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Collins instruction book

Collins Radio Group

831G-2 20-kW and 831G-2B 22.5-kW FM Transmitters



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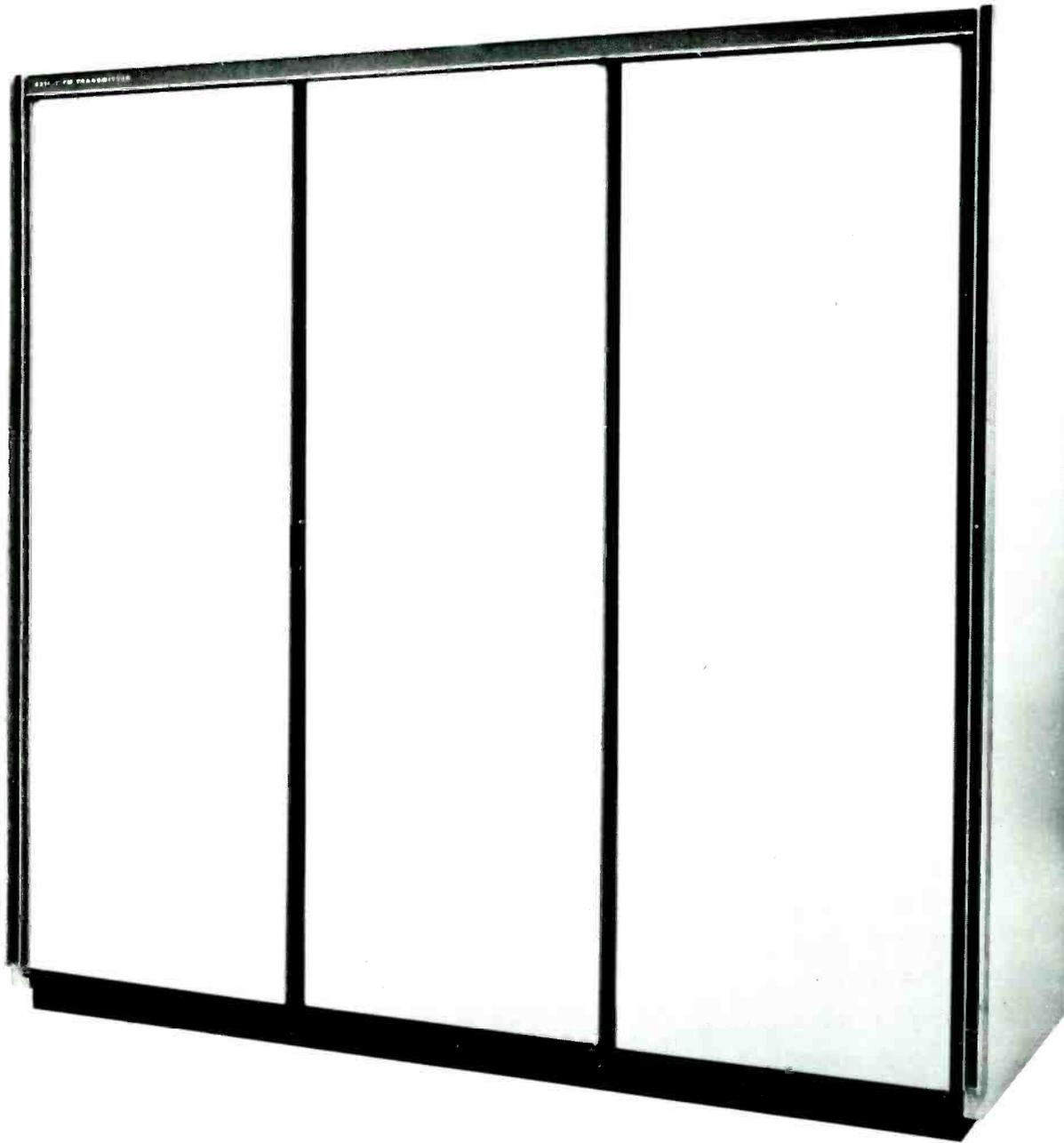
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Figure 1-1. 831G-2 20-kW/831G-2B 22.5-kW
FM Transmitter.

1.1 Introduction

When equipped with an optional stereo generator and SCA generator, the 831G-2 20-kW or 831G-2B 22.5-kW FM Transmitter provides continuous monaural, stereophonic, and SCA (subsidiary communication authorization) frequency-modulated service. The transmitter operates in the fm broadcast range (88 to 108 MHz) at a maximum output of 20,000 watts (831G-2) or 22,500 watts (831G-2B). Reduced maximum power is available by tap changes on the plate and screen transformers.

1.2 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 control panel, exciter, and control circuits. The section on the right contains the power supplies, the circuit breaker, and fuse panel.

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

1.3 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 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 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.

1.4 Technical Characteristics

1.4.1 Mechanical

Weight:

1088.6 kg (2400 pounds)

Size:

Height

1752.6 mm (69 inches)

Width

1816.1 mm (71-1/2 inches)

general description

Depth

698.5 mm (27-1/2 inches)

Ventilation (2 Sources):

Squirrel-cage type blower mounted under the cavity
Axial fan that provides positive air pressure within the entire cabinet of the 831G-2,
or negative air pressure within the 831G-2B cabinet.

Ambient Temperature Range:

+15° to +45° C (59° to 113° F) operating

Relative Humidity Range:

0 to 90% relative humidity

Altitude:

Up to 7500 feet (2285 m) at 40° C (104° F)

Shock and Vibration:

Normal handling and transportation

Finish:

Cabinet Exterior

Collins gray baked enamel

Control Panel

White baked enamel

1.4.2 Electrical

Frequency Range:

88 to 108 MHz

Maximum Power Output:

20,000 watts into a 50-ohm unbalanced line (831G-2)

22,500 watts into a 50-ohm unbalanced line (831G-2B)

Standing Wave Ratio:

Not to exceed 2:1

Power Source:

200 to 250 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 Characteristics:

Wideband direct fm; standard audio preemphasis is incorporated

Input Power Requirements:

35 kVA at 0.97 power factor for 20-kW output (831G-2)

39 kVA at 0.97 power factor for 22.5-kW output (831G-2B)

Excitation Source:

Collins 310Z-2 exciter capable of accepting an input signal of from 30 Hz to 75 kHz

Options:

Stereo

Add Collins 786V-1 Stereo Generator to exciter

Stereo and SCA

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

Remote Control

Add Collins latching relay A12, power control relays A2A3, and remote relays A2A1

Output Impedance:

50 ohms, unbalanced

Carrier Frequency Stability:

Frequency will not vary more than ± 500 Hz for an ambient temperature range of +15 to +45°C (59° to 113° F) and a line variation of $\pm 5\%$

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:

Stereo

Not more than 0.5%, 50 Hz to 15 kHz

Monaural

Not more than 0.25%, 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

2.1 Unpacking and Inspecting

2.1.1 Domestic Shipments

- a. The uncrated transmitter is shipped mounted on a shipping skid. 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. File any damage claims properly with the transportation company. Retain all packing material if a claim is filed.

2.1.2 Foreign Shipments

- 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. 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 or 2-2, and paragraph 2-4.) 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, and the remote control unit.
- 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 to 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. If the 310Z-2 exciter was not factory installed, mount it in the area provided in the transmitter center section. Connect an rf cable from the exciter output to the driver input. Attach the override voltage lead from A4TB1-16 to A19E6. Connect the 117-volt ac power cable from the exciter to connector J3 (figure 2-1 or 2-2). Refer to the 310Z-2 exciter instruction book for installation of audio input cables. Replace the rear cover and place the transmitter in its permanent location.
- d. Connect primary power according to instructions supplied in paragraph 2.3.1.

Inductors L1 and L2, and filter capacitor C3 may have been
Install these components if they were shipped separ-

for proper connection. Refer to paragraph 2.3.2 and table

If A was removed for shipping, install it using the procedure out-
line 7.1.

If a control panel is used, run the external wiring from the remote unit into the
cabinet and connect it to TB4 (figure 2-1 or 2-2). Also install the appropriate
remote control relay cards, A12, A2A3, and A2A1.

Connect the customer-supplied 50-ohm transmission line to the rf output connector
located 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.

2.3 Primary Power

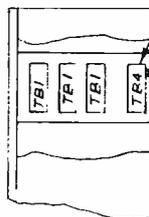
2.3.1 General

The transmitter requires a 200- to 250-volt $\pm 5\%$, 3-phase, 60-Hz ac power source that de-
livers 35 kilovolt-amperes at a 0.97 power factor for the 831G-2 or 39 kilovolt-amperes at
a 0.97 power factor for the 831G-2B. Make provisions for a fused main power disconnect
switch or circuit breaker to A19TB3 in the transmitter.

2.3.2 Transformer Connections

The broad range of allowable voltage sources (200 to 250 volts) is made possible by the
availability of different tap connections on power transformers T1, T2, T3, and T4 and
power supply transformers PS1T1 and PS2T1.

Six connections are made on each of the transformers T1, T2, and T3. Three of these con-
nections (at pins 1, 10, and 19 on T1, T2, and T3) are made regardless of the source voltage.
The wires at these connections are labeled with their connecting pin number. The other
three connections are made to correspond with the power source voltage. The wires at these
connections are labeled A, B, or C on transformers T1 and T2, and AA, BB, or CC on trans-
former T3. The initial connection of these wires to their respective transformers are made
according to the instructions supplied in table 2-1.



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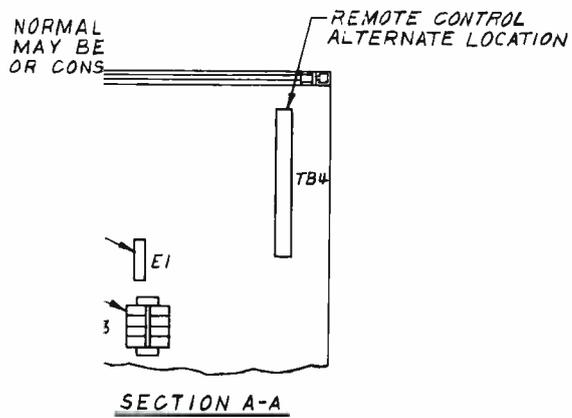


Figure 2-1. 831G-2 20-kW FM Transmitter,
Outline and Installation Drawing.

LEAST
WALL

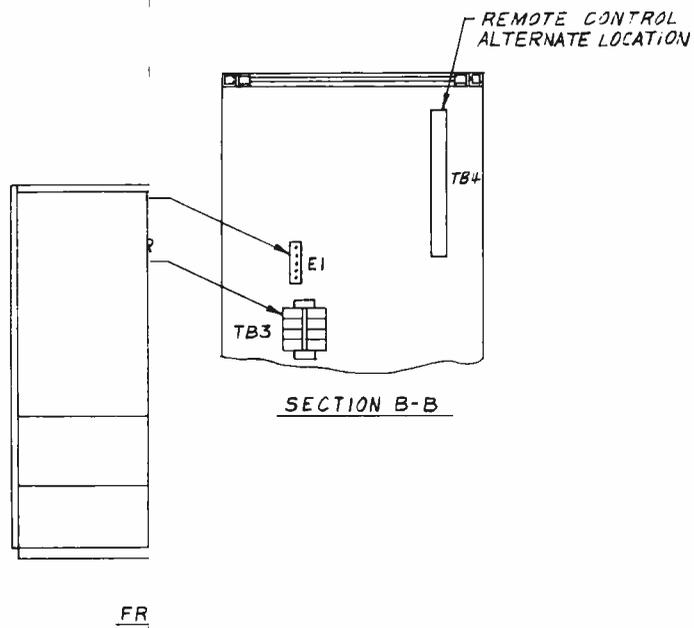


Figure 2-2. 831G-2B 22.5-kW FM Transmitter, Outline and Installation Drawing.

Table 2-1. Transformer Connections.

LINE	T1, T2		T3		T4		PS1T1		PS2T1	
	WIRE LABEL	TERM CONN								
200 volts, 3-phase	A	13	AA	13	A	2	A	2	A	2
	B	22	BB	22	B		B	5		
	C	4	CC	4	C		C	8		
210 volts, 3-phase	A	14	AA	14	A	3	A	2	A	2
	B	23	BB	23	B		B	5		
	C	5	CC	5	C		C	8		
220 volts, 3-phase	A	15	AA	15	A	4	A	2	A	2
	B	24	BB	24	B		B	5		
	C	6	CC	6	C		C	8		
230 volts, 3-phase	A	16	AA	16	A	5	A	3	A	3
	B	25	BB	25	B		B	6		
	C	7	CC	7	C		C	9		
240 volts, 3-phase	A	17	AA	17	A	6	A	3	A	3
	B	26	BB	26	B		B	6		
	C	8	CC	8	C		C	9		
250 volts, 3-phase	A	18	AA	18	A	7	A	3	A	3
	B	27	BB	27	B		B	6		
	C	9	CC	9	C		C	9		

NOTE

The initial connections on transformers T1 and T2 may be changed after tuning to reduce am noise and to provide more accurate meter readings. (See paragraph 5.6.7.6) T1 connections are selected to provide a power output approximately 10 percent above the authorized station rating. T3 connections are selected to give 1800 to 2000 volts of driver voltage at the authorized station output.

Two connections are made at transformer T4. One connection is made at pin 1 regardless of the source voltage and the wire at this pin is labeled with its connecting pin number (1). The second wire (A) is connected to correspond with the power source voltage. Wire A is connected according to instructions supplied in table 2-1.

Six connections are made on power supply transformer PS1T1. Three of these connections (at pins 1, 4, and 7) are made regardless of the source voltage. The wires at these connections are labeled with their connecting pin number. The other three connections are made to correspond with the power source voltage. The wires at these connections are labeled A, B, or C. These wires are connected according to instructions supplied in table 2-1.

Two connections are made at power supply transformer PS2T1. One connection is made at pin 1 regardless of the source voltage and the wire at this pin is labeled with its connecting pin number (1). The second wire (A) is connected to correspond with the power source voltage. Wire A is connected according to instructions supplied in table 2-1.

2.4 Transmitter Cooling

Adequate cooling of the transmitter is imperative to reduce downtime, to extend component reliability, and to provide longer tube life. An adequate supply of cool ambient air (temperature must not exceed +45 C) is required. Consult a qualified air-conditioning engineer for recommendations on ducting and cooling requirements. When designing the cooling system, observe the following rules:

- a. If the exhaust air is ducted away from the transmitter, the duct work must not create any back pressure on the transmitter exhaust system. Use a fan or blower to compensate for duct losses when the exhaust is ducted outdoors or when back pressure is present (1200-ft³/min capacity for the 831G-2 and 1600-ft³/min capacity for the 831G-2B).
- b. If intake air is ducted in from the roof, raise the intake sufficiently high above the surface to prevent intake of air heated by sun reflection from the roof.
- c. If both intake and exhaust ducts are used, locate the duct openings in a common area of the building to equalize wind pressure effects. However, do not allow the exhaust to recirculate into the intake causing heat build-up.

2.5 Initial Turn-on Procedure

- a. Ensure that the transmitter has been properly assembled and connected according to instructions provided in paragraphs 2-2 through 2-4.
- b. Open access panels to the control circuit cards and exciter circuit cards. Check the circuit cards for proper installation.
- c. Replace all access panels and ensure that all doors and panels are properly closed.

- d. Ensure that all transmitter circuit breakers are OFF.
- e. Apply primary power to transmitter.
- f. Set the 28 VDC POWER SUPPLY circuit breaker to ON.
- g. Set the BLOWERS circuit breaker to ON and press the FILAMENT ON pushbutton. The power amplifier blower will start.

WARNING

Deadly voltages are exposed when side cover is removed. Use extreme caution to prevent operator injury.

- h. Loosen the two retaining bolts at the bottom of the left cabinet side panel. Grip the panel securely and lift it from place. Check the rotation of the blower. Rotation should be counterclockwise when viewed from the left side. If rotation is in the wrong direction, turn off primary power and interchange any two primary power input leads at A19TB3. Replace the side panel, reapply primary power, and press the FILAMENT ON pushbutton.
- i. Check the cabinet fan rotation by lifting the foam filter from the top right side of the cabinet. Rotation should be counterclockwise on the 831G-2 and clockwise in the 831G-2B, when viewed from the top. If the rotation is in the wrong direction, turn off the primary power and reverse any two leads of the fan motor. Replace the filter, reapply primary power, and press the FILAMENT ON pushbutton.

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 at least 25 kW.

- j. Set all circuit breakers to ON.
- k. Set the test meter selector switch to 28V SUPPLY 40V. The test meter will indicate 28 ± 2.0 volts dc.
- l. Set the test meter selector switch to PA FIL 8V. The test meter will indicate $5.8 -0, +0.2$ volts. Refer to paragraphs 5.6.2 and 5.6.3 if meter indication is out of tolerance.
- m. Ascertain that the exciter POWER switch is ON.

NOTE

The transmitter is adjusted and pretuned at the factory for specific customer power output and frequency requirements. In normal applications, the fine-tuning and adjustment procedures provided in steps n. through u. are adequate to ensure proper transmitter operation. However, if the transmitter is to be operated at a frequency or power output different from the frequency or power output designated in the production test data supplied with the transmitter, perform the complete rf tuning and power adjustment procedures listed in paragraph 5.6.7.

installation

- n. Set the POWER CONTROL switch to MANUAL.
- o. Set the POWER switch to FORWARD.
- p. Set the TRANSMITTER CONTROL switch to LOCAL.
- q. Press the PLATE ON switch. The PLATE ON switch will light.
- r. Slightly adjust the PA LOADING and PA TUNING controls until maximum power output is displayed on the RF WATTMETER.
- s. RAISE or LOWER the POWER ADJUST control until the RF WATTMETER displays the station's authorized power level.
- t. Compare meter readings with those listed in table 3-4 or 3-5. If additional tuning is required, refer to the adjustment procedures listed in section 5.
- u. Set POWER CONTROL switch to AUTOMATIC.

2.6 Remote Operation

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

2.7 Frequency Change

The transmitter operating frequency is changed by replacing the crystal in the exciter and performing the rf tuning procedure in paragraph 5.6.7. (See the 310Z-2 exciter instruction book.)

3.1 GENERAL

The transmitter is operated from the 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 adjustments (figure 3-1). See the 310Z-2 exciter instruction book for 310Z-2 operation.

3.2 Controls and Indicators

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

3.3 Turn-on Procedure

- a. Ensure that steps a. through m. in paragraph 2.5 have been performed.
- b. Observe the control panel meters after plate voltage is applied and ensure that the transmitter readings agree with those in table 3-4 or table 3-5.
- c. If minor tuning is required, perform steps n. through u. of paragraph 2.5.

Table 3-1. Left Cabinet

REF DESIG	CONTROLS AND INDICATORS	FUNCTION
C37	DRIVER PLATE TUNING	A variable capacitor that adjusts driver tuning.
A24DS1	PA SCREEN	Screen fault indicator.
A24DS2	PA PLATE	Plate fault indicator.
A24DS3	VSWR	Vswr fault indicator.
A24DS4	DRIVER	Driver plate fault indicator.
A24S1	AUTO RECYCLE	Automatic recycle ON/OFF.

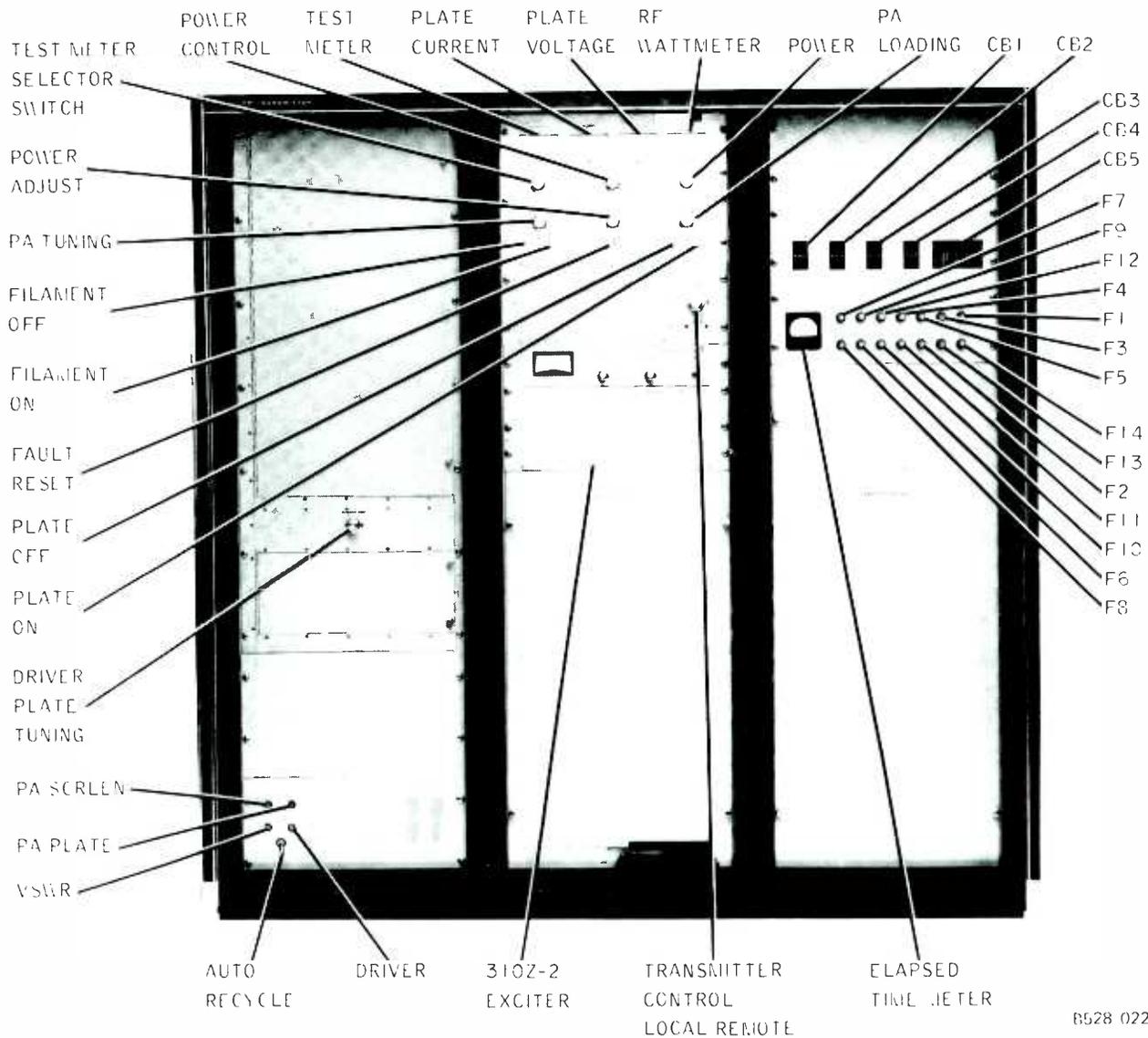


Figure 3-1. 831G-2 20-KW/831G-2B 22.5-kW FM Transmitter, Controls and Indicators.

Table 3-2. Center Cabinet.

REF DESIG	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. The value below each switch position is the full-scale reading for that position.

Table 3-2. Center Cabinet. (Cont)

REF DESIG	CONTROLS AND INDICATORS	FUNCTION
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 MANUAL.
A1S3	PA 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 switch that resets the fault indicators.
S10	TRANSMITTER CONTROL LOCAL/REMOTE	2-position switch that selects local or remote operation.

Table 3-3. Right Cabinet.

REF DESIG	CONTROLS AND INDICATORS	FUNCTION
A6CB1	28 VDC POWER SUPPLY	1 ampere magnetic circuit breaker that protects the 28-V dc power supply.
A6CB2	BLOWERS	10-ampere magnetic circuit breaker that protects both blowers.
A6CB3	DRIVER POWER SUPPLY	4.5-ampere magnetic circuit breaker that protects the driver power supply.
A6CB4	PA SCREEN POWER SUPPLY	15-ampere magnetic circuit breaker that protects the pa screen power supply.
A6CB5	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.
A6F7/F9 F12	FAN	2-ampere fuse.
A6F6/F8 F10	CONTROLLER	1-ampere fuse.
A6F4/F5	PA BIAS POWER SUPPLY	0.25-ampere fuse.
A6F1/F3	FILAMENTS	8-ampere fuse.
A6F2/F11	EXCITER	3-ampere fuse.
A6F13/ F14	DRIVER FILAMENT	2-ampere fuse.

Table 3-4. Typical Indications, 20-Kilowatt and 22.5-Kilowatt Power Output.

TYPICAL METER READINGS		
	831G-2	831G-2B
Power output	20.0 kilowatts	22.5 kilowatts
Pa plate volts	7600 to 7900 volts	7800 to 8000 volts
Pa plate current	3.40 to 3.65 amperes	3.5 to 4.1 amperes
Pa screen current	350 to 500 mA	380 to 570 mA
Pa grid current	50 to 65 mA	120 to 180 mA
Left dvr. cath. 1	180 to 200 mA	180 to 200 mA
Right dvr. cath. 1	180 to 200 mA	180 to 200 mA

Table 3-4. Typical Indications, 20-Kilowatt and 22.5-Kilowatt Power Output. (Cont)

TYPICAL METER READINGS		
	831G-2	831G-2B
Dvr. screen 1	5 to 30 mA	5 to 60 mA
Dvr. grid 1	5 to 10 mA	5 to 10 mA
Dvr. plate volts	1800 to 2000 volts	1800 to 2000 volts
Dvr. screen volts	290 to 310 volts	290 to 310 volts
310Z-2 Output Power	5 to 10 watts	5 to 10 watts
Pa plate efficiency	70 to 76%	70 to 74%
Control V	26 to 28 volts	26 to 28 volts

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 PA PLATE POWER SUPPLY circuit breaker CB5 OFF.
- d. Set 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 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.

Table 3-5. 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.

3.6 Automatic Recycle Resetting

Automatic transmitter shutdown occurs when pa screen, pa plate, driver, or vswr is overloaded. An overload indicator (A24DS1 through A24DS4) lights on fault tally and automatic recycle panel A24. If the overload was of short duration, the automatic recycling circuits restart the transmitter. The indicator light remains on until the transmitter operator presses the FAULT RESET switch on the main control panel. Perform maintenance procedures if the automatic recycling circuits fail to restart the transmitter.

The fault recycling circuits may be disabled for tuning or maintenance by switching the AUTO RECYCLE switch to OFF.

4.1 General

The 831G-2 20-kW and 831G-2B 22.5-kW FM Transmitters operate in the 88- to 108-MHz range at a maximum output of 20,000 (831G-2) or 22,500 (831G-2B) watts. A Collins 310Z-2 solid-state fm wideband 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 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 diagrams in Section 7 for detailed circuit information.

4.2 Block Diagram Discussion

Refer to figure 4-1. A 10-dBm input signal (monaural, stereo, or SCA) modulates the exciter. 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. The power amplifier output is applied via a low-pass filter and directional coupler to a 50-ohm antenna.

A small portion of the forward power in the coupler is sent to the 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-2 exciter section of this book 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 C with adjustable cathode bias 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 transmission line 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 transformer winding connected across pins 9 and 12 inside Hall-effect probe A22Z5 for screen current monitoring. Using the principle of the Hall effect, the stationary magnetic field around the transformer produces a current

principles of operation

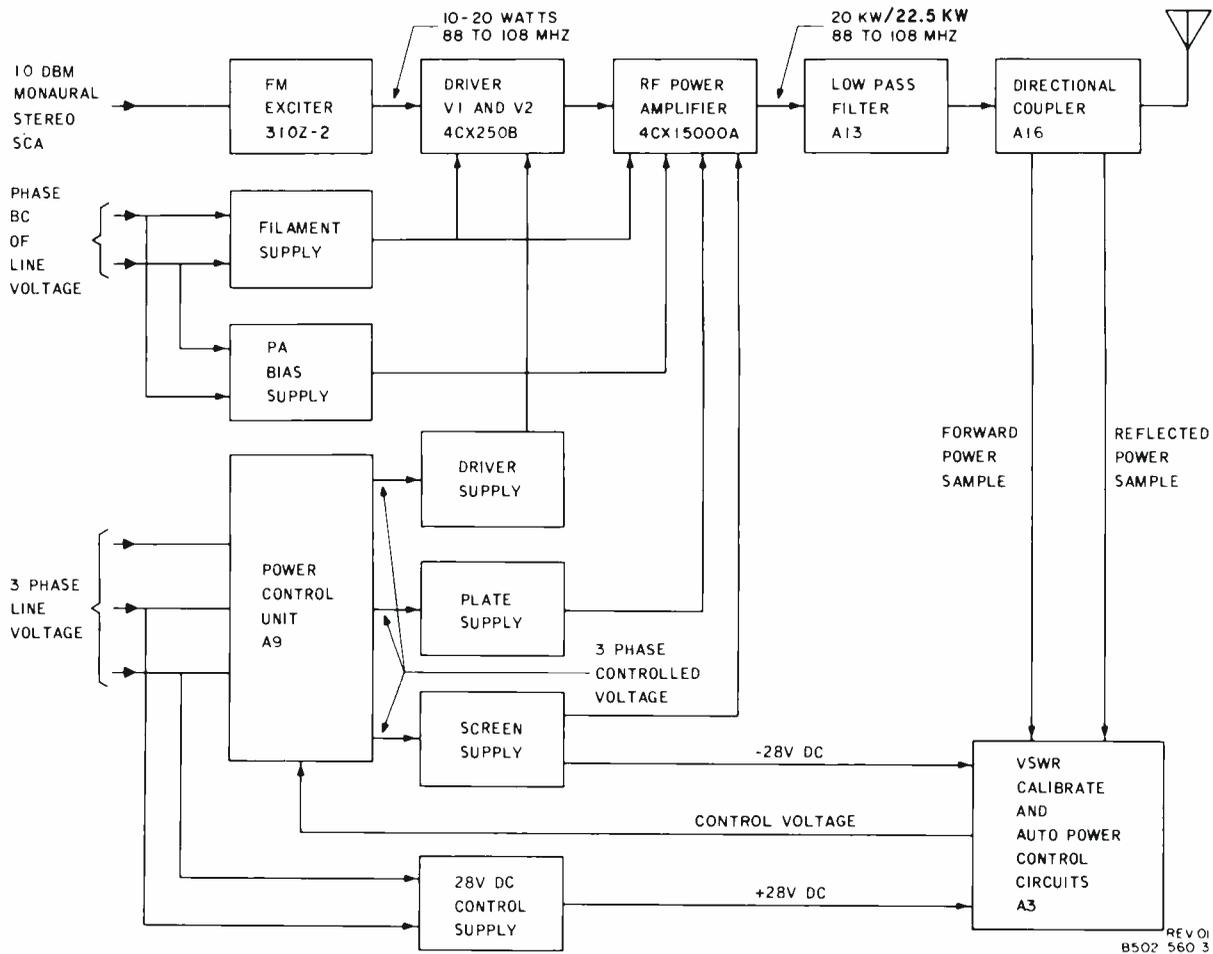


Figure 4-1. 831G-2 20-kW/831G-2B 22.5 kW FM Transmitter, Block Diagram.

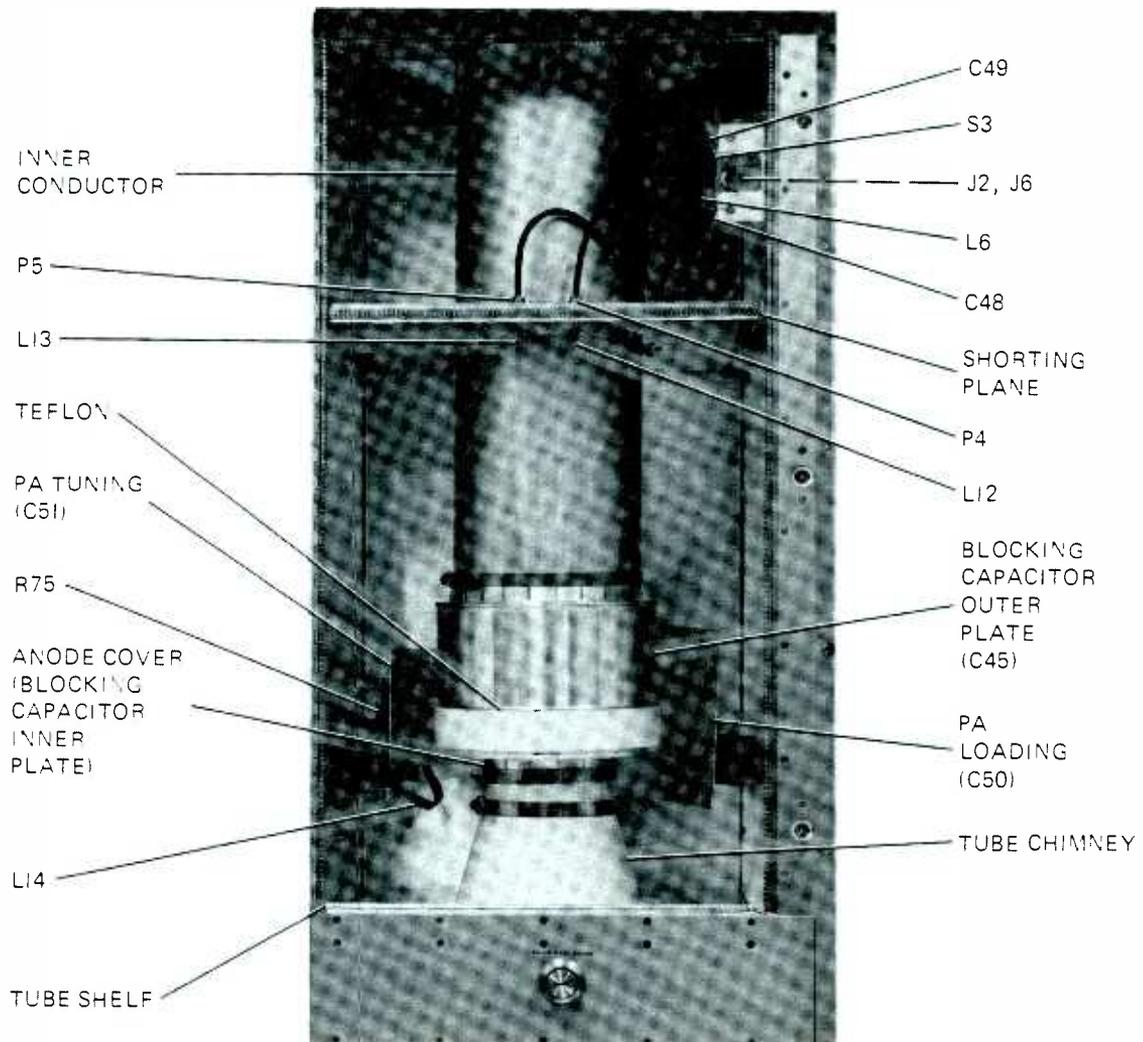
through the control panel meter connected across pins 3 and 4 of A22Z5. A control current that is adjusted to calibrate the control panel meter flows through pins 1 and 2.

