

# CARVER

P R O F E S S I O N A L

## MODEL PM-120 Magnetic-Field Power Amplifier

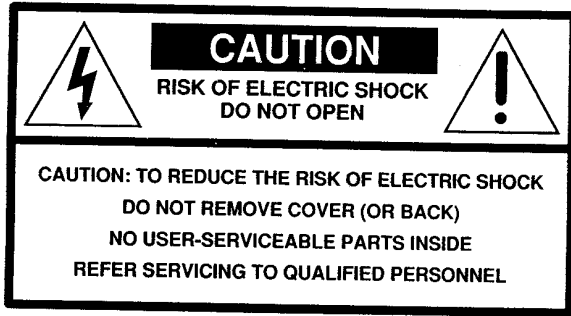
### Owner's Manual

**IMPORTANT NOTICE**  
*Please read carefully!*

This amplifier was originally manufactured by Carver Corporation. There are references contained within this manual to addresses and telephone numbers that should no longer be used to obtain technical support or factory service.

For any assistance with this product please contact:

**Carver Professional**  
A Division of Phoenix Gold International, Inc.  
9300 North Decatur  
Portland, Oregon 97203  
Tel. 503.978.3344  
Fax 503.978.3302



## Safety Instructions

1. Read Instructions — All the safety and operation instructions should be read before the Carver Component is operated.
2. Retain Instructions — The safety and operating instructions should be kept for future reference.
3. Heed Warnings — All warnings on the Component and in these operating instructions should be followed.
4. Follow Instructions — All operating and other instructions should be followed.
5. Water and Moisture — The Component should not be used near water - for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.
6. Ventilation — The Component should be situated so that its location or position does not interfere with its proper ventilation. For example, the Component should not be situated on a bed, sofa, rug, or similar surface that may block any ventilation openings; or placed in a built-in installation such as a bookcase or cabinet that may impede the flow of air through ventilation openings.
7. Heat — The Component should be situated away from heat sources such as radiators, or other devices which produce heat.
8. Power Sources — The Component should be connected to a power supply only of the type described in these operation instructions or as marked on the Component.
9. Power Cord Protection — Power-supply cords should be routed so that they are not likely to be walked upon or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit the Component.
10. Cleaning — The Component should be cleaned only as recommended in this manual.



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure, that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user of the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

11. Non-use Periods — The power cord of the Component should be unplugged from the outlet when unused for a long period of time.
12. Object and Liquid Entry — Care should be taken so that objects do not fall into and liquids are not spilled into the inside of the Component.
13. Damage Requiring Service — The Component should be serviced only by qualified service personnel when:
  - A. The power-supply cord or the plug has been damaged; or
  - B. Objects have fallen, or liquid has spilled into the Component; or
  - C. The Component has been exposed to rain; or
  - D. The Component does not appear to operate normally or exhibits a marked change in performance; or
  - E. The Component has been dropped, or its cabinet damaged.
14. Servicing — The user should not attempt to service the Component beyond those means described in this operating manual. All other servicing should be referred to qualified service personnel.

## PORTABLE CART WARNING



Carts and stands - The Component should be used only with a cart or stand that is recommended by the manufacturer. A Component and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the Component and cart combination to overturn.

15. To prevent electric shock, do not use this polarized plug with an extension cord, receptacle or other outlet unless the blades can be fully inserted to prevent blade exposure.

Pour prévenir les chocs électriques ne pas utiliser cette fiche polarisée avec un prolongateur, un prise de courant ou une autre sortie de courant, sauf si les lames peuvent être insérées à fond sans laisser aucune partie à découvert.

16. Grounding or Polarization - Precautions should be taken so that the grounding or polarization means of the Component is not defeated.

17. Internal/External Voltage Selectors — Internal or external line voltage selector switches, if any, should only be reset and re-equipped with a proper plug for alternate voltage by a qualified service technician. See an Authorized Carver Dealer for more information.

18. Attachment Plugs for Alternate Line Voltage (Dual voltage models only)— See your Authorized Carver Dealer for information on the attachment plug for alternate voltage use. This pertains to dual-voltage units only.

**WARNING** – To reduce the risk of fire or electric shock, do not expose this appliance to rain or moisture.

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## A Message from Bob Carver



Congratulations on the purchase of your professional PM-120 Amplifier. It represents the latest technology and is designed to provide both rugged output and studio-reference sound quality. Because of the specially-designed protection systems, you can be assured your valuable speakers and amplifier will be protected.

Its lightweight and rugged construction makes it ideal for touring and permanent installations. We are proud of our track record for excellent performance and proven reliability. The high quality standards Carver products provide are the quality that our customers have come to expect.

Bob Carver  
Chairman of the Board and  
VP Advanced Research

## 1. Introduction

### About This Manual

The manual is divided into the following sections:

**Introduction** — Introduces the PM-120 and describes the manual and the notational conventions used in the manual.

**Special Features** — Describes the features that make the PM-120 unique and lists the specifications.

**Front and Rear Panel Features** — Describes every knob, button, switch, and connector on the front and rear panels of the PM-120.

**Installation** — Covers all aspects of installation: mechanical, electrical, and thermal.

**Technical Information** — Describes the PM-120's circuit design. Includes schematic diagrams.

**In Case of Difficulty** — Describes what to do when the PM-120 won't operate.

**Warranty Information** — Tells what to do when you need to contact the factory for repair or repair parts.

### Notational Conventions

Several notational conventions are used in this manual. Some paragraphs may use **Note**, **Caution**, or **Warning** as a heading. These headings have the following meaning:

**Note** — Identifies information that needs extra emphasis. A Note generally supplies extra information to help you use the amplifier more effectively.

**Caution** — Identifies information that, if not heeded, may cause damage to the amplifier or other equipment in your system.

**Warning** — Identifies information that, if ignored, may be hazardous to your health or that of others.

## 2. Special Features

The PM-120 has two design features that set it apart from the competition:

- Clipping eliminator circuitry
- Protection circuitry

### Clipping Eliminator

In addition to sounding bad, clipped waveforms kill loudspeakers. This fact of life is made more true by the practice of using large amplifiers for increased headroom. When an amplifier clips, the output waveform contains large amounts of harmonics which extend both above and below the fundamental frequency. This can be potentially destructive to any high-frequency driver.

The clipping eliminator works by sensing any amplifier clipping and reducing the input signal level to limit the distortion in the output signal to less than one percent THD with up to 8 dB of overdrive. The action is similar to that of a limiter. The clipping eliminator is sensitive to clipping regardless of cause: excessive input drive, power line sag, low load impedances, etc.

### Protection Circuitry

The PM-120 has specially designed protection circuitry that protects the amplifier from abnormal load conditions, as well as protecting the load from an abnormal amplifier. The amplifier includes the following protective measures:

- Power line filtering.
- Amplifier protection from sustained current limiting caused by severe overdrive or abnormally low load impedances.
- Thermal overload protection.

The two yellow LED indicators in the output display are illuminated when the amplifier clips, or when the clipping-limiters are activated.

### Specifications

<b>Power Output</b> .....	<b>20-20kHz ..EIA</b>
8 ohms, both ch driven .....	40W ..... 55W
4 ohms, both ch driven .....	60W ..... 70W
8 ohms series mono .....	120W ... 130W
16 ohms series mono .....	80W ..... 100W

Note: 20-20kHz rating at 0.5% THD. EIA ratings are based on 1kHz sine wave, 0.5% THD.

