STANDARD POWER SUPPLY

MODEL TPN1191A

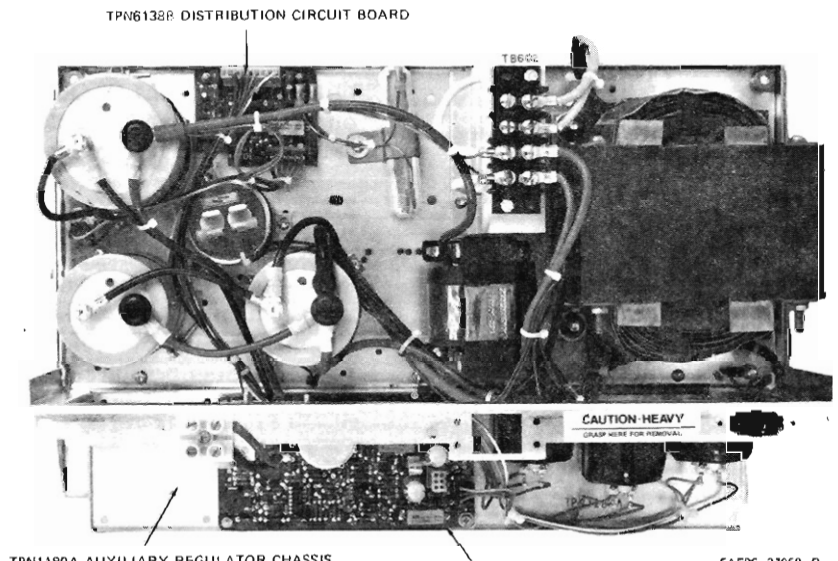


Figure 1. Model TPN1191A Standard Power Supply

1. DESCRIPTION

(Refer to Figure 1)

1.1 Model TPN1191A Standard Power Supply is a high efficiency, solid state, power source for operation of base and repeater radio stations. The power supply consists of three main sections: transformer/rectifier/filter, distribution board, and auxiliary regulator board. Refer to Table 1 for the power supply model complement.

1.2 The transformer has a primary winding, a high current secondary winding, and a resonant secondary winding. Under normal operations, the current in the resonant winding causes the transformer core to saturate, limiting the transformer output voltage. Rectifying and filtering the transformer output produces a stable direct current output.

1.3 The distribution board consists of four power supply fuses and circuitry for overvoltage protection. Transistorized circuitry senses a high dc voltage and adds loading for voltage reduction.

1.4 The auxiliary regulator board consists of two current limited linear series pass regulators. These regulators are set for 9.4 V and 13.9 V. The 9.4 V regulator draws power from the main ferroresonant supply output. The 13.9 V regulator draws full-wave rectified power directly from the ferroresonant transformer.

1.5 The features of this power supply include short circuit protection which is inherent in the ferroresonant power transformer, and overvoltage protection. Refer to Table 2 for performance specifications.

Table 1. Model Complement For TPN1191A Standard Power Supply

Kit	Sub-Kit	Description
TPN1189A		Auxiliary Regulator Chassis
	TRN5119A	Auxiliary Regulator Circuit Board
	TRN5297A	Hardware Kit
	TRN5299A	Chassis Kit
TPN6138B		Distribution Circuit Board
TRN5335A		Hardware, Interconnect
TRN5336A		Hardware, 500 W
TRN5452A		Hardware, Miscellaneous

2. THEORY OF OPERATION

2.1 TRN5336A STANDARD POWER SUPPLY

The TRN5336A Power Supply performs the conversion of ac line voltage to the dc voltages required by the radio. The supply consists of rectification, filtering, and regulation.

2.1.1 Rectification and Filtering

The secondary voltage of transformer T601 is rectified by CR601 and CR602. Ground connection for the diodes is provided through the heat sink to chassis. Output filtering is provided by the network of C602, C603, L601, and C604.

2.1.2 Regulation

Line and load regulation is provided by the ferroresonant action in the secondary resonant winding of the power transformer T601. The high voltage winding resonates with C601, causing the secondary to saturate and restrict the secondary output voltage.

2.2 TPN6138B DISTRIBUTION BOARD

The TPN6138B Distribution Board provides overcurrent and overvoltage protection for the power supply. Refer to the functional and schematic diagrams for circuit details. Secondary voltage fusing is provided by F602 thru F605. Overvoltage protection is provided by a surge protection circuit consisting of Q601 thru Q604. A surge in excess of 18 V causes VR601 to conduct. Forward bias current through R602 and base-emitter junction of Q604, turns on Q604. The other transistors turn on, and the chassis mounted R601 acts as a pull-down load for the line voltage surge.

2.3 TRN5119A AUXILIARY REGULATOR BOARD

The TRN5119A Auxiliary Regulator Board provides regulated 9.4 V and 14 V for the radio. The board circuitry consists of a reference voltage, 9.4 V and 14 V regulators, temperature compensated overcurrent amplifier, and a local control inhibit inverter.

Table 2. Performance Specifications

Operating Temp	−30° to +80°C
Input Voltage	96-132 V, 60 Hz
Line Current*	8A max. at full rated power supply output
HIGH CURRENT OUTPUT	
Steady State Output Voltage	13.1 to 16.3 Vdc (36A to 2A)
Output Current	30.4A at 14.1 V
Load Transient	Shall not drop below 11.5 V for a 2A to 36A transient
Output Ripple	50 mV p-p 25°C to +80°C Derate to 100 mV p-p at −30°C
9.4 OUTPUT	
Output Voltage	9.4 V dc set nominal (9.1-9.7 Adjustable)
Output Ripple	Less than 10 mV rms when installed in station
Line Regulation	Shall not change more than 50 mV over input range
Load Regulation	Shall not change more than 150 mV from no load to full load
Max. Output Current	1.1A at +80°C
Current Limit	2.3A typ at 25°C
Short Circuit Current	0.77 max @ 25°C
14 V OUTPUT	
Output Voltage	13.9 set nominal (13.5-14.1 Adjustable)
Output Ripple	Less than 40 mV rms when installed in station
Line Regulation	Shall not change more than 25 mV over input voltage
Load Regulation	Shall not change more than 175 mV from no load to full load
Max. Output Current	1.16A at +80°C
Current Limit	2.5A typ at 25°C
Short Circuit Current	0.77A max. @25°C

* When calculating primary power requirements do not use Line Current to calculate dissipated power. Use a power meter with provisions for non-unity Power Factor.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

2.3.1 Reference Voltage

The operational amplifiers on the circuit board requires a stable reference voltage. This reference voltage is produced in two stages of circuitry. The first stage consists of VR4 and R40 which are connected to J1-1 and main 13.8 V. Diode VR4 regulates at 9.6 V. The second stage which operates from this 9.6 V is temperature compensated and consists of VR1, CR2, and R39. The resultant 6.5 V reference is feed to each of the operational amplifiers.

2.3.2 9.4 V Regulator

2.3.2.1 The 9.4 V regulator is a series pass type circuit using a PNP transistor (Q6). A PNP type transistor can provide voltage regulation with as little as 0.7 V differential between collector and emitter. This means that the input voltage can go as low as 10.4 V, and the circuitry will still maintain voltage regulation. The voltage regulator circuitry provides output voltage adjustment, correction for changes of input voltage and load and overcurrent protection.

2.3.2.2 The 9.4 V regulator output voltage (J5-6) is set by the 9.4 V VOLTAGE ADJUST potentiometer, R35. The voltage from R35 goes to U1A-2 and is compared to U1A-3, the reference voltage input. The differential voltage appears at U1A-1. For example, if U1A-2 becomes less positive, the output at U1A-1 becomes more positive, causing Q7 to conduct harder. Increased collector current at Q7 causes increased base-emitter current at Q6. As a result, Q6 conducts harder, with a resultant higher (more positive) regulated output voltage at J5-6.

