Introduction and General Information

This manual has been prepared to assist technicians with the repair and maintenance of the JBL EON line of portable performance systems. The procedures described in this manual require advanced technical experience and equipment to perform.

> ***WARNING***
> There are no user-serviceable parts inside these products. Opening these products or attempting to service may expose the user to electrical shock. Refer servicing to qualified personnel.

Substitutions

Although many of the electronic components used in these products may be available from electronic suppliers, some components are JBL replacements only. A product repaired without JBL specified components may not meet the factory specifications. The product warranty may be voided by a repair using unapproved JBL components.

Test Equipment

1) Audio Precision System One, or
   Distortion Analyzer
   Function Generator
2) 20MHz Oscilloscope
3) Desoldering Equipment
4) Digital Multimeter
5) High Power Load Bank
6) Variac

The complexity of the product under repair requires professional audio service equipment. Do not attempt to repair this product without this equipment.

Factory Repair

In the U.S. and Canada: In the event that an EON product must be returned to the factory for service, contact JBL Professional Service at (818) 895-3479 for return instructions. Do not return any merchandise without prior authorization.

Outside the U.S.: Contact the JBL Professional Distributor in your area for service information.

Transducer Repair

Repair Kits

Part Number	Description
C8REON15	LF Cone Replacement Kit, EON15
C2REON15P	LF Cone Replacement Kit, EON15P, EON15P-1/230
31385-03	Dust Dome, EON15, EON15P, EON15P-1/230 EON15PAK
D8R2418	HF Diaphragm Replacement Kit, EON15, EON Power15, EON15P-1/230 (2418H) (315436-001X)
C2REONSUB	LF Cone Replacement Kit, EON PowerSub
C8REON10-G2	LF Cone Replacement Kit, EON10
C4REON10P	LF Cone Replacement Kit, Power10

No repair kit is available for the 2412H Compression Driver. Entire driver should be replaced (P/N 125-10000-00X).
No Repair Kit is available for the M115-8 woofer. Entire driver should be replaced (124-67001-00X)

Cone Replacement Procedure

***NOTE:* To recone the EON woofers, it is not necessary to disassemble the enclosure. The woofer can be reconed from the front.**

Tools and Supplies

The following items will be required to properly recone the speaker:

- Screwdriver
- Long-Nose Pliers
- Masking Tape
- MEK
- Utility Knife
- Teflon or Orange Stick
- Gap Gauges – 0.089" (15" models only - JBL P/N 90075-.089)
  0.080" (10" models only - JBL P/N 90075-.080)

An audio function generator is also required for testing purposes.

The entire recone process uses 3M 1300L adhesive. A tube is included with the recone kit. Additional adhesive may be ordered from JBL, either by the tube (P/N 71715), or by the quart (P/N 63376).

Recone Procedure

1) Remove grille and inspect speaker carefully before disassembly. Look for and record the following:
   - A) Model Number, Serial Number, Date Code, Customer, and Complaint
   - B) Obvious damage or defects
   - C) Rubbing / Buzzing
   - D) Damaged dust dome
   - E) Damaged cone
   - F) Glue bond, compliance to frame
2) Remove dust dome. Look for and record the following:
   - A) Voice coil rubbing in the gap
   - B) Evidence of cone collapse near the voice coil joint
   - C) Chips in the gap
3) Remove the cone assembly. Look for and record the following:
   - A) Coil condition: Overheated, rubbing, chip gouges, voice coil date code
   - B) Coil to cone and spider bond.
   - C) Bent or broken frame
   - D) Loose magnet assembly
   - E) Foreign material in the gap
   - F) Check gap concentricity with appropriate gap gauge. Be sure to check both upper and lower gaps
4) Remove and discard the grille standoffs.
5) Cover magnet gap with tape. Scrape and sand compliance land and spider land until clean and flat.
6) Clean all dust and dirt from speaker. Clean compliance land and spider land with MEK or acetone.
7) Remove tape from gap and clean magnet gap with masking tape and with MEK and a rag.
8) Unpack recone kit and inspect for damage.
9) Verify that the voice coil impedance is correct for the model under repair. 8 ohm voice coils have a blue mark near the leads, and are used in the passive models ONLY.
10) Place Mylar tube inside the voice coil.
11) Test-fit the cone assembly to the speaker frame. Make sure the tinsel leads are aligned with the proper terminals, and the scallops in the compliance are aligned with the bosses on the compliance land. It may be helpful to mark the uppermost scallop. Remove the cone assembly.
12) Apply a 3/16" (4.75mm) bead of glue to the frame at the spider land. Apply another bead of glue to the inner edge of the compliance land.
13) Install the cone assembly, maintaining proper alignment of the leads and scallops.
14) Press the surround into the glue with Teflon or orange stick.
15) Allow at least 30 minutes for adhesive to set.
16) Press the surround into the glue again.
17) For best results, allow 24 hours to dry.
18) Remove Mylar tube from voice coil.
19) Using pliers, connect 2 tinsel leads to the terminals.

20) Carefully position dust dome on cone.
21) Apply a heavy bead of glue around the dome.
22) Allow 30 minutes for adhesive to set, then apply another bead of glue around the dome.
23) Install the new grille standoffs into the frame. The long standoffs are for the top holes.
24) Install the grille, using the 4 original screws.
25) Test speaker (See Test Specifications).
26 Inspect and clean the speaker. Return to service.

Rediaphragm Instructions 2418H

For EON15, EON Power15 and EON15P-1/230

NOTE: YOU MUST REMOVE THE BAFFLE FROM THE CABINET. USE CAUTION TO AVOID DAMAGE TO THE BAFFLE GASKET AS IT CAN BE REUSED.

Tools Required

1) .040" Pin Gauge
2) #10 Torx Driver
3) Phillips Screwdriver
4) Prying Tool
5) Gap Cleaning Tape
6) High Frequency Test Station
7) Air Gun and Safety Glasses

Procedure

1) Record Model number, Serial number, Date code and compliant for warranty information.

2) Lay the enclosure face down on a soft clean surface to avoid damage to the grille. The woofer, or bottom of the product should be towards the front of the service table.

3) Using a Phillips head screwdriver remove the 2 screws holding the handle and remove the handle. Remove the 16 screws holding the baffle to the rear enclosure.

4) Remove the rear enclosure from the front baffle using a pry tool. Begin by prying at the bottom of the enclosure directly beneath the center mounting screw holes.

5) Tilt the enclosure away from the baffle so it rests on it's top. Disconnect the transformer wires from the A.C. input board as you are tilting if these wires are long enough.

6) Pull the lead wires off the compression driver terminals.

7) Remove the rear cover on the compression driver by removing the three(3) TORX head screws using a #10 TORX driver. Do not discard the cover/screws.

8) Remove the diaphragm assembly from the magnet structure or cover.

9) Identify defect and record Q.A. code per JBL Professional Service Program manual.

10) Check the gap with a .040" gap gauge. Using compressed air and masking or “tuck” tape, clean the gap thoroughly per JBL Professional rediaphragming procedures.

11) Lay the new diaphragm assembly into the magnetic gap and align the three screw holes in the top plate with the three openings in the diaphragm assembly. ANY ORIENTATION OF THE THREE HOLES IS ACCEPTABLE.

12) Be sure the diaphragm seats completely against the top plate within the guide pins.

13) Reinstall the rear cover over the diaphragm. Torgue these screws to 14 inch pounds.

14) Test the compression driver for rubs or buzzes using a 2 volt sine wave from 300Hz to 800Hz. If no buzzes are detected, then test at 2V from 1,500 Hz to 20 kHz for full range operation and audio clarity. It will be necessary to lift the baffle to expose the horn so listening tests can be performed accurately.

15) Reconnect the high frequency lead wires to the appropriate terminal on the compression driver. The terminals are polarized so they will fit only one way. Reconnect the transformer wires if they were disconnected in step 5 above.

16) Reinstall the rear enclosure on the front baffle (torque to 21 inch pounds) taking care to ensure that the baffle gasket is not damaged. If the gasket is damaged, replace with PN# 3321167-001 (382-00036-00 for EON 10 and 10P). Reinstall the handle.

17) Perform a complete system test before returning the product to the customer.

Signal Input Assembly Trouble-shooting EON Power15 and EON15P-1/230

A) Initial Setup

Connect board under test to a +/– 15V power supply at the designated connector pins.
Connect Port-one generator (or a function generator) output A to XLR input connector.
Turn generator A off. Place S201 in “Mic” position.

1) Power up board and verify that “Mic” LED, D202, lights.

B) Power Supply Test
Verify that +15V and –15V supplies are at the correct levels.

1) If the LED doesn't light: Check for shorts from +15V to ground, –15V to ground, and +15V to –15V. Check for opens on +15V and –15V lines. Verify that D204 - D207 are not shorted.

C) "Mic" LED Test
Verify that "Mic" LED, D202, Lights.

1) If the voltage across D202 is greater than 3V, replace open LED, D202.

Line Amp level for 1V P/P at XLR input connector. Adjust volume control, P201, fully clockwise.

D) Gain Test
1) Place S201 in "Line" mode (switch out), Turn on generator A, set frequency to 400Hz and adjust.

2) Verify that voltage at output, pin 1 of J204 = 800mV P/P (+/– 100mV)

3) Verify presence of 400mV P/P (+/– 50mV) at pin 1 of U202.

4) Remove oscillator connection to XLR input. Verify resistance from pin 2 of J202 to pin 2 of U202 = Pin 3 of J202 to pin 3 of U202 = 24.75K. If not, check for shorted sections of S201. Verify resistance from pin 2 to pin 1 of U202 = pin 3 of U202 to ground = 10K. If not check for opens and shorts around U202.

5) Rotate Volume control counter clockwise while monitoring pin 1 of P204. Voltage should gradually decrease to zero. If the level is intermittent or control does not attenuate, replace defective P201.

E) Line Amp Frequency Response Test
Advance volume fully clockwise and adjust for 800mV P/P at pin 1 of J204. Change Frequency to 20kHz and verify a level of 750mV (+/– 100mV). Change frequency to 20Hz and verify a level of 750mV (+/– 100mV).

F) Line Amp Common Mode Rejection Test
Set generator output drive to unbalanced. Adjust frequency to 400Hz. Bring volume control fully clockwise and adjust oscillator output to obtain 10V P/P at pin 1 of J204. Lift pin on R227 that is closest to J201 and solder it to pin on R226 that is closest to J201. Reapply power to board and verify that the voltage present at pin 1 on J204 is less that 250mV P/P. Readjust frequency to 20kHz and verify that the voltage present at pin 1 on J204 is less that 250mV P/P.

G) Mic Amp Test
Push Mic/Line switch, S201, in. Adjust volume control, P201, fully clockwise. Adjust for 20V P/P at pin 1 of J204. The input level to the board should be 5.6mV (+/– 300uV).

Adjust oscillator for 5.6mV and verify that voltage at pin 1 of U202 is equal to 150mV P/P (+/– 20mV).

H) Mic Amp Frequency Response Test
Adjust for 20V P/P at 400Hz at pin 1 of P204. Adjust frequency to 20kHz and verify 20V P/P (+/– 1V) at pin 1 of J204. Adjust frequency to 20Hz and verify 14V P/P (+/– 2V) at Pin 1 of J204.

I) Signal Indicator Test
Set oscillator frequency to 400Hz, S201 to “Mic” position (In). Adjust oscillator level for 300mV P/P on pin 1 of U202. Verify that signal LED, D201 is on. Turn off oscillator and verify that signal indicator turns off.

J) Peak Indicator Test
Set oscillator frequency to 400Hz, S201 to “Mic” position (In), and Volume control, P201 fully clockwise. Adjust oscillator level for 20V P/P on pin 1 of P204. Verify that Peak LED, D203, as well as signal LED, D201 are on. Turn volume control down and verify that Peak indicator turns off.

Amp Assembly Trouble-shooting EON Power15 and EON15P-1/230

A) Initial Setup
The easiest way to drive the EON Power15 Main Board is to connect it to a known good EON Power15 Input Board. Interconnect both boards using a 7-pin cable assembly. Place the input board in “Line” mode (S201 out). Advance volume control on input board, P201, fully clockwise. Attach power transformer to J1. If at all uncertain about bias adjustment being correct, adjust bias control, VR1, fully counter clockwise. Connect the low frequency output to a 4 ohm load and the high frequency output to a 8 ohm load. Connect Porta-One generator output A to input board’s XLR connector. Generator output A should be turned off.

B) Main Test Loop
Monitor +15V supply while slowly advancing Variac, that is powering primary of power transformer. Watch the input watt meter, the input volt meter, and the voltmeter on the +15V supply. Verify the following:

Excessive power not pulled. Slowly advance input power (Don't allow +15 supply to go higher than 16V). If power pulled is greater that 20W, before reaching 120VAC in, refer to "Excessive Line Power Test".

As you ramp out the input voltage, verify that +15V supply stays in regulation. If supply is non-existent or excessive refer to "+/– 15V Supply Test". Verify –15V supply is proper, if not, refer to above test.

Check –V1 (–39V) and +V1 (39V). If non-existent refer to "+/– 39V Supply Test".

Check –V2 (–77V) and +V2 (39V). If low refer to "+/– 77V Supply Test".

Verify that "Mute" test point is close to –15V. Remove power to unit and verify mute line immediately (200mS) goes high (+15). Re-power board and verify mute line initially goes high and then goes low about 2 seconds later. If any of the above is not true refer to "Amplifier Muting Test".

C) Confirmation of Low Frequency Chain:
Measure across emitters of Q1 and Q13, for 4mVDC +/– 300uV (20mA). If required adjust bias pot, VR1. Measure at low frequency amp output (+LF test point) and confirm less than +/– 50mV of offset. Turn on Generator A and adjust frequency to 400Hz. Adjust Oscillator amplitude to obtain 60V P/P at amp output. The waveform should be a nice clean sine wave, with perhaps, a small hint of clipping. The amp will begin to clip at around 62V P/P. If the amp prematurely clips, verify input to the amp is not clipped. The amp input can be measured at the junction of R22 and C18. With 60V P/P at the amp output there should be around 1.9V p/P at the input to the amp. If one or more of the above tests fails. proceed to "Low Frequency Power Amp Test".

Adjust oscillator for 1.9V p/P at pin 1 of U2. Verify voltage at input to the filter, pin 1 of J3, is about 3.5V P/P. If not, proceed to "Low Frequency Filter Test".

