

**BROADCAST AND TELEVISION EQUIPMENT**

122



*Instructions*

RADIO CORPORATION OF AMERICA, Industrial Electronic Products

**Type WP-16B**

**Semiconductor Power Supply**

IB-30558-1

Tmk(s)®

*Rec'd 10/27/61*

## EQUIPMENT LOST OR DAMAGED IN TRANSIT

When delivering the equipment to you, the truck driver or carrier's agent will present a receipt for your signature. Do not sign it until you have (a) inspected the containers for visible signs of damage and (b) counted the containers and compared with the amount shown on the shipping papers. If a shortage or if evidence of damage is noted, insist that notation to that effect be made on the shipping papers before you sign them.

Further, after receiving the equipment, unpack it and inspect thoroughly for concealed damage. If concealed damage is discovered, immediately notify the carrier, confirming the notification in writing, and secure an inspection report. This item should be unpacked and inspected for damage WITHIN 15 DAYS after receipt. Report all shortages and damages to RCA, Broadcast and Television Department, Camden 2, N. J.

Radio Corporation of America will file all claims for loss and damage on this equipment so long as the inspection report is obtained. Disposition of the damaged item will be furnished by RCA.

## REPLACEMENT PARTS AND ENGINEERING SERVICE

RCA field engineering service is available at current rates. Requests for field engineering service may be addressed to your RCA Broadcast Field Representative or the RCA Service Company, Inc., Broadcast Service Division, Camden, N. J. Telephone: WOODLAWN 3-8000.

When ordering replacement parts, please give symbol, description, and stock number of each item ordered.

The part which will be supplied against an order for a replacement item may not be an exact duplicate of the original part. However, it will be a satisfactory replacement differing only in minor mechanical or electrical characteristics. Such differences will in no way impair the operation of the equipment. Parts with no stock numbers are standard components. They are not stocked by RCA and should be obtained from your local electronic parts distributor.

The following tabulations list service parts and electron tube ordering instructions according to your geographical location.

### SERVICE PARTS

LOCATION	ORDER SERVICE PARTS FROM:
Continental United States, including Alaska and Hawaii	RCA Parts and Accessories Department, P.O. Box 654, Camden, New Jersey or through your nearest RCA Regional Office. Emergency orders may be telephoned, telegraphed, or teletyped to RCA Emergency Service, Bldg. 60, Camden, N. J. (Telephone: WO 3-8000).
Dominion of Canada	RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec or through your local Sales Representative or his office.
Outside of Continental United States, Alaska, Hawaii and the Dominion of Canada	RCA International Division, Clark, N. J., U.S.A. or through your local Sales Representative.

### ELECTRON TUBES

LOCATION	ORDER ELECTRON TUBES FROM:
Continental United States, including Alaska and Hawaii	Local RCA Tube Distributor.
Dominion of Canada	RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec or through your local Sales Representative or his office.
Outside of Continental United States, Alaska, Hawaii and the Dominion of Canada	Local RCA Tube Distributor or from: Tube Department RCA International Division 30 Rockefeller Plaza New York 20, New York, U.S.A.

### RETURN OF ELECTRON TUBES

If for any reason, it is desired to return tubes, please return them through your local RCA tube distributor, RCA Victor Co. Ltd., or RCA International Div., depending on your location.

*Please do not return tubes directly to RCA without authorization and shipping instructions.*

It is important that complete information regarding each tube (including type, serial number, hours of service and reason for its return) be given. When tubes are returned, they should be shipped to the address specified on the Return Authorization form. A copy of the Return Authorization and also a Service Report for each tube should be packed with the tubes.

### LIST OF RCA SALES OFFICES

<p><i>Atlanta 3, Georgia</i> 1121 Rhodes-Haverty Bldg. 134 Peachtree St. N.W. JACKSON 4-7703</p>	<p><i>Boston 16, Mass.</i> Room 2301, John Hancock Bldg. 200 Berkley St. HUBBARD 2-5765</p>	<p><i>Camden 2, N. J.</i> Building 15 WOODLAWN 3-8000</p>	<p><i>Charlotte 4, N. C.</i> 504 Charlottetown Mall 333-3996</p>
<p><i>Chicago 54, Ill.</i> 1186 Merchandise Mart Plaza DELAWARE 7-0700</p>	<p><i>Cleveland 15, Ohio</i> 1600 Keith Bldg. CHERRY 1-3450</p>	<p><i>Dallas 35, Texas</i> 7901 Empire Freeway FLEETWOOD 2-3911</p>	<p><i>Detroit 39, Mich.</i> 12605 Arnold St. KENWOOD 4-5100</p>
<p><i>Hollywood 28, Calif.</i> RCA Bldg., 1560 N. Vine St. HOLLYWOOD 9-2154</p>	<p><i>Indianapolis, Ind.</i> 501 N. LaSalle St. MELROSE 6-5321</p>	<p><i>Kansas City 15, Missouri</i> 7711 State Line Road EMERSON 1-6770</p>	<p><i>New York 20, New York</i> 36 W. 49th St. JUDSON 6-3800</p>
<p><i>Paterson, N. J.</i> 495 E. 30th St. MULBERRY 4-0972</p>	<p><i>Portland 5, Oregon</i> 1208 S.W. 14th St. CAPITOL 6-6828</p>	<p><i>San Francisco 2, Calif.</i> 420 Taylor St. ORDWAY 3-8027</p>	<p><i>Seattle, Washington</i> 2250 First Ave., S. MAIN 2-8350</p>
<p><i>Washington 6, D. C.</i> 1725 K St., N.W. FEDERAL 7-8500</p>			

**BROADCAST AND TELEVISION EQUIPMENT**

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**INSTRUCTIONS**

**Type WP-16B  
Semiconductor Power Supply**

**MI-26084B — MI-26094B — MI-26216 — MI-556216**

**MI-26083A — MI-26082A**

**RADIO CORPORATION OF AMERICA  
INDUSTRIAL ELECTRONIC PRODUCTS, CAMDEN, N. J.**

PRINTED IN U.S.A.  
WA 671

IB-30558-1

# FIRST AID

## WARNING

OPERATION OF ELECTRONIC EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE THE EQUIPMENT WITH VOLTAGE SUPPLY ON. UNDER CERTAIN CONDITIONS DANGEROUS POTENTIALS MAY EXIST IN CIRCUITS WITH POWER CONTROLS IN THE OFF POSITION DUE TO CHARGES RETAINED BY CAPACITORS, ETC. TO AVOID CASUALTIES, ALWAYS DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM.

Personnel engaged in the installation, operation and maintenance of this equipment or similar equipment are urged to become familiar with the following rules both in theory and in the practical application thereof. It is the duty of every radioman to be prepared to give adequate First Aid and thereby prevent avoidable loss of life.

## ARTIFICIAL RESPIRATION

(Courtesy of the American Red Cross)

If victim is not breathing, begin some form of artificial respiration at once. Wipe out quickly any foreign matter visible in the mouth, using your fingers or a cloth wrapped around your fingers.

### MOUTH-TO-MOUTH (MOUTH-TO-NOSE) METHOD



Fig. 1

Tilt victim's head back. (Fig. 1). Pull or push the jaw into a jutting-out position. (Fig. 2).



Fig. 2

If victim is a small child, place your mouth tightly over his mouth and nose and blow gently into his lungs about 20 times a minute. If victim is an adult (see Fig. 3), cover the mouth with your mouth, pinch his nostrils shut, and blow vigorously about 12 times a minute.



Fig. 3

If unable to get air into lungs of victim, and if head and jaw positions are correct, suspect foreign matter in throat. To remove it, place victim in position shown in Fig. 4, and slap sharply between shoulder blades.



Fig. 4

Rescuers who cannot, or will not, use mouth-to-mouth or mouth-to-nose technique should use a manual method.

### THE BACK PRESSURE-ARM LIFT (HOLGER-NIELSEN) METHOD

Place victim face-down, bend his elbows and place his hands one upon the other, turn his head slightly to one side and extend it as far as possible, making sure that the chin is jutting out. Kneel at the head of the victim. Place your hands on the flat of the victim's back so that the palms lie just below an imaginary line running between the armpits (Fig. 5).



Fig. 5

Rock forward until the arms are approximately vertical and allow the weight of the upper part of your body to exert steady, even pressure downward upon the hands (Fig. 6).



Fig. 6

Immediately draw his arms upward and toward you, applying enough lift to feel resistance and tension at his shoulders (Fig. 7). Then lower the arms to the ground. Repeat this cycle about 12 times per minute, checking the mouth frequently for obstruction.



Fig. 7

If a second rescuer is available, have him hold the victim's head so that the jaw continues to jut out (Fig. 8). The helper should be alert to detect any stomach contents in the mouth and keep the mouth as clean as possible at all times.



Fig. 8

### RELATED INFORMATION FOR BOTH METHODS

If vomiting occurs, quickly turn the victim on his side, wipe out his mouth, and then reposition him.

When a victim is revived, keep him as quiet as possible until he is breathing regularly. Keep him from becoming chilled and otherwise treat him for shock. Continue artificial respiration until

the victim begins to breathe for himself or a physician pronounces him dead or he appears to be dead beyond any doubt.

Because respiratory and other disturbances may develop as an aftermath, a doctor's care is necessary during the recovery period.

## BURNS

### FIRST DEGREE BURN

SKIN REDDENED. Temporary treatment—Apply baking soda or Unguentine.

### SECOND DEGREE BURN

SKIN BLISTERED. Temporary treatment—Apply baking soda, wet compress, white petroleum jelly, foille jelly, olive oil, or tea.

### THIRD DEGREE BURN

FLESH CHARRED. Temporary treatment—Apply baking soda, wet compress, white petroleum jelly, or foille spray. Treat for severe shock.



