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POWER AMPLIFIER SERVICE MANUAL

D-45 / D-75A

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The information furnished in this manual does not include all of the details of design, production, or variations of the equipment. Nor does it cover every possible situation which may arise during installation, operation or maintenance. If you need special assistance beyond the scope of this manual, please contact the Crown Technical Support Group.

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WARNING

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE!

CAUTION

TO PREVENT SHOCK DO NOT USE THE POLARIZED AC PLUG OF THIS UNIT WITH AN UNPOLARIZED EXTENSION CORD, RECEPTACLE OR OTHER OUTLET WHERE THE BLADES CANNOT BE FULLY INSERTED.

ATTENTION

POUR PREVENIR LES CHOCS ELECTRIQUES NE PAS UTILISER CETTE FICHE POLARISEE AVEC UN PROLONGATEUR. UNE PRISE DE COURANT OU UNE AUTRE SORTIE DE COURANT, SAUF SI LES LAMES PEUVENT ETRE INSEREES A FOND SANS EN LAISSER AUCUNE PARTIE A DECOUVERT.

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Introduction

This manual contains service information on Crown power amplifiers. It is designed to be used in conjunction with the applicable Owner's Manual. However, some important information is duplicated in this Service Manual in case the Owner's Manual is not readily available.

NOTE: THE INFORMATION IN THIS MANUAL IS INTENDED FOR USE BY AN EXPERIENCED TECHNICIAN ONLY.

Scope

This Service Manual comes in several sections. The contents of each section apply to all models listed on the front cover except the Electrical Checkout Procedure sections which are model specific. The information in this manual will cover each version of the models covered with an emphasis on the U.S. (120VAC 60 Hz) version. The sections covered include General Parts Information, Circuit Theory, Specifications, Voltage Conversion, Electrical Checkout Procedures, Exploded Views (mechanical art with parts list), Printed Circuit Board Art (tracework drawings), Module Parts Lists, and Schematics. Note that component parts with circuit board comprise a complete module. Module part numbers are always associated with a specific circuit board, although an unpopulated circuit board

may be built up with different parts to create different modules. Note that Crown does not sell blank (unpopulated) circuit boards.

Each of the compact audio power amplifiers are designed for professional or commercial use. Providing power amplification from 20Hz-20KHz with minimum distortion, they feature balanced inputs with bridged monophonic capability. Specific features vary depending on model family.

Warranty

Each Owner's Manual contains basic policies as related to the customer. In addition it should be stated that this service documentation is meant to be used only by properly trained service personnel. Because most Crown products carry a 3 Year Full Warranty (including round trip shipping within the United States), all warranty service should be referred to the Crown Factory or Authorized Warranty Service Center. See the applicable Owner's Manual for warranty details. To find the location of the nearest Authorized Service Center or obtain instructions for receiving Crown Factory Service please contact the Crown Technical Support Group (within North America) or your Crown/Amcron Importer (outside North America).

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General Parts Information

General Information

Later sections include both mechanical and electrical parts lists for this product. The parts listed are current as of the date printed. Crown reserves the right to modify and improve its products for the benefit of its customers.

Part Numbering Systems

As of the printing of this manual, Crown is using two numbering systems. The elder system always uses eight characters. The first character is a letter. Common letters used are C, D, H, M, P, and Q. The second through sixth characters are numbers. The numbers build sequentially (for each prefix letter) as new parts are added to our parts inventory system. (In some cases there will be a space then a four character number after the prefix letter; the space is considered a character.) The seventh character is usually a hyphen, though it may be a letter to indicate a revision or special note. The last character is called a check-digit, and is useful to Crown for internal tracking.

Crown is in the process of converting to a new part number system. Length may vary from eight to twelve characters. There is still a letter prefix, then five numbers. These five numbers identify a type of part. The seventh character is a hyphen. Remaining characters identify the details of the type of part identified by the first part of the number.

Standard and Special Parts

Many smaller electrical and electronic parts used by Crown are 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. Structural items such as modules and panels are available from Crown only.

Ordering Parts

When ordering parts, be sure to give the product model, and include a description and part number (CPN/DPN) from the parts listing. Price quotes are available on request.

Shipment

Shipment will be normally made by UPS or best other method unless you specify otherwise. Shipments are made to and from Elkhart, Indiana USA, only. Established accounts with Crown will receive shipment freight

prepaid and will be billed. All others will receive shipment on a C.O.D. or pre-payment (check or credit card) basis.

Terms

Normal terms are pre-paid. Net-30 Days applies to only those firms having pre-established accounts with Crown. If pre-paying, the order must be packed and weighed before a total bill can be established, after which an amount due will be issued and shipment made upon receipt of pre-payment. New parts returned for credit are subject to a 10% re-stocking fee, and authorization from the Crown Parts Department must be obtained before returning parts for credit.

Crown is not a general parts warehouse. Parts sold by the Crown Parts Department are solely for servicing Crown/Amcron products. **Part prices and availability are subject to change without notice.**

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Specifications

Unless noted otherwise, all specifications are based on driving an 8 ohm load per channel, both channels driven. The AC supply is 120VAC 60Hz. Crown specifications are guaranteed through the warranty period (normally 3 years). Because our testing methods are more stringent than our published specifications, every Crown amplifier will exceed its published specifications.

Power

Output Power

Note: Maximum average power at 1 KHz with less than 0.1% THD.

D-75A

16 Ohm Stereo—25W/Ch
8 Ohm Stereo—40W/Ch
4 Ohm Stereo—55W/Ch
16 Ohm Bridge Mono—80W
8 Ohm Bridge Mono—110W

D-45

16 Ohm Stereo—20W/Ch
8 Ohm Stereo—25W/Ch
4 Ohm Stereo—35W/Ch
16 Ohm Bridge Mono—50W
8 Ohm Bridge Mono—70W

Load Impedance: Safe with all types of loads. Rated for 4 to 16 ohms in Dual, and 8 to 16 ohms in Bridged Mono mode.

AC Mains: 100, 120, 200, 220, and 240 VAC units are available (all voltage requirements are $\pm 10\%$). 50 to 400 Hz AC mains can be used with international units depending on the transformer configuration. North American 120 VAC, 60 Hz units are not convertible and can only be used at the specified voltage and frequency. Both units draw 15 watts or less when idle. Maximum AC power consumption is 150 watts.

Performance

Frequency Response: ± 0.1 dB from 20 Hz to 20 KHz at 1 watt.

Phase Response: $+10^\circ$ to -15° from 20 Hz to 20 KHz at 1 watt.

Signal-to-Noise Ratio: 106dB below full rated output from 20 Hz to 20 KHz at 1 watt.

Total Harmonic Distortion (THD): Less than 0.001% at full rated output from 20 Hz to 400 Hz increasing linearly to 0.05% at 20 KHz.

Intermodulation Distortion (IMD): Less than 0.05% from 0.01 to 0.25 watts; less than 0.01% from 0.25 watts to full rated output.

Controlled Slew Rate: Greater than 6 volts per micro-

second. (Slew rates are limited to useful levels for ultrasonic/RF protection.)

Damping Factor: Greater than 400 from DC to 400 Hz.

Input Impedance: Nominally 20 K ohms balanced, and 10 K ohms unbalanced.

Output Impedance: Less than 15 milliohms in series with less than 3 microhenries.

Input Sensitivity: 26 dB voltage gain. Configurable for 0.775 volt sensitivity.

Mechanical/Features

Power Switch: A two-position front panel rotary switch.

Level Controls: A detented front panel rotary potentiometer for each channel used to control the output level.

Dual-Mono: A dual-mono jumper located inside the amplifier.

AC Line Connector: Standard three-wire grounded connector.

Power Indicator: This orange indicator shows that the unit has been turned on.

IOC Indicators: A red indicator for each channel flashes if the amplifier causes any distortion of 0.05% or more.

Signal Presence Indicators (SPI): A green indicator for each channel flashes to show that there is amplifier output.

Input Connectors: A balanced three-pin female Neutrik® combination XLR and 1/4 inch phone connector for each channel.

Output Connectors: A four-terminal barrier block (two terminals per channel) and stereo headphone jack. Headphone output is unpaddinged and in parallel with the main outputs.

Chassis Construction: Durable black finish on the steel chassis, and an aluminum front panel with Lexan overlay specially designed to provide maximum heat conduction and minimal weight.

Cooling: Convection.

Dimensions: 19 inches (48.3 cm) wide, 1.75 inches (4.45 cm) tall and 8.38 inches (21.27 cm) deep behind the front mounting surface.

Approximate Weight: Net 10 lbs (4.53 Kg). Shipping 12 lbs (5.45 Kg).

Mounting: Standard EIA 310 19-inch rack mounting.

