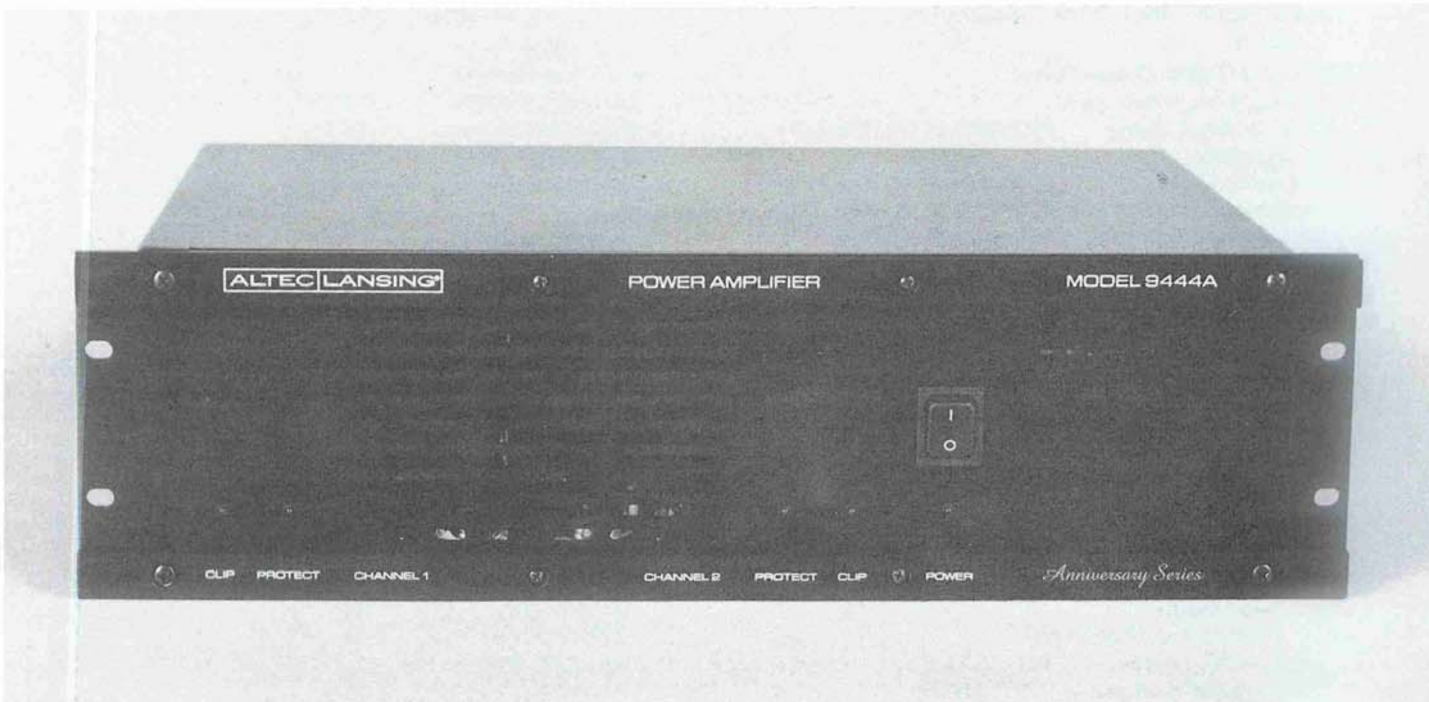
ALTEC LANSING

9444A POWER AMPLIFIER



DESCRIPTION

As the level of sophistication in power amplifier designs increases, two things typically result; increased cost and reduced reliability. The ALTEC LANSING Model **9444A** Anniversary Series Power Amplifier utilizes the best proven concepts derived from our 50 year history to provide an ultra reliable amplifier with virtually unmatched performance characteristics. It achieves this success without increased complexity or cost making it a real value.

Each channel delivers 200 watts of continuous average power into 8 ohms or 300 watts into 4 ohms over the full audio frequency range. In the bridge mode, the amplifier can deliver more than 600 watts at less than 0.10% THD.

Sixteen metal output transistors are utilized for a total device power dissipation of 4,000 watts. A dual speed fan is incorporated as an added reliability measure for the most thermally stressing situations. The massive 3/16 inch heatsink is specially engineered to minimize thermal gradients meaning that all of the transistors now operate at approximately the same temperature. As a result, the amplifier runs cooler than most enabling it to operate under more adverse environmental conditions without failure. In a typical fixed installation, this means that the long term reliability is substantially increased.

The 2.2 KVA equivalent universal power transformer and the 22,000 microfarads of total capacitance combine to provide the reserve power necessary in today's installations anywhere in the world.

Each channel is independently protected against...

- Over temperature
- Excessive output voltage
- Excessive phase shift
- Radio frequency interference
- Shorted loads

The load is protected from startup/shutdown transients, subsonic signals, low AC line voltage, and DC. When a problem is detected, an output relay automatically disconnects the load from the channel and illuminates the "Protect" LED located on the front panel.

The **9444A** has electronically balanced inputs and powered accessory sockets for plug-in transformers and electronic modules. The level controls are rear mounted to avoid "accidental" changes. True output balancing transformers (models **15524A** and **15525A**) and an autoformer (model **15567A**) are also available.

The ALTEC LANSING Model **9444A** Anniversary Series Power Amplifier is the choice for serious professional installations which demand the highest quality at high power levels for extended periods of time.

SPECIFICATIONS

Conditions:

1. 0 dBv = 0.775 V rms.
2. Dual mode ratings are for each channel.
3. Both channels operating at rated output power unless noted.
4. 120 Volt AC line voltage maintained throughout testing.

