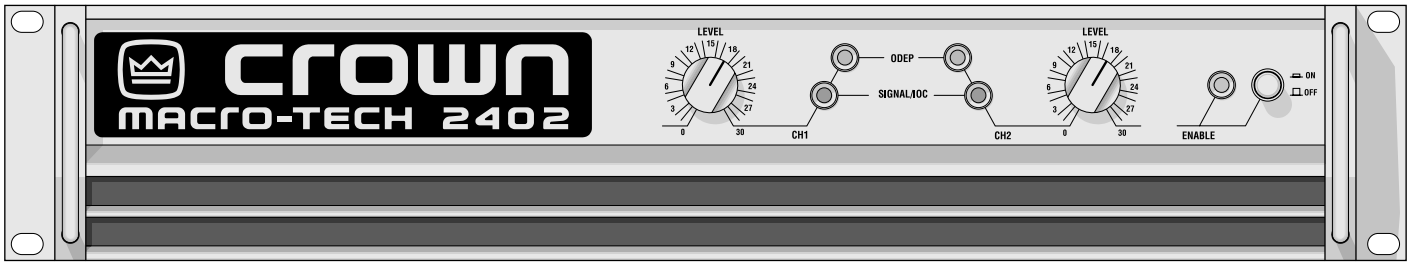
Macro-Tech®

POWER AMPLIFIER

SERVICE MANUAL



Models:

MA-2402

Some models may be exported under the name *Amcron*®

130445-1
02-00
Rev. A

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.

Mail: P.O. Box 1000 Elkhart IN 46515-1000
Shipping: Plant 2 SW 1718 W. Mishawaka Road Elkhart IN 46517
Phone: (800) 342-6939 / (219) 294-8200
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CAUTION	AVIS
TO PREVENT ELECTRIC SHOCK DO NOT REMOVE TOP OR BOTTOM COVERS. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL. DISCONNECT POWER CORD BEFORE REMOVING REAR INPUT MODULE TO ACCESS GAIN SWITCH.	**À PRÉVENIR LE CHOC ÉLECTRIQUE N'ENLEVEZ PAS LES COUVERTURES. RIEN DES PARTIES UTILES À L'INTÉRIEUR. DÉBRANCHER LA BORNE AVANT D'OUVRIR LA MODULE EN ARRIÈRE.**

WARNING

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

The lightning bolt triangle is used to alert the user to the risk of electric shock.

The exclamation point triangle is used to alert the user to important operating or maintenance instructions.

Revision History

Revision Number	Date	Comments
Rev. A	02-2000	Initial Printing

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1 Introduction

1.1 Introduction

This manual contains complete service information on the *Crown*® MA-2402 power amplifier. It is designed to be used in conjunction with the Reference Manual; however, some important information is duplicated in this Service Manual in case the Reference Manual is not readily available.

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

1.2 The MA "02" Series Amplifiers

The *Macro-Tech*® series is a complete family of amplifiers designed for pro sound reinforcement. Macro-Tech amplifiers are designed to provide enormous levels of pure, undistorted power in a rugged low-profile package, utilizing Crown's patented *Grounded Bridge*™ output topology. They also employ Crown's patented *ODEP*® protection circuitry, which keeps the amplifier working under extreme conditions that would shut down a lesser amplifier. Crown's new Macro-Tech "02" series amplifiers feature Crown's enhanced *PIP2*™ (Programmable Input Processor) expansion system. The PIP2 expansion system makes it easy to tailor the amplifier to a specific application. Providing high power amplification from 20 Hz to 20 kHz with minimum distortion, Macro-Tech series amplifiers feature balanced inputs with bridged and parallel monophonic capability. Specific features vary depending on model.

1.3 Scope

This Service Manual in intended to apply to all versions of the MA-2402 amplifier. The Parts Listings include parts specific for the US version and the European version (E13CE). For parts specific only to other versions contact the Crown Technical Support Group for help in finding part numbers.

1.4 Warranty

Each Reference 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 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 Reference Manual for warranty details. To find the location of the nearest Authorized Warranty Service Center or to 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). If you are an Authorized Warranty Service Center and have questions regarding the warranty of a product, please contact the Field Service Manager or the Technical Support Group.

Crown Customer Service

Technical Support Group
Factory Service
Parts Department

Mailing Address: P.O. Box 1000, Elkhart IN 46515
Shipping Address: Plant 2 S. W.
1718 W. Mishawaka Rd., Elkhart IN 46517
Phone: (219) 294-8200
Toll Free: (800) 342-6939
Fax: (219) 294-8301
http://www.crownaudio.com

Figure 1.1 MA-2402 Front and Rear Views

2 Specifications

6 Specifications

Note: Specifications relate to 120-volt,60-Hz units in Stereo mode with 8-ohm loads and an input sensitivity of 26-dB gain at 1-kHz rated power unless otherwise specified. Specifications for units supplied outside the U.S.A. may vary slightly at different AC voltages and frequencies.

Power

MA-2402	*1 kHz Power	**20 Hz- 20 kHz Power
2-ohm Dual (per ch.)	**1,050W**	**850W**
4-ohm Dual (per ch.)	**800W**	**750W**
8-ohm Dual (per ch.)	**520W**	**505W**
4-ohm Bridge-Mono	**2,070W**	**1,670W**
8-ohm Bridge-Mono	**1,585W**	**1,485W**

*1 kHz Power: refers to maximum average power in watts at 1 kHz with 0.1% THD.

**20 Hz- 20 kHz Power: refers to maximum average power in watts from 20 Hz to 20 kHz with 0.1% THD.

Output Power:

Load Impedance: Safe with all types of loads. Rated for 2 to 16 ohms in Stereo, 4 to 16 ohms in Bridge-Mono and 1 to 4 ohms in Parallel-Mono mode.

Voltage Gain to 1-kHz, 8-ohm rated output;

83:1 ±12% or 38 dB ±0.5 dB at 0.775-volt sensitivity;

46:1 ±12% or 33 dB ±0.5 dB at 1.4-volt sensitivity.

20:1 ±3% or 26 dB ±0.25 dB at 3.1-volt sensitivity at the maximum level setting.

Required AC Mains: 50/60 Hz; 100-, 120-, 220- and 240-VAC (±10%) units are available. All draw 100 watts or less at idle. Current, voltage and frequency requirements are provided on the unit's back-panel.

AC Line Connector: NEMA 5-20P (20A).

Performance

Frequency Response: ±0.1 dB from 20 Hz to 20 kHz at 1 watt (see Figure 2.5).

Phase Response: ±10 degrees from 10 Hz to 20 kHz at 1 watt (see Figure 2.3)..

Signal-to-Noise Ratio, A-weighted:

Better than 105 dB below rated full bandwidth power.

20 Hz to 20 kHz:

Better than 100 dB below full bandwidth power.

Total Harmonic Distortion (THD): full bandwidth power, Less than 0.05% from 20 Hz to 1 kHz increasing linearly to 0.1% at 20 kHz.

Intermodulation Distortion (IMD): (60 Hz and 7 kHz at 4:1) Less than 0.05% from 163 milliwatts to full bandwidth power.

Damping Factor: Greater than 1,000 from 10 Hz to 400 Hz (see Figure 2.6).

Crosstalk: See Figure 2.4.

Slew Rate: (Slew rates are limited to useful levels for ultrasonic/RF protection). Greater than 13 volts per microsecond.

Controls

Enable: A front-panel push button used to turn the amplifier on and off.

Level: A front-panel 31-detent rotary control for each channel used to control the output level.

Stereo/Mono: A three-position back-panel switch used to select Stereo, Bridge-Mono or Parallel-Mono mode.

Sensitivity: A three-position switch inside the PIP compartment used to select the input sensitivity for both channels: 0.775 volts or 1.4 volts for standard 1-kHz power, or a 26 dB voltage gain.

Reset: A back-panel push button for each channel used to reset the circuit breaker that protects each power supply.

Indicators

Enable: An amber front-panel indicator that shows the on/off status of the low-voltage power supply.

Signal/IOC: A green front-panel indicator for each channel that flashes to show amplifier output. If a channel's output waveform differs from its input by 0.05% or more, the indicator flashes brightly to show distortion. This function provides proof of distortion-free performance. In Parallel-Mono mode, the Channel 2 light stays on.

ODEP: An amber front-panel indicator for each channel that shows thermal-dynamic energy reserve. Normally, each ODEP indicator is lit to show available reserve energy. In the rare event that a channel has no reserve, its indicator will dim in proportion to ODEP limiting. An ODEP indicator may also turn off under other conditions.

Input/Output

Input Connector: Two balanced ¼-inch(6.35-mm) phone jacks and two balanced three-pin female XLR connectors on the factory-installed PIP2-FXQ.

Input Impedance: Nominally 20 k ohms, balanced. Nominally 10 k ohms, unbalanced.

Maximum Input Level: 9 Vrms.

Input Sensitivity: 0.775 volts for standard 1 kHz power, 1.4 volts for standard 1 kHz power, or a 26 dB voltage gain.

Output Connectors: Two sets of color-coded 5-way binding posts (for banana plugs, spade lugs or bare wire).

Output Impedance: Less than 10 milliohms in series with less than 2 microhenries (see Figure 2.7).

DC Output Offset: (Shorted input) ±10 millivolts.

Output Signal

Stereo: Unbalanced, two-channel.

Bridge-Mono: Balanced, single-channel. Channel 1 controls are active; Channel 2 should not be used.

Parallel-Mono: Unbalanced, single-channel. Channel 1 controls are active; Channel 2 controls are bypassed.

Protection

Macro-Tech amplifiers are protected against shorted, open or mismatched loads; overloaded power supplies; excessive temperature; chain destruction phenomena; input overload damage; and high-frequency blowups. They also protect loudspeakers from input/output DC and turn-on/turn-off transients.

If unreasonable operating conditions occur, the patented ODEP circuitry will proportionally limit the drive level to protect the output

transistor stages, particularly in the case of elevated temperature. Transformer overheating will result in a temporary shutdown of the affected channel; when it has cooled to a safe temperature, the transformer will automatically reset itself. Controlled slew-rate voltage amplifiers prevent RF burnouts. And input overload protection is provided by current-limiting resistance at the input.

Turn On: Four-second delay with no dangerous transients. Delay time can be changed (contact Crown's Technical Support Group).

Accessories: Crown PIP and PIP2 modules including IQ-PIP modules.

Construction

Steel chassis with durable black finish, aluminum front panel with Lexan overlay, and specially designed flow-through ventilation from front to side panels.

Cooling: Internal heat sinks with forced-air cooling for rapid, uniform heat dissipation.

Dimensions: EIA Standard 19-inch (48.3-cm) rack mount width (EIA RS-310-B), 3.5-inch (8.9-cm) height, 16-inch (40.6-cm) depth behind the mounting surface and 2.5-inch (6.3- cm) protrusion in front of the mounting surface.

Approximate Weight: Center of gravity is 6 inches (15.2 cm) behind front mounting surface.

120 VAC, 60 Hz Units: 51 pounds, 12 ounces (23.5 kg) net; 65 pounds (29.5 kg) shipping weight.

International Units: 48 pounds, 15 ounces (22.2 kg) net; 57 pounds, 6 ounces (26.0 kg) shipping weight.

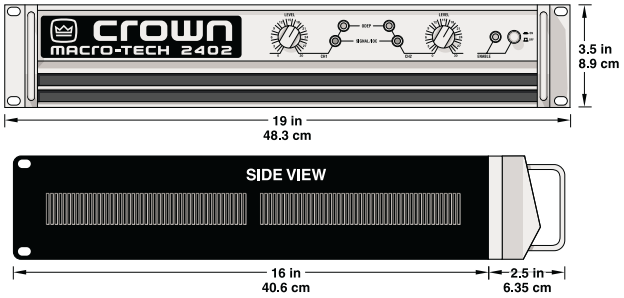

Figure 2.1 Dimensions

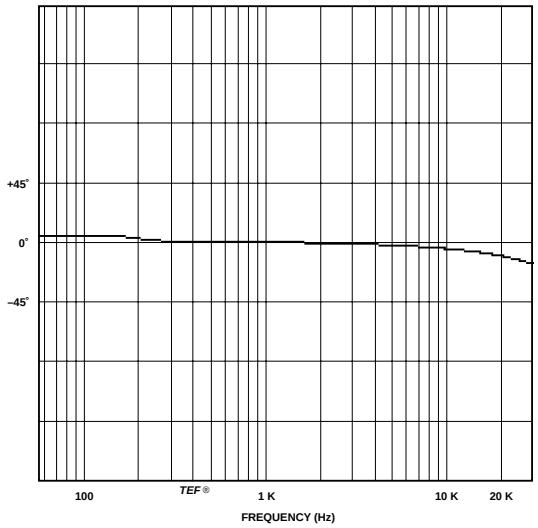

Figure 2.3 Typical Phase Response

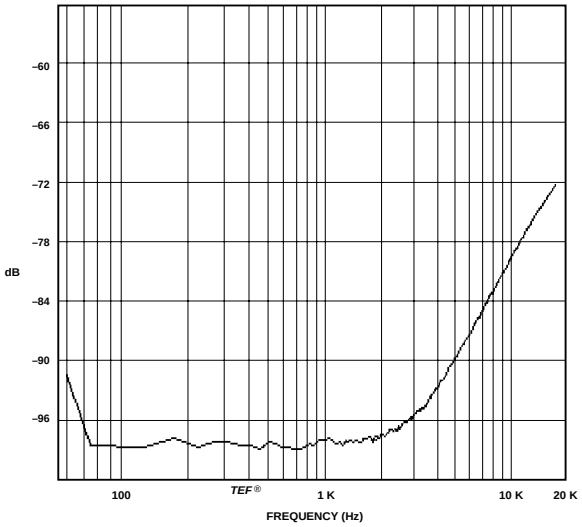

Figure 2.4 Typical Crosstalk

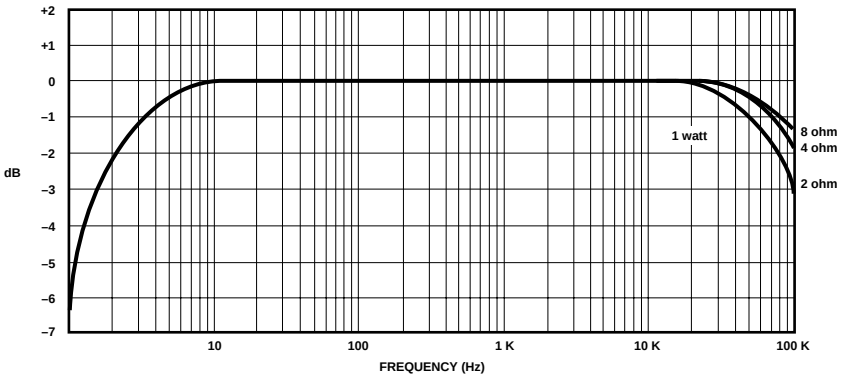

Figure 2.5 Typical Frequency Response

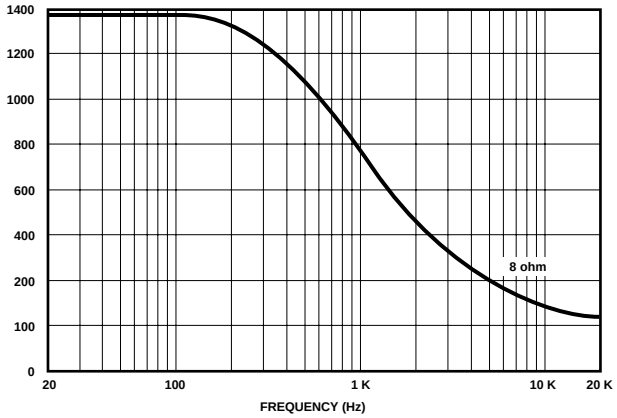

Figure 2.6 Typical Damping Factor

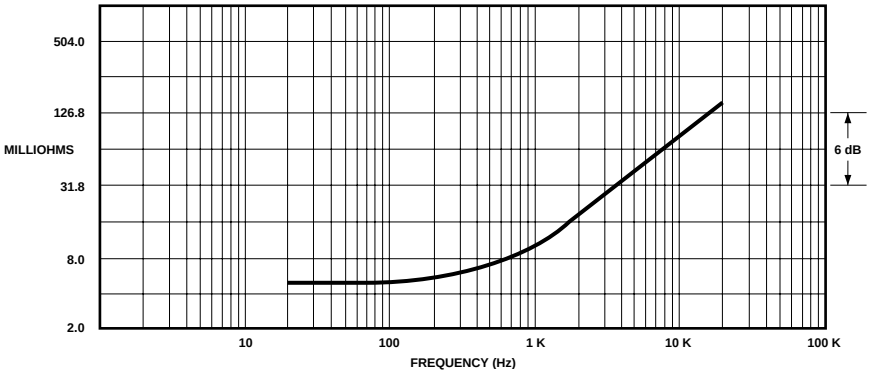

Figure 2.7 Typical Output Impedance

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3 Voltage Conversion

Due to Crown's distribution of Macro-Tech amplifiers all over the world, not all of these amplifiers are built with the same power supply components. MA-2402 amplifiers are built in one of the following two versions:

120 VAC, 60 Hz Units
These North American units have dedicated transformers for 120 VAC, 60 Hz power mains. These units are not convertable for use at any other voltage or frequency.

100 – 240 VAC, 50/60 Hz Units
These units have mult-tap transformers that accept 100, 120, 220/230, or 240 VAC, and 50 or 60 Hz power mains. Jumpers are used to configure the power supplies for different voltages. Note that the circuit breakers, fuse, fan motor and low voltage transformer may need to be changed to accommodate different voltages. Refer to Figure 3.1 for Main Transformer jumper locations and part numbers for all voltage configurations. Figure 3.2 shows correct wiring of the Low Voltage Transformer for 100-120VAC and 220-240VAC operation.

	100V	120V	220V/230V	240V
Main Transformer Jumpers	J21–J23 J19–J26 J28–J30	J19–J26 J23–J24 J30–J31	J24–J26 J28–J30 J16–J17	J24–J26 J30–J31 J16–17
Circuit Breakers CB100/CB200	C10169-8 15A		C10171-4 8A	
Fuse F1	A10285-8 0.5A Slow Blow		A10285-6 0.25A Slow Blow	
Fan Motor TF1	127325-1	127516-1	127337-1	
High Voltage Transformers (No. America)		127410-1		
High Voltage Transformers (Export)	127248-1			
Low Voltage Transformer	127114-1	127113-1	127113-1	

Figure 3.1 Voltage Jumper Settings and Parts

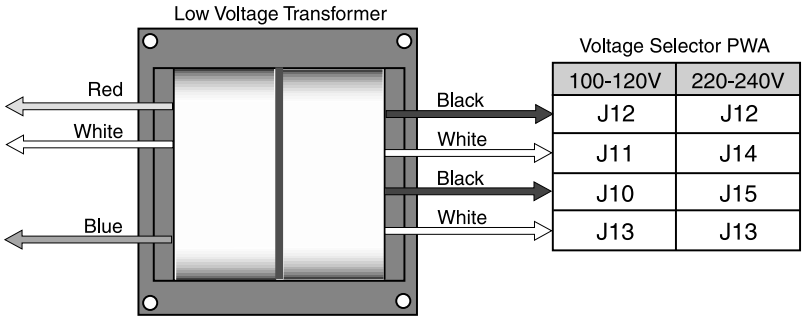

Figure 3.2 Low Voltage Transformer Wiring

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4 Circuit Theory

4.1 Overview

It should be noted that over time Crown makes improvements and changes to their products for various reasons. This manual is up to date as of the time of writing. For additional information regarding these amplifiers, refer to the applicable Technical Notes provided by Crown for this product.

This section of the manual explains the general operation of a typical Crown grounded bridge power amplifier. Topics covered include Front End, Grounded Bridge, and ODEP. Due to variations in design from vintage to vintage (and similarities with other Crown products) the theory of operation remains simplified.

4.2 Features

Macro Tech amplifiers utilize numerous Crown innovations including grounded bridge and ODEP technologies. Cooling techniques make use of the what is essentially air conditioner technology. Air flows bottom to top, and front to side. Air flows a short distance across a wide heatsink. Output transistors are of the metal can type rather than plastic case. This allows for a significantly higher thermal margin for the given voltage and current ratings. All devices used are tested and graded to ensure maximum reliability. Another electronic technique used is negative feedback. Almost all power amplifiers utilize negative feedback to control gain and provide stability, but Crown uses multiple nested feedback loops for maximum stability and greatly improved damping. Most Crown amplifiers have damping in excess of 1000 in the bass frequency range. This feedback, along with our compensation and ultra-low distortion output topology, make Crown amplifiers superior.

Features specific to the Macro Tech Series include three seperate power transformers (one for each channel and one for low voltage), a full time full speed fan, slew rate limiting, and Crown's “Quad-Mute” protection circuit for muting delay or protective action. This amplifier can operate in either a Bridged or Parallel Mono mode as well as dual (stereo). A sensitivity switch allows selection of input voltage required for rated output. Level controls are mounted on the front panel and are of the rotary type. Front panel indicators let the user know the status of the low voltage power supply (enable), an ODEP indicator for each channel which shows the reserve energy status, and a SPI/IOC indicator for each channel which indicates signal output and distortion. In general, the packaging of this model is designed for maximum watt/price/weight/size value with user friendly features.

For additional details refer to the specification section, or to the applicable Reference Manual.

4.3 Front End Operation

The front end is comprised of three stages: Balanced Gain Stage (BGS), Variable Gain Stage (VGS), and the Error Amp. Figure 4.1 shows a simplified diagram of a typical front end with voltage amplification stages.

4.3.1 Balanced Gain Stage (BGS)

Input to the amplifier is balanced. The shield may be isolated from chassis ground by an RC network to interrupt ground loops via the Ground Lift Switch. The non-inverting (hot) side of the balanced input is fed to the non-inverting input of the first op-amp stage. The inverting (negative) side of the balanced input is fed to the inverting input of the first op-amp stage. A potentiometer is provided for common mode rejection adjustment. Electrically, the BGS is at unity gain. (From an audio perspective, however, this stage actually provides +6dB gain if a fully balanced signal is placed on its input.) The BGS is a non-inverting stage. It’s output is delivered to the Variable Gain Stage.

4.3.2 Variable Gain Stage (VGS)

From the output of the BGS, the signal goes to the VGS where gain is determined by the position of the Sensitivity Switch, and level is determined by the level control. VGS is an inverting stage with the input being fed to its op-amp stage. Because gain after this stage is fixed at 26 dB (factor of 20), greater amplifier sensitivity is achieved by controlling the ratio of feedback to input resistance. The Sensitivity Switch sets the input impedance to this stage and varies the gain such that the overall amplifier gain is 26 dB, or is adjusted appropriately for 0.775V or 1.4V input to attain rated output.

4.3.3 Error Amp

The inverted output from the VGS is fed to the non-inverting input of the Error Amp op-amp stage through an AC coupling capacitor and input resistor. Amplifier output is fed back via the negative feedback (NFb) loop resistor. The ratio of feedback resistor to input resistor fixes gain from the Error Amp input to the output of the amplifier at 26 dB. Diodes prevent overdriving the Error Amp. Because the Error Amp amplifies the difference between input and output signals, any difference in the two waveforms will produce a near open loop gain con-

dition which in turn results in high peak output voltage. The output of the Error Amp, called the Error Signal (ES) drives the Voltage Translators.

4.4 Voltage Amplification

The Voltage Translator stage separates the output of the Error Amp into balanced positive and negative drive voltages for the Last Voltage Amplifiers (LVAs), translating the signal from ground referenced ±15V to ±Vcc reference. LVAs provide the main voltage amplification and drive the High Side output stages. Gain from Voltage Translator input to amplifier output is a factor of 25.2.

4.4.1 Voltage Translators

A voltage divider network splits the Error Signal (ES) into positive and negative drive signals for the balanced voltage translator stage. These offset reference voltages drive the input to the Voltage Translator transistors. A nested NFb loop from the output of the amplifier mixes with the inverted signal riding on the offset references. This negative feedback fixes gain at the offset reference points (and the output of the Error Amp) at a factor of -25.2 with respect to the amplifier output. The Voltage Translators are arranged in a common base configuration for non-inverting voltage gain with equal gain. They shift the audio from the ±15V reference to VCC reference. Their outputs drive their respective LVA.

Also tied into the Voltage Translator inputs are ODEP limiting transistors and control/protection transistors. The ODEP transistors steal drive as dictated by the ODEP circuitry (discussed later). The control/protection transistors act as switches to totally shunt audio to ground during the turn-on delay, or during a DC/LF or Fault protective action.

4.4.2 Last Voltage Amplifiers (LVAs)

The Voltage Translator stage channels the signal to the Last Voltage Amplifiers (LVA's) in a balanced configuration. The +LVA and -LVA, with their push-pull effect through the Bias Servo, drive the fully complementary output stage. The LVAs are configured as common emitter amplifiers. This configuration provides sufficient voltage gain and inverts the audio. The polarity inversion is necessary to avoid an overall polarity inversion from input jack to output jack, and it allows the NFb loop to control Error Amp gain by feeding back to its non-inverting input (with its polarity opposite to the output of the VGS). With the added voltage swing provided by the LVAs, the signal then gains current amplification through the Darlington emitter-follower output stage.

4.5 Grounded Bridge Topology

Figure 4.2 is a simplified example of the grounded bridge output topology. It consists of four quadrants of three deep Darlington (composite) emitter-follower stages per channel: one NPN and one PNP on the High Side of the bridge (driving the load), and one NPN and one PNP on the Low Side of the bridge (controlling the ground reference for the rails). The output stages are biased to operate class AB+B for ultra low distortion in the signal zero-crossing region and high efficiency.

4.5.1 High Side (HS)

The High Side (HS) of the bridge operates much like a conventional bipolar push-pull output configuration. As the input drive voltage becomes more positive, the HS NPN conducts and delivers positive voltage to the load. Eventually the NPN devices reach full conduction and +Vcc is across the load. At this time the HS PNP is biased off. When the drive signal is negative going, the HS PNP conducts to deliver -Vcc to the load and the HS NPN stage is off.

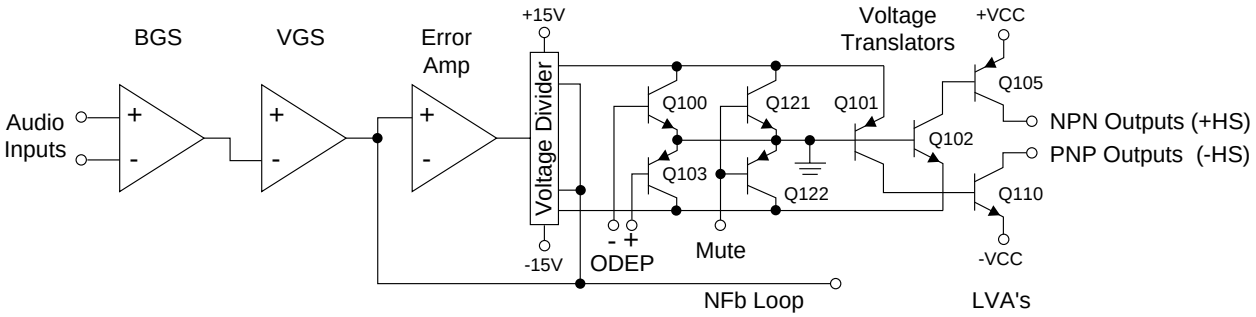

Figure 4.1 Typical Amplifier Front End and Voltage Amplification Stages.

