THE PROFESSIONAL AUDIO DIVISION OF CROWN INTERNATIONAL, INC.

POWER AMPLIFIER

SERVICE MANUAL

POWER BASE™-3 & 1400CSL™

Mailing Address:
P.O. Box 1000
Elkhart, IN U.S.A. 46515-1000

Shipping Address:
57620 C.R. 105
Elkhart, IN U.S.A. 46517

K-SVCPB3
6-95

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
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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!

Table of Contents

Introduction

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

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

SCOPE

This Service Manual includes several sections. These sections include Parts Ordering, Specifications, Voltage Conversion, Circuit Theory, Factory Test Procedures, Mechanical Parts Lists, and Module Parts Lists. Schematics are attached. Note that component parts with circuit board comprise a complete module. Module part numbers are always associated with a specific circuit board, although an unpopulated circuit board may be built up with different parts to create different modules. Note that Crown does not sell blank (unpopulated) circuit boards.

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

WARRANTY

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

Crown
Technical Support Group
Factory Service
Parts Department

Mailing Address:
PO Box 1000
Elkhart, IN USA 46515-1000

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57620 C.R. 105
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Parts Information

GENERAL INFORMATION

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

PART NUMBERING SYSTEMS

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

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

STANDARD AND SPECIAL PARTS

Many smaller electrical and electronic parts used by Crown are stocked by and available from electronic supply houses. However, some electronic parts that appear to be standard are actually special. A part ordered from Crown will assure an acceptable replacement. Structural items such as modules and panels are available from Crown only.

ORDERING PARTS

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

SHIPMENT

Shipment will be normally made by UPS or best other method unless you specify otherwise. Shipments are made to and from Elkhart, Indiana USA, only. Established accounts with Crown will receive shipment freight prepaid and will be billed. All others will receive shipment on a C.O.D. or pre-payment (check or credit card) basis.

TERMS

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

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

Crown
Parts Department

Mailing Address:
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or: (219) 294-8211
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FAX: (219) 294-8301

Specifications

Unless noted otherwise, all specifications are based on driving an 8 ohm load per channel, both channels driven, the sensitivity switch in the 26dB position, the AC supply is 120VAC at 60Hz. Crown specifications are guaranteed through the warranty period (normally 3 years). Because our testing methods are more stringent than our published specifications, every Crown amplifier will exceed its published specifications.

POWER

Power

8 Ohm Stereo—500W/Ch
4 Ohm Stereo—700W/Ch
8 Ohm Bridge Mono—1500W
4 Ohm Parallel Mono—1050W
2 Ohm Parallel Mono—1515W

Load Impedances: Rated for 16, 8, 4, and 2 (parallel mono only) Ohm operation; safe with all types of loads, even totally reactive loads.

AC Mains: 120VAC at 60 Hz with standard 3 wire grounded 15A connector with single voltage transformer and fan for North American units; 100VAC, 120VAC, 220VAC, and 240VAC at 50 or 60 Hz when equipped with universal transformer, applicable fan, and other applicable hardware with country specific power cord. Note that at 50 Hz fan speed is reduced.

PERFORMANCE

Frequency Response: ±0.1dB from 20 Hz to 20 kHz at 1 Watt.

Phase Response: ±10° from 10 Hz to 20 kHz at 1 Watt.

Signal to Noise Ratio: A-weighted, better than 105 dB below full rated output. Better than 100 dB below full rated output from 20 Hz to 20 kHz.

Total Harmonic Distortion (THD): <0.05% from 20 Hz to 1 kHz, increasing linearly to 0.1% at 20 kHz at 500W.

I.M. Distortion: <0.05% from 170 milliwatts to 500 W at 26 dB gain.

Slew Rate: >13V per microsecond.

Damping Factor: >1000 from 10 Hz to 400 Hz.

DC Offset: <10 millivolts.

Input Impedance: Nominally 20K ohms balanced; 10K ohms unbalanced.

Output Impedance: <10 milliohms in series with <2 microhenries.

Protection Systems: Output Device Emulation Protection (ODEP) limits drive in the event of dangerous dynamic thermal conditions without interrupting power. Current limiting for shorted load protection. DC/LF and common mode output current Fault circuitry to mute audio. Delay of 4 seconds from turn on mutes amplifier to prevent dangerous turn-on transients. High voltage circuit breaker in main transformer primary and low voltage fuse in fan primary. Slew rate limiting to prevent RF burn out.

MECHANICAL

Input Connectors: Balanced 1/4 inch phone jacks. Optional XLR inputs with MT-XLR accessory.

Output Connectors: Color-coded 5-way binding posts on 3/4 inch centers; spaced 3/4 inch apart.

Front Panel Controls: A rocker on/off power switch.

Back Panel Controls: A three-position switch which selects Stereo, Bridge-Mono, or Parallel-Mono mode; a two position input ground-lift switch, and level controls for each channel.

Internal Controls: A three-position switch selects 0.775V, 1.4V, or 26 dB voltage gain input sensitivity.

Indicators: Red Enable indicator shows on/off status of low-voltage power supply.

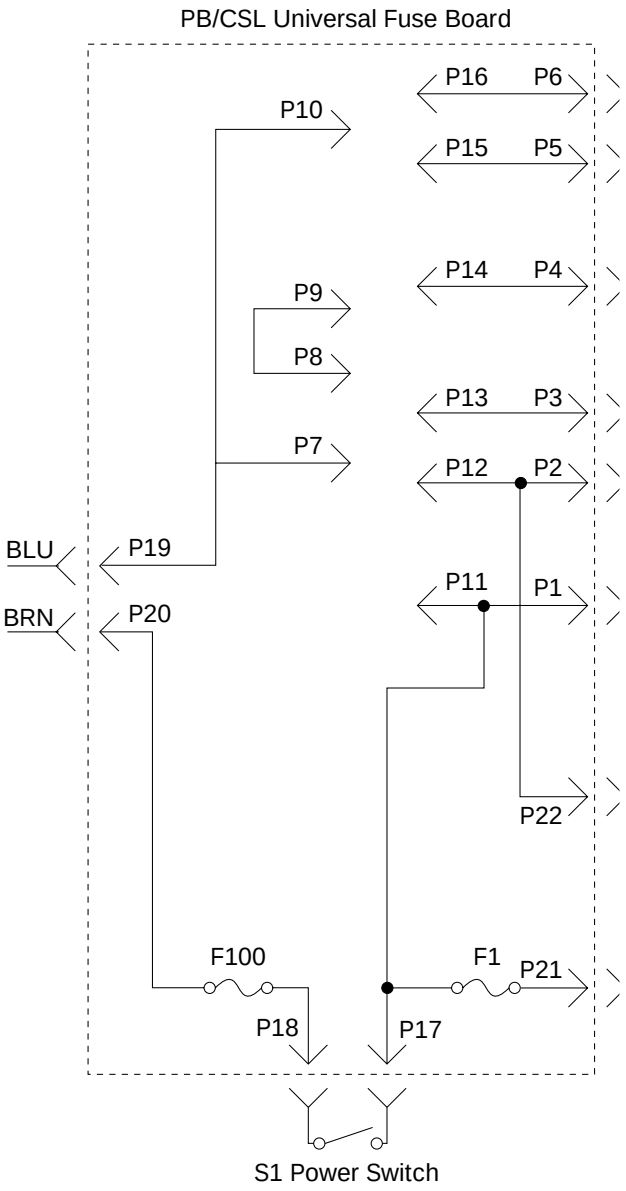
Construction: Black splatter-coat steel chassis with specially designed flow-through ventilation system.

Mounting: Standard EIA 310 front-panel rack mount with supports for supplemental rear corner mounting.

Dimensions: 19 inches wide, 3.5 inches high, 16 inches deep behind front mounting surface.

Weight: 36 lbs. Shipping; 40 lbs.

Voltage Conversion



100V Connections:
P10 to P15
P11 to P14
P7 to P12

120V Connections:
P10 to P16
P11 to P14
P7 to P13

220V Connections:
P10 to P15
P9 to P14
P8 to P13

240V Connections:
P10 to P16
P9 to P14
P8 to P13

For list of applicable transformer, fuse F100, fanformer, and power cord refer to voltage-parts cross-reference.

Note: The only versions of this product produced at the Crown Factory with international voltage capabilities are the CSL versions built specifically for sale outside the United States.

Specific parts are required for the PB-3/1400CSL in order to be used at different international line voltages. Refer also to Mechanical Parts Lists.

Voltage Specific Parts:

30A Breaker for 100-120V Operation	C 9837-3
15A Breaker for 220-240V Operation	C 9839-9
0.5A F1, Low Voltage*	A10285-7
Power Transformer (United States)	D 8598-1
Power Transformer (Universal)	D 8601-3
Transmotor 120V 60 Hz Only	H43065-4
Transmotor 120V 50-60 Hz	H43055-5

*Use 0.3A for UL® approval A10285-33

Theory

OVERVIEW

It should be noted from the outset that the PB-3 and 1400CSL amplifiers are electrically and mechanically identical products. The only differences, from a service perspective, are cosmetic. It should also be noted that over time Crown makes improvements and changes 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 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.

FEATURES

Power Base/CSL 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. This type of air flow provides significantly better cooling than the “wind tunnel” technology used by many other manufacturers. 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 Power Base/CSL Series’ include a single core transformer (one primary with two independent ungrounded secondaries), a full time full speed fan which also serves as the low voltage transformer, slew rate limiting, and audio muting for 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 rear mounted. The only indicator provided tells the operator that the low voltage supply is energized. In general, the packaging of this model is designed for maximum watt/price/weight/size value. It is the most basic grounded bridge amplifier series now available from Crown.

For additional details refer to the specification section, or to the applicable Owner’s Manual.

FRONT END OPERATION

The front end is comprised of three stages: Balanced Gain Stage (BGS), Variable Gain Stage (VGS), and the Error Amp. Figure 1 shows a simplified diagram of a typical front end with voltage amplification stages.

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.

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 26dB (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.

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

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

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.

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.

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.

