

- c. Remove the 2 ohm load and place a 159 microhenry inductive load on the output. Observe the output waveform. It should be similar to that in **Illustration 6-3**.

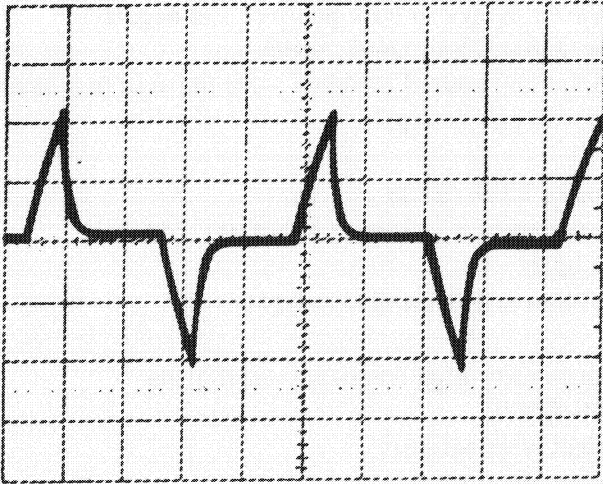


Illustration 6-3
Protection Circuit
Memory Waveform

6.1.5 Intermodulation Distortion

- a. Using a 60Hz - 7kHz signal summed in a 4:1 ratio (S.M.P.T.E. method) on the input of the amplifier with an 8 ohm load on the output, insure that the following specs are within tolerance at a rated power output of 80 watts. 0dB through -25dB less than .01% -30dB through -40dB less than .03%

6.1.6 IOC Circuit

The IOC indicator should illuminate when the output signal is driven into clip.

6.1.7 Signal to Noise

- a. With the input level controls fully CCW, use a 20Hz to 20kHz bandpass filter on the output of the amplifier to measure the signal to noise ratio. Insure that it's greater than 110dB below the rated output power.

6.1.8 Quiescent AC Power

Quiescent power should be less than 30 watts with a line voltage of 120VAC. 20 watts is typical.

6.1.9 Mono Operation

Using only channel one for an input signal, insert a 1kHz sine wave with the dual/mono switch in the mono position. Observe that channel two is 180 degrees out of polarity from channel one. Channel one input level control should vary both channel one and two output signal.

6.2 Troubleshooting Chart

The following chart will be helpful in identifying symptoms and possible defects in the operation of model D-150A. For more detailed troubleshooting contact the Crown engineering.

| Symptom | Defect |
|-------------------------------------|--|
| Blows Fuse | <ol style="list-style-type: none"> 1. Rectifier block shorted, DM 1 2. C1 shorted 3. Leaky or shorted filter capacitors C2, C3 4. Bootstrap supply AC wire frayed and shorts to positive supply trace on Main Board 5. Shorted power transformer TI 6. A shorted power device in both positive and negative output stage Q301, Q303, Q401, Q403 7. Fuse blown due to external problem -- wrong size fuse inserted 8. Pinched wires in power supply |
| No Output Stage Bias | <ol style="list-style-type: none"> 1. No bias resistor R128, R228 2. Bias resistor connector to circuit board not soldered 3. L100, L200 open 4. C-E short of bias transistor Q111, Q211 |
| High Bias (amplifier heats up) | <ol style="list-style-type: none"> 1. Amplifier instability-high frequency oscillation (check Q106, Q206) 2. Shorted output terminal post 3. DC offset (see offset section) 4. Leaky output device (may pass signal and show okay with continuity test) Q110, Q210, Q114, Q214 |
| Negative Offset -Both Channels- | <ol style="list-style-type: none"> 1. Defective IC op amp 2. D5 shorted 3. Q101, Q201 leaky or shorted |
| Positive Offset -Both Channels- | <ol style="list-style-type: none"> 1. Defective IC op amp 2. D4 shorted |
| Positive Offset -Single Channel- | <ol style="list-style-type: none"> 1. Defective IC op amp 2. Q100, Q200 leaky or shorted 3. Q101, Q201 open 4. Q106, Q206 open, leaky or shorted 5. Q105, Q205 open, leaky or shorted 6. Positive predriver, driver or output device leaky or shorted Q107, Q207, Q109, Q209, Q110, Q210 7. Q111, Q211 shorted |

