ALTEC LANSING®

the sound of experience

9444B Power Amplifier

SERVICE INSTRUCTIONS

*** * * CAUTION * * ***

NO USER SERVICEABLE PARTS INSIDE. EXTREMELY HAZARDOUS VOLTAGES AND CURRENTS MAY BE ENCOUNTERED WITHIN THE CHASSIS. THE SERVICING INFORMATION CONTAINED WITHIN THIS DOCUMENT IS ONLY FOR USE BY ALTEC LANSING AUTHORIZED WARRANTY REPAIR STATIONS AND QUALIFIED SERVICE PERSONNEL. TO AVOID ELECTRIC SHOCK, DO NO PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN THE OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO. OTHERWISE, REFER ALL SERVICING TO QUALIFIED SERVICE PERSONNEL.

9 SERVICE INFORMATION

WARNING: *No user servicable parts inside. Extremely hazardous voltages and currents may be encountered within the chassis. The servicing information contained within this document is only for use by Altec Lansing authorized warranty repair stations and qualified service personnel. To avoid electric shock DO NOT perform any servicing other than that contained in the Operating Instructions unless you are qualified to do so. Otherwise, refer all servicing to qualified service personnel.*

NOTICE: *Modifications to Altec Lansing products are not recommended. Such modifications shall be at the sole expense of the person(s) or company responsible, and any damage resulting therefrom shall not be covered under warranty or otherwise.*

9.1 Trimpot Adjustments

Figure 12 is a component layout of the main circuit board for one channel (both channels use the same board). The schematic of the amplifier is shown in Figure 13. Several trimpots are provided for adjustment. Resistor R26 adjusts the bias. Resistor R23 sets the negative current limit and resistor R24 sets the positive current limit. These two resistors also affect the symmetry of clipping. The LF Cancel trimpot, R39, minimizes distortion caused by ripple on the power supply lines.

9.2 Equipment Needed

To precisely adjust the trimpots, you must have the following equipment:

- 1 — Oscilloscope (Tektronix 2445 or equivalent)
- 1 — Distortion analyzer (Sound Technology 1700B or equivalent)
- 1 — 15 amp ac ammeter
- 1 — 4 Ω load rated at 600 watts
- 1 — 8 Ω load rated at 300 watts
- 1 — Small non-conducting flat-blade screwdriver or set of plastic TV alignment tools
- 1 — 12 in jumper cable with alligator clips on each end
- Miscellaneous handtools (to remove the top cover)

NOTE: *If you need to verify the amplifier's performance against the rated specifications, you must be able to maintain the ac line voltage constant at 120 V ac (or 240 V ac if wired according to Figure 2b). Therefore, we recommend a suitably rated variac (50 ampere rating at 120 V ac).*

9.3 Adjusting R39, the LF Cancel Trimpot

Shown in Figure 6 is a distortion waveform resulting from an improperly adjusted R39. Notice the near sawtooth appearance of the waveform. The trace in Figure 7 shows the resulting waveform after R39 is properly adjusted. Notice the reduction in ripple.

To adjust R39 for minimum ripple, follow the procedures below:

1. Turn power off and disconnect the unit from its power source. Make sure the unit is in the Dual mode with 8 Ω loads connected to each channel.

2. Remove the eleven screws securing the top cover. Refer to Figure 1 for the screw locations.

3. Connect the sinewave generator output of the analyzer to the input of Channel 1. Rotate the input level control of Channel 1 to its full clockwise position. Rotate the input level control of Channel 2 to its full counter-clockwise position.

4. Apply power to the amplifier and adjust the sinewave generator for a 60 Hz, 0 dBu (0.775 V rms) output level. For this adjustment, it is not necessary to maintain a constant 120 V ac line input voltage under load.

5. Find R39 on the component layout in Figure 12. With a non-conducting or plastic-shaft screwdriver, adjust R39 for least amount of ripple as shown in Figure 7.

6. Repeat steps 3 through 5 for Channel 2.

7. Turn off the generator's output signal. If you have concluded with the test and alignment procedures, disconnect the amplifier from its power source and re-install the top cover with the eleven screws previously removed.

9.4 Adjusting R26, the BIAS Trimpot

Shown in Figure 8 is a distortion waveform resulting from an improperly adjusted R26. Notice the pronounced spikes at the crossover point in the waveform. The trace in Figure 9 shows the waveform with less pronounced spikes after R39 is properly adjusted.