Continuous Rated Output Power:
(20 Hz-20 kHz, reference 1 kHz)

Dual mode, 4 ohms	300 watts at <0.10% THD
Bridge mode, 8 ohms (70V)	600 watts at <0.10% THD
Dual mode, 8 ohms	200 watts at <0.05% THD
Bridge mode, 16 ohms	400 watts at <0.05% THD

Maximum Midband Output Power:
(reference 1 kHz, 1% THD)

Dual mode, 4 ohms	400 watts
Bridge mode, 8 ohms	800 watts
Dual mode, 8 ohms	250 watts
Bridge mode, 16 ohms	500 watts

Headroom:
(reference 1 kHz)

Dual mode, 4 ohms	>1.2 dB
Bridge mode, 8 ohms	>1.2 dB
Dual mode, 8 ohms	>0.9 dB
Bridge mode, 16 ohms	>0.9 dB

Power Bandwidth:
(+0, −3 dB, ref. 0 dB at 1 kHz)

Dual mode, 4 ohms	10 Hz-70 kHz
Bridge mode, 8 ohms	10 Hz-60 kHz
Dual mode, 8 ohms	10 Hz-85 kHz
Bridge mode, 16 ohms	10 Hz-65 kHz

Voltage Gain:
(reference 1 kHz, ±0.5 dB)

Dual mode	32.6 dB
Bridge mode	38.6 dB

Input Sensitivity for Rated Output Power:
(reference 1 kHz, ±50 mV rms)

Dual mode, 4 ohms	0.812 V rms (0.4 dBv)
Bridge mode, 8 ohms	0.812 V rms (0.4 dBv)
Dual mode, 8 ohms	0.932 V rms (1.6 dBv)
Bridge mode, 16 ohms	0.932 V rms (1.6 dBv)

Maximum Input Level: +20 dBv (7.75 V rms)
(reference 1 kHz)

Input Impedance:
(per channel, 20 Hz-20 kHz)

Balanced	>30 kohms
Unbalanced	>15 kohms

Phase Response:
(at rated output power, any mode, ±2 degrees)

at 20 Hz	+15 degrees
at 20 kHz	−15 degrees

THD:
(at rated outut power)

Dual mode, 4 ohms, 20 Hz-20 kHz	<0.10%
Bridge mode, 8 ohms, 20 Hz-20 kHz	<.010%
Dual mode, 8 ohms, 20 Hz-1 kHz	<0.01%
1 Khz-20 kHz	<0.05%
Bridge mode, 16 ohms, 20 Hz-1 kHz	<0.01%
1 kHz-20 kHz	<0.05%

IMD (SMPTE):
(at rated output power)

Dual mode, 4 ohms	<0.05%
Bridge mode, 8 ohms	<0.05%
Dual mode, 8 ohms	<0.03%
Bridge mode, 16 ohms	<0.03%

TIM (DIM 100):
(at rated output power)

Dual mode, 4 ohms	<0.05%
Bridge mode, 8 ohms	<0.05%
Dual mode, 8 ohms	<0.03%
Bridge mode, 16 ohms	<0.03%

Rise Time:
(10% to 90%, at rated output power)

Dual mode, 4 ohms	<5 μsec
Bridge mode, 8 ohms	<6 μsec
Dual mode, 8 ohms	<4.5 μsec
Bridge mode, 16 ohms	<5.5 μsec

Slew Rate:
(at rated output power)

Dual mode, 4 ohms	>18 V/μsec
Bridge mode, 8 ohms	>36 V/μsec
Dual mode, 8 ohms	>25 V/μsec
Bridge mode, 16 ohms	>50 V/μsec

Damping Factor:

Dual mode, 4 ohms, 20 Hz-1 kHz	>100
20 kHz	>40
Bridge mode, 8 ohms, 20 Hz-1 kHz	>200
20 kHz	>50
Dual mode, 8 ohms, 20 Hz-1 kHz	>200
20 kHz	>80
Bridge mode, 16 ohms, 20 Hz-1 kHz	>400
20 kHz	>100

Channel Separation: >75 dB at 1 kHz
(below rated output power, single channel operating)

Noise: >100 dB
(below rated output power, A weighted, any mode)

Amplifier Protection: Excessive output voltage
shorted loads
Excessive phase shift
RF interference
Over temperature

Load Protection: Startup/shutdown transients
DC fault
Subsonic signals
Low AC line voltage

Cooling:

Heatsink	Thermally equalized 3/16 inch aluminum black anodized heatsink
Dual speed fan	106 CFM (high speed), minimum life rating of 20,000 hours at 72°C, or 43,500 hours at 25°C ambient temperature. 50,000 hours minimum at low speed operation.

ELECTRICAL

120 VAC, 50/60 Hz Power Connections

The amplifier is provided with the primary of the power transformer strapped for 120 Volts from the factory. Refer to Table I for exact strapping details and other voltage options.

> **NOTE**
>
> **Verify that the AC line voltage is in accordance with the selected voltage rating *before* connecting the amplifier to the AC line.**

100, 200, 220, and 240 VAC, 50/60 Hz Power Connections

The amplifier may be powered from line voltages other than 120 Volts by re-strapping the primary of the power transformer. Use the following procedures to change the factory strapping to the desired line voltage.

1. Disconnect the amplifier from the AC power source.
2. Remove the ten screws securing the top/back cover. There are three screws on each side, two screws on the rear along the bottom edge, and the two innermost screws inset into the top strip on the front panel. Refer to Figure 1 for exact screw locations.
3. Carefully discharge each large filter cap through a 150 ohm, 2 watt resistor for at least 1 minute. Refer to Figure 2 for details.

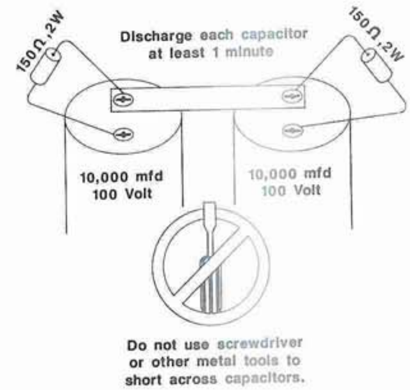


Figure 2. Capacitor Discharging

4. Locate the voltage selection terminal block on the side between the power transformer and the large filter cap. **Referring to Table I,** disconnect the primary leads of the power transformer and reconnect them in accordance with the terminal designations that correspond to the desired operating voltage. Pull each wire firmly to disengage the push-on terminal connector. Press each connector firmly to snap into place.
5. Install the top/back cover with the ten screws previously removed.
6. Install the appropriate fuse value from Table II. **Use of fuses other than those listed in Table II will void the warranty.**

Table I. Primary Power Conversion Chart for 100V, 120V, 200V, 220V, and 240V 50/60 Hz Operation

T1 LEADS	100V	120V	200V	220V	240V
black	TB2-3	TB2-3	TB2-9	TB2-6	TB2-6
white	TB1-6	TB2-9	TB1-6	TB1-6	TB1-10
brown	TB2-9	TB1-6	TB1-10	TB1-10	TB1-6
black/white	TB2-4	TB2-4	TB2-3	TB2-3	TB2-3
white/green	TB1-7	TB2-10	TB2-10	TB2-10	TB2-10
brown/white	TB2-8	TB1-7	TB2-6	TB2-7	TB2-7
fan (0V)	TB2-5	TB2-5	TB2-4	TB2-4	TB2-4
fan (120V)	TB2-7	TB1-8	TB2-7	TB2-8	TB2-8

PERMANENT AC POWER CONNECTIONS*

AC Cord (white	TB2-2
Fuse F1	TB1-2
Power Switch S1	TB1-3
Power Switch S1	TB1-5
Capacitor C2	TB1-1
Capacitor C1	TB2-1

TB1 TB2
1 2 3 4 5 6 7 8 9 10

*Do not make any wiring changes of these wire connections when altering the amplifier for a different primary operating voltage.

