CARVER C-500
Specifications

1. Power Output: 250 watts per channel continuous RMS. 20Hz - 20 KHz into 8 ohms at no more than 0.05% THD. 454 watts per channel minimum RMS at 1 KHz into 4 ohms at no more than 0.05% THD.

2. Intermodulation Distortion: (60Hz: 7 KHz = 4:1) Less than 0.05% at rated power.

3. Dynamic Headroom: (IHF-A-202) 2 dB.

4. Frequency Response at 1 Watt: 1Hz to .25MHz.

5. Coupling: DC.

6. Sensitivity: With controls set to full clockwise, 1.5 V for full rated power.

7. Input Impedence: 39K ohms.

8. Phase Inversion: The C-500 inverts the phase of the right channel. The speaker terminal color-coding is reversed for this channel to restore correct relative and absolute phasing.

9. Signal-to-Noise Ratio: All hum and noise is at least 100 dB below rated output, IHF "A" weighted.

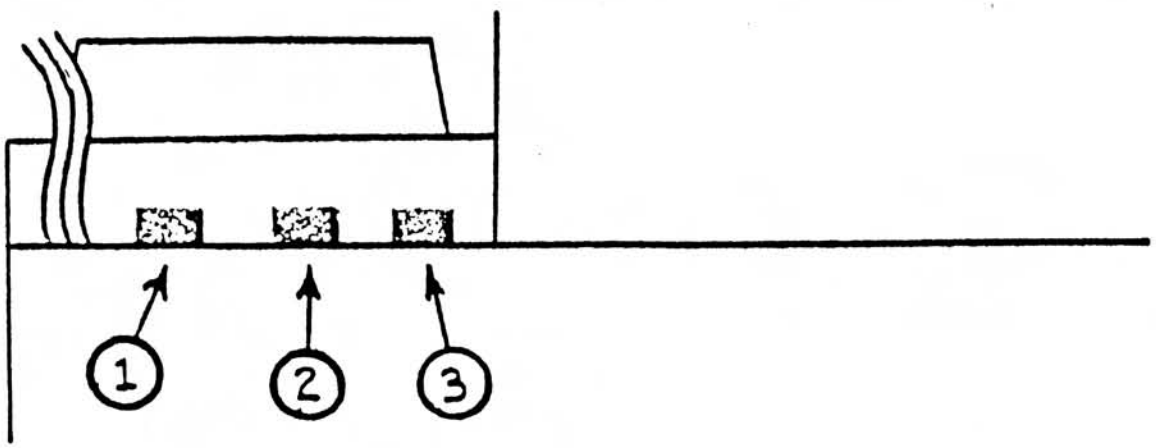
C-500 Supply Fusing and Protection

Protection is accomplished by the following:

1) Thermal switch on heatsink: Will turn unit off (LEDS go off) if heatsink exceeds temp. threshold. Will stay off usually about 5 minutes. Install "boxer" fans on heatsink if thermal switch cuts out.

2) Input Clampers: Will cut signal off if it exceeds clamper threshold. Flashers will come on, sound will go off, for about 3-5 seconds.

3) Supply Fuses: Primary and secondary are fused. Fuses are as follows:



1: Line fuse (primary)

- AGC 10 (long, 10 amp) (5 amp for 220V)
- Only blows if bridge rectifier shorted.

2: Negative supply fuse (secondary)

- AGX 5 (short, 5 amp) for 8 ohm loads
- AGX 8 (short, 8 amp) for 4 ohm or mono.
- May blow on musical peaks, indicated by badly distorted output after clamper lets go.
- Will blow if output transistor is shorted.

3: Positive supply fuse (secondary)

- Same as #2.

C-500 Test Procedure

Outline:

1. Power Supply
2. Powering-up
3. Output Signal No Load
4. Output With 8 ohm load
5. Clampers
6. Distortion/Bias Setting
7. Offset
8. Limiters
9. Display

Equipment Needed:

Low distortion audio signal generator

DVM or VTVM

Dual-trace oscilloscope, high input impedence

250 watt 8 ohm load resistors (2)

