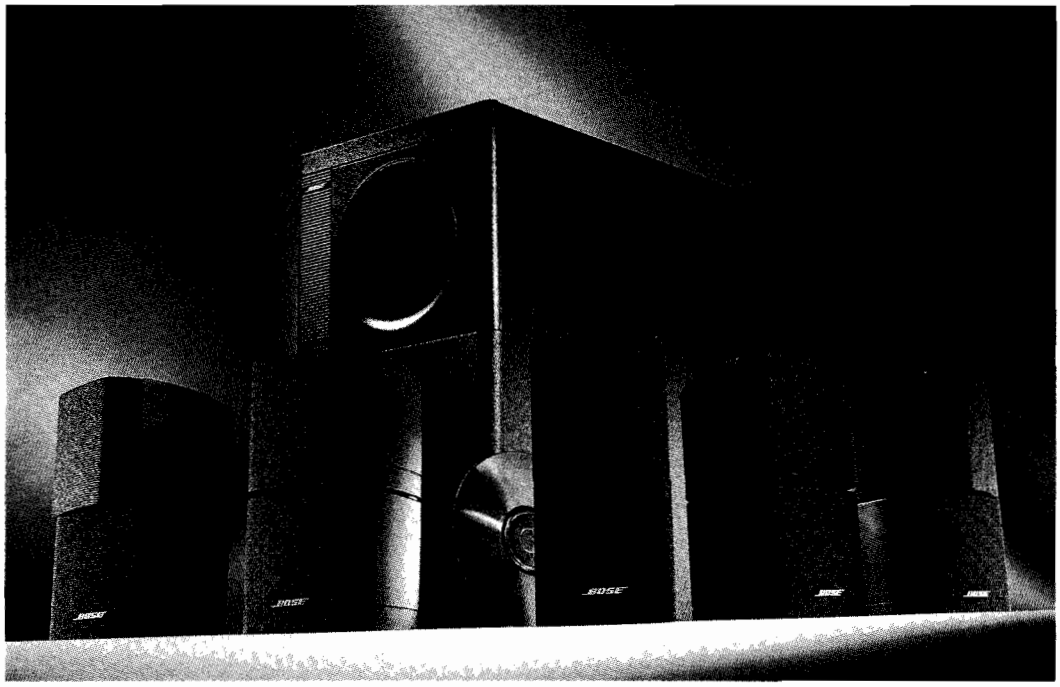
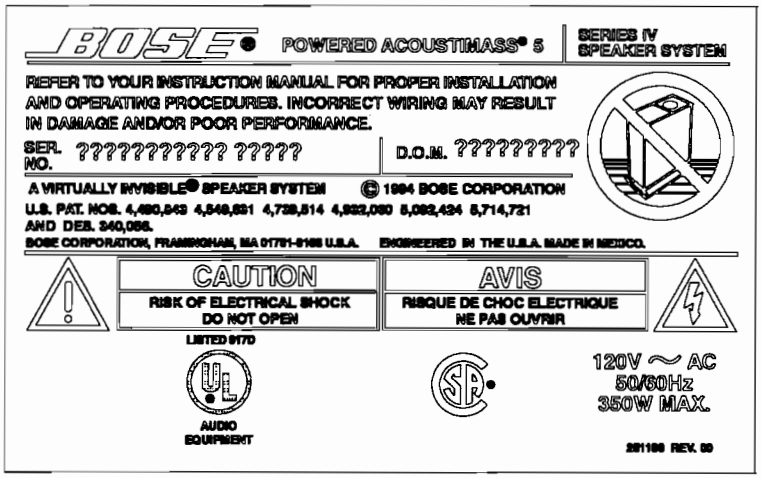
BOSE®
Better sound through research®

Powered Acoustimass® -5 Series IV Speaker System (AM-5P IV)





Product label

Service Manual
Part Number 254125 REV. 00

Contents

CAUTION: THE BOSE ACOUSTIMASS® -5P IV SPEAKER SYSTEM CONTAINS NO USER SERVICEABLE PARTS. TO PREVENT WARRANTY INFRACTIONS, REFER SERVICING TO WARRANTY SERVICE STATIONS OR FACTORY SERVICE.

SPECIFICATIONS

Mechanical

Dimensions:	Bass module: 7 ½" x 14" x 22 $^{7}/_{8}$" Satellites: 4" x 3 $^{1}/_{16}$" x 6 $^{3}/_{16}$"
Weight:	Bass module: 32 lbs. Satellites: 2.4 lbs.
Driver complement:	Bass: 2-5.25" woofers, 8 Ohm (wired in parallel) Satellites: 2-2.25" Twiddler™ speakers, 4 Ohm, (wired in series)
Finish:	Bass module: Black or white vinyl veneer Satellites: Black or white painted polymer finish

Electrical

Input impedance:	Audio input: 9.5 k
Input sensitivity:	0.5 Vrms @ 1 kHz produces rated power in L/R channel outputs
Amplifier:	Class G (high efficiency)
Power output:	Bass channel: 95W into 4 Ohms, ≤ 0.2% THD, from 40-200 Hz, L/R channels unloaded Satellite channel: 40W into 8 Ohm, ≤ 0.2% THD, from 200 Hz-15 kH. L/R channels driven simultaneously, bass channel unloaded
Protection	Satellite channel short circuit protection; current trip point: 6 ± 1 Amps Maximum short duration: infinite Output DC offset protection; voltage trip point: 5 Vdc (unit powers off)
DC offset:	< 70 mVdc, all channels
Distortion:	Bass channel @ 0.5W, 40-250 Hz: < 0.3% THD typical L/R channels @ 0.5W, 200 Hz-15 kHz: < 0.1% THD typical
Output noise:	Satellite channel: 180 uVrms A-weighted Bass channel: < 5 mVrms unweighted
Compressor:	Attack time: 10 ±5 ms Release time: 80 ±20 ms Attenuation range: 20 dB
Channel separation:	@ 1 kHz; > 40 dB @10 kHz; > 30 dB
Dynamic equalization:	Contours per Figure 4
Frequency response:	Bass channel: see Figure 7 Satellite channel: see Figure 7

SPECIFICATIONS

Electrical (continued)

Thermal protection:	Mute at 80° C internal ambient; unit automatically unmutes at 75° C
Turn-on delay:	1.5 seconds maximum; @ turn-on of Lifestyle® music center
Turn-on voltage:	4 Vdc @ 1 mA minimum, when operated with a Lifestyle® music center
Turn-off delay:	0.1 seconds maximum; @ turn-off of Lifestyle® music center or power switch
Acoustic output:	95 dB SPL (pink noise in IEC standard room)
Mains voltage:	120 Vrms +10/-25%, 60 Hz US version 230 Vrms +10/-25%, 50 Hz EURO/AU version 120/230 Vrms +10/-25%, international version (with voltage select switch)
Power consumption:	350W (real power); @ nominal mains voltage
Standby power consumption:	15W maximum; @ nominal mains voltage

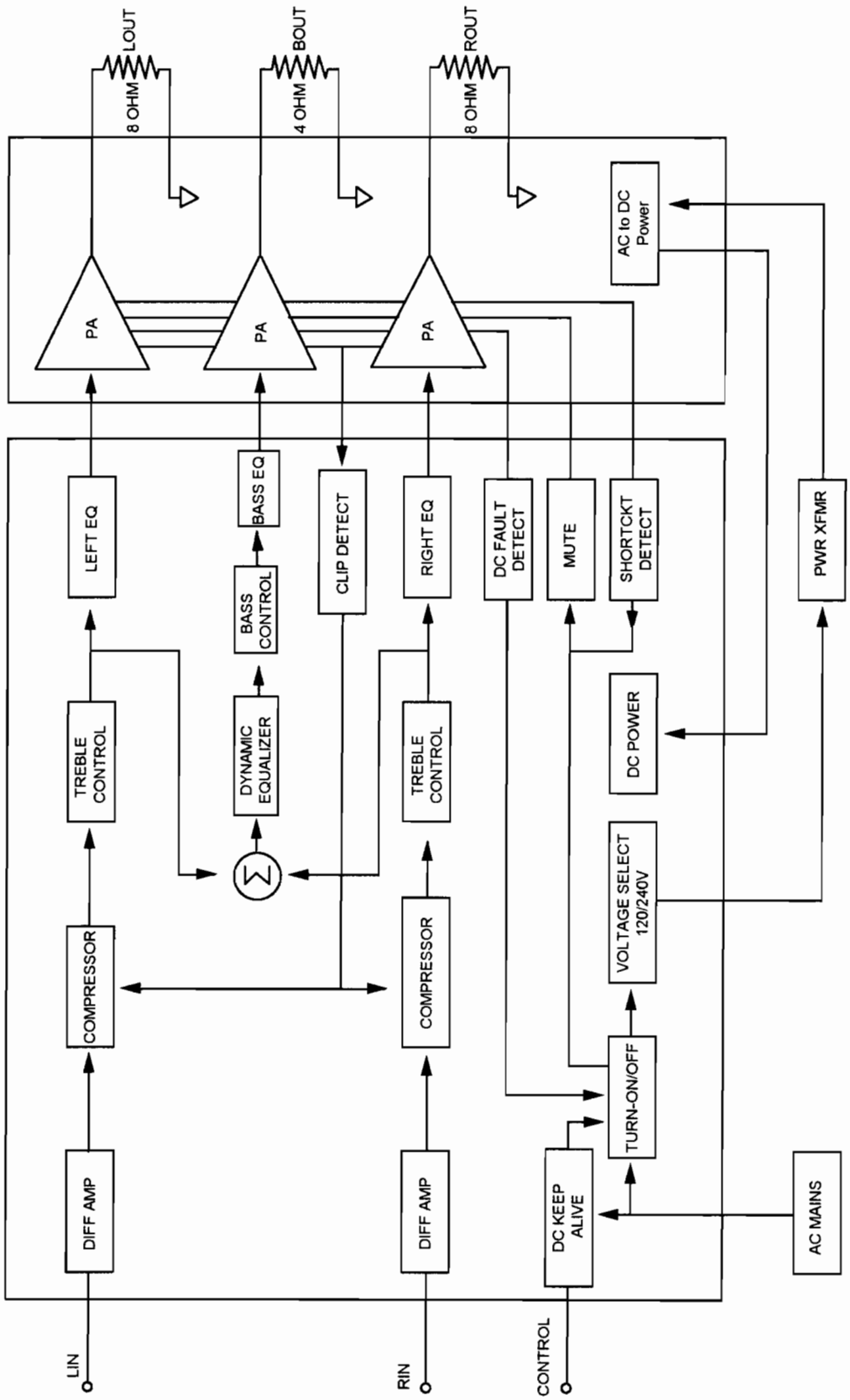


Figure 1. AM-5P IV Block Diagram

THEORY OF OPERATION

1. OVERVIEW

The AM-5P IV is a three-channel, powered version of the AM-5® Acoustimass® loudspeaker. It is designed to be used with the Bose® CD-5V and CD-20 Lifestyle® music center and the Bose Personal™ music center. Major design features of the AM-5P IV include:

- Patented Acoustimass speaker technology
- High efficiency class-G power amplifiers
- Patented automatic (level sense) dynamic equalization
- Active equalization
- Bass and treble tone controls
- Automatic power on/off when used with the Lifestyle® music center.
- Speaker overload compression
- Speaker short circuit protection
- Thermal overload protection
- Compatible with any (volume adjustable) audio source

ELECTRICAL THEORY OF OPERATION

The following theory of operation references the block diagram of Figure 1, and schematic diagram SD251167. Overall system frequency response of the satellite channel and bass channel (with tone controls in the flat position) is shown in Figure 7.

2. POWER SUPPLY

2.1 Control

The 10 Vdc turn-on signal from the CD-5V is received at DIN connector J5 pin 1. It is coupled to the anode of opto-coupler U401 (through D401, R402, and D405) and to the base of transistor Q401 (through D403, R417, and R404). Q401 acts as a switch to conduct current through the opto-coupler input diode (pins 1 and 2 of U401). The opto-coupler provides electrical isolation between the 10V control signal and the AC Mains derived "DC keep alive" supply.

2.2 DC Keep Alive Supply

Circuitry between opto-couplers U401 and U402 is electrically optional when the AM-5P IV is used directly with the CD-5V because the 10V control voltage can be used to trigger opto-coupler U402 directly. However, to make the product more versatile (so that it can be used with other equipment that does not have a 10V control voltage), this circuitry is provided on all versions of the product.

The keep-alive circuit creates a small (approximately 10V) DC supply voltage that can turn ON opto-coupler U402. This occurs as AC MAINS voltage is rectified and current-limited through power resistor R437 and high voltage diode D420, charging capacitor C402. Zener clamping diode D413 is normally off.

THEORY OF OPERATION

2.3 Turn-On/Off

When power is first applied to the unit (i.e. when the power switch is turned ON), the following sequence of events occurs:

a. C402 charges up to about 10 Vdc (as explained in 2.2).

b. Q411 and Q412 conduct and latch, effectively shorting the negative side of C403 to R409.

c. Current briefly flows from C402, through R408, U402, D404, C403, Q412, Q411, and R409. This current triggers opto-coupler triac driver U402 (through pins 6 and 4) to turn on triac switch Q400. This energizes the primary winding of the power transformer, which momentarily powers on the product. After about 50 ms, C403 becomes fully charged, and the DC current drops below 5 mA, which is the minimum amount required to keep opto-coupler U402 triggered.

d. At this point, the circuit determines whether the 10V control line (from CD-5V) is connected:

2.3.1 If the line is not connected (open circuit), current from the 12V supply flows through resistor R403, D402, R417, R404 and to the base of Q401. This latches Q401 and causes current to flow through opto-coupler U401 from the 12V supply, which has reverse biased the 10V supply at dual diode D401. U401 output pins 4 and 5 then short and establish a current path from pin 3 of U402 to R409, keeping the triac driver energized. Thus, the AM-5P IV will stay on when it does not detect that the serial data plug is connected.

2.3.2 If the line is connected (low resistance) and the CD-5V is off, the 12V supply (through R403) is effectively shorted to ground (back through R401 to the CD-5V). The AM-5P IV will then turn off, as there is no sustaining current to opto-coupler U402. If the CD-5V is on, the 10V signal will keep opto-coupler U401 energized and the AM-5P IV will remain on.

2.4 Power Supply

The transformer has dual primary windings that are wired in series for 240V operation, and in parallel for 120V operation. Inrush current is limited by NTC (Negative Temperature Coefficient) device R456 for 240V operation. The inrush suppressor acts as a current-limiting 25 Ohm resistor at turn-on, and quickly reduces in resistance to less than 1 Ohm after a few seconds of heating (from I^2R loss). Resistor R626 and capacitor C613 form a snubber network that suppresses the high voltage transients that can occur across the triac.

Secondary voltages are fully developed within 100 milliseconds of turn-on. Three main power supplies are energized:

±38 Vdc for the high voltage (class-G) power amplifier rails
±19 Vdc for the low voltage power amplifier rails
±12 Vdc regulated for the low power signal processing circuitry

3. AUDIO CHAIN

The following discussion references the left channel electronics. Right channel operation is identical and therefore is not specified.

THEORY OF OPERATION

3.1 Differential Amp

The differential input amplifier (DIFF AMP) stage, consisting of op-amp U301 pins 5,6 and 7, buffers and preamplifies the CD-5V audio output signal. Gain is limited to 5.2 dB to prevent potential overload (from the 4 Vrms maximum input signal). Capacitors C103, 124, 125 and 130 are for suppression of radio frequency interference (RFI). D101 and D102 are protection diodes for input overload or electrostatic discharge (ESD).

3.2 Compressor

The output of the differential amplifier is applied to the compressor stage. This stage consists of R107, R108, C104, and 1/4 of transistor array U403. Since pin 2 of op-amp U102 is at virtual ground, the compressor is isolated from the treble control portion of the circuit. When triggered by the CLIP DETECT circuit, transistor U403 (pins 1,2,3) conducts in the linear region and acts as a variable resistor to ground. This resistance forms a voltage divider with the parallel resistance combination of R107 and R108, causing voltage attenuation. Capacitor C104 is used for DC isolation between the transistor and op-amp. The purpose of R108 is to attenuate the voltage at the output of U301 (pin 7) down to a maximum level of about 20 mVrms where the transistor operates linearly (at low distortion). The attack and release time of the compressor is discussed later in the CLIP DETECT paragraph (3.10).

3.3 Treble Control

The treble control stage consists of op-amp U102, potentiometer R113, resistors R109 through R112 and capacitor C106. At low frequencies, C106 represents an open circuit and the stage acts as a simple inverting amplifier with a gain of -(R111 + R112) / (R107 + R108). At higher frequencies, depending on the position of potentiometer R113 (which affects the amount of feedback), the circuit will have either positive or negative gain. The frequency response of the treble control is shown in Figure 2.

3.4 Satellite Equalization

Left and right satellite channels undergo three stages of active filter equalization. The reason for this is to band limit the frequency response from 200 Hz to 15 kHz and correct for satellite speaker response irregularities. Left and right channel equalization is identical. The frequency response graphs for each stage is shown in Figure 3.

3.5 Dynamic Equalizer

A level-sensing automatic dynamic equalizer circuit is used in the bass channel to compensate for the ear's perceived loss of bass response at low listening levels. It provides negligible bass boost at frequencies above 200 Hz so as not to impact the tonal quality of human speech.

The level detect circuit consists of op-amp U101 (pins 1, 2 and 3), transistors Q301 through Q303, diodes D301 and D302, resistors R303 through R308 and capacitors C301 through C304. Left and right audio at the output of the treble control stage is summed through resistors R140 and R240 and AC coupled through capacitor C302. A small DC bias signal (40 mVdc) is established by resistors R303 and R304 and is summed with the audio at the non-inverting input of U101. This negative bias limits the maximum amount of boost that the dynamic EQ circuit applies when no audio is present. Diode D302 and capacitor C304, which are inside the feedback loop of U101, form a precision negative-peak detector. The voltage at the inverting input (pin 2) of U101 is the negative

peak value of the voltage applied to the non-inverting input (pin 3). The voltage at C304 is "held" constant at the peak value until transistor Q301 begins to conduct. This occurs about 10 seconds after the audio peak and is controlled by the RC discharge time of C303 and R306. Q302 is an emitter follower circuit that buffers the voltage at C304. Q303 is used to convert the voltage across resistor R309 to a proportional current that controls the gain of OTA (Operational Transconductance Amplifier) amplifier U302.

L+R audio from the output of the bass gain control stage (U301 pin 1) is applied to the audio input of the dynamic equalizer circuit. Resistors R310 through R315 and capacitors C306 and C307 along with feedback from U302 pin 6 form a 50 Hz variable gain band-pass filter. This signal is summed with the input signal through R316, R317 and R318 to form a composite signal at the output of U303 pin 1. The smaller the amplitude of the audio signal; the smaller the amount of current that flows into pin 5 of U302, and the less the gain from input to output. However, U302 is in the feedback loop of U303 and therefore its transfer function inverses at the output of op-amp U303 pin 1. Therefore, as the signal level decreases, the gain from the non-inverting input to the output of U303 increases and the effect of the band-pass filter is more pronounced. The frequency response family of curves for the dynamic equalizer circuit as measured at the output of U303 pin 1 is shown in Figure 4.

3.6 Bass Channel Equalization

The output of the dynamic equalizer circuit is applied to the first of two fixed equalizer stages. The purpose of this equalization is to band-pass limit the signal from 45 Hz to 250 Hz and to provide frequency response correction to the bass module. The response graphs for each stage are shown in Figure 5.

3.7 System Mute

Muting (decision) of the system at power-up or power-down occurs at transistors Q403, Q404 and Q405. These transistors form an analog AND gate with the output at the collector of Q405 and the inputs at the base of Q403 and Q404. At initial power-up, a one second delay occurs before capacitor C405 fully charges, which delays turn-on of Q403 and unmute of the system until the power supplies completely settle. If the 10V control line from the CD-5V is high, then Q404 also saturates and Q405 is eventually cutoff. Additionally, the mute line at the collector of Q405 goes high (+6 Vdc) and unmutes the amplifier stages.

At turnoff, if either the 12 Vdc supply falls below 7 Vdc (causing turnoff of Q403), or if the 10V control line from the CD-5V triggers low (causing turnoff of Q404), Q405 will trigger ON. This pulls the mute line from normal +6 Vdc to 0 Vdc, and immediately mutes all amplifier channels.

3.8 Bass Power Amplifier

The bass power amplifier is a discrete high efficiency class-G design. Maximum power is 90W into 4 Ohm at less than 0.1% THD. In Class-G operation, the amplifier is powered by two independent power supplies depending on the amplitude of the signal input. When the audio amplitude is low, the amplifier runs off of the lower voltage supply but during musical peaks it switches to the higher voltage supply. Efficiency is typically increased from 20% to 40% and power dissipation is reduced by a factor of 2.5, which is necessary for thermal management. Detailed operation is as follows:

Referring to sheet 2 of the schematic, audio input is applied to the amplifier PCB at pin 1 of connector J2 and is AC coupled through C375. The amplifier is controlled by negative feedback to op-amp

U375, which is configured as a non-inverting amplifier with a voltage gain of 6 (15.6 dB). With no signal applied to the input, all output power devices are biased at cutoff. For a positive input signal, pin 6 goes high and conducts driver transistor Q384. Collector current is pulled through R390 and R389 until the voltage drop across R389 reaches about 1V. At this time, high gain darlington transistor Q382 begins to conduct emitter current through 3A power diode D376 which connects to the lower voltage +17 Vdc supply. Collector current from Q382 flows through the speaker load and the voltage at this node is regulated by feedback to the op-amp through resistor R383.

When the audio output voltage approaches the 17 Vdc power supply rail, output transistor Q382 begins to saturate and conducts much more base current than the normal maximum of 5 mA. At approximately 8 mA, the voltage drop across 75 Ohm resistor R390 exceeds 0.6V and small signal transistor Q383 begins to conduct. This in turn conducts class-G darlington transistor Q381, which turns on the +34 Vdc power supply and reverse biases power diode D376, effectively turning off the +17 Vdc supply. During this period, the wave form at the collector of Q381 resembles the audio output signal plus the saturation drop of Q382 (see Figure 6). In addition, Q381 operates in the active region (not as a switch), and thus shares power dissipation with output transistor Q382.

Crossover distortion and switching transients are negligible because of the relatively low bandwidth of the amplifier (250 Hz) and the ability of the Acoustimass® bass module to roll-off high frequency distortion products. Crossover distortion measures less than 0.5% at 200 Hz, 0.5 Watt.

Muting of the amplifier, at system turn-on or turnoff, occurs when the voltage at the mute input line (J2 pin 5) drops below 4.4 volts. Under this condition, Q377 conducts through Q378, and in turn conducts both positive and negative half cycle mute transistors Q379 and Q380. These transistors saturate and cut off output transistors Q382 and Q387.

