

## Companion<sup>®</sup> 3 Series II Multimedia Speaker System



### Product Description

The Companion 3 series II multimedia speaker system is a stereo system designed to be used as a computer sound system. It can be used with any analog audio source. It has a bass module with a 6.5 inch dual voice coil woofer in a slot ported design. The two satellite speakers connect to the bass module and are mounted to speaker stands. The speakers can be placed on a desk or other surface when removed from the stands. A wired remote control pod is used to control volume and mute/un-mute functions. The system also has a second input and a stereo headphone output on the control pod.

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## Warranty

The Bose® Companion® 3 series II MultiMedia Speaker System is covered by a 1-year, transferable limited warranty.

### 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.

**Caution:** The Companion 3 series II MultiMedia Speaker System contains no user serviceable parts. To prevent warranty infractions, refer servicing to warranty service centers or factory service.

## Safety Information



1. Parts that have special safety characteristics are identified by the  symbol on the 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 the American National Standards Institute (ANSI) C101.1 "Leakage Current for Appliances" and the Underwriters Laboratories (UL) 6500/IEC 60056 paragraph 9.1.1. With the unit AC switch first in the ON position and then in the 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 AC outlet and repeat the 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 testing 3 wire products, the resistance measured to the product enclosure should be between 2 and infinite MOhms. Also, the resistance measured to exposed input/output connectors should be between 4 and infinite MOhms. When testing 2 wire products, the resistance measured to exposed input/output connectors should be between 4 and infinite MOhms. 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.

## Electrostatic Discharge Sensitive (ESDS) Device Handling

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

# Specifications

## Mechanical

|                       |                                  |                                                           |
|-----------------------|----------------------------------|-----------------------------------------------------------|
| Dimensions:           | Bass Module:                     | 8 5/8 " H x 7 1/8" W x 14" D<br>(21.8 x 18 x 35.56 cm)    |
|                       | Satellite Speaker:<br>(no stand) | 2 1/2" H x 2 3/4" W x 2 3/8" D<br>(6.14 x 6.86 x 6.03 cm) |
|                       | Control Pod:                     | 2 1/2 " D x 1 1/8" H<br>(6.35 x 2.79 cm)                  |
| Weight:               | Bass Module:                     | 14.65 lbs (6.64 kg) unpacked                              |
|                       | Satellite Speaker:               | .75 lbs (0.34 kg) each                                    |
|                       | Packaged System:                 | 20.15 lbs (9.13 kg) packed                                |
| Finish:               | Bass Module:                     | Scratch-resistant, satin-finish vinyl                     |
|                       | Satellites:                      | Painted polymer finish                                    |
| Bass Box:             |                                  | Slot ported                                               |
| Bass Box Port Tuning: |                                  | 45 Hz                                                     |

## Electrical

|                           |             |                                       |
|---------------------------|-------------|---------------------------------------|
| Power Rating:             | USA/Canada: | 115 VAC 50/60 Hz                      |
|                           | Japan:      | 100 VAC 50/60 Hz                      |
|                           | Euro:       | 230 VAC 50/60 Hz                      |
| Nominal System Bandwidth: |             | 40 Hz to 15 kHz                       |
| Maximum SPL:              |             | 100 dB (A weighted) pink noise signal |
| Output:                   | Bass:       | 60 Watts                              |
|                           | Satellites: | 18 Watts per channel                  |

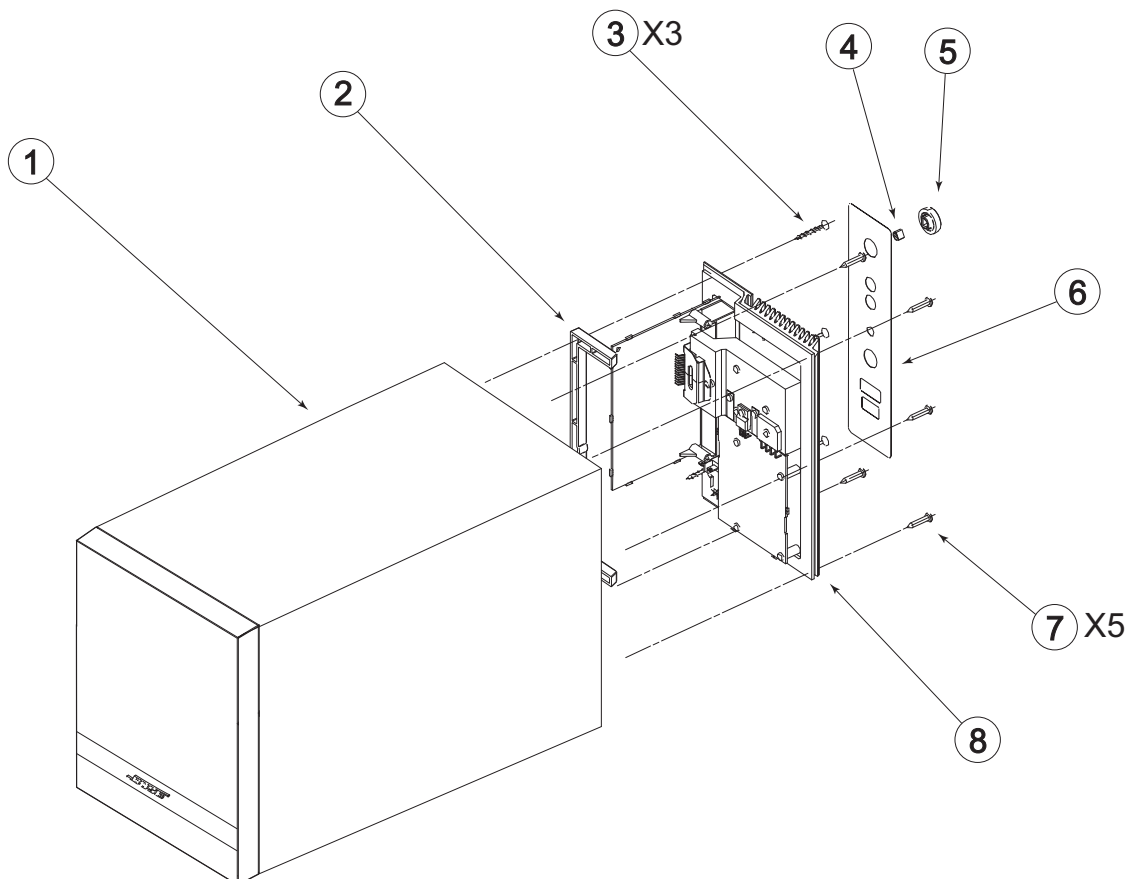
## Part List Notes

1. This part is not normally available from Customer Service. Approval from the Field Service Manager is required before ordering.
2. The individual parts on the PCBs are listed in the Electrical Part list.
3.  This part is critical for safety purposes. Failure to use a substitute replacement with the same safety characteristics as the recommended replacement part might create shock, fire and/or other hazards.
4. The part number listed is an assembly part number. The individual parts of the assembly might not be available separately.
5. This part is referenced for informational purposes only. It is not stocked as a repair part. Refer to the next higher assembly for a replacement part.

## Bass Module Assembly Exploded View

| Item | Description                                           | Part Number | Qty. | Note                                                                                  |
|------|-------------------------------------------------------|-------------|------|---------------------------------------------------------------------------------------|
| 1    | BASS MODULE, ASSY, US/CANADA, 120V (Electrofoil Logo) | *300905-001 | 1    |                                                                                       |
|      | BASS MODULE, ASSY, EURO, 230V (Electrofoil Logo)      | *300905-003 | 1    |                                                                                       |
|      | BASS MODULE, ASSY, JAPAN, 100V (Electrofoil Logo)     | *300905-002 | 1    |                                                                                       |
|      | BASS MODULE, ASSY, US/CANADA, 120V (Padprint Logo)    | *303939-112 |      |                                                                                       |
|      | BASS MODULE, ASSY, EURO, 230V (Padprint Logo)         | *303939-122 |      |                                                                                       |
|      | BASS MODULE, ASSY, JAPAN, 100V (Padprint Logo)        | *303939-132 |      |                                                                                       |
|      | (Complete bass module package, includes Amp Mod Assy) |             |      |                                                                                       |
| 2    | CLEAT, ABS                                            | 271817-001  | 1    | 5                                                                                     |
| 3    | SCREW, 4 x 1, THDF, FLHD, 82 DEG, PH                  | 274151-16   | 3    |                                                                                       |
| 4    | CLIP, SPRING, KNOB                                    | 262542      | 1    |                                                                                       |
| 5    | KNOB, VOL CNTL, BLK                                   | 271860-001  | 1    |                                                                                       |
| 6    | LABEL, I/O, US/CANADA, 120V                           | 300954-001  | 1    |                                                                                       |
|      | LABEL, I/O, JAPAN, 100V                               | 300954-002  |      |                                                                                       |
|      | LABEL, I/O, EURO, 230V                                | 300954-003  |      |                                                                                       |
| 7    | SCREW, TF, 4 x 3/4, PAN, PH, BLK                      | 273556-12   | 5    |                                                                                       |
| 8    | MOD ASSY, AMP, 120V                                   | *307876-011 | 1    | 3  |
|      | MOD ASSY, AMP, 220V, EURO                             | *307876-033 | 1    |                                                                                       |
|      | MOD ASSY, AMP, 100V JAPAN                             | *307876-022 | 1    |                                                                                       |
| -    | XFORMER, TORROID, 105W, 15VDC, 7A                     | 271818-001  |      |                                                                                       |
|      | TRANSFORMER, TOROID, 100V, 60Hz                       | N/A         |      |                                                                                       |
|      | TRANSFORMER, TOROID, 230V, 50Hz                       | 277613-001  |      |                                                                                       |

\*Capacitor C7 on the new power supply board may need to be replaced, see Service Bulletin 271885-B4