4.3.3 RF Power Amplifier

The driver output is coupled to the grid of the power amplifier tube A18V3. A tuned circuit composed of A21L7 and A11C37 provides impedance matching. Loading of the driver 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 A18R75, is connected behind the pa plate tuning capacitor, A18C51. Inductor A18L14 and the distributed capacity of A18R75 are strapped to the cavity wall, forming a suppressor that dampens the higher order cavity resonances that can occur near the third harmonic of the output frequency. Cathode tuning (or peaking) capacitor A21C39 improves the bypass action at the operating frequency. Resistors A21R76 and A21R77 broaden the frequency response and minimize synchronous amplitude modulation products. Inductors A11L4 and A21L5 are the driver plate and the pa grid chokes and A18LN1 and A18LN2 provide neutralization.

The power amplifier is a plate-tuned 4CX15000A that is operated class C. 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 A18R35 (831G-2 or A18R36 (831G-2B)). 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 A22Z4 monitors the amount of grid current for control panel metering.

The power amplifier plate circuit is coarse tuned from 88 to 108 MHz by resonating an adjustable coaxial resonator. (See figure 4-2.) The resonator is the area between the tube shelf and the sliding shorting plane. Two motor-driven capacitors permit more precise tuning (A18C51) and loading (A18C50). RAISE/LOWER switches S3 (PA TUNING) and S4 (PA LOADING) on control panel A1 control associated relays on tuning/power control relay board A7. The relays, in turn, control the capacitor drive motors.



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Figure 4-2. Plate Cavity.

principles of operation

DC blocking capacitor A18C45 is formed by placing a Teflon cylinder over the pa anode cover and then a metal cylinder over the Teflon cylinder. Figure 4-3 shows the electrical equivalence of the plate tuning circuit.

4.3.4 Low-Pass Filter A13

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

4.3.5 Directional Coupler A16

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.

4.4 Power Supplies and Power Control Circuits

4.4.1 General

There are five separate power supplies in the transmitter. Three of the five, the plate, screen and 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 PS1

The 28-volt dc supply receives its 3-phase 60-Hz input from the unregulated line voltage. The input is applied through circuit breaker A6CB1 and stepdown transformer T1 to 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.

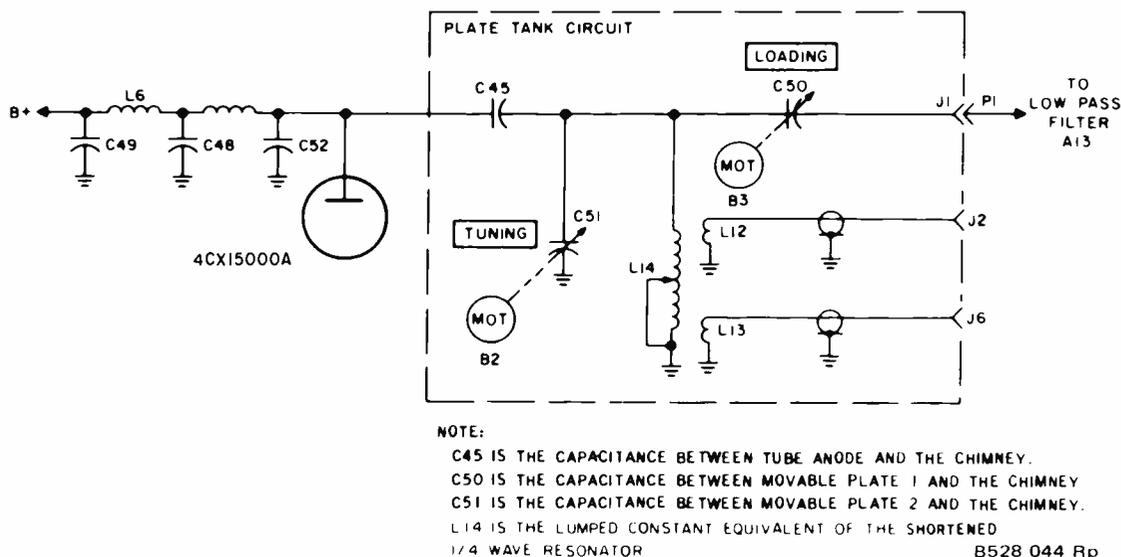


Figure 4-3. 831G-2 20-kW/831G-2B 22.5-kW FM Transmitter, Schematic Diagram, Output Network.

4.4.3 PA Bias Power Supply PS2

The pa bias power supply provides the power amplifier with fixed grid bias that holds the tube near cutoff when no signal is present on the grid. Single-phase primary power is applied through circuit breaker A6 and step-up transformer T1 to a bridge rectifier network. An L-section filter is formed by C1 and L1.

The power supply output is applied to the grid of the power amplifier through CR5. CR5 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 A1M1 for monitoring.

4.4.4 PA Plate Power Supply

The pa plate power supply provides plate voltage to the power amplifier. Primary components of the supply are transformer T1, 3-phase bridge rectifier assembly Z1, filter choke L1, and filter capacitor C3. A meter multiplier board, A15, samples plate voltage and allows constant monitoring. Input power to T1 is controlled by scr (silicon-controlled rectifier) power control unit A9. This unit, connected as a closed loop regulator, maintains constant power output to offset conditions of varying input power.

4.4.5 Power Control Unit A9

Power control unit A9 adjusts the 3-phase ac power input to the pa plate, the pa screen, and the driver power supplies through transformers T1, T2, and T3 respectively. Unit A9 consists of two major component assemblies—scr assembly A9Z1 and firing control unit A9AR1. Scr assembly A9Z1 has three scr pairs; one pair in series with each primary winding of the 3-phase power transformers. Each pair is connected within the inside-delta circuit of the transformer primaries. Scr firing control unit A9AR1 consists of three control cards. Each control card controls the firing (turn-on) point of one scr pair. Relay A9AR1K1 deenergizes on PLATE OFF, disabling the three gating cards and driving the scr's.

A common control signal from power control regulator A8 is fed simultaneously to each control card. This control signal governs the firing of the scr pairs that regulate the input power applied to the power supplies.

4.4.6 Power Control Regulator A8

Power control regulator A8 provides the necessary control signals to operate power control unit A9. A8 supplies a soft-start pa plate supply turn-on signal, a negative voltage for manual power control, and amplifier-mixer functions for automatic power control.

When the PLATE ON switch is pressed, +28 volts is supplied to XA8-27 through plate-on relay A19K3, phase-loss relays A19K10, 11, and 5, and time-delay relay A19K4. (See figure 4-4.) The +28 volts activates transistor A8Q1 to turn on relay K12. Relay K12 supplies 3-phase ac control power to A9AR1. An RC time delay circuit formed by A8R2 and A8C1 maintains K12 closed for a short interval after the PLATE OFF switch is pressed. Transistors A8Q2, Q3, and Q4, also energized by the +28 volts, provide the dc turn-on signal to unit A9AR1. On power control regulator A8, R8, R9, and C2 modify this signal to soft-start the high-voltage pa plate power supply. Zener regulator A8VR2 provides a -10-volt voltage to MANUAL power adjust resistor A20R43. Transistors A8Q5 and A8Q4 amplify the automatic control signal from A3 and apply the signal to A9AR1TB2-1 when the MANUAL/AUTOMATIC switch is in AUTOMATIC. A8C5 and A8R5 phase-compensate the power control servo loop.

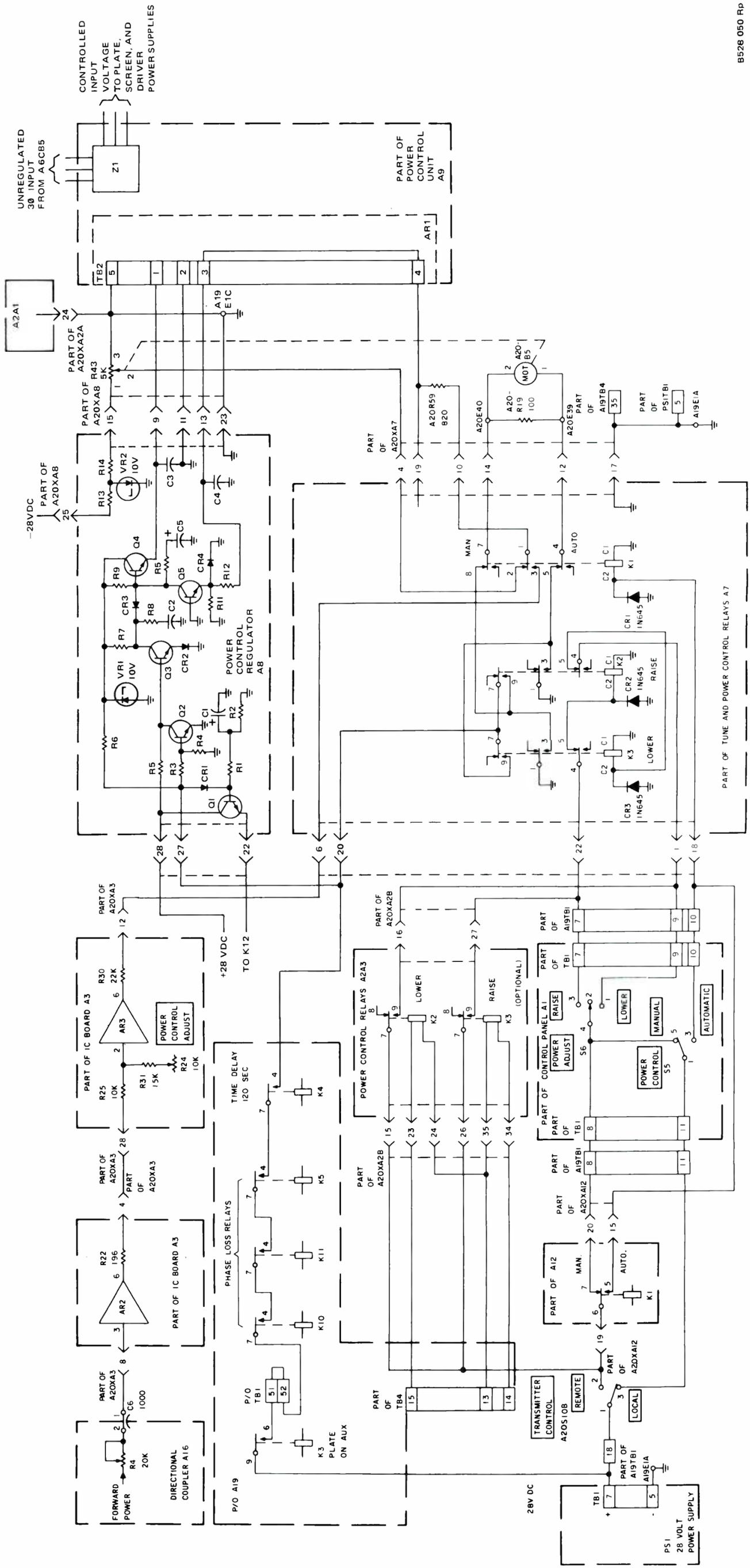


Figure 4-4. Power Control Circuits, Schematic Diagram.



4.4.7 PA Screen Power Supply

The 3-phase regulated voltage from the power control unit is applied through transformer T2 to a silicon 3-phase full-wave bridge assembly, Z2, in the pa screen power supply. The output of Z2 is filtered and applied to the cathode circuit of the power amplifier at the secondary center tap of filament transformer A18T5. The pa screen power supply also provides -28 volts, obtained from the junction of resistors A17R4 and A17R18, for vswr calibrate and auto power control A3.

4.4.8 Driver Power Supply

The driver power supply provides plate and screen voltages for the driver stage. The 3-phase ac power for the primary of T3 is supplied by power control A9. The output of T3 is applied to a silicon 3-phase full-wave bridge assembly, Z3, with RC compensation. The output of the rectifier bridge is filtered and applied to the driver plate circuit via panel grounding switches S8 and S9. The driver screen voltage, developed at the junction of A17R34 and A17R25 is applied through a metering circuit to the driver screen circuit. Gaseous protector A17E2B shorts excessive transient voltages to ground. Portions of the supply output are supplied to control panel A1 for driver plate voltage (from across A14R32) and screen voltage (from across A17R3) monitoring.

4.4.9 Filament Voltage Regulator A5

Filament voltage regulator A5 maintains a constant rms voltage on the filaments of the driver and power amplifier. One of two scr's (A20Q1 or A20Q2) is triggered on each alternation of the input line voltage (figure 4-5). When the amplitude of the input voltage increases, the regulator prevents the scr's 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 to appear on the filaments. 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 later in the cycle. The resulting output voltage on T1 is thus maintained at its preset value. If a decrease in line voltage occurs, C2 charges faster and fires Q3 earlier in the cycle.

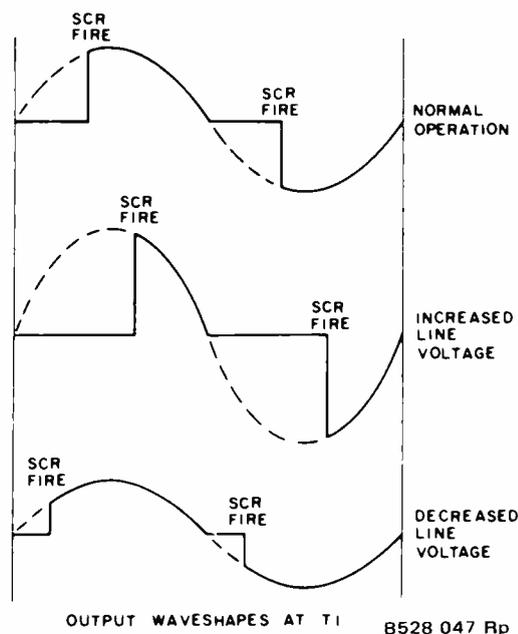


Figure 4-5. Filament Regulator Output Waveshapes.

4.4.10 Filament Voltage Distribution

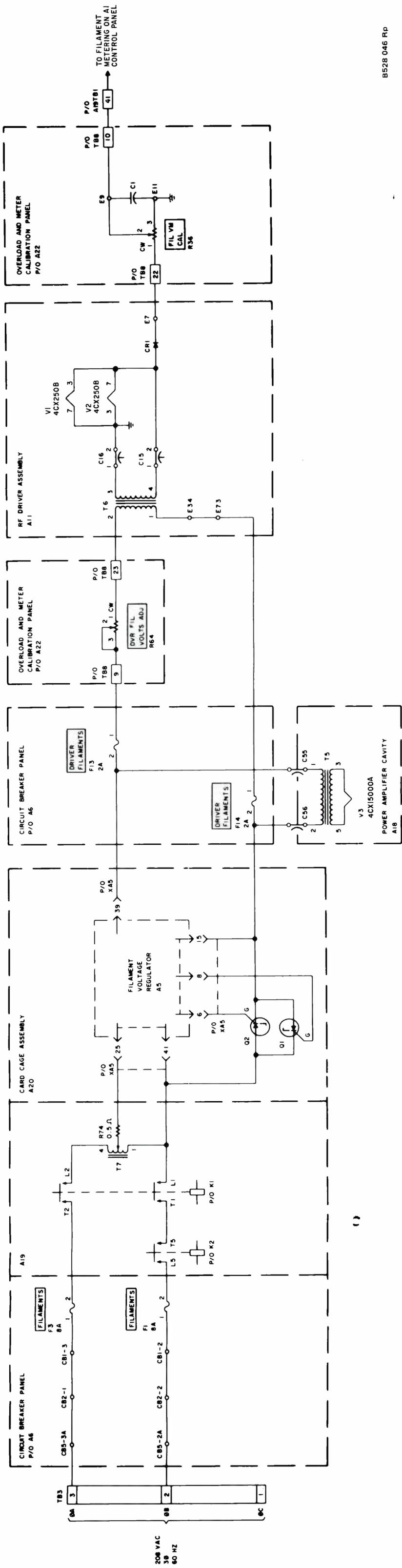
The filament voltage distribution is shown in figure 4-6. Filament voltage regulator A5 maintains a constant rms voltage on the filaments as discussed in paragraph 4.4.9.

4.5 Primary Power Distribution Control and Overload Circuits

4.5.1 Primary Power Distribution

The 60-Hz, 3-phase primary power is distributed to the various circuits of the transmitter via circuit breakers and fuses mounted on circuit breaker panel A6 (figure 4-7). PA PLATE POWER SUPPLY circuit breaker A6CB5 not only controls application of primary power to the pa plate power supply, but also controls application of primary power to the pa screen and driver power supplies through additional associated circuit breakers, A6CB4 (PA SCREEN SUPPLY) and A6CB3 (DRIVER POWER SUPPLY). One side of each phase of the primary power is applied to the respective primary winding of power transformers T1 (pa power supply), T2 (pa screen power supply), and T3 (driver power supply). The other side of each phase is applied to the transformers primaries through fuses A6F15, F16, and F17 (scr energy limiting) and power control A9. Loss of a phase, either externally or by excessive phase current causing the respective phase fuse to blow, deenergizes the associated phase-loss relay and causes the transmitter to revert to a plate-off condition.

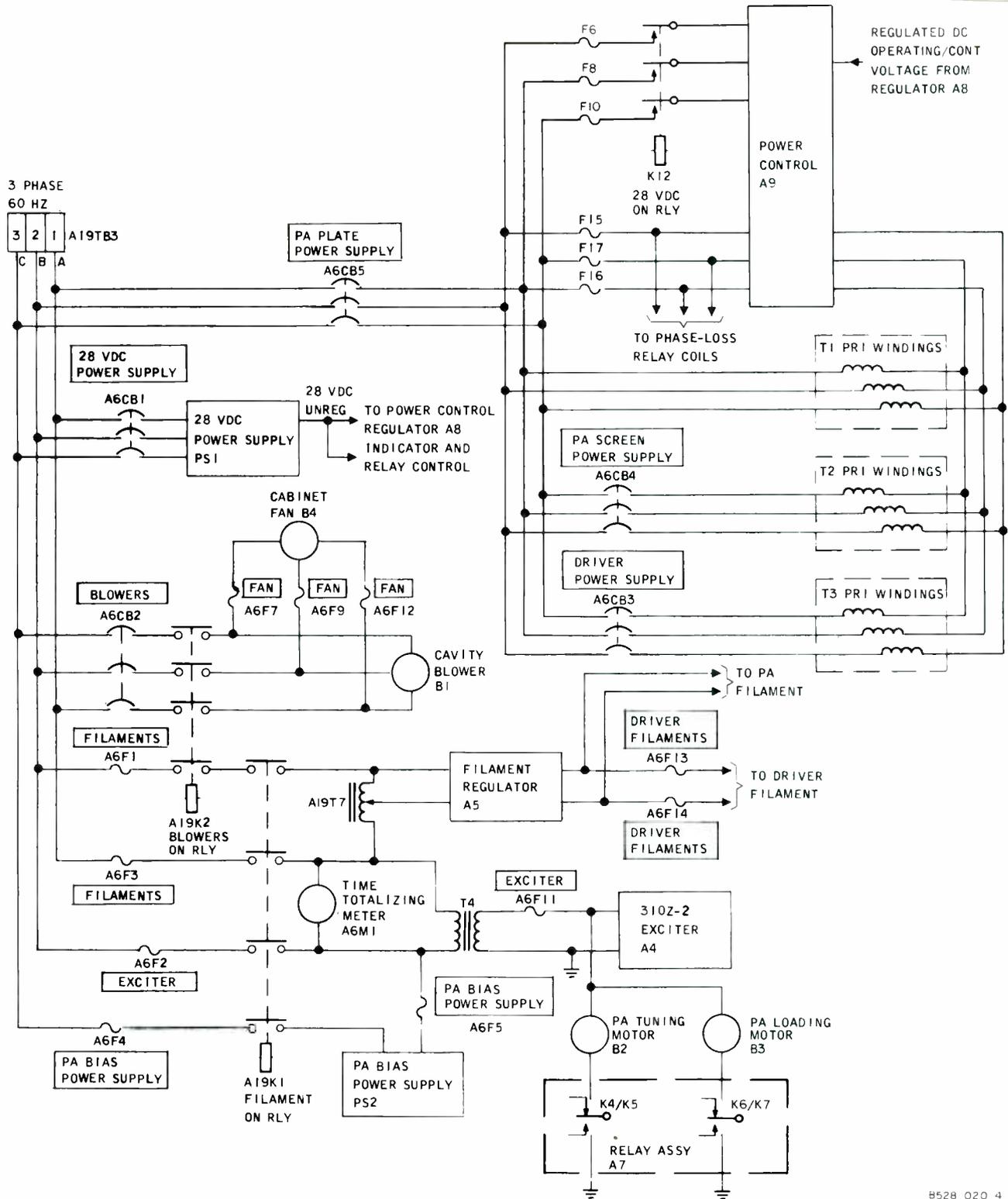
The 28 VDC POWER SUPPLY circuit breaker, A6CB2, controls application of primary power to cavity blower B1 through filament-on relay A19K2 and FAN fuses A6F7, F9, and F12. Relay A19K2 is energized when the filaments are turned on by the operator during equipment turn-on.



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Figure 4-6. Filament Voltage Distribution.





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Figure 4-7. Primary Power Distribution.

Application of primary power to the filament circuits, the exciter, the pa bias power supply, and the pa tuning and loading motors is relay controlled. Filament-on relay A19K2 and blower-on relay A19K1 control application of power to filament regulator A5 through auto-transformer A19T7. Relay A19K1 also controls application of power to 310Z-2 exciter A4, to pa bias power supply PS2, and, in conjunction with tuning/loading control relays on assembly A7, to the pa tuning and loading motors (B2 and B3 respectively). Power to the exciter and the motors is through isolation transformer T4. Time-totalizing meter A6M1 is placed across the primary of T4. The filament relay is energized when the cavity blower has built up sufficient air flow to close an associated air switch.

The filament, exciter, and pa bias supply input power circuits are protected by associated fuses, some of which protect more than one input power circuit. FILAMENTS fuse A6F3 protects not only the filament input power circuit but also that of the exciter and pa motors. EXCITER fuse A6F11 serves only the exciter and the motors. EXCITER fuse A6F2 protects not only the exciter/motor circuit but also the pa bias power supply input power circuit.

4.5.2 Transmitter Turn-on

The transmitter is energized by pressing FILAMENT ON switch S10 in the A1 control panel (figure 4-8). Relay A19K2 is energized and power is applied to the blower motors. After sufficient air pressure is created in the power amplifier cabinet, air switch A18S1 is closed and relay A19K1 is energized.

After the FILAMENT ON switch is pressed, the PLATE ON switch is pressed and relay A19K3 is energized. After the 120-second delay, relay A19K4 is energized and +28 volts is supplied to the base of transistor A8Q3. This turns on control amplifier A9AR1, which applies input voltage to the plate, screen, and driver power supplies.

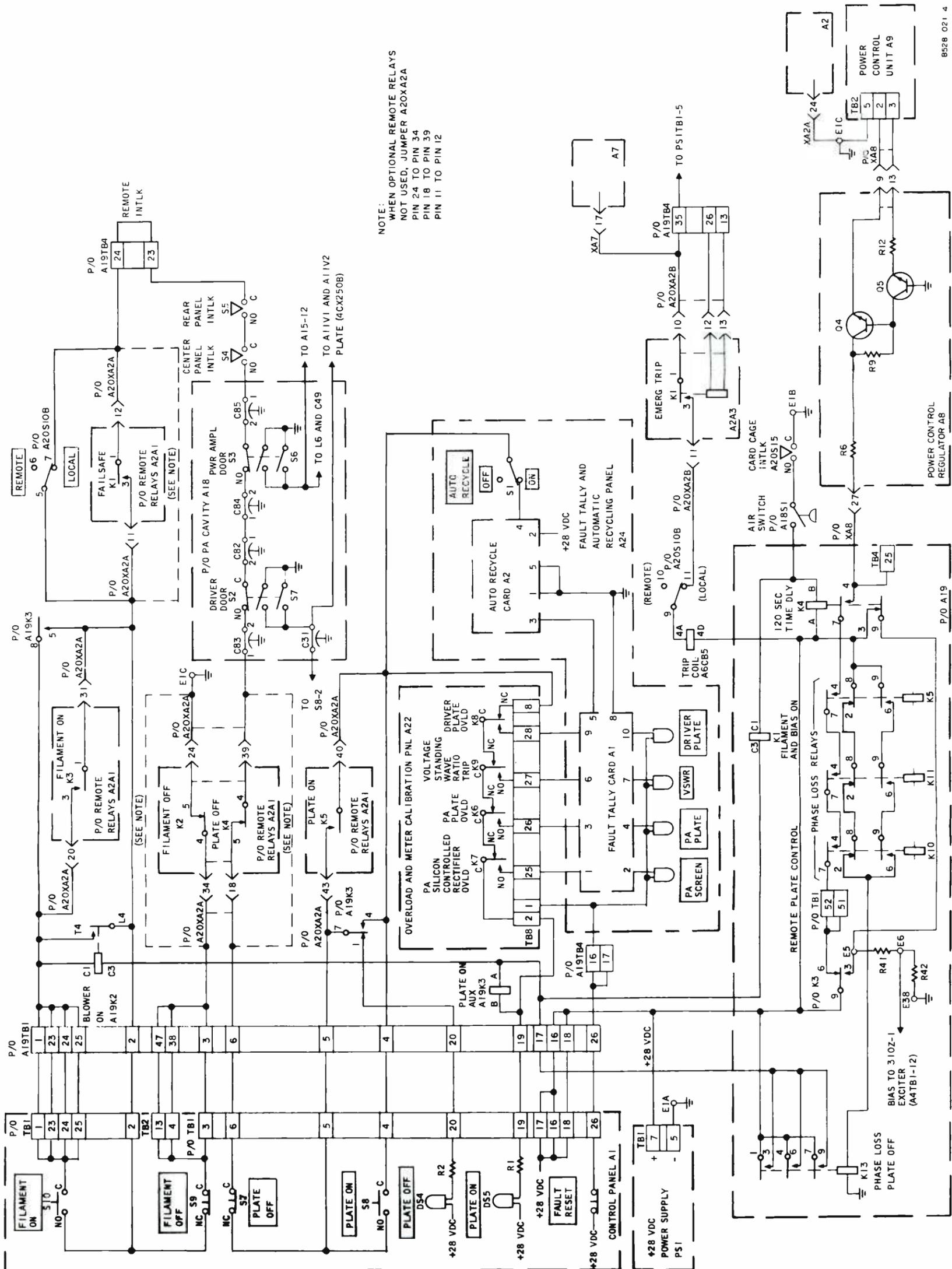
4.5.3 Exciter Power Control Override

An output override voltage is supplied to the 310Z-2 exciter when the plate voltage is turned off. This turns off the output of the exciter while the pa plates are off (figure 4-9). The voltage is applied from the 28-volt power supply through contacts 7 and 8 of relay A19K3 to the 310Z-2 exciter power supply regulator.

4.5.4 VSWR Calibrate and Auto Power Control Unit A3

The vswr calibrate and auto power control unit, A3, monitors the forward and reflected power received from directional coupler A16. Forward power is applied through R18 to pin 3 of operational amplifier AR2. 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.

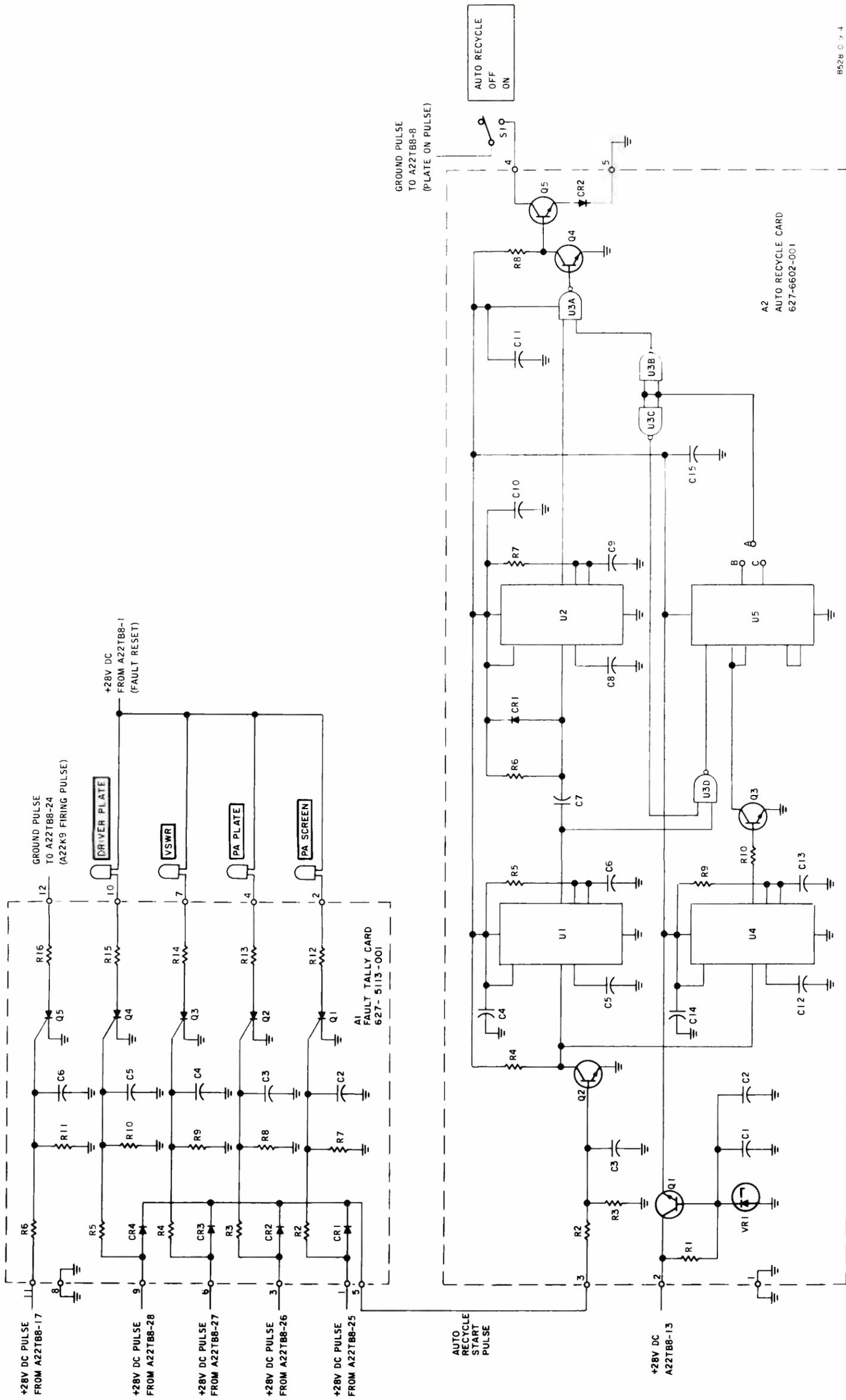
Operational amplifier A3AR3 is connected as an integrator. Feedback is supplied by the parallel combination of capacitor C5 and resistor R8. During automatic power operation, the output of A3AR3 is connected to power control A9 through relay A7K1-3 and power control regulator A8. Resistor R24 in the input of AR3 increases or decreases the transmitter output power during automatic power operation by increasing or decreasing the output of AR3.



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 4-8. Power ON-OFF Control Circuits.

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Figure 4-9. Fault Tally and Automatic Recycle Panel, Simplified Schematic.



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 trigger of A24Q5 through A22TB8-17. When excessive reflected power exists in the transmitter and trip disable switch A3S1 is closed, AR1 produces an output that triggers scr A24Q5. Scr A24Q5 conducts and energizes relay A22K9, which removes power from the transmitter. (See paragraph 4.5.6.).

OFFSET ZERO controls R11 (AR1) and R19 (AR2) each prevents an output at pin 6 when no input exists at pin 3 of the related amplifier.

4.5.5 Tune and Power Control Relay Assembly

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 (figure 4-4). When POWER CONTROL switch A1S5 is placed in the AUTOMATIC position, +28 volts is applied through TRANSMITTER CONTROL switch A20S10B to relay A7K1. When A7K1 is energized, the output of A3AR3 is supplied through contacts 1 and 3 of relay A7K1 and resistor A20R59 to A9AR1TB2-4.

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 A1S5 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, 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 A1S6 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.

4.5.6 Overload Protection

Relays A22K6, A22K7, A22K8, and A22K9 are adjusted to energize and remove power from the transmitter when an overload occurs in the plate, screen, or driver supply or when the vswr exceeds a preset level. 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. Current from scr A24Q5 is applied to relay A22K9 through A22TB8-24. Each relay is adjusted to trip after detecting a certain current level (figure 4-8). The relay contacts are in series with relay A19K3. If an overload occurs, the corresponding relay trips and removes power from the transmitter.

4.5.7 Fault Tally and Automatic Recycle Panel A24

Fault tally and automatic recycle panel A24 contains circuits on two cards. Fault tally card A24A1 provides overload indication and memory. Auto recycle card A24A2 provides a timed recycle function allowing recycling either two or four times (depending on strapping connections) in the event of an overload. See figure 4-9 for a simplified schematic.

4.5.7.1 Fault Tally Card A24A1

Fault tally card A24A1 contains five scr (silicon-controlled rectifier) circuits, four that provide overload memory functions and one that provides a firing pulse to vswr overload relay A22K9.

When an overload occurs in the pa plate, pa screen, vswr, or driver plate, a 28-volt pulse is supplied to the appropriate scr (Q1 through Q4). The scr latches, and lights its associated warning lamp (A24DS1 through A24DS4) to indicate which overload function has occurred. The carrier is removed from the air by overload relays A22K6, A22K7, A22K8, or A22K9 (figure 4-8). The 28-volt pulse that triggers the scr is simultaneously routed to card A24A2 via diode CR1, CR2, CR3, or CR4 to be used to automatically restart the transmitter.

Scr Q5 and its associated circuits are used to fire vswr relay A22K9. The gate pulse is derived from vswr trip disable switch A3S1. The scr momentarily energizes relay A22K9 to remove power from the transmitter (figure 4-8).

All lamps that have been lighted by an overload function remain lighted until FAULT RESET switch A1S11 on the main control panel is pressed.

4.5.7.2 Auto Recycle Card A24A2

Auto recycle card A24A2 provides a timed, automatic restart pulse up to four times in a 30-second period. The supplied card is connected so only two restart pulses will occur in a 30-second period; but may be reconnected to allow four restart pulses in a 30-second period. Conversion from the 2-pulse to the 4-pulse production may be accomplished by removing the jumper between terminals A and B on the card and replacing it between A and C.

The auto recycle begins when the 28-volt pulse from A22A1 is applied to terminal 3 causing transistor Q2 to conduct. The Q2 output is fed to timers U1 and U4. Timer U1 provides a 0.5-second delay, then triggers timer U1, which generates a pulse 0.5 second in length. This pulse is fed through gate U3A to inverter Q5, which closes the PLATE ON circuit through switch S1.

Gate U3D conducts the output pulse from timer U1 to counter U5. Counter U5 counts the number of recycle pulses and provides a logic 1 output at terminal C when four pulses have been received. Depending on which terminal has been strapped to terminal A, two or four recycle attempts in a 30-second period will close gates U3A, U3B, U3C, and U3D preventing any further attempts by the card to restart the transmitter. When the 30-second period of timer U4 has elapsed, a pulse is generated, inverted by Q3, and applied to U5 to reset it to zero. This clears the memory and allows another sequence to begin. If the maximum count of two or four pulses has not been received in the 30-second period, the timer will also reset the counter automatically.

