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# CARVER

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

**PM-350**

**MAGNETIC FIELD POWER AMPLIFIER**

**SERVICE MANUAL**

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# CARVER Corporation

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**SHIP TO:**

20121 48th Ave. West  
Lynnwood Wa. 98036  
(206) 775-6245

**MAIL TO:**

P.O. Box 1237  
Lynnwood Wa. 98046-1237

**Published by:**

CARVER Corporation  
20121 48th Avenue West  
Lynnwood, WA 98036  
(206) 775-6245

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# SECTION 1

## SAFETY INFORMATION

### WARNING.

Any person performing the procedures described in this manual will be exposed to hazardous voltages and the risk of electric shock.

Carver Corporation assumes that any person who removes the cover from the unit has been properly trained in protecting against avoidable injury and shock.

Therefore, the procedures described here are to be performed by qualified electronics service personnel only.

We recommend that the unit be tested only when line isolation is provided by an isolation transformer. The line cord of the unit must be disconnected and the power supply fully discharged before any components are replaced. Failure to do so may result in severe damage to the unit and the risk of electric shock.

The safety tests described below must be performed properly.

### CAUTION:

Before returning the unit to the customer, one of the following safety tests must be performed.

1. Check the leakage current. Connect the unit to 120 VAC supply and turn the power switch "ON". Using an ammeter, measure the current between the neutral side of the AC supply and chassis ground of the unit under test. If leakage current exceeds 0.5mA, the unit is defective.

Reverse the polarity of the AC supply and repeat.

2. Measure the resistance from either side of the linecord to chassis ground. If it is less than 500k ohms, the unit is defective.

**WARNING - DO NOT** return the unit to the customer if it fails one of these tests until the problem is located and corrected.

### CAUTION

	<b>CAUTION</b> RISK OF ELECTRIC SHOCK DO NOT OPEN	
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK DO NOT REMOVE COVER (OR BACK) NO USER-SERVICEABLE PARTS INSIDE REFER SERVICING TO QUALIFIED PERSONNEL		



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.

## SECTION 2

### INTRODUCTION

This manual is intended for use by qualified, authorized personnel only.

Due to the unique and complex circuit designs of Carver Corporation, the following procedure is recommended to diagnose & repair problems with speed and accuracy.

The best way to figure out what is wrong is to learn what is working properly first. Then, through the process of elimination, the defective area can be located. Upon locating the defective area, you then would use your own preferred troubleshooting skills.

The removal of parts for testing, should be kept to an absolute minimum. "In circuit" analysis should provide you with enough data to determine correct operation.

At Carver Corporation we continually strive for the most reliable, cost-efficient product available.

When updates and service bulletins are sent to you, please take the time to review them and insert them into the correct service manuals.

The Carver PM-350 Magnetic Field Power Amplifier was released in July of 1986. It was in production until early 1990 when the entire line of professional power amplifiers was redesigned and renamed for the 1990's.

The PM-350 has an accessory cover on the rear panel which can be removed for installing the Carver PMX Electronic Crossover Module. Beginning at S/N 5001, the connectors were changed for interconnecting the PMX with the PM-350. PM-350 amplifiers with S/N 5000 and below will accept PMX crossovers with S/N below 600, unless the amplifier has been modified as described in Service Bulletin PM-350-5 (see Section 10). The PM-350 will also accept the Carver PG/2 Paging Module and the Carver PMT-2 Input Module, which provides transformer balanced inputs. However, the PM-350 interconnect must be modified to accommodate these modules as described in Service Bulletin PM-350-5 for the PMX Module.

The balanced XLR inputs of the PM-350 were configured for pin 2 high (DIN standard) from S/N 0001 through 1625. Beginning with S/N 1626 the XLR inputs were configured with pin 3 high (American standard).

The PM-350 is a stereo power amplifier rated at 350W per channel into 8 ohms and 450W per channels into 4 ohms. In bridged mono mode, it will deliver 900W into 8 ohms.

## SECTION 3

### SPECIFICATIONS

#### Specifications for the PM-350 Magnetic Field Power Amplifier

##### Power Output:

Continuous Average Output Power, both channels driven:

350 watts per channel into 8 ohms from 20 Hz to 20 kHz, with no more than 0.5% THD  
450 watts per channel into 4 ohms from 20 Hz to 20 kHz, with no more than 0.5% THD

Bridged-mono operation:

900 watts into 8 ohms from 20Hz to 20 kHz, with no more than 0.5% THD  
1000 watts into 70V distribution system

Frequency Response:	20Hz to 20kHz (+0, - 0.5dB)
Damping Factor:	Greater than 200 at 1kHz
Input Impedance:	15k ohms unbalanced; 30k ohms balanced
Sensitivity:	1.5V rms for rated power into 8 ohms at 1kHz 80mV rms for 1W output into 8 ohms at 1kHz
Gain:	31dB
Input Overload:	+15dBu
IM Distortion:	Less than 0.1%
THD:	Less than 0.5%
Noise:	-115dB A-weighted, referenced to rated power -89dBW A-weighted, referenced to 1W
Slew Rate:	25V/ $\mu$ S
Power Consumption:	1200W at full power
Power Requirements:	120VAC/60Hz (USA and Canada) 230VAC/50Hz (Europe)
Display:	4 LED's; Power On, Protect, Clip and Signal Present
Size (H x W x D):	3.5" x 19" x 11.5" (13.5" overall) 89mm x 483mm x 292mm (343mm overall)
Weight:	21 lbs. 9.5 kg

Test Note: Accurate measurement depends on a sufficiently "stiff" AC supply. The 60 Hz AC line distortion must be below IHF specifications.

# SECTION 4

## CIRCUIT DESCRIPTION

### PM-350

#### TECHNICAL DESCRIPTION

The magnetic-field amplifier design incorporated in the PM-350 allows a degree of efficiency and protection unequalled in conventional amplifiers.

The high efficiency and comprehensive protection are made possible by a triac phase controlled power supply and multiple level DC amplifier supplies. These features greatly reduce size, weight, heat and cost per watt.

To better understand this design, which is far from conventional, the following circuit description should be read carefully. Attempting to repair the unit without the following information may lead to severe damage to the unit.

#### PRIMARY CIRCUIT

The 230V PM-350 is fused with an MDL 6-1/4 amp fuse. The 115V PM-350 is fused with an MDQ 10 amp fuse. It is thermally protected by a 100° C thermal breaker.

An RC line filter network is used to suppress line noise generated by the triac conduction, and to reduce noise already present on the AC line.

The PM-350 power supply provides both AC line and secondary load regulation. This is achieved through triac phase control.

#### START-UP SEQUENCE

The triac and power to the unit is held off as long as the power switch shorts out the phase shift capacitor C4 on the regulator board.

Once the power switch is turned on and C4 is unshorted, C4 will charge through R8 and Q2 or Q3 depending on the polarity. The "+" half cycle of the AC line will charge C4 through R8 and Q3. This charging current causes Q3 to conduct which turns on Q4. No gate current will flow because D6 is reverse biased. C4 will continue charging until the

charge on C4 is greater than the now falling line voltage formed by divider R8 and R9 (see figure 1). Q3 and Q4 will turn off and C4 will begin to discharge through Q2 because the junction of R8 and R9 is more negative than the emitter of Q2 (C4). Q2 will conduct and turn on Q1. The positive charge on C4 will now supply gate current through Q1, Q2, D5 and R10, and thus turn on the triac. The triac fires at the same point on the negative half cycle. The negative charge on C4 supplies gate current through Q3, Q4, D6 and R10.

This minimum triac conduction angle provides enough voltage to the primary of the power transformer to allow the secondary regulator stage on the amp board to begin operating.

OC1 LED current is supplied by U1 pin 1. This differential amplifier senses the low voltage secondary supplies through R22, R23, R24, R28, R29 and R30. The output voltage at U1 pin 1 increases at the rate determined by C3 (slow start up). OC1 photo transistor will begin to conduct and charge C4 on the regulator board at a faster rate through R2. This decrease in phase shift results in a longer triac conduction time and higher secondary voltages. The idle secondary voltages are set by RP1 on the amp board. The top supply should be set to 95Vdc cold (20-30° C). The triac conduction angle at idle is shown in Figure 2. The secondary DC voltages at idle should be approximately +/- 97V, 56V, 27V, 13V and 10V.

#### LOAD REGULATION

The conduction angle of the triac, which controls the voltage on the primary of the transformer, is increased as the conduction of OC1 increases. The phototransistor conduction of OC1 is controlled by OC1 LED current. When either amplifier channel of both are driven into a load (8 or 4 ohm), the DC supplies will begin to "sag". Differential

amplifier U1 (pins 1, 2, 3) senses this and increases OC1 LED current. This action increases the following in the primary circuit:

OC1 phototransistor conduction

Triac conduction

Primary voltage

Increasing the primary transformer voltage regulates the secondary voltages. Load regulation at rated power into 8 ohms is within 10% or 7Vdc.

Figure 3 is the conduction angle and voltage across the triac at full power. Figure 4 is the primary current and line voltage. The amplifier is being driven to rated power into 8 ohms, both channels.

## AMPLIFIER CIRCUITRY

Both channels are basically identical, therefore for the purpose of simplification reference to only the right channel will be made.

The input circuit used in the PM-350 is an electronic balanced type, which can be driven by either the XLR or the parallel TRS 1/4" phone jacks.

The output of the differential amplifier (U2) is coupled to the right level control through the accessory module jumpers (pins 5-6).

The wiper of the level control pot is coupled to the input buffer op-amp U101 through the mono bridging switch. R105 provides local negative feedback around U101 to decrease the differential gain at clipping. The output of the input buffer is coupled to Q101 and Q110 which provide a current source for DC biasing and also provide DC level shifting which is required for referencing the audio signal to the top DC supplies. The output of the DC level shifters drives a pair of predriver voltage amplifiers (Q102 and Q111). This stage provides full voltage swing to the following current gain stages and supplies "tracking" for the commutator circuits.

The bias network of Q103 and Q104 provides adjustment of the DC idle current through outputs Q109 and Q117. Q104 is mounted on the heatsink and provides thermal feedback to prevent thermal runaway and helps maintain a constant idle current. RP100 on the amp board adjusts the idle current, which should be adjusted so that the common mode current is approximately 15mA cold (20-30° C).

The predrivers drive the "driver" stage (Q106 and Q113) which provide current amplification for driving the outputs and supply commutating circuitry.

Under a short circuit condition, the available current to the base of the drivers is limited by limiter transistors Q105 and Q112. Q105/Q112 are biased on by the voltage drop across the output emitter resistors R133 and R157. Q105 also provides a shutdown pulse to the protection mute circuitry (see overcurrent protection).

Q105 will also be biased on by excessive high frequency. This is achieved with C108. As frequency increases, the current through R123 increases on a positive going output voltage, turning on Q105 sooner with higher frequencies.

Current from drivers Q106 and Q113 provide drive for the two high gain, high linearity output devices Q109 and Q117. These devices provide full voltage swing and current drive to the loads.

The active local bias network of Q114, R129 and R151 provides variable "pull-down" of the bases of Q109 and Q117 to help prevent common-mode conduction of the output transistors and reduce their turnoff time.

The first supply commutator transistors, Q107/Q108 and Q115/Q116 are used to increase the supply voltages on the collectors of Q109 and Q117 from 21V to 44V as required. The diode network of D107, D108 and D109 (and their negative equivalents) in the base of Q109 and Q117 provide voltage "lead" for the first supply commutating transistors Q107/Q108 and Q115/Q116. This allows the supply voltages to stay ahead of the audio demand. As frequency increases, Q107/Q108 and Q115/Q116 require additional "lead" time to stay ahead of the audio. This is achieved by C109 and R126 (and their negative equivalents).

The first commutator transistors operate linearly and "track" the audio output. The second commutator transistors are switching type (see figure 5). The second commutators Q122 and Q119 switch on when the peak output voltage is within 12 volts of the +/-44V supplies. The turn-on threshold is set by zener diodes D122, D119. As the output of the amplifier is increased and Q120, Q123 are biased on, Q118, Q121 will turn on and will switch on commutators Q119, Q122.

The second supply commutators Q119, Q122 switch the supply voltages on the collectors of Q107/Q108 and Q115/Q116 from +/-44V to +/-70V

as required (voltages are lower depending on load). This in turn allows Q107/Q108 and Q115/Q116 to increase Q109 and Q117 collector voltages to within a few volts of the top supply, 70Vdc (see figure 5).

D110, D118, D117 and D121 prevent current from the higher commutated supplies from flowing back into the lower supplies.

If the clipping eliminator switch is pushed, then the input signal is processed by a circuit which consists of an optocoupler U102, a "steering" bridge (D125-D128), and a filter network (R176, R177, C123). The clipping eliminator is driven by the error signal on the output of input buffer U101. Distortion in excess of 1% will provide sufficient drive to attenuate the input and light the headroom exhausted LED on the display. This circuit will prevent distortion in excess of 3% with up to 15dB of overdrive on the input.

## PROTECTION CIRCUITS

Depending on the fault condition, the type of protection may be handled in one of three ways:

1. Inputs muted.
2. Triac conduction angle reduced to minimum value.
3. In-line thermal switch shuts off the unit temporarily.

The protection circuits are:

- A) Turn-on mute
- B) Overcurrent
- C) Excessive high frequency
- D) DC offset
- E) Low voltage fault
- F) Thermal

### A) TURN-ON MUTE

When the amplifier is turned on, FET Q1 and Q2 shunt the left and right channel respectively to ground. C1 is charged up through R6. After approximately 4 seconds Q3 will turn on and apply -13Vdc to the junction of R1/R2. This will pinch off Q1 and Q2 and the signal paths will unmute.

### B) OVERCURRENT

Short circuit current limiting is limited by Q105, Q112 on the right channel (Q205, Q212 on the left). When the short circuit current through emitter resistors R133 (R233) or R157 (R257) is greater

than 7.6 amps, Q105 (Q205) or Q112 (Q212) will turn on and will clamp the base drive current to Q106 (Q206) or Q113 (Q213).

Conduction of Q105 or Q205 will turn on Q8. Q8 will supply base current through D10 to turn on Q9 and light the protect LED. Q8 will also provide base current for Q4 allowing it to turn on and short out C1. Shorting out C1 will turn on both FETs (Q1/Q2) and mute both channels for 4 seconds repeatedly until the short is removed.

### C) EXCESSIVE HIGH FREQUENCY

When either amplifier (left or right) is driven at excessive high frequencies, C108 or C208 will supply base current to Q105 or Q205. This will mute the inputs the same as the short circuit condition and light the protect LED. C108 (C208) should only turn on Q105 (Q205) at frequencies greater than 20kHz.

### D) DC OFFSET

DC present at the output of either channel is coupled to a low pass filter. C7, R44 and R45 roll off the output in the audio spectrum. DC voltages greater than +/-8V on the left channel or +/-14V on the right channel will cause the output of comparator U1 pin 7 to go from -13V to +13Vdc. This will forward bias D11, turning the protect LED on. D7 also is forward biased driving the regulator U1 pin 1 negative and cutting off OC1 LED current. This causes the conduction angle of the triac to be reduced.

Since both channels are AC coupled by C101 (C201), DC fault protect would only occur if an internal fault condition existed. This will normally represent a load on the amplifier and with no regulation the maximum sustained DC output voltage will be less than +/-10Vdc.

Internal fault failures cause the protect LED to glow dimly because the secondary power supplies are reduced.

### E) LOW VOLTAGE FAULT

Failure of either the +/-10Vdc or +/-13Vdc supplies will result in regulator U1 pin 1 being driven negative. With no OC1 LED current, the conduction angle of the triac is minimum and therefore the secondary supplies are low. With very low power supplies the amplifier offset is low.

## F) THERMAL

Thermal protection is accomplished by an in-line thermal switch that will switch the unit temporarily off when the heatsink reaches 100° C. Reset time is determined by the ventilation allowed. Reset temperature is 70° C.

## DISPLAY

**Power LED:** connected in series with a 15k ohm resistor across the +/- 13Vdc supply.

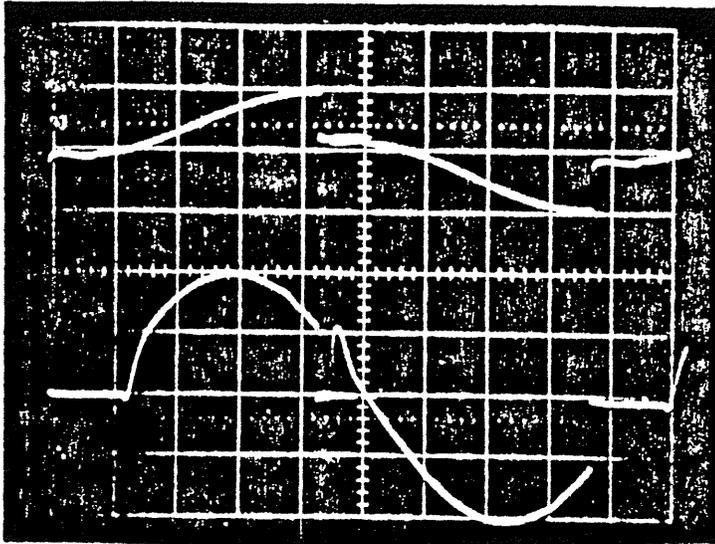
**Signal Present LED:** Q7 on the amp board is driven directly off the output of both channels. The LED will light at about 0.1 watt output into 8 ohms in dual channel operation, and 0.5 watts in the bridged mono operation.

**Clip LED:** The negative differential output at clipping from U201 pin 1 or U101 pin 1 quickly charges C2 through R8, R11 and D2, D3. The negative charge on C2 turns on Q5 which drives Q6 to light the clip LED. The turn off time of the LED is determined by the RC time constant C2, R13.

**Protect LED:** As explained in the protection circuit section, the protect LED may light from either a short circuit condition, excessive high frequency or a DC offset at either amplifier output. For the first two faults the LED will be bright and last for four seconds (same as the mute time). The on time is determined by C8, R47 and R48. When the latter (DC offset) occurs the power supply is reduced to minimize the offset and the LED will be dim. A dim protect LED will usually indicate an internal amplifier or power supply fault, while a bright protect LED will indicate an external amplifier problem.

## COOLING

The PM-350 is cooled by a variable speed fan that increases airflow in direct proportion to the power output of the amplifier. This is accomplished by controlling the voltage to the fan directly in relation to the triac conduction angle. This is done by D25, D26, R68, R69, R70 and C31. When the heatsink reaches a temperature of about 50° C, the thermal switch in the fan circuit closes and shorts out R68. This increases the airflow and cooling capacity by about 2 times.