The output of the +LVA drives the base of predriver device. Together, the predriver and driver form the first two parts of the three-deep Darlington and are biased class AB. They provide output drive through the bias resistor, bypassing the output devices, at levels below about 100mW. An RLC network between the predriver and driver provide phase shift compensation and limit driver base current to safe levels. Output devices are biased class B, just below cutoff. At about 100mW output they switch on to conduct high current to the load. Together with predriver and driver, the output device provide an overall class AB+B output.

The negative half of the HS is almost identical to the positive half, except that the devices are PNP. One difference is that the PNP bias resistor is slightly greater in value so that PNP output devices run closer to the cutoff level under static (no signal) conditions. This is because PNP devices require greater drive current.

HS bias is regulated by Q18, the Bias Servo. Q18 is a Vbe multiplier which maintains approximately 3.2V Vce under static conditions. The positive and negative halves of the HS output are in parallel with this 3.2V. With a full base-emitter on voltage drop across predrivers and drivers, the balance of voltage results in approximately .35V drop across the bias resistors in the positive half, and about .5V across the bias resistor in the negative half. Q18 conduction (and thus bias) is adjustable.

A diode string prevents excessive charge build up within the high conduction output devices when off. Flyback diodes shunt back-EMF pulses from reactive loads to the power supply to protect output devices from dangerous reverse voltage levels. An output terminating circuit blocks RF on output lines from entering the amplifier through its output connectors.

4.5.2 Low Side (LS)

The Low Side (LS) operates quite differently. The power supply bridge rectifier is not ground referenced, nor is the secondary of the main transformer. In other words, the high voltage power supply floats with respect to ground, but ±Vcc remain constant with respect to each other. This allows the power supply to deliver +Vcc and -Vcc from the same bridge rectifier and filter as a total difference in potential, regardless of their voltages with respect to ground. The LS uses inverted feedback from the HS output to control the ground reference for the rails (±Vcc). Both LS quadrants are arranged in a three-deep Darlington and are biased AB+B in the same manner as the HS.

When the amplifier output swings positive, the audio is fed to an op-amp stage where it is inverted. This inverted signal is delivered directly to the bases of the positive (NPN) and negative (PNP) LS predrivers. The negative drive forces the LS PNP devices on (NPN off). As the PNP devices conduct, Vce of the PNP Darlington drops. With LS device emitters tied to ground, -Vcc is pulled toward ground reference. Since the power supply is not ground referenced (and the total voltage from +Vcc to -Vcc is constant) +Vcc is forced higher above ground potential. This continues until, at the positive amplifier output peak, -Vcc = 0V and +Vcc equals the total power supply potential with a positive polarity. If,

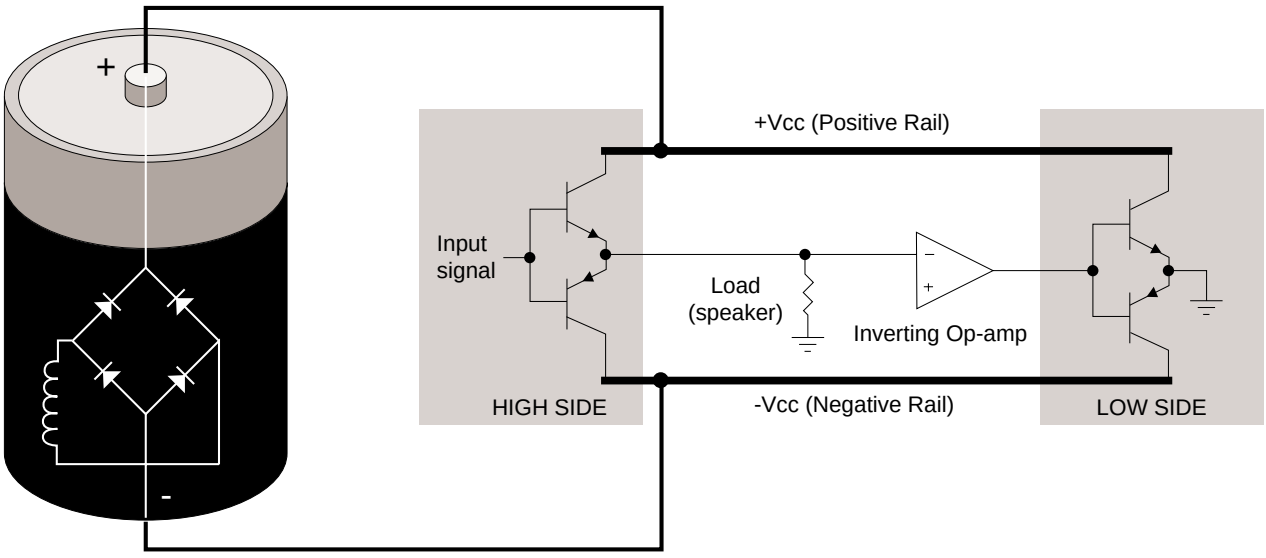

Figure 4.2 Grounded Bridge Output Topology

for example, the power supply produced a total of 70V from rail to rail (±35VDC measured from ground with no signal), the amplifier output would reach a positive peak of +70V.

Conversely, during a negative swing of the HS output where HS PNP devices conduct, the op-amp would output a positive voltage forcing LS NPN devices to conduct. This would result in +Vcc swinging toward ground potential and -Vcc further from ground potential. At the negative amplifier output peak, +Vcc = 0V and -Vcc equals the total power supply potential with a negative polarity. Using the same example as above, a 70V supply would allow a negative output peak of -70V. In summary, a power supply which produces a total of 70VDC rail to rail (or ±35VDC statically) is capable of producing 140V peak-to-peak at the amplifier output when the grounded bridge topology is used. The voltage used in this example are relatively close to the voltages of the MA-602.

The total effect is to deliver a peak to peak voltage to the speaker load which is twice the voltage produced by the power supply. Benefits include full utilization of the power supply (it conducts current during both halves of the output signal; conventional designs require two power supplies per channel, one positive and one negative), and never exposing any output device to more than half of the peak to peak output voltage (which does occur in conventional designs).

Low side bias is established by a diode string which also shunts built up charges on the output devices. Bias is adjustable via potentiometer. Flyback diodes perform the same function as the HS flybacks. The output of the LS is tied directly to chassis ground via ground strap.

4.6 Output Device Emulation Protection (ODEP)

To further protect the output stages, a specially developed ODEP circuit is used. It produces a complex analog output signal. This signal is proportional to the always changing safe-operating-area margin of the output transistors. The ODEP signal controls the Voltage Translator stage by removing drive that may exceed the safe-operating-area of the output stage.

ODEP senses output current by measuring the voltage dropped across LS emitter resistors. LS NPN current (negative amplifier output) and +Vcc are sensed, then multiplied to obtain a signal proportional to output power. Positive and negative ODEP voltages are adjustable via two potentiometers. Across ±ODEP are a PTC and a thermal sense (current source). The PTC is essentially a cutoff switch that causes hard ODEP limiting if heatsink temperature exceeds a safe maximum, regardless of signal level. The thermal sense causes the differential between +ODEP and -ODEP to decrease as heatsink temperature increases. An increase in positive output signal output into a load will result in -ODEP voltage dropping; an increase in negative output voltage and current will cause +ODEP voltage to drop. A complex RC network between the ±ODEP circuitry is used to simulate the thermal barriers between the interior of the output device die (immeasurable by normal means) and the time delay from heat generation at the die until heat dissipates to the thermal sensor. The combined effects of thermal history and instantaneous dynamic power level result in an accurate simulation of the actual thermal condition of the output transistors.

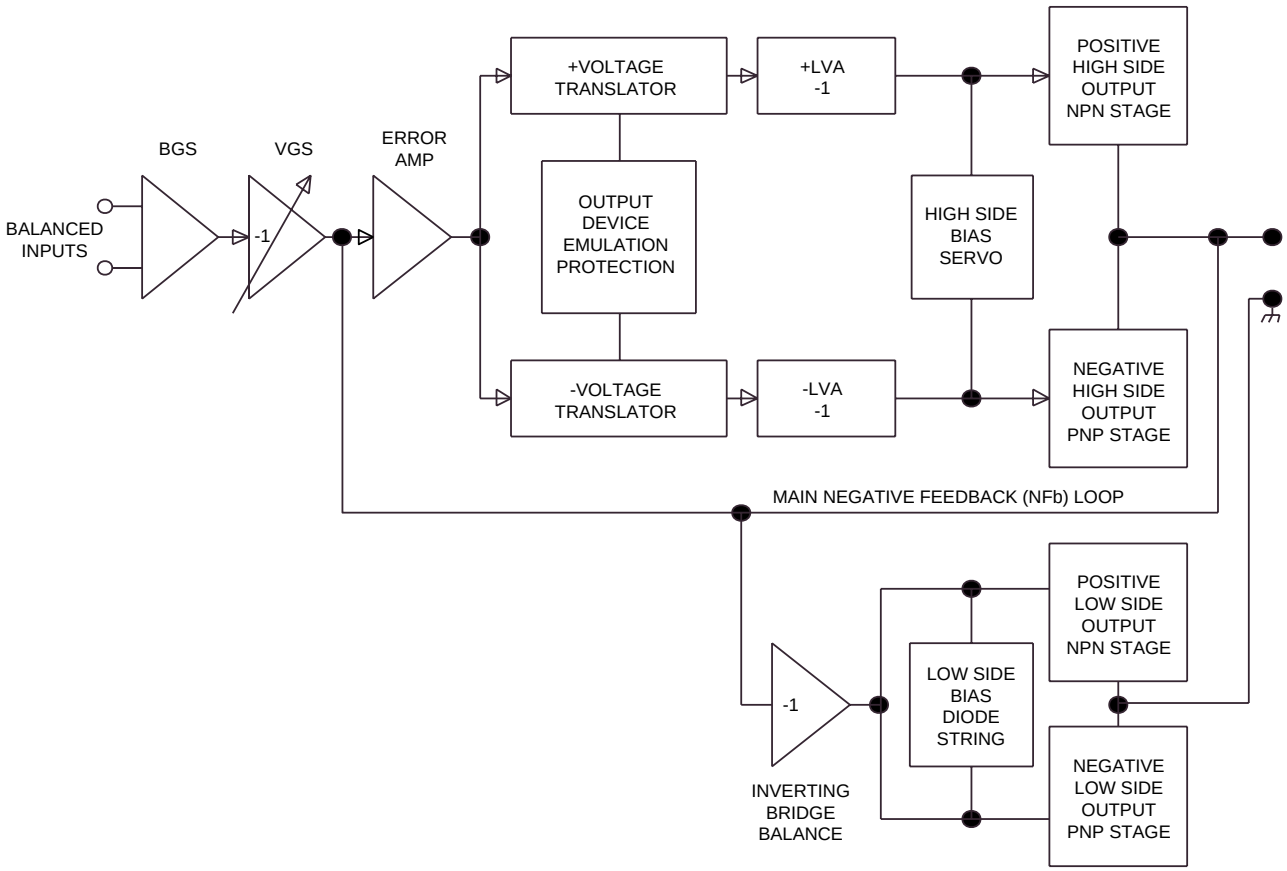

Figure 4.3 Typical Crown Grounded Bridge Amplifier Basic Block Diagram (One Channel Shown)

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5 Maintenance

5.1 Cautions and Warnings

DANGER: The outputs of this amplifier can produce LETHAL energy levels! Be very careful when making connections. Do not attempt to change output wiring until the amplifier has been off at least 10 seconds.

WARNING: This unit is capable of producing high sound pressure levels. Continued exposure to high sound pressure levels can cause permanent hearing impairment or loss. User caution is advised and ear protection is recommended when using at high levels.

WARNING: Do not expose this unit to rain or moisture.

WARNING: Only properly trained and qualified technicians should attempt to service this unit. There are no user serviceable parts inside.

WARNING: When performing service checks with the power off, discharge the main power supply filter capacitors fully before taking any measurements or touching any electrical components. A 300-ohm 10-W resistor is recommended for this. Hold the resistor with pliers, as the resistor may become extremely hot.

WARNING: Under load, with a sine wave signal at full power into both channels, the amplifier may draw in excess of 30 amperes from the AC service mains.

WARNING: Do not change the position of the Mode Switch when the amplifier is turned on. If the position of this switch is changed while the amplifier is powered, transients may damage your speakers.

WARNING: Heatsinks are not at ground potential. Simultaneously touching either heatsink and ground, or both heatsinks will cause electrical shock.

CAUTION: Eye protection should be worn at all times when protective covers are removed and the amplifier is plugged in.

CAUTION: Disconnect the power cord before installing or removing any cover or panel.

5.2 General Information

The following test procedures are to be used to verify operation of this amplifier. 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 AC source appropriate for the unit under test.. Test equipment includes an oscilloscope, a DMM, a signal generator, loads, and I.M.D. and T.H.D. noise test equipment.

5.3 Test Procedures

5.3.1 Standard Initial Conditions

Level controls fully clockwise.
Stereo/Mono switch in Stereo.
Sensitivity switch in 26 dB fixed gain position.
Ambient Temperature: 20 to 30 degrees C.
It is assumed, in each step, that conditions of the amplifier are per these initial conditions unless otherwise specified.

5.3.2 Output Bias Adjustment

Spec: 310 to 330mVDC.

Procedure: Perform procedure for each channel. While the heatsink temperature is less than 40° C measure the DC voltage on the output module across R09 (15 ohm) or on the main module at TP100-7 (TP200-7 for channel 2), adjust R02 if necessary. Measure the DC voltage on the output module across R25 (15 ohm) or on the main module at TP100-8 (TP200-8 for channel 2), adjust R33 if necessary.

5.3.3 ODEP Voltage Adjustment

Spec: 10.00V at 25 degrees C heat sink. See chart for temperatures other than 25 degrees.

Procedure: Measure the heatsink temperature. If unable to do so, note the room temperature and do this procedure while the heatsink temperature is at room temperature.

Measure the voltage on TP100-5 and adjust R186 for the voltage per the chart. This voltage will be a negative voltage. Measure the voltage on TP100-10 and adjust R300 for the voltage per the chart. This voltage will be a positive voltage. For channel 2 the designations are TP200-5, TP200-10, R286, and R400.

ODEP Voltage Chart
Tolerance ±0.1V

°C	°F	Voltage
35	95.0	10.73
34	93.2	10.66
33	91.4	10.58
32	89.6	10.51
31	87.8	10.44
30	86.0	10.37
29	84.2	10.29
28	82.4	10.22
27	80.6	10.15
26	78.8	10.07
25	77.0	10.00
24	75.2	9.93
23	73.4	9.85
22	71.6	9.78
21	69.8	9.71
20	68.0	9.64
19	66.2	9.56
18	64.4	9.49
17	62.6	9.42
16	60.8	9.34
15	59.0	9.27

5.3.4 DC Offset
Spec: 0 VDC, ±10 mV.

Procedure: Measure DC voltage at the output connectors (rear panel). There is no adjustment for output offset. If spec is not met, there is an electrical malfunction. Slightly out of spec measurement is usually due to U104/U204 out of tolorance.

5.3.5 Quiescent Power Draw
Spec: 100 watts maximum

Procedure: With no input signal the amplifier should draw no more than 100 watts from the power source. Slightly high readings may be due to out of tolerance Output Bias Adjustment.

5.3.6 Voltage Gain
Spec 26 dB Gain: Gain of 20.0 ±3%.
Spec 0.775V Sensitivity: ±10%.
Spec 1.4V Sensitivity: ±10%.

Procedure: No load connected. Inject a 0.775 VAC 1 kHz sine wave with the Sensitivity Switch in the 26 dB position. Measure 15.5 VAC ±0.5 VAC at the amplifier output. Inject a 0.775 VAC 1 kHz sine wave with the Sensitivity Switch in the 0.775V position. Measure 64 VAC ±6 VAC at the amplifier output. Inject a 1.4 VAC 1 kHz sine wave with the Sensitivity Switch in the 1.4V position. Measure 64 VAC ±6 VAC at the amplifier output. Return the Sensitivity Switch to the 26 dB position.

5.3.7 Current Limit
Spec: 31.5 to 43.0 Amps

Procedure: Load the channel under test to 1 ohm. Inject a 1 kHz differentiated (10% duty cycle) square wave. See Figure 5.1 for differentiator circuit. Increase output level until current limit occurs. Current limit should occur between 31.5 and 43.0 amps (31.5 to 43.0 Vpk). Observe clean (no oscillations) current clipping. See Figure 5.2 for differentiated wave form at current limit.

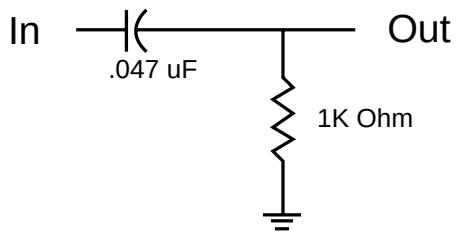

Figure 5.1 Differentiator Circuit

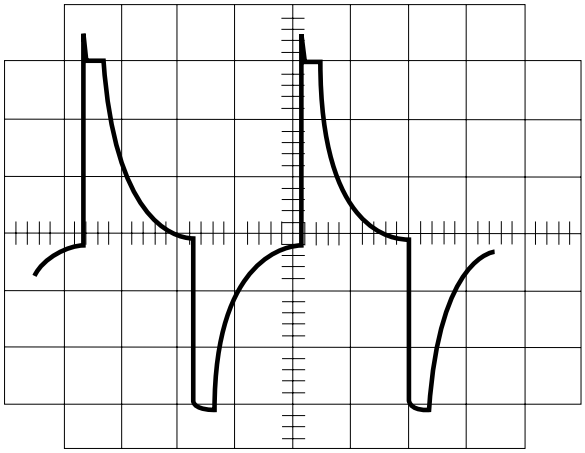

Figure 5.2 Differentiated wave form at current limit

5.3.8 10 kHz Square Wave Response

Spec: No overshoot, ringing, or oscillations. Slew rate 17 - 25 V/µS into 8 ohm load.

Procedure: Load the channel under test to 8 ohms. Inject a 10 kHz square wave to obtain 35 volts zero-to-peak at the output. Observe the wave form. It must not include overshoot (<23mV), ringing, or any type of oscillation. Rise time should be between 17 and 25 volts per microsecond. See Figure 5.3 for typical 10 kHz square wave response.

5.3.9 Crosstalk

Spec: 60 dB below 8 ohm rated power at 20 kHz, 85 dB below 8 ohm rated power at 1 kHz and below.
Initial Conditions: Per standard. Terminate input of channel not driven with 600 ohms.

Procedure: Load each channel to 8 ohms. Inject a 20 kHz sine wave into Channel 1 and increase the level to 63 VAC at the output. Measure less than 63 millivolts AC at the output of Channel 2. Inject a 1 kHz sine wave into Channel 1 and increase the level to 63 VAC at the output. Measure less than 3.6 millivolts AC at the output of Channel 2.Repeat for Channel 2 by driving channel 2 and terminating Channel 1. Measure less than 63 millivolts at the output of Channel 1 at 20 kHz, and 3.6 millivolts at 1 kHz.

5.3.10 Output Power

North America:
Spec at 8 Ohm Stereo: >= 520W at 0.1% THD.
Spec at 4 Ohm Stereo: >= 800W at 0.1% THD.
Spec at 2 Ohm Stereo: >= 1050W at 0.1% THD.

International:
Spec at 8 Ohm Stereo: >= 512W at 0.1% THD.
Spec at 4 Ohm Stereo: >= 742W at 0.1% THD.
Spec at 2 Ohm Stereo: >= 924W at 0.1% THD.

Procedure:
North America: Load each channel to 8 ohms. Inject a 1 kHz sine wave and measure at least 64.50 VAC at the output of each channel. Load each channel to 4 ohms. Inject a 1 kHz sine wave and measure at least 56.57 VAC. Load each channel to 2 ohms. Inject a 1 kHz sine wave and measure at least 45.82 VAC. All power measurements must be at less than 0.1% THD.

International: Load each channel to 8 ohms. Inject a 1 kHz sine wave and measure at least 64.0 VAC at the output of each channel. Load each channel to 4 ohms. Inject a 1 kHz sine wave and measure at least 54.5 VAC. Load each channel to 2 ohms. Inject a 1 kHz sine wave and measure at least 43.0 VAC. All power measurements must be at less than 0.1% THD.

5.3.11 ODEP Limiting

Spec: Clean limiting into a resistive load (see Figure 5.4).

Procedure: Load each channel to 4 ohms. Inject a 50 Hz sine wave into each channel and increase the level for 20 VAC at the output. Stuff a rag into the fan to prevent the fan from turning. Observe the wave form on an oscilloscope. After about 1 minute ODEP limiting will occur (see Figure 5.4). Once limiting occurs the wave form will collapse at a rapid rate. Make sure both channels limit. Remove the load and signal, remove the rag from the fan, and allow the amp to cool.

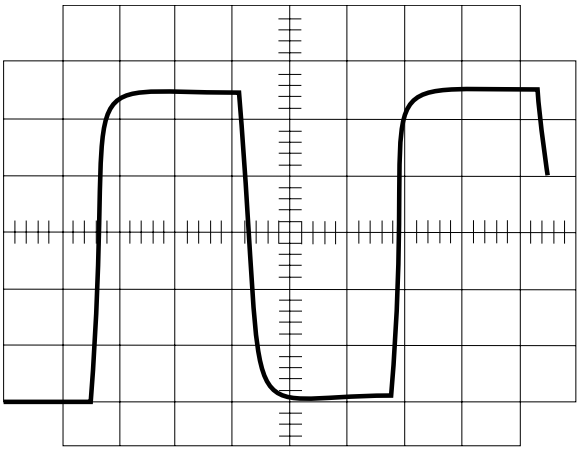

Figure 5.3 10 kHz square wave response

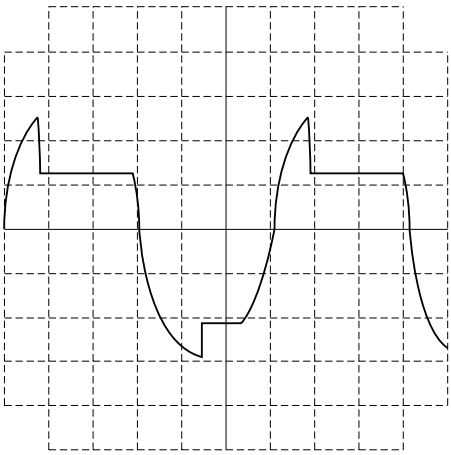

Figure 5.4 ODEP *limiting wave form*

5.3.12 Fan Operation

Spec:Continuous full speed.

Procedure: Verify operation per above specification.

5.3.13 LF Protection

Spec: Amplifier channel will cycle into protect with .5 Hz 6Vp-p or 2 Hz 6 Vrms sine wave at the output.

Procedure: Inject a 2 Hz sine wave into the input of the channel under test. Increase the level until the amplifier cycles on and off. It should cycle on and off when the output reaches approximately 6 Vrms.

5.3.14 Signal to Noise

Spec: 100 dB below rated 8 ohm power 20 Hz-20 kHz (A-weighted).

Procedure: Short inputs. Load each channel to 8 ohms. Measure less than 645 µV at the output of each channel.

5.3.15 Intermodulation Distortion (IMD)

Spec: 8 ohms, 0 dB = FTC continuous average 20 Hz-20 kHz power

0 dB < .01%
-35 dB < .05%

Procedure: Load each channel to 8 ohms. Inject a SMPTE standard IM signal (60 Hz and 7 kHz sine wave mixed at 4:1 ratio). Set the 60 Hz portion of the signal for 50.8 Vrms output. Set the 7 kHz portion to 25%. With the IM analyzer measure less than 0.01% IMD. Repeat the test at -35 dB (reference 50.8 Vrms) and measure less than 0.05% IMD.

5.3.16 Displays

Spec:

Enable - On when low voltage supply is on.
ODEP - Dims in proportion to ODEP limiting.
IOC - On with error amp clip (distortion).
SPI - Flash in sync with amplifier output.

Procedure: Verify indicators per above specifications.

5.3.17 Post Testing

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

Level Controls: 9 to 11 O'Clock.
Sensitivity Switch: .775V.
Stereo/Mono Switch: Stereo (Dual)
Power: Off.

6 Parts

6.1 General Information

Replacement parts for this Crown amplifier can be ordered from the Crown parts department.

PART PRICES AND AVAILABILITY ARE SUBJECT TO CHANGE WITHOUT NOTICE.

6.2 Ordering and Receiving Parts

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

6.2.1 Terms

Normal terms are prepaid. Net-30 Days applies to only those having pre-established accounts with Crown. The Crown Parts Department does accept Visa or Master Card. If prepaying, 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 payment. New parts returned for credit are subject to a restocking fee, and authorization from the Crown Parts Department must be obtained before returning parts for credit.

6.2.2 Shipment

Shipment will normally be made via 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 prepayment (check or credit card) basis.

Crown Customer Service
Technical Support Group
Factory Service
Parts Department

Mailing Address: P.O. Box 1000, Elkhart IN 46515
Shipping Address: Plant 2 S. W.
1718 W. Mishawaka Rd., Elkhart IN 46517
Phone: (219) 294-8200
Toll Free: (800) 342-6939
Fax: (219) 294-8301
http://www.crownaudio.com

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7 Exploded View Parts

7.1 General Information

This chapter includes a mechanical part list for this product. All serviceable parts and assemblies will have a Crown Part Number (CPN) listed in this chapter. 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.