THD/IM Analyzer

AC Variac, 10 amps

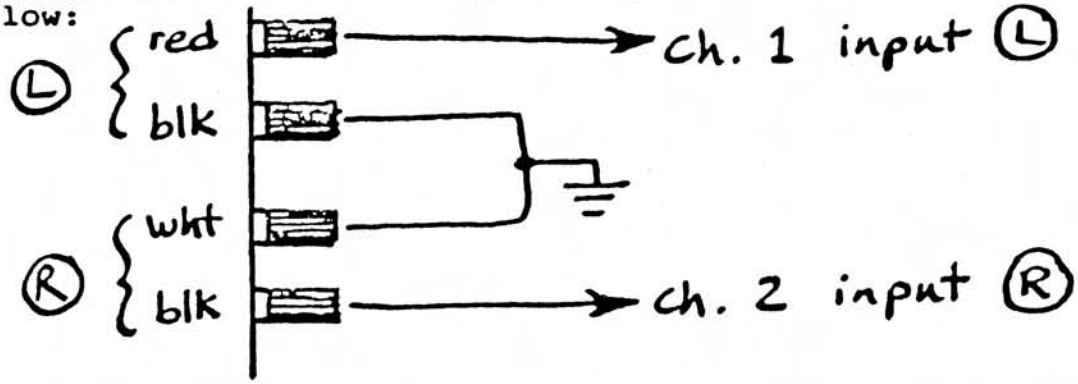
1. Power Supply - Before plugging in AC line cord, refer to "C-500 Supply Fusing and Protection" for details on fusing. Check all fuses, verify correct values.

   IF ANY FUSE IS BLOWN, DO NOT POWER UNIT UP EVEN AFTER REPLACING FUSE. REFER TO C-500 TROUBLESHOOTING PROCEDURE FOR PROPER PROCEDURE TO AVOID FURTHER DAMAGE TO C-500.

2. Powering-up - Plug line-cord into a variable line transformer (variac), an4 slowly turn it up to the required line voltage (117 or 230). Watch for any evidence that the amplifier is drawing current from the line (observe current meter if variac is equipped). Set variac for full voltage (100% line). Verify that the left-most LED segment is lit after 30 seconds.

   Note: Clampers may come on, indicated by flashers at right end of display, during power-up on variac. The display may "jump" toward the right at the instant of turn-on, but should quickly settle to the far left.

3. Output Signal With No Load - Connect signal generator set to no output, to the left and right inputs on the C-500. Connect AC Voltmeters and Dual-trace scope to speaker terminals as shown below:



Make certain to observe this connection because of the floating ground of the lower (right) speaker terminals.

Drive both inputs with a 2k Hz signal, set Input Sensitivity pots at full clockwise, observe output voltage on scope. Two channels should appear 180 degrees out of phase. Increase input level until output clips. Verify clipping is symmetrical for both channels. Reduce input level.

4. Output Signal With 8 Ohm Load - Connect two, independently wired 8 ohm load resistors across the two channels of the C-500 outputs. Drive amplifier to clipping at 2k Hz. Verify no less than 45V RMS before clipping. Repeat this test at 20 Hz, 200 Hz, verify 45V. Test at 20k Hz: note clamper will turn input off when approaching full power. Reduce input level.

5. Clampers - Clampers will kill input signal under the following conditions:

   - One channel driven to full power below 30 Hz.
   - Both channels 4riven to full power at 20k Hz.
   - Both channels clipped severely at 2k Hz.

Drive the amplifier under these conditions, and verify that, when clamper comes on,

   - Output goes to OV.
   - Flashers on right end of display come on.
   - Signal display goes to far left end of display.

6. Distortion/Bias Setting - Monitor left channel output with a THD analyzer. Loads should remain in place. Drive to full power (250W) at 2k Hz, verify no more than 0.05% THD. Repeat for right channel. Set input level such that output is 2k Hz, 1 Watt. Observe distortion trace for crossover notch. Notch should be smooth, without evidence of ringing, or of other non-linear components. If distortion is greater than 0.05%, or no notch is visible on distortion trace, refer to troubleshooting guide for full bias setting procedure.

7. Offset - Measure across the output terminals of each channel for presence of DC voltage and verify ± 10 mV or less with no inputs connected to the unit.

8. Limiters - Drive both channels at 200 Hz, 1 watt. Use a tool to short-circuit left channel. Drive to full power (250W) for 2 seconds, remove short. Minor arcing may occur. Verify normal output resumes and no fuses blow. Fuse may blow if short is left on 5 seconds or longer. Reduce to 1 watt level. Repeat for right channel.