2.3.2.3 The circuitry described in the previous paragraph is a negative feedback loop. It maintains a constant output voltage for changes in load or input voltage. The feedback loop has typically 40 dB of gain at dc to give a load/line regulation of ±0.1 V dc maximum from no load to full load. As an example, for an increase in load current, the regulator output voltage would normally decrease. The reduced output voltage is sensed at U1A-2, which is now less positive than U1A-3, the reference voltage. U1A-1 goes more positive and drives Q7 into further conduction. An increase in collector current of Q7 causes increased conduction of Q6 which returns the regulated output voltage to normal. A decrease in load current causes the opposite action.

2.3.2.4 The overcurrent protection circuitry is of the current foldback type. As the load increases beyond the knee, the output voltage and current decrease simultaneously to a final short circuit current of 0.77 amp maximum. The current is sensed across R20. When this voltage exceeds about 0.3 volts (representing a load current of about 2.3 amps), Q8 is forward biased and starts to conduct. Its collector goes positive, causing Q9 to conduct thru R23 and R25. Q9 conducting lowers the voltage at R28 (VREF). As the voltage on U1A-3 lowers, it causes the voltage on U1A-1 to go lower, forcing Q7 and Q6 to conduct less. As a result, the output voltage (9.4 V regulated) decreases. As output current increases, Q8 and Q9 conduct harder resulting in higher Q6 impedance. This action continues until the output voltage decreases to about 6.5 V. At this point, CR10 becomes forward biased, and the emitter current of Q10 increases. This results in an increased voltage across R21. This will forward bias Q8 harder. As a result less output current can be drawn under a short circuit condition. This is desirable because the power dissipated in Q6 is now reduced.

2.3.3 14 V Regulator

2.3.3.1 The 14 V regulator is a series pass type circuit using PNP transistors (Q1 and Q11). A PNP type transistor can provide voltage regulation with as little as 0.7 V differential between collector and emitter. This means that the input voltage can go as low as 14.7 V, and the circuitry will still maintain voltage regulation. The voltage regulator circuitry provides output voltage adjustment, correction for changes of input voltage and load current, and overcurrent protection.

2.3.3.2 The input filter circuitry provides power to the 14 V regulator. CR1 and CR15 rectify ac to dc (26-34 V). Resistors R47 and R48 limit the surge and reduce the ripple current filter capacitor C1.

2.3.3.3 The 14 V regulated (J5-2) is set by the 14 V VOLTAGE ADJUST potentiometer, R7. The voltage from R7 goes to U1C-9 and is compared to U1C-10, the reference voltage input. The differential voltage appears at U1C-8. For example, if U1C-9 becomes less positive, the output at U1C-8 becomes more positive, causing Q2 to conduct harder. Increased collector current at Q2 causes increased base-emitter current at Q1 and Q11. As a result Q1 and Q11 conduct harder, with a resultant higher (more positive) regulated output voltage at J5-2.

2.3.3.4 The circuitry described in the previous paragraph is a negative feedback loop. It maintains a constant output voltage for changes in load or input voltages. The feedback loop has typically 40 dB of gain at dc to give a load/line regulation of ±0.1 V dc maximum from no load to full load. As an example, for an increase in load current, the regulator output voltage would normally decrease. The reduced output voltage is sensed at U1C-9, which is now less positive than U1C-10, the reference voltage input. U1C-8 goes more positive and drives Q2 into further conduction. An increase in collector current of Q2 causes increased conduction of Q1 and Q11. The regulator output returns to normal. A decrease in load current causes the opposite action.

2.3.3.5 The overcurrent protection circuitry is of the current foldback type. As the load increases

beyond the knee, the output voltage and current decrease simultaneously to a final short circuit current of 0.77 ampere maximum. The current is sensed across R10. When this voltage exceeds about 0.3 volts (representing a load current of about 2.3 amperes), Q3 is forward biased and starts to conduct. Its collector goes positive, causing Q4 to conduct through R13 and R14. Q4 conducting lowers the voltage at R9 (V REF). As the voltage on U1C-10 lowers, it causes the voltage on U1C-8 to go lower forcing Q2, Q1, and Q11 to conduct less. As a result, the output voltage (14 V regulated) decreases. As output current increases, Q3 and Q4 conduct harder, resulting in higher Q1 and Q11 impedance. This action continues until the output voltage decreases to about 6.5 V. At this point, CR5 becomes forward biased, and the emitter current of Q5 increases. This results in an increased voltage across R11. This will forward bias Q3 harder. As a result less output current can be drawn under a short circuit condition. This is desirable because the power dissipated in Q1 and Q11 is now reduced.

2.3.4 Temperature Compensated Overcurrent Amplifier

The temperature compensated overcurrent amplifier (U1D) compensates the knee of the 9.4 V and 14 V overcurrent detect circuits (Q3 and Q8). Compensation allows operation from $-30\,^{\circ}C$ to $+80\,^{\circ}C$ without major degradation in available output current. Compensation begins at diodes CR13 and CR14. These diodes are temperature sensitive, having a voltage decrease of about 2 mV from an increase of each degree centigrade. A temperature increase makes U1D-14 less positive. Both Q5 and Q10 reduce collector current with a reduction in voltage drop across R11 and R21. The reduced bias voltage developed across these resistors counteracts the effects of high ambient temperatures on Q3 and Q8.

2.3.5 Local Control Inhibit Inverter

The local control inhibit inverter (U1B) is used to turn off the 9.4 V and 14 V voltage regulators externally for local control operation. When used, jumper JU2 is removed, and J5-5 is connected to ground through the normally closed contacts of a switch. Opening the switch contacts causes U1B-7 to go high. Both Q4 and Q9 are driven into saturation. U1C-8 and U1A-1 are pulled low which cuts off Q6, Q1, and Q11.

3. REGULATED OUTPUT VOLTAGE ADJUSTMENT PROCEDURE

The regulated output voltages can be adjusted with the auxiliary regulator board in the radio or on the service bench. If adjusted on the test bench, the regulator must be supplied 14 V at J1-1 and +28 V at J1-6 or J1-7. The outputs must be loaded to 1.1 ampere each.

Step 1. Measure the regulated output voltages at TP101 (9.4 V) and TP111 (14 V).

Step 2. Set R35 for 9.4 V $\pm$0.1 V.

Step 3. Set R7 for 13.9 $\pm$0.1 V.

4. MAINTENANCE

4.1 INTRODUCTION

Maintenance and repairs of this power supply demands a thorough understanding of its operation. Refer to the Power Supply Theory of Operation for this information.

4.2 TEST EQUIPMENT REQUIRED

The following test equipment is necessary for efficient, accurate servicing in the event that maintenance is required.

- 3-1/2 digit DVM (Motorola Model R1001A or equivalent).
- DC current meter (50 amperes)
- Load resistor (variable from 0 ohms to 15 ohms, and capable of carrying 50 amperes).
- Variable voltage ac line transformer (0-130 volts).
- Oscilloscope.
- Bench service cord consisting of:

Qty.	Part No.	Description
1	15-83183N01	Housing
2	39-83145N01	Contact
1	39-83145N02	Contact
1	30-865903	Cord

4.3 AUXILIARY REGULATOR CHASSIS REMOVAL (Refer to Figure 2)

The circuitry on the auxiliary regulator chassis can be serviced without removing the entire power supply. The auxiliary chassis below the main chassis can be disconnected and removed separately.

Step 1. Disconnect P1 and P5.

Step 2. Remove the three screws holding the auxiliary chassis to the main chassis. Use a magnetic screwdriver.

Step 3. Lift the auxiliary regulator chassis out of the cabinet.

Step 4. Remove circuit board(s) by compressing the plastic locking tabs.

4.4 POWER SUPPLY REMOVAL (Refer to Figures 2 thru 5)

WARNING

The power supply is unexpectedly heavy, and balances sharply to the right. Follow the removal instructions carefully.