D) Confirmation of High Frequency Chain:
Turn off Generator A. Adjust "High Frequency Level" control, VR201, on signal board, fully clockwise. Measure at high frequency amp output (+HF test point) and confirm less than +/– 50mV of offset. Turn on Generator A and adjust frequency to 3kHz. Adjust Oscillator amplitude to obtain 60V P/P at amp output. The waveform should be a nice clean sine wave, with perhaps, a small hint of clipping. The amp will begin to clip at around 63V P/P. Adjust "High Frequency Level" fully counter clockwise and verify that output level reduces to around 35V P/P (5dB). Re-adjust "High Frequency Level" fully clockwise. If the amp prematurely clips, verify input to amp is not clipped. The amp input can be measured at the junction of R50, R51 and R39. With 60V P/P at the amp output there should be around 2.8V P/P at the input to the amp. If one or more of the above tests fails proceed to "High Frequency Power Amp Test".

Adjust oscillator for 3.2V P/P at pin 7 of U2. Verify voltage at the input to the filter, pin 1 of J3, is about 4V P/P. If not, proceed to "High Frequency Filter Test".

E) Excessive Line Power Test

Verify correct polarity and the following parts are not shorted:
C1, C2 (main filters) and D1 D8 (low frequency power amp), D2-D5, C3, C5, C7, C10 (+/– 77V doublers). No section of BR1 (main bridge) should be shorted. Verify that the +15V and –15V supplies are not shorted. Return to “Main Test Loop” when fault fixed.

Measure across Q1 and Q13 emitters using DC Voltmeter. Slowly ramp up input voltage never allowing more than 40W to be pulled from Variac. The voltage across the emitters should be less than 5mV. If excessive refer to “Low Power Amp Test”.

Measure at +HF test point using DC Voltmeter. Slowly ramp up input voltage never allowing more than 40W to be pulled from Variac. The voltage at the output pin, pin 3 of U1, should be less than +/– 50mV. Monitor the temperature of U1, with your finger. The temperature should warm slightly but not excessively. The Temperature should not rise more than 10 degrees C after a few minutes of “idle” operation. If any of the above not true refer to “High Frequency Power Amp Test”.

F) Supply Test

+/– 15V Supply Test

Slowly ramp up Variac, never allowing the supplies to exceed +/– 16V. Measure +15V and –15V supplies. Both should be the correct value +/– .5V.

If a supply is very close to ground potential (Less than +/– 100mV check for:

1. shorts on the +/–15V supplies; references Z3 or Z4;
2. open or incorrect reference bias sources R52 and R65;
3. open series pass devices Q18 and Q19;
4. +/– 39V supplies absent, proceed to “+/– 39V Supply Test”.

If supply is out of specification (deviation of more than .5V but not close to ground potential) check for:

1. incorrect values of Z3, Z4, R52 or R65
2. proper polarity on C32 and C40
3. excessive current being pulled (Do U2-U4 run hot?...etc.)
4. verify that Q18 or Q19 are noted shorted from base to emitter

If supply is high verify that:

1. Z3 and Z4 are of correct value and are not open
2. R52 and R65 are the correct value
3. Q18 is a 2SD1763A and that Q19 is a 2SB1186A
4. Q18 and Q19 are not shorted Base to Collector, or collector to emitter

+/– 39V Supply Test

Look for open traces between main bridge, BR1, and main filter Capacitors, C1, C2. Look for open traces between BR1 and power input connector, J1. Verify that BR1 is not open. Return to “Main Test Loop” after fault found.

+/– 77V Supply Test
The low frequency power amp might also be pulling excessive current. Check for correct value of R4 and R6 (3.3K) and verify 1.5VDC across them when board is powered. Check for correct value of R5, R9, R21 and R29 (243 ohms) and verify 900mVDC across them when board is powered. Check for correct value of R18 (100 ohms) and verify 1.1VDC across it when board is powered. If any of the above is not true proceed to “Low Frequency Power Amp Test”.

G) Amplifier Muting Test
Power up board and measure voltage at junction of D12, R33 and C21. The voltage should be –35VDC with about 10V of ripple. If voltage is positive check polarity of D12. If ripple is excessive check values of R33, C21 and R34.

Measure base of Q17. Voltage should be –.6V. If voltage is more than –1V then D13 is open or reversed biased. The collector of Q17 should be at around +9V.

Turn power off. Q17 base should quickly go to .6V. If less, check R48 value and for shorted Q17 (base emitter). If greater than .6V check for open Q17 from base to emitter.

Power up board while monitoring collector of Q17. Voltage should ramp from zero to around 9V in around 2 seconds. If collector remains close to zero check for:
1. collector to emitter short on Q17
2. incorrect value R49
3. shorted TS1 (Thermostat should be open when cold and will close at 80 degrees C)
4. reversed or shorted Z2.

If voltage ramps up higher than 10V check for open or incorrect value Z2, and for an open Q16 from base to emitter.

Interrupt power while monitoring collector of Q17. The voltage should quickly fall close to zero volts. If it doesn’t replace open (from collector to emitter) Q17.

Voltage from base to emitter on Q16 should be .6VDC, if less than that, check for proper value of R36 and from base to emitter short on Q16.

With power applied the collector of Q16 should be close to –15V. After removing power the collector should go high, if this is not the case check R35, R44, R47 and Q16.

With power applied the collector of Q16 will be at –15V. This will turn on Q15 and bring the collector of Q15 close to ground. The voltage at the base of Q15 should be around –.6V. If lower check value of R35 and verify Q15 and D14 are not shorted. After removing power, base of Q15 should go to around .6V. If greater than .6V replace open D14.

When operating normal the collector of Q15 should be close to ground potential. If not check R32. If R32 is correct replace open Q15. When power is removed the collector ofQ15 should approach –15V. If collector stays close to ground potential look for short sur rounding Q15 emitter to collector.

With the collector of Q16 low, D15 will be forward biased and pin 8 of U1 will be at around 3V. If voltage at pin 8 of U1 is lower than the 3V, U1 is defective. Verify:

1. correct value of R44
2. D15 is not shorted and oriented correctly

H) Low Frequency Power Amp Test

1. Amp pulls excessive power when board is connected.

Verify correct values of Q1 (2SC3281), Q13 (2SA1302), Q2 (2SD1763A), and Q12 (2SB1186A). Check that D6 and D7 are not shorted and for proper polarity. Look for posible shorts in the areas where these parts are. All the above parts form the "Current Amplifier" (Providing current gain). Everything from Q6, Q8 and before, form the "Voltage Amplifier" (Providing voltage gain).

If output voltage is centered (Close to ground potential), look for shorts to ground on output leg (+LF test point).

If output voltage is centered (+LF test point), and output leg is not shorted, there could be a problem with the bias reference. Jumper across C12. Power Unit. If excessive current is not pulled, bring AC supply to full (120VAC). Measure across R9 and R21. The voltage across these parts should not be any greater than 2.5VDC. Measure resistance of R9 and R21, the correct value is 243 ohms. If R9 or R21 value incorrect, or if the voltage across these parts is excessive proceed to "Voltage Amp Test". If R9 and R21 testing doesn't uncover a problem, and shorting C12 does bring the power consumption to normal, proceed to "Bias Reference Test". Remove jumper across C12.

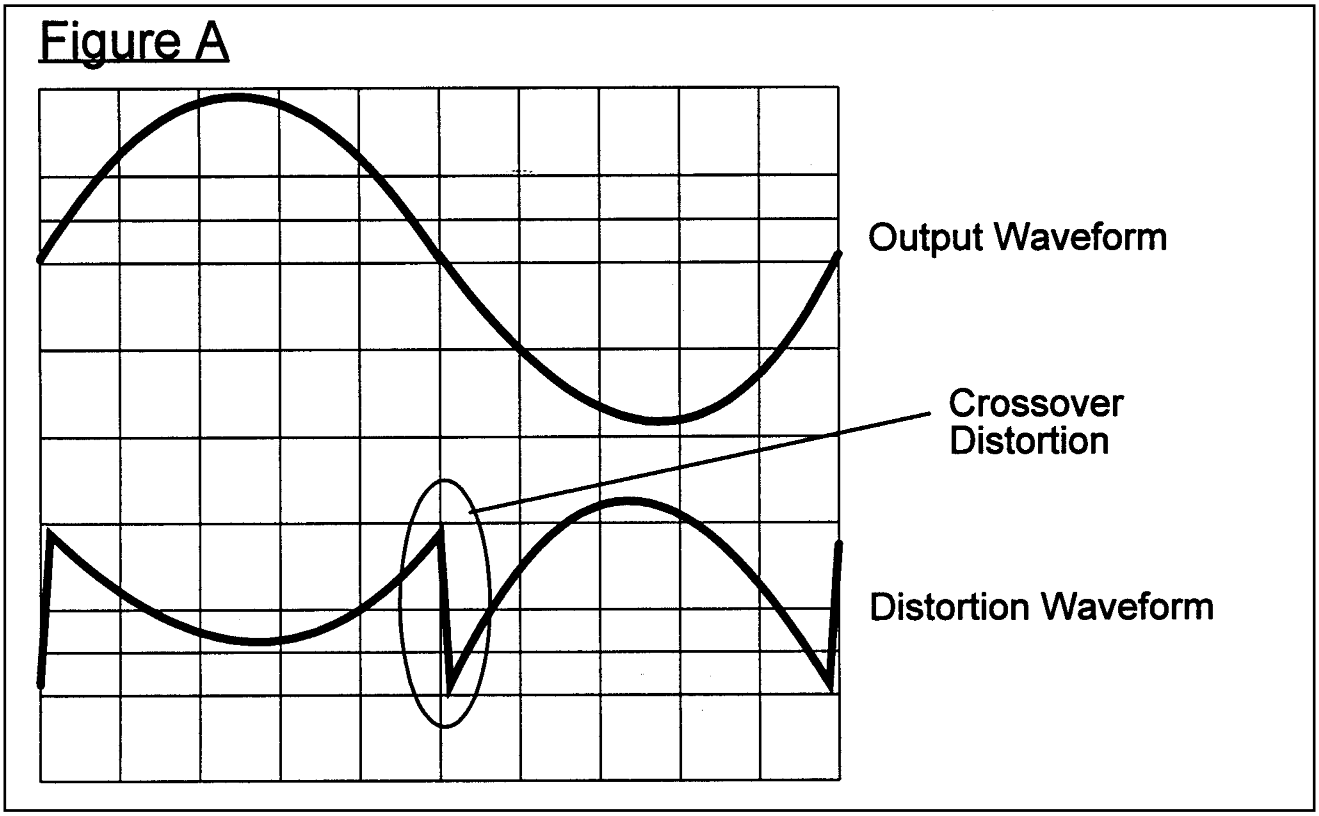
If the output voltage is offset (+LF test point) from ground there could be a problem in the voltage amp. Jumper across C12 and then bring this point to ground. If the output voltage centers itself, remove jumper and proceed to "Voltage Amp Test". If the voltage does not center, then the problem is in the current amplifier. Check for shorts on all elements (base to emitter, base to collector, collector to emitter) of Q1, Q13, Q2, and Q12.

2. No output from the amp when driven.

Verify signal at base of Q10. If there is no signal refer to "Low Frequency Filter Test". Verify that junction of R32 and Q15 collector is close to ground potential. If not close to ground potential refer to "Amplifier Muting Test". If all of the above is OK refer to "Voltage Amp Test".

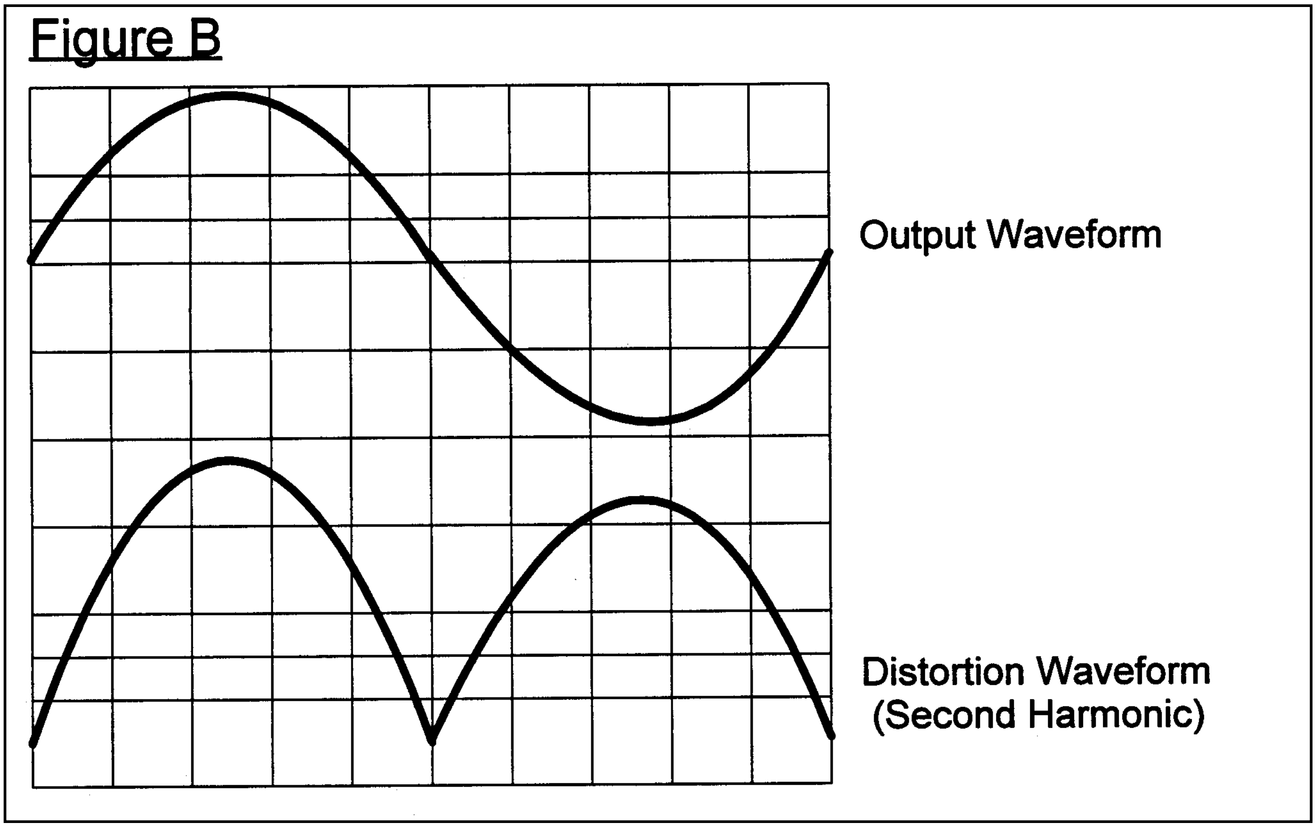
3. Does amp oscillate? Does amp roll off too soon at high frequencies?

