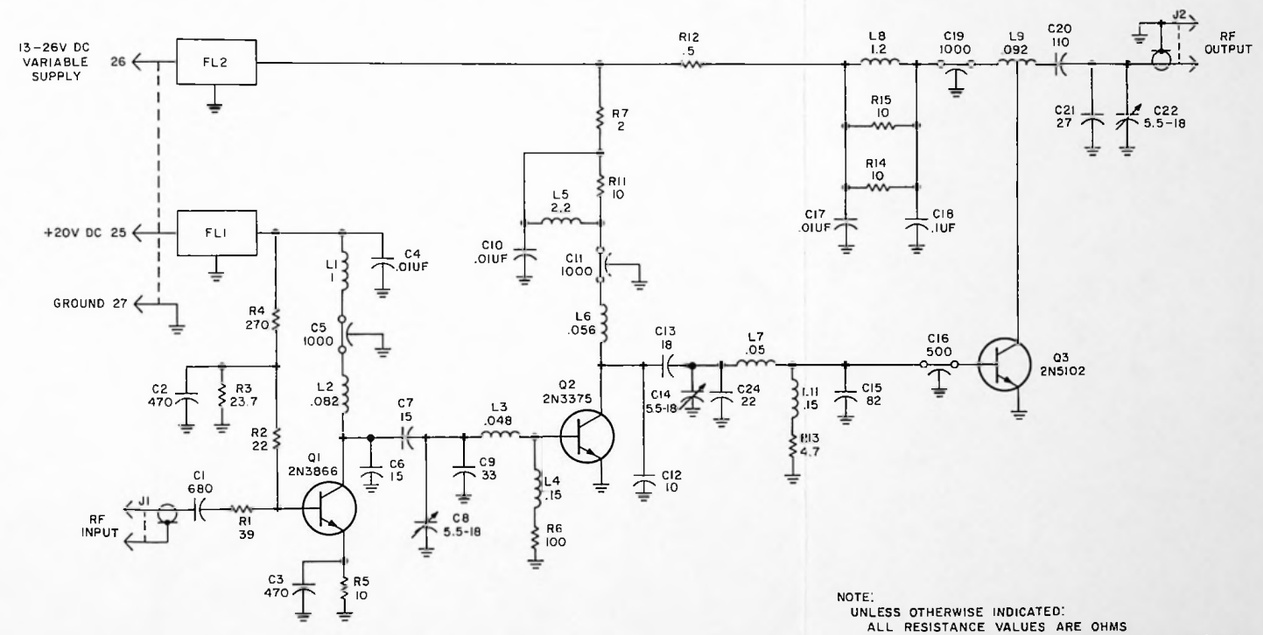


Figure 7-7. FM Modulator (A5), Schematic Diagram.



NOTE:
UNLESS OTHERWISE INDICATED:
ALL RESISTANCE VALUES ARE OHMS
ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS
ALL INDUCTANCE VALUES ARE IN MICROHENRYS

781 5322 001 A
8502 324 4

Figure 7-9. Power Amplifier (A7), Schematic Diagram.

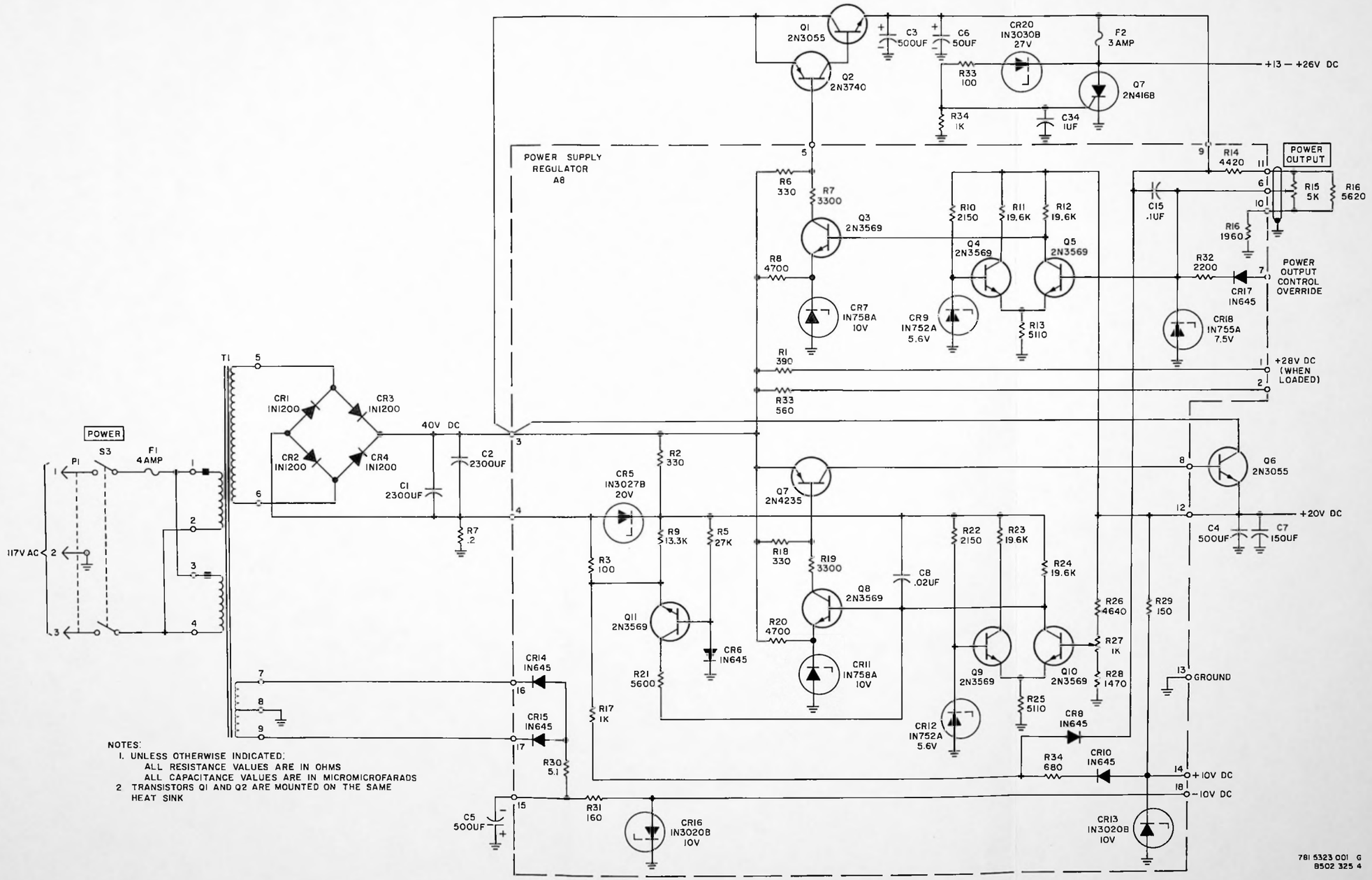


Figure 7-10. Power Supply (A8), Schematic Diagram.

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glossary

Crosstalk - An undesired signal occurring in the main channel (or stereo subchannel) caused by an electrical signal in the stereo subchannel (or main channel).

FM stereophonic broadcast - The transmission of a stereophonic program by a single FM broadcast station utilizing the main channel and a stereophonic subchannel.

Left (or right) signal - The electrical output of a microphone or combination of microphones placed so as to convey the intensity, time, and location of sounds originating from areas predominately to the listener's left (or right) of the center of the performing area.

Left (or right) stereophonic channel - The left (or right) signal as electrically reproduced in the reception of FM stereophonic broadcasts.

Main channel - The band of frequencies from 50 to 15,000 Hz which frequency modulate the main carrier.

Pilot carrier - A subcarrier serving as a control signal for use in the reception of FM stereophonic broadcasts.

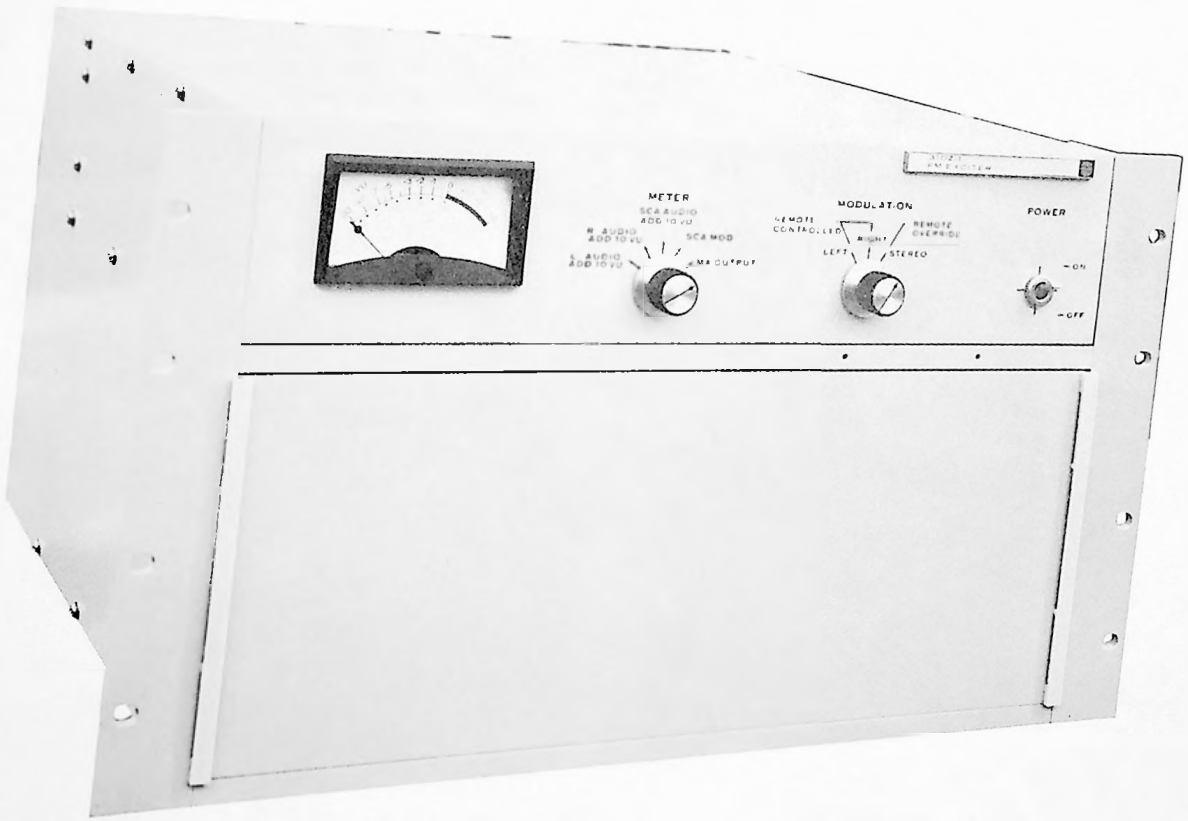
Stereophonic separation - The radio of the electrical signal caused in the right (or left) stereophonic channel to the electrical signal caused in the left (or right) stereophonic channel by the transmission of only a right (or left) signal.

Stereophonic subchannel - The band of frequencies from 23 to 53 kHz containing the suppressed stereophonic subcarrier and its associated AM sidebands.

100-percent modulation - 75-kHz deviation of the main carrier.

SCA - Subsidiary Communication Authorization. The authorization to transmit background music that is multiplexed on FM broadcast.

Multiplex - The simultaneous transmission of two or more programs or signals over a single rf channel.



8502 493 P1

Figure 1-1. 310Z-1 FM Broadcast Exciter.

section 1
general description

1.1 INTRODUCTION

The 310Z-1 is an FM broadcast exciter (figure 1-1) that provides a frequency-modulated signal in the 88- to 108-MHz range (exact frequency as specified by the customer) for further amplification or direct transmission. It is a solid-state exciter which can be manually adjusted to provide a minimum output of 10 watts and a maximum output of 20 watts. The 310Z-1 exciter is prewired to accept two optional plug-in modules which perform stereo generation and SCA generation so that the 310Z-1 can perform any or all of the functions required of an FM broadcast exciter. The optional 786W-1 SCA Generator enables background music to be transmitted at 67 kHz multiplexed on an FM broadcast. The optional 786V-1 Stereo Generator allows broadcasting compatible time division multiplex stereo.

1.2 PHYSICAL DESCRIPTION

The 310Z-1 exciter is 19 inches wide, 10.5 inches high, and 15 inches deep, weighs approximately 40 pounds, and is designed for mounting in a standard 19-inch equipment rack. Six plug-in circuit cards contain most of the circuitry. Controls, audio filters, and power supply components are mounted on the chassis. A card cage secured to the chassis provides receptacles for the plug-in cards. A removable front panel provides access to the cards. The connector for the rf signal output and the connector for the ac power input as well as the terminal strip for audio inputs are located on the back of the exciter. Built-in shielding prevents radiation and interference.

1.3 FUNCTIONAL DESCRIPTION

The functional units of the 310Z-1 FM Broadcast Exciter are: an FM modulator, an afc discriminator, an afc synchronous detector, an rf mixer, and a power amplifier. In addition, a stereo generator and an SCA generator are optional units which may be included as part of the 310Z-1. Each of these major functional units is constructed as a plug-in module, and the 310Z-1 is prewired so that the stereo generator and the SCA generator plug-in modules can be added at any time.

When the 310Z-1 is used only for monaural broadcasts (without the optional SCA generator or stereo generator), the audio input is applied to the baseband amplifier of the FM modulator through the required audio processing circuits. A 14-MHz oscillator is modulated to full deviation by the input. A discriminator detects this FM signal and applies the detected audio as negative feedback to the baseband amplifier to minimize noise and distortion. This FM signal is also applied to the afc discriminator which, in conjunction with the afc synchronous detector, maintains the oscillator output frequency at 14 MHz. The modulation is removed from the error correction voltage by synchronously adding an out-of-phase baseband signal to the discriminator output so that the deviation effects are canceled.

The output frequency selected from the frequency range of 88 to 108 MHz is generated by mixing the 14-MHz output with the output from the 74- to 94-MHz crystal oscillator in the balanced mixer. The balanced mixer output frequency is the sum of the crystal oscillator frequency and the 14-MHz FM signal. This station output frequency signal is filtered and amplified to provide 10 to 20 watts of output power.

When the stereo generator is used, the exciter functions the same as described above with the exception that left and right audio inputs are applied to the stereo generator through separate preemphasis and shaping networks. These audio signals are multiplexed to provide the baseband signal which is filtered and applied to the FM modulator. When the SCA generator is used, the SCA audio input is amplified and used to frequency modulate a 67-kHz subcarrier oscillator. The FM SCA output is filtered and applied to the FM modulator.

1.4 OPTIONAL EQUIPMENT

Both the 786V-1 Stereo Generator and the 786W-1 SCA Generator are customer options. The exciter

may be purchased without either of these, for monophonic broadcasting.

1.5 TECHNICAL CHARACTERISTICS

The technical characteristics for the 310Z-1 are listed below, and have been divided into four lists: (1) general characteristics which apply to all 310Z-1 exciters, (2) those characteristics which apply to the 310Z-1 when it is used for monaural FM, (3) those characteristics which apply to the 310Z-1 when it is used for stereo FM with the 786V-1 Stereo Generator, and (4) those characteristics which apply to the 310Z-1 when it is used for SCA transmission with the 786W-1 SCA Generator.

1.5.1 General

Ambient Temperature Range:
+15° to +55°C

Ambient Humidity Range:
Up to 95%

Maximum Altitude:
7500 ft

Input Power Requirement:
117 volts ac, ±10%, single-phase, 50/60 Hz

RF Power Output:
10 to 20 watts

Output Impedance:
50 to 70 ohms, unbalanced

Output Frequency Range:
88 to 108 MHz, crystal controlled

Crystal installed and exciter adjusted at factory to meet customer requirement

Carrier Frequency Stability:
Within ±1 kHz with ac line voltage of ±15% and temperature range of 0° to +55°C

Harmonic and Spurious Radiation:
Any emission appearing on a frequency removed from the carrier by between 120 and 240 kHz, inclusive is attenuated at least 30 db below the level of the unmodulated carrier

Any emission appearing on a frequency removed from the carrier by more than 240 kHz up to and including 600 kHz is attenuated at least 35 db below the level of the unmodulated carrier

Any emission appearing on a frequency removed from the carrier by more than 600 kHz is attenuated at least 80 db below the level of the unmodulated carrier, with the exception of harmonics of the rf carrier

Type of Modulation:
Direct frequency modulation

Modulating Frequencies:
50 Hz to 75 kHz

FM Noise Level:
65 db below 100% modulation

AM Noise Level:
55 db below carrier level

1.5.2 Monaural FM

Audio Input Impedances:
Monaural (left channel)
600 ohms balanced

SCA
600 ohms balanced

Audio Input Levels:
Monaural
10 ±2 dbm for 100% modulation

SCA
6 to 15 dbm, adjustable from 0% to 10% modulation

Frequency Response:
Standard 75-microsecond preemphasis

Distortion:
Not more than 0.5%

1.5.3 Stereo FM With 786V-1

Audio Input Impedances:
Left Channel
600 ohms balanced

Right Channel
600 ohms balanced

Audio Input Levels:
Left Channel
+10 ±2 dbm for 100% modulation

Right Channel
+10 ±2 dbm for 100% modulation

Frequency Response:
Standard 75-microsecond preemphasis for both right and left channels

Distortion:
1.0% for 50-Hz to 15-kHz audio modulation

Stereophonic Subcarrier and Pilot Carrier Phasing:
When used with 786V-1 Stereo Generator or equivalent, phase difference between the stereophonic subcarrier and pilot carrier is within the limits required for channel separation of more than 35 db with audio modulating frequencies of 50 Hz to 15 kHz

Stereo Channel Separation:
At least 35 db, 50 Hz to 15 kHz

Crosstalk:
At least 40 db below either single-channel level

38-kHz Stereo Subcarrier Suppression:
40 db below 90% modulation of the main carrier

Pilot Carrier Frequency:
19 kHz ±2 Hz

Pilot Carrier Level:
Adjustable from 0% to 15% modulation of main carrier

1.5.1 SCA FM With 786W-1

Audio Input Impedance:
600 ohms, balanced

Audio Input Level:
+6 to +15 dbm, adjustable from 0% to 10% modulation

SCA Subcarrier Center Frequency:
67 kHz

SCA Frequency Modulation of Main Carrier:
Adjustable from 10% to 30%

SCA Generator Center Frequency Stability:
Within ±0.5%

Frequency Response:
Standard 75-microsecond preemphasis

FM Noise Level:
Less than -55 db

Distortion:
1.0% for 50 to 15 Hz with 3.5-kHz deviation

1.0% for 50 to 5 Hz with 7.5-kHz deviation

2.0% for 50 Hz to 15 kHz with 7.5-kHz deviation

Crosstalk:
Crosstalk from main channel and stereo subchannel into the SCA channel shall be 40 db below 10% modulation of the main channel

section 2
installation

2.1 GENERAL

Remove all packing material carefully. Check equipment against shipping invoices and records. Inspect the unit for damaged or missing components. Check for free movement of front panel controls. Any claims for damage should be filed promptly with the transportation agency. If such claims are to be filed, all packing material must be retained. Store the factory shipping container for future use.

2.2 PREINSTALLATION

Make sure that all plug-in filters and cards are securely plugged in. Refer to Section 6, Parts List for locations.

Note

If the 786V-1 Stereo Generator is not to be installed, right channel filters FL-3 and FL-4 are not required.

2.3 WIRING

2.3.1 Audio Input Connections

Use only balanced 600-ohm audio inputs to the 310Z-1. Use only twisted, shielded pairs for input cables. (See figure 2-1.)

a. Monaural Inputs - Connect the monaural audio input line to TB1-1 and TB1-3. Connect the cable shield to TB1-2. (See figure 2-2.)
b. Stereophonic Inputs - Connect the left channel audio input line to TB1-1 and TB1-3. (See figure 2-2.) Connect the cable shield to TB1-2. Connect the right channel audio input line to TB1-4 and TB1-6. Connect the cable shield to TB1-5. Be sure that the 786V-1 Stereo Generator is plugged into the 310Z-1.
c. SCA Inputs - Connect the SCA audio input to TB1-7 and TB1-9. Connect the cable shield to TB1-8. Be sure that the 786W-1 SCA Generator is plugged into the 310Z-1. Set the 786W-1 METER switch to 3.6 kHz or 7.5 kHz, depending on the deviation to be used. Set the 786W-1 MUTE ENABLE switch to ON.

2.3.2 Stereo Remote Control

If stereo remote control is desired, connect the leads from the station remote control switch to TB1-10 and TB1-11 (ground).

2.3.3 RF Output

Connect a coaxial cable from the transmitter rf input to the exciter rf output jack, J1.

2.3.4 Input Power

Connect the ac line cord between P1 on the exciter and 117 volts ac.

Caution

Do not operate the 310Z-1 exciter without a load connected to the rf output, and do not operate the exciter over any extended period of time into a vswr greater than 2:1. To guard against such operation, steps should be taken during installation, as outlined in paragraph 2.3.5.

2.3.5 Power Control Override

A voltage should be connected to TB1-12 of the 310Z-1 to protect the exciter output transistors when the exciter is operated without a load. A dc voltage source (+12 to +35 volts) is connected to TB1-12 so that when no plate voltage is present in the transmitter, the dc voltage is applied to the power regulator card; and as a result the exciter output power is reduced to a sale level.

If the override voltage is not available directly from the transmitter with which the exciter is being used, the +35 volts provided at TB1-13 of the exciter may be connected through a relay so that it is applied whenever plate voltage is removed from the power amplifier stage in the transmitter.

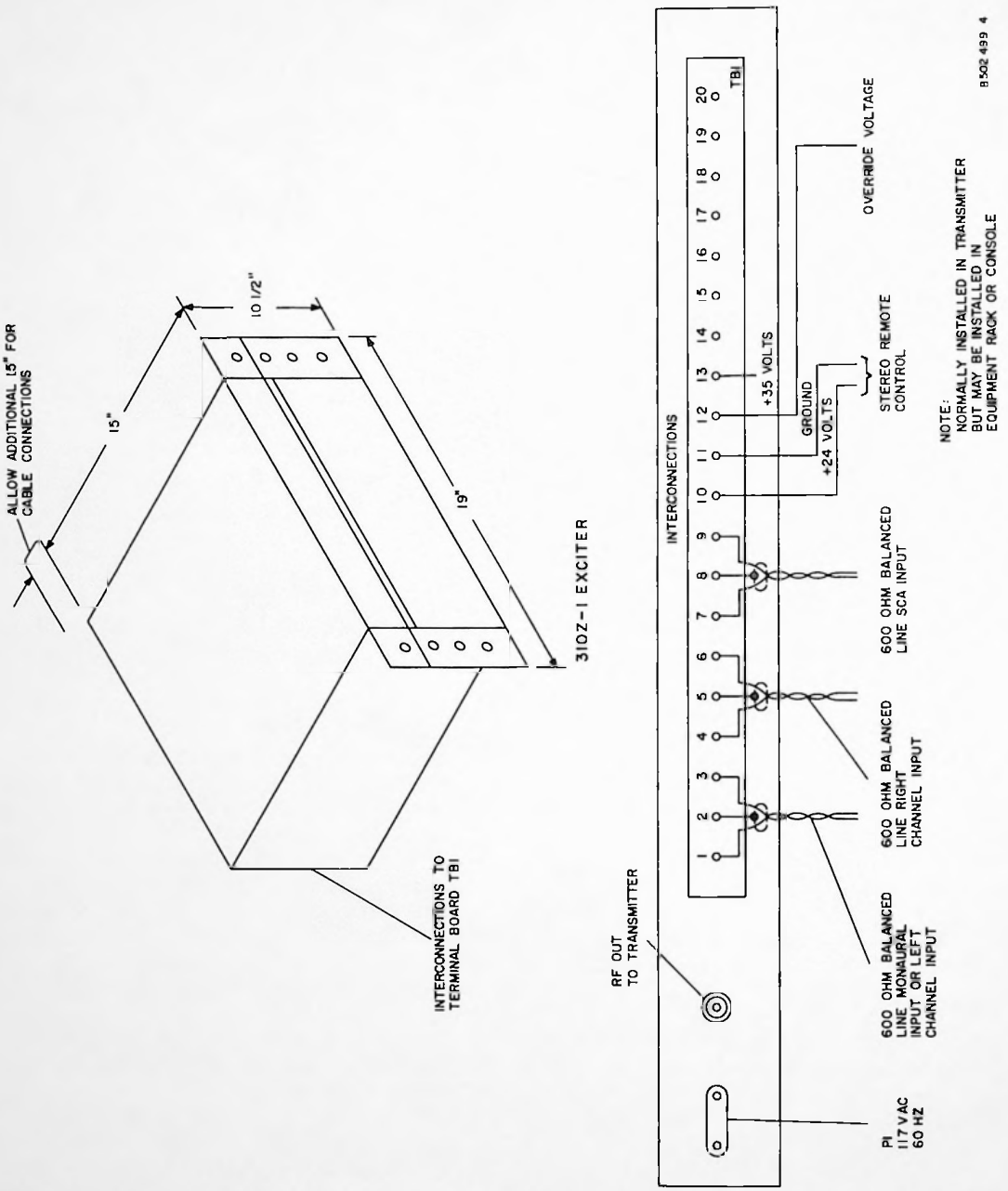


Figure 2-1. 310Z-1 FM Broadcast Exciter, Outline Dimensions and Installation Details.

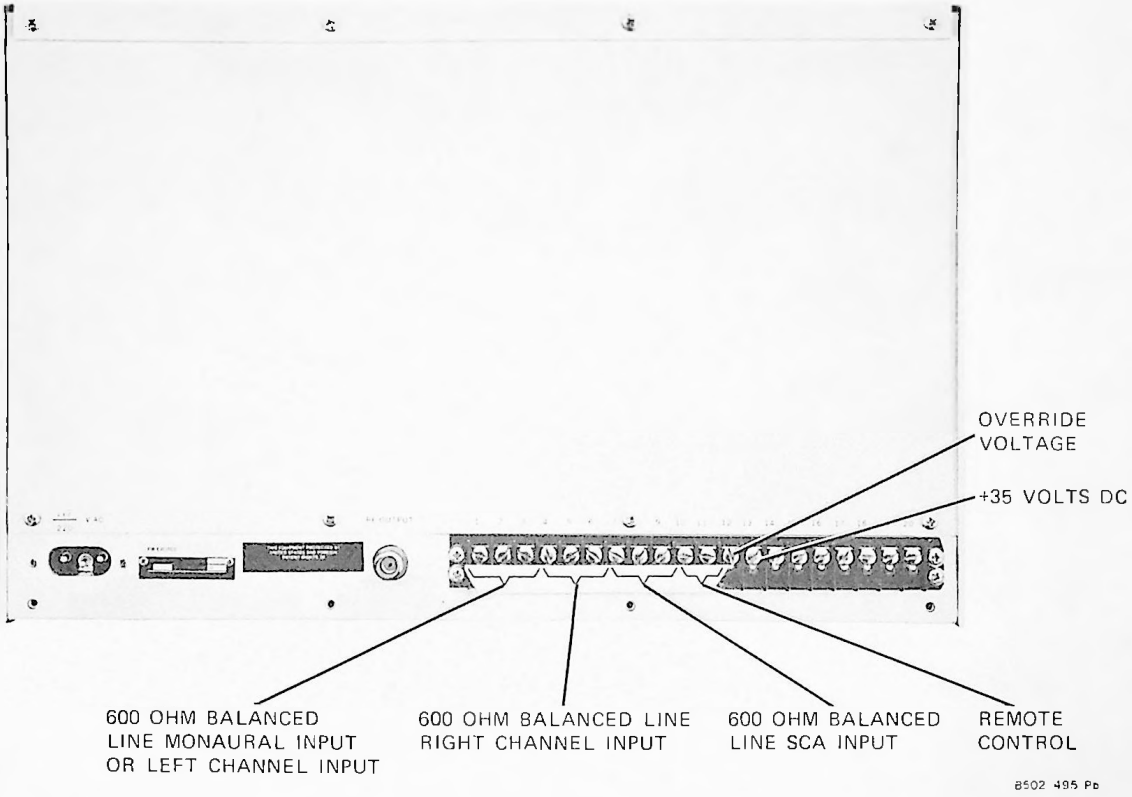


Figure 2-2. 310Z-1 FM Broadcast Exciter, External Connections.

2.4 INITIAL CHECKS

The 310Z-1 exciter is carefully adjusted and inspected at the factory and no special tests or adjustments are required upon installation. However, once the exciter has been installed in the transmitter or other broadcast system, the transmitter should be checked to ensure that it is operating.

2.5 OUTPUT FREQUENCY CHANGE

The output frequency of the 310Z-1 is crystal controlled and can be changed to any desired frequency between 88 and 108 MHz. To change the exciter frequency, refer to paragraph 5.8.

section 3
operation

3.1 GENERAL

Only the three front panel switches and the vu meter on the front panel of the exciter (figure 3-1) are used during normal operation. Refer to table 3-1. After the exciter has been placed in operation, it is necessary only to check meter indications from time to time to ensure that the exciter is operating properly.

3.2 NORMAL TURN-ON PROCEDURE

a. Place POWER switch to ON.
b. Set MODULATION switch to LEFT, RIGHT, or STEREO, depending on the type of modulation desired.
c. Make sure that exciter is functioning correctly by placing METER switch in each position and ensuring that the vu meter indicates 0 ±1 vu in each switch position.

Note

If monaural operation is used, the left audio input channel is normally used for the audio input with the MODULATION switch in the LEFT position. To use the left channel for monaural operation, filters FL1 and FL2 must be installed. To use the right audio input, filters FL3 and FL4 must be installed. For stereo operation all four filters must be installed.

3.3 ALTERNATE TURN-ON PROCEDURE

When the 310Z-1 is used in a Collins transmitter having automatic sequencing circuits, the POWER switch is normally left in the ON position and the exciter is turned on and off by the power sequencing circuits of the transmitter.

3.4 STEREO/MONAURAL REMOTE SWITCHING

When it is desired to switch the exciter from monaural to stereo from a remote location, a stereo on/off switch is connected between pins 10 and 11 of terminal board TB1. This switch will then control relay K1 so that remote switching can be used as long as the MODULATION switch is in either the LEFT or RIGHT position. The STEREO position overrides the remote stereo OFF position.

Table 3-1. 310Z-1 FM Broadcast Exciter, Front Panel Controls and Indicators.

REFERENCE DESIGNATION (Figure 3-1)	CONTROL OR INDICATOR	FUNCTION
S1	MODULATION	Selects either the left audio input to be broadcast monaurally (LEFT), or the right audio input to be broadcast monaurally (RIGHT), or the left and right audio inputs to be broadcast stereophonically (STEREO).
M1/S2	METER	The vu meter, in conjunction with the METER function switch S2, permits monitoring of the various audio inputs and the output from the 310Z-1 exciter. Refer to table 3-2.
S3	POWER	Controls the application of 117 vac to the exciter.

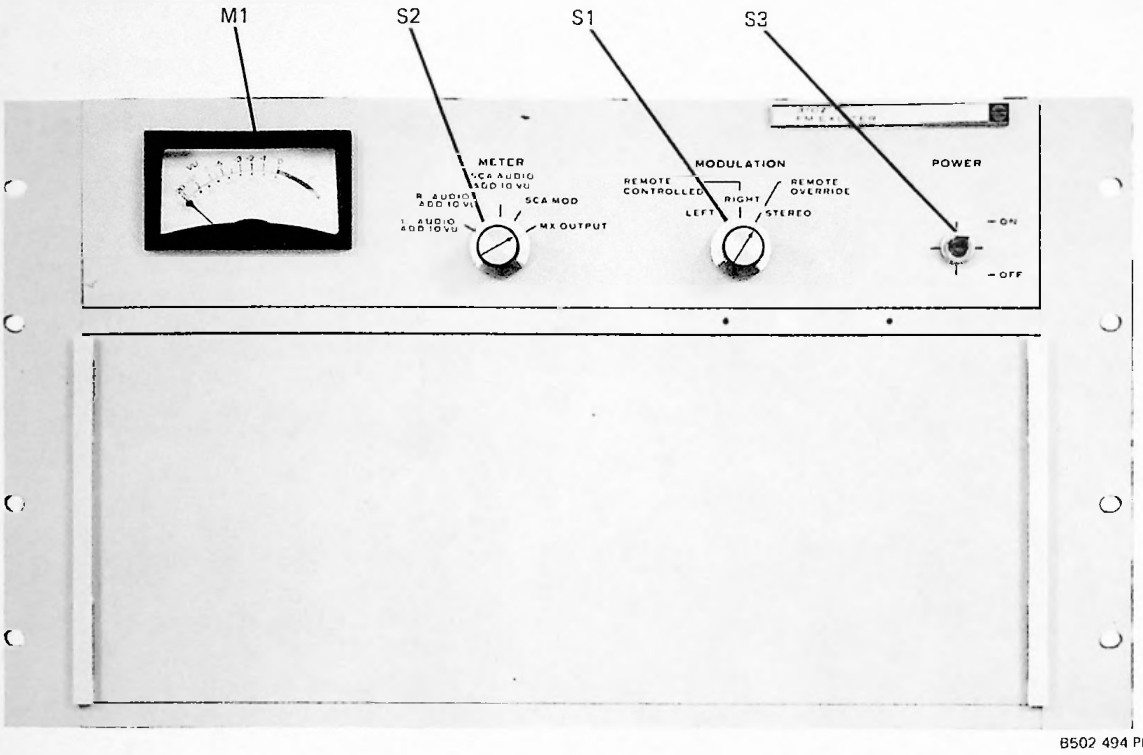


Figure 3-1. 310Z-1 FM Broadcast Exciter, Front Panel Controls and Indicators.

Table 3-2. 310Z-1 FM Broadcast Exciter, Typical Meter Indications.

POSITION OF METER SWITCH S2	FUNCTION	METER INDICATION
L AUDIO ADD 10 VU	Left channel audio input level	-1 to +1 vu
R AUDIO ADD 10 VU	Right channel audio input level	-1 to +1 vu
SCA AUDIO ADD 10 VU	SCA audio input level	-1 to +1 vu
SCA MOD	Amount of deviation of SCA subcarrier	0 ±1 vu. With switch S2 on the 786W-1 SCA Generator card in the 7.5-kHz position, 0-vu indication means that the SCA audio input is causing ±7.5-kHz deviation of the subcarrier. With S2 on the 786W-1 card in the ±3.5-kHz position, 0 vu indicates a 3.5-kHz deviation of the subcarrier.
MX OUTPUT	Level of baseband signal to the FM modulator	-1 to +1 vu

section 4
principles of operation

4.1 GENERAL

The 310Z-1 exciter produces a frequency-modulated output for driving a power amplifier in an FM broadcast transmitter. The 310Z-1 employs the direct method of frequency modulation. The optional 786V-1 Stereo Generator produces signals which meet all FCC requirements for stereophonic broadcasting. The optional 786W-1 SCA generator produces an FM subcarrier for broadcasting background music under an FCC Subsidiary Communications Authorization.

4.2 BLOCK DIAGRAM DISCUSSION

Refer to figure 4-1 (simplified block diagram) and figure 7-1 (detail block diagram) during the following discussion. The major circuits of the 310Z-1 are contained on plug-in modules; and as shown on figure 4-1, these modules are the major blocks of the 310Z-1 exciter. When an exciter is used for monaural broadcasting without the optional modules, the monaural input is normally applied to the audio processing circuits and then directly to the modulator module as the baseband signal. Since the remaining circuits operate the same for either monaural or stereophonic and SCA broadcasting, the block diagram discussion covers a complete exciter with the optional modules.

The left and right audio input signals are applied through the audio frequency circuits as the modulation input to the balanced modulator of the stereo generator. These signals are used to modulate two 38-kHz subcarrier signals which are 180° out of phase. As a result, the 38-kHz carrier is canceled so that the modulator output consists of only the two modulation frequencies and the desired modulation sidebands of the carrier frequency. One component is directly proportional to the sum of the two audio signals (L + R), and the other component is a double-sideband signal (L - R). The output from the balanced modulator is combined with the 19-kHz pilot carrier. Signal generation within the stereo generator is described in paragraph 4.3.

The output from the stereo generator is passed through a 53-kHz low-pass filter and then combined with the output from the SCA generator (if used) to produce the baseband signal. The 19-kHz pilot carrier is derived in the stereo generator by routing one of the 38-kHz subcarrier signals to a divide-by-2 circuit to produce the 19-kHz pilot carrier which is phase-locked to the 38-kHz signals. The baseband signal is then applied to the baseband amplifiers in the modulator and the baseband cancel amplifier in the afc synchronous detector.

The SCA audio input is applied to an audio transformer in the SCA generator, routed through a preemphasis network, amplified, and used to frequency modulate the 67-kHz center frequency subcarrier. The audio input is also monitored by a carrier mute circuit which removes the SCA output whenever the audio input drops below the selected mute level.

The input to the modulator module is the baseband signal which modulates the 14-MHz carrier. This baseband signal may consist simply of the monaural audio signal or it may be a composite signal consisting of the L + R, L - R, 19-kHz pilot carrier, and the 67-kHz SCA signals, depending on the type of broadcast being employed. A portion of the FM output signal, which is routed to a modulator discriminator circuit from the modulator, applies a negative feedback to the baseband amplifier to reduce noise and distortion. The FM output from the modulator is then applied to the rf mixer.

The center frequency of the modulator oscillator is maintained at 14 MHz by the afc circuits of the afc discriminator and the synchronous detector. The afc discriminator compares the output frequency from the modulator with the output from a 14-MHz reference oscillator and derives an error signal. The afc synchronous detector uses this error signal from the discriminator to develop a voltage that will correct the frequency drift of the 14-MHz oscillator output.

The rf mixer develops the desired output frequency by the heterodyne action, mixing the frequency-modulated 14-MHz signal with the signal from a crystal-controlled oscillator. The sum of 14 MHz and the customer-selected crystal frequency is the FM output frequency (88 to 108 MHz). The output from the rf mixer is applied to the 3-stage rf amplifier which raises the signal to the desired output power level of 10 to 20 watts.

4.3 STEREO GENERATOR

The 786V-1 Stereo Generator performs the conversion of stereophonic input signals to an output which conforms to the standards approved by the FCC for transmission of stereophonic signals. In order to provide a realistic stereo effect, the 786V-1 maintains the difference in time delay and signal amplitude from the sound source to both the right and left channel microphones through the entire stereo system. Channel separation, which is the isolation between the two channels, is held to greater than 35 db by the 786V-1 to enhance the stereo effect to the listener. The following paragraphs discuss stereophonic signal generation and the principles of operation of the 786V-1 Stereo Generator.

4.3.1 Signals Required

The FCC requires that stereophonic FM broadcast signals be compatible, which means that the signals may be detected by either a monophonic or stereophonic receiver. To satisfy this and other requirements of the FCC, the signals and frequencies generated must be as shown in figure 4-2. In monophonic receivers only the L + R (left plus right) audio frequency component of the signal, called the main channel, is used. The L - R (left minus right) component of the baseband signal, called the subchannel, is a difference signal only and is comprised of sidebands of a 38-kHz suppressed subcarrier. This difference component and the 19-kHz pilot carrier signal are reduced by the deemphasis network of the monophonic receiver.

In FM stereophonic receivers all signals shown in figure 4-2 are detected and used. The L - R subchannel and L + R main channel signals are mixed, added, and subtracted to separate them into left and right audio signals. The 19-kHz pilot carrier signal is doubled in the receiver to regenerate the 38-kHz suppressed subcarrier which is used to demodulate the stereo signal. By this means, proper phase relationship is maintained between main channel and subchannel frequencies and between the left and right audio channels.

After the L + R and L - R signals have been generated, any interaction or exchange of information between the main channel (L + R) and the subchannel (L - R) represents crosstalk, which deteriorates the signals and has the effect of adding noise. In stereo transmitting systems, crosstalk must be kept at least 40 db below either signal-channel level.

To maintain 30-db channel separation, as required by the FCC, for the condition of an input into one channel only, the main channel and stereo subchannel signals must have equal peak amplitude, within approximately 0.3 db, and the envelope of the subchannel signal must cross the zero level simultaneously with the main channel signal, within approximately ±3°.

4.3.2 Method of Signal Generation in 786V-1 Stereo Generator

The 786V-1 generates the spectrum of signals shown in figure 4-2 by the time-division multiplex method. The basic system operating principle is shown in figure 4-3. The left and right audio channels are switched into the link (used alternately) at a 38-kHz rate. If the receiver switching rate is synchronized with the transmitter switching rate, the original left and right audio signals are detected. In the receiver the frequency of the 19-kHz pilot carrier is doubled to synchronize the receiver to the transmitter. It is important that the switching frequency in both the stereo generator and the receiver be of the same phase to retain the identity of the left and right audio signals. In the 786V-1 generator a crystal-controlled oscillator is used to generate a 76-kHz signal. This 76-kHz signal is divided by 2 in a micrologic flip-flop circuit; and by using both the logic 1 and the logic 0 outputs of the flip-flop, two 38-kHz square waves are obtained which will be exactly 180° out of phase. One of the 38-kHz square-wave signals is used to trigger another micrologic flip-flop (A4) to obtain a phase-locked 19-kHz pilot carrier signal.

