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ACOUSTIMASS®-3 POWERED SPEAKER SYSTEM

Service Manual

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CAUTION: THE ACOUSTIMASS®-3 POWERED SPEAKER SYSTEM CONTAINS NO USER-SERVICEABLE PARTS. TO PREVENT WARRANTY INFRACTIONS, REFER SERVICING TO WARRANTY SERVICE STATIONS OR FACTORY SERVICE.

Note: This service manual has been updated with information from service manual supplement 175032-S2. This supplement affects part number for R146 and R246 as used on the amplifier PCB. Refer to 175032-S2 for more information.

SAFETY INFORMATION

1. Parts that have special safety characteristics are identified by the ⚠ symbol on schematics or by special notes on the parts list. Use only replacement parts that have critical characteristics recommended by the manufacturer.

2. Make leakage current or resistance measurements to determine that exposed parts are acceptably insulated from the supply circuit before returning the unit to the customer. Use the following checks to perform these measurements:

   A. **Leakage Current Hot Check**-With the unit completely reassembled, plug the AC line cord directly into a 120V AC outlet.(Do not use an isolation transformer during this test.) Use a leakage current tester or a metering system that complies with American National Standards Institute (ANSI) C101.1 "Leakage Current for Appliances" and Underwriters Laboratories (UL) 1492 (71). With the unit AC switch first in the ON position and then in OFF position, measure from a known earth ground (metal waterpipe, conduit,etc.) to all exposed metal parts of the unit (antennas,handle bracket, metal cabinet,screwheads,metallic overlays,control shafts,etc.), especially any exposed metal parts that offer an electrical return path to the chassis. Any current measured must not exceed 0.5 milliamp. Reverse the unit power cord plug in the outlet and repeat test. ANY MEASUREMENTS NOT WITHIN THE LIMITS SPECIFIED HEREIN INDICATE A POTENTIAL SHOCK HAZARD THAT MUST BE ELIMINATED BEFORE RETURNING THE UNIT TO THE CUSTOMER.

   B. **Insulation Resistance Test Cold Check**-(1) Unplug the power supply and connect a jumper wire between the two prongs of the plug.(2)Turn on the power switch of the unit. (3) Measure the resistance with an ohmmeter between the jumpered AC plug and each exposed metallic cabinet part on the unit. When the exposed metallic part has a return path to the chassis, the reading should be between 1 and 5.2 Megohms. When there is no return path to the chassis, the reading must be "infinite". If it is not within the limits specified, there is the possibility of a shock hazard, and the unit must be repaired and rechecked before it is returned to the customer.

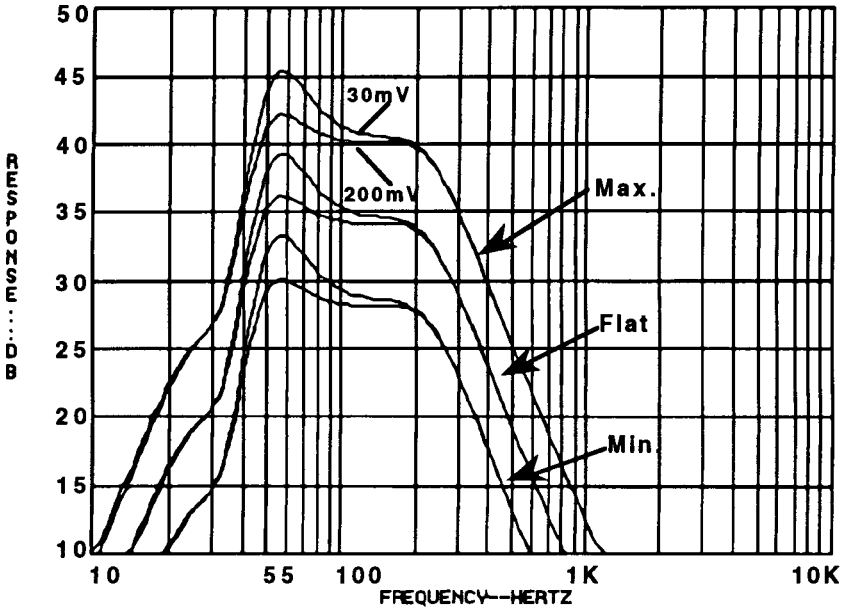
SPECIFICATIONS

Dimensions	Module: Satellite:	7.75"H x 18.5"W x 8.5"D (20x47x22 cm) 4.5"H x 4.5"W x 3.5" D (11x11x9 cm)
Weight	Module: Satellite: Packed System:	21 lbs. (9.5 kg.) 1.3 lbs. (0.6 kg.) 27 lbs. (12.3 kg.)
Driver Complement	1-5-1/4" Woofer 2-2-1/4" Twiddlers	
Finish	Module:	Black or white,scratch-resistant,satin-finished vinyl
	Satellites:	Black or white,painted polymer finish

PERFORMANCE SPECIFICATIONS

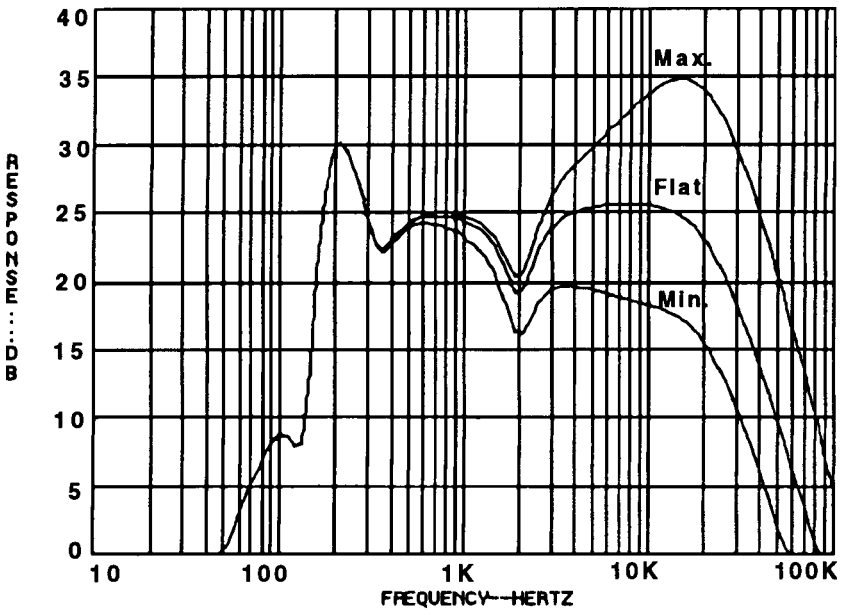
Amplifier Power	Woofer (single):	50 watts into 5Ω resistive load, ≤0.2% THD, from 40-200 Hz
	Satellites (each):	20 watts into 4Ω resistive load, ≤0.2% THD, from 200Hz-15kHz
Input Impedance	System: Satellites: Woofer:	5.9kΩ ± 4% 4Ω 5Ω
Distortion	@ 1W	<0.1% THD (all channels
Output Noise	<180μVrms	A weighted for L/R channels
Output Hum	<500μVrms	Unweighted for bass channel
Channel Separation	@1kHz @10 kHz	>40 dB >30 dB
Port Tuning Frequency	Small Chamber: Large Chamber:	110 Hz 43 Hz
Input Sensitivity	0.6 Vrms input	@1kHz produces rated power in L/R channel outputs (at full volume)
Turn-On Delay (Auto)	80ms ± 40 ms	
Turn-Off Delay (Auto)	100 sec. ± 20 sec.	
Acoustic Output:	97 dB SPL in IEC standard room @ 50W	

Frequency Response Curves



AM-3P bass channel frequency response with bass control at min, max, and flat positions (for 30 and 200 mVrms input level).
A boost occurs at 55Hz for low input levels-i.e.-30mV. The gain measurements in this graph should be referenced to the input level.

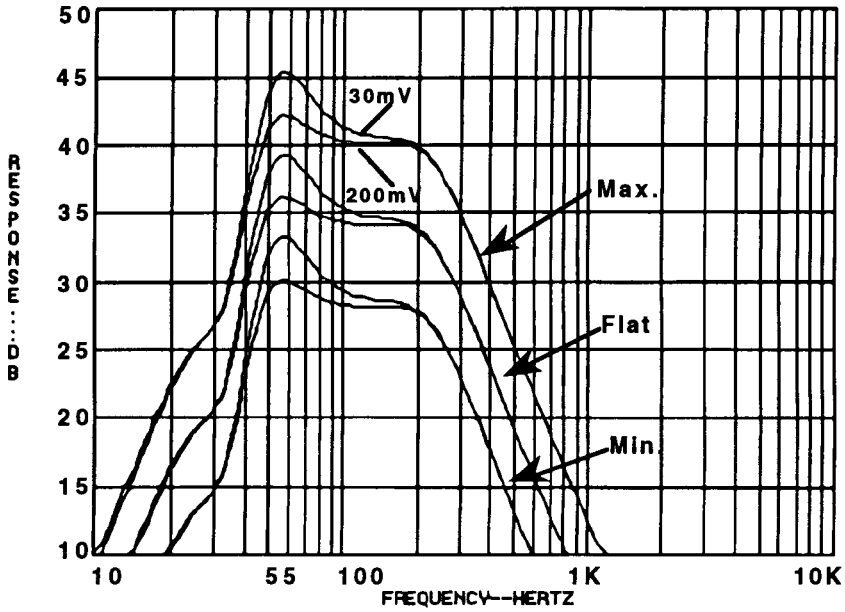
Figure 1. Bass Channel Frequency Response Curve



AM-3P left/right channel frequency response with treble control at min, max, and flat positions. The gain measurements in this graph should be referenced to the input level.

