

1800 SERIES V/VI AMPLIFIERS TROUBLESHOOTING GUIDE

Refer to the 1800 Series V service manual, part number 181812 and the 1600/1800 Series VI service manual, part number 199747, for schematics, PCB layouts and part lists.

This procedure will allow you to operate a failed amplifier at low voltage in order to troubleshoot it more easily. The voltages listed are approximate and will vary slightly in your amplifier due to component tolerances. Follow the steps listed below. These steps will allow you to isolate the different boards of the amplifier to allow easier troubleshooting.

1. Remove the top cover of the amplifier using the disassembly/assembly procedures located in the service manual.
2. On the bottom of the amplifier, remove the two screws nearest the center of the unit that secure the power transformer into the chassis. Loosen the other two transformer screws, but DO NOT remove them. This will allow the access needed for later steps.
3. On the power supply board, remove the large ribbon cable connector at J2. This ribbon cable runs from the power supply board up to the amplifier board. You may need to slide the power transformer toward the front panel slightly to do this. Refer to the service manual for PCB locations if necessary.
4. At the Input/Output PCB, remove the three cables at J3, J100 and J200. J100 and J200 run from the amplifier board to the I/O board and J3 runs from the I/O board to the display board at the front of the amplifier.

Caution: Observe all safety precautions when operating this unit with the top cover removed. Dangerous and possibly lethal voltages are present inside the unit.

Note: For the following tests, we will be applying a percentage of the full AC mains voltage to the amplifier in order to troubleshoot it. We will use a US 120V version of the amplifier for our tests. You will need to adjust the AC mains voltage level applied to your unit in accordance with the AC mains voltage that your amplifier is designed to use.

For the following tests you will need a Variac and a Digital Voltmeter.

5. On the power supply board, apply a short across pins C and A of the triac Q1. These are the top two pins. This will allow the amplifier to operate at the lower AC mains voltages we will be using.
6. Plug the amplifier AC mains cable into the Variac. Apply AC mains voltage equivalent to one-third of the full AC mains voltage. In the case of 120V units, this would be 40 VAC.
7. With 40 VAC applied (for a 120V unit), carefully measure the DC voltages on the power supply board at the locations listed in the following table. Use the ground point located on the power supply board near the large electrolytic capacitors. You are primarily checking to make sure that none of the voltages are significantly different from those listed in the table. If all of the voltages at the 40 VAC level are okay, you would then turn the AC mains voltage on the Variac up to 60 VAC and measure the DC voltage levels again. If the voltages at this level are okay as well, turn the Variac up to 120 VAC and check the voltage levels once more to make sure that none of the components are breaking down under the full AC mains voltage.

AC mains	Q9	Q14	Q20	Q25	D13	D19	Q2	Q3
40 VAC	G + 22.0	G - 40.0	G + 22.4	G - 41.0	1 + 22.4	1 - 22.0	B + 15.7	B - 15.7
	D + 40.0	D - 19.3	D + 41.2	D - 19.8	2 + 19.2	2 - 20.1	C + 20.1	C - 20.0
	S + 21.9	S - 40.1	S + 22.1	S - 41.0	3 + 22.0	3 - 22.0	E + 15.2	E - 15.1
60 VAC	G + 31.9	G - 61.6	G + 31.8	G - 61.6	1 + 30.7	1 - 30.0	B + 15.8	B - 15.8
	D + 60.6	D - 30.1	D + 60.5	D - 30.0	2 + 30.2	2 - 30.3	C + 30.3	C - 30.4
	S + 30.0	S - 61.0	S + 31.2	S - 61.5	3 + 30.1	3 - 30.0	E + 15.3	E - 15.2
120 VAC	G + 56.3	G - 106.4	G + 56.4	G - 106.4	1 + 56.3	1 - 52.1	B + 16.1	B - 16.1
	D + 106.9	D - 52.2	D + 107.0	D - 52.2	2 + 52.7	2 - 52.4	C + 52.6	C - 52.3
	S + 56.4	S - 106.3	S + 56.4	S - 106.4	3 + 56.3	3 - 52.1	E + 15.6	E - 15.5

Power Supply Voltage table

8. If the voltage levels are okay at the full AC mains level, then progress to the next step.

9. Turn off the AC mains voltage at the Variac. Using an Ohmmeter, make sure that none of the output transistors are shorted either internally or to the heat sink. Connect the large ribbon cable on the amplifier board back onto the J2 connector on the power supply. Leave the other 3 smaller cables from the amplifier board disconnected.

10. Power up the unit at 40 VAC and measure the DC voltages on the output transistors. Again, you are looking for any significant difference from those listed in the table below.

AC Mains Voltage	2SA1302 PNP Transistors	2SA3281 NPN Transistors
40 VAC	B - 0.5 V C - 18.8 V E - 12.5 mV	B + 0.5 V C + 18.5 V E + 12.0 mV
60 VAC	B - 0.52 V C - 29.8 V E - 12.2 mV	B + .51 V C + 29.8 V E + 12.0 mV
120 VAC	B - 0.58 V C - 53.0 V E - 12.2 mV	B + 0.56 V C + 53.0 V E + 12.0 mV

Output Transistor Voltage table

11. If the power amplifier output transistors measure okay, and the DC voltage levels are okay, then you would move on to the next step.

12. Remove AC mains power. Reconnect the three remaining cables to the Input/Output board at J3, J100 and J200.

13. Power up the unit at 40 VAC and make sure that all is well. If everything seems okay, turn the AC mains voltage up to 60 VAC and check again. If all is still well, turn the AC mains voltage up to the full 120 VAC level and check once more. You should have found your problem by now.

14. When you have finished troubleshooting, remove AC mains voltage and remove the short across the triac Q1. Make sure that all of the cables removed previously have been re-connected. Replace the two transformer screws removed previously and make sure that the other two are tight. Replace the top cover using the disassembly/assembly procedures in the service manual.

Test the unit for proper operation using the test procedures located in the service manual.