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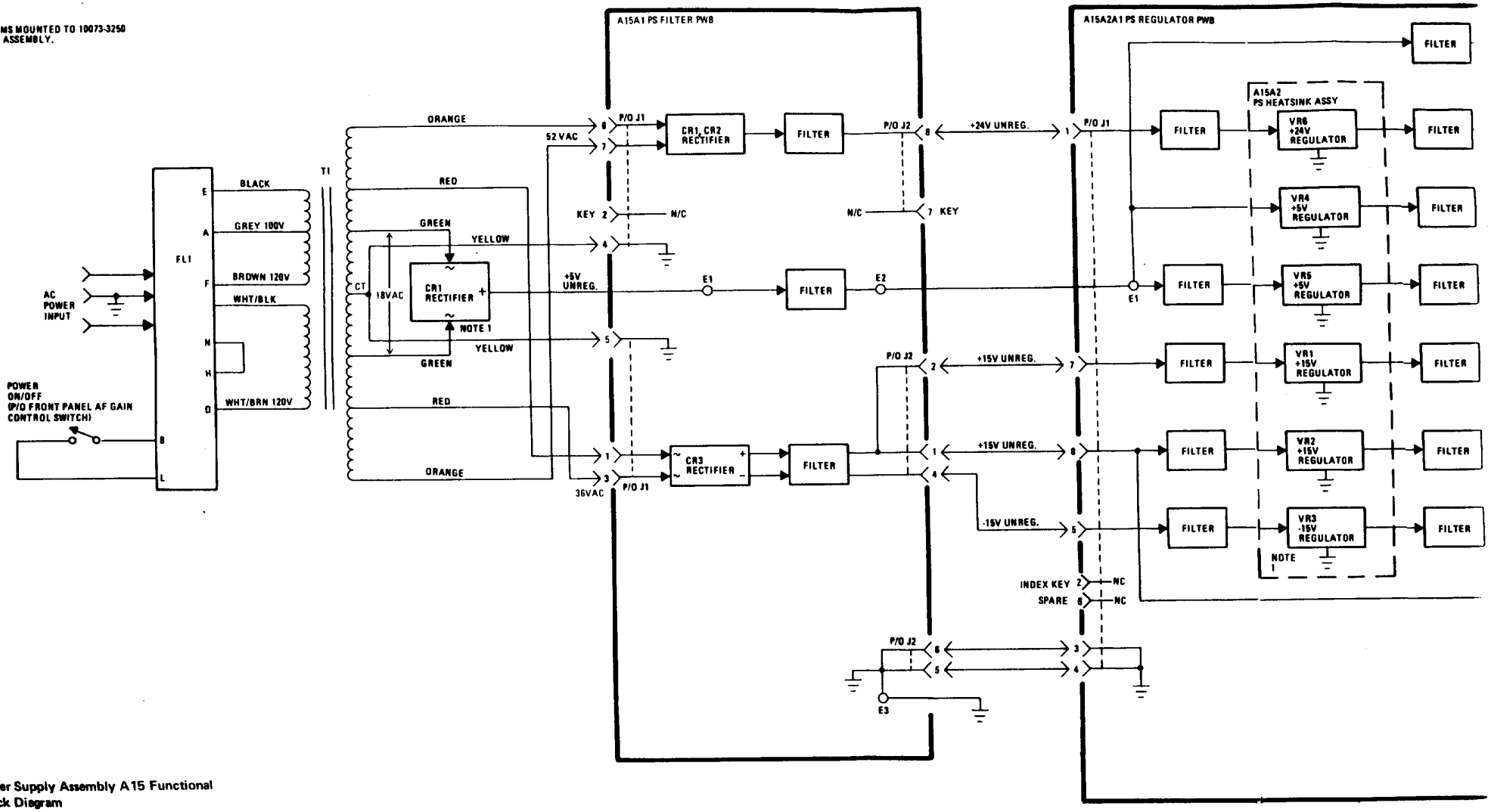
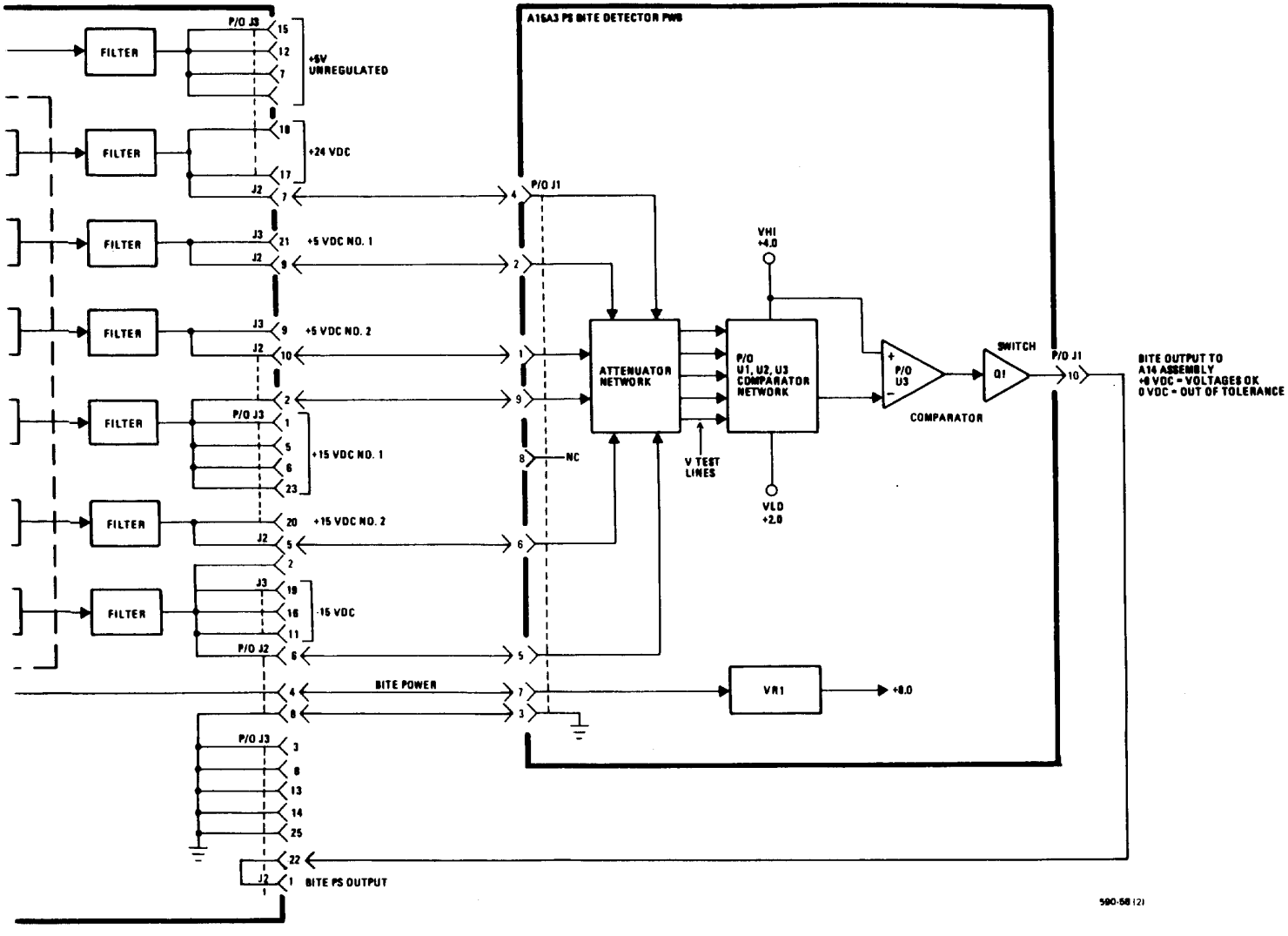
1) THESE ITEMS MOUNTED TO 10073-3250 HEATSINK ASSEMBLY.



