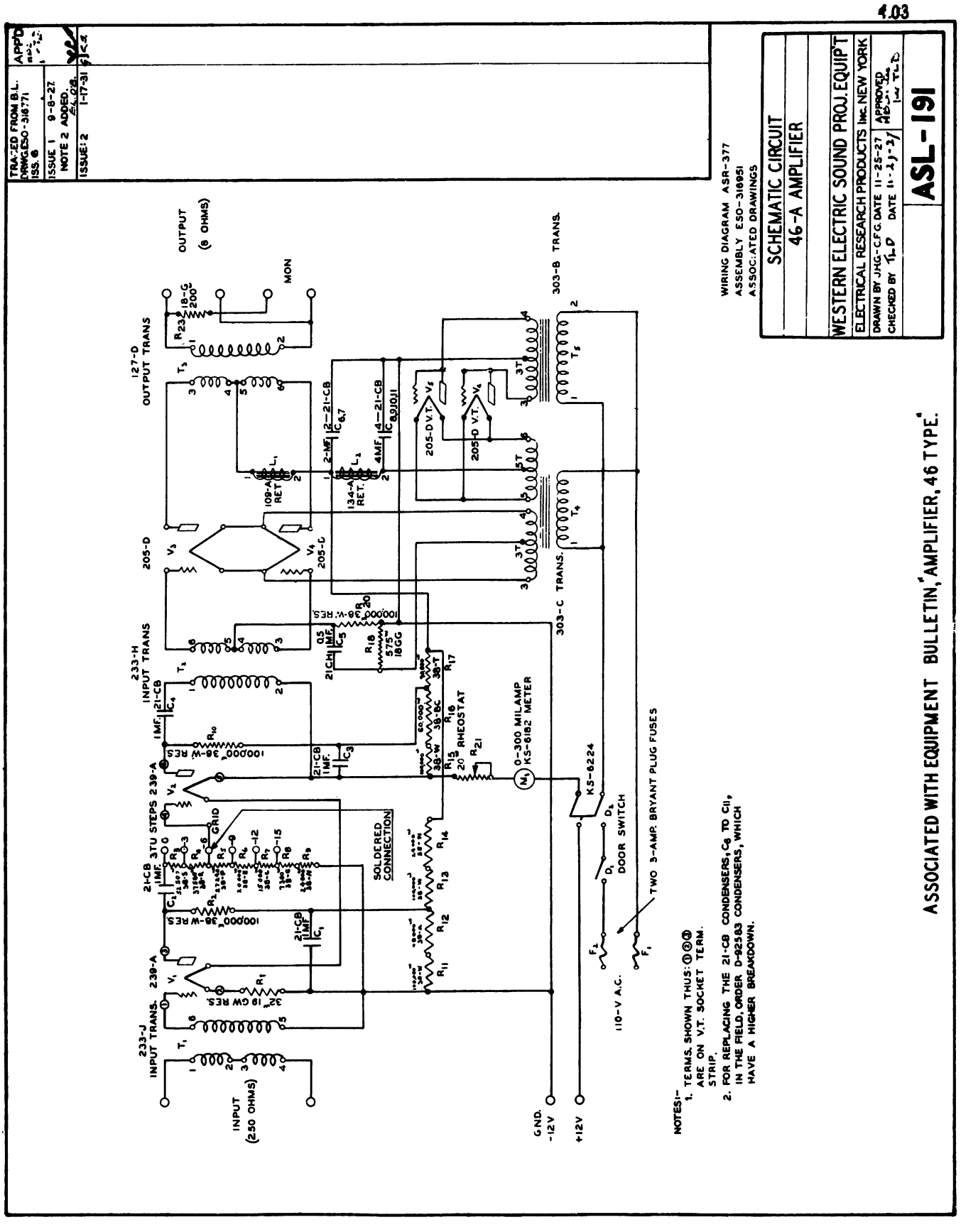
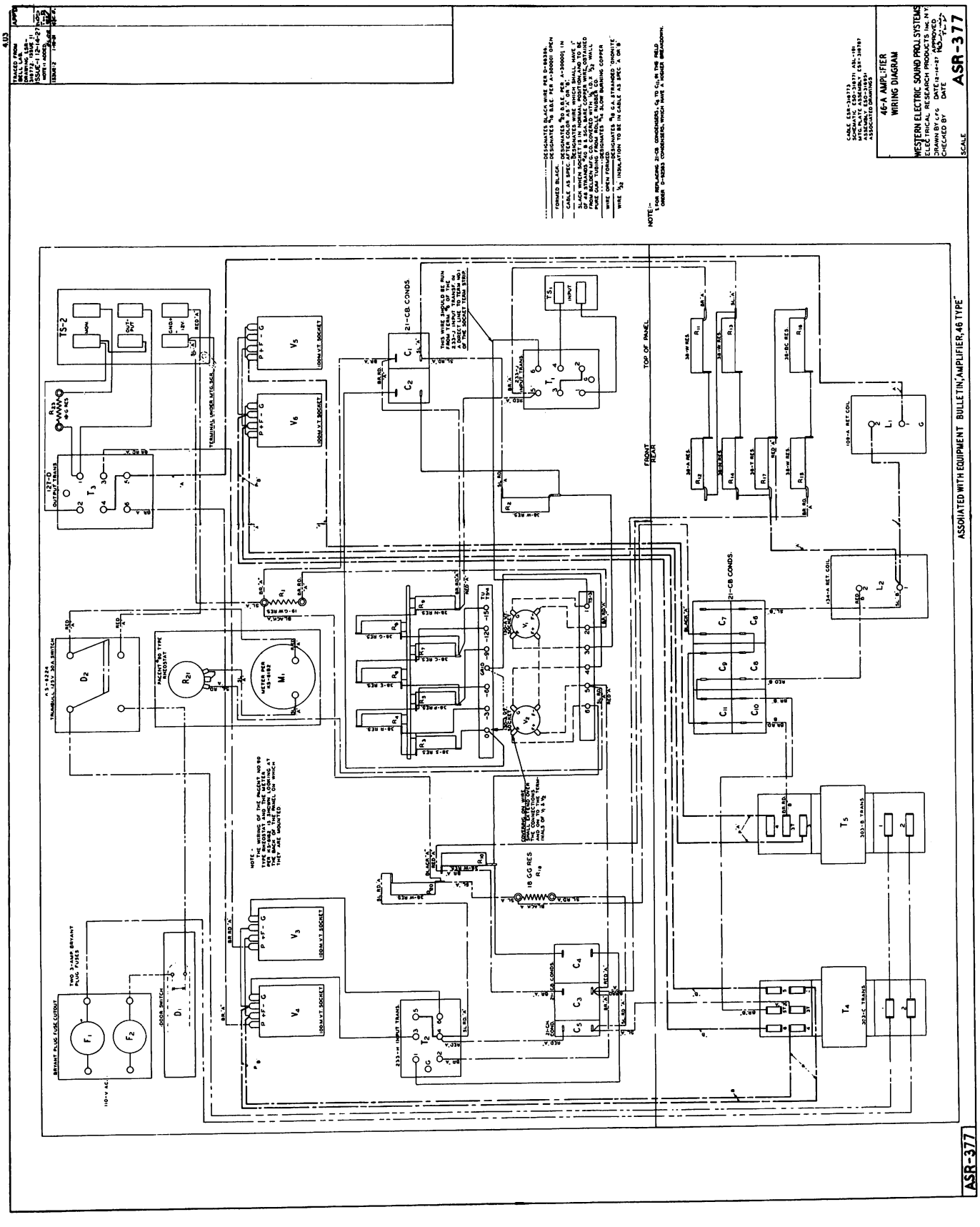

Western Electric
46-B AMPLIFIER
PLATE 1
PLATE 2
PLATE TOTAL 3+4
FILAMENT 1 AND 2
OFF ON
FILT CONTROL
OUTPUT
PRESS TO READ
OFF
PLATE TOTAL 3+4


4.03
TRACED FROM B.L. DRWG ESO-316771 ISS. 6
ISSUE 1 9-8-27
NOTE 2 ADDED
ISSUE 2 1-17-31
APP'D
WIRING DIAGRAM ASR-377
ASSEMBLY ESO-316951
ASSOCIATED DRAWINGS
SCHEMATIC CIRCUIT
46-A AMPLIFIER
WESTERN ELECTRIC SOUND PROJ. EQUIPT
ELECTRICAL RESEARCH PRODUCTS INC. NEW YORK
DRAWN BY JHG-CFG. DATE 11-25-27
CHECKED BY TLD DATE 11-29-27
APPROVED
ASL-191
ASSOCIATED WITH EQUIPMENT BULLETIN, AMPLIFIER, 46 TYPE.
NOTES:-
1. TERMS. SHOWN THUS: ① ② ③ ARE ON V.T. SOCKET TERM. STRIP.
2. FOR REPLACING THE 21-CB CONDENSERS, C6 TO C11, IN THE FIELD, ORDER D-92583 CONDENSERS, WHICH HAVE A HIGHER BREAKDOWN.
INPUT (250 OHMS)
233-J INPUT TRANS.
239-A
21-CB 3TU STEPS
233-H INPUT TRANS
205-D
205-C
127-D OUTPUT TRANS
OUTPUT (6 OHMS)
MON
303-B TRANS.
303-C TRANS.
0-300 MILAMP KS-6182 METER
20 RHEOSTAT
K5-6224
DOOR SWITCH
TWO 3-AMP. BRYANT PLUG FUSES
110-V A.C.
-12V
+12V
GND.
SOLDERED CONNECTION
GRID


46-A AMPLIFIER
WIRING DIAGRAM
WESTERN ELECTRIC SOUND PROJ. SYSTEMS
ELECTRICAL RESEARCH PRODUCTS INC. N.Y.
ASR-377
ASSOCIATED WITH EQUIPMENT BULLETIN, AMPLIFIER, 46 TYPE
TOP OF PANEL
FRONT
REAR
ASR-377

1. References

1.1 Equipment Bulletins on: Amplifiers, 25-C & 51-A
Apparatus Unit, 702-A
Panel, 213-A
Panel, 214-A
Telephone Set, 6055-C
Apparatus Unit (Theatre) 6427-D

1.2 Drawings ASO-3361, H.A. Attach. Wiring Diag. 1U-41 and 1A-41 Systems
ASO-3349, H.A. Attach. Cond. Layout, 1U-41, 2UX-41, 3UX-46 and 3AX-46 Systems
ASO-3340, H.A. Attach. Wiring Diag. 2UX-41 and 2AX-41 Sys.
ASO-3358, H.A. Attach. Wiring Diag. 3UX-46 and 3AX-46 Sys.
ASL-2266, H.A. Attach. Wiring Diag. 3U-46 and 3A-46 Systems
ASO-3347, H.A. Attach. Cond. Layout, 3U-46 and 3A-46 Sys.

