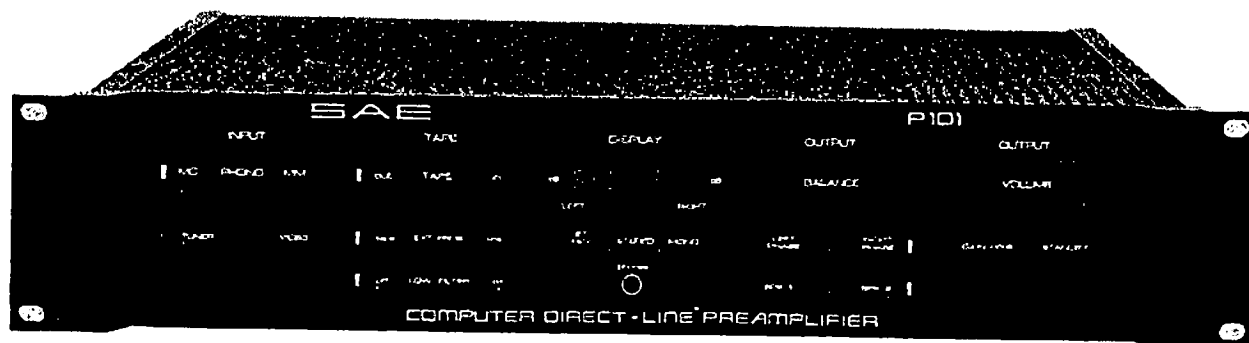


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COMPUTER DIRECT-LINE™ PREAMPLIFIER



SAE

SERVICE MANUAL

SCIENTIFIC AUDIO ELECTRONICS INC

S.A.E. 18369 EDDY ST NORTHRIDGE CA 91325
818 772 7165

P101 Reference Voltages (DC)
 Use fluke 8010A DVM (unit on, no signal, inputs open)

POWER SUPPLY SECTION

PART	VOLTAGE	COMMENT
Q10	+29.1V	COLL TO GND
Q11	-29.1V	" "
C54	+28.3V	+ TERM TO GND
C55	-28.3V	- TERM TO GND
CR3	-40V	ANODE TO GND
CR1	+40	CATHODE TO GND
CR13	-16.8V	CATHODE TO GND
CR12	+16.8V	ANODE TO GND
C63-64	+11.8V	+ JUNCTION TO GND
CR6	+15.8V	CATHODE TO GND
CR8	+9.9V	" "
Q13	+5.0V	PIN 3 TO GND

PHONO (MC & MM) SECTION

PART	VOLTAGE	COMMENT
R44/144	<u>+</u> 26.5V	LOW SIDE TO GND
R27/127	<u>+</u> 26.0V	" "
Q1, 2	0.0V	JUNCTION TO GND (OFFSET)
Q5	+0.28V	EMITTER TO GND
Q6	-0.28V	" "
U1, 2	+.04 to .05V	PIN 1 TO END
U1, 2	+20 to 22V	PIN 3 TO END
Q14	+0.45V	EMITTER TO END
Q15	-0.45V	" "

VOLUME / BALANCE / LINE SECTION

U211, 212	PIN	0dB	46.5dB	94.5dB
	1	0.0V	0.0V	0.0V
	2	0.0V	0.0V	0.0V
	3	+5.0V	+5.0V	0.0V
	4	+5.0	0.0V	0.0V
	5	+5.0	0.0V	0.0V
	6	+5.0	0.0V	0.0V
	7	+5.0V	0.0V	0.0V
	8	+5.0V	0.0V	0.0V
	9	0.0V	0.0V	0.0V
	10	0.0V	0.0V	0.0V
	11	0.0V	+0.7V	+0.4V
	12	0.0V	+0.7V	+0.4V
	13	+0.5V	0.0V	+0.3V
	14	+5.0V	+5.0V	+5.0V
	15	0.0V	0.0V	0.0V
	16	0.0V	0.0V	0.0V
U3 / 103	4	+16.5V		
	8	-16.5V		

PART	VOLTAGE	COMMENT
Q7	+11.7V	EMITTER TO GND
Q7	+11.5V	COLLECTOR " "

U210 VOLTAGE TABLE (FOR VOL. CONTROL)

	4	5	6	7	8	9	15	16	17	18	19	20
0dB	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5	+5
1.5	+5	+5	+5	+5	+5	0	+5	+5	+5	+5	+5	0
3	+5	+5	+5	+5	0	+5	+5	+5	+5	+5	0	+5
4.5	+5	+5	+5	+5	0	0	+5	+5	+5	+5	0	0
6	+5	+5	+5	0	+5	+5	+5	+5	+5	0	+5	+5
7.5	+5	+5	+5	0	+5	0	+5	+5	+5	0	+5	0
9	+5	+5	+5	0	0	+5	+5	+5	+5	0	0	+5
10.5	+5	+5	+5	0	0	0	+5	+5	+5	0	0	0
12	+5	+5	0	+5	+5	+5	+5	+5	0	+5	+5	+5
13.5	+5	+5	0	+5	+5	0	+5	+5	0	+5	+5	0
15	+5	+5	0	+5	0	+5	+5	+5	0	+5	0	+5
16.5	+5	+5	0	+5	0	0	+5	+5	0	+5	0	0
18	+5	+5	0	0	+5	+5	+5	+5	0	0	+5	+5
19.5	+5	+5	0	0	+5	0	+5	+5	0	0	+5	0
21	+5	+5	0	0	0	+5	+5	+5	0	0	0	+5
22.5	+5	+5	0	0	0	0	+5	+5	0	0	0	0
24	+5	0	+5	+5	+5	+5	+5	0	+5	+5	+5	+5
25.5	+5	0	+5	+5	+5	0	+5	0	+5	+5	+5	0
27	+5	0	+5	+5	0	+5	+5	0	+5	+5	0	+5
28.5	+5	0	+5	+5	0	0	+5	0	+5	+5	0	0
30	+5	0	+5	0	+5	+5	+5	0	+5	0	+5	+5
31.5	+5	0	+5	0	+5	0	+5	0	+5	0	+5	0
33	+5	0	+5	0	0	+5	+5	0	+5	0	0	+5
34.5	+5	0	+5	0	0	0	+5	0	+5	0	0	0
36	+5	0	0	+5	+5	+5	+5	0	0	+5	+5	+5