To generate the baseband stereo signals, the 786V-1 Stereo Generator utilizes the basic circuits and functions of a balanced modulator. Refer to figure 4-1, the exciter block diagram, for component relationship and signal flow; refer to figure 7-4, the stereo generator schematic,

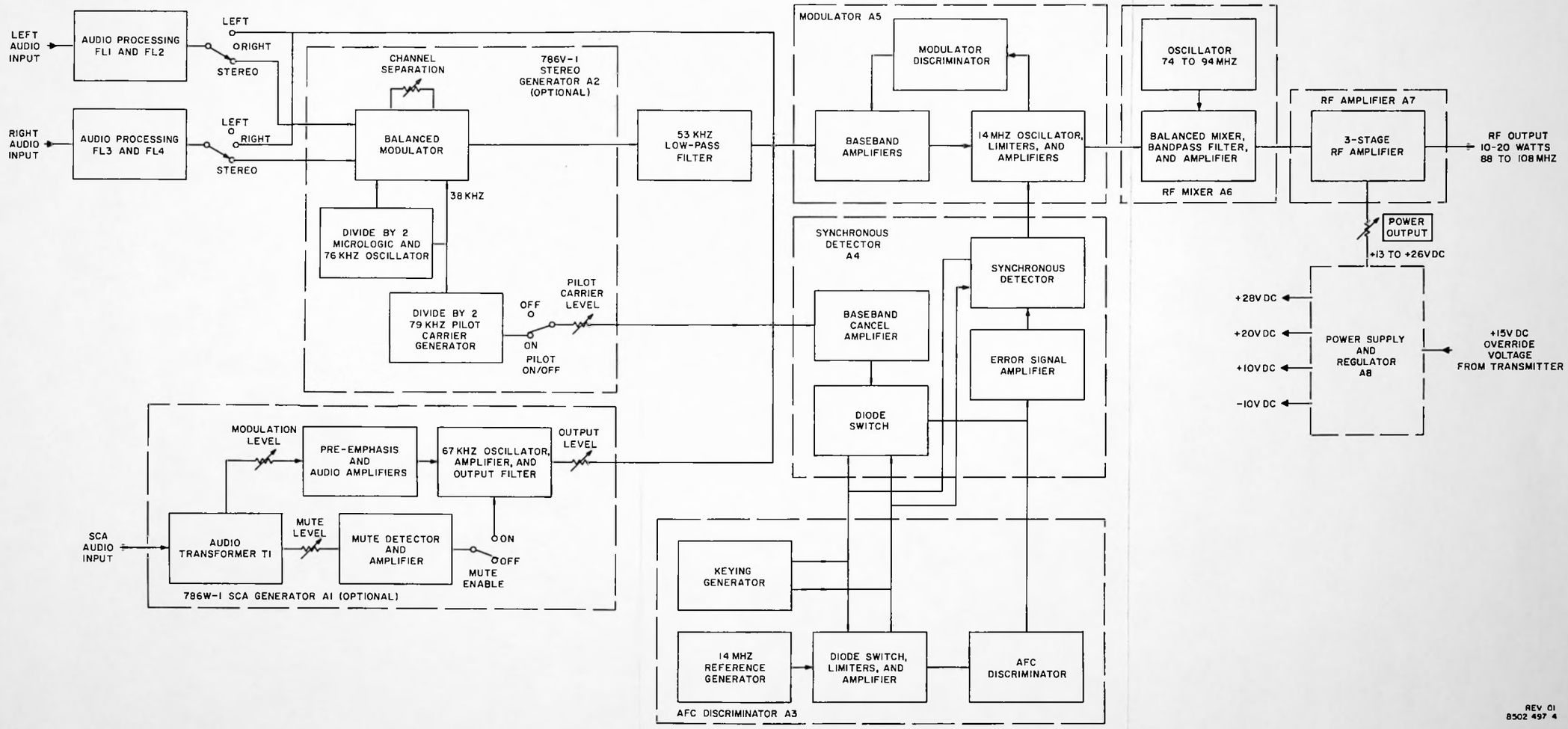


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Figure 4-1. 310Z-1 FM Broadcast Exciter, Simplified Block Diagram.

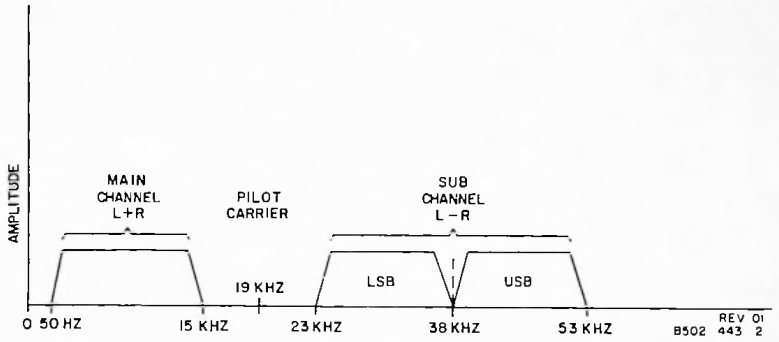


Figure 4-2. Spectrum of Signals in Stereo Baseband Audio.

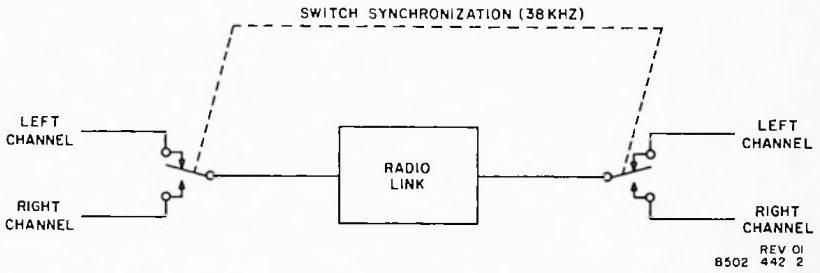


Figure 4-3. Elementary Time-Division Multiplex System.

for circuit detail. Although transistors Q2 and Q5 and their associated circuits function as a balanced modulator, several additional considerations affect the overall operation of the circuits to produce the desired stereo output signal. Separate input channels couple the two different modulating audio signals, L and R (left and right), to the modulator. Emitter follower Q1 applies the right audio signal to the balance modulator, and emitter follower Q4 couples the left audio signal to the balanced modulator. The 38-kHz subcarrier signals are applied to the balanced modulator transistor switches, Q3 and Q6. Because the two 38-kHz signals are of opposite phase, modulator transistors Q2 and Q5 are switched on and off at 38 kHz. Furthermore, when the outputs from Q2 and Q5 are combined, the subcarrier signals cancel and the 38-kHz subcarrier does not appear in the output signal. Transistor Q2 conducts during one half-cycle of the subcarrier frequency, and during this half-cycle one excursion of the square wave is modulated by the audio signal in the right channel. During the next half-cycle of the subcarrier, Q5 conducts and the next excursion of the square wave is modulated by the audio signal in the left channel. As stated previously, the 38-kHz subcarrier signals are balanced out in the modulator, and only the two modulating audio frequencies and the desired modulation sidebands of the carrier frequency are combined in the output.

4.3.3 Analysis of Signals Generated

It can be demonstrated by mathematical analysis that if a square wave is modulated alternately by two audio signals, two significant components are in the resultant signal. One component is directly proportional to the sum of the two audio signals (L + R), and the other component is a double-sideband (DSB) signal centered on the switching frequency, or subcarrier frequency (38 kHz). Mathematical analysis in detail is hardly within the scope of this manual. One other fact derived

from such analysis is necessary, however, to an understanding of the 786V-1 operation. Because the peak amplitude of the fundamental sine-wave components of a square wave is $\frac{4}{\pi}$ times the peak amplitude of the square wave itself, the L - R component mentioned above is $\frac{4}{\pi}$ times the L + R component.

To make L + R = L - R, as required by the FCC, small portions of the L and R signals are added directly in the 786V-1, shunted around the balanced modulator through R9, R25, R16, and C13, and added to the modulator output.

Development of the FCC required signal in the 786V-1 may also be demonstrated by an analysis of the waveforms generated. Figure 4-4 represents the circuit operation when the inputs to each of the audio channels (L and R) are identical sine waves. On one half-cycle of the square-wave switching frequency (subcarrier frequency), Q5 conducts and the L signal is utilized (or sampled). On the next half-cycle, Q2 conducts and the R signal is utilized. Expressing the same action in a different way, on one half-cycle of the switching frequency an excursion of the subcarrier square wave is modulated by the left channel audio signal; and on the next half-cycle the next excursion of the subcarrier square wave is modulated by the right channel audio signal. As may be seen in figure 4-4, the 38-kHz subcarrier switching frequency is balanced out, and with equal sine-wave input to both audio channels (L - R = sine wave) no sidebands are generated. The spikes shown on the composite sine wave in the third illustration of figure 4-4 are caused by imperfect switching and must be filtered out. The output of the modulator is then a sine wave identical to the original sine-wave input in either channel (L - R or $\frac{L+R}{2}$). Equal sine-wave input seldom occurs in an actual broadcast but is shown here for analysis.

Figure 4-5 shows the balanced modulator output when L = 1 and R = 0. The output of the balanced modulator is an audio component plus DSB components centered on the switching frequency, and odd harmonics. When the odd harmonics are filtered out by a phase-linear low-pass filter, the third waveform results. The audio component is then increased by $\frac{4}{\pi}$ and the fourth illustration results.

Figure 4-6 shows the time-division multiplex signal when L = -R, or L + R = 0, and L - R = 2L (or 2R). The composite waveform from the balanced modulator is shown in the third illustration. This waveform is composed of equal but opposite audio components, DSB components centered on the switching frequency, and odd harmonics. The audio components balance out; and when the odd harmonics are removed by filtering, the waveform in the fourth illustration results. This waveform is a DSB signal which equals L - R as required.

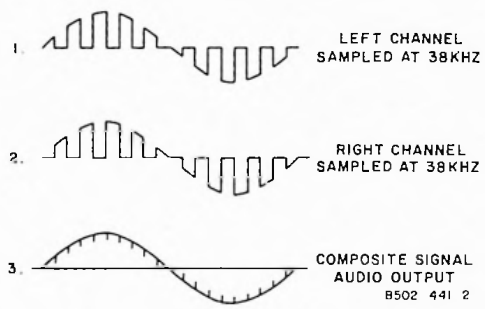


Figure 4-4. Balanced Modulator Output When L + R = 2; L - R = 0.

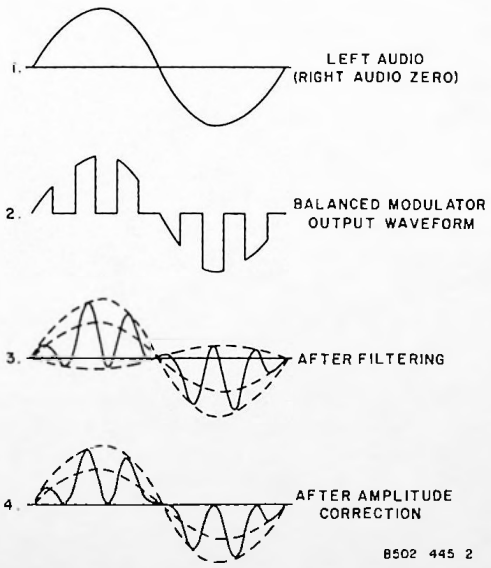


Figure 4-5. Balanced Modulator Output When L + R = 1; L - R = 1.

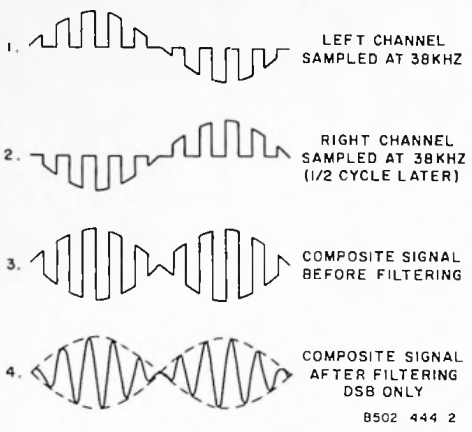


Figure 4-6. Balanced Modulator Output When L + R = 0; L - R = 2.

Perhaps the relationship of the L + R and L - R signals should be noted again here in connection with the above analysis. The L + R main channel component of the composite signal represents the sound which would be heard if only one microphone is used for input, and it is also the sound which would be heard from a monophonic receiver tuned to a stereo broadcast. The L - R component is a difference signal only. It may be a positive value, may be equal to zero, or may be a negative value (in the case where R is greater than L). When the composite signal is detected in a stereo receiver which is exactly synchronized with the transmitter, the L + R component is split and routed to both left and right audio channels in the receiver. The L - R difference signal is split also, and in effect is added to the left channel audio component and subtracted from the right. The result is $\frac{1}{2}(L + R) + \frac{1}{2}(L - R) = L$ in the left channel, and $\frac{1}{2}(L + R) - \frac{1}{2}(L - R) = R$, in the right channel. In this way the receiver gives a perfect reproduction of the stereo input to the transmitter.

4.3.1 Circuit Analysis

Both left and right audio signals are fed through preemphasis networks in the exciter before application to the right and left audio inputs of the stereo generator, connector pins 13 and 29, (figure 7-4). Within the generator the left and right audio channels are identical. The audio signals are fed through 15-kHz low-pass filters (FL1 and FL2), which sharply attenuate frequencies above 15 kHz. From FL1, capacitor C1 couples the right audio signal to the base of emitter follower Q1 and then to the modulator at the junction of resistors R9 and R10. The right channel audio signal is divided so that the signal through R9 adds to the left channel signal and the signal through R10 modulates the 38-kHz subcarrier. A similar circuit couples the left audio signal to emitter follower Q6 and to the other side of the balanced modulator at the junction of resistors R25 and R26. The signal through R25 adds to the right channel signal (through R9) and is routed around the modulator to increase the L + R component of the modulator output. Variable resistor R16 provides a control for the amplitude of the L + R component to control channel separation.

The 38-kHz subcarrier signals for the balanced modulator are produced from the output of the 76-kHz oscillator, transistor Q7 and its associated circuits. The oscillator frequency is controlled by crystal Y1, and after amplification by amplifier Q8 the 76-kHz signal triggers a flip-flop (micrologic A1). By using both the logic 1 and the logic 0 from this flip-flop, two 38-kHz signals are obtained which are 180° apart in phase. The output signals from flip-flop A1 are first amplified by the inverters (micrologics A2 and A3) and then applied to the modulator through transistor switches Q3 and Q6. Capacitor C26 helps maintain balance between Q3 and Q6 and improves the switching operation. The 38-kHz signals combine with the right and left channel audio signals at the base of Q2 and Q5 respectively. As a result, Q2 and Q5 alternately conduct at a 38-kHz rate and produce the stereo signals which are coupled through C12. The 38-kHz output from micrologic inverter A3 triggers micrologic flip-flop A4. With both the set side (pin 1) and the reset side (pin 3) of the flip-flop grounded, the flip-flop functions as a complementary flip-flop. Thus, the output from the logic 1 side (pin 7) is a 19-kHz signal which is phase-locked to the 38-kHz subcarrier signals. The 19-kHz pilot carrier signal is routed through the PILOT CARRIER switch (S1) to a filter network (C29, C23, L2, and C24) which removes the undesired third harmonic of 19 kHz. From the filter the signal is fed through potentiometer R49, which provides control of the pilot carrier amplitude, through capacitor C14 and a resistor network to the output of the balanced modulator.

Bypass capacitors C25 and C4 provide an ac ground for any signal through Q3 when the transistor conducts. Similar capacitors (C27 and C11) perform the same function in relation to Q6. Potentiometers R12 and R28 provide a means for adjusting the sideband suppression. Of special importance in this circuit is suppression of the 76-kHz harmonics of the 38-kHz subcarrier. The L - R double-sideband signal from the balanced modulator and the 19-kHz pilot carrier signal are combined and capacitor C12 couples the combined signal to the multiplex output, connector pin 16. The L + R amplitude correction from R16 through C13, adds to the signal coupled through C12, to form the composite stereo baseband signal at the multiplex output.

4.4 SCA GENERATOR

4.4.1 General

Signals from the SCA generator become part of the audio baseband signal which is used to modulate the carrier. The subcarrier oscillator is a free-running multivibrator which generates a 67-kHz center frequency that is frequency modulated by the SCA audio input signal. During normal stereo broadcast operation, modulation is limited to ±3.5-kHz deviation to avoid interference with the stereo frequencies in the baseband signal. During monophonic broadcasts, ±7.5-kHz deviation is used. The modulation output from the oscillator is filtered to remove unwanted harmonics. Refer to figure 4-1, the exciter block diagram, for component relationship and signal flow; refer to figure 7-3, SCA generator schematic for circuit detail.

4.4.2 Circuit Analysis

The SCA audio input is applied to the SCA generator through connector pins 17 and 19 (figure 7-3). The main signal path is through T1 to the audio amplifier Q2, but a portion of the input signal is also applied through S2 to the SCA audio input of the vu meter, and through the mute level control (potentiometer R1) to the carrier mute circuits.

Modulation level control R3 selects the SCA audio input level which is coupled through C1 to impedance-matching emitter follower Q1. A standard 75-microsecond preemphasis network (consisting of R7, R8, and C3) and capacitor C4 couple the input signal to the audio amplifier Q2. Capacitor C30 and switch S2 couple the amplified audio signal to the modulation input of the vu meter. Switch S2 selects the correct attenuation (R46 or R47) of the modulation input signal to provide a 0-vu indication for either 3.5-kHz or 7.5-kHz frequency deviation. The audio signal used to modulate the subcarrier frequency is applied through CR1 to the subcarrier oscillator circuit. Transistors Q4 through Q7 and their associated circuits comprise the astable multivibrator circuit which generates the 67-kHz center frequency subcarrier. Deviation of the subcarrier frequency, as adjusted by modulation level control R3, is within the range selected (±3.5 kHz or ±7.5 kHz). The modulated rf output from the oscillator is coupled through C10 and R3 to the base of amplifier Q8.

The carrier mute circuit is connected to the collector circuit of amplifier Q8 through MUTE ENABLE switch S1. Whenever the carrier mute circuit is being used (normally) and the audio input level drops below the level selected by MUTE LEVEL control R1, the output from the SCA generator is grounded at the collector of Q8. Positive pulses that are normally applied to the base of Q12 are removed and Q12 is turned off. As a result, C27 charges through R43 toward +20 volts; and when a potential of +10 volts is reached (in 3 seconds), diode CR9 breaks down and a positive voltage is applied to the base of Q13. Consequently, the collector of Q13 is at ground potential and this ground is applied through S1 to the collector of Q8.

Assuming that the input level is greater than the threshold level selected by MUTE LEVEL control R1, the modulated signal from the subcarrier oscillator is amplified by the direct-coupled amplifier (Q8 and Q9) and applied through CR7, R32, and R51 to the filter network. Capacitors C12 through C21 and inductors L1 through L3 comprise a 2-section band-shaping filter which removes the unwanted harmonics of the 67-kHz subcarrier. Capacitor C22 couples the filtered signal to emitter follower Q10, which provides a low-output impedance to feed the SCA subcarrier signal through capacitor C23 and connector pin 43 to the input of the FM modulator card of the exciter.

4.5 FM MODULATOR

The FM modulator card of the 310Z-1 exciter uses the direct method of frequency modulation. The modulating signal combines with the audio baseband signal through pin 19 (figure 7-7) and

the SCA signal through pin 23 (if SCA is used). If only stereo is being broadcast, the audio baseband signal may contain frequencies ranging from 50 Hz to approximately 53 kHz. If an SCA signal is included, the baseband frequency range extends upward to approximately 70.5 kHz. Consequently, broadband amplifiers are used throughout the FM modulator circuits.

The audio baseband signal is fed through potentiometer R3, which provides a control for the level of the signal to the modulated oscillator. From R3 the baseband signal is fed through C5 to the input of the oscillator. Voltage-sensitive capacitor C52 has a capacitance which changes with variations of the input signal, thus controlling the frequency of the oscillator and providing frequency deviation of ±75 kHz for 100-percent modulation. The Q3 and associated components comprise the modulated oscillator which develops a center frequency of 14 MHz.

Zener diode CR2 maintains a constant dc potential at the cathode of voltage-sensitive capacitor C52. An afc correction signal is fed through L1, R18, and pin 27 to the anode of C52. If the oscillator center frequency drifts below 14 MHz, the afc circuit develops a positive dc voltage (see paragraph 4.6.2) which is applied to C52, and the oscillator frequency is driven back toward 14 MHz. If the center frequency drifts upward, a negative voltage is applied to C52.

The 14-MHz FM signal from Q3 is fed to the first limiter, Q4. The first and second limiters, Q4 and Q5, clip the signal fed through them, and remove any amplitude modulation. Q6 is a discriminator driver which feeds a signal to the output amplifier, Q7, and to the modulator discriminator circuit.

The purpose of the discriminator on the FM modulator card is to complete an audio feedback loop which suppresses distortion, incidental noise, and transient carrier offset in the FM modulator circuits. The discriminator circuit provides negative feedback with fidelity over the range of frequencies handled. The discriminator demodulates the 14-MHz FM signal and develops an inverted baseband signal which is detected in diodes CR8 and CR9 and fed back to opposite sides of R6, in the input circuit of the first baseband amplifier.

The amplifier output signal from Q7 is filtered and then coupled through J1 to the rf mixer card. The output from Q7 is also coupled to Q8. The output from Q8 is filtered and fed through J2 to the afc discriminator card.

4.6 AUTOMATIC FREQUENCY CONTROL

The automatic frequency control (afc) of the 310Z-1 maintains the center frequency of the modulator oscillator at 14 MHz. The afc discriminator compares the output frequency from the modulator with the output from a 14-MHz crystal-controlled reference oscillator, and derives an error signal that is proportional in magnitude and polarity to the magnitude and direction of the difference in frequency of these two signals. The afc synchronous detector develops from the error signal a correction voltage that is used to correct the modulator oscillator. The afc discriminator uses a 5-Hz square-wave switching signal, generated by a keying generator-multivibrator circuit, to compare the two signals. This switching signal causes the discriminator to sample first one frequency and then the other. The afc circuits correct for frequency drift of the modulator oscillator and maintain stability of the center frequency of the exciter output within ±1 kHz.

4.6.1 AFC Discriminator Card

A 14-MHz crystal, Y1 (figure 7-5), controls the output frequency of the reference oscillator comprised of transistor Q4 and associated circuits. Capacitor C24 couples the output of Q4 to potentiometer R21 (REF LEVEL), which controls the 14-MHz reference signal level. From R21 the reference signal is coupled through C21 and is sampled on alternate half-cycles of the 5-Hz signal from the keying generator-multivibrator circuit. Diode CR7 is a gate for the 14-MHz reference signal. Contact J1 is the input for the 14-MHz FM signal from the FM modulator card. This signal is coupled through C27 and is sampled on alternate half-cycles (180° phase difference from the sampled 14-MHz reference signal) of the 5 Hz from the multivibrator circuit. Diode CR8 is the gate for this output. Transistors Q7, Q6, Q5, and associated circuits comprise the keying generator-multivibrator circuit which generates two 5-Hz square-wave signals equal in amplitude but opposite in phase. The signal from one multivibrator output is coupled through R27 and R26, combined with the signal from the FM modulator card, and applied to CR8. The signal in the other multivibrator output is coupled through a similar circuit, combined with the signal from the reference oscillator, and fed to CR7.

Diodes CR7 and CR8 are a gating switch which is controlled by the 5-Hz square-wave signals. During one half-cycle of the square wave, the signal from the oscillator is coupled through CR7 and C18 and to the first limiter, Q3. During the next half-cycle of the square wave, the signal from the FM modulator card is coupled through CR8 and C18 and to Q3. The first and second limiters, Q3 and Q2, clip the signal and remove any amplitude variations. The output of Q2 is a signal which for 1/10 second (one half-cycle of the 5-Hz square wave) represents the frequency of the reference oscillator, and for the next 1/10 second represents the frequency of the FM oscillator output. The output of Q2 is coupled through C11 to the discriminator driver, transistor Q1. The output of Q1, through transformer T2, drives a conventional discriminator, comprised of T1, CR1, CR2, and associated circuits. Capacitors C6 and C4 are variable to allow tuning of the discriminator transformer primary and secondary windings. Provided the signal from the FM modulator carries no frequency modulation, the output of the discriminator at connector pin 8 is a 5-Hz square wave proportional in amplitude to the frequency drift, or error, of the FM modulator. The polarity of the square wave depends on the direction of drift, or error.

When the FM modulator is modulated by a baseband audio signal, the baseband audio signal is fed around the discriminator to a baseband cancellation circuit on the afc synchronous detector card, and added in opposite phase to the detector output. This action assures that the output of the discriminator at pin 9 is a true difference signal related to the modulator center frequency, when the FM modulator is modulated by a baseband audio signal. This circuit will be identified and discussed with the afc synchronous detector (paragraph 4.6.2).

A signal from one multivibrator output is coupled through pin 21, and a signal from the other output through pin 23. These signals key the circuits of the afc synchronous detector, and synchronize the detector with the afc discriminator.

4.6.2 AFC Synchronous Detector

The signal through connector pin 26 (figure 7-6) is the output of the afc discriminator discussed above, and is coupled to the error signal amplifiers, which consist of three stages, Q1, Q2, and Q3. The output of the discriminator is a 5-Hz square-wave error signal with amplitude proportional to the magnitude of the frequency error, and with a polarity dependent upon the direction of error.

From Q3 the amplified error signal is coupled to phase splitter Q4. Capacitor C9 couples one square-wave error signal from the collector of Q4 to CR2. Capacitor C8 couples an equal signal of opposite phase from the emitter of Q4 to CR3. Both CR2 and CR3 are synchronous bridge detectors with nearly similar functions, but the internal diode elements of CR2 are connected in opposite polarity to those of CR3. Two other signals are connected through pins 29 and 30, each to an opposite side of both CR2 and CR3. These two signals are outputs of the discriminator multivibrator, and are 5-Hz square waves of equal amplitude and opposite polarity. One of these signals is always the same polarity as one output of Q4; the other signal is the polarity of the opposite output of Q4. The polarity of the error signal determines which multivibrator signal is in step with a given output of Q4. Because the signals from the multivibrator are equal and opposite, they cancel in the detector circuit (do not appear in the output) but function as keying signals for CR2 and CR3.

Diode CR2 conducts on one half-cycle of its input signal and produces a pulsating dc output. CR3 does the same thing, but because of the opposite phase of their input signals and the action of the keying signals from the multivibrator, the two detectors conduct during alternating time intervals and produce dc voltages of the same polarity. If no FM modulation effect is present in the error signal, and if the error signal remains constant, then the dc voltage pulses from CR2 and CR3, applied in sequence to the junction of R13 and R10, are equal. These pulses are filtered by R10, R11, C24, C7, and R9 to provide a relatively constant dc output.

As mentioned in the discussion of the discriminator, frequency modulation of the FM modulator output may affect the output of the discriminator, so that this output is not a true reflection of modulator frequency drift. Any such modulation effect is amplified proportionate to the error signal in Q1, Q2, and Q3, and results in an input to Q4 which is largely false.

The baseband cancellation circuit cancels the effect of frequency modulation on the error signal. A baseband audio signal is fed through pin 31 and capacitor C10 to the base of amplifier Q5. It will also be noted that the keying signals from the multivibrator are fed to opposite sides of

CR1, through R40 and R48. Capacitor C16 couples the audio output from Q5 to CR1. CR1 acts as a switch and shunts the audio to ground on alternate half-cycles of the 5-Hz square wave from the multivibrator. During the other half-cycle, capacitor C22 and resistor R47 couple the signal to the base of Q1 where it is subtracted (added as a negative quantity) from the error signal input from the afc discriminator card. This action cancels the effect of the frequency modulation of the error signal. Because frequency modulation affects only that portion of the error signal (one half-cycle) which relates to the output of the FM modulator, the output of CR1 must be subtracted only during this particular half-cycle. These effects are accomplished through interaction of the keying signals from the multivibrator and the keying signal coupled through C22.

When the modulation balance control (R35) is properly adjusted, the combined and filtered output of CR2, CR3, and CR1 provides an accurate dc correction voltage. This signal is coupled through pin 32 to the input of the FM modulator. When the frequency of the modulator drifts, the correction voltage always tends to drive it back toward the frequency of the reference oscillator.

4.7 RF MIXER

The primary function of the rf mixer is to convert the 14-MHz FM signal from the FM modulator to an FM signal having the desired station output frequency (88- to 108-MHz). This is accomplished by heterodyne action, mixing the 14-MHz signal with the output of a crystal-controlled oscillator. The crystal used is selected at the Collins factory for a resonant frequency which equals the desired station output frequency minus 14 MHz. This frequency is between 74 and 94 MHz, and the desired output frequency is produced by heterodyning.

Transistor Q1 (figure 7-8) and associated components comprise the oscillator which is controlled by crystal Y1 to provide the 74- to 94-MHz signal. This signal is fed through transformer T1 to the balanced mixer (Q2 and Q3). The 14-MHz signal from the FM modulator is coupled to the mixer through T2. The mixer output signal (88- to 108-MHz) is routed through transformer T3 to a bandpass filter which shapes the signal and removes unwanted mixer products. From the filter, the signal is amplified in Q4 and Q5 and applied through transformer T5 to a push-pull output amplifier, Q6 and Q7. The output is coupled through transformer T6 to the output jack, J1. At this point, the signal is the frequency-modulated 88- to 108-MHz signal to be routed to the power amplifier card.

4.8 POWER AMPLIFIER

The power amplifier card of the 310Z-1 contains a broadband, solid-state, 3-stage power amplifier. The FM signal from the rf mixer is amplified to provide an rf output power level of 10 to 20 watts.

The first amplifier stage (Q1, figure 7-9) receives the FM input signal (through jack J1) and operates as a class A amplifier, using 20-volt dc power supplied through filter FL1. The second and third stages (Q2 and Q3) operate as class C amplifiers so that greater efficiency is obtained. All three amplifier stages are set for gain saturation, which is permissible with an FM input signal and provides higher efficiency. Both Q2 and Q3 use a variable 13- to 26-volt dc power input through FL2. The rf output power level of the amplifier (adjustable from 10 to 20 watts) is controlled by the level of this variable dc power, which is adjustable by the POWER CONTROL adjustment mounted under the card cage front panel. The power amplifier output is coupled through J2 to J1 on the exciter main chassis.

4.9 POWER SUPPLY AND REGULATOR

The solid-state power supply and regulator card of the 310Z-1 provides closely regulated dc power at the levels required for operation of the other cards and modules of the exciter. These levels include -10 volts, +10 volts, +20 volts, +28 volts, and a variable +13- to +26-volt supply. The level of the variable supply at pin 9 (figure 7-10) is controlled by power control potentiometer R15, which is located under the card cage front panel, and which in turn controls the rf output power level of the power amplifier card.

Exciter components may be damaged if the exciter is operated with no load or if it is operated into a vswr greater than 2:1. To avoid the danger of such operation, an output control override is provided. This positive voltage (+15 to +35 volts dc) is connected, through a relay circuit controlled by the transmitter. This override voltage is applied to pin 7, breaks down zener diode CR18, lowers the voltage at the base of Q5, and stops all current flow except leakage current through Q3, Q2, and Q1. A +15 volts applied to pin 7 effectively lowers the output voltage at pin 9 to less than 1 volt.

section 5
maintenance

5.1 GENERAL

The 310Z-1 FM Broadcast Exciter, which contains all solid-state circuits, has been carefully inspected and adjusted at the factory by skilled technicians using special test equipment. Therefore, the 310Z-1 should not be readjusted as part of routine maintenance procedures, but instead should be readjusted only after trouble has definitely been traced to misadjustment. When the 310Z-1 is readjusted, adjustments should be performed in accordance with the procedures outlined in paragraph 5.6 using the recommended test equipment listed in table 5-1.

To ensure peak performance and maximum service life, a regular schedule of routine maintenance should be carried out. For the 310Z-1 this routine maintenance should consist only of cleaning and inspecting, and should occasionally include a check of the minimum performance standards for the 310Z-1 in accordance with paragraph 5.7.

Caution

The 310Z-1 exciter should not be operated without a load connected to the rf output, and should not be operated over any extended period of time into vswr greater than 2:1.

5.2 CLEANING

Clean the 310Z-1 whenever a perceptible quantity of dust accumulates at any point inside the equipment. A solvent consisting of the following mixture may be used as a cleaning material.

Methylene chloride, 25 percent

Perchlorethylene, 5 percent

Drycleaning solvent, 70 percent by volume

Use the following procedure:

a. Remove dust from chassis, panels, and components with a soft-bristled brush.

Table 5-1. Required Test Equipment.

ITEM	MANUFACTURERS DESIGNATION
Wideband FM modulation monitor	Collins 900C-3, part no. 758-5812-001
Distortion and noise meter	Hewlett-Packard 334A
Audio vtvm	Hewlett-Packard 400L
Vtvm	Hewlett-Packard 410B
Radio Receiver	Collins 51S-1
Wattmeter	Sierra 164B with 181A/250 plug-in element
Stereo test circuit	Fabricated per figure 5-3
Low-distortion af signal generator	Hewlett-Packard 206A
Oscilloscope	Tektronix 581A
Vertical amplifier	Tektronix type 81
Rf voltmeter	Boonton 91-C
Crosstalk test circuit	Fabricated per figure 5-6
FM frequency monitor	Collins 54N-1
SCA monitor	Collins 900F-1
Wave analyzer	Hewlett-Packard 302A

b. Clean flat surfaces and accessible areas with a lintless cloth moistened with solvent, removing any foreign matter adhering to the equipment. Dry with a clean, dry, lintless cloth.
c. Wash switch contacts and the less accessible areas with solvent lightly applied with a small soft-bristled brush.
d. Use a burnishing tool on relay contacts if contacts are corroded or pitted. Apply solvent lightly to relay contacts with a small soft-bristled brush. Dry with a clean, dry, soft-bristled brush.
e. Use a dry, oil-free jet of air to remove any dust accumulated on the modules, circuit cards, in the card cage, or on components located in the area above the cage.

5.3 LUBRICATION

No lubrication is required.

5.4 INSPECTION

Perform periodic visual inspection of the 310Z-1 at least once each month. Inspect all metal parts for rust, corrosion, and general deterioration. Check circuit cards, wiring, and components for signs of overheating. Check the blower and cabinet fan for normal operation. Check all operating controls for smoothness of operation. Check all connections.

5.5 TEST EQUIPMENT REQUIRED

The test equipment listed in table 5-1, or its equivalent, is required to perform the adjustment and test procedures given in this section.

5.6 ALIGNMENT AND ADJUSTMENT

The maintenance controls for the 310Z-1 that are referenced in the following procedures are shown on figure 5-1 and their function is described in table 5-2.

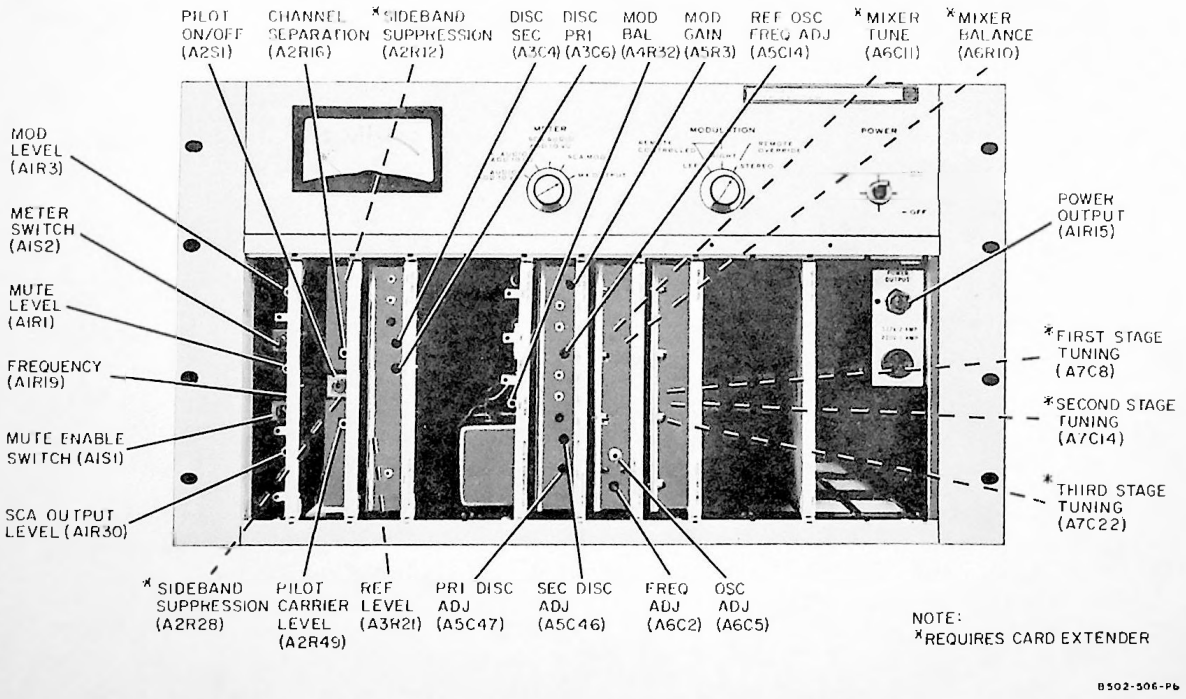


Figure 5-1. 310Z-1 FM Broadcast Exciter, Maintenance Controls and Adjustments.

Table 5-2. Maintenance Controls.

CONTROL	FUNCTION
Power output R15	Controls the amount of collector voltage applied the rf output transistors.
786W-1 SCA Generator card A1	
R3 - modulation level	Sets the SCA audio input levels to the SCA modulator.
R1 - mute level	Sets the minimum audio level that will activate the SCA subcarrier mute circuit.
R30 - output level	Sets the SCA subcarrier output level.
R19 - frequency	Sets the SCA subcarrier frequency.
786V-1 Stereo Generator card A2	
R12 - sideband suppression	Sets the switching point of Q3.
R28 - sideband suppression	Sets the switching point of Q6.
R16 - channel separation	Sets the level of the 1 + R signal from Q1 and Q4 applied to the multiply output to give proper levels for good stereo channel generation.
S1 - MUTE ENABLE switch	ON position enables mute circuit to remove the 67-kHz SCA oscillator output when there is no SCA audio input. OFF position disables mute circuit for maintenance.
R49 - pilot carrier level	Sets the level of the 19-kHz pilot carrier applied to the multiplex output.
S1 - PILOT ON/OFF switch	Switches the 19-kHz pilot carrier to the multiplex output.
Afc discriminator card A3	
R21 - reference level	Sets the level of the 14-MHz crystal oscillator input to the first limiter.
C6 - DISC PRI	Tunes the primary of the discriminator transformer.
C4 - DISC SEC	Tunes the secondary of the discriminator transformer.
Afc synchronous detector card A4	
R35 - MOD BAL	Sets the output level of the baseband canceling amplifier.
FM modulator card A5	
R3 - MOD GAIN	Sets the baseband input level into the FM modulator.
R12	Sets the base bias on transistor Q1.
C14	Sets the center frequency of the 14-MHz frequency modulator oscillator.
C47	Tunes the primary of the modulator discriminator transformer.
C46	Tunes the secondary of the modulator discriminator transformer.
Rf mixer A6	
C2 - trimmer capacitor	Adjusts oscillator frequency.
C5 - collector tuning	Tunes collector load to oscillator frequency.
C11 - mixer tune	Tunes input to mixer circuit.
R10 - mixer balance	Sets Q2 gate current equal to Q3 gate current.

Table 5-2. Maintenance Controls (Cont).

CONTROL	FUNCTION
Power amplifier card A7	
C8	Tunes the collector of Q1.
C14	Tunes the collector of Q2.
C22	Tunes the collector of Q3.
Power supply regulator A8	
R27	Sets output level of +20-vdc regulator.
S2 - 7.5-kHz/3.5-kHz SCA deviation switch	7.5-kHz position causes vu meter to indicate 0 vu in SCA MOD position when SCA subcarrier deviation is 7.5 kHz. 3.5-kHz position causes vu meter to indicate 0 vu in SCA MOD position when SCA subcarrier deviation is 3.5 kHz.

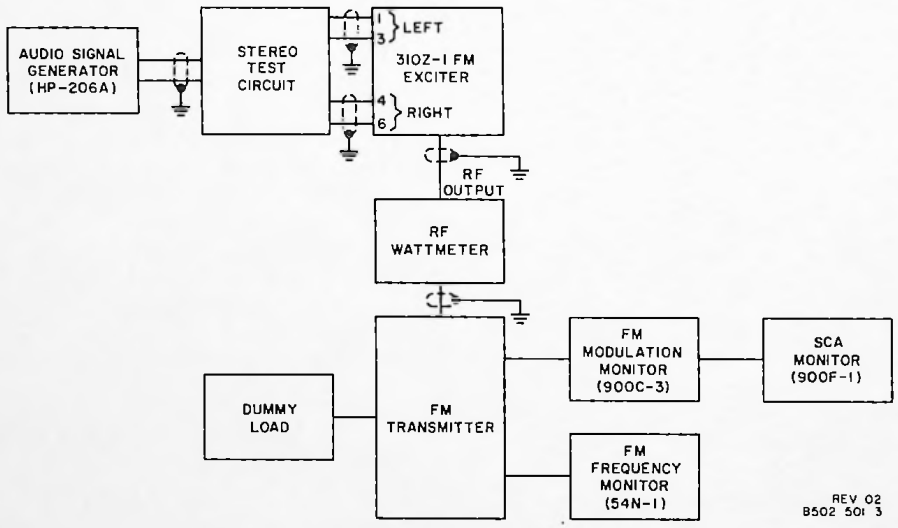


Figure 5-2. Test Equipment Connections to 310Z-1 for Adjustment and Test Procedures.

Caution

Do not attempt to make any adjustment to the 310Z-1 unless trouble has been definitely traced to misadjustment and the recommended test equipment is available.

5.6.1 Power Supply Checks and Adjustments

a. Remove exciter from transmitter or equipment rack, remove top cover, and connect equipment as shown in figures 5-2 and 5-3.

b. Locate capacitor C4 (see figure 6-1, sheet 3) and connect a vtvm across it (20-volt dc mid-scale range).

c. Place POWER switch to ON, and adjust A8R27 until vtvm indicates +20 ±1 volts.

d. Place POWER switch to OFF, and remove power amplifier card.