GROUNDED BRIDGE TOPOLOGY

Figure 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

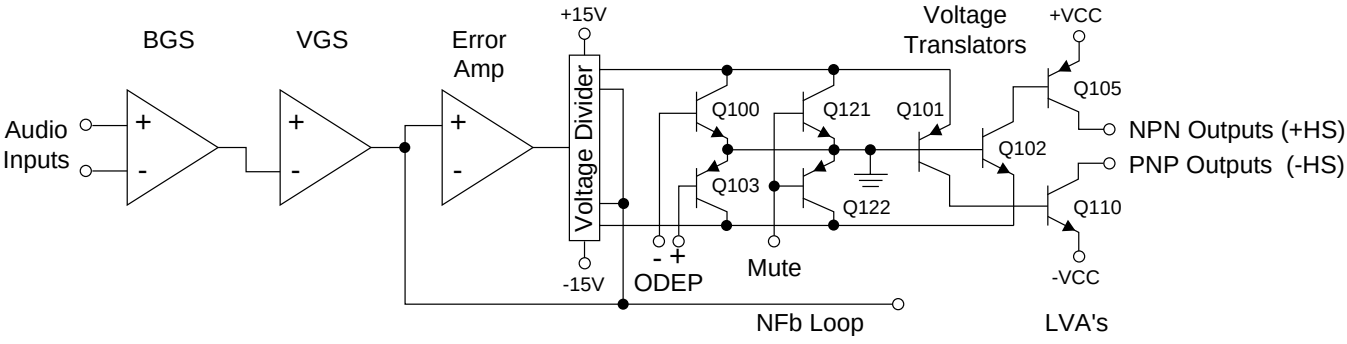

Figure 1. Typical Amplifier Front End and Voltage Amplification Stages.

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ultra low distortion in the signal zero-crossing region and high efficiency.

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.

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 3.3V Vce under static conditions. The positive and negative halves of the HS output are in parallel with this 3.3V. 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.

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.

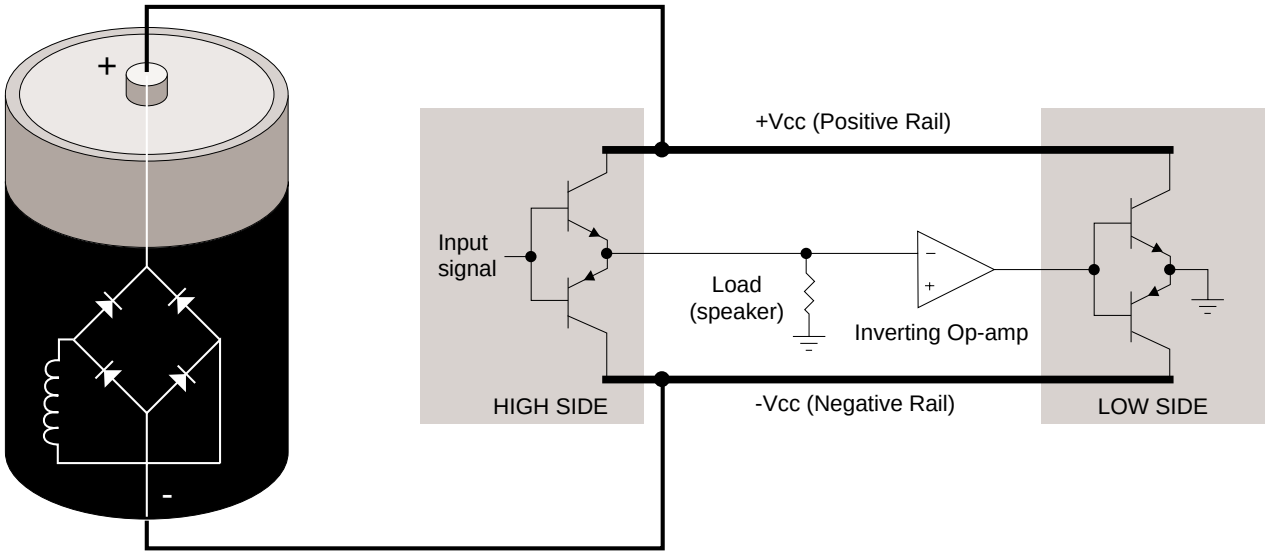


Figure 2. Crown Patented Grounded Bridge Topology

Theory

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, 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 PB-1/460CSL.

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.

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.

Theory

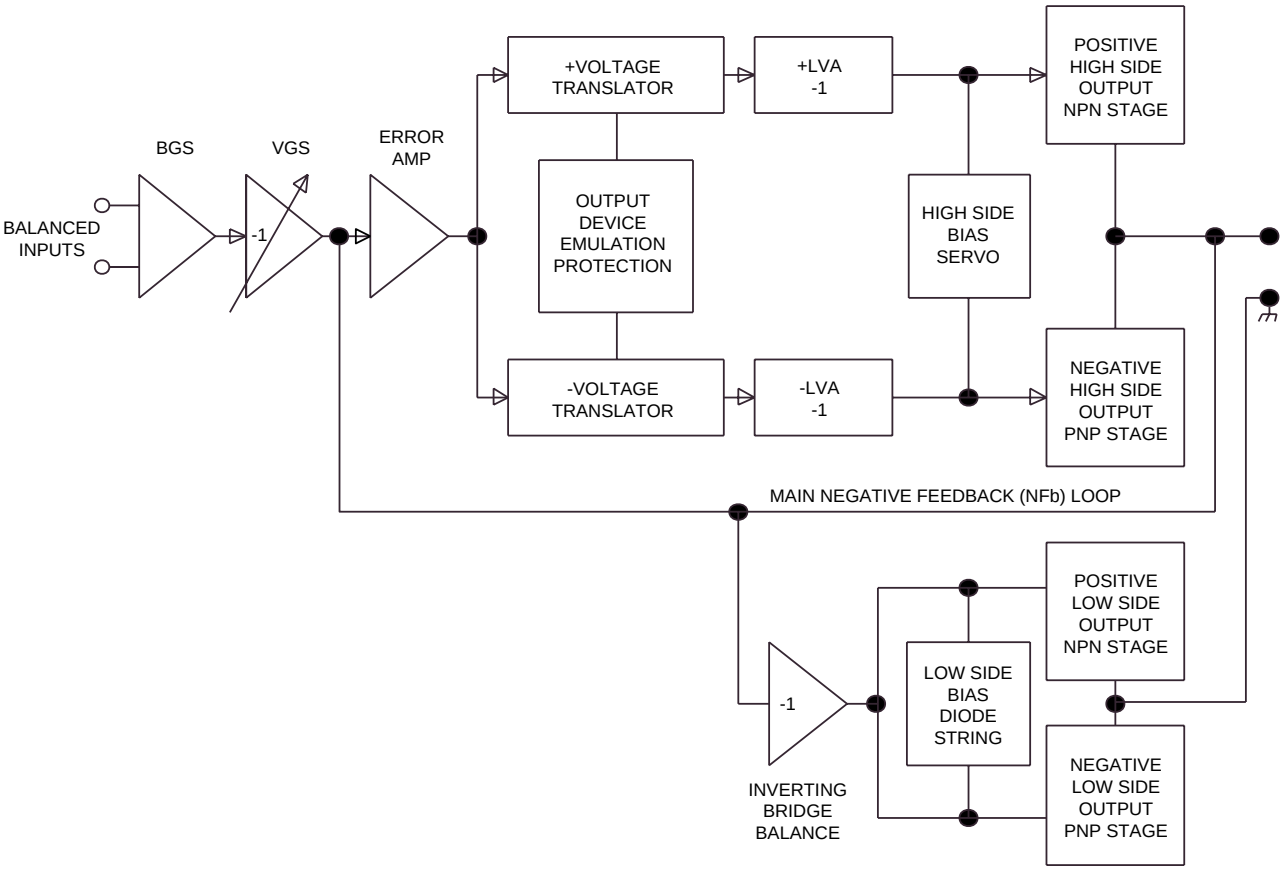


Figure 3. Typical Crown Amplifier Basic Block Diagram (One Channel Shown)

Electrical Checkout Procedures

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 120 VAC source. Test equipment includes an oscilloscope, a DMM, a signal generator, loads, and I.M.D. and T.H.D. noise test equipment.

STANDARD INITIAL CONDITIONS

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

TEST 1: DC OFFSET

Spec: 0 VDC, ±10 mV.
Initial Conditions: Controls per standard, inputs shorted.
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.

TEST 2: OUTPUT BIAS ADJUSTMENT

Spec: 300 to 320 mVDC.
Initial Conditions: Controls per standard, heatsink temperature less than 40°C.
Procedure: Measure DC voltages on the output module across R02, adjust R26 if necessary. Measure DC voltages on the output module across R21, adjust R23 if necessary. Repeat for second channel.

TEST 3: ODEP VOLTAGE ADJUSTMENT

Spec: Cold Bias Per Charts Below ±0.1V DC.
Initial Conditions: Controls per standard, heatsink at room temperature 20 to 30°C (68 to 86°F). Note: This adjustment should normally be performed within 2 minutes of turn on from ambient (cold) conditions. If possible measure heatsink temperature, if not measure ambient room temperature. Use this information when referencing the following chart.

°F	°C	V_{-ODEP}	V_{+ODEP}
66	18.9	–10.31	10.31
68	20.0	–10.26	10.26
70	21.1	–10.20	10.20
72	22.2	–10.14	10.14
74	23.3	–10.09	10.09
76	24.4	–10.03	10.03
77	25.0	–10.00	10.00
78	25.6	–9.97	9.97
80	26.7	–9.91	9.91
82	27.8	–9.86	9.86
84	28.9	–9.80	9.80
86	30.0	–9.74	9.74
88	31.1	–9.69	9.69
90	32.2	–9.63	9.63
92	33.3	–9.57	9.57
94	34.4	–9.51	9.51

–ODEP Procedure: Measure pin 6 of U100 and, if necessary, adjust R121 to obtain V_{-ODEP} as specified above. Measure pin 6 of U200 and, if necessary, adjust R221 to obtain V_{-ODEP} as specified above.
+ODEP Procedure: Measure pin 6 of U103 and, if necessary, adjust R132 to obtain V_{+ODEP} as specified above. Measure pin 6 of U203 and, if necessary, adjust R232 to obtain V_{+ODEP} as specified above.

TEST 4: AC POWER DRAW

Spec: 100 Watts maximum quiescent.
Initial Conditions: Controls per standard.
Procedure: With no input signal and no load, measure AC line wattage draw. If current draw is excessive, check for high AC line voltage or high bias voltage.

TEST 5: COMMON MODE REJECTION

Spec at 100 Hz: –70 dB.
Spec at 20 kHz: –50 dB.
Initial Conditions: Controls per standard.
Procedure: No load. Inject a 0 dBu 100 Hz sine wave into each channel, one channel at a time, with inverting and non-inverting inputs shorted together. At the output measure less than –44 dBu. Inject a 0 dBu 20 kHz sine wave into each channel, one channel at a time, with inverting and non-inverting inputs shorted together. At the output measure less than –24 dBu. Adjust R921 or R1021, if necessary, to obtain the required measurements.