Switch S1 may be used to disable the auto recycle card when desired. This is usually done during tune-up or maintenance procedures.

4.5.8 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.

4.5.8.1 Latching Relays A12

Unit A12 is connected to the remote control panel through TB4 (figure 4-10). When A10B 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 4.5.4 and 4.5.5). 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.

Strapping information for the latching relays is given in figure 4-11.

4.5.8.2 Power Control Relays A2A3

Unit A2A3 provides remote manual power lower and raise control (figure 4-12). 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 4.5.5.)

Emergency trip relay A2A3K1 provides the remote location with an alternate means of removing power in the event of an emergency (figure 4-8). During abnormal operation, A2A3K1 is energized from the remote control panel and trips circuit breaker A6CB5, which removes power from the transmitter.

4.5.8.3 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 relay is illustrated in figure 4-8. 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.

4.5.8.4 Remote Connections

Typical remote interconnections to remote control terminal board TB4 are given in figure 4-13.

principles of operation

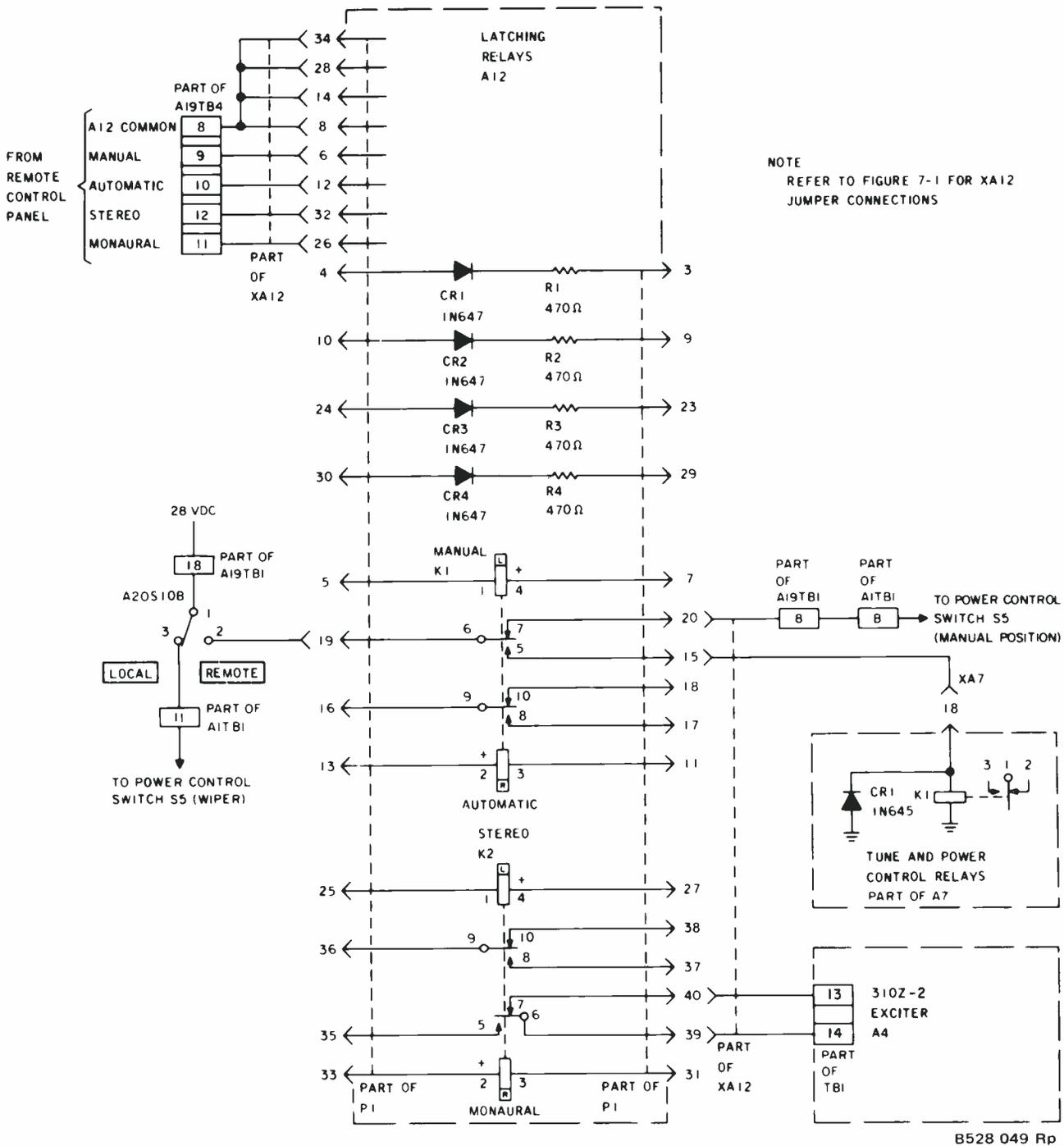


Figure 4-10. Latching Relays A12, Simplified Schematic.

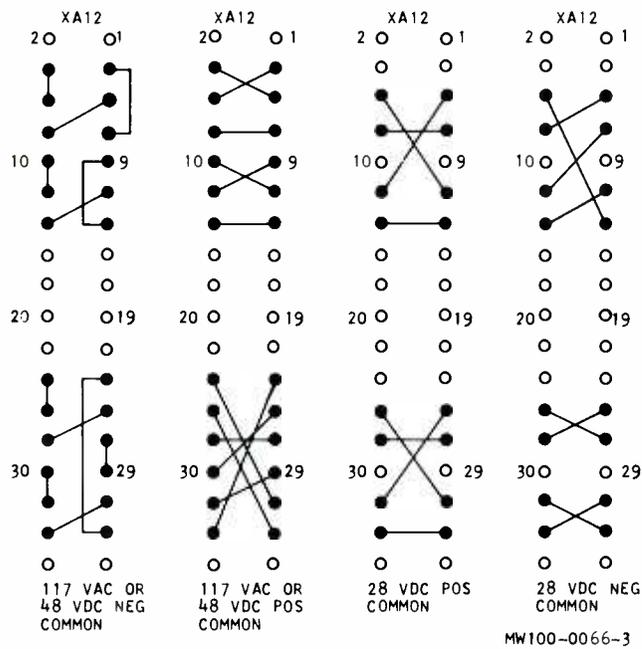


Figure 4-11. Remote Control Strapping, Latching Relay Board (A12).

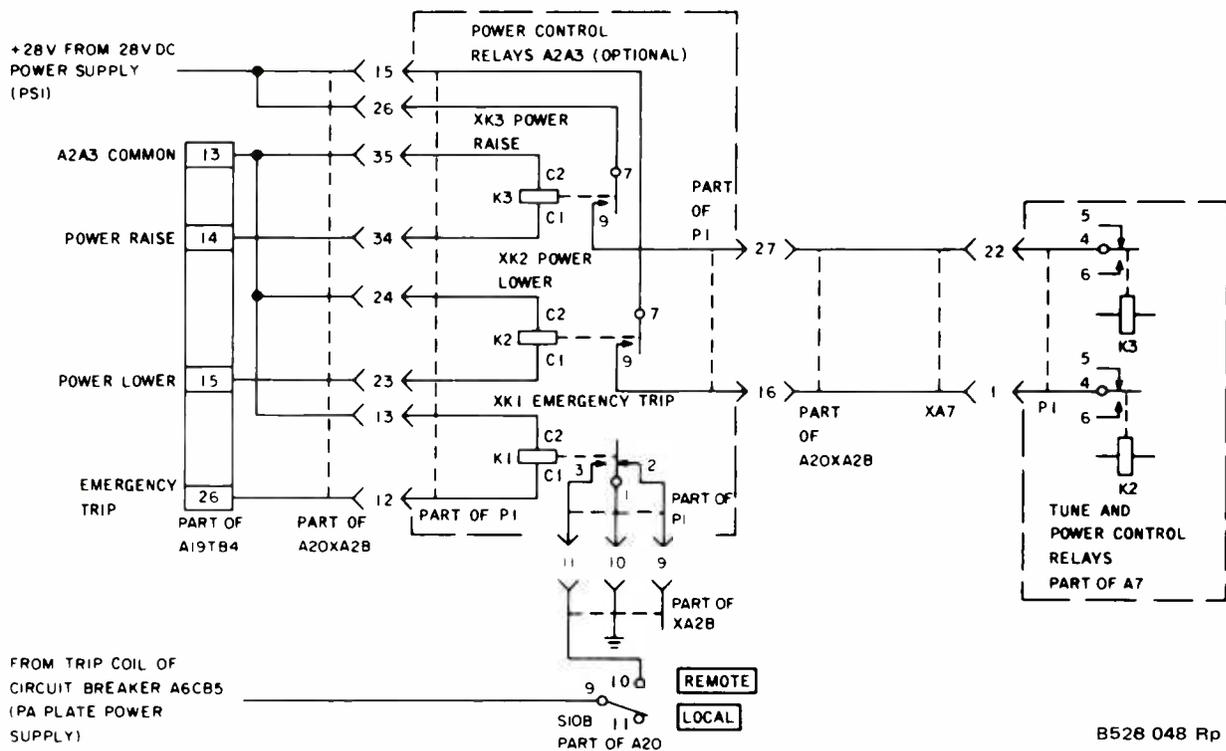


Figure 4-12. Power Control Relays A2A3, Simplified Schematic.

principles of operation

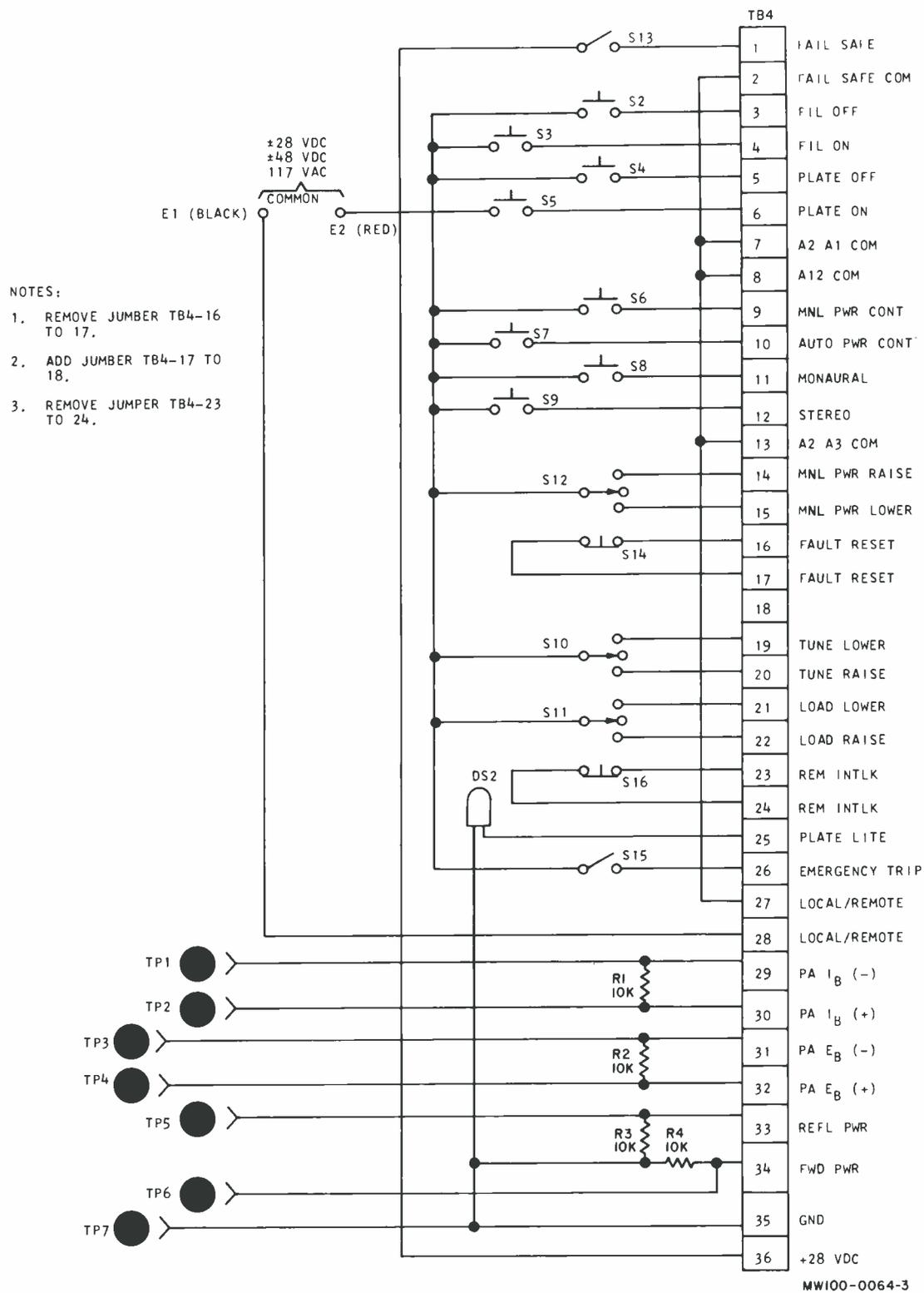


Figure 4-13. Typical Remote Interconnections to Remote Control Terminal Board TB4.

5.1 General

The transmitter is 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

HIGH VOLTAGES are exposed when cabinet doors or access panels are opened.

DEATH ON CONTACT may occur if you fail to observe safety precautions. When working inside the equipment, be sure that all circuit breakers are OFF and that primary power is disabled at the wall disconnect or circuit breaker unless otherwise directed. Always short all high-voltage terminals to ground with the grounding stick provided.

5.2 Cleaning

Clean the transmitter when dust accumulation occurs anywhere inside the equipment. A solvent composed of 25 percent methylene chloride, 5 percent perchloroethylene, and 70 percent 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 moistened 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, on the 831G-2 transmitter, 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.

maintenance

- e. Wash the filter in a solution of hot water and detergent.
- f. Replace the filter when dry.

NOTE

On the 831G-2B transmitter, air filters are contained in the rear panels of the right and center bays. The filters are furnace type filters that measure 16 by 20 by 1 inches and are available locally. These filters should be replaced in lieu of cleaning.

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 and the manual power increase/decrease motor are sealed and do not require lubrication. The cabinet inlet motor and the pa cavity blower motor should be lubricated with SAE 10 oil 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. Normal control panel meter readings are provided in table 3-4 and an efficiency vs frequency graph is provided in figure 5-4.

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.

5.5.2 Test Equipment

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

5.6 Adjustments

All transmitters are factory adjusted and pretuned to specific customer requirements. No adjustments are required by the customer unless a broken part is replaced, a specific assembly does not display meter readings within allowable tolerances, or the transmitter is

Table 5-1. Required Test Equipment.

NAME	DESCRIPTION	MANUFACTURER AND MODEL
Volt-ohm-milliammeter		Triplet 630-N
Ac voltmeter	0 to 10 volts, 1% tol (true rms)	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
Thru-line wattmeter	25 watts	Bird 43
Dc voltmeter	0 to 10 kV	
Dc ammeter	0 to 5 amperes	

operated at a frequency or power output different from the frequency or power output specified in the production test data supplied with the transmitter.

WARNING

HIGH VOLTAGES are exposed when cabinet doors or access panels are opened.

DEATH ON CONTACT may occur if you are not extremely careful when you perform the following procedures.

NOTE

The 28-volt power supply is on when both the filament and plate voltages are off.

Unless otherwise indicated, the POWER CONTROL switch is set to MANUAL, the POWER switch is set to FORWARD, the AUTO RECYCLE switch is set to OFF, and all circuit breakers are set to ON during adjustment procedures.

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 the side panel next to the cavity.
- c. Loosen the mounting screws on the limit switch.

maintenance

- d. Position the limit switches so that the peg mounted to the rack gear causes the switch to trip before the peg runs into either end-stop. The tuning and loading paddles must never be closer than 5/8 inch from the blocking capacitor.

5.6.2 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 percent 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.

- c. Run the meter leads out the corner of the compartment and close the pa compartment door.
- d. Remove the cover from the control circuits 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.

WARNING

HIGH VOLTAGES are exposed when cabinet doors or access panels are opened.

DEATH ON CONTACT may occur if you are not extremely careful when you perform the following procedures.

- g. Adjust variable transformer A19T7 for an indication of 6.6 volts ac.
- h. Press FILAMENT OFF switch on control panel A1.
- i. Remove the jumpers across A5C4 and A5R16.
- j. Press FILAMENT ON switch on control panel A1.
- k. Adjust A5R4 for an indication of 6.0 volts ac.

5.6.3 Filament Voltmeter Adjustment

NOTE

This procedure should be performed only after procedure in 5.6.2 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.

- c. Set the TEST METER selector switch on control panel A1 to PA FIL 8V.
- d. Press the FILAMENT ON switch.
- e. 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 5.8 ± 0.1 volts on the ac voltmeter.
- f. 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.

5.6.4 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 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 dc power supply to TB8-6 on the transmitter.
- e. Connect the negative terminal of the dc 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 DVR PLT fault indicator on the fault tally and recycle panel lights when the relay trips).
- h. Disconnect the milliammeter and remove the jumper from the dc power supply to the chassis.
- i. Connect an ammeter from the positive terminal of a 28-volt dc power supply to TB8-5.
- j. Connect the negative terminal of the dc power supply to TB8-7.
- k. Adjust the dc power supply current to 4.5 amperes.
- l. Adjust PA PLATE OVLD ADJ A22R66 to trip relay A22K6 at this current. (The PLATE fault indicator on the fault tally and recycle panel lights when the relay trips.)
- m. Disconnect the ammeter and remove the jumper from the dc power supply to TB8-7.
- n. Connect a milliammeter from the positive terminal of a 28-volt dc power supply to TB8-5.
- o. Connect the negative terminal of the dc power supply to TB8-4.

maintenance

- p. Adjust the power supply current to 900 mA.
- q. Adjust PA SCREEN OVLD ADJ A22R65 to trip relay A22K7 at this current. (The SCREEN fault indicator on the fault tally and recycle panel lights when the relay trips.)
- r. Disconnect the milliammeter and remove the jumper from the dc power supply to TB8-4.
- s. Press the FAULT RESET switch on control panel A1.

5.6.5 PA Grid Current and Driver Screen Current Meter Calibration

- a. Press PLATE OFF and FILAMENT OFF switches on control panel A1.
- b. Remove the front panel beneath the pa grid compartment door.
- c. Connect the negative terminal of a 28-volt dc power supply to A22TB8-20 and the positive terminal to A22TB8-19.
- d. Adjust the dc power supply current to 80 mA (831G-2) or 400 mA (831G-2B).
- e. Set the TEST METER selector switch to PA GRID 80 MA (831G-2) or 400 MA (831G-2B).
- f. Adjust PA GRID MTRG CAL control A22R72 for an 80-mA (831G-2) or a 400 mA (831G-2B) reading on the test meter.
- g. Remove the dc power supply test leads.
- h. Attach the positive terminal of the dc power supply to A22TB8-11 and the negative terminal to A22TB8-21.
- i. Set the TEST METER selector switch to DVR SCREEN 80 MA.
- j. Adjust the DVR SCREEN MTRG CAL control A22R73 for an 80-mA driver screen current reading on the TEST METER.
- k. Remove the dc power supply test leads.

5.6.6 High-Voltage Power Supply Adjustments

WARNING

HIGH VOLTAGES are exposed when cabinet doors or access panels are opened.

DEATH ON CONTACT may occur if you are not extremely careful when you perform the following procedures.

- a. Remove the lower front panel below the exciter and block open the interlock switch.

- b. Press the FILAMENT ON and PLATE ON switches on control panel A1.
- c. Raise or lower the POWER ADJUST control until approximately 8000 volts is indicated on the PLATE VOLTAGE meter.
- d. Set TEST METER select switch to PA SCREEN 800 V. Observe that approximately 750 volts is indicated on the TEST METER.
- e. Set TEST METER select switch to DVR SCREEN 400 V. Observe that 290 ± 10 volts is indicated on the TEST METER.
- f. Set the TEST METER selector switch to the LEFT DVR K 400 MA position.
- g. Adjust the LEFT BIAS control on the driver box A11 until the TEST METER indicates 125 mA.
- h. Set the TEST METER selector switch to the RIGHT DVR K 400 MA position.
- i. Adjust the RIGHT BIAS control on driver box A11 until the TEST METER indicates 125 mA.

NOTE

The two bias controls interact and should be adjusted several times to acquire a constant 125 mA in both tubes.

- j. Set TEST METER select switch to DVR PLATE 4000 V. Observe that 1800 to 2000 volts is indicated on the TEST METER.
- k. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.
- l. Replace all panels and close all compartment doors.

5.6.7 RF Tuning Procedure

NOTE

Major rf tuning is required only when components in the rf circuit are replaced or when the operating frequency is changed. Refer to the initial turn-on procedures (paragraph 2.5) for minor tuning instructions.

The following paragraphs provide procedures for major rf tuning of the transmitter. If the operating frequency is the same as the frequency specified in the production test data supplied with the transmitter, perform the procedures in paragraphs 5.6.7.3 through 5.6.7.6. If the operating frequency is different from the frequency specified in the production test data supplied with the transmitter, perform the procedures in paragraphs 5.6.7.1 through 5.6.7.6.

5.6.7.1 Shorting Plane, Driver Loading Slider, Driver Tuning Slider, Driver Grid Slider, and PA Neutralization Preliminary Adjustments

NOTE

These adjustments are not necessary if the related components have not been replaced and the operating frequency is the same as the frequency specified in the production test data supplied with the transmitter.

maintenance

- a. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.
- b. Open the plate cavity and grid compartment doors.
- c. Adjust the plate cavity shorting plane (figure 4-2) to the desired frequency in accordance with the graph in figure 5-1.
- d. Adjust driver loading slider A21L8, driver tuning slider A21L7, and driver grid slider A11L9 to the desired frequency in accordance with the graph in figure 5-2.
- e. Adjust the pa neutralization bar to the desired frequency in accordance with the graph in figure 5-3.
- f. Remove the panel located beneath the exciter.

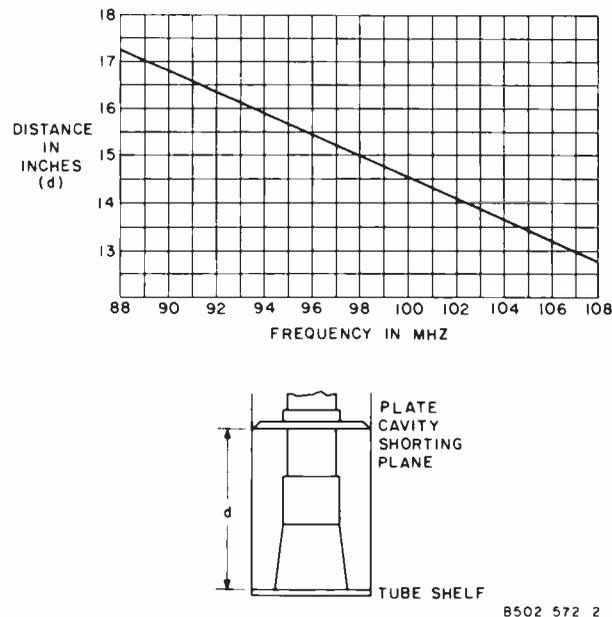


Figure 5-1. PA Plate Cavity Shorting Plane Approximate Adjustment.

WARNING

HIGH VOLTAGES are exposed when cabinet doors or access panels are opened.

DEATH ON CONTACT may occur if you are not extremely careful when you perform the following procedures.

- g. Discharge all large capacitors.
- h. Remove the driver box access panel.

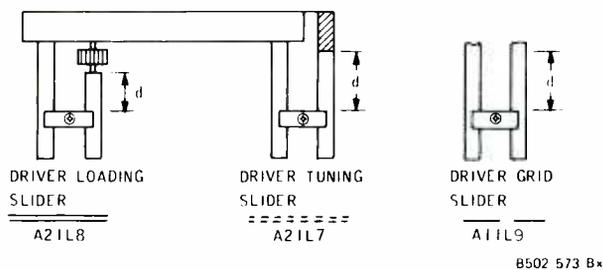
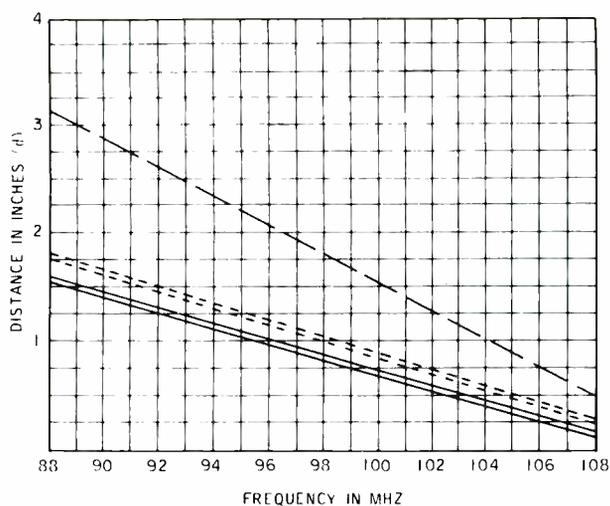
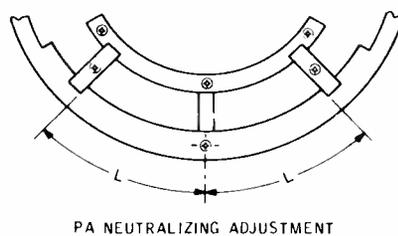
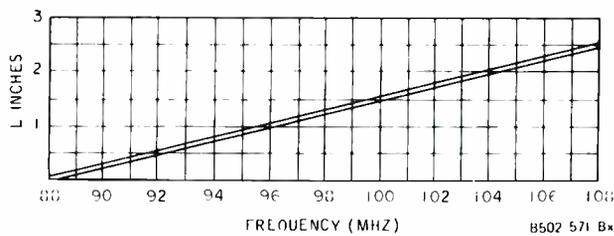


Figure 5-2. Graph for Approximate Setting of Driver Loading, Driver Tuning, and Driver Grid Sliders.



PA NEUTRALIZING ADJUSTMENT



B502 571 Bx

Figure 5-3. PA Neutralizing Adjustment.

- i. Adjust driver grid slider A11L9 to the desired frequency in accordance with the graph in figure 5-2.

5.6.7.2 Driver Grid Tuning

NOTE

This procedure is not necessary if the related components have not been replaced and the operating frequency is the same as the frequency specified in the production test data supplied with the transmitter.

- a. Perform the preliminary adjustments in paragraph 5.6.7.1 before proceeding.
- b. Tuning the 310Z-2 exciter to the desired operating frequency. Refer to the 310Z-2 exciter instruction book.
- c. On top of the driver box mount a Bird thru-line wattmeter, model 43, that contains a 25-watt, 50- to 125-MHz element.
- d. Use short lengths of 50-ohm coaxial cable (RG-223 or equivalent) to connect the wattmeter between driver rf input jack J1 and the 310Z-2 exciter output jack.
- e. Block the interlock grounding switch open.
- f. Set PA SCREEN POWER SUPPLY circuit breaker A6CB4 to OFF.
- g. Remove the exciter cover and set the exciter POWER switch to ON.
- h. Press the FILAMENT ON and PLATE ON switches.

WARNING

HIGH VOLTAGES are exposed when cabinet doors or access panels are opened.

DEATH ON CONTACT may occur if you are not extremely careful when you perform the following procedures.

- 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 TUNE and COUPLE capacitors A11C33 and A11C34 on the driver box for minimum reflected power.

NOTE

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

- k. Check that the TUNE and COUPLE capacitors are approximately one-half mesh when they are adjusted for minimum reflected power.
- l. If either control is not approximately midrange, remove power from the transmitter, adjust A11L9, and repeat steps h. through k.
- m. Replace all panels and close all compartment doors.

5.6.7.3 PA Tuning

- a. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.
- b. If possible, connect the transmitter to an rf wattmeter/dummy load combination or a calorimeter capable of measuring and dissipating 25 kilowatts at 50 to 125 MHz. If these devices are unavailable, refer to the RF WATTMETER on the control panel for power output measurement.

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 at least 25 kilowatts.

- c. Turn the DRIVER PLATE TUNING control fully clockwise. Then, turn the control six turns counterclockwise (30 percent from minimum capacity).
- d. Open the plate cavity access door and observe pa tuning and loading capacitors A18C51 and A18C50. (See figure 4-2.) Adjust the PA TUNING and PA LOADING controls on the control panel until the two capacitors are positioned approximately midrange. Close the plate cavity door.
- e. Open the tube socket access door located beneath the DRIVER PLATE TUNING control.
- f. Turn filament peaking capacitor A21C39 to near minimum capacity.
- g. Set PA SCREEN circuit breaker to OFF. Ascertain that the exciter POWER switch is ON.

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

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

CAUTION

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

- i. If an rf output from the transmitter is indicated when power is applied, quickly adjust the PA TUNING and PA LOADING controls for a maximum output power indication.
- j. If an rf output is not present when power is applied, adjust the DRIVER PLATE TUNING control until an output is indicated.
- k. Repeat steps i. and j. until maximum output power is obtained. If the PA TUNING control encounters an end-stop while in the LOWER position, lower the shorting plane and

maintenance

retune. If an end-stop is encountered in the RAISE position, raise the shorting plane and retune.

- l. Adjust the exciter output to produce 5 to 10 mA of grid current.
- m. Check for pa neutralization. Refer to paragraph 5.6.7.5.
- n. Check driver neutralization. Refer to paragraph 5.6.7.4.

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.

- o. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.
- p. Open the pa cavity door and ensure that plate tuning capacitor A18C50 is approximately halfway between its limits.
- q. If plate tuning capacitor A18C50 is not approximately halfway between its limits, adjust the pa plate cavity shorting plane (paragraph 5.6.7.1) and repeat steps c. through p. of this paragraph.
- r. Remove the rear access panel behind the plate cavity.
- s. Remove the access panel directly below the exciter. Block open the interlock switch.
- t. Press the FILAMENT ON and PLATE ON switches on the control panel.

WARNING

HIGH VOLTAGES are exposed when cabinet doors or access panels are opened.

DEATH ON CONTACT may occur if you are not extremely careful when you perform the following procedures.

- u. Using an insulated screwdriver, adjust PA BIAS ADJ resistor A18R35 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. Compare the efficiency with the efficiency graph in figure 5-4.

NOTE

Efficiency is calculated using the following formula:

$$\text{Efficiency} = \frac{\text{Power Output (watts)}}{\text{Plate Voltage} \times \text{Plate Current}}$$

- v. Adjust L DVR BIAS ADJ control A11R40, and R DVR BIAS ADJ control A11R44 until the pa is saturated. (LEFT DVR K 400 MA and RIGHT DVR K 400 MA test meter (M1) indications are not to exceed 250 mA.)
- w. Adjust the power output as described in paragraph 5.6.7.6.

5.6.7.4 Driver Neutralization

- a. Check for proper driver neutralization by adjusting the tuning of the transmitter and noting that the DVR SCREEN current peak is coincident with the peak of PA GRID current, and a dip of DVR K current. If neutralization is correct, do not perform the remainder of this procedure.

POWER OUTPUT = $I_p E_p K$
 WHERE: I_p = PA PLATE CURRENT (AMPS)
 E_p = PA PLATE VOLTAGE (VOLTS)
 K = EFF FACTOR FROM CHART

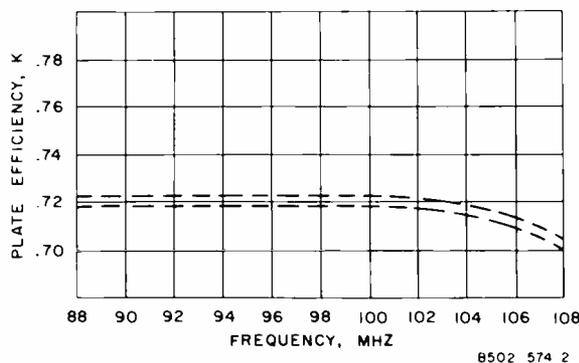


Figure 5-4. 831G-2/831G-2B Amplifier Efficiency Vs Frequency Graph.

- b. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.
- c. Open the tube socket access door directly beneath the DRIVER PLATE TUNING control.
- d. Slightly adjust the paddle, C_N , attached to capacitor A11C35.
- e. Close the access door and recheck the driver neutralization.
- f. Repeat steps b. through e. until proper neutralization is obtained.

5.6.7.5 Neutralization

- a. Check the transmitter for proper neutralization by tuning the transmitter for a pa screen current peak and observing that maximum output power occurs at the same time. If neutralization is correct, do not perform the remainder of this procedure.

NOTE

- A minimum value of a pa plate current also occurs when neutralization is correct.
- b. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.
 - c. Open the pa cavity door. Short all high voltage terminals with grounding stick.

maintenance

- d. Slide the blocking capacitor and the tube anode cover up to expose screen sliders.
- e. Refer to figure 5-3 and adjust the screen sliders, LN1 and LN2. The sliders should not require an adjustment greater than $\pm 1/4$ inch from the initial setting. (A setting on the plus side is preferred.)
- 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 b. through g.

5.6.7.6 Maximum Power Output Adjustment

NOTE

Do not make this adjustment until the pa tuning procedure in paragraph 5.6.7.3 is accomplished.

- a. Set the POWER ADJUST control to RAISE until maximum power output is displayed on the RF WATTMETER.
- b. If the maximum power output is not more than 10 percent above the authorized station maximum output, skip to step h. If the maximum power output is more than 10 percent of the authorized station maximum output, proceed to step c.
- c. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.
- d. Turn off primary power to the transmitter.
- e. Refer to table 2-1. Change wires A, B, and C to the terminals for the next higher line voltage connection. (Example: If the wires are originally connected for a line voltage of 240 volts, reconnect the wires for a line voltage of 250 volts.)
- f. Reapply primary power and press the FILAMENT ON and PLATE ON switches on control panel A1.
- g. Repeat steps b. through f. until the maximum transmitter output is not more than 10 percent above the authorized station maximum output.
- h. Compare the PLATE VOLTAGE reading with the plate voltage listed in table 3-4 for the authorized station maximum power output. (Linear interpolation of tabulated values may be necessary.) If the compared voltages differ by more than 10 percent, proceed to step i. If the compared voltages differ by less than 10 percent, skip to step m.
- i. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.
- j. Turn off primary power to the transmitter.

NOTE

Additional power control is achieved by changing the pa loading.

- k. Refer to table 2-1. If the transmitter plate voltage exceeds the tabulated voltage, change wires AA, BB, and CC on transformer T3 to the terminals listed for the next higher line voltage. If the tabulated voltage exceeds the transmitter plate voltage, change wires AA, BB, and CC on transformer T3 to their terminals listed for the next lower line voltage.
- l. Repeat steps h. through k. until the transmitter and the tabulated plate voltages differ by less than 10 percent.
- m. Adjust the POWER ADJUST control until the RF WATTMETER displays the authorized station maximum power output.
- n. Refer to figure 5-5. Check the forward and reflected power levels and determine the vswr. If the vswr exceeds 2:1, check the antenna impedance.

