METROM

MODEL M-200 POWER AMPLIFIER

SERVICE MANUAL

TABLE OF CONTENTS

M-200 SPECIFICATIONS

Minimum continuous power output per channel 20Hz-20kHz, 8 Ω , both channels driven.	125w
Minimum continuous power output per channel 20Hz-20kHz at 4 Ω , both channels driven.	200w
THD 20Hz-20kHz between 0.25w and full power, 8 Ω	.02%
THD 20Hz-20kHz between 0.25w and full power, 4 Ω	.05%
IM distortion, (SMPTE) from 0.25w to full power, 8 Ω	.02%
Signal to noise (ref. rated output, "A" weighting).	110dB
IHF noise. (ref. OdBW, "A" weighting)	-90dB
Power bandwidth (IHF).	7Hz-100kHz
Slew rate v/μsec	70
Damping factor ref. 50Hz, 8 Ω	175
Input impedance	10k Ω
Input sensitivity (ref. full output)	1.4v
IHF sensitivity (ref. OdBW)	.125v
Input connection	phono (RCA)
Output connection	Dual binding post (5-way)
Fan cooling	outlet -25w max.
Power requirements idle/ full power	50w/500w
Weight (net)	31 lbs./14kg
Dimensions (W,H,D,)	19" x 5 1/4" x 13" 48.2cm x 13.3cm x 33cm

The above specifications are subject to change without prior notice.

Required Test Equipment

BEFORE STARTING . . . .

Cerwin-Vega amps are professional, high power amplifiers that absolutely require proper test equipment and qualified service personnel. In order to perform basic amplifier testing and repair you must have the following equipment:

1. Digital multimeter or VTVM
2. Oscilloscope, preferrably with dual trace.
3. AC current meter
   DC current meter
   0-15 amp range
4. AC variac 20 amp, 0-120% output
5. High power (250w) load resistors which can provide the following precision, noninductive load resistances.
   2Ω , 1kW min.
   4Ω , 1kW min.
   8Ω , 500W min.
6. Signal generator with 10v sine wave output or, if distortion measurements are to be made, a high quality distortion analyzer with very low residual distortion (.002%) is required (such as the Sound Technology 1700 Series).

NOTE

Read the product owner's manual thoroughly if in doubt about operation.

This service manual is intended as a guide, not a Bible. We have made every effort to insure its accuracy; however, an error in the manual or a change in the amplifier assembly is always possible. If you feel you are fighting an impossible problem or have a question, call Cerwin-Vega's Technical Services Department.

Notes to Reading Schematics -

All voltages are DC, no load, no signal, unless otherwise specified.

When replacing transistors, be sure to match the beta codes.

Resistors are 1/2w, 5% carbon film unless otherwise specified.

Cap values are in µf, unless otherwise specified.

Capacitor tolerance coding on parts list is as follows:

J = 5%

K = 10%

M = 20%

P = Guaranteed minimum value

Z = +80%, -20%

DRIVE CIRCUITRY

Q202/Q203 and Q204/Q206 make up a dual differential first stage which provides the initial voltage gain. This stage operates from a ±24v supply (zeners CR205 and CR212). Q201 and Q205 act as level shifters to drive the class A stage, Q209 and Q210. Drivers Q211 and Q212 provide further current gain for the output stage.

Electronic current limiting is provided by Q213 and Q214, and associated components. When the voltage across any emitter resistors in the output stage (i.e., output current) becomes excessive, Q213 or Q214 turns on, clamping the base of the driver to the output rail, preventing further current drive.

OUTPUT STAGE

The output sections consist of parallelled output devices Q601 through Q604, which provide final output drive. Q301, Q302, and related components form a bias compensation network. Q302, mounted behind the circuit board directly against the output heat sink, senses temperature and adjusts the idling current (back in the class A stage) accordingly. This provides optimum thermal stability and performance.

PROTECTION CIRCUIT

The protect circuitry is designed to protect the amplifier and speakers under potentially harmful conditions, described below:

1.) Short circuits, excessive current flow, overloads, etc. are sensed across the output emitter resistors. If Q401 or Q402 switches on, level shifter Q404 will turn on Q407, de-energizing the output

relay, K401 (via Q408).

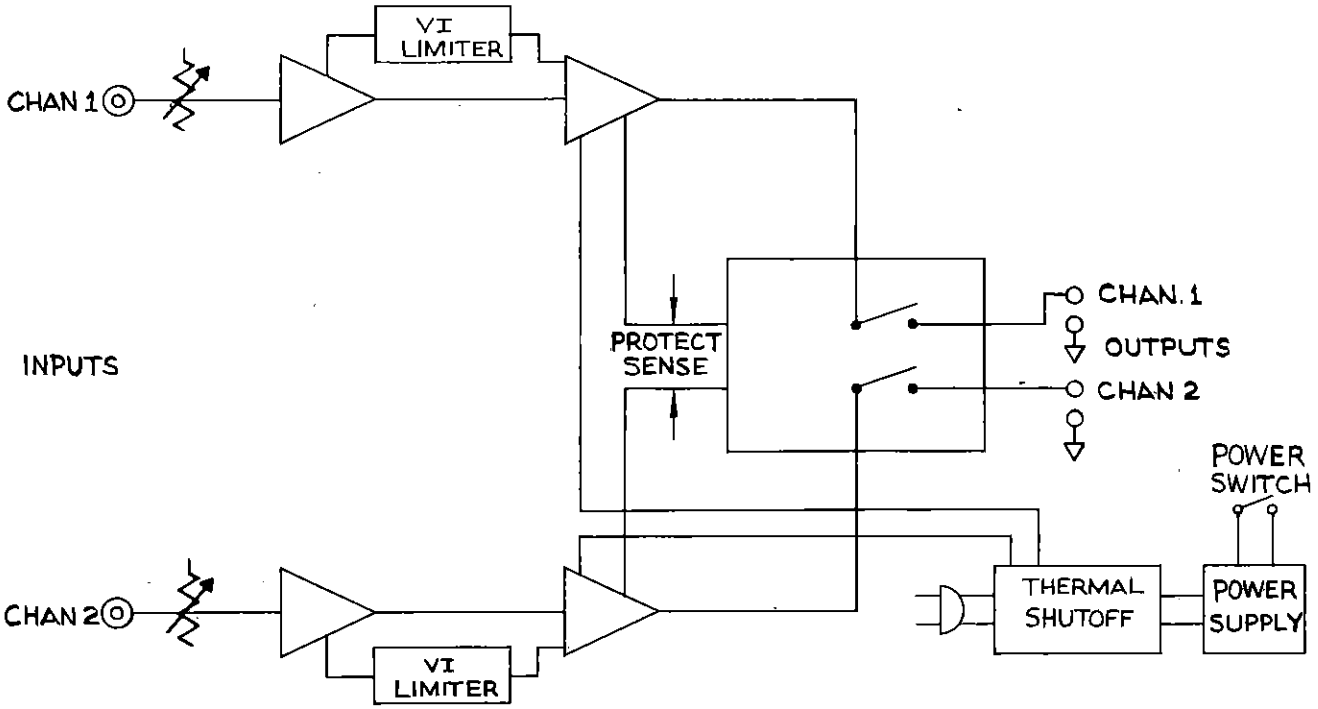
2.) Sustained DC voltage at the output - the output of Ch1 and Ch2 is summed and integrated by R403, R404, and C403. A positive offset will turn on Q406, a negative offset turns on the Q403/Q405 pair. Again, the result is that Q408 and K401 are turned off.

3.) Loss of AC power or very low line voltages are prevented from causing dangerous or annoying transients by Q407. A loss of rectified AC (via CR401) will forward bias Q407 through R411. This also provides turn-off muting. Turn-on delay is dependent upon R415 and C406, approximately four (4) seconds.

As long as the fault condition remains, K401 will remain off. When the condition has cleared, Q408 will again turn on after C406 has charged (typically three to five [3 to 5] seconds).

CR402 through CR409 are meter rectifier bridges. Note that the output metering is connected after the output relay, preventing an indication when in the protect mode.

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



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TOLERANCES UNLESS OTHERWISE SPECIFIED		
FRACTIONS	DEC.	ANGLES
±	±	±

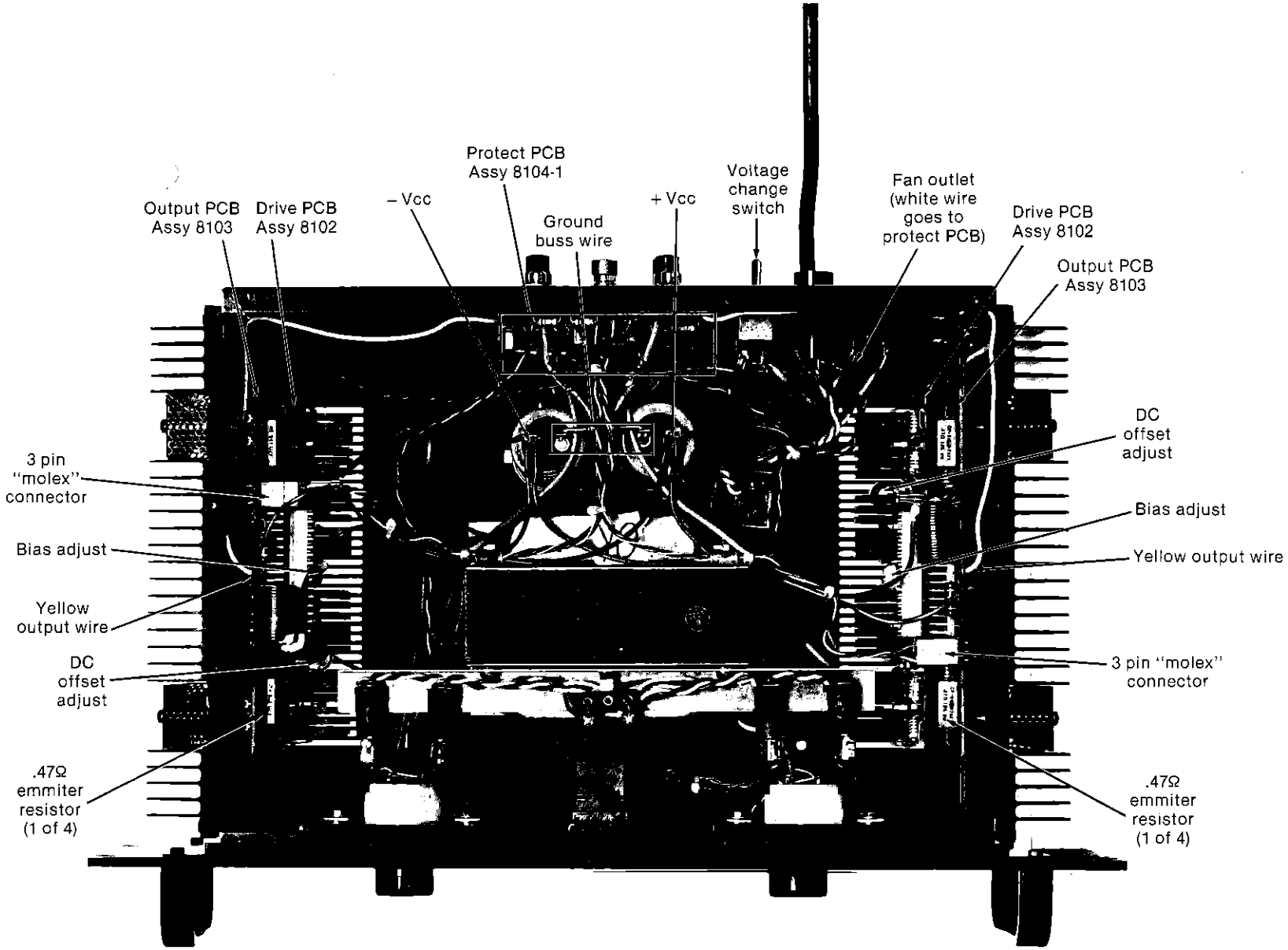
APPROVALS	DATE
DRAWN RAL	11-1
CHECKED	11-20-79