Resistors R384, R393, R398 and R399 and capacitors C378, C379, C389 and C382-387 are used for high frequency stabilization.

3.9 Satellite Power Amplifiers

Each of the satellite channel amplifiers is operated in class-G configuration and consist of a 40W class AB monolithic integrated circuit SGS TDA7294. The amplifier is short circuit and thermally protected. External to this IC is a pair of TO-220 darlington transistors (the same as used in the discrete bass amplifier) to perform the class-G power supply switching. Detailed operation is described for the left channel only as follows:

The left signal is applied to capacitor C175 and is coupled to the non-inverting input (pin 3) of the amplifier IC. It is configured as a non-inverting amplifier with a voltage gain of 6 (15.6 dB). The output stage of the TDA7294 consists of a pair of MOSFET transistors and the positive FET must develop gate drive well above the supply voltage. Hence there is a bootstrap cap between pin 6 and 14 that is biased at approximately 18 Vdc. During positive audio output swings, the voltage at the plus (+) side of C181 rises to as much as +45 Vdc.

With a low amplitude signal, the amplifier runs off of the ±17 Vdc rails through power diodes D177 and D180. The power supply voltage at pin 13 is subtracted by 5.6V zener diode D176 and divided down by the ratio of 1 + R182/R181. This bias voltage sets the threshold at which transistor Q175 turns on. When the audio at the input to the amplifier exceeds the voltage at the emitter of Q175 by two diode drops, D175 and Q175 conduct. In turn, this conducts small signal transistor Q179, which in turn conducts output transistor Q176. A negative feedback loop is established that prevents Q176 from turning completely on and the voltage at the collector of Q176 resembles the audio output

waveform plus several volts of saturation headroom (see Figure 6). Q176, operating in the active region (as opposed to a simple on/off switch), shares some of the power dissipation with the power amplifier IC. The phase lag created by the input network R175 and C177 allows the power circuitry to switch on slightly ahead of the power amplifier at high frequencies (above 8 kHz) to minimize turn-on glitch.

The amplifiers are muted by setting the voltage at pin 10 (mute pin) to less than 1.5 Vdc. Unmute occurs at 3.5 Vdc or above. In the AM-5P IV application, mute voltage is typically zero volts and unmute is 5 volts. The timing of the mute and standby lines are separately controlled but they are always toggled low or high together. In standby mode, the maximum quiescent current to the chip is 3 mA maximum, and 60 mA maximum in unmute mode.

3.10 Clip Detect

The left and right satellite amplifier channels are protected by a compressor (3.2) that momentarily reduces the voltage gain of the system if either of the amplifier outputs clip. Operation of the clip detect portion of the circuit is as follows:

Referring to Sheet 1 (Main PCB) of the schematic, each of the left and right channel outputs is half-wave rectified by diode D412 and is attenuated to the emitter of Q410. Similarly, the "40V" power supply rail is attenuated (in the same ratio) by R432 (2 k) and R10 (10 k from the amplifier PCB) and is applied to the base of Q410 through diode D410. The function of D410 is to create a fixed DC drop that, when scaled up by the ratio of R432/R10, is equal to slightly more than the total saturation drop of the amplifier. Under this condition, the amplifier outputs are allowed to rise to an amplitude level that is just below clipping. However, beyond this level, Q410 conducts and charges capacitor C411 and C410 through diode D411. When the DC voltage at C410 reaches two diode drops (1.2 Volts), driver transistors U403 (pins 5, 6, 7, 8, 9 and 10) conduct and turn-on attenuator transistors U403 (pins 1, 2, 3, 12, 13 and 14). The voltage at C410 is held constant for a minimum of 15 ms in order to prevent waveform distortion at low frequencies. Eventually, C410 is discharged when the voltage at C411 drops low enough (through discharge resistor R448) to conduct D411 in the reverse direction. The attack time of the compressor is set by the RC time constant of R439 and C411/C410, and is approximately 5-10 ms. Release time of the compressor is set by the RC time constant of R448 and C411/C410 and is approximately 80-100 ms.

4. PROTECTION CIRCUITS

4.1 Thermal mute

A thermistor is located on the amplifier PCB near the heat-sink. If the temperature of the thermistor rises above 80°C, the amplifier channels will mute. This occurs at comparator U404 on the main PCB. The inverting input is biased at +120 mVdc and the non-inverting input is biased through a resistor divider that includes thermistor R11. At 25 °C, the thermistor has a resistance of 22k and the bias is approximately 2 Vdc, but at 80 °C, its resistance drops to 1k, at which time the output of U404 (pin 1) trips low. This causes transistor Q403 to turn off. This in turn causes Q405 to saturate on, which pulls the mute voltage at J8 pin 5 low, causing all the amplifier channels to mute. With all amplifiers muted, power dissipation of the system is less than 12 watts and the system is forced to cool down to about 75 °C before the comparator trips high, at which time the amplifiers unmute and normal operation resumes.

4.2 DC Offset Latch-Off

THEORY OF OPERATION

The outputs of all three amplifier channels are summed together through 100k resistors R149, R249 and R394 and averaged by capacitor C409. Under normal conditions, the average DC offset voltage at this node will be less than 25 mVdc. If any one of the three power amplifiers suffers a malfunction that creates a DC offset >|6 Vdc| (absolute value) at the output to the speaker, transistor Q408 will conduct on (through diodes D402 and D414). Q408 will then latch when transistor Q407 is triggered on. Q407 also causes Q406 to latch on, which shorts out the voltage supply to the base of Q401. This causes opto-coupler U401 and U402 to trip off, which in turn trips off the primary line triac Q400, causing total shut-off of the system. The current that flows through transistors Q407 and Q408 under this situation comes directly from the Lifestyle® Music Center 10 Vdc control line, ensuring that the unit stays latched off.

4.3 Power Supply Fault

The same bipolar latch circuit that is used in the DC offset detect circuit is also used to sense fault (imbalance) conditions in the power supply. Referring to sheet 2 of the schematic (amplifier PCB), there is a section labeled "Power Supply Fault Detect" consisting of resistors R22 through R25 and diodes D21, D22, D24, and D25.

Under normal conditions the positive and negative power supplies will be approximately equal and opposite in amplitude. This applies to the ±12 Vdc regulated supplies and to a lesser extent, the ±40 Vdc amplifier power supplies. The ±12 Vdc supplies are summed through resistors R22 and R23 and are buffered by two diode drops from D21 and D22. The ±40 Vdc supplies are summed through resistors R24 and R25 and are buffered by zener diodes D24 and D25. If the absolute sum of the ±12 Vdc supplies is greater than about 1.2 Volts, then D21 and D22 will conduct. Likewise, if the absolute sum of the ± 40 Vdc supplies is greater than about 7.5 Vdc, then D24 and D25 will conduct. In either case, the voltage at node J2 pin 10 (labeled "bass offset") will rise above or below 0V, and if it exceeds 1.5 volts will trigger the DC offset protect latch circuit (4.2).

4.4 Short Circuit Detect

Although the left and right amplifier ICs have internal SOA (Safe Operation Area) and thermal protection, under sustained short circuit conditions power diodes D177 and D180 and other power supply components including the transformer and bridge rectifier B2 are subject to thermal overload. Therefore, a separate short-circuit protection circuit is employed.

Referring to left channel operation, current sense resistor R194 is in series with the output of the left power amplifier. Under normal conditions the current flowing through the nominal 8 Ohm satellite speaker does not exceed 5 Amperes. Above this level transistor Q181 will conduct through D182 and R196 and pull the voltage at "thermal" node J2 pin 6 low from nominal 2 volts to below .12V. At this time comparator U404 (same as used in the thermal mute circuit) will trip low and mute the amplifiers (4.1). When U404 trips low (-12 Vdc), a negative pulse is fed back as positive feedback through voltage divider R459 and R460 and capacitor C427 to the non-inverting input of comparator U404 pin 5. The output of U404 pin 2 stays low for approximately three seconds until the voltage at the negative side of C427 rises above ground. At this time the comparator resets high (open collector output) and the amplifier outputs unmute.

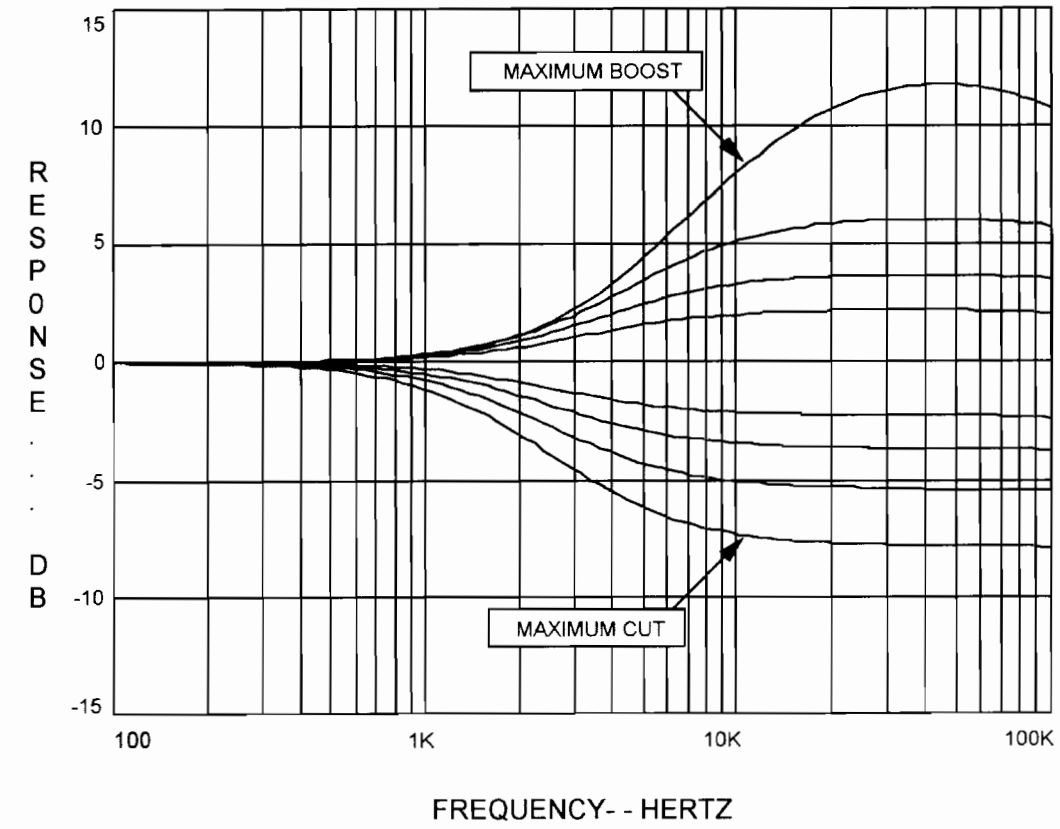


Figure 2. Treble Control Frequency Response (normalized)

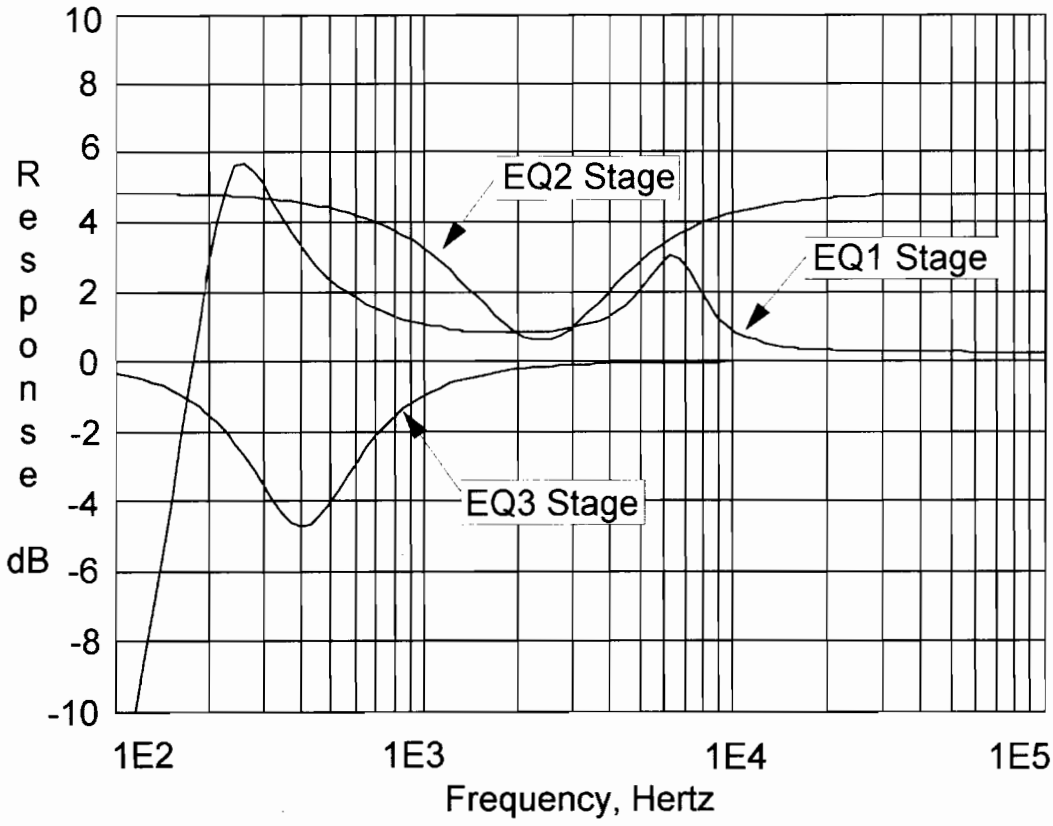


Figure 3. Satellite Channel Equalizer Stage Frequency Response

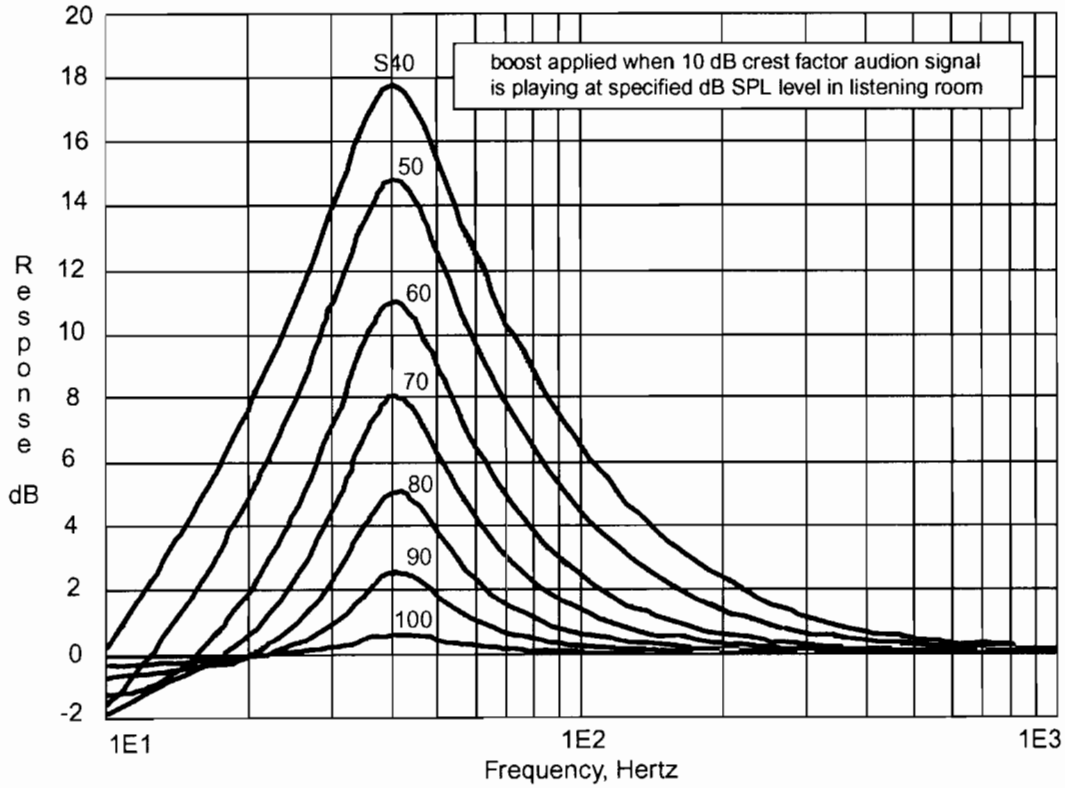


Figure 4. Dynamic Equalizer Frequency Response vs. Input Level

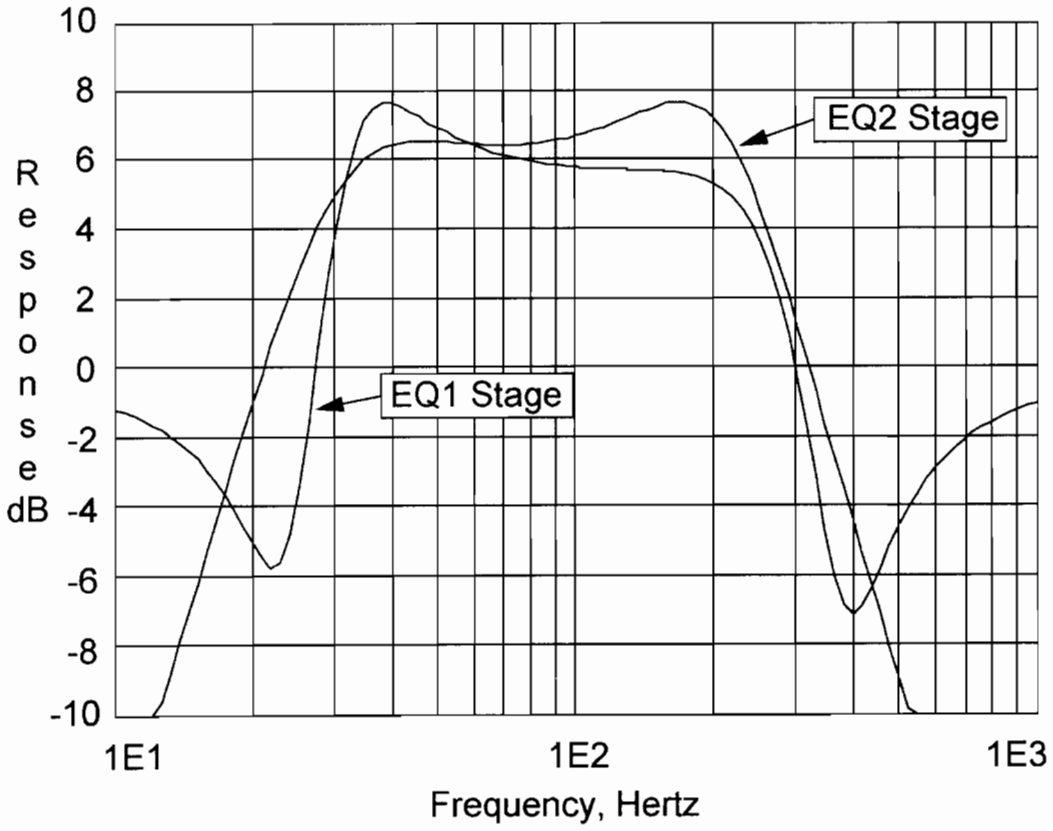


Figure 5. Bass Channel Equalizer Stage Frequency Response

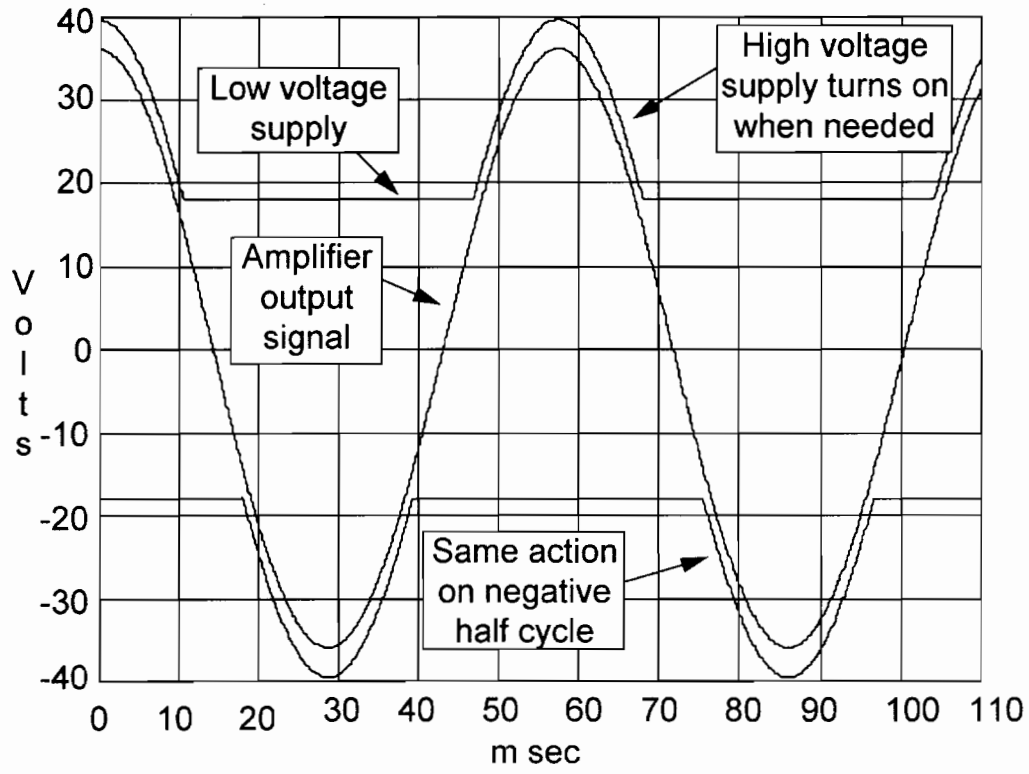


Figure 6. Voltage at Collector of Q831 (bass amplifier) and Q176 (left channel) (shows power supply switching during class-G operation)

