NO 1-9
AMPLIFIER
103A

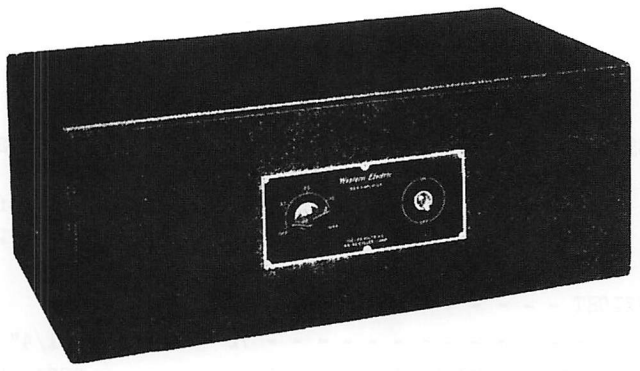
4-28-37

ELECTRICAL CHARACTERISTICS

GAIN - - - - - - - - - - - - - - - MAX. 58db
OPERATES FROM - - - - - - - - - - 200 OHMS
INTERNAL INPUT IMPEDANCE - - - 500 OHMS
OPERATES INTO - - - - - - - - - 8 OR 500 OHMS
INTERNAL OUTPUT IMPEDANCE - - 1/2 OF LOAD IMPEDANCE
OUTPUT POWER - - - - - - - - - - 8 WATTS, 5% HARMONIC DISTORTION
OUTPUT NOISE - - - - - - - - - -50db UNWEIGHTED
POWER SUPPLY - - - - - - - - - - 105-125 VOLTS, AC 45-65 CYCLES, 75 WATTS. SHOULD BE FUSED FOR 1 AMPERE.

A D.C. VOLTAGE 14-60 VOLTS IS REQUIRED TO OPERATE THE RELAY IN THIS AMPLIFIER.

GAIN CONTROL - - - - - - - - - - A 500 OHM POTENTIOMETER IS PROVIDED. 40db CONTINUOUS VARIATION.



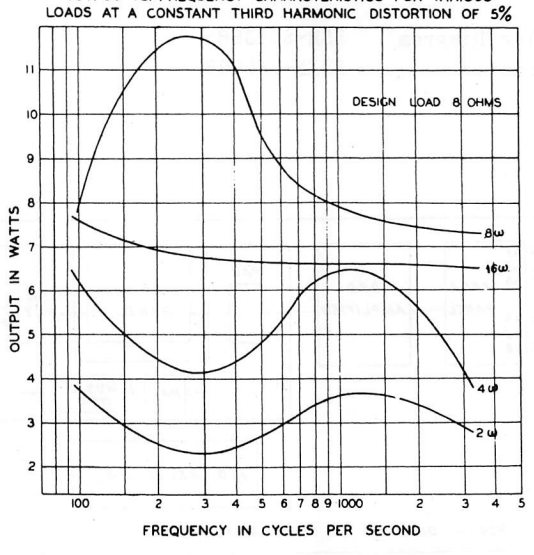
EQUIPMENT CHARACTERISTICS

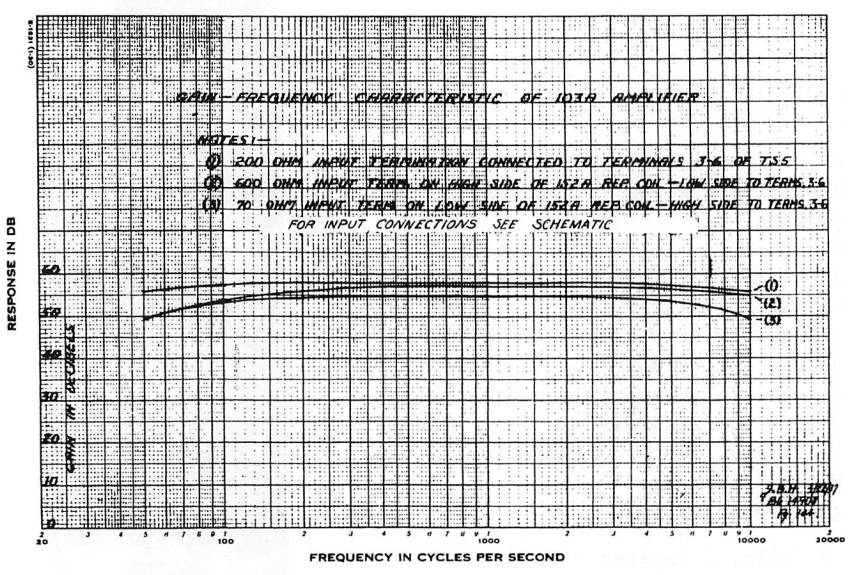
WEIGHT - - - - - - - - - - - - - 40 LBS.
SIZE - - - - - - - - - - - - - - 19-13/16" x 7-7/8" x 10-3/4"
MOUNTING - - - - - - - - - - - - IT IS DESIGNED FOR DESK OR TABLE MOUNTING.

NOTES 1. THIS AMPLIFIER CONSISTS OF A 109A AMPLIFIER MOUNTED IN A METAL CABINET AS ILLUSTRATED. ADDITIONAL INFORMATION ON THE 109A AMPLIFIER IS GIVEN ON SHEET NO. 1-10.

2. FACILITIES ARE PROVIDED IN THE 103A AMPLIFIER FOR MOUNTING A 152A REPEATING COIL, BUT THIS COIL MUST BE ORDERED SEPARATELY. WHEN THIS COIL IS USED THE AMPLIFIER OPERATES FROM A 600 OHM IMPEDANCE AND SUPERIMPOSED D.C. CURRENTS AS HIGH AS 100 MILLIAMPERES MAY BE APPLIED. (SEE ALSO NOTE 3 OF SCHEMATIC.)