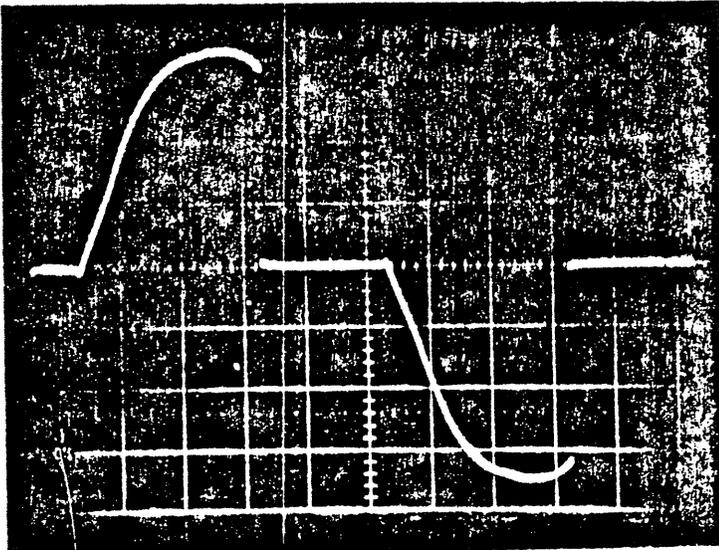
START UP VOLTAGES

VOLTAGE ACROSS C4

VOLTAGE ACROSS TRIAC

FIG. 1

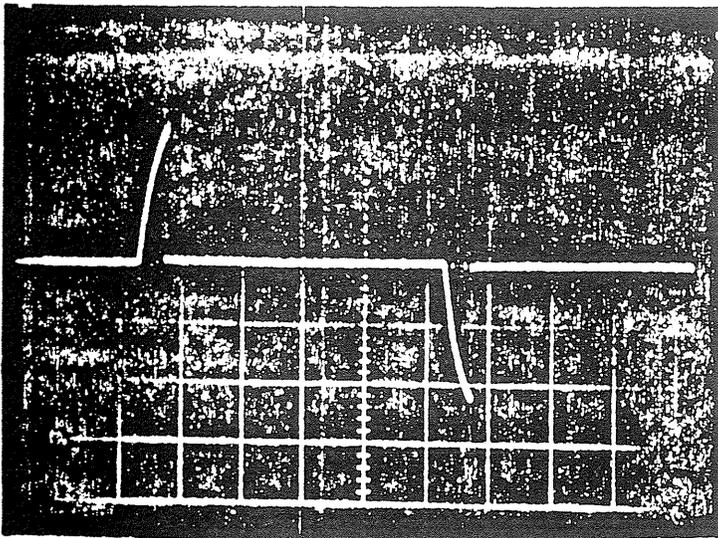
2ms/DIV



VOLTAGE ACROSS TRIAC  
AT IDLE

FIG. 2

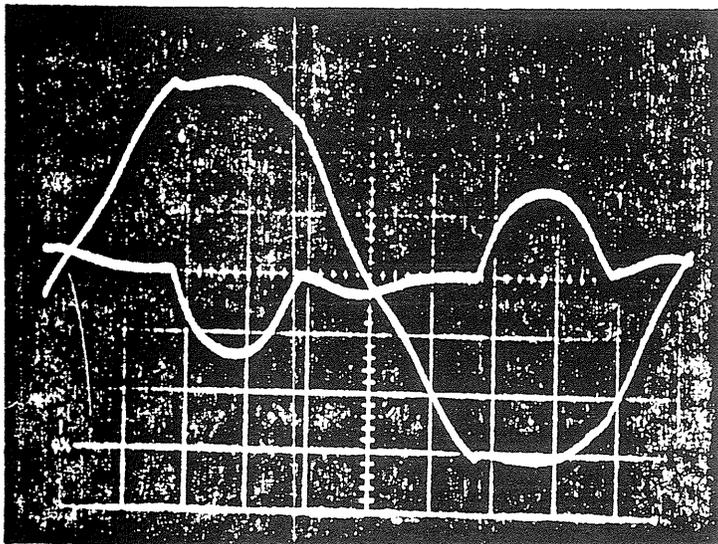
2ms/DIV



VOLTAGE ACROSS TRIAC  
AT RATED POWER  $8\Omega$

FIG. 3

2ms/DIV

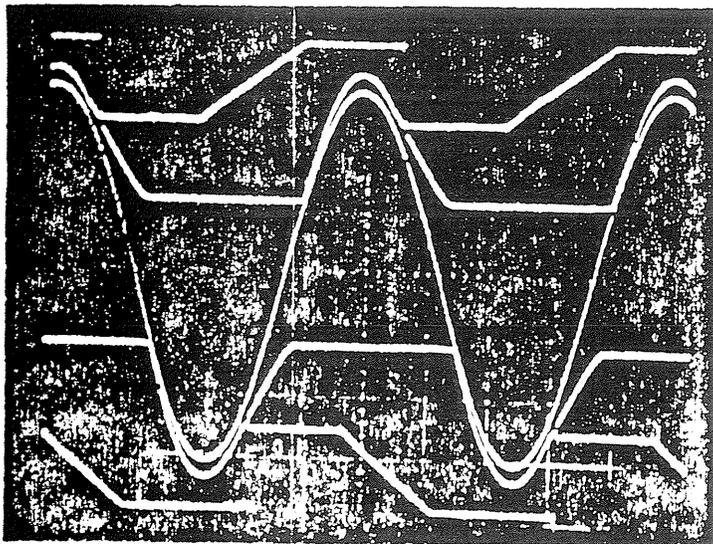


LINE CURRENT  
LINE VOLTAGE

RATED POWER  $8\Omega$

FIG. 4

2ms/DIV



COMMUTATED POWER SUPPLIES

+56

+27

OUTPUT

-27

-56

FIG. 5

2ms/DIV

- 19) Noise.
  - a) Verify noise <math><168\mu\text{V}</math> (-73.3dBm; -75.5dBV) A-weighted, with inputs shorted.
- 20) Gain.
  - a) Verify gain is 31dB (+/-1dB).
- 21) Turn off thump.
  - a) Set amp for 1Vrms output at 2kHz, both channels into and 8 ohms load.
  - b) Turn amplifier off and verify less than +/-2V peak.
- 22) Restart test.
  - a) Set line voltage to 95Vac. Verify unit will turn back on and confirm operation.
- 23) Line Leakage.
  - a) With an approved safety analyzer, verify line leakage is less than 500uA from both high and low sides of the line to ground.
- 24) Dielectric Breakdown.
  - a) With a calibrated and approved tester, verify that the unit can withstand application of a 1000 Vac signal for at least one second.
  - b) Apply the signal between either side of the line and an exposed ground on the unit. The power switch should be ON.

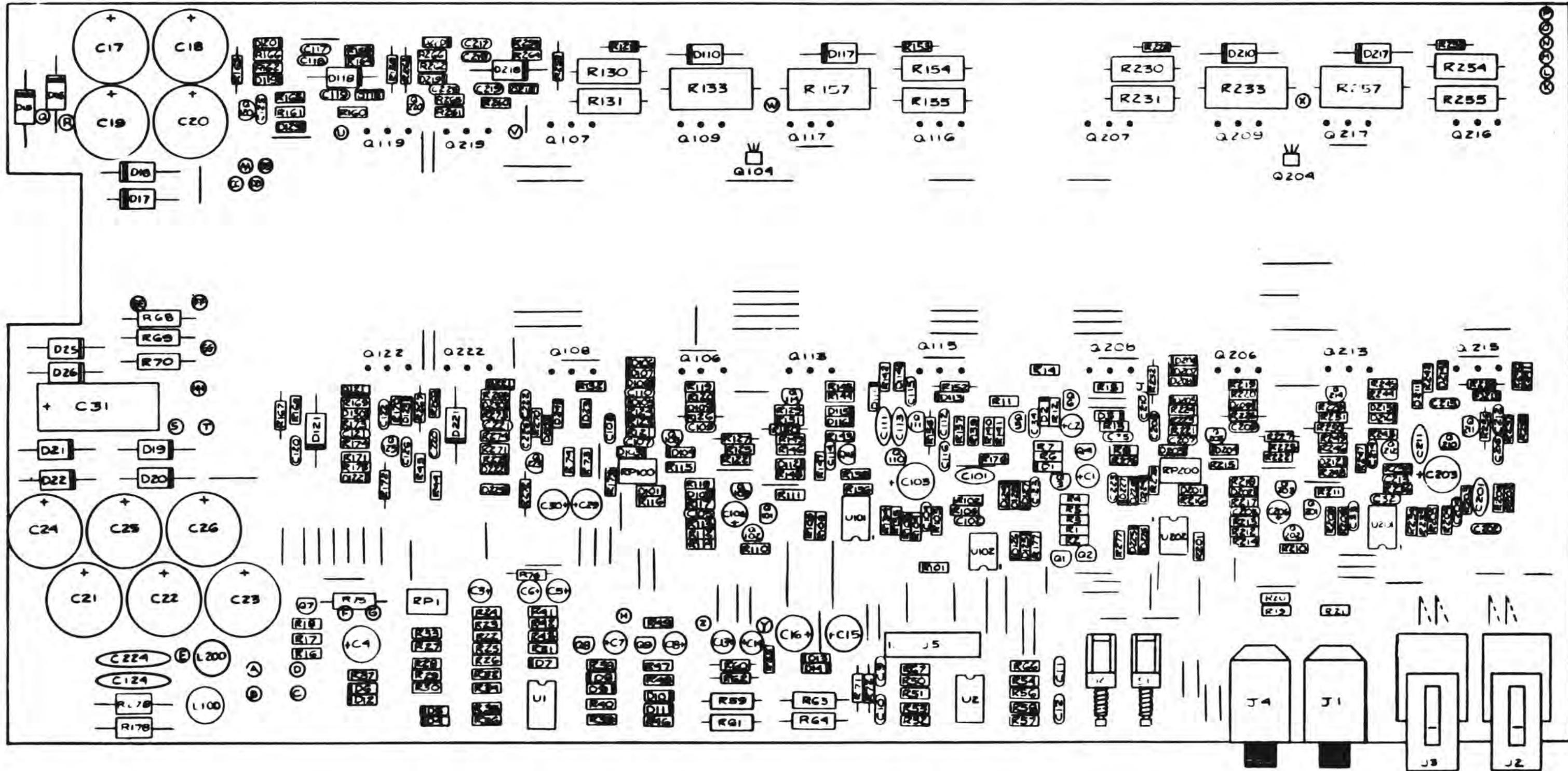


## SECTION 6

### SCHEMATICS AND LAYOUTS

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PM-350 Regulator Schematic .....	18
PM-350 Regulator Board Layout .....	19
PM-350 Final Assembly .....	20
PM-350 Wiring Diagram .....	21
PM-350 Button-Up .....	22

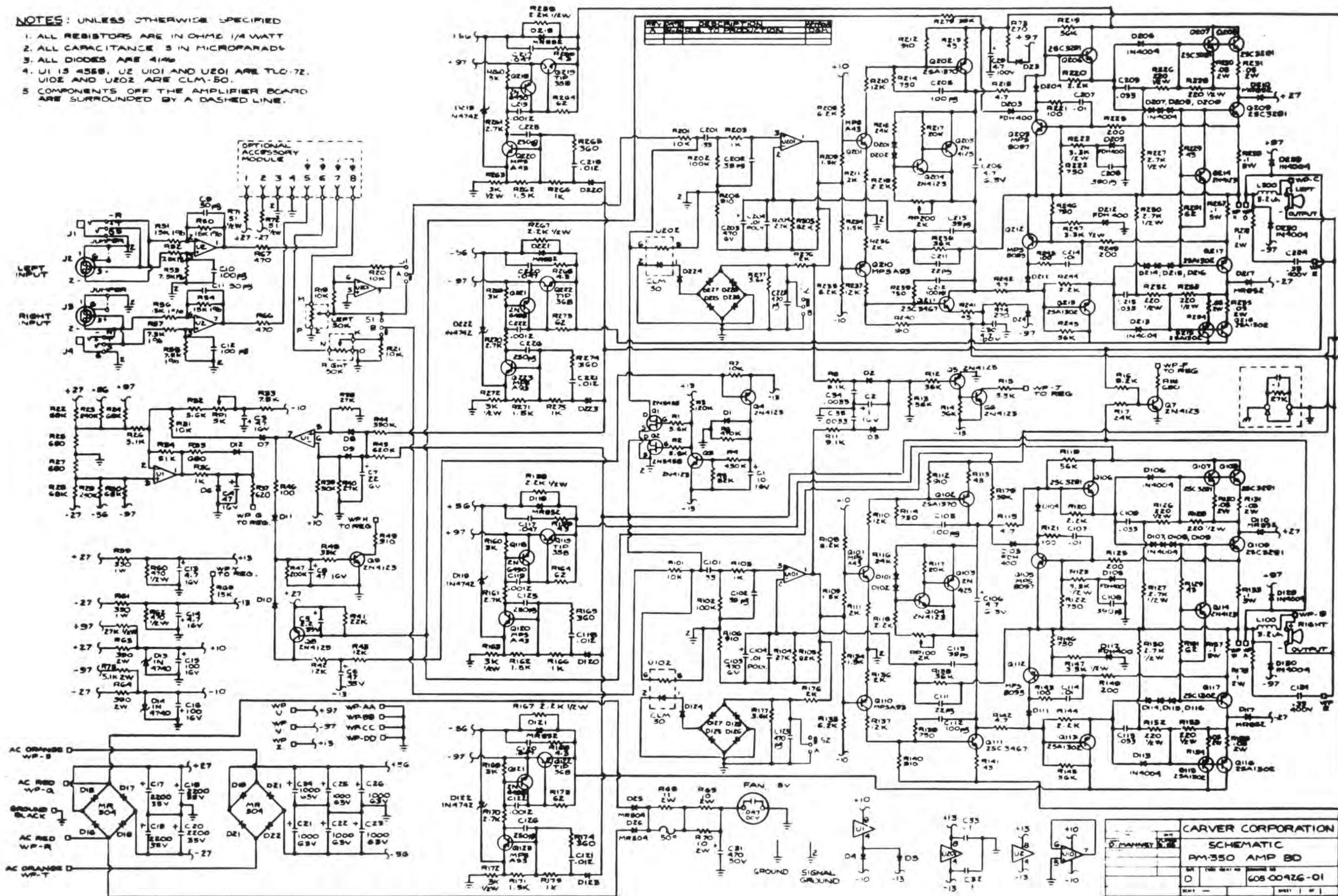
REVISIONS			
QTY	DESCRIPTION	DATE	APPROV.
-	A RELEASED TO PROD.	8-11-66	DBM



CARVER CORP.	
PM-350 AMP	
PARTS LOCATOR	
D	201-00426-01
REV 2/1	REV 10/1

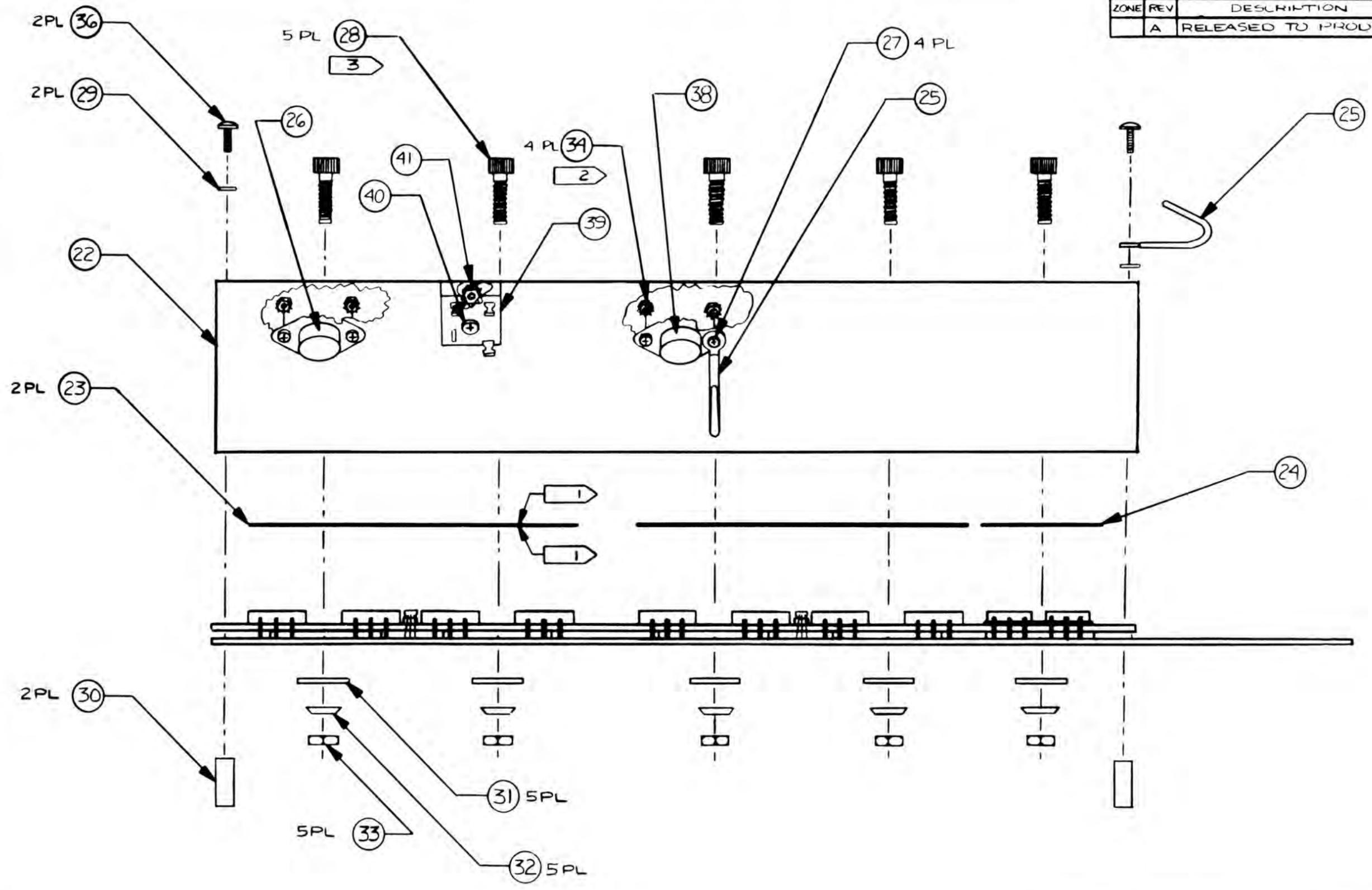
**NOTES: UNLESS OTHERWISE SPECIFIED**

1. ALL RESISTORS ARE IN OHMS 1/4 WATT
2. ALL CAPACITANCE IS IN MICROFARADS
3. ALL DIODES ARE 4146
4. U1 IS 4558, U2 U101 AND U201 ARE TL072.
5. COMPONENTS OFF THE AMPLIFIER BOARD ARE SURROUNDED BY A DASHED LINE.