Check all components that effect high frequency stability and response: C4, R2 (output loading), C8, C15 (current amp stabilizers), C14, R15, and C11.



4. Crossover distortion in output

Refer to Figure A above and note the character of crossover distortion. This is caused by both halves of the output stage (Q1, Q2 on positive side, and Q13, Q12 on the negative side) being turned off right around crossover (crossover from positive drive to negative drive). This actually takes a small chunk (sometimes only visible in distortion waveform) out of the center of the output waveform. This also causes some harmonic distortion (Note the curved portions of the “Distortion Waveform”). Remove input signal to amp and measure DC voltage across emitters of Q1 and Q13. Bias adjustment, VR1, should allow adjustment from zero volts to well over 10mV. If not proceed to “Bias Reference Test”.



5. Excessive Second harmonic distortion in output

Refer to Figure B above and note the character of second harmonic distortion. This is caused by an imbalance in amplifying capability in either the current amplifier or the voltage amplifier. Note that the “Distortion Waveform” could also be inverted in relation to above depending on the polarity of the imbalance. Place a probe on the output of the amp and adjust for around 40V P/P if the condition of the board allows this much voltage. Visually note the characteristics of the waveform and then probe on both sides of C12. C12 is across the input to the current amp. If the waveform visibly appears almost identical (Same P/P voltage, same waveform shape) then the problem lies in the voltage amp. Proceed to “Voltage Amp Test”. If there is much difference between the output waveform and the waveforms measured at C12 there is probably a problem in the current amp.

6. Bias Reference Test

The purpose of the bias reference circuit is to provide bias to the driver and output transistors to just barely turn them on. Q6 is a positive current source and Q8 a negative current source. The voltage between the collectors of Q6 and Q8 is regulated by the bias reference.

A voltage of around .6V is required across the base emitter junction of a transistor to begin to turn it on. Since a total of 4 junctions are in the current amp (Q2, Q1, Q13, and Q12) the bias reference needs to have around 2.4V (4 drops) across it to turn on all four transistors in the current amplifier.

The range of adjustment is very small (Between 1.7V and 2.8V when VR1 adjustment from stop to stop). The reason the adjustment range is small, is because very little change in voltage across the reference produces radical bias current changes in the output stage (Due to the logarithmic relationship between base emitter voltage to collector current). Too great a range results in a control that is very hard to adjust.

As a transistor heats up it requires less and less base emitter voltage to obtain the same collector current. If the bias reference voltage remains constant, and the output and driver transistors begin to heat up, the current amp will draw more and more current, eventually destroying itself. This is why the reference transistor, Q5 is mounted to the heatsink: As the outputs (Q1, Q13) and drivers (Q2, Q12) heat up so does Q5. This action regulates the output bias current and keeps it constant with temperature.

a. Excessive power pulled from AC line.
This is due to excessive voltage across reference. The range (measure across C12) should be 1.7V to 2.8V. If not check R13, VR1, R14, and Q5.

b. Crossover distortion in output waveform.
This is due to inadequate voltage across reference. The range (measure across C12) should be 1.7V to 2.8V. If not check R13, VR1, R14, and Q5.

After amplifier heats up, bias current, and power pulled from AC line, increases.

This is due to the fact that the bias circuit not tracking the current amplifier with temperature. Make sure that all of the transistors, Q1, Q2, Q5, Q12, and Q13, make good thermal contact with the heatsink (Hardware is tight, adequate thermal grease is on devices, insulators, and heatsink). If all of this is OK replace Q5.

I) Voltage Amp Test
Turn Generator A off. Lift one side of R12. Connect base of Q10 to base of Q11. Power up amplifier. Verify that the voltage at collector of Q15 is around zero volts. If not, refer to "Amplifier Muting Test".

1. Front End and Current Source

Verify 1.2V across anode of D10 to cathode of D11. If incorrect check D10, D11, R32, R31 and Q14. Verify voltage across R31 (600mV). Verify resistance of R31 (620 ohms).

The voltage at the collector of Q14 should be –6V. If the voltage is subsequently lower look for short from collector to emitter of Q14.

The voltage at both bases of Q10 and Q11 should be very close to ground potential and the emitters should be at –6V. The voltage drop across R23 and R26 should be around 50mV. Both drops should match within +/– 20%. If all above is not correct check Q10, Q11, R23, and R26.

The voltage drop across R4 and R6 should be 1.5V for both devices +/– 20%. If voltages not matched, or if they are higher or lower, verify values of R4 and R6 (3.3K), R5 and R9 (243 ohm), and check for open or shorted elements in Q10, Q11, Q4, or Q7.

2. Upper Class A Drive

Verify that voltage across R9 equals 870mV +/– 20%. If incorrect, check Q7 for open or shorted elements.

Check the voltage at the base of Q6. This should be half way between the positive supply voltage and the output node. V(base Q6) = (39 +V (output))/2. If the output is offset –10V the voltage at the base of Q6 will equal (39 –10)/2 = 14.5V. If incorrect, check values of R8 and R10 (33K). If R8 and R10 are correct, replace Q6.

3. Level Shifter

Verify that voltage across R5 equals 870mV +/– 20%. If incorrect, check Q4 for open or shorted elements.

Verify that the voltage at the emitter of Q3 is .6V. If incorrect, check Q3 and Q4 for shorts and opens.

Verify that the voltage across R29 and R5 are the same (+/– 10%). If not check values of R5, and R29 (243 ohms). Verify that D9 isn’t open, shorted or reversed. If the above checked OK, verify value of R21 (243 ohms), and check Q9.

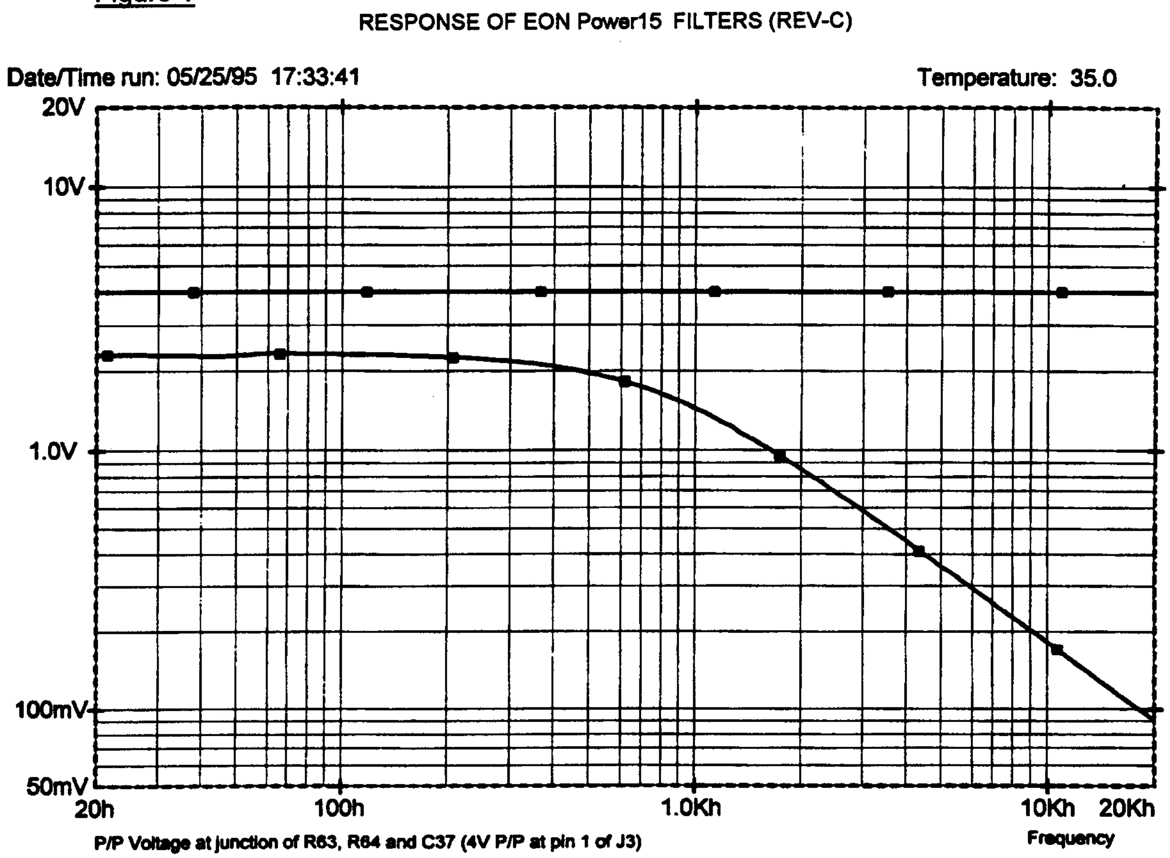
4. Lower Class A Drive

Verify that voltage across R21 equals 870V +/– 20%. If incorrect, check Q9 for open or shorted elements.

Check the voltage at the base of Q8. This should be half way between the negative supply voltage and the output node. V(base Q8) = (–39 +V(output))/2. If the output is offset 10V the voltage at the base of Q6 will equal (–39 +10)/2 = –14.5V. If incorrect, check values of R20 and R25 (33K). If R20 and R25 are correct, replace Q8.

Remove jumper across bases of Q10 and Q11. Re-solder lifted end of R12 back into board. Turn Generator A on and Power up board. Verify that the output is centered and undistorted. Turn down oscillator and re-connect 4 ohm load. Bring up oscillator level and verify that the output is centered and undistorted.

Figure 1



J) Low Frequency Filter Test

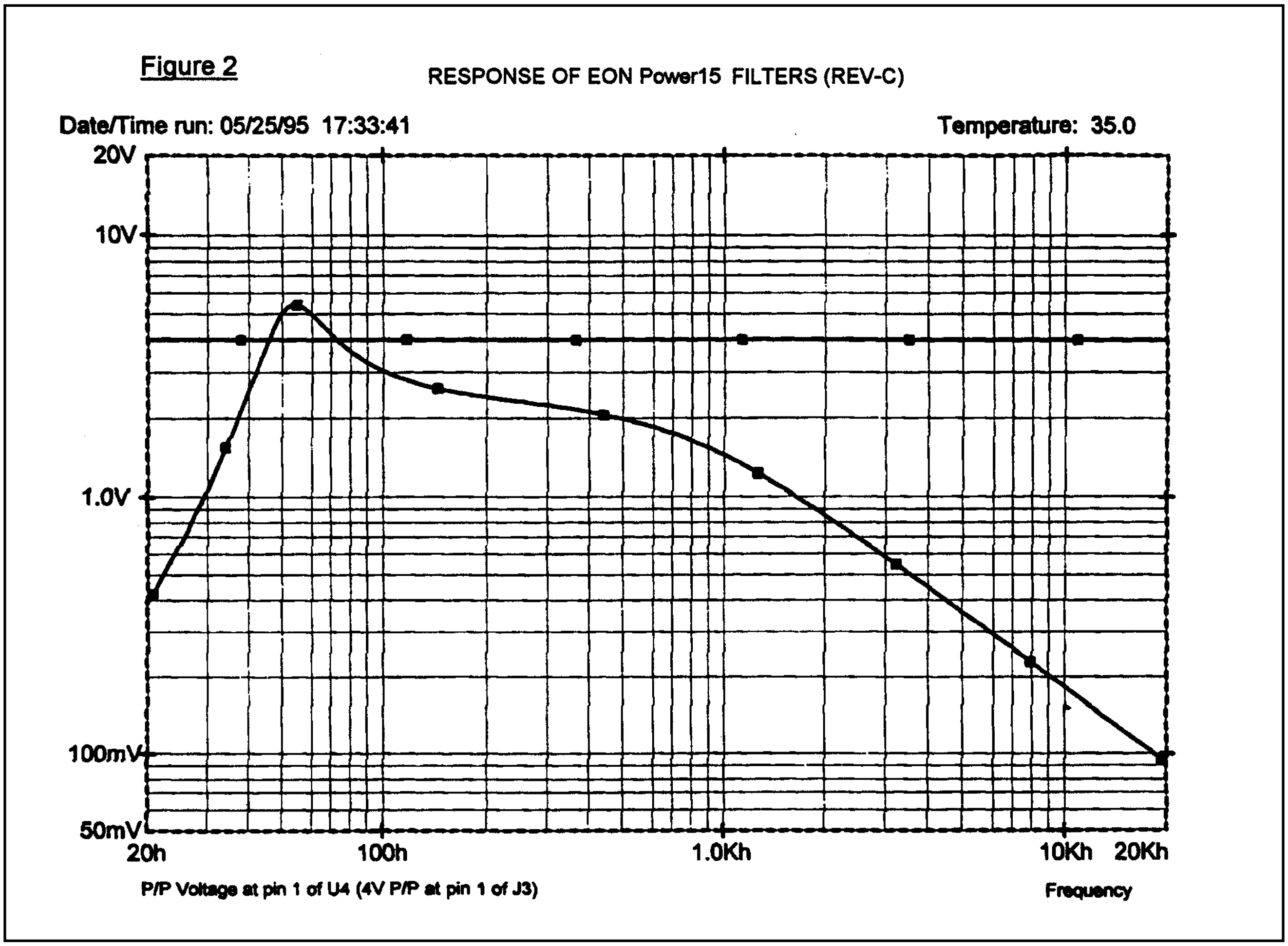
Lift one side of C18. Turn on Generator output A, adjust frequency for 1kHz, and adjust oscillator level to obtain 4V P/P at the input to the filter, pin 1 of J3. Move probe to junction of R63, R64, and C37.

Refer to Figure 1 above. Note the straight line from 20Hz to 20kHz at 4 volts. This represents the 4V P/P input signal that was just set up on pin 1 of J3. The curve below this line represents the transfer function of the first filter section (R63, R64, and C37) when this section is operating properly.

Sweep the oscillator frequency and note if the readings are reasonably close to the values indicated in the plot above. (+/– 15%). For example, with a filter that operates normally, the output will be 2.3V P/P at 20Hz, 2V P/P at 500Hz, 850mV P/P at 2kHz, 300mV P/P at 6kHz and 90mV P/P at 20kHz.