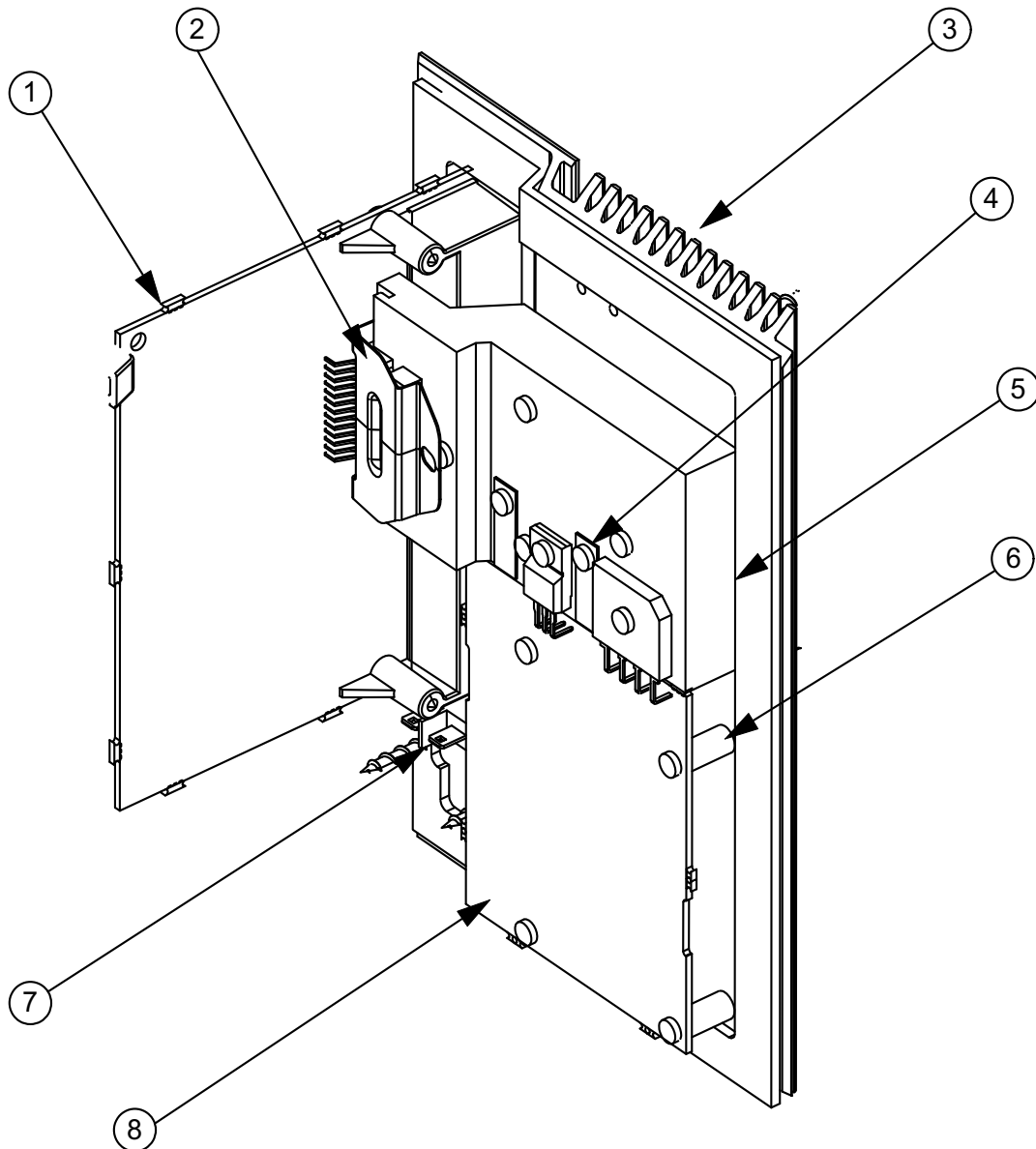


**Figure 1. Bass Module Assembly Exploded View**

## Amplifier Module Assembly

| Item | Description                        | Part Number | Qty. | Note |
|------|------------------------------------|-------------|------|------|
| 1    | PCB ASSY, MAIN                     | 277574-001  | 1    | 5    |
| 2    | BRACKET, METAL, IC                 | 271859      | 1    | 5    |
| 3    | HEATSINK, EXTRUDED, COMP 3         | 271856      | 1    | 5    |
| 4    | CLIP, THERMAL, THERMISTOR          | 272964-001  | 1    | 5    |
| 5    | HEAT SPREADER, ALUM                | 279844-001  | 1    | 5    |
| 6    | SCREW, TAPP, 6-13x.625, PAN, XRC/S | 172783-10   | 4    |      |
| 7    | CONN, SWITCH, POWER, 3P            | 273115-001  | 1    | 5    |
| 8    | PCB ASSY, PS, 120V, US             | *307872-011 | 1    | 4    |
|      | PCB ASSY, PS, 100V, JAPAN          | *307872-022 | 1    | 4    |
|      | PCB ASSY, PS, 220V, EURO           | *307872-033 | 1    | 4    |

\*Capacitor C7 on the new power supply board may need to be replaced, see Service Bulletin 271885-B4

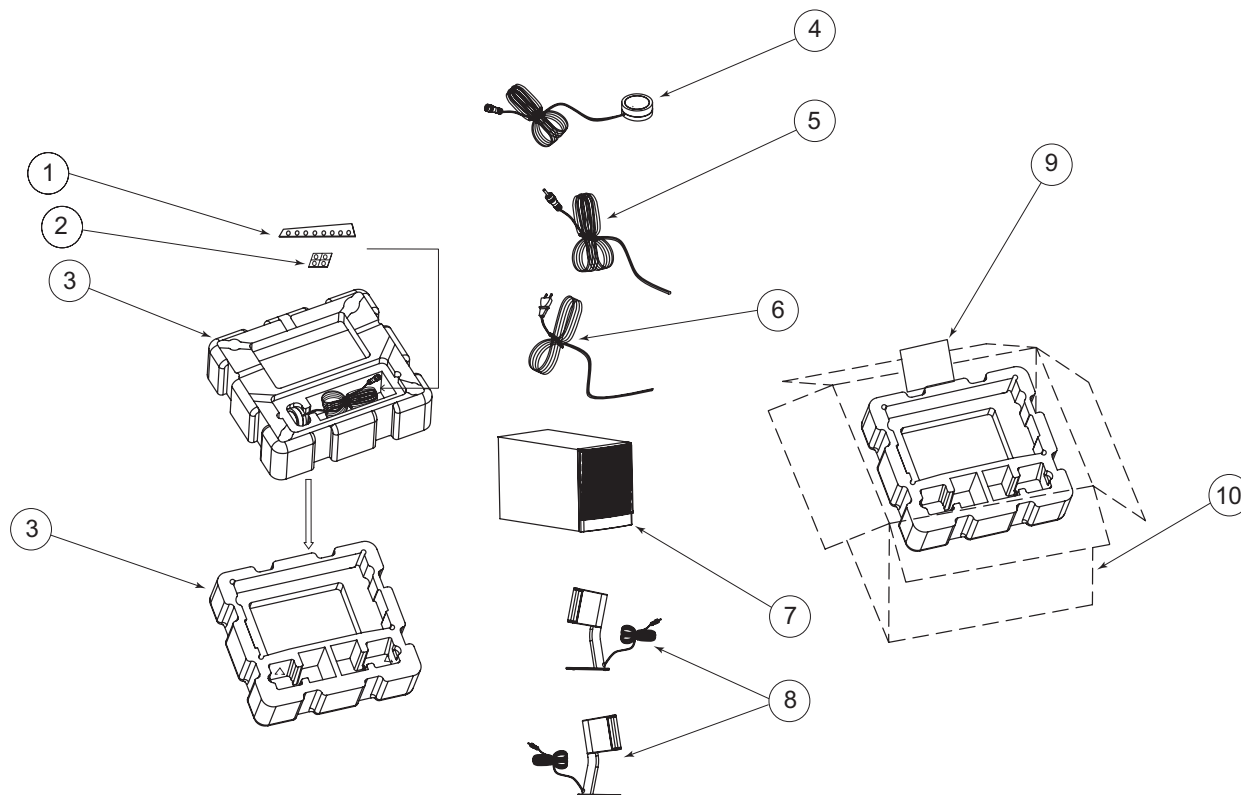


**Figure 2. Amplifier Module Assembly**

## Packaging Part List

| Item Number | Description                                                                                                                                                                                                                                                                                                                                                                      | Part Number                                                                            | Qty. | Notes  |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------|--------|
| 1           | FEET, CLEAR SATELLITE                                                                                                                                                                                                                                                                                                                                                            | 178321-04                                                                              | 2    |        |
| 2           | FEET, RUBBER, BRACKET                                                                                                                                                                                                                                                                                                                                                            | 260465                                                                                 | 1    |        |
| 3           | PACKING EPS, FILLER (includes both top and bottom filler)                                                                                                                                                                                                                                                                                                                        | 300908-001                                                                             | 1    |        |
| 4           | CONTROL POD, (NON-REPAIRABLE)                                                                                                                                                                                                                                                                                                                                                    | 307874-002                                                                             | 1    |        |
| 5           | CABLE, INPUT, 3.5MM, 6FT, BLK                                                                                                                                                                                                                                                                                                                                                    | 271994-001                                                                             | 1    |        |
| 6           | LINE CORD, 100V, BLK, JAPAN<br>LINE CORD, 120V, BLK, US/CANADA<br>LINE CORD, 220V, BLK, EURO<br>LINE CORD, 230V, BLK, UK<br>LINE CORD, 240V, BLK, AUS                                                                                                                                                                                                                            | 264514-001<br>262814-001<br>148203<br>134725<br>284243-001                             | 1    | 3<br>⚠ |
| 7           | BASS MODULE, ASSY, US/CANADA, 120V (Electrofoil Logo)<br>BASS MODULE, ASSY, EURO, 230V (Electrofoil Logo)<br>BASS MODULE, ASSY, JAPAN, 100V (Electrofoil Logo)<br>BASS MODULE, ASSY, US/CANADA, 120V (Padprint Logo)<br>BASS MODULE, ASSY, EURO, 230V (Padprint Logo)<br>BASS MODULE, ASSY, JAPAN, 100V (Padprint Logo)<br>(Complete bass module package, includes Amp Mod Assy) | *300905-001<br>*300905-003<br>*300905-002<br>*303939-112<br>*303939-122<br>*303939-132 | 1    |        |
| 8           | SAT, ASSY (Electrofoil Logo)<br>SAT, ASSY (Padprint Logo)<br>(single array, includes speaker stand)                                                                                                                                                                                                                                                                              | 300766-001<br>303938-002                                                               | 2    |        |
| 9           | OWNERS GUIDE, 3 LANG, US/CANADA<br>OWNERS GUIDE, 5 LANG, EURO<br>OWNERS GUIDE, 5 LANG, AP                                                                                                                                                                                                                                                                                        | 296583<br>296584<br>299450                                                             | 1    |        |
| 10          | CARTON, RSC, PRINTED                                                                                                                                                                                                                                                                                                                                                             | 300911-001                                                                             | 1    |        |
| -           | CARTON KIT                                                                                                                                                                                                                                                                                                                                                                       | 300911-001K                                                                            | 1    |        |

\*Capacitor C7 on the new power supply board may need to be replaced, see Service Bulletin 271885-B4



**Figure 3. Packaging Exploded View**

# ELECTRICAL PARTS LIST

Main PCB Assembly

Resistors

| Reference Designator | Description              | Part Number | Note |
|----------------------|--------------------------|-------------|------|
| R101                 | 1.21K, 0805, 1/10W, 1%   | 133625-1211 |      |
| R102                 | 1.30K, 0805, 1/10W, 1%   | 133625-1301 |      |
| R103                 | 9.53K, 0805, 1/10W, 1%   | 133625-9531 |      |
| R104                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R105                 | 127K, 0805, 1/10W, 1%    | 133625-1273 |      |
| R106                 | 127K, 0805, 1/10W, 1%    | 133625-1273 |      |
| R107                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R108                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R109                 | 2.00K, 0805, 1/10W, 1%   | 133625-2001 |      |
| R110                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R111                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R125                 | 2.55K, 0805, 1/10W, 1%   | 133625-2551 |      |
| R126                 | 200K, 0805, 1/10W, 1%    | 133625-2003 |      |
| R127                 | 47.5K, 0805, 1/10W, 1%   | 133625-4752 |      |
| R128                 | 1.10K, 0805, 1/10W, 1%   | 133625-1101 |      |
| R129                 | 21.5K, 0805, 1/10W, 1%   | 133625-2152 |      |
| R130                 | 330 OHM, 0805, 1/10W, 1% | 133625-3300 |      |
| R131                 | 6.81K, 0805, 1/10W, 1%   | 133625-6811 |      |
| R132                 | 17.4K, 0805, 1/10W, 1%   | 133625-1742 |      |
| R133                 | 1.62K, 0805, 1/10W, 1%   | 133625-1621 |      |
| R134                 | 2.00K, 0805, 1/10W, 1%   | 133625-2001 |      |
| R135                 | 1.00K, 0805, 1/10W, 1%   | 133625-1001 |      |
| R136                 | 1.82K, 0805, 1/10W, 1%   | 133625-1821 |      |
| R137                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R138                 | 2.00K, 0805, 1/10W, 1%   | 133625-2001 |      |
| R139                 | 1.50K, 0805, 1/10W, 1%   | 133625-1501 |      |
| R140                 | 1.50K, 0805, 1/10W, 1%   | 133625-1501 |      |
| R201                 | 1.21K, 0805, 1/10W, 1%   | 133625-1211 |      |
| R202                 | 1.30K, 0805, 1/10W, 1%   | 133625-1301 |      |
| R203                 | 9.53K, 0805, 1/10W, 1%   | 133625-9531 |      |
| R204                 | 127K, 0805, 1/10W, 1%    | 133625-1273 |      |
| R205                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R206                 | 127K, 0805, 1/10W, 1%    | 133625-1273 |      |
| R207                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R208                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R209                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R210                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R211                 | 2.00K, 0805, 1/10W, 1%   | 133625-2001 |      |
| R225                 | 100K, 0805, 1/10W, 1%    | 133625-1003 |      |
| R226                 | 100K, 0805, 1/10W, 1%    | 133625-1003 |      |
| R227                 | JUMPER, CHIP, 0805       | 133627      |      |
| R229                 | 2.55K, 0805, 1/10W, 1%   | 133625-2551 |      |
| R230                 | 200K, 0805, 1/10W, 1%    | 133625-2003 |      |
| R231                 | 47.5K, 0805, 1/10W, 1%   | 133625-4752 |      |
| R232                 | 1.10K, 0805, 1/10W, 1%   | 133625-1101 |      |

