

NO	I-50
AMPLIFIER	
104 A	
2-6-39	

### GENERAL

THE 104A AMPLIFIER IS A SINGLE STAGE AMPLIFIER INTENDED FOR USE AS A PREMIXING OR LOW LEVEL AMPLIFIER IN SPEECH INPUT EQUIPMENTS FOR RADIO TELEPHONE BROADCASTING.

### ELECTRICAL CHARACTERISTICS

GAIN..... 29.5DB  
 GAIN CONTROL..... NONE  
 OPERATES FROM..... 30 OHMS, TERMINALS 1-2.  
 250 OHMS, TERMINALS 1-3.  
 INTERNAL INPUT IMPEDANCE. OPEN CIRCUIT  
 OPERATES INTO..... 30 OHMS, TERMINALS 7-8. 500 TO  
 600 OHMS, TERMINAL 7 & BL WIRE.  
 INTERNAL OUTPUT IMPEDANCE. 30 OR 330 OHMS  
 OUTPUT POWER..... 60 MICROWATTS (-20 DB)  
 OUTPUT NOISE..... APPROX. -110 DB WEIGHTED, -100 DB UN-  
 WEIGHTED (0 DB = 6 MW)  
 POWER SUPPLY..... FIL'T. 0.32 AMP. AT  $10 \pm 0.3$  V. AC OR DC  
 PLATE 0.6 MA AT 375 V. DC.

COMPLETE POWER SUPPLY MAY BE OBTAINED FROM FOLLOWING EQUIPMENT:

### EQUIPMENT

701A S.I. BAY.....  
 105A AMPLIFIER.....  
 106A AMPLIFIER PLUS 221A RETARD. COIL AND 8 MF COND.....  
 15A RECTIFIER.....

### SUPPLIES 104 TYPE AMPLIFIERS

SIX  
 SIX  
 SIX  
 TWELVE

### VACUUM TUBE

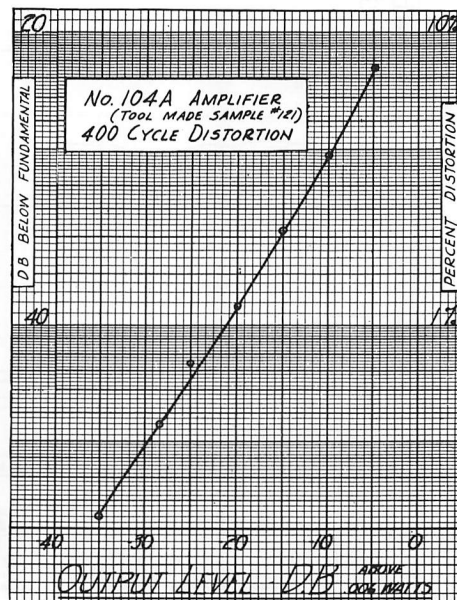
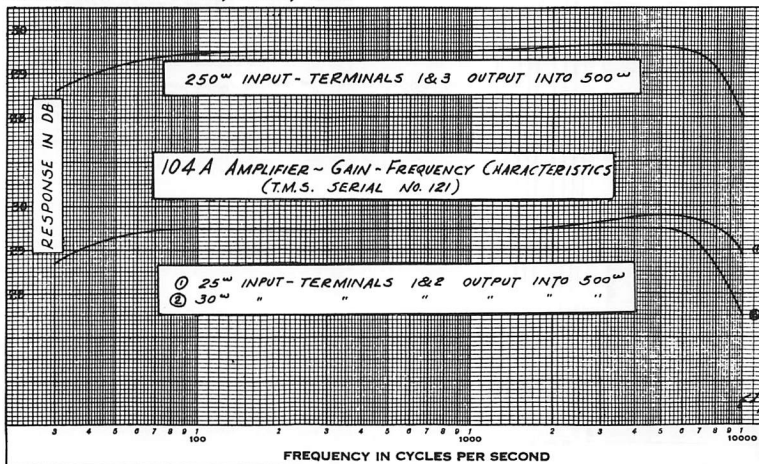
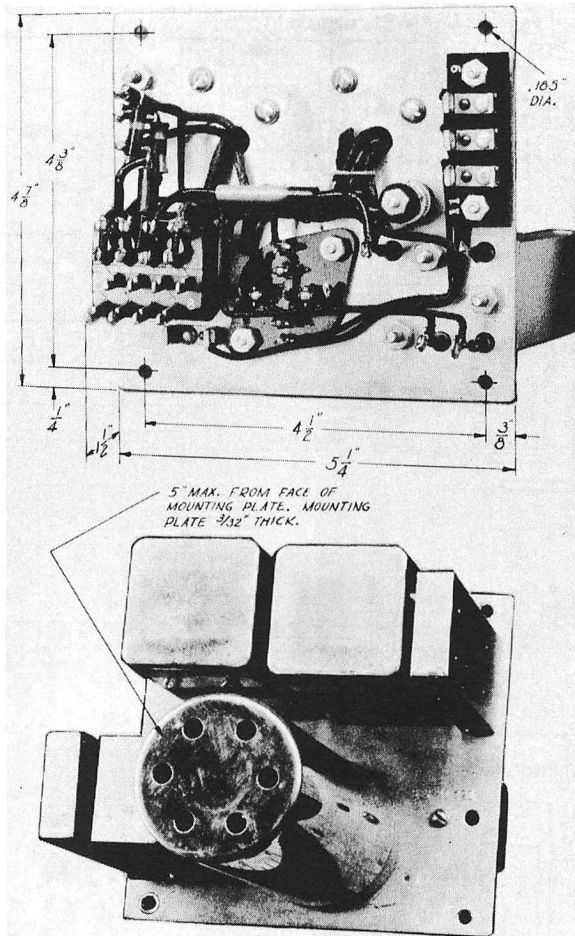
ONE 262B VACUUM TUBE IS REQUIRED.(MUST BE ORDERED SEPARATELY)