To adjust R26 for the proper bias, follow the procedures below:

1. Turn power off and disconnect the unit from its power source. Make sure the unit is in the Dual

mode with 8 Ω loads connected to each channel.

2. Remove the eleven screws securing the top cover. Refer to Figure 1 for the screw locations.

3. Connect the sinewave generator output of the analyzer to the input of Channel 1. Rotate the input level control of Channel 1 to its full clockwise position. Rotate the input level control of Channel 2 to its full counter-clockwise position.

4. Apply power to the amplifier and adjust the sinewave generator for a 1 kHz, 0 dBu (0.775 V rms) output level. For this adjustment, it is not necessary to maintain a constant 120 V ac line input voltage under load.

5. Find R26 on the component layout in Figure 12. Rotate the shaft of R26 slowly clockwise until the spikes are minimized in the distortion waveform as shown in Figure 9.

6. Repeat steps 3 through 5 for Channel 2.

7. Check the ac idle current draw. With both channels at idle, the ac line current should be approximately 0.6 amps rms. If the idle current draw is significantly greater, rotate R26 counter-clockwise slightly on both channels until the idle current is approximately 0.6 amps rms.

8. Turn off the generator's output signal. If you have concluded with the test and alignment procedures, disconnect the amplifier from its power source and re-install the top cover with the eleven screws previously removed.

9.5 Adjusting R23 and R24, the Negative and Positive Current Limit Trimpots

Shown in Figure 11 is an asymmetrically clipped waveform caused by an improperly adjusted positive current limit as determined by R24. Had R23 been improperly adjusted, the negative half of the waveform would be clipped as well, but its degree of clipping is a function of R23 only and is independent of R24.

In the following procedures, you will be adjusting the current limit thresholds by varying R23 and R24 in such a way so as to insure symmetrical clipping.

1. Turn power off and disconnect unit from power source. Make sure the unit is in the Dual mode with a 4 Ω load connected to the channel under test.

2. Remove the eleven screws securing the top cover. Refer to Figure 1 for the screw locations.

3. Connect the sinewave generator output of the analyzer to the input of Channel 1. Rotate the input level control of Channel 1 to its full clockwise position. Rotate the input level control of Channel 2 to its full counter-clockwise position.

4. Find R23 and R24 on the component layout in Figure 12. With a small non-conducting screwdriver, rotate R23 and R24 to their full clockwise positions.

5. Apply power to the amplifier and adjust the sinewave generator for a 1 kHz, -10 dBu (0.245 V rms) output level. For this adjustment, it is not necessary to maintain a constant 120 V ac line input under load.

6. Increase the level of the generator until the output of the amplifier reaches 34.6 V rms (which corresponds to 300 watts output into the 4 Ω load).

7. While monitoring the distortion waveform on the oscilloscope, rotate R23 counter-clockwise until the negative half of the waveform just begins to visibly clip (more pronounced spikes will appear on the distortion waveform). Then, rotate slightly clockwise just until the visible clipping disappears and the spikes in the distortion waveform reduce to their pre-clip level.

8. Repeat Step 7 for the positive current limit pot R24. You may have to slightly re-adjust R23.

9. If R23 and R24 are properly adjusted, the channel should clip symmetrically (@ 1% THD) at approximately 450 watts as shown in Figure 11.

10. Repeat Steps 3 through 9 for Channel 2.

11. Turn off the generator's output signal. If you have concluded with the test and alignment procedures, disconnect the amplifier

from its power source and re-install the top cover with the eleven screws previously removed.

9.6 Checking the Short Circuit Current

With one channel operating at full rated power into an 4 Ω load, carefully short the output terminals using the 12 inch jumper cable while monitoring the ac line current. The ac line current draw under a short circuit condition should be at least 3.5 amps, but no more than 4 amps rms). If it exceeds 4 amps, re-adjust R23 and R24 by rotating them slightly counter-clockwise, both by approximately the same amount, until the ac line current is typically 3.5 amps. Repeat this procedure for Channel 2.

9.7 Ordering Replacement Parts

To order replacement parts, look up the ordering number from the component parts listing and call (405) 324-5311, FAX (405) 324-8981, or write:

Altec Lansing
Replacement Parts Sales
P.O. Box 26105
Oklahoma City, OK 73126-0105
U.S.A.

9.8 Factory Service

If factory service is required, ship the unit in its original packing prepaid to:

Altec Lansing Customer
Service/Repair
10500 W. Reno
Oklahoma City, OK 73128
U.S.A.