Cerwin-Vega, Inc.

M-200 BLOCK DIAGRAM

SCALE	SIZE	DRAWING NO.
	B	

DO NOT SCALE DRAWING — SHEET



M-200 ALIGNMENT POINTS AND PCB LOCATION

M-200 Bias and DC Offset Adjustment

The bias and offset adjustments are preset at the factory to strict tolerances, and should not drift or require re-adjustment. However, if any transistors on the drive board have been replaced, these procedures should be followed. These measurements should be performed with no signal and no load.

Setting bias - To check the bias connect a DC voltmeter between the output and the VI sense buss. These points can be found on the yellow and red wires which exit the output board on the 3 pin molex plug. If necessary, adjust R246, a thumbwheel pot directly below the 15-pin drive board connector, to obtain a reading between 22mv-28mv (.022v-.028v). Note: When the amplifier is first turned on "cold", these readings may be lower. *CAUTION: The 15-pin connector has high DC voltages on the exposed pins. Use care to avoid them.

DC offset null - To check the DC offset, connect a DC voltmeter between circuit ground and the yellow wire soldered to the top of the output board. If necessary, adjust R203, a thumbwheel pot at the bottom left of the drive board, to obtain a reading within about 10mv of zero (-.01v-+.01v). CAUTION: The finned heat sinks on adjacent driver transistors have high voltage potentials between them. A better method involves using a small screwdriver with an insulated shaft and handle, and inserting it into the rear adjustment slot on R203.

* Before making any adjustments, let the amplifier warm up by operating it into a load at low power (1-10 watts) for a few minutes.

Operational Test Procedure - Initial "Common Sense" Trouble Shooting

A. Remove the top cover and visually inspect the unit. Look for burnt components or open internal fuses, loose wiring connectors, screw connections, etc. If an intermittent problem is suspected, remove the drive boards and carefully examine all solder connections and foil patterns for breaks.

B. Basic Voltage Checks:

Note: Unless otherwise stated, all measurements made with 120 vac line, with no signal, and no load.

1. Check the positive and negative supply voltages at the supply capacitors. They should be + and - 67 vdc ±5%, and positive and negative supplies should be within 1 volt of each other.

2. Check bias and DC offset in each channel, adjust if necessary. (See bias and DC offset procedures.)

3. Verify VI limiter operation by connecting a 2 Ω load to the output terminals. With a 1kHz signal generator, slowly increase the signal until; at approximately 9vrms out the positive and negative wave tops will clip symmetrically. Be sure that the AC line voltage is maintained at 120v. If the above description isn't observed, stop the test and repair the VI limiter circuit.

4. Verify full power output. Into 8Ω -31.6 vrms. Into 4Ω -28.3 vrms.

5. If a distortion analyzer is available, the distortion may also be checked.

6. Recheck the bias and offset while the unit is warm. It should remain relatively stable.

M-200 Protection Circuit Problems

Protection stays in "Protect" mode:

Disconnect the 3 pin connector from the channel one output board and wait about 15 seconds.

Does the protection circuit reset?

YES — NO

Repeat the above procedure for channel two, with channel one still disconnected.

Does the protection circuit reset now?

YES — NO

Is the AC voltage at the fan outlet on rear chassis apron (white wire) about 48 vrms?

YES — NO

Check the AC wiring connections back through bridge rectifier to power transformer.

Trouble in protection circuit -- check on protection schematic.

Determine the channel causing the protect mode by reconnecting the molex plugs. When the unit goes back into protection, check the voltages on the plug wires.

Between black and red -- about 50 mvdc (.04v-.06v)?

YES NO

Does bias control correct reading?

YES NO

Set bias according to instructions.

Replace with another drive board and recheck.

DC voltage exists between yellow wire (output) and ground. If the offset adjustment does not correct it, there is probably a shorted output device(s). Refer to output stage flowchart.

Output Stage Problems M-200

Is there DC output or are DC fuses blown?

YES

Blown DC fuses are usually caused by a short in the output stage.

1. The output protection relay must be bypassed by connecting the yellow PCB output wire to the red output terminal. REMEMBER TO DISCONNECT THE JUMPER WIRE AFTER SERVICING!!!
2. It is also necessary to connect an eight or four ohm load resistor (500 watt) to the outputs.
3. Remove the drive board from the output assembly.
4. Connect an AC current meter (0-5 amps) into the AC (mains) line. Turn up the variac slowly and monitor the AC current. Does it stay below 0.5 ampere?

NO

YES

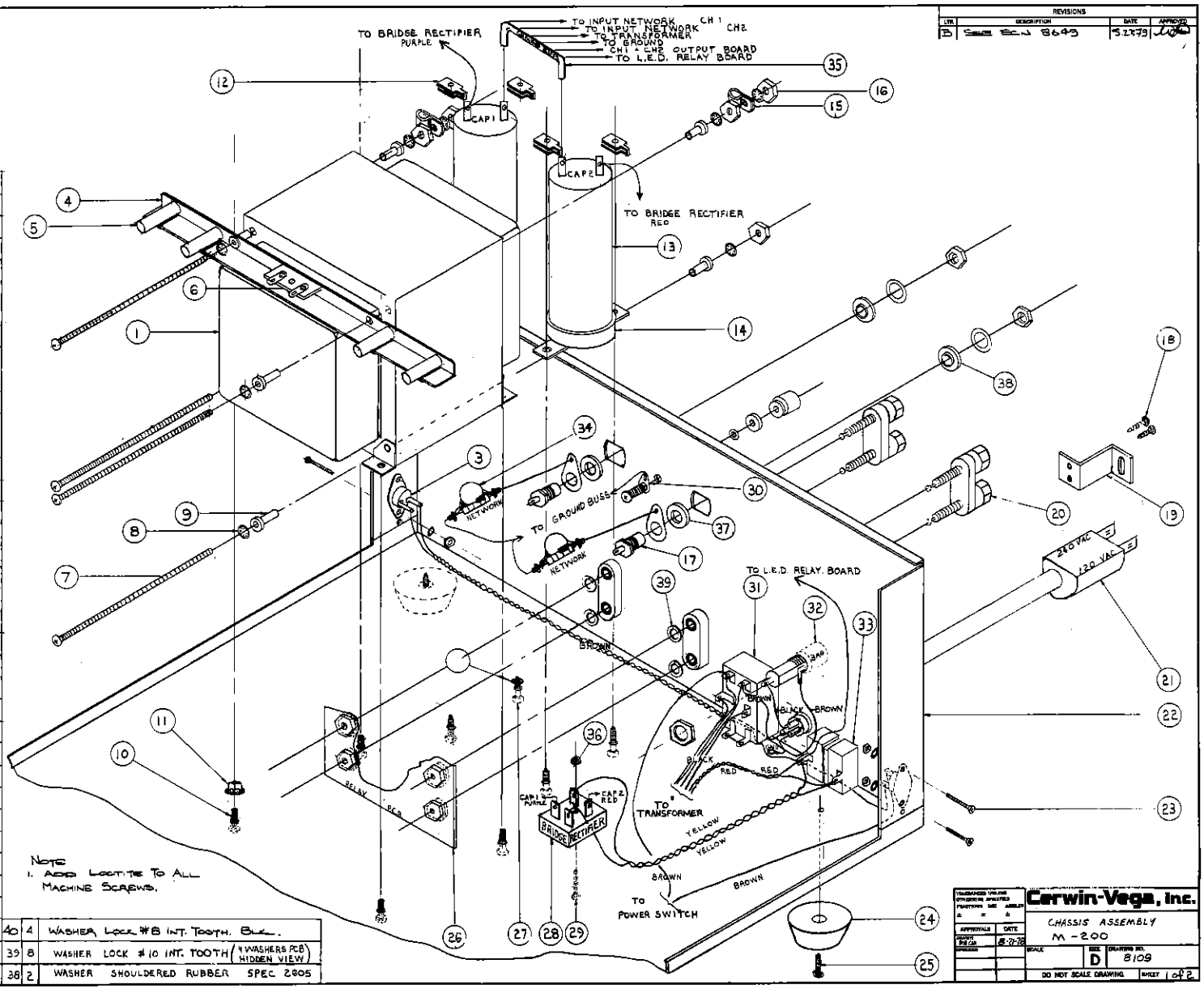
Drive board or bias network (Q301, Q302, etc.) is defective. Replace board and check voltage between pins 7 and 9 -- should be approximately 2.35 volts. If bias control can not bring it into this range, try another drive board. If it doesn't work, bias network (Q203, Q301, or related components) are defective.

Check voltages across .47Ω emitter resistors -- any reading indicates a bad device in the positive or negative legs. Remove any devices which show emitter current.