9. Display - Drive at 2k Hz, increase generator output until clipping into 8 ohms. Observe both displays between -5 and 0 dB on scale, flashers on. Slowly reduce the left Input Sensivitity control while observing display for any missing segments. Repeat this for right channel. Depress Display Sensitivity +15 dB switch IN. Advance left and right sensitivity pots until both displays just reach 0 dB on scale. Depress PK locking switch IN, and release -15 dB switch. Observe slow decay of display level. Release PK locking switch OUT, observe steady -17 dB ± 2 sets of LEDS on display scale. Return both level controls to full clockwise. Reduce generator level in 10 dB steps until display reaches left extreme. Verify that both channels track within ± 2 sets of LEDS. Repeat this test at 20 Hz and 10K Hz. See Troubleshooting guide for instructions on setting display levels for minimum mistracking.

C-500 TROUBLESHOOTING

(Refer to new schematic part numbers)

1. Many defective semiconductor devices can be isolated in-circuit, both on the main PCB and in the output stage.

All measurements should be taken with the unit unplugged and supply caps discharged. Measure the forward-biased resistance of the diode or transistor junction with an ohmmeter on the RX1, RX2, or 2K scale. A good device will usually measure between 400 and 700 ohms. Actual readings will carry from meter to meter; some meters do not have sufficient test voltage to turn on a semiconductor.

To test for shorted output transistors, remove all loads from output connections, remove both supply fuses (AGX5). Place the negative ohmeter probe on the collector buss-wire of one bank of output transistors at a time, touch the positive meter probe to the emitter of each of the output transistors. If one transistor is shorted, they will all read very low (usually less than 1 ohm), but one (or more) will read slightly lower than the rest --- this is the defective transistor. If all read low and the same, repeat the above test with the negative probe on the base buss-wire.

2. To disable the protective circuitry for troubleshooting purposes, it will be necessary to remove <u>one lead</u> from the following parts:

<u>Clamper</u> - CR-29, 30, 31, 32.
<u>Current Limiter</u> - CR-4, 9, 15, 18.

Always make sure these parts have been re-installed on the board before driving the amp to full power.

3. To set Bias, first warm-up the C-500 at 2KHz, 1 watt into 8 ohms for about 60 seconds. Remove all input and output connections, and measure the DC voltage drop across the output-emitter resistors 100 ohms per ½ watt, between output terminal buss and emitter of RCA 410 positive driver transistor, each channel. Adjust R9 and R41 for 380 mV ± 100 mV. Measure THD at 2KHz, 1 watt per 8 ohms, and check to verify smooth, symmet-

rical crossover notch, with distortion within specification. DO NOT set bias pots to obtain very-low notch, as this will result in hot idle.

4. Blowing fuses: If the AGC 10 / 110V (AGC5 / 220V) line fuse blows, test and replace as necessary the bridge rectifier and filter capacitors. If the AGX5 supply fuses blow, replace and power-up unit gradually on variac, checking for current-draw from the C-500. If unit works okay with new fuse, check to determine whether customer is using correct fuse value:

AGX5 - for 8 ohm speakers.
AGX8 - for speakers below 8 ohms.

If current is drawn or output offsets when variac is brought up, check for shorted output transistors, broken leads to the bias transistor on the heatsink, etc.

C-500 SCHEMATICS AND DRAWINGS

1. To follow the number codes for wiring connections in the amplifier, you must refer to the "Wiring / Interconnect Diagram". A pinout number on the other schematic and parts layout drawings will appear along the border of a block on the Wiring / Interconnect Diagram with the same name. The circuit-board edge-wiring tabs are sequentially numbered, and the same numbers are used on the Wiring / Interconnect Diagram.