OUTPUT VS. FREQUENCY CHARACTERISTICS FOR VARIOUS LOADS AT A CONSTANT THIRD HARMONIC DISTORTION OF 5%



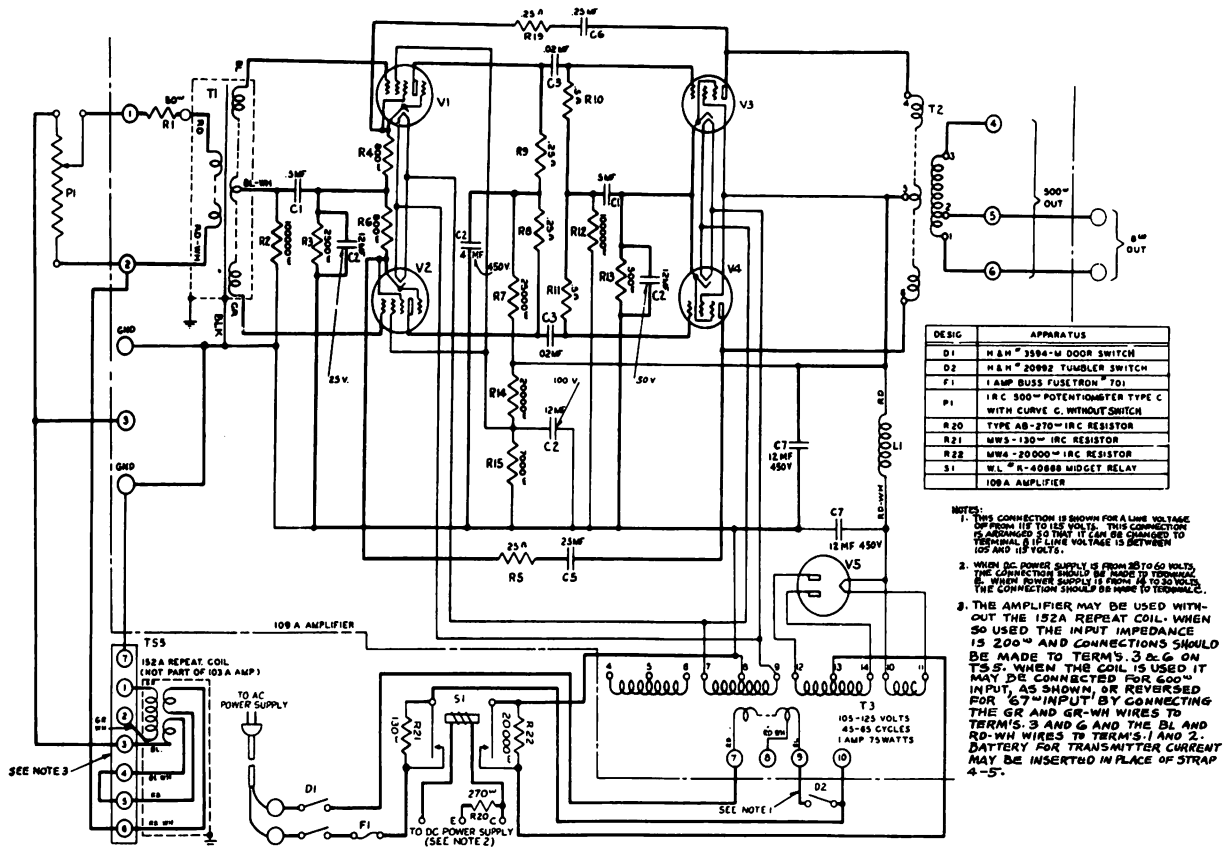


REFERENCE

HARMONIC CONTENT
VS
POWER OUTPUT

ES-732177
ES-732178
ES-732179
ES-732180

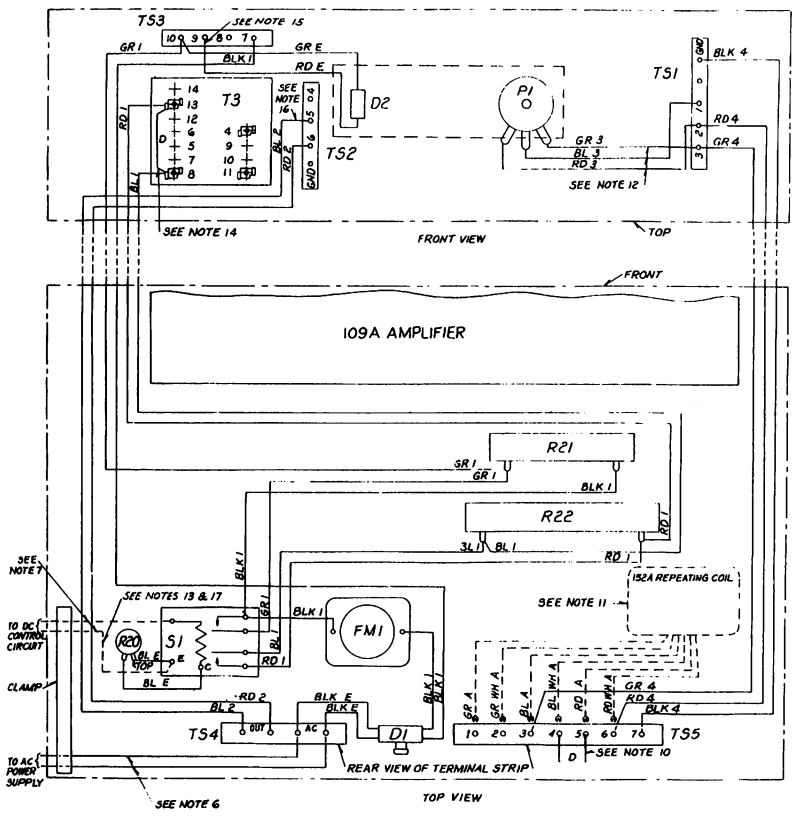
SCHEMATIC



DESIG	APPARATUS
D1	H & H # 3594-M DOOR SWITCH
D2	H & H # 20992 TUMBLER SWITCH
F1	1 AMP BUSS FUSETRON # 701
P1	I R C 500Ω POTENTIOMETER TYPE C WITH CURVE C, WITHOUT SWITCH
R20	TYPE AB-270Ω I R C RESISTOR
R21	MW5-130Ω I R C RESISTOR
R22	MW4-20000Ω I R C RESISTOR
S1	W. L. # K-40688 MIDGET RELAY
	109 A AMPLIFIER

NOTES:
1. THIS CONNECTION IS SHOWN FOR A LINE VOLTAGE UP FROM 115 TO 125 VOLTS. THIS CONNECTION IS ARRANGED SO THAT IT CAN BE CHANGED TO TERMINAL 8 IF LINE VOLTAGE IS BETWEEN 105 AND 115 VOLTS.
2. WHEN DC POWER SUPPLY IS FROM 28 TO 60 VOLTS, THE CONNECTION SHOULD BE MADE TO TERMINAL 8. WHEN POWER SUPPLY IS FROM 14 TO 30 VOLTS, THE CONNECTION SHOULD BE MADE TO TERMINAL C.
3. THE AMPLIFIER MAY BE USED WITHOUT THE 152A REPEAT COIL. WHEN SO USED THE INPUT IMPEDANCE IS 200Ω AND CONNECTIONS SHOULD BE MADE TO TERM'S. 3 & 6 ON TS5. WHEN THE COIL IS USED IT MAY BE CONNECTED FOR 600Ω INPUT, AS SHOWN, OR REVERSED FOR 67Ω INPUT BY CONNECTING THE GR AND GR-WH WIRES TO TERM'S. 3 AND 6 AND THE BL AND RD-WH WIRES TO TERM'S. 1 AND 2. BATTERY FOR TRANSMITTER CURRENT MAY BE INSERTED IN PLACE OF STRAP 4-5.

WIRING DIAGRAM

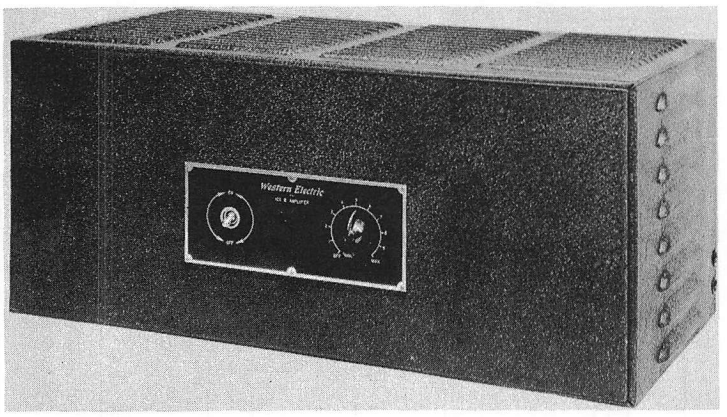


DESIG.	APPARATUS
D1	H&H #3594-M DOOR SWITCH
D2	H&H #20992 TUMBLER SWITCH
FM1	BRYANT #62569 PLUGFUSE CUTOUT BASE
P1	I.R.C. 500Ω POTENTIOMETER TYPE C WITH CURVE C
R20	TYPE AB-270Ω I.R.C. RESISTOR
R21	MW5-130Ω I.R.C. RESISTOR
R22	MW4-20000Ω I.R.C. RESISTOR
S1	W.L. #K-40688 MIDGET RELAY
TS4	TERMINAL STRIP, ESO 622567-3
TS5	TERMINAL STRIP, ESO 622567-4
	109 A AMPLIFIER