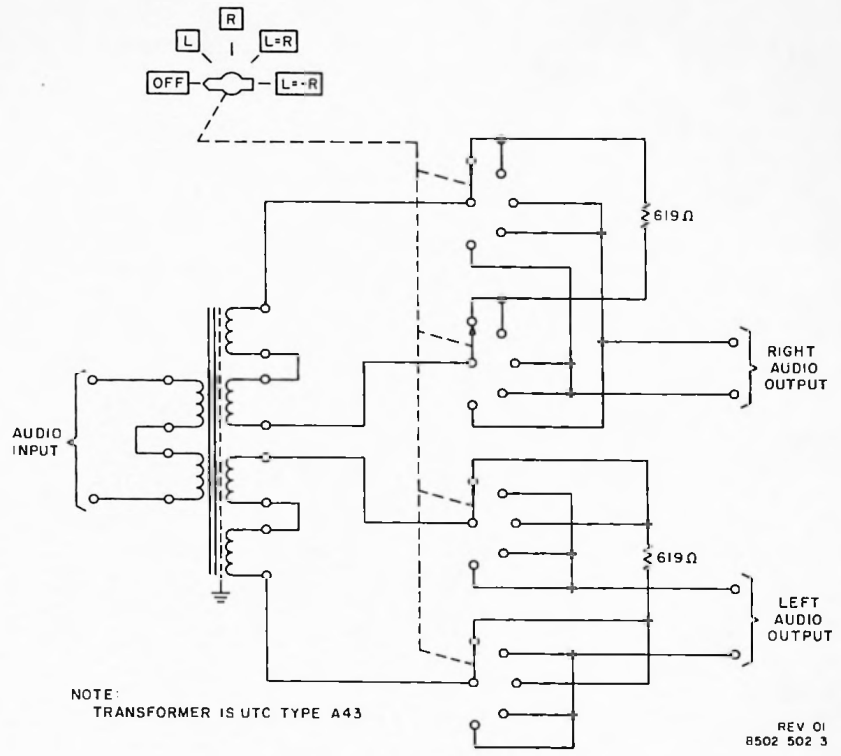


Figure 5-3. Stereo Test Circuit, Schematic Diagram.

e. Connect vtvm across capacitor C3 and place POWER switch to ON.
f. Vtvm indication should be between +13 and +26 volts dc.
g. Mark position of POWER OUTPUT adjustment (R15), and then turn it fully clockwise. Vtvm should indicate +24 to +27 volts dc.
h. Turn POWER OUTPUT adjustment fully counterclockwise and ensure that vtvm indicates +10 to +13 volts dc.
i. Connect vtvm between A8-14 and ground, and ensure that vtvm indicates +10 volts dc.
j. Connect vtvm between A8-18 and ground, and ensure that vtvm indicates -10 volts dc.
k. Return POWER OUTPUT adjustment to its original position, place POWER switch to OFF, and remove vtvm.
l. Replace top cover and power amplifier card.

5.6.2 Oscillator Alignment (FM Modulator)

a. Connect the equipment as shown in figure 5-2 and 5-3.
b. Place MUTE ENABLE switch (located on SCA generator card) to ON.
c. Place 19-kHz PILOT CARRIER switch (located on stereo generator card) to OFF. Turn stereo test switch to off.
d. Connect a jumper between A4TP3 and A4TP4 on synchronous detector card.
e. Connect a receiver (Collins 51S or equivalent) to a short antenna placed near A5Q3 at the back of FM modulator card.
f. Tune receiver to exactly 14.0 MHz.
g. Place POWER switch to ON, and adjust A5C14 for 14.0 MHz.

5.6.3 Discriminator Alignment (FM Modulator)

a. With equipment still connected as shown in figure 5-2, connect vtvm to test point A5TP2.
b. Adjust A5C47 for a maximum indication on vtvm.
c. Connect vtvm (0.1-volt dc range) to test point A5TP3, and ensure that level at A5TP3 can be varied from a positive level to a negative level by adjusting A5C46.
d. Adjust A5C46 until vtvm indicates 0 ±0.1 volt dc.

e. Connect vtvm (15-volt dc range) to test point A5TP1 and adjust A5R12 for +7.5 volts dc.
f. Remove the jumper from A4TP3 and A4TP4 on synchronous detector card.
g. Place MUTE ENABLE switch to ON.

5.6.4 Discriminator Alignment (AFC Discriminator)

a. Connect equipment as shown in figure 5-2.
b. Remove afc discriminator card from card cage, install extender card, and install afc discriminator card on card extender.
c. Remove cover from afc discriminator card and disconnect one end of resistor A3R32.
d. Connect oscilloscope to A3TP4.
e. Place POWER switch to ON and adjust A3R21 for a maximum level.
f. Connect vtvm to A3TP1 and adjust A3C6 for a maximum indication on vtvm.
g. Connect vtvm to A3TP2 and ensure that level at A3TP2 can be varied from a positive level to a negative level by adjusting A3C4.
h. Adjust A3C4 for a 0 ±0.1-volt dc indication on vtvm.
i. Reconnect resistor A3R32.

5.6.5 Reference Oscillator Level Adjustment (AFC Discriminator)

a. Connect oscilloscope to A3TP4 with external trigger lead connected to the collector of A3Q5.
b. Place POWER switch to ON, and adjust A3R21 until equal amplitudes of alternate signals are obtained as shown in figure 5-4.

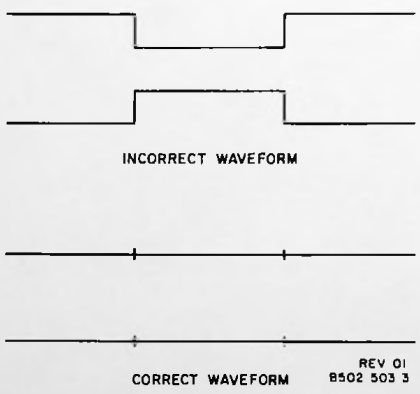


Figure 5-4. Reference Oscillator Waveform.

c. Place POWER switch to OFF, remove extender card, and replace afc discriminator card in card cage.

5.6.6 Oscillator Tuning (RF Mixer)

a. Connect equipment as shown in figure 5-2.
b. Place rf mixer card on extender card and remove cover from rf mixer.
c. Place POWER switch to ON, and touch probe of rf voltmeter to primary of transformer A6T1 (approximately 1/2 inch above ground).
d. Adjust A6C5 for a maximum indication on rf voltmeter.
e. Adjust A6C2 until correct station frequency is indicated on frequency monitor (Collins 54N-1 or equivalent).

Note

If oscillator cannot be adjusted on frequency by A6C2, also adjust A6C5.

5.6.7 Mixer Tuning (RF Mixer)

a. Ensure that power amplifier card is installed.
b. Replace cover on rf mixer card, and connect rf voltmeter to rf mixer output A6J1.
c. Adjust A6C11 for maximum output.

5.6.8 RF Mixer Balance

a. Connect audio oscilloscope (HP130C or equivalent) to FM modulator monitor (Collins 900C-3) WIDEBAND output.
b. Increase sensitivity of oscilloscope until 100-kHz signal can be observed.
c. Adjust MIXER BALANCE control A7R11 for a minimum 100-kHz signal on oscilloscope.

5.6.9 RF Modulator Sensitivity

a. Connect vtvm to A5TP5 on FM modulator card.
b. Place MODULATION switch on 310Z-1 to LEFT and stereo test circuit switch to L. (See figure 5-3.)
c. Adjust audio oscillator (HP206A or equivalent) for an output of 400 Hz and 100 ±2 mv rms on vtvm.
d. Turn MODULATION METER switch on FM modulator monitor to MAIN CHAN MOD.
e. Adjust A5R3 to obtain an indication of 100-percent main channel modulation on FM modulator monitor.

5.6.10 Baseband Cancel Amplifier Adjustment (AFC Synchronous Detector)

a. Place afc synchronous detector card on extender card.
b. Set MODULATION switch on 310Z-1 to LEFT and stereo test circuit switch to I.
c. Adjust audio oscillator to a frequency of 50 Hz and 100-percent modulation as indicated on FM modulation monitor.
d. Turn A4R32 on afc synchronous detector card fully counterclockwise.
e. Connect jumper from A4TP3 to A4TP4.
f. Connect oscilloscope (Tektronix 581A or equivalent) to A4TP4, and observe the 50-Hz audio on one half-cycle of 5-Hz signal.
g. Adjust A4R32 slowly clockwise to minimize 50-Hz audio signal.
h. Remove card extender and replace afc synchronous detector card in card cage.

5.6.11 SCA Generator Output Level Adjustment

a. With equipment connected as shown in figure 5-2, set MODULATOR METER switch on FM modulation monitor to SCA MOD.
b. Place MUTE ENABLE switch (on SCA generator card) to OFF.
c. Adjust OUTPUT LEVEL control R30 for 10-percent modulation as indicated on the 0- to 30-percent scale on FM modulator monitor.
d. Turn MUTE ENABLE switch to ON and note that indication on the FM modulation monitor decreases to zero.

5.6.12 SCA Generator Frequency Adjustment

a. With equipment connected as shown in figure 5-2, turn stereo test circuit switch to OFF.
b. Check the SCA output frequency as indicated on the SCA frequency monitor (Collins 900F-1 or equivalent).
c. Adjust A1R19 until SCA frequency monitor indicates 67 kHz.

5.6.13 Stereo Generator Adjustment

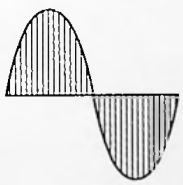
a. Connect equipment as shown in figure 5-2.
b. Set MODULATION switch on 310Z-1 front panel to STERO.
c. Set MODULATION METER switch on FM modulator monitor to TOTAL MOD.
d. Place 19-kHz PILOT CARRIER switch on stereo generator card to OFF.
e. Turn stereo test circuit (figure 5-3) switch to L position (left modulation only).
f. Set audio oscillator (HP206A or equivalent) to 5000 Hz and adjust the output amplitude for 100-percent total modulation on FM modulation monitor.
g. Connect oscilloscope (HP130C or equivalent) to A5TP5 on FM modulator card.
h. Adjust channel separation control A2R16 on stereo generator for perfect stereo signal as observed on oscilloscope. (See figure 5-5.)

Note

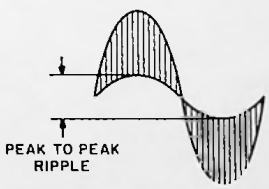
A perfect stereo signal is indicated by a straight baseline with the oscilloscope dc coupled, vertical sensitivity set to 2 mv/cm, and external triggering applied from audio oscillator.

5.7 MINIMUM PERFORMANCE STANDARDS

The 310Z-1 should be tested in accordance with the following procedures after alignment and adjustment. In addition the following tests should be used to determine if the 310Z-1 is operating properly. Table 5-3 lists those tests which are applicable to monaural, stereo, and SCA functions of the 310Z-1. If it is desired to test the 310Z-1 for monaural only, perform only those tests listed in table 5-3 for monaural, etc.



PERFECT SIGNAL



IMPERFECT SIGNAL
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Figure 5-5. Stereo Waveforms.

Table 5-3. Tests Applicable to Broadcast Mode.

MONAURAL (para. no.)	STEREO (para. no.)	SCA (para. no.)	TEST
5.7.1	5.7.1	5.7.1	Output frequency
5.7.2	5.7.2	5.7.2	Frequency stability
5.7.3	5.7.3	5.7.3	Output power
5.7.4	5.7.4	5.7.4	Afc loop test
	5.7.5		Remote control
5.7.6	5.7.6	5.7.6	AM noise
5.7.7	5.7.7	5.7.7	FM noise
5.7.8			Frequency response (monaural)
5.7.9			Harmonic distortion (monaural)
	5.7.10		Frequency response (stereo)
	5.7.11		Harmonic distortion (stereo)
	5.7.12		Subcarrier suppression
	5.7.13		Channel separation
	5.7.14		Main-to-subchannel crosstalk
	5.7.15		Subchannel-to-main crosstalk
		5.7.16	SCA input test
		5.7.17	SCA noise test
		5.7.18	SCA mute test
		5.7.19	SCA harmonic distortion
		5.7.20	SCA frequency response

5.7.1 Output Frequency

a. Connect the equipment as shown in figure 5-2, and turn stereo test circuit switch to OFF.
b. Place POWER switch to ON and measure output frequency.
c. If the output frequency is incorrect (should be the customer-selected frequency of 88 to 108 MHz), readjust the rf mixer circuits as outlined in paragraph 5.6.6.

5.7.2 Frequency Stability

a. With the equipment connected as shown in figure 5-6, turn stereo test circuit switch to L.
b. Adjust the audio oscillator output for 50 Hz.
c. Set output level for 100-percent main channel modulation on FM modulation monitor (Collins 900C-3 or equivalent).
d. Output frequency should be ±500 Hz of desired station frequency.

5.7.3 Output Power

a. Connect equipment as shown in figure 5-2.
b. Adjust OUTPUT POWER control until rf wattmeter indicates output of 10 watts.
c. Adjust OUTPUT POWER control until rf wattmeter indicates an output of 20 watts.

5.7.4 AFC Loop Test

a. Connect a receiver (Collins 51S or equivalent) to a short antenna and place it near A5Q3 in the back of the FM modulator card.
b. Tune receiver to exactly 14.0 MHz and note that a pulsed tone is heard.
c. Place stereo test circuit switch to OFF and connect a jumper between test points A4TP3 and A4TP4 on the synchronous detector card.
d. Pulse tone should increase in pitch until it cannot be heard.
e. Remove jumper and note that pitch of pulsed tone decreases to a zero beat.

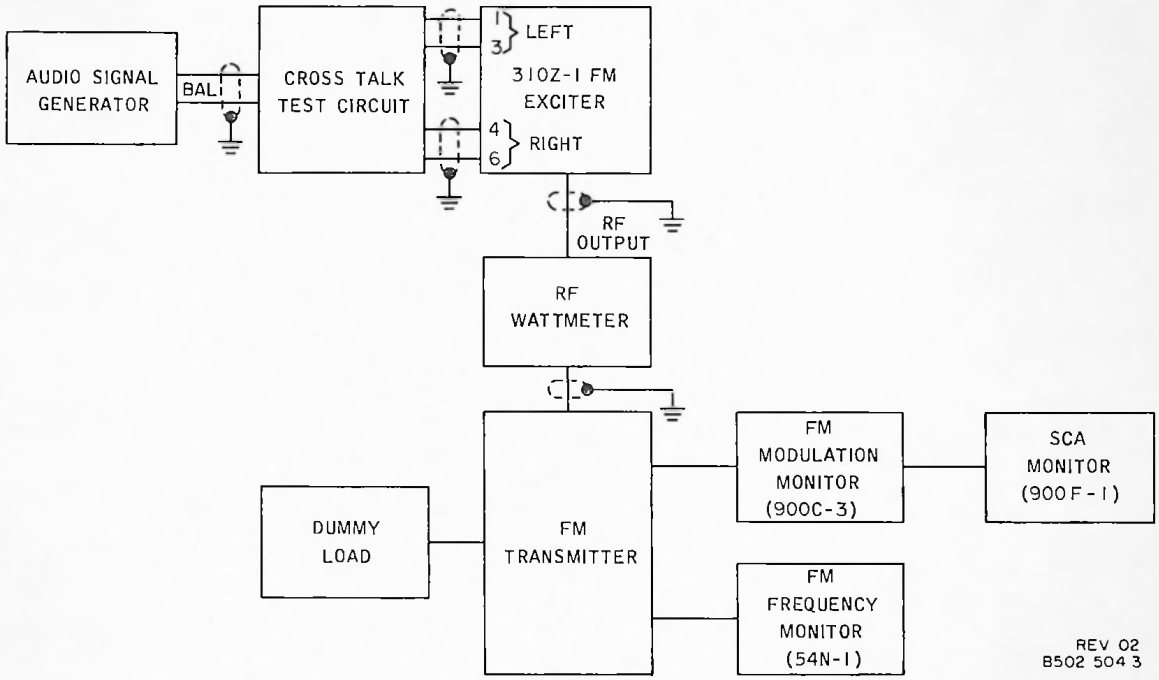

Figure 5-6. Test Equipment Connections to 310Z-1 Exciter for Crosstalk Test.

5.7.5 Remote Control Circuit Test

a. With the equipment connected as shown in figure 5-2, set the stereo test switch to OFF.
b. Turn the MODULATION switch on the 310Z-1 to LEFT.
c. Turn the METER switch on the FM modulation monitor (Collins 900C-3) to PILOT MOD.
d. Place 19-kHz PILOT switch A2S1 on the stereo generator card to ON.
e. Ensure that there is no indication on the FM modulation monitor.
f. Turn MODULATION switch on 310Z-1 to RIGHT and observe that there is no meter reading on the FM modulation monitor.
g. Connect a jumper between terminals TB1-10 and TB1-11 on the rear panel of the 310Z-1.
h. Observe that meter indicates approximately 8.5 percent on the FM modulation monitor.
i. Place 19-kHz PILOT switch A2S1 on the stereo generator to OFF.

5.7.6 AM Noise

a. Connect the equipment as shown in figure 5-2.
b. Turn the METER switch on the FM modulation monitor to RF LEVEL and adjust the RF LEVEL control for 100 percent on the front panel meter.
c. Connect audio voltmeter (HP400L) to the AM NOISE jack on the FM modulation monitor.
d. Ensure that the indicated noise level on the voltmeter is no more than 1.78 mv rms.

5.7.7 FM Noise

a. Connect the equipment as shown in figure 5-2.
b. Turn MODULATION switch on 310Z-1 to LEFT.
c. Turn MODULATION METER switch on the FM modulation monitor to TOTAL MOD.
d. Turn stereo test circuit switch to L.
e. Set output of audio oscillator to 400 Hz and 100-percent modulation as indicated on the FM modulation monitor.
f. Turn DECIBELS switch on FM modulation monitor to 0 and METER switch to MAIN CHAN AUDIO.
g. Turn METER ADJUST control until 0 db is indicated on FM modulation monitor front panel meter.

h. Remove 400-Hz monaural input signal and turn the DECIBELS switch clockwise until a reading is observed on the meter.
i. The main channel FM noise is the algebraic sum of the DECIBELS switch and the meter indication, and should be no more than -65 db.
j. Turn METER switch to SUB CHAN AUDIO.
k. The subchannel FM noise is the algebraic sum of the DECIBELS switch setting and the meter indication, and it should be no more than -65 db.

5.7.8 Frequency Response (Monaural)

a. With the equipment connected as shown in figure 5-2, set the MODULATION switch on the 310Z-1 to LEFT and the stereo test circuit switch to L.
b. Set the audio generator (HP206A or equivalent) for a frequency of 50 Hz.
c. Place DE-EMPHASIS switch on FM modulation monitor to OUT.
d. Adjust the output of the audio generator for 100-percent main channel modulation as indicated on the FM modulation monitor.
e. Vary the audio generator and maintain 100-percent modulation for frequencies of 100, 400, 1000, 5000, 7500, 10,000 and 15,000 Hz.
f. Ensure that attenuator settings for each frequency are within the limits of the 75 microsecond preemphasis curve as defined by the FCC.

5.7.9 Harmonic Distortion (Monaural)

a. Connect the equipment as shown in figure 5-2.
b. Turn MODULATION switch on the 310Z-1 to the LEFT position.
c. Turn MODULATION METER switch on the FM modulation monitor (900C-3) to TOTAL MOD and the DE-EMPHASIS switch to OUT.
d. Turn stereo test circuit switch to L.
e. Set the audio oscillator (HP206A) to 50 Hz, and adjust the output amplitude for 100-percent total modulation on the FM modulation monitor.
f. Turn MODULATION METER switch on FM modulation monitor to MAIN CHAN AUDIO.
g. Connect distortion meter (HP334A or equivalent) to the DISTORTION METER jack on the FM modulation monitor.
h. Ensure that the distortion meter indication is not more than 0.5 percent.
i. Repeat steps e. through h. for modulating frequencies of 100, 400, 1000, 5000, 7500, 10,000 and 15,000 Hz.

5.7.10 Frequency Response (Stereo)

a. With equipment connected as shown in figure 5-2, set the MODULATION switch on the 310Z-1 to LEFT and the stereo test circuit switch to STEREO.
b. Turn on 19-kHz pilot.
c. Repeat steps b. through f. of paragraph 5.7.8.
d. Place MODULATION switch on 310Z-1 to RIGHT.
e. Repeat steps b. through f. of paragraph 5.7.8.

5.7.11 Harmonic Distortion (Stereo)

a. With equipment connected as shown in figure 5-2, place PILOT CARRIER switch to ON.
b. Turn MODULATION switch on 310Z-1 to STEREO.
c. Turn MODULATION METER switch on 900C-3 to TOTAL MOD, and place DE-EMPHASIS switch to OUT.
d. Set switch on stereo test circuit (figure 5-3) to L = R.
e. Set audio oscillator (HP206A) to 50 Hz, and adjust output amplitude for 100-percent total modulation on 900C-3.
f. Connect distortion meter (HP334A or equivalent) to LEFT AUDIO jack on the 900C-3.
g. Measure and record total distortion for modulating frequencies of 50, 100, 400, 1000, 5000, 7500, 10,000 and 15,000 Hz. Maintain modulation on 900C-3 at 100 percent for all frequencies, and distortion should be not more than 1.0 percent.
h. Connect distortion meter to RIGHT AUDIO jack on 900C-3 and repeat step g.

5.7.12 Subcarrier Suppression

a. With equipment connected as shown in figure 5-2, place PILOT CARRIER switch to OFF.
b. Ensure that there is no input to the SCA generator of the 310Z-1 exciter.
c. Turn DECIBELS switch on FM modulation monitor to 0.
d. Turn METER switch on FM modulation monitor to TOTAL MOD.
e. Adjust the audio generator for a frequency of 15,000 Hz, and adjust the amplitude for 90-percent modulation indication on the FM modulation monitor.
f. Turn METER switch on FM modulation monitor to MAIN CHAN AUDIO, and adjust METER ADJUST control until meter indicates 0 db.

g. Turn METER switch on FM modulation monitor to SUB CAR, and rotate the DECIBELS switch in a clockwise direction until a meter indication is observed.
h. The setting of the DECIBELS switch indicates the subcarrier suppression; it should be at least -40 db.

5.7.13 Channel Separation

It is recommended that the channel separation test be performed using the Collins 900C-3 FM Modulation Monitor; however, channel separation can also be checked using an oscilloscope and following the procedure outlined in paragraph 5.7.13.2.

5.7.13.1 Channel Separation Test Using 900C-3

a. Connect equipment as shown in figure 5-2.
b. Turn MODULATION switch on front panel of 310Z-1 to STEREO.
c. Turn MODULATION METER switch on FM modulation monitor (900C-3) to TOTAL MOD.
d. Place 19-kHz PILOT CARRIER switch A2A1 to ON.
e. Turn stereo test circuit switch to L.
f. Set audio generator (HP206A) to 5000 Hz, and adjust output amplitude for 100-percent total modulation on FM modulation monitor.
g. Set METER switch on front panel of FM modulation monitor to LEFT AUDIO.
h. Set DECIBELS switch on front panel of FM modulation monitor to 0, and turn METER ADJUST control until an indication of 0 db is obtained on the front panel meter.
i. Switch from left channel modulation to right channel modulation, and turn DECIBELS switch in a clockwise direction until an indication is observed on the front panel meter.
j. Adjust A2R16 for best channel separation indicated on meter. The channel separation is the algebraic sum of the DECIBELS switch setting and the meter indication.
k. Repeat steps f. through j. for frequencies of 50, 100, 400, 1000, 5000, 7500, 10,000 and 15,000 Hz, except do not readjust A2A16.
l. To obtain channel separation measurements with audio applied to the right channel and measurements taken in the left channel, repeat steps e. through i. and substitute left for right and right for left where these instructions are indicated, but do not readjust A2R16.

5.7.13.2 Channel Separation Test Using Oscilloscope

a. Connect the shipment as shown in figure 5-2.
b. Turn the MODULATION switch on the front of the 310Z-1 to the STEREO position.
c. Turn MODULATION METER switch on the FM modulation monitor (900C-3) to TOTAL MOD.
d. Place the 19-kHz PILOT CARRIER switch A2A1 to OFF.
e. Turn stereo test circuit switch to L.
f. Set audio oscillator (HP206A) to 5000 Hz and adjust the output amplitude for 100-percent total modulation on the FM modulator monitor.
g. Connect an oscilloscope (HP130C) to A5TP5 on the FM modulator card.
h. Adjust the channel separation control A2R16 for a perfect stereo signal as observed on the oscilloscope. See figure 5-4.

Note

A perfect signal is indicated by a straight baseline with the oscilloscope dc coupled, vertical sensitivity set to 2 mv/cm, and external triggering applied from the audio oscillator.

i. Connect the oscilloscope (HP130C) to the WIDEBAND output jack on the FM modulation monitor.
j. Adjust the audio generator output for 400-mv p-p signal on the oscilloscope.
k. Increase the vertical sensitivity on the oscilloscope to 5 mv/cm, and ensure that the ripple on the baseline is not more than 7.0 mv p-p.
l. Repeat steps f. through k. for frequencies of 50, 100, 1000, 7500, 10,000 and 15,000 Hz, except the channel separation control should not be readjusted.
m. Turn stereo test switch to R, and repeat steps f. through l. Do not readjust the channel separation control.

5.7.14 Main Channel to Subchannel Crosstalk

a. Connect the equipment as shown in figure 5-6. The crosstalk test circuit shown on figure 5-7 must be fabricated for this test.
b. Set the crosstalk test circuit switch to MAIN and the FREQ RANGE SELECT switch to 50/400.
c. Turn the MODULATION switch on the 310Z-1 to STEREO.

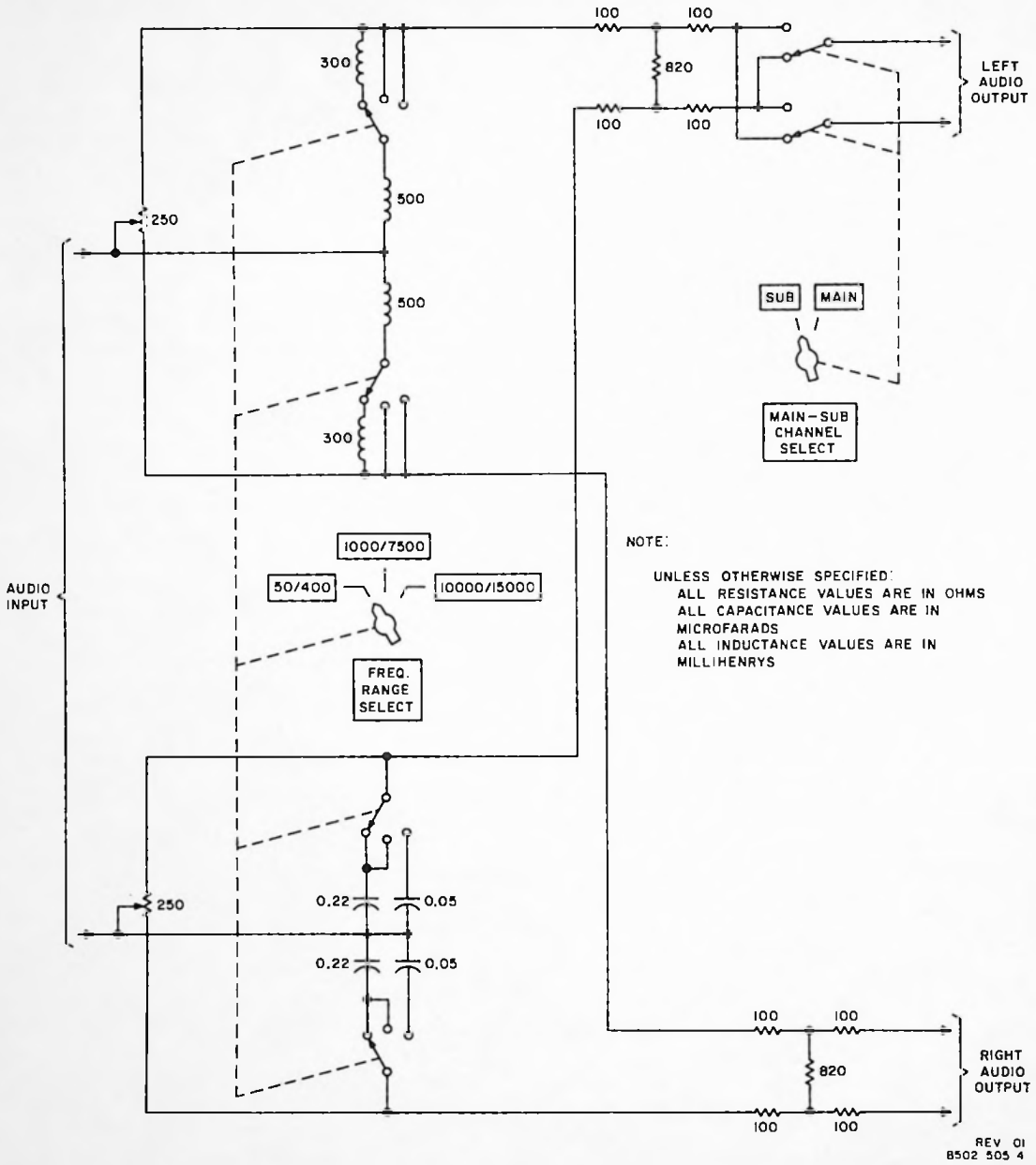

Figure 5-7. Crosstalk Test Circuit, Schematic Diagram.

d. Adjust the audio generator (HP206A or equivalent) to a frequency of 50 Hz, and adjust the output level for 90-percent main channel modulation as indicated on the FM modulation monitor.

e. On the FM modulation monitor, place the METER switch to MAIN CHAN AUDIO, turn the DECIBELS switch to 0, and turn the METER ADJUST control until 0 db is indicated on the meter.

f. Turn METER switch to SUB CHAN AUDIO, and turn DECIBELS switch clockwise until an indication on the front panel meter of the FM modulation monitor is observed.
g. Turn adjustments on crosstalk test circuit until a null is observed on the FM modulation monitor meter.

Note

These adjustments are critical and require special attenation to achieve the proper null.

h. Crosstalk is the algebraic sum of the DECIBELS switch setting and the meter indication. The main channel into subchannel crosstalk should be not more than -40 db from 50 to 15,000 Hz.
i. Repeat the above procedure for frequencies of 100, 400, 1000, 5000, 7500, 10,000 and 15,000 Hz. Ensure that the proper frequency range is selected by the FREQ RANGE SELECT switch of the crosstalk test circuit.

5.7.15 Subchannel to Main Channel Crosstalk

a. With the test equipment connected as shown in figure 5-6, set the crosstalk test circuit switch to SUB and the FREQ RANGE SELECT switch to 50/400.
b. Adjust the audio generator (HP206A or equivalent) to a frequency of 50 Hz, and adjust the output level for 90-percent subchannel modulation as indicated on the FM modulation monitor.
c. Turn METER switch to MAIN CHAN AUDIO, and turn DECIBELS switch clockwise until an indication is observed.

5.7.16 SCA Input Test

a. With the equipment connected as shown in figure 5-2, place the MODULATION METER switch on the FM modulation monitor to SCA MOD.
b. Place MUTE ENABLE switch (on SCA generator card) to OFF.
c. Place POWER switch to ON, and adjust SCA OUTPUT LEVEL control A1R30 for an indication of 10-percent modulation on the 0- to 30-percent scale on the meter of the FM modulation monitor.

5.7.17 SCA Noise Test

a. With equipment connected as in figure 5-2, place MUTE DISABLE switch to OFF.
b. Connect audio generator (HP206A) to SCA input terminals (TB1-7 and TB1-9) of exciter.
c. Set the audio generator for a frequency of 400 Hz and an output level of +10 dbm.
d. Connect ac voltmeter (HP403B) across the audio output (TB1-1 and TB1-2) of the SCA modulation monitor (900F-1).
e. Record the 400-Hz reference signal level as indicated on the ac voltmeter.
f. Remove the SCA input signal from the 310Z-1 exciter, and increase the sensitivity of the cated.
g. The difference between the levels recorded in steps e. and f. should be not less than 55 db.

5.7.18 SCA Mute Circuit Test

a. Connect equipment as shown in figure 5-2.
b. Connect audio signal generator (HP206A) to terminals TB1-7 and TB1-9.
c. Place PILOT CARRIER switch on stereo generator card to OFF.
d. Turn stereo test circuit switch to OFF.
e. Adjust audio signal generator connected to terminals TB1-7 and TB1-9 for 400 Hz at 6 dbm.
f. Turn MUTE LEVEL control A1R1 fully counterclockwise.
g. Observe the SCA subcarrier level on the SCA monitor.
h. Place MUTE ENABLE switch to ON.
i. After a few seconds, note that the SCA subcarrier level is still indicated on SCA monitor.
j. Remove input to SCA generator card, and observe that SCA subcarrier indicated on SCA monitor is (decreased to zero) within 3 to 4 seconds.
k. Adjust audio signal generator for 400 Hz at 6-dbm input to exciter.
l. Adjust attenuator on signal generator to reduce input level 30 db.
m. Observe the SCA subcarrier on SCA monitor, and ensure that is still present after 3 to 4 seconds indicating that mute circuit did not cut off carrier.
n. Remove audio signal generator.

5.7.19 SCA Harmonic Distortion

a. With equipment connected as shown in figure 5-2, connect a wave analyzer (HP302A or equivalent) to the audio output of the SCA monitor.

b. Connect audio signal generator to SCA input terminals on exciter, and adjust audio generator frequency to 50 Hz.
c. Adjust audio signal generator output to obtain a 425 mv rms at TP1 of the SCA card.
d. On the wave analyzer, set the ABSOLUTE/RELATIVE switch to RELATIVE, set MAX INPUT VOLTAGE to .3, and set RANGE switch to -10 db.
e. Tune wave analyzer to 50 Hz and adjust REF ADJUST for 0 db.
f. Measure the level of the second harmonic (100 Hz) and third harmonic (150 Hz) below the 0-db reference level. Harmonic levels should be not more than -43 db.
g. Tune signal generator and wave analyzer to 1000 Hz and adjust REF ADJUST for 0 db.
h. Measure level of second and third harmonics. Harmonic levels should be not more than -43 db.
i. Repeat steps g. and h. for 5000 Hz.
k. Repeat steps g. and h. for 10,000 Hz. Harmonic levels should be not more than -37 db.
l. Repeat steps g. and h. for 15,000 Hz. Harmonic levels should be not more than -37 db.

5.7.20 SCA Frequency Response

a. With equipment connected as in figure 5-2, place the PILOT CARRIER switch on stereo generator card to OFF.
b. Connect audio generator (HP206A) to SCA input terminals (TB1-7 and TB1-9) of exciter.
c. Turn stereo test circuit switch to OFF.
d. Turn METER switch on SCA modulation monitor (900F-1) to SCA modulation monaural mode.
e. Set audio generator frequency to 50 Hz, and adjust output amplitude for 7.5-kHz deviation on the SCA modulaton monitor.
f. While maintaining the 7.5-kHz deviation, vary the audio generator frequency to 100, 400, 1000, and 5000 Hz. The audio generator attenuator settings for each frequency should follow the 75-microsecond preemphasis curve as specified by the FCC. See figure 5-8.

5.8 FREQUENCY CHANGE

If it is desired to change the output frequency of the 310Z-1, crystal A6Y1 located in the oscillator compartment on the rf mixer must be changed. Table 5-4 lists the channel frequency versus crystal frequency and the Collins part number for each crystal.

5.9 WIRE LIST

A complete list of the point-to-point wiring within the 310Z-1 FM Broadcast Exciter is included in table 5-5.

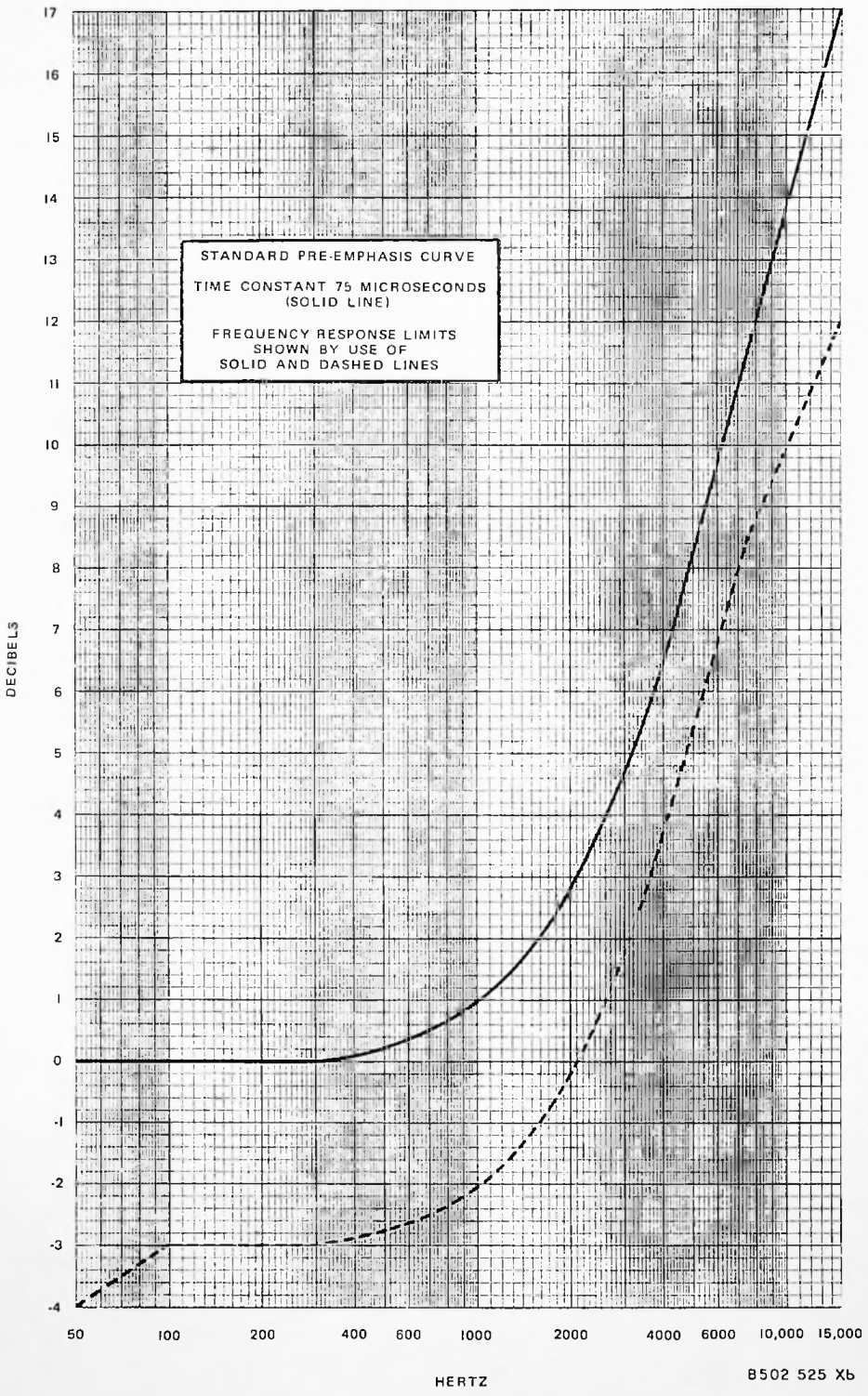

Figure 5-8. Standard Preemphasis Curve.

Table 5-4. Crystal Part Numbers.

CHANNEL FREQ (MHz)	CRYSTAL FREQ (MHz)	COLLINS PART NUMBER	CHANNEL FREQ (MHz)	CRYSTAL FREQ (MHz)	COLLINS PART NUMBER
88.1	74.10000	289-2744-00	96.1	82.10000	289-2784-00
88.3	74.30000	289-2745-00	96.3	82.30000	289-2785-00
88.5	74.50000	289-2746-00	96.5	82.50000	289-2786-00
88.7	74.70000	289-2747-00	96.7	82.70000	289-2787-00
88.9	74.90000	289-2748-00	96.9	82.90000	289-2788-00
89.1	75.10000	289-2749-00	97.1	83.10000	289-2789-00
89.3	75.30000	289-2750-00	97.3	83.30000	289-2790-00
89.5	75.50000	289-2751-00	97.5	83.50000	289-2791-00
89.7	75.70000	289-2752-00	97.7	83.70000	289-2792-00
89.9	75.90000	289-2753-00	97.9	83.90000	289-2793-00
90.1	76.10000	289-2754-00	98.1	84.10000	289-2794-00
90.3	76.30000	289-2755-00	98.3	84.30000	289-2795-00
90.5	76.50000	289-2756-00	98.5	84.50000	289-2796-00
90.7	76.70000	289-2757-00	98.7	84.70000	289-2797-00
90.9	76.90000	289-2758-00	98.9	84.90000	289-2798-00
91.1	77.10000	289-2759-00	99.1	85.10000	289-2799-00
91.3	77.30000	289-2760-00	99.3	85.30000	289-2800-00
91.5	77.50000	289-2761-00	99.5	85.50000	289-2801-00
91.7	77.70000	289-2762-00	99.7	85.70000	289-2802-00
91.9	77.90000	289-2763-00	99.9	85.90000	289-2803-00
92.1	78.10000	289-2764-00	100.1	86.10000	289-2804-00
92.3	78.30000	289-2765-00	100.3	86.30000	289-2805-00
92.5	78.50000	289-2766-00	100.5	86.50000	289-2806-00
92.7	78.70000	289-2767-00	100.7	86.70000	289-2807-00
92.9	78.90000	289-2768-00	100.9	86.90000	289-2808-00
93.1	79.10000	289-2769-00	101.1	87.10000	289-2809-00
93.3	79.30000	289-2770-00	101.3	87.30000	289-2810-00
93.5	79.50000	289-2771-00	101.5	87.50000	289-2811-00
93.7	79.70000	289-2772-00	101.7	87.70000	289-2812-00
93.9	79.90000	289-2773-00	101.9	87.90000	289-2813-00
94.1	80.10000	289-2774-00	102.1	88.10000	289-2814-00
94.3	80.30000	289-2775-00	102.3	88.30000	289-2815-00
94.5	80.50000	289-2776-00	102.5	88.50000	289-2816-00
94.7	80.70000	289-2777-00	102.7	88.70000	289-2817-00
94.9	80.90000	289-2778-00	102.9	88.90000	289-2818-00
95.1	81.10000	289-2779-00	103.1	89.10000	289-2819-00
95.3	81.30000	289-2780-00	103.3	89.30000	289-2820-00
95.5	81.50000	289-2781-00	103.5	89.50000	289-2821-00
95.7	81.70000	289-2782-00	103.7	89.70000	289-2822-00
95.9	81.90000	289-2783-00	103.9	89.90000	289-2823-00

Table 5-4. Crystal Part Numbers (Cont).