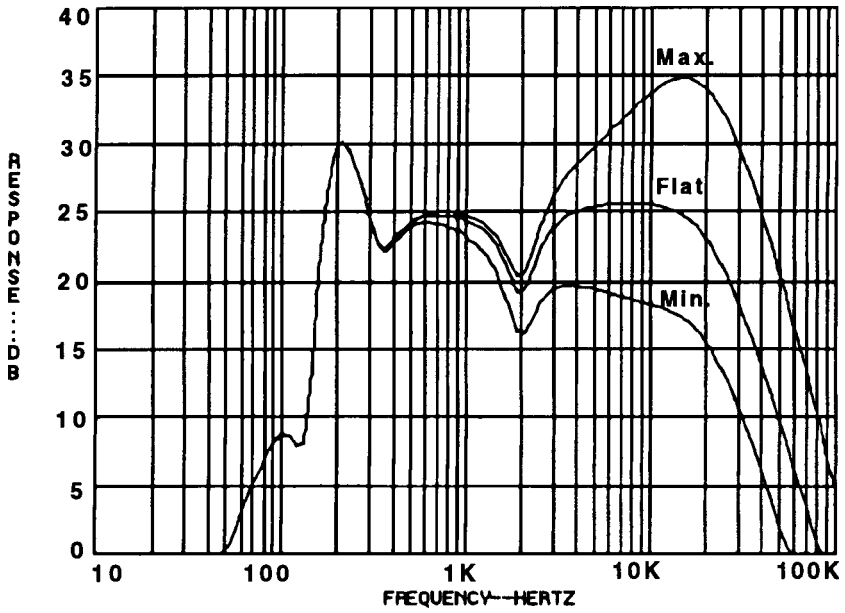
Figure 2. Left/Right Channel Frequency Response Curve

BLOCK DIAGRAM



AM-3P bass channel frequency response with bass control at min, max, and flat positions (for 30 and 200 mVrms input level).
A boost occurs at 55Hz for low input levels-i.e.-30mV. The gain measurements in this graph should be referenced to the input level.

Figure 3. AM-3P Amplifier PCB Assembly Block Diagram



AM-3P left/right channel frequency response with treble control at min, max, and flat positions. The gain measurements in this graph should be referenced to the input level.

Figure 4. AM-3P Equalizer PCB Assembly Block Diagram

AM-3P THEORY OF OPERATION

NOTE: The following discussion references the **AM-3P EQ** and **Amplifier** schematics and block diagrams. The block diagrams,**Figures 3 and 4,** can be found on **page 5** and the schematics are located in the back of this service manual.

GENERAL

The AM-3P powered Acoustimass loudspeaker system is designed to be used with the BOSE Lifestyle Music Center (or other line level audio source) to form a simple, yet complete, home audio system. The AM-3P is based acoustically on the AM-3 Acoustimass (unpowered) loudspeaker system. The AM-3P, like its big brother, the AM-5P, offers many advantages over a separately powered AM-3 system. These include:

- Automatic turn-on/ turn-off (mute) of the amplifier output stage
- Automatic (BOSE patented) dynamic equalization
- Bi-amplification for better power distribution to speakers
- Active equalization for smoother frequency response
- Amplifier short-circuit and DC offset fault protection
- Local volume/sensitivity control
- Bass/treble room compensation controls
- Differential input stage (to reject hum)
- Dynamic compressor to prevent amplifier output overload distortion

BLOCK DIAGRAM DESCRIPTION

NOTE: In the discussion of L/R (left/right) channels,only the right channel is discussed. The left channel operation is identical.

1. Power Supply

A single, universal, **115/230V EI** core power transformer is used to power the system. It has been specially designed for minimum magnetic flux leakage and stand-by power consumption. The transformer primary remains energized (always on) except when the power switch is in the off position.

The two primary windings of the transformer are wired in series for 230V operation, and in parallel for 115V operation, depending on the position of the customer accessible voltage select switch. If the system is accidentally energized at 230V with the switch in the 115V position, the replaceable fuse (**F1** located on the **Equalizer PCB** assembly), will open the circuit within 2 minutes. This will be the only damage to the system.

A non-serviceable thermal fuse is located inside the transformer to limit the maximum temperature to 145 °C under abnormal conditions. However, in most cases the external fuse (F1) should fail before the internal transformer thermal fuse. The thermal fuse can be checked by measuring the continuity between **pins 1** and **4** (black and white wire) of the primary connector. This connector is located on the **Equalizer PCB**.

2. Differential Input Stage

Audio input applied at the phono jack (**J8**) connects directly to the right (left) differential amplifier buffer. This stage accomplishes several functions:

- Provides rejection of common-mode interference (such as hum) that might be picked up by the long audio cable between the AM-3P and lifestyle music center

- Provides input overload and ESD protection through diodes **(D101-104**)

- Removes radio frequency Interference through **C103,125,127**

- Provides DC blockage by **C101,102**

- Provides a 6 dB gain through op-amp **U101**.

3. Compressor/Treble Stage

U102 (pins 1,2,3), with potentiometer **VR2** at the center position, operates as a conventional inverting operational amplifier stage with a gain of 6 dB. However, when voltage overload is present at the speaker outputs, transistor array **U1** (pins 1,2,3) receives a turn-on signal from the compressor detect stage. Under this condition, the transistor acts as a variable resistor to ground, and with **R107**, forms a resistor divider network that attenuates the audio signal. The amount of attenuation and timing action is carefully controlled by the compressor detect stage (to be discussed later).

Potentiometer **VR2** adjusts the amount of treble boost or cut. In the full counterclockwise position, the wiper (pin 4) shorts to pin 1. The maximum boost and cut frequency response graph is shown in **Figure 2** on **page 4**.

4. High Frequency (HF) Equalization

High frequency equalization and crossover is achieved through three cascaded active EQ stages. These stages consist of **U103,U104** and **U105**. The purpose of equalization is two-fold:

- It provides very sharp low frequency attenuation below 200 Hz (the crossover frequency) to prevent overload of the L/R speakers

- It provides finely tailored correction in the speaker pass-band so that overall frequency response of the system is acoustically correct.

The **U103** stage is a combination 2nd order 200 Hz high-pass filter and 5 dB 2 kHz dip (notch) filter. The **U104** stage provides the 5 dB peak at 200 Hz and the sharp band-reject between 100 and 200 Hz. Finally, the **U105** stage is a combination 2nd order 20 kHz low-pass filter and 2 dB 350 Hz notch filter.

5. Bass Control

The bass channel signal is derived from the sum of the left and right channels through resistors **R129** and **R229** and through inverting op-amp summer **U2**. Potentiometer **VR3** simply adjusts the gain of the stage between -6 dB to +6 dB. In the flat (center) position of the control ,the gain is 0 dB. Adjusting the bass by varying the gain of the overall bass channel has been determined to be acoustically appropriate to compensate for various placement options of the bass module.

6. Automatic Dynamic Loudness

In order to compensate for the ear's loss of bass response at low listening levels, a BOSE patented (4,739,513) automatic loudness circuit is employed. This circuit automatically senses the volume level of the incoming audio signal and properly adjusts the amount of low frequency bass boost. When the volume level is high, the frequency response of the circuit is flat. When the volume level is decreased (at the music center), the low frequency gain is increased in the region between 50 and 150 Hz (see the bass channel frequency response graph on page 4). This loudness contour, and the time constants associated with it, have been precisely determined through psycho-acoustic testing and should not be confused with other conventional loudness schemes.

Circuit operation is as follows: Left and right audio output at **pins 7** and **1** of **U101** are summed together by resistors **R132** and **R232**. The **AC** signal at **pin 3** of level detect op-amp **U2** is negative-peak detected and is presented across emitter resistor **R9**. The peak detected signal has a (approximate) 4 second hold time and a 4 sec/10 dB release time constant which is developed within the feedback loop of **U2** (pins 1,2,3). The voltage across **R9** is converted to a current source through transistor **Q3**, and flows into **pin 5** of transconductance amplifier **U4**. **U4** is placed in the feedback loop of op-amp **U3** to create an inverse voltage controlled bandpass stage such that increased current into **pin 5** of **U4** causes the gain of the band-pass stage to decrease. The 55 Hz band-pass filter consists of resistors **R10,11** and **15** and capacitors **C6** and **C7**. At frequencies above 200 Hz, the stage acts as a unity gain follower (flat frequency response) through resistors **R16,17**, and **18**. The over-all loudness contour response is visible at **U3 pin 1**.