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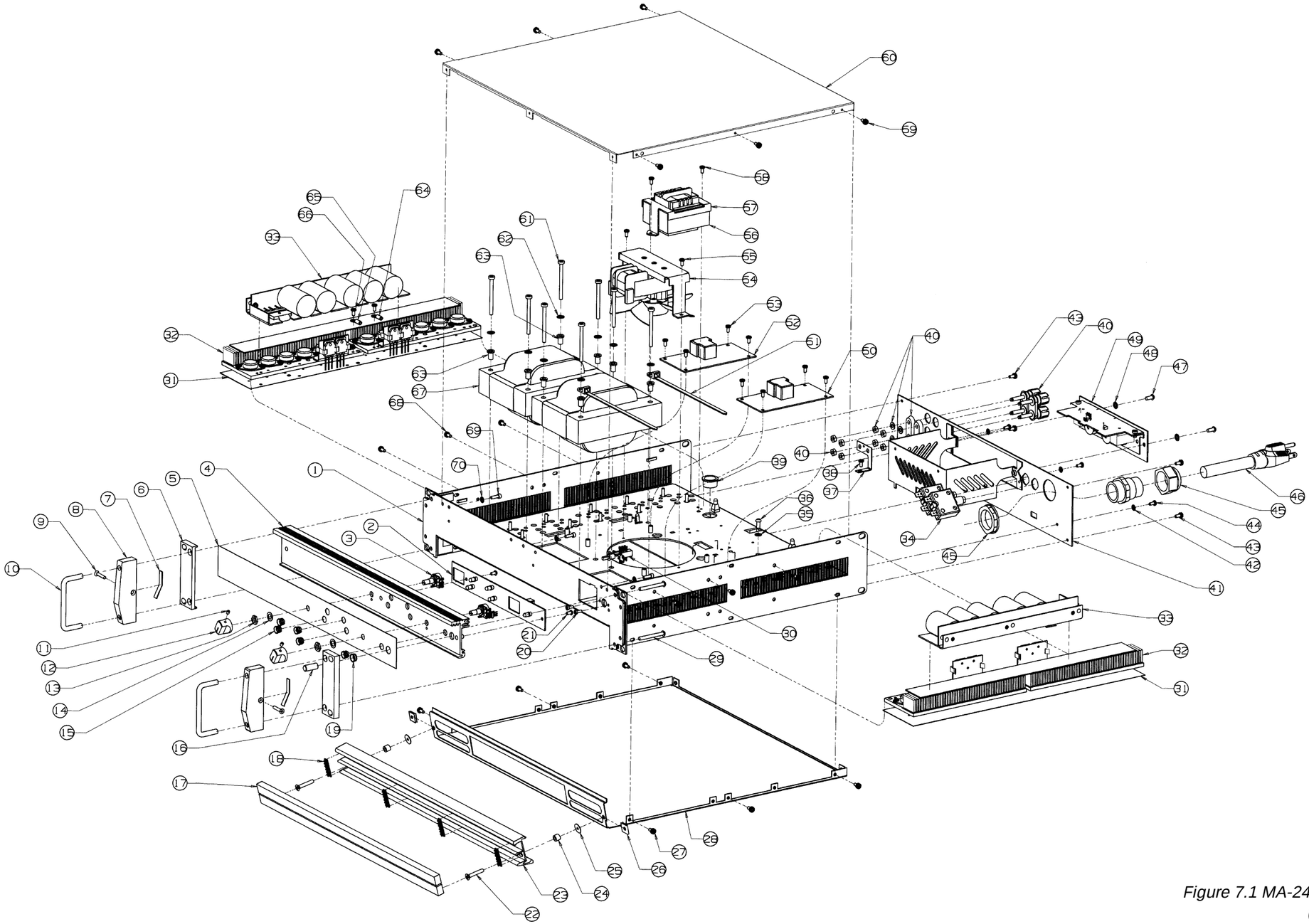

Figure 7.1 MA-2402 Chassis Assembly (Top)

7.2 Chassis Assembly (Top)

Refer to figure 7.1 for Location of Major Parts

Item	Quantity	Description	Part # (CPN)
1	1	CHAS, MA2402 WELD/AP/PC	127105-2
2	1	PWA, MA PIP2 DISPLAY	SEE SECTION 8
3	1	5KOHM LNR 31 DETENT 15MM SHAFT POT	C7280-8
4	1	PANEL, MA DISPLAY AP SIL PC	F12887-0
5	1	OVERLAY,MA2402 DOM FP LEXAN	127385-1
6	2	END CAP, D6271-5 PC SIL	D8052J8
7	2	SPACER, MA PNL CAP 245	F12647-8
8	2	PNL CAP D6271-7 PC SIL	D8049J4
9	2	6-32 X .75 FLTHD TT Z	C10258-9
10	2	HDL, C6713-9 PC SIL	D8048J6
11	2	6-32 X .18 CUP POINT MSCR BLK	C6005-0
12	2	KNOB, MA/MR SERIES	D6265-9
13	2	LEVEL CONTROL HARDWARE	INCLUDED W POT
14	2	LEVEL CONTROL HARDWARE	INCLUDED W POT
15	5	COLLAR, LED PLASTIC SILVER	D7937-2
16	1	PUSHBUTTON, .75 BEADED	D6013-3
17	2	FILTER, FR FOAM .53 X 16.7	D7696-4
18	8	VELCRO TAPE, MVA#8 1/2" X 1/4"	B5796-6
19	1	COLLAR, .35 ROUND PB SW	D4108-3
20	2	4-40 X .375 TAPTITE PAN PH	C5961-5
21	2	6-32 X .25 RDHD PH MSCR Z	A10086-10604
22	2	SCR,#8X1.00 TYPE AB FLAT HD PH	A10103-10816
23	1	EXTRU, D 8753-2 PC SIL	D8752-4
24	2	#8 X 5/16OD X 1/4L SPACER	A10101-12
25	2	.5 X .136 X .02 NYLON WASHER	A10101-5
26	2	CLIP, CT/MA/MT/PB FIL GRILLE	A10173-1
27	8	SEMS, 6-32X.31 TORX PNHD STAR	103433-70605
28	1	CVR, MA2400/3600 BTM PC	F12609-8
29	4	8-32 X 1.50 RDHD PH MSCR Z	A10086-10824
30	1	SWITCH, DPST PUSHBTN 6A 250VAC	C10180-5
31	2	SILPAD, 2.87X14.57 7 MIL	D7796-2
32	2	HEATSINK ASSEMBLY	SEE SECTION 8
33	2	CAP SHELF ASSEMBLY	SEE SECTION 8
34	2	BREAKER	SEE SECTION 3
35	1	#8 INT STAR LOCKWASHER BLACK	A10094-5
36	1	8-32 X .37 RDHD BZ MSCR	A10086-70806
37	1	JUMPER, TWO OTPT GROUND 215	D8854-8
38	1	6-32X.312 PAN HD T15 TT TYPE W	C9491-9

7.2 Chassis Assembly (Top) Continued

Refer to figure 7.1 for Location of Major Parts

Item	Quantity	Description	Part # (CPN)
39	2	.750D X 5/8ID BUSHING	A10191-5
40	2	TERMINAL, DUAL BINDING POST W/HARDWARE	C10184-7
41	1	BP, MA2402 DOMESTIC	127106-1
		BP, MA2402 EXPORT (E13)	128259-1
42	3	#6 INT STAR WASHER BLACK	A10094-3
43	4	SEMS, 6-32 X .31 TORX PNHD STAR	103433-70605
44	3	6-32X.312 PAN HD T15 TT TYPE W	C9491-9
45	1	STRAIN RELIEF, DOMESTIC	C7315-2
		STRAIN RELIEF, EXPORT (E13)	C10187-0
46	1	PWR CORD, MA2402 DOMESTIC	127510-1
		PWR CORD, EUR PLUG CSL/PT#2 (E13CE)	A10793-0503M
47	2	8-32 X .37 RDHD BZ MSCR	A10086-70806
48	2	#8 INT STAR LOCKWASHER BLACK	A10094-5
49	1	ASM, PIP2 FXQ	127256-1
50	1	PWA, MA2402 CH2 RLT/V SELECT EXPORT	SEE SECTION 8
		PWA, MA2402 DOMESTIC CH2 RELAY	SEE SECTION 8
51	2	7.5" CABLE TIE & CLAMP	C 1813-2
52	1	PWA, MA2402 CH1 RLY/VSELECT	SEE SECTION 8
53	8	6-32X.312 PAN HD T15 TT TYPE W	C9491-9
54	1	FAN ASSEMBLY	SEE SECTION 7.6
55	2	6-32X.312 PAN HD T15 TT TYPE W	C9491-9
56	1	XFMR, LOW VOLTAGE	SEE SECTION 3
57	1	BRACKET, MA2402 LV XFMR MOUNT	127309-1
58	2	6-32X.312 PAN HD T15 TT TYPE W	C9491-9
59	6	SEMS, 6-32 X .31 TORX PNHD STAR	103433-70605
60	1	CVR, MA MT PB CT TOP PC	D8501-5
61	8	10-32 X 2 PNHD PH MSCR Z	A10089-11032
62	8	#10 INT TOOTH LOCKWASHER ZINC	A10094-8
63	8	#10 NYL SHLDR WASHER #10-375-A	A10099-7
64	1	WIRE, 16 BLU RING X 7.0 X FAST	A11379-J070C
65	1	WIRE, 16 RED RING X 7.0 X FAST	A11378-G070A
66	2	6-32X.312 PAN HD T15 TT TYPE W	C9491-9
67	2	TRANSFORMER, MA2402 MAIN 120V 60Hz	SEE SECTION 3
		TRANSFORMER, MA2402 MAIN EXPORT	SEE SECTION 3
68	6	SEMS, 6-32 X .31 TORX PNHD STAR	103433-70605
69	3	SCREW, SOCKET CAP 6-32 X .437 BLK	A10092-20607
70	3	#6 INT STAR WASHER ZINC	A10094-4

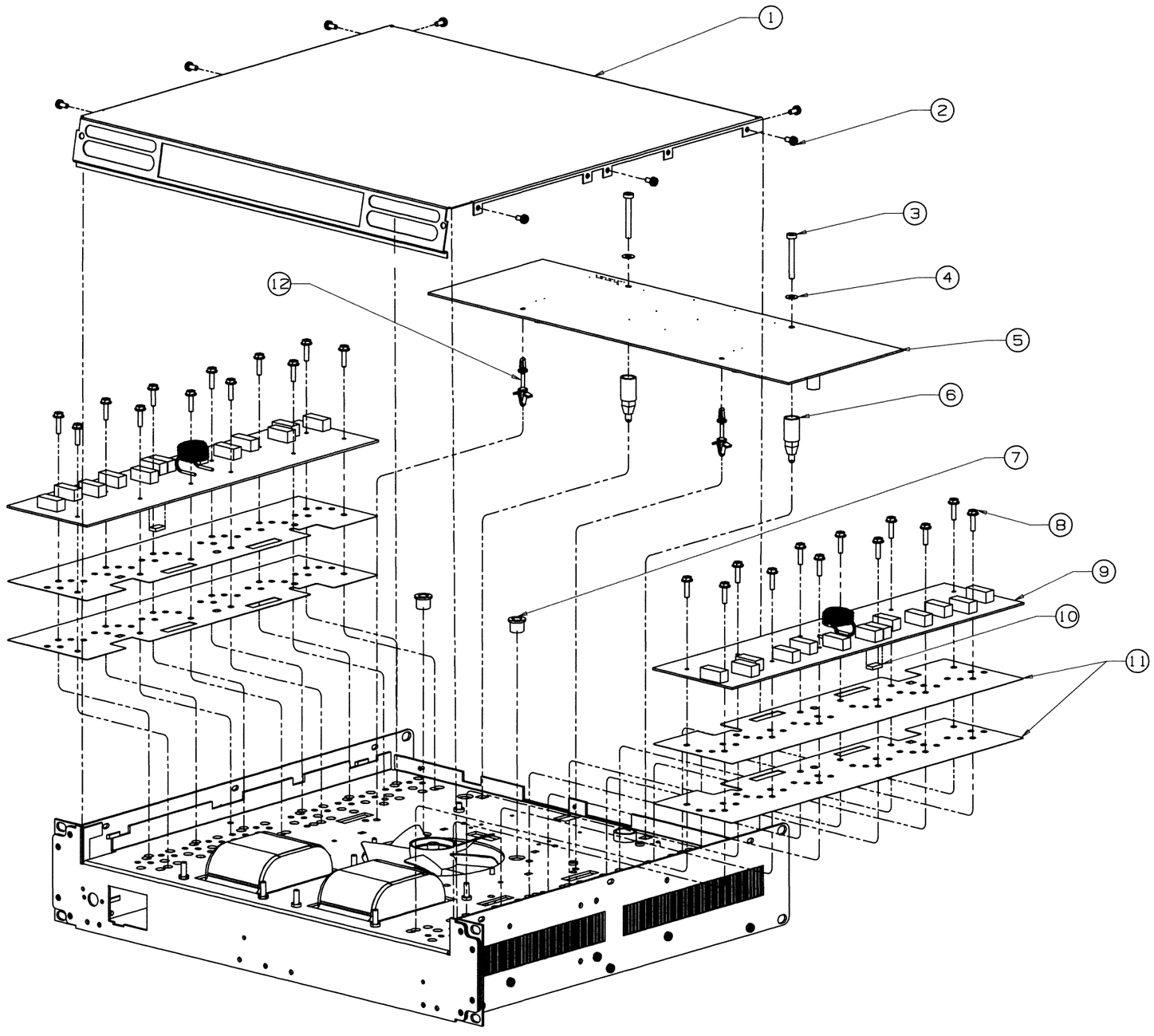

Figure 7.2 MA-2402 Chassis Assembly (Bottom)

7.3 Chassis Assembly (Bottom)

Refer to figure 7.2 for Location of Major Parts

Item	Quantity	Description	Part # (CPN)
1	1	CVR, MA2400/3600 BTM PC	F12609-8
2	8	SEMS, 6-32 X .31 TORX PNHD STAR	103433-70605
3	2	8-18 X 1.375 PH PNHD ST SCR Z	A10109-10822
4	2	NYL THUMBSCREW WASHER	D4137-2
5	1	PWA, MA2402 MAIN	SEE SECTION 8
6	2	.75" SPACER TOGGLE NUT PLASTIC	C6914-3
7	2	OCB.500 SNAP BUSHING	A10192-1
8	24	6-32 X .56 HEX WSHR HD W/T15	A10315-1
9	2	PWA, OUTPUT	SEE SECTION 8
10	2	HEATSINK, OUTPUT DIODES	F12019-0
11	4	INSULATOR, THROUGH HOLE OUTPUT	125547-1
12	2	TENSION RETAINING BD SUPPORTS	C6912-7

7.4 Heat Sink Assembly

(Channel 1 and 2 are Identical)

Refer to figure 7.3 for Exploded View

Item	Quantity	Description	Part # (CPN)
1	1	INS, 1.38 X 13.56 PAPER	D8867-0
2	24	6-32 X .312 PAN HD T15 TT TYPE W	C9491-9
3	6	SJ7147 PNP PWR XSISTOR (Q08, Q09, Q10, Q16, Q17, Q18)	C8188-2
4	2	BRKT, TO3P HEATSINK	D 7666-7
5	2	2SA1186 PWR PNP T03P SANKEN (Q07, Q15)	C8573-5
6	2	CLIP, TO3P MOUNTING	D7665-9
7	2	HS, COP 3/4" FINS #7 SOLDER	M21322J8
8	2	2SC2837 PWR NPN TO3P SANKEN (Q03, Q11)	C8574-3
9	6	SJ7148 NPN PWR XSISTOR (Q04, Q05, Q06, Q12, Q13, Q14)	C8187-4

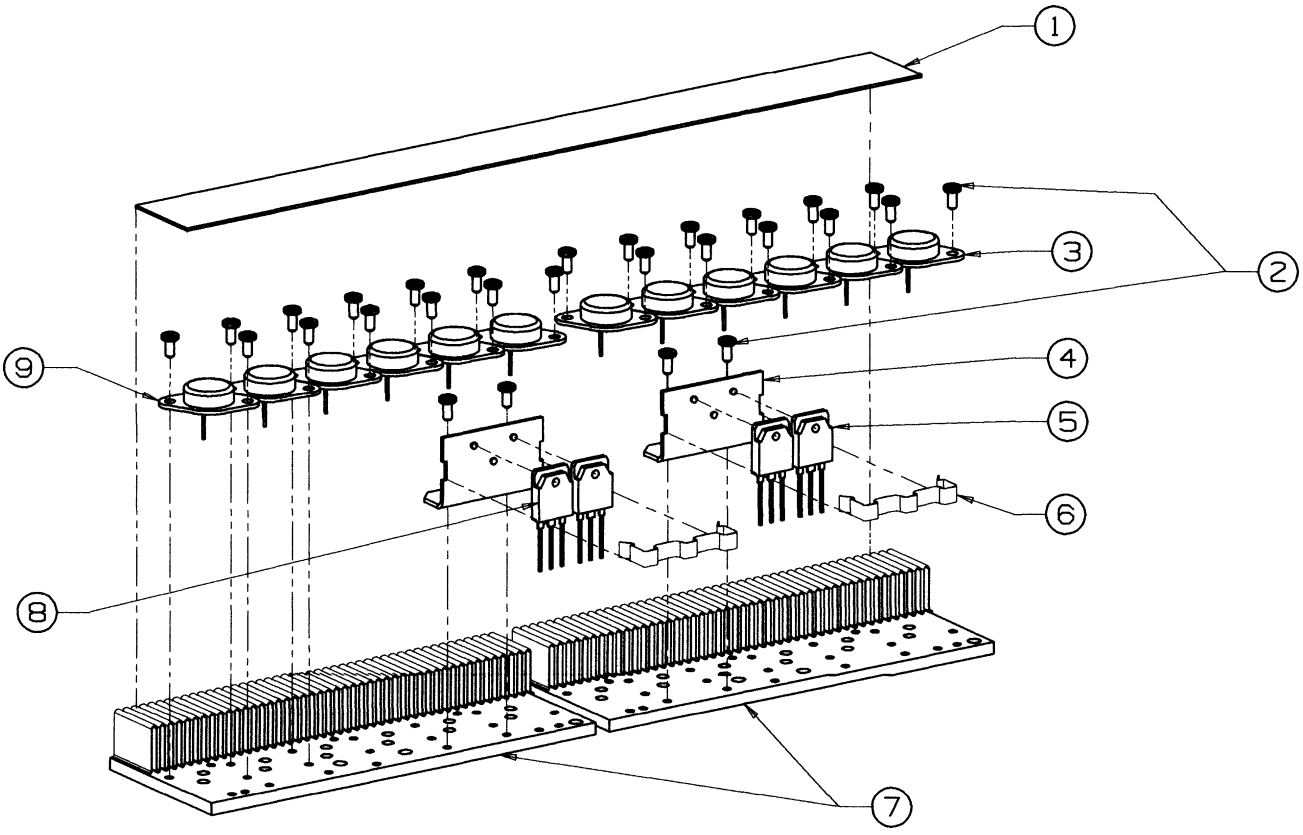

Figure 7.3 MA-2402 Heatsink Assembly

7.5 Cap Shelf Assembly

(Channel 1 and 2 are Identical)

Refer to figure 7.4 for Exploded View

Item	Quantity	Description	Part # (CPN)
1	3	6-32X.312 PAN HD T15 TT TYPE W	C9491-9
2	1	CLIP, MA2402 RECTIFIER SPRING	127467-1
3	1	PWA, MA2402 PIP2 CAP/RECT	SEE SECTION 8
4	1	SHELF, MA2402 CAP/RECT	127111-1
5	1	TAPE, KAPTON(POLYIMIDE) 1/2 IN	S6251-3

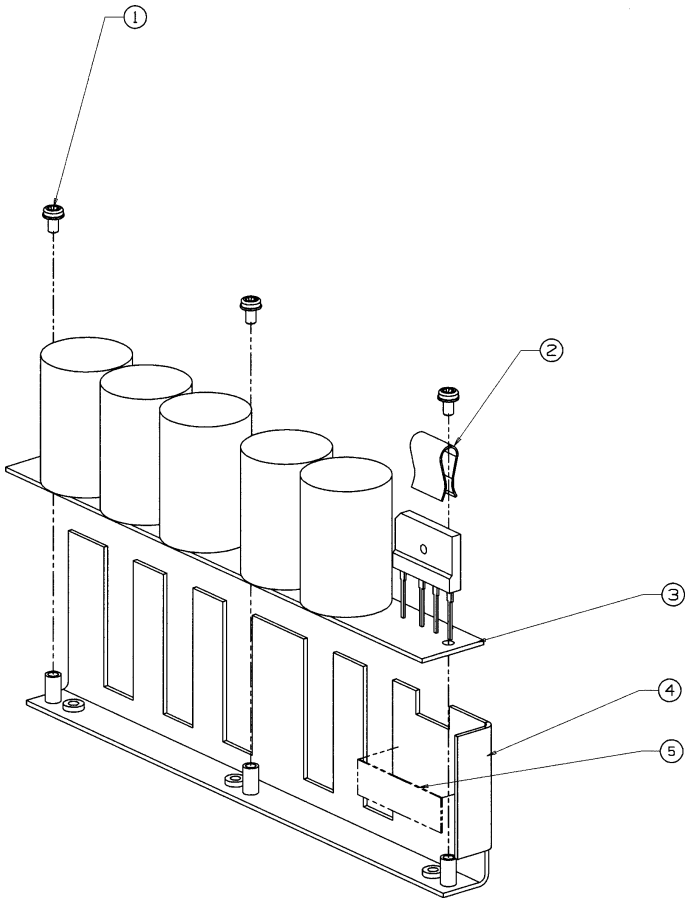

Figure 7.4 MA-2402 Cap Shelf Assembly

7.6 Fan Assembly

Refer to figure 7.5 for Exploded View

Item	Quantity	Description	Part # (CPN)
1	2	6-32 X 5/16 UNDERCUT FLTHD MSCR	C7062-0
2	1	BRACKET, FAN	D8439-8
3	2	6-32 X .312 PAN HD T15 TT TYPE W	C9491-9
4	1	XMOTOR	SEE SECTION 3
5	1	FAN BLADE, 4.5 INCH CCW	C9938-9
6	1	LBL, 1A/05A FUSE REPLACEMENT	D7340-9
7	1	LBL, FAN VOLTAGE DOMESTIC	127516-1

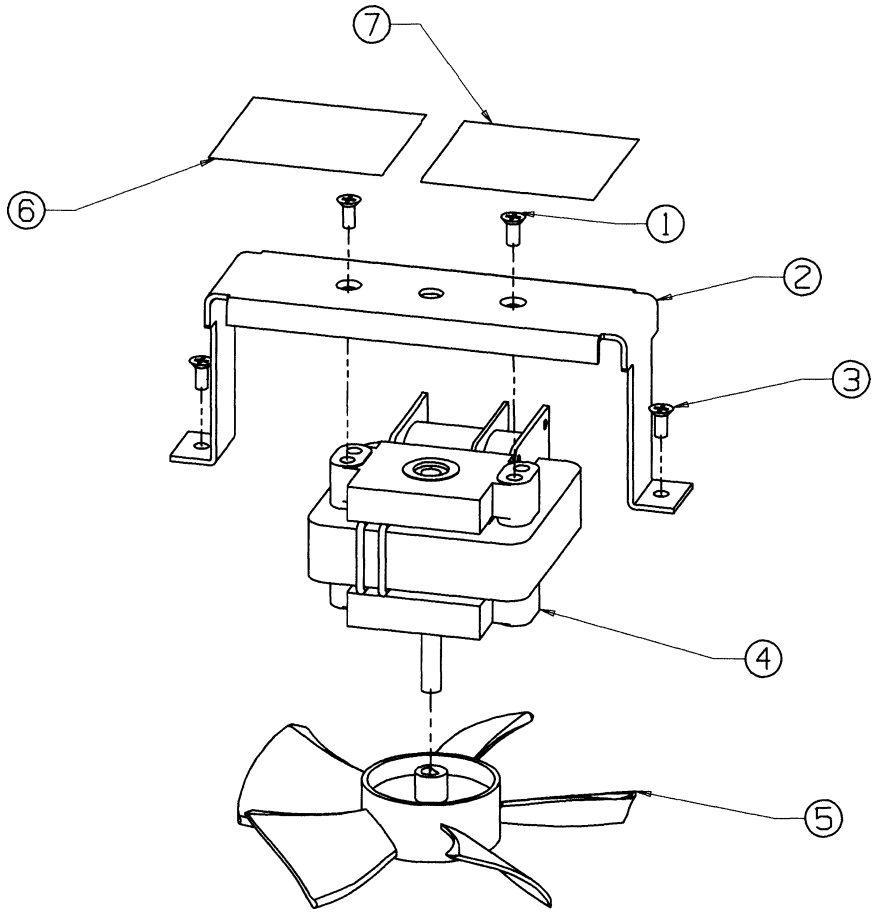

Figure 7.5 MA-2402 Fan Assembly

7.7 Standard PIP Assembly

Refer to figure 7.6 for Exploded View

Item	Quantity	Description	Part # (CPN)
1	2	#8 X 1/4 #6 PNHD PH BZ	C 7161-0
2	1	PWA, PIP2FXQ	127210-1
3	1	PANEL, PIP2FXQ	127234-1
4	2	PHONE JACK HARDWARE INCLD. W/ PHONE JACK	
5	2	PHONE JACK HARDWARE INCLD. W/ PHONE JACK	
6	4	M3 X .5 X 7MM PN HD BLK/NYLOK	A10330-9

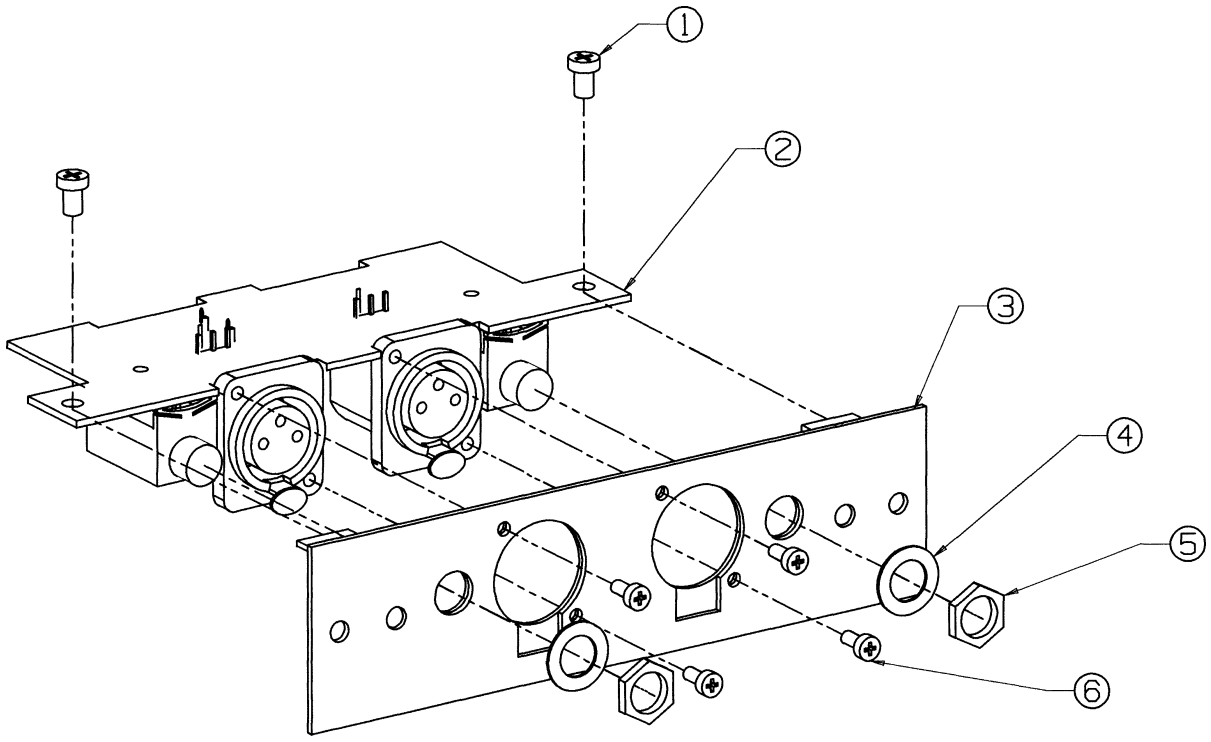

Figure 7.6 Standard PIP Assembly

8 Module and Schematic Information

8.1 General Information

The schematics referenced and provided are representative only. There may be slight variations between amplifier to amplifier. These schematics are intended to be used for troubleshooting purposes only.

