

FREESPACE[®]6 BUSINESS MUSIC SYSTEM

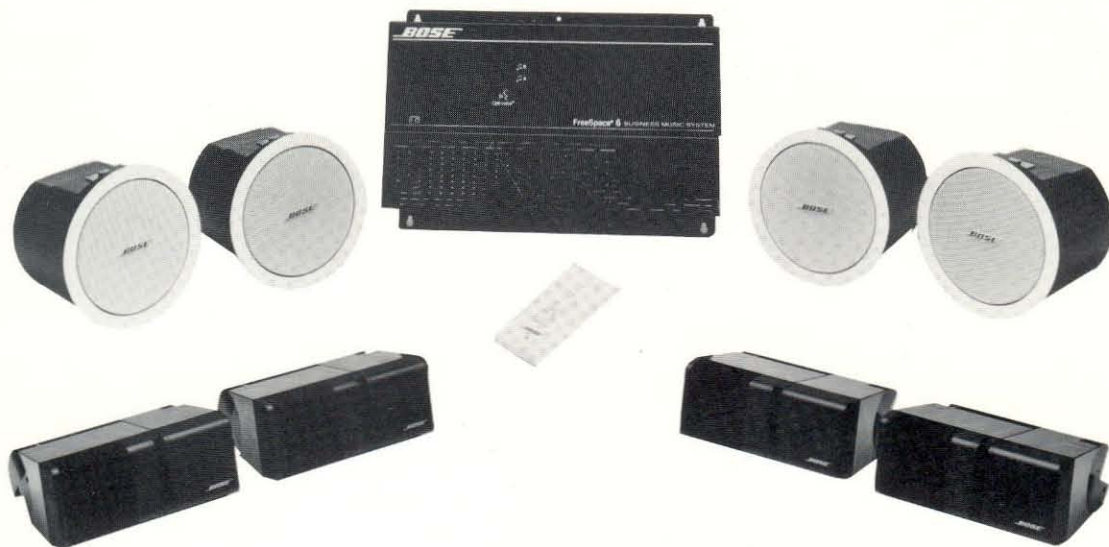


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ELECTROSTATIC DISCHARGE SENSITIVE (ESDS) DEVICE HANDLING

This unit contains ESD sensitive devices. We recommend the following precautions when repairing, replacing or transporting ESD sensitive devices:

- Perform work at an electrically grounded work station.
- Wear wrist straps that connect to the station or heel straps that connect to conductive floor mats.
- Avoid touching the leads or contacts of ESDS devices or PC boards even if properly grounded. Handle boards by the edges only.
- Transport or store ESDS devices in ESD protective bags, bins, or totes. Do not insert unprotected devices into materials such as plastic, polystyrene foam, clear plastic bags, bubble wrap or plastic trays.

**CAUTION: THE FREESPACE®6 BUSINESS MUSIC SYSTEM
CONTAINS NO USER-SERVICEABLE PARTS. TO PREVENT
WARRANTY INFRACTIONS, REFER SERVICING TO WARRANTY
SERVICE STATIONS OR FACTORY SERVICE.**

PROPRIETARY INFORMATION

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF BOSE® CORPORATION WHICH IS BEING FURNISHED ONLY FOR THE PURPOSE OF SERVICING THE IDENTIFIED BOSE PRODUCT BY AN AUTHORIZED BOSE SERVICE CENTER OR OWNER OF THE BOSE PRODUCT, AND SHALL NOT BE REPRODUCED OR USED FOR ANY OTHER PURPOSE.

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. Perform 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 milliamperes. 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.

IDENTIFICATION OF UNIT UNDER TEST

When servicing a FreeSpace®6 take notice of the following attributes:

- **PC Board Part Number**
- **Revision Level Number of the PC Board**
- **Unit's Voltage Variation Type (100V, 120V, 220V, 240V).**

There are two types of FreeSpace 6 units manufactured. If the unit you are servicing has a switch denoted by surface/flush mount speaker icons in block 12 of the front panel, then you have a 2 EQ unit. If not, then you have a 1 EQ unit.

The EQ changes are represented on page 56 (**Sheet 7, PCB Tone Control and Surface EQ**) of this manual. The 2 EQ unit will have all optional components (OPT) populated on the I02 board. The 1 EQ unit will be depopulated.

Refer to the applicable part list and schematics as follows:

- There are two Electrical Part Lists, one for **Revision 0** and one for **Revision 1** of **PCB 177300**.
- The **PCB Schematics and Layout views** supplied with this service manual are applicable for **Revisions 0** and **1** of **PCB 177300**.

NOTE: The PC board revision level number is marked on the PC board as follows:



SPECIFICATIONS

Dimensions	Module	4.0" H x 7.5" W x 15.0" D (10.16 x 19.05 x 38.10 cm)
	Flush-mount Speaker Assembly:	Flange Dia.: 6.25" (15.9 cm) Hole Dia.: 5.75" (14.6 cm) Depth: 6.5" (16.5 cm)
	Surface-mount Speaker Assembly:	3.3" H x 7.6" W x 6.4" D (8.3 x 19.3 x 16.33 cm)
Weight	Module:	11.3 lb. (5.14 kg.)
	Flush-mount Speaker Only:	2.1 lb. (.97 kg)
	(Including Mounting Hardware):	4.2 lb. (1.9 kg)
	Surface-mount Speaker (Including Mounting Hardware):	2.5 lb. (1.2 kg)
Driver	Flush-mount & Surface-mount Speaker:	2.5" Full-range Driver
Beamwidth	Flush-mount & Surface-mount Speaker:	150° @ -6 dB

Performance Specifications

Input Sensitivity	Music Input:	200mV
	Page Input:	200μV
Power Output		16W into 2Ω load
Power Requirements		120V or 220-240V ~ 50/60 Hz
Remote Volume Control Value		10kΩ, Audio taper
Music Input Impedance	Channel A: Balanced:	32kΩ
	Channel A: Unbalanced:	11kΩ
	Channel B: Unbalanced:	10kΩ
Page Input Impedance	Balanced:	9kΩ
	Unbalanced:	1kΩ
Page and Line Output Impedance		400Ω
Page Gain		0dB to 80dB adjustable
Frequency Range		80Hz - 16kHz
Noise	(line into loudspeaker outputs):	20Hz - 20kHz bandwidth; -65dBV at 20dB gain into 10kΩ load
Frequency Response		20Hz - 20kHz, ±1dB, referenced to 1kHz at line outputs

Performance Specifications (Continued)

**Maximum Acoustic
Output**

82dB-SPL in 20,000 cubic feet room
with a speech band RT₆₀ of 0.5 secs

**Opti-voice® Paging
Circuitry**

Ensures a constant paging level over a
30dB dynamic range by compressing
the page signal. Music gradually
returns to original level after page.

THEORY OF OPERATION

1. OVERVIEW

The FreeSpace®6 business music system delivers high-fidelity music and paging in commercial environments. The FreeSpace 6 components have been engineered to work together as a system. The electronics have separate compressors for music and paging sources that decrease the dynamic range of the audio signal, thereby increasing the audibility of musical passages and paging announcements. A protective compressor in the power amplifier prevents audible overload distortion if the user attempts to play the system too loud. The system has the following features:

- High-fidelity sound over a large area
- Active equalization, music compression, and system overload protection
- Opti-voice® circuitry for high quality paging capability
- Remote control of volume and source selection

The circuit descriptions that follow are grouped according to the PCB section and sheet number of the schematic.

2. IO1 PCB

2.1 IO1 PCB Schematic Sheet 1

Music Input A is routed through a differential input amplifier (U4) which accepts balanced sources or unbalanced sources. The amplifier output is passed through a gain trim pot and presented to the Music A/B selector. Music Input B is fed directly to a gain trim pot and then to the Music Input A/B selector.

Music Selector A/B is a 2P2T analog switch, implemented with a special switching op amp (U11,U12)). The op amp is controlled by the signal SELECTB.

The Music Selector Interface is a two transistor circuit that normally selects Music Input A. With the Remote Selector switch open, transistor Q2 is on, which turns on D4, the Source A LED, pulling SELECTB low. This turns off Q1, keeping its LED off. When the Remote Selector switch is closed, Q2 is turned off, allowing Q1 and D3 (the Music B LED) to turn on. This moves SELECTB high and turns off the Source A LED. When SELECTB is high, current is no longer sunk from U11 and U12's SW pin, and they select Music Input B.

2.2 IO1 PCB Schematic Sheet 2

On their way to the compressor, the left and right music signals pass through a stereo/mono switch, S1. After the compressor (U7 and part of U6), the music signals leave this sheet. The compressor is enabled by a logical function of SELECTB, Music Compressor A, and Music Compressor B enable switches. The logic (U8) determines that the compressor will be enabled only for a music source if that source is the one currently selected and if it has been enabled for compression via its switch (S2 or S3).

The compressor offers a maximum gain of about 20dB for very low level signals and operates at a 2:1 slope. It slowly raises the level of quiet musical passages, and quickly reduces the level of loud passages. The two channels are cross coupled to maintain a centered stereo image. By selecting the rectifier input source as a DC current, the compressor is disabled (U9).

The two sections of U15 are used to control a bi-colored Music-Compressor LED, D2. As long as the compressor is enabled, the LED glows green to indicate how active the compressor is. Whether or not the compressor is enabled, the LED is also acting as a watch dog and will flash red if the signal presented to the music compressor is too great for it to handle.

2.3 IO1 PCB Schematic Sheet 3

The Page Input is presented to a differential amplifier (U2) that can handle a wide range of source voltages, as well as balanced or unbalanced sources. S5 determines the gain of the first stage (0dB or 30dB). The page signal next passes through U2, where it can be given a gain of 0 to 30dB, as determined by R1. At S4, the page signal is routed either through another variable gain stage (U2, gain adjustable from 0 to 20dB), or through the Opti-voice® compressor. The Opti-voice compressor (U5 and part of U6) provides anywhere from 20dB of gain to 10dB of loss, depending upon the signal level.

Finally, the output of S4 is passed through the Page Muting stage (part of U10, Q3, and Q4), in which it is muted unless the page trigger circuits have detected a signal. The Page Output connector (J2) is driven by part of U10, acting as a buffer stage.

The two sections of U3 are used to control a bi-colored Opti-voice Compressor LED, D5. As long as the compressor is enabled; the LED glows green to indicate how active the compressor is. Whether or not the compressor is enabled, the LED is also acting as a watch dog and will flash red if the signals at U2's outputs are too great for the compressor to handle.

2.4 IO1 PCB Schematic Sheet 4

The Page Trigger circuits first offer a user sensitivity adjustment, via R3, then provide up to 26dB of gain for the trigger signal. V13, Section B acts as a threshold comparator and a peak hold circuit. For signals exceeding the threshold, the circuit changes state rapidly, and holds the new state long enough to ride through syllabic and inter-word pauses in paging. The two remaining sections of U13 provide a fade-back time constant for the music and adjust the **control voltage** levels to suit the muting transistors Q3,4,5,6 and 7.

Two sections of U14 mix the music and page signals, while the other two sections of U14 provide the mono versions of the music signals and the music+page signals. Switch S9 enables paging in the signals fed on to the speaker outputs. R2 allows for adjustment of the page level relative to the music.

3. IO2 PCB

3.1 IO2 PCB Schematic Sheet 5

S7, the Line Output Mode switch, selects the signals sent on to U200 and the Line Outputs. Relay K1, controlled by Q201 and Q200, mute the Page and Line Outputs during power on and power off transitions to prevent glitches from reaching the outputs.

3.2 IO2 PCB Schematic Sheet 6

The remote volume control function is implemented on this sheet with a dual VCA, IC U201, and its buffer, U202. (An alternate part could be used in U201A, but this is a manufacturing alternative, not a field service alternative.) U201 is controlled by a current sourced into the signal VCA, coming from Sheet 7. When VCA is about 2mk, gain is at its maximum, which is unity (0dB). When the current into VCA is zero, the gain is essentially off (-80dB or so).

S4 and its related components are factory set gain trims.

3.3 IO2 PCB Schematic Sheet 7

Transistors Q202, Q203 and related components transform the variable resistance of the remote volume control into the current source that feeds signal VCA, on Sheet 6.

U205 is a conventional bass and treble control, while U203 is an equalizer stage intended to provide the EQ adjustment needed when FreeSpace® 6 systems are configured with Surface-mount loudspeakers (as opposed to the Flush-mount FreeSpace 6 speakers).

4. Power Amplifier PCB

4.1 PA PCB Schematic Sheet 8

U301, part of U300, and U302 implement a acoustically correct low frequency compensation for more natural bass. The other two sections of U300 process the signal CD-DIA ("clip-detect-diagnostic", see Sheet 10) into a control signal that is sent through P2A, remote volume control circuit on Sheet 7. CD-DIA becomes active when the power amplifiers are driven into clipping. This in turn causes the remote volume control circuit to be turned down so that clipping ceases.

4.2 PA PCB Schematic Sheet 9

U303 combines the low frequency compensation signal with the full range signals and then equalizes them to compensate for room acoustic and speaker driver characteristics.

4.3 PA PCB Schematic Sheet 10

U304 and U307 are power amplifiers with differential outputs. Both amplifier outputs can deliver 16 watts into the nominal 2 ohm load of a pair of FreeSpace 6 speakers. The CD-DIA pins are pulled low when the amplifiers begin to clip. This is used to control a compressor implemented on Sheet 9 and Sheet 7.

D306 develops the DC power supply for the power amplifier. Q305 and associated components constitute a shunt voltage regulator which only conducts in the unlikely event of both a high power line voltage and a low or no signal output case. It holds 18V maximum which is presented to U304 and U307.

D305, U305, and U306 are the +/-15V supply for all the circuits except for the power amplifier.

The power transformer secondary plug can be inserted two ways; one way will handle a nominal 120VAC main, the other a nominal 240VAC main. The two orientations of this plug are noted on the PCB.

5. Remote PCB

REM PCB Schematic Sheet 11

The circuits on this sheet are contained on a small PC board inside the remote control. The potentiometer is wired as a 10K ohm rheostat and controls the remote volume control circuits on Sheet 6, while the SPST switch controls the Music Selector on Sheet 1.

DISASSEMBLY/ASSEMBLY PROCEDURES

Main Assembly Procedures

Note: Certain parts will be referred to in these procedures. The numbers in parentheses represent individual parts called out in **Figure 1**. The callout numbers correspond to those on the part lists.

1. Chassis Cover/Top Cover Removal

1.1 Place the amplifier flat on the workbench with the Bose® logo in the upper-left corner.

1.2 Detach the chassis cover (1) by holding both corners and pulling upward. Once the cover is loosened, slide the bottom tabs out and away from the unit.

1.3 Use a phillips-head screwdriver to remove two silver screws (2) securing the chassis top cover (3).

1.4 Gently lift the right side of the chassis top cover up at a 45° angle and pull to the right and up. This is done to clear the left screw mount away from the Amp PCB (8) when the cover is lifted off.

IMPORTANT: Be careful not to pull the three cables connected to the Amp PCB (8) assembly. They must be disconnected before final removal of the chassis-top cover.

2. Chassis Cover/Top Cover Replacement

2.1 Place the chassis-top cover (3) over the chassis base (4). Align the cover so that the left-side screw mount of the chassis base will slide between the IO1 PCB (8) and the inside surface of the chassis-top cover. Otherwise there will be difficulty securing the cover.

2.2 Align the screw holes of the top cover with the screw mounts located on the base. Also align the four metal tabs on the base with the tab slots on the cover. There are also six metal tabs located on the bottom edges of the cover that must be aligned when the cover is finally seated.

2.3 Slide the cover down over the base until the screw holes are aligned and all tab slots are locked into place.

2.4 Secure the chassis top cover (3) by tightening two silver screws (2) with a phillips-head screwdriver.

2.5 Position the three bottom tabs on the chassis cover into the slots located in the chassis base. Press the chassis cover down over the chassis-top cover to secure it.

3. Amplifier PCB Removal (Chassis Base)

3.1 Remove the Chassis Cover/ Top Cover (Procedure 1) .

3.2 Separate the chassis-top cover from the base by disconnecting both two-pin cables from the Amp PCB's (8) P3A and P3B connectors. Disconnect the eight-pin cable from the Amp PCB's P2A connector.

3.3 Disconnect the following cables:

- Disconnect the transformer's five-pin primary cable from the Amp PCB's P7 connector.
- Disconnect the transformer's five-pin primary cable from the Amp PCB's P4 connector.
- Disconnect the main power two-pin primary cable from the Amp PCB's P4 connector.

IMPORTANT: Be sure to notice the orientation of the transformer's five-pin primary cable. Pin 1 is keyed to pin 1 of Amp PCB connector P6 (or P7 depending upon the unit's applicable voltage rating).

3.4 Remove two black screws (5) from the Amp PCB (8) and three black screws (6) from the Heatsink (7).

3.5 Remove the Heatsink/Amplifier PCB Subassembly from the chassis base.

3.6 Place the subassembly on the workbench with the heatsink (7) fins down.

3.7 Remove three black decoupler bar screws (5) that connect the heatsink to the Amplifier PCB.

3.8 Remove the Amplifier PCB (8) from the heatsink.

4. Amplifier PCB Replacement (Chassis Base)

IMPORTANT: Thermal grease should be applied to the heatsink before seating the PCB.

4.1 Place the Amplifier PCB (8) onto the heatsink (7). Align the coupler bar (9) screw holes with the screw holes of the heatsink. The PCB should be component side up with the power devices resting on the inner side of the heatsink.

4.2 Secure the coupler bar and Amplifier PCB to the heatsink by tightening three black screws (5).

IMPORTANT: Make sure that the coupler bar does not make contact with the metal tab of transistor Q305.

4.3 Place the Heatsink/Amplifier PCB subassembly solderside down into the chassis base. Secure the upper-left hand corner of PCB onto the standoff snap. Secure the subassembly to the chassis base by tightening two black screws (5) on the Amp PCB and three black screws (6) on the heatsink.

4.4 Connect the following cables:

- Connect the main power's two-pin cable to the Amp PCB's P5 connector.
- Connect the transformer's secondary five-pin cable to the Amp PCB's P4 connector.
- Connect the transformer's primary five-pin cable to the Amp PCB's P7 connector.

IMPORTANT: Pin 1 of the transformer's five-pin primary cable is keyed to pin 1 of Amp PCB connector P6 (or P7 depending upon the unit's applicable voltage rating).

4.5 Install the Chassis Cover/Top Cover (Procedure 2).

5. Transformer Removal

5.1 Remove the Chassis Cover/Top Cover (Procedure 1).

5.2 Disconnect the following cables from the transformer:

- Disconnect the transformer's five-pin primary cable from the Amp PCB's P7 connector.
- Disconnect the transformer's five-pin primary cable from the Amp PCB's P4 connector.

5.3 Remove transformer cables from cable clamps (12) and lift the transformer from the chassis base (4).

6. Transformer Replacement

6.1 Place the transformer (10) into the recess of the chassis base and align it with the chassis base mounting holes. Make sure that the primary side is facing the IEC Connector Assembly (13).

6.2 Place the two transformer clips (11) over the transformer's mounting tabs. Secure the transformer to the chassis base by tightening the two black screws (5).

6.3 Connect the following cables:

- Connect the transformer's five-pin secondary cable to the Amp PCB's P4 connector.
- Connect the transformer's five-pin primary cable to the Amp PCB's P7 connector.

IMPORTANT: Pin 1 of the transformer's five-pin primary cable is keyed to pin 1 of Amp PCB connector P6 (or P7 depending upon the unit's applicable voltage rating).

6.4 Install the Chassis Cover/Top Cover (Procedure 2).

7. IO1 & IO2 PCB Removal (Chassis Top)

7.1 Remove the Chassis Cover/Top Cover (Procedure 1).

7.2 Remove six black screws (5) from both Amplifier IO PCB's (8). Remove the IO2 PCB board first. Grasp it by the top corners, lift up and off the chassis-top's standoffs. (Note: The IO boards are connected by a 12-pin cable. Do not attempt to separate until both are removed).

7.3 Remove both two-pin and eight-pin cables from the cable clamp (12) from the inside of the chassis-top cover.

7.4 Grasp the IO1 PCB board by its top corners, lift up and off the chassis-top's standoffs. Position the board at a 45° angle and carefully pull it back so that the I/O connectors clear the top cover.

7.5 To separate boards, disconnect the 12-pin cable from connector P1A on the larger board.

8. IO1 & IO2 PCB Replacement (Chassis Top)

8.1 Connect the 12-pin cable to connector P1A on the larger board.

8.2 Carefully align both board's connectors into the chassis top cover and snap them onto the chassis standoffs.

8.3 Secure the two-pin and the eight-pin cables into the cable clamps (12).

8.4 Replace six black screws (5) and tighten to secure both boards.

8.5 Install the Chassis Cover/Top Cover (Procedure 2).

Flush-Mount Loudspeaker Procedures

1. Flush-mount Loudspeaker

NOTES: Certain parts will be referred to in these procedures. The numbers in parentheses correspond to the individual parts called out in **Figure 2**.

1.1 Grille Removal

To remove the grille (**Not Shown**) take a scribe or a small flat-head screwdriver to grasp an edge of the grille. Gently lift the grille out from the enclosure (**2**).

1.2 Grille Installation

Push the grille into the enclosure (**2**) until it is flush with the rim of the enclosure. Orientation of the logo is not necessary.

1.3 Driver Removal

A. Use **Procedure 1.1** to remove the grille from the enclosure (**2**).

B. Use a phillips-head screwdriver to remove four screws (**3**) securing the driver (**4**) to the enclosure's baffle (**6**). Carefully lift the driver from the enclosure and cut the wires as close to the terminals as possible.

1.4 Driver Replacement

A. Strip the terminal wires from the terminal cup (**5**) and connect them to the replacement driver (**4**). *Connect the red wire to the + positive terminal and the black wire to the - negative.*

B. Align the driver so their four screw holes align with the screw holes of the enclosure's baffle (**6**). Secure the driver to the enclosure (**2**) by tightening four screws (**3**) with a phillips-head screwdriver.

C. Use **Procedure 1.2** to return the grille to the enclosure.

1.5 Terminal Cup Removal

A. Use a phillips-head screwdriver to remove one screw (**7**) from the junction-box cover.

B. Swivel the junction-box cover out to expose the terminal cup (**5**) in the recess of the speaker enclosure (**2**).

C. Use a phillips-head screwdriver to remove three screws (**3**) that secure the terminal cup to the speaker enclosure.

D. Use **Procedure 1.3** to remove the driver (**4**) from the speaker enclosure (**2**).

E. Disconnect the terminal wires from the driver and remove the faulty terminal cup.

1.6 Terminal Cup Replacement

A. Use **Procedure 1.4** to connect the replacement terminal cup (**5**) to the driver (**4**).

B. Place the enclosure (**2**) on its side. Fit the terminal cup into the slot at the back of the enclosure. See **Figure 2** for the proper orientation of the terminal.

C. While holding the terminal from the inside of the enclosure, tighten three screws (**3**) with a phillips-head screwdriver.