Circuit Theory

Overview

It should be noted from the start that the D-45 and the D-75A have identical circuitry except for the size of the power supply. The same schematic is used for both models. It is also important to realize that over time Crown can introduce improvements to its amplifiers. Though often changes are minor, and are made for a variety of reasons it is a good idea to see if any Technical Notes have been issued on these models. This manual is up to date as of the time of writing, November 1995.

This section of the manual explains the general operation of the D-45 and D-75A amplifiers. Topics covered include Power Supply, Balanced input stage, Error amp, Signal Translator, Last Voltage Amplification stage, Bias, Output stage, Protection circuitry, IOC, and Signal Presence Indicators (SPI).

Block Diagram

The following discussion refers to the block diagram in figure 1.

The balanced input signal is converted to an unbalanced signal at the input stage. This unbalanced signal is then routed through the volume control into the Error Amp which provides voltage amplification with extremely low distortion by means of several feedback paths, one of which is from the output stage providing distortion control from input to output. Any difference in the comparison between the input signal and output signal of .05% or greater will result in an Error signal, and the IOC indicator will light. Next, the signal is feed into the Signal Translator. This transistor converts the signal reference from ground to the negative supply, allowing greater voltage swing capabilities. The Last Voltage Amp (LVA) then receives the signal and gives it more voltage amplification. This is the main voltage amplification stage. The output of the LVA provides the signal drive to the output stage which provides the current necessary for the final output power.

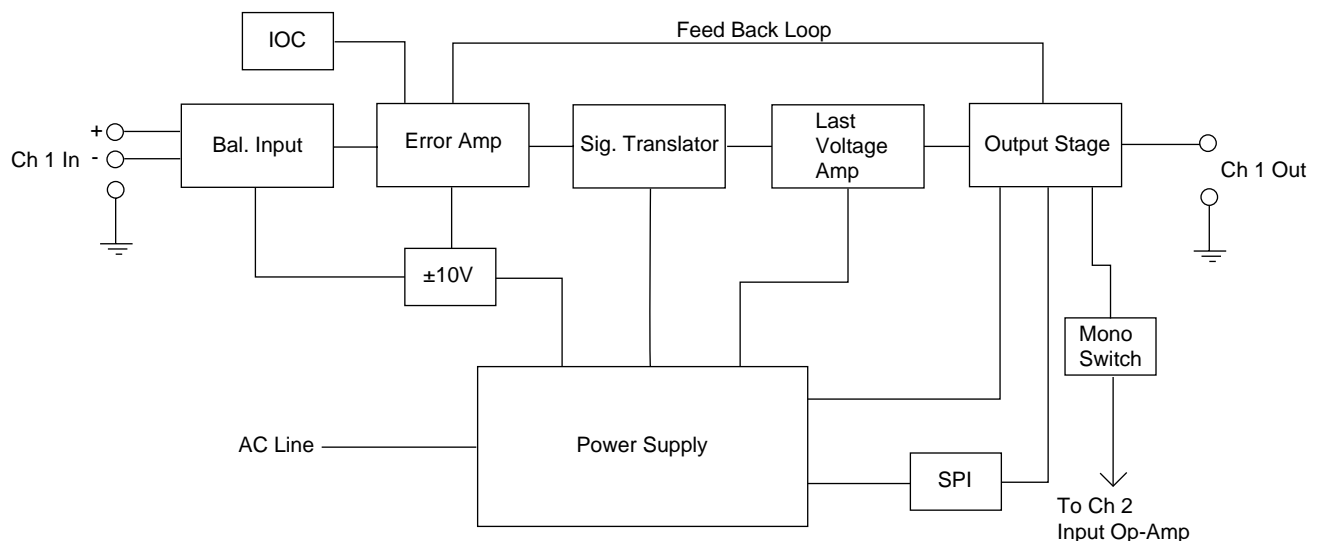


Figure 1: D-45, D-75A amplifier circuit block diagram (channel one only)

Circuit Theory

Power Supply

The power supply consists of a single power transformer with two sets of secondary windings which are paralleled together. The AC power is then full wave rectified and filtered with capacitors C8 and C9. The result is VCC voltages of $\pm 31\text{VDC}$ for the D-45, and $\pm 35\text{VDC}$ for the D-75A.

The power supply is protected by the fuse F1 which is in series with the primary of the transformer. The power indicator lamp is in series with a 27K ohm resistor and is across the primary of the transformer.

The ± 10 volt supplies, which supply voltage to the integrated circuits, are regulated by the 10 volt zener diodes D1 and D2. VCC supplies voltage to these zeners through R1 and R2.

Balanced Input Stage

In order to eliminate annoying noise and RF interference, a balanced input stage is incorporated into the design of the D-45 and D-75A. U100 is the balanced input op-amp which provides the correct phase inversion used in balanced input design. As per the definition of a balanced input signal, an input from a balanced line is fed into the inverting (-) and non-inverting (+) inputs of U100B,C (pins 5 and 6 for Ch 1 and pins 9 and 10 for Ch 2). The balanced line consists of two signals 180 degrees out of phase. The output signal of the op-amp (pins 7 and 8) is unbalanced and in phase with the non-inverting (+) input. Any "noise" that is common to both the non-inverting and inverting inputs is canceled and is not present at the output.

Error Amp

U100, which is used in the balanced input stage, is also used in the Error Amp stage. This op-amp is a low noise, large gain, large bandwidth integrated circuit. It acts as an input voltage amplifier producing extremely low distortion by means of the feedback path from the output of the amplifier. The ratio of the feedback resistor (R108/208) to the input resistor (R103/203) fixes the overall gain at 26dB. Diodes R109/209 and R110/210 prevent overdriving the Error Amp. Because the Error Amp amplifies the difference between the input and output signals, any difference in the two waveforms will produce a near open loop gain condition which in turn results in a high peak output voltage. This high peak is the Error Signal which results in IOC indication.

Signal Translator

The Signal Translator transistor Q100/200 provides no voltage amplification, but rather converts the ground referenced input signal to a signal with a reference to the negative supply. The result is higher voltage swing capabilities from Q102/202, the Last Voltage Amp. The output of the Translator produces a voltage across the resistor R114/214, which then drives the LVA.

Last Voltage Amplifier (LVA)

The Last Voltage Amplifier transistor, Q102/202, is the main voltage amplification stage. All signal voltage that appears at the output is developed here. R114/214 connected at the base of Q102/202 serves several purposes. It provides collector current for Q100/200. It provides bias voltage for Q102/202. And it provides signal voltage to drive Q102/202. The transistors Q101/201 prevent Q102/202 from being overdriven.

Bias

The output of the Last Voltage Amplifier provides the signal drive to the predriver, driver, and output transistors in order to amplify the current for the final output power. The bias transistor Q103/203 provides a bias voltage of 2.1V DC. This bias voltage is distributed throughout the current amplification stages in the following manner:

- 1) Base to Emitter junction of Q107/207, positive predriver, is 0.6V.
- 2) Base to Emitter junction of Q108/208, positive driver, is 0.6V. The negative driver and output transistors have fixed base-emitter bias.
- 3) Base to Emitter junction of Q109/209, positive output transistor is 0.314V (biased to sub turn-on state).

As the amplifier under loaded operating conditions increases in temperature, the bias sensing transistor, Q103/203, temperature increases proportionally. This condition reduces the bias supply which results in prevention of thermal runaway.

Output Stage

There are several categories or classes in which amplifiers are placed, the most common being class A, B or C. Each class or combination thereof, has a specific bias current applied to the transistor which determines its operating conditions. Class A amplifiers will be biased in such a way that its transistors operate always in the active region (360 degrees) between saturation and cutoff. Class B amplifiers are biased at

Circuit Theory

cutoff (180 degrees), and class C below cutoff. The D-45 and D-75A output stages are designed with Class AB+B mode of operation where the driver transistors carry the bias current while the output transistors serve only as boosters. The output transistors sense when the driver transistors are developing significant current draw from the load and thus take over and deliver the needed current. The output stage is of a quasi-complementary format using no bias current into the output transistors themselves. The result is maximum efficiency with minimum crossover notch distortion and idling amplifier heat.

Protection Circuitry

The D-45 and D-75A utilizes Voltage-Current limiting for protecting the output stages. V-I limiting is superior to most other forms of protection because it directly senses the overload condition and instantly reacts to relieve the overload, and acts only as long as the overload exists.

Should the output voltage or current become dangerously high, the voltage induced across the current limiting sense resistors (R128/228, R129/229) is fed to the limiting transistors (Q104/204, Q105/205). These transistors will then "clamp" a limit on the signal as it threatens to push the output stage beyond its capabilities. The limit point is determined by a combination of the predriver plus limiter current equaling the available current source on the main board. In other words, the signal drive that is fed to the predrivers is limited or clamped.