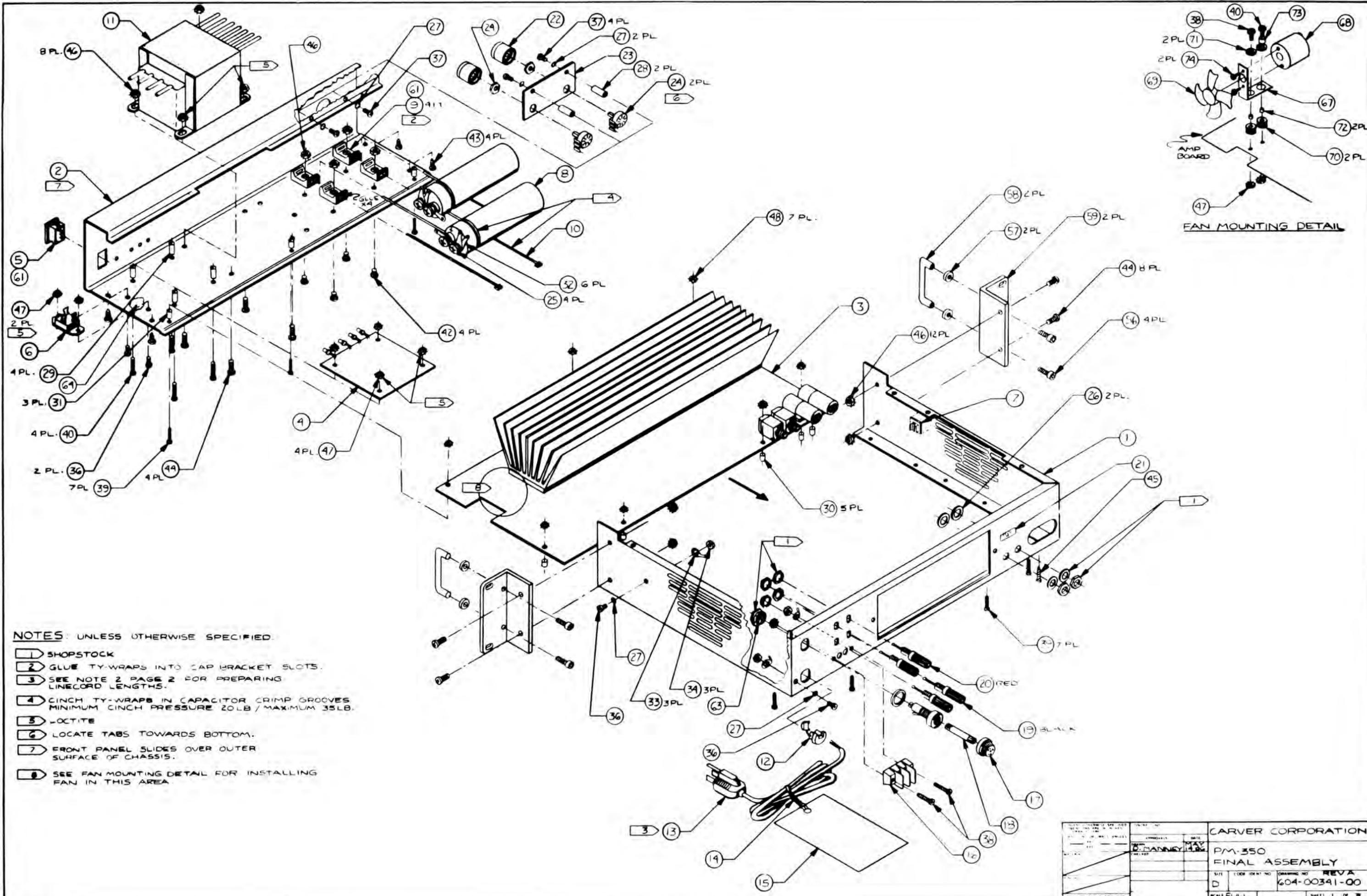
CARVER CORPORATION	
SCHEMATIC	
PM-350 AMP BD	
DR	60500926-01
REV	

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED
	A	RELEASED TO PRODUCTION	SEPT. 11, 66	DUG.



- 3** TORQUE AT 55 IN. LBS.
- 2** LOCTITE
- 1** THERMAL COMPOUND BOTH SIDES OF MICA WASHERS.

QTY REQD	FSCM NO	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION
PARTS LIST				
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLES		CONTRACT NO		
MATERIAL		APPROVALS	DATE	CARVER CORP
FINISH		DRAWN D. MANNEY	MAY 13, 66	PM-350 AMP BC
DO NOT SCALE DRAWING		CHECKED		TOUCH-UP
		ISSUED		SIZE FSCM NO DWG NO REV C C 602-00426-01 A
			SCALE FULL	SHEET 1 OF 2



**NOTES: UNLESS OTHERWISE SPECIFIED:**

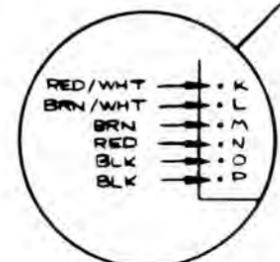
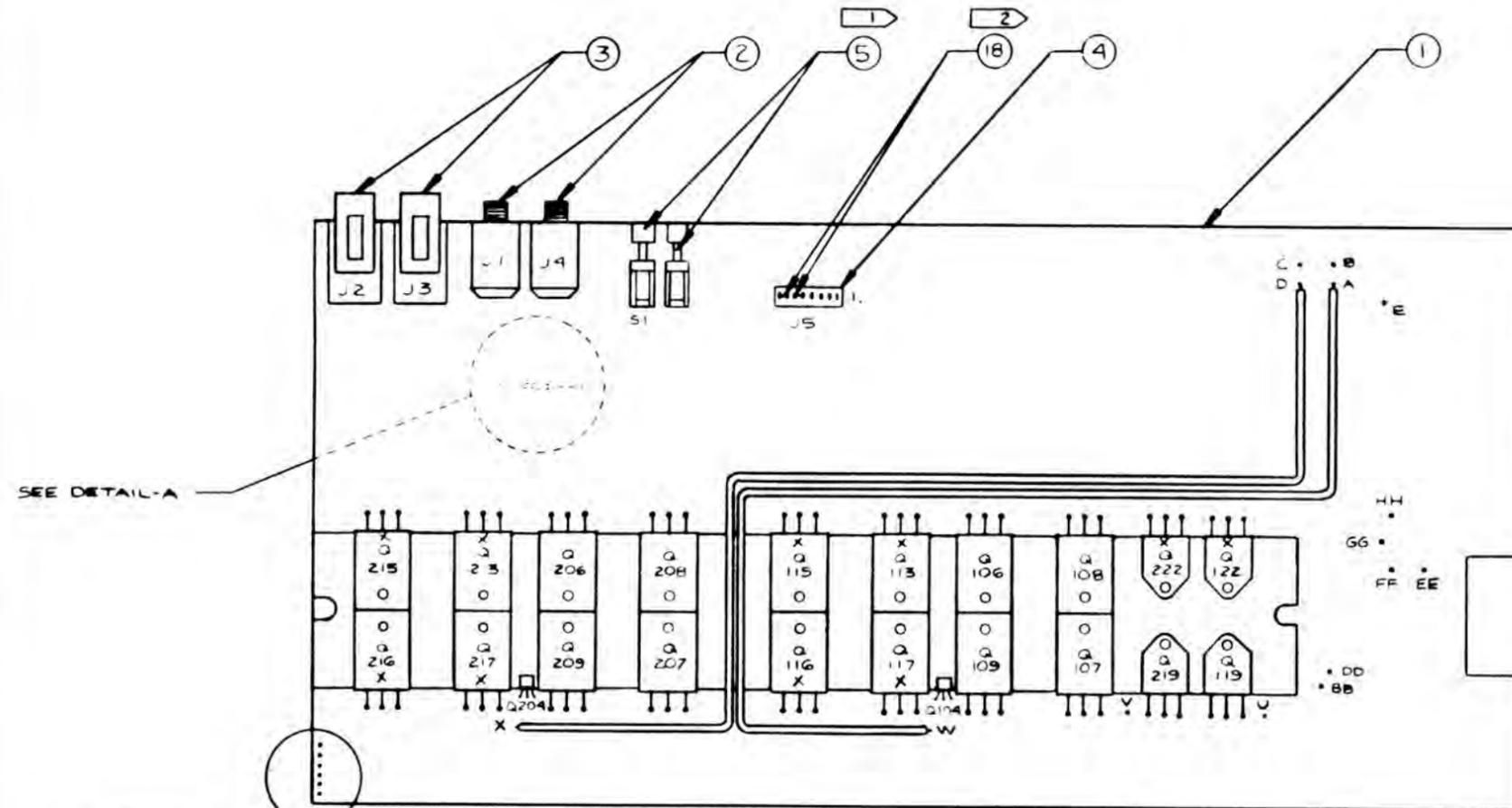
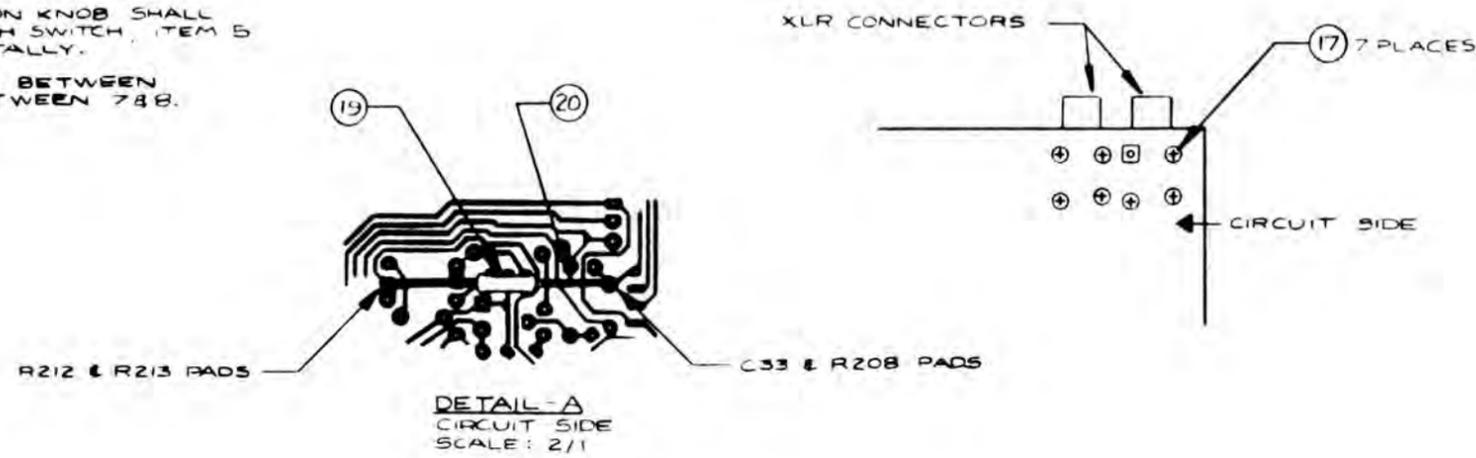
- 1 SHOPSTOCK
- 2 GLUE TY-WRAPS INTO CAP BRACKET SLOTS.
- 3 SEE NOTE 2 PAGE 2 FOR PREPARING LINECORD LENGTHS.
- 4 CINCH TY-WRAPS IN CAPACITOR CRIMP GROOVES. MINIMUM CINCH PRESSURE 20LB / MAXIMUM 35LB.
- 5 LOCTITE
- 6 LOCATE TABS TOWARDS BOTTOM.
- 7 FRONT PANEL SLIDES OVER OUTER SURFACE OF CHASSIS.
- 8 SEE FAN MOUNTING DETAIL FOR INSTALLING FAN IN THIS AREA.

CARVER CORPORATION PM-350 FINAL ASSEMBLY	
DATE: MAY 1966 DRAWING NO: REVA 604-00341-00	SHEET 1 OF 3

NOTES: UNLESS OTHERWISE SPECIFIED:

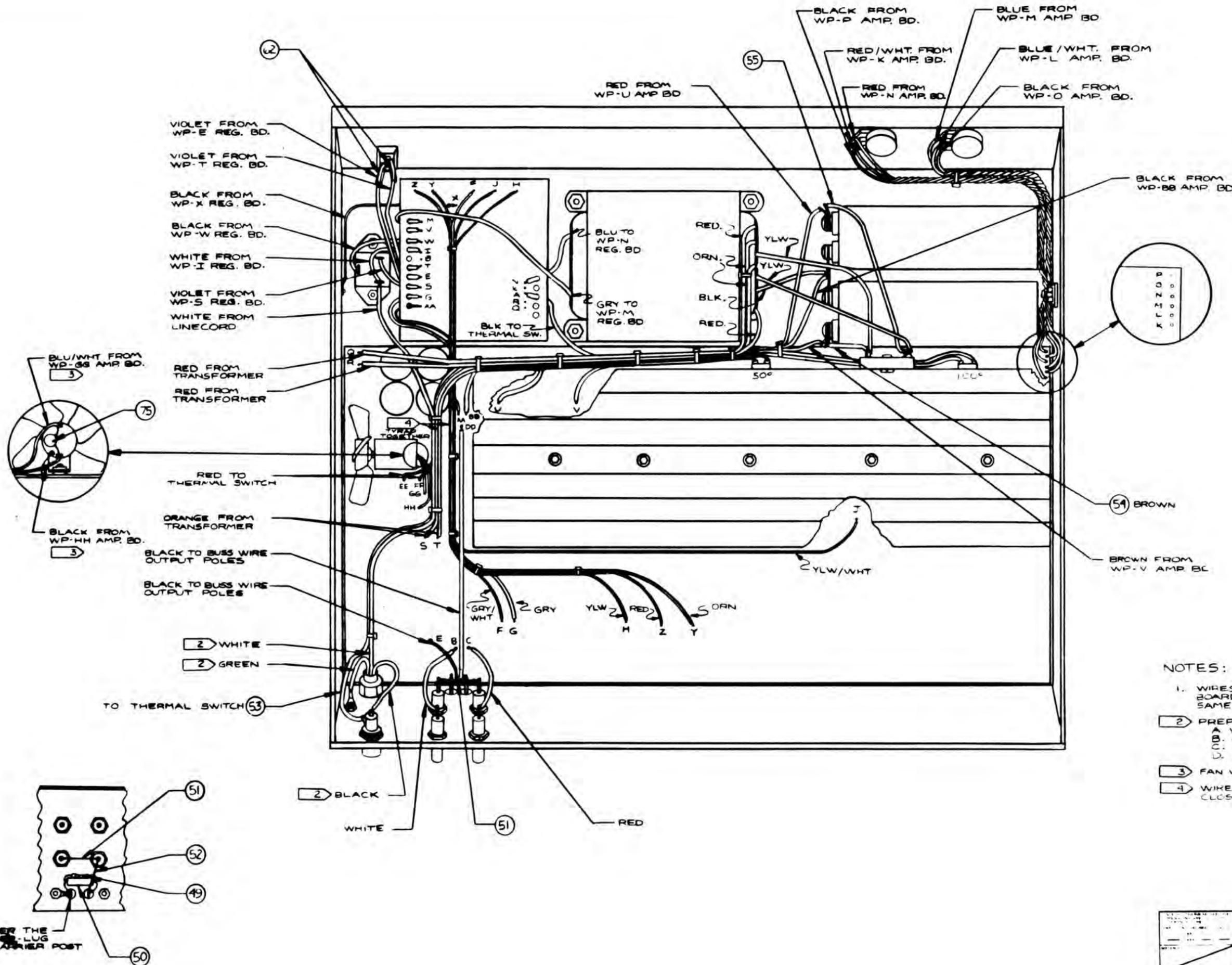
1 BLACK PUSHBUTTON KNOB SHALL BE SUPPLIED WITH SWITCH, ITEM 5 INSTALL HORIZONTALLY.

2 INSTALL JUMPERS BETWEEN PINS 5&6 AND BETWEEN 7&8.



ITEM	PART NUMBER	DESCRIPTION	DESIGNATOR	QTY
1	601-00426-01	AMP. BD. PM-350, STUFFED		1
2	109-23001-00	PHONE JACK 1/4" CHASSIS MNT	J1, J4	2
3	109-00002-00	JACK, XLR CONNECTOR	J2, J3	2
4	160-20005-00	CONNECTOR, 8 POS		1
5	318-10009-00	SWITCH, PUSH 1 KEY, NO FRAME	S1	2
	401-10115-00	WIRE, 18 AWG TEW, RED 16.00	WP-DWP-X	1
	401-10170-00	WIRE, 18 AWG TEW, WHT 16.00	WP-AEWP-W	1
	401-10161-00	WIRE, 18 AWG TEW, RED 3.00	WP-C	1
	401-10162-00	WIRE, 18 AWG TEW, WHT 3.00	WP-B	1
	401-10151-00	WIRE, 18 AWG TR-64, BLK 7.00	WP-DD	1
	401-10501-00	WIRE, 22 AWG TR-64, BLK 2.25	WP-E	1
	401-10163-00	WIRE, 18 AWG TR-64, BRN 11.00	WP-V	1
	401-10127-00	WIRE, 18 AWG TR-64, RED 11.00	WP-U	1
	401-10125-00	WIRE, 18 AWG TR-64, BLK 12.00	WP-BB	1
	401-40012-00	WIRE T, #22 RED, RED/WHT, BLK 9.50	SEE DETAIL-A	1
	401-40013-00	WIRE T, #22 BRN, BRN/WHT, BLK 9.50	SEE DETAIL-A	1
17	151-20601-00	SCREW, 4-40 X 1/4 PHP BLK		7
18	401-30012-00	JUMPER, NON-INSULATED .10"		2
19	251-10104-03	RESISTOR, 27K 1/2W UNPREPARED		1
20	402-00002-00	SLEEVING CLEAR 16 GA SPOOL		.40
21				
22	511-10001-01	HEATSINK ANO BLK, PM-175 & PM-350		1
23	512-10610-00	INSULATOR MICA LARGE		2
24	512-10611-00	INSULATOR, MICA SMALL		1
25	112-20002-00	MOUNT, SNAKE LUG		2
26	318-50003-00	THERMAL SWITCH 100 DEG C		1
27	151-20607-00	SCREW, 4-40 X 5/16 PHP BLK		4
28	151-00258-00	SCREW MACH, SKT. HD. HEX 1/4-20 1.00 BLK		5
29	154-20052-00	WASHER, INT LOCK SAE BLK #6		2
30	118-80011-00	SPACER 6-32 THD MTL .250D .750LG		2
31	154-10251-00	WASHER, FLAT SAE BLK .25 X .625		5
32	154-00005-01	WASHER, BELL ZC 1/4" ID		5
33	152-00005-02	HEX-NUT 1/4-20 CAD		5
34	152-10001-00	KEPNUT 4-40 ZC		4
35	403-20041-00	THERMAL COATE		AS REQ
36	151-20055-00	SCREW, 6-32 X 5/8 PHP BLK		2
37	403-10005-00	LOCTITE		AS REQ
38	318-50000-00	THERMAL SWITCH 50 DEG C		1
39	319-00027-00	RECTIFIER BRIDGE 200V 25AMP		1
40	151-20106-00	SCREW, MACH 8-32 X 3/4 PHP BLK		1
41	152-10003-00	KEPNUT 8-32		1
	401-10541-00	WIRE, 22 AWG TR-64, BLK 3.50	WP-HH	1
	401-10583-00	WIRE, 22 AWG TR-64, BLU/WHT 3.00	WP-GG	1
	401-10508-00	WIRE, 22 AWG TR-64, RED 11.00	WP-EE WP-FF	1