2. Description

2.1 This attachment is intended for use in connection with our sound systems, for the assistance of hard-of-hearing members of the audience. It consists essentially of a network which taps off a small amount of energy from the amplifier speech circuit of the system; an amplifier which raises this energy to the proper level; jack boxes installed on the theatre seats and containing jacks which are wired to the output of the amplifier; and telephone sets, each containing a receiver, a volume control and a plug which connects the telephone set to the amplifier output.

2.2 The network referred to above is made up in three forms to adapt it to all types of Western Electric Sound Systems. The various systems, with the form of network required for each, are listed in Section 5.

2.3 The amplifier used with this system is either a 25-C or a 51-A type. The 25-C Amplifier is supplied until such time as the 51-A, which is a mechanical re-design of the 25-C, is available. These amplifiers have a gain of 31 db, a power output level of + 20 db, and are wholly AC operated. Each amplifier can supply from 1 to 30 of the 6055-C telephone sets at the necessary level.

2.4 The jack box for mounting on the theatre seat is coded 6427-D Theatre Apparatus Unit (Hart Mfg. Co.). Each unit contains two jacks in multiple and is intended to serve two seats, by mounting one unit on every second seat.

2.5 The 6055-C Telephone Set used with this system consists of a 528 Receiver with a single wire headband and headband pad, a small cylindrical shaped volume control unit coded 27-A Potentiometer and a small sized plug (271-A) which fits the jack in the 6427-D Theatre Apparatus Unit. One is required for each seat equipped.

3. Installation

3.1 The 214-A and 213-A Panels are used with reproducing systems employing rack type mounting for the amplifiers and associated apparatus and are accordingly designed for rack mounting. The location of the panels for each of the 41 Type Systems is shown on the wiring diagram for that system, as listed in Section 1. When either panel is used with a system marked (*) in the Equipment List below, a 6.4 ohm W.L. resistance is furnished and has to be mounted on the rear of the panel. This resistance is connected across terminals 8 and 14 of the 214-A Panel and across terminals 3 and 4 of the 213-A Panel. The 702-A Apparatus Unit designed for systems using the 46 Type Amplifier is mounted in the "A" box.

3.2 Install conduit, wiring, etc. in accordance with the drawings listed in Section 1.

3.3 In the 214-A and 213-A Panels five attenuation steps of 3 db each are provided, and in the 702-A Apparatus Unit 3 steps of 3 db each are available. The selection of the proper step is made at the time of installation and should be such that with the individual controls at the head sets set at maximum volume, the sound is not sufficient to cause annoyance to occupants of the adjacent seats. The power supply of the deaf set amplifier being in parallel with that of the sound system amplifiers, the deaf set system will be in operation whenever the sound picture system is being operated.

4. Standard Equipment List

WESTERN ELECTRIC SOUND SYSTEM			ATTACHMENT EQUIPMENT LIST	
A * 2SX-41 C 2S-41 CC 2D-41 1S* 3SX-46 1D* 1U-41 2S 2UX-41 2D 3UX-46 2SX 1A-41 2DX 2AX-41 1S-41 3AX-46	B * 1D-41 2DX-41	2S-46 3S-46 3U-46 3A-46		
1	1	1	51-A (or 25-C)	Amplifier ----------
-	-	1	702-A	Apparatus Unit -----
200'	200'	200'	#19 AWG	Cable, Lead Covered (Twisted Pr.) (Coded)----------
12	12	12	#4302 Econ.	Fuses, 2 Amp. Plug (10 Spares)---------
-	1	-	213-A	Panel----------
1	-	-	214-A	Panel----------
As Req'd	As Req'd	As Req'd	6055-C	Telephone Set (One for each seat to be equipped)-----
As Req'd	As Req'd	As Req'd	6427-D	Theatre Apparatus Unit, Hart Mfg. Co. (One for every two seats to be equipped
3	3	3	205-D	Vacuum Tubes (1 spare)----------
(1)	(1)	-	WL Type D	Resistor Unit, 6.4 ohms, tab terminals, non-inductive (systems marked with (*) only)----------

5. Operation

5.1 The user of the system inserts the plug of a 6055-C Telephone Set in the jack of the 6427-D Theatre Apparatus Unit. He then holds the receiver to his ear by means of the headband, and adjusts the volume to suit by means of the 27-A Potentiometer. This potentiometer has 7 volume steps and an off position. A total of 30 db attenuation is provided with two steps of 3.5 db each, two of 5.0 db each, and two of 6.5 db each.

5.2 The 1002-C Headset can be used for monitoring purposes by inserting its cord tips in the jacks provided on the 214-A and 213-A Panels and on the 702-A Apparatus Unit.

6. Availability

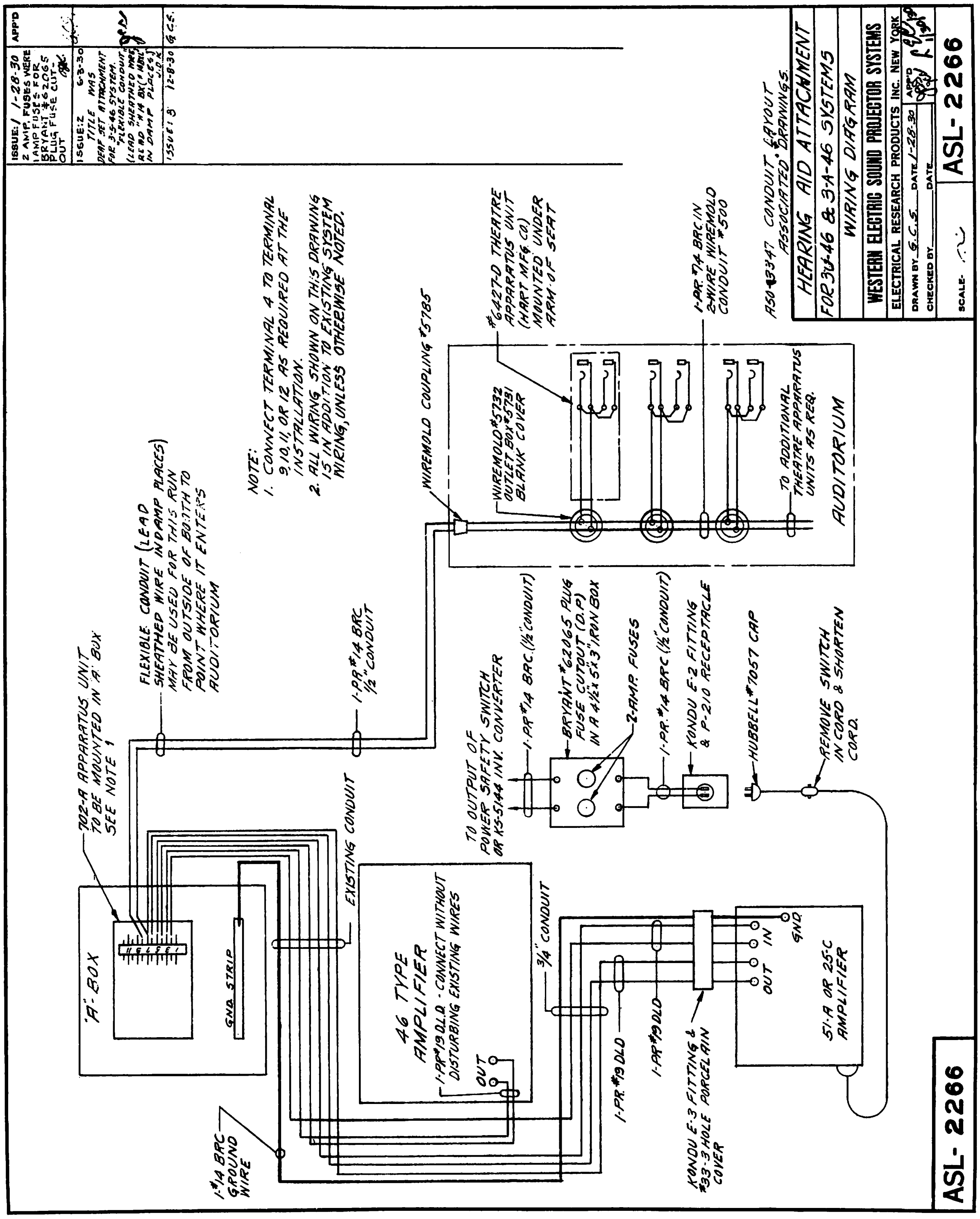
6.1 These attachments have been obtainable since January 1, 1930. Order the component parts separately in accordance with the Equipment List.

7. Reason for Reissue

7.1 To bring information up to date, to include Equipment List in Bulletin and to change title from "System, Deaf Set Attachment" to "Attachment, Hearing Aid".