Electrical Checkout Procedures

TEST 6: VOLTAGE GAIN

Spec 26dB Gain: ±3%.
Spec 0.775V Sensitivity: ±6%.
Spec 1.4V Sensitivity: +12%/–6%.
Initial Conditions: Controls per standard.
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 65.7 VAC ±3.9 VAC at the amplifier output. Inject a 1.4 VAC 1 kHz sine wave with the Sensitivity Switch in the 1.4V position. Measure 65.7 VAC +7.8/-3.9 VAC at the amplifier output. Return the Sensitivity Switch to the 26 dB position.

TEST 7: PHASE RESPONSE

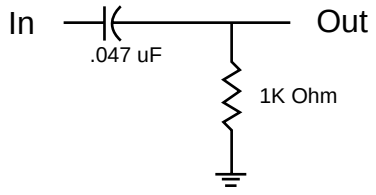
Spec: ±10° from 10 Hz to 20 kHz at 1 Watt.
Initial Conditions: Controls per standard, 8 ohm load on each channel.
Procedure: Inject a 1 kHz sine wave and adjust for 1 Watt output (2.8 VAC). Check input and output signals against each other, input and output signals must be within 10° of each other.

TEST 8: LEVEL CONTROLS

Spec: Level controlled by level controls.
Initial Conditions: Controls per standard.
Procedure: No Load. Inject a 1 kHz sine wave. With level controls fully clockwise you should see full gain. As controls are rotated counterclockwise, observe similar gain reduction in each channel. When complete, return level controls to fully clockwise position.

TEST 9: CURRENT LIMIT

Spec: Current Limit at 38 ±3 Amps
Initial Conditions: Controls per standard.
Procedure: Load each channel to 1 Ohm. Inject a 1 kHz differentiated (or 10% duty cycle) square wave and increase output level until current limit occurs. Current limit should occur at 38 ±3 Amps (38 Vpk) with output device Vce less than 40 Vpk. Observe clean (no oscillations) current clipping.



Differenciator Circuit

TEST 10: SLEW RATE & 10 KHZ SQUARE WAVE

Spec: >17V/µS.
Initial Conditions: Controls per standard.
Procedure: Load each channel to 8 ohms. Inject a 10 kHz square wave to obtain 65 volts peak-to-peak at each output. Observe the slope of the square wave. It should typically measure 17 to 25 V/µS. Also, the square wave must not include overshoot, ringing, or any type of oscillation.

TEST 11: CROSSTALK

Spec: -60dB at 20 kHz.
Initial Conditions: Controls per standard. Terminate input of channel not driven with 600 ohms.
Procedure: 8 ohm load on each channel. Inject a 20 kHz sine wave into the Channel 1 input and increase output level to 62 VAC. Measure less than 62 mVAC at the output of Channel 2. Inject a 20 kHz sine wave into the Channel 2 input and increase output level to 62 VAC. Measure less than 62 mVAC at the output of Channel 1.

TEST 12: OUTPUT POWER

Spec at 8 Ohm Stereo: 540W at 0.1% THD.
Spec at 4 Ohm Stereo: 760W at 0.1% THD.
International 8 Ohm Stereo: 510W at 0.1% THD.
International 4 Ohm Stereo: 680W at 0.1% THD.
Initial Conditions: Controls per standard.
Procedure: Load each channel to 8 ohms. Inject a 1 kHz sine wave and measure at least 65.7 VAC at the output of each channel. Load each channel to 4 ohms. Inject a 1 kHz sine wave and measure at least 55.1 VAC. All power measurements must be at less than 0.1% THD.

TEST 13: REACTIVE LOADS

Spec: No oscillations. Safe with all types of loads.
Initial Conditions: Controls per standard.
Procedure Capacitive: Load each channel to 8 ohms in parallel with 2 µF. Inject a 20 kHz sine wave with 55 VAC output for 10 seconds.
Procedure Inductive: Load each channel to 8 ohms in parallel with 159 µHenries. Inject a 1 kHz sine wave with 35.8 VAC output for 10 seconds.
Procedure Torture: Load each channel with the primary (red and black leads) of a DC-300A transformer (D 5781-6). Inject a 10 Hz sine wave at sufficient output level to cause 3 to 5 flyback pulses, for 10 seconds.
Procedure Short: Inject a 60 Hz sine wave at 5 VAC minimum output. After establishing signal, short the output for 10 seconds.

Electrical Checkout Procedures

TEST 14: ODEP LIMITING

Spec: No oscillation on ODEP Limiting wave form; either channel controls limiting in Parallel Mono Mode.
Initial Conditions: Controls per standard; rag or other obstruction blocking fan so that it does not turn.
Procedure: Load the amplifier to 4 ohms on each channel. Inject a 60 Hz sine wave and adjust for 35 Vrms at the output. After a few minutes observe a wave form similar to Figure 4. Remove the input signal from both channels and allow the amplifier to cool for a few minutes. Switch the amplifier to Parallel Mono and remove the load from Channel 1. Inject the signal into Channel 1 and observe that ODEP limiting occurs at the output of both channels. Remove the load from Channel 2, and install the load on Channel 1. Again, observe that both channels limit. Return all amplifier controls to standard initial conditions. Remove the fan obstruction.

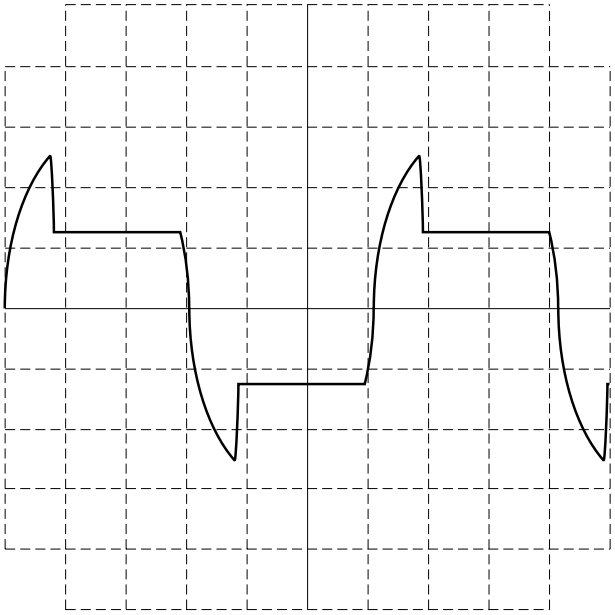


Figure 4. ODEP Limiting Wave Form

TEST 15: LF PROTECTION

Spec: Amplifier mutes for low frequency.
Initial Conditions: Controls per standard.
Procedure: No load. Inject a 0.5 Hz 6 volt peak-to-peak square wave, or a 2 Hz 6VAC sine wave into each channel and verify that each channel cycles into mute.

TEST 16: SIGNAL TO NOISE RATIO

Spec: 100 dB below rated 8 ohm power 20 Hz to 20 kHz. 105 dB A-Weighted.
Initial Conditions: Controls per standard. Short inputs.
Procedure: Load each channel to 8 ohms. Measure less than 648 µV at the output of each channel (20 Hz-20 kHz bandpass filter).

TEST 17: TURN ON TRANSIENTS

Spec: No dangerous transients.
Initial Conditions: Controls per standard.
Procedure: From an off condition, turn on the amplifier and monitor the output noise at the time of turn on. Note: Turn on noise may increase significantly if the amplifier is cycled off and on.

TEST 18: TURN OFF TRANSIENTS

Spec: No dangerous transients.
Initial Conditions: Controls per standard.
Procedure: From an on condition, turn off the amplifier and monitor the output noise at the time of turn off. Note: Turn off noise may increase significantly if the amplifier is cycled off and on.

TEST 19: INTERMODULATION DISTORTION

Spec at 0 dB Output: 0.01%.
Spec at –35 dB Output: 0.05%.
Initial Conditions: Controls per standard.
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) at 495 Watts (50.3 Volt RMS). With an IM analyzer measure less than 0.01% IMD. Repeat test at –35 dB (reference 495 Watts or 50.3 Volt RMS) and measure less than 0.05% IMD.

TEST 20: CLIPPING

Spec: No protective action during test.
Initial Conditions: Controls per standard.
Procedure: Load each channel to 8 ohms. Inject a 1 kHz sine wave at each input and drive output 6 dB into clip for 10 seconds. The amplifier should not activate any protective circuits (ODEP, Fault, or LF Protection).

POST TESTING

After completion of testing, if all tests are satisfactory, the amplifier controls should be returned to the positions required by customer. If conditions are unknown or unspecified, factory settings are as follows:
Level Controls: 9 to 11 O'Clock.
Sensitivity Switch: 0.775V U.S., 1.4V International.
Stereo/Mono Switch: Stereo.
Ground Lift: Lift.
Power: Off.

Parts List (Non-Module)

SUPPLIMENTAL ITEMS

CPN	ITEM	QTY
D 4137-2	Nylon Thumbscrew Washer	4
C 3342-0	Feet, Black Self-Stick	4
A10087-71012	10-32 .75 Machine (Rack Screw)	4
K80607-3	PB Series Owners Manual	1

POWER SUPPLY

CPN	ITEM	QTY
C 9837-3	Breaker, 30A 250VAC (100-120VAC)	1
C 9839-9	Breaker, 15A 250VAC (200-240VAC)	1
A10285-33	Fuse F1, .3A Slo Blow (120V 60Hz UL approved only)	1
A10285-7	Fuse F1, .5A AGC 1.25x.25	1
D 8598-1	PB-3 Power Transformer (120V 60Hz Only)	1
D 8601-3	1400CSL Power Transformer Universal Volt	1
A10089-10832	Screw, 8-32 2.0 Ph Machine	4
H43344-3	Primary Voltage Jumpers (Set of Three)	1
H43437-5	Power Cord Assembly, NEMA (Standard US model)	1
A10793-0503C	Power Cord, EUR plug (European CSL)	1
A10214-7	Strain Relief, SR7N-2 Black	1
H43450-8	Power Switch Wires	1
C 6487-0	Switch, 2 Pole 22A Power Rocker	1
H43065-4	TransMotor (60 Hz Only)	1
H43055-5	TransMotor (Universal)	1
C 9939-7	Fan Blade, 4 Inch CCW	1
D 8439-8	Bracket, Fan	1
C 7062-0	6-32 X 5/16 FLTHD Screw	1
C 8752-5	35A 400V Bridge Rectifier	2
D 8438-0	Bracket, Capacitor	2
A10110-70812	Screw, 8-32 X .750 Pan Head	2
D 8639-3	6300µF 150V Electrolytic Capacitor	2
C 9870-4	10-32 X .38 PNHD with T25	4
A10095-4	#10 External Star Lockwasher	4
A10098-5	1/4" Belleville Spring Washer	4
D 6764-1	Washer, Shoulder Cap Assembly	4
H43469-8	Blue Wires, Cap Assembly	2
H43470-6	Red Wires, Cap Assembly	2