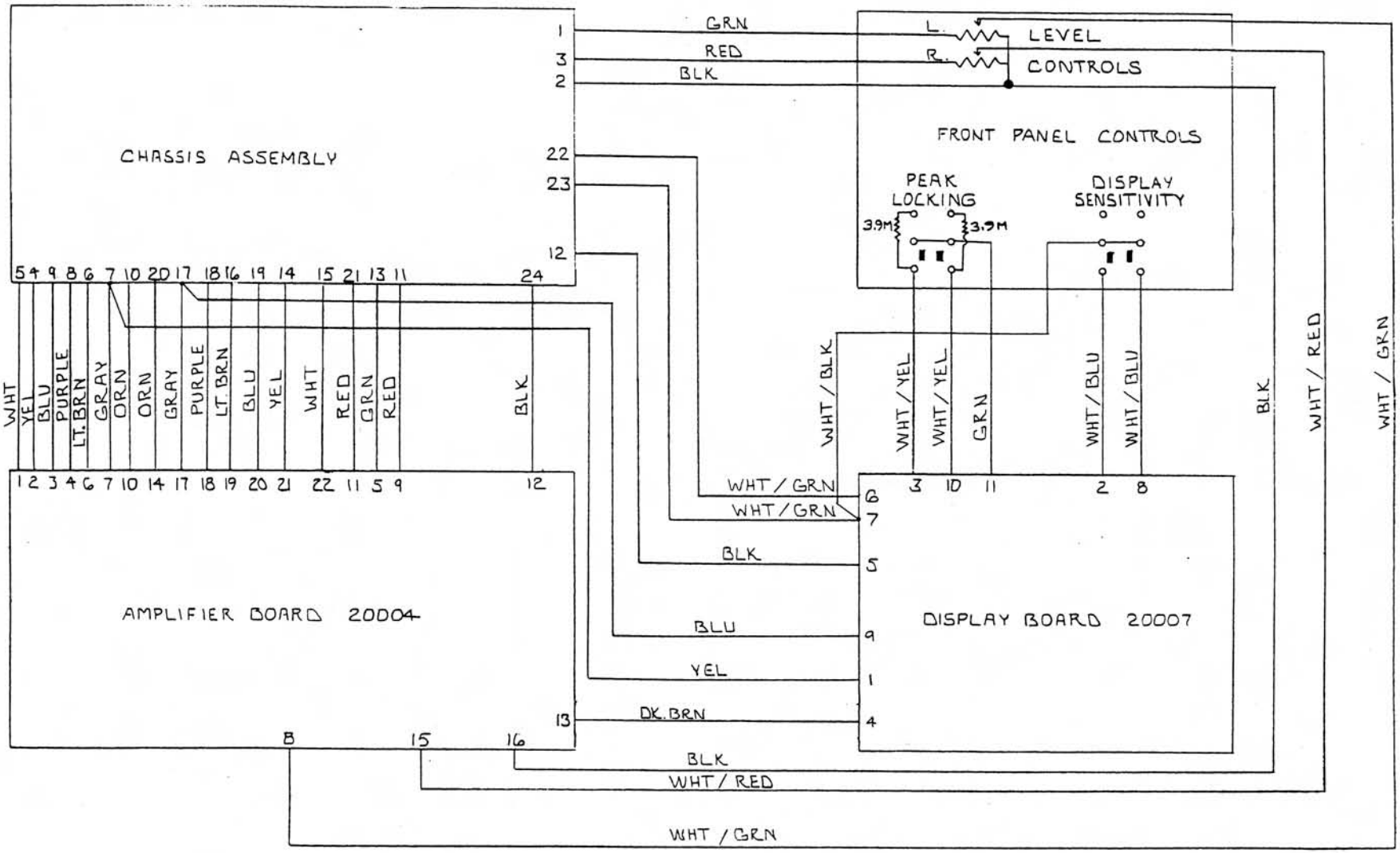
2. The part numbers for the New Amp Card are printed on the circuit boards, hence no seperate Locator Diagram.