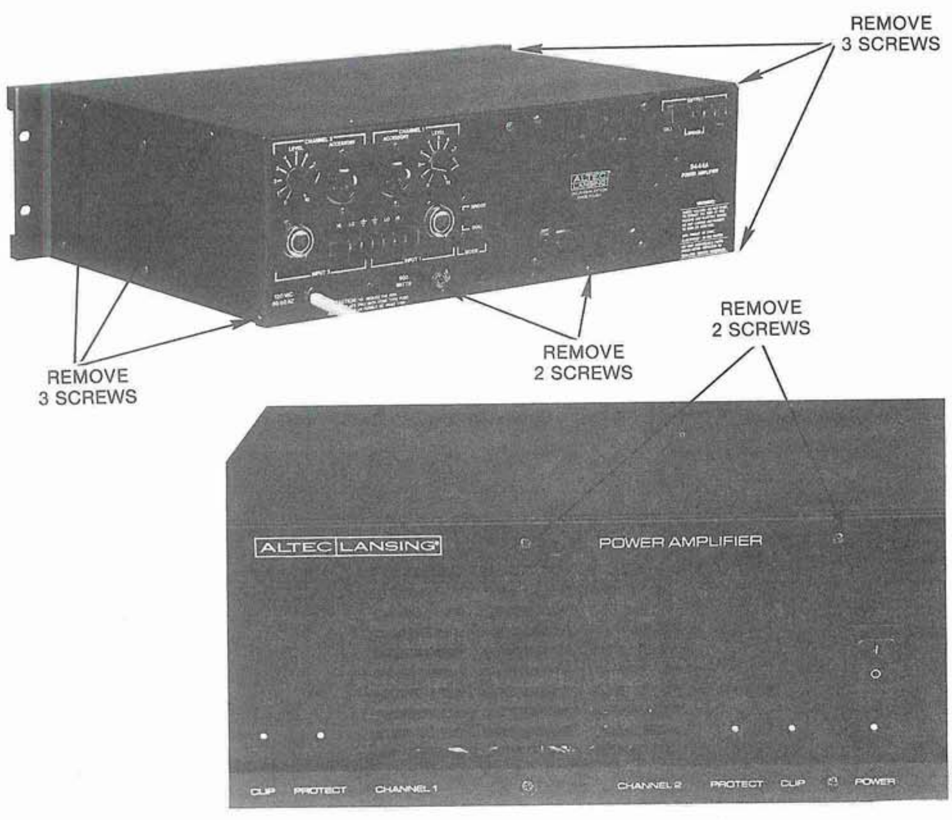


Figure 1. Top/Back Cover Removal

Table II. Main Fuse Selection Guide

AC Line Voltage	AC Line Fuse 314 Series Normal-Blo
100 VAC	10 Amp/250 Volt
120 VAC	10 Amp/250 Volt
200 VAC	5 Amp/250 Volt
220 VAC	5 Amp/250 Volt
240 VAC	5 Amp/250 Volt

INSTALLATION

Rack Mounting

The **9444A** may be installed in a standard 19 inch equipment rack. The amplifier requires 5¼ inches of vertical space and mounting is accomplished by using the appropriate four mounting screws supplied.

Ventilation

The **9444A** must be adequately ventilated to avoid excessive temperature rise. The amplifier should not be used in areas where the ambient temperature exceeds 60°C (140°F). To determine the ambient air temperature, operate the system until the temperature stabilizes. Measure the ambient air with a bulb-type thermometer held at the bottom of the uppermost amplifier. Do not let the thermometer bulb touch the metal chassis because the chassis will probably be hotter than the ambient air. If the air temperature exceeds 60°C (140°F), the equipment should be spaced at least 1¾ inches apart or a blower installed to provide air movement within the cabinet.

CAUTION

Do not operate the amplifier within a completely closed, unventilated housing.

SIGNAL CONNECTIONS

Input Connections

Balanced input connections may be made to either the barrier strip or the XLR connector. For single-ended inputs, strap the low (–) input to ground. Otherwise, the amplifier will see 6 dB less input signal than with a balanced input. Refer to Figure 3 for typical input connections.

Line Output Connections

The XLR and barrier strip connectors are wired in parallel. Since the input impedance of the amplifier is high, there is minimal loading on the signal source. When the input connections are made to one connector, the other may be used as an auxiliary line output to feed other high input impedance equipment. Refer to Figure 3 for possible applications.

Output Connections

Output connections are made to the four terminal barrier strip connector. Refer to Figure 4 for typical output connections.

Cable Selection

Speaker wire size plays an important part in quality sound systems. Small wire gauges can waste power and reduce the amplifier's damping factor at the speaker terminals. This can add coloration and muddiness to the sound. To help offset this problem, Table III has been assembled to enable you to calculate the power losses in the speaker cable.