FUSE BOARD ASSEMBLY (MODULE Q43349-2)

CPN	ITEM	QTY
C 5060-6	Fuse Clip, PC Mount #926	2
C 7817-7	Tab, AMP .25 FASTON PC MOUNT	22
P10426-8	Fuse Board	1

LED ASSEMBLY

CPN	ITEM	QT
C 4342-9	Enable LED, Amber	1
P10068B4	LED Board	1

Parts List (Non-Module)

OUTPUT ASSEMBLY (ONE PER CHANNEL)

CPN	ITEM	QTY (PER CHANNEL)
C 8187-4	NPN Output Device	4
C 8188-2	PNP Output Device	4
C 8573-5	PNP Driver Transistor, TO-3P (2SA1186)	2
C 8574-3	NPN Driver Transistor, TO-3P (2SC2837)	2
D 7665-9	Clip, TO-3P Mounting	2
D 7666-7	Bracket, TO-3P Heatsink	2
C 8813-5	Q318/Q418 Bias Servo MPSA18/MPS8097	1
B 5842-8	Tubing, #23 TFE Thin Wall Red (For C 8813-5)	Request in Inches
C 5826-0	S100/S200 Thermal Sense LM334Z	1
B 5464-1	Tubing, #24 Teflon Thin Wall (For C 5826-0)	Request in Inches
D 8774-8	PTC Thermal Sensor 95DEGC	1
A10315-1	Screw, 6-32-.56 Hex Washer Head	12
C 9491-9	Screw, 6-32-.312 Taptite Pan Ph	23
D 7796-2	Silpad Insulator (Between Chassis and Heatsinks)	1
D 7797-0	Output Thru-Hole Pad Insulator	1
D 8197-2	Paper Shroud	1
C 9387-9	Rivet, Plastic	2
F12019-0	Diode Heatsink Slug (Under diodes on Module)	1
M21324-5	Heatsink, Aluminum	2
H43058-9	Output Wires, Both Red and Black	1
	Output Module (See Module List)	1

BACK PANEL ASSEMBLY

CPN	ITEM	QTY
A10214-7	Strain Relief (Power Cord)	1
C 2823-0	Dual Binding Post Assembly	2
H43437-5	Power Cord Assembly, NEMA (Standard US Model)	1
A10793-0503C	Power Cord EUR Plug (European CSL)	1
F12605-6	Back Panel	1
M46285-9	Back Panel Assembly (w/ Binding Posts & Strain Relief)	1
A10019-8	Nut, #8 32-2 Captive	2

CHASSIS FRONT ASSEMBLY

CPN	ITEM	QTY
A10090-70806	Screw, 8-32-.375 Mach Ph Oval (Grille)	3
A10090-70808	Screw, 8-32-.5 Mach Ph Oval (End Caps)	4
A10101-5	Washer, Nylon (Grille)	3
A10173-1	Clip, Grille Filter	3
D 6944-9	Air Filter	1
D 8465J2	End Cap	2
F12435J7	Grille	1
C 6487-0	Switch, 2 Pole 22A Power Rocker	1
F12566J9	Overlay, PB3	1
D 8638-5	Overlay, 1400CSL	1

Parts List (Non-Module)

MAIN CHASSIS ASSEMBLY

CPN	ITEM	QTY
A10086-70806	Screw, 8-32 x .37 RDHD Ph	2
A10086-10604	Screw, 6-32 x .25 RDHD Ph	2
A10094-3	Washer, #6 Black Star	3
A10094-4	Washer, #6 Zinc Star	2
A10094-6	Washer, #8 Black Star	4
A10099-5	Washer, #8 Nylon Shoulder	4
A10109-10822	Screw, 8-18-1.375 Pan Ph	2
A10110-70812	Screw, 8-32-.75 Taptite Pan Ph	2
A10192-1	Snap Bushing .5	4
C 6487-0	Power Switch 22A Rocker 2 Pole	1
C 6912-7	Tension Retainer Board Support	2
C 6913-5	Spacer Nut, 1 inch	2
C 6914-3	Spacer Nut, .75 inch	2
C 8812-7	5.5" Cable Tie	5
C 8852-3	.5 Locking PCB Support	5
C 9491-9	Screw, 6-32 x .312 Pan Head	6
D 7600-6	Ground Strap (DBP to Chassis)	1
D 7784-8	Label, Sensitivity Switch	1
D 8606-2	Label, F1 Fuse Replacement	1
F10787J3	Back Panel Plate	1
D 8501-5	Cover, Top	1
D 8548-6	Cover, Bottom	1
A10110-70605	Screw, 6-32-.312 Taptite Ph (Covers)	20
F12610-6	Chassis	1
	Main Module (See Module List)	1

Module Information

MODULE HISTORY

The PB-3 and 1400CSL amplifiers were introduced in January of 1995. Since then there have been several updates and revisions, some of which called for new modules. The following is a list of Main and Output modules used up to this date, June 1995. It should be noted that both the PB-3 and the 1400CSL use the same modules.

OUTPUT MODULES: (left and right are identical)

Q43339-3
Original Output Module, still in production. Uses P10429-2 board.

MAIN MODULES:

Q43353-4
Original Main Module on D 8679-9 board. Used until 6-14-95.
Q43400-3
Main Module on D 8827-4 board.

FUSE MODULE:

Q43349-2
See parts list on page 16

Q43339-3 Output Module Parts List (P10429-2 Board)

Q43339-3 Output Module for PB-3:

CAPACITORS

C01	C 8511-5	.047µF
C02	C 8426-6	.1µF
C03	C 8426-6	.1µF
C04	C 6806-1	.01µF
C05	C 6806-1	.01µF
C06	C 6806-1	.01µF
C07	C 6807-9	.001µF
C08	C 6810-3	180pF
C09	C 6809-5	220pF
C43	C 7697-3	.01µF 500V

DIODES

D01	C 2851-1	1N4004
D02	C 2851-1	1N4004
D03	C 2851-1	1N4004
D04	C 2851-1	1N4004
D05	C 2941-0	1N5402
D06	C 2941-0	1N5402
D07	C 2941-0	1N5402
D08	C 2941-0	1N5402
D09	C 2851-1	1N4004
D10	C 2851-1	1N4004
D11	C 2851-1	1N4004
D12	C 2851-1	1N4004
D13	C 2851-1	1N4004
D14	C 2851-1	1N4004

INDUCTORS

L00	C 6592-6	Output Coil
L01	C 3510-2	470µH
L02	C 3510-2	470µH

TRANSISTORS

Q17	C 8508-1	NPN 2SC3298B
Q19	C 8509-9	PNP 2SA1306B

Note: Q18, S100/200, Driver and Output Transistors are not included with the module. See the Output Assembly Parts List on page 17.

RESISTORS

R00	A10266-7501	75
R01	A10266-1011	100
R02	C 7778-1	5.6 flame proof
R03	C 6486-2	.2 5W
R04	C 6486-2	.2 5W
R06	C 6486-2	.2 5W
R07	C 6486-2	.2 5W
R09	C 7779-9	22 flame proof
R10	A10266-1011	100
R11	C 7317-8	2.7 5W
R12	A10266-2R74	2.7 2W
R13	A10266-7501	75
R14	A10266-2R74	2.7 2W
R16	C 6486-2	.2 5W
R17	C 6486-2	.2 5W
R19	C 6486-2	.2 5W
R20	C 6486-2	.2 5W
R21	C 7778-1	5.6 flame proof
R22	C 7779-9	22 flame proof
R23	C 6844-2	250 Pot LS Bias
R24	A10266-1331	13K
R25	A10266-2221	2.2K
R26	C 6844-2	250 Pot HS Bias
R27	A10266-3911	390
R28	A10266-1331	13K
R29	A10266-5101	51
R30	A10265-10201	102
R41	A10266-2201	22
R42	A10266-2201	22

MISC.

Board	P10429-2	
Jumpers	C 5868-2	0 Ohm Jumper (11)
Clips	D 6414-3	Q17/19 Hold Down
J500 J600	C 9828-2	12 Pin Header

Q43353-4 Main Module Parts List (D 8679-9 Board)

Q43353-4 Applicability: Main Module PB-3/1400CSL units. For Schematic See J0659-3.

CAPACITORS

C1		C 3913-8	470µF
C2		C 3913-8	470µF
C4		C 6802-0	.47µF
C5		C 6806-1	.01µF
C6		C 6806-1	.01µF
C7		C 8897-8	.1µF
C8		C 5362-6	2.2uF
C100	C200	C 5311-3	22µF
C101	C201	C 9464-6	10pF
C102	C202	C 8576-8	100uF
C103	C203	C 6805-3	.022µF
C104	C204	C 6805-3	.022µF
C105	C205	C 6812-9	47pF
C106	C206	C 6812-9	47pF
C107	C207	C 8897-8	.1µF
C108	C208	C 6814-5	12pF
C109	C209	C 8576-8	100µF
C110	C210	C 5362-6	2.2µF
C112	C212	C 9991-8	1µF
C113	C213	C 9992-6	47µF
C114	C214	C 8854-9	100µF
C115	C215	C 8854-9	100µF
C116	C216	C 9992-6	47µF
C117	C217	C 9991-8	1µF
C118	C218	C 6814-5	12pF
C119	C219	C 6802-0	.47µF
C122	C222	C 6811-1	100pF
C123	C223	C 6812-9	47pF
C124	C224	C 6812-9	47pF
C129	C229	C 6814-5	12pF
C130	C230	C 6813-7	27pF
C133	C233	C 6813-7	27pF
C134	C234	C 6805-3	.022µF
C135	C235	C 6805-3	.022µF
C136	C236	C 6808-7	470pF
C137	C237	C 6808-7	470pF
C138	C238	C 6813-7	27pF
C139	C239	C 6813-7	27pF
C140	C240	C 6812-9	47pF
C141	C241	C 6812-9	47pF
C144	C244	C 8576-8	100µF
C145	C245	C 6812-9	47pF
C146	C246	C 6812-9	47pF
C147	C247	C 6806-1	.01µF
C148	C248	C 6810-3	180pF
C149	C249	C 6808-7	470pF
C150	C250	C 6806-1	.01µF
C151	C251	C 6806-1	.01µF
C152	C252	C 6950-7	82pF 5%
C153	C253	C 8897-8	.1µF
C154	C254	A10434-104JD	.1µF 250V
C155	C255	C 8897-8	.1µF
C156	C256	C 8897-8	.1µF
C158	C258	C 6805-3	.022uF
C159	C259	C 6805-3	.022uF
C160	C260	C 8897-8	.1uF
C161	C261	C 8897-8	.1uF