NOTE

The vswr on a properly tuned antenna is 1.1:1, or less.

5.6.8 Board A3, Offset Zero Adjustment

- a. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.
- b. Remove cover from the control circuits 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 dc 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 dc voltmeter.
- h. Remove the dc 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 dc voltmeter.
- j. Press the PLATE OFF and FILAMENT OFF switches.
- k. Replace board A3 in its proper place. Replace cover on the control circuits.

5.6.9 Automatic Power Control Adjustment

- a. Set the POWER CONTROL switch to AUTOMATIC.
- b. Remove the panel covering the control circuits and disable the interlock switch.
- c. Press the FILAMENTS ON and PLATE ON switches on control panel A1.

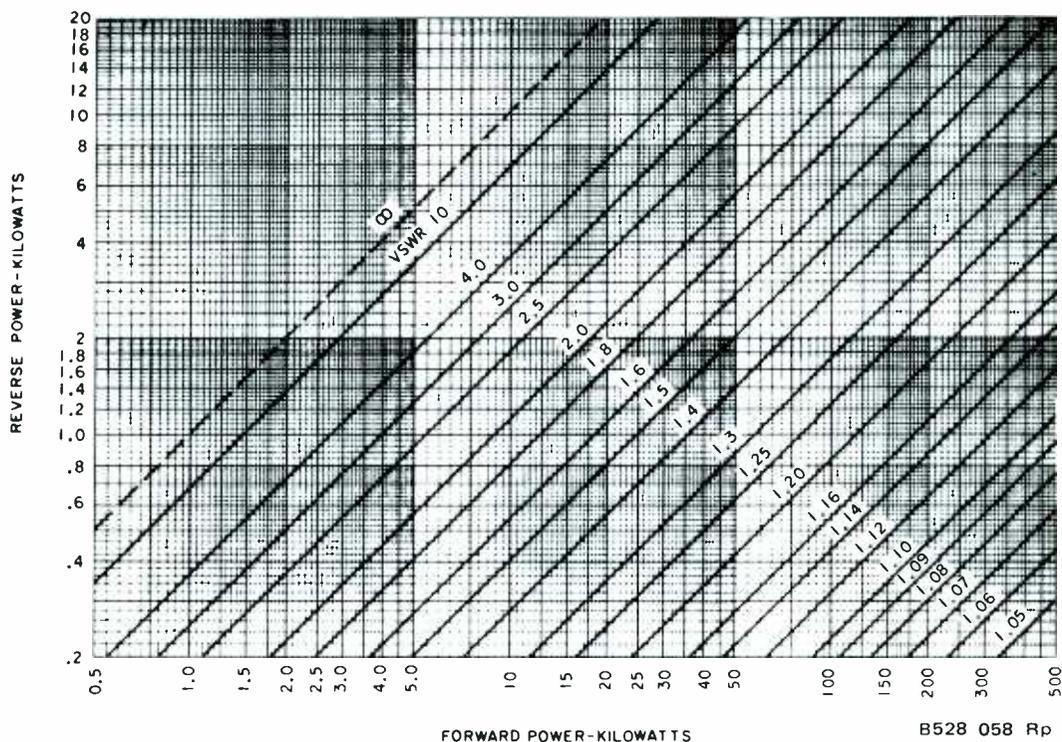


Figure 5-5. Power to V SWR Conversion Graph.

- d. Adjust POWER CONTROL ADJ A3R24 until the authorized station output is displayed on the RF WATTMETER.

WARNING

HIGH VOLTAGES are exposed when cabinet doors or access panels are opened.

DEATH ON CONTACT may occur if you are not extremely careful when you perform the following procedures.

- e. Adjust CATHODE TUNE capacitor A21C39 until minimum plate current is displayed on the PLATE CURRENT meter. (Power output should remain near maximum.)
- f. Replace all panels and close all compartment doors.

5.6.10 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. With the POWER ADJUST control, lower the maximum output power to 2000 watts (821G-2) or 2250 watts (831G-2B).
- d. Press the PLATE OFF and FILAMENT OFF switches on control panel A1.
- e. Carefully loosen the base clamps on directional coupler A16 and reverse the assembly.

- f. Remove cover from the control circuits and pull out the plunger on the card cage interlock.
- g. Set the TRIP DISABLE switch on A3 to ON and the AUTO RECYCLE switch on A24 to OFF.
- h. Press the FILAMENT ON and PLATE ON switches on control panel A1.
- i. Adjust TRIP LEV A3R23 until vswr trip relay A22K9 is energized and plate voltage is removed. (The VSWR fault indicator on A24 will light.)
- 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 and the FAULT RESET switch. Set AUTO RECYCLE switch to ON.
- m. Replace the directional coupler in its normal position.
- n. Adjust the transmitter power output to authorized station power output with the POWER ADJUST control.

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 higher 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.

5.7.2 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.

maintenance

5.7.4 Replacement Parts

Order replacement parts from the following address:

Collins Radio Group
Rockwell International
Service Parts, 412-126
Richardson, Texas 75080

6.1 General

This section contains a list of all repairable/replaceable electrical, electronic, and critical mechanical parts for the 831G-2 20-kW and 831G-2B 22.5-kW FM Transmitters.

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 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. Refer to paragraph 6.9, Manufacturers Code and Name Index.

6.6 Collins Part Number

The Collins Radio 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.

parts list

6.8 List of Equipment

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6.9 Manufacturers Code and Index

<u>CODE</u>	<u>NAME AND ADDRESS</u>	<u>CODE</u>	<u>NAME AND ADDRESS</u>
ASSOC	Associated Electrical Ind. Eugene Munsell, Distributor Box 126 Ho Ho Kus, NJ 07423	01002	General Electric Co. Industrial and Power Capacitor Dept. John St. Hudson Falls, NY 12839
POWER	Power Semiconductors, Inc. Munson St. Devon, CT 06460	01295	Texas Instruments, Inc. Semiconductor and Components Div. 13500 N Central Expwy. Dallas, TX 75231
00141	Pic Design Corp. 477 Atlantic Ave. East Rockaway, NY 11518	03508	General Electric Co. Semiconductor Products Dept. Electronics Park Syracuse, NY 13201
00779	Amp, Inc. PO Box 3608 Harrisburg, PS 17105	03877	Transitron Electronic Corp. 168-186 Albion St. Wakefield, MA 01880

<u>CODE</u>	<u>NAME AND ADDRESS</u>	<u>CODE</u>	<u>NAME AND ADDRESS</u>
04009	Arrow-Hart and Hegeman Electric Co. 103 Hawthorne St. Hartford, CT 06106	08510	Magnetics, Inc. Kemco Div. Sandy Lake, PA 16145
04713	Motorola Semiconductor Products, Inc. 5005 E McDowell Rd. Phoenix, AZ 85008	09023	Cornell-Dubilier Electronics Div. Federal Pacific Electric Co. 2562 Dalrymple Sanford, NC 27330
05277	Westinghouse Electric Corp. Semiconductor Dept. Youngwood, PA 15697	09214	General Electric Co. Semiconductor Products Dept. West Genesee St. Auburn, NY 31022
06751	Components, Inc. Semcor Div. Phoenix, AZ	10108	Hurst Mfg. Corp. Road 64 East Princeton, IN 47570
06978	Aladdin Electronics Div. of Aladdin Industries, Inc. 705 Murfreesboro Rd. Nashville, TN 37210	10646	Carborundum Co. PO Box 337 Niagara Falls, NY 14302
06980	Varian Eimac Div. 301 Industrial Way San Carlos, CA 94070	11502	IRC, Div. of TRW, Inc. Boone Plant Greenway Rd. Boone, NC 28607
07263	Fairchild Camera and Instrument Corp. Semiconductor Div. 464 Ellis St. Mountain View, CA 94040	12066	Ohio Semitronics, Inc. 1205 Chesapeake Ave. Columbus, OH 43212
07688	Military Standards	13103	Thermalloy Co. 8717 Diplomacy Row Dallas, TX 75247
07716	IRC, Div. of TRW, Inc. Burlington Plant 2850 Mt. Pleasant Burlington, IA 52601	14433	ITT Semiconductors Div. of International Telephone and Telegraph Corp. 3301 Electronics Way West Palm Beach, FL 33401
08289	Blinn Delbert Co., Inc. 1678 E Fifth Ave. PO Box 2007 Pomona, CA 91766	16546	US Capacitor Corp. 2151 N Lincoln Burbank, CA 91504
08466	General Instrument of Canada, Ltd. 151 Weber South Waterloo, Ontario, Canada	17117	Electronic Molding Co. 96 Mill St. Woonsocket, RI 02895
08484	Breeze Corporations, Inc. 700 Liberty Ave. Union, NJ 07083	18100	Hill Magnetics, Inc. 2201 Bay Rd. Redwood City, CA 94063

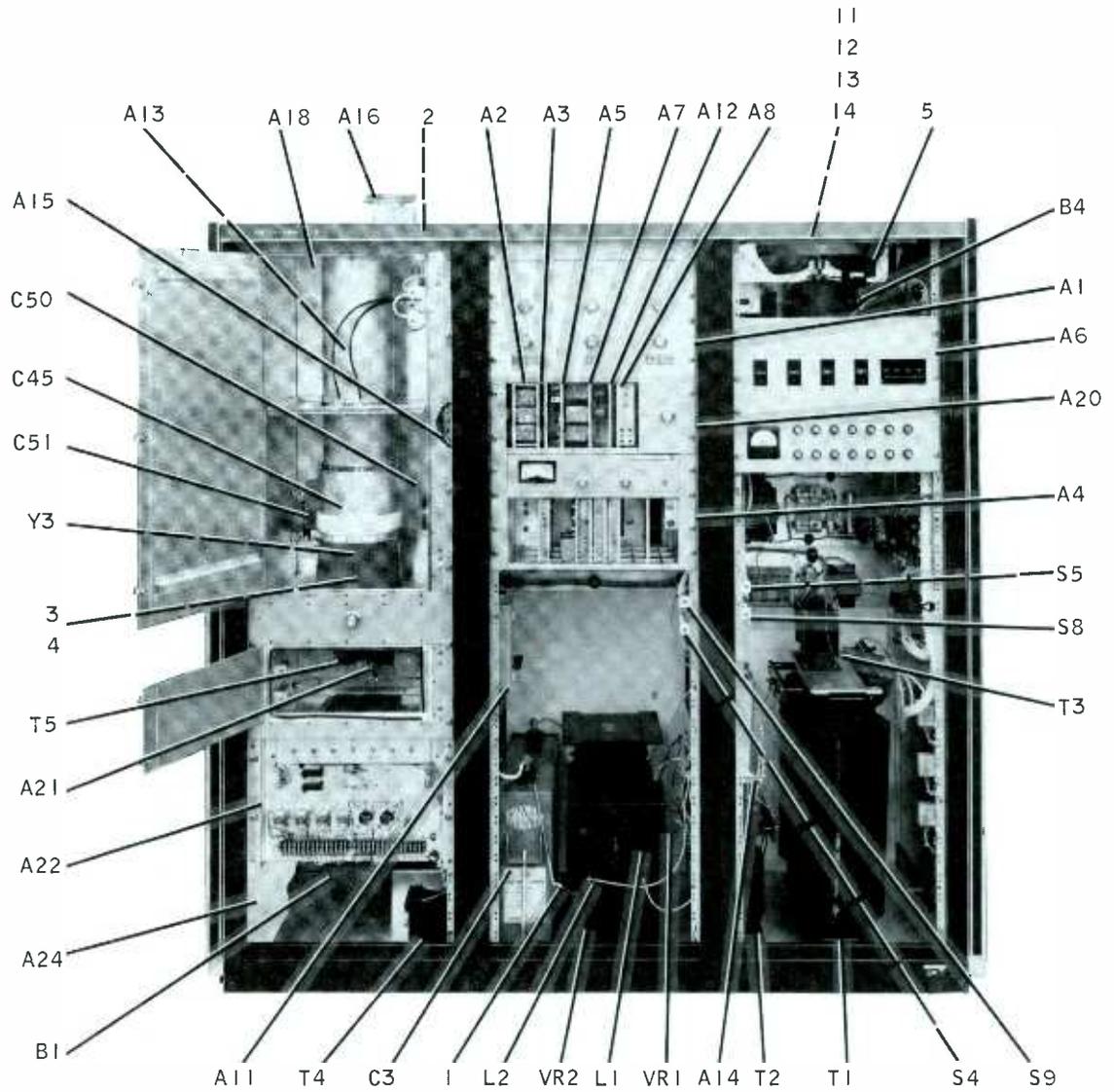
parts list

<u>CODE</u>	<u>NAME AND ADDRESS</u>	<u>CODE</u>	<u>NAME AND ADDRESS</u>
19070	Eastern Air Devices, Inc. 385 Central Avenue Dover, NH 38022	58474	Superior Electric Co. 383 Middle St. Bristol, CT 06010
19701	Electra/Midland Corp. PO Box 760 Mineral Wells, TX 76067	59730	Thomas and Betts Co. 36 Butler St. Elizabeth, NJ 07207
33173	General Electric Co. Tube Dept. 316 E Ninth St. Owensboro, KY 42301	60399	Torrington Mfg. Co. 100 Franklin Dr. Torrington, CT 06790
33954	Vectrol, Inc. 1010 Westmore Ave. Rockville, MD 20850	65092	Weston Instruments, Inc. Weston Instruments Div. 614 Frelinghuysen Ave. Newark, NJ 07114
35844	Andrew Antenna Corp, Ltd. 606 Beech St. Whitby, Ontario, Canada	70309	Allied Control Co., Inc. 2 East End Ave. New York, NY 10021
37942	P.R. Mallory and Co., Inc. 3029 E Washington St. Indianapolis, IN 46206	70371	American Lava Corp. Cherokee Vld. and Manufacturers Road Chattanooga, TN 37405
41197	Modine Mfg. Co. 1500 Dekoven Ave. Racine, WI 53401	70674	ADC Products Div. of Magnetic Controls Co. 6405 Cambridge St. Minneapolis, MN 55426
44655	Ohmite Mfg. Co. 3601 W Howard St. Skokie, IL 60076	71400	Bussman Mfg. Div. of McGraw & Edison Co. 2536 W University St. St. Louis, MO 63017
49671	RCA Corp. 30 Rockefeller Plaza New York, NY 10020	71424	Chase Shawmut Co. 374 Merrimac St. Newburyport, MA 01950
52090	Rowan Controller Co. PO Box 306 Westminster, MD 21157	71450	CTS Corp. 1142 W Beardsley Ave. Elkhart, IN 46514
53021	Sangamo Electric Co. 1301 N 11th Springfield, IL 62705	71590	Globe-Union, Inc. Centralab Div. PO Box 591 Milwaukee, WI 53201
56289	Sprague Electric Co. North Adams, MA 01247		
56365	Square D Co. Executive Plaza Park Ridge, IL 60068		

<u>CODE</u>	<u>NAME AND ADDRESS</u>	<u>CODE</u>	<u>NAME AND ADDRESS</u>
71785	Cinch Mfg. Co. Howard B. Jones Div. 1026 S Homan Ave. Chicago, IL 60624	77342	American Machine and Foundry Co. Potter and Brumfield Div. 1200 E Broadway PO Box 522 Princeton, IN 47570
72136	Electro Motive Mfg. Co., Inc. South Park and John St. Willimantic, CT 06226	78277	Sigma Instruments, Inc. 170 Pearl St. South Braintree, MA 02185
72699	General Instrument Corp. Automatic Manufacturing Div. 65 Gouverneur St. Newark, NJ 07104	79136	Waldes Kohinoor, Inc. 47-17 Austel Place Long Island, City, NY 11101
72962	Elastic Stop Nut Div. of Amerace Esna Corp. 2330 Vauxhall Rd. Union, NJ 07083	80008	Electro Engineering Work, Inc. 6555 Covey Rd. PO Box 338 Forestville, CA 95436
72982	Erie Technological Products, Inc. 644 W 12th St. Erie, PA 16512	80058	Military Standards
73445	Amperex Electronic Corp. 230 Duffy Ave. Hicksville, Long Island, NY 11801	80089	Essex Wire Corp. Controls Div. 131 Godfrey St. Logansport, IN 46947
74193	Heinemann Electric Co. 2612 Brunswick Pike Trenton, NJ 08602	80223	United Transformer Co. Div. of TRW, Inc. 150 Varick St. New York, NY 10013
74545	Harvey Hubbell, Inc. State St. and Bostwick Ave. Bridgeport, CT 06602	80583	Hammarlund Mfg. Co. 73-88 Hammarlund Dr. Mars Hill, NC 28754
75042	IRC, Div. of TRW, Inc. 401 N Broad St. Philadelphia, PA 19108	81349	Military Standards
75382	Kulka Electronic Corp. 520 S Fulton Ave. Mt. Vernon, NY 10550	81350	Military Standards
75382	Kulka Electronic Corp. 520 S Fulton Ave. Mt. Vernon, NY 10550	81483	International Rectifier Corp. 233 Kansas St. El Segundo, CA 90245
76487	James Millen Mfg. Co., Inc. 150 Exchange St. Malden, MA 02148	82142	Airco Speer Electronics Div. of Air Reduction Co., Inc. Nogales, AZ 85621
76854	Oak Mfg. Co. Div. of Oak Electro/Netics Corp. S Main Crystal Lake, IL 60014	82227	A.W. Haydon 232 N Elm St. Waterbury, CT 06720

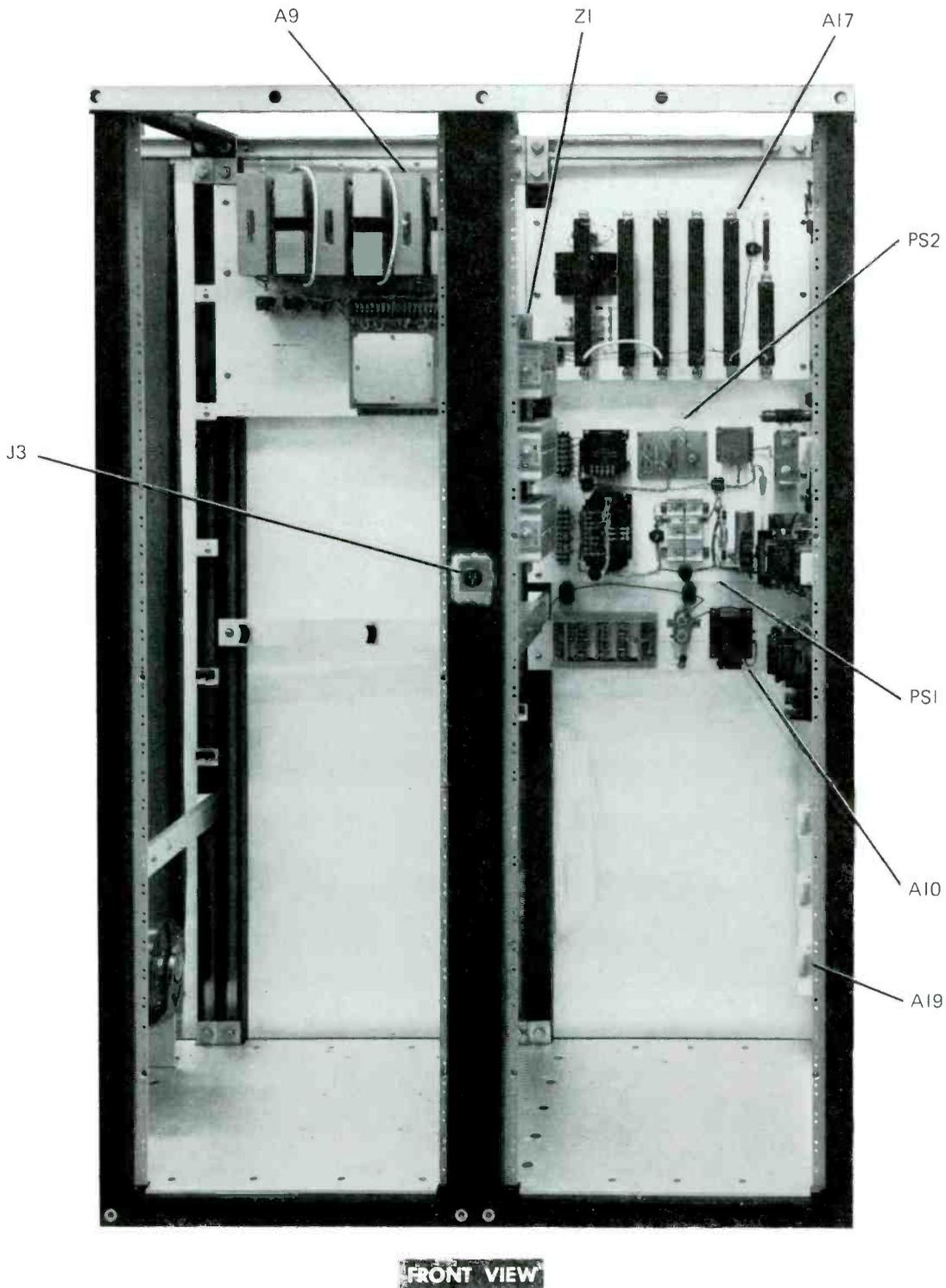
parts list

<u>CODE</u>	<u>NAME AND ADDRESS</u>	<u>CODE</u>	<u>NAME AND ADDRESS</u>
82386	Sun Electric Corp. 6321 Avondale Ave. Chicago, IL 60631	91929	Honeywell, Inc. Micro Switch Div. Chicago and Spring St. Freeport, IL 61032
82877	Rotron, Inc. 7-9 Hasbrouck Lane Woodstock, NY 12498	93790	Cornell-Dubilier Electronics Div. Federal Pacific Electric Co. 1605 Rodney French Blvd. New Bedford, MA 02741
83330	Herman H. Smith, Inc. 812 Snediker Ave. Brooklyn, NY 11207	94154	Wagner Electric Corp. Tung Sol Div. 630 W Mount Pleasant Ave. Livingston, NJ 07039
83781	National Electronics, Inc. PO Box 269 Geneva, IL 60134	94375	Automatic Metal Products Corp. 315-323 Berry St. Brooklyn, NY 11211
84147	Andrew Corp. 10500 W 153rd St. Oland Park, IL 60462	96095	Aerovox Corp. Sneeca Ave. Olean, NY 14760
86151	Genisco Technology Corp. Illinois Div. 9367 William St. Rosemon, IL 60018	96182	Master Specialities Co. 1640 Monrovia Costa Mesa, CA 92627
87216	Philco-Ford Corp. Lansdale Div. Church Rd. Lansdale, PA 19446	96502	Henry G. Dietz Co., Inc. 14-26 28th Ave. Long Island City, NY 11102
88422	General Electric Co. General Purpose Motor Dept. 2000 Taylor St. Fort Wayne, IN 46804	96906	Military Standards
88797	Robintech, Inc. Electro Mechanical Div. PO Box 714 Ginghamton, NY 13902	98978	International Electronic Research Corp. 135 W Magnolia Ave. Burbank, CA 91502
90634	Gulton Industries, Inc. Gulton St. Metuchen, NJ 08840	99934	Renbrandt, Inc. 6 Parmelee St. Boston, MA 02118
91637	Dale Electronics, Inc. PO Box 609 Columbus, NB 68601	99942	Globe-Union, Inc. Centralab Semiconductor Div. 4501 N Arden Drive El Monte, CA 91734
91662	Elco Corp. Maryland Rd. and Computer Ave. Willow Grove, PA 19090	99971	General Electric Co. Aerospace Electronics Dept. French Rd. Utica, NY 13503



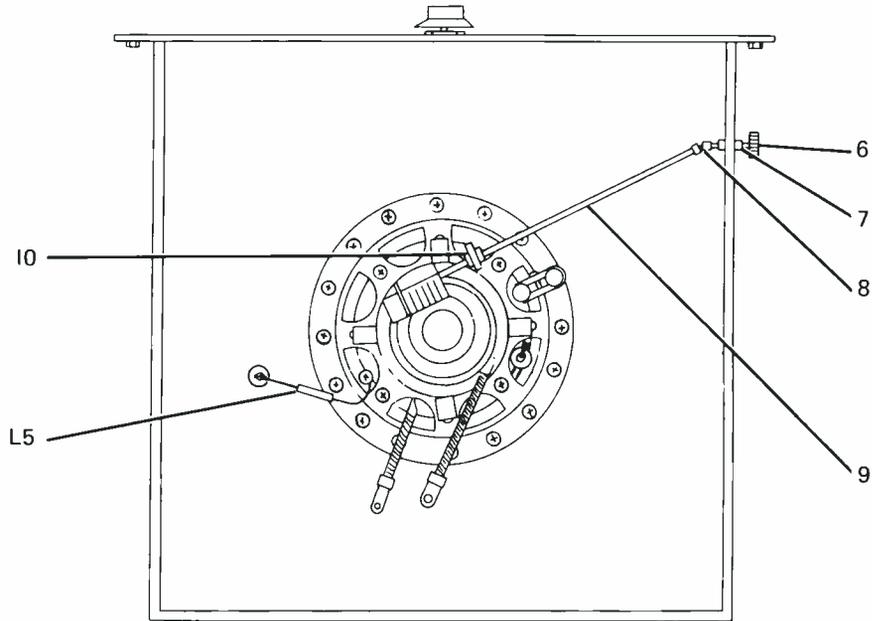
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Figure 6-1. 831G-2 20-kW/831G-2B 22.5-kW FM Transmitter (Sheet 1 of 3).

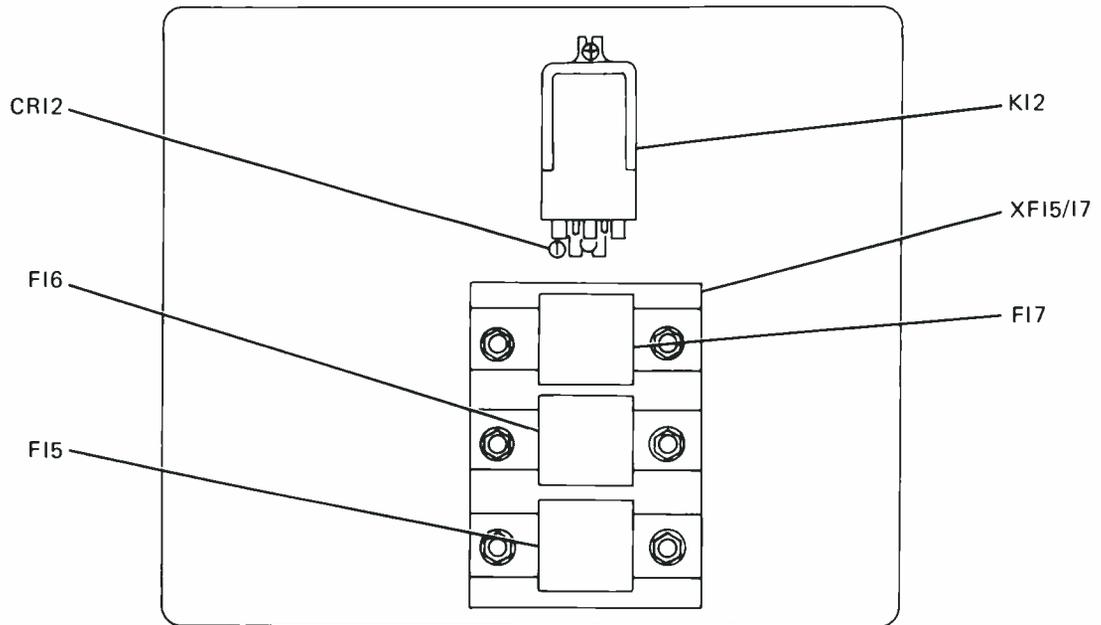


B700 407 Pb

Figure 6-1. 831G-2 20-kW/831G-2B 22.5-kW FM Transmitter (Sheet 2 of 3).



SECTION A-A



SECTION B-B

B700 408 Bx

Figure 6-1. 831G-2 20-kW/831G-2B 22.5-kW FM Transmitter (Sheet 3 of 3).

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
	831G-2 20-KW FM TRANSMITTER 831G-2B 22.5-KW FM TRANSMITTER			622-2555-XXX 622-2556-XXX
A1	CONTROL PANEL SEE BREAKDOWN ON PAGE 6-13			786-3243-001
A2	REMOTE CONTROL ASSEMBLY -OPTIONAL EQUIPMENT- SEE BREAKDOWN ON PAGE 6-17			786-3327-001
A3	IC BOARD SEE BREAKDOWN ON PAGE 6-19			786-3499-001
A4	310Z-2 FM EXCITER SEE SEPARATE PUBLICATION			622-2184-001
A5	FILAMENT REGULATOR SEE BREAKDOWN ON PAGE 6-22			786-3085-001
A6	CIRCUIT BREAKER PANEL SEE BREAKDOWN ON PAGE 6-24			786-3416-001
A7	TUNING/POWER CONTROL RELAY BOARD SEE BREAKDOWN ON PAGE 6-26			786-3018-001
A8	POWER CONTROL REGULATOR SEE BREAKDOWN ON PAGE 6-28			627-6683-001
A9	POWER CONTROL PANEL SEE BREAKDOWN ON PAGE 6-30			789-4342-001
A10	2 KV POWER SUPPLY SEE BREAKDOWN ON PAGE 6-32			789-4358-001
A11	RF DRIVER ASSEMBLY SEE BREAKDOWN ON PAGE 6-34			786-3309-001
A12	REMOTE CONTROL LATCHING RELAY BOARD -OPTIONAL EQUIPMENT- SEE BREAKDOWN ON PAGE 6-38			778-2538-001
A13	RF OUTPUT LOW-PASS FILTER SEE BREAKDOWN ON PAGE 6-40			786-3451-001
A14	POWER SUPPLY FILTER SEE BREAKDOWN ON PAGE 6-42			786-3583-001
A15	METERING MULTIPLIER BOARD SEE BREAKDOWN ON PAGE 6-46			786-3168-001
A16	DIRECTIONAL COUPLER SEE BREAKDOWN ON PAGE 6-48			786-3264-001
A17	BLEEDER RESISTOR PANEL SEE BREAKDOWN ON PAGE 6-50			786-3154-001
A18	POWER AMPLIFIER CAVITY SEE BREAKDOWN ON PAGE 6-52			786-3335-001
A19	INPUT TERMINAL PANEL SEE BREAKDOWN ON PAGE 6-58			786-3333-001
A20	CARD CAGE ASSEMBLY SEE BREAKDOWN ON PAGE 6-60			786-3301-001
A21	POWER AMPLIFIER SOCKET SEE BREAKDOWN ON PAGE 6-62			786-3686-001
A22	OVERLOAD AND METER CALIBRATE PANEL SEE BREAKDOWN ON PAGE 6-64			786-3666-001
A23	EXTENDER CARD NOTE--ACCESSORY ITEM NOT SHOWN INCLUDES CONNECTOR, ELECTRICAL 4 CONTACTS	375430904501	91662	372-2425-040
A24	FAULT TALLY AND AUTOMATIC RECYCLE PANEL SEE BREAKDOWN ON PAGE 6-67			627-5129-001
B1	FAN, CENTRIFUGAL	879A10R7	19070	009-0167-010
B2	MOTOR, ALTERNATING CURRENT 0.5A, 208/220 VAC	SK33GG102	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

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
C4 THROUGH C44	NOT USED			
C45 C46 THROUGH C49	BLOCKING CAPACITOR			786-3557-001
C50 C51 CR1 THROUGH CR11	PA LOADING CAPACITOR PA TUNING CAPACITOR NOT USED			786-3048-001 786-3049-001
CR12 F1 THROUGH F14 F15	DIODE NOT USED FUSE, CARTRIDGE 350 AMP CURRENT RATING	1N645 A25X350	14433 71424	353-2607-000 264-0917-750
F16 F17 J1 J2 J3	SAME AS F15 SAME AS F15 NOT USED NOT USED CONNECTOR, ELECTRICAL 1 CONTACT			
K1 THROUGH K11 K12	NOT USED RELAY, ARMATURE 3 FORM C CONTACT ARRANGEMENT	KUP14D5124V	77342	970-0007-250
L1 L2 L3 L4 L5	REACTOR 4 H INDUCTANCE REACTOR 1 H INDUCTANCE NOT USED NOT USED COIL, RF 4.7 UH, 10% TOL	E16437 E16439 240-0178-000	80008 80008 82142	668-0199-010 668-0200-010 240-0178-000
PS1 PS2	28 VOLT POWER SUPPLY SEE BREAKDOWN ON PAGE 6-73 PA BIAS POWER SUPPLY SEE BREAKDOWN ON PAGE 6-75			786-3013-001 786-3081-001
S1 S2 S3 S4	NOT USED NOT USED NOT USED SWITCH, SENSITIVE SPDT CONTACT ARRANGEMENT INCLUDES ACTUATOR, SWITCH	MS25253-4 JV9	96906 91929	260-0025-000 260-0026-000
S5 S6 S7 S8	SAME AS S4 NOT USED NOT USED SHORTING SWITCH INCLUDES SPRING, SHORTING SWITCH STRAP, GROUNDING STRIP, SHORTING CONTACT, SHORTING SHAFT, FLAT, STRAIGHT INSULATOR, STANDOFF	38X3841	71590	786-3156-001 540-5342-002 542-1768-002 542-1770-002 542-1773-002 542-2242-003 190-0026-000
S9 T1 T2 T3 T4 T5 XF1 THROUGH XF14	SAME AS S8 TRANSFORMER, PWR, STEP-UP TRANSFORMER, PWR, STEP-UP TRANSFORMER, PWR, STEP-UP TRANSFORMER, PWR, STEP-DOWN TRANSFORMER, PWR, STEP-DOWN NOT USED	E16436 E16438 E16445 E12322 3-18174	80008 80008 80008 80008 70674	664-0124-010 664-0123-010 664-0125-010 662-0043-000 662-0410-020

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
XF15/17	FUSEHOLDER 225- 600A CURRENT RATING	3515	71400	265-1269-C20
V1	NOT USED			
V2	NOT USED			
V3	ELECTRON TUBE	8281-4CX15000A	06980	256-0157-CC0
VR1	SUPPRESSOR, PLATE INCLUDES ABSORBER, OVERVOLTAGE -CR1 THRU CR4-	6RS21SA11H15	09214	625-8349-CC1 353-0281-140
VR2	SUPPRESSOR, SCREEN INCLUDES ABSORBER, OVERVOLTAGE -CR5, CR6-	6RS21SA11H11	09214	625-8348-CC1 353-0283-100
Z1	COMPLETE RECTIFIER INCLUDES RECTIFIER COLUMN -QTY 3-	67-7226	81483	353-6241-CC0
	INCLUDES MODULE -QTY 31-	67-7468	81483	353-6242-CC0 353-6243-CC0
	MODULE, AC CONNECT -QTY 3-	67-7469	81483	353-6244-CC0
1	SHORTING STICK INCLUDES ROD, SHORTING SPRING, COMPRESSION CORD, SHORTING STICK			786-3553-CC1 547-6574-CC2 547-6575-CC2 786-355C-CC1
2	CONDUCTOR, CENTER	24216-2	84147	013-1331-C40 786-3236-CC1
3	CLAMP, NEUTRALIZING -QTY 2-			786-3237-CC1
4	CLAMP, NEUTRALIZING -QTY 2-			
5	IMPELLER, FAN	009-3118-010	60399	009-3118-010
6	KNOB			757-0228-CC1
7	BEARING ASSEMBLY, PANEL	148	83330	015-3437-CC0
8	JOINT, UNIVERSAL	MB360	88797	233-0132-CC0
9	SHAFT			789-4365-CC1
10	COUPLING, INSULATOR	FC46-5	80583	015-3438-010
11	FILTER -USED ON 831G-2 ONLY-			786-3457-CC1
12	RETAINER, UPPER -USED ON 831G-2 ONLY-			786-3537-CC1
13	DEFLECTOR			786-5842-CC1
14	CLAMP	QS200M104W	08484	013-1309-430

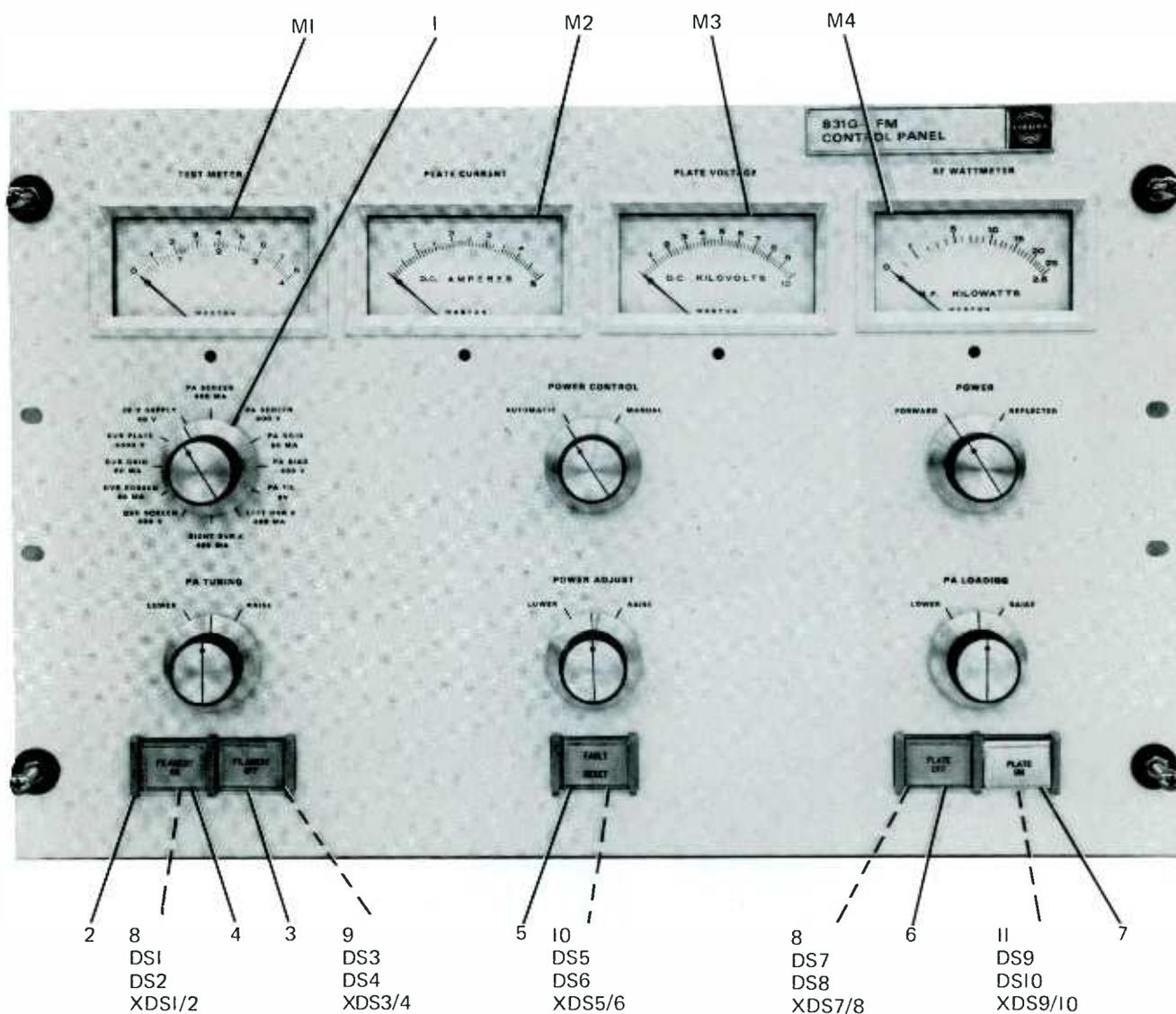


Figure 6-2. Control Panel, A1 (Sheet 1 of 2).