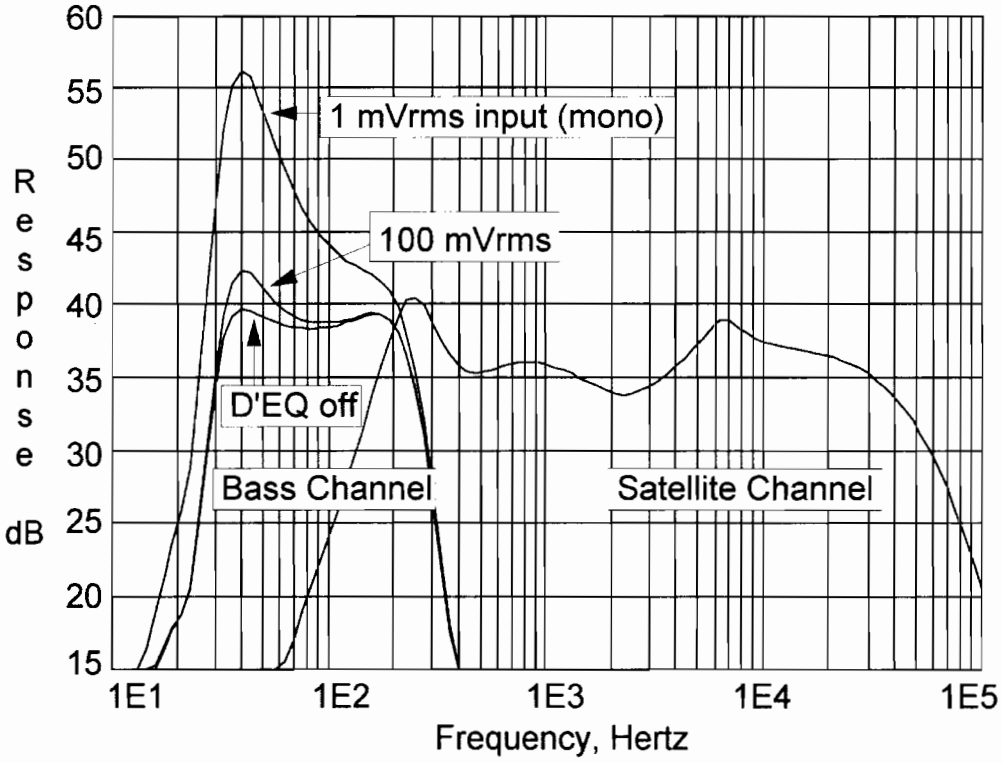
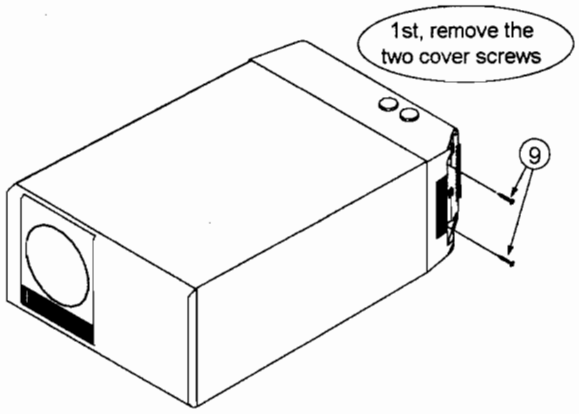


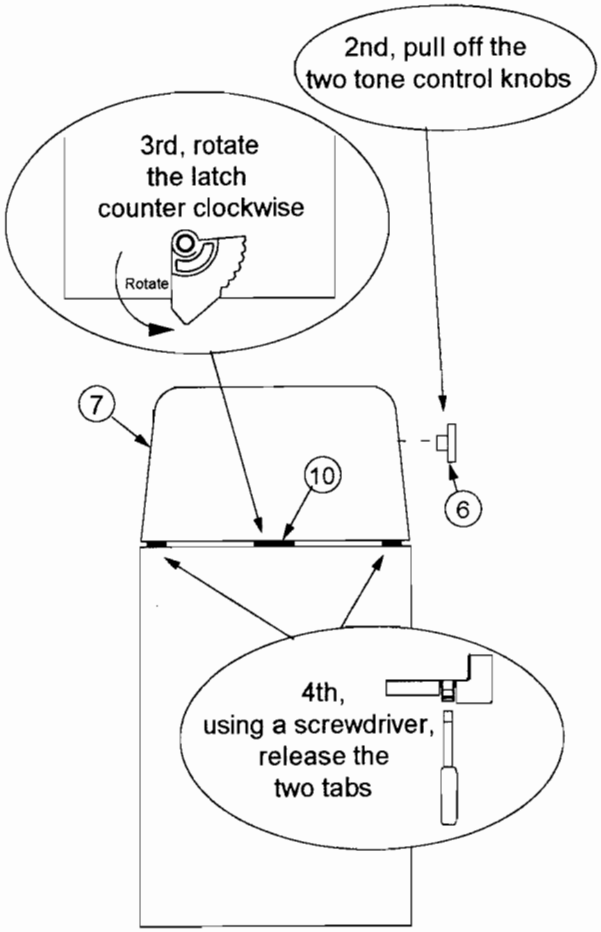
Figure 7. Bass and Satellite Channel System Frequency Response

DISASSEMBLY/ASSEMBLY PROCEDURES

1. Cover Removal



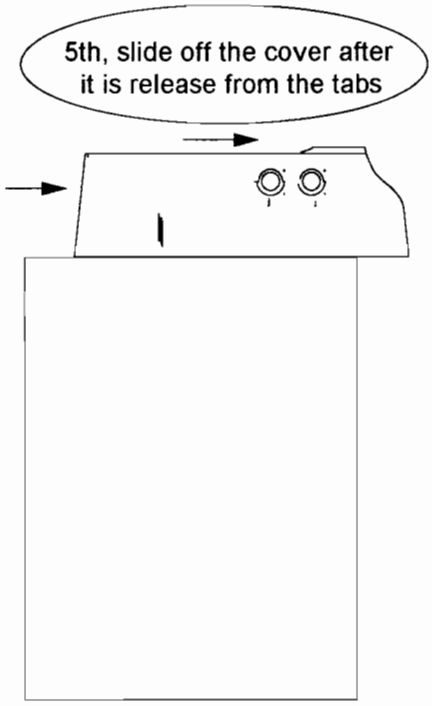
1.1 Remove the two screws (9) that secure the cover to the amplifier module.



1.2 Pull off the two tone control knobs (6).

1.3 Engage one of the cogs of the cover latch (10) with a small flathead screw driver and fully rotate, counterclockwise, the cover latch.

1.4 With a small flathead screwdriver, press down on the right tab and with your thumb in the bass control hole of the top cover, push backward on the cover (7). Do this for the left side also.



1.5 Slide off the cover, once it is released.

2. Cover Replacement

2.1 Align the cover (7) on the bass module so that the input/output connectors on the main PCB are lined up with their respective holes in the cover.

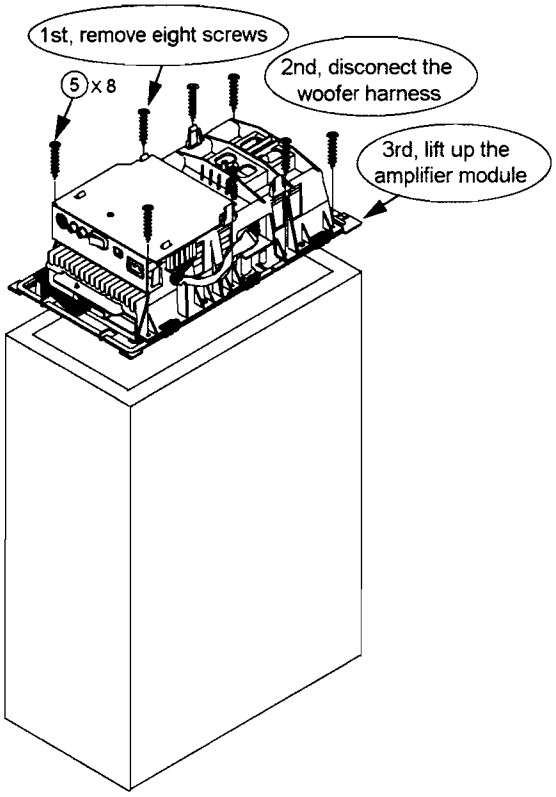
2.2 With the cover latch (10) rotated outward, slide the cover onto the bass module until it snaps over the tabs. Rotate the cover latch fully clockwise.

2.3 Replace the two screws (9) that secure the cover to the bass module.

2.4 Press the two tone control knobs (6) onto the tone control shafts.

DISASSEMBLY/ASSEMBLY PROCEDURES

3. Amplifier Module Removal
(perform procedure 1 first)



3.1 Remove the eight screws (5) that secure the amplifier module to the bass module.

3.2 Disconnect the woofer wire harness from the amplifier module's connector J3.

3.3 Lift the amplifier module up.

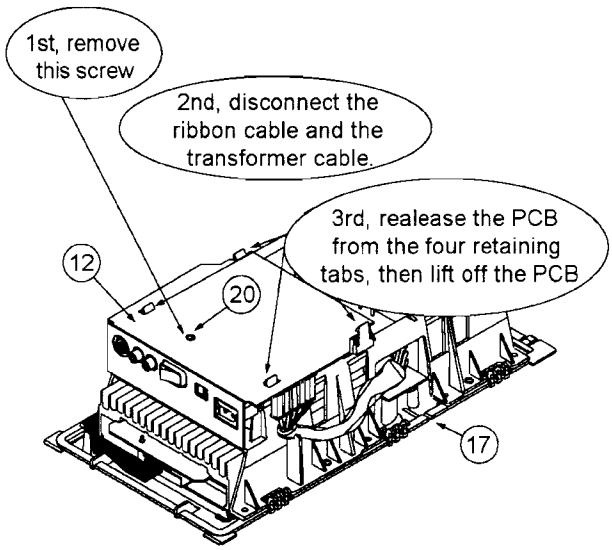
4. Amplifier Module Replacement

4.1 Attach the woofer wire harness to the amplifier module's connector J3.

4.2 Lower the amplifier module into the bass module so that the input/output connectors are facing toward the opposite side of the port.

4.3 Replace the eight screws (5) that secure the amplifier module to the bass module.

5. Equalizer PCB Removal
(perform procedure 3 first)



5.1 Remove the screw (20) that secures the equalizer PCB to the adaptor bracket (17).

5.2 Disconnect the ribbon cable from connector J8 and the transformer cable from connector J7.

5.3 Release the equalizer PCB (12) from the tabs on the adaptor bracket. Lift off the equalizer PCB.

6. Equalizer PCB Replacement

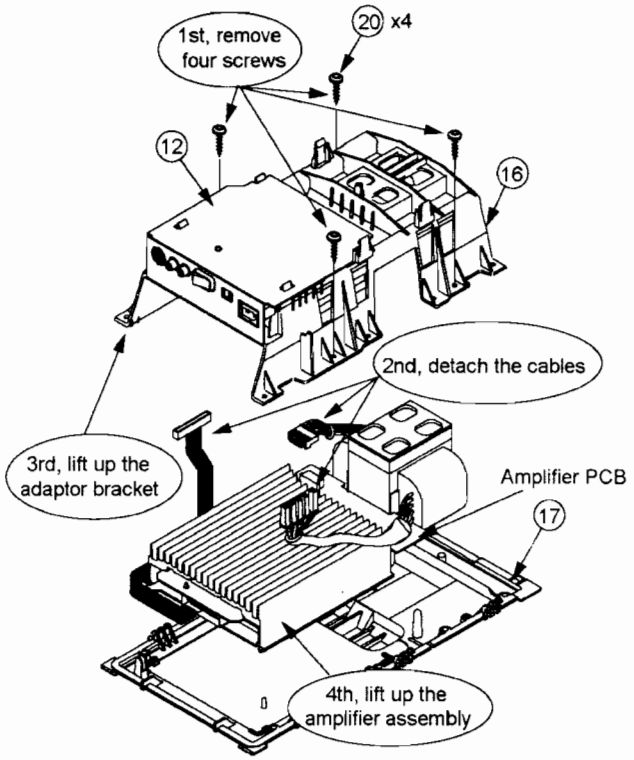
6.1 Align the equalizer PCB (12) to the adaptor bracket (17) so that the input/output connectors are facing away from the transformer and the holes in the PCB lineup with the tabs on the adaptor bracket. Press down on the equalizer PCB so that it snaps into place.

6.2 Replace the screw (20) that secures the equalizer PCB to the adaptor bracket.

6.3 Attach the transformer cable to connector J7 and the ribbon cable to connector J8.

DISASSEMBLY/ASSEMBLY PROCEDURES

7. Amplifier Assembly Removal
(perform procedure 3 first)



7.1 Remove the four screws (20) that secure the adaptor bracket (16) to the base plate (17).

7.2 Detach the transformer cable from J1 on the amplifier PCB and from J7 on the equalizer PCB (12). Disconnect the ribbon cable from J2 on the equalizer PCB.

7.3 Lift up the adaptor bracket.

7.4 Lift up the amplifier assembly.

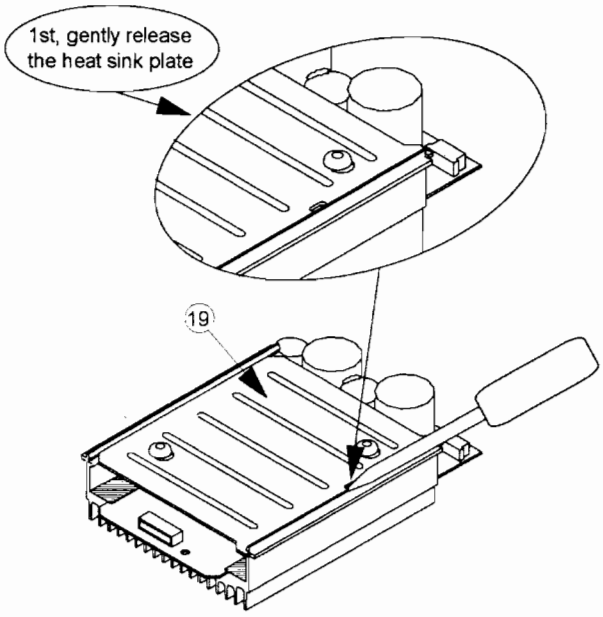
8. Amplifier Assembly Replacement

8.1 Align the amplifier assembly with two posts on the base plate (17) so that connector J4 is toward the transformer.

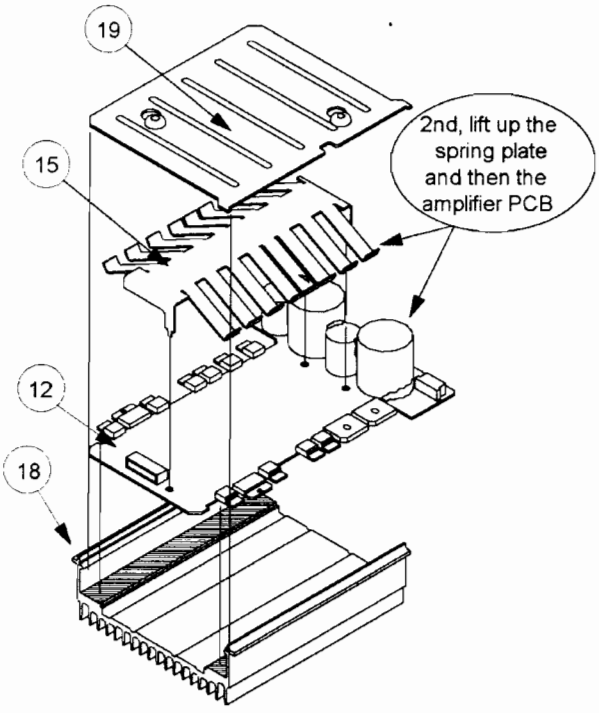
8.2 Connect the transformer cable to connector J4 on the amplifier PCB.

8.3 Align the adaptor bracket (16) to the base plate and replace the four screws (20) that secure the adaptor bracket to the base plate. Attach the ribbon cable to J2 on the equalizer PCB (12).

9. Amplifier PCB Removal
(perform procedure 7 first)



9.1 With the heat-sink (18) face down, place a screwdriver in the notch of the heat-sink plate (19) and with only as much force as needed, release the heat-sink plate.



9.2 Once the heat-sink plate has been removed, lift up the spring plate (15) and then the amplifier PCB (12).

DISASSEMBLY/ASSEMBLY PROCEDURES

10. Amplifier PCB Replacement

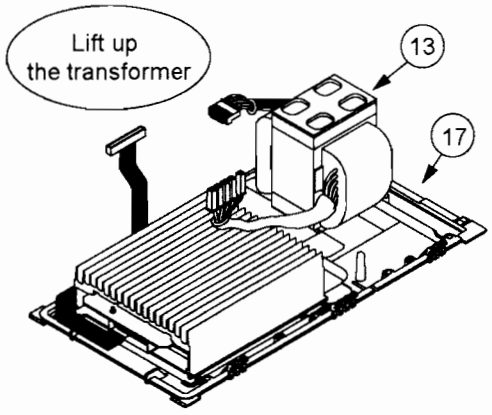
10.1 Align the amplifier PCB (12) in the heat sink (18) so that the transistors and the ICs rest on the heat sink. Make sure that there is sufficient thermal grease on the heat sink.

10.2 Align the spring plate (15) so that the tabs line up with the holes in the amplifier PCB.

10.3 Align the heat sink plate (19) so the word "outside" is visible and the notch is on the same side as the connector J4, which is located on the amplifier PCB.

10.4 Place the side of the heat sink plate with the word "outside" into the groove on the heat sink. With the palms of your hands, press down on the other side of the heat sink plate until it snaps into place. Use Figure 9 as a visual aide.

11. Transformer Removal
(perform procedure 7.1-7.3 first)

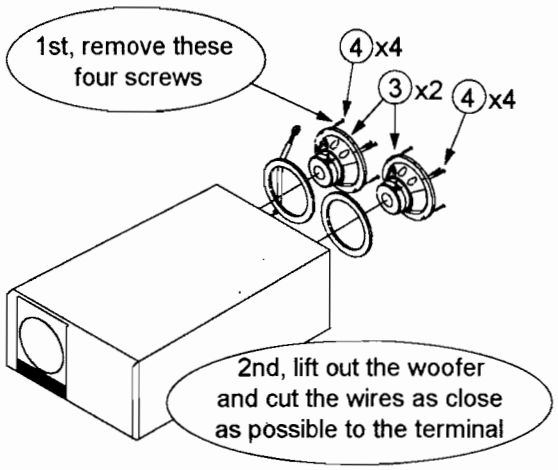


11.1 The transformer (13) rests in the base plate (17) and only needs to be lifted up.

12. Transformer Replacement

12.1 Lower the transformer (13) into the base plate (17).

13. Woofer Removal
(perform procedure 3 first)



13.1 Remove the four screws (4) that secure the woofer (3) to the cabinet.

13.2 Lift out the woofer and cut the wires as close as possible to the woofer's wire terminal.
Note: Make a note of the wiring configuration.

14. Woofer Replacement

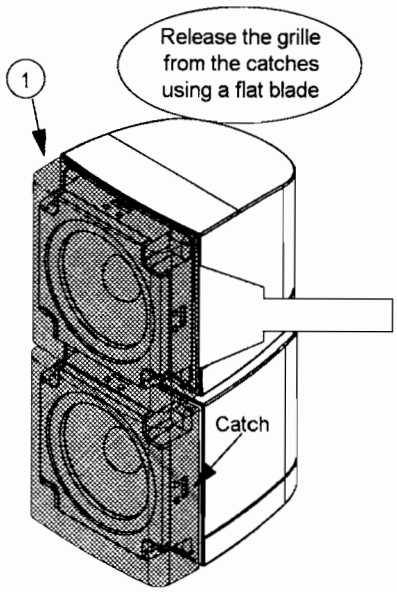
14.1 Connect the red wire to the positive (+) terminal and the black wire to the negative (-) terminal of the woofer (3).

14.2 Lower the woofer into the cabinet and twist the excess wire into a loop to prevent wire buzzes.

14.3 Replace the four screws (4) that secure the woofer to the cabinet.

DISASSEMBLY/ASSEMBLY PROCEDURES

15. Satellite Grille Removal



15.1 Insert a plastic flat blade tool between the edge of the grille (1) and the satellite enclosure. With a twisting action, gently release the grille form the catches on the satellite enclosure. Use care not to cosmetically damage the satellite enclosure.

16. Satellite Grille Replacement

16.1 Lineup the grille (1) with the catches on the satellite enclosure. Press the grille onto the enclosure so that it snaps into place. The grille with the logo is used on the lower satellite.
Note: The Twiddler™ speakers can not be removed.

TEST PROCEDURES

Bass Module Test Setup

Turn-on Procedure

If a bass module is returned without the music center, apply 10 VDC to J5 pin 1, which is located on the main PCB. This will simulate the turn-on signal that is sent from the music center to the bass module.

Audio input

Connect the 5 pin din audio input cable, part number 172296, to the bass module. Connect the other end with the RCA connectors to the audio signal generator. The red RCA plug is the right input and the white RCA plug is the left input. The mini jack is not needed.

If the customer does not supply the audio input cable, contact Bose® Customer Service to obtain one or connect the signal generator directly to the J5 input connector. Connect a jumper wire from pin 2 to pin 4 (audio ground) of J5. Connect the audio signal generator to the left input pin 3 (+) and pin 2 (-) and to the right input pin 5 (+) and pin 2 (-) of J5.

Loading

Load the left, right and woofer outputs (J3 pin 1 (-) and pin 2 (+)) with a 1k resistor unless otherwise noted.

Bass Channel Tests

1. Bass Module Sweep and Air Leak Test

1.1 Set the bass control to the maximum boost position.

1.2 Apply a 40 mVrms, 100 Hz signal to the left and right input.

1.3 Sweep the signal generator from 45 Hz to 300 Hz. Listen for and repair any buzz, rub or extraneous sound.

1.4 Adjust the signal generator to 45 Hz and listen for and repair any air leaks around the cabinet.

2. Bass and Treble Control Test

2.1 Apply a 40 mVrms, 100 Hz signal to the left and right input.

2.2 Rotate the bass control fully counterclockwise and then clockwise. Return the bass control to the center detent position. Change the audio signal generator to 8 kHz. Rotate the treble control fully counterclockwise and then clockwise. The output should increase and decrease smoothly without any static noise. **Note:** The satellites need to be connected to hear the change in sound for the treble control test.

3. Bass Channel Gain Test

3.1 Apply a 100 mVrms, 200 Hz signal to the left and right input.

3.2 Reference a dB meter to the applied signal.

3.3 Measure the bass channel output at J3 pin 1 (-) and pin 2 (+). It should be +38.6 ± 1.5 dB referenced to the input.

4. Bass Channel Frequency Response Test

4.1 Apply a 100 mVrms, 200 Hz signal to the left and right input.

4.2 Reference a dB meter to the bass channel output J3 pin 1 (-) and pin 2 (+).

4.3 Measure the bass channel output at the frequencies listed in the table below.

Frequency	Output
20 Hz	-20.4 ± 2.0 dB
40 Hz	+3.8 ± 1.5 dB
100 Hz	+0.2 ± 1.5 dB
400 Hz	-24.2 ± 2.5 dB

5. Bass Channel Dynamic EQ Gain Test

5.1 Apply a 1 mVrms, 40 Hz signal to the left and right input.

5.2 Reference a dB meter to the bass channel output J3 pin 1 (-) and pin 2 (+).

TEST PROCEDURES

5.3 Apply a 100 mVrms, 40 Hz signal to the left and right input.

5.4 Measure the bass channel output at J3 pin 1 (-) and pin 2 (+). It should be +24.3 ± 1.5 dB.

6. Bass channel Small Signal Distortion at .5 W

6.1 Apply a 16.4 mVrms, 100 Hz signal to the left and right input.

6.2 Measure the distortion at the bass channel output J3 pin 1 (-) and pin 2 (+). It should be < 0.5% THD.

7. Bass Channel Large Signal Distortion at 80 W

7.1 Apply a 208 mVrms, 100 Hz signal to the left and right input.

7.2 Measure the distortion at the bass channel output J3 pin 1 (-) and pin 2 (+). It should be < 0.2%.

8. Bass Control Test

8.1 Apply a 50 mVrms, 100 Hz signal to the left and right input.

8.2 With the bass control in the center position, reference a dB meter to the bass channel output J3 pin 1 (-) and pin 2 (+).