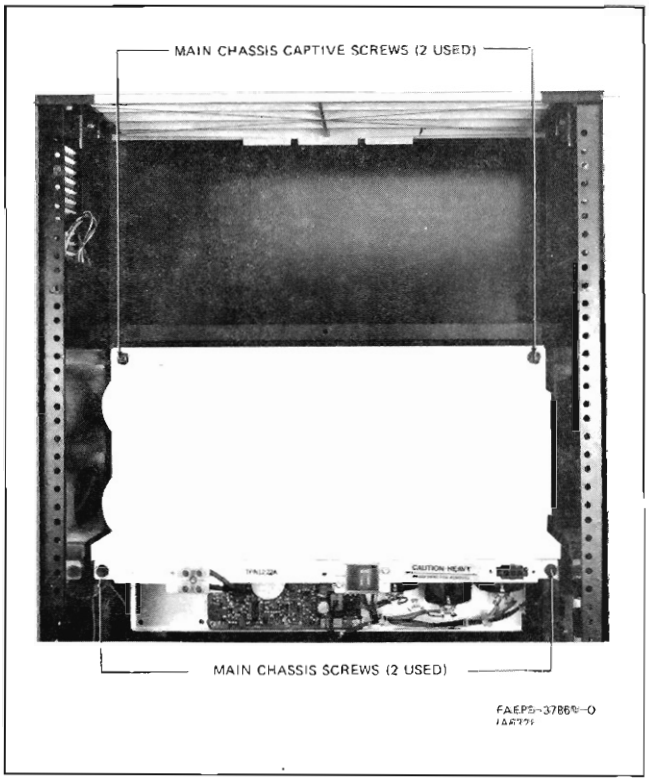


Figure 2. Power Supply Mounting Hardware

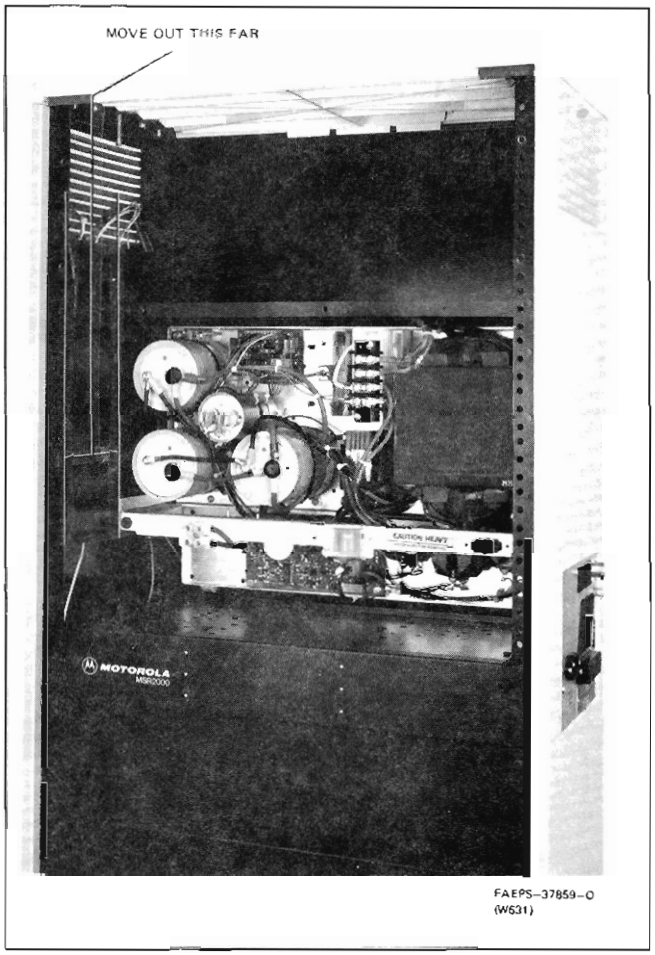


Figure 3. Power Supply Chassis Travel Distance

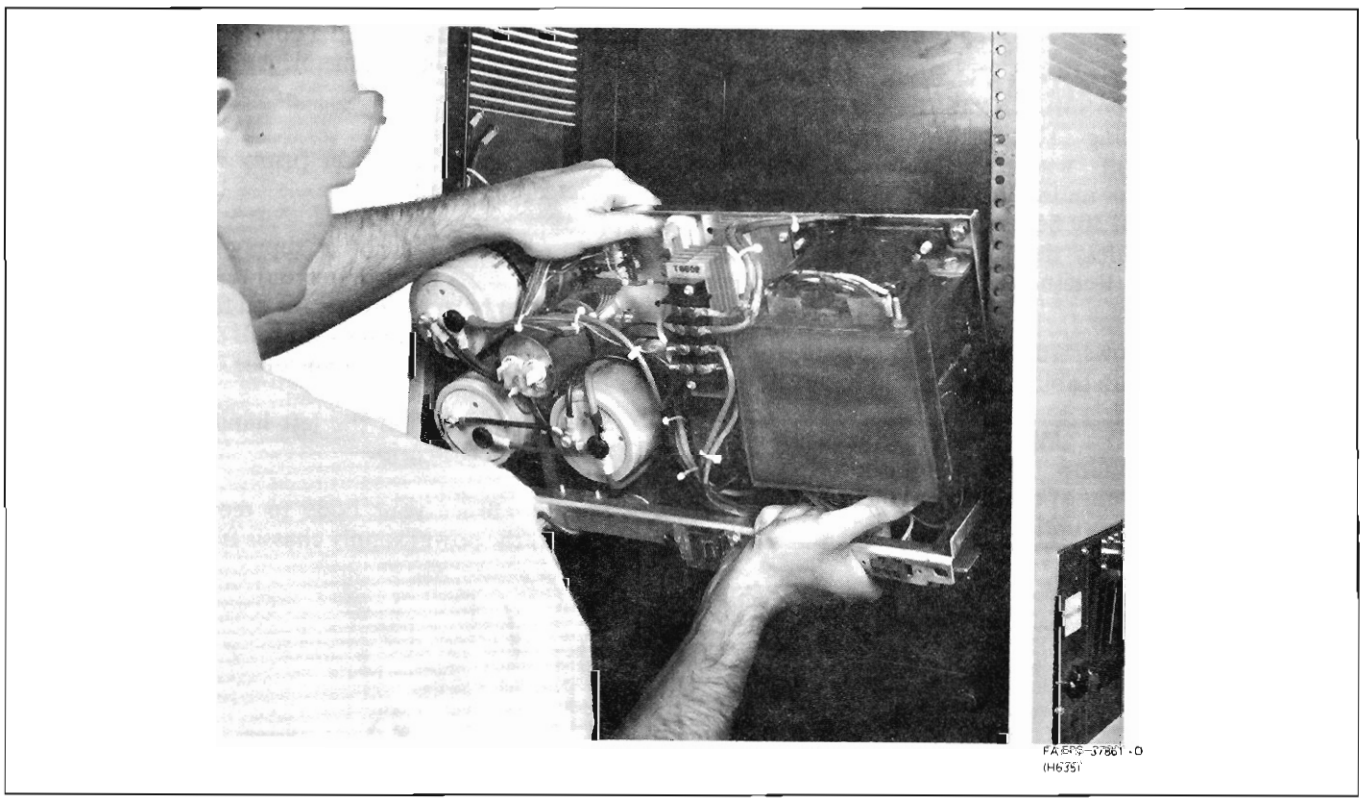


Figure 4. Properly Gripped Chassis

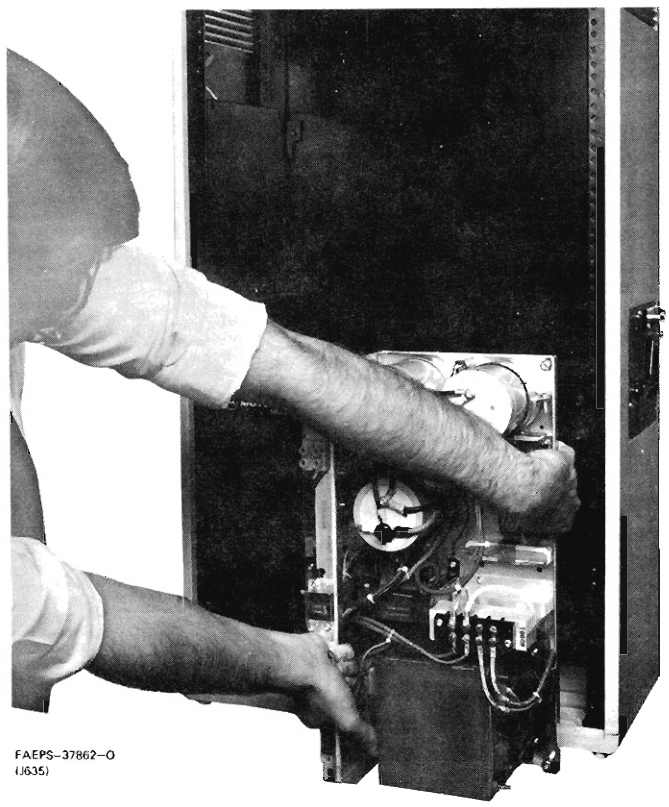


Figure 5. Power Supply Removed From Cabinet

Step 1. Disconnect P5 and P103 (for battery power supply). Open tie wraps and reposition cable.