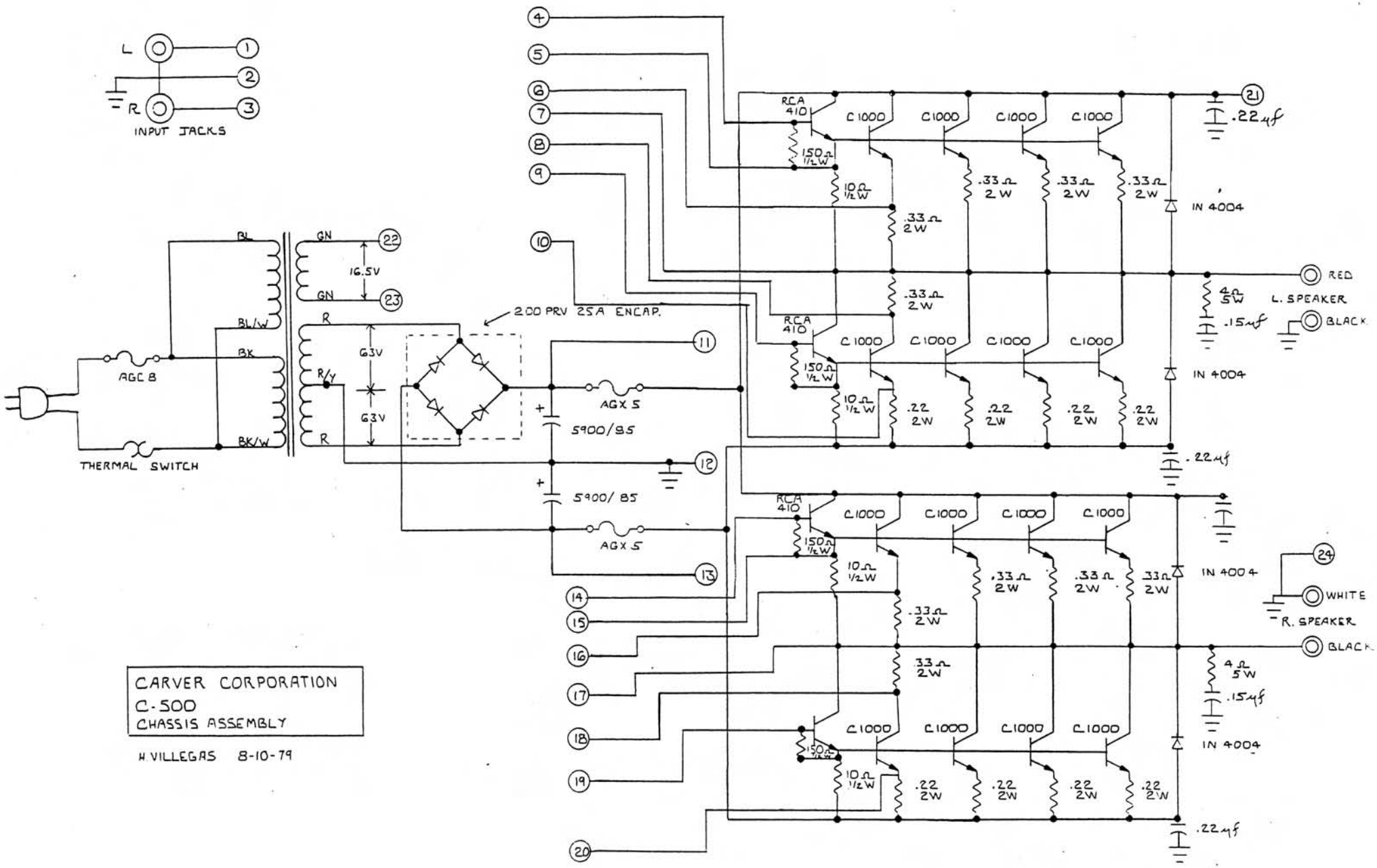
3. The 10 ohm / ½ Watt resistors referred to in the Bias section of the Troubleshooting guide are identified on the "Chassis Assembly" diagram. These resistors are located on the back rail of the amp, wired between the left-hand terminal strip tab for each channel and the Collector bus-wire of the positive (left-hand) output buss for each channel.