CHANNEL FREQ (MHz)	CRYSTAL FREQ (MHz)	COLLINS PART NUMBER	CHANNEL FREQ (MHz)	CRYSTAL FREQ (MHz)	COLLINS PART NUMBER
104.1	90.10000	289-2824-00	106.1	92.10000	289-2834-00
104.3	90.30000	289-2825-00	106.3	92.30000	289-2835-00
104.5	90.50000	289-2826-00	106.5	92.50000	289-2836-00
104.7	90.70000	289-2827-00	106.7	92.70000	289-2837-00
104.9	90.90000	289-2828-00	106.9	92.90000	289-2838-00
105.1	91.10000	289-2829-00	107.1	93.10000	289-2839-00
105.3	91.30000	289-2830-00	107.3	93.30000	289-2840-00
105.5	91.50000	289-2831-00	107.5	93.50000	289-2841-00
105.7	91.70000	289-2832-00	107.7	93.70000	289-2842-00
105.9	91.90000	289-2833-00	107.9	93.90000	289-2843-00

Table 5-5. Wire List.

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
204	RG58	A..1-.J1	A..7-.J2	RF OUT
.13A	D26TVSJ9	A..1-.17	TB.1-..7	SCA IN
.13B	D26TVSJ6	A..1-.19	TB.1-..9	SCA IN
.44	A22TA01S7XXX	A..1-.19	S..2B-..9	INPUT
.40	A20PB00X8XXX	A..1-.25	A..2-.25	+20V
207	A20PB00X0XXX	A..1-.28	A..2-.28	GRD
.46	A20PB00X1XXX	A..1-.28	TB..1-.11	GRD
..2S	SHIELD	A..1-.28	E.26	GRD
..1S	SHIELD	A..1-.28	E.25	GRD
.17	A22TA01S6XXX	A..1-.41	S..2A-.12	SCA MPD.
.16	A22TA01S5XXX	A..1-.42	S..2B-..1	AUDIO LV
.20	A22TA01S9XXX	A..1-.43	A..5-.23	SCA OUT
.20S	SHIELD	A..1-END-NC	E.17	SHIELD
.44S	SHIELD	A..1-END-NC	S..2-E28	SHIELD
.17S	SHIELD	A..1-END-NC	S..2-E27	SHIELD
.16S	SHIELD	A..1-END-NC	S..2-E28	SHIELD
.13S	SHIELD	A..1-END-NC	TB.1-..8	SHIELD
..1	A22TA01S3XXX	A..2-.13	S..1-..7	RIGHT IN
..3	A22TA01S2XXX	A..2-.16	XFL5-3	MX. OUT
.39	A20PB00X8XXX	A..2-.25	A..3-.25	+20V
.40	A20PB00X8XXX	A..2-.25	A..1-.25	+20V
208	A20PB00X0XXX	A..2-.28	A..3-.28	GRD
..3S	SHIELD	A..2-.28	SHIELD	GRD

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
207	A20PB00X0XXX	A..2-.23	A..1-.26	GRD
..2	A22TA01S1XXX	A..2-.29	S..1-.11	LEFT IN
.24	RG196/U	A..3-..J1	A..5-.J1	AFC OUT
.21	A22TA01S5XXX	A..3-..9	A..4-.26	DISC OUT
.41	A20PB00X7XXX	A..3-.17	A..8-.14	+10V
.42	A20PB00X3XXX	A..3-.19	A..8-.18	-10V
.23	A22PB00X2XXX	A..3-.21	A..4-.30	MVB OUT
.22	A22PB00X1XXX	A..3-.23	A..4-.29	MVB OUT
.38	A20PB00X8XXX	A..3-.25	A..4-.25	+20V
.39	A20PB00X8XXX	A..3-.25	A..2-.25	+20V
209	A20PB00X0XXX	A..3-.28	A..4-.28	GRD
208	A20PB00X0XXX	A..3-.28	A..2-.28	GRD
.21S	SHIELD	A..3-END-NC	E.17	SHIELD
.53	A22TA01S3XXX	A..4-..3	S..2A-.11	MX IN
.19	A22TA01S4XXX	A..4-..4	S..2B-.11	MX. OUT
.38	A20PB00X8XXX	A..4-.25	A..3-.25	+20V
.37	A20PB00X8XXX	A..4-.25	A..5-.25	+20V
.21	A22TA01S5XXX	A..4-.26	A..3-..9	DISC OUT
210	A20PB00X0XXX	A..4-.28	A..5-.28	GRD
209	A20PB00X0XXX	A..4-.28	A..3-.28	GRD
.22	A22PB00X1XXX	A..4-.29	A..3-.23	MVB OUT
.23	A22PB00X2XXX	A..4-.30	A..3-.21	MVB OUT
.27	A22TA01S6XXX	A..4-.31	A..5-.21	AUD.CNCL

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
213	A22PC00X9XXX	A..4-.32	A..5-.27	AFC
..7A	D26TVSJ9	A..4-.41	TB.1-..3	RIGHT IN
..9B	D26TVSJ6	A..4-.41	S..2B-..7	LEFT IN
..9A	D26TVSJ9	A..4-.42	S..2B-..1	LEFT OUT
..5A	D26TVSJ9	A..4-.45	TB.1-..6	LEFT IN
.10B	D26TVSJ6	A..4-.45	S..2B-..8	RIGHT IN
..5B	D26TVSJ6	A..4-.47	TB.1-..4	LEFT IN
.10A	D26TVSJ9	A..4-.48	S..2B-..2	R OUT
..5S	SHIELD	A..4-END-NC	TB.1-..5	GRD
..7S	SHIELD	A..4-END-NC	TB..1-..2	GRD
.10S	SHIELD	A..4-END-NC	S..2-E27	SHIELD
.27S	SHIELD	A..4-END-NC	E.17	SHIELD
.19S	SHIELD	A..4-END-NC	S..2-E28	SHIELD
.24	RG196/U	A..5-.J1	A..3-..J1	AFC OUT
205	RG196/U	A..5-.J2	A..6-.J2	OUT -MXR
..4	A22TA01S3XXX	A..5-.19	K..1-..9	BASEBDIN
.27	A22TA01S6XXX	A..5-.21	A..4-.31	AUD.CNCL
.20	A22TA01S9XXX	A..5-.23	A..1-.43	SCA OUT
.37	A20PB00X8XXX	A..5-.25	A..4-.25	+20V
.36	A20PB00X8XXX	A..5-.25	A..6-.25	+20V
213	A22PB00X9XXX	A..5-.27	A..4-.32	AFC
210	A20PB00X0XXX	A..5-.28	A..4-.28	GRD
211	A20PB00X0XXX	A..5-.28	A..6-.27	GRD

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
..4S	SHIELD	A..5-END-NC	E.2C	GRD
206	RG196/U	A..6-.J1	A..6-.J1	OUT - IN
206	RG196/U	A..6-.J1	A..6-.J1	OUT - IN
205	RG196/U	A..6-.J2	A..5-.J2	OUT -MXR
240	620BA00XXXXX	A..6-.25	A..6-.26	JUMPER
.35	A20PB00X8XXX	A..6-.25	A..7-.25	+20V
.36	A20PB00X8XXX	A..6-.25	A..5-.25	+20V
240	820BA00XXXXX	A..6-.26	A..6-.25	JUMPER
212	A20PB00X0XXX	A..6-.27	A..7-.27	GRD
211	A20PB00X0XXX	A..6-.27	A..5-.26	GRD
204	RG58	A..7-.J2	A..1-.J1	RF OUT
.35	A20PB00X8XXX	A..7-.25	A..6-.25	+20V
.34	A20PB00X8XXX	A..7-.25	A..8-.12	+20V
.29	A20PB00X3XXX	A..7-.26	Q1-E	13-26V
212	A20PB00X0XXX	A..7-.27	A..6-.27	GRD
.86	A20PB00X0XXX	A..7-.27	A..8-.13	GRD
.33	A22PB00X9XXX	A..8-..1	XK1-.4	+28V
.71	A20PB00X9XXX	A..8-..3	E..6	+40 VDC
.72	A20PB00X9XXX	A..8-..3	Q6-C	+40 VDC
.87	A20PB00X9CXX	A..8-. 4	E..2	+40 COMM
.59	A22PB00X6XXX	A..8-..5	Q2-B	DC CON V
.70	A22PB00X2XXX	A..8-..6	R.15-..2	
.94	A22TA01S5XXX	A..8-..7	TB..1-.12	PWR CONT

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
.84	A22PB00X91XX	A..8-..8	Q6-B	
.56	A22PB00X1XXX	A..8-..9	E..9	13-26VDC
.63	A22PB00X4XXX	A..8-.10	R.15-..1	
.69	A22PB00X5XXX	A..8-.11	R.15-..3	
.51	A20PP00X8XXX	A..8-.12	E..5	+20V
.34	A20PB00X8XXX	A..8-.12	A..7-.25	+20V
.86	A20PB00X0XXX	A..8-.13	A..7-.27	GRD
.85	A20PB00X0XXX	A..8-.13	E.11	GRD
.41	A20PB00X7XXX	A..8-.14	A..3-.17	+10V
.93	A22PB00X93XX	A..8-.15	E..3	
.81	A20PB00X902X	A..8-.16	TB.1-..7	6 VAC IN
.82	A20PB00X96XX	A..8-.17	TB.1-..9	6 VAC IN
.42	A20PB00X3XXX	A..8-.18	A..3-.19	-10V
.94S	SHIELD	A..8-END-NC	TB..1-.11	SHIELD
.95	A22PB00X1XXX	A..9-.49	T..1-..1	117 VAC
.96	A22PB00X2XXX	A..9-.51	T..1-..4	117 VAC
219	A22PB00X9XXX	CR..1-..A	CR..2-..C	JUMPER
.79	A20PB00X8XXX	CR..1-..A	T..1-..6	AC
217	A22PB00X9XXX	CR..1-..C	CR..3-..C	JUMPER
.74	A20PB00X4XXX	CR..1-..C	E..7	+40 VDC
.75	A20PB00X4XXX	CR..2-..A	E..1	+40 COMM
218	A22PB00X9XXX	CR..2-..A	CR..4-..A	JUMPER
219	A22PB00X9XXX	CR..2-..C	CR..1-..A	JUMPER

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
.77	A20PB00X1XXX	CR..3-..A	T..1-..5	AC
216	A22PB00X9XXX	CR..3-..A	CR..4-..C	JUMPER
217	A22PB00X9XXX	CR..3-..C	CR..1-..C	JUMPER
218	A22PB00X9XXX	CR..4-..A	CR..2-..A	JUMPER
216	A22PB00X9XXX	CR..4-..C	CR..3-..A	JUMPER
.75	A20PB00X4XXX	E..1	CR..2-..A	+40 COMM
226	B20TM00XXXXX	E..1	E..2	JUMPER
C.1	CAPACITOR	E..1(-)	E..7(+)	
226	B20TM00XXXXX	E..2	E..1	JUMPER
.87	A20PB00X90XX	E..2	A..8-. 4	+40 COMM
.83	A22PB00X93XX	E..3	A..8-.15	
C.5	CAPACITOR	E..3(-)	E..4(+)	
228	B20BA00XXXXX	E..4	E.10	GRD
C.5	CAPACITOR	E..4(+)	E..3(-)	
C.4	CAPACITOR	E..4(-)	E..5(+)	
.51	A20PB00X8XXX	E..5	A..3-.12	+20V
.52	A20PB00X8XXX	E..5	Q6-E	+20V
C.4	CAPACITOR	E..5(+)	E..4(-)	
.71	A20PB00X9XXX	E..6	A..8-..3	+40 VDC
227	B20TM00XXXXX	E..6	E..7	JUMPER
227	B20TM00XXXXX	E..7	E..6	JUMPER
.74	A20PB00X4XXX	E..7	CR..1-..C	+40 VDC
C.1	CAPACITOR	E..7(+)	E..1(-)	

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
229	B20BACOXXXXX	E..8	E.11	GRD
C.3	CAPACITOR	E..8(-)	E..9(+)	
.55	A22PB00X1XXX	E..9	C1-E	13-26VDC
.56	A22PB0GX1XXX	E..9	A..8-..9	13-26VDC
C.3	CAPACITOR	E..9(+)	E..8(-)	
228	B20BA00XXXXX	E.10	E..4	GRD
229	B20BA00XXXXX	E.11	E..8	GRD
.67	A20PB00X0XXX	E.11	T..1-..8	CT GRD
.85	A20PB00X0XXX	E.11	A..8-.13	GRD
204S	SHIELD	E.12	GRD	SHIELD
205S	SHIELD	E.13	E.14	GRD
205S	SHIELD	E.14	E.13	GRD
206S	SHIELD	E.15	E.16	GRD
206S	SHIELD	E.16	E.15	GRD
.24S	SHIELD	E.17	E.18..	GRD
.21S	SHIELD	E.17	A..3-END-NC	SHIELD
.20S	SHIELD	E.17	A..1-END-NC	SHIELD
.27S	SHIELD	E.17	A..4-END-NC	SHIELD
.53S	SHIELD	E.17	S..2-END-NC	SHIELD
.24S	SHIELD	E.18	E.17	GRD
221	B20TM00XXXXX	E.19	FL..4-..6	GRD
..4S	SHIELD	E.20	A..5-END-NC	GRD
223	B20TM00XXXXX	E.21	FL..2-..6	GRD

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
230	B20TM00XXXXX	E.22	FL..3-..1	GRD
231	B20TM00XXXXX	E.23	FL..1-..1	GRD
233	B20TM00XXXXX	E.24	FL..5-..1	GRD
..1S	SHIELD	E.25	A..1-.28	GRD
..2S	SHIELD	E.26	A..1-.28	GRD
R.3	RESISTOR	E.26	S..1-..5	
237	A20PB00X0XXX	E.26	S..2B-..5	GRD
231	B20TM00XXXXX	FL..1-..1	E.23	GRD
.89A	D26TVSJ9	FL..1-..4	FL..2-..3	CONN
.78A	D26TVSJ9	FL..1-..5	TB..1-..3	L AUDIO
.89B	D26TVSJ6	FL..1-..6	FL..2-..5	
.89S	SHIELD	FL..1-E23	FL..2-E21	SHIELD
222	B20TM00XXXXX	FL..2-..1	FL..2-..6	GRD
.89A	D26TVSJ9	FL..2-..3	FL..1-..4	CONN
.89B	D26TVSJ6	FL..2-..5	FL..1-..6	
222	B20TM00XXXXX	FL..2-..6	FL..2-..1	GRD
223	B20TM00XXXXX	FL..2-..6	E.21	GRD
.89S	SHIELD	FL..2-E21	FL..1-E23	SHIELD
230	B20TM00XXXXX	FL..3-..1	E.22	GRD
.93B	D26TVSJ6	FL..3-..3	TB..1-..4	R AUDIO
.93A	D26TVSJ9	FL..3-..5	TB..1-..6	R AUDIO
..93S	SHIELD	FL..3-E22	TB..1-..5	GRD
220	B20TM00XXXXX	FL..4-..1	FL..4-..6	GRD

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
221	B20TM00XXXXX	FL..4-..6	E.19	GRD
220	B20TM00XXXXX	FL..4-..6	FL..4-..1	GRD
233	B20TM00XXXXX	FL..5-..1	E.24	GRD
232	B20BA00XXXXX	FL..5-..1	FL..5-..8	GRD
R.5	RESISTOR	FL..5-..6	FL..5-..8	
R.5	RESISTOR	FL..5-..8	FL..5-..6	
232	B20BA00XXXXX	FL..5-..8	FL..5-..1	GRD
.57S	SHIELD	FL..5-ENDNC	S..1-E25	SHIELD
.25S	SHIELD	FL..5-ENDNC	XFL4-E20	SHIELD
..9S	SHIELD	GRD	S..2-E27	GRD
204S	SHIELD	GRD	E.12	SHIELD
..4	A22TA01S3XXX	K..1-..9	A..5-.19	BASEBDIN
.92	A22TA01S4XXX	M..1-..N	S..28- 12	METER -
.91	A22TA01S4XXX	M..1-..P	S..28-..6	METER +
.92S	SHIELD	M..1-END-NC	S..28-E28	SHIELD
.91S	SHIELD	M..1-END-NC	S..2-E28	SHIELD
.61	A20PB00X3XXX	P..1-..1	S..3-..4	AC HOT
.60	A20PB00X6XXX	P..1-..2	S..3-..2	AC NEUT
215	A22PB00X9XXX	Q1-B	Q2-C	JUMPER
.76	A20PB00X9XXX	Q1-C	Q6-C	+40 VDC
214	A22PB00X9XXX	Q1-C	Q2-E	JUMPER
.29	A20PB00X3XXX	Q1-E	A..7-.26	13-26V
.55	A22PB00X1XXX	Q1-E	E..9	13-26VDC

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
.59	A22PB00X6XXX	Q2-B	A..8-..5	DC CON V
215	A22PB00X9XXX	Q2-C	Q1-B	JUMPER
214	A22PB00X9XXX	Q2-E	Q1-C	JUMPER
.84	A22PB00X91XX	Q6-B	A..8-..8	
.76	A20PB00X9XXX	Q6-C	Q1-C	+40 VDC
.72	A20PB00X9XXX	Q6-C	A..8-..3	+40 VDC
.52	A20PB00X8XXX	Q6-E	E..5	+20V
.68	A22PB00X4XXX	R.15-..1	A..8-.10	
R16	RESISTOR	R.15-..1	R.15-..3	
.70	A22PB00X2XXX	R.15-..2	A..8-..6	
R16	RESISTOR	R.15-..3	R.15-..1	
.69	A22PB00X5XXX	R.15-..3	A..8-.11	
R.1	RESISTOR	S..1-..1	S..1-.10	
234	B22BA00XXXXX	S..1-..1	S..1-..2	JUMPER
234	B22BA00XXXXX	S..1-..2	S..1-..1	JUMPER
.48	A22TA01S5XXX	S..1-..3	XFL5-6	CONN
.57	A22TA01S5XXX	S..1-..3	XFL5-6	CONN
.50	A20TA01S8XXX	S..1-..4	XK1-.8	CONN
R.2	RESISTOR	S..1-..5	S..1-..6	
235	B22TM00XXXXX	S..1-..5	S..1-.10	JUMPER
R.3	RESISTOR	S..1-..5	E.26	
R.2	RESISTOR	S..1-..6	S..1-..5	
..1	A22TA01S3XXX	S..1-..7	A..2-.13	RIGHT IN

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
.49	A22TA01S6XXX	S..1-..7	XK1-.7	CONN
R.4	RESISTOR	S..1-..9	S..1-.10	
235	B22TM00XXXXX	S..1-.10	S..1-..5	JUMPER
R.1	RESISTOR	S..1-.10	S..1-..1	
R.4	RESISTOR	S..1-.10	S..1-..9	
..2	A22TA01S1XXX	S..1-.11	A..2-.29	LEFT IN
.15	A22TA01S4XXX	S..1-.11	XK1-.3	CONN.
.47	A22TA01S2XXX	S..1-.12	XK1-11	CONN
.47S	SHIELD	S..1-E25	XK1-END-NC	SHIELD
.15S	SHIELD	S..1-E25	XK1-END-NC	SHIELD
.57S	SHIELD	S..1-E25	FL..5-ENDNC	SHIELD
.48S	SHIELD	S..1-E26	XK1-END-NC	SHIELD
.50S	SHIELD	S..1-E26	XK1-END-NC	SHIELD
.49S	SHIELD	S..1-E26	XK1-END-NC	SHIELD
.53S	SHIELD	S..2-END-NC	E.17	SHIELD
.18S	SHIELD	S..2-E27	XFL4-E20	GRD
..9S	SHIELD	S..2-E27	GRD	GRD
.17S	SHIELD	S..2-E27	A..1-END-NC	SHIELD
.10S	SHIELD	S..2-E27	A..4-END-NC	SHIELD
.19S	SHIELD	S..2-E28	A..4-END-NC	SHIELD
.44S	SHIELD	S..2-E28	A..1-END-NC	SHIELD
.91S	SHIELD	S..2-E28	M..1-END-NC	SHIELD
.16S	SHIELD	S..2-E28	A..1-END-NC	SHIELD

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
239	A22PB00X9XXX	S..2A-..1	S..2A-..6	JUMPER
R.6	RESISTOR	S..2A-..4	S..2B-..4	
.18	A22TA01S7XXX	S..2A-..5	XK1-.9	CONN.
239	A22PB00X9XXX	S..2A-..6	S..2A-..1	JUMPER
.53	A22TA01S3XXX	S..2A-.11	A..4-..3	MX IN
.17	A22TA01S6XXX	S..2A-.12	A..1-.41	SCA MPD.
.16	A22TA01S5XXX	S..2B-..1	A..1-.42	AUDIO LV
..9A	D26TVSJ9	S..2B-..1	A..4-.42	LEFT OUT
.10A	D26TVSJ9	S..2B-..2	A..4-.48	R OUT
236	B22BA00XXXXX	S..2B-..4	S..2B-..4	JUMPER
R.6	RESISTOR	S..2B-..4	S..2A-..4	
236	B22BA00XXXXX	S..2B-..4	S..2B-..4	JUMPER
237	A20PB00X0XXX	S..2B-..5	E.28	GRD
.91	A22TA01S4XXX	S..2B-..6	M..1-..P	METER +
..9B	D26TVSJ6	S..2B-..7	A..4-.41	LEFT IN
.10B	D26TVSJ6	S..2B-..8	A..4-.45	RIGHT IN
.44	A22TA01S7XXX	S..2B-..9	A..1-.19	INPUT
238	B22BA00XXXXX	S..2B-.10	S..2B-.11	JUMPER
238	B22BA00XXXXX	S..2B-.11	S..2B-.10	JUMPER
.19	A22TA01S4XXX	S..2B-.11	A..4-..4	MX. OUT
.92	A22TA01S4XXX	S..2B- 12	M..1-..N	METER -
.92S	SHIELD	S..2B-E2B	M..1-END-NC	SHIELD
.62	A20PB00X2XXX	S..3-..1	T..1-..4	AC NEUT

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
.60	A20PB00X6XXX	S..3-..2	P..1-..2	AC NEUT
.63	A20PB00X9XXX	S..3-..3	XF..1-..2	AC HOT
.61	A20PB00X3XXX	S..3-..4	P..1-..1	AC HOT
..3S	SHIELD	SHIELD	A..2-.28	GRD
224	B20TM00XXXXX	T..1-..1	T..1-..1	JUMPER
224	B20TM00XXXXX	T..1-..1	T..1-..1	JUMPER
.64	A20PB00X9XXX	T..1-..1	XF..1-..1	AC FUSED
.95	A22PB00X1XXX	T..1-..1	A..9-.49	117 VAC
225	B20TM00XXXXX	T..1-..2	T..1-..4	JUMPER
.62	A20PB00X2XXX	T..1-..4	S..3-..1	AC NEUT
225	B20TM00XXXXX	T..1-..4	T..1-..2	JUMPER
.96	A22PB00X2XXX	T..1-..4	A..9-.51	117 VAC
.77	A20PB00X1XXX	T..1-..5	CR..3-..A	AC
.79	A20PB00X8XXX	T..1-..6	CR..1-..A	AC
.67	A20PB00X0XXX	T..1-..8	E.11	CT GRD
.78B	D26TVSJ9	TB..1-..1	XFL1-3	L AUDIO
C.6	CAPACITOR	TB..1-..1	TB..1-..2	
C.7	CAPACITOR	TB..1-..2	TB..1-..3	
C.6	CAPACITOR	TB..1-..2	TB..1-..1	
.78S	SHIELD	TB..1-..2	XFL1-E23	GRD
201	A20PB00X0XXX	TB..1-..2	TB..1-..5	GRD
..7S	SHIELD	TB..1-..2	A..4-END-NC	GRD
.78A	D26TVSJ9	TB..1-..3	FL..1-..5	L AUDIO

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
C.7	CAPACITOR	TB..1-..3	TB..1-..2	
.93B	D26TVSJ6	TB..1-..4	FL..3-..3	R AUDIO
C.8	CAPACITOR	TB..1-..4	TB..1-..5	
C.8	CAPACITOR	TB..1-..5	TB..1-..4	
C.9	CAPACITOR	TB..1-..5	TB..1-..6	
.93S	SHIELD	TB..1-..5	FL..3-E22	GRD
202	A20PB00X0XXX	TB..1-..5	TB..1-..8	GRD
201	A20PB00X0XXX	TB..1-..5	TB..1-..2	GRD
.93A	D26TVSJ9	TB..1-..6	FL..3-..5	R AUDIO
C.9	CAPACITOR	TB..1-..6	TB..1-..5	
C10	CAPACITOR	TB..1-..7	TB..1-..8	
C11	CAPACITOR	TB..1-..8	TB..1-..9	
C10	CAPACITOR	TB..1-..8	TB..1-..7	
203	A20PB00X0XXX	TB..1-..8	TB..1-.11	GRD
202	A20PB00X0XXX	TB..1-..8	TB..1-..5	GRD
C11	CAPACITOR	TB..1-..9	TB..1-..8	
.54	A22PB00X6XXX	TB..1-.10	XK1-.1	STRO RMT
203	A20PB00X0XXX	TB..1-.11	TB..1-..8	GRD
.46	A20PB00X1XXX	TB..1-.11	A..1-.28	GRD
.94S	SHIELD	TB..1-.11	A..8-END-NC	SHIELD
.94	A22TA01S5XXX	TB..1-.12	A..8-..7	PWR CONT
..7A	D26TVSJ9	TB.1-..3	A..4-.41	RIGHT IN
..56	D26TVSJ6	TB.1-..4	A..4-.47	LEFT IN

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
..5S	SHIELD	TB.1-..5	A..4-END-NC	GRD
..5A	D26TVSJ9	TB.1-..6	A..4-.45	LEFT IN
.81	A20PB00X902X	TB.1-..7	A..8-.16	6 VAC IN
.13A	D26TVSJ9	TB.1-..7	A..1-.17	SCA IN
.13S	SHIELD	TB.1-..8	A..1-END-NC	SHIELD
.82	A20PB00X96XX	TB.1-..9	A..8-.17	6 VAC IN
.13B	D26TVSJ6	TB.1-..9	A..1-.19	SCA IN
.64	A20PB00X9XXX	XF..1-..1	T..1-..1	AC FUSED
.63	A20PB00X9XXX	XF..1-..2	S..3-..3	AC HOT
.78S	SHIELD	XFL1-E23	TB..1-..2	GRD
.78B	D26TVSJ9	XFL1-3	TB..1-..1	L AUDIO
.73S	SHIELD	XFL2-E21	XK1-END-NC	SHIELD
.73	A22TA01S4XXX	XFL2-4	XK1-12	L AUDIO
.65S	SHIELD	XFL3-E22	XFL4-E19	SHIELD
.65A	D26TVSJ9	XFL3-4	XFL4-3	CONN
.65B	D26TVSJ6	XFL3-6	XFL4-5	CONN
.58S	SHIELD	XFL4-E19	XK1-END-NC	SHIELD
.65S	SHIELD	XFL4-E19	XFL3-E22	SHIELD
.18S	SHIELD	XFL4-E20	S..2-E27	GRD
.25S	SHIELD	XFL4-E20	FL..5-ENDNC	SHIELD
.65A	D26TVSJ9	XFL4-3	XFL3-4	CONN
.58	A22TA01S1XXX	XFL4-4	XK1-.6	R AUDIO
.65B	D26TVSJ6	XFL4-5	XFL3-6	CONN

Table 5-5. Wire List (Cont).

WIRE NO.	WIRE CODE	CONNECTION	CONNECTION	FUNCTION
..3	A22TA01S2XXX	XFL5-3	A..2-.16	MX. OUT
.48	A22TA01S5XXX	XFL5-6	S..1-..3	CONN
.57	A22TA01S5XXX	XFL5-6	S..1-..3	CONN
.25	A22TA01S5XXX	XFL5-6	XK1-10	CONN
.54	A22PB00X6XXX	XK1-.1	TB..1-.10	STRO RMT
.15	A22TA01S4XXX	XK1-.3	S..1-.11	CONN.
.33	A22PB00X9XXX	XK1-.4	A..8-..1	+28V
.58	A22TA01S1XXX	XK1-.6	XFL4-4	R AUDIO
.49	A22TA01S6XXX	XK1-.7	S..1-..7	CONN
.50	A22TA01S8XXX	XK1-.8	S..1-..4	CONN
.18	A22TA01S7XXX	XK1-.9	S..2A-..5	CONN.
.49S	SHIELD	XK1-END-NC	S..1-E26	SHIELD
.58S	SHIELD	XK1-END-NC	XFL4-E19	SHIELD
.50S	SHIELD	XK1-END-NC	S..1-E26	SHIELD
.73S	SHIELD	XK1-END-NC	XFL2-E21	SHIELD
.47S	SHIELD	XK1-END-NC	S..1-E25	SHIELD
.15S	SHIELD	XK1-END-NC	S..1-E25	SHIELD
.48S	SHIELD	XK1-END-NC	S..1-E26	SHIELD
.25	A22TA01S5XXX	XK1-10	XFL5-6	CONN
.47	A22TA01S2XXX	XK1-11	S..1-.12	CONN
.73	A22TA01S4XXX	XK1-12	XFL2-4	L AUDIO

section 6
parts list

6.1 GENERAL

This section contains a list of all replaceable electrical, electronic, and critical mechanical parts for the 310Z-1 FM EXCITER.

The manufacturers' codes appearing in the Mfr Code column of the parts list are listed in numerical order at the end of the parts list. The code list provides the manufacturer's name and address as shown in the Federal Supply Code for Manufacturers' Handbook H4-1. Manufacturers not listed in Handbook H4-1 are assigned a 5-letter code and appear first in the code list.

6.2 LIST OF EQUIPMENT

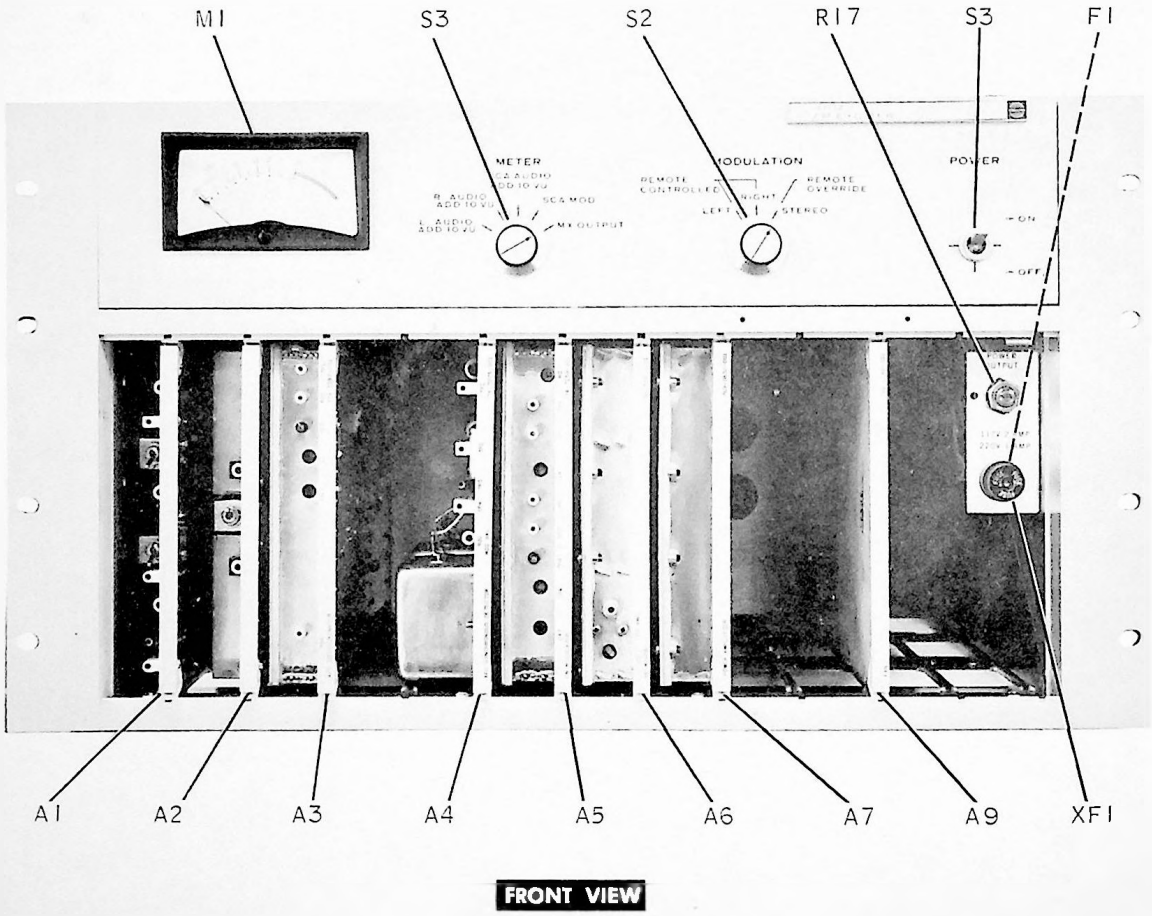

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Figure 6-1. 310Z-1 FM Exciter (Sheet 1 of 3).

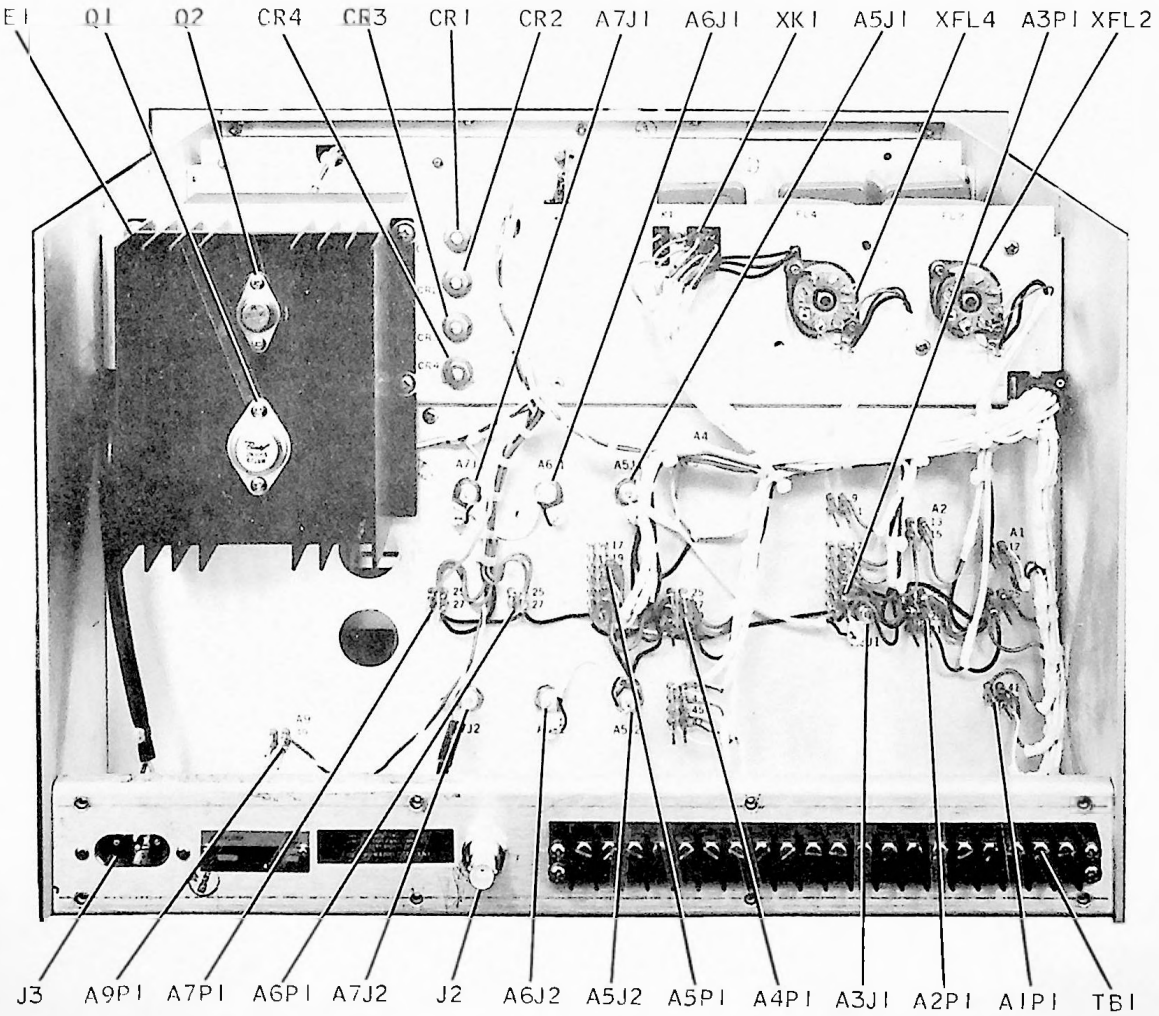

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Figure 6-1. 310Z-1 FM Exciter (Sheet 2 of 3).