Enclose a note describing the problem in as much detail as possible. Include any additional helpful information such as test conditions, where used, how used, etc.

9.9 Technical Assistance

For applications assistance or other technical information, contact the Technical Services Manager. You can call (405) 324-5311, FAX (405) 324-8981, or write:

Altec Lansing
Technical Services Manager
P.O. Box 26105
Oklahoma City, OK 73126-0105
U.S.A.

10 THE 9444B/SA (MODEL WITH STEPPED ATTENUATORS)

In the 9444B/SA, the standard input level controls are replaced with precision stepped attenuators. The stepped attenuators have the following characteristics (from the full clockwise position):

Click Position (CP)

1 → 20:	1 dB step sizes (-20 dB @ CP 20)
20 → 25:	2 dB step sizes (-30 dB @ CP 25)
25 → 26:	3 dB step size (-33 dB @ CP 26)
26 → 29:	4 dB step sizes (-45 dB @ CP 29)
29 → 30:	5 dB step size (-50 dB @ CP 30)
30 → 31:	OFF (full attenuation @ CP 31)

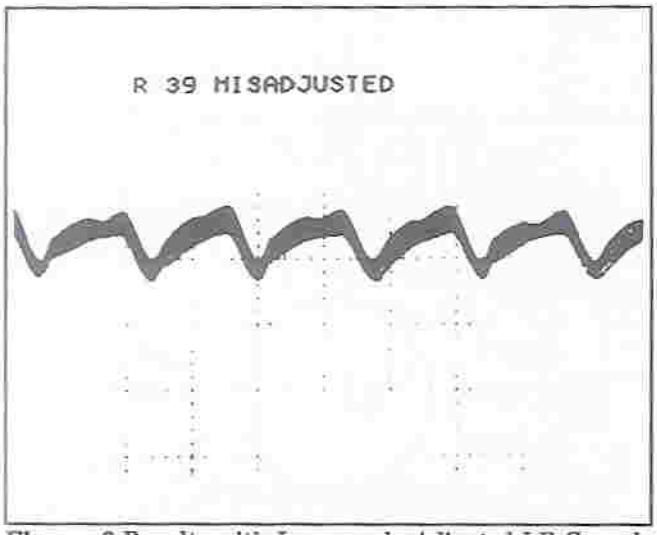

Figure 6 Results with Improperly Adjusted LF Cancel

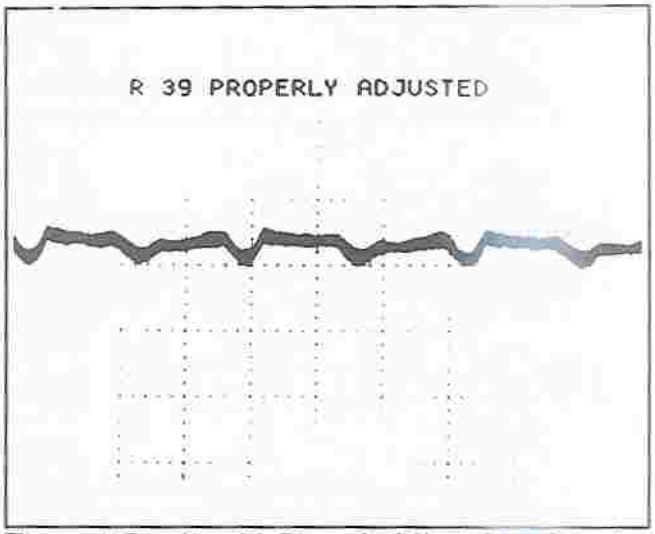

Figure 7 Results with Properly Adjusted LF Cancel

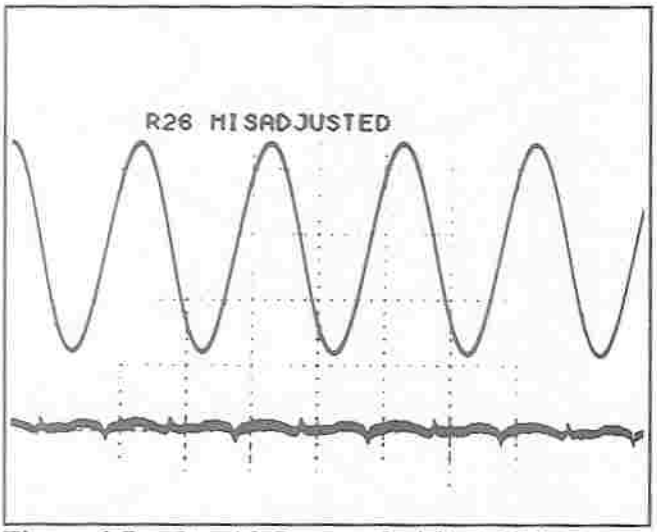

Figure 8 Results with Improperly Adjusted Bias

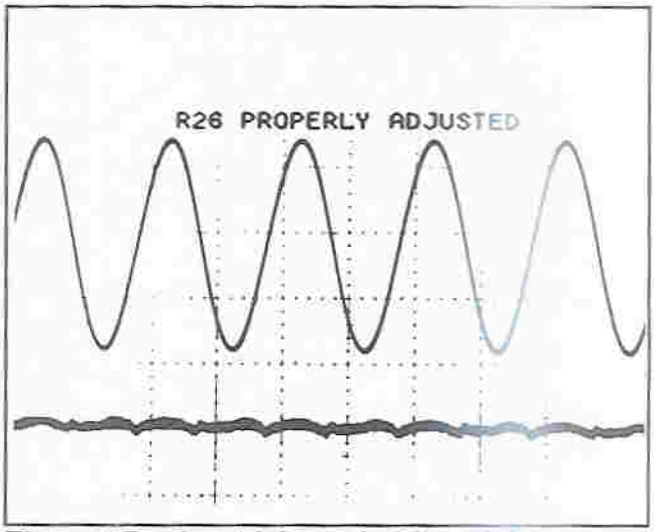

Figure 9 Results with Properly Adjusted Bias

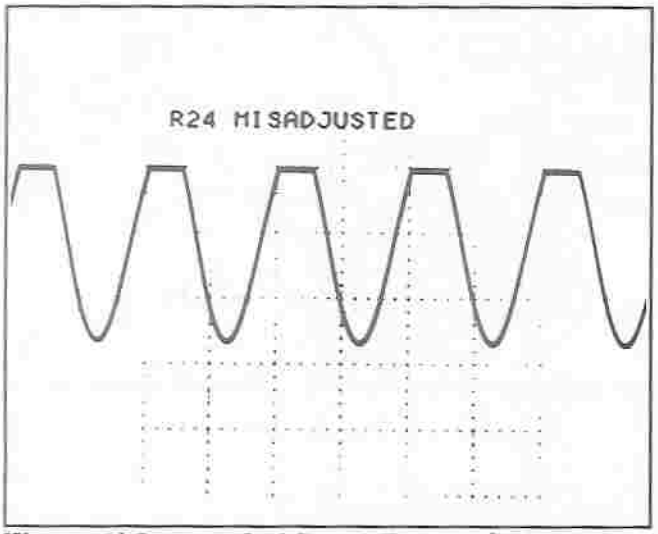

Figure 10 Improperly Adjusted Positive Current Limit

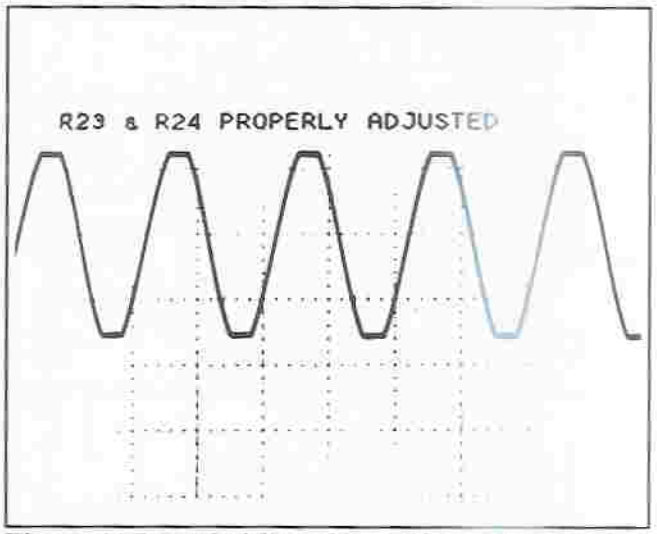

Figure 11 Properly Adjusted Pos and Neg Current Limit

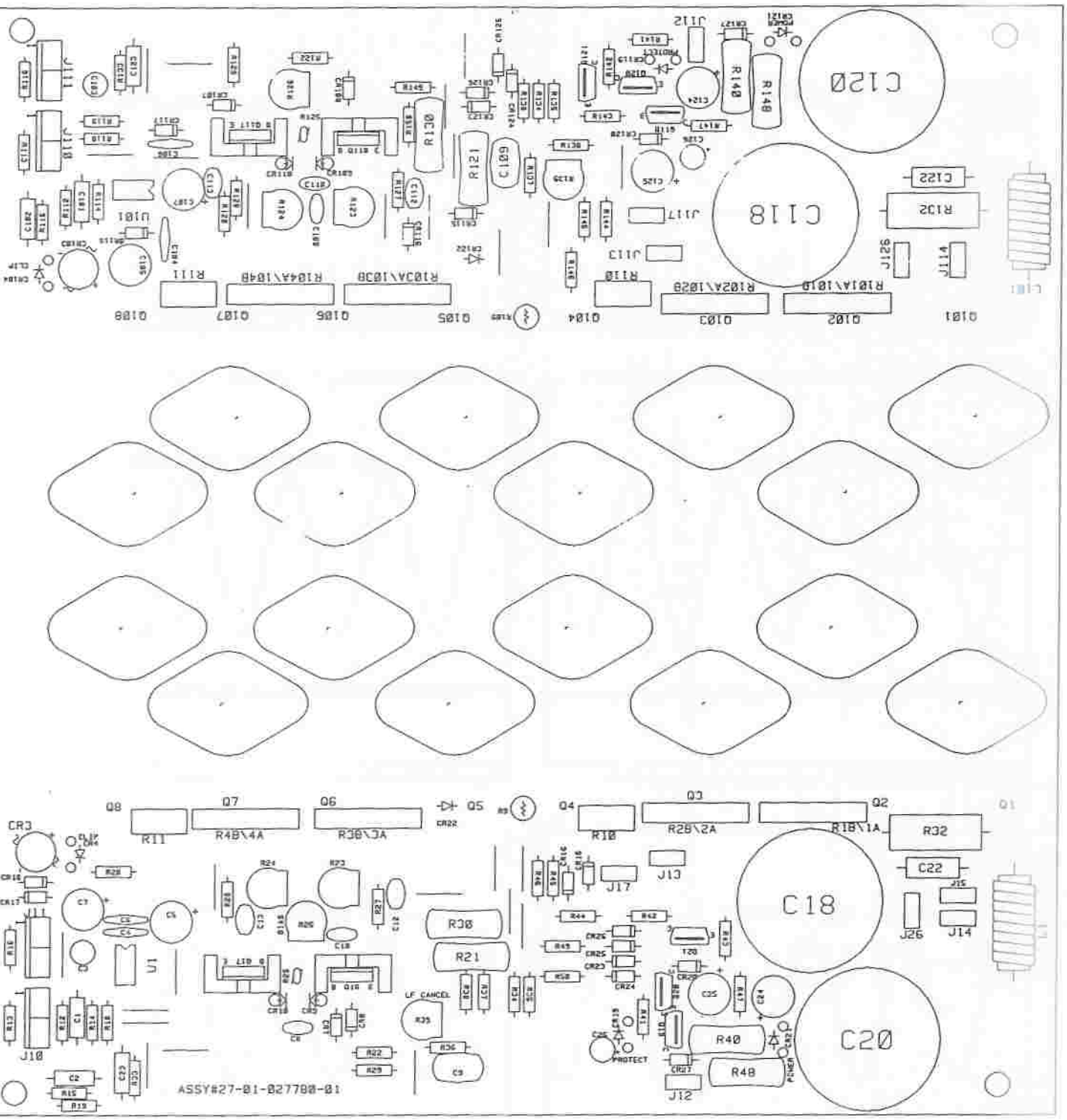

Figure 12 Component Layout of Dual Channel Board

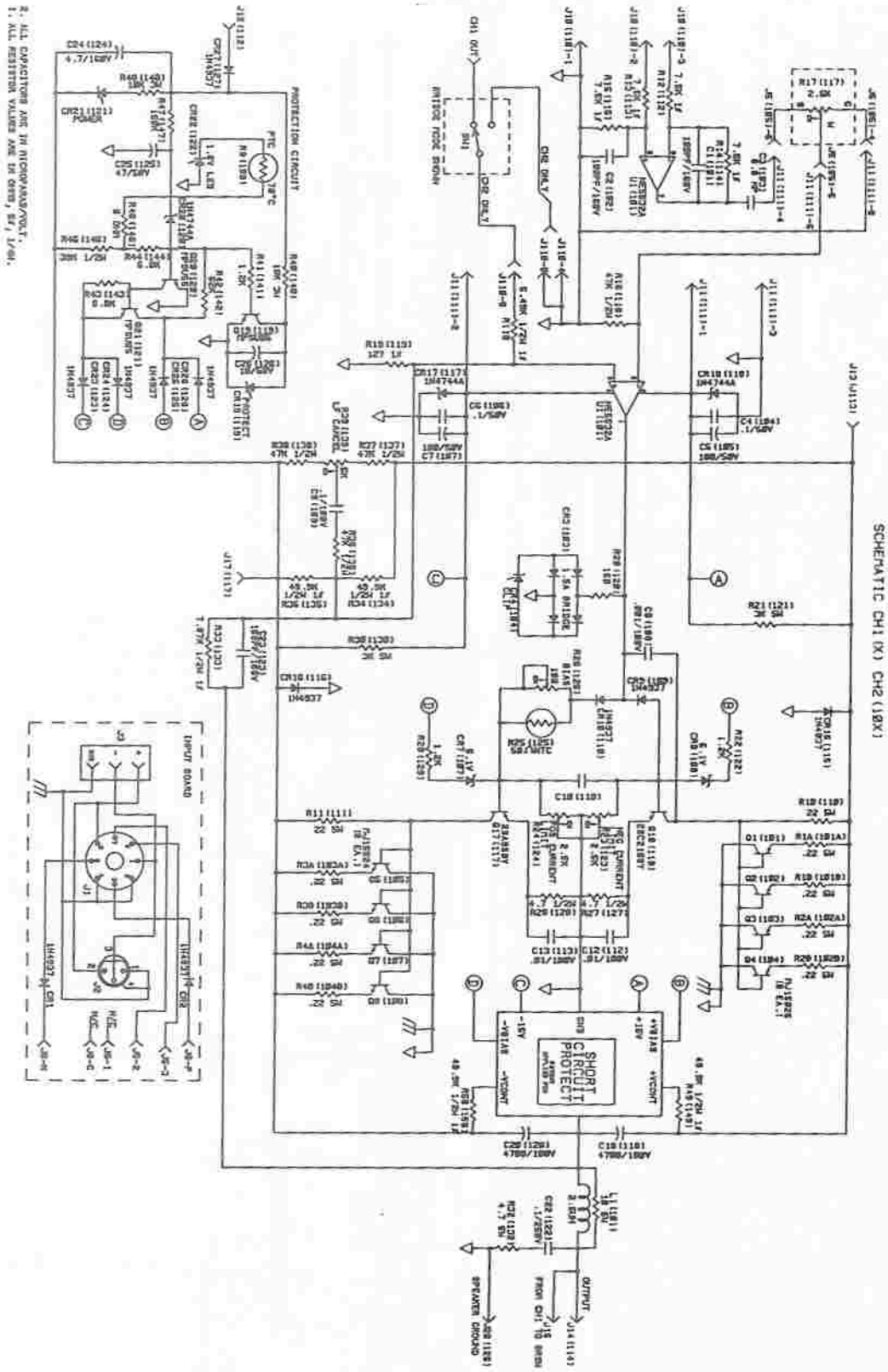

Figure 13 Schematic of 9444B, Sheet 1 of 2

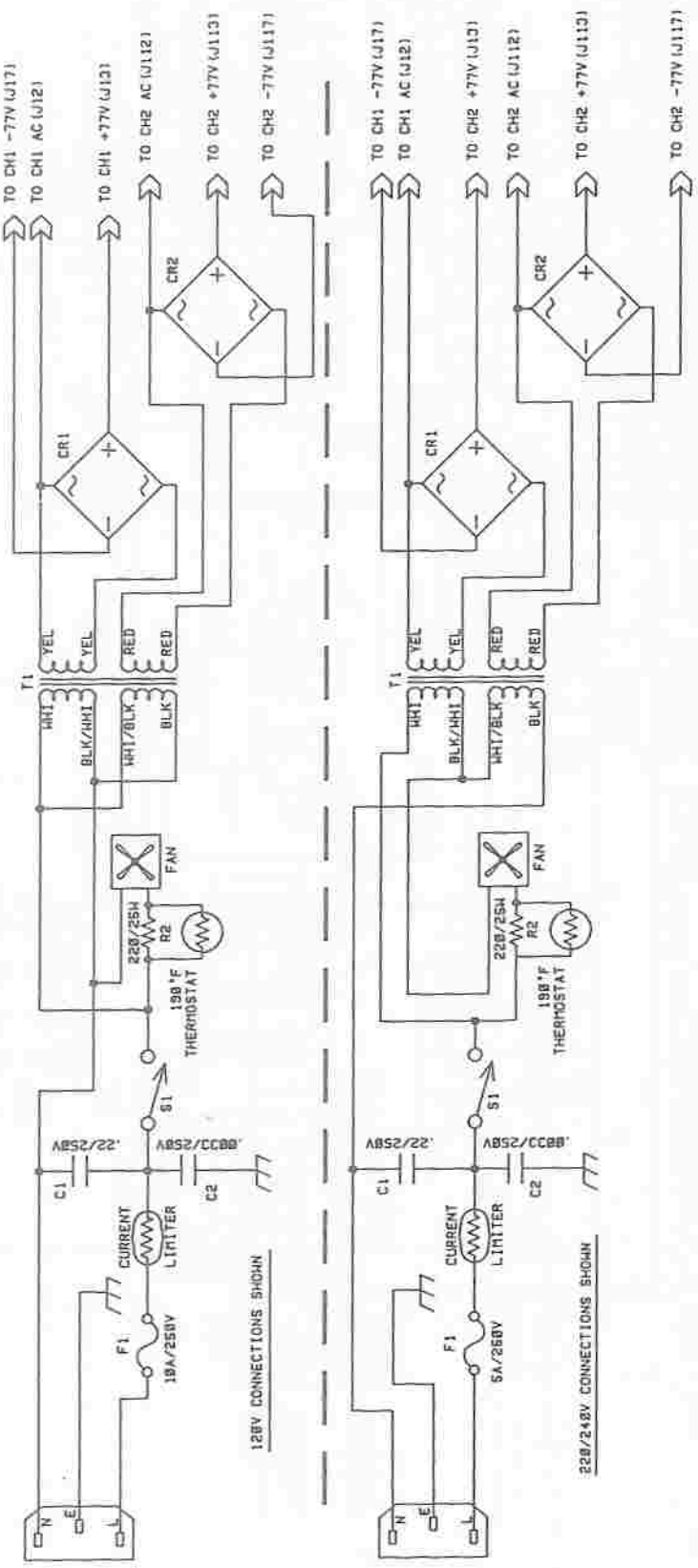

Figure 13 Schematic of 9444B, Sheet 2 of 2

Component Parts Listing for the 9444B

Reference Designator	Ordering Number	Name and Description