8.2 Measure the bass channel output J3 pin 1 (-) and pin 2 (+) according to the following table.

Bass Control Position	Bass Channel Output
Center	0 dB (reference)
Maximum	+10.0 ± 1.5 dB
Minimum	-12.0 ± 1.5 dB

9. Bass Compressor Test

9.1 Apply a 629 mVrms, 100 Hz signal to the left and right input.

9.2 Measure the distortion at the bass channel output J3 pin 1 (-) and pin 2 (+). It should be < 10%.

Left/Right Channel Tests

10. Left/Right Channel Gain Test

10.1 Apply a 100 mVrms, 1 kHz signal to the left and right input.

10.2 Reference a dB meter to the applied signal.

10.3 Measure the left/right channel output. It should be +35.9 ± 1.5 dB referenced to the input.

11. Left/Right Channel Frequency Response Test

11.1 Apply a 100 mVrms, 1 kHz signal to the left and right input.

11.2 Reference a dB meter to the left/right channel output.

11.3 Measure the left/right channel output at the frequencies listed in the table below.

Frequency	Output
100 Hz	-11.8 ± 2.0 dB
280 Hz	+3.9 ± 1.5 dB
460 Hz	-0.6 ± 1.5 dB
2.3 kHz	-2.1 ± 1.5 dB
6.6 kHz	+3.2 ± 1.5 dB
20 kHz	+0.6 ± 2.5 dB

12. Left/Right Channel Small Signal Distortion at .1 W

12.1 Apply a 12.1 mVrms, 8 kHz signal to the left and right input.

12.2 Measure the distortion at the left/right channel output. It should be < 0.2% THD.

13. Left/Right Channel Large Signal Distortion at 30 W

13.1 Apply a 240 mVrms, 1 kHz signal to the left and right input.

13.2 Measure the distortion at the left/right channel output. It should be < 0.2% THD.

TEST PROCEDURES

14. Left/Right Channel Separation

14.1 Apply a 162 mVrms, 10 kHz signal to the left channel input only. Short the right channel input.

14.2 Reference a dB meter to the left channel output.

14.3 Measure the right channel output. It should be ≤ -30 dB.

15. Compressor Test

15.1 Apply a 635 mVrms, 1 kHz signal to the left and right input.

15.2 Measure the distortion at the left/right output. It should be < 6.0%.

16. Treble Control Test

16.1 Apply a 50 mVrms, 10 kHz signal to the left and right input.

16.2 With the treble control in the center position, reference a dB meter to the left/right channel output.

16.2 Measure the left/right channel output according to the following table.

Treble Control Position	Treble Channel Output
Center	0 dB (reference)
Maximum	+8.8 ± 1.5 dB
Minimum	-7.3 ± 1.5 dB

Satellite Test

17. Satellite Sweep Test

17.1 Apply an 18 Vrms, 20 Hz signal to the input of the satellite. Change the applied signal to 8 Vrms, 150 Hz. Sweep the oscillator from 150 Hz to 2 kHz.

17.2 Listen for rubs, ticks, air leaks, buzzes or other extraneous noises.
Note: Defects such as rubs, ticks and air leaks will typically be most audible during the 20 Hz test. Defects such as buzzes will typically be heard during the 150 Hz to 2 kHz sweep.
Note: Replace any satellite that fails these tests. The satellites are not repairable.

PART LIST NOTES

1. This part is not normally available from customer service. Approval from the Field Service Manager is required before ordering.

2. The individual parts are listed in the part list.

3.  This part is critical for safety purposes. Failure to use a substitute replacement with the same safety characteristics as the recommended replacement part might create shock, fire and/ or other hazards.

MAIN ASSEMBLY PART LIST

Item Number	Description	Part Number	Qty.	Note
1	MODULE ASSY, 120V MODULE ASSY, 230V MODULE ASSY, 120V/230V	251168-13 251168-23 251168-63	1	1, 2
2	GASKET WOOFER, 6.5"	104794-08	2	
3	WOOFER ASSY, 5.25"	172276	2	
4	SCREW, TAPP, 8-11x.75, PAN, XRC/SQ	172672-12	8	
5	SCREW TAPP, 8-11x1.25, PAN, XRS/C	172672-20	8	
6	KNOB, TONE CONTROL, WHITE KNOB, TONE CONTROL, BLACK	172289-1 172289-2	2	
7	COVER, WHITE COVER, BLACK	172278-21 172278-22	1	
8	GASKET, CONN/COVER	186844	1	
9	SCREW, HILO, 6-20x.625, PANHD, XRC	172779-10	2	
10	HARNESS, WOOFER	188207	1	
11	GASKET, TAPE FOAM	175548	2	

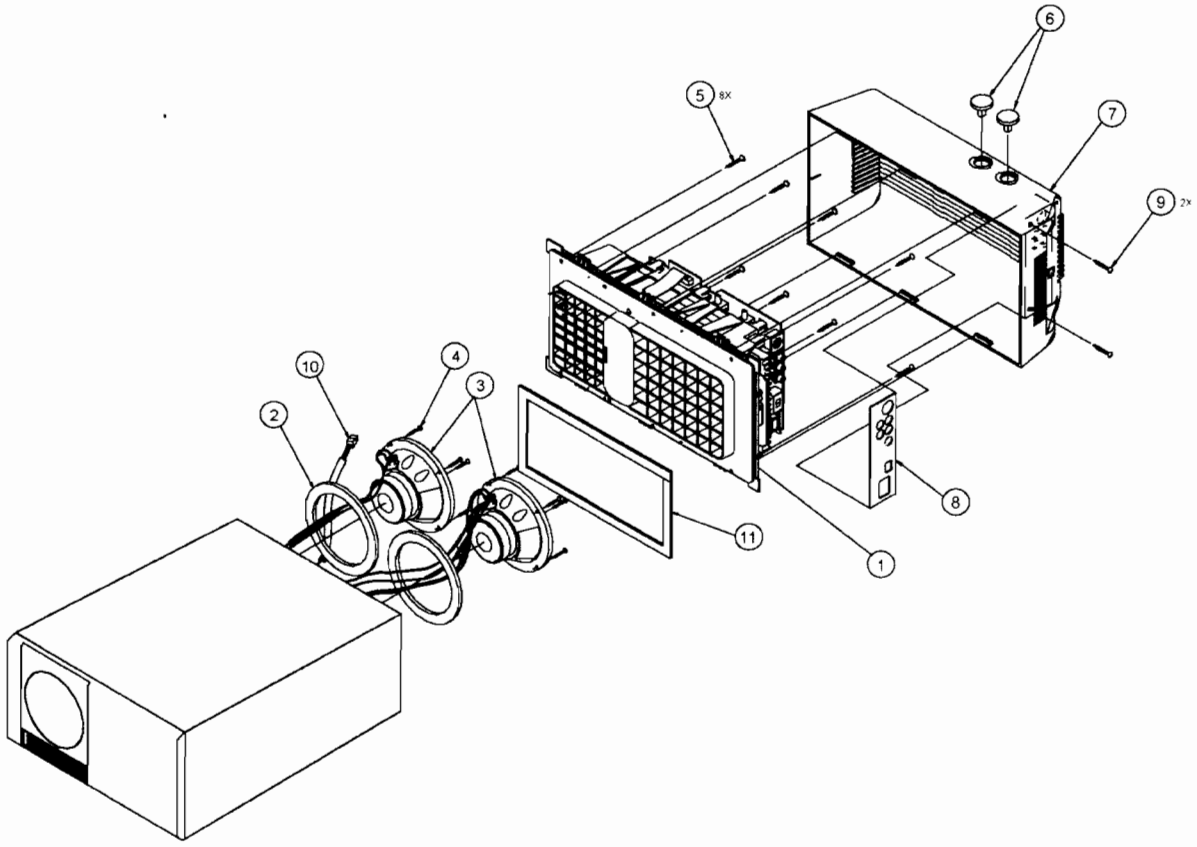


Figure 8. Bass Module Exploded View

AMPLIFIER MODULE ASSEMBLY

Item Number	Description	Part Number	Qty.	Note
12	PCB ASSEMBLY, 120V PCB ASSEMBLY, 230V PCB ASSEMBLY, 120/230V	251167-1 251167-2 251167-6	1	1, 2
13	TRANSFORMER, 120V/230V	176194	1	3 ⚠
14	CUSHION, TRANSFORMER	176169	2	
15	PLATE, SPRING	172281	1	
16	BRACKET ASSY, ADAPTER	172287	1	
17	BASE PLATE ASSY	172288	1	
18	HEAT SINK, AMP PC BOARD	172283	1	
19	PLATE, HEAT SINK, METAL	172291	1	
20	SCREW, HILO, 6x.38, PAN, XREC	147516-06	5	
21	LATCH, COVER	172294	1	
22	GROMMET	172295	2	
23	CABLE, INTERCONNECT	172293	1	
24	VINYL CAP, SHORT, ROUND	183863	1	
25	ANCHOR, SCREW, #6, PLASTIC	186207	1	

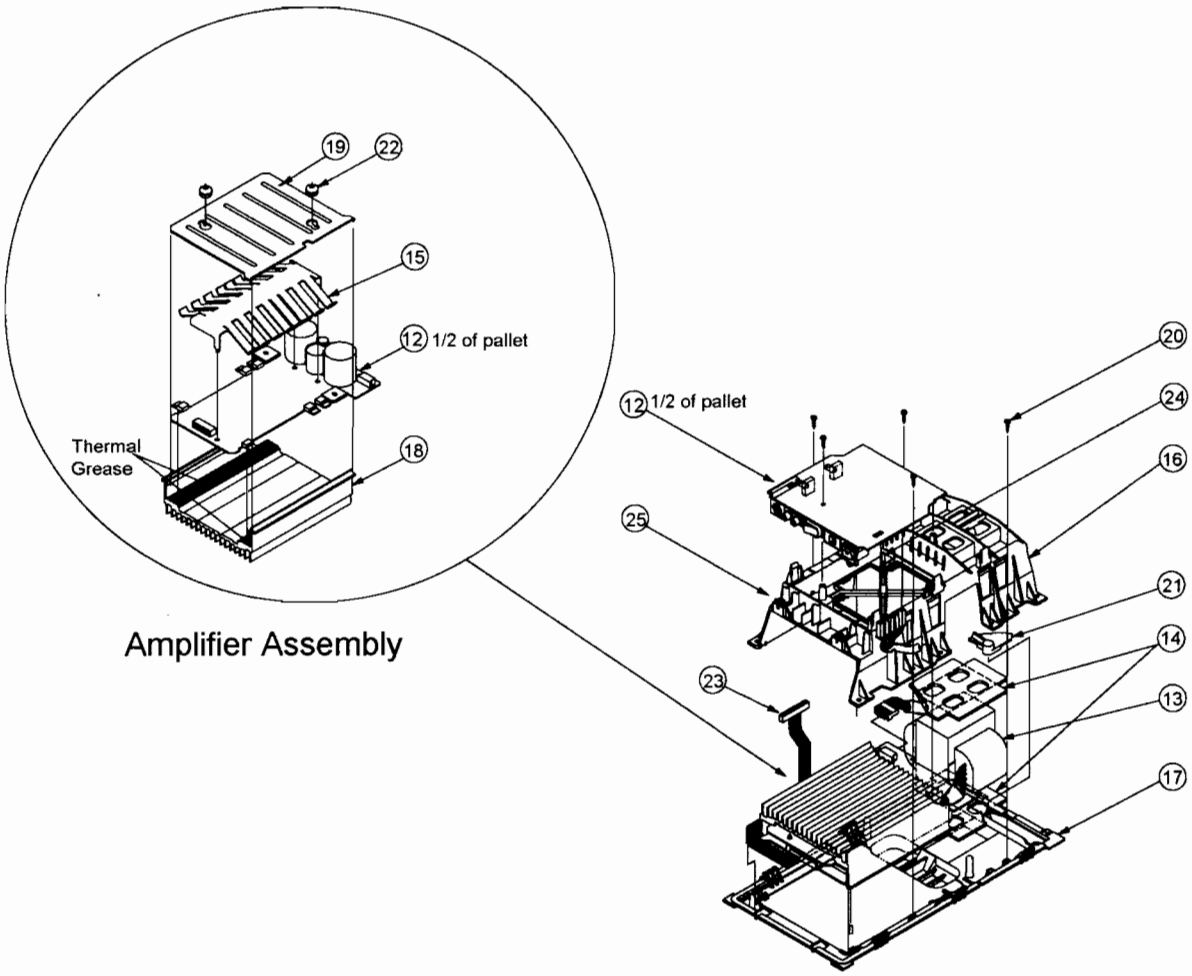


Figure 9. Amplifier Module Exploded View

SATELLITE PART LIST

Item Number	Description	Part Number	Note
1	GRILLE, BLACK GRILLE, WHITE	192410-019 192410-029	
2	LOGO, 1" DIAMOND CUT, BLACK LOGO, 1" DIAMOND CUT, WHITE	193250-11 193250-12	

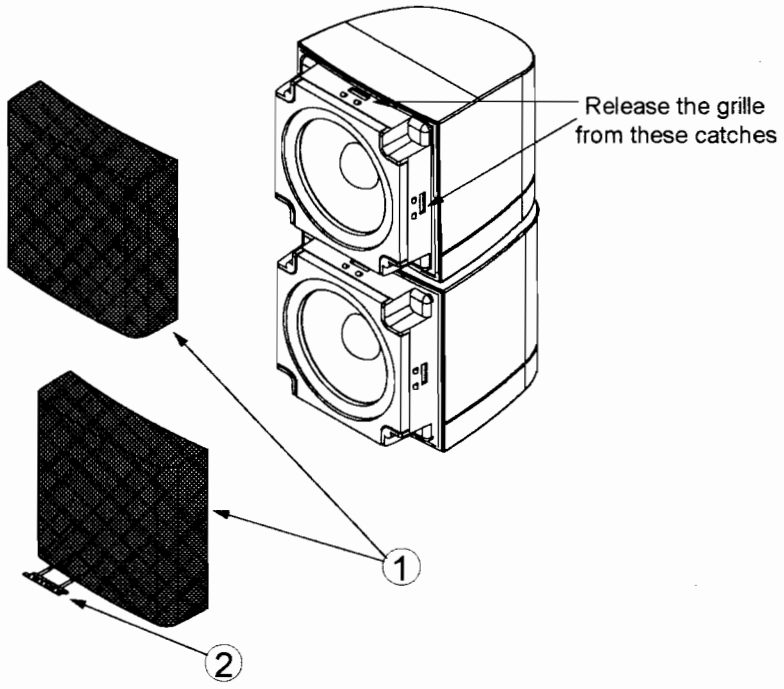


Figure 10. Satellite Speaker

ELECTRICAL PART LIST

Resistors

Reference Designator	Description	Part Number	Note
R2	14.3K, 1206, 1/8W, 1%	124894-1432	
R3	10.0K, 1206, 1/8W, 5%	124895-1035	
R4	10.0K, 1206, 1/8W, 5%	124895-1035	
R5	5.1 OHM, LEADED, FUSE, 1/4W	130102-5R1	3 ⚠
R6	5.1 OHM, LEADED, FUSE, 1/4W	130102-5R1	3 ⚠
R7	20.0K, 1206, 1/8W, 5%	124895-2035	
R8	10.0K, 1206, 1/8W, 5%	124895-1035	
R9	30.1K, 1206, 1/8W, 1%	124894-3012	
R10	10.0K, 1206, 1/8W, 5%	124895-1035	
R11	20K, THERMISTOR, ERT-D3FHL203S	177557	
R12	10.0K, 1206, 1/8W, 5%	124895-1035	
R22	10.0K, 1206, 1/8W, 5%	124895-1035	
R23	10.0K, 1206, 1/8W, 5%	124895-1035	
R24	20.0K, 1206, 1/8W, 5%	124895-2035	
R25	20.0K, 1206, 1/8W, 5%	124895-2035	
R101	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R102	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R103	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R104	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R105	7.50K, 0805, 1/10W, 1%	133625-7501	
R106	7.50K, 0805, 1/10W, 1%	133625-7501	
R107	10.0K, 0805, 1/10W, 5%	133626-1035	
R108	147 OHM, 0805, 1/10W, 1%	133625-1470	
R109	681 OHM, CHIP, 0805, 1/10W, 1%	133625-6810	
R110	6.19K, CHIP, 0805, 1/10W, 1%	133625-6191	
R111	12.1K, 0805, 1/10W, 1%	133625-1212	
R112	8.25K, CHIP, 0805, 1/10W, 1%	133625-8251	
R113	10K, POT, DUAL, DETENT.	185173	
R114	11.0K, CHIP, 0805, 1/10W, 1%	133625-1102	
R115	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R116	15.8K, 0805, 1/10W, 1%	133625-1582	
R117	2.00K, 0805, 1/10W, 1%	133625-2001	
R119	1.10K, 0805, 1/10W, 1%	133625-1101	
R120	10.0K, 0805, 1/10W, 5%	133626-1035	
R121	475 OHM, 0805, 1/10W, 1%	133625-4750	
R122	10 OHM, CHIP, 0805, 5%	133626-1005	
R123	JUMPER, CHIP, 0805	133627	
R125	13.7K, CHIP, 0805, 1/10W, 1%	133625-1372	
R126	7.15K, 0805, 1/10W, 1%	133625-7151	
R127	15.8K, 0805, 1/10W, 1%	133625-1582	
R128	10.0K, 0805, 1/10W, 1%	133625-1002	
R129	7.50K, 0805, 1/10W, 1%	133625-7501	

ELECTRICAL PART LIST

Resistors (continued)

Reference Designator	Description	Part Number	Note
R130	10.0K, 0805, 1/10W, 1%	133625-1002	
R131	7.15K, 0805, 1/10W, 1%	133625-7151	
R132	2.00K, 0805, 1/10W, 1%	133625-2001	
R133	JUMPER, CHIP, 0805	133627	
R134	JUMPER, CHIP, 0805	133627	
R135	330 OHM, 0805, 1/10W, 5%	133626-3315	
R136	330 OHM, 0805, 1/10W, 5%	133626-3315	
R137	10 OHM, CHIP, 0805, 5%	133626-1005	
R138	JUMPER, CHIP, 0805	133627	
R140	10.0K, 0805, 1/10W, 5%	133626-1035	
R141	10.0K, 0805, 1/10W, 1%	133625-1002	
R143	100K, 0805, 1/10W, 5%	133626-1045	
R149	100K, 0805, 1/10W, 5%	133626-1045	
R174	5.90K, 1206, 1/8W, 1%	124894-5901	
R175	2.49K, 1206, 1/8W, 1%	124894-2491	
R176	10.0K, 1206, 1/8W, 5%	124895-1035	
R177	2.49K, 1206, 1/8W, 1%	124894-2491	
R178	49.9K, 1206, 1/8W, 1%	124894-4992	
R179	49.9K, 1206, 1/8W, 1%	124894-4992	
R180	100K, 1206, 1/8W, 5%	124895-1045	
R181	1.00K, 1206, 1/8W, 5%	124895-1025	
R182	5.90K, 1206, 1/8W, 1%	124894-5901	
R183	1.00K, 1206, 1/8W, 5%	124895-1025	
R184	220 OHM, CF, 5%, 52MM	121243-1212215	
R185	100K, 1206, 1/8W, 5%	124895-1045	
R186	1.00K, 1206, 1/8W, 5%	124895-1025	
R187	5.90K, 1206, 1/8W, 1%	124894-5901	
R188	1.00K, 1206, 1/8W, 5%	124895-1025	
R189	1.00K, 1206, 1/8W, 5%	124895-1025	
R190	10.0K, 1206, 1/8W, 5%	124895-1035	
R191	1.00K, 1206, 1/8W, 5%	124895-1025	
R192	10.0K, 1206, 1/8W, 5%	124895-1035	
R193	220 OHM, CF, 5%, 52MM	121243-1212215	
R194	0.1 OHM, 2512, 1W, 5%	149322-100	
R195	10.0K, 1206, 1/8W, 5%	124895-1035	
R196	4.02K, 0805, 1/10W, 1%	133625-4021	
R201	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R202	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R203	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R204	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R205	7.50K, 0805, 1/10W, 1%	133625-7501	
R206	7.50K, 0805, 1/10W, 1%	133625-7501	
R207	10.0K, 0805, 1/10W, 5%	133626-1035	
R208	147 OHM, 0805, 1/10W, 1%	133625-1470	

ELECTRICAL PART LIST

Resistors (continued)

Reference Designator	Description	Part Number	Note
R209	681 OHM, CHIP, 0805, 1/10W, 1%	133625-6810	
R210	6.19K, CHIP, 0805, 1/10W, 1%	133625-6191	
R211	12.1K, 0805, 1/10W, 1%	133625-1212	
R212	8.25K, CHIP, 0805, 1/10W, 1%	133625-8251	
R214	11.0K, CHIP, 0805, 1/10W, 1%	133625-1102	
R215	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R216	15.8K, 0805, 1/10W, 1%	133625-1582	
R217	2.00K, 0805, 1/10W, 1%	133625-2001	
R219	1.10K, 0805, 1/10W, 1%	133625-1101	
R220	10.0K, 0805, 1/10W, 5%	133626-1035	
R221	475 OHM, 0805, 1/10W, 1%	133625-4750	
R222	10 OHM, CHIP, 0805, 5%	133626-1005	
R223	JUMPER, CHIP, 0805	133627	
R225	13.7K, CHIP, 0805, 1/10W, 1%	133625-1372	
R226	7.15K, 0805, 1/10W, 1%	133625-7151	
R227	15.8K, 0805, 1/10W, 1%	133625-1582	
R228	10.0K, 0805, 1/10W, 1%	133625-1002	
R229	7.50K, 0805, 1/10W, 1%	133625-7501	
R230	10.0K, 0805, 1/10W, 1%	133625-1002	
R231	7.15K, 0805, 1/10W, 1%	133625-7151	
R232	2.00K, 0805, 1/10W, 1%	133625-2001	
R233	JUMPER, CHIP, 0805	133627	
R234	JUMPER, CHIP, 0805	133627	
R235	330 OHM, 0805, 1/10W, 5%	133626-3315	
R236	330 OHM, 0805, 1/10W, 5%	133626-3315	
R237	10 OHM, CHIP, 0805, 5%	133626-1005	
R238	JUMPER, CHIP, 0805	133627	
R240	10.0K, 0805, 1/10W, 5%	133626-1035	
R241	10.0K, 0805, 1/10W, 1%	133625-1002	
R243	100K, 0805, 1/10W, 5%	133626-1045	
R249	100K, 0805, 1/10W, 5%	133626-1045	
R274	5.90K, 1206, 1/8W, 1%	124894-5901	
R275	2.49K, 1206, 1/8W, 1%	124894-2491	
R276	10.0K, 1206, 1/8W, 5%	124895-1035	
R277	2.49K, 1206, 1/8W, 1%	124894-2491	
R278	49.9K, 1206, 1/8W, 1%	124894-4992	
R279	49.9K, 1206, 1/8W, 1%	124894-4992	
R280	100K, 1206, 1/8W, 5%	124895-1045	
R281	1.00K, 1206, 1/8W, 5%	124895-1025	
R282	5.90K, 1206, 1/8W, 1%	124894-5901	
R283	1.00K, 1206, 1/8W, 5%	124895-1025	
R284	220 OHM, CF, 5%, 52MM	121243-1212215	
R285	100K, 1206, 1/8W, 5%	124895-1045	
R286	1.00K, 1206, 1/8W, 5%	124895-1025	