Defective devices should be replaced with ones of the same beta grade code. Before replacing the drive board, a quick check with an ohm meter should be made for a shorted driver or predriver. Check the 2SA969's and 2SC2239's between emitter, base, and collector. If they're o.k., replace the drive board, and slowly power up the unit.

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
B	SEE ECN 8643	5.22.78	

NO	QTY	DESCRIPTION
1	1	TRANSFORMER SPEC 8108
3	2	THERMAL BREAKER SPEC 2655
4	1	LIGHT BRACKET SPEC 8055
5	4	LAMP SOCKET SPEC 2693
6	1	SOLDER TERMINAL SPEC 8255
7	4	SCREW 10/32 × 2 1/2" CAD R-H PHIL
8	10	WASHER #10 INTERNAL TOOTH LOCK
9	8	BUSHING #10 × 3/8" SHOULDER SPEC 2609
10	4	SCREW 10-32 × 3/8" PH. BLK PHIL
11	4	NUT. SELF. LOCK-ING N°10
12	4	TINNERMAN NUT #6/32 SPEC 8261
13	2	ELECTROLYTIC (CAP) SPEC 8250
14	2	CAPACITOR MOUNTING BRACKET SPEC 8250
15	2	CABLE CLAMP 3/16"
16	6	NUT 10/32 × 3/8" HEX 7/64 THICK, CAD
17	2	SWITCHCRAFT PHONO JACK SPEC 2616
18	2	SCREW #6 P-H PHIL BLK
19	1	SWITCH GUARD SPEC 8050
20	2	BINDING POST SWAY SPEC 2607
21	1	POWER CORD SPEC 8259
22	1	CHASSIS SPEC 8042-2
23	4	SCREW 4/40 × 3/8" F.H CAD PHIL
24	4	RUBBER FEET
25	4	SCREW #6 P-H PHIL BLK
26	1	ASSEMBLY RELAY PCB 8104
27	4	SCREW #6 × 1/2" 'B' PH. BLK PHIL
28	1	BRIDGE RECTIFIER SPEC 2604
29	1	SCREW 6/32 × 5/8" PH BLK PHIL
30	1	BINDING POST (GROUND) SPEC 8257
31	1	TAP CHANGE SWITCH SPEC 8254
32	1	FUSE HOLDER SPEC 8252
33	1	FAN OUTLET SPEC 8258
34	2	INPUT HARNESS ASSEMBLY 8110, 8111
35	1	GROUND BUSS BAR
36	1	NUT 6/32 × 1/4 HEX CAD
37	2	WASHER FLAT RUBBER SPEC 2689
40	4	WASHER LOCK #6 INT. TOOTH. BLK.
39	8	WASHER LOCK #10 INT. TOOTH (4 WASHERS PCB) (HIDDEN VIEW)
38	2	WASHER SHOULDERED RUBBER SPEC 2605



NOTE
1. ADD LOCTITE TO ALL MACHINE SCREWS.

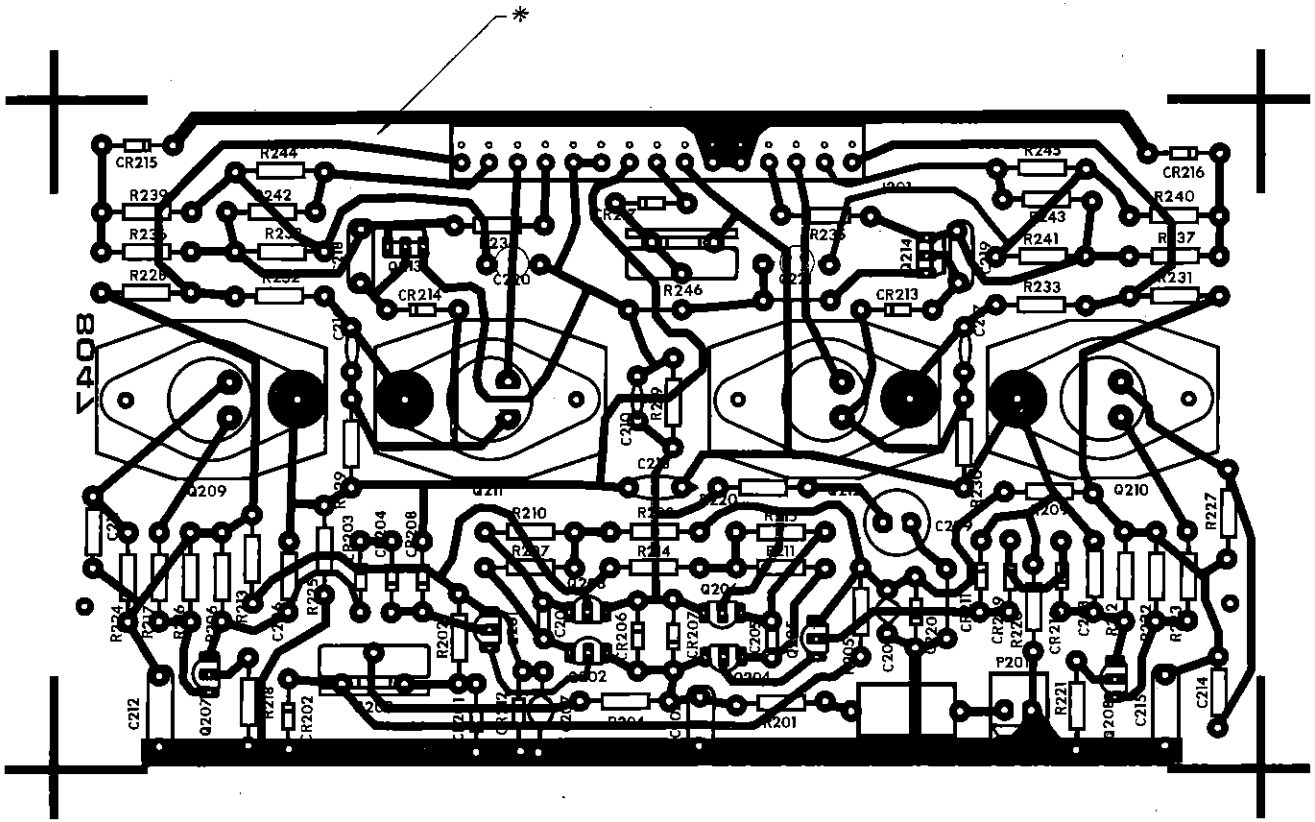
Carwin-Vega, inc.

CHASSIS ASSEMBLY
M-200

SCALE | SIZE D | DRAWING NO. 8109

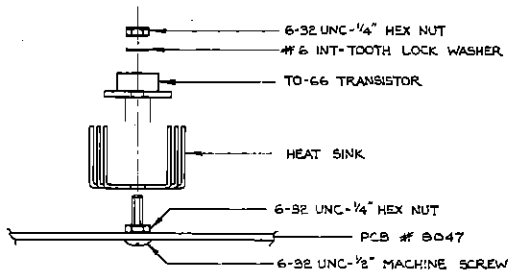
DO NOT SCALE DRAWING | SHEET 1 of 2

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



NOTES UNLESS OTHERWISE STATED.

1. IDENTIFY ASSEMBLY IN THIS AREA * ON COMPONENT SIDE OF PCB USING NON-CONDUCTIVE STICKER.
2. MOUNT FOUR (4) TO-66 TRANSISTORS AS SHOWN IN DETAIL VIEW.



TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS ± DEC ± ANGLES ±		Cerwin-Vega, inc.		
APPROVALS	DATE	DRIVE PCB ASSEMBLY		
DRAWN J. Domes	6.23.78			
CHECKED	8-24-78	SCALE	SIZE C	DRAWING NO. 8102
		DO NOT SCALE DRAWING		SHEET 1 of 1

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REVISIONS			
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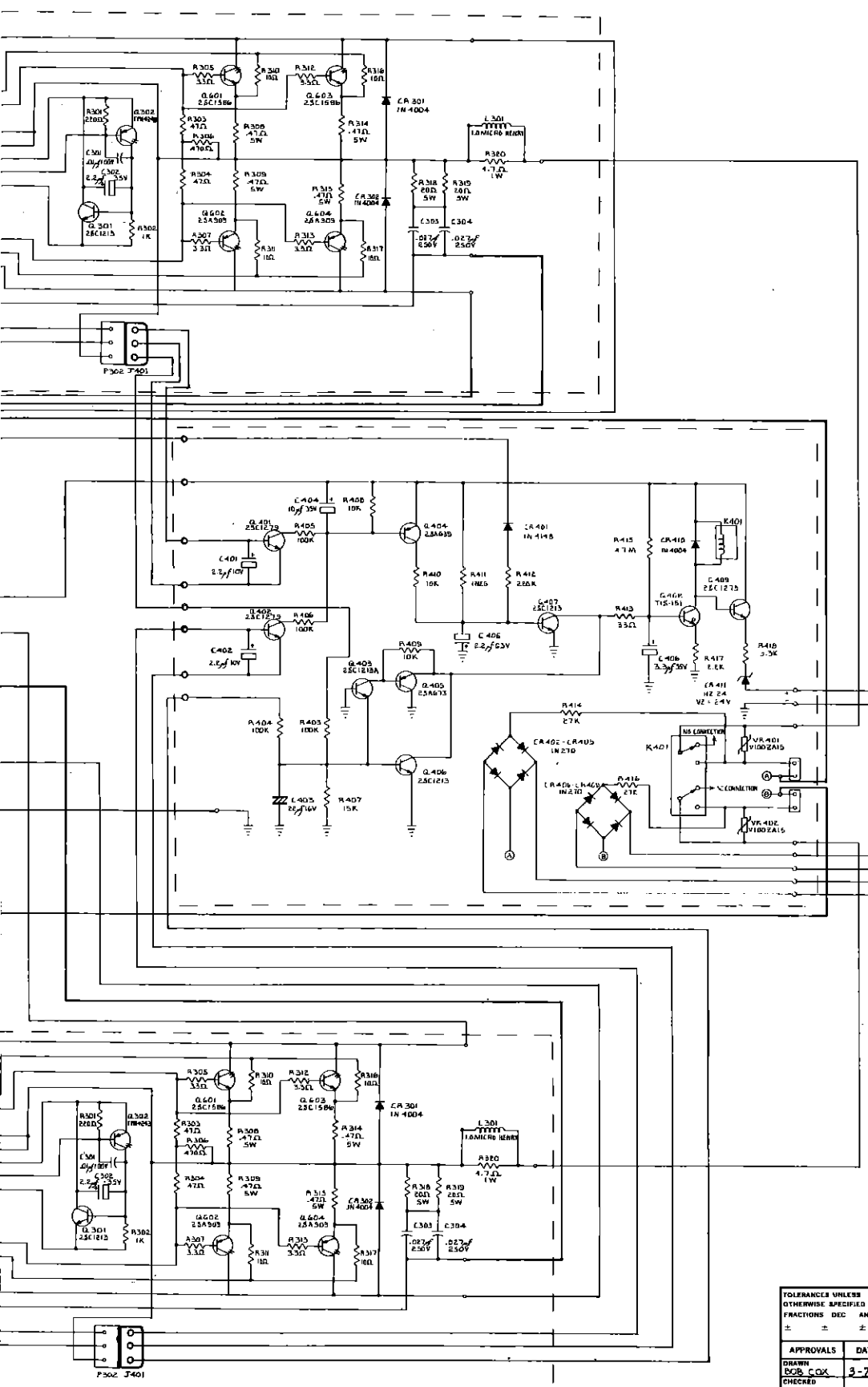