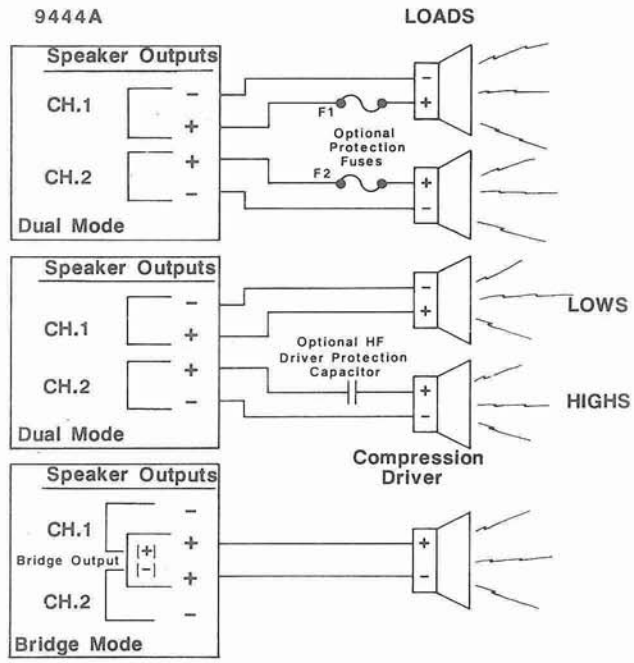
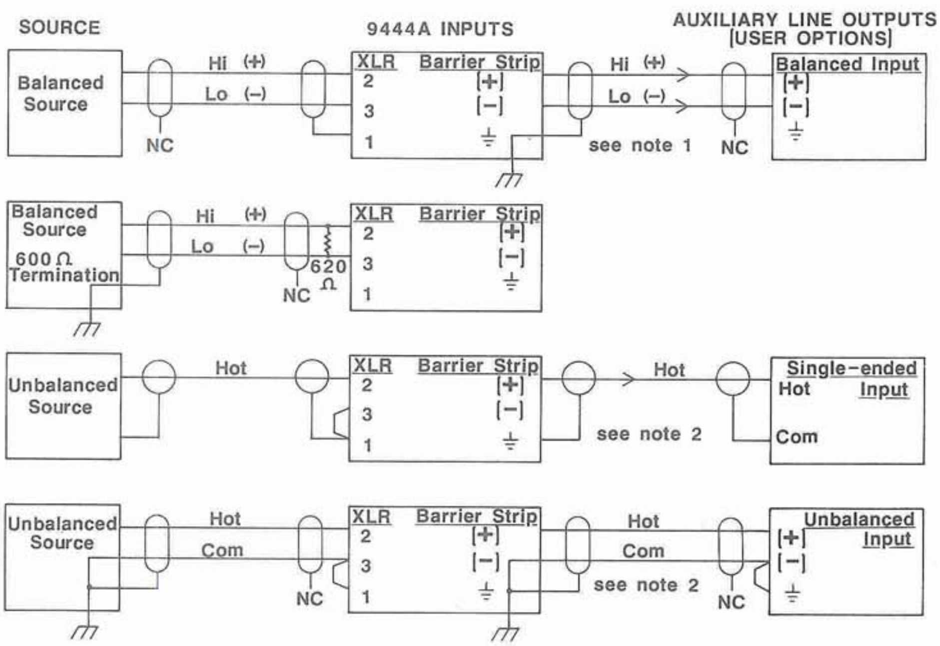


Figure 4. Typical Output Connections

Table III. Power Losses in 2-Wire Speaker Cable

A.W.G. GA	DCR/foot ohms/ft.	Power Loss/ foot with 8 ohm load	Wire Dia. (mm)	DCR/meter ohms/m	Power Loss/ meter with 8 ohm load
6 GA.	0.0008	0.019 watts/ft.	4.115 mm	0.00262	0.0623 watts/m
8	0.00128	0.032	3.264	0.00420	0.1050
10	0.0020	0.050	2.588	0.00656	0.1640
12	0.0032	0.080	2.05	0.0105	0.2624
14	0.0052	0.130	1.63	0.0171	0.4264
16	0.0080	0.200	1.29	0.0262	0.6560
18	0.0130	0.324	1.02	0.0426	1.0627
20	0.0206	0.512	0.813	0.0676	1.6794
22	0.0326	0.808	0.643	0.1070	2.6502



Note 1. Not recommended for cable runs over 100 ft (30m)
Note 2. Not recommended for cable runs over 6 ft (2m)

Figure 3. Typical Input Connections

To calculate the total power loss in the speaker cable, multiply the power loss per foot (or meter) of the 2-wire cable shown in Table III by the length of the cable in feet (or meters). For example, suppose an installer uses 160 feet of 10 GA. 2-wire cable with an 8 ohm speaker system. The total power loss in the cable is:

Total Power Loss in cable = 0.05 watts/ foot x 160 feet = 8 watts

Does this mean that whenever the **9444A** produces 200 watts of output power, 192 watts (200 watts minus 8 watts) will be delivered to the 8 ohm load? NO! The actual load impedance is 8 ohms plus the resistance of the cable (0.002 ohms per foot times 160 feet) for a total load impedance of 8.32 ohms. At the 8 ohm rated output voltage (40V rms), the amplifier produces 192.3 watts (40 Volts^2 divided by 8.32 ohms). The actual power delivered to the load is 184.3 watts (192.3 watts minus the 8 watts lost in the cable). This example illustrates the importance of using the proper wire size. For more information regarding power losses in speaker cable, please refer to Engineering Technical Letter Nos. 265A and 113.

Had 18 GA. wire been used in the above example, the loss in the cable would have been 51.84 watts. To calculate, the cable losses when using a 4 ohm speaker system, multiply the loss at 8 ohms by 3. In the example above, the 10 GA. wire would consume 24 watts of power while the 18 GA. wire would waste 155.5 watts—more than half of the amplifier's 4 ohm power rating.

The damping factor at the speaker terminals should be at least 20 for general applications and 50 for high quality sound systems. To calculate the resulting damping factor at the speaker (8 ohm), use the following:

$$\text{DF (at speaker)} = \frac{8}{[(\text{DCR/ft}) \times (\text{L})] + 0.04}$$

where DCR/ft is a value from Table III for a given wire size; and
L is length of wire in feet.

Referring to the 10 GA. example above, the damping factor at the speaker is 22.2 which is acceptable in general applications. With 18 GA. wire, it reduces to 3.77. Neither is acceptable in high fidelity applications. If high fidelity sound quality is of prime concern and using larger wire size presents too great an expense, one solution is to step up the output voltage of the amplifier to 70.7 Volts or higher with an output transformer. This will permit the use of smaller gauge cable since the lower resulting current will waste fewer watts. Power companies use this technique to transfer large amounts of power over great distances. Two ALTEC LANSING output transformers are available for this purpose. The **15524A** is a 300 watt transformer usable on either output channel. The **15525A**, a 600 watt version, is designed for the balanced (bridged) output. For more information, refer to Engineering Technical Letter No. 265A.