DIODES

D1		C 2851-1	1N4004
D2		C 2851-1	1N4004
D3		C 2851-1	1N4004
D4		C 2851-1	1N4004
D5		C 2851-1	1N4004
D6		C 2851-1	1N4004
D7		C 2851-1	1N4004
D100	D200	C 3181-2	1N4148
D101	D201	C 3824-7	1N970B, 24V
D103	D203	C 3181-2	1N4148
D104	D204	C 3181-2	1N4148
D108	D208	C 3181-2	1N4148
D109	D209	C 3181-2	1N4148
D110	D210	C 3181-2	1N4148
D111	D211	C 5061-4	1N3070
D112	D212	C 3181-2	1N4148
D113	D213	C 3181-2	1N4148
D120	D220	C 3181-2	1N4148
D121	D221	C 3181-2	1N4148
D122	D222	C 3181-2	1N4148
D123	D223	C 5061-4	1N3070
D124	D224	C 3181-2	1N4148
D125	D225	C 3181-2	1N4148
D126	D226	C 5061-4	1N3070
D127	D227	C 5061-4	1N3070
D129	D229	C 3181-2	1N4148
D130	D230	C 3181-2	1N4148
D131	D231	C 3181-2	1N4148
D132	D232	C 3181-2	1N4148
D133	D233	C 3181-2	1N4148
D134	D234	C 3181-2	1N4148
E100	E200	C 9857-1	RED
E101	E201	C 9857-1	RED

TRANSISTORS

Q100	Q200	D 2961-7	NPN 2N3859A
Q101	Q201	C 3578-9	PNP MPSA93
Q102	Q202	C 3810-6	NPN MPSA43
Q103	Q203	C 3786-8	PNP PN4250
Q105	Q205	C 3578-9	PNP MPSA93

Q43353-4 Main Module Parts List Cont. (D 8679-9 Board)

Q106	Q206	C 3625-8	NPN 2N4125
Q107	Q207	C 3786-8	PNP PN4250
Q108	Q208	C 5891-4	NPN MTS105
Q109	Q209	D 2961-7	NPN 2N3859A
Q110	Q210	C 3810-6	NPN MPSA43
Q112	Q212	C 3625-8	NPN 2N4125
Q113	Q213	C 3625-8	NPN 2N4125
Q115	Q215	D 2962-5	NPN MPS8097
Q116	Q216	C 3786-8	PNP PN4250
Q117	Q217	D 2961-7	NPN 2N3859A
Q118	Q218	D 2961-7	NPN 2N3859A
Q119	Q219	C 3625-8	NPN 2N4125
Q120	Q220	C 3625-8	NPN 2N4125
Q123	Q223	C 7458-0	NPN 2N4123
Q124	Q224	C 3625-8	PNP 2N4125
Q125	Q225	C 3786-8	PNP PN4250
Q126	Q226	C 5891-4	NPN MTS105
Q127	Q227	C 3625-8	PNP 2N4125
Q128	Q228	C 7458-0	NPN 2N4123
Q129	Q229	C 3625-8	PNP 2N4125
Q130	Q230	C 7458-0	NPN 2N4123
Q131	Q231	C 3625-8	PNP 2N4125
Q132	Q232	C 3625-8	PNP 2N4125
Q133	Q233	C 3625-8	PNP 2N4125
Q134	Q234	C 3625-8	PNP 2N4125
Q135	Q235	C 7458-0	NPN 2N4123
Q136	Q236	C 7458-0	NPN 2N4123
Q137	Q237	C 3625-8	PNP 2N4125

RESISTORS

N101A	N201A	A10265-68111	6.81K 1%
N101B	N201B	A10265-32421	32.4K 1%
N101C	N201C	A10265-17421	17.4K 1%
N101D	N201D	A10265-17421	17.4K 1%
N101E	N201E	A10265-32421	32.4K 1%
N101F	N201F	A10265-68111	6.81K 1%
R1		A10265-53621	53.6K 1%
R2		C 7340-0	24 5W
R3		C 7340-0	24 5W
R4		A10265-46421	46.4K 1%
R5		A10266-3321	3.3K
R7		A10266-4331	43K
R8		A10265-75021	75K 1%
R17		A10265-75021	75K 1%
R18		A10266-4331	43K
R100	R200	C 7409-3	5K Linear Pot (Level)
R101	R201	A10265-49911	4.99K 1%
R102	R202	A10266-5111	510
R103	R203	A10265-10031	100K 1%
R104	R204	A10266-2721	2.7K
R105	R205	A10266-2721	2.7K
R106	R206	A10266-1231	12K
R107	R207	A10266-6831	68K
R108	R208	A10265-80601	806
R109	R209	A10266-5601	56
R110	R210	A10266-6831	68K
R111	R211	A10266-1231	12K
R113	R213	A10266-4721	4.7K
R118	R218	A10265-28701	287 1%
R119	R219	A10265-71501	715 1%
R120	R220	A10265-28701	287 1%
R121	R221	C 5062-2	100K Pot (–ODEP)
R122	R222	A10266-2741	270K
R123	R223	A10266-2732	27K .5W
R124	R224	A10266-6821	6.8K
R125	R225	C 8836-6	100 .5W Flame Proof
R126	R226	C 8836-6	100 .5W Flame Proof
R127	R227	A10266-6821	6.8K
R128	R228	A10266-1331	13K
R129	R229	A10265-10031	100K 1%
R130	R230	A10265-10031	100K 1%
R131	R231	A10266-1331	13K
R132	R232	C 5062-2	100K Pot (+ODEP)
R133	R233	A10266-2741	270K
R134	R234	A10266-2732	27K .5W
R135	R235	C 8836-6	100 .5W Flame Proof
R136	R236	A10266-6821	6.8K
R137	R237	C 8836-6	100 .5W Flame Proof
R138	R238	A10266-6821	6.8K
R139	R239	A10265-80601	806 1%
R140	R240	A10266-5601	56
R141	R241	A10266-1541	150K
R142	R242	A10266-1541	150K
R143	R243	A10266-4711	470
R144	R244	A10266-4711	470
R145	R245	A10266-4711	470
R146	R246	A10266-1231	12K
R147	R247	C 8836-6	100 .5W Flame Proof
R148	R248	A10266-2721	2.7K
R149	R249	C 8836-6	100 .5W Flame Proof
R150	R250	A10266-2721	2.7K
R151	R251	A10266-1231	12K
R152	R252	A10265-11521	11.5K 1%
R153	R253	A10124-24	JUMPER
R154	R254	A10266-5601	56
R155	R255	A10266-1321	1.3K
R156	R256	A10266-1321	1.3K
R157	R257	A10266-1321	1.3K
R158	R258	A10265-11321	11.3K
R159	R259	A10266-1021	1K
R160	R260	A10266-5601	56
R161	R261	A10266-4701	47
R162	R262	A10266-4701	47
R163	R263	A10266-5601	56

Q43353-4 Main Module Parts List Cont. (D 8679-9 Board)

R164	R264	A10266-4711	470
R165	R265	A10266-4711	470
R166	R266	A10266-4711	470
R167	R267	A10265-10011	1K 1%
R168	R268	A10265-10011	1K 1%
R170	R270	A10265-10011	1K 1%
R171	R271	A10265-10011	1K 1%
R173	R273	A10266-5601	56
R174	R274	A10265-24921	24.9K 1%
R175	R275	A10265-76811	7.68K 1%
R176	R276	A10265-24921	24.9K 1%
R177	R277	A10265-19121	19.1K 1%
R179	R279	A10266-1321	1.3K
R180	R280	A10266-4711	470
R181	R281	A10266-4721	4.7K
R182	R282	A10266-2201	22
R184	R284	A10266-4741	470K
R186	R286	A10266-2751	2.7M
R187	R287	A10266-3321	3.3K
R188	R288	A10266-3321	3.3K
R189	R289	A10266-2731	27K
R190	R290	A10266-2051	2M
R193	R293	A10266-1031	10K
R194	R294	A10265-10031	100K 1%
R195	R295	A10266-3021	3K
R196	R296	A10266-4721	4.7K
R197	R297	A10265-10021	10K 1%
R198	R298	A10266-4721	4.7K
R199	R299	A10265-10021	10K 1%
R300	R400	A10265-10031	100K 1%
R301	R401	A10265-10031	100K 1%
R909	R1009	A10266-4741	470K
R911	R1011	A10266-1521	1.5K
R912	R1012	A10266-4711	470
R913	R1013	A10266-1041	100K
R915	R1015	A10266-2201	22
R916	R1016	A10266-2201	22
R917	R1017	A10266-10021	10K
R918	R1018	A10266-10021	10K
R919	R1019	A10266-10021	10K
R920	R1020	A10266-10021	10K
R921	R1021	C 9079-2	200 Pot (CMR Null)
R922	R1022	A10265-71501	715 1%
R923	R1023	A10265-35711	3.57K 1%
R924	R1024	A10266-5111	510
R925	R1025	A10266-1041	100K
R926	R1026	A10266-5111	510
R927	R1027	A10266-1041	100K
R928	R1028	A10265-35711	3.57K 1%
R929	R1029	A10266-1241	120K
R930	R1030	A10266-1241	120K
R931	R1031	A10266-3921	3.9K
R932	R1032	A10266-1031	10K
R933	R1033	A10266-4731	47K
R934	R1034	A10266-1031	10K
R935	R1035	A10266-4731	47K
R936	R1036	A10266-1031	10K
R937	R1037	A10266-1031	10K
R938	R1038	A10266-1031	10K
R939	R1039	A10266-4731	47K
R940	R1040	A10266-4731	47K
R941	R1041	A10266-4731	47K
R942	R1042	A10266-4731	47K

SWITCHES

S2	C 7325-1	Ground Lift
S3	C 7960-5	Sensitivity
S4	C 6781-6	Stereo/Mono

INTEGRATED CIRCUITS

U1		C 5095-2	UA7815
U2		C 5096-0	UA7915
U100	U200	C 6911-9	UPA75
U101	U201	C 6411-0	H11C2
U102	U202	C 4345-2	LM339
U103	U203	C 6910-1	UPA76
U104	U204	C 7558-7	MC33079P

MISC.