Step 2. Remove MAIN CHASSIS SCREWS and loosen MAIN CHASSIS CAPTIVE SCREWS. Remove the two shipping screws (Motorola Part No. 3-83498N08) and washers (Motorola Part No. 4-135873) located under the main chassis side rails. These screws need not be replaced when re-installing the power supply unless the station is to be shipped to another location. Retain the screws for further shipping needs.

Step 3. Slide power supply chassis toward you until chassis is flush with cabinet as shown in Figure 3.

WARNING

Do not allow chassis to slide freely beyond front of cabinet: Cabinet rail support ends abruptly.

Step 4. Grip the main chassis with the right hand as shown in Figure 4. Find a comfortable grip around the flattened parts of the metal. Adjacent parts have sharp edges.

Step 5. Plant your feet firmly with good balance to receive a heavy weight.

Step 6. Slide the power supply toward you. Slightly tilt the chassis toward you and reach the left hand over the top to balance the chassis on the cabinet rails. Press the chassis firmly against the rails or the chassis will suddenly slide out of the cabinet. See Figure 5.

Step 7. Reposition the left hand from balancing the chassis to a firm grip.

Step 8. Brace your body to receive a heavy weight, and lift the power supply chassis free of the cabinet.

Table 3. Troubleshooting Chart

	Symptom	Corrective Action
A.	No output voltage	1) Check primary line connection to supply. 2) Check transformer secondary voltage at TB601. 3) Check power rectifiers CR601 and CR602.
B.	No regulated output voltages	1) Check for approximately 14 volts at J1-1. If no voltage, check fuse F603. 2) Check for approximately 6.5 volts at TP105, 6.5 V REF. If no voltage, check CR2 and VR1. 3) Check for grounded CR4 and CR8, REGULATOR INHIBIT lead. 4) Check for defective U1B. 5) Check for defective U1D.
C.	9.4 V regulated output: OK. No 14 V regulated output.	1) Check fuses F605 and F604. 2) Check Q3 and Q4. TP105 should be 6.5 volts. 3) Check U1C. 4) Check Q2 for open circuit. 5) Check Q1 and Q11 for open circuit. 6) Check VR2 for short. 7) Check for short circuit at J5-2.
D.	14 V regulated output: OK. No 9.4 V regulated output	1) Check Q8 and Q9. TP104 should be 6.5 volts. 2) Check U1A. 3) Check Q7 for open circuit. 4) Check Q6 for open circuit. 5) Check VR3 for short circuit. 6) Check for short circuit at J5-6.
E.	Regulators cannot supply full rated current of 1.1A (output drops more than 1 volt.)	1) Check U1D, Q3, Q4, Q8 and Q9.
F.	Regulators short circuit current greater than 0.8A, and possibly input fuse blowing.	1) Overcurrent detect circuits defective. Check U1D, Q3, Q4, Q8 and Q9. 2) Check CR5 and CR10.
G.	Regulated output voltages cannot be adjusted to 9.4 ±0.1 V and 13.9 ± 0.1 V.	1) Check 6.5 V REF. It should be 6.5 ±0.2 volts. If not, check CR2, VR1, and VR4. 2) Check regulator feedback loop: U1A, Q7, and Q6; U1C, Q2, Q1 and Q11. 3) Check for high leakage Q2 and Q7.
H.	High ac ripple voltage on 14 V regulated output: greater than 10 mV at 1.5A.	1) Check filter capacitor C1 for low capacity or leakage. Ripple voltage at TP100 is greater than 4 V peak-to-peak. 2) Check U1C for low loop gain: less than 20 dB.

parts list

TRN5299A Chassis — PL-8013-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		diode: (see note)
Q1,5,11	48-869672	PNP; type M9672
		connector:
P3	15-83498F39	HOUSING, 3 position (WHT)
P4	15-83498F40	HOUSING, 3 position (RED)
P7	15-83498F39	HOUSING, 3 position (WHT)
		mechanical parts
	3-136143	SCREW, tapping: 8-32 x 1/4"; 6 used
	43-83561N01	STANDOFF, twist lock, 2 used
	3-136850	SCREW, tapping: 6-32 x 1/2"; 6 used
	9-82973A01	SOCKET, transistor; 3 used
	14-865854	INSULATOR; 3 used
	26-82979N01	HEAT SINK, 3 used
	29-83499F01	TERMINAL; 9 used

note: For optimum performance, diodes, transistors and integrated circuits must be ordered by Motorola part numbers.

TRN5297A Hardware Kit
TRN5298A Hardware Kit — PL-8014-O

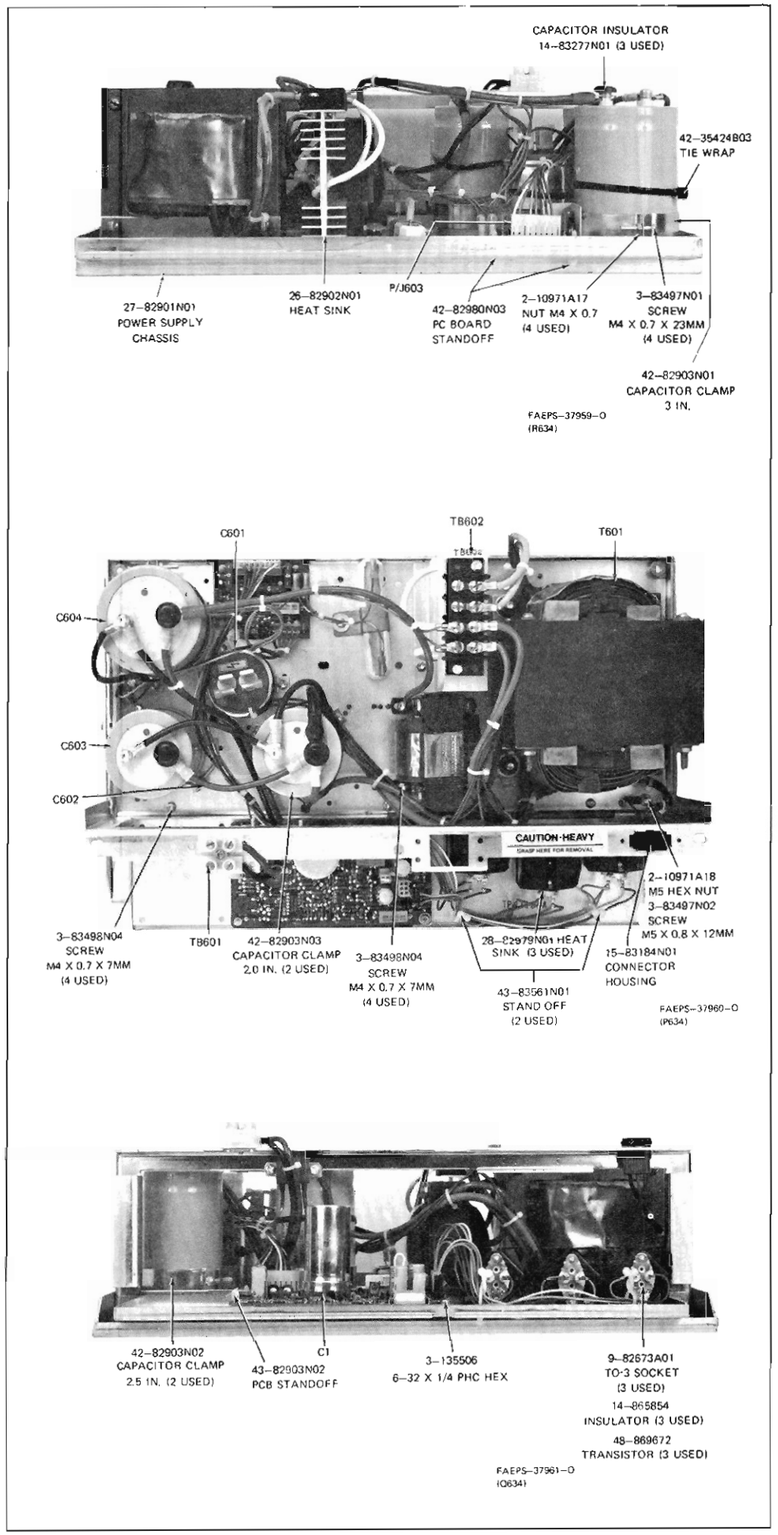
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		connector:
P6,101	15-83498F38	HOUSING, 2 position
		mechanical parts
	3-134185	SCREW, tapping: 6-32 x 1/4"
	43-82980N01	STANDOFF, 3 used TRN5297A; 5 used TRN5298A
	43-82980N02	STANDOFF, spacer, 2 used TRN5298A
	43-83561N01	STANDOFF, twist lock; 2 used
	1-80754D87	Assembly Wire and Lug includes: (p/o TRN5297A)
	29-83499F01	TERMINAL; 2 used
	1-80754D97	Assembly Wire and Lug includes: (p/o TRN5298A)
	29-83499F01	TERMINAL, 2 used
	1-80754D98	Assembly Wire and Lug includes: (p/o TRN5298A)
	29-83499F01	TERMINAL, 2 used
	42-10217A02	STRAP, ties