# ELECTRICAL PARTS LIST

Main PCB Assembly  
Resistors

| Reference Designator | Description              | Part Number | Note |
|----------------------|--------------------------|-------------|------|
| R233                 | 21.5K, 0805, 1/10W, 1%   | 133625-2152 |      |
| R234                 | 330 OHM, 0805, 1/10W, 1% | 133625-3300 |      |
| R235                 | 6.81K, 0805, 1/10W, 1%   | 133625-6811 |      |
| R236                 | 17.4K, 0805, 1/10W, 1%   | 133625-1742 |      |
| R237                 | 1.62K, 0805, 1/10W, 1%   | 133625-1621 |      |
| R238                 | 2.00K, 0805, 1/10W, 1%   | 133625-2001 |      |
| R239                 | 1.00K, 0805, 1/10W, 1%   | 133625-1001 |      |
| R240                 | 1.82K, 0805, 1/10W, 1%   | 133625-1821 |      |
| R241                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R242                 | 2.00K, 0805, 1/10W, 1%   | 133625-2001 |      |
| R243                 | 1.50K, 0805, 1/10W, 1%   | 133625-1501 |      |
| R244                 | 1.50K, 0805, 1/10W, 1%   | 133625-1501 |      |
| R301                 | 100 OHM, 0805, 1/10W, 1% | 133625-1000 |      |
| R302                 | 100 OHM, 0805, 1/10W, 1% | 133625-1000 |      |
| R305                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R306                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R307                 | 1.2 OHMS, 2512, 1W, 5%   | 181895-1R20 |      |
| R308                 | 1K, 2512, 1W, 5%         | 181895-1001 |      |
| R309                 | 100 OHM, 0805, 1/10W, 1% | 133625-1000 |      |
| R310                 | 100 OHM, 0805, 1/10W, 1% | 133625-1000 |      |
| R311                 | JUMPER, CHIP, 0805       | 133627      |      |
| R312                 | JUMPER, CHIP, 0805       | 133627      |      |
| R314                 | 1.00K, 0805, 1/10W, 1%   | 133625-1001 |      |
| R315                 | 1.00K, 0805, 1/10W, 1%   | 133625-1001 |      |
| R316                 | 249 OHM, 0805, 1/10W, 1% | 133625-2490 |      |
| R317                 | 249 OHM, 0805, 1/10W, 1% | 133625-2490 |      |
| R318                 | 100K, 0805, 1/10W, 1%    | 133625-1003 |      |
| R319                 | 249 OHM, 0805, 1/10W, 1% | 133625-2490 |      |
| R320                 | 1.00K, 0805, 1/10W, 1%   | 133625-1001 |      |
| R323                 | 487K, 0805, 1/10W, 1%    | 133625-4873 |      |
| R324                 | 12.1K, 0805, 1/10W, 1%   | 133625-1212 |      |
| R325                 | 12.1K, 0805, 1/10W, 1%   | 133625-1212 |      |
| R327                 | JUMPER, CHIP, 0805       | 133627      |      |
| R328                 | JUMPER, CHIP, 0805       | 133627      |      |
| R329                 | 16.2K, 0805, 1/10W, 1%   | 133625-1622 |      |
| R330                 | 78.7K, 0805, 1/10W, 1%   | 133625-7872 |      |
| R331                 | 2.00K, 0805, 1/10W, 1%   | 133625-2001 |      |
| R334                 | 100K, 0805, 1/10W, 1%    | 133625-1003 |      |
| R335                 | 100K, 0805, 1/10W, 1%    | 133625-1003 |      |
| R336                 | 10 OHM, 2512, 1W, 5%     | 181895-10R0 |      |
| R337                 | 162 OHM, 0805, 1/10W, 1% | 133625-1620 |      |
| R338                 | 14.0K, 0805, 1/10W, 1%   | 133625-1402 |      |
| R339                 | 1.00K, 0805, 1/10W, 1%   | 133625-1001 |      |
| R340                 | 10.0K, 0805, 1/10W, 1%   | 133625-1002 |      |
| R347                 | 2.00K, 0805, 1/10W, 1%   | 133625-2001 |      |

# ELECTRICAL PARTS LIST

Main PCB Assembly

Resistors

| Reference Designator | Description                   | Part Number | Note                                                                                  |
|----------------------|-------------------------------|-------------|---------------------------------------------------------------------------------------|
| R348                 | 2.00K, 0805, 1/10W, 1%        | 133625-2001 |                                                                                       |
| R349                 | JUMPER, CHIP, 0805            | 133627      |                                                                                       |
| R350                 | JUMPER, CHIP, 0805            | 133627      |                                                                                       |
| R351                 | 100OHM, 0805, 1/10W, 1%       | 133625-1000 |                                                                                       |
| R352                 | 1.00K, 0805, 1/10W, 1%        | 133625-1001 |                                                                                       |
| R353                 | 1.00K, 0805, 1/10W, 1%        | 133625-1001 |                                                                                       |
| R354                 | 1.00K, 0805, 1/10W, 1%        | 133625-1001 |                                                                                       |
| R355                 | 1.00K, 0805, 1/10W, 1%        | 133625-1001 |                                                                                       |
| R356                 | 499K, 0805, 1/10W, 1%         | 133625-4993 |                                                                                       |
| R357                 | 10.0K, 0805, 1/10W, 1%        | 133625-1002 |                                                                                       |
| R358                 | 1.1 OHM, SMD, FUSE, 1/10W, 5% | 192349-1R1A | 3  |
| R359                 | 1.1 OHM, SMD, FUSE, 1/10W, 5% | 192349-1R1A | 3  |
| R360                 | 1.1 OHM, SMD, FUSE, 1/10W, 5% | 192349-1R1A | 3  |
| R361                 | 1.1 OHM, SMD, FUSE, 1/10W, 5% | 192349-1R1A | 3  |
| R362                 | JUMPER, CHIP, 0805            | 133627      |                                                                                       |
| R401                 | 100K, 0805, 1/10W, 1%         | 133625-1003 |                                                                                       |
| R402                 | 10.0K, 0805, 1/10W, 1%        | 133625-1002 |                                                                                       |
| R403                 | 221 OHM, 0805, 1/10W, 1%      | 133625-2210 |                                                                                       |
| R404                 | 10.0K, 0805, 1/10W, 1%        | 133625-1002 |                                                                                       |
| R405                 | 1.00K, 0805, 1/10W, 1%        | 133625-1001 |                                                                                       |
| R406                 | 1.00K, 0805, 1/10W, 1%        | 133625-1001 |                                                                                       |
| R407                 | 1.00K, 0805, 1/10W, 1%        | 133625-1001 |                                                                                       |
| R408                 | 1.00K, 0805, 1/10W, 1%        | 133625-1001 |                                                                                       |
| R409                 | 5.90K, 0805, 1/10W, 1%        | 133625-5901 |                                                                                       |
| R410                 | 5.90K, 0805, 1/10W, 1%        | 133625-5901 |                                                                                       |
| R950                 | 2.55K, 0805, 1/10W, 1%        | 133625-2551 |                                                                                       |
| R951                 | 4.12K, 0805, 1/10W, 1%        | 133625-4121 |                                                                                       |
| R952                 | 1.0M, 0805, 1/10W, 1%         | 133625-1004 |                                                                                       |
| R953                 | 10.0K, 0805, 1/10W, 1%        | 133625-1002 |                                                                                       |
| R954                 | 750 OHM, 0805, 1/10W, 1%      | 133625-7500 |                                                                                       |
| R956                 | 88.7K, 0805, 1/10W, 1%        | 133625-8872 |                                                                                       |
| R957                 | 1.21K, 0805, 1/10W, 1%        | 133625-1211 |                                                                                       |
| R958                 | 10.0K, 0805, 1/10W, 1%        | 133625-1002 |                                                                                       |
| R959                 | 1.00K, 0805, 1/10W, 1%        | 133625-1001 |                                                                                       |
| R960                 | 36.5K, 0805, 1/10W, 1%        | 133625-3652 |                                                                                       |
| R961                 | 36.5K, 0805, 1/10W, 1%        | 133625-3652 |                                                                                       |
| R962                 | 1.0M, 0805, 1/10W, 1%         | 133625-1004 |                                                                                       |
| R963                 | 26.7K, 0805, 1/10W, 1%        | 133625-2672 |                                                                                       |
| R964                 | 750 OHM, 0805, 1/10W, 1%      | 133625-7500 |                                                                                       |
| R965                 | 15.4K, 0805, 1/10W, 1%        | 133625-1542 |                                                                                       |
| R966                 | 121K, 0805, 1/10W, 1%         | 133625-1213 |                                                                                       |
| R967                 | 1.00K, 0805, 1/10W, 1%        | 133625-1001 |                                                                                       |
| R968                 | 4.99K, 0805, 1/10W, 1%        | 133625-4991 |                                                                                       |

# ELECTRICAL PARTS LIST

Main PCB Assembly

Resistors

| Reference Designator | Description                 | Part Number | Note |
|----------------------|-----------------------------|-------------|------|
| R969                 | JUMPER, CHIP, 0805          | 133627      |      |
| R970                 | 20.0K, 0805, 1/10W, 1%      | 133625-2002 |      |
| R971                 | 10.0K, 0805, 1/10W, 1%      | 133625-1002 |      |
| R972                 | 49.9K, 0805, 1/10W, 1%      | 133625-4992 |      |
| R973                 | 1.21K, 0805, 1/10W, 1%      | 133625-1211 |      |
| R974                 | 1.00K, 0805, 1/10W, 1%      | 133625-1001 |      |
| R975                 | 10.0K, 0805, 1/10W, 1%      | 133625-1002 |      |
| R976                 | 5.90K, 0805, 1/10W, 1%      | 133625-5901 |      |
| R977                 | 100 OHM, 0805, 1/10W, 1%    | 133625-1000 |      |
| R978                 | 100K, 0805, 1/10W, 1%       | 133625-1003 |      |
| R979                 | 10.0K, 0805, 1/10W, 1%      | 133625-1002 |      |
| R980                 | 4.99K, 0805, 1/10W, 1%      | 133625-4991 |      |
| R981                 | 100K, 0805, 1/10W, 1%       | 133625-1003 |      |
| R982                 | 1.00K, 0805, 1/10W, 1%      | 133625-1001 |      |
| R983                 | 1.00K, 0805, 1/10W, 1%      | 133625-1001 |      |
| R986                 | POTENTIOMETER, 10K, 1B, 20% | 273741-001  |      |
| R987                 | 1.54K, 0805, 1/10W, 1%      | 133625-1541 |      |