TOLERANCES UNLESS OTHERWISE SPECIFIED			
FRACTIONS	DEC	ANGLES	
±	±	±	

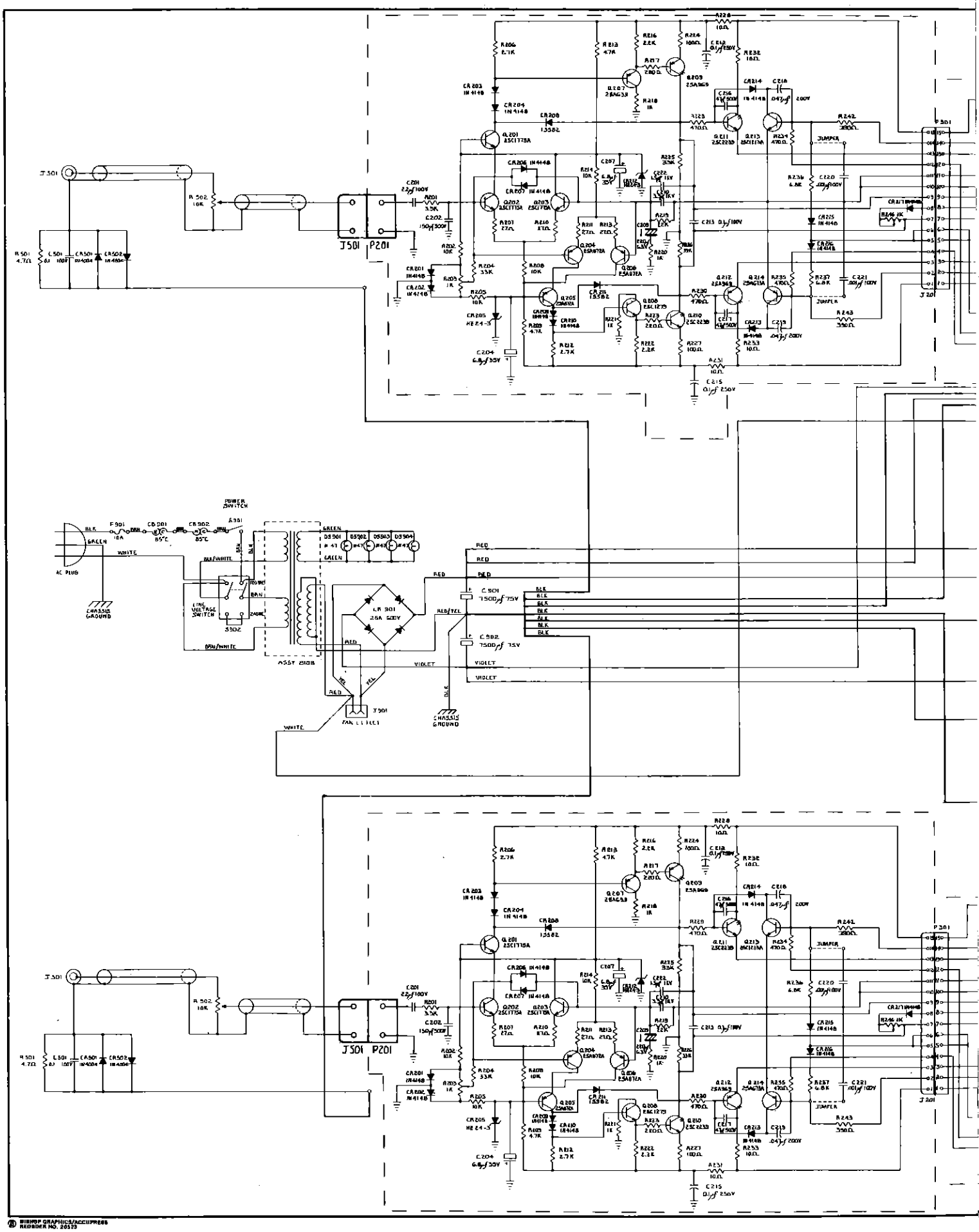
Cerwin-Vega, Inc.

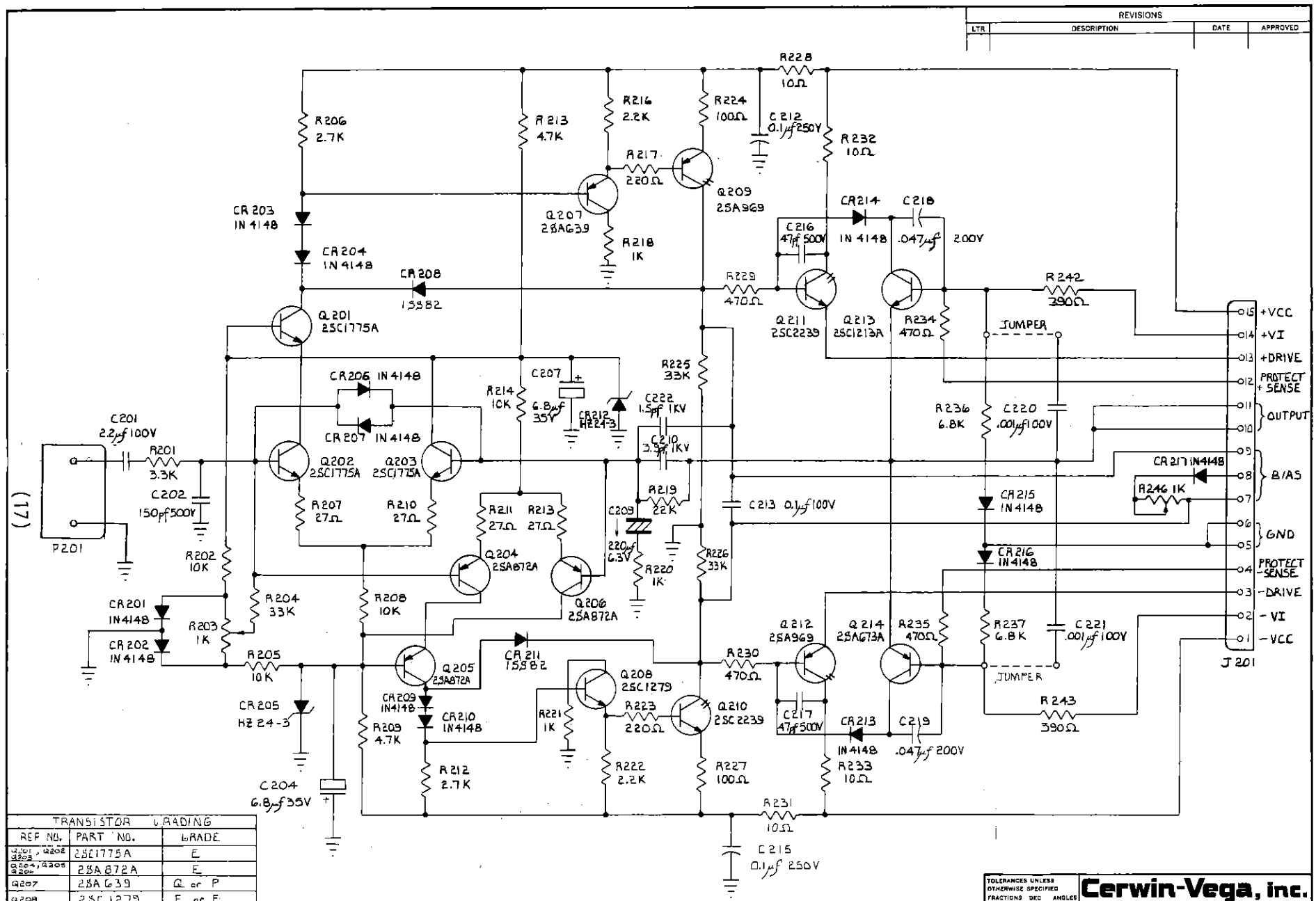
M 200 [illegible]