### EQUIPMENT CHARACTERISTICS

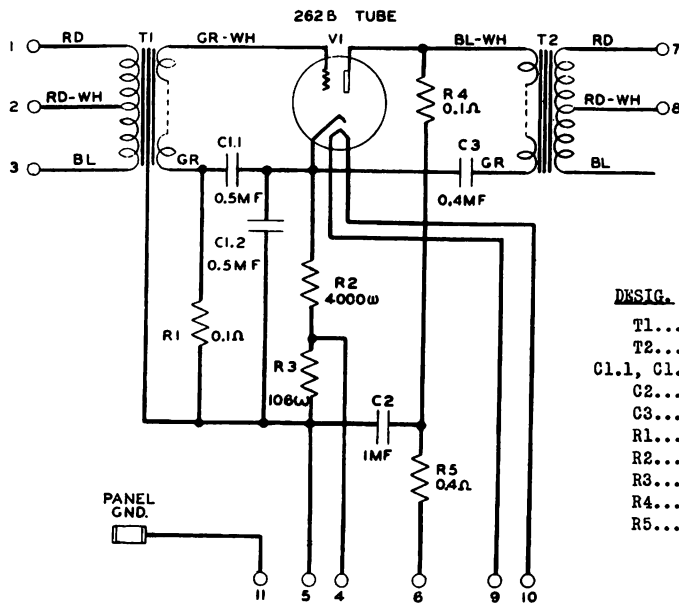
WEIGHT..... APPROX. 4-3/4 LBS.  
 DIMENSIONS..... SEE ILLUSTRATION.  
 MOUNTING..... 998A, 998B OR 998C MOUNTING PLATES WILL EACH  
 MOUNT THREE 104 TYPE AMPLIFIERS.  
 FINISH..... CADMIUM.