# ELECTRICAL PARTS LIST

Main PCB Assembly

Capacitors

| Reference Designator | Description                  | Part Number | Note |
|----------------------|------------------------------|-------------|------|
| C101                 | 2.2uF, 1206, X7R, 10V, 20%   | 260361-2253 |      |
| C102                 | .0068uF, BOX, 85C, 100V, 5%  | 137127-682  |      |
| C103                 | .033uF, BOX, 85C, 63V, 5%    | 137127-333  |      |
| C104                 | 1000pF, 0805, COG, 50V, 5%   | 133622-102  |      |
| C105                 | 100 pF, 0805, COG, 50V, 5%   | 133622-101  |      |
| C110                 | 68pF, 0603, COG, 50V, 5%     | 188454-680  |      |
| C111                 | 68pF, 0603, COG, 50V, 5%     | 188454-680  |      |
| C112                 | 68pF, 0603, COG, 50V, 5%     | 188454-680  |      |
| C125                 | .12uF, BOX, 85C, 50V, 5%     | 137127-124  |      |
| C126                 | .12uF, BOX, 85C, 50V, 5%     | 137127-124  |      |
| C127                 | .18uF, BOX, 85C, 50V, 5%     | 137127-184  |      |
| C128                 | .01uF, BOX, 85C, 100V, 5%    | 137127-103  |      |
| C129                 | .01uF, BOX, 85C, 100V, 5%    | 137127-103  |      |
| C130                 | .0015uF, BOX, 85C, 100V, 5%  | 137127-152  |      |
| C131                 | .0056uF, BOX, 85C, 100V, 5%  | 137127-562  |      |
| C132                 | .12uF, BOX, 85C, 50V, 5%     | 137127-124  |      |
| C133                 | .12uF, BOX, 85C, 50V, 5%     | 137127-124  |      |
| C134                 | 1000pF, 0805, COG, 50V, 5%   | 133622-102  |      |
| C201                 | 2.2uF, 1206, X7R, 10V, 20%   | 260361-2253 |      |
| C202                 | .0068uF, BOX, 85C, 100V, 5%  | 137127-682  |      |
| C203                 | .033uF, BOX, 85C, 63V, 5%    | 137127-333  |      |
| C204                 | 100 pF, 0805, COG, 50V, 5%   | 133622-101  |      |
| C210                 | 68pF, 0603, COG, 50V, 5%     | 188454-680  |      |
| C225                 | .12uF, BOX, 85C, 50V, 5%     | 137127-124  |      |
| C226                 | .12uF, BOX, 85C, 50V, 5%     | 137127-124  |      |
| C227                 | .18uF, BOX, 85C, 50V, 5%     | 137127-184  |      |
| C228                 | .01uF, BOX, 85C, 100V, 5%    | 137127-103  |      |
| C229                 | .01uF, BOX, 85C, 100V, 5%    | 137127-103  |      |
| C230                 | .0015uF, BOX, 85C, 100V, 5%  | 137127-152  |      |
| C231                 | .0056uF, BOX, 85C, 100V, 5%  | 137127-562  |      |
| C232                 | 1000pF, 0805, COG, 50V, 5%   | 133622-102  |      |
| C233                 | .12uF, BOX, 85C, 50V, 5%     | 137127-124  |      |
| C234                 | .12uF, BOX, 85C, 50V, 5%     | 137127-124  |      |
| C235                 | .1uF, 0805, X7R, 25V, 10%    | 181264-104  |      |
| C236                 | 10uF, EL, SMD, 105, 25V, 20% | 255071-100E |      |
| C238                 | 10uF, EL, SMD, 105, 25V, 20% | 255071-100E |      |
| C239                 | .1uF, 0805, X7R, 25V, 10%    | 181264-104  |      |
| C240                 | 68pF, 0603, COG, 50V, 5%     | 188454-680  |      |
| C241                 | 68pF, 0603, COG, 50V, 5%     | 188454-680  |      |
| C301                 | 100 pF, 0805, COG, 50V, 5%   | 133622-101  |      |
| C302                 | 3300pF, 0805, X7R, 50V, 10%  | 133623-332  |      |
| C303                 | 100 pF, 0805, COG, 50V, 5%   | 133622-101  |      |
| C305                 | 3300pF, 0805, X7R, 50V, 10%  | 133623-332  |      |
| C306                 | 1uF, EL, SMD, 105C, 50V, 20% | 255071-1R0H |      |
| C307                 | 1uF, EL, SMD, 105C, 50V, 20% | 255071-1R0H |      |

# ELECTRICAL PARTS LIST

Main PCB Assembly  
Capacitors (continued)

| Reference Designator | Description                    | Part Number | Note |
|----------------------|--------------------------------|-------------|------|
| C307                 | 1uF, EL, SMD, 105C, 50V, 20%   | 255071-1R0H |      |
| C308                 | 100 pF, 0805, COG, 50V, 5%     | 133622-101  |      |
| C309                 | .015uF, 0805, X7R, 50V, 10%    | 133623-153  |      |
| C310                 | 100 pF, 0805, COG, 50V, 5%     | 133622-101  |      |
| C311                 | 10uF, EL, SMD, 105C, 25V, 20%  | 255071-100E |      |
| C312                 | 100 pF, 0805, COG, 50V, 5%     | 133622-101  |      |
| C313                 | 100uF, EL, SMD, 105C, 25V, 20% | 255071-101E |      |
| C314                 | 10uF, EL, SMD, 105C, 25V, 20%  | 255071-100E |      |
| C315                 | 10uF, EL, SMD, 105C, 25V, 20%  | 255071-100E |      |
| C316                 | .1uF, 0805, X7R, 25V, 10%      | 181264-104  |      |
| C317                 | .1uF, 0805, X7R, 25V, 10%      | 181264-104  |      |
| C318                 | .1uF, 0805, X7R, 25V, 10%      | 181264-104  |      |
| C319                 | .1uF, 0805, X7R, 25V, 10%      | 181264-104  |      |
| C320                 | .47uF, 0805, X7R, 16V, 5%      | 196995-474  |      |
| C321                 | .015uF, BOX, 85C, 100V, 5%     | 137127-153  |      |
| C322                 | 47uF, EL, SMD, 105, 25V, 20%   | 255071-470E |      |
| C324                 | .15uF, BOX, 85C, 50V, 5%       | 137127-154  |      |
| C325                 | 0.1uF, 0805, X7R, 50V, 10%     | 133623-104  |      |
| C326                 | .01uF, 0805, X7R, 50V, 10%     | 133623-103  |      |
| C327                 | .1uF, BOX, 85C, 50V, 5%        | 137127-104  |      |
| C328                 | .01uF, 0805, X7R, 50V, 10%     | 133623-103  |      |
| C329                 | .1uF, BOX, 85C, 50V, 5%        | 137127-104  |      |
| C330                 | .01uF, 0805, X7R, 50V, 10%     | 133623-103  |      |
| C331                 | .01uF, 0805, X7R, 50V, 10%     | 133623-103  |      |
| C332                 | 1000pF, 0805, COG, 50V, 5%     | 133622-102  |      |
| C333                 | 1000pF, 0805, X7R, 50V, 10%    | 133623-102  |      |
| C334                 | 1000pF, 0805, X7R, 50V, 10%    | 133623-102  |      |
| C335                 | 1000pF, 0805, X7R, 50V, 10%    | 133623-102  |      |
| C336                 | 1000pF, 0805, X7R, 50V, 10%    | 133623-102  |      |
| C337                 | 10uF, EL, SMD, 105C, 25V, 20%  | 255071-100E |      |
| C338                 | 1000pF, 0805, COG, 50V, 5%     | 133622-102  |      |
| C339                 | 1000pF, 0805, COG, 50V, 5%     | 133622-102  |      |
| C340                 | 1000pF, 0805, COG, 50V, 5%     | 133622-102  |      |
| C341                 | 1000pF, 0805, COG, 50V, 5%     | 133622-102  |      |
| C342                 | 47uF, EL, SMD, 105C, 25V, 20%  | 255071-470E |      |
| C343                 | 1000pF, 0805, COG, 50V, 5%     | 133622-102  |      |
| C348                 | .01uF, 0805, X7R, 50V, 10%     | 133623-103  |      |
| C349                 | .01uF, 0805, X7R, 50V, 10%     | 133623-103  |      |
| C350                 | .01uF, 0805, X7R, 50V, 10%     | 133623-103  |      |
| C351                 | .01uF, 0805, X7R, 50V, 10%     | 133623-103  |      |
| C352                 | 68pF, 0603, COG, 50V, 5%       | 188454-680  |      |
| C353                 | 68pF, 0603, COG, 50V, 5%       | 188454-680  |      |
| C354                 | 68pF, 0603, COG, 50V, 5%       | 188454-680  |      |
| C355                 | 68pF, 0603, COG, 50V, 5%       | 188454-680  |      |
| C360                 | .01uF, 0805, X7R, 50V, 10%     | 133623-103  |      |

# ELECTRICAL PARTS LIST

Main PCB Assembly  
Capacitors (continued)

| Reference Designator | Description                   | Part Number | Note |
|----------------------|-------------------------------|-------------|------|
| C401                 | 10uF, EL, SMD, 105C, 25V, 20% | 255071-100E |      |
| C402                 | .01uF, 0805, X7R, 50V, 10%    | 133623-103  |      |
| C403                 | .01uF, 0805, X7R, 50V, 10%    | 133623-103  |      |
| C404                 | 1000pF, 0805, COG, 50V, 5%    | 133622-102  |      |
| C950                 | 10uF, EL, SMD, 105C, 25V, 20% | 255071-100E |      |
| C951                 | 68pF, 0603, COG, 50V, 5%      | 188454-680  |      |
| C952                 | 68pF, 0603, COG, 50V, 5%      | 188454-680  |      |
| C953                 | .12uF, BOX, 85C, 50V, 5%      | 137127-124  |      |
| C954                 | .12uF, BOX, 85C, 50V, 5%      | 137127-124  |      |
| C955                 | 10uF, EL, SMD, 105, 25V, 20%  | 255071-100E |      |
| C956                 | .01uF, BOX, 85C, 100V, 5%     | 137127-103  |      |
| C957                 | 10uF, EL, SMD, 105, 25V, 20%  | 255071-100E |      |
| C959                 | 1000pF, 0805, COG, 50V, 5%    | 133622-102  |      |
| C960                 | .12uF, BOX, 85C, 50V, 5%      | 137127-124  |      |
| C961                 | .12uF, BOX, 85C, 50V, 5%      | 137127-124  |      |
| C962                 | .0015uF, BOX, 85C, 100V, 5%   | 137127-152  |      |
| C963                 | 1000pF, 0805, COG, 50V, 5%    | 133622-102  |      |
| C964                 | 1000pF, 0805, COG, 50V, 5%    | 133622-102  |      |
| C965                 | 1000pF, 0805, COG, 50V, 5%    | 133622-102  |      |
| C966                 | 1000pF, 0805, COG, 50V, 5%    | 133622-102  |      |
| C968                 | .01uF, 0805, X7R, 50V, 10%    | 133623-103  |      |
| C969                 | 10uF, EL, SMD, 105C, 25V, 20% | 255071-100E |      |
| C970                 | 1uF, EL, SMD, 105C, 50V, 20%  | 255071-1R0H |      |
| C971                 | .47uF, BOX, 85C, 50V, 5%      | 137127-474  |      |
| C977                 | 68pF, 0603, COG, 50V, 5%      | 188454-680  |      |
| C980                 | 68pF, 0603, COG, 50V, 5%      | 188454-680  |      |
| C983                 | 68pF, 0603, COG, 50V, 5%      | 188454-680  |      |
| C988                 | 68pF, 0603, COG, 50V, 5%      | 188454-680  |      |

## Inductors

| Reference Designator | Description                        | Part Number | Note |
|----------------------|------------------------------------|-------------|------|
| L301                 | 330 OHM, BEAD, FERRITE, 0805, 1.5A | 267539-331  |      |