Power Supply Assembly A15 Functional Block Diagram


A16A3 PS BITE DETECTOR PWB
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7
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18
17
+24 VDC
J2
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P/O J1
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J2
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590-58 (2)

1. A15 POWER SUPPLY ASSEMBLY

WARNING

Potentially hazardous high voltages are present inside the A15 assembly whenever the receiver is connected to an ac line source. Do not attempt any repair to this assembly unless the line cord is disconnected. Do not operate the receiver without the protective cover over the assembly properly installed.

Power Supply Assembly A15 converts either 100, 120, 220, or 240 Vac (47 - 420 Hz) line input voltages into the voltage and current requirements of the RF-590. Input voltage selection is made via the positioning of a plug-in printed circuit card (P/O FL1) located next to the rear panel ac power fuse. The positioning of this card determines the tap selection of power transformer T1. (FL1 also contains the main ac power fuse and ac input power receptacle.)

All power supply components and assemblies are housed in a single metal housing with a perforated cover. This housing (and all the components it contains) may be removed from the RF-590 main frame chassis by removing the six screws at the rear panel and the two screws inside the housing which hold it to the chassis. A single plug-in connector (A15A2A1J3) carries output voltages to the RF-590 power distribution assemblies, and one other connector routes the ac input power to the front panel ON/OFF switch. Both of these must be disconnected in order to remove the housing completely.

EMI protection is provided via line filter FL1, as well as the shielding provided by the power supply housing and cover.

The main components and assemblies contained in Power Supply Assembly A15 are listed below.

- Input Line Filter FL1
- Power Transformer T1
- Filter PWB A15A1
- Heatsink Assembly A15A2 with Regulator PWB A15A2A1
- Power Supply BITE Detector PWB A15A3

FL1 provides both EMI protection and input voltage selection. T1 converts the ac line voltage into the required lower ac voltage levels needed to run the regulators. Filter PWB A15A1 converts the T1 ac outputs into unregulated dc voltage levels. The A15A2 assembly contains the three terminal voltage regulators which convert the unregulated dc levels into regulated dc output voltages. (Note that the voltage regulators VR1-VR6 are mounted to the Heatsink assembly, while the remainder of the necessary circuitry is on Regulator PWB Assembly A15A2A1. It is these A15A2A1 outputs which power the receiver.)

Power Supply BITE PWB A15A3 monitors the output of Regulator PWB A15A2A1 and signals the Control PWB A14 microprocessor if these levels exceed certain prescribed limits. This in turn, would cause a front panel fault light to light. All major components and assemblies in the A15 assembly are interconnected via ribbon cable with plug-in connectors.

The power supply output voltages and maximum design current capabilities provided to power the receiver at A15A2A1J3 are listed in table 1. Note that the current is the maximum allowable current, and that the actual amount drawn from each regulator would vary depending upon the options installed in the radio. (i.e., ISB, remote control, frequency standard, etc.)

Table 1. A15 Power Supply Outputs

A15A2A1J3 (Pin)	Voltage (Vdc)	Current (Maximum)
4, 7, 12, 15	+5 Unregulated	2.5 A
2, 17, 18	+24 Regulated	600 mA
21	+5 Regulated no. 1	750 mA
9	+5 Regulated no. 2	750 mA
1, 5, 6, 23	+15 Regulated no. 1	1.0 A
20	+15 Regulated no. 2	1.0 A
11, 16, 19	-15 Regulated	500 mA

2. A15 ASSEMBLY CIRCUIT DESCRIPTION

The RF-590 may be operated using either 100, 120, 220, or 240 Vac, 47 - 420 Hz as a primary source voltage. This voltage feeds through a standard three prong connector on the RF-590 rear panel (part of EMI Filter Assembly FL1). Input voltage selection is via a plug-in printed circuit board which is part of FL1 and accessible from the rear panel. FL1 also contains fuse F1 (replaceable from the rear panel) and initial line filtering. The receiver power switch is part of the front panel AF Gain control and is connected in series with one side of the ac line.

FL1 feeds power transformer T1 (mounted to the A15 assembly). T1 supplies 52 Vac and 36 Vac to Power Supply Filter PWB A15A1, and 18.5 Vac to rectifier CR1 mounted on the Heatsink assembly. CR1 in turn feeds an unregulated +5 volts to A15A1.

Table 2 is the A15 assembly parts list. Figures 1 and 2 show overall component location and schematic diagrams.