NOTES:
1. WIRES MARKED A ARE TERMINAL LEADS FURNISHED WITH APPARATUS.
2. WIRES MARKED 1, 2, 3, OR 4 INDICATE CABLE IN WHICH WIRES ARE RUN.
3. WIRES MARKED D ARE STRAPS OF #18 AWG T WIRE.
4. ALL WIRES ARE #22 AWG SOLID WIRE PER MS7612 UNLESS OTHERWISE SPECIFIED.
5. WIRES MARKED E ARE OPEN FORM.
6. CORD 10 FT. LONG OF 2-18 (POS-J) 1/32 RUBBER SPECIAL BLACK CORD WITH MOULDED-ON PLUG ON ONE END. OTHER END STRIPPED 3/4 IN. AND TINNED.
7. NOT FURNISHED AS PART OF 103A AMPLIFIER.
8. APPARATUS DESIGNATED T3, TS1, TS2, AND TS3 ARE PART OF 109A AMPLIFIER.
9. ALL SOLDERING SHALL BE MADE IN ACCORDANCE WITH KS512, METHOD D.
10. THIS CONNECTION TO BE MADE UNDER SCREW HEADS WITHOUT SOLDERING.
11. NOT PART OF 103A AMPLIFIER; IF REQUIRED SHALL BE INSTALLED AND CONNECTED TO TS5 IN FIELD.
12. TIE TO PARALLELING CABLE IN 109A AMPLIFIER.
13. TERMINAL NUMBERS SHOWN, BUT NOT APPEARING ON APPARATUS, ARE FOR REFERENCE ONLY.
14. REMOVE STRAP BETWEEN TERMINALS 8 AND 13 OF T3.
15. CONNECT WIRE RD, E FROM D2 TO TERMINAL 9 OF TS3. THIS CONNECTION CORRESPONDS TO A LINE VOLTAGE OF FROM 115 TO 125 VOLTS. THIS LEAD SHALL BE ARRANGED SO THAT IT CAN BE CHANGED IN THE FIELD TO TERMINAL 8 IF LINE VOLTAGE IS BETWEEN 105 AND 115 VOLTS.
16. THE BL, 2 WIRE FROM TS4 TO TERMINAL 5 OF TS2 IS FOR 8 OHM OUTPUT CONNECTION. THIS LEAD SHALL BE ARRANGED SO THAT IT CAN BE CHANGED IN THE FIELD TO TERMINAL 4 FOR 500 OHM OUTPUT CONNECTION.
17. D.C. CONTROL WIRE SHOWN CONNECTED TO TERM. AL E IN S1 CORRESPONDS TO THE CONDITION FOR 28 TO 60 VOLT OPERATION. FOR 14 TO 30 VOLT OPERATION THE D.C. CONTROL WIRE SHALL BE CONNECTED TO TERMINAL C.

NO 1-12
AMPLIFIER
103B

1-5-39



ELECTRICAL CHARACTERISTICS

GAIN	61 DB (MAX) WHEN WORKING BETWEEN A 200-OHM GENERATOR AND A 500 OR 8-OHM LOAD. FIG. 1
OPERATES FROM	0-500 OHMS
INTERNAL INPUT IMPEDANCE	500 OHMS
OPERATES INTO	8 OR 500 OHMS
INTERNAL OUTPUT IMPEDANCE	1/2 OF LOAD IMPEDANCE
OUTPUT POWER	12 WATTS OR +33 DB (0 LEVEL = .006 WATTS) 5% TOTAL HARMONIC DISTORTION. FIGS. 2 & 3.
OUTPUT NOISE	(-) 40 DB UNWEIGHTED (0 LEVEL = .006 WATTS).
POWER SUPPLY	105-125 VOLTS, 45-65 CYCLES, 100 WATTS. FUSE FOR 1.25 AMPS. 14-60 VOLTS DC IS REQUIRED TO OPERATE THE RELAY.
GAIN CONTROL	500-OHM POTENTIOMETER (40 DB CONTINUOUS VARIATION).

EQUIPMENT CHARACTERISTICS

WIDTH	20-1/4 INCHES
HEIGHT	9 INCHES
DEPTH	11-1/4 INCHES
WEIGHT	APPROX. 40 LBS.
MOUNTING	TABLE

VACUUM TUBES

	METAL		GLASS
FIRST STAGE	TWO - 6J7	OR	TWO - 6J7G
SECOND STAGE	TWO - 6L6	OR	TWO - 6L6G
RECTIFIER	ONE - 5Z4	OR	ONE - 5V4G

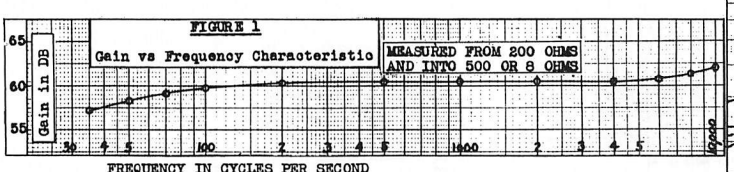
REFERENCES

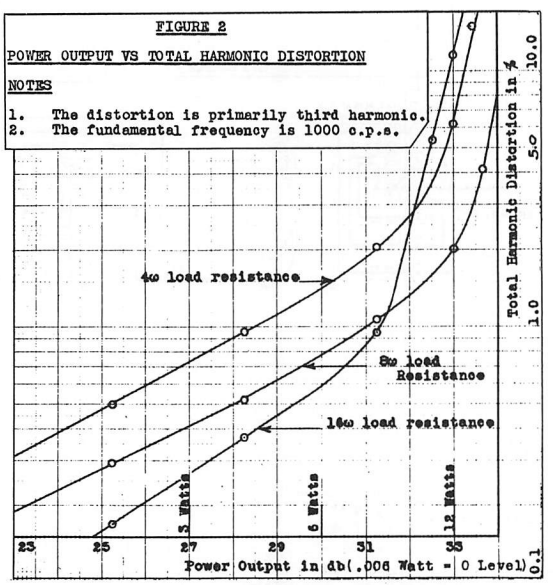
ESR-612452	-	ASSEMBLY
ESO-612453	-	SCHEMATIC
ESO-612454	-	WIRING DIAGRAM
ES-743721	-	GAIN VS FREQUENCY CHARACTERISTIC
ES-743672	-	POWER OUTPUT VS TOTAL HARMONIC
ES-743673	-	DISTORTION

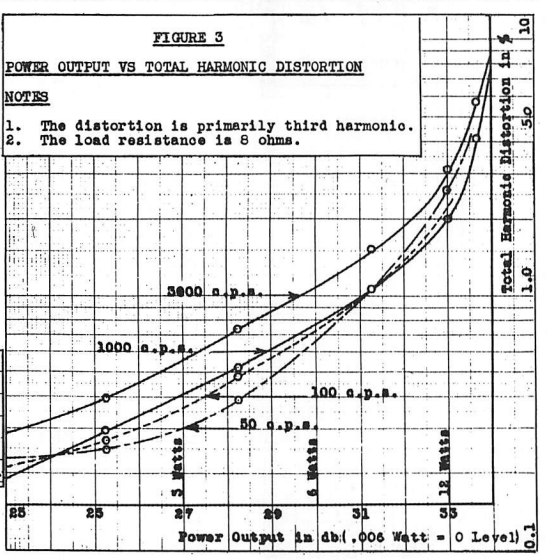
PHOTOGRAPHS - NOS. 81292 AND 81293

NOTES: 1. THE 103B AMPLIFIER CONSISTS OF A 109B AMPLIFIER AND THE NECESSARY EQUIPMENT FOR STAND-BY OPERATION, MOUNTED IN A METAL CABINET.