D. *Use **Procedure 1.4** to secure the driver (**4**) to the enclosure.*

E. Use **Procedure 1.2** to secure the grille to the enclosure.

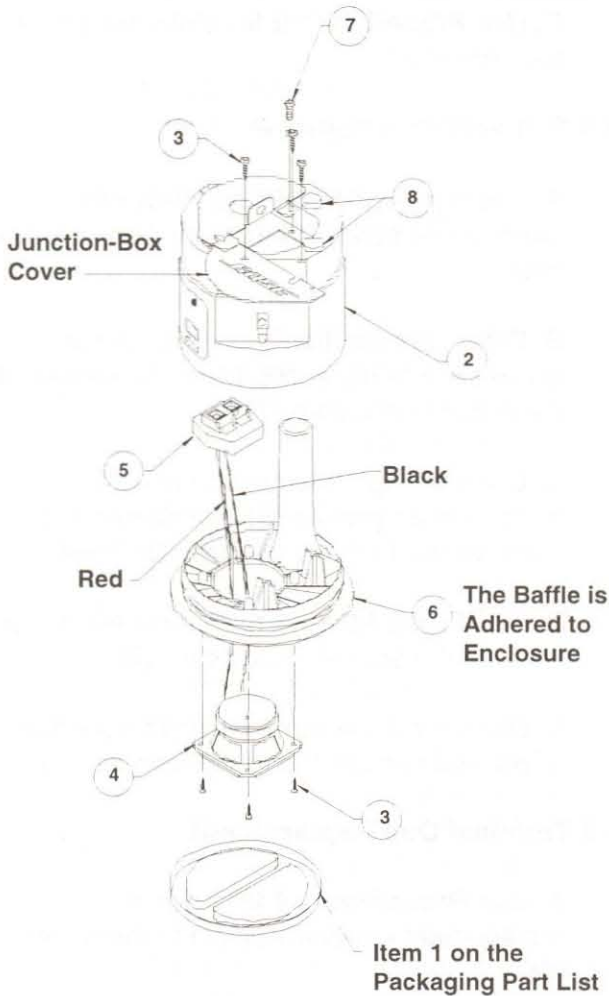


Figure 2. Flush-Mount Loudspeaker Exploded View

Surface-Mount Loudspeaker Procedures

1. Surface-Mount Loudspeaker

NOTE: The Surface-mount Loudspeaker has only two removable and replaceable parts, the grille and the grille's scrim cloth. Refer to the Surface-mount Assembly Part List for the grille and scrim cloth's order numbers.

1.1 Grille Removal

Grasp one edge of the grille with a small scribe and gently pull the grille from the enclosure. The grille's scrim cloth is behind the grille.

1.2 Grille Replacement

1. Place the scrim cloth inside the grille.
2. Place the grille over the twiddler section of the enclosure (Refer to **Figure 3** for the correct orientation). Press the grille until it snaps into place.

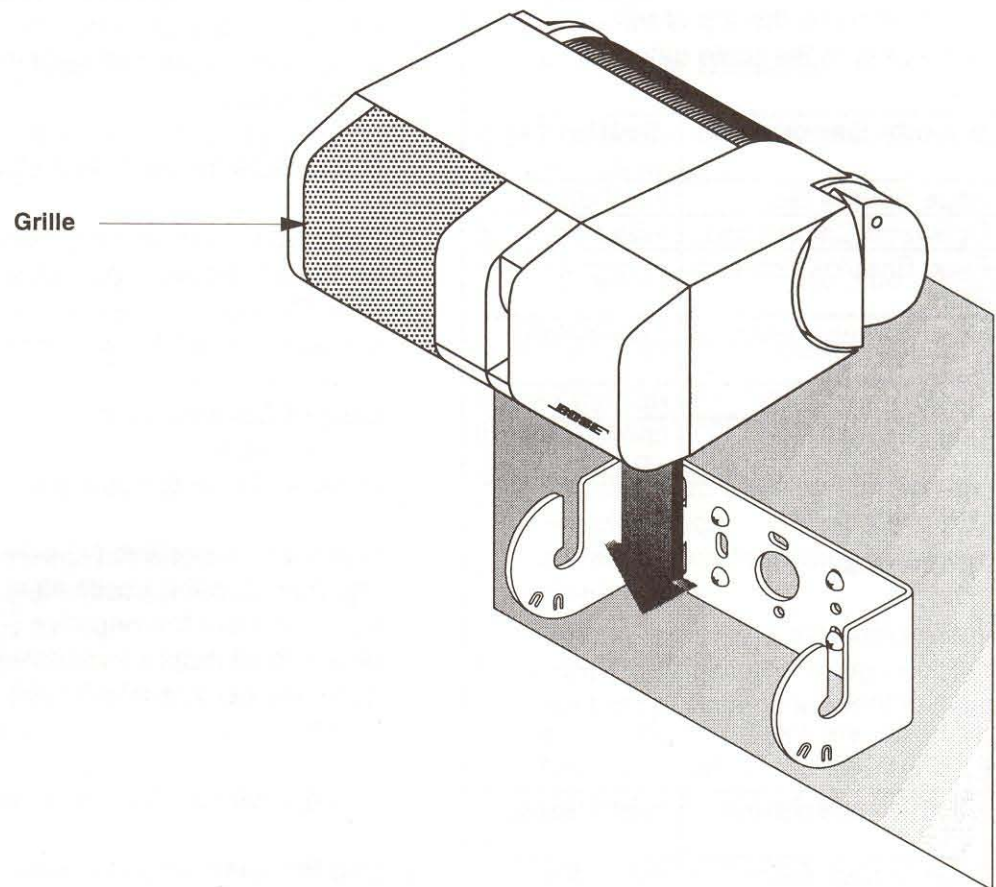


Figure 3. Surface-mount Loudspeaker

TEST PROCEDURES

Main Assembly Test Procedures

Test Set-Up Parameters

Switches

All switches are referenced by their block diagram location on the top of the unit. Set them according to the table below.

Block No.	Switch Description	Setting(s)
1	Page Source Gain	left (0dB)
2	Optivoice Compressor	left(off)
5	Page Enables Left and Right	right(on)
7	Music Compressors A and B	forward(off)
9	Music Input Mode	rear(stereo)
10	Line Output Mode	center(Music +Page)

Potentiometers

All potentiometers are referenced by their block diagram location on the top of the unit. Set them according to the table below.

Block No.	Pot. Description	Setting(s)
1	Page Source Gain Trim	ccw(0dB)
3	Page Trigger Level	cw(max)
4	Page Mix Trim	cw(max)
6	Music A and B Source Trim	cw(max gain)
12	Treble and Bass Trim	center(flat)
13	Volume Trim Right	cw(max gain)

Input Connections

Page Input

Connect the positive (+) side of an oscillator to the positive input terminal. Connect the negative (-) side to the negative (-) and common input terminals. Do this using quick connectors (P/N180094) supplied with the unit.

Music RCA Inputs A, B (Left and Right)

Connect the positive (+) side of an oscillator to the positive input terminal on the RCA jack. Connect the negative (-) side to the negative (-) and RCA jack ground sleeve.

Output Connections

Page and Line Outputs (Left and Right)

Connect the positive (+) side of the test equipment to the positive (+) output terminals. Connect the negative (-) side to the negative (-) output terminals. Do this using quick connectors (P/N180094) supplied with the unit.

Speaker Output (Left and Right)

Use the same output connections as above with a 2Ω/50Watt resistor as a load.

All test equipment should be isolated from ground (floated).

1. Page Input To Page Output Gain

1.1 Apply a **5 Vrms, 1KHz** signal to the Page Input.

1.2 Measure the Page Output. Should be **4.22 Vrms (+.78 Vrms/ -.67 Vrms)**.

2. Page Input To Line Outputs Gain

2.1 Apply a **5 Vrms, 1KHz** signal to the Page Input.

2.2 Measure the left and right Line Output. Should be **4.22 Vrms (+1.09 Vrms/ -.87 Vrms)**.

3. Music Input A to Line Outputs Gain

3.1 Apply a **500mV rms, 1KHz** signal to the Music A left and right input.

3.2 Measure the left and right Line outputs. Should be **4.47 Vrms (+.84 Vrms/ -.71 Vrms)**.

Note: Repeat this test for Music Input B. To select Music Input B, short the remote select input.

4. Music Input A to Speaker Outputs Gain

4.1 Apply a **10 mVrms, 2KHz** signal to the left and right Music A input.

4.2 Measure the Speaker output. Should be **290 mVrms (+54mVrms/ - 46mVrms)**.

5. Frequency Response

5.1 Apply a **10 mVrms, 2KHz** signal to the left and right Music A Input.

5.2 Reference a dB meter to the Speaker output and set level to **0 dBr**.

5.3 Change the signal to **12.5 KHz**.

5.4 Measure the left and right Speaker output. Should be **5.1 dBr (± 2.0 dB)**.

6. Noise

6.1 Set the volume control to Max.

6.2 With the source off, measure the left and right Speaker output. Should be ≤ 5.6 mVrms.

7. Full Power Distortion

7.1 Apply a **130 mVrms, 800 Hz** signal to the left input.

7.2 Measure the distortion at the left Speaker output. Should be $\leq 1\%$ THD.

7.3 Change the frequency to **95 Hz** and adjust the applied signal to get **5.66 Vrms** at the left Speaker output.

7.4 Measure the distortion at the left Speaker output. Should be $\leq 2\%$.

Note: Repeat this procedure for the right channel.

8. Separation

8.1 Apply a **100 mVrms, 800Hz** to the right Music A Input. Terminate the left Music A Input with a **50 Ω** resistor.

8.2 Measure the left Speaker output. Should be ≤ 10 mV.

Note: Repeat this procedure for the right channel.

Loudspeaker Test Procedures

NOTE: These procedures apply to both Flush-mount and surface-mount loudspeakers. The surface-mount loudspeaker is not repairable. If this loudspeaker fails the following tests contact your Bose® Field Service Representative.

1. Rub and Tick Test

Apply a signal of **6.0 Vrms at 80 Hz** to the input terminals of the loudspeaker. **See Figure 1.** No extraneous noises such as rubbing or ticking should be heard. Replace any driver that has a rubbing or ticking noise.

NOTE: There is a normal suspension noise. To distinguish between a rub or tick and suspension noise, displace the cone slightly with your finger. If the rubbing can be made to go away or get worse, then it is a rub or tick and the driver should be replaced. If the noise stays the same, it is a suspension noise and the driver is fine. Suspension noise will not be heard with program material.

2. Air Leak Test

Apply a signal of **6.0 Vrms $\pm$ 1V at 80 Hz** to the speaker input terminals. **See Figure 1.** For at least 5 seconds, listen for air leaks around the driver, speaker terminals, and along all cabinet joints. Repair air leaks as required.

3. Sweep Test

Sweep the oscillator from **50 Hz to 5 kHz at 6Vrms**. There should not be any loud extraneous sounds. If there are any loud buzzes or distortion, replace the driver. The whooshing noise from the port at around **80 Hz** is acceptable.

NOTE: There should not be any buzzes or rattles from the internal connecting wires or components. Redress any wire or component that buzzes.

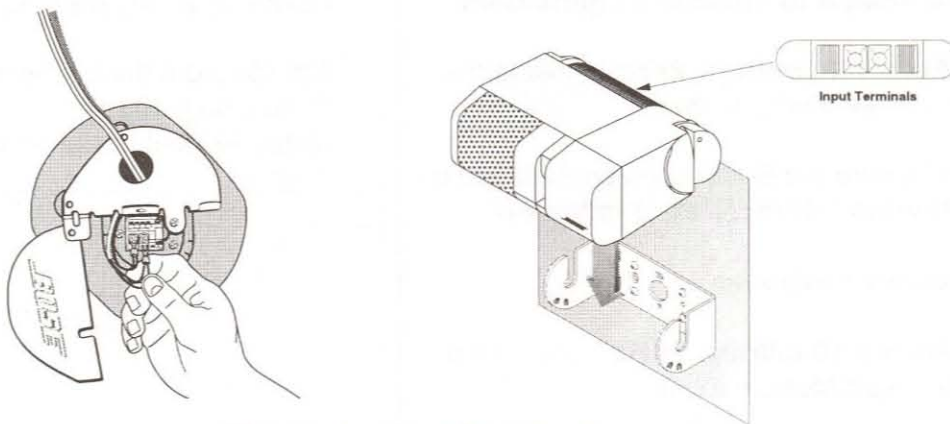


Figure 1. Input Terminals

4. Phase Test

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

Apply a **6 Vdc $\pm$ 1 Vdc** signal to the speaker input terminals (**see Figure 1**). The driver should move outward.

PART LISTS AND EXPLODED VIEWS

The following section contains part lists and exploded views for the FreeSpace®6 business music system. The part lists are broken down as follows:

- Main Assembly Part List and Main Assembly Exploded View.
- Remote Assembly Part List and Remote Assembly Exploded View
- Main Assembly Packaging Part List and Main Assembly Packaging Exploded View.
- Flush-mount Loudspeaker Assembly Part List and Exploded View.
- Flush-mount Loudspeaker Assembly Packaging Part List and Packaging Illustration.
- Surface-mount Loudspeaker Assembly Part List and Illustration.
- Surface-mount Loudspeaker Assembly Packaging Part List and Packaging View.
- Electrical Part Lists : These lists contain all electrical and mechanical parts located on the PCB assembly 177300, Revisions 0 and 1.

PCB layouts and schematics are located in the back of the service manual.

Main Assembly Part List (Figure 4)

Item Number	Description	Part Number	Qty Per Assy	See Note
1	Chassis,Cover,FreeSpace®6	177287	1	
2	Screw,Mach,8-32,Pan,Xrec/Slot	172715-08	2	
3	Chassis,Top Cover,FreeSpace 6	177286	1	
4	Chassis,Base,FreeSpace 6	177285	1	4
5	Screw,#8-32x.25,Pan,Xrec	179096-04	13	
6	Screw,#8-32x2.75,Pan,Xrec	179096-44	3	
7	Heatsink,FreeSpace 6	177283	1	4
8	Pcb Assy,FreeSpace 6,Amp,S/f	181692	1	1,3
9	Coupler Bar,FreeSpace 6	177284	1	
10 	Transformer,120/240V,FreeSpace 6 Transformer,100V,FreeSpace 6	177278 178892	1	2
11	Clip,Transformer	179108	2	
12	Clip,Cable,DbI Face Adh,.76"	131062	3	
13	Conn Assy,IEC Receptical	179064	1	
14	Nut,Hex,8-32,keps	100413-2	1	

Notes:

1. The individual parts located on the PCB's are listed in the Electrical Part List.
2.  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.
3. The PCB Assembly is divided into three parts: the Amplifier PCB, IO1 PCB, and IO2 PCB. The PCB locations are identified on the FreeSpace 6 Exploded View. This information is provided for reference only.
4. This part is not normally available from Customer Service. Approval from the Field Service Manager is required before ordering.

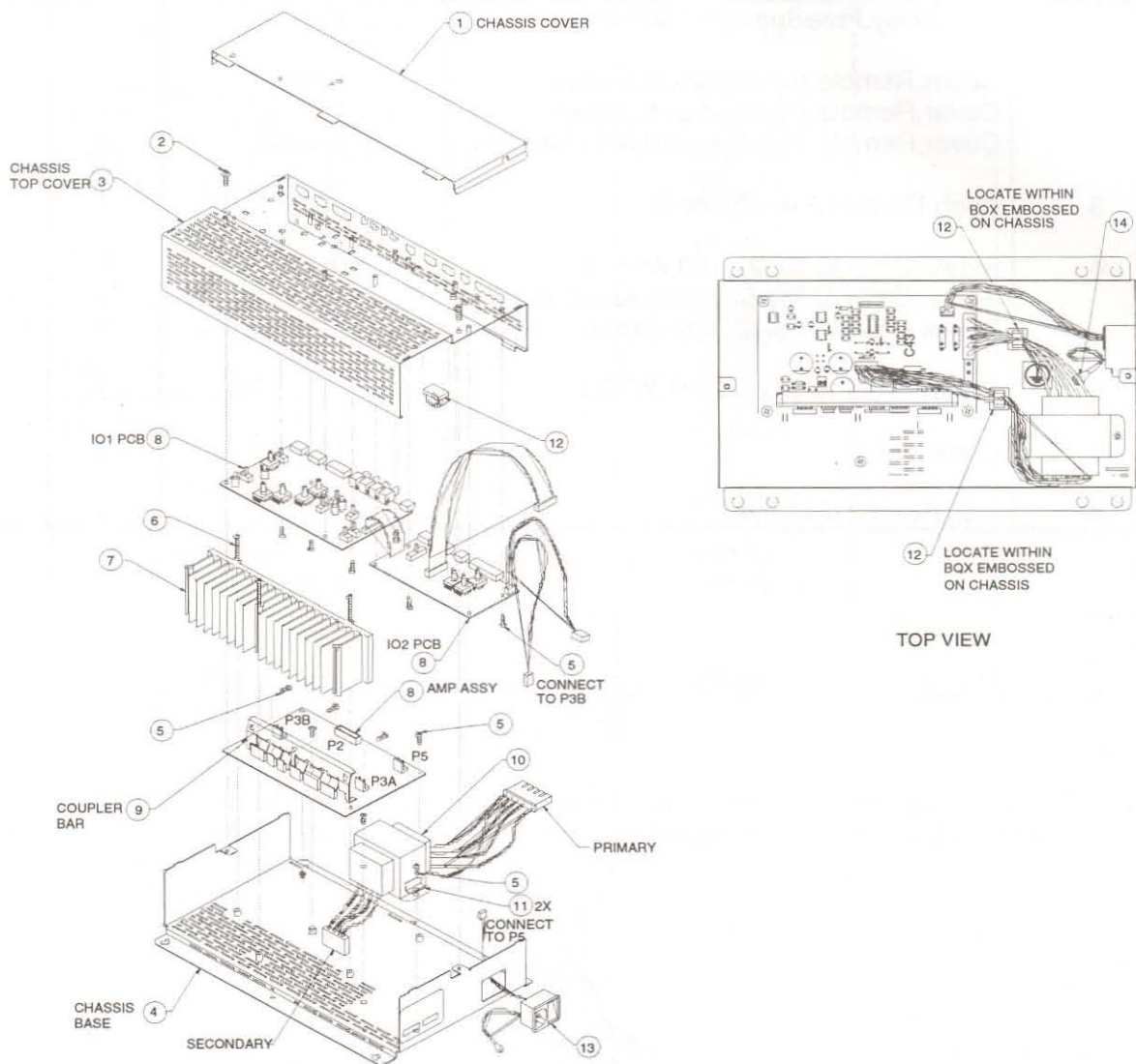


Figure 4. Main Assembly Exploded View

Remote Assembly Part List

Item Number	Description	Part Number	Qty Per Assy	See Note
1	PCB Assy,FreeSpace 6,AMP,S/F	181692	1	
2	Cover,Remote,FreeSpace 6,Europe	178101	1	
	Cover,Remote,FreeSpace 6,Japan	178102	1	
	Cover,Remote,FreeSpace 6,Aus,Am/Can	178103	1	
3	Knob,Remote,FreeSpace 6	178104	1	
4	Screw,OVLHD,6-32x1.00,Am/Can	178115-16	2	
	Screw,OVLHD,M3.5x25mm,Aus,Europe	178116-25	2	
	Screw,OVLHD,M4x25mm,Japan	178117-25	2	
5	Screw,TAPP,6-13x.5,PAN,XREC	173555-08	2	
6	Cable Tie	135540	2	
7	Bag,Poly,6x10x5 mil	147794	1	

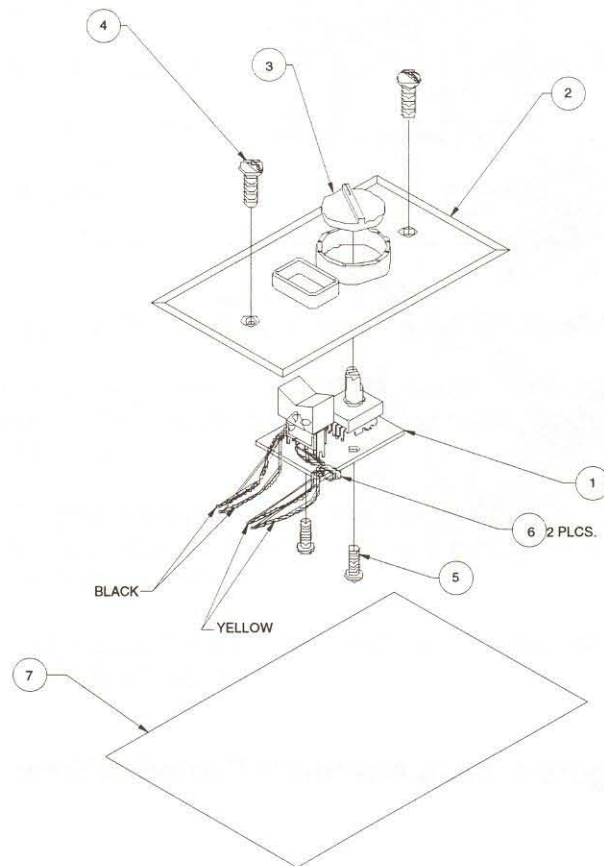


Figure 5 Remote Assembly Exploded View

Main Assembly Packaging Part List (Figure 5)

Item Number	Description	Part Number	Qty Per Assy	See Note
1	Packing, Endcap, EPS, Left	177949	1	
2	Polybag, 12"x8"x24"	143076	1	
3	Packing, Endcap, EPS, Right	177305	1	
4	Rem,RVC Walplt,Frspc 6,US/CAN	178111	1	
	Rem,RVC Walplt,Frspc 6,Eur	178113		
	Rem,RVC Walplt,Frspc 6,Japan	178112		
	Rem,RVC Walplt,Frspc 6,Australia	181735		
5	Packing, Crease Sheet	177950	1	
6 	Line Cord,120V,Detachable, US/CAN	173350	1	1
	Line Cord,230V,Detachable,UK	173351		
	Line Cord,230V,Detachable,Europe	173352		
	Line Cord,240V,Detachable,Australia	173354		
	Line, Cord,100V,Detachable,Japan	181690		
7	Carton, RSC	177948	1	
8	Lit kit Assy,FS6,F/S,Japan	181704-1	1	
	Lit kit Assy,FS6,F/S, Australian, Eur,UK, US/Can	181704-2		
9	Connector Kit, Assy	180094	1	

Note:

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.