<b>Specification</b> .....	<b>Value</b>
Frequency Bandwidth-3, +0 dB, @2Hz & 120kHz	
IM Distortion (SMPTE) .....	Less than 0.1%
Gain .....	21.5 dB
Input Sensitivity (full output) .....	1.5V RMS, +5.74 dBu
Input Impedance .....	30 Kilohms balanced, 15 Kilohms unbalanced
Input Overload .....	+15 dBu
Slew Rate .....	10V/ $\mu$ Sec
Damping Factor .....	100 @ 1 KHz
Output Noise (A weighted) .....	-95 dB, ref 28V output
Inputs (balanced, differential) .....	XLR, 1/4 inch tip-ring-sleeve phone jack, barrier strip terminals
Dimensions (HWD inches) .....	1.75 x 19 x 12 (13.25 overall), 1U rack space.
Weight .....	10 pounds
Power Requirements .....	200 Watts

## 3. Front and Rear Panel Features

### Front Panel

The following paragraphs describe the controls, switches, jacks, and displays found on the front panel of the PM-120. Refer to Figure 1.

**1. POWER switch.**

**2. LEFT and RIGHT level controls.** 11-step attenuators that adjust the relative output level of the PM-120. The amount of attenuation corresponds to the front-panel marking, in dB.

**3. PHONES jack.** A tip-ring-sleeve jack intended for use with stereo headphones. The tip connection of the jack connects to the left amplifier channel.

**4. LED Output Status Display.** The green LED indicates power-on. The yellow LEDs indicate the onset of clipping or the activation of the clipping-eliminator circuitry (if the clipping-eliminator switch is depressed). The yellow LEDs also indicate activation of the amplifier's protection circuits.

### Rear Panel

The following paragraphs describe the various rear panel features of the PM-120. Refer to Figure 2.

**1. INPUTS.** Barrier strip terminals, female XLR connectors and 1/4 inch tip-ring-sleeve phone jacks. These are the input connectors for the amplifier.

**2. PUSH MONO.** Pressing this switch sets the PM-120 for bridged-mono operation. Use this mode for 8 ohm or greater loads.

**3. PUSH CLIPPING ELIMINATOR.** Pressing this switch turns on the clipping eliminator circuit. In this mode, the amplifier output remains undistorted even when overdriven by up to 8 dB.

**4. AMPLIFIER/CHASSIS.** Removing this jumper isolates the amplifier's power supply ground from the amplifier chassis. This may be necessary to eliminate ground loops in some systems. The amplifier chassis is always connected to the safety ground (line plug ground or green wire) of the power cord. With the jumper removed, the amplifier's circuit ground is connected to the amplifier's chassis ground via a 27-kilohm resistor in parallel with a 0.1-mfd capacitor.

**5. LEFT/RIGHT.** 5-way binding posts used to connect the loudspeakers to the amplifier outputs. The red terminal is the signal connection, the black terminal is the signal return connection.

**6. FUSE.** AC power line fuse for the PM-120. Use only type MDQ 2, 2 ampere slow-blow. Repeated fuse blowing is a sign of internal distress. Have an authorized Carver service technician repair the amplifier.

**7. POWER CORD.** The PM-120 is available with 120 VAC North American Standard or 240V IEC Standard.

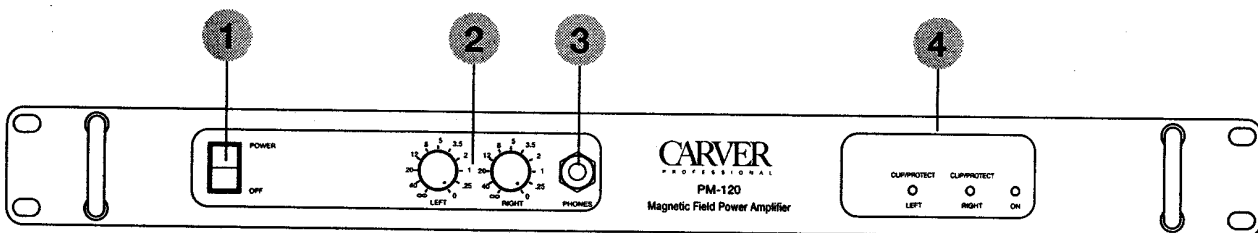


Fig. 1

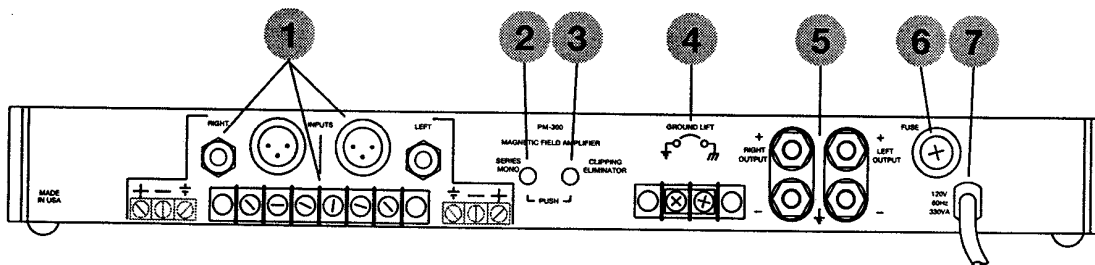


Fig. 2

## 4. Installation

The PM-120 may be used free-standing or installed inside a rack enclosure. Installation consists of the actual mechanical installation, and the electrical and thermal considerations needed. These considerations are detailed in the following paragraphs.

### Mechanical Considerations

The PM-120 requires one rack space (1.75 inches). The amplifier requires 13.25 inches depth inside the rack. Be sure to secure the unit mechanically using four screws. It is a good idea to use flat-washers with the screws to prevent marring the front panel. Be sure that there is sufficient air space at the sides of the amplifier for airflow around the heat sinks.

### Rear Support for Road Applications.

If the PM-120 is rack-mounted, and the rack transported, it is good practice to provide mechanical support for the rear of the amplifier. This could take the form of a shelf across the rear of the amplifier, or brackets that engage the rear of the unit. This practice is recommended for all rack-mounted electronic instruments; especially those that are large, heavy, or mechanically deep. Note: In most rack-mount applications, the rubber "feet" will need to be removed from the PM-120.

### Thermal Considerations

When the PM-120 is used free-standing, there are no thermal considerations to be made. If the PM-120 is rack mounted, ensure that adequate ventilation exists on each side of the amplifier. When several amplifiers are mounted together in a rack, you may need to provide air inlets from the outside of the rack. In most cases, convection cooling is sufficient. However, in high ambient temperatures, forced-air cooling may be needed.

PM-120s may be stacked directly on top of each other without spacer panels. However, if the amplifier is used with other amplifiers, you should ensure that the other amplifier's heat output doesn't become part of the PM-120's cold air supply. In this case, additional cooling (fans) may be required.

### AC Power Considerations

The PM-120 can operate from 120 VAC or 240 VAC, 50-60 Hz. Ensure that the amplifier is plugged into an outlet capable of supplying enough current to allow full-power operation of all the amplifiers plugged into it.

### Line Voltage Conversion

#### Caution

The line voltage conversion process requires soldering and the services of a competent technician. Please refer the unit to an authorized Carver Service Facility for conversion.

### Magnetic Flux Leakage Considerations

The PM-120 may be mounted without regard to any magnetic flux leakage (within reason). We recommend using a bit of common sense: it's not a good idea to mount any power amplifier near a microphone input transformer.

### I/O Wiring

The PM-120 has three types of input connections (in order of reliability): screw terminals, XLR female, and 1/4 inch tip-ring-sleeve phone jack. Use the connector most appropriate to your installation. For fixed installations, we recommend using the screw terminals with suitable crimp-on lugs attached to the wire.