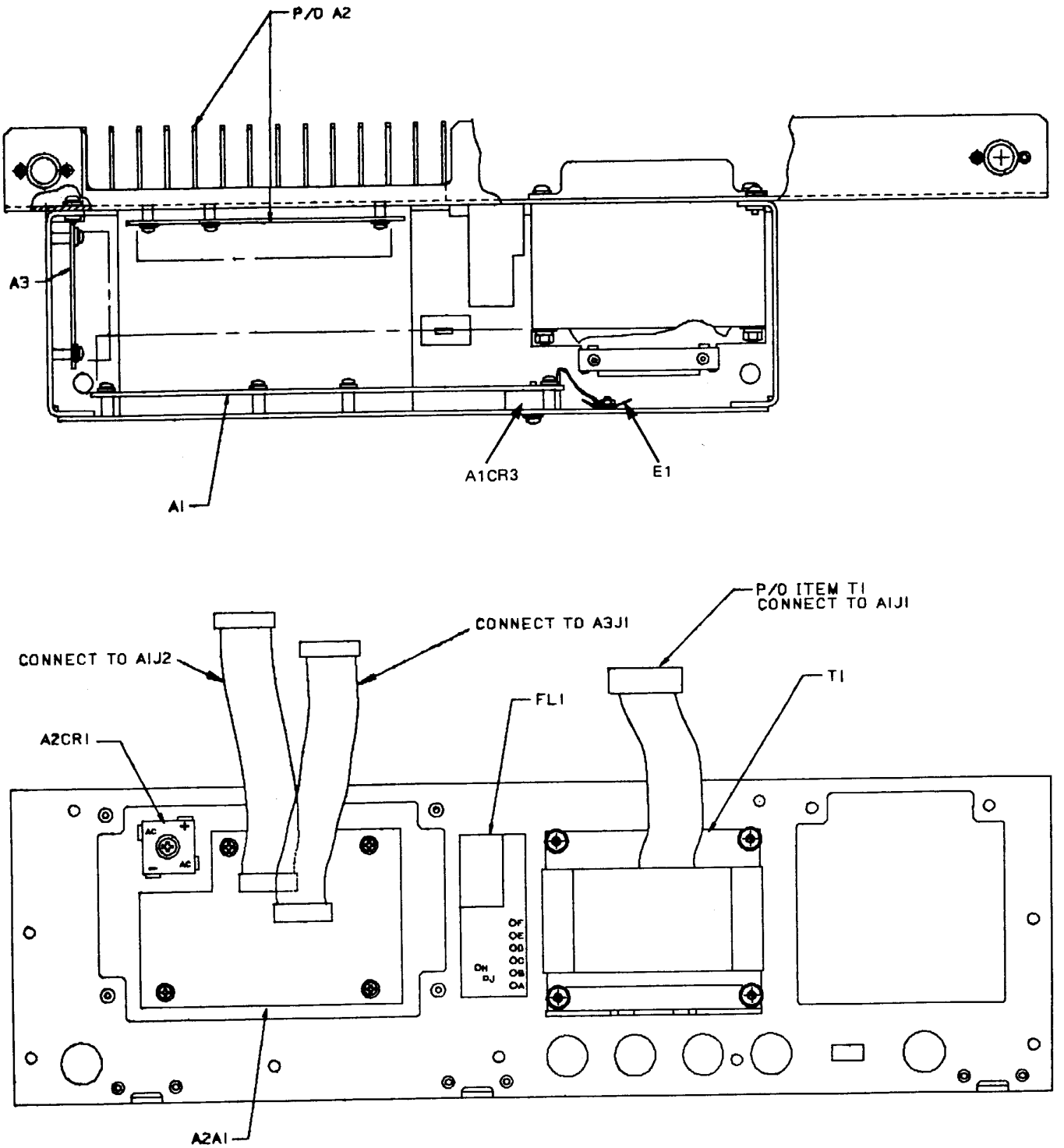


Figure 1. Power Supply Assembly A15 Component Location Diagram (10073-3000, Rev. G)

NOTE: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.

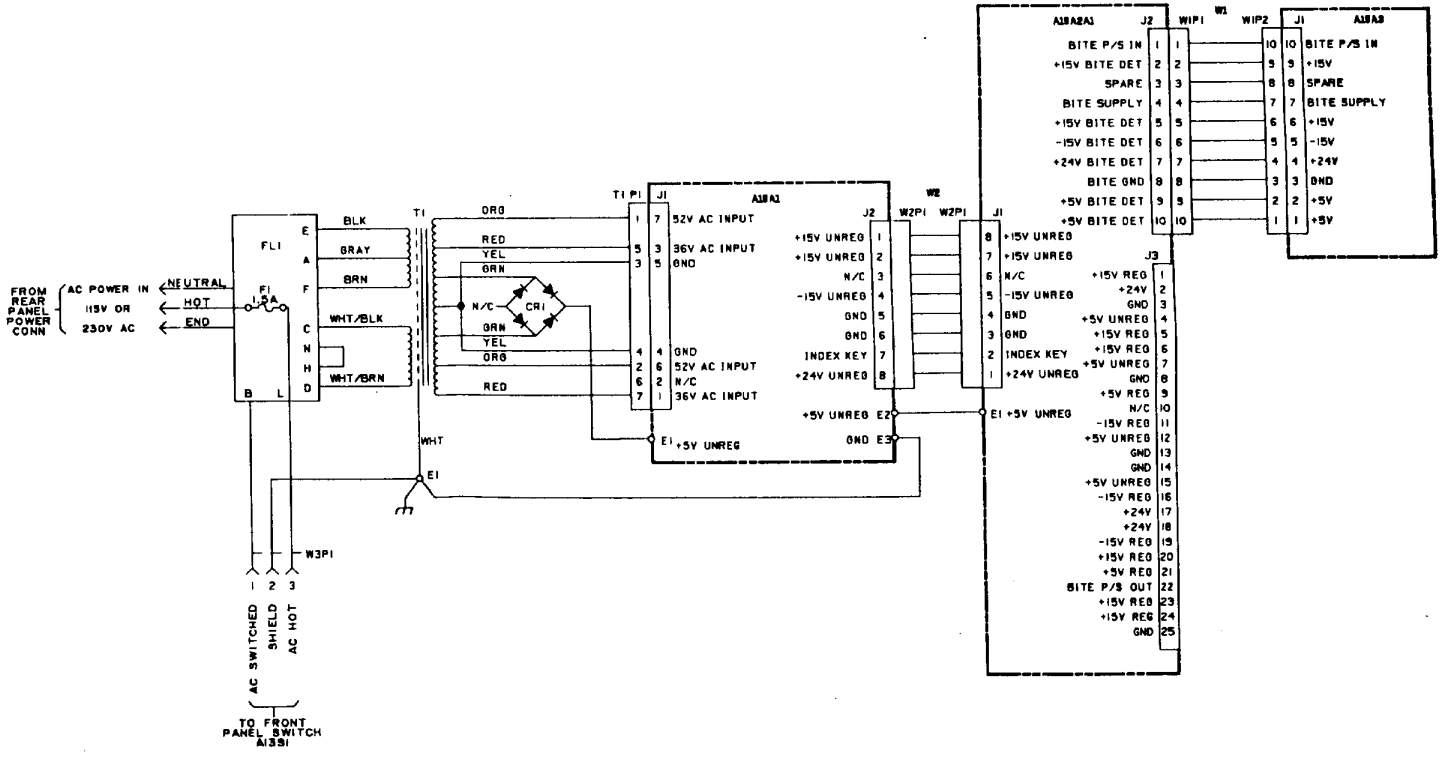


Figure 2. Power Supply Assembly A15 Schematic Diagram (10073-3001, Rev. E)

Table 2. Power Supply Rear Panel Assembly A15 Parts List (PL 10073-3000)

Ref. Desig.	Part Number	Description
	10073-3000	REAR PANEL ASSEMBLY
	10073-3006	CHASSIS, POWER SUPPLY
A1	10073-3100	PWB ASSY, FILTER
A2	10073-3250	HEATSINK ASSY
A3	10073-3300	PWB ASSY, BITE
E1	MS77068-1	LUG SOLDER #4
F1	F03-0002-022	FUSE 1-1/2A QA
FL1	6919-1400	LINE FILTER
T1	10073-3052	TRANSFORMER,POWER
W1	10073-7060	RIBBON CABLE, 10 COND
W2	10073-7059	RIBBON CABLE, 8 COND
W3	10073-7250	CABLE ASSY,3 COND

2.1 A15A1 Power Supply Filter Assembly

The A15A1 assembly contains voltage rectifiers and the large filter capacitors required to filter the input voltages from T1. The 52 Vac at J1-6 and J1-7 is full-wave rectified by CR1 and CR2 and filtered by C1 to produce an unregulated +24 volts at J2-8.

The 36 Vac at J1-1 and J1-3 is full-wave rectified by CR3 and filtered by C2 and C3 to produce an unregulated +15 volts at J2-1 and J2-2 and -15 volts unregulated at J2-4. The 5 volts unregulated at E1 is heavily filtered by filter network C4-L1-C5 and made available at E2.

Table 3 is the A15A1 assembly parts list. Figures 3 and 4 are the A15A1 component location and schematic diagrams.