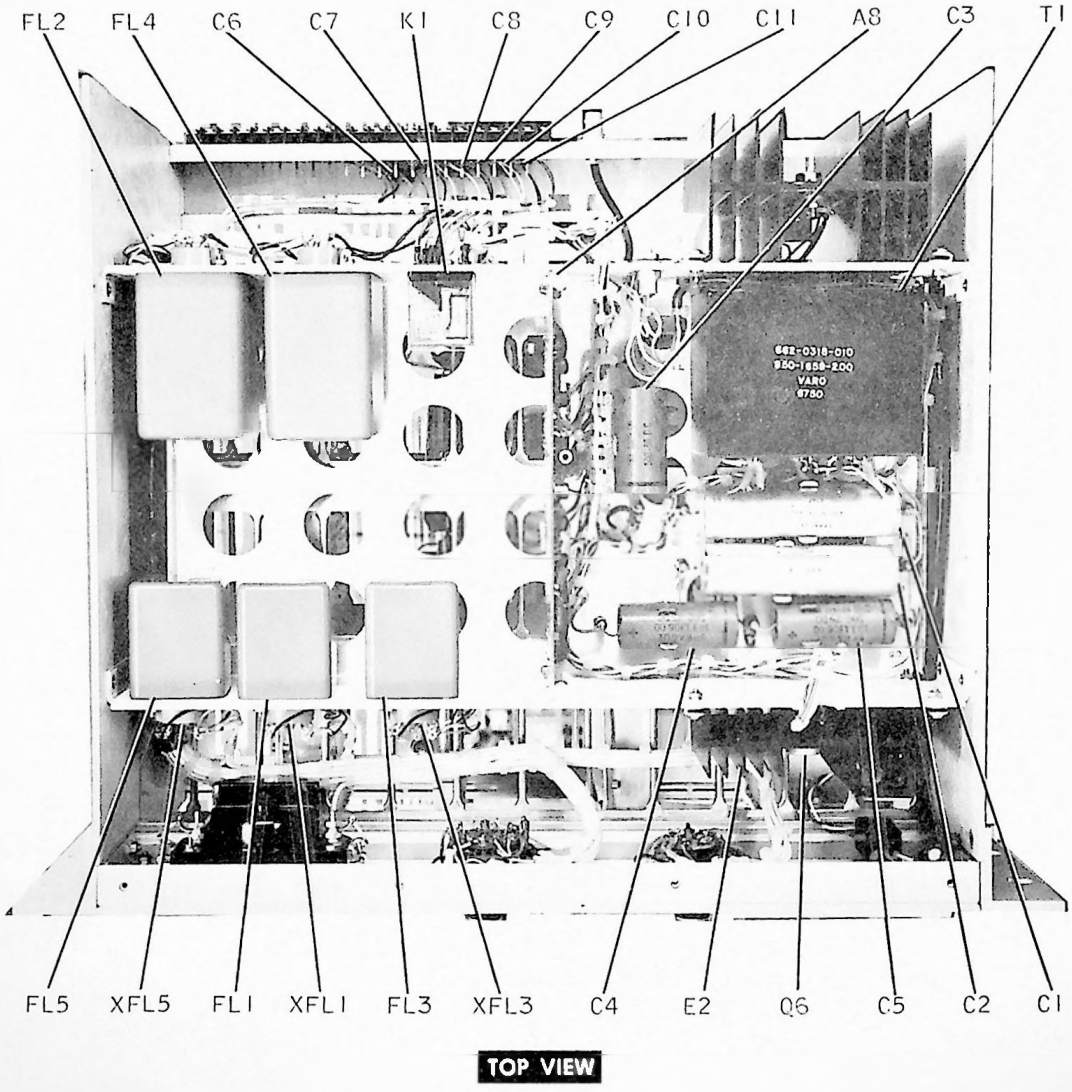

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Figure 6-1. 310Z-1 FM Exciter (Sheet 3 of 3).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	310Z-1 FM EXCITER			522-4687-001
A1	SCA GENERATOR 786W-1 SEE BREAKDOWN ON PAGE 6-7			772-5338-001
A1P1	CONNECTOR, ELECTRICAL -QTY 3- 4 CONTACTS	375430-9010	91662	372-2425-010
A2	STEREO GENERATOR 786V-1 SEE BREAKDOWN ON PAGE 6-13			772-5336-001
A2P1	SAME AS A1P1			
A3	AFC DISCRIMINATOR SEE BREAKDOWN ON PAGE 6-18			774-7097-001
A3J1	CONNECTOR, ELECTRICAL 1 CONTACT			372-9211-000
A3P1	CONNECTOR, ELECTRICAL -QTY 4- 4 CONTACTS	375430-9010	91662	372-2425-010
A4	AFC SYNCHRONOUS DETECTOR 6-23 SEE BREAKDOWN ON PAGE			774-7075-001
A4P1	CONNECTOR, ELECTRICAL -QTY 6- 4 CONTACTS	375430-9010	91662	372-2425-010
A5	FM MODULATOR SEE BREAKDOWN ON PAGE 6-28			774-7160-001
A5J1	SAME AS A3J1			
A5J2	SAME AS A3J1			
A5P1	SAME AS A1P1			
A6	RF MIXER SEE BREAKDOWN ON PAGE 6-36			781-5380-001
A6J1	SAME AS A3J1			
A6J2	SAME AS A3J1			
A6P1	CONNECTOR, ELECTRICAL 4 CONTACTS	375430-9010	91662	372-2425-010
A7	POWER AMPLIFIER SEE BREAKDOWN ON PAGE 6-40			769-0830-001
A7J1	SAME AS A3J1			
A7J2	SAME AS A3J1			
A7P1	SAME AS A6P1			
A8	POWER SUPPLY REGULATOR SEE BREAKDOWN ON PAGE 6-43			774-7216-001
A9	FAN SEE BREAKDOWN ON PAGE 6-46			783-7049-001
A9P1	SAME AS A6P1			
A10	EXTENDER BOARD SEE BREAKDOWN ON PAGE 6-48			781-5365-001
C1	CAPACITOR, FXD, ELECTROLYTIC 2300 UF, PLUS 75% MINUS 10%, 40 VDCW	601D238G040JT4	56289	183-1282-050
C2	SAME AS C1			
C3	CAPACITOR, FXD, ELECTROLYTIC 500 UF, PLUS 100% MINUS 10%, 50 VDCW			183-1309-000
C4	CAPACITOR, FXD, ELECTROLYTIC 500 UF, PLUS 100% MINUS 10%, 25 VDCW	D25447	56289	183-1306-000
C5	SAME AS C4			
C6	CAPACITOR, FXD, MICA 4700 UUF, 5% TOL, 500 VDCW	CM06F472J03	81349	912-3052-000
C7 THROUGH C11	SAME AS C6			
CR1	SEMICONDUCTOR DEVICE, DIODE	1N1200	07688	353-1721-000
CR2	SAME AS CR1			
CR3	SAME AS CR1			
CR4	SAME AS CR1			
E1	HEATSINK			776-1855-001
E2	HEATSINK, TRANSISTOR	6403B2	13103	352-9597-010
F1	FUSE, CARTRIDGE 2-AMP, 130 VAC/DC	GBB2	71400	264-0928-040

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
FL1	NETWORK, PRE-EMPHASIS	526-0016-010	95105	673-1158-010
FL2	FILTER, HIGH PASS	D11193	70674	673-1159-010
FL3	SAME AS FL1			
FL4	SAME AS FL2			
FL5	FILTER, LOW PASS	5220	17857	673-1162-020
J1	CONNECTOR, ELECTRICAL 1 CONTACT	UG1050AU	80058	357-9211-000
J2	CONNECTOR, ELECTRICAL 1 CONTACT	100B3000C75	94375	357-9248-000
J3	CONNECTOR, ELECTRICAL 3 CONTACTS	1065-1	87930	368-0207-010
K1	RELAY, ARMATURE 4C CONTACT ARRANGEMENT	T154CCCC24VDC	70309	970-2106-000
M1	METER, AUDIO LEVEL	36-0276-0000	80105	456-0056-000
Q1	TRANSISTOR	2N3505	07688	352-0583-010
Q2	TRANSISTOR	2N3740	07688	352-0695-010
Q3	NOT USED			
Q4	NOT USED			
Q5	NOT USED			
Q6	SAME AS Q1			
R1	RESISTOR, FXD, FILM 261 OHMS, 1% TOL, 1/4 WATT	RN60D2610F	81349	705-6568-000
R2	SAME AS R1			
R3	RESISTOR, FXD, FILM 562 OHMS, 1% TOL, 1/4 WATT	RN60D5620F	81349	705-6584-000
R4	SAME AS R1			
R5	RESISTOR, FXD, COMPOSITION 100K OHMS, 10% TOL, 1/4 WATT	RC07GF104K	81349	745-0821-000
R6 THROUGH R15	NOT USED			
R16	RESISTOR, FXD, FILM 5620 OHMS, 1% TOL, 1/2 WATT	RN65D5621F	81349	705-7132-000
R17	RESISTOR, VAR, COMPOSITION 5K OHMS, 20% TOL, 1/4 WATT	LL6059	71450	376-4729-000
S1	SWITCH, ROTARY, WAFER 3 POLE, 3 POSITION, 1 SECTION	233065A1	76854	259-1866-010
S2	SWITCH, ROTARY, WAFER 2 POLE, 5 POSITION 2 SECTIONS	264752N1	76854	259-2328-030
S3	SWITCH, TOGGLE DPST CONTACT ARRANGEMENT	81024SP	04009	266-5376-010
T1	TRANSFORMER, AF, STEP-DOWN 115/230 VOLTS TO 28 VOLTS	950-1669-200	83003	662-0318-010
TB1	BOARD, TERMINAL 20 TERMINALS	670A3000-20	75382	367-1852-200
XF1	FUSEHOLDER 30-AMP CURRENT RATING	HKPH	71400	265-1171-000
XFL1	SOCKET, ELECTRON TUBE 8 CONTACTS	88-8TM	02660	220-1005-000
XFL2 THROUGH XFL5	SAME AS XFL1			
XK1	SOCKET, RELAY 16 CONTACTS	30055-2	02288	220-1471-000

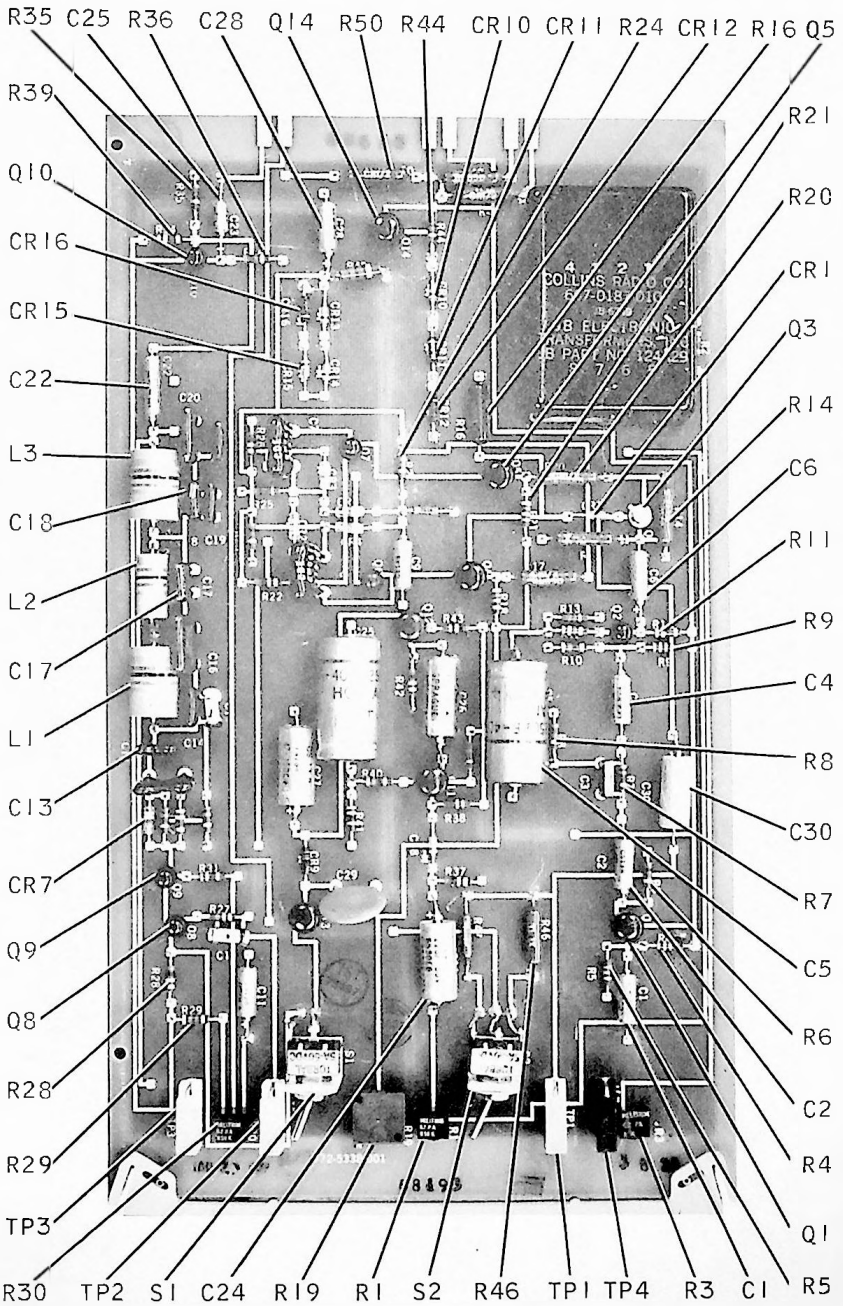

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Figure 6-2. SCA Generator 786W-1 (Sheet 1 of 2).

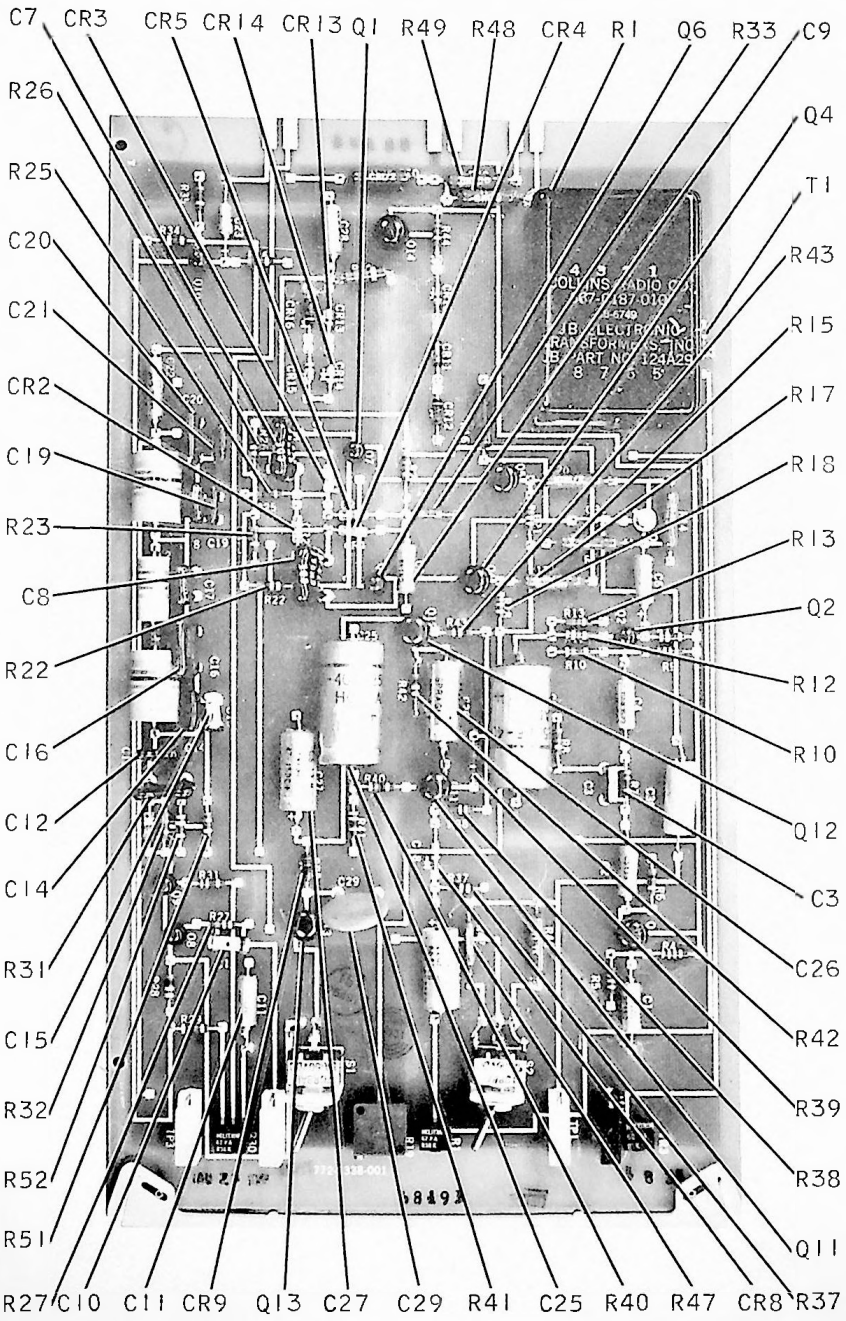

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Figure 6-2. SCA Generator 786W-1 (Sheet 2 of 2).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	SCA GENERATOR 786W-1			772-5338-001
C1	CAPACITOR, FXD, ELECTROLYTIC 6.8 UF, 20% TOL, 35 VDCW	CS13BF685M	81349	184-6216-000
C2	SAME AS C1			
C3	CAPACITOR, FXD, FILM 0.01 UF, 10% TOL, 50 VDCW	65F10AA103	01002	933-0854-000
C4	SAME AS C1			
C5	CAPACITOR, FXD, ELECTROLYTIC 250 UF, PLUS 50%, MINUS 10%, 40 VDCW	C437ARG250	73445	183-2355-150
C6	SAME AS C1			
C7	CAPACITOR, FXD, MICA 3900 UUF, 5% TOL, 500 VDCW	CM06FD392J03	81349	912-3046-000
C8	SAME AS C7			
C9	SAME AS C1			
C10	CAPACITOR, FXD, CERAMIC 2 UUF, 1/2 UUF TOL, 500 VDCW	CC20CK020D	81349	916-0076-000
C11	SAME AS C1			
C12	CAPACITOR, FXD, MICA 500 UUF, 5% TOL, 500 VDCW	DM19E501J03	72136	912-2977-000
C13	CAPACITOR, FXD, MICA 100 UUF, 5% TOL, 500 VDCW	CM05F101J03	81349	912-2816-000
C14	CAPACITOR, FXD, MICA 47 UUF, 5% TOL, 500 VDCW	CM05F470J03	81349	912-2792-000
C15	CAPACITOR, FXD, CERAMIC 5 UUF, 1/2 UUF TOL, 500 VDCW	CC20CH050D	81349	916-0118-000
C16	CAPACITOR, FXD, MICA 820 UUF, 5% TOL, 500 VDCW	CM06F821J03	81349	912-2995-000
C17	CAPACITOR, FXD, MICA 22 UUF, 5% TOL, 500 VDCW	CM05E220J03	81349	912-2768-000
C18	CAPACITOR, FXD, MICA 120 UUF, 5% TOL, 500 VDCW	CM05F121J03	81349	912-2822-000
C19	CAPACITOR, FXD, MICA 18 UUF, 10% TOL, 500 VDCW	CM05C180K03	81349	912-2763-000
C20	CAPACITOR, FXD, MICA 470 UUF, 5% TOL, 500 VDCW	CM06F471J03	81349	912-2974-000
C21	SAME AS C14			
C22	CAPACITOR, FXD, ELECTROLYTIC 0.0075 UF, 20% TOL, 75 VDCW	151D752X0075W2	56289	184-9062-040
C23	CAPACITOR, FXD, ELECTROLYTIC 0.033 UF, 20% TOL, 100 VDCW	CS13BJ333M	81349	184-6326-580
C24	CAPACITOR, FXD, ELECTROLYTIC 22 UF, 20% TOL, 50 VDCW	CS13BG226M	81349	184-6257-000
C25	SAME AS C5			
C26	CAPACITOR, FXD, ELECTROLYTIC 47 UF, 20% TOL, 35 VDCW	CS13BF476M	81349	184-6231-000
C27	SAME AS C26			
C28	SAME AS C1			
C29	CAPACITOR, FXD, CERAMIC 0.01 UF, 20% TOL, 500 VDCW	36C175A	01939	913-3013-000
C30	CAPACITOR, FXD, ELECTROLYTIC 15 UF, 20% TOL, 35 VDCW	CS13BF156M	81349	184-6222-000
CR1	SEMICONDUCTOR DEVICE, DIODE	1N914	07688	353-2906-000
CR2	SEMICONDUCTOR DEVICE, DIODE	1N995	07688	353-2042-000
CR3	SAME AS CR2			
CR4	SAME AS CR2			
CR5	SAME AS CR2			
CR6	NOT USED			
CR7	SAME AS CR2			
CR8	SAME AS CR1			
CR9	SEMICONDUCTOR DEVICE, DIODE	1N758	07688	353-2723-000
CR10	SAME AS CR1			
CR11	SEMICONDUCTOR DEVICE, DIODE	1N756	07688	353-2719-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
CR12	SAME AS CR11			
CR13	SAME AS CR1			
CR14	SAME AS CR1			
CR15	SAME AS CR1			
CR16	SEMICONDUCTOR DEVICE, DIODE	1N754A	07688	353-2981-000
L1	CHOKE, RF 5000 UH, 10% TOL	3500-40	99800	240-0843-000
L2	COIL, RF 1000 UH, 10% TOL	3500-32	99800	240-0839-000
L3	SAME AS L1			
Q1	TRANSISTOR	2N3569	07688	352-0629-030
Q2	TRANSISTOR	2N3565	07688	352-0638-010
Q3	TRANSISTOR	2N718A	07688	352-0318-000
Q4	TRANSISTOR	2N3638A	07688	352-0636-020
Q5	SAME AS Q4			
Q6	TRANSISTOR	2N3563	07688	352-0630-010
Q7	SAME AS Q6			
Q8	SAME AS Q6			
Q9	TRANSISTOR	2N3646	07688	352-0680-010
Q10	SAME AS Q2			
Q11	TRANSISTOR	2N3643	07688	352-0713-030
Q12	SAME AS Q11			
Q13	SAME AS Q11			
Q14	SAME AS Q11			
R1	RESISTOR, VAR, CERAMIC 50K OHMS, 30% TOL, 1/2 WATT	62PAR50K	73138	382-0012-130
R2	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/4 WATT	RC07GF472K	81349	745-0773-000
R3	RESISTOR, VAR, CERAMIC 5K OHMS, 30% TOL, 1/2 WATT	62PAR5K	73138	382-0012-090
R4	RESISTOR, FXD, COMPOSITION 39K OHMS, 10% TOL, 1/4 WATT	RC07GF393K	81349	745-0806-000
R5	RESISTOR, FXD, COMPOSITION 56K OHMS, 10% TOL, 1/4 WATT	RC07GF563K	81349	745-0812-000
R6	RESISTOR, FXD, COMPOSITION 1K OHMS, 10% TOL, 1/4 WATT	RC07GF102K	81349	745-0749-000
R7	RESISTOR, FXD, COMPOSITION 6800 OHMS, 10% TOL, 1/4 WATT	RC07GF682K	81349	745-0779-000
R8	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 1/4 WATT	RC07GF821K	81349	745-0746-000
R9	SAME AS R4			
R10	SAME AS R2			
R11	RESISTOR, FXD, COMPOSITION 3900 OHMS, 10% TOL, 1/4 WATT	RC07GF392K	81349	745-0770-000
R12	RESISTOR, FXD, COMPOSITION 390 OHMS, 10% TOL, 1/4 WATT	RC07GF391K	81349	745-0734-000
R13	RESISTOR, FXD, COMPOSITION 270 OHMS, 10% TOL, 1/4 WATT	RC07GF271K	81349	745-0728-000
R14	RESISTOR, FXD, FILM 7500 OHMS, 1% TOL, 1/2 WATT	RN65D7501F	81349	705-7138-000
R15	RESISTOR, FXD, FILM 6190 OHMS, 1% TOL, 1/2 WATT	RN65D6191F	81349	705-7134-000
R16	RESISTOR, FXD, FILM 1780 OHMS, 1% TOL, 1/2 WATT	RN65D1781F	81349	705-7108-000
R17	RESISTOR, FXD, FILM 2.15K OHMS, 1% TOL, 1/2 WATT	RN65D2151F	81349	705-7112-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R18	RESISTOR, FXD, COMPOSITION 33K OHMS, 10% TOL, 1/4 WATT	RC07GF333K	81349	745-0803-000
R19	RESISTOR, VAR, WIRE WOUND 5K OHMS, 0.16% TOL, 3/4 WATT	RT22C2P502	81349	381-1721-060
R20	SAME AS R17			
R21	SAME AS R18			
R22	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/4 WATT	RC07GF103K	81349	745-0785-000
R23	SAME AS R6			
R24	RESISTOR, FXD, COMPOSITION 1.96K OHMS, 10% TOL, 1/4 WATT	RN60D1961F	81349	705-6610-000
R25	SAME AS R6			
R26	SAME AS R22			
R27	RESISTOR, FXD, COMPOSITION 27K OHMS, 10% TOL, 1/4 WATT	RC07GF273K	81349	745-0800-000
R28	SAME AS R22			
R29	RESISTOR, FXD, COMPOSITION 470 OHMS, 10% TOL, 1/4 WATT	RC07GF471K	81349	745-0737-000
R30	SAME AS R1			
R31	RESISTOR, FXD, COMPOSITION 3300 OHMS, 10 TOL, 1/4 WATT	RC07GF332K	81349	745-0767-000
R32	RESISTOR, FXD, COMPOSITION 1800 OHMS, 10% TOL, 1/4 WATT	RC07GF182K	81349	745-0758-000
R33	RESISTOR, FXD, COMPOSITION 1.62K OHMS, 10% TOL, 1/4 WATT	RN60D1621F	81349	705-6606-000
R34	SAME AS R11			
R35	RESISTOR, FXD, COMPOSITION 8200 OHMS, 10% TOL, 1/4 WATT	RC07GF822K	81349	745-0782-000
R36	SAME AS R8			
R37	SAME AS R22			
R38	RESISTOR, FXD, COMPOSITION 220K OHMS, 10% TOL, 1/4 WATT	RC07GF224K	81349	745-0833-000
R39	RESISTOR, FXD, COMPOSITION 2700 OHMS, 10% TOL, 1/4 WATT	RC07GF272K	81349	745-0764-000
R40	RESISTOR, FXD, COMPOSITION 68 OHMS, 10% TOL, 1/4 WATT	RC07GF680K	81349	745-0707-000
R41	RESISTOR, FXD, COMPOSITION 33 OHMS, 10% TOL, 1/4 WATT	RC07GF330K	81349	745-0695-000
R42	SAME AS R22			
R43	RESISTOR, FXD, COMPOSITION 100K OHMS, 10% TOL, 1/4 WATT	RC07GF104K	81349	745-0821-000
R44	RESISTOR, FXD, COMPOSITION 180 OHMS, 10% TOL, 1/4 WATT	RC07GF181K	81349	745-0722-000
R45	RESISTOR, FXD, COMPOSITION 220 OHMS, 10% TOL, 1/4 WATT	RC07GF221K	81349	745-0725-000
R46	RESISTOR, FXD, FILM 12K OHMS, 2% TOL, 2 WATTS	RL42S123G	81349	745-7188-000
R47	RESISTOR, FXD, FILM 28.7K OHMS, 2% TOL, 2 WATTS	RN65D2872F	81349	705-7166-000
R48	RESISTOR, FXD, FILM 5110 OHMS, 1% TOL, 1/2 WATT	RN65D5111F	81349	705-7130-000
R49	SAME AS R48			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R50	RESISTOR, FXD, FILM 1330 OHMS, 1% TOL, 1/2 WATT	RN65D1331F	81349	705-7102-000
R51	SAME AS R32			
R52	SAME AS R11			
S1	SWITCH, TOGGLE SPST CONTACT ARRANGEMENT	SP4	60418	266-5064-000
S2	SWITCH, TOGGLE DPDT CONTACT ARRANGEMENT	MS24659-21D	96906	266-5065-000
T1	TRANSFORMER, AF OPEN FRAME, LEAD BROWN TO ORANGE 1.9K OHMS IMPEDANCE, LEAD YELLOW TO BLUE 600 OHMS IMPEDANCE, LEADS RED AND GREEN CENTER TAP, LEAD WHITE STATIC SHIELD	A16940	70674	677-0187-010
TP1	JACK, TIP WHITE	4877-125-9	17117	360-0434-100
TP2	SAME AS TP1			
TP3	SAME AS TP1			
TP4	JACK, TIP BLACK	11J1043	82389	360-0434-010

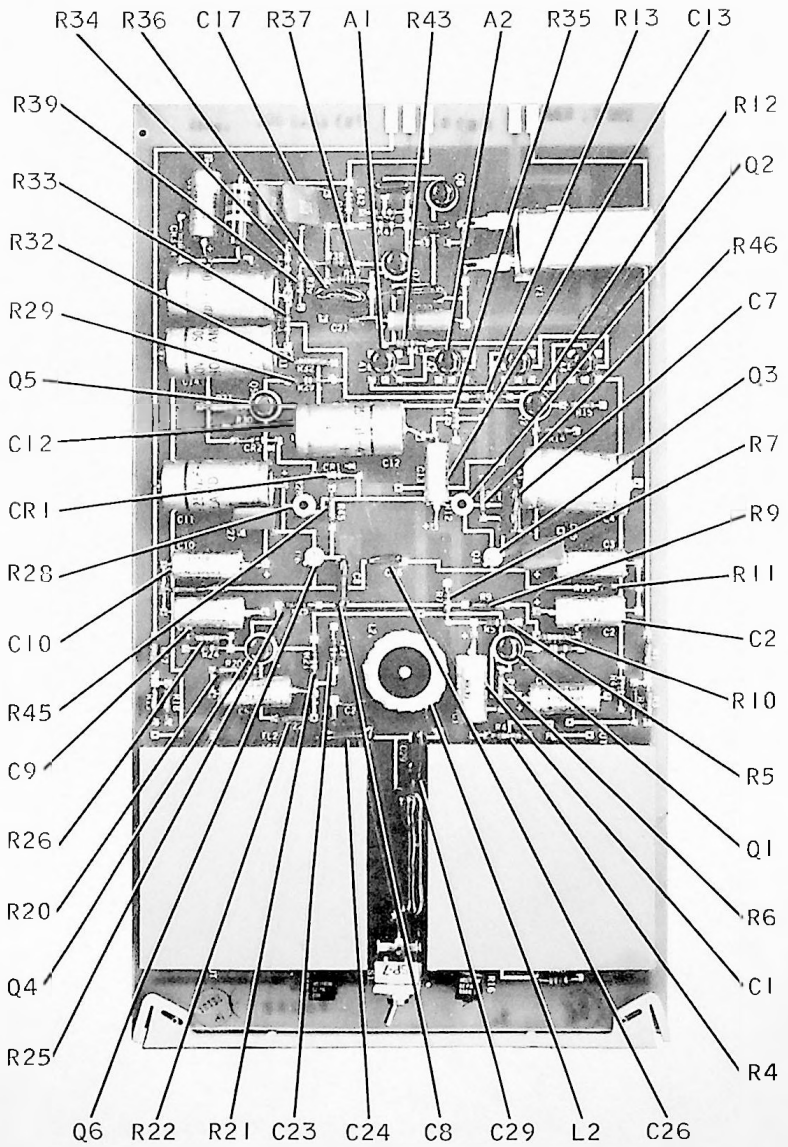

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Figure 6-3. Stereo Generator 786V-1 (Sheet 1 of 2).

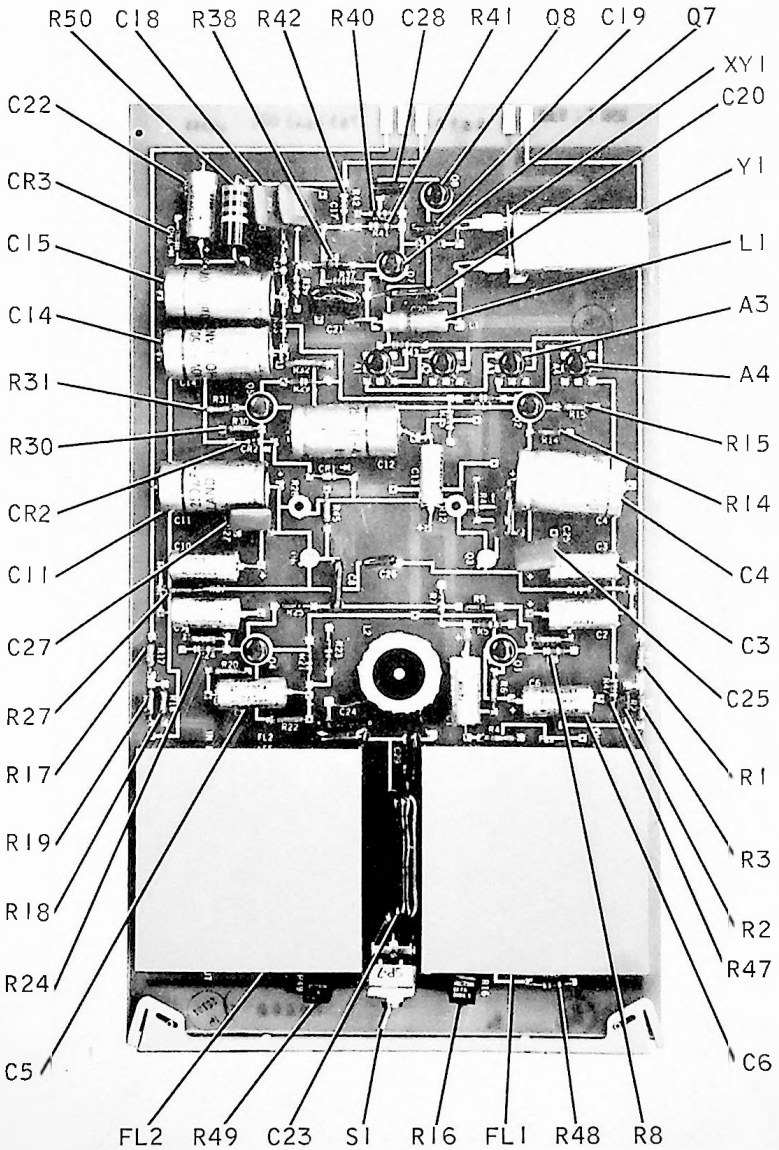

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Figure 6-3. Stereo Generator 786V-1 (Sheet 2 of 2).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	STEREO GENERATOR 786V-1			772-5336-001
A1	INTERGRATED CIRCUIT	SL3977	07263	351-7121-010
A2	INTERGRATED CIRCUIT	SL3979	07263	351-7121-030
A3	SAME AS A2			
A4	SAME AS A1			
C1	CAPACITOR, FXD, ELECTROLYTIC 47 UF, 20% TOL, 35 VDCW	CS13BF476M	81349	184-6231-000
C2	SAME AS C1			
C3	SAME AS C1			
C4	CAPACITOR, FXD, ELECTROLYTIC 1000 UF, PLUS 50% MINUS 10%, 16 VDCW	C437ARE1000	73445	183-2355-090
C5	SAME AS C1			
C6	SAME AS C1			
C7	CAPACITOR, FXD, MICA 1000 UUF, 5% TOL, 500 VDCW	CM06F102J03	81349	912-3001-000
C8	SAME AS C7			
C9	SAME AS C1			
C10	SAME AS C1			
C11	SAME AS C4			
C12	CAPACITOR, FXD, ELECTROLYTIC 250 UF, PLUS 50% MINUS 10%, 40 VDCW	C437ARG250	73445	183-2355-150
C13	CAPACITOR, FXD, ELECTROLYTIC 22 UF, 20% TOL, 35 VDCW	CS13BF226M	81349	184-6225-000
C14	SAME AS C12			
C15	SAME AS C12			
C16	NOT USED			
C17	CAPACITOR, FXD, CERAMIC 2.2 UF, PLUS 80% MINUS 20%, 25 VDCW	5C15A	56289	913-3812-000
C18	SAME AS C17			
C19	CAPACITOR, FXD, MICA 33 UUF, 5% TOL, 500 VDCW	CM05F330J03	81349	912-2780-000
C20	CAPACITOR, FXD, MICA 820 UUF, 5% TOL, 500 VDCW	CM06F821J03	81349	912-2995-000
C21	CAPACITOR, FXD, MICA 3300 UUF, 5% TOL, 500 VDCW	CM06F332J03	81349	912-3040-000
C22	SAME AS C1			
C23	CAPACITOR, FXD, MICA 30,000 UUF, 1% TOL, 500 VDCW	CM08FD303F03	81349	912-3131-000
C24	CAPACITOR, FXD, MICA 3900 UUF, 1% TOL, 500 VDCW	CM06FD392F03	81349	912-3044-000
C25	SAME AS C17			
C26	SAME AS C19			
C27	SAME AS C17			
C28	CAPACITOR, FXD, MICA 47 UUF, 5% TOL, 500 VDCW	CM05F470J03	81349	912-2792-000
C29	CAPACITOR, FXD, MICA 1800 UUF, 2% TOL, 500 VDCW	CM06F182G03	81349	912-3018-000
CR1	SEMICONDUCTOR DEVICE, DIODE	1N914	07688	353-2906-000
CR2	SAME AS CR1			
CR3	SEMICONDUCTOR DEVICE, DIODE	1N747A	07688	353-2702-000
FL1	FILTER, LOW PASS 1500 HZ CENTER FREQUENCY			673-1167-010
FL2	SAME AS FL1			
L1	CHOKE, RF 6800 UH, 5% TOL	MS90541-07	96906	240-2560-000
L2	INDUCTOR, RF 2.055 MH			781-5329-001
Q1	TRANSISTOR	2N3642	07688	352-0713-030
Q2	SAME AS Q1			
Q3	TRANSISTOR	2N3153	12040	352-0776-010
Q4	SAME AS Q1			
Q5	SAME AS Q1			
Q6	SAME AS Q3			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
Q7	SAME AS Q1			
Q8	SAME AS Q1			
R1	RESISTOR, FXD, FILM 226 OHMS, 1% TOL, 1/8 WATT	RN55D2260F	81349	705-0965-CCC
R2	SAME AS R1			
R3	RESISTOR, FXD, FILM 681 OHMS, 1% TOL, 1/8 WATT	RN55D6810F	81349	705-0988-CCC
R4	RESISTOR, FXD, FILM 649 OHMS, 1% TOL, 1/8 WATT	RN55D6490F	81349	705-0987-CCC
R5	RESISTOR, FXD, COMPOSITION 22K OHMS, 10% TOL, 1/4 WATT	RC07GF223K	81349	745-0797-CCC
R6	RESISTOR, FXD, FILM 100 OHMS, 1% TOL, 1/8 WATT	RN55D1000F	81349	705-0946-CCC
R7	SAME AS R5			
R8	RESISTOR, FXD, COMPOSITION 3300 OHMS, 10 TOL, 1/4 WATT	RC07GF332K	81349	745-0767-CCC
R9	RESISTOR, FXD, FILM 10K OHMS, 1% TOL, 1/8 WATT	RN55D1002F	81349	705-1044-CCC
R10	RESISTOR, FXD, FILM 464 OHMS, 1% TOL, 1/8 WATT	RN55D4640F	81349	705-0980-CCC
R11	RESISTOR, FXD, FILM 61.9 OHMS, 1% TOL, 1/8 WATT	RN55D61R9F	81349	705-0938-CCC
R12	RESISTOR, VAR, CERAMIC 1K OHMS, 30% TOL, 1/2 WATT	62PR1K	73138	382-0008-07C
R13	RESISTOR, FXD, COMPOSITION 120K OHMS, 10% TOL, 1/4 WATT	RC07GF124K	81349	745-0824-CCC
R14	RESISTOR, FXD, FILM 21.5K OHMS, 1% TOL, 1/8 WATT	RN55D2152F	81349	705-1066-CCC
R15	RESISTOR, FXD, FILM 348 OHMS, 1% TOL, 1/8 WATT	RN55D3480F	81349	705-0974-CCC
R16	RESISTOR, VAR, CERAMIC 10K OHMS, 30% TOL, 1/2 WATT	62PAR10K	73138	382-0008-44C
R17	RESISTOR, FXD, FILM 215 OHMS, 1% TOL, 1/8 WATT	RN55D2150F	81349	705-0964-CCC
R18	SAME AS R17			
R19	RESISTOR, FXD, FILM 715 OHMS, 1% TOL, 1/8 WATT	RN55D7150F	81349	705-0989-CCC
R20	SAME AS R4			
R21	SAME AS R5			
R22	SAME AS R6			
R23	SAME AS R5			
R24	SAME AS R8			
R25	SAME AS R9			
R26	SAME AS R10			
R27	SAME AS R11			
R28	SAME AS R12			
R29	SAME AS R13			
R30	SAME AS R14			
R31	SAME AS R15			
R32	RESISTOR, FXD, FILM 619 OHMS, 1% TOL, 1/4 WATT	RN60D6190F	81349	705-6586-CCC
R33	RESISTOR, FXD, COMPOSITION 560 OHMS, 10% TOL, 1/4 WATTS	RC07GF561K	81349	745-0740-CCC
R34	RESISTOR, FXD, COMPOSITION 56 OHMS, 10% TOL, 1/4 WATT	RC07GF560K	81349	745-0704-CCC
R35	RESISTOR, FXD, COMPOSITION 470 OHMS, 10% TOL, 1/4 WATT	RC07GF471K	81349	745-0737-CCC
R36	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/4 WATT	RC07GF103K	81349	745-0785-CCC

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R37	RESISTOR, FXD, COMPOSITION 68K OHMS, 10% TOL, 1/4 WATT	RC07GF683K	81349	745-0815-000
R38	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1/4 WATT	RC07GF101K	81349	745-0713-000
R39	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 1/4 WATT	RC07GF821K	81349	745-0746-000
R40	RESISTOR, FXD, COMPOSITION 100K OHMS, 10% TOL, 1/4 WATT	RC07GF104K	81349	745-0821-000
R41	RESISTOR, FXD, COMPOSITION 3900 OHMS, 10% TOL, 1/4 WATT	RC07GF392K	81349	745-0770-000
R42	SAME AS R35			
R43	RESISTOR, FXD, COMPOSITION 680 OHMS, 10% TOL, 1/4 WATT	RC07GF681K	81349	745-0742-000
R44	NOT USED			
R45	RESISTOR, FXD, FILM 147 OHMS, 1% TOL, 1/8 WATT	RN55D1470F	81349	705-0956-000
R46	SAME AS R45			
R47	SAME AS R35			
R48	RESISTOR, FXD, COMPOSITION 330 OHMS, 10% TOL, 1/4 WATT	RC07GF331K	81349	745-0731-000
R49	RESISTOR, VAR, CERAMIC 50 OHMS, 30% TOL, 1/2 WATT	62PAR50	73138	382-0008-370
R50	RESISTOR, FXD, COMPOSITION 180 OHMS, 10% TOL, 2 WATTS	RC42GF181K	81349	745-5621-000
S1	SWITCH, TOGGLE SPDT CONTACT ARRANGEMENT	SP7	60418	266-5059-000
XY1	SOCKET, CRYSTAL 2 CONTACTS	8000AG2	91506	292-0215-000
Y1	CRYSTAL UNIT, QUARTZ	289-7095-020	71034	289-7095-020

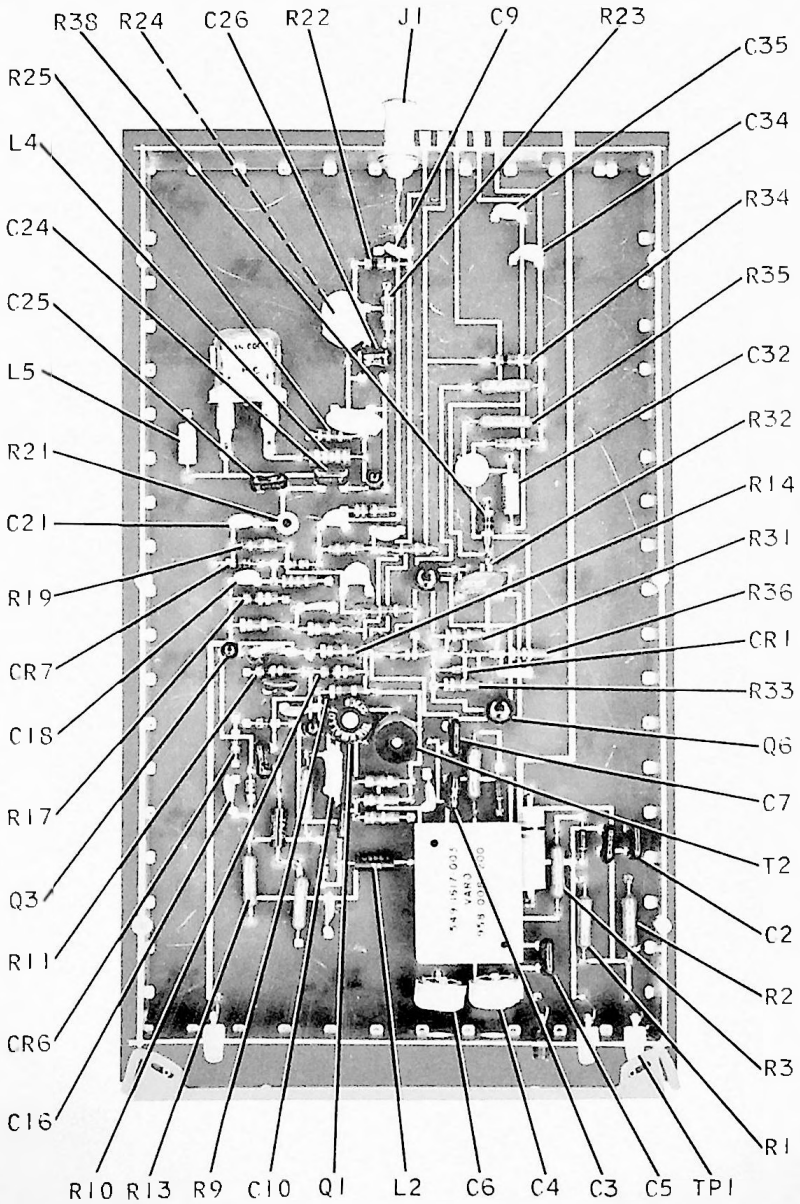

Figure 6-4. AFC Discriminator (Sheet 1 of 2).