### REFERENCES

INSTRUCTION BULLETIN NO. 869  
 ESO-744337..... PUBLICATION SCHEMATIC AND WIRING DIAGRAM  
 ESO-611721, ISS. 2.. MANUFACTURING SCHEMATIC AND WIRING DIAGRAM  
 ESO-611795..... ASSEMBLY  
 ESL-611456..... APPARATUS LIST OF 104A AMPLIFIER AND 998B  
 MOUNTING PLATE FOR CUSTOMERS USE  
 ES-743563..... GAIN VS. FREQUENCY CHARACTERISTIC  
 ES-745050..... POWER OUTPUT VS. TOTAL HARMONIC DISTORTION  
 PHOTOGRAPHS NOS. 73147, 73148, 73149



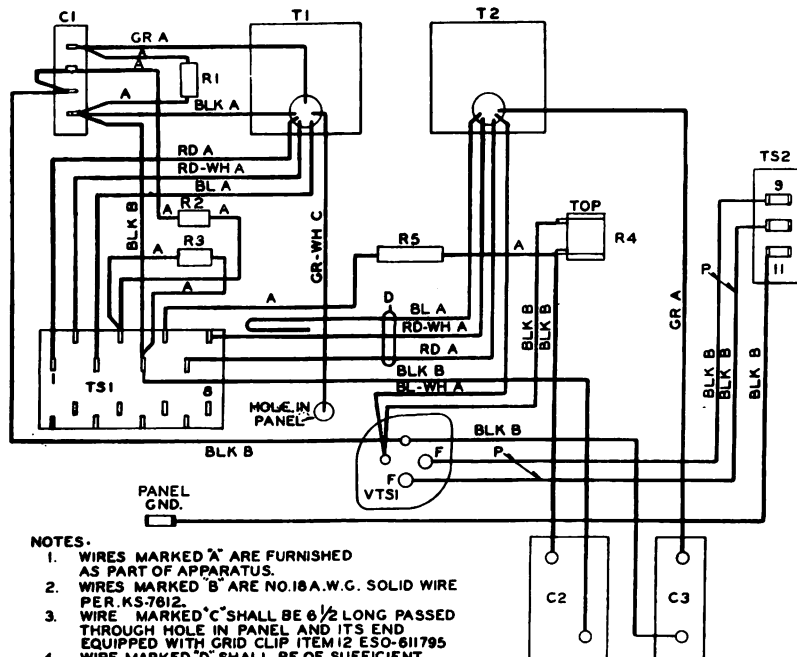
SCHEMATIC



APPARATUS LIST

DESIG.	APPARATUS
T1.....	265F INPUT TRANSFORMER
T2.....	170B OUTPUT TRANSFORMER
C1.1, C1.2.....	141C CONDENSER 0.5-0.5 MF.
C2.....	229C CONDENSER 1.0 MF.
C3.....	230A CONDENSER 0.4 MF.
R1.....	0.1 MEGOHM ) I.R.C. TYPE BT-1/2
R2.....	4000 OHMS ) RESISTANCES
R3.....	I.R.C. TYPE BW-1/2 RES. 106 OHMS ± 5%
R4.....	I.R.C. TYPE WW3 RES. 0.1 MEGOHM ± 5%
R5.....	I.R.C. TYPE BT1 RES. 0.4 MEGOHM

WIRING DIAGRAM



- NOTES.
1. WIRES MARKED 'A' ARE FURNISHED AS PART OF APPARATUS.
  2. WIRES MARKED 'B' ARE NO.18 A.W.G. SOLID WIRE PER KS-7812.
  3. WIRE MARKED 'C' SHALL BE 8 1/2 LONG PASSED THROUGH HOLE IN PANEL AND ITS END EQUIPPED WITH GRID CLIP (ITEM 12 ESO-611795
  4. WIRE MARKED 'D' SHALL BE OF SUFFICIENT LENGTH TO REACH TERMINAL NO.8 ON TS1, ITS END FOLDED OVER, TAPED AND SECURED TO TRANSFORMER LEADS AS INDICATED.
  5. WIRES MARKED 'P' ARE TWISTED PAIRS.
  6. APPARATUS DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON APPARATUS.