## Diodes

| Reference Designator | Description    | Part Number | Note |
|----------------------|----------------|-------------|------|
| D301                 | SOT-23, BAV 99 | 147239      |      |
| D302                 | SOT-23, BAV 99 | 147239      |      |
| D303                 | SOT-23, BAV 99 | 147239      |      |
| D304                 | SOT-23, BAV 99 | 147239      |      |
| D305                 | SOT-23, BAV 99 | 147239      |      |
| D306                 | SOT-23, BAV 99 | 147239      |      |

# ELECTRICAL PARTS LIST

Main PCB Assembly

Diodes (continued)

| Reference Designator | Description               | Part Number | Note |
|----------------------|---------------------------|-------------|------|
| D401                 | DUAL, SOT-23, BAW56       | 180738      |      |
| D402                 | DUAL, SOT-23, BAW56       | 180738      |      |
| D403                 | SOT-23, BAV 99            | 147239      |      |
| D951                 | SOT-23, BAV 70            | 147249      |      |
| D952                 | SOT-23, BAV 99            | 147239      |      |
| D954                 | DUAL, SOT-23, BAW56       | 180738      |      |
| D955                 | SOT-23, BAV 99            | 147239      |      |
| ZR301                | ZEN,SOD-123, .5W, 10V, 5% | 174265-5240 |      |

## Transistors

| Reference Designator | Description                | Part Number | Note |
|----------------------|----------------------------|-------------|------|
| Q303                 | NPN, 1.3W, SOT-223         | 258416-001  |      |
| Q304                 | BPLR, P, 40V, 200mA, SOT23 | 148596      |      |
| Q305                 | BPLR, N, 40V, 200mA, SOT23 | 146819      |      |
| Q306                 | BPLR, P, 40V, 200mA, SOT23 | 148596      |      |
| Q307                 | BPLR, P, 40V, 200mA, SOT23 | 148596      |      |
| Q308                 | BPLR, N, 40V, 200mA, SOT23 | 146819      |      |
| Q309                 | BPLR, N, 40V, 200mA, SOT23 | 146819      |      |
| Q401                 | BPLR, N, 40V, 200mA, SOT23 | 146819      |      |
| Q402                 | BPLR, P, 40V, 200mA, SOT23 | 148596      |      |
| Q403                 | BPLR, P, 40V, 200mA, SOT23 | 148596      |      |
| Q950                 | BPLR, N, 40V, 200mA, SOT23 | 146819      |      |
| Q951                 | BPLR, P, 40V, 200mA, SOT23 | 148596      |      |
| Q952                 | BPLR, P, 40V, 200mA, SOT23 | 148596      |      |
| Q953                 | BPLR, N, 40V, 200mA, SOT23 | 146819      |      |
| Q954                 | BPLR, P, 40V, 200mA, SOT23 | 148596      |      |

## Integrated Circuits

| Reference Designator | Description                           | Part Number | Note |
|----------------------|---------------------------------------|-------------|------|
| U3                   | IC, 0P AMP QUAD, SOIC-14, NJM2059     | 187472      |      |
| U102                 | IC, 0P AMP QUAD, SOIC-14, NJM2059     | 187472      |      |
| U125                 | IC, 0P AMP QUAD, SOIC-14, NJM2059     | 187472      |      |
| U201                 | IC, 0P AMP QUAD, SOIC-14, NJM2059     | 187472      |      |
| U301                 | IC, POWER AMP, 4x45W, 25-PIN, TDA7560 | 271833-001  |      |
| U401                 | IC, TRANS, DUAL, SOIC-16, NJM13700    | 188650-001  |      |
| U950                 | IC, TRANS, DUAL, SOIC-16, NJM13700    | 188650-001  |      |
| U951                 | IC, 0P AMP QUAD, SOIC-14, NJM2059     | 187472      |      |

# ELECTRICAL PARTS LIST

Main PCB Assembly  
Miscellaneous

| Reference Designator | Description                       | Part Number | Note |
|----------------------|-----------------------------------|-------------|------|
| J301                 | CONN, HEADER, 3 POS, .156         | 133220-03   |      |
| J302                 | CONN, JACK PHONE, 3.5MM           | 269841-001  |      |
| J305                 | CONN, HEADER, INLINE, PCB MNT, 4P | 133220-04   |      |
| J307                 | CONN, RCA, DUAL, PC MOUNT         | 272376-001  |      |
| J308                 | CONN, MINI DIN, R/A, 9-PIN        | 273227-001  |      |

# ELECTRICAL PARTS LIST

## Power Supply PCB Assembly Resistors

| Reference Designator | Description                             | Part Number | Note                                                                                  |
|----------------------|-----------------------------------------|-------------|---------------------------------------------------------------------------------------|
| R01                  | 10.0 OHM, 0805, 1/10W, 1%               | 133625-10R0 |                                                                                       |
| R02                  | 10.0 OHM, 0805, 1/10W, 1%               | 133625-10R0 |                                                                                       |
| R03                  | 10.0 OHM, 0805, 1/10W, 1%               | 133625-10R0 |                                                                                       |
| R04                  | 10.0 OHM, 0805, 1/10W, 1%               | 133625-10R0 |                                                                                       |
| R05                  | 2.00K, 0805, 1/10W, 1%                  | 133625-2001 |                                                                                       |
| R06                  | 10.0 OHM, 0805, 1/10W, 1%               | 133625-10R0 |                                                                                       |
| R07                  | 412 OHMS, 0805, 1/10W, 1%               | 133625-4120 |                                                                                       |
| R08                  | JUMPER, CHIP, 0805                      | 133627      |                                                                                       |
| R09                  | 412 OHMS, 0805, 1/10W, 1%               | 133625-4120 |                                                                                       |
| R10                  | JUMPER, CHIP, 0805                      | 133627      |                                                                                       |
| R11                  | 10.0 OHM, 0805, 1/10W, 1%               | 133625-10R0 |                                                                                       |
| RT1                  | 22K, THERMISTOR, RADIAL, 1/4W, 5%       | 177557      | 3  |
| RT2                  | 22K, THERMISTOR, RADIAL, 1/4W, 5%       | 177557      | 3  |
| VR1                  | VARISTOR, MET OX, 275V, 140JOULE, US    | 273545-001  | 3  |
| VR1                  | VARISTOR, MET OX, 300V, 140JOULE, EURO  | 273545-002  | 3  |
| VR1                  | VARISTOR, MET OX, 175V, 140JOULE, JAPAN | 273545-003  | 3  |

## Capacitors

| Reference Designator | Description                    | Part Number  | Note |
|----------------------|--------------------------------|--------------|------|
| C1                   | 1.0uF, BOX, 85, 100V, 5%       | 137127-105   |      |
| C2                   | .22uF, 0805, X7R, 25V, 10%     | 181264-224   |      |
| C3                   | .047uF, 0805, X7R, 50V, 10%    | 133623-473   |      |
| C4                   | .1uF, 0805, X7R, 10%, 25V      | 181264-104   |      |
| C5                   | .1uF, 0805, X7R, 10%, 25V      | 181264-104   |      |
| C7                   | .033F, EL, AL, 25V, 4T, US     | 260693-3331E |      |
| C7                   | .039F, EL, AL, 25V, 20% EURO   | 260693-3931E |      |
| C7                   | .039F, EL, AL, 25V, 20%, JAPAN | 260693-3931E |      |
| C8                   | .22uF, FILM, X2, 275VAC, 15MM  | 268166-224B  |      |

## Inductors

| Reference Designator | Description                     | Part Number | Note |
|----------------------|---------------------------------|-------------|------|
| L1                   | CHOKE, COMMON MODE, WITH HEADER | 277667-001  |      |

# ELECTRICAL PARTS LIST

Power Supply PCB Assembly

Diodes

| Reference Designator | Description                 | Part Number | Note |
|----------------------|-----------------------------|-------------|------|
| BR1                  | RECTIFIER, BRIDGE, 8A, 400V | 260684-400  |      |
| D1                   | 13V, ZEN, SOD-123, .5W, 5%  | 174265-5243 |      |
| D2                   | SOT-23, BAV 99              | 147239      |      |

Transistors

| Reference Designator | Description                | Part Number | Note |
|----------------------|----------------------------|-------------|------|
| Q1                   | BPLR, P, 40V, 200mA, SOT23 | 148596      |      |
| Q2                   | BPLR, P, 40V, 200mA, SOT23 | 148596      |      |
| Q3                   | MFET, N, 55V, TO-220FP     | 257359-001  |      |
| Q4                   | BPLR, P, 40V, 200mA, SOT23 | 148596      |      |
| Q5                   | BPLR, P, 40V, 200mA, SOT23 | 148596      |      |

Miscellaneous

| Reference Designator | Description                                                                       | Part Number              | Note                                                                                    |
|----------------------|-----------------------------------------------------------------------------------|--------------------------|-----------------------------------------------------------------------------------------|
| F1                   | FUSE, 4.0A, 125V, .60X.19, SLOBLO, US<br>FUSE, 3.15A, 250V, 5.5X21mm, SLO-BLO, US | 135677-12<br>298780-3150 | 3    |
| F1                   | FUSE, 2.0 AMPS, AXIAL, EURO                                                       | 269855-02000             | 3   |
| F1                   | FUSE, 4.0A, 125V, .60X.19, SLOBLO, JAPAN                                          | 135677-12                | 3  |
| J1                   | CONN, HEADER, LOCKING, TOP ENTRY                                                  | 193369-002               | 3  |
| J2                   | CONN, HEADER, 3.96mm, 7-pin                                                       | 272385-07                | 3  |
| J3                   | CONN, HEADER, 3 POS, .156                                                         | 133220-03                | 3  |

# Disassembly Procedures

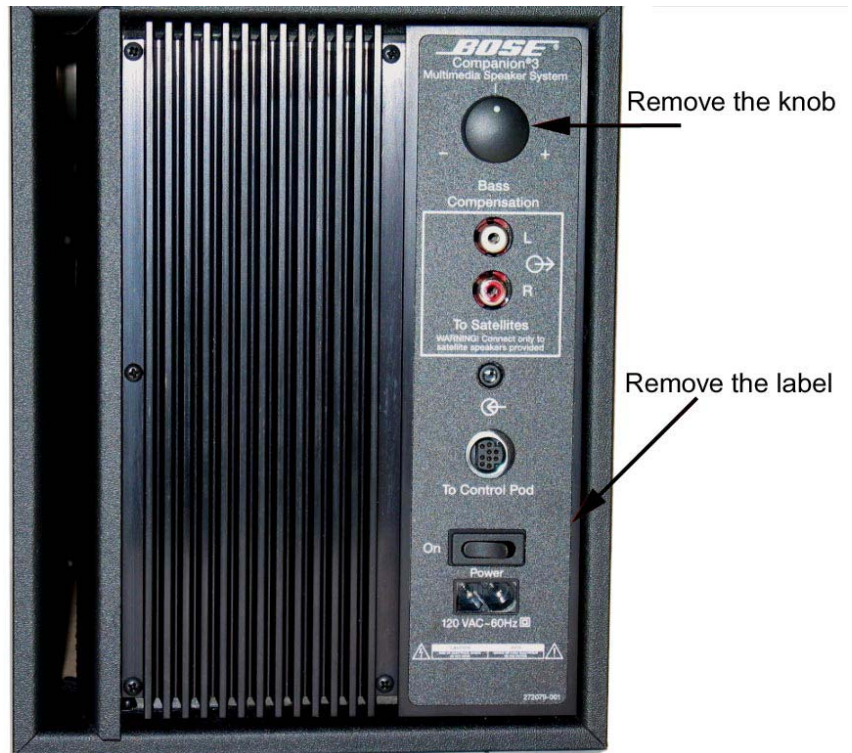
## Bass Module

### 1. Module Assembly Removal

1.1 Remove the knob from the unit.

1.2 Peel back the label and remove it.

**Note:** The label will become damaged once removed from the rear panel. A replacement label must be installed during reassembly.