ELECTRICAL PART LIST

Resistors (continued)

Reference Designator	Description	Part Number	Note
R287	5.90K, 1206, 1/8W, 1%	124894-5901	
R288	1.00K, 1206, 1/8W, 5%	124895-1025	
R289	1.00K, 1206, 1/8W, 5%	124895-1025	
R290	10.0K, 1206, 1/8W, 5%	124895-1035	
R291	1.00K, 1206, 1/8W, 5%	124895-1025	
R292	10.0K, 1206, 1/8W, 5%	124895-1035	
R293	220 OHM, CF, 5%, 52MM	121243-1212215	
R294	0.1 OHM, 2512, 1W, 5%	149322-100	
R295	10.0K, 1206, 1/8W, 5%	124895-1035	
R296	4.02K, 0805, 1/10W, 1%	133625-4021	
R301	3.01K, 0805, 1/10W, 1%	133625-3011	
R302	10K, POT., DUAL, DETENT.	185173	
R303	100K, 0805, 1/10W, 5%	133626-1045	
R304	475 OHM, 0805, 1/10W, 1%	133625-4750	
R305	100K, 0805, 1/10W, 5%	133626-1045	
R306	1MEG, 0805, 1/10W, 5%	133626-1055	
R309	2.00K, 0805, 1/10W, 1%	133625-2001	
R310	68.1K, 0805, 1/10W, 1%	133625-6812	
R311	23.7K, 0805, 1/10W, 1%	133625-2372	
R312	25.5K, 0805, 1/10W, 1%	133625-2552	
R313	12.1K, 0805, 1/10W, 1%	133625-1212	
R314	100 OHM, CHIP, 0805, 1/10W, 5%	133626-1015	
R315	22.6K, 0805, 1/10W, 1%	133625-2262	
R316	3.16K, 0805, 1/10W, 1%	133625-3161	
R317	147 OHM, 0805, 1/10W, 1%	133625-1470	
R318	3.16K, 0805, 1/10W, 1%	133625-3161	
R319	100K, 0805, 1/10W, 5%	133626-1045	
R320	3.01K, 0805, 1/10W, 1%	133625-3011	
R321	82.5K, 0805, 1/10W, 1%	133625-8252	
R322	196 OHM, 0805, 1/10W, 1%	133625-1960	
R323	20.0K, CHIP, 0805, 1/10W, 1%	133625-2002	
R324	20.0K, CHIP, 0805, 1/10W, 1%	133625-2002	
R325	8.25K, CHIP, 0805, 1/10W, 1%	133625-8251	
R326	27.4K, CHIP, 0805, 1/10W, 1%	133625-2742	
R327	27.4K, CHIP, 0805, 1/10W, 1%	133625-2742	
R328	27.4K, CHIP, 0805, 1/10W, 1%	133625-2742	
R329	330 OHM, 0805, 1/10W, 5%	133626-3315	
R330	330 OHM, 0805, 1/10W, 5%	133626-3315	
R331	JUMPER, CHIP, 0805	133627	
R332	3.01K, 0805, 1/10W, 1%	133625-3011	
R333	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R336	3.01K, 0805, 1/10W, 1%	133625-3011	
R337	100K, 0805, 1/10W, 5%	133626-1045	
R344	100K, 0805, 1/10W, 5%	133626-1045	

ELECTRICAL PART LIST

Resistors (continued)

Reference Designator	Description	Part Number	Note
R346	196 OHM, 0805, 1/10W, 1%	133625-1960	
R374	5.90K, 1206, 1/8W, 1%	124894-5901	
R375	14.3K, 1206, 1/8W, 1%	124894-1432	
R376	1MEG, 0805, 1/10W, 5%	133626-1055	
R377	301 OHM, 1206, 1/8W, 1%	124894-3010	
R378	100K, 1206, 1/8W, 5%	124895-1045	
R379	10MEG, 1206, 1/8W, 5%	124895-1065	
R380	100K, 1206, 1/8W, 5%	124895-1045	
R381	2.49K, 1206, 1/8W, 1%	124894-2491	
R382	200 OHM, 1206, 1/8W, 5%	124895-2015	
R383	200K, 1206, 1/8W, 1%	124894-2003	
R384	10.0K, 1206, 1/8W, 5%	124895-1035	
R385	2.49K, 1206, 1/8W, 1%	124894-2491	
R386	4.22K, 1206, 1/8W, 1%	124894-4221	
R387	100K, 1206, 1/8W, 5%	124895-1045	
R388	1.00K, 1206, 1/8W, 5%	124895-1025	
R389	1.00K, 1206, 1/8W, 5%	124895-1025	
R390	75 OHM, CF, 5%, 1/4W, 52MM	121243-1217505	
R391	JUMPER, CHIP, 1206	124896	
R392	220 OHM, CF, 5%, 52MM	121243-1212215	
R393	5.1 OHM, LEADED, FUSE, 1/4W	130102-5R1	3 
R394	100K, 1206, 1/8W, 5%	124895-1045	
R395	75 OHM, CF, 5%, 1/4W, 52MM	121243-1217505	
R396	1.00K, 1206, 1/8W, 5%	124895-1025	
R397	1.00K, 1206, 1/8W, 5%	124895-1025	
R398	33.2K, 1206, 1/8W, 1%	124894-3322	
R399	49.9K, 1206, 1/8W, 1%	124894-4992	
R401	100 OHM, CHIP, 0805, 1/10W, 5%	133626-1015	
R402	5.11K, CHIP, 0805, 1/10W, 1%	133625-5111	
R403	100K, 0805, 1/10W, 5%	133626-1045	
R404	100K, 0805, 1/10W, 5%	133626-1045	
R405	27.4K, CHIP, 0805, 1/10W, 1%	133625-2742	
R407	1.62K, 0805, 1/10W, 1%	133625-1621	
R408	1.62K, 0805, 1/10W, 1%	133625-1621	
R409	5.1 OHM, LEADED, FUSE, 1/4W	130102-5R1	3 120v 
R409	3.3K, MET OX, 2W, 5%	183482-3325	3 Dual Voltage 
R410	100 OHM, CHIP, 0805, 1/10W, 5%	133626-1015	
R411	330 OHM, 0805, 1/10W, 5%	133626-3315	
R412	39 OHM, CF, 1/4W, 5%, 52MM	121243-1213905	
R413	12.1K, 0805, 1/10W, 1%	133625-1212	
R414	10.0K, 0805, 1/10W, 5%	133626-1035	

ELECTRICAL PART LIST

Resistors (continued)

Reference Designator	Description	Part Number	Note
R415	100K, 0805, 1/10W, 5%	133626-1045	
R416	100K, 0805, 1/10W, 5%	133626-1045	
R417	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R418	100K, 0805, 1/10W, 5%	133626-1045	
R419	10.0K, 0805, 1/10W, 5%	133626-1035	
R420	100K, 0805, 1/10W, 5%	133626-1045	
R421	100K, 0805, 1/10W, 5%	133626-1045	
R422	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R423	100K, 0805, 1/10W, 5%	133626-1045	
R424	1MEG, 0805, 1/10W, 5%	133626-1055	
R425	10.0K, 0805, 1/10W, 5%	133626-1035	
R426	20K, CHIP, 0805, 5%	133626-2035	
R428	20K, CHIP, 0805, 5%	133626-2035	
R429	100K, 0805, 1/10W, 5%	133626-1045	
R430	1MEG, 0805, 1/10W, 5%	133626-1055	
R431	100K, 0805, 1/10W, 5%	133626-1045	
R432	2.00K, 0805, 1/10W, 1%	133625-2001	
R433	10.0K, 0805, 1/10W, 5%	133626-1035	
R434	2.00K, 0805, 1/10W, 1%	133625-2001	
R435	20K, CHIP, 0805, 5%	133626-2035	
R436	2.00K, 0805, 1/10W, 1%	133625-2001	
R437	7.5 OHM, 2 W	177962-752	120V, 230V
R437	4.3K, MET OX, 3W, 5%	183483-4325	Dual Voltage
R438	196 OHM, 0805, 1/10W, 1%	133625-1960	
R439	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R441	20.0K, CHIP, 0805, 1/10W, 1%	133625-2002	
R448	15.8K, 0805, 1/10W, 1%	133625-1582	
R449	470 OHM, CHIP, 0805, 1/10W, 5%	133626-4715	
R450	1.62K, 0805, 1/10W, 1%	133625-1621	
R451	100K, 0805, 1/10W, 5%	133626-1045	
R455	36.5K, 0805, 1/10W, 1%	133625-3652	
R456	JUMPER, 22AWG, NON-INSUL, 7.5mm	148242-075	
R457	100K, 0805, 1/10W, 5%	133626-1045	
R458	100K, 0805, 1/10W, 5%	133626-1045	
R459	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	
R460	1.00K, CHIP, 0805, 1/10W, 1%	133625-1001	

Capacitors

Reference Designator	Description	Part Number	Note
C1	.1uF, 1206, Y5V, 50V, 80%	138551-104	
C3	4700u EL, 105, 50V, 20%	187394	

ELECTRICAL PART LIST

Capacitors (continued)

Reference Designator	Description	Part Number	Note
C4	4700uF, EL, 105, 50V, 20%	187394	
C5	.1uF, 1206, Y5V, 50V, 80%	138551-104	
C6	.1uF, 1206, Y5V, 50V, 80%	138551-104	
C7	4700uF, EL, 85, 25V, 20%	170216	
C8	4700uF, EL, 85, 25V, 20%	170216	
C9	10uF, EL, 105, 16V, 20%	137126-100	
C10	10uF, EL, 105, 16V, 20%	137126-100	
C11	.1uF, 1206, Y5V, 50V, 80%	138551-104	
C12	.1uF, 1206, Y5V, 50V, 80%	138551-104	
C13	10uF, EL, 105, 16V, 20%	137126-100	
C14	10uF, EL, 105, 16V, 20%	137126-100	
C15	.1uF, 1206, Y5V, 50V, 80%	138551-104	
C16	.1uF, 1206, Y5V, 50V, 80%	138551-104	
C17	.1uF, 1206, Y5V, 50V, 80%	138551-104	
C18	.1uF, 1206, Y5V, 50V, 80%	138551-104	
C101	10uF, EL, 105, 16V, 20%	137126-100	
C102	10uF, EL, 105, 16V, 20%	137126-100	
C103	100pF, 0805, COG, 50V, 5%	133622-101	
C104	47uF, EL, 105, 16V, 20%	137126-470	
C106	.0082uF, BOX, 85, 100V, 5%	137127-822	
C107	.12uF, BOX, 85, 50V, 5%	137127-124	
C108	.12uF, BOX, 85, 50V, 5%	137127-124	
C109	.0068uF, BOX, 85, 100V, 5%	137127-682	
C110	.0068uF, BOX, 85, 100V, 5%	137127-682	
C115	.0082uF, BOX, 85, 100V, 5%	137127-822	
C116	.0082uF, BOX, 85, 100V, 5%	137127-822	
C118	.1uF, BOX, 85, 50V, 5%	137127-104	
C119	.1uF, BOX, 85, 50V, 5%	137127-104	
C122	3300pF, 0805, X7R, 50V, 10%	133623-332	
C123	.033uF, 0805, X7R, 50V, 10%	133623-333	
C124	3300pF, 0805, X7R, 50V, 10%	133623-332	
C125	3300pF, 0805, X7R, 50V, 10%	133623-332	
C126	.033uF, 0805, X7R, 50V, 10%	133623-333	
C127	.033uF, 0805, X7R, 50V, 10%	133623-333	
C128	.033uF, 0805, X7R, 50V, 10%	133623-333	
C129	.033uF, 0805, X7R, 50V, 10%	133623-333	
C130	100pF, 0805, COG, 50V, 5%	133622-101	
C131	270pF, 0805, COG, 50V, 5%	133622-271	
C175	10uF, EL, 105, 16V, 20%	137126-100	
C176	10uF, EL, 105, 16V, 20%	137126-100	
C177	1000pF, 1206, COG, 50V, 10%	124956-1022	
C178	1000pF, 1206, COG, 50V, 10%	124956-1022	
C179	10000pF, CHIP, 5%	124959-103	
C180	1000pF, 1206, COG, 50V, 10%	124956-1022	

ELECTRICAL PART LIST

Capacitors (continued)

Reference Designator	Description	Part Number	Note
C181	10uF, EL, 85, 25V, 20%	149947-100E	
C182	1000pF, 1206, COG, 50V, 10%	124956-1022	
C183	10000pF, CHIP, 5%	124959-103	
C185	.1uF, 1206, Y5V, 50V, 80%	138551-104	
C186	1000pF, 1206, COG, 50V, 10%	124956-1022	
C201	10uF, EL, 105, 16V, 20%	137126-100	
C202	10uF, EL, 105, 16V, 20%	137126-100	
C203	100pF, 0805, COG, 50V, 5%	133622-101	
C204	47uF, EL, 105, 16V, 20%	137126-470	
C206	.0082uF, BOX, 85, 100V, 5%	137127-822	
C207	.12uF, BOX, 85, 50V, 5%	137127-124	
C208	.12uF, BOX, 85, 50V, 5%	137127-124	
C209	.0068uF, BOX, 85, 100V, 5%	137127-682	
C210	.0068uF, BOX, 85, 100V, 5%	137127-682	
C215	.0082uF, BOX, 85, 100V, 5%	137127-822	
C216	.0082uF, BOX, 85, 100V, 5%	137127-822	
C218	.1uF, BOX, 85, 50V, 5%	137127-104	
C219	.1uF, BOX, 85, 50V, 5%	137127-104	
C222	3300pF, 0805, X7R, 50V, 10%	133623-332	
C223	.033uF, 0805, X7R, 50V, 10%	133623-333	
C224	3300pF, 0805, X7R, 50V, 10%	133623-332	
C225	3300pF, 0805, X7R, 50V, 10%	133623-332	
C226	.033uF, 0805, X7R, 50V, 10%	133623-333	
C227	.033uF, 0805, X7R, 50V, 10%	133623-333	
C228	.033uF, 0805, X7R, 50V, 10%	133623-333	
C229	.033uF, 0805, X7R, 50V, 10%	133623-333	
C230	100pF, 0805, COG, 50V, 5%	133622-101	
C231	270pF, 0805, COG, 50V, 5%	133622-271	
C275	10uF, EL, 105, 16V, 20%	137126-100	
C276	10uF, EL, 105, 16V, 20%	137126-100	
C277	1000pF, 1206, COG, 50V, 10%	124956-1022	
C278	1000pF, 1206, COG, 50V, 10%	124956-1022	
C279	10000pF, CHIP, 5%	124959-103	
C280	1000pF, 1206, COG, 50V, 10%	124956-1022	
C281	10uF, EL, 85, 25V, 20%	149947-100E	
C282	1000pF, 1206, COG, 50V, 10%	124956-1022	
C283	10000pF, CHIP, 5%	124959-103	
C285	.1uF, 1206, Y5V, 50V, 80%	138551-104	
C286	1000pF, 1206, COG, 50V, 10%	124956-1022	
C301	100pF, 0805, COG, 50V, 5%	133622-101	
C302	10uF, EL, 105, 16V, 20%	137126-100	
C303	10uF, EL, 105, 16V, 20%	137126-100	
C304	10uF, EL, 105, 16V, 20%	137126-100	
C306	.22uF, BOX, 85, 50V, 5%	137127-224	

ELECTRICAL PART LIST

Capacitors (continued)

Reference Designator	Description	Part Number	Note
C307	.18uF, BOX, 85, 50V, 5%	137127-184	
C308	.033uF, 0805, X7R, 50V, 10%	133623-333	
C309	.39uF, BOX, 85, 50V, 5%	137127-394	
C310	.39uF, BOX, 85, 50V, 5%	137127-394	
C311	.0039uF, BOX, 85, 100V, 5%	137127-392	
C312	.12uF, BOX, 85, 50V, 5%	137127-124	
C313	.0039uF, BOX, 85, 100V, 5%	137127-392	
C314	.33uF, BOX, 85, 50V, 5%	137127-334	
C315	.33uF, BOX, 85, 50V, 5%	137127-334	
C316	.15uF, BOX, 85, 50V, 5%	137127-154	
C317	.0056uF, BOX, 85, 100V, 5%	137127-562	
C318	3300pF, 0805, X7R, 50V, 10%	133623-332	
C319	.10uF, 0805, Y5V, 25V, 80%	133624	
C320	.10uF, 0805, Y5V, 25V, 80%	133624	
C373	100uF, EL, 105, 16V, 20%	139734-101	
C377	1uF, 1206, Y5V, 16V, 80%	173383-105	
C378	.1uF, BOX, 85, 50V, 5%	137127-104	
C379	.1uF, 1206, Y5V, 50V, 80%	138551-104	
C380	.1uF, 1206, Y5V, 50V, 80%	138551-104	
C381	.1uF, 1206, Y5V, 50V, 80%	138551-104	
C382	.0033uF, 1206, Y5V, 50V, 80%	124959-332	
C383	1000pF, 1206, COG, 50V, 10%	124956-1022	
C384	10000pF, CHIP, 5%	124959-103	
C385	JUMPER, CHIP, 1206	124896	
C386	1000pF, 1206, COG, 50V, 10%	124956-1022	
C387	.0033uF, 1206, Y5V, 50V, 80%	124959-332	
C388	1.0uF, EL, 105, 50V, 20%	137126-1R0	
C389	270pF, 0805, COG, 50V, 5%	133622-271	
C390	1uF, 1206, Y5V, 16V, 80%	173383-105	
C401	3300pF, 0805, X7R, 50V, 10%	133623-332	
C402	100uF, EL, 105, 16V, 20%	139734-101	
C403	47uF, EL, 85, 25V, 20%	149948-470E	
C404	.0047UF, DISC, 60, AC, 100%	149016	
C405	100uF, EL, 105, 16V, 20%	139734-101	
C408	1.0uF, EL, 105, 50V, 20%	137126-1R0	
C409	10uF, EL, 105, 16V, 20%	137126-100	
C410	2.2uF, EL, 105, 50V, 20%	137126-2R2	
C411	2.2uF, EL, 105, 50V, 20%	137126-2R2	
C412	.10uF, 0805, Y5V, 25V, 80%	133624	
C413	.10uF, 0805, Y5V, 25V, 80%	133624	
C415	3300pF, 0805, X7R, 50V, 10%	133623-332	
C416	3300pF, 0805, X7R, 50V, 10%	133623-332	
C418	3300pF, 0805, X7R, 50V, 10%	133623-332	
C420	270pF, 0805, COG, 50V, 5%	133622-271	

ELECTRICAL PART LIST

Capacitors (continued)

Reference Designator	Description	Part Number	Note
C426	100pF, 0805, COG, 50V, 5%	133622-101	
C427	10uF, EL, 105, 16V, 20%	137126-100	
C428	3300pF, 0805, X7R, 50V, 10%	133623-332	

Diodes

Reference Designator	Description	Part Number	Note
D1	SWITCHING, 75V, 200mA	136603	
D21	BAV99, DUAL, SOT-23	147239	
D22	BAV99, DUAL, SOT-23	147239	
D23	SWITCHING, 75V, 300mA	121501	
D24	ZENER, 6.8V, 225mW	135247-5235	
D25	ZENER, 6.8V, 225mW	135247-5235	
D101	BAV99, DUAL, SOT-23	147239	
D102	BAV99, DUAL, SOT-23	147239	
D175	SWITCHING, 75V, 200mA	136603	
D176	ZENER, 6.8V, 225mW	135247-5235	
D177	1N5393, AXIAL	177961	
D178	SWITCHING, 75V, 200mA	136603	
D179	ZENER, 6.8V, 225mW	135247-5235	
D180	1N5393, AXIAL	177961	
D181	BAV99, DUAL, SOT-23	147239	
D182	SWITCHING, 75V, 200mA	136603	
D201	BAV99, DUAL, SOT-23	147239	
D202	BAV99, DUAL, SOT-23	147239	
D275	SWITCHING, 75V, 200mA	136603	
D276	ZENER, 6.8V, 225mW	135247-5235	
D277	1N5393, AXIAL	177961	
D278	SWITCHING, 75V, 200mA	136603	
D279	ZENER, 6.8V, 225mW	135247-5235	
D280	1N5393, AXIAL	177961	
D281	BAV99, DUAL, SOT-23	147239	
D282	SWITCHING, 75V, 200mA	136603	
D301	BAV70, DUAL, SOT-23	147249	
D302	BAV99, DUAL, SOT-23	147239	
D375	BAV99, DUAL, SOT-23,	147239	
D376	1N5402	170219	
D377	1N5402	170219	
D380	ZENER, SOT23, 5%, 5.1V	135247-5231	
D401	BAV70, DUAL, SOT-23	147249	
D402	BAV99, DUAL, SOT-23	147239	
D403	SWITCHING, 75V, 200mA	136603	
D404	BAV99, DUAL, SOT-23	147239	

ELECTRICAL PART LIST

Diodes (continued)

Reference Designator	Description	Part Number	Note
D405	BAV99, DUAL, SOT-23	147239	
D406	SWITCHING, 75V, 200mA	136603	
D407	SWITCHING, 75V, 200mA	136603	
D410	BAV99, DUAL, SOT-23	147239	
D411	BAV99, DUAL, SOT-23	147239	
D412	BAV70, DUAL, SOT-23	147249	
D413	1N4742, ZEN, 12V, 1W, 5%	116995-4742A	
D414	DUAL, SOT-23, BAV99	147239	
D415	P6KE120, ZEN, 120V, 5W, 10%	195227-120B	3 230v ⚠
D416	ZENER, 6.8V, 225mW	135247-5235	
D420	1N4004	116996-4	
D421	SWITCHING, 75V, 200mA	136603	
B1	RECTIFIER, BRIDGE	170214	
B2	RECTIFIER, BRIDGE	170214	