L. W. CONROW
Installation Manager

JCC:SC


HEARING AID ATTACHMENT
FOR 3-J-46 & 3-A-46 SYSTEMS
WIRING DIAGRAM
WESTERN ELECTRIC SOUND PROJECTOR SYSTEMS
ELECTRICAL RESEARCH PRODUCTS INC. NEW YORK
ASL- 2266
NOTE:
1. CONNECT TERMINAL 4 TO TERMINAL 9,10,11, OR 12 AS REQUIRED AT THE INSTALLATION.
2. ALL WIRING SHOWN ON THIS DRAWING IS IN ADDITION TO EXISTING SYSTEM WIRING, UNLESS OTHERWISE NOTED.
'A' BOX
GND. STRIP
46 TYPE AMPLIFIER
51-A OR 25-C AMPLIFIER
AUDITORIUM
EXISTING CONDUIT
3/4" CONDUIT
WIREMOLD COUPLING #5785
2-AMP. FUSES
HUBBELL #7057 CAP
REMOVE SWITCH IN CORD & SHORTEN CORD.
1-#14 BRC GROUND WIRE

AMPLIFIER CODE	INPUT (*2) LINE IMPED. (OHMS)	INPUT (*2) TERMINAL IMPED. (OHMS)	INPUT (*2) TRANSF. CODE	OUTPUT NOMINAL LOAD IMPED(OHMS)	OUTPUT TERMINAL IMPED. (OHMS)	OUTPUT TRANSF. CODE	GAIN (1000 CPS) MIN. MAX. (db)	GAIN (1000 CPS) STEPS No.	GAIN (1000 CPS) STEPS db	MAX. OUTPUT WATTS	MAX. OUTPUT db	AMPLIFIER TUBES STAGE	TYPE	I_f (Amp) per Tube	I_p (Mils) per Tube	E_g VOLTS (*7)	RECT. TUBES QUAN.	RECT. TUBES TYPE	POWER SUPPLY DC Fil.	DC Plate	AC Volts	AC Cycles	Watts	WEIGHT APPROX. NET (Lbs)	DIMENSIONS W x D x H (*13)
46-A 46-B	250	-	233-J	8.	11.	127-D	51 66	5	3	1.5	24.	1 2 PP	239-A 239-A 205-D	.27 .27 1.60	.65-1.1 1.3-1.6 25-32.5	6.6 (Rf) 9.7 (Rf) 28.8-37.4 (Rp)	2	205-D	12	-	105 115	50-62½	80	113	20"x12"x16-1/2" (W)
B-46-A B-46-B	250	-	247-A	8.	11.	127-D	49 63																		
46-C 46-F D-46-C D-46-F	250	-	247-A	8.	11.	127-D	46 63	5	3	1.5	24.	1 2 PP	239-A 239-A 205-D	.27 .27 1.50	.65-1.1 1.3-1.6 25-32.5	6.6 (Rf) 9.7 (Rf) 28.8-37.4 (Rp)	2	205-D	12	-	105 115	50-62½	80	113	20"x12"x16-1/2" (W)
46-E B-46-E	250	-	247-A	500	-	127-A	48 63	5	3	1.5	24.	1 2 PP	239-A 239-A 205-D	.27 .27 1.60	.65-1.1 1.3-1.6 25-32.5	6.6 (Rf) 9.7 (Rf) 28.8-37.4 (Rp)	2	205-D	12	-	105- 115	50-62½	80	113	20"x12"x16-1/2" (W)
A-46-A C-46-A	250	-	233-J	8.	11.	127-D	51 66	5	3	1.5	24.	1 2 PP	264-A 264-A 205-D	.30 .30 1.60	.65-1.1 1.3-1.6 25-32.5	6.6 (Rf) 8.1 (Rf) 28.8-37.4 (Rp)	2	205-D	12	-	105 115	50-62½	80	113	20"x12"x16-1/2" (W)
A-46-B (*4) C-46-B	250	-	247-A	8.	11.	127-D	51 63																		
A-46-C, C-46-C, B-46-C, A-46-F C-46-C, C-46-F E-46-C, D-46-F F-46-C, E-46-F (*4)	250	-	247-A	8.	11.	127-D	51 66	5	3	1.5	24.	1 2 PP	264-A 264-A 205-D	.30 .30 1.60	.65-1.1 1.3-1.6 25-32.5	6.6 (Rf) 8.1 (Rf) 28.8-37.4 (Rp)	2	205-D	12	-	105 115	50-62½	80	113	20"x12"x16-1/2" (W)
A-46-E (*4) C-46-E	250	-	247-A	500	-	127-A	51 66	5	3	1.5	24.	1 2 PP	264-A 264-A 205-D	.30 .30 1.60	.65-1.1 1.3-1.6 25-32.5	6.6 (Rf) 8.1 (Rf) 28.8-37.4 (Rp)	2	205-D	12	-	105 115	50-62½	80	113	20"x12"x16-1/2" (W)
D-46-A D-46-B F-46-C F-46-F	250	-	247-A	4.8	2.1	D-96736	50 65	5	3	3.0	27.	1 2 PP	264-B 264-B 205-D	.30 .30 1.6	.97 1.45 -	6.6 (Rf) 8.1 (Rf) - (Rp)	2	205-D	12	-	105 115	50-62½	80	113	20"x12"x16-1/2" (W)
D-46-E E-46-E G-46-E H-46-E J-46-E K-46-E L-46-E	250	-	247-A	500	-	127-A	51 66	5	3	1.5	24.	1 2 PP	264-B 264-B 205-D	.30 .30 1.6	.97 1.45 28.7	6.6 (Rf) 8.1 (Rf) 28.7-37.4 (Rp)	2	205-D	12	-	105 115	50-62½	80	113	20"x12"x16-1/2" (W)
K-46-E	250	-	247-A	500	-	127-A	48 63	5	3	1.5	24.	1 2 PP	239-A 239-A 205-D	.27 .27 1.60	.65-1.1 1.3-1.6 25-32.5	6.6 (Rf) 9.7 (Rf) 28.8-37.4 (Rp)	2	205-D	12	-	110	50-62½	80	113	20"x12"x16-1/2" (W)
B-46-F	250	-	247-A	8.	11.	127-D	51 66	5	3	1.5	24.	1 2 PP	264-B 264-B 205-D	.30 .30 1.6	.97 1.45 28.7	6.6 (Rf) 8.1 (Rf) 28.8-37.4 (Rp)	2	205-D	12	-	105 115	50-62½	80	113	20"x12"x16-1/2" (W)

Amplifier Type	Gain (1000~) DB ***	Gain Control Stps	Gain Control DB	Input Source Imped. (ohms)	Input Term. Imped. (1000~) (ohms)	Input Trans.	Output Recom. Load Imped. (ohms)	Output Term. Imped. (ohms)	Output Trans.	Recom. Test Load (ohms)	VU Corr. ##	Power Output Watts 1000 cps	Power Output DB **	Power Output DBM **	Unweighted Noise Level DB **	Unweighted Noise Level DBM **	Vacuum Tubes Type	Stage	If (amps) (each)	Ip(ma) each tube	*Eg (volts	Power Required	Power Supplied
46	66	5	3	250	-	247-A	8	11	127-D	8	*18.8	1.5	24	31.8			264	1	0.3	0.85-1.1	6.6	12V DC 105-115V AC 50-62-1/2~ 80 W	440V DC
E-46	66	5	3	250	-	247-A	250 500	250 500	127-A	250 500	*3.8 *0.8	1.5	24	31.8			264 205 205	2 PP RR	0.3 1.6 1.6	1.3-1.6 25.0-32.5	8.1 28.8-37.4		
H-46	65	5	3	250	-	247-A	4.8	2.1	D-76736	4.8	*21	3	27	34.8									
J-46	69	5	3	250	-	233-J	8	11	127-D	8	*18.8	1.5	24	31.8	-	-	264 264 205 205	1 2 PP RR	0.3 0.3 1.6 1.6	0.85-1.1 1.3-1.6 25.0-32.5	6.6 8.1 28.8-37.4	12V DC 105-115V AC 50-62-1/2~ 80 W	440V DC
JE-46	69	5	3	250	-	233-J	250 500	250 500	127-A	250 500	*3.8 *0.8	1.5	24	31.8									
JH-46	68	5	3	250		233-J	4.8	2.1	D-96736	4.8	*21	3	27	34.8									
46-G/GA	78	5	3	250		247-A	8	11	127-D	8	*18.8	1.5	24	31.8	-18	-10.2	262 262 205 205	1 2 PP RR	0.32 0.32 1.6 1.6	1.75 1.75 25.0-32.5	5.2 5.2 28.8-37.4	12V DC (not req.for GA Types) 105-115V AC 50-62-1/2~ 60W	440V DC
E-46-G/GA	78	5	3	250	-	247-A	250 500	250 500	127-A	250 500	*3.8 *0.8	1.5	24	31.8	-18	-10.2							
J-46-G/GA	81	5	3	250	-	233-J	8	11	127-D	8	*18.8	1.5	24	31.8	-18	-10.2							
JE-46-G/GA	81	5	3	250	-	233-J	250 500	250 500	127-A	250 500	*3.8 *0.8	1.5	24	31.8	-18	-10.2							
46-P	65	5	3	250	-	247-A	10	4.5	127-D	10	*17.8	9	31.8	39.6			264 264 300cm 1276 205	1 2 PP RR	0.3 0.3 1.2 1.14 1.6	0.85-1.1 1.3-1.6 42.5	6.6 8.1 70	12V DC 105-115V AC 50-62-1/2~ 80W	440V DC
J-46-P	68	5	3	250	-	233-J	10	4.5	127-D	10	*17.8	9	31.8	39.6									
46-GP/GPA	77	5	3	250	-	247-A	10	4.5	127-D	10	*17.8	9	31.8	39.6	-18	-10.2	262 262 300cm 1276 205	1 2 PP RR	0.32 0.32 1.2 1.14 1.6	1.7 1.7 42.5	5. 5. 70	12V DC (not req.for GPA Types) 105-115V AC 50-62-1/2~ 80 W	440V DC
J-46-GP/GPA	80	5	3	250	-	233-J	10	4.5	127-D	10	*17.8	9	31.8	39.6	-18	-10.2							

Replacing Addendum #1 (8/14/32)

1. Reason for Reissue - General revision

2. Associated Drawings and Photographs

ASL-191, 46-A Amplifier, Schematic
ASR-377, 46-A Amplifier, Wiring
ASO-3014, 46-B,46-C & 46-F Amplifiers, Schematic
ASO-3369, 46-E Amplifier, Schematic
ASO-3620, A-46-C, B-46-C & A-46-F Amplifiers, Schematic
ASO-3761, 46 type Amplifiers, Wiring Modifications per TA-159
ASX-5011, 46-B,46-C & 46-F Amplifiers, Wiring
ASX-5141, 46-E Amplifier, Wiring
Photo #9186, Views of 46-C Amplifier

3. General Information (Gain, Capacity, Current Values, etc.) - See E.B."Amplifiers, General", F.R. 4.03

4. Installation

4.1 Modify,if necessary (E.B. Equipment Modifications, General, F.R. 4.01, and Section 5 below). Install per System Drawings. Insert vacuum tubes and fuses. With system operating, check line voltage at amplifier terminals; adjust TA-4005 Control Cabinet, if required, to bring within 105-115V. Adjust filament current and check plate currents (E.B. Amplifiers, General, F.R. 4.03).