Figure 1—Type WP-16B Power Supply (Rack Mounting)

## TECHNICAL SUMMARY

### BASIC REGULATED POWER SUPPLY

#### INPUT

Voltage .....	95 to 130 volts ac or 190 to 260 volts ac
Frequency:	
60 Cycle Unit .....	60 cycles $\pm 1$ cycle per second
50 Cycle Unit .....	50 cycles $\pm 1$ cycle per second
Power Input .....	680 to 700 watts
Efficiency:	
Full Load (1600 ma.) .....	65%
2/3 Load (1000 ma.) .....	55%
1/3 Load (500 ma.) .....	45%
Maximum rate of line current change .....	$2 \times 10^3$ amp./sec.

#### REGULATED OUTPUT

Voltage .....	275 to 290 volts, adjustable
Current (without unregulated supply load) .....	0.0 to 1.6 amperes
Current (with 250 ma unregulated supply load) .....	0.0 to 1.35 amperes
Capacitance Loading .....	Infinite
Stabilization .....	0.05 volt output change for $\pm 18$ volts line change
Long Term Stability .....	Not over 1.0 volt variation
Ripple and Noise .....	Less than 2.5 millivolts peak-to-peak
Regulation .....	Less than 0.1 volt change, 0.0 to 1.6 ampere
Output Impedance .....	0.10 ohm to 2 KC; 0.15 ohm to 50 KC
Short Circuit Load Performance .....	Self protecting normal operation resumed when short is removed
Time Delay .....	45 seconds nominal

#### Semiconductor Complement:\*

Transistor, 1—2N333; 2—2N1040; 4—2N458A; 1—2N1012  
 Diodes, 3—Stock No. 224097; 1—651C4; 1—1N540  
 Rectifier, 1—4JA211CB2AC1.

\*See Parts List for RCA replacement Pts. Stock No. identification.

#### DIMENSIONS

Height .....	7 inches
Width .....	19 inches
Depth .....	13½ inches

#### POWER SUPPLY (Rack Mounting)

7 inches
19 inches
13½ inches
50 pounds

#### FIELD CASE

19 inches
8½ inches
27½ inches
18 pounds

#### WEIGHT

#### STOCK IDENTIFICATION

WP-16B for 60 Cycle AC Operation .....	MI-26084-B
WP-16B for 50 Cycle AC Operation .....	MI-26094-B

### UNREGULATED VOLTAGE PLUG-IN UNIT

Input Voltage .....	From WP-16B basic unit
Output Voltage .....	360, 380, 400, 420 or 460 volts
Output Current .....	250 milliamperes maximum
Regulation .....	1% for 15% change in line voltage
Ripple .....	5 volts peak-to-peak maximum
Mounting Space .....	Plugs into basic WP-16B
Diodes, 2—1N1084	
Stock Identification .....	MI-26082-A

### CENTERING CURRENT PLUG-IN UNIT

Input .....	From WP-16B basic unit
Output .....	300 to 1000 ma (5-ohm load) adjustable regulated, constant current
Mounting Space .....	Plugs into WP-16B basic unit
Diodes, 2—1N1085; 1—651C4	
Transistor, 1—2N458A; 1—2N1040	
Stock Identification .....	MI-26083-A

#### FIELD CASE

Fieldcase for 110 volts, 50/60 cycle operation .....	MI-26216
Fieldcase for 220 volts, 50/60 cycle operation .....	MI-556216

#### DIMENSIONS

See *Dimension* and *Weight* Under Basic Regulated Supply.

## DESCRIPTION

### General

The WP-16B, MI-26084B and MI-26094B, is an all semiconductor power supply capable of supplying current loads from 0 to 1600 milliamperes at 280 volts nominal. An unregulated output of up to 250 milliamperes, 400 volts nominal and a current regulated centering output of up to 1000 milliamperes, are provided by means of plug-in units. The power supply is contained in a 7-inch bathtub chassis for 19-inch rack mounting. MI-26084B operates on a 110 or 220 volts ac 60-cycle power line. MI-26094B operates on 110 or 220 volts ac, 50-cycle.

The front control panel consists of a meter, meter switch, fuse, ON-OFF switch, centering current control and a regulated output voltage control. The meter switch selects meter readings of the regulated and unregulated output voltage, regulated plus unregulated current output, and centering current output. The centering control ( $I_{cen}$  ADJ) varies the amount of centering current output, and the regulated voltage control ( $E_o$  ADJ) varies the regulated voltage output. The nominal regulated voltage range is 275 to 290 volts.

Mounted to the rear of the meter panel is a circuit board which contains the DC Amplifier for the 280-volt regulated supply. Mounted directly to the rear of the circuit board on the main chassis is the regulator driving transistor. The series regulators are mounted on the heat sink which is located on the

front of the bathtub chassis. See Figure 3. All transistors in the regulated supply can be removed from the front of the unit. The main power transformer is mounted on the extreme left side of the main chassis.

The centering and unregulated supplies are separate removable sub-chassis which are accessible from the rear of the regulated power supply chassis. All wiring to these chassis pass through plug-in connectors.

A portable fieldcase is available to accommodate the WP-16B Power Supply for field application. MI-26216 Fieldcase is designed for 110 volt operation on either 50 or 60 cycles. MI-556216 is designed for 220 volt operation on either 50 or 60 cycles.

A shock mount, MI-26511-A5, is available for securing the fieldcase in transit. The side panels of the fieldcase are easily removable to permit access to the basic chassis.

When the power supply is mounted in the fieldcase, the meter and operating controls are located on a recessed panel in the end of the fieldcase (see Figure 2). An input connector, output connector, and a convenience outlet are mounted at the opposite end of the fieldcase. Proper ventilation is maintained by a blower fan mounted inside the fieldcase; also interlock switches for the removable side panels are mounted inside the fieldcase for added circuit protection (see Figure 12).

## CIRCUIT DESCRIPTION

### General

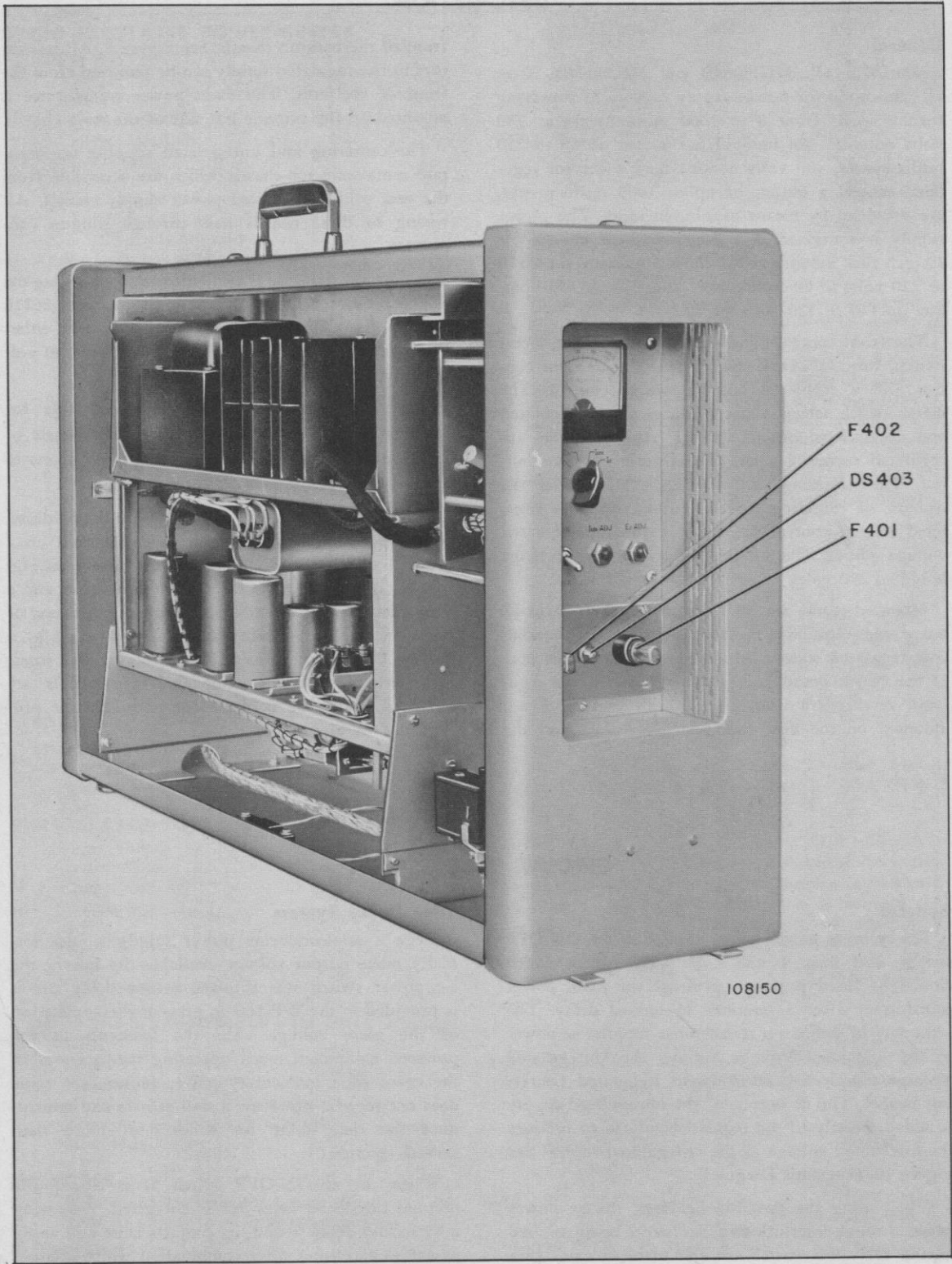
The ac input power is first applied to the ON-OFF switch, and then to the time delay system which closes the fused primary circuit of the main power transformer after a nominal 45 second delay. The secondary of the power transformer supplies ac power to the Regulated Voltage Supply, the Unregulated Voltage Supply and the Current Regulated Centering Supply. The dc output of the unregulated supply is added directly to the regulated voltage to produce the total rated voltage of the unregulated supply. See Figure 10, Schematic Diagram.

When using the portable fieldcase, the ac power passes through interlock switches before being applied to the ON-OFF switch on the main chassis. (See Figure 12, Interconnection Diagram.)