Note on circuit board designations: Crown circuit boards are referenced with a PWA and/or PWB part number. PWA stands for Printed Wire Assembly. This is the completed circuit board with all components assembled. PWB stands for Printed Wire Board. This is the circuit board only, without components.

8.2 MA-2402 Modules

8.2.1 Cap/Rectifier PWA:

127100-2
Cap/Rectifier PWA on 127101-2 PWB.

8.2.2 Display PWA:

127177-2
Display PWA on 127176-2 PWB.

8.2.3 Main PWA:

127245-3
Main PWA on 125414-3 PWB.

8.2.4 Output PWA: (left and right are identical)

102774-1
Output PWA on 102770-1 PWB.

8.2.5 Relay PWA:

Ch 1
127476-1
Domestic Relay PWA on 127199-1 PWB.

127259-1
Export Relay PWA on 127199-1 PWB.

Ch 2
127477-1
Domestic Relay PWA on 127199-1 PWB.

127200-1
Export Relay PWA on 127199-1 PWB.

8.3 Schematic Diagrams:

8.3.1 Main PWA
127252

8.3.2 Display PWA
127175

8.3.3 Output PWA
102773

8.3.4 Cap/Rectifier PWA
127108

8.3.5 Relay PWA (Domestic)
127494

8.3.6 Relay/Voltage Select PWA (Export)
127198

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9 Module Parts

9.1 General Information

This chapter includes electrical parts lists for this product. All serviceable parts and assemblies will have a Crown Part Number (CPN) listed in this chapter. 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. Please note: where reference designations are listed as “installed on next assembly,” the CPN (Crown Part Number) for the associated part may be found in Section 7, Exploded View Parts.

102774-2

127100-2

127177-2

127200-1

127245-3

127259-1

127476-1

127477-1

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E.C.N.	ZONE	REV.	DESCRIPTION	DATE	BY	APPROVALS CHK	ME	EE	PE
		A	INITIAL RELEASE	05/30/97	LCD	KW			TS
		B	ADDED Z16 AND Z17 0 OHM RESISTORS. NOTE 2 WAS 102770-1. NOTE 3 WAS 102774-1.	12/02/97	TLM				

UNLESS OTHERWISE SPECIFIED, THE FINISHED PWA SHALL MEET:
IPC-A-610_ CLASS 2

NOTES:

1. SCHEMATIC DRAWING NUMBER 102773.
2. PWB PART NUMBER 102770-2.
3. PWA PART NUMBER 102774-2.

CAUTION

STATIC CAN DAMAGE COMPONENTS!

DO NOT HANDLE

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PRINTS: K

PWA CT810A/1610A OUTPUT

TOL. UNLESS SPECIFIED
X.XX = ± 0.020
X.XXX = ± 0.010
DRILLS = ± 0.003

DRAWN	LCD	05/30/97	APPROVED BY:		DO NOT SCALE PRINT
CHECKED	KW	05/30/97	ME		SUPERSEDES
SCALE	NONE		EE		E.C.N.
PROJ #	MD360D0		PE	TS 06/02/97	DWG. NO. 102774 SHEET 1 CONT. ON SHEET 2 REV B
NEXT ASSEMBLY					

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
1	102770-2	PWB, CT10A OUTPUT, ,	
C00	C 6807-9	.001UF 100V 10% AXL CER T/R	H 3
C01	C 6806-1	.01UF 100V AXIAL CER T/R 103	H 3
C02	C 6809-5	220PF 100V AXIAL CER T/R 221	N 4
C03	C 6810-3	180PF 100V AXIAL CER T/R 181	A 3
C04	C 6806-1	.01UF 100V AXIAL CER T/R 103	D 4
C05	C 6806-1	.01UF 100V AXIAL CER T/R 103	K 4
C06	C 7697-3	.01 UF 500V 1.5" LEADS DISC	H 3
C07	C 8511-5	0.047UF 250V 5% FILM	H 3
C08	C 8426-6	.1UF 250V 10% MET POLY RADIAL	E 2
C09	C 8426-6	.1UF 250V 10% MET POLY RADIAL	J 2
D00	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	E 4
D01	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	F 4
D02	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	G 4
D03	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	H 4
D04	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	C 2
D05	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	K 2
D06	C 2941-0	DIODE, 1N5402 3A 200V	C 3
D07	C 2941-0	DIODE, 1N5402 3A 200V	D 3
D08	C 2941-0	DIODE, 1N5402 3A 200V	L 3
D09	C 2941-0	DIODE, 1N5402 3A 200V	L 3
D10	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	E 3
D11	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	F 3
D12	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	F 3
D13	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	I 3
L00	C 3510-2	CHOKE, 10% AXIAL 470 UH TR	E 4
L01	C 3510-2	CHOKE, 10% AXIAL 470 UH TR	K 4
L02	D 6592-6	COIL, MICROTECH OUTPUT 414W1	G 2
P00	C 9828-2	12 PIN MTA HDR, R/A PC MNT TIN	B 3
P01	C 9828-2	12 PIN MTA HDR, R/A PC MNT TIN	M 3
Q00		INSTALLED ON NEXT ASSEMBLY	G 3
Q01	C10155-7	2SC4793 PWR NPN XSISTOR	B 4
Q01X	D 6414-3	CLIP CT/MA/MT/PB PRED HOLDDOWN	B 4
Q02	C10156-5	2SA1837 PWR PNP XSISTOR	K 4
Q02X	D 6414-3	CLIP CT/MA/MT/PB PRED HOLDDOWN	K 4
Q03		INSTALLED ON NEXT ASSEMBLY	E 3
Q04		INSTALLED ON NEXT ASSEMBLY	C 2
Q05		INSTALLED ON NEXT ASSEMBLY	E 2
Q06		INSTALLED ON NEXT ASSEMBLY	A 2
Q07		INSTALLED ON NEXT ASSEMBLY	J 3
Q08		INSTALLED ON NEXT ASSEMBLY	L 2
Q09		INSTALLED ON NEXT ASSEMBLY	I 2
Q10		INSTALLED ON NEXT ASSEMBLY	N 2
Q11		INSTALLED ON NEXT ASSEMBLY	F 3
Q12		INSTALLED ON NEXT ASSEMBLY	D 2
Q13		INSTALLED ON NEXT ASSEMBLY	G 2
Q14		INSTALLED ON NEXT ASSEMBLY	B 2

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DRAWN	LCD	05/30/97	DWG. NO.	SHEET 3	REV
PROJ.	MD360D0		102774	CONT. ON SHEET 4	B

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
Q15		INSTALLED ON NEXT ASSEMBLY	I 3
Q16		INSTALLED ON NEXT ASSEMBLY	K 2
Q17		INSTALLED ON NEXT ASSEMBLY	H 2
Q18		INSTALLED ON NEXT ASSEMBLY	M 2
R00	A10266-2221	2.2 KOHM .25W 5% CF T/R	G 4
R01	A10266-3911	390. OHM .25W 5% CF T/R	H 3
R02	C 6844-2	250 OHM LNR VERT ADJ TRIMPOT	H 4
R03	A10266-5101	51.0 OHM .25W 5% CF T/R	B 4
R04	A10266-1331	13.0KOHM .25W 5% CF T/R	D 4
R05	A10266-7501	75.0 OHM .25W 5 CF T/R	D 4
R06	A10266-1331	13.0KOHM .25W 5% CF T/R	K 4
R07	A10266-7501	75.0 OHM .25W 5 CF T/R	K 4
R08	A10266-1011	100. OHM .25W 5% CF T/R	E 3
R09	C 7778-1	5.6 OHM .5W 5% FU/ FP T/R	E 3
R10	A10266-2201	22.0 OHM .25W 5 CF T/R	C 3
R11	A10266-2201	22.0 OHM .25W 5 CF T/R	E 3
R12	A10266-2201	22.0 OHM .25W 5 CF T/R	A 3
R13	C 6486-2	0.2 OHM 5W 5% WIRE	C 2
R14	C 6486-2	0.2 OHM 5W 5% WIRE	E 2
R15	C 6486-2	0.2 OHM 5W 5% WIRE	A 2
R16	C 6486-2	0.2 OHM 5W 5% WIRE	L 2
R17	C 6486-2	0.2 OHM 5W 5% WIRE	I 2
R18	C 6486-2	0.2 OHM 5W 5% WIRE	N 2
R19	A10266-1011	100. OHM .25W 5% CF T/R	J 3
R20	C 7779-9	22. OHM .25W 5% FU/FP T/R	J 3
R21	A10266-2R74	2.7 OHM 2W 5% CF T/R	G 3
R22	C10444-5	.02 OHM 5W 3% WW RES AXL MOUNT	H 1
R23	A10266-2R74	2.7 OHM 2W 5% CF T/R	E 2
R24	A10266-2R74	2.7 OHM 2W 5% CF T/R	J 1
R25	C 7778-1	5.6 OHM .5W 5% FU/ FP T/R	F 2
R26	C 6486-2	0.2 OHM 5W 5% WIRE	D 1
R27	C 6486-2	0.2 OHM 5W 5% WIRE	F 1
R28	C 6486-2	0.2 OHM 5W 5% WIRE	B 1
R29	C 7779-9	22. OHM .25W 5% FU/FP T/R	H 2
R30	C 6486-2	0.2 OHM 5W 5% WIRE	J 1
R31	C 6486-2	0.2 OHM 5W 5% WIRE	H 1
R32	C 6486-2	0.2 OHM 5W 5% WIRE	L 1
R33	C 6844-2	250 OHM LNR VERT ADJ TRIMPOT	I 3
R34	A10266-2721	2.7 KOHM .25W 5 CF T/R	C 3
R35	A10265-11301	113 OHM .25W 1% MF T/R	C 3
R36	A10266-2721	2.7 KOHM .25W 5 CF T/R	C 3
R37		DO NOT INSTALL	C 2
R38		DO NOT INSTALL	L 2
R39		DO NOT INSTALL	D 2
R40		DO NOT INSTALL	K 2
U00		INSTALLED ON NEXT ASSEMBLY	C 3

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DRAWN	LCD	05/30/97	DWG. NO.	SHEET 4	REV
PROJ.	MD360D0		102774	CONT. ON SHEET 5	B

PARTS LIST

REF DES	C.P.N.	DESCRIPTION	MAP LOC.
Z1	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	A 4
Z2	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	N 4
Z3	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	H 1
Z4	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	G 3
Z5	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	E 3
Z6	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	F 3
Z7	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	J 4
Z8	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	M 3
Z9	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	K 3
Z10	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	C 2
Z11	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	B 2
Z12	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	D 3
Z13	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	D 2
Z14	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	B 4
Z16	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	I 1
Z17	C 5868-2	0 OHM. 25W 20 MILOHM MAX T/R	G 1

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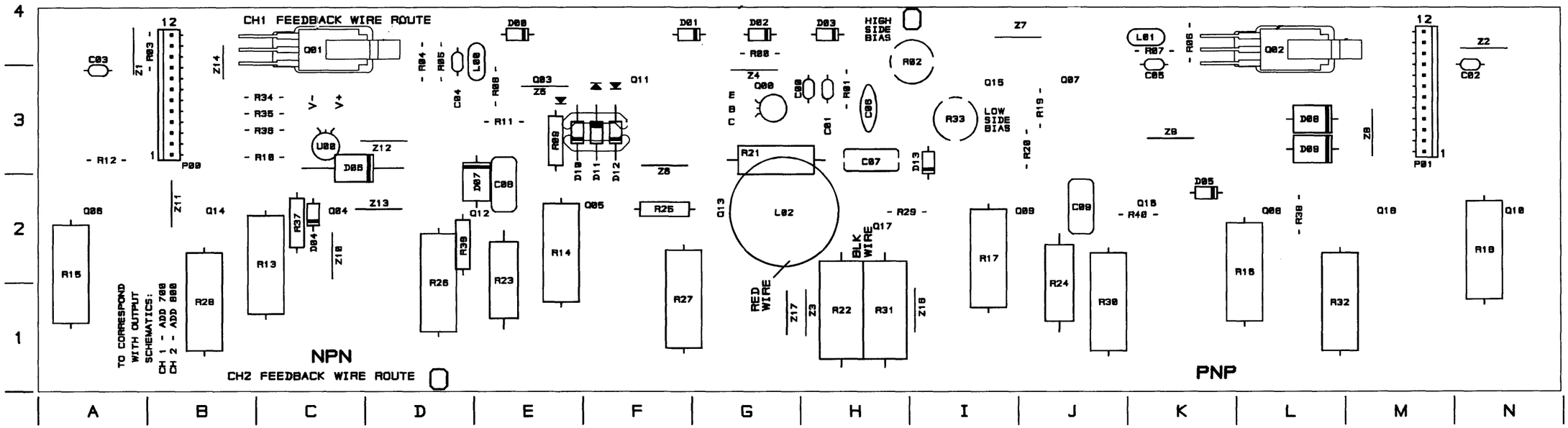
DRAWN	LCD	05/30/97	DWG. NO.	SHEET 5	REV
PROJ.	MD360D0		102774	CONT. ON SHEET 6	B



102774-2 PWA Component Map
(Component Side)

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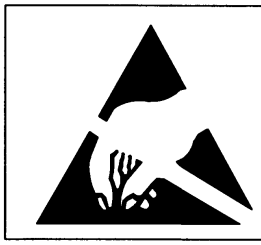
E.C.N.	ZONE	REV	DESCRIPTION	DATE	BY	APPROVAL CK	CM	EE	PE
		A	INITIAL RELEASE FOR PRODUCTION.	02-16-99	KLW				

UNLESS OTHERWISE SPECIFIED, THIS PRINTED WIRING ASSEMBLY SHALL MEET THE SPECIFICATION DESCRIBED IN IPC-A-610_ CLASS 2 STANDARDS.

NOTES:

1. SCHEMATIC DRAWING NUMBER 127108.
2. PRINTED WIRING BOARD PART NUMBER 127101-2.
3. ALL LEADS SHALL BE TRIMMED TO 0.093" OR LESS.



CAUTION

STATIC CAN DAMAGE COMPONENTS!

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PWA, MA2402 PIP2 CAP/RECT

TOL. UNLESS SPECIFIED
X.XX = ±0.02"
X.XXX = ±0.010"
DRILLS = ±0.003"

PRINTS TO		DRAWN BY	KLW	2/16/99	APPROVED BY:			DO NOT SCALE PRINT
K		CHECKED	KLW	02-18-99	ME	CDA	2-22-99	SUPERSEDES
		SCALE	NONE		EE			E.C.
		PROJ. #	MD439P0		PE	MK	2/16/99	DWG. NO. 127100-2 SHEET 1 OF 4 REV A
		FILENAME: 127100-2_A_01.PCB			NEXT ASSEMBLY:			

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
C100	C 8426-6	0.1 250V 10% MET POLY RADIAL	B 1
C101	127104-1	1500UF 200VDC ELECTROLYTIC	C 1
C102	127104-1	1500UF 200VDC ELECTROLYTIC	D 1
C103	127104-1	1500UF 200VDC ELECTROLYTIC	F 1
C104	127104-1	1500UF 200VDC ELECTROLYTIC	G 1
C105	127104-1	1500UF 200VDC ELECTROLYTIC	H 1
D100	125770-1	RECT, 35A 600V PC MNT BRIDGE	B 1
J1	101031-1	.250 FASTON, AUTO INSERTABLE	B 1
J2	101031-1	.250 FASTON, AUTO INSERTABLE	A 1
J3	101031-1	.250 FASTON, AUTO INSERTABLE	A 1
J4	101031-1	.250 FASTON, AUTO INSERTABLE	B 1

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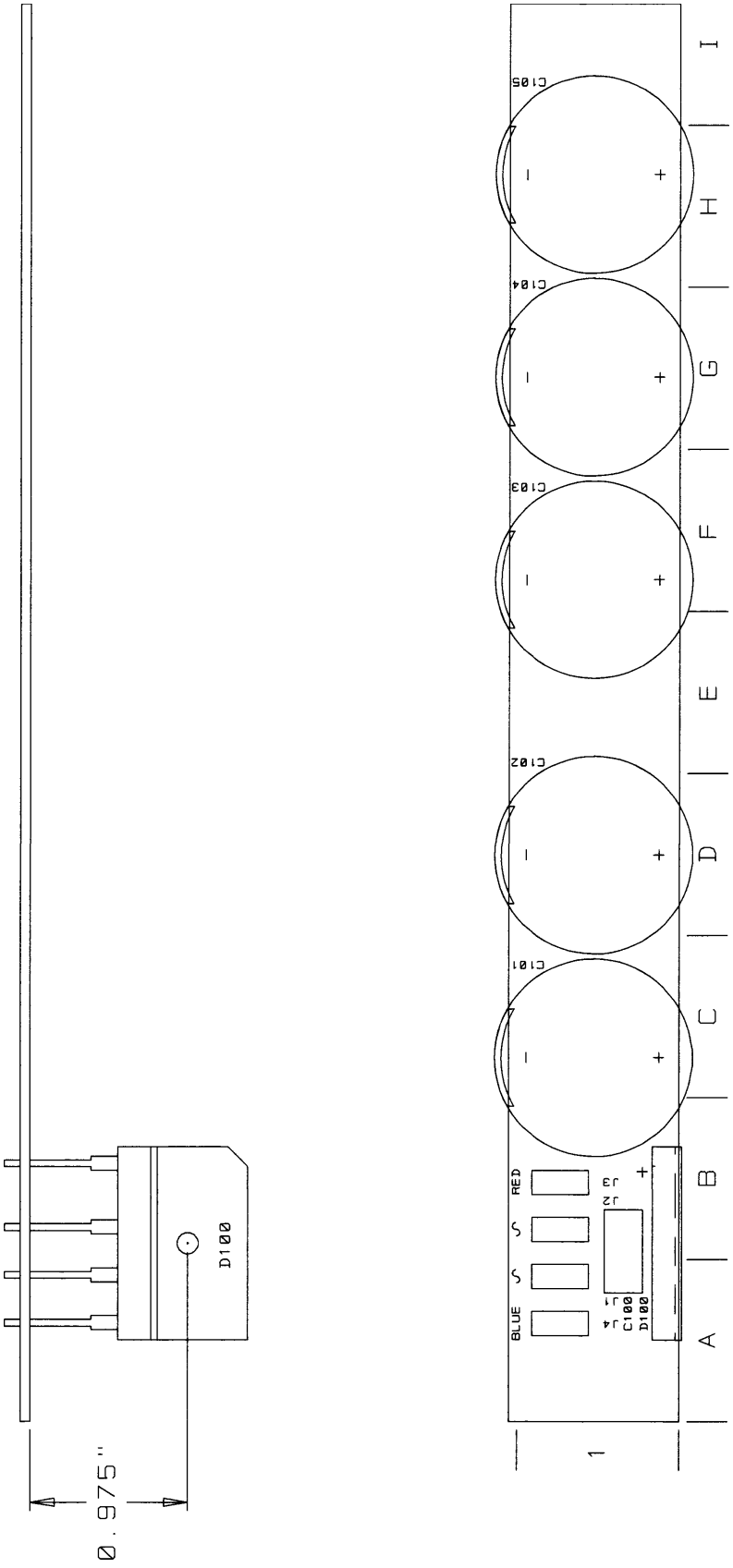
DRAWN	KLW	2/16/99	DWG. NO. 127100-2	REV A
PROJ.	MD438P0		SHEET 3 OF 4	



127100-2 PWA Component Map (Component Side)

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E.C.N.	ZONE	REV	DESCRIPTION	DATE	BY	APPROVAL CK	CM	EE	PE
		A	INITIAL RELEASE FOR PRODUCTION.	03-15-99	KLW	JAW	KL	N/A	MK

UNLESS OTHERWISE SPECIFIED, THIS PRINTED WIRING ASSEMBLY SHALL MEET THE SPECIFICATION DESCRIBED IN IPC-A-610_ CLASS 2 STANDARDS.

NOTES:

1. SCHEMATIC DRAWING NUMBER 127175.
2. PRINTED WIRING BOARD PART NUMBER 127176-2.
3. ALL LEADS SHALL BE TRIMMED TO 0.093" OR LESS.

CAUTION

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PWA, MA PIP2 DISPLAY

TOL. UNLESS SPECIFIED
X.XX = ±0.02"
X.XXX = ±0.010"
DRILLS = ±0.003"

PRINTS TO		DRAWN BY	KLW	3/15/99	APPROVED BY:			DO NOT SCALE PRINT
K		CHECKED	JAW	3/15/99	ME	WDH	3-17-99	SUPERSEDES
		SCALE	NONE		EE	N/A		E.C.
		PROJ. #	MD439P0		PE	MK	3/17/99	DWG. NO. 127177-2 SHEET 1 OF 5 REV A
		FILENAME: 127177-2_A_01.PCB			NEXT ASSEMBLY:			

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
C501	C 6806-1	0.01 MF 100V AX CERM	B 1
C502	C 6809-5	220 PF 100V 10% AX CERM	C 1
C601	C 6806-1	0.01 MF 100V AX CERM	E 1
C602	C 6809-5	220 PF 100V 10% AX CERM	D 1
C701	C 6804-6	0.1 MF 50V 10% CERM	H 1
C702	C 6804-6	0.1 MF 50V 10% CERM	I 1
C703	C 6804-6	0.1 MF 50V 10% CERM	H 1
C704	C 6804-6	0.1 MF 50V 10% CERM	I 2
D501	C 3181-2	1N4148 HI SPEED DIODE	C 1
D601	C 3181-2	1N4148 HI SPEED DIODE	E 1
D701	C 8235-1	DIODE, 1N6263 SCHOTTKY T/R	H 1
E501	C10592-1	LED, T1.75 GREEN	C 1
E501X	A10101-2	.187X.115X.125 NYLON SPCR	C 1
E502	C 4342-9	LED, AMBER GI #MV5153	C 1
E502X	A10101-2	.187X.115X.125 NYLON SPCR	C 1
E601	C10592-1	LED, T1.75 GREEN	E 1
E601X	A10101-2	.187X.115X.125 NYLON SPCR	E 1
E602	C 4342-9	LED, AMBER GI #MV5153	D 1
E602X	A10101-2	.187X.115X.125 NYLON SPCR	D 1
E701	C 4342-9	LED, AMBER GI #MV5153	H 1
E701X	A10101-2	.187X.115X.125 NYLON SPCR	H 1
J3	100375-1	HDR, 14PIN VERT DOUBLE ROW	G 1*
J10	C 7526-4	3POS .1 CENTER MTA HEADER	G 1*
Q501	C 3625-8	2N4125 30V PNP T/R	A 1
Q502	D 2961-7	SPS8010 60V NPN	B 1
Q503	D 2961-7	SPS8010 60V NPN	C 1
Q504	C 3625-8	2N4125 30V PNP T/R	C 1
Q505	C 3954-2	MPSA56 80V PNP T/R	G 1
Q601	C 3625-8	2N4125 30V PNP T/R	F 1
Q602	D 2961-7	SPS8010 60V NPN	F 1
Q603	D 2961-7	SPS8010 60V NPN	E 1
Q604	C 3625-8	2N4125 30V PNP T/R	E 1
Q605	C 3954-2	MPSA56 80V PNP T/R	G 1
R501	A10265-75011	7.5K 0.25W 1% MF	H 1
R502	A10265-33221	33.2K 0.25W 1% MF	B 1
R503	A10265-27431	274K 0.25W 1% MF	B 1
R504	A10265-10021	10K 0.25W 1% MF	B 2
R505	A10266-1522	1.5K 0.50W 5% CF	B 1
R506	A10265-33211	3.32K 0.25W 1% MF	C 1
R507	A10265-20022	20K 0.50W 1% MF	B 1
R508	A10266-1351	1.3M 0.25W 5% CF	C 1
R509	A10266-5151	5.1M 0.25W 5% CF	C 2
R510	A10265-12141	1.21M 0.25W 1% MF	C 1
R511	A10265-47531	475K 0.25W 1% MF	C 1
R512	A10265-22111	2.21K 0.25W 1% MF	C 1
R513	A10265-30111	3.01K 0.25W 1% MF	C 1
R514	A10265-10R01	10 OHM 0.25W 1% MF	C 1

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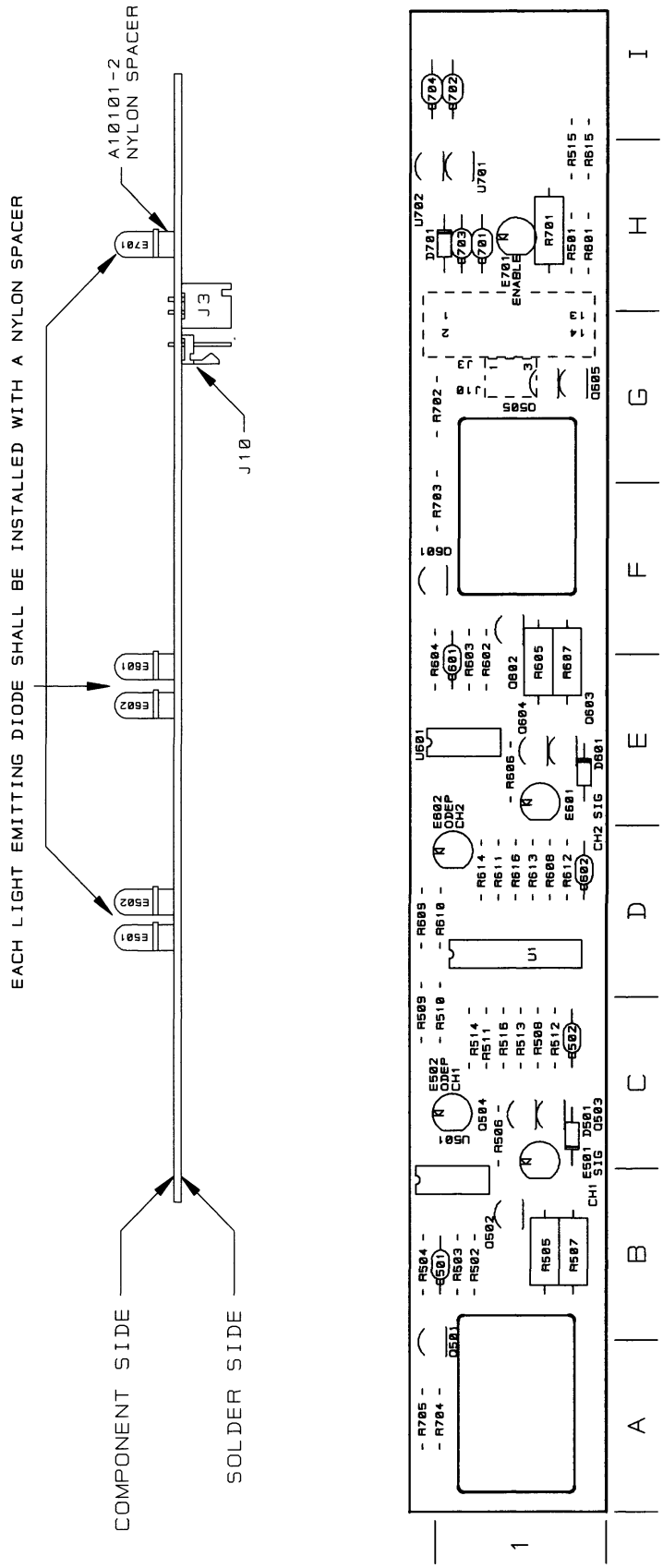
DRAWN	KLW	3/15/99	DWG. NO.	SHEET 3 OF 5	REV
PROJ.	MD439P0		127177-2		A

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
R515	A10265-22111	2.21K 0.25W 1% MF	H 1
R516	A10265-30111	3.01K 0.25W 1% MF	C 1
R601	A10265-75011	7.5K 0.25W 1% MF	H 1
R602	A10265-33221	33.2K 0.25W 1% MF	E 1
R603	A10265-27431	274K 0.25W 1% MF	E 1
R604	A10265-10021	10K 0.25W 1% MF	E 2
R605	A10266-1522	1.5K 0.50W 5% CF	E 1
R606	A10265-33211	3.32K 0.25W 1% MF	E 1
R607	A10265-20022	20K 0.50W 1% MF	E 1
R608	A10266-1351	1.3M 0.25W 5% CF	D 1
R609	A10266-5151	5.1M 0.25W 5% CF	D 2
R610	A10265-12141	1.21M 0.25W 1% MF	D 1
R611	A10265-47531	475K 0.25W 1% MF	D 1
R612	A10265-22111	2.21K 0.25W 1% MF	D 1
R613	A10265-30111	3.01K 0.25W 1% MF	D 1
R614	A10265-10R01	10 OHM 0.25W 1% MF	D 1
R615	A10265-22111	2.21K 0.25W 1% MF	H 1
R616	A10265-30111	3.01K 0.25W 1% MF	D 1
R701	A10266-1522	1.5K 0.50W 5% CF	H 1
R702	A10265-20021	20K 0.25W 1% MF	G 1
R703	A10265-10021	10K 0.25W 1% MF	F 1
R704	A10265-10021	10K 0.25W 1% MF	A 1
R705	A10265-20021	20K 0.25W 1% MF	A 2
U1	C 4696-8	TL074CN QUAD OP AMP	D 1
U501	C 7444-0	LM393 DUAL COMPARATOR	B 2
U601	C 7444-0	LM393 DUAL COMPARATOR	E 1
U701	C 8518-0	MC78L15ACP POS 15V 5% REG T/R	H 1
U702	C 8519-8	MC79L15ACP NEG 15V 5% REG T/A	H 2

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

DRAWN	KLW	3/15/99	DWG. NO.	SHEET 4 OF 5	REV
PROJ.	MD439P0		127177-2		A



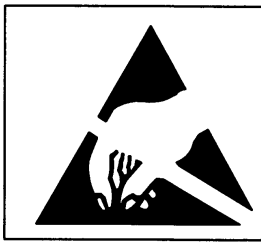
127177-2 PWA Component Map (Component Side)

E.C.N.	ZONE	REV	DESCRIPTION	DATE	BY	APPROVAL CK	CM	EE	PE
		A	INITIAL RELEASE FOR PRODUCTION.	02-17-99	KLW	JAW	CDA		MK

UNLESS OTHERWISE SPECIFIED, THIS PRINTED WIRING ASSEMBLY SHALL MEET THE SPECIFICATION DESCRIBED IN IPC-A-610_ CLASS 2 STANDARDS.