CARVER CORPORATION

C-500
WIRING DIAGRAM

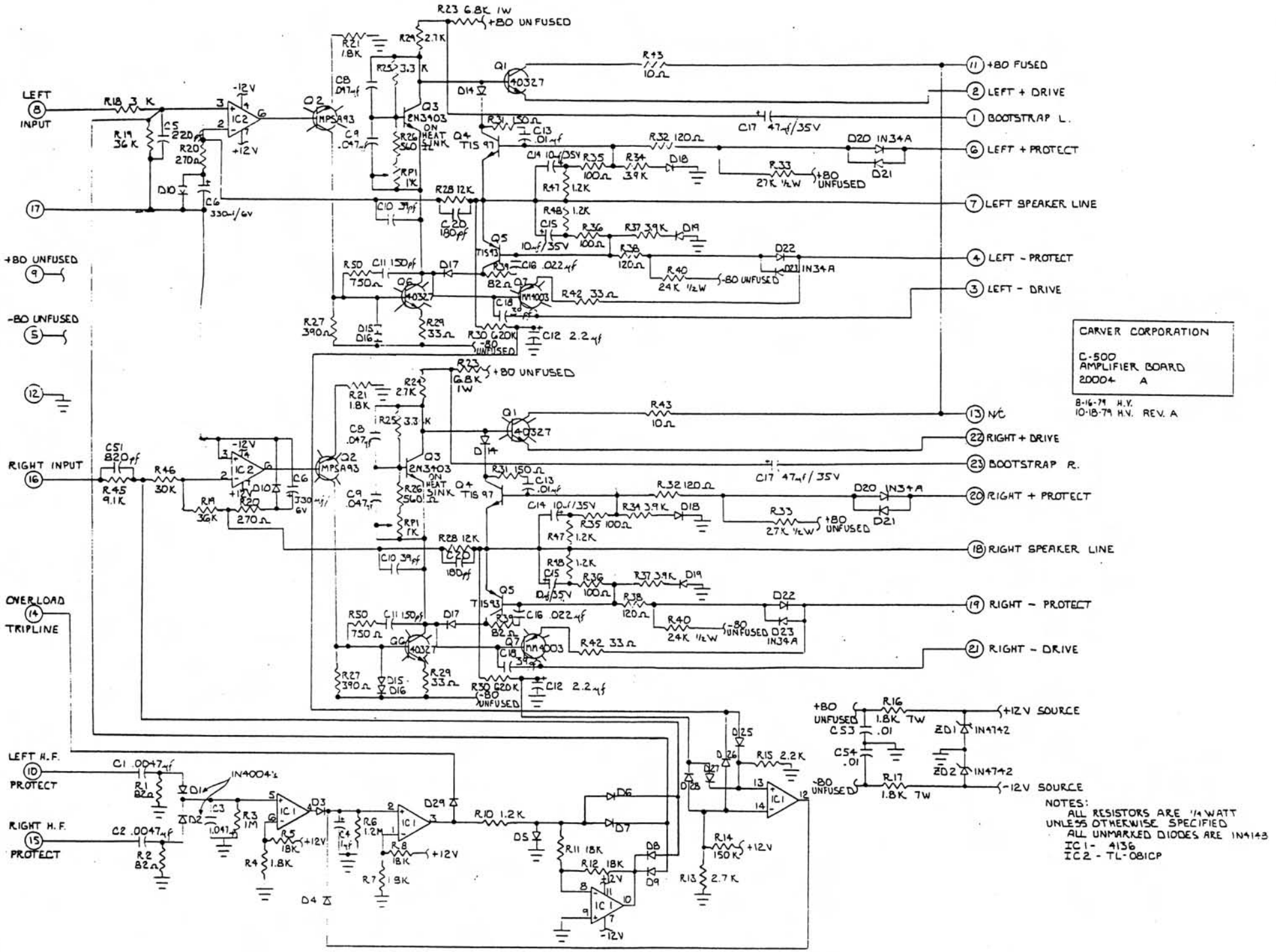
H.V. 8-17-79

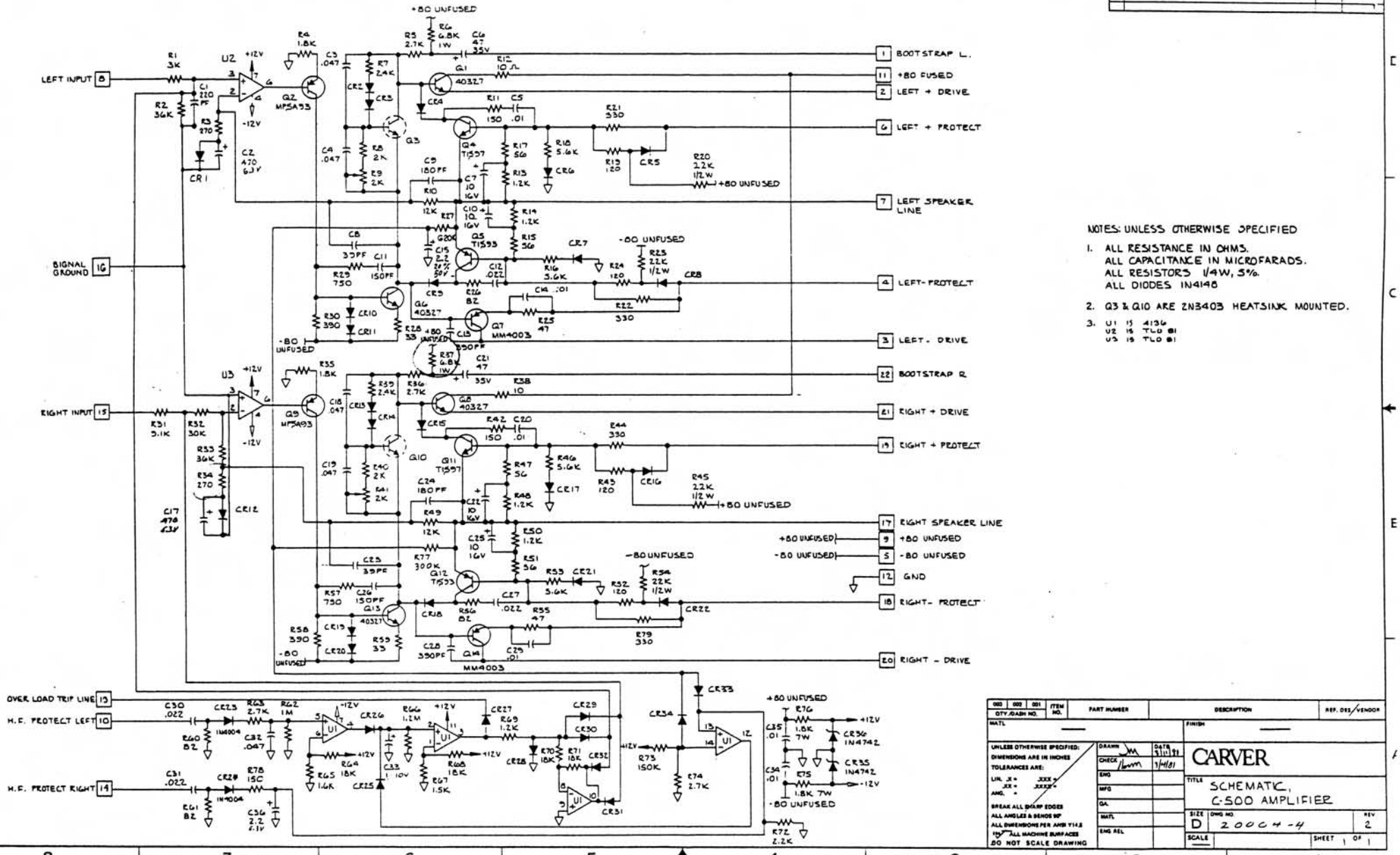




CARVER CORPORATION
C-500
CHASSIS ASSEMBLY

H VILLEGAS 8-10-79


CARVER CORPORATION
C-500
AMPLIFIER BOARD
20004 A
8-16-79 H.V.
10-18-79 H.V. REV. A
LEFT INPUT
RIGHT INPUT
+80 UNFUSED
-80 UNFUSED
OVERLOAD TRIPLINE
LEFT H.F. PROTECT
RIGHT H.F. PROTECT
+80 FUSED
LEFT + DRIVE
BOOTSTRAP L.
LEFT + PROTECT
LEFT SPEAKER LINE
LEFT - PROTECT
LEFT - DRIVE
N/C
RIGHT + DRIVE
BOOTSTRAP R.
RIGHT + PROTECT
RIGHT SPEAKER LINE
RIGHT - PROTECT
RIGHT - DRIVE
+12V SOURCE
-12V SOURCE
NOTES:
ALL RESISTORS ARE 1/4 WATT
UNLESS OTHERWISE SPECIFIED
ALL UNMARKED DIODES ARE IN4148
IC1 - 4136
IC2 - TL-081CP



NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTANCE IN OHMS.
   ALL CAPACITANCE IN MICROFARADS.
   ALL RESISTORS 1/4W, 5%.
   ALL DIODES IN4148
2. Q3 & Q10 ARE 2N3403 HEATSINK MOUNTED.
3. U1 IS 4136
   U2 IS TLO 81
   U3 IS TLO 81

QTY /DASH NO.	ITEM NO.	PART NUMBER	DESCRIPTION	REF. DES/VENDOR
003 002 001				

MATL —

FINISH —

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRAC. ± XXX
.XX ± XXX±
ANG. °
BREAK ALL SHARP EDGES
ALL ANGLES & BENDS 90°
ALL DIMENSIONS PER ANSI Y14.5
125 ALL MACHINE SURFACES
DO NOT SCALE DRAWING