### Time Delay System

Since a semiconductor power supply would normally make output voltage available the instant the a-c power switch was thrown, a time delay circuit is provided in the WP-16B to prevent the application of the plate voltage until the filaments of the powered equipment reach operating temperature. In the event of a momentary power failure, the relay does not recycle; however, it will recycle and reintroduce the time delay for failures of more than several seconds.

When the ac ON-OFF switch S1 is closed, the thermal time-delay relay K1 is energized. Following a 45 second delay period, its contacts close and apply power to a rectifier filter combination which consists of CR2, R11, and C8. The output of this rectifier



**Figure 2—Type WP-16B Power Supply in Fieldcase, Left Side Panel Removed**



is applied to the coil of the main power relay (K2) causing its contacts to close and apply ac to the primary of the power transformer T1.

#### Short Circuit Protection

Under very heavy loads, the power transformer loses its regulation properties and the amount of power it can deliver is very low. It takes a short time for this power reduction to occur, and protection during this time is obtained in the following sequence.

At the first instant of a short circuit, the surge current that flows through the limiting resistors R19 and R22, develops enough voltage to prevent breakdown of the series regulators Q1, Q2 and Q3, the regulator driver Q4, the dc amplifier transistor Q101, and the Zener diode CR101. The drop to zero-output-voltage is sensed by the input dc amplifier which in a few milliseconds drives the regulators into saturation.

The resistance of the regulators then drops to a very low value thereby limiting the regulator collector dissipation to a safe value during the remainder of the surge. The steady state short-circuit-current is approximately 2 amperes.

#### Regulated Supply

The output of the voltage-regulated-secondary of T1 is applied to the bridge rectifier CR1. The rectified dc is then filtered by the capacity input filters consisting of C2, C3, C4, L1, and C1, C9, C10, and C11. The filtered output is then applied to the regulator circuit which operates as follows:

Series regulation is used with the parallel connected series regulator transistors (Q1, Q2, and Q3) in the ground side of the supply. The control of these regulator transistors is accomplished by the transistor dc amplifier, Q101, which senses load variations at the output. Load variations at the output tend to change the output voltage. This change, which represents an error, is sensed by the base of the first dc amplifier Q105. A reference voltage is applied to the emitter of Q105 by the series Zener diodes CR102, CR103 and CR104. In Q105 the error is amplified, inverted, and applied to the base of the second amplifier Q104. Here again inversion takes place.

The collector load of Q104 consists of transistors Q101 and the base circuit of Q102. The base voltage of Q101 is referenced by Zener diode CR101. Thus Q101 acts as a very high ac impedance looking into its collector. However, the dc impedance is comparatively low and allows a nominal dc current to flow through the amplifying transistor Q104. The result is that any change in the Q104 collector current will be forced through the base of the third amplifier Q102, resulting in a very high gain characteristic.

The Q101 emitter resistance is made variable by the D.C. Amplifier Control, R118, to permit adjustment to optimum amplifier operating conditions. This is a factory adjustment and need not be made again under normal conditions. Refer to the Maintenance section of this instruction book for use of this control.

Q102 is an emitter follower (current gain) amplifier whose output drives the emitter follower transistor Q4 which in turn drives the paralleled-series-regulator transistors Q1, Q2, and Q3. The amplified error is applied to the series regulators in such a way as to oppose the error and keep the output nearly constant.

Capacitor C105 improves the high frequency coupling to the base of the input stage which results in the improvement of ripple and high frequency output impedance characteristics. Capacitors C107 and C106 are decoupling capacitors which minimize the possibility of spurious high frequency oscillations.

#### WP-16B Centering Supply

The secondary of T1 drives the full wave rectifier circuit CR301 and CR302. The output from the latter two is filtered by C301 and R301. The filtered output then drives the constant current regulator circuit consisting of Q301 and Q302. The output looks back into the collector of Q301 (high ac impedance); this high source impedance results in the constant current properties of the centering supply. The action of Q301 is increased by the current gain emitter follower Q302 whose base senses the changes in load current which appears as changes in voltage at the junction of R301 and R302.

The emitter of Q302 drives directly the base of Q301. The reference diode CR303 allows good ac coupling to the base of Q302 and also sets a fixed dc potential across the current centering control R13. This control varies the base current of Q302 which changes the current through Q301, thereby varying the current through the load.

#### Unregulated Supply

The secondary of T1 drives the voltage doubler rectifiers CR201 and CR202. The total output voltage is developed across C201 and C202 which are in series. These capacitors along with R202 and C203 comprise the ripple filter network. The unregulated output is added to the regulated output to give the rated unregulated output voltage of the supply. The load current output of the unregulated supply also passes through the series regulators of the regulated supply. Thus the regulated supply must be derated by the amount of load used in the unregulated unit.

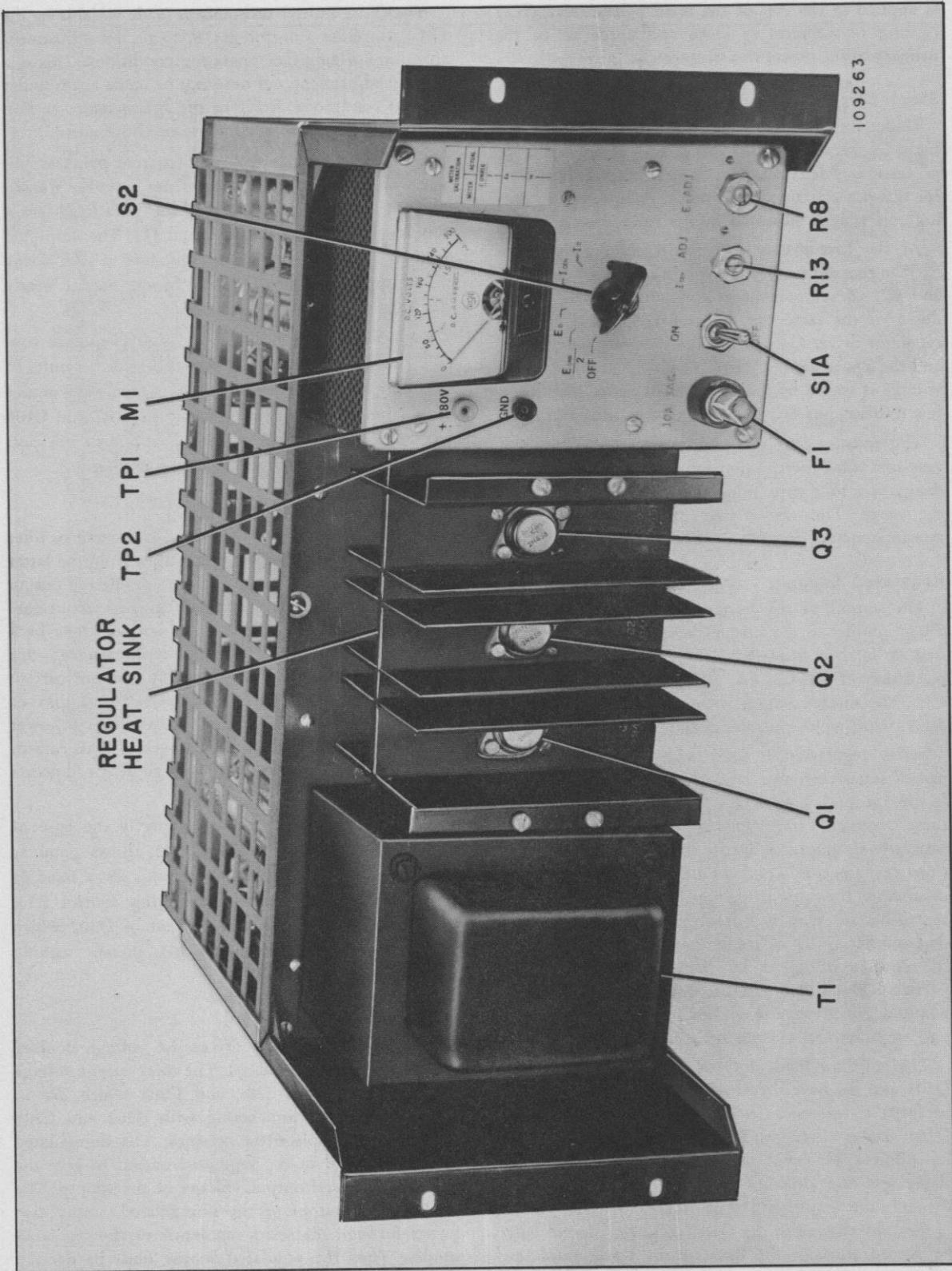


Figure 3—Front View of Power Supply Showing Components and Controls

## INSTALLATION

### Studio Installation

The WP-16B Power Supply is designed to be mounted in a standard 19-inch rack. A total of seven WP-16B power supplies spaced  $1\frac{3}{4}$  inches apart may be mounted in an open rack without forced ventilation. A total of seven power supplies spaced  $1\frac{3}{4}$  inches apart may be mounted in a cabinet with front and rear doors closed, when adequate forced ventilation is used.

### 220 Volt Operation

The WP-16B power supply is factory wired for 110 volt operation. When 220 volt operation is required, the following changes must be made. (Refer to Schematic Diagram, Figure 10):

*CAUTION: Remove all power from unit before touching any components.*

1. Remove jumpers from terminals 1 and 3, and terminals 2 and 4 of TB1.
2. Then connect a jumper between terminals 2 and 3 of TB1.
3. Remove jumper between pins 1 and 7 of XK1; this completes the changes for 220 volt operation.

### Fieldcase Installation

When it is desired to mount the basic chassis into the fieldcase, the following procedure is recommended. Refer to Figure 11, Installation Drawing, and Figure 12, Interconnecting Diagram. Also refer to the LIST OF CONTENTS of Master Items for MI-26216 or MI-556216.