NOTES:

1. SCHEMATIC DRAWING NUMBER 127198.
2. PRINTED WIRING BOARD PART NUMBER 127199-1.
3. ALL LEADS SHALL BE TRIMMED TO 0.093" OR LESS.



CAUTION

STATIC CAN DAMAGE COMPONENTS!

DO NOT HANDLE

UNLESS WRIST STRAP IS WORN

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

PWA, MA2402 CH2 RLY/V SELECT

TOL. UNLESS SPECIFIED
X.XX = ±0.02"
X.XXX = ±0.010"
DRILLS = ±0.003"

PRINTS TO		DRAWN BY	KLW	2/17/99	APPROVED BY:			DO NOT SCALE PRINT
K		CHECKED	JAW	02-17-99	ME	CDA	2-18-'99	SUPERSEDES
		SCALE	NONE		EE			E.C.
		PROJ. #	MD439P0		PE	MK	2/17/99	DWG. NO. 127200-1 SHEET 1 OF 4 REV A
		FILENAME: 127200-1_A_01.PCB			NEXT ASSEMBLY:			

PARTS LIST

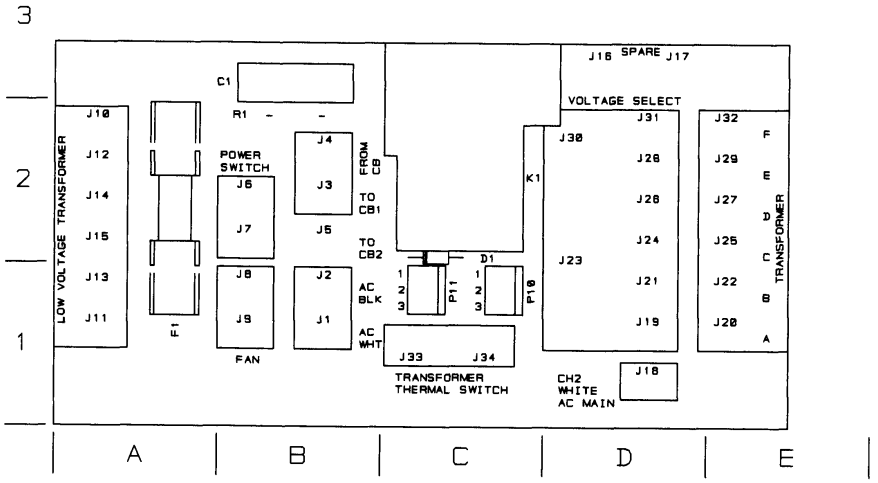
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
C1	C 5234-7	CAPACITOR, 0.047UF 250 VAC X2	B 3
D1	C 3181-2	1N4148 HI SPEED DIODE	C 2
F1	C 8908-3	FUSEHOLDER PCB UNIVERSAL	A 2
F1	C 8908-3	FUSEHOLDER PCB UNIVERSAL	A 2
J1	101031-1	.250 FASTON, AUTO INSERTABLE	B 1
J2	101031-1	.250 FASTON, AUTO INSERTABLE	B 1
J3	101031-1	.250 FASTON, AUTO INSERTABLE	B 2
J4	101031-1	.250 FASTON, AUTO INSERTABLE	B 2
J5	101031-1	.250 FASTON, AUTO INSERTABLE	B 2
J6	101031-1	.250 FASTON, AUTO INSERTABLE	B 2
J7	101031-1	.250 FASTON, AUTO INSERTABLE	B 2
J8	101031-1	.250 FASTON, AUTO INSERTABLE	B 1
J9	101031-1	.250 FASTON, AUTO INSERTABLE	B 1
J10	101031-1	.250 FASTON, AUTO INSERTABLE	A 2
J11	101031-1	.250 FASTON, AUTO INSERTABLE	A 1
J12	101031-1	.250 FASTON, AUTO INSERTABLE	A 2
J13	101031-1	.250 FASTON, AUTO INSERTABLE	A 1
J14	101031-1	.250 FASTON, AUTO INSERTABLE	A 2
J15	101031-1	.250 FASTON, AUTO INSERTABLE	A 2
J16	101031-1	.250 FASTON, AUTO INSERTABLE	D 3
J17	101031-1	.250 FASTON, AUTO INSERTABLE	D 3
J18	101031-1	.250 FASTON, AUTO INSERTABLE	D 1
J19	101031-1	.250 FASTON, AUTO INSERTABLE	D 1
J20	101031-1	.250 FASTON, AUTO INSERTABLE	E 1
J21	101031-1	.250 FASTON, AUTO INSERTABLE	D 1
J22	101031-1	.250 FASTON, AUTO INSERTABLE	E 1
J23	101031-1	.250 FASTON, AUTO INSERTABLE	D 1
J24	101031-1	.250 FASTON, AUTO INSERTABLE	D 2
J25	101031-1	.250 FASTON, AUTO INSERTABLE	E 2
J26	101031-1	.250 FASTON, AUTO INSERTABLE	D 2
J27	101031-1	.250 FASTON, AUTO INSERTABLE	E 2
J28	101031-1	.250 FASTON, AUTO INSERTABLE	D 2
J29	101031-1	.250 FASTON, AUTO INSERTABLE	E 2
J30	101031-1	.250 FASTON, AUTO INSERTABLE	D 2
J31	101031-1	.250 FASTON, AUTO INSERTABLE	D 2
J32	101031-1	.250 FASTON, AUTO INSERTABLE	E 2
J33	101031-1	.250 FASTON, AUTO INSERTABLE	C 1
J34	101031-1	.250 FASTON, AUTO INSERTABLE	C 1
K1	C10335-5	RELAY, 30A 24V SEALED CE	C 2
P10	C 7526-4	3POS .1 CENTER MTA HEADER	C 1
P11		OPEN	C 1
R1	A10265-10R01	10 OHM 0.25W 1% MF	B 2

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

DRAWN	KLW	2/17/99	DWG. NO.	SHEET 3 OF 4	REV
PROJ.	MD439P0		127200-1		A

COMPONENT MAP

(COMPONENT SIDE VIEW)



CROWN INTERNATIONAL INC.

1718 WEST MISHAWAKA ROAD ELKHART, INDIANA 46517 PHONE (219) 294-8000

DRAWN	KLW	2/17/99	DWG. NO. 127200-1	SHEET 4 OF 4
PROJ.	MD439P0			REV A

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E.C.N.	ZONE	REV	DESCRIPTION	DATE	BY	APPROVAL CK	CM	EE	PE
T991663		A	INITIAL RELEASE FOR PRODUCTION.	07-28-99	KLW	DAW	DSV	N/A	MK

UNLESS OTHERWISE SPECIFIED, THE FINISHED PWA SHALL MEET:
IPC-A-610_ CLASS 2

NOTES:

1. SCHEMATIC DRAWING NUMBER 127252.
2. PRINTED WIRING BOARD PART NUMBER 125414-3.

CAUTION

STATIC CAN DAMAGE COMPONENTS!

DO NOT HANDLE

UNLESS WRIST STRAP IS WORN

CROWN INTERNATIONAL, INC.

1718 W. MISHAWAKA RD. ELKHART IN. 46517 PHONE (219) 294-8000

PWA; MA2402 MAIN

TOL. UNLESS SPECIFIED
X.XX = ±0.02"
X.XXX = ±0.010"
DRILLS = ±0.003"

PRINTS TO		DRAWN BY	KLW	07-28-99	APPROVED BY:			DO NOT SCALE PRINT	
K		CHECKED	DAW	07/29/99	ME	N/A		SUPERSEDES	
		SCALE	NONE		EE	N/A		E.C.	
		PROJ. #	MD439P0		PE	MK	7/29/99	DWG. NO. 127245-3 SHEET 1 OF 22	REV A
		FILENAME: 127245-3_A_01.PCB			NEXT ASSEMBLY:				

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
1	125414-3	PWB, CT'10A MAIN, , ,	
C1	C 4303-1	1000UF 35V AXIAL CAP	H 4
C2	C 5202-4	2200UF 35V AXIAL CAP	I 4
C3	C 6804-6	.1UF 50V AXIAL CER T/R 104	J 5
C4	C 5362-6	2.2UF 50V VERT ELECT T/A	J 5
C5	C 6804-6	.1UF 50V AXIAL CER T/R 104	I 2
C6	C 8897-8	.1UF 100V 20% Z5U RAD CER T/R	E 1
C7		OPEN	G 5
C8		OPEN	E 6
C9		OPEN	I 6
C10		OPEN	H 5
C100	C 6813-7	27PF 200V 10% NPO AXIAL CER	J 3
C101	C 6813-7	27PF 200V 10% NPO AXIAL CER	J 2
C102	C 6813-7	27PF 200V 10% NPO AXIAL CER	J 2
C103	C 6805-3	.022UF 100V AXIALCER T/R 223	J 2
C104	C 6805-3	.022UF 100V AXIALCER T/R 223	K 3
C105	C 8576-8	100UF 35V 10% ALUM ELECT T/A	I 1
C106	C 6812-9	47PF 200V 10% NPO AXL CER	J 2
C107	C 5311-3	22UF 50V 20% NP VERT T/A	K 1
C108	C 9464-6	10PF 100V 5% NPO RAD CER T/R	K 2
C109	C 8897-8	.1UF 100V 20% Z5U RAD CER T/R	J 2
C110	C 6812-9	47PF 200V 10% NPO AXL CER	K 2
C111	C 6812-9	47PF 200V 10% NPO AXL CER	L 3
C112	C 6812-9	47PF 200V 10% NPO AXL CER	L 2
C113	C 6812-9	47PF 200V 10% NPO AXL CER	L 3
C114	C 6812-9	47PF 200V 10% NPO AXL CER	L 3
C115	C 6805-3	.022UF 100V AXIALCER T/R 223	L 3
C116	C 6805-3	.022UF 100V AXIALCER T/R 223	L 2
C117	C 6806-1	.01UF 100V AXIAL CER T/R 103	M 3
C118	C 6814-5	12PF 200V AXIAL CER T/R 120	M 2
C119	C 6814-5	12PF 200V AXIAL CER T/R 120	M 3
C120	C 6808-7	470.PF 100V 5% NPO AXL CER T/R	P 5
C121	C 6810-3	180PF 100V AXIAL CER T/R 181	M 4
C122	C 7417-6	3300PF 100V 10% CAP	P 5
C123	C 7417-6	3300PF 100V 10% CAP	O 5
C124	C 6806-1	.01UF 100V AXIAL CER T/R 103	K 4
C125	C 8897-8	.1UF 100V 20% Z5U RAD CER T/R	K 4
C126	C 6811-1	100PF 200V 10% NPO AXL CER T/R	K 4
C127	C 6950-7	82PF 200V 5% NPO AXIAL CER T/R	K 4
C128	C 6812-9	47PF 200V 10% NPO AXL CER	K 3
C129	C 6814-5	12PF 200V AXIAL CER T/R 120	K 3
C130	C 6813-7	27PF 200V 10% NPO AXL CER	K 3
C131	C 6806-1	.01UF 100V AXIAL CER T/R 103	K 3
C132	C 8897-8	.1UF 100V 20% Z5U RAD CER T/R	K 3
C133	C 6812-9	47PF 200V 10% NPO AXL CER	K 3
C134	C 6804-6	.1UF 50V AXIAL CER T/R 104	P 3
C135	C 6804-6	.1UF 50V AXIAL CER T/R 104	O 3

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

DRAWN	KLW	07-28-99	DWG. NO.	SHEET 7 OF 22	REV
PROJ.	MD439P0		127245-3		A

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
C136	C 6804-6	.1UF 50V AXIAL CER T/R 104	O 2
C137	C 6804-6	.1UF 50V AXIAL CER T/R 104	P 2
C138	C 6804-6	.1UF 50V AXIAL CER T/R 104	O 4
C139	C 6804-6	.1UF 50V AXIAL CER T/R 104	P 4
C140	C 7964-7	.22UF 100V AXIAL CER CAP T/R	O 4
C141	C 6804-6	.1 UF 50V AXIAL CER T/R 104	O 4
C142	C10588-9	15UF 35V 20% NP RAD ELECT T/R	N 4
C143	C10587-1	220UF 25V 20% NP RAD ELECT T/R	N 5
C144	C 6804-6	.1UF 50V AXIAL CER T/R 104	P 3
C145	C 6804-6	.1 UF 50V AXIAL CER T/R 104	P 4
C146	C 7964-7	.22UF 100V AXIAL CER CAP T/R	P 4
C147	C10588-9	15UF 35V 20% NP RAD ELECT T/R	P 4
C148	C10587-1	220UF 25V 20% NP RAD ELECT T/R	P 5
C149	C 8576-8	100UF 35V 10% ALUM ELECT T/A	M 5
C150	C 8576-8	100UF 35V 10% ALUM ELECT T/A	M 4
C151	C 5362-6	2.2UF 50V VERT ELECT T/A	L 5
C152	C 6802-0	.47UF 50V AXIAL CER T/R 474	L 5
C153	C 8897-8	.1UF 100V 20% Z5U RAD CER T/R	K 5
C158	C 6811-1	100PF 200V 10% NPO AXL CER T/R	N 4
C159	C 6811-1	100PF 200V 10% NPO AXL CER T/R	N 3
C160	C 6804-6	.1UF 50V AXIAL CER T/R 104	N 4
C161	C 6804-6	.1UF 50V AXIAL CER T/R 104	N 3
C162	C 6811-1	100PF 200V 10% NPO AXL CER T/R	I 4
C163	C 6811-1	100PF 200V 10% NPO AXL CER T/R	I 4
C164	A10434-104JD	.1UF 250V 5% MTL POLY FILM T/A	O 6
C171	C10208-4	100.UF 25V 20% RAD ELECT T/R	J 1
C172	C10208-4	100.UF 25V 20% RAD ELECT T/R	J 1
C173	C 6811-1	100PF 200V 10% NPO AXL CER T/R	N 3
C174	C 6811-1	100PF 200V 10% NPO AXL CER T/R	N 3
C175	A10579-222KC	2200PF 100 10% POLY FILM T/A	N 2
C176	A10579-222KC	2200PF 100 10% POLY FILM T/A	P 2
C200	C 6813-7	27PF 200V 10% NPO AXIAL CER	G 3
C201	C 6813-7	27PF 200V 10% NPO AXIAL CER	G 2
C202	C 6813-7	27PF 200V 10% NPO AXIAL CER	G 2
C205	C 8576-8	100UF 35V 10% ALUM ELECT T/A	H 1
C206	C 6812-9	47PF 200V 10% NPO AXL CER	G 2
C207	C 5311-3	22UF 50V 20% NP VERT T/A	F 1
C208	C 9464-6	10PF 100V 5% NPO RAD CER T/R	F 2
C209	C 8897-8	.1UF 100V 20% Z5U RAD CER T/R	G 2
C210	C 6812-9	47PF 200V 10% NPO AXL CER	F 2
C211	C 6812-9	47PF 200V 10% NPO AXL CER	E 3
C212	C 6812-9	47PF 200V 10% NPO AXL CER	E 2
C213	C 6812-9	47PF 200V 10% NPO AXL CER	E 3
C214	C 6812-9	47PF 200V 10% NPO AXL CER	E 3
C215	C 6805-3	.022UF 100V AXIALCER T/R 223	E 3
C216	C 6805-3	.022UF 100V AXIALCER T/R 223	E 2
C217	C 6806-1	.01UF 100V AXIAL CER T/R 103	D 3
C218	C 6814-5	12PF 200V AXIAL CER T/R 120	D 2
C219	C 6814-5	12PF 200V AXIAL CER T/R 120	D 3

CROWN INTERNATIONAL INC.

1718 WEST MISHAWAKA ROAD ELKHART, INDIANA 46517 PHONE (219) 294-8000

DRAWN	KLW	07-28-99	DWG. NO.	SHEET 8 OF 22	REV
PROJ.	MD439P0		127245-3		A

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
C220	C 6808-7	470.PF 100V 5% NPO AXL CER T/R	A 5
C221	C 6810-3	180PF 100V AXIAL CER T/R 181	D 4
C222	C 7417-6	3300PF 100V 10% CAP	A 5
C223	C 7417-6	3300PF 100V 10% CAP	B 5
C224	C 6806-1	.01UF 100V AXIAL CER T/R 103	F 4
C225	C 8897-8	.1UF 100V 20% Z5U RAD CER T/R	F 4
C226	C 6811-1	100PF 200V 10% NPO AXL CER T/R	F 4
C227	C 6950-7	82PF 200V 5% NPO AXIAL CER T/R	F 4
C228	C 6812-9	47PF 200V 10% NPO AXL CER	F 3
C229	C 6814-5	12PF 200V AXIAL CER T/R 120	F 3
C230	C 6813-7	27PF 200V 10% NPO AXL CER	F 3
C231	C 6806-1	.01UF 100V AXIAL CER T/R 103	F 3
C232	C 8897-8	.1UF 100V 20% Z5U RAD CER T/R	F 3
C233	C 6812-9	47PF 200V 10% NPO AXL CER	F 3
C234	C 6804-6	.1UF 50V AXIAL CER T/R 104	B 3
C235	C 6804-6	.1UF 50V AXIAL CER T/R 104	A 3
C236	C 6804-6	.1UF 50V AXIAL CER T/R 104	A 2
C237	C 6804-6	.1UF 50V AXIAL CER T/R 104	B 2
C238	C 6804-6	.1UF 50V AXIAL CER T/R 104	A 4
C239	C 6804-6	.1UF 50V AXIAL CER T/R 104	B 4
C240	C 7964-7	.22UF 100V AXIAL CER CAP T/R	A 4
C241	C 6804-6	.1UF 50V AXIAL CER T/R 104	A 4
C242	C10588-9	15UF 35V 20% NP RAD ELECT T/R	A 4
C243	C10587-1	220UF 25V 20% NP RAD ELECT T/R	A 4
C244	C 6804-6	.1UF 50V AXIAL CER T/R 104	B 3
C245	C 6804-6	.1UF 50V AXIAL CER T/R 104	B 4
C246	C 7964-7	.22UF 100V AXIAL CER CAP T/R	B 4
C247	C10588-9	15UF 35V 20% NP RAD ELECT T/R	C 4
C248	C10587-1	220UF 25V 20% NP RAD ELECT T/R	C 5
C249	C 8576-8	100UF 35V 10% ALUM ELECT T/A	D 5
C250	C 8576-8	100UF 35V 10% ALUM ELECT T/A	D 4
C251	C 5362-6	2.2UF 50V VERT ELECT T/A	E 5
C252	C 6802-0	.47UF 50V AXIAL CER T/R 474	E 5
C253	C 8897-8	.1UF 100V 20% Z5U RAD CER T/R	F 5
C258	C 6811-1	100PF 200V 10% NPO AXL CER T/R	C 4
C259	C 6811-1	100PF 200V 10% NPO AXL CER T/R	C 3
C262	C 6811-1	100PF 200V 10% NPO AXL CER T/R	H 4
C263	C 6811-1	100PF 200V 10% NPO AXL CER T/R	H 4
C264	A10434-104JD	.1UF 250V 5% MTL POLY FILM T/A	B 6
C265	C 6805-3	.022UF 100V AXIALCER T/R 223	F 3
C266	C 6805-3	.022UF 100V AXIALCER T/R 223	G 2
C267	C 6804-6	.1UF 50V AXIAL CER T/R 104	C 3
C268	C 6804-6	.1UF 50V AXIAL CER T/R 104	C 3
C271	C10208-4	100.UF 25V 20% RAD ELECT T/R	G 1
C272	C10208-4	100.UF 25V 20% RAD ELECT T/R	G 1
C273	C 6811-1	100PF 200V 10% NPO AXL CER T/R	C 3
C274	C 6811-1	100PF 200V 10% NPO AXL CER T/R	C 2
C275	A10579-222KC	2200PF 100 10% POLY FILM T/A	A 2
C276	A10579-222KC	2200PF 100 10% POLY FILM T/A	B 2

CROWN INTERNATIONAL INC.