Speaker Protection Fuse Selection

Sometimes it may be desirable to use in-line fuses to protect loudspeaker systems. It is difficult to determine the proper fuse value with the correct time lag and overload characteristics to match the limitations of a speaker system. The values shown in Table IV should serve as a guide only. To use, determine the power rating and load value. Select a standard value fuse of the next smaller value to the one in the table.

The values are calculated for fast-blow fuses which will carry 135% of their current rating for an hour but will blow within 1 second at 200%. Other fuse values may be calculated for different power levels from the following equation:

$$\text{Fuse value} = \frac{P_{out} \times R_L}{R_L \times 1.35} \text{Amps}$$

Use 32 Volt fuses if possible. They typically have the lowest internal resistance which will minimize deterioration of the amplifier's damping factor. Refer to Figure 4 for additional information.

Compression Driver Protection

Compression drivers, used for mid to high frequency sound reproduction, are much more susceptible to damage from low frequencies than large cone loudspeakers. Even though an electronic crossover may be employed, problems may arise in the cables between the crossover and the power amplifier, or from misadjustment of the crossover. Either of these could apply low frequency signals or hum to the driver and cause damage. To prevent a potential mishap, ALTEC recommends using a capacitor between the amplifier and the compression driver to suppress low frequencies and possible DC. Refer to Figure 4 for installation details.

In choosing a value, one must be careful not to interfere with the crossover frequency. As a general rule, select a capacitor whose break frequency, with respect to the load, is 3 dB down at approximately 1/2 of the high pass corner frequency of the crossover. Mylar capacitors of at least 50 Volts (preferably 100 Volts) are recommended but electrolytics are usable if they are nonpolar. Table V shows the recommended capacitor values for use with 8 and 16 ohm drivers at popular crossover frequencies. For more information, consult Engineering Technical Letter No. 205.

Table V. Compression Driver Protection Capacitors

Crossover Frequency	Compression Drivers: 8 ohm Driver	16 ohm Driver
500 Hz	80 μfd	40 μfd
800	50	25
1000	40	20
1200	33	16
2000	20	10
3500	12	6
7000	6	3

Octal Accessory Socket

The octal sockets permit a variety of plug-in accessories to be used with the amplifier. Normally, two "U" jumpers are inserted between octal socket pins 8 and 1, and between pins 7 and 6. These jumpers must remain in place for the amplifier to operate. To use with an accessory module, remove (and save) the jumpers and install the module making sure the key on the center post aligns with the groove in the female socket. For operation, refer to the instructions provided with the module. Schematically, the module will be inserted between the input connector and the balanced input stage.

PROTECTION SYSTEMS

Load Protection Circuitry

Each channel has an output relay which provides protection from startup/shutdown transients, DC offset, low AC line voltage, and large low frequency transients.

Normally, the load is connected to ground whenever the amplifier is in the "off" state. During startup, the load remains grounded until the completion of a three second delay interval. At shutdown, or during a power loss, the load is instantaneously disconnected from the output to eliminate any shutdown transients. In addition, an output sensing circuit continuously monitors for the presence of potentially harmful DC offset and high level subsonic signals. If detected, the relay immediately opens until the problem is corrected.

Amplifier Protection Circuitry

Each output device is continuously monitored to insure operation within its SOA (safe operating area) from loading conditions which result in excessive output voltage, current, or phase shift. A dual speed fan is also incorporated to provide efficient cooling under the most demanding conditions. When the heatsink temperature reaches approximately 95°C, the fan automatically switches to high speed operation. As the temperature falls to approximately 85°C, low speed operation is once again engaged. The heatsink is also thermally equalized to prevent the output transistors nearest the fan from operating at a cooler temperature than the farthest devices. This minimizes thermal gradients across the heatsink to equalize the lifetimes and reliability characteristics of the output devices. Should the heatsink temperature remain excessively high, the output relay of the stressed channel(s) will disconnect its load. When the output devices cool to a safe operating temperature, the amplifier will automatically resume operation.

NOTE

Some of the amplifier circuitry is powered from a bipolar 15 Volt supply which provides up to 125 milliamperes of current. The low voltage supply is separately protected by type MDL (slow-blow) 1/2 Amp, 250 Volt fuses mounted on the rear circuit board. Should the supply ever fail, the load would be disconnected from the amplifier (without illuminating the "Protect" LED) until the problem is corrected. See Figure 5 for fuse location.

CAUTION

Replacement fuses must be the same type and rating as originally installed.

Table IV. Calculated Speaker Protection Fuse Values

Power, watts	4 ohm loads	8 ohm loads	16 ohm loads
50	2.62 Amp	1.85 Amp	1.31 Amp
100	3.70	2.61	1.85
200	5.24	3.70	2.62
300	6.42	4.54	3.21
400	7.41	5.24	3.70

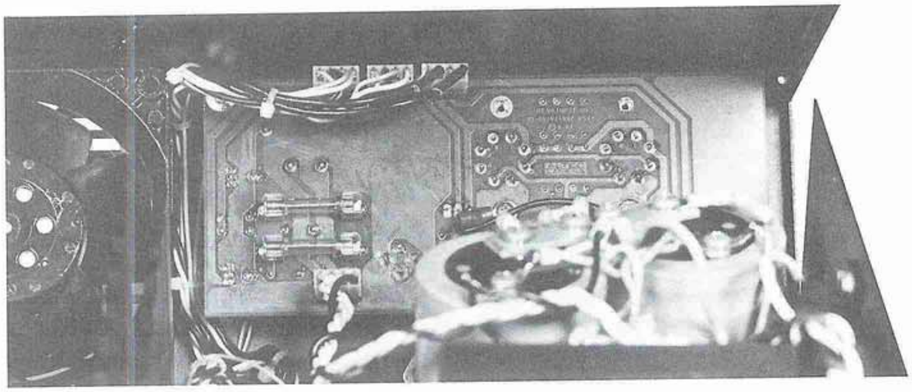


Figure 5. Fuse Location for Bipolar 15 VDC Supply

OPERATION

Dual Mode

In the dual mode, the channels may be operated independently. After installation and hookup, verify that the mode switch is in the "dual" position and rotate the level controls fully counterclockwise (full attenuation). Input a 0 dBv (0.775 Vrms) nominal level signal and apply power. Slowly increase the level controls until the desired output power is obtained. If either "clip" LED illuminates, reduce the output with the channel level control, or reduce the input signal level at its source.