TRN5335A Interconnect Hardware Kit — PL-8015-B

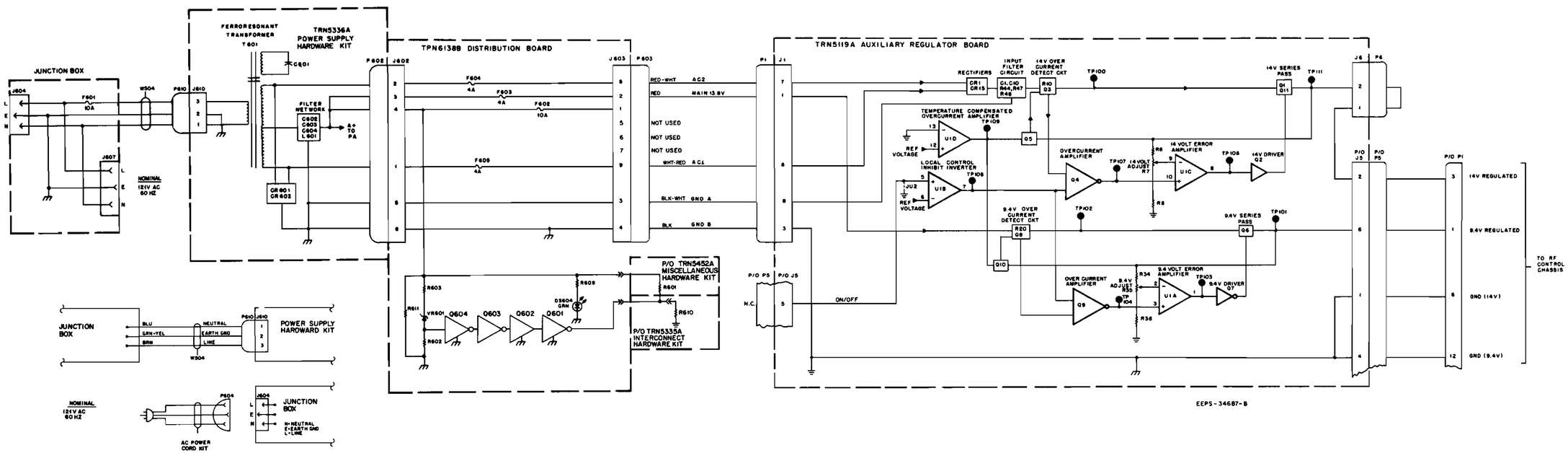
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		connector:
P1,603	15-83498F45	HOUSING, 9 position
		resistor, fixed: ± 5%; 20 W: unless otherwise stated
R610	17-83389G03	15
		mechanical parts
	3-10943M25	SCREW, tapping, M4 x 7 x 20mm; 2 used
	3-83498N04	SCREW, tapping; M4 x 7 x 7mm, 3 used
	42-10217A02	STRAP, tie, 6 used
	29-83499F01	TERMINAL, 14 used
	29-83113N01	TERMINAL, right angle
	29-83113N02	TERMINAL, right angle
	46-84549F01	PLUG, polarizing
	4-7651	WASHER, lock, #8

TRN5452A Miscellaneous Power Supply Hardware Kit — PL-8269-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		resistor, fixed:
R601	17-82177B65	10 ± 10%; 50 W
		non-referenced items
	1-80766D012	ASSEMBLY, resistor cable; includes:
	29-83113N02	TERMINAL, right angle; 4 used
	2-10971A17	NUT, hex, M4 × 0.7mm
	3-83497N05	SCREW, machine; M4 × 10mm
	4-7633	WASHER, flat
	4-7651	LOCKWASHER, internal, #8
	43-82980N03	STANDOFF, support; 4 used