The first section is a low-pass filter with the half power point at 800Hz. If the response is incorrect check the values of R63, R64 and C37. If these values are OK, check the values of C35 - C37, R59, and R60.

After obtaining proper response proceed to following section.



Measure the response at pin 1 of U4. Note in figure 2 above that the input voltage has not been changed. (Voltage at pin 1 of J3). The other curve represents the response at the output of the second section of the filter.

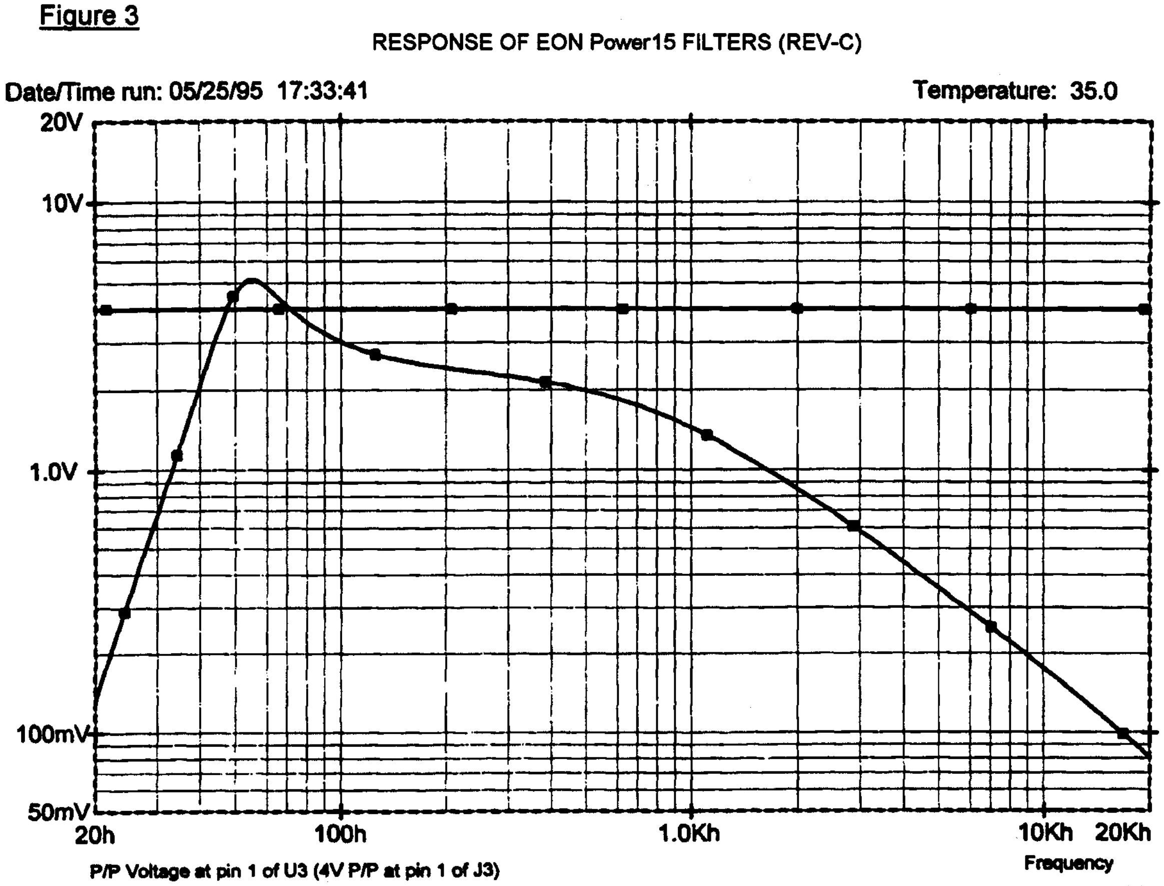
The second section is a moderate Q (Q equals about 2) high-pass filter at 55Hz. Because of the moderate Q the filter actually peaks (The 55Hz Peak).

Verify the peak frequency, 55Hz and the peak voltage 5.1V P/P. Also verify voltages at 20Hz, 100Hz, and 1kHz and 20kHz.

If the response is incorrect check values of C35 - C37, and R59, and R60.

After obtaining proper response proceed to following section.

Figure 3



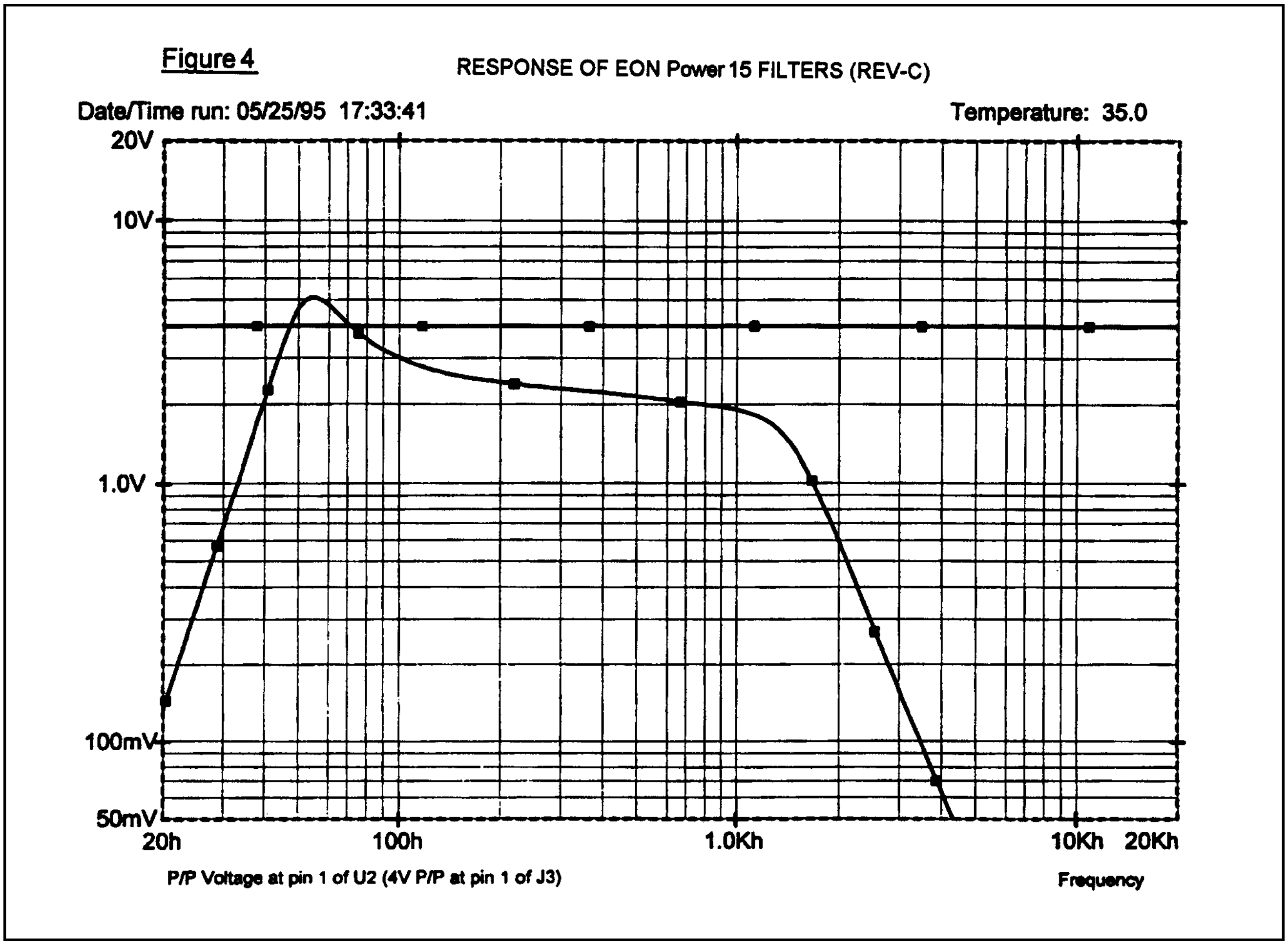
Measure the response at pin 1 of U3. Note in figure 3 above that the input voltage has not been changed. (Voltage at pin 1 of J3). The other curve represents the response at the output of the third section of the filter.

The third section is a low Q (Q equals about .7) high-pass filter at 33Hz.

Verify the peak frequency, 55Hz and the peak voltage 5.1V P/P. Also verify voltages at 20Hz, 30Hz, and 40Hz.

If the response is incorrect check values of C29, C30, C34, R56 and R57.

After obtaining proper response proceed to following section.



Measure the response at pin 1 of U2. Note in figure 4 above that the input voltage has not been changed. (Voltage at pin 1 of J3). The other curve represents the response at the output of the fourth and final section of the filter. The output is fed to the low frequency power amp that essentially has a flat response from 20Hz to 20kHz.

The fourth section is a moderate Q (Q is a little more than 1) low-pass filter at 1.4Hz.

Verify voltages at 100Hz, 1kHz, 2kHz. and 4kHz.

If the response is incorrect check values of R53 - R55, C28 and C33.

Reattach lifted lead of C18.

Bias Set Procedure

The following steps are necessary to set the bias on the Power15 amplifier module, PCB 510-00007-XX rev (any).

1. Connect a 4 ohm load (250 watts) to the red and black leads of the amplifier.
2. While maintaining 120VAC, 60Hz, turn the unit on.
3. Set the signal generator to 85 to 200Hz, and to 0.2 Vrms approximately.

4. Using a distortion analyzer and an oscilloscope, turn the bias trim pot (VR1) CCW until distortion spikes disappear, and the THD+N reading is below 0.1%.
5. Turn oscillator off, while keeping the amplifier on.
6. Verify the power is between 10 and 20 watts.

K) High Frequency Power Amp Test

Turn off Generator A.

1. Amp pulls excessive power when board is powered.

If the output of the amplifier, pin 3 of U1, is centered (around ground potential) check for a short from ground to the output pin, pin 3 of U1. If no shorting problem is found replace U1.

If the output pin, pin 3, is offset to one of the rails the power consumption should go to normal idle level (less than 20W) if the 8 ohm load is removed. If it does not, check for shorting from the output pin, pin 3, to either the +39V or –39V supplies. If not shorted replace U1.

If the output is offset, and the power consumption goes down to normal with the load removed, check the following:

Verify that the input to the amp, pin 10, is close to ground potential. If not close, check for shorts surrounding pin 10. If no shorts are found replace U1.

Verify that pin 9 reflects the output offset polarity. The offset should be much greater than +/– 1V. If not look for shorts surrounding pin 9 and verify values of R38, R40 and C25. If no problem found replace U1.

2. No output from the amp when driven.

Verify input to the amp on pin 10. If no signal is present verify that there is a signal at pin 7 of U2. If signal is present a pin 7 of U2 verify values of C27, R51, R50 and R39. Look for shorts at pin 10 of U1 and for shorts at pin 7 of P3. If nothing is found in above testing replace U1.

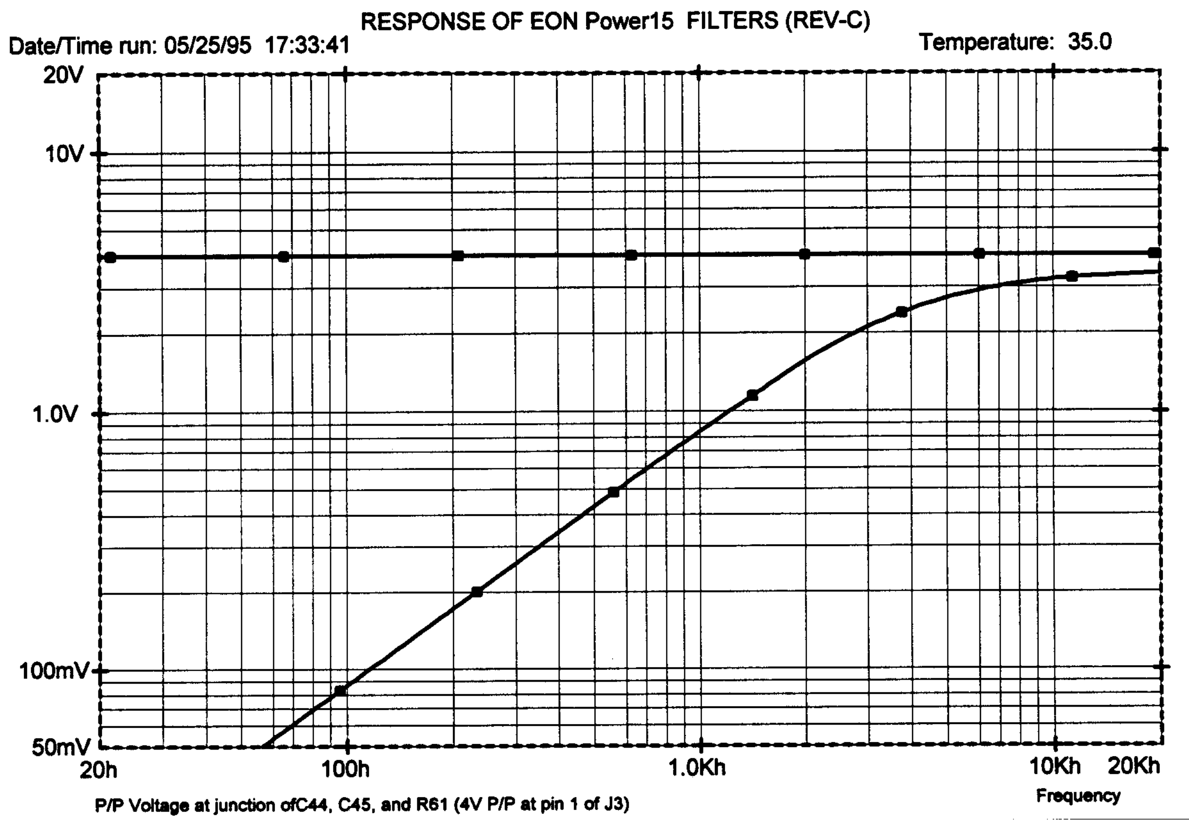
The amp should be out of muting. Verify that pin 8 is equal to about –3V. If the muting pin is substantially lower, replace U1. If the voltage goes higher than around –5V, and the turn on delay is operating properly (junction of R44 D15 at around –15V), replace U1.

3. Is the gain of the amplifier low or high? (The gain should be equal to 21). The gain from pin 10 to pin 3 should be around 21.