7. Low Frequency (LF) Equalization

Low frequency bass channel equalization and crossover is accomplished in two active filter stages. The first stage consists of op-amp **U3** (pin 5,6,7),capacitors **C9** and **10** and resistors **R19,20,** and **21.** It creates the sharp band-reject attenuation below 50 Hz. The second stage consists of op-amp **U5** (pin 1,2,3,), capacitors **C13** and **14**, and resistors **R24,25,26** and **27.** It acts as a combination 2nd order 50 Hz high-pass and 200 Hz low-pass filter. The combined response of these two stages is shown in the bass channel frequency response graph in **Figure 1** on **page 4**.

8. Auto Turn-On/Off Mute

An improved version of auto turn-on/off is used in the AM-3P. A separate 3.5 mm stereo mini-jack (**J7**) is used to receive the turn-on signal from the serial data output of the Lifestyle music center. When the 3.5 mm plug is inserted, the audio sense circuit is disabled and the amplifier outputs will only unmute if the DC control signal is present at **J7 pin 3**. This action occurs through the built-in DPDT switch in **J7** which connects **J7 pin 3** directly to the **Q9** mute circuit. Therefore, the system is not subject to random false turn-on (from electrical noise, etc.) when used with the Lifestyle music center.

When the AM-3P is used with a source other than the Lifestyle music center,the stereo mini-plug is not inserted into the jack, and therefore mute transistor **Q9** is directed to the output of the audio detect comparator **U6** (pin 5,6,7). This comparator uses hysteresis to achieve a positive turn-on of at least 90 seconds before the system will revert to stand-by (mute) mode after removal of the audio signal.

9. Compressor Detect

The output of each left/right amplifier is half-wave detected through diodes **D108** and **208**. This voltage is divided down by **R53** and **R54** and presented at the emitter of **Q12**. Power supply voltage is similarly divided down by **R50** and **R51** and presented at the base of **Q12**. Diodes **D13** and **D14** simulate the saturation voltage drop that occurs in the power amp stage. Therefore, when the audio output of any amplifier comes within 2 volts of the instantaneous power supply voltage, **Q12** will conduct.This signals the compressor (limiter) to act. Current from **Q12** charges hold capacitor **C35** and releases capacitor **C36**. Voltage at **C35** is buffered by transistor **U1** (pins 5,6,7) and decreased down to a logarithmic voltage by resistor **R67** and diode **U1** (pins 12,13,14). This voltage is then presented to the base of compressor transistors **U1** (pins 1,2,3) and **U1** (pins 8,9,10) which are described in the compressor section.

The DC control voltage present across capacitor **C35** is derived through the use of an improved hold and release characteristic, resulting in lower compressor distortion. In conventional limiters, this DC control voltage is derived by a simple series diode and parallel RC network to ground. Unfortunately, for low frequency overload, this results in substantial ripple voltage present on the DC gain control voltage. This results in the all too common problem of mid-range voices or instruments being badly “modulated” by low frequency overload. This problem is solved by having two separate capacitors, one that “holds” the smooth DC voltage just long enough to prevent low frequency ripple (approximately 40ms) and the other (**C36**) which quickly releases the hold capacitor (through diode **D17**) at the proper time to maintain overall 100ms release time.

10. Power Amp (Amplifier PCB)

Four identical topology class B, power amplifier stages are used to create the three power amplifier channels. One each is used for the left and right power amplifiers (2 x 20W into 4 Ohm), and two are used in bridged mode for the bass channel to create 50W into 5 Ohm. Operation of the left channel (representative) is as follows:

A positive signal at op-amp input **U106 pin 3** causes op-amp supply current to flow into **pin 7** (and out through **pin 6**) through **Q103. Q103** is used simply to buffer the +20V high voltage supply down to a safe +7.4V for the op-amp. This current also flows through **R132** and diode **D105**. **R132** and **D105**, together with driver transistor **Q105** and **R134** form a current mirror which multiplies the current through **Q103** by the ratio **R132/R134**. This increased current flows through driver transistor **Q105**, and into the base of output transistor **Q107**. The hFE current gain of output transistor **Q107** (about 100) provides final current amplification before reaching the speaker output.

The power amplifier topology is complementary.Therefore,operation of the amplifier on negative half cycles is identical to positive cycle operation, except for component reference designations.

11. Short-Circuit Protection

Left and right power amp stages have short circuit protection. This is necessary to prevent damage to the amplifier from customer misuse that might occur, for instance, if the customer were to accidentally short the speaker cable wires that connect to the cube speakers. If this happens, all three amplifiers will momentarily mute for about 3-4 seconds and continue to mute until the abnormal condition is removed.

Short circuit protection is achieved with the use of a **.1** Ω resistor (**R146** for left channel) in series with each amplifier output. Under normal conditions, peak current to the 8 Ω speakers should never exceed **3.5A**. If current flow momentarily exceeds **5.0A**, then **Q109** will conduct and trigger monostable multivibrator circuit **U5** (pins 5,6,7)on the **Equalizer PCB**. **Pin 7** will go high (for about 3 seconds) and through diode **D12** will trigger mute transistor **Q10**. Turn-on of **Q10** causes all three amplifiers to mute. Referring to the left channel power amplifier, actual muting occurs by turning on transistors **Q110, 101**, and **102** which cause both driver transistors (**Q105** and **Q106**) to turn off. When the driver transistors are off, there can be no current flow through the output transistors, which results in no current flow to the speaker.

12. DC Offset Protection

If any one of the three amplifier channels should fail, it is likely that a large DC voltage will occur at the output of that channel. If this occurs, the DC offset detect circuit will cause the AM-3P amplifier power supply to shut down. It will remain shut-down until the unit is unplugged from the power source. This provides a safe indication to the customer that the unit requires service.

Detailed operation is as follows: The amplifier outputs are summed by resistors **R149,249,318**, and **418**, and (low pass) filtered by capacitor **C29**. For a sustained DC offset, **C29** will charge either negative or positive. A positive offset will trigger **Q7** and a negative offset will trigger **Q8**. This in turn causes **Q6** to conduct and latches **Q5** permanently on. **Q5** then shorts the emitter of **Q4** to ground (off). **Q4** is the transistor that controls turn-on of **2P1T relay K1** (on the **Amp PCB**) that is used to connect +/- 20V supply rails to the power amplifiers. Thus, the amplifiers are de-energized.

NOTES FOR FUTURE REFERENCE

AM-3P DISASSEMBLY/ ASSEMBLY PROCEDURES

Module Procedures

1.Cover Removal

NOTE: Refer to **Figures 5** and **6** for an exploded view of the module. Certain parts will be referred to in these procedures. The item number which corresponds to the part will be enclosed in parentheses-i.e.-heatsink (9).

A. Remove the cover cap (1) either by using the flat edge of a screwdriver or your fingers. Find the recess on one side of the cap and lift the cap up and away from the cover (3).

B. Remove the screw (2) located under the cover cap.

C. Pull the 3 (friction fit) control knobs (4) directly out from the module.

D. Stick your fingers into the control knob holes. Swivel the cover carefully away from the connector panel and pull it away from the module.

2. Cover Replacement

A. Hook the cover (3) into place by slanting the cover slightly forward (with connector panel facing you) and aligning the appropriate holes with the connector panel.

B. Snap the cover into place.

C. Replace the 3 control knobs (4) by pushing them in towards the module.They are keyed and will only fit one way.

D. Secure the cover to the module with 1 screw (2).

E. Hook the cover cap (1) into place. The notched edge must align with the module's label side.

3. EQ PCB Assembly Removal

A. Remove 1 screw (6) which secures the PCB (5) to the adapter bracket (8).

NOTE: The connector gasket (7) has a light adhesive backing. Be careful not to tear it during removal.

B. Pull the connector gasket carefully away from the connector panel.

C. Release the PCB from the 4 adapter bracket snaps (not shown),one edge at a time.

D. Unplug the flat,16-pin cable (13) which is connected to the Amplifier PCB (11).

NOTE: The J5 connector pins fit snugly into the mating connector housing. Take care when attempting to unhook this connector.

E. Disconnect the 5-pin connector housing, J5, (which is connected to the transformer assembly's (18) primary side),by pulling the PCB carefully up from the unit. Unhook the connector housing from the slot on the adapter bracket.

4. EQ PCB Assembly Replacement

A. Hook the J5 connector housing into the slot on the adapter bracket (8).

NOTE: Connector J5 has a unique keying feature and can only be re-connected one way.