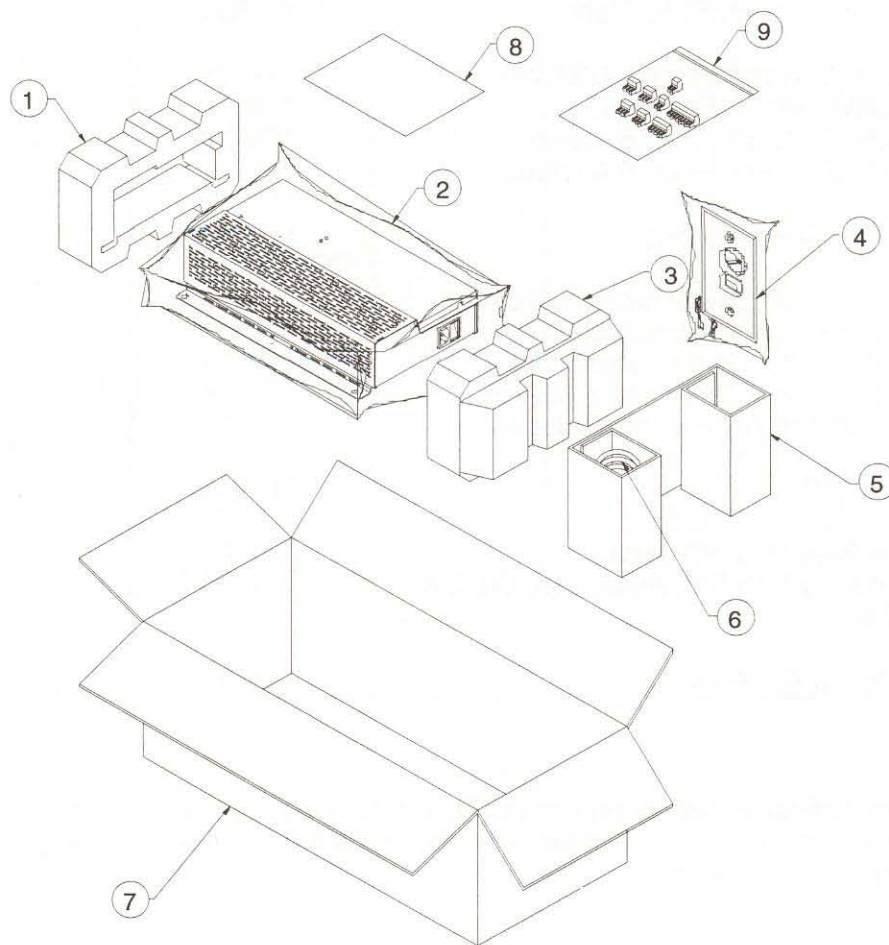


Figure 6. Main Assembly Packaging Exploded View

Flush-mount Assembly Part List

Item Number	Description	Part Number	Qty	See Note
1	Grille Assy.		1	
2	Enclosure Assy, Back Can, 102-F6	-----	1	*
3	Screw, Hilo, 8, Pan, Xrec	172721-10	7	
4	Twiddler, 2.25"	149167	1	
5	Cup, Terminal	176459	1	
6	Baffle, 75 Cu In, White	-----	1	*
7	Screw, Mach, 8-32, Pan,Xrec/Slot	172715-08	1	
8	Foot, Clear, .312x.085, Bulk	178321-99	2	

*This part was listed and illustrated for reference purposes only.

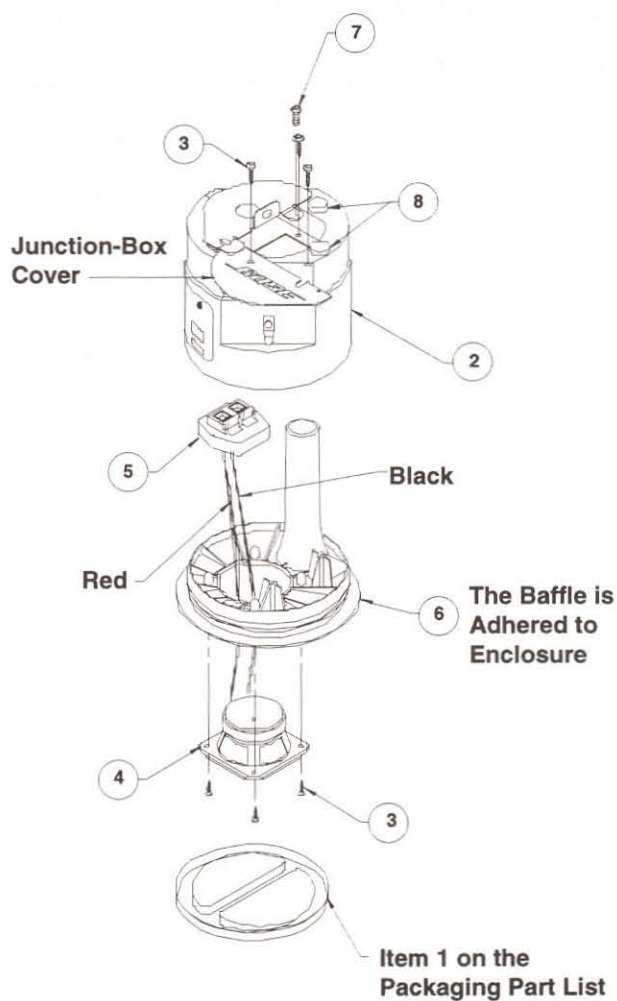


Figure 7. Flush-mount Exploded View

Flush-mount Packaging Part List

Item Number	Description	Part Number	Qty	See Note
1	Shield, Paint	180092	1	
2	Grille Assy, 4pk, Wht	178133-2	1	
3	Pan Mounting Assy, 4 Pk	178135	1	
4	Spring Assy, 8 Pack, Freespace 6	178132	1	
5	Carton, RSC	177752	1	
6	Packing, Insert	177744	1	
7	Packing, Crease Sheet, 18x21	177749	1	
8	Packing, Crease Sheet, 16.07x5.75	177747	1	
9	Packing, Crease Sheet, 20.75x17.0	177750	1	
10	Bushing, Short,.75"	146046	1	
11	Bag,Poly, 14.38x9.87x2 Mil	103351	1	
12	Packing, Sheet, 8.75x8.75x.03	180023	1	

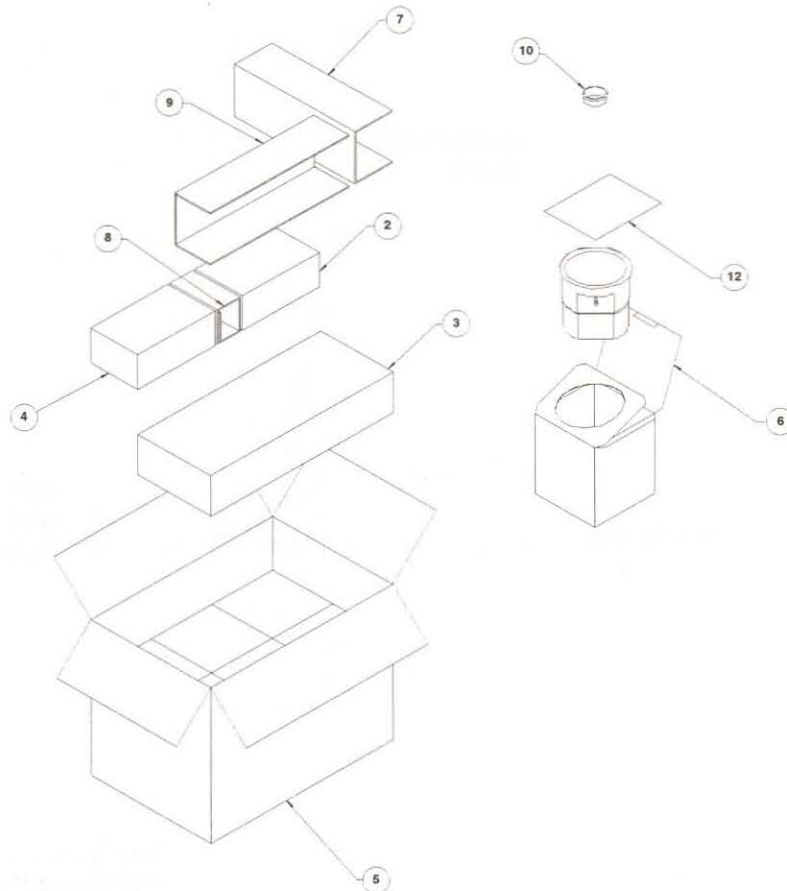


Figure 8. Flush-mount Loudspeaker Packaging Illustration

Surface-mount Assembly Part List

Item Number	Description	Part Number	Qty	See Note
1	Knob, White	178149-02	1	
	Knob, Gray	178149-01	1	
2	Grille, Speaker, Computer Gray	177146-01	1	
	Grille, Speaker, Arctic White	177146-02	1	
3	Cloth, Scrim, Grille	181192	1	*

*Part not illustrated

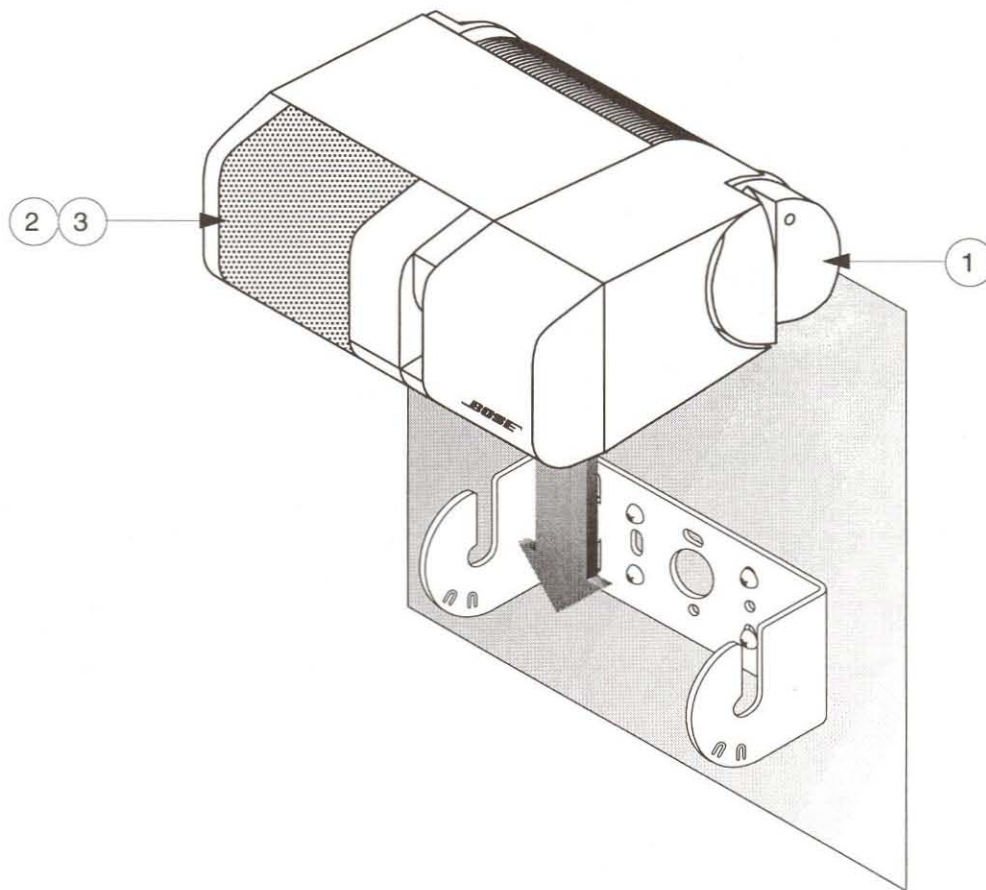


Figure 9. Surface-mount Loudspeaker Illustration

Surface-Mount Packaging Part List

Item Number	Description	Part Number	Qty Per Pack	See Note
1	Bracket, Wall, White	178146-02	4	
	Bracket, Wall, Gray	178146-01	4	
2	Knob And Pkg Assy, Arctic White	181736-02	1	
	Knob And Pkg Assy, Gray	181736-01	1	
3	Carton, 4 Pack	181535	1	
4	Packing, End Cap,	181537	8	
5	Packing, Crease Sht, 46.5x8.5	181536	1	
6	Bag, Poly, 14.38x9.87x2 Mil	103351	4	

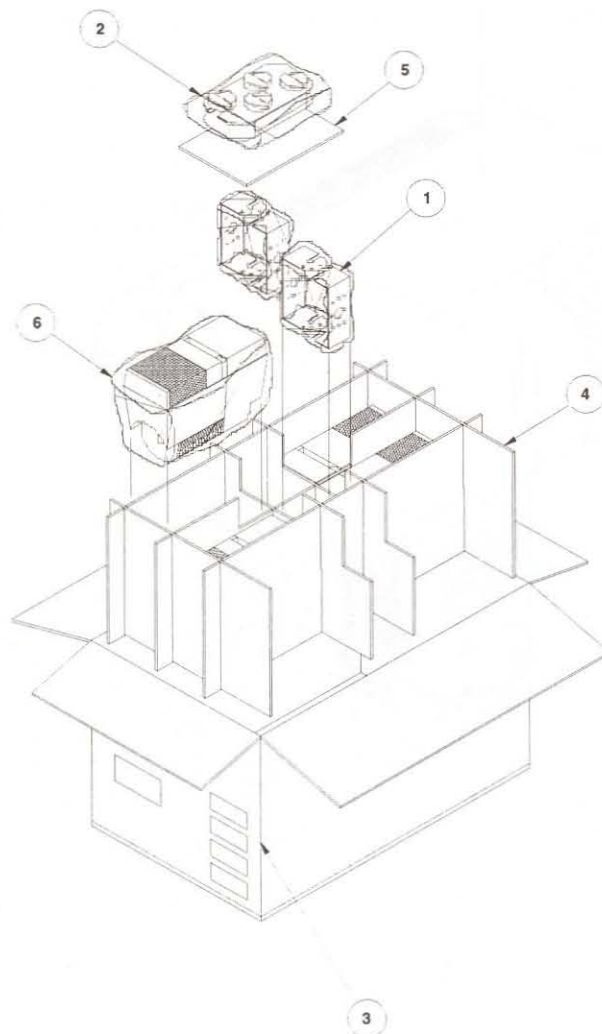


Figure 10. Surface-mount Loudspeaker Packaging

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 0

Resistors

Reference Designator	Description	Part Number	Reference
R1	Pot,Rotary,50k Ω , 10%,Dual	177289-503	
R2,3,5	Pot,Rotary,10k Ω , 10%,Single	177290-103	
R6-9	Pot,Rotary,10k Ω , 10%,dual	177289-103	
R10,11,27,36- 39,44,45,47,50,52, 53,55,56,61,63,64, 65,70-72,75,85,89, 96,99,101,107,110, 116,128,129,130, 135,152,202,204, 206,212,213,218, 219,221,222,240, 256,265,275,315, 319,321,322,336, 339,345, 378,379	10.0K Ω ,1%,1/10W, 0805	133625-1002	
R12,203,214,362	402 Ω ,1%,1/10W, 0805	133625-4020	
R13,18,59,76,87,94, 127, 137,291,331, 335, 355	30.1K Ω ,1%,1/10W, 0805	133625-3012	
R14-17,21,34,35,62, 66, 79,88,95,98,103, 106,109,112,136, 287,320	1.00K Ω ,1%,1/10W, 0805	133625-1001	
R19,20,86	1.54K Ω ,1%,1/10W, 0805	133625-1541	
R22,23,311	5.62K Ω ,1%,1/10W, 0805	133625-5621	
R24,25,28,29,31, 113,123,124,307, 310, 377	20.0K Ω ,1%,1/10W, 0805	133625-2002	
R26,253,255,267, 269,312	7.50K Ω ,1%,1/10W, 0805	133625-7501	
R32,58,74,151,257, 258,264,266,305	1M Ω ,5%,1/10W, 0805	133626-1055	
R33,90,92	1.2K Ω ,2%,1/4W, 52mm,CF	121243-1211222	
R40,117,200,216, 350,376	100 Ω ,1%,1/10W, 0805	133625-1000	
R41,208,306	301K Ω ,1%,1/10W, 0805	133625-3013	
R42	26.7K Ω ,1%,1/10W, 0805	133625-2672	
R43,121,143,201, 210,217,236,	301 Ω ,1%,1/10W, 0805	133625-3010	

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 0

Resistors (Continued)

Reference Designator	Description	Part Number	Reference
R46,54,73,209	56.2K Ω ,1%,1/10W,0805	133625-5622	
R51,119,120,125,126,138-141,325,346	61.9K Ω ,1%,1/10W,0805	133625-6192	
R57,91,97,102,104,111,133,157,160,207,224,241,277,279,304,317,358	100K Ω ,1%,1/10W,0805	133625-1003	
R60,78	68.1K Ω ,1%,1/10W,0805	133625-6812	
R67,83,237,301,333,353	4.12K Ω ,1%,1/10W,0805	133625-4121	
R68	15.0K Ω ,1%,1/10W,0805	133625-1502	
R69	45.3K Ω ,1%,1/10W,0805	133625-4532	
R77,84	127K Ω ,1%,1/10W,0805	133625-1273	
R80	26.1K Ω ,1%,1/10W,0805	133625-2612	
R81	1.82K Ω ,1%,1/10W,0805	133625-1821	
R82,131,154	17.8K Ω ,1%,1/10W,0805	133625-1782	
R91,205,215,278,326,327,347,349	15.0K Ω ,1%,1/10W,0805	133625-1503	
R93,118,318	2.43K Ω ,1%,1/10W,0805	133625-2431	
R100,108	2.55K Ω ,1%,1/10W,0805	133625-2551	
R105,316,368,370	47.5K Ω ,1%,1/10W,0805	133625-4752	
R114,357	200K Ω ,1%,1/10W,0805	133625-2003	
R115,134	73.2K Ω ,1%,1/10W,0805	133625-7322	
R122,142	4.75 Ω ,1%,1/10W,0805	133625-4R75	
R132,145,148,161,232,242,260,262,276,290,292,356,374,380,381	Jumper,Chip,0805	133627	
R144,323,338,343,363	2.00K Ω ,1%,1/10W,0805	133625-2001	
R146,147,149,150	255 Ω ,1%,1/10W,0805	133625-2550	

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 0

Resistors (Continued)

Reference Designator	Description	Part Number	Reference
R153	27.4K Ω ,1%,1/10W,0805	133625-2742	
R155158,239	5.11K Ω ,1%,1/10W,0805	133625-5111	
R156,159	Pot, Rotary, 10K Ω , 10%, 1/2W, Trim	170042-103	
R211,280,340	88.7K Ω ,1%,1/10W,0805	133625-8872	
R220,223	11.0K Ω ,1%,1/10W,0805	133625-1102	
R238,308,309,313,314	4.75K Ω ,1%,1/10W,0805	133625-4751	
R254,259,268,274	18.2K Ω ,1%,1/10W,0805	133625-1822	
R270-273	57.6K Ω ,1%,1/10W,0805	133625-10R0	
R300	25.5K Ω ,1%,1/10W,0805	133625-2552	
R302	6.49K Ω ,1%,1/10W,0805	133625-6491	
R303,324,344	14.0K Ω ,1%,1/10W,0805	133625-1402	
R324,337,359	7.15K Ω ,1%,1/10W,0805	133625-7151	
R328,352	110K Ω ,1%,1/10W,0805	133625-1103	
R329,342	9.09K Ω ,1%,1/10W,0805	133625-9091	
R330,354	23.7K Ω ,1%,1/10W,0805	133625-2372	
R332,334,348,351	4.99K Ω ,1%,1/10W,0805	133625-4991	
R341,375	38.3K Ω ,1%,1/10W,0805	133625-3832	
R364	2.74K Ω ,1%,1/10W,0805	133625-2741	
R366,367,369,372	RES, CF, 1/4W, 5%, 10 OHM	121243-1211005	
R371	Jumper, 22AWG, Non-Insul, 10.0mm	148242-100	
R373	196 Ω ,1%,1/10W,0805	133625-1960	
R500	Pot, Rotary, 10k Ω , 10%	177299-103	

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 0

Capacitors

Reference Designator	Description	Part Number	Reference
C1,2,29,123,200,205	.01uF,10%,50V, X7R,0805	133623-103	
C3,7,23,24,25,35,47,50,51,63,89,93,100,103,116,117,118,119,120	47pF,5%,50V,0805, COG	133622-470	
C4,5,36,38,54,86,90,102,105,202,217,227,237,301,304,309,335,348	10uF,20%,35V,85, EL	149948-100V	
C6,14,19,39,106,107,112,113,114,115,121,122	100pF,5%,50V, 0805,COG	133622-101	
C8,11,15,18,20,27,32,46,53,57,62,65,76,77,80,81,88,92,94,95,96,101,109,110,153,201,204,206,208,216,218,220,222,223,226,238,300,307,308,310,311,321,324,501,512	.022uF,10%,50V, X7R,0805	133623-223	
C9,43,55,79,98,207,219,312,322	1.0uF,20%,50V,105, EL	137126-1R0	
C10,41,59,224,239	10pF,5%,50V,0805, COG	133622-100	
C12,17,108,111,242,243,244,245,339,340,353,354,357,361,362	.10uF,80%,25V, Y5V,0805	133624	
C13,314,315,329,330	18uF,5%,50V,85, BOX	137127-184	
C16,320,331,355,356,359,360	1000pF,5%,50V, 0805,COG	133622-102	
C21,26,49,52,70,74	680pF,5%,50V, 0805,COG	133622-681	
C22,48,68,69,71,75,84	4.7uF,20%,35V,105, EL	137126-4R7	
C28	47uF,20%,16V,105, EL	137126-470	
C30,33,34,37,40,56,58,61,66,67,83,85	2.2uF,20%,50V,105, EL	137126-2R2	
C31,72,73,78,82,333,334,349,352	.1uF,5%,50V,85, BOX	137127-104	
C42,303	15uF,5%,50V,85, BOX	137127-154	

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 0

Capacitors (Continued)

Reference Designator	Description	Part Number	Reference
C44	220uF,20%,25V,85, EL	149948-221E	
C45,60	100uF,20%,25V,85, EL	149948-101E	
C64,319,327,337, 350, 351	.22uF,5%,50V,85, BOX	137127-224	
C87	.47uF,5%,50V,85, BOX	137127-474	
C104,203,341,342	22uF,20%,25V,85, EL	149948-220E	
C225,240,248-250	390pF,5%,50V,0805 ,COG	133622-391	
C228,241	.0012uF,5%,100V, 85, BOX,	137127-122	
C229,230,246,247	.047uF,5%,63V,85, BOX	137127-473	
C302	.068uF,5%,63V,85, BOX	137127-683	
C306	1800pF,10%,50V, X7R,0805	133623-182	
C313,317,325,326	.0015uF,5%,100V, 85,BOX	137127-152	
C336,345	2200uf,20% ,50v, 105,EL	144000-222H	
C344,346,347	3300uf,20%,35v, 105,EL	144000-332V	
 C363,364	1000pf,20%,250vac, Y-type,	170183	

Note:

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.

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 0

Diodes

Reference Designator	Description	Part Number	Reference
D1,3,4,6	LED,2.5v,10ma Green,Vertical	177280	
D2,5	LED,2.5v,10ma, Grn/Red,Vertical	177281	
D10,11,13- 17,22,24,107,201, 204,300	Dual,SOT-23,BAV99	147239	
D12,20,21,200,302, 309,310	Switching,75V, 300mA	121501	
D18,19,23,202,203	Zener,18V,1W,5%, 1N4746	116995-4746A	
D25,27,29,301	Dual,SOT-23,BAV70	147249	
 *D305	Rectifier,Bridge, 100v,1.0a	143952	*See Note 1
 *D306	Rectifier,Bridge, 1 00v,6a	170214	*See Note 1
D307	Zener,16V,1W,5%, 1N4745	116995-4745A	

Transistors

Reference Designator	Description	Part Number	Reference
Q1,2,202,300,304	BPLR,N,40V,200mA ,SOT23	146819	
Q3-7	BPLR,N,SOT23,2S D2114K	177294	
Q200	BPLR,P,60V,200mA, TO-92	119168	
Q201	BPLR,N,30V,500mA ,TO-92	173476	
Q203,301,302	BPLR,P,40V,200mA, SOT23	148596	
Q305	DARL,NPN, Tip140	177310	

Note:

-  This part is critical for safety purposes. Failure to use the recommended replacement part may create shock, fire and/or other hazards.