APPROVALS	DATE
DRAWN BOB COX	3-7-79
CHECKED	

SCALE	SIZE	DRAWING NO.
	D	8307

DO NOT SCALE DRAWING — SHEET


J501
P201
R502 10K
C201 22pf 100V
R201 3.3K
C202 150pf 500V
R202 10K
R203 1K
R204 33K
R205 10K
R206 2.7K
R207 27Ω
R208 10K
R209 4.7K
R210 8.1Ω
R211 27Ω
R212 2.7K
R213 21Ω
R214 10K
R215 22K
R216 2.2K
R217 280Ω
R218 1K
R220 1K
R221 1K
R222 2.2K
R223 280Ω
R224 100Ω
R227 100Ω
R228 10Ω
R230 470Ω
R231 10Ω
R232 10Ω
R234 470Ω
R235 33K
R236 6.8K
R237 6.8K
R238 10Ω
R241 390Ω
R242 390Ω
R243 390Ω
R246 1K
C204 6.8µf 35V
C205 6.8µf 35V
C207 6.8µf 35V
C208 6.8µf 35V
C209 .001µf 100V
C210 .001µf 100V
C211 47µf 50V
C212 .01µf 250V
C213 .01µf 100V
C214 .047µf 200V
C215 .01µf 250V
C216 47µf 50V
C217 47µf 50V
C218 .047µf 200V
C219 .047µf 200V
C220 .001µf 100V
C221 .001µf 100V
Q201 2SC1775A
Q202 2SC1775A
Q203 2SC1775A
Q204 2SA872A
Q205 2SA872A
Q206 2SA872A
Q207 2SA628
Q208 2SC1213
Q209 2SA969
Q210 2SC2238
Q211 2SC2238
Q212 2SA963
Q213 2SC1213A
Q214 2SA673A
CR201 1N4148
CR202 1N4148
CR203 1N4148
CR204 1N4148
CR205 HZ24-3
CR206 1N4448
CR207 1N4148
CR208 1S582
CR209 1N4148
CR210 1N4148
CR211 1N4148
CR212 1N4148
CR213 1N4148
CR214 1N4148
CR215 1N4148
CR216 1N4148
CR217 1N4148
CR218 1N4148
CR501 1N4004
CR502 1N4004
L501 .6µ 100T
R501 4.7Ω
JUMPER
P301
J301
POWER SWITCH
S301
F901 10A
CB901 85°C
CB902 85°C
BLK
GREEN
WHITE
BRN
BLK/WHITE
AC PLUG
CHASSIS GROUND
LINE VOLTAGE SWITCH
S302
BRN/WHITE
ASSY 8008
D5901 #47
D5902 #47
D5903 #47
D5904 #47
GREEN
RED
CR 301 25A 600V
C 501 7500µf 75V
C 502 7500µf 75V
RED/YEL
VIOLET
BLK
FAN (LIDS)
CHASSIS GROUND
WHITE



TRANSISTOR LOADING		
REF NO.	PART NO.	GRADE
Q201, Q202, Q203	2SC1775A	E
Q204, Q205, Q206	2SA872A	E
Q207	2SA639	Q or P
Q208	2SC1279	F or E
Q209, Q212	2SA969	Y
Q210, Q211	2SC2239	Y
Q213	2SC1213A	L or D
Q214	2SA673A	L or D

NOTES:
1. ALL RESISTORS 1/2W 5% UNLESS OTHERWISE NOTE
2. ALL CAPACITORS ARE 25V OR HIGHER
3. 2SA639 GRADE Q PARTS MUST BE PAIRED WITH 2SC1279 GRADE F OR 2SA639 GRADE P PARTS MUST BE PAIRED WITH 2SC1279 GRADE E. THERE ARE NO EXCEPTIONS

TOLERANCES UNLESS OTHERWISE SPECIFIED: FRACTIONS ± DEC ± ANGLES ±

APPROVALS	DATE
DRAWN BOB COX	1-25-79
CHECKED	2-26-79

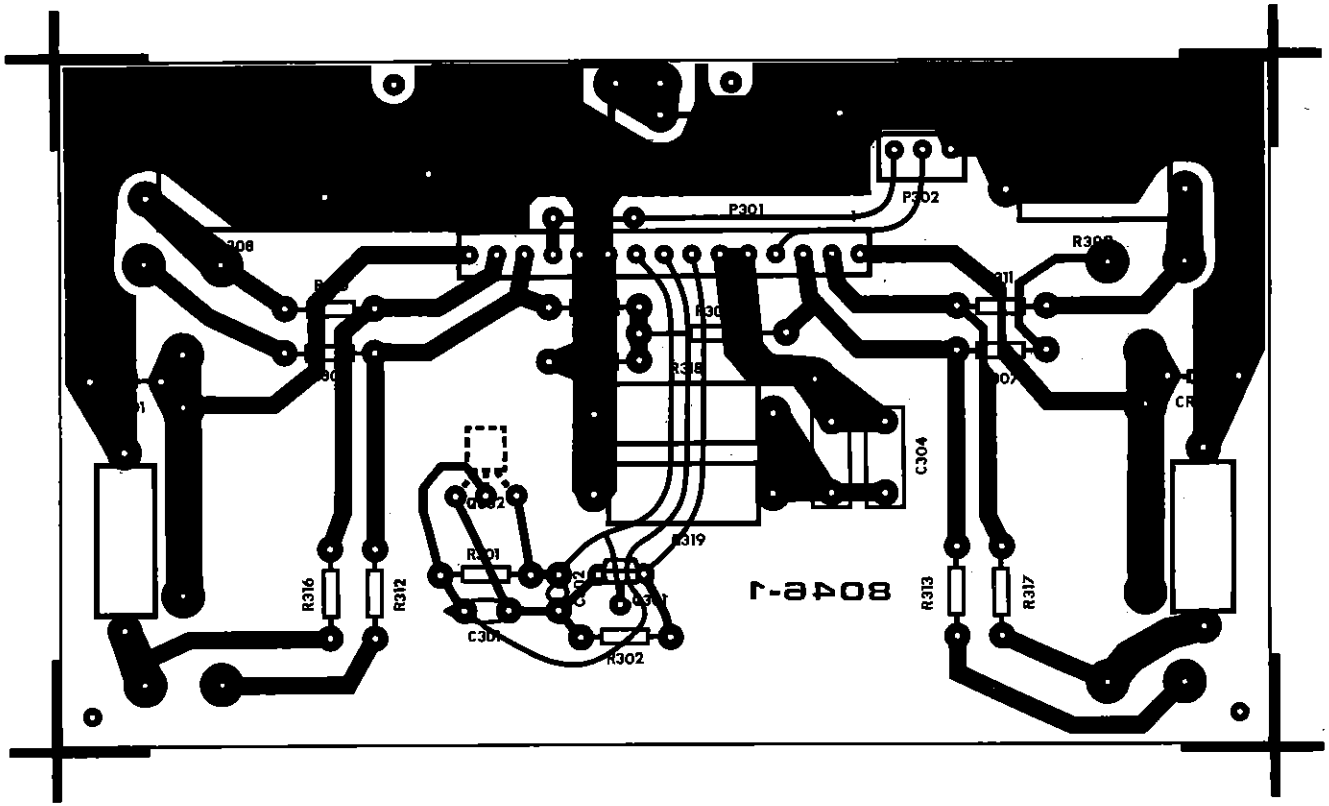
Cerwin-Vega, inc.

SCHEMATIC ASSY 8102
M-200 DRIVE BOARD

SCALE | SIZE C | DRAWING NO. 8902

DO NOT SCALE DRAWING | SHEET

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



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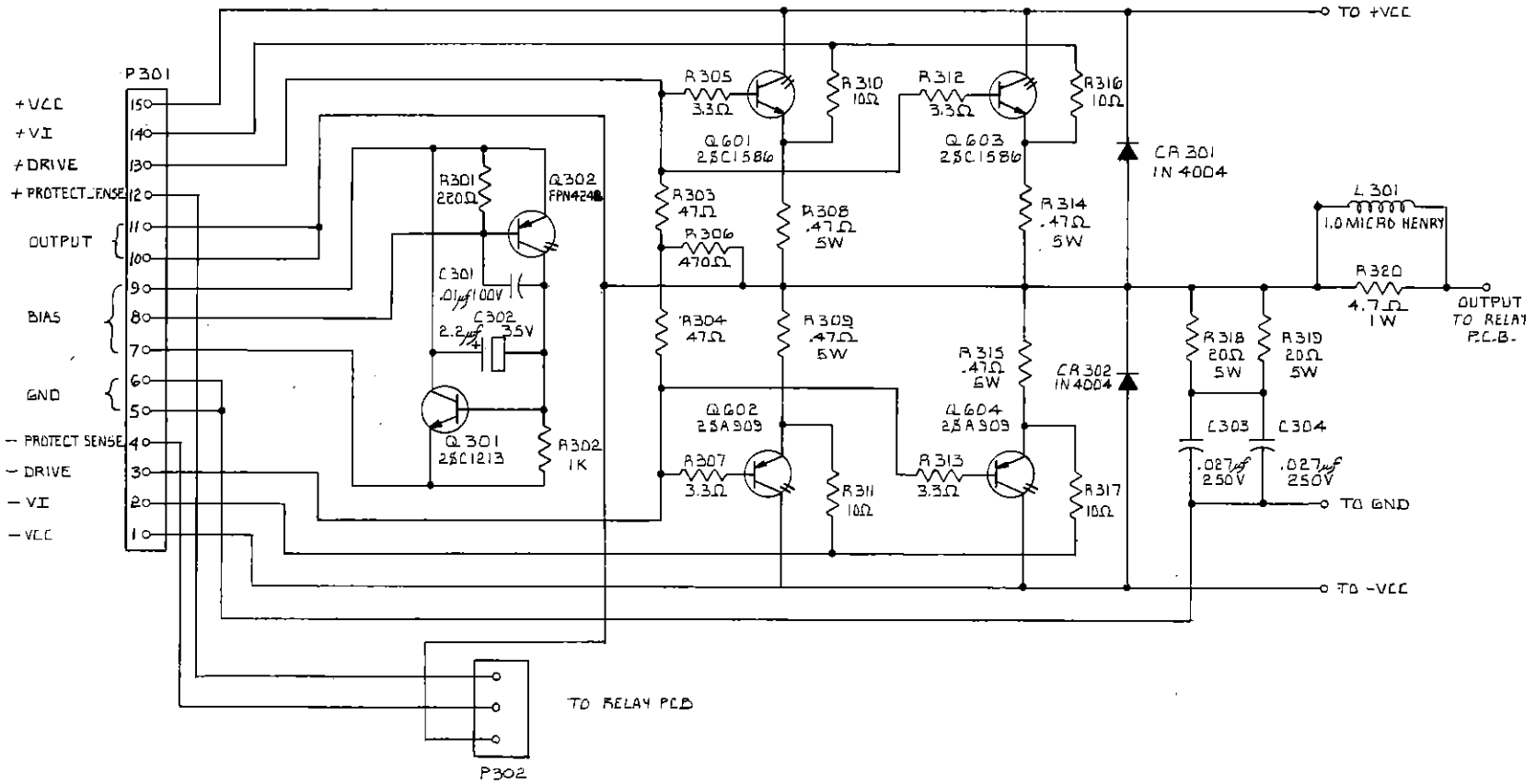
NOTES UNLESS OTHERWISE STATED
1. ● THIS SYMBOL DENOTES SOLDERED TIN EYELET.