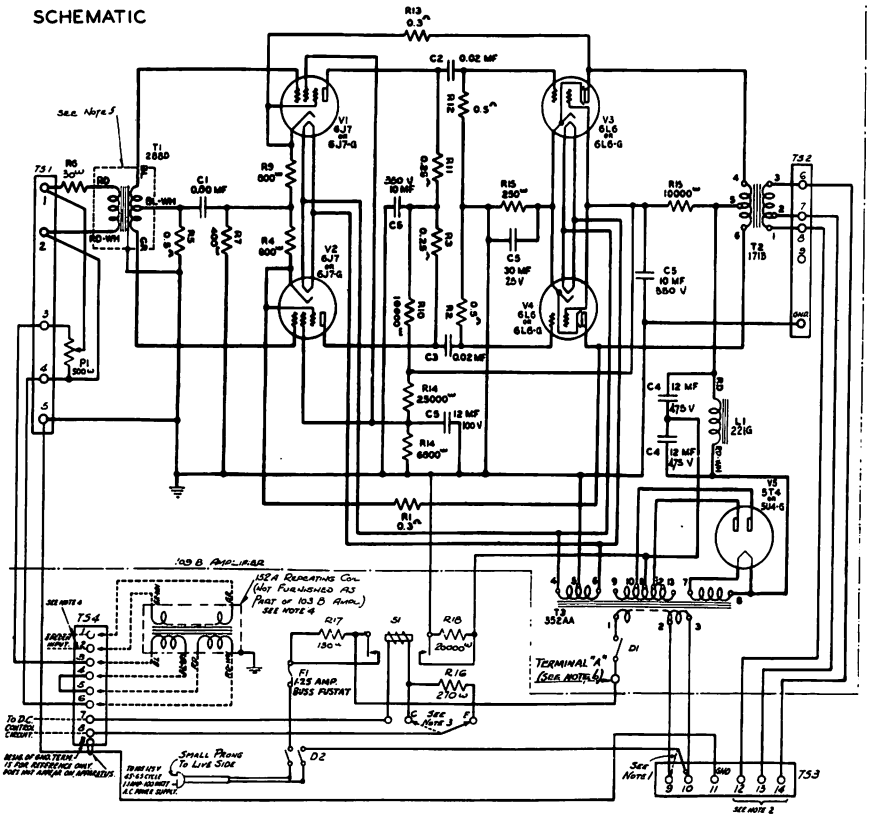
2. FACILITIES ARE PROVIDED IN THE 103B AMPLIFIER FOR MOUNTING A 152A REPEATING COIL.







SCHEMATIC



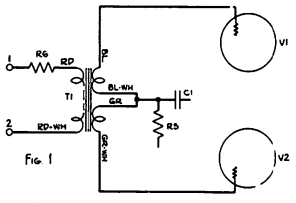


FIG. 1

NOTES

1- IF AC LINE VOLTAGE AVERAGES BETWEEN 116 AND 125 VOLTS, CONNECT TO TERMINAL 10 ON T53. IF AC LINE VOLTAGE AVERAGES BETWEEN 105 AND 115 VOLTS, CONNECT TO TERMINAL 9 ON T53.

2- IF 8 OHM O/P IS DESIRED CONNECT S-TERMINALS 12 AND 13 ON T53. IF 500 OHM OUTPUT IS DESIRED CONNECT TO TERMINALS 12 AND 14 ON T53.

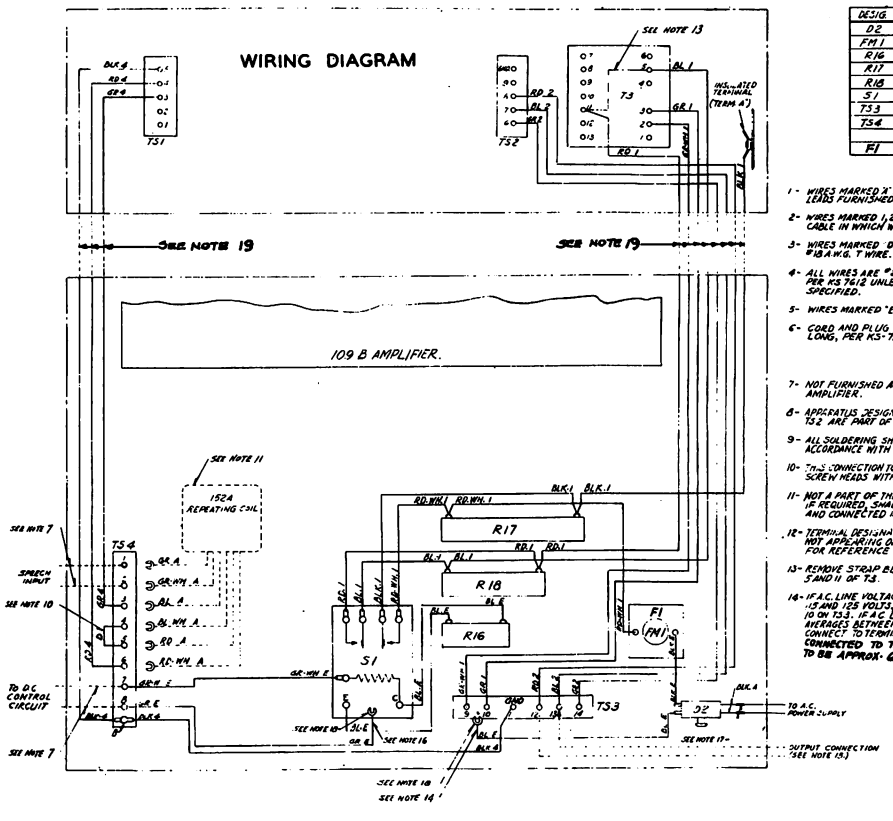
3- IF DC SUPPLY IS FROM 28 TO 60 VOLTS, THE CONNECTION SHOULD BE MADE TO TERMINAL E. IF DC SUPPLY IS FROM 14 TO 30 VOLTS, THE CONNECTION SHOULD BE MADE TO TERMINAL C

4- THE AMPLIFIER MAY BE USED WITHOUT THE 152 A REPEATING COIL WHEN SO USED THE INPUT IMPEDANCE IS 200Ω AND CONNECTIONS SHOULD BE MADE TO TERMS 3 AND 6 ON T54. WHEN THE 152 A REPEATING COIL IS USED IT MAY BE CONNECTED FOR 600Ω INPUT AS SHOWN OR REVERSED FOR 67Ω INPUT BY CONNECTING THE GR AND SP-WH WIRES TO TERMS. 3 AND 6 RESPECTIVELY AND THE BL AND RD-WH WIRES TO TERMS 1 AND 2 RESPECTIVELY. LEADS FROM TRANSMITTER CURRENT SUPPLY MAY BE CONNECTED TO TERMS 4 AND 5 AFTER REMOVING THE STRAP.