B. Lower the PCB (5),solder side up,into position. The PCB's connector panel must align with the module's label side. Make sure that the pins on connector J5 line up with its mating connector housing (transformer primary wires).

C. Push down the corners of the PCB until all 4 adapter bracket snaps (not shown) engage. Make sure that the J5 connector pins are completely re-connected to the mating connector housing.

D. Plug in the flat,16-pin cable (13) to the PCB.

E. Secure the PCB to the bracket with 1 screw (6).

F. Place the connector gasket (7) over the connector panel.

5. Adapter Bracket and Heatsink Removal

NOTE: It is only necessary to remove 3 screws (10) to remove the adapter bracket (8). These screws are located on the same side as the module's labels. The bracket hooks onto a flange that is part of the heatsink (9). If further teardown of the unit is required,then all 6 screws (10) should be removed.

A. Remove 6 screws (10) that secure the adapter bracket and the heatsink to the module.

B. Pull the bracket and heatsink away from the module.

NOTE: The Amplifier PCB Assembly (11) may be stuck to the heatsink with thermal grease.

6. Adapter Bracket and Heatsink Replacement

A. Lower the heatsink (9) into position on top of the Amplifier PCB (11). Make sure that the side of the heatsink with smaller fins is aligned with the module's label side.

B. Align the screw holes on the heatsink with those on the transformer cup (19).

C. Hook the bracket onto the heatsink flange.Lower the adapter bracket (8) into position. The bracket has screw holes only on one side. These should be aligned with the screw holes on the module's label side.

D. Secure the heatsink and adapter bracket to the module with 6 screws (10).

7. Amplifier PCB Assembly Removal

NOTE: It is not necesary to completely tear down the unit to access the Amplifier PCB (11). Follow the simplified **steps A-D** below if direct access to this PCB is required and you have not already disassembled the unit.

A. Remove the cover (3) using **Procedure 1**.

B. Unplug the flat,16-pin cable (13).

C. Remove 6 screws (10) which secure the adapter bracket (8) and heatsink (9) to the module.

D. Lift the EQ PCB (5),adapter bracket and heatsink away from the module.

NOTE: The EQ PCB should remain connected to the transformer primary side. It should also remain secured to the adapter bracket with 1 screw (6).

E. Lift up the Amplifier PCB (11) and unhook connectors J1 and J4 from the PCB. J4 is connected to the woofer and J1 is connected to the transformer assembly's (18) secondary side. Pull the PCB away from the unit.

F. Remove the 2 transistor spring clips (14) which rest on the transformer cup (19).

8. Amplifier PCB Assembly Replacement

A. Place the 2 transistor spring clips (14) on the transformer cup (19).

B. Re-connect connector J4 to the safety-controlled woofer cable (24) and connector J1 (5 pin) to the transformer assembly's (18) secondary side.

NOTE: The Amplifier PCB (11) has large capacitors which will only fit into one side of the transformer cup (19).

C. Lower the PCB (solder side up) into place on top of the transformer cup. There are holes in each corner of the PCB that align with the locater pins on the cup.The transistors (on PCB edges) should rest lightly on the transistor spring clips (14). Place the transformer primary connector wires into the slot on the PCB.

NOTE: If no further servicing is required,use the simplified steps below to re-assemble the unit.

D. Replace the heatsink (9) using **Procedure 6,steps A. and B**.

E. Place the transformer primary into the slot on the Amplifier PCB (11).

F. Replace the adapter bracket (8) and EQ PCB (5) and secure using **Procedure 6,step C**.

G. Secure the heatsink, adapter bracket and EQ PCB to the module with 6 screws (10).

H. Replace the cover (3) using **Procedure 2**.

9. Transformer Assembly Removal

NOTE: If direct access to the transformer is required and the unit has not been disassembled, refer to the simplified steps provided in **Procedure 7**, along with **steps A. and B**. below.

A. Remove 4 screws (15) and 4 washers (16) using a 3/32-inch Allen wrench and lift the transformer assembly (18) out of the transformer cup.

NOTE: With the module's label side facing you, the transformer's primary side is on the left and the secondary side is on the right.

10. Transformer Assembly Replacement

NOTE: The transformer bracket (part of the assembly) has a bent flange in corner which will only allow the transformer to fit 1 way in the transformer cup (19).

A. Lower the transformer assembly (18) into the transformer cup.

B. Align the screw holes on the transformer with those on the cup.

C. Secure the transformer to the cup with 4 screws (15) and 4 washers (16) using a 3/32-inch Allen wrench.

NOTE: If no further servicing of the unit is required,refer to the simplified steps provided in **Procedure 8** to re-assemble the unit.

11. Transformer Cup and Gasket Removal

NOTE: To directly access the transformer cup and gasket,follow the simplified steps provided in **Procedure 9**,then proceed with **steps A. and B.** of this procedure.

A. Remove 2 screws (10) which secure the transformer cup (19) to the module and lift the transformer cup away from the module.

NOTE: There might be woofer connector wires (safety controlled cable-(24)) taped over the transformer cup gasket (20). Note the location of the cable relative to the module. Remove the tape and move the wires aside.

B. Remove the transformer cup gasket .

12. Transformer Cup and Gasket Replacement

NOTE: The transformer cup gasket (20) has raised edges which should be facing up when positioning the gasket. The gasket also has a U-shaped opening which will align precisely with the module.

A. Place the gasket in position over the opening of the module.

B. Lay the woofer cable (24) over the appropriate corner of the bass module. The wires must cross over the top of the gasket.

C. Position the transformer cup. The cup has a locating ridge and only fits into the module one way. The lip should be aligned with the U-shaped opening in the module.

D. Secure the cup to the module with 2 screws (10).

NOTE: If no further servicing of the unit is required,refer to the simplified steps provided in **Procedure 10** to re-assemble the unit.

13. Woofer Removal

NOTE: If direct access to the woofer is required and the unit has not already been disassembled,follow the simplified steps **A.-D.** given below.

A. Remove the cover (3) using **Procedure 1**.

B. Remove the EQ PCB (5),heatsink (9) and adapter bracket (8) using **Procedure 7,steps C. and D**.

C. Lift up the Amplifier PCB (11) and unhook the safety controlled woofer cable (24) from connector J4 (Amplifier PCB).

D. Remove the transformer cup (19) and gasket (20) using **Procedure 11**.

E. Remove 4 screws (22) which secure the woofer (21) to the baffle (part of the module).

14. Woofer Replacement

A. Carefully lift the woofer out and cut the wires connected to the woofer terminals as close to the terminals as possible.

NOTE: Make a note of the woofer terminal orientation relative to the module. The woofer should be re-positioned in its original location.

B. Strip the wires and connect to a replacement woofer. Make sure that the **red** wire is connected to the positive (+) terminal and the **black** wire is connected to the negative (-) terminal. When re-positioning the woofer,make sure that the woofer gasket (23) is correctly positioned behind the woofer to make an airtight seal.

C. Re-mount the woofer (21) to the module using 4 screws (22). Repeat the woofer test procedures.

NOTE: If no further servicing of the unit is required,use the following simplified procedures to re-assemble the unit.

D. Replace the transformer cup (19) and gasket (20) using **Procedure 12**.

E. Replace the transformer assembly (18) using **Procedure 10**.

F. Re-install the Amplifier PCB (11) using **Procedure 8**.

G. Re-install the heatsink (9) and adapter bracket (8) using **Procedure 6**.

H. Re-install the EQ PCB (5) using **Procedure 4.**

I. Replace the cover (3) using **Procedure 2**.

Satellite Procedures

NOTE: Refer to **Figure 7** for an exploded view of the satellite. Certain parts will be referred to in these procedures. The item number which corresponds to the part will be enclosed in parentheses-i.e.-baffle (9).

1. Grille Removal

A. Grasp the top and bottom of the grille and grille frame (1,2). Pull the assembly carefully away from the satellite.

2. Grille Replacement

A. Align the grille feet (not shown) with the 4 holes in the satellite enclosure. Push the assembly gently into place.

3. Twiddler Removal

A. Remove the 4 screws (4) holding the twiddler (3) in place. Lift the twiddler out and cut the wires connected to the twiddler as close to its terminals as possible.

4. Twiddler Replacement

A. Strip the wires and connect to the replacement twiddler (3).

NOTE: The positive (+) terminal of each twiddler is marked with a red dot.

B. Connect the red wire to the positive (+) twiddler terminal and the black wire to the negative (-) twiddler terminal.

C. Lower the twiddler into the satellite enclosure and secure the twiddler to the enclosure with 4 screws (4). Repeat the satellite test procedures.

5. Terminal Cover Removal

NOTE: There are catches on the top and bottom (inside) of the terminal cover (7) that hook it into the satellite enclosure. Take care when removing the cover.

A. Using your fingers or the flat edge of a screwdriver,pull the terminal cover carefully from the satellite enclosure using the recesses in the cover.