1. Remove the red protective cover from the WP-16B Power Supply.
2. Remove the four screws that hold the four DC Amplifier mounting spacers to the chassis. Remove the perforated shield fastened by two screws. Remount

DC Amplifier panel as shown, using the screws previously removed.

3. Replace two screws removed nearest the end of the chassis with two screws (item 5E), two lockwashers (item 5G) and two nuts (item 5I).

4. Remove hardware that fastens output connector bracket to sub chassis. Remove mounting hardware from connectors J1, J4 and J5 and then mount connectors J1, J4 and J5 on new plate (item 3) using the same mounting hardware.

5. Assemble support plates (item 3 and item 4) as shown with hardware—4 screws (item 5C), 4 lockwashers (item 5F).

6. From the DC amplifier panel, remove and save the selector switch knob and the two locking nuts only of the  $I_{cen}$  and  $E_o$  screwdriver potentiometers. Then remove the four mounting screws that hold the DC amplifier on the four mounting spacers.

7. Mount panel (item 2) using hardware—4 screws (item 5D), 4 lockwashers (item 5G).

8. Replace selector switch knob and two locking nuts that were removed and saved in step 6.

9. Power supply is now ready to be installed into fieldcase. Slide power supply into runners and mount with hardware—4 screws (item 5A).

10. Fasten the support brackets (item 3 and item 4) to support brackets in the fieldcase with hardware—4 screws (item 5B), 4 lockwashers (item 5F), 4 washers (item 5J).

11. Connect and solder six leads from cable to the fuse holder and lamp socket per interconnection diagram (fig. 12). Lead markings should match wire numbers on the interconnection diagram.

12. Plug P403 into J1 and plug P405 into J4 or J5.

## OPERATION

The operation of the WP-16B Power Supply is relatively simple. Once the unit is turned on and the proper settings are made, there is no further need for close attention. The following procedure should be observed:

Turn on the ON-OFF switch. Wait for the time delay relay to close; place the selector switch in the  $E_o$  position, and adjust the  $E_o$  ADJ for 280 volts on

meter M1. Use the correction chart mounted on the front panel of the Power Supply when precise voltage readings are desired.

Switch to  $I_{cen}$  position and adjust  $I_{cen}$  (if used) to the desired current.  $I_o$  and  $E$  unregulated can be monitored by selecting the appropriate meter switch position.

## MAINTENANCE

Under normal conditions no adjustments are necessary when transistors are replaced. However, if desired, optimum ripple and impedance performance can be obtained by readjustment of the D.C. AMPL ADJ control (R118). To determine whether this adjustment is necessary, proceed as follows:

1. Provide a fixed external dc load of 1.5 amps for a setting of 290 volts of regulated voltage (no unregulated load).

2. Observe ripple. If 2 millivolts peak-to-peak or less appear, no further adjustment is necessary. If ripple is greater than 2 millivolts peak-to-peak, proceed to step 3.

3. Adjust the D.C. AMPL ADJ control (R118) for minimum ripple.

4. Adjust the  $E_o$  ADJ (on front panel) for a meter reading of 280 volts, and resume normal operation.

Should it become necessary to replace CR102, CR103 or CR104, it is recommended that the replacement Zener diodes be ordered from RCA Replacement Parts under stock number 224097. This diode is electrically similar to a 1N429 with the exception of an added specification for low level noise.

In all cases of trouble shooting and component changes, refer to the *Parts List* and *Schematic Diagram*.

## NOTES

**WP-16B POWER SUPPLY DC VOLTAGE MEASUREMENTS**

Measurements made with Senior Voltohmyst WV-98A; all voltages are made with respect to chassis ground unless otherwise stated.

**Measurement Conditions**

E <sub>o</sub> Regulated .....	280 volts
I Regulated .....	1.350 ampere
E <sub>u</sub> Unregulated .....	Set on 400 v tap of transformer
I Unregulated .....	250 milliamps
I Centering .....	0.5 ampere into 10-ohm load

**REGULATED SUPPLY CHASSIS**

<i>Location</i>		<i>Voltage</i>
<b>Main Chassis</b>		
Q1	E	- 0.57
	B	- .75
	C	-25.0
Q2	E	- 0.55*
	B	- 0.75
	C	-25.0
Q3	E	- 0.58
	B	- .75
	C	-25.0
Q4	E	- .75
	B	- .87
	C	-24.5
C1	(-)	-29.5
<b>Circuit Board</b>		
Q101	E	-19.5
	B	-19.5
	C	- 0.92
Q102	E	- 0.82
	B	- 0.92
	C	- 0.23
Q104	E	30.5
	B	30.0
	C	92.0

**REGULATED SUPPLY CHASSIS (Cont)**

<i>Location</i>		<i>Voltage</i>
<b>Circuit Board (Cont)</b>		
Q105	E	19.5
	B	20.0
	C	30.0
Across CR101		5.0
Jct. R115-R116-R109		31.0
<b>CENTERING SUPPLY CHASSIS</b>		
<b>Sub Assembly</b>		
Q301	E	7.0
	B	6.7
	C	0.0
Q302	E	6.8
	B	6.7
	C	0.0
Across C301		18.0
Across C302		5.0
Across CR303		5.0
<b>UNREGULATED SUPPLY CHASSIS</b>		
<b>Sub Assembly</b>		
Across C203		370.0