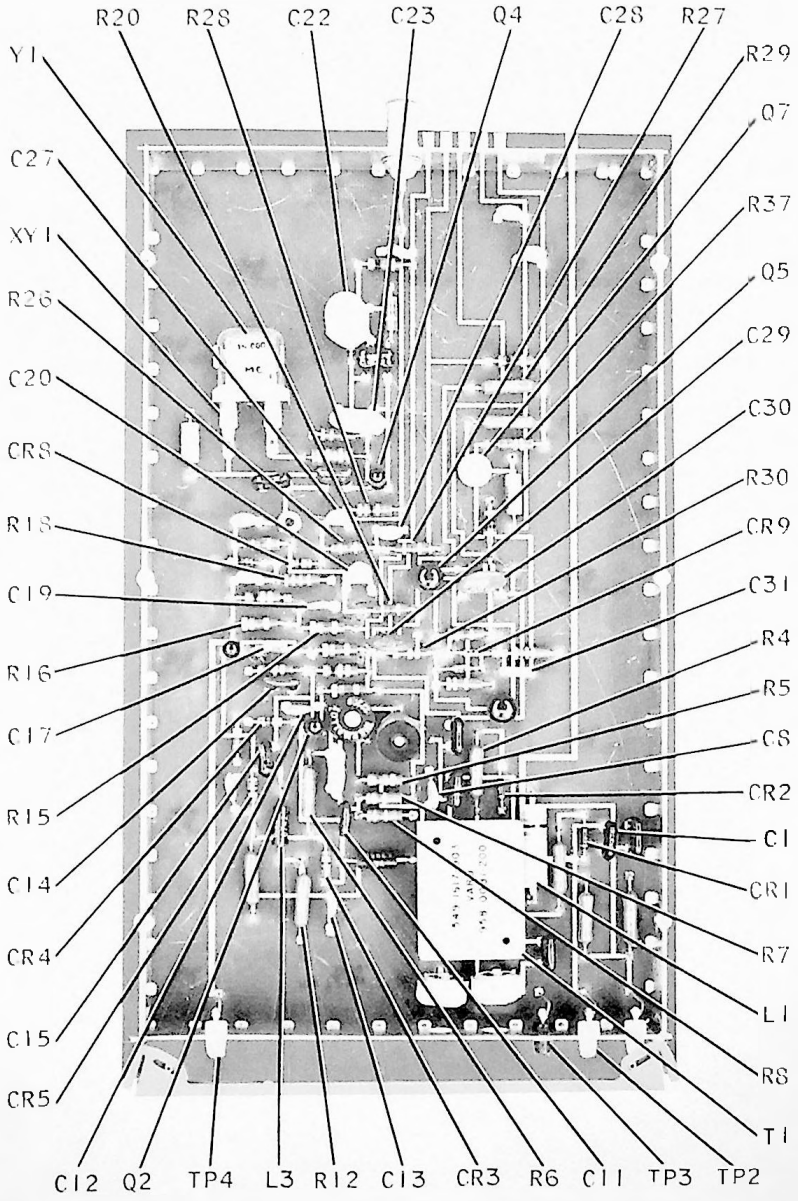

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Figure 6-4. AFC Discriminator (Sheet 2 of 2).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	AFC DISCRIMINATOR			774-7097-001
C1	CAPACITOR, FXD, MICA 470 UUF, 5% TOL, 300 VDCW	DM15F471J03	72136	912-2864-000
C2	SAME AS C1			
C3	CAPACITOR, FXD, MICA 220 UUF, 5% TOL, 500 VDCW	CM05F221J03	81349	912-2840-000
C4	CAPACITOR, VAR, CERAMIC 4-12 UUF, 350 VDCW	3192-000-C0P0-15R	72982	917-1253-020
C5	CAPACITOR, FXD, MICA 22 UUF, 5% TOL, 500 VDCW	CM05E220J03	81349	912-2768-000
C6	CAPACITOR, VAR, CERAMIC 6-25 UUF, 350 VDCW	3192-000-C0P0-32R	72982	917-1253-030
C7	CAPACITOR, FXD, MICA 75 UUF, 5% TOL, 500 VDCW	CM05ED750J03	81349	912-2807-000
C8	CAPACITOR, FXD, CERAMIC 0.01 UF, PLUS 80% MINUS 20%, 100 VDCW	805-014X5V0103Z	72982	913-3680-000
C9	SAME AS C8			
C10	CAPACITOR, FXD, CERAMIC 0.01 UF, PLUS 80% MINUS 20%, 50 VDCW	33C41	56289	913-3886-000
C11	SAME AS C5			
C12	SAME AS C8			
C13	SAME AS C8			
C14	CAPACITOR, FXD, MICA 82 UUF, 5% TOL, 500 VDCW	CM05E820J03	81349	912-2810-000
C15	CAPACITOR, FXD, MICA 10 UUF, 5% TOL, 500 VDCW	DM15C100J01	72136	912-2753-000
C16	SAME AS C8			
C17	SAME AS C8			
C18	CAPACITOR, FXD, CERAMIC 1000 UUF, 20% TOL, 500 VDCW	40C73A1	01939	913-3009-000
C19	SAME AS C8			
C20	SAME AS C18			
C21	SAME AS C18			
C22	SAME AS C10			
C23	SAME AS C10			
C24	CAPACITOR, FXD, MICA 68 UUF, 5% TOL, 500 VDCW	CM05E680J03	81349	912-2804-000
C25	CAPACITOR, FXD, MICA 510 UUF, 5% TOL, 300 VDCW	DM15F511J03	72136	912-2867-000
C26	CAPACITOR, FXD, MICA 180 UUF, 5% TOL, 500 VDCW	CM05F181J03	81349	912-2834-000
C27	SAME AS C18			
C28	SAME AS C18			
C29	CAPACITOR, FXD, CERAMIC 3300 UUF, 20% TOL, 500 VDCW	CK62AW332M	81349	913-1193-000
C30	SAME AS C29			
C31	CAPACITOR, FXD, CERAMIC 10,000 UUF, 20% TOL, 200 VDCW	CK06CW103M	81349	913-4001-000
C32	CAPACITOR, FXD, ELECTROLYTIC 2.2 UF, 10% TOL, 35 VDCW	CS12BF225K	81349	184-6077-000
C33	NOT USED			
C34	SAME AS C18			
C35	SAME AS C18			
CR1	SEMICONDUCTOR DEVICE, DIODE	FA2311U	07263	353-3593-010
CR2	SAME AS CR1			
CR3	SEMICONDUCTOR DEVICE, DIODE	1N270	07688	353-2018-000
CR4 THROUGH CR8	SAME AS CR3			
CR9	SEMICONDUCTOR DEVICE, DIODE	1N626	07688	353-2857-000
CR10	SAME AS CR9			
J1	CONNECTOR, ELECTRICAL 1 CONTACT	UG1051U	80058	357-9210-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
L1	CHOKE, RF 1000 UH, 10% TOL	LT7K209	81349	240-0193-000
L2	COIL, RF 6.8 UH, 5% TOL	13950	03550	240-1996-110
L3	COIL, RF 6.2 UH, 5% TOL	13949	03550	240-1996-100
L4	COIL, RF 3.3 UH, 10% TOL	C7307	42190	240-0065-000
L5	COIL, RF 4.7 UH, 10% TOL	LT4K042	81349	240-0145-000
Q1	TRANSISTOR	2N741	07688	352-0322-000
Q2	TRANSISTOR	2N4121	07688	352-0743-010
Q3	SAME AS Q2			
Q4	SAME AS Q2			
Q5	TRANSISTOR	2N3643	07688	352-0713-030
Q6	SAME AS Q5			
Q7	TRANSISTOR	2N491	07688	352-0116-000
R1	RESISTOR, FXD, FILM 6810 OHMS, 1% TOL, 1/2 WATT	RN65D6811F	81349	705-7136-000
R2	SAME AS R1			
R3	RESISTOR, FXD, FILM 110 OHMS, 1% TOL, 1/2 WATT	RN65D1100F	81349	705-7050-000
R4	SAME AS R3			
R5	RESISTOR, FXD, COMPOSITION 150 OHMS, 10% TOL, 1/2 WATT	RC20GF151K	81349	745-1317-000
R6	RESISTOR, FXD, FILM 261 OHMS, 1% TOL, 1/2 WATT	RN65D2610F	81349	705-7068-000
R7	RESISTOR, FXD, COMPOSITION 1800 OHMS, 10% TOL, 1/2 WATT	RC20GF182K	81349	745-1363-000
R8	SAME AS R7			
R9	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/2 WATT	RC20GF472K	81349	745-1380-000
R10	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/2 WATT	RC20GF103K	81349	745-1394-000
R11	SAME AS R10			
R12	RESISTOR, FXD, FILM 42.2 OHMS, 1% TOL, 1/2 WATT	RN65D42R2F	81349	705-7030-000
R13	RESISTOR, FXD, FILM 51.1 OHMS, 1% TOL, 1/2 WATT	RN65D51R1F	81349	705-7034-000
R14	SAME AS R9			
R15	SAME AS R9			
R16	SAME AS R9			
R17	SAME AS R10			
R18	RESISTOR, FXD, COMPOSITION 680 OHMS, 10% TOL, 1/2 WATT	RC20GF681K	81349	745-1345-000
R19	RESISTOR, FXD, COMPOSITION 2700 OHMS, 10% TOL, 1/2 WATT	RC20GF272K	81349	745-1370-000
R20	SAME AS R19			
R21	RESISTOR, VAR, CERMET 500 OHMS, 30% TOL, 1/2 WATT	62PR500	73138	382-0008-060
R22	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1/2 WATT	RC20GF101K	81349	745-1310-000
R23	RESISTOR, FXD, COMPOSITION 8200 OHMS, 10% TOL, 1/2 WATT	RC20GF822K	81349	745-1391-000
R24	RESISTOR, FXD, COMPOSITION 18K OHMS, 5% TOL, 1/2 WATT	RC20GF183J	81349	745-1404-000
R25	RESISTOR, FXD, COMPOSITION 6800 OHMS, 10% TOL, 1/2 WATT	RC20GF682K	81349	745-1387-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R26	SAME AS R19			
R27	SAME AS R19			
R28	RESISTOR, FXD, COMPOSITION 68 OHMS, 10% TOL, 1/2 WATT	RC20GF680K	81349	745-1303-000
R29	RESISTOR, FXD, FILM 1.33K OHMS, 1% TOL, 1/2 WATT	RN65D1331F	81349	705-7102-000
R30	RESISTOR, FXD, COMPOSITION 15K OHMS, 10% TOL, 1/2 WATT	RC20GF153K	81349	745-1401-000
R31	RESISTOR, FXD, COMPOSITION 3300 OHMS, 10% TOL, 1/2 WATT	RC20GF332K	81349	745-1373-000
R32	SAME AS R30			
R33	SAME AS R31			
R34	RESISTOR, FXD, COMPOSITION 1K OHMS, 10% TOL, 1/2 WATT	RC20GF102K	81349	745-1352-000
R35	RESISTOR, FXD, FILM 56.2K OHMS, 1% TOL, 1/2 WATT	RN65D5622F	81349	705-7180-000
R36	RESISTOR, FXD, COMPOSITION 47K OHMS, 10% TOL, 1/2 WATT	RC20GF473K	81349	745-1422-000
R37	RESISTOR, FXD, COMPOSITION 220 OHMS, 10% TOL, 1/2 WATT	RC20GF221K	81349	745-1324-000
R38	RESISTOR, FXD, COMPOSITION 10 OHMS, 10% TOL, 1/2 WATT	RC20GF100K	81349	745-1268-000
T1	TRANSFORMER			549-1617-003
T2	TRANSFORMER			549-1589-002
TP1	JACK, TIP WHITE	SL490-458WHT	12615	306-2241-100
TP2	SAME AS TP1			
TP3	JACK, TIP BLACK	SL490-458BLK	12615	306-2241-010
TP4	SAME AS TP1			
XY1	SOCKET, CRYSTAL	8000AG2	91506	292-0215-000
Y1	CRYSTAL UNIT, QUARTZ 14 MHZ FREQUENCY RANGE	S289-2743-00	94148	289-2743-000

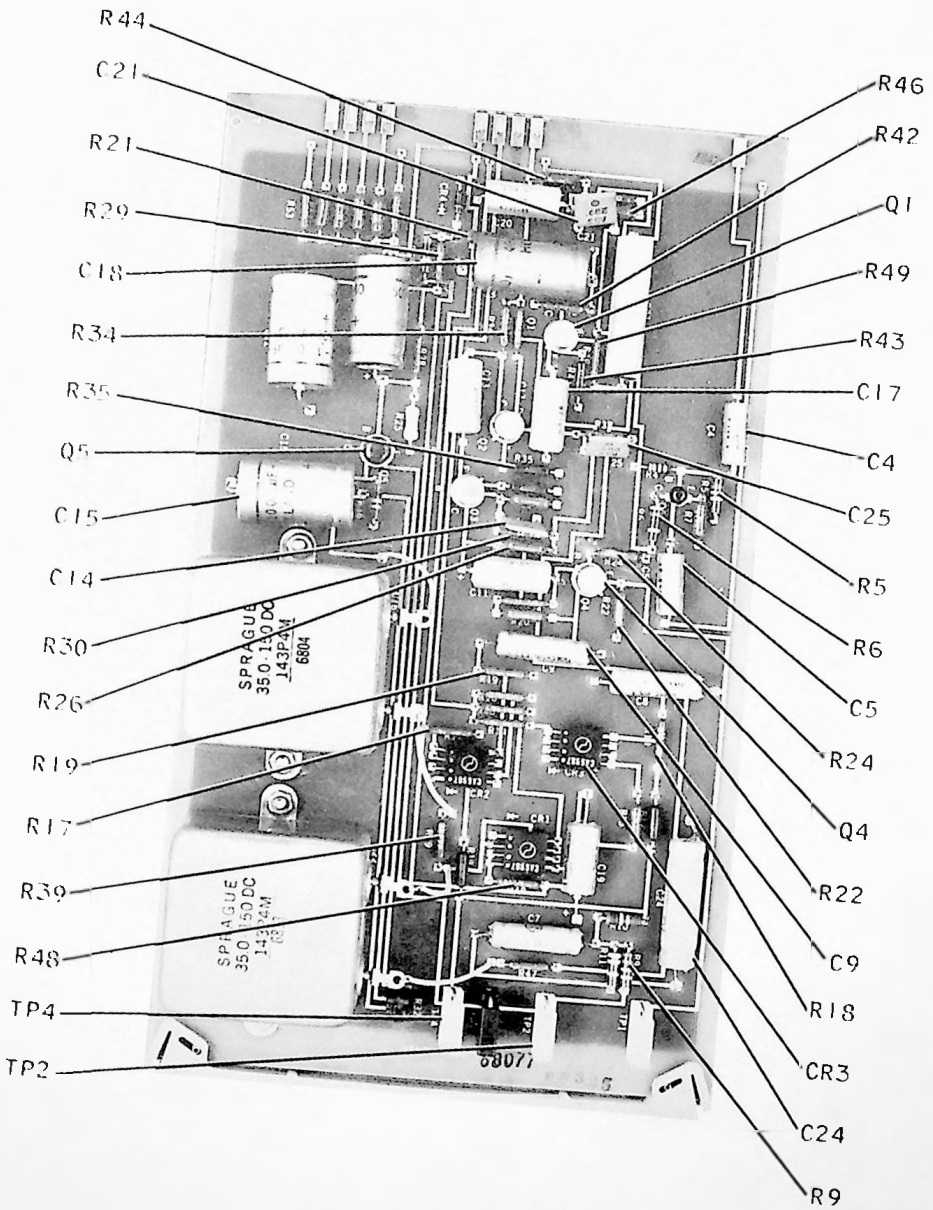

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Figure 6-5. AFC Synchronous Detector (Sheet 1 of 2).

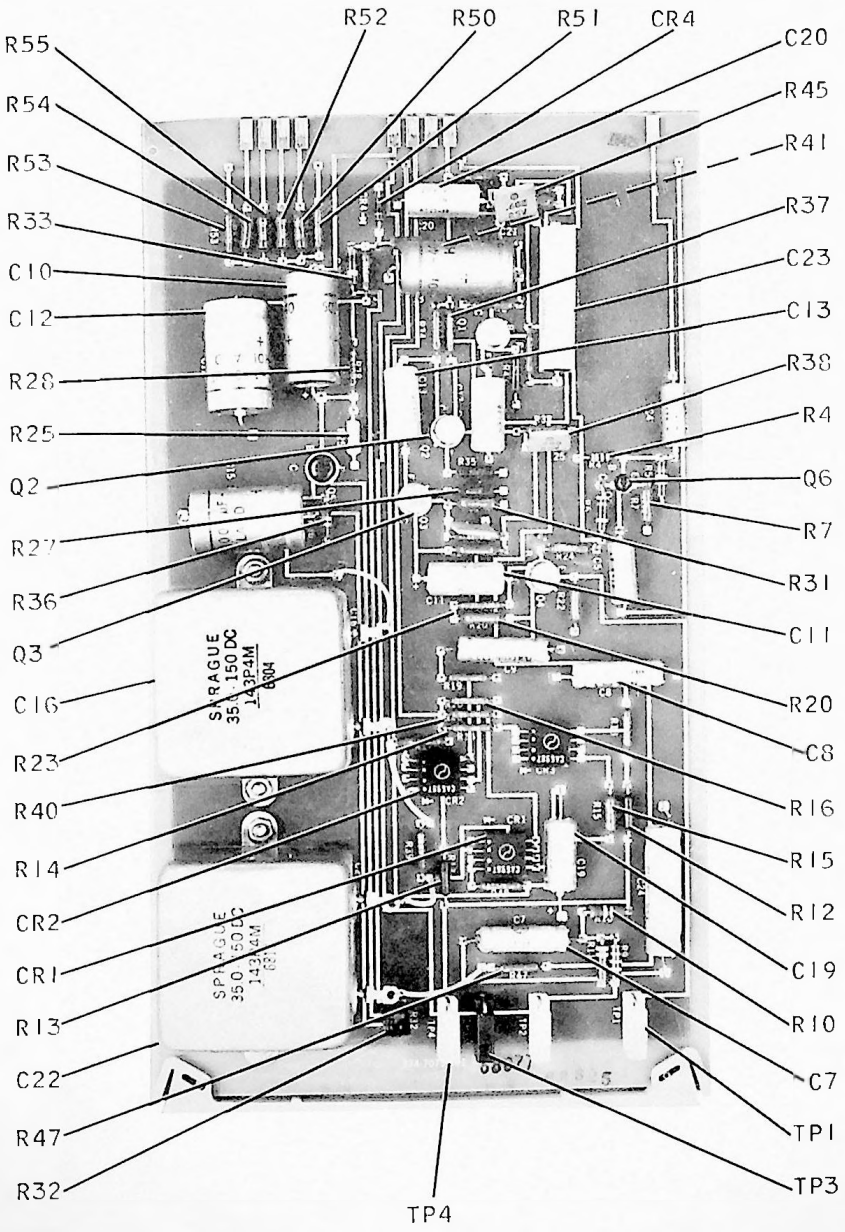

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Figure 6-5. AFC Synchronous Detector (Sheet 2 of 2).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	AFC SYNCHRONOUS DETECTOR			774-7075-001
C1	NOT USED			
C2	NOT USED			
C3	NOT USED			
C4	CAPACITOR, FXD, ELECTROLYTIC 15 UF, 20% TOL, 35 VDCW	CS13BF156M	81349	184-6222-000
C5	SAME AS C4			
C6	NOT USED			
C7	CAPACITOR, FXD, ELECTROLYTIC 2 UF, 20% TOL, 75 VDCW	CL37BL020MN3	81349	184-7929-000
C8	CAPACITOR, FXD, ELECTROLYTIC 5.5 UF, 20% TOL, 30 VDCW	CL37BN5R5MN3	81349	184-7918-000
C9	SAME AS C8			
C10	CAPACITOR, FXD, ELECTROLYTIC 250 UF, PLUS 50% MINUS 10%, 40 VDCW	C437ARG250	73445	183-2355-150
C11	CAPACITOR, FXD, ELECTROLYTIC 100 UF, 20% TOL, 20 VDCW	CS13BE107M	81349	184-6190-000
C12	CAPACITOR, FXD, ELECTROLYTIC 1000 UF, PLUS 50% MINUS 10%, 16 VDCW	C437ARE1000	73445	183-2355-090
C13	SAME AS C11			
C14	CAPACITOR, FXD, CERAMIC 0.68 UF, PLUS 80% MINUS 20%, 25 VDCW	5C12A	56289	913-3809-000
C15	SAME AS C12			
C16	CAPACITOR, FXD, PAPER 35 UF, 20% TOL, 150 VDCW	143P4M	56289	951-2003-000
C17	SAME AS C11			
C18	SAME AS C10			
C19	CAPACITOR, FXD, ELECTROLYTIC 220 UF, 20% TOL, 10 VDCW	CS13BC227M	81349	184-6154-000
C20	SAME AS C11			
C21	SAME AS C14			
C22	SAME AS C16			
C23	CAPACITOR, FXD, ELECTROLYTIC 100 UF, PLUS 100% MINUS 10%, 10 VDCW	S13691	56289	183-2151-000
C24	CAPACITOR, FXD, ELECTROLYTIC 20 UF, 20% TOL, 25 VDCW	CL37BG200MN3	81349	184-7258-000
C25	SAME AS C14			
CR1	SEMICONDUCTOR DEVICE, DIODE	FA4000	07263	353-3271-000
CR2	SAME AS CR1			
CR3	SAME AS CR1			
CR4	SEMICONDUCTOR DEVICE, DIODE	1N718	07688	353-2734-000
Q1	TRANSISTOR	2N1613	07688	352-0349-000
Q2	SAME AS Q1			
Q3	SAME AS Q1			
Q4	SAME AS Q1			
Q5	TRANSISTOR	2N4250	07263	352-0773-030
Q6	TRANSISTOR	2N3565	07688	352-0638-010
R1	NOT USED			
R2	NOT USED			
R3	NOT USED			
R4	RESISTOR, FXD, COMPOSITION 330K OHMS, 10% TOL, 1/4 WATT	RC07GF334K	81349	745-0839-000
R5	RESISTOR, FXD, COMPOSITION 27K OHMS, 10% TOL, 1/2 WATT	RC20GF273K	81349	745-1412-000
R6	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/2 WATT	RC20GF472K	81349	745-1380-000
R7	RESISTOR, FXD, FILM 287 OHMS, 1% TOL, 1/8 WATT	RN60C2870F	81349	705-6260-000
R8	NOT USED			
R9	RESISTOR, FXD, COMPOSITION 180K OHMS, 10% TOL, 1/2 WATT	RC20GF184K	81349	745-1447-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R10	RESISTOR, FXD, COMPOSITION 120K OHMS, 10% TOL, 1/2 WATT	RC20GF124K	81349	745-1440-000
R11	RESISTOR, FXD, COMPOSITION 27K OHMS, 10% TOL, 1/2 WATT	RC20GF273K	81349	745-1412-000
R12	RESISTOR, FXD, FILM 100K OHMS, 1% TOL, 1/4 WATT	RN60D1003F	81349	705-6692-000
R13	SAME AS R12			
R14	RESISTOR, FXD, FILM 9090 OHMS, 1% TOL, 1/4 WATT	RN60D9091F	81349	705-6642-000
R15	RESISTOR, FXD, FILM 8250 OHMS, 1% TOL, 1/4 WATT	RN60D8251F	81349	705-6640-000
R16	RESISTOR, FXD, FILM 5620 OHMS, 1% TOL, 1/4 WATT	RN60D5621F	81349	705-6632-000
R17	SAME AS R14			
R18	RESISTOR, FXD, FILM 2870 OHMS, 1% TOL, 1/4 WATT	RN60D2871F	81349	705-6618-000
R19	SAME AS R18			
R20	RESISTOR, FXD, FILM 1470 OHMS, 1% TOL, 1/4 WATT	RN60D1471F	81349	705-6604-000
R21	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 1/2 WATT	RC20GF821K	81349	745-1349-000
R22	SAME AS R20			
R23	RESISTOR, FXD, FILM 38.3K OHMS, 1% TOL, 1/4 WATT	RN60D3832F	81349	705-6672-000
R24	RESISTOR, FXD, FILM 19.6K OHMS, 1% TOL, 1/4 WATT	RN60D1962F	81349	705-6658-000
R25	RESISTOR, FXD, FILM 31.6K OHMS, 1% TOL, 1/4 WATT	RN60D3162F	81349	705-6668-000
R26	RESISTOR, FXD, FILM 7500 OHMS, 1% TOL, 1/4 WATT	RN60D7501F	81349	705-6638-000
R27	RESISTOR, FXD, FILM 422 OHMS, 1% TOL, 1/4 WATT	RN60D4220F	81349	705-6578-000
R28	RESISTOR, FXD, FILM 2610 OHMS, 1% TOL, 1/4 WATT	RN60D2611F	81349	705-6616-000
R29	RESISTOR, FXD, FILM 3160 OHMS, 1% TOL, 1/4 WATT	RN60D3161F	81349	705-6620-000
R30	RESISTOR, FXD, FILM 196K OHMS, 1% TOL, 1/4 WATT	RN60D1963F	81349	705-6706-000
R31	RESISTOR, FXD, FILM 14.7K, 1% TOL, 1/4 WATT	RN60D1472F	81349	705-6652-000
R32	RESISTOR, VAR 1K OHMS, 30% TOL, 1/2 WATT	62PAR1K	73138	382-0008-410
R33	RESISTOR, FXD, COMPOSITION 1K OHMS, 10% TOL, 1/2 WATT	RC20GF102K	81349	745-1352-000
R34	SAME AS R26			
R35	SAME AS R27			
R36	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/2 WATT	RC20GF103	81349	745-1394-000
R37	SAME AS R30			
R38	SAME AS R31			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R39	RESISTOR, FXD, FILM 34.8K OHMS, 1% TOL, 1/4 WATT	RN60D3482F	81349	705-6670-000
R40	RESISTOR, FXD, FILM 3480 OHMS, 1% TOL, 1/4 WATT	RN60D3481F	81349	705-6622-000
R41	RESISTOR, FXD, FILM 2150 OHMS, 1% TOL, 1/4 WATT	RN60D2151F	81349	705-6612-000
R42	SAME AS R26			
R43	SAME AS R27			
R44	RESISTOR, FXD, FILM 10K OHMS, 1% TOL, 1/4 WATT	RN60D1002F	81349	705-6644-000
R45	RESISTOR, FXD, FILM 178K OHMS, 1% TOL, 1/4 WATT	RN60D1783F	81349	705-6704-000
R46	SAME AS R31			
R47	SAME AS R39			
R48	RESISTOR, FXD, FILM 4640 OHMS, 1% TOL, 1/4 WATT	RN60D4641F	81349	705-6628-000
R49	SAME AS R39			
R50	RESISTOR, FXD, FILM 5110 OHMS, 1% TOL, 1/4 WATT	RN60D5111F	81349	705-6630-000
R51	RESISTOR, FXD, FILM 1330 OHMS, 1% TOL, 1/4 WATT	RN60D1331F	81349	705-6602-000
R52	SAME AS R50			
R53	SAME AS R51			
R54	SAME AS R50			
R55	SAME AS R50			
TP1	JACK, TIP WHITE	4877-125-9	17117	360-0434-100
TP2	SAME AS TP1			
TP3	JACK, TIP BLACK	4877-125-0	17117	360-0434-010
TP4	SAME AS TP1			

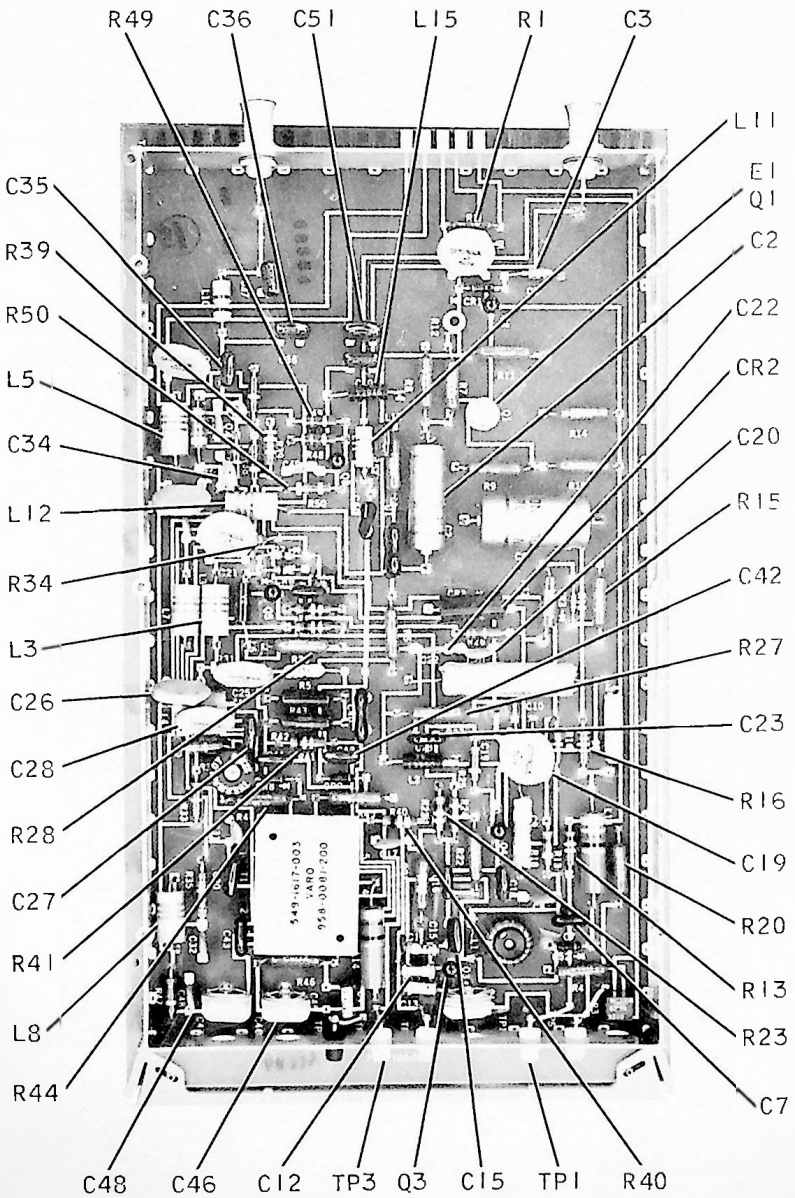

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Figure 6-6. FM Modulator (Sheet 1 of 3).

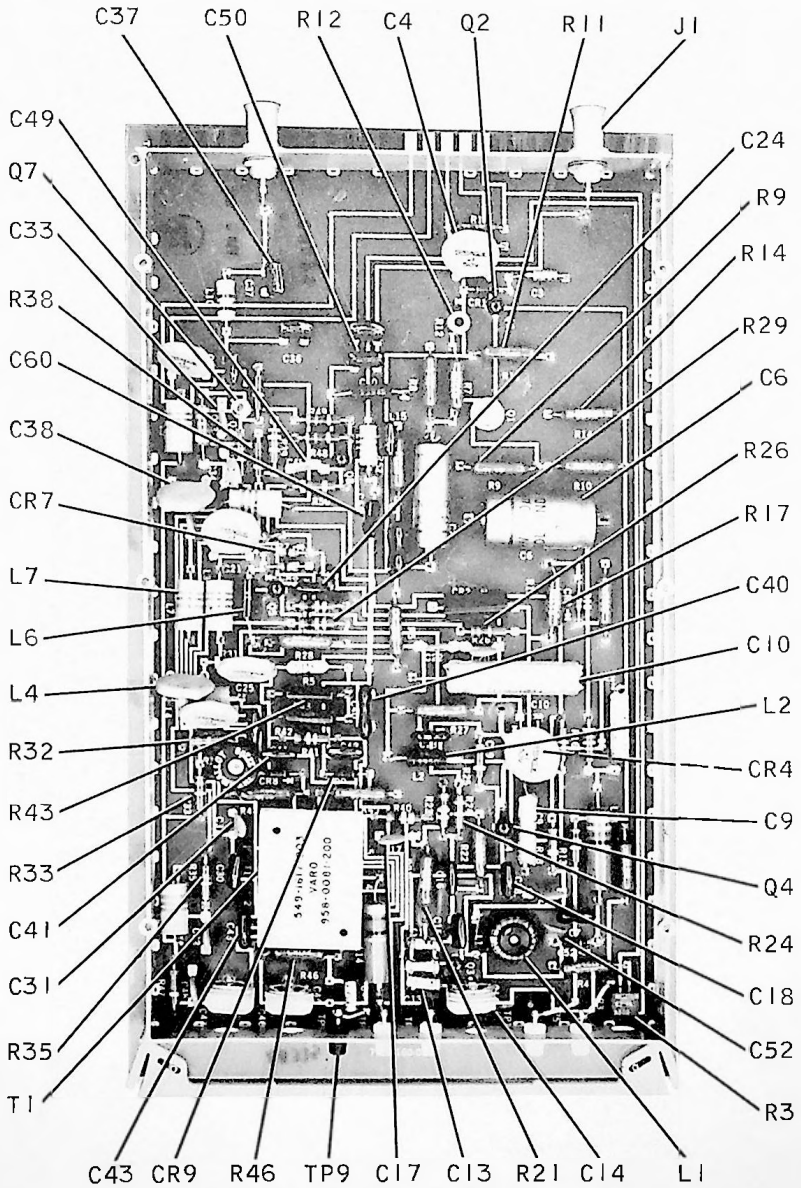

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Figure 6-6. FM Modulator (Sheet 2 of 3).