B700 405 Pb

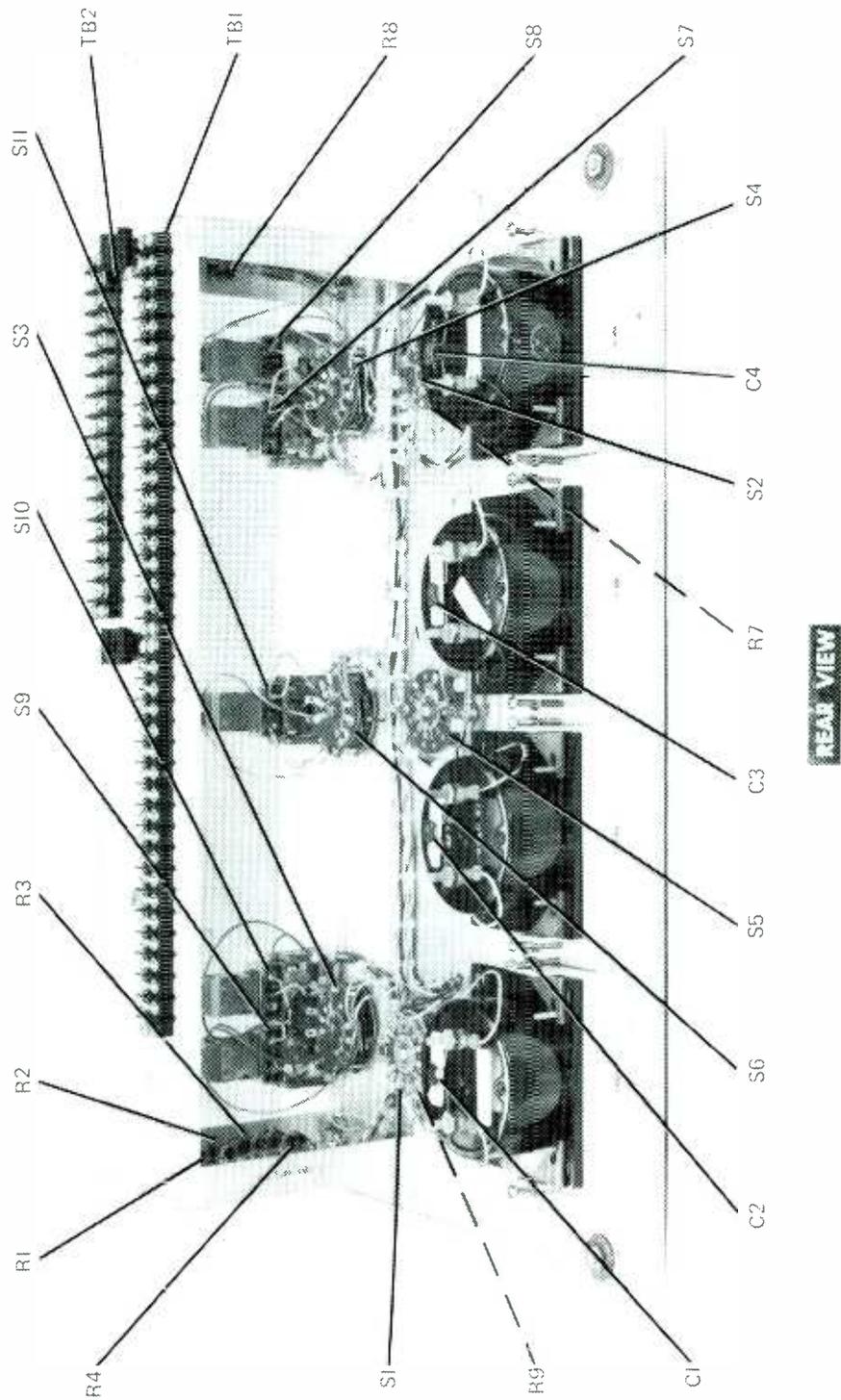
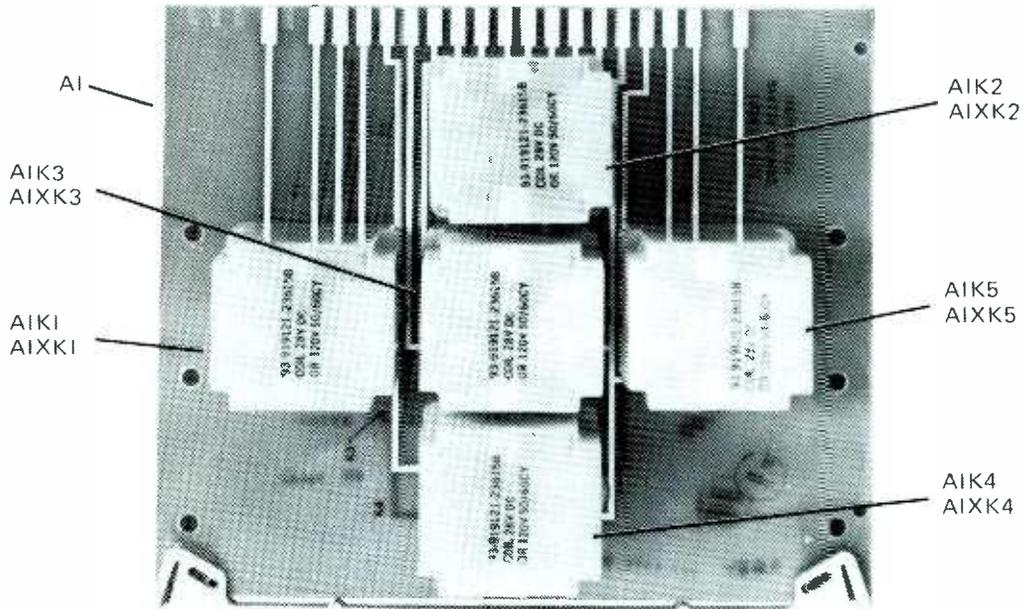
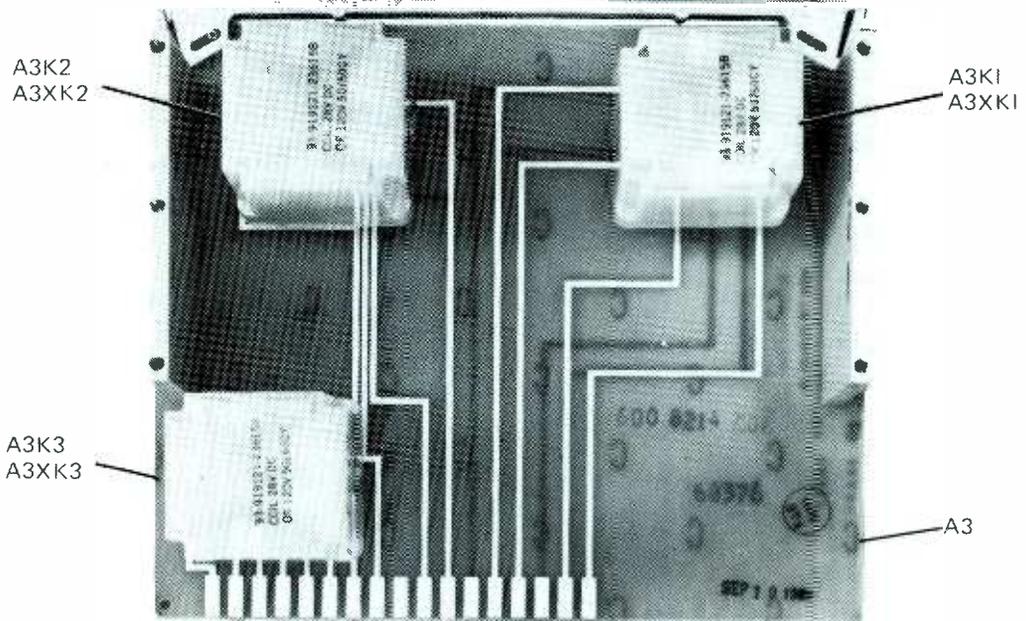


Figure 6-2. Control Panel, A1 (Sheet 2 of 2).

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-C00
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 THROUGH XDS9/10	SWITCH, PUSH, ILLUMINATED	12-1	96182	266-6806-010
1	KNOB, ROUND, SKIRTED -QTY 6-			757-0233-003
2	BARRIER, VERTICAL MOUNTING -QTY 8-	1252	96182	266-6806-030
3	LENS, ENGRAVED FILAMENT OFF	12-240-13FILA MENTOFF	96182	266-6806-270
4	LENS, ENGRAVED FILAMENT ON	12-240-13FILA MENTON	96182	266-6806-280
5	LENS, ENGRAVED FAULT/RESET	12-240-16	96182	266-6806-800

parts list

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

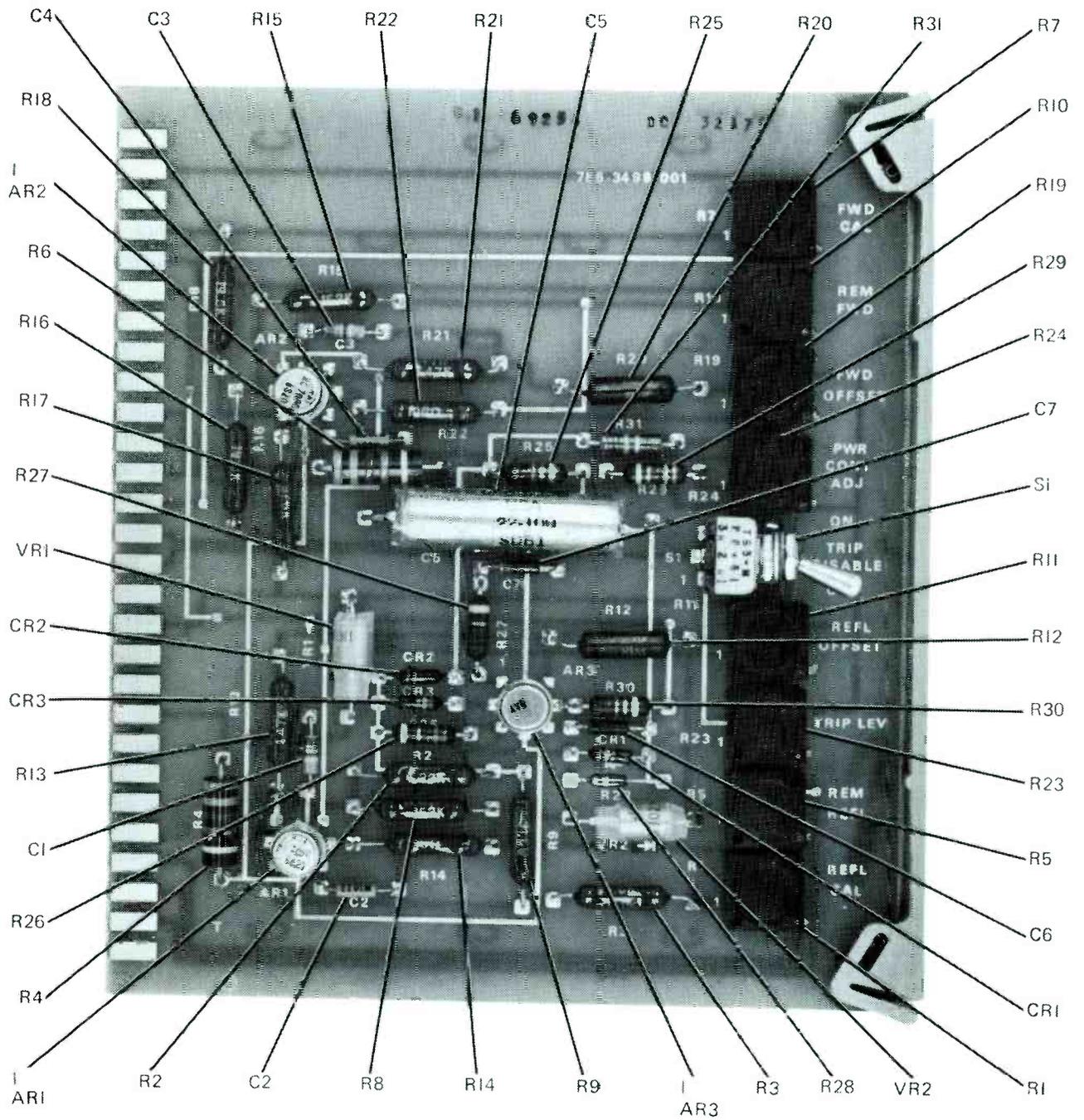


B700 1083 Pb

Figure 6-3. Remote Control Assembly, A2.

parts list

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



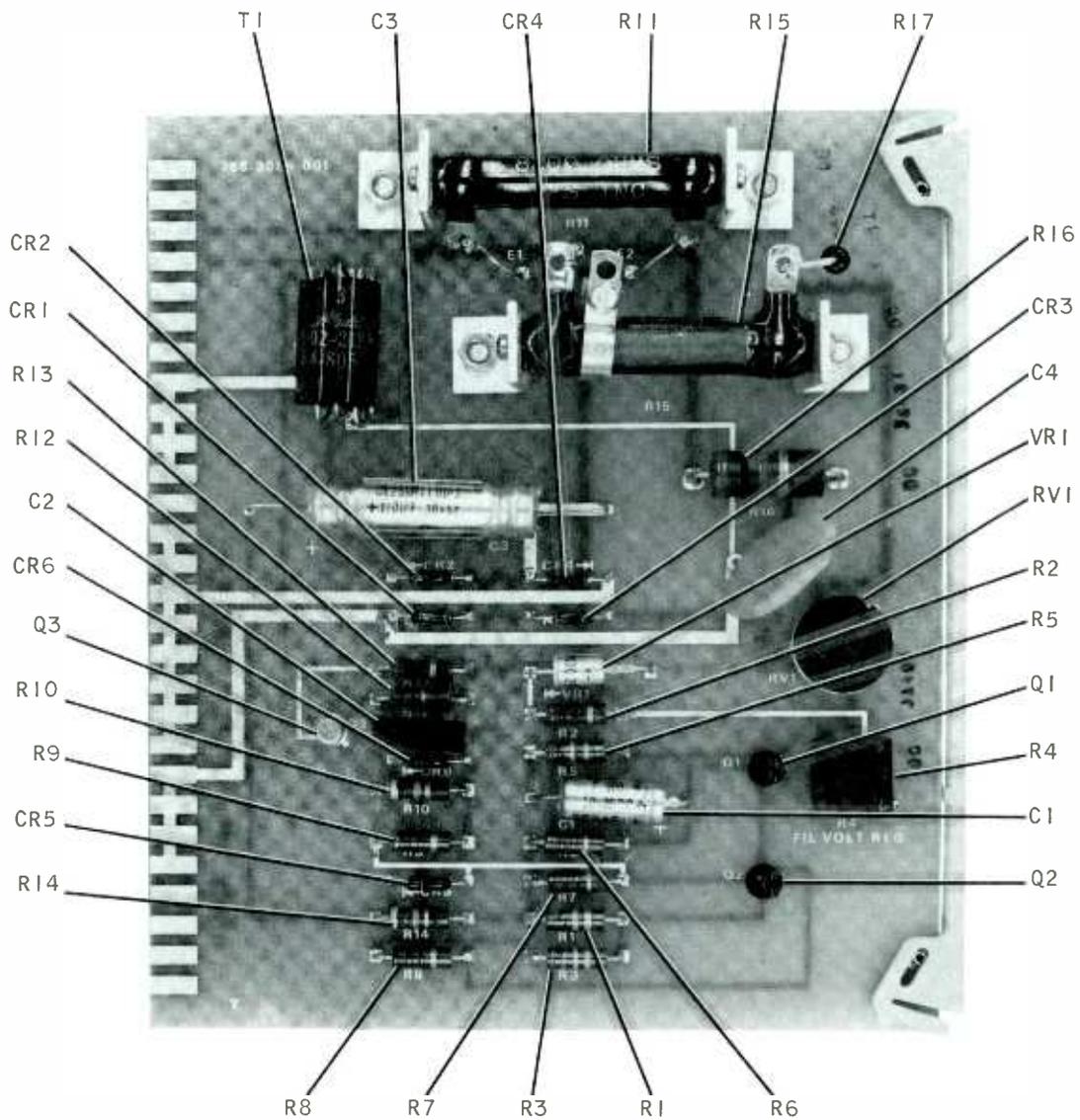
B700 404 Pb

Figure 6-4. IC Board, A3.

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
IC BOARD, A3				786-3499-001
AR1	AMPLIFIER, OPERATIONAL	U58770939	07263	351-7140-010
AR2	SAME AS AR1			
AR3	SAME AS AR1			
C1	CAPACITOR, FXD, CERAMIC 5600 PF, 10% TOL, 100 VDCW	C22A562K	16546	913-4243-080
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, ELECTROLYTIC 1 UF, MINUS 10% PLUS 75%, 50 VDCW	D29327	56289	183-1177-000
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	RESISTOR, FXD, FILM 14.7 KILOHMS, 1% TOL, 1/2 WATT	RN65D1472F	81349	705-7152-000
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

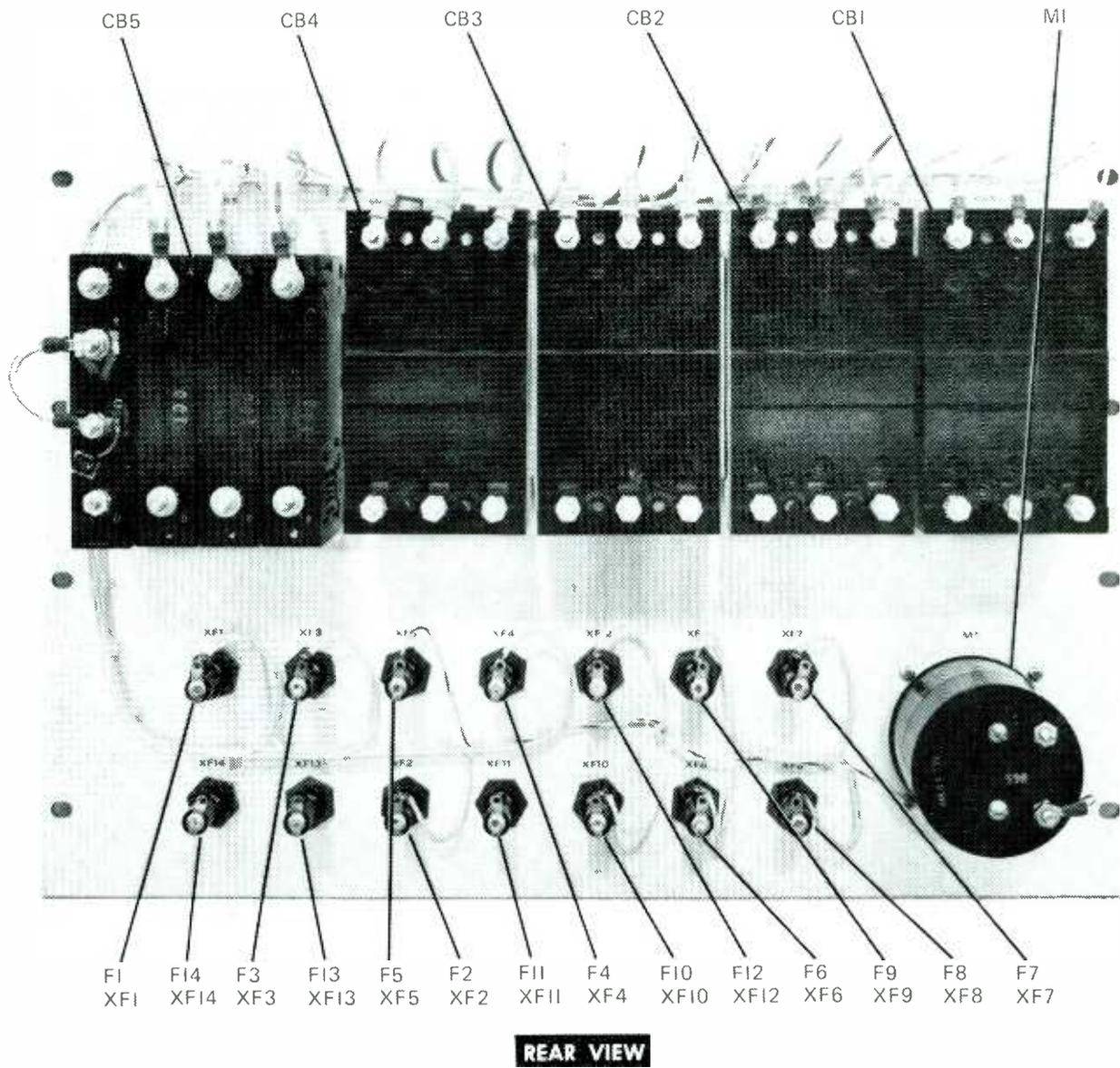
SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R27	RESISTOR, FXD, FILM 1500 OHMS, 5% TOL, 1/2 WATT	RL20S152J	81349	745-2610-000
R28	RESISTOR, FXD, COMPOSITION 470 KILOHMS, 10% TOL, 1/2 WATT	RCR20G474KS	81349	745-1464-000
R29	RESISTOR, FXD, FILM 3900 OHMS, 5% TOL, 1/2 WATT	RL20S392J	81349	745-2636-000
R30	RESISTOR, FXD, FILM 10 KILOHMS, 5% TOL, 1/2 WATT	RL20S103G	81349	745-2661-000
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			
I	INSULATOR, DISC -QTY 3-	7717-19N	13103	352-9552-020



MW200-0001-Pb

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	2N1671B	04713	352-0361-010
R1	RESISTOR, FXD, COMPOSITION 22 KILOHMS, 10% TOL, 1/2 WATT	RCR20G223KS	81349	745-1408-000
R2	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/2 WATT	RCR20G222KS	81349	745-1366-000
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	SAME AS R2			
R7	SAME AS R2			
R8	SAME AS R2			
R9	RESISTOR, FXD, COMPOSITION 1000 OHMS, 10% TOL, 1/2 WATT	RCR20G102KS	81349	745-1352-000
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	710-0146-000
R12	RESISTOR, FXD, COMPOSITION 1500 KILOHMS, 10% TOL, 1/2 WATT	RCR20G155KS	81349	745-1485-000
R13	SAME AS R9			
R14	SAME AS R10			
R15	RESISTOR, ADJ, WIRE-WOUND 5000 OHMS, 10% TOL, 12 WATTS	1033	44655	716-0055-150
R16	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 2 WATTS	RC42GF101K	81349	745-5610-000
R17	RESISTOR, FXD, WIRE-WOUND 1000 OHMS, 5% TOL, 3 WATTS	RW69V102	81349	747-7600-250
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
V1	DIODE	1N3028A	06751	353-1323-000

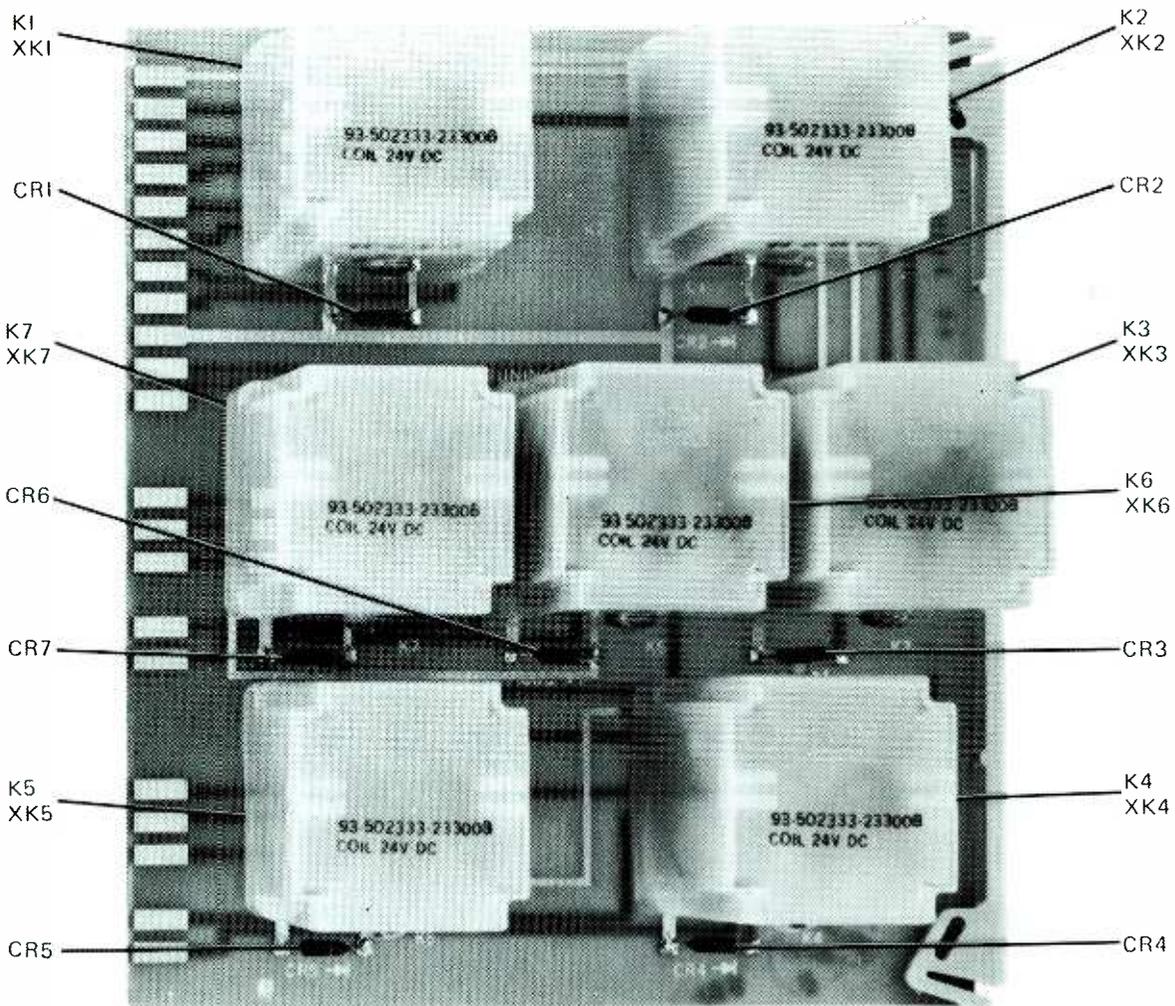


REAR VIEW

B700 402 PL

Figure 6-6. Circuit Breaker Panel, A6.