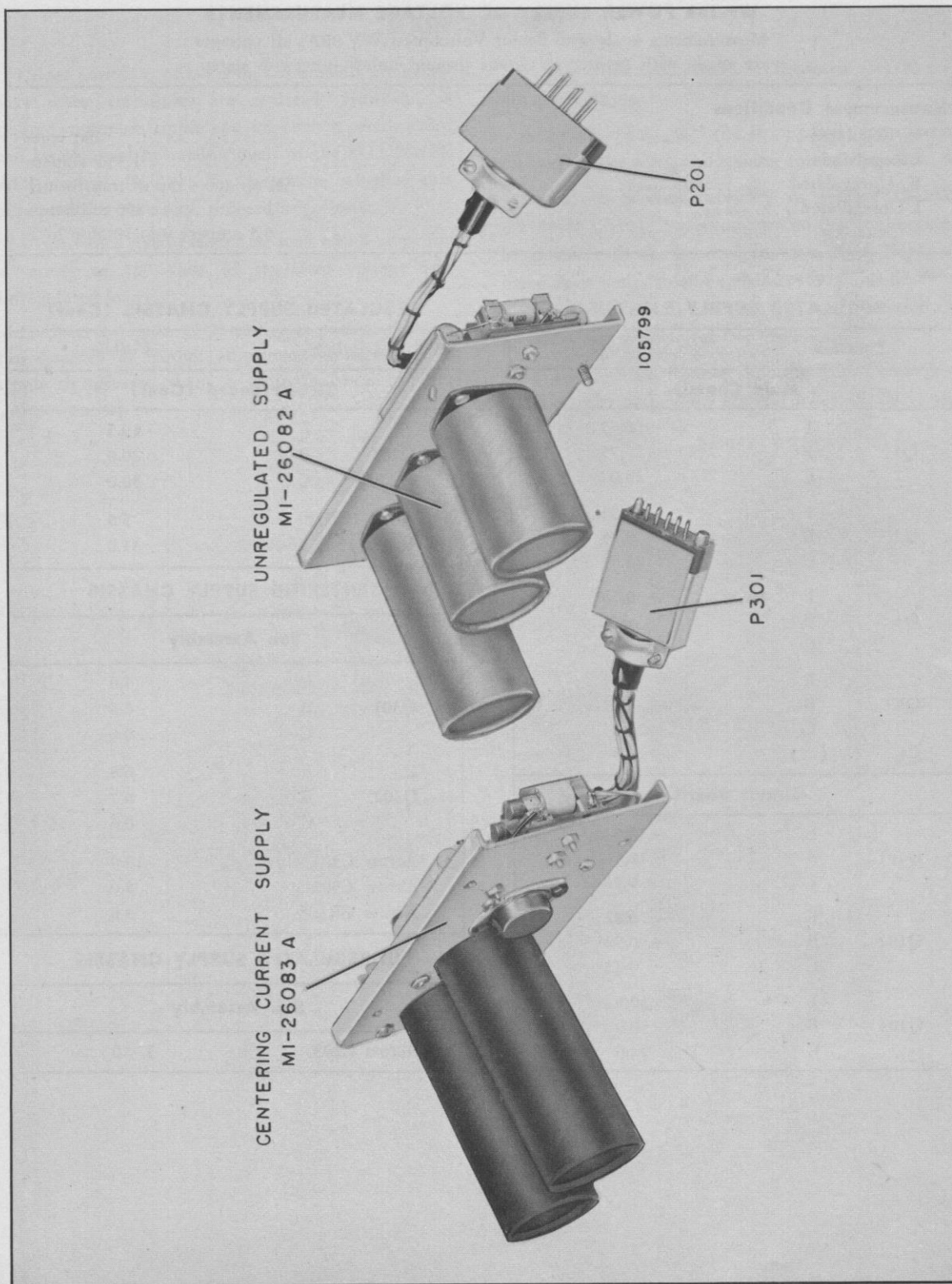


Figure 4—Plug-in Units of Type WP-16B Power Supply

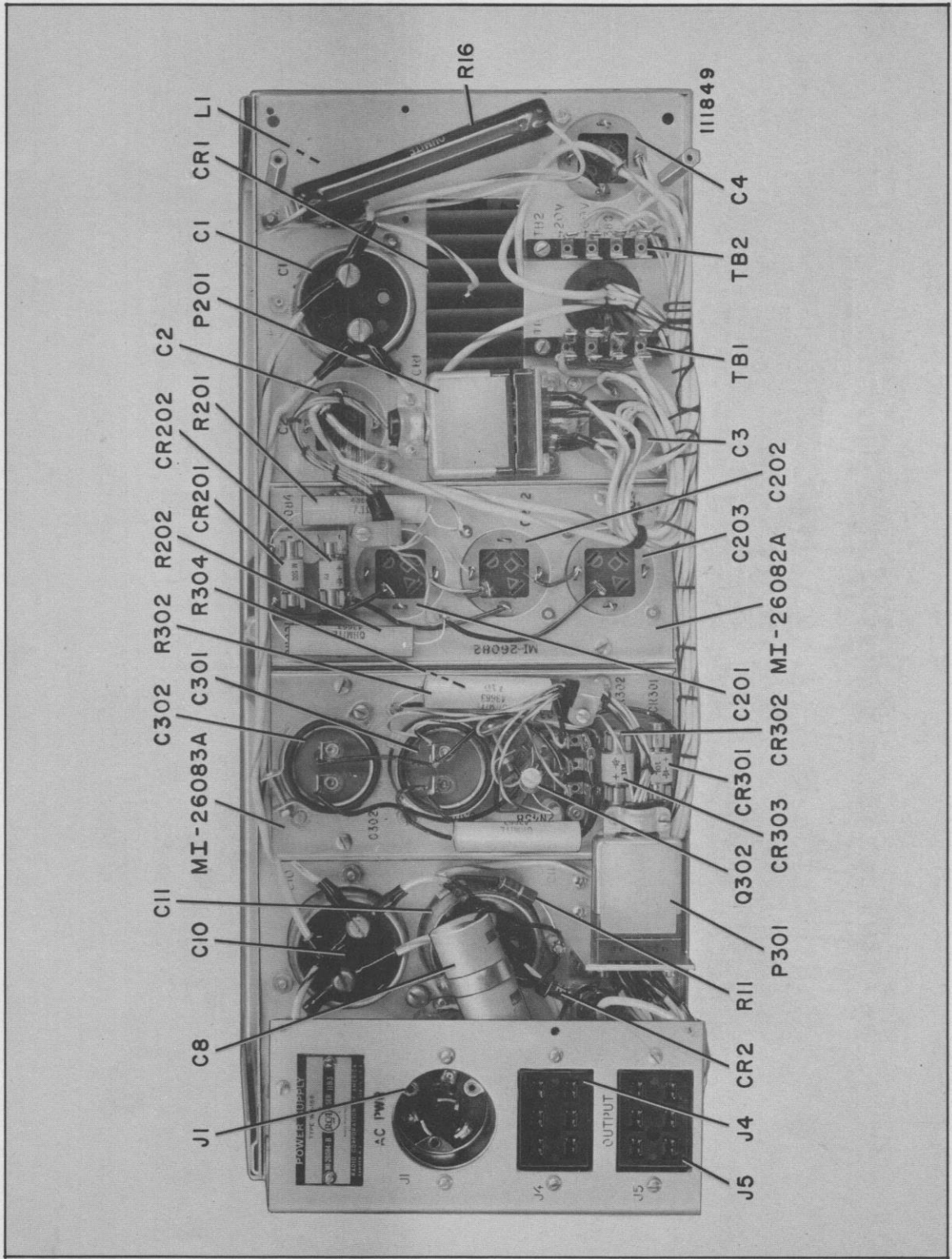


Figure 5—Rear View of Power Supply Showing Component Location

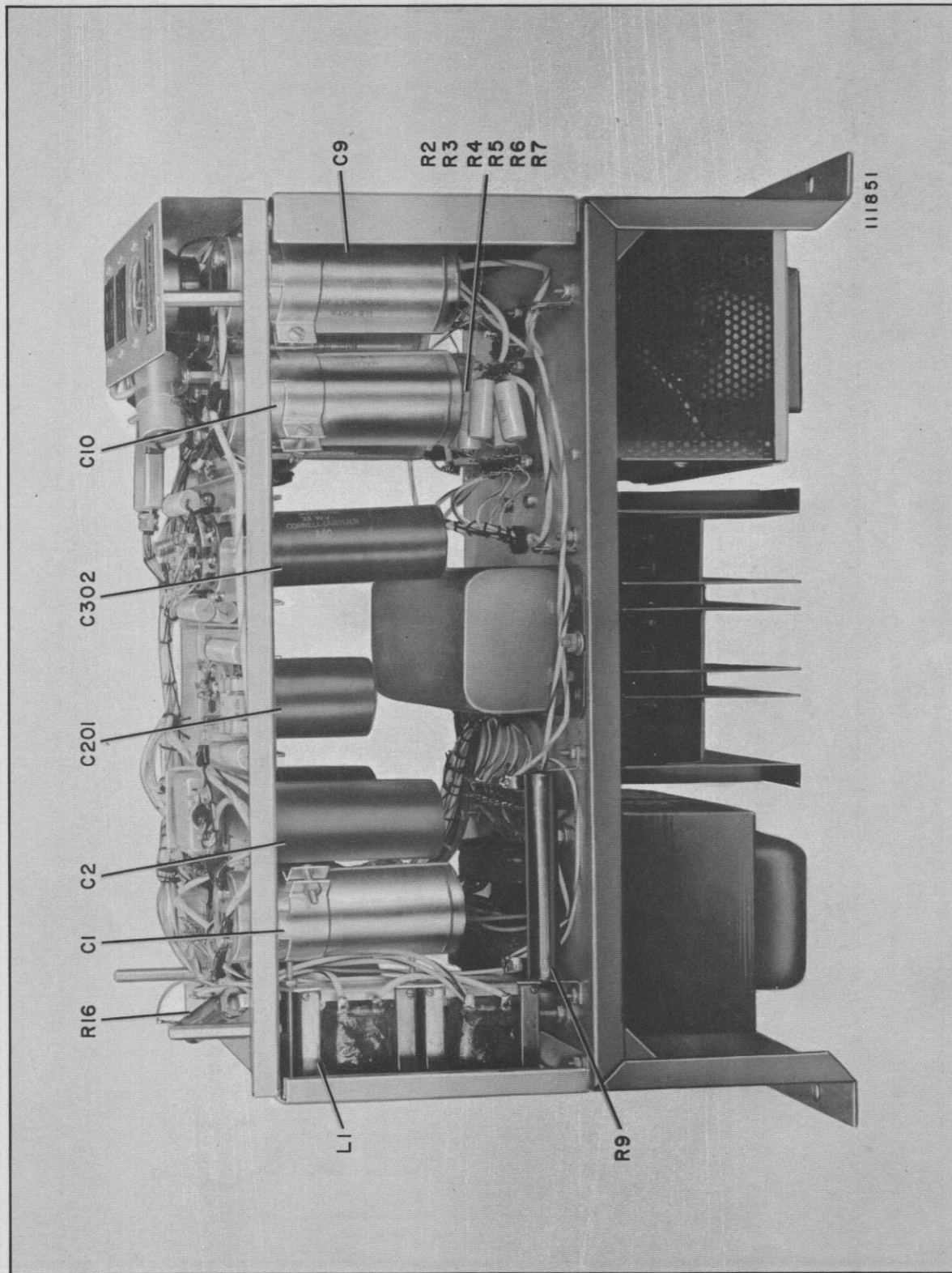


Figure 6—Top View of Power Supply Showing Component Location



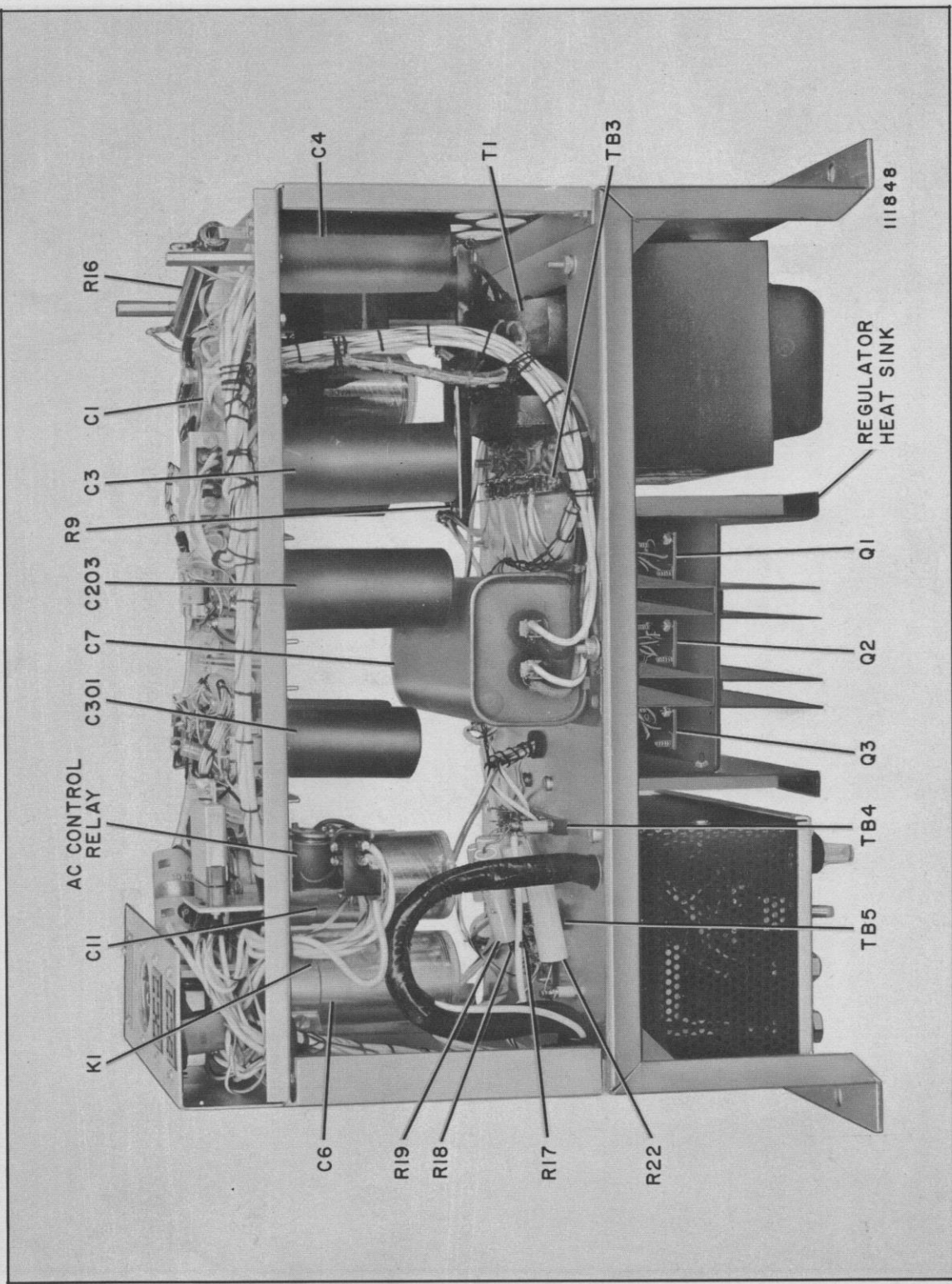
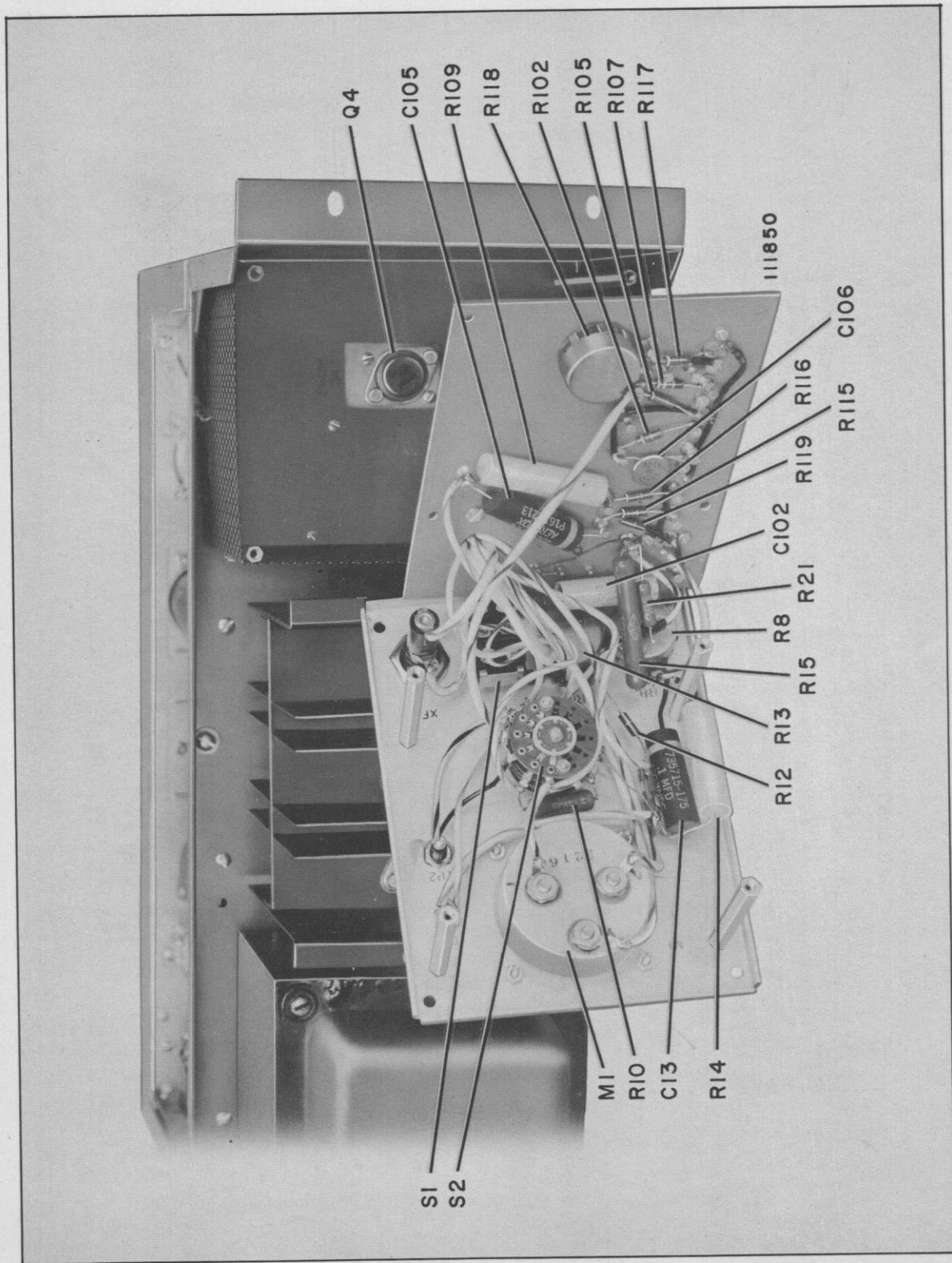


Figure 7—Bottom View of Power Supply Showing Component Location



**Figure 8—Exposed View of Components on Assembly Board and Front Panel of WP-16B Power Supply**

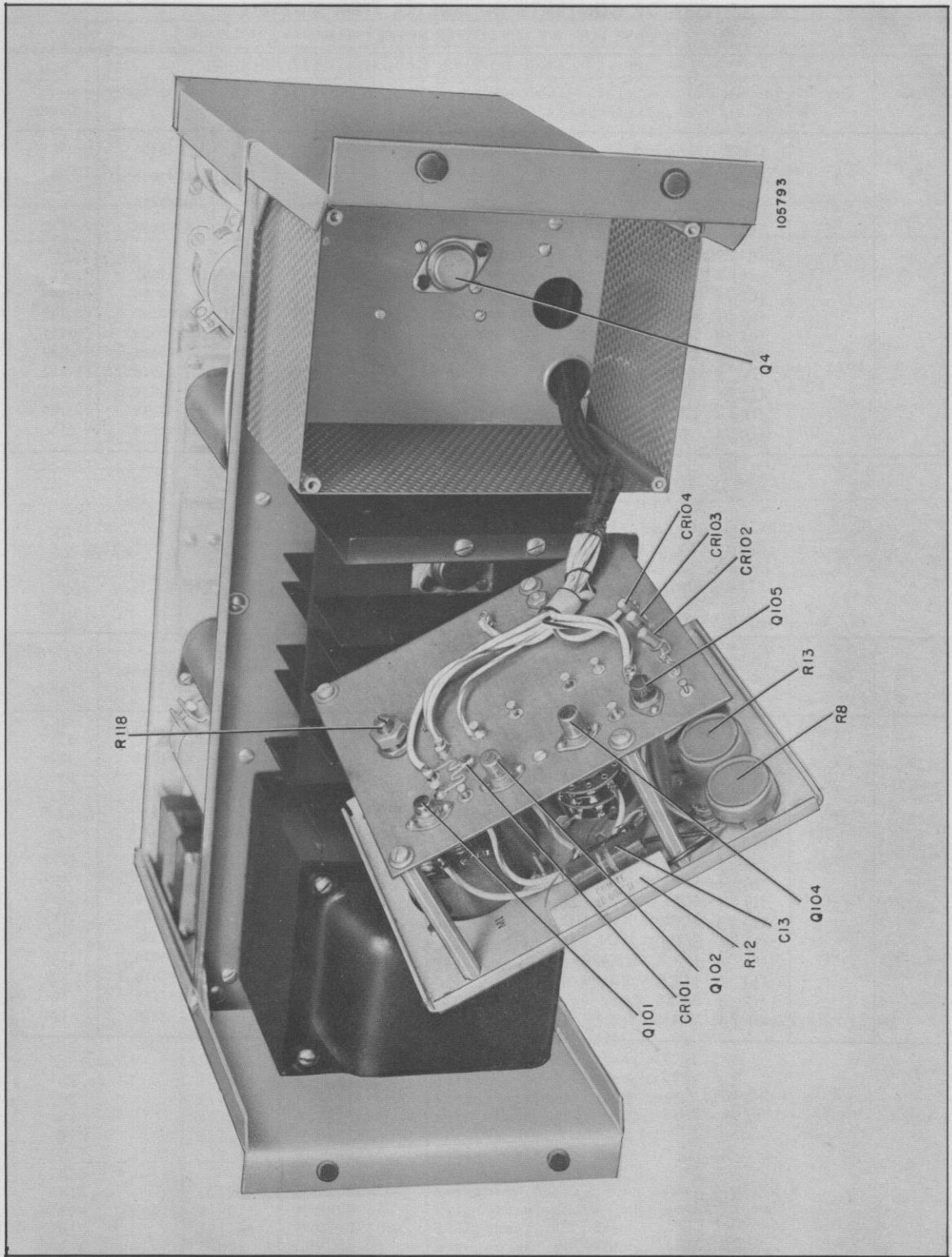


Figure 9—Rear View of Assembly Board, Front Panel Removed from Main Chassis

**LIST OF CONTENTS OF MASTER ITEM MI-26216**  
MI-26216 CASE FOR WP-16B POWER SUPPLY 115V—60 CYCLE

<i>Item</i>	<i>Qty</i>	<i>Description</i>	<i>Reference</i>	<i>Part or Group</i>
1	1	CASE ASSEMBLY	8618466	501
2	1	PANEL OVERLAY	8741031	501
3	1	SUPPORT PLATE	8462456	1
4	1	SUPPORT PLATE	8462456	2
5	1	SUITABLE CONTAINER CONTAINING:		
		(a) 4 SCREW RD. HD. 12-24 x .50 BLK	57461	213
		(b) 4 SCREW PAN HD. 10-32 x .38	990390	109
		(c) 4 SCREW PAN HD. 10-32 x .25	990390	105
		(d) 4 SCREW PAN HD. 8-32 x 50	990388	113
		(e) 2 SCREW PAN HD. 8-32 x .38	990388	109
		(f) 8 LOCKWASHER #10	93618	112
		(g) 6 LOCKWASHER #8	93618	109
		(i) 2 NUTS #8-32	57435	105
		(j) 4 WASHER #10	82278	106