IOC (Input Output Comparator)

The front panel IOC display (E102 and E202) is driven by a window comparator circuit that uses an operational amplifier IC (U3). Any small nonlinearity in the amplifier causes an error signal to appear at the output of the main IC op-amp (U100) (see the section on Error Amp). This error signal is then responsible for raising the bias voltage on U3 and inturn activating Q114/214 which illuminates the LED.

SPI (Signal Presence Indicator)

E101 and E201 are the green front panel indicators which illuminate any time the output of their channel reaches 1 volt peak-peak or above. Q115/215 senses the output voltage through the resistor R131/132 and turns on the LED which is powered by +VCC.

Voltage Conversion

The 120 volt 60 Hz models, sold in the United States, are not voltage convertible. They do not use a multi-tap transformer. These domestic models are to be used only with 120 volts, 60 Hz.

All other models, sold outside the US, use a multi-tap transformer which can be configured for different voltages. Use the following diagram (figure 2) to determine the jumper configuration for the different voltages. The units terminal strip is located near the front of the

amplifier on the right side (front panel toward you). These export models can be operated with an AC mains frequency of 50 to 400 Hz. The back panel sticker indicates the unit's factory configuration.

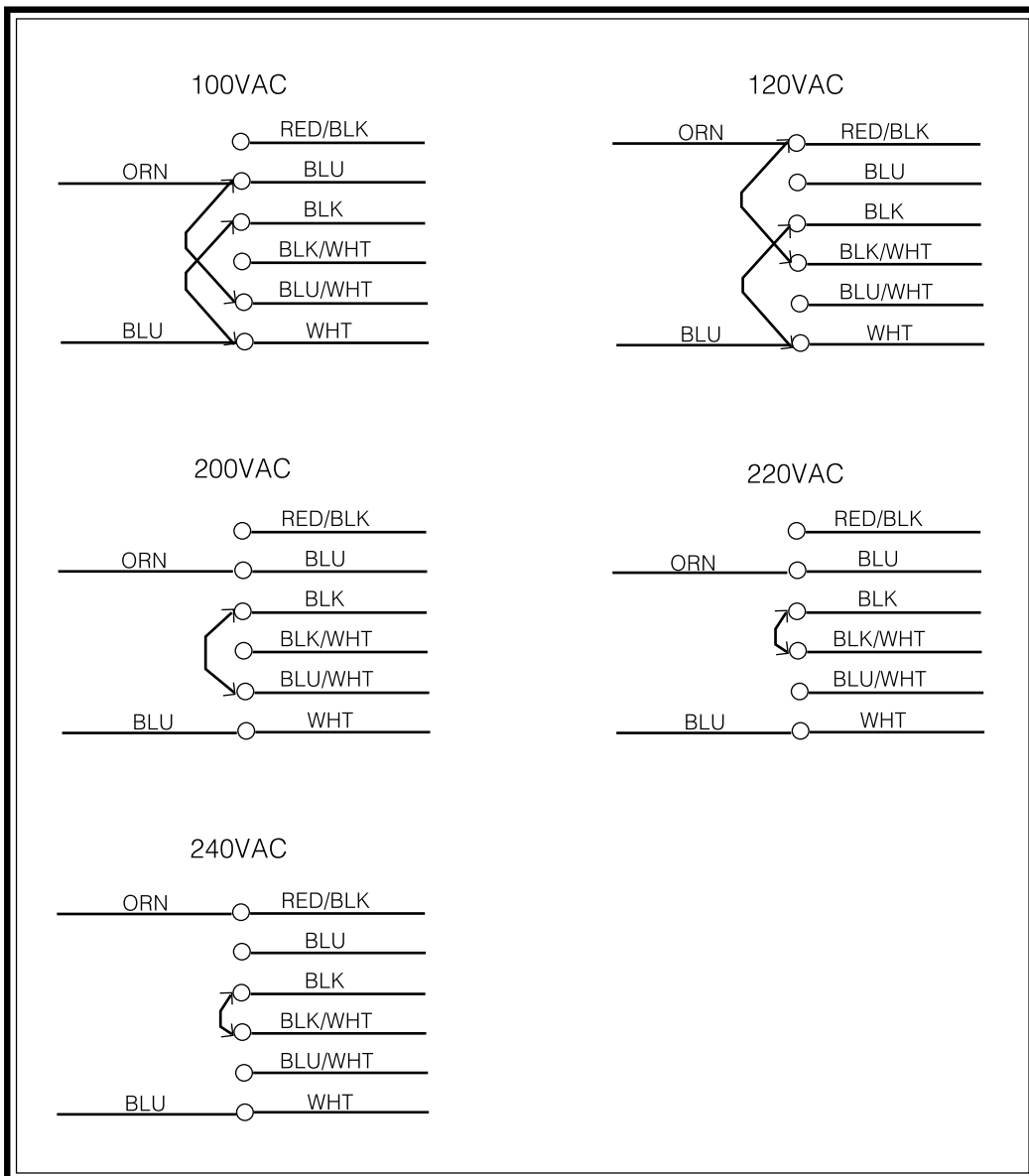


Figure 2: Voltage jumper configurations for export models

Internal Settings

Internal Settings

From the factory, the amplifier is configured for dual (stereo) operation and an input sensitivity of 26 dB gain. The amplifier may be configured for higher power, single channel, bridge-mono operation. The amplifier may also be configured for an input sensitivity of 0.775 volt.

26 dB Gain vs. 0.775 Volt Sensitivity

For most applications, the amplifier's default setting of 26 dB gain will be ideal. With this default setting, full output power is achieved with an input signal of 0.837 volts for the D-75A, and 0.632 volts for the D-45. Some applications may require the gain structure to be calculated based on a sensitivity of 0.775 volts. And although the 26 dB gain setting provides a sensitivity for each amplifier that is very near 0.775 volts, the 0.775 volt sensitivity setting is provided for applications that demand this sensitivity with a high level of precision.

To activate the 0.775 volt sensitivity, both the top and the bottom covers must be removed. After the covers are removed use the following instructions.

D-75A

Solder #22 jumper wires at the locations marked R152 and R252 on the main circuit board.

D-45

Desolder and remove the resistors in locations R103 and R203. In place of the old resistors, solder ¼ watt, 665 ohm (1%) resistors.

Reassemble the unit.

Dual vs. Bridge-Mono Mode

The D-75A and D-45 amplifiers are configured at the factory for dual operation because it is commonly used in two channel or stereo applications. The amplifiers have excellent crosstalk characteristics, so each channel can be used as an independent, single channel amplifier. For more conventional stereo applications, left and right source signals can be connected to inputs 1 and 2 to drive a pair of stereo loudspeakers.

For some applications, it is desirable to have higher power output from a single (mono) channel. The bridge-mono mode makes this convenient. Bridge-mono mode can be used in single channel applications such as paging. It also lets you get the absolute maximum power out of the amplifier, like with the D-75A which delivers 80 watts (2 x 40) in dual mode and 110 watts (1 x 110) bridge-mono into 8 ohms. The bridge-mono mode also provides an easy power and performance upgrade path for stereo applications. A single amplifier might provide adequate power until a second amplifier can be added for use in a "dual mono" configuration.

To activate the bridge-mono mode, both the top and bottom covers must be removed. After the covers are removed use the following instructions.

1. Remove the jumper from the pins marked with the words "DUAL" and "MONO"
2. Reinstall the jumper so the two pins closest to the word "MONO" on the circuit board are shorted.
3. Reassemble the unit.

To convert back to the Dual mode, simply move the jumper back to the "DUAL" position.

Electrical Checkout Procedures

General Information

The following test procedures are to be used to verify the operation of both the D-45 and D-75A amplifiers. DO NOT connect a load or inject a signal unless directed to do so by the procedure. These tests, though meant for verification and alignment of the amplifier, may also be very helpful in troubleshooting. For best results, tests should be performed in order.

All tests assume that AC power is from a regulated 120VAC source. Test equipment includes an oscilloscope, a DMM, a signal generator, loads, and I.M.D. and T.H.D. noise test equipment.

Standard Initial Conditions

- Level controls fully clockwise.
- Stereo/Mono jumper in the Stereo position.
- 26 dB gain (factory setting).

It is assumed, in each step, that conditions of the amplifier are per these initial conditions unless otherwise specified.

Test 1: DC Offset

Spec: $\leq \pm .01$ VDC for both channels throughout the range of the input level control travel.

Initial Conditions: Controls per standard, inputs shorted.

Procedure: Measure DC voltage at the output connectors, while rotating the input level controls. There is no adjustment for the output offset. If spec is not met, there is an electrical malfunction.

Test 2: Output Bias Adjustment

Spec: .350 VDC, $\pm .01$ VDC.

Initial Conditions: Controls per standard, heatsink at room temperature.

Procedure: Measure the DC voltage across the base and emitter of an output transistor in each channel. Adjust R112 for channel 1 and R212 for channel 2.

Test 3: Quiescent AC Power Draw

Spec: ≤ 20 Watts

Initial Conditions: Controls per standard. This measurement must be made after bias adjustment.