Table 6-1
Troubleshooting

| Symptom | Defect |
|-------------------------------------|--|
| Negative Offset -Single Channel- | <ol style="list-style-type: none"> 1. Defective IC op amp 2. Mono switch hot wire shorted to ground 3. Negative predriver, driver or output device leaky or shorted Q112, Q212, Q113, Q213, Q114, Q214 4. Q101, Q201 base to collector leakage |
| Small DC Offsets | <ol style="list-style-type: none"> 1. Broken Ground on input level control (R105, R205) 2. Input jack hot lead and ground pin not shorted together (level controls full up with no input jack) 3. D100, D200 leaky or shorted |
| Negative half of Signal missing | <ol style="list-style-type: none"> 1. Q112, Q212 open 2. Violet/white wire from main board to output board open or not soldered |
| Positive half of Signal missing | <ol style="list-style-type: none"> 1. Bootstrap supply <ol style="list-style-type: none"> a. C4 open b. D1 or D2 shorted c. Green AC wire not soldered correctly 2. Q102, Q202 open 3. Loss of positive supply voltage (+45V) 4. D3 shorted 5. Q108, Q208 open, leaky or shorted 6. Q107, Q207 open 7. R300, R400 open 8. Yellow/white wire from main board to output board open or not correctly soldered |
| Oscillation (Full waveform) | <ol style="list-style-type: none"> 1. R106, R206 open 2. C116, C216 open |
| Oscillation (Positive half) | <ol style="list-style-type: none"> 1. Defective IC op amp 2. Defective driver, Q300, Q400 3. C113, C213 open |
| Oscillation (Negative half) | <ol style="list-style-type: none"> 1. Defective IC op amp 2. C112, C212 defective 3. Defective driver, Q113, Q213 |

**Table 6-1 (cont.)
Troubleshooting**

| Symptom | Defect |
|--|---|
| Protection Circuit -No current limiting | <ol style="list-style-type: none"> 1. Current limiting transistor open <ol style="list-style-type: none"> a. Positive (Q103, Q203) b. Negative (Q104, Q204) 2. D101, D201, D107, D207 open 3. D118, R218, R119, R219 open 4. C108, C208, C109, C209 open |
| -Excessive limiting | <ol style="list-style-type: none"> 1. D101, D201, D107, D207 shorted 2. Q103, Q203, Q104, Q204 shorted 3. Loose output hardware |
| -Current limiting oscillation- | <ol style="list-style-type: none"> 1. Negative feedback capacitor, in limiting transistor circuit defective, positive C107, C207, negative C110, C210 |
| -Flyback pulses from inductive loads | <ol style="list-style-type: none"> 1. C108, C208, C109, C209 open |
| Clipping (negative) Both Channels | <ol style="list-style-type: none"> 1. D5 open or leaky 2. D2 open or leaky 3. Defective IC op amp |
| Clipping (positive) Both Channels | <ol style="list-style-type: none"> 1. D4 open or leaky 2. D3 open or leaky 3. Defective IC op amp 4. D1 or D2 open (positive portion of signal will clip at a 60 Hz rate) 5. C4 open or changed in value |
| Clipping (negative) Single Channel | <ol style="list-style-type: none"> 1. Open or leaky predriver Q112, Q212 2. Shorted or leaky limiting transistor Q104, Q204 3. L100, L200 open 4. Open output emitter resistor R303, R403 5. Q115, Q215, Q116, Q216 on IOC board defective |
| Clipping (positive) Single Channel | <ol style="list-style-type: none"> 1. Open or leaky predriver, Q107, Q207 2. Shorted or leaky limiting transistor Q103, Q203 3. Open output emitter resistor R301, R401 4. Defective IC op amp 5. Q102, Q202 defective |

**Table 6-1 (cont.)
Troubleshooting**

| Symptom | Defect |
|----------------------------|--|
| High IM (Load Related) | <ol style="list-style-type: none">1. R9 (1 ohm) open2. Defective IC op amp3. C101, C201 open4. C114, C214 open5. Q106, Q206 defective6. Defective predriver or driver device Q107, Q207, Q112, Q212, Q300, Q400, Q302, Q402 |
| Low dB IM | <ol style="list-style-type: none">1. Low output Bias2. C102, C202 open3. C104, C204 open |
| High IM (Not Load Related) | <ol style="list-style-type: none">1. R115, R215 changed in value2. R109, R209 changed in value3. C105, C205 changed in value4. C106, C206 changed in value |
| 120 Hz in output waveform | <ol style="list-style-type: none">1. Power Supply filter capacitor(s) open, C2, C32. C5 open3. Power Supply filter capacitor mounting hardware loose |
| High noise | <ol style="list-style-type: none">1. Input jacks not isolated from chassis ground2. Noisy zener diode, D33. Broken ground on input jack, in input cable or on input level control (R105, R205)4. Oscillation (C101, C201 open) |

