

Moog Modular IIIp Modules

901*

901A(x3)

901B(x9)

902(x3)

903A

904A

904B

904C

905

910

911(x3)

911A

912

914

950

956

984

991*

992

993*

994*

CP1*

CP3(x4)

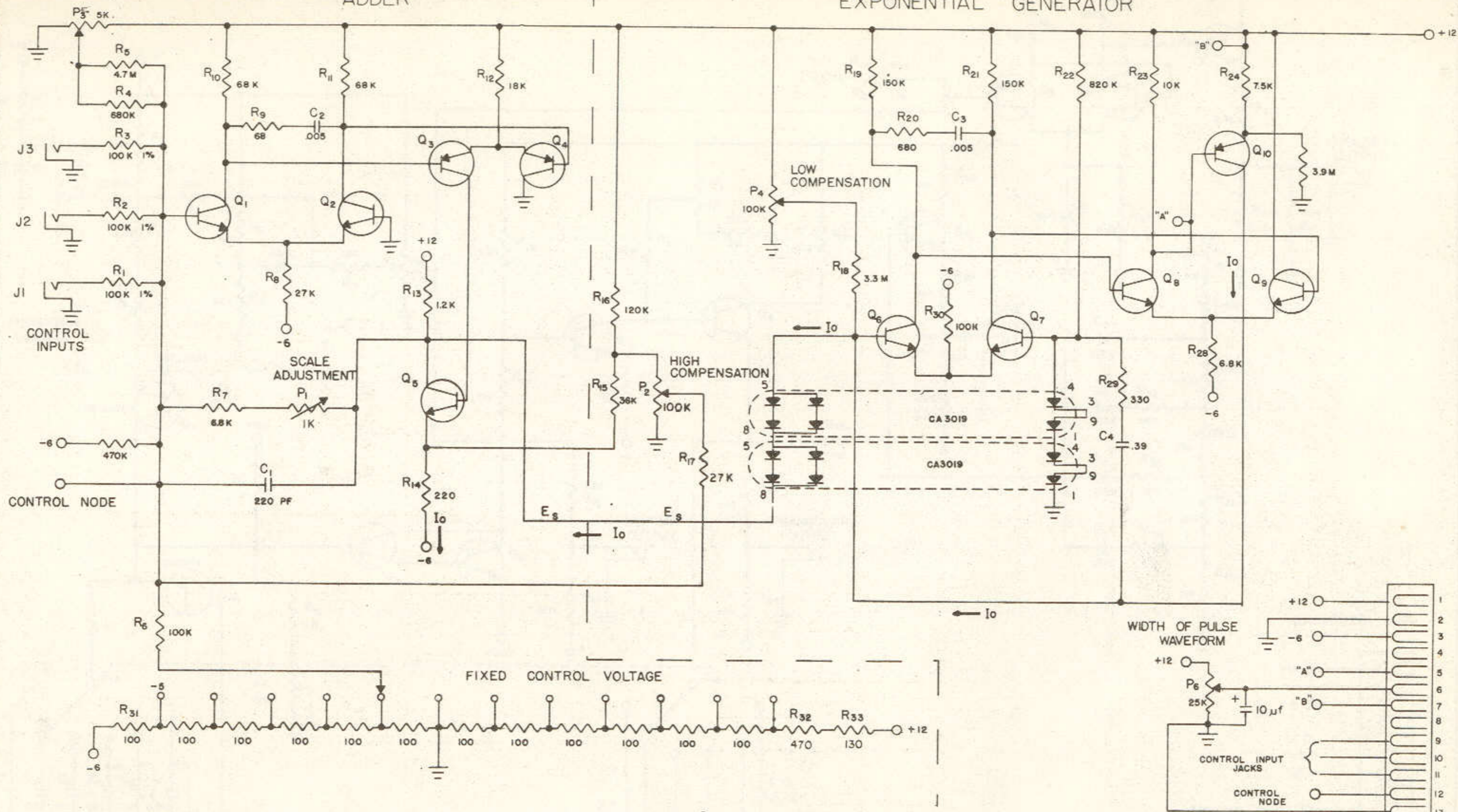
CP9*

(*) Doesn't appear in schematics

FIXED CONTROL VOLTAGE

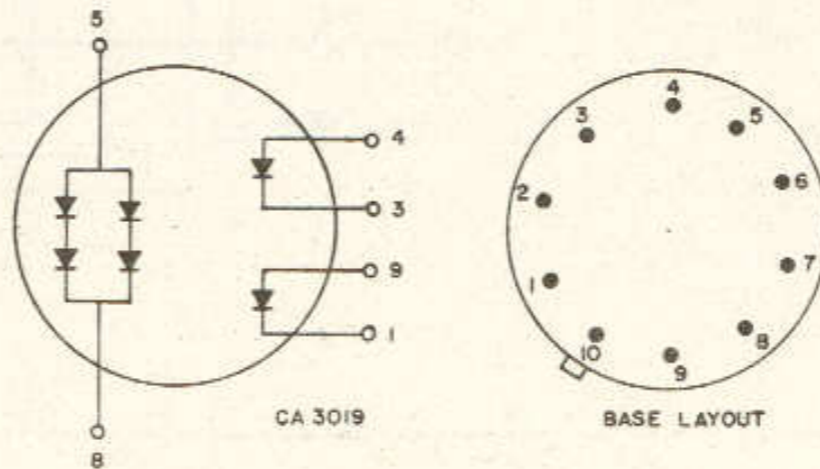
ADDER

EXPONENTIAL GENERATOR



NOTES :

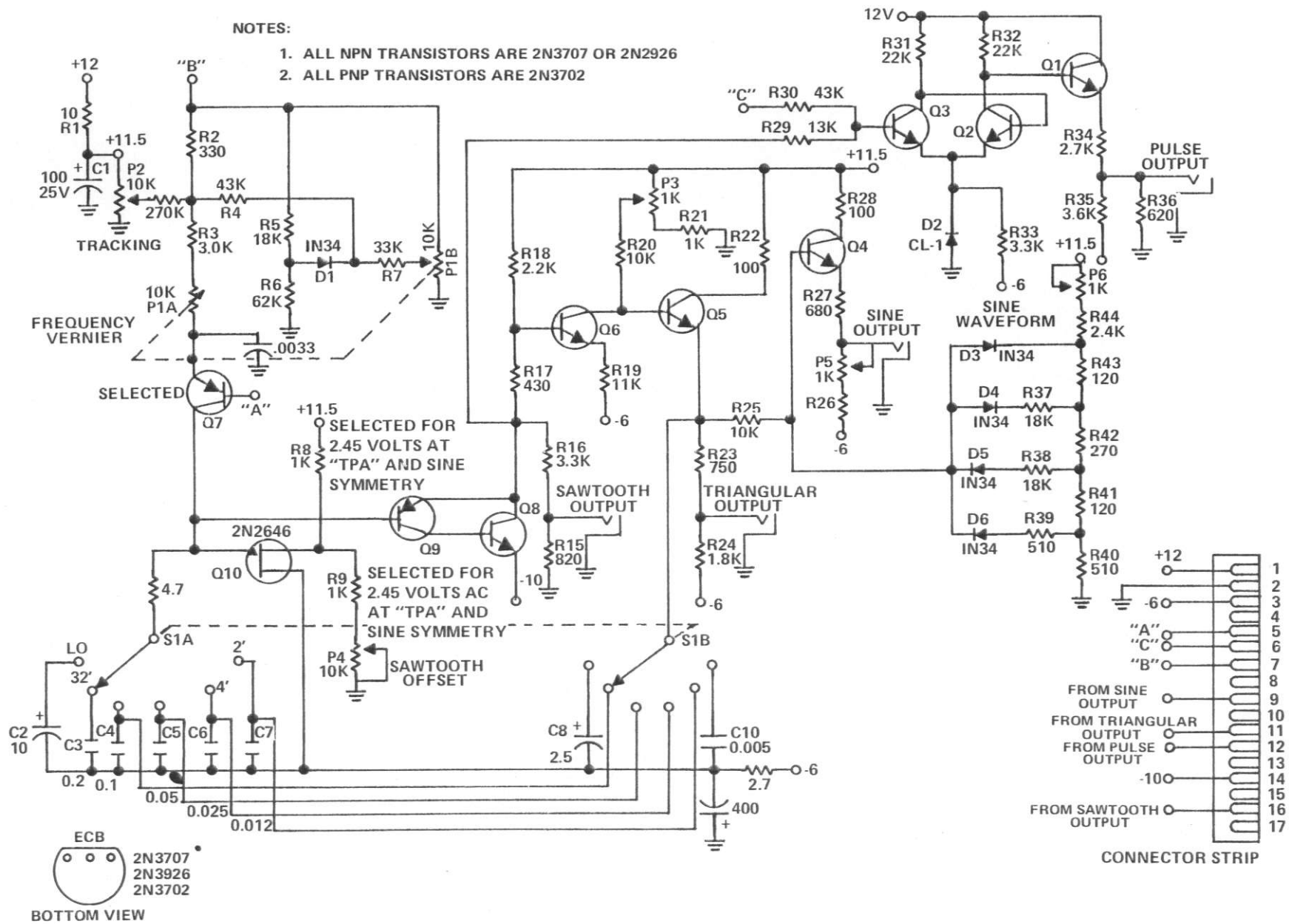
- 1 ALL NPN TRANSISTORS ARE 2N3391A OR 2N3392.
- 2 " PNP " " 2N4058.



OLD DWG. FILED OBSOLETE

APPROVED FOR PRODUCTION WRH 4-70

REVISIONS	R. A. MOOG CO. TRUMANSBURG, NEW YORK	
REV A ECM 014	TITLE	901-A OSCILLATOR CONTROLLER
	SCALE	DR. BY JA
	DATE 7-2-69	CK'D. BY
		DWG NO. 1100



993-042646

FIGURE 7 OSCILLATOR 901B

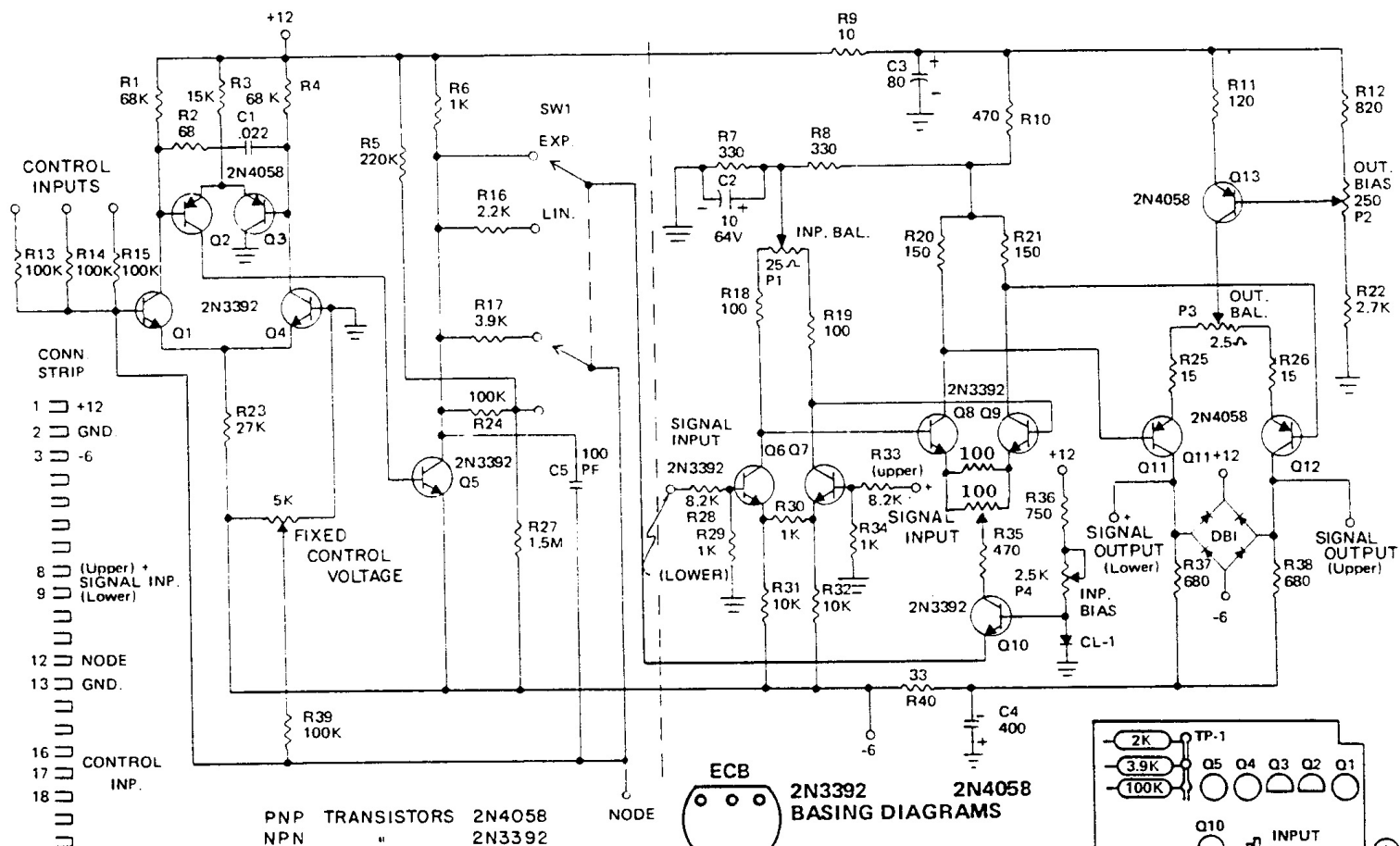
902 VOLTAGE CONTROLLED AMPLIFIER TEST PROCEDURE

1. Connect dc voltmeter to TP-L (collector of Q5); low side to ground.
2. Turn FIXED CONTROL VOLTAGE pot to 6 and set CONTROL MODE switch to "EXP." DC voltage should read approximately zero.
3. Rotate FIXED CONTROL VOLTAGE pot to 0. DC voltage should read approximately +0.24V.
4. Set CONTROL MODE switch to LIN. DC voltage should read approximately +1.2V.
5. Rotate FIXED CONTROL VOLTAGE pot to 6. DC voltage should read approximately -4.8V.

NOTE

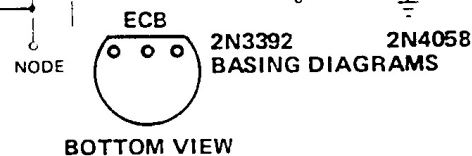
If the above voltages are observed, the adder section (Q1 thru Q5) is operating properly.

6. With FIXED CONTROL VOLTAGE in 6 and dc voltmeter connected between one of the SIGNAL OUTPUTS jacks and ground, adjust OUTPUT BIAS trimpot for zero volts.
7. Connect dc voltmeter across positive terminals of SIGNAL OUTPUTS jacks. Connect jumper between collectors of Q8 and Q9 and adjust OUTPUT BALANCE trimpot for 0 VDC.
8. Remove jumper across collectors of Q8 and Q9 and connect across collectors of Q6 and Q7. Adjust Q8 and Q9 BALANCE trimpot for 0 VDC.
9. Remove jumper and adjust INPUT BALANCE trimpot for 0 VDC.
10. Turn FIXED CONTROL VOLTAGE pot and ascertain that there is no large offset. If necessary, repeat steps 7, 8 and 9.
11. Turn FIXED CONTROL VOLTAGE pot to 6. Apply 0db 1kHz sine wave to one of the SIGNAL INPUTS. Signal output should be approximately +5db to +7db.
12. Note the output level. Set the CONTROL MODE switch to "EXP." Adjust INPUT BIAS to obtain a level equal to that noted in the "LIN" position.

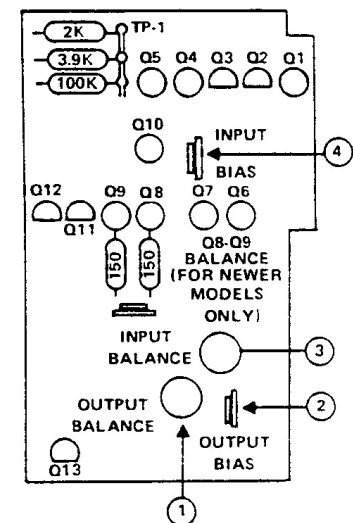


CONN STRIP
1 +12
2 GND
3 -6
8 (Upper) + SIGNAL INP.
9 (Lower)
12 NODE
13 GND.
16 CONTROL INP.
17
18
21 (Upper) SIGNAL OUT (Lower) +
22

PNP TRANSISTORS 2N4058
NPN " 2N3392



- 1 Adjusts + output balance for exponential dc voltages with FIXED CONTROL VOLTAGE control fully counterclockwise.
- 2 Adjusts zero output offset with FIXED CONTROL VOLTAGE control fully counterclockwise.
- 3 Adjusts zero output offset with FIXED CONTROL VOLTAGE control fully clockwise.
- 4 Adjusts amplitude level balance between linear and exponential mode with FIXED CONTROL VOLTAGE control full clockwise.



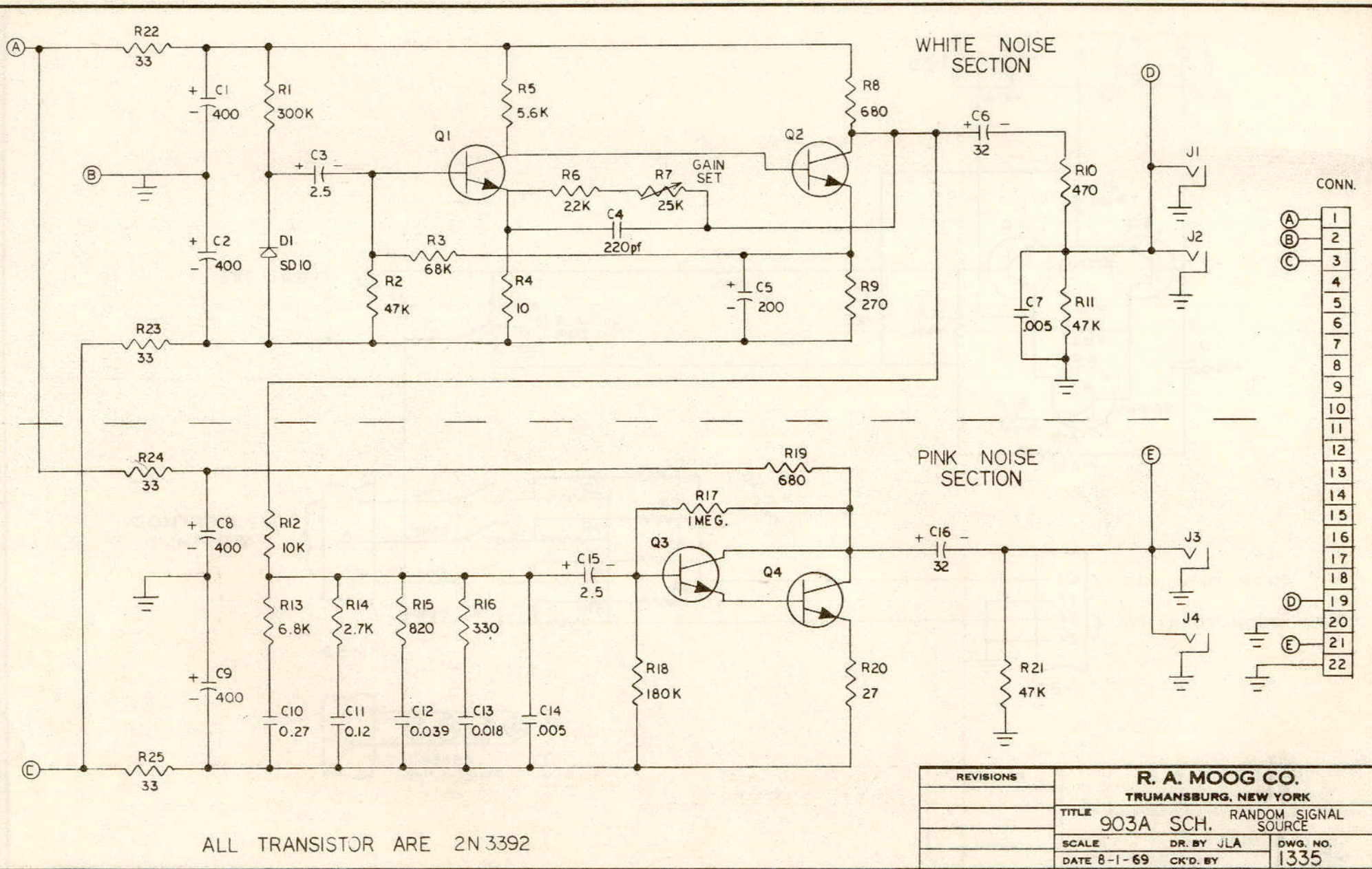
VOLTAGE CONTROLLED AMPLIFIER ALIGNMENT PROCEDURE AND ADJUSTMENT LOCATION DIAGRAM

MOOG MUSIC INC.

SCHMATIC, 902 VOLTAGE CONTROLLED AMPLIFIER
993-041813

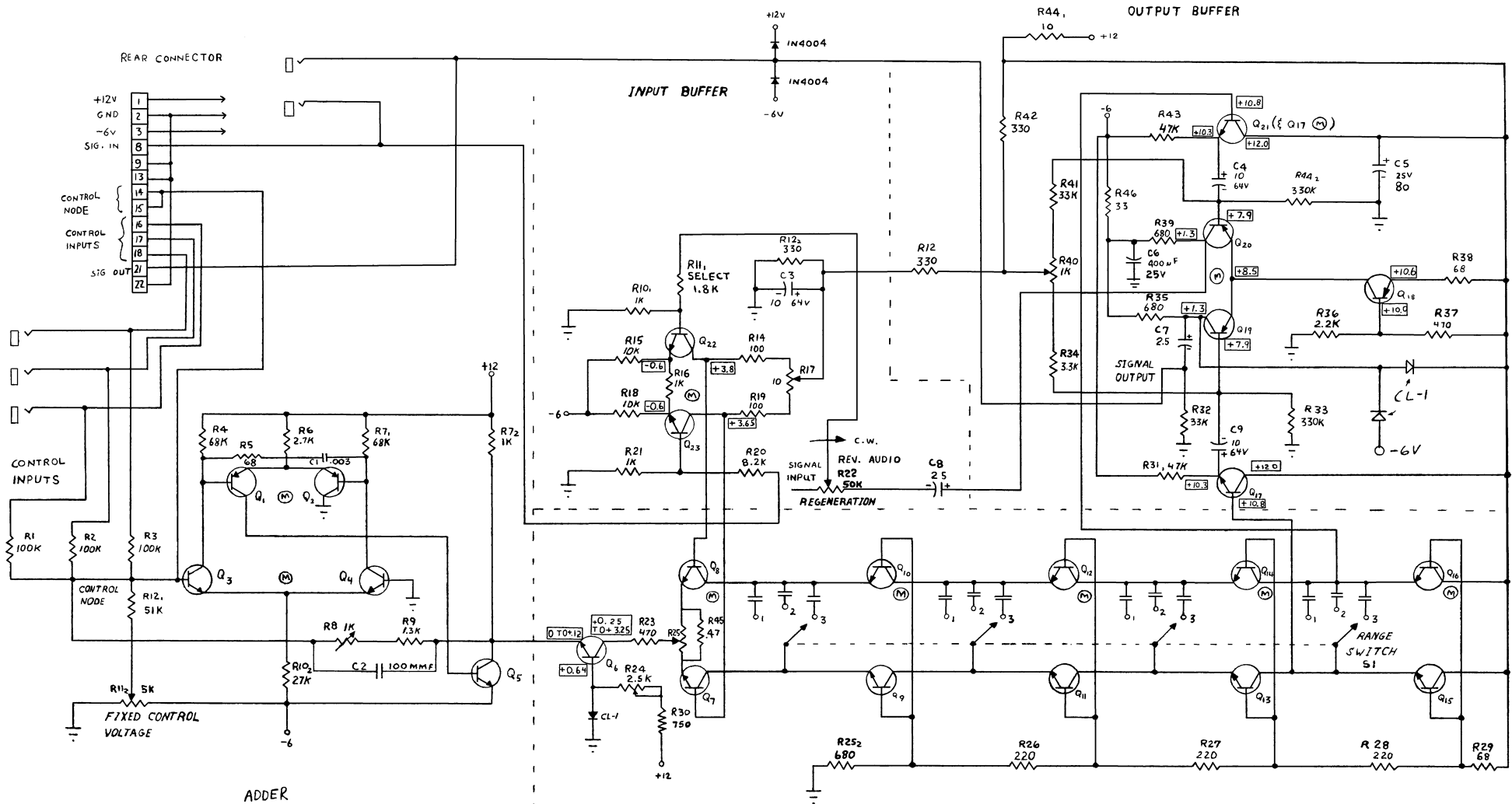
1068

FIGURE 9 VOLTAGE CONTROLLED AMPLIFIER MODEL 902



ALL TRANSISTOR ARE 2N 3392

REVISIONS		R. A. MOOG CO.	
		TRUMANSBURG, NEW YORK	
		TITLE	903A SCH. RANDOM SIGNAL SOURCE
		SCALE	DR. BY JLA DWG. NO. 1335
		DATE 8-1-69	CK'D. BY



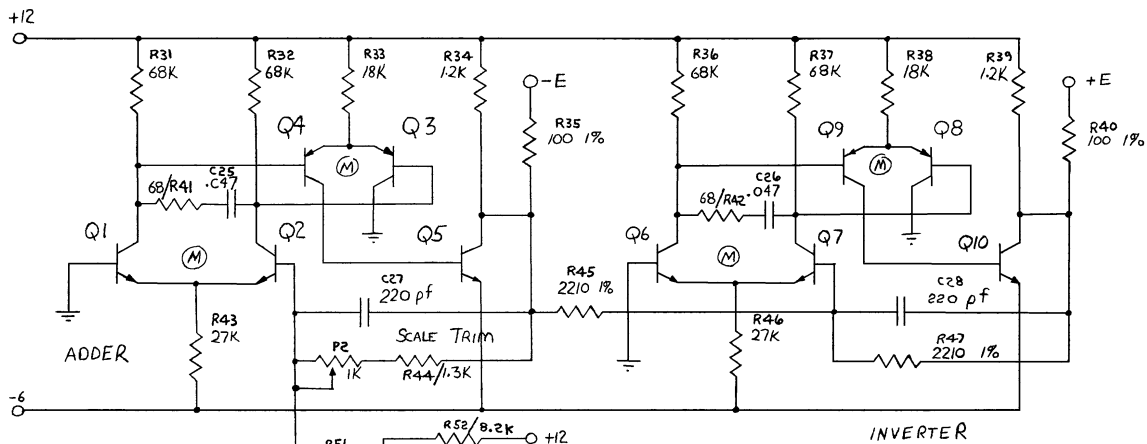
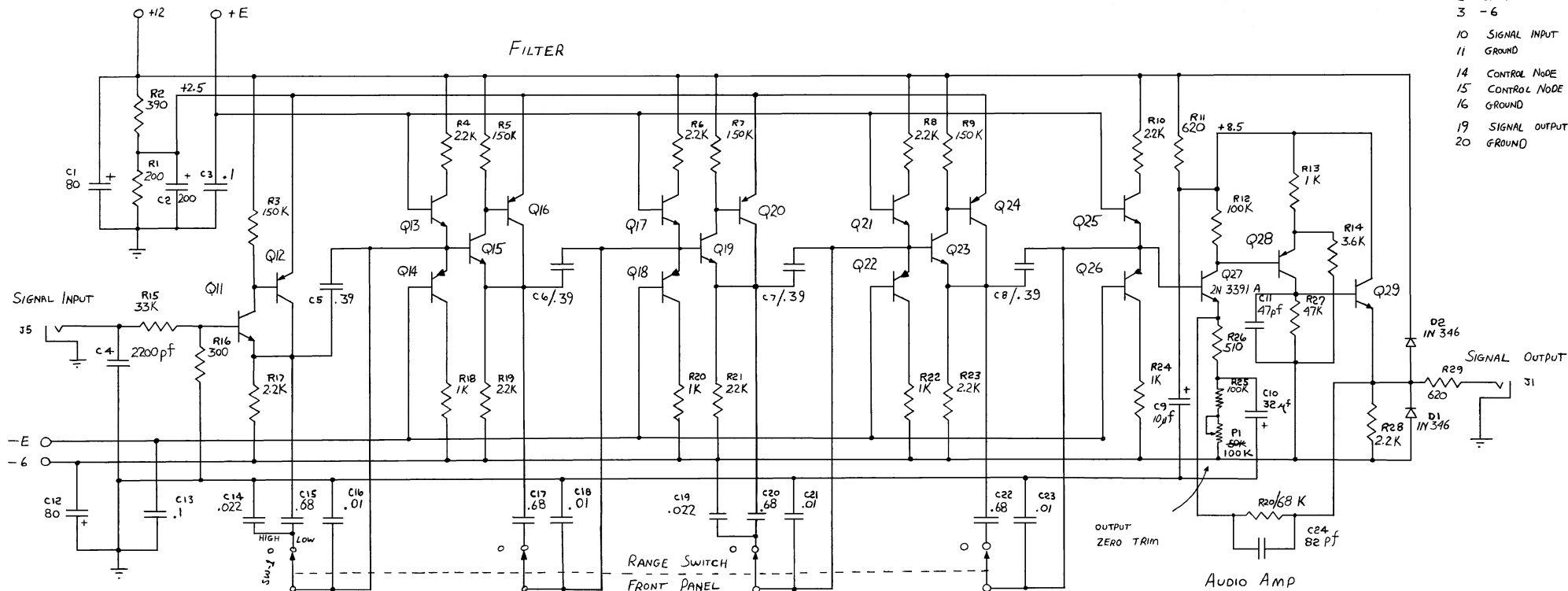
- NOTES:
1. ALL NPN TRANSISTORS: 2N 3392
 2. ALL PNP TRANSISTORS: 2N 4058
 3. (M) ⇒ MATCHED PAIR
 4. RANGE CAPACITOR SIZES

1	1.2 μ F
2	0.3 μ F
3	0.075 μ F

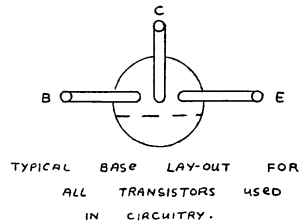
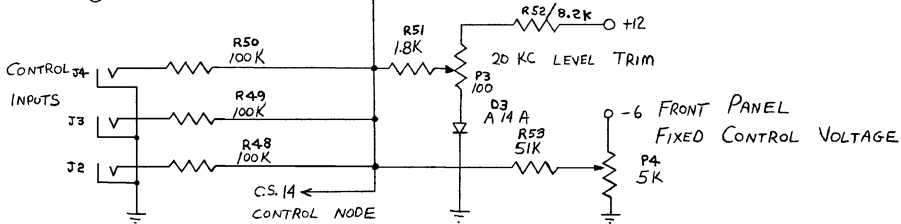
904-A VOLTAGE CONTROLLED LOW PASS FILTER	
DRAWN BY P.Y.	
APPR. BY	
DATE	DRAWING NUMBER
7-25-67	SUPERCEDES NO. 1039
R. A. MOOG CO. TRAUMANSBURG, N. Y.	
REV. C 11/10/70 w/g.s.	REV. D
REV. A 9-8-69 - JLA	REV. B ~ECN-003

CONNECTOR STRIP

- 1 +12
- 2 GROUND
- 3 -6
- 10 SIGNAL INPUT
- 11 GROUND
- 14 CONTROL NODE
- 15 CONTROL NODE
- 16 GROUND
- 19 SIGNAL OUTPUT
- 20 GROUND



ALL NPN TRANSISTORS 2N 3392 EXCEPT Q 27
 ALL PNP TRANSISTORS 2N 405B
 (M) INDICATES MATCHED PAIR
 ALL RESISTORS 1/2 WATT 5% CARBON } UNLESS OTHERWISE MARKED
 ALL CAPACITORS IN μF
 Q 13, 17, 21, 25 ARE A MATCHED SET
 Q 14, 18, 22, 26 " " " "



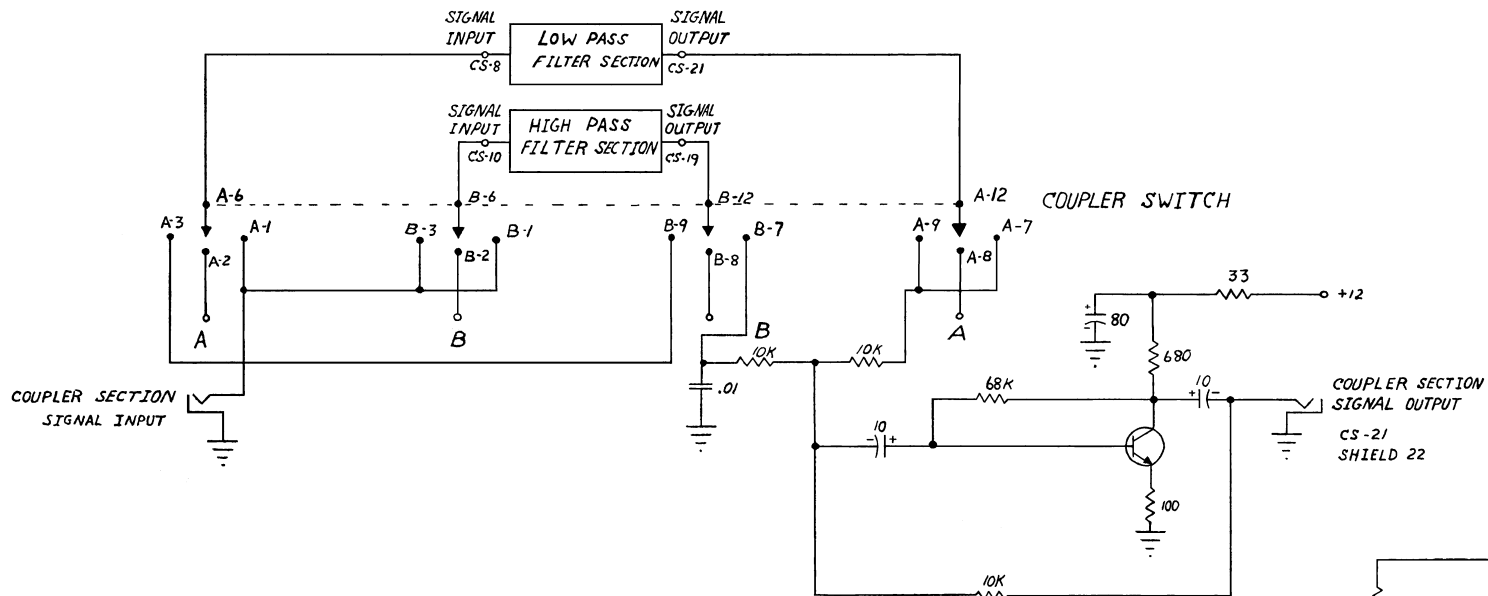
THIS DWG. APPLIES TO MODULES WITH SERIAL NUMBERS 199 AND ABOVE

REVISIONS		R. A. MOOG CO.	
COMPLETE * C REDRAWING		TRUMANSBURG, NEW YORK	
* OLD DWG DATED 12/12/66 OBSOLETE		TITLE 904 B	NEW VERSION
SCALE		DR. BY SCOTT	DWG. NO.
DATE 6/23/70		CK'D. BY	11/8

Moog Modular IIIp Modules

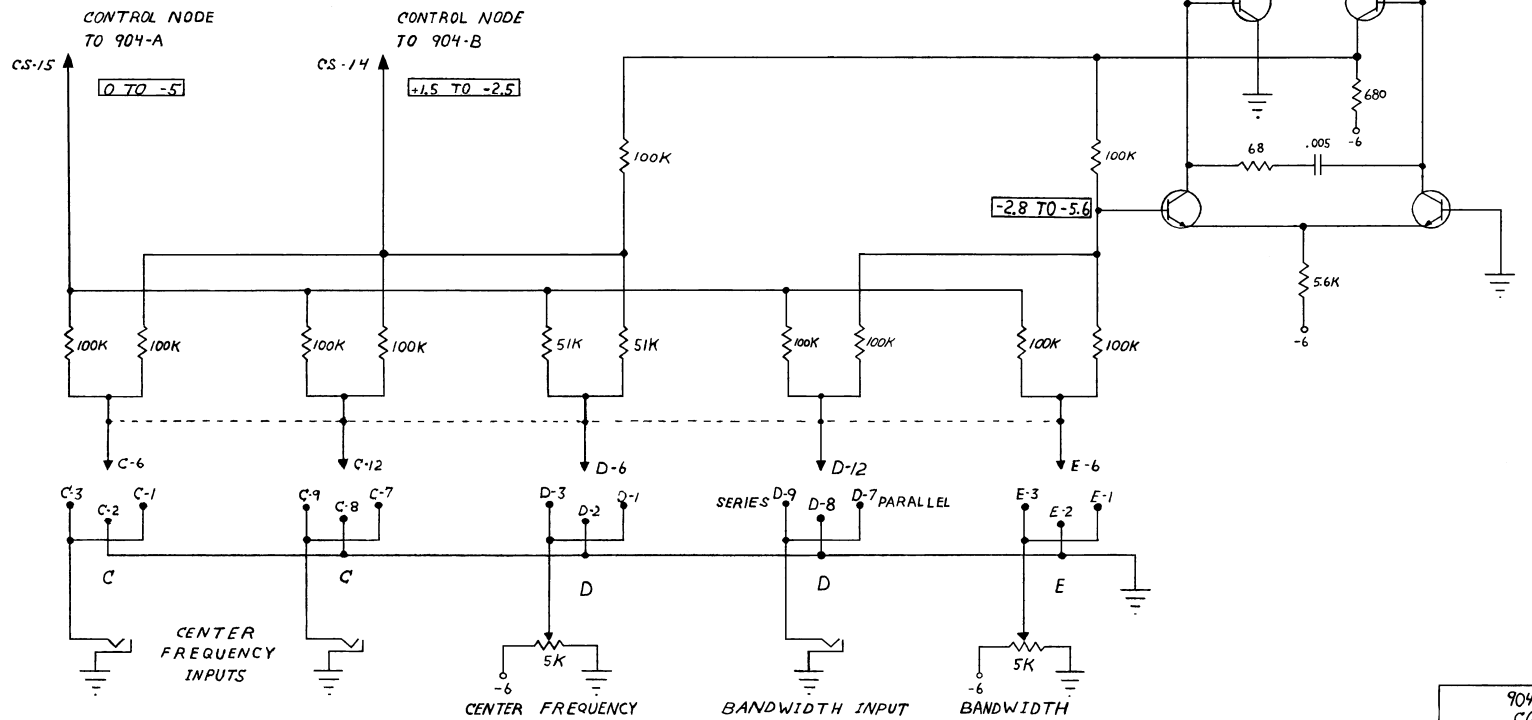
901*
901A(x3)
901B(x9)
902(x3)
903A
904A
904B
904C
905
910
911(x3)
911A
912
914
950
956
984
991*
992
993*
994*
CP1*
CP3(x4)
CP9*

(*) Doesn't appear in schematics

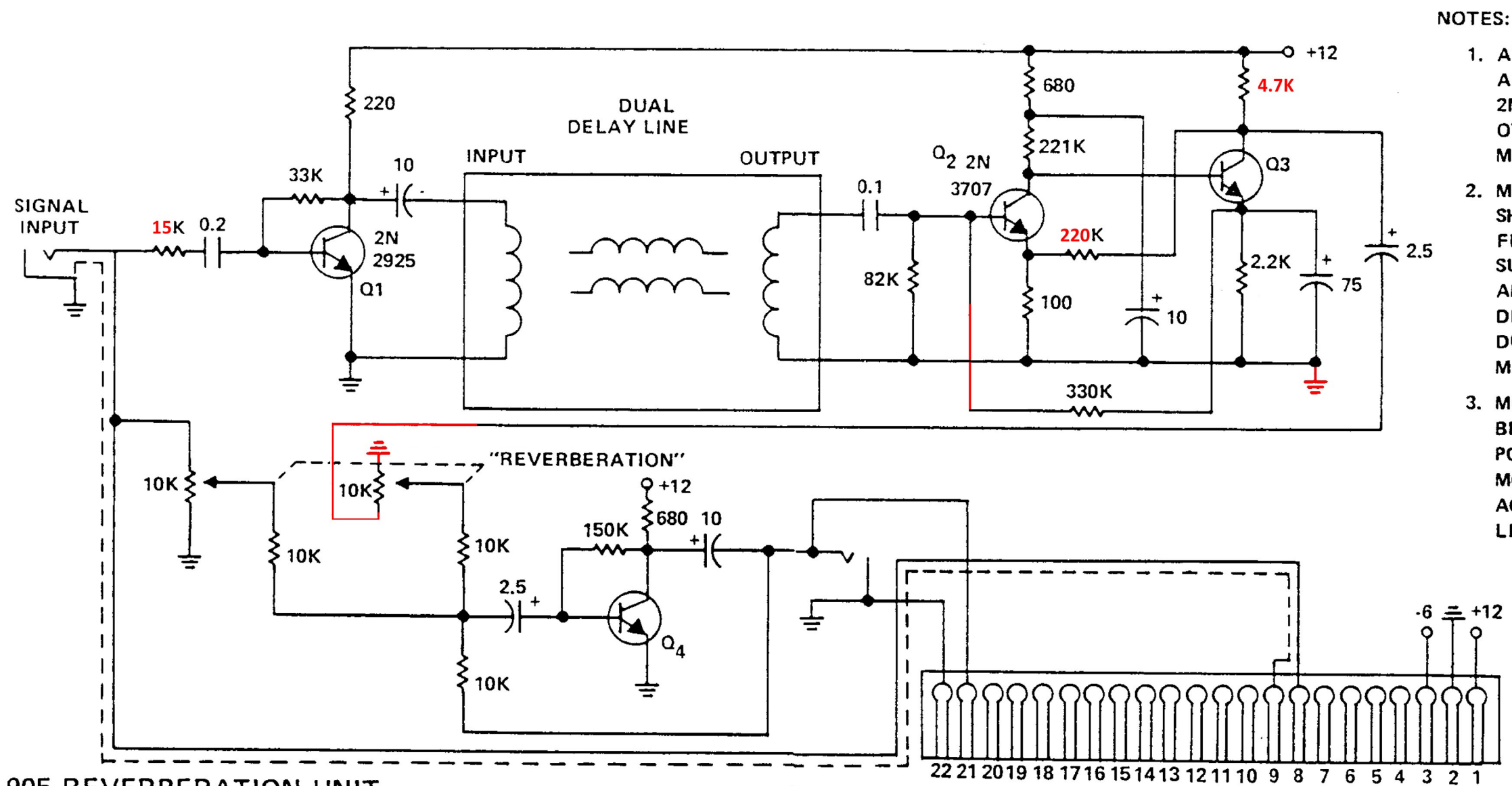


SWITCH FUNCTION
 POSITION THREE ON FRONT PANEL - SERIES (BAND PASS)
 POSITION TWO ON FRONT PANEL - LOW PASS - HIGH PASS
 POSITION ONE ON FRONT PANEL - PARALLEL (BAND REJECT)

TRANSISTORS
 NPN - 2N2926 OR TI416
 PNP - 2N3702



904-C VOLTAGE CONTROLLED FILTER COUPLER CONTROL CIRCUITRY	
DRAWN BY PY.	SCHMATIC
APPR. BY	
DATE 7-14-67	DRAWING NUMBER 1148 SUPERCEDES NUMBER
R. A. MOOG CO. TRUMANSBURG N.Y.	



- NOTES:
1. ALL TRANSISTORS ARE 2N2926 OR 2N3707 UNLESS OTHERWISE MARKED
 2. MOUNTING SHOULD BE AWAY FROM POWER SUPPLIES, MOTORS AND OTHER DEVICES PRODUCING STRONG MAGNETIC FIELDS
 3. MOUNTING SHOULD BE AS RIGID AS POSSIBLE TO AVOID MOVEMENT OF THE ACOUSTIC DELAY LINE

905 REVERBERATION UNIT

A. GENERAL

The 905 Reverberation Unit utilizes a dual spring-type acoustic delay line to produce a succession of decaying echoes of an audio signal. A single panel control determines the ratio between the amounts of reverberated and non-reverberated signals that appear at the output jack. The front panel control does not alter the characteristic decay time of the echoes, since this is a function of the delay line itself.

Instructions for mounting and connecting of power, and input and output characteristics, are the same as those which apply to all 900 series modules. However, special consideration in mounting the 905 must be observed. First, power supplies, motors and other devices producing

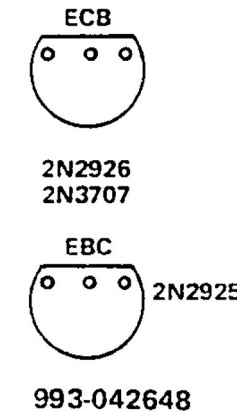
strong magnetic fields should be kept away from this instrument to avoid the pickup of power line frequency hum. Second, the mounting should be rigid to avoid shaking the acoustic delay line which would result in unwanted output signals. Third, monitor speakers should not be mounted close to the 905, as this would encourage acoustic feedback between speaker and delay line.

Before the 905 is installed, fittings and wrappings restricting the motion of the delay line should be removed. When the 905 is mounted vertically, the delay line bracket will be supported entirely by the suspension springs, and should not touch the chassis frame.

B. APPLICATIONS

When a dynamically varying signal is applied to the input of the 905, the output will consist of a series of closely spaced echoes, the subjected

BOTTOM VIEW



effect of which is similar to that of reverberation of sound. If a small amount of "echo signal" is mixed with a larger amount of "direct signal" (REVERBERATION Control set slightly clockwise), the effect of a typical concert hall is obtained. If the echo signal only is passed (REVERBERATION Control set fully clockwise), an exaggerated echo suggesting a cave is obtained. The relative amount of echo signal and direct signal can be continuously changed from 100 percent direct signal to 100 percent echo signal.

When a static signal is applied to the input of the 905, the output will also be static. There will be no sensation of echo. Rather, the 905 will perform in this application like a formant filter, strongly coloring the timbre of any signal with appreciable harmonic content.

FIGURE 14 REVERBERATION UNIT MODEL 905

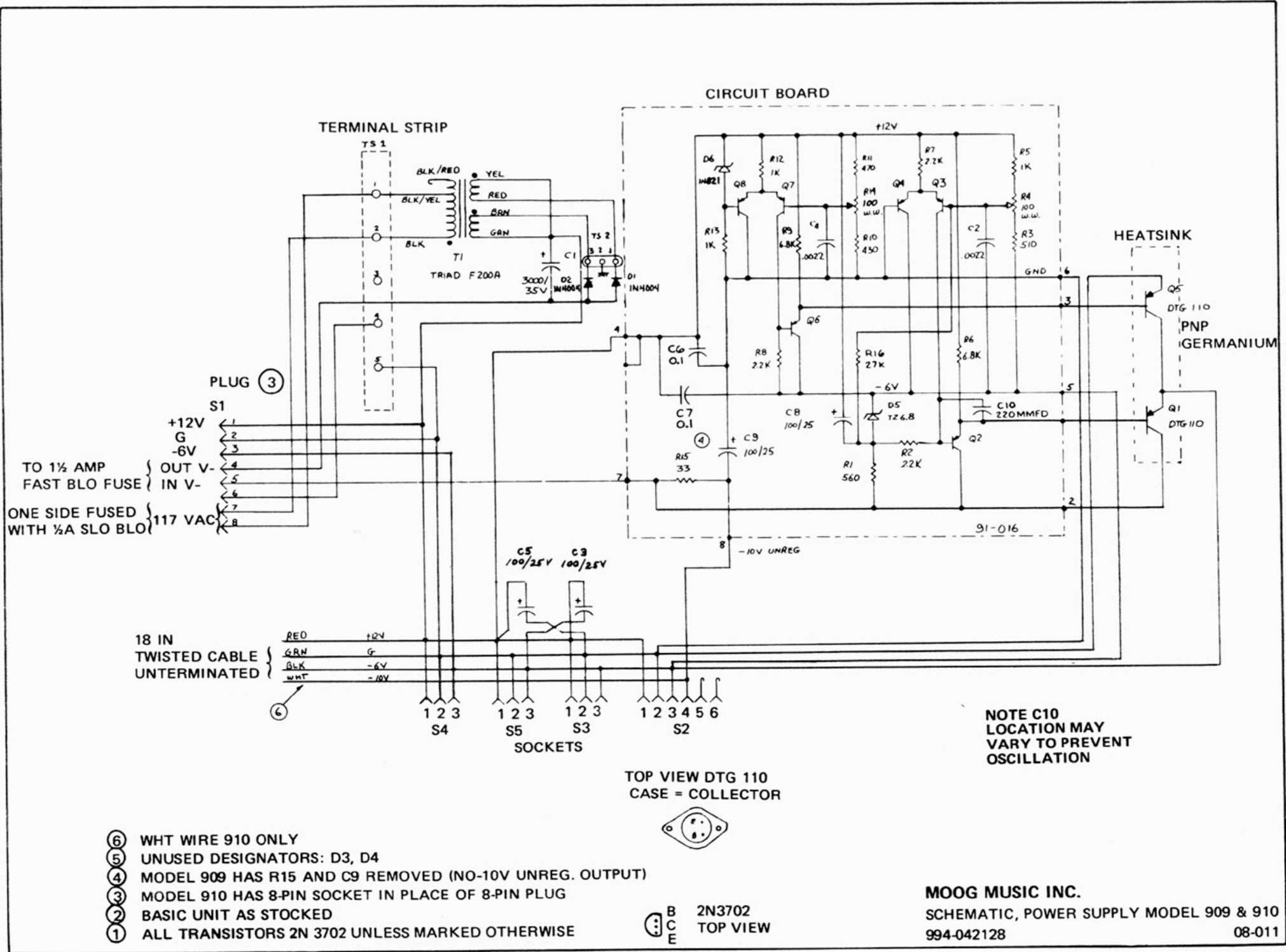
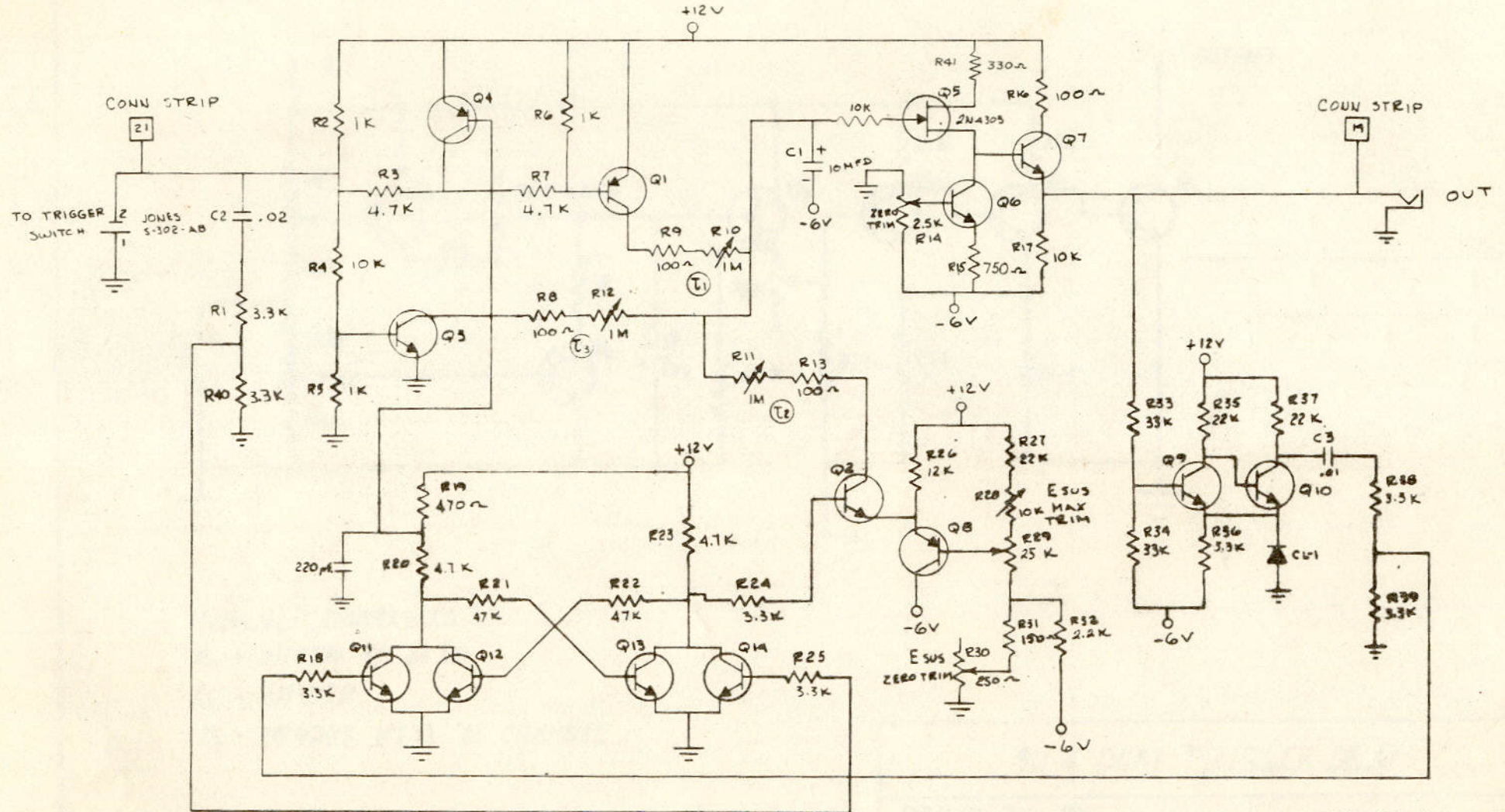


FIGURE 16 POWER SUPPLY MODELS 909 AND 910

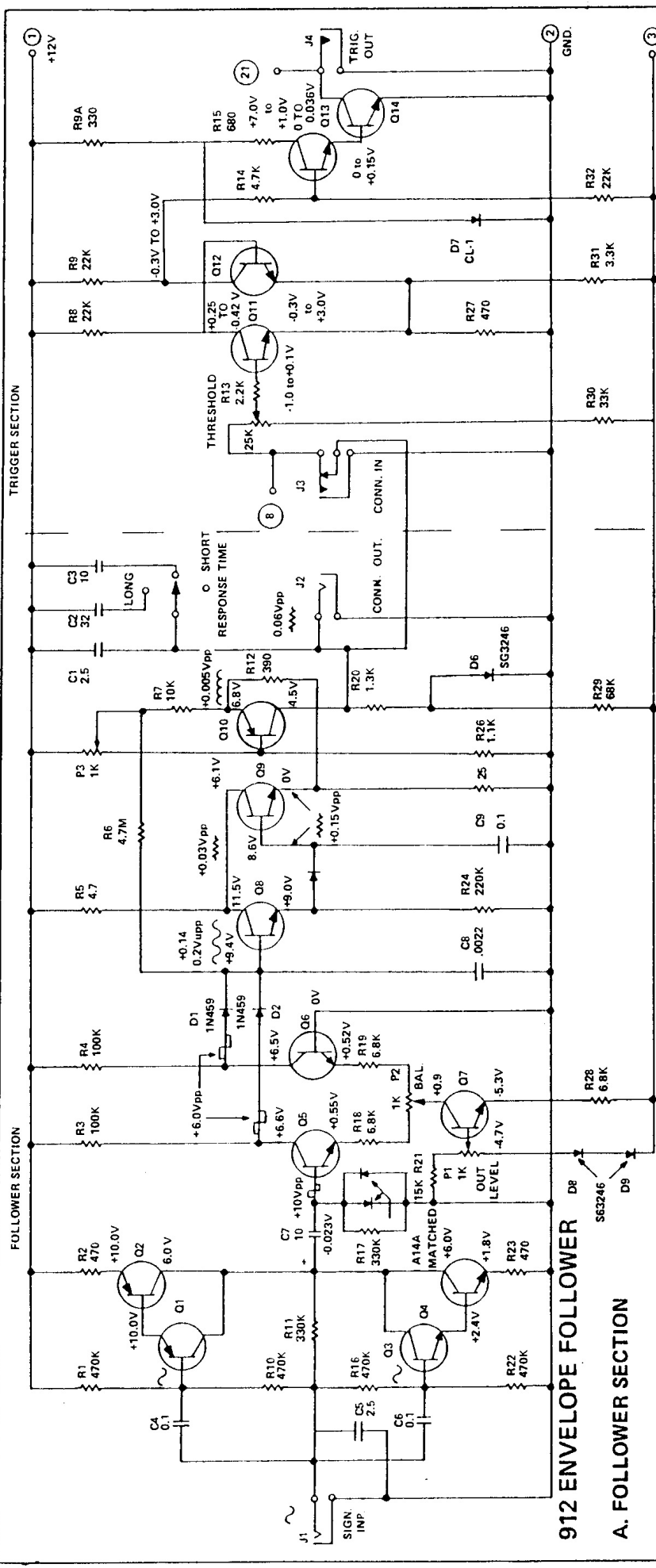


NOTES:

- I. ALL PNP TRANSISTORS ARE 2N4058
- II. ALL NPN TRANSISTORS ARE 2N3392

REPLACES DWG. 1103

WAR C-ECN-004 1-12-69 318	REVISIONS	R. A. MOOG CO. TRUMANSBURG, NEW YORK	
	A-R15 FROM 1.5K	TITLE	911 ENVELOPE GENERATOR
	To R20	SCALE	DR. BY RER
	A-R41 FROM Q5 To R12V	DATE 8-14-68	CK'D. BY
B-ECN-002			



912 ENVELOPE FOLLOWER
A. FOLLOWER SECTION

1. Set P1 to mid-rotation.
2. Apply a 250Hz sine wave at -15db to the SIGNAL INPUT (J1).
3. Set P4 for 4.5 volts dc at the CONTROL OUTPUT (J2).
4. Adjust P3 to even the "TOPS" of the peaks of the sine wave, with response ON, as observed on oscilloscope connected at CONTROL OUTPUT (symmetry). Repeat steps 3 and 4 to maintain proper dc output. If necessary, change R21 from 15K to

6.5K for a 4.5V indication.

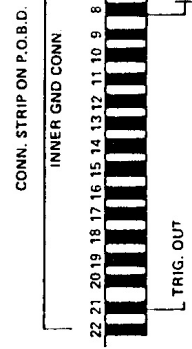
5. Check input/output levels as shown below with a 250Hz sine wave.

INPUT (db) OUTPUT (volts)	OUTPUT (volts)
+3	6.0
-3	5.5
-9	5.0
-15	4.5
-21	4.0
-27	3.5
-33	3.0
-39	2.4
-45	1.8
-51	1.1
-57	0

B. TRIGGER SECTION

1. Apply a -42db signal to SIGNAL INPUT (J1).
2. Connect dc voltmeter across TRIGGER OUTPUT (J4). As THRESHOLD control (R13) is rotated counterclockwise, trigger output of approximately 50MV will occur at mid-range of rotation.

NOTE
 Utilize a 912 Envelope Follower to trigger a 921, 902 and 911 setup to determine proper operation of trigger threshold.



- NOTES: UNLESS OTHERWISE NOTED:**
1. ALL RESISTORS IN OHMS
 2. ALL CAPACITORS IN UF
 3. ALL NPN TRANSISTORS = 2N3392
 4. ALL PNP TRANSISTORS = 2N4058
 5. ALL DC VOLTAGES ± 20% MEASURED WITH 250Hz ±5db SIGNAL AT SIGNAL INPUT
 6. VOLTAGES READ WITH THRESHOLD CONTROL GOING FROM FULL CW TO FULL CCW
 7. BASE LAYOUT FOR TRANSISTORS USED:

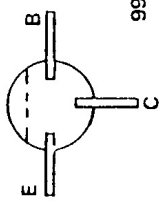
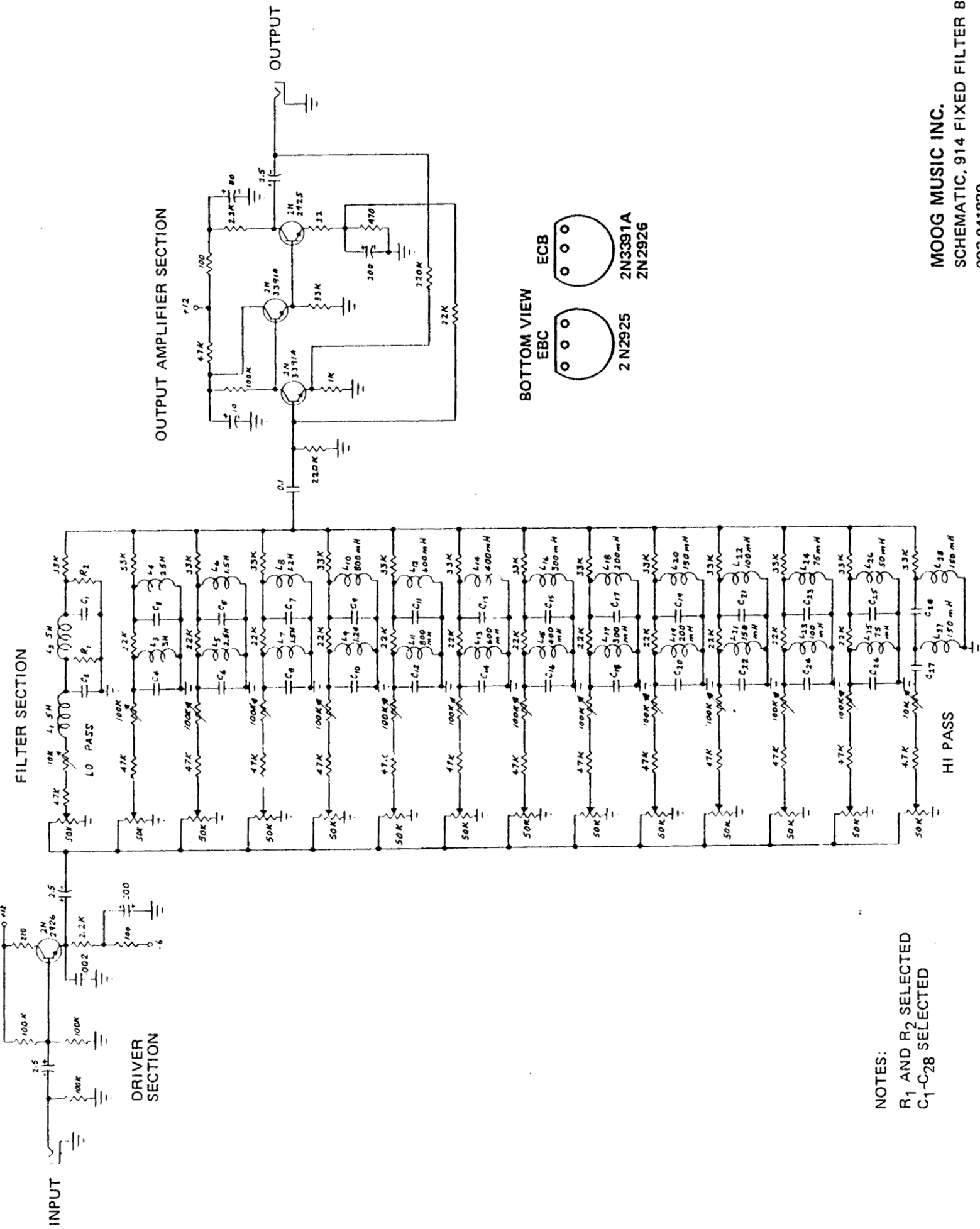
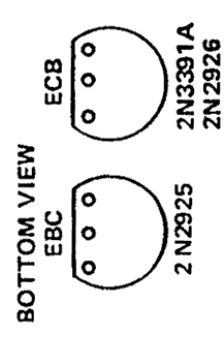


FIGURE 19 ENVELOPE FOLLOWER MODEL 912



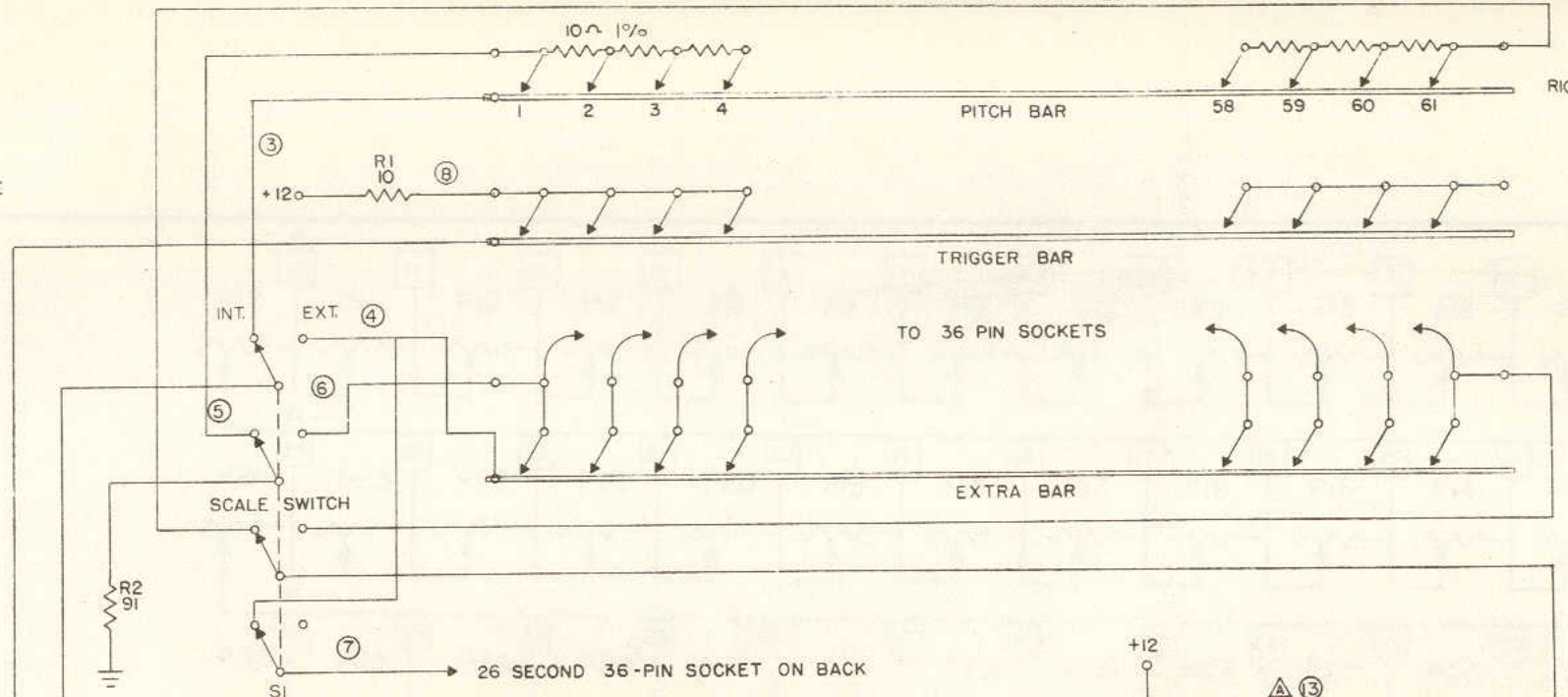
NOTES:
 R₁ AND R₂ SELECTED
 C₁-C₂₈ SELECTED



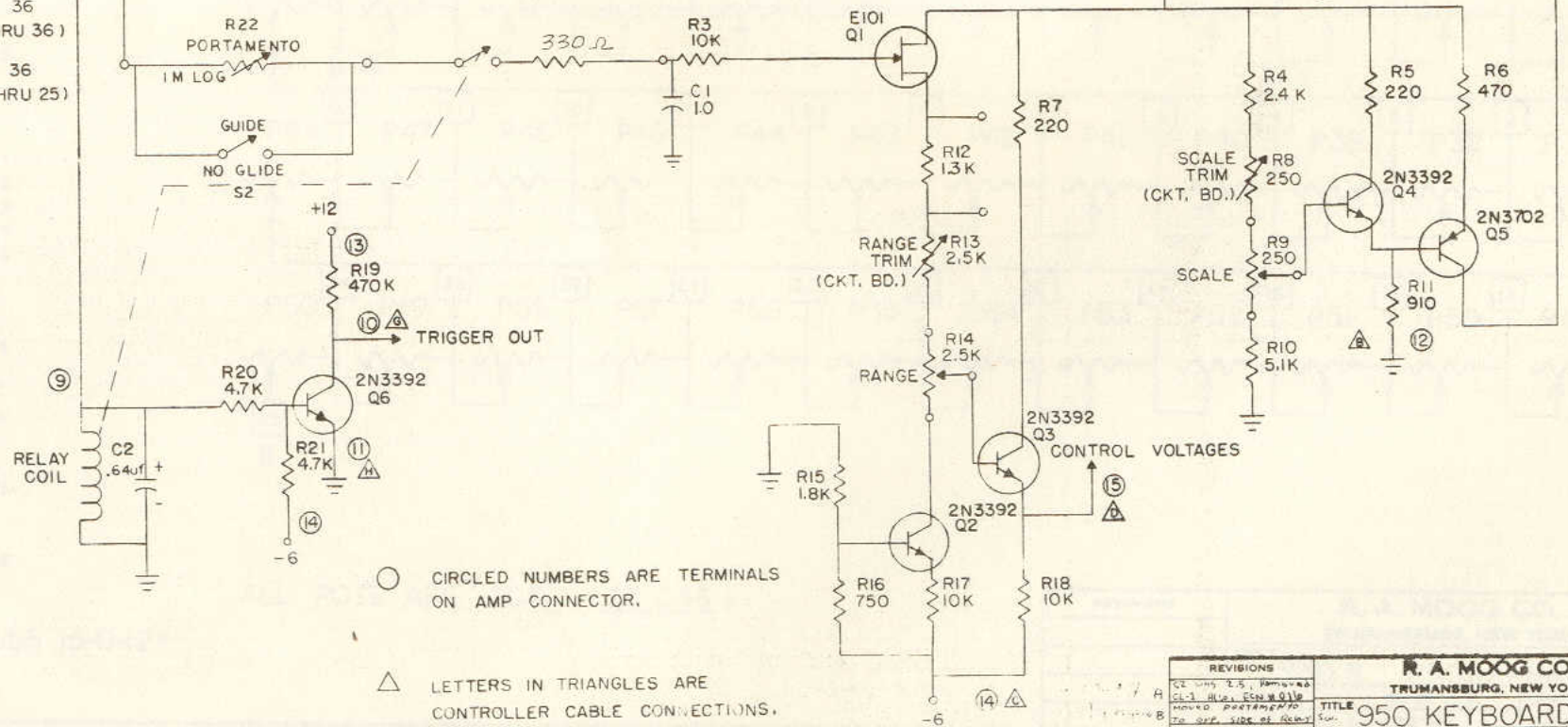
KEYBOARD SWITCHES

CONTROLLER CABLE

TERM.	FUNCTION	COLOR WIRE
A	+12	RED
B	GND	BLACK
C	-6	BLUE
D	CONTROL VOLTAGE	GRN
E	_____	_____
F	_____	_____
G	TRIGGER	BRN
H	TRIGGER GND	WHITE

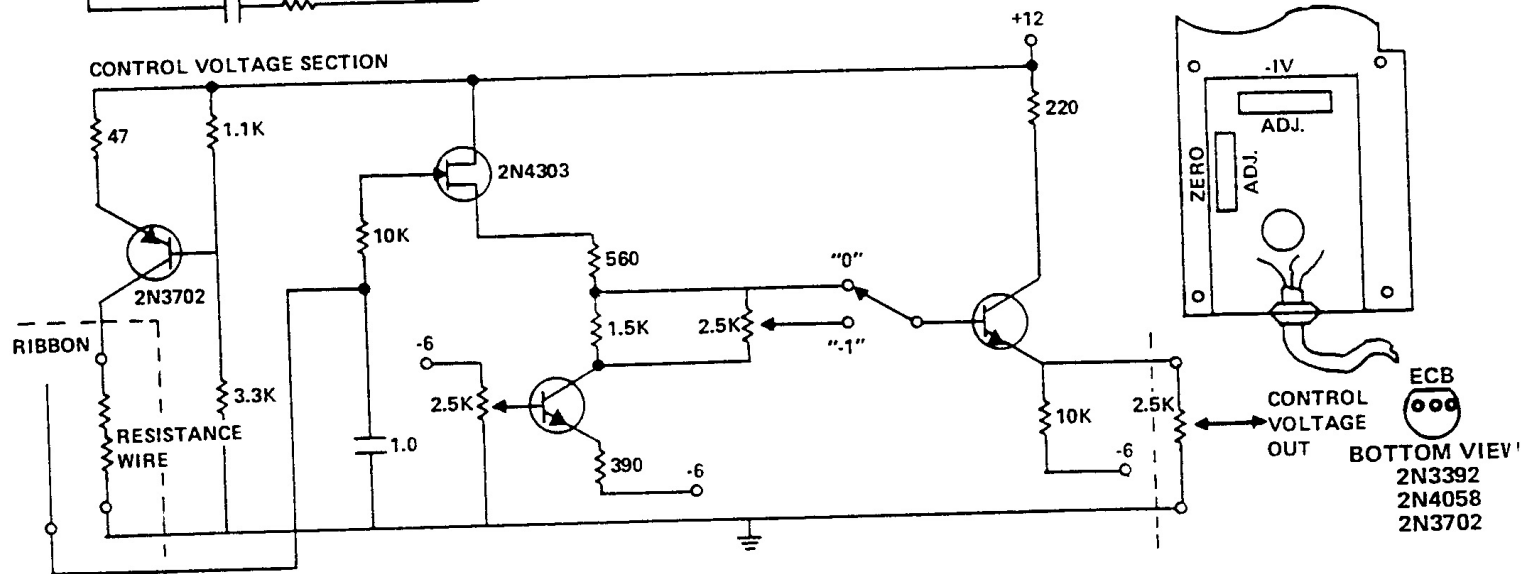
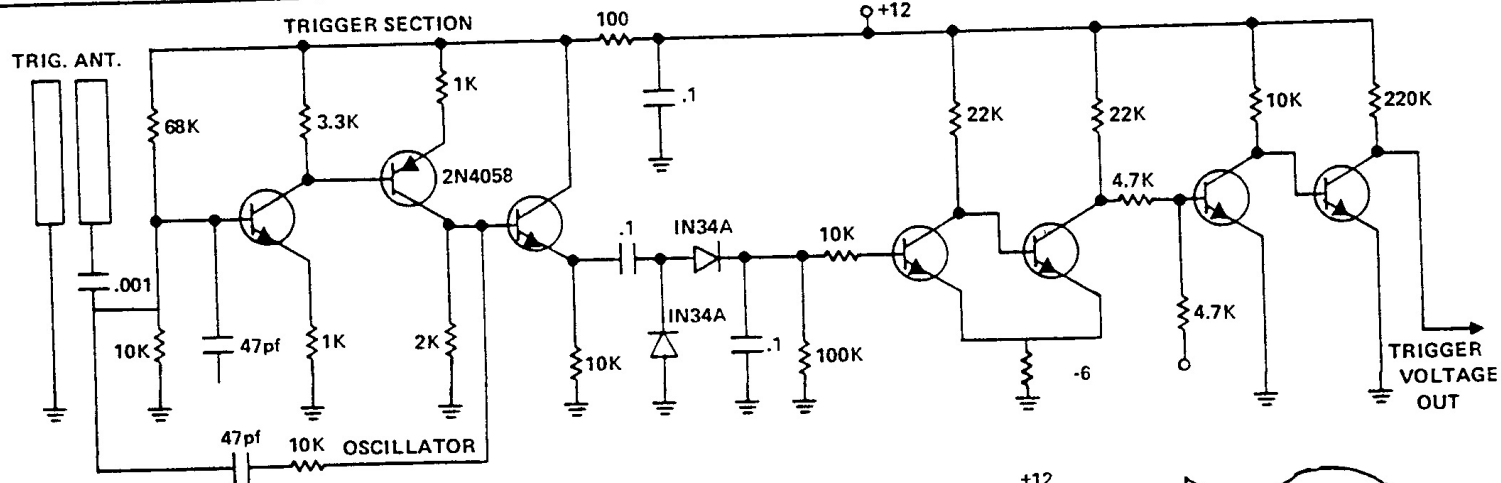


KEYS 1 THRU 36 - (FIRST 36 PIN SOCKET, PINS 1 THRU 36)
 KEYS 37 THRU 61 - (2ND 36 PIN SOCKET, PINS 1 THRU 25)



○ CIRCLED NUMBERS ARE TERMINALS ON AMP CONNECTOR.
 △ LETTERS IN TRIANGLES ARE CONTROLLER CABLE CONNECTIONS.

REVISIONS		R. A. MOOG CO.	
02	Ans 2.5, Removed	TRUMANSBURG, NEW YORK	
01	CL-3 Hues. ESN 9116	TITLE 950 KEYBOARD	
MOVED PARTMENTS TO opp. side of sheet		SCALE	DR. BY JLA
		DATE 4-25-65	DWG. NO. 1266



NOTE: ALL UNLABELED TRANSISTORS OF TYPE 2N3392

956 RIBBON CONTROLLER TEST PROCEDURE

1. Connect the 956 Ribbon Controller to the test rack.
2. Patch TRIGGER output of the 956 to the 911 Envelope Generator, then to the 902 Voltage Controlled Amplifier. Connect SIGNAL OUTPUT of a voltage controlled oscillator to the 902 SIGNAL INPUT. Connect 902 SIGNAL OUTPUT to a monitor amplifier and speaker.
3. Connect PITCH output to the voltage controlled oscillator CONTROL INPUT.
4. Touch TRIGGER bar on the 956. Oscillator should be heard. Adjust the 911 and 902 for a square envelope.
5. Set SCALE to "1" and LOW END VOLTAGE to "0".
6. Slide finger up and down the ribbon while touching the TRIGGER bar. A pitch change should be heard.
7. Adjust the ZERO ADJ. trimpot for 0.0 volt dc indication at PITCH OUTPUT jack.
8. Adjust the -1V. ADJ. trimpot for a 1.0 dc indication when switching between 0 and -1 low end voltage. Trimpot offsets -1 volt position only.
9. Play the ribbon. It should have a 6.0 volt dc span (six octaves). Decrease the SCALE setting to "5". The ribbon should now span 3.0 volts (three octaves).
10. Slowly play the ribbon listening for erratic pitch changes. If erratic conditions exist, lightly sand the resistance wire and underside of ribbon with No. 400 emery paper. Apply a light film of cramolin to the resistance wire and ribbon to further promote a smooth contact.
11. Depress and release ribbon at low, middle and high end with scale at "10". Check for drift of the sample hold circuit at each of these points. Drift shall be less than 10 mv/minute as measured at the PITCH CONTROL OUTPUT jack.

993-042651

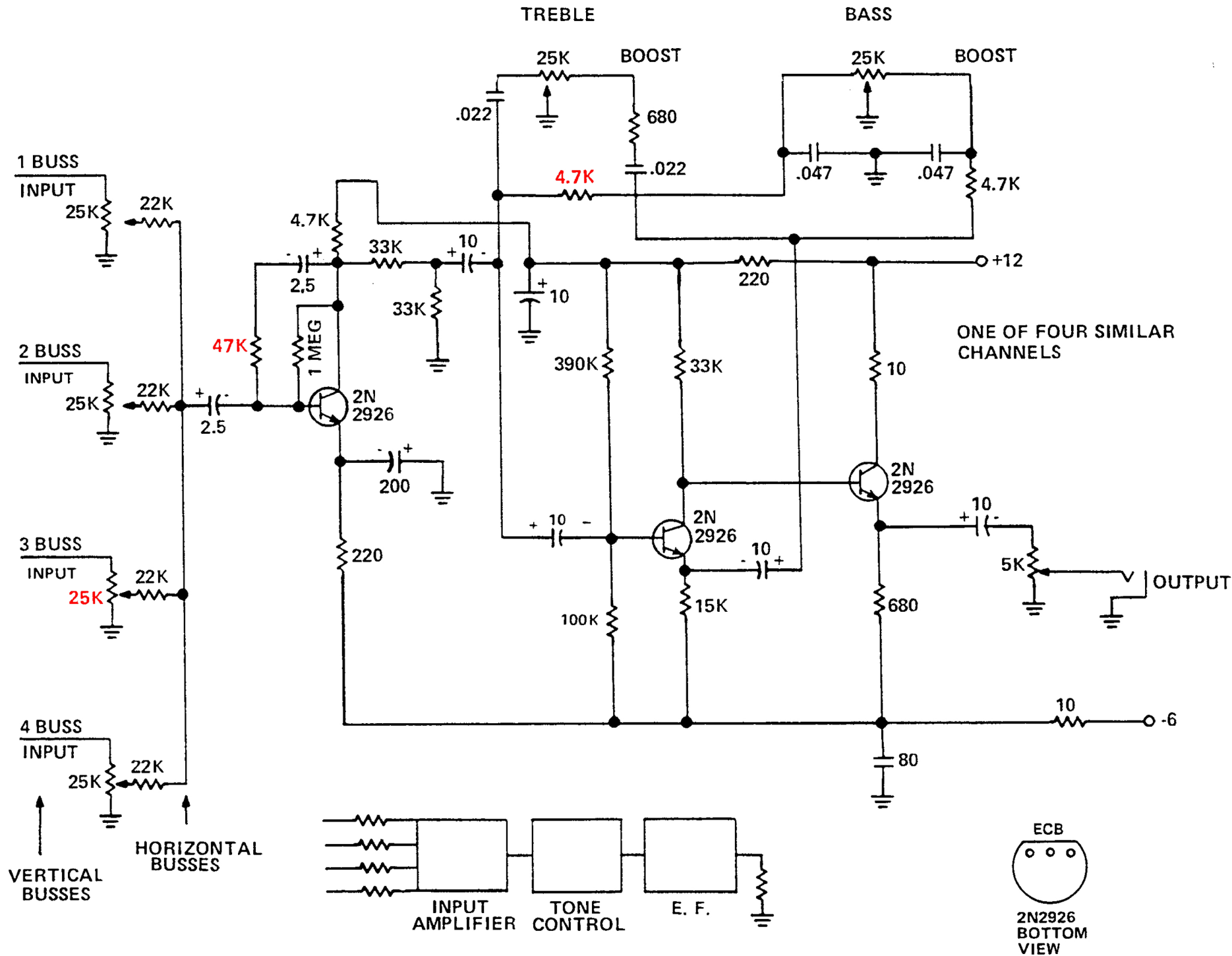
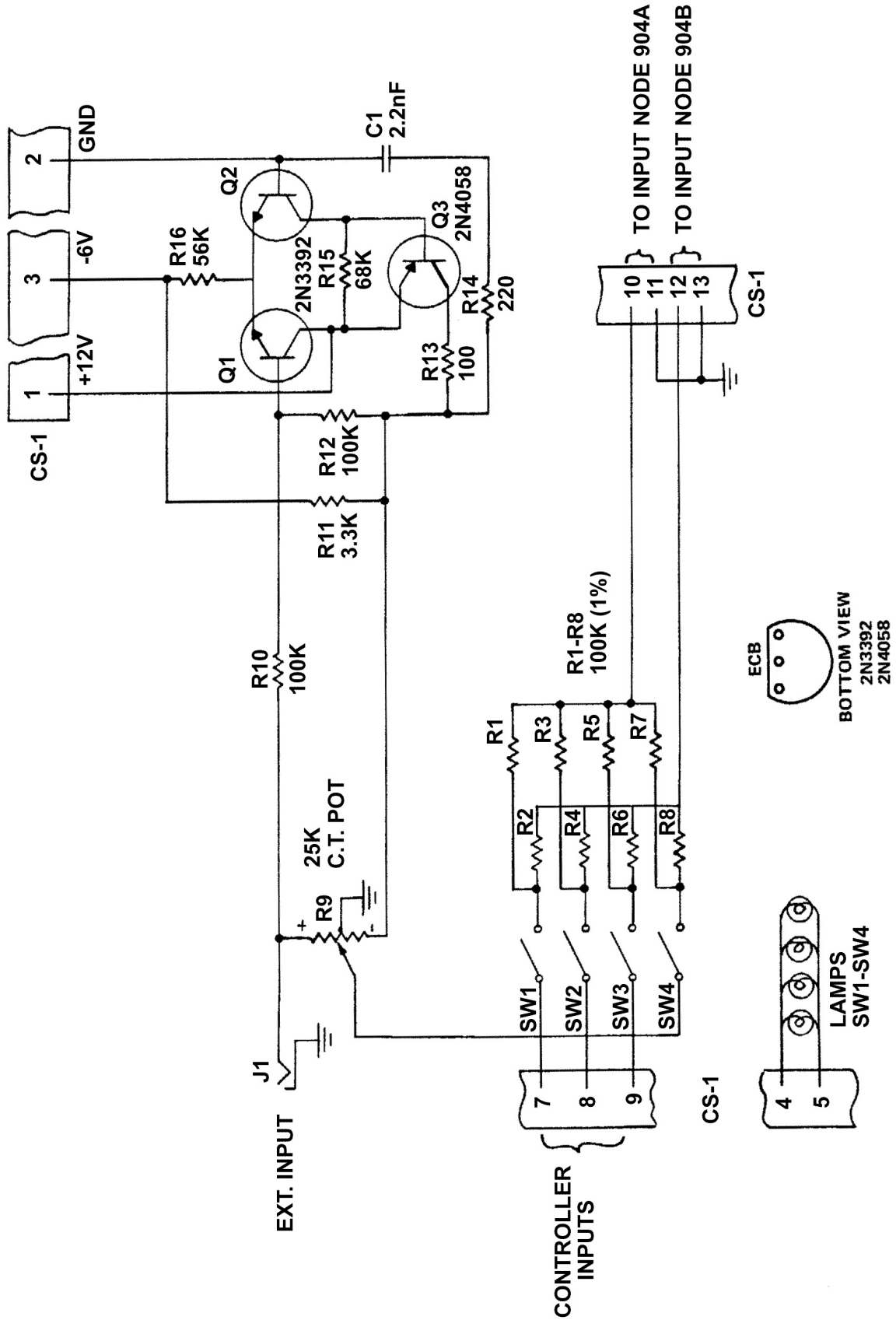
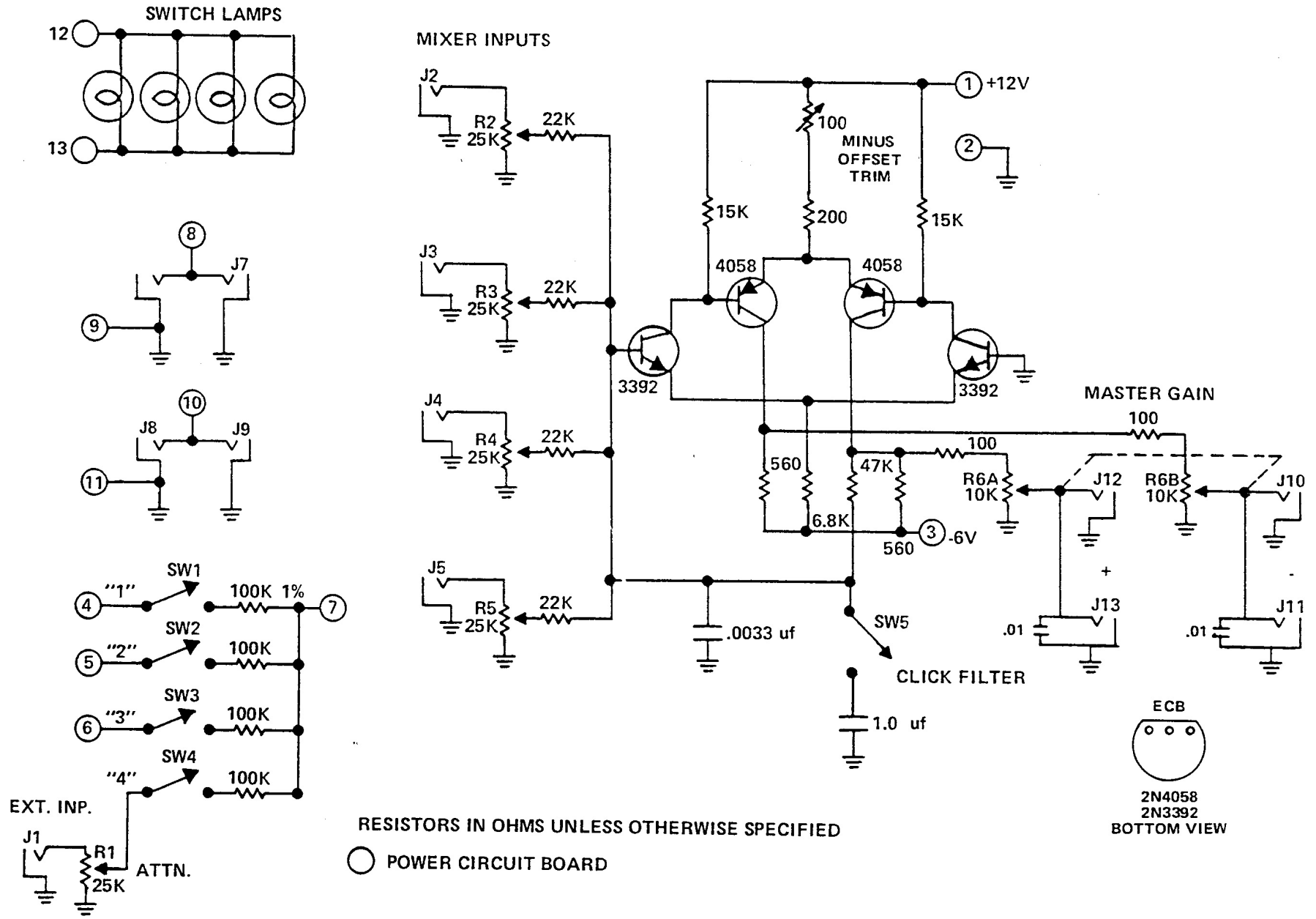


FIGURE 36 FOUR CHANNEL MIXER MODEL 984



MOOG MUSIC INC.
 SCHEMATIC, 904S CONTROL-992 MODULE
 993-041804 1186

FIGURE 37 CONTROLLER MODEL 992 FOR MODEL 904S



RESISTORS IN OHMS UNLESS OTHERWISE SPECIFIED
 ○ POWER CIRCUIT BOARD

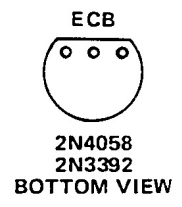


FIGURE 2 CONSOLE PANEL MODEL 3