5- CONNECTIONS HAS SHOWN FOR THE 288 D INPUT TRANSFORMER. WHEN THE 53 G INPUT TRANSFORMER IS USED, CONNECTIONS SHALL BE PER FIG 1

6- TERMINAL "A" IS MOUNTED ON THE METAL BARRIER NEAR THE POWER TRANSFORMER. THE DESIGNATION "A" DOES NOT ACTUALLY APPEAR ON THE AMPLIFIER.

WIRING DIAGRAM



DESIG.	APPARATUS
D2	H&H #9592 DOOR SWITCH.
FTH 1	BRYANT #7-719 PONY CLEAT RECEPTACLE.
R16	I.R.C. #MW 2 RESISTOR, 270 OHMS.
R17	I.R.C. #AW-5 RESISTOR, 130 OHMS.
R18	I.R.C. #MW 4 RESISTOR, 20,000 OHMS.
S1	W.L. #K-60754 MIDGET RELAY.
T53	TERMINAL STRIP ESO-612455-4.
T54	TERMINAL STRIP ESO-612690-2.
	109 B AMPLIFIER.
F1	1.25 A. BUSS FUSTAT #6012 (BUSSMAN MFG. CO.)

1- WIRES MARKED 'X' ARE TERMINAL LEADS FURNISHED WITH APPARATUS.

2- WIRES MARKED 1, 2, 3 OR 4 INDICATE CABLE IN WHICH WIRES ARE RUN.

3- WIRES MARKED 'D' ARE STRAPS OF #18 A.W.G. T WIRE.

4- ALL WIRES ARE #22 A.W.G. SOLID WIRE PER RS 7612 UNLESS OTHERWISE SPECIFIED.

5- WIRES MARKED 'E' ARE OPEN FORM.

6- CORD AND PLUG ASSEMBLY, 6 FT. LONG, PER RS-7993.

7- NOT FURNISHED AS PART OF THE 103B AMPLIFIER.

8- APPARATUS DESIGNATED T3, T51 AND T52 ARE PART OF THE 109B AMPLIFIER

9- ALL SOLDERING SHALL BE MADE IN ACCORDANCE WITH RS 512 I DET-40C 'D'.

10- THIS CONNECTION TO BE MADE UNDER THE SCREW HEADS WITHOUT SOLDERING.

11- NOT A PART OF THE 103B AMPLIFIER. IF REQUIRED, SHALL BE INSTALLED AND CONNECTED IN THE FIELD.

12- TERMINAL DESIGNATIONS SHOWN BUT NOT APPEARING ON APPARATUS, ARE FOR REFERENCE ONLY.

13- REMOVE STRAP BETWEEN TERMINALS 5 AND 11 OF T3.

14- IF A.C. LINE VOLTAGE AVERAGES BETWEEN 115 AND 125 VOLTS, CONNECT TO TERMINAL 10 ON T53. IF A.C. LINE VOLTAGE AVERAGES BETWEEN 105 AND 115 VOLTS, CONNECT TO TERMINAL 9 ON T53. WIPPED CONNECTED TO TERM. 10. THIS LEAD TO BE APPROX. 6" LONG.

15- IF 8 OHM OUTPUT IS DESIRED, CONNECT TO TERMINALS 12 AND 13 ON T53. IF 500 OHM OUTPUT IS DESIRED, CONNECT TO TERMINALS 12 AND 14 ON T53.

16- IF D.C. SUPPLY IS FROM 28 TO 60 VOLTS, CONNECT TO TERMINAL 'E' ON 31. IF D.C. SUPPLY IS FROM 14 TO 30 VOLTS, CONNECT TO TERMINAL 'C' ON 31. WIPPED CONNECTED TO TERM. 'E' LEAD APPROX. 7" LG.

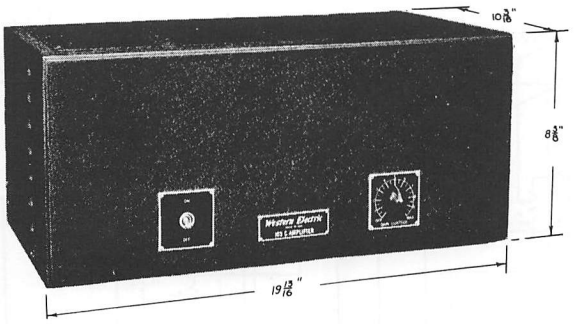
17- CORD AS PER NOTE 6 SHALL BE SPLICED TO THE FLEXIBLE LEADS OF D2, AND EACH SPLICE SHALL BE COVERED WITH ONE LAYER OF INSULATING RUBBER TAPE. THE TWO LEADS SHALL THEN BE COVERED WITH ONE LAYER OF BLACK FRICTION TAPE AND GIVEN ONE COAT OF ORANGE SHELLAC.

18- ZIERICK #76 TERMINAL, 1 REQ.

19- WHERE WIRES PASS THRU HOLES IN CHASSIS THEY SHALL BE COVERED WITH ONE LAYER OF INSULATING RUBBER TAPE & THEN ONE LAYER OF BLACK FRICTION TAPE & THEN GIVEN ONE COAT OF ORANGE SHELLAC.

NO 1-31
AMPLIFIER
103C

4-15-41



GENERAL

This amplifier is for use in paging systems employing carbon microphones. It includes a 124C Amplifier. It replaces the 103A and 103B Amplifiers.

ELECTRICAL CHARACTERISTICS

Gain (W.E. Tubes)	58 db Measured between nominal impedances
Gain Control	45 db Continuously Variable
Source Impedance	0-1000 Ohms 50 Ohms nominal See "Repeating Coil Input" below
Internal Input Impedance	150 Ohms
Load Impedance	1-1200 ohms Nominal load impedance - 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	5V 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 Standby Power - 55 Watts Approx. Fused with 1.25 amp. Buss Fustat on chassis Power switch furnished. Battery supply of 14-60 volts for relay and microphone.

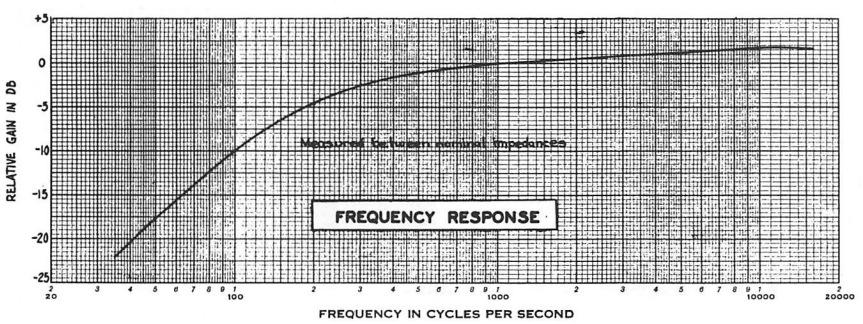
*Gain 0.7 db less with RCA tubes

Repeating Coil Input - Space is provided for mounting a 152A Repeating Coil, for use when it is desirable to supply battery to the microphone on a balanced basis. The coil is wired as shown on the schematic. In this condition the input terminals are 3 and 6, the source impedance may be any value between 50 and 1000 ohms, and the internal input impedance is about 125 ohms. The battery supply for the microphone is connected to terminals 4 and 5. The repeating coil may be reversed in which case the internal input impedance is about 600 ohms.

Bridging Input - A bridging input connection is available if required. For information on this input see Apparatus Reference Sheet No. 1-28 on the 124C Amplifier.