6. Terminal Cover Replacement

A. Snap the terminal cover (7) carefully into place on the satellite enclosure.

7. Connector Removal

A. Remove 2 screws (4) which hold the connector in place.

8. Connector Replacement

A. Secure the connector (6) to the satellite enclosure with 2 screws (4).

NOTES FOR FUTURE REFERENCE

AM-3P TEST PROCEDURES

Satellite Test Procedures

NOTE: Use these procedures only when satellites come in to be serviced (without the bass module).

1. Sweep Test

A. Connect an oscillator to a power amplifier. Adjust the amplifier output to **4 Vrms**. Connect the amplifier leads to the satellite (cube speaker) input terminals. Sweep the oscillator from **100 Hz** to **5 kHz**. If any twiddler buzzes or sounds distorted,replace it.

2. Phase Test

NOTE: Supply voltage should only be momentarily applied to the satellite input terminals to avoid possible damage to the twiddlers.

A. Set a **DC** power supply to **8 volts**. To ensure that each twiddler is connected in phase, connect the positive supply lead to the positive (+) satellite input terminal (red) and the negative supply lead to the negative (-) satellite input terminal (black). The twiddler should move outwards with the application of the supply voltage.

NOTE: If any twiddler cone deflects inwards or does not move,check all connections.

Woofer (Module) Test Procedures

NOTES: Use these procedures only when a module comes in to be serviced (without satellites). All tests should be performed with the bass and treble control knobs in the normal or "detent" position and the volume control knob at maximum volume.

It may be necessary to disassemble the module in some of these procedures. Refer to the **Disassembly/Assembly Procedures** section for specific instructions.

1. Turn-On Test

NOTES: Refer to the **AM-3P EQ PCB schematic** for the location of the **J7** mini-jack input,**pins 1** and **3**. It is contained in the **On/Off Control circuit** on this schematic.

This test can be performed with a fully assembled module.

This procedure also refers to the "**ring**" and "**sleeve**" of a standard **3.5 mm** mini-jack.

A. Connect an oscillator to the module's L/R audio input terminals. Adjust the oscillator to **500 Hz,220 mVrms**.

B. Insert a **3.5 mm** mini-jack into the input terminal labeled "**System Control**". The audio signal should mute.

C. Set a **DC** power supply to **8 volts** and apply this voltage between **pins 3** (ring) and **1**(sleeve-which is connected to ground) of the mini-jack. The audio signal should return.

2. Sweep Test

NOTE: This test can be performed with a fully assembled module.

A. Connect an oscillator to the module's L/R audio input terminals. Adjust the oscillator to **100 Hz,220 mVrms**. Sweep the oscillator from **10-300 Hz**. There should not be any loud,extraneous sounds. If there are any loud buzzes or distortion,replace the woofer.

NOTE: There should not be any buzzes or rattles from within the module. Redress any wire or component that buzzes or rattles.

3. Tone Control Test

NOTE: This test can be performed with a fully assembled module.

A. Connect an oscillator to the module's L/R audio input terminals. Adjust the oscillator to **100 Hz,220 mVrms**.

B. Rotate the bass control knob fully clockwise and counterclockwise from its center or "normal" position. The bass level should increase and decrease cleanly without making a scratchy noise. Clean or replace any potentiometer that makes this noise.

C. Repeat this procedure for the treble control using a frequency of **4 kHz.**

4. Frequency Response of L/R (Twiddler) Channels

NOTE: This test can be performed with a fully assembled module.

A. Connect an oscillator to the module's L/R audio input terminals. Adjust the oscillator to **1 kHz,200 mVrms**. Connect a piece of test equipment capable of measuring decibels to either the left or right twiddler output terminals (labeled "**To Cube Speakers**"). Measure the dBs at this setting and use as a 0 dB reference.

B. Once connected to either the left or right "cube speaker" output terminals,adjust the oscillator frequency and measure the relative response according to the chart located at the end of this procedure.

C. Repeat this test for the other channel.

Frequency	Relative Response
100 Hz	-16.0 dB ± 2.0 dB
200 Hz	+5.7 dB ± 1.5 dB
360 Hz	-2.0 dB ± 1.5 dB
1 kHz	0 dB
2 kHz	-5.2 dB ± 1.5 dB
10 kHz	+1.0 dB ± 1.5 dB
20 kHz	-1.4 dB ± 2.0 dB

5. Twiddler Power Output Test

NOTE: This test can be performed with a fully assembled module.

A. Connect a **4Ω** resistive load across either the left or right twiddler output terminals (labeled "**To Cube Speakers**"). Connect a voltmeter across the load.

NOTE: These measurements can be obtained at 120 and 240 V. Results will vary depending on the line voltage used.

B. Connect an oscillator to the module's L/R audio input terminals. Adjust the oscillator to **1 kHz, 549 mVrms.**

C. Measure the voltage across the load. It should be approximately **8.9 volts** (**20 watts**).The signal should look undistorted when viewed on an oscilloscope.

6. Twiddler Short Circuit Protection Test

NOTES: This test can be performed with a fully assembled module.

Do not short out for longer than 1 second.

A. Adjust the oscillator to **1 kHz, 200 mVrms**. Short the left or right twiddler output terminals. The signal should mute for approximately 3 seconds.

7. Air Leak Test

NOTE: Part A. of this test can be performed with a fully assembled module.

A. Connect an oscillator to the module's left/right (L/R) audio input terminals. Adjust the oscillator to **40 Hz,1 Vrms**. Listen for air leaks around the transformer cup gasket. If there is a"whooshing"noise,there is probably an air leak around the gasket. Refer to the **Disassembly/ Assembly Procedures** section for instructions on accessing this gasket. Re-position the transformer cup gasket under the cup to make an airtight seal.

NOTE: In order to perform the remaining procedures,it is necessary to disassemble the module to the woofer level. Leave all connections intact to perform these tests. Remove the cover using the procedures in the **Disassembly/ Assembly Procedures** section. Remove 6 screws which secure the heatsink to the module. Remove 2 screws which secure the transformer cup to the module. Slide out the transformer cup and PCBs carefully. Lay the module on its side to access the woofer more easily.

B. Using the same oscillator setting as part A., listen for air leaks around the woofer gasket. If there is a "whooshing" noise around the gasket,re-position the woofer gasket behind the woofer to make an airtight seal.

8. Woofer Rub and Tick Test

A. Connect an oscillator to the module's L/R audio input terminals. Adjust the oscillator to **10 Hz,1.5 Vrms**. No extraneous noises such as rubbing,scraping or ticking should be heard.

NOTE: To distinguish between normal suspension noise and rubs or ticks,displace the cone on the woofer slightly with your fingers. If the noise can be made to go away or get worse,it is a rub or a tick and the woofer should be replaced. If the noise stays the same,it is normal suspension noise and the woofer is fine. Suspension noises will not be heard with program material.

9. Woofer Phase Test

A. Disconnect the woofer (connector **J4**) from the **Amplifier PCB**. Set a **DC** power supply to **8 volts**. Connect the positive supply lead to the positive (+) woofer connection (**red**) and the negative supply lead to the negative (-) woofer connection (**black**). The woofer should move outwards with the application of the supply voltage.

10. Frequency Response of Bass Channel

NOTES: Pull the heatsink away from the Amplifier PCB to expose the board's solder side. It will be necessary to access the woofer output connector (J4) to perform the remaining procedures.

Bass amplifier output measurements are made across **J4 pins 1** and **2**. The amplifier uses a bridged output. **Do not connect either output to ground**. Any test equipment that will be connected to these points must be floated,or isolated from ground.

A. Make up a temporary set of connections to the woofer output connector **J4**.

B. Connect an oscillator to the module's L/R audio input terminals. Adjust the oscillator to **100 Hz,200 mVrms**.

C. Connect a piece of test equipment capable of measuring decibels to the woofer output connector **J4**. **Make sure that the meter is not grounded**. Measure the decibels at this setting and use as a reference for all other readings.

D. Adjust the oscillator frequency and measure the relative response according to the chart located at the end of this procedure (next page).

Frequency	Relative Response
20 Hz	-18.0 dB ± 2.0 dB
55 Hz	+1.8 dB ± 1.5 dB
100 Hz	0 dB
200 Hz	-0.5 dB ± 1.5 dB
400 Hz	-10.7 dB ± 1.5 dB

11. Bass Channel Dynamic EQ Gain

NOTE: Use the same test setup as **Procedure 10**.

A. Adjust the oscillator to **100 Hz,30 mVrms**. Use this as a reference point.

B. Adjust the oscillator to **55 Hz**. There should be a boost of approximately **5 dB**. (a **3.0 dB ± 1.0 dB** difference between the **30mV** and the **200 mV** input level). Refer to the chart in the previous procedure.

12. Woofer Power Output Test

NOTE: Use the same test setup as **Procedure 10**,except remove the dB meter. Make sure that any test equipment connected to the woofer output is floated (or isolated from ground).