Board		D 8679-9	
TP1	TP2	C 6564-6	HDR, 10POS
Socket		C 3450-1	14 Pin
HW 9-10		C 9494-3	TO-220, Heatsinks
HW 11-15		C 9944-7	Spacer, .25 push
J1		C 7593-4	5 Pin Header
J11		C 7526-4	3 Pin Header
J12		C 7873-0	2 Pin Header
J100	J200	C 6777-4	Phone Jack
Cover		C 6778-2	Phone Jack Cover
J500	J800	D 8681-5	10 Inch Ribbon
J600	J700	D 8680-7	6 Inch Ribbon
HW5-8		C 8812-7	5.5" Cable Tie
Z6		C 5868-2	0 Ohm Jumper

Q43400-3 Main Module Parts List (D 8827-4)

Q43400-3 PB-3, 1400CSL MAIN MODULE

CAPACITORS

C1		C 3913-8	470µF
C2		C 3913-8	470µF
C4		C 6802-0	.47µF
C5		C 6806-1	.01µF
C6		C 6806-1	.01µF
C7		C 8897-8	.1µF
C8		C 5362-6	2.2uF
C100	C200	C 5311-3	22µF
C101	C201	C 9464-6	10pF
C102	C202	C 8576-8	100uF
C103	C203	C 6805-3	.022µF
C104	C204	C 6805-3	.022µF
C105	C205	C 6812-9	47pF
C106	C206	C 6812-9	47pF
C107	C207	C 8897-8	.1µF
C108	C208	C 6814-5	12pF
C109	C209	C 8576-8	100µF
C110	C210	C 5362-6	2.2µF
C112	C212	C 9991-8	1µF
C113	C213	C 9992-6	47µF
C114	C214	C 8854-9	100µF
C115	C215	C 8854-9	100µF
C116	C216	C 9992-6	47µF
C117	C217	C 9991-8	1µF
C118	C218	C 6814-5	12pF
C119	C219	C 6802-0	.47µF
C122	C222	C 6811-1	100pF
C123	C223	C 6812-9	47pF
C124	C224	C 6812-9	47pF
C129	C229	C 6814-5	12pF
C130	C230	C 6813-7	27pF
C133	C233	C 6813-7	27pF
C134	C234	C 6805-3	.022µF
C135	C235	C 6805-3	.022µF
C136	C236	C 6808-7	470pF
C137	C237	C 6808-7	470pF
C138	C238	C 6813-7	27pF
C139	C239	C 6813-7	27pF
C140	C240	C 6812-9	47pF
C141	C241	C 6812-9	47pF
C144	C244	C 8576-8	100µF
C145	C245	C 6812-9	47pF
C146	C246	C 6812-9	47pF
C147	C247	C 6806-1	.01µF
C148	C248	C 6810-3	180pF
C149	C249	C 6808-7	470pF
C150	C250	C 6806-1	.01µF
C151	C251	C 6806-1	.01µF
C152	C252	C 6950-7	82pF 5%
C153	C253	C 8897-8	.1µF
C154	C254	A10434-104JD	.1µF 250V
C155	C255	C 8897-8	.1µF
C156	C256	C 8897-8	.1µF
C158	C258	C 6805-3	.022uF
C159	C259	C 6805-3	.022uF
C160	C260	C 8897-8	.1uF
C161	C261	C 8897-8	.1uF
C113X	C213X	OPEN	
C116X	C216X	OPEN	

DIODES

D1		C 2851-1	1N4004
D2		C 2851-1	1N4004
D3		C 2851-1	1N4004
D4		C 2851-1	1N4004
D5		C 2851-1	1N4004
D6		C 2851-1	1N4004
D7		C 2851-1	1N4004
D100	D200	C 3181-2	1N4148
D101	D201	C 3181-2	1N4148
D102	D202	C 3824-7	1N970B
D103	D203	C 3181-2	1N4148
D104	D204	C 3181-2	1N4148
D105	D205	C 2851-1	1N4004
D106	D206	C 2851-1	1N4004
D108	D208	C 3181-2	1N4148
D109	D209	C 3181-2	1N4148
D110	D210	C 3181-2	1N4148
D111	D211	C 5061-4	1N3070
D112	D212	C 3181-2	1N4148
D113	D213	C 3181-2	1N4148
D120	D220	C 3181-2	1N4148
D121	D221	C 3181-2	1N4148
D122	D222	C 3181-2	1N4148
D123	D223	C 5061-4	1N3070
D124	D224	C 3181-2	1N4148
D125	D225	C 3181-2	1N4148
D126	D226	C 5061-4	1N3070
D127	D227	C 5061-4	1N3070
D128	228	OPEN	
D129	D229	C 3181-2	1N4148
D130	D230	C 3181-2	1N4148
D131	D231	C 3181-2	1N4148
D132	D232	C 3181-2	1N4148
D133	D233	C 3181-2	1N4148
D134	D234	C 3181-2	1N4148

L.E.D.'S

E100	E200	C 9857-1	RED
E101	E201	C 9857-1	RED

Q43400-3 Main Module Parts List Cont. (D 8827-4)

NETWORK RESISTORS

N101A	N201A	A10265-68111	6.81K 1%
N101B	N201B	A10265-32421	32.4K 1%
N101C	N201C	A10265-17421	17.4K 1%
N101D	N201D	A10265-17421	17.4K 1%
N101E	N201E	A10265-32421	32.4K 1%
N101F	N201F	A10265-68111	6.81K 1%

TRANSISTORS

Q100	Q200	D 2961-7	2N3859A
Q101	Q201	C 3578-9	MPSA93
Q102	Q202	C 3810-6	MPSA43
Q103	Q203	C 3786-8	PN4250
Q105	Q205	C 3578-9	MPSA93
Q106	Q206	C 3625-8	2N4125
Q107	Q207	C 3786-8	PN4250
Q108	Q208	C 5891-4	MTS105
Q109	Q209	D 2961-7	2N3859A
Q110	Q210	C 3810-6	MPSA43
Q112	Q212	C 3625-8	2N4125
Q113	Q213	C 3625-8	2N4125
Q115	Q215	D 2962-5	MPS8097
Q116	Q216	C 3786-8	PN4250
Q117	Q217	D 2961-7	2N3859A
Q118	Q218	D 2961-7	2N3859A
Q119	Q219	C 3625-8	2N4125
Q120	Q220	C 3625-8	2N4125
Q123	Q223	C 7458-0	2N4123
Q124	Q224	C 3625-8	2N4125
Q125	Q225	C 3786-8	PN4250
Q126	Q226	C 5891-4	MTS105
Q127	Q227	C 3625-8	2N4125
Q128	Q228	C 7458-0	2N4123
Q129	Q229	C 3625-8	2N4125
Q130	Q230	C 7458-0	2N4123
Q131	Q231	C 3625-8	2N4125
Q132	Q232	C 3625-8	2N4125
Q133	Q233	C 3625-8	2N4125
Q134	Q234	C 3625-8	2N4125
Q135	Q235	C 7458-0	2N4123
Q136	Q236	C 7458-0	2N4123
Q137	Q237	C 3625-8	2N4125
Q138	Q238	C 3810-6	MPSA42
Q139	Q239	C 3578-9	MPSA93

RESISTORS

R1		A10265-53621	53.6K 1%
R2		C 7340-0	24 5W
R3		C 7340-0	24 5W
R4		A10265-46421	46.4K 1%
R5		C 3617-5	3.3K 1W
R7		A10266-4331	43K
R8		A10265-75021	75K 1%
R10		OPEN	
R11		OPEN	
R12		OPEN	
R17		A10265-75021	75K 1%
R18		A10266-4331	43K
R100	R200	C 7409-3	5K Linear Pot
R101	R201	A10265-49911	4.99K 1%
R102	R202	A10266-5111	510
R103	R203	A10265-10031	100K 1%
R104	R204	A10266-2721	2.7K
R105	R205	A10266-2721	2.7K
R106	R206	A10266-1231	12K
R107	R207	A10266-6831	68K
R108	R208	A10265-80601	806
R109	R209	A10266-5601	56
R110	R210	A10266-6831	68K
R111	R211	A10266-1231	12K
R112	R212	OPEN	
R113	R213	A10266-4721	4.7K
R114	R214	OPEN	
R115	R215	OPEN	
R116	R216	OPEN	
R117	R217	OPEN	
R118	R218	A10265-28701	287 1%
R119	R219	A10265-71501	715 1%
R120	R220	A10265-28701	287 1%
R121	R221	C 5062-2	100K Pot
R122	R222	A10266-2741	270K
R123	R223	A10266-2732	27K .5W
R124	R224	A10266-6821	6.8K
R125	R225	C 8836-6	100 .5W FP
R126	R226	C 8836-6	100 .5W FP
R127	R227	A10266-6821	6.8K
R128	R228	A10266-1331	13K
R129	R229	A10265-10031	100K 1%
R130	R230	A10265-10031	100K 1%
R131	R231	A10266-1331	13K
R132	R232	C 5062-2	100K Pot
R133	R233	A10266-2741	270K
R134	R234	A10266-2732	27K .5W
R135	R235	C 8836-6	100 .5W FP
R136	R236	A10266-6821	6.8K
R137	R237	C 8836-6	100 .5W FP
R138	R238	A10266-6821	6.8K
R139	R239	A10265-80601	806 1%
R140	R240	A10266-5601	56
R141	R241	A10266-1541	150K
R142	R242	A10266-1541	150K
R143	R243	A10266-4711	470
R144	R244	A10266-4711	470

Q43400-3 Main Module Parts List Cont. (D 8827-4)