1.3 Remove the three silver Phillips-head screws located on the right hand side (under the label) and the five Phillips-head or T-15 Torx head screws around the heat sink fins.

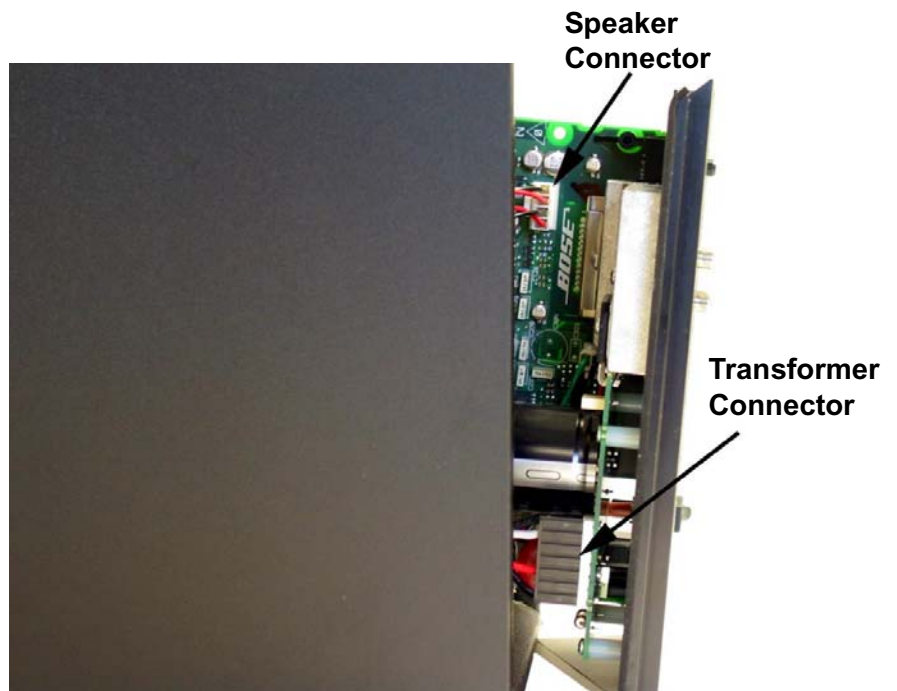
1.4 Slide the electronic module back slightly.



# Disassembly Procedures

## Bass Module Cont.

**1.5** Disconnect the two connectors shown and remove the module assembly.

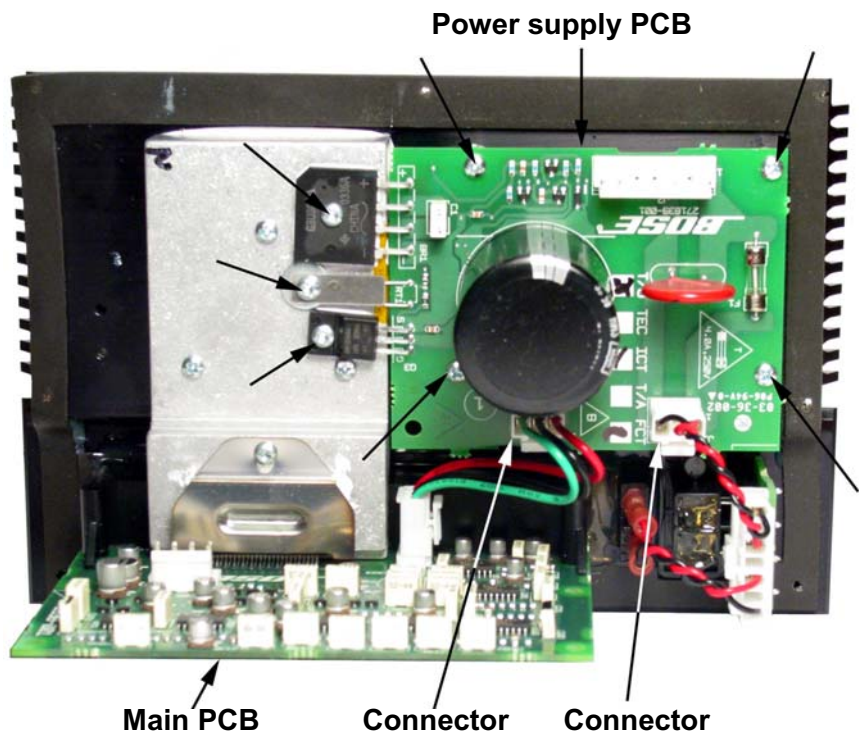


**1.6** Disconnect the two connectors on the power supply PCB.

**1.7** Remove the seven T-15 Torx screws shown, to remove the power supply PCB.

**Note:** The PCB is mounted on stand-offs which will become loose when removing the screws.

**Note:** The main PCB is glued to the heat sink assembly however it can be repaired without having to remove it.



# Disassembly Procedures

## Bass Module Cont.

### 2. Power Transformer Removal

**2.1** Remove the module assembly, perform procedure 1.

**2.2** Remove the bolt at the center of the power transformer.

**2.3** Remove the transformer and shield-can from the bass box.



### 3. Woofer Removal

**3.1** The Grille on the bass module is glued into place. The woofer is not replaceable. Replace the bass box assembly if the woofer is defective.

# Test Procedures

## Test Equipment required:

1. Audio Signal Generator
2. Oscilloscope
3. Digital Multimeter

## Test Set up

Connect the satellites to the output jacks on the bass module.

Connect the control pod to the DIN jack on the bass module.

Connect a signal generator to the audio input cable and connect the cable to the input jack on the bass module.

### 1. Bass Module Air Leak test

1.1 Apply a 40 mVrms, 40 Hz signal to the input of the bass module.

1.2 Set the volume knob on the control pod to maximum (fully clockwise), and set the bass control to the center detent (flat) position.

1.3 Listen carefully for air leaks along all glued joints, around the heat sink, connectors and at the woofer mounting location.

1.4 Repair any air leaks around the heat sink and connectors. Replace any bass module that has air leaks around the bass box or woofer mounting location.

### 2. Bass Module Sweep Test

2.1 Apply a 200 mVrms, 100 Hz signal to the input of the bass module.

2.2 Set the volume knob on the control pod to maximum (fully clockwise), and set the bass control to the center detent (flat) position.

2.3 Listen carefully as you sweep the bass module from 100 Hz to 300 Hz, then from 300 Hz to 100 Hz.

2.4 Listen carefully for buzzes, rattles, or other extraneous noises from the woofer, cabinet, plastic trim parts, or heat sink. A slight whooshing sound from the port at approximately 45 Hz is acceptable.

2.5 Repair any noise heard from around the heat sink and connectors. Replace the bass module if it has noises from the woofer or cabinet area.

# Test Procedures

## 3. Bass Module Tone Control Test

3.1 Apply a 90 mVrms, 100 Hz signal to the input of the bass module.

3.2 Set the volume knob on the control pod to maximum (fully clockwise), and set the bass control to the center detent (flat) position.

3.3 Rotate the tone control fully clockwise and counter clockwise.

3.4 Verify that the bass level cleanly increases and decreases in level.

## 4. Satellite Air Leak Test

4.1 Apply a 270mV, 200 Hz signal to the input of the bass module.

4.2 Set the volume knob on the control pod to maximum (fully clockwise), and set the bass control to the center detent (flat) position.

4.3 Listen carefully for air leaks along edges of the satellite and near the grille where the Twiddler speaker is installed.

4.4 Replace any satellite that is defective.

## 5. Satellite Sweep Test

5.1 Apply a 270mV, 100 Hz signal to the input of the bass module.

5.2 Set the volume knob on the control pod to maximum (fully clockwise), and set the bass control to the center detent (flat) position.

5.3 Sweep the satellite speakers from 100 Hz to 3 kHz then from 3 kHz to 100 Hz.

5.4 Listen carefully for buzzes, rattles, or other extraneous noises from the Twiddler™ speakers, plastic satellite enclosure, grille, or internal wires.

5.5 Replace any satellite that is found to be defective.

# Test Procedures

## 6. Control Pod Functional Test

- 6.1** With the system completely set up, turn on the system using the power switch located on the bass module.
- 6.2** Set the volume knob on the control pod to maximum (fully clockwise), and set the bass control to the center detent (flat) position.
- 6.3** Touch the center of the control pod . Verify that the LED turns from green to orange and orange to green with each touch.
- 6.4** Verify that the sound is muted and un-muted when the LED changes color and that there is no audible pop when switching from mute to un-mute.
- 6.5** Rotate the control pod ring, verify that the volume increases and decreases and that the ring moves smoothly.
- 6.6** Replace any control pod that is defective.

# Theory of Operation

The Companion® 3 Multimedia Speaker System is a 2.1 system designed to be used as a computer sound system.

The electronics contain signal processing circuitry and the amplifiers for the woofer and satellites. A 120 volt AC input, 14 volt DC power supply powers the electronics. The power supply is located on a separate PC board.

The signal processing electronics in the bass module include equalizers, bass summing, TrueSpace™ processing, level compression, to prevent clipping at high volume, and protection circuitry.

The crossover frequency between bass and satellites is 300 Hz. The system is rated at 60 watts to the woofer and 18 watts to each satellite. The bass box is tuned to 45 Hz.

The following is a detailed description of the circuitry on the power supply, amp board, and remote board.

## 1.0 Power Supply (refer to the schematic diagram 276769)

The power supply is located on the heat sink of the module and is the smaller PCB of the two. The 120 volt AC is received from the AC inlet jack and switch at J1. The AC is fused by the 4 amp F1 fuse. VR1 protects against high voltage surges. The 120 volts is sent out to the 15 VAC, 7 amp toroid transformer mounted to the interior of the bass box on J2. The 15 VAC secondary voltage comes back into the board on J2. The 15 VAC is converted to 15-20 volts DC by bridge rectifier BR1.

Q1, Q2 and Q3 form a pre-regulator to keep the DC output voltage at 14 VDC. The 13 volt zener D1 serves as a reference to Q1. When the input AC goes one diode drop above the zener voltage, Q1 turns on. This turns off Q2, allowing Q3 to turn off, which disconnects the input rectified AC from charging C7, the 3300 uF filter capacitor above 14 volts. This makes the voltage at C7 stay at about 14 volts. C2, C3 and C4 slow down the turn on of Q3 to reduce interference from this circuit to the amplifier.

When the rectified voltage is lower than 14 volts, Q1 turns off, turning on Q2 and then Q3, allowing C7 to charge whenever the rectified voltage from BR1 is above the voltage left on C7. The 14 VDC is sent to the amplifier board over J3.

RT1 is a 22K thermistor at room temperature. It is mounted on the heat sink between BR1 and Q3. It senses the system temperature and sends a signal to the main amp board to help reduce system gain when the heat sink is getting too hot.

## 2.0 Main Amplifier Board (refer the schematic diagram 276762)

On sheet 1 of 3, location (D8), is the A input. U3, (D7) buffers the inputs to be sent to the remote control through J308. The remote mixes the A with the B input, on the remote, and sends the signal back to the main PCB through J308. The control pod is further described in section 3.

# Theory of Operation

## 2.0 Main Amplifier Board (continued) (refer the schematic diagram 276762)

The signals coming into J308 (C7) are sent to sheet 3 of 3 (L\_VOL and R\_VOL). Three amplifiers in U201 (D8-4) are the equalizers for the right channel and U125, (A8-4) are the equalizers for the left channel. U951 (C8-3) in conjunction with U950 (C-2), the voltage controlled amplifier, form the bass summer and dynamic bass equalizer.

The three stage equalizers for the equalizer perform the bass cutoff, mid-range cut, and high end boost, in that order. They are 4-pole Salen-Key elliptical filters.