5. Field Modification (see E.B. "Equipment Modifications, General", F.R. 4.01 for list)

5.1 For use of 264-A Vacuum Tubes (TA-4109, 4110, 4111, 4112 or 4113).

5.11 Required material (supplied to district offices)

1 - 70W W.L. Type "O" Resistor with #210 Terminals

5.12 Procedure - As shown in Fig. 1. Change code marking per E.B."Equipment Modifications, General", F.R. 4.01.

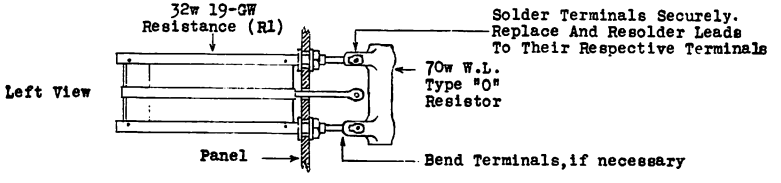


FIG. 1

5.13 Result - Either 264-A or 239-A Vacuum Tubes may now be used, adjusting filament current to 300 mils or 270 mils respectively.

5.2 For use of 264-A Vacuum Tubes and D-94814 Filter (TA-139)

5.21 Required material (supplied with equipment)

1 - Set of ASP-703 Conversion Parts, consisting of
1 - 70W W.L. type "O" Resistor with #210 Terminals
1 - Terminal Plate Assembly per Det. 2A, ASO-3618
3'- #18 Belden Motor Lead, code "Frozen"
1 - Copy ASO-3620 Circuit Label (not used)

5.22 Procedure

(a) Install 70W Resistor per Fig. 1
(b) Install new terminal plate assembly as per Fig. 2.
(c) Remove amplifier from casing, and connect terminal 2 of L1 to new +440V terminal, using #18 Motor Lead, per Fig. 2
(d) Recode per E.B. Equipment Modifications, General, F.R. 4.01

5.23 Result - Added termin l provides source of 440V supply to D-94814 Filter, for 90V supply to PEC Amplifiers. Either 264-A or 239-A Vacuum Tubes may now be used.

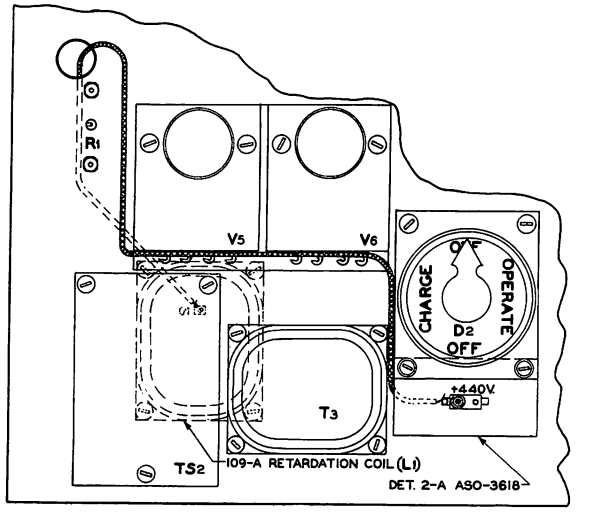


FIG. 2

5.3 Rapid Filter Condenser Disconnection (TA-159).

5.31 Required material (Engineers' Kits)

10 ft. - #18 Belden Motor Lead, code "Frozen"

5.32 Procedure - As shown in Fig. 1, ASO-3761

5.33 General - If and when the 21-CB Condensers (C6 - C11 inclusive) in 46 type Amplifiers are replaced by D-92583 Condensers (E.B. Condensers, General, F.R. 4.05) the TA-159 Modification should be made also. In cases where the condenser replacement has been made without making the TA-159 Modification, the latter should be made whenever convenient without incurring expense. The modification results in making accessible the filter bank connections, so that each bank may be cut out of circuit in case of condenser trouble. Refer to E.B. "Condensers, General" for information on condenser replacement.

5.4 Addition of Monitoring Unit (Mobile H-46 Systems only)

5.41 Required material

1 - ASO-3278 Monitoring Unit (supplied with equipment)
3'- #16 twisted fixture wire (procure locally)

5.42 Procedure - Remove Monitoring Unit from Kondu fitting (not used). Facing right end of amplifier in upper left corner drill or ream out one ventilating hole (lowest row, 3rd hole from front) as shown on Fig. 3. Attach apparatus unit (inside) and face plate (outside) by means of the #6-32 Brass Screws supplied with unit. Solder one end of the #16 twisted pair to terminals "MON" of the amplifier, lead the pair to the unit and connect as shown on ASL-2238 (E.B. "Monitoring Unit, ASO-3278", F.R. 4.01). It will facilitate matters to remove unit while making these connections. No coding change is required.

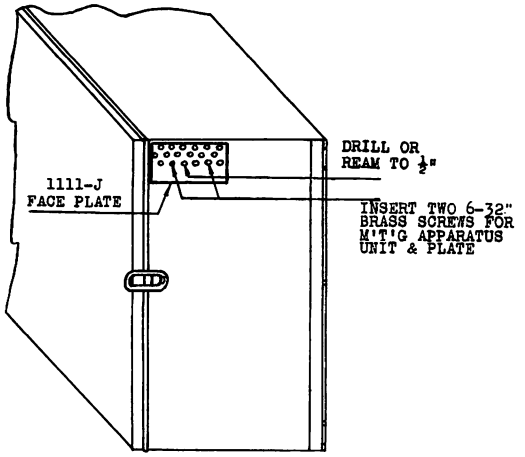


FIG. 3

5.43 Result - The 1002-C Headset with 240 Plug, part of Mobile H-46 type Systems, may be plugged into amplifier monitoring output.

5.5 Conversion - 46-C Amplifier to 46-E

5.51 Required Material

1 - 127-A Output Transformer (supplied with equipment)

5.52 Procedure - Replace 127-D Output Transformer by 127-A Output Transformer. Attach a tag within the amplifier noting change. No coding change necessary.

5.53 Result - Output impedance raised to 500W as required in 3AX-46 or 3UX-46 System.

6. Stores Division Modifications (See E.B. "Equipment Modifications, General" F.R. 4.01)

6.1 For use of 264-A Vacuum Tubes and D-94813 type Current Supply Set (TA-140)

6.11 General - In Mobile or Portable 46 "H" type Systems, the PEC Amplifier receives its 90V supply from the plate rectifier circuit of the 46 type Amplifier through the D-94813 type Current Supply Set, from which the 46 type Amplifier receives its low voltage supply. This modification provides a terminal from which to take the high voltage supply for the D-94813 type Current Supply Set, and replaces the 30W Rheostat by a 45W KS-7162 Rheostat. The changes necessary to permit the use of 264-A Vacuum Tubes are also included. Inasmuch as this modification is to be made in the Stores Division, no instruction is provided herein.

7. Cable Form Support

7.1 Connections at K1 and K2 sometimes break off due to insufficient support for the cable form. In amplifiers of later manufacture, this condition has been eliminated by the use of three leather supports instead of one as formerly. In amplifiers having only one such cable form support, tie the cable form securely to the upper screw that holds K1 to the panel, dress the wires, inspect for loose or weak connections, and starting as close as possible to each key, tape together the wires leading from the main form to each key, thus protecting the connections at this point.

8. Maintenance

8.1 Should a 21-CB Condenser in Filter Bank C-6 to C-11 incl. require replacement, replace entire bank with D-92583 Condensers (customer's expense). Modify per Section 5.3 at the same time (refer E.B. "Condensers, General," F.R. 4.05).

8.2 For Emergency Operation in case of Failure of Plate Rectifier, refer to "Emergency Expedients" in E.B. "Amplifiers, 46-B,C,F & D-88446 Trouble Charts" and "Amplifier, 46-F Trouble Chart", F.R. 4.03.

Note: Referring to the instructions in the above E.B's it will be necessary to open the lead to T-5 (1) only when there are internal short-circuits or grounds in T-5 or grounds in the rectifier plate circuit.

9. Merchandising

9.1 46-B,C,E,F,A-46-B,C-46-C,A-46-E and A-46-F Amplifiers are available in the Stores Division (see E.B. "Equipment Modifications, General", F.R. 4.01). Order them as:

"One 46-C Amplifier, etc."

9.2 46 type Amplifiers now shipped from the Stores Division or Emergency Stock are equipped with D-92583 Condensers in place of 21-CB Condensers, C-6 - C-11 inclusive (see E.B. "Condensers, General", F.R. 4.05).

1. ASSOCIATED DRAWINGS: ASO-6285 - D-46-A Amplifier, Schematic
ASO-6287 - D-46-B, H-46-C, & F-46-F Amplifiers, Schematic

2. ABSTRACT

2.1 This addendum covers the method of modifying 46 type Amplifiers to increase the power and to provide a lower impedance output for use in Wide Range Systems.

2.2 It is reissued to specify a different method for changing the value of Resistor R-18; also to supply the modification data in diagram form.

3. MODIFICATION (FIELD) OF 46 TYPE AMPLIFIERS FOR IMPROVED OUTPUT (TA-226)

3.1 General: This modification reduces the output load impedance to limits of 4.2 to 7.4 ohms, and increases the max. output to 3.0 watts. It is made in all cases where the amplifier is used as the final amplifier in a system converted for EW Wide RAnge operation, and may be made in other cases, to increase the system output capacity. The modification consists of changing the output transformer (T_3) and increasing the value of the biasing resistor (R_{18}). If the existing 46 type output amplifier is not C-46-A, C-46-B, C-46-C or E-46-F, it must be modified to one of these codes before proceeding with the modification herein described.

3.2 Required Material: 1 - Set of Conversion Parts, per ASP-6528, including:
1 - D-96736 Output Transformer
1 - IRC PB-2 200 ohm Resistor
1 - Copy of each of Labels, per ASP-616, ASO-6285 & ASO-6287.

3.3 Procedure for Modifying C-46-A Amplifier to D-46-A; C-46-B to D-46-B; C-46-C to H-46-C; and E-46-F to F-46-F

(a) Replace the 127-D Output Transformer by a D-96736 Output Transformer, install the IRC PB-2 200 ohm Resistor and change the wiring per Fig. 1 or Fig. 2 below.
(b) Recode and add circuit label per E.B. "Equipment Modifications, General", File 4.01, and change wiring diagram in ink.