In addition, a ground system strap allows isolating the amplifier circuit ground from the AC line safety ground (green wire). Isolating the grounds may be necessary in some installations to break a ground loop.

### XLR Connector Polarity (Pin 2 vs Pin 3)

The PM-120's XLR connector may be wired for either the DIN/ISO convention (pin 2 hot) or the American convention (pin 3 hot). An internal slide switch determines the configuration. The amplifier is supplied configured for pin 3 hot.

#### Note:

The XLR connector polarity does not affect the polarity of the phone jack or the screw terminals. All input connectors are connected in parallel; you can parallel the amplifier inputs by patching an unused input connector to its counterpart on the other channel.

# PM-120

## Changing XLR connector polarity (Pin 2 vs Pin 3)

Use the following procedure to change the polarity of the XLR connector.

1. Disconnect the amplifier from the source of AC power.
2. Remove the PM-120's outer cover.
3. Locate the polarity-setting slide switch directly behind the input sockets.
4. Set the switches.
5. Replace the outer cover.

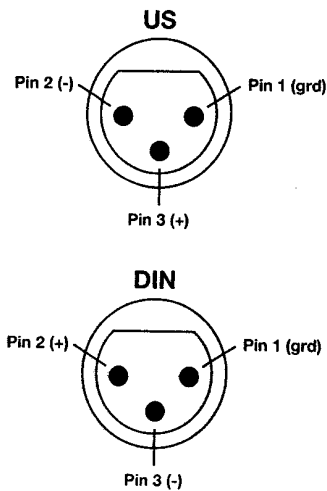


Fig. 3

## Output Connector Wiring

For stereo operation, use the red and black binding posts associated with each channel (see Figure 4 on the next page).

For bridged-mono operation, use both red binding posts (see Figure 5). The left-channel red post is the 'hot' side (non-inverting) and the right-channel red post is the 'low' side (inverting).

In either case, ensure that the total load impedance is not lower than that listed in the specifications for the mode of operation that you have selected.

## Ground Lift Strap

The ground lift strap is located on the rear chassis of the amplifier, near the speaker output binding posts. To break the link between the amplifier's circuit ground and the amplifier chassis, remove the metal link that connects the two terminals.

## Warning

For safety reasons, do not separate the ground systems unless absolutely necessary.

## Switch Settings

The PM-120 has two switches on the rear panel that control various aspects of its operation.

**Bridging Operation.** One switch, located on the rear panel of the PM-120, enables bridging mode for the amplifier.

For stereo operation, use the INPUT connectors and OUTPUT connectors associated with each channel. For bridged-mono operation, use the LEFT INPUT connector, and both red OUTPUT connections. The LEFT output is the signal (inverting) connection, the RIGHT output is the common (non-inverting) connection.

## Note

In bridged-mono operation, the output connections are actually a balanced output configuration. This means that neither output terminal may be grounded (both are "hot").

## Caution

If you use phone plugs for speaker cables, beware! When connected to a bridged-mono amplifier, the shell of the plug is 'hot' and could cause a nasty surprise if it comes in contact with something that is grounded.

**Clipping Eliminator.** The CLIPPING ELIMINATOR switch turns on the anti-clipping feature of the PM-120. When the switch is pressed, input signals that are large enough to drive the amplifier output past clipping are reduced enough to keep the amplifier from clipping. The clipping eliminator circuit keeps the amplifier output below one percent THD at up to 8 dB of overdrive.

## Note

If the input LEVEL control(s) are turned down far enough, a sufficiently large input signal could drive the input differential amplifier into clipping. Another possibility is that the mixer, equalizer, etc. that is driving the amplifier may not have sufficient output to overcome the loss introduced by the setting of the input LEVEL control(s). The CLIPPING ELIMINATOR switch has no effect on this cause of clipping.



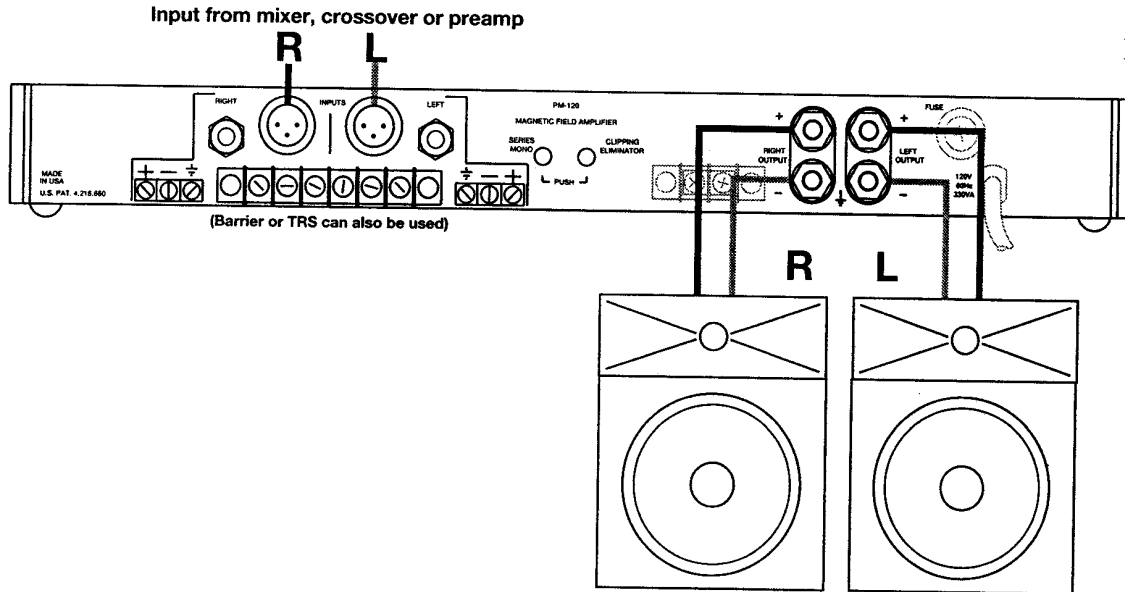
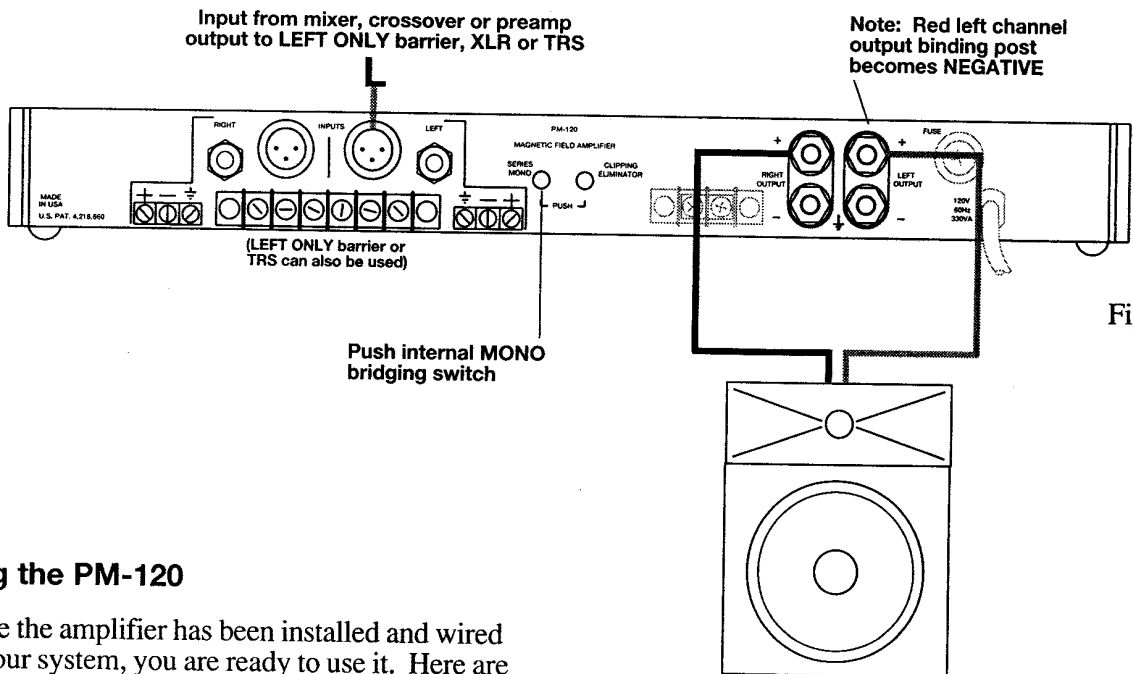


Fig. 4



## Using the PM-120

Once the amplifier has been installed and wired into your system, you are ready to use it. Here are some tips to help you get the most from your PM-120.