R1, R2, R3, R4	47-09-125029	Resistor, 2 × 0.22 Ω, 5 watt, 5%
R9	47-09-125181	Resistor, 100 Ω @25 °C, Positive Temperature Coefficient
R10, R11	47-01-125064	Resistor, 22 Ω, 5 watt, 5%
R12, R13, R14, R15	47-03-124805	Resistor, 7.5 kΩ, 0.25 watt, 1%, metal film
R16, R36, R37, R38	47-01-102119	Resistor, 47 kΩ, 0.25 watt, 5%, carbon film
R17 (9444B)	47-06-124795	Potentiometer, 2.5 kΩ, log taper, 20%
R17 (9444B/SA)	47-06-124578	Stepped attenuator, 2.5 kΩ
R18	47-03-125185	Resistor, 5.49 kΩ, 0.5 watt, 1% metal film
R19	47-01-125099	Resistor, 127 Ω, 0.25 watt, 1% metal film
R20	47-01-102059	Resistor, 160 Ω, 0.25 watt, 5% carbon film
R21, R30	47-01-125102	Resistor, 3 kΩ, 5 watt, 5%
R22, R29, R41	47-01-102080	Resistor, 1.2 kΩ, 0.25 watt, 5% carbon film
R23, R24	47-06-027458	Trimpot, 2.5 kΩ, 0.15 watt, horizontal mount
R25	47-09-125021	Resistor, 50 Ω @25 °C, Negative Temperature Coefficient
R26	47-06-036008	Trimpot, 100 Ω, 0.15 watt, horizontal mount