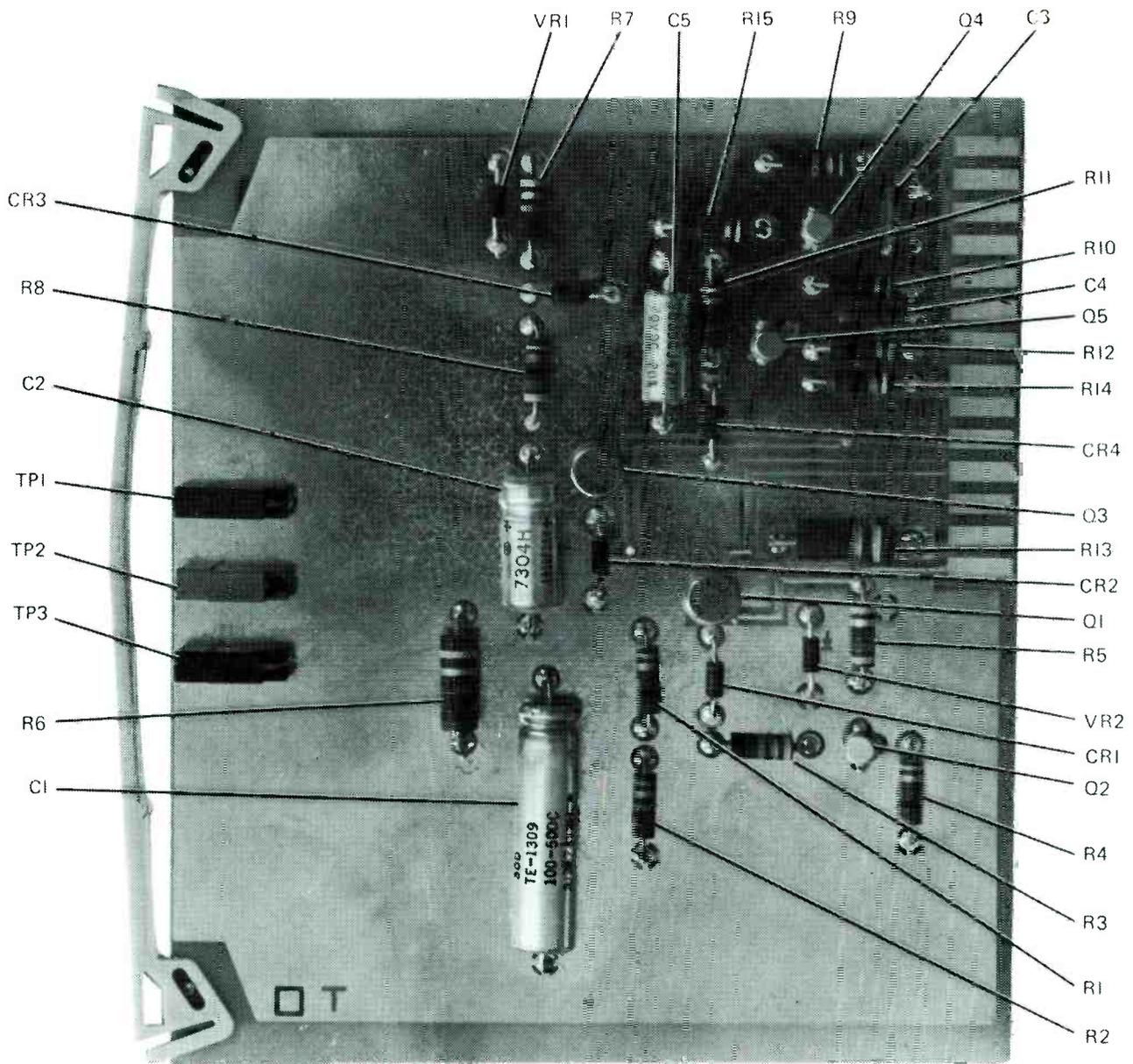
SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
CIRCUIT BREAKER PANEL, A6				786-3416-001
CB1	CIRCUIT BREAKER 1.0A CURRENT RATING	3363SHK-1-250-6 0-3	74193	260-4038-150
CB2	CIRCUIT BREAKER 10A CURRENT RATING	3363SMG410-230-6 0-3	74193	260-0407-000
CB3	CIRCUIT BREAKER 4.5A CURRENT 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 0.25A CURRENT RATING	MDL1-4	71400	264-0291-000
F5	SAME AS F4			
F6	FUSE, CARTRIDGE 1A CURRENT RATING	F02B250V1AS	81349	264-4280-000
F7	FUSE, CARTRIDGE 2A CURRENT RATING	F02B125V2AS	81349	264-0008-000
F8	SAME AS F6			
F9	SAME AS F7			
F10	SAME AS F6			
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			



B700 401 Pb

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

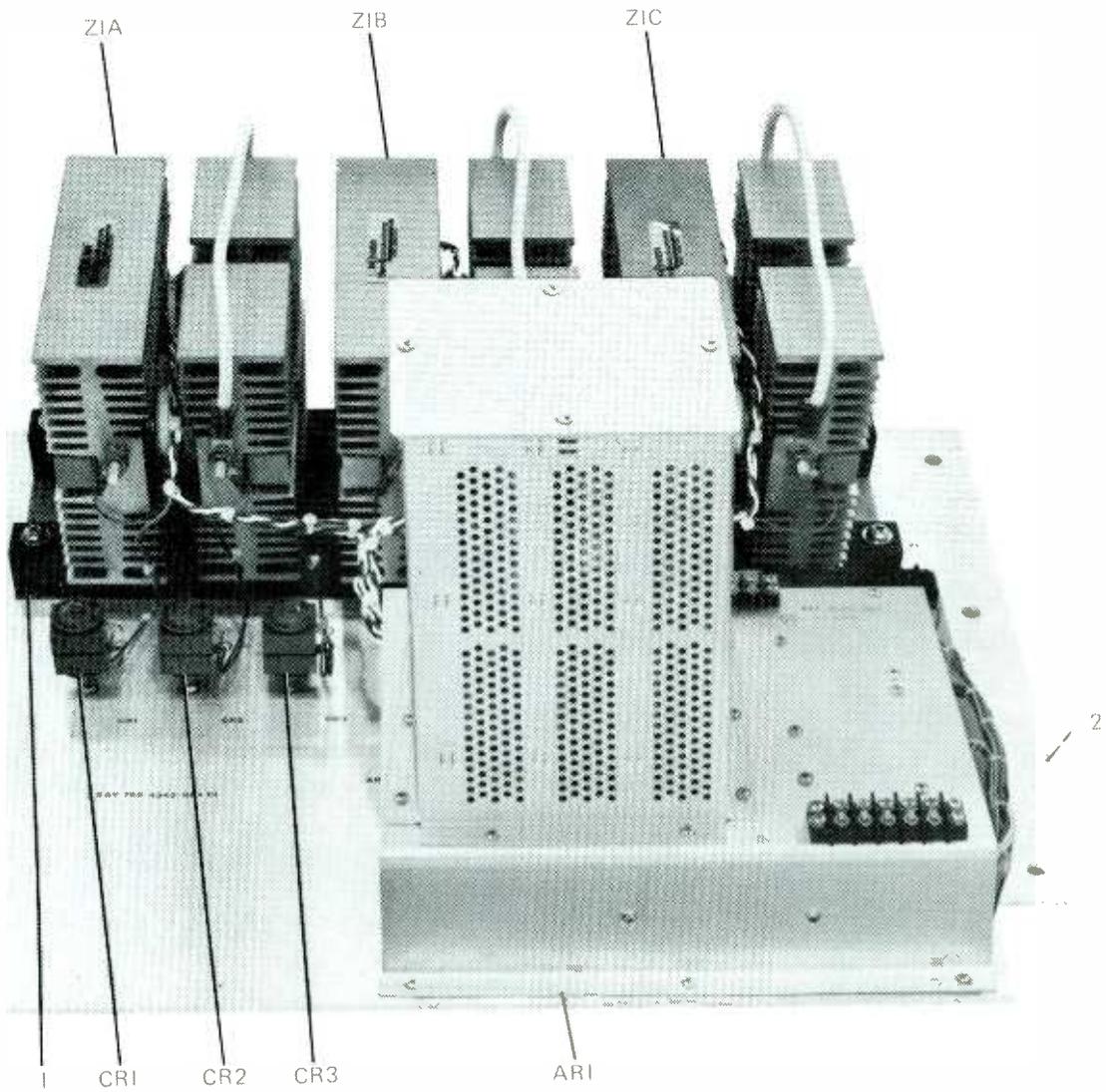
SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
TUNING/POWER CONTROL RELAY BOARD, A7				786-3018-CC1
CR1 CR2 THROUGH CR7	DIODE	1N645	14433	353-2607-C00
K1	SAME AS CR1			
K2 THROUGH K7	RELAY, ARMATURE 3C CONTACT ARRANGEMENT	93-502333-23300B	80089	970-2454-270
XK1	SAME AS K1			
XK2	SOCKET, RELAY INCLUDES PIN -QTY 11-	93-153-1	80089	220-1399-020
XK3 THROUGH XK7	SOCKET, RELAY INCLUDES PIN -QTY 8-	93-46-101	80089	220-1399-030
	SAME AS XK2			



B700 3178 Pb

Figure 6-8. Power Control Regulator, A8.

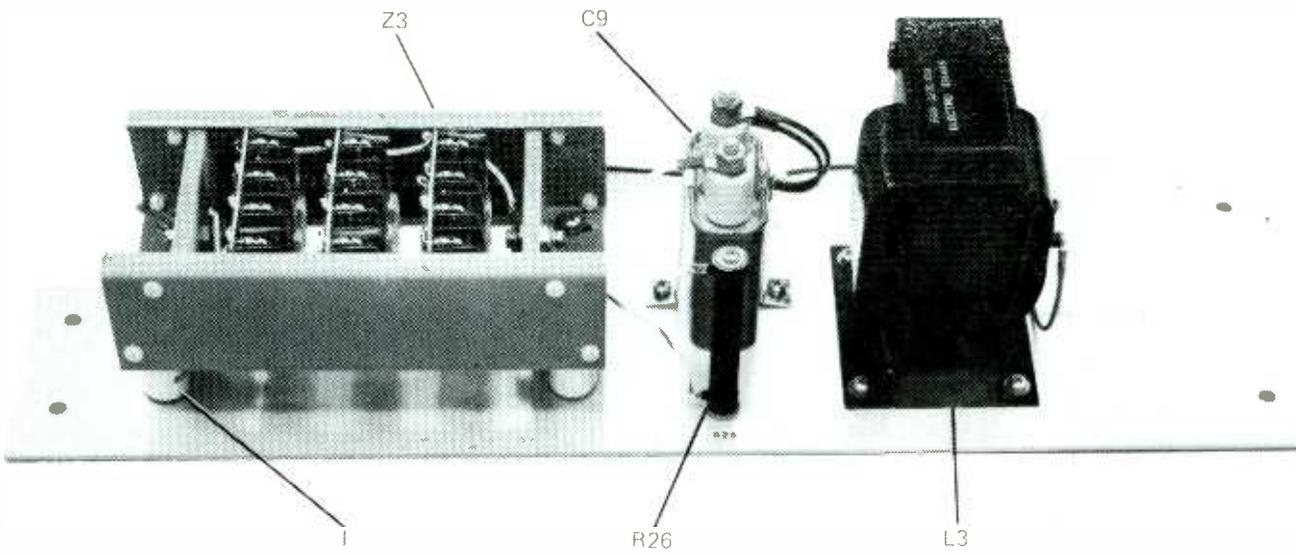
SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
POWER CONTROL REGULATOR, A8				627-6683-001
C1	CAPACITOR, FXD, ELECTROLYTIC 100 UF, MINUS 10%, PLUS 75%, 50 VDCW	30D107G0S0DH5	56289	183-1281-080
C2	CAPACITOR, FXD, ELECTROLYTIC 180 UF, 20% TOL, 25 VDCW	CL65BG181MPE	81349	184-8664-000
C3	CAPACITOR, FXD, CERAMIC 0.1 UF, PLUS 80% MINUS 20%, 25 VDCW	5C7A	56289	913-3806-000
C4	SAME AS C3			
C5	CAPACITOR, FXD, ELECTROLYTIC 47 UF, 20% TOL, 20 VDCW	M39003-01-2296	81349	184-9086-560
CR1	DIODE	1N4003	07688	353-6442-030
CR2	SAME AS CR1			
CR3	SAME AS CR1			
CR4	SAME AS CR1			
Q1	TRANSISTOR	2N3053	07688	352-0613-010
Q2	TRANSISTOR	2N2222A	07688	352-0661-020
Q3	SAME AS Q1			
Q4	SAME AS Q2			
Q5	SAME AS Q2			
R1	RESISTOR, FXD, COMPOSITION 1000 OHMS, 10% TOL, 1/2 WATT	RCR20G102KS	81349	745-1352-000
R2	RESISTOR, FXD, COMPOSITION 15 KILOHMS, 10% TOL, 1/2 WATT	RCR20G153KS	81349	745-1401-000
R3	RESISTOR, FXD, COMPOSITION 22 KILOHMS, 10% TOL, 1/2 WATT	RCR20G223KS	81349	745-1408-000
R4	SAME AS R1			
R5	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/2 WATT	RCR20G472KS	81349	745-1380-000
R6	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 1 WATT	RCR32G821KS	81349	745-3349-000
R7	SAME AS R3			
R8	RESISTOR, FXD, COMPOSITION 47 OHMS, 10% TOL, 1/2 WATT	RCR20G470KS	81349	745-1296-000
R9	SAME AS R2			
P10	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/2 WATT	RCR20G222KS	81349	745-1366-000
R11	RESISTOR, FXD, COMPOSITION 2700 OHMS, 10% TOL, 1/2 WATT	RCR20G272KS	81349	745-1370-000
R12	SAME AS R1			
P13	RESISTOR, FXD, COMPOSITION 1200 OHMS, 10% TOL, 1 WATT	RCR32G122KS	81349	745-3356-000
R14	RESISTOR, FXD, COMPOSITION 6800 OHMS, 10% TOL, 1/2 WATT	RCR20G682KS	81349	745-1387-000
R15	SAME AS R11			
TP1	JACK, TIP RED	5173-125-2	17117	360-0434-030
TP2	JACK, TIP ORANGE	5173-125-3	17117	360-0434-040
TP3	JACK, TIP BLACK	5173-125-0	17117	360-0434-010
VR1	DIODE	1N4740	07688	353-6481-260
VR2	SAME AS VR1			



8700 399 Pb

Figure 6-9. Power Control Panel, A9.

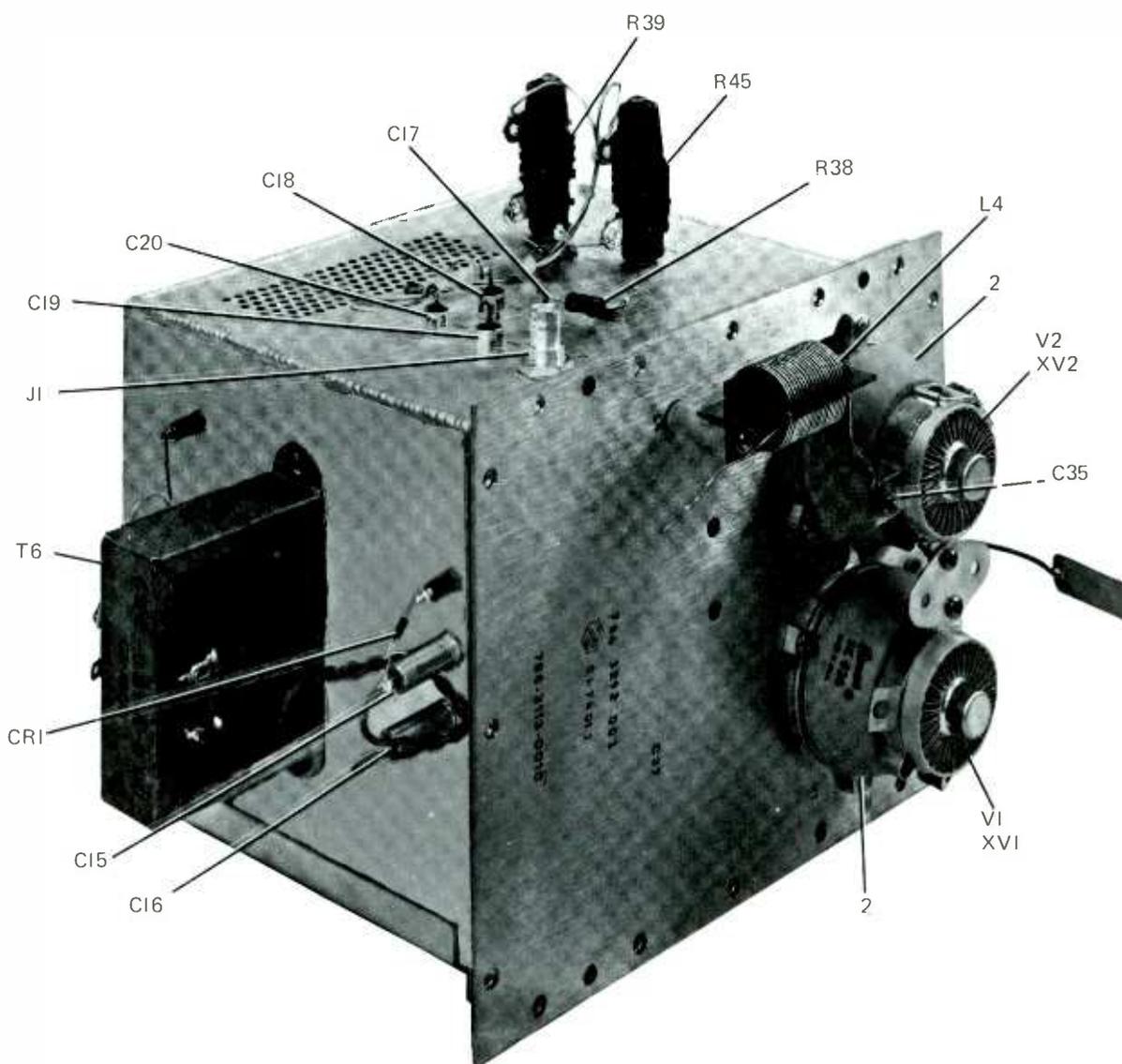
SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
POWER CONTROL PANEL, A9				789-4342-001
AR1	AMPLIFIER, MAGNETIC INCLUDES CAPACITOR, FXC, CERAMIC 0.1 UF, PLUS 80% MINUS 20%, 25 VDCW -C1 THRU C3- CONNECTOR, ELECTRICAL -J1 THRU J3- TRANSFORMER -T1 THRU T3- TERMINAL BOARD -TR1- TERMINAL BOARD -TB2- CARD, CONTROL -QTY 3-	5C7A	56289	627-5140-001 913-3806-000
CR1	ABSORBOR, OVERTOLTAGE	6RS2LSA11H11	C9214	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
2	FAN, VENTURI	021004-20125	82877	009-1829-020



5/10/1954

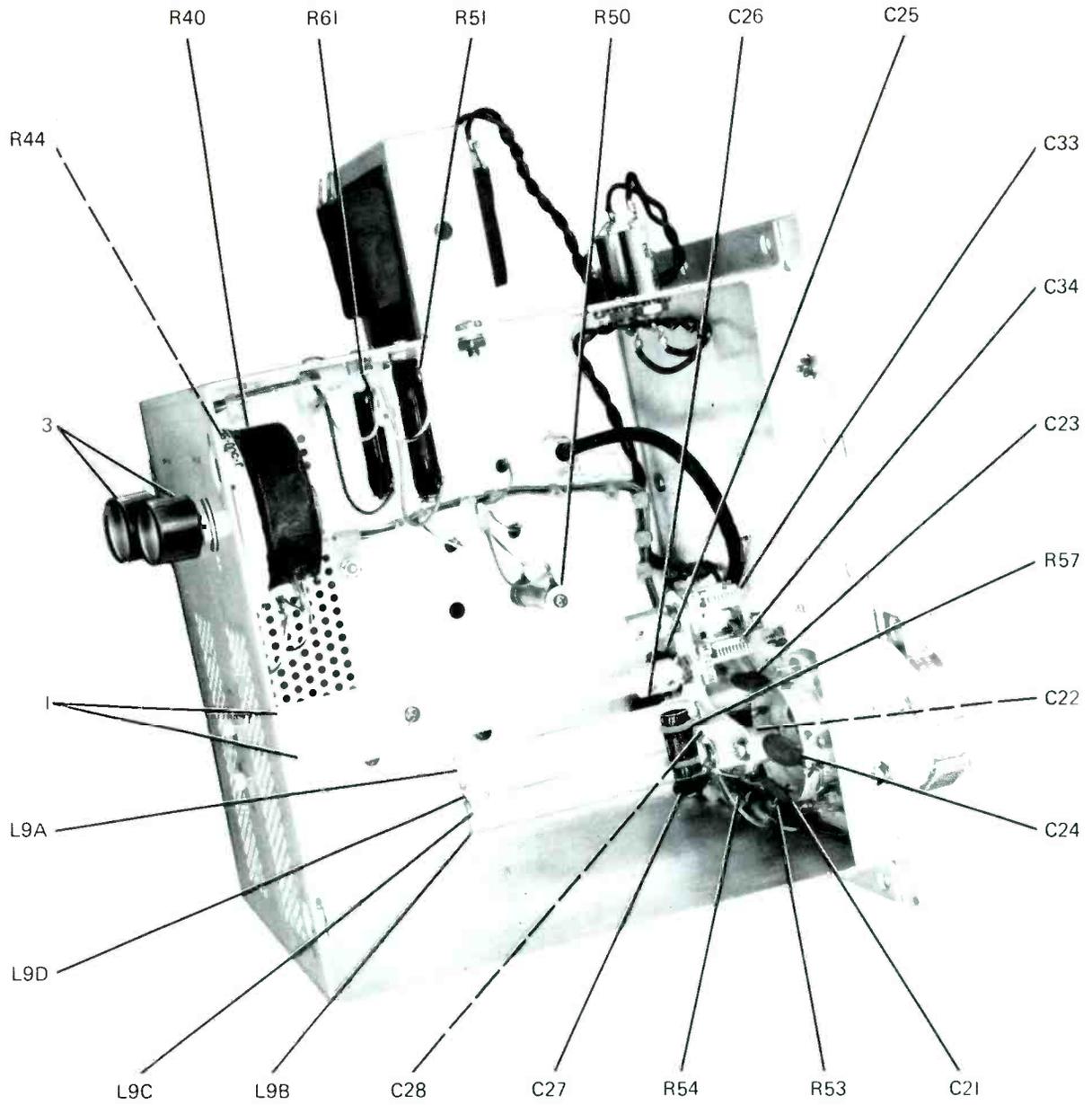
Figure 6-10. 2-kV Power Supply, A10.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
2 KV POWER SUPPLY, A10				789-4358-001
C1 THROUGH C8 C9	NOT USED CAPACITOR, FXD, PAPER 0.05 UF, 10 % TOL, 5000 VDCW	23F1129G2	01002	930-0728-000
L1 L2 L3	NOT USED NOT USED CHOKE, RF 1.5H INDUCTANCE	E16446	80008	668-0201-010
R1 THROUGH R25 R26	NOT USED RESISTOR, FXD, WIRE-WOUND 3900 OHMS, 5% TOL, 26 WATTS	RW33V392	81349	747-1808-000
Z1 Z2 Z3 1	NOT USED NOT USED RECTIFIER INSULATOR, STANDOFF -QTY 4-	6-1-2M1B3988S E1010	05277 70371	353-0435-010 190-1156-000



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



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

parts list

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 3-18.7 PF, 1250 VDCW	160-110-3	81349	922-0033-000
C34	SAME AS C33			
C35	SAME AS C17			
CR1	DIODE	1N645	14433	353-2607-000
J1	CONNECTOR, ELECTRICAL 1 CONTACT	UG909BU	80358	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			786-3110-001
	BAR			786-3283-003
	BAR			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	44555	710-5076-010
R40	RESISTOR, VAR, WIRE-WOUND 500 OHMS, 10% TOL, 50 WATTS	J500S553E	44555	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	1-3-4D57F160PORM 5PCT	44555	710-2921-000
R52	NOT USED			
R53	RESISTOR, FXD, COMPOSITION 47 OHMS, 10% TOL, 1 WATT	RCR32G470KS	81349	745-3296-000

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R54	SAME AS R53			
R55	NOT USED			
R56	NOT USED			
R57	RESISTOR, FXD, COMPOSITION 50 OHMS, 10% TOL, 16.5 WATTS	7805P2	10646	712-0129-000
R58	NOT USED			
THROUGH				
R60				
R61	SAME AS R51			
T1	NOT USED			
THROUGH				
T5				
T6	TRANSFORMER, PWR, STEP-DOWN	40-9023	86151	662-0394-010
V1	ELECTRON TUBE	7203-4CX250B	49571	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-			786-3312-001
2	CHIMNEY, AIR SOCKET -QTY 2-	SK626	06980	220-1466-000
3	KNOB, PLASTIC -QTY 2-	MS91528-102B	96906	281-0122-000

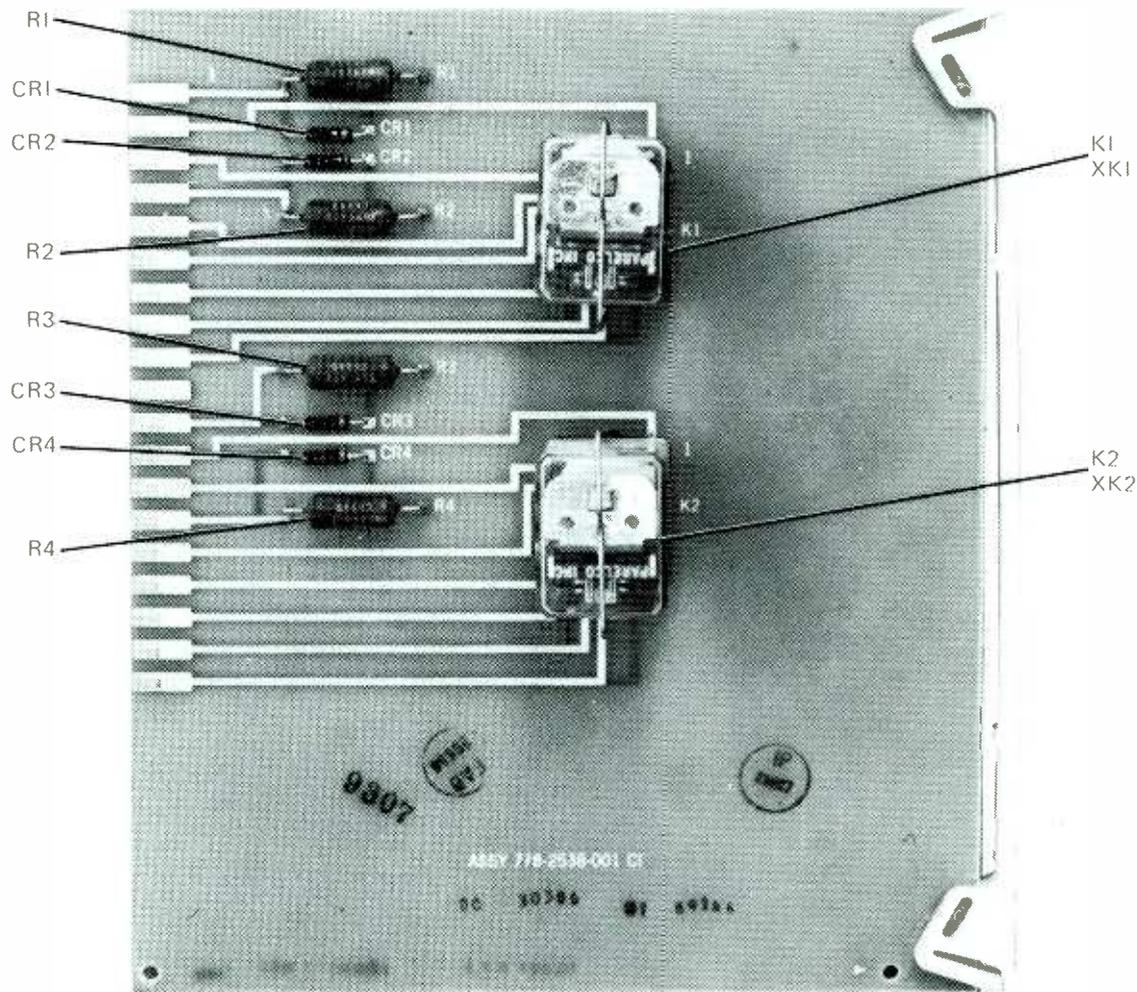
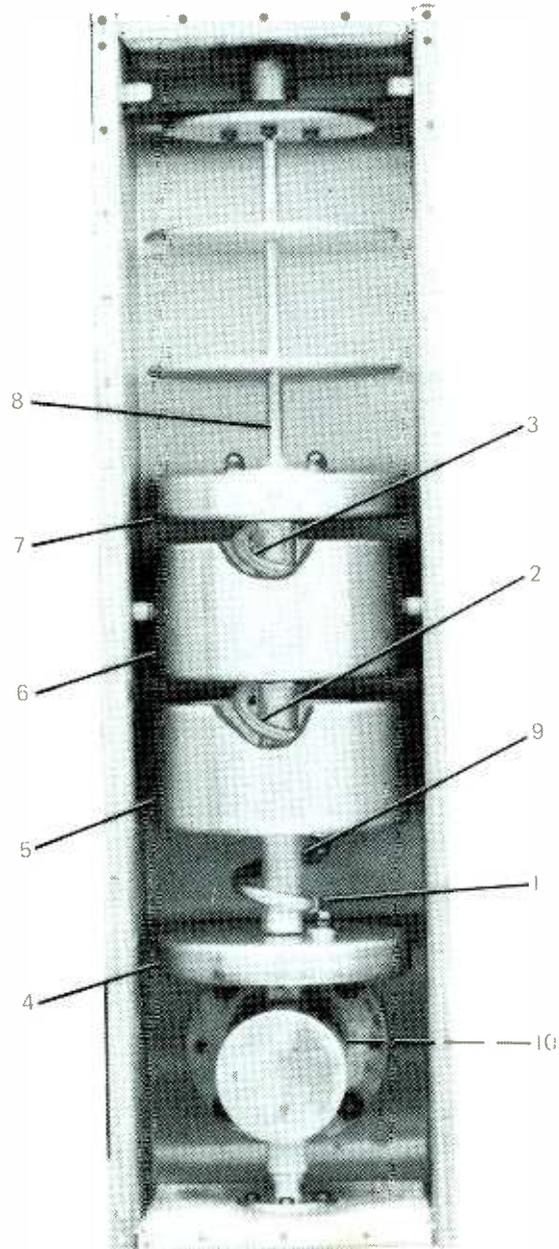


Figure 6-12. Remote Control Latching Relay Board, A12.

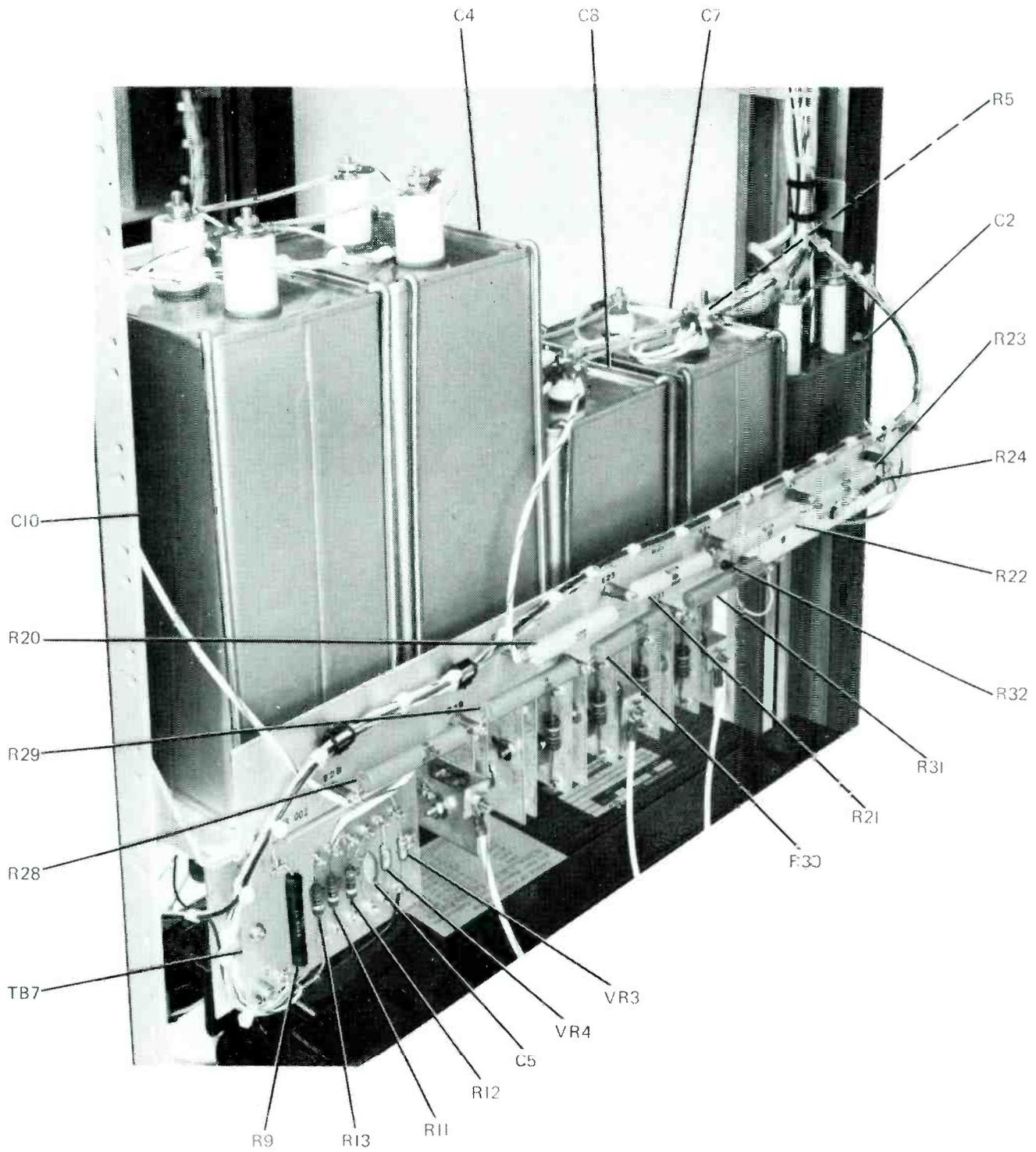
SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
REMOTE CONTROL LATCHING RELAY BOARD, A12				778-2538-001
CR1	DIODE	1N647	01295	353-2596-000
CR2	SAME AS CR1			
CR3	SAME AS CR1			
CR4	SAME AS CR1			
K1	RELAY, ARMATURE 2C CONTACT ARRANGEMENT	TF351CC2-24	70309	970-0004-030
K2	SAME AS K1			
R1	RESISTOR, FXD, WIRE-WOUND 470 OHMS, 5% TOL, 3 WATTS	RW69V471	81349	747-5391-C00
R2	SAME AS R1			
R3	SAME AS R1			
R4	SAME AS R1			
XK1	SOCKET, RELAY 10 PINS INCLUDES PIN, GROUNDING	30054-3	70309	220-1520-000
XK2	SAME AS XK1	99-018-078-0250	72962	311-0605-CC0



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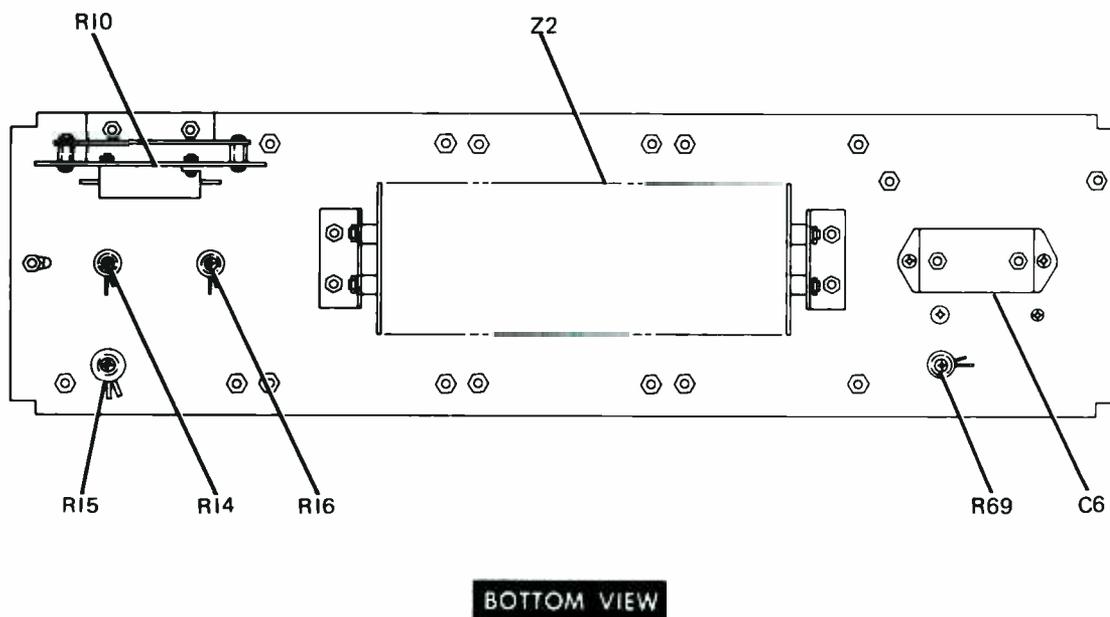
Figure 6-13. RF Output Low-Pass Filter, A13.