Procedure: With no input signal and no load, measure AC line wattage draw. If current draw is excessive, check for high AC line voltage or high bias voltage.

Test 4: Common Mode Rejection

Spec: ≥ 60 dB at 1 KHz.

Initial Conditions: Controls per standard.

Procedure: No load. Inject a 0 dBu (.775 V) 1 KHz common mode sine wave (inverting and non-inverting inputs shorted together) into each channel, one channel at a time. At the output measure less than 15.9 mV. Adjust R157 for channel 1 and R257 for channel 2.

Test 5: Input Sensitivity

Spec: Gain of 20 (26 dB)

Initial Conditions: Controls per standard.

Procedure: No load connected. Front panel level controls turned full CW. Inject a 0.775 V, 1 KHz sine wave into the input of each channel. Measure between 15.46 V and 16.42 V at the output of each channel. There is no calibration adjustment for voltage gain. If gain is not in spec then there is an electrical malfunction.

Test 6: Level Controls

Spec: Level controlled by level controls.

Initial Conditions: Controls per standard.

Procedure: No load. Inject a 1 KHz sine wave. With level controls fully clockwise you should see full gain. As controls are rotated counterclockwise, observe similar gain reduction in each channel. When complete, return level controls to fully clockwise position.

Test 7: Current Limit

Spec: D-45—Current limit between 6.12 & 12.0 amps.

D-75A—Current limit between 7.75 & 12.0 amps.

Initial Conditions: Controls per standard.

Procedure: Load each channel to 1 ohm. Inject a 1 KHz differentiated square wave (or 10% duty cycle). See figure 3 for differentiator circuit. Increase output level until current limit occurs. Current limit should occur around 10 amps (10 Vpk). See above specifications.

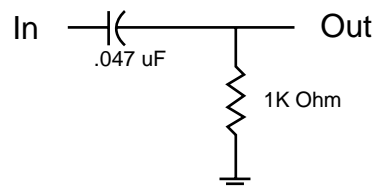


Figure 3: Differentiator Circuit

Electrical Checkout Procedures

Test 8: Slew Rate

Spec: >6 V/ μ S.

Initial Conditions: Controls per standard.

Procedure: Load each channel to 8 ohms. Inject a 10 KHz square wave. For the D-45 adjust the output magnitude for 10 Vp-p. For D-75A adjust the output magnitude for 12 Vp-p. Observe the output. It shall be square with no ringing.

Test 9: Harmonic Distortion

Spec: \leq 1% THD.

Initial Conditions: Controls per standard.

Procedure: Load each channel to 8 ohms. Inject a 20 KHz sine wave into each channel. For the D-45 adjust the output for 12.7 VAC. For the D-75A adjust the output for 16.7 VAC. No filters shall be used at this time. Measure \leq 1% THD.

Test 10: Output Power

Spec:

D-45 8 Ohm Stereo—25W/Ch
4 Ohm Stereo—35W/Ch

D-75A 8 Ohm Stereo—40W/Ch
4 Ohm Stereo—55W/Ch

Initial Conditions: Controls per standard.

Procedure: Load each channel to 8 ohms. Inject a 1 KHz sine wave into each channel. For the D-45 measure at least 14.2 VAC at the output of each channel. For the D-75A measure at least 17.9 VAC at the output of each channel. Load each channel to 4 ohms. For the D-45 measure at least 11.9 VAC at the output of each channel. For the D-75A measure at least 14.8 VAC at the output of each channel. All power measurements must be at less than 0.1% THD.

Test 11: Short Test

Spec: Must not damage components, fuse shall not blow.

Initial Conditions: Controls per standard.

Procedure: Inject a 60 Hz sine wave into both channels. If testing a D-45 adjust the output to 14.2 VAC, if testing a D-75A adjust the output to 17.9 VAC. Short only one channel at a time. Amplifier must not damage any components to pass the test.

Test 12: Signal to Noise

Spec: 106 dB below full rated output from 20 Hz to 20 KHz.

Initial Conditions: Controls per standard.

Procedure: Load each channel to 8 ohms. Meter to read the output shall have an audio band pass (20 Hz-20

KHz) filter. For the D-45 measure \leq 71 μ V of noise at the output of each channel. For the D-75A measure \leq 89 μ V of noise at the output of each channel.

Test 13: Intermodulation Distortion

Spec: \leq .01% at 0dB, \leq .05% at -30dB.

Initial Conditions: Controls per standard.

Procedure: Load each channel to 8 ohms. Inject a SMPT standard IM signal (60 Hz and 7 KHz sine wave mixed at 4:1 ratio). For 0 dB reference on the D-45, set the 60 Hz portion of the sine wave to 12.7 VAC. For 0 dB reference on the D-75A set the 60 Hz portion of the sine wave to 16.7 VAC. Set the 7 KHz portion at 25%. With the IM analyzer, measure less than .01% at 0 dB and less than .05% at -30 dB.

Test 14: Headphone Jack

Spec: Output signal same as output jacks.

Initial Conditions: Controls per standard.

Procedure: Inject a 1 KHz sine wave into each channel. By rotating the level controls, verify that the outer ring is ground, the inter ring is channel 2 and the tip is channel 1.

Test 15: Display Check

Spec: SPI at 1 V output, IOC at output clip, power on.

Initial Conditions: Controls per standard.

Procedure: Inject a 1 KHz sine wave into each channel. Verify that the green LED's start to light around 1 volt output. Verify that the red LED's light when the amplifier is in voltage clip. Verify that the power indicator is lit.

Post Testing

After completion of testing, if all tests are satisfactory, the amplifier controls should be returned to the position required by the customer. If conditions are unknown or unspecified, factory settings are as follows:

Level Controls: Between 9 and 11 O'Clock.

Power Switch: Off.

Rear Panel Barrier Block: All screws tight.

Internal Settings: Dual (stereo) mode. 26 dB gain.