4. Does the amp oscillate? Verify correct values of R37, C24, C20, R28, C19, and C22. If all this is OK replace U1.

5. Is output distorted? Verify input to amp, pin 10 is clean. If input is OK replace U1.

Figure 5



L) High Frequency Filter Test

Lift one end of C27. Turn on Generator output A, adjust frequency for 1kHz, and adjust oscillator level to obtain 4V P/P at the input to the filter, pin 1 of J3. Move probe to junction R61, C44 and C45.

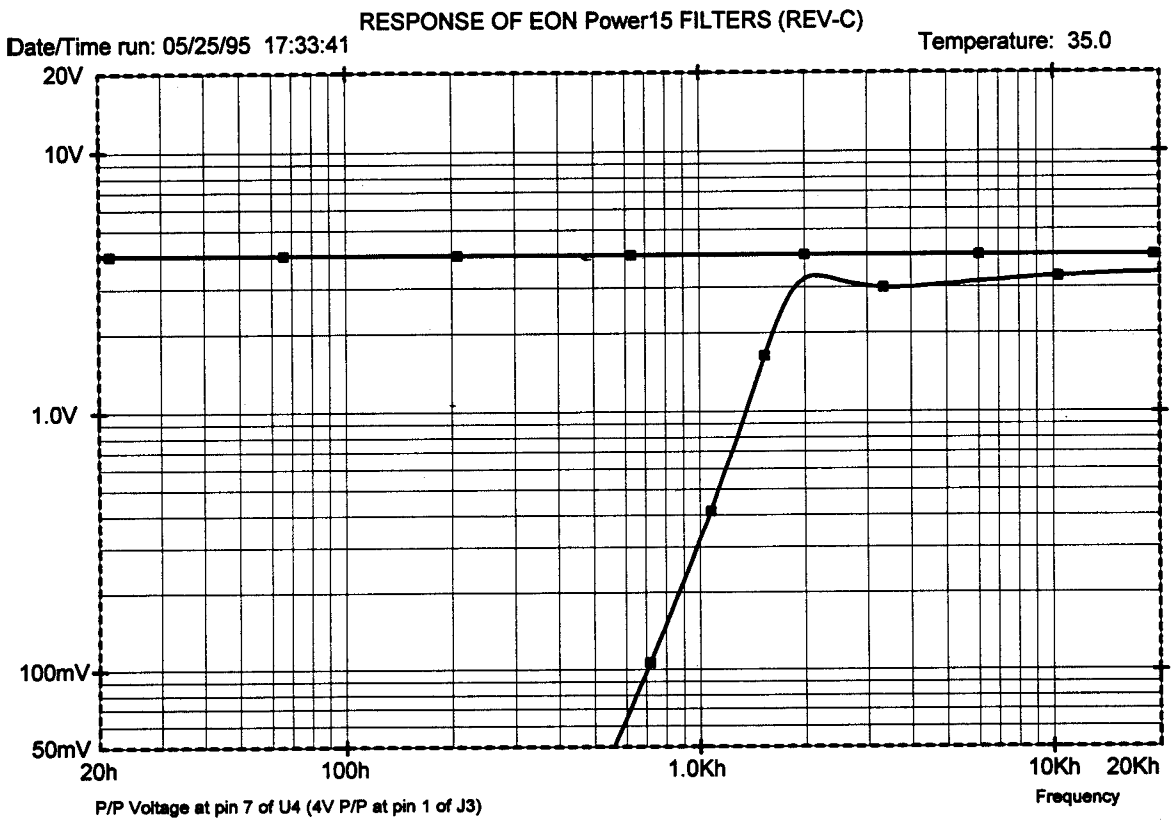
Refer to Figure 5 above. Note the straight line from 20Hz to 20kHz at 4 volts. This represents the 4V P/P input signal that was just set up on pin 1 of J3. The curve below this line represents the transfer function of the first filter section (R61, R71, and C44) when this section is operating properly.

Sweep the oscillator frequency and note if the readings are reasonably close to the values indicated in the plot above (+/– 15%). For example, with a filter that operates normally the output will be 3.3V P/P at 20kHz, 3V P/P at 7kHz, 1.5V P/P at 2kHz, 350mV P/P at 400Hz and 50mV P/P at 60Hz.

This first section is a high-pass filter with the half power point at 4kHz.

After obtaining proper response proceed to following section.

Figure 6

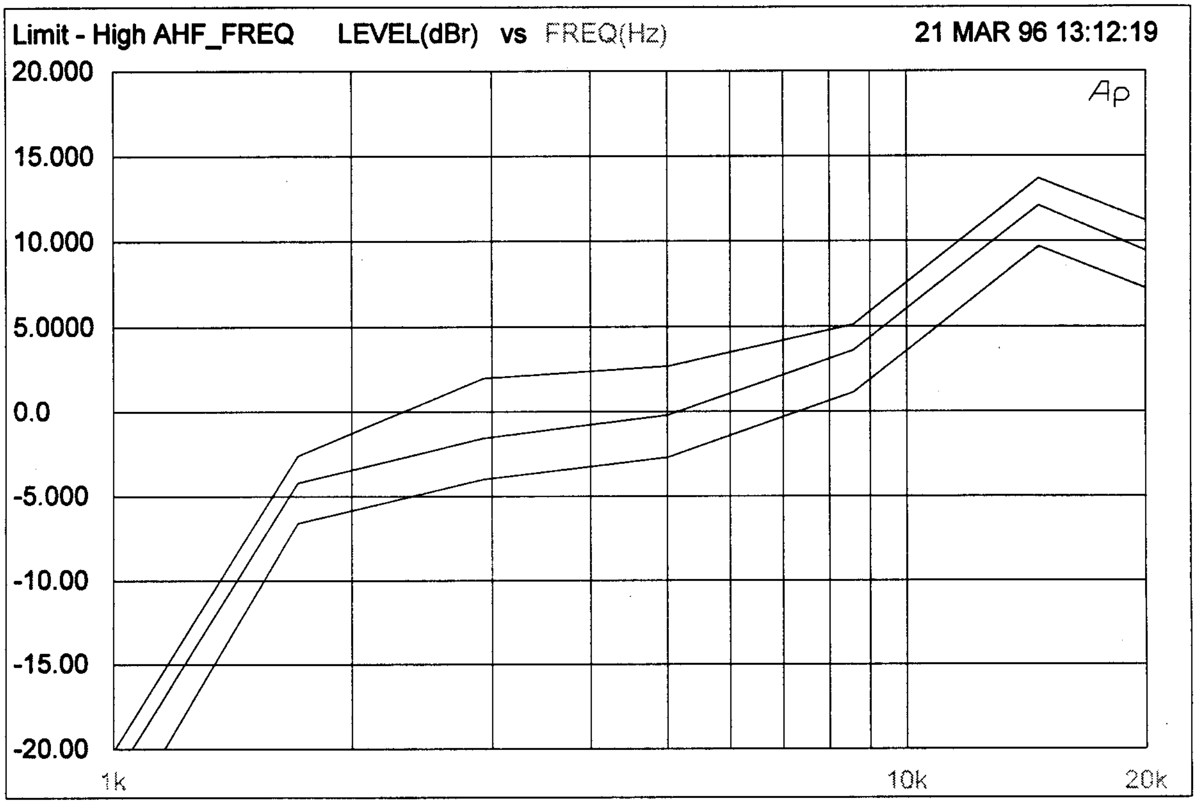


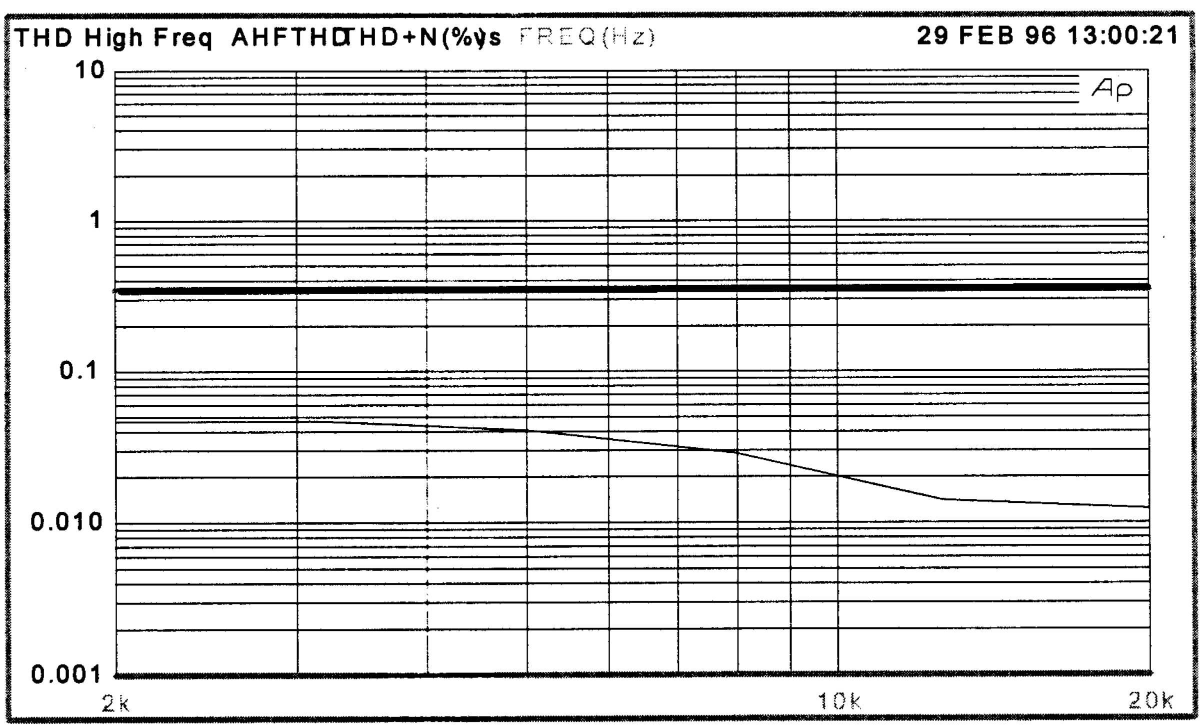
Measure the response at pin 7 of U4. Note in Figure 6 above that the input voltage has not been changed. (Voltage at pin 1 of J3). The other curve represents the response at the output of the second section of the filter.

The second section is a moderate Q (Q equals about 2) high-pass filter at 1.9kHz. Because of the higher Q the filter actually peaks (The 2.1kHz Peak).

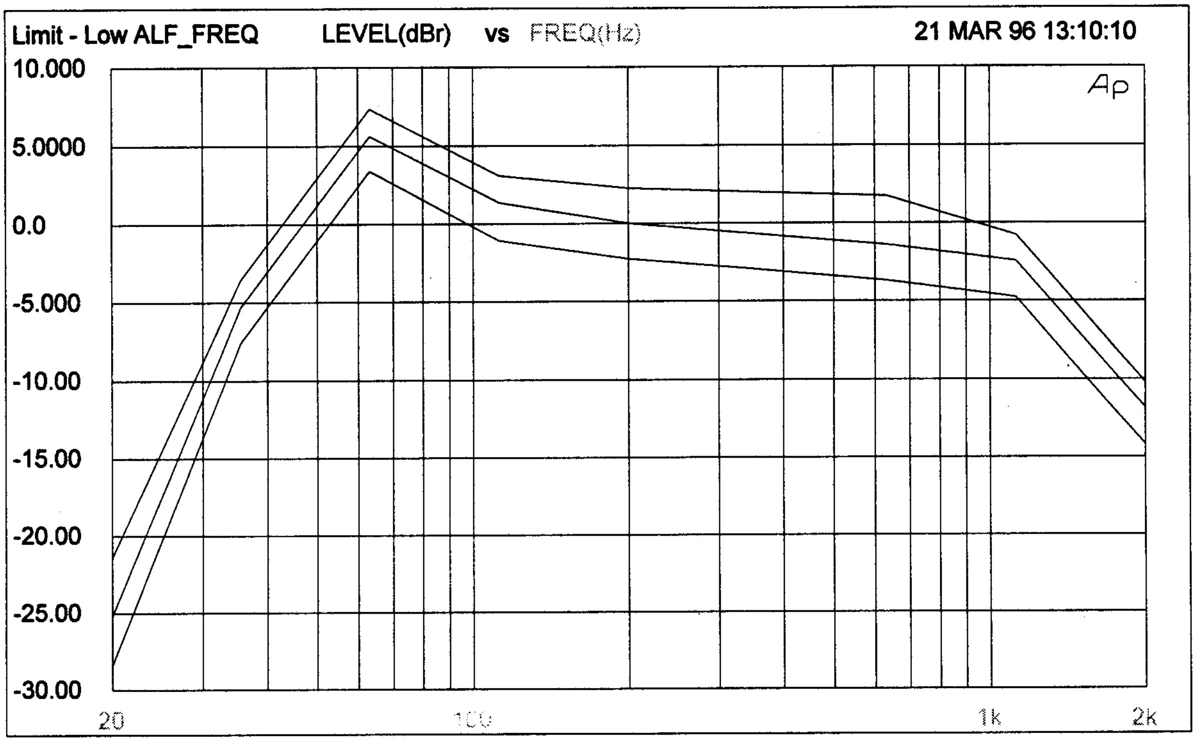
Verify the peak frequency, 2.1kHz and the peak voltage 3.2V P/P. Also verify voltages at 40kHz, 20kHz, 1kHz, and 600Hz.