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



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



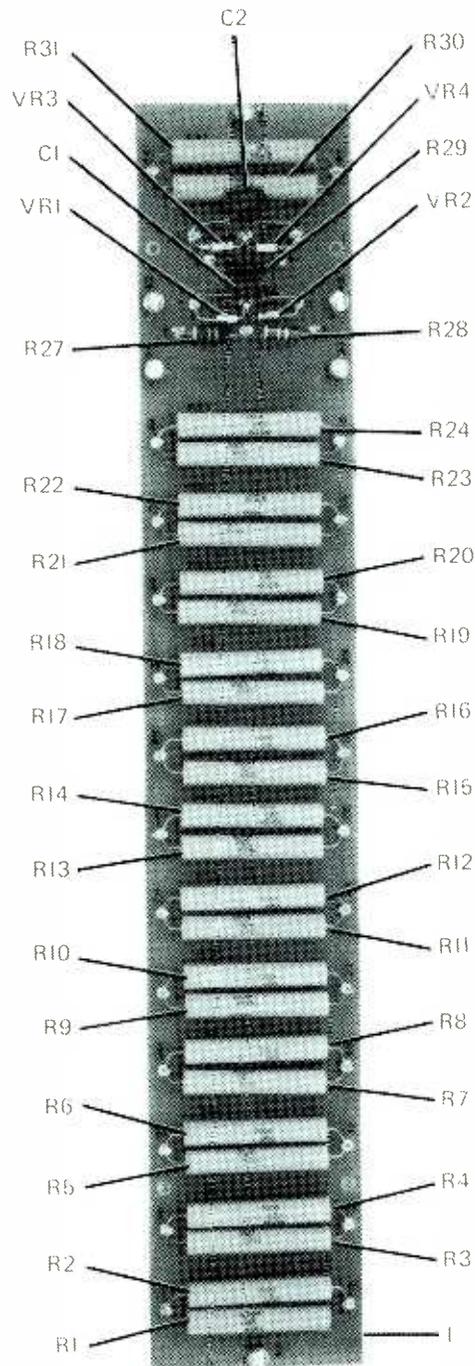
B700 462 Bx

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

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
POWER SUPPLY FILTER, A14				786-3583-C01
C1	NOT USED			
C2	CAPACITOR, FXD, PAPER 0.05 UF, 10% TOL, 10,000 VDCW	Y48960	56289	93C-0610-CC0
C3	NOT USED			
C4	CAPACITOR, FXD, PAPER 10 UF, 10% TOL, 2500 VDCW	CP70E1EK106K1	81349	962-4204-CC0
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	CM70B223GM1	81349	938-2129-CC0
C7	CAPACITOR, FXD, PAPER 12 UF, 10% TOL, 1500 VDCW	CP70E1EH126K1	81349	962-4246-CC0
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-CC0
R6	NOT USED			
R7	NOT USED			
R8	NOT USED			
R9	RESISTOR, FXD, WIRE-WOUND 0.25 OHMS, 1% TOL, 10 WATTS	RS1DX41DER2500F	91637	747-9451-000
R10	RESISTOR, FXD, WIRE-WOUND 2.5 OHMS, 3% TOL, 50 WATTS	RH50-2R500G	91637	747-8697-CC0
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-CC0
R13	SAME AS R11			
R14	RESISTOR, FXD, WIRE-WOUND 0.5 OHMS, 1% TOL, 36 WATTS	2K46C5-1PCT	44655	710-5076-C30
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 KILOHMS, 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-CC0
R29	SAME AS R28			
R30	SAME AS R28			
R31	SAME AS R28			
R32	SAME AS R24			
R33 THROUGH R68	NOT USED			

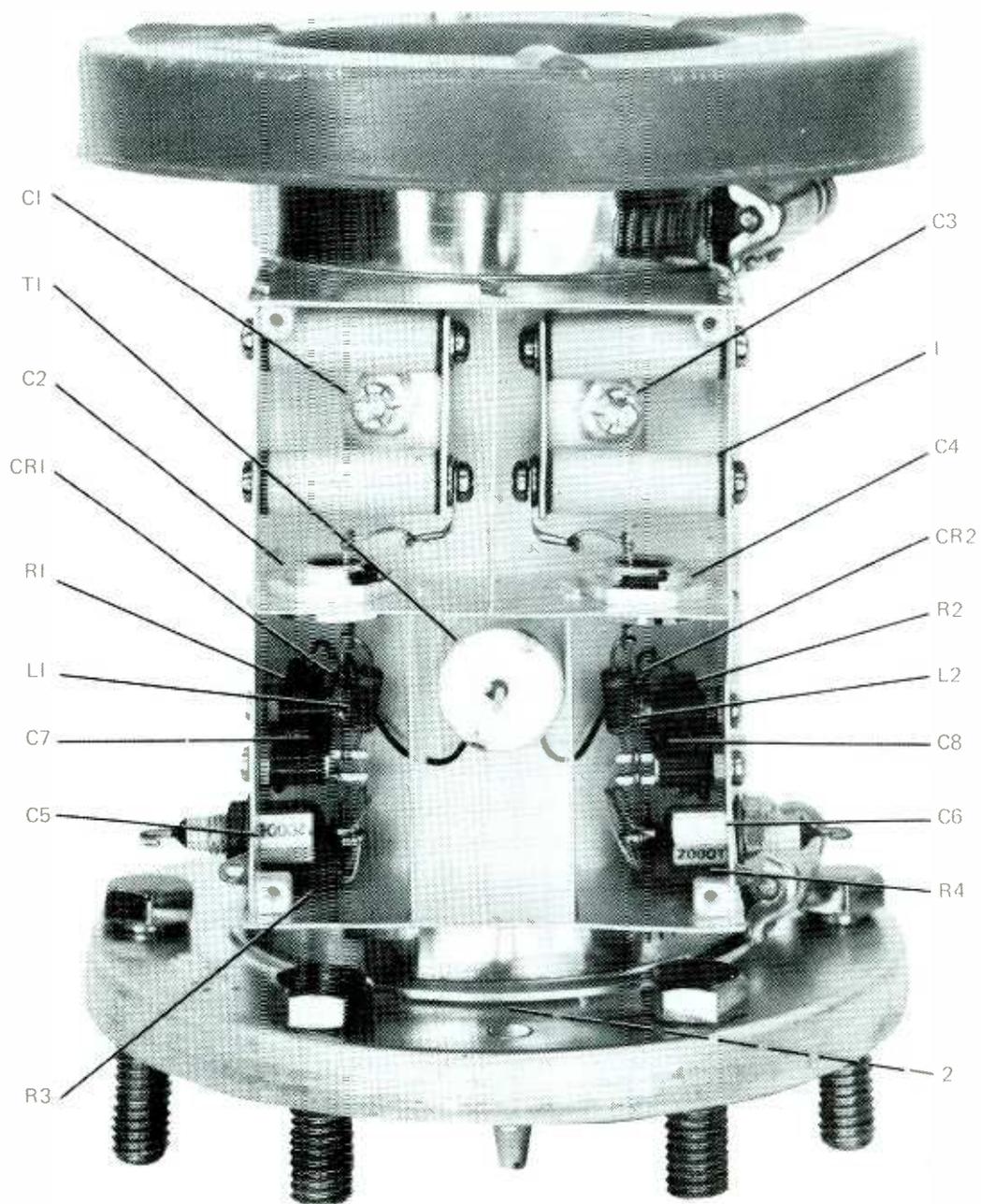
SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
R69	RESISTOR, FXD, WIRE-WOUND 310 OHMS, 5% TOL, 14 WATTS	HL15-3100HMS5PCT	91637	747-0754-C00
TB1 THROUGH	NOT USED			
TB6				
TB7	BOARD, TERMINAL			786-3126-C01
VR1	NOT USED			
VR2	NOT USED			
VR3	DIODE	1N3016B	99942	353-3121-000
VR4	SAME AS VR3			
Z1	NOT USED			
Z2	RECTIFIER	6-2-1B404S3X3	05277	353-0434-C10



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Figure 6-15. Metering Multiplier Board, A15.

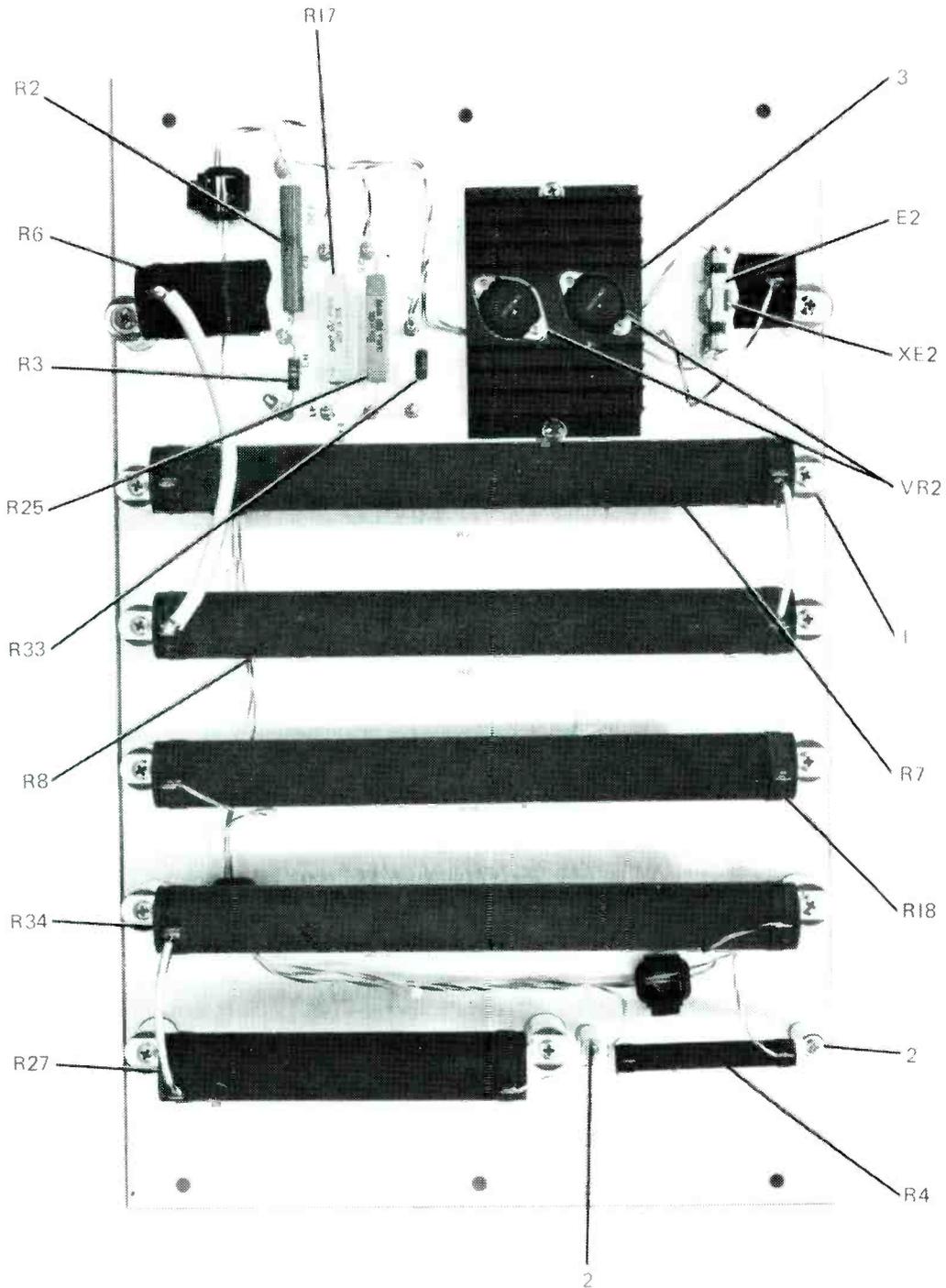
SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
METERING MULTIPLIER BOARD, A15				786-3168-001
C1	CAPACITOR, FXD, CERAMIC 0.01 UF, 20% TOL, 500 VDCW	CK63AW103M	81349	913-1188-000
C2	SAME AS C1			
R1	RESISTOR, FXD, FILM 750 KILOHMS, 1% TOL, 2 WATTS	MEH750K1PCTT2	07716	705-1493-020
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



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Figure 6-16. Directional Coupler, A16.

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
DIRECTIONAL COUPLER, A16				786-3264-001
C1	CAPACITOR			786-3059-001
C2	CAPACITOR, FXD, MICA 250 PF, 2% TOL, 1000 VDCW	66901314A0-251G	72982	912-4133-030
C3	SAME AS C1			
C4	SAME AS C2			
C5	CAPACITOR, FXD, CERAMIC 1000 PF, PLUS 80% MINUS 20%, 500 VDCW	327-029X5T01027	72982	913-1292-000
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	1N5711	07688	353-3691-010
CR2	SAME AS CR1			
L1	COIL, RF 3.3 MH, 10% TOL	#S18130-14	81349	240-0791-000
L2	SAME AS L1			
R1	RESISTOR, FXD, COMPOSITION 33 OHMS, 10% TOL, 3/4 WATT	RCR32G330KS	81349	745-3288-000
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	190-1144-000
2	CONNECTOR ASSY, ELECTRICAL	15093	35844	013-1876-020



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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	NOT USED			
THROUGH R16				
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	G8T1-39K5	75042	745-6817-000
R19	NOT USED			
THROUGH R24				
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	NOT USED			
THROUGH R32				
R33	RESISTOR, FXD, WIRE-WOUND 10 OHMS, 1% TOL, 26 WATTS	RW33V100	91637	747-1646-000
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-	38X3822	71590	190-0025-000
2	STANDOFF, INSULATOR -QTY 2-	E1708	70371	190-1145-000
3	HEAT SINK	1E115583033	41197	352-9866-000

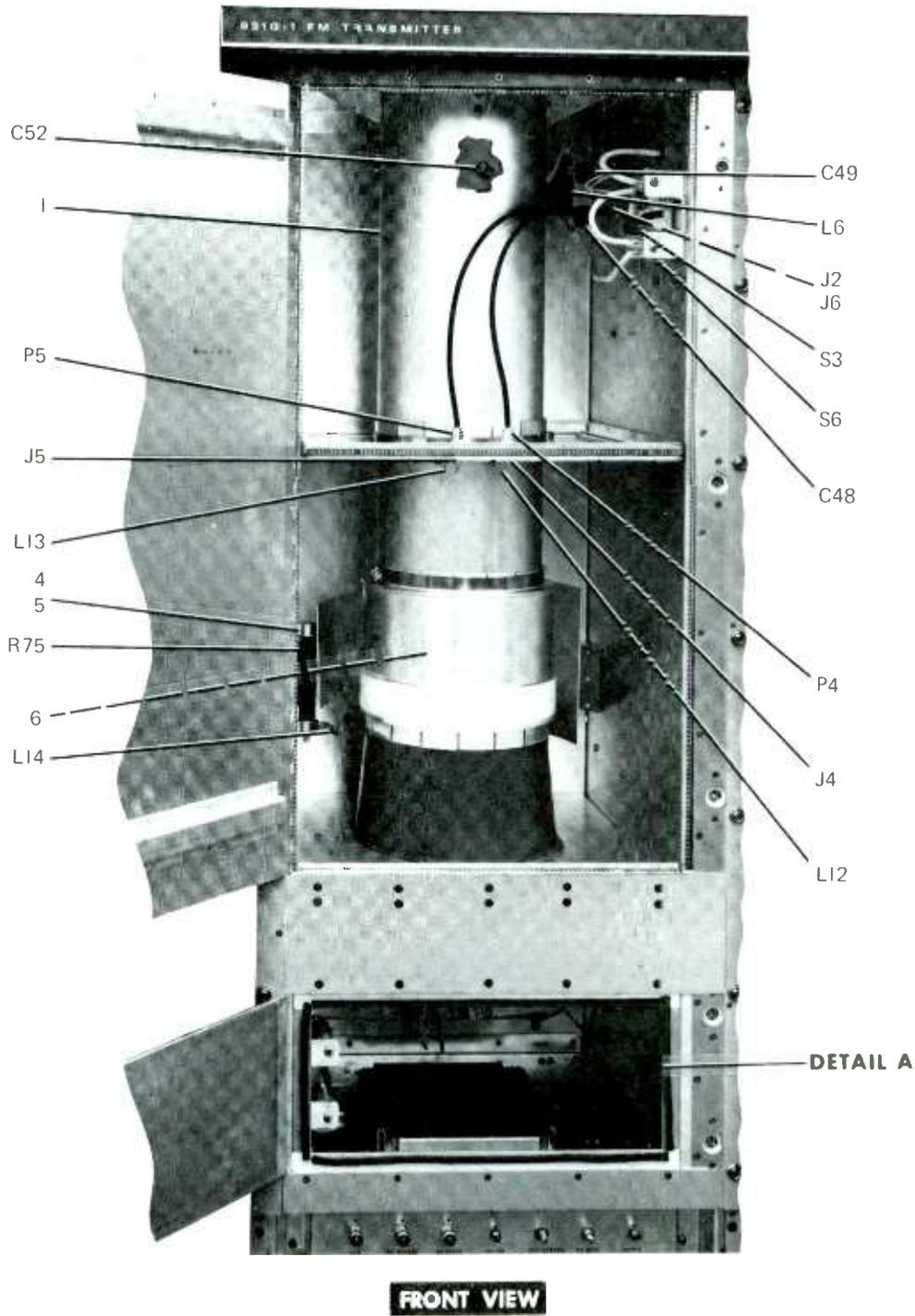
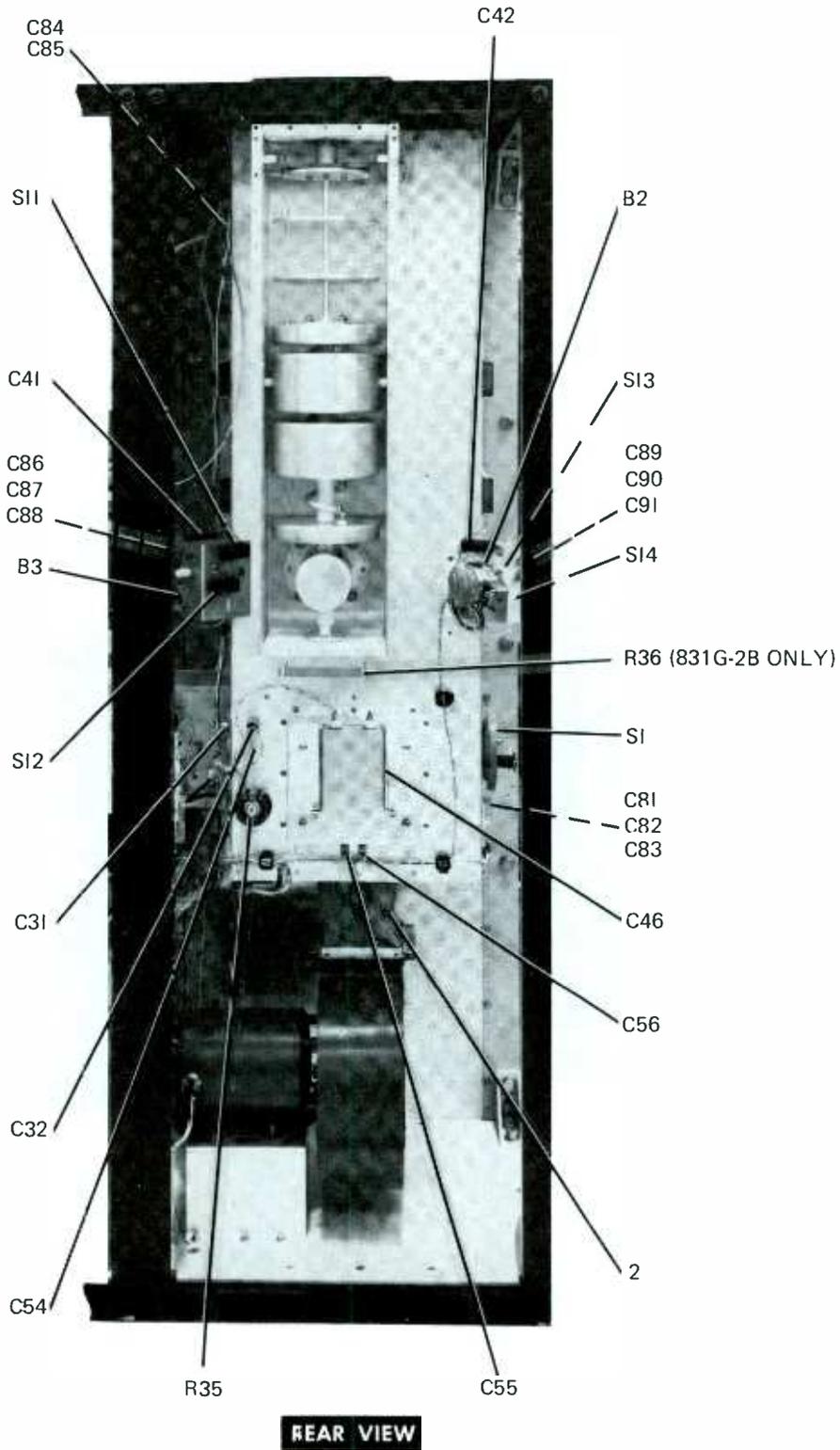


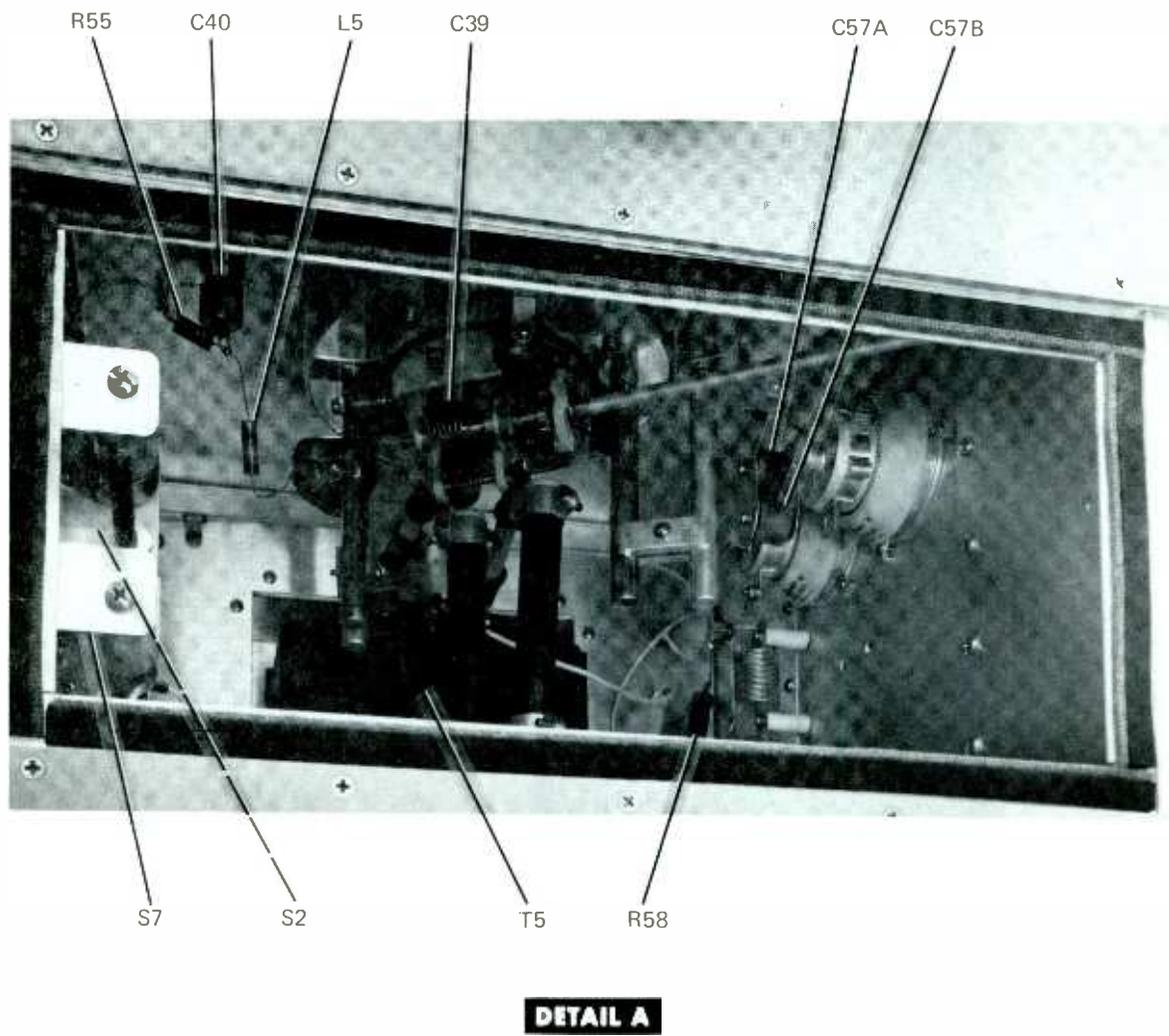
Figure 6-18. Power Amplifier Cavity, A18 (Sheet 1 of 3).

B700 45-4 Pb



B700 395 Pb

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



B700 1086 Pb

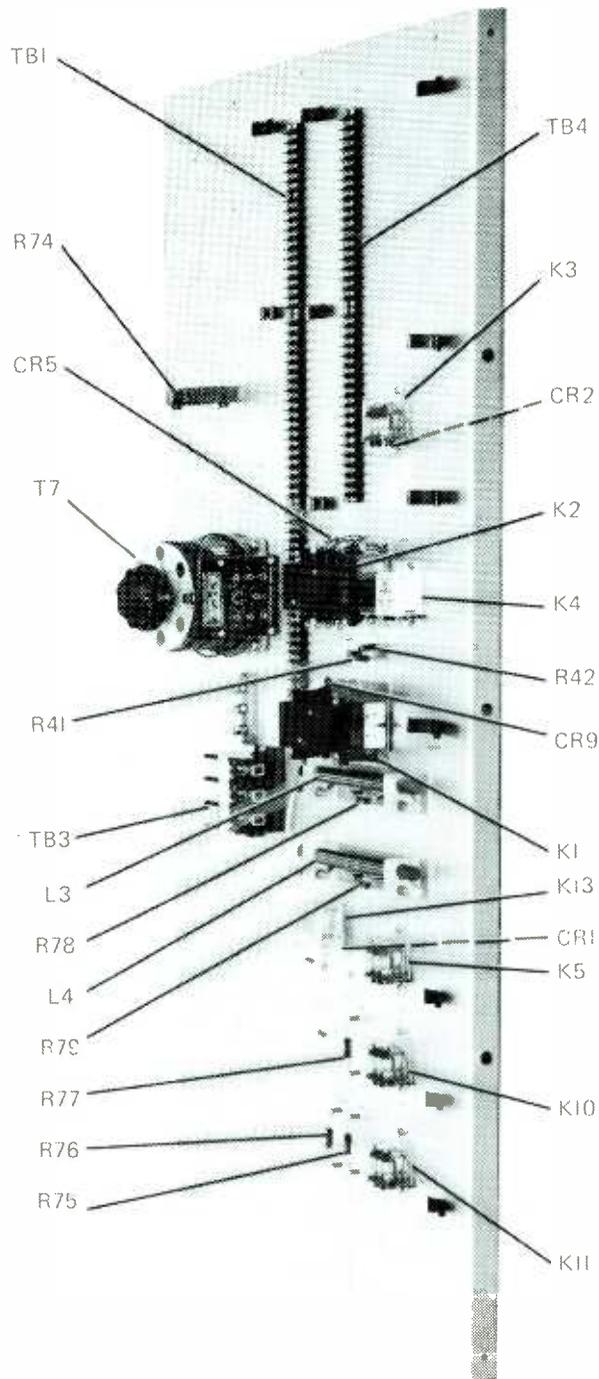
Figure 6-18. Power Amplifier Cavity, A18 (Sheet 3 of 3).

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	T10100	93790	930-0038-000
C47	NOT USED			
C48	CAPACITOR, FXD, CERAMIC 500 PF, PLUS 50% MINUS 20%, 20,000 VDCW	HV50020KV	96095	913-110100
C49	SAME AS C48			
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	2432002X550102M	72982	913-4843-000
C55	CAPACITOR, FXD, PAPER 0.1 UF, 10% TOL, 600 VDCW	C224BKF104	81349	241-0090-000
C56	SAME AS C55			
C57A	CAPACITOR, FXD, CERAMIC 100 PF, 10% TOL, 5000 VDCW	850S100N	71590	913-0821-000
C57B	SAME AS C57A			
C58 THROUGH C80	NOT USED			
C81	CAPACITOR, FXD, CERAMIC 1000 PF, 20% TOL, 600 VDCW	DA858-003	71590	913-0101-000
C82	CAPACITOR, FXD, CERAMIC	CK70AW102M	81349	913-4064-000
C83	NOT USED			
C84	NOT USED			
C85	NOT USED			
C86	CAPACITOR, FXD, CERAMIC 0.1 UF, PLUS 80% MINUS 20%, 500 VDCW	41C92	56289	913-3152-000
C87 THROUGH C91	SAME AS C86			
J1	NOT USED			
J2	CONNECTOR, ELECTRICAL 1 CONTACT	100B3000C75	94375	357-9248-010
J3	NOT USED			
J4	CONNECTOR, ELECTRICAL 1 CONTACT	UG625BU	80058	357-9670-000

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
J5	SAME AS J4			
J6	SAME AS J2			
L1	NOT USED			
THROUGH				
L4				
L5	COIL, RF 4.7 UH	240-0178-000	82142	240-0178-000
L6	CHOKE, RF			786-3548-001
L7	NOT USED			
THROUGH				
L11				
L12	FERRULE, RF, GROUNDING	GSB165	59730	304-0160-000
L13	SAME AS L12			
L14	CHOKE, RF			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	NOT USED			
THROUGH				
R34				
R35	RESISTOR, FXD, WIRE-WOUND 10 KILOHMS, 10% TOL, 50 WATTS	RP151SD103KK	81349	749-1032-000
	RESISTOR, VAR, WIRE-WOUND 1000 OHMS, 10% TOL, 50 WATTS -USED ON 831G-2B-	M22-05-00231SD	81349	749-1026-000
R36	RESISTOR, FXD, WIRE-WOUND 3000 OHMS, 5% TOL, 80 WATTS -USED ON 831G-2B ONLY-	0613	44655	710-9294-000
R37	NOT USED			
THROUGH				
R54				
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	NOT USED			
THROUGH				
R74				
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	SWITCH, SENSITIVE SPDT CONTACT ARRANGEMENT INCLUDES ACTUATOR	MS25253-4	96906	260-0025-000
S3	SAME AS S2	JV9	91929	260-0026-000
S4	NOT USED			
S5	NOT USED			
S6	SHORTING SWITCH INCLUDES SPRING, SHORTING SWITCH STRAP, GROUNDING STRIP, SHORTING CONTACT, SHORTING SHAFT, FLAT, STRAIGHT INSULATOR, STANDOFF	3BX3841	71590	786-3156-001 540-5342-002 542-1768-002 542-1770-002 542-1773-002 542-2242-003 190-0026-000
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			

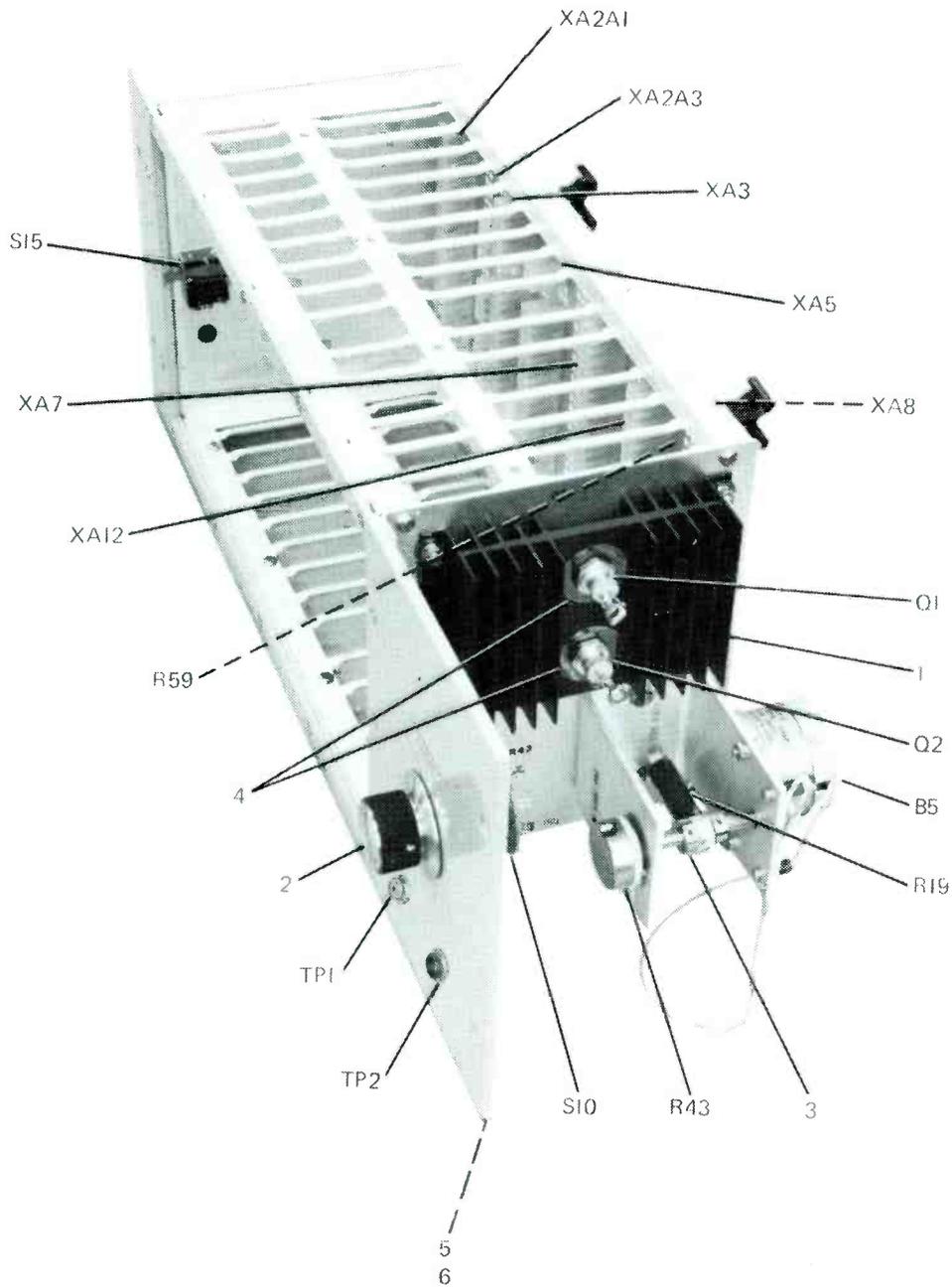
SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
T1 THROUGH T4	NOT USED			
T5	TRANSFORMER, POWER	3-18294	70674	662-0418-010
1	CONDUCTOR, CENTER, CAVITY			786-3124-001
2	DUCT, BLOWER			786-3026-001
3	SHIELD, RF			786-3095-001
4	CERAMIC POST			190-0017-000
	-QTY 2-			
5	CLAMP			516-6730-001
	-QTY 2-			
6	TUBE CLIP			265-9020-000



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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	DIODE	1N645	14433	353-2607-000
CR2	SAME AS CR1			
CR3	NOT USED			
CR4	NOT USED			
CR5	SAME AS CR1			
CR6				
CR7	NOT USED			
CR8				
CR9	SAME AS CR1			
K1	RELAY, CONTACTOR 3A CONTACT ARRANGEMENT	2160B430QA3-4-22 -41XB1860	52090	401-1607-000
K2	RELAY, MAGNETIC 1C CONTACT ARRANGEMENT	2195R50QAXR1920	52090	401-1614-000
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	NOT USED			
K9				
K10	SAME AS K5			
K11	SAME AS K5			
K12	NOT USED			
K13	RELAY, ARMATURE	93-502333-233008	80089	970-2454-270
L1	NOT USED			
L2	NOT USED			
L3	INDUCTOR			786-3677-001
L4	SAME AS L3			
R1				
THROUGH	NOT USED			
R40				
R41	RESISTOR, FXD, COMPOSITION 820 OHMS, 10% TOL, 2 WATTS	RC42GF821K	81349	745-5649-000
R42	SAME AS R41			
R43				
THROUGH	NOT USED			
R73				
R74	RESISTOR, FXD, WIRE-WOUND 0.5 OHMS, 10% TOL, 100 WATTS	3-1-2M45C5	44555	710-5076-050
R75	RESISTOR, FXD, COMPOSITION 500 OHMS, 20% TOL, 60 WATTS	218SP9	10646	712-0070-000
R76	SAME AS R75			
R77	SAME AS R75			
R78	RESISTOR, FXD, COMPOSITION 470 OHMS, 10% TOL, 2 WATTS	RCR42G471KS	81349	745-5638-000
R79	SAME AS R78			
T1				
THROUGH	NOT USED			
T6				
T7	TRANSFORMER, PWR, VARIABLE	225U	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
1	SOCKET, RELAY	93-153-1	80089	220-1399-010
2	BRACKET, RELAY			625-8371-001

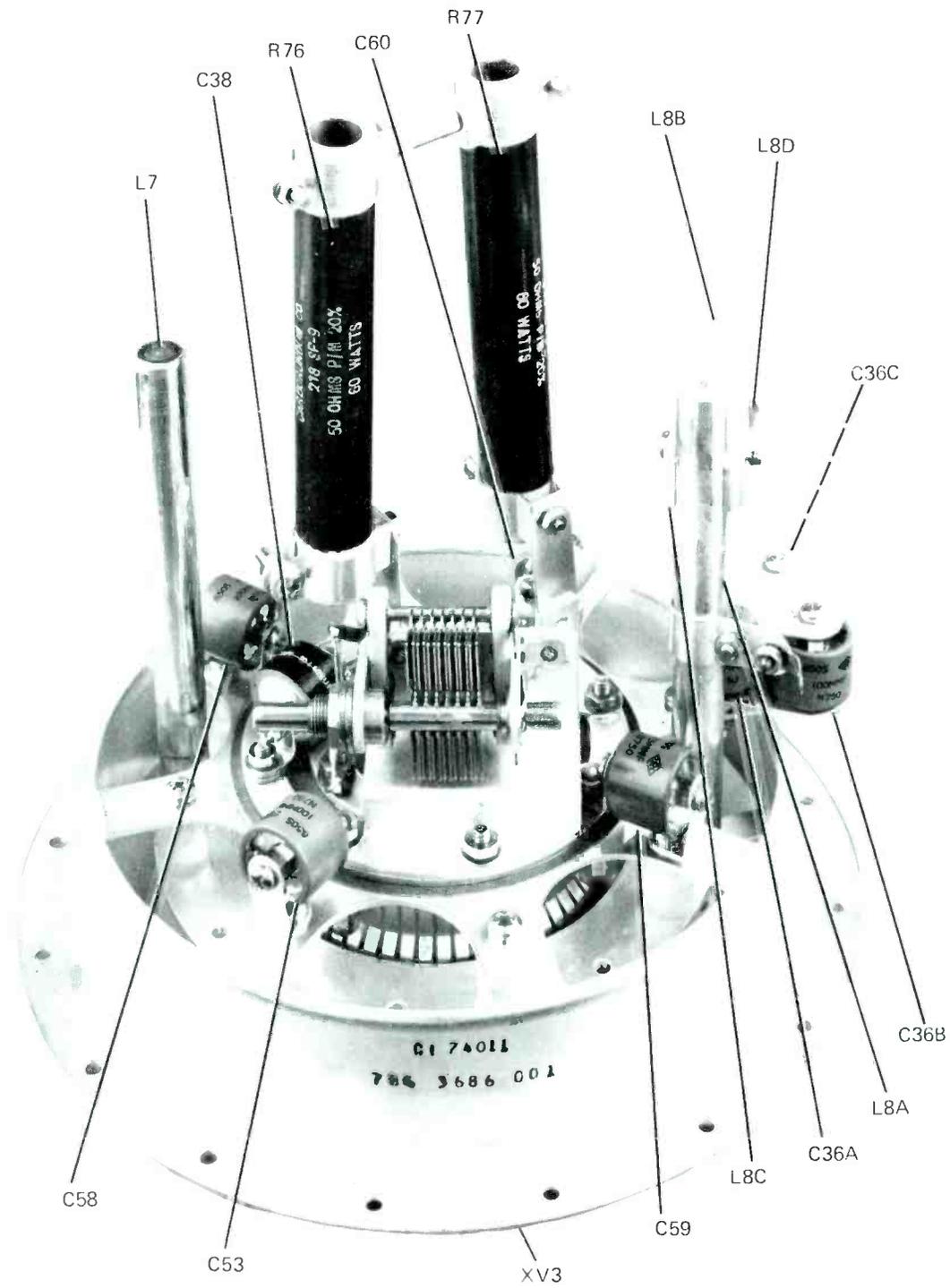


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Figure 6-20. Card Cage Assembly, A20.