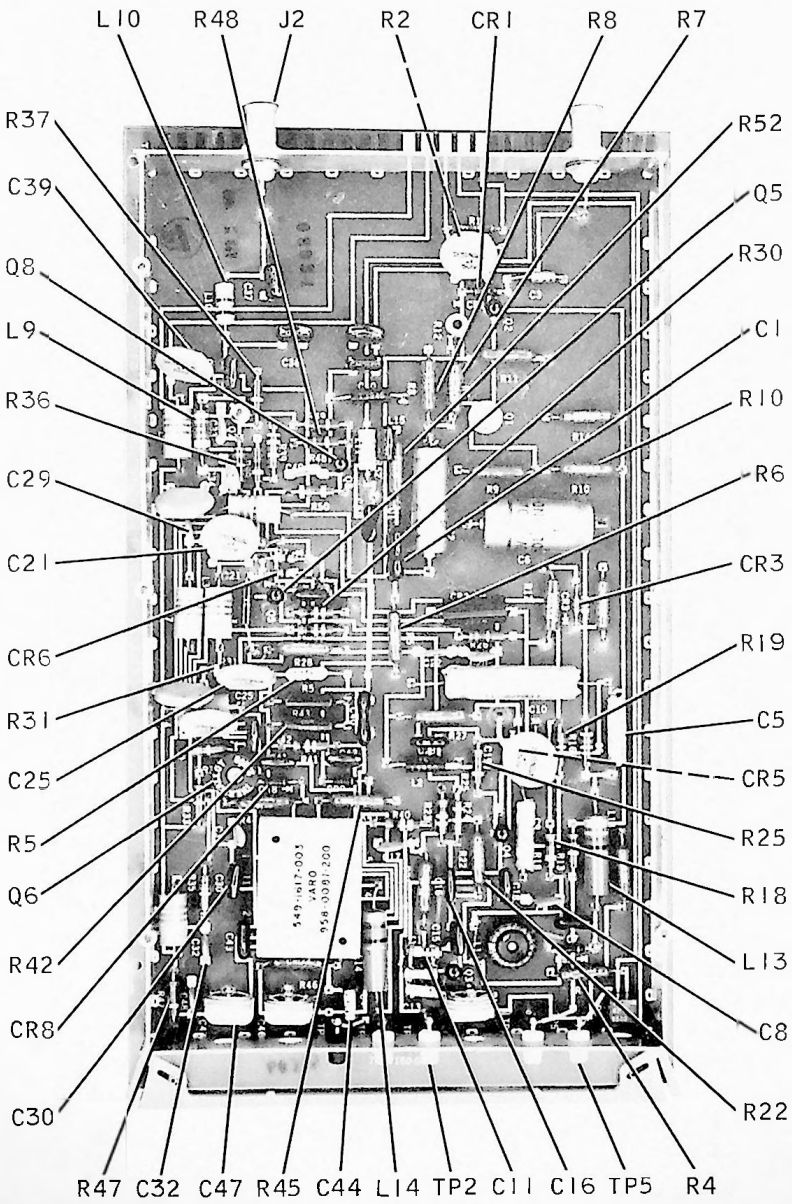

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Figure 6-6. FM Modulator (Sheet 3 of 3).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	FM MODULATOR			774-7160-001
C1	CAPACITOR, FXD, MICA 2200 UUF, 5% TOL, 500 VDCW	CM06F222J03	81349	912-3025-000
C2	CAPACITOR, FXD, ELECTROLYTIC 100 UF, PLUS 50% MINUS 10% 40 VDCW	C437ARG100	73445	183-2355-140
C3	CAPACITOR, FXD, ELECTROLYTIC 1 UF, 10% TOL, 35 VDCW	CS12BF105K	81349	184-6071-000
C4	CAPACITOR, FXD, CERAMIC 0.01 UF, PLUS 80% MINUS 20%, 50 VDCW	33C41	56289	913-3886-000
C5	CAPACITOR, FXD, ELECTROLYTIC 1 UF, PLUS 50% MINUS 15%, 150 VDCW	CL25B0010SP3	81349	184-7227-000
C6	CAPACITOR, FXD, ELECTROLYTIC 250 UF, PLUS 50% MINUS 10%, 40 VDCW	C437ARG250	73445	183-2355-150
C7	CAPACITOR, FXD, MICA 100 UUF, 5% TOL, 500 VDCW	CM05F101J03	81349	912-2816-000
C8	CAPACITOR, FXD, CERAMIC 0.01 UF, PLUS 80% MINUS 20%, 100 VDCW	805-014X5V0103Z	72982	913-3680-000
C9	CAPACITOR, FXD, ELECTROLYTIC 0.5 UF, PLUS 50% MINUS 15% TOL, 75 VDCW	CL37BL0R5MN3	81349	184-7220-000
C10	CAPACITOR, FXD, ELECTROLYTIC 20 UF, PLUS 75% MINUS 20%, 25 VDCW	CL37BG200MN3	81349	184-7258-000
C11	CAPACITOR, FXD, CERAMIC 20 UUF, 2% TOL, 500 VDCW	CC20SH200G	81349	916-0362-000
C12	CAPACITOR, FXD, CERAMIC 20 UUF, 2% TOL, 500 VDCW	CC20SH200G	81349	916-0362-000
C13	CAPACITOR, FXD, CERAMIC 10 UUF, 1/4% TOL, 500 VDCW	CC20UJ100C	81349	916-0412-000
C14	CAPACITOR, VAR, CERAMIC 625 UUF, 350 VDCW	3192-000C0P0-32R	72989	917-1253-030
C15	CAPACITOR, FXD, MICA 68 UUF, 5% TOL, 500 VDCW	CM05E680J03	81349	912-2804-000
C16	SAME AS C15			
C17	SAME AS C8			
C18	CAPACITOR, FXD, MICA 220 UUF, 5% TOL, 500 VDCW	CM05F221J03	81349	912-2840-000
C19	SAME AS C4			
C20	SAME AS C8			
C21	SAME AS C4			
C22	SAME AS C8			
C23	CAPACITOR, FXD, MICA 10 UUF, 5% TOL, 500 VDCW	DM15C100J01	72136	912-2753-000
C24	CAPACITOR, FXD, MICA 82 UUF, 5% TOL, 500 VDCW	CM05E820J03	81349	912-2810-000
C25	SAME AS C4			
C26	SAME AS C4			
C27	CAPACITOR, FXD, MICA 22 UUF, 5% TOL, 500 VDCW	CM05E220J03	81349	912-2768-000
C28	SAME AS C4			
C29	SAME AS C8			
C30	SAME AS C15			
C31	CAPACITOR, FXD, CERAMIC 1000 UUF, 20% TOL, 1000 VDCW	CK604W102M	81349	913-1186-000
C32	SAME AS C8			
C33	SAME AS C8			
C34	SAME AS C8			
C35	CAPACITOR, FXD, MICA 39 UUF, 5% TOL, 500 VDCW	CM05E390J03	81349	912-2786-000
C36	CAPACITOR, FXD, MICA 150 UUF, 5% TOL, 500 VDCW	CM05F151J03	81349	912-2828-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
C37	SAME AS C36			
C38	SAME AS C4			
C39	SAME AS C4			
C40	CAPACITOR, FXD, MICA 560 UUF, 5% TOL, 500 VDCW	CM06F561J03	81349	912-2983-000
C41	CAPACITOR, FXD, MICA 33 UUF, 5% TOL, 500 VDCW	CM05E330J03	81349	912-2780-000
C42	SAME AS C41			
C43	SAME AS C18			
C44	SAME AS C11			
C45	NOT USED			
C46	CAPACITOR, VAR, CERAMIC 4-12 UUF, 300 VDCW	3192-000C0P0-20R	72982	917-1253-020
C47	SAME AS C14			
C48	SAME AS C8			
C49	SAME AS C8			
C50	SAME AS C27			
C51	CAPACITOR, FXD, MICA 270 UUF, 5% TOL, 500 VDCW	CM05F271J03	81349	912-2846-000
C52	SEMIDONDUCTOR DEVICE, DIODE	1N5146A	07688	922-6095-160
C53 THROUGH C59	NOT USED			
C60	SAME AS C24			
CR1	SEMICONDUCTOR DEVICE, DIODE	1N751A	07688	353-2710-000
CR2	SEMICONDUCTOR DEVICE, DIODE	SV3173	03877	353-3304-000
CR3	SEMICONDUCTOR DEVICE, DIODE	1N626	07688	353-2857-000
CR4	SEMICONDUCTOR DEVICE, DIODE	1N270	07688	353-2018-000
CR5	SAME AS CR4			
CR6	SAME AS CR4			
CR7	SAME AS CR4			
CR8	SEMICONDUCTOR DEVICE, DIODE	FA2311U	07263	353-3593-010
CR9	SAME AS CR8			
E1	HEATSINK	22208	13103	352-9950-060
J1	CONNECTOR, ELECTRICAL 1 CONTACT	UG1051U	09408	357-9210-000
J2	SAME AS J1			
L1	INDUCTOR, RF 2.4 UH, 2% TOL	526-6799-00	95105	240-1529-000
L2	COIL, RF 6.8 UH, 5% TOL	13950	03550	240-1996-110
L3	COIL, RF 220 UH, 5% TOL	MS217	99800	240-0198-000
L4	SAME AS L3			
L5	SAME AS L3			
L6	COIL, RF 2.4 UH, 5% TOL	13949	03550	240-1996-100
L7	SAME AS L3			
L8	SAME AS L3			
L9	COIL, RF 4.3 UH, 5% TOL	13946	03550	240-1996-030
L10	COIL, RF 1 UH, 10% TOL	LT4K034	81349	240-0062-000
L11	SELECT L11 FROM THE FOLLOWING LIST			
L11	COIL, RF 1.5 UH, 10% TOL	LT4K036	81349	240-0063-000
	INDUCTOR, RF 2.4 UH, 2% TOL	526-6799-00	95105	240-1529-000
	COIL, RF 82 UH, 10% TOL	LT7K208		240-0192-000
L12	SAME AS L3			
L13	COIL, RF 82 UH, 10% TOL	LT7K208	81349	240-0192-000
L14	COIL, RF 56 UH, 10% TOL	LT7K207	81349	240-0191-000
L15	COIL, RF 6.2 UH, 10% TOL	13956	03550	240-1996-070
Q1	TRANSISTOR	S4639	07263	352-0373-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
Q2	TRANSISTOR	2N4121	07688	352-0743-010
Q3	SAME AS Q2			
Q4	SAME AS Q2			
Q5	SAME AS Q2			
Q6	TRANSISTOR	MM2181	04713	352-0322-000
Q7	SAME AS Q6			
Q8	SAME AS Q2			
R1	RESISTOR, FXD, FILM 12.1K OHMS, 1% TOL, 1/4 WATT	RN60D1212F	81349	705-6648-000
R2	RESISTOR, FXD, COMPOSITION 680 OHMS, 10% TOL, 1/2 WATT	RC20GF681K	81349	745-1345-000
R3	RESISTOR, VAR, CERAMIC 500 OHMS, 30% TOL, 1/2 WATT	62PAR500	73138	382-0008-400
R4	RESISTOR, FXD, FILM 348 OHMS, 1% TOL, 1/2 WATT	RN65D3480F	81349	705-7074-000
R5	SELECT R5 FROM THE FOLLOWING LIST			
	RESISTOR, FXD, FILM 3480 OHMS, 1% TOL, 1/2 WATT	RN65D3481F	81349	705-7122-000
	RESISTOR, FXD, FILM 4220 OHMS, 1% TOL, 1/2 WATT	RN65D4221F	81349	705-7126-000
	RESISTOR, FXD, FILM 5110 OHMS, 1% TOL, 1/2 WATT	RN65D5111F	81349	705-7130-000
	RESISTOR, FXD, FILM 10K OHMS, 1% TOL, 1/2 WATT	RN65D1002F	81349	705-7144-000
R6	RESISTOR, FXD, FILM 1210 OHMS, 1% TOL, 1/2 WATT	RN65D1211F	81349	705-7100-000
R7	RESISTOR, FXD, FILM 100K OHMS, 1% TOL, 1/2 WATT	RN65D1003F	81349	705-7192-000
R8	RESISTOR, FXD, FILM 7.5K OHMS, 1% TOL, 1/2 WATT	RN65D7501F	81349	705-7138-000
R9	RESISTOR, FXD, FILM 316 OHMS, 1% TOL, 1/2 WATT	RN65D3160F	81349	705-7072-000
R10	RESISTOR, FXD, FILM 13.3K OHMS, 1% TOL, 1/2 WATT	RN65D1332F	81349	705-7150-000
R11	RESISTOR, FXD, FILM 5110 OHMS, 1% TOL, 1/2 WATT	RN65D5111F	81349	705-7130-000
R12	RESISTOR, VAR, CERAMIC 50K, 30% TOL, 1/2 WATT	62PR50K	73138	382-0008-130
R13	RESISTOR, FXD, COMPOSITION 100K OHMS, 10% TOL, 1/2 WATT	RC20GF104K	81349	745-1436-000
R14	RESISTOR, FXD, FILM 2870 OHMS, 1% TOL, 1/2 WATT	RN65D2871F	81349	705-7118-000
R15	RESISTOR, FXD, FILM 19K OHMS, 1% TOL, 1/2 WATT	RN65D1902F	81349	705-7158-000
R16	RESISTOR, FXD, COMPOSITION 47K OHMS, 10% TOL, 1/2 WATT	RC20GF473K	81349	745-1422-000
R17	SELECT R17 FROM THE FOLLOWING LIST			
	RESISTOR, FXD, FILM 1K OHMS, 1% TOL, 1/2 WATT	RN65D1001F	81349	705-7096-000
	RESISTOR, FXD, FILM 1960 OHMS, 1% TOL, 1/2 WATT	RN65D1961F	81349	705-7110-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	RESISTOR, FXD, FILM 3160 OHMS, 1% TOL, 1/2 WATT	RN65D3161F	81349	705-7120-000
	RESISTOR, FXD, FILM 4220 OHMS, 1% TOL, 1/2 WATT	RN65D4221F	81349	705-7126-000
R18	RESISTOR, FXD, COMPOSITION 1K OHMS, 10% TOL, 1/2 WATT	RC20GF102K	81349	745-1352-000
R19	RESISTOR, FXD, COMPOSITION 27K OHMS, 10% TOL, 1/2 WATT	RC20GF273K	81349	745-1412-000
R20	RESISTOR, FXD, FILM 21.5K OHMS, 1% TOL, 1/2 WATT	RN65D2152F	81349	705-7160-000
R21	RESISTOR, FXD, FILM 12.1K OHMS, 1% TOL, 1/2 WATT	RN65D1212F	81349	705-7148-000
R22	RESISTOR, FXD, FILM 2610 OHMS, 1% TOL, 1/2 WATT	RN65D2611F	81349	705-7116-000
R23	RESISTOR, FXD, COMPOSITION 10K OHMS, 10% TOL, 1/2 WATT	RC20GF103K	81349	745-1394-000
R24	RESISTOR, FXD, COMPOSITION 5600 OHMS, 10% TOL, 1/2 WATT	RC20GF562K	81349	745-1384-000
R25	RESISTOR, FXD, COMPOSITION 1500 OHMS, 10% TOL, 1/2 WATT	RC20GF152K	81349	745-1359-000
R26	RESISTOR, FXD, COMPOSITION 1800 OHMS, 10% TOL, 1/2 WATT	RC20GF182K	81349	745-1363-000
R27	RESISTOR, FXD, FILM 51.1 OHMS, 1% TOL, 1/2 WATT	RN65D51R1F	81349	705-7034-000
R28	RESISTOR, FXD, FILM 42.2 OHMS, 1% TOL, 1/4 WATT	RN65D42R2F	81349	705-7030-000
R29	SAME AS R23			
R30	SAME AS R23			
R31	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/2 WATT	RC20GF472K	81349	745-1380-000
R32	SAME AS R26			
R33	SAME AS R26			
R34	RESISTOR, FXD, FILM 261 OHMS, 1% TOL, 1/2 WATT	RN65D2610F	81349	705-7068-000
R35	RESISTOR, FXD, FILM 220 OHMS, 10% TOL, 1/2 WATT	RC20GF221K	81349	745-1324-000
R36	SAME AS R26			
R37	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/2 WATT	RC20GF222K	81349	745-1366-000
R38	RESISTOR, FXD, COMPOSITION 22 OHMS, 10% TOL, 1/2 WATT	RC20GF220K	81349	745-1282-000
R39	RESISTOR, FXD, COMPOSITION 390 OHMS, 10% TOL, 1/2 WATT	RC20GF391K	81349	745-1335-000
R40	SAME AS R13			
R41	SAME AS R13			
R42	RESISTOR, FXD, FILM 1100 OHMS, 1% TOL, 1/2 WATT	RN65D1101F	81349	705-7098-000
R43	SAME AS R42			
R44	RESISTOR, FXD, FILM 1960 OHMS, 1% TOL, 1/2 WATT	RN65D1961F	81349	705-7110-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R45	SAME AS R44			
R46	RESISTOR, FXD, FILM 8250 OHMS, 1% TOL, 1/2 WATT	RN65D8251F	81349	705-7140-000
R47	RESISTOR, FXD, COMPOSITION 150 OHMS, 10% TOL, 1/2 WATT	RC20GF151K	81349	745-1317-000
R48	RESISTOR, FXD, COMPOSITION 6800 OHMS, 10% TOL, 1/2 WATT	RC20GF682K	81349	745-1387-000
R49	SAME AS R48			
R50	SAME AS R31			
R51	NOT USED			
R52	RESISTOR, FXD, FILM 68.1 OHMS, 1% TOL, 1/2 WATT	RN65D68R1F	81349	705-7040-000
T1	TRANSFORMER			549-1617-003
TP1	JACK, TIP WHITE	SL490-458	12615	306-2241-100
TP2	SAME AS TP1			
TP3	SAME AS TP1			
TP4	JACK, TIP BLACK	SL490-468	12615	306-2241-010
TP5	SAME AS TP1			

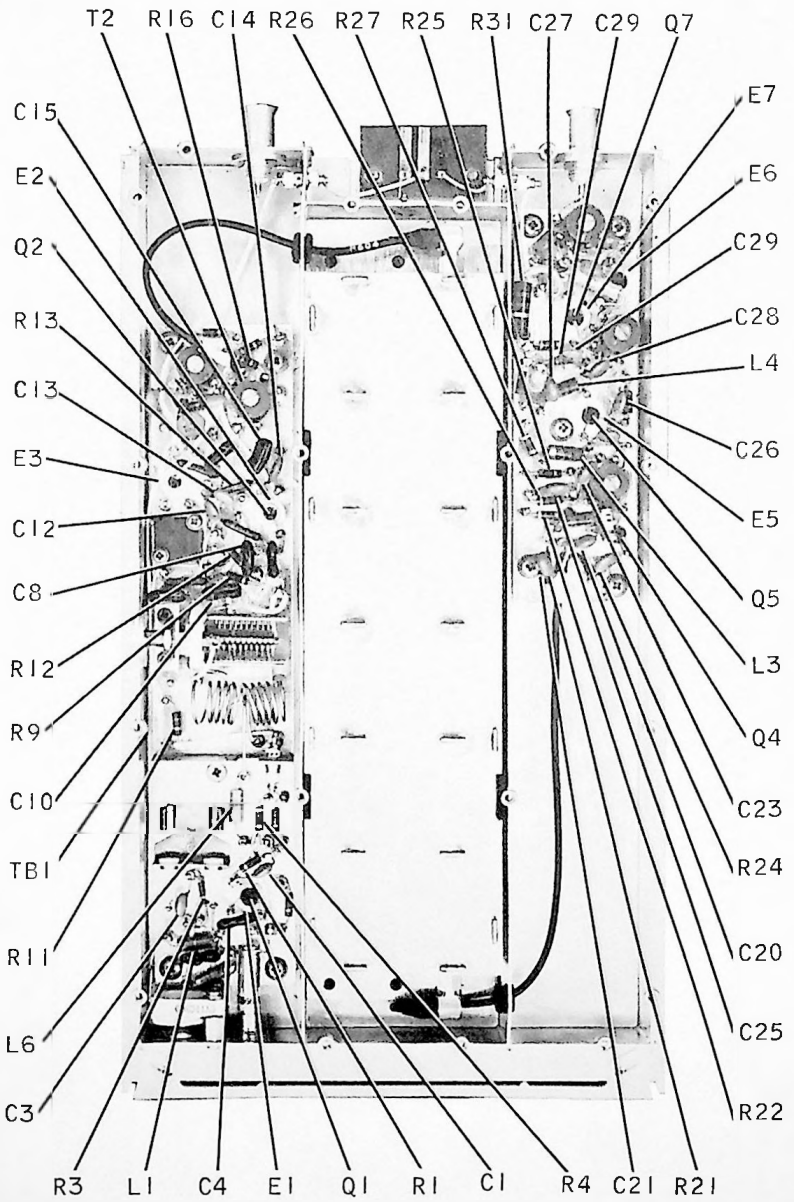

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Figure 6-7. RF Mixer (Sheet 1 of 2).

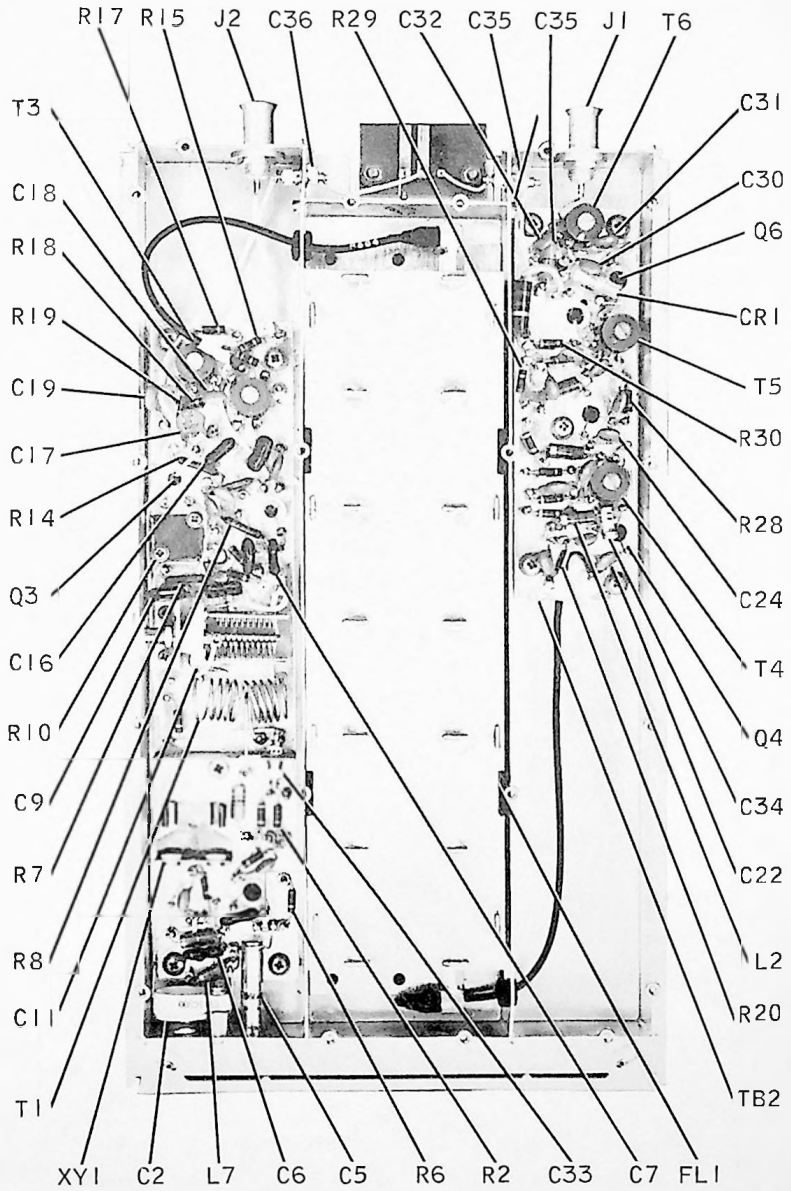

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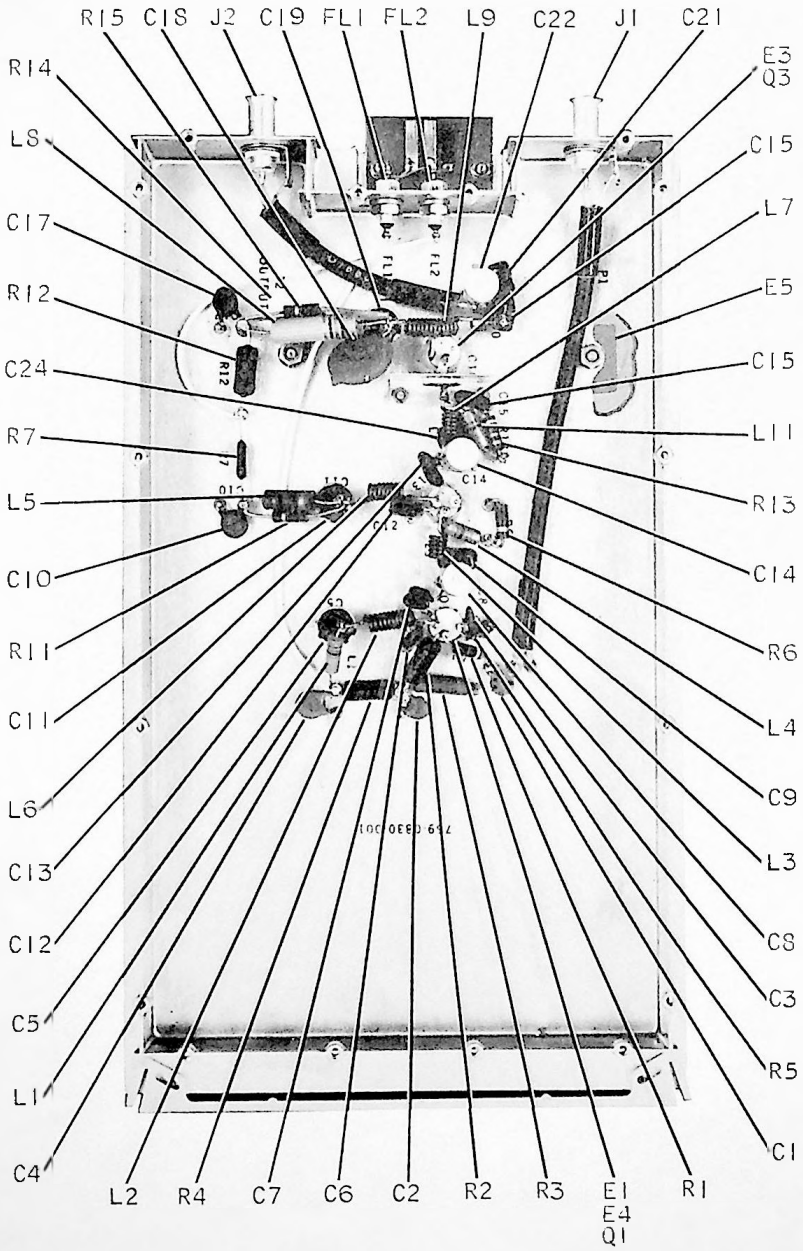
Figure 6-7. RF Mixer (Sheet 2 of 2).

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	RF MIXER			781-5380-001
C1	CAPACITOR, FXD, CERAMIC 1000 UUF, 20% TOL, 500 VDCW	40C73A1	01939	913-3009-000
C2	CAPACITOR, VAR, CERAMIC 4-30 UUF, 50 VDCW	CV11C300	81349	917-9005-000
C3	SAME AS C1			
C4	CAPACITOR, FXD, MICA 10 UUF, 10% TOL, 500 VDCW	CM05C100K03	81349	912-2754-000
C5	CAPACITOR, VAR, GLASS 0.8-18 UUF, 1K VDCW	VC23G	73899	922-0437-000
C6	SAME AS C4			
C7	SAME AS C4			
C8	CAPACITOR, FXD, MICA 18 UUF, 10% TOL, 500 VDCW	CM05C180K03	81349	912-2763-000
C9	SAME AS C8			
C10	SAME AS C4			
C11	CAPACITOR, VAR, AIR 3-9.8 UUF, 1250 VDCW	160-211-35	74970	922-0046-000
C12	SAME AS C1			
C13	SAME AS C1			
C14	CAPACITOR, FXD, CERAMIC 0.01 UF, PLUS 80% MINUS 20%, 100 VDCW	805-14X5V0103Z	72982	913-3680-000
C15	CAPACITOR, FXD, MICA 33 UUF, 5% TOL, 500 VDCW	CM05E330J03	81349	912-2780-000
C16	SAME AS C15			
C17	SAME AS C14			
C18 THROUGH C32	SAME AS C1			
C33	CAPACITOR, FXD, CERAMIC 1000 UUF, GMV TOL, 500 VDCW	2465-008W5T0102P	72982	913-3208-000
C34	CAPACATOR, FXD, CERAMIC 1.5 UUF, 33% TOL, 500 VDCW	CC20CK1R5D	81349	916-0073-000
C35	SAME AS C33			
C36	SAME AS C33			
CR1	SEMICONDUCTOR DEVICE, DIODE	1N3018B	07688	353-3123-000
E1	HOLDER, TRANSISTOR	T1533	98291	352-9509-000
E2 THROUGH E7	SAME AS E1			
FL1	SELECT FL1 FROM THE FOLLOWING LIST			
	FILTER, HIGH BAND			781-5343-001
	FILTER, LOW BAND			781-5344-001
J1	CONNECTOR, ELECTRICAL	UG1051U	80058	357-9210-000
J2	SAME AS J1			
L1	COIL, RF 0.68 UH, 10% TOL	MS18130-6	96906	240-1566-000
L2	COIL, RF 0.22 UH, 20% TOL	MS18130-1	96906	240-1572-000
L3	SAME AS L2			
L4	SAME AS L2			
L5	COIL, RF 2.20 UH, 10% TOL	MS18130-12	96906	240-1572-000
L6	COIL, RF 0.22 UH, 20% TOL	MS18130-2	96906	240-1563-000
L7	SAME AS L6			
Q1	TRANSISTOR	2N4258	07263	352-0848-020
Q2	TRANSISTOR	2N4416	22229	352-0756-010
Q3	SAME AS Q2			
Q4	TRANSISTOR	2N3563	07688	352-0630-010
Q5	SAME AS Q4			
Q6	SAME AS Q4			
Q7	SAME AS Q4			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R1	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/4 WATT	RC07GF222K	81349	745-0761-000
R2	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/4 WATT	RC07GF472K	81349	745-0773-000
R3	RESISTOR, FXD, COMPOSITION 1800 OHMS, 10% TOL, 1/4 WATT	RC07GF182K	81349	745-0758-000
R4	RESISTOR, FXD, COMPOSITION 180 OHMS, 10% TOL, 1/4 WATT	RC07GF181K	81349	745-0722-000
R5	NOT USED			
R6	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 1/4 WATT	RC07GF821K	81349	745-0746-000
R7	RESISTOR, FXD, FILM 2150 OHMS, 1% TOL, 1/4 WATT	RN6002151F	81349	705-6612-000
R8	SAME AS R7			
R9	RESISTOR, FXD, COMPOSITION 6800 OHMS, 10% TOL, 1/4 WATT	RC07GF682K	81349	745-0779-000
R10	RESISTOR, VAR 5K OHMS, 5% TOL, 3/4 WATT	RT22C2L502	81349	381-1721-120
R11	RESISTOR, FXD, COMPOSITION 5600 OHMS, 10% TOL, 1/4 WATT	RC07GF562K	81349	745-0776-000
R12	SAME AS R9			
R13	SAME AS R7			
R14	SAME AS R7			
R15	RESISTOR, FXD, COMPOSITION 33 OHMS, 10% TOL, 1/4 WATT	RC07GF330K	81349	745-0695-000
R16	SAME AS R15			
R17	RESISTOR, FXD, COMPOSITION 22 OHMS, 10% TOL, 1/4 WATT	RC07GF220K	81349	745-0689-000
R18	RESISTOR, FXD, COMPOSITION 680 OHMS, 10% TOL, 1/4 WATT	RC07GF681K	81349	745-0743-000
R19	RESISTOR, FXD, COMPOSITION 270 OHMS, 10% TOL, 1/4 WATT	RC07GF271K	81349	745-0728-000
R20	RESISTOR, FXD, COMPOSITION 150 OHMS, 10% TOL, 1/4 WATT	RC07GF151K	81349	745-0719-000
R21	SAME AS R2			
R22	SAME AS R2			
R23	NOT USED			
R24	SAME AS R6			
R25	SAME AS R6			
R26	SAME AS R2			
R27	SAME AS R2			
R28	SAME AS R6			
R29	SAME AS R6			
R30	SAME AS R2			
R31	RESISTOR, FXD, COMPOSITION 270 OHMS, 10% TOL, 1 WATT	RC32GF271K	81349	745-3328-000
R32	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1/4 WATT	RC07GF101K	81349	745-0713-000
T1	TRANSFORMER			781-5376-001
T2	TRANSFORMER			781-5389-001
T3	TRANSFORMER			781-5371-001
T4	TRANSFORMER			781-5372-001
T5	TRANSFORMER			781-5373-001
T6	TRANSFORMER			781-5374-001
TB1	BOARD, FABRICATED			781-5358-001
TB2	BOARD, FABRICATED			781-5352-001
XY1	SOCKET, CRYSTAL	8000AG20	91506	292-0305-010

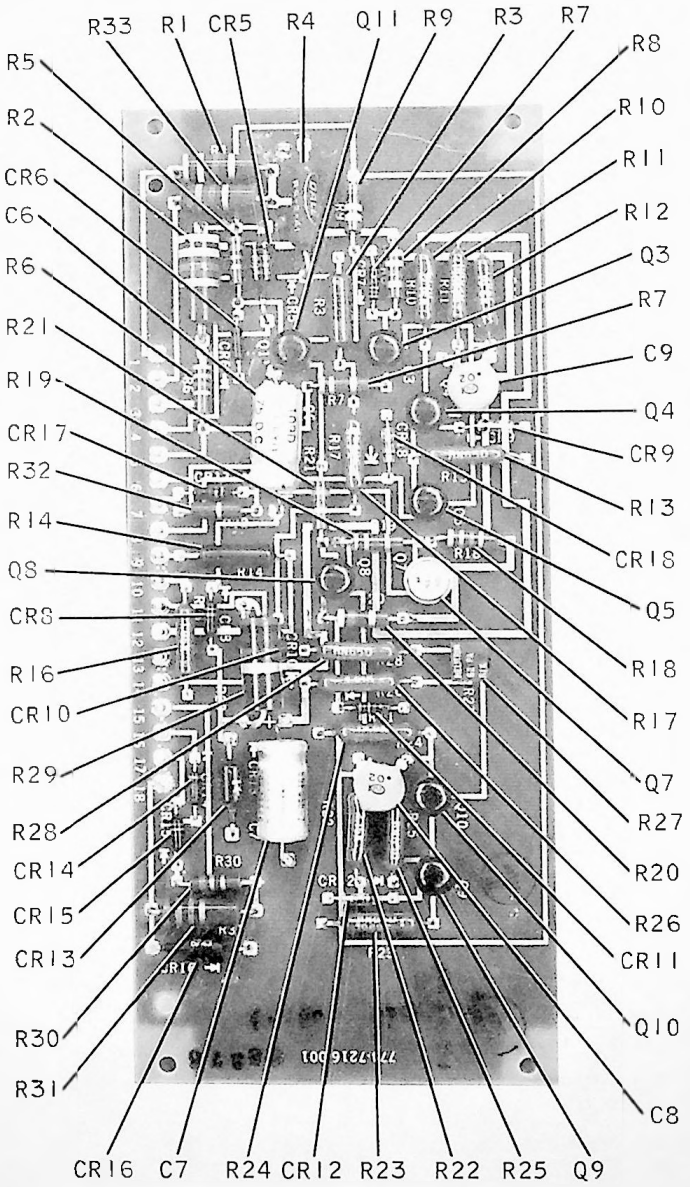


B502 0538 Pb

Figure 6-8. Power Amplifier.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	POWER AMPLIFIER			769-0830-001
C1	CAPACITOR, FXD, CERAMIC 680 UUF, 20% TOL, 1000 VDCW	CK60AW681M	81349	913-1194-000
C2	CAPACITOR, FXD, CERAMIC 470 UUF, 20% TOL, 500 VDCW	CK60AX471M	81349	913-1189-000
C3	SAME AS C2			
C4	CAPACITOR, FXD, CERAMIC 0.01 UF, PLUS 80 MINUS 20%, 100 VDCW	805-014X5V0103Z	72982	912-3680-000
C5	CAPACITOR, FXD, MICA 1000 UUF, 5% TOL, 500 VDCW	CB21PE102J	81349	912-4115-330
C6	CAPACITOR, FXD, MICA 15 UUF, 5% TOL, 500 VDCW	DM15C150J01	72136	912-2759-000
C7	SAME AS C6			
C8	CAPACITOR, VAR, CERAMIC 5.5-18 UUF, PLUS 2% MINUS 2.5%, 350 VDCW	538011C0P092R	72982	917-1222-000
C9	CAPACITOR, FXD, MICA 33 UUF, 10% TOL, 500 VDCW	DM30F562K03	72136	912-2781-000
C10	SAME AS C4			
C11	SAME AS C5			
C12	CAPACITOR, FXD, MICA 10 UUF, 5% TOL, 500 VDCW	DM15C100J01	72136	912-2753-000
C13	CAPACITOR, FXD, MICA 18 UUF, 5% TOL, 500 VDCW	DM15C180J01	72136	912-2762-000
C14	SAME AS C8			
C15	CAPACITOR, FXD, MICA 82 UUF, 5% TOL, 500 VDCW	CM05ED820J03	81349	912-2810-000
C16	CAPACITOR, FXD, MICA 1500 UUF, 20% TOL, 500 VDCW	M23-500M	53021	912-0667-000
C17	SAME AS C4			
C18	CAPACITOR, FXD, CERAMIC 0.1 UUF, PLUS 80% MINUS 20%, 200 VDCW	805-213X5V0104Z	72982	913-3681-000
C19	SAME AS C5			
C20	CAPACITOR, FXD, MICA 110 UUF, 5% TOL, 500 VDCW	CM05F111J03	81349	912-2819-000
C21	CAPACITOR, FXD, MICA 27 UUF, 5% TOL, 500 VDCW	CM05E270J03	81349	912-2774-000
C22	SAME AS C8			
C23	NOT USED			
C24	CAPACITOR, FXD, MICA 22 UUF, 10% TOL, 500 VDCW	D155E220K0	00853	912-2769-000
E1	INSULATOR, TRANSISTOR	XB021667-5	98291	352-9800-070
E2	INSULATOR, TRANSISTOR	T1529	98291	352-9800-010
E3	SAME AS E2			
E4	HEATSINK	TXP0508B	98978	352-9555-030
E5	HEATSINK	6156-7	13103	352-9612-010
FL1	FILTER, RADIO INTERFERENCE 1300 UUF, GMV TOL, 200 VDCW	10201050	72982	241-0332-000
FL2	SAME AS FL1			
J1	CONNECTOR, ELECTRICAL 1 CONTACT	UG1051U	80058	357-9210-000
J2	SAME AS J1			
L1	COIL, RF 1 UH, 10% TOL	MS75008-28	96906	240-1590-000
L2	COIL, RF			776-1882-000
L3	COIL, RF			776-1910-000
L4	COIL, RF 0.15 UH, 20% TOL	MS75008-21	96906	240-1585-000
L5	COIL, RF 2.2 UH, 10% TOL	MS16222-5	96906	240-1654-000
L6	COIL, RF			776-1911-000
L7	COIL, RF			776-1912-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
L8	COIL, RF 1.2 UH, 10% TOL	MS16231-1	96906	240-1605-000
L9	COIL, RF			776-1883-001
L10	NOT USED			
L11	SAME AS L4			
Q1	TRANSISTOR	2N3866	07688	352-0671-010
Q2	TRANSISTOR	2N3375	07688	352-0611-010
Q3	TRANSISTOR	2N5102	02735	352-0747-010
R1	RESISTOR, FXD, COMPOSITION 39 OHMS, 10% TOL, 1/2 WATT	RC20GF390K	81349	745-1293-000
R2	RESISTOR, FXD, WIRE WOUND 22 OHMS, 5% TOL, 3 WATTS	RW69V220	81349	747-5327-000
R3	RESISTOR, FXD, FILM 23.7 OHMS, 1% TOL, 1/2 WATT	RN65D23R7F	81349	705-7018-000
R4	RESISTOR, FXD, WIRE WOUND 270 OHMS, 5% TOL, 3 WATTS	RW69V271	81349	747-5349-000
R5	RESISTOR, FXD, FILM 10 OHMS, 1% TOL, 1/4 WATT	RN60D10R0F	81349	705-6500-000
R6	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1/2 WATT	RC20GF101K	81349	745-1310-000
R7	RESISTOR, FXD, WIRE WOUND 2 OHMS, 1% TOL, 1.25 WATT	RS1A73-2R00-1PCT	91637	747-4230-300
R8	NOT USED			
R9	NOT USED			
R10	NOT USED			
R11	RESISTOR, FXD, COMPOSITION 10 OHMS, 10% TOL, 1/2 WATT	RC20GF100K	81349	745-1268-000
R12	RESISTOR, FXD, WIRE WOUND 0.5 OHM, 1% TOL, 2.5 WATT	RSM2C0R500F	91637	746-9457-000
R13	RESISTOR, FXD, COMPOSITION 4.7 OHMS, 5% TOL, 1/2 WATT	GBT1-2 4-7-5	75042	745-6279-000
R14	SAME AS R11			
R15	SAME AS R11			

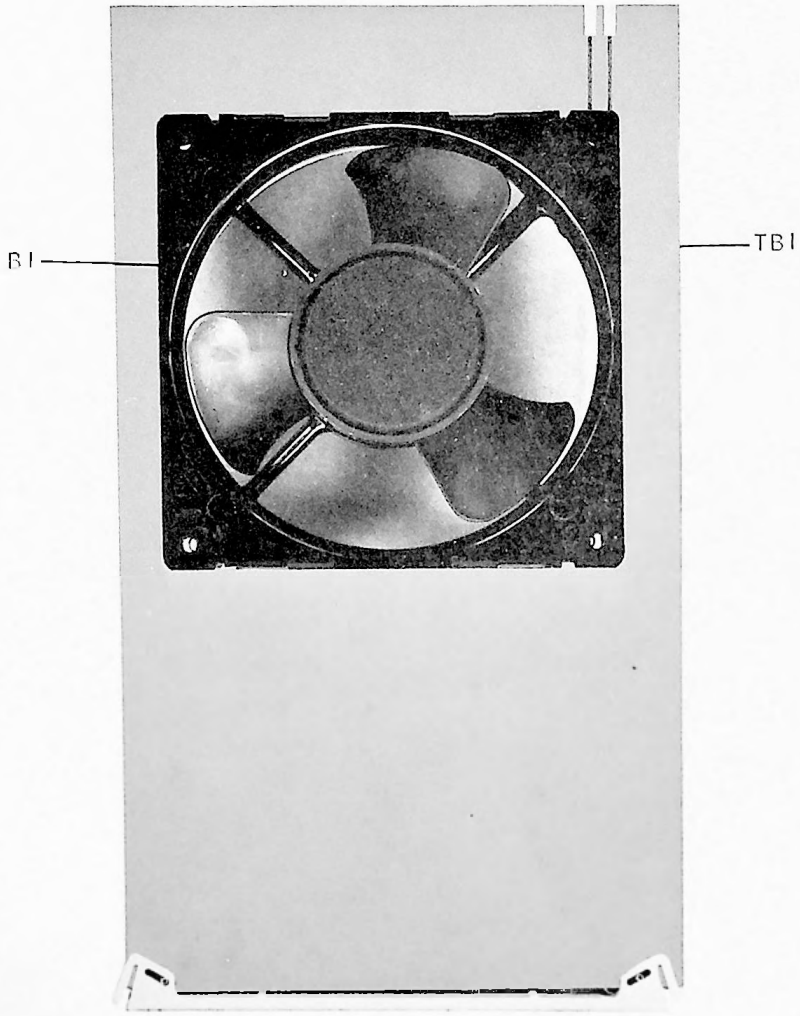


8502 541 Pb

Figure 6-9. Power Supply Regulator.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	POWER SUPPLY REGULATOR			774-7216-000
C1 THROUGH C5	NOT USED			
C6	CAPACITOR, FXD, ELECTROLYTIC 56 UF, 20% TOL, 75 VDCW	109D566X0075T2	56289	184-7793-000
C7	CAPACITOR, FXD, ELECTROLYTIC 150 UF, 20% TOL, 30 VDCW	109D157X0030T2	56289	184-7796-000
C8	CAPACITOR, FXD, CERAMIC 0.02 UF, PLUS 60% MINUS 40%, 250 VDCW	20C109	01939	913-2097-000
C9	SAME AS C8			
CR1 THROUGH CR4	NOT USED			
CR5	SEMICONDUCTOR DEVICE, DIODE	1N3027B	81349	353-3057-000
CR6	SEMICONDUCTOR DEVICE, DIODE	1N645	07688	353-2607-000
CR7	SEMICONDUCTOR DEVICE, DIODE	1N758A	07688	353-2724-000
CR8	SAME AS CR6			
CR9	SEMICONDUCTOR DEVICE, DIODE	1N752A	07688	353-2712-000
CR10	SEMICONDUCTOR DEVICE, DIODE	1N645	07688	353-2607-000
CR11	SAME AS CR7			
CR12	SAME AS CR9			
CR13	SEMICONDUCTOR DEVICE, DIODE	1N3020B	07688	353-3125-000
CR14	SAME AS CR6			
CR15	SAME AS CR6			
CR16	SAME AS CR13			
CR17	SAME AS CR6			
CR18	SEMICONDUCTOR DEVICE, DIODE	1N755A	07688	353-2718-000
Q1	NOT USED			
Q2	NOT USED			
Q3	TRANSISTOR	2N3569	07688	352-0629-030
Q4	SAME AS Q3			
Q5	SAME AS Q3			
Q6	NOT USED			
Q7	TRANSISTOR	2N4235	07688	352-0695-040
Q8 THROUGH Q11	SAME AS Q3			
R1	RESISTOR, FXD, COMPOSITION 390 OHMS, 10% TOL, 1 WATT	RC32GF391K	81349	745-3335-000
R2	RESISTOR, FXD, COMPOSITION 330 OHMS, 10% TOL, 2 WATTS	RC42GF331K	81349	745-5631-000
R3	RESISTOR, FXD, FILM 46.4 OHMS, 1% TOL, 1/2 WATT	RN65D46R4F	81349	705-7032-000
R4	RESISTOR, FXD, WIRE WOUND 0.2 OHM 3% TOL, 3 WATTS	RSM2R2000G	91637	747-9651-000
R5	RESISTOR, FXD, COMPOSITION 18K OHMS, 10% TOL, 1/2 WATT	RC20GF183K	81349	745-1405-000
R6	RESISTOR, FXD, COMPOSITION 330 OHMS, 10% TOL, 1/2 WATT	RC20GF331K	81349	745-1331-000
R7	RESISTOR, FXD, COMPOSITION 3300 OHMS, 10% TOL, 1/2 WATT	RC20GF332K	81349	745-1373-000
R8	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/2 WATT	RC20GF472K	81349	745-1380-000
R9	RESISTOR, FXD, COMPOSITION 15K OHMS, 10% TOL, 1/2 WATT	RC20GF153K	81349	745-1401-000
R10	RESISTOR, FXD, FILM 2150 OHMS, 1% TOL, 1/2 WATT	RN65D2151F	81349	705-7112-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R11	RESISTOR, FXD, FILM 19K OHMS, 1% TOL, 1/2 WATT	RN65D1902F	81349	705-7158-000
R12	SAME AS R11			
R13	RESISTOR, FXD, FILM 5110 OHMS, 1% TOL, 1/2 WATT	RN65D5111F	81349	705-7130-000
R14	RESISTOR, FXD, FILM 4.42K OHMS, 1% TOL, 1/2 WATT	RN65D4421F	81349	705-7127-000
R15	NOT USED			
R16	RESISTOR, FXD, FILM 1960 OHMS, 1% TOL, 1/2 WATT	RN65D1961F	81349	705-7110-000
R17	RESISTOR, FXD, FILM 464 OHMS, 1% TOL, 1/2 WATT	RN65D4640F	81349	705-7080-000
R18	SAME AS R6			
R19	SAME AS R7			
R20	SAME AS R8			
R21	RESISTOR, FXD, COMPOSITION 5600 OHMS, 10% TOL, 1/2 WATT	RC20GF562K	81349	745-1384-000
R22	SAME AS R10			
R23	SAME AS R11			
R24	SAME AS R11			
R25	SAME AS R13			
R26	RESISTOR, FXD, FILM 4640 OHMS, 1% TOL, 1/2 WATT	RN65D4641F	81349	705-7128-000
R27	RESISTOR, VAR 1K, 30% TOL, 1/2 WATT	62PAR1K	73138	382-0008-410
R28	RESISTOR, FXD, FILM 1470 OHMS, 1% TOL, 1/2 WATT	RN65D1411F	81349	705-7104-000
R29	RESISTOR, FXD, COMPOSITION 150 OHMS, 10% TOL, 2 WATTS	RC42GF151K	81349	745-5617-000
R30	RESISTOR, FXD, COMPOSITION 5.1 OHMS, 5% TOL, 1/2 WATT	RC20GF5R1J	81349	745-1544-000
R31	RESISTOR, FXD, COMPOSITION 160 OHMS, 5% TOL, 1 WATT	RC32GF161J	81349	745-3319-000
R32	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/2 WATT	RC20GF222K	81349	745-1366-000
R33	RESISTOR, FXD, COMPOSITION 560 OHMS, 10% TOL, 1 WATT	RC32GF561K	81349	745-3342-000



8502 532 Pb

Figure 6-10. Fan.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	FAN			783-7049-001
B1	FAN, TUBEAXIAL 0.16-AMP, 115 VAC	20-244-2301	82887	009-1829-020
TB1	BOARD, FABRICATED			786-1248-001

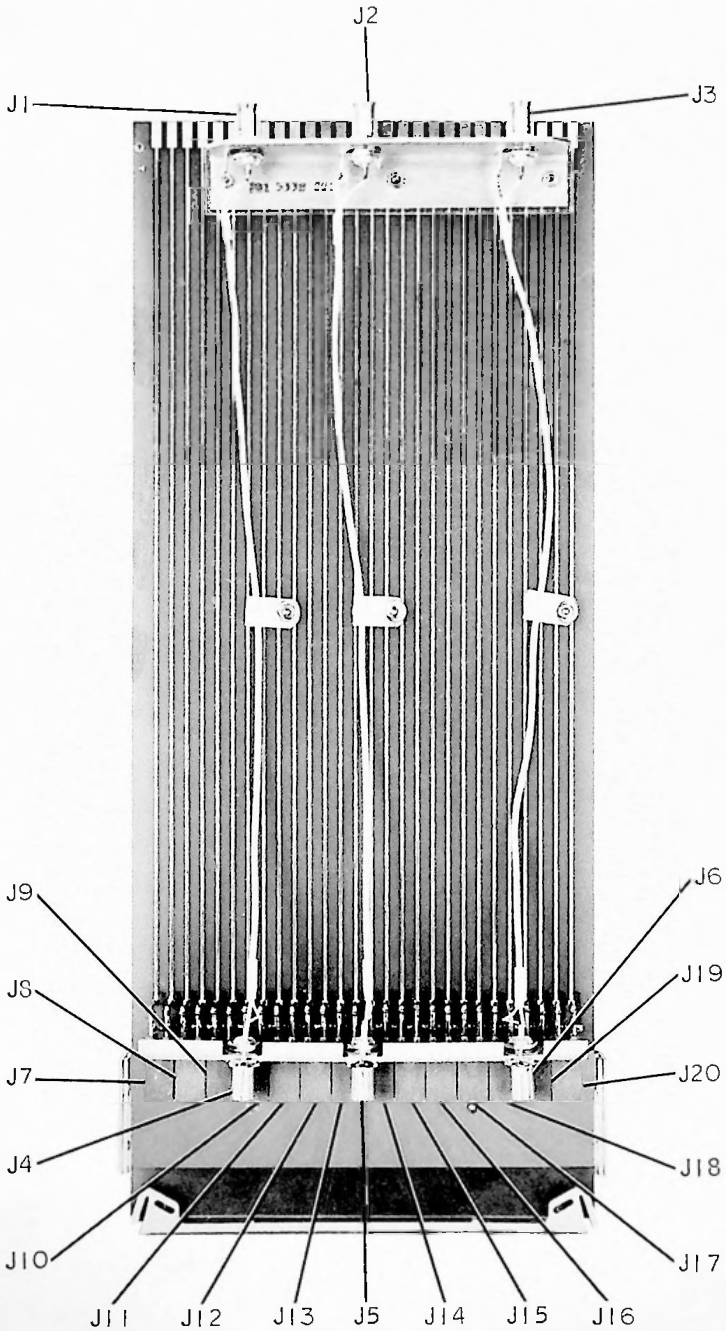


Figure 6-11. Extender Board.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	EXTENDER BOARD			781-5365-001
J1	CONNECTOR, ELECTRICAL 1 CONTACT	UG1051U	80058	357-9210-000
J2	SAME AS J1			
J3	SAME AS J1			
J4	CONNECTOR, ELECTRICAL 1 CONTACT	UG1050AU	80058	357-9211-000
J5	SAME AS J4			
J6	SAME AS J4			
J7	CONNECTOR, ELECTRICAL 2 CONTACTS	375430-9010	91662	372-2425-010
J8 THROUGH J20	SAME AS J7			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	MANUFACTURERS CODES			
CODE	MANUFACTURER			
00853	SANGAMO ELECTRIC CO S CAROLINA DIV PICKENS, S.C.			
01002	GENERAL ELECTRIC CO CAPACITOR DEPT HUDSON FALLS, N.Y.			
01939	SPRAGUE ELECTRIC CO OF WISCONSIN GRAFTON, WISC			
02288	ALLIED CONTROL CO INC PLANTSVILLE, CONN			
02660	AMPHENOL CORP BROADVIEW, ILL.			
02735	RADIO CORP OF AMERICA SOLID STATE AND RECEIVING TUBE DIVISION SOMERVILLE, N.J.			
03550	VANGUARD ELECTRONICS CO INGLEWOOD, CALIF			
03877	TRANSISTRON ELECTRONIC WAKEFIELD, MASS.			
04009	ARROW-HART AND HEGEMAN ELECTRIC CO HARTFORD, CONN			
04713	MOTOROLA SEMICONDUCTOR PRODUCTS INC PHOENIX, ARIZ			
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV MOUNTAIN VIEW, CALIF			
07688	MILITARY SPECIFICATIONS			
09408	STAR-TRONICS INC GEORGETOWN, MASS.			
12040	NATIONAL SEMICONDUCTOR CORP DANBURY, CONN			
12615	U.S. TERMINALS INC CINCINNATI, OHIO			
13103	THERMALLOY CO DALLAS, TEX			
16352	COMPUTER DIODE CORP LODI, N.J.			
17117	ELECTRONIC MOULDING CORP PANTUCKET, R.I.			
17857	KARKAR ELECTRONICS INC SAN FRANSISCO, CALIF			
22229	UNION CARBIDE CORP LINDE DIV MOUNTAIN VIEW, CALIF			
42190	THE MUTER CO CHICAGO, ILL.			
53021	SANGAMO ELECTRIC CO SPRINGFIELD, ILL.			
56289	SPRAGUE ELECTRIC CO NORTH ADAMS, MASS.			
60418	THE TORSION BALANCE CO CLIFTON, N.J.			
70309	ALLIED CONTROL CO INC NEW YORK, N.Y.			
70674	ADC PRODUCTS INC MINNEAPOLIS, MINN			
71034	BLILEY ELECTRIC CO INC ERIE, PA.			