Exploded View Parts List

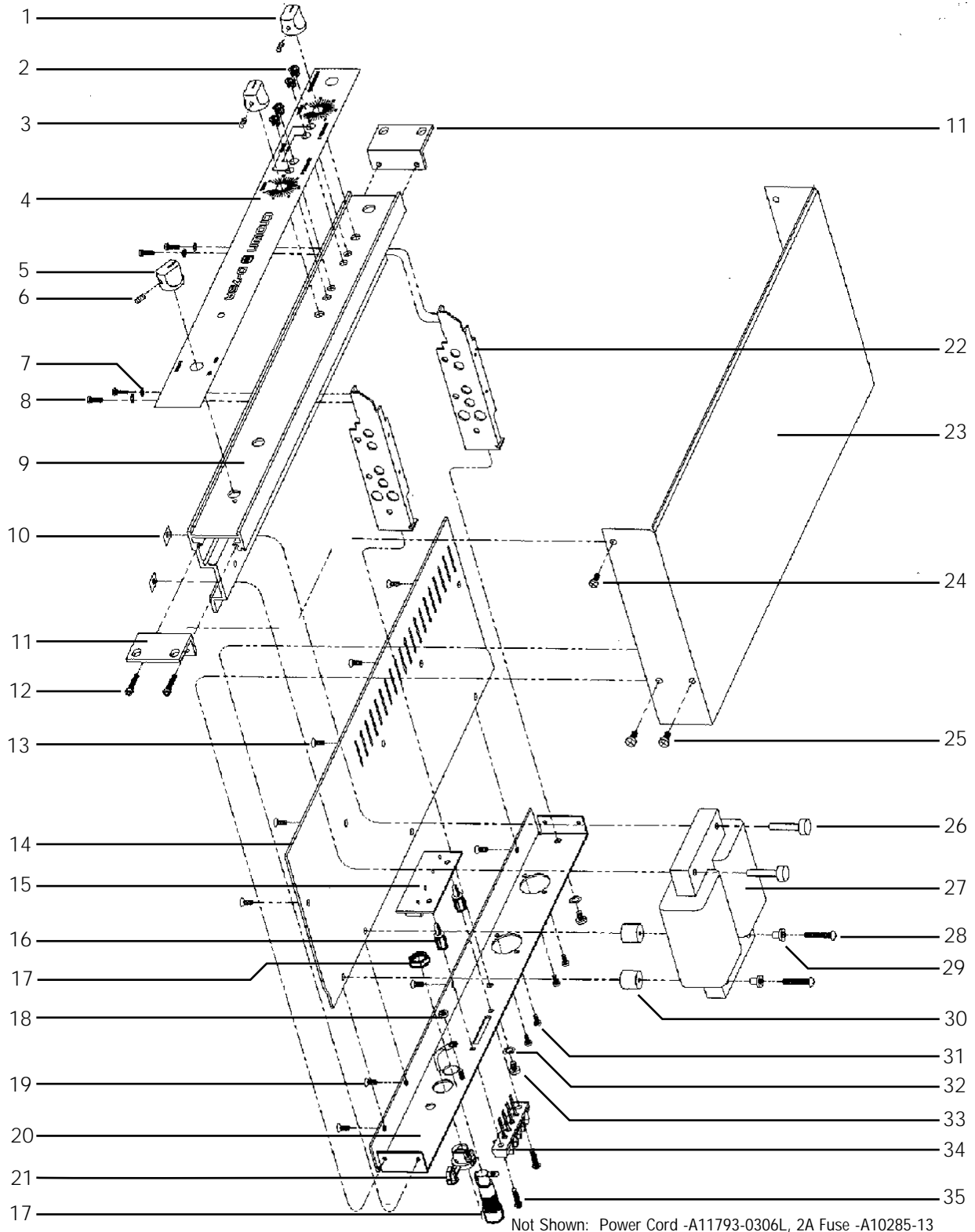
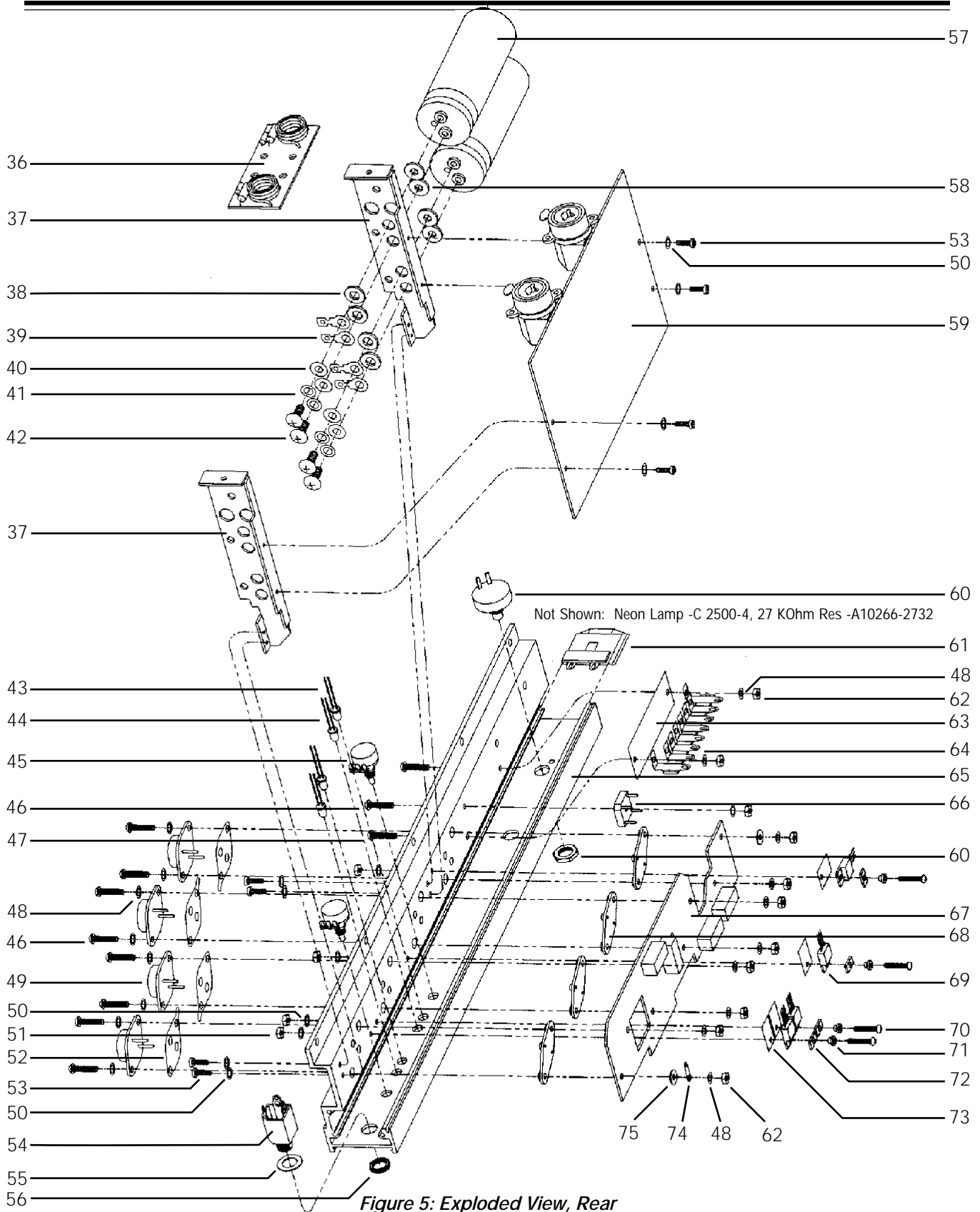


Figure 4: Exploded View, Front

Exploded View Parts List

<i>Item</i>	<i>Description</i>	<i>Part #</i>	<i>Quantity</i>
1	Knob, Level	D 6265-9	2
2	LED Mount	C 9369-7	4
3	Set Screw, 6-32 x .18	C 6005-0	2
4	Overlay, D-45	F12545J3	1
	Overlay, D-45 Amcron	F12549J5	1
	Overlay, D-75A	F12546J1	1
	Overlay, D-75A Amcron	F12548J7	1
5	Knob, On/Off	D 8559-3	1
6	Set Screw, 6-32 x .25	C 9460-4	1
7	Lockwasher, #4 Internal Star	A10094-2	12
8	Screw, 4-40 x .375 Taptite	A10110-10406	8
9	Front Panel Extrusion	D 8553-6	1
10	Speed Nut	A10178-1	2
11	Rack Ears	D 8583-3	2
12	Screw, 6-32 x .75 Socket Head	A10092-70612	4
13	Screw, 6-32 x .25 Flat Head	A10091-10604	5
14	Bottom Cover	M20073K5	1
15	Terminator Module	Q43309-6	1
16	Board Support, .5 Inch Screw Mount	C 9947-0	2
17	Fuse Holder	C 5597A5	1
18	Hex Nut, 6-32	A10102-5	1
19	Screw, 8-32 x .25 Flat Head	C 2136-7	4
20	Back Panel	M21399J6	1
21	Strain Relief	C 9949-6	1
22	Bracket	F10104-2	2
23	Top Cover	F12454J8	1
24	Screw, 6-32 x .37 Pozi-Drive	C 4329-6	2
25	Screw, #8 x .375	C 6457-3	4
26	Nylon Transformer Pin	D 3557-2	2
27	Power Transformer, D-45 (Domestic)	D 8555-1	1
	Power Transformer, D-45 (Export)	D 8554-4	1
	Power Transformer, D-75A (Domestic)	D 8556-9	1
	Power Transformer, D-75A (Export)	D 4668-6	1
28	Screw, 8-32 x .87	A10086-10814	2
29	Nylon Transformer Shoulder Washer	A10099-4	2
30	Transformer Mount, .5 x 9/16	C 3556-5	2
31	Screw, M3X.5X7MM PNHD W/NYLOC	D 7261-7	4
32	Lockwasher, #8 Internal Star	A10094-6	2
33	Screw, 8-32 x .375 Taptite	A10110-10806	2
34	Barrier Block, 4 Position, Chassis Mount	C 9950-4	1
35	Screw, 6-32 x .5	A10110-10608	2

Exploded View Parts List



Exploded View Parts List

<i>Item</i>	<i>Description</i>	<i>Part #</i>	<i>Quantity</i>
36	Terminator Module	Q43309-6	1
37	Bracket	F10104-2	2
38	Fiber Shoulder Washer, .25	A10099-8	4
39	Solder Lug	D 2934-4	4
40	Washer, 7/17OD x .203ID	A10100-16	4
41	Lockwasher, #10 Internal Tooth	A10094-8	4
42	Screw, 10-32 x .5	A10087-11008	4
43	Green LED (SPI)	C 7863-1	2
44	Red LED (IOC)	C 8903-4	2
45	Level Control Pot. 20 KOhm Audio 31DNT	C10000-5	2
46	Screw, 6-32 x .62	A10086-10610	9
47	Screw, 6-32 x .375	A10086-10606	2
48	Lockwasher, #6 Internal Star	A10094-4	19
49	Power Transistor, NPN	C 4751-1	4
50	Lockwasher, #4 Internal Star	A10094-2	12
51	Hex Nut, 4-40	A10102-3	4
52	Insulator, TO-3 Anodized	C 3570-6	4
53	Screw, 4-40 x .375 Taptite	A10110-10406	8
54	Phone Jack, 3 Conductor	C 3507-8	1
55	Lockwasher, .375 Internal Star	A10094-10	1
56	Nut, .376-32 Knurled	C 3495B2	1
57	Filter Capacitor (D-45, 5000 μ F)	D 8557-7	2
	Filter Capacitor (D-75A, 10,000 μ F)	C 4250-4	2
58	Fiber Washer, .500OD x .195ID	A10101-19	4
59	Main Module	Q43308-8	1
60	Power Switch, SPST Rotary, 12A (Incl. Nut)	C 9463-8	1
61	Bracket, Neon Lamp	M20069-7	1
62	Hex Nut, 6-32	A10102-5	11
63	Insulator, 1 x 3 Fishpaper	D 2600-0	1
64	Terminal Strip	D 4985-4	1
65	Front Panel Extrusion	D 8553-6	1
66	Bridge Rectifier, 6A	C 3062-4	1
67	Output Module	Q43156-1	1
68	Insulator, TO-3 Nylon	D 4071-3	4
69	Power Transistor, TIP 47, NPN	C 4647-1	4
70	Screw, 4-40 x .62	A10086-10410	4
71	Nylon Shoulder Washer	A10099-1	4
72	Torque Spreader, TO-220	C 6541-4	4
73	Mica Insulator, TO-220	C 6052-2	4
74	Solder Lug	D 1220-9	1
75	Fiber Washer, .375 x .141 x .031	A10101-9	2