**LIST OF CONTENTS OF MASTER ITEM MI-556216**  
MI-556216 CASE FOR WP16B POWER SUPPLY 230V—50 CYCLE

<i>Item</i>	<i>Qty</i>	<i>Description</i>	<i>Reference</i>	<i>Part or Group</i>
1	1	CASE ASSEMBLY	8618466	502
2	1	PANEL OVERLAY	8741031	502
3	1	SUPPORT PLATE	8462456	1
4	1	SUPPORT PLATE	8462456	2
5	1	SUITABLE CONTAINER CONTAINING:		
		(a) 4 SCREW RD. HD. 12-24 x .50 BLK	57461	213
		(b) 4 SCREW PAN HD. 10-32 x .48	990390	109
		(c) 4 SCREW PAN HD. 10-32 x .25	990390	105
		(d) 4 SCREW PAN HD. 8-32 x 50	990388	113
		(e) 2 SCREW PAN HD. 8-32 x .38	990388	109
		(f) 8 LOCKWASHER #10	93618	112
		(g) 6 LOCKWASHER #8	93618	109
		(i) 2 NUTS #8-32	57435	105
		(j) 4 WASHER #10	82278	106

LIST OF PARTS  
WP16 POWER SUPPLY

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Symbol No.	Stock No.	Drawing No.	Description
<b>UNREGULATED CHASSIS (POWER SUPPLY), MI-26082-A</b>			
C201, C202 C203 CR201, CR202 P201 R201, R202	221607 218426 217351 207140 221608	458558-58 458558-51 1N1084 474619-1 993008-38	Capacitor: electrolytic, 120 $\mu$ f 200 v Capacitor: electrolytic, 150 $\mu$ f 300 v Rectifier: crystal diode, 1N1084 Connector: male, 7 contact Resistor: fixed, wire wound, 7.1 ohms, $\pm$ 10%, 10 w
<b>CENTERING CHASSIS, MI-26083-A</b>			
C301, C302 CR301, CR302 CR303 P301 Q301 Q302 R301, R302 R303 R304 XQ301	218606 221606 221603 207139 221605 221602 221608 221608 221608 219949	189335-6 1N1085 651C4 475145-1 1N458 2N1040 993008-38 90496-63 993008-38 8975560-2	Capacitor: electrolytic, 2000 $\mu$ f 25 v Rectifier: crystal diode, 1N1085 Rectifier: crystal diode, 651C4 Connector: male, 9 contact Transistor: 2N458A Transistor: 2N1040 Resistor: fixed, wire wound, 7.1 ohms, $\pm$ 10%, 10 w Resistor: fixed, comp., 1200 ohms, $\pm$ 10%, 1 w Resistor: fixed, wire wound, 7.1 ohms, $\pm$ 10%, 10 w Socket: transistor
<b>POWER SUPPLY — TRANSISTORIZED, MI-26084-B &amp; MI-26094-B</b>			
C1 C2 to C4 C5 C6 C7 C8 C9 to C11 C12 CR1 CR2 DS1 F1 J1 J2 J3 J4, J5 K1 K2 L1, L2 M1 P1 P2, P3 P4, P5 Q1 to Q4  R1 R2 to R4 R5 to R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R17, R18	221618 95914 218097 221618  96216 221618 218097 210347 218392  94709  207456 209765 51594 221610 221612 221615 221614  51595 221605  221611 210854 98221 46071 212130  56596 219511 221604 46071	8975570-16 458558-1 8976580-1 8975570-16 8725806-3 442901-174 8975570-16 8976580-1 8974309-1 1N540  8845660-6 8980085-1 474619-2 475145-2 727969-1 8989717-1 8448880-1 8449588-1 8462494-1 8980084-1  727969-2 2N458  993007-29 993007-21 8971860-105 427230-21 990187-547 90496-71 82283-53 8971860-108 993008-107 990190-309 427230-21 727834-501	Capacitor: electrolytic, 300 $\mu$ f 350 v Capacitor: electrolytic, 125 $\mu$ f 350 v Capacitor: ceramic, 0.1 $\mu$ f 500 v Capacitor: electrolytic, 300 $\mu$ f 350 v Capacitor: 25 $\mu$ f Pt. of T1 Capacitor: electrolytic, 10 $\mu$ f 450 v Capacitor: electrolytic, 300 $\mu$ f 350 v Capacitor: ceramic, 0.1 $\mu$ f 500 v Rectifier: power Rectifier: crystal diode 1N540 Lamp: neon part of XF1 Fuse: 10 amps Connector: male, A.C. Connector: female, 7 contacts Connector: female, 9 contacts Connector: female, 6 contacts Relay: time delay Relay Reactor: filter Meter: 0-300 v, D.C. Connector: female, A.C. Not Used Connector: male, 6 contact Transistor: 2N458A  <i>RESISTORS:</i> <i>Fixed, Composition - unless otherwise specified</i> 220,000 ohms - part of XF1 wire wound, 2.5 ohms, $\pm$ 10%, 5 w wire wound, 1.0 ohms, $\pm$ 10%, 5 w variable, comp., 500 ohms, $\pm$ 10%, 2 w wire wound, 4000 ohms, $\pm$ 10%, 50 w 301,000 ohms, $\pm$ 1%, 1 w 5600 ohms $\pm$ 10%, 1 w 180 ohms, $\pm$ 10%, $\frac{1}{2}$ w variable, comp., 2500 ohms, $\pm$ 10%, 2 w wire wound, 20,000 ohms, $\pm$ 5%, 10 w 1210 ohms, $\pm$ 1%, 2 w wire wound, 4000 ohms, $\pm$ 10%, 50 w 6.2 ohms, $\pm$ 5%, $\frac{1}{2}$ w

Symbol No.	Stock No.	Drawing No.	Description
R19		993008-29	wire wound, 2.5 ohms, $\pm 10\%$ , 10 w
R20	78907	458572-64	4000 ohms, $\pm 5\%$ , 5 w
R21	223129	990186-389	8250 ohms $\pm 1\%$ , $\frac{1}{2}$ w
R22		993008-29	wire wound, 2.5 ohms, $\pm 10\%$ , 10 w
S1	204583	990780-109	Switch: D.P.D.T.
S2	221613	8449586-1	Switch: rotary, 3 sec. 3 pos.
T1	221616	8728432-1	Transformer: 60 cycle (for MI-26084-B)
TP1	203532	8225493-2	Transformer: 50 cycle (for MI-26094-B)
TP2	205675	8825493-3	Connector: tip jack, red
XF1	211618	8920191-2	Connector: tip jack, black
XK1	94926	737870-14	Holder: fuse
XQ1 to XQ4	219949	8975560-2	Socket: relay
			Socket: transistor
	34950	845607-1	Miscellaneous: Knob: control, black
			<b>Circuit Board Assembly</b>
C101			Not Used
C102		737818-16	Capacitor: paper, 0.47 $\mu$ f 100 v
C103, C104			Not Used
C105		735715-175	Capacitor: paper, 0.1 $\mu$ f 400 v
C106	205656	8811182-5	Capacitor: ceramic, 0.01 $\mu$ f 500 v
C107		8811182-5	Capacitor: .01 $\mu$ f 500 v (disc)
CR101	221603	651C4	Rectifier: Zener diode, 651C4
CR102 to CR104	224097	8468166-1	Rectifier: Zener diode,
Q101	221601	2N1012	Transistor: 2N1012
Q102	221602	2N1040	Transistor: 2N1040
Q103			Not Used
Q104	221602	2N1040	Transistor: 2N1040
Q105	221600	2N333	Transistor: 2N333
			<b>RESISTORS:</b> <i>Fixed, Composition - unless otherwise specified</i>
R101			Not Used
R102		82283-138	130 ohms, $\pm 5\%$ , $\frac{1}{2}$ w
R103, R104			Not Used
R105		82283-136	110 ohms, $\pm 5\%$ , $\frac{1}{2}$ w
R106			Not Used
R107		82283-69	3900 ohms, $\pm 10\%$ , $\frac{1}{2}$ w
R108			Not Used
R109	221609	993008-110	wire wound, 28,000 ohms, $\pm 5\%$ , 10 w
R110 to R114			Not Used
R115		727834-153	560 ohms, $\pm 5\%$ , $\frac{1}{2}$ w
R116		727834-137	120 ohms, $\pm 5\%$ , $\frac{1}{2}$ w
R117		727834-158	910 ohms, $\pm 5\%$ , $\frac{1}{2}$ w
R118	98956	8971860-106	variable, comp., 1000 ohms, $\pm 10\%$ , 2 w
R119		727834-167	2200 ohms, $\pm 5\%$ , $\frac{1}{2}$ w
R120		8983944-2	wire wound, 1 turn 0.25 dia. magnet wire
R121		727834-156	750 ohms $\pm 5\%$ , $\frac{1}{2}$ w
XQ101, XQ102	222734	8707294-1	Socket: transistor
XQ103			Not Used
XQ104, XQ105	222734	8707294-1	Socket: transistor