EQUIPMENT CHARACTERISTICS

Dimensions	See photograph
Weight	40 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	Black crinkled Enamel



REFERENCES

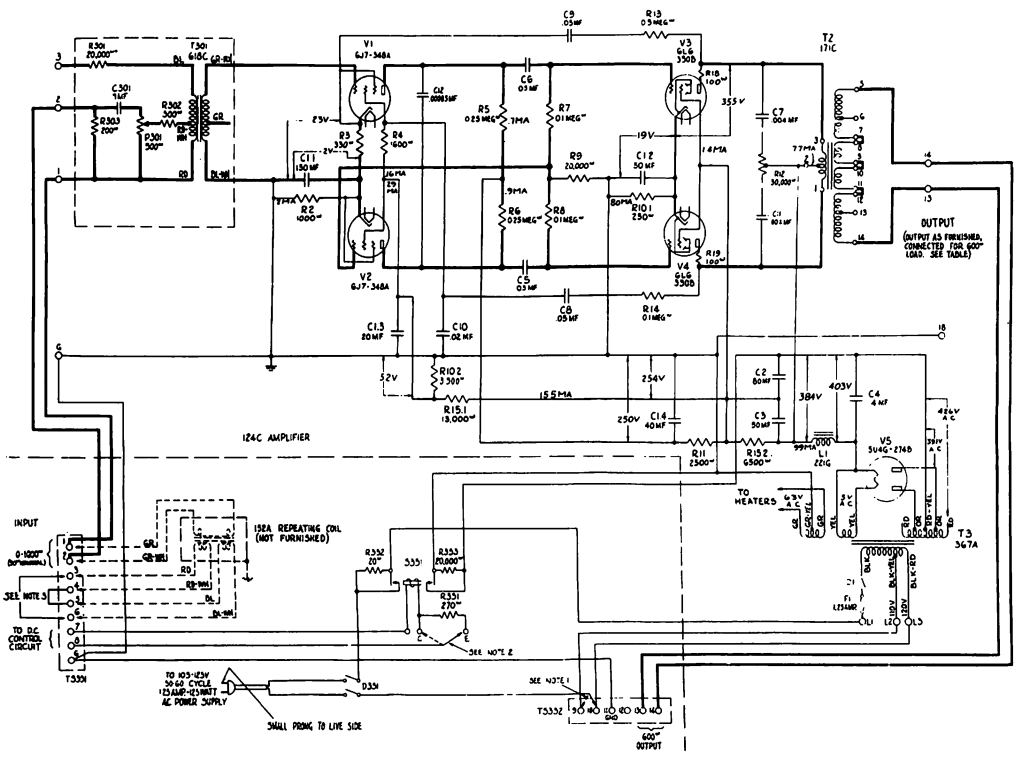
ES-676175 - Assembly
ESXX-676176 - Schematic
ES0-676177 - Wiring Diagram
ESA-746281 - Harmonic Char.

Photographs
92115
92120

SCHEMATIC

OUTPUT TRANSFORMER TERMINATIONS (T2)

NOMINAL LOAD IMPEDANCE	WORKING RANGE OF LOAD IMPEDANCE	STRAP TERMINALS	OUTPUT CONNECTIONS
600Ω	360Ω TO 1200Ω	1-2-3-4-11-12	5&14
150Ω	90Ω TO 300Ω	1-2-3-4-8-9-12	5&14
50Ω	45Ω TO 90Ω	1-2-3-4-8-9-12	6&13
16Ω	9Ω TO 20Ω	1-2-3-4-8-9-11-12	6&15
7.5Ω	5Ω TO 10Ω	1-2-3-4-7-8-11-12	6&13
4Ω	2Ω TO 5Ω	1-2-3-4-7-8-9-11-12	6&13



NOTES -

1 IF A.C. LINE VOLTAGE AVERAGES BETWEEN 105&125 VOLTS, CONNECT TO TERMINAL 10 ON T5352. IF A.C. LINE VOLTAGE AVERAGES BETWEEN 105&115 VOLTS, CONNECT TO TERMINAL 9 ON T5352. WITH R.C.A. TUBES, OPERATION ON VOLTAGES ABOVE 110 WHEN CONNECTED TO TERMINAL 9, OR ABOVE 120 VOLTS WHEN CONNECTED TO TERMINAL 10 MAY RESULT IN DECREASED VACUUM TUBE LIFE.

2 IF D.C. SUPPLY IS FROM 28 TO 60 VOLTS, THE CONNECTION SHOULD BE MADE TO TERMINAL E. IF D.C. SUPPLY IS FROM 14 TO 30 VOLTS, THE CONNECTION SHOULD BE MADE TO TERMINAL C.

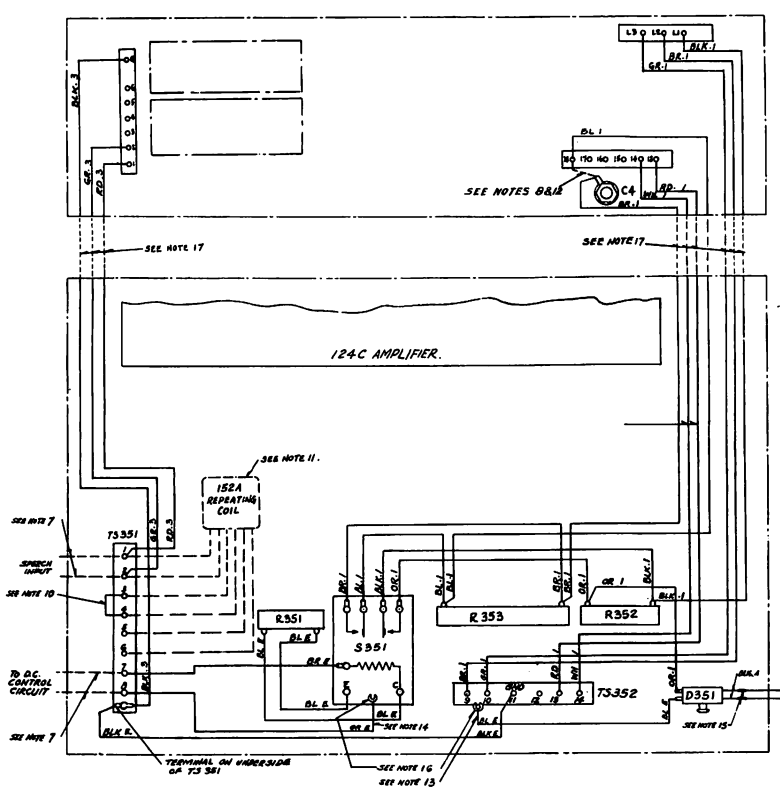
3 THE AMPLIFIER MAY BE USED WITHOUT THE 152A REPEATING COIL. WHEN SO USED THE INTERNAL INPUT IMPEDANCE IS 150Ω AND CONNECTIONS SHOULD BE MADE TO TERMINALS 1&2 ON T5351. WHEN THE 152A REPEATING COIL IS USED IT MAY BE CONNECTED AS SHOWN FOR 50Ω INTERNAL INPUT IMPEDANCE OR FOR 600Ω BY CONNECTING THE RD & BL-WH WIRES TO TERMINALS 1&2 AND THE GR & GR-WH WIRES TO TERMINALS 3&6. TRANSMITTER CURRENT MAY BE FED TO TERMINALS 4&5 IF DESIRED, OR DIRECTLY TO THE AMPLIFIER TERMINALS 1&2 IF THE REPEATING COIL IS NOT USED. BRIDGING INPUT IS PROVIDED BY CHANGING INPUT CONNECTIONS ON 124C AMPLIFIER TO TERMINALS 1&3 AND CONNECTING INPUT SOURCE TO TERMINALS 1&2 ON T5351.