**Table 6-1 (cont.)
Troubleshooting**

6.3 .775 V RMS Conversion

D-150A II models with serial numbers 59429 and higher carry a main circuit board with the Crown part number Q42531-6. This board incorporates several modifications from earlier models:

- a. New dual LF 357H operational amplifiers in the front end.
- b. New IOC circuitry.
- c. An option of having a 0 dB (.775 V RMS) input sensitivity.

Note that this later version of the D-150A II main circuit board is not interchangeable with earlier types of boards. The Appendix includes the layout parts lists and schematic for both board versions.

Here are the procedures to convert the Q42531-6 main board to the .775 V RMS input sensitivity:

- 1. Disconnect AC Power.
- 2. Remove dress plate and perforated main circuit board cover.
- 3. Solder #22 buss wire jumpers at locations R146 and R246.

This conversion will result in the changes to operating specifications:

Stereo Voltage Gain: 21.6 +/- 2% or 26.7dB +/- .02dB.

Monaural Voltage Gain: 43.2 +/- 2% or 32.7Db +/- .02dB.

Input Sensitivity: .775 +/- 2% for 80 watts into 8 ohms stereo or 160 watts into 16 ohms mono.

6.4 Voltage Conversion

Often Crown products are purchased in one country and later moved to another requiring an AC mains conversion. For this reason, the following procedure and chart as well as a world-wide voltage map is provided.

The D-150A II power supply may be connected for any of five voltages. Converting from one to the other is accomplished by unsoldering and reconnecting wire jumpers between terminal connectors.

- 1. Remove front panel as described in Section 7.4.
- 2. Locate the voltage conversion terminal strips, (26) and (27) in Illustration 7-2. Unsolder and move the jumper wires as necessary by referring to Illustration 6-5 for desired AC line voltage.
- 3. For all voltages 200V and higher, the fuse must be changed from a 6.25 amp to 3 amp.
- 4. Install the front panel.

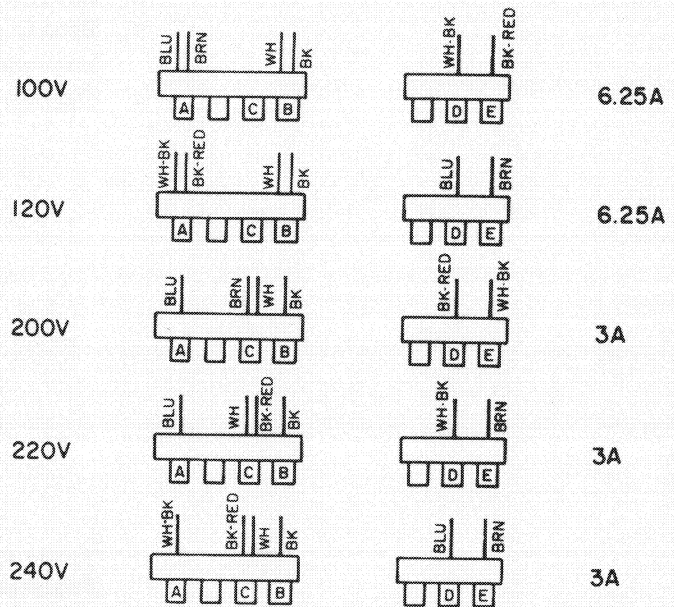


Illustration 6-4
Voltage Conversion

The following are a number of operating precautions given as an aid to understanding proper and improper amplifier usage.

1. Use care in making connections, selecting signal sources and controlling the output level. Crown is not liable for damage done to loads.
2. Never parallel the output with any other amplifiers output or parallel the two channels of the D-150A II amplifier. Damage incurred by such operation is not covered under warranty.
3. Never drive a transformer-coupled device or any other device which appears as a low frequency short (less than 3 ohms at DC) without a series isolating capacitor. Such operation may damage the device and/or needlessly waste output power.
4. Do not connect the ground lead of the output cable to the input signal ground as oscillations may result from forming such a loop.
5. Never connect the output to a power supply, battery, or power main.
6. Operate the amplifier from AC mains of not more than 10% above or below the selected line voltage and only 50/60Hz AC. Failure to comply with these frequency limits voids the warranty.
7. Tampering in the circuitry by unqualified personnel or the making of unauthorized circuit modifications may seriously degrade the performance of the amplifier and possibly invalidate the warranty.