TOLERANCES UNLESS OTHERWISE SPECIFIED			Cerwin-Vega, Inc.		
FRACTIONS ±	DEC ±	ANGLES ±			
APPROVALS	DATE		OUTPUT PCB ASSY.		
DRAWN J.D.	8.25.76				
CHECKED	8-25-76		SCALE	SIZE C	DRAWING NO. 8046-1
			DO NOT SCALE DRAWING		SHEET 1 of 1

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED



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NOTES:
1. ALL RESISTORS 1/2W 5% UNLESS SPECIFIED OTHERWISE
2. ALL RESISTANCE EXPRESSED IN OHMS
3. Q601 – Q604 ARE MOUNTED ON HEAT SINK ASSY 8106 BUT ARE SHOWN HERE TO CLARIFY THE CIRCUIT CONFIGURATION.

TRANSISTOR GRADING		
REF. NO.	PART NO.	GRADING
Q301	2SC1213A	C or D
Q302	FN4248	NA.
Q601, Q603	2SC 1586	O or Y
Q602, Q604	2SA 909	C or Y

TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES ± ± ±		Cerwin-Vega, inc.	
APPROVALS	DATE	M200 OUTPUT SCHEMATIC BOARD ASSY 8102	
DRAWN BCA 1/28			
CHECKED	2-26-79	SCALE	SIZE C
		DRAWING NO. E301	
		DO NOT SCALE DRAWING	SHEET

REVISIONS			
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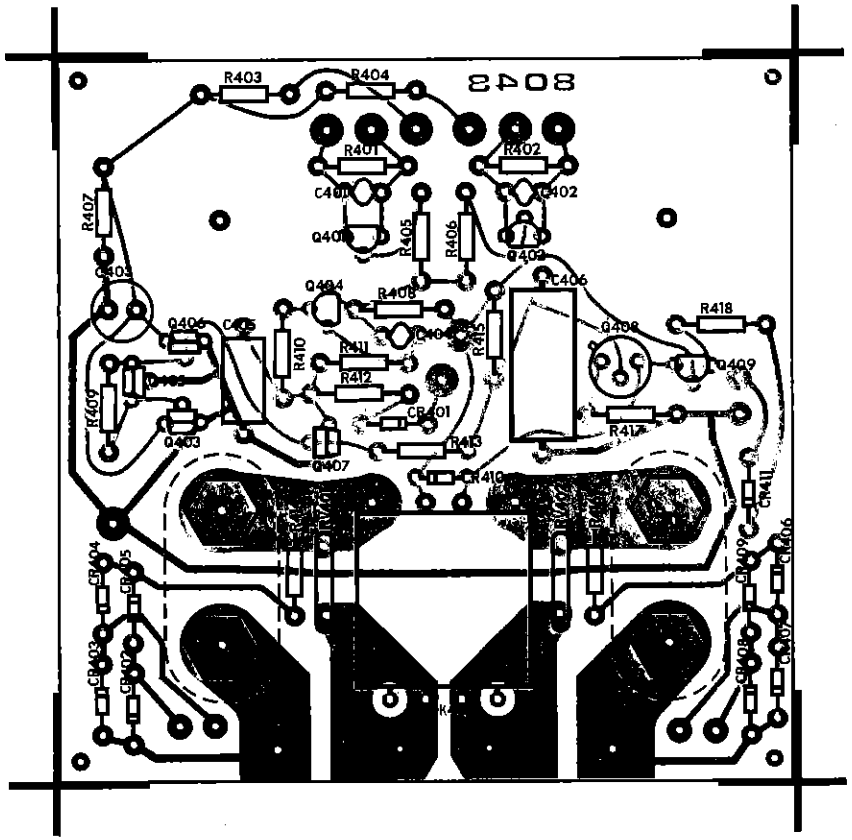

NOTES UNLESS OTHERWISE STATED
1. ○ THIS SYMBOL DENOTES SOLDERED TIN EYELET

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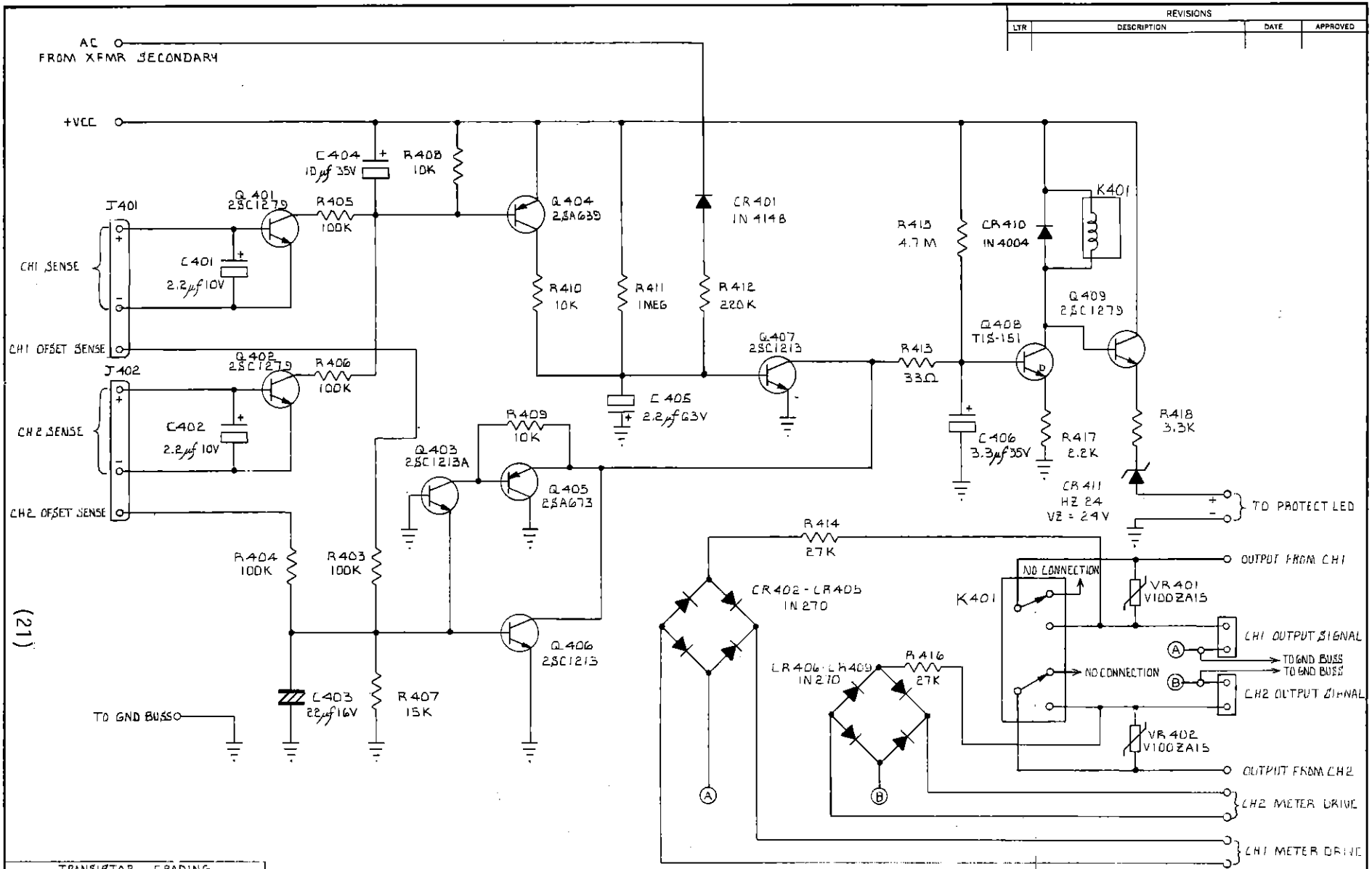
TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS DEC ANGLES ± ± ±		Cerwin-Vega, Inc.	
APPROVALS	DATE	PROTECT RELAY PCB ASSY	
DRAWN J. Davis	8.26.78		
CHECKED	8-28-78	SCALE	SIZE C / DRAWING NO. 8043
		DO NOT SCALE DRAWING	SHEET 1 of 1



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TRANSISTOR GRADING		
REF. NO.	PART NO.	GRADE
Q401, Q402, Q409	2SC1279	F or E
Q403, Q406, Q407	2SC1213A	C or D
Q404	2SA639	Q or P
Q405	2SA673A	C or D
Q408	TIS 151	NA

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

TOLERANCES UNLESS OTHERWISE SPECIFIED
FRACTIONS DEC ANGLES
± ± ±

APPROVALS	DATE
DRAWN Bob Cox	2-9-79
CHECKED	

Cerwin-Vega, Inc.

MEGA RELAY SCHEMATIC BOARD ASSY 2104

SCALE | SIZE C | DRAWING NO. 8306

DO NOT SCALE DRAWING | SHEET

Service Addendums - M-200 Protect PCB

1. Relay circuit: This modification may be necessary to any units with serial numbers below 790600. The changes described shorten the time required for the relay to de-energize (protect) and also provides a more stable turn-on time.

See protect PCB assembly drawing.

R415 - was 180k - is 4.7MΩ , 5%, 1/2w

C406 - was 100uf - is 3.3uf, 35v, 20% tantalum

Q408 - was RCA IA09 - is TIS 151

This change should be made, under warranty, to any unit not modified, in order to provide better protection to the amplifier.

2. DC sense resistor: R407, a 15kΩ resistor, determines the protection unit's sensitivity to DC output voltage. In some cases, when using bass synthesizer boxes which produce an asymmetrical waveform, this resistor may have to be lowered (to 8.2k) to prevent false protection triggering.