1718 WEST MISHAWAKA ROAD ELKHART, INDIANA 46517 PHONE (219) 294-8000

DRAWN	KLW	07-28-99	DWG. NO.	SHEET 9 OF 22	REV
PROJ.	MD439P0		127245-3		A

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
D1	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	G 4
D2	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	G 5
D3	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	G 4
D4	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	G 5
D5	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	J 4
D6	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	J 4
D7	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	J 5
D8	C 5082-0	DIODE, 1N4733A 5.1V ZENER T/R	I 2
D9		OPEN	H 6
D10		OPEN	H 6
D11		OPEN	H 6
D12		OPEN	H 6
D13		OPEN	I 6
D100	C 3181-2	DIODE, 1N4148 T/R	K 2
D101	C 3181-2	DIODE, 1N4148 T/R	K 2
D102	C 3181-2	DIODE, 1N4148 T/R	L 3
D103	C 3181-2	DIODE, 1N4148 T/R	L 2
D104	C 3181-2	DIODE, 1N4148 T/R	M 3
D105	C 3181-2	DIODE, 1N4148 T/R	M 3
D106	C 3181-2	DIODE, 1N4148 T/R	M 3
D107	C 3181-2	DIODE, 1N4148 T/R	M 3
D108	C 3181-2	DIODE, 1N4148 T/R	M 2
D109	C 3181-2	DIODE, 1N4148 T/R	M 2
D110	C 5061-4	DIODE, 1N3070 10K/T&R	M 2
D111	C 3181-2	DIODE, 1N4148 T/R	O 5
D112	C 3181-2	DIODE, 1N4148 T/R	P 5
D113	C 5061-4	DIODE, 1N3070 10K/T&R	M 3
D114	C 5061-4	DIODE, 1N3070 10K/T&R	K 4
D115	C 3181-2	DIODE, 1N4148 T/R	K 4
D116	C 3181-2	DIODE, 1N4148 T/R	K 3
D117	C 5061-4	DIODE, 1N3070 10K/T&R	K 3
D118	C 3181-2	DIODE, 1N4148 T/R	J 3
D119	C 3181-2	DIODE, 1N4148 T/R	J 3
D120	C 8182-5	1N753A 6.2V .5W ZENER DIODE	O 3
D121	C 3181-2	DIODE, 1N4148 T/R	L 5
D122	C 3181-2	DIODE, 1N4148 T/R	L 5
D123	C 3181-2	DIODE, 1N4148 T/R	L 6
D124	C 3181-2	DIODE, 1N4148 T/R	L 6
D125	C 3181-2	DIODE, 1N4148 T/R	L 6
D127		OPEN	L 6
D128	C 3533-4	DIODE, 1N966B 16V ZENER T/R	L 5
D129	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	L 5
D130	C 3181-2	DIODE, 1N4148 T/R	K 4
D131	C 3181-2	DIODE, 1N4148 T/R	K 3
D132	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	L 5
D133	C 3181-2	DIODE, 1N4148 T/R	J 1
D134	C 3181-2	DIODE, 1N4148 T/R	J 2
D135		OPEN	K 5

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

DRAWN	KLW	06-08-99	DWG. NO.	SHEET 10 OF 22	REV
PROJ.	MD439P0		127245-3		A

PARTS LIST

REF DES	C.P.N.	DESCRIPTION	MAP LOC.
D200	C 3181-2	DIODE, 1N4148 T/R	F 2
D201	C 3181-2	DIODE, 1N4148 T/R	F 2
D202	C 3181-2	DIODE, 1N4148 T/R	E 3
D203	C 3181-2	DIODE, 1N4148 T/R	E 2
D204	C 3181-2	DIODE, 1N4148 T/R	D 3
D205	C 3181-2	DIODE, 1N4148 T/R	D 3
D206	C 3181-2	DIODE, 1N4148 T/R	D 3
D207	C 3181-2	DIODE, 1N4148 T/R	D 3
D208	C 3181-2	DIODE, 1N4148 T/R	D 2
D209	C 3181-2	DIODE, 1N4148 T/R	D 2
D210	C 5061-4	DIODE, 1N3070 10K/T&R	D 2
D211	C 3181-2	DIODE, 1N4148 T/R	B 5
D212	C 3181-2	DIODE, 1N4148 T/R	A 5
D213	C 5061-4	DIODE, 1N3070 10K/T&R	D 3
D214	C 5061-4	DIODE, 1N3070 10K/T&R	F 4
D215	C 3181-2	DIODE, 1N4148 T/R	F 4
D216	C 3181-2	DIODE, 1N4148 T/R	F 3
D217	C 5061-4	DIODE, 1N3070 10K/T&R	F 3
D218	C 3181-2	DIODE, 1N4148 T/R	G 3
D219	C 3181-2	DIODE, 1N4148 T/R	G 3
D220	C 8182-5	1N753A 6.2V .5W ZENER DIODE	A 3
D221	C 3181-2	DIODE, 1N4148 T/R	E 5
D222	C 3181-2	DIODE, 1N4148 T/R	E 5
D223	C 3181-2	DIODE, 1N4148 T/R	E 6
D224	C 3181-2	DIODE, 1N4148 T/R	E 6
D225	C 3181-2	DIODE, 1N4148 T/R	E 6
D227		OPEN	E 6
D228	C 3533-4	DIODE, 1N966B 16V ZENER T/R	E 5
D229	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	E 5
D230	C 3181-2	DIODE, 1N4148 T/R	F 4
D231	C 3181-2	DIODE, 1N4148 T/R	F 3
D232	C 2851-1	RECTIFIER, 1N4004 SILICON T/R	E 5
D233	C 3181-2	DIODE, 1N4148 T/R	G 1
D234	C 3181-2	DIODE, 1N4148 T/R	G 2
D235		OPEN	G 6
E100	C 9857-1	LED, RED T1 .1 LEAD SPACE T/R	M 5
E101	C 9857-1	LED, RED T1 .1 LEAD SPACE T/R	M 5
E200	C 9857-1	LED, RED T1 .1 LEAD SPACE T/R	D 5
E201	C 9857-1	LED, RED T1 .1 LEAD SPACE T/R	D 5
HW7	C 8812-7	5.5" CABLE TIE	A 6
HW8	C 8812-7	5.5" CABLE TIE	C 6

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

DRAWN	KLW	07-28-99	DWG. NO.	SHEET 11 OF 22	REV
PROJ.	MD439P0		127245-3		A

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
HW9	C 8812-7	5.5" CABLE TIE	N 6
HW10	C 8812-7	5.5" CABLE TIE	P 6
J1	127466-1	CABLE, MA2402 MAINBOARD POWER	I 6
J2A	C10570-7	20 PIN HDR PICOFLEX TIN	I 3
J2B	C10571-5	18 PIN HDR PICOFLEX TIN	I 2
J700	D 8681-5	CABLE, 10 INCH 12 PIN MTA	P 6
J701	D 8680-7	CABLE, 6 INCH 12 PIN MTA	N 6
J800	D 8680-7	CABLE, 6 INCH 12 PIN MTA	B 6
J801	D 8681-5	CABLE, 10 INCH 12 PIN MTA	A 6
J901X	100375-1	HDR, , 14PIN,	H 4
N100	D 6082-8	RESISTOR NETWORK-C	L 3
N200	D 6082-8	RESISTOR NETWORK-C	E 3
Q100	C 3625-8	2N4125 30V PNP T/R	K 2
Q101	C 3625-8	2N4125 30V PNP T/R	K 2
Q102	D 2961-7	SPS8010 60V NPN T/R	M 4
Q103	C 3786-8	MPS4250A 40V PNP T/R	M 2
Q104	C 3578-9	MPSA93 200V PNP T/R	M 3
Q105	C 3810-6	MPSA42 300V NPN T/R	M 2
Q106	C 3578-9	MPSA93 200V PNP T/R	M 2
Q107	C 7458-0	2N4123 30V NPN T/R	O 5
Q108	C 3786-8	MPS4250A 40V PNP T/R	O 5
Q109	C 3810-6	MPSA42 300V NPN T/R	M 4
Q110	C 7458-0	2N4123 30V NPN T/R	O 5
Q111	C 3786-8	MPS4250A 40V PNP T/R	O 5
Q112	D 2962-5	MPSA18 45V NPN T/R	K 4
Q113	C 7458-0	2N4123 30V NPN T/R	J 4
Q114	C 3625-8	2N4125 30V PNP T/R	J 3
Q115	C 3786-8	MPS4250A 40V PNP T/R	K 3
Q116	C 3625-8	2N4125 30V PNP T/R	O 1
Q117	C 7458-0	2N4123 30V NPN T/R	O 1
Q118	C 3625-8	2N4125 30V PNP T/R	M 5
Q119	C 7458-0	2N4123 30V NPN T/R	M 5
Q120	C 3625-8	2N4125 30V PNP T/R	M 4
Q121	C 7458-0	2N4123 30V NPN T/R	M 4
Q122	C 3625-8	2N4125 30V PNP T/R	M 4
Q123	C 3625-8	2N4125 30V PNP T/R	M 5
Q124	C 3625-8	2N4125 30V PNP T/R	M 4
Q125	C 3625-8	2N4125 30V PNP T/R	M 4
Q126	C 7458-0	2N4123 30V NPN T/R	L 4
Q127	C 3810-6	MPSA42 300V NPN T/R	K 4
Q128	C 7458-0	2N4123 30V NPN T/R	M 4
Q129	C 3625-8	2N4125 30V PNP T/R	M 4
Q130	C 3578-9	MPSA93 200V PNP T/R	L 4
Q131		OPEN	J 6
Q200	C 3625-8	2N4125 30V PNP T/R	F 2
Q201	C 3625-8	2N4125 30V PNP T/R	F 2
Q202	D 2961-7	SPS8010 60V NPN T/R	D 4

CROWN INTERNATIONAL INC.
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DRAWN	KLW	07-28-99	DWG. NO.	SHEET 12 OF 22	REV
PROJ.	MD439P0		127245-3		A

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
Q203	C 3786-8	MPS4250A 40V PNP T/R	D 2
Q204	C 3578-9	MPSA93 200V PNP T/R	D 3
Q205	C 3810-6	MPSA42 300V NPN T/R	C 2
Q206	C 3578-9	MPSA93 200V PNP T/R	C 2
Q207	C 7458-0	2N4123 30V NPN T/R	A 5
Q208	C 3786-8	MPS4250A 40V PNP T/R	A 5
Q209	C 3810-6	MPSA42 300V NPN T/R	D 4
Q210	C 7458-0	2N4123 30V NPN T/R	A 5
Q211	C 3786-8	MPS4250A 40V PNP T/R	B 5
Q212	D 2962-5	MPSA18 45V NPN T/R	F 4
Q213	C 7458-0	2N4123 30V NPN T/R	G 4
Q214	C 3625-8	2N4125 30V PNP T/R	G 3
Q215	C 3786-8	MPS4250A 40V PNP T/R	F 3
Q216	C 3625-8	2N4125 30V PNP T/R	B 1
Q217	C 7458-0	2N4123 30V NPN T/R	B 1
Q218	C 3625-8	2N4125 30V PNP T/R	C 5
Q219	C 7458-0	2N4123 30V NPN T/R	C 5
Q220	C 3625-8	2N4125 30V PNP T/R	C 4
Q221	C 7458-0	2N4123 30V NPN T/R	C 4
Q222	C 3625-8	2N4125 30V PNP T/R	C 4
Q223	C 3625-8	2N4125 30V PNP T/R	D 5
Q224	C 3625-8	2N4125 30V PNP T/R	D 4
Q225	C 3625-8	2N4125 30V PNP T/R	D 4
Q226	C 7458-0	2N4123 30V NPN T/R	E 4
Q227	C 3810-6	MPSA42 300V NPN T/R	F 4
Q228	C 7458-0	2N4123 30V NPN T/R	D 4
Q229	C 3625-8	2N4125 30V PNP T/R	D 4
Q230	C 3578-9	MPSA93 200V PNP T/R	E 4
Q231		OPEN	G 6
R1	A10265-46421	46.4 KOHM .25W 1% MF T/R	E 2
R2	A10265-53621	53.6 KOHM .25W 1% MF T/R	F 2
R4	A10265-10031	100. KOHM .25W 1 MF T/R	G 5
R5	A10265-24921	24.9 KOHM .25W 1% MF T/R	G 5
R6	A10265-24921	24.9 KOHM .25W 1% MF T/R	F 5
R7	A10265-10031	100. KOHM .25W 1 MF T/R	F 5
R8	A10266-1051	1.0 MOHM .25W 5 CF T/R	H 2
R9	A10266-1051	1.0 MOHM .25W 5 CF T/R	H 2
R10	A10266-1051	1.0 MOHM .25W 5 CF T/R	H 2
R11	A10266-9111	910. OHM .25W 5 CF T/R	I 2
R12	A10124-24	WIRE, #24 SOLID BUS	J 6
R13	A10124-24	WIRE, #24 SOLID BUS	H 6
R14		OPEN	G 5
R15		OPEN	G 6
R16		OPEN	G 6
R17		OPEN	E 6
R18		OPEN	E 6
R19		OPEN	E 6

CROWN INTERNATIONAL INC.

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DRAWN	KLW	07-28-99	DWG. NO.	SHEET 13 OF 22	REV
PROJ.	MD439P0		127245-3		A

PARTS LIST

REF DES	C.P.N.	DESCRIPTION	MAP LOC.
R20		OPEN	E 6
R21		OPEN	E 6
R22		OPEN	H 5
R23		OPEN	H 5
R24		OPEN	I 6
R25		OPEN	I 6
R100	A10265-10021	10. KOHM .25W 1 MF T/R	J 3
R101	A10265-10021	10. KOHM .25W 1 MF T/R	J 3
R102	A10265-10021	10. KOHM .25W 1 MF T/R	J 3
R103	C 9079-2	200.OHM TOP ADJ CERMET TRIMMER	I 2
R104	A10265-10021	10. KOHM .25W 1 MF T/R	J 2
R105	A10265-49911	4.99KOHM .25W 1 MF T/R	I 3
R106	A10265-49911	4.99KOHM .25W 1 MF T/R	I 3
R107	C 7526-4	3POS .1 CENTER MTA HEADER	J 2
R108	A10265-78711	7.87 KOHM 0.25W 1% MF T/R	I 1
R109	A10265-24921	24.9 KOHM .25W 1% MF T/R	I 1
R110	A10265-19121	19.1 KOHM .25W 1% MF T/R	I 1
R111	A10265-24921	24.9 KOHM .25W 1% MF T/R	K 2
R112	A10266-2201	22.0 OHM .25W 5 CF T/R	J 2
R113	A10265-49911	4.99KOHM .25W 1 MF T/R	K 2
R114	A10265-10031	100. KOHM .25W 1 MF T/R	K 2
R115	A10265-14031	140 KOHM .25 1% MF T/R	J 4
R116	A10265-11521	11.5KOHM .25W 1% MF T/R	I 4
R117	A10265-20031	200.KOHM .25W 1 MF T/R	I 3
R118	A10265-10521	10.5KOHM .25W 1% MF T/R	I 3
R119	A10265-10031	100. KOHM .25W 1 MF T/R	K 2
R120	A10266-5111	510. OHM .25W 5 CF T/R	K 2
R121	C 5215-6	22. MOHM .25W 5 THICK FILM T/R	K 2
R122	A10266-1321	1.3 KOHM .25W 5 CF T/R	K 2
R123	A10265-49911	4.99KOHM .25W 1 MF T/R	K 2
R124	A10266-1231	12.KOHM .25W 5% CF T/R	L 3
R125	A10266-1231	12.KOHM .25W 5% CF T/R	L 2
R126	A10266-2721	2.7 KOHM .25W 5 CF T/R	L 3
R127	A10266-2721	2.7 KOHM .25W 5 CF T/R	L 2
R128	A10266-6831	68. KOHM .25W 5% CF T/R	L 3
R129	A10266-6831	68. KOHM .25W 5% CF T/R	L 3
R130	A10265-10031	100. KOHM .25W 1 MF T/R	L 3
R131	A10265-10031	100. KOHM .25W 1 MF T/R	L 2
R132	A10266-4701	47.0 OHM .25W 5 CF T/R	L 4
R133	A10266-4701	47.0 OHM .25W 5 CF T/R	L 2
R134	A10266-4711	470. OHM .25W 5% CF T/R	M 3
R135	A10266-2201	22.0 OHM .25W 5 CF T/R	M 3
R136	A10266-8211	820. OHM .25W 5% CF T/R	M 3
R137	A10266-8211	820. OHM .25W 5% CF T/R	M 2
R138	A10266-2201	22.0 OHM .25W 5 CF T/R	M 2
R139	A10266-5601	56.0 OHM .25W 5% CF T/R	M 2
R140	A10266-4721	4.7 KOHM .25W 5% CF T/R	P 5

CROWN INTERNATIONAL INC.
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DRAWN	KLW	07-28-99	DWG. NO.	SHEET 14 OF 22	REV
PROJ.	MD439P0		127245-3		A

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
R141	A10266-5601	56.0 OHM .25W 5% CF T/R	M 4
R142	A10265-66501	665. OHM .25W 1 MF T/R	O 5
R143	A10265-27401	274. OHM .25W 1% MF T/R	P 5
R144	A10265-27401	274. OHM .25W 1% MF T/R	O 5
R145	A10265-66501	665. OHM .25W 1 MF T/R	O 5
R146	A10265-66501	665. OHM .25W 1 MF T/R	O 5
R147	A10265-66501	665. OHM .25W 1 MF T/R	O 5
R148	A10265-10031	100. KOHM .25W 1 MF T/R	P 5
R149	A10265-35711	3.57KOHM .25W 1 MF T/R	P 5
R150	A10265-35711	3.57KOHM .25W 1 MF T/R	O 5
R151	A10265-10031	100. KOHM .25W 1 MF T/R	O 5
R152	C 8836-6	100 OHM 0.50W 5% FU/FP T/R	K 4
R153	A10265-10021	10. KOHM .25W 1 MF T/R	K 4
R154	A10266-2721	2.7 KOHM .25W 5 CF T/R	K 3
R155	C 8836-6	100 OHM 0.50W 5% FU/FP T/R	K 3
R156	A10265-10021	10. KOHM .25W 1 MF T/R	K 3
R157	A10266-2721	2.7 KOHM .25W 5 CF T/R	K 3
R158	A10266-3021	3.0 KOHM .25W 5 CF T/R	J 4
R159	A10265-10011	1.0 KOHM .25W 1 MF T/R	K 3
R160	A10265-10021	10. KOHM .25W 1 MF T/R	J 3
R161	A10266-4721	4.7 KOHM .25W 5% CF T/R	J 3
R162	A10266-4721	4.7 KOHM .25W 5% CF T/R	J 3
R163	A10265-10021	10. KOHM .25W 1 MF T/R	J 3
R164	C 5215-6	22. MOHM .25W 5 THICK FILM T/R	K 3
R165	A10265-27431	274.KOHM .25W 1% MF T/R	J 4
R166	A10265-95311	9.53KOHM .25W 1% MF T/R	I 4
R167	A10266-1321	1.3 KOHM .25W 5 CF T/R	K 3
R168	A10124-24	WIRE, #24 SOLID BUS	K 3
R169	A10265-27431	274.KOHM .25W 1% MF T/R	J 2
R170	A10265-95311	9.53KOHM .25W 1% MF T/R	J 2
R171	A10266-5621	5.6 KOHM .25W 5% CF T/R	P 3
R172	A10266-1541	150. KOHM .25W 5% CF T/R	O 3
R173	A10265-17821	17.8KOHM .25W 1% MF T/R	O 3
R174	A10265-24921	24.9 KOHM .25W 1% MF T/R	O 3
R175	A10265-49911	4.99KOHM .25W 1 MF T/R	O 3
R176	A10265-68111	6.81KOHM .25W 1% MF T/R	O 3
R177	A10265-33221	33.2KOHM .25W 1% MF T/R	O 4
R178	A10265-10021	10. KOHM .25W 1 MF T/R	O 4
R179	A10265-20011	2.0 KOHM .25W 1% MF T/R	O 3
R180	A10265-20011	2.0 KOHM .25W 1% MF T/R	O 3
R181	A10265-10001	100. OHM .25W 1 MF T/R	O 2
R182	A10265-51121	51.1 KOHM .25W 1% MF T/R	O 2
R183	A10265-68111	6.81KOHM .25W 1% MF T/R	O 2
R184	A10265-10001	100. OHM .25W 1 MF T/R	O 2
R185	A10265-27431	274.KOHM .25W 1% MF T/R	O 2
R186	C 5062-2	100KOHM LINEAR TRIMPOT	O 2
R187	A10265-14721	14.7 KOHM .25W 1% MF T/R	O 4

CROWN INTERNATIONAL INC.
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DRAWN	KLW	07-28-99	DWG. NO.	SHEET 15 OF 22	REV
PROJ.	MD439P0		127245-3		A

PARTS LIST

REF DES	C.P.N.	DESCRIPTION	MAP LOC.
R188	A10265-30921	30.9 KOHM .25W 1% MF T/R	O 4
R189	A10265-19121	19.1KOHM .25W 1% MF T/R	O 4
R190	A10265-33221	33.2KOHM .25W 1% MF T/R	P 3
R191	A10265-10021	10. KOHM .25W 1 MF T/R	P 3
R192	A10265-20011	2.0 KOHM .25W 1% MF T/R	P 3
R193	A10265-20011	2.0 KOHM .25W 1% MF T/R	P 4
R194	A10265-68111	6.81KOHM .25W 1% MF T/R	P 3
R195	A10265-10001	100. OHM .25W 1 MF T/R	P 2
R196	A10265-51121	51.1 KOHM .25W 1% MF T/R	P 2
R197	A10265-68111	6.81KOHM .25W 1% MF T/R	P 2
R198	A10265-10001	100. OHM .25W 1 MF T/R	P 2
R199	A10265-27431	274.KOHM .25W 1% MF T/R	P 2
R200	A10265-10021	10. KOHM .25W 1 MF T/R	G 3
R201	A10265-10021	10. KOHM .25W 1 MF T/R	G 3
R202	A10265-10021	10. KOHM .25W 1 MF T/R	G 3
R203	C 9079-2	200.OHM TOP ADJ CERMET TRIMMER	H 1
R204	A10265-10021	10. KOHM .25W 1 MF T/R	G 2
R205	A10265-49911	4.99KOHM .25W 1 MF T/R	H 3
R206	A10265-49911	4.99KOHM .25W 1 MF T/R	H 3
R207	C 7526-4	3POS .1 CENTER MTA HEADER	F 2
R208	A10265-78711	7.87K OHM 0.25W 1% MF T/R	H 1
R209	A10265-24921	24.9 KOHM .25W 1% MF T/R	H 1
R210	A10265-19121	19.1 KOHM .25W 1% MF T/R	H 1
R211	A10265-24921	24.9 KOHM .25W 1% MF T/R	F 2
R212	A10266-2201	22.0 OHM .25W 5 CF T/R	G 2
R213	A10265-49911	4.99KOHM .25W 1 MF T/R	F 2
R214	A10265-10031	100. KOHM .25W 1 MF T/R	F 2
R215	A10265-14031	140 KOHM .25 1% MF T/R	G 4
R216	A10265-11521	11.5KOHM .25W 1% MF T/R	H 4
R217	A10265-20031	200.KOHM .25W 1 MF T/R	H 3
R218	A10265-10521	10.5KOHM .25W 1% MF T/R	H 3
R219	A10265-10031	100. KOHM .25W 1 MF T/R	F 2
R220	A10266-5111	510. OHM .25W 5 CF T/R	F 2
R221	C 5215-6	22. MOHM .25W 5 THICK FILM T/R	F 2
R222	A10266-1321	1.3 KOHM .25W 5 CF T/R	F 2
R223	A10265-49911	4.99KOHM .25W 1 MF T/R	F 2
R224	A10266-1231	12.KOHM .25W 5% CF T/R	E 3
R225	A10266-1231	12.KOHM .25W 5% CF T/R	E 2
R226	A10266-2721	2.7 KOHM .25W 5 CF T/R	E 3
R227	A10266-2721	2.7 KOHM .25W 5 CF T/R	E 2
R228	A10266-6831	68. KOHM .25W 5% CF T/R	E 3
R229	A10266-6831	68. KOHM .25W 5% CF T/R	E 3
R230	A10265-10031	100. KOHM .25W 1 MF T/R	E 3
R231	A10265-10031	100. KOHM .25W 1 MF T/R	E 2
R232	A10266-4701	47.0 OHM .25W 5 CF T/R	E 4
R233	A10266-4701	47.0 OHM .25W 5 CF T/R	E 2
R234	A10266-4711	470. OHM .25W 5% CF T/R	D 3

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DRAWN	KLW	07-28-99	DWG. NO.	SHEET 16 OF 22	REV
PROJ.	MD439P0		127245-3		A

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
R235	A10266-2201	22.0 OHM .25W 5 CF T/R	D 3
R236	A10266-8211	820. OHM .25W 5% CF T/R	D 3
R237	A10266-8211	820. OHM .25W 5% CF T/R	D 2
R238	A10266-2201	22.0 OHM .25W 5 CF T/R	D 2
R239	A10266-5601	56.0 OHM .25W 5% CF T/R	D 2
R240	A10266-4721	4.7 KOHM .25W 5% CF T/R	A 5
R241	A10266-5601	56.0 OHM .25W 5% CF T/R	D 4
R242	A10265-66501	665. OHM .25W 1 MF T/R	B 5
R243	A10265-27401	274. OHM .25W 1% MF T/R	A 5
R244	A10265-27401	274. OHM .25W 1% MF T/R	B 5
R245	A10265-66501	665. OHM .25W 1 MF T/R	B 5
R246	A10265-66501	665. OHM .25W 1 MF T/R	B 5
R247	A10265-66501	665. OHM .25W 1 MF T/R	B 5
R248	A10265-10031	100. KOHM .25W 1 MF T/R	A 5
R249	A10265-35711	3.57KOHM .25W 1 MF T/R	A 5
R250	A10265-35711	3.57KOHM .25W 1 MF T/R	B 5
R251	A10265-10031	100. KOHM .25W 1 MF T/R	B 5
R252	C 8836-6	100 OHM 0.50W 5% FU/FP T/R	F 4
R253	A10265-10021	10. KOHM .25W 1 MF T/R	E 4
R254	A10266-2721	2.7 KOHM .25W 5 CF T/R	E 3
R255	C 8836-6	100 OHM 0.50W 5% FU/FP T/R	F 3
R256	A10265-10021	10. KOHM .25W 1 MF T/R	E 3
R257	A10266-2721	2.7 KOHM .25W 5 CF T/R	E 3
R258	A10266-3021	3.0 KOHM .25W 5 CF T/R	G 4
R259	A10265-10011	1.0 KOHM .25W 1 MF T/R	F 3
R260	A10265-10021	10. KOHM .25W 1 MF T/R	G 3
R261	A10266-4721	4.7 KOHM .25W 5% CF T/R	G 3
R262	A10266-4721	4.7 KOHM .25W 5% CF T/R	G 3
R263	A10265-10021	10. KOHM .25W 1 MF T/R	G 3
R264	C 5215-6	22. MOHM .25W 5 THICK FILM T/R	F 3
R265	A10265-27431	274.KOHM .25W 1% MF T/R	G 4
R266	A10265-95311	9.53KOHM .25W 1% MF T/R	H 4
R267	A10266-1321	1.3 KOHM .25W 5 CF T/R	F 3
R268	A10124-24	WIRE, #24 SOLID BUS	F 3
R269	A10265-27431	274.KOHM .25W 1% MF T/R	G 2
R270	A10265-95311	9.53KOHM .25W 1% MF T/R	G 2
R271	A10266-5621	5.6 KOHM .25W 5% CF T/R	B 3
R272	A10266-1541	150. KOHM .25W 5% CF T/R	A 3
R273	A10265-17821	17.8KOHM .25W 1% MF T/R	A 3
R274	A10265-24921	24.9 KOHM .25W 1% MF T/R	A 3
R275	A10265-49911	4.99KOHM .25W 1 MF T/R	A 3
R276	A10265-68111	6.81KOHM .25W 1% MF T/R	A 3
R277	A10265-33221	33.2KOHM .25W 1% MF T/R	A 4
R278	A10265-10021	10. KOHM .25W 1 MF T/R	A 4
R279	A10265-20011	2.0 KOHM .25W 1% MF T/R	A 3
R280	A10265-20011	2.0 KOHM .25W 1% MF T/R	A 3
R281	A10265-10001	100. OHM .25W 1 MF T/R	A 2

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

DRAWN	KLW	07-28-99	DWG. NO.	SHEET 17 OF 22	REV
PROJ.	MD439P0		127245-3		A

PARTS LIST

REF DES	C.P.N.	DESCRIPTION	MAP LOC.
R282	A10265-51121	51.1 KOHM .25W 1% MF T/R	A 2
R283	A10265-68111	6.81KOHM .25W 1% MF T/R	A 2
R284	A10265-10001	100. OHM .25W 1 MF T/R	A 2
R285	A10265-27431	274.KOHM .25W 1% MF T/R	A 2
R286	C 5062-2	100KOHM LINEAR TRIMPOT	A 2
R287	A10265-14721	14.7 KOHM .25W 1% MF T/R	A 4
R288	A10265-30921	30.9 KOHM .25W 1% MF T/R	A 4
R289	A10265-19121	19.1KOHM .25W 1% MF T/R	A 4
R290	A10265-33221	33.2KOHM .25W 1% MF T/R	B 3
R291	A10265-10021	10. KOHM .25W 1 MF T/R	B 3
R292	A10265-20011	2.0 KOHM .25W 1% MF T/R	B 4
R293	A10265-20011	2.0 KOHM .25W 1% MF T/R	B 4
R294	A10265-68111	6.81KOHM .25W 1% MF T/R	B 3
R295	A10265-10001	100. OHM .25W 1 MF T/R	B 2
R296	A10265-51121	51.1 KOHM .25W 1% MF T/R	B 2
R297	A10265-68111	6.81KOHM .25W 1% MF T/R	B 2
R298	A10265-10001	100. OHM .25W 1 MF T/R	B 2
R299	A10265-27431	274.KOHM .25W 1% MF T/R	B 2
R300	C 5062-2	100KOHM LINEAR TRIMPOT	P 2
R301	A10265-21021	21.KOHM 25W 1% MF T/R	P 4
R302	A10265-24321	24.3 KOHM .25W 1% MF T/R	P 4
R303	A10265-20521	20.5KOHM .25W 1% MF T/R	P 4
R304	A10265-39221	39.2KOHM .25W 1% MF T/R	P 4
R305	A10265-35731	357.KOHM .25W 1 MF T/R	P 4
R306	A10266-3021	3.0 KOHM .25W 5 CF T/R	O 1
R307	A10266-1521	1.5 KOHM .25W 5% CF T/R	O 1
R308	A10265-10031	100. KOHM .25W 1 MF T/R	O 1
R309	C 7779-9	22. OHM .25W 5% FU/FP T/R	N 5
R310	A10266-4711	470. OHM .25W 5% CF T/R	N 5
R311	A10266-4711	470. OHM .25W 5% CF T/R	N 5
R312	C 7779-9	22. OHM .25W 5% FU/FP T/R	N 5
R313	A10266-4711	470. OHM .25W 5% CF T/R	N 5
R314	C 7779-9	22. OHM .25W 5% FU/FP T/R	N 4
R315	A10266-4711	470. OHM .25W 5% CF T/R	N 4
R316	A10266-4711	470. OHM .25W 5% CF T/R	N 4
R317	A10266-4711	470. OHM .25W 5% CF T/R	N 4
R318	C 7779-9	22. OHM .25W 5% FU/FP T/R	N 4
R319	A10266-3321	3.3 KOHM .25W 5% CF T/R	N 5
R320	A10266-3321	3.3 KOHM .25W 5% CF T/R	L 5
R321	A10266-3321	3.3 KOHM .25W 5% CF T/R	L 5
R322	A10266-2051	2.0 MOHM .25W 5 CF T/R	K 5
R323	A10266-1521	1.5 KOHM .25W 5% CF T/R	L 5
R324	A10266-4711	470. OHM .25W 5% CF T/R	K 5
R325	A10265-10031	100. KOHM .25W 1 MF T/R	K 5
R326	A10265-49911	4.99KOHM .25W 1 MF T/R	K 5
R327	A10266-7521	7.5 KOHM .25W 5% CF T/R	K 5
R328	A10266-8231	82. KOHM .25W 5% CF T/R	L 5

CROWN INTERNATIONAL INC.