6.5 Controls and Adjustments

The following paragraphs refer to the front and rear panel diagrams (**Illustration 3-1** and **Illustration 3-2**).

6.5.1 Power Switch/Indicator

This button, when depressed, will activate the D-150A II and also cause the amber LED indicator to illuminate if proper power requirements are met.

6.5.2 Input Level Controls

Both Input Level Controls provide control of the input signal level by channeling the input signal through 25K ohm audio taper potentiometer.

6.5.3 IOC Indicators

The IOC (Input Output Comparator) indicators are the two red LED indicators located on the front panel and help the user identify problems the unit may experience, such as input signal overload, improper load impedance, or even an amplifier based problem. Occasional flashing with music program peaks is normal, however, continuous illumination indicates a problem and should be investigated.

6.5.4 Input Phone Jacks

Input signal hook-up is through conventional unbalanced 1/4" phone jacks. Refer to the Instruction Manual for complete information on connecting input lines to the unit.

6.5.5 Mono/Dual Switch

This rear panel switch determines whether the unit is to perform as a single (mono) or dual (stereo) channel amplifier.

6.5.6 Fuse

Fuse replacement should not normally be necessary unless AC main voltage conversion is needed (see **Section 7.10**) or if the fuse has blown due to improper AC voltage or the amplifier develops an internal problem.

6.5.7 AC Line Cord

The D-150A II is furnished with a three wire, heavy duty AC cord and plug as standard equipment. Use caution with the third wire ground since it may introduce a ground loop in the system. A three-to-two plug adapter may be needed to prevent ground loop problems. Contact Crown Technical Service Department for further information if grounding problems are suspected in a particular system hook-up.

NOTE: Crown assumes no liability whatsoever for operation of ungrounded auxiliary equipment, nor for violation of UL or local electrical codes.

6.5.8 Main Output Jacks

The D-150A II main output jacks are of the standard MDP banana style. Refer to the D-150A II Instruction Manual for complete information on connecting output lines and loads to the unit.

SECTION 7: ILLUSTRATED PARTS LIST

7.1 General Information

This section contains illustrations and parts lists that are to be used in conjunction with the service, repair and adjustment procedures contained in **Section 4** of this manual.

Most of the mechanical and structural type parts are illustrated and indexed on exploded view drawings. Electrical and electronic parts on these illustrations are also identified by the circuit schematic designation next to the illustration. Both the index number and the schematic designation are included in the parts list in separate columns. The schematic designations correspond to those shown in schematic diagrams.

Electrical and electronic parts located on printed circuit boards are illustrated by schematic symbols on the trace side and by component shape on the component side. Schematic designations also appear on these diagrams.

The quantity of each part used in each location is also shown in the parts listing.

7.2 Standard and Special Parts

Some electrical and electronic parts used are standard items stocked by and available from electronic supply houses. However, some electronic parts that appear to be standard, are actually special. A part ordered from Crown will assure an acceptable replacement.

7.3 Ordering Parts

When ordering parts, be sure to give the model and serial number and include schematic designation and/or part description and Crown Part Number (CPN) from the parts list. Price quotes are available upon request.

7.4 Shipment

1. Shipment will be made by UPS or best method unless you specify a preferred method.
2. Shipments are made F.O.B. Elkhart, Indiana only.
3. Established Crown accounts will be freight prepaid and billed unless shipped by truck or air freight.
4. All others will be shipped freight collect.

7.5 Terms

NOTE: Part prices are subject to change without notice.

1. Normal terms are C.O.D. The order may also be charged to your Visa or Master Charge account or prepaid.
2. Net 30 days terms apply only to those firms who have an established line of credit with Crown.
3. If prepaying, please add an amount for the freight charge. \$2.50 is average for an order under one pound.
4. New parts returned for credit are subject to a 10% restocking charge.
5. You must receive authorization from the Parts Dept. before returning parts for credit.
6. We are not a general parts warehouse! Parts are available for servicing Crown products only.