Q43308-8 Main Module (D 8268-1 Board)

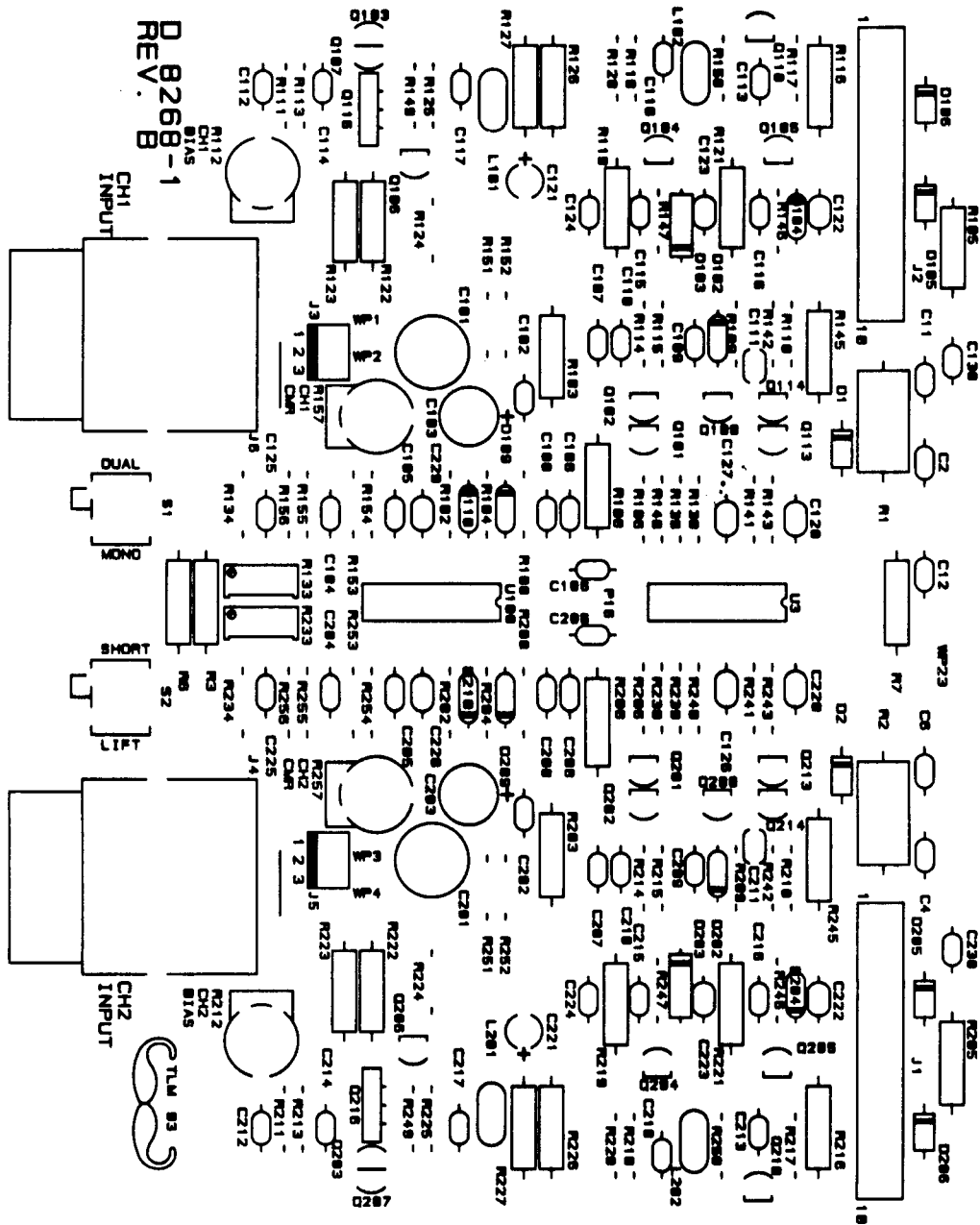


Figure 6: Main Module Component Layout (Q43308-8)

Q43308-8 Main Module Parts List

Capacitors

C2		C 6806-1	.01 μ F, 100V
C4		C 6806-1	.01 μ F, 100V
C6		C 6806-1	.01 μ F, 100V
C11		C 6806-1	.01 μ F, 100V
C12		C 6806-1	.01 μ F, 100V
C100	C200	C 6813-7	27pF, 200V
C101	C201	C 5311-3	22 μ F, 50V NP
C102	C202	C 6809-5	220pF, 100V
C103	C203	C 8576-8	100 μ F, 35V
C104	C204	C 6813-7	27pF, 200V
C105	C205	C 6813-7	27pF, 200V
C106	C206	C 6813-7	27pF, 200V
C107	C207	C 6806-1	.01 μ F, 100V
C108	C208	C 9447-1	120pF, 200V
C109	C209	C 9447-1	120pF, 200V
C110	C210	C 6811-1	100pF, 200V
C111	C211	C 9240-0	5pF, 200V
C112	C212	C 6806-1	.01 μ F, 100V
C113	C213	C 9447-1	120pF, 200V
C114	C214	C 6806-1	.01 μ F, 100V
C115	C215	C 6806-1	.01 μ F, 100V
C116	C216	C 6806-1	.01 μ F, 100V
C117	C217	C 6806-1	.01 μ F, 100V
C118	C218	C 6806-1	.01 μ F, 100V
C120	C220	C 6804-6	.1 μ F, 50V
C121	C221	C 9465-3	10 μ F, 50V
C122	C222	C 6804-6	.1 μ F, 50V
C123	C223	C 6804-6	.1 μ F, 50V
C124	C224	C 6950-7	82pF, 100V
C125	C225	C 6950-7	82pF, 100V
C126	C226	C 6804-6	.1 μ F, 50V
C127	C227	C 6804-6	.1 μ F, 50V
C130	C230	C 6806-1	.01 μ F, 100V

Diodes

D1		C 9011-5	1N4740A, 10V
D2		C 9011-5	1N4740A, 10V
D102	D202	C 3181-2	1N4148
D103	D203	C 6212-1	1N270, SEL
D104	D204	C 3181-2	1N4148
D105	D205	C 2851-1	1N4004
D106	D206	C 2851-1	1N4004
D109	D209	C 3181-2	1N4148
D110	D210	C 3181-2	1N4148

Inductors

L101	L201	C 3510-2	470 μ H
L102	L202	C 3510-2	470 μ H

Transistors

Q100	Q200	C 3954-2	MPSA56
Q101	Q201	D 2961-7	2961
Q102	Q202	D 2961-7	2961
Q103	Q203	D 2961-7	2961
Q104	Q204	C 3625-8	2N4125
Q105	Q205	D 2961-7	2961
Q106	Q206	C 3625-8	2N4125
Q107	Q207	C 3528-4	MPSA06
Q110	Q210	C 3954-2	MPSA56
Q113	Q213	D 2961-7	2961
Q114	Q214	D 2961-7	2961

Resistors

R1		C 9952-0	560 2W
R2		C 9952-0	560 2W
R3		A10265-10022	10K .5W 1%
R6		A10266-2R72	2.7 .5W
R7		A10266-1R02	1 .5W
R100	R200	A10265-10021	10K 1%
R102	R202	A10266-1021	1K
R103	R203	A10265-51102	511 .5W 1%
R104	R204	A10265-10021	10K 1%
R105	R205	A10266-2R72	2.7 .5W
R106	R206	A10266-8221	8.2K
R108	R208	A10265-10022	10K .5W 1%
R109	R209	A10266-5631	56K
R110	R210	A10266-3921	3.9K
R111	R211	A10266-2221	2.2K
R112	R212	C 6048-0	500 Trim
R113	R213	A10266-7511	750
R114	R214	A10266-8211	820
R115	R215	A10266-5601	56
R116	R216	C 7778-1	5.6 .5W FP
R117	R217	A10266-1811	180
R118	R218	A10266-1011	100
R119	R219	A10265-10022	10K .5W 1%
R120	R220	A10266-1211	120
R121	R221	A10265-10022	10K .5W 1%
R122	R222	A10266-1212	120 .5W
R123	R223	C 7778-1	5.6 .5W FP
R124	R224	A10266-1811	180
R125	R225	A10266-2011	200
R126	R226	A10266-4722	4.7K .5W
R127	R227	A10266-4722	4.7K .5W
R138	R238	A10266-3331	33K
R139	R239	A10266-1541	150K
R140	R240	A10266-3331	33K
R141	R241	A10266-1541	150K
R142	R242	A10266-1531	15K
R143	R243	A10266-4721	4.7K
R145	R245	A10266-1522	1.5K .5W

Q43308-8 Main Module Parts List

Resistors (Cont.)