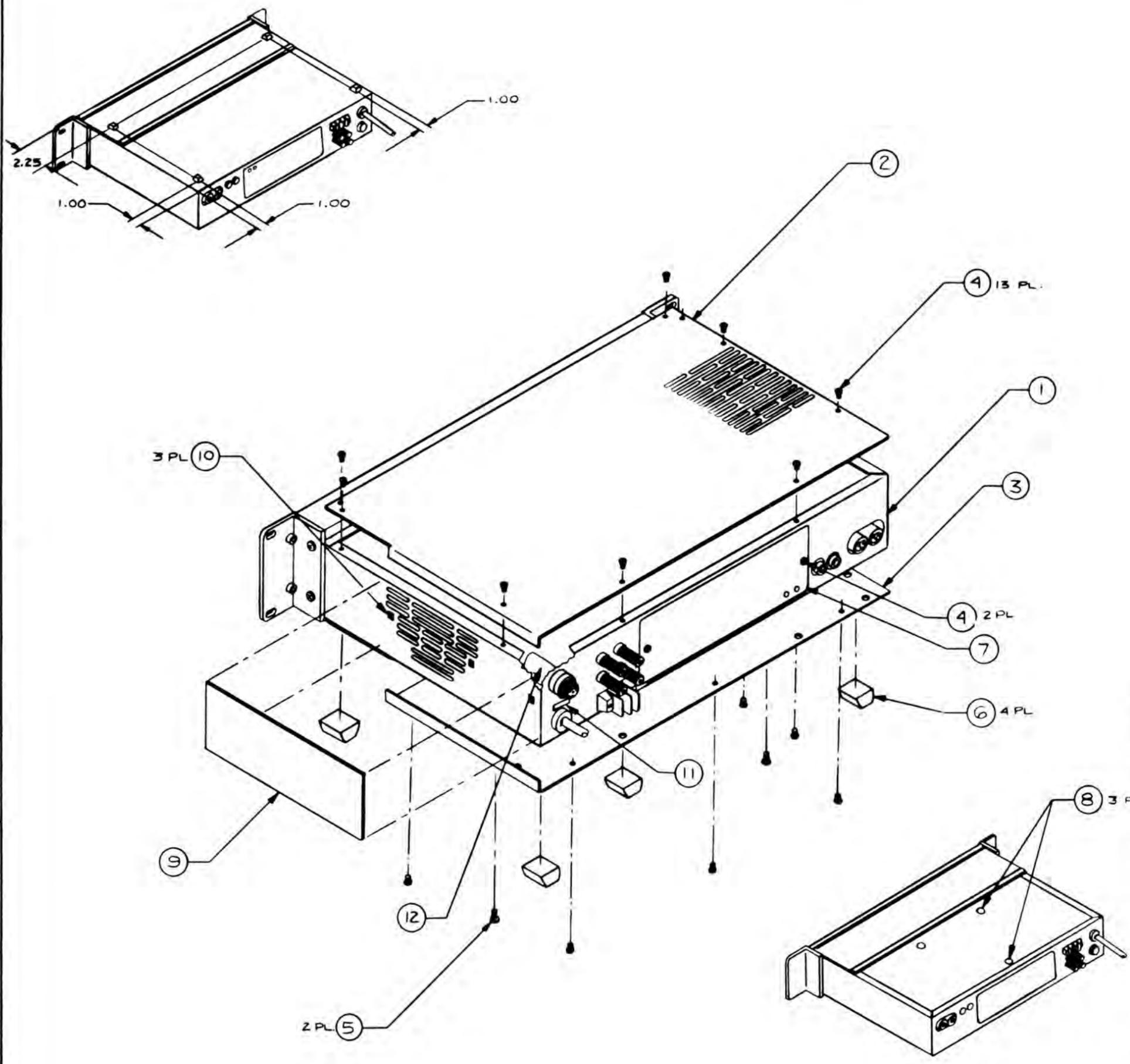
CARVER CORPORATION	
PM-350 AMP. BD.	
TOUCH-UP	
DATE: MAY 14 1964	REV A
DWG NO: 602-00426-01	REV A
DATE: MAY 14 1964	REV A
DWG NO: 602-00426-01	REV A
DATE: MAY 14 1964	REV A
DWG NO: 602-00426-01	REV A



NOTES: UNLESS OTHERWISE SPECIFIED.

1. WIRES FROM INPUT BOARD TO AMP BOARD ARE DESIGNATED BY THE SAME LETTERS AT WIRE PADS
2. PREPARE LINECORD AS FOLLOWS  
 A. WHITE WIRE: 12" LONG  
 B. GREEN WIRE: 2" LONG  
 C. BLACK WIRE: 3" LONG  
 D. EACH WIRE STRIPPED 3/8"
3. FAN WIRES NOT TYRAPPED
4. WIRE BUNDLE MUST BE ROUTED CLOSE TO CIRCUIT BOARD

CARVER CORP.			
PM-350			
FINAL ASSEMBLY			
WIRING INSTRUCTIONS			
DATE	CODE	DEPT. NO.	DRAWING NO.
D			604-00341-00
SCALE FULL			SHEET 2 OF 2



ITEM	QTY	FRCH NO	PART OR IDENTIFYING NO	DESCRIPTION OR REFERENCE	REVISION
12	AS REQD		108-00101-00	RAG PAPER	
11	1		530-10064-00	FUSE LABEL	
10	3		403-40006-00	VELCRO STRIP 1/2	
9	1		105-10003-00	FAN FILTER 2 7/8 X 7.00	
8	3		101-30001-00	BUMPONS, MED	
7	1		512-10703-01	ACCESSORY PANEL, SCREENED	
6	4		101-30003-00	BUMPONS, RUBBER SQ. .81 X .515	
5	2		151-20052-00	SCREW, MACH #6-32 X 3/8 PHR BLK	
4	17		151-30051-00	SCREW, S.M., #6, PHR, BLK, 25, B	
3	1		504-20025-01	BOTTOM COVER, PNT, BLK, PM 350	
2	1		504-20026-01	TOP COVER, PNT, BLK, PM 350	
1	1		604-00341-00	ASSY, FINAL, PM-350	

UNLESS OTHERWISE SPECIFIED  
 DIMENSIONS ARE IN INCHES  
 TOLERANCES ARE  
 FRACTIONS DECIMALS ANGLES  
 XXX .XXX .XXX .XXX

CONTRACT NO

APPROVALS DATE  
 DRAWN BY: D. MANNEY JUN 4, 56  
 CHECKED  
 ISSUED

**CARVER**  
 PM-350  
 BUTTON-UP

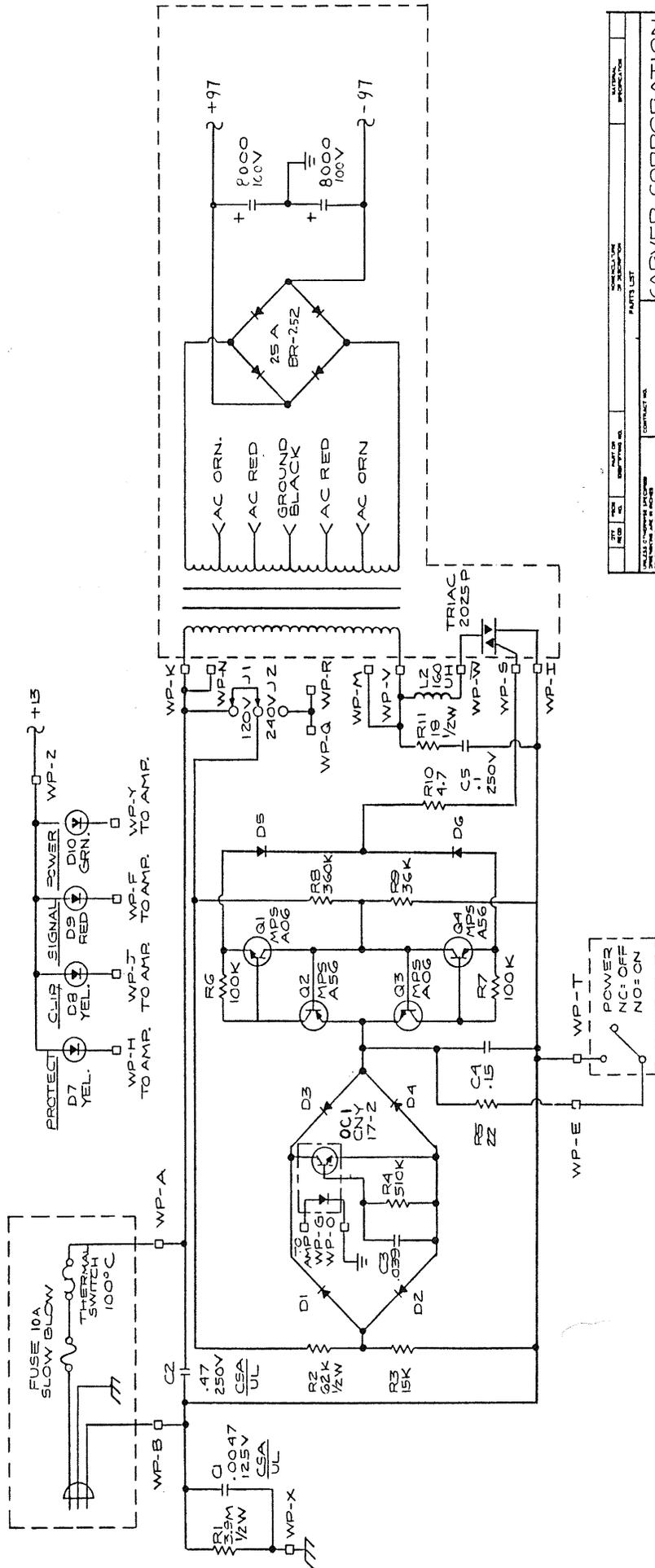
FRCH NO: 607-00341-00  
 REV: A  
 SHEET 1 OF 1

DO NOT SCALE DRAWING



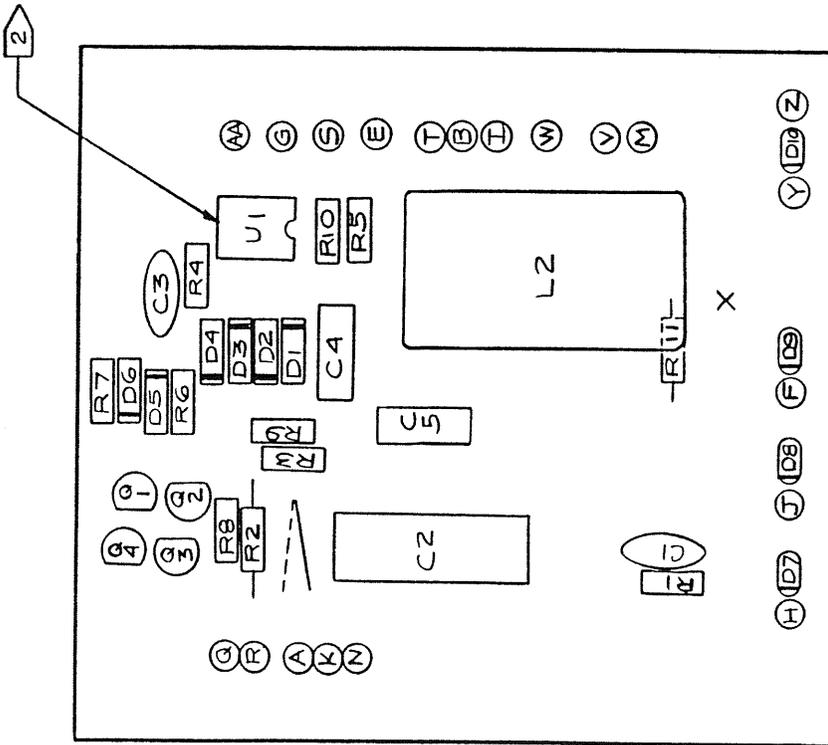
**NOTES :** UNLESS OTHERWISE SPECIFIED.

1. ALL RESISTORS ARE IN OHMS 1/4 WATT.
2. ALL CAPACITANCE IS IN MICROFARADS.
3. ALL DIODES ARE IN4004.
4. COMPONENTS OFF THE REGULATOR BOARD ARE SURROUNDED BY A DASHED LINE.



DATE	REV	BY	CHKD	DESCRIPTION
PARTS LIST				
CONTRACT NO.	CARVER CORPORATION			
PROJECT NO.	FM-350 120V			
DATE	REGULATOR BOARD			
SCALE	SCHEMATIC			
DESIGNER	C			
DRAWN	SOS-00427-01 A			
CHECKED	KAE			
DATE	SHEET 1 OF 1			

DO NOT SCALE DRAWING

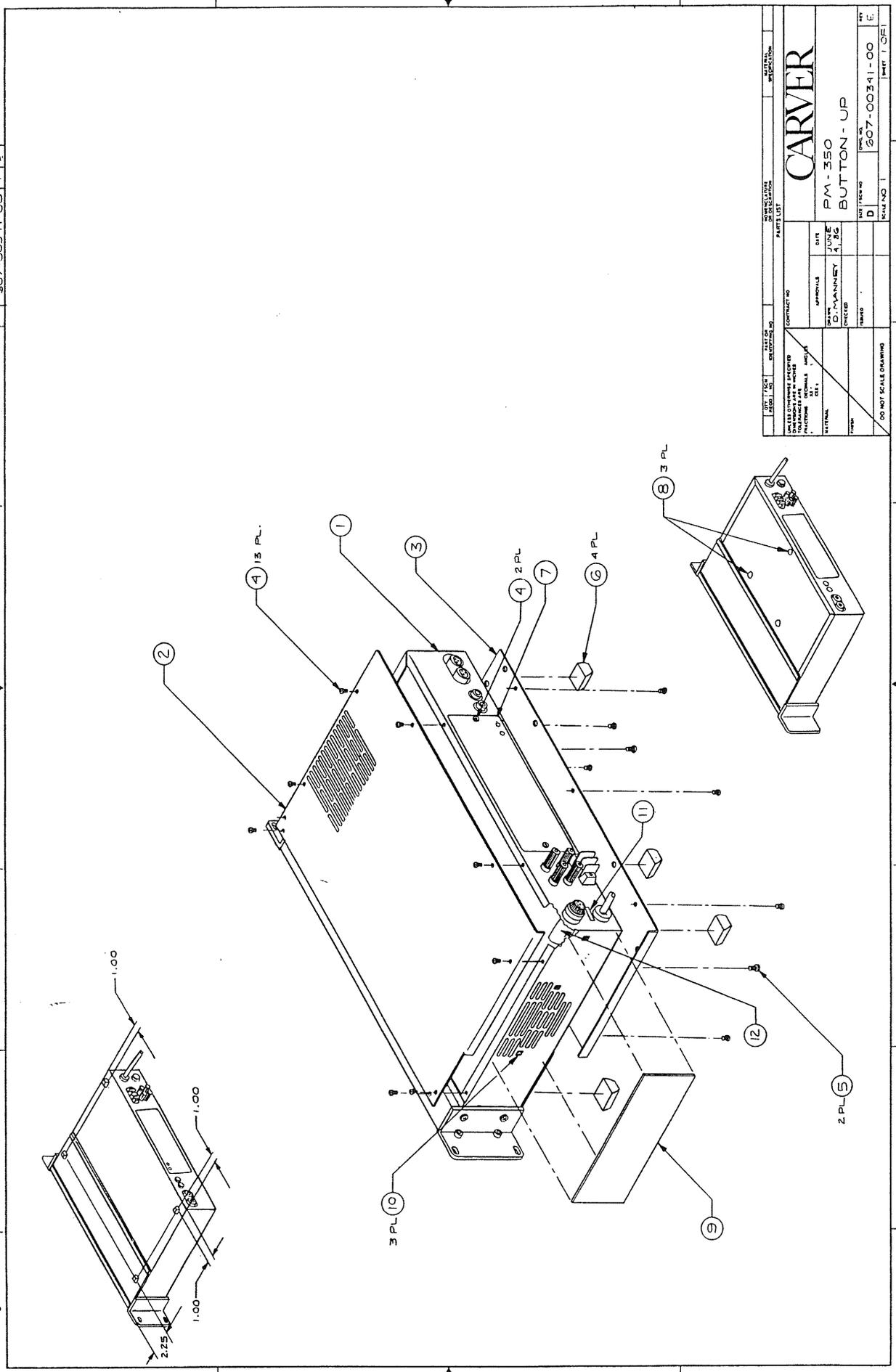


ITEM ON 60Z PARTS LISTS.  
 NOTES: UNLESS OTHERWISE SPECIFIED:

CONTRACT NO.		CARVER CORPORATION	
APPROVALS	DATE	PM-175 & PM-350	120V

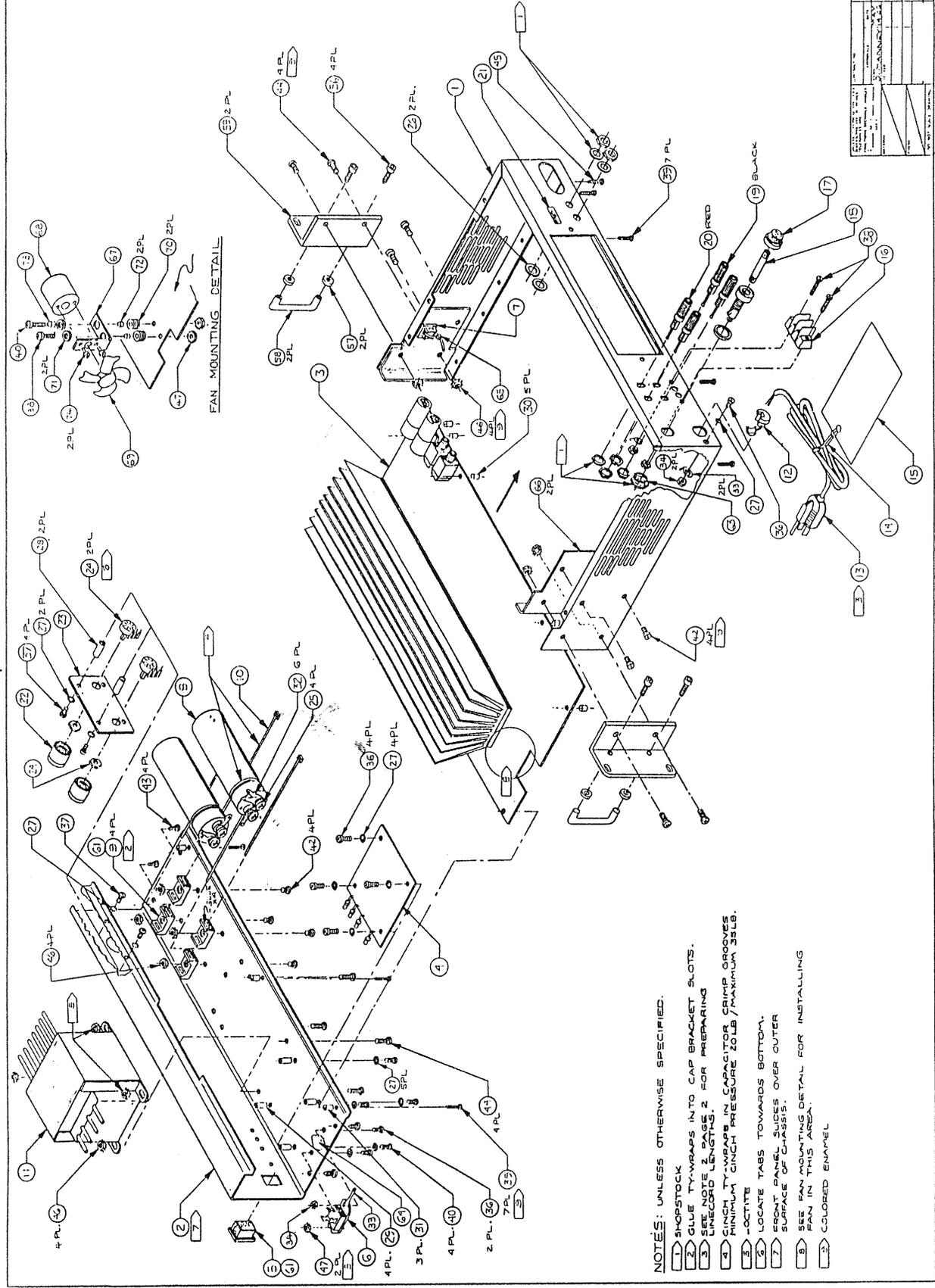
207-00341-00 1 2

1 3 4 5 6 7 8



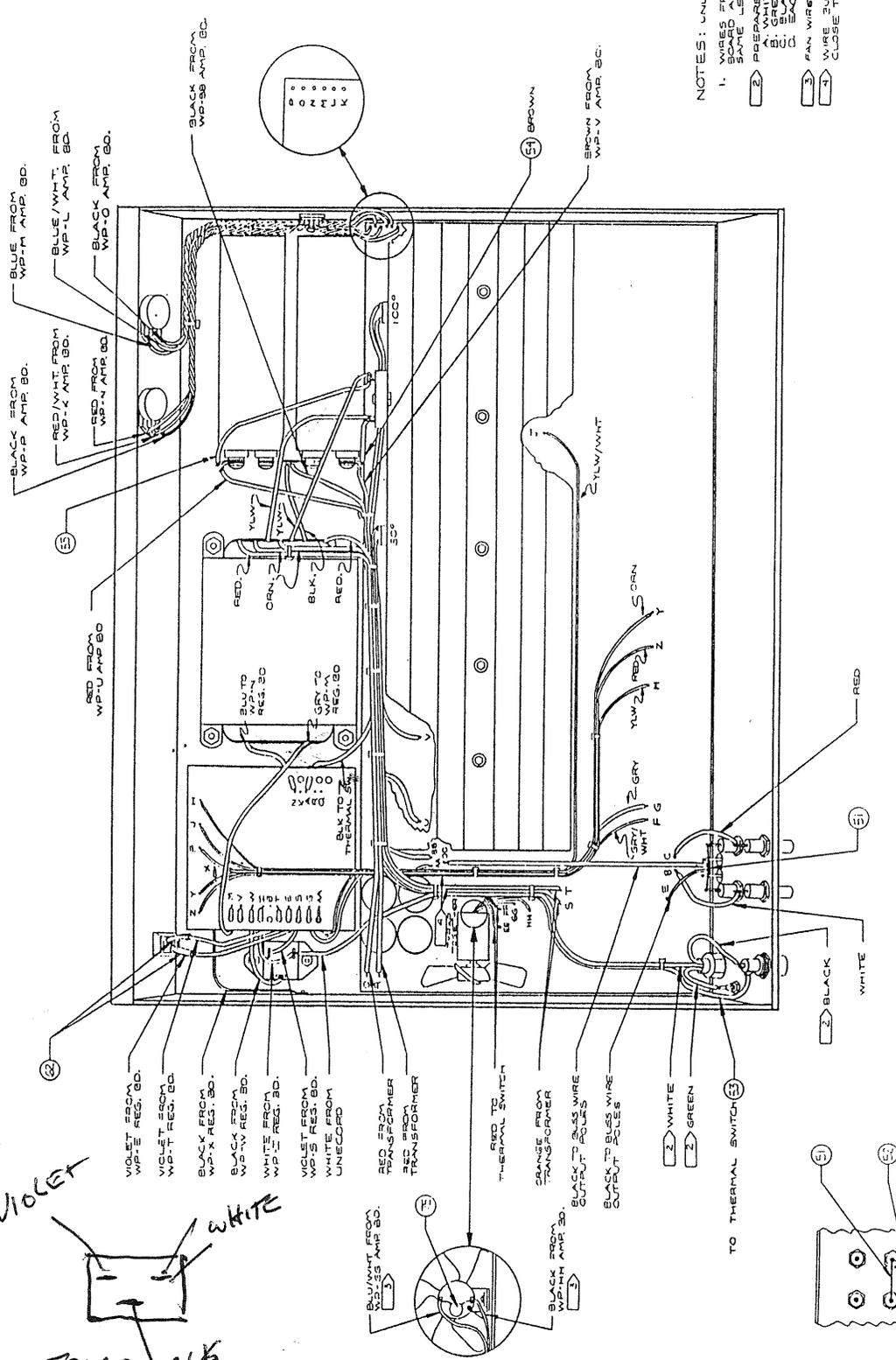
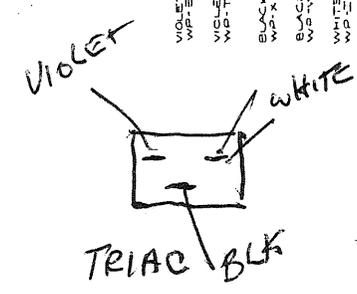
DATE	REV	DESCRIPTION	APPROVED
PART LIST		MATERIAL	
CONTRACT NO.		207-00341-00	
DATE		JUNE 4, 1966	
BY		W. H. HANNEY	
CHECKED			
DRAWN			
SCALE		AS SHOWN	
SHEET NO.		1 OF 1	

1 2 3 4 5 6 7 8



- NOTES: UNLESS OTHERWISE SPECIFIED.
- 1 - SHOP STOCK
  - 2 - GUE TY-WRAPS INTO CAP BRACKET SLOTS.
  - 3 - SEE NOTE 2 FOR PREPARING
  - 4 - SEE NOTE 2 FOR PREPARING
  - 5 - GING TY-WRAPS IN CAPACITOR CRIMP GROOVES MINIMUM CINCH PRESSURE 20 LB / MAXIMUM 35 LB.
  - 6 - ACTIVE
  - 7 - LOCATE TABS TOWARDS BOTTOM.
  - 8 - FRONT PANEL SLICES OVER OUTER SURFACE OF CHASSIS.
  - 9 - SEE FAN MOUNTING DETAIL FOR INSTALLING FAN IN THIS AREA.
  - 10 - COLORED ENAMEL





NOTES: UNLESS OTHERWISE SPECIFIED:

1. WIRES FROM MOUNT BOARD TO AMP BOARD ARE DESIGNATED BY THE SAME LETTERS AT WIRE PADS
2. PREPARE LINES AS FOLLOWS
  - a. GREEN WIRE: 3" LONG
  - b. GRAY WIRE: 3" LONG
  - c. BLACK WIRE: 3" LONG
  - d. EACH WIRE STRIPPED 3/8"
3. FAN WIRES NOT TYRAPPED
4. WIRE BUNDLE MUST BE ROUTED CLOSE TO CIRCUIT BOARD.

CARVER CORP.	
REV. 1	REV. 2
REV. 3	REV. 4
REV. 5	REV. 6
REV. 7	REV. 8
REV. 9	REV. 10
REV. 11	REV. 12
REV. 13	REV. 14
REV. 15	REV. 16
REV. 17	REV. 18
REV. 19	REV. 20
REV. 21	REV. 22
REV. 23	REV. 24
REV. 25	REV. 26
REV. 27	REV. 28
REV. 29	REV. 30
REV. 31	REV. 32
REV. 33	REV. 34
REV. 35	REV. 36
REV. 37	REV. 38
REV. 39	REV. 40
REV. 41	REV. 42
REV. 43	REV. 44
REV. 45	REV. 46
REV. 47	REV. 48
REV. 49	REV. 50
REV. 51	REV. 52
REV. 53	REV. 54
REV. 55	REV. 56
REV. 57	REV. 58
REV. 59	REV. 60
REV. 61	REV. 62
REV. 63	REV. 64
REV. 65	REV. 66
REV. 67	REV. 68
REV. 69	REV. 70
REV. 71	REV. 72
REV. 73	REV. 74
REV. 75	REV. 76
REV. 77	REV. 78
REV. 79	REV. 80
REV. 81	REV. 82
REV. 83	REV. 84
REV. 85	REV. 86
REV. 87	REV. 88
REV. 89	REV. 90
REV. 91	REV. 92
REV. 93	REV. 94
REV. 95	REV. 96
REV. 97	REV. 98
REV. 99	REV. 100





## **SECTION 7**

### **PARTS ORDERING**

Please provide the Model numbers of the units involved when ordering genuine CARVER replacement parts. Also provide the CARVER part number and the generic part number to confirm the correct part needed.

The Carver Parts Department is open Monday thru Friday, 7:00 a.m. to 4:45 p.m. PST.

The following phone number is to be used for part orders only!

Technical assistance is not available on this line.

**1-800-433-0547**

Or if you prefer to FAX in your part order, please use the following FAX number:

**1-206-775-9180**

From time to time, when it is necessary, we may make a substitution for the original part ordered, due to circuit revisions or part availability.

Random deviation from the original CARVER designated part is not recommended!

Complete PCB replacement is not recommended. You must have prior approval for warranty repair should PCB replacement be necessary.

CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
251-10039-00	RES CFILM 51 OHM 1/2W PREP .5	R71,72	
251-10054-00	RES CFILM 220 OHM 1/2W PREP .5	R128,153,228,253	
251-10062-00	RES CFILM 470 OHM 1/2W PREP .5	R60,62	
251-10078-00	RES CFILM 2.2K 1/2W PREP .5	R158,167,258,267	
251-10080-00	RES CFILM 2.7K 1/2W PREP .5	R127,150,227,250	
251-10081-00	RES CFILM 3.0K 1/2W PREP .5	R163,172,263,272	
251-10082-03	RES CFILM 3.3K 1/2W UNPREP	R123,147,223,247	
251-10104-00	RES CFILM 27K 1/2W UNPREP	R76	
252-00373-00	RES CFILM 7.50K 1/4W 1%	R52,53,57,58	
252-00402-00	RES CFILM 15.0K 1/4W 1%	R50,51,54,56	
253-20000-00	RES WIRE WOUND .05 OHM 2W 10%	R130,131,154,155,230,231,254,255	
253-20018-00	RES WIRE WOUND 1.0 OHM 2W	R178,278	
253-40001-00	RES WIRE WOUND .1 OHM 5W 10%	R133,157,233,257	
255-10081-00	RES MET OXIDE 330 OHM 1W	R59,61	
255-20041-00	RES MET OXIDE 10 OHM 2W	R69,70	
255-20042-00	RES MET OXIDE 11 OHM 2W	R68	
255-20086-00	RES MET OXIDE 390 OHM 2W	R63,64	
255-20124-00	RES MET OXIDE 6.8K 2W	R75	
259-20003-00	TRIM POT 5K PCB MOUNT	RP1	
259-20011-00	TRIM POT 2K PCB MOUNT	RP100,200	

## DIODES

CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
320-20001-00	DIODE1N4148 75V PREP	D1-12,23,24,101,102,104,111,120,123-128,201,202,204,211,220,223-228	
320-20004-00	DIODE 1N4004 400V PREP .4	D106-109,113-116,129,130,206-209,213-216,229,230	
320-20005-03	DIODE MR504 400V	D25,26	
320-20006-00	DIODE BAV20 400V PREP .4	D103,105,112,203,205,212	
320-20007-03	DIODE MR852	D110,117,118,121,210,217,218,221	
320-20010-03	DIODE 6 AMP 200V UNPREP	D15,16,18-22	Was MR504 400V (P/N 320-20005-00)
320-30000-00	DIODE ZENER 1N4740 10V PREP	D13,14	
320-30001-00	DIODE ZENER 1N4742 12V PREP	D119,122,219,222	

## TRANSISTORS

CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
321-30013-00	XISTOR TO3P(L) NPN PWR 2SC3281	Q106-109,206-209	
321-30014-00	XISTOR TO3P(L) PNP PWR 2SA1302	Q113,115-117,213,215-217	
321-40000-00	XISTOR TO92 NPN SM SG MPS8097	Q105,205	
321-40001-00	XISTOR TO92 NPN SM SG MPSA43	Q101,120,210,220	
321-40003-00	XISTOR TO92 PNP SM SG MPS8093	Q112,212	
321-40004-00	XISTOR TO92 PNP SM SG MPSA93	Q110,123,210,223	
321-40005-00	XISTOR TO92 JFET SM SG 2N5458	Q1,2	

# SECTION 8

## PARTS LIST

PM-350 AMP BOARD  
P/N 602-00426-01

### CAPACITORS

CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
201-00004-00	CAP CER DISC 22pF 10% 1000V	C111,211	
201-00006-00	CAP CER DISC 39pF 10% 1000V	C102,202,211,311	
201-00008-00	CAP CER DISC 50pF 10% 1000V	C9,11	
201-00012-00	CAP CER DISC 100pF 10% 1000V	C10,12,105,112,205,212	
201-00019-00	CAP CER DISC 250pF 10% 1000V	C125,126,225,226	
201-00022-00	CAP CER DISC 390pF 10% 1000V	C108,208	
201-00023-00	CAP CER DISC 470pF 10% 1000V	C123,223	
204-00004-00	CAP MYLAR .0012 $\mu$ F	C119,122,219,222	
204-00009-00	CAP MYLAR .0033 $\mu$ F	C34,35	
204-00015-00	CAP MYLAR .01 $\mu$ F	C107,114,207,214	
204-00016-00	CAP MYLAR .047 $\mu$ F	C118,121,218,221	
204-00024-00	CAP MYLAR .047 $\mu$ F	C117,120,217,220	
204-00027-00	CAP MYLAR .1 $\mu$ F	C32,33	
204-00033-00	CAP MYLAR .33 $\mu$ F/400V	C124,224	
205-00002-00	CAP LYTIC 2.2 $\mu$ F/35V RAD	C5	
205-00005-00	CAP LYTIC 4.7 $\mu$ F/35V RAD	C2,13,14,106,206	
205-00009-00	CAP LYTIC 4.7 $\mu$ F/100V RAD	C29,30	
205-00011-00	CAP LYTIC 22 $\mu$ F/16V RAD	C7,8	
205-00013-00	CAP LYTIC 47 $\mu$ F/25V RAD	C1,3,4	
205-00014-00	CAP LYTIC 47 $\mu$ F/35V RAD	C6	
205-00016-00	CAP LYTIC 100 $\mu$ F/16V RAD	C15,16	
205-00019-00	CAP LYTIC 470 $\mu$ F/6.3V RAD	C103,203	
205-00037-00	CAP LYTIC 470 $\mu$ F/50V AX	C31	
205-00056-00	CAP LYTIC 1000 $\mu$ F/63V RAD	C21-26	MAX DIA 0.71"
205-00057-00	CAP LYTIC 2200 $\mu$ F/35V RAD	C17-20	MAX DIA 0.71"
207-20001-00	CAP POLYPROP .01 $\mu$ F/50V RAD	C104,204	

### RESISTORS

CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
251-00013-00	RES CFILM 4.3 OHM 1/4W PREP .4	R159,168,259,268	
251-00014-00	RES CFILM 4.7 OHM 1/4W PREP .4	R115,142,215,242	
251-00037-00	RES CFILM 43 OHM 1/4W PREP .4	R113,129,141,213,229,241	
251-00041-00	RES CFILM 62 OHM 1/4W PREP .4	R151,164,173,251,264,273	



CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
251-00046-00	RES CFILM 100 OHM 1/4W PREP .4	R46,121,143,221,243	
251-00053-00	RES CFILM 200 OHM 1/4W PREP .4	R125,149,225,249	
251-00056-00	RES CFILM 270 OHM 1/4W PREP .4	R73,74	
251-00059-00	RES CFILM 360 OHM 1/4W PREP .4	R165,174,265,274	
251-00062-00	RES CFILM 470 OHM 1/4W PREP .4	R66,67	
251-00065-00	RES CFILM 620 OHM 1/4W PREP .4	R37	
251-00066-00	RES CFILM 680 OHM 1/4W PREP .4	R18,25,27,35	
251-00067-00	RES CFILM 750 OHM 1/4W PREP .4	R114,122,139,146,214,222,239,246	
251-00069-00	RES CFILM 910 OHM 1/4W PREP .4	R49,106,112,140,206,212,240	
251-00070-00	RES CFILM 1K 1/4W PREP .4	R36,103,166,175,203,266,275	
251-00074-00	RES CFILM 1.5K 1/4W PREP .4	R109,134,162,171,209,234,262,271	
251-00077-00	RES CFILM 2.0K 1/4W PREP .4	R111,136,176,211,236,276	
251-00078-00	RES CFILM 2.2K 1/4W PREP .4	R118,120,144,218,220,244	
251-00080-00	RES CFILM 2.7K 1/4W PREP .4	R161,170,261,270	
251-00081-00	RES CFILM 3.0K 1/4W PREP .4	R160,169,260,269	
251-00082-00	RES CFILM 3.3K 1/4W PREP .4	R15	
251-00083-00	RES CFILM 3.6K 1/4W PREP .4	R177,277	
251-00087-00	RES CFILM 5.1K 1/4W PREP .4	R26	
251-00088-00	RES CFILM 5.6K 1/4W PREP .4	R1,2,32	
251-00089-00	RES CFILM 6.2K 1/4W PREP .4	R108,135,208,235	
251-00091-00	RES CFILM 7.5K 1/4W PREP .4	R33	
251-00092-00	RES CFILM 8.2K 1/4W PREP .4	R16	
251-00093-00	RES CFILM 9.1K 1/4W PREP .4	R8,11	
251-00094-00	RES CFILM 10K 1/4W PREP .4	R7,19-21,31	
251-00096-00	RES CFILM 12K 1/4W PREP .4	R42,43,110,137,210,237	
251-00097-00	RES CFILM 13K 1/4W PREP .4	R13	
251-00098-00	RES CFILM 15K 1/4W PREP .4	R65,101,201	
251-00099-00	RES CFILM 16K 1/4W PREP .4	R5	
251-00101-00	RES CFILM 20K 1/4W PREP .4	R117,217	
251-00102-00	RES CFILM 22K 1/4W PREP .4	R41	
251-00103-00	RES CFILM 24K 1/4W PREP .4	R17,116,216	
251-00104-00	RES CFILM 27K 1/4W PREP .4	R38,40,104,204	
251-00106-00	RES CFILM 33K 1/4W PREP .4	R48	
251-00107-00	RES CFILM 36K 1/4W PREP .4	R12,14,138,238	
251-00108-00	RES CFILM 39K 1/4W PREP .4	R179,279	
251-00111-00	RES CFILM 51K 1/4W PREP .4	R34	
251-00112-00	RES CFILM 56K 1/4W PREP .4	R119,145,219,245	
251-00114-00	RES CFILM 68K 1/4W PREP .4	R22,24,28,30	
251-00116-00	RES CFILM 82K 1/4W PREP .4	R4,105,205	
251-00117-00	RES CFILM 91K 1/4W PREP .4	R6	
251-00118-00	RES CFILM 100K 1/4W PREP .4	R102,202	
251-00120-00	RES CFILM 120K 1/4W PREP .4	R3	
251-00125-00	RES CFILM 200K 1/4W PREP .4	R47	
251-00127-00	RES CFILM 240K 1/4W PREP .4	R23,29	
251-00130-00	RES CFILM 330K 1/4W PREP .4	R44	
251-00135-00	RES CFILM 510K 1/4W PREP .4	R39	
251-00137-00	RES CFILM 620K 1/4W PREP .4	R45	



CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
321-40009-00	XISTOR TO92 PNP SM SG 2N4125	Q5,8,103,203	
321-40010-00	XISTOR TO92 NPN SM SG 2N4123	Q3,4,6,7,9,104,114,204,214	
321-60004-00	XISTOR TO220 NPN 2N6488	Q121,221	
321-60006-00	XISTOR TO220 PNP 2N6490	Q118,218	
321-60008-00	XISTOR TO220 PNP 2SA1370	Q102,202	
321-60009-00	XISTOR TO220 NPN 2SC3467	Q111,211	
321-80000-00	XISTOR TO218AA NPN TIP358	Q119,219	
321-80003-00	XISTOR TO218AA PNP TIP36B	Q122,222	

## INTEGRATED CIRCUITS

CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
330-30001-00	IC DUAL OP AMP BIFET TL072	U2,101,201	
330-30008-00	IC DUAL OP AMP 4558	U1	
330-40008-00	IC OPTOISOLATOR DIP VTL5C4	U102, 202	(Or CLM 51)

## MISCELLANEOUS ITEMS

CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
109-00002-00	JACK, RT ANGLE XLR CONNECTOR	J2,3	
109-20001-00	JACK, PHONE 1/4" PC MT	J1,4	
112-20002-00	MOUNT, SNAKE LUG		
118-80011-00	STANDOFF THREADED 6-32 x .750" L		
151-00258-00	SCREW MACH SCKT H HEX 1/4 x 20 x 1"		
151-20001-00	SCREW MACH PP BLK 440 x 1/4"		
151-20007-00	SCREW MACH PP BLK 440 x 5/16"		
151-20055-00	SCREW MACH PP BLK 6-32 x 5/8"		
151-20106-00	SCREW MACH PP BLK 8-32 x 3/4"		
152-00005-02	NUT HEX 1/4-20 CAD		
152-10001-00	KEPNUT, 4-40 ZC		
152-10003-00	KEPNUT, 8-32 x 11/32" ZC		
154-00005-01	WASHER, BELL ZC 1/4" ID		
154-10251-00	WASHER FLAT SAE BLK .25 x .625"		
154-20052-00	WASHER INT LOCK SAE BLK #6		
154-40302-01	WASHER SHOULDER NYLON 1/4"		
160-20005-00	CONNECTOR RIBBON CABLE 8 POS		Before S/N 5000
160-20007-00	CONNECTOR, MINI LINK .025" SPACING	J5	After S/N 5000
160-30013-00	HEADER LOCKING GOLD MOLEX		After S/N 5000
204-00031-00	CAP MYLAR .33 $\mu$ F	C101,201	
318-10009-00	SWITCH PUSH 1 KEY NO FRAME MINI W/BUTTON	S1	
318-50000-00	SWITCH THERMAL 50 DEG C		
318-50003-00	SWITCH THERMAL 100 DEG C		



CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
401-10115-00	WIRE 18 AWG TEW RED 16"		
401-10125-00	WIRE 18 AWG TR-64 BLACK 12"	WP-BB	
401-10127-00	WIRE 18 AWG TR-64 RED 11"	WP-U	
401-10151-00	WIRE 18 AWG TR-64 BLACK 7"	WP-DD	
401-10161-00	WIRE 18 AWG TEW RED 3"	WP-C	
401-10163-00	WIRE 18 AWG TR-64 BROWN 11"	WP-V	
401-10170-00	WIRE 18 AWG TEW WHITE 16"		
401-10501-00	WIRE 22 AWG TR-64 BLACK 2.25"	WP-E	
401-10508-00	WIRE 22 AWG TR-64 RED 11"		
401-10541-00	WIRE 22 AWG TR-64 BLACK 3.5"		
401-10583-00	WIRE 22 AWG TR-64 BLU/WHT 3"		
401-30002-00	JUMPER INSULATED #22 .3"		
401-30003-00	JUMPER INSULATED #22 .4"		
401-30005-00	JUMPER INSULATED #22 .5"		
401-30006-00	JUMPER INSULATED #22 .6"		
401-30007-00	JUMPER INSULATED #22 .7"		
401-30012-00	JUMPER NONINSULATED #22 .10"		
401-40013-00	WIRE T #22 1-BRN, BRN/WHT, BLK 9.5"		
403-10003-00	SEALANT SILICONE RUBBER RTV		
403-10009-00	LOCTITE TAK PAK ADHESIVE		
403-10010-00	LOCTITE TAK PAK ACCELERATOR		
403-20001-00	THERMALCOTE #253		
501-00426-00	PCB, AMP PM-175		
511-10001-01	HEATSINK ANODIZED BLACK PM-175/PM-350		
512-10501-00	SHIM PM-175/PM-350		
512-10610-00	MICA INSULATOR LARGE PM-175		
512-10611-00	MICA INSULATOR SMALL PM-175		
512-10704-00	PLATE THERMAL PRESSURE PM-175		
616-00005-00	COIL AIR CORE	3.2μH	L100,200

## PM-350 REGULATOR BOARD P/N 602-00427-01

### CAPACITORS

CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
201-00033-00	CAP CER DISC .0047μF/400V 20%	C1	
204-00023-00	CAP MYLAR .039μF	C3	
204-00029-00	CAP MYLAR .15μF	C4	
207-10003-00	CAP MET POLY .1μF/250V 20% RAD	C5	
207-10005-00	CAP MET POLY .47μF/250V	C2	

## RESISTORS

CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
251-00014-00	RES CFILM 4.7 OHM 1/4W PREP .4	R10	
251-00030-00	RES CFILM 22 OHM 1/4W PREP .4	R5	
251-00098-00	RES CFILM 15K 1/4W PREP .4	R3	
251-00107-00	RES CFILM 36K 1/4W PREP .4	R9	
251-00118-00	RES CFILM 100K 1/4W PREP .4	R6,7	
251-00131-00	RES CFILM 360K 1/4W PREP .4	R8	
251-00135-00	RES CFILM 510K 1/4W PREP .4	R4	
251-10028-00	RES CFILM 18 OHM 1/2W PREP .5	R11	
251-10113-00	RES CFILM 62K 1/2W PREP .5	R2	
251-10156-00	RES CFILM 3.9M 1/2W PREP .5	R1	

## DIODES

CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
320-20004-00	DIODE 1N4004 400V PREP .4	D1-6	
320-40001-00	LED RED	D9	
320-40002-00	LED AMBER	D7,8	
320-40004-00	LED GREEN H.E.	D10	

## TRANSISTORS

CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
321-40011-00	XISTOR TO92 NPN SM SG MPSA06	Q1,3	
321-40012-00	XISTOR TO92 PNP SM SG MPSA56	Q2,4	

## MISCELLANEOUS ITEMS

CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
330-40002-00	OPTOISOLATOR PHOTOTRANSISTOR CNY172	OC1	
401-10104-00	WIRE 18 AWG TEW BLACK 5"	WP-W	
401-10120-00	WIRE 18 AWG TEW VIOLET 3"	WP-S	
401-10155-00	WIRE 18 AWG TEW BLACK 14"	WP-A	
401-10158-00	WIRE 18 AWG TEW WHITE 5"	WP-I	
401-10533-00	WIRE 22 AWG TR-64 RED 15"	WP-Z	
401-10556-00	WIRE 22 AWG TR-64 BLACK 5"	WP-L	
401-10565-00	WIRE 22 AWG TR-64 WHT/GRY 12.5"	WP-F	
401-10575-00	WIRE 22 AWG TEW GREY 10.5"	WP-C	
401-10599-00	WIRE 22 AWG TEW VIOLET 6.5"	WP-E, WP-T	
401-10600-00	WIRE 22 AWG TEW YELLOW 14"	WP-H	
401-10601-00	WIRE 22 AWG TR-64 YEL/WHT 18"	WP-7	
401-10628-00	WIRE 22 AWG TEW BLACK 7"	WP-AA	
401-30003-00	JUMPER INSULATED #22 .4"		
402-00006-00	SLEEVING BLACK 18 GA .4"		
501-00427-00	PCB REGULATOR PM-175		
616-00053-00	CHOKE 160μH	L2	

# PM-350 FINAL ASSEMBLY

## P/N 607-00341-00

CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
101-00004-00	BARRIER STRIP 2 POS PANEL MNT		
101-10004-00	BLADE, FAN PLASTIC 2.5" CCW		
101-30001-00	BUMPONS RUBBER ROUND MEDIUM		
101-30003-00	BUMPONS RUBBER SQUARE .81 x .515"H		
105-10003-00	FILTER ELEMENT 2-7/8" x 7" x 3/16" TH		
105-40002-00	FUSEHOLDER PANEL MOUNT DOMESTIC		⚠
106-30004-00	GROMMET FAN MOUNT PM-350		
108-00102-00	INSULATOR, RAG PAPER .015"1.25" x 3.25"		
111-20051-00	SOLDER LUG #6		
111-20151-00	SOLDER LUG #10		
112-10003-00	MOTOR, FAN 18V		
112-20001-00	MOUNT TYRAP WHITE		
112-20003-00	MOUNT TYRAP, SCREW MNT #10		
115-30001-00	POST SPEAKER BINDING RED		
115-30002-00	POST SPEAKER BINDING BLACK		
118-60003-00	SPACER #4 CLR .250"D x .188"L		
118-60004-00	SPACER #4 CLR .250"D x .312"L NYLON		
118-60010-00	SPACER #6 CLR .250"D x .32"L METAL		
118-80012-00	STANDOFF THREADED 6-32 x .50"L NYLON		
118-80013-00	STANDOFF HEX THREADED 6-32 x .75"L		
118-90007-00	STRAIN RELIEF MCT.063 SJT 16/3 & 18/3		⚠
151-00154-00	SCREW MACH SCKT H BLK 10-32 x 1/2"		
151-20001-00	SCREW MACH PP BLK 440 x 1/4"		
151-20004-00	SCREW MACH PP BLK 440 x 9/16"		
151-20051-00	SCREW MACH PP BLK 6-32 x 1/4"		
151-20052-00	SCREW MACH PP BLK 6-32 x 3/8"		
151-20054-00	SCREW MACH PP BLK 6-32 x 3/4"		
151-20055-00	SCREW MACH PP BLK 6-32 x 5/8"		
151-20056-00	SCREW MACH PP BLK 6-32 x 5/16"		
151-20101-00	SCREW MACH PP BLK 8-32 x 1/4"		
151-20103-00	SCREW MACH PP BLK 8-32 x 1/2"		
151-20151-01	SCREW MACH PP BLK 10-32 x 1/4"		
151-30004-00	SCREW SHT MTL PP BLK 4 x 9/16" A		
151-30051-00	SCREW SHT MTL PP BLK 6 x 1/4" *B*		
151-30101-00	SCREW SHT MTL #8 x 1/4" TYPE *B* BLK		
152-00001-00	NUT HEX 6-32 x 5/16" ZC		
152-10002-00	KEPNUT 6-32 x 5/16" ZC		
152-10003-00	KEPNUT 8-32 x 11/32" ZC		
154-10052-00	WASHER FLAT #6 .156"ID x .562"OD x .040"TH		
154-20052-00	WASHER INT LOCK SAE BLK #6		
154-20351-02	WASHER INT LOCK CAD PLTD 1/2"ID		
154-40351-01	WASHER FLAT NYL 3/8"ID x 5/8"OD		
159-50001-00	TYRAP 3-3/8" L WHT		
159-50004-00	TYRAP 7-3/8" L NATURAL		

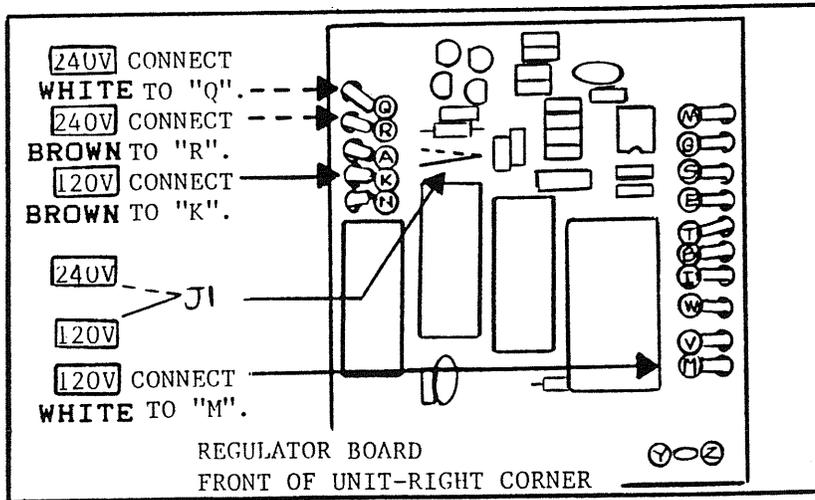
CARVER P/N	DESCRIPTION	REF DESIGNATORS	NOTES
201-00042-00	CAP CER DISC .047μF/100V 20%		Use on Fan
205-00058-00	CAP LYTIC 8000μF/100V RAD		
207-10002-00	CAP MET POLY .1μF/250V 10% AX		Use on Ground Lift Terminal
251-10104-03	RES CFILM 27K 1/2W UNPREP		Use on Ground Lift Terminal
259-10005-00	POT 50KB PANEL MOUNT		
315-14001-00	FUSE MDQ10		115V Version
315-12004 -00	FUSE MDL 6-1/4		230V Version
318-20001-00	SWITCH ROCKER SPDT BLK		
319-00031-00	RECTIFIER BRIDGE 200V 25A		
319-00055-00	TRIAC T03 F/P 25A 200V		
401-10114-00	WIRE 18 AWG TR-64 RED 6.5"		
401-10116-01	WIRE 18 AWG TR-64 BROWN 4"		
401-10167-00	WIRE 18 AWG TEW BLACK 20"		
401-20101-00	BUSS WIRE 18 GA 1.5"		
401-20108-00	BUSS WIRE 18 GA 1.25"		
401-90006-00	LINECORD 16 AWG SJT 6'		
402-10002-00	TUBING HEATSHRINK CLR 1/4"		
403-10003-00	SEALANT SILICONE RUBBER RTV		
403-10005-00	LOCTITE		
403-10007-00	PLASTIC ADHESIVE		
403-20001-00	THERMALCOTE #253		
403-40006-00	VELCO STRIP HOOK SIDE 5/8"		
502-30026-01	CHASSIS SCREENED PM-175/PM-350		
503-40021-01	PANEL FRONT SCREENED PM-350		
504-20026-01	COVER TOP PAINTED BLACK PM-350		
504-20028-01	COVER BOTTOM PAINTED BLACK PM-350		
506-20003-01	BRACKET EXT APP PAINTED BLK PM-175		
507-00020-00	BRACKET 50KB POT MNT PM-175/PM-350		
507-00027-00	BRACKET SUPPORT PM-175/PM-350		
507-00029-00	BRACKET FAN MNT PM-350		
508-00012-13	KNOB 22mm SMOOTH BLK 90 DGR		
509-20001-01	FERRULE 5/16" PAINTED BLK		
510-20001-01	HANDLE 2" PAINTED BLK		
512-10001-01	SPACER BLK OX 3/16"ID x 5/16"OD x .17"		
512-10703-01	PANEL ACCESSORY COVER SCREENED		
530-10064-00	LABEL 10A/120V SLO-BLO 1200W		
602-00426-01	ASSY PCB AMP PM-350		
602-00427-01	ASSY PCB REGULATOR PM-350		
617-10028-00	TRANSFORMER 115/230V PM-350		
617-10029-00	TRANSFORMER 115V PM-350		

# SECTION 9

## VOLTAGE CONVERSION FOR PM-350

For switchable units only, containing power transformers with a split primary winding (4 wires).

PM-350 120V/240V CONVERSION	
<p><u>CONVERSION TO 120V</u></p> <p>1. MOVE J1 TO 120V POSITION. ———</p> <p>2. MOVE TRANSFORMER <b>WHITE</b> WIRE FROM "Q" TO WIRE PAD "M". ———▶</p> <p>3. MOVE TRANSFORMER <b>BROWN</b> WIRE FROM "R" TO WIRE PAD "K". ———▶</p> <p>4. CHANGE FUSE TO <b>10A</b>/120V SLO-BLO.</p> <p>5. REMOVE <b>6A</b>/240V SLO-BLO LABEL.</p>	<p><u>CONVERSION TO 240V</u></p> <p>1. MOVE J1 TO 240V POSITION. - - - - -</p> <p>2. MOVE TRANSFORMER <b>WHITE</b> WIRE FROM "M" TO WIRE PAD "Q". - - - - -▶</p> <p>3. MOVE TRANSFORMER <b>BROWN</b> WIRE FROM "K" TO WIRE PAD "R". - - - - -▶</p> <p>4. CHANGE FUSE TO <b>6A</b>/240V SLO-BLO.</p>
530-10071-00	





**SECTION 10**  
**SERVICE BULLETINS**

Please insert Carver Service Bulletins pertaining to the PM-350 here to ensure proper repair in the future.