A. Connect a **5Ω** resistive load to the woofer output. Connect a voltmeter across the load.

NOTE: These measurements can be obtained at 120 and 240 V. Results will vary depending on the line voltage used.

B. Connect an oscillator to the module's L/R audio input terminals. Adjust the oscillator to **100 Hz,345 mVrms**.

C. Measure the voltage across the load. It should be approximately **15.8 volts (50 watts**). The signal should look undistorted when viewed on an oscilloscope.

Complete System Tests

NOTE: Use these procedures when a complete AM-3P system (module and satellites) comes in to be serviced.

1. System Phase Test

A. Use the procedures already listed for the satellites and the module. Use **Procedure #2** under **Satellite Test Procedures** and **Procedure #9** under **Module Test Procedures**.

2. System Sweep Test

A. Use the procedures already given for the satellites and the module,except use **220 mVrms** for both parts of the test. Use **Procedure #1** under **Satellite Test Procedures** and **Procedure #2** under **Module Test Procedures**. Make sure that the satellites are connected to the bass module.

3. All Other Tests

A. All other tests listed under Module Test Procedures can be used to test a complete system.

PARTS LISTS AND EXPLODED VIEWS

The following section contains parts lists and exploded views for the AM-3P powered speaker system. The parts lists are broken down as follows:

- Module Parts List and Module Exploded View. A view of the woofer is contained in a separate figure.

-Satellite Parts List and SatelliteExploded View.

-Packaging Parts List and Packaging Exploded View.

-PCB Assembly Parts Lists. PCB layouts and schematics are located in the back of the service manual.

AM-3P Bass Module Parts List (Figures 5 and 6)

Item Number	Description	Part Number	Qty. Per Module	See Note
1	Cap-Cover,White	145105-1	1	
	Cap-Cover,Black	145105-2	1	
2	Screw-Mach.,8-32x1/2,PAN,XREC	121316-08	1	
3	Cover-White,International	144590-0231	1	
	Cover-Black,International	144590-0222	1	
	Cover-Black,Japan	144590-0822	1	
4	Knob-Control,White	148839-1	3	
	Knob-Control,Black	148839-2	3	
5	PCB Assy-EQ,US/International	193567-1		1,2
	PCB Assy-EQ,Japan	143624-2	1	1,2
	PCB Assy-EQ,Europe 143624-3 replaced by 175302-3		1	1,2
6	Screw-HILO,6x1/2,PAN,XREC	127015-08	1	
7	Gasket-Cover,Connector	146208	1	
8	Bracket-Adapter,Black	144587-2	1	1
9	Heat Sink	144588	1	1
10	Screw-HIRS,8-10x1,PAN,XREC/SQ	137527-16	8	
11	PCB Assy-Amplifier	149374	1	1,2
	PCB Assy-Amplifier	143627	1	1,2,3
12	Foam Tape-3"	129284-030	1	1
13	Cable-Flat,16 pin,Terminated	144437	1	
14	Clip-Spring,Transistor	144591	2	
15	Screw-Shoulder,#8-32x.31L	143444-04	4	
16	Washer-Flat,#10,.08-.085 THK	146981	4	
17	Grommet-Vibration Isolator	143445	4	

NOTES

1. This part is not normally stocked as a service part.

2. Refer to either the EQ or Amplifier PCB Assembly Parts Lists for the part numbers of components located on these boards.

3. This version of the Amplifier PCB has been replaced by P/N 149374. Refer to the Amplifier PCB Assembly Parts List and Schematic for specific information.

AM-3P Module Parts List (Continued)

Item Number	Description	Part Number	Qty. Per Module	See Note
18	Transformer -120/240V (US/Eur.)	143051	1	
	Transformer -100V (Japan)	145318	1	
19	Cup-Transformer,Black	144589-2	1	
20	Gasket-Transformer Cup	143514	1	
21	Woofer -5-1/4"	143357	1	
22	Screw-HIRS,8-10x3/4,PAN,XRC/SQ	137527-12	4	
23	Woofer Gasket	104794-08	1	
24	Cable-Speaker,Safety Controlled	143513	1	

AM-3P Satellite Parts List (Figure 7)

Item Number	Description	Part Number	Qty. Per Satellite	See Note
1	Grille Assembly-Left,Black	142142-11	1	
	Grille Assembly-Left,White	142142-13	1	
	Grille Assembly-Right,Black	142142-21	1	
	Grille Assembly-Right,White	142142-23	1	
2	Grille Frame-Left,Black	142079-11	1	
	Grille Frame-Left,White	142079-13	1	
	Grille Frame-Right,Black	142079-21	1	
	Grille Frame-Right,White	142079-23	1	
3	Twiddler,2-1/4" (Gasket-Backed)	147525	1	
4	Screw-HIRS,6-10x1/2,PAN,XREC	124773-08	6	
5	Batting-Polyester	116082	N/A	1
6	Connector,Terminal Strip	136547	1	
7	Terminal Cover-Left,Black	136546-11	1	
	Terminal Cover-Left,White	136546-13	1	
	Terminal Cover-Right,Black	136546-21	1	
	Terminal Cover-Right,White	136546-23	1	