Transistors

Reference Designator	Description	Part Number	Note
Q175	TO-92, BPLR, N, 60V, 200mA	117921	
Q176	DARL, P, TIP146T	172285	
Q177	TO-92, BPLR, P, 60V, 200mA	119168	
Q178	DARL, N, TIP141T	172284	
Q179	TO-92, BPLR, P, 60V, 200mA	119168	
Q180	TO-92, BPLR, N, 60V, 200mA	117921	
Q181	SOT23, BPLR, N, 55V, 150mA	134741	
Q275	TO-92, BPLR, N, 60V, 200mA	117921	
Q276	TIP146T, BPRL, P	172285	
Q277	TO-92, BPLR, P, 60V, 200mA	119168	
Q278	TIP141T, DARL, N	172284	
Q279	TO-92, BPLR, P, 60V, 200mA	119168	
Q280	TO-92, BPLR, N, 60V, 200mA	117921	
Q281	SOT23, BPLR, N, 55V, 150mA	134741	
Q301	SOT23, BPLR, N, 55V, 150mA	134741	
Q302	SOT23, BPLR, P, 55V, 150mA	134743	
Q303	SOT23, BPLR, P, 55V, 150mA	134743	
Q375	MMBF4392, JFET, SOT	134738	
Q376	SOT23, BPLR, P, 55V, 150mA	134743	
Q377	TO-92, BPLR, N, 60V, 200mA	117921	
Q378	PNP, (2SB560F)	140349	
Q379	TO-92, BPLR, P, 60V, 200mA	119168	
Q380	TO-92, BPLR, N, 60V, 200mA	117921	
Q381	TIP146T, DARL, P	172285	

ELECTRICAL PART LIST

Transistors (continued)

Reference Designator	Description	Part Number	Note
Q382	TIP146T, DARL, P	172285	
Q383	TO-92, BPLR, N, 60V, 200mA	117921	
Q384	TO-92, BPLR, N, 60V, 200mA	117921	
Q385	TO-92, BPLR, P, 60V, 200mA	119168	
Q386	TO-92, BPLR, P, 60V, 200mA	119168	
Q387	TIP141T, DARL, N	172284	
Q388	TIP141T, DARL, N	172284	
Q400	TRIAC	178807	3 ⚠
Q401	SOT23, BPLR, N, 55V, 150mA	134741	
Q403	SOT23, BPLR, N, 55V, 150mA	134741	
Q404	SOT23, BPLR, N, 55V, 150mA	134741	
Q405	SOT23, BPLR, N, 55V, 150mA	134741	
Q406	SOT23, BPLR, N, 55V, 150mA	134741	
Q407	SOT23, BPLR, P, 55V, 150mA	134743	
Q408	SOT23, BPLR, N, 55V, 150mA	134741	
Q410	SOT23, BPLR, P, 55V, 150mA	134743	
Q411	SOT23, BPLR, N, 55V, 150mA	134741	
Q412	SOT23, BPLR, P, 55V, 150mA	134743	

Integrated Circuits

Reference Designator	Description	Part Number	Note
U1	VOLT REG, 12V, POS TO2	116736	
U2	VOLT REG, 12V, NEG TO2	116736	
U101	RC4559, OPAMP, DUAL, DIP-8	108568	
U102	LF353, OPAMP, DUAL, DIP-8	110698	
U103	LF353, OPAMP, DUAL, DIP-8	110698	
U104	LF353, OPAMP, DUAL, DIP-8	110698	
U105	LF353, OPAMP, DUAL, DIP-8	110698	
U175	50W AMP	170156	
U275	50W AMP	170156	
U301	RC4559, OP-AMP, DUAL, DIP-8	108568	
U302	CA3080, OP-AMP, SNGL, DIP-8	119834	
U303	LF353, OP-AMP, DUAL, DIP-8	110698	
U304	LF353, OP-AMP, DUAL, DIP-8	110698	
U375	LF351N, OP-AMP, SNGL, DIP-8	132604	
U401	4N32T, OPTO ISOLATOR	172298	
U402	MOC3023T, OPTO-TRIAC, PDIP-6	190334-001	
U403	QUAD TRANSISTOR ARRAY, NPN	145317	
U404	VOLTAGE COMPARATOR, DIP-14	137929	

ELECTRICAL PART LIST

Miscellaneous

Reference Designator	Description	Part Number	Note
F1	FUSE, 5X20mm, SLO-BLO, 3A FUSE, 5X20MM, SLO-BLO, 1.6 AMP	181561-3000 ⚠ 181561-1600	3, 120/Dual 3, 230V
F601	FUSECLIP, 5MM	178548	
J1	HEADER, RTANG, 5 POS	134290-05	
J2	HEADER, RTANG, 2.5MM, 14 POS	145402-14	
J3	HEADER, RTANG, JSTS 2P-VH	190552-02	
J5	DIN, PC MOUNT, 5 PIN	170135	
J6	HOUSING, AC, 2 POS, FEMALE	146563 ⚠	3 120v, Dual
J6	JACK, AC, POWER, VDE	145306	3 230v ⚠
J7	HEADER, 5 POS.	178742-5	
J8	HEADER, PCB MNT, 14 POS, M	133224-14	
J9	RCA, JACK, 2 POS, BLUE	182495-2	
S1	SWITCH, AC, POWER, RTANGLE	178792	3 ⚠
Y1	JUMPER, 22AWG, 20.0mm	148242-200	
Y2	JUMPER, 22AWG, NON-INSUL, 7.5mm	148242-075	
Y3	JUMPER, 22AWG, NON-INSUL, 7.5mm	148242-075	
S2	SWITCH, SLIDE, DPDT	145307	3 ⚠
-	SHIELD, MICRO	177564	

LIFESTYLE® 5 III PACKAGING PART LIST

(Refer to Figures 11 and 12)

Item Number	Description	Part Number	Qty.	Note
1	BASS BOX, 120V, WHITE BASS BOX, 120V, BLACK BASS BOX, 230V, WHITE BASS BOX, 230V, BLACK BASS BOX, DUAL, WHITE BASS BOX, DUAL, BLACK	251169-1119 251169-1219 251169-2113 251169-2213 251169-6119 251169-6219	1	1
2	BAG, POLY	114522	1	
3	PACKING, CORNER, POST, BASS MOD	148044	1	
4	PACKING, INSERT, EPS	172279	1	
5	CARTON	178874-04	1	
6	PACKING, D/C, FILLER, SW	250999	1	
7	QUICK START, MULTI LANGUAGE	251182	1	
8	COMMITMENT LETTER	251001	1	
9	SATELLITE PACK	(reference only)	1	Items 10-16
10	SATELLITE, WHITE SATELLITE, BLACK	192420-019 192420-029	2	
11	CARTON, CHIPBOARD, SATELLITE, BLUE	197330-002	2	
12	BAG, POLY	144677	1	
13	CARTON, SATELLITE PACK	251950	1	
14	CABLES, SPEAKER,18 AWG, L/R	180643-5	1PK	
15	CABLE, AUDIO INPUT, 5 PIN	172296	1	
16	CABLE, AUDIO, DUAL RCA	185931-01	1	
17	CD-5V2	(reference only)	1	
18	ESSENTIALS KIT, 120V, US ESSENTIALS KIT, 230V, EURO ESSENTIALS KIT, 230V, UK ESSENTIALS KIT, 240V, AUS ESSENTIALS KIT, DUAL	251172-111 251172-211 251172-411 251172-511 251172-611	1	1, 2 Items 19-28
19	REMOTE CONTROL	179980	1	
20	LINE CORD, 120V, POLARIZED, DETACH, BLACK LINE CORD, EURO, DETACHABLE, 96", BLACK LINE CORD, 230V, UK, DETACHABLE, 72", BLACK LINE CORD, 230V, AUS, DETACHABLE, BLACK	198603-001 148203 134725 134726	1	3
21	POWER PACK, 120V, US POWER PACK, 230V, EURO POWER PACK, 230V, UK POWER PACK, 240V, AUS	178371 178375 251773 178373	1	3
22	FM ANTENNA, DIPOLE, 75 OHM, F CON FM ANTENNA, DIPOLE, PAL	148589 143185	1	
23	AM ANTENNA	199824-001	1	
24	BATTERY, AAA, 3 PACK	147538	1PK	3
25	WIRE COVER, BLACK	173201	1	
26	CARTON	190208-003	1	
27	PACKING TRAY	190209-004	1	
28	BAG, POLY, 3X3.5	194392	1	

LIFESTYLE® 5 III PACKAGING PART LIST

(Refer to Figures 11 and 12)

Item Number	Description	Part Number	Qty	Note
29	LIT KIT,120V, US LIT KIT, 230V, EURO LIT KIT, UK/SING/AUS LIT KIT, DUAL	251173-001 251173-002 251173-004 251173-006	1	Items 30-38
30	BUMPER, RECESSED, FOOT, .88", 4 PACK	142839	1	
31	ADAPTER, 120/230V POLARIZED	147013	1	3 ⚠
32	SHEET, INSTRUCTION, ADAPTER	147751	1	
33	OWNER'S MANUAL: ENGLISH, SPANISH, FRENCH DANISH, GERMAN, ITALIAN, DUTCH, SWEDISH	 251174 251177	1	
34	BROCHURE ALL PRODUCTS	188898	1	
35	CARD, INFO, WARRANTY, US CARD, INFO, WARRANTY, MULTIPLE LANGUAGE	181357 181460	1	
36	CD, DEMO, US CD, DEMO, EURO	183768 183769	1	
37	SAFETY SHEET	176236	1	
38	DECLARATION OF CONFORMITY	251179	1	

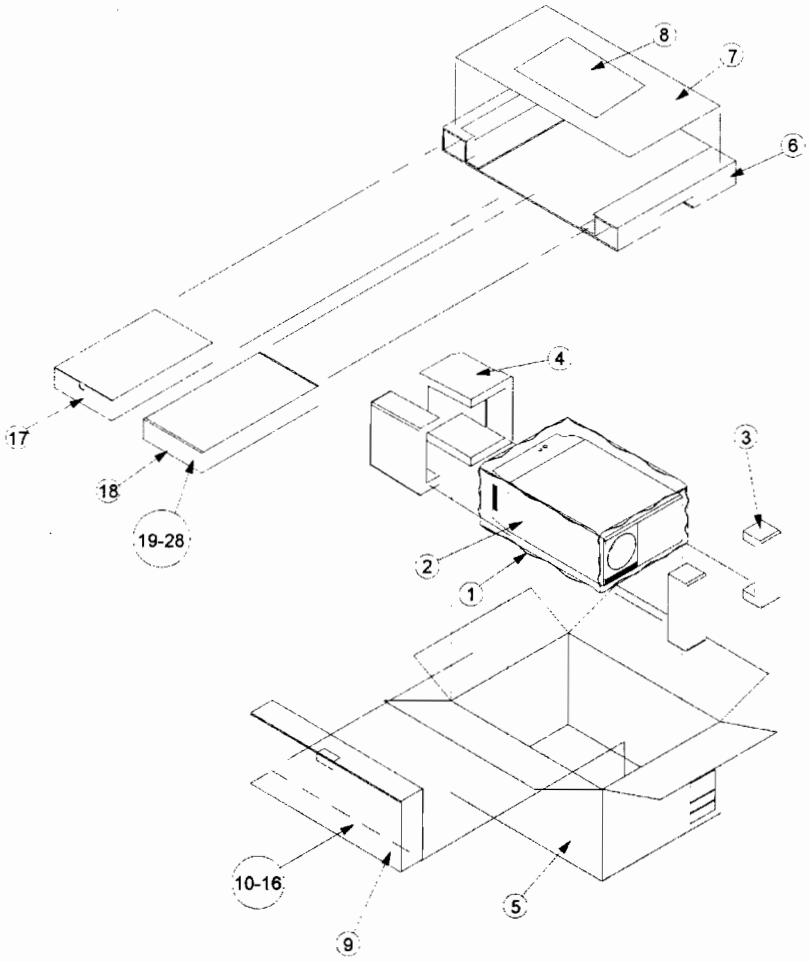


Figure 11. Lifestyle® 5 III Packaging View 1 of 2

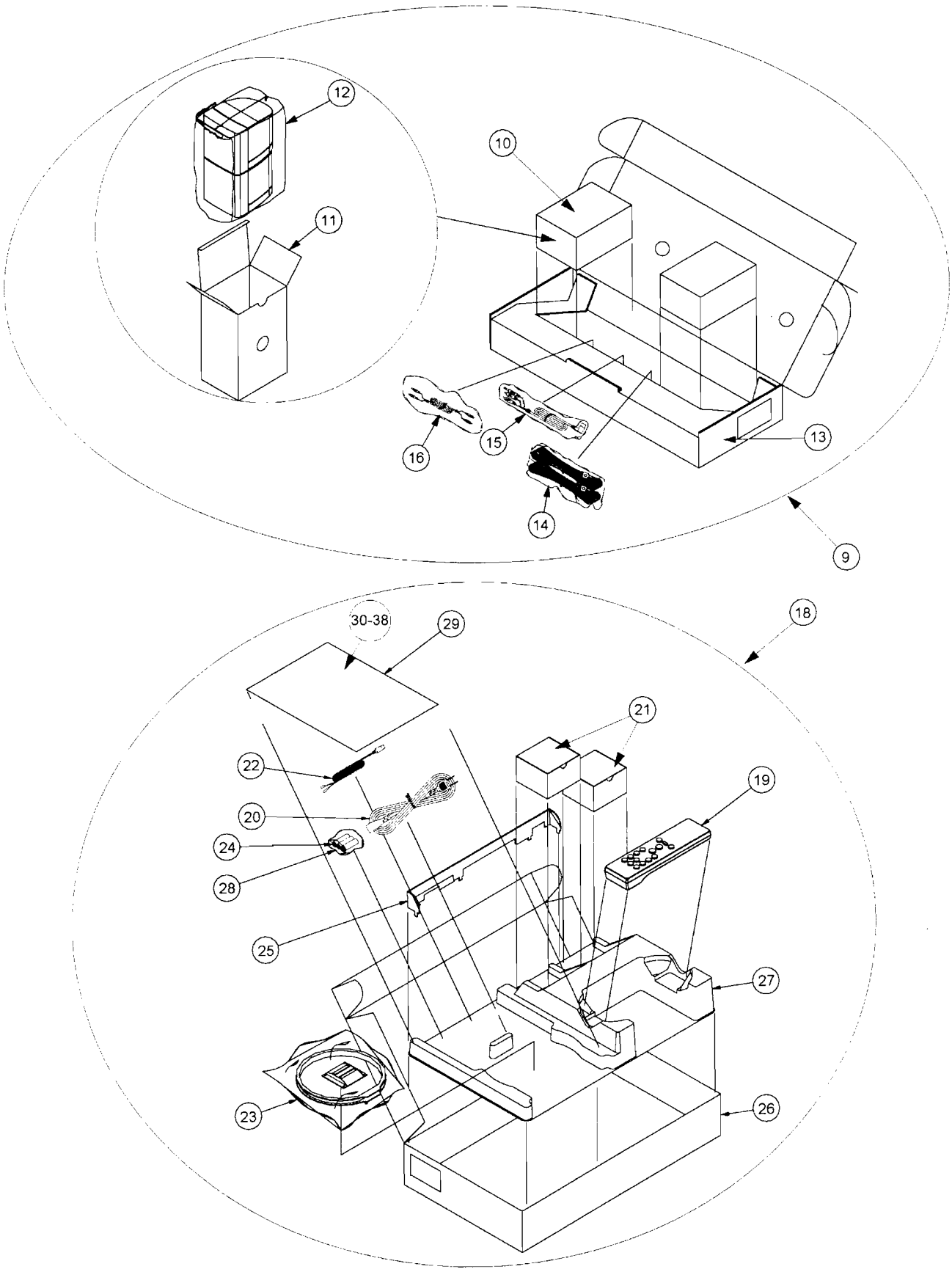


Figure 12. Lifestyle® III Packaging View 2 of 2

AM-5P IV PACKAGING

(Refer to Figure 13.)

Item Number	Description	Part Number	Qty.	Note
1	BASS BOX, 120V, WHITE BASS BOX, 120V, BLACK BASS BOX, 230V, WHITE BASS BOX, 230V, BLACK BASS BOX, DUAL, WHITE BASS BOX, DUAL, BLACK	251169-1119 251169-1219 251169-2113 251169-2213 251169-6119 251169-6219	1	1
2	BAG, POLY	114522	1	
3	PACKING, CORNER, POST, BASS MOD	148044	1	
4	PACKING, INSERT, EPS	172279	1	
5	CARTON, US CARTON, EURO	183774-15 183774-16	2	
6	LIT KIT,120V, US LIT KIT, 230V, EURO LIT KIT, UK/SING/AUS LIT KIT, DUAL	251173-001 251173-002 251173-004 251173-006	1	Items 7-16
7	BUMPER, RECESSED, FOOT, .88", 4 PACK	142839	1pk	
8	ADAPTER, 120/230V POLARIZED	147013	1	3 ⚠
9	SHEET, INSTRUCTION, ADAPTER	147751	1	
10	OWNER'S MANUAL: ENGLISH, SPANISH, FRENCH DANISH, GERMAN, ITALIAN, DUTCH, SWEDISH	 251174 251177	1	
11	BROCHURE ALL PRODUCTS	188898	1	
12	CARD, INFO, WARRANTY, US CARD, INFO, WARRANTY, MULTIPLE LANGUAGE	181357 181460	1	
13	CD, DEMO, US CD, DEMO, EURO	183768 183769	1	
14	SAFETY SHEET	176236	1	
15	DECLARATION OF CONFORMITY	251179	1	
16	COMMITMENT LETTER	251001	1	
17	SATELLITE PACK	(reference only)	1	Items 18-24
18	SATELLITE, BLACK SATELLITE, WHITE	192420-019 192420-029	2	
19	CABLE, AUDIO INPUT, 5 PIN	172296	1	
20	CABLES, SPEAKER, 18 AWG, L/R, BLACK CABLES, SPEAKER, 18 AWG, L/R, WHITE	180643-5 176201-5	1pk	
21	LINE CORD, 120V, POLARIZED, DETACH, BLACK LINE CORD, EURO, DETACHABLE, 96", BLACK LINE CORD, 230V, UK, DETACHABLE, 72", BLACK LINE CORD, 230V, AUS, DETACHABLE, BLACK	198603-001 148203 134725 134726	1	3
22	BAG, POLY, 10X12X2 mil	144677	1	
23	CARTON, CHIPBOARD, SATELLITE, BLUE	197330-002	1	
24	CARTON, SATELLITE PACK	251950	1	

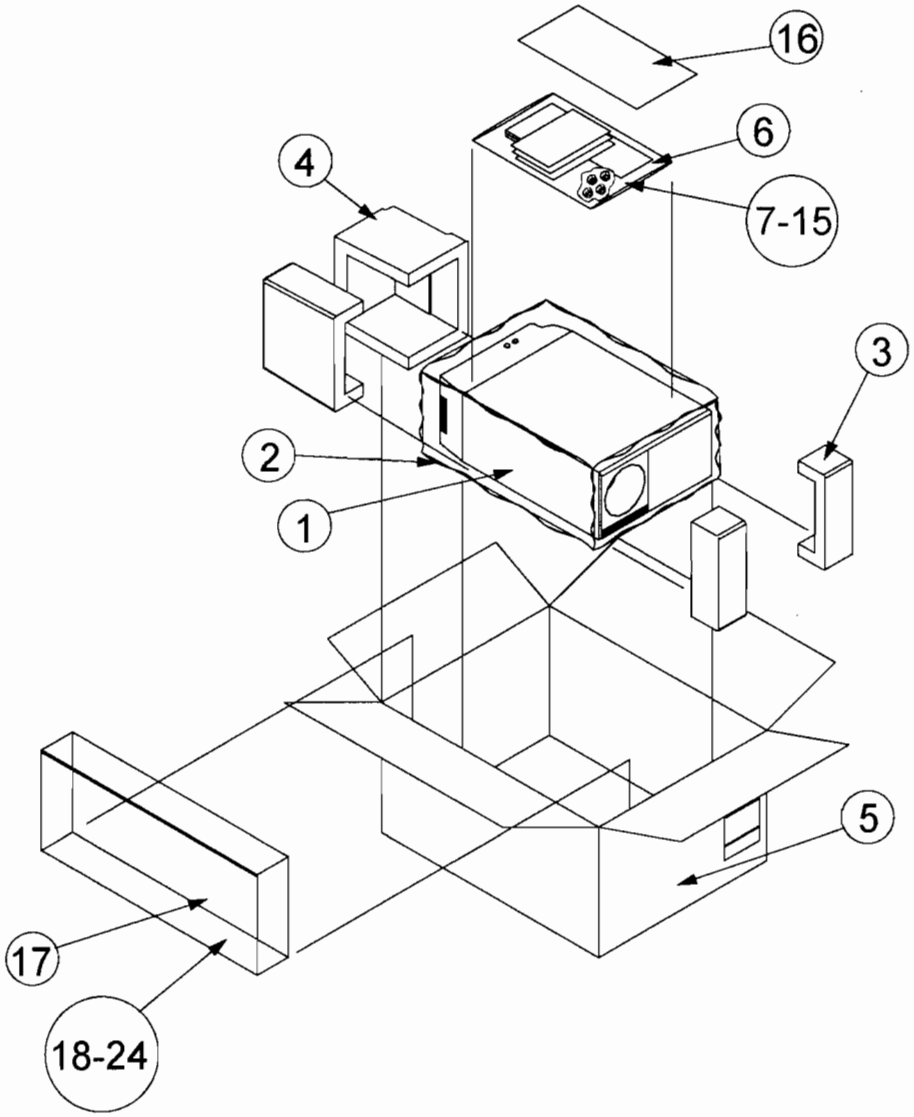
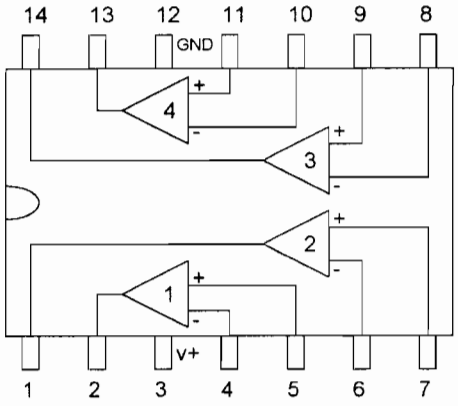
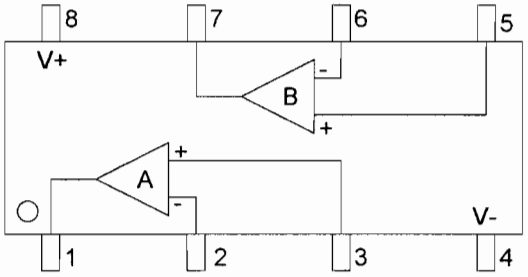