R27, R28	47-01-102208	Resistor, 4.7 Ω, 0.5 watt, 5%
R31	47-01-125028	Resistor, 450 Ω, 5 watt, 5%
R32	47-01-124834	Resistor, 4.7 Ω, 5 watt, 5%
R33	47-03-125106	Resistor, 7.87 kΩ, 0.5 watt, 1% metal film
R34, R35, R49, R50	47-03-125033	Resistor, 49.9 kΩ, 0.5 watt, 1% metal film
R39	47-06-027459	Trimpot, 5 kΩ, 0.15 watt, hoizontal mount
R40, R48	47-01-125066	Resistor, 10 kΩ, 3 watt, 5%
R42	47-01-102122	Resistor, 62 kΩ, 0.25 watt, 5% carbon film
R43, R44	47-01-102098	Resistor, 6.8 kΩ, 0.25 watt, 5% carbon film
R45	47-01-028531	Resistor, 39 kΩ, 0.5 watt, 5% carbon film
R46	21-01-110310	Resistor, 0 Ω jumper
R47	47-01-102126	Resistor, 91 kΩ, 0.25 watt, 5% carbon film
C1, C2, C23	15-06-037468	Capacitor, 100 pF, 160 volt, 5%, polypropylene
C3	15-01-125026	Capacitor, 6.8 µF, 50 VDC, non-polar, Aluminum
C4, C6	15-02-124437	Capacitor, 0.1 µF, 50 VDC, ceramic disk
C5, C7	15-01-124503	Capacitor, 100 µF, 50 VDC, Aluminum