NO	1-51
AMPLIFIER	
104 B	
2-6-39	

**GENERAL**

THE 104B AMPLIFIER IS A SINGLE STAGE AMPLIFIER INTENDED FOR USE AS A PREMIXING OR LOW LEVEL AMPLIFIER IN SPEECH INPUT EQUIPMENTS FOR RADIO TELEPHONE BROADCASTING. IT IS INTERCHANGEABLE WITH THE 104A AMPLIFIER AND SIMILAR IN DESIGN EXCEPT THAT THE 104B AMPLIFIER HAS A BETTER SHIELDED INPUT TRANSFORMER, IS PROVIDED WITH TERMINALS FOR OPERATING FROM PLATE VOLTAGES OF 200 AND 250, IN ADDITION TO THE 375 VOLTS REQUIRED FOR THE 104A AMPLIFIER AND IS SUPPLIED WITH FOUR FLEXIBLE MOUNTINGS.

**ELECTRICAL CHARACTERISTICS**

GAIN..... 28 DB  
 GAIN CONTROL..... NONE  
 OPERATES FROM..... 30 OHMS, TERM'S. 1-2, 250 OHMS, TERM'S. 1-3.  
 INTERNAL INPUT IMPEDANCE.. OPEN CIRCUIT  
 OPERATES INTO..... 30 OHMS, TERM'S. 7-8, 500-600 OHMS, TERM'S. 6-7.  
 INTERNAL OUTPUT IMPEDANCE. 30 OR 330 OHMS  
 OUTPUT NOISE..... APPROX. -110 DB WTD. -100 DB UNWTD. (0 DB = 6 MW)  
 OUTPUT POWER..... 60 MICROWATTS (-20 DB)  
 POWER SUPPLY..... FILAMENT 0.32 AMP. AT 10 ± 0.3 V. AC OR DC, TERM'S. 15-16. PLATE 0.6 MA AT 375 V. DC, TERM. 9, 250 V. TERM. 10, 200 V. TERM. 11. NEGATIVE PLATE VOLTAGE, TERM. 12.

COMPLETE POWER SUPPLY MAY BE OBTAINED FROM FOLLOWING EQUIPMENT:

EQUIPMENT	SUPPLIES 104 TYPE AMPLIFIERS
701A SPEECH INPUT BAY.....	SIX
105A AMPLIFIER.....	SIX
106A AMPLIFIER PLUS 221A RETARD. COIL AND 8 MF COND..	SIX
15A RECTIFIER.....	TWELVE