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DRAWN	KLW	07-28-99	DWG. NO.	SHEET 18 OF 22	REV
PROJ.	MD439P0		127245-3		A

PARTS LIST

REF DES	C.P.N.	DESCRIPTION	MAP LOC.
R329	A10265-51121	51.1 KOHM .25W 1% MF T/R	L 6
R330	A10266-4741	470. KOHM .25W 5% CF T/R	L 5
R331	A10266-2751	2.7 MOHM .25W 5% CF T/R	L 5
R332	A10265-10001	100 OHM 0.25W 1% MF T/R	
R338		OPEN	J 6
R339		OPEN	J 6
R340		OPEN	L 6
R341	A10266-1531	15. KOHM .25W 5% CF T/R	L 6
R342	A10266-3921	3.9 KOHM .25W 5% CF T/R	L 5
R343	A10265-10021	10. KOHM .25W 1 MF T/R	L 5
R344	A10265-46421	46.4 KOHM .25W 1% MF T/R	L 4
R345	A10265-10021	10. KOHM .25W 1 MF T/R	L 5
R346	A10265-46421	46.4 KOHM .25W 1% MF T/R	L 4
R347	A10265-10021	10. KOHM .25W 1 MF T/R	L 4
R348	A10265-10021	10. KOHM .25W 1 MF T/R	L 4
R349	A10265-10021	10. KOHM .25W 1 MF T/R	L 4
R350	A10266-4701	47.0 OHM .25W 5 CF T/R	L 5
R351	A10265-20521	20.5KOHM .25W 1% MF T/R	K 4
R352	A10265-10021	10. KOHM .25W 1 MF T/R	L 4
R353	A10265-46421	46.4 KOHM .25W 1% MF T/R	L 4
R354	A10265-46421	46.4 KOHM .25W 1% MF T/R	L 4
R355	A10265-46421	46.4 KOHM .25W 1% MF T/R	L 4
R356	A10265-46421	46.4 KOHM .25W 1% MF T/R	L 4
R357	A10265-10021	10. KOHM .25W 1 MF T/R	L 5
R358	A10265-20521	20.5KOHM .25W 1% MF T/R	L 4
R359	A10265-10R01	10.0 OHM .25W 1 MF T/R	N 4
R360	A10266-1211	120. OHM .25W 5 CF T/R	N 4
R361	C 6048-0	500 OHM PIHER TRIM	N 4
R362	A10265-10R01	10.0 OHM .25W 1 MF T/R	N 4
R363	A10265-10211	1.02K OHM 0.25W 1% MF T/R	N 3
R364	A10265-18221	18.2K OHM 0.25W 1% MF T/R	N 3
R365	A10265-10211	1.02K OHM 0.25W 1% MF T/R	N 3
R366	A10265-18221	18.2K OHM 0.25W 1% MF T/R	N 3
R367	A10265-10R01	10 OHM 0.25W 1% MF T/R	N 3
R368	A10266-4711	470. OHM .25W 5% CF T/R	J 4
R369	A10266-4711	470. OHM .25W 5% CF T/R	J 4
R400	C 5062-2	100KOHM LINEAR TRIMPOT	B 2
R401	A10265-21021	21.KOHM 25W 1% MF T/R	B 4
R402	A10265-24321	24.3 KOHM .25W 1% MF T/R	B 4
R403	A10265-20521	20.5KOHM .25W 1% MF T/R	B 4
R404	A10265-39221	39.2KOHM .25W 1% MF T/R	B 4
R405	A10265-35731	357.KOHM .25W 1 MF T/R	B 5
R406	A10266-3021	3.0 KOHM .25W 5 CF T/R	B 1
R407	A10266-1521	1.5 KOHM .25W 5% CF T/R	B 1
R408	A10265-10031	100. KOHM .25W 1 MF T/R	B 1
R409	C 7779-9	22. OHM .25W 5% FU/FP T/R	C 5
R410	A10266-4711	470. OHM .25W 5% CF T/R	C 5

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1718 WEST MISHAWAKA ROAD ELKHART, INDIANA 46517 PHONE (219) 294-8000

DRAWN	KLW	07-28-99	DWG. NO.	SHEET 19 OF 22	REV
PROJ.	MD439P0		127245-3		A

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
R411	A10266-4711	470. OHM .25W 5% CF T/R	C 5
R412	C 7779-9	22. OHM .25W 5% FU/FP T/R	C 5
R413	A10266-4711	470. OHM .25W 5% CF T/R	C 5
R414	C 7779-9	22. OHM .25W 5% FU/FP T/R	C 4
R415	A10266-4711	470. OHM .25W 5% CF T/R	C 4
R416	A10266-4711	470. OHM .25W 5% CF T/R	C 4
R417	A10266-4711	470. OHM .25W 5% CF T/R	C 4
R418	C 7779-9	22. OHM .25W 5% FU/FP T/R	C 4
R419	A10266-3321	3.3 KOHM .25W 5% CF T/R	C 5
R420	A10266-3321	3.3 KOHM .25W 5% CF T/R	E 5
R421	A10266-3321	3.3 KOHM .25W 5% CF T/R	E 5
R422	A10266-2051	2.0 MOHM .25W 5 CF T/R	F 5
R423	A10266-1521	1.5 KOHM .25W 5% CF T/R	E 5
R424	A10266-4711	470. OHM .25W 5% CF T/R	F 5
R425	A10265-10031	100. KOHM .25W 1 MF T/R	F 5
R426	A10265-49911	4.99KOHM .25W 1 MF T/R	F 5
R427	A10266-7521	7.5 KOHM .25W 5% CF T/R	F 5
R428	A10266-8231	82. KOHM .25W 5% CF T/R	E 5
R429	A10265-51121	51.1 KOHM .25W 1% MF T/R	E 6
R430	A10266-4741	470. KOHM .25W 5% CF T/R	E 5
R431	A10266-2751	2.7 MOHM .25W 5% CF T/R	E 5
R438		OPEN	G 6
R439		OPEN	G 6
R440		OPEN	E 6
R441	A10266-1531	15. KOHM .25W 5% CF T/R	E 6
R442	A10266-3921	3.9 KOHM .25W 5% CF T/R	E 5
R443	A10265-10021	10. KOHM .25W 1 MF T/R	E 5
R444	A10265-46421	46.4 KOHM .25W 1% MF T/R	E 4
R445	A10265-10021	10. KOHM .25W 1 MF T/R	E 5
R446	A10265-46421	46.4 KOHM .25W 1% MF T/R	E 4
R447	A10265-10021	10. KOHM .25W 1 MF T/R	E 4
R448	A10265-10021	10. KOHM .25W 1 MF T/R	E 4
R449	A10265-10021	10. KOHM .25W 1 MF T/R	E 4
R450	A10266-4701	47.0 OHM .25W 5 CF T/R	E 5
R451	A10265-20521	20.5KOHM .25W 1% MF T/R	F 4
R452	A10265-10021	10. KOHM .25W 1 MF T/R	E 4
R453	A10265-46421	46.4 KOHM .25W 1% MF T/R	E 4
R454	A10265-46421	46.4 KOHM .25W 1% MF T/R	E 4
R455	A10265-46421	46.4 KOHM .25W 1% MF T/R	E 4
R456	A10265-46421	46.4 KOHM .25W 1% MF T/R	E 4
R457	A10265-10021	10. KOHM .25W 1 MF T/R	E 5
R458	A10265-20521	20.5KOHM .25W 1% MF T/R	E 4
R459	A10265-10R01	10.0 OHM .25W 1 MF T/R	C 3
R460	A10266-1211	120. OHM .25W 5 CF T/R	C 3
R461	C 6048-0	500 OHM PIHER TRIM	C 4
R462	A10265-10R01	10.0 OHM .25W 1 MF T/R	C 4
R463	A10265-10211	1.02K OHM 0.25W 1% MF T/R	C 3

CROWN INTERNATIONAL INC.

1718 WEST MISHAWAKA ROAD ELKHART, INDIANA 46517 PHONE (219) 294-8000

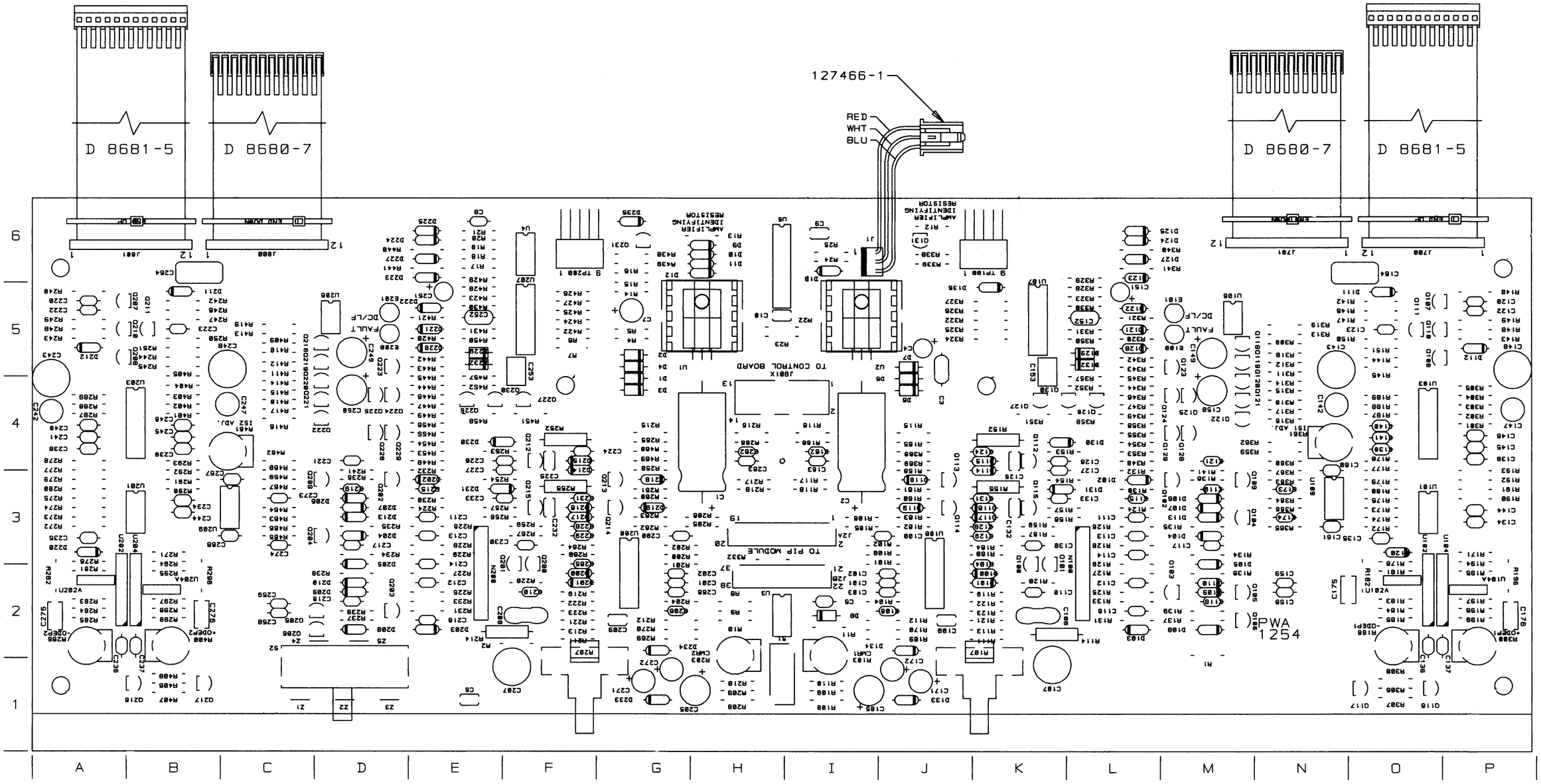
DRAWN	KLW	07-28-99	DWG. NO.	SHEET 20 OF 22	REV
PROJ.	MD439P0		127245-3		A

PARTS LIST

REF DES	C.P.N.	DESCRIPTION	MAP LOC.
R464	A10265-18221	18.2K OHM 0.25W 1% MF T/R	C 3
R465	A10265-10211	1.02K OHM 0.25W 1% MF T/R	C 3
R466	A10265-18221	18.2K OHM 0.25W 1% MF T/R	C 3
R467	A10265-10R01	10 OHM 0.25W 1% MF T/R	C 3
R468	A10266-4711	470. OHM .25W 5% CF T/R	G 4
R469	A10266-4711	470. OHM .25W 5% CF T/R	G 4
S1	C 7960-5	DPDT 3POS PC SLIDE SWITCH	I 1
S2	C 6781-6	6P3T MONO/STEREO SWITCH	C 1
TP100	C 6564-6	10P DBLROW UNSHRD HDR 87230-5	K 6
TP200	C 6564-6	10P DBLROW UNSHRD HDR 87230-5	F 6
U1	C 5095-2	MC7815CT +15V. REG	H 5
U1X	C 9494-3	HEATSINK, T0220 PLUG IN	H 5
U2	C 5096-0	MC7915CT -15V. REG	I 5
U2X	C 9494-3	HEATSINK, T0220 PLUG IN	I 5
U3	C10237-3	EEPROM, SERIAL 256X8 #93C56	H 2
U3X	C 3451-9	IC SOCKET, 8PIN DIP 2-640463-3	H 2
U4		OPEN	F 6
U5		OPEN	H 6
U100	101651-1	MC33079N QUAD OP AMP SGS ONLY	J 3
U101	C 7444-0	LM393 DUAL COMPARATOR	O 3
U102A	101374-1	2SA1349 DUAL PNP 80V SIP	O 2
U103	101651-1	MC33079N QUAD OP AMP SGS ONLY	O 4
U104A	101375-1	2SC3381 DUAL NPN 80V SIP	P 2
U106	C 6411-0	H11C2 OPTO SCR	M 5
U107	C 4345-2	LM339N VOLT COMPARATOR	K 5
U109	C 7636-1	MC33078P DUAL LOW NOISE OP AMP	N 3
U200	101651-1	MC33079N QUAD OP AMP SGS ONLY	G 3
U201	C 7444-0	LM393 DUAL COMPARATOR	A 3
U202A	101374-1	2SA1349 DUAL PNP 80V SIP	A 2
U203	101651-1	MC33079N QUAD OP AMP SGS ONLY	A 4
U204A	101375-1	2SC3381 DUAL NPN 80V SIP	B 2
U206	C 6411-0	H11C2 OPTO SCR	D 5
U207	C 4345-2	LM339N VOLT COMPARATOR	F 5
U209	C 7636-1	MC33078P DUAL LOW NOISE OP AMP	B 3
U102		--- OPEN ---	O 2
U104		--- OPEN ---	P 2
U202		--- OPEN ---	A 2
U204		--- OPEN ---	B 2
Z1		--- OPEN ---	C 1
Z2		--- OPEN ---	D 1
Z3		--- OPEN ---	D 1
Z4		--- OPEN ---	D 2
Z5		--- OPEN ---	D 2

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

DRAWN	KLW	07-28-98	DWG. NO.	SHEET 21 OF 22	REV
PROJ.	MD439P0		127245-3		A



127245-3 PWA Component Map
(Component Side)

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E.C.N.	ZONE	REV	DESCRIPTION	DATE	BY	APPROVAL CK	CM	EE	PE
		A	INITIAL RELEASE FOR PRODUCTION.	02-17-99	KLW	JW	CB		MK

UNLESS OTHERWISE SPECIFIED, THIS PRINTED WIRING ASSEMBLY SHALL MEET THE SPECIFICATION DESCRIBED IN IPC-A-610_ CLASS 2 STANDARDS.

NOTES:

1. SCHEMATIC DRAWING NUMBER 127198.
2. PRINTED WIRING BOARD PART NUMBER 127199-1.
3. ALL LEADS SHALL BE TRIMMED TO 0.093" OR LESS.

CAUTION

STATIC CAN DAMAGE COMPONENTS!

DO NOT HANDLE

UNLESS WRIST STRAP IS WORN

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

PWA, MA2402 CH1 RLY/V SELECT

TOL. UNLESS SPECIFIED
X.XX = ±0.02"
X.XXX = ±0.010"
DRILLS = ±0.003"

PRINTS TO		DRAWN BY	KLW	2/17/99	APPROVED BY:			DO NOT SCALE PRINT	
K		CHECKED	JW	02-17-99	ME	CDA	2-18-99	SUPERSEDES	
		SCALE	NONE		EE			E.C.	
		PROJ. #	MD439P0		PE	MK	2/17/99	DWG. NO. 127259-1 SHEET 1 OF 4	REV (A)
		FILENAME: 127259-1_A_01.PCB			NEXT ASSEMBLY:				

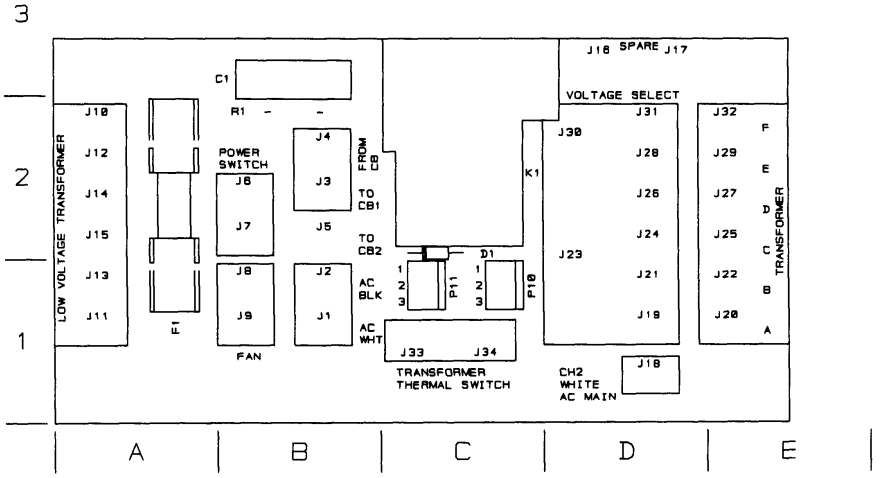
PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
C1	C 5234-7	CAPACITOR, 0.047UF 250 VAC X2	B 3
D1	C 3181-2	1N4148 HI SPEED DIODE	C 2
F1	C 8908-3	FUSEHOLDER PCB UNIVERSAL	A 2
F1	C 8908-3	FUSEHOLDER PCB UNIVERSAL	A 2
J1		OPEN	B 1
J2		OPEN	B 1
J3		OPEN	B 2
J4	101031-1	.250 FASTON, AUTO INSERTABLE	B 2
J5		OPEN	B 2
J6		OPEN	B 2
J7		OPEN	B 2
J8		OPEN	B 1
J9		OPEN	B 1
J10		OPEN	A 2
J11		OPEN	A 1
J12		OPEN	A 2
J13		OPEN	A 1
J14		OPEN	A 2
J15		OPEN	A 2
J16	101031-1	.250 FASTON, AUTO INSERTABLE	D 3
J17	101031-1	.250 FASTON, AUTO INSERTABLE	D 3
J18	101031-1	.250 FASTON, AUTO INSERTABLE	D 1
J19	101031-1	.250 FASTON, AUTO INSERTABLE	D 1
J20	101031-1	.250 FASTON, AUTO INSERTABLE	E 1
J21	101031-1	.250 FASTON, AUTO INSERTABLE	D 1
J22	101031-1	.250 FASTON, AUTO INSERTABLE	E 1
J23	101031-1	.250 FASTON, AUTO INSERTABLE	D 1
J24	101031-1	.250 FASTON, AUTO INSERTABLE	D 2
J25	101031-1	.250 FASTON, AUTO INSERTABLE	E 2
J26	101031-1	.250 FASTON, AUTO INSERTABLE	D 2
J27	101031-1	.250 FASTON, AUTO INSERTABLE	E 2
J28	101031-1	.250 FASTON, AUTO INSERTABLE	D 2
J29	101031-1	.250 FASTON, AUTO INSERTABLE	E 2
J30	101031-1	.250 FASTON, AUTO INSERTABLE	D 2
J31	101031-1	.250 FASTON, AUTO INSERTABLE	D 2
J32	101031-1	.250 FASTON, AUTO INSERTABLE	E 2
J33	101031-1	.250 FASTON, AUTO INSERTABLE	C 1
J34	101031-1	.250 FASTON, AUTO INSERTABLE	C 1
K1	C10335-5	RELAY, 30A 24V SEALED CE	C 2
P10	C 7526-4	3POS .1 CENTER MTA HEADER	C 1
P11	C 7526-4	3POS .1 CENTER MTA HEADER	C 1
R1	A10265-10R01	10 OHM 0.25W 1% MF	B 2

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

DRAWN	KLW	2/17/99	DWG. NO.	SHEET 3 OF 4	REV
PROJ.	MD439P0		127259-1		A

COMPONENT MAP

(COMPONENT SIDE VIEW)



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	1718 WEST MISHAWAKA ROAD ELKHART, INDIANA 46517 PHONE (219) 294-8000			
	DRAWN	KLW 2/17/99	DWG. NO.	SHEET 4 OF 4 REV
	PROJ.	MD439P0	127259-1	A

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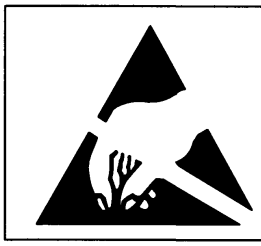
E.C.N.	ZONE	REV	DESCRIPTION	DATE	BY	APPROVAL CK	CM	EE	PE
		A	INITIAL RELEASE FOR PRODUCTION.	04-13-99	KLW	JAW		N/A	MK

UNLESS OTHERWISE SPECIFIED, THIS PRINTED WIRING ASSEMBLY SHALL MEET THE SPECIFICATION DESCRIBED IN IPC-A-610_ CLASS 2 STANDARDS.

NOTES:

1. SCHEMATIC DRAWING NUMBER 127492.
2. PRINTED WIRING BOARD PART NUMBER 127199-1.
3. ALL LEADS SHALL BE TRIMMED TO 0.093" OR LESS.



CAUTION

STATIC CAN DAMAGE COMPONENTS!

DO NOT HANDLE

UNLESS WRIST STRAP IS WORN

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

PWA, MA2402 DOMESTIC CH1 RELAY

TOL. UNLESS SPECIFIED
X.XX = ±0.02"
X.XXX = ±0.010"
DRILLS = ±0.003"

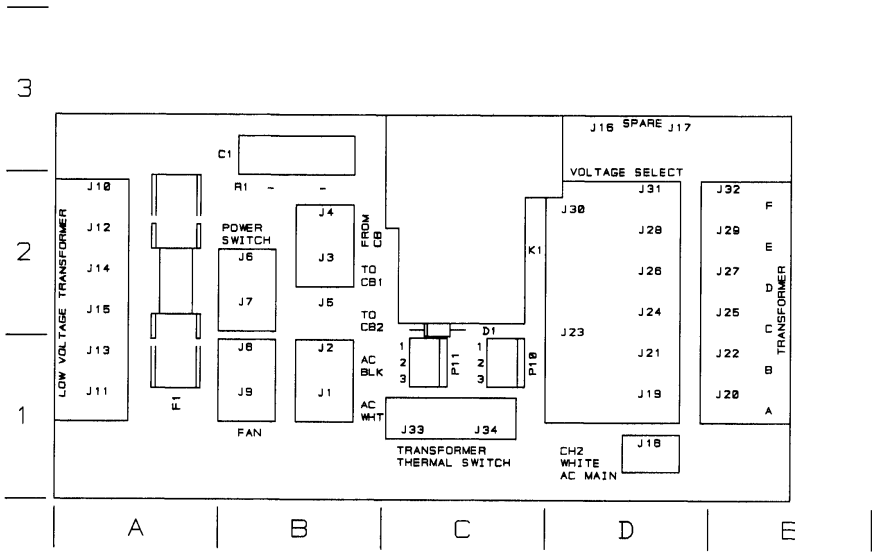
PRINTS TO		DRAWN BY	KLW	4/13/99	APPROVED BY:			DO NOT SCALE PRINT
K		CHECKED	JAW	04/13/99	ME	CSH	4-13-99	SUPERSEDES
		SCALE	NONE		EE	N/A	N/A	E.C.
		PROJ. #	MD439P0		PE	MK	4/13/99	DWG. NO. 127476-1 SHEET 1 OF 4 REV A
		FILENAME: 127476-1_A_01.PCB			NEXT ASSEMBLY:			

PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
C1	C 5234-7	CAPACITOR, 0.047UF 250 VAC X2	B 3
D1	C 3181-2	1N4148 HI SPEED DIODE	C 2
F1		OPEN	A 2
F1		OPEN	A 2
J1	101031-1	.250 FASTON, AUTO INSERTABLE	B 1
J2		OPEN	B 1
J3		OPEN	B 2
J4	101031-1	.250 FASTON, AUTO INSERTABLE	B 2
J5		OPEN	B 2
J6		OPEN	B 2
J7		OPEN	B 2
J8		OPEN	B 1
J9		OPEN	B 1
J10		OPEN	A 2
J11		OPEN	A 1
J12		OPEN	A 2
J13		OPEN	A 1
J14		OPEN	A 2
J15		OPEN	A 2
J16	101031-1	.250 FASTON, AUTO INSERTABLE	D 3
J17	101031-1	.250 FASTON, AUTO INSERTABLE	D 3
J18		OPEN	D 1
J19	101031-1	.250 FASTON, AUTO INSERTABLE	D 1
J20		OPEN	E 1
J21		OPEN	D 1
J22		OPEN	E 1
J23		OPEN	D 1
J24		OPEN	D 2
J25		OPEN	E 2
J26		OPEN	D 2
J27		OPEN	E 2
J28		OPEN	D 2
J29		OPEN	E 2
J30	101031-1	.250 FASTON, AUTO INSERTABLE	D 2
J31		OPEN	D 2
J32		OPEN	E 2
J33	101031-1	.250 FASTON, AUTO INSERTABLE	C 1
J34	101031-1	.250 FASTON, AUTO INSERTABLE	C 1
K1	C10335-5	RELAY, 30A 24V SEALED CE	C 2
P10	C 7526-4	3POS .1 CENTER MTA HEADER	C 1
P11	C 7526-4	3POS .1 CENTER MTA HEADER	C 1
R1	A10265-10R01	10 OHM 0.25W 1% MF	B 2

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

DRAWN	KLW	4/13/99	DWG. NO. 127476-1	SHEET 3 OF 4
PROJ.	MD439P0			REV A

COMPONENT MAP
(COMPONENT SIDE VIEW)



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

DRAWN	KLW	4/13/99	DWG. NO. 127476-1	REV A
PROJ.	MD439P0		SHEET 4 OF 4	

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E.C.N.	ZONE	REV	DESCRIPTION	DATE	BY	APPROVAL CK	CM	EE	PE
		A	INITIAL RELEASE FOR PRODUCTION.	04-13-99	KLW	JAW		N/A	MK

UNLESS OTHERWISE SPECIFIED, THIS PRINTED WIRING ASSEMBLY SHALL MEET THE SPECIFICATION DESCRIBED IN IPC-A-610_ CLASS 2 STANDARDS.