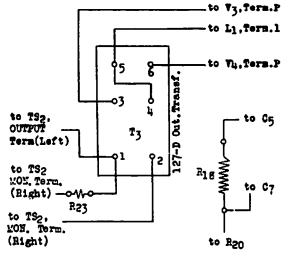


FIG. 1-A
Before Modification

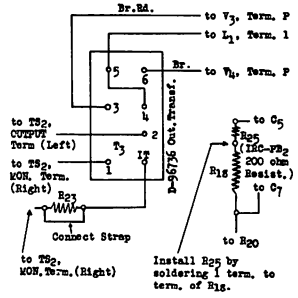


FIG. 1-B
After Modification

FIGURE 1
SHOWING MODIFICATION OF C-46-A AMPLIFIER TO D-46-A

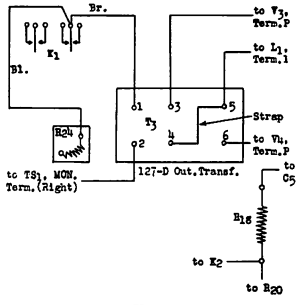


FIG. 2-A
Before Modification

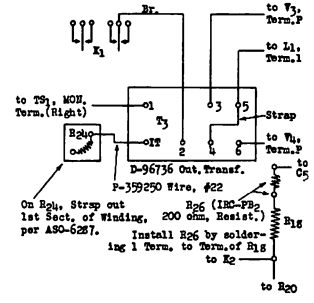


FIG. 2-B
After Modification

FIGURE 2
SHOWING MODIFICATION OF C-46-B, C-46-C or E-46-F AMPLIFIERS TO D-46-B, H-46-C, or F-46-F RESPECTIVELY

4. MERCHANDISING

4.1 The ASP-6528 Conversion Parts are furnished, when required with EW Wide Range conversion equipment. For existing installations (including those on R & R contract), the conversion may be ordered in the regular manner on a full price basis. Order parts as: "1 - Set of Conversion Parts, per ASP-6528".

1. ABSTRACT

1.1 This addendum specifies the disconnection from the output circuit of Key K1 on D-46-B, H-46-C and F-46-F Amplifiers, providing the system has other means for cutting off the stage loudspeakers from the booth.

2. DISCONNECTION OF OUTPUT KEY

2.1 As a measure to aid in reducing key contact troubles to a minimum, in all cases where the D-46-B, H-46-C or F-46-F Amplifier feeds into a TA-7284 or TA-7297 Control Cabinet, or where there are other facilities for opening the speech circuit to the stage loudspeakers from the booth, the leads to Key K1 in the 46 type Amplifier, shall be disconnected from the key, spliced (two splices, S1 to BR, and RED to GR) and taped.

2.2 At the next reissue of associated drawing ASO-6287, a note in accordance with the above will be included.

ALTEC SERVICE CORPORATION

EQUIPMENT BULLETIN

Amplifiers - 46 Type
Addendum #3

0. PURPOSE

0.1 To provide data on modification of 46-type Amplifier for use of 300-B Tube.

0.2 To incorporate data in this bulletin formerly included in Issue 2 of E. B. 40.44 (4.44) - #1276 Vacuum Tubes, dated October 28, 1938, and to advise that either of these type tubes and their associated modification parts may be furnished for power modifications.

1. GENERAL DESCRIPTION

1.1 The 300-B Vacuum Tube is a new W. E. tube of the 300 type which has been manufactured in accordance with Altec specifications. The filament current and voltage, plate characteristics, impedance, power sensitivity, etc. of this new type tube are optional for the output current of the 46-type Amplifiers as used in theatres. Through the proper use of a pair of these tubes the power capacity of the 46 Amplifiers is increased to 10 watts, fully realizable down to 50 c.p.s. As used, they replace the 205-D tubes in the amplifier sockets of this amplifier.

1.2 When so modified, a 46-type Amplifier will retain its existing code numbers with the letter "P" added, as for example the "C-46-E" becomes the "C-46-EP"

2. MATERIAL REQUIRED

2.1 One set of AP-1050 Conversion Parts consisting of:-

3 - 300-B Vacuum Tubes (1 spare)
1 - AQ-1070 Bracket
1 - AP-1044 Auto Transformer
1 - IRC DHA-1000 ohm adjustable Resistor (25 watts)
1 - 8/36 x 3" RH Iron Machine Screw
1 - #10 Iron Washer
2 - #8 Asbestos Washers
1 - 8/32 Iron Hex Nut

2.2 The AP-1044 Auto-Transformer contains a single winding. The secondary leads (brown) are connected to the extremities of the winding and the primary leads (black) connected at equal distances in from the ends of the winding, to give an output under load of 5.0 volts when the primary voltage is 4.55 volts.

2.3 Before proceeding with the power modification, it will be necessary to measure the normal operating line voltage at the amplifier to determine the need for this transformer. If this voltage is less than 115 volts proceed with the installation of the transformer as outlined in items (b), (c), (f) and (g) of Section 3.1 under INSTALLATION PROCEDURE. If the voltage is greater than 115 volts, the auto-transformer need not be installed.

3. INSTALLATION PROCEDURE

3.1 When using the 300-B Vacuum Tubes for this modification, it is necessary to modify the socket mounting of the amplifier tubes, as shown in Fig. 1, and make wiring changes as follows:

a. Remove the two amplifier tube sockets V_3 and V_4 from amplifier panel.
b. Remove the SL and SLRD wires leading to the filament terminals of V_4 socket from T_4. Leave the wires running from filament terminals of V_4 to same terminals of V_3. (V_4 socket is right-hand socket looking at front of amplifier panel.)
c. Mount AP-1044 Transformer to AP-1070 Mounting Bracket, using bolts and nuts supplied.
d. Fasten AP-1070 Mounting Bracket to amplifier panel with screws supplied, using former socket mounting holes as shown in Fig. 1.
e. Fasten tube sockets previously removed from amplifier panel to AP-1070 Mounting Bracket, making sure to reinstall the fiber insulator between sockets and bracket. If AQ-1030 Equalizer is installed at time of power modification, the #8 round head screw supplied with modification parts is held in place by the threaded hole in the equalizer supporting bracket. If equalizer is not installed, this screw is held in place by a nut furnished as a separate part of AP-1050 modification parts.
f. Connect primary leads (black) of AP-1044 auto-transformer to leads removed from V_4 socket.
g. Connect secondary leads (brown) to filament terminals of V_4 socket.
h. If the amplifier is not already equipped with the D-91938 heat shield, it will be necessary to install one before completing this modification with 300-B Tubes due to the new position of the tube mounting.

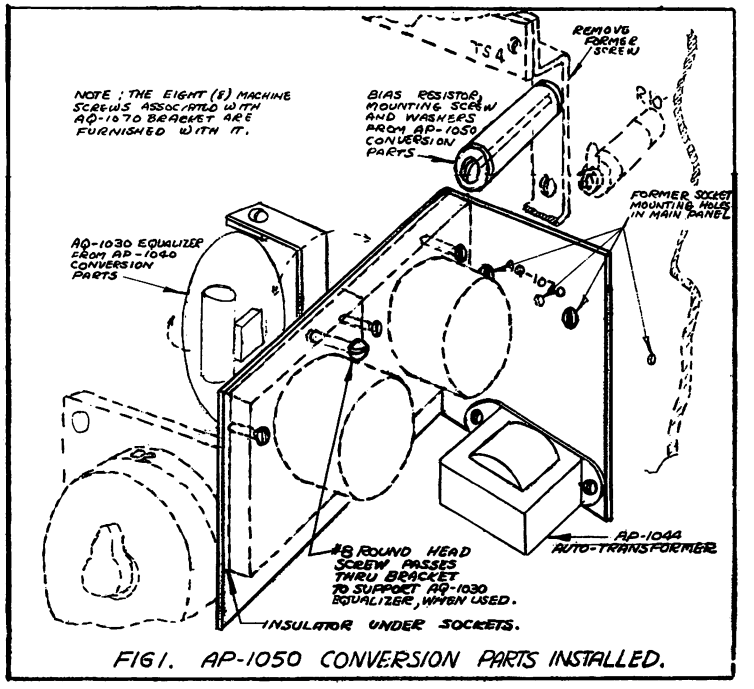


FIG1. AP-1050 CONVERSION PARTS INSTALLED.

3.2 Short out L_1 (109-A Retard Coil). In all 46 Amplifiers which have been modified for rapid filter disconnection as per ASO-3761, File 4.03 - 46 Amplifiers, L_1 may be shorted out by running a jumper wire between the proper disconnect lead and the center tap of the primary winding of the output transformer. This lead should be the one which is soldered to the lower lug on the back of the disconnect terminal strip. To verify this, an ohmmeter is placed across the center tap of the primary winding and this lead should measure 120 ohms which is the resistance of L_1.

3.3 Remove R_{18} (575 ohms) and replace with DHA 1000 ohm adjustable resistor. Mount this resistor at right angles to panel, as shown in Fig. 1 by means of 8/36 x 3" round head iron machine screw, steel washer and two asbestos washers using tapped hole in right-hand bracket supporting TS_4. Unsolder the leads from present R_{18} resistor and solder them to new resistor. Adjust value of new resistor to 825 ohms by sliding contact.

NOTE:- When 1276 type Tubes are supplied for this modification, the only changes necessary will be to short out L_1 (109-A Retard Coil) and install DHA 1000 ohm adjustable bias resistor as outlined in paragraphs 3.2 and 3.3 above.

4. CHARACTERISTICS OF MODIFIED AMPLIFIER

4.1	Power Capacity	10 watts
	60 cps. Line Voltage	$120 \begin{smallmatrix} +5 \\ -10 \end{smallmatrix}$
	Plate current V_3 plus V_4	85 mils
	Nominal Load Resistance	10 ohms

VI Correction (open circuit)	14.4 db
Effect of mod. on 1000 cps. gain	-1.0 db
Effect of mod. on response	None

4.2 The rated full load output of 10 watts has been determined by measurement with a wave analyzer which is the precise method of determining distortion. Field methods of checking will give results as follows:

a. The "Gain Load" test will give a figure of about 7 watts.
b. The oscillograph check will show a figure of about 9 watts.
c. Introducing a 120 cycle signal by use of an AC lamp at the PEC and noting output level when harmonics are first heard in the monitor, gives a figure of about 9 watts.