**VACUUM TUBE**

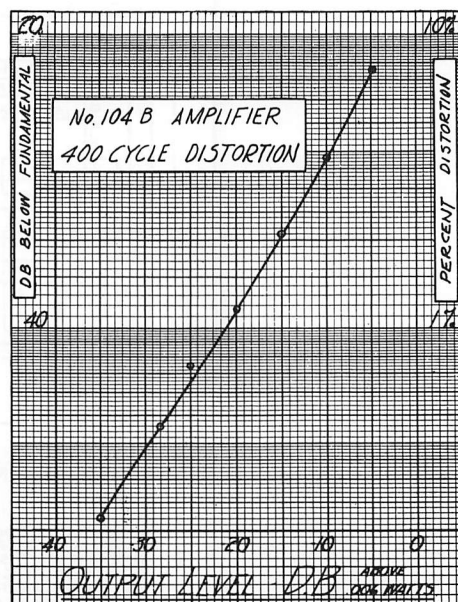
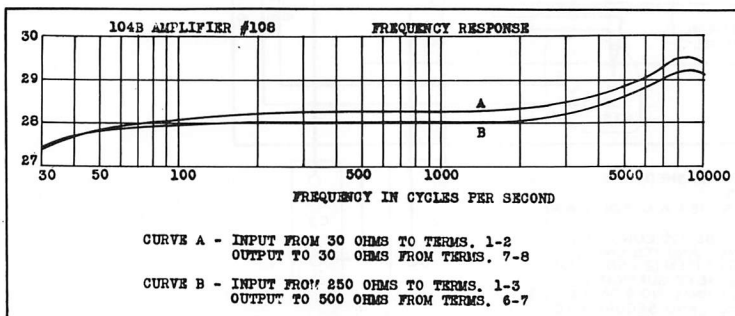
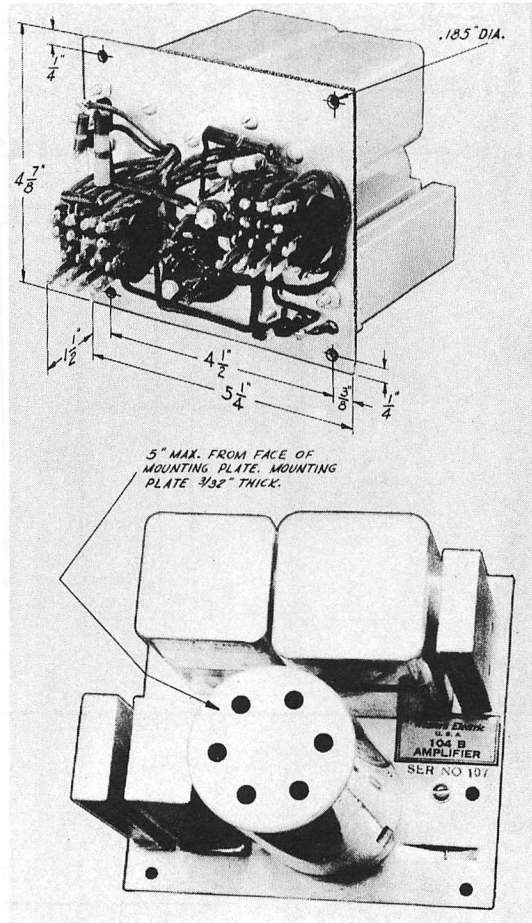
ONE 262B VACUUM TUBE IS REQUIRED. (MUST BE ORDERED SEPARATELY)

**EQUIPMENT CHARACTERISTICS**

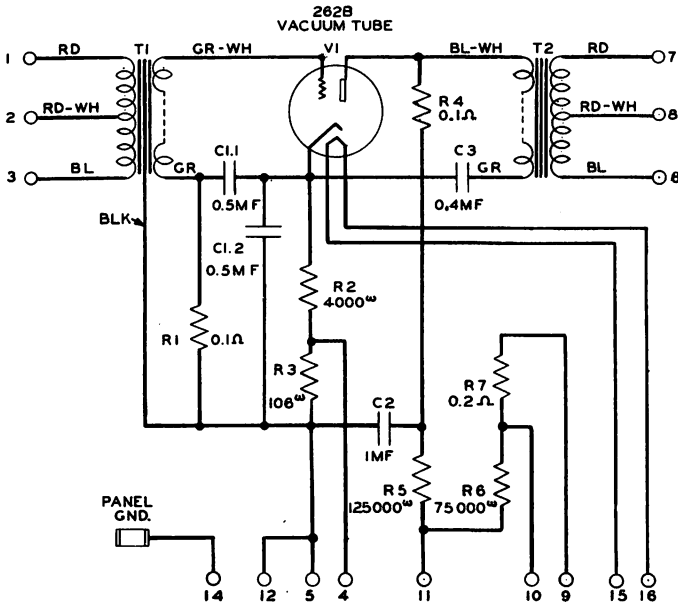
WEIGHT..... APPROX. 4-3/4 LBS.  
 DIMENSIONS..... SEE ILLUSTRATION.  
 MOUNTING..... 998A, 998B OR 998C MOUNTING PLATES WILL EACH MOUNT THREE 104 TYPE AMPLIFIERS.  
 FINISH..... CADMIUM.