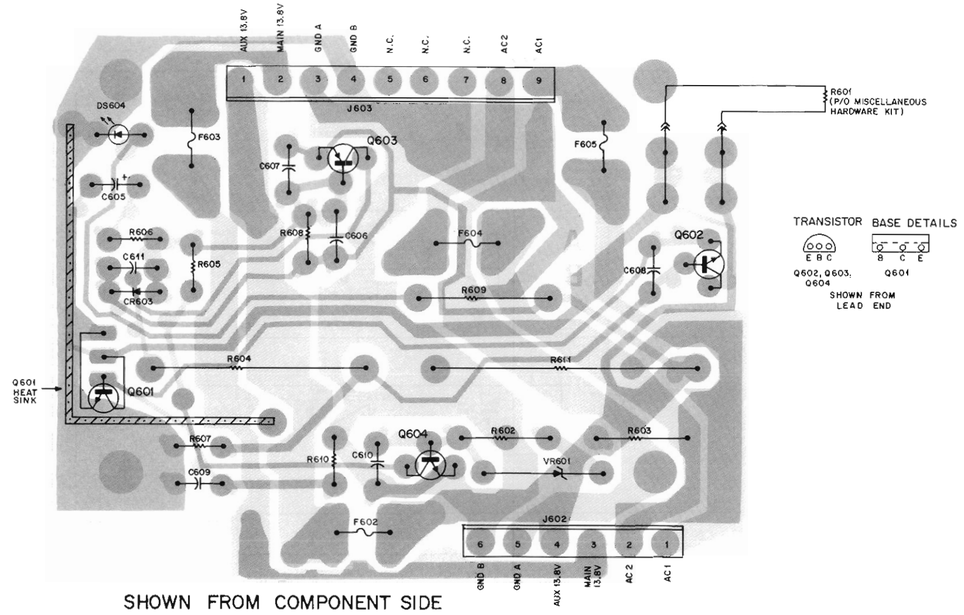


STANDARD POWER SUPPLY
MODEL TPN1191A



Functional Block Diagram
Motorola No. EEPS-34687-B
10/31/83 - V & G

STANDARD POWER SUPPLY
MODEL TPN1191A



COMPONENT SIDE — 80-CEPS-35439-O
SOLDER SIDE — 80-CEPS-35440-O
0L-CEPS-35441-O

parts list

TPN6138B Power Supply Distribution Board — PL-8265-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed:
C605	23-11019A27	22 uF ± 20%; 25 V
C606	8-11017B08	.01 uF ± 10%; 50 V
C607 thru 611	21-11014H32	20 pF ± 5%; 100 V
		diode: (see note)
CR603	48-11034D01	silicon
		light emitting diode:
DS604	48-84404E04	green
		fuse:
F602	65-139767	10 amp; 32 V
F603, 604, 605	65-82859N01	4 amp; 32 V
		connector, plug:
J602	28-82984N06	male; 6 contact
J603	28-82984N10	male; 9 contact
		transistor: (see note)
Q601	48-869806	NPN; type M9806
Q602	48-869568	NPN; type M9568
Q603	48-869643	PNP; type M9643
Q604	48-869642	NPN; type M9642
		resistor, fixed ± 5%; 1/4 W: unless otherwise stated
R602	6-11009E25	100
R603	6-11009E37	330
R604	6-127A37	330, 2 W
R605 thru 608	6-11009E69	6.8k
R609	6-125C51	1.2k
R610	6-11009E35	270
R611	17-82177B08	200; 5 W
		voltage regulator:
VR601	48-83461E18	Zener; 18 V
		mechanical parts
	29-82906N01	TERMINAL, fuse; 8 used
	2-10971A16	NUT, machine; M3 × 0.5mm
	3-83497N04	SCREW, machine
	4-84180C01	WASHER, shoulder
	14-83820M02	INSULATOR, thermoconductive
	29-10231A10	LUG, terminal; 2 used
	29-82906N01	TERMINAL, blade fuse; 8 used
	15-84576N01	HOUSING, fuse clip; 4 used

TRN5336A Power Supply Hardware Kit (500 W) — PL-8020-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed:
C601	8-82682N01	20 uF ± 6%; 330 V
C602,603	23-82681N01	64,000 uF + 75-7%; 20 V
C604	23-82681N02	120,000 uF + 75-10%; 20 V
		diode: (see note)
CR601,602	48-82732C09	silicon
		connector, receptacle:
P602	9-83360N01	female; 6 contact
		coil:
L601	25-82686N01	choke, 420 uH
		transformer:
T601	25-82253N01	power: 500 W; 60 Hz
		terminal, board:
TB601	31-83576K02	2-terminals
		mechanical parts
	2-10971A17	NUT, machine M4 x 0.7 hex; 4 used
	2-10971A18	NUT, machine: M5 x 0.8 hex; 4 used
	3-10907A55	SCREW, machine: M6 x 1 x 25mm; 4 used
	3-83497N01	SCREW, machine: M4 x 0.7 x 25mm; 4 used
	3-83497N02	SCREW, terminal: M5 x 0.8 x 12mm; 6 used
	3-83498N04	SCREW, tapping: M4 x 0.7 x 7mm; 18 used
	3-83498N06	SCREW, tapping: M4 x 0.7 x 16mm; 2 used
	3-83678N02	SCREW, tapping; M3 x 0.5 x 5mm
	4-7651	LOCKWASHER, #8 internal; 10 used
	4-83499N01	WASHER, insulator; 3 used
	4-7658	LOCKWASHER, #10 internal; 20 used
	5-82904N01	GROMMET; 4 used
	14-83277N01	INSULATOR, lug; 3 used
	14-84088N01	INSULATOR, cap terminals; 2 used
	14-84548A01	INSULATOR, washer; 2 used
	26-82902N01	HEAT SINK
	29-824456	LUG, ring tongue; 2 used
	29-845081	LUG, ring tongue; 2 used
	29-82907N02	TERMINAL, ring
	29-82907N03	TERMINAL, ring; 4 used
	29-83113N01	TERMINAL, right angle; 6 used
	29-83137N01	TERMINAL, splice; 2 used
	39-83146N01	CONTACT, socket
	42-85238	CLAMP, cable; 2 used
	42-10217A02	STRAP, tie; .091 x 3.62; 16 used
	42-35424B03	STRAP, tie; .094 x 14; 3 used
	42-82903N01	CLAMP, cap; 2"
	42-82903N02	CLAMP, cap; 2 1/2"; 2 used
	42-82903N03	CLAMP, cap; 3"
	43-82980N03	STANDOFF; 4 used
	29-824154	TERMINAL, ring non-insulated; 4 used
	29-82907N01	TERMINAL, ring; 18-22GA; 2 used

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

TRN5336A Standard Power Supply, and
TRN6138B Distribution Board
Schematic Diagram, Circuit Board Details,
and Parts Lists
Motorola No. PEPS-34737-C
(Sheet 1 of 2)
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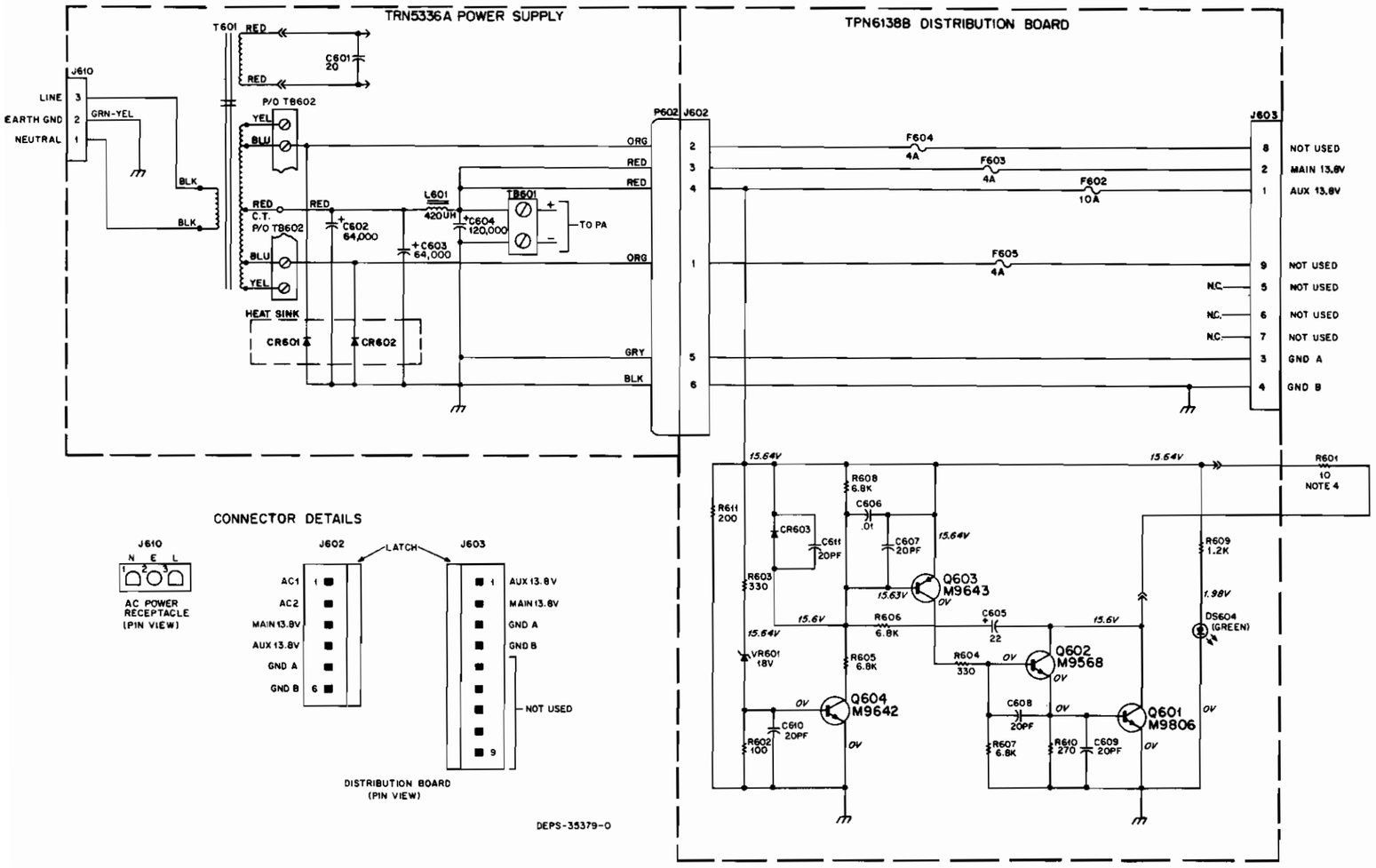
STANDARD POWER SUPPLY

MODEL TPN1191A



CONNECTOR DETAILS

DEPS-35379-O

NOTES:

1. Unless otherwise indicated: resistor values are in ohms; capacitor values are in microfarads; and inductor values are in millihenries.
2. Voltages measured with DVM, with 1 megohm or greater input resistance.
3. Circuit conditions: load current = 2A, @ 120 V AC (line in).
4. R601 is mounted on power supply chassis.