4.21 It is suggested that the aural method outlined in Item C of Paragraph 4.2 be used, as it is easy to perform and gives more accurate results.

4.3 The rating of 10 watts has been established at 120 volts AC and without a D-Spec filter. The power capacity drops about 1 watt for every 5 volts below 120, and about one-half watt when the D-Spec filter is connected in.

4.4 Amplifiers now equipped with D-96736 Output Transformers will deliver only 3.5 watts with a normal 10 ohm speaker load. Therefore, no attempt should be made at the present time to modify such amplifiers for power increase, as this modification, in its present form, is applicable only to the 127-D Transformer.

5. MERCHANDISING

5.1 For use with 300-B Tubes order:-

1 Set AP-1050 Conversion Parts

5.2 When 1276 tubes are supplied with this power modification the order will specify:-

1 Set AP-1041 Conversion Parts

5.3 When ordering #1276 type Tubes for replacement purposes, the orders should specify, "DO NOT SUBSTITUTE".

6. RETURN OF SURPLUS 205-D TUBES

6.1 After each power modification, there will be a surplus of two 205-D Vacuum Tubes. A major consideration in supplying these new tubes at no expense to the exhibitor is that the surplus 205-D Tubes from each job be returned to Altec.

6.2 Upon completion of modification the two tubes removed from the amplifier socket should be placed in spare parts cabinet as spares for rectifier circuit. The two good (new) tubes nominally kept as spares should be packed in the same container in which the 300-B or #1276 Tubes were shipped and returned immediately to the Altec Warehouse, 533 W. 57th Street, New York, N. Y., tagged "Return Account of AP-1050 or AP-1041 Modification".

6.3 When each of these power conversion parts is sent out, a follow-up procedure will be instigated for the return of surplus 205-D Tubes.

0. PURPOSE

0.1 To provide data on equalization of 46 Type Amplifiers, as used in (Standard) one-way W. E. Type Systems, to ensure best aural frequency response for current release. The amount of high rise desirable will vary with the type horns used and with the acoustical characteristics of the theatre. A low end rise limitation is imposed by amplifier output power penalization and by receiver diaphragm hazard. Should it be found necessary to exceed the low end rise provided by the standard equalizer, the installation should be checked carefully periodically for evidence of the above-mentioned difficulties.

1. ASSOCIATED DRAWINGS

AQ-8337-C - File 4.64
AQ-1060 - File 4.03
AQ-1061 - File 4.03

2. GENERAL DESCRIPTION

2.1 This equalization is accomplished through the installation of an equalizer in the grid circuit of the second stage of the 46 Type Amplifier and, where necessary, through a modification of the 49 Type Amplifiers consisting of the reconnection of the T_2 Transformer, and, in the case of the B-49-A or B-49-C Type Amplifier, the replacement of the C_3 .1 mf condenser by a 1 mf condenser (see EB-49 Type Addendum #3, Issue 1). This transformer reconnection, when made, adds 10 db to compensate partially for the 13 db (500 cycles) insertion loss of the equalizer. The equalizer bracket is designed to allow for orientation of the equalizer unit to the position giving minimum hum (stray field) pick-up.

3. EQUIPMENT REQUIRED

3.1 One set of AP-1040 Modification Parts consisting of:

1 - AQ-1030 Equalizer including as loose parts:
1 - BT-1/2 - 20,000 ohm Resistor R_3
1 - .01 mf Condenser C_3
1 - .0005 mf Condenser
1 - .0015 mf "
1 - .0025 mf "
1 - 1/4" Brass Spacer
1 - 8/32 x 1/2" RHBM Screw

NOTE: Prior to January 20, 1939, a 15,000 ohm resistor and a .015 mf condenser were supplied for R_3 - C_3 combination. The values now supplied have been substituted as their use affords more satisfactory curve variation.

4. INSTALLATION PROCEDURE (See Fig. 1)

(a) On amplifiers using 1276 Tubes, drill a hole with #18 (11/64") drill in fibre plate supporting sockets V_1 and V_2, midway between sockets and 1-1/4" from front edge. Providing the drill is held in a small tapwrench, the hole may be drilled without removing socket assembly. Attach the equalizer to the underside of this plate by means of the 8/32 x 1/2" screw and brass spacer furnished.

NOTE: When 300-B Tubes are used, the equalizer is mounted on the AQ-1070 Bracket as shown in Addendum #3, EB-46 Type Amplifier, File 4.03, dated 12/7/38

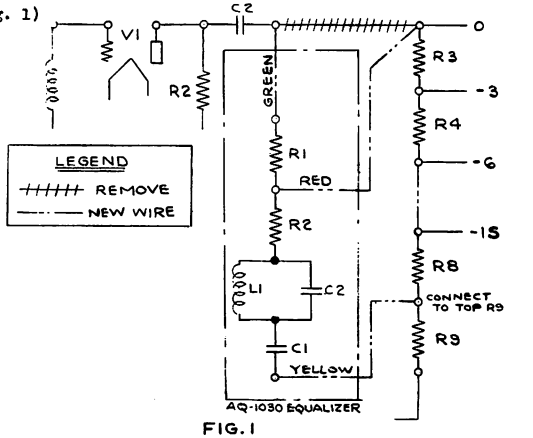


FIG. 1

(b) Disconnect from attenuator strip wire running from C_2 to "O" terminal of strip and connect green wire from equalizer unit to this wire.

(c) Connect red wire from equalizer to "O" terminal of attenuator strip.

(d) Connect yellow wire from equalizer to top terminal of R_9.

(e) Orient unit for minimum hum and tighten all holding screws. This hum must be checked from stage horns or by means of a headset, as it may not be perceptible in the monitor horn output.

4.1 The attenuator of the 46 Amplifier must be left at "O" setting to prevent overloading of the first tube. The following table shows variations from present final system gain after installation of equalizer with insertion loss of 13 db and reconnection of Transformer T_2 in 49 Type Amplifier which provides 10 db gain:-

FINAL 46 AMP. ATTENUATOR SETTING AT "O"

Original Attenuator Setting	49 Type Amplifier T_2 Transformer	Overall Loss or Gain at 500 Cycles
-15	Not Reconnected	+ 2 DB
-12	" "	- 1 "
-9	" "	- 4 "
	Reconnected	+ 6 "
-6	Not Reconnected	- 7 "
	Reconnected	+ 3 "
-3	"	0 "
0	"	- 3 "

4.2 Note that where the original attenuator setting was -15, -12, or -9, it should be unnecessary and it is preferable not to modify the 49 Type Amplifier for transformer coupling. In the case of the -9 db Attenuator setting, experience indicates that the improved articulation resulting from the equalization will probably compensate for the indicated 4 db 500 cycle gain loss.

4.3 If it is found that additional gain is needed, the 49 Amplifier should be modified (per EB 49 Type Amp., Addendum #3, Issue 1), and excess gain may be reduced, if necessary, by adjustment of the attenuator strips on Universal base installations or by decreasing the exciting lamp current on 206 and 208 Type installations. Where it is impossible to further decrease the exciter lamp current in 206 or 208 Reproducer Sets and 713 type Control Cabinet installations, the attenuation may be obtained by the installation of a 5.5 db "T" Pad consisting of two series legs of 150 ohms each and a shunt leg of 750 ohms in the 713 control cabinet. This "T" Pad should be constructed by soldering together one end of each of the three Resistors.

In the 713 Control Cabinet, connect the free end of one of the 150 ohm resistors to the wire (713-A type) or both wires (713-C type) removed from terminal 3 of the 701-A Potentiometer and the free end of the other 150 ohm resistor to terminal 3 of the Potentiometer. The free end of the 750 ohm resistor should be connected to terminal 1 of the Potentiometer.

4.4 Where the original attenuator setting was -6, -3, or 0, it will be necessary to reconnect transformer T_2 of 49 Type Amplifiers similar to original circuit of 49-A or 49-B as per EB-49 Type Amp., File 4.03, Addendum 3, Issue 1 (Dwgs. AQ-1060 or 1061).

5. ELECTRICAL RESULTS

5.1 Before proceeding with the equalization, the System should be made to conform with standard normal limits. After equalization, the variations from normal based on the connections for the added equipment should again fall within limits.

NOTE: Before attempting to adjust the final setting on the H.F. end of the equalizer, the flutter content of the reproducer set should be brought within limits specified under EB-TA-7421 Flutter Bridge, File 4.61. If considerable flutter is present, it may affect materially the H.F. equalization selected as best.

5.2 The maximum high frequency equalization has been generally satisfactory for 15 Type Horns. If desired, it may be reduced by substituting a 1 megohm for the .5 megohm resistor in R_1 position of the 49 Type Amplifier. It may be still further lowered by the insertion of the resistance condenser combination (R_3,C_3)

furnished with the equalizer and installed as shown in Dwg. (AQ-8337-C), File 4.64, Testing Procedures). This change also raises slightly the low end response from 300 c.p.s down.

5.3 The position of the H.F. peak and the H.F. cut-off curve, may be varied by changing values of C_2 condenser in the equalizer with condensers supplied to obtain curves as shown in Dwg. AQ-8337-C (File 4.64-Testing Procedures). It will be noted that if C_3 and R_3 are used, C_2 variation still affects the cut-off but has practically no effect on the location of the peak.

6. MERCHANDISING

6.1 Where B-49-A or B-49-C Amplifiers are now installed, order:

1 Set of AP-1040 Modification Parts
2 Aerovox Type 484 1 Mf Paper Condensers with spaghetti tubing.

NOTE: In those cases where transformers have been reconnected in the above type amplifiers prior to issuance of this bulletin, the condenser change should be made at the first opportunity, in the interest of protecting receiver diaphragms from high amplitudes at sub-audible frequencies.

6.2 Where A-49-A or E-49-C Amplifiers are now installed, order:

1 Set of AP-1040 Modification Parts

7. CODING

7.1 All 46 Type Amplifiers converted with this equalization shall be coded as follows:

46-B shall become 46-BQ
A-46-B " " A-46-BQ
Etc.

1. PURPOSE

1.1 To provide data on modification of 46 Type Amplifier for use of two 262 Type Vacuum Tubes to increase the gain approximately 12 db.