CAUTION

Do not attempt to connect the outputs of the channels in parallel.

Bridge Mode

After installation and hookup, verify that the mode switch is in the "bridge" position and rotate both level controls fully counterclockwise (full attenuation). Input a 0 dBv (0.775 Vrms) nominal level signal into Channel 1 only and apply power. Slowly increase the Channel 1 level control until the desired output power is obtained. If either "clip" LED illuminates, reduce the output with the level control, or reduce the input signal level at its source.

NOTE

Be sure no input connections are made to Channel 2 and that its level control is fully counterclockwise (off).

CAUTION

The bridged output mode provides a true balanced-to-ground output. Do not connect either side of the loudspeaker cable to ground.

DO NOT use any test equipment to test or evaluate this amplifier which does not have floating grounds.

In Case of Problems

Please check the following items:

1. Verify the input connections are properly made. Refer to Figure 3.
2. Verify the output connections are properly made. Refer to Figure 4.
3. Check the input and output cables for proper wiring.
4. Check the signal source and the load.
5. Insure that the two jumpers for each octal socket are properly installed (if not using the optional plug-in modules).
6. Check that the mode switch is in the desired position.

NOTICE

REPAIR PERFORMED BY OTHER THAN AUTHORIZED WARRANTY STATIONS (DEALERS) OR QUALIFIED PERSONNEL SHALL VOID THE WARRANTY PERIOD OF THIS UNIT. TO AVOID LOSS OF WARRANTY, SEE YOUR NEAREST ALTEC LANSING AUTHORIZED DEALER, OR CALL ALTEC LANSING CUSTOMER SERVICE DIRECTLY AT (405) 324-5311, TELEX 160369, OR WRITE:

ALTEC LANSING CUSTOMER SERVICE/REPAIR
P.O. BOX 26105
OKLAHOMA CITY, OK 73126-0105
U.S.A.

CAUTION

No user serviceable parts inside. Hazardous voltages and currents may be encountered within the chassis. The servicing information contained within this document is for use only by ALTEC LANSING Corp. authorized warranty 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. Refer all servicing to qualified service personnel.

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 to persons or property resulting therefrom shall not be covered under warranty or otherwise.

Figure 6 is the schematic of the amplifier. Two trimpots (for each channel) are provided for adjustment. Resistor R15 (and R115) adjusts the DC offset at the output of the amplifier, and resistor R27 (and R127) adjusts the bias. The minimum amount of test equiment required is a DC voltmeter capable of reading voltages in the millivolt range.

DC Offset Adjustment

The following procedures are recommended.

1. Make sure the amplifier is in the dual mode of operation (not bridge) and that the power is off. Rotate both input level controls fully counterclockwise.
2. Remove the ten screws securing the top cover. Refer to Figure 1 for screw locations.
3. Connect a DC voltmeter across the output of Channel 1 and apply power.
4. Carefully adjust R15 for a reading of less than 10 mV DC.
5. Turn power off and connect DC voltmeter across the output of Channel 2.
6. Turn power on and adjust R115 for a reading of less than 10 mV DC. Turn power off.

Bias Adjustment

The bias may be adjusted by one of several methods.

Method I.—No test equipment required.

1. Turn power off and rotate both input level controls fully counterclockwise.
2. Remove the ten screws securing the top cover. Refer to Figure 1 for screw locations.
3. Adjust R27 to its one o'clock position when looking at it from the front of the amplifier.
4. Adjust R127 to its eleven o'clock position when looking at it from the front of the amplifier.

NOTE

The bias range is intentionally limited to prevent overbias. The clock positions in the preceding steps serve as a good compromise between low distortion and ease of adjustment.

Method II.—Use of Distortion Analyzer.

1. Turn power off. Rotate the input level controls fully clockwise.
2. Remove the ten screws securing the top cover. Refer to Figure 1 for screw locations.
3. Connect the output of the oscillator to Channel 1. Connect the output of Channel 1 to an 8Ω load with short pieces (<36 inches) of 16-18 GA. cable. Connect the input of the analyzer across the load.
4. Apply power and adjust the output level of the oscillator to read 40 Vrms at 1 kHz across the load on the analyzer. Change the frequency of the oscillator to 20 kHz.
5. Adjust R27 for the lowest distortion reading, then rotate R27 slightly counterclockwise.
6. Using the same setup, repeat the procedures for Channel 2. Adjust R127 for the lowest distortion reading, then rotate slightly clockwise.

Method III.—Use of Clamp-on DC Milliampere Meter.

1. Turn power off. Rotate the input level controls fully counterclockwise.
2. Remove the ten screws securing the top cover. Reer to Figure 1 for screw locations.
3. Connect the output of Channel 1 to an 8Ω load with short pieces (<36 inches) of 16-18 GA. cable.
4. Attach the clamp-on current probe to the red wire connected to J2 on the main circuit board and apply power. Adjust R27 to read approximately 130 mA DC on the meter. Turn power off.
5. Attach the clamp-on current probe to the red wire connected to J102 on the main circuit board and apply power. Adjust R127 to read approximately 130 mA DC.

Method IV.—Use of DC Voltmeter.

1. Turn power off. Rotate the input level controls fully counterclockwise. If the DC voltmeter is AC powered, float the AC ground wire.
2. Remove the ten screws securing the top cover. Refer to Figure 1 for screw locations.
3. Connect the voltmeter probes across R40 (100Ω, 1W) and apply power.
4. Adjust R27 for a reading of 1.2 volts across the resistor. Turn power off.
5. Connect the voltmeter probes across R140 (100Ω, 1W) and apply power.
6. Adjust R127 for a reading of 1.2 volts across the resistor. Turn power off.

Method V.—Averaging Emitter Resistor Voltage Drops

1. Turn power off. Rotate the input level controls fully counterclockwise. If the DC voltmeter is AC powered, float the AC ground wire.
2. Remove the ten screws securing the top cover. Refer to Figure 1 for screw locations.
3. Apply power and sequentially measure the voltage drop across each emitter resistor (R41 through R48) while adjusting R27 for an average voltage drop of 10 mV DC. Turn power off.
4. Apply power and sequentially measure the voltage drop across each emitter resistor (R141 through R148) while adjusting R127 for an average voltage drop of 10 mV DC. Turn power off.