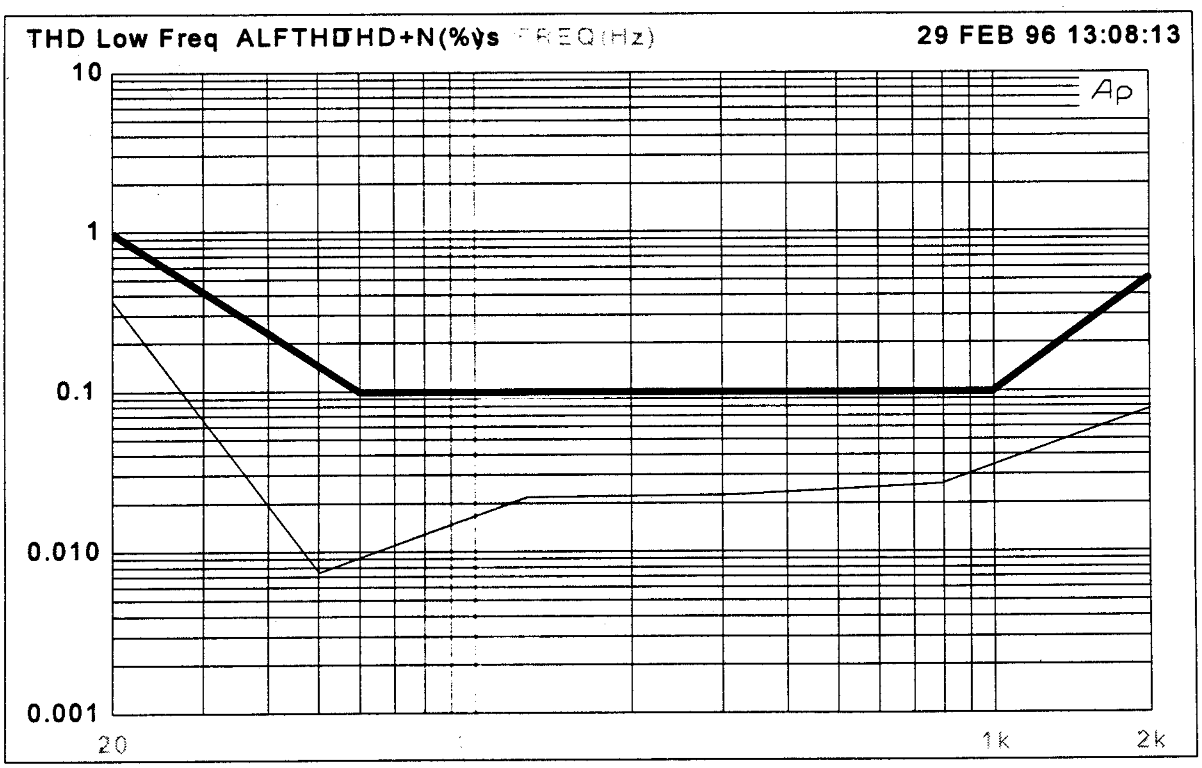
High Frequency Response EON Power15 and EON15P-1/230





Low Frequency Response EON Power15 and EON15P-1/230





Signal Input Assembly Trouble-shooting EON PowerSub

A) Initial Setup

Connect board under test to a +/– 15V power supply at the designated connector pins. Connect Generator output to XLR input connector.

B) Power supply Test

Verify that +15V and –15V supplies are at the correct levels.

Check for shorts from +15V to ground, –15V to ground, and +15V to –15V. Check for opens on +15V and –15V lines. Verify that D1, D2, D5, and D6 are not shorted.

C) Gain Test

1) Turn on Generator, set frequency to 400Hz and level to 1V P/P. Adjust volume control, R16, fully clockwise.

2) Verify that voltage at output, pin 1 of J4 = 3.8V P/P (+/– 100mV).

3). Verify presence of 500mV P/P (+/– 50mV) at pin 1 of U1.

4) Remove oscillator connection to XLR input. Verify resistance from pin 2 of J1 to pin 2 of U2 = pin 3 of J1 to pin 3 of U2 = 6.49k, if this is not the case, check for shorted and/or opened traces of phase switch, SW1. Also verify resistance from pin 2 to pin 1 of U2 = pin 3 of U2 to ground = 3.2k, if not, check for opened and or shorted traces around U2.

5) Rotate volume control counter clockwise while monitoring voltage at the junction of pin 2 of R16 and C10. Voltage should gradually decrease to zero. If level is intermittent or control does not attenuate, replace defective pot R16.

D) Common Mode Rejection Test

Set Generator output drive to unbalanced. Adjust frequency to 400Hz. Bring volume control fully clockwise and adjust oscillator output to obtain 4V P/P at pin 1 of J4. Lift leg of R1 that is closest to J1 and solder it to leg of R2 that is closest to J3. Reapply power to board and verify that the voltage present at pin 1 of J4 is less that 250mV P/P.

E) "Phase LED Test"

Set phase switch in, SW1, and verify that "Phase" red LED, D4, lights. If the voltage across D4 is greater than 3V, replace LED.

F) Signal Indicator Test

Set oscillator frequency to 400Hz. Adjust oscillator level for 300mV P/P on pin 1 of U2. Verify that signal LED, D7, is on. Turn off oscillator and verify that signal indicator turns off. If the above test fails:

1) LED may be defective, and check traces around it.

2) Check reference voltage at pin 8 of U1 = –100mV, and for any short or open circuits around U1.

3) With oscillator off, check that there is 0V DC at pin 1 of U2, if the voltage is greater than 0V, U2 may either be defective or have one of its input pins (2 or 3) disconnected (open trace) from the rest of the circuit.

G) Peak Indicator Test
Set oscillator frequency to 100 Hz, and Volume control, R16 fully clockwise. Adjust oscillator level for 4V P/P on pin 1 of J4. Verify that Peak LED, D3, as well as Signal LED, D7, are on. Turn volume control down and verify that Peak indicator turns off. If the above test fails, check reference voltage at pin 4 of U1 = –730mV, also check for any short or open circuits around U1.

Amp Assembly Trouble-shooting EON PowerSub

A) Initial Setup
The easiest way to drive the EON PowerSub Main Board is to connect it to an EON PowerSub Input Board. Interconnect both boards using a 6-pin cable assembly. Advance Volume control on input board, R16 fully clockwise. Attach power transformer to J5. Adjust bias control, R17, fully counter clockwise if at all uncertain about the bias adjustment being correct. Connect the output to a 4ohm load. Connect generator output to input board's XLR connector. Generator output should be turned off.

B) Main Loop Test
Monitor +15V supply while slowly advancing Variac that is powering primary of power transformer. Watch the input watt meter, as well as the input volt meter. Verify the following:

1. Excessive power not pulled. Slowly advance input power (Don't allow +15V supply to go higher than 16V). If power pulled is greater than 20W, before reaching 120VAC in, refer to "Excessive Line Power Test".

2. As you ramp up the input voltage verify that +/– 15V supply stays in regulation. If supply is non-existent or excessive refer to "+/– 15V Supply Test".

3. Check for the presence of +/– 48V at test points 1 and 8 (TP1, TP8). If low or nonexistent refer to "+/– 48V Supply Test".

4. Check for the presence of +/– 95V at test points 2 and 5 (TP2, TP5). If low or non-existent refer to “+/– 95V Supply Test”.

5. Verify that “Mute Line” voltage at pin 7 of IC U1B is at 15V. Remove power to unit and verify that mute line immediately goes low (–15V). Re-power board and verify that mute line initially goes high. If any of the above is not true refer to “Amplifier Muting Test”.

C) Confirmation of Low Frequency Chain

Turn Generator off, verify 4mV of bias voltage at test point 3 (TP3). Adjust bias pot, R17, for 4mV DC +/– 300uV (20mA) if required. Measure at the output of the amplifier (J1, red lead) and confirm less than +/– 50mV of offset. Turn on Generator and adjust frequency to 100Hz. Adjust oscillator amplitude to obtain 60V P/P at amp output. The waveform should be a nice clean sine wave. The amp will begin to clip at around 87V P/P. If the amp prematurely clips, verify that the input to the amp is not clipped. The amp input can be measured at the junction of R35 and C20. With 60V P/P at the amp output there should be around 1.7V P/P at the input to the amp. If one or more of the above tests fails, proceed to “Power Amp Test”.

Adjust oscillator for 1.7V P/P at pin 1 of U1A. Verify that the voltage at the input to the filter, pin 1 of J3, is about 2.7V P/P. If not, check for shorts or open circuits around filter IC’s (U2A, U2B and U1A).

E) Excessive Line Power Test

Verify the correct polarity and that none of the following parts are shorted:
C4, C10 (Main Filters), D13, D14 (Low Frequency Power Amp), D9 - D12, C11, C13, C3, C12 (+/– 95V Doublers). Verify that no section of BR1 (Main Bridge) is shorted. Verify that the +15V and –15V supplies are not shorted. Return to “Main Test Loop” when fault fixed.

F) Supply Test

+/– 15V Supply Test

Slowly ramp up Variac, never allowing the supplies to exceed +/– 16V. Measure +15V and –15V supplies. Both should be the correct value +/– .5V.

If supply is very close to ground potential (Less than +/– 100mV) or out of spec check for: shorts on the +/– 15V supplies; for shorted references D1 or D4; for open or incorrect reference bias sources R12 and R19; for open series pass devices Q4 and Q6; for proper polarity and value of C5 and C8; for excessive current being pulled (Do U1 and U2 run hot?).

+/– 48V Supply Test

Look for open traces between main bridge, BR1 and main filter capacitors, C4 C10. Look for open traces between BR1 and power input connector, J5. Verify that BR1 is not open. Return to “Main Loop Test” after fault found.

+/– 95V Supply Test

Check for correct value of R31 and R29 (3.24k) and verify 1.4V DC across them when board is powered. Check for correct values of R30, R24 (464) and R23, R7 (150 ohms) and verify 750mV DC (+/– 100mV) across them. Check for correct values of R2 and R25 (0.1 ohms, 3W) and verify 5mV (or similar to bias setting) across them when board is powered. If any of the above is not true proceed to “Power Amp Test”.

G) Amplifier Muting Test

1. Power up board and measure voltage at junction of D18, R43, and C24. The voltage should be around 46V DC. If voltage is negative check polarity of D18.

2. Power up board while monitoring collector of Q19. Voltage should ramp from zero to around –8V in around 2 seconds and eventually –15V. If collector remains close to zero check: for collector to emitter short on Q19; for incorrect value R45; and for shorted SW1.

3. Interrupt power while monitoring collector of Q17. The voltage should quickly change to +15V and eventually to zero volts. If it doesn’t check C25 and Q19.

4. With negative voltage applied to pin 6 of U1B, pin 7 of U1B will be at 15V. If not, check for short or open traces around pins 5 and 6 or replace IC U1.

H) Power Amp Test

1. Amp pulls excessive power when board is connected.

a. Verify correct values of Q1, Q2 (2SC3201), Q3 (2SD1763A), Q7 (2SB1186A), Q8, Q9 (2SA1302). Look for possible shorts in the areas where these parts are. All the above parts form the “Current Amplifier” (Providing current gain). Everything from Q10, Q12 and before, form the “Voltage Amplifier” (Providing voltage gain).

b. If output voltage is at ground potential (test point 4, TP4), and output leg is not shorted, there could be a problem with the bias reference. Check transistor Q5 (2SD1763A), make sure base is not shorted to emitter, check resistor R15, R14, R13 and potentiometer R17.

c. If the output voltage is offset (+LF test point) from ground there could be a problem in the voltage amp. Jumper across base of Q3 and Q7 and then bring this point to ground. If the output voltage is close to ground potential, remove jumper and check transistors in the “Voltage Amplifier” area, Q10 - Q15. If the voltage does not center, then the problem is in the current amplifier. Check for shorts on all elements (base to emitter, base to collector, collector to emitter) of Q1, Q2, Q3, Q7, Q8, and Q9.

2. No output from the amp when driven.

Verify signal at base of Q17. If there is no signal check the low frequency filter section (U2A, U2B and U1A). Verify that junction of R41 and pin 7 of U1B is around 15V. If not close to 15V refer to “Amplifier Muting Test”. If all of the above is OK check the “Voltage Amplifier” area.

3. Amplifier AB Crossover distortion in output.

This is caused by both halves of the output stage (Q1, Q2 on positive side, and Q8, Q9 on the negative side) being turned off right around crossover (crossover from positive drive to negative drive). This actually takes a small chunk (sometimes only visible in distortion waveform) out of the center of the output waveform. This also causes some harmonic distortion. Remove input signal to amp and measure DC voltage across emitters of Q2 and Q8 (TP3). Bias adjustment, R17, should allow adjustment from zero volts to well over 10mV.

4. Bias Reference Test.

The purpose of the bias reference circuit is to provide bias to the driver and output transistors to just barely turn them on. Q10 is a positive current source and Q12 a negative current source. The voltage between the collectors of Q10 and Q12 is regulated by the bias reference.

A voltage of around .6V is required across the base emitter junction of a transistor to begin to turn it on. Since a total of 4 junctions are in the current amp (Q3, Q1, Q7, and Q8) the bias reference needs to have around 2.4V (4 drops) across it to turn on all four transistors in the current amplifier.

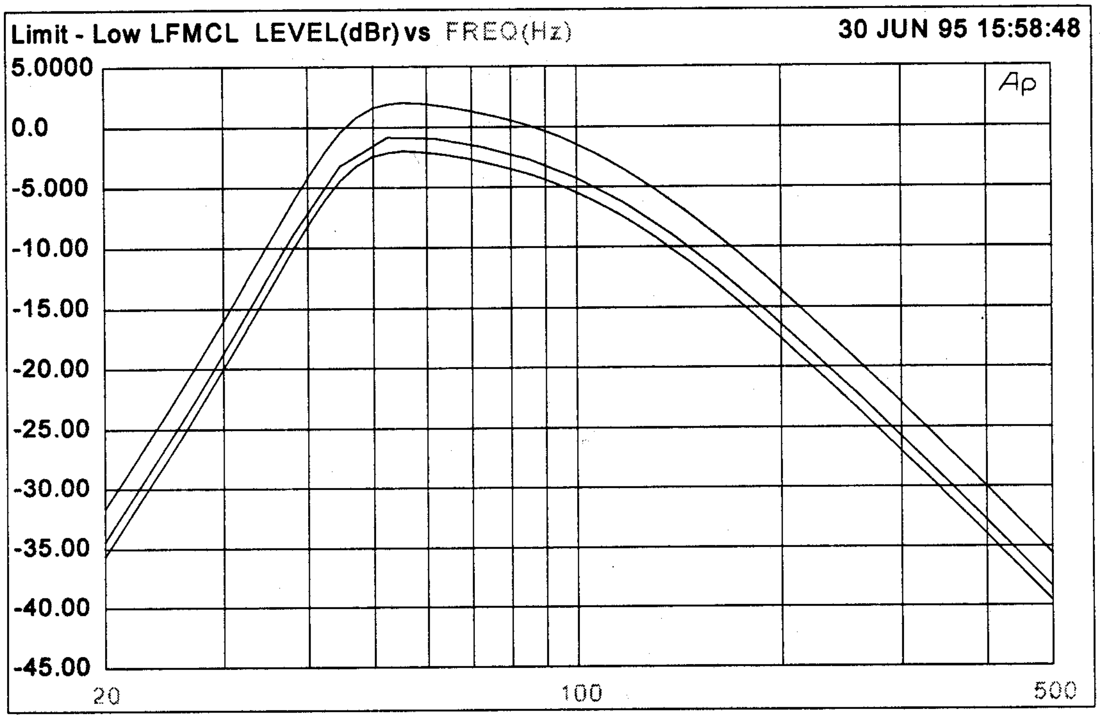
The range of adjustment is very small (Between 1.7V and 2.8V when R17 adjusted from stop to stop). The reason the adjustment range is small, is because very little change in voltage across the reference produces radical bias current changes in the output stage (Due to the logarithmic relationship between base emitter voltage to collector current). Too great a range results in a control that is very hard to adjust.