TRN5336A Standard Power Supply, and TRN6138B Distribution Board Schematic Diagram, Circuit Board Details, and Parts Lists
Motorola No. PEPS-34737-C
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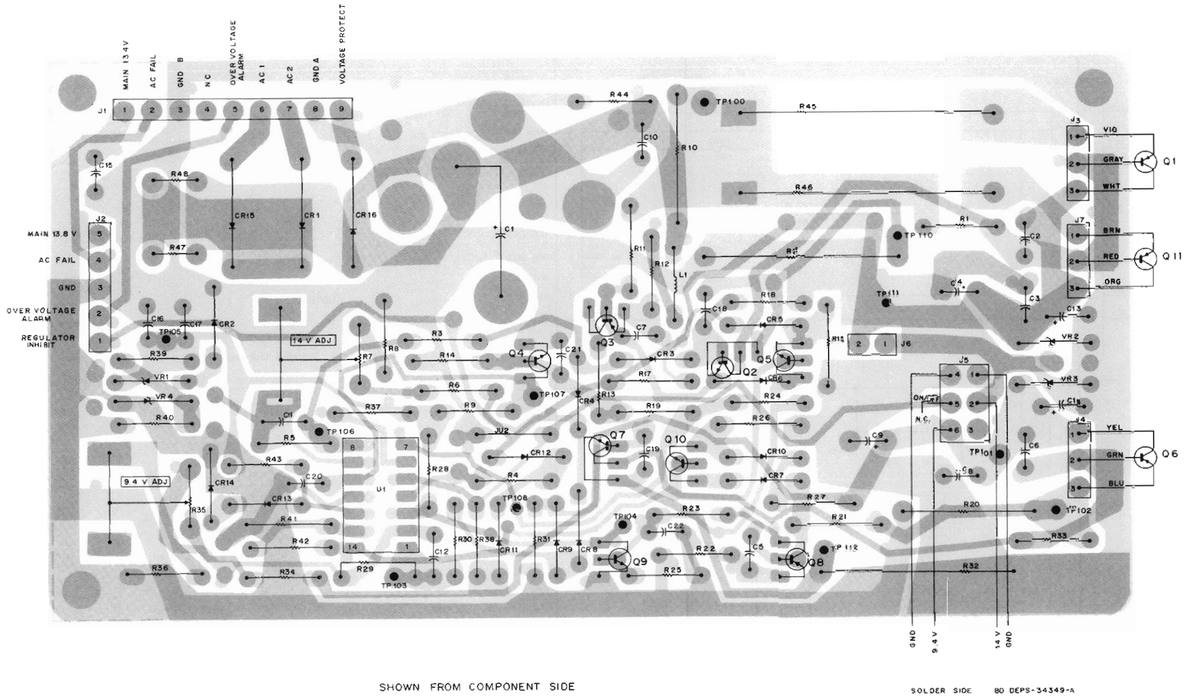
1/14/83 - V & G

STANDARD POWER SUPPLY

MODEL TPN1191A



SHOWN FROM COMPONENT SIDE

SOLDER SIDE 80 DEPS-34349-A
COMPONENT SIDE 80 DEPS-34350-A
GL DEPS-34351-A

TRN5119A Auxiliary Regulator Board
Schematic Diagram, Circuit Board Detail,
and Parts List
Motorola No. PEPS-38130-O
(Sheet 1 of 2)

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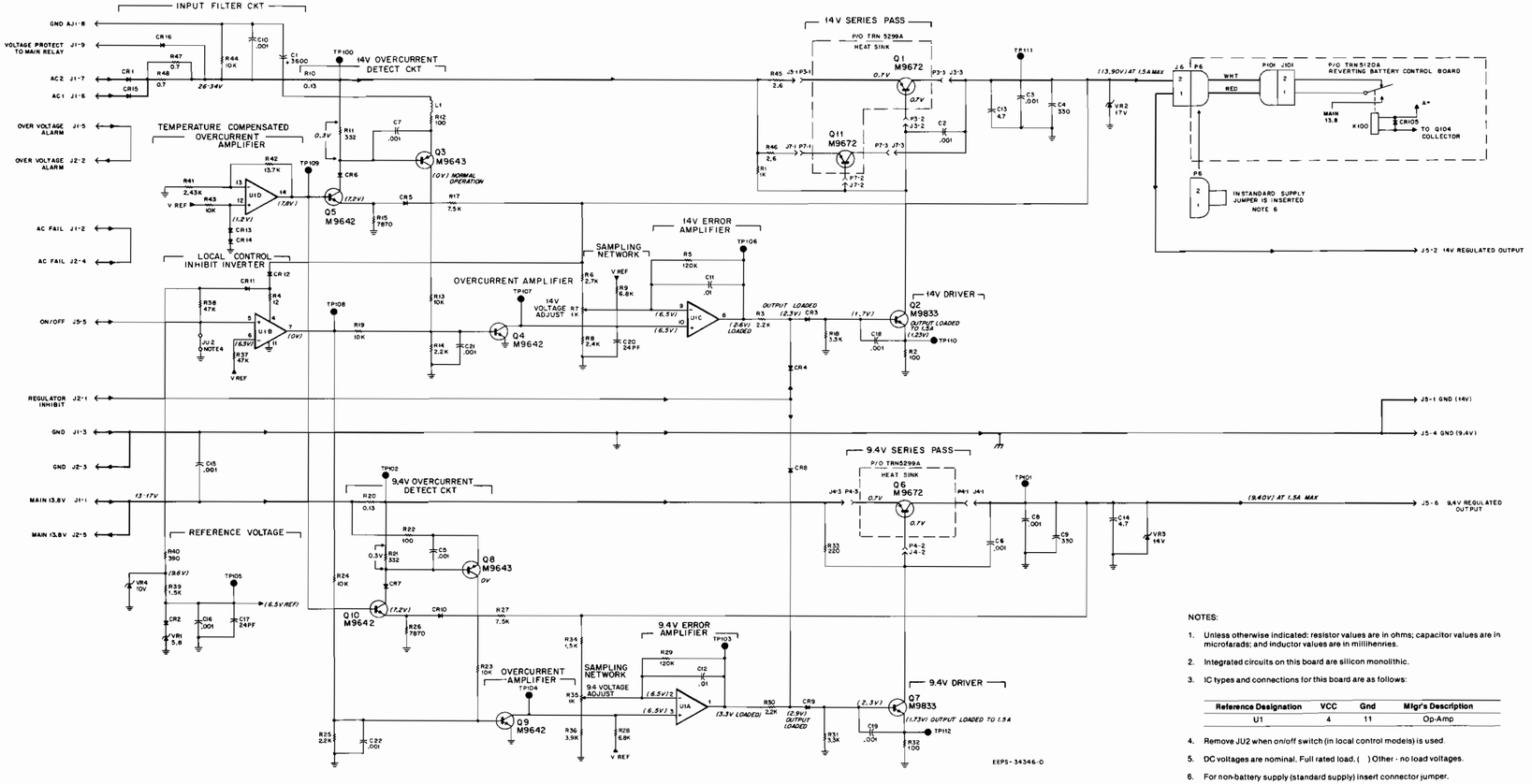
parts list