R146	R246	A10266-1021	1K
R147	R247	A10266-4711	470
R149	R249	A10266-1331	13K
R150	R250	A10266-1331	13K
R151	R251	A10265-95311	9.53K 1%
R152	R252	OPEN	
R153	R253	A10265-10021	10K 1%
R154	R254	A10265-10021	10K 1%
R155	R255	A10265-10021	10K 1%
R156	R256	A10265-10021	10K 1%
R157	R257	C 9079-2	200 Trim

Integrated Circuits

U3	C 4345-2	LM339
U100	C 7558-7	MC33079

Miscellaneous

J1	C 9455-4	Socket, 10 Pin
J2	C 9455-4	Socket, 10 Pin
J3	C 7526-4	Header, 3 Pos.
J4	C 9454-7	XLR/Phone Jack
J5	C 7526-4	Header, 3 Pos.
J6	C 9454-7	XLR/Phone Jack
S1	C 9941-3	Header, 3 Pos. R/A
S1X	C 6419-3	2 Pos Shunt (jmp)
U100X	C 3450-1	14 Pin IC Socket
Z1	A10124-24	#24 Buss Wire
Z2	A10124-24	#24 Buss Wire
1	D 8268-1	Bd, D75 Main #3

Q43156-1 Output Module (P 9730A4 Board)

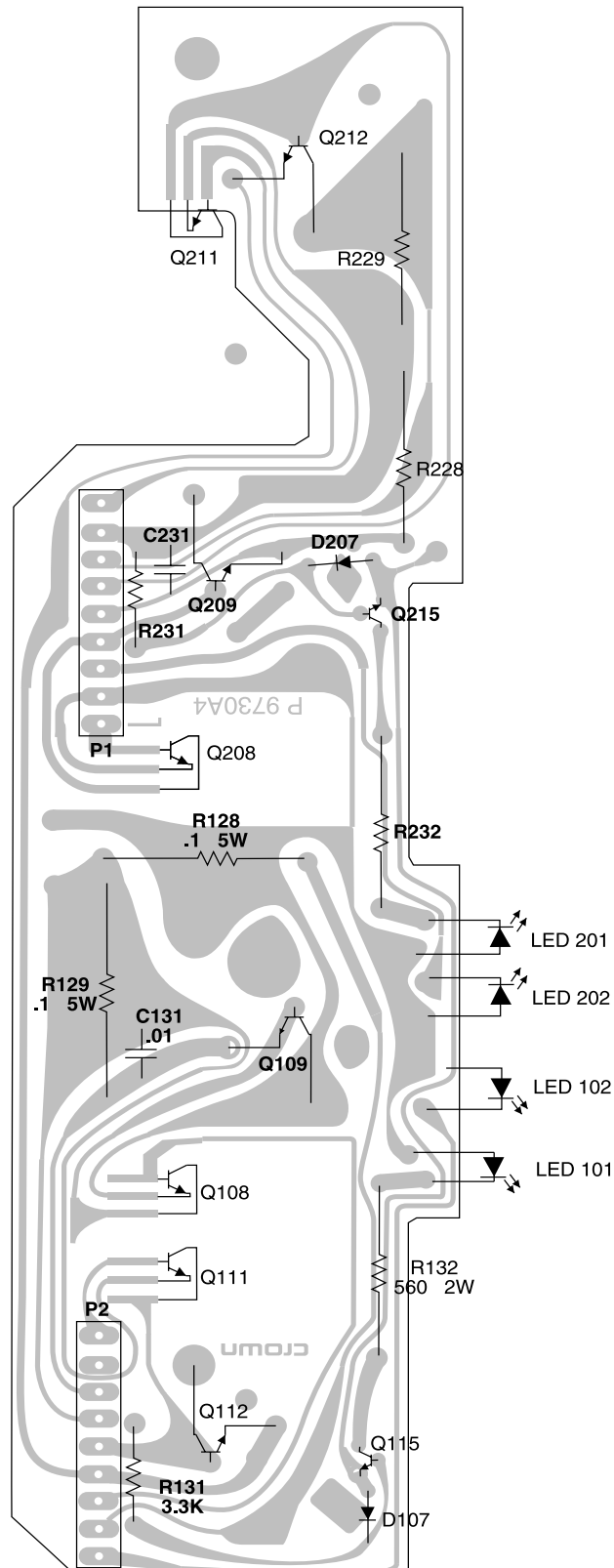


Figure 7: Output Module Component Layout (Q43156-1)

Q43156-1 Output Module and Q43309-6 Terminator Module

Q43156-1 Output Module

Capacitors

C131 C231 C 1751-4 .01μF 500V

Diodes

D107 D207 C 3181-2 1N4148

Headers

P1 C 4730-5 9 Pin
 P2 C 4730-5 9 Pin

Transistors

Q115 Q215 D 2961-7 2961

Resistors

R128 R228 C 3291-9 .1 5W
 R129 R229 C 3291-9 .1 5W
 R131 R231 A10266-3322 3.3K .5W
 R132 R232 A10266-5614 560 2W

Board

1 P 9730A4 Bd, D75 Output

Note: Driver Transistors, Output Transistors, and LED's are not included with the Output Module. See Exploded View for part numbers. Also not included with the module parts list, but soldered to output module are:

C1 C 5050-7 4.7μF, 100V
 Soldered between -VCC & Ground
 C5 C 5050-7 4.7μF, 100V
 Soldered between +VCC & Ground
 1 D 7168-4 Ground Buss Bar