4 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_1 & L_2. FOR THE 20 WATT CONNECTION MULTIPLY THE VALUES SHOWN BY A FACTOR OF 1.10

5 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 1.15 FOR THE 12 & 20 WATT CONDITIONS RESPECTIVELY (EXCEPTION:- THE G1 & SCREEN CURRENT IS APPROXIMATELY 1MA IN EITHER CASE).

6 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-OHMMETER" WHOSE RESISTANCE IS AT LEAST 1000 OHMS PER VOLT.

WIRING DIAGRAM



NOTES:

1 - WIRES MARKED "2" ARE TERMINAL LEADS FURNISHED WITH APPARATUS.

2 - WIRES MARKED 1, 2 OR 3 INDICATE CABLE IN WHICH WIRES ARE RUN.

3 - WIRES MARKED "D" ARE STRAPS OF #18 A.W.G. T WIRE.

4 - ALL WIRES ARE #20 AWG SOLID 1000V ECKBESTOS RADIO HOOK-UP WIRE UNLESS OTHERWISE SPEC.

5 - WIRES MARKED "E" ARE OPEN FORMED.

6 - CORD AND PLUG ASSEMBLY, 6 FT. LONG, PER KS-7983.

7 - NOT FURNISHED AS PART OF THE 103C AMPLIFIER.

8 - APPARATUS DESIGNATED C4 IS PART OF THE 124C AMPLIFIER

9 - ALL SOLDERING SHALL BE MADE IN ACCORDANCE WITH KS 312 METHOD "D".

10 - THIS CONNECTION TO BE MADE UNDER THE SCREW HEADS WITHOUT SOLDERING.

11 - NOT A PART OF THE 103C AMPLIFIER. IF REQUIRED, SHALL BE INSTALLED AND CONNECTED IN THE FIELD.

12 - REMOVE WIRE BETWEEN CONDENSER C4 & GROUND TERMINAL 18 ON TERM. STRIP.

13 - SHIPPED CONNECTED TO TERMINAL 10. THIS LEAD APPROX. 6 IN. LONG.

14 - SHIPPED CONNECTED TO TERMINAL "E". THIS LEAD APPROX. 7 IN. LONG.

15 - CORD AS PER NOTE 6 SHALL BE SPLICED TO THE FLEXIBLE LEADS OF D351, AND EACH SPLICE SHALL BE COVERED WITH ONE LAYER OF INSULATING RUBBER TAPE. THE TWO LEADS SHALL THEN BE COVERED WITH ONE LAYER OF BLACK FRICTION TAPE, AND GIVEN ONE COAT OF ORANGE SHELLAC.

16 - ZIERICK #76 TERMINAL, 2 REQ.

17 - WHERE WIRES PASS THROUGH HOLES IN CHASSIS THEY SHALL BE COVERED WITH FLEXIBLE VARNISHED TUBING PER LAM 106 HELD IN PLACE BY W & C CORD.

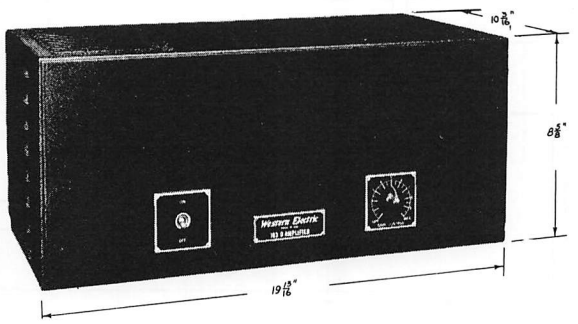
18 - TP DENOTES TWISTED PAIR.

NO 1-32
AMPLIFIER
103D

4-15-41

GENERAL

This amplifier is for use in paging systems employing dynamic microphones. It includes a 124D Amplifier.



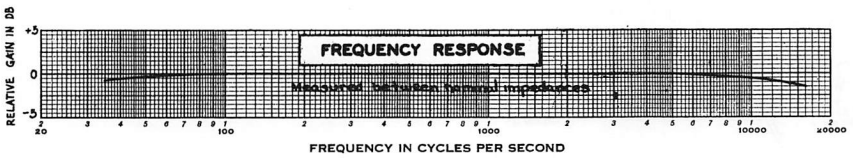
ELECTRICAL CHARACTERISTICS

Gain (W.E.Tubes)*	107 db Measured between nominal impedances
Gain Control	35 db continuously variable
Source Impedance	Normal connection, 15-60 ohms 30 ohms nominal May be reconnected for, 60-250 ohms 120 ohms nominal See schematic, Note 3
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 Standby power- 55 watts approx. Fused with 1.25 amp. Buss Fustat on chassis Power switch furnished Battery supply of 14-60 volts for relay

* Gain 0.7 db less with RCA tubes

EQUIPMENT CHARACTERISTICS

Dimensions	See photograph
Weight	40 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 - 1-16I2
Finish	Black crinkled Enamel



REFERENCES

ES-676175 - Assembly
ESXX-676178 - Schematic
ESO-676179 - Wiring Diagram
ESA-746281 - Harmonic Char.

Photographs
92113
92123

SCHEMATIC

NOTES:-

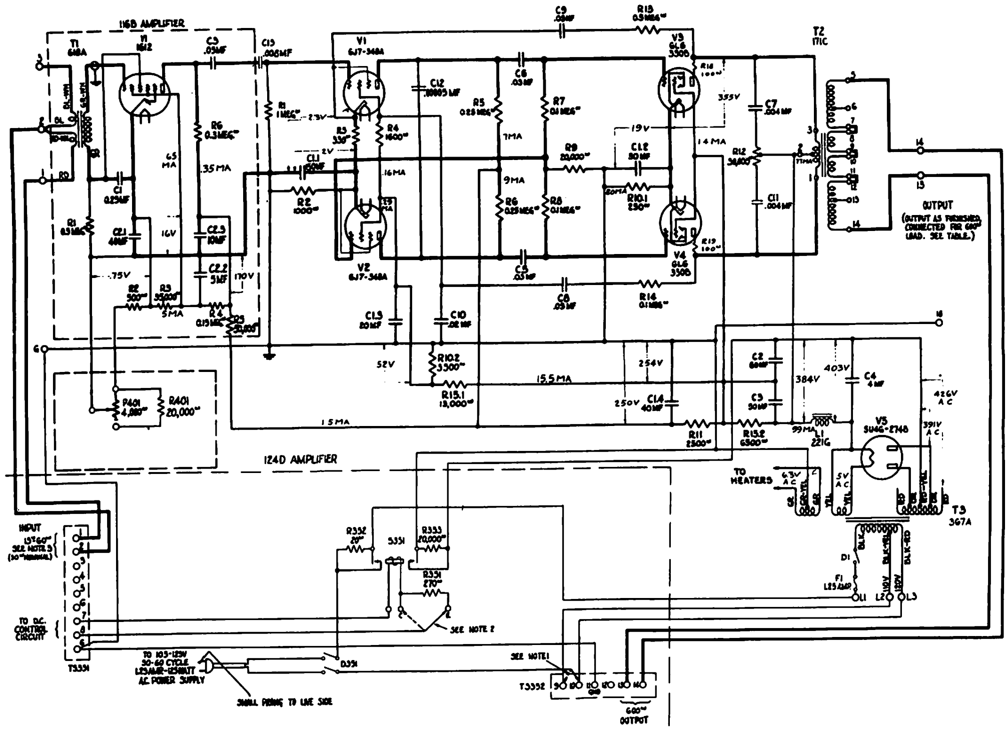
1. IF A.C. LINE VOLTAGE AVERAGES BETWEEN 115 & 125 VOLTS, CONNECT TO TERMINAL 10 ON TS352. IF A.C. LINE VOLTAGE AVERAGES BETWEEN 105 & 115 VOLTS, CONNECT TO TERMINAL 9 ON TS352. WITH R.C.A. TUBES, OPERATION ON VOLTAGES ABOVE 110 WHEN CONNECTED TO TERMINAL 9 OR ABOVE 120 VOLTS WHEN CONNECTED TO TERMINAL 10 MAY RESULT IN DECREASED VACUUM TUBE LIFE.