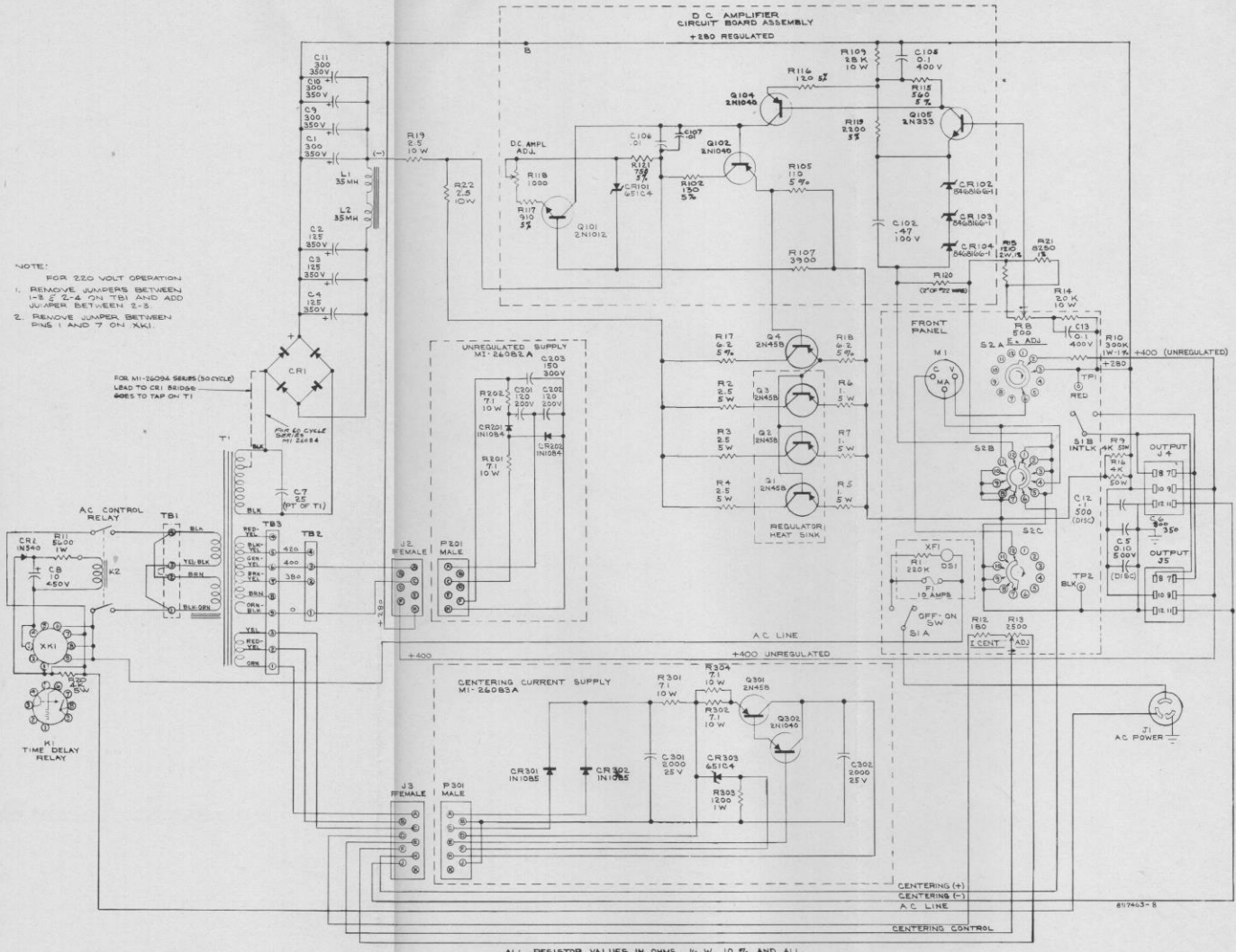
## LIST OF PARTS

Symbol No.	Stock No.	Drawing No.	Description
<b>MI-26216 CASE FOR WP-16B POWER SUPPLY 115 V</b>			
B401	218735	8975512-1	Blower: 115 v 50/60 cy.
DS401, DS402			Lamp: neon (part of XF401, XF402)
DS403	217389	872291-19	Lamp: NE 2D
F401, F402	200159	8845660-18	Fuse: 110 v 20 A
J401, J402	54591	99119-1	Connector: female, 2 contact
J403	223471	8979041-19	Connector: male, 3 contact
J404		8514417-1	Connector: female, 3 contact (Hubbell Cat. #5259)
J405			Not Used
J406	52105	722805-10	Connector: female, 12 contact
K401	223470	8518622-1	Relay: 115 v 50/60 cy.
P401A, P402A	54592	99119-2	Connector: male, 2 contact
P401B, P402B	45492	8865103-1	Connector: male, 2 contact
P403		8980084-1	Connector: female, twist lock (Hubbell cat. #4730)
P404			Not Used
P405	56750	174697-4	Connector: male, 6 contact
R401, R402			Resistor: fixed, comp., 220,000 ohms, (Pt. of XF401, XF402)
R403		82283-239	Resistor: fixed, comp., 220,000 ohms, $\pm 5\%$ , $\frac{1}{2}$ w
R404		82283-208	Resistor: fixed, comp., 110,000 ohms, $\pm 5\%$ , $\frac{1}{2}$ w
XDS403	223367	8515348-1	Socket: only
	223366	8515348-1	Jewel: only red
XF401, XF402	211618	8920191-2	Holder: fuse
	218729	8438323-1	<i>Miscellaneous:</i>
	94641	8914329-1	Fan Blade: 4"
	216288	8956076-1	Fastener: cover (4 req'd.)
	97755	8833040-1	Foot: case (4 req'd.)
			Handle: carrying

MEMORANDUM

DATE	DESCRIPTION	AMOUNT	CHECK NO.	ACCOUNT
1954-01-01	...	...	...	...
1954-01-02	...	...	...	...
1954-01-03	...	...	...	...
1954-01-04	...	...	...	...
1954-01-05	...	...	...	...
1954-01-06	...	...	...	...
1954-01-07	...	...	...	...
1954-01-08	...	...	...	...
1954-01-09	...	...	...	...
1954-01-10	...	...	...	...
1954-01-11	...	...	...	...
1954-01-12	...	...	...	...
1954-01-13	...	...	...	...
1954-01-14	...	...	...	...
1954-01-15	...	...	...	...
1954-01-16	...	...	...	...
1954-01-17	...	...	...	...
1954-01-18	...	...	...	...
1954-01-19	...	...	...	...
1954-01-20	...	...	...	...
1954-01-21	...	...	...	...
1954-01-22	...	...	...	...
1954-01-23	...	...	...	...
1954-01-24	...	...	...	...
1954-01-25	...	...	...	...
1954-01-26	...	...	...	...
1954-01-27	...	...	...	...
1954-01-28	...	...	...	...
1954-01-29	...	...	...	...
1954-01-30	...	...	...	...
1954-01-31	...	...	...	...





NOTE:  
FOR 220 VOLT OPERATION  
1. REMOVE JUMPERS BETWEEN 1-3 & 2-4 ON TB1 AND ADD JUMPER BETWEEN 2-3.  
2. REMOVE JUMPER BETWEEN PINS 1 AND 7 ON XK1.

FOR MI-26094 SEARS (30 CYCLE)  
LEAD TO CR1 BRIDGE  
400S TO TAP ON T1

ALL RESISTOR VALUES IN OHMS, 1/2 W. 10% AND ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

Figure 10—Schematic Diagram, WP-16B Power Supply

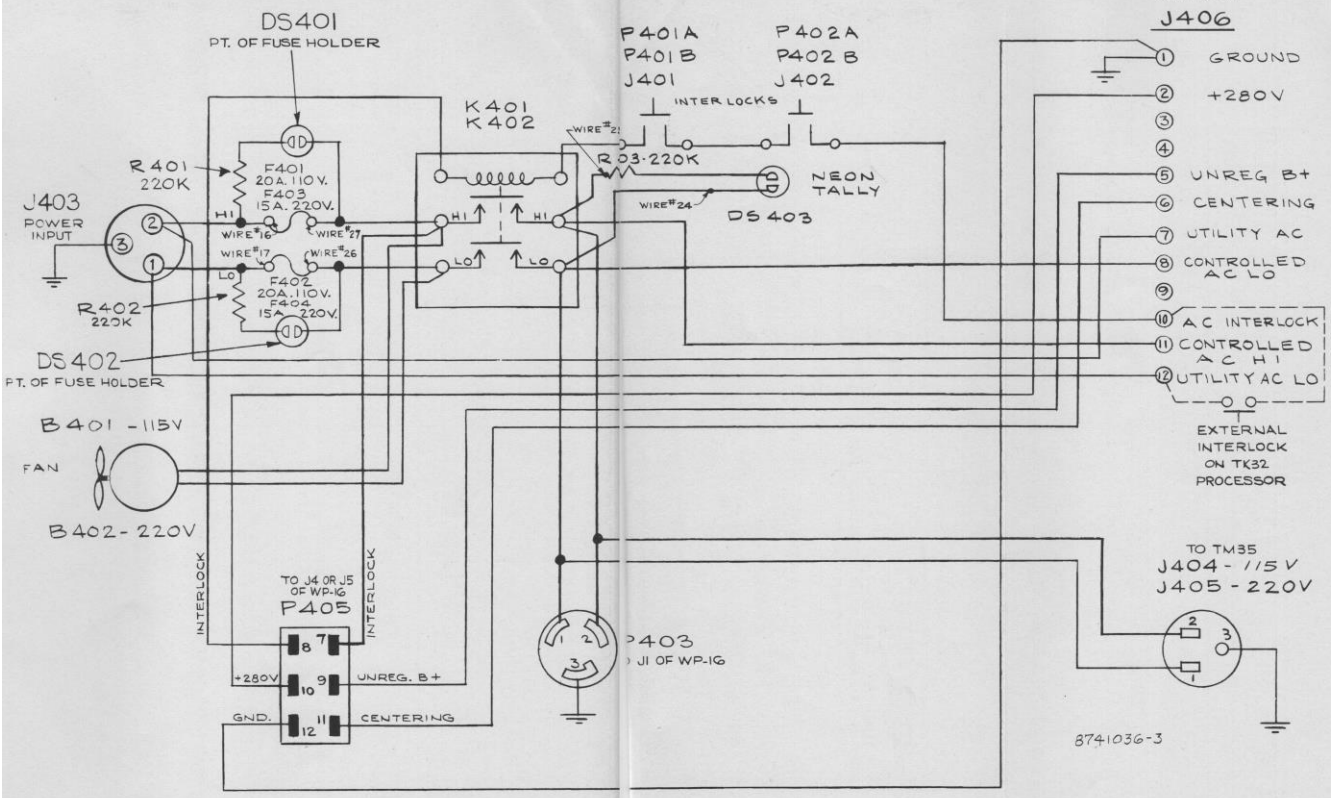


Figure 12—Interconnection Diagram, WP-16B Power Supply and Fieldcase

8741036-3



RADIO CORPORATION OF AMERICA  
INDUSTRIAL ELECTRONIC PRODUCTS, CAMDEN, N. J.