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 0

Integrated Circuits

Reference Designator	Description	Part Number	Reference
U1-4,10,15,200,202-205,301	Op-Amp,Dual, DIP-8,RC4559	108568	
U11,12	Switch,Active, SIP-8,BA3128N	177292	
U201	Op-Amp,Dual, DIP-16,CN3280	133171	
U302	Op-Amp,Single, DIP-8,CA3080	119834	
U5,7	Compandor, NE572N	178894	
U6,13,14,300,303	OpAmp,Quad, DIP-14,NJM2059	144008	
U8	Multiplexer/ Demultiplexer,8CH, DIP-16,4051	177308	
U9	Multiplexer, DIP-16,CD4052	147243	
U302	Op Amp,Sngl,DIP- 8,CA3080	119834	
U304,307	Power Amp,Mult-11, 45W,TDA7396	177279	
U305	Voltage Regulator,15V,Pos., TO-220	143858	
U306	Voltage Regulator,15V,Neg., TO-220	143806	

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 0

Miscellaneous Components

Reference Designator	Description	Part Number	Reference
 *F1,2	Fuse,630ma 5x20mm	140346-0630	*See Note 1
 *F3,4	Fuse,Time Lag,Auto,400mA (Inv.)	177312-0400	*See Note 1
 *F5	Fuse,10.0A, 5x20mm,Slo Blo	177311-10000	*See Note 1
 *F6	Fuse,3.0A,250V, .60x.19,Slo Blo	135677-10	*See Note 1
FC1A,2A,5A,F61A, 62A,65A,FC1B,C2B, C5B, F61B,62B,65B	Fuseclip,5mm	178548	
JP300	Jumper,22AWG, Non-Insul. ,10.0mm	148242-100	
J1,2,9,10	Connector,Rt.Ang., 3 pos,Blk	177291-03	
J11,8	Connector,Rt.Ang., 2 pos,Blk	177291-02	
J12	Connector,Rt.Ang. Beau	177291-08	
J3	Connector,Rt.Ang., 5 pos,Blk	177291-05	
J4,5	Connector,RCA, Dual,Female	177295	
K1	Relay,24 Vdc,4PDT	144017	
P1	Harness,26 AWG,Freespace 6	177298-12	
P1A	Connector,Header, 12 pos	148591-12	
P2	Harness,24 AWG,Freespace 6	177298-08	
P2A	Connector,Header, 8 pos	148591-08	
P3	Harness,22 AWG,Freespace 6	177296	
P3A ,3B	Connector,Header, Inline,PCB Mnt.,2p	133220-02	
P4	Connector,Header, Inline,PCB Mnt.,5p	133220-05	
P5	Connector,Header, 2 pos	143963	
P6	Connector,Header, High Current 8mm pitch	178742-4	

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 0

Miscellaneous Components

Reference Designator	Description	Part Number	Reference
P7	Connector,Header, High Current 8mm pitch	178742-4	
P9	Connector,Header,5 pos	148591-05	
S1-6,S9	Switch,Slide,DPST, Vertical	176148	
S7	Switch,Slide,DPDT	176147	
S10	Switch,DIP,SPST, 4 pos.	148777-1	
SW500	Switch,SPST, Rocker	178108	
TP1-9,10,500,	Connector,Header, Test Jack,1 pos.,OR	171621-0103	
 VR300	Varistor,Met. Oxide, 275V,75 joule	170189	

Note:

-  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.

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 1

Resistors

Reference Designator	Description	Part Number	Reference
R1	Pot,Rotary,50k Ω , 10%,Dual	177289-503	
R2,3,5	Pot,Rotary,10k Ω , 10%,Single	177290-103	
R6,7	Pot,Rotary,20k Ω , 10%,Dual	177289-203	
R8,9	Pot,Rotary,10k Ω , 10%,Dual	177289-103	
R10,11,27,36-39, 44,45,47-50,52,53, 55,56,61, 63-65, 70-72,75,85,89,96, 99,101,107,110,116, 128-130,135,152, 202,204,206,212, 213,218,219,221, 222,232,240,242, 256,265,275,315, 319,321,322,336, 339,345,378,379	10.0K Ω ,1%,1/10W, 0805	133625-1002	
R12,203,214,362	402 Ω ,1%,1/10W, 0805	133625-4020	
R13,18,59,76,87,94 127,137,291,331, 355	30.1K Ω ,1%,1/10W, 0805	133625-3012	
R14-17,21,34,35,62, 66,79,88,95,98103, 106,109,112,136, 229,247,287,320	1.00K Ω ,1%,1/10W, 0805	133625-1001	
R19,20,86,226,231, 249,252	1.54K Ω ,1%,1/10W, 0805	133625-1541	
R22,23	5.62K Ω ,1%,1/10W, 0805	133625-5621	
R24,25,28,29,31, 113,123,124,155, 158,307,310,377	20.0K Ω ,1%,1/10W, 0805	133625-2002	
R26	7.50K Ω ,1%,1/10W, 0805	133625-7501	
R32,58,74,151,257, 258,264,266,305	1M Ω ,5%,1/10W, 0805	133626-1055	
R33,90,92	1.2K Ω ,2%,1/4W, 52mm,CF	121243-1211222	
R40,117,200,216, 350,376	100 Ω ,1%,1/10W, 0805	133625-1000	
R41,208,306	301K Ω ,1%,1/10W, 0805	133625-3013	
R42	26.7K Ω ,1%,1/10W, 0805	133625-2672	
R43,121,143,201, 210,217,236	301 Ω ,1%,1/10W, 0805	133625-3010	

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 1

Resistors (Continued)

Reference Designator	Description	Part Number	Reference
R46,54,73,209,233,243,	57.6K Ω ,1%,1/10W,0805	133625-5762	
R51,119,120,125,126,138-141,325,328,346,352,	61.9K Ω ,1%,1/10W,0805	133625-6192	
R57,91,97,102,104,111,133,157,160,207,224,241,277,279,304,317,358	100K Ω ,1%,1/10W,0805	133625-1003	
R60,78	68.1K Ω ,1%,1/10W,0805	133625-6812	
R67,83,237,301,333,353	4.12K Ω ,1%,1/10W,0805	133625-4121	
R68	15.0K Ω ,1%,1/10W,0805	133625-1502	
R69	45.3K Ω ,1%,1/10W,0805	133625-4532	
R77,84	127K Ω ,1%,1/10W,0805	133625-1273	
R80	26.1K Ω ,1%,1/10W,0805	133625-2612	
R81	1.82K Ω ,1%,1/10W,0805	133625-1821	
R82,131,154	17.8K Ω ,1%,1/10W,0805	133625-1782	
R100,108	2.55K Ω ,1%,1/10W,0805	133625-2551	
R105,234,244,316,368,370	47.5K Ω ,1%,1/10W,0805	133625-4752	
R114,357	200K Ω ,1%,1/10W,0805	133625-2003	
R115,134	73.2K Ω ,1%,1/10W,0805	133625-7322	
R118,318,93	2.43K Ω ,1%,1/10W,0805	133625-2431	
R122,142	4.75 Ω ,1%,1/10W,0805	133625-4R75	
R132,145,161,276,290,292,380,381	Jumper,Chip,0805	133627	
R144,323,338,343,363	2.00K Ω ,1%,1/10W,0805	133625-2001	
R146,147,149,150	255 Ω ,1%,1/10W,0805	133625-2550	

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 1

Resistors (Continued)

Reference Designator	Description	Part Number	Reference
R153	27.4K Ω ,1%,1/10W,0805	133625-2742	
R156,159	Pot, Rotary, 10K Ω ,10%,1/2W, Trim	170042-103	
R205,215,278,326,327,347,349	150K Ω ,1%,1/10W,0805	133625-1503	
R220,223	11.0K Ω ,1%,1/10W,0805	133625-1102	
R230,250,303,324,344	14.0K Ω ,1%,1/10W,0805	133625-1402	
R235,245,330,354	23.7K Ω ,1%,1/10W,0805	133625-2372	
R238,308,309,313,314	4.75K Ω ,1%,1/10W,0805	133625-4751	
R239	5.11K Ω ,1%,1/10W,0805	133625-5111	
R253,255,267,269,312	8.25K Ω ,1%,1/10W,0805	133625-8251	
R254,259,268,274	18.2K Ω ,1%,1/10W,0805	133625-1822	
R270-273	57.6K Ω ,1%,1/10W,0805	133625-10R0	
R280	56.2K Ω ,1%,1/10W,0805	133625-5622	
R300	25.5K Ω ,1%,1/10W,0805	133625-2552	
R302	6.49K Ω ,1%,1/10W,0805	133625-6491	
R311	5.62K Ω ,1%,1/10W,0805	133625-5621	
R329,342	9.09K Ω ,1%,1/10W,0805	133625-9091	
R332,334,348,351	4.99K Ω ,1%,1/10W,0805	133625-4991	
R337,359	7.15K Ω ,1%,1/10W,0805	133625-7151	
R340	88.7K Ω ,1%,1/10W,0805	133625-8872	
R341,375	38.3K Ω ,1%,1/10W,0805	133625-3832	
R364	2.74K Ω ,1%,1/10W,0805	133625-2741	
R366,367,369,372	10 Ω ,5%,1/4W,CF	121243-1211005	
R373	196 Ω ,1%,1/10W,0805	133625-1960	
R500	Pot, Rotary, 10k Ω , 10%	177299-103	

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 1

Capacitors

Reference Designator	Description	Part Number	Reference
C1,2,29,123,200,205	.01uF,10%,50V, X7R,0805	133623-103	
C3,7,23-25,35,47,50,51,63, 89,93,100,103, 116-120	47pF,5%,50V,COG, 0805	133622-470	
C4,5,36,38,54,90,102, 105,202,217,301, 304,309,335,348	10uF,20%,35V,85, EL	149948-100V	
C6,14,19,39,106,107,112-115,121,122	100pF,5%,50V, COG,0805	133622-101	
C8,11,15,18,20,27,32,46,53,57,62,65,76,77,80,81,88,92,94-96,109,110,153,201,204,206,208,216,218,220,222,223,226,238,300,307,308,310,311,321,324,501,512	.022uF,10%,50V, X7R,0805	133623-223	
C9,43,55,79,98,207,219,312,322	1.0uF,20%,50V,105, EL	137126-1R0	
C10,41,59,224,239	10pF,5%,50V,COG, 0805	133622-100	
C12,17,108,111,242-245,339,340,343,353,354,357,358, 361,362	.10uF,80%,25V, Y5V,0805	133624	
C13,314,315,329,330	.18uF,5%,50V,85, BOX	137127-184	
C16,320,331,355,356,359,360	1000pF,5%,50V, COG,0805	133622-102	
C21,26,49,52,70,74	680pF,5%,50V, COG,0805	133622-681	
C28	47uF,20%,16V,105, EL	137126-470	
C30,33,34,37,40,56,58,61,66,67,83,85	2.2uF,20%,50V,105, EL	137126-2R2	
C31,72,73,78,82,214,235,333,334,349,352	.1uF,5%,50V,85, BOX	137127-104	
C22,48,68,69,71,75	4.7uF,20%,35V,105, EL	137126-4R7	
C42,303	.15uF,20%,50V,85, BOX	137127-154	

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 1

Capacitors (Continued)

Reference Designator	Description	Part Number	Reference
C44	220uF,20%,25V,85,EL	149948-221E	
C45,60	100uF,20%,25V,85,EL	149948-101E	
C48,68,69,71,75	4.7uF,20%,35V,105,EL	137126-4R7	
C64,319,327,337,338,350,351	.22uF,5%,50V,85,BOX	137127-224	
C86	10uF,20%,25V,85,EL	149947-100E	
C87	.47uF,5%,50V,85,BOX	137127-474	
C104,203,341,342	22uF,20%,25V,85,EL	149948-220E	
*C209,227,232,237	0Ω,RES,Axial,.2W	139942	*See Note 1
C210,231	.01uF,5%,100V,85,BOX	137127-103	
C211,212,221,233	100pF,10%,50V,DISC,SL	137269-101	
C213,234	.0047uF,5%,100V,85,BOX	137127-472	
C215,229,230,236,246,247	.047uF,5%,63V,85,BOX	137127-473	
C228,241	.0012uF,5%,100V,85,BOX	137127-122	
C248-250	390pF,5%,50V,COG,0805	133622-391	
C302	.068uF,5%,63V,85,BOX	137127-683	
C306	1800pF,10%,50V,X7R,0805	133623-182	
C313,317,325,326	.0015uF,5%,100V,85,BOX	137127-152	
C336,345	2200uf,20%,50V,105,EL	144000-222H	
C344,346,347	3300uf,20%,35V,105,EL	144000-332V	

Note:

1. These parts are screened as **C209,227,232,237** on the PCB even though they are resistors.

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 1

Diodes

Reference Designator	Description	Part Number	Reference
D1,3,4,6	LED,10mA,2.5V, Green,Vert	177280	
D2,5	LED,10mA,2.5V, Grn/Red,Vert	177281	
D10,11,13-17,22,24,25,27,29,107,201,204,300,301	Dual,SOT-23,BAV99	147239	
D12,20,21,200,302,309,310,	Switching,75V, 300mA	121501	
D18,19,23,202,203	Zener,18V,1W,5%, 1N4746	116995-4746A	
 *D305	Rectifier,Bridge, 100V,1.0A	143952	*See Note 1
 *D306	Rectifier,Bridge, 100V,6A	170214	*See Note 1
D307	Zener,16V,1W,5%, 1N4745	116995-4745A	

Transistors

Reference Designator	Description	Part Number	Reference
Q1,2,202,300	BPLR,N,40V,200mA ,SOT23	146819	
Q3-7	BPLR,N,SOT23, 2SD2114K	177294	
Q200	BPLR,P,60V,200mA, TO-92	119168	
Q201	BPLR,N,30V,500mA ,TO-92	173476	
Q203,301,302	BPLR,P,40V,200mA, SOT23	148596	
Q305	DARL,NPN,tip140	177310	

Note:

-  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.

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 1

Integrated Circuits

Reference Designator	Description	Part Number	Reference
U1-4,10,15,200, 202-205,301	Op Amp,Dual, DIP-8, RC4559	108568	
U5,7	Comparator, And/Or,NE572N	178894	
U6,13,14,300,303	OpAmp,Quad, DIP-14,NJM2059	144008	
U8	Mult/Demult,8CH, DIP-16,4051	177308	
U9	Multiplexer,DIP-16, CD4052	147243	
U11,12	Switch,Active, SIP-8, BA3128N	177292	
U201	Op-Amp,Dual, DIP-16,CN3280	133171	
U302	Op-Amp,Single, DIP-8, CA3080	119834	
U304,307	Power Amp, Mult-11, 45W, TDA7396	177279	
U305	Voltage Regulator,15V, Pos.,TO-220	143858	
U306	Voltage Regulator,15V,Neg., TO-220	143806	

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 1

Miscellaneous Components

Reference Designator	Description	Part Number	Reference
 *F1,2	Fuse,5x20mm, 630mA	140346-0630	*See Note 1
 *F3,4	Fuse,Time,400mA Lag,Auto	177312-0400C1	*See Note 1
 *F5	Fuse,5x20mm, Slo Blo,10A	177311-10000	*See Note 1
 *F6	Fuse,.60x.19, 250V, Slo Blo, 3.0A	135677-10	*See Note 1
FC1A,C1B,C2A, C2B,C5A,C5B	Fuseclip,5MM	178548	
J1,2,9,10	Connector,Rt.Ang., 3 Pos.,Blk.	177291-03	
J3	Connector,Rt.Ang., 5 Pos,Blk.	177291-05	
J4,5	Connector,RCA, Dual,Female	177295	
J8,11	Connector,Rt.Ang., 2 Pos,Blk.	177291-02	
J12	Connector,Rt. Ang., Beau	177291-08	
JP300	Jumper,22AWG, Non-Insul, 10.0mm	148242-100	
K1	Relay,24Vdc,4PDT	144017	
P1	Harness,26 AWG,Freespace 6	181702-12	
P1A	Connector,Header, 12 Pos.	148591-12	
P2	Harness,24 AWG,Freespace 6	177298-08	
P2A	Connector,Header, 8 Pos.	148591-08	
P3	Harness,22 AWG,Freespace 6	177296	
P3A ,3B	Connector,Header, Inline, PCB, Mnt., 2pos	133220-02	
P4	Connector,Header, Inline,PCB Mnt, 5 Pos.	133220-05	
P5	Connector,Header,2 Pos.	143963	
P6	Header,High Current 8mm. pitch	178742-4	
P7	Header,High Current 8mm. pitch	178742-4	
P9	Connector,Header, 5 Pos.	148591-05	

FreeSpace®6 Electrical Part List
PCB P/N 177300, Revision 1

Miscellaneous Components

Reference Designator	Description	Part Number	Reference
S1-6,8,9	Switch,Slide,DPST, Vertical	176148	
S7	Switch,Slide,DPDT	176147	
S10	Switch,DIP,SPST, 4 Pos.	148777-1	
SW500	Switch,SPST, Rocker	178108	
TP1-10,500	Connector,Header, Testjack,1 Pos,OR	171621-0103	
 VR300	Varistor,Met Oxide ,275V,75 joule	170189	

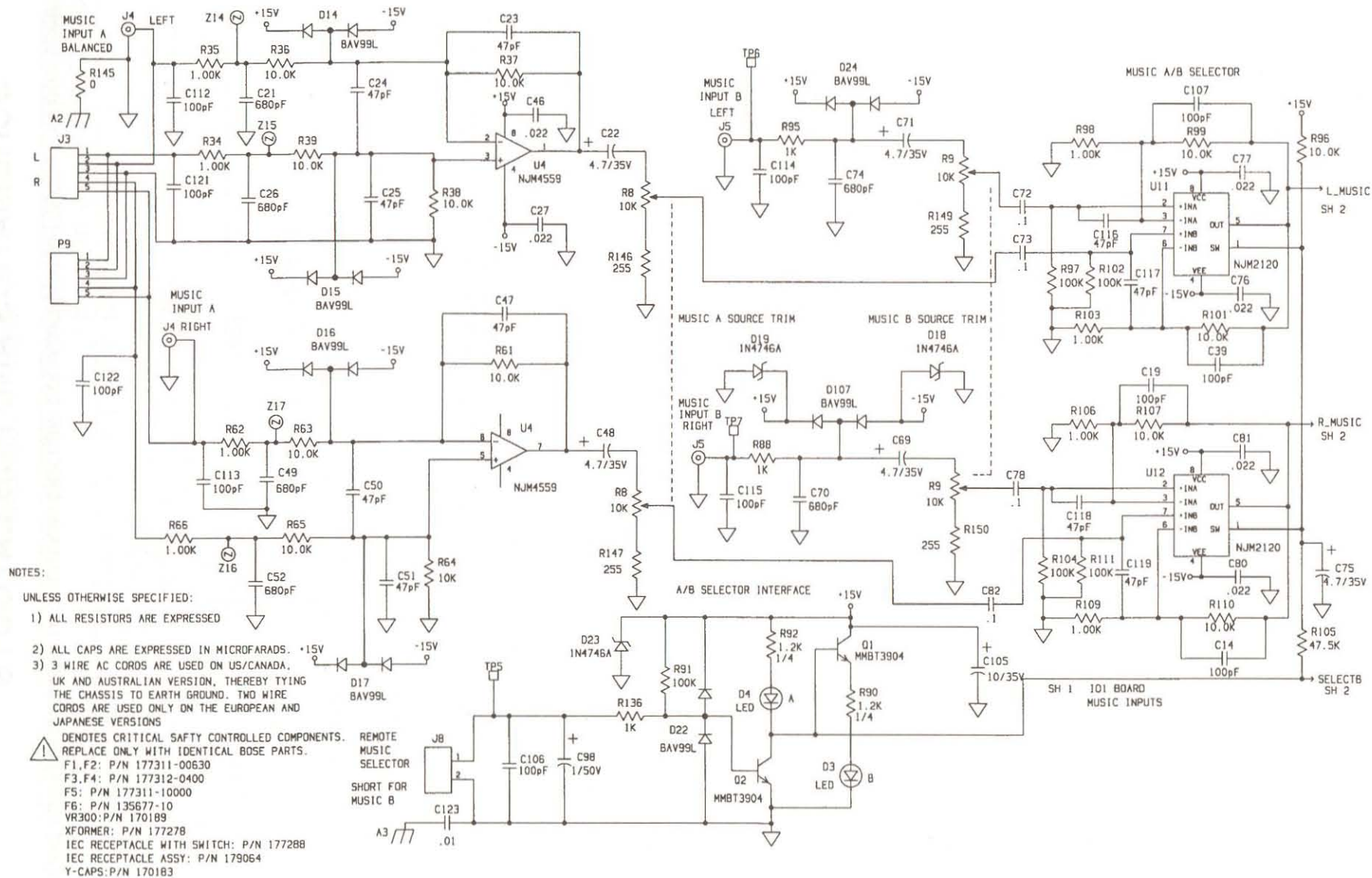
Note:

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.

SCHEMATICS AND PCB LAYOUTS

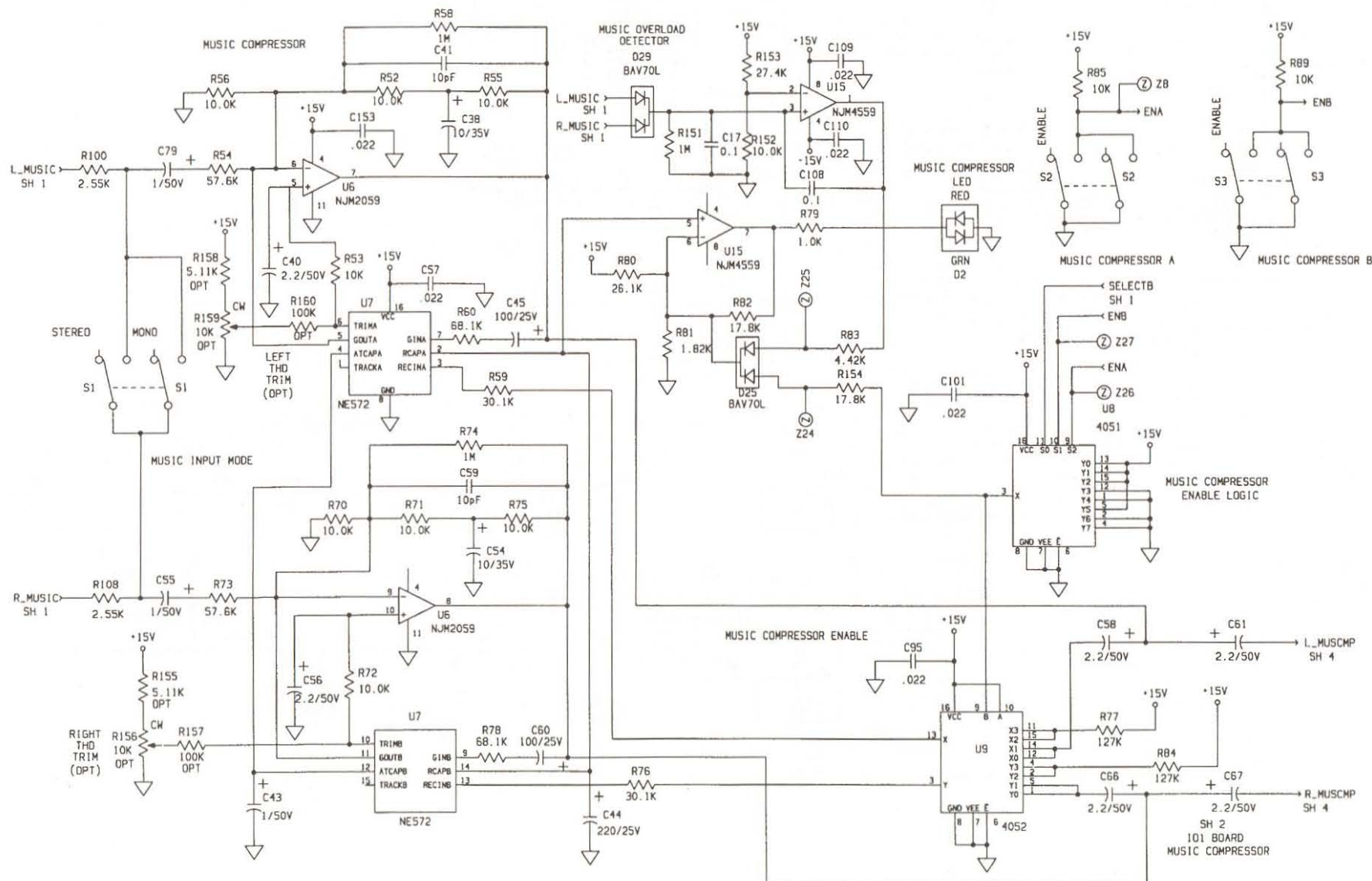
The schematics and PC board layouts provided with this manual can be used for units built with PC board 177300, Revisions 0 and 1.