Table 3. Power Supply Filter Board Assembly A15A1 Parts List (PL 10073-3100)

Ref. Desig.	Part Number	Description
	10073-3100	PWB, FILTER
C1	C17-0050-282	CAP 2800UF 50V ELEC
C2	C17-0035-562	CAP 5600UF 35V ELEC
C3	C17-0035-212	CAP 2100UF 35V ELEC
C15	C17-0035-123	CAP 12000UF 35V ELEC
C19	C17-0035-123	CAP 12000UF 35V ELEC
CR1	D22-0006-001	DIODE 3A 600V RECT GP
CR2	D22-0006-001	DIODE 3A 600V RECT GP
CR3	D22-5011-200	DIODE 10A 200V RECT BR
E3	MP-0372	FAST-ON .125 PCB MOUNT
J1	J42-0004-007	CONN ,7 PIN
J2	J46-0032-008	HDR 8 PIN 0.100" SR
L1	10073-3051	INDUCTOR,1MH 4 AMP

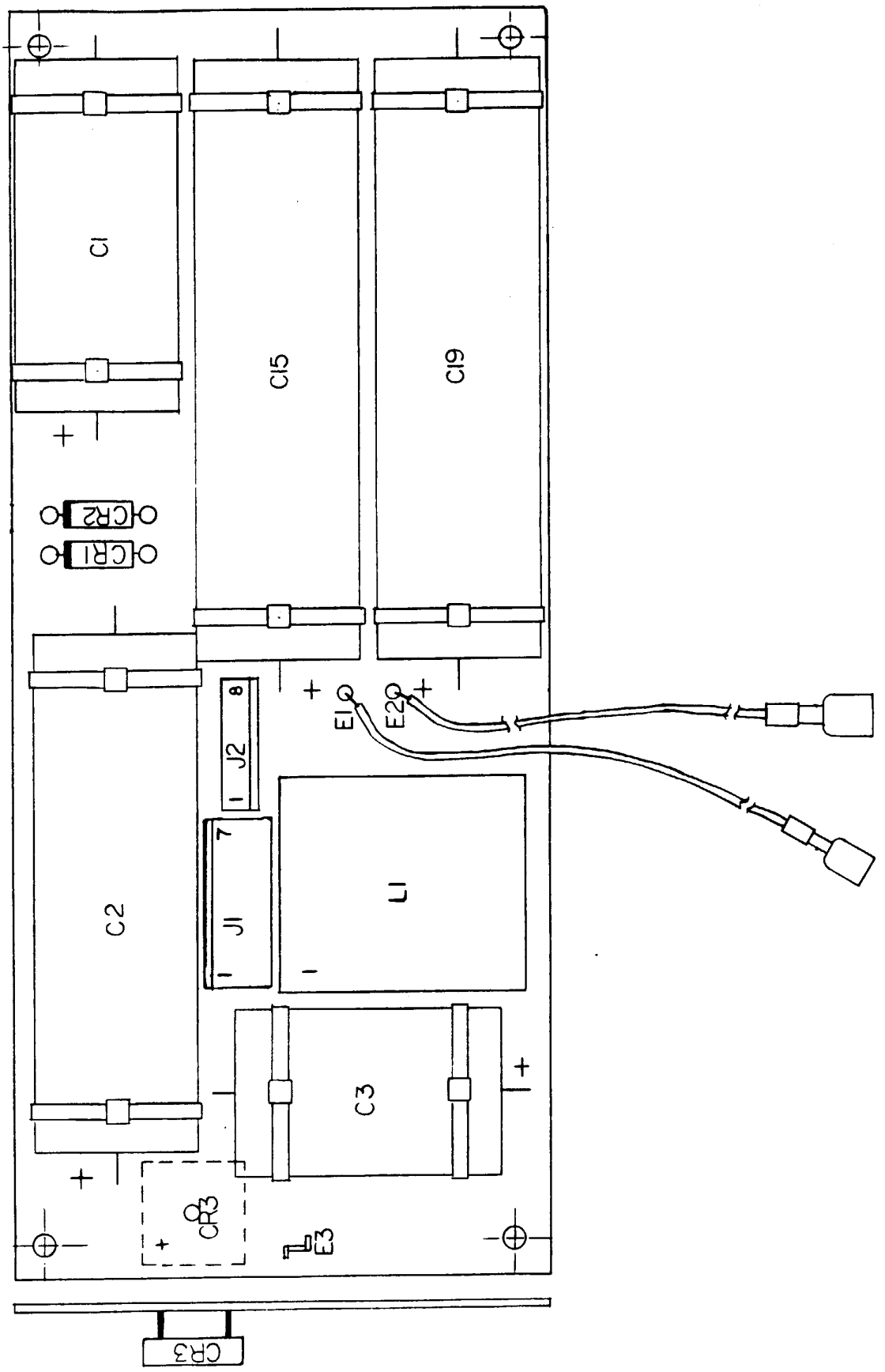


Figure 3. Power Supply Filter Board Assembly A15A1 Component Location Diagram (10073-3100, Rev. D)

NOTE: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
4. VENDOR PART NO. CALLOUTS ARE FOR REFERENCE ONLY. COMPONENTS ARE SUPPLIED PER PART NO. IN PARTS LIST.

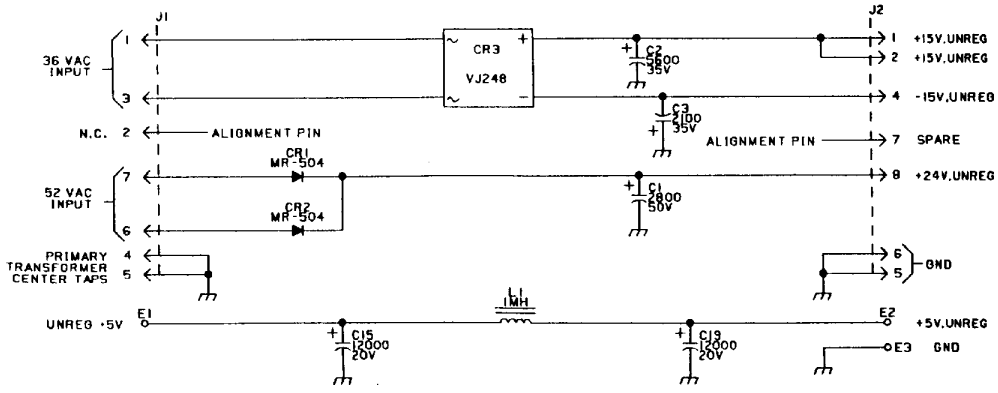


Figure 4. Power Supply Filter Board Assembly A15A1 Schematic Diagram (10073-3101, Rev. C)

2.2 Power Supply Regulator Assembly A15A2

Heatsink Assembly A15A2 consists of voltage regulators VR1-VR6, CR1, and Regulator PWB A15A2A1. They are all mounted to a large heatsink bolted to the rear of the A15 assembly. Heatsink Assembly A15A2 may be removed from Power Supply Assembly A15 by removing the five mounting screws on the rear of the A15 assembly.

Regulator PWB A15A2A1 receives the unregulated output voltages from A15A1, and uses linear regulators mounted to Heatsink Assembly A15A2 to produce the regulated output voltages required. Table 4 lists the input voltages, the associated voltage regulator, and the output voltages.

Table 4. A15A2 Voltage Regulator Identification

Input Voltage	A15A2 Voltage Regulator	Output Voltage
+15 Unregulated	VR1	15 Vdc no. 1
+15 Unregulated	VR2	15 Vdc no. 2
-15 Unregulated	VR3	-15 Vdc
+5 Unregulated	VR4	+5 Vdc no. 1
+5 Unregulated	VR5	+5 Vdc no. 2
+24 Unregulated	VR6	+24 Vdc

All these voltages are routed through connector A15A2A1J3 (located on the bottom of the A15A2A1 PWB) for power distribution throughout the radio.