**REFERENCES**

INSTRUCTION BULLETIN NO. 869  
 ESO-611721..... SCHEMATIC AND WIRING DIAGRAM  
 ESO-611795..... ASSEMBLY AND STOCK LIST  
 ESL-613876..... APPARATUS LIST FOR CUSTOMERS USE  
 ESA-744992..... GAIN VS. FREQUENCY CHARACTERISTIC  
 ES-745050..... POWER OUTPUT VS. TOTAL HARMONIC DISTORTION  
 PHOTOGRAPH NO. 81751, 83116.



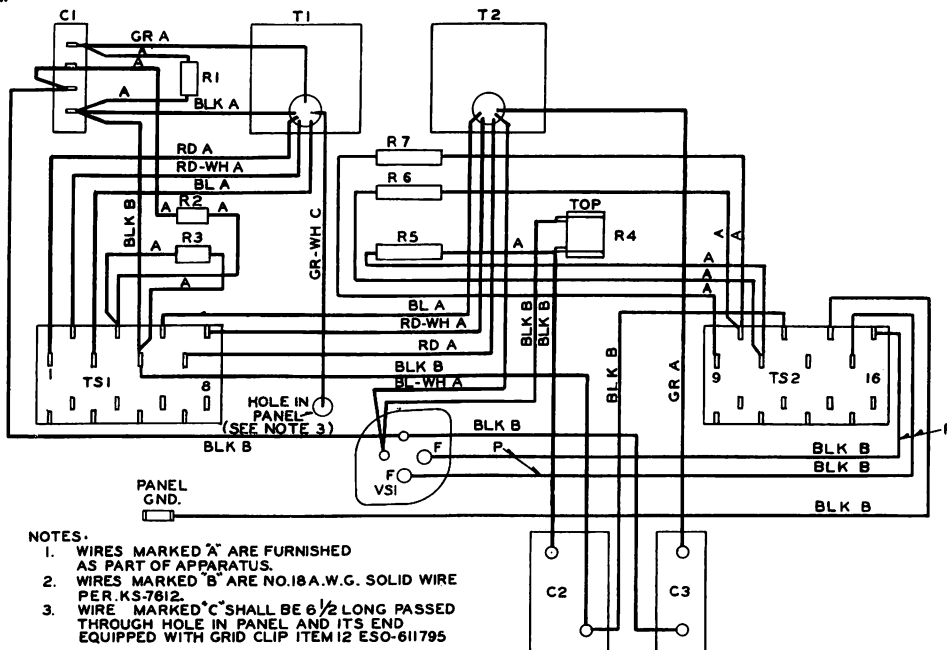
**SCHEMATIC**



**APPARATUS LIST**

DESIG.	APPARATUS
T1	615A INPUT TRANSFORMER
T2	170B OUTPUT TRANSFORMER
C1.1, C1.2	141C CONDENSER 0.5-0.5 MF.
C2	229C CONDENSER 1.0 MF.
C3	230A CONDENSER 0.4 MF.
R1	0.1 MEGOHM I.R.C. TYPE BT 1/2 RESISTANCES
R2	4000 OHMS )
R3	I.R.C. TYPE BW 1/2 RES. 106 OHMS ± 5%
R4	I.R.C. TYPE WW3 RES. 0.1 MEGOHM ± 5%
R5	125,000 OHMS )
R6	75,000 OHMS ) I.R.C. TYPE BT1 RESISTANCES
R7	200,000 OHMS )

**WIRING DIAGRAM**



- NOTES.**
1. WIRES MARKED 'A' ARE FURNISHED AS PART OF APPARATUS.
  2. WIRES MARKED 'B' ARE NO.18A.W.G. SOLID WIRE PER.KS-7612.
  3. WIRE MARKED 'C' SHALL BE 6 1/2 LONG PASSED THROUGH HOLE IN PANEL AND ITS END EQUIPPED WITH GRID CLIP ITEM 12 ESO-611795
  4. WIRES MARKED 'P' ARE TWISTED PAIRS
  5. APPARATUS DESIGNATIONS ARE FOR REFERENCE ONLY AND DO NOT APPEAR ON APPARATUS.