The bass signal is formed from the two inputs summed and low pass filtered by U951. The bass level is detected by U125, D951, D952, Q950, Q951 and Q952 (B-6) forming an active peak detector. C955 and C957 filter the detected peaks to form the control voltage for the VCA in U950. When the bass level is very low, the signal is boosted by U951. U950 is in the negative feedback path for U951, and when its gain is low, U951 gain goes up, boosting the bass. U950 gain goes down when control current generated by Q952 goes down, as controlled by peak detector circuit.

Q953, Q954 and D954 (D-2) form the peak detector on the bass outputs. Peaks near the negative rail are conducted through D954 and Q953 to charge C969. Voltage on C969 is converted to a current by Q954 which controls the VCA in U950. U950 is in the negative feedback loop of U951, so when U950 gain is high, less bass is output. Near clipping detected by the peak detector is converted to high current by Q954, causing high gain in U950, reducing the gain in U951 and less bass. R980 and C969 determine the attack time of the compressor, and R981 and C969 determine the release time.

Also on sheet 3 of 3, U201 (A-3) is the virtual ground generator. The 10 volt line is divided by two R225 and R226, filtered by C970 and C235, and input to U201. The 5 volts generated by U201 is used by all the signal processing circuitry as the virtual ground reference.

The right and left outputs, EQ\_R and EQ\_L are sent to page 2 of 3 (B3). U102 (B3) forms the true space processing and the satellite signal compressors. TrueSpace™ processing consists of U102B and U102D which act a low pass filters with a -3 dB point of 3 kHz. This signal is subtracted from the opposite channel signal by U102A and U102C.

R204 and R105 determine how much TrueSpace signal is subtracted. The 127K compared to the 10K value of the main signal inputs gives a TrueSpace signal of -18 dB relative to the main signal. To keep the levels the same in mono conditions, the same amount of low pass filtered signal is added back to the main channel of itself, through R106 and R206.

The satellite compressor consist of D401, D402, and Q401 (D7) which detect the right and left channel level, charging C401 when the R+, R-, L+ and L- signals get near the negative rail. The compressor attack time is determined by R403, and the release time is determined by R404. When C401 charges negatively, Q402 and Q403 convert this to current which increases the gain of U401A and U401B. U401 is in the negative feedback path of U102A and U102C, and higher gain reduces the gain through the satellite channels. Therefore, high signal levels near clipping reduces the gain of the satellite channels, compressing the signals.

The compressed signals are sent to the main amplifier on sheet 1 of 3 over signals Sat\_Drv\_L and Sat\_Drv\_R. The bass signal from the bass compressor on sheet 3 of 3, BASS\_DRV, is sent to two stages of bass equalization at U3B and U3D (D7). These form the 40 - 50 Hz boost, and the 100 Hz cut for the bass box equalization.

# Theory of Operation

## 2.0 Main Amplifier Board (continued) (refer the schematic diagram 276762)

The two satellite signals, and the bass signal are sent to the power Amp IC, U301 (C3). One channel of the power Amp IC is used for each satellite, and the bass signal uses two channels of the power chip to drive both of the woofer voice coils.

The Amp IC can provide up to 40 watts into 2 ohms per channel. The woofer coils are 2 ohms each, and 60 watts total is specified for the woofer drive. Each satellite can receive 18 watts each into their 4 ohm impedance.

The mute signal from the remote unit comes in through J308, is slowed down by C314 to prevent pops.

The 10 volts for the signal processing circuitry is generated by D301, a 10 volt zener, and Q303 in an emitter follower configuration. Q303 is specified up to 500 ma, and the entire remote and signal processor consumes about 100 ma.

For thermal protection, Q304, Q305, and Q307 (A5) process the voltage generated by the thermistor on the power supply and R337 and generate a current that goes higher as the temperature rises. This current is summed into the three compressors, reducing the gain through the system at high temperatures. This prevents the heat sink from getting too hot. R337 determines the voltage division ratio and therefore the heat sink maximum temperature.

Q308 and Q309 (D5) form a voltage detector that determines when power has reached sufficient voltage for proper power amplifier operation. If the DC voltage falls below 10 volts, the power amplifier will be muted. This prevents power up and down pops.

## 3.0 Control Pod Remote (refer to schematic diagram 272092)

The remote receives the A input signal from the bass module over J4. This is summed with the B input on the remote control by U2. U2 drives the volume control pot R31. The adjusted volume is sent to U4 to drive the headphone outputs J5 and connector J4 back to the bass module. U1 buffers the 5 volts reference to the sleeve of J5. J5 is a switched jack, and the switch mutes the main speakers when a headphone plug is inserted. This grounds the mute signal, which is active low.

U3 is a touch sensor switch. When the operator touches the touch sensor pad on the remote, which is connected electrically to WT1 and WT2, the QT113 chip will sense this and toggle the standby line. This changes the LED (DS1) color from yellow to green. The green led is always on, and the red led glows during standby, as driven by Q1, to mix with the green to show yellow color. U3 output also drives the standby line to the bass module power amplifier. Standby is active high on the remote, and inverted in the bass module to the active low signal required by the power amplifier.

The remote amplifiers are powered by the 10 volt supply coming in at J4 from the bass module. The virtual ground from the bass module comes in as the VCCD2 signal reference from the signal processing. ZD1 is a 4.7 volt zener which generates the local power supply voltage from the 10 volt input. R41 is the current limiting resistor for ZR1. This 4.7 volts powers U3.

At each I/O connector, resistors, capacitors, diodes, and spark gaps are present on each signal to protect against RF emissions, susceptibility, and ESD.

## SERVICE MANUAL REVISION HISTORY

| Date  | Revision Level | Description of Change                                                                                                                | Change Driven By                                              | Pages Affected |
|-------|----------------|--------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|----------------|
| 9/06  | 00             | Document released at revision 00                                                                                                     | Service Manual Release                                        | All            |
| 4/07  | 01             | Added pad printed logo part numbers for Bass module and Satellites                                                                   | Improvement of logo                                           | 5, 7           |
|       | 01             | New part number for power supply board –<br>307872-011 – 120V<br>307872-022 – 100V<br>307872-033 – 240V                              | Improved power supply.                                        | 6              |
| 8/7   | 02             | Part number changes<br><br>Mod Assembly<br>307876-011- 120V<br>307876-022- 100V<br>307876-033- 240V<br><br>Control Pod<br>307874-002 | Improved power supply and Control pod.                        | 5, 7           |
| 3//08 | 03             | Added fuse part number 298780-3150                                                                                                   | Two versions of the Power PCB, need two versions of the fuse. | 18             |
| 3//08 | 04             | Deleted part number for BOTTOM EPS FILLER.                                                                                           | The top filler now includes both top and bottom filler.       | 7              |
| 6/09  | 05             | Deleted part number for BOTTOM EPS FILLER.                                                                                           | The top filler now includes both top and bottom filler.       | 6              |
| 1/10  | 05             | Changed part number 178321-08 to 178321-04                                                                                           | ECN 46966                                                     | 8              |

SPECIFICATIONS AND FEATURES SUBJECT TO CHANGE WITHOUT NOTICE

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P/N 297700-SM Rev. 05 09/2007 (H):  
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## Troubleshooting Tips

### Companion® 3 Series II Multimedia Speaker System

Refer to the Companion® 3 Multimedia Speaker System service manuals, part number 297700 for schematics, PCB layouts and parts lists.

#### Preventative Repair Measures

**Note:** Perform the following on all units returned for repair.

| Product               | Check                                     | Action                                                                                                                                                                                                                                                                                                                                |
|-----------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Companion 3 series II | Units built before 10/23/2007 (DOM 7289). | Units built before 10/23/2007 will have the Aishi capacitor C7 installed on the power supply PCB. Replace C7 with a United Chemi-Con (UCC) capacitor. Refer to the service manual for the part number. The DOM cut-in date only applies to U.S. variants. Refer to Service Bulletin: <b><u>271885-B4</u></b> for further information. |

## Troubleshooting Tips

| Product               | Symptom            | Check                                                  | Action                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------|--------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Companion 3 series II | Intermittent power | Either J308 or the control pod itself can be defective | Use a test control pod to identify if the problem is with the customer's control pod or the connector J308. If the test control pod works, the problem can be identified as the customer having a defective control pod. If the control pod does not fix the problem, J308 is the failed component. J308 is not repairable. The module assembly would have to be replaced. Refer to the Service Manual for the module assembly part number. |
| Companion 3 series II | Intermittent power | Check J1                                               | Sometimes J1 is not seated properly and may become intermittent. If J1 is intermittent, the cable may need to be replaced or reseated.                                                                                                                                                                                                                                                                                                      |
| Companion 3 series II | No Audio           | Check U301                                             | Check pins 6 and 20 for 15Vdc. If the 15Vdc is not present, check all other power supply voltages. If the power supply voltages are present, inject a 1KHz signal into J302. Check pins 14 (right in) and 15 (left in) and then pins 17 (right out) and 21 (left out). If audio is coming in and nothing is going out, replace U301                                                                                                         |

## Troubleshooting Tips, continued

| Product               | Symptom                                        | Check                                     | Action                                                                                                                                                                                                                                                                                                                                     |
|-----------------------|------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Companion 3 series II | No Audio                                       | Make sure the unit isn't stuck in standby | At IC U301, place your positive probe on pin 22 and the negative probe on ground. Toggle the control pod between mute and standby by touching the top of the control pod. When the LED is green, the voltmeter should read 11Vdc. When the LED is yellow, the voltmeter should read 0Vdc.                                                  |
| Companion 3 series II | No Bass                                        | Check U3                                  | Insert a 200 mVrms, 200Hz signal into J302. Check U3, pin 10 for a signal going into the IC and check pin 14 for the signal coming out. If there is a signal going in but nothing coming out, replace U3 using the part number in the Service Manual.                                                                                      |
| Companion 3 series II | Intermittent Audio from Left or Right Speakers | Check J307                                | With the speakers connected and an audio source playing, wiggle the speaker connections and listen to see if the audio cuts out or becomes intermittent. Before determining the connectors as a failure, be sure to inspect the speaker cable for broken or intermittent connections. J302 is non-repairable; Replace the module assembly. |
| Companion 3 series II | No Audio or Dead Unit                          | Check the Control Pod                     | Check the pins inside the din connector at the end of the control pod cable to see if any pins are misshaped, bent or broken. Also, inspect J308 to make sure none of the pins has broken off. If the control pod connector is defective, replace it.                                                                                      |

# SERVICE BULLETIN

**Bulletin Part Number:** 271885-B2

**Product:** Companion<sup>®</sup>3 Multimedia Speaker System

**Subject:** No Audio Output

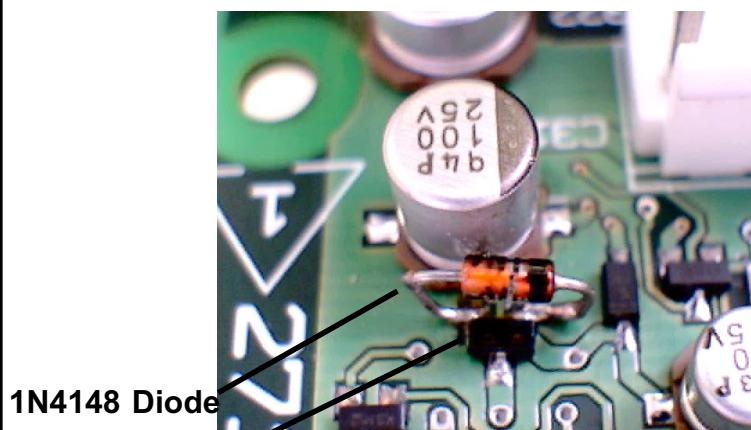
**Disposition:** All units in for repair with a no audio complaint.