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-CC0
R20 THROUGH R42	NOT USED			
R43	RESISTOR, VAR, COMPOSITION 250 OHMS, 10% TOL, 2 WATTS	RV4NAYS0254A	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	64037B	13103	352-9597-C30
2	KNOB, ALUMINUM			757-0233-CC3
3	COUPLING, SHAFT, FLEXIBLE	A201-5N	99934	015-0514-C00
4	KIT, MOUNTING -QTY 2-	PK22-31M	08289	352-9573-020
5	PLASTIC FASTENER FOR COVER			769-0532-003
6	PINS FOR COVER			311-0438-000

parts list



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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			
C36A	CAPACITOR, FXD, CERAMIC 100 PF, 10% TOL, 5000 VDCW	850S100N	71590	913-0821-000
C36B	SAME AS C36A			
C36C	SAME AS C36A			
C37	NOT USED			
C38	CAPACITOR, FXD, CERAMIC 1000 PF, PLUS 40% MINUS 20%, 2500 VDCW	HPB20-BC1000PF	96095	913-2831-000
C39 THROUGH C52	NOT USED			
C53	SAME AS C36A			
C54 THROUGH C57	NOT USED			
C58	SAME AS C36A			
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 50 OHMS, 20% TOL, 6 WATTS	218SP9	10646	712-0070-000
R77	SAME AS R76			
L1 THROUGH L6	NOT USED			
L7	DRIVER PLATE INDUCTOR INCLUDES ROD			786-3110-002
L8	DRIVER LOADING INDUCTOR INCLUDES ROD -A- ROD -B- BAR -C- BAR -D-			786-3110-C02 786-3110-006 786-3283-002 786-3283-001
XV1	NOT USED			
XV2	NOT USED			
XV3	SOCKET, ELECTRON TUBE	Y291	06980	220-1491-000

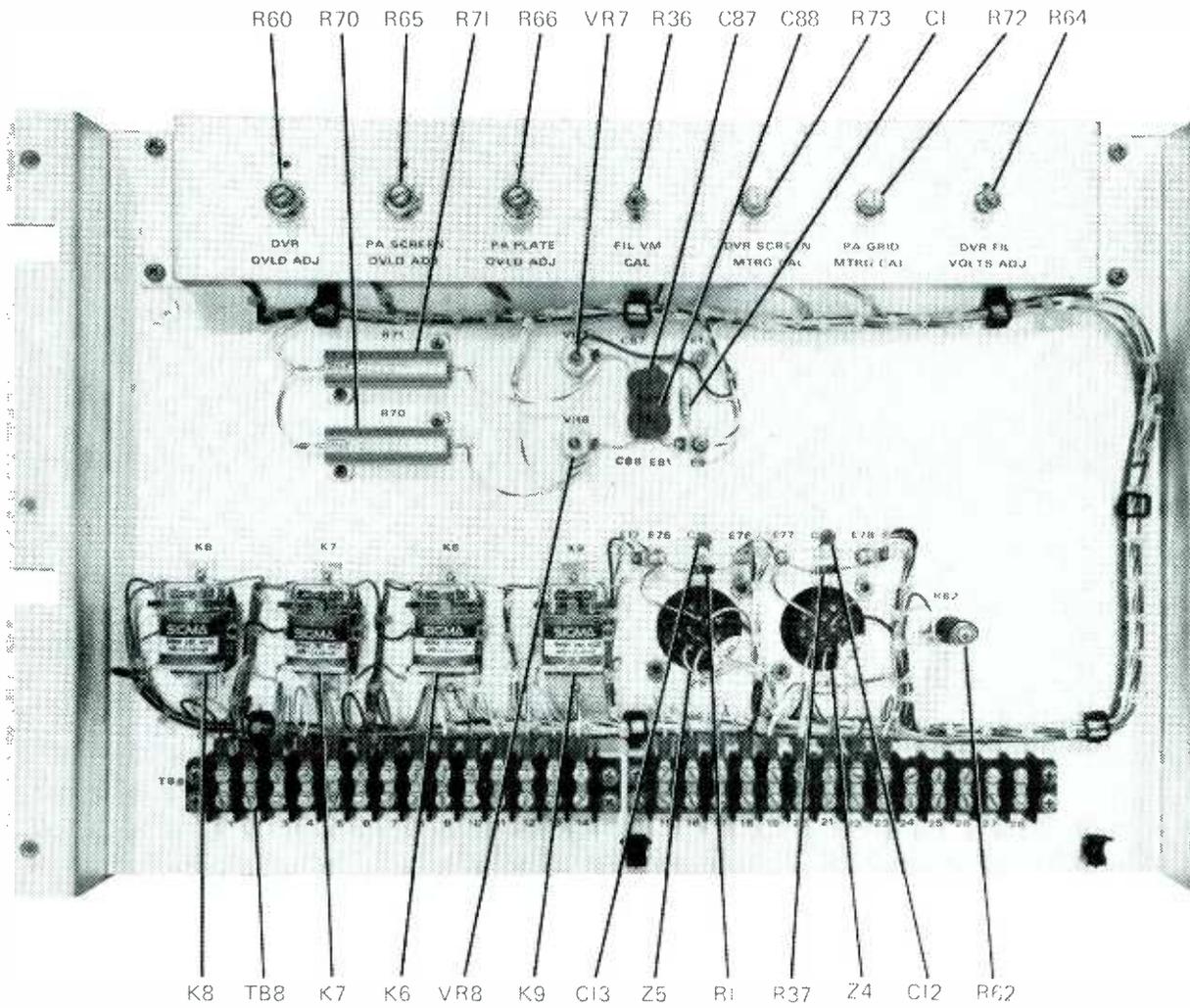
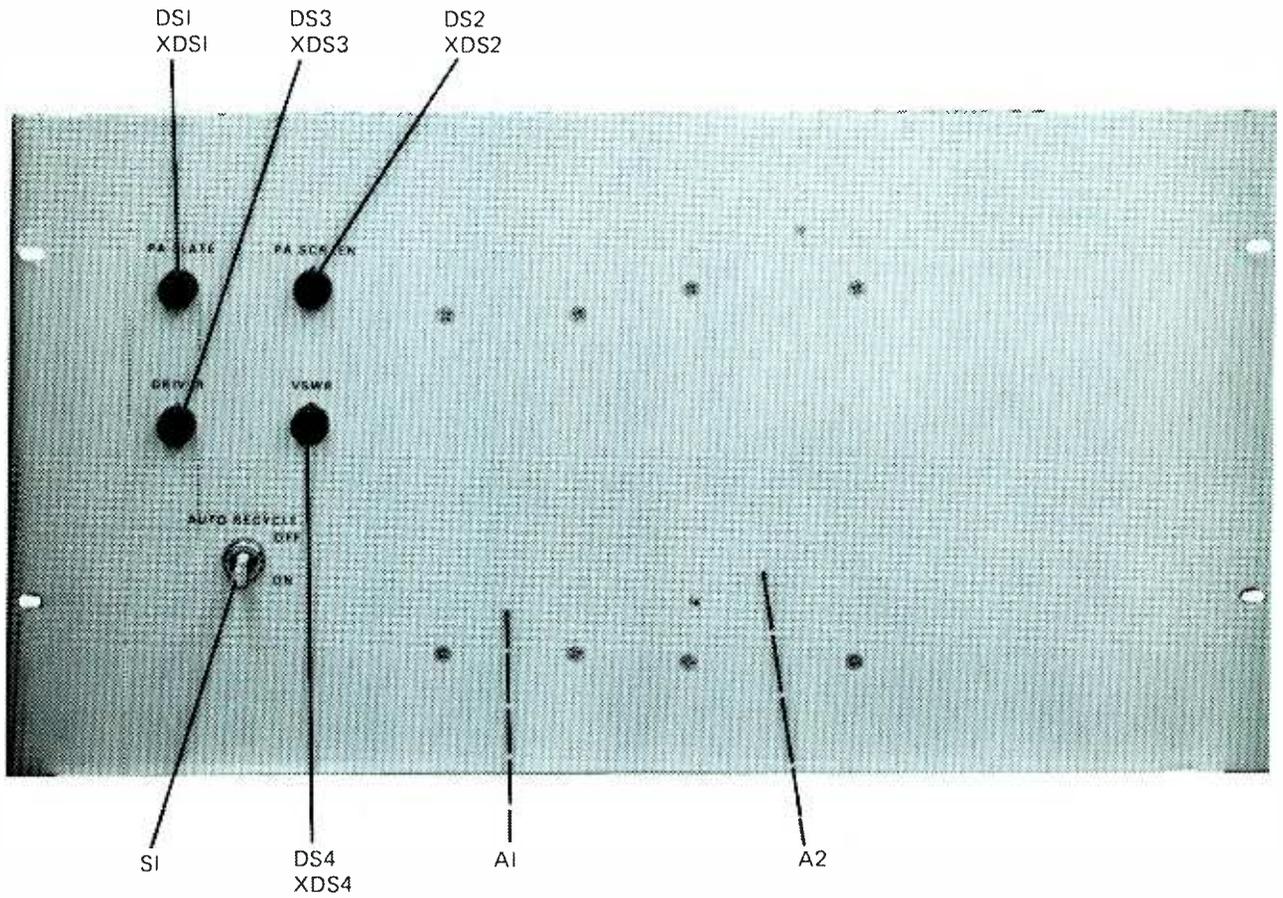


Figure 6-22. Overload and Meter Calibrate Panel, A22.

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 C11	NOT USED			
C12	CAPACITOR, FXD, CERAMIC 1000 PF, 20% TOL, 1000 VDCW	CK60AW102M	81239	913-1136-000
C13	SAME AS C12			
C14 THROUGH C86	NOT USED			
C87	CAPACITOR, FXD, CERAMIC 0.1 UF, PLUS 80% MINUS 20%, 200 VDCW	825-213X5V0104Z	72982	913-3681-000
C88	SAME AS C87			
K1 THROUGH K5	NOT USED			
K6	RELAY, ARMATURE 1 C CONTACT ARRANGEMENT	95062	78277	408-1114-000
K7	SAME AS K6			
K8	SAME AS K6			
K9	SAME AS K6			
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	RV6LAYS253A	81349	380-2292-000
R37	RESISTOR, FXD, COMPOSITION 1000 OHMS, 10% TOL, 1/2 WATT -USED ON 831G-2-	RCR20G102KS	81349	745-1352-000
	RESISTOR, FXD, WIRE-WOUND 10 OHMS, 5% TOL, 3 WATTS -USED ON 831G-2B-	RW69V100	81349	747-5230-000
R38 THROUGH 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	NOT USED			

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
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	NOT USED			
R69	NOT USED			
R70	RESISTOR, FXD, WIRE-WOUND 60.4 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			
TB1 THROUGH TB7	NOT USED			
TB8	BOARD, TERMINAL 14 TERMINALS	14-141	71785	367-4140-000
VR1 THROUGH VR6	NOT USED			
VR7	DIODE	1N1547	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			

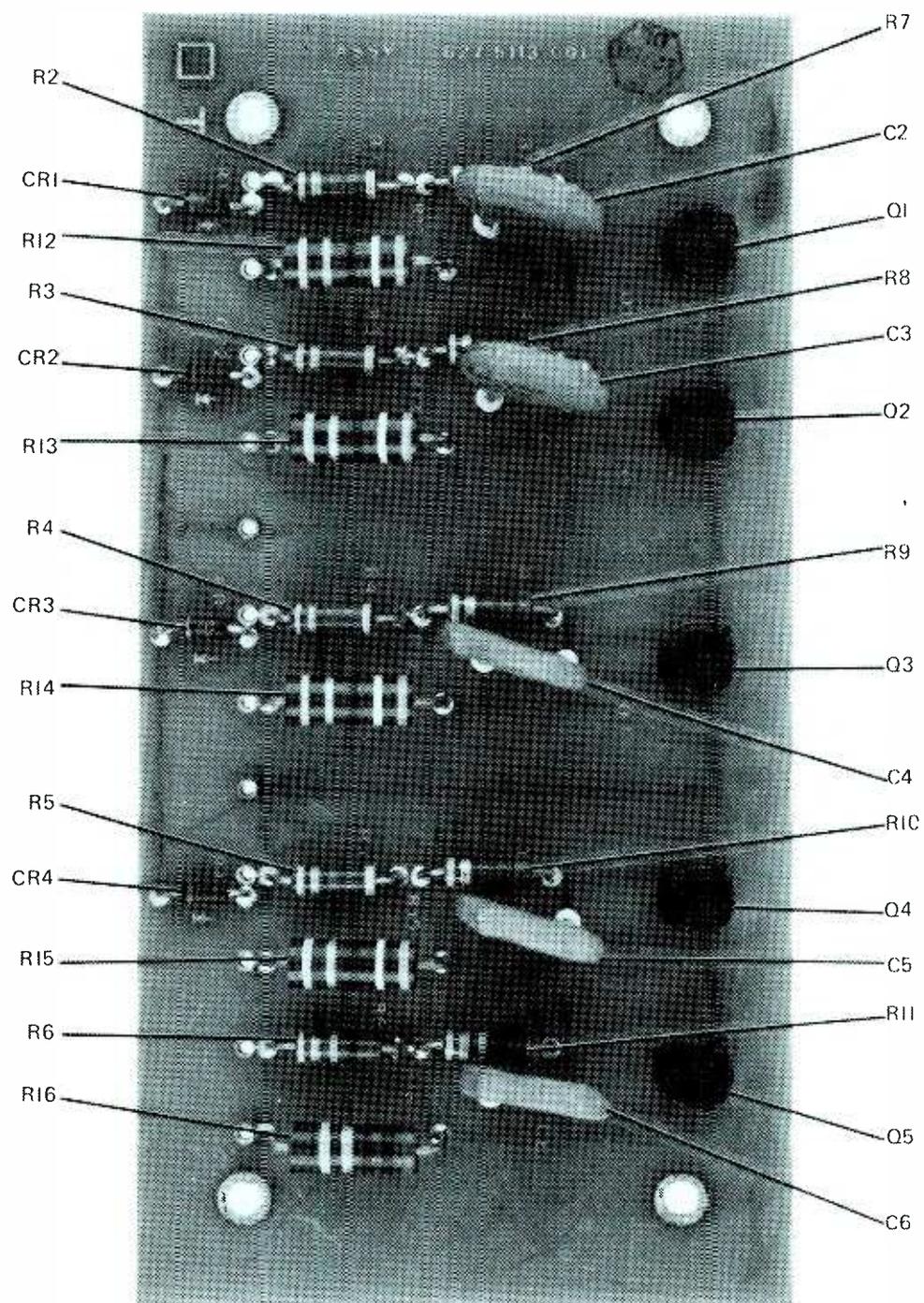


8700 3087 Pb

Figure 6-23. Fault Tally and Automatic Recycle Panel, A24.

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
FAULT TALLY AND AUTOMATIC RECYCLE PANEL, A24				627-5129-001
A1	FAULT TALLY CARD SEE BREAKDOWN ON PAGE 6-69			627-5113-001
A2	AUTO RECYCLE CARD SEE BREAKDOWN ON PAGE 6-71			627-6602-001
DS1	LAMP, INCANDESCENT	MS18209-387	96906	262-0179-010
DS2	SAME AS DS1			
DS3	SAME AS DS1			
DS4	SAME AS DS1			
S1	SWITCH, TOGGLE	81024GB	04009	260-2344-000
XDS1	LIGHT, INDICATOR RED	183-9730-1431-60 2	72619	262-2555-000
XDS2	SAME AS XDS1			
XDS3	SAME AS XDS1			
XDS4	SAME AS XDS1			

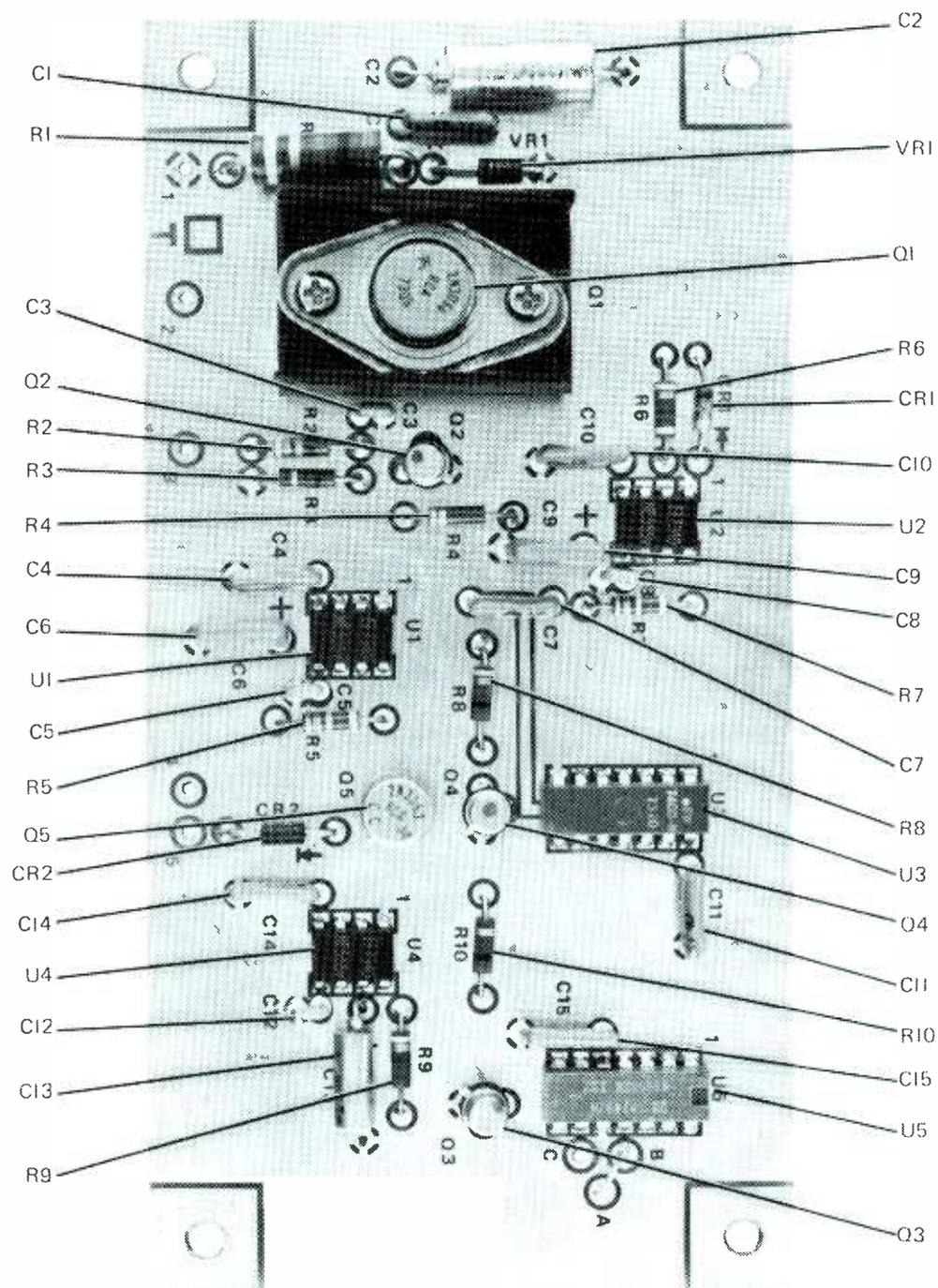


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Figure 6-24. Fault Tally Card, A24A1.

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
FAULT TALLY CARD, A24A1				627-5113-001
C1	NOT USED			
C2	CAPACITOR, FXD, CERAMIC 0.1 UF, PLUS 80% MINUS 20% 200 VDCW	825-213X5V0104Z	72982	913-3681-000
C3 THROUGH C6	SAME AS C2			
CR1	DIODE	1N4003	07688	353-6442-030
CR2	SAME AS CR1			
CR3	SAME AS CR1			
CR4	SAME AS CR1			
Q1	TRANSISTOR			553-6468-000
Q2 THROUGH Q5	SAME AS Q2			
R1	NOT USED			
R2	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/2 WATT	RCR20G472KS	81349	745-1380-000
R3	SAME AS R2			
R4	SAME AS R2			
R5	SAME AS R2			
R6	RESISTOR, FXD, COMPOSITION 10 KILOHMS, 10% TOL, 1/2 WATT	RCR20G103KS	81349	745-1394-000
R7	RESISTOR, FXD, COMPOSITION 220 OHMS, 10% TOL, 1/2 WATT	RCR20G221KS	81349	745-1324-000
R8	SAME AS R7			
R9	SAME AS R7			
R10	SAME AS R7			
R11	SAME AS R6			
R12	RESISTOR, FXD, COMPOSITION 39 OHMS, 10% TOL, 1 WATT	RCR32G390KS	81349	745-3293-000
R13	SAME AS R12			
R14	SAME AS R12			
R15	SAME AS R12			
R16	RESISTOR, FXD, COMPOSITION 100 OHMS, 10% TOL, 1 WATT	RCR32G100KS	81349	745-3268-000

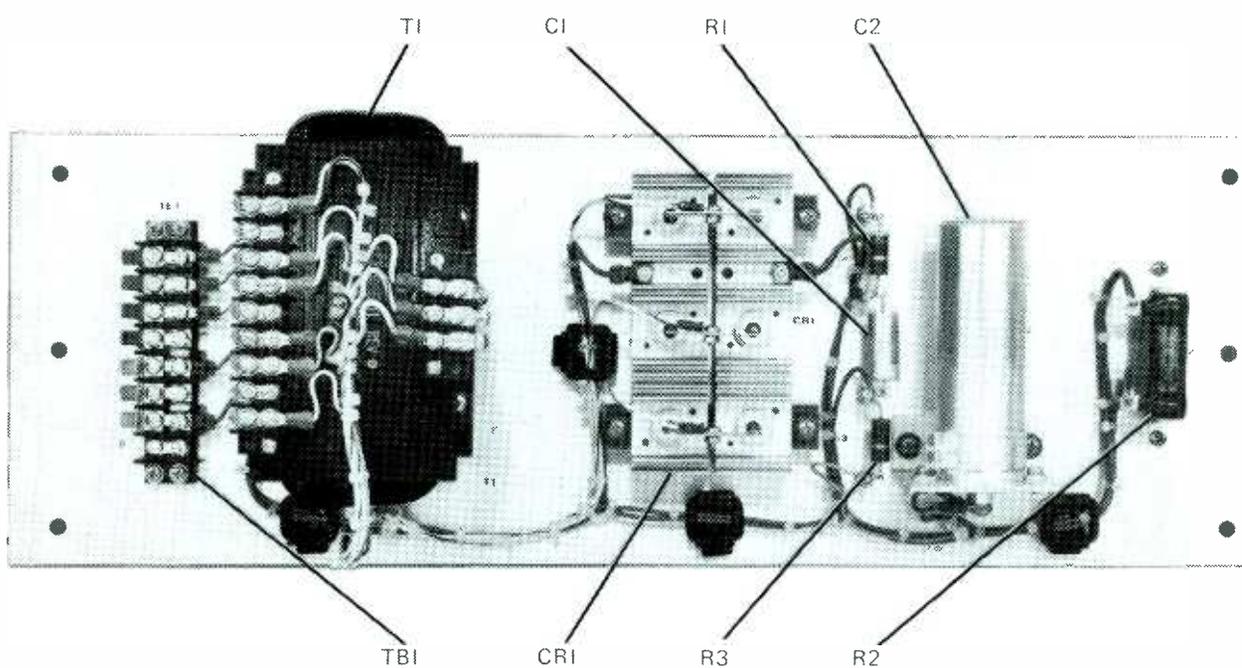


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Figure 6-25. Auto Recycle Card, A24A2.

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
AUTO RECYCLE CARD, A24A2				627-6602-001
C1	CAPACITOR, FXD, CERAMIC 0.1 UF, PLUS 80% MINUS 20%, 25 VDCW	5C7A	56289	913-3806-000
C2	CAPACITOR, FXD, ELECTROLYTIC 100 UF, 20% TOL, 10 VDCW	M39003-01-2022	81349	184-9083-220
C3	CAPACITOR, FXD, CERAMIC 0.01 UF, 20% TOL, 50 VDCW	8121-050-651-103	72982	913-3279-110
C4	SAME AS C1			
C5	SAME AS C3			
C6	CAPACITOR, FXD, CERAMIC 1 UF, PLUS 80% MINUS 20%, 25 VDCW	5C13A	56289	913-3810-000
C7	SAME AS C1			
C8	SAME AS C3			
C9	SAME AS C6			
C10	SAME AS C1			
C11	SAME AS C1			
C12	SAME AS C3			
C13	CAPACITOR, FXD, ELECTROLYTIC 10 UF, 20% TOL, 20 VDCW	M39003-01-2047	81349	184-9083-470
C14	SAME AS C1			
C15	SAME AS C1			
CR1	DIODE	1N914	07688	353-2906-000
CR2	DIODE	1N4003	07688	353-6442-030
Q1	TRANSISTOR	2N3054	07688	352-0581-010
Q2	TRANSISTOR	2N2222	07688	352-0661-023
Q3	SAME AS Q2			
Q4	SAME AS Q2			
Q5	TRANSISTOR	2N3053	07688	352-0613-010
R1	RESISTOR, FXD, COMPOSITION 1000 OHMS, 10% TOL, 1/2 WATT	RCR20G102KS	81349	745-1352-000
R2	RESISTOR, FXD, COMPOSITION 27 OHMS, 5% TOL, 2.6 WATTS	RC09GF270J	81349	745-0285-000
R3	RESISTOR, FXD, COMPOSITION 1000 OHMS, 10% TOL, 1/4 WATT	RCR07G102KS	81349	745-0749-000
R4	RESISTOR, FXD, COMPOSITION 2200 OHMS, 10% TOL, 1/4 WATT	RCR07G222KS	81349	745-0761-000
R5	RESISTOR, FXD, COMPOSITION 470 KILOHMS, 10% TOL, 1/4 WATT	RCR07G474KS	81349	745-0845-000
R6	RESISTOR, FXD, COMPOSITION 4700 OHMS, 10% TOL, 1/4 WATT	RCR07G472KS	81349	745-0773-000
R7	SAME AS R5			
R8	SAME AS R3			
R9	RESISTOR, FXD, COMPOSITION 2200 KILOHMS, 10% TOL, 1/4 WATT	RCR07G225KS	81349	745-0869-000
R10	SAME AS R3			
U1	INTEGRATED CIRCUIT	NE555V	18324	351-1137-020
U2	SAME AS U1			
U3	INTEGRATED CIRCUIT	SN7400N	01295	351-7629-010
U4	SAME AS U1			
U5	INTEGRATED CIRCUIT	SN7492N	01295	351-7643-010



B700 397 Pb

Figure 6-26. 28-Volt Power Supply, PS1.

parts list

SYMBOL	DESCRIPTION	MANUFACTURER'S PART NUMBER	MFR CODE	COLLINS PART NUMBER
28 VOLT POWER SUPPLY, PS1				786-3013-C01
C1	CAPACITOR, FXD, PAPER 0.68 UF, 20% TOL, 200 VDCW	118P68402S1	56289	951-0087-CC0
C2	CAPACITOR, FXD, ELECTROLYTIC 1400 UF, PLUS 100% MINUS 10%, 50 VDCW	CE71C142G	81349	184-2516-CC0
CR1	RECTIFIER	27A611B10H2	94154	353-6327-CC0
R1	RESISTOR, FXD, COMPOSITION 47 OHMS, 10% TOL, 2 WATTS	RC42GF470K	81349	745-5596-CC0
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-CC0
T1	TRANSFORMER, PWR, STEP-DOWN	E14331	80008	664-0096-010
TB1	BOARD, TERMINAL 8 TERMINALS	601-8	75382	367-4080-CC0

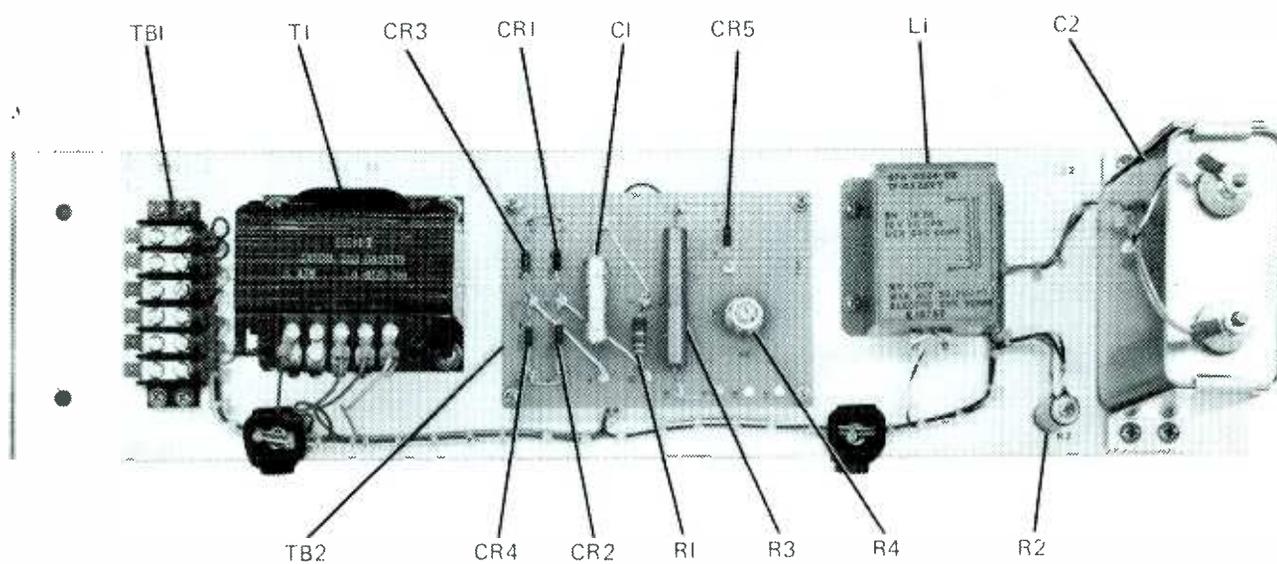


Figure 6-27. PA Bias Power Supply, PS2.

parts list

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 CR2 THROUGH CR5	DIODE SAME AS CR1	1N4586	72699	353-6467-050
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 2500 OHMS, 10% TOL, 2 WATTS	RVLAYS252A	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