NOTES:

1. SCHEMATIC DRAWING NUMBER 127493.
2. PRINTED WIRING BOARD PART NUMBER 127199-1.
3. ALL LEADS SHALL BE TRIMMED TO 0.093" OR LESS.

CAUTION

STATIC CAN DAMAGE COMPONENTS!

DO NOT HANDLE

UNLESS WRIST STRAP IS WORN

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

PWA, MA2402 DOMESTIC CH2 RELAY

TOL. UNLESS SPECIFIED
X.XX = ±0.02"
X.XXX = ±0.010"
DRILLS = ±0.003"

PRINTS TO		DRAWN BY	KLW	4/13/99	APPROVED BY:			DO NOT SCALE PRINT	
K		CHECKED	JAW	04/13/99	ME	CSH	4-13-99	SUPERSEDES	
		SCALE	NONE		EE	N/A	N/A	E.C.	
		PROJ. #	MD439P0		PE	MK	4/13/99	DWG. NO. 127477-1 SHEET 1 OF 4	REV A
		FILENAME: 127477-1_A_01.PCB			NEXT ASSEMBLY:				

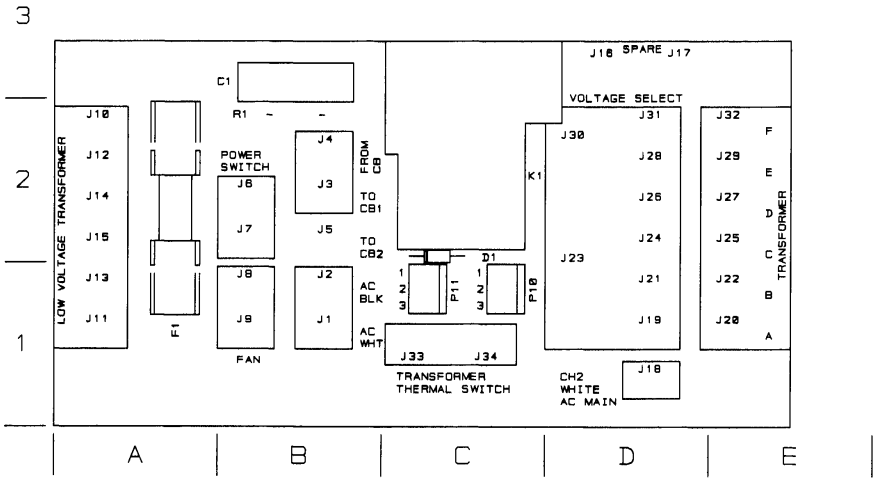
PARTS LIST			
REF DES	C.P.N.	DESCRIPTION	MAP LOC.
C1	C 5234-7	CAPACITOR, 0.047UF 250 VAC X2	B 3
D1	C 3181-2	1N4148 HI SPEED DIODE	C 2
F1	C 8908-3	FUSEHOLDER PCB UNIVERSAL	A 2
F1	C 8908-3	FUSEHOLDER PCB UNIVERSAL	A 2
J1	101031-1	.250 FASTON, AUTO INSERTABLE	B 1
J2	101031-1	.250 FASTON, AUTO INSERTABLE	B 1
J3	101031-1	.250 FASTON, AUTO INSERTABLE	B 2
J4	101031-1	.250 FASTON, AUTO INSERTABLE	B 2
J5	101031-1	.250 FASTON, AUTO INSERTABLE	B 2
J6	101031-1	.250 FASTON, AUTO INSERTABLE	B 2
J7	101031-1	.250 FASTON, AUTO INSERTABLE	B 2
J8	101031-1	.250 FASTON, AUTO INSERTABLE	B 1
J9	101031-1	.250 FASTON, AUTO INSERTABLE	B 1
J10	101031-1	.250 FASTON, AUTO INSERTABLE	A 2
J11	101031-1	.250 FASTON, AUTO INSERTABLE	A 1
J12	101031-1	.250 FASTON, AUTO INSERTABLE	A 2
J13	101031-1	.250 FASTON, AUTO INSERTABLE	A 1
J14	101031-1	.250 FASTON, AUTO INSERTABLE	A 2
J15	101031-1	.250 FASTON, AUTO INSERTABLE	A 2
J16	101031-1	.250 FASTON, AUTO INSERTABLE	D 3
J17	101031-1	.250 FASTON, AUTO INSERTABLE	D 3
J18	101031-1	.250 FASTON, AUTO INSERTABLE	D 1
J19	101031-1	.250 FASTON, AUTO INSERTABLE	D 1
J20		OPEN	E 1
J21		OPEN	D 1
J22		OPEN	E 1
J23		OPEN	D 1
J24		OPEN	D 2
J25		OPEN	E 2
J26		OPEN	D 2
J27		OPEN	E 2
J28		OPEN	D 2
J29		OPEN	E 2
J30	101031-1	.250 FASTON, AUTO INSERTABLE	D 2
J31		OPEN	D 2
J32		OPEN	E 2
J33	101031-1	.250 FASTON, AUTO INSERTABLE	C 1
J34	101031-1	.250 FASTON, AUTO INSERTABLE	C 1
K1	C10335-5	RELAY, 30A 24V SEALED CE	C 2
P10	C 7526-4	3POS .1 CENTER MTA HEADER	C 1
P11		OPEN	C 1
R1	A10265-10R01	10 OHM 0.25W 1% MF	B 2

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

DRAWN	KLW	4/13/99	DWG. NO.	SHEET 3 OF 4	REV
PROJ.	MD439P0		127477-1		A

COMPONENT MAP

(COMPONENT SIDE VIEW)



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

DRAWN	KLW	4/13/99	DWG. NO. 127477-1	SHEET 4 OF 4
PROJ.	MD439P0			REV A

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10 Schematics

The schematics referenced and provided are representative only. There may be slight variations between amplifier to amplifier. These schematics are intended to be used for troubleshooting purposes only.

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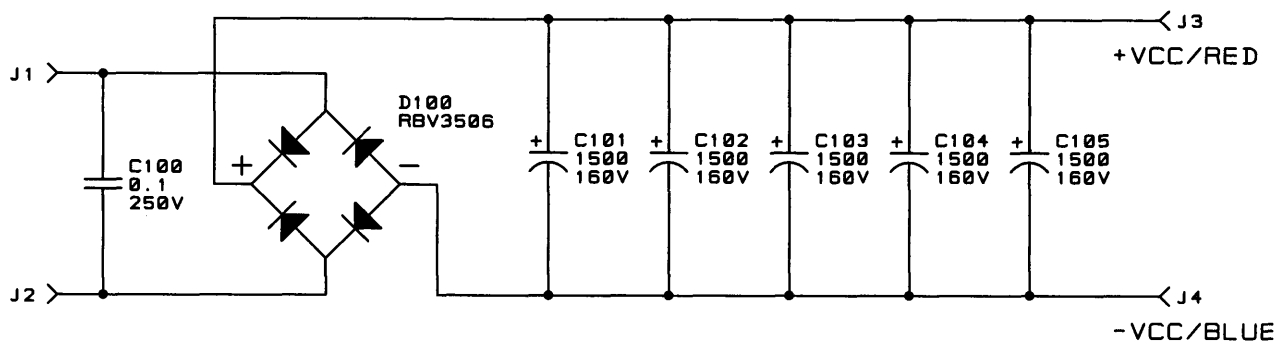
E.C.N.	ZONE	REV	DESCRIPTION	DATE	BY	APPROVAL			
						CK	CM	EE	PE
		A	INITIAL RELEASE FOR PRODUCTION.	01-28-99	KLW	JAW	CB		MK
99E0076		B	D100 WAS RBV5006. REVISED NOTE 2.	02-16-99	KLW	JAW	CB		MK



INACTIVE

For Reference Use Only

NOTES:

1. ALL CAPACITORS ARE IN MICROFARADS. UNLESS OTHERWISE SPECIFIED.
2. THIS SCHEMATIC APPLIES TO:
   PRINTED WIRING BOARD 127101-2.
   PRINTED WIRING ASSEMBLY 127100-2.

LAST USED	NOT USED
C105	
D100	
J4	

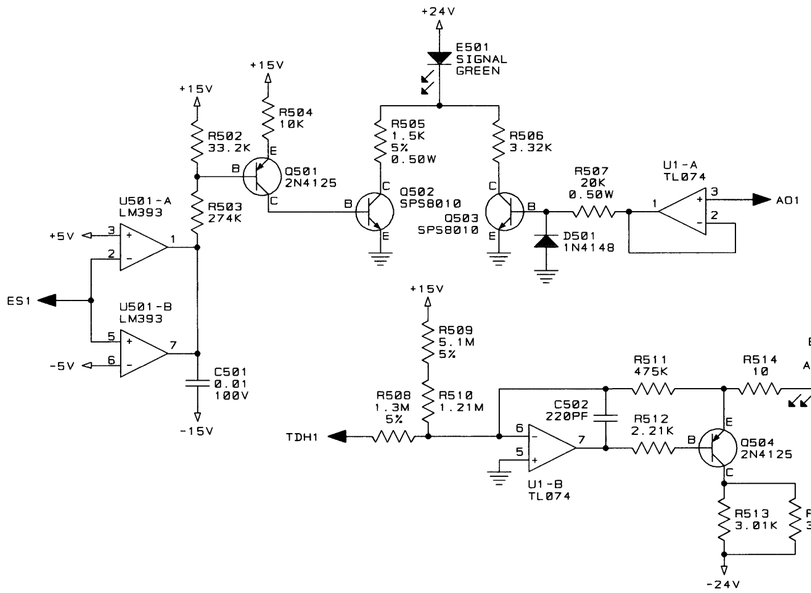
CROWN INTERNATIONAL, INC.
1718 W. MISHAWAKA RD. ELKHART IN. 46517 PHONE (219) 294-8000

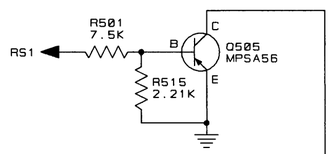
SCHEM, MA2402 PIP2 CAP/RECT BOARD

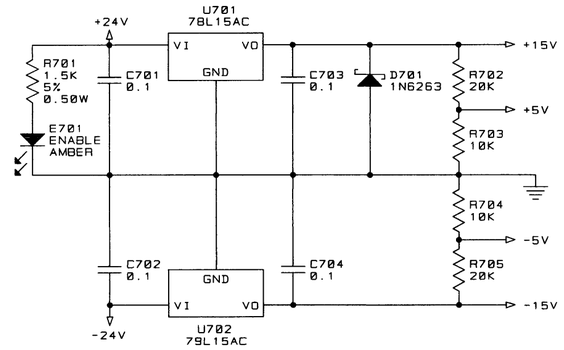
TOL. UNLESS SPECIFIED
X.XX = ±0.02"
X.XXX = ±0.010"
DRILLS = ±0.003"

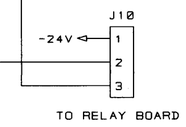
PRINTS TO		DRAWN BY	KLW	01-28-99	APPROVED BY:			DO NOT SCALE PRINT	
G		CHECKED	JAW	01-28-99	ME			SUPERSEDES	
		SCALE	NONE		EE			E.C.	
		PROJ. #	MD438P0		PE	MK	01-28-99	DWG. NO. 127108	REV B
		FILENAME: 127108_B.SCM			NEXT ASSEMBLY:				

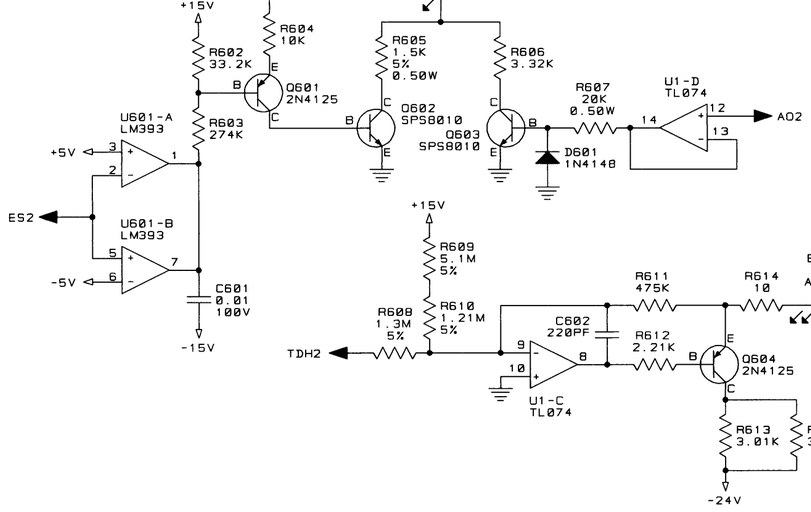
E.C.N.	ZONE	REV	DESCRIPTION	DATE	BY	APPROVAL			
						CK	CM	EE	PE
		A	INITIAL RELEASE FOR PRODUCTION.	01-29-99	KLW	JAW	CB		MK
99E0112		B	U1 WAS TL072. REVISED NOTE 3.	03-08-99	KLW	JAW	JW	NA	MK

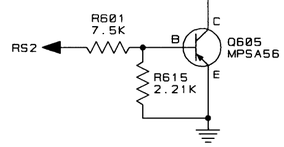








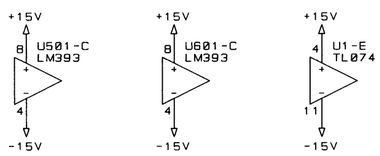


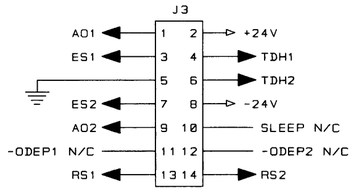


LAST USED	NOT USED
C704	503-600.603-700
D701	502-600.602-700
E701	502-600.602-700
J10	1.2.4-9
Q605	506-600
R705	516-600.616-700
U702	2-500,502-600,602-700

NOTES:

1. ALL RESISTORS ARE IN OHMS, 1/4W, 1%. UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITORS ARE IN MICROFARADS. UNLESS OTHERWISE SPECIFIED.
3. THIS SCHEMATIC APPLIES TO: PRINTED WIRING BOARD 127176-2. PRINTED WIRING ASSEMBLY 127177-2.





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

SCHEM, MA2402 DISPLAY

TOL. UNLESS SPECIFIED
X.XX = ±0.02"
X.XXX = ±0.010"
DRILLS = ±0.003"

PRINTS TO		DRAWN BY	KLW	01-29-99	APPROVED BY:			DO NOT SCALE PRINT
G		CHECKED	JAW	02-03-99	ME			SUPERSEDES
		SCALE	NONE		EE			E.C.
		PROJ. #	MD439P0		PE	MK	2/3/99	DWG. NO. 127175 REV B
		FILENAME: 127175_B.SCM			NEXT ASSEMBLY:			

E.C.N.	ZONE	REV	DESCRIPTION	DATE	BY	APPROVAL CK	CM	EE	PE
		A	INITIAL RELEASE FOR PRODUCTION.	02-18-99	KLW				

BALANCED TO UNBALANCED INPUT STAGE

GAIN STAGE LEVEL

LAST VOLTAGE AMP

TO PIP ADAPTER MODULE

THE PIN NUMBERS WITHIN "( )" REPRESENT THE PIP2 STANDARD PINOUT.

CT810 AMPLIFIER IDENTIFIER RESISTOR

PRE-DRIVER

HIGH-SIDE ERROR AMP

VOLTAGE TRANSLATOR STAGE

DIRTY GROUND

LOW-SIDE ERROR AMP

TO OUTPUT BOARD CH1

TO OUTPUT BOARD CH1

TO DISPLAY BOARD J901X

ODEP

ENERGY SAVING CIRCUIT

FAULT CIRCUIT

DC/LF PROTECT

PRE-DRIVER

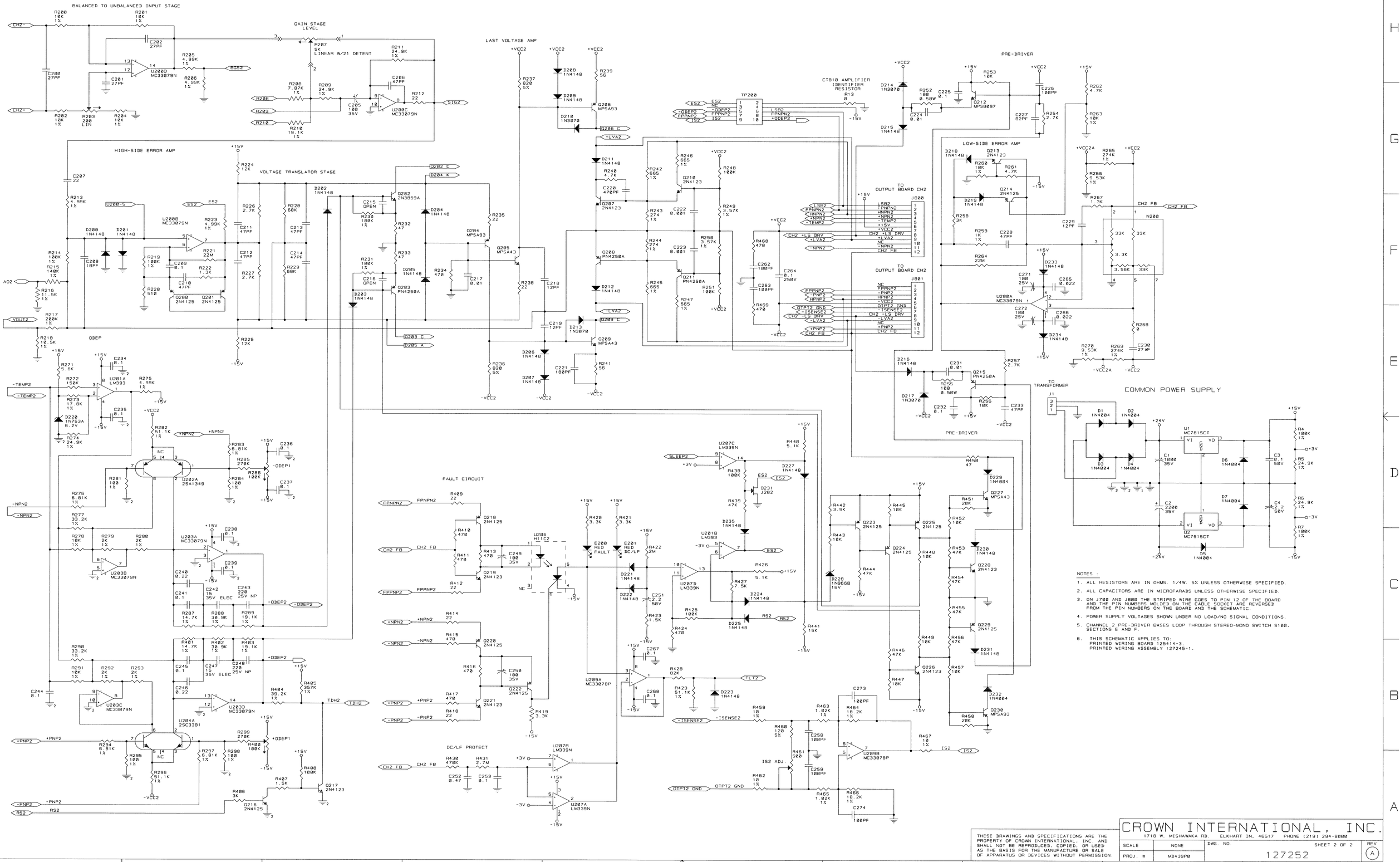
PARALLEL STEREO BRIDGE

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

SCHEM, MA2402 MAIN

TOL. UNLESS SPECIFIED
X.XX = ±0.02"
X.XXX = ±0.010"
DRILLS = ±0.003"

PRINTS TO	DRAWN BY	KLW	02-18-99	APPROVED BY:	DO NOT SCALE PRINT
G	CHECKED			ME	SUPERSEDES
	SCALE	NONE		EE	E.C.
	PROJ. #	MA439P0		PE	DWG. NO. 127252 SHEET 1 OF 2 REV A
	FILENAME:	127252_A.SCM		NEXT ASSEMBLY:	

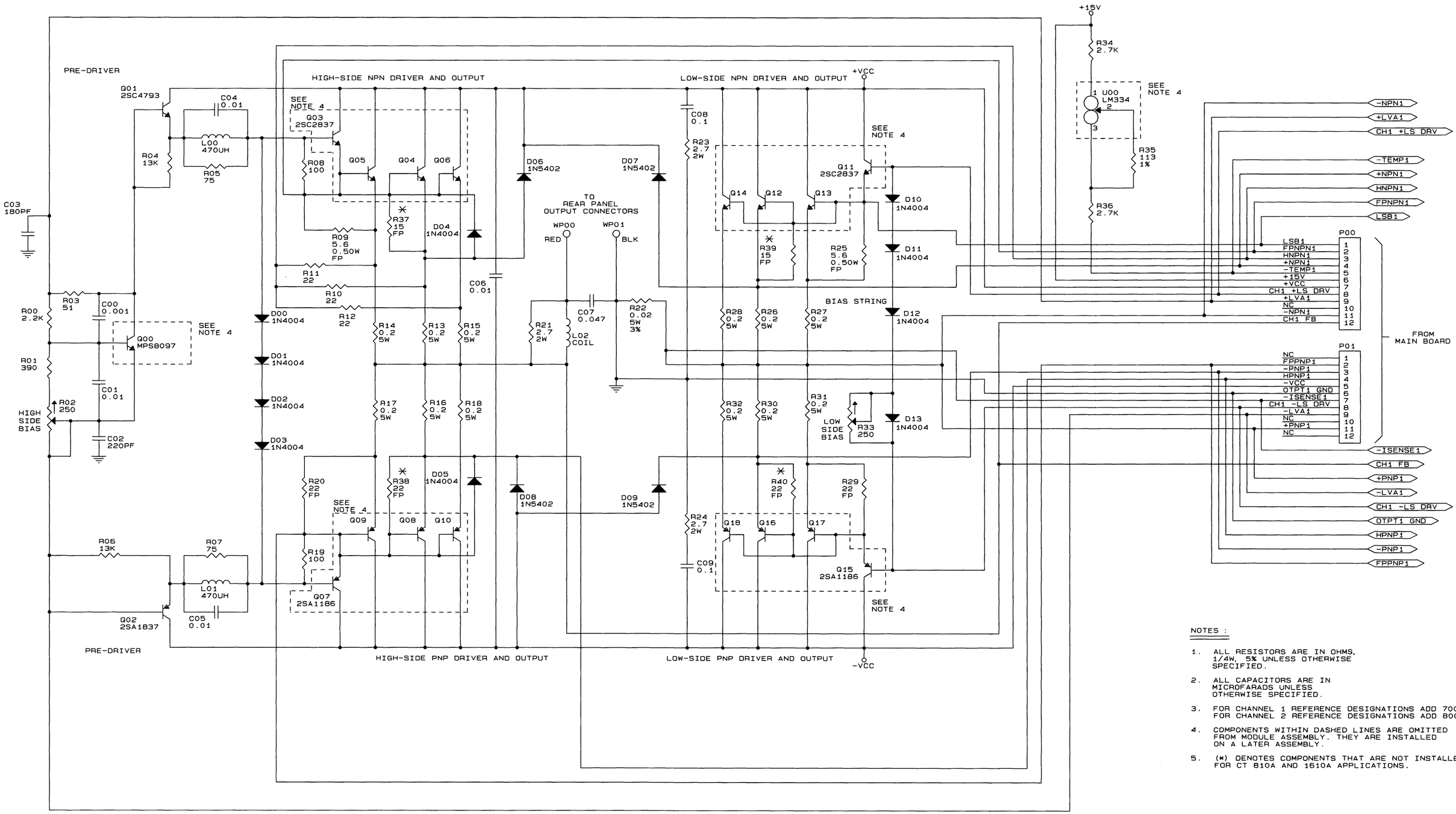


CROWN INTERNATIONAL, INC.
1718 W. MISHAWAKA RD. ELKHART IN. 46517 PHONE (219) 294-8000

SCALE	NONE	DWG. NO.	SHEET 2 OF 2	REV
PROJ. #	MD439P0	127252		A

DWG. NO. 102773 REV (B)

E.C.	ZONE	REV	DESCRIPTION	DATE	BY	APPROVALS CK	ME	EE	PE
		(A)	INITIAL RELEASE	05/30/97	LCD	KW		PW	TS
		(B)	RECONNECTED R23 & R24 TO GROUND.	12-02-97	TLM				
		○							



NOTES :

1. ALL RESISTORS ARE IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
3. FOR CHANNEL 1 REFERENCE DESIGNATIONS ADD 700. FOR CHANNEL 2 REFERENCE DESIGNATIONS ADD 800.
4. COMPONENTS WITHIN DASHED LINES ARE OMITTED FROM MODULE ASSEMBLY. THEY ARE INSTALLED ON A LATER ASSEMBLY.
5. (*) DENOTES COMPONENTS THAT ARE NOT INSTALLED FOR CT 810A AND 1610A APPLICATIONS.

LAST USED	OBSOLETED
C09	
D13	
L02	
Q18	
R40	
U00	

PRINTS TO	
G	

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

SCHEMATIC; CT810A/1610A OUTPUT

DRAWN	LCD	05/30/97	APPROVED BY :			DO NOT SCALE PRINT
CHECKED	KW	05-30-97	ME			SUPERSEDES
SCALE	NONE		EE	PW	06-02-97	E.C.
PROJ #	MD360D0		PE	TS	06-02-97	DWG. NO. SHEET 1 OF 1
FILENAME:	1027730B.SCM		NEXT ASSEMBLY:			102773 REV (B)