Additionally, the A15A2A1 assembly provides additional filtering to these voltages, as well as to a +5 volt unregulated output which does not receive any regulation. (This output is used where local regulation to +5 Vdc will be accomplished on a particular assembly.)

Table 5 is the A15A2 assembly parts list and figure 5 is the A15A2 assembly component location drawing. Table 6 is the A15A2A1 parts list and figure 6 is the A15A2A1 assembly component location drawing. Figure 7 is the A15A2 assembly and A15A2A1 assembly schematic diagram.

Table 5. Power Supply Heatsink Assembly A15A2 Parts List (PL 10073-3250)

Ref. Desig.	Part Number	Description
	X-0814	INSULATOR, TRANSISTOR
A1	10073-3200	PWB ASSY, REGULATOR
CR1	D22-5004-001	DIODE 15A 200V RECT BR
VR1, VR2	I11-0001-006	IC VR 7815 +15V 1.5A 4%
VR3	I12-0002-005	IC VR 7915C -15V 1.5A 4%
VR4, VR5	I11-0001-001	IC VR 7805 +5V 1.5A 4%
VR6	IC-0358	IC VR 317 ADJ V 1.5A

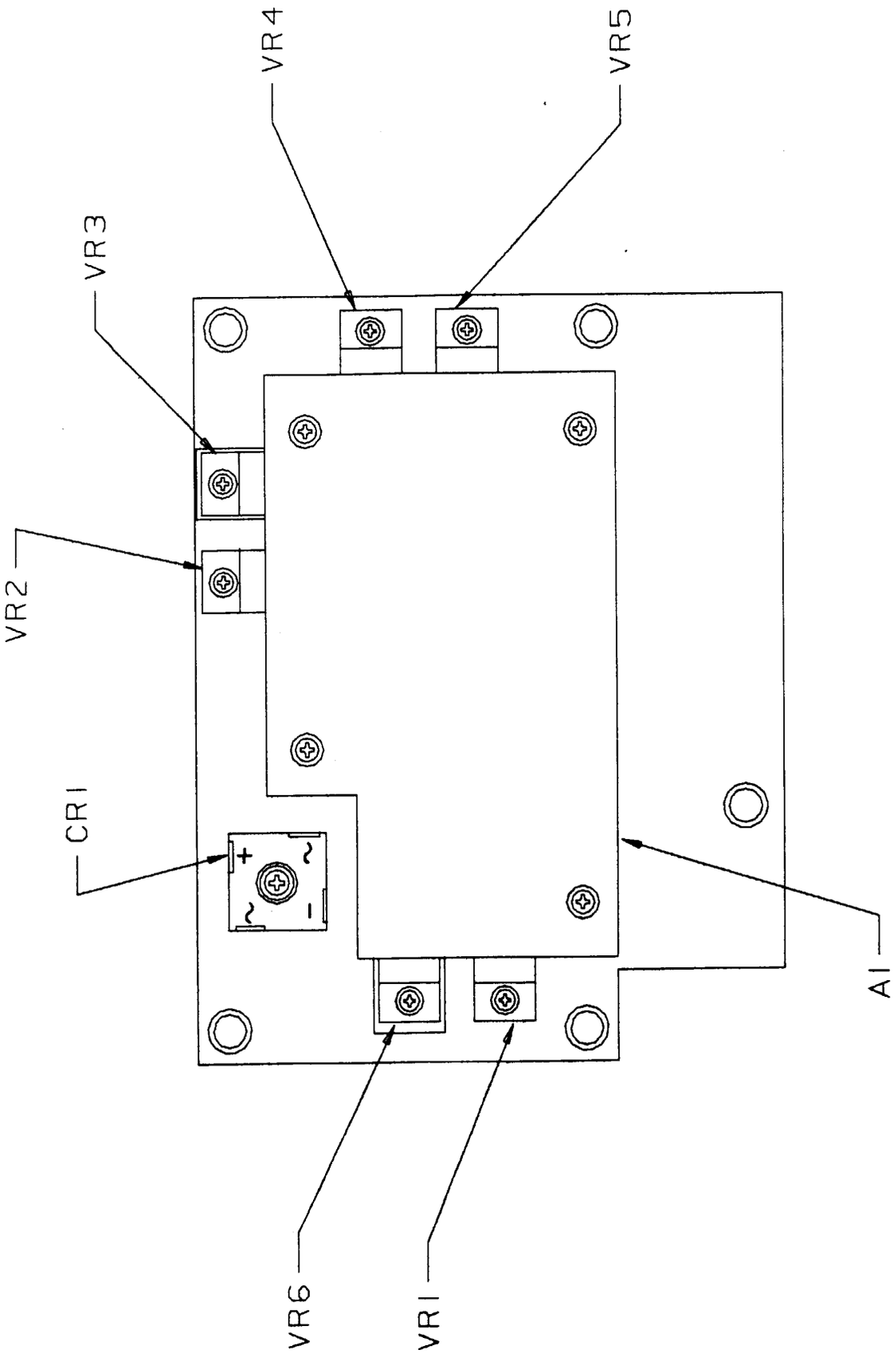


Figure 5. Power Supply Heatsink Assembly A15A2 Component Location Diagram (10073-3250, Rev. C)

Table 6. Power Supply Regulator Board Assembly A15A2A1 Parts List (PL 10073-3200)

Ref. Desig.	Part Number	Description
	10073-3200	PWB, REGULATOR
C1	C26-0050-100	CAP 10UF 20% 50V TANT
C2	M39014/02-1320	CAP .47UF 10% 50V CER-R
C3	M39014/02-1320	CAP .47UF 10% 50V CER-R
C4	C26-0025-680	CAP 68UF 20% 25V TANT
C5	M39014/02-1310	CAP .1UF 10% 100V CER-R
C6	C26-0050-100	CAP 10UF 20% 50V TANT
C7	M39014/02-1320	CAP .47UF 10% 50V CER-R
C8	M39014/02-1320	CAP .47UF 10% 50V CER-R
C9	C26-0025-680	CAP 68UF 20% 25V TANT
C10	M39014/02-1310	CAP .1UF 10% 100V CER-R
C11	C26-0050-100	CAP 10UF 20% 50V TANT
C12	M39014/02-1320	CAP .47UF 10% 50V CER-R
C13	M39014/02-1320	CAP .47UF 10% 50V CER-R
C14	C26-0025-680	CAP 68UF 20% 25V TANT
C15	M39014/02-1310	CAP .1UF 10% 100V CER-R
C16	M39014/02-1320	CAP .47UF 10% 50V CER-R
C17	M39014/02-1310	CAP .1UF 10% 100V CER-R
C18	C26-0016-150	CAP 15UF 20% 16V TANT
C19	M39014/02-1320	CAP .47UF 10% 50V CER-R
C20	M39014/02-1310	CAP .1UF 10% 100V CER-R
C21	C26-0016-150	CAP 15UF 20% 16V TANT
C22	C25-0003-015	CAP 22UF 10% 50V TANT
C23	M39014/02-1320	CAP .47UF 10% 50V CER-R
C24	M39014/02-1320	CAP .47UF 10% 50V CER-R
C25	C25-0003-015	CAP 22UF 10% 50V TANT
C26	M39014/02-1310	CAP .1UF 10% 100V CER-R
C27	C25-0003-313	CAP 100UF 10% 20V TANT
C28	M39014/02-1310	CAP .1UF 10% 100V CER-R
E1	MP-0372	FAST-ON .125 PCB MOUNT
J1	J46-0032-008	HDR 8 PIN 0.100" SR
J2	J46-0032-010	HDR 10 PIN 0.100" SR
J3	J20-0009-025	CONN-D F 25 FXD RT A
R1	RN55D2430F	RES,243.0 1% 1/8W MET FLM
R2	RN55D4421F	RES,4420 1% 1/8W MET FLM
TP1	J-0392	TP PWB BRN RA SIDE ACCESS