Q43309-6 Terminator Module

Capacitors

C119 C219 C 7706-2 .1μF 100V

Inductors

L103 L203 H43294-0 2.75μH

Resistors

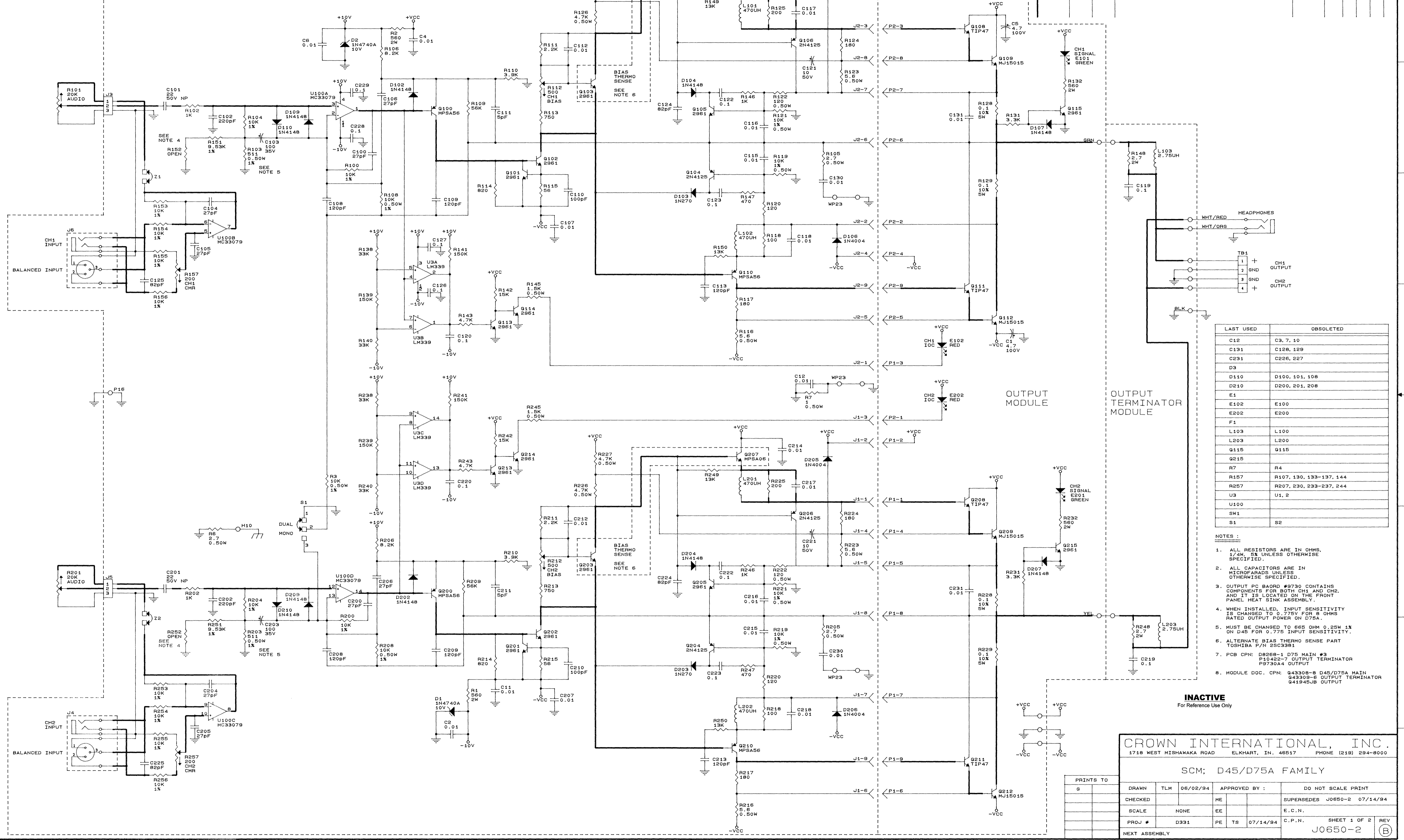
R148 R248 A10266-2R73 2.7 2W

Board

1 P10422-7 Bd, D45/75A Term

MAIN MODULE

E.C.N.	ZONE	REV	DESCRIPTION	DATE	BY	APPROVALS
94-160		(A)	R152, 252 WERE 0 OHM ADD NEW NOTE 5 AND RENUMBER 5, 6 & 7	10/06/94	LCD	TS
5A* 5B-255		(B)	ADD THERMAL SWITCH TO TRANSFORMER	08/26/96	LCD	



LAST USED	OBSOLETE
C12	C3, 7, 10
C131	C128, 129
C231	C226, 227
D3	
D110	D100, 101, 108
D210	D200, 201, 208
E1	
E102	E100
E202	E200
F1	
L103	L100
L203	L200
Q115	Q115
Q215	
R7	R4
R157	R107, 130, 133-137, 144
R257	R207, 230, 233-237, 244
U3	U1, 2
U100	
SW1	
S1	S2

- NOTES:
- ALL RESISTORS ARE IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
 - ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
 - OUTPUT PC BOARD #3730 CONTAINS COMPONENTS FOR BOTH CH1 AND CH2, AND IT IS LOCATED ON THE FRONT PANEL HEAT SINK ASSEMBLY.
 - WHEN INSTALLED, INPUT SENSITIVITY IS CHANGED TO 0.775V FOR 8 OHMS RATED OUTPUT POWER ON D75A.
 - MUST BE CHANGED TO 665 OHM 0.25W 1% ON D45 FOR 0.775 INPUT SENSITIVITY.
 - ALTERNATE BIAS THERMO SENSE PART TOSHIBA P/N 28C381
 - PCB C/P/N: D8268-1 D75 MAIN #3
P10422-7 OUTPUT TERMINATOR
P9730A-4 OUTPUT
 - MODULE D.C. C/P/N: G43308-B D45/D75A MAIN
G43309-B D45/D75A MAIN
G41945B OUTPUT

INACTIVE
For Reference Use Only

CROWN INTERNATIONAL, INC.
1718 WEST MISHAWAKA ROAD ELKHART, IN. 46517 PHONE (219) 294-8000

SCM; D45/D75A FAMILY			
PRINTS TO	DRAWN	TLM	06/02/94
G	CHECKED	ME	APPROVED BY :
	SCALE	NONE	DO NOT SCALE PRINT
	PROJ #	D331	SUPERSEDES J0650-2 07/14/94
	NEXT ASSEMBLY		E.C.N.
			07/14/94
			C.P.N.
			SHEET 1 OF 2
			J0650-2
			REV
			(B)

D45 EXPORT

D75A EXPORT

D45 DOMESTIC
120VAC

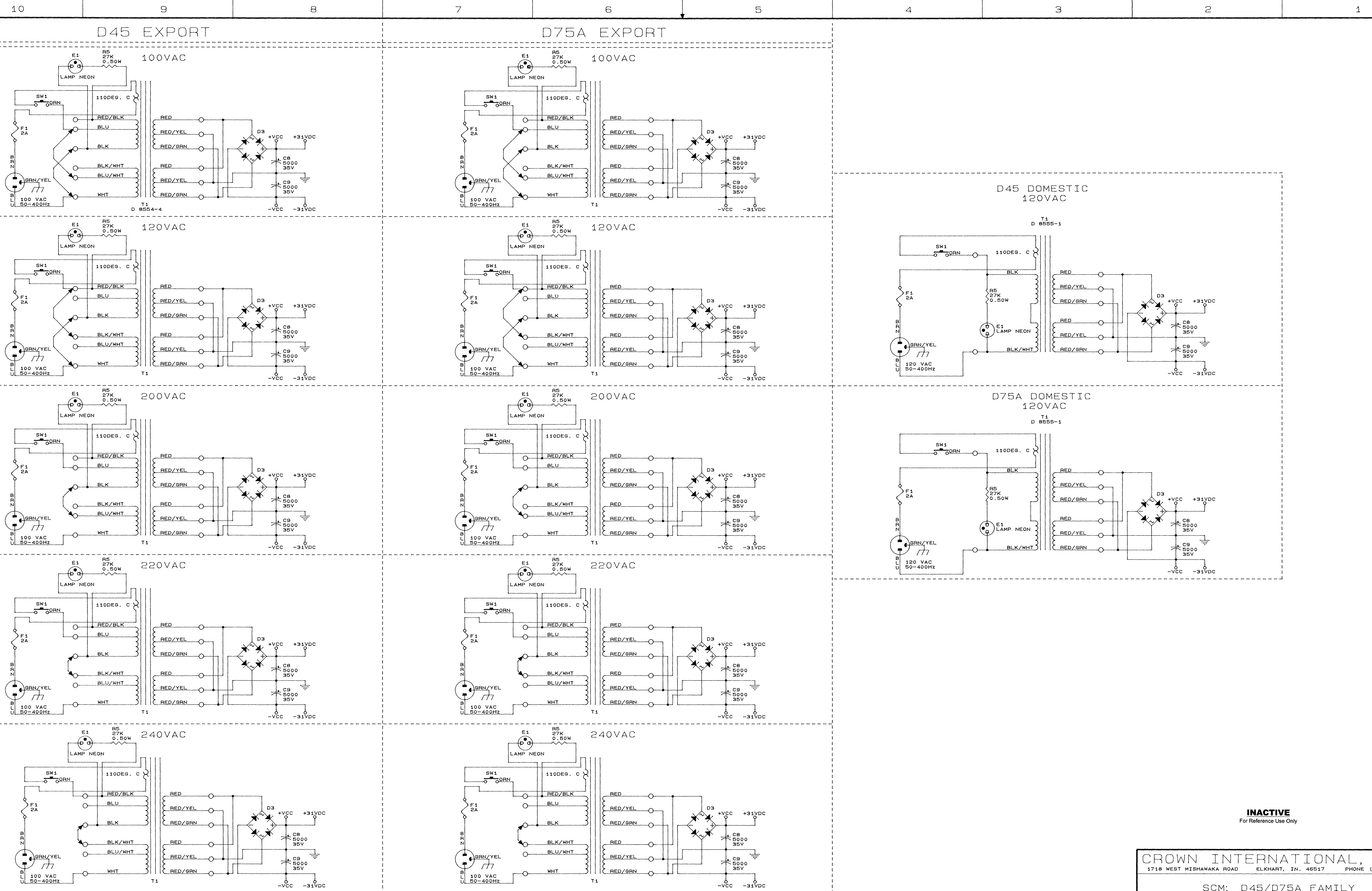
D75A DOMESTIC
120VAC

INACTIVE
For Reference Use Only

CROWN INTERNATIONAL, INC.
1718 WEST MISHAWAKA ROAD ELKHART, IN. 46517 PHONE (219) 294-8000

SCM; D45/D75A FAMILY

PRINTS TO				DO NOT SCALE PRINT	
G	DRAWN	TLM	06/02/94	APPROVED BY :	SUPERSEDES
	CHECKED			ME	E.C.N.
	SCALE	NONE		EE	C.P.N.
	PROJ #	D331		PE	SHEET 2 OF 2
	NEXT ASSEMBLY				J0650-2



PRINTS TO	
G	

DO NOT SCALE PRINT
SUPERSEDES
E.C.N.
C.P.N.
SHEET 2 OF 2
J0650-2