C8	15-06-124587	Capacitor, 0.001 µF, 100 VDC, 5%, polypropylene
C9	15-06-124637	Capacitor, 0.1 µF, 100 VDC, 5%, polypropylene
C12, C13	15-06-124588	Capacitor, 0.01 µF, 100 VDC, 5%, polypropylene
C18, C20	15-01-036110	Capacitor, 4700 µF, 100 VDC, Aluminum, 10%
C22	15-06-100113	Capacitor, 0.1 µF, 250 VDC, 10%, Polyester
C24	15-01-125024	Capacitor, 4.7 µF, 160 VDC, Aluminum
C25	15-01-124508	Capacitor, 47 µF, 50 VDC, Aluminum
C26	15-01-124502	Capacitor, 10 µF, 50 VDC, Aluminum
L1	56-01-026510	Inductor, 2.0 µH, choke
CR1, CR2, CR9, CR5, CR6 CR10, CR12, CR14, CR15, CR16 CR23, CR24, CR25, CR26, CR27	48-01-125067	Diode, 1N4937, fast recovery rectifier
CR3	48-02-037580	Bridge Rectifier, 1.5 Amp, 70 V
CR4, CR19, CR21	39-01-124540	LED, red, with 12 inch leads
CR7, CR8	48-01-122988	Zener, 1N5231B, 5.1 volt, 0.5 watt, 5%
CR11, CR13, CR17, CR18, CR20	48-01-125098	Zener, 1N4744A, 15.0 volt, 1 watt, 5%
CR22	39-01-121926	LED, red, T1-3/4
U1	17-01-122832	IC, NE5532A