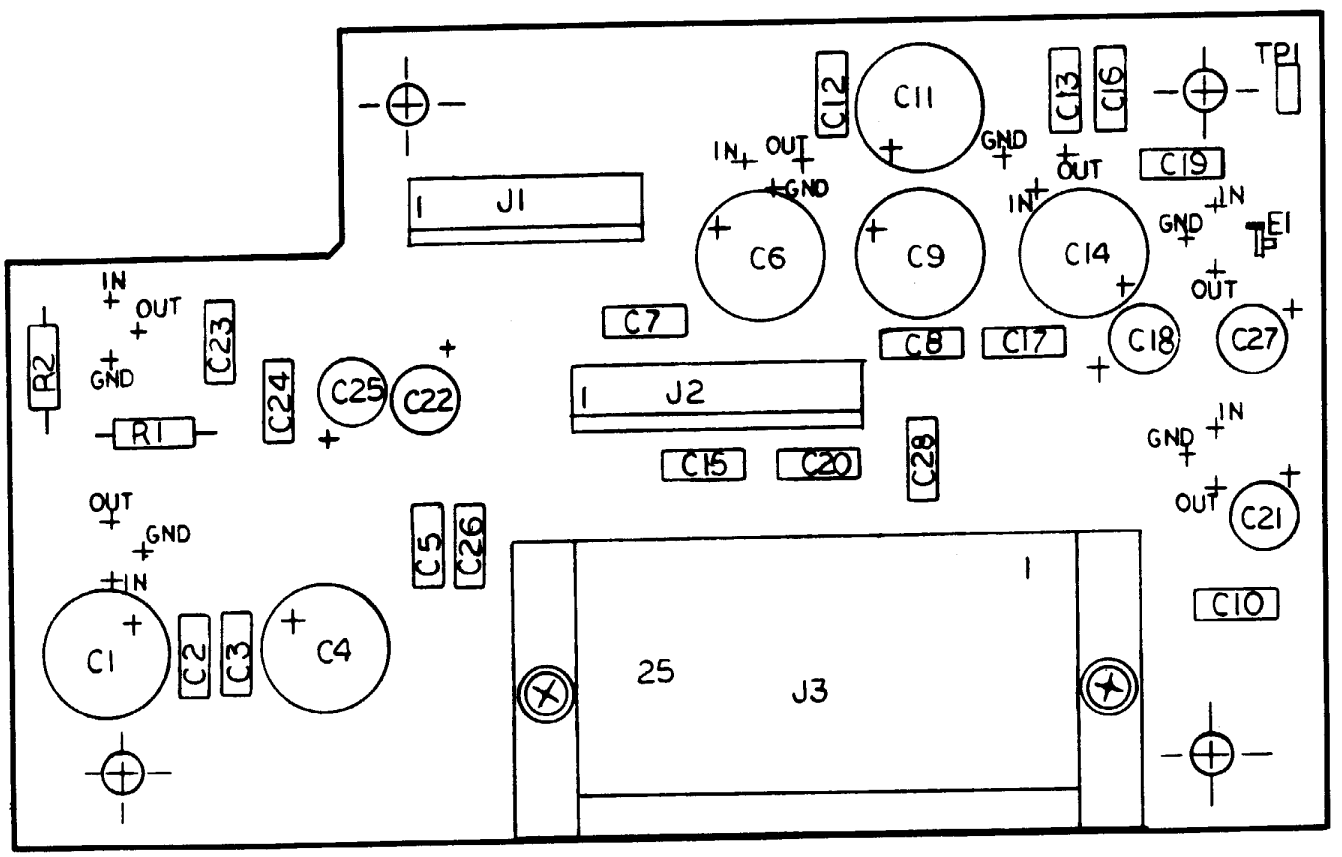


Figure 6. Power Supply Regulator Board Assembly A15A2A1 Component Location Diagram (10073-3200, Rev. C)

NOTE: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4W, ±5%.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
4. VENDOR PART NO. CALLOUTS ARE FOR REFERENCE ONLY. COMPONENTS ARE SUPPLIED PER PART NO. IN PARTS LIST.