		DATE
DRAWN	JM	3/11/91
CHECK	[illegible]	3/14/91
ENG		
MFG		
QA		
MATL		
ENG REL		

CARVER

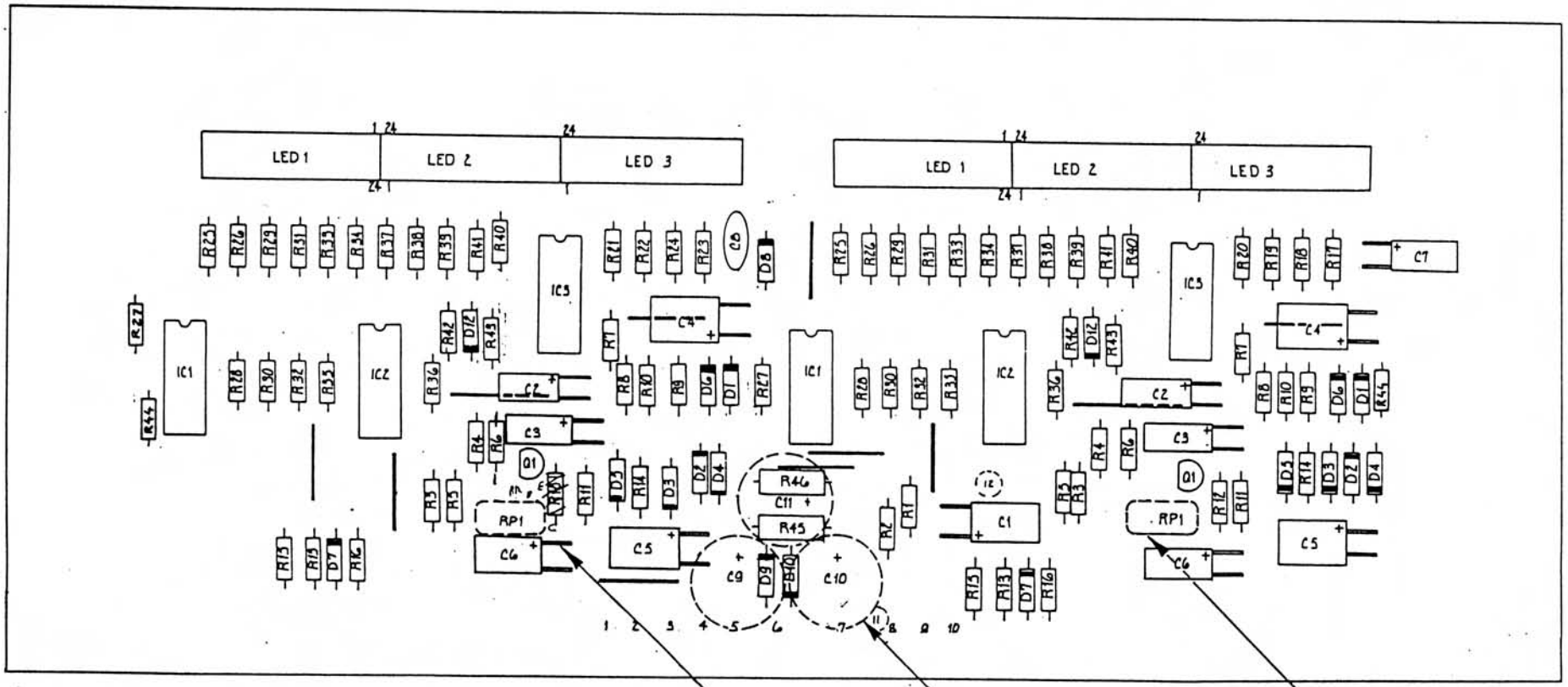
TITLE SCHEMATIC, C-500 AMPLIFIER

SIZE D | DWG NO 200C4-4 | REV 2

SCALE — | SHEET 1 OF 1

CARVER CORPORATION
EVERETT, WASH.

ASSEMBLY DIAGRAM
04 02 3 0007 P
FRONT PANEL DISPLAY CARD 400 SERIES



CARVER CORPORATION
C500 AMP BOARD
20004

H. VILLEGAS 5-16-79

23	BOOT STRAP RT
22	RIGHT DRIVE +
21	RIGHT DRIVE −
20	RIGHT PROTECTION+
19	RIGHT PROTECTION-
18	RIGHT SPEAKER LINE
17	INPUT GROUND
16	RIGHT INPUT
15	HIGH FREQ. R
14	OVERLOAD TRIP LINE
13	+80 FUSED RIGHT
12	SIGNAL GROUND
11	+80 FUSED
10	HIGH FREQ. L
9	+80 UNFUSED L
8	LEFT INPUT
7	LEFT SPEAKER LINE
6	LEFT PROTECTION +
5	-80 UNFUSED
4	LEFT PROTECTION −
3	LEFT DRIVE −
2	LEFT DRIVE +
1	BOOT STRAP L

C-500

CARVER CORPORATION
WOODINVILLE, WA.

SCHEMATIC DIAGRAM
20007
FRONT PANEL DISPLAY CARD

NOTES:
1. ALL IC'S ARE 4136
2. ALL DIODES ARE IN4148 (EXCEPT D9 & D10)