- Check the switch settings on the rear panel. Be sure that the mono-mode switch conforms to the actual mode that you want.
- Use the clipping-eliminator feature. It helps save your loudspeakers from damage.
- Be sure that the input LEVEL controls are set sufficiently high to allow the preceding device in your system to drive the amplifier to full output.

For most installations, the LEVEL controls are set fully clockwise.

- When you power the system up for the first time (out of the cartons), it's a good idea to start with all of the amplifier level controls off, then advance them slowly, one at a time, so that you can determine that each amplifier channel is operating normally.

- Once you have established settings, it is a good idea to mark them down, on paper, on pieces of tape, or sticky-dots attached to the amplifier's front panel.
- In bi-amplified (all multi-amp) systems, it is a good idea to start with the low-frequency amplifiers turned off or down, and to check each frequency range from highest to lowest to ensure that the proper loudspeaker components are reproducing it.
- You can use the PHONES jack to quickly check the amplifier during operation. Simply plug in a pair of headphones to listen to the amplifier output.

## 5. Technical Information

### Theory of Operation

This section discusses the theory of operation of the PM-120. For a better understanding of the circuitry involved, refer to the schematic diagrams presented later in this section. Op-amps used in the circuitry use the following notation: IC1(7). This means op-amp U1, whose output appears on pin 7. The majority of the following discussion applies to the left amplifier channel; the right channel is essentially identical.

### Low Level Circuit

Input signals enter the circuit through the rear-panel XLR connector, tip-ring-sleeve (TRS) phone jack, or screw terminal connections. S3 allows the polarity of the XLR connector to be configured for pin 3 hot (US standard) or pin 2 hot (DIN standard). As supplied from the factory, the PM-120 is configured for pin 3 hot. The switch setting does not affect the wiring of the TRS jack (tip = hot) or the screw terminal connections.

IC1(7) is configured as a unity-gain, differential amplifier driving the right-channel level control. R9, R14, and IC3 form an attenuator whose loss is dependent on the resistance of IC3, a LED-LDR module. The drive for the LED portion of IC3 comes from the clipping eliminator circuitry, which will be discussed later on. The signal then enters the mono-mode switching.

The PM-120 may be configured to operate as a conventional 2-channel, dual-mono amplifier, or a single-channel, mono amplifier with high-voltage output. The operational mode is determined by switch SW2. For now, assume that SW2 is set for 2-channel, dual-mono (stereo) operation.

### Power Amplifier Circuit

IC1(7) is the input stage, providing differential inputs for input and feedback connections as well as most of the open-loop voltage gain of the circuit. The output of IC1(7) drives Q9 and Q12, operating as emitter followers, that level-shift the drive signal and couple it to common-emitter amplifiers Q8 and Q6. Q8 and Q6 provide additional voltage gain, which when combined with the voltage gain of the

input op-amp is sufficient to swing the input signal between the +43 and -43 volt power supply rails. Q7 and Q12 are connected as a NPN-PNP conjugate pair and are used as a VBE multiplier for bias control. Q7 is thermally connected to the output transistors and together with Q12 provides bias stabilization over a wide temperature range. Overall negative feedback from the output stage via R20 and R16 sets the closed-loop gain at 12 (21.6dB).

The positive-going portion of the output stage is comprised of two series-connected emitter-followers (Q11, Q2). The negative-going portion of the output stage is exactly complementary to the positive-going portion; two series connected PNP darlington, emitter followers (Q13/Q3). The innermost pair (Q11 and Q13), are driven from the opposite sides of the VBE multiplier (Q7/Q12), which looks suspiciously like a full-complementary amplifier (it is exactly that). Q5 operates as a VI limiter, sensing the voltage drop across emitter resistor, R1, and reducing the drive signal going into the output stage under overload conditions. Q9 operates in similar fashion for the negative-portion of the output stage.

Returning to the LED/LDR opto-isolator, IC3, the LED portion of this component is driven from a bridge rectifier (D11/D12, D14/D16) that gets its input signal from IC1(1) on the main amplifier board. Under normal conditions (undistorted amplifier output) there is almost no signal at this point. If the amplifier is driven into clipping, the signal level at IC1(1) rises rapidly because the feedback signal no longer represents the input signal. Once this occurs, the LED in IC3 illuminates, reducing the input signal. The clipping-eliminator drive signal also drives the clipping indicator on the display board.

### Power Supply Circuitry

The main power supply for the PM-120 is a design that provides no-load voltages of +43 and -43 VDC. This is accomplished by T1, BR1, C7 and C8.

A separate zener regulated power supply (D1, D2, R4, R5, C6 and C5) provides +11.4 and -11.4 VDC for the op-amps and other circuitry.

The AC in-line thermal switches shut the amplifier off, should the heatsink temperature go above 100 degrees Centigrade.