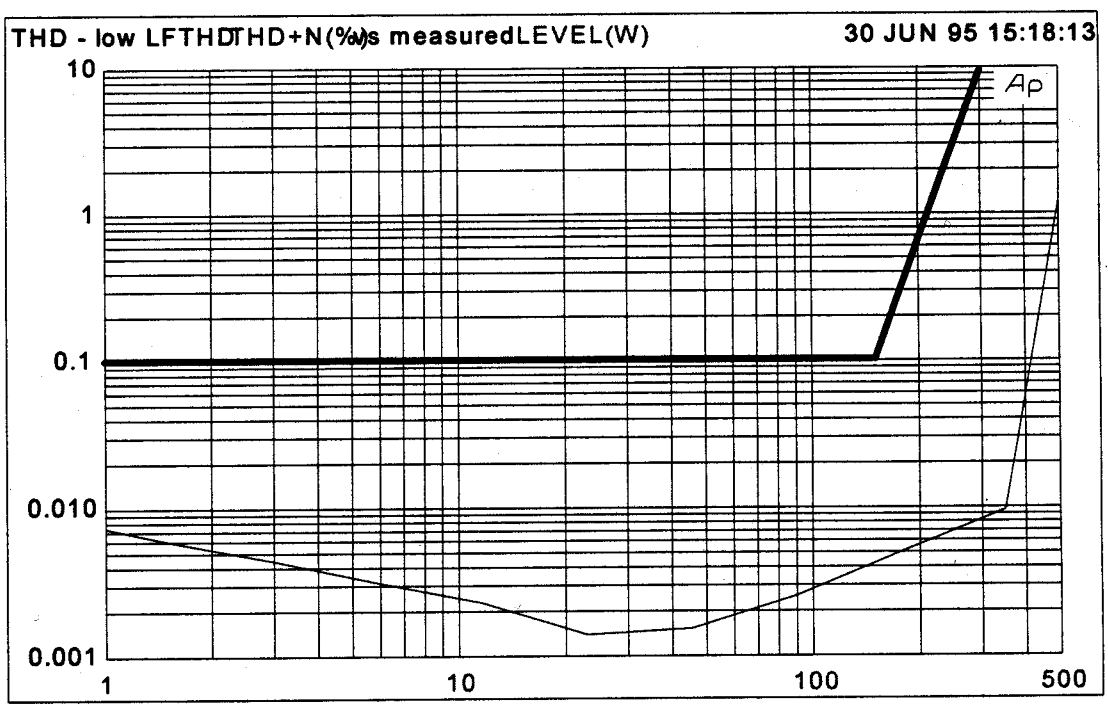
If there is excessive power pulled from AC line or crossover distortion, this is due to excessive voltage across reference. The range (measure across C2) should be 1.7V to 2.8V. if not check R15, R17 (pot), R13, and Q5.

5. After amplifier heats up, bias current and power pulled from AC line, increases.

This is due to the fact that the bias circuit not tracking the current amplifier with temperature. Make sure that all of the transistors, Q1, Q2, Q3, Q5, Q7, Q8, and Q9 make good thermal contact with the heatsink (Hardware is tight, adequate thermal grease is on devices, insulators, and heatsink). If all of this is OK replace Q5.

Low Frequency Response EON PowerSub





Signal Input Assembly Trouble-shooting
EON Power10

A) Initial Setup

Connect board under test to a +/– 15V power supply at the designated connector pins. Connect Porta-one Generator (or a function generator) output A to XLR input connector.

B) "Mic" LED Test

Turn Generator A off. Place Mic/Line switch, S1 in "Mic" position, power up board and verify that "Mic" LED, D6, lights. If the voltage across D6 is greater tan 3V, replace LED. If LED doesn't light check power supply (see "C" below) and check IC, U2.

C) Power Supply Test

Verify that +15V and –15V supplies are at the correct levels.

Check for shorts from +15V to ground, –15V to ground, and +15V to –15V. Check for opens on +15V and –15V lines. Verify that D1 - D4 are not shorted.

D) Line Amp Gain Test

1) Place Mic/Line switch. SW1, in "Line" mode (switch out), set generator level at 1V P/P at XLR input connector. Adjust volume control, R25, fully clockwise, set frequency to 400Hz.

2) Verify that voltage at output, pin 1 of J1 = 800mV P/P (+/– 100mV).

3) Verify presence of 400mV P/P (+/– 50mV) at pin 1 of U1.

4) Remove oscillator connection to XLR input. Verify resistance from pin 2 of J2 to pin 3 of U1 = Pin 3 of J2 to pin 3 of U1 = 24.23K. If not, check for shorted sections of SW1. Verify resistance from pin 2 to pin 1 of U1 = pin 3 of U1 to ground = 10K. If not check for opens and shorts around U1.

5) Rotate Volume control counter clockwise while monitoring pin 2 (see schematic) of R25. Voltage should gradually decrease to zero. If the level is intermittent or control does not attenuate, replace defective potentiometer R25.

E) Line Amp Frequency Response Test

Advance volume fully clockwise and adjust for 800mV P/P at pin 1 of J1. Change Frequency to 20kHz and verify a level of 750mV (+/– 100mV). Change frequency to 20Hz and verify a level of 750mV (+/– 100mV).

F) Mic Amp Gain Test

Push Mic/Line switch, SW1, in. Set volume control, R25 fully clockwise. Adjust for 20V P/P at pin 1 of J1. The input level to the board should be 20mV P/P (+/– 1mV). Verify that voltage at pin 1 of U1 is equal to 150mV P/P (+/– 20mV).

G) Mic Amp Frequency Response Test
Adjust for 20V P/P at 400Hz at pin 1 of J1. Adjust frequency to 20kHz and verify 20V P/P (+/– 1V) at pin 1 of J1. Adjust frequency to 20Hz and verify 14V P/P (+/– 2V) at Pin 1 of J1.

H) Signal Indicator Test
Set oscillator frequency to 400Hz, Mic/Line switch, SW1 to “Mic” position (In). Adjust oscillator level for 150mV P/P on pin 1 of U1. Verify that signal LED, D7 is on. Turn off oscillator and verify that signal indicator turns off.

I) Peak Indicator Test
Set oscillator frequency to 400Hz, SW1 to “Mic” position (In), and Volume control, R25 fully clockwise. Adjust oscillator level for 20V P/P on pin 1 of J1. Verify that Peak LED, D5, as well as signal LED, D7 are on. Turn volume control down and verify that Peak indicator turns off.

Amp Assembly Trouble-shooting EON Power10

A) Initial Setup
The easiest way to drive the EON Power10 Main Board is to connect it to a known good EON Power10 Input Board. Interconnect both boards using a 7-pin cable assembly. Place the input board in “Line” mode (SW1 out). Advance volume control on input board, R25, fully clockwise. Attach power transformer to J7. Connect the low frequency output to a 4 ohm load and the high frequency output to a 8 ohm load. Connect generator output to input board’s XLR connector. Generator should be turned off.

B) Main Test Loop
Monitor +15V supply while slowly advancing Variac that is powering primary of power transformer. Watch the input watt meter, the input volt meter, and the voltmeter on the +15V supply. Verify the following:

1. Excessive power not pulled. Slowly advance input power (Don’t allow +15 supply to go higher than 16V). If power pulled is greater that 20W, before reaching 120VAC in, refer to “Excessive Line Power Test”.

2. As you ramp up the input voltage, verify that +15V supply stays in regulation. If supply is non-existent or excessive refer to “+/– 15V Supply Test”. Verify –15V supply is proper, if not, refer to above test.

3. Check –31V (TP4) and +31V (TP5). If non-existent refer to “+/– 31V Supply Test”.

C) Confirmation of Low Frequency Chain

Turn on Generator and adjust frequency to 400Hz. Adjust Oscillator amplitude to obtain 50V P/P at amp output. The waveform should be a nice clean sine wave. The amp will begin to clip at around 57V P/P at the output. If the amp prematurely clips verify that the input to the amp is not clipped. The amp input can be measured at the junction of C13, R7, and R6. With 50V P/P at the amp output, there should be around 1.8V P/P at the input to the amp. If one or more of the above tests fails, proceed to “High and Low Frequency Power Amp Test”.

If the oscillator is adjusted for 1.8V P/P at pin 1 of U4, the voltage at the input to the filter, pin 1 of J6, should be about 3.1V P/P. If not, check low frequency filter IC’s (U3A and U4A).

D) Confirmation of High Frequency Chain

Turn on Generator and adjust frequency to 3kHz. Adjust Oscillator amplitude to obtain 50V P/P at amp output. The waveform should be a nice clean sine wave. The amp will begin to clip at around 58V P/P at the output. If the amp prematurely clips verify that the input to the amp is not clipped. The amp input can be measured at the junction of R9, R10, and R11. With 50V P/P at the amp output, there should be around 3.9V P/P at the input to the amp. If one or more of the above tests fails, proceed to “High and Low Frequency Power Amp Test”.

If the oscillator is adjusted for 4.9V P/P at pin 7 of U4, the voltage at the input to the filter, pin 1 of J6, should be about 7.7V P/P. If not, check high frequency filter IC’s (U3B and U4B).

E) Excessive Line Power Test

Verify correct polarity and that none the following parts are not shorted:
C41, C42 (main filters) and D1, D2, Q1, Q2, C9, C14 and BR1 (Main Bridge). Verify that the +15V and –15V supplies are not shorted. Return to “Main Test Loop” when fault fixed.

Verify that there are no shorts between U1, U2, and their respective heat sinks.

Slowly ramp up input voltage. The voltage at the output pin, of U1, and U2, pin 3, should be less than +/– 10mV. (Use mV scale). Monitor the temperature of U1, with your finger. The temperature should warm up slightly but not excessively. The temperature should not rise more than 10 degrees C after a few minutes of “idle” operation. If any of the above not true refer to “High Frequency Power Amp Test”.

F) Supply Test

+/– 15V Supply Test

Slowly ramp up Variac, never allowing the supplies to exceed +/– 16V. Measure +15V and –15V supplies. Both should be the correct value +/– .5V.

If a supply is very close to ground potential (Less than +/– 100mV check: for shorts on the +/–15V supplies; for shorted references D1 or D2; for open devices Q1 and Q2.

If supply is out of specification (deviation of more than .5V but not close to ground potential) check for: incorrect values of D1, D2, R15 or R16; for proper polarity on C10 and C15; for excessive current being pulled (do U3 and U4 run hot?...etc.) and for base emitter shorts on Q1 (2SB1186A) or Q2 (2SD1763A).

+/– 31V Supply Test
Look for open traces between main bridge, BR1, and main filter Capacitors, C41, C42 and power input connector, J7. Verify that BR1 is not open. Return to “Main Test Loop” after fault found.

G) Amplifier Muting Test
Power up board and measure volatage at junction of D8, R43, and C40. The voltage should be about –28VDC. If voltage is positive check polarity of D12 and check values of R43, R40, C40 and R42. Also check for any shorts around Q5 and D7.

H) High and Low Frequency Power Amp Test
Turn off Generator.

1. Amp pulls excessive power when board is powered.

If the output of the amplifier, pin 3 of U1 (LF) and of U2 (HF), is centered (ground potential) check for short between ground and output pin, pin 3 of U1 and U2. If no shorting problem is found replace U1 or U2 (Depending on which one failed).

If the output pin, pin 3 is offset to one of the power rails, the power consumption should go to normal idle level (less than 40W) if the load is removed. If it does not, check for shorting from the output pin, pin 3 to either the +31V or –31V supplies. If not shorted, replace U1 or U2 (Depending on which one failed).

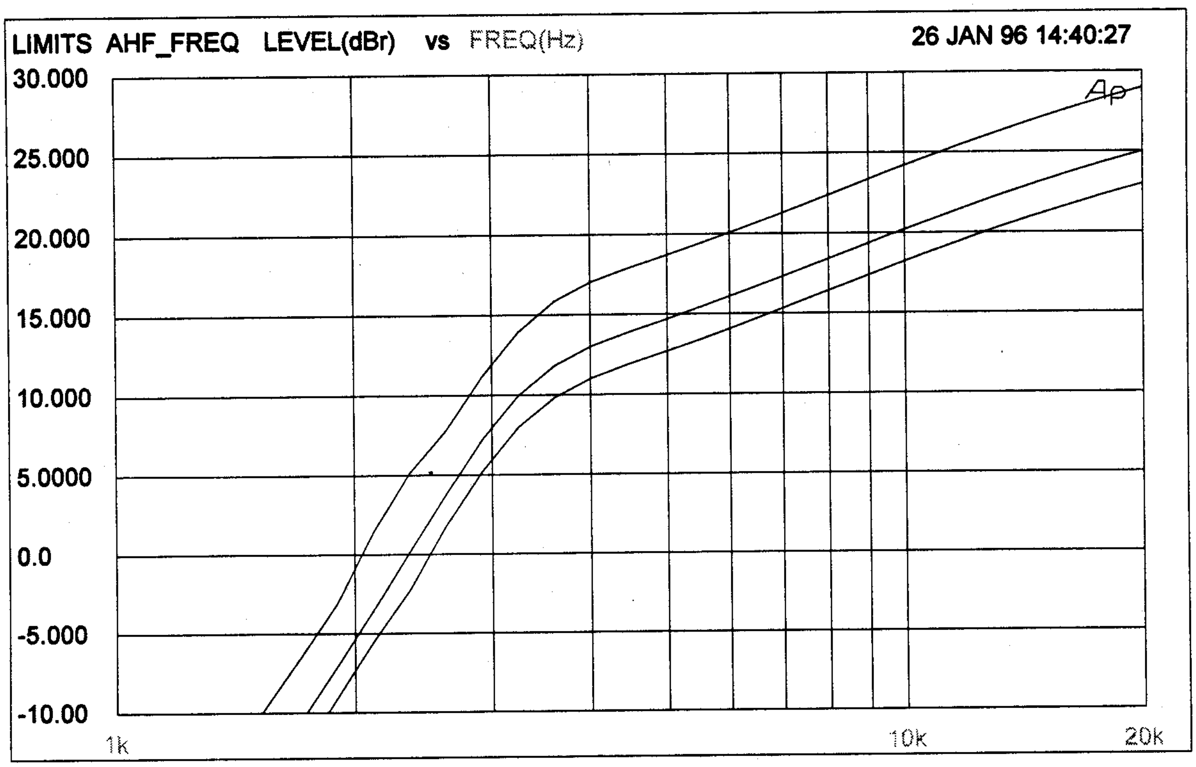
Verify that the input to the amp, pin 10 of both U2 or U1, is close to ground potential. If not close, check for shorts surrounding pin 10. If no shorts are found replace U1 or U2 (Depending on which one failed).