Figure 13. AM-5P IV Packaging

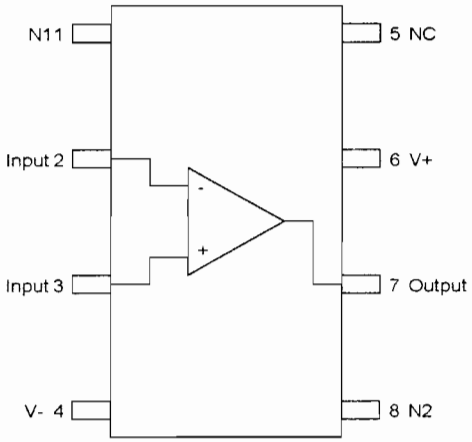
INTEGRATED CIRCUITS



LM339N
Voltage comparator
part number 137929
U404

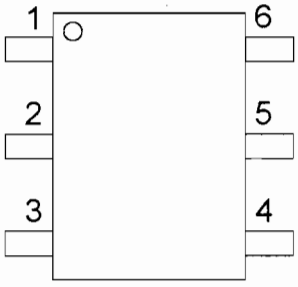


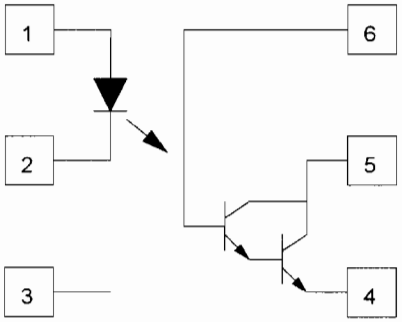
RC4559
Dual operational amplifier
part number 108568
U101, U301, U305



Pin	Description
1	Offset voltage null input 1
2	Inverting input
3	Non-inverting input
4	Negative power supply input
5	Offset voltage null input 2
6	Amplifier output
7	Positive power supply input
8	No connection

LF351N
Operational amplifier
part number 132 604
U375

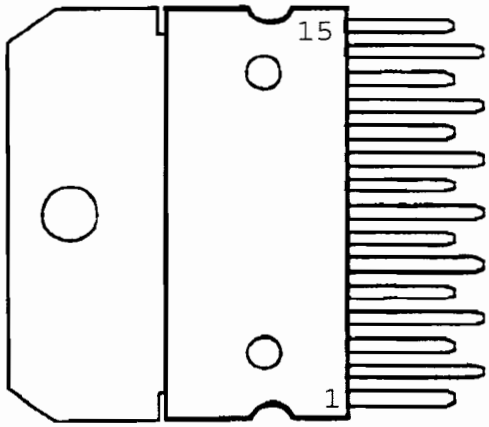




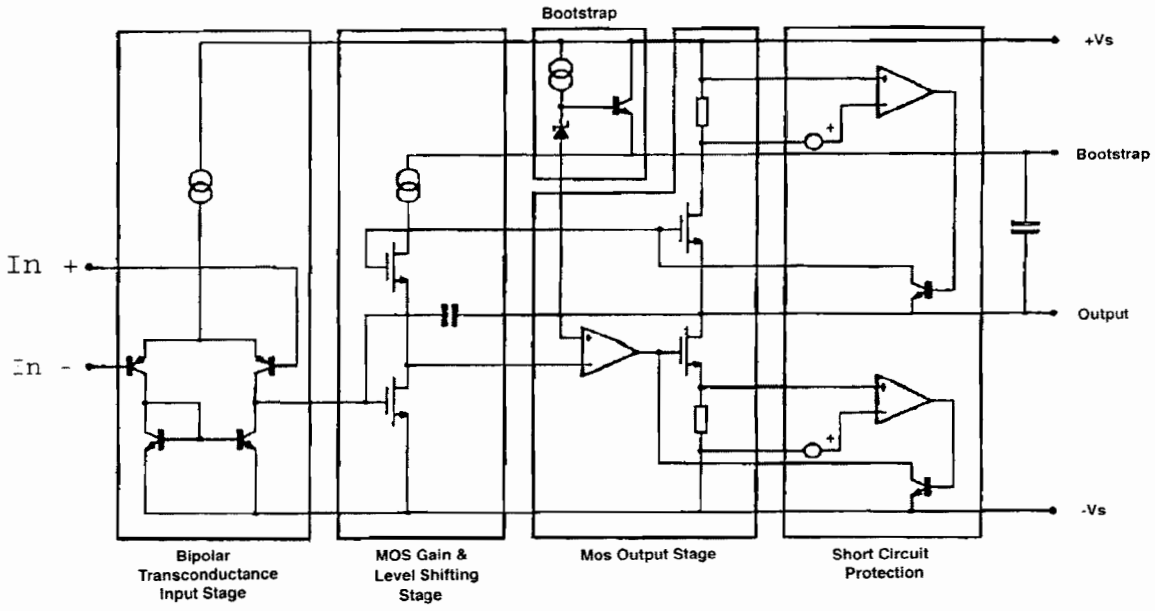
Pin	Description
1	LED anode
2	LED cathode
3	N.C.
4	Emitter
5	Collector
6	Base

4N32T
Opto-isolator
part number 172298
U401

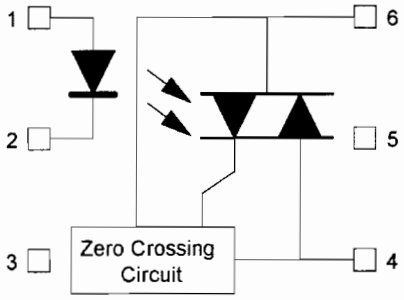
INTEGRATED CIRCUITS

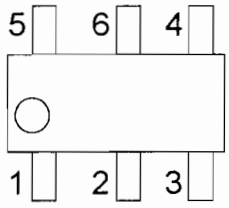


Pin	Description
15	-Vs (Power)
14	Out
13	+Vs (Power)
12	N.C.
11	N.C.
10	Mute
9	Stand-by
8	-Vs (Signal)
7	+Vs (Signal)
6	Bootstrap
5	N.C.
4	SUR
3	Non-Inverting Input
2	Inverting Input
1	Stand-by GND



TDA7294
Audio power amplifier
part number 170156
U175, U275

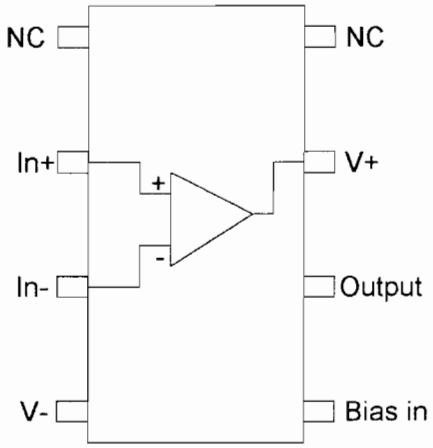




Pin	Description
1	Anode
2	Cathode
3	NC
4	Main terminal
5	Substrate, do not connect
6	Main terminal

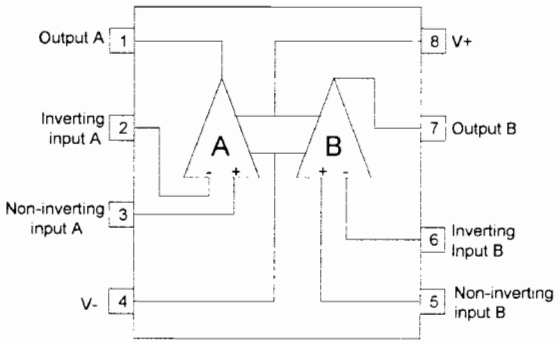
MOC3063T
Opto-triac
part number 172297
U402

INTEGRATED CIRCUITS

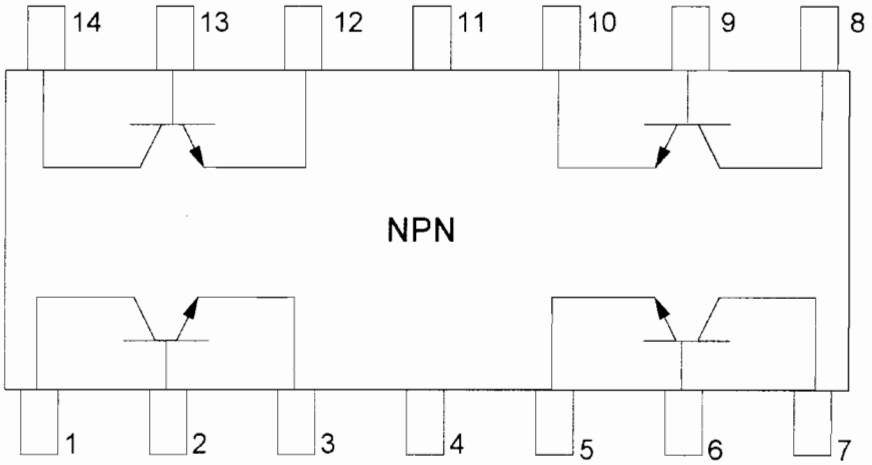


Pin	Description
1	NC
2	In-
3	In+
4	V-
5	IABC
6	Out
7	V+
8	NC

CA3080
Bipolar operational transconductance amplifier
part number 119834
U302

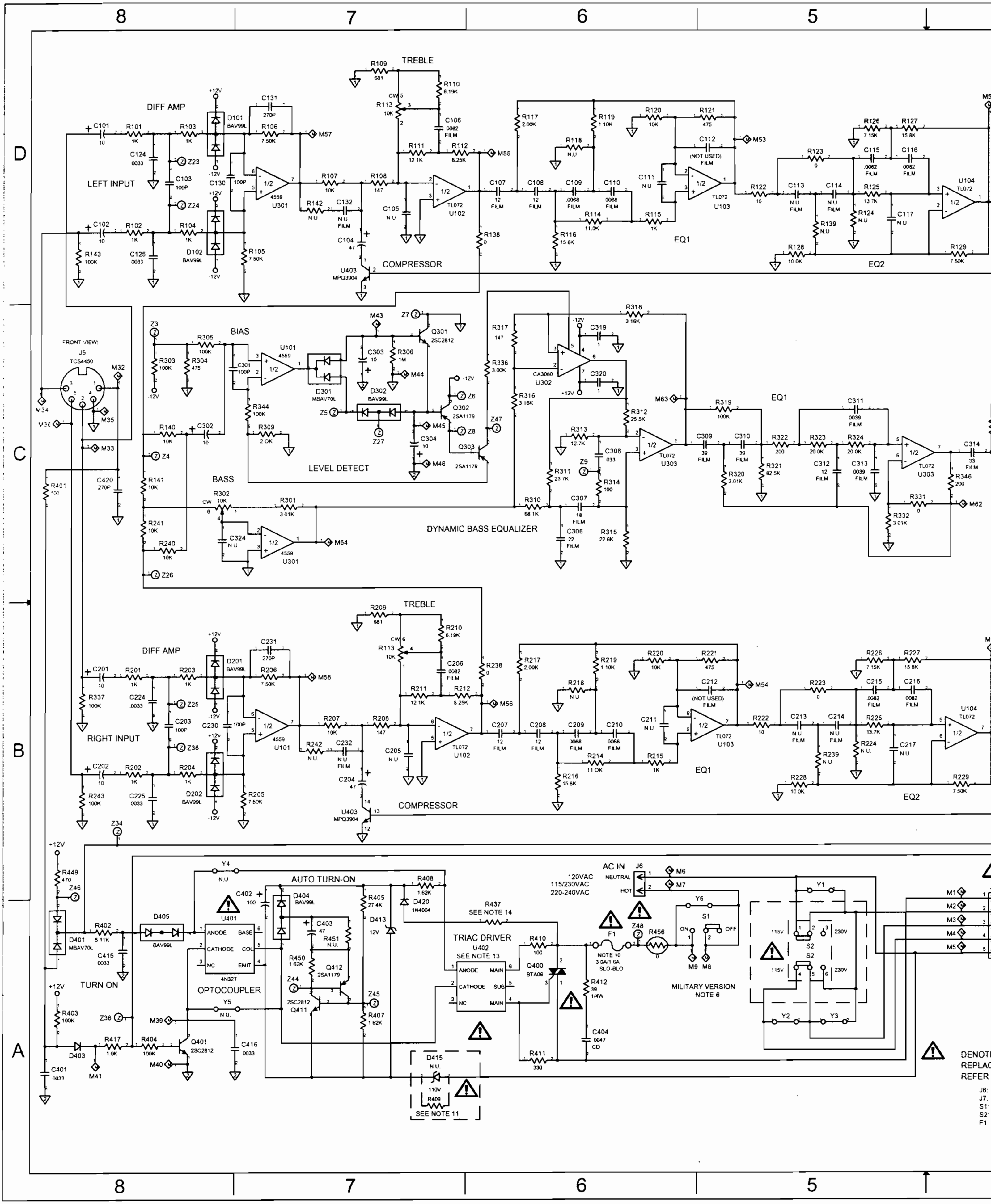


LF353
Operational amplifier
part number 110698
U102-105, U303, U304

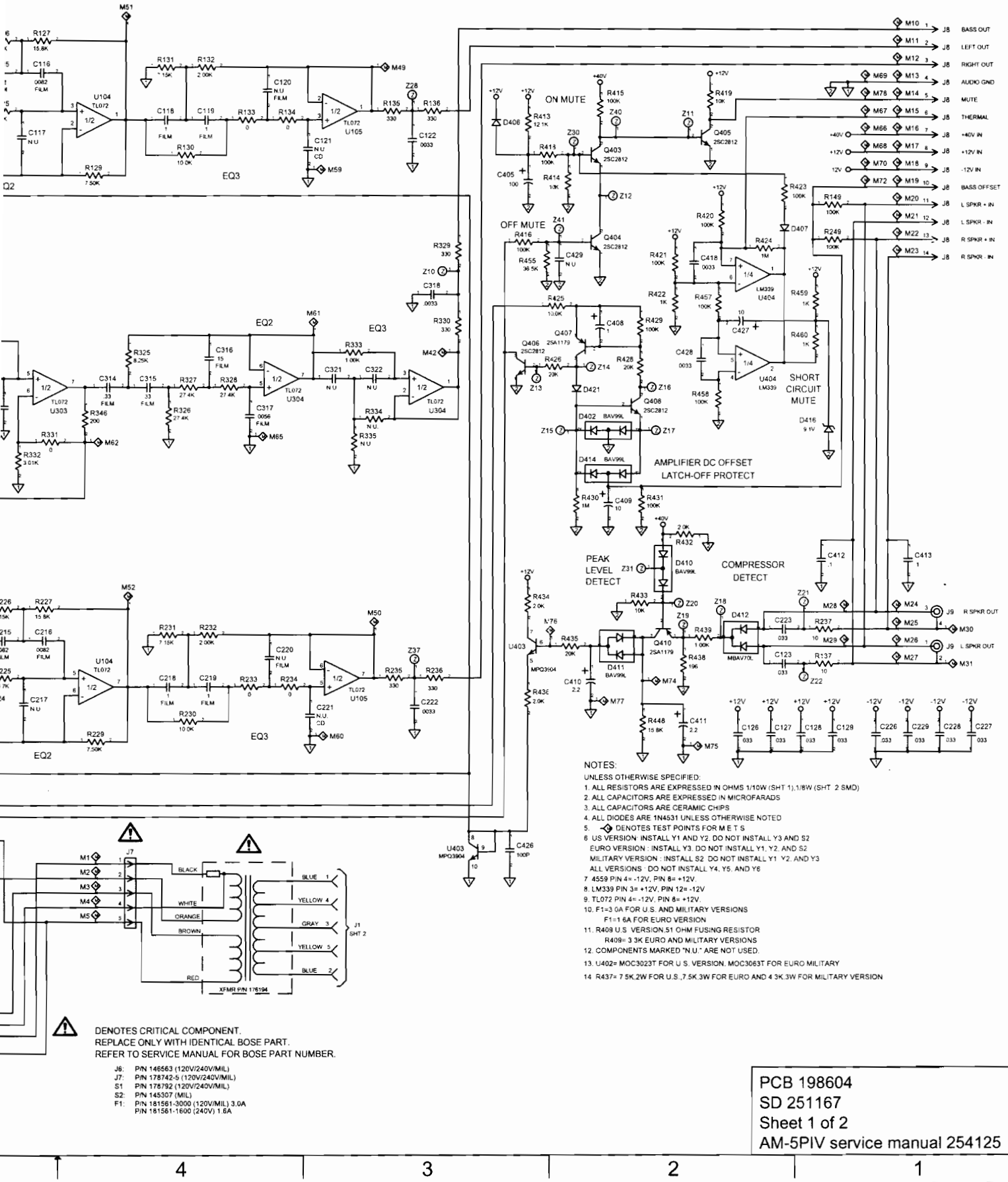


Transistor array
part number 145317
U403

Pin	Description
1	Collector
2	Base
3	Emitter
4	N.C.
5	Emitter
6	Base
7	Collector
8	Collector
9	Base
10	Emitter
11	N.C.
12	Emitter
13	Base
14	Collector



DIFF AMP
LEFT INPUT
TREBLE
COMPRESSOR
EQ1
EQ2
BIAS
LEVEL DETECT
BASS
DYNAMIC BASS EQUALIZER
(FRONT VIEW)
J5
TCS4450
RIGHT INPUT
AUTO TURN-ON
OPTOCOUPLER
TURN ON
TRIAC DRIVER
U402
SEE NOTE 13
SEE NOTE 14
AC IN
NEUTRAL
HOT
120VAC
115/230VAC
220-240VAC
NOTE 10
3.0A/1.6A
SLO-BLO
MILITARY VERSION
NOTE 6
SEE NOTE 11
DENOTE
REPLAC
REFER



NOTES:

UNLESS OTHERWISE SPECIFIED:

1. ALL RESISTORS ARE EXPRESSED IN OHMS 1/10W (SHT 1),1/8W (SHT 2 SMD)
2. ALL CAPACITORS ARE EXPRESSED IN MICROFARADS
3. ALL CAPACITORS ARE CERAMIC CHIPS
4. ALL DIODES ARE 1N4531 UNLESS OTHERWISE NOTED
5. ◇ DENOTES TEST POINTS FOR M E T S
6. US VERSION: INSTALL Y1 AND Y2. DO NOT INSTALL Y3 AND S2
   EURO VERSION : INSTALL Y3. DO NOT INSTALL Y1, Y2, AND S2
   MILITARY VERSION : INSTALL S2 DO NOT INSTALL Y1 Y2, AND Y3
   ALL VERSIONS : DO NOT INSTALL Y4, Y5, AND Y6
7. 4559 PIN 4= -12V, PIN 8= +12V.
8. LM339 PIN 3= +12V, PIN 12= -12V
9. TL072 PIN 4= -12V, PIN 8= +12V.
10. F1=3.0A FOR U.S. AND MILITARY VERSIONS
    F1=1.6A FOR EURO VERSION
11. R409 U.S. VERSION,51 OHM FUSING RESISTOR
    R409= 3.3K EURO AND MILITARY VERSIONS
12. COMPONENTS MARKED "N.U." ARE NOT USED.
13. U402= MOC3023T FOR U.S. VERSION, MOC3063T FOR EURO MILITARY
14. R437= 7.5K,2W FOR U.S.,7.5K,3W FOR EURO AND 4.3K,3W FOR MILITARY VERSION

⚠ DENOTES CRITICAL COMPONENT.
REPLACE ONLY WITH IDENTICAL BOSE PART.
REFER TO SERVICE MANUAL FOR BOSE PART NUMBER.