TRN5119A Auxiliary Regulator Board — PL-7945-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed: uF: unless otherwise stated
C1	23-82394A12	3600 + 100-10%; 40 V
C2, 3	21-11015B13	.001 ± 10%; 100 V
C4	23-84665F15	330 + 10-50%; 25 V
C5 thru 8	21-11015B13	.001 ± 10%; 100 V
C9	23-84665F15	330 + 10-50%; 25 V
C10	21-11015B13	.001 ± 10%; 100 V
C11, 12	21-82428B21	.01 + 10,30%; 100 V
C13, 14	23-84538G02	4.7 ± 20%; 20 V
C15, 16	21-11015B13	.001 ± 10%; 100 V
C17	21-11022G39	24 pF ± 5%; 50 V
C18, 19	21-11015B13	.001 ± 10%; 100 V
C20	21-11022G39	24 pF ± 5%; 50 V
C21, 22	21-11015B13	.001 ± 10%; 100 V
		diode: (see note)
CR1	48-82525G13	silicon
CR2 thru 12	48-83654H01	silicon
CR13, 14	48-82392B12	silicon
CR15	48-82525G13	silicon
CR16	48-82525G19	silicon
		connector, receptacle:
J1	29-82984N12	male; 8-contact
J2	9-83497F08	female, 5-contact
J3	28-82984N02	male; 3-contact
J4	28-82984N03	male; 3-contact
J5	1-80754D88	Assembly connector, consists of:
	15-84953L01	Housing, receptacle; 6-position
	39-82977N01	Contact, receptacle; 6 used
J6	28-82984N01	male; 2-contact
J7	28-82984N02	male, 3-contact
		jumper:
JU2	6-11009B23	"0" ohms
		coil, rf:
L1	24-83961B01	choke
		transistor (see note)
Q2	48-869633	NPN; type M9833
Q3	48-869643	PNP; type M9643
Q4, 5	48-869642	NPN; ype M9642
Q7	48-869633	NPN; type M9833
Q8	48-869643	PNP; typ M9643
Q9, 10	48-869642	NPN; type M9642
		resistor, fixed: ± 5%; 1/4 W: unless otherwise stated
R1	6-11009A49	1k
R2	17-82177B16	100 ± 10%; 5 W
R3	6-11009A57	2.2k
R4	6-11009A03	12
R5	6-11009A99	120k
R6	6-11009A59	2.7k
R7	18-83083G14	var. 1k
R8	6-11009A58	2.4k
R9	6-11009A69	6.8k
R10	17-82036G24	0.13; 2 W
R11	6-84444A01	332 ± 1%; 1/8 W
R12	6-11009A25	100
R13	6-11009A73	10k
R14	6-11009A57	2.2k
R15	6-10621C81	7.87k ± 1%; 1/8 W
R17	6-10621C79	7.5k ± 1%; 1/8 W
R18	6-11009A61	3.3k
R19	6-11009A73	10k
R20	17-82036G24	0.13; 2 W
R21	6-84444A01	332 ± 1%; 1/8 W
R22	6-11009A25	100
R23, 24	6-11009A73	10k
R25	6-11009A57	2.2k
R26	6-10621C81	7.87k ± 1%; 1/8 W
R27	6-10621C79	7.5k ± 1%; 1/8 W
R28	6-11009A69	6.8k
R29	6-11009A99	120k
R30	6-11009A57	2.2k
R31	6-11009A61	3.3k
R32	17-82177B16	100 ± 10%; 5 W
R33	6-11009A33	220
R34	6-11009A53	1.5k
R35	18-83083G14	var. 1k
R36	6-11009A63	3.9k
R37, 38	6-11009A89	47k
R39	6-11009A53	1.5k
R40	6-11009A39	390
R41	6-84444A09	2.49k ± 1%
R42	6-10621D05	13.7k ± 1%; 1/8 W
R43, 44	6-11009A73	10k
R45, 46	17-82177B64	2.6; 10 W
R47, 48	17-82177B12	0.7 ± 10%; 5 W

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		integrated circuit: (see note)
U1	51-83629M08	quad op amp
		voltage regulator: (see note)
VR1	48-82256C61	Zener, 5.8 V
VR2	48-82256C63	Zener, 17 V
VR3	48-82256C13	Zener, 14 V
VR4	48-82256C11	Zener, 10 V

note: For optimum performance, diodes, transistors and integrated circuits must be ordered by Motorola part numbers.



NOTES:

1. Unless otherwise indicated: resistor values are in ohms; capacitor values are in microfarads; and inductor values are in millihenries.
2. Integrated circuits on this board are silicon monolithic.
3. IC types and connections for this board are as follows:

Reference Designation	VCC	Gnd	Mfgr's Description
U1	4	11	Op-Amp

4. Remove JU2 when on/off switch (in local control models) is used.
5. DC voltages are nominal. Full rated load. ( ) Other - no load voltages.
6. For non-battery supply (standard supply) insert connector jumper.

TRN5119A Auxiliary Regulator Board Schematic Diagram, Circuit Board Detail, and Parts List
Motorola No. PEPS-38130-O
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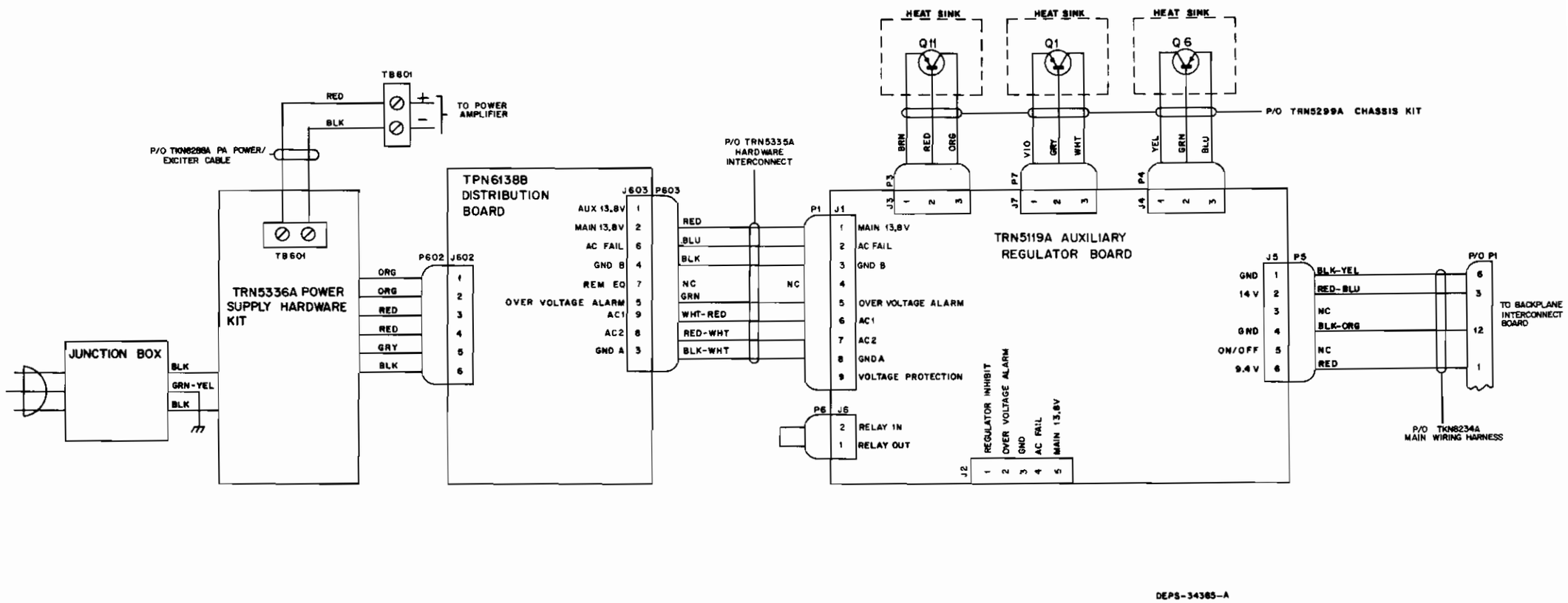
STANDARD POWER SUPPLY

MODEL TPN1191A



DEPS-34365-A

TPN1191A Standard Power Supply
Cable Interconnect Wiring Diagram
Motorola No. DEPS-34365-A

10/31/83 - V & G