2. ASSOCIATED DRAWING

AQ-1172 - Schematic

3. IMPORTANT NOTE

3.1 The voltage amplification stages modified in accordance with the following procedure will have a greater power handling capacity than they had before modification. This will be a significant factor under certain conditions when the power stage which follows has been modified for higher power.

4. EQUIPMENT REQUIRED

4.1 One set of AQ-1157 Modification Parts consisting of:

1 - AP-1162 Apparatus Unit
3 - 262-A or B Vacuum Tubes (1 spare)
2 - #6-32 x 5/8" R.H. Brass Machine Screws, N.P.
2 - 1/4" x 20 steel machine screw hex nuts N.P., 3/16" thick
2 - National Standard Tube Grid Grips
10'- #22 Stranded Black Lenz #1329 Push Back Wire

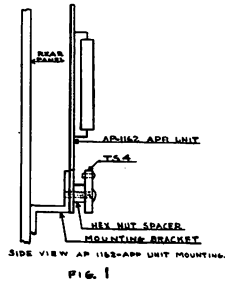


FIG. 1

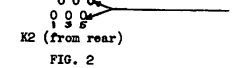
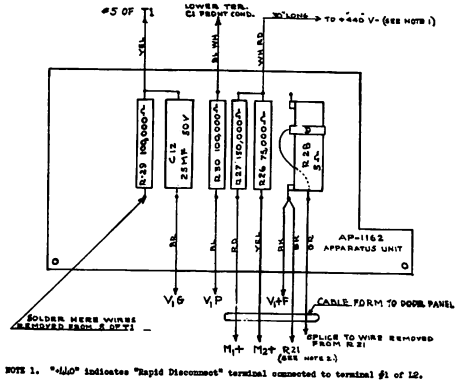


FIG. 2



NOTE 1. "+440" indicates "Rapid Disconnect" terminal connected to terminal #1 of L2.

NOTE 2. One outside terminal of R21 (filament rheostat) contains one wire which runs to "-12" terminal of TS2. Remove this single wire from R21 and connect black lead from AP-1162 Apparatus Unit to R21. Splice the removed wire to black lead from apparatus unit.

FIG 3

FIG 1.

5. MODIFICATION DETAILS

a. Remove wires from "G" of V1 and V2, fold back and tape.
b. Remove wire from "-F" of V1 and connect to "G" of V1.
c. Remove wires from "+F" of V2 and connect to "G" of V2.
d. Add new wire, connecting "G" of V1 to "G"of V2.
e. Add new wire, connecting "-F" of V1 to "+F" of V2.
f. Add new wire, connecting "-F" of V1 to "-12" of TS2.
g. Connect 6" piece of wire with grid clip to term. #6 of T1.
h. Connect 6" piece of wire with grid clip to "GRID" of TS4.
i. Remove wiper strap on filament rheostat R21.
j. Remove R25 (70 ohms), found connected across R1.
k. Remove strap between "2" and "4" of K2. See Fig. 2.
l. Remove strap between "3" and "5" of K2.

m. Add strap between "4" and "6" of K2.
n. Add strap between "1" and "3" of K2.
o. Remove wire or wires from Term. 5 of T1.
p. Install AP-1162 Apparatus Unit on mounting brackets now supporting TS4 by remounting TS4 using new screws with the hex nuts supplied as spacers in the original tapped holes. The spacers must be placed between the apparatus unit panel and the TS4 Strip to keep the back of the terminals on TS4 from striking the metal panel of the AP-1162 Apparatus Unit. (See Fig. 1). Connect Apparatus Unit leads in accordance with legends on Fig. 3. The cable form should be run to door panel and tied to existing cable.
q. Install 262 Type Tubes
r. Adjust Resistor (R-28) in heater and bias circuit and power unit or MG voltage until voltage across heaters is exactly 10 volts.
s. On front of panel, paint out lettering "Fil. Control", "Press to Read", "Plate Total 3 and 4" under Key and "Fil. 1 & 2" with flat black paint.

6. OPERATION

6.1 The 262 Type Tubes should be operated at a heater voltage of close to 10 volts if maximum life is to be obtained. Base the adjustment to this value upon the normal line voltage, which may be different from the line voltage at the time the adjustment is made. The heater voltage should be checked from time to time during routine inspection.

6.2 Meter M3 will read the combined plate current of V3 and V4 and K2 will be inoperative.

7. CHARACTERISTICS

7.1 Gain

	Before Mod.	After Mod:
Gain without AQ-1030 Equalizer	65.0 db.	77.2 db.
Gain with AQ-1030 Equalizer	53.5 db.	65.5 db.

7.2 Response Corrections for the modified amplifier without AQ-1030 Equalizer -

55	130	300	500	1000	3000	5000	7000	8000
0	0	0	0	0	+.4	+1.7	+3.6	+4.8

7.3 Power output based on 3% total harmonic content, with or without AQ-1030 Equalizer-(D-96101 Filter not installed) -

80 cps 10 watts
1000 cps 10 watts
5000 cps 5 watts

7.4 Noise Level

With AQ Equalizer adjusted for min. Noise -22 to -27 db.
Without AQ Equalizer installed -18 to -24 db.

7.5 Plate Current

V1 - 1.75 mils
V2 - 1.75 mils

7.6 Grid Bias

V1 - 5.2 volts
V2 - 5.2 volts

8. SIGNIFICANT CIRCUIT CHANGES

1. Plate feed resistance of V1 reduced.
2. Plate bleeder voltage of V1 increased.
3. Heaters V1 and V2 paralleled.
4. Bias Bleeder Circuit installed to raise cathodes 5.2 volts above ground.
5. Adjustable resistance (R28) installed in circuit common to heaters and bias bleeder to adjust heater voltage.
6. R-C combination placed in grid circuit of V1 to suppress ripple in bias supply.

9. MERCHANDISING

9.1 Where amplifiers are already modified for increased power output order:

1 Set AQ-1157 Modification Parts.

9.2 If amplifiers are to be modified for increased power during this gain modification, order:

1 Set AP-1041 Conversion Parts
1 Set AQ-1157 Modification Parts.

9.3 Upon completion of the gain modification, the two 264 type Tubes removed from the amplifier should be placed in the spare parts cabinet. Two of the good (new) 264 type Tubes normally kept as spares should be packed and returned immediately to Altec Warehouse, 533 West 57th St., New York, N. Y., tagged "Return Account of AQ-1157 Modification Parts."

9.31 Where 62 type Film Amplifiers are now in use, all 264 type Tubes should be returned.

1. PURPOSE

1.1 To provide data on the modification of the 46 type Amplifier for AC operation of filaments where the amplifier has been or is being modified for the use of 262 type Vacuum Tubes (increased gain).

2. ASSOCIATED DRAWING

AP-1254 Schematic

3. EQUIPMENT REQUIRED FOR AC MODIFICATION (Where Gain Modification Is Already Made)

3.1 One set of AQ-1256 Modification Parts consisting of:

1 - Thordarson T19-F25 110V/10V 60 cycle Transformer
1 - AP-1255 Mounting Plate
1 - BT1 - 2000 ohm Resistor
1 - 25 mf - 50 V Condenser
4 - #6 x 3/16" Parker Kalon Type Z Binding Head Cadmium Plated Screws
10'- #22 Stranded Black Lenz #1329 Push Back Wire

3.2 If gain modification has not previously been made see Section (7.2) for data on ordering equipment.

4. MODIFICATION PROCEDURE

4.1 If 262 Tubes are not already installed refer to Par. (4.3) for procedure.

4.2 Where the amplifier has already been modified for the use of 262 type Vacuum Tubes proceed as follows:

(a) Remove wires from G of V_1 and G of V_2.
(b) Connect strap between G of V_1 and G of V_2.
(c) Remove wire connecting -F of V_1 to -12V of TS_2.
(d) Remove wire(s) from + "12V Charge" Terminal.
(e) Remove wire(s) from - "12V Charge" terminal and connect to -"12V". Disconnect strap between -"12V Charge" and -"12V".
(f) Connect wire from -F of V_1 to -"12V Charge" terminal.
(g) Connect strap tying GND., -12V and +12V terminals.
(h) In the AP-1162 Apparatus Unit, disconnect black and green wire in cable form leading to R28 - 5 ohm variable resistor.
(i) Connect wire from slider of R28 to + "12V Charge" terminal.
(j) Mount 2000 ohm resistor on spare terminal of AP-1162 Apparatus Unit and shunt it with 25 mf condenser.
(k) Connect + terminal of 25 mf condenser to G of V_1.
(l) Connect - terminal of 25 mf condenser to wire removed from F of V_1.

4.3 If modification for gain is made at the same time as this AC modification, proceed as follows:

(a) Remove wires from G of V_1 and V_2. Fold back and tape.
(b) Remove wire from -F of V_1.
(c) Remove wires from +F of V_2, making sure that the wires removed remain connected together. Tape ends.
(d) Add new wire connecting G of V_1 to G of V_2.
(e) Add new wire connecting -F of V_1 to +F of V_2.

Then proceed according to Par. 5 of E.B. Amplifiers, 46 Type, Addendum 5, Issue 1, omitting steps (a), (b), (c), (d), (e), (f), and (i), and modifying (P) in accordance with (h) and (i) Par. 4.2 of this bulletin. Then proceed with (4.2) of this bulletin, omitting steps (a), (b), and (c).

5. INSTALLATION OF FILAMENT TRANSFORMER

5.1 Mount the transformer in amplifier case by attaching transformer to AP-1255 Mounting Plate and mounting whole unit on two lower brackets supporting power switch. Ground center tap of transformer low voltage winding.

5.2 Connect 10V winding of transformer to -12V "Charge" and +12V "Charge" terminal respectively.

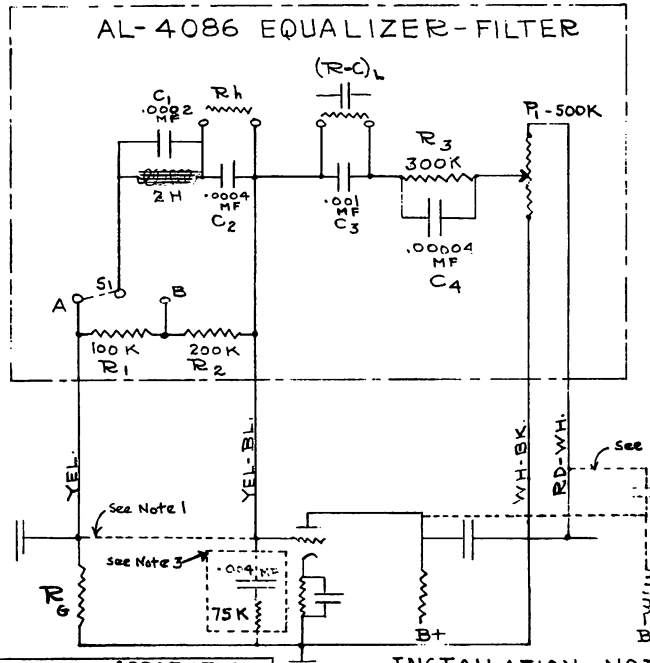
5.3 Connect primary of transformer to AC fuse block and power switch so that it is turned off by switch.