J6: P/N 146563 (120V/240V/MIL)
J7: P/N 178742-5 (120V/240V/MIL)
S1: P/N 176792 (120V/240V/MIL)
S2: P/N 145307 (MIL)
F1: P/N 181561-3000 (120V/MIL) 3.0A
P/N 181561-1600 (240V) 1.6A

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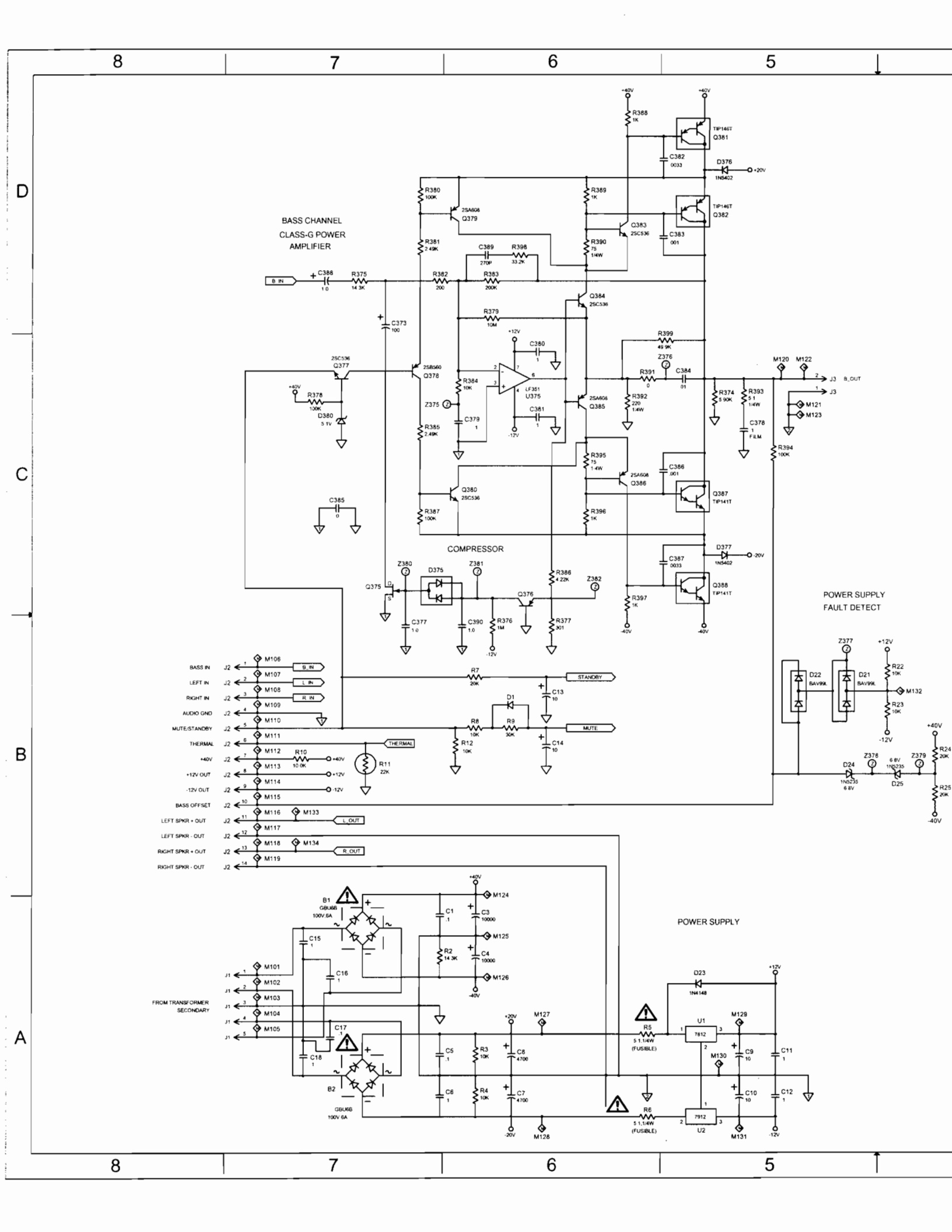
BASS CHANNEL
CLASS-G POWER
AMPLIFIER
COMPRESSOR
POWER SUPPLY
FAULT DETECT
POWER SUPPLY
B_IN
B_OUT
L_IN
R_IN
L_OUT
R_OUT
STANDBY
MUTE
THERMAL
BASS IN
LEFT IN
RIGHT IN
AUDIO GND
MUTE/STANDBY
+40V
+12V OUT
-12V OUT
BASS OFFSET
LEFT SPKR + OUT
LEFT SPKR - OUT
RIGHT SPKR + OUT
RIGHT SPKR - OUT
FROM TRANSFORMER SECONDARY
TIP146T Q381
TIP146T Q382
2SA608 Q379
2SC536 Q383
2SC536 Q384
2SC536 Q377
2SB560 Q378
2SA608 Q385
2SC536 Q380
2SA608 Q386
TIP141T Q387
TIP141T Q388
LF351 U375
D376 1N5402
D377 1N5402
D380 5.1V
D375
Q375
Q376
D22 BAV99L
D21 BAV99L
D24 1N5235 6.8V
D25
D23 1N4148
U1 7812
U2 7912
B1 GBU6B 100V 6A
B2 GBU6B 100V 6A
J3
M120
M122
M121
M123
M132
M133
M134
M124
M125
M126
M127
M128
M129
M130
M131
M101
M102
M103
M104
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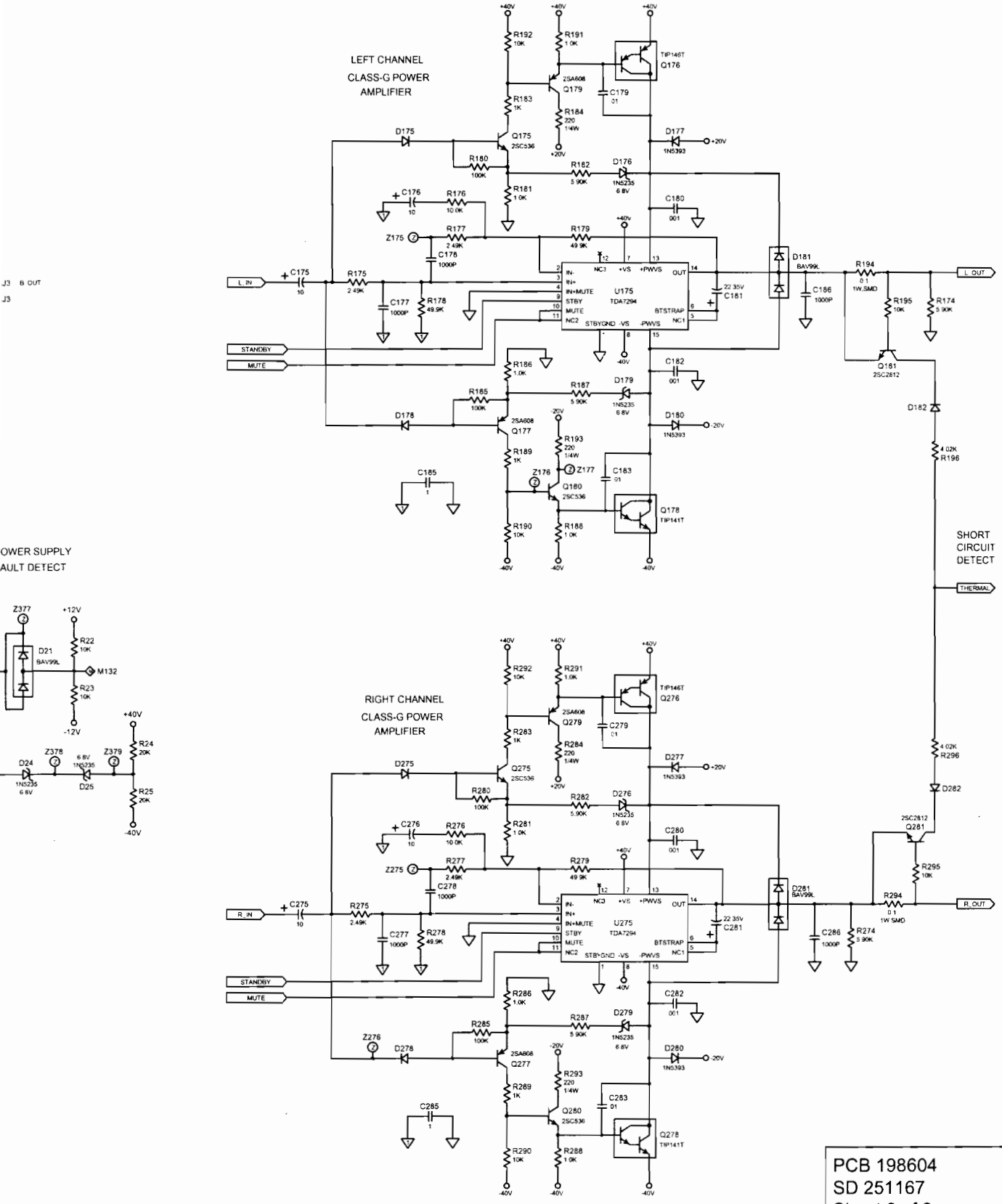
M116
M117
M118
M119



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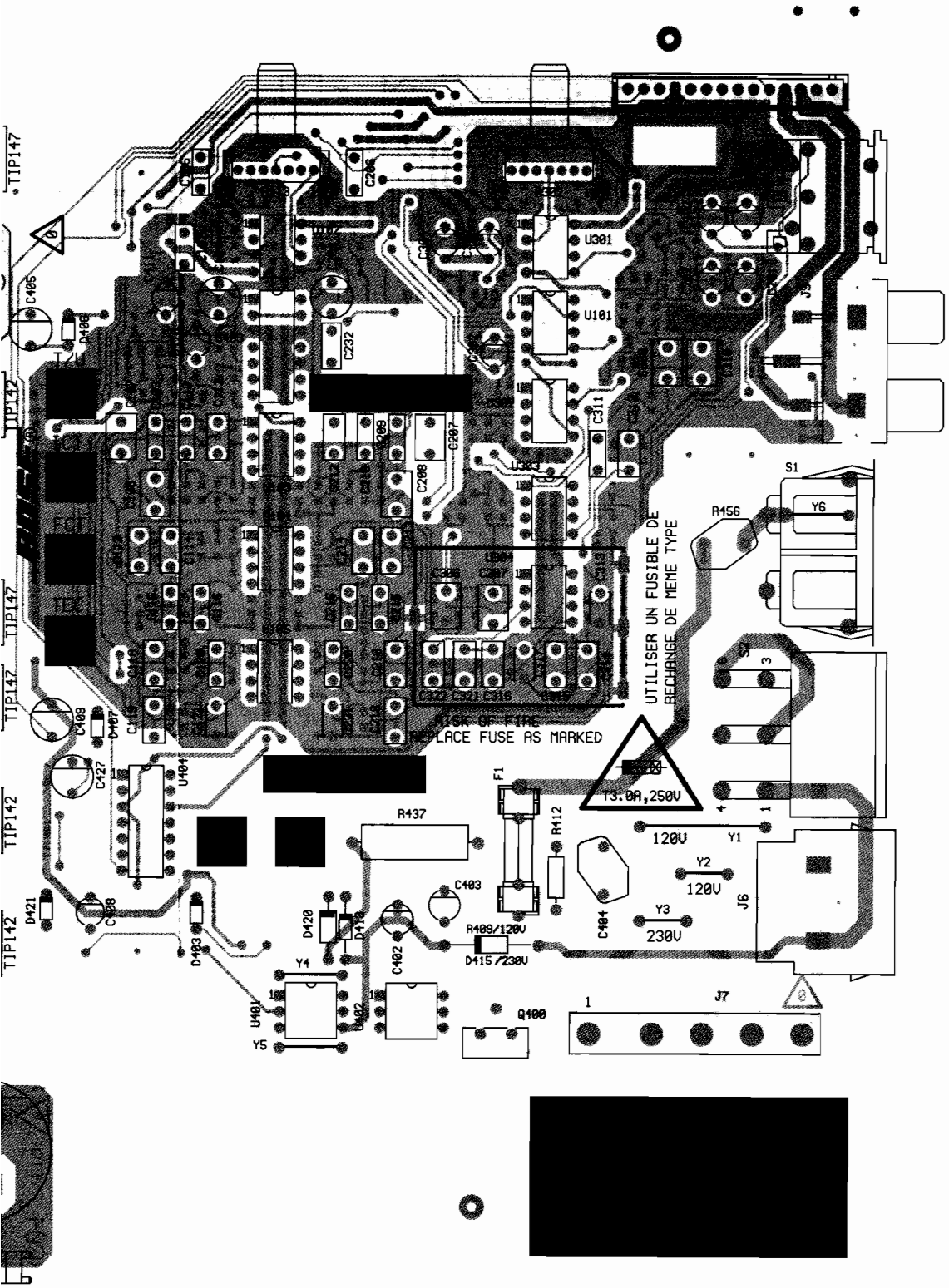
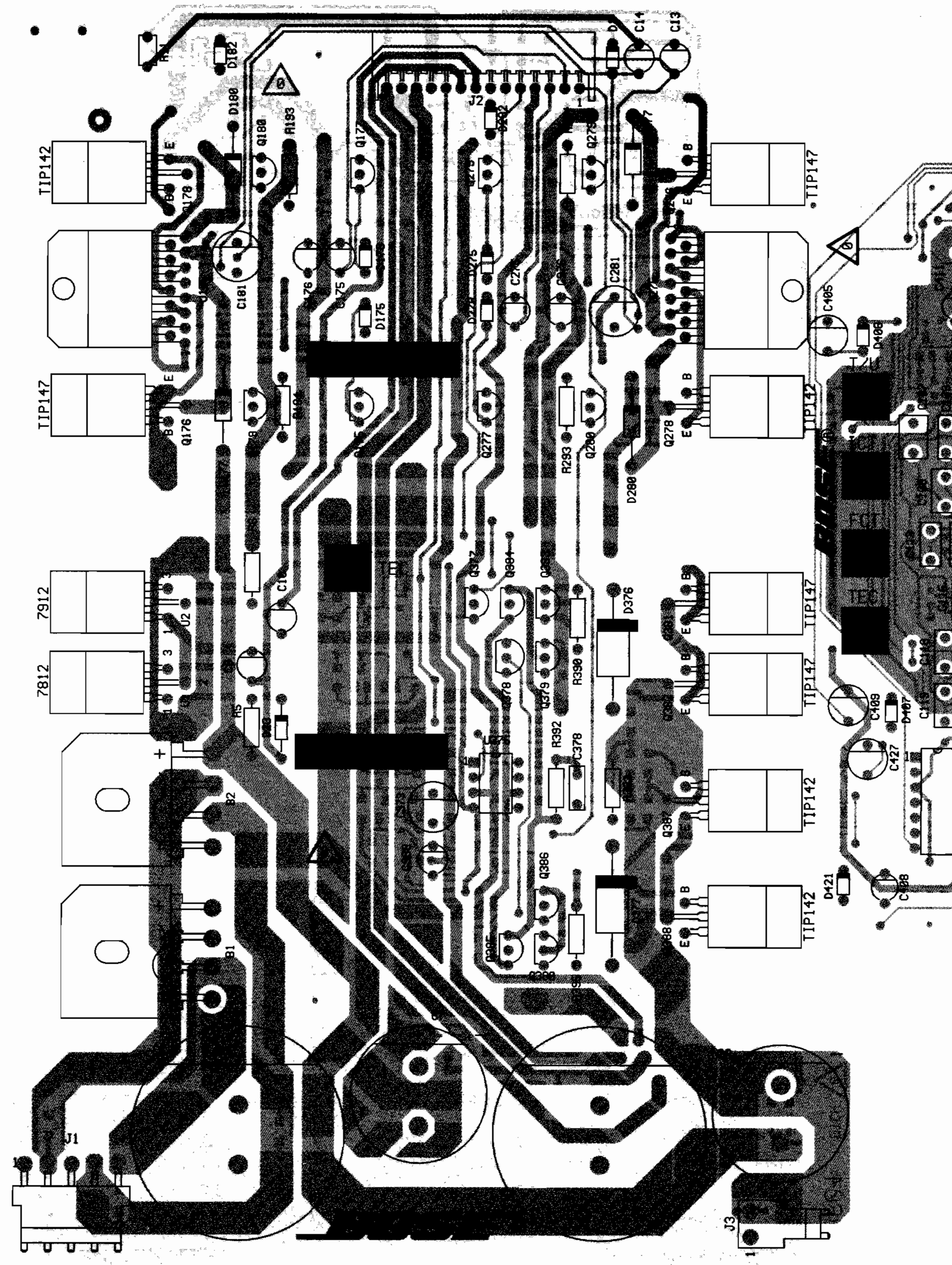
SD 251167
Sheet 2 of 2
AM-5PIV service manual 254125

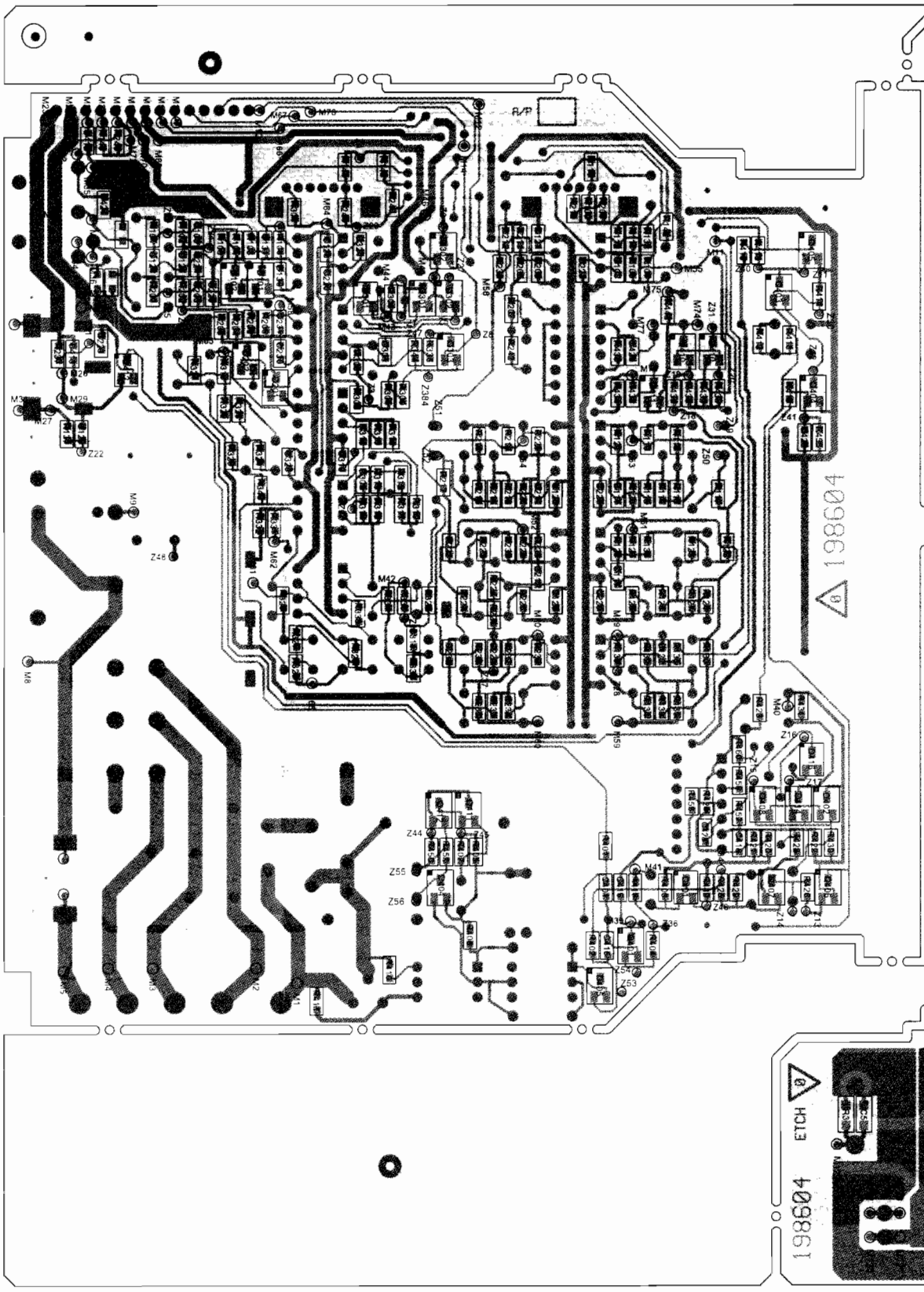
'OP SIDE LAYOUT



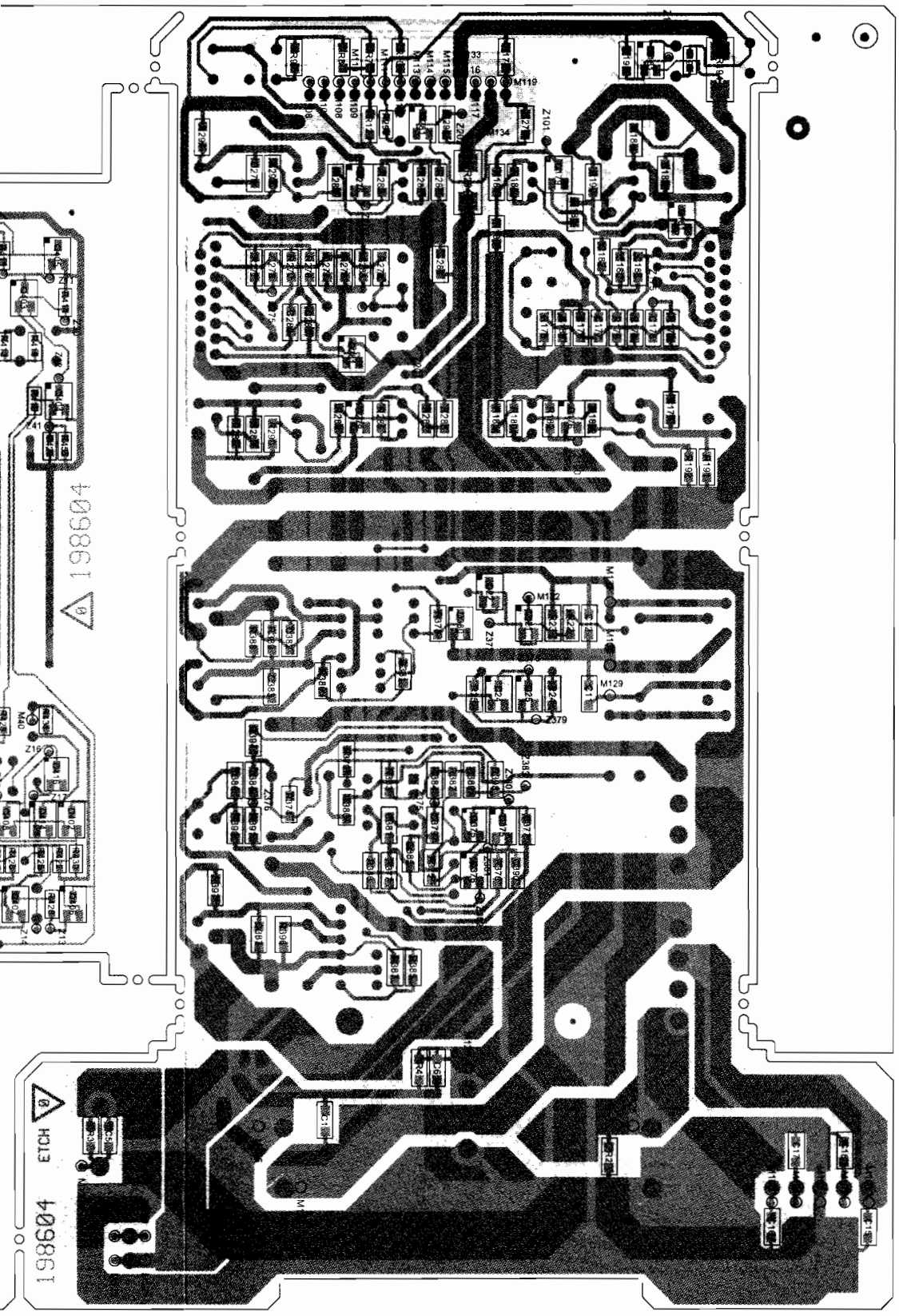
PCB 198604 TOP SIDE

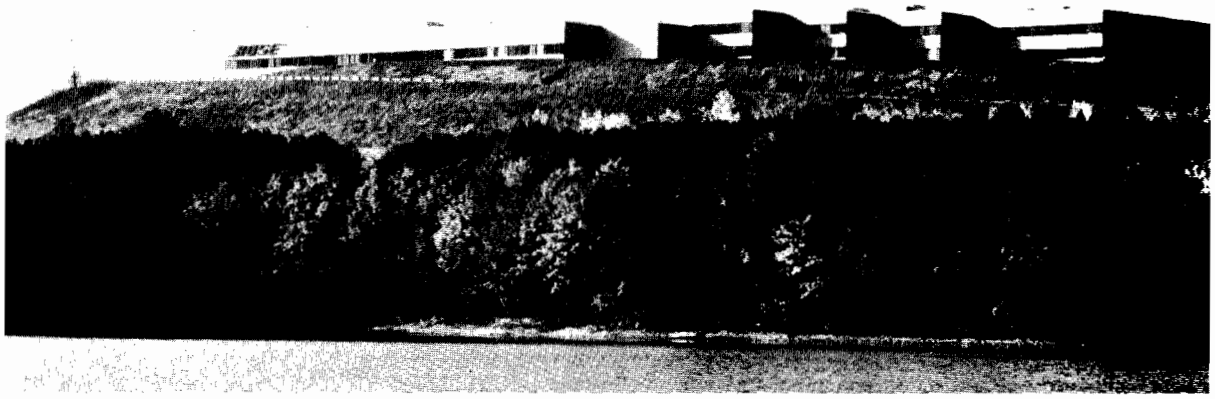


PCB 198604 BOTTOM S



OTTOM SIDE LAYOUT





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