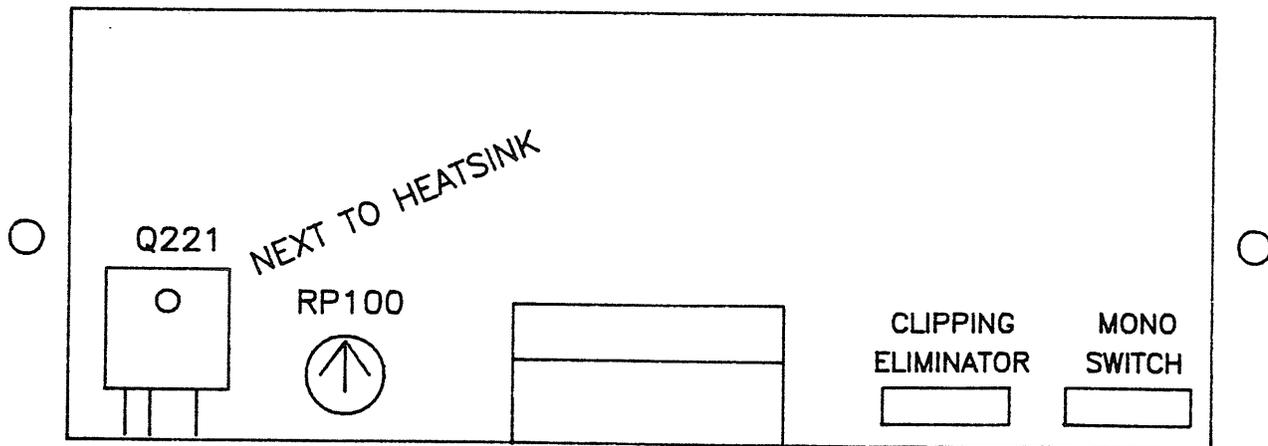
CARVER	SERVICE BULLETIN	PM350-4
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DATE 07-12-88	PRODUCT PM350	PCB MAIN
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SERVICE PRIORITY		ALL UNITS
		SERIAL NOS. (specify)
	X	AFTER REPAIR/WHEN INSTALLING ACCESSORY MODULE
		SPECIFIC CHANGE

### PROCEDURE

After repair, please locate Q221 (to 220 case) visible through the left side of accessory module panel. Make sure that it is positioned vertically to prevent possible short from case of Q221 to chassis of PMX module or of modules to come.



**CARVER CORPORATION  
SERVICE BULLETIN**

Service Bulletin # PM-350-5

Model PM-350

Serial # 5000 and below

Reason: To make the PMX interconnect cable connection stronger and simpler to install

Procedure: Change the Ribbon Connector to a Header Connector and add mini-link plug.  
Install the mini-link's between pins 5 & 6 and between pins 7 & 8

NOTE: PMX's below S/N 600 will NOT plug into this amplifier unless the PMX is modified by replacing the interconnect cable or using a adapter.

ECD #954

Delete: Qty (1) 160-20005-00 J5  
(Ribbon Connector)

Add: Qty (1) 160-30013-00 J5  
(Molex Header)  
Qty (2) 160-20007-00  
(Mini-link jumper)

SERVICE APPROVAL \_\_\_\_\_  
ENGINEERING APPROVAL \_\_\_\_\_

3/07/89

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Printed in U.S.A.

P/N 990-20023-01  
Rev. B

# CARVER

*Powerful · Musical · Accurate*

**MODEL PM-350**

**Magnetic-Field Power Amplifier™**

OPERATOR'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

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**WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.**

**TO AVOID ELECTRICAL SHOCK, DO NOT OPEN CHASSIS. NO USER-SERVICEABLE PARTS INSIDE. REFER ALL SERVICING TO QUALIFIED PERSONNEL.**

**CAUTION: Read and follow all safety and operating instructions.**

#### **CARVER CORPORATION LIMITED WARRANTY**

**NOTICE: the following warranty is exclusive to the United States only. Please see your Carver dealer or distributor for the correct warranty information in your area or locale.**

Carver Corporation is proud of its products which have been built with care using advanced technology and premium parts. Your unit has been crafted to perform properly for many years. Carver Corporation offers to you, the owner of a new Carver product, the following warranty:

The Carver Corporation Warranty for each of its products is in effect for one year from the date of original retail purchase. The Carver Corporation Warranty covers defects in materials and workmanship. However, the following are excluded: a) damage caused during shipment, b) damage caused by accident, misuse, abuse or operation contrary to instructions specified in the Carver Corporation owner's manual, c) units where the serial number has been defaced, modified or removed, d) damage resulting from modification or attempted repair by any person other than authorized by Carver Corporation.

The Carver Corporation Warranty extends to the original owner or subsequent owner(s) during the one-year warranty period so long as the original dated purchase receipt is presented whenever warranty service is required.

If your Carver Corporation product ever requires service, write to or call Carver Corporation (Attention: Customer Service Department), P.O. Box 1237, 20121- 48 Ave W., Lynnwood, WA 98036, (206) 778-0509. You will be directed to an Authorized Carver Corporation Service Station or receive instructions to ship the unit to the factory. Please save the original shipping carton and packaging material in case shipping is required. Please do not ship by Parcel Post. Be sure you have specific authorization from Carver Corporation and include a complete description of the problem, the associated components and connections and a copy of the purchase receipt. Initial costs are not paid by Carver Corporation; return shipping costs will be prepaid if repairs were covered by the scope of this Warranty.

All implied warranties or merchantability and fitness for particular purpose, are limited in duration to the one-year length of this warranty, unless otherwise provided by state law.

Carver Corporation's liability is limited to the repair or replacement, at our option, of any defective product and shall not, in any event include property or any other incidental or consequential damages which may result from the failure of this product.

Some states do not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state. We suggest that you attach your purchase receipt to this Warranty and keep these in a safe place. Thank you for your choice of a Carver Corporation product.

Carver Corporation  
20121 -48th Ave. W.  
P.O. Box 1237  
Lynnwood, Washington 98036  
(206) 778-0509

Congratulations on the purchase of your professional PM-350 Amplifier. It represents the latest technology in Carver's patented Magnetic Field Power Supply. This efficient supply coupled with a unique amplifier design provide you with the very best in performance. Because of the specially designed protection system 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 is the quality that our customers have come to expect.

A handwritten signature in black ink, appearing to read "Bob Carver". The signature is fluid and cursive, with a long horizontal stroke at the end.

Bob Carver

**SPECIFICATIONS: CARVER PM-350**

**Power: 8 ohms, 350 W/channel 20-20kHz**  
**both channels driven with no more than 0.5% THD**

**4 ohms, 450 W/channel 20-20kHz**  
**both channels driven with no more than 0.5% THD**

**2 ohms 450 W/channel 20-20kHz**  
**both channels driven with no more than .5% THD**

**Bridging: 900 Watts into 8 ohms**  
**750 Watts into 16 ohms**

**THD-less than 0.5% at any power level from 20 mW to clipping**

**IM Distortion less than 0.1% SMPTE**

**Frequency Bandwidth: 5Hz-80kHz**

**Gain: 31 dB**

**Input Sensitivity: 1.5 V rms**

**Damping: 200 at 1kHz**

**Slew rate: 25 V/micro second**

**Noise: Better than 115 dB below 350 Watts, A-weighted**

**Inputs: Balanced to ground, XLR or TRS phone jacks**

**Input Impedance: 15k ohm each leg**

**Compatible with 25 V and 70 V systems**

**Mounting: Standard 19" rack with 3.5" space**

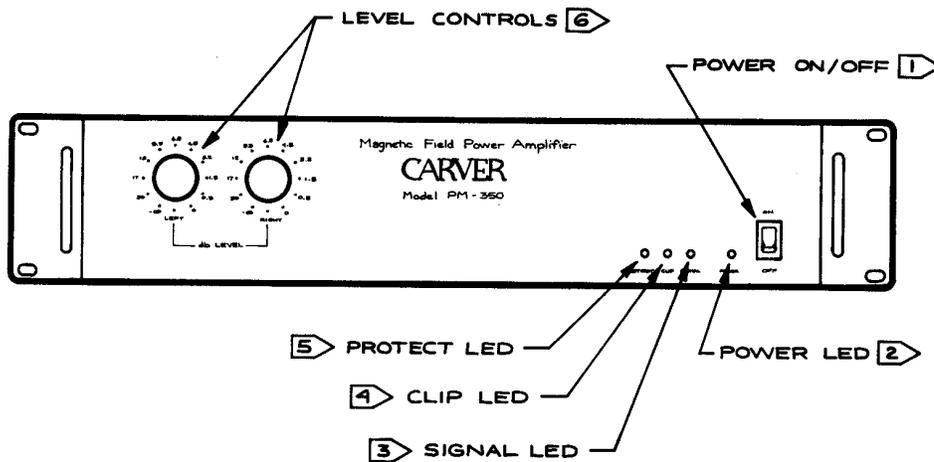
**Height: 3.5"**

**Width: 19"**

**Depth: (front to back of chassis): 11.56"**

**Weight: 21 lbs.**

FIG. 1-A FEATURES AND FUNCTIONS



1. POWER ON/OFF

This switch powers up the amplifier with a "slow startup" eliminating a turn-on current surge.

2. POWER LED

Upon startup, the lit green LED indicates the amplifier is ready for operation.

3. SIGNAL LED

The Signal LED indicates the presence of audio greater than 100 mW at the output of either the left or right channel. This LED is beneficial in system checkout and monitoring.

#### 4. CLIP LED

The amber Clip LED will flash at the point of clipping for either the right or left channel. When the Clip LED flashes it indicates that the headroom of the amplifier has been exhausted. If the Clipping Eliminator switch is pushed in, then the Clip LED will indicate operation of the Clipping Eliminator.

#### 5. PROTECT LED

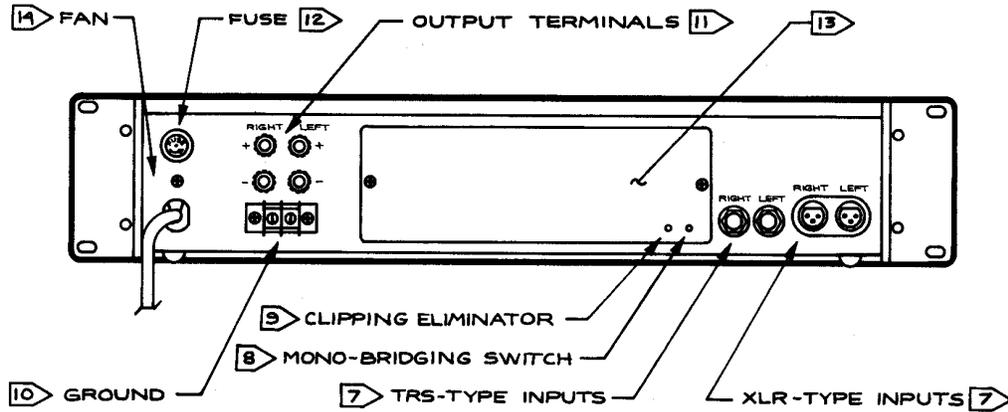
If the Protect LED is brightly lit, then the amplifier is either being driven into a short-circuited load, or with excessive high frequency (non-musical) signals. The Protect LED will go out if the fault condition is removed or corrected.

If the Protect LED is dimly lit for more than 10 seconds, then a fault condition has occurred within the amplifier. It indicates that the power supplies have been automatically limited to an extremely low output level. This prevents the power supply or amplifier failure from damaging the loudspeakers. See Troubleshooting section.

#### 6. LEVEL CONTROLS

The Input Level Controls exist for each channel to progressively reduce the amplifier's input sensitivity. Turn fully clockwise for maximum sensitivity. Each control has eleven detents for precise adjustment without tracking-induced variations in level settings between channels. The left Level Control provides the control during mono-bridged operation. The controls also allow for easy return to predetermined settings with minimum error.

FIG.1-B FEATURES AND FUNCTIONS



## 7. INPUTS

Signals to drive the PM-350 are supplied to either a dual differentially balanced pair of female XLR connectors or a pair of TRS 1/4-inch phone jacks. Both styles of connectors have the same input impedance: 15K ohms each leg balanced to ground for a total input impedance of 30K ohms. The input overload point for the line amplifier is 7 volts RMS. This ensures full compatibility with all modern signal sources, for both input overload and an optimum input signal to noise ratio.

The balanced XLR and TRS inputs allow single-ended (unbalanced) input operation without switches or adaptors. The only thing required is a set of properly wired signal cables. See Amplifier Input/Output Connections section. For each channel the XLR and the TRS input connectors on the PM-350 are wired in parallel to allow signals to be passed on when cascading multiple amplifier arrays.

#### 8. MONO-BRIDGING SWITCH

This switch is used for operating the PM-350 as a mono (single channel) amplifier. Before operating the PM-350 in mono-bridged mode, this switch must be pushed to the recessed position to invert the left channel drive signal. Gently push the switch in with a narrow screwdriver. Never activate this switch with the amplifier turned ON. To resume dual channel operation, push the switch to its released position.

#### 9. CLIPPING ELIMINATOR SWITCH

This switch protects the speakers from potential damage caused by amplifier hard clipping. The squared-off waveforms that result from hard clipping can ruin sensitive speaker elements. The Clipping Eliminator also helps maintain the overall sound quality of a system by reducing the clipping-induced distortion that is both annoying and fatiguing to the listener. This problem is common with conventional amplifiers that have less headroom than the PM-350.

When this switch is pushed in (ON) the circuitry detects and eliminates hard clipping. The Clipping Eliminator efficiently reduces amplifier clipping to no more than 3% THD. with input signals up to 13 dB of overdrive.

#### 10. GROUND

A small barrier strip provides a means of altering the grounding scheme of the PM-350. When it comes from the factory, a jumper bar connects the amplifier ground to the amplifier chassis. For normal operation the jumper should remain in place. Removing the jumper may be helpful in solving certain ground-loop hum and noise problems. Removing the jumper leaves a 0.1 uf capacitor in parallel with a 27K ohm resistor between the amplifier ground and the chassis.

#### 11. OUTPUT TERMINALS OR BINDING POSTS

The PM-350's speaker connections are two vertical pairs of five-way binding posts that supply output to the loudspeakers for both dual-channel and mono-bridged operation. The output binding posts accept both single- and dual-banana plugs, spade lugs and stripped or tinned leads.

#### 12. FUSE

REPLACE WITH THE SAME TYPE AND RATING ONLY (MDA 10 or 10A, slo-blo equivalent). The PM-350's fuse type and value allow full dynamic range and allow the amplifier to track the most powerful musical waveforms without compromising the safety of the transformer and triac control circuitry. Never replace the fuse with a different type or rating. Never use a fuse bypass or "cheater". Doing either of these can result in serious amplifier damage and will void the warranty. Make sure the AC line cord is unplugged before replacing the fuse. If the fuse blows immediately after initial replacement, remove the amplifier for servicing.

#### 13. ACCESSORY MODULE PANEL

This panel may be removed by qualified service personnel for the purpose of installing proposed signal processing modules, ie. crossovers, compressors, noise gates.

Consult your Carver Professional Products Dealer for the type and availability.

#### 14. FAN

The PM-350 uses a method of forced-air cooling to promote overall thermal stability and long term operational reliability. The PM-350 draws air through the right side intake port and exhausts through the top and left side.

The PM-350 uses a proportional internally monitored system where fan speed is tied directly to the demands placed on the amplifier's power supply, as well as the heatsink temperature. When no signal is present at the inputs, the fan operates quietly at a very slow speed. As drive signal is applied to the amplifier, the fan speed increases as the power output of the amplifier increases, and decreases as the output decreases. At high operating levels or installations where there is restricted air flow, the fan speed operating range is automatically increased over a given amount of time. This is accomplished by a thermal device that is constantly monitoring the heatsink temperature. If the heatsink temperature should go over 90 degrees C, the amplifier will completely shut down until it has cooled. Check to make sure the fan intake port and exhaust vents are unobstructed and the foam fan filter is clean.

## INSTALLER'S CHECKLIST

1.  Placement of Amplifier.
2.  AC Connections
3.  Amplifier Input/Output Connections
4.  Initial Power up
5.  Fill Out and Mail Warranty Card.

Keep the carton and packing material your amplifier came in. For shipping and service shipment the best container is the original carton.

### 1. CHECK PLACEMENT OF AMPLIFIER

If the PM-350 will be used in mobile sound systems, be sure it is securely rack mounted in an equipment rack or enclosure.

Air must be free to enter the intake port on the right panel and exhaust through the left side and top. In a permanent installation where the PM-350 is housed in a special amp room, be sure the room has adequate ventilation.

When mounting equipment in a case or rack, it is a good practice to install the heaviest components in the bottom of the enclosure. This helps stabilize the enclosure during handling.

### Mobile Rack Installation

The PM-350 is completely rack-mountable and ready to be installed in any standard equipment rack, road/flight case or in any other type of rack mount enclosure.

## 2. [ ] AC CONNECTIONS

BE SURE POWER SWITCH IS OFF.

The PM-350 should be connected to an AC outlet or receptacle rated for no less than 1200 W. If your sound system uses several amplifiers, then be sure your power bar, outlet strip or special power block can safely handle the total maximum wattage of all the sound system components.

Although output power specifications are conditional to having an AC line voltage of 120V/60Hz (stable), your amplifier will operate on AC lines voltages from 100V to almost 140V.

If the outlets used to power the system are exposed to foot traffic, secure the plugs to the outlet and the AC line to the wall/floor with tape. This aids in preventing accidental disconnection.

If an extension cord is used, be sure it is the three-prong (grounded) type and 12 gauge or heavier. The longer the extension cord, the heavier the gauge required for safety and minimum line loss.

## 3. [ ] AMPLIFIER INPUT/OUTPUT CONNECTIONS

### DUAL CHANNEL OPERATIONS

The PM-350 can be operated with both channels amplifying a stereo pair of drive signals or two signals independently in dual channel mode. Also bi-amplified/multi-amplified loudspeaker systems will take advantage of the dual-channel mode of operation when driving separate low frequency/upper frequency elements.