FreeSpace®6 Business Music System
Sheet 1, PCB IO1 Music Inputs (PCB 177300, Revisions 0 and 1)



Note: This schematic can be used for Revisions 0 and 1 of PCB 177300.

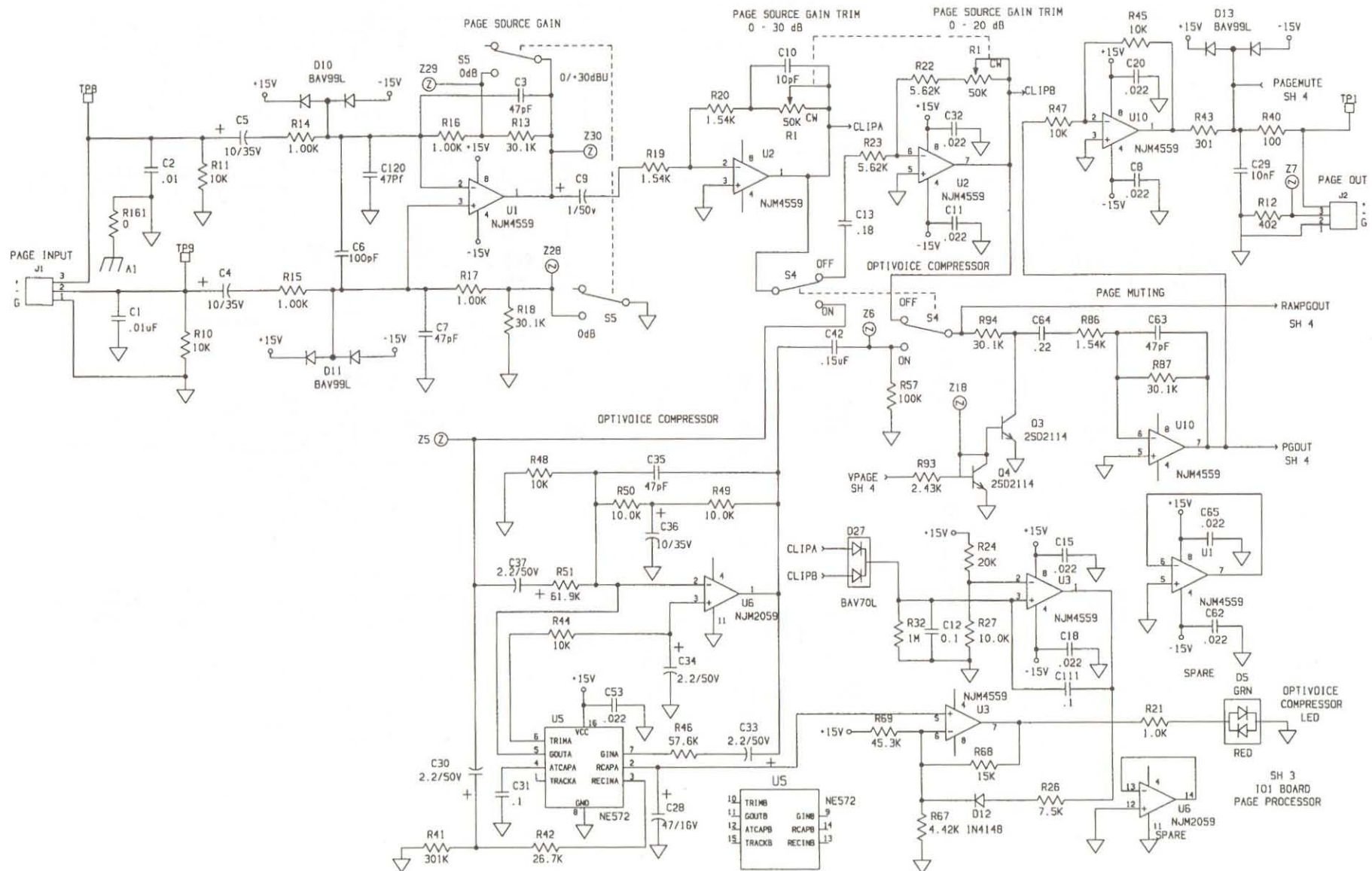
FreeSpace®6 Business Music System
Sheet 2, PCB IO1 Music Compressor (PCB 177300, Revisions 0 and 1)



Note: This schematic can be used for Revisions 0 and 1 of PCB 177300.

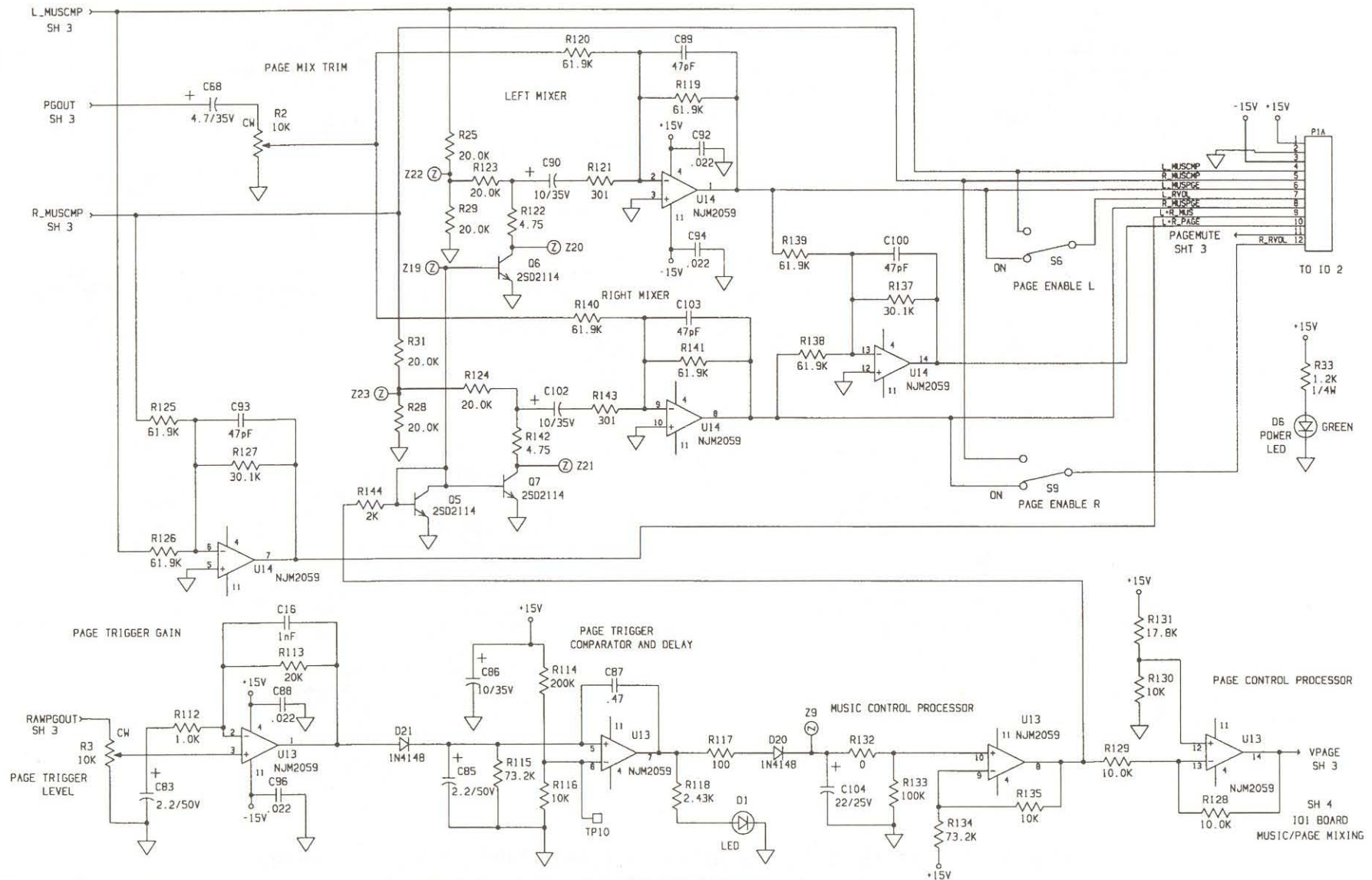
FreeSpace®6 Business Music System

Sheet 3, PCB IO1 Board Page Processor (PCB 177300, Revisions 0 and 1)



Note: This schematic can be used for Revisions 0 and 1 of PCB 177300.

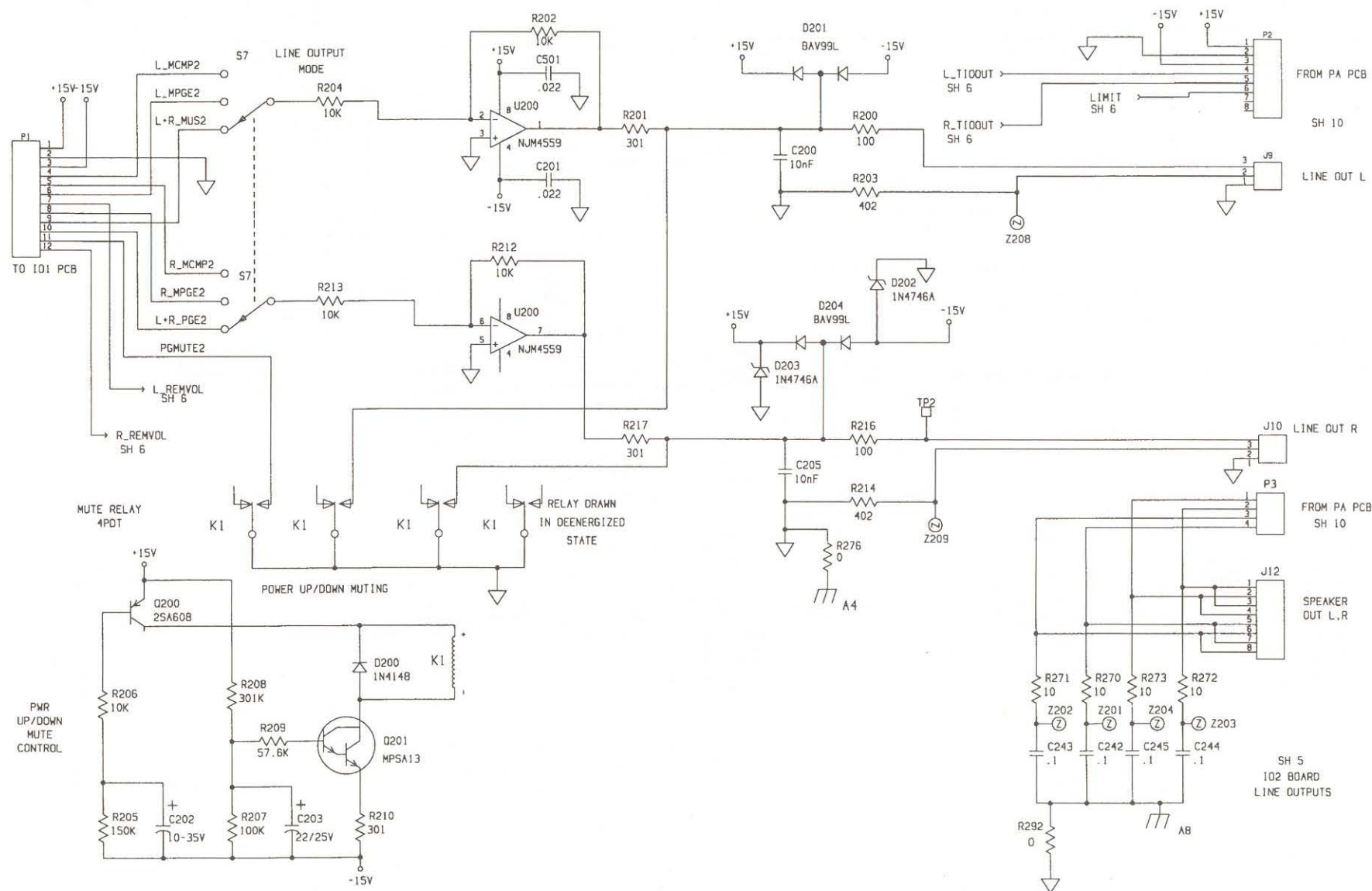
FreeSpace®6 Business Music System
Sheet 4, PCB IO1 Board Music/Page Mixing (PCB 177300, Revisions 0 and 1)



Note: This schematic can be used for Revisions 0 and 1 of PCB 177300.

FreeSpace®6 Business Music System

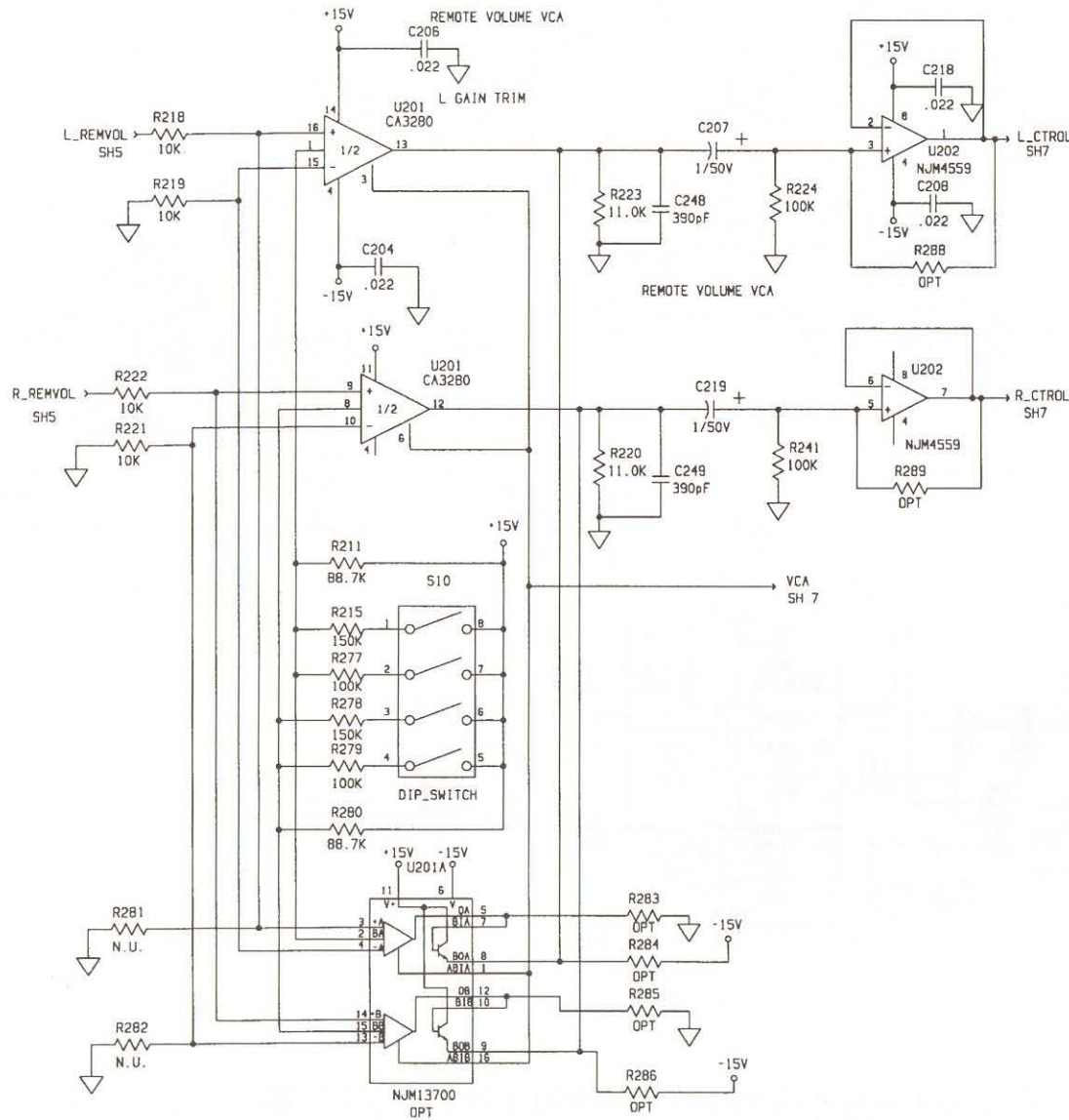
Sheet 5, PCB IO2 Board Line Outputs (PCB 177300, Revisions 0 and 1)



Note: This schematic can be used for Revisions 0 and 1 of PCB 177300.

FreeSpace®6 Business Music System

Sheet 6, PCB IO2 Board Remote Volume (PCB 177300, Revisions 0 and 1)



COMPONENT CHART		
REF DES	U201 CA3280 VALUE	U201A NJM13700 (ALT. PART) VALUE
R219, R221	10K	511
R218, R222	10K	16.9K
R281, R282	OPT	511
R284, R286	OPT	5.11K
R223, R220	11.0K	OPT
R224, R241	100K	OPT
R288, R289	OPT	0
R283, R285	OPT	10K
C248, C249	390pF	OPT
U201	CA3280	OPT
U201A	OPT	NJM13700
U202	NJM4559	OPT
IF S10 USED		
R211, R280	88.7K	48.7K
R215, R278	150K	80.6K
R277, R279	100K	52.3K
IF S10 NOT USED		
R211, R280	56.2K	30.1K
R215, R278	OPT	OPT
R277, R279	OPT	OPT

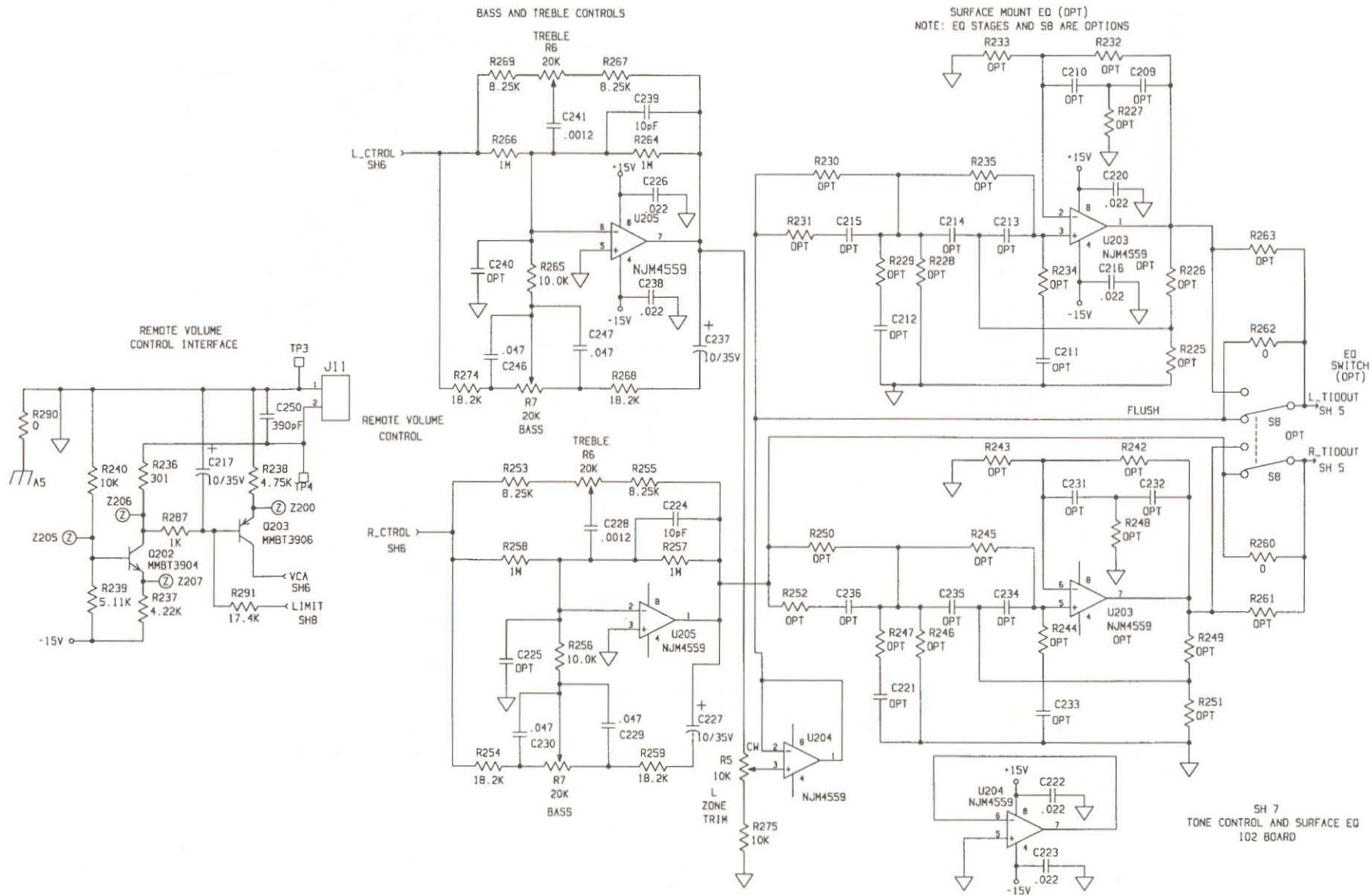
	+4dB	0	-4dB
S10-1	OPEN	CLOSED	CLOSED
S10-2	OPEN	OPEN	CLOSED
S10-3	OPEN	CLOSED	CLOSED
S10-4	OPEN	OPEN	CLOSED

SH 6
IO2 BOARD
REMOTE VOLUME

Note: This schematic can be used for Revisions 0 and 1 of PCB 177300.