Parts Ordering

To order replacement parts, look up the ordering number from the parts list and call (405) 324-5311, Telex 160369, or write:

ALTEC LANSING Replacement Parts S
P.O. Box 26105
Oklahoma City, OK 73126-0105 U.S.A.

Factory Service

If factory service is required, ship the unit prepaid to:

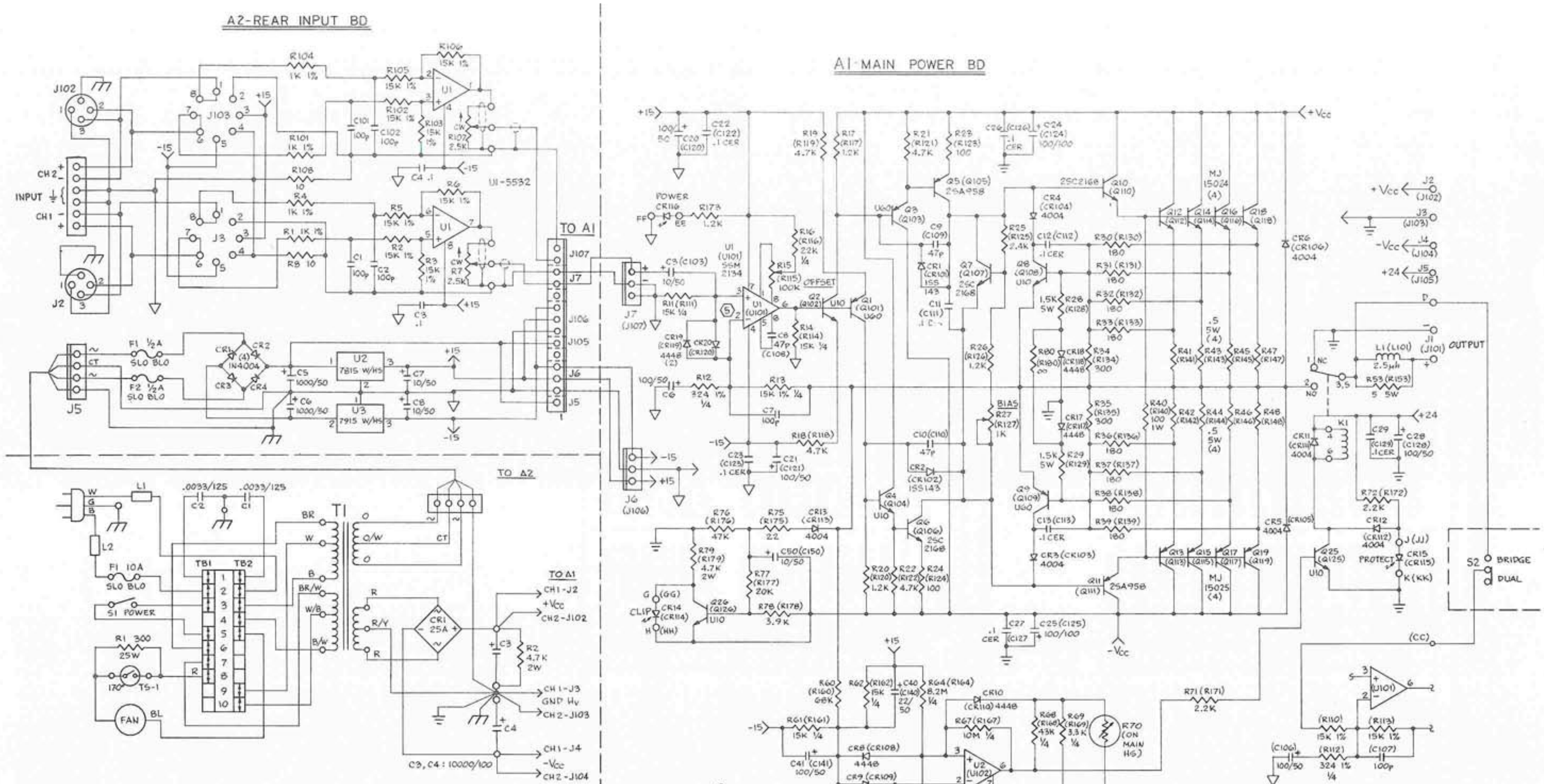
ALTEC LANSING Customer Service/Repair
10500 W. Reno
Oklahoma City, OK 73128 U.S.A.

Enclose a written note describing the problem along with any other helpful information such as where used, how used, etc.

Technical Assistance

For applications assistance or other technical information, call (405) 324-5311, Telex 160369, or write:

ALTEC LANSING Technical Assistance
P.O. Box 26105
Oklahoma City, OK 73126-0105 U.S.A.



7. FOR MAIN POWER BD ASSY SEE DWG NO. 27-01-025896.
6. FOR REAR INPUT BD ASSY SEE DWG NO. 27-01-025898.
(5) SEE DETAIL "A" FOR CONNECTIONS AT PIN 2 OF U101 (CHANNEL 2).
4. CHANNEL 2 DESIGNATORS IN (xxx), BEGIN IN 100 SERIES.
3. ALL RESISTORS IN OHMS, 1/4 W, 5% - REAR INPUT BOARD ONLY.
2. ALL CAPACITORS IN MICROFARADS/VOLT.
1. ALL RESISTORS IN OHMS, 1/2 W, 5%.

NOTES: UNLESS OTHERWISE SPECIFIED

LEAD COLORS	100V	120V	200V	220V	240V
BLACK	TB2-3	TB2-3	TB2-9	TB2-6	TB2-6
WHITE	TB1-6	TB2-9	TB1-6	TB1-6	TB1-10
BROWN	TB2-9	TB1-6	TB1-10	TB1-10	TB1-6
BLACK/WHITE	TB2-4	TB2-4	TB2-3	TB2-3	TB2-3
WHITE/BLACK	TB1-7	TB2-10	TB2-10	TB2-10	TB2-10
BROWN/WHITE	TB2-8	TB1-7	TB2-6	TB2-7	TB2-7
FAN(0V)	TB2-5	TB2-5	TB2-4	TB2-4	TB2-4
FAN(120V)	TB2-7	TB1-8	TB2-7	TB2-8	TB2-8

Figure 6. Schematic of 9444A Power Amplifier (11D094)

