

Langevin



**INSTALLATION AND
SERVICE MANUAL**

**TYPE 128X SERIES
AUDIO
20 Watt AMPLIFIERS**

LANGEVIN, DIVISION OF SONOTEC, INC.

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SERVICE-AND INSTALLATION MANUAL FOR LANGEVIN TYPE 128X SERIES AMPLIFIERS

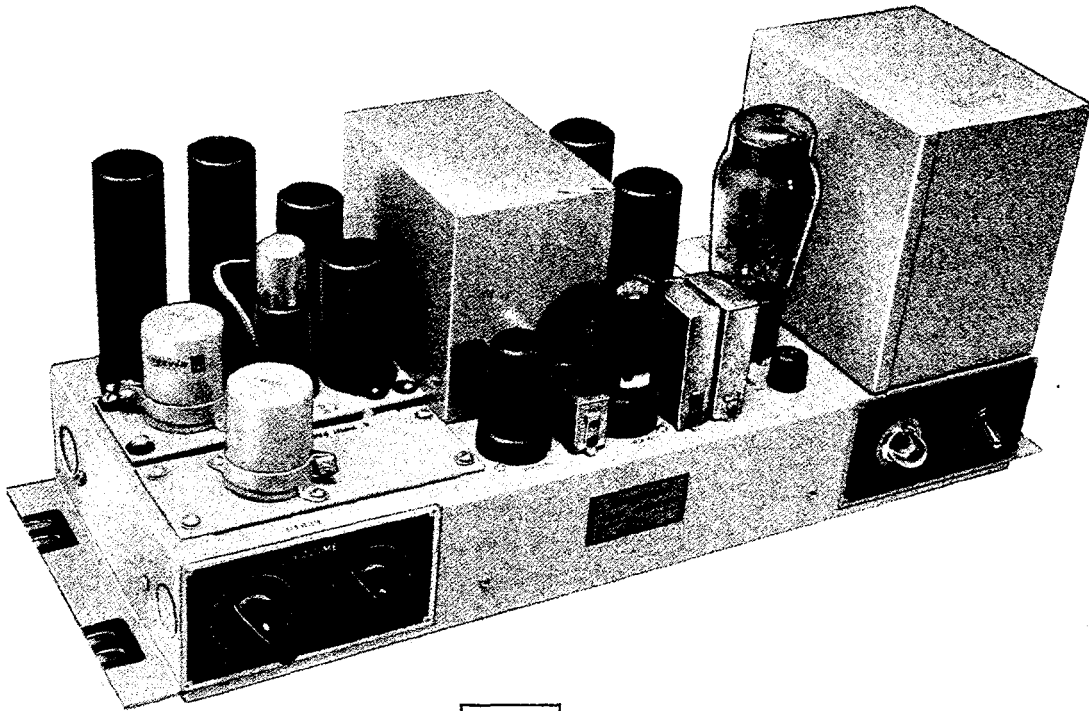


Fig. 1

GENERAL

The Langevin Type 128X series amplifiers are 20-watt units designed for operation in high-quality sound systems. Design features make these amplifiers adaptable to the varied requirements of sound installations. These features include interchangeable input panels for line matching or bridging, for low-impedance microphone or phono pickup inputs of 30 or 250 ohms impedance, for high-impedance inputs, such as high-impedance microphones, phono pick-ups, and radio tuners, and for broadcast-type monitor use.

These input panels, while interchangeable, must be mounted on the basic amplifier and wired into the circuit. The low output noise level and low internal output impedance permits the use of the 128X amplifier as a power unit to drive a low impedance buss across which a number of power amplifiers can be bridged in large sound installations. The Type 128X series amplifier can be either rack or cabinet mounted.

BASIC 128X AMPLIFIER

GENERAL CHARACTERISTICS

The electrical characteristics of the 128X amplifier are dependent upon and vary with the particular type of input panel in use. These electrical characteristics are given in detail in the following service data for the individual input panels.

The basic 128X amplifier is a three stage amplifier consisting of a 6SJ7 voltage amplifier, a 6V6 phase inverter and driver, and push-pull 6L6 tubes in the final power amplifier stage. Quiet, low-distortion performance over a wide frequency range at rated power output (20 Watts) highlights the electrical characteristics which make these amplifiers desirable where fine sound reinforcement or reproduction is required.

All transformers are especially made for these units in our own transformer shops, to insure full control over the manufacturing process, including winding, impregnating, potting and testing. Potted coils assure longer life and uniform characteristics despite variations in temperature and humidity.

Electrically, this amplifier has low noise level (78 db below full output) and excellent transient response. Each amplifier is tested for distortion at rated output over the entire frequency range from 50 to 15,000 cycles, assuring full performance at the frequency extremes as well as over the middle range.

Since gain-per-stage measurements will vary with the particular conditions existing at the time of measurements, such as type of equipment used and variations in line voltage, the values given are to be considered as average values and may vary by an appreciable amount. These figures will be valuable as references in making the service checks on the amplifiers.

Good regulation of output is provided in the Langevin 128X series by the very low internal output impedance. The change in output level from a condition of no load to a condition of full load is only 1 db. In addition, a new circuit, incorporating direct coupling between the voltage amplifier and phase splitter stages, minimizes circuit components and provides maximum gain and reliability.

The power supply uses a 5U4G rectifier tube and is filtered so that less than 0.1% ripple is present in the output of the B supply. The power transformer is tapped with different input terminals for the 105-115 V range, and the 115-125 V range, thus assuring a constant value of B voltage over this wide range of input voltage.

The output transformer is tapped so that loads from 1 ohm up to 1200 ohms may be matched for maximum output power.

Chassis layout has been arranged to reduce interconnecting wiring to a minimum, thus providing maximum accessibility to all parts and connections. The chassis is constructed of 16 gauge, bonderized steel, finished inside and out with baked-on grey enamel. Components have been selected with high safety and overload factors, thereby providing economical operation by reducing service calls. The 128X amplifier can be mounted on a standard 19 inch equipment rack or it can be housed in a wall - or shelf - mounting cabinet.