ITEM	REF DISGN	DESCRIPTION	MFGR PART #	MFGR	PART/STOCK #	QTY	SPEC. #	PRICE
1		Assembly Print		CV		1	8108	
2		Winding Diagram		CV		1	8201	
3								
4		Bobbin		CV		1	2009	
5								
6		Wire: Magnet #15		CV			2712	
7		Wire: Magnet #18		CV			2713	
8		Wire: Green #22		CV		1	8208	
9		Wire: Black $ White Stripe #16		CV		1	8204	
10		Wire: Black #16		CV		1	8205	
11		Wire: Red $ Yellow Stripe #16		CV		1	8206	
12		Wire: Red #16		CV		2	8207	
13		Wire: Brown $ White Stripe #16		CV		1	8209	
14		Wire: Brown #16		CV		1	8210	
15		Kapton Tape	K 250	CHR		3 ft.	8272	
16		Nomex Paper 2.35"W. .010"thick	410	Dupont		13.33	2645	
17		Fiberglass Tape	G-550	CHR		6 ft.	2646	
18		Kapton Tape	K 250	CHR		6'6"	2647	
19		Thinwall Teflon Tubing	1500-15T				8271	
20		Lamination E1-175 (Sets)		CV		110	2513	
21		Heat Shrink Tubing	PO-135 125C FR 1				8270	
22		End Cap - One Exit		CV		1	8202	
23		End Cap - No Exit		CV		1	8203	
24		Mounting Bracket Right		CV		2	11017	
25		Mounting Bracket Left		CV		2	11018	
26		Copper Foil		CV		1	5220	
27		Screw 10/32-2½" Cad R-H Phil				4		
28		Washer #10 Int-Tooth Lock				8		
29		Nut 10/32-3/8" Hex 7/64 Thick,Cad				4		
30		Tinnerman Nut #10	C8125-10-4	Eaton		4	2659	
31		Bushing #10-3/8" Shoulder	NY10-375GF	McNabb		8	2609	
32		Washer #6 Int-Tooth Lock				1		
33		Varnish: Electrical Insulating	WS-600	Stering		1oz	2653	
34		Light /Bracket		CV		1	8055	
35		Lamp Socket	2-01	Leecft		4	2663	
36		Lamps #47				4		
37		Solder Terminal (2-Pos.)	1077	Smith		1	8255	
38		Rivet-Alum. 1/8 x 5/32" S-T				1		

Cerwin-Vega	TITLE Power Transformer	DWN. BEH	ASSY.
	MODEL M-200 1 Required	APP.	8108

REV

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ITEM	REF DISGN	DESCRIPTION	MFGR PART #	MFGR	PART/STOCK #	QTY	SPEC. #	PRICE
39		Nomex 5.625" x 1.81" x .010"thick				3	11279	
40		Nomex 1.125" x 1.375" x .010"thick				2	8283	

Cerwin-Vega	TITLE Power Transformer	DWN. BJG	ASSY.	REV
	MODEL M-200	APP.	8108	

ITEM	REF DISGN	DESCRIPTION	MFGR PART #	MFGR	PART/STOCK #	QTY	SPEC. #	PRICE
1		Assembly Print		CV		1	8102	
2		Printed Circuit Board		CV		1	8047	
3		Schematic		CV		1	8302	
4								
5		Resistors						
6	R239 R240 R244							
	R245	Omit				4		
7	R238 R241	Jumper		CV		2		
8	R228 R231 R232							
	R233	Carbon Film ½w 5% 10 ohm				4		
9	R207 R210 R211							
	R215	Carbon Film ½w 5% 27 ohm				4		
10	R224 R227	Carbon Film ½w 5% 100 ohm				2		
11	R217 R223	Carbon Film ½w 5% 220 ohm				2		
12	R242 R243	Carbon Film ½w 5% 390 ohm				2		
13	R229 R230 R234							
	R235	Carbon Film ½w 5% 470 ohm				4		
14	R218 R220 R221	Carbon Film ½w 5% 1 k				3		
15	R216 R222	Carbon Film ½w 5% 2.2 k				2		
16	R206 R212	Carbon Film ½w 5% 2.7 k				2		
17	R201	Carbon Film ½w 5% 3.3 k				1		
18	R209 R213	Carbon Film ½w 5% 4.7 k				2		
19	R236 R237	Carbon Film ½w 5% 6.8 k				2		
20	R202 R205 R208							
	R214	Carbon Film ½w 5% 10 k				4		
21	R219	Carbon Film ½w 5% 22 k				1		
22	R204 R225 R226	Carbon Film ½w 5% 33 k				3		
23	R203 R246	Trim Pot 1 k	PT15-YB-1k	Piher		2	2619	
24								
25		Capacitors						
26	C203 C205 C205							
	C208 C211 C214	Omit				6		
27	C222	Ceramic NPO 1kV D 1.5 pf				1		
28	C210	Ceramic NPO 1kV D 3.9 pf				1		
29	C216 C217	Disc 500wV 10% 47 pf				2		
30	C202	Sil-Mica 500wV 5% 150 pf				1		
31	C220 C221	Disc 100wV 20% .001 uf				2		
32	C218 C219	Dip-Mylar 200wV 10% .047 uf				2		

Cerwin-Vega	TITLE Drive Board	DWN. BJG	ASSY.	REV
	MODEL Series 200 2 Required	APP.	8102	

ITEM	REF DISGN	DESCRIPTION	MFGR PART #	MFGR	PART/STOCK #	QTY	SPEC. #	PRICE
33	C213	Disc 100wV GMV 0.1 uf				1		
34	C212 C215	Dip-Mylar 250wV 20% 0.1 uf				2		
35	C201	Stack Foil 100wV 5% 2.2 uf	B32562	Siemens		1	2867	
36	C204 C207	Tant-Tag 35wV 20% 6.8 uf				2		
37	C209	Elect-NP 6.3wV 20% 220 uf	6.3 U 220NP-M	Nichicon		1	2865	
38								
39		Semiconductors						
40	CR201 CR202							
	CR203 CR204							
	CR205 CR206 CR207							
	CR209 CR210							
	CR213 CR214							
	CR215 CR216							
	CR217	Diode 1N4148				13	2856	
41	CR208 CR211	Diode - Low Capacitance	1SS82	Hitachi		2	2857	
42	CR205 CR212	Zener Diode	HZ24-3	Hitachi		2	2859	
43	Q201 Q202 Q203	Transistor NPN	2SC1775AE	Hitachi		3	2846	
44	Q204 Q205 Q206	Transistor PNP	2SA872AE	Hitachi		3	2847	
45	Q207	Transistor PNP	2SA639Q	NEC		1	2848	
46	Q208	Transistor NPN	2SC1279	NEC		1	2849	
47	Q209 Q212	Transistor PNP	2SA969Y	Toshiba		2	2850	
48	Q210 Q211	Transistor NPN	2SC2239Y	Toshiba		2	2851	
49	Q213	Transistor NPN	2SC1213A	Hitachi		1	2852	
50	Q214	Transistor PNP	2SA673	Hitachi		1	2853	
51								
52		Mechanical Parts						
53	P201	Connector : Input - Male 2 Pin	09-65-1022	Molex		1	2765	
54	J201	Connector : PCB - Female 15 Pin	09-52-3152	Molex		1	2631	
55		Screw 6/32-½" Cad P-H Phil				8		
56		Nut - 6/32-¼" Cad Hex				16		
57		Washer-Lock #6 Int.-Tooth				8		
58		Heat Sink TO-66	LAD66A4CB	IERC		4	8213	
59		Mini Label				1		

Cerwin-Vega	TITLE Drive Board	DWN. BJG	ASSY.
	MODEL Series 200	APP.	8102

REV

ITEM	REF DISGN	DESCRIPTION	MFGR PART #	MFGR	PART/STOCK #	QTY	SPEC. #	PRICE
1		Assembly Print		CV		1	8110	
2		Schematic		CV		1	8305	
3								
4		Step Attentuator	V90-5719	Noble		1	8264	
5		Ground Network		CV		1	8238	
6		Phono Jack	350 IFR	Swcft.		1	2616	
7								
8		Washer: Flat		CV		1	2689	
9		Washer: Shoulder		CV		1	2605	
10								
11		Wire: Shield		CV		1	8237	
12		Wire: Shield		CV		1	8239	

Cerwin-Vega	TITLE Channel 1 Input Harness M-200 MODEL 1 Required	DWN. BEH APP.	ASSY. 8110	REV

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ITEM	REF DISGN	DESCRIPTION	MFGR PART #	MFGR	PART/STOCK #	QTY	SPEC. #	PRICE
1		Assembly Print		CV		1	8111	
2		Schematic		CV		1	8305	
3								
4		Step Attenuator	V90-5719	Noble		1	8264	
5		Ground Network		CV		1	8238	
6		Phono Jack	350 IFR	SWCFT		1	2616	
7								
8		Washer : Flat		CV		1	2689	
9		Washer : Shoulder		CV		1	2605	
10								
11		Wire: Shield		CV		1	8237	
12		Wire: Shield		CV		2	8240	

Cerwin-Vega	TITLE Channel 2 Input Harness MODEL M-200 1 Required	DWN. BEH APP.	ASSY. 8111

REV

ITEM	REF DISGN	DESCRIPTION	MFGR PART #	MFGR	PART/STOCK #	QTY	SPEC. #	PRICE
1		Assembly Print		CV		1	8103	
2		Printed Circuit Board		CV		1	8046-1	
3		Schematic		CV		1	8301	
4								
5		Drive PCB Assembly		CV		1	8102	
6								
7		Resistors						
8	R305 R307 R312							
	R313	Carbon Film ½w 5% 3.3ohm				4		
9	R310 R311 R316							
	R317	Carbon Film ½w 5% 10 ohm				4		
10	R303 R304	Carbon Film ½w 5% 47 ohm				2		
11	R301	Carbon Film ½w 5% 220 ohm				1		
12	R306	Carbon Film ½w 5% 470 ohm				1		
13	R302	Carbon Film ½w 5% 1 K				1		
14	R320	Carbon Film 1w 5% 4.7 ohm				1		
15	R308 R309 R314							
	R315	Wire Wound 5w 10% .47 ohm	CP-5	Dale		4	8241	
16	R318 R319	Wire Wound 5w 10% 20 ohm	CP-5	Dale		2	8242	
17								
18		Capacitors						
19	C303 C304	Polyester Film 250wV 10% .027uf	160.027K250C	Plessey		2	2922	
20	C301	Disc 100wV "P" .01uf				1		
21	C302	Tant-Tag 35wV 20% 2.2uf				1		
22								
23		Inductors						
24	L301	Air Core Coil 1.0 Micro Henry		CV		1	8214	
25								
26		Semiconductors						
27	CR301 CR302	Diode IN4004				2	2879	
28	Q301	Transistor NPN	2SC1213	Hitachi		1	2852	
29	Q302	Transistor PNP	PN4248	Far		1	2622	
30								
31		Mechanical Parts						
32	P301	Connector : PCB 15 Pin Male	09-67-1154	Molex		1	2642	
33		Transistor Socket	M1629	Emuden		4	8243	
34		PCB Support	CBS-8N	Richco		2	8244	
35		Connector : PCB	09-65-1032	Molex		1	8265	

Cerwin-Vega	TITLE OUTPUT PCB	DWN. BEH	ASSY. 8103 / REV
	MODEL SERIES 200 2 Required	APP.	