Reference Designator	Ordering Number	Name and Description
Q1, Q2, Q3, Q4	48-03-122979	Transistor, MJ15025, PNP
Q5, Q6, Q7, Q8	48-03-122978	Transistor, MJ15024, NPN
Q17	48-03-124475	Transistor, 2SA958Y, PNP
Q18	48-03-124474	Transistor, 2SC2168Y, NPN
Q19, Q21	48-03-028711	Transistor, MPS-U05, NPN
Q20	48-03-028712	Transistor, MPS-U55, PNP
C1	15-02-124994	Capacitor, 0.22 μF, 250 VAC
C2	15-02-124993	Capacitor, 0.0033 μF, 250 VAC
CR1, CR2	48-02-122651	Bridge Rectifier, 25 amp, 400 volt
F1	51-04-105890	Fuse, 10 amp, 250 volt, NB-UL-CER
(F1)	51-04-100470	Fuse, 5 amp, 250 volt, NB-UL-GLS
R2	47-02-123106	Resistor, 300 Ω, 25 watt, 5%
	53-02-125179	Surge suppressor, NTC Thermistor
S1	51-02-124582	Switch, power
T1	56-08-027782	Transformer, power
TS1	53-01-027945	Thermostat, 190 °F, normally open
	28-13-026422	Hardware, rack mount
	35-01-124521	Fan, equipment cooling, 100 CFM
	24-04-124846	Knob, black
	21-01-013567	Jumper, octal socket, gold flash