R145	R245	A10266-4711	470
R146	R246	A10266-1231	12K
R147	R247	C 8836-6	100 .5W FP
R148	R248	A10266-2721	2.7K
R149	R249	C 8836-6	100 .5W FP
R150	R250	A10266-2721	2.7K
R151	R251	A10266-1231	12K
R152	R252	A10265-11521	11.5K 1%
R153	R253	A10124-24	JUMPER
R154	R254	A10266-5601	56
R155	R255	A10266-1321	1.3K
R156	R256	A10266-1321	1.3K
R157	R257	A10266-1321	1.3K
R158	R258	A10265-11321	11.3K
R159	R259	A10265-10011	1K 1%
R160	R260	A10266-5601	56
R161	R261	A10266-4701	47
R162	R262	A10266-4701	47
R163	R263	C10166-4	56 FP
R164	R264	A10266-4711	470
R165	R265	A10266-4711	470
R166	R266	A10266-4711	470
R167	R267	A10265-10011	1K 1%
R168	R268	A10265-10011	1K 1%
R169	R269	OPEN	
R170	R270	A10265-10011	1K 1%
R171	R271	A10265-10011	1K 1%
R172	R272	OPEN	
R173	R273	C10166-4	56 FP
R174	R274	A10265-24921	24.9K 1%
R175	R275	A10265-80611	8.06K 1%
R176	R276	A10265-24921	24.9K 1%
R177	R277	A10265-20021	20.0K 1%
R179	R279	A10266-1321	1.3K
R180	R280	A10266-4711	470
R181	R281	A10266-4721	4.7K
R182	R282	A10266-2201	22
R184	R284	A10266-4741	470K
R186	R286	A10266-2751	2.7M
R187	R287	A10266-3321	3.3K
R188	R288	A10266-3321	3.3K
R189	R289	A10266-2731	27K
R190	R290	A10266-2051	2M
R193	R293	A10266-1031	10K
R194	R294	A10265-10031	100K 1%
R195	R295	A10266-3021	3K
R196	R296	A10266-4721	4.7K
R197	R297	A10265-10021	10K 1%
R198	R298	A10266-4721	4.7K
R199	R299	A10265-10021	10K 1%
R300	R400	A10265-10031	100K 1%
R301	R401	A10265-10031	100K 1%
R911	R1011	A10266-1521	1.5K
R912	R1012	A10266-4711	470
R913	R1013	A10266-1041	100K
R914	R1014	OPEN	
R915	R1015	A10266-2201	22
R916	R1016	A10266-2201	22
R917	R1017	A10266-10021	10K
R918	R1018	A10266-10021	10K
R919	R1019	A10266-10021	10K
R920	R1020	A10266-10021	10K
R921	R1021	C 9079-2	200 Pot
R922	R1022	A10265-71501	715 1%
R923	R1023	A10265-35711	3.57K 1%
R924	R1024	A10266-5111	510
R925	R1025	A10266-1041	100K
R926	R1026	A10266-5111	510
R927	R1027	A10266-1041	100K
R928	R1028	A10265-35711	3.57K 1%
R929	R1029	A10266-1241	120K
R930	R1030	A10266-1241	120K
R931	R1031	A10266-3921	3.9K
R932	R1032	A10266-1031	10K
R933	R1033	A10266-4731	47K
R934	R1034	A10266-1031	10K
R935	R1035	A10266-4731	47K
R936	R1036	A10266-1031	10K
R937	R1037	A10266-1031	10K
R938	R1038	A10266-1031	10K
R939	R1039	A10266-4731	47K
R940	R1040	A10266-4731	47K
R941	R1041	A10266-4731	47K
R942	R1042	A10266-4731	47K
R943	R1043	A10266-1031	10K
R944	R1044	A10266-1031	10K
R945	R1045	A10266-4701	47
R946	R1046	A10266-2031	20K
R947	R1074	A10266-2031	20K

SWITCHES

S2	C 7325-1	Ground Lift
S3	C 7960-5	Sensitivity
S4	C 6781-6	Stereo/Mono

HEADERS

TP1	TP2	C 6564-6	HDR

INTEGRATED CIRCUITS

U1		C 5095-2	UA7815
U2		C 5096-0	UA7915
U100	U200	C 6911-9	UPA75
U101	U201	C 6411-0	H11C2

Q43400-3 Main Module Parts List Cont. (D 8827-4)

U102	U202	C 4345-2	LM339
U103	U203	C 6910-1	UPA76
U104	U204	C 7558-7	MC33079P
U100A	U200A	OPEN	
U103A	U203A	OPEN	

MISCELLANEOUS

Board		D 8827-4	
Socket		C 3450-1	14 Pin, (2)
HW9-10		C 9494-3	TO-220, (2)
HW11-15		C 9944-7	Spacer, (5)
J1		C 7593-4	5 Pin HDR
J2		OPEN	
J11		C 7526-4	3 Pin HDR
J12		C 7873-0	2 Pin HDR
J100	J200	C 6777-4	Input, Ph Jk
Cover		C 6778-2	Ph Jk CVR
J101	J201	OPEN	
J500	J800	D 8681-5	Ribbon, 10"
J600	J700	D 8680-7	Ribbon, 6"
HW5-8		C 8812-7	5.5" Tie, (4)
Z6		C 5868-2	0 Ohm Jmp

REVISION HISTORY									
E.C.N.	ZONE	REV	DESCRIPTION	DATE	APPROVED			
					DWN	CHK	CM	PE
95-212	A		C102,C202,C109,C209 WERE 100MF	05/04/95	LCD			TS
96-110	B		REVISED NOTE 15 Q43400-3 WAS REV.A	02/00/96	TLM			TS
00N0092	C		CHANGE Q109,125 TO C 7458-0. CHANGE R189 TO 3.3K. CHANGE U100 TO 101374-1. CHANGE U103 TO 101375-1.	02/00/00	JAW	DLM	KZ	LB

BALANCED TO UNBALANCED INPUT STAGE

GAIN STAGE

LEVEL

LAST VOLTAGE AMP

OUTPUT BOARD

HIGH-SIDE NPN DRIVER AND OUTPUT

LOW-SIDE NPN DRIVER AND OUTPUT

PRE-DRIVER

LOW-SIDE ERROR AMP

VOLTAGE TRANSLATOR STAGE

HIGH-SIDE ERROR AMP

ODEP

PRE-DRIVER

HIGH-SIDE PNP DRIVER AND OUTPUT

LOW-SIDE PNP DRIVER AND OUTPUT

REAR PANEL OUTPUT

BIAS STRING

FAULT CIRCUIT

DELAY

DC/LF PROTECT

UNUSED ELEMENT

PB3/1400CSL AMPLIFIER IDENTIFIER RESISTOR

STEREO-MONO SWITCH (S4)

INACTIVE
For Reference Use Only

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DISTRIBUTION		
G		

FILENAME: J0693-2_C.SCM

TOLERANCE UNLESS OTHERWISE SPECIFIED
.00 = ±.02"
.000 = ±.010"
DRILLS = ±.003"

DO NOT SCALE DRAWING

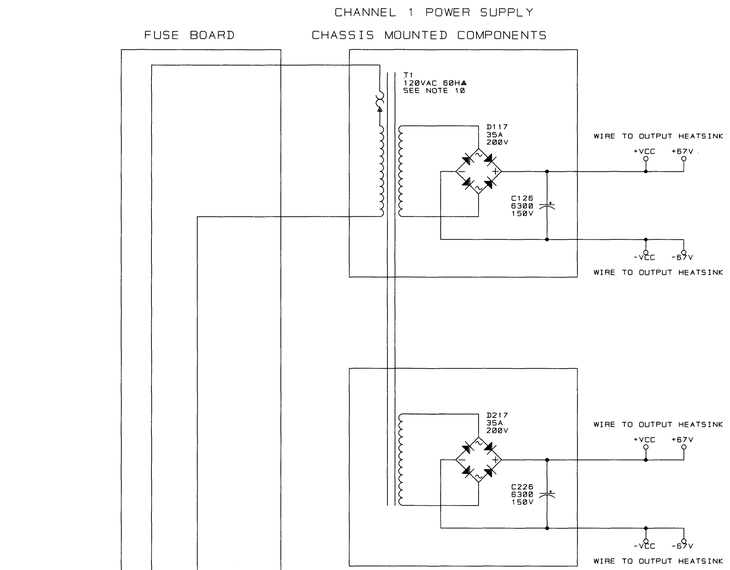
DWN	TLM	05/03/95
CHK		
CM		
PE	TS	05/04/95

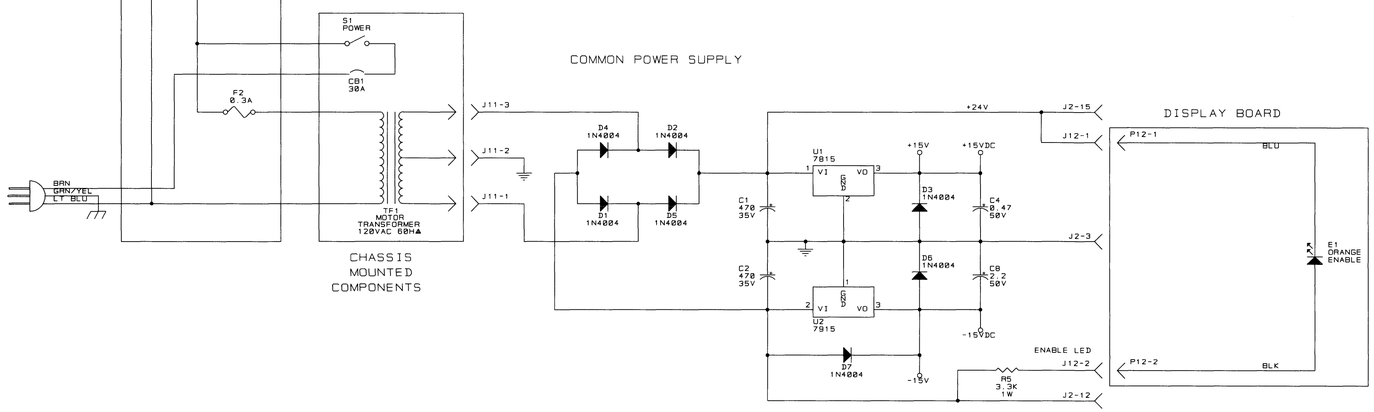
CROWN INTERNATIONAL, INC.
1718 W. MISHAWAKA RD.
ELKHART IN. 46517
PHONE(219)294-8000
WWW.CROWNINTL.COM