NOTE

1. This part is not normally stocked as a service part.

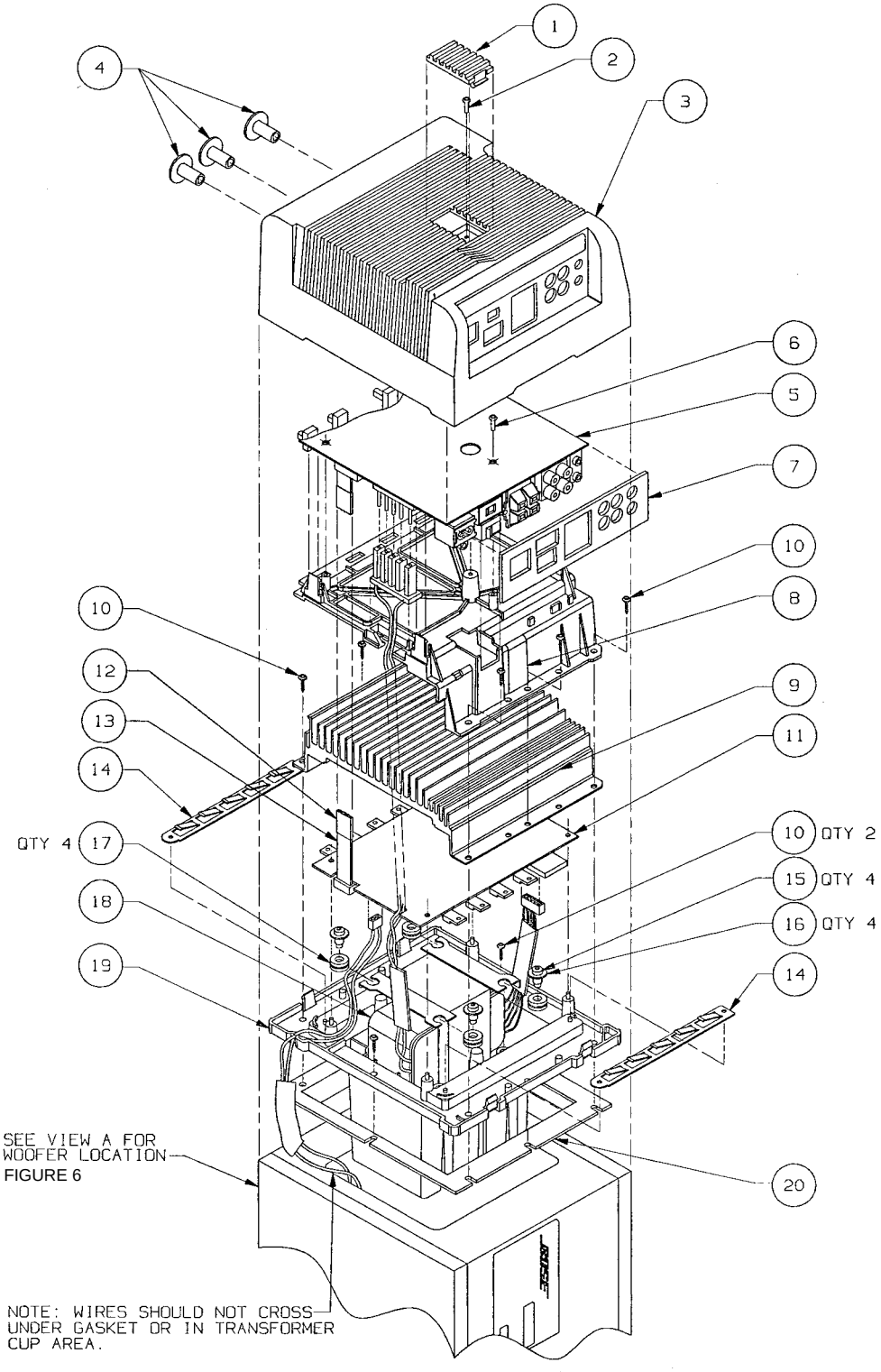


Figure 5. AM-3P Bass Module Exploded View

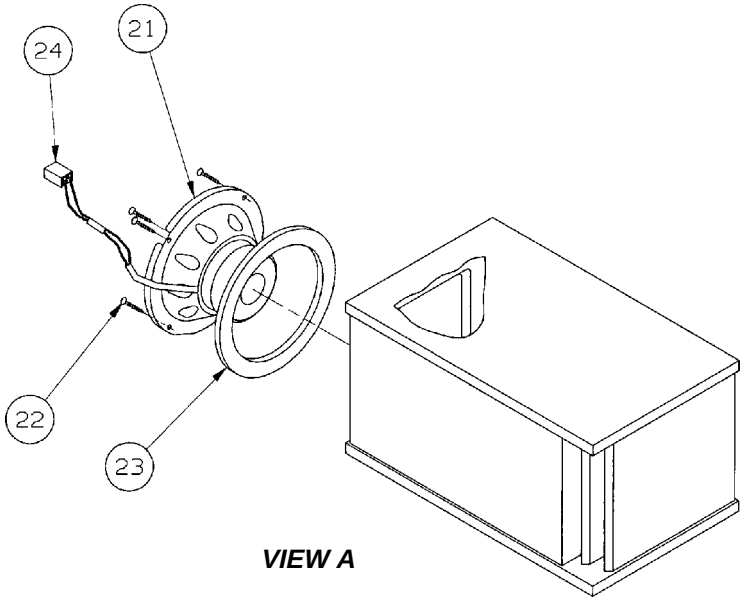


Figure 6. Woofer Location in Module

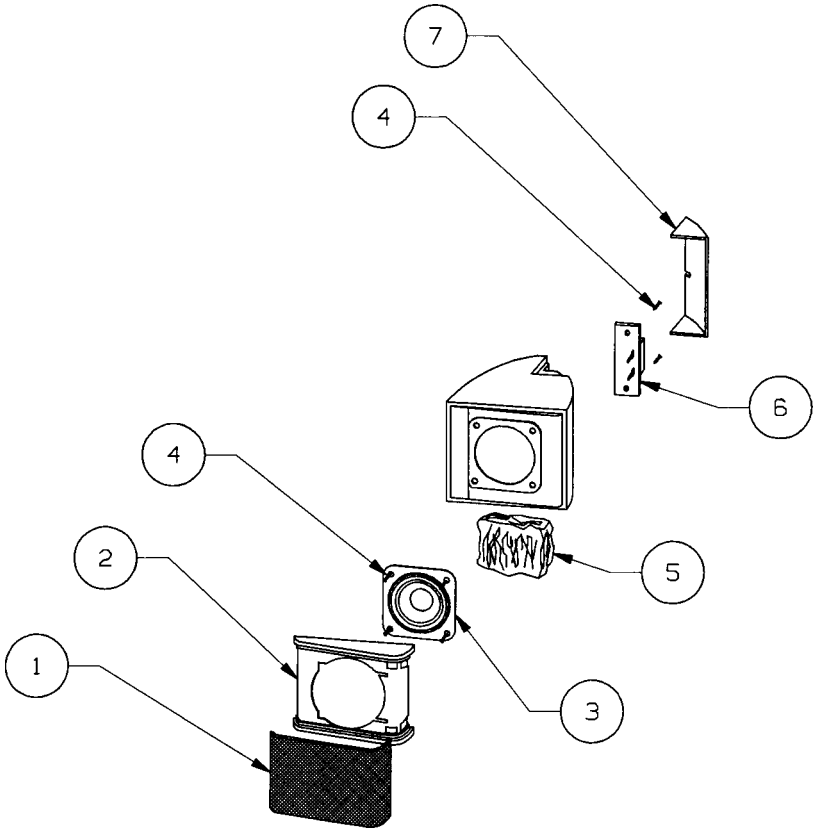


Figure 7. AM-3P Satellite Exploded View

AM-3P Packaging Parts List (Figure 8)

Item Number	Description	Part Number	Qty. Per Carton	See Note
1	Polybag (Satellite Parts)	144677	2	
2	Packing-Insert,EPS	136436	2	
3	Literature Kit (N.America)	143516-1	1	1
	Literature Kit (Europe)	143516-2	1	1
	Literature Kit (UK)	143516-4	1	1
	Literature Kit (Australia)	143516-5	1	1
	Literature Kit (International)	143516-6	1	1
	which consists of:			
	Polybag	103351	1	
	Owner's Manual	143515	1	
	Card-Warranty,Universal	149225	1	
	Warranty Service List (N.America)	122766	1	
	All Products Brochure (N.America)	141478	1	
	Envelope (N.America,International)	123001	1	
	Envelope (Europe,Japan,UK, Aus.)	128450	1	1
	Adaptor-120/230V,Polarized (International)	147013	1	
	Sheet-Instruction (International)	147751	1	
	Sheet-Instruction	149523	1	1
4	Packing-Insert,EPS	143518	2	
5	Packing-Insert,EPS	143517	1	
6	Polybag (Bass Module)	106595	1	
7	Cable-Audio Input	143630	1	
8	Cable-Interconnect,White,20'	140236	2	
	Cable-Interconnect,Black,20' (Japan)	130915	2	

NOTE

1. Product sold in Japan does not contain a literature kit. However,an envelope and instruction sheet are included in the carton.

AM-3P Packaging Parts List (Continued)

Item Number	Description	Part Number	Qty. Per Carton	See Note
9	Line Cord-120V,Detachable (N.America,International)	146999	1	
	Line Cord-Euro,Detachable (Europe)	148203	1	
	Line Cord-100V,Detachable (Japan)	145316	1	
	Line Cord-230V UK,Detachable (UK)	134725	1	
	Line Cord-230V Aus.,Detachable (Australia)	134726	1	
10	Carton-Generic Carton-Japan	149086 145757	1 1	

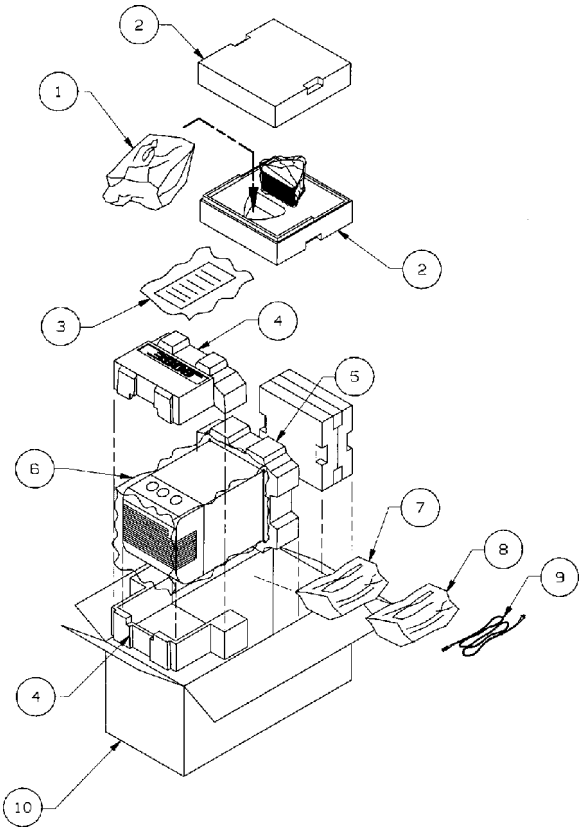


Figure 8. AM-3P Packaging Exploded View

AM-3P EQ PCB Assembly Parts List

Resistors

Reference Designator	Description	Part Number	See Note
R1,4,29,39,41,43-45,46,52,59,60, 107,120,132,207, 220,229,232	10kΩ,5%,1/8W, Chip	124895-1035	
R2,3,5,33,34,38, 57,149,249	100kΩ,5%,1/8W, Chip	124895-1045	
R6,48,56,62	1MΩ,5%,1/8W, Chip	124895-1055	
R7,8,36,42,47, 55,58,68,129	20kΩ,5%,1/8W, Chip	124895-2035	
R9,37,49,66,67	2kΩ,5%,1/8W, Chip	124895-2025	
R10	27.4kΩ,1%,1/8W, Chip	124894-2742	
R11,15,32	6.81kΩ,1%,1/8W, Chip	124894-6811	
R12,112,212	8.25kΩ,1%,1/8W, Chip	124894-8251	
R13,24,69	5.11kΩ,1%,1/8W, Chip	124894-5111	
R14,121,221	10Ω,5%,1/8W, Chip	124895-1005	
R16,18,35,50,51, 101-104,115, 201-204,215	1kΩ,5%,1/8W, Chip	124895-1025	
R17,28,108,130, 208,230	330Ω,5%,1/8W, Chip	124895-3315	
R19,21,114,214	51.1kΩ,1%,1/8W, Chip	124894-5112	
R20,119,219	2kΩ,1%,1/8W, Chip	124894-2001	
R22	10kΩ,2%,1/4W, 52mm,Carbon Film	121243-1211032	
R25	18.2kΩ,1%,1/8W, Chip	124894-1822	
R26,27,113,213	24.3kΩ,1%,1/8W, Chip	124894-2432	
R30,53	91Ω,5%,1/8W, Chip	124895-9105	
R31,61,125,225	14.3kΩ,1%,1/8W, Chip	124894-1432	
R40	75kΩ,1%,1/8W, Chip	124894-7502	