MAIN CHASSIS

Reference Designator	Ordering Number	Name and Description
A1	27-01-025896	Main PC Board Assembly
A2	27-01-025898	Input PC Board Assembly
C1,2	15-02-122768	Cap., .0003 μfd, 125 VAC
C3,4	15-01-124445	Cap., 10000 μfd, 100 VDC
CR1	48-02-122651	Bridge Rectifier, 25 Amp
F1	51-04-105890	Fuse, 10 Amp
R1	47-02-123106	Res., 300Ω, 25W, 5%
R2	47-03-124444	Res., 4.7 kΩ, 2W, 5%
S1	51-02-124476	Switch, Power, SPST
S2	51-02-122828	Switch, Bridge, SPDT
T1	56-08-025907	Transformer, Power
—	35-01-124521	Fan
—	24-04-122894	Knob, Black

INPUT PC BOARD ASSEMBLY

Reference Designator	Ordering Number	Name and Description
C1,2,101,102	15-06-124440	Cap., 100 pfd, 630 VDC
C3,4	15-02-124438	Cap., .1 μfd, 100 VDC
C5,6	15-01-124505	Cap., 1000 μfd, 50 VDC
C7,8	15-01-124502	Cap., 10 μfd, 50 VDC
CR1,2,3,4	48-02-042787	Diode, 1N4004
F1,2	51-04-109448	Fuse, 1/2 Amp, Slo-Blo
R1,4,101,104	47-03-121532	Res., 1 kΩ, ¼W, 1%
R2,3,5,6,102, 103,105,106	47-03-124484	Res., 15 kΩ, ¼W, 1%
R7,107	47-06-124511	Pot., 2.5 kΩ log taper
R8,108	47-01-102030	Res., 10Ω, ¼W, 5%
U1	17-01-122832	IC, NE5532A
U2	17-01-121660	Voltage Regulator, 7815
U3	17-01-121659	Voltage Regulator, 7915
—	21-01-013567	Jumper, Octal Socket

MAIN PC BOARD ASSEMBLY

Reference Designator	Ordering Number	Name and Desciption
C3,50,103,150	15-01-124502	Cap., 10 μfd, 50 VDC
C6,20,21,28, 41,106,120, 121,128,141	15-01-124503	Cap., 100 μfd, 50 VDC
C7,107	15-06-124440	Cap., 100 pfd, 630 VDC
C8,9,10,108, 109,110	15-06-124498	Cap., 47 pfd, 1 kV
C11,12,13,22, 23,26,27,29, 30,31,111, 112,113,122, 123,126,127, 129,130,131	15-02-124438	Cap., .1 μfd, 100 VDC
C40,140	15-01-124504	Cap., 22 μfd, 50 VDC
CR1,2,101,102	48-01-124566	Diode, 1SS143
CR3,4,5,6,11, 12,13,103, 104,105, 106,111, 112,113	48-02-042787	Diode, 1N4004
CR8,9,10,17, 18,108,109, 110,117,118	48-01-122601	Diode, 1N4448
CR14,15,114, 115,116	39-01-124540	LED, Red
K1,101	45-01-124473	Relay, SPDT
L1,101	56-01-122770	Choke, 2.5 mH
Q1,3,9,101, 103,109	48-03-120160	Trans., PNP, MPS-U60
Q2,4,8,25,26, 102,104,108, 125,126	48-03-120159	Trans., NPN, MPS-U10
Q5,11,105,111	48-03-124475	Trans., PNP, 2SA958
Q6,7,10,106, 107,110	48-03-124474	Trans., NPN, 2SC2168
Q12,14,16,18, 112,114,116, 118	48-03-122978	Trans., NPN, MJ15024
Q13,15,17,19, 113,115,117, 119	48-03-122979	Trans., PNP, MJ15025
R11,14,61,62, 63,65,66,111, 114,161,162, 163,165,166	47-01-102106	Res., 15 kΩ, ¼W, 5%

Reference Designator	Ordering Number	Name and Description
R12,112	47-03-124539	Res., 324Ω, ¼W, 1%
R13,110,113	47-03-124484	Res., 15 kΩ, ¼W, 1%
R15,115	47-06-122136	Res., trimpot, 100 kΩ
R16,116	47-01-102110	Res., 22 kΩ, ¼W, 5%
R17,20,26,117, 120,126,173	47-04-124497	Res., 1.2 kΩ, ½W, 5%
R18,19,21,22, 118,119,121 122	47-01-102280	Res., 4.7 kΩ, ½W, 5%
R23,24,123, 124	47-01-123177	Res., 100Ω, ½W, 5%
R25,125	47-04-124496	Res., 2.4 kΩ, ½W, 5%
R78,178	47-01-102278	Res., 3.9 kΩ, ½W, 5%
R27,127	47-06-124483	Res., trimpot, 1 kΩ
R28,29,128, 129	47-01-122881	Res., 1.5 kΩ, 5W, 5%
R30,31,32,33, 36,37,38,39, 130,131,132, 133,136,137, 138,139	47-01-102246	Res., 180Ω, ½W, 5%
R34,35,134, 135	47-04-124571	Res., 300Ω, ½W, 5%
R40,140	47-03-102893	Res., 100Ω, 1W, 5%
R41,42,43,44, 45,46,47,48, 141,142,143, 144,145,146, 147,148	47-02-108440	Res., .5Ω, 5W, 10%
R53,153	47-02-112166	Res., 5Ω, 5W, 10%
R60,160	47-04-124493	Res., 68 kΩ, ½W, 5%
R64,164	47-01-108586	Res., 8.2 MΩ, ¼W, 5%
R67,167	47-01-107373	Res., 10 MΩ, ¼W, 5%
R68,168	47-01-102118	Res., 43 kΩ, ¼W, 5%
R69,169	47-01-102090	Res., 3.3 kΩ, ¼W, 5%
R70,170	53-02-124481	Thermistor
R71,72,171, 172	47-01-102272	Res., 2.2 kΩ, ½W, 5%
R75,175	47-01-102224	Res., 22Ω, ½W, 5%
R76,176	47-04-124495	Res., 47 kΩ, ½W, 5%
R77,177	47-04-124494	Res., 20 kΩ, ½W, 5%
R79,179	47-03-124444	Res., 4.7 kΩ, 2W, 5%
U1,101	17-01-124543	IC, SSM2134
U2,102	17-01-124462	IC, TL071CP
TS1	53-01-124572	Thermostat, 170°F