FreeSpace®6 Business Music System

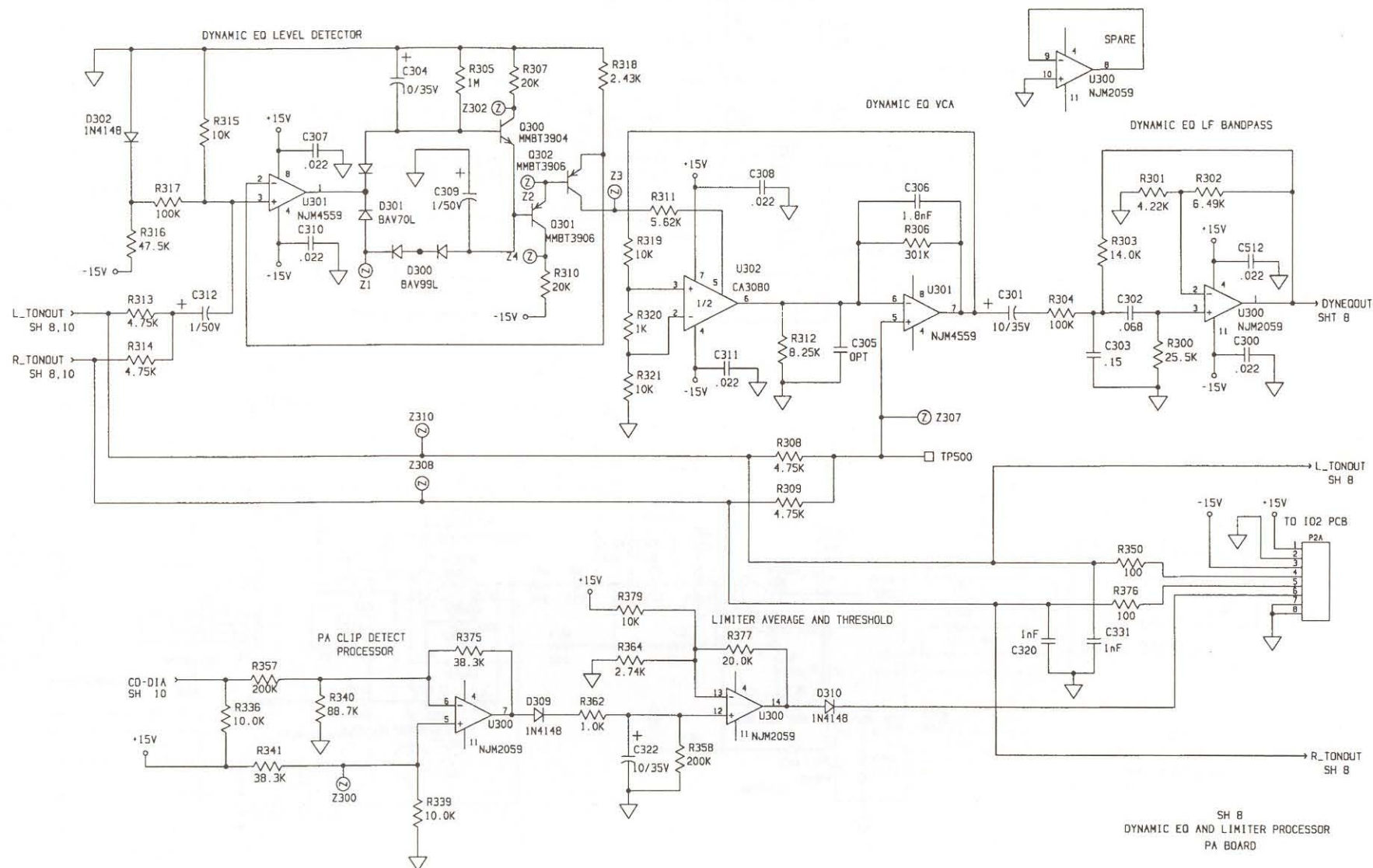
Sheet 7, PCB IO2 Tone Control and Surface EQ (PCB 177300, Revisions 0 and 1)



Note: This schematic can be used for Revisions 0 and 1 of PCB 177300.

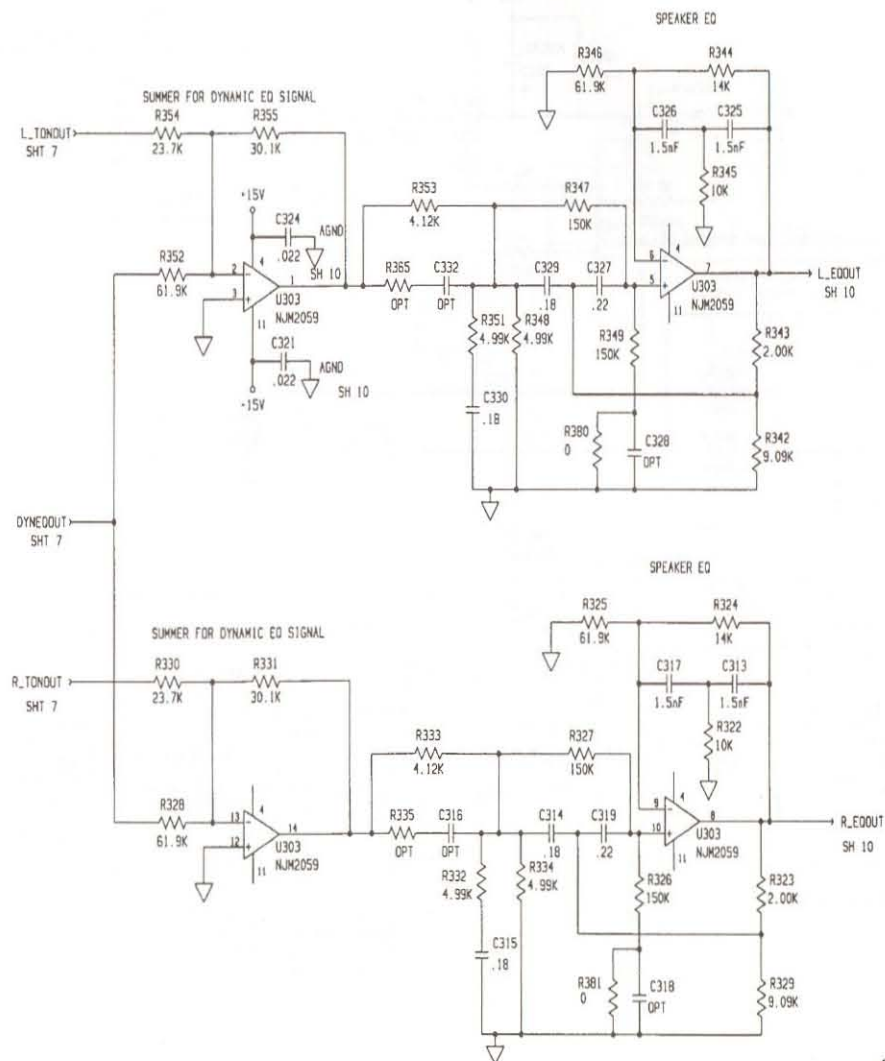
FreeSpace®6 Business Music System

Sheet 8, PA Board Dynamic EQ and Limiter Processor (PCB 177300, Revisions 0 and 1)



Note: This schematic can be used for Revisions 0 and 1 of PCB 177300.

FreeSpace®6 Business Music System
Sheet 9, PA Board Speaker EQ (PCB 177300, Revisions 0 and 1)

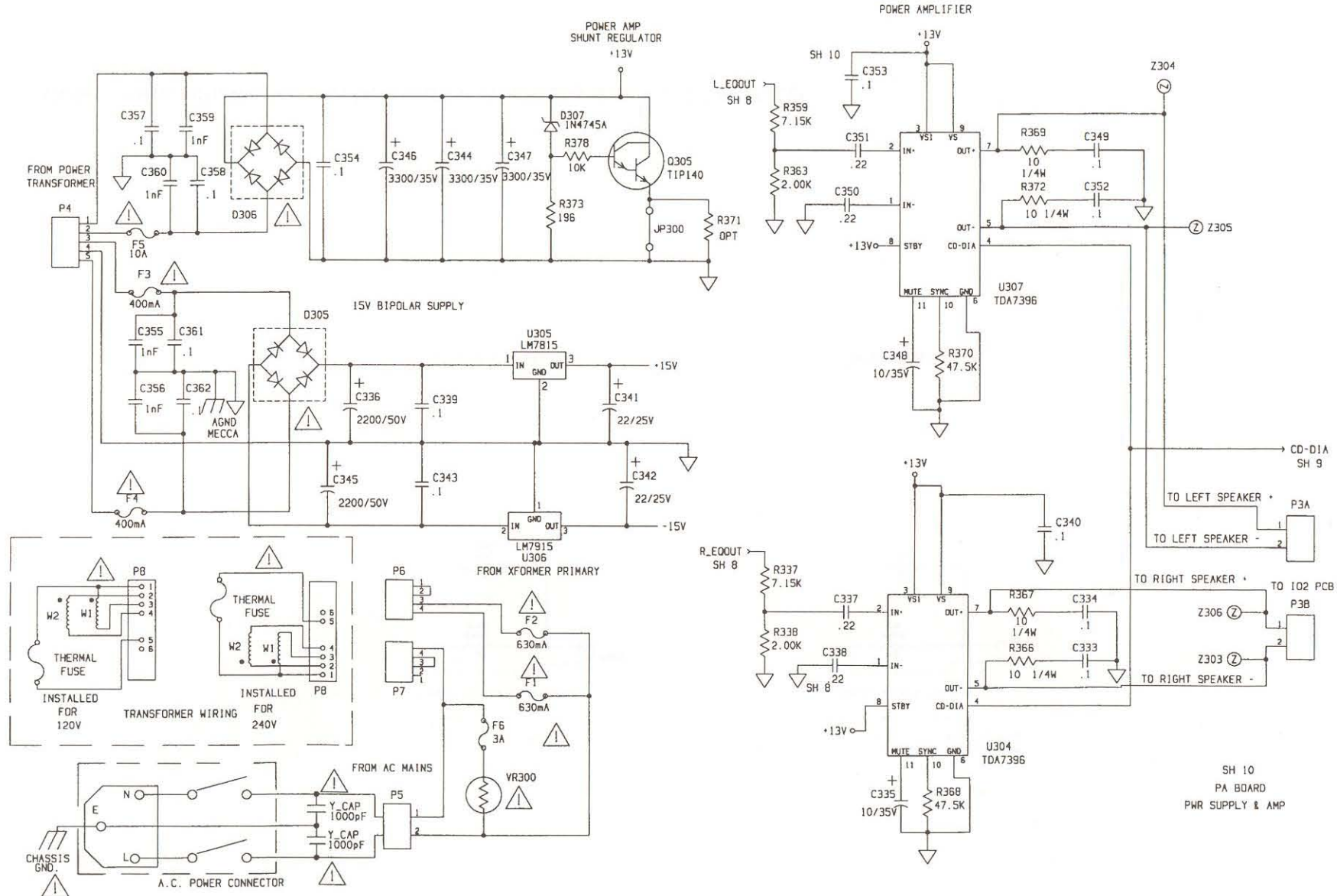


SH 9
 SPEAKER EQ
 PA BOARD

Note: This schematic can be used for Revisions 0 and 1 of PCB 177300.

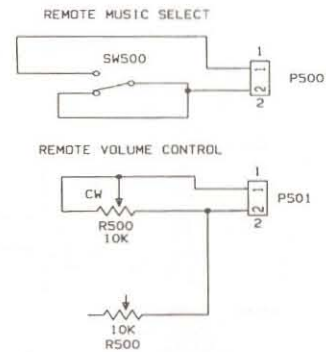
FreeSpace®6 Business Music System

Sheet 10, PA Board Power Supply and Amp(PCB 177300, Revisions 0 and 1)

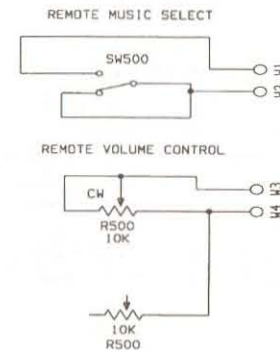


Note: This schematic can be used for Revisions 0 and 1 of PCB 177300.

FreeSpace®6 Business Music System
Sheet 11, Remote Board (PCB 177300, Revisions 0 and 1)



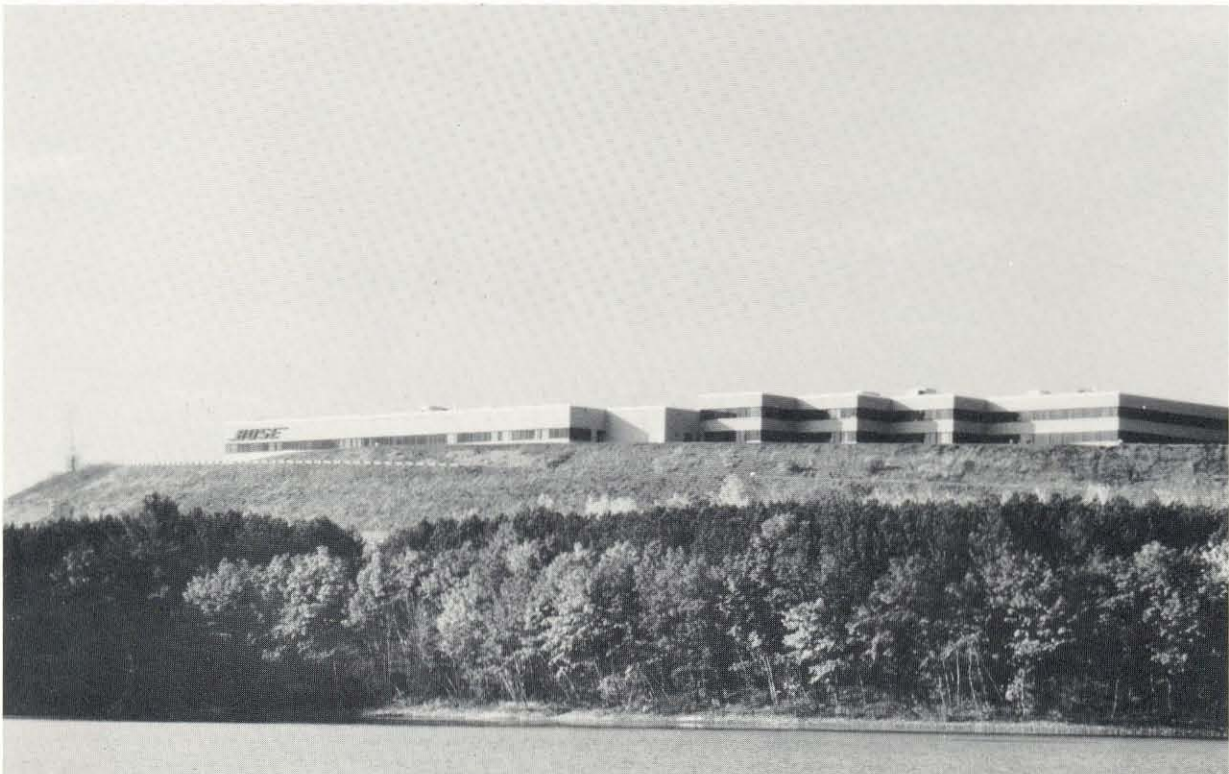
Revision 0



Revision 1

11
BOARD

Note: These schematics can be used for Revisions 0 or 1 of PCB 177300.



SPECIFICATIONS AND FEATURES SUBJECT TO CHANGE WITHOUT NOTICE

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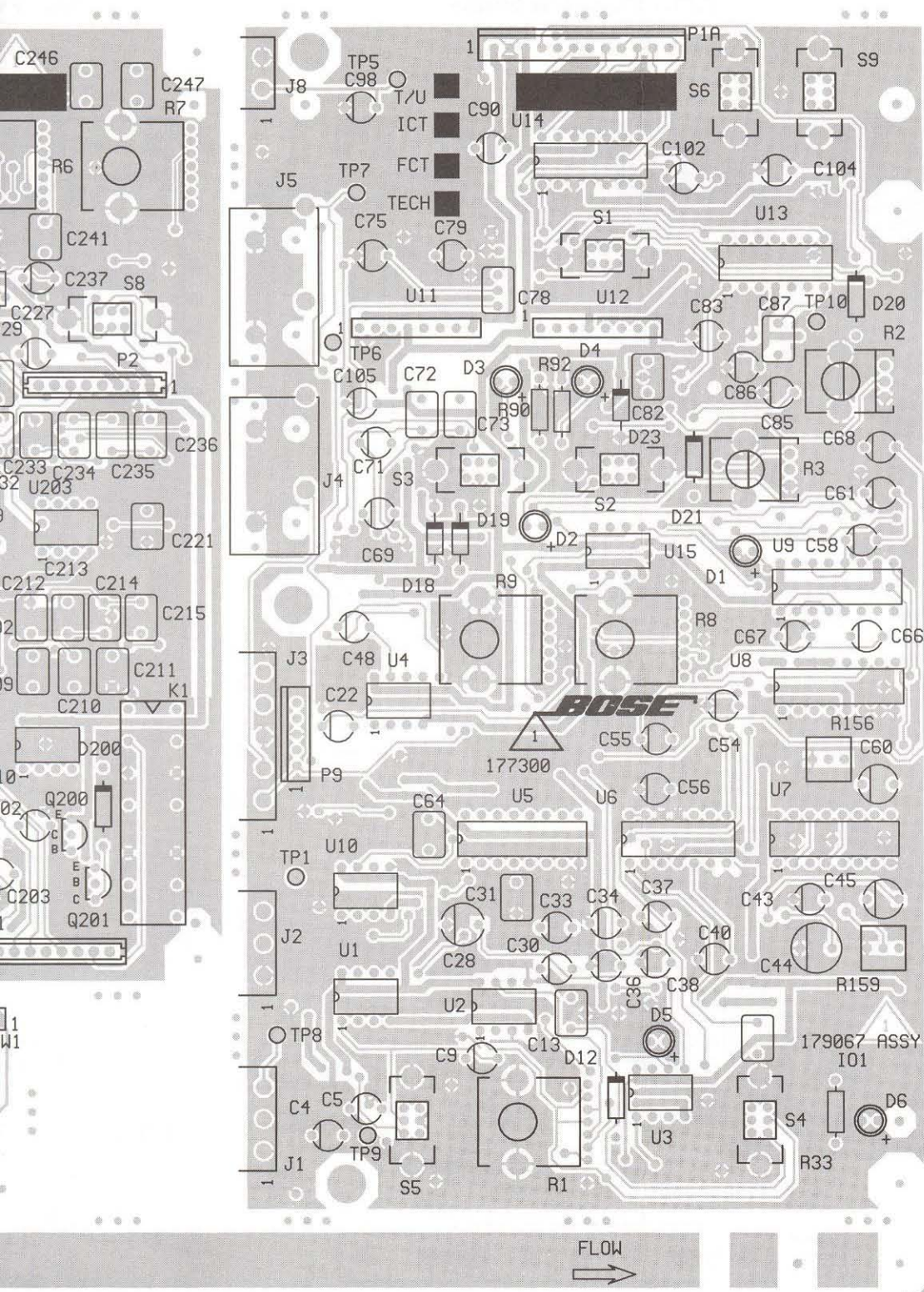


P/N 181816 01/96: Rev.0

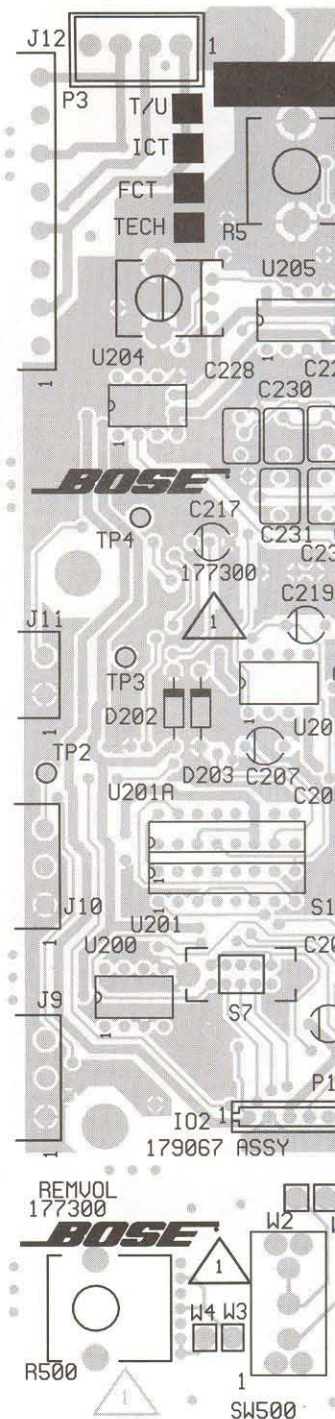
FOR TECHNICAL ASSISTANCE OR PART ORDERS, CALL 1-800-367-4008

Assembly

IO1 PCB Assembly

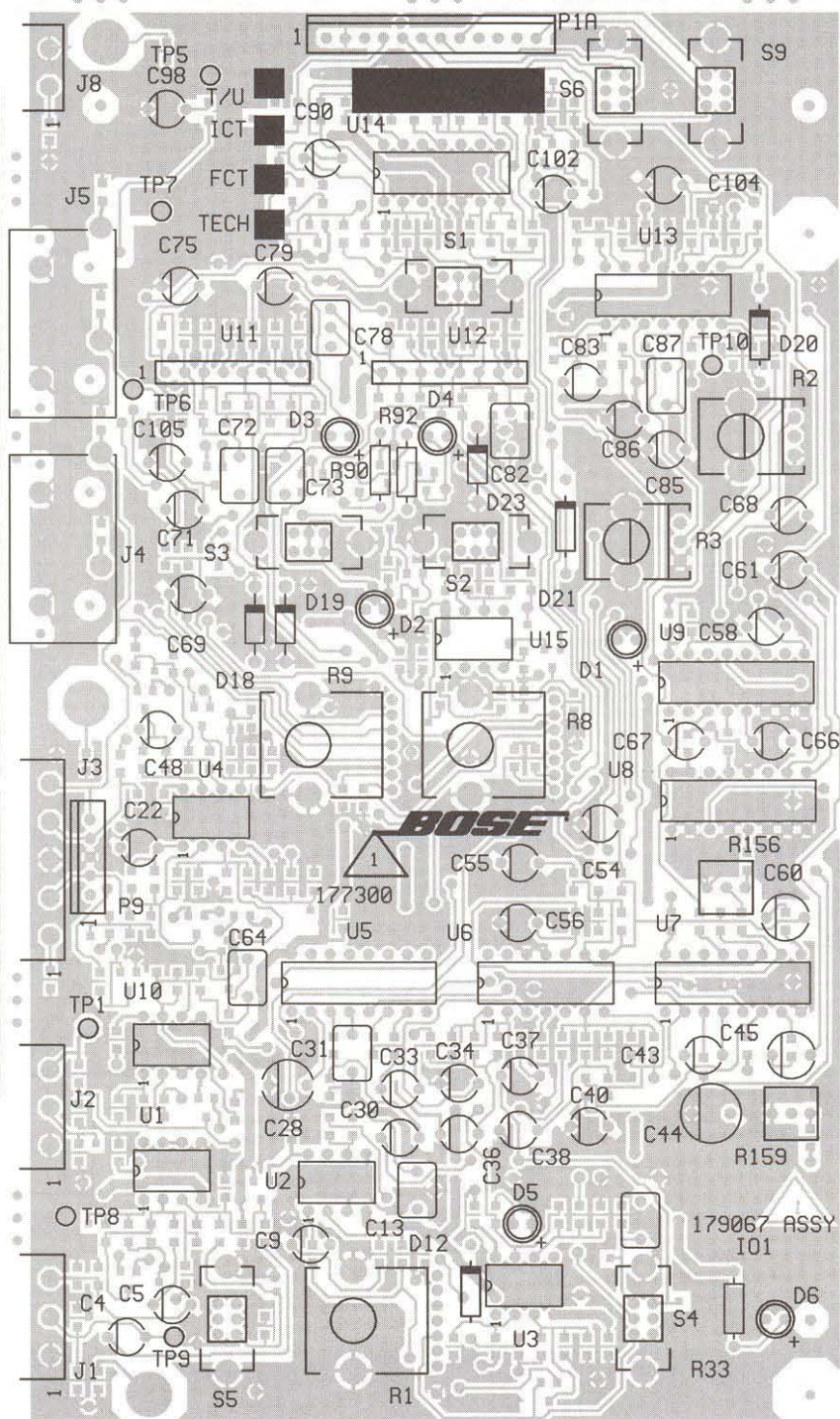
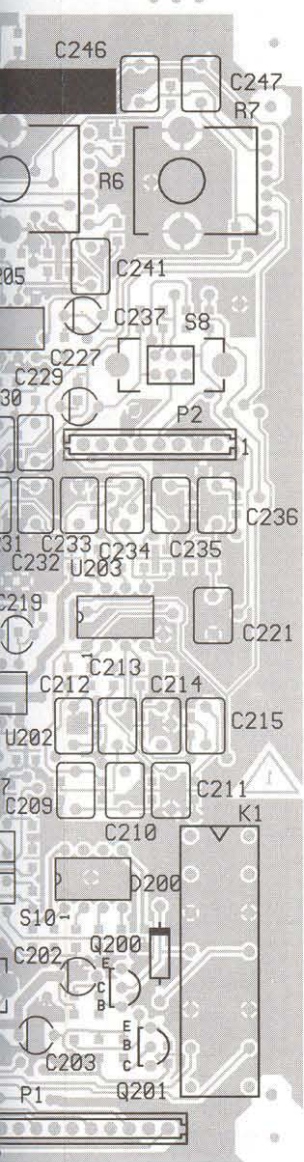


Special Note: The Top Components/Bottom Etch Layer layout of PC Board 177300, Revision 1 is on the back of this foldout.