**Symptom:** No audio output from the system and the control pod LED is dimly lit.

**Reason:** Q303 on the main PCB is defective or shorted completely.

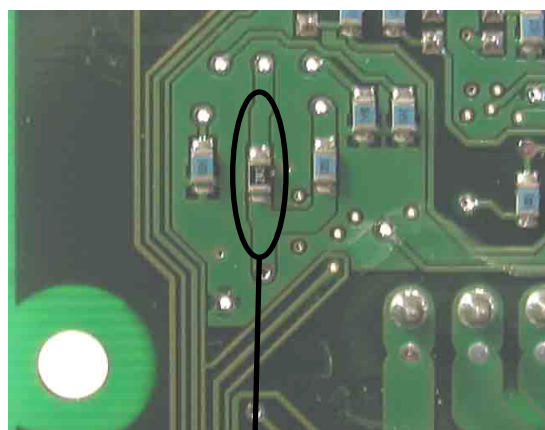
**Solution:** Replace Q303 with part number 148770. Add a 1N4148 diode part number 121501 across the base and emitter junction. Polarity is very important. Connect the cathode of the diode to the base and the anode to the emitter. Refer to the figures below for the location of Q303 and orientation of the diode. Also replace R336, as identified in the table below. Refer to the Companion 3 Speaker System service manual part number 271885-SM.

| Component | From    | Part Number | To     | Part Number |
|-----------|---------|-------------|--------|-------------|
| R336      | 2.2 Ohm | 133625-2R25 | 10 Ohm | 133625-10R0 |

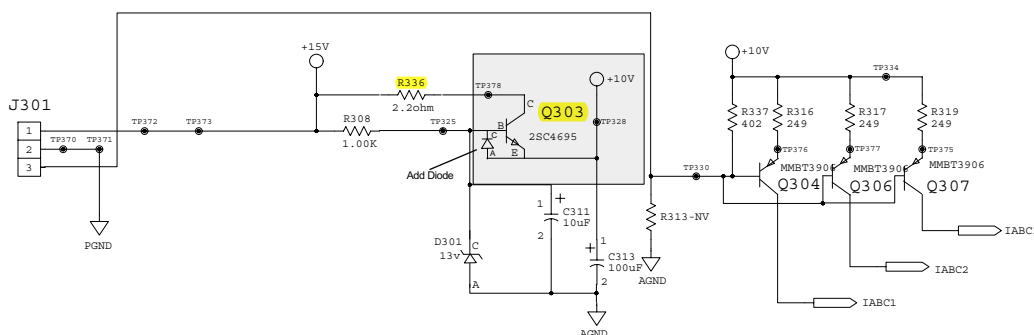


1N4148 Diode

Q303



R336



**Date:** 09/04

**FINS:** 1569



# SAFETY BULLETIN

**Bulletin Part Number:** 271885-SB3

**Product:** Companion® 3 Multimedia Speaker System

**Subject:** Possible failure of C316, C317, C318 and C319 on the main PCB assembly.

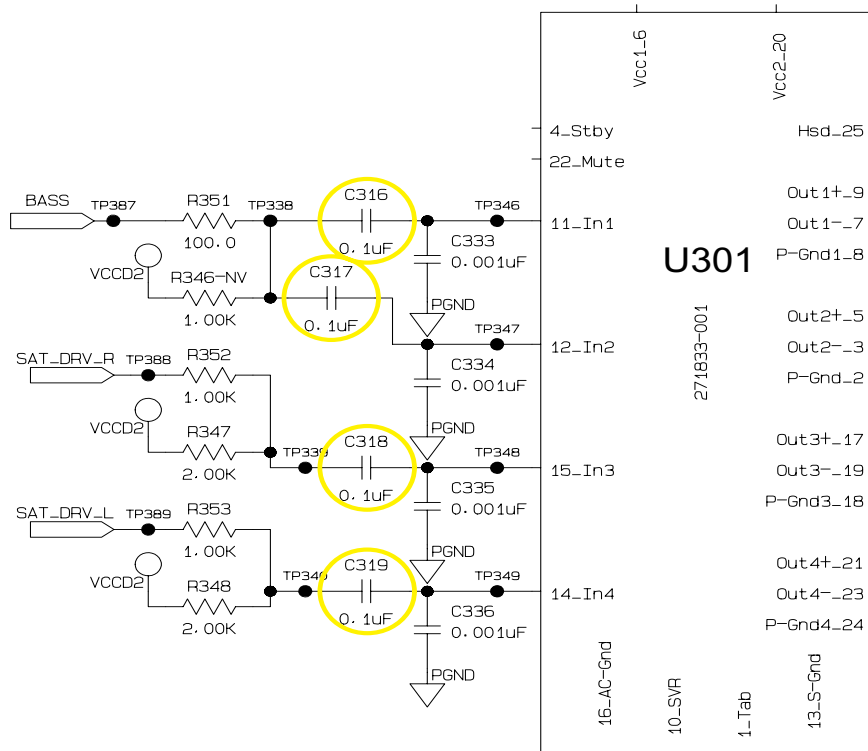
**Disposition:** All Companion® 3 Multimedia Speaker System built before 11/11/05 (DOM below 5315).

**Symptom:** The four capacitors should be replaced regardless of symptom.

**Reason:** The capacitors C316, C317, C318 and C319 may crack due to flexing of the board. This can cause the capacitors to have a low resistance and create a DC offset voltage on the output of the amplifier.

**Solution:** Replace C316, C317, C318 and C319 with a new type (Kemet open-mode ceramic) and value (0.1uF) part number 286499-104. This change will prevent possible DC offset voltages due to a cracked capacitor. Refer to the Companion® 3 service manual part number 271885-SM for disassembly/assembly and test procedures. Verify proper operation before returning the system to the customer.

**NOTE:** There are two versions of the board, the original board is labeled with 271838 and present board is labeled with 280066. Both versions need the four capacitors replaced with the new part number. The two different versions are shown on Page 2 of this document.



Location of C316, C317, C318 and C319  
on Sheet 1 of SD280066 and SD271838

**FINS:** 2476, 2499 and 2619

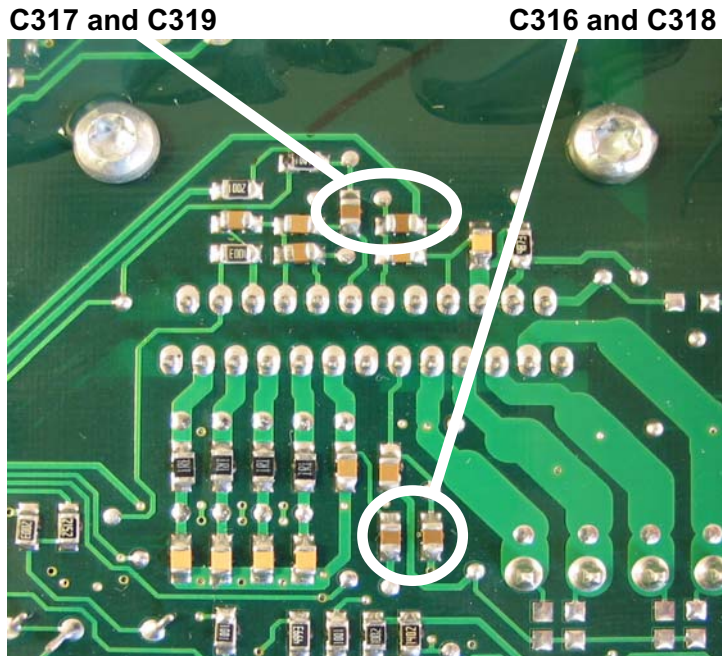
**FRACAS:** 494

**Date Issued:** 10/05

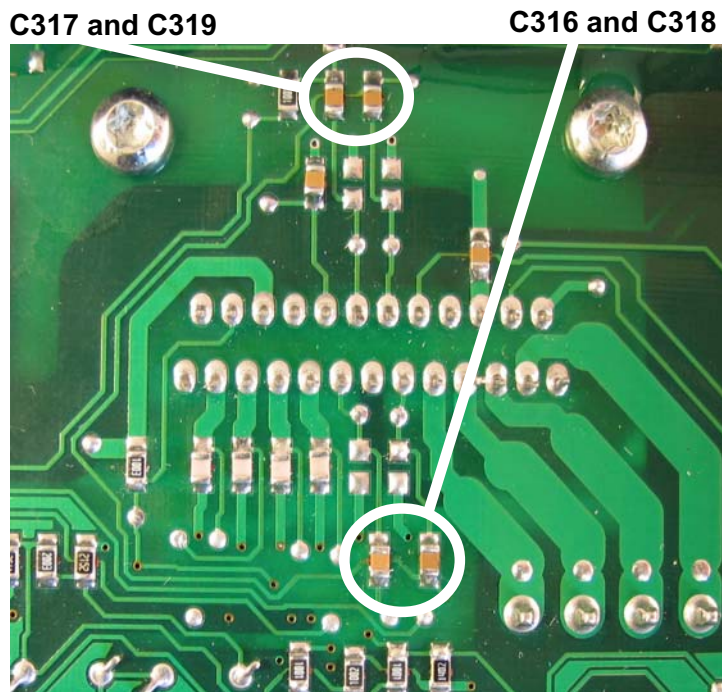


# SAFETY BULLETIN

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Location of C316, C317, C318 and C319 on the bottom side of 280066-001 PCB



Location of C316, C317, C318 and C319 on the bottom side of 271838-001 PCB

**FINS:** 2476, 2499 and 2619

**FRACAS:** 494

Date Issued: 10/05

# SERVICE BULLETIN

**Bulletin Part Number:** 271885-B4

**Product:** Companion<sup>®</sup> 3 Multimedia Speaker System

**Subject:** Poor reliability on vendor part

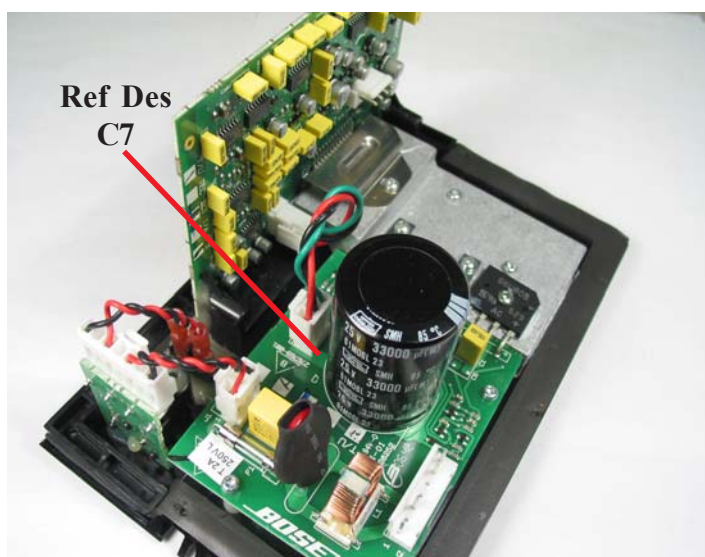
**Disposition:** On all units that come in for repair, replace C7 with a Chemi-Con capacitor

**Symptom:** No Audio, Dead Unit or No Symptom

**Reason:** The capacitor made by Aishi is made using a low quality foil and poor quality etching which is critical to the performance of an aluminum electrolytic capacitor. The capacitor made by United Chemi-Con (UCC) is more dense and has more uniform layering which makes the UCC capacitor more reliable.

**Solution:** All units that come in for repair, replace C7 using the part number listed in the table below. For assembly/disassembly procedures, please refer to Service Manual 271885-SM (Companion<sup>®</sup> 3 Multimedia Speaker System) or 297700-SM (Companion<sup>®</sup> 3 Series II Multimedia Speaker System).

| Variant    | Description                    | Part Number  |
|------------|--------------------------------|--------------|
| US         | 33000 $\mu$ F, EL, AL, 25V, 4T | 260693-3331E |
| Euro/Japan | 39000 $\mu$ F, EL, AL, 25V     | 260693-3931E |



**FINS:** 2784  
**Date:** 11/07