	4	5	6	7	8	9	15	16	17	18	19	20
37.5	+5	0	0	+5	+5	0	+5	0	0	+5	+5	0
39	+5	0	0	+5	0	+5	+5	0	0	+5	0	+5
40.5	+5	0	0	+5	0	0	+5	0	0	+5	0	0
42dB	+5	0	0	0	+5	+5	+5	0	0	0	+5	+5
43.5	+5	0	0	0	+5	0	+5	0	0	0	+5	0
45	+5	0	0	0	0	+5	+5	0	0	0	0	+5
46.5	+5	0	0	0	0	0	+5	0	0	0	0	0
48	0	+5	+5	+5	+5	+5	0	+5	+5	+5	+5	+5
49.5	0	+5	+5	+5	+5	0	0	+5	+5	+5	+5	0
51	0	+5	+5	+5	0	+5	0	+5	+5	+5	0	+5
52.5	0	+5	+5	+5	0	0	0	+5	+5	+5	0	0
54	0	+5	+5	0	+5	+5	0	+5	+5	0	+5	+5
55.5	0	+5	+5	0	+5	0	0	+5	+5	0	+5	0
57	0	+5	+5	0	0	+5	0	+5	+5	0	0	+5
58.5	0	+5	+5	0	0	0	0	+5	+5	0	0	0
60	0	+5	0	+5	+5	+5	0	+5	0	+5	+5	+5
61.5	0	+5	0	+5	+5	0	0	+5	0	+5	+5	0
63	0	+5	0	+5	0	+5	0	+5	0	+5	0	+5
64.5	0	+5	0	+5	0	0	0	+5	0	+5	0	0
66	0	+5	0	0	+5	+5	0	+5	0	0	+5	+5
67.5	0	+5	0	0	+5	0	0	+5	0	0	+5	0
69	0	+5	0	0	0	+5	0	+5	0	0	0	+5
70.5	0	+5	0	0	0	0	0	+5	0	0	0	0
72	0	0	+5	+5	+5	+5	0	0	+5	+5	+5	+5
73.5	0	0	+5	+5	+5	0	0	0	+5	+5	+5	0
75	0	0	+5	+5	0	+5	0	0	+5	+5	0	+5

	4	5	6	7	8	9	15	16	17	18	19	20
76.5	0	0	+5	+5	0	0	0	0	+5	+5	0	0
78	0	0	+5	0	+5	+5	0	0	+5	0	+5	+5
79.5	0	0	+5	0	+5	0	0	0	+5	0	+5	0
81	0	0	+5	0	0	+5	0	0	+5	0	0	+5
82.5	0	0	+5	0	0	0	0	0	+5	0	0	0
84dB	0	0	0	+5	+5	+5	0	0	0	+5	+5	+5
85.5	0	0	0	+5	+5	0	0	0	0	+5	+5	0
87	0	0	0	+5	0	+5	0	0	0	+5	0	+5
88.5	0	0	0	+5	0	0	0	0	0	+5	0	0
90	0	0	0	0	+5	+5	0	0	0	0	+5	+5
91.5	0	0	0	0	+5	0	0	0	0	0	+5	0
93	0	0	0	0	0	+5	0	0	0	0	0	+5
94.5	0	0	0	0	0	0	0	0	0	0	0	0

U210

PIN	VOLTAGE	COMMENT
1	+5.0V	
2	+5.0 / 0.15V	VOLTAGE DROPS WHEN VOL. UP IS PRESSEI
3	+5.0 / 0.15V	VOLTAGE DROPS WHEN BAL. LT IS PRESSEI
10	+2.11V	
11	+2.0V	
12	0.0V	
13	+5.0 / 0.15V	VOLTAGE DROPS WHEN VOL. DN IS PRESSEI
14	+5.0 / 0.15V	VOLTAGE DROPS WHEN BAL RT IS PRESSED
21	+5.0	NOT USED
22	+0.4V	NOT USED

NOT USED

GND

GND

+4.5V

0.0V

0.0V

+2.5V

+2.5V

+2.5V

COMMENTS

VOLTAGE

PIN

U209

+5.0V

+5.0V

0dB = 0.8V

+5.0V

" 0.8V

" 0.8V

" 0.8V

" 0.8V

" 0.8V

0dB = 0.4V

+5.0V

+2.50V

+2.50V

+2.50V

+0.4

0.0V

+0.4V

+0.4V

COMMENTS

VOLTAGE

PIN

NOT USED

NOT USED

NOT USED

NOT USED

DROPS TO 0.4V WHEN USING VOL. OR BAL.

22.5dB = 1.2V

48dB = 0.8V

60dB = 1.2V

22.5dB = 1.2V

48dB = 0.8V

60dB = 0.4V

" 1.2V

" 1.2V

" 0.8V

" 0.8V

" 1.2V

" 0.8V

" 1.2V

" 1.2V

" 0.8V

" 0.8V

" 1.2V

" 0.8V

" 1.2V

" 0.8V

PIN	VOLTAGE	COMMENTS
8	0.0V	END
9	+4.7V	
10	+4.5V	
11	+4.5V	PULSED 5:1 RATIO
12	+4.5V	(DUTY CYCLE)
13	+4.5V	
14	+4.5V	
15	+4.5V	D.C.
16	+5.0V	SUPPLY

PART	VOLTAGE	COMMENTS
Q235	+0.8V	EMITTER TO GND (STANDBY)
Q235	+0.0V	" (ON)
Q235	+0.2V	BASE TO GND (STANDBY)
Q235	+0.65V	" (ON)
Q226-232	+0.3 TO 0.7V	DEPENDING ON DISPLAY (BASE)
" "	+0.2 TO 2.3V	" (COLLECTOR)
Q220-225	+2.7 TO 4.1V	" (COLLECTOR)

U201-208

PIN	VOLTAGE	COMMENTS
1	+11.0V	FUNCTION ON
1	+0.01V	FUNCTION OFF
2	+0.01V	FUNCTION ON
2	+11.0V	FUNCTION OFF
14	+0.01V	FUNCTION ON
14	+11.0V	FUNCTION OFF
15	+11.0V	FUNCTION ON
15	+0.01V	FUNCTION OFF

PART	VOLTAGE	COMMENTS
Q201-219	+0.2V	FUNCTION ON (COLLECTOR TO GND)
	+11.7V	FUNCTION OFF (" ")

P101 FUNCTIONAL TEST

EQUIPMENT REQUIRED: Sound Tech 1700B distortion analyzer or Equiv.
Dual Trace Oscilloscope Voltmeter (set in AC volts mode).

SET UP: On unit under test; select "Tuner" input vol. max (94.5dB) input signal set for 2.5V at main outputs monitor both channels.

1. Sweep 20Hz to 20kHz, ck. THD, should be less than 0.01% unweighted. If spec is not met, ck. Q7, 8, U211, U3 (ch A). Q107, 108, U212, U103, (ch B).
2. Ck. gain difference between channels, should be less than 0.25dB. If not, ck. components listed in step 1.
3. Increase signal to obtain an output of at least 9V @ 1kHz before clipping occurs (typ. spec. is 10.5-11V) ck. U3, 103 if fault is found.
4. Repeat steps 1 thru 3 with both phase switches activated (this test checks U4) related components: U207 A and B Q216, 217, K15, K115, K16, K116.
5. Connect input signal to the "video" input. Connect jumpers between the in/out of "ext. pros." and "tape". Level should remain unchanged when related function switches are operated (this test ck's K5-9, K105-109) if variations occur. Also, ck. U203, Q207 (tape) U204B, U205A, Q210, 211 (ext. pros.).
6. Disconnect jumpers from step 5, activate low filter function, set analyzer to 15Hz output should drop - 11dB. Related components: U203A, Q205-206, K11-111.
7. Remove input from one channel and operate "stereo rev" control. Note channel reversal on scope. If no action occurs, ck. the following: U205B, Q212, K10, 110.
8. Press mono, signal appears at output on both channels attenuated .2dB if mono inop, ck: U206A, Q213, K100.
9. Reconnect both inputs, sync. scope. Press "left phase" signal should shift 180° in relation to the right channel. Ck. "right phase" in the same manner. (related components listed in step 4).

10. Operate mute switch, note 15dB gain reduction. If not, ck; U204A, Q209, K12, 112, U3, 103.
11. Operate volume up and down, note even stepping operation. Display should correspond to signal level change (1.5dB / step) if erratic action occurs, ck. the following: U209, 210, 211, 212, Q225-232, display readout.
12. Operate balance control (L and R) same as step 11.
13. Connect input signal to MM (phono), connect output cables to "tape" out. Set analyzer for 1V out at tape jacks. Channel gain (left and right) should vary no more than 0.25dB ck. THD. (use reverse R1AA, schematic supplied) 0.01% @ 1kHz weighted max. 0.03% @ 1kHz unweighted max. Disconnect inputs and insert shorting plugs, measure residual noise: -84dB unweighted
-90dB weighted
Ck. following components if spec is not met: U2, U102, Q5, Q6, Q105, Q106, K2, K102, U201B, Q202.
14. Repeat step 13 for MC (phono) with the following exception: Noise spec should be -84dB weighted. Related components: Q1, Q2, Q101, Q102, U1, U101, Q3, Q4, K1-101, U201A, Q201.

USE OF REVERSE RIAA EQUALIZER

General

Since all magnetic phono preamps incorporate playback equalization conforming to the RIAA recording characteristic, it is important to verify that the equalization is accurate within normal tolerances throughout the audio band.

Industry practice for standard stereo magnetic phono inputs is to provide an input termination of 47k ohms and 40db to 42db gain to the tape outputs. This results in a nominal input sensitivity of 2.0mV @ 1kHz to produce 200-250mV at the tape outputs.

The recording equalization introduces approximately -20db cut @ 20Hz and +20db boost @ 20kHz (reference 1kHz). Therefore, playback equalization must restore flat response by providing the inverse characteristic (+20db @ 20Hz, -20db @ 20kHz).

To verify the playback response of the phono preamp would require a painstaking measurement of input signal vs. output response and comparison to a standard RIAA playback equalization graph.

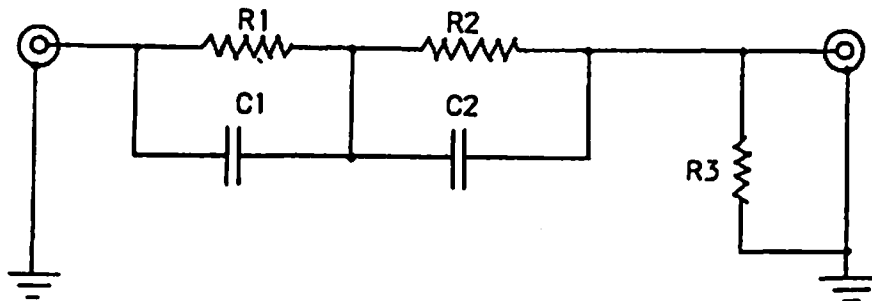
The reverse RIAA equalizer can be a most helpful and efficient tool in daily use. It allows the audio technician to make quick and accurate phono circuit performance verification. The reverse RIAA equalizer alters the output of the test oscillator to the required RIAA recording response. Thus, when inserted between the test oscillator and the input of a phono preamp under test, the resultant signal at the tape outputs should be a nominally flat response at all frequencies (20Hz to 20kHz). Naturally, the accuracy of design values and component tolerances in the reverse RIAA equalizer and preamp equalization circuit will determine the overall response accuracy to the desired RIAA curve.

The reverse RIAA equalizer also provides the nominal 40 or 42db insertion loss at 1kHz which allows convenient signal attenuation from the test oscillator. The test oscillator can be operated at the normal 250mV output for high level inputs (tuner, tape, aux) then without adjustment, the reverse RIAA equalizer can be inserted and the phono inputs can be tested at the nominal 2mV input. This will also insure that the input stages are not overloaded.

In practice, the technician will always want to check all phono inputs (PH 1 A/B and PH 2 A/B) to make sure no obvious problems exist in a given preamp. The 1kHz reference signal is fed into the reverse RIAA equalizer and its output to the phono input. Short shielded leads must be used for all interconnecting. The phono preamp output is monitored with a precision A.C. voltmeter and oscilloscope at the preamp tape output jacks (ahead of tone, balance, volume or high level stages). The oscillator output is adjusted to obtain the 200/250mV reference level at the tape output jacks at 1kHz. The frequency is then varied throughout 20Hz

20kHz range without changing the level setting. The preamp output should remain constant ($\pm 1\text{db}$) throughout frequency range. Comparison of one stereo channel to the other should result, of course. Insufficient frequency boost or cut or channel imbalance can clue the technician to locate and remedy faulty phono preamp circuit components to restore normal operation.

Reverse RIAA Equalizer



Install in shielded chassis box. One channel only shown, duplicate for stereo use.

Note: R3 = 470 ohm for -42db
 R3 = 620 ohm for -40db

<u>Circuit Symbol</u>	<u>S.A.E. Part No.</u>	<u>Description</u>
R1	02-0051	47K 5% 1/3w carbon film
R2	02-0063	560K " " " "
R3	02-0017	470 ohm 5% 1/3w carbon film
or	02-0020	620 " " " " "
C1	10-0018	1.6nf 63v polystyrene
C2	10-0027	5.6nf 63v "

SPECIAL NOTE CONCERNING RELAYS

If the unit in question has an intermittent problem, random noise (audible) or inconsistent signal routing, the probable cause will be found in the relays. To clean, use the following procedure: to isolate and locate a faulty relay is usually done by tapping the relay bodies (start at the input and work thru to the output). Tapping will produce audible noise if a relay has dirty contacts (the most frequent problem). Remove the clear plastic cover and work the contacts back and forth in a wiping motion.

CAUTION: THE USE OF CERTAIN CLEANERS WILL DESTROY THE RELAY THUS VOIDING WARRANTY REIMBURSEMENT. ONLY THE FOLLOWING CONTACT CLEANERS ARE RECOMMENDED:

1. LPS instant contact cleaner No. 00416
2. Sprayon No. 2002 T.F. electrical contact and tape head cleaner.

Equiv to: Mil. 81302B, NASA MSFC 237a, FED. BB-C-00310.

SERVICE MANUAL

22-0271

P101

PCB ASSY-PHONO IMP

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[illegible]

SERVICE MANUAL

45-0036

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MAIN CHASSIS ASSY

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TO SER. NO 2000

[illegible]

P101

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[illegible]

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SERVICE MANUAL	PCB ASSY- MAIN		1 OF 5

TO SER. NO 2000

PART NO	DESCRIPTION	QTY	REF. DESIG.
01-0005	R: 47 OHM 5 % $\frac{1}{4}$ CF	2	R22 R122
01-0006	R: 100 "	4	R77-78 R81 R303
01-0021	R 1 K "	14	R50 R62 R79- 80 R150 R162 R316-322 R299
01-0023	R: 1.2 K "	15	R286-282 R288-294 R296 R298
01-0030	R: 3.3 K "	4	R305-306 R323-324
01-0034	R: 4.7 K "	38	R85 R238-246 R252 R255 R257-280 R307 R331
01-0038	R: 6.8 K "	1	R308
01-0041	R: 10 K "	34	R73-74 R84 R207 R209 R213 R222 R225-226
"		"	R220 R217 R231-232 R237 R247-248 R251
"		"	R300-301 R325-330 R332-337
01-0059	R: 100 K	1	R302
01-0073	R: 1 MEG "	32	R28 R128 R201-206 R208-212 R214- 216
"		"	R218-219 R221 R223-224 R227-230
"		"	R233-236 R249-250 R253-254
01-0077-2	R: 68 OHM 2 % $\frac{1}{4}$ MF	8	R25-26 R42-43 R125-126 R142-143
01-0082	R: 750 OHM 5 % $\frac{1}{4}$ CF	2	R71-72
01-0095-2	R: 1 K OHM 2 % $\frac{1}{4}$ MF	2	R58 R158
01-0097-2	R: 10 OHM "	2	R2 R102
01-0096-2	R: 2.2 K OHM "	2	R57 R157
01-0098	R: 120 OHM 5 % $\frac{1}{4}$ CF	4	R27 R44 R127 R144
01-0101	R:620 "	3	R281 R287 R295
01-0120	R: 68 "	8	R304 R309 R315
01-0127-2	R: 390 OHM 2 % $\frac{1}{4}$ MF	6	R24 R41 R60 R124 R141 R160
01-0138	R: 100 "	20	R13 R29 R31 R45 R49 R51 R53 R113 R129 R131
"		"	R145 R149 R151 R153

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	PCB ASSY-MAIN		2 OF 5

TO SER. NO 2000

PART NO.	DESCRIPTION	QTY	REF DESIG.
01-0143	R: 10K OHM 2% $\frac{1}{4}$ MF	6	R6 R64 R65 R107 R164 R165
01-0146	R: 47K "	16	R5 R8 R23 R40 R52 R59 R68 R70 R105
" "		"	R108 R123 R140 R152 R159 R168 R170
01-0060	R: 150K OHM 5% $\frac{1}{4}$ CF	4	R61 R63 R161 R163
01-0156	R: 1.2 "	1	R76
01-0157	R: 47 OHM 2% $\frac{1}{4}$ MF	6	R10 R67 R69 R110 R167 R169
01-0158	R: 100K "	12	R18 R21 R30 R35 R38 R118 R121 R130 R135 R138 R66 R166
01-0159	R: 1MEG "	4	R54 R56 R154 R156
01-0161	R: 3.9 K	8	R19 R20 R36 R37 R119 R120 R136 R137
01-0162	R: 7.5 K "	4	R16 R33 R116 R133
01-0163	R: 160 "	4	R14 R32 R114 R132
01-0164	R: 5.6 K "	4	R4 R9 R104 R109
01-0165	R: 4.7 "	2	R7 R106
01-0166	R: 43 K "	4	R15 R39 R115 R139
01-0167	R: 910	2	R11 R111
01-0168	R: 24 "	2	R1 R101
01-0169	R: 1.2 K "	2	R3 R103
01-0170	R: 110 K "	4	R12 R30 R112 R130
01-0171	R: 95.3 K "	4	R17 R34 R117 R134
01-0172	R: 2.0 K "	2	R58 R158
01-0221	R: 19.1 K "	2	R55 R155
07-0010	C: CER D 100 PF 10% 100V	6	C12 C22 C26 C112 C126
07-0011	C: CER D 150 PF "	18	C14-15 C27-28 C114-115 C127-128 C209-218
07-0014	C: CER D 200 PF "	12	C18 C31 C37 C40 C50-51 C118 C131 C137 C140 C150-151

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	PCB ASS'Y-MAIN		3 OF 5

TO SER. NO 2000

PART NO.	DESCRIPTION	QTY	REF. DESIG.
07-0019	C: CER D .001 MF 500V EP	24	C6-7 C106-107 C201-208 C244-255
07-0023	C: CER D .01 MF 100V "	12	C8 C20 C33 C38 C44 C49 C108 C120 C133 C144 C149
07-0024	C: CER D .01 MF 1KV "	3	C58 C62 C64
07-0047	C: CER D .1 MF 100V "	4	C61 C65 C67 C239
06-0056	POT: 5K CERMET PC MT.	1	R338
07-0045	C: CER D 39 PF 100V EP	6	C13 C25 C45 C113 C125 C145
08-0023-2	C: MY .01 MF 50V DIP	4	C17 C30 C117 C130
08-0037-5	C: MY .12 MF 50V MLD	2	C35 C135
08-0040-5	C: MY .0047 MF 50V DIP	2	C1 C101
08-0050	C: MY .036 MF 100V DIP	4	C16 C29 C116 C129
09-0010	C: EL 10 MF 50V RA	19	C219-237
09-0027	C: EL 100 MF 10V RA	2	C66 C70
09-0033	C: EL 220 MF 16V "	5	C2 C3 C60 C102 C103
09-0054	C: EL 1 MF 50V "	4	C54-55 C242-243
09-0057	C: EL 47 MF 16V "	1	C238
09-0058	C: EL 470 MF 50V "	6	C21 C34 C52 C53 C121 C134
09-0067	C: EL 2200 MF 16V "	2	C59 C63
09-0078	C: EL 47 MF 6.3V NP	10	C9 C19 C24 C32 C41 C109 C119 C124 C132 C141
09-0081	C: EL 22 MF 25V RA	5	C4-5 C104-105 C240
09-0086	C: EL 220 MF 35V "	2	C68-69
09-0087	C: EL 220 MF 6.3V NP	8	C11 C23 C47-48 C11 C123 C147-148
09-0089	C: EL 1000 MF 35V RA	2	C10 C110
09-0090	C: EL 10MF 16V NP	10	C36 C39 C42-43 C46 C136 C139 C142-143 C146
08-0046	C: MY .1 MF 250V DIP	2	C56-57

SERVICE MANUAL

22-0272

P101

PCB ASSY- MAIN

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TO SER. NO 2000

PART NO	DESCRIPTION	QTY	REF. DESIG
11-0044	TR: BC 237B NPN	1	Q10
11-0092	DI: IN238 GERM.	4	CR229- 232
11-0094	DI: IN4004 400V 1 A	12	CR1-9 CR 14 (R82-83 LOCATION)
11-0096	DI: IN4148 100V 500 MV	25	CR201-210 CR213-227
11-0117	TR: BC307 B PNP	1	Q11
11-0154	TR: MPS A06 NPN	32	Q3 Q5 Q103 Q105 Q201-219 Q226-232
"		"	Q234-235
11-0155	TR: MPS A56 PNP	11	Q4 Q6 Q7 Q104 Q106 Q220-225
11-0224	IC: MICROCOMP. R6500/1	1	U210
11-0225	IC: CD4027 BCN	8	U201-208
11-0226	IC: DM74LS138 N	1	U209
11-0227	IC: AD7110 KN	2	U211-212
11-0228	TR: 2SA991 NEC	2	Q1 Q101
11-0229	TR: 2SC1844 NEC	2	Q2 Q102
11-0230	DI: IN5255B 28V ZENER	2	CR10-11
11-0232	TR: 2SA1111 MAT	1	Q8
11-0236	REG: LM7805 CT 5V	1	Q13
11-0237	REG: LM7812 CT 12V	1	Q12
11-0238	IC: HA12017 OP AMP	4	U1-2 U101-102
11-0239	IC: NE5532 N RAT	3	U3-5
11-0255	DI: IN5241 B ZENER	2	CR12-13
12-0105	RLY: SPDT 211A-DO12-M	3	K1-16 K100-116
12-0109	RLY: AC SWITCH	1	K17
17-0868	PCB: P101 MAIN	1	

SERVICE MANUAL	22-0272	P101	A
	PCB ASSY- MAIN		1 OF 5

SER. NO 2001 AND UP

PART NO	DESCRIPTION	QTY	REF DESIG.
01-0006	R: 100 OHM 5 % $\frac{1}{4}$ CF	6	R80 R81 R90 R271 R272 R303
01-0021	R: 1 K " " "	10	R88 R89 R299 R316 - 322
01-0023	R: 1.2 K " "	15	R282 - R298
01-0030	R: 3.3 K " "	5	R305 R306 R323 R324 R341
01-0034	R: 4.7 K " "	38	R239 - 245 R252 - 255 R257 - 270 R273 - 280 R93 R307 R
"			R331 R342
01-0041	R: 10 K " "	36	R84 - 85 R92 R207 R209 R213 R217 R220 R222 R225 - 226
			R231 - 232 R237 R248 - 247 R251 R300 - 301 R325 - 330
			R332- R337 R339 - 340 R343 R349
01-0038	R: 6.8 K " "	1	R308
01-0048	R: 22 K " "	1	R346
01-0059	R: 100 K " "	2	R302 R339
01-0063	R: 220 K " "	2	R344 R347
01-0073	R: 1 MEG " "	32	R56 R156 R201 - 208 R210 - 219 R221 R223 - 224 R227 - 230
"			R233 - 236 R249 - 250 R253 - 254
01-0082	R: 750 OHM " "	2	R86- R87
01-0095-2	R: 1 K " 2 % $\frac{1}{4}$ MF	2	R50 R150
01-0097-2	R: 10 OHM " "	2	R2 R102
01-0098	R: 120 OHM 5 % $\frac{1}{4}$ CF	4	R27 R127 R44 R144
01-0101	R: 620 " " "	3	R281 R287 R295
01-0120	R: 68 " " "	12	R25 - 26 R42 - 43 R59 - 60 R125 - 126 R142 - 143 R159- 160
01-0127-2	R: 390 " 2 % $\frac{1}{4}$ MF	2	R24 - 124
	R: 390 " 5 % $\frac{1}{4}$ CF	2	R41 - 141

SERVICE MANUAL	22- 0272	P101	A
	PCB ASSY- MAIN		2 OF 5

SER. NO 2001 AND UP

PART NO	DESCRIPTION	QTY	REF. DESIG.
01-0138	R: 100 OHM 2 % $\frac{1}{4}$ MF	20	R13 - 113 R31 - 131 R29 - 129 R45 - 49 R145 - 149
"			R51 R151 R69 R169
01-0143	R: 10 K " "	6	R6 R106 R72 - 73 R172 R173
01-0145	R: 27 K " "	4	R62 R162 R65 R165
01-0146	R: 47 K " "	16	R5 R105 R8 R108 R23 R123 R40 R140 R52 R152 R55
"			R155 R74 R174 R76 R176
01-0150	R: 150 K " "	4	R67- 68 R167 - 168
01-0156	R: 1.2 OHM 5 % $\frac{1}{4}$ CF	3	R82 - 83 R94
01-0157	R: 47 OHM 2 % $\frac{1}{4}$ MF	12	R7 R107 R10 R110 R22 R122 R66 R166 R75 R175 R77 R177
01-0158	R: 100 K " "	14	R18 R118 R21 R121 R35 R135 R38 R138 R57 R157 R58
"			R158 R71 R171
01-0159	R: 1 MEG " "	2	R28 R128
01-0161	R: 3.9 K " "	8	R20 R120 R19 R119 R36 R136 R37 R137
01-0162	R: 7.5 K " "	4	R16 R116 R33 R133
01-0163	R: 160 OHM " "	4	R14 R114 R32 R132
01-0164	R: 5.6 K " "	4	R4 R104 R9 R109
01-0166	R: 43 K " "	4	R15 R115 R39 R139
01-0167	R: 910 OHM " "	2	R11 R111
01-0168	R: 24 " " "	2	R1 R101
01-0169	R: 1.2 K " "	2	R3 R103
01-0170	R: 110 K " "	4	R12 R112 R30 R130
01-0171	R: 95.3 K " "	4	R17 R117 R34 R134
01-0222	R: 5.1 K " "	4	R53 - 54 R153 - 154
06-0056	POT: 5 K OHM CERMET PC	1	R338

SERVICE MANUAL	22-0272	P101	A
	PCB ASSY- MAIN		3 OF 5

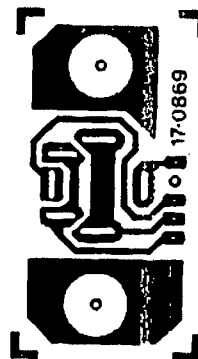
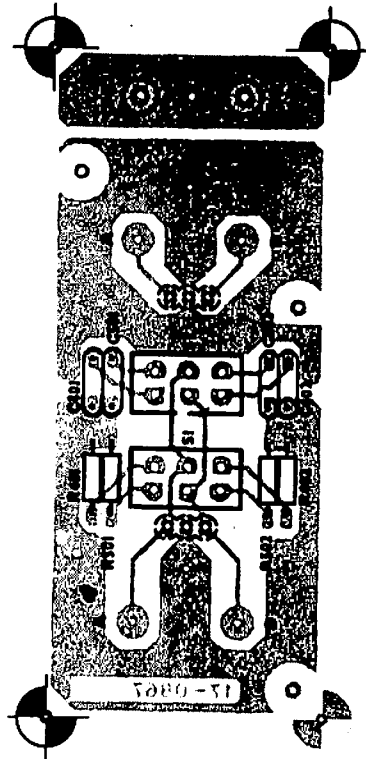
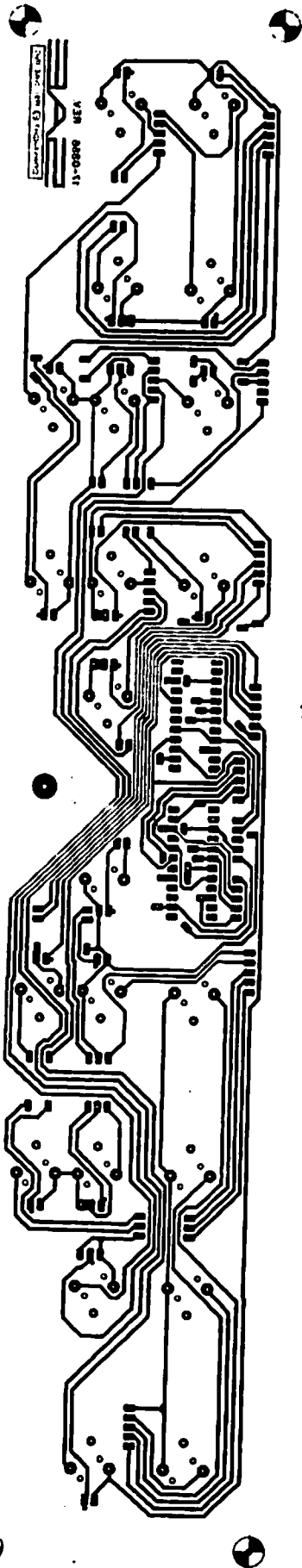
SER. NO 2001 AND UP

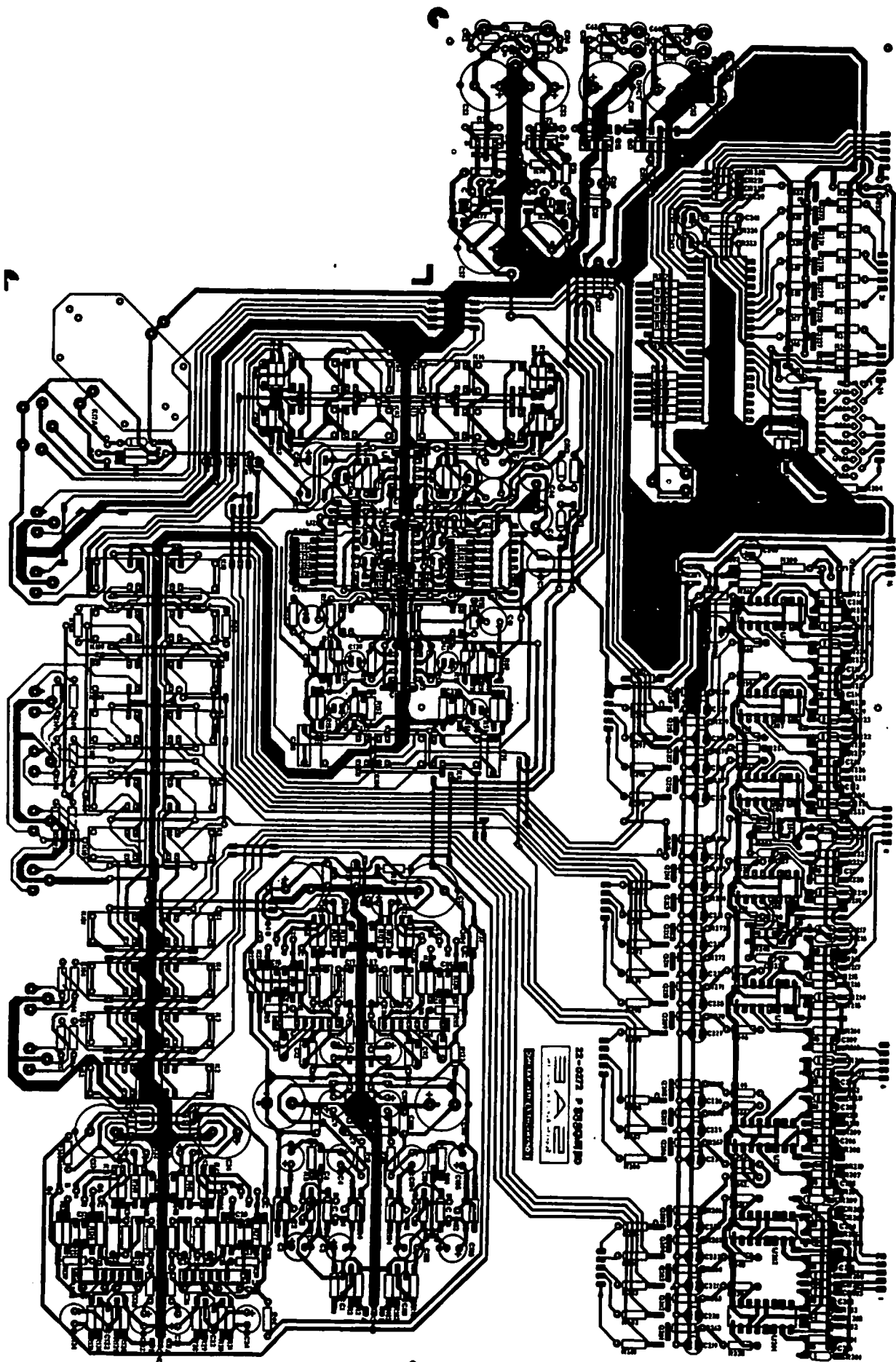
PART NO	DESCRIPTION	QTY	REF. DESIG.
07-0010	C: CER D 100PF 100 V 10 %	8	C12 C112 C22 C122 C26 C126 C37 C137
07-0011	C: CER D 150PF " "	18	C209- 216 C217- 218 C14- 15 C114- 115 C27- 28 C127- 128
07-0014	C: CER D 220PF 500 V "	10	C18 C118 C31 C131 C44 C144 C52- 53 C152- 153
07-0019	C: CER D .001MF " "	24	C6- 7 C106- 107 C201- 208 C244- 255
07-0047	C: CER D .01MF 100 V "	12	C8 C108 C20 C120 C33 C133 C51 C151 C58 C62 C66 C244A *
07-0034	C: CER D .1MF 25 V + 80 %	7	C54- 55 C64 C68- 69 C239 C241
07-0004	C: CER D 10PF 500 V 10 %	6	C40 C140 (4 CAPS ARE LOCATED AROUND LINE AMP.)
07-0008	C: CER D 33P F 100 V 10 %	2	C25 C125
07-0045	C: CER D 39PF " "	4	C13 C113 C47 C147
08-0023-2	C: MY .01MF 50 V 2 % RA	4	C17 C117 C30 C130
08-0036-5	C: MY .012MF " 5 % "	2	C38 C138
08-0037-5	C: MY .12MF " " "	2	C35 C135
08-0043	C: MY .0039MF " "	2	C1 C101
08-0050	C: MY .036MF 100 V 2 %	4	C16 C116 C29 C129
09-0010	C: EL 10MF 50 V RA	19	C219- 237
09-0027	C: EL 100MF 10 V RA	2	C67 C72
09-0033	C: EL 220MF 16 V "	5	C2- 3 C102- 103 C63
09-0054	C: EL 1MF 50 V "	5	C56- 57 C242- 243 C245A *
09-0057	C: EL 47MF 16 V "	1	C238
09-0058	C: EL 470MF 50 V "	4	C21 C121 C34 C134
09-0067	C: EL 2200MF 16 V "	2	C61 C65
09-0078	C: EL 47MF 6.3 V " NP	8	C32 C132 C9 C109 C19 C119 C24 C124
09-0081	C: EL 22MF 25 V "	5	C4- 5 C104- 105 C240
09-0086	C: EL 220MF 35 V "	2	C70- 71

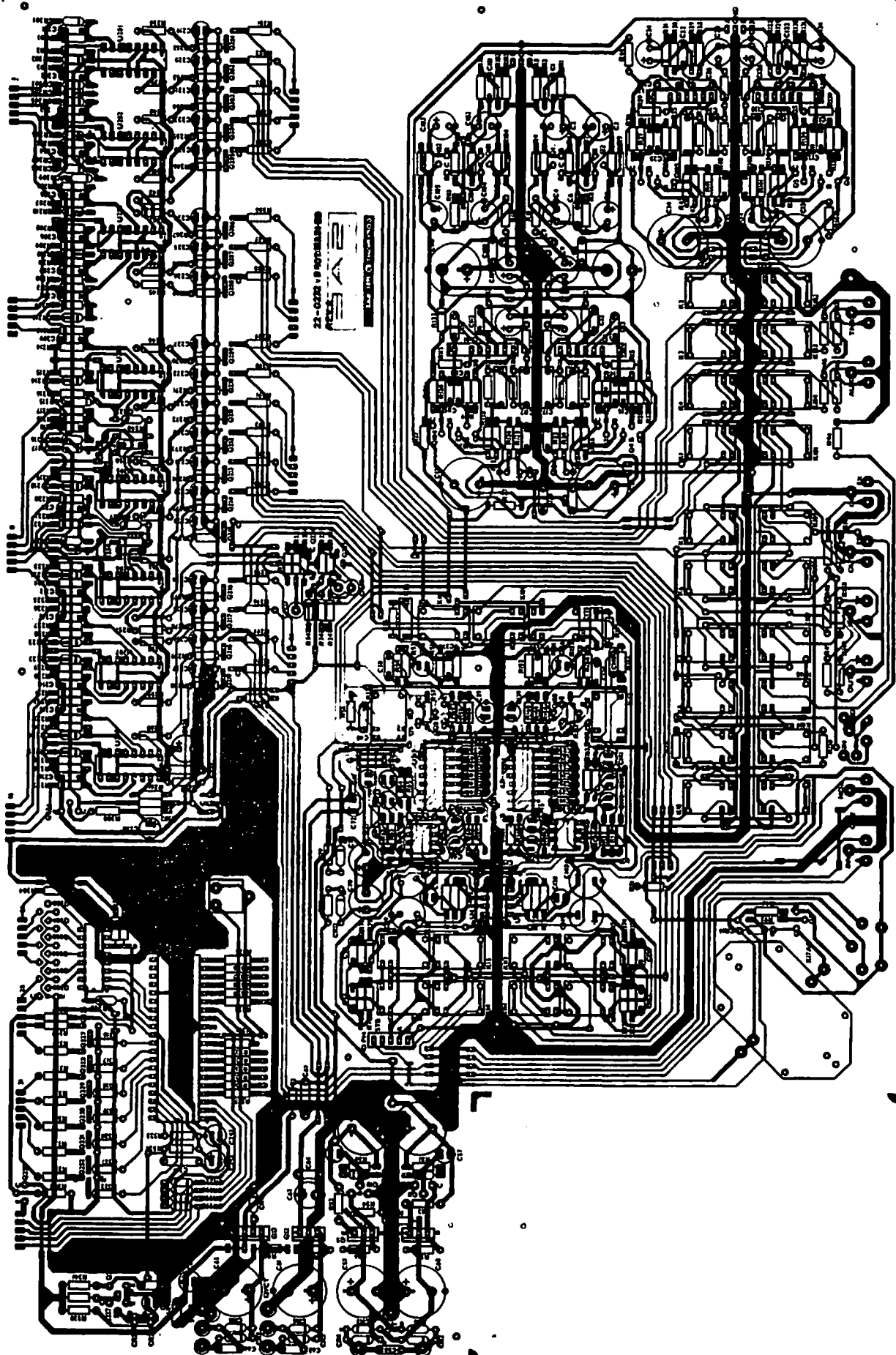
SERVICE MANUAL	22-0272	P101	A
	PCB ASSY- MAIN		4 OF 5

SER. NO 2001 AND UP

PART NO	DESCRIPTION	QTY	REF. DESIG.
09-0088	C: EL 1000 MF 50 V RA	2	C59- 60
09-0087	C: EL 220 MF 16 V RA NP.	10	C11 C111 C23 C123 C43 C143 C48- 49 C148- 149
09-0090	C: EL 10 MF 16 V RA NP	16	C36 C136 C39 C139 C41- 42 C141- 142 C45- 46 C145- 146
			C50 C150 C73 C173
11-0092	DI: IN238 GERM.	4	CR229 CR232
11-0094	DI: IN4004 400 V 1 AMP	11	CR1- 8 CR14- 16
11-0117	TR: PNP BC307B	3	Q11 Q15 Q115
11-0096	DI: IN4148 100 V	26	CR201- 225 CR233
11-0154	TR: NPN MPS A06	33	Q3 Q103 Q5 Q105 Q201- 214 Q216- 219 Q226- 232 Q236- 237
11-0155	TR: PNP MPS A56	13	Q4 Q104 Q6 Q106 Q7 Q220- 225 Q234- 235
11-0225	IC: J.K FF CO 4027 BCN	8	U201- 208
11-0226	IC: LINE DC DM74LS138N	1	U209
11-0227	IC: VOL CONT AD7110 KN	2	U211- 212
11-0228	TR: 2SA991	2	Q1 Q101
11-0229	TR: 2SC1844	2	Q2 Q102
11-0230	DI: IN5255 B 28 V ZNR 5 %	2	CR12- 13
11-0232	TR: 2SA 1111	2	Q9 Q233
11-0233	TR: 2SC 2591	1	Q8
11-0236	REG: LM 7805 CT 5/V 1 A	1	Q13
11-0237	REG: LM 7812 C 12 V 1A	1	Q12
11-0238	IC: OP AMP HA 12017	4	U1- 2 U101- 102
11-0242-A	IC: MICRO CCMP	1	U210
11-0239	IC: 2043DD (NE5532N)	3	U3- 4 U103
11-0255	DI: IN52418 ZENER	2	CR10- 11









Scientific Audio Electronics, Inc.

SAE SERVICE BULLETIN FOR REPLACEMENT PARTS

SAE P/N 11-0242A, 6500/1 BY COMMODORE WILL REPLACE THE FOLLOWING PARTS:

- (1) 11-0224 R1078-11 BY ROCKWELL WITHOUT BUILT IN CLOCK REQUIRES
EXTERNAL CRYSTAL. APPLICATION ON X1-P.
- (2) 11-0224 R1078-12 BY ROCKWELL WITH BUILT IN CLOCK FACILITY.
APPLICATION ON P101
- (3) 11-0242 BY ROCKWELL WITH BUILT IN CLOCK FACILITY RUNS ON E101 ONLY

THIS 11-0242A MICRO PROCESSOR RUNS ON A LOWER POWER SUPPLY THAN
THE ORIGINAL ONES. FOR EASY TO ACHIEVE THIS CHANGE A JUNCTION
VOLTAGE DROP OF SEMICONDUCTOR (0.6V SILICONE) WILL BE ADEQUATE
FOR SUCH PURPOSE.

NOTE: PIN NO. 25 IS THE PROGRAM SELECT PIN: - WHEN TIES LOW
(CONNECT DIRECT TO GROUND) WHEN APPLY ON X1P OF P101.
WHEN TIES HI (OR SIMPLY WITH OUT CONNECTION). IT WILL
RUN ON E101.

ATTACHMENT

Components for the Commodore

P.O. Box 60271 Terminal Annex, Los Angeles, California 90060 • (213) 489-7600 • Telex 67-4062

APPLICATION

E101: REPLACE THE 0.4 INCH JUMPER RIGHT NEXT TO R614 BY ONE DIODE.
(SAE P/N 11-0094 OR IN4004) SO THAT THE 5.6 VOLTS POWER SUPPLY
LINE CAN DROP TO 5 VOLTS.

P101:A) DELETE DIODE CR9 (11-0094 OR IN4004) AND REPLACE WITH A
0.4 INCH JUMPER TO LOWER THE 5.6 VOLTS LINE TO 5 VOLTS.
B) CONNECT JUMPER BETWEEN GROUND TO PIN 25
ALSO MAKE SURE IT IS TIED LOW FOR SOME
EARLY MODELS PINS 21 TO 26 ON THE IC
SOCKET HAS BEEN REMOVED. SO THAT PRECAUTION
SHOULD BE MADE BEFORE ADOPTING THE 11-0242A TO THE UNIT.

X1-P: ON COMPONENT SIDE

DELETE THE 1.25MHZ CRYSTAL

DELETE THE 0.4'' JUMPER 10HIGH LOCATED INSIDE THE ROADMAP
FOR K202.

INSTALL A 4.7K RESISTOR FOR R271

INSTALL A 1.5K RESISTOR FOR R270. IN WHICH THE VALUE OF R270
CAN BE VARIED TO ADJUST THE CLOCK SPEED (PREFERABLE FROM 1MHZ TO
1.25 MHZ)

INSTALL TRANSISTOR A06 AT THE INNER LEFT SIDE OF K201 AND K202
(CLOSE TO S4) WITH EMMITER AND BASE PINS INSIDE K202 AND
COLLECTOR PIN IN K201.

REPLACE THE 5 VOLTS POWER SUPPLY JUMPER (LOCATED IN THE RIGHT
FRONT CORNER OF THE UNIT BETWEEN R265 AND C231) WITH DIODE
(SAE D/N 11-0094, IN4004) ON FOIL SIDE.

CONNECT PIN 25 OF U206 TO GROUND (REFER TO P101 SECTION B)

CONNECT THE EMMITER OF A06 TO GROUND, BY ADDING ONE 0.25''

JUMPER TO C OF S4 FROM THE PROJECTING FOIL FROM THE EMMITER

CONNECT ONE 47K OHM RESISTOR TO THE BASE OF THE A06 AND LINK

THE OTHER END TO THE LOGIC RESET LINE: (LOCATE 47K FROM BASE OF A06

TO THE PAD WHERE S4 AND K201 JOINT. THEN RUN ONE 3 INCHES JUMPER

FROM THE PAD OF S4 TO THE JOINT OF R257 AND THE ANODE OF CR216)

CONNECT JUMPER (ABOUT 4 INCHES) FROM COLLECTOR OF A06 TO PIN 39 OF U 206.