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ITEM	REF DISGN	DESCRIPTION	MFGR PART #	MFGR	PART/STOCK #	QTY	SPEC. #	PRICE
36		Wire : Red CH 1 (+Vcc)		CV		1	8215	
37		Wire : Red CH 2 (+Vcc)		CV		1	8216	
38		Wire : Violet CH 1 (-Vcc)				1	8217	
39		Wire : Violet CH 2				1	8218	
40		Wire : Black				1	8219	
41								
42		Compression Pad				1	8054	
43		Speedy-Tys				3	2812	

Cerwin-Vega	TITLE OUTPUT PCB MODEL SERIES 200	2 Required	DWN. BEH APP.	ASSY. 8103	REV

ITEM	REF DISGN	DESCRIPTION	MFGR PART #	MFGR	PART/STOCK #	QTY	SPEC. #	PRICE
1		Assembly Print		CV		1	8104	
2		Printed Circuit Board		CV		1	8048	
3		Schematic		CV		1		
4								
5	R401 R402	Omit						
6		Resistors						
7	R413	Carbon Film ½w 5% 33 ohm				1		
8	R417	Carbon Film ½w 5% 2.2 k				1		
9	R418	Carbon Film ½w 5% 3.3 k				1		
10	R408 R409 R410	Carbon Film ½w 5% 10 k				3		
11	R407	Carbon Film ½w 5% 15 k				1		
12	R414 R416	Carbon Film ½w 5% 27 k				2		
13	R403 R404 R405	5						
	R406	Carbon Film ½w 5% 100 k				4		
14	R415	Carbon Film ½w 5% 4.7Meg				1		
15	R412	Carbon Film ½w 5% 220 k				1		
16	R411	Carbon Film ½w 5% 1 M				1		
17								
18		Capacitors						
19	C401 C402	Elect 10wV Z 2.2 mfd	50 ULA 2.2	Nichicon		2	2864	
20	C405	Elect R-LBP 50wV M 2.2 mfd				1		
21	C404	Tant-Tag 35wV Z 10 mfd				1		
22	C403	NP-Elect 16wV Z 22 mfd				1		
23	C406	Tant-Tag 35wV Z 3.3 mfd				1		
24								
25		Semiconductors						
26	CR402 CR403							
	CR404 Cr405							
	CR406 CR407							
	CR408 CR409	Diode 1N 270				8	2880	
27	CR401	Diode IN4148				1	2856	
28	CR410	Diode ln4004				1	2879	
29	CR411	Zener-Diode 24V	Hz24-3	Hitachi		1	2859	
30	Q401 Q402 Q409	Transistor NPN	2SC1279S	Nec		3	2849	
31	Q403 Q406 Q407	Transistor NPN	2SC1213AC	Hitachi		3	2852	
32	Q404	Transistor PNP	2SA639Q	Nec		1	2848	
33	Q405	Transistor PNP	2SA673D	Hitachi		1	2853	
34	Q408	Transistor NPN	TIS-151	TEX INST.		1	8269	

Cerwin-Vega	TITLE Relay PCB	DWN. BEH	ASSY.	REV
	MODEL M-200 1 Required	APP.	8104	8653

ITEM	REF DISGN	DESCRIPTION	MFGR PART #	MFGR	PART/STOCK #	QTY	SPEC. #	PRICE
1		Assembly Print		CV		1	8109	
2		Chassis Schematic		CV		1	8304	
3								
4		Assembly - Relay PCB		CV		1	8104	
5		Assembly - Heat Sink		CV		2	8106	
6		Assembly - Front Panel		CV		1	8107	
7		Assembly - Transformer		CV		1	8108	
8								
9		Chassis		CV		1	8042-2	
10		Chassis Cover		CV		1	8043-2	
11		Ground Buss		CV		1	8263	
12								
13		Electrolytic 75wV Z 7500 uf	VA-3415	Unicon		2	8250	
14								
15		Light Emitting Diode (LED)	GL-9PR2	Sharp		1	8251	
16		Bridge Rectifier	J775	Sol.		1	2604	
17		Power Switch	JU-3045	SMK		1	8253	
18		TAP Change Switch	2GL50-73	Carling		1	8254	
19		Switch Bracket		CV		1	8053-1	
20								
21		Binding Post (5-Way)	BF3U-2-BRC	Superior		2	2607	
22		Binding Post (Ground)	110	Smith		1	8257	
23		Fan Outlet	MD-40-2	Emuden		1	8258	
24		Fuse Holder	SN-2059	SMK		1	8252	
25		Fuse 3AG-5A				1		
26		Thermal Breaker	L185	Elmwd		2	2655	
27		Power Cord	04919	Carol		1	8259	
28		Strain Relief	SR6N3-4	Heyco		1	2656	
29								
30		Capacitor Mount Bracket		Unicon		2	8250	
31		Switch Guard		CV		1	8050	
32		Switch Bracket		CV		1	8053	
33		Power Switch Button		CV		1	8211	
34		Rubber Feet				4		
35		Adhesive Back Cable Clamp	UC-4	Richco		2		
36		Speedy Tys	65002	Waldom		9	2812	
37		Cable Clamp - Nylon	8911	Smith		2	5236	

Cerwin-Vega	TITLE CHASSIS	DWN. BEH	ASSY. 8109	REV
	MODEL M-200	APP.		

ITEM	REF DISGN	DESCRIPTION	MFGR PART #	MFGR	PART/STOCK #	QTY	SPEC. #	PRICE
38		Screw-Metric M3-.5/5 P-h Cad Phil				2		
39		Screw 4/40-3/8" F-H Cad Phil				6		
40		Screw 6/32-3/8" P-H Blk Phil				6		
41		Screw 6/32-5/8" P-H Blk Phil				1		
42		Screw 8/32-1/2" P-H Blk Phil				8		
43		Screw-Sheet #6-½" A P-H Blk Phil				10		
44		Screw-Sheet #8-½" B P-H Cad Phil				4		
45		Screw- 10-32 x .3/8 PH BLK PHIL				4		
46		Nut 4/40-¼" Hex Cad				4		
47		Nut 6/32-¼" Hex Cad				3		
48		Nut 10/32-3/8" Hex Cad				2		
49		Nut-Tinnerman #4/40	C105SS-440	Eaton		2	8262	
50		Nut-Tinnerman #6/32	C8092-632-4	Eaton		4	8261	
51		Washer #4 Int-Tooth Lock				4		
52		Washer #6 Int-Tooth Lock				1		
53		Washer #10 Int-Tooth Lock				2		
54		Wire; #16 Black (to ground buss)				1	8229	
55		Wire: #16 Brown (jumper for power)				1	8230	
56		Wire: #16 Brown (jumper for power switch)				1	8231	
57		Wire: #16 Brown Twisted Pair				1	8232	
58		Wire: #16 Brown Twisted Pair				1	8233	
59		Wire: #16 Yellow Twisted Pair				1	8234-1	
60		Wire: #16 Violet				1	8235	
61		Wire: #16 Red				1	8236	
62		NUT SELF LOCKING #10				4		
63		WASHER #8 INT. TOOTH LOCK				4		

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Cerwin-Vega	TITLE CHASSIS	DWN. BEH	ASSY. 8109
	MODEL M-200	APP.	REV

ITEM	REF DISGN	DESCRIPTION	MFGR PART #	MFGR	PART/STOCK #	QTY	SPEC. #	PRICE
1		**Assembly Print**		**CV**		1	8107	
2								
3		**Front Panel**		**CV**		1	8040-2	
4		**Meter Window**		**CV**		2	8051-1	
5		**Meter Bracket**		**CV**		2	8025-1	
6		**Knob**		**CV**		2	8030	
7		**Channel 1 Input Harness Assembly**		**CV**		1	8110	
8		**Channel 2 Input Harness Assembly**		**CV**		1	8111	
9								
10		**Meter $ Mounting Nuts (4)**		**Toyo**		2	2395 $ 2396	
11		**Handle**	**FBA 7**	**Vemaline**		2	8249	
12								
13								
14								
15								
16								
17		**Wire: #16 Black**		**CV**		1	8228	
18		**Set-Screw 4/40-¼-.050 Allen**				2		
19		**Screw 8/32-.438" Blk Hex**				4		
20		**Nut-Metric ***				2		
21		**Washer-Flat ***				2		
22		**Washer-Flat .30IDx.15x.032**				8		
23		**Washer-Lock #8 Int-Tooth**				4		
24		**Washer-Lock 3/8" Int-Tooth Small Pattern**				2		
		Washer # 8Int tooth lock blk				8		

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Cerwin-Vega	TITLE **Front Panel** *supplied with item 10 MODEL **M-200** 1 Required	DWN. **BEH** APP.	ASSY. 8107 REV

ITEM	REF DISGN	DESCRIPTION	MFGR PART #	MFGR	PART/STOCK #	QTY	SPEC. #	PRICE
1		Assembly Print		CV		1	8106	
2		Assembly 8103		CV		1		
3								
4		Semiconductors						
5	Q601 Q603	Transistor NPN	2SC1586	Sanken		2	2855	
6	Q602 Q604	Transistor PNP	2SA909	Sanken		2	2854	
7								
8		Mechanical Parts						
9		Heat Sink		CV		1	8045-1	
10		Transistor Cover		CV		2	8052	
11		Standoff	8218-A-0632	Amatom		2	8247	
12		Standoff	9741-SS-0632	Amatom		2	8266	
13		Screw M3x0.5-16mm P-H Phil				8		
14		Screw 6/32 UNC- .375"L Blk PH Phil				6		
15								
16		Washers #6 Int.-Tooth Lock				4		
17								
18		Transistor Insulator	DM-101K	McNabb		4	2611	
19		Heat Sink Compound				A/R	2675	

Cerwin-Vega	TITLE Heat Sink	DWN. BJG	ASSY. 8106
	MODEL Series 200	APP.	REV

ITEM	REF DISGN	DESCRIPTION	MFGR PART #	MFGR	PART/STOCK #	QTY	SPEC. #	PRICE
1		Completed Amplifier		CV		1		
2								
3.		Shipping Carton & Inserts		CV		1	8212	
4		Owners Manual		CV		1	8601	
5		Plastic Bag						

Cerwin-Vega	TITLE Final Assembly	DWN. BJG	ASSY.	REV
	MODEL Series 200 1 Required	APP.	8101	