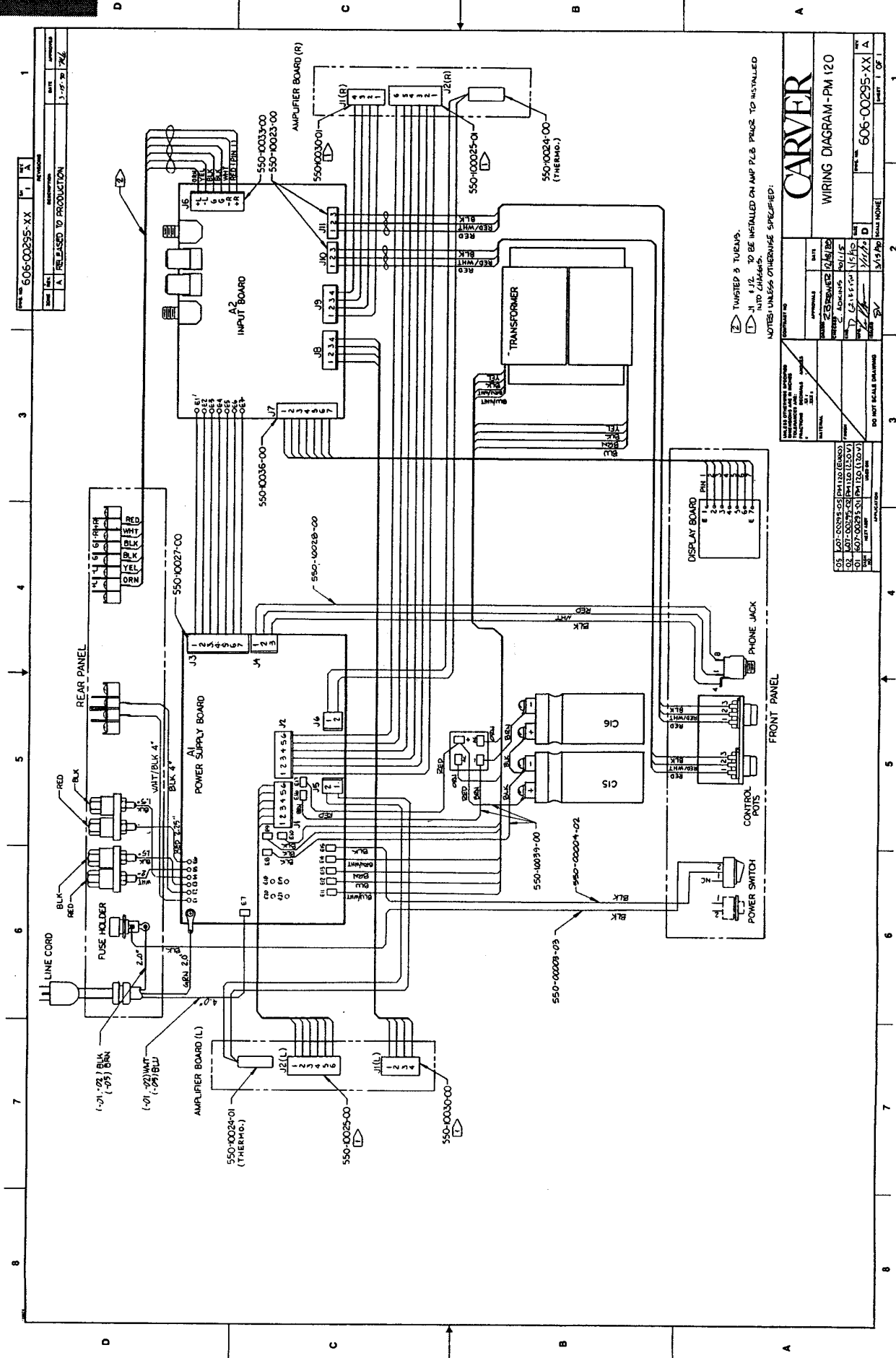
### Display Circuit

The Clip/Protect LEDs are turned on by the conduction of Q1/Q2 and Q3/Q4. These transistors are driven by the output voltage from IC1(1) and IC1(7) at clipping or by Q10 and Q3 when the positive current limiter transistor Q5 conducts.

The green "ON" LED current is supplied from the +11.4 and -11.4 VDC supply.

### Series Mono Circuit

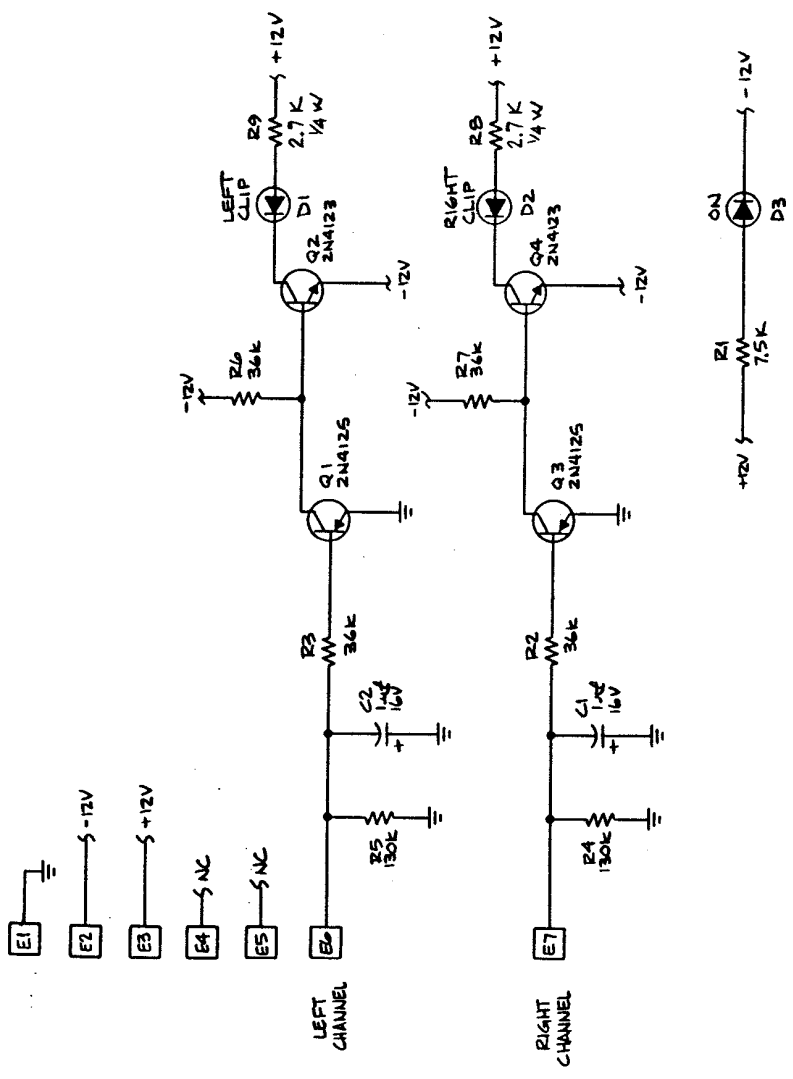
The Series mono switch inserts a 180 degree phase inversion stage, IC5(1), into the left channel. The series mono switch also connects the right channel to the non-inverting stage IC5(7). This allows both channels to be driven by the left channel output.



Z TWISTED 3 TURN. S.  
 T 1/2 TO BE INSTALLED ON AMP PLS. PRIOR TO INSTALLATION INTO CHASSIS.  
 NOTES: UNLESS OTHERWISE SPECIFIED:

<b>CARVER</b> WIRING DIAGRAM - PM 120	
PART NO. 606-00295-XX REV. A DATE 3-22-74	SHEET 1 OF 1
DESIGNED BY: J. J. ... DRAWN BY: J. J. ... CHECKED BY: J. J. ... APPROVED BY: J. J. ...	DO NOT SCALE DRAWING
ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED ARE IN INCHES AND DECIMALS THEREOF.	MATERIAL:

DWG. NO. 605-00413-00		REV. 1	REV. A
REVISIONS			
ZONE	REV.	DESCRIPTION	DATE
A		RELEASED TO PRODUCTION	1-15-90
			APPROVED
			<i>[Signature]</i>