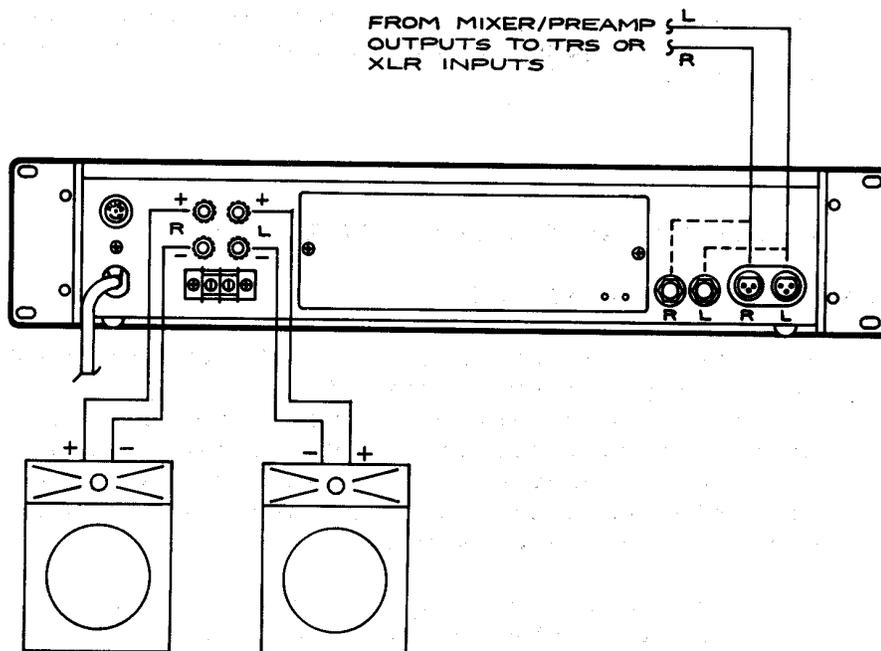
With the power for the PM-350 and other components in the system completely off, connect the cables that run from the outputs of the mixer/preamp or crossover to the appropriate

left/right channel inputs on the PM-350. Figure 2.

Be sure that the connectors are firmly in their respective jacks. Connect the speaker wires between the output terminals of the amplifier and the loudspeakers, being careful to maintain the proper speaker phasing. (Figure 2). The PM-350 should be connected to loudspeakers with a nominal impedance of 4-ohms or greater.

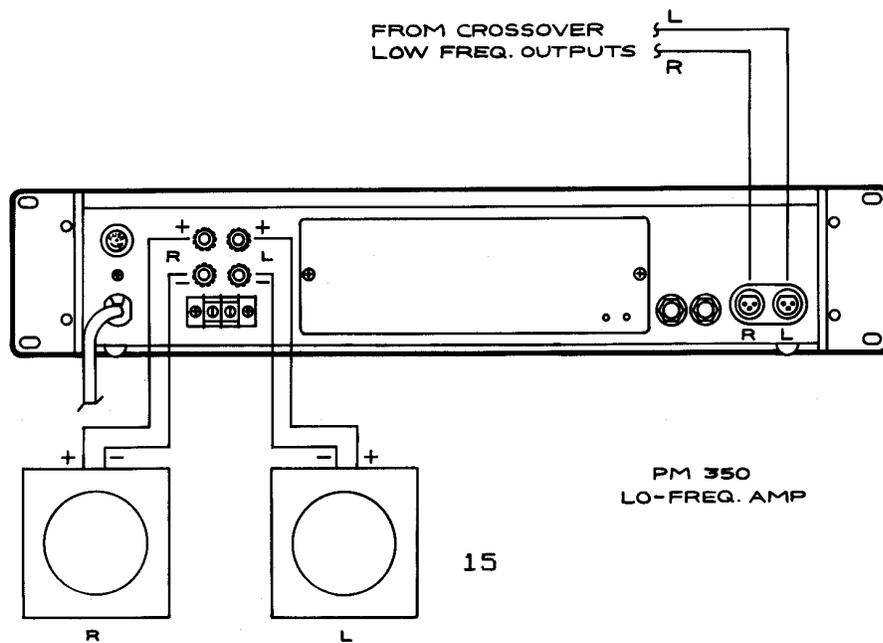
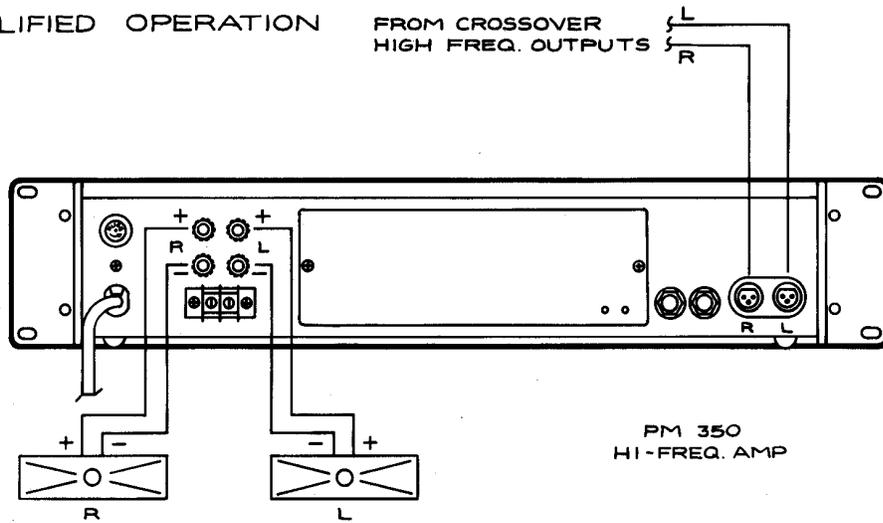
In Figure 2, the left-main output of the mixing console is connected to the left-channel input of the PM-350. The right-main output of the mixing console is connected to the right-channel of the amplifier in a stereo configuration.

FIG. 2 DUAL CHANNEL OPERATION



If your sound system uses bi-amplified or multi-amplified loudspeakers, make connections from the high frequency output of the crossover to the high frequency amplifier's inputs. Also make connections from the low-frequency output of the crossover to the low frequency amplifier's inputs. Figure 3.

FIG. 3 BI-AMPLIFIED OPERATION



## MONO-BRIDGED OPERATION

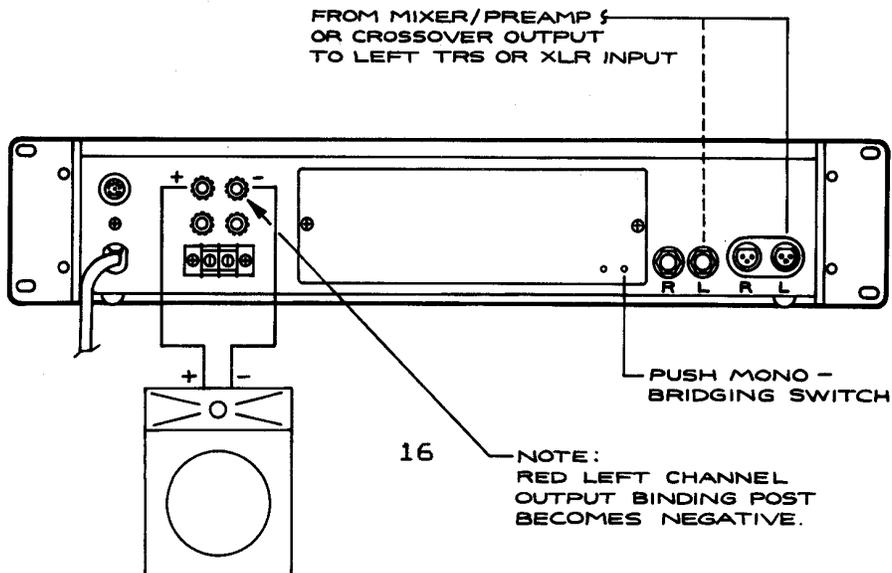
The PM-350 may be used as a single-channel amplifier by setting-up and connecting it as follows.

MAKE SURE POWER IS OFF. Use a narrow screwdriver to push the Mono-bridge switch IN. This switch inverts the phase of the left-channel input signal which is necessary to operate in mono-bridge mode. Push the switch to its released position to return to Dual-Channel operation. Never activate this switch with the POWER on.

In balanced or unbalanced modes signal is supplied to the LEFT channel input only. Use either the XLR connector or the TRS phone jack.

The PM-350 must be used with a loudspeaker with a nominal impedance of 8 ohms or greater when operating in mono-bridged mode. Connect the red binding posts of both output pairs to the loudspeaker. The red left channel binding post becomes the (-) and the red right channel binding post is the (+). If you are using dual-banana plugs for terminating the speaker wire, clock the locator tab on the (-) side so it is connected to the red left channel binding post for proper phasing of the output connections. See Figure 4.

FIG. 4 MONO - BRIDGED OPERATION



## DETERMINING BALANCED OR UNBALANCED

The connections are made in either balanced or unbalanced mode depending on your requirements and output capabilities of the components driving the PM-350. Check your mixer/preamp or signal processing component for balanced or unbalanced outputs. Selecting a mode depends on where and how the system is installed and operated. Running a balanced system reduces noise and rejects interference especially when it comes to long runs of snake cable or interconnect lines from the mixing console/crossover.

If you plan to operate a balanced system, make sure everything is balanced ie. balanced outputs from the console going to the balanced inputs on an equalizer or crossover going to the balanced inputs on the PM-350. If other amps are being supplied signal via the paralleled input connectors on the PM-350, these input connections must be balanced also. The same is true for unbalanced mode. KEEP YOUR CONNECTIONS EITHER ALL BALANCED OR ALL UNBALANCED. A mix of balanced and unbalanced can cause severe noise, hum or possible damage to the output circuitry on some balanced-drive, low-level components.

NOTE: The majority of system problems originate with improperly wired or faulty cables.

Make all connections to and from the PM-350 with its power switch OFF and the power for all other components in the system switched OFF or with line cords unplugged.

## BALANCED CABLE

Selecting which input connectors to use to supply drive signals depends on:

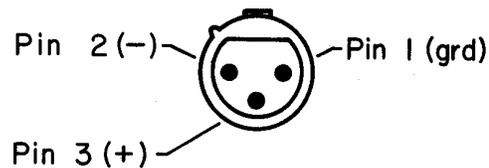
- 1) the output connectors on the component supplying signal. Signal may be supplied to the XLR or to the 1/4-inch TRS phone jacks or

2) the type of connectors used as terminations on the stage box of a multipaired snake cable.

The pin configurations for the PM-350's input connectors are:

1. Female XLR Inputs: the connectors are wired so that Pin 1 is ground, Pin 2 is (-) Low, Pin 3 is (+) High. Figure 5.

FIGURE 5



2. 1/4 inch TRS (Tip, Ring, Sleeve Inputs): These jacks are wired so that the Tip is (+) High, Ring is (-) Low, and the Sleeve is ground. Figure 6.

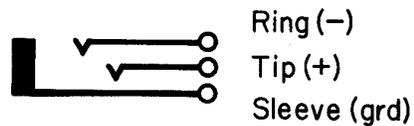


FIGURE 6

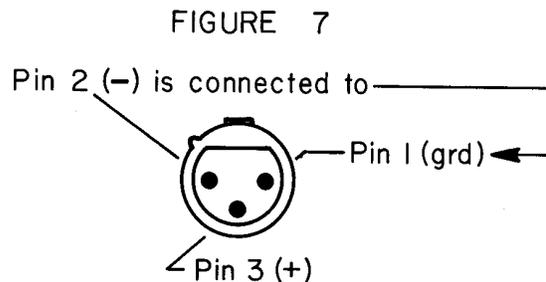
Balanced cord configurations should always be made in-phase. Examples:

Pin 1 on the PM-350's female XLR input corresponds to Pin 1 on a male XLR connector at the output of the component supplying drive signal.

Since the PM-350's input connectors are wired together in parallel, the unused connectors can supply signals when cascading several amplifiers with the same drive signal. However, the patch cords must be wired in balanced mode.

#### UNBALANCED CABLE

1. Female XLR-type Inputs: The cables supplying unbalanced drive signals are wired so the (+) is connected to Pin 3 and the ground to Pins 1 and 2. Figure 7.



NOTE: Failure to connect Pins 1 and 2 will result in an approximate 50% reduction in gain.

2. 1/4-inch TRS (Tip, Ring, Sleeve) Inputs: The TRS 1/4" phone plugs are wired so that the tip is (+) and the ring and sleeve are wired to ground. When using standard (mono) 1/4" phone plugs, the ring and sleeve are automatically connected to ground. Figure 8.

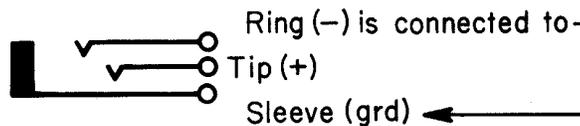


FIGURE 8

NOTE: Failure to connect ring and sleeve will result in an approximate 50% reduction in gain.

Signals to cascade amplifiers in the unbalanced mode are made ideally by supplying main drive signal to the XLR connectors. Use the standard (mono) 1/4" phone plugs to connect the other amplifiers.

#### SPEAKER WIRE

Use high quality speaker wire to connect the output terminals to the loudspeakers. While speaker wires as light as 16-gauge can be used to connect the amplifier to the loudspeakers, heavier-gauged speaker wires should be used in wire runs over long distances. Heavier speaker wires minimize line losses and will improve the damping factor.

The type of speaker wire connection depends on your system's application. For mobile sound systems, dual-banana plugs are a safe and convenient method of terminating speaker wires at the amplifier and loudspeakers. Dual-banana plugs have a locator tab along one side which usually denotes the ground (-) side of the terminals and speaker wire. For permanent installations, tinned leads or spade lugs provide excellent terminations.

Speaker wires may be purchased with the proper terminations and wire gauge for your amplifier and loudspeakers. If you are not sure how to put a good cable system together, consult your Carver Professional Products Dealer.

4. [ ] INITIAL POWER UP

WARNING: IMPROPER POWER UP/ POWER DOWN PROCEDURES  
MAY CAUSE DAMAGE TO LOUDSPEAKERS.

Make sure Power switch is OFF.

Turn left and right Level Controls to  
full counterclockwise position.

Push Power switch ON.  
Green Power LED lights.

Turn Level Controls to desired input  
sensitivity levels.

Red Signal LED should light when there is  
an audio output greater than 100 mW at  
either the right or left channel.

If Power LED or Signal LED does not light  
see Troubleshooting section.

5. [ ] FILL OUT AND MAIL WARRANTY CARD

## OPERATION

Do not operate the PM-350 into nominal loudspeaker impedances less than 4 ohms in dual channel operation, 8 ohms nominal loudspeaker impedances in mono-bridged mode.

## POWER UP

Reduce master gain controls on the instrument preamp or mixing console. Turn ON all low-level components in the sound system. This includes mixing consoles, on-stage instruments, effects devices, tape machines, signal processing equipment and crossovers. Turn ON the PM-350 and other amplifiers.

## POWER DOWN

Reduce master gain control levels at the preamp or console. Turn OFF the PM-350 and other amplifiers. Wait for their power supplies to discharge. Turn OFF the low-level equipment.

## POWER INTERRUPTION

Immediately reduce master gain controls at the preamp/mixer. Then restart the whole system when power is fully restored.

## PROTECTION SYSTEMS

Several protective circuits have been built-in to guard against major faults that could damage the amplifier or the loudspeakers.

Turn ON: "Slow startup" circuitry prevents an excessive AC line current surge when the amplifiers are turned on with the power ON/OFF switch or simultaneously by a Master Power AC line switch.

Input mute: The inputs are muted 4 seconds during turn-on. If low level driving equipment is accidentally turned on with the amplifiers, the input muting will prevent turn on "thumps" from reaching and possibly

damaging the loudspeakers. The loudspeakers will also be protected from this condition during momentary power failures.

Short circuit: Protect LED is lit. A short circuit load exists across either the left or right output binding posts. The output transistors are current limited. The inputs are muted to prevent the amplifier from driving into a short circuit condition. The amplifier will immediately resume normal operation when the fault is removed.

Excessive High-frequency signals (non-musical): Inputs are muted. The Protect LED is lit until the problem is eliminated. In excessive high frequencies, the protection circuits have been designed to react only to signals and oscillations that are different than any conceivable music signal. Generally, excessive high frequency feedback and preamp/mixer problems will activate these circuits.

DC Offset: Significant DC offset (2-4V DC) present at the outputs. Power output is significantly reduced. Protect LED is lit but dim.

Internal, Low-level Supply Fault: Internal component problem causing imbalance in the amplifier's low-level power supplies. Power output is significantly reduced.

Amplifier Overheated: Activated when the heatsink temperature exceeds 90 degrees C. All LED's are off.

Depending on the fault condition or problem that activates the PM-350's protection circuits, the amplifier will give a visual indication and/or simply shut itself off.

## MAINTENANCE

### Cleaning your Amplifier

Use a soft, dry cloth to wipe the front panel and chassis. For stubborn stains use a mild detergent sparingly on a soft cloth. Do not use ammonia, alcohol or other strong solvents.

### Cleaning your Fan Filter

Clean the filter as needed. Remove the filter from the rear of the chassis and shake out loose dirt and smoke buildup. If the buildup is heavy, use compressed air to clean the filter. Do NOT use ammonia or other strong solvents to clean the fan filter.

## TROUBLESHOOTING

Most problems include faulty interconnect cables and cords. Check each cable and cord with a good cable tester. Replace any faulty cables before continuing with Troubleshooting.

PROBLEM	SOLUTION
LEDs Off at Power Up	Check AC line cord and power switches on outlet strip or power block.
All LEDs Off during operation	Check fuse and replace if necessary. If fuse is O.K. then: the amplifier has thermalled out and has reached a temperature greater than 90 degrees C. Bring Level Controls down, and when the unit has cooled to 65 degrees C the unit will automatically switch ON.

Protect LED (bright)

Inspect speaker wires for frays and shorts.

Check for high frequency oscillation at inputs caused by unstable driving equipment. Turn down left and right Level Controls to full counterclockwise or oo. If LED goes out, replace faulty equipment.

Protect LED (dim)  
or ON LED (dim)

When dim more than 15 seconds, an internal fault has occurred within the amplifier. This will indicate either a power supply failure or the presence of DC at either the Left or Right channel outputs. In this case servicing the amplifier will be required.

Amplifier gets wet

Have it dried and checked out by service personnel. Clean before returning it to operation.

Noise or hum

Certain sensitive low-level components might pick up noise or hum from the PM-350 or other power amplifiers. If this occurs, separate the components and amplifiers until noise stops. Another option is to install a shielding

plate between the components for the same results. If the amplifier is being driven in a BALANCED configuration, then the ground lead may be lifted on either Pin 1 of the XLR plugs or the sleeve on the TRS phone plugs. This ground shield must remain connected to the output of the driving equipment.

**One channel dead**

Check dead channel input cables. Inspect all connections to be sure of a firm fit in their respective jacks at the amplifier inputs and the outputs of the preamp/mixer.

Check the speaker leads at the amplifier's output binding posts and at the loudspeakers for disconnection.

Inspect the loudspeaker fuses.

**Lack of bass**

Check speaker wires for proper phasing. If in dual channel operation, check to see if the Mono-bridging switch is in its proper released position.

**Main fuse blows**

Replace ONLY with same type and rating. Using a larger fuse or fuse bypass can result in serious amplifier damage and will void the warranty.

The Amplifier may be running beyond its capacity.

- 1)SWITCH POWER OFF
- 2)UNPLUG AMPLIFIER
- 3)REPLACE FUSE
- 4)POWERUP AMPLIFIER

If fuse IMMEDIATELY blows again, remove amplifier for servicing.

**Overheated**

If the internal heatsink temperature should go over 90 degrees C or 194 degrees F, the amplifier will completely shut down until it has cooled. Check for adequate ventilation.