2. IF D.C. SUPPLY IS FROM 28 TO 60 VOLTS, THE CONNECTION SHOULD BE MADE TO TERMINAL E. IF D.C. SUPPLY IS FROM 14 TO 30 VOLTS, THE CONNECTION SHOULD BE MADE TO TERMINAL C.

3. NORMALLY CONNECTED FOR SOURCE IMPEDANCES BETWEEN 15Ω & 60Ω. FOR 60Ω TO 250Ω SOURCES, INPUT CONNECTIONS ON 124D AMPLIFIER SHOULD BE CHANGED TO TERMINALS 1 & 3.

OUTPUT TRANSFORMER TERMINATIONS (T2)

NOMINAL LOAD IMPEDANCE	WORKING RANGE OF LOAD IMPEDANCE	STRAP TERMINALS	OUTPUT CONNECTIONS
600Ω	300Ω TO 1200Ω	7-8, 9-10, 11-12	3 & 14
150Ω	75Ω TO 300Ω	[illegible]	3 & 14
30Ω	15Ω TO 70Ω	[illegible]	6 & 13
15Ω	10Ω TO 15Ω	7-8-10, 9-11-12	6 & 13
7.5Ω	5Ω TO 10Ω	[illegible]	6 & 13
1.75Ω	1Ω TO 3Ω	[illegible]	6 & 13



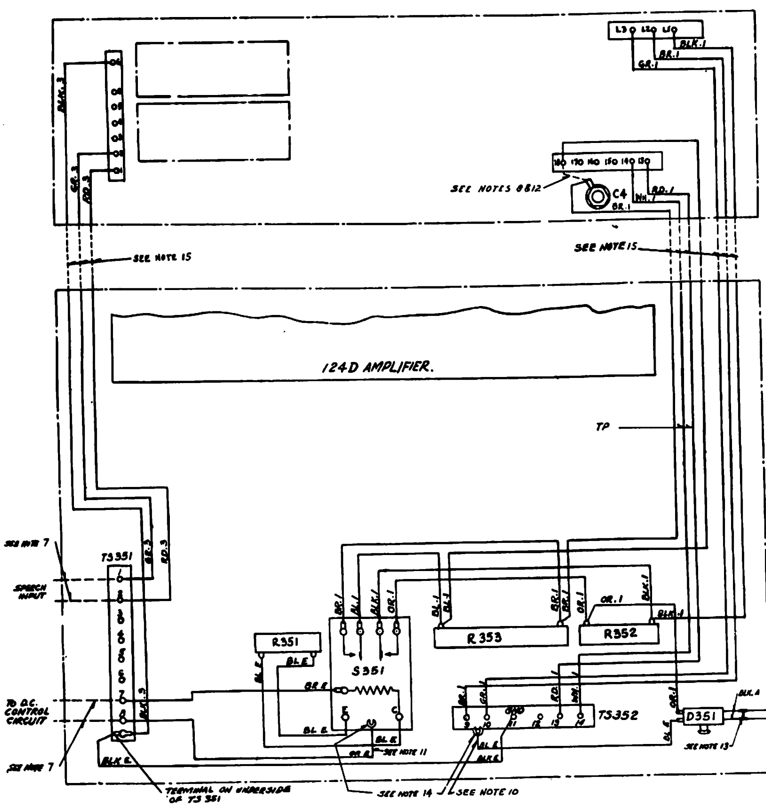
4. THE VOLTAGE AND CURRENT VALUES SHOWN REPRESENT TYPICAL NO SIGNAL CONDITIONS FOR A 12 WATT AMPLIFIER CONNECTION WHEN EQUIPPED WITH WESTERN ELECTRIC TUBES AND OPERATED FROM A 60~ 120 VOLT POWER LINE CONNECTED TO L_1 & L_3. FOR THE 20 WATT CONNECTION MULTIPLY THE VALUES SHOWN BY A FACTOR OF 1.10

5. 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 1.15 FOR THE 12 & 20 WATT CONDITIONS RESPECTIVELY (EXCEPTION:- THE 6L6 SCREEN CURRENT IS APPROXIMATELY 1MA IN EITHER CASE).

6. 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-OHMMETER" WHOSE RESISTANCE IS AT LEAST 1000 OHMS PER VOLT.

7. THE VOLTAGE AND CURRENT VALUES SHOWN REPRESENT CONDITIONS OBTAINED WHEN THE GAIN CONTROL P401 IS SET FOR MAXIMUM GAIN. (ZERO RESISTANCE)

WIRING DIAGRAM



NOTES:

1 - WIRES MARKED "A" ARE TERMINAL LEADS FURNISHED WITH APPARATUS.

2 - WIRES MARKED 1, 2 OR 3 INDICATE CABLE IN WHICH WIRES ARE RUN.

3 - WIRES MARKED "D" ARE STRAPS OF #18 A.W.G. T WIRE.

4 - ALL WIRES ARE #20 AWG SOLID 1000V. ROCKBESTOS RADIO HOOK-UP WIRE UNLESS OTHERWISE SPEC.

5 - WIRES MARKED "E" ARE OPEN FORMED.

6 - CORD AND PLUG ASSEMBLY, 6 FT. LONG, PER KS-7983.

7 - NOT FURNISHED AS PART OF THE 103D AMPLIFIER.

8 - APPARATUS DESIGNATED C4 IS PART OF THE 124D AMPLIFIER

9 - ALL SOLDERING SHALL BE MADE IN ACCORDANCE WITH KS 512 METHOD "D".

10 - SHIPPED CONNECTED TO TERMINAL 10. THIS LEAD APPROX. 6 IN. LONG.

11 - SHIPPED CONNECTED TO TERMINAL "E". THIS LEAD APPROX. 7 IN. LONG.

12 - REMOVE WIRE BETWEEN CONDENSER C4 & GROUND TERMINAL 18 ON TERMINAL STRIP.

13 - CORD AS PER NOTE 6 SHALL BE SPLICED TO THE FLEXIBLE LEADS OF D351, AND EACH SPLICE SHALL BE COVERED WITH ONE LAYER OF INSULATING RUBBER TAPE. THE TWO LEADS SHALL THEN BE COVERED WITH ONE LAYER OF BLACK FRICTION TAPE, AND GIVEN ONE COAT OF ORANGE SHELLAC.

14 - ZIERICK #76 TERMINAL, 2 REQ.

15 - WHERE WIRES PASS THROUGH HOLES IN CHASSIS THEY SHALL BE COVERED WITH FLEXIBLE VARNISHED TUBING PER L.R.M. 196 HELD IN PLACE BY TYING WITH #6 CORD.

16 TP DENOTLS TWISTED PAIR.