Resistors (Continued)

Reference Designator	Description	Part Number	See Note
R54	162Ω,1%,1/8W, Chip	124894-1620	
R105,106,205,206	3.9kΩ,5%,1/8W, Chip	124895-3925	
R109,209	681Ω,1%,1/8W, Chip	124894-6810	
R110,210	6.19kΩ,1%,1/8W, Chip	124894-6191	
R111,127,128, 211,227,228	12.1kΩ,1%,1/8W, Chip	124894-1212	
R116,216	20kΩ,1%,1/8W, Chip	124894-2002	
R117,217	6.81kΩ,1%,1/8W, Chip	124894-6811	
R118,218	30.1kΩ,1%,1/8W, Chip	124894-3012	
R122,124,222,224	100kΩ,1%,1/8W, Chip	124894-1003	
R123,223	1kΩ,1%,1/8W, Chip	124894-1001	
R126,226	953Ω,1%,1/8W, Chip	124894-9530	
R131,231	1Ω,5%,1/4W, 52 mm,Carbon Film	121243-1211R05	
R133,233	1kΩ,2%,1/4W, 52 mm,Carbon Film	121243-1211022	

Diodes

Reference Designator	Description	Part Number	See Note
D1-10,D12-15, D17-19,101-104, 108,201-204,208	1N4148,52mm, Axial	121501	

Transistors

Reference Designator	Description	Part Number	See Note
Q1,5,7-9,11	NPN,Tape	117921	
Q2-4,6,10,12	PNP,Small	119168	

Capacitors

Reference Designator	Description	Part Number	See Note
C1-4,28,30,32,35, 36,101,102,126, 201,202,226	10µF,20%,EL	137126-100	
C6,7,9,10,13,14	.47µF,5%,Box Film	137127-474	
C8,120-124, 220-224	33000pF,20%, Chip	124958-3331	
C11,103,105,111, 115,203,205,211, 215	100pF,5%,Chip	124956-1012	
C12,29,34,104, 204	47µF,20%,EL	137126-470	
C15,113,114,213, 214	.12µF,5%,Box Film	137127-124	
C16,106,109,110, 206,209,210	.0082µF,5%,Film	137123-822	
C17	33µF,20%,EL, Bi-polar	147522-330	
C31,116,117,216, 217	.1µF,5%,Film	137123-104	
C107,108,207,208	.082µF,5%,Film	137123-823	
C118,218	.001µF,5%,Film	137123-102	
C119,219	470pF,10%, Ceramic	137269-471	
C125,127,225,227	.0033µF,10%,Chip	124957-332	

ICs

Reference Designator	Description	Part Number	See Note
U2,3,5,6,101-105	Op Amp	108568	
U4	CA3080	119834	
U1	Quad,Transistor Array NPN	145317	

Switches

Reference Designator	Description	Part Number	See Note
None	Power Switch	143629	
S2	DPDT,Voltage Select	145307	3

Connectors

Reference Designator	Description	Part Number	See Note
None	AC Power Connector	146563	1
J5	Connector-Header,5 pin, Hi Current	145315-5	
J7	Connector-Dual Stereo,Mini	145310	
J8	Connector-Quad Phono	145309	
J9	Connector-Quad Speaker Terminal	145308	
J10	AC Jack Connector	145306	2

Potentiometers

Reference Designator	Description	Part Number	See Note
VR1	Dual 10K-Volume	145311	
VR2	Dual 10K,Detent-Treble	145312	
VR3	Single 10K-Bass	145313	

Fuses

Reference Designator	Description	Part Number	See Note
None	Connector,Fuse Clip	140347	
⚠ F1	Fuse-Slo-Blo, 1.5A,5x20mm	143668-1500	4

Cable Assemblies

Reference Designator	Description	Part Number	See Note
S1A,S1B	Cable Assy-Quick Disconnect	145314	

Miscellaneous

Reference Designator	Description	Part Number	See Note
W1-15	Chip Jumper	124896	

NOTES

1. This part is used on the -1 and -2 PCBs only.

2. This part is used on the -3 PCB only.

3. This part is used on the -1 and -3 PCBs only.

4. 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.

AM-3P Amplifier PCB Assembly Parts List

Resistors

Reference Designator	Description	Part Number	See Note
R30,31	5.1Ω,5%,1/4W, 52 mm,Carbon Film	121243-1215R15	
R32,33,131,142, 231,242,303,313, 403,413	10kΩ,5%,1/8W, Chip	124895-1035	
R34,138,238,308	1kΩ,5%,1/8W, Chip	124895-1025	
R130,141,230, 241,302,312,318, 402,412,418	100kΩ,5%,1/8W, Chip	124895-1045	
⚠ R132,143,232, 243,304,314,404, 414	51Ω,5%,1/4W, Fusing	130102-510	1
⚠ R134,145,234, 245,306,316,406, 416	5.1Ω,5%,1/4W, Fusing	130102-5R1	1
R135,139,140, 235,239,240,301, 307,310,311,407, 410,411	220Ω,5%,1/8W, Chip	124895-2215	
R136,236	20kΩ,5%,1/8W, Chip	124895-2035	
R137,237,309	5.11kΩ,1%,1/8W, Chip	124894-5111	
R144,244,317,417	10Ω,5%,1/8W, Chip	124895-1005	
R146,246	0.1Ω,10%,2W, Cut,Axial	146759	
R147,247	3.3kΩ,5%,1/8W, Chip	124895-3325	
R408	3.3kΩ,5%,1/10W, 0805,Chip	133626-3325	
R409	20kΩ,5%,1/10W, 0805,Chip	133626-2035	

Diodes

Reference Designator	Description	Part Number	See Note
D105-107, 205-207,301,302, 401,402	1N4148,52mm, Axial	121501	

Capacitors

Reference Designator	Description	Part Number	See Note
C17,125,225	10µF,20%,EL	137126-100	
C18,120-123,126, 220-223,226, 301-304,401-404	.0047µF,5%,Chip	131754-472	
C20,24	560µF,20%,EL	128548	
C21,25	10000µF,35V, 105C,EL	143623	
C22,23,26,27,124, 224,305,405	33000pF,20%, Chip	124958-3331	

Transistors

Reference Designator	Description	Part Number	See Note
Q1,102,103,110, 202,203,210,302, 303,310,402,403, 410	NPN,Tape	117921	
Q101,104,109, 201,204,209,301, 304,401,404	PNP,Small	119168	
Q105,205,305,405	PNP,2SB560F	140349	
Q106,206,306,406	NPN,2SD438F	140348	
Q107,207,307,407	NPN,Formed	129001	
Q108,208,308,408	PNP,Formed	129002	

ICs

Reference Designator	Description	Part Number	See Note
U1	Voltage Regulator, TO-92,+8V	146234	
U2	Voltage Regulator, TO-92,-8V	146235	
U106,206,301,401	Single Op Amp	250475-001	

Connectors and Jumpers

Reference Designator	Description	Part Number	See Note
J1	Connector-Header,5 pole, Med.Current	133220-05	
J2	Connector-Header,Rt.Angle, 15 pin	145305-15	
J4	Connector-Header,2 pole, Med.Current,.156	133220-02	
W1,4,12,34,35,47	Jumper-Chip,0805	133627	2
W2,3,5-11,14-27, 29-33,36-42,45, 46,48,49	Jumper-Chip	124896	2
W1,3-46	Jumper-Chip	124896	3

Relays and Rectifiers

Reference Designator	Description	Part Number	See Note
K1	Relay-DPST,TV-3 rated	143622	
Z1	Rectifier-Bridge, Cut	112027	
Z2	Rectifier-Bridge, Formed	148950	

NOTES

1. 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.

2. These jumpers are used on the latest version of the Amplifier PCB,P/N 149374.

3. These jumpers are used on the original version of the Amplifier PCB,P/N 143627.

NOTES FOR FUTURE REFERENCE

SCHEMATICS AND PCB LAYOUTS

Two schematics are enclosed backed by their respective PCB layouts. The following PCB assemblies are contained here:

- EQ PCB schematic backed by component side and solder side PCB layouts
- Amplifier PCB schematic backed by component side and solder side PCB layouts

NOTES FOR FUTURE REFERENCE

SPECIFICATIONS AND FEATURES SUBJECT TO CHANGE WITHOUT NOTICE

12/92: REV.0

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