128X SERIES AMPLIFIER ELECTRICAL CHARACTERISTICS

UNIT DESIGNATION	SOURCE IMPEDANCE	MAXIMUM OVER-ALL GAIN	FREQUENCY RESPONSE 30-15000 cps	OUTPUT NOISE BELOW FULL OUTPUT LEVEL	INPUT SIGNAL LEVEL	HARMONIC DISTORTION 50-10000 cps	GENERAL INFORMATION
128X-A	600 ohms 600 ohms bridging	63db matching 600 ohms 45db bridging 600 ohms	± 1.0 db	78 db	-20 dbm (600 ohm input)	20 watts less than 2% 15 watts less than 1%	Provides for line level input
128X-B	30 or 250 ohms	103 db	± 1.0 db	55 db	-60 dbm	Same as 128X-A	Provides for low impedance inputs. Volume controlled remotely to a distance of 5000 ft.
128X-E	1 meg ohm	116 db	± 1.5 db (from 100,000 ohm source impedance)	60 db	13 MV at 400 cps	Same as 128X-A	Provides for high impedance inputs, crystal microphones or other high impedance low level signal source
128X-H	6800 ohms input from variable reluctance type phono pick-up	103 db	See Fig. A	55 db	5.8 MV at 400 cps	Same as 128X-A	Provides for General Electric variable reluctance phono pick-up or Pickering cartridge pick-up
128X-J	1 meg ohm (max.)	76 db	± 1.5 db	60 db	16 volts	Same as 128X-A	Provides for high impedance input for radio tuners and equivalent input devices
128X-R	"T" pad matched to 30, 150, 250 or 600 ohms	62 db	± 1.0 db	73 db	-20 dbm	Same as 128X-A	Monitor Amplifier
128X-Q	30, 150, 250 or 600 ohms	62 db	± 1.0 db	75 db	-20 dbm	Same as 128X-A	Monitor or Booster Amplifier for recording or sound systems

128X BASIC AMPLIFIER

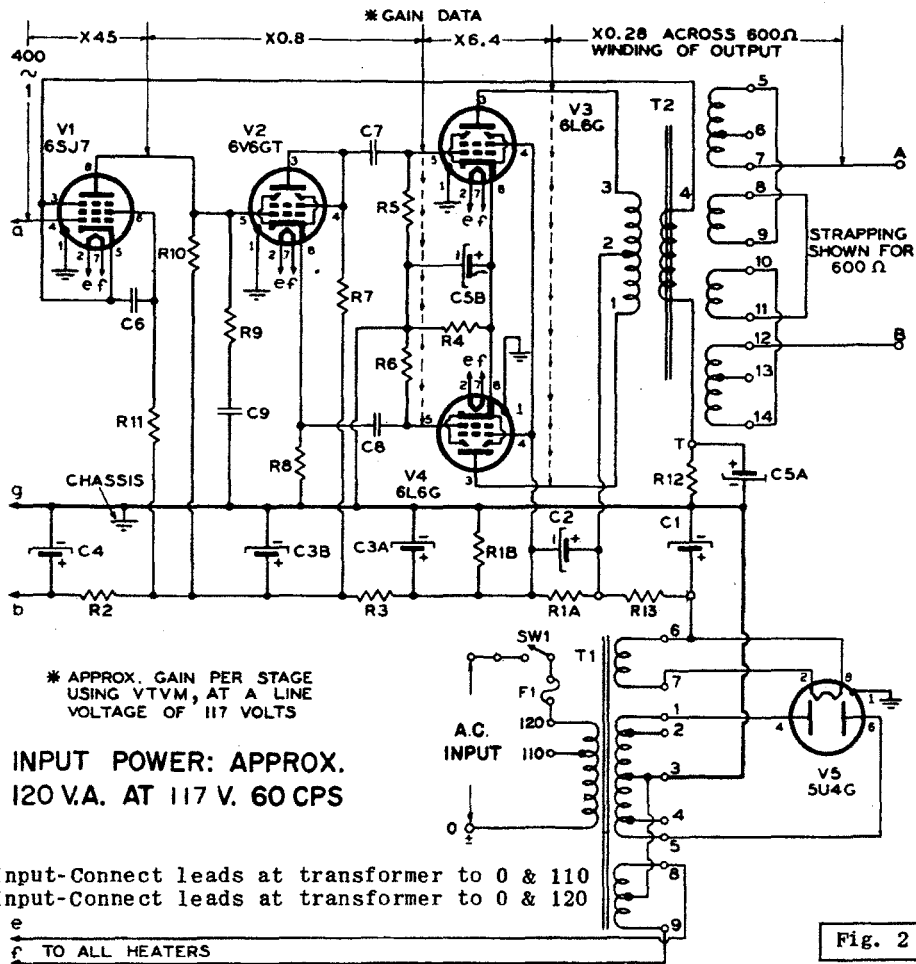


Fig. 2

VOLTAGE AND RESISTANCE OF BASIC 128 AMPLIFIER

TUBE	PIN	VTVM	RESISTANCE
6SJ7 (V1)	1	Gnd	0
	2	3.15 AC	0.09 Ohms
	3	+1.2	1K
	4	0	Open
	5	+1.2	1K
	6	+45	1.2 meg
	7	3.15 AC	0.09 Ohms
	8	+72	300 K
6V6 (V2)	1	Gnd	0
	2	3.15 AC	0.09 Ohms
	3	+225	24K
	4	+225	24K
	5	+72	300K
	6	NC	---
6L6 (V3)	1	Gnd	0
	2	3.15 AC	0.09 Ohms
	3	+420	15K
	4	+320	13K
	5	0	100 K
	6	NC	---
	7	3.15 AC	0.09 Ohms
	8	+26	260 Ohms

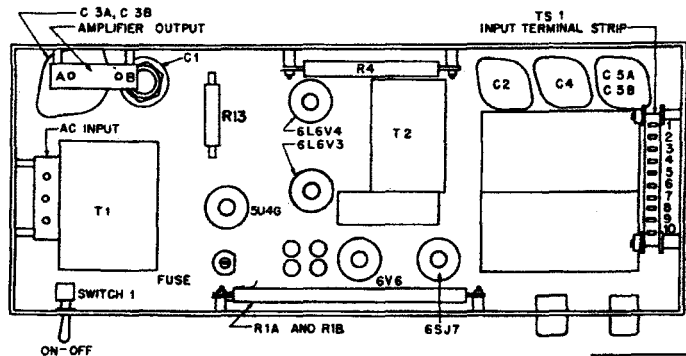


Fig. 3

6L6 (V4)	1	Gnd	0	5U4G (V5)	1	NC	---
	2	3.15 AC	0.09 Ohms		2	+440	15K
	3	+420	15K		3	NC	---
	4	+320	13K		4	380AC RMS	120 Ohms
	5	0	100K		5	NC	---
	6	NC	---		6	380AC RMS	120 Ohms
	7	3.15 AC	0.09 Ohms		7	NC	---
	8	+26	260 Ohms		8	+440	15K

ALL VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO CHASSIS GROUND, WITH A LINE VOLTAGE OF 117 V. A. C. 600 OHMS LOAD ACROSS OUTPUT.

INPUT PANELS FOR LANGEVIN AMPLIFIER TYPE 128X SERIES

In the design of the 128X series of amplifiers, provisions have been made for two input channels. These channels are furnished as separate input panels which are interchangeable on the amplifier. Six different types of input panels are available, any two of which may be used at one time. The type numbering of the 128X series varies with the input panels connected to the basic amplifier unit. For example, the basic unit with a line level input panel type A, would be a 128X-A amplifier; with a line level input panel Type A, and a high-impedance pre-amplifier panel Type E, it would be a 128X-AE. A basic amplifier with two low impedance pre-amplifier inputs Type B would be a 128X-BB, etc. The input panels and their designations follow.

DESIGNATION	DESCRIPTION
TYPE A	Line level input panel with transformer connections for matching 600 ohms, or bridging 600 ohms (equipped with volume control).

TYPE B	Pre-amplifier input panel for source impedances of 30/250 ohms (equipped with volume control).
TYPE E	Pre-amplifier input panel for high impedance inputs (equipped with volume control).
TYPE H	Preamplifier, equalizer input panel for variable reluctance type pickup (equipped with volume control).
TYPE J	Input panel for high impedance inputs such as radio tuners or their equivalent (equipped with volume control).
TYPE R	Input panel for monitor (broadcast use) for source impedance of 30/150/250/600 ohms.
TYPE Q	Input panel for monitor or booster use for source impedance of 30/150/250/600 ohms.

INSTALLATION INSTRUCTIONS FOR THE 128X BASIC AMPLIFIER

ELECTRICAL CONNECTIONS

Before the 128X amplifier can be placed in operation, the following electrical connections must be made in order to apply a-c power for operating voltages, and to provide an output load for the audio signals.

1. Connect an a-c power cord to the two terminals on the a-c input terminal strip shown in Figure 3.
2. Connect the required output load (loud-speaker's or other) to the terminals on the amplifier output terminal strip (Fig. 3).

The manner in which the input signal devices are connected is described in the text on the individual input panels.

OUTPUT IMPEDANCE STRAPPING

Connect the output leads to the terminals marked A and B on the output terminal strip (Fig. 3). Bring the leads into the amplifier by punching out the knockout on the rear-right side of the chassis.

The amplifier is shipped with output impedance strapping for 600 ohms as shown in the basic schematic diagram, Fig. 2. Strapping for other output impedance values is shown in the following chart.

NOMINAL LOAD IMPEDANCE	LOAD IMPEDANCE WORKING RANGE	TRANSFORMER STRAPPING
600	300 to 1200	5-9, 8-11, 10-14
150	70 to 300	5-9, 7-11, 8-12, 10-14
32	20 to 70	6-9, 8-11, 10-13
16	10 to 20	6-9-11, 8-10-13
8	3 to 10	6-8-11-13, 7-9, 10-12
2	1 to 3	6-8-10-12, 7-9-11-13

INSTALLATION & MOUNTING DATA

A Langevin Type 1201 cabinet is available for this amplifier. The cabinet can be placed on a table or a shelf or, if it is desired, mounted on wall or other flat surface. For wall mounting, two right angle mounting brackets are supplied with the cabinet. These brackets are fastened to the cabinet, as shown in Fig. 4, before installing the amplifier chassis.

The brackets contain two sets of mounting holes along the side that fastens to the cabinet. This allows the cabinet to be mounted spaced from the wall, or flush against the wall, as desired.

To install the amplifier chassis in the cabinet, proceed as follows:

Slide the amplifier chassis into the cabinet with the end flanges of the chassis between the 2 end rails on each side of the cabinet interior. Bolt the chassis into place, using the 2 holes provided in the end rails.

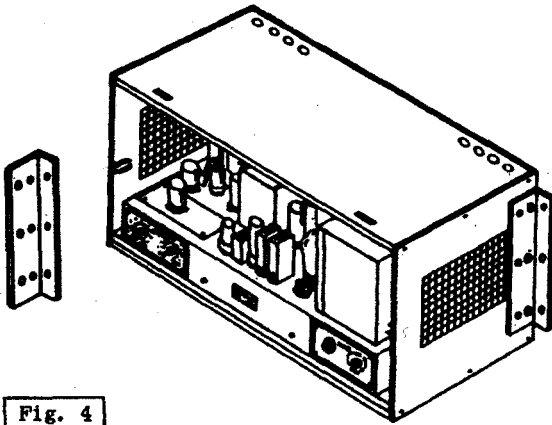


Fig. 4

Fasten the cabinet cover into place by means of the 2 knurled panel screws, or by the spring mounting clips, whichever are used.

RACK MOUNTING

When the amplifier is to be rack mounted, Modification Group Type 21 is required. This modification kit includes brackets to remount the power switch, pilot light, and volume controls; and a mat panel.

Remove the volume controls, power switch, and the pilot light from the chassis and fasten them in the corresponding holes on the two mounting brackets. Note that these components are mounted directly on the brackets and are not fastened to the mat panel.

To effect the modification, mount the narrow bracket with the 2 small holes over the resistor strip as shown in the diagram (Fig. 5) and bolt it into place by means of the two existing bolts in the bottom of the chassis. Remove the power escutcheon plate from the chassis exposing two small mounting holes. Mount the remaining bracket as shown in Fig. 5 by means of these small mounting holes. Place the amplifier chassis in the rack and bolt it into place using the extreme top and bottom slots on the end flanges. Place the mat panel over the chassis and bolt it to the rack through the two center slots on the flange. Mount the two escutcheon plates with the volume control to the left facing the rack and the pilot light and on-off switch to the right as shown in Fig. 5.

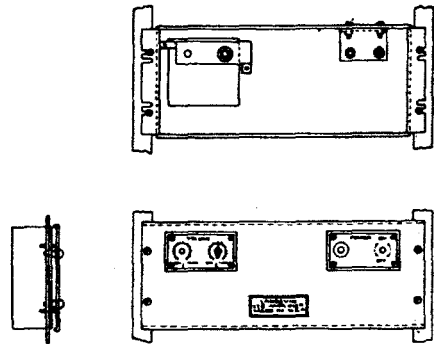


Fig. 5

INSTALLATION OF INPUT PANELS

INPUT PANEL TYPE A

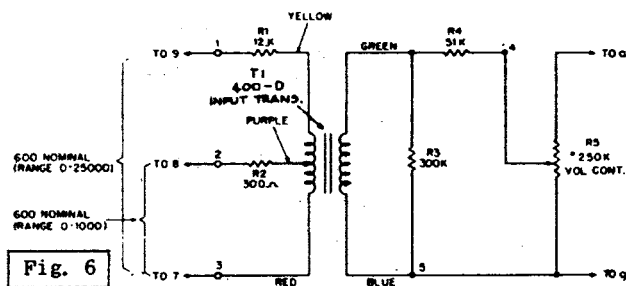


Fig. 6

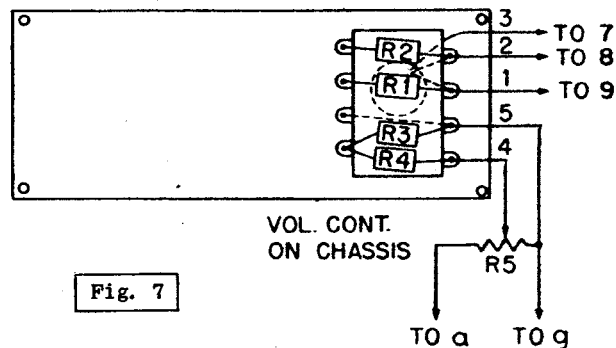


Fig. 7

INSTALLATION

Mount the input panel in the space provided at the left hand side of the amplifier chassis when facing the front of the amplifier as shown in Fig. 1. Select any 3 terminals not in use on the basic amplifier terminal strip. (7, 8 and 9 are used here for demonstration.) Connect the indicated points on the A input panel resistor strip (Fig. 7) to terminals 8 and 9 on the input terminal strip of the basic amplifier. The unattached lead No. 3 from the input transformer connects to terminal 7 on the basic amplifier terminal strip. Mount the volume control in the space provided on the left front side of the amplifier chassis, and connect it to the input panel resistor strip and to points "a" and "g" on the basic amplifier as indicated in Figures 2, 6 and 7.

Mount the volume control in the space provided on the left front side of the amplifier chassis, and connect it to the input panel resistor strip and to points "a" and "g" on the basic amplifier as indicated in Figures 2, 6 and 7.

INPUT PANEL TYPE B

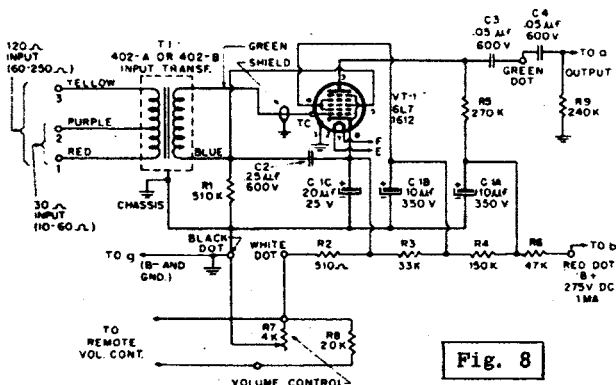


Fig. 8

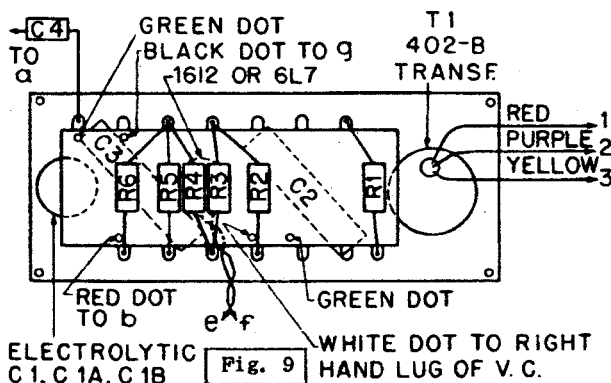


Fig. 9

INSTALLATION

Connect the filament leads of the B panel to the filament lugs "g" and "f". Connect the red-dot terminal on the resistor strip to point "b" shown on the schematic for the basic amplifier; Fig. 2. Connect one side of the 0.05 mfd capacitor (supplied) to the green-dot terminal on the resistor strip and the other side of this capacitor to point "a" on the basic amplifier schematic. Connect resistor R9 from point "a" to ground of basic amplifier. When unbalanced input is used, ground terminal 1 of the input transformer.

Terminal 10 on the input terminal strip should be grounded at all times. Connect terminal 10 to the black-dot terminal on the B resistor strip and also to the center terminal on the volume control. Connect the 20 K ohm resistor, R8, across the outside terminals of the volume control.

Select any four adjacent terminals not in use on the basic amplifier input terminal strip (for demonstration purposes we shall select terminals 1, 2, 3 and 4). Connect terminals 1, 2 and 3 of the input transformer (Fig. 8) to terminals 1, 2, 3 respectively, of the input terminal strip. Connect terminal 4 of the input terminal strip to the white dot terminal on the B resistor strip, and to the right-hand lug on the volume control (as viewed from the bottom with lugs upright).

VOLTAGE AND RESISTANCE OF B INPUT PANEL

TUBE	PIN	VTVM	RESISTANCE
1612	1	GND	0
or	2	3.15 vac	0.09Ω
6L7	3	+215 v.	350K
	4	+60 v.	50K
	5	0	520K
	6	NC	-
	7	3.15 vac	0.09Ω
	8	+25 v.*	20K *
	Grid Cap	0	520K

*Varies with V.C. Setting

INPUT PANEL TYPE E

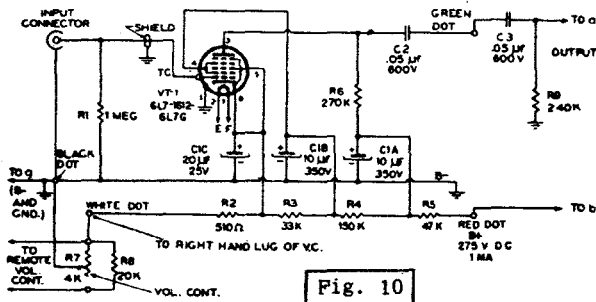


Fig. 10

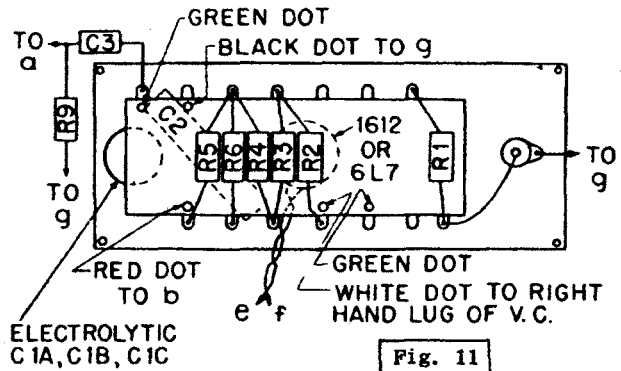


Fig. 11

INSTALLATION

Select two terminals on the input terminal strip (for demonstration, assume terminals 4 and 6). Connect the black-dot terminal on the E resistor strip to input terminal 6, then connect terminal 6 to terminal 10 (ground). Connect the white-dot terminal on the E resistor strip to input terminal 4, and connect 4 to the right-hand lug on the volume control (viewed from bottom with lugs upright). Connect the center lug of the volume control to ground. Connect the 20 K resistor across the outside terminals of the volume control. The filament leads are wired to "e" and "f" as in the case of the B panel, and the red-dot terminal on the E strip is connected to point "b" shown on the basic schematic. The 0.05 mfd coupling capacitor is connected from the green-dot terminal on the resistor strip to point "a" on the basic schematic.

Connect resistor R9 from point "a" to ground of the basic amplifier.

VOLTAGE AND RESISTANCE OF E INPUT PANEL

TUBE	PIN	VTVM	RESISTANCE
1612	1	GND	0
or	2	3.15 vac	0.09Ω
6L7	3	+220 v.	390K
	4	+76 v.	50K
	5	+44 v.	20K
	6	-	-
	7	3.15 vac	0.09Ω
	8	+44 v.*	20K *
	Grid Cap	0	1MΩ

*Varies with V. C. setting

INPUT PANEL TYPE H

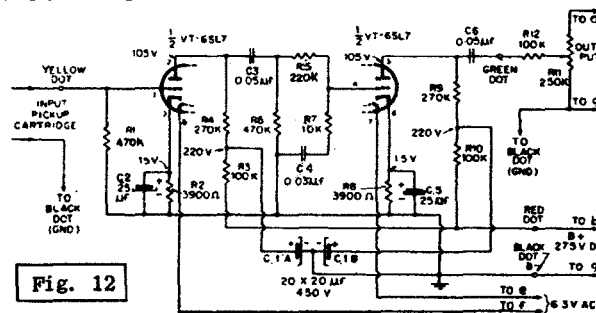


Fig. 12

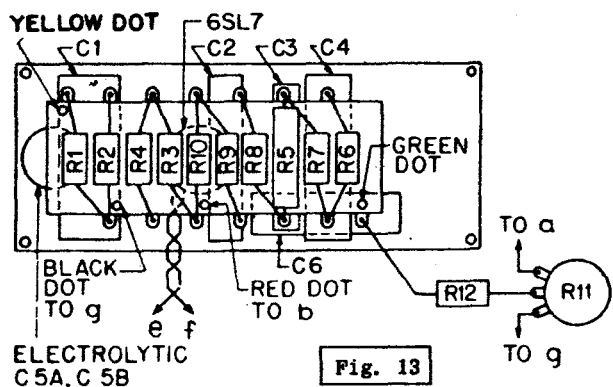


Fig. 13

INSTALLATION

Install the panel in the space provided on the basic amplifier. Connect the high side of the input lead directly to the yellow-dot terminal on the panel resistor strip. Connect the other input lead to ground as represented by the black-dot on the resistor strip and connect the black-dot terminal to point "g" on the basic amplifier. Connect the filament leads to points "e" and "f" on the basic amplifier. Connect the red-dot terminal to point "b" on the basic amplifier. Mount the 250K volume control, R11, in the proper place on the basic amplifier chassis and connect the two outside terminals to points "a" and "g" on the basic amplifier, as shown in Fig. 13. Connect the 100K resistor R12 from the green-dot terminal on the panel resistor strip to the movable arm of the volume control (Fig. 13).

VOLTAGE AND RESISTANCE OF H INPUT PANEL

TUBE	PIN	VTVM	RESISTANCE
6SL7	1	0	7K
	2	105V	420K
	3	1.5V	4K
	4	0	700K
	5	105V	420K
	6	1.5V	4K
	7	3.15 vac	0.09Ω
	8	3.15 vac	0.09Ω

INPUT PANEL TYPE J

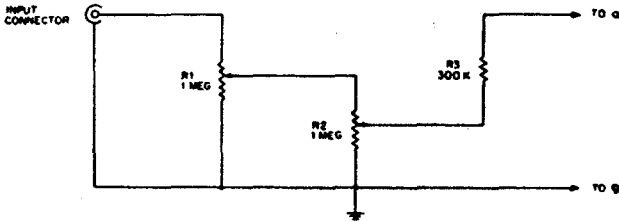


Fig. 14

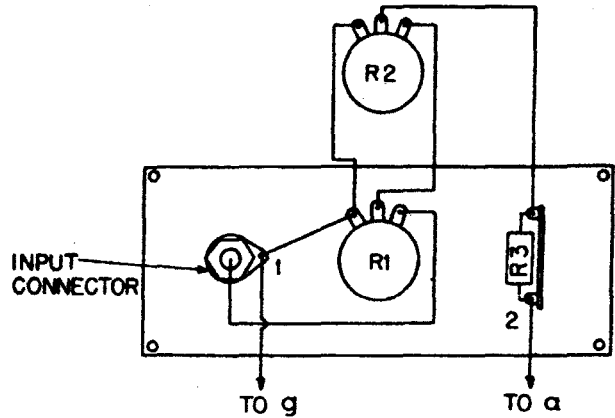


Fig. 15

INSTALLATION

Mount the panel in the space provided at the left hand side of the amplifier chassis when facing the front of the amplifier as shown in Fig. 1. Connect point 1 on the J panel to "g" and point 2

to "a" on the basic amplifier.

Mount volume control, R-2 on the front of the 128X amplifier in the space provided.

INPUT PANEL TYPE Q

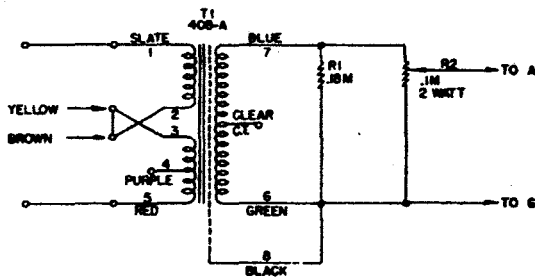


Fig. 16

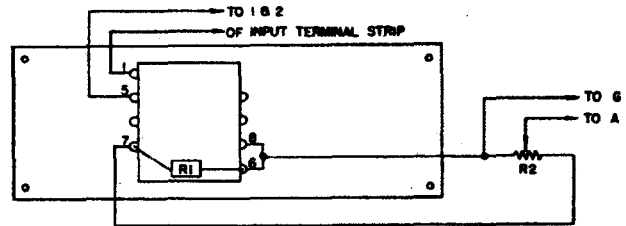


Fig. 17

INSTALLATION

Mount the panel in the appropriate blank space indicated in Figure 1. Select 2 terminals not in use on the basic amplifier terminal strip. (1 & 2 used here for demonstration). Connect 1 & 5 of panel to 1 & 2 of basic amplifier terminal strip. Match input impedance using table below. Connect output lead from arm of volume control to point "a" (grid) on the basic amplifier. Connect other output lead (6 on panel) to point "g" on basic amplifier.

INPUT IMPEDANCE	INPUT CONNECTIONS	STRAPPING
600 ohms	Slate(1) & Red(5)	Yellow(2) & Brown(3)
250 ohms	Slate(1) & Purple(4)	Yellow(2) & Brown(3)
150 ohms	Slate(1) & Red(5)	Slate(1) & Brown(3)
30 ohms	Purple(4) & Red(5)	Yellow(2) & Red(5)

INPUT PANEL TYPE R

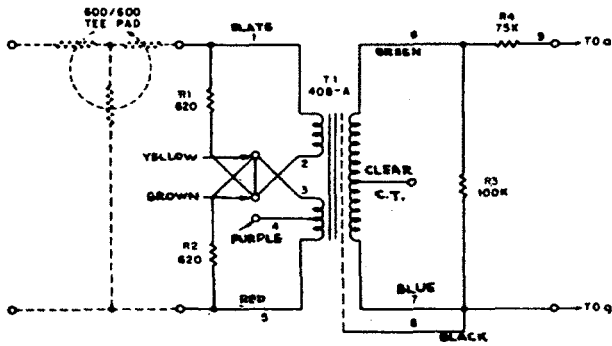


Fig. 18

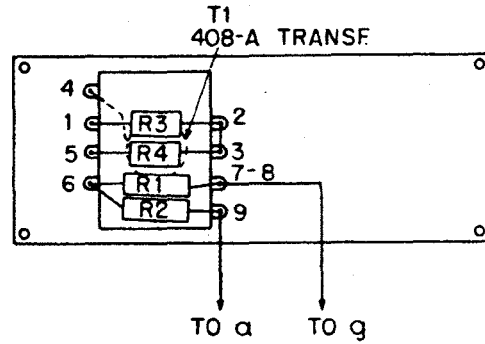


Fig. 19

INSTALLATION

Mount the panel in the space provided at the left hand side of the amplifier chassis when facing the front of the amplifier as shown in Fig. 1. Connect a properly matched "T" pad to the input transformer as shown in table. Connect the leads from the input device to the input of the "T" pad. Connect the output lead from point 7 on Fig. 18 to point "g" and the other output lead from point 9 on Fig. 18 to point "a" (grid) on the basic amplifier.

<u>INPUT IMPEDANCE</u>	<u>INPUT CONNECTIONS</u>	<u>STRAPPING</u>
600 ohms	Slate(1) & Red(5)	Yellow(2) & Brown(3)
250 ohms	Slate(1) & Purple(4)	Yellow(2) & Brown(3)
150 ohms	Slate(1) & Red(5)	Slate(1) & Brown(3)
30 ohms	Purple(4) & Red(5)	Yellow(2) & Red (5)

ELECTRICAL PARTS LISTS

PARTS LIST FOR 128X BASIC AMPLIFIER

REF SYMBOL	DESCRIPTION	MANUFACTURER	
C1	Cap, 16 mfd elec, 600dcwv	Aerovox	GL 600
C2	Cap, 50 mfd, elec, 450dcwv	Aerovox	AFH 1-53
C3A	Cap, elec, 2 sect 40 mfd 450dcwv,	Sprague	DFP
C3B	40 mfd, 450dcwv	Sprague	
C4	Cap, 50 mfd elec, 450dcwv	Aerovox	AFH 1-53
C5A	Cap, elec, 3-sect 80-80mfd 50dcwv		
C5B	80mfd 50dcwv	Sprague	DFP
C6	Cap, oil paper 0.25mfd 600dcwv	Tobe	OM-625
C7	Cap, oil paper 1mfd 600dcwv	Tobe	OM-601
C8	Cap, oil paper 1mfd 600dcwv	Tobe	OM-601
C9	Cap, mica 100mmf $\pm 10\%$ 600dcwv	Elwenco	EM-45
R1A	Res. ww. 2000 ohms $\pm 10\%$ 75 watt	Ward Leonard	
R1B	Res. ww. 13,000 ohms $\pm 10\%$ 75 watt	Ward Leonard	
R2	Res. carbon, 47,000 ohms $\pm 5\%$ 1 watt	Allen Bradley	GB-4735
R3	Res. carbon, 1600 ohms $\pm 5\%$ 1 watt	Allen Bradley	GB-1625
R4	Res. 260 ohms $\pm 10\%$ 17.5 w	IRC	MW5
R5	Res. carbon, 100,000 ohms $\pm 5\%$ 1 watt	Allen Bradley	GB-1045
R6	$\pm 5\%$ 1 watt		
R7	Res. carbon, 10,000 ohms $\pm 5\%$ 2 watt	Allen Bradley	HB-1036
R8	$\pm 5\%$ 2 watt		
R9	Res. carbon, 20,000 ohms $\pm 5\%$ 1 watt	Allen Bradley	GB-2035
R10	Res. carbon, 270,000 ohms $\pm 5\%$ 1 watt	Allen Bradley	GB-2745
R11	Res. carbon, 1 M ohms $\pm 5\%$ 1 watt	Allen Bradley	GB-1055
R12	Res. carbon, 1000 ohms $\pm 5\%$ 1 watt	Allen Bradley	GB-1025
R13	Res. ww. 150 ohms $\pm 10\%$ 25w	Ohmite	0200G
T1	Transformer, Power	Langevin	101-E
T2	Transformer, Output	Langevin	317-A
F1	Fuseholder	Bussman	HKP
Sw1	Switch, toggle, bat handled	Arrow-Hart & Hegeman	
V1	Tube type 6SJ7		
V2	Tube type 6V6GT		
V3	Tube type 6L6GA		
V4	Tube type 6L6GA		
V5	Tube type 5U4G		
X1	Socket, octal, bakelite-mica filled		
X2	Socket, octal, bakelite- mica filled		
X3	Socket, octal, bakelite- mica filled		
X4	Socket, octal, bakelite- mica filled		
X5	Socket, octal, bakelite- mica filled		

PARTS LIST FOR INPUT PANEL TYPE A

REF SYMBOL	DESCRIPTION	MANUFACTURER	
R1-1A	Res. carbon, 12,000Ω ±5% 1/2 watt	Allen-Bradley	EB
R2-1A	Res. carbon, 300Ω ±5% 1/2 watt	Allen-Bradley	EB
R3-1A	Res. carbon, 300,000Ω ±5% 1/2 watt	Allen-Bradley	EB
R4-1A	Res. carbon, 51,000Ω ±5% 1/2 watt	Allen Bradley	EB
R5-1A	Res. variable, 250KΩ	Allen Bradley Type J	VC-11
T1-1A	Transf, input	Langevin	400-D

PARTS LIST FOR INPUT PANEL TYPE B

REF SYMBOL	DESCRIPTION	MANUFACTURER	
C1A-1B	Cap, elect, 3-sect 10μf 350dcwv		
C1B-1B	10μf 350dcwv		
C1C-1B	20μf 250dcwv	Sprague	DFF
C2-1B	Cap, paper 0.25μf 600dcwv	Goodall	M503
C3-1B	Cap, paper 0.05μf 600dcwv	Goodall	M503
C4-1B	Cap, paper 0.05μf 600dcwv	Goodall	M503
R1-1B	Res. carbon, 470,000Ω ±10% 1/2 watt	Allen Bradley	EB
R2-1B	Res. carbon, 510Ω ±5% 1/2 watt	Allen Bradley	EB
R3-1B	Res. carbon, 33,000Ω ±10% 1/2 watt	Allen Bradley	EB
R4-1B	Res. carbon, 150,000Ω ±10% 1/2watt	Allen Bradley	EB
R5-1B	Res. carbon, 270,000Ω ±10% 1/2 watt	Allen Bradley	EB
R6-1B	Res. carbon, 47,000Ω ±10% 1/2 watt	Allen Bradley	EB
R7-1B	Res. variable 4000Ω linear, open in ccw position	Allen Bradley	VC-3
R8-1B	Res. carbon, 22,000Ω ±10% 1 watt	Allen Bradley	GB
R9-1B	Res. carbon, 240,000Ω ±5% 1 watt	Allen Bradley	GB
T1-1B	Transformer, input	Langevin	402-B
V1-1B	Tube type 1612 or 6L7		
X1-1B	Socket, octal bakelite		

PARTS LIST FOR INPUT PANEL TYPE E

REF SYMBOL	DESCRIPTION	MANUFACTURER	
C1A-1E	Cap, elect, 3-sect 10 μ f 350dcwv		
C1B-1E	10 μ f 350dcwv		
C1C-1E	20 μ f 25dcwv	Sprague	DFP
C2-1E	Cap, paper		
C3-1E	0.05 μ f 600dcwv	Goodall	M503
R1-1E	Res, carbon 1M Ω \pm 10% 1 watt	Allen Bradley	GB-1050
R2-1E	Res, carbon, 510 Ω \pm 5% 1/2 watt	Allen Bradley	EB
R3-1E	Res, carbon, 33,000 Ω \pm 10% 1/2 watt	Allen Bradley	EB
R4-1E	Res, carbon, 150,000 Ω \pm 10% 1/2 watt	Allen Bradley	EB
R5-1E	Res, carbon, 270,000 Ω \pm 10% 1/2 watt	Allen Bradley	EB
R6-1E	Res, carbon, 47,000 Ω \pm 10% 1/2 watt	Allen Bradley	EB
R7-1E	Res, variable, 4000 Ω linear, open in ccw position.	Allen Bradley Allen Bradley	VC-3
R8-1E	Res, carbon, 22,000 Ω \pm 10% 1 watt	Allen Bradley	GB-
R9-1E	Res, carbon, 240,000 Ω \pm 5% 1 watt	Allen Bradley	GB
J1-1E	Connector, input	Amphenol	75-CL-PC1M
V1-1E	Tube type 1612 or 6L7		
X1-1E	Socket, octal bakelite		

PARTS LIST FOR INPUT PANEL TYPE H

REF SYMBOL	DESCRIPTION	MANUFACTURER	
C2-1H	Cap, elect, 25 μ f 25dcwv	Sprague	TA-25
C3&C6-1H	Cap, paper 0.05 μ f 600dcwv	Goodall	M-503
C4-1H	Cap, paper 0.03 μ f 400dcwv	Goodall	M-503
C5-1H	Cap, elect 25 μ f 25dcwv	Sprague	TA-25
C1A-1H	Cap, elect, 2-sect		
C1B-1H	20 μ f 450dcwv	Sprague	DFP
R1-1H	Res, carbon, 470K \pm 10% 1/2 watt	Allen Bradley	EB
R2-1H	Res, carbon, 3,900 Ω \pm 10% 1/2 watt	Allen Bradley	EB
R3-1H	Res, carbon, 100,000 Ω \pm 10% 1/2 watt	Allen Bradley	EB
R4-1H	Res, carbon, 270,000 Ω \pm 10% 1/2 watt	Allen Bradley	EB
R5-1H	Res, carbon, 220,000 Ω \pm 10% 1/2 watt	Allen Bradley	EB
R6-1H	Res, carbon, 470,000 Ω \pm 10% 1/2 watt,	Allen Bradley	EB
R7-1H	Res, carbon, 10,000 Ω \pm 10% 1/2 watt	Allen Bradley	EB
R8-1H	Res, carbon, 3,900 Ω \pm 10% 1/2 watt	Allen Bradley	EB
R9-1H	Res, carbon, 270,000 Ω \pm 10% 1/2 watt	Allen Bradley	EB
R10-1H	Res, carbon, 100,000 Ω \pm 10% 1/2 watt	Allen Bradley	EB
R11-1H	Res, var, 250,000 Ω	Allen Bradley	VC-11
R12-1H	Res, carbon, 100,000 Ω \pm 10% 1/2 watt	Allen Bradley Type J	
V1-1H	Tube type 6SL7		
X1-1H	Socket, octal Bakelite		

PARTS LIST FOR INPUT PANEL TYPE J

REF SYMBOL	DESCRIPTION	MANUFACTURER	
R1-1J	Res, variable, 1M Ω	Allen Bradley Type	JA-1052-P3048
R2-1J	Res, variable, 1M Ω	Allen Bradley Type	JA-1052-P3048
R3-1J	Res, carbon, 300,000 Ω ±5% 1/2 watt	Allen Bradley	EB
J1-1J	Connector, input	Amphenol	75-CL-PC1M

PARTS LIST FOR INPUT PANEL TYPE Q

REF SYMBOL	DESCRIPTION	MANUFACTURER	
R1-1Q	Res, carbon 180,000 ohms ±10% 1/2 watt	Allen Bradley	EB
R2-1Q	Res, variable 100,000 ohms 2 watts, audio taper	Allen Bradley	JA-1041-P3048
T1-1Q	Input transformer	Langevin	408-A

PARTS LIST FOR INPUT PANEL TYPE R

REF SYMBOL	DESCRIPTION	MANUFACTURER	
R1-1M	Res, carbon, 620 Ω		
R2-1M	±5% 1/2 watt	Allen Bradley	EB
R3-1M	Res, carbon, 100,000 Ω ±5% 1/2 watt	Allen Bradley	EB
R4-1M	Res, carbon, 75,000 Ω ±5% 1/2 watt	Allen Bradley	EB
T1-1M	Transformer, input	Langevin	408-A

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