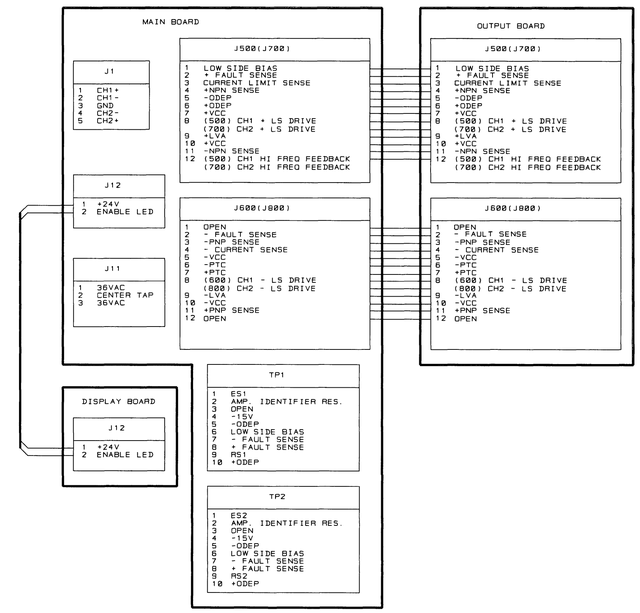
TITLE: SCH, PB3/1400CSL MAIN

SIZE: D | DWG NO.: J0693-2 | REV: C

SCALE: NONE | PROJ NO.: MD33850 | SHEET 1 OF 2







NOTES :

1. ALL RESISTORS ARE IN OHMS, 1/4W, 5% UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
3. VALUES SELECTED AS NEEDED FOR DIFFERENT OP AMP CHARACTERISTICS.
4. CHANNEL 2 IS SHOWN ON SHEET 3. WHEN SHEET 3 IS NOT PRINTED, THEN FOR CHANNEL 2 ADD 100 TO REFERENCE DESIGNATORS. (EXAMPLE : CHANNEL 1 R101 WOULD BE CHANNEL 2 R201.) CONNECTOR AND IC PIN NUMBERS FOR CHANNEL 2 ARE SHOWN IN PARENTHESIS WHEN THEY DIFFER FROM CHANNEL 1. EXCEPTIONS ARE CHAN 1 R2 CORRESPONDS TO CHAN 2 R3, CHAN 1 C5 CORRESPONDS TO CHAN 2 C6, CHAN 1 J500 CORRESPONDS TO CHAN 2 J700, AND CHAN 1 J600 CORRESPONDS TO CHAN 2 J800.
5. ALL DIODES ARE 1N4148 UNLESS OTHERWISE SPECIFIED.
6. ON J500 AND J700 THE STRIPED WIRE GOES TO PIN 10 OF THE BOARD AND THE PIN NUMBERS MOLDED ON THE CABLE SOCKET ARE REVERSED FROM THE PIN NUMBERS ON THE BOARD AND THE SCHEMATIC.
7. STANDARD UNIT HAS R10 OPEN. INSTALL JUMPER IN R10 TO DISABLE CHANNEL 2 IOC LIGHT IN PARALLEL MONO MODE.
8. POWER SUPPLY VOLTAGES SHOWN UNDER NO LOAD/NO SIGNAL CONDITIONS.
9. CHANNEL 2 PRE-DRIVER BASES LOOP THROUGH STEREO-MONO SWITCH S100, SECTIONS E AND F.
10. T1 INCLUDES AN INTERNAL THERMAL SWITCH.
11. R330 VALUE DEPENDS ON GRADE OF SENSOR S100 AS FOLLOWS:

GRADE OF SENSOR S100	VALUE OF RESISTOR R330
BLUE	107 OHM 1% 0.25W
GREEN	102 OHM 1% 0.25W
YELLOW	100 OHM 1% 0.25W

12. J2 IS LEFT EMPTY.
13. ALTERNATE 1/4W 1% RESISTORS ARE DESIGNATED AS N101A, N101B ETC.
14. NEC COMPONENTS ARE SHOWN. ALTERNATE TOSHIBA PARTS ARE:
    NPN P/N 2SC3381
    PNP P/N 2SA1349
15. SCHEMATIC APPLIES TO AMPLIFIERS USING MAIN BOARD D8827-4 / MODULE Q43400-3 REV.B AND OUTPUT BOARD P18429-2 / MODULE Q43339-3 (REV A).

INACTIVE
For Reference Use Only

SIZE	DWG NO.	REV
D	J0693-2	C
SCALE NONE	PROJ NO. MD33850	SHEET 2 OF 2

EAT #	ZONE	REV	DESCRIPTION	DATE	BY	APPROVALS CK	ME	EE	PE
94-195		(B)	REMOVED C120	12/07/94	TLM				EB
94-206		(C)	R177 AND R277 WERE 18.2K.	12/28/94	TLM				TB
95-111		(D)	R175 & R275 WERE 7.68K. R177 & R277 WERE 19.1K.	01/18/95	TLM				bjs

BALANCED TO UNBALANCED INPUT STAGE

GAIN STAGE

LEVEL

CHANNEL 1

SEE NOTE 3

GAIN

LAST VOLTAGE AMP

OUTPUT BOARD

HIGH-SIDE NPN DRIVER AND OUTPUT

LOW-SIDE NPN DRIVER AND OUTPUT

PRE-DRIVER

REAR PANEL OUTPUT

RED BLACK

HIGH-SIDE ERROR AMP

VOLTAGE TRANSLATOR STAGE

BIAS STRING

LOW-SIDE ERROR AMP

HIGH SIDE BIAS

LOW SIDE BIAS

ODEP

CH1 FB

PRE-DRIVER

HIGH-SIDE PNP DRIVER AND OUTPUT

LOW-SIDE PNP DRIVER AND OUTPUT

FAULT CIRCUIT

DELAY

DC/LF PROTECT

UNUSED ELEMENT

OUTPUT HEATSINK

STEREO-MONO SWITCH (S4)

PARALLEL
STEREO
BRIDGE

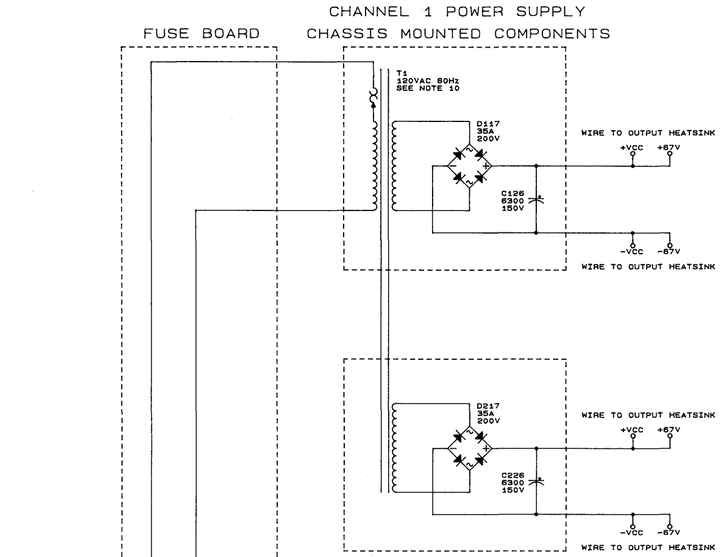
PRINTS TO	
G	

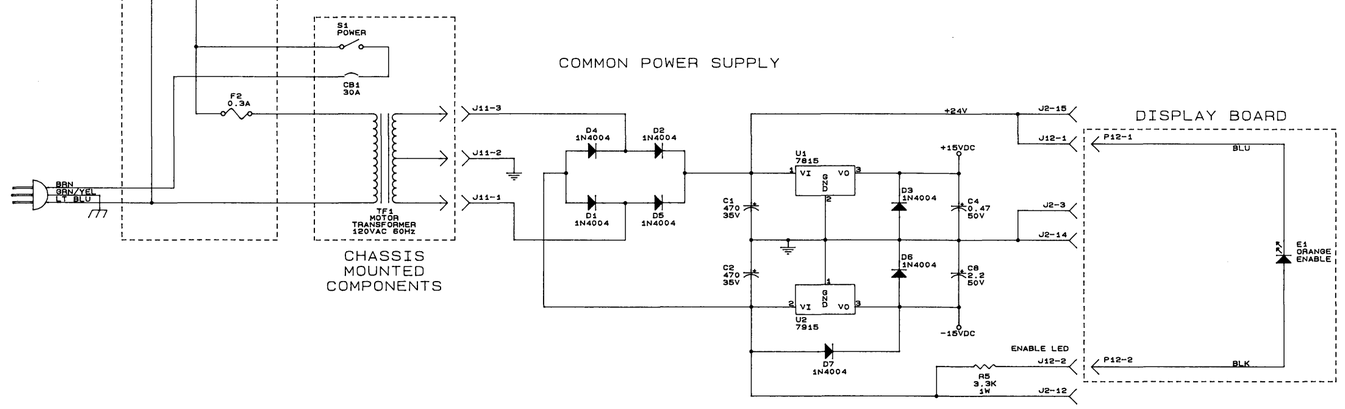
CROWN INTERNATIONAL, INC.

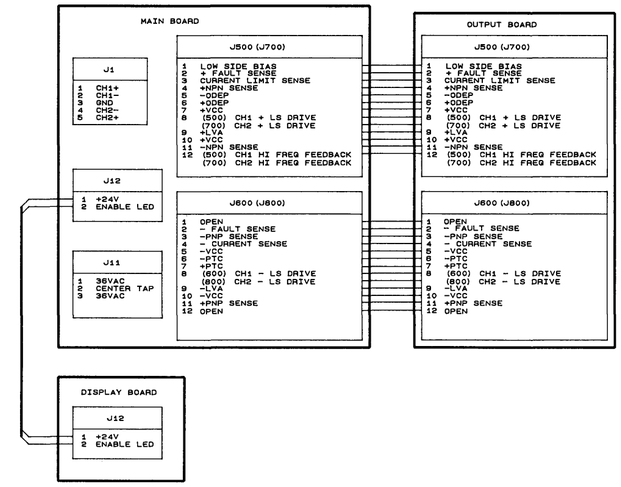
1718 WEST MISHAWAKA ROAD ELKHART, IN. 46517 PHONE (219) 294-8000

SCHEMATIC; PB3/1400CSL MAIN

DRAWN	LCD	07/21/94	APPROVED BY :			DO NOT SCALE PRINT
CHECKED			ME			SUPERSEDES J0659-3 REV.C
SCALE	NONE		EE			E.C.N. EAT# 95-111
PROJ #	D338		PE	EB	09/14/94	C.P.N. SHEET 1 OF 2
NEXT ASSEMBLY						J0659-3 REV (D)







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PRINTS TO

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SCHEMATIC; PB3/1400CSL MAIN

DRAWN	LCD	07/21/94	APPROVED BY :			DO NOT SCALE PRINT
CHECKED			ME			SUPERSEDES J0659-3 REV.C
SCALE	NONE		EE			E.C.N. EAT# 95-111
PROJ #	D338		PE	EB	09/14/94	C.P.N. SHEET 2 OF 2
NEXT ASSEMBLY						J0659-3 REV D