CB Assembly

IO1 PCB Assembly

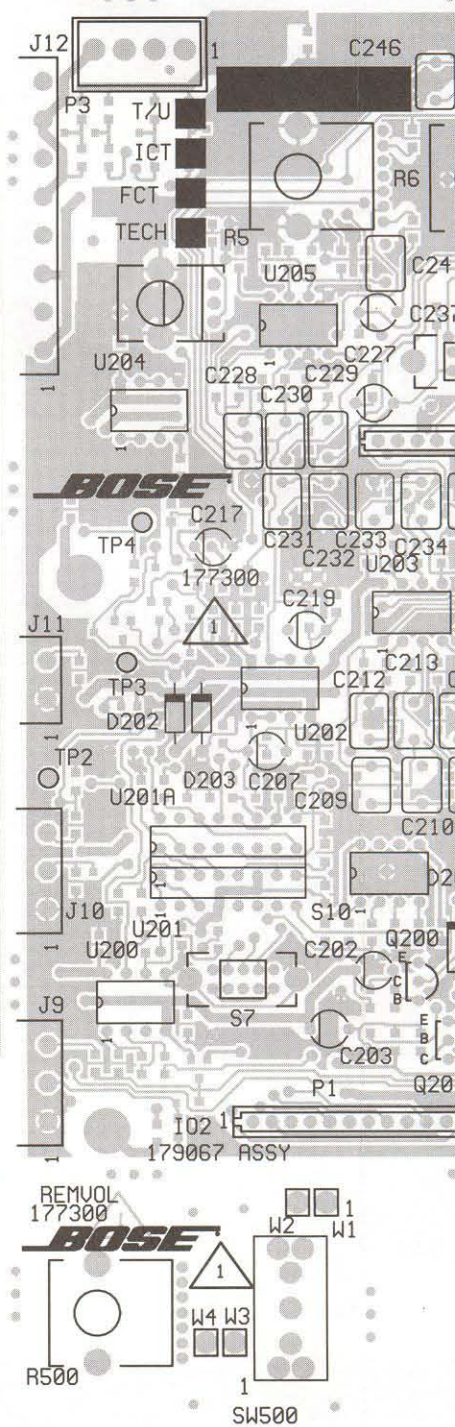
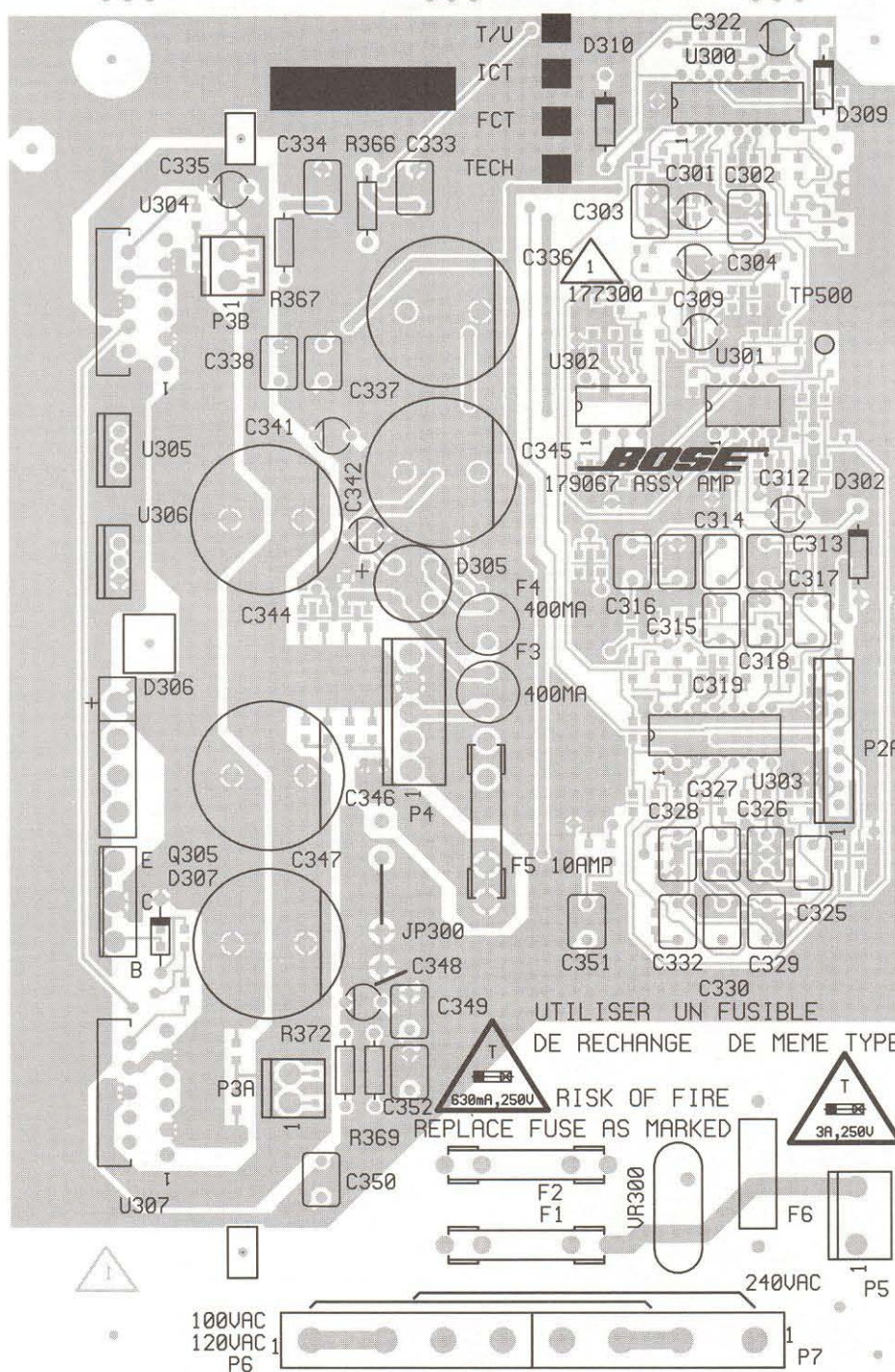