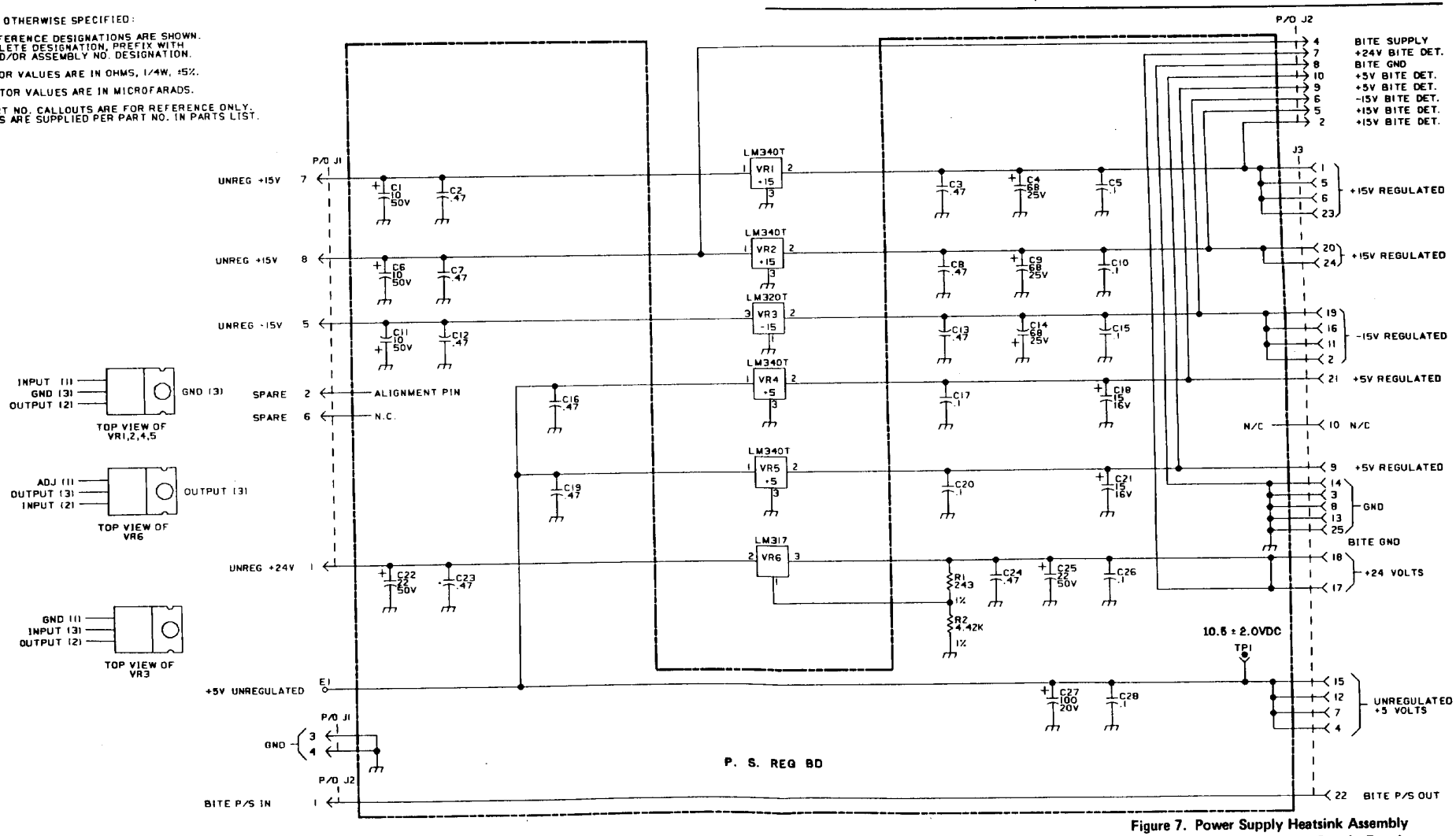


Figure 7. Power Supply Heatsink Assembly A15A2 and Power Supply Regulator Assembly A15A2A1 Schematic Diagram (10073-3201, Rev. E)

2.3 Power Supply BITE Detector Assembly A15A3

The A15A3 assembly monitors all the regulated output voltages listed in table 4 and will issue a fault signal to Control Board Assembly A14 if any of them exceed a defined upper or lower limit. The A14 assembly will then issue a fault command and turn on the RF-590 fault indicator on the front panel. This operation is performed continually while the receiver is operating.

The general operation scheme of the assembly is as follows, using the +5 Vdc from A15A2 at A15A3 J1-9 as an example.

The +5 Vdc at pin 2 is divided by resistor network R13-R14 to place nominally 3.1 Vdc at U2D-10 (-) and U2C-9 (+). (This level shall be referred to a V_{TEST}.) The +8 Vdc from VR1 is divided by R1 and R3 to place +4 Vdc at U2D-11 (+) and by R2 and R4 to place +2 Vdc at U2C-8 (-). (The +4 Vdc level shall be referred to as V_{HI}; the +2 Vdc level as V_{LO}). These two levels establish the "window" that V_{TEST} must not exceed.

Under conditions where $V_{LO} < V_{TEST} < V_{HI}$, U2C and U2D outputs are at +8 volts. This feeds to U3C-8 (-). Since U3C-9 (+) input is always held fixed at 4 Vdc (V_{HI}), U3C output will be low (0 Vdc), Q1 will be biased off, and the BITE output signal will be at +8 Vdc. This notifies the BITE circuits that the +5 Vdc level is within its limits.

Assume that V_{TEST} exceeds V_{HI}. U2D output would switch 0 Vdc, causing U3C to switch to +8 Vdc, turning on Q1. Q1 output would drag the BITE output to 0 Vdc, and notify the BITE circuits of an error condition. The same events would occur if V_{TEST} fell below V_{LO}, except that now U2C output would affect the switching of U3C.

This concept of a comparator pair providing the lower and upper window limits is used to monitor the other regulated input voltages. Since all the comparator outputs are tied together, any one of them changing states would cause Q1 to issue an error signal.

Note that there are five comparator pairs, but six input voltages. The -15 Vdc input is used as a reference (instead of ground) for the two +15 Vdc and one +24 Vdc inputs, thereby eliminating the need for a separate comparator pair to monitor the -15 Vdc.

The approximate range of upper and lower input limits which will not trip the comparators is given in table 7.

Table 7. A15A3 BITE Detector Trip Limits

Input Voltage Vdc	Permissable Voltage Range
+5 Vdc no. 1	≈ 3.0 to 6.5
+5 Vdc no. 2	≈ 3.0 to 6.5

Table 7. A15A3 BITE Detector Trip Limits (Cont.)

Input Voltage Vdc	Permissable Voltage Range
+15 Vdc no. 1	≈ 13.0 to 17.0
+15 Vdc no. 2	≈ 13.0 to 17.0
-15 Vdc	≈ -13.0 to -17.0
+24 Vdc	≈ 21 to 26

Table 8 is the A15A3 assembly parts list. Figures 8 and 9 are the A15A3 assembly component location and schematic diagrams.

Table 8. Power Supply BITE Board A15A3 Parts List (PL 10073-3300)

Ref. Desig.	Part Number	Description
	10073-3300	PWB, BITE
C1	M39014/02-1310	CAP .1UF 10% 100V CER-R
C2	C26-0025-100	CAP 10UF 20% 25V TANT
C3	M39014/02-1310	CAP .1UF 10% 100V CER-R
J1	J46-0032-010	HDR 10 PIN 0.100" SR
Q1	2N2222	XSTR SS/GP NPN TO-18
R1	RN55D4021F	RES,4020 1% 1/8W MET FLM
R2	RN55D7501F	RES,7500 1% 1/8W MET FLM
R3	RN55D4021F	RES,4020 1% 1/8W MET FLM
R4	RN55D2491F	RES,2490 1% 1/8W MET FLM
R5	RN55D1212F	RES,12.1K 1% 1/8W MET FLM
R6	RN55D1822F	RES,18.2K 1% 1/8W MET FLM
R7	RN55D1212F	RES,12.1K 1% 1/8W MET FLM
R8	RN55D1822F	RES,18.2K 1% 1/8W MET FLM
R9	RN55D1822F	RES,18.2K 1% 1/8W MET FLM
R10	RN55D2102F	RES,21.0K 1% 1/8W MET FLM
R11	RN55D1821F	RES,1820 1% 1/8W MET FLM
R12	RN55D3011F	RES,3010 1% 1/8W MET FLM
R13	RN55D1821F	RES,1820 1% 1/8W MET FLM
R14	RN55D3011F	RES,3010 1% 1/8W MET FLM
R15	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R16	R65-0003-472	RES 4.7K 5% 1/4W CAR FILM
R17	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R18	R65-0003-103	RES 10K 5% 1/4W CAR FILM
R19	R65-0003-103	RES 10K 5% 1/4W CAR FILM
TP1	J-0392	TP PWB BRN RA SIDE ACCESS
TP2	J-0387	TP PWB RED RA SIDE ACCESS

Table 8. Power Supply BITE Board A15A3 Parts List (PL 10073-3300) (Cont.)