6. SIGNIFICANT CHANGES

6.1 262 Tubes are energized by AC.

4210.95

AL-4086 EQUALIZER-FILTER



DESIG	APPARATUS
C1	.0002mfd mica Aerovox Type 1460
C2	.0004 " " " " "
C4	.00004 " " " " "
C3	.001 " paper " 400V tubular
R1	100,000 ohm IRC BT ½
R2	200,000 " " "
R3	300,000 " " "
P1	500K Front Type S 723A - #8920 taperd pot or equiv.

INSTALLATION NOTES

1. REMOVE THIS LEAD AS SHOWN.
2. WHERE TUBE WORKS INTO A TRANSFORMER WITH NO BLOCKING CONDENSER AS SHOWN BY DOTTED LINE CONNECT RD-WH WIRE TO PLATE OF TUBE THROUGH A .25MF COND.
3. REFER TO INSTRUCTIONS FOR USE OF THIS RESISTOR CONDENSOR COMBINATION

APPD. WWS

ISSUE 1- 8/27/41
APPARATUS DESIGNATION LIST ADDED C1 W.E. .002 MFD - R3 W.E. 350 K

DRAWN BY WWS DATE 8-27-41

AL-4086 EQUALIZER-FILTER SCHEMATIC

ALTEC SERVICE CORPORATION NEW YORK

APPD. DATE

AP-1263

4210.97

AL-4086 EQUALIZER-FILTER

	INSERTION LOSS	S_1	R_h	$R\text{-}C_L$	55	130	300	1000	3000	5000	7000	8000
FOR LOW AND HIGH END RISE ADJUST FEEDBACK POT. P_1 FOR 6.5 DB FEEDBACK WITH R_h AND RC_L OPEN AND LEAVE SET AT THAT POINT.	0	A	0	Open	0	0	0	0	-.2	-2.2	-8.0	-10.0
	4.0		50,000	Open	+3	+2.5	+1.0	0	0	-.2	-4.8	-6.0
	4.0		50,000	Short	0	0	0	0	0	-.2	-4.8	-6.0
	5.5		100,000	Open	+4.5	+3.0	+1.2	0	+.5	+1.8	-2.8	-5.0
	5.5		100,000	.001 mfd	+3.0	+1.5	+.3	0	+.5	+1.8	-2.8	-5.0
	5.5		100,000	1 meg.	+2.5	+2.0	+.8	0	+.5	+1.8	-2.8	-5.0
	5.5		100,000	Short	0	0	0	0	+.5	+1.8	-2.8	-5.0
	6.0		150,000	Open	+4.8	+3.0	+1.0	0	+1.0	+2.8	-1.8	-4.0
	6.0		150,000	.001 mfd	+3.5	+1.8	+.5	0	+1.0	+2.8	-1.8	-4.0
	6.0		150,000	.5 meg.	+1.5	+1.0	+.8	0	+1.0	+2.8	-1.8	-4.0
	6.0		150,000	Short	-.8	-.2	-.2	0	+1.0	+2.8	-1.8	-4.0
	7.0		200,000	Open	+5.0	+3.2	+1.0	0	+1.8	+3.8	-1.0	-3.0
	7.0		200,000	.001 mfd	+3.5	+1.2	0	0	+1.8	+3.8	-1.0	-3.0
	7.0		200,000	.5 meg.	+1.5	+1.0	+.7	0	+1.8	+3.8	-1.0	-3.0
	7.0		200,000	Short	-1.0	-.7	-.5	0	+1.8	+3.8	-1.0	-3.0
	8.0		300,000	Open	+5.5	+3.5	+1.0	0	+2.2	+5.0	0	-2.5
	8.0		300,000	.001 mfd	+3.8	+1.2	0	0	+2.2	+5.0	0	-2.5
	8.0		300,000	.5 meg.	+2.0	+1.5	+.8	0	+2.2	+5.0	0	-2.5
	8.0		300,000	Short	-1.2	-1.0	-.8	0	+2.2	+5.0	0	-2.5
	9.0		500,000	Open	+6.0	+3.5	+.8	0	+3.0	+5.8	+1.2	-1.5
	9.0		500,000	1 meg.	+3.5	+2.5	+.4	0	+3.0	+5.8	+1.2	-1.5
	9.0		500,000	.001 mfd	+3.5	+1.0	0	0	+3.0	+5.8	+1.2	-1.5
	9.0		500,000	.5 meg.	+2.2	+1.8	+.9	0	+3.0	+5.8	+1.2	-1.5
	9.0		500,000	Short	-1.8	-1.2	-1.0	0	+3.0	+5.8	+1.2	-1.5
	10.0		Open	Open	+6.5	+3.0	0	0	+4.8	+7.8	+1.5	-1.0
	10.0		Open	1 meg.	+3.5	+2.5	+.4	0	+4.8	+7.8	+1.5	-1.0
	10.0		Open	.001 mfd	+3.0	0	-1.0	0	+4.8	+7.8	+1.5	-1.0
	10.0	↓	Open	Short	-3.0	-2.0	-1.5	0	+4.8	+7.8	+1.5	-1.0
FOR LOW PASS FILTER	0.	A	Short	Short	0	0	0	0	0	+1.0	-1.0	-4.0
	0.5							0	-.2	-1.0	-6.0	-9.0
	1.0							0	-.6	-2.5	-8.0	-10.0
	1.3							0	-.9	-4.0	-9.0	-11.5
	2.0							0	-1.5	-5.5	-11.0	-13.5
.001 mfd. cond. & 75000 res.	0.	↓	↓	↓	↓	↓	↓	0	-1.5	-4.0	-9.0	-10.5
LOW END RISE HIGH END DROP.	0.	B	Short	Open	+1.2	+1.2	+.7	0	-.3	-1.0	-3.0	-4.5
	2.0	B	Short	Open	+3.0	+2.5	+1.2	0	-1.0	-2.0	-5.0	-6.0
	4.0	B	Short	Open	+4.5	+3.2	+1.4	0	-1.2	-3.0	-6.0	-7.0
	5.0	B	100,000	Open	+5.5	+4.0	+1.5	0	-.2	-.5	-4.0	-4.5

Note: These values show actual response. For correction reverse signs.

APPD. WWS

ISSUE 1 9/9/41

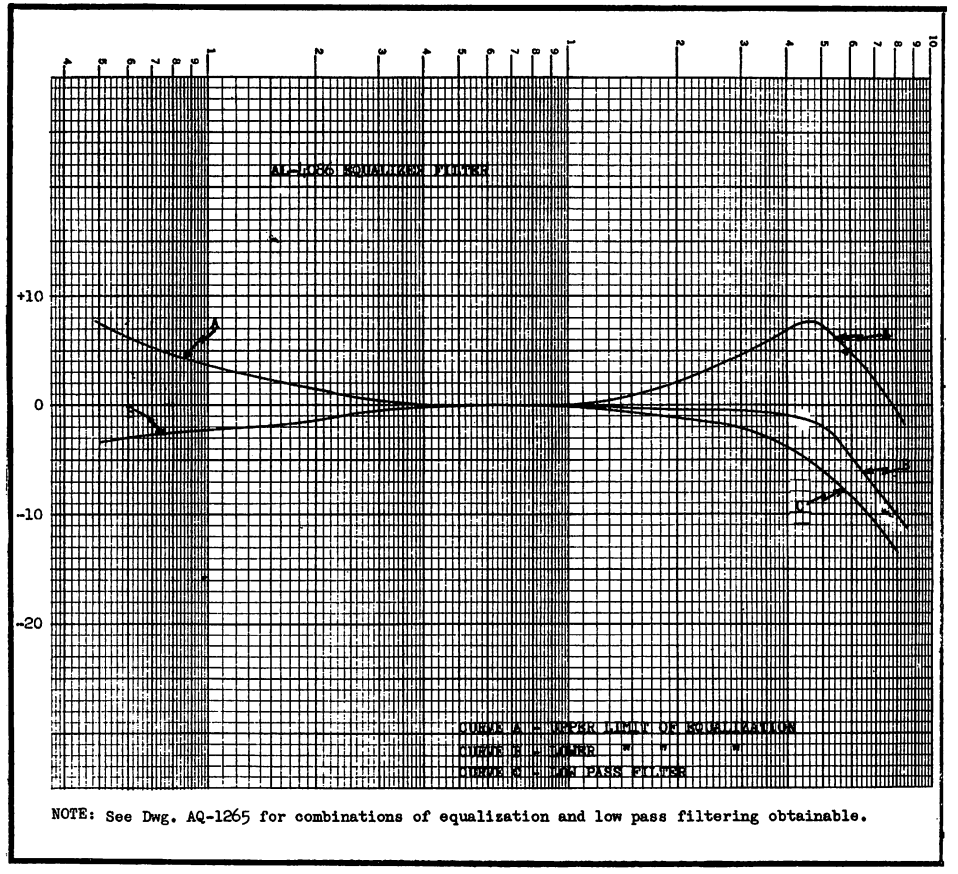
DRAWN BY WWS DATE 9/9/41

RESPONSE CHARACTERISTICS OBTAINABLE WITH AL-4086 EQUALIZER-FILTER USING W.E. 41, 46, AND 86 TYPE AMPLIFIERS

ALTEC SERVICE CORPORATION NEW YORK

APPD. DATE

AQ-1265



NOTE: See Dwg. AQ-1265 for combinations of equalization and low pass filtering obtainable.

6.2 -12V "Charge" and +12V "Charge" are now 10V heater supply for external amplifier.

7. MERCHANDISING

7.1 Where gain modification has already been made, order:

