MODEL 1000A/1100A SYSTEM
PRECISION FM TRANSMITTER*

L. White Copy.

SOUND TECHNOLOGY

SOUND TECHNOLOGY
1400 Dell Avenue
Campbell, California 95008

July 4, 1972

* Patented

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WARRANTY

All new Sound Technology products are warranted against defects in materials and workmanship for one year from the date of delivery. Any instrument or component that is found to be defective within the warranty period after examination by Sound Technology or an authorized representative thereof will be repaired or replaced without charge for labor or material. No other warranty is expressed or implied. We are not liable for consequential damages.

Before returning a product to Sound Technology for service, authorization must be obtained from the factory. For products not covered by the warranty, a purchase order should be forwarded to avoid unnecessary delay. Please include instrument model number and serial number with all requests for parts or service to facilitate the fastest possible response.

All products returned to the factory must be shipped prepaid. For products under warranty, Sound Technology will pay for shipment back to the customer.

INTRODUCTION

The Models 1000A FM Alignment Generator and 1100A Signal Conditioner combine to serve as an extremely low distortion FM transmitter. The 1100A accepts audio from a tape recorder or other auxiliary device or from a low level phonograph cartridge, equalizes, amplifies and pre-emphasizes the signal, and routes it to the external audio inputs of the 1000A. The 1000A multiplexes the audio and modulates its internal FM oscillator with a precision stereo signal. RF output level is continuously adjustable, and the 1000A can be tuned to any frequency in the 88 to 108 MHz band. To see how the 1000A can be used for stereo receiver or tuner service as well, refer to the 1000A manual.

SYSTEM CONNECTIONS

The 1000A, 1100A and audio source are to be connected as shown in Fig. 1. BNC cables for connecting the 1100A audio outputs to the 1000A external modulation inputs are supplied with the 1100A. A phonograph or tape recorder (or both) may be used as an audio source.

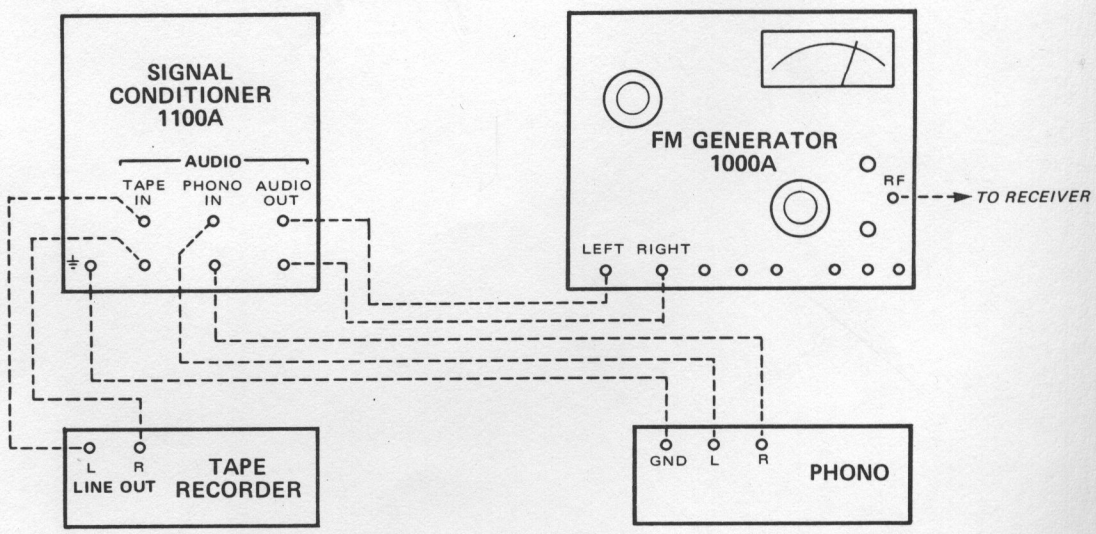


Fig. 1 System Connections

CONNECTION TO RECEIVER

The 1000A RF output may be coupled to the receiver in a variety of ways. Three alternatives follow:

1. Using the Sound Technology Model 100 Matching Transformer, connect the 1000A directly to the receiver antenna terminals. This method provides a signal of known level at the receiver antenna terminals because the signal level can be read directly from the 1000A RF LEVEL dial. This method is recommended for making critical receiver listening tests at known rf levels.

2. Connection may be made to a 75 Ω Master Antenna system using a directional coupler (Jerrold Model DC-12 UV or equivalent). Figure 2 shows the suggested method of correction. The 1000A should be connected to the directional coupler through a 50 Ω to 75 Ω transformer (Tekscan ZM57F or equivalent).

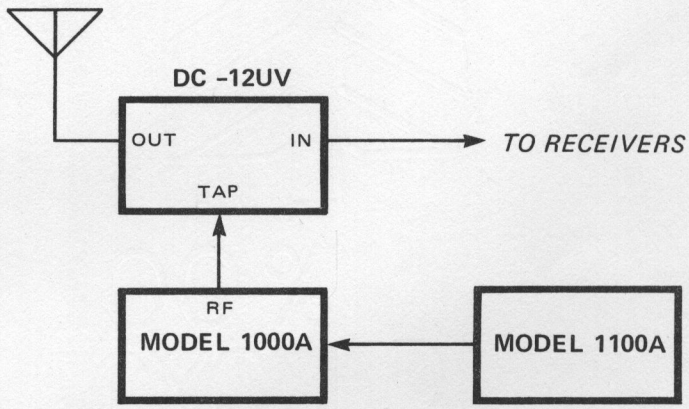


Fig. 2 Coupling to Master Antenna System

3. The 1000A can be used to radiate its rf signal a considerable distance with only a few feet of wire connected to its r.f. output. The user should be aware, however, that radiating a signal from the 1000A may violate FCC rules and regulations.

SYSTEM CONTROL SETTINGS

Preliminary adjustments should be made as follows:

1100A STEREO BAL: centered

1100A OUTPUT LEVEL: 3/4 of the way to maximum (about 3:00 o'clock)

1100A PROGRAM SOURCE: TAPE or PHONO, depending on the source used.

1000A INPUT: EXT

1000A PILOT LEVEL: to 100% on meter FM DEV % scale with the PILOT TEST push button depressed. This is actually 10% pilot, since the meter scale is expanded 10X with the button depressed.

1000A RF LEVEL: to 30,000 μv

1000A FREQUENCY: to any dead spot in the FM band

When the system is working, fine adjustments can be made. The following points should be kept in mind.

1. The 1000A RF LEVEL is continuously adjustable. The desired setting will depend on the antenna system used and on the type of receiver test (e.g. sensitivity) being made.

2. When using a tape recorder or other auxiliary source capable of a 2 volts or more output, the 1100A OUTPUT LEVEL control should be kept at about 3/4 of maximum, and the source level control should be used to set system level to avoid overloading the 1100A.

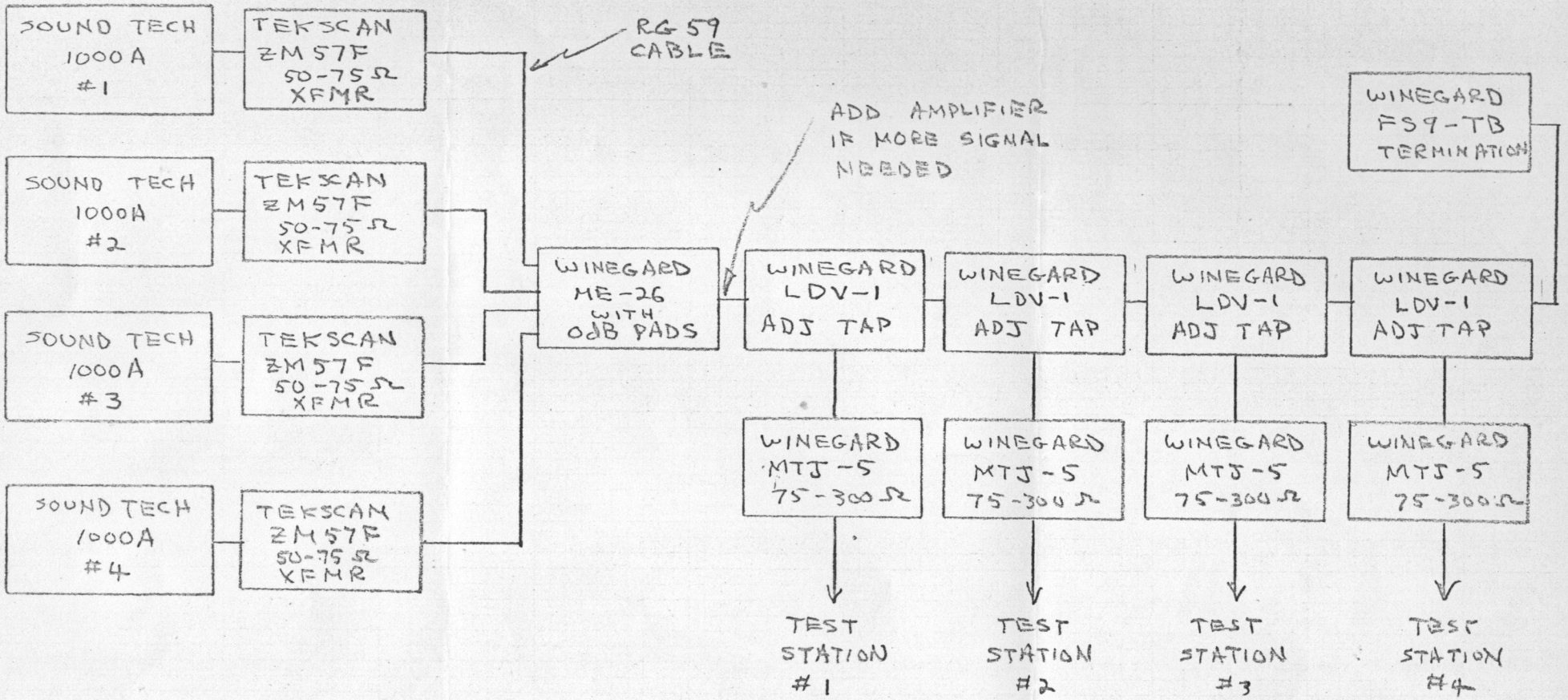
3. The 1000A meter (FM DEV % scale) should be used to make final program level adjustments. As a rule-of-thumb, levels should be set so the meter reads 40% or below on music

passages with average loudness. Setting the level too high will result in heavy overmodulation during a loud music passage, and many receivers "break up" when subjected to overmodulation. High frequency notes, particularly from a loud instrument result in extreme modulation levels.

Many FM stations overmodulate as a matter of practice. FCC rules permit this, stating:

> Para 73.268 "...In no case is it (modulation) to exceed 100% on peaks of frequent recurrance..."
>
> Para 73.317 "...Compliance with this specification will be deemed to show the occupied bandwidth to be 240 kc/s or less..."

Expensive receivers can usually withstand overmodulation better than others because they have more non-distorting bandwidth, and this is a good selling feature, easily demonstrated with the 1100A/1000A system.



PRODUCTION TEST SYSTEM

SCALE:	APPROVED BY: LARRY MAGUIRE	DRAWN BY
DATE: 8/15/73		REVISED
		DRAWING NUMBER

THE PRINGLE GROUP
30 SCARSDALE ROAD
DON MILLS, ONTARIO
M3B 2R7

- FM Signal Distribution Systems for In-Store Demonstrations with Sound Technology.

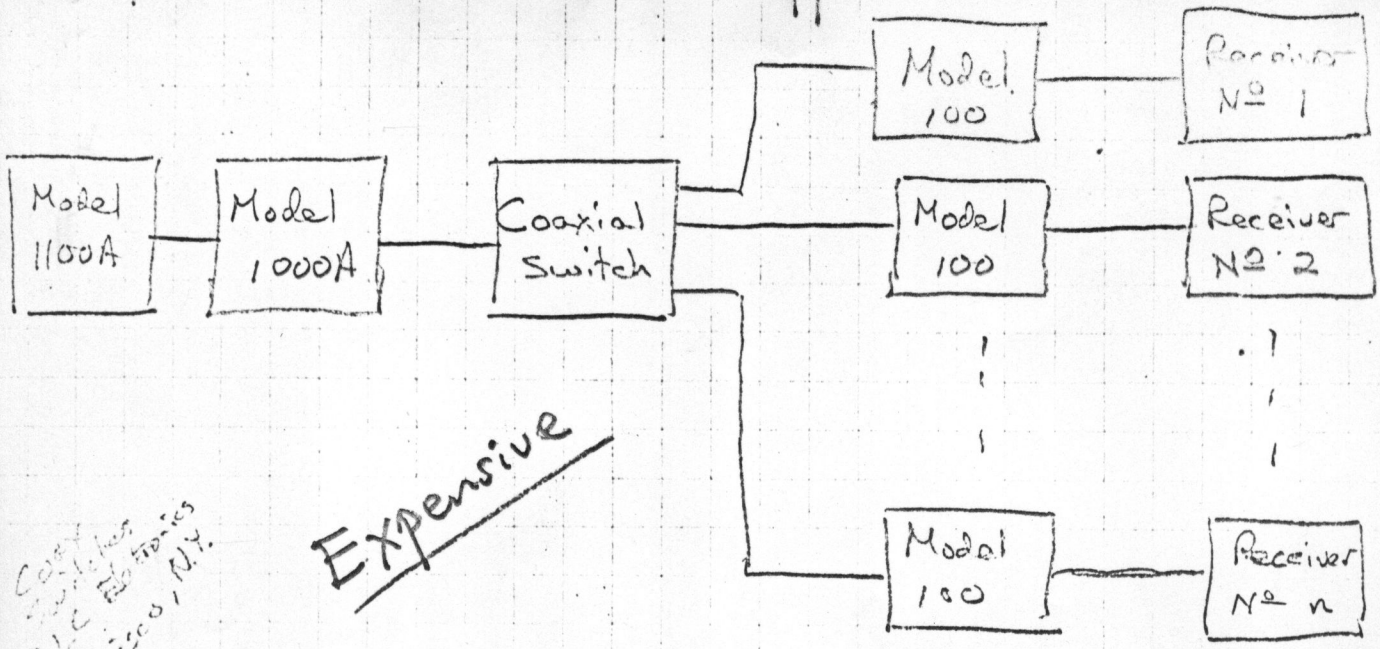


Fig 2 - FM Signal Distribution System

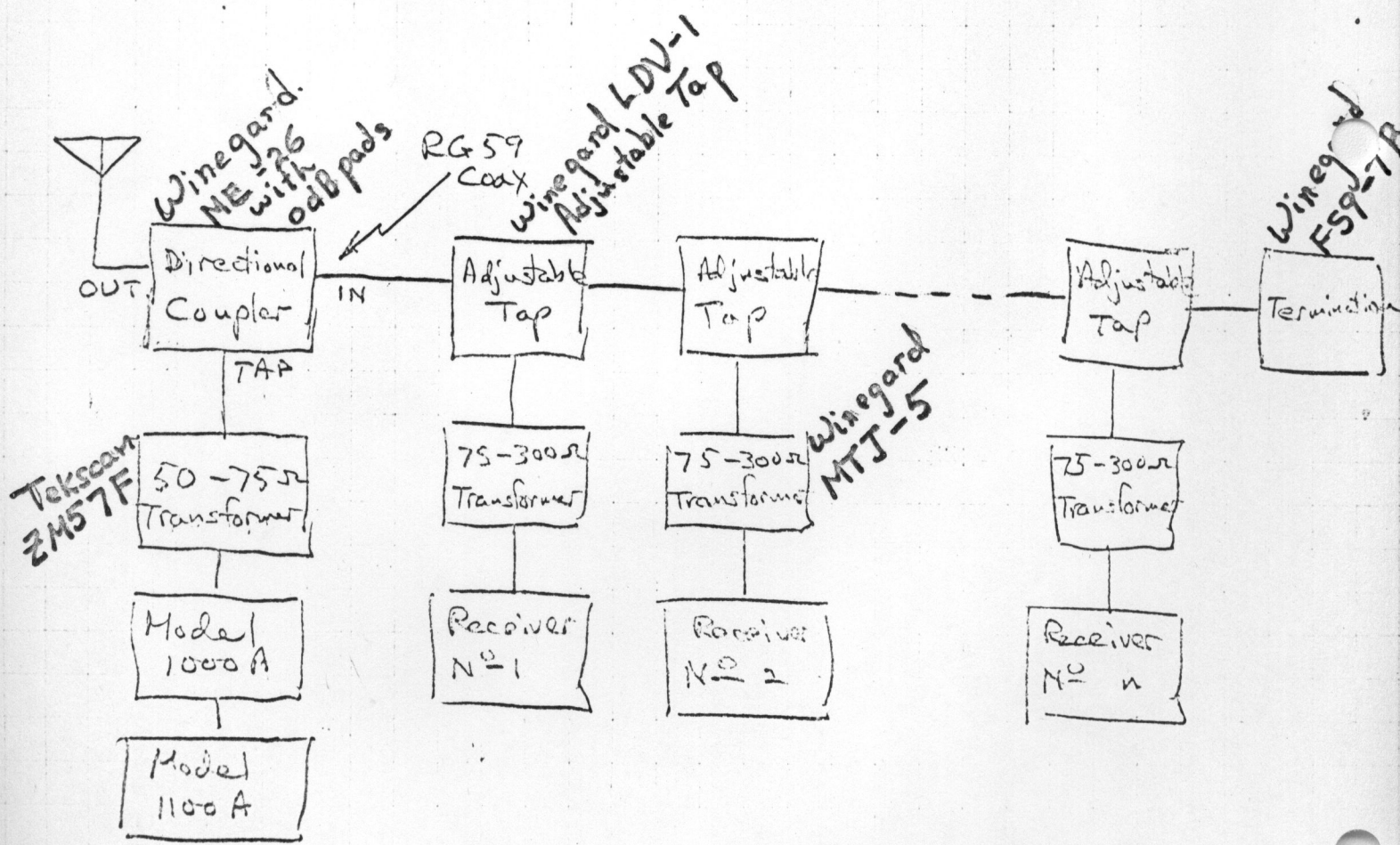


Fig 3 - Master Antenna System

A. Allen Pringle Ltd. 11-5-73.

Model 1100A Audio Amplifier Chain

The 1100A contains 2 identical amplifier chains, one for each channel. Each chain consists of 3 operational amplifiers. A block diagram of one amplifier chain is shown below.

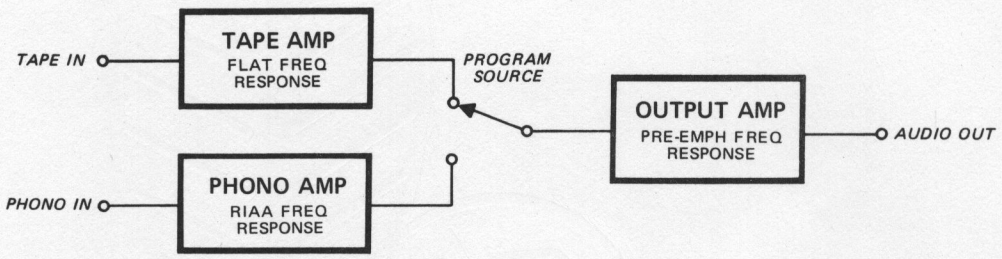


Fig. 3 1100A Amplifier Chain

The tape and phono amplifiers use the potentiometric operational amplifier configuration. In the drawing below and in the equations that follow, this configuration is described using a 709 type operational amplifier.

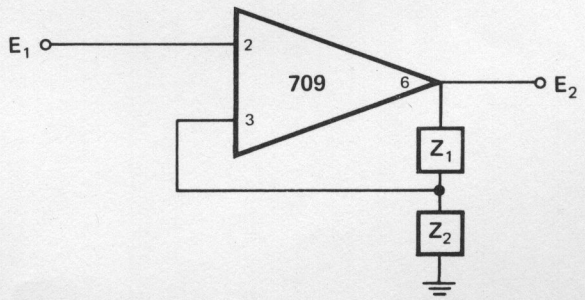


Fig. 4 Potentiometric Amplifier

CIRCUIT OPERATION

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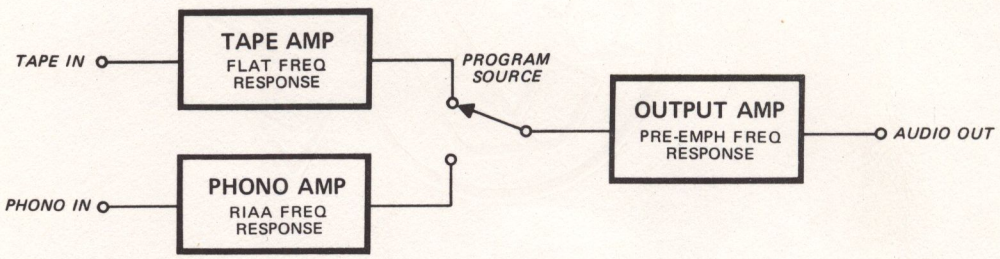

Fig. 3 1100A Amplifier Chain

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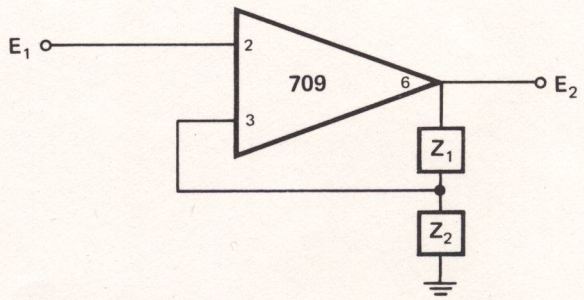


Fig. 4 Potentiometric Amplifier

$$\text{Gain} = \frac{E_2}{E_1} = \frac{Z_1 + Z_2}{Z_2}$$

If Z1 and Z2 are made up of resistors only, the gain is flat with frequency, as in the case of the tape amplifier, MC1 or MC4. Since Z1 =0 in the tape amplifiers, the gain equation reduces to:

$$\text{Gain} = \frac{E_2}{E_1} = 1$$

Z1 and Z2 are comprised of resistors and capacitors in the phonograph amplifier, MC3 and MC6, to provide RIAA equalization, which requires a variation of gain with audio frequency. The phonograph amplifier has a gain of 60 at 1 KHz.

The output amplifier is constructed in the summing configuration as described in the 1000A manual and shown below:

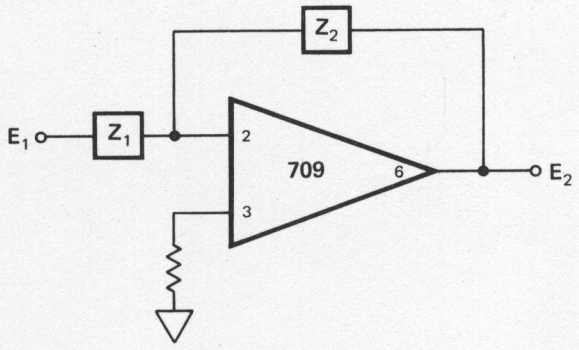


Fig. 5 Summing Amplifier

Gain for this operational amplifier configuration is:

$$\text{Gain} = \frac{E_2}{E_1} = \frac{Z_2}{Z_1}$$

The output amplifiers, MC2 and MC3, provide pre-emphasis by including a capacitive network in Z1, thus increasing gain at frequencies above 1 KHz. Output amplifier gain is 1.0 at 1 KHz with the PRE-EMPH switch OUT.

Model 1100A Power Supply

MC7 and MC8 are the plus and minus 15 volt regulator amplifiers. R61 and R62 form the reference divider for the +15 volt supply, and R66 and R67 form the reference divider for the -15 volt supply. Q1 and Q2 are the series regulators.

Model 1000A

For Model 1000A circuit operation, refer to the Model 1000A manual.

INTERNAL ADJUSTMENTS

The Model 1100A has no internal adjustments. For internal adjustment procedures on the Model 1000A, refer to the 1000A manual.

For instructions on Model 1100A cover removal, refer to Fig. 6.

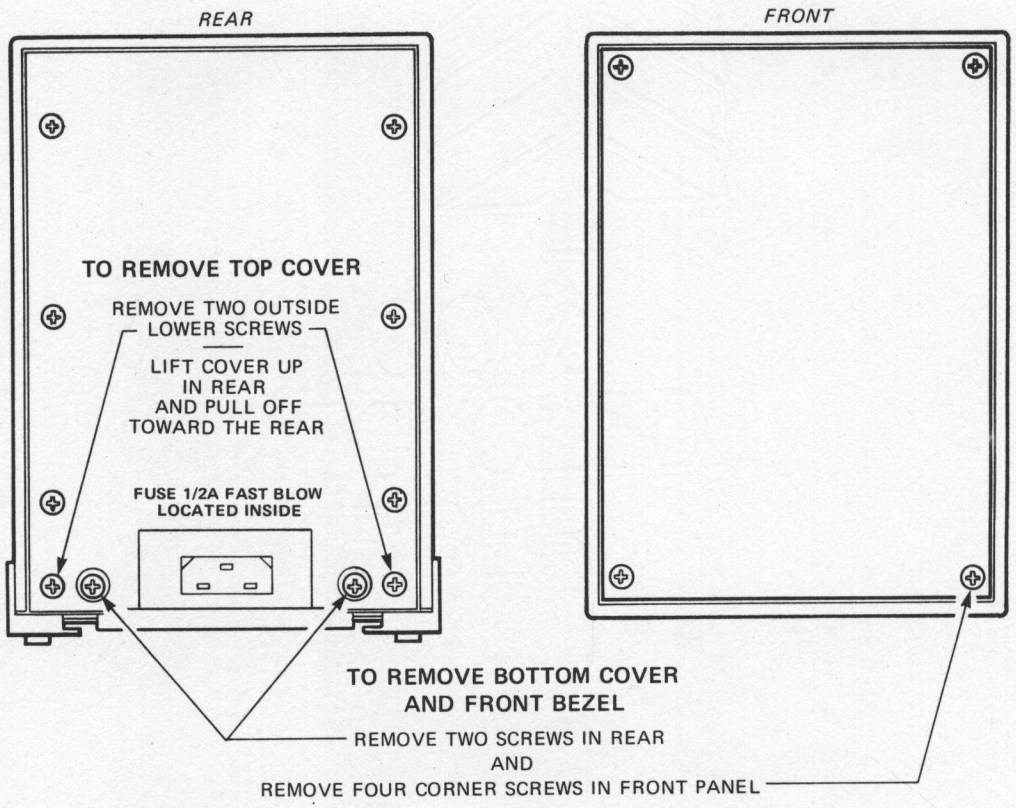
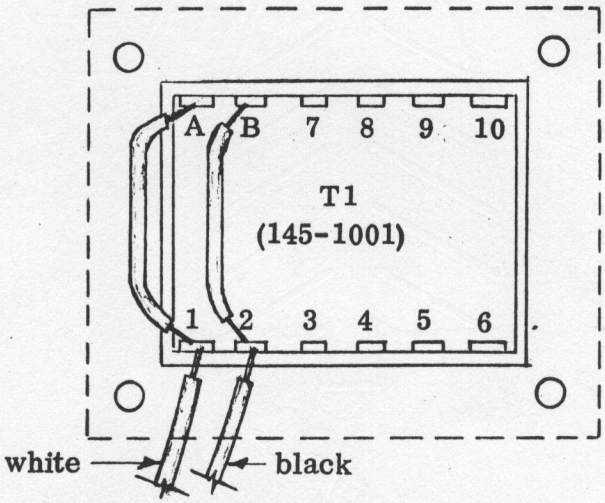
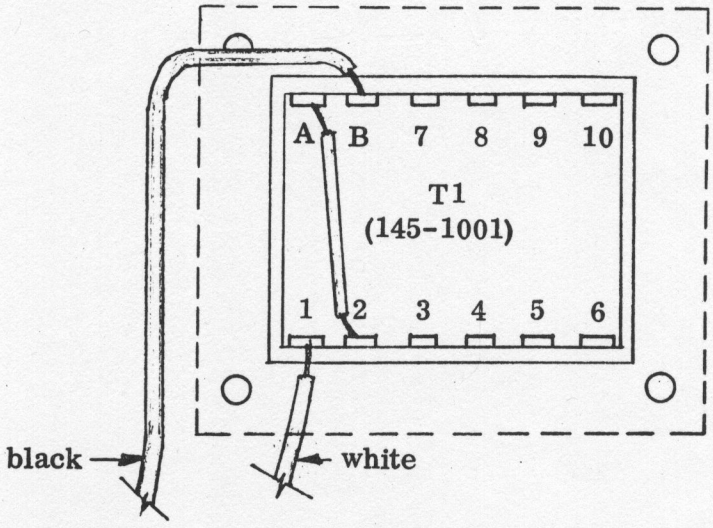


Fig. 6 Cover Removal



Primary Wiring for 115V

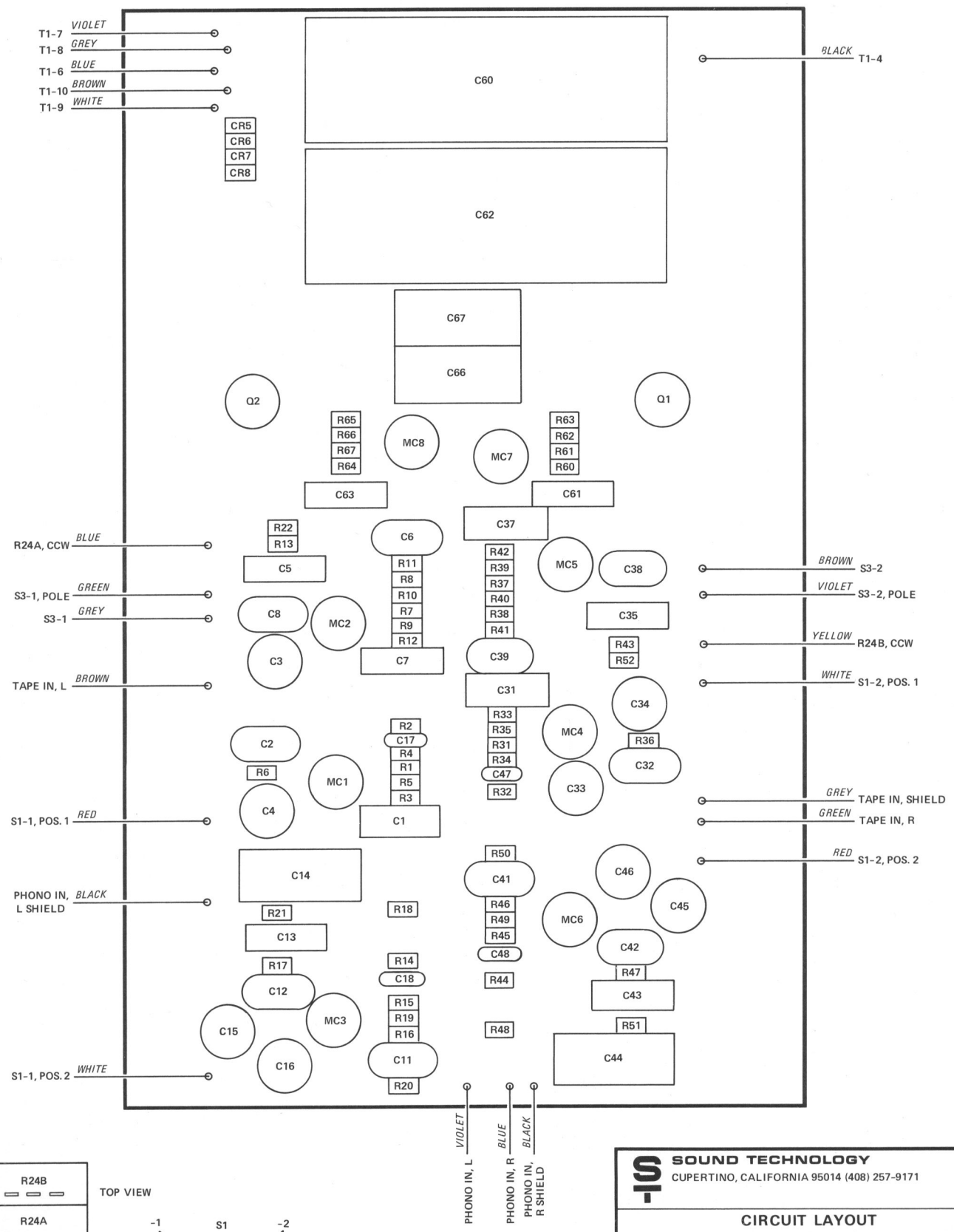


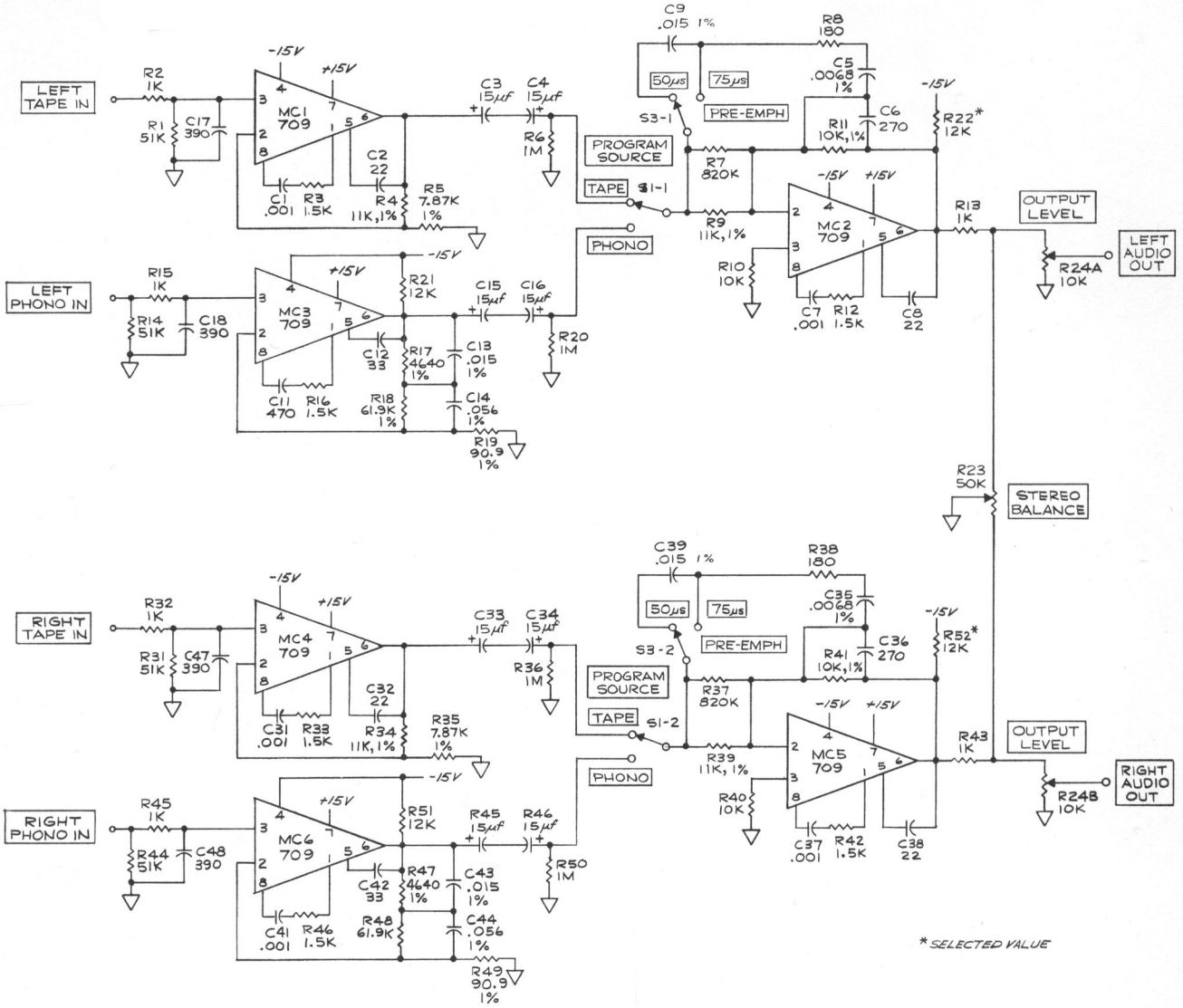
Primary Wiring for 230V

Fig. 7 Model 1100A 115/230 v Primary Wiring

REFERENCE DESIGNATION	DESCRIPTION	SOUND TECHNOLOGY STOCK NO.	MANUFACTURER	MANUFACTURER PART NO.
All fixed resistors except 1% values	R: Fxd, Comp, 1/4w, ±5%, 10Ω thru 1MΩ	100-1000 (10Ω) thru 100-1050 (1MΩ)	Allen-Bradley	Type CB
All 1% resistors	R: Fxd, Met Flm, 1/8w, ±1%, 100 ppm 90.9Ω thru 61.9kΩ	105-0900 (90.9Ω) thru 105-6192 (61.9kΩ)	Corning	NA55
R15A, B	R, Var, Comp, Dual 10k±10%	110-1031	A-B	JDIN200P103UA
R14	R, Var, Comp, 50k±10%	110-5030	A-B	JAIN056S503UA
C1, 31, 7, 37	C, Fxd, My, 100v, .001μf±10%	125-1020	Sprague	225P10291
C61, 63	C, Fxd, My, 100v, .01μf±10%	125-1030	Sprague	225P10391
C5, 35	C, Fxd, Polyst, .0068μf, 2.5%	126-6820	Mial	611-2 1/2%-63v
C13, 43	C, Fxd, Polyst, .015μf, 2.5%	126-1530	Mial	611-2 1/2%-63v
C14, 44	C, Fxd, Polyst, .056μf, 2.5%	126-5630	Mial	611-2 1/2%-63v
C2, 32, 8, 38	C, Fxd, Mica, 22pf, 10%	120-2200	Arco	DM15-220J
C12, 42	C, Fxd, Mica, 33pf, 10%	120-3300	Arco	DM15-330J
C11, 41	C, Fxd, Mica, 470pf, 10%	120-4710	Arco	DM15-471J
C6, 36	C, Fxd, Mica, 270pf, 10%	120-2710	Arco	DM15-271J
C64, 65	C, Fxd, CER, 2000v, .01μf	127-1040	Sprague	BL-S10
C66, 67	C, Fxd, Elect, 25v, 100μf	135-1010	Sprague	TE1211
C60, 62	C, Fxd, Elect, 50v, 1100μf	135-1120	Sprague	39D118G050HP4
C3, 4, 33, 34, 15, 16, 45, 46	C, Fxd, Elect, 25v, 15μf	136-1500	Sprague	502D156G025CC1C
CR5, 6, 7, 8	Diode, Si, IN4003	210-4003	General Instruments	IN4003

Q1,2	Transistor, Si, NPN, 2N3053	226-3391	National	2N3053
MC1,2,3,4,5,6, MC7,8	Int Ckt, 709C Int Ckt, 723C	250-7090 250-7723	MOT Fair	MC1709CG U5R7723393
T1	XFMR, Pwr w/T-Bracket	145-1000	SAE	12296
	Pwr Cord	310-1200	Belden	17250
	Pwr Socket	440-0301	Switchcraft	EAC-301
XF1	Fuse Post, 3AG	440-3570	Little Fuse	357001
F1	Fuse, 3AG, 1/2A	330-0500	Little Fuse	312.500
DS1	Indicator Light, Neon	321-1311	Leecraft	3GN1311-6
J1,2,3,4,	RCA Jack	420-3501	Switchcraft	3501 FP
J5,6	Connector, BNC	420-1094	Kings	KC79-35, TR-5 Finish
S1	SW, Rotary, 2P-2T	340-7500	Special	
S2	SW, Toggle, SP-ST	340-9492	C-H	8280K16
S3	SW, Toggle, DP-DT	340-9494	C-H	8363K7


T1-7 VIOLET
T1-8 GREY
T1-6 BLUE
T1-10 BROWN
T1-9 WHITE
CR5
CR6
CR7
CR8
C60
C62
C67
C66
BLACK T1-4
Q2
Q1
R65
R66
R67
R64
MC8
MC7
R63
R62
R61
R60
C63
C61
C37
R24A, CCW BLUE
R22
R13
C5
C6
R11
R8
R10
R7
R9
R12
C7
R42
R39
R37
R40
R38
R41
C39
C31
MC5
C38
C35
R43
R52
BROWN S3-2
VIOLET S3-2, POLE
YELLOW R24B, CCW
WHITE S1-2, POS. 1
S3-1, POLE GREEN
S3-1 GREY
C8
C3
MC2
TAPE IN, L BROWN
C2
R6
C4
MC1
R2
C17
R4
R1
R5
R3
C1
R33
R35
R31
R34
C47
R32
MC4
C33
C34
R36
C32
S1-1, POS. 1 RED
GREY TAPE IN, SHIELD
GREEN TAPE IN, R
RED S1-2, POS. 2
C14
R50
C41
C46
C45
PHONO IN, L SHIELD BLACK
R21
C13
R18
R46
R49
R45
C48
MC6
C42
R47
C43
R17
C12
R14
C18
R44
C15
MC3
R15
R19
R16
R48
R51
C44
C16
C11
R20
S1-1, POS. 2 WHITE
VIOLET PHONO IN, L
BLUE PHONO IN, R
BLACK PHONO IN, R SHIELD
R24B
R24A
TOP VIEW
-1
S1
-2
SOUND TECHNOLOGY
CUPERTINO, CALIFORNIA 95014 (408) 257-9171
CIRCUIT LAYOUT
MODEL 1100A SIGNAL CONDITIONER
DATE: 9-72
DRAWN BY: JL
APPROVED: LAM



*SELECTED VALUE

SOUND TECHNOLOGY
CUPERTINO, CALIFORNIA 95014 (408) 257-9171

CIRCUIT DIAGRAM
MODEL 1100A SIGNAL CONDITIONER

DATE: 9-72	DRAWN BY: JL	APPROVED: LAM