Ref. Desig.	Part Number	Description
TP3	J-0390	TP PWB ORN RA SIDE ACCESS
TP4	J-0391	TP PWB YEL RA SIDE ACCESS
TP5	J-0389	TP PWB GRN RA SIDE ACCESS
TP6	J-0393	TP PWB BLU RA SIDE ACCESS
U1	I20-0006-000	IC LM339 COMPARATOR PL
U2	I20-0006-000	IC LM339 COMPARATOR PL
U3	I20-0006-000	IC LM339 COMPARATOR PL
VR1	I12-0006-008	IC VR 78L08A +8V .10A 4%

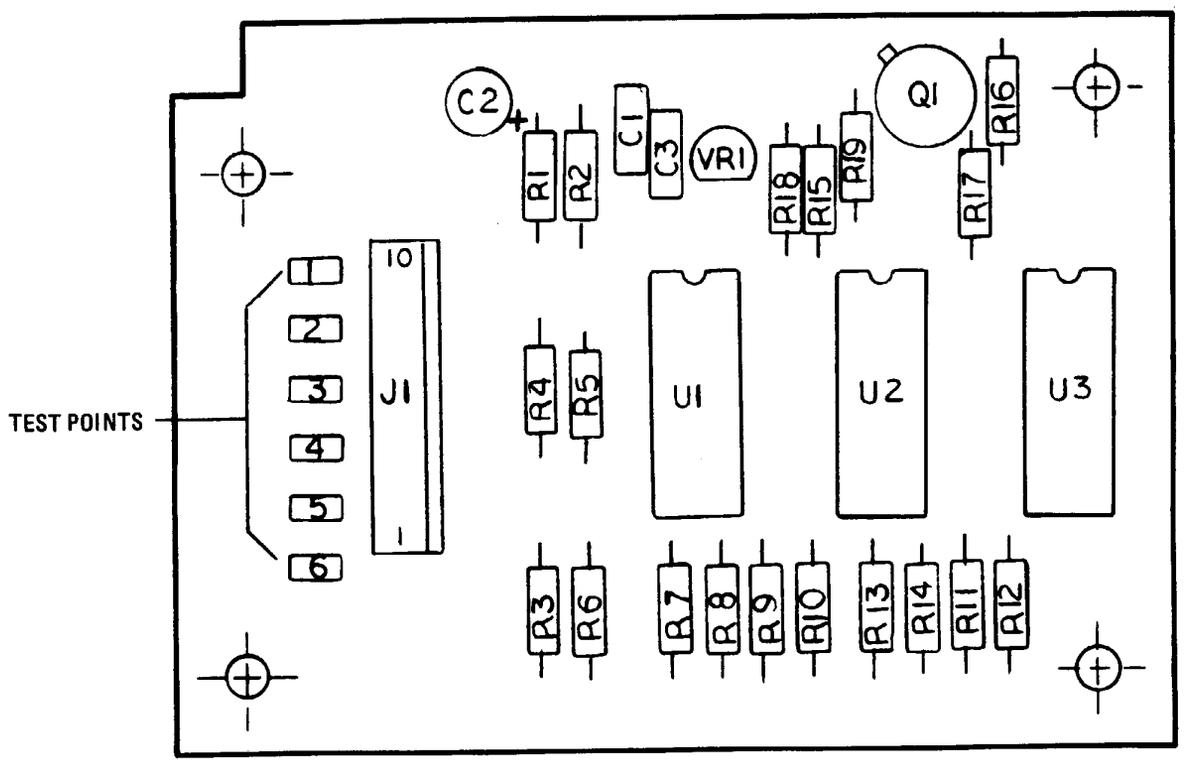
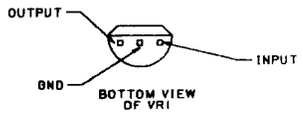


Figure 8. Power Supply BITE Board A15A3 Component Location Diagram (10073-3300, Rev. B)

NOTE: UNLESS OTHERWISE SPECIFIED:

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. FOR A COMPLETE DESIGNATION, PREFIX WITH UNIT NO. AND/OR ASSEMBLY NO. DESIGNATION.
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4W, ±5%.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
4. VENDOR PART NO. CALLOUTS ARE FOR REFERENCE ONLY. COMPONENTS ARE SUPPLIED PER PART NO. IN PARTS LIST.
5. SEE GRAPHICS BELOW.



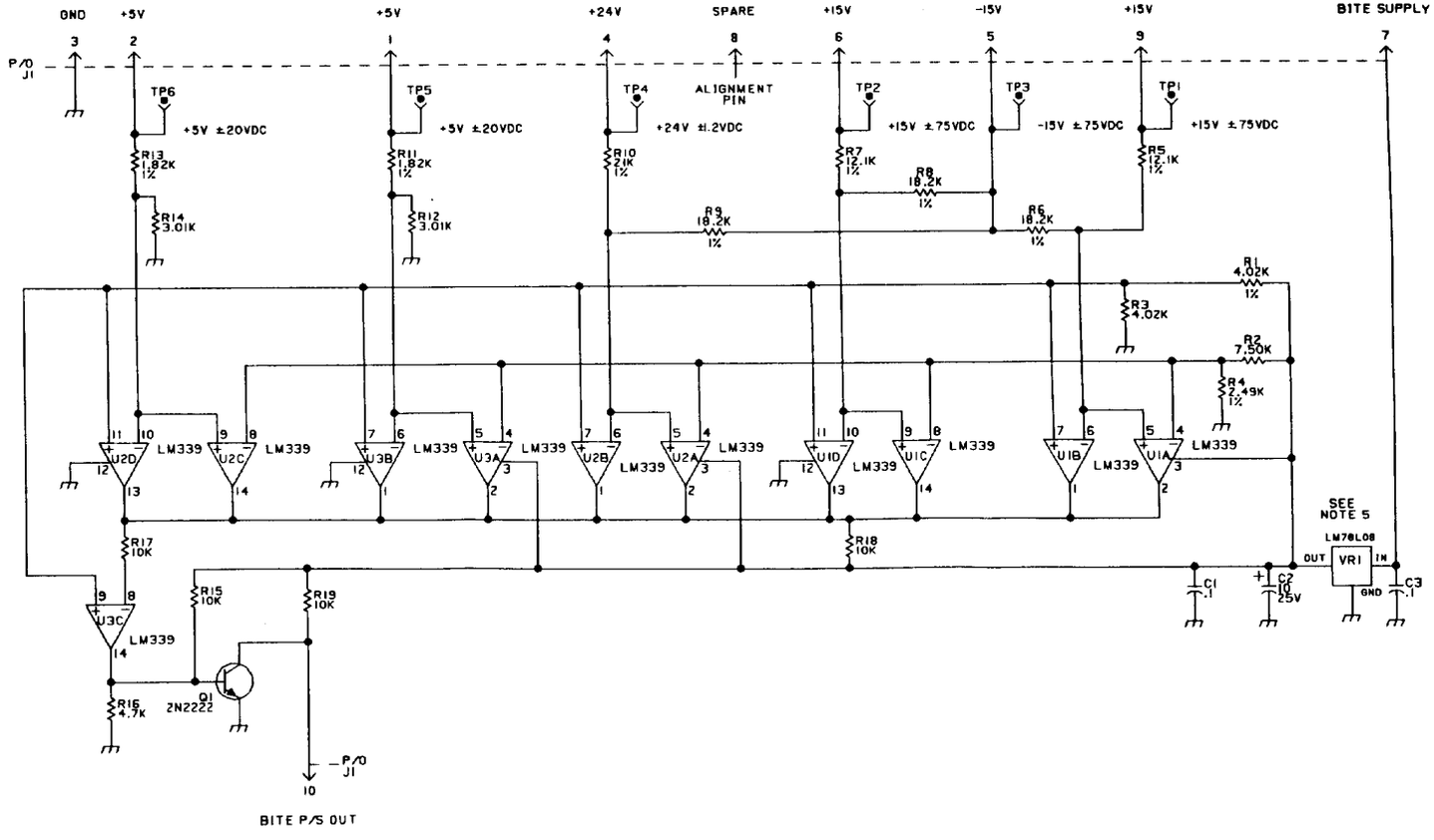


Figure 9. Power Supply BITE PWB A15A3 Schematic Diagram (10073-3301, Rev. D)