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
71400	BUSSMANN MFG DIV OF MCGRAW-EDISON CO ST LOUIS, MO			
71450	CTS CORP ELKHART, IND			
72136	THE ELECTRO MOTIVE MFG CO INC WILL IMANTIC, CONN			
72982	ERIE TECHNOLOGICAL PRODUCTS INC ERIE, PA			
73138	BECKMAN INSTRUMENTS INC HELIPOT DIVISION FULLERTON, CALIF			
73445	AMPEREX ELECTRONIC CORP HICKSVILLE LONG ISLAND, N.Y.			
73899	J F D ELECTRONICS CO A DIVISION OF STRATFORD RETREAT HOUSE BROOKLYN, N.Y.			
74970	E F JOHNSON CO WASECA, MINN			
75042	I R C INC PHILADELPHIA, PA.			
75382	KULKA ELECTRIC CORP MT VERNON, N.Y.			
76854	OAK MFG CO CRYSTAL LAKE, ILL.			
80058	MILITARY SPECIFICATIONS			
80105	BOLLER AND CHIVENS INC PASADENA, CALIF			
80145	A P I INSTRUMENTS CO CHESTERLAND, OHIO			
81349	MILITARY SPECIFICATIONS			
82389	SWITCH CRAFT INC CHICAGO, ILL.			
83003	VARO INC GARLAND, TEX			
87930	TOWER MFG CORP LATROBE, PA			
91506	AUGAT INC ATTLEBORO, MASS.			
91637	DALE ELECTRONICS INC COLUMBUS, NEBR			
91662	ELCO CORP WILLOW GROVE, PA.			
94148	SCIENTIFIC ELECTRONIC PRODUCTS INC LOVELAND, COLO			
94375	AUTOMATIC METAL PRODUCTS BROOKLYN, N.Y.			
95105	COLLINS RADIO CO INFORMATION SCIENCE CENTER NEWPORT BEACH, CALIF			
96906	MILITARY SPECIFICATIONS			
98291	SEALECTRIC CORP MAMARONECK, N.Y.			
98978	INTERNATIONAL ELECTRONIC RESEARCH CORP BURBANK, CALIF			
99800	DELEVAN ELECTRONICS CORP AURORA, N.Y.			

section 7
schematic diagrams

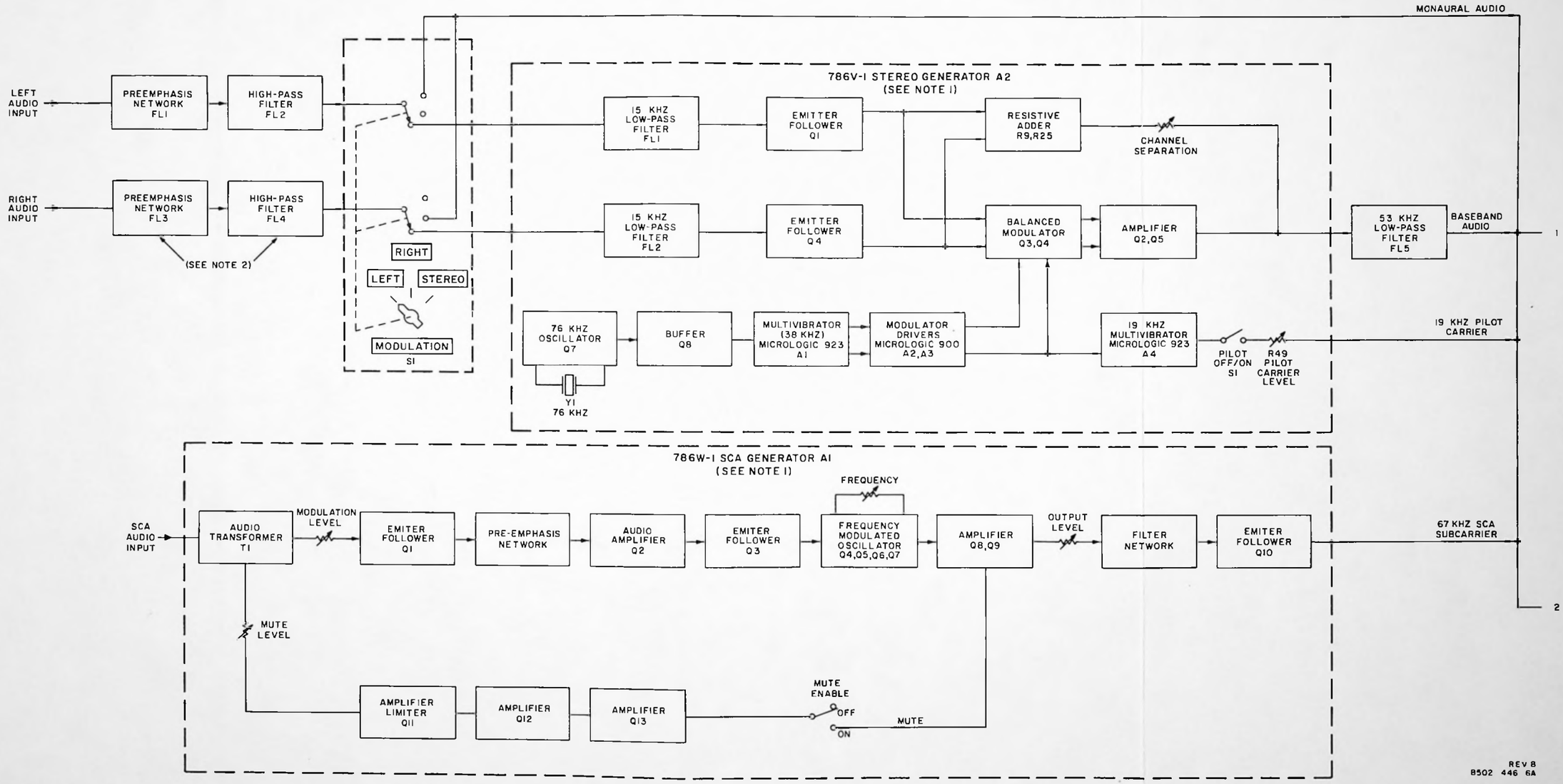


Figure 7-1. 310Z-1 FM Broadcast Exciter, Detail Block Diagram (Sheet 1 of 2).

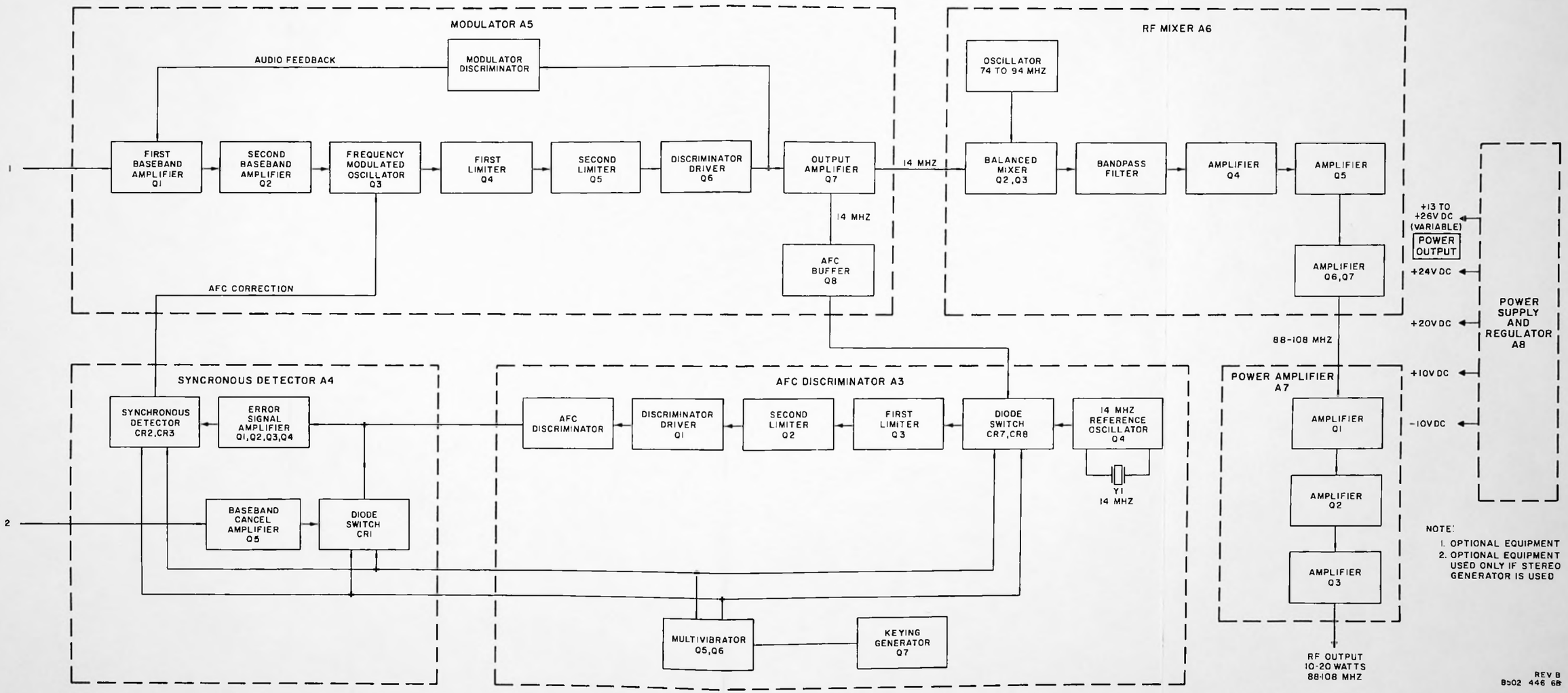
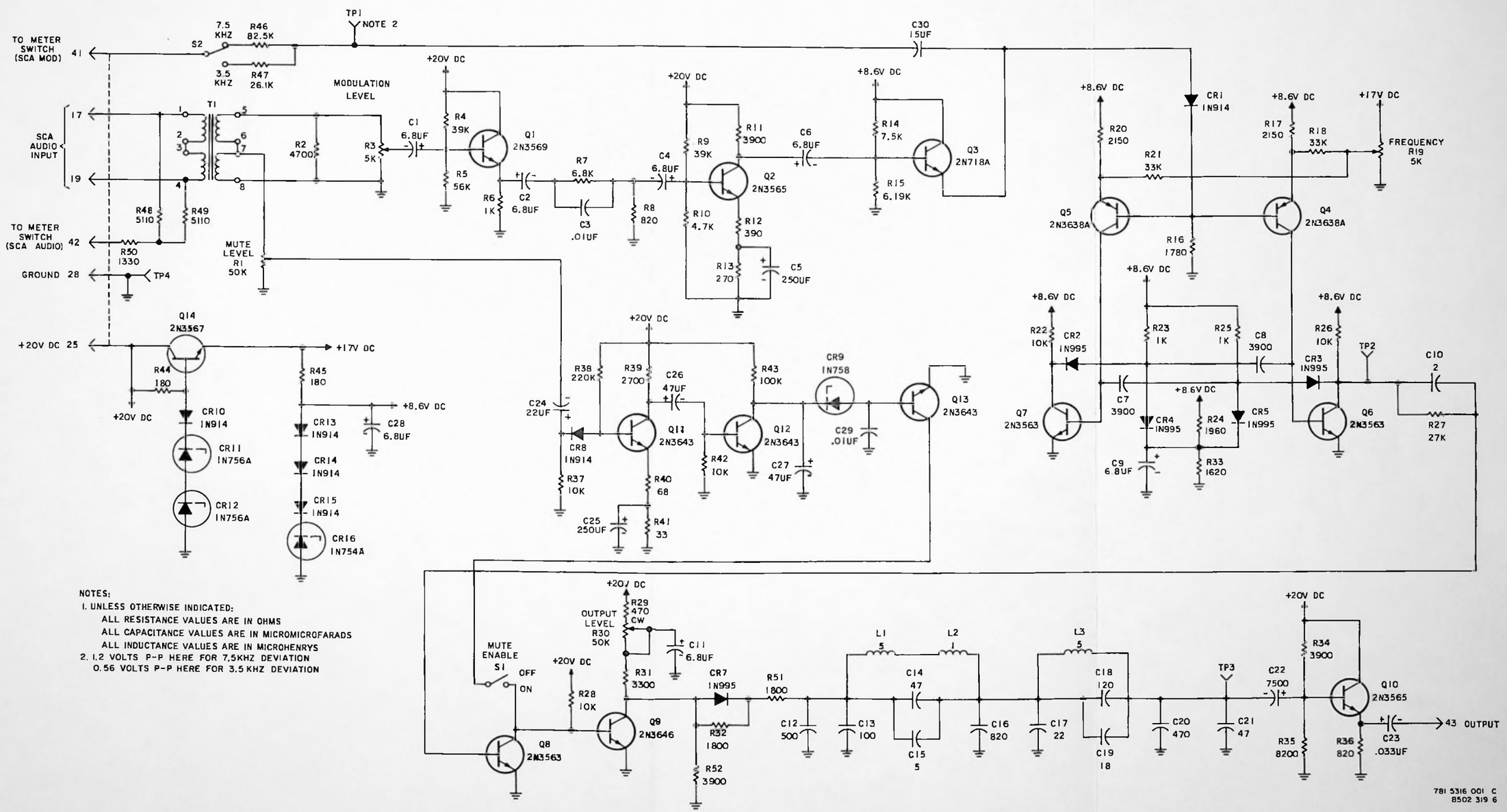


Figure 7-1. 310Z-1 FM Broadcast Exciter, Detail Block Diagram (Sheet 2 of 2).



NOTES:
1. UNLESS OTHERWISE INDICATED:
   ALL RESISTANCE VALUES ARE IN OHMS
   ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS
   ALL INDUCTANCE VALUES ARE IN MICROHENRYS
2. 1.2 VOLTS P-P HERE FOR 7.5KHZ DEVIATION
   0.56 VOLTS P-P HERE FOR 3.5 KHZ DEVIATION

Figure 7-3. 786W-1 SCA Generator (A1), Schematic Diagram.

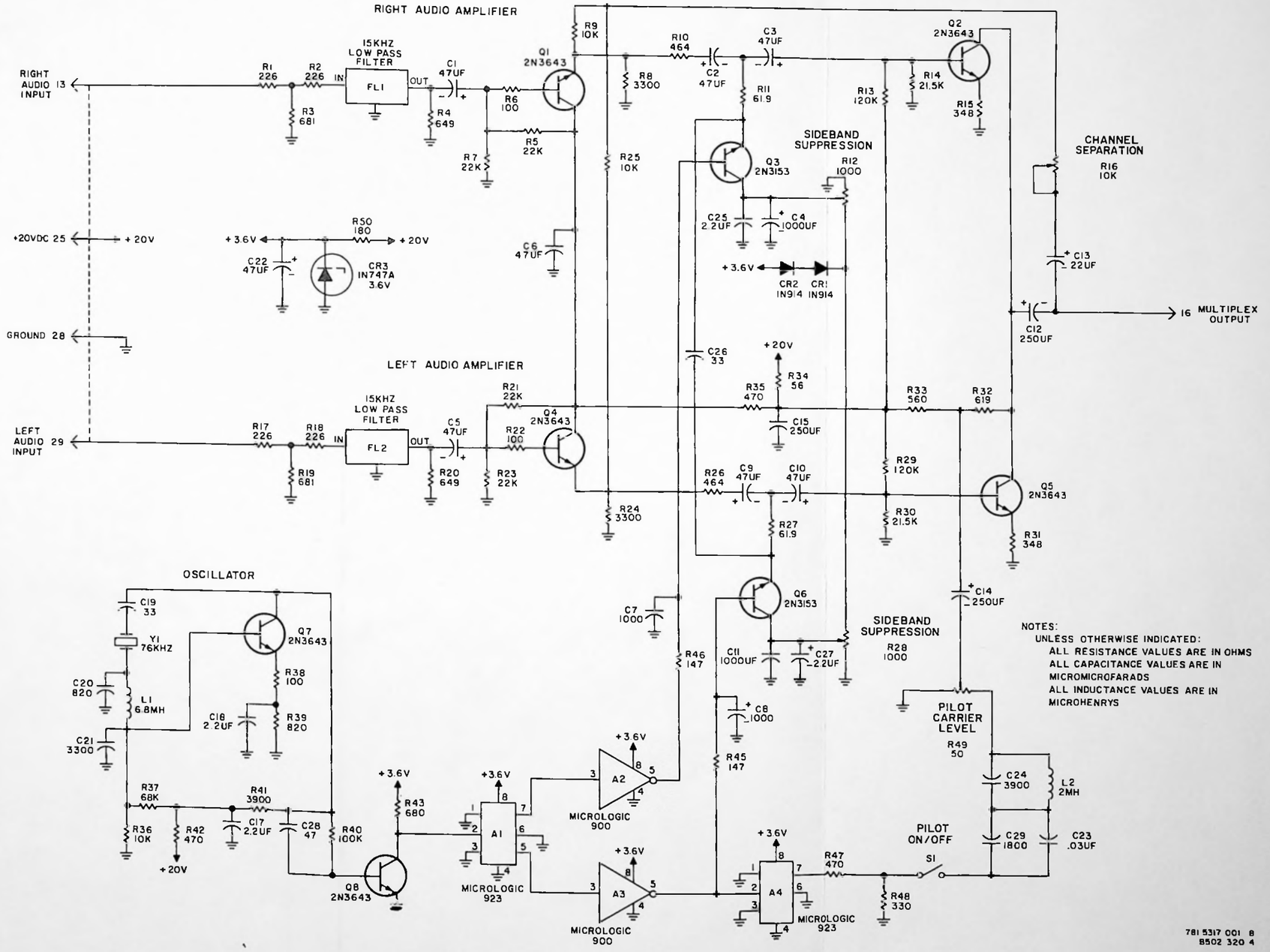
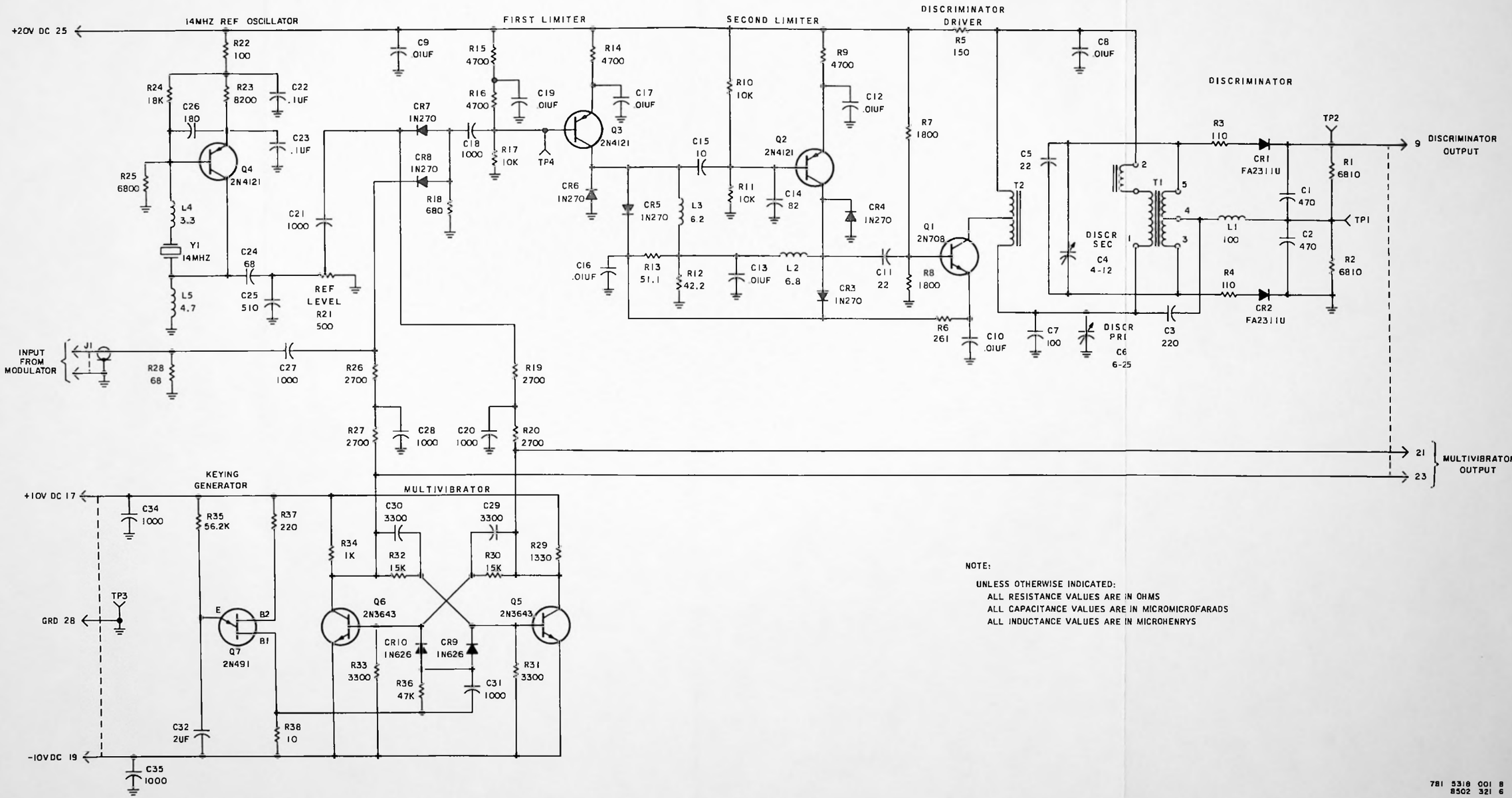


Figure 7-4. 786V-1 Stereo Generator (A2), Schematic Diagram.



NOTE:

UNLESS OTHERWISE INDICATED:
ALL RESISTANCE VALUES ARE IN OHMS
ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS
ALL INDUCTANCE VALUES ARE IN MICROHENRYS

781 5318 001 8
8502 321 6

Figure 7-5. AFC Discriminator (A3), Schematic Diagram.

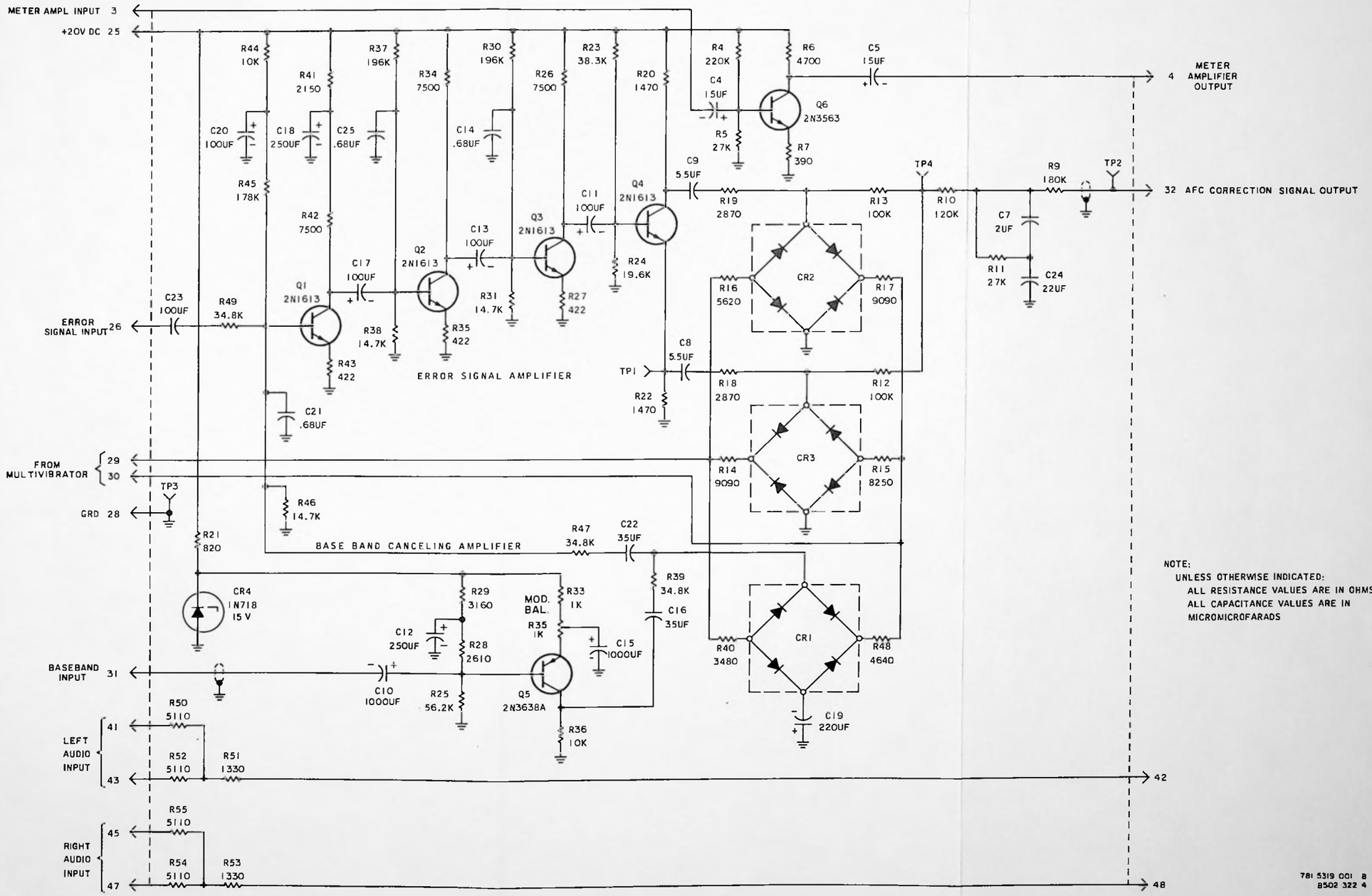
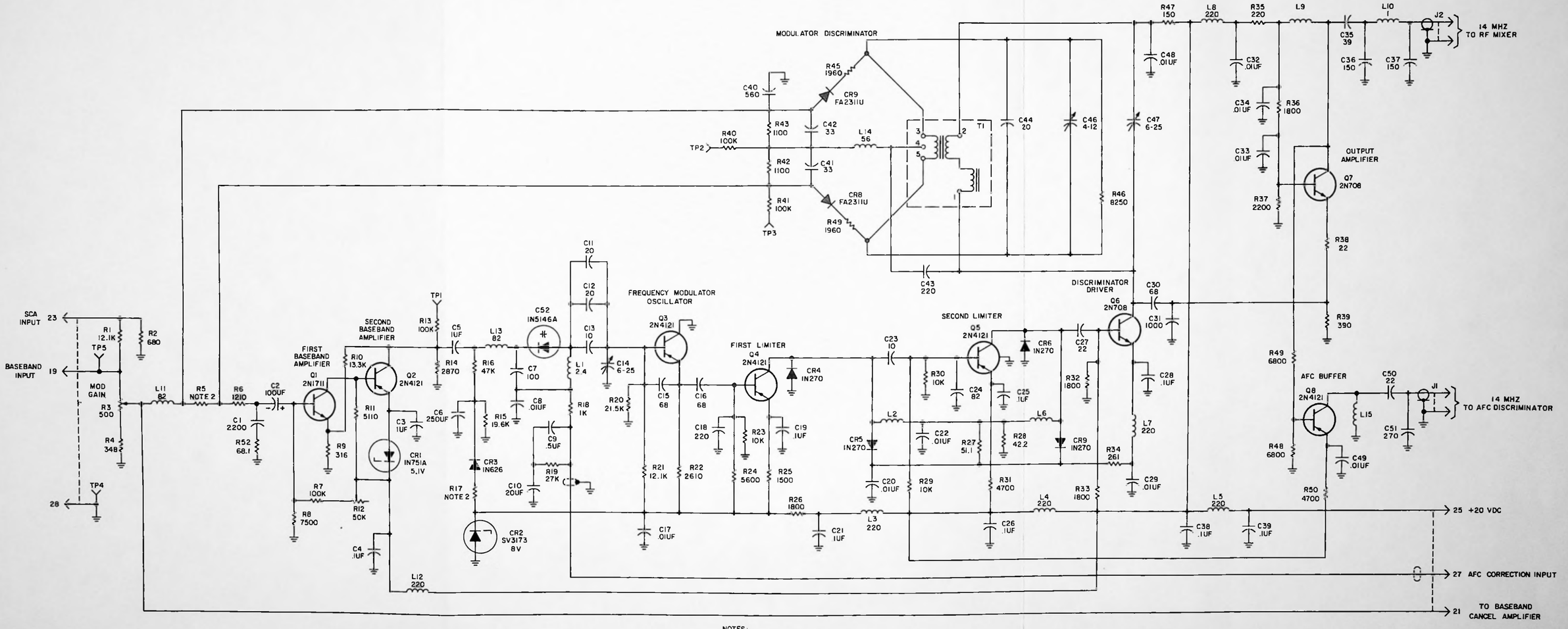


Figure 7-6. AFC Synchronous Detector (A4), Schematic Diagram.

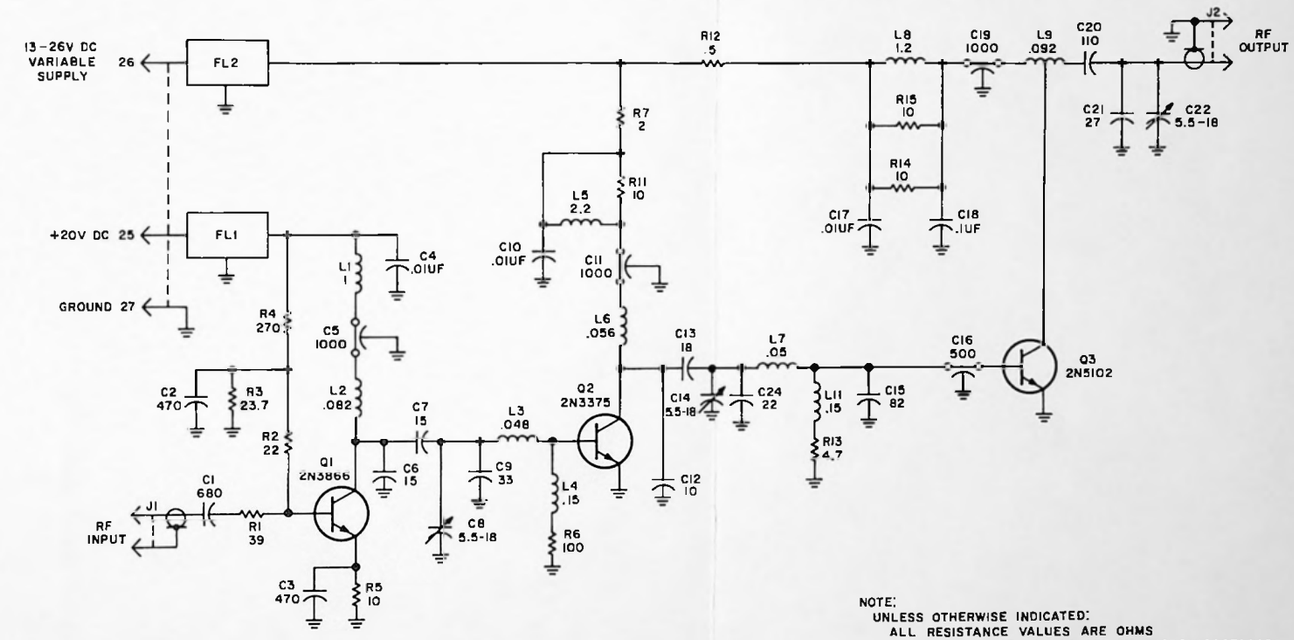


NOTES:

1. UNLESS OTHERWISE INDICATED:
   - ALL RESISTANCE VALUES ARE IN OHMS
   - ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS
   - ALL INDUCTANCE VALUES ARE IN MICROHENRYS
2. SELECTED IN PRODUCTION

781 5320 001 B
8502 323 6

Figure 7-7. FM Modulator (A5), Schematic Diagram.



NOTE:
UNLESS OTHERWISE INDICATED:
ALL RESISTANCE VALUES ARE OHMS
ALL CAPACITANCE VALUES ARE IN MICROMICROFARADS
ALL INDUCTANCE VALUES ARE IN MICROHENRYS

781 5322 001 A
8502 324 4

Figure 7-9. Power Amplifier (A7), Schematic Diagram.

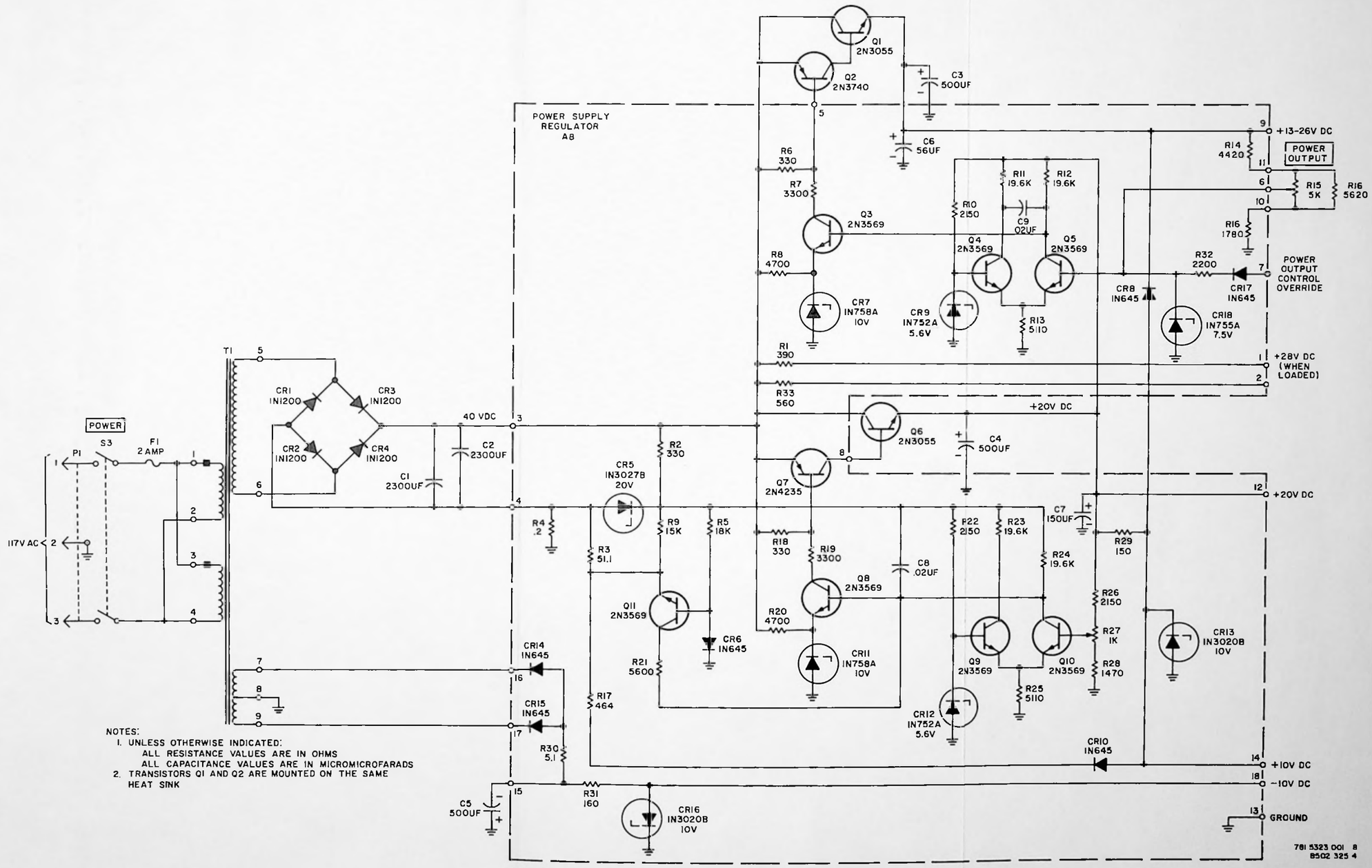


Figure 7-10. Power Supply (A8), Schematic Diagram.

COLLINS