FLOW

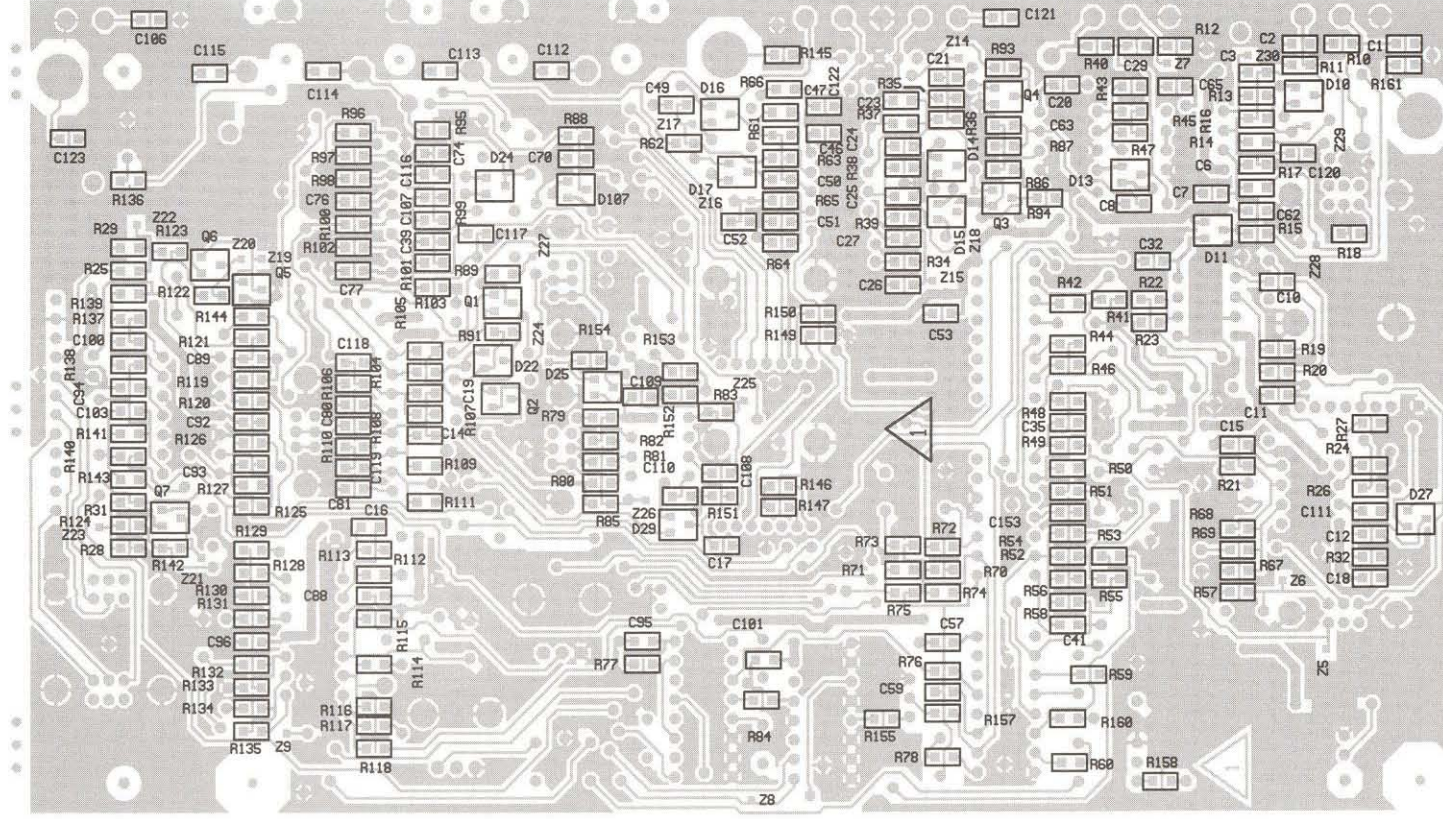


Amp PCB Assembly

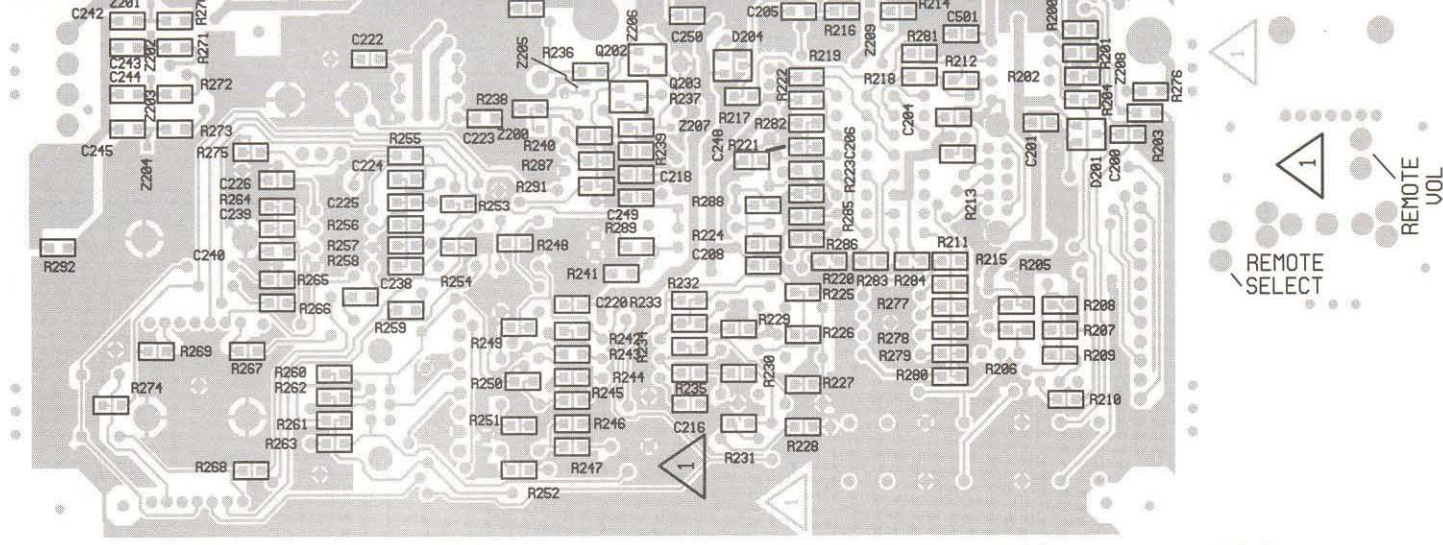
IO2 PCB Assembly



IO1 PCB Assembly



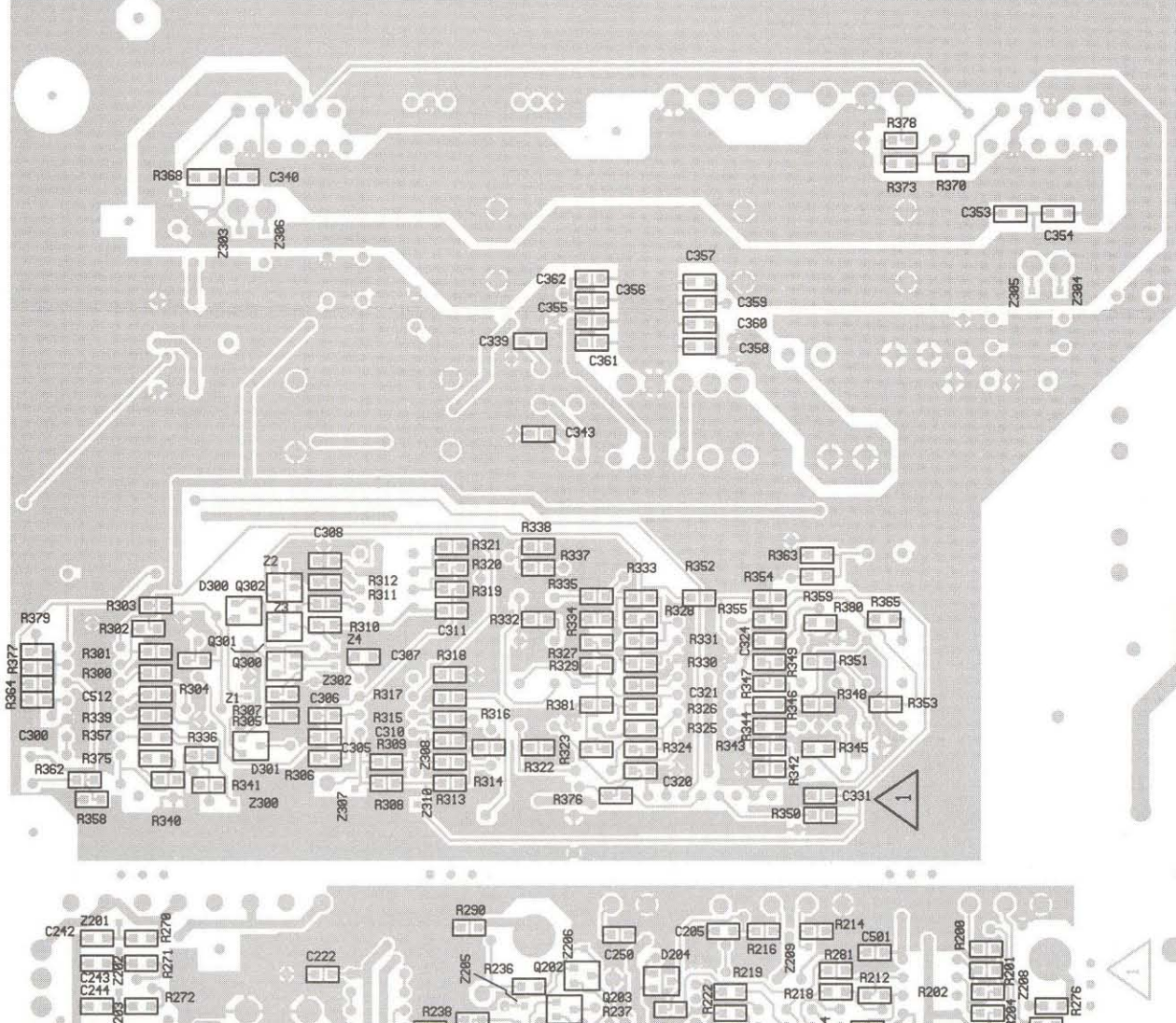
IO2 PCB Assem

REMOTE
SELECT

REMOTE
VOL

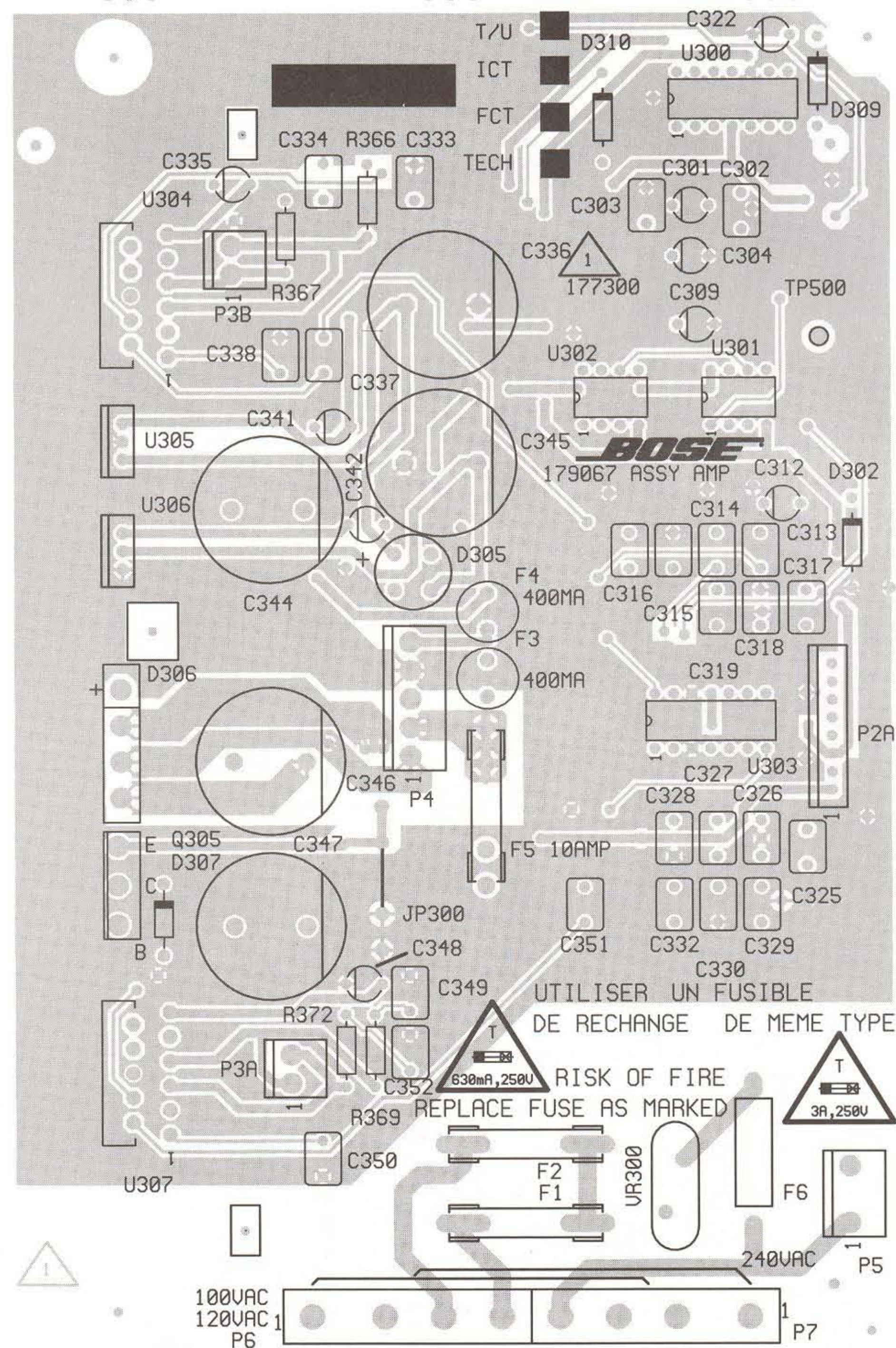
Assembly

Amp PCB Assembly

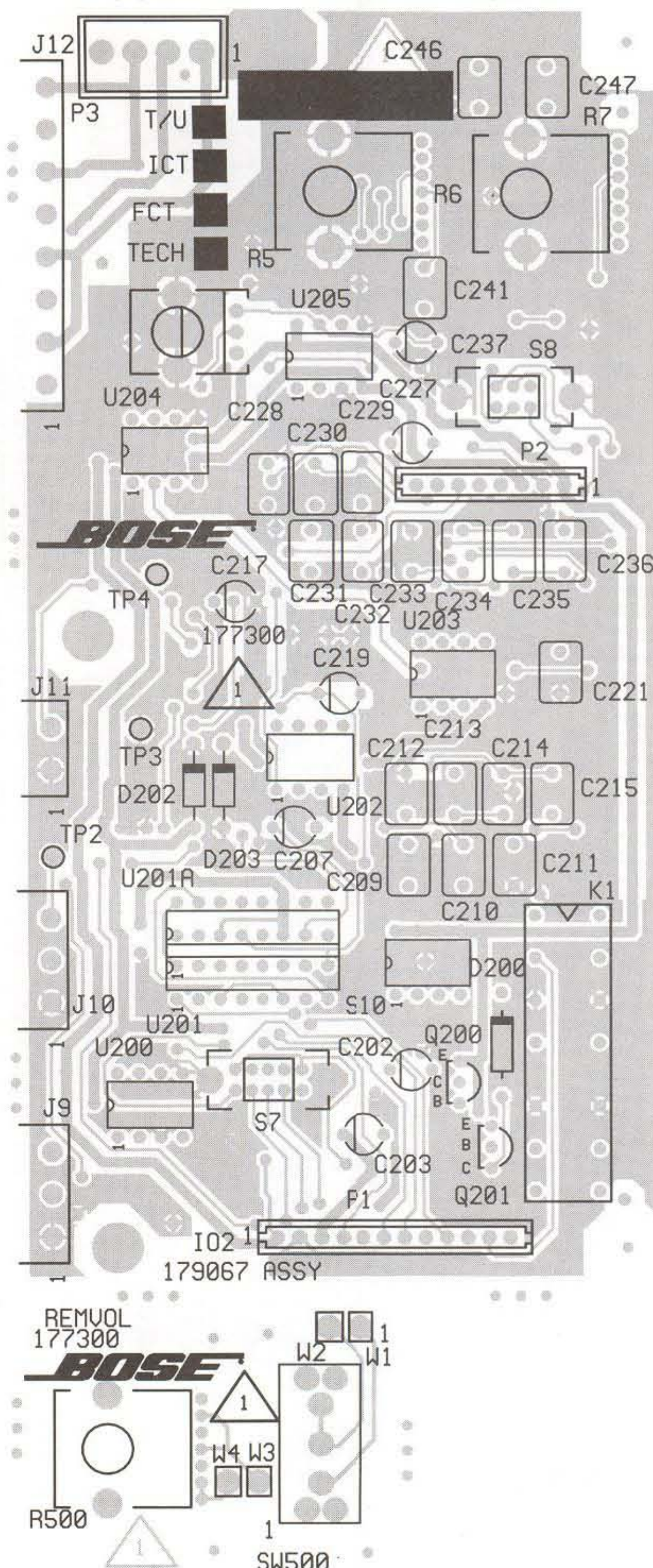


PC Board 177300, Revision 1
Top Components
Top Etch Layer

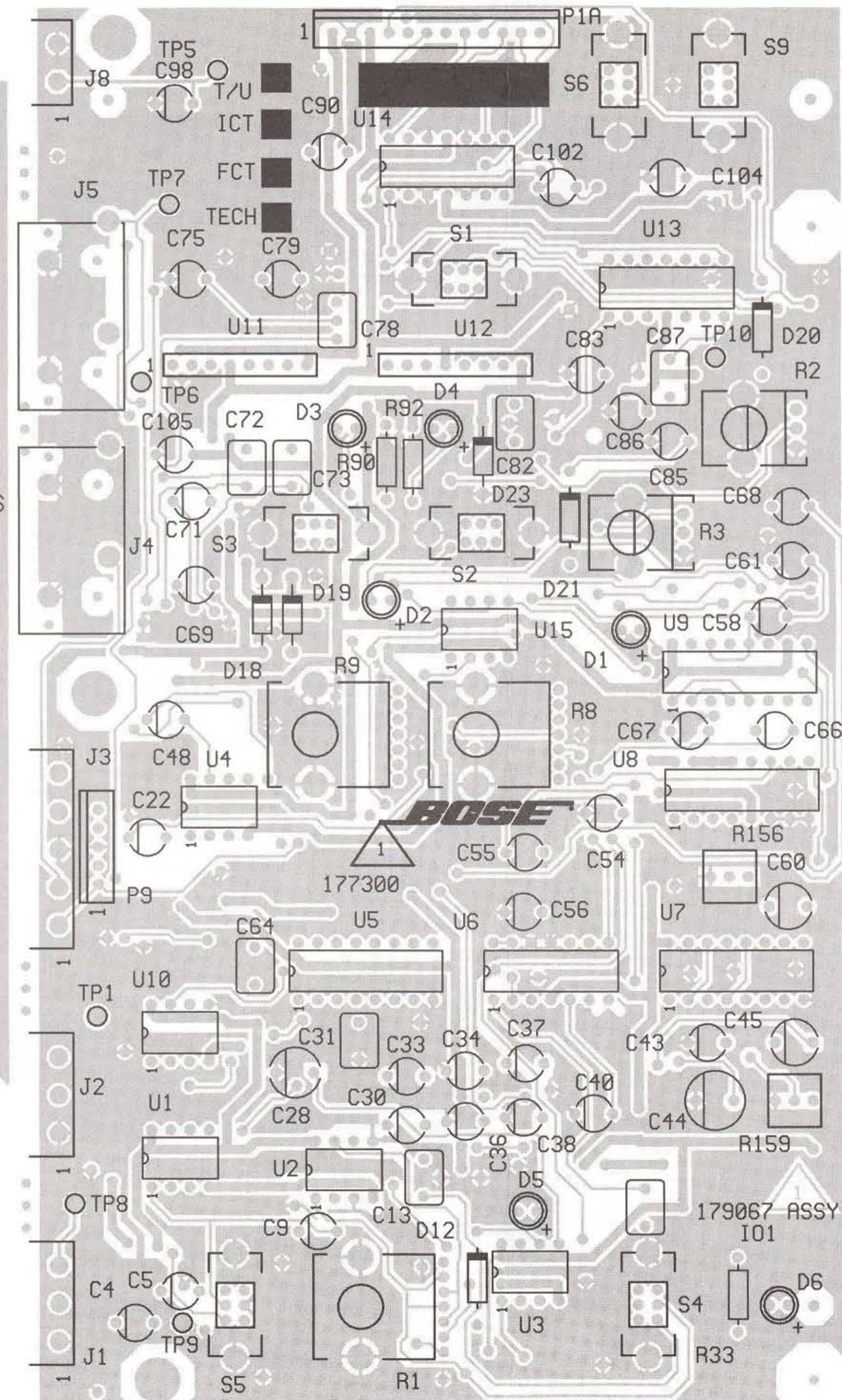
Amp PCB Assembly



IO2 PCB Assembly



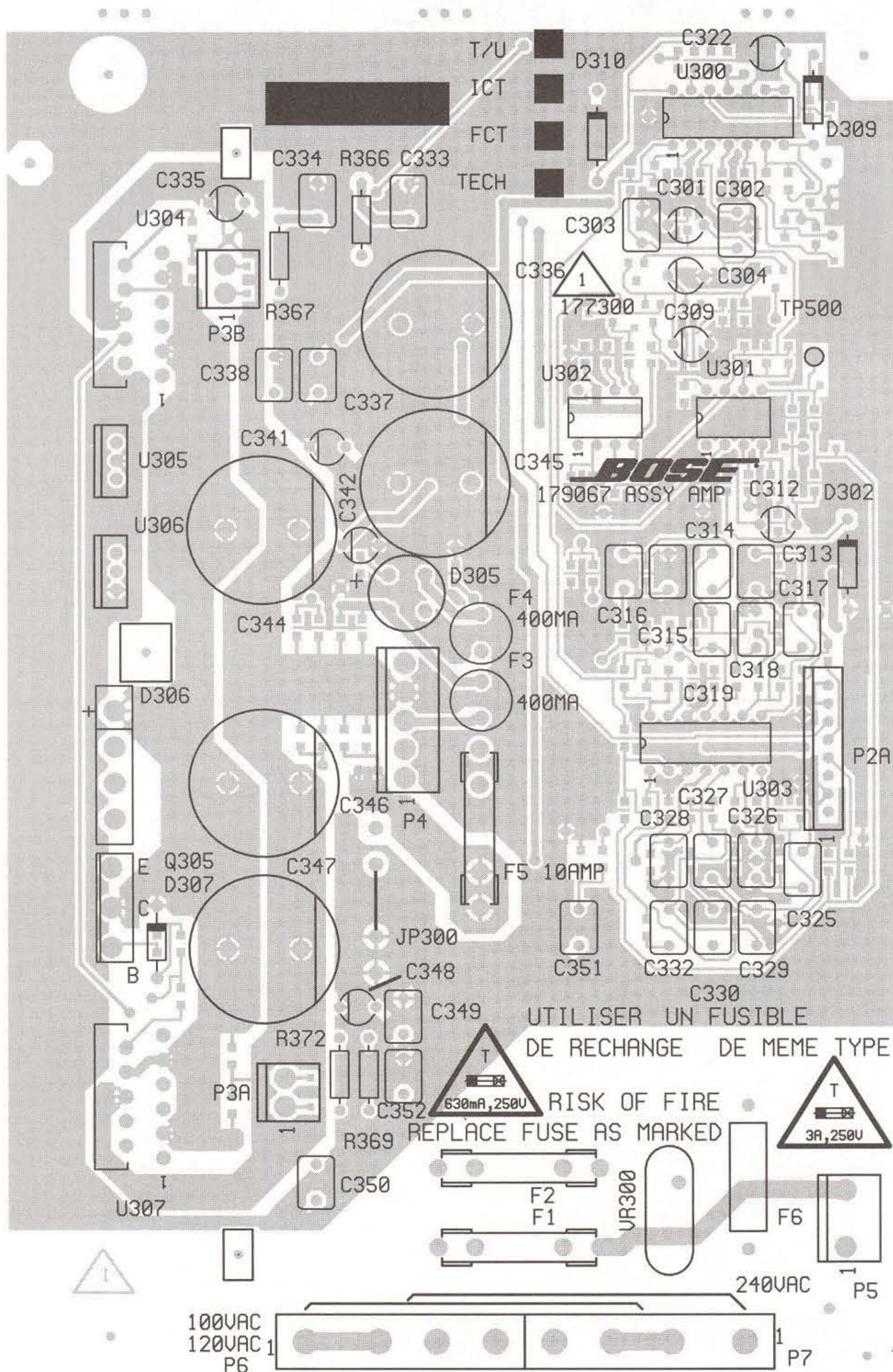
IO1 PCB Assembly



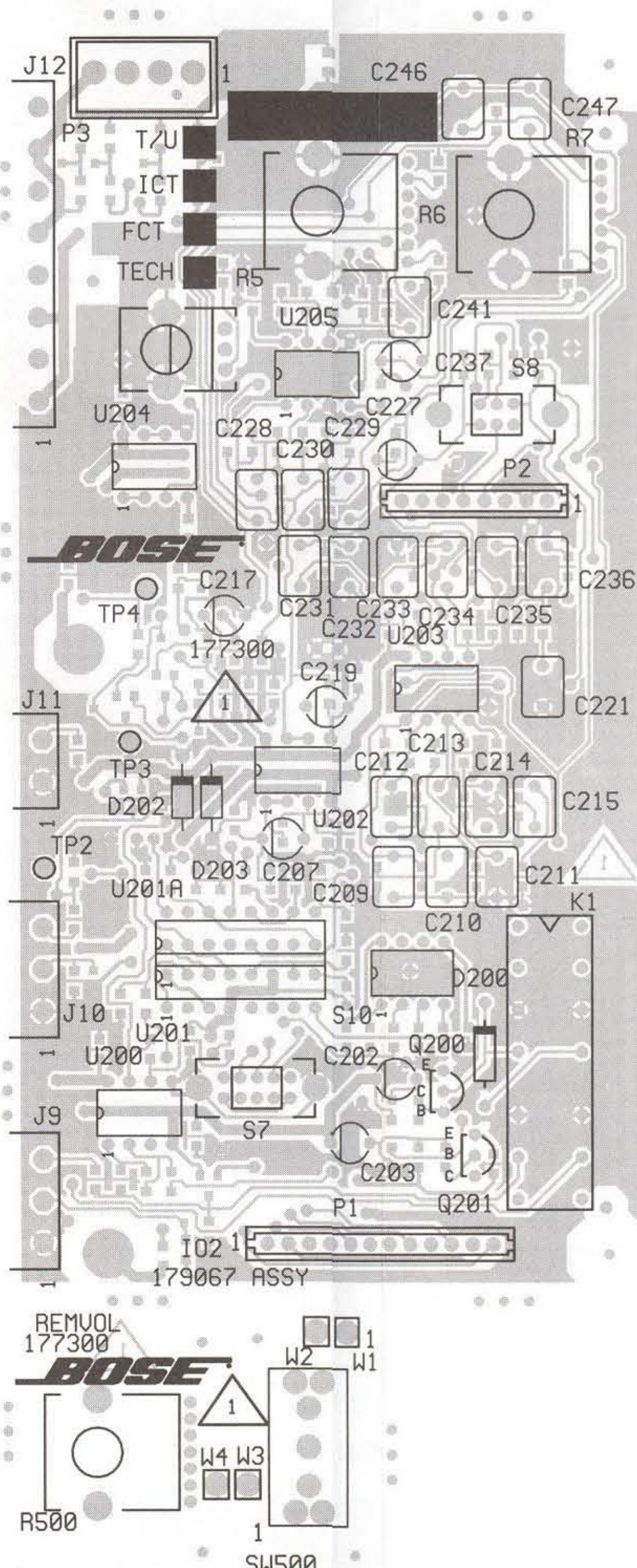
Special Note: The Top Components/Bottom Etch Layer layout of PC Board 177300, Revision 1 is on the back of this foldout.

Bottom Etch Layer

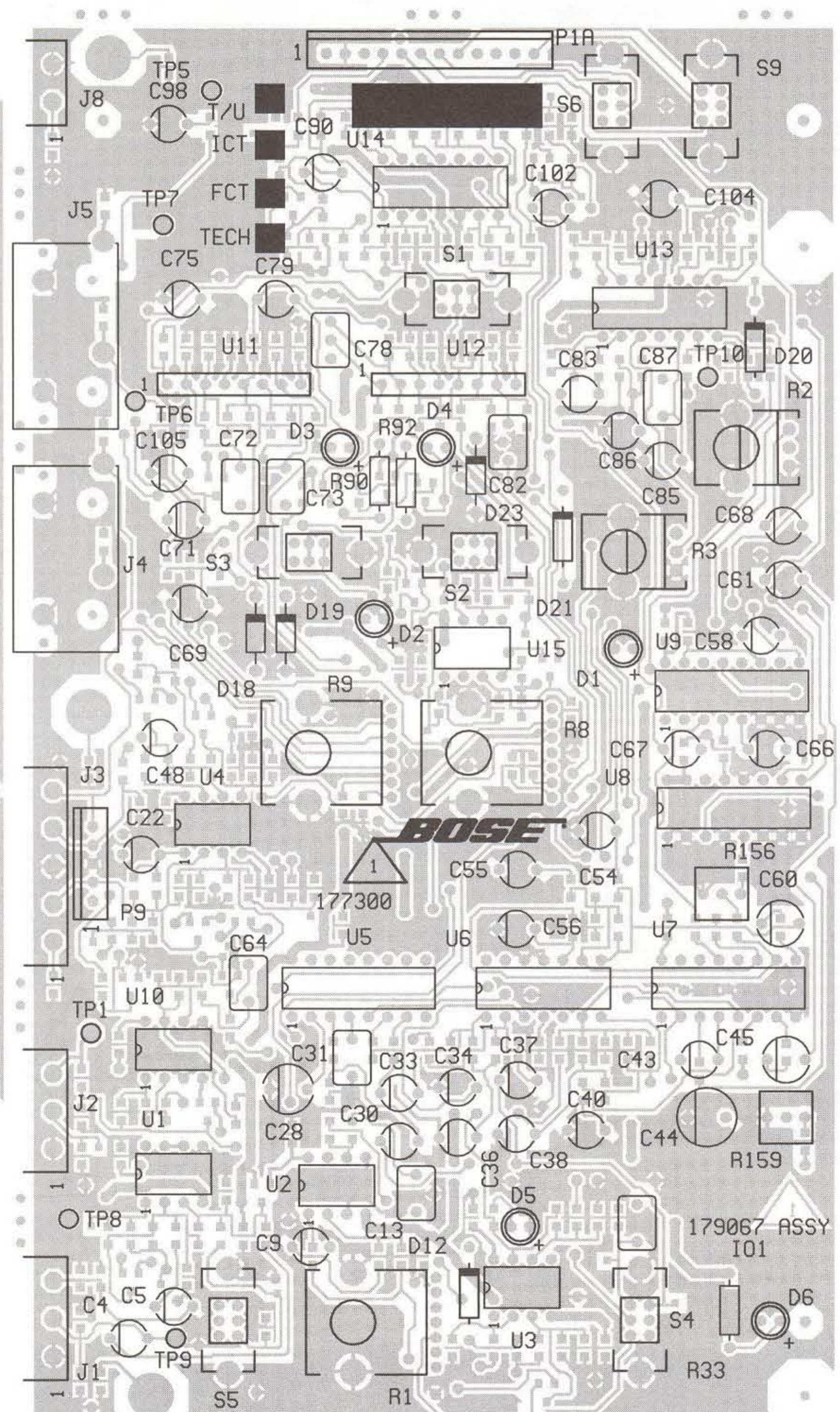
Amp PCB Assembly



IO2 PCB Assembly



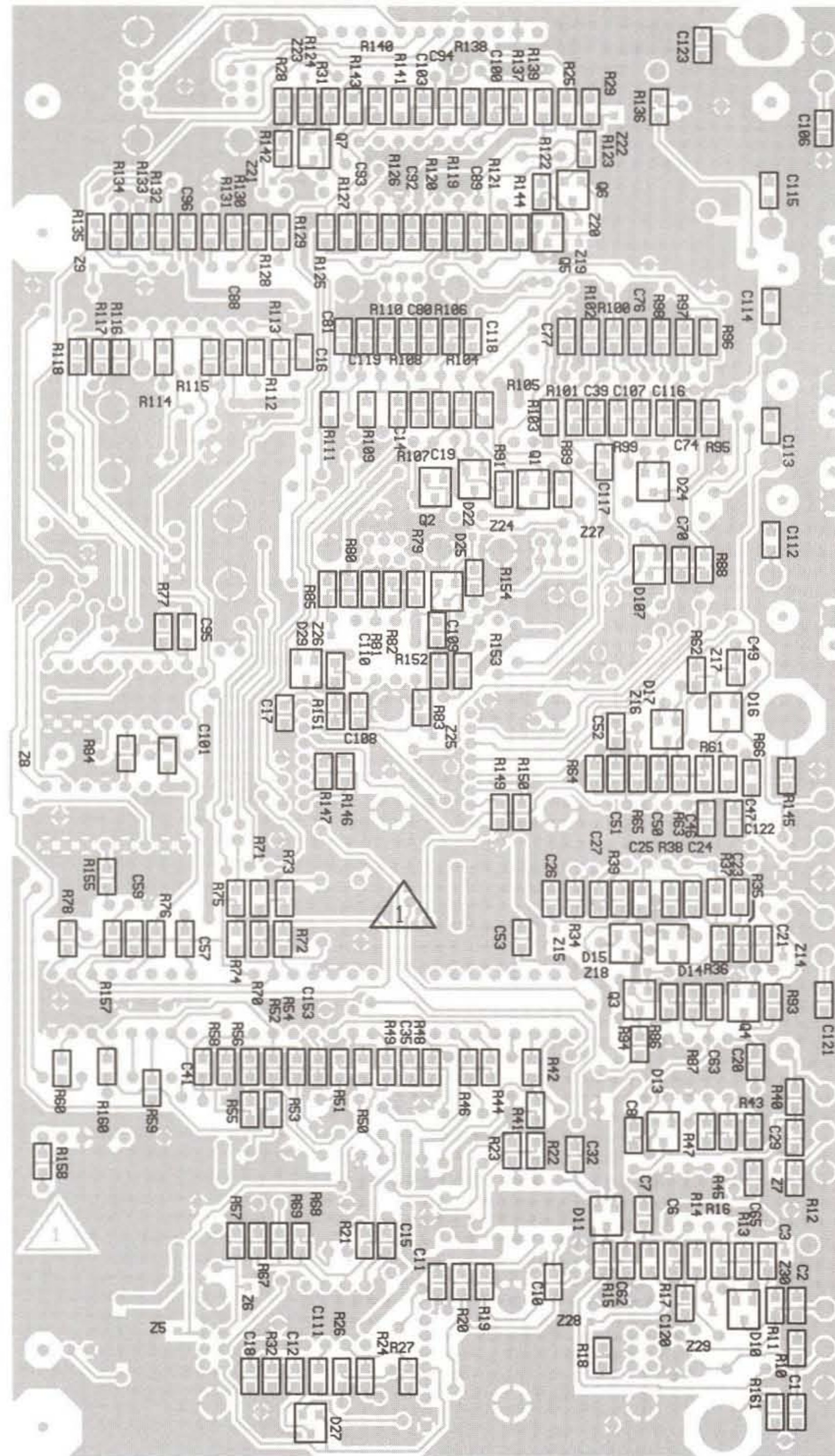
IO1 PCB Assembly



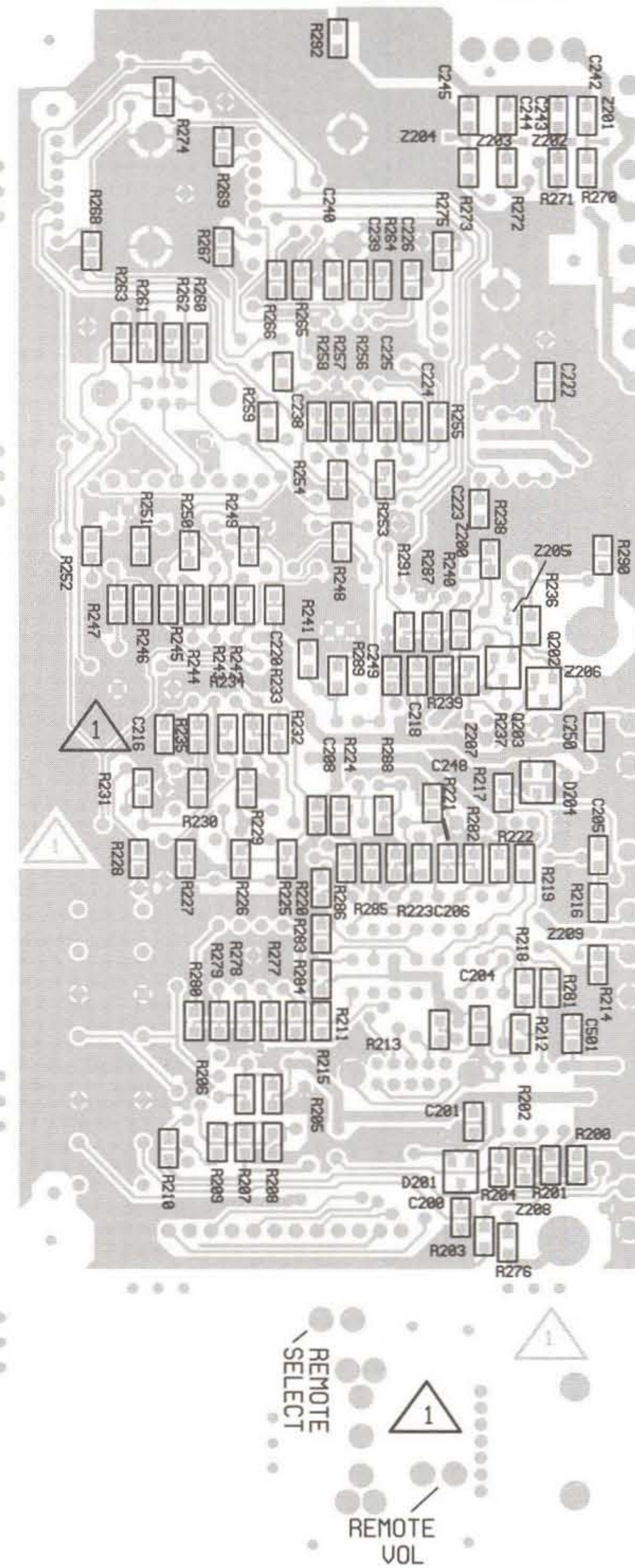
FLOW

PC Board 177300, Revision 1
SMD Components
Bottom Etch Layer

IO1 PCB Assembly



IO2 PCB Assembly



Amp PCB Assembly