7.6 Parts Lists, Exploded Views and Schematics

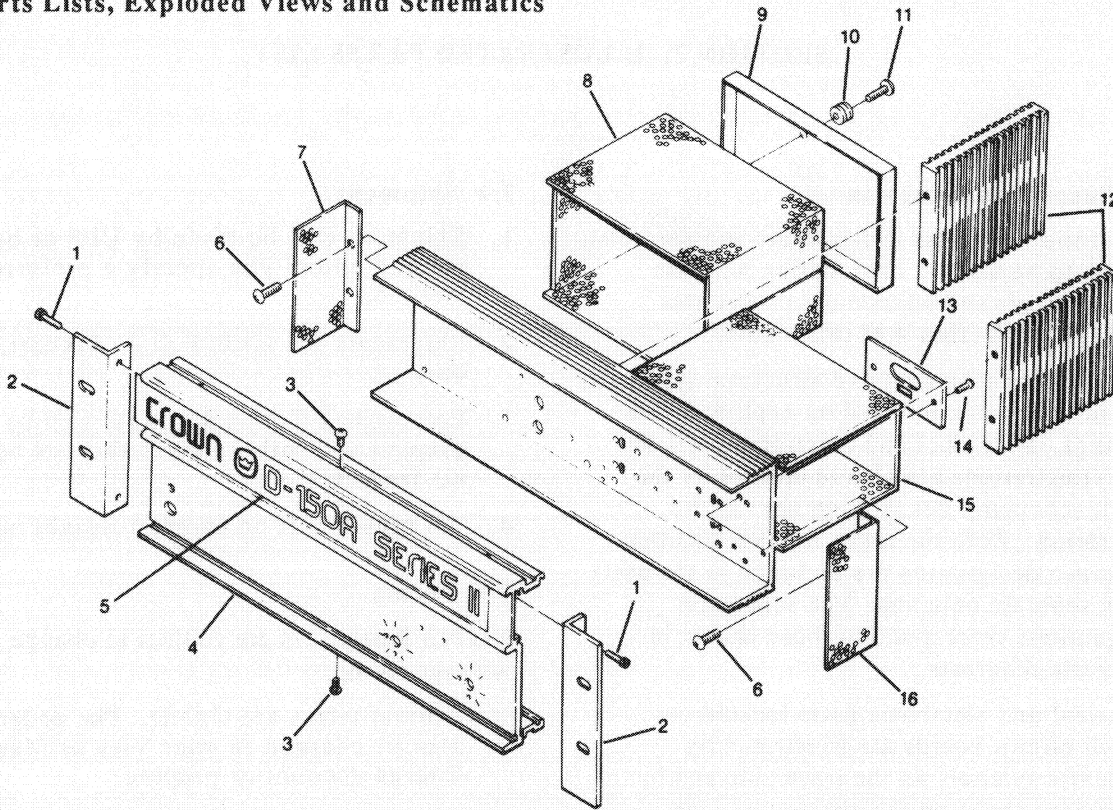


Illustration 7-1
Chassis Assembly

| ITEM # | DESCRIPTION | PART # | REFERENCE |
|--------|-----------------------------------|----------|-------------------------|
| 1 | 6-32 x .75 Hex Screw | C 1858-7 | |
| 2A | 5 1/4" Rack Mount (Charcoal Grey) | D 5708J8 | Serial #62738 and below |
| 2B | 5 1/4" Rack Mount (Carbide Black) | F10940J8 | Serial #62739 and above |
| 3 | 6-32 x .25" Screw | C 4758-6 | |
| 4A | Front Panel (Charcoal Grey) | F10075-4 | Serial #62738 and below |
| 4B | Front Panel (Carbide Black) | F10926J7 | Serial #62739 and above |
| 5 | Front Panel Overlay | F10074-7 | |
| 6 | 10-24 x .75 Self Tap Screw | C 4017-7 | |
| 7 | End Cover | F 9565J6 | Transformer End |
| 8 | Transformer Wraparound | F 9952K3 | |
| 9 | Transformer Cover | F10159J5 | |
| 10 | Rubber Gromet | C 6915-0 | |
| 11 | 10-32 x .5" Screw | C 2049-2 | |
| 12 | Heat Sink | D 3956-6 | |
| 13 | Dress Plate | F 9594K3 | |
| 14 | 8-32 x .37 Screw | C 5297-4 | |
| 15 | PC Board Cover | F 9564K6 | |
| 16 | End Cover | F 9566K1 | PC Board End |