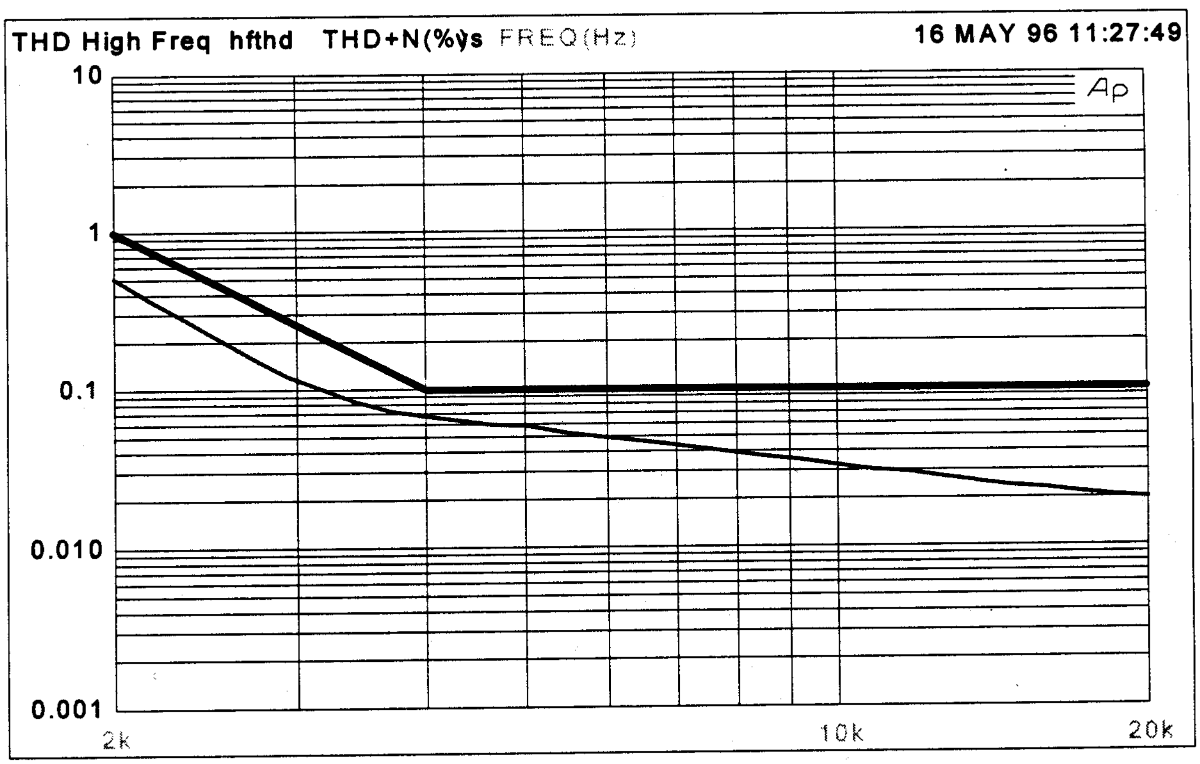
2. No output from the amp when driven.

Verify input to the amp on pin 10, of U1 (LF), if no signal is present verify that there is signal at pin 1 of U4A. If signal is present at U4A verify values of C13, R7, R6, and C7. Verify input to the amp on pin 10 of U2 (HF). If no signal is present verify that there is signal at pin 7 of U4B. If signal is present at pin 7 of U4B verify values of C16, R10, R11 and R14. Look for shorts at pin 10 of both U1 and U2. If nothing is found in above testing replace U1 and U2 (Depending on which one failed).

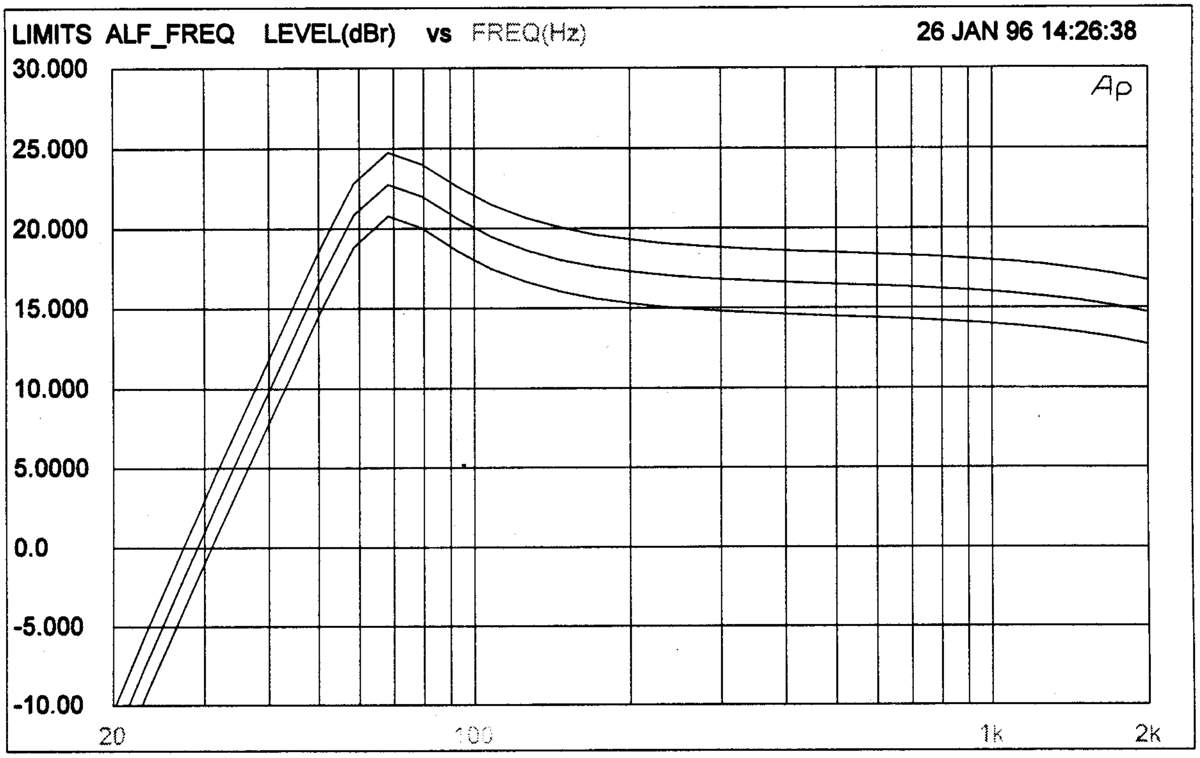
The amp should be out of muting. Verify that pin 8 (Muting pin of U1 or U2) is equal to about –3.4V. If the turn on delay is operating properly (Collector of Q6 at around –15V), and the muting pin is substantially lower or higher than -0.5V, replace U1 or U2 (Depending on which one failed).

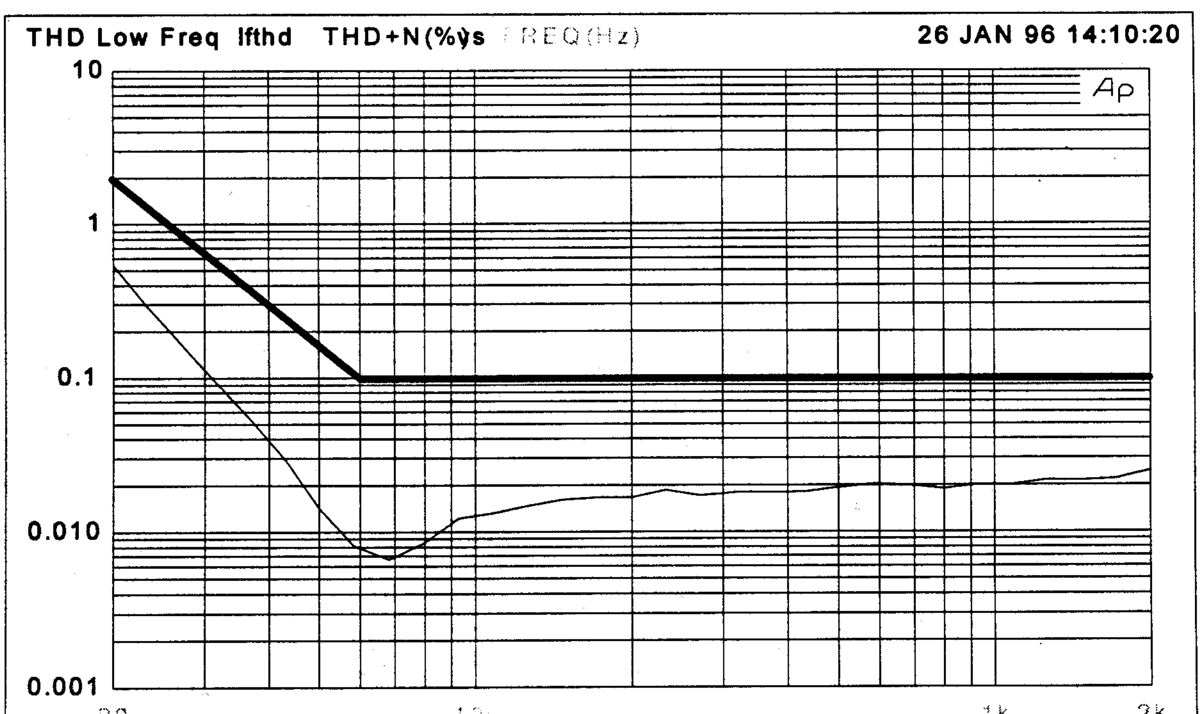
High Frequency Response EON Power10





Low Frequency Response EON Power10





Input Assembly Trouble-shooting
EON 15PAK

A) Initial Setup

Connect board under test to a +/– 15V power supply according to the following pin out: pin 3 = +15V, Pin 4 = –15V and pins 2 and 5 = power ground. Connect a function generator output to XLR input connector.

B) "Mic" LED Test

Turn Generator A off. Place Mic/Line switch, SW1 in "Mic" position, power up board and verify that "Mic" LED, D6, lights. If the voltage across D6 is greater tan 3V, replace LED. If LED doesn't light check power supply (see "C" below) and check IC #6 (power rail pins, pin 3 = +15V, pin 12 = –15V) and check for any shorts or open traces around the IC.

C) Power Supply Test

Verify that +15V and –15V supplies are at the correct levels.
Check for shorts from +15V to ground, –15V to ground and +15V to –15V. Verify that D1- D4 are not shorted.

D) Line Gain Test

1) **Mic Input Gain:** Place Mic/Line switch. SW1, in "Line" mode (switch out), set generator level at 0.5V at 1kHz into XLR input connector J10, channel 1. Do not plug anything to the Patch nor to the Phone Jacks. Adjust volume control, R47 (Master) and R48 (Channel 1), fully clockwise, and all EQ controls flat (at center detented point).

- Verify that the voltage at pin 1 of J1 is = 1.28V (+/– 100mV).
- Verify 215mV (+/– 50mV) on pin 1 of U1A and pin 1 of U3A (Meter Feed).
- Verify 430mV (+/– 50mV) on pin 7 of U1B.
- Verify 0.5V on pin 1 and 7 of U7, pin 1 and 7 of U8.
- Verify 400mV (+/– 25mV) on pin 1 of U4A. If voltage is low inspect Effects Patch input output jack and traces/solder around it.
- Verify 1.28mV (+/– 100mV) on pin 7 of U4B.

2) **Channel 2 Gain:** Since channels 2 and 3 are electronically identical, we will discuss channel 2 only. Please refer to schematic for channel 3. Make sure that nothing is plugged into Patch and Phone Jacks. Set generator level at 0.5V, 1kHz, at 1/4' input jack connector J5, channel 2. Adjust volume controls, R47 (Master), and R49 (Channel 2 Volume), fully clockwise. Set all EQ controls to flat (at center detented point).

- Verify 0.5mV (+/– 25mV) on pin 1 of U2a (U2B).
- Verify 0.5V (+/– 25mV) on pin 2 of R49 that is located on the control board.
- Verify that there is 0.5V (+/– 25mV) on pin 1 and 7 of U7, and pin 1 and 7 of U8.

3) **Low Mid Frequency Band**: Using the Mic input at mic level (i.e. Switch SW1 in), set the input signal to –60dBu at 400Hz. Verify that the output at pin 1 of J1 is approximately 9.3 dBu.Turn Low Mid Frequency EQ control fully clockwise and verify that pin 1 of J1 is now approximately 21.6 dBu. Turn same knob fully counter clockwise and verify that pin 1 of J1 has now decreased to –3 dBu. If none of the above is true, check U8A, C46, C47, R60, R65, R64, and all traces/solder around them. If all the above is true, set knob back to center detented point and go to the next frequency band.

4) **High Mid Frequency Band:** Using the Mic input at mic level (i.e. Switch SW1 in), set the input signal to –60 dBu at 2.5kHz. Verify that the output at pin 1 of J1 is approximately 9.3 dBu. Turn High Mid Frequency EQ control fully clockwise and verify that pin 1 of J1 is now approximately 21.2 dBu. Turn same knob fully counter clockwise and verify that pin 1 of J1 has now decreased to –2.8 dBu. If none of the above is true, check U8B, C45, C56, R74, R63, R59, and all traces/solder around them. If all the above is true, set knob back to center detented point and go to the next frequency band.

5) **High Frequency Band:** Using the Mic input at mic level (i.e. Switch SW1 in), set the input signal to –60 dBu at 12kHz. Verify that the output at pin 1 of J1 is approximately 9.0 dBu. Turn High Frequency EQ control fully clockwise and verify that pin 1 of J1 is now approximately 21.2 dBu. Turn same knob fully counter clockwise and verify that pin 1 of J1 has now decreased to –3 dBu. If none of the above is true, check U7A, C43, R69, R58, and all traces/solder around them.