2. ALL CAPACITOR VALUES ARE IN MICROFARADS, 5%.  
 1. ALL RESISTOR VALUES IN OHMS, 1/4W, 5%.

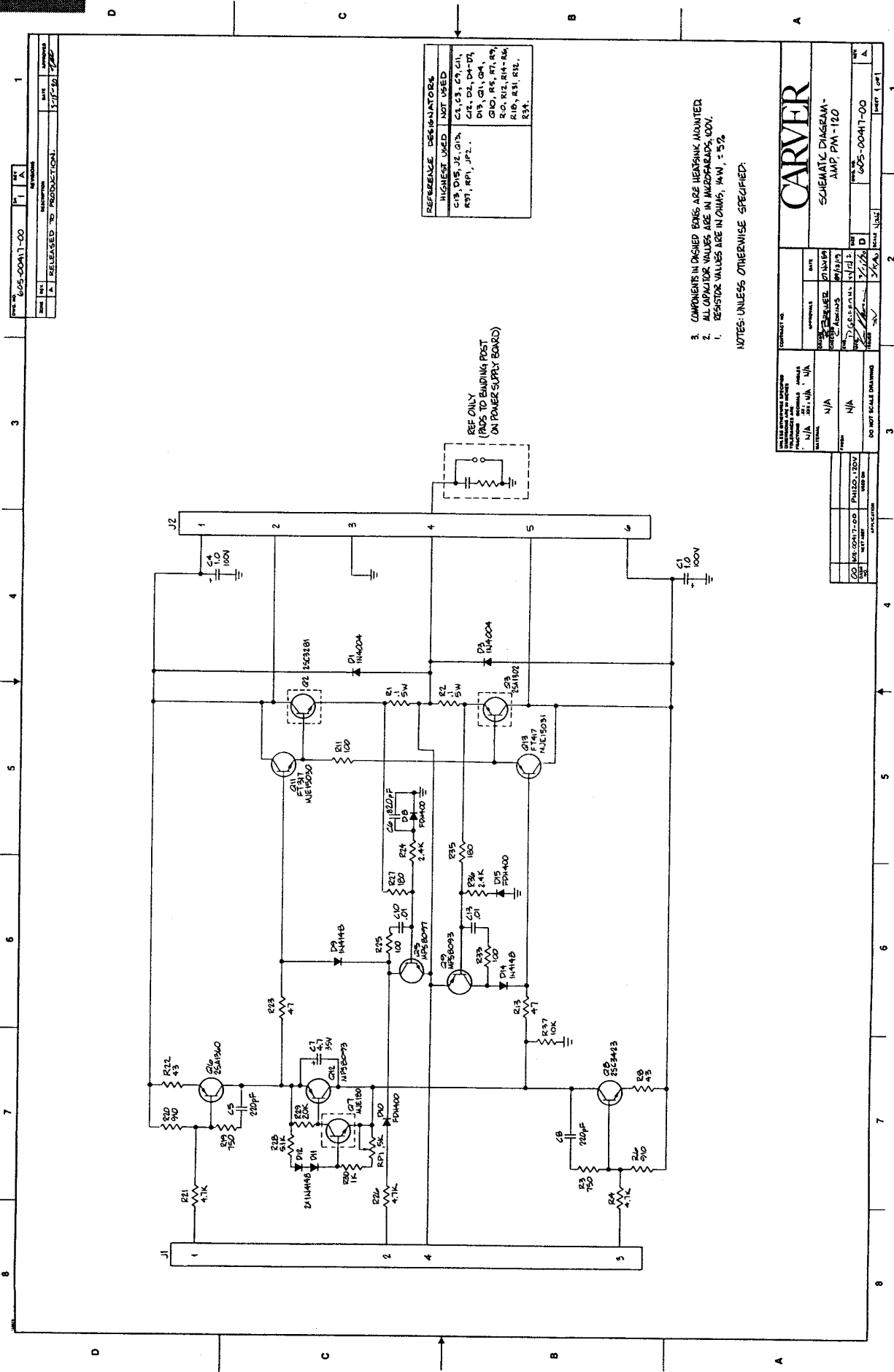
NOTES: UNLESS OTHERWISE SPECIFIED:

# PM-120

CONTRACT NO.		APPROVALS		DATE
		DESIGNED	TB	7-25-9
		CHECKED	[Signature]	8-7-99
		TESTED	SV	9/15/90
		DATE	12/21/91	C
		SCALE	3/16"	1
		DWG. NO.	605-00413-00	SHEET 1 OF 1
		PM120		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES	
FRACTIONS	DECIMALS
1/16"	.0625"
1/8"	.125"
1/4"	.250"
3/8"	.375"
1/2"	.500"
3/4"	.750"
1"	1.000"
MATERIAL	
FINISH	
PART NO.	USED ON
602-00413-00	PM 120
APPLICATION	
HERN ARMY	
DO NOT SCALE DRAWING	

605-00417-00 SMT 1  
Schematic AMP PM120



REFERENCE DESIGNATORS	HIGHEST USED	NOT USED
C1, C2, C3, C4, C5	C1, C2, C3, C4, C5	
D1, D2, D3, D4, D5	D1, D2, D3, D4, D5	
R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37	

- COMPONENTS IN DASHED BOXES ARE HEAT-SINK MOUNTED.
  - ALL CAPACITOR VALUES ARE IN MICROFARADS, 100V.
  - RESISTOR VALUES ARE IN OHMS, 1/4W, 5%.
- NOTES: UNLESS OTHERWISE SPECIFIED:

**CARVER**

SCHMATIC DIAGRAM -  
AMP PM-120

605-00417-00

DATE: 1/17/50

APPROVED: [Signature]

DESIGNED BY: [Signature]

CHECKED BY: [Signature]

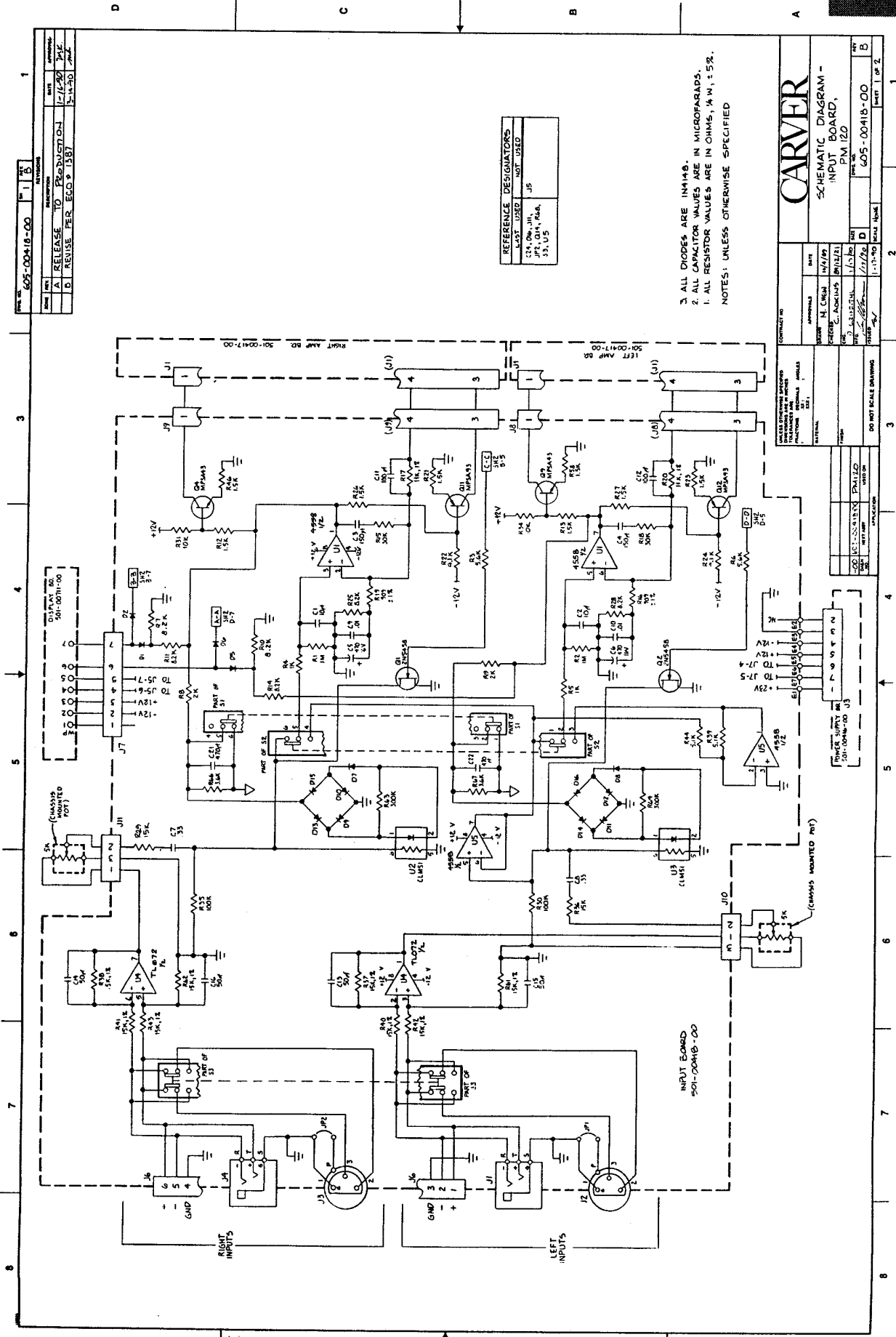
SCALE: 1:1

DO NOT SCALE DRAWING

DATE	605-00418-00	REV	1	BY	15
DESCRIPTION	SCHEMATIC	DATE		APPROVAL	
A	RELEASE TO PRODUCTION	1-17-90	PAK		
B	REVISE PER ECO 91587	5-14-90	PAK		

REFERENCE DESIGNATORS	
USED	NOT USED
U1, U2, U3, U4, U5	J5
J1, J2, J3, J4, J6, J7, J8	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100

3. ALL DIODES ARE 1N4148.
  2. ALL CAPACITOR VALUES ARE IN MICROFARADS.
  1. ALL RESISTOR VALUES ARE IN OHMS,  $\mu$ M,  $\pm 5\%$ .
- NOTES: UNLESS OTHERWISE SPECIFIED



**CARVER**

SCHEMATIC DIAGRAM -  
INPUT BOARD,  
PM-120

DATE	BY	CHKD
10/17/90	H. C. CHAMBERS	H. C. CHAMBERS
11/15/90	C. ADKINS	H. C. CHAMBERS
11/15/90	J. J. KELLEY	H. C. CHAMBERS
11/15/90	J. J. KELLEY	H. C. CHAMBERS

CONTROL NO.	501-00417-00
CONTRACT NO.	501-00417-00
REVISED BY	
REVISIONS	
DESCRIPTION	
DATE	
BY	
CHKD	

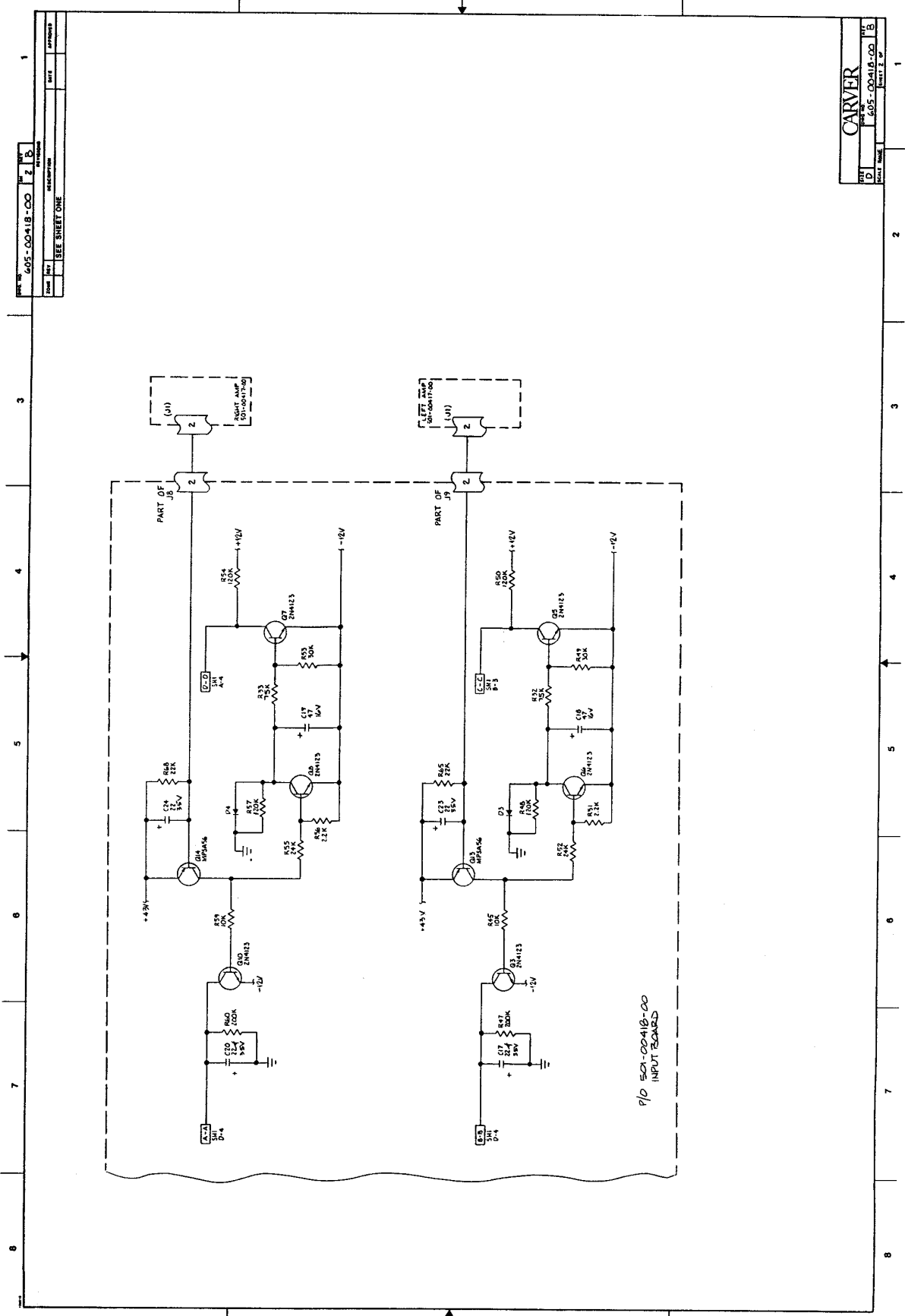
DO NOT SCALE DRAWING

SCALE	AS SHOWN
TOLERANCES	UNLESS OTHERWISE SPECIFIED
RESISTORS	5% UNLESS OTHERWISE SPECIFIED
CAPACITORS	5% UNLESS OTHERWISE SPECIFIED
DIODES	1N4148 UNLESS OTHERWISE SPECIFIED
IC'S	EXACTLY AS SHOWN

REV	DATE	DESCRIPTION
1	1-17-90	INITIAL DESIGN
2	5-14-90	REVISED PER ECO 91587
3	1-17-90	REVISED PER ECO 91587

# PM-120

605-00418-00 SHT 1 of 2  
SCHEMATIC DRAWING PM-120



REV. NO.	605-00418-00	Z	1
DATE			
DESCRIPTION	SEE SHEET ONE		

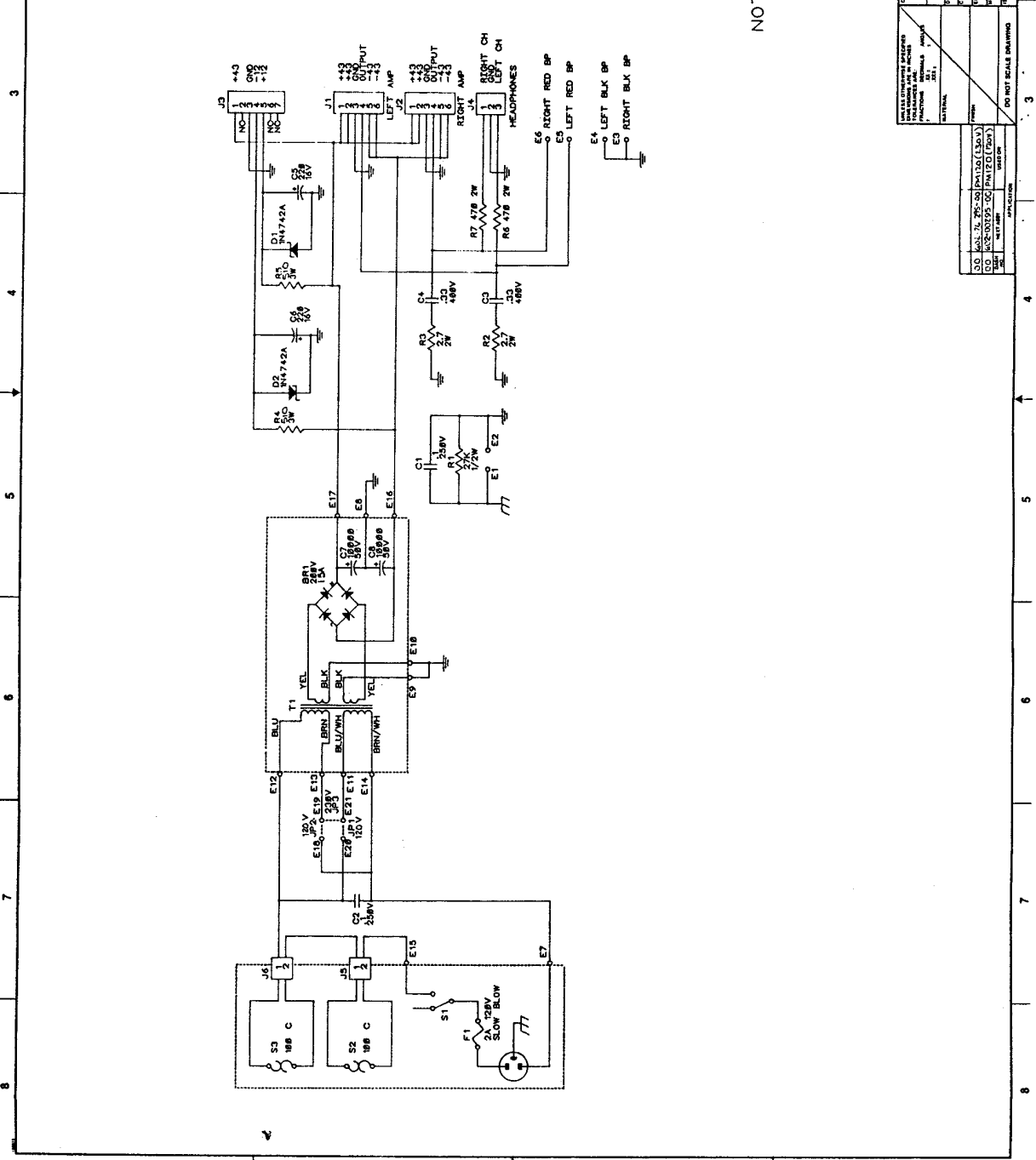
REV. NO.	605-00418-00	1	1
DATE			
DESCRIPTION	SEE SHEET ONE		

P/O 50-00418-00  
INPUT BOARD



# PM-120

605-00420-00	1	A
REV	REV	REV
A	RELEASED TO PRODUCTION	1.7.72



5. ALL COMPONENTS DRAWN INSIDE DASHED LINES ARE CHASSIS MOUNTED.
4. JAMPER (JP3) FROM E19 TO E21 ONLY IN 228V APPLICATIONS.
3. JAMPER (JP2) FROM E18 TO E19 AND (JP1) FROM E20 TO E21 ONLY IN 185V APPLICATIONS.
2. ALL CAPACITORS ARE IN MICROFARADS. SR.
1. ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%.  
NOTES: UNLESS OTHERWISE SPECIFIED

<b>CARVER</b> PM120 SCHEMATIC POWER SUPPLY	
CONTRACT NO. APPROVALS DESIGNED BY CHECKED BY DRAWN BY DATE	SHEET 12-20-59 8/16/59 1/1/59 1/1/59
DO NOT SCALE DRAWING	
U.O. 605-00420-00 (330 V) U.O. 605-00420-00 (PM120) (200 V) U.O. 605-00420-00 (PM120) (100 V)	APPLICATION 1 OF 1

## 6. In Case of Difficulty

If the PM-120 fails to operate, here is a list of things to check before contacting an Authorized Carver Service Center (or the factory).

### No lights, no sound

No lights, no sound is usually a power supply problem (either the power line itself, or the amplifier's power supply).

- Is the amplifier plugged in?
- Is the fuse okay?
- Is the power switch set to ON?
- Has the amplifier overheated?

### Low Output or No Output

Low or no output problems are usually signal-source, bad cable, or partial-output short circuit problems.

- Are the input LEVEL controls set to their normal settings?
- Move the input connections to another amplifier that you know is working to verify that it is not a source problem.
- Check the speaker connections. Be sure that there are no small strands of wire touching similar strands coming from the other wire in the cable. If you use banana plugs, be sure that the setscrews in the plug are securely tightened.
- Are the speakers okay?
- Check the setting of the SERIES/MONO switch. Verify that they are set properly. The mono modes use only the LEFT input connector.

### Distortion

Distortion is usually caused by excessive loss in the input controls (the mixer/equalizer/crossover can't produce enough output), overdriving resulting in output clipping, or current limiting caused by excessively low load impedances.

- Check the setting of the input level controls. If set too low, the preceding piece of equipment may not have sufficient output to overcome the loss. This is especially possible if you hear

distortion, but the yellow PROTECTION LED(s) are not illuminated.

- If the yellow PROTECTION LED(s) are illuminated, check the speaker connections; verify that any setscrews are tight and that there are no stray strands of wire to cause short circuits.
- Verify that the total load impedance presented to the amplifier is within the limits described in this manual for the mode of operation selected.

### Protection LEDs Illuminated

The protection LEDs respond to sustained clipping, overheating, current limiting, or activation of the clipping-eliminator (if the clipping-eliminator switch is depressed).

- Check speaker cables for shorts (also tank tops).
- Are the speakers okay?
- Are you driving the amplifier into sustained clipping?

## 7. Warranty Information

Note:

Fill out and mail the WARRANTY REGISTRATION CARD which is enclosed in a separate envelope with the CARVER LIMITED WARRANTY.

If your CARVER product should require service, we suggest you contact the Dealer from whom you purchased your unit. Should the Dealer be unable to take care of your needs, you may contact CARVER Customer Service Department by phoning (206) 775-6245, or by writing to us at the Factory address given below. We will then direct you to one of our National network of factory trained and authorized Warranty Service Centers, or give you detailed instructions on returning the product to us for prompt appropriate action.

We suggest you read the LIMITED WARRANTY completely to fully understand what your warranty/service coverage is, and the duration. You must promptly complete and return the

WARRANTY REGISTRATION CARD to validate your LIMITED WARRANTY.

If you should have questions or comments, please write to the Factory address given below. Please include the model and serial number of your Carver product, your complete address, and a daytime phone number.

### Factory Address

Carver Corporation  
Service Department  
P.O. Box 1237  
Lynnwood Washington, 98046  
(206) 775-6245

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Pub #900417-A, Part #990-20081-00, Printed in USA

Magnetic Field technology protected under US Patent 4,218,660

**CARVER**

P R O F E S S I O N A L