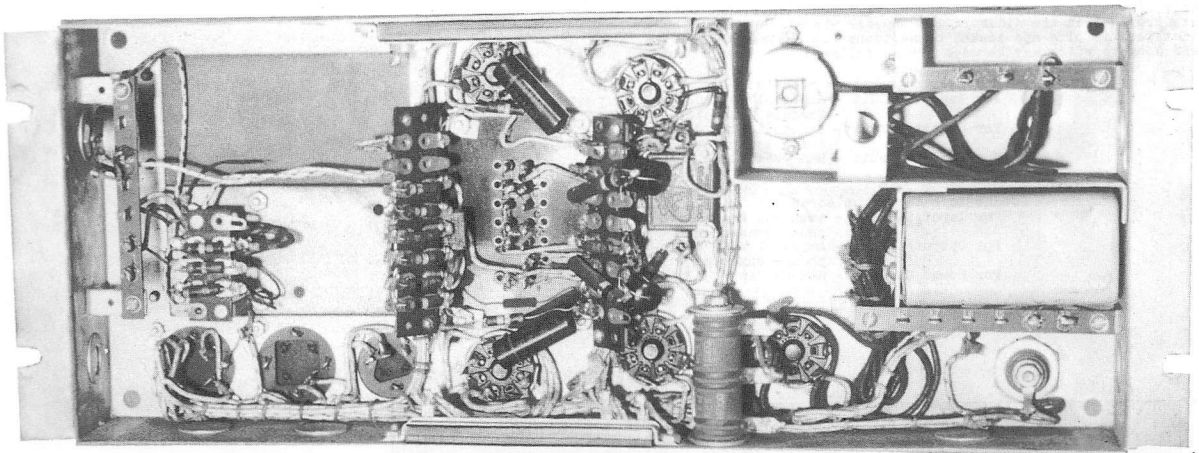
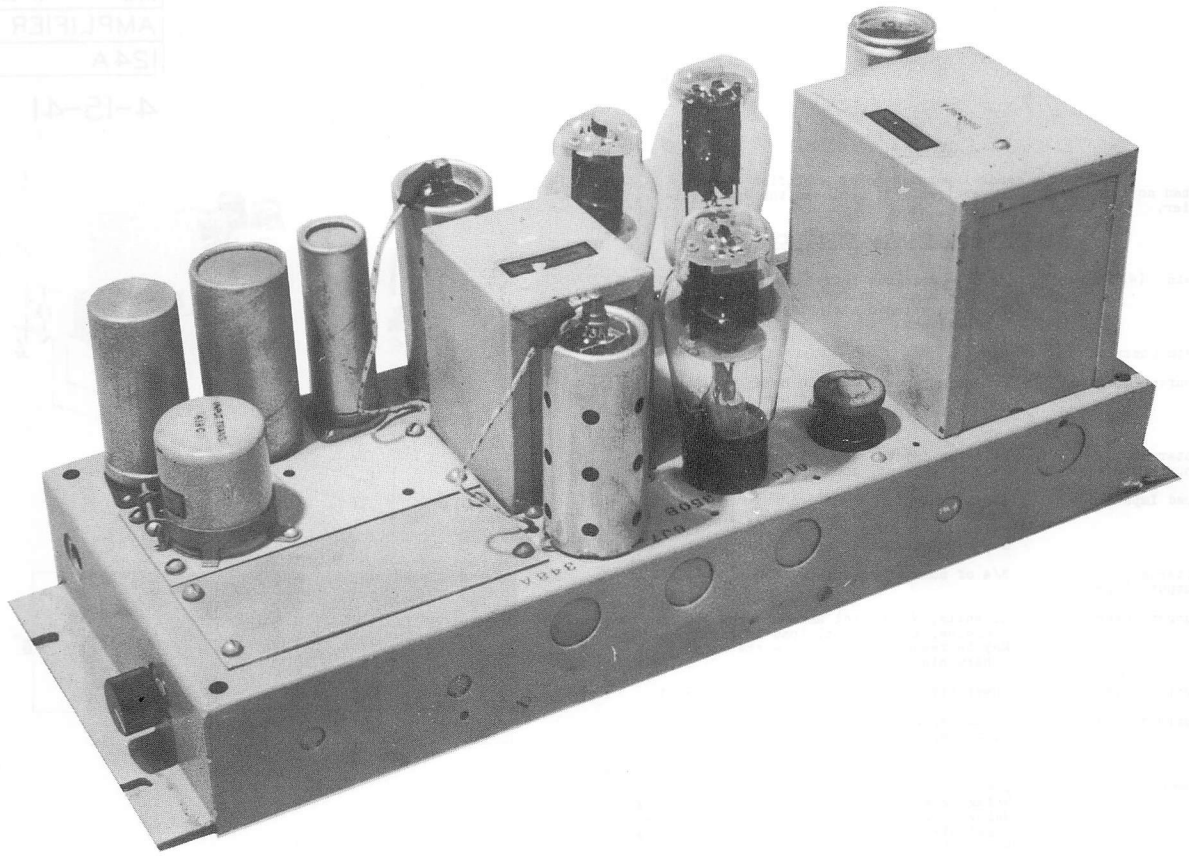


NO 1-58
AMPLIFIER
A24

4-12-41



NO	1-26
AMPLIFIER	
124A	

4-15-41

GENERAL

This is a general purpose power amplifier for use when no gain control is required. It replaces the 94C Amplifier.

ELECTRICAL CHARACTERISTICS

Gain (W.E.Tubes)*	50 db - Bridging Input - Terminals 1 & 3 63 db - High Gain Input - Terminals 1 & 2 Measured between nominal source and load impedances
Gain Control	None
Source Impedance	Bridging Input, 0-25,000 ohms 600 ohms nominal High Gain Input, 0-1000 ohms 600 ohms nominal
Internal Input Impedance	Bridging Input, 40,000 ohms High Gain Input, 1000 ohms
Load Impedance	1-1200 ohms Nominal load impedances - 600, 150, 30, 16, 7.5 or 1.75 ohms See strapping data on schematic
Internal Output Impedance	3/4 of nominal load impedance
Output Power	12 watts, 2.0% total harmonics at 400 cycles, into nominal load impedance May be reconnected for 20 watts with 5% harmonic content
Output Noise	Unweighted, -37 db relative to .001 watt
Maximum Input	0.75V. single frequency, Bridging Input 0.1V. single frequency, High Gain Input
Power Supply	105-125 volts, 50-60 cycles Using 12 watt output, 1.1 amperes, 105 watts Using 20 watt output, 1.25 ampere, 125 watts Fused with 1.25 amp. Buss Fustat on chassis No power switch furnished

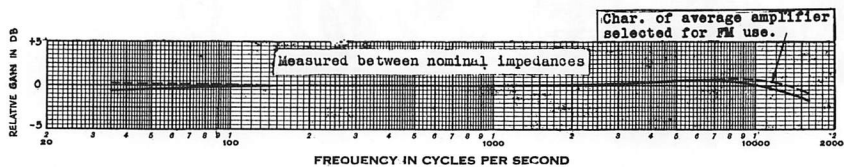
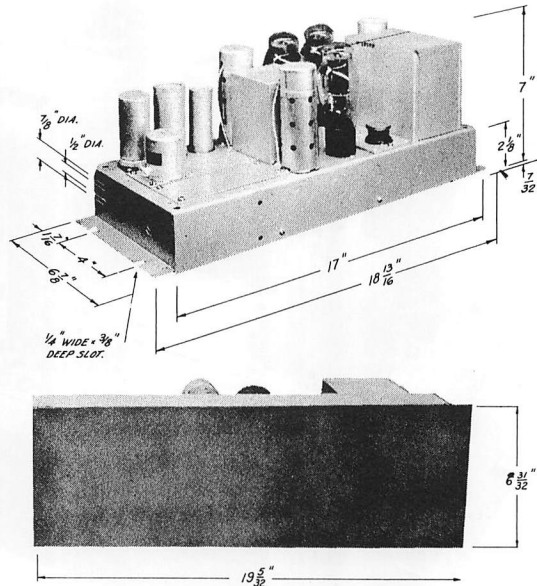
* Gain 0.75 db less with RCA tubes

EQUIPMENT CHARACTERISTICS

Dimensions	See photograph.
Weight	20 pounds, approx.
Vacuum Tubes	W.E. or R.C.A. 2-348A or 2-6J7 or 6J7G 2-350B or 2-6L6 or 6L6G 1-274B or 1-5T4 or 5U4G
Finish	Chassis, Aluminum Lacquer Mat, Black enamel - Code 124A-3 Aluminum Gray - Code 124A-15

Connections - All external connections are normally made to terminals under the chassis, and knockouts are provided in the ends of the chassis to admit the wires. Additional knockouts are provided in the sides of the chassis where sockets may be installed if plug and socket connections are desired. Plugs and sockets which may be used are as follows:

- Connectors to mount on chassis:
- For Input Circuit - Amphenol PC4F Compact Chassis Connector
 - For Output Circuit - Amphenol PC3F Compact Chassis Connector
 - For Power Circuit - H&H #754 Flush Receptacle
- Connectors to use on cords:
- For Input Circuit - Amphenol MC4M Microphone Connector
 - For Output Circuit - Amphenol MC3M Microphone Connector
 - For Power Circuit - H&H MB Cap



NO 1-27
AMPLIFIER
124 B

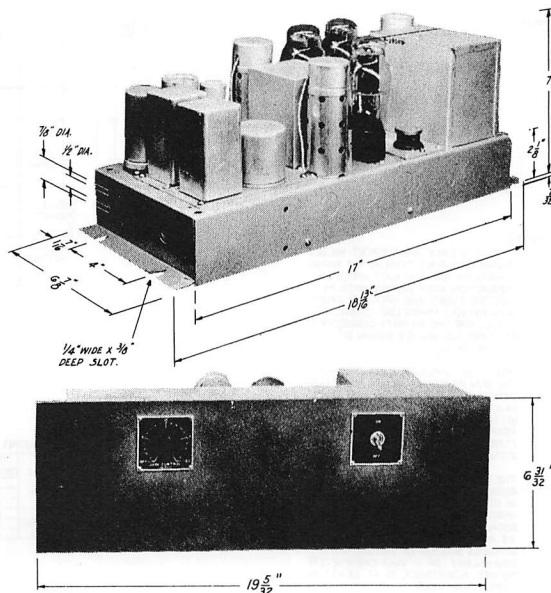
4-15-41

GENERAL

This is power amplifier similar to the 94-type, intended for general use in the telephone plant.

ELECTRICAL CHARACTERISTICS

Gain(W.E.Tubes*)	These depend on the input strapping used. See other side of this sheet
Source Impedance	
Internal Input Impedance	
Gain Control	38 db in 2 db steps
Load Impedance	1-1200 ohms Nominal load impedances - 600, 150, 30, 16, 7.5 or 1.75 ohms, terminals 13 and 14 See strapping data on schematic
Internal Output Impedance	3/4 of nominal load impedance With strapping for 600 ohm load impedance, the use of terminals 16 and 17 gives an internal output impedance of 600 ohms.
Output Power	12 watts, 2.0% total harmonics at 400 cycles into nominal load impedance May be reconnected for 20 watts with 5% harmonic content
Output Noise	Unweighted, -37 db relative to .001 watt
Maximum Input	Depends on input strapping used. See other side of this sheet.
Power Supply	105-125 volts, 50-60 cycles. Using 12 watt output, 1.1 amperes, 105 watts Using 20 watt output, 1.25 amperes, 125 watts Fused with 1.25 amp. Buss Fustat on chassis Power switch furnished



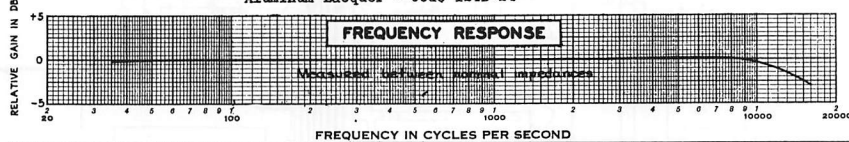
EQUIPMENT CHARACTERISTICS

Dimensions	See photograph.
Weight	20 pounds.
Vacuum Tubes	W.E. or R.C.A. 2-348A or 2-6J7 or 6J7G 2-350B or 2-6L6 or 6L6G 1-274B or 1-5T4 or 5U4G
Finish	Chassis, Aluminum Lacquer Mat, Black Enamel - Code 124B-3 Aluminum Gray - Code 124B-15 Aluminum Lacquer - Code 124B-24

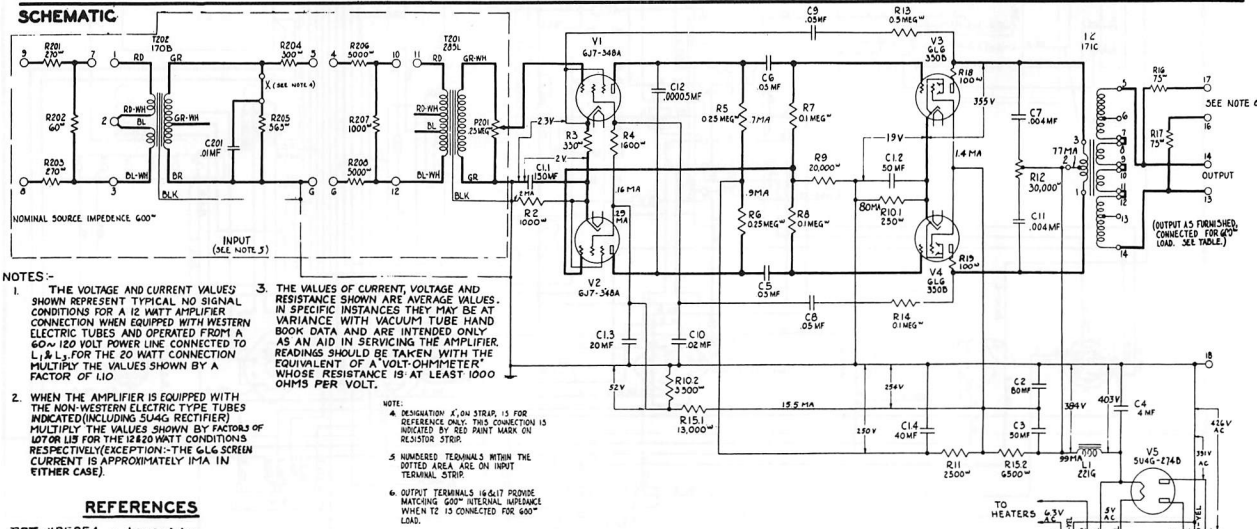
Connections - All external connections are normally made to terminals under the chassis, and knockouts are provided in the ends of the chassis to admit the wires. Additional knockouts are provided in the sides of the chassis where sockets may be installed if plug and socket connections are desired. Plugs and sockets which may be used are as follows:

Connectors to mount on chassis:
For Input Circuit - Amphenol PC4F Compact Chassis Connector
For Output Circuit - Amphenol PC3F Compact Chassis Connector
For Power Circuit - H&H #754 Flush Receptacle

connectors to use on cords:
For Input Circuit - Amphenol MC4M Microphone Connector
For Output Circuit - Amphenol MC3M Microphone Connector
For Power Circuit - H&H MB Cap



SCHEMATIC



NOTES -

- THE VOLTAGE AND CURRENT VALUES SHOWN REPRESENT TYPICAL NO SIGNAL CONDITIONS FOR A 12 WATT AMPLIFIER CONNECTION WHEN EQUIPPED WITH WESTERN ELECTRIC TUBES AND OPERATED FROM A 60~120 VOLT POWER LINE CONNECTED TO L₁ & L₂ FOR THE 20 WATT CONNECTION MULTIPLY THE VALUES SHOWN BY A FACTOR OF 1.10
- WHEN THE AMPLIFIER IS EQUIPPED WITH THE NON-WESTERN ELECTRIC TYPE TUBES INDICATED (INCLUDING 5U4G RECTIFIER) MULTIPLY THE VALUES SHOWN BY FACTORS OF 1.07 OR 1.13 FOR THE 12 WATT CONNECTIONS RESPECTIVELY (EXCEPTION - THE 6L6 SCREEN CURRENT IS APPROXIMATELY 1.1 MA IN EITHER CASE).
- THE VALUES OF CURRENT, VOLTAGE AND RESISTANCE SHOWN ARE AVERAGE VALUES. IN SPECIFIC INSTANCES THEY MAY BE AT VARIANCE WITH VACUUM TUBE HAND BOOK DATA AND ARE INTENDED ONLY AS AN AID IN SERVICING THE AMPLIFIER. READINGS SHOULD BE TAKEN WITH THE EQUIVALENT OF A VOLT-OHM-METER WHOSE RESISTANCE IS AT LEAST 1000 OHMS PER VOLT.
- RESISTOR X₁ ON STRAP IS FOR REFERENCE ONLY. THIS CONNECTION IS INDICATED BY RED PAINT MARK ON RESISTOR STRAP.
- NUMBERED TERMINALS WITHIN THE DOTTED AREA ARE ON INPUT TERMINAL STRAP.
- OUTPUT TERMINALS 16 & 17 PROVIDE MATCHING 600 Ω INTERNAL IMPEDANCE WHEN TE IS CONNECTED FOR 600 Ω LOAD.

REFERENCES

- ESX-675954 - Assembly
- ESX-676184 - Schematic
- ESX-676187 - Wiring Diagram
- ES-745902 - Longitudinal Characteristic
- ES-745403 - Internal Imp. and Out. Impedance Impedance Characteristic
- ES-746079 - Phase Shift Characteristic
- ES-746281 - Harmonics Characteristic

NOMINAL LOAD IMPEDANCE	WORKING RANGE OF LOAD IMPEDANCE	STRAP TERMINALS	OUTPUT CONNECTIONS
600 Ω	300 Ω TO 1200 Ω	1, 2, 3	1, 2, 3
150 Ω	75 Ω TO 300 Ω	1, 2, 3, 4, 5, 6	1, 2, 3, 4
30 Ω	15 Ω TO 60 Ω	1, 2, 3, 4, 5, 6, 7	1, 2, 3, 4, 5
16 Ω	8 Ω TO 32 Ω	1, 2, 3, 4, 5, 6, 7, 8	1, 2, 3, 4, 5, 6
7.5 Ω	3.75 Ω TO 15 Ω	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7
1.75 Ω	.875 Ω TO 7.0 Ω	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	1, 2, 3, 4, 5, 6, 7, 8

105-125V 50-60 CYCLES
125 WATT 1.25 AMPS MAX. 125 AMP

NO	1-28
AMPLIFIER	
124C	
4-15-41	

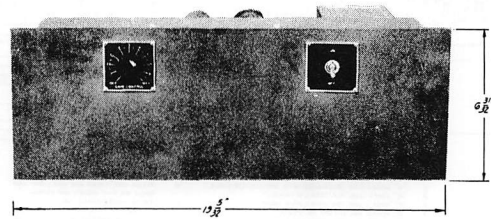
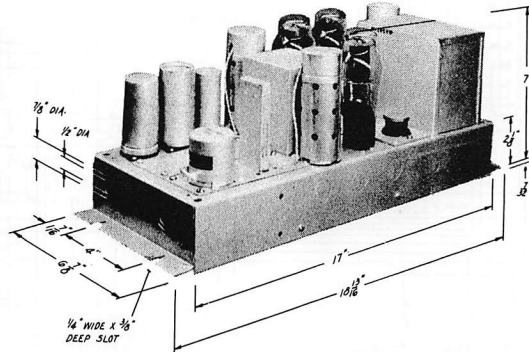
GENERAL

This is a power amplifier, similar to the 94-type, for use whenever a carbon microphone source is required. It is used in the 103C Amplifier. It replaces the 109A and 109B Amplifiers.

ELECTRICAL CHARACTERISTICS

Gain (W.E. Tubes)*	50 db - Bridging Input - Terminals 1 & 3 58 db - High Gain Input - Terminals 1 & 2 Measured between nominal impedances
Gain Control	45 db Continuously Variable - High Gain Input only. The potentiometer should be set at "Maximum" when the Bridging Input is used.
Source Impedance	Bridging Input, 0-25,000 ohms 600 ohms nominal High Gain Input, 0-1000 ohms 50 ohms nominal
Internal Input Impedance	Bridging Input, 27,000 ohms High Gain Input, 150 ohms
Load Impedance	1-1200 ohms Nominal load impedances - 800, 150, 30, 16, 7.5 or 1.75 ohms See strapping data on schematic
Internal Output Impedance	3/4 of nominal load impedance
Output Power	12 watts, 2.0% total harmonics at 400 cycles into nominal load impedance May be reconnected for 20 watts with 5% harmonic content
Output Noise	Unweighted, -37 db relative to .001 watt
Maximum Input Level	0.85V single frequency Bridging Input 5.0 V single frequency High Gain Input
Power Supply	105-125 Volts 50-60 cycles Using 12 watt output 1.1A amperes 105 watts Using 20 watt output 1.25 ampere 125 watts Standby Power - 55 watts approx. Fused with 1.25 amp. Buss Fustat on chassis Power switch furnished

*Gain .7 db less with RCA tubes



Connections - All external connections are normally made to terminals under the chassis, and knockouts are provided in the ends of the chassis to admit the wires. Additional knockouts are provided in the sides of the chassis where sockets may be installed if plug and socket connections are desired. Plugs and sockets which may be used are as follows:

EQUIPMENT CHARACTERISTICS

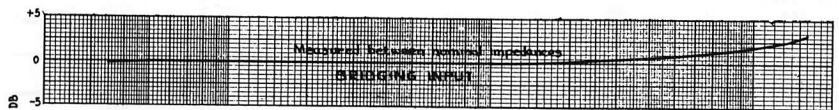
Dimensions	See photograph.
Weight	20 pounds.
Vacuum Tubes	W.E. or R.C.A. 2-348A or 2-6J7 or 6J7G 2-350B or 2-6L6 or 6L6G 1-274B or 1-5Y4 or 5U4G
Finish	Chassis, Aluminum Lacquer Mat, Black Enamel - Code 124C-3 Aluminum Gray - Code 124C-15 Aluminum Lacquer - Code 124C-24

Connectors to mount on chassis:
For Input Circuit - Amphenol PC4F Compact Chassis Connector
For Output Circuit - Amphenol PC3F Compact Chassis Connector
For Power Circuit - H&H #754 Flush Receptacle

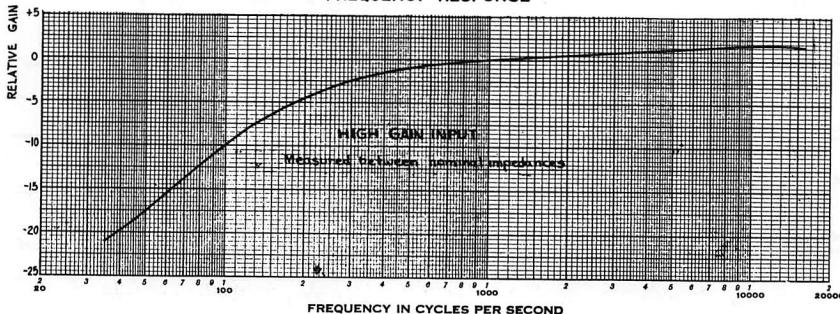
Connectors to use on cords:
For Input Circuit - Amphenol MC4M Microphone Connector
For Output Circuit - Amphenol MC3M Microphone Connector
For Power Circuit - H&H MB Cap

REFERENCES

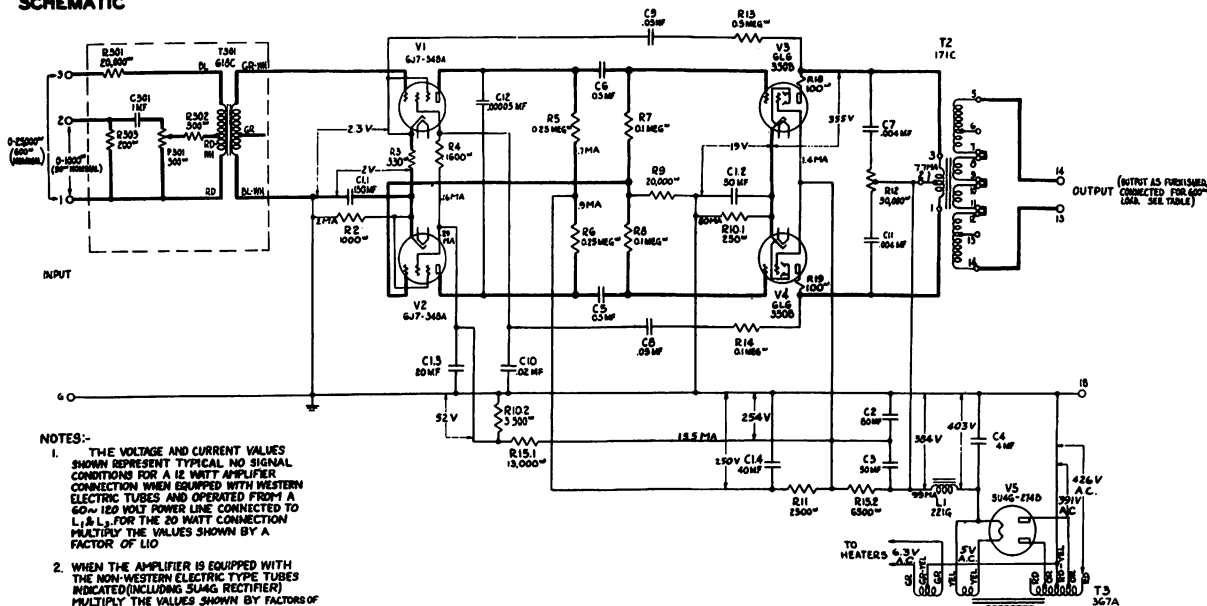
ESX-675954	-Assembly	Photographs
ESX-676165	-Schematic	92117
ESX-676168	-Wiring Diagram	92118
ESA-746281	-Harmonic Char.	



FREQUENCY RESPONSE



SCHEMATIC



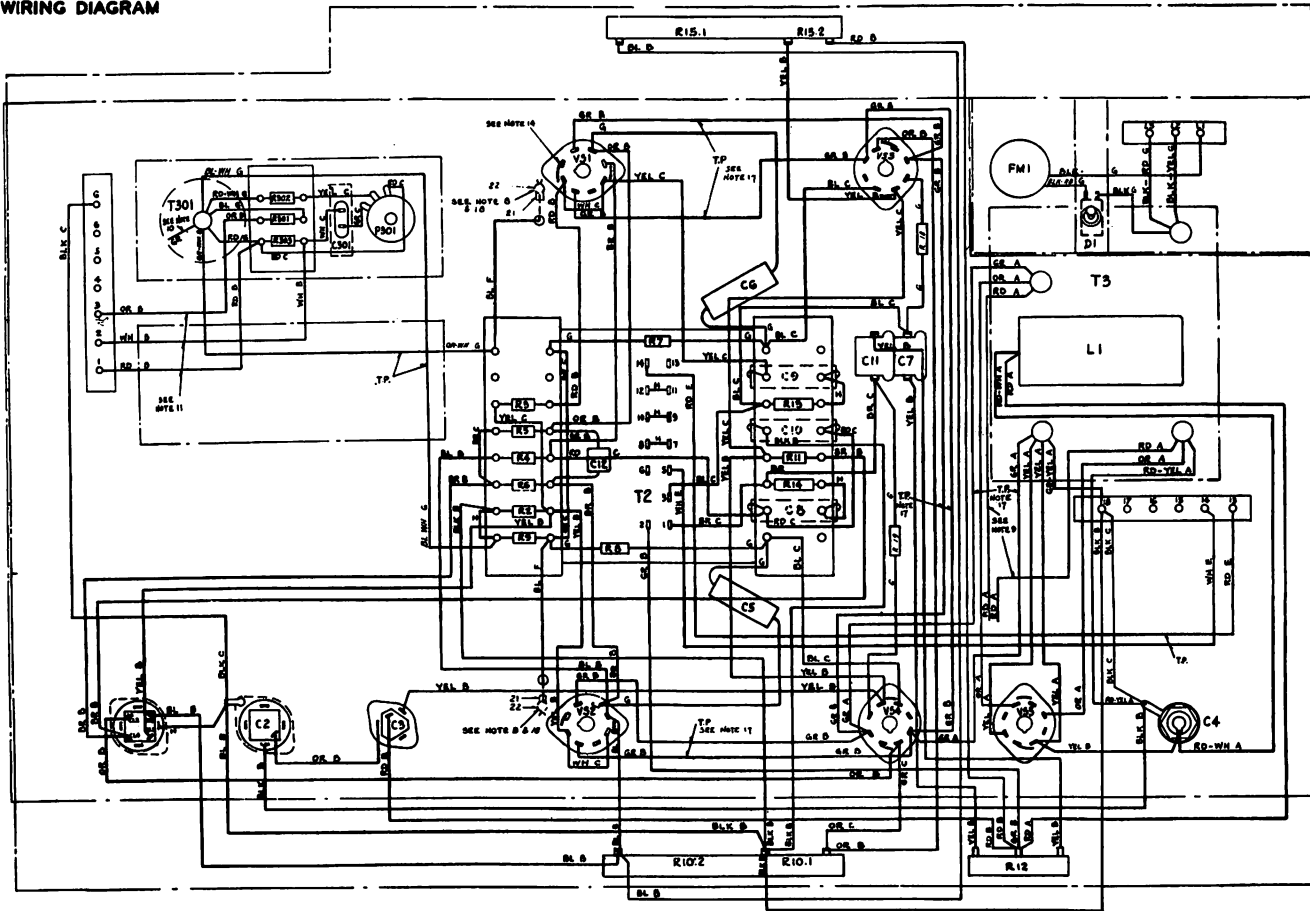
NOTES:-

1. THE VOLTAGE AND CURRENT VALUES SHOWN REPRESENT TYPICAL NO SIGNAL CONDITIONS FOR A 12 WATT APPLIERS CONNECTION WHEN EQUIPPED WITH WESTERN ELECTRIC TUBES AND OPERATED FROM A 60-120 VOLT POWER LINE CONNECTED TO L₁ & L₂. FOR THE 20 WATT CONNECTION MULTIPLY THE VALUES SHOWN BY A FACTOR OF 1.10
2. WHEN THE AMPLIFIER IS EQUIPPED WITH THE NON-WESTERN ELECTRIC TYPE TUBES INDICATED (INCLUDING 5Y4G RECTIFIER) MULTIPLY THE VALUES SHOWN BY FACTORS OF 1.07 OR 1.15 FOR THE 12WATT CONDITIONS RESPECTIVELY (EXCEPTION:- THE 6L6 SCREEN CURRENT IS APPROXIMATELY 1.1 MA IN EITHER CASE).
3. THE VALUES OF CURRENT, VOLTAGE AND RESISTANCE SHOWN ARE AVERAGE VALUES. IN SPECIFIC INSTANCES THEY MAY BE AT VARIANCE WITH VACUUM TUBE HAND BOOK DATA AND ARE INTENDED ONLY AS AN AID IN SERVICING THE AMPLIFIER. READINGS SHOULD BE TAKEN WITH THE EQUIVALENT OF A VOLT-OHM-METER WHOSE RESISTANCE IS AT LEAST 1000 OHMS PER VOLT.

OUTPUT TRANSFORMER TERMINATIONS (T2)

MINIMAL LOAD IMPEDANCE	WINDING RANGE & LOAD RANGE	STRAP TERMINALS	OUTPUT CONNECTIONS
100Ω	1-10	1-2-3-4-5-6-7-8	2-14
200Ω	1-10	1-2-3-4-5-6-7-8	2-14
500Ω	1-10	1-2-3-4-5-6-7-8	2-14
1KΩ	1-10	1-2-3-4-5-6-7-8	2-14
2KΩ	1-10	1-2-3-4-5-6-7-8	2-14
5KΩ	1-10	1-2-3-4-5-6-7-8	2-14
10KΩ	1-10	1-2-3-4-5-6-7-8	2-14
100KΩ	1-10	1-2-3-4-5-6-7-8	2-14
1MΩ	1-10	1-2-3-4-5-6-7-8	2-14

WIRING DIAGRAM



NOTES:

1. "A" WIRES ARE FURNISHED WITH A PARENTS IN CABLE.
2. "D" WIRES ARE PER ITEM 1, IN CABLE.
3. "C" WIRES ARE PER ITEM 1, OPEN FURNISHED.
4. "O" WIRES ARE STRIP FROM ITEM 10.
5. "B" WIRES ARE PER ITEM 11, IN CABLE.
6. "H" WIRES ARE PER ITEM 11, OPEN FURNISHED.
7. "M" STRIPPED TWISTED PAIR.
8. GRID CONNECTOR SHALL BE APPROX. 5/16" LONG MEASURED FROM GRID CAP TO GRID-SIDE SURFACE. THE CONNECTION TO BRACKET OF RES STRIP.
9. THESE WIRES SHALL HAVE THE ENDS TAPED SEPARATELY AND SHALL BE LONG ENOUGH TO REPLACE THE "M" WIRES AT VGS.
10. THESE COIL WIRES ARE NOT USED AND SHALL BE CUT SHORT AND TAPED.
11. THESE WIRES SHALL BE RUN AS A SEPARATE CABLE.
12. ALL WIRES FROM DE TO THE OUTPUT TRANSFORMER T2 SHALL RUN IN THE CABLE ON THE RIGHT, LINKING WITH THE GRID-RES AS SHOWN.
13. WIRES SHALL HAVE ENDS OVER TRANSFORMER T2. SECONDARY LEAD INDICATED THE KEY ON SCHEMATIC SHALL BE BENT & BUNGLED TO ADJACENT TERMINAL (S) AS SHOWN. GROUND WIRE ON OPPOSITE SIDE SHALL BE BENT AWAY FROM THE GRID TRANSFORMER.
14. "G" WIRES ARE FURNISHED WITH APPROPRIATE, OPEN FURNISHED
15. "N" WIRES ARE PER ITEM 26, OPEN FURNISHED
16. CLARITY NEED NOT BE OBSERVED OF THESE WIRES, THEY MAY BE INTERCHANGED IF DESIRED.
17. FILAMENT LEADS TO V1 AND V2 (G2) SHALL BE KEPT AWAY FROM GRID LEADS.
18. ALL WIRING SHALL BE KEPT OUT OF AN AREA OF 3" x 4" IN EACH CORNER OF CHASSIS TO PROVIDE CLEARANCE FOR BRACKET OF HEAT

NO 1-29
AMPLIFIER
124 D

4-15-41

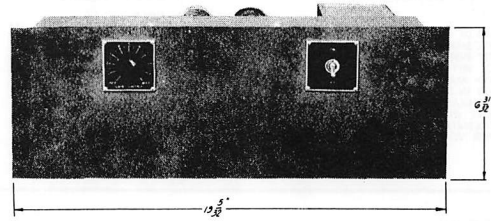
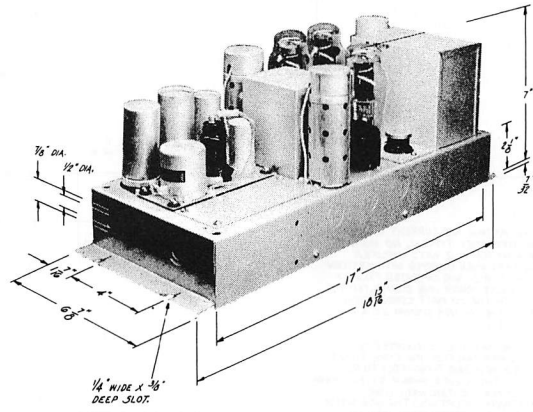
GENERAL

This is a general purpose amplifier for use where high gain is desired. It replaces the 86-type and 92-type Amplifiers and is also used in the 103D Amplifier.

ELECTRICAL CHARACTERISTICS

Gain (W.E. Tubes)*	107 db Measured between nominal impedances
Gain Control	35 db continuously variable Paralleled remote control may be used if desired
Source Impedance	Terminals 1 & 2, 15-80 ohms 30 ohms nominal Terminals 1 & 3, 60-250 ohms 120 ohms nominal
Internal Input Impedance	High - unterminated input transformer
Load Impedance	1-1200 ohms Nominal load impedances - 600, 150, 30, 16, 7.5 or 1.75 ohms See strapping data on schematic
Internal Output Impedance	3/4 of nominal load impedance
Output Power	12 watts, 2.0% total harmonics at 400 cycles into nominal load impedance May be reconnected for 20 watts with 5% harmonic content
Output Noise	-8 db relative to .001 watt unweighted
Maximum Input	Terminals 1 & 2, .008V single frequency 1 & 3, .016V single frequency
Power Supply	105-125 volts, 50-60 cycles Using 12 watt output, 1.1 amperes, 105 watts Using 20 watt output, 1.25 amperes, 125 watts Fused with 1.25 amp. Buss Fustat on chassis Power switch furnished

* Gain 0.7 db less with RCA tubes

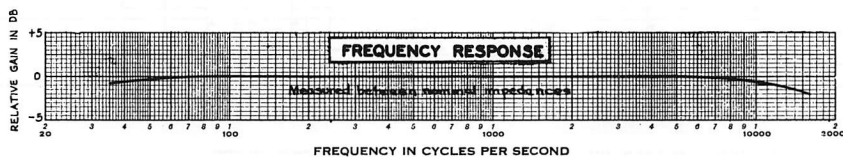


EQUIPMENT CHARACTERISTICS

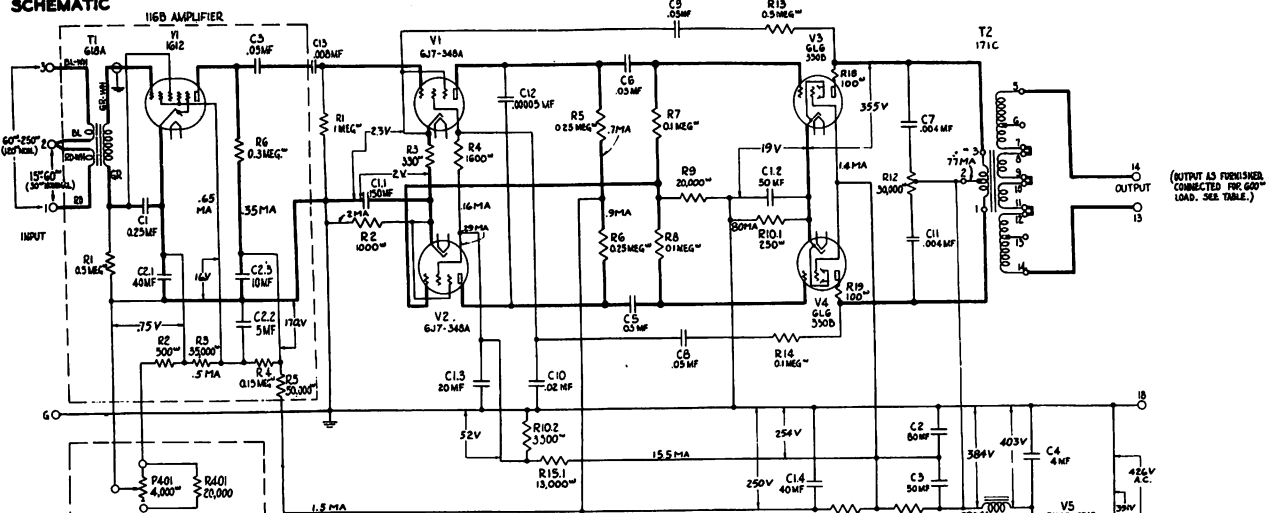
Dimensions	See photograph.
Weight	20 pounds.
Vacuum Tubes	W.E. or R.C.A. 2-348A or 2-6J7 or 6J7G 2-350B or 2-6L6 or 6L6G 1-274B or 1-5T4 or 5U4G 1-161Z
Finish	Chassis, Aluminum Lacquer Mat, Black Enamel - Code 124D-3 Aluminum Gray - Code 124D-15

Connections - All external connections are normally made to terminals under the chassis, and knockouts are provided in the ends of the chassis to admit the wires. Additional knockouts are provided in the sides of the chassis where sockets may be installed if plug and socket connections are desired. Plugs and sockets which may be used are as follows:

- Connectors to mount on chassis:
- For Input Circuit - Amphenol PC4F Compact Chassis Connector
 - For Output Circuit - Amphenol PC3F Compact Chassis Connector
 - For Power Circuit - H&H #754 Flush Receptacle
- Connectors to use on cords:
- For Input Circuit - Amphenol MC4M Microphone Connector
 - For Output Circuit - Amphenol MC3M Microphone Connector
 - For Power Circuit - H&H MB Cap



SCHEMATIC



NOTES

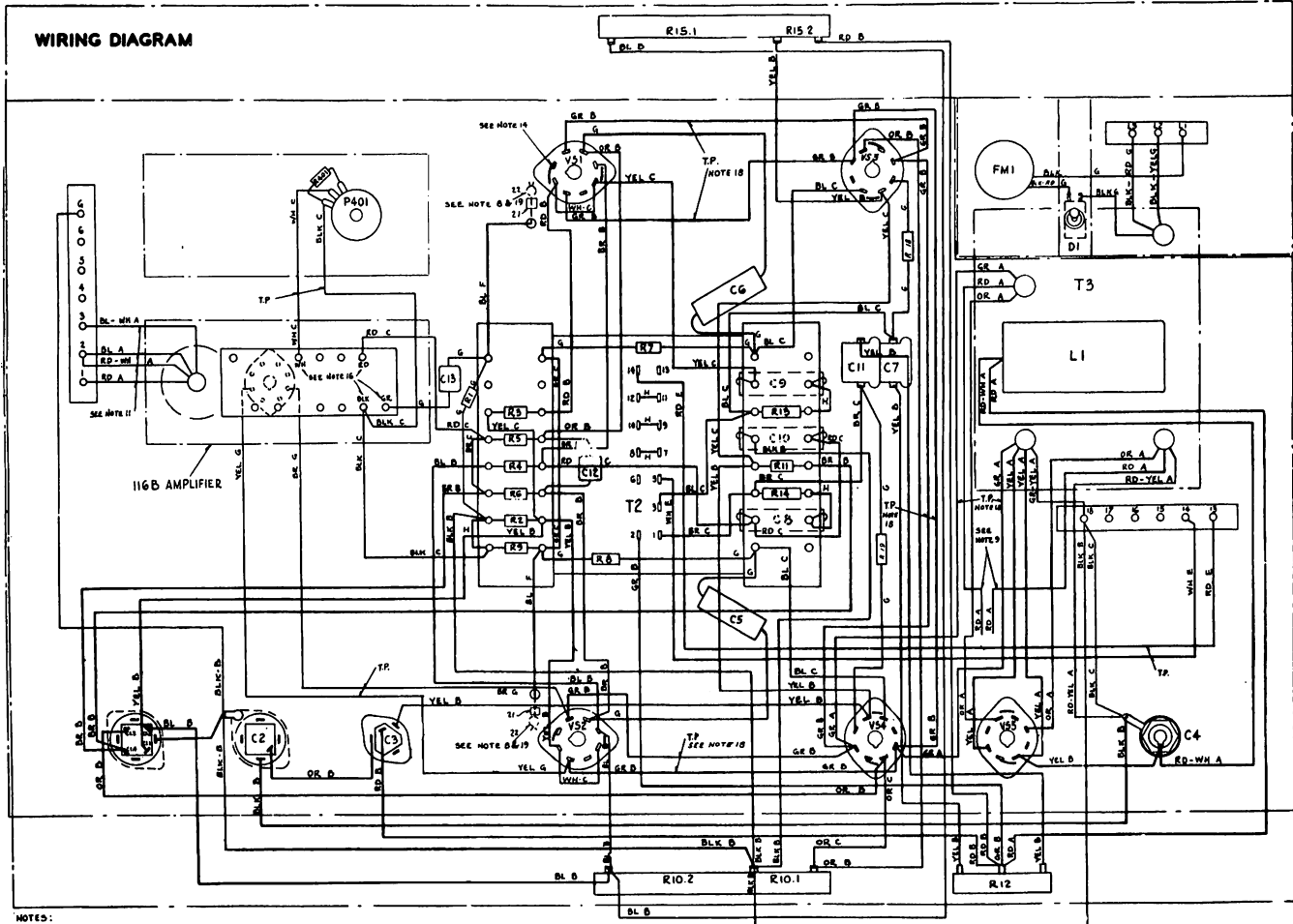
1. THE VOLTAGE AND CURRENT VALUES SHOWN REPRESENT TYPICAL NO SIGNAL CONDITIONS FOR A 12 WATT AMPLIFIER CONNECTION WHEN EQUIPPED WITH WESTERN ELECTRIC TUBES AND OPERATED FROM A 60-120 VOLT POWER LINE CONNECTED TO L1 & L2. FOR THE 20 WATT CONNECTION MULTIPLY THE VALUES SHOWN BY A FACTOR OF 1.0
2. WHEN THE AMPLIFIER IS EQUIPPED WITH THE NON-WESTERN ELECTRIC TYPE TUBES INDICATED (INCLUDING 5046 RECTIFIER) MULTIPLY THE VALUES SHOWN BY FACTORS OF 1.07 OR 1.15 FOR THE 12 AND 20 WATT CONNECTIONS RESPECTIVELY (EXCEPT ION- THE G.L.G. SCREEN CURRENT IS APPROXIMATELY 1 MA IN EITHER CASE)
3. THE VALUES OF CURRENT, VOLTAGE AND RESISTANCE SHOWN ARE AVERAGE VALUES. IN SPECIFIC INSTANCES THEY MAY BE AT VARIANCE WITH VACUUM TUBE HAND BOOK DATA AND ARE INTENDED ONLY AS AN AID IN SERVICING THE AMPLIFIER. READINGS SHOULD BE TAKEN WITH THE EQUIVALENT OF A "VOLT-OHM-METER" WHOSE RESISTANCE IS AT LEAST 1000 OHMS PER VOLT.
4. THE VOLTAGE AND CURRENT VALUES SHOWN REPRESENT CONDITIONS OBTAINED WHEN THE GAIN CONTROL PA01 IS SET FOR MAXIMUM GAIN (ZERO RESISTANCE)

OUTPUT TRANSFORMER TERMINATIONS (T2)

MINIMUM LOAD IMPEDANCE	MARKING RANGE OF LOAD IMPEDANCE	STRAP TERMINALS CONNECTIONS	OUTPUT CONNECTIONS
500	100 TO 1000	T1-T2-T3	5-6-14
100	20 TO 500	T1-T2-T3-T4	5-6-14
50	5 TO 100	T1-T2-T3-T4-T5	5-6-14
20	2 TO 50	T1-T2-T3-T4-T5-T6	5-6-14
10	1 TO 20	T1-T2-T3-T4-T5-T6-T7	5-6-14
5	1/2 TO 10	T1-T2-T3-T4-T5-T6-T7-T8	5-6-14
1 1/2	1/4 TO 3	T1-T2-T3-T4-T5-T6-T7-T8-T9	5-6-14

105-125V 30-60 CYCLES
125 WATTS 125 AMPS. MAX.

WIRING DIAGRAM



NOTES:

1. "A" WIRES ARE FURNISHED WITH APPARATUS, OPEN FORMED.
2. "B" WIRES ARE PER ITEM 11, IN CABLE.
3. "C" WIRES ARE PER ITEM 11, OPEN FORMED.
4. "D" WIRES ARE STRAPS PER ITEM 19
5. "E" WIRES ARE PER ITEM 11, IN CABLE.
6. "F" WIRES ARE PER ITEM 11, OPEN FORMED.
7. "T.P." DENOTES TWISTED PAIR.
8. GRID CONNECTIONS SHALL BE APPROX. 5/16" LONG MEASURED FROM GRID CAP TO CHASSIS SURFACE. THIS CONNECTION TO BE MADE ON REE. STRIP. THESE WIRES SHALL HAVE THE RIGID TYPE DEPARTURE AND SHALL BE LONG ENOUGH TO REPLACE THE "OR" WIRES AT V5.
9. THESE COIL WIRES ARE NOT USED AND SHALL BE CUT SHORT AND TAPED.
10. THESE WIRES SHALL BE RUN AS A SEPARATE CABLE.
11. ALL WIRES FROM OR TO THE OUTPUT TRANSFORMER T2 SHALL RUN IN THE CABLE ON THE RIGHT, LOOKING INTO THE CHASSIS AS SHOWN.
12. WIRES SHALL NOT CROSS OVER TRANSFORMER T2 AROUND LUG. NEAREST THE KEY ON T2 SOCKETS SHALL BE BENT & SOLDERED TO ADJACENT TERMINAL AS SHOWN. GROUND LUG ON OPPOSITE SIDE SHALL BE BENT AWAY FROM THE SOCKET TERMINALS.
13. "G" WIRES ARE FURNISHED WITH APPARATUS, OPEN FORMED. THESE TERMINALS OR WIRE ARE DESIGNATED WITH THE CHAR. INDICATED.
14. "H" WIRES ARE PER ITEM 19, OPEN FORMED
15. POLARITY NEED NOT BE OBSERVED ON THESE WIRES. THEY MAY BE INTERCHANGED IF DISTURBED.
16. FILAMENT LEADS TO V5 (6X4) SHALL BE KEPT AWAY FROM GRID LEADS.
17. ALL WIRING SHALL BE KEPT OUT OF AN AREA OF 1/2" IN EACH CORNER OF CHASSIS TO PROVIDE CLEARANCE FOR BRACKETS ON PLAT.

NO 1-29-A
AMPLIFIER
124 D MOD. FOR 2-116 B

GENERAL

Data for modifying a 124D Amplifier so that it will have two input channels (116B Amplifier) each with a separate volume control. The following electrical characteristics are the same as those of the 124D Amplifier, except for the gain which is 3 db less.

ELECTRICAL CHARACTERISTICS

- Gain 104 db measured between nominal impedances
- Gain Frequency Characteristic See Reference Sheet 1-29 on 124D Amplifier
- Gain Control 35 db continuously variable for each channel. Paralleled remote controls may be used if desired
- Source Impedance Channel No.1, Terminals 1 & 2, 15 - 60 ohms
30 ohms nominal
Terminals 1 & 3, 60 - 250 ohms
180 ohms nominal
Channel No.2, Terminals 4 & 5, 15 - 60 ohms
30 ohms nominal
Terminals 4 & 6, 60 - 250 ohms
120 ohms nominal
- Internal Input Impedance High - unterminated input transformer
- Load Impedance 1 - 1200 ohms
Nominal load impedances - 600, 150, 30, 16, 7.5 or 1.75 ohms
See strapping data on schematic
- Internal Output Impedance 3/4 of nominal load impedance
- Output Power 12 watts, 2.0% total harmonics at 400 cycles into nominal load impedance
May be reconnected for 20 watts with 5% harmonic content
- Output Noise -8 db relative to .001 watt, unweighted, under maximum gain condition
- Maximum Single Frequency Input .008 volt, terminals 1 & 2, 4 & 5
.016 " " " 1 & 3, 4 & 6
- Power Supply 105-125 volts, 50-60 cycles
Using 12 watt output, 1.1 amperes, 105 watts
Using 20 watt output, 1.25 amperes, 125 watts
Fused with 1.25 amp. Buss Fustat on chassis
Power switch furnished

EQUIPMENT CHARACTERISTICS

For Dimensions, Finish and information on external connections, see 124D Amplifier Reference Sheet No. 1-29

- Weight 21 pounds
- Vacuum Tubes W.E. R.C.A.
2-348A or 2-6J7 or 6J7G
2-350B or 2-6L6 or 6L6G
1-274B or 1-5Y4 or 5U4G
2-1612

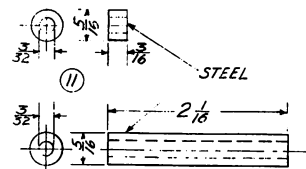
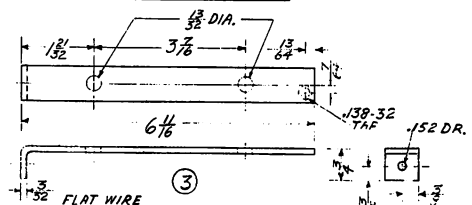
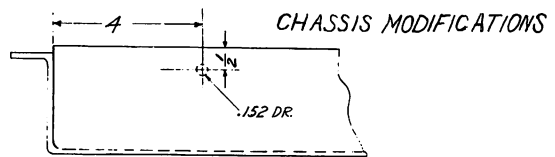
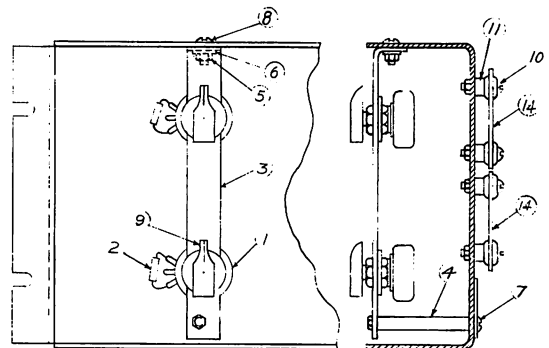
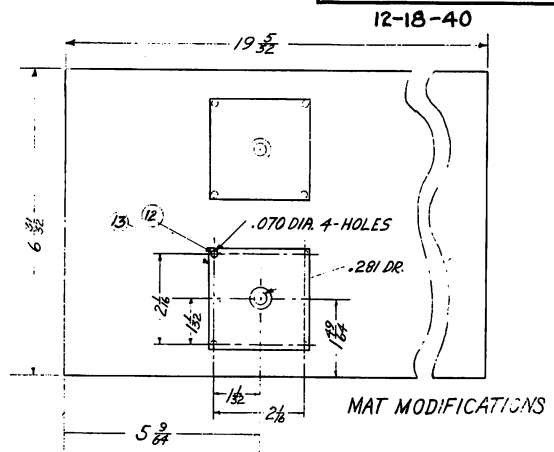
STOCK LIST

Item No.	No. Required	Applying to Conversion Part
1	2	IRC Type CS Potentiometer, 4000 Ohms, Curve A, open Circuit in counter clockwise position, 2 hex. nuts per ESO-676028-4 (1 potentiometer furnished, mounted)
2	2	IRC 20,000 ohm BT 1/2 Resistor (1 furnished, Mounted)
3	1	Bracket (shown)
4	1	Spacer (shown)
5	1	.138"-32 iron hex. nut
6	1	No. 1106 Shakeproof Lockwasher
7	1	.138"-32 round head iron machine screw, 2-3/8" long
8	1	.138"-32 round head iron machine screw, 3/8" long
9	1	#S292-1L Kurz Kosch knob, black
10	8	.138"-32 round head iron machine screw, 7/8" long
11	8	Spacers (shown)
12	4	#2253 x 3/16" long tubular rivet obtained from Tubular Rivet and Stud Co.
13	1	Escutcheon plate, ESO-675878-1
14	2	116B Amplifier (1 furnished, mounted)

NOTE: Items 5, 7, 8 and 10 to have cadmium plate finish, 20 msi.

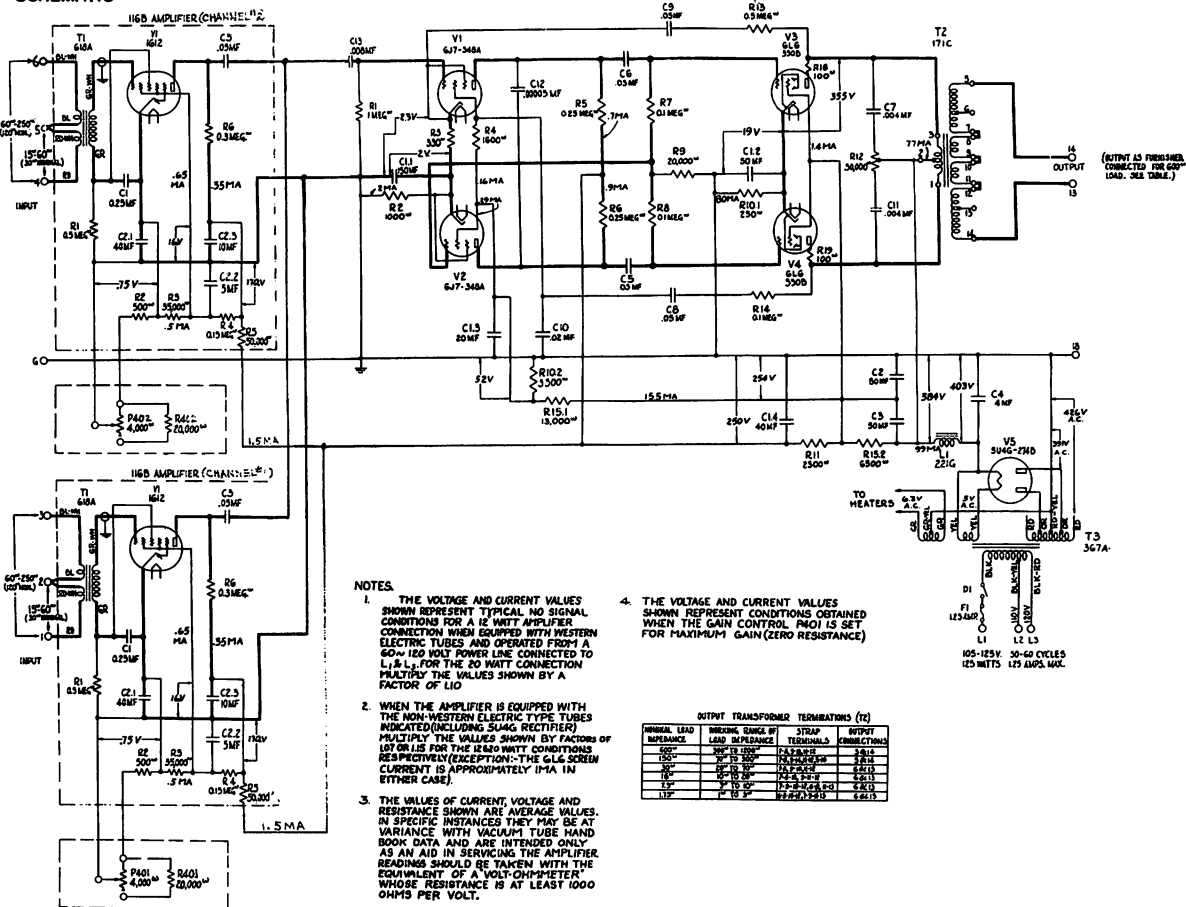
Items 3, 4 and 11 to have electro zinc plate, 20 msi, #298A finish

Items 6 and 12 to have nickel plate #388A finish



4

SCHEMATIC



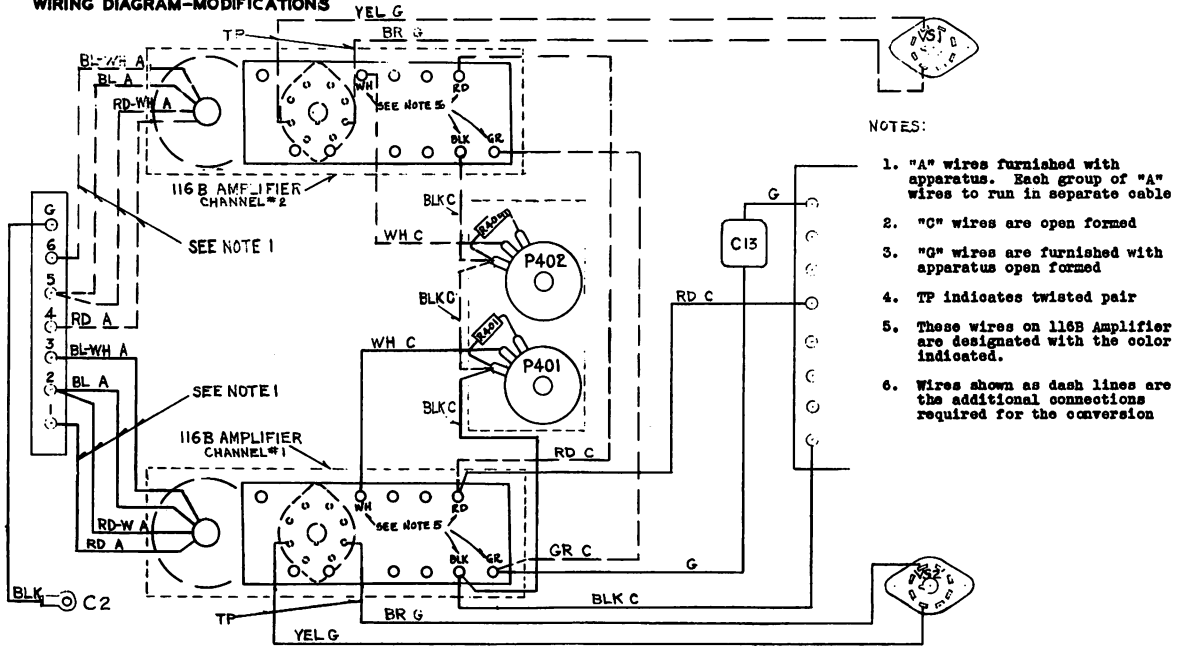
NOTES

1. THE VOLTAGE AND CURRENT VALUES SHOWN REPRESENT TYPICAL NO SIGNAL CONDITIONS FOR A 12 WATT AMPLIFIER CONNECTION WHEN EQUIPPED WITH WESTERN ELECTRIC TUBES AND OPERATED FROM A 60[±] 1% 120 VOLT POWER LINE CONNECTED TO L1 & L2. FOR THE 20 WATT CONNECTION MULTIPLY THE VALUES SHOWN BY A FACTOR OF 1.10
2. WHEN THE AMPLIFIER IS EQUIPPED WITH THE NON-WESTERN ELECTRIC TYPE TUBES INDICATED (INCLUDING 5046 RECTIFIERS) MULTIPLY THE VALUES SHOWN BY FACTORS OF 1.07 OR 1.05 FOR THE 12.5 WATT CONDITIONS RESPECTIVELY (EXCEPTION-THE 6L6 SCREEN CURRENT IS APPROXIMATELY 1.5 MA IN EITHER CASE).
3. THE VALUES OF CURRENT, VOLTAGE AND RESISTANCE SHOWN ARE AVERAGE VALUES. IN SPECIFIC INSTANCES THEY MAY BE AT VARIANCE WITH VACUUM TUBE HAND BOOK DATA AND ARE INTENDED ONLY AS AN AID IN SERVICING THE AMPLIFIER. READINGS SHOULD BE TAKEN WITH THE EQUIVALENT OF A VOLT-OHM-METER WHOSE RESISTANCE IS AT LEAST 1000 OHMS PER VOLT.
4. THE VOLTAGE AND CURRENT VALUES SHOWN REPRESENT CONDITIONS OBTAINED WHEN THE GAIN CONTROL P401 IS SET FOR MAXIMUM GAIN (ZERO RESISTANCE)

OUTPUT TRANSFORMER TERMINATIONS (T2)

MINIMUM LOAD IMPEDANCE	WINDING GAUGE BY LEAD IMPEDANCE	STRAP TERMINALS CONNECTIONS	OUTPUT
500 [±]	18 [±] 18 1000 [±]	1-2-3-4-5-6	2.5-14
200 [±]	18 [±] 18 500 [±]	1-2-3-4-5-6	2.5-14
100 [±]	18 [±] 18 250 [±]	1-2-3-4-5-6	2.5-14
50 [±]	18 [±] 18 125 [±]	1-2-3-4-5-6	2.5-14
25 [±]	18 [±] 18 62.5 [±]	1-2-3-4-5-6	2.5-14
12.5 [±]	18 [±] 18 31.25 [±]	1-2-3-4-5-6	2.5-14

WIRING DIAGRAM-MODIFICATIONS



NOTES:

1. "A" wires furnished with apparatus. Each group of "A" wires to run in separate cable
2. "C" wires are open formed
3. "G" wires are furnished with apparatus open formed
4. TP indicates twisted pair
5. These wires on 116B Amplifier are designated with the color indicated.
6. Wires shown as dash lines are the additional connections required for the conversion

NO 1-30
AMPLIFIER
124E

4-15-41

GENERAL

This is a general purpose power amplifier for use when a gain control is required. It replaces the 94D Amplifier.

ELECTRICAL CHARACTERISTICS

Gain (W.E. Tubes)*	These depend on the input strapping used.
Source Impedance)	See individual arrangements below.
Internal	
Input Impedance)	
Gain Control	38 db in 2 db steps
Load Impedance	1-1200 ohms Nominal load impedances - 600, 150, 30, 16, 7.5 or 1.75 ohms See strapping data on schematic
Internal	
Output Impedance	3/4 of nominal load impedance
Output Power	12 watts, 2.0% total harmonics at 400 cycles into nominal load impedance May be reconnected for 20 watts with 5% harmonic content
Output Noise	Unweighted, -37 db relative to .001 watt
Maximum Input	Depends on input strapping used. See indi- vidual arrangements below.
Power Supply	105-125 volts, 50-60 cycles Using 12 watt output, 1.1 amperes, 105 watts Using 20 watt output, 1.25 amperes, 125 watts Fused with 1.25 amp. Buss Fustat on chassis Power switch furnished

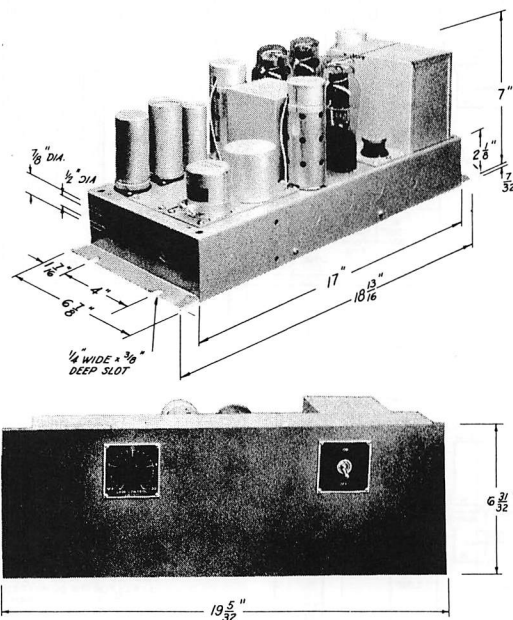
*Gain 0.7 db less with RCA tubes

EQUIPMENT CHARACTERISTICS

Dimensions	See photograph.
Weight	20 pounds, approx.
Vacuum Tubes	W.E. or R.C.A. 2-348A or 2-6J7 or 6J7G 2-350B or 2-6L6 or 6L6G 1-274B or 1-5Y4 or 5U4G
Finish	Chassis, Aluminum Lacquer Mat, Black enamel - Code 124E-3 Aluminum Gray - Code 124E-15

REFERENCES

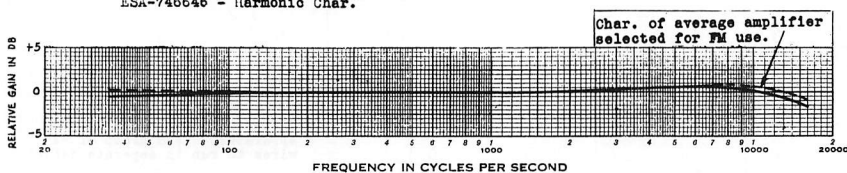
ESX-675954	- Assembly	Photographs
ESXI-676195	- Schematic	92119
ESX-676196	- Wiring Diagram	87961
ESA-746646	- Harmonic Char.	



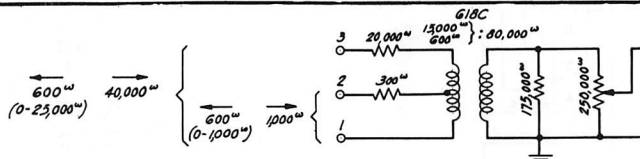
Connections - All external connections are normally made to terminals under the chassis, and knockouts are provided in the ends of the chassis to admit the wires. Additional knockouts are provided in the sides of the chassis where sockets may be installed if plug and socket connections are desired. Plugs and sockets which may be used are as follows:

Connectors to mount on chassis:
For Input Circuit - Amphenol PC4F Compact Chassis Connector
For Output Circuit - Amphenol PC3F Compact Chassis Connector
For Power Circuit - H&H #754 Flush Receptacle

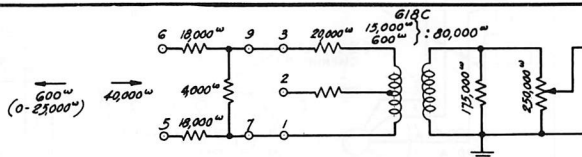
Connectors to use on cords:
For Input Circuit - Amphenol MC4M Microphone Connector
For Output Circuit - Amphenol MC3M Microphone Connector
For Power Circuit - H&H MB Cap



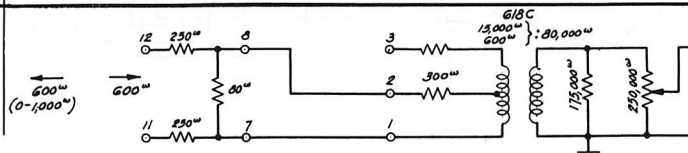
124E Amplifier - Input Arrangement #1
Gain 50 db - Bridging Input - Terminals 1 & 3
63 db - High Gain Input - Terminals 1 & 2
Measured between nominal impedances
Gain Control 38 db in 2 db steps
Maximum Input 25V. single freq. - Bridging Input
3V. single freq. - High Gain Input
Use General purpose where gain control is desired.
Replaces 94D Amplifier.



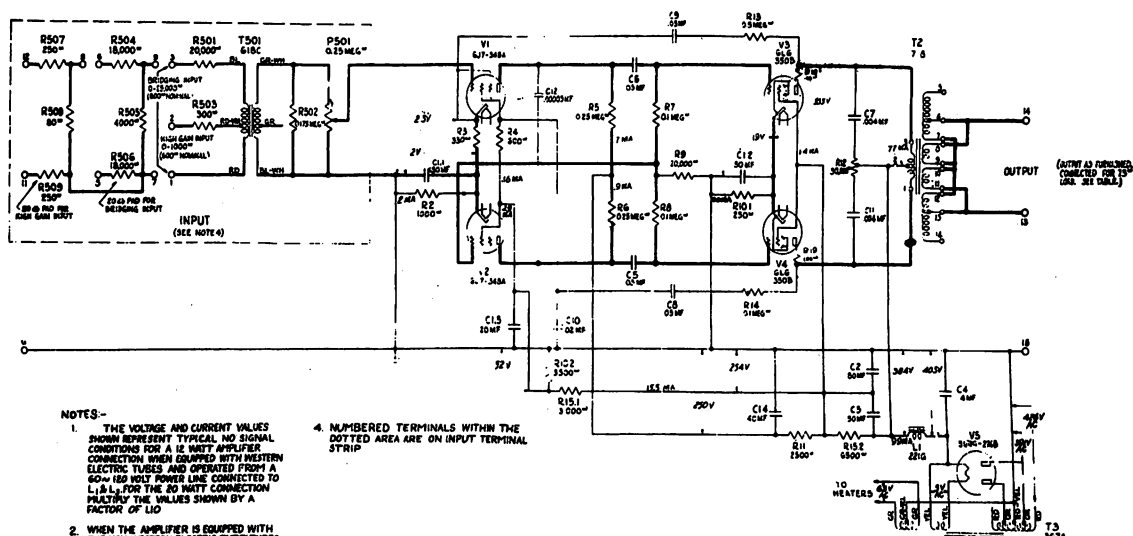
124E Amplifier - Input Arrangement #2
Gain 30 db Measured between nominal impedances
Gain Control 38 db in 2 db steps
Maximum Input 100V. single freq.
Use Same as for Input Arrangement #1 when higher input levels are available.



124E Amplifier - Input Arrangement #3
Gain 43 db Measured between nominal impedances
Gain Control 38 db in 2 db steps
Maximum Input 10V Single Freq.
Use Same as for Input Arrangement #1 when higher input levels are available and where a 600 ohm internal input impedance is desired.



SCHEMATIC

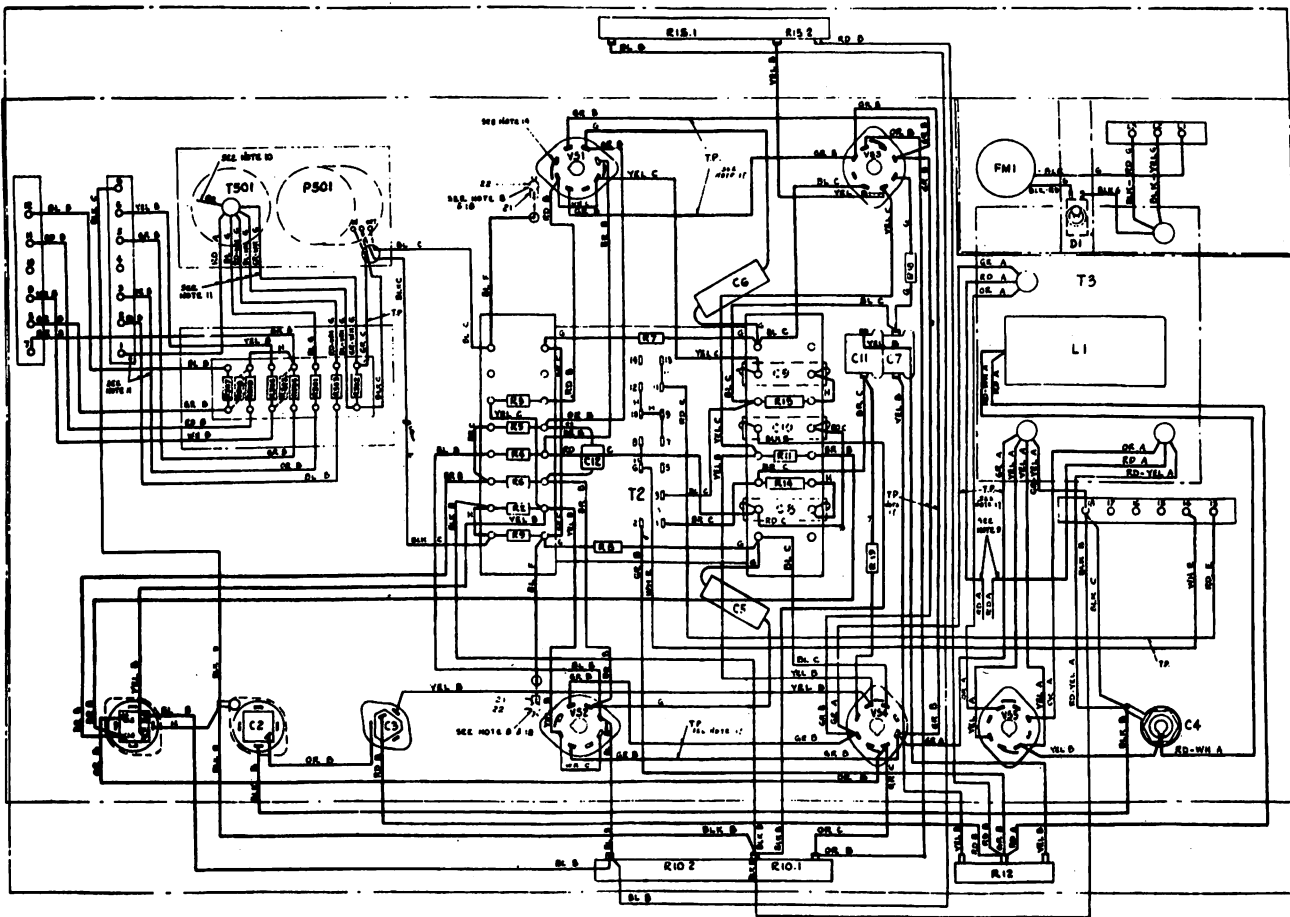


NOTES:-

1. THE VOLTAGE AND CURRENT VALUES SHOWN REPRESENT TYPICAL NO SIGNAL CONDITIONS FOR A 12 WATT AMPLIFIER CONNECTION WHEN EQUIPPED WITH WESTERN ELECTRIC TUBES AND OPERATED FROM A 60-180 VOLT POWER LINE CONNECTED TO L1, L2, FOR THE 80 WATT CONNECTION MULTIPLY THE VALUES SHOWN BY A FACTOR OF 1.10
2. WHEN THE AMPLIFIER IS EQUIPPED WITH THE NON-WESTERN ELECTRIC TYPE TUBES INDICATED (EXCEPT 6X4 RECTIFIERS) MULTIPLY THE VALUES SHOWN BY FACTORS OF 1.07 FOR THE 120 WATT CONNECTIONS RESPECTIVELY (EXCEPT THE 6X4 WHICH CURRENT IS APPROPRIATELY 1.14 IN EITHER CASE)
3. THE VALUES OF CURRENT, VOLTAGE AND RESISTANCE SHOWN ARE AVERAGE VALUES. IN SPECIFIC INSTANCES THEY MAY BE AT VARIANCE WITH VACUUM TUBE HAND BOOK DATA AND ARE INTENDED ONLY AS AN AID IN SERVICING THE AMPLIFIER READINGS SHOULD BE TAKEN WITH THE EQUIPMENT OF A "VOLT-COMMETER" WHOSE RESISTANCE IS AT LEAST 1000 OHMS PER VOLT.

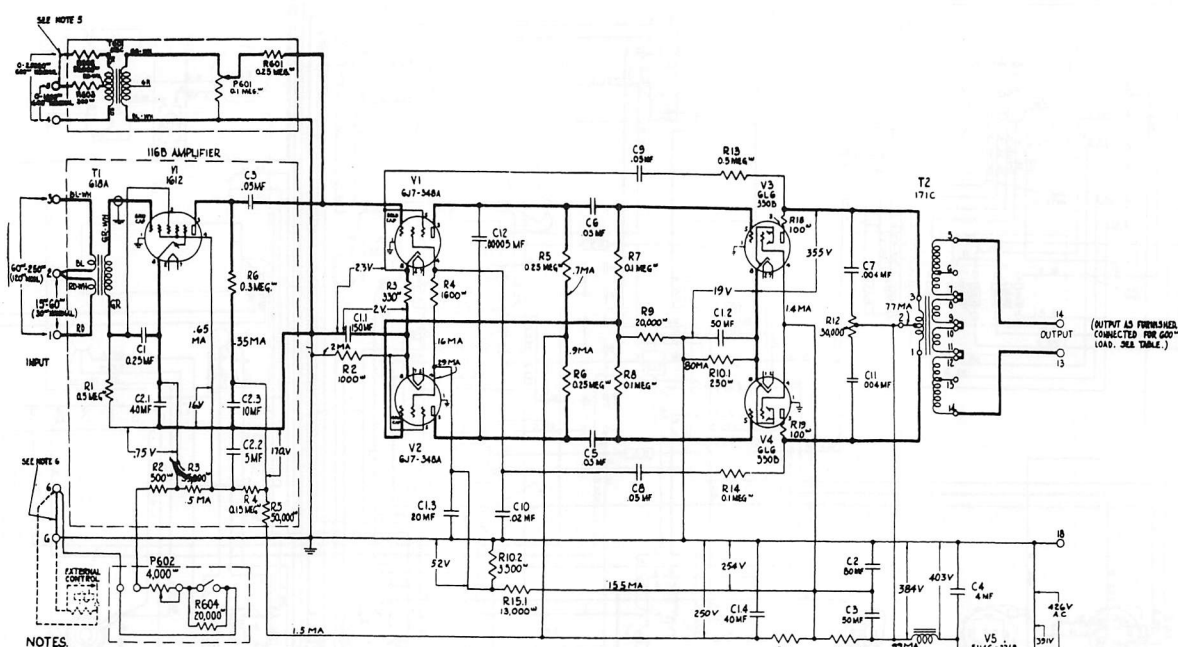
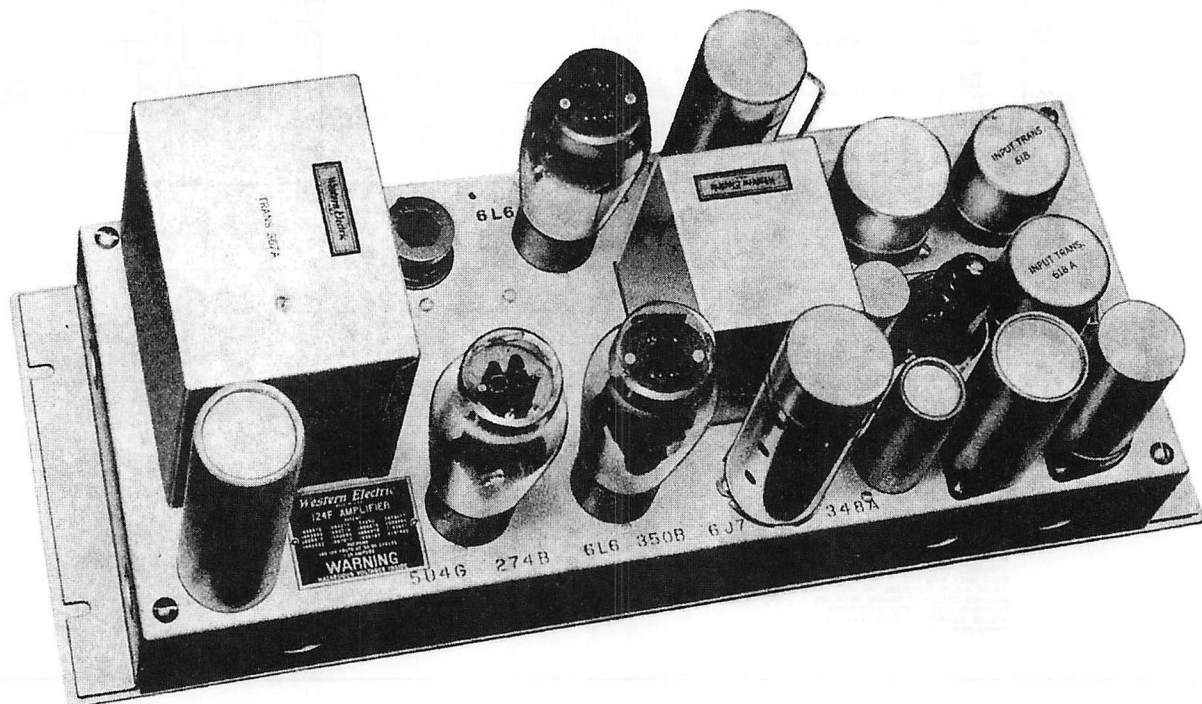
4. NUMBERED TERMINALS WITHIN THE DOTTED AREA ARE ON INPUT TERMINAL STRIP

MINIMUM LOAD IMPEDANCE	TERMINAL CONNECTION	STANDARD TERMINAL CONNECTION	OUTPUT
100Ω	80Ω TO 100Ω	1-2-3-4	2.4A
200Ω	120Ω TO 200Ω	1-2-3-4	2.4A
300Ω	150Ω TO 300Ω	1-2-3-4	2.4A
400Ω	200Ω TO 400Ω	1-2-3-4	2.4A
500Ω	250Ω TO 500Ω	1-2-3-4	2.4A
600Ω	300Ω TO 600Ω	1-2-3-4	2.4A
700Ω	350Ω TO 700Ω	1-2-3-4	2.4A
800Ω	400Ω TO 800Ω	1-2-3-4	2.4A
900Ω	450Ω TO 900Ω	1-2-3-4	2.4A
1000Ω	500Ω TO 1000Ω	1-2-3-4	2.4A



NOTES:

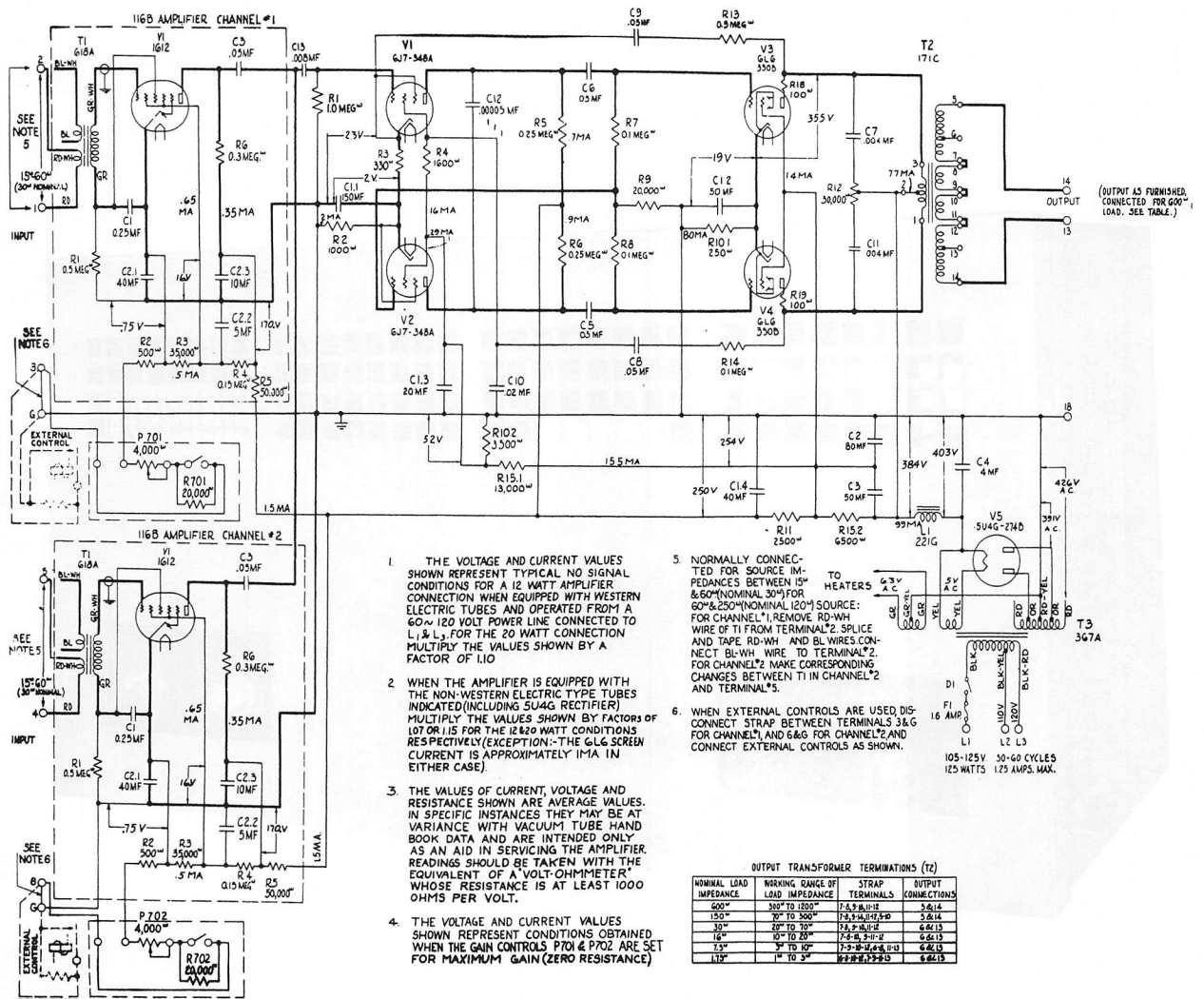
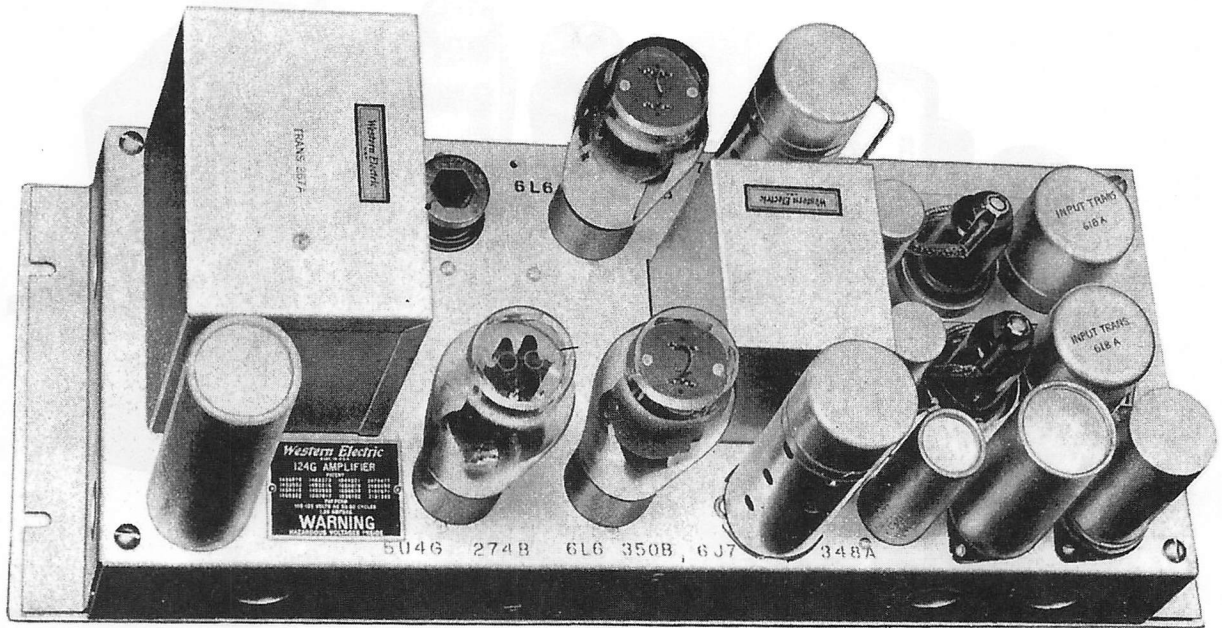
1. "A" WIRES ARE FURNISHED WITH APPARATUS, OPEN PARALLEL
2. "B" WIRES ARE PULLED FROM THE CABLE
3. "C" WIRES ARE PULLED FROM THE CABLE
4. "D" WIRES ARE STRAPS FOR ITEM 11
5. "E" WIRES ARE PULLED FROM THE CABLE
6. "F" WIRES ARE PULLED FROM THE CABLE
7. "G" WIRES ARE PULLED FROM THE CABLE
8. "H" WIRES ARE PULLED FROM THE CABLE
9. "I" WIRES ARE PULLED FROM THE CABLE
10. THESE COIL WIRES ARE NOT USED AND SHALL BE CUT SHORT AND TAPED
11. THESE WIRES SHALL BE RUN AS A SEPARATE CABLE
12. ALL WIRES FROM 10 TO THE OUTPUT TRANSFORMER SHALL RUN IN THE CABLE ON THE RIGHT SIDE OF THE CHASSIS AS SHOWN
13. WIRES SHALL NOT CROSS OVER TRANSFORMERS, ET. AL
14. WIRES SHALL BE TIGHTLY TIGHTENED TO THE POINT OF CONTACT
15. ALL WIRES SHALL BE TIGHTLY TIGHTENED TO THE POINT OF CONTACT
16. "H" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
17. "I" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
18. "J" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
19. "K" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
20. "L" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
21. "M" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
22. "N" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
23. "O" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
24. "P" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
25. "Q" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
26. "R" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
27. "S" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
28. "T" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
29. "U" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
30. "V" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
31. "W" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
32. "X" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
33. "Y" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL
34. "Z" WIRES ARE PULLED FROM THE CABLE, OPEN PARALLEL

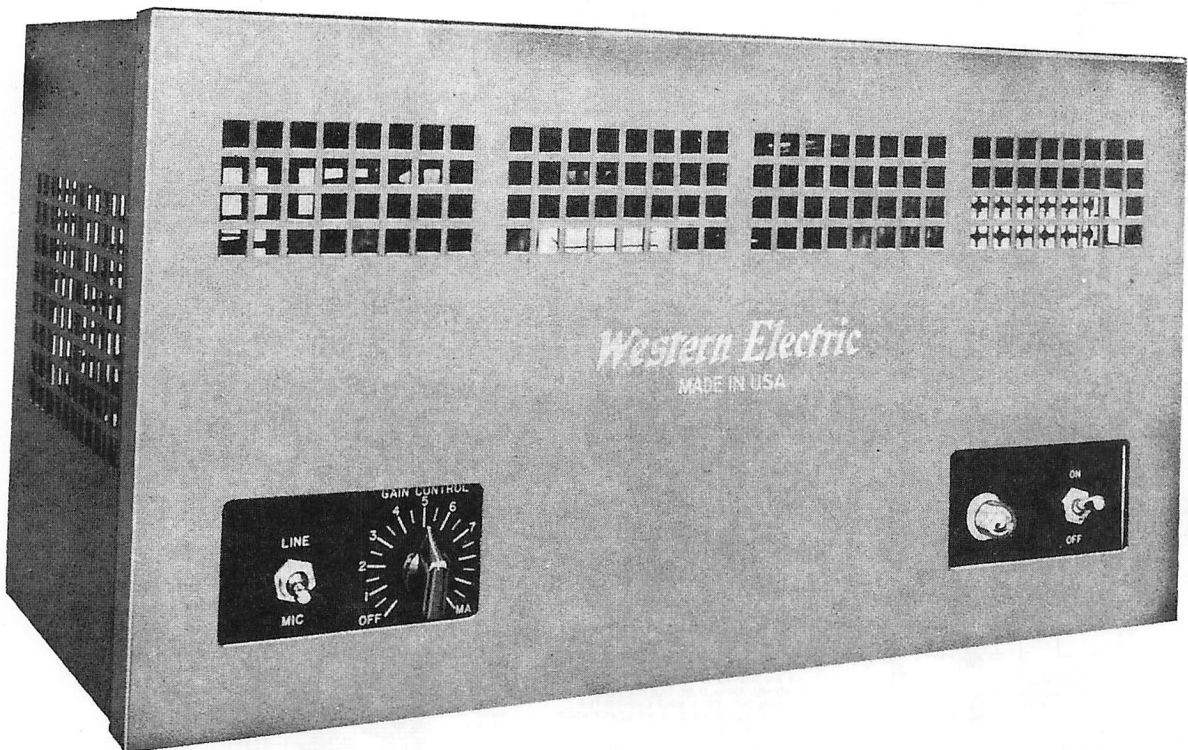
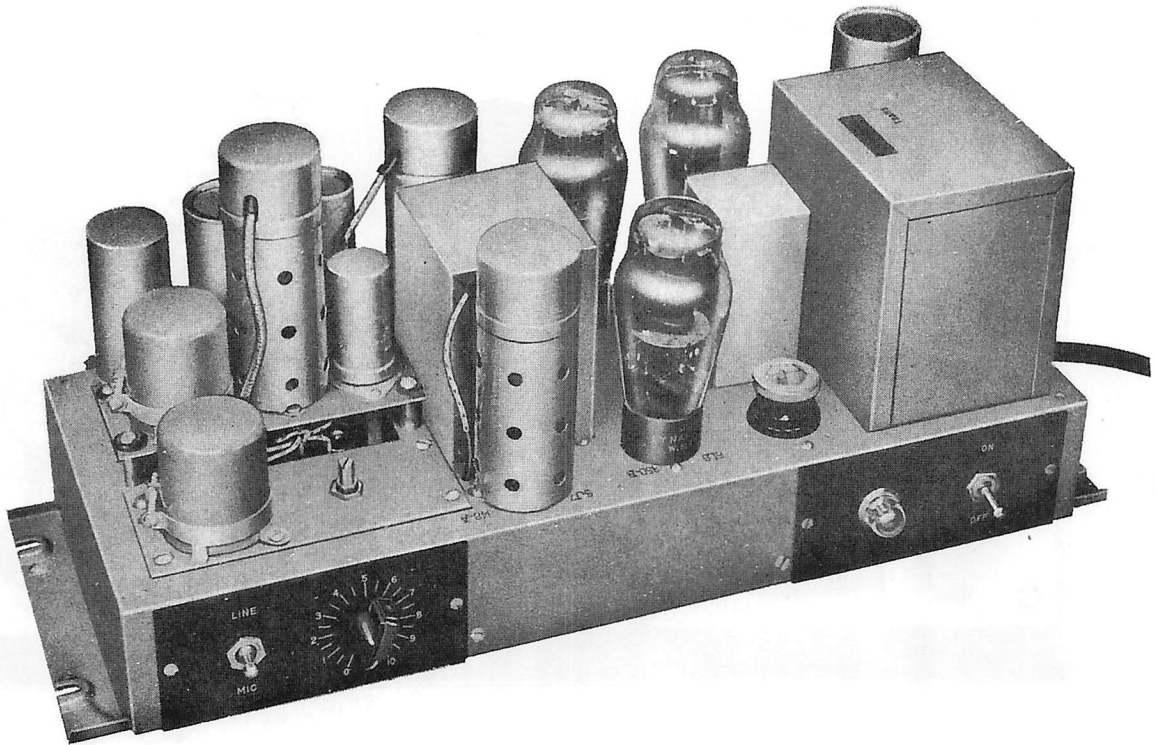


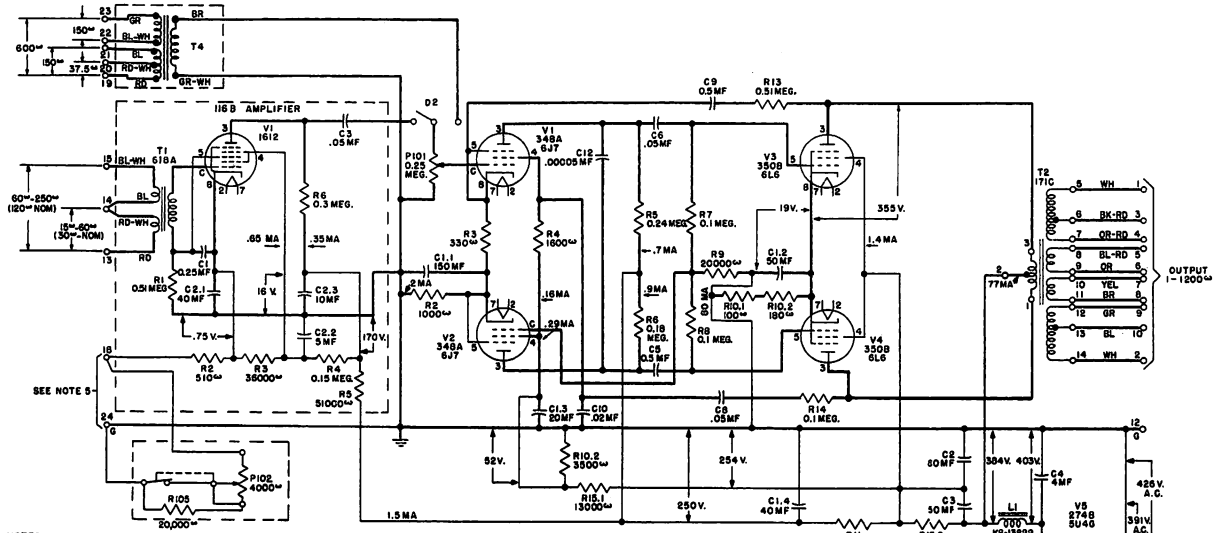
- NOTES:
1. THE VOLTAGE AND CURRENT VALUES SHOWN REPRESENT TYPICAL NO SIGNAL CONDITIONS FOR A 12 WATT AMPLIFIER CONNECTION WHEN EQUIPPED WITH WESTERN ELECTRIC TUBES AND OPERATED FROM A 60-120 VOLT POWER LINE CONNECTED TO L₁ & L₂. FOR THE 20 WATT CONNECTION MULTIPLY THE VALUES SHOWN BY A FACTOR OF 1.10
 2. WHEN THE AMPLIFIER IS EQUIPPED WITH THE NON-WESTERN ELECTRIC TYPE TUBES INDICATED (INCLUDING 504G RECTIFIER) MULTIPLY THE VALUES SHOWN BY FACTORS OF 1.07 OR 1.15 FOR THE 12 & 20 WATT CONDITIONS RESPECTIVELY (EXCEPTION--THE 6L6 SCREEN CURRENT IS APPROXIMATELY 1.1 MA IN EITHER CASE).
 3. THE VALUES OF CURRENT, VOLTAGE AND RESISTANCE SHOWN ARE AVERAGE VALUES. IN SPECIFIC INSTANCES THEY MAY BE AT VARIANCE WITH VACUUM TUBE HAND BOOK DATA AND ARE INTENDED ONLY AS AN AID IN SERVICING THE AMPLIFIER. READINGS SHOULD BE TAKEN WITH THE EQUIVALENT OF A VOLT-OHM-METER WHOSE RESISTANCE IS AT LEAST 1000 OHMS PER VOLT.
 4. THE VOLTAGE AND CURRENT VALUES SHOWN REPRESENT CONDITIONS OBTAINED WHEN THE GAIN CONTROL IS SET FOR MAXIMUM GAIN (ZERO RESISTANCE)
 5. NORMALLY CONNECTED FOR SOURCE IMPEDANCES BETWEEN 0 & 1000 OHMS. FOR 0 TO 25,000 OHMS DISCONNECT THE WIRE BETWEEN TERMINAL 5 & R602 AND CONNECT TO CORRESPONDING SIDE OF R602.
 6. WHEN EXTERNAL CONTROL IS USED, DISCONNECT STRAP BETWEEN TERMINALS 6 & G AND CONNECT EXTERNAL CONTROL AS SHOWN.

OUTPUT TRANSFORMER TERMINATIONS (T2)

NOMINAL LOAD IMPEDANCE	WORKING RANGE OF LOAD IMPEDANCE	STRAP TERMINALS CONNECTIONS	OUTPUT
600 Ω	500 Ω TO 3000 Ω	2, 3, 4, 5, 6	3.4 W
150 Ω	100 Ω TO 3000 Ω	2, 3, 4, 5, 6, 7	2.4 W
50 Ω	50 Ω TO 10 Ω	2, 3, 4, 5, 6, 7, 8	1.4 W
15 Ω	10 Ω TO 50 Ω	2, 3, 4, 5, 6, 7, 8, 9	0.8 W
5 Ω	5 Ω TO 15 Ω	2, 3, 4, 5, 6, 7, 8, 9, 10	0.4 W
1.5 Ω	1 Ω TO 3 Ω	2, 3, 4, 5, 6, 7, 8, 9, 10, 11	0.2 W

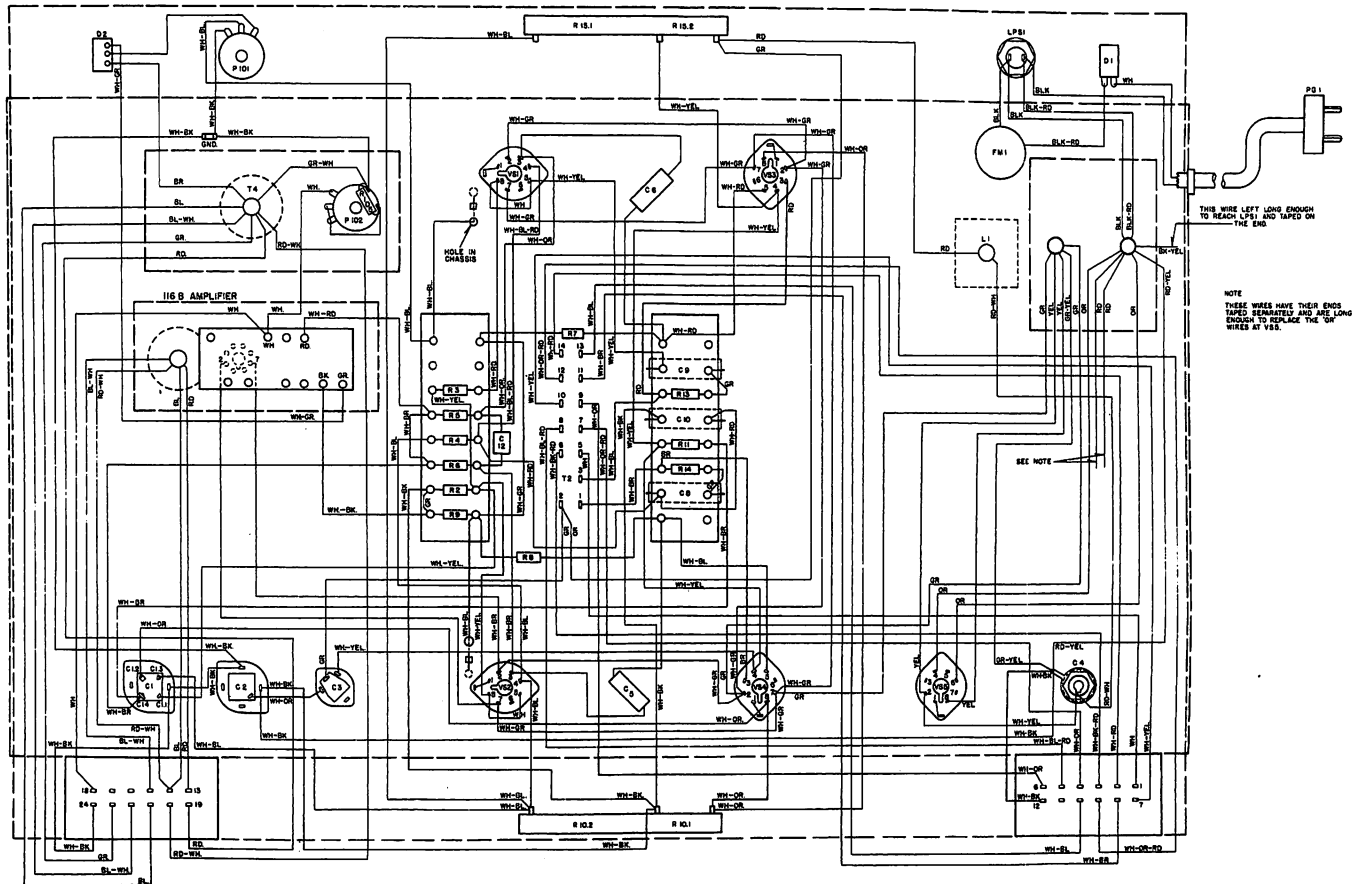
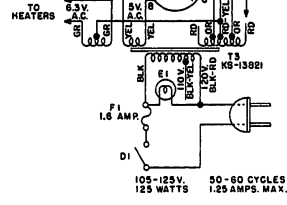






- NOTES:**
1. THE VOLTAGE AND CURRENT VALUES SHOWN REPRESENT TYPICAL, NO SIGNAL, CONDITIONS FOR A 12 WATT AMPLIFIER CONNECTION WHEN EQUIPPED WITH WESTERN ELECTRIC TUBES AND OPERATED FROM A 60V, 120 VOLT POWER LINE CONNECTED TO L, B, L₄ FOR THE 20 WATT CONNECTION MULTIPLY THE VALUES SHOWN BY A FACTOR OF 1.10.
 2. WHEN THE AMPLIFIER IS EQUIPPED WITH THE NON-WESTERN ELECTRIC TYPE TUBES INDICATED (INCLUDING 5Y4G RECTIFIERS) MULTIPLY THE VALUES SHOWN BY FACTORS OF 1.07 OR 1.15 FOR THE 12 & 20 WATT CONDITIONS RESPECTIVELY.
 3. THE VALUES OF CURRENT, VOLTAGE AND RESISTANCE SHOWN ARE AVERAGE VALUES IN SPECIFIC INSTANCES THEY MAY BE AT VARIANCE WITH VACUUM TUBE HAND BOOK DATA AND ARE INTENDED ONLY AS AN AID IN SERVICING THE AMPLIFIER. READINGS SHOULD BE TAKEN WITH THE EQUIVALENT OF A "VOLT-OHMMEYER" WHOSE RESISTANCE IS AT LEAST 1000 OHMS PER VOLT.
 4. THE VOLTAGE AND CURRENT VALUES SHOWN REPRESENT CONDITIONS OBTAINED WHEN THE GAIN CONTROL (P102) IS SET FOR MAXIMUM GAIN (ZERO RESISTANCE.)
 5. THESE TERMINALS FOR EXTERNAL VOLUME CONTROL, IF REQUIRED.

NOMINAL LOAD IMPEDANCE	WORKING RANGE OF LOAD IMPEDANCE	STRAP TERMINALS CONNECTIONS	OUTPUT
800Ω	300Ω TO 1200Ω	4-5, 6-7, 8-9	1.8 2
150Ω	70Ω TO 300Ω	4-5, 6-2, 8-9, 1-7	1.8 2
30Ω	20Ω TO 70Ω	4-5, 6-7, 8-9	3.8 10
16Ω	10Ω TO 20Ω	4-5-7, 6-8-9	3.8 10
7.5Ω	3Ω TO 10Ω	4-6-7-9, 3-5, 8-10	3.8 10
1.7 5Ω	1Ω TO 3Ω	3-5-7-9, 4-6-8-10	3.8 10



Western Electric

124H AMPLIFIER

Typical Performance Data

Frequency Response (Nominal source and load impedances)
 ± 1 db over the range from 50 to 10,000 cycles.
 ± 2 db over the range from 50 to 15,000 cycles.

Maximum Gain

Microphone Channel—107 db.
 Line Channel—67 db.

Source Impedance

Microphone Channel—15 to 60 ohms on 30 ohm nominal.
 Line Channel—60 to 250 ohms on 120 ohm nominal.
 37.5, 150 or 600 ohms nominal ± 50%.

Load Impedance

1 to 1200 ohms (See Table III).

Nominal Load Impedances

600, 150, 30, 16, 7.5 and 1.75 ohms.

Signal-to-Noise Ratio (12 watt output connection)

Microphone Channel—48 db at maximum gain.
 60 db at normal operating gain.
 Line Channel—77 db at maximum gain.

Output Noise (12 watt output connection)

Microphone Channel—-8 dbm at maximum gain.
 -25 dbm at 90 db gain.
 Line Channel—-87 dbm at maximum gain.

Output Power

12 watts at 5% total harmonic distortion over the 100 to 5000 cycle range when

operated into nominal load impedance. 20 watts over the 100 to 5000 cycle range at 5% total harmonic distortion when operated into nominal load impedance and power transformer is strapped and Western Electric vacuum tubes are used in the amplifier stages.

Volume Controls

Microphone Channel—35 db continuously variable, and "OFF".
 Master Control—Continuously variable to "OFF".

Power Supply

105 to 125 volts, 50 or 60 cycles, 1.1 amperes when strapped for 12 watts output, and 1.25 amperes maximum when strapped for 20 watts output. Fused with 1.6 ampere Buss Fustat.

Mounting

The KS-13625 Cabinet is recommended.

Dimensions

Amplifier—18-13/16" long, 7-3/8" high, 7-5/8" deep.
 Cabinet—19-3/4" long, 11" high, 9-3/4" deep.

Weight

Amplifier—20 pounds.
 Cabinet—15 pounds.

Finish

Amplifier—Light gray enamel.
 Cabinet—Light aluminum gray.

General Description

The 124H Amplifier is primarily intended for use on subscriber's premises in wired

music service. It has two channels, designated "LINE" and "MIC", and is equipped with a switch for selecting either channel. The "MIC" channel is intended for use with dynamic microphones where high gain is necessary and is also suitable for general use. The input transformer accommodates microphones with an internal impedance of 15 to 250 ohms. Input strapping is tabulated in Table I under the section "External Connections". The "MIC" channel has an individual gain control in addition to the common gain control for use on both channels.

The input transformer for the "LINE" channel allows this amplifier to be connected directly to telephone lines, thereby eliminating the necessity of installing a repeating coil between the line and the amplifier. This transformer accommodates input circuits of nominal impedances of 37.5, 150 and 600 ohms. Input strapping is tabulated in Table II under the section "External Connections".

The first stage of the 124H Amplifier is a Western Electric 116B Voltage Amplifier employing a 1612 Vacuum Tube and is used only for the "MIC" channel. It is terminated in the "MIC-LINE" switch. The second stage is a paraphase voltage amplifier in which a single input is converted for push-pull output to drive the third stage which is a push-pull power amplifier. The use of negative feedback results in a low internal output impedance and stabilizes the operation of the amplifier. Either Western Electric vacuum tubes or commercial receiving type vacuum tubes may be employed interchangeably, except that the amplifier should not be operated with a mixed complement of Western Electric and commercial receiving type vacuum tubes in the power stage. Six different output connections are recommended, thereby permitting any load impedance between 1 and 1200 ohms to be connected to the output. The amplifier as shipped is connected to give a power output of 12 watts when greater power is not required, with result-

ing lengthening of vacuum tube life and lower operating temperature. A power output of 20 watts is available if required, by restrapping the power transformer.

Mounted on the front side of the amplifier chassis are an "ON-OFF" switch, pilot light, main volume control common to both channels, and a "MIC-LINE" transfer switch. On the top of the chassis, adjacent to the "LINE" channel input transformer is mounted the gain control for the "MIC" channel. Two terminal strips for input and output external connections are located on the rear of the amplifier chassis. Strappings for various input and output impedance conditions are shown in tabular form under "External Connections".

105 to 125 volt alternating current power is brought in by means of a two conductor cord and attachment plug. The cord enters the chassis through a hole in the top which is provided with a cable clamp.

It is intended that the amplifier be mounted in cabinet KS-13625 which was specially designed for this purpose.

Ventilation

Sufficient ventilation should be provided so that the air temperature one inch above the center of the power transformer surface is not greater than 30°F. above the room temperature after the amplifier has been in operation for four hours. When mounted in the KS-13625 Cabinet sufficient air space is provided between the amplifier and the cabinet for proper ventilation. The cabinet should not be located in an enclosed space where free access to circulating air is not available.

Noise Pickup Precautions

When mounted near other amplifying equipment, particularly low level microphone or line amplifiers, sufficient clearance should be allowed between sensitive parts of such equipment and the power transformer of the 124H Amplifier to avoid induced noise pickup. Correspondingly, the 124H Amplifier input circuits should preferably not be located near other equipments about which strong magnetic fields

exist. If the 124H Amplifier is mounted near strong magnetic fields such that noise voltages are induced in the input transformers, the two input transformers may be rotated (limited to $\pm 180^\circ$ to prevent damage to leads) to a position of minimum pickup.

Volume Controls

The 124H Amplifier is equipped with two volume controls, one for the "MIC" channel and the other a master gain control. The "MIC" control varies the gain of the first amplifier stage by varying the bias on the 1612 Vacuum Tube. It is mounted on the plate on which is also mounted the input transformer for the "LINE" channel. The control is a potentiometer with a screwdriver slot for adjustment. It is intended for occasional adjustment but not for continual adjustment of the "MIC" channel level.

The master control is a potentiometer associated with the grid input circuit of the second voltage stage. It is mounted on the front side of the amplifier chassis and is calibrated in arbitrary divisions from 0 to 10.

Remote Volume Controls

Remote volume controls for adjusting the output level of the amplifier on either

or both channels can be provided by the purchaser. A 4000 ohm potentiometer similar to P102 can be connected external to the amplifier to terminals 18 and ground for control of the "MIC" channel level. In this case both controls in this circuit are mutually dependent on the setting of the associated control. (See schematic, Figure 4.) Remote control of the volume output of the "LINE" channel may be obtained by the use of an auxiliary attenuator, such as the Davern Type LA-802-G Ladder Type Network, or equivalent, with the output connections of the control connected to terminals 19 and 23 of the 124H Amplifier. When this additional control is used in wired music service, the general practice is to use an additional line isolation coil, such as the Western Electric 111C Repeating Coil, connected between the telephone line and the input connections of the external remote volume control. A suggested schematic diagram of the connections for this control and the additional line isolation coil is shown below (Figure 3). Neither the remote volume controls nor the line isolation coil are supplied as a part of the amplifier and must be obtained separately.

Volume Control Adjustment

In a particular installation, it is recommended that the volume controls be ad-

justed in the following manner:
With the channel switch to "LINE", position and normal drive on the "LINE" channel the master gain control is adjusted to the desired level at the listening point. The channel switch is then set to the "MIC" position and with normal input level on the "MIC" channel the channel volume control is adjusted to the desired level at the listening point without disturbing the master gain control adjustment that was determined above for the "LINE" channel.

Satisfactory operation should be obtained when operating the 124H Amplifier into any load impedance between 1 and 1200 ohms, as shown in Table III.

External Connections

Table I

INPUT TERMINAL CONNECTIONS—"MIC" CHANNEL

Nominal Source Impedance	Working Range of Source Impedance	Input Connections
30 ohms	15 to 60 ohms	13, 14
120 ohms	60 to 250 ohms	13, 15

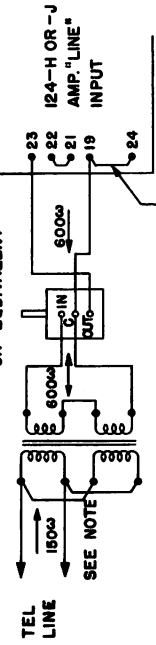
Table II

INPUT TERMINAL CONNECTIONS—"LINE" CHANNEL

Nominal Source Impedance	Working Range of Source Impedance	Strap Terminals	Input Connections
600 ohms	300 to 1200 ohms	21-22	19 and 23
150 ohms	75 to 300 ohms	19-22, 21-23	19 and 23
37.5 ohms	20 to 75 ohms	—	19 and 20

(The 37.5 ohm connection is the center tap for the 150 ohm winding.)

III-C REP. COIL ATTENUATOR DAVEN LA-802-G OR EQUIVALENT



NOTE. FOR STRAPPING III-C COIL CONSULT LOCAL TELEPHONE COMPANY. SEE TEXT

THIS STRAP USED ONLY WITH AUXILIARY REPEATING COIL. REMOVE STRAP IF REPEATING COIL IS DISCONNECTED.

Fig. 3—124H & J Amplifier Remote Volume Control Schematic

Table III

CONNECTIONS FOR VARIOUS LOADS

Nominal Load Impedance	Working Range of Load Impedance	Strap Terminals	Input Connections	Output Connections
600 ohms	300 to 1200 ohms	4-5, 6-7, 8-9	1 and 2	1 and 2
150 ohms	70 to 300 ohms	4-5, 6-2, 8-9, 1-7	1 and 2	1 and 2
30 ohms	20 to 70 ohms	4-5, 6-7, 8-9	3 and 10	3 and 10
16 ohms	10 to 20 ohms	4-5-7, 6-8-9	3 and 10	3 and 10
7.5 ohms	3 to 10 ohms	4-6-7-9, 3-5, 8-10	3 and 10	3 and 10
1.75 ohms	1 to 3 ohms	3-5-7-9, 4-6-8-10	3 and 10	3 and 10

For wired music service the local telephone company should be consulted for the "LINE" channel is used, connections can be made as shown in Figure 3,

on page 279

Power

The 124H Amplifier is furnished with a 10-foot length of cord equipped with a Hubbel plug cap. This cord is supplied connected to one side of switch D1 and lamp socket LPS-1. (See wiring diagram, Figure 5.) This connection is for operation with line voltages between 115 and 125 volts. For operation from line voltages between 105 and 115 volts, the BLK-RD wire from transformer T3 should be disconnected from LPS-1, and the BLK-YEL. wire from transformer T3 (which will be found taped) should be connected to the terminal on LPS-1 from which the BLK-RD wire was removed. The BLK-RD wire should be carefully taped to prevent accidental contact with ground or any other parts of the amplifier.

A 1.6 ampere Buss Fustat is screwed in a mounting on the chassis. This type of fuse gives maximum protection to the amplifier, and it is inadvisable to employ any other type. Consult the distributor or dealer from whom the amplifier was purchased for sources of supply.

Ground

The terminal marked "G" should be connected to a good building ground. Ground connections should not be made to any other point of the amplifier; except, when a remote "LINE" channel volume control is used, ground should be connected to terminal 19. (See Figure 3.) This ground should be removed if the external control is disconnected.

Safety Precautions

The local inspection authority should be

Nominal Load Impedance	Working Range of Load Impedances
400 ohms	200 to 800 ohms
100 ohms	50 to 200 ohms
20 ohms	10 to 50 ohms
10 ohms	5 to 15 ohms
5 ohms	2 to 7.5 ohms
1 ohm	0.5 to 2 ohms

consulted regarding installation and use of power equipment. In general, in order to meet these requirements, no terminals or wiring involving the a-c supply or secondary power should be exposed to accidental contact. This condition is ordinarily met when the amplifier is mounted in the KS-13625 Cabinet.

Changes for Increased Power Output

The amplifier as supplied is connected for 12 watt operation, and either 6L6 or 350B Vacuum Tubes may be used in the output stage. If 20 watt operation is required, the following changes should be made:

1. Short circuit resistor R10.1 (100 ohm section).
2. Replace the two orange colored wires connected to the rectifier tube socket marked 5U4G-274B with the two unconnected red wires having taped ends. The orange wires removed should be taped.
3. If 6L6 Vacuum Tubes are used, they should be replaced with Western Electric 350B Vacuum Tubes. Operation with 6L6 Tubes is not recommended as the tubes will be operated at voltages and dissipations above those recommended by the manufacturer; and, consequently, short or unsatisfactory tube life can be expected.

For the 20 watt condition, the nominal load impedances and the working range of load impedances as shown in the output transformer terminations table of the schematic diagram should be changed to values two-thirds of those indicated. The revised table is as follows:

Strap Terminals	Output Connections
7-8, 9-10, 11-12	5 and 14
7-8, 9-14, 11-12, 5-10	5 and 14
7-8, 9-10, 11-12	6 and 13
7-8-10, 9-11-12	6 and 13
7-9-10-12, 6-8, 11-13	6 and 13
6-8-10-12, 7-9-11-13	6 and 13

Vacuum Tubes

Either Western Electric vacuum tubes or commercial receiving type vacuum tubes can be used interchangeably in the 124H Amplifier, except that the amplifier should not be operated with a mixed complement of Western Electric and commercial receiving type vacuum tubes in the power stage.

The vacuum tubes should be inserted in the sockets as indicated by the markings on the chassis. Connect the flexible grid leads to the tubes in the voltage stages, and if glass tubes are installed, the vacuum tube shields supplied with the amplifier should be placed over these tubes. Tube shields are not required with metal tubes.

Vacuum tubes are an important factor affecting both gain and total noise. A judicious selection of vacuum tubes will result in optimum performance.

Maintenance

No routine maintenance of the 124H Amplifier is required other than the occasional checking and replacement, when necessary, of vacuum tubes. If the amplifier fails to operate properly, the trouble may be traced through the use of the schematic diagram, Figure 4, and the wiring diagram, Figure 5.

Associated Parts

The following vacuum tubes required for operation must be ordered separately.

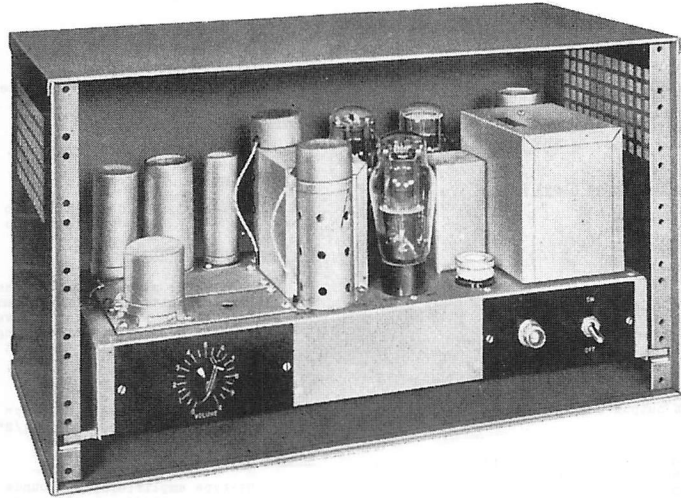
Western Electric Vacuum Tubes	Commercial Receiving Type Vacuum Tubes
2-348A	or 2-6J7 or 6J7G
2-350B	or 2-6L6 or 6L6G
1-274B	or 1-5T4 or 5U4G
—	1-1612

Additional volume controls or additional line isolation coils are not supplied with the 124H Amplifier. These items must be obtained separately.

It is suggested that spare 1.6 ampere Buss Fustats be kept on hand in case of accidental blowout.

Pilot lamp E1 is a neon NE51 Glow Lamp. It is recommended that spare lamps be kept on hand in case of accidental breakage.

Additional information regarding this amplifier, its use in special services, or in connection with other apparatus, may be obtained from the distributor from whom the amplifier was purchased.



124J Amplifier shown mounted in a KS-13625 List 1 Cabinet (face mat not shown).

Use — The 124J Amplifier is particularly suitable for wired program service and as a general purpose monitoring amplifier for speech and music.

Description — The 124J is a single channel line level amplifier. It can be operated directly from telephone lines and meets the requirements imposed by telephone companies for such equipment, hence, separate isolating coils are not required where local telephone company practices permit. The mechanical design affords ease of installation and accessibility in servicing and maintenance. Operation into impedances from 1 to 1200 ohms is provided for by screw terminal strapping. A wide variety of loudspeaker combinations can be matched in impedance without loss of power or introduction of harmonics.

This amplifier is designed for mounting in a KS-13625 List 1 Cabinet, which can be ordered separately. Versatility of design in this amplifier permits it to be used in fixed installations or as portable equipment.

Features

- Designed to be operated directly from telephone lines where local telephone company practices permit.
- Maximum accessibility for servicing and maintenance.
- Output terminal connections permit matching to a wide range of load impedances.
- Self-contained power supply protected by thermal cutout fuse.
- Stabilized feedback gives high quality, reduces distortion and noise.

Typical Specifications

Frequency Response: ±1 db, 50 to 10,000 cycles, down approximately 3 db at 15,000 cycles.

Output Noise: —37 dbm.

Source Impedance: 20 to 1,000 ohms (nominal 37½, 150 or 600 ohms).

Load Impedance: 1 to 1,200 ohms. See Figure 13.

Maximum Gain: 67 db.

Gain Control: 35 db continuously variable.

Output Power: 12 watts (41 dbm) with less than 5% total harmonic distortion, 50 to 5000 cycles. 20 watts (+43 dbm) with 5% harmonics at 400 cycles with 600 ohm load.

Power Supply: 105-125 volts, 60 cycles, 1.25 amperes, 125 watts maximum. Fused with 1.6 ampere thermal cut-out fuse.

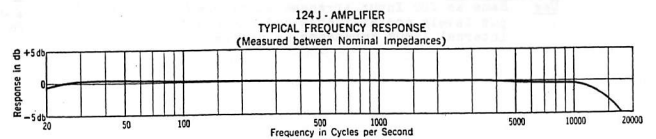
VACUUM TUBES

Quantity Required	Western Electric	Commercial Receiver Type
2	348A	or 6J7 (or 6J7G)
2	350B	or 6L6 (or 6L6G)
1	274B	or 5T4 (or 5U4G)
5		

Mounting: KS-13625 List 1 Cabinet is available and can be ordered separately.

Weight: Amplifier—20 pounds. Cabinet—15 pounds.

Finish: Chassis—light gray enamel. Cabinet—light aluminum gray.



Frequency Response Curve 124J Amplifier

NO 1-25
AMPLIFIERS
124 TYPE

4-15-41

GENERAL

The 124-type amplifiers will fit a variety of requirements, depending on the input circuit arrangement used. Certain characteristics common to all 124-type amplifiers are given below, and the individual variations are then indicated.
This sheet gives a condensation of characteristics. For more details refer to the individual sheet on the particular amplifier as follows:

Amplifier	Apparatus Reference Sheet No.
124A	1-26
124B	1-27
124C	1-28
124D	1-29
124E	1-30
103C	1-31
103D	1-32

Power Supply Requirements

105-125 volts, 50-60 cycles, 1.1 amperes, 105 watts maximum for 12 watt output connection.
105-125 volts, 50-60 cycles, 1.25 amperes, 125 watts maximum for 20 watt output connection.

Output Power

12 Watts, 2.0% total Harmonics at 400 cycles into nominal load impedance. May be reconnected from 20 watts with 5% harmonic content.

Load Impedance

Nominal load impedance of 600, 150, 30, 16, 7.5 or 1.75 ohms. Will operate satisfactorily into any load between 1 and 1200 ohms. See schematic on other side of sheet for proper strapping for load impedance to be used.

Gain

Values given are with W.E. tubes. Subtract .7 db for RCA Tubes.

Internal Output Impedance

3/4 of nominal load impedance.

Output Noise

Unweighted, -37 db relative to .001 watt for 124A,B,C,E.
-8 db relative to .001 watt for 124D.

Maximum Input Level

The figures given below for the maximum input voltages permitted with the different amplifiers are based on the limitation due to amplifier overload, input transformer harmonic generation, or heating of the input network, whichever occurs at the highest voltage.

Size

124-type amplifiers, 19"x7"x7"
103-type amplifiers, 20"x8-1/2"x10"

Weight

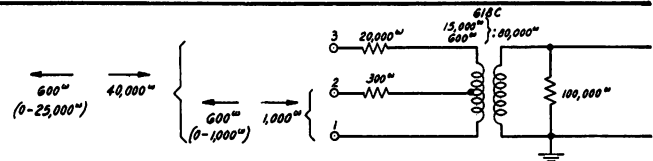
124-type amplifiers, 20 pounds
103-type amplifiers, 40 pounds

Power Switch

A power switch is supplied on all except the 124A amplifier.

124A Amplifier

Gain 50 db - Bridging Input - Terminals 1 & 3
85 db - High Gain Input - Terminals 1 & 2
Gain Control None
Maximum Input .75V Single freq-Bridging Input
.10V Single freq-High Gain Input
Use General purpose where no gain control is required. Replaces 94C Amplifier.

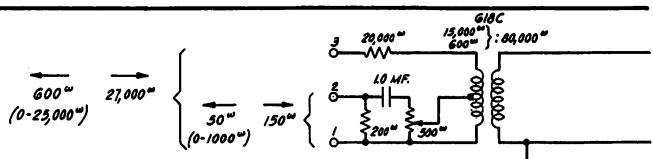


124B Amplifier

SD-95104-01 Systems Circuit
Used for telephone line application - See reverse side of this sheet

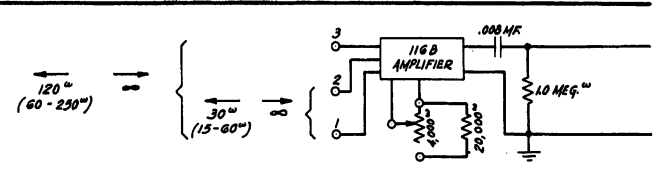
124C Amplifier

SD-96330-01 -Systems Circuit
Gain 50 db - Bridging Input - Terminals 1 & 3
58 db - High Gain Input - Terminals 1 & 2
Gain Control 45 db Continuously Variable - High Gain Input Only.
Maximum Input .85V Single freq. Bridging Input
5.0V Single freq. High Gain Input
Use Used wherever a carbon microphone source is required. Replaces 103A and B Amplifiers. Used in the 103D Amplifier which replaces the 103A and B Amplifiers.



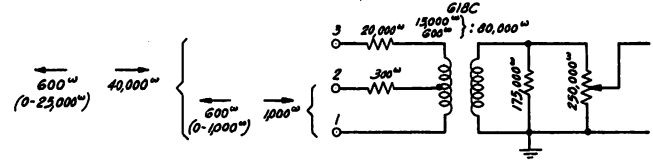
124D Amplifier

Gain 107 db
Gain Control 35 db Continuously Variable
Paralleled remote control may be used if desired.
Maximum Input .008V Single freq. terms 1 & 2
.016V Single freq. terms 1 & 3
Use General purpose where high gain is required. Replaces 85 type and 92 type Amplifiers. Used in 103D Amplifier.



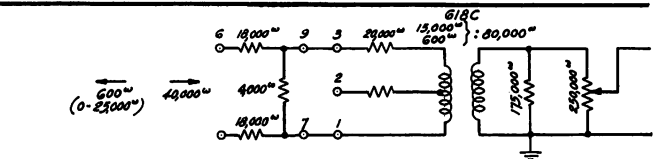
124E Amplifier - Input Arrangement #1

Gain 50 db - Bridging input - Terminals 1 & 3
85 db - High Gain Input - Terminals 1 & 2
Gain Control 38 db in 2 db steps
Maximum Input 25V single freq. Bridging Input
3V single freq. High Gain Input
Use General purpose where gain control is desired. Replaces 94D Amplifier.



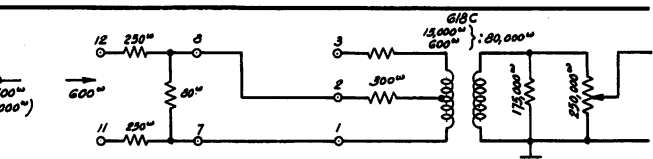
124E Amplifier - Input Arrangement #2

Gain 30 db
Gain Control 38 db in 2 db steps
Maximum Input 100V Single frequency
Use Same as for Input Arrangement #1 when higher input levels are available.

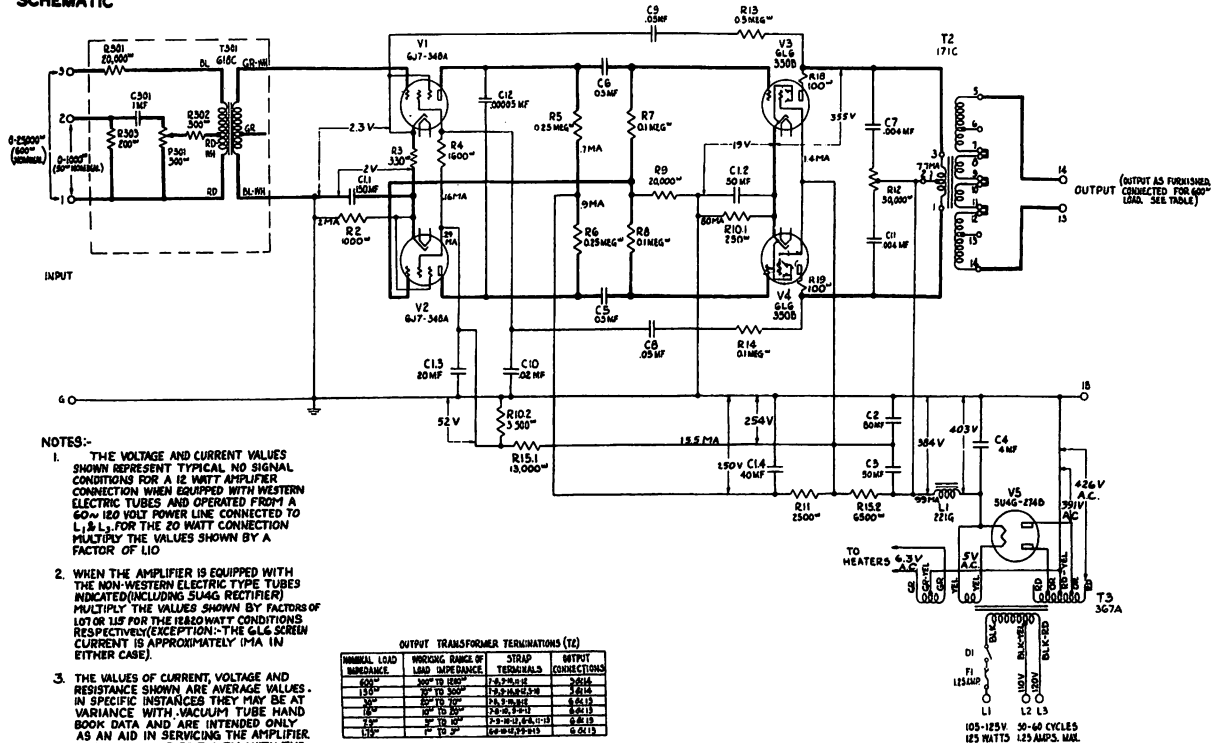


124E Amplifier - Input Arrangement #3

Gain 43 db
Gain Control 38 db in 2 db steps
Maximum Input 10V Single freq.
Use Same as for Input Arrangement #1 when higher input levels are available and where a 600 ohm internal input impedance is desired.



SCHEMATIC



- NOTES:-**
1. THE VOLTAGE AND CURRENT VALUES SHOWN REPRESENT TYPICAL NO SIGNAL CONDITIONS FOR A 12 WATT AMPLIFIER CONNECTION WHEN EQUIPPED WITH WESTERN ELECTRIC TUBES AND OPERATED FROM A 60-120 VOLT POWER LINE CONNECTED TO L, S, L, FOR THE 20 WATT CONNECTION MULTIPLY THE VALUES SHOWN BY A FACTOR OF 1.10
 2. WHEN THE AMPLIFIER IS EQUIPPED WITH THE NON-WESTERN ELECTRIC TYPE TUBES INDICATED (INCLUDING 504G RECTIFIER) MULTIPLY THE VALUES SHOWN BY FACTORS OF 1.07 OR 1.17 FOR THE 12WATT CONDITIONS RESPECTIVELY (EXCEPTION:-THE 6L6 SCREEN CURRENT IS APPROXIMATELY 1.1MA IN EITHER CASE)
 3. THE VALUES OF CURRENT, VOLTAGE AND RESISTANCE SHOWN ARE AVERAGE VALUES. IN SPECIFIC INSTANCES THEY MAY BE AT VARIANCE WITH VACUUM TUBE HAND BOOK DATA AND ARE INTENDED ONLY AS AN AID IN SERVICING THE AMPLIFIER READINGS SHOULD BE TAKEN WITH THE EQUIVALENT OF A VOLT-OHM-METER WHOSE RESISTANCE IS AT LEAST 1000 OHMS PER VOLT.

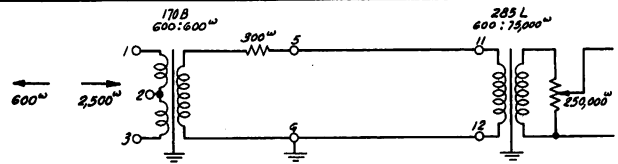
OUTPUT TRANSFORMER TERMINATIONS (Ω)

INTERNAL LOAD IMPEDANCE	PRIMARY RANGE OF LOAD IMPEDANCE	STRIP TERMINALS	OUTPUT CONNECTIONS
600	300 TO 1200	1, 2, 3, 4, 5	1, 2, 12
120	20 TO 300	1, 2, 3, 4, 5	2, 11, 12
10	10 TO 20	1, 2, 3, 4, 5	3, 11, 12
1	1 TO 10	1, 2, 3, 4, 5	4, 11, 12
0.1	0.1 TO 1	1, 2, 3, 4, 5	5, 11, 12
0.01	0.01 TO 0.1	1, 2, 3, 4, 5	6, 11, 12

**SCHEMATIC
124C AMPLIFIER
(TYPICAL OF 124 TYPE AMPLIFIERS)**

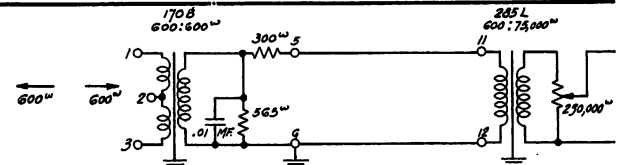
124B Amplifier - Input Arrangement #1

Gain 68.6 db
Gain Control 38 db in 8 db steps
Maximum Input 2.4V single freq.
Use Primarily designed for associate company use. Meets Bell System longitudinal balance requirements.



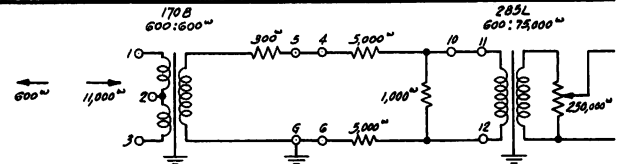
124B Amplifier - Input Arrangement #2

Gain 60.6 db
Gain Control 38 db in 8 db steps
Maximum Input 2.4V single freq.
Use Same as for Input Arrangement #1 where an internal input impedance of 600 ohms is required.



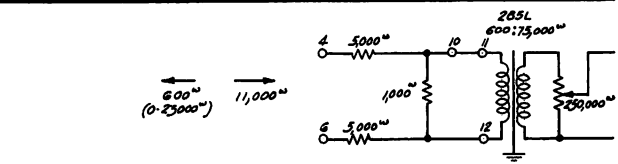
124B Amplifier - Input Arrangement #3

Gain 45.4 db
Gain Control 38 db in 8 db steps
Maximum Input 2.4V single freq.
Use Same as Input Arrangement #1 where a high internal input impedance is required for bridging purposes.



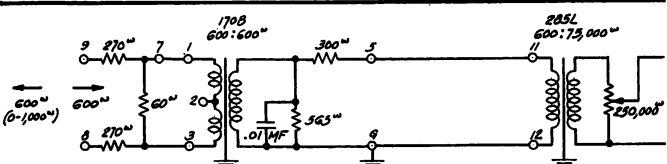
124B Amplifier - Input Arrangement #4

Gain 45.4 db
Gain Control 38 db in 8 db steps
Maximum Input 38.5V single freq.
Use For bridging purpose where high levels are encountered. This arrangement does not meet the longitudinal balance requirements.



124B Amplifier - Input Arrangement #5

Gain 40.6 db
Gain Control 38 db in 8 db steps
Maximum Input 10V single freq.
Use Same as Input Arrangement #1 where an internal input impedance of 600 ohms is required, and where high levels are encountered.



NO 1-25A
AMPLIFIERS
124 TYPE

12-20-40

AMPLIFIER	124A		124B					124C		124D		124E					103C		103D		
	BRIDGING INPUT	HIGH GAIN INPUT	ARRANGEMENT NO. 1	NO. 2	NO. 3	NO. 4	NO. 5	BRIDGING INPUT	HIGH GAIN INPUT	30" INPUT	120" INPUT	ARRANGEMENT NO. 1	ARRANGEMENT NO. 2	ARRANGEMENT NO. 3	ARRANGEMENT NO. 4	ARRANGEMENT NO. 5	NOMINAL (AS SHIPPED)	REPEATING COIL INPUT	BRIDGING INPUT	30" INPUT (AS SHIPPED)	120" INPUT
GAIN IN DECIBELS (SEE NOTE 1)	50	83	86.6	80.6	45.4	45.4	40.6	50	58	107	107	50	63	30	43	58	56	50	107	107	
GAIN CONTROL	NONE		36DB IN 2DB STEPS & OFF					NONE	45DB CONTINUOUSLY VARIABLE	35DB CONTINUOUSLY VARIABLE		36DB IN 2DB STEPS & OFF					45DB CONTINUOUSLY VARIABLE	NONE	35DB CONTINUOUSLY VARIABLE		
MAX. SINGLE FREQ INPUT VOLTAGE	0.75	0.1	2.4	2.4	2.4	38.5	10	0.85	5	.008	.016	25	3	100	10	5	5	0.85	.008	.016	
INPUT TERMINALS	1 & 3	1 & 2	1 & 3	1 & 3	1 & 3	4 & 6	8 & 9	1 & 3	1 & 2	1 & 2	1 & 3	1 & 3	1 & 2	5 & 6	11 & 12	1 & 2	3 & 6	WIRING CHANGE REQ.	1 & 2	WIRING CHANGE REQ.	
SOURCE IMPEDANCE IN OHMS	NOMINAL	600	600	600	600	600	600	600	50	30	120	600	600	600	600	50	50	600	30	120	
	OPERATING RANGE	0-25000	0-1000	600	600	600	0-25000	0-1000	0-25000	0-1000	15-60	60-250	0-25000	0-1000	0-25000	0-1000	0-1000	50-1000	0-25000	15-60	60-250
INTERNAL INPUT IMPEDANCE IN OHMS (APPROX.)	40000	1000	2500	600 SEE NOTE 2	11000	11000	600 SEE NOTE 2	27000	150	HIGH UNTERMINATED INPUT TRANSFORMER		40000	1000	40000	600	150	125	27000	HIGH UNTERMINATED INPUT TRANSFORMER		
LOAD IMPEDANCE	AS SHIPPED	NOMINAL	600					600		600		7.5					600		600		
	AVAILABLE	NOMINAL	600, 150, 30, 16, 7.5 OR 1.75																		
	OPERATING RANGE	1 - 1200																			
INTERNAL OUTPUT IMPEDANCE IN OHMS (APPROX.)	TERMINALS 13 & 14	3/4 OF NOMINAL LOAD IMPEDANCE																			
	TERMINALS 16 & 17	600 OHMS WHEN OUTPUT COIL 13 STRAPPED FOR 600 OHM LOAD IMPEDANCE. (AS SHIPPED)																			
OUTPUT POWER	AS SHIPPED	12 WATTS 2% TOTAL HARMONICS AT 400 CYCLES INTO NOMINAL LOAD IMPEDANCE																			
	AVAILABLE	20 WATTS, 5% TOTAL HARMONICS AT 400 CYCLES INTO NOMINAL LOAD IMPEDANCE																			
OUTPUT NOISE IN DB RELATIVE TO .001 WATT (UNWEIGHTED)	-37	-37					-37		-6		-37					-37		-6			
FREQUENCY CHARACTERISTIC MEASURED BETWEEN NOMINAL SOURCE AND LOAD IMPEDANCES	±1 DB 25-10000 ~ -2 DB AT 16000 ~		±1 DB 25-10000 ~ -4 DB AT 16000 ~		±1 DB 25-10000 ~ -3 DB AT 16000 ~			±1 DB 25-10000 ~ -3 DB AT 16000 ~		±1 DB 25-10000 ~ -2 DB AT 16000 ~		-2 DB AT 25 ~ 11 DB 30-10000 ~ -2 DB AT 16000 ~			-12 DB AT 30 ~ -14 DB AT 50 ~ -15 DB AT 10000 ~ -2 DB AT 16000 ~		-2 DB AT 10000 ~ -20 DB AT 40000 ~				
POWER REQUIRED	A C	105-125 VOLTS (FOR 20 WATT OUTPUT CONNECTION, 1.25 AMPERES, 125 WATTS 50-60 CYCLES) (FOR 12 WATT OUTPUT CONNECTION, 1.1 AMPERES, 105 WATTS)																			
	D C	NONE		NONE					NONE		NONE		NONE					14-60 VOLTS FOR RELAY AND CARBON MICROPHONE		14-60 VOLTS FOR RELAY	
EXTERNAL POWER SUPPLY FACILITIES	NONE																				
FUSE	1.25 AMPERE "BUSS FUSTAT" ON CHASSIS																				
POWER SWITCH	NO	YES					YES		YES		YES					YES		YES			
DIMENSIONS	19" x 7" x 7"																				
WEIGHT	20 POUNDS																				
FINISH	CHASSIS - ALUMINUM LACQUER CODE - 3 MAT - BLACK ENAMEL CODE - 3 ALUMINUM GRAY CODE - 15 ALUMINUM LACQUER CODE - 24 124 B AND C ONLY																				
VACUUM TUBES	WE OR RCA 2-348A OR 2-6J7 OR 6J7G 2-350B OR 2-6L6 OR 6L6G 1-274B OR 1-5T4 OR 5U4G								SAME AS FOR 124A & 1-RCA-1612				SAME AS FOR 124A					SAME AS FOR 124A & 1-RCA-1612			
COVER	102A COVER TO PROTECT APPARATUS AND VACUUM TUBES WGT 3 LBS																				
ASSEMBLY	ESX-67595-4																				
SCHEMATIC	ESXX-675955	ESXX-676164					ESXX-676165		ESXX-676166		ESXX-676169					ESXX-676176		ESXX-676178			
WIRING DIAGRAM	ESX-675956		ESX-676167					ESX-676168		ESX-676169		ESX-676190					ESX-676177		ESX-676179		
APPARATUS REFERENCE SHEET	1-26		1-27					1-28		1-29		1-30					1-31		1-32		

NOTES:
1. GAIN AT 1000 CYCLES BETWEEN NOMINAL SOURCE AND LOAD IMPEDANCES, WITH W.E. TUBES
2. 600 OHMS ± 10% BETWEEN 50 - 8000 CYCLES