BOSE®
Better sound through research®

Model 1600VI and 1800VI Professional Stereo Power Amplifiers

Service Manual

Part Number 199747 Rev. 00

CONTENTS

SAFETY INFORMATION

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

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

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

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

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.

1800VI SPECIFICATIONS

Size:		3.5"H (2U) x 19"W x 13.25"D 89mm x 483mm x 337mm
Weight:		Net: 33 lbs. (15 kg) Shipping weight: 39 lbs. (17.7 kg)
Display:		7 LED indicators per channel 1 green - READY, 5 yellow - SIGNAL, 1 red - CLIP/PROTECT
Operating Temperature:		0° to 50° C, up to 85% RH

Performance Specifications

Continuous Average Output Power, both channels driven:		450 Watts per channel into 8 Ohms from 20 Hz to 20 kHz, with no more than 0.2% THD 600 Watts per channel into 4 Ohms from 20 Hz to 20 kHz, with no more than 0.2% THD
Bridged Mono Operation:		1400 Watts into 8 Ohms from 20 Hz to 20 kHz, with no more than 0.2% THD
Voltage Output:		60 V line voltage per channel into 8 Ohms 49 V line voltage per channel into 4 Ohms
Dynamic Headroom:		1.0 dB nominal
Power Bandwidth:		5 Hz to 40 kHz (+0, -3 dB)
Frequency Response:		20 Hz to 20 kHz (±0.75 dB)
Channel Separation:		> 65 dB @ 1 kHz; > 55 dB @ 10 kHz
Damping Factor:		> 170
Input Impedance:		25k Ohms unbalanced, each leg to ground, 50k Ohms balanced
***Sensitivity:**	High:	.775 Vrms for rated power into 4 Ohms @ 1 kHz, 57 mVrms for 1W into 4 Ohms @ 1 kHz
	Low:	1.5 Vrms for rated power into 4 Ohms @ 1 kHz, 116 mVrms for 1W into 4 Ohms @ 1 kHz
***Gain:**	High:	36.0 dB (±0.5 dB)
	Low:	30.3 dB (±0.5 dB)

***The amplifier sensitivity is set to 0.775V rms for rated output. To reduce the sensitivity by 6 dB to 1.5V rms, remove JP100 (CH1) and JP200 (CH2), located on the main amplifier board.

1800VI SPECIFICATIONS

Input Overload:	+18 dBu
IM Distortion:	< 0.1%
THD:	@ 0.775 V Sensitivity, < 0.2% @ 1.5 V Sensitivity, < 0.1%
Signal-to-Noise Ratio:	> 100 dB, A-weighted, referenced to rated power into 4 Ohms (high gain) > 78 dBW, A-weighted, referenced to 1 W into 4 Ohms (high gain)
Slew Rate:	10 V/μS (bandwidth limited) 40 V/μS (RFI filtering removed)
CMRR:	> 80 dB @ 1 kHz (without Bose® input module) > 60 dB from 20 Hz - 20 kHz (without Bose input module)
Power Consumption:	55 W at idle 800 W with musical program 1500 W at full power into 8 Ohms (continuous) 2400 W at full power into 4 Ohms (continuous)
Power Requirements:	120 VAC/50-60 Hz (USA and Canada) 230 VAC/50-60 Hz (Europe/UK) 240 VAC/50-60 Hz (Australia) 100 VAC/50-60 Hz (Japan)
Fusing:	15 Amp Slo-Blo (125 V/60 Hz) 8 Amp Slo-Blo (230 V/50 Hz)

1600VI SPECIFICATIONS

Size:	3.5"H (2U) x 19"W x 13.25"D 89mm x 483mm x 337mm
Weight:	Net: 30 lbs. (13.6 kg) Shipping weight: 36 lbs. (16.3 kg)
Display:	7 LED indicators per channel 1 green - READY, 5 yellow - SIGNAL, 1 red - CLIP/PROTECT
Operating Temperature:	0° to 50° C, up to 85% RH

Performance Specifications

Continuous Average Output Power, both channels driven:		240 Watts per channel into 8 Ohms from 20 Hz to 20 kHz, with no more than 0.2% THD 325 Watts per channel into 4 Ohms from 20 Hz to 20 kHz, with no more than 0.2% THD
Bridged Mono Operation:		700 Watts into 8 Ohms at 1 kHz, with no more than 0.2% THD
Voltage Output:		43.8 V line voltage per channel into 8 Ohms 36.0 V line voltage per channel into 4 Ohms
Dynamic Headroom:		2.0 dB nominal
Power Bandwidth:		5 Hz to 40 kHz (+0, -3 dB)
Frequency Response:		20 Hz to 20 kHz (±0.75 dB)
Channel Separation:		> 65 dB @ 1 kHz; > 55 dB @ 10 kHz
Input Impedance:		25k Ohms unbalanced, each leg to ground, 50k Ohms balanced
***Sensitivity:**	High:	0.775 Vrms for rated power into 4 Ohms, 83 mVrms for 1 W into 4 Ohms
	Low:	1.5 Vrms for rated power into 4 Ohms, 160 mVrms for 1 W into 4 Ohms @ 1 kHz
***Gain:**	High:	33.3 dB (±0.5 dB)
	Low:	27.6 dB (±0.5 dB)

***The amplifier sensitivity is set to 0.775V rms for rated output. To reduce the sensitivity by 6 dB to 1.5V rms, remove JP100 (CH1) and JP200 (CH2), located on the main amplifier board.

1600VI SPECIFICATIONS

Input Overload:	+18 dBu
IM Distortion:	< 0.1%
THD:	@ 0.775 V Sensitivity, < 0.2% @ 1.5 V Sensitivity, < 0.1%
Signal-to-Noise Ratio:	> 100 dB, A-weighted, referenced to rated power into 4 Ohms (high gain) > 78 dBW, A-weighted, referenced to 1 W into 4 Ohms (high gain)
Slew Rate:	40 V/μS (bandwidth limited)
CMRR:	> 80 dB @ 1 kHz (without Bose® input module) > 60 dB from 20 Hz - 20 kHz (without Bose input module)
Power Consumption:	45 W at idle 500 W with musical program 1000 W at full power into 8 Ohms (continuous) 1550 W at full power into 4 Ohms (continuous)
Power Requirements:	120 VAC/50-60 Hz (USA and Canada) 230 VAC/50-60 Hz (Europe/UK) 240 VAC/50-60 Hz (Australia) 100 VAC/50-60 Hz (Japan)
Fusing:	10 Amp Slo-Blo (125V/60Hz) 7 Amp Slo-Blo (230V/50Hz)

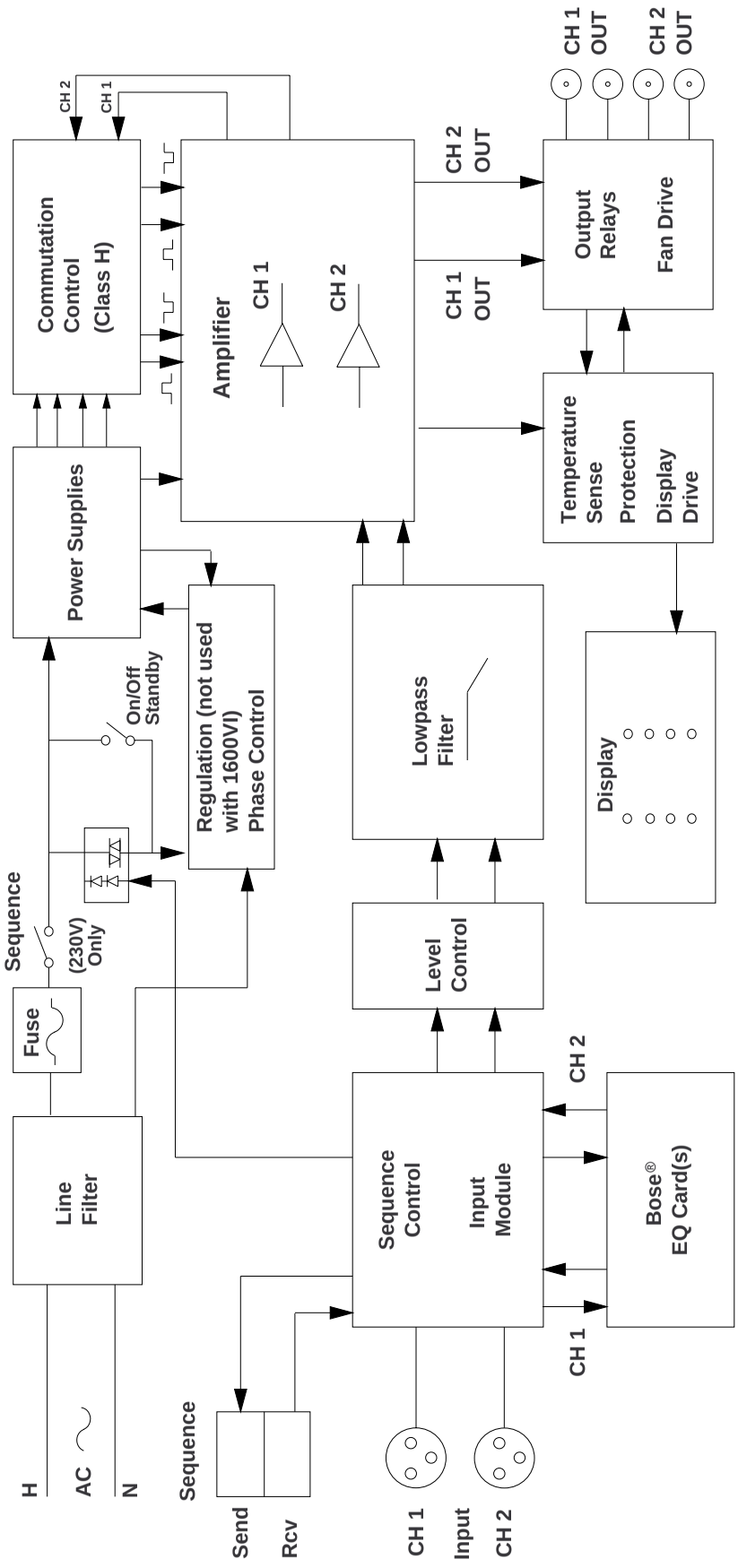


Figure 1. 1600VI and 1800VI Block Diagram

THEORY OF OPERATION

1. General

The Bose® Model 1600VI and 1800VI Professional Stereo Power Amplifiers are two-channel, installed/portable amplifiers made for professional sound applications. The 1600VI is rated at 240 Watts into 8 Ohms and 325 Watts into 4 Ohms. In the bridged-mono setting it can deliver 700 Watts. The 1800VI is rated at 450 Watts into 8 Ohms and 600 Watts into 4 Ohms. In the bridged-mono setting it can deliver 1400 Watts.

The protection circuits designed into the amplifiers will protect them from unexpected faults, excessive temperature, continuous current limiting and shorted outputs.

The balanced inputs use high quality, high common-mode rejection differential amplifiers for exceptional hum and noise rejection.

Through the use of equalization cards the amplifier can provide active equalization for Bose 402™, 502®A, 502B, 802®, Model 25/32, Model 8, Model 1B and FreeSpace® 360 professional loudspeakers. These cards fit into the J6, Channel 1 and J7, Channel 2 connectors located on the Input Module motherboard or the Bose ACM-1 Amplifier Control Module.

Additional Features are as follows:

- Two input connectors per channel allow 1/4" TRS, XLR, or quick connect terminal block connection
- Two input connectors for each channel are wired in parallel
- Accepts balanced or unbalanced lines
- Independent CH 1 and CH 2 Level Controls with 11 detented positions
- Level Control Defeat Switch
- Dual Mono Mode for combining the power of both channels into a single higher powered channel
- Sequencer connection for sequentially powering-up multiple amplifiers to limit instantaneous in-rush current
- Bi-Amp/Full Range configurable
- Internally configurable for Parallel Mono mode for single channel low impedance operation
- Internally configurable for 0.775V or 1.5V rms input sensitivity
- Internally configurable input polarity of XLR connectors
- Class H dual-rail power supply
- Additional protection circuitry includes Clipping Eliminator, AC Lines Fuse
- Power Connected/Standby Indicator
- 7 LED display per channel, including power ready and Clip/Protect indicators
- Two-speed fan cooled

2. Circuit Descriptions

This section discusses the theory of operation of the 1600VI and 1800VI Amplifiers.
For a better understanding of the circuitry involved, refer to the schematics included with this manual. Component pin designation is notated as follows: U1-7 means U1 at pin 7.
Unless otherwise noted, this discussion centers around the CH 1 circuitry.
The CH 2 circuitry is essentially identical.

THEORY OF OPERATION

2.1 Input Module

Note: Some amplifiers will be equipped with the Bose® ACM-1 Amplifier Control Module in place of the Bose Input Module. This module retains all of the capabilities of the Bose Input Module, except sequence (see section 2.8), and includes the ability to control and monitor the amplifier over a control network. Refer to the ACM-1 Amplifier Control Module service manual, part number 199746 for more information.

The Input Module consists of signal input connections, mode switching, optional equalization, and power sequencing circuitry. The module operates from +15V and -15V, supplied by the host amplifier through J2-2 and J2-1 respectively.

The signal inputs are designed for balanced connection, though unbalanced inputs can be configured by proper input wiring. Channel 1 (CH1) line-level inputs are made via P4 and J4, Channel 2 (CH2) input connections are made via P1 and J5. P4 and P1 allow for the insertion of either male XLR or phone plugs. The phone plug terminations are: tip positive (+), ring negative (-), and sleeve ground. The XLR connections pins 2 and 3 are user configurable. As shipped, jumper blocks JB2 and JB1 have jumpers between pins 2 to 3 and 5 to 6. This jumper configuration assigns XLR pin 2 to positive (+) and pin 3 to negative (-), pin 1 is ground in all configurations. If the jumpers are placed across JB1/JB2 pins 1 to 2 and 4 to 5 the XLR pin assignment becomes pin 2 negative (-), and pin 3 positive (+). The Euro-block terminal block connectors J4 and J5 assignments are: pin 1 positive (+), pin 2 negative (-), and pin 3 ground. The CH1 input signal is applied to ICs U1, and the CH2 signal to U2. U1 and U2 are unity gain (0 dB) differential amplifiers (SSM2141). These inputs are protected against RFI (Radio Frequency Interference) and ESD (Electro-Static Discharge). The signals are then routed to the A inputs of op-amp/switch ICs (BA3128) U4 (CH1) and U3 (CH2) and to EQ card connectors J6-4 and J7-4 respectively. The switch's B inputs are driven by the output of the EQ cards via J6-5 and J7-5.

The input module detects the presence of EQ cards via J7-6 and J6-6. Without the card installed these pins are pulled high (+15V) which keeps both CH1 and CH2 sections of dual LED D23 extinguished. This logic high signal is also applied to the control pins of the switch ICs which selects the A (unequalized) input. When an EQ is plugged into J7 and/or J6 pin 6 the EQ is detected and pulls the control pin low (+7.5V), turning on the corresponding LED(s) and switching the IC to the B input which selects the output of the EQ card.
On some EQ cards the equalization can be modified for either full range "FULL BANDWIDTH" or bi-amplified "HF ONLY" operation. The equalization mode switch SW2 selects either FULL BANDWIDTH or HF ONLY modes of the EQ cards installed. These control signals are sent to the EQ cards via J6-7, 8 and J7-7, 8.
The selected signals from U4 and U3 are buffered by U7B and U7A which are wired to P2 and P3. These phone connectors provide balanced, buffered, equalized outputs (if an EQ card is installed) to drive additional amplifiers or other equipment. This allows external equipment to provide equalized signals without the need for additional equalization. The pin assignment for these connectors are the same as for the input phone connectors P1B and P4B. The output circuitry is also protected from RFI and EMI.

The amplifier can be operated in four different output modes: normal (two independent channels) dual mono (one input channel, two separate channels), bridged mono, or parallel mono. These modes are selected via SW1 and control the operation of op-amp/switching ICs U6 and U5. Parallel mono operation requires internal modifications to the amplifier, contact the local Bose Pro Product dealer for information on parallel mono operation.

When SW1 is set to the NORMAL mode, CH1 and CH2 operate independently. In this mode a logic high is applied to the control pins of U6 and U5. This routes the outputs of U4 and U3 to their respective channels in the amplifier via J1-20 and J1-16.
In DUAL MONO mode both amplifier channels are driven by the signal applied to the CH2 input. U6-1 is driven high (+15V) and U5-1 is driven low (+7.5V), selecting CH2 to drive both channels of the amplifier.
In BRIDGED MONO operation the CH2 signal is routed directly from the equalizer switch U3 to the amplifier inputs. U5 control pin 1 is driven low (+7.5V) selecting the inverting input of the op-amp switching IC signal. This inverting signal is then sent to the B input of U6 whose control signal at pin 1 is driven low selecting the B input. This routes the inverted signal to the CH1 input of the amplifier.
For information on sequence operation see Section 2.8, Sequence Send/Receive.

2.2 Power Amplifier Circuitry

The 1600VI and 1800VI amplifiers use a conventional class AB push-pull power amplifier circuit, with a commutated two-stage (dual-rail, class H) power supply. U100A-1 is the input stage, providing differential inputs for input and feedback connections as well as most of the open-loop voltage gain of the circuit. Local and global negative feedback from the output stage via R109, R113, R111/ R112 and R129 sets the closed-loop gain at 33.3 dB for the 1600VI and 36.0 dB for the 1800VI. Removing jumper JP100 disconnects R111 from the circuit and sets the closed-loop gain at 27.6 dB for the 1600VI and 30.3 dB for the 1800VI. The factory default settings are 33.3 dB for the 1600VI gain and 36.0 dB for the 1800VI gain. The output of U100A-1 drives Q100 and Q101, operating as common emitters that level-shift the drive signal and couple it to the pre-driver amplifiers Q102 and Q103. Q102 and Q103 provide additional voltage gain, and when combined with the voltage gain of the input op-amp is sufficient to swing the input signal between the +90V/1600VI and +106V/1800VI power supply rails. Q104 and Q122 are connected as an NPN-PNP conjugate pair and used as a V_{BE} multiplier for bias control. Q104 is thermally connected to the output transistors and together with Q122 provides bias stabilization over a wide temperature range. R124 allows the bias current to be adjusted to its optimum value.

The predrivers Q102 and Q103 provide the base current to the drivers Q108 and Q109. These drive the output transistors; Q110, Q112, Q114, Q116, Q118 and Q120 for the positive half-cycle, and Q111, Q113, Q115, Q117, Q119 and Q121 for the negative half-cycle.
Note: Output transistors Q112, 118, 212 and 218, along with the corresponding channel 2 output transistors Q113, 119, 213, 219, are not used in the 1600VI amplifier.

Q105 operates as a V-I limiter, sensing the voltage drop across emitter resistor R148 (Q106 across R149 for the negative side), and reducing the drive signal to the output stage under overload conditions (see Section 3.1 Over-Current Protection for more information). From the Amplifier Board, the signal passes to the Output Board via E100 (E200 for CH 2). R100, L100, R110 and C100 on the Output PCB comprise the output pole circuit for amplifier stabilization.

THEORY OF OPERATION

2.3 Output Relays

Note: Refer to the Output PCB schematic for the following.

Relay K100 is used to connect the output signal to the Speaker Output Binding Posts through J1. The CH1 and CH2 (K100 and K200) output relays are energized independantly of each other. In CH1, immediately after the power switch is turned on, +6 Vdc is applied to terminal 2 of D105 (ready LED) on the display board via the voltage divider formed by R112/R113. Terminal 1 of D105 is connected to pin 6 of K100 via J3-8 and J6-5 on the I/O board. A small amount of current is drawn through R102 and the relay coil, which is enough to illuminate the red LED portion of D105 but not enough to activate the relay. In the meantime, C13 begins to charge through R26 on the I/O board, which delays turning on Q2 and Q3 by a few seconds.
When Q3 turns on, VLF+ is applied to pin 6 of K100 which activates the relay. VLF+ is also applied to terminal 1 of D105, which reverse biases the red LED and D107, and forward biases the green LED, drawing current from ground through R112.

2.4 Magnetic Field Power Supply

When the power switch is OFF (S1 across E1 and E2) and the linecord is connected to an AC voltage, D1 illuminates (Standby LED). When the power switch is turned ON (S1 across E2 and E3), the LED goes off and gate voltage is applied to triac Q1, which turns it on and energizes the transformer primary winding.

The secondary winding of the power transformer has two taps that supply the two pairs of DC supply voltages, ±90 Vdc and ±45 Vdc for the 1600VI and ±106 Vdc and ±53 Vdc for the 1800VI, each having its own bridge rectifier and filter capacitors. The ±15 Vdc is tapped from the ±53 Vdc for the 1800VI and the ±45 Vdc for the 1600VI through R6 and R8, and regulated by Q2, Q3 and zener diodes D3 and D6. The ±15 Vdc supply powers the op-amps and small-signal transistors.

Note: Refer to the Regulator Board schematic diagram for the following.
The Regulator Board is not used on the 1600VI.

In the 1800VI, the triac Q1 drives the primary of the magnetic field power transformer by operating as a phase controlled switch; its gate signal depends on the signal supplied to opto-isolator U3 located on the regulator board. U4B provides steering for the photodiac in U3, allowing the triac to fire on both alternations of the power line. U2 on the Regulator Board provides AC to DC conversion, with the AC line voltage providing the input to the converter through limit resistors R3 and R4, and the 12.5 Vdc output determined by feedback resistor R6. This voltage provides the positive supply for U4, DC reference for comparators U4C and U4D, and the current through opto-isolator U1 which sets the voltage for the voltage-to-current converter U4A. Note that U4 (MC3405) is a dual op-amp and dual-voltage comparator in a singe package (U4A/U4B are op-amps and U4C/U4D are open collector comparators).

2.5 Start-up Sequence (1800VI only)

When the power switch is OFF (S1 across E1 and E2) and the linecord is connected to an AC voltage, D1 illuminates (STANDBY LED). When the power switch is turned ON (S1 across E2 and E3), the LED goes off and AC HI is supplied to the Regulator Board.

D2 and D3 on the Regulator Board provide overvoltage protection to U4. U4B-14 is a full-wave rectifier that outputs positive pulses to comparator U4C. The reference voltage is set at 0.7Vdc by R10 at pin 3. Where pin 2 crosses the threshold, the output of U4C-1 goes open and C6 begins to charge through R21 and U4A-8.
U4A is a voltage-to-current converter (Howland current pump), whose output current is determined by the voltage at the junction of R12 and R13. As the voltage increases, the charging current to C6 increases.

The voltage on C6 is connected to comparator U4D-6. The reference voltage is set at 0.7Vdc by R22 at pin 5. When pin 6 crosses the threshold, the output of U4D-7 goes open and base current is supplied to Q1 through R14. Q1 turns on, and current flows through the LED portion of U3, illuminating it and turning on the diac. This applies voltage to the gate of triac Q1 on the Power Supply Board which fires it and allows it to conduct current through the primary side of the power transformer.
When the output of U4B-14 drops below the threshold voltage of U4C-3, U4C-1 goes low and C6 discharges rapidly through it. When the voltage on C6 drops below the threshold voltage of U4D-5, U4D-7 goes low and Q1 and U3 turn off, removing the gate voltage to the triac momentarily interrupting the current through the primary side of the transformer.
The triac is switched on and off every half-cycle of the 60Hz AC line. Thus, the triac switches the AC line current off at a rate twice the line frequency, at the instant the line current crosses the zero axis. The triac will then remain off for a number of degrees of the sinusoid, before switching on again. The phase angle at which the triac switches on is the “firing angle” of the triac. This produces enough voltage to the primary of the power transformer to allow the secondary regulator stage to begin to operate.

2.6 Power Supply Regulation (1800VI only)

The firing angle of the triac controls the voltage on the primary of the transformer, and is determined by the conduction of the optocoupler U3 on the Regulator Board.
As the conduction of the optocoupler increases, so does the conduction angle of the triac. The photodiac conduction of the optocoupler is controlled by the current through the LED portion of the optocoupler, the amount of current through the LED is equal to the amount of current through transistor Q1. When the LED in U3 is fully ON, the triac conducts earliest in the AC cycle: the power supply is operating at maximum output. The LED current is supplied by voltage regulator U2 on the Regulator PCB. U5A differential amplifier senses the secondary supply voltages through R37 and R38. The output voltage at U5A-1 increases at the rate determined by R30 and C8 (slow start-up). The idle secondary voltages are set by R36 on the Regulator Board .

2.7 Load Regulation (1800VI only)

When the amplifier is driven at high power into a load, the high DC supplies (rail voltages) will begin to “sag”. Differential amplifier U5A-1 senses this and increases the LED current to optocoupler U1. This action increases the phototransistor conduction, which increases the output current of U4-8, increasing the charging rate on C6. This ultimately increases the triac conduction which increases the primary voltage, which increases the secondary voltages, thus providing steady, regulated DC supplies for the amplifier stage.

The -15Vdc supplied to U5A-4 is backed up with a voltage divider off the -106Vdc supply (R26/R27). Without this, if the -15Vdc supply should fail for some reason, the output of U5A-1 would go high, drawing maximum current through the LED in U1 and latching the triac into full conduction. To prevent this, D8 will become forward biased and supply negative DC to U5A-4, keeping it operating normally. Note that if the +15Vdc supply should fail, the output of U5A-1 would go negative, turning off the triac.

2.8 Sequence Send/Receive

The amplifier can be powered up while the power switch is in the OFF position by applying a DC control voltage of +7V to +15V to the Sequence RCV terminal. Q3 on the Input Module Board will turn on and carry the control voltage through to the SND terminal, which is connected to the next amplifier in the sequential chain. Q1 also turns on which turns on Q2, providing enough current to pass through the LED portion of optocoupler U1 on the Power Supply Board to illuminate it and turn on the diac. This provides a gate voltage to fire triac Q1, which powers up the primary circuit. Once the secondary voltages are up, the +15Vdc supply keeps the Receive circuit operating.

2.9 Commutators

Under idle or small-signal conditions, the low-rail voltage is applied to the collectors of the output transistors through D13 and D19 on the Power Supply Board. The output of the amplifier is connected to the Power Supply Board via J1-10/J2-10. The signal is half-wave rectified by D7 and D14, sending the positive half of the signal to comparator U2A-1 and the negative half to comparator U2B-7. When the signal level exceeds the threshold of the comparator, Q4 (positive) or Q10 (negative) turns on. Current can now flow from ground through Q8 which acts as a current source for Q6. Q6 or Q11 turn on providing gate drive to the power FET Q9 (positive) or Q14 (negative). When the FETs turn on, the high-rail voltage is connected to the collectors of the output transistors. D13 and D19 become reversed biased and switch off the low-rail voltage from the circuit. Zener diodes D11 and D18 provide gate protection to the FETs.
Q7 and Q12 speed up the turn off time of the FETs.

This two-stage approach minimizes the voltage across each of the output devices which also minimizes the power dissipation required. Without this approach, the output transistors would be required to support the entire power supply voltage under small-signal conditions and the “unused” portion of the power supply voltage would be turned into heat.

2.10 Display Circuit

In addition to the READY LEDs discussed in section 2.3 (Output Relays), the Display Board contains five SIGNAL LEDs and one CLIP/PROTECT LED per channel.
The clipping indicators are driven by transistors Q100 (CH1), and Q200 (CH2) located on the Display Board. The signal for the clipping indicators initially comes from U100A-1 and U100B-7 on the Amplifier Board. This is the same signal that operates the anti-clipping opto-isolator on the I/O Board. D30 on the I/O Board half-wave rectifies the positive-going portion of the signal and drives comparator U9B which is a switch. C9 and R62 establish the time constant of the clipping indicator. D23 rectifies the negative-going portion and also drives comparator U9B. When clipping occurs, U9B-7 changes from positive to negative, which forward biases D100 on the Display Board and turns on Q100. Q100 supplies current for clipping LED D104, causing it to illuminate.

The output signal is sensed at the speaker output via the I/O Board (J2-3 Output Board to J6-3 I/O Board to J3-6 I/O Board to J1-6 Display Board). D22 half-wave rectifies the signal and provides a DC voltage proportional to the amplifier's output to drive the signal display circuit. C2 and R19 determine the response characteristics of the display.
The signal driver circuit comprised of U1-U4 is basically a ladder comparator driving LEDs, with a twist. Assume that the signal at U2A-3 is zero volts (ignore R24 and D23 for now). R13 and R14 are a voltage divider that establishes a reference voltage for the comparators (four per channel). The comparators compare this reference voltage against the voltages established by the tapped voltage divider made up of R22, R20, R15 and R25. The CH1 LEDs are in the following sequence (lowest to highest): D105 (red/ green), D13 (amber), D15 (amber), D14 (amber), D12 (amber), D11 (amber), and D104 (red).
With the input at zero volts, all of the comparator outputs are at -12V, except for U2B-7 which is high. None of the signal LEDs have any voltage across them, all are extinguished. As the input signal rises, it crosses in sequence at the thresholds established at each of the four comparators. First U2A-1 fires; its output goes high and D13 illuminates. Next U1B-7 fires, its output goes high, D13 extinguishes (no net voltage across it) and D15 illuminates. Finally U1A-1 fires, D15 extinguishes, and (this is the twist) D23/R24 supply current to the bottom of the R15, R20, R22 and R25 voltage divider, which inverts the relationship of the comparators to each other.
When U1A-1 fires, the current through R24 reverses the sequence of the voltages that establish the thresholds for the three comparators. This allows the same comparators to perform double-duty. The new thresholds leave U1A-1 high, U2B-7 low, U2A-1 and U1B-7 low and D14 on. D11 and D12 are off. As the input signal rises further, U1B-7 fires, extinguishing D14 and illuminating D12. Next U2A-1 fires, extinguishing D12 and illuminating D11. Finally U2B-7 fires, extinguishing D11. The last LED is the clipping indicator, D104.

3.0 Protection Circuitry

Protection functions are provided that will deactivate the output relays. Protection is provided for the following fault conditions:

3.1 Over-Current Protection

The amplifiers are protected from short-term excess current through the output stage by electronic current limiters. When the current through the output transistors becomes excessive, the voltage drop across the emitter resistors R148 and R149 bias the current limiter transistors Q105 and Q106 on, which shunt the drive current via D106 and D107. R139, D102, R140 and D103 determine the V-I limits.
When the current-limiters turn on, the voltage at voltage divider R127/R128 becomes less positive, providing base current for Q1 on the I/O Board through R38. When Q1 turns on two things happen; current flows through U3 (LED/LDR module) via D31 which attenuates the input signal, removing the high current condition as well as providing base current to Q5 through D1 which turns off Q2 and Q3, causing the relay to disengage. C13 provides a time delay to prevent the relay from disengaging during momentary program peaks. When the relay disengages, it causes the red LED in D105 (READY LED) to illuminate and also turns on Q100 and D104 (CLIP/PROTECT LED).

THEORY OF OPERATION

3.2 Clipping Eliminator Circuit

This circuit is controlled by the LED/LDR opto-isolator U3, located on the I/O Board. The LED portion of this component is driven from a bridge rectifier (D4) that gets its input signal from U100A-1 on the Amplifier Board. Under normal conditions (undistorted amplifier output) there is almost no signal at this point. If the amplifier is driven into clipping, the signal level at U100A-1 rises rapidly because the feedback signal no longer represents the input signal. Once this occurs, the LED in U3 illuminates, reducing the resistance of the LDR portion which in turn reduces the input signal. The clipping-eliminator circuit is activated by switch S2B on the I/O Board. When the switch is off, the signal driving the bridge rectifier is shorted to ground.

3.3 DC Offset

DC offset is sensed by the comparator amplifier U2A on the I/O Board. If a DC component should appear at the output, it is sensed through either D6 or D7, depending on its polarity. The output of U2A-1 will switch from -14Vdc to +14Vdc, which turns on Q5 via D8. This deactivates the relay, turns the READY LED red, and turns on the CLIP/PROTECT LED.
In addition, the output of U2A-1 is conveyed to the Regulator Board via D15, J100-10 to Regulator Board J1-12 and D9. The positive voltage on U5A-2 causes the output of U5A-1 to become less positive, shutting off the conduction current through optocoupler U1, which shuts off the triac and primary current.
Note: The Regulator PCB is not used in the 1600VI amplifier.

3.4 Overheated Output Transistors

A thermistor (RT100) is positioned near the amplifier PCB's heatsink. As the negative coefficient thermistor heats up, the voltage on comparator U2B-6 located on the I/O PCB drops. When it crosses the reference voltage set up by voltage divider R42/R43, U2B-7 goes positive. This forward biases D17, turning on Q5, which deactivates relay K100. As the heatsink temperature cools, the thermistor will cool until the voltage at U2B-6 once again crosses the reference voltage at U2B-5, allowing the relay to reactivate.

3.4 Fan Speed Control

The fan operates at low speed when the amplifier is first turned on. The voltage at the thermistor is connected to the Fan Drive circuit on the Output Board via D16 (on the I/O Board) and J6-4/J2-4. As the heatsink temperature increases, the voltage at U1A-3 on the Output Board decreases until it crosses the threshold set by voltage divider R4 and R6. When this occurs, the output of U1A-1 toggles low, which turns on Q1. Q1 shorts across R1 and applies the full VF+ voltage to the fan, kicking it into high speed.

3.5 Major Faults

The slo-blo line fuse protects the unit from further damage when a major fault such as a shorted output transistor or a secondary power supply fault occurs. If the unit is run at or near its rated power, the fuse will eventually blow. The rated line fuse allows the unit to be operated without interruption for all musical applications.

THEORY OF OPERATION

4.0 Operating Modes

The Bose® 1600VI and 1800VI amplifiers are capable of being configured to operate in several different modes in order to allow greater flexibility in use.

4.1 Bridged Mono/Dual Mono Switching

The Stereo/Mono Switch (S1) on the Input Board is a three-position switch used to select Normal Stereo, Bridged Mono or Dual Mono operation. In the Bridged Mono position, it connects CH 1 in parallel with the CH 2 input, but inverts the signal to CH 1. The CH 1 input connection becomes disabled. The speaker output signals are identical except CH 1 is 180 degrees out of phase. In this way, a single speaker can be connected between the two "+" speaker terminals and receive twice the voltage as a single channel. When connected in this way, each channel "sees" one-half the impedance of the speaker that is connected between them. If an 8 ohm speaker is used, each channel will see a 4 ohm load. The result is twice the rated power (per channel) into twice the rated impedance.

Note: Each channel can still be independently controlled with its own level control so it is important that both level controls be set to the same position for a balanced output.

When S1 is switched to the Dual Mono position, CH 1 is connected in parallel with the CH 2 input, but in phase. The CH 1 input connection becomes disabled. This allows both channels to be driven with the same signal without the use of special patch cords. Each channel can still be independently controlled with its own level control.

4.2 Parallel Mono

To operate in Parallel Mono mode, leave S1 in the Normal Stereo position. Removing jumpers JP201 and JP203 will disconnect the CH 2 predrivers from the output stage. Installing jumpers JP102, JP104, JP202 and JP204 will connect the CH 1 predrivers to the CH 2 output stage. In this way, both channels will operate at exactly the same level, and will be controlled by the CH 1 level control.

In addition, removing JP1 will prevent the CH 2 clip LED from activating, and installing a 16 ga. jumper wire between WL100 and WL200 on the Output Board will tie both amplifier outputs together before the relays.

When operating in parallel mono, either of the speaker output terminals (CH 1 or CH 2) can be used since they both have exactly the same signal present. When a speaker is connected to the output terminals it can be driven with twice the current capacity of a single channel. The result is twice the rated power (per channel) into half the rated impedance.

DISASSEMBLY/ASSEMBLY PROCEDURES

Note: It's advisable to mark or note wiring configuration before any disassembly begins. For more information refer to the Wiring Diagrams Figures 19 and 20.

Note: Refer to Figures 2, 3 and 4 for the following procedures.

1. Cover Removal

1.1 Use a phillips-head screwdriver to remove seven screws (3) from the back and sides of the chassis cover (1) and the two longer screws that are located in the center behind the rack-mount brackets. See Figure 2.

1.2 Lift the back of the cover up, while moving it forward (front panel) from the chassis (2). The front lip of the cover is hinged on the two front angle pieces of the chassis.

2. Cover Replacement

2.1 Align the cover (1) so its front angle fits over the chassis.

2.2 Secure the cover to the chassis by tightening seven screws (3) and the two longer screws located in the center behind the rack-mount brackets with a phillips-head screwdriver. See Figure 2.

Note: Refer to Figure 6 for the following procedures.

3. Display Board Removal

3.1 Remove the cover (1) using procedure 1.

3.2 Remove the connectors from transformer (4) terminals 6-11. This will give you access to the screw on the display board (5) which is next to the transformer.

3.3 Remove two screws (20) on the solder side of the display board with a phillips-head screwdriver.

3.4 Move the board back from the chassis front panel and disconnect the wiring harness from the display board J1 connector.

3.5 Lift the board out from the chassis.

4. Display Board Replacement

4.1 Connect the wiring harness from the I/O board (6) to the display board (5) J1 connector.

4.2 Secure the display board to the chassis standoffs by tightening two screws (20) with a phillips-head screwdriver.

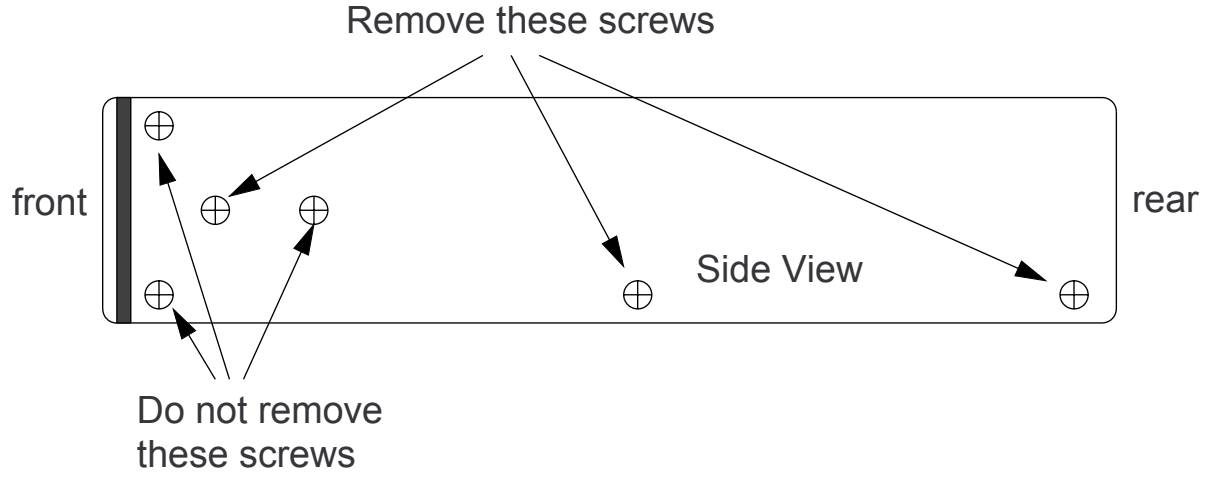


Figure 2. Cover Removal Screw Location Side View

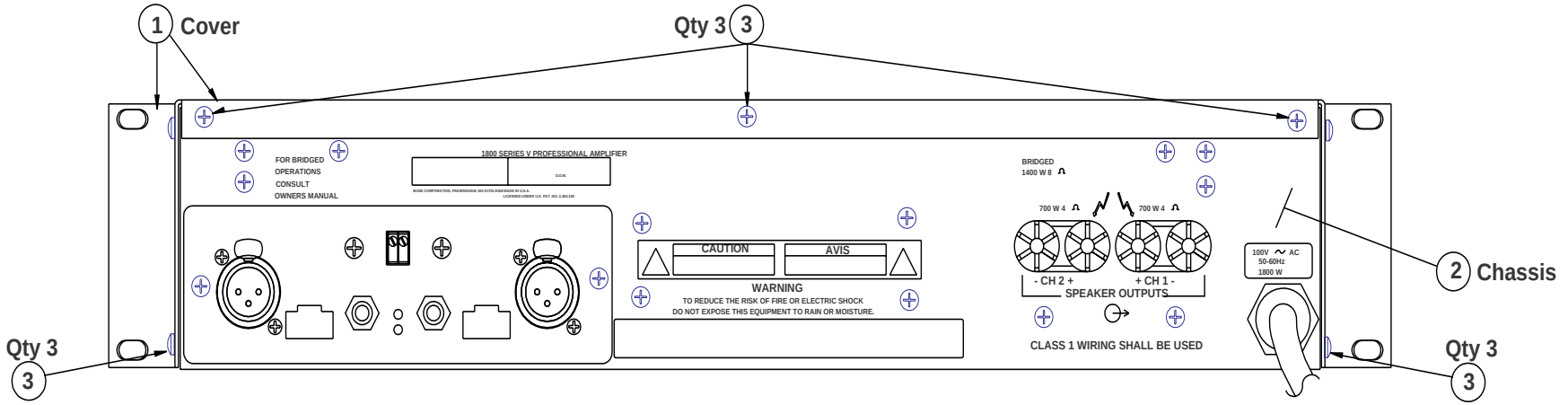


Figure 3. Cover Attaching Hardware

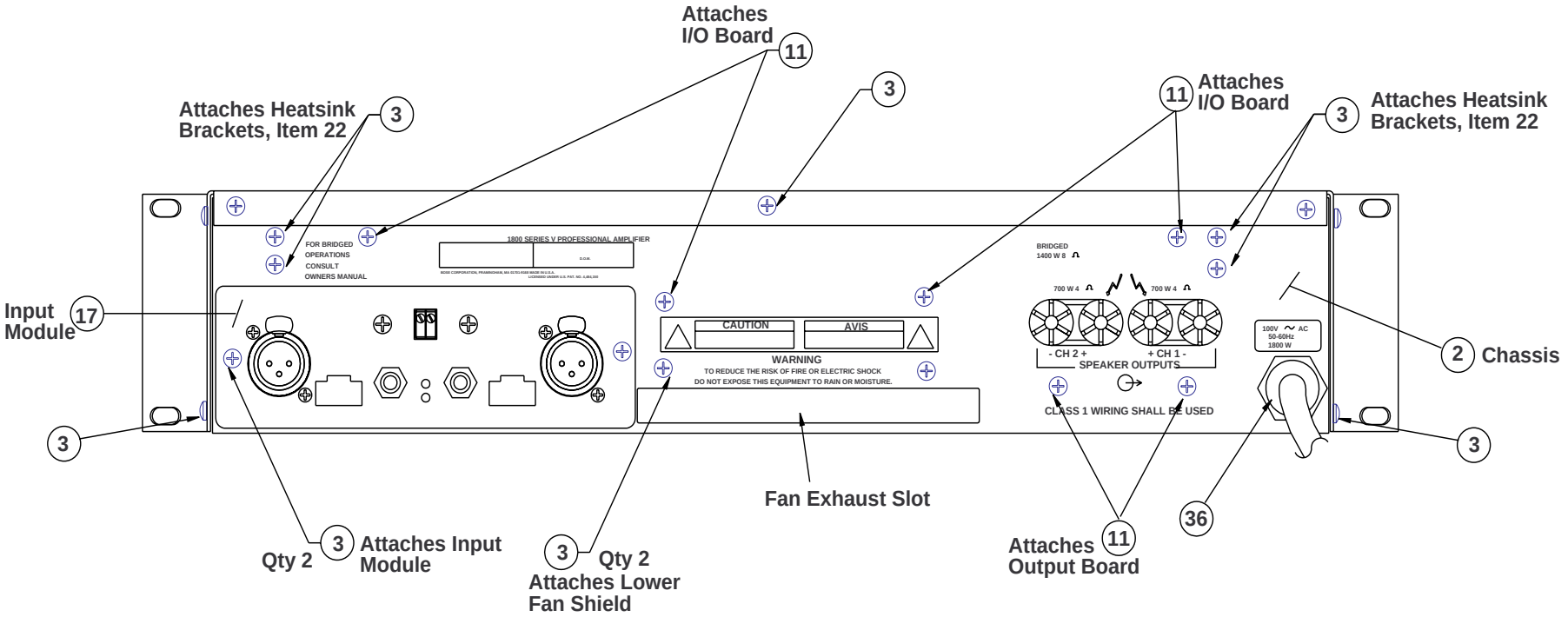


Figure 4. Rear View - Attaching Hardware

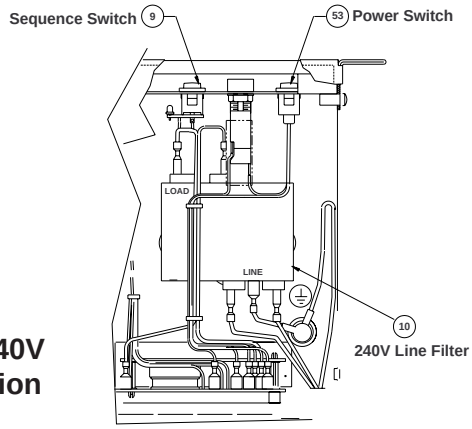


Figure 5. 240V Configuration

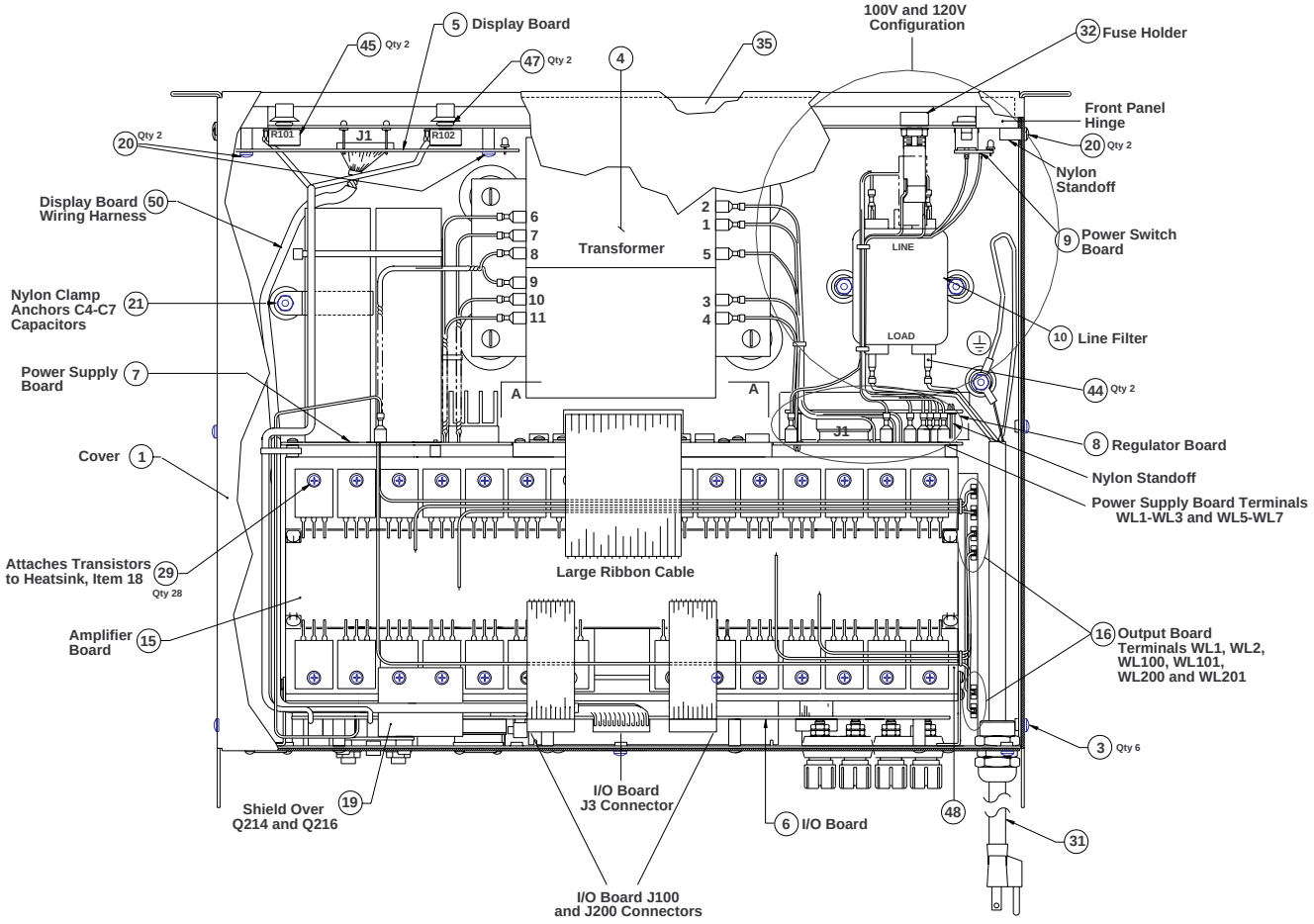


Figure 6. 1600VI and 1800VI Amplifier Assembly

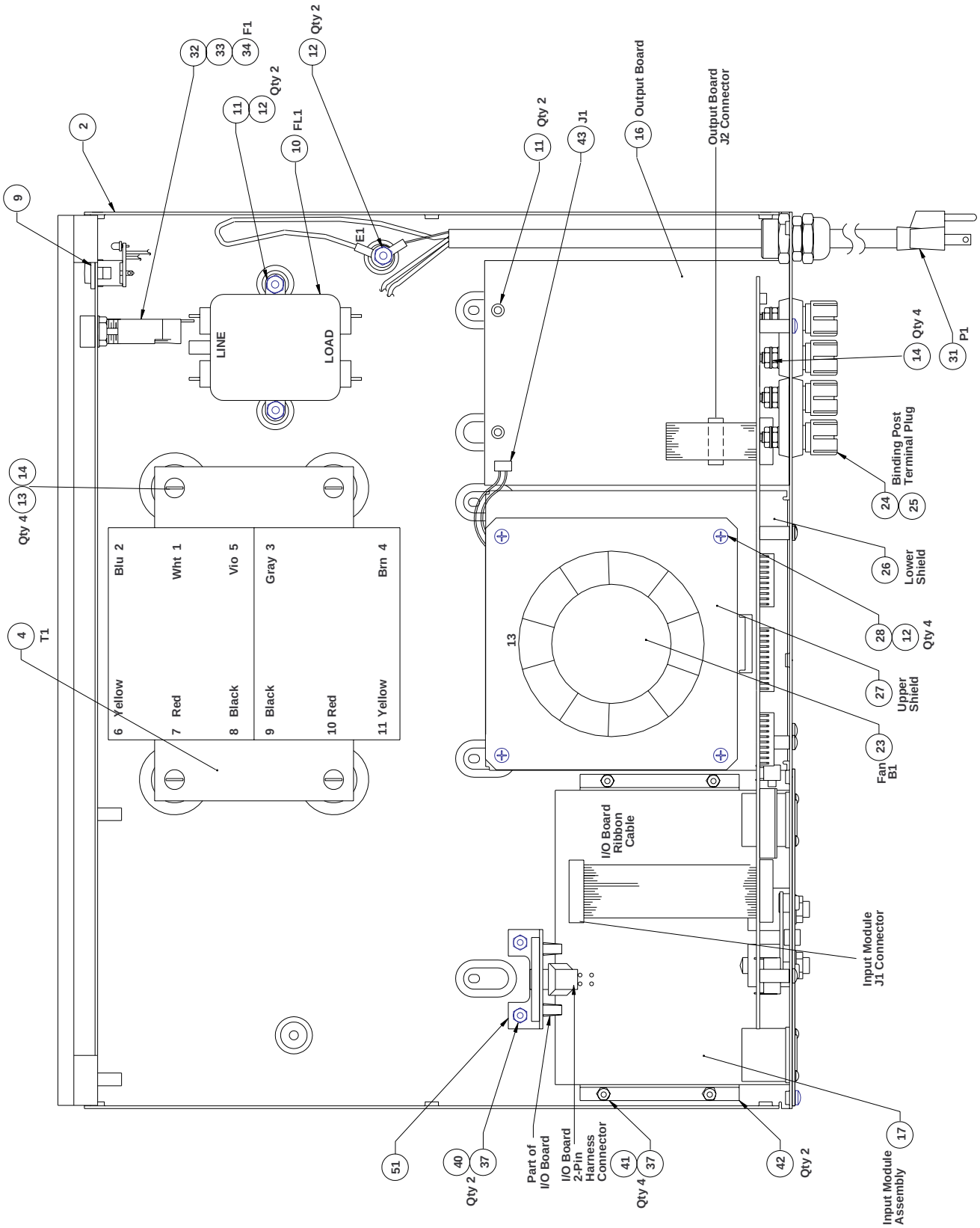


Figure 7. Bottom Mounted Components

DISASSEMBLY/ASSEMBLY PROCEDURES

4.3 Connect the power supply cables back to transformer (4) terminals 6-11.

4.4 Replace the cover (1) using procedure 2.

Note: Refer to Figures 3, 4 and 6 for the following procedures.

5. Regulator Board Removal

Note: The regulator board is not used in the 1600VI amplifier.

5.1 Remove the cover (1) using procedure 1.

5.2 Note the wiring configuration and disconnect cables WL1-WL3 and WL5-WL7 from the power supply board (7) terminals. This will allow easier access to the regulator board (8). These terminals are located directly over the regulator board in the 1800VI.

5.3 Disconnect the cables from the terminals of the line filter (10) that are next to the regulator board.

5.4 Remove the transformer (4) using procedure 11. This will allow easier access to the standoffs that secure the regulator to the power supply board.

5.5 Unsnap the regulator board from the nylon standoffs mounted on the power supply board. This will also disengage the regulator board from the power supply J1 connector.

6. Regulator Board Replacement

6.1 Line up and insert the pins of the regulator board (8) J1 connector (solder side) into the power supply (7) J1 connector.

6.2 Carefully line up the holes of the regulator board with the nylon standoffs mounted on the power supply board. Snap three corners of the board onto each nylon standoff.

6.3 Replace the transformer (4) using procedure 12. Refer to Figures 7 and16 for correct wire locations.

6.4 Connect the cables from the line cord (31) (for 240V, line cord and ground) to the line filters terminals (10).

6.5 Connect the cables to power supply board (7) terminals WL1-WL3 and WL5-WL7. These terminals are directly over the regulator board.

6.6 Replace the cover (1) using procedure 2.

Note: Refer to Figures 5 and 6 for the following procedures.

7. Power or Sequence Switch Removal

7.1 Remove the cover (1) using procedure 1.

7.2 Unsolder the three tabs that secure the power switch board (9) to the switch.

7.3 Push the switch through the chassis (2) front panel.

8. Power or Sequence Switch Replacement

8.1 Push the switch into the chassis (2) front panel.

8.2 Solder the power switch board (9) to the switch terminals. For 100V and 120V units, make sure the LED is lined up with the panel hole labeled "Standby". For 240V units, make sure the board's LED is aligned underneath the "ON" position icon.

8.3 Replace the cover (1) using procedure 2.

DISASSEMBLY/ASSEMBLY PROCEDURES

Note: Refer to Figures 5, 6 and 7 for the following procedures.

9. Line Filter Removal

9.1 Remove the cover (1) using procedure 1.

9.2 Make a note of the wiring configuration of the line filter (10) and disconnect the wires.

9.3 Using a phillips-head screwdriver and a 5/16 wrench, remove the two screws (11) and locknuts (12) that attach the line filter to the chassis (2). The screws are driven from the bottom of the chassis.

9.4 Remove the line filter from the chassis.

10. Line Filter Replacement

10.1 Align the line filter (10) to the chassis (2). Refer to Figures 16 and 17.

10.2 Secure the line filter to the chassis using the two screws (11) and locknuts (12) removed in procedure 9.3. The screws are driven from the bottom of the chassis.

10.3 Connect the cables from the line cord (31) and power supply to the terminals of the line filter. Refer to the Wiring Diagrams Figures 19 and 20.

10.4 Replace the cover using procedure 2.

Note: Refer to Figure 7 for the following procedures.

11. Transformer Removal

11.1 Remove the cover (1) using procedure 1.

11.2 Make a note of the wiring configuration and disconnect all of the connectors attached to the transformer (4) terminals.

11.3 Place the chassis (2) on its side.

11.4 While holding the transformer with one hand, use a phillips-head screwdriver to remove four screws (13) and washers (14) from the bottom of the chassis.

11.5 Remove the transformer from the chassis.

12. Transformer Replacement

12.1 Place the chassis (2) on its side. Align the transformer (4) in the chassis so that the six terminal side of the transformer is next to the large capacitors of the power supply board (7).

12.2 While holding the transformer with one hand, use a phillips-head screwdriver to tighten four screws (13) and washers (14) from the bottom of the chassis.

12.3 Return the cables to their designated terminals on the transformer. Refer to the Wiring Diagrams, Figures 19 and 20 for proper hookup.

12.4 Replace the cover (1) using procedure 2.

Note: Refer to Figures 6 and 7 for the following procedures.

13. Amplifier Board Removal

13.1 Remove the cover (1) using procedure 1.

13.2 Disconnect the two ribbon cables connected to the I/O board (6), J101 and J201, from the amplifier board (15).

13.3 Disconnect the large ribbon cable JP200 from the power supply board (7).

13.4 Make a note of the wiring configuration and disconnect the cables connected to terminals WL1, WL2, WL100, WL101, WL200 and WL201 on the output board (16).

DISASSEMBLY/ASSEMBLY PROCEDURES

Note: Some cables are bundled together. Cut any wire wraps when necessary.

13.5 Note the locations of RT100, RT200, Q104 and Q204 at the corners of the amplifier board and their placement against the heatsink.

13.6 Remove one screw (29) and washer from each of the twenty-eight transistors that attaches the amplifier board to the heatsink (18).

Note: Make a note of the location and alignment of the shield over Q214 and Q216.

13.7 Lift the amplifier board from the heatsink.

14. Amplifier Board Replacement

14.1 Place the amplifier board (15) onto the heatsink (18). Align the board so that the large ribbon cable is facing the power supply board (7). Be sure that RT100, RT200, Q104 and Q204 are aligned properly against the heatsink and that they have sufficient heatsink compound between the component and the heatsink.

14.2 Secure the amplifier board to the heatsink by tightening one screw (29) and washer to each of the power transistors. Torque the screws to 5.7 inch-pounds.

Note: Make sure the shield (19) is attached to Q214 and Q216 transistors. Refer to Figure 6 for shield alignment.

14.3 Connect the two ribbon cables J101 and J201 to I/O board (6) connectors, J100 and J200).

14.4 Connect the large ribbon cable (JP200) to the power supply board (7) connector J2.

14.5 Connect the amplifier and power supply board (7) cables to the output board (16) WL1, WL2, WL100, WL101, WL200 and WL201 terminals. Refer to Wiring Diagram Figure 19.

14.6 Replace the cover (1) using procedure 2.

Note: Refer to Figures 7, 8 and 9 for the following procedures.

15. Output Board Removal

15.1 Remove the cover (1) using procedure 1.

15.2 Disconnect the display board (5) wiring harness from the I/O board (6) J3 connector.

15.3 Disconnect the amplifier board (15) two ribbon cables from the I/O board J100 and J200 connectors.

15.4 Make a note of the wiring configuration and disconnect the cables connected to the output board (16) WL1, WL2, WL100, WL200 and WL201 terminals.

15.5 If necessary, unsolder the red and white wires from the I/O board E10 and E11 terminals. They are located near the amplifier board transistor shield (19).

15.6 Make a note of the wiring configuration and disconnect the cables from the power supply WL1-WL8 terminals. WL8 is located near the large power supply capacitors.

15.7 Make a note of the wiring configuration and disconnect all of the cables connected to the transformer.

15.8 Using a phillips-head screwdriver, remove one screw from the nylon clamp (21) that fastens the power supply capacitors (7) C4-C7 to the chassis (2).

15.9 Using a phillips-head screwdriver, remove four screws (29) from the two brackets (22) that secure the heatsink (18) to the inside of the chassis back panel.

15.10 To release the heatsink base from the bottom of the chassis, use a phillips-head screwdriver to remove four screws (3) from the chassis bottom panel. Move the entire heatsink away from the output board.

15.11 Disconnect the fan (23) from the output board J3 connector.

15.12 Disconnect the I/O board ribbon cable from the output board J2 connector.

15.13 Use a phillips-head screwdriver to remove two screws (11) that fasten the output board to the bottom of the chassis.

15.14 Use a phillips-head screwdriver to remove two screws (11) on the back panel that attach to the two brackets on the output board. They are located underneath the red and black binding posts.

15.15 Use a wrench to remove four nuts from the binding posts (items 24 or 25). Release the wires from the posts.

15.16 Lift the output board out of the chassis.

16. Output Board Replacement

16.1 Place the output board (16) into the chassis (2). Align the board so the two brackets on the board face the back panel of the chassis.

16.2 Secure the output board to the bottom of the chassis by tightening two screws (11) with a phillips-head screwdriver.

16.3 Use a phillips-head screwdriver to tighten two screws (11) into the output board brackets. The screws are driven from the outside of the back panel.

16.4 Connect the output board black wires to the binding posts (items 24 or 25) by tightening four nuts with a wrench. Refer to Figure 19 for the proper wiring.

16.5 Connect the I/O board (6) ribbon cable to the output board J2 connector.

16.6 Connect the fan (23) connector to the output board J3 connector.

16.7 Return the heatsink (18) to it's location. Use a phillips-head screwdriver to tighten four screws (29) to the two brackets (22) that fasten the heatsink to the chassis back panel.

16.8 Secure the heatsink to the bottom of the chassis by tightening four screws (3) with a phillips-head screwdriver. The screws are driven from the bottom of the chassis.

16.9 Secure the power supply (7) large capacitors to the inside of the chassis by tightening one screw (20) into the nylon clamp that wraps around one of the capacitors.

Note: Refer to wiring diagrams Figures 19 and 20 for the following procedures.

16.10 Connect the cables from the amplifier (15) and power supply board to the output board WL1, WL2, WL100, WL200 and WL201 terminals.

16.11 Connect the amplifier board ribbon cables to the I/O Board J100 and J200 connectors.

16.12 Connect the display board (5) wiring harness to the I/O board J3 connector.

16.13 Solder the red and white wires from the 2-pin harness connector to the I/O board E10 and E11 terminals. They are located near the amplifier board transistor shield (19).

16.14 Connect the cables from the line filter (10) power or sequence switch board (9) and fuse holder (32) to the power supply WL1-WL8 terminals.

16.15 Connect all the cables connected to the transformer.

16.16 Replace the cover (1) using procedure 2.

Note: Refer to Figures 6, 8 and 9 for the following procedures.

17. Power Supply Board Removal

17.1 Remove the cover (1) using procedure 1.

17.2 Remove the transformer (4) using procedure 11.

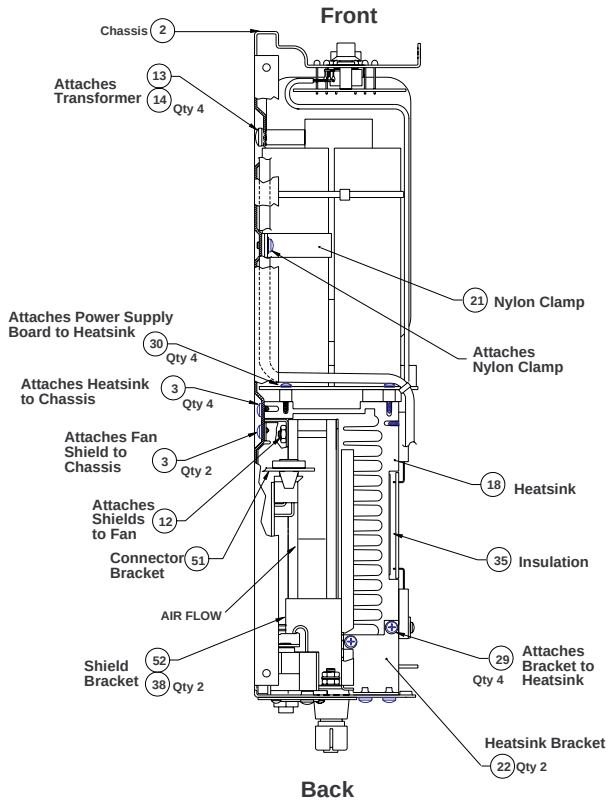


Figure 8. Side View - Bottom Mounted Components

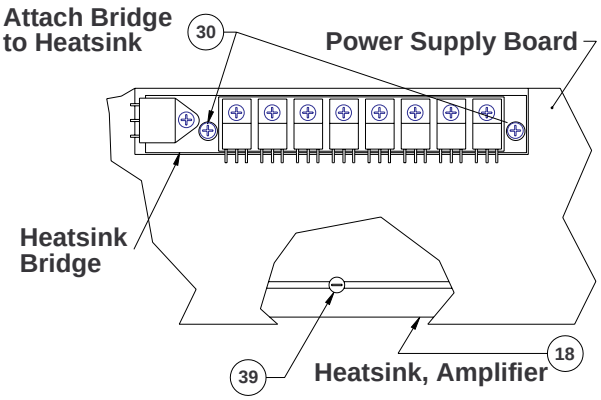


Figure 9. Heatsink Bridge

17.3 Disconnect the amplifier board (15) ribbon cable from the power supply (7) J2 connector.

17.4 Make a note of the wiring configuration and disconnect the wiring from power supply terminals WL1-WL8.

17.5 Make a note of the wiring configuration and disconnect all of the wires connected to terminals E5-E17 of the power supply board.

17.6 Use a phillips-head screwdriver to remove one screw from the nylon clamp (21) that secures the power supply large capacitors to the chassis.

17.7 Remove two screws (30) from the heatsink bridge with a phillips-head screwdriver. Refer to Figure 9.

17.8 Disconnect the regulator board (8) from the power supply using procedure 5. **Note:** The regulator board is not used in the 1600VI amplifier.

17.9 Remove four screws (30), one from each corner of the power supply board with a phillips-head screwdriver.

17.10 Lift the power supply board from the chassis.

DISASSEMBLY/ASSEMBLY PROCEDURES

18. Power Supply Board Replacement

18.1 Attach the power supply board (7) to the heatsink (18) by tightening four screws (30) into each corner of the board. Use a phillips-head screwdriver. Refer to Figure 7.

18.2 Seat the regulator board into the power supply board, see Procedure 6.

18.3 Secure the power supply heatsink bridge to the heatsink by tightening two screws (30) with a phillips-head screwdriver.

18.4 Secure the power supply large capacitors to the chassis by tightening one screw into the nylon clamp (21). See Figure 8.

18.5 Connect all wiring to the power supply WL1-WL8 terminals.

18.6 Connect all wires attached to the power supply terminals E5-E17.

18.7 Connect the amplifier board ribbon cable to the power supply J2 connector.

18.8 Replace the transformer (4) using procedure 12.

18.9 Replace the cover (1) using procedure 2.

Note: Refer to Figures 6 and 7 for the following procedures.

19. Fan Removal

19.1 Remove the cover (1) using procedure 1.

19.2 Use procedure 15, Steps 15.2-15.12 to move the heatsink (18), with the amplifier, power supply and regulator boards attached, to allow access to the fan (23).

19.3 Release the fan and shield (26) from the chassis back panel by removing two screws (3) with a phillips-head screwdriver. The screws are located over the fan exhaust slot.

19.4 Release the lower shield from the bottom of the chassis by removing two screws (3) with a phillips-head screwdriver.

19.5 Disconnect the fan cable (J1) from the output board (16) J3 connector.

19.6 Lift out the fan and shield. To disassemble the fan from the shields, (upper (27) and lower (26)) use a phillips-head screwdriver and 5/16" wrench to remove four screws (28) and locknuts (12).

20. Fan Replacement

20.1 Place the fan (23) label-side down onto the lower shield (26). The fan is seated flush on one side of the lower shield and a 1/2" space on the other side. Align the fan so that the red and black wires are on the side of the shield with the 1/2" space.

20.2 Place the upper shield (27) on the back of the fan. Use a phillips-head screwdriver and 5/16" wrench to tighten four screws (28) and locknuts (12).

20.3 Secure the fan and shield to the chassis back panel by tightening two screws (3) with a phillips-head screwdriver. The screws are located over the fan exhaust slot.

20.4 Secure the lower shield to the bottom of the chassis by tightening two screws (3) with a phillips-head screwdriver.

20.5 Connect the fan cable into the output board (16) J3 connector (Pin 1 is red, Pin 2 is black).

20.6 Use procedure 16, Steps 16.4-16.15 to install the heatsink (18) and cabling.

20.7 Replace the cover (1) using procedure 2.

DISASSEMBLY/ASSEMBLY PROCEDURES

Note: Refer to Figure 6 for the following procedures.

21. I/O Board Removal

21.1 Use Procedure 15, Steps 15.1-15.12 to remove the chassis cover (1), disconnect cabling, and to move the heatsink (18), which will allow access to the I/O board (6).

21.2 Disconnect the I/O board ribbon cable from the output board (16) J2 connector.

21.3 To release the I/O board from the chassis back panel, use a phillips-head screwdriver to remove four screws (11) from the board standoffs.

21.4 If necessary, unsolder the cables from the I/O board E1-E9 terminals.

21.5 Lift the I/O board from the chassis.

22. I/O Board Replacement

22.1 Place the I/O board (6) into the chassis (2) with the component side of the board facing the back panel.

22.2 Solder the cables from the display (5) and power supply board (7) to the I/O board E1-E9 terminals if they were unsoldered in Procedure 21.4. Refer to the wiring diagrams Figures 19 and 20 for proper connection.

22.3 Connect the I/O board ribbon cable to the output board (16) J2 connector.

22.4 Attach the I/O board to the chassis back panel by tightening four screws (11) with a phillips-head screwdriver. The screws are driven from the outside of the back panel.

22.5 Use Procedure 16, Steps 16.4-16.15 to install the heatsink (18) and cables.

22.6 Replace the cover (1) using procedure 2.

Note: Refer to Figures 4, 10 and 11 for the following procedures.

23. Input Module Removal

23.1 Use a phillips-head screwdriver to remove two screws (3) from the input module (17) connector panel.

23.2 Pull the input module out of the chassis (2).

23.3 Disconnect the I/O board (6) ribbon cable from the input module J1 connector.

23.4 Once the input module is out of the amplifier chassis the equalization cards can be accessed.

24. Input Module Replacement

24.1 Slide the input module (17) into its slot far enough so you can connect the I/O board (6) ribbon cable into the input module J1 connector.

24.2 Slide the input module into the chassis slot until the input module J2 connector is completely seated into the I/O board two-pin harness connector. The input module should be flush with the chassis back panel.

24.3 Secure the input module to the amplifier chassis by tightening two screws (3) with a phillips-head screwdriver.

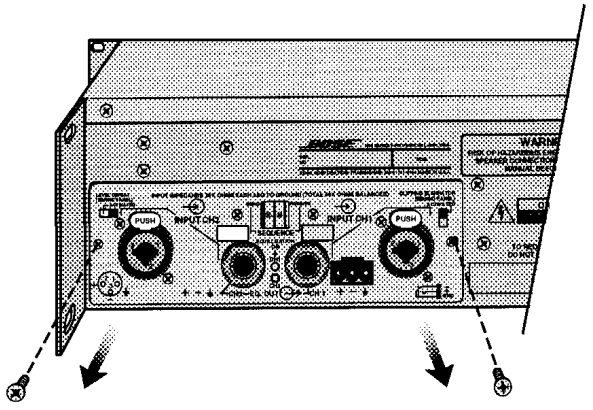


Figure 10. Input Module Screw Location

DISASSEMBLY/ASSEMBLY PROCEDURES

Note: The Bose® ACM-1 Amplifier Control Module is used in place of the standard Input Module to allow control and monitoring of the amplifier by use of a control network. It uses the same types of audio input connectors as the standard Input Module, as well as EQ outputs and sequence control. It will accommodate one Bose EQ card for each channel. Refer to the ACM-1 Amplifier Control Module service manual part number 199746 for more information.

Note: Refer to Figures 4, 10 and 11 for the following procedures.

25. Bose ACM-1 Amplifier Control Module Removal

25.1 Use a phillips-head screwdriver to remove two screws (3) from the Bose ACM-1 module (17) connector panel.

25.2 Pull the ACM-1 module out of the chassis (2).

25.3 Disconnect the I/O board (6) ribbon cable from the ACM-1 module J1 connector.

25.4 Disconnect the ACM-1 ribbon cable from J2 on the amplifier I/O board.

25.5 Once the ACM-1 module is out of the amplifier chassis the equalization cards can be accessed.

26. Bose ACM-1 Amplifier Control Module Replacement

26.1 Slide the ACM-1 module (17) into its slot far enough so you can connect the amplifier I/O board (6) ribbon cable into the ACM-1 module J1 connector. Pin 1 is to the right as you face the rear of the amplifier. This corresponds to the red stripe on the ribbon cable.

26.2 Connect the ACM-1 ribbon cable to J2 located on the amplifier I/O board. This jack is located on the top right side of the opening in the rear of the amplifier for the ACM-1 module. Pin 1 is to the right. This corresponds to the red stripe on the ribbon cable.

26.2 Slide the ACM-1 module into the chassis slot until the input module J2 connector is completely seated into the I/O board two-pin harness connector. The ACM-1 module should be flush with the chassis back panel.

26.3 Secure the ACM-1 module to the amplifier chassis by tightening two screws (3) with a phillips-head screwdriver.

Note: Bose Equalizer PCBs can be installed into both the standard Input Module and the ACM-1 Amplifier Control Module to allow active equalization of Bose loudspeakers as used in various installations. For more information, refer to the Equalizer PCB Assemblies service manual part number 181812-S2 for the 402™, 502®A, 502B, 802®, 3202®, 4402®, 9702® and LT II loudspeakers, and service manual part number 181812-S5 for the Model 8 and Model 25/32 loudspeakers.

Note: Refer to Figure 11 for the following procedures.

27. Equalizer PCB Installation and Removal

27.1 Remove the Input Module or ACM-1, as applicable, using procedure 23 or 25.

27.2 Located on the motherboard for the module, you will see two jacks labelled J6 and J7. J6 corresponds to channel 1 of the amplifier, and J7 corresponds to channel 2.

27.3 Plug the EQ card into the desired channel. Be sure that it is firmly seated into the connector. If you are removing an EQ card, grip it firmly and gently pull it straight out of the connector located on the module.

27.4 Replace the module using procedure 24 or 26, as applicable.

TEST PROCEDURES

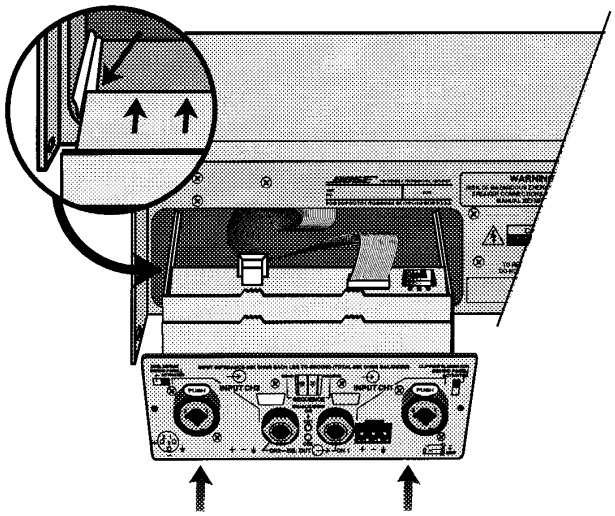


Figure 11. EQ Card Placement

Test Setup Parameters:

1. In order to test these amplifiers at full power, you will need at least one 4Ω, 500W load and one 8Ω, 500W load.

2. Set up the amplifier under test as shown in the Test Setup Diagram, Figure 12.

3. For the following tests it is recommended that you apply balanced signals for all input levels. If you do not have the ability to provide balanced signal inputs, you may use a single-ended input signal. Be sure to connect the negative leg of the wiring to ground for proper gain levels.

4. You will need input cables with either XLR, TRS, or the 3-pin connectors (Bose® part number 182769) in order to be able to apply an input signal to the amplifier. Refer to section 2.1 of the Theory of Operation for the wiring scheme.

5. The input levels shall be the actual level as measured at the input jack, not the signal generator open circuit level.

6. If you have an amplifier with the Bose ACM-1 Amplifier Control Module installed, you will need to replace it with a standard Input Module in order to be able to test it.

Only if you are connected to a Bose control network using the required Bose software will you be able to pass audio through an amplifier with a Bose ACM-1 Amplifier Control Module installed. Refer to the ACM-1 service manual part number 199746 for more information.

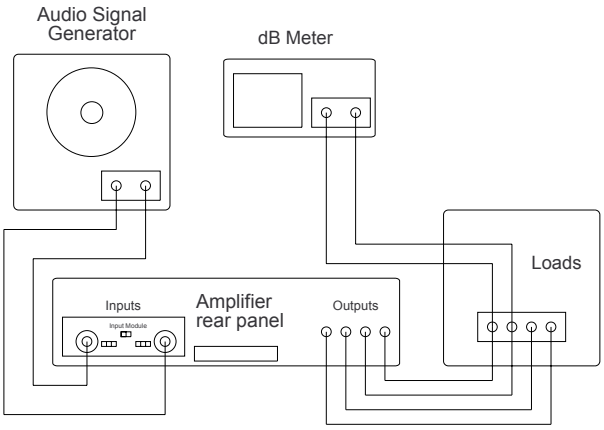


Figure 12. Amplifier Test Setup Diagram

1. Gain Test

1.1 Apply a 41 mVrms, 1 kHz signal to the input of the amplifier channel under test.

1.2 Reference a dB meter to the input level.

1.3 Measure the output level for the channel under test. For the 1600VI amplifier, it should be +27.6 dB ± 0.5 dB for low sensitivity units, and +33.3 dB ± 0.5 for high sensitivity units. For the 1800VI amplifier, it should be +30.3 dB ± 0.5 dB for low sensitivity units, and +36.0 dB ± 0.5 for high sensitivity units.

2. Frequency Response Test

2.1 Apply a 16 mVrms, 1 kHz signal to the amplifier channel under test.

2.2 Reference a dB meter to the output level. This is the reference level.

2.3 Measure the frequency response. It should be 0.0 dB ± 0.75 dB from 20 Hz to 20 kHz.

TEST PROCEDURES

3. Distortion Level

3.1 Apply a 1.5 Vrms, 1 kHz signal for low sensitivity units, or a 775 mVrms, 1 kHz signal for high sensitivity units, to the amplifier channel under test.

3.2 Set the CH1 or CH2 level controls, as appropriate, to the full on position (fully clockwise).

3.3 Measure the distortion level. It should be ≤ .2% THD.

4. DC Offset

4.1 With no signal applied, measure the DC voltage level at the amplifier output.

4.2 It should be ≤ 35 mVdc.

5. Overcurrent Shut Down Test

5.1 Apply a 1.0 Vrms, 1 kHz signal to the amplifier channel under test.

5.2 Use a 0.1 Ω, 50 W resistor to simulate a short circuit across the amplifier channel under test. Do not apply a dead short across the amplifier output as damage could result. Test duration should be approximately 5 seconds.

5.3 The amplifier protection circuit should cause the output relays to drop out, removing the output signal from the binding posts. After a short period, the amplifier should attempt to come out of protect mode. If the short is still applied, the amplifier should stay in protect mode.
Once the short is removed, the output relays should stay on and provide signal output to the binding posts.

6. Thermal Shut Down Test

6.1 Remove the top cover using Disassembly/Assembly procedure 1.

6.2 Apply a 16 mVrms, 1 kHz signal to the input jacks of both channels of the amplifier under test.

6.3 On the amplifier PCB, locate RT100 and RT200. They are located near the corners of the PCB. See the amplifier PCB layout diagram for more information.

6.4 Apply a short to RT100. Verify that the appropriate protection LED for CH 1 illuminates on the front panel and that the fan speed increases while RT100 is shorted.

6.5 Remove the short on RT100.

6.6 Apply a short to RT200. Verify that the appropriate protection LED for CH 2 illuminates on the front panel and that the fan speed increases while RT200 is shorted.

6.7 Remove the short on RT200 and replace the top cover using Disassembly/Assembly procedure 2.

7. Channel Imbalance Test

7.1 Apply a 775 mVrms, 1 kHz signal to both channels of the amplifier under test.

7.2 With both gain pots on the front panel fully CW, reference a dB meter to the output level of one channel.

7.3 Measure the output level on the other channel of the amplifier. There should be less than a 0.5 dB difference between channels.

TEST PROCEDURES

8. Potentiometer Tracking Test

8.1 Apply a 16 mVrms, 1 kHz signal to both channels of the amplifier under test.

8.2 With both gain pots on the front panel fully CW, reference a dB meter to the output level of one channel.

8.3 On the same channel, turn the gain pot CCW one notch and note the dB reading.

8.4 Repeat step 8.3 for each of the first seven notches of the gain pot for the channel under test.

8.5 Turn the pot fully CW again, and repeat steps 8.2 to 8.5 for the other channel.

8.6 Compare the output levels noted for both channels for the first seven notches of the gain pots, and verify that all of the steps are within 1.5 dB of each other from one channel to the other.

9. Display Test

9.1 With both gain pots fully CW, apply a 10 mVrms, 1 kHz signal to both channels of the amplifier under test.

9.2 The bottom-most LEDs on the display located on the front panel should be illuminated.

9.3 While observing the LEDs on the front panel, slowly increase the input level. You should see each one of the LEDs light up one at a time from bottom to the top of the display until the red clipping indicator for each channel illuminates. Be careful not to overdrive the amplifier for too long a period.

10. Amplifier PCB Bias Adjustment

Note: The bias level should be set without an input signal or a load on the outputs. Refer to the PCB layout diagrams for part locations.

10.1 Using a DVM, measure the DC voltage across one of the emitter resistors. For the 1600VI amplifier, measure across R144, R145, R148, R149, R150, R151, R154 or R155 for channel 1. Measure across the corresponding emitter resistors for channel 2. For the 1800VI amplifier, measure across R144 through R155. Measure across the corresponding emitter resistors for channel 2. Refer to the amplifier PCB schematic diagrams located in this service manual for more information.

10.2 While reading across one of the emitter resistors, adjust R124 for channel 1, or R224 for channel 2, until you read a 1.5 mVdc voltage drop across the resistor. **Note:** To ensure that the emitter resistors share the bias current equally, it is recommended that you measure two or three of the emitter resistors for that channel. Equal bias current sharing is indicated by a 1.5 mVdc voltage drop across each emitter resistor.

11. 1800VI Amplifier High-Voltage Rail Adjustment

Note: The rail voltages should be set with the AC line input voltage at its nominal value and with no input signal or output load. Refer to the layout diagrams for part locations. The rail voltage for the 1600VI amplifier is not adjustable.

11.1 Use a DVM to measure the DC level across TP1 to TP3 located on the power supply PCB.

11.2 Adjust R36 on the regulator PCB until you read -106 Vdc $\pm$ 2 Vdc.

11.3 The reading across TP1 and TP2 on the power supply PCB should be approximately +104 Vdc.

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 located 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. Used on the 1600VI amplifier.

5. Used on the 1800VI amplifier.

6. Domestic units.

7. European units.

8. Australian units.

9. Japanese units.

PART LISTS AND EXPLODED VIEWS

The following section contains part lists and exploded views for the 1600VI and 1800VI Amplifiers. The part lists are broken down as follows:

- Main Part List and Layout Views
- Packing Part List and Exploded View

Electrical and Mechanical Part Lists:

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

MAIN PART LIST

1600VI and 1800VI Amplifiers (see Figures 13-17)

Item Number	Description	Part Number	Qty.	Note
1	Cover, PC, Gray	182740	1	
2	Chassis, 1800VI, DOM	182739	1	5, 6, 9
	1800VI, ECE	199793	1	5, 7, 8
	1600VI, DOM	199791	1	4, 6, 9
	1600VI, ECE	199792	1	4, 7, 8
3	Screw, Sheetmetal, PHP, SERR, 6 x 1/4, blk, hs brkt (4), cover (9), input (2), hs (4), fan brkt (4)	182721	27	
4	Transformer, UI, 1800VI, 1250W, 120V	182766	1	3, 5, 6
	1800VI, 1250W, IEC, 230/240V	182765		3, 5, 7, 8
	1800VI, 1250W, 100V	182767		3, 5, 9
	1600VI, 750W, 120V	199784		3, 4, 6
	1600VI, 750W, IEC, 230/240V	199783		3, 4, 7
⚠	1600VI, 750W, 100V	199785		3, 4, 9
5	PCB Assy, Display, 1600VI/1800VI	182762	1	1, 2, 4, 5
6	PCB Assy, Input/Output, 1600VI/1800VI	182758	1	1, 2, 4, 5
7	PCB Assembly, Power Supply, 1600 VI	199782	1	1, 2, 3, 4
⚠	1800VI	182757		1, 2, 3, 5
8	PCB Assy, Regulator, 1800VI	182760	1	1, 2, 5
9	PCB Assy, Power Switch	182761	1	1, 2, 3, 4, 5
⚠				
10	Line Filter, 16A/20A, 120V and 100V	182763	1	3, 6, 9
⚠	w/Tabs, 8A, 230V	182764		3, 7, 8
11	Screw, SEMS, PHP, 6-32 x 1/4, BO WAX, I/O (4), output (4), L.F. (2)	182723	12	
12	Nut, 6-32 Hex, Kep, STZ, linefilter (2), fan (2), chassis gnd (2)	199774	8	
13	Screw, SEMS, PHP, 10-32 x 3/8, BO, WAX, xfmr (4)	182721	4	
14	Washer, Int Lock, #10, STZ, binding post (4)	182730	4	
15	PCB Assy, Amplifier, 1600VI	199781	1	1, 2, 4
	1800VI	182756		1, 2, 5
16	PCB Assy, Output, 1600VI/1800VI	182759	1	1, 2, 4, 5
17	PCB Assy, Input, 1600VI/1800VI	182755	1	1, 2, 4, 5
18	Heatsink, Amplifier	182745	1	
19	Shield, Noise, Q214, 216	182749	1	
20	Screw, SEMS, PHP, 6-32 x 3/8, BO, WAX	182724	4	
21	Clamp, Cable, 1.38, Nylon, caps	182732	1	
22	Bracket, Heatsink	182741	1	5, 8
23	Fan, 24VDC, High Flow	182710	1	
24	Post, Binding, Dual, Short, Red/Black, 120V and 100V	182711	2	
24	Bind Post, Dual, Short RT Entry, 230V	182712	1	5, 7
24	Bind Post, Dual, Short LT Entry, 230V	182713	1	5, 7
25	Plug, Terminal, Blanking, Red, 230V	182714	2	7
25	Plug, Terminal, Blanking, Black, 230V	182715	2	7
26	Shield, Fan, Lower, Fab	182751	1	
27	Shield, Fan, Upper, Fab	182748	1	

MAIN PART LIST

1600VI and 1800VI Amplifiers (see Figures 13-17)

Item Number	Description	Part Number	Qty.	Note
28	Screw, MA, FHP, 6-32 x 1-1/4, blk, upper fan shield	182718	4	
29	Screw, STP, PHP, 4 x 1/2, AB, w/washer, BO, transistors (28), hs brkt (4)	182722	32	
30	Screw, #4 x 1/2", PHP, Type B STZ, p/s mounting (4), hs block (2)	182720	6	
31 ⚠	Line Cord, 14/3, SJT, SHLD, 15A Euro, 16A, 7ft. Australia 16/3, SJT, SHLD, 13A	182738 182737 199769 199768	1	3, 5, 6, 9 3, 4, 5, 7 3, 5, 8 3, 4, 6
32 ⚠	Fuseholder, Panel Mount 120/230V	182706	1	3, 4, 6, 7
33 ⚠	Fuse Carrier, 100V 230V	182707 182708	1	3, 4, 9 3, 5, 7
34 ⚠	Fuse, MDA, 15A, 250V Time Lag, 8A MDA, 10A, 250V MDA, 7A, 250V	182736 183551 199763 199764	1	3, 5, 6, 9 3, 5, 7, 8 3, 4, 6 3, 4, 7
35	Insulation Film, .010 thick 2.2" x 14" Heatsink, 7" x 10.5"	182709	-	
36	Strain Relief, Threaded Nylon	199780	1	
37	Screw, Machine, FHP, 4-40 x 1/2, card slide, conn brkt	182717	4	
38	Screw, TF, 4-40 x 1/4, FHP, UC, ST, BZ, shield brkt	199771	4	
39	Screw, PHSL, 4-40 x 3/8, Nylon, 6/6	182726	1	
40	Kepnut, 4-40, ZC	182727	2	
41	Nut, 4-40, mini card slide	182729	4	
42	Slide Card	182731	2	
43	Connector, .100 ctr, 2-pin, on fan wires	182733	1	
44	Fast NYL, 16-14 AWG, Blu .250	182734	2	
45	Pot, Rotary, 11 Det, Wire Tabs, 1KB	182735	2	
46	Knob, Soft Touch, 13mm	182744	2	
47	Nut, 7mm, Metric, Dress	182746	2	
48	Insulator, Sil-Pad, K-6, 7-Pos	182747	4	
49	Shield, Pot Noise, over leads R102	182750	1	
50	Harness, Conn, 13p, 22AWG, 23in	182754	1	
51	Bracket, Connector	182742	1	5, 8
52	Brkt, Shield, Fab, PM1400/1800V	199790	1	
53 ⚠	Switch, Rocker, SPST, QICDIS, 15A	183550	1	3, 5, 7, 8
-	PCB Assy, Barrier	182774	1	4, 5
-	Brkt, 2U, Rack Ear, PC, Gray	199790	2	
-	Panel, I/O, SS, Gray	199786	1	
-	Brkt, Heatsink	199787	2	
-	Brkt, Connector	199788	1	

MAIN PART LIST

1600VI and 1800VI Amplifiers (see Figures 13-17)

Item Number	Description	Part Number	Qty.	Note
-	Standoff, .280d x .625l, Locking Nylon, between pwr supply and reg.	199751	3	
-	Standoff, PEM, 6-32 x 1/2, ST UP	199776	2	
-	Standoff, PEM, 6-32 x .188, ST UP	199777	1	
-	Screw, MA, BSC, 6-32 x 1/2, blk, chassis gnd	199757	1	
-	Screw, Sheetmetal, PHP, SERR, 6 x 3/8, B, BO	199758	2	
-	Screw, MA, 6-32 x 3/16, WHSR, STZ	199772	1	
-	Screw, MA, 6-32 x 1/4, PHP, WSHR, STZ	199773	1	5, 8
-	Washer, Int Lock, #4, Blk	182772	4	
-	Washer, Shldr, #4, .252 x .093, Nylon	182832	9	

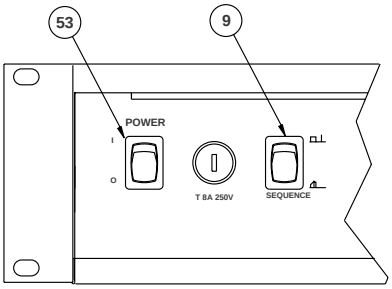


Figure 13. Front Panel Views

240V Variation

100V and 120V Variation

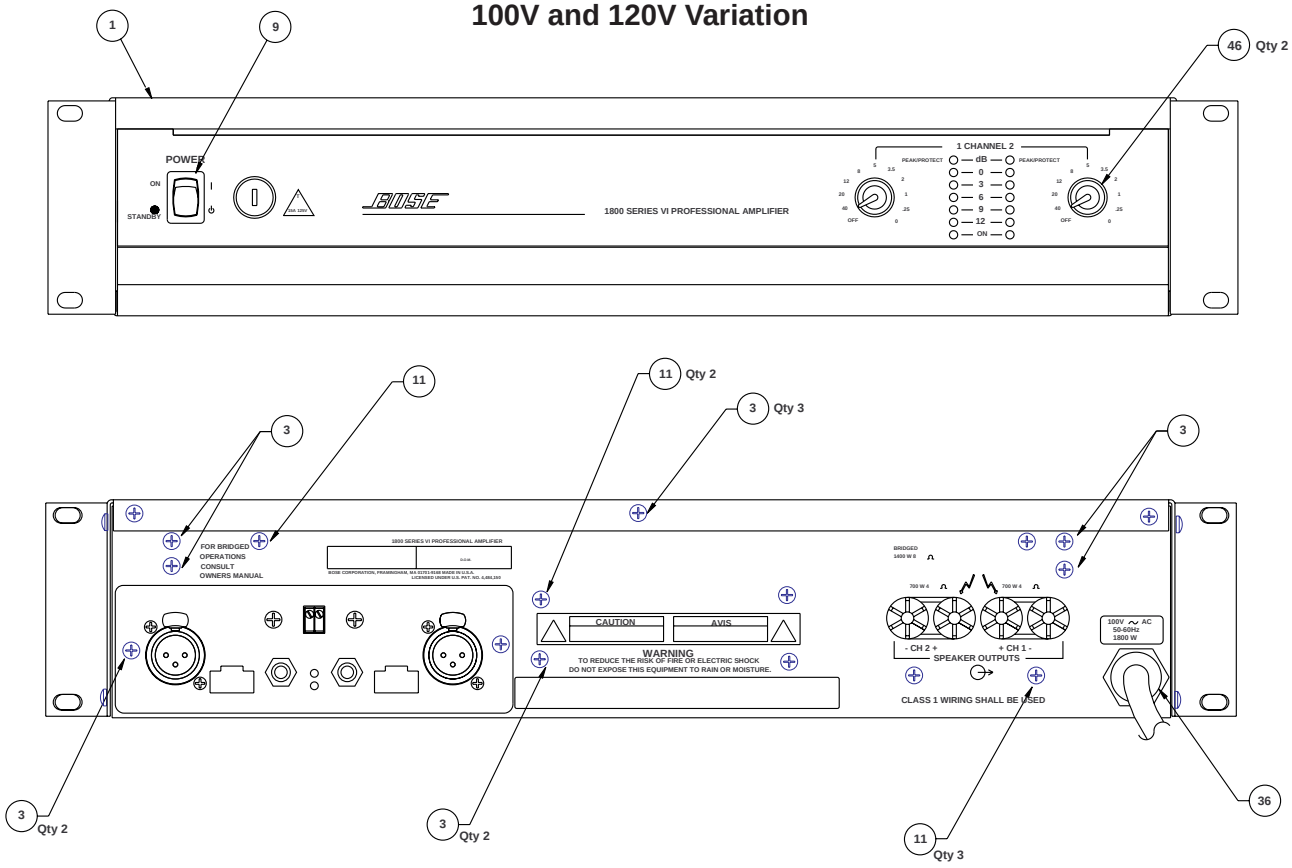


Figure 14. Back Panel View

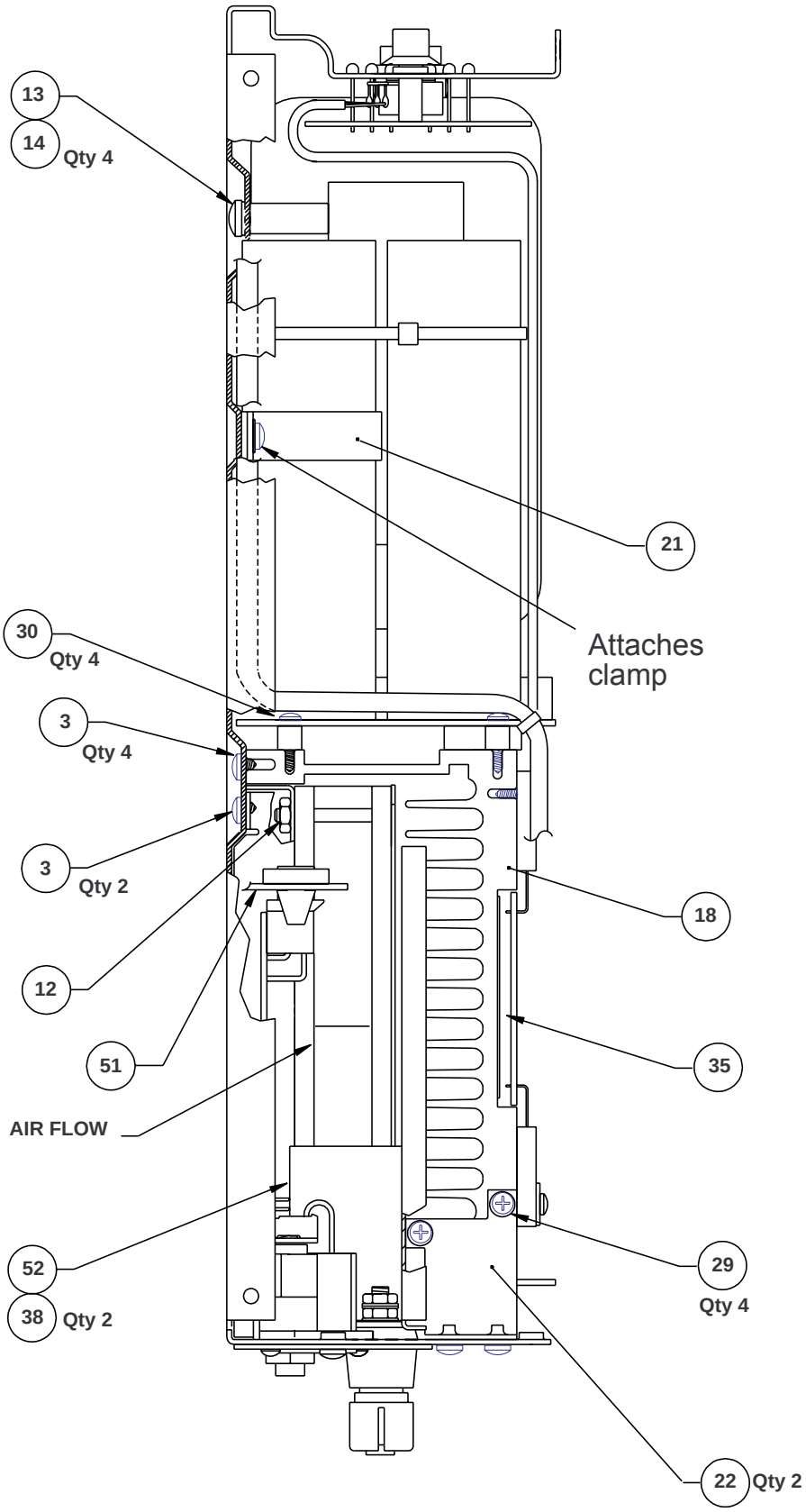


Figure 15. Cross Section View

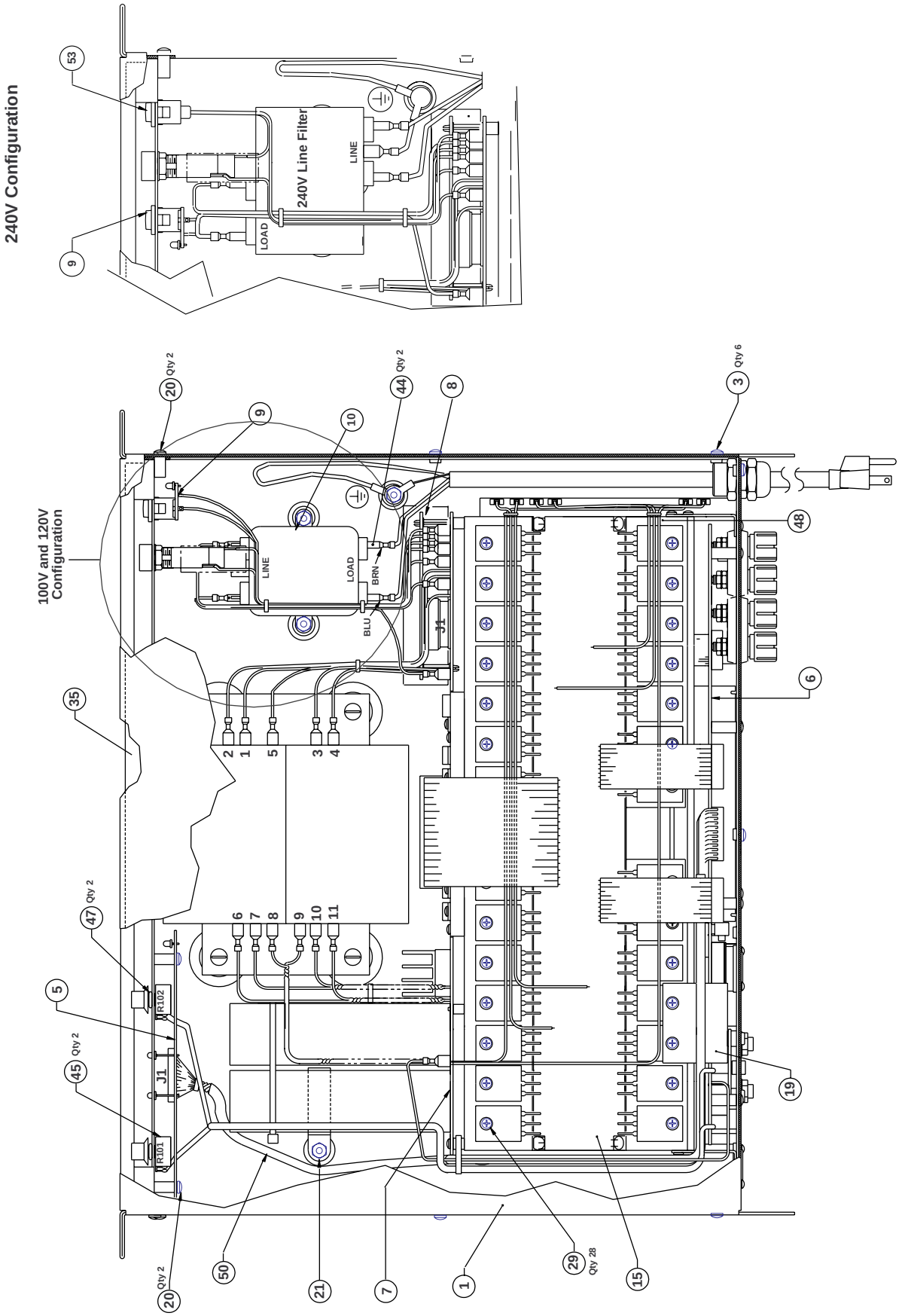


Figure 16. 1600VI and 1800VI Amplifier Top View

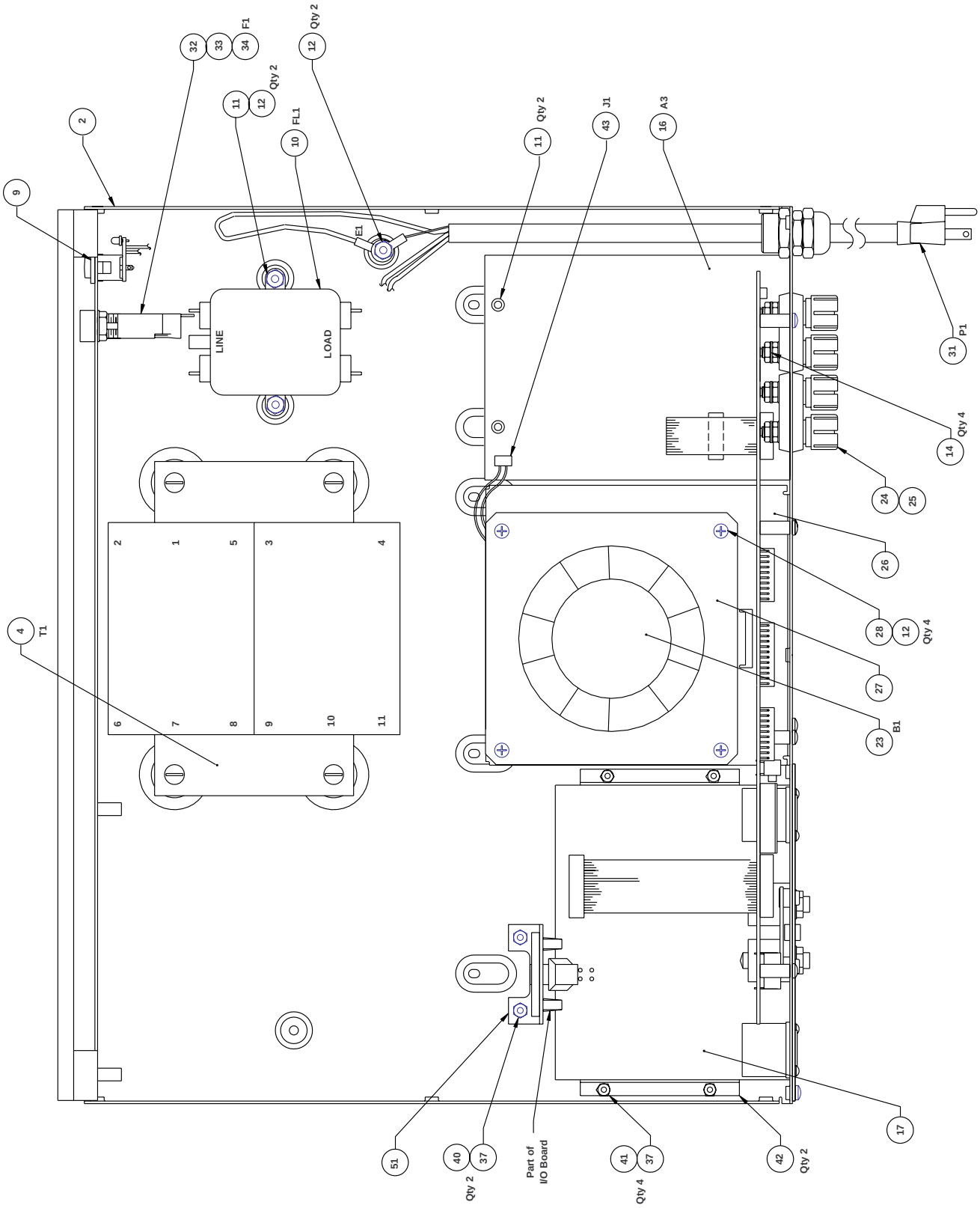


Figure 17. 1600VI and 1800VI, Amplifier Assembly Removed View

ELECTRICAL PART LIST

Amplifier PCB Assembly

Reference Designator	Description	Part Number	Note
A5	PCB Assy, Amplifier, 1600VI	199781	1, 2, 4
A5	PCB Assy, Amplifier, 1800VI	182756	1, 2, 5

Resistors

Reference Designator	Description	Part Number	Note
R100, 200	1k, CF, 1/4W, 5%	182788	
R101, 115, 201, 215	10.0k, MF, 1/4W, 1%	182800	
R102, 107, 114, 116, 202, 207, 214, 216	1.5k, MF, 1/4W, 1%	182802	
R103, 117, 203, 217	4.7k, CF, 1/4W, 5%	182796	
R104, 119, 204, 219	910Ω, MF, Fuse, 1/4W, 5%	182810	
R105, 120, 143, 205, 220, 243	100Ω, MF, Fuse, 1/4W, 5%	182806	
R106, 121, 206, 221	43Ω, MF, Fuse, 1/4W, 5%	182807	
R108, 118, 208, 218	750Ω, MF, Fuse, 1/4W, 5%	182809	
R109, 209	29.4k, MF, 1/4W, 1%	199754	4
R109, 209	45.3k, MF, 1/4W, 1%	182803	5
R110, R210	2.2k, CF, 1/4W, 5%	182793	
R111, 112, 211, 212	909Ω, MF, 1/4W, 1%	182804	
R113, 213	100k, MF, 1/4W, 1%	182801	
R122, 222	16k, CF, 1/4W, 5%	182791	
R123, 223	3.6k, CF, 1/4W, 5%	182794	
R124, 224	Pot, Trim, PCMT, 5kΩ	182786	
R125, 126, 225, 226	4.7Ω, MF, Fuse, 1/4W, 5%	182808	
R127, 128, 134, 227, 228, 234	51k, CF, 1/4W, 5%	182797	
R129, 229	100k, CF, 1/4W. 5%	182790	
R130, 230	510k, CF, 1/4W, 5%	182798	
R131, 132, 231, 232	750Ω, CF, 1/4W, 5%	182799	
R133	10Ω, CF, 1/4W, 5%	182787	
R136, 236	10kΩ, CF, 1/4W, 5%	182789	
R138, 141, 238, 241	150Ω, CF, 1/4W, 5%	199753	4
R138, 141, 238, 241	220Ω, CF, 1/4W, 5%	182792	5
R139, 140, 239, 240	4.3k, CF, 1/2W, 5%	182795	
R144, 145, **146, 147,** 148, 149, 150, 151, **152, 153,** 154, 155, 244, 245, **246, 247,** 248, 249, 250, 251, 254, 255	0.22Ω, Metal Oxide Film, 2W	182805	5
RT100, 200	Thermistor, NTC, 1/2W, 5%, 1000Ω	182785	

Capacitors

Reference Designator	Description	Part Number	Note
C101, 201	30pF, Ceramic Disc, 10%, 1000V	182779	
C102, 202	470uF, AE, AXL, 20%, 6.3V	182783	
C103, 203	68pF, Ceramic Disc, 10%, 1000V	182778	
C104, 108, 204, 208	22uF, AE, AXL, 20%, 35V	182782	
C105, 107, 205, 207	50pF, Ceramic Disc, 10%, 1000V	182777	

ELECTRICAL PART LIST

Capacitors

Reference Designator	Description	Part Number	Note
C106, 206	22pF, Ceramic Disc, 10%, 1000V	182776	
C109, 209	4.7uF, AE, AXL, 20%, 50V	182784	
C110, 111	.01uF, CRML, RDL, +80 -20, 100V	182780	
C112, 113, 210, 211	.082uF, MPE, 5%, 50V	182781	

Diodes

Reference Designator	Description	Part Number	Note
D100, 101, 102, 103, 106, 107, 200, 201, 202, 203, 206, 207	1SS143	199762	
D104, 105, 204, 205	1N4004, 400V	182811	

Transistors

Reference Designator	Description	Part Number	Note
Q100, 107, 200, 207	NPN, MPSA42, Small Signal	182817	
Q101, 106, 201, 206	PNP, MPSA92, TO92	182818	
Q102, 202	PNP, 2SA1381E, TO126	182820	
Q103, 203	NPN, 2SC3503E, TO126	182819	
Q104, 204	NPN, MPSA18, TO92	182816	
Q105, 205	NPN, MPSA42, Small Signal	182817	
Q108, 110, **112**, 114, 116, **118,** 120, 208, 210, **212**, 214, 216, **218**, 220	NPN, 2SC3281, Motorola, TO3PL	182813	5
Q109, 111, **113**, 115, 117, **119**, 121, 209, 211, **213**, 215, 217, **219**, 221	PNP, 2SA1302, Motorola, TO3PL	182814	5
Q122, 222	PNP, 2N4125, TO92, Small Signal	182815	

Integrated Circuits

Reference Designator	Description	Part Number	Note
U100	Dual Op-Amp, Bi-FET, TL072	182821	

Miscellaneous

Reference Designator	Description	Part Number	Note
J1	Harness Connector, 16p, 18AWG, 6in	182824	
J101, 201	Harness Connector, 10p, 22AWG, 4in	182823	

ELECTRICAL PART LIST

Power Supply PCB Assembly

Reference Designator	Description	Part Number	Note
A4	PCB Assy, Power Supply, 1600VI	199782	1, 2, 4
A4	PCB Assy, Power Supply, 1800VI	182757	1, 2, 5

Resistors

Reference Designator	Description	Part Number	Note
R1	270Ω, CF, 1/4W, 5%	182850	
R2	8.2Ω, CF, 1/2W, 5%	182857	
R3, 12, 21, 32, 41, 52, 63	1k, CF, 1/4W, 5%	182788	
R4	18Ω, HM, CC, 1/2W, 5%	187934-18R0	
R5, 9	6.2k, CF, 1/2W, 5%	182856	
R6, 7, 8	1Ω, MF, Fuse, 1/4W, 5%	182861	
R10, 13, 15, 27, 29, 31, 42, 44, 46, 59, 60, 62	10.0k, MF, 1/4W, 1%	182800	
R11, 30, 43, 61	511Ω, MF, 1/4W, 1%	182858	
R14, 28, 45, 58	681Ω, MF, 1/4W, 1%	182859	
R16, 47	3.0k, CF, 1/4W, 5%	182851	
R17, 23, 39, 48, 54, 71	10k, CF, 1/4W, 5%	182789	
R18, 49	5.1k, CF, 1/4W, 5%	182855	
R19, 50	30k, CF, 1/4W, 5%	182852	
R20, 35, 51, 66	910Ω, MF, Fuse, 1/4W, 5%	182810	
R22, 38, 53, 70	220Ω, MF, Fuse, 1/4W, 5%	182863	
R24, 40, 55, 69	100Ω, MF, Fuse, 1/4W, 5%	182806	
R25, 36, 56, 67	200Ω, MF, Fuse, 1/4W, 5%	182862	
R26, 37, 57, 68	15k, CF, 1/4W, 5%	182848	
R33, 64	220Ω, CF, 1/4W, 5%	182792	
R34, 65	4.7k, CF, 1/2W, 5%	182854	
R72	62k, Metal Oxide Film, 1W, 5%	182860	
R73, **74**, 75, **76**	470Ω, CF, 1/4W, 5%	182853	Not used on 1800VI
R74, 76	150Ω, CF, 1/4W, 5%	199753	5

Capacitors

Reference Designator	Description	Part Number	Note
C1, 2	.10uF, MP, 250VAC, UL/CSA	182846	
C3, 9	22uF, AE, Radial, 20%, 25V	182841	
C4, 5, 6, 7	22000uF, AE, SCR, 20%, 50V	199760	4
C4, 5, 6, 7	22000uF, AE, SCR, 20%, 63V	182844	5
C8	470uF, AE, AXL, 20%, 63V	182842	
C10, 19, 26, 33	.1uF, CRML, 20%, 100V, X7R, 5mm	199761	
C11, 27	.001uF, PE, Radial, 10%, 100V	182839	

ELECTRICAL PART LIST

Capacitors

Reference Designator	Description	Part Number	Note
C12, 18, 21, 28, 32, 35, 42, 43	.0018uF, PE, Radial, 10%, 100V	182840	
C13, 20, 29, 34	390pF, Ceramic Disc, 10%, 1000V	182835	
C14, 22, 30, 36	100uF , AE, AXL, 20%, 25V	182843	
C15, 23, 31, 37	.01uF, Ceramic Disc, 20%, 500V	182836	
C16, 17, 24, 25	.047uF, CRML, 20%, 200V, X7R	182837	
C38, 40	.01uF, CRML, Radial, +80 -20, 100V	182780	
C39, 41	.01uF, CRML, RDL, +80 -20, 100V	182780	
C44, 45	10uF, AE, Radial, 20%, 100V	182845	

Diodes

Reference Designator	Description	Part Number	Note
D1, 2	Rectifier, Bridge, 25A, 400V	182866	
D3, 6	Zener, 1N4745C, 16V, 1W, 2%	182870	
D4, 5, 7, 14, 20, 26, 31	1N4004, 400V	182811	
D8, 9, 10, 15, 17, 21, 22, 23, 27, 28	1N4148	182868	
D11, 12, 16, 18, 24, 25, 29, 30	Zener, 1N4744A, 15V, 1W	182869	
D13	Rectifier, HW, Com Cathode, 16A, 200V	182865	
D19	Rectifier, HW, Com Cathode, 16A, 200V	182864	

Transistors

Reference Designator	Description	Part Number	Note
Q1	Triac, Q6025k6, 25A, 600V, TO218AC	199765	4
Q1	Triac, Q6040K7, 40A, 600V, TO218AC	182867	5
Q2	NPN, 2N6488, TO220	182876	
Q3	PNP, 2N6490, TO220	182877	
Q4, 15	NPN, MPSA43, TO92	182872	
Q5, 7, 12, 16, 18, 23	PNP, MPSA56, TO92	182875	
Q6, 11, 17, 22	NPN, MPSA06, TO92	182874	
Q8, 13, 19, 24	NPN, MPSW06, 152, SM SIG	182871	
Q9, 14, 20, 25	N-Channel MosFET, IRFZ44, TO220	182878	
Q10, 21	PNP, MPSA93, TO92	182873	

ELECTRICAL PART LIST

Integrated Circuits

Reference Designator	Description	Part Number	Note
U1	Opto-Triac Driver, MOC3052	182880	
U2, 3	Dual Volt Comparators, LM393	182879	

Miscellaneous

Reference Designator	Description	Part Number	Note
J1	Conn, 18 pin, Single Row, .100, Gold	182833	5
J2	Header, Square pin, .156 CTR, Tin, 16 pin	182834	
JP1, 2	Jumper, .2 x .25, 22AWG, Insul Wht	182881	4
JP3	Jumper, .2 x .25, 22AWG, Insul Wht	182881	5
JP4	Jumper, 18AWG, .5in, Insulated	182882	
WL1, 2, 3, 4, 5, 6, 7, 8	Connector Tab, .250, PCMT	182825	
	Heatsink, Power Supply, 1600VI/1800VI	199794	
	Heatsink, .75H, TO-3, Bridge Rectifier	199778	5
	Insulator, Sil-Pad, K-6, 8-Pos	182886	
	Insulator, Sil-Pad, K-6, TO216	182887	
	Spacer, Push-in .250L	182826	
	Stand-off, .140id x .25 SWG x .25, L, AL	182827	
	Stand-off, .250D, 6-32 x .125, SWG, BRS	182828	
	Screw, TF, 4-40 x 3.8, PHP, STZ, item #27 on DWG 602-00517-01	199770	
	Screw, Machine, PHP, 6-32 x 5/8, Blk	199756	
	Washer, Int Lock, #6, STZ	182831	

ELECTRICAL PART LIST

Input/Output PCB Assembly

Reference Designator	Description	Part Number	Note
	PCB Assy, Input/Output, 1600VI/1800VI	182758	1, 2, 4, 5

Resistors

Reference Designator	Description	Part Number	Note
R1, 3	62k, CF, 1/4W, 5%	182906	
R4	100k, MF, Fuse, 1/4W, 5%	199752	
R5	2.2k, CF, 1/4W, 5%	182793	
R6	4.7Ω, MF, Fuse, 1/4W, 5%	182808	
R7, 8	100k, CF, 1/4W, 5%	182790	
R8, 12, 20, 27, 28, 53, 96, 97, 99, 100	10.0k, MF, 1/4W, 1%	182800	
R9, 11, 56, 92	1k, CF, 1/4W, 5%	182788	
R10, 26, 63, 76	200k, CF, 1/4W, 5%	182901	
R13, 16, 30, 38, 44, 59, 60, 62, 66, 78	10k, CF, 1/4W, 5%	182789	
R14, 65	3.6k, CF, 14W, 5%	182794	
R15, 67	3.3k, CF, 1/4W, 5%	182979	
R17, 91	2.7k, CF, 1/4W, 5%	182902	
R19, 70	30k, CF, 1/4W, 5%	182852	
R21, 22, 71, 72	27k, CF, 1/4W, 5%	182903	
R23, 73	510k, CF, 1/4W, 5%	182798	
R24, 74	330k, CF, 1/4W, 5%	182904	
R29, 77	910Ω, MF, Fuse, 1/4W, 5%	182810	
R31, 79, 81, 95	4.7k, CF, 1/4W, 5%	182796	
R40, 83	29.4k, MF, 1/4W, 1%	199754	
R41, 84	3.32k, MF, 1/4W, 1%	199755	
R42, 85	11.5k, MF, 1/4W, 1%	182907	
R43, 86	825Ω, MF, 1/4W, 1%	182910	
R61, 93	1M, CF, 1/4W, 5%	182900	
R69, 94	3.9k, CF, 1/4W, 5%	182905	

Capacitors

Reference Designator	Description	Part Number	Note
C2, 23	1uF, AE, Radial, 20%, 100V	182898	
C3, 29	.18uF, MPE, 5%, 50V	182893	
C4, 5	270pF, CRML, 5%, 100V	182891	
C6, 7, 17, 18, 19, 20, 21, 22	.01uF, CRML, Radial, +80 -20, 100V	182780	
C8, 30	680pF, CRML, 5%, 100V	182892	
C9, 25, 33, 34	4.7uF, AE, Radial, 20%, 100V	182894	
C10, 12, 15, 31	470pF, Ceramic Disc, 10%, 1000V	182890	
C11, 26	22uF, AE, Radial, 20%, 25V	182841	
C13, 27	220uF, AE, SNP, 20%, 10V	182899	
C14, 28	47uF, AE, Radial, 20%, 25V	182896	
C16, 32	10uF, AE, Radial, 20%, 50V	182895	

ELECTRICAL PART LIST

Diodes

Reference Designator	Description	Part Number	Note
D1, 2, 6, 7, 8, 9, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 27, 29, 30, 31, 32, 33, 34, 36	1N4148	182868	
D3, 4	Bridge Rect, 50V, 1.0A, DF005	182912	
D5, 19	1SS143	199762	
D10, 26	1N4004, 400V	182811	
D35, 37	Zener, 1W, 15V, 1N4744A	182869	

Transistors

Reference Designator	Description	Part Number	Note
Q1, 3, 6, 10	PNP, MPSA93, TO-92	182873	
Q2, 7	NPN, MPSA06, TO-92	182874	
Q5, 13	NPN, 2N4123, TO92, SM SIG	182913	

Integrated Circuits

Reference Designator	Description	Part Number	Note
U1	Op-Amp, Dual J-FET, 9 pin, SIP	182915	
U2, 7, 9	Dual Op-Amp, 4558, 8 pin, SIP	182914	
U3, 8	Optoisolator, VTL5C4	199766	

Miscellaneous

Reference Designator	Description	Part Number	Note
S1, 2	Slide, DPDT	183001	
J1	CAF, 2x10, TRANS, 2x10, RCPT, 6in	182919	
J2	Header, 20 pin, Rt Angle, Vert Ejector	199759	
J3	Header, 13p, .1 CTR, Rt Angle, Flat	182889	
J6	CAF, 2x7, TRANS, 2x7, RCPT, 6in	182918	
J100, 200	Header, 10p, Right Angle, Square	182888	
W41, 42	Cable, Shielded, 3 cond, 22AWG	199767	
	Harness, 2p, 22AWG, Blind Mate	182920	
	Standoff, .25od, 6-32 x .625, SWG, BRS	199750	

ELECTRICAL PART LIST

Output PCB Assembly

Reference Designator	Description	Part Number	Note
A3	PCB Assy, Output, 1600VI/1800VI	182759	1, 2, 4, 5

Resistors

Reference Designator	Description	Part Number	Note
R1	130Ω, Metal Oxide Film, 3W, 5%	182932	
R2	910Ω, MF, Fuse, 1/4W, 5%	182810	
R3	27k, CF, 1/4W, 5%	182903	
R4	20k, CF, 1/4W, 5%	182927	
R5	10k, CF, 1/4W, 5%	182789	
R6	6.2k, CF, 1/4W, 5%	182930	
R7	47k, CF, 1/4W, 5%	182928	
R8	91Ω, WW, 7W, 5%	182936	
R11	56k, CF, 1/4W, 5%	182929	
R100, 200	6.8Ω, Metal Oxide Film, 5W, 5%	182934	
R102, 202	470Ω, Metal Oxide Film, 2W, 5%	182933	
R103, 203	.02Ω, WW, 5W, 5%	182935	
R110, 210	1Ω, Metal Oxide Film, 5W, 5%	182931	
R111, 211	1Ω, MF, Fuse, 1/4W, 5%	182861	
R112, 113, 212, 213	10Ω, MF, Fuse, 1/4W, 5%	182937	
R114, 214	1.1k, CF, 1/4W, 5%	182926	

Capacitors

Reference Designator	Description	Part Number	Note
C1, 2, 101, 201	.01uF, Ceramic Disc, 20%, 500V	182836	
C3	4.7uF, AE, Radial, 20%, 35V	182925	
C4	4.7uF, AE, Radial, 20%, 63V	182924	
C100, 200	.33uF, MPE, Radial, 10%, 400V	182923	

Diodes

Reference Designator	Description	Part Number	Note
D100, 101, 200, 201	1N4004, 400V	182811	

Transistors

Reference Designator	Description	Part Number	Note
Q1	PNP, MPS6729, 152, SM SIG	182938	

ELECTRICAL PART LIST

Integrated Circuits

Reference Designator	Description	Part Number	Note
U1	Dual Volt Comparators, LM393	182879	

Miscellaneous

Reference Designator	Description	Part Number	Note
K100, 200	Relay, SPST, NO, 24V, 20A	182942	
L100, 200	Choke, 5uH, 14AWG Wire	182941	
J2	Header, 14p, Dual Row, .1 CTR, G	182922	
J3	Header, 2p, .1 CTR, LOCK ST POST	182921	
WL1, 2, 100, 101, 200, 201	CONN TAB, .250, PCMT	182825	
E1, 2	Screw, Terminal PC Mnt		
	Standoff, .25od, 6-32 x .187, SWG, BRS	199749	

ELECTRICAL PART LIST

Regulator PCB Assembly

Note: The Regulator PCB Assembly is not used in the 1600VI Amplifier

Reference Designator	Description	Part Number	Note
A11	PCB Assy, Regulator, 1800VI	182760	1, 2, 5

Resistors

Reference Designator	Description	Part Number	Note
R1	150k, CF, 1W, 5%	182947	
R3, 4	390Ω, Metal Oxide Film, 2W, 5%	182960	
R5, 6, 34	7.5k, CF, 1/4W, 5%	182953	
R8	270Ω, CF, 1/2W, 5%	182949	
R9	47k, CF, 1/4W, 5%	182927	
R10, 22	1.05k, MF, 1/4W, 1%	182956	
R11	510k, CF, 1/4W, 5%	182798	
R12, 18	100k, MF, 1/4W, 1%	182801	
R13	3.32k, MF, 1/4W, 1%	182958	
R14, 17	10k, CF, 1/4W, 5%	182789	
R15	1k, CF, 1/4W, 5%	182788	
R16	15k, CF, 1/4W, 5%	182848	
R19, 21	10.0k, MF, 1/4W, 1%	182800	
R20	30k, CF, 1/4W, 5%	182852	
R23, 24	20k, MF, 1/4W, 1%	182957	
R25	390Ω, CF, 1/4W, 5%	182951	
R26	3.3k, CF, 1/4W, 5%	182979	
R27	22k, Metal Oxide Film, 1W, 5%	182959	
R28, 29, 30, 31	681Ω, MF, 1/4W, 1%	182859	
R32	18k, CF, 1/4W, 5%	182948	
R33	5.1k, CF, 1/4W, 5%	182855	
R35	910Ω, CF, 1/4W, 5%	182955	
R36	5k, Pot, Trim, PC Mount	182786	
R37, 38	82k, CF, 1/2W, 5%	182954	
R41	5.6k, CF, 1/4W, 5%	182952	

Capacitors

Reference Designator	Description	Part Number	Note
C1	.10uF, MP, 250VAC, UL/CSA	182846	
C2	330uF, AE, Radial, 20%, 25V	182946	
C3, 8	47uF, AE, Radial, 20%, 25V	182896	
C4, 5	150pF, Ceramic Disc, 10%, 1000V	182944	
C6	.1uF, PE, Radial, 5%, 100V	182945	
C7	10uF, AE, Radial, 20%, 50V	182895	
C9, 10	.01uF, CRML, PE, Radial, +80 –20, 100V	182780	

ELECTRICAL PART LIST

Diodes

Reference Designator	Description	Part Number	Note
D2, 3	Zener, 1N4736A, 6.8V	182961	
D4, 5, 7, 8, 9	1N4148	182868	
D6	Zener, 1N4735A, 6.2V	182962	

Transistors

Reference Designator	Description	Part Number	Note
Q1	NPN, 2N4123, TO-92, Small Signal	182913	

Integrated Circuits

Reference Designator	Description	Part Number	Note
U1	Opto-Isolator, PXSTR, CNY17-2.300	182965	
U2	Power Supply, HV3-2405E-5	182963	
U3	Opto-Triac Driver, MOC3052	182880	
U4	Op-Amp/Comparator, MC3405P	182964	
U5	Dual Op-Amp, 4558, 8 pin, SIP	182914	

Miscellaneous

Reference Designator	Description	Part Number	Note
J1	Header, 18 pin, Single Row, .1 Ctr, Gold	182943	

Power Switch PCB Assembly

Reference Designator	Description	Part Number	Note
A10	Assy, PCB Power Switch	182761	4, 5

Diodes

Reference Designator	Description	Part Number	Note
D1	LED, Yellow	182970	

Miscellaneous

Reference Designator	Description	Part Number	Note
S1	Rocker, SPDT, 15A	182969	

ELECTRICAL PART LIST

Display PCB Assembly

Reference Designator	Description	Part Number	Note
A6	Assy, PCB Display, 1600VI/1800VI	182762	1, 2, 4, 5

Resistors

Reference Designator	Description	Part Number	Note
R9, 10, 13, 17, 24, 35	10.0k, MF, 1/4W, 1%	182800	
R11, 18	2.21k, MF, 1/4W, 1%	182908	
R12, 19	150k, CF, 1/4W, 5%	182974	
R14, 36	2.74k, MF, 1/4W, 1%	182976	
R15, 20, 22, 25, 26, 28, 31, 34	30.1k, MF, 1/4W, 1%	182977	
R16, 21, 23, 27, 29, 32	7.50k, MF, 1/4W, 1%	182978	
R103, 149, 164, 203	10k, CF, 1/4W, 5%	182789	
R104, 204	3.3k, CF, 1/4W, 5%	182979	
R112, 212	7.5k, CF, 1/2W, 5%	182975	
R113, 142, 202, 213	2.2k, CF, 1/4W, 5%	182793	

Capacitors

Reference Designator	Description	Part Number	Note
C1, 2	1uF, AE, AXL, 20%, 50V	182973	
C3, 4, 5, 6	.01uF, CRML, Radial, +80 -20, 100V	182780	

Diodes

Reference Designator	Description	Part Number	Note
D1, 105, 205	LED, Red/Green, 3mm	182982	
D10, 21, 22, 23, 24, 25, 100, 101, 107, 200, 201, 207	1N4148	182868	
D11, 12, 13, 14, 15, 16, 17, 18, 19, 20	LED, Yellow	182981	
D104, 204	LED, Red	182980	

Transistors

Reference Designator	Description	Part Number	Note
Q100, 200	PNP, 2N4125, TO-92, SM SIG	182815	

Integrated Circuits

Reference Designator	Description	Part Number	Note
U1, 2, 3, 4	Dual Op-Amp, 4558, 8 pin SIP	182914	

Miscellaneous

Reference Designator	Description	Part Number	Note
J1	Header, 13p, .1 CTR, Lock, Rt Angle	182972	

ELECTRICAL PART LIST

Input Module PCB Assembly

Reference Designator	Description	Part Number	Note
	PCB Assy, Input Module, 1600VI/1800VI	182755	1, 2, 4, 5

Resistors

Reference Designator	Description	Part Number	Note
R52, 53, 54, 55, 60, 62	332k, MF, 1/4W, 1%	183000	
R56	120Ω, CF, 1/4W, 5%	182995	
R57, 58, 61, 64, 69, 70, 76, 77	10k, CF, 1/4W, 5%	182789	
R59	120k, CF, 1/4W, 5%	182996	
R63	330Ω, CF, 1/4W, 5%	182998	
R65	30k, CF, 1/4W, 5%	182852	
R66	51Ω, CF, 1/4W, 5%	182999	
R72, 79	100k, CF, 1/4W, 5%	182790	
R73, 74, 75, 78, 80, 81, 82, 83	47k, CF, 1/4W, 5%	182927	
R84, 87	300Ω, CF, 1/4W, 5%	182997	
R85, 88	100Ω, CF, 1/4W, 5%	182994	
R86, 89	390Ω, CF, 1/4W, 5%	182951	

Capacitors

Reference Designator	Description	Part Number	Note
C37, 38, 39, 40	330pF, Ceramic Disc, 5%, 100V	182992	
C41	3300pF, Ceramic Disc, 10%, 100V	183883	
C42	3300pF, Ceramic Disc, 10%, 100V	183883	
C43	220uF, AE, Radial, 20%, 16V	182993	
C44, 45, 46, 47	.1uF, CRML, 20%, 100V, X7R, 5mm	199761	
C57, 58, 60	.01uF, CRML, Radial, +80 -20, 100V	182780	
C61	.01uF, CRML, Radial, +80 -20, 100V	182780	
C59, 62	.001uF, PE, Radial, 10%, 100V	182839	

Diodes

Reference Designator	Description	Part Number	Note
D1, 4, 5, 22	1N4004, 400V	182811	
D2, 3, 6, 7, 8, 9, 10, 15, 17, 20, 21, 24, 25, 26, 27, 28, 29, 30, 31	1N4148	182868	
D15, 18	Zener, 1N4746A, 18V, 1W	183003	
D23	LED, Bi-Level, Grn/Grn	183020	

ELECTRICAL PART LIST

Transistors

Reference Designator	Description	Part Number	Note
Q1	NPN, MPSA06, TO-92	182874	
Q2, 3	PNP, MPSA56, TO-92	182875	

Integrated Circuits

Reference Designator	Description	Part Number	Note
U1, 2	Bal Line Rcvr, SSM2141	183005	
U3, 4, 5, 6	Op-Amp, w/Switch	183004	
U7	Dual Op-Amp, BiFET, TL072	182821	

Miscellaneous

Reference Designator	Description	Part Number	Note
SW1	Slide, DPTT, Rt Angle	183002	
S2	Slide, DPDT	183001	
J1	Header, 20 pin, Dual Row, .1 CTR	182988	
J2	Header, 4 pin, Rt Angle, Blind Mate	182991	
J3	Header, 2 pin, .1 CTR, Lock, ST Post	182921	
J4, 5	Header, 90deg, Closed End, 3 pin	182990	
J6, 7	Header, 12 pin, .098 CTR, Shroud	182987	
P1, 4	Jack, XLR/TRS, Right Angle	182984	
P2, 3	Phone Jack, 1/4, PCMT	182985	
JB1, 2	Header, 6 pin, Dual Row, .1 CTR, Gold	182989	
	Connector, Mini Link, .10	182986	

Barrier PCB Assembly

Reference Designator	Description	Part Number	Qty.	Note
	PCB Assy, Barrier	182774		4, 5
J2	Term Block, 2p, .15 CTR, Angled	182967	1	
J4, 5	Plug, Right Angle, Term Block, 3 pin	182769	2	
	Screw, Machine, Phillips, 3x8mm, blk	182770	4	
	Screw, SEMS, PP, BLKOX, WX 6-32 x 1/4	182771	2	
	Washer, Int lock, Blk #4	182772	4	
	Panel, Rear, TRS	182773	1	

PACKING LIST

1600VI and 1800VI Amplifiers (see Figure 18)

Item Number	Description	Part Number	Qty.	Note
1	Box, Shipping, 1600VI 1800VI	199798 199799	1	
2	Sleeve, Cord holder, 13 1/4 x 12	182752	2	
3	Foam, Packaging, 2U	182753	4	
4	Manual, Owners, 1600VI/1800VI	180118	1	
5	Bag, Plastic, 20 x 30	199775	1	
-	Foot, Rubber, Blk, .81sq x .3h	199779	4	

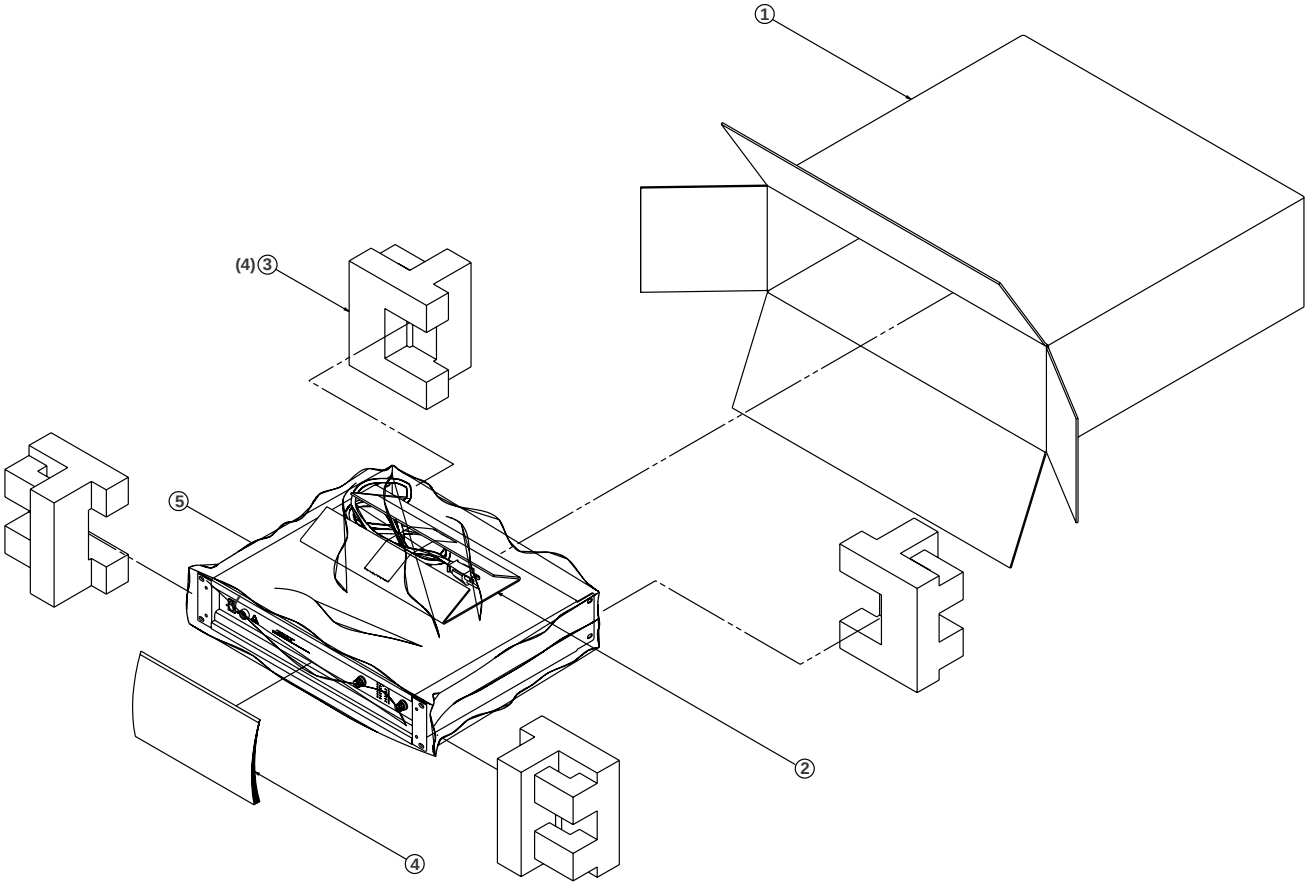


Figure 18. 1600VI and 1800VI Amplifiers Packing Diagram

WIRING DIAGRAMS

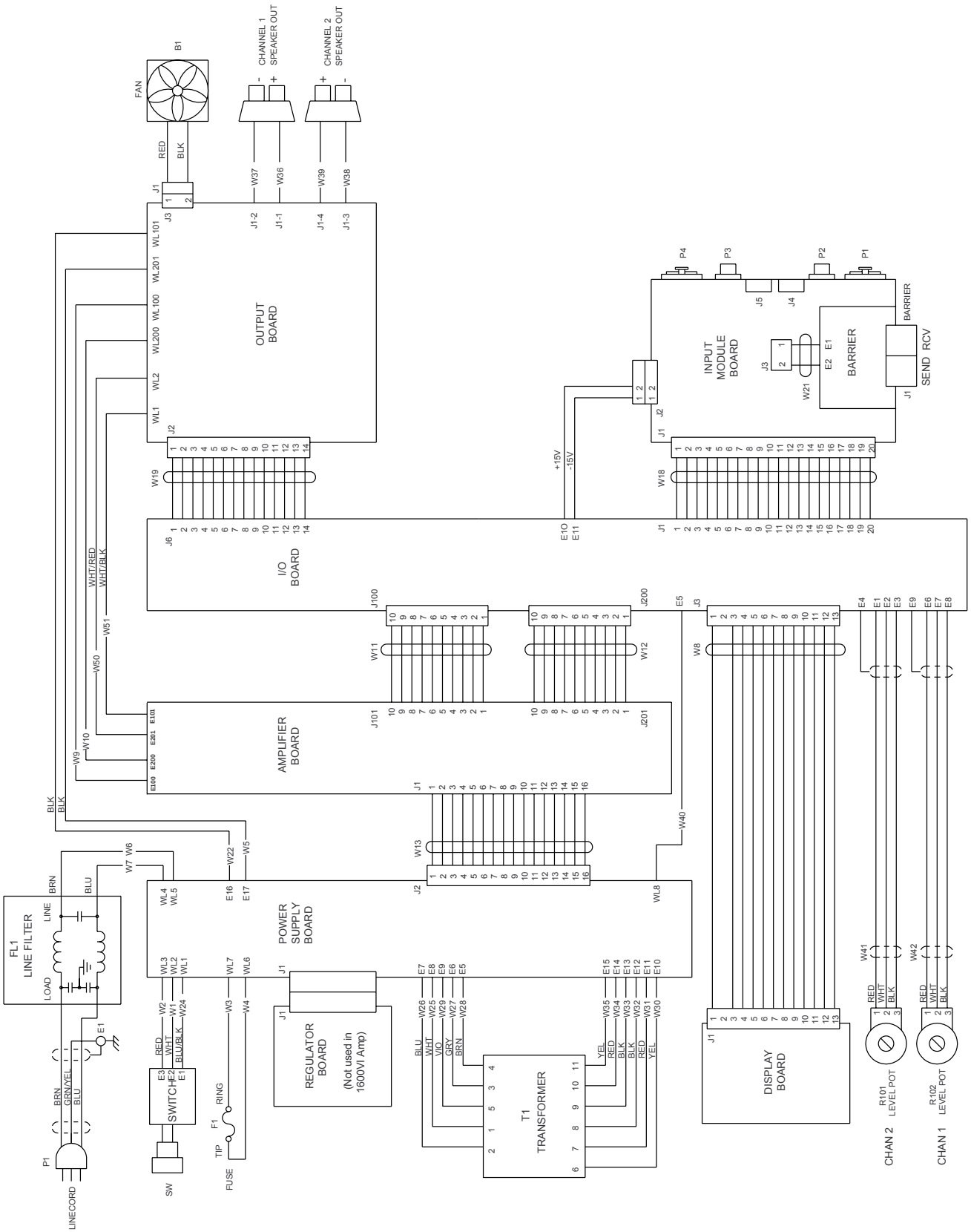


Figure 19. 1600VI and 1800VI Wiring Diagram

WIRING DIAGRAMS

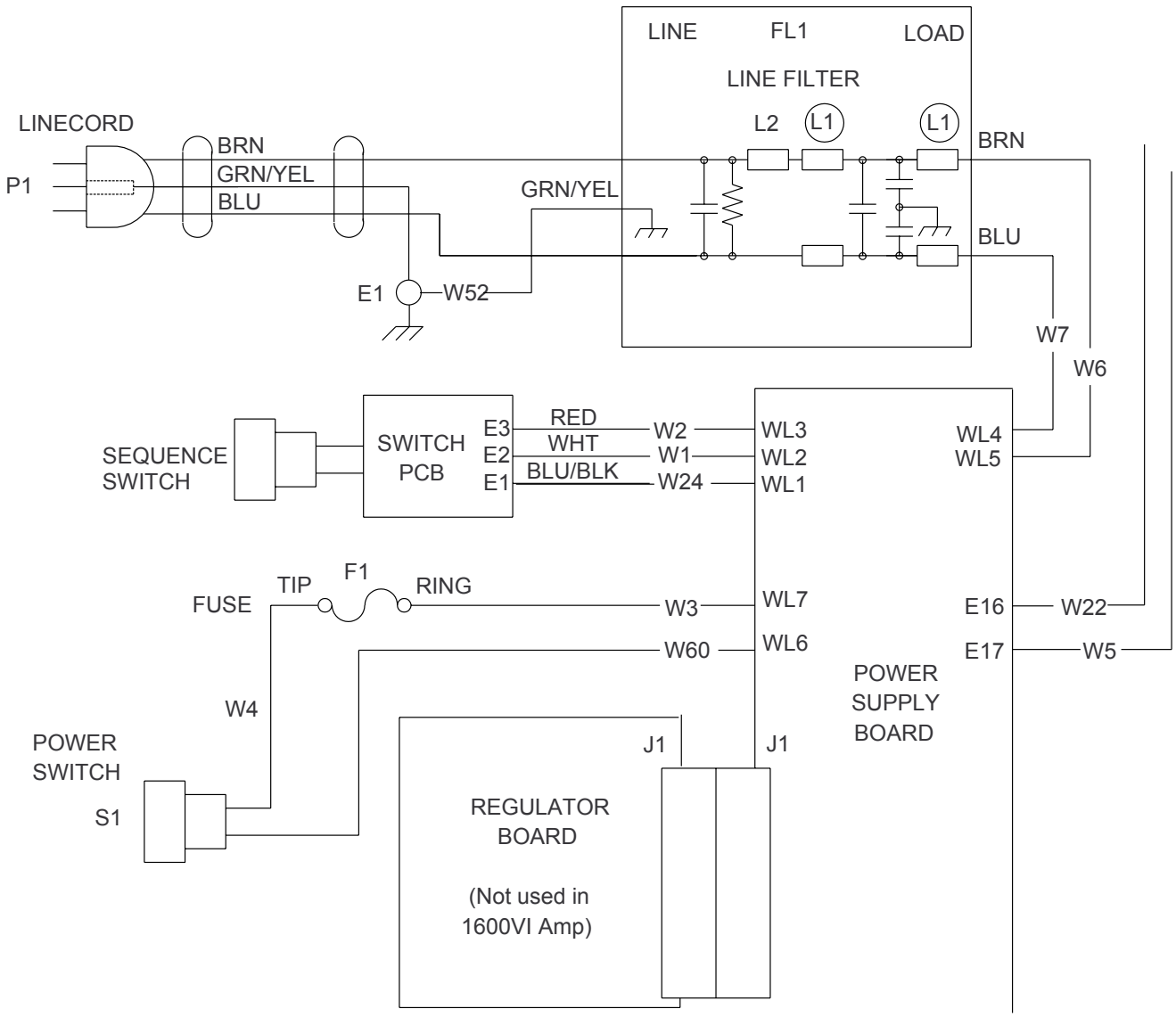
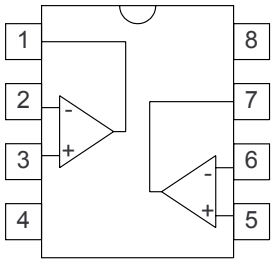


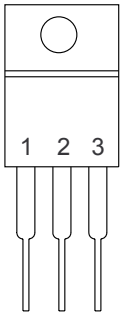
Figure 20. 1600VI and 1800VI 240V Wiring Diagram

IC PINOUT DIAGRAMS



1. Output1
2. Inverting input1
3. Non-inverting input 1
4. -Vcc
5. Non-inverting input 2
6. Inverting input 2
7. Output 2
8. +Vcc

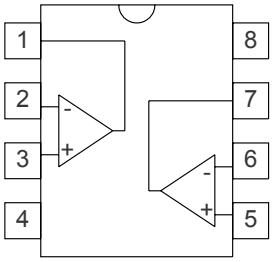
Bose® Part Number 182821, TL072



Front View

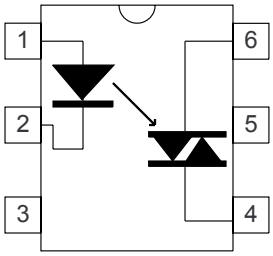
1. Gate
2. Drain
3. Source

Bose Part Number 182878, IRFZ44



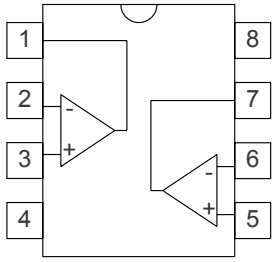
1. Output1
2. Inverting input1
3. Non-inverting input 1
4. -Vcc
5. Non-inverting input 2
6. Inverting input 2
7. Output 2
8. +Vcc

Bose Part Number 182879, LM393



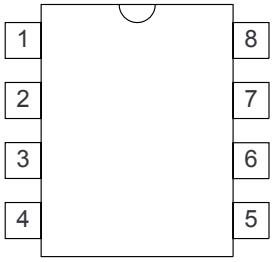
1. Anode
2. Cathode
3. NC
4. Main Terminal
5. Substrate
   (do not connect)
6. Main Terminal

Bose Part Number 182880, MOC3052



1. Output1
2. Inverting input1
3. Non-inverting input 1
4. VEE
5. Non-inverting input 2
6. Inverting input 2
7. Output 2
8. VCC

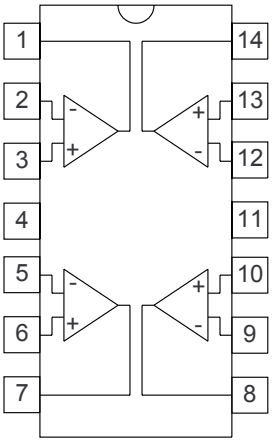
Bose Part Number 182914, 4558



1. AC Return
2. Pre-Reg cap (C2)
3. GND
4. Inhibit
5. Voltage Sense
6. Voltage Output
7. NC
8. AC High

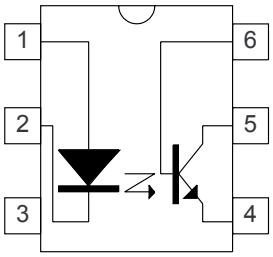
Bose Part Number 182963, HV3-2405E-5

IC PINOUT DIAGRAMS



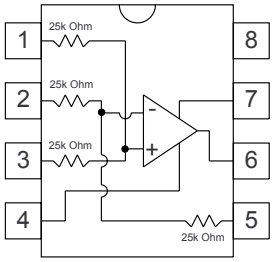
1. Comp 1 Output
2. Comp 1 Inv Input
3. Comp 1 Non-inv Input
4. Vcc
5. Comp 2 Inv Input
6. Comp 2 Non-inv Input
7. Comp 2 Output
8. Op-Amp 2 Output
9. Op-Amp 2 Inv Input
10. Op-Amp 2 Non-inv Input
11. VEE/GND
12. Op-Amp 1 Inv Input
13. Op-Amp 1 Non-inv Input
14. Op-Amp 1 Output

Bose® Part Number 182964, MC3405P



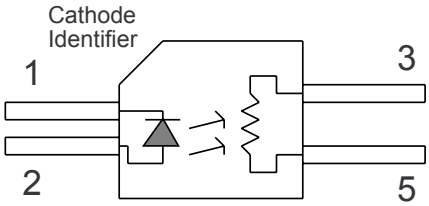
1. Anode
2. Cathode
3. NC
4. Emitter
5. Collector
6. Base

Bose Part Number 182965, CNY17-2



1. Reference
2. Inverting input
3. Non-inverting input
4. -Vcc
5. Sense
6. Output
7. +Vcc
8. NC

Bose Part Number 183005, SSM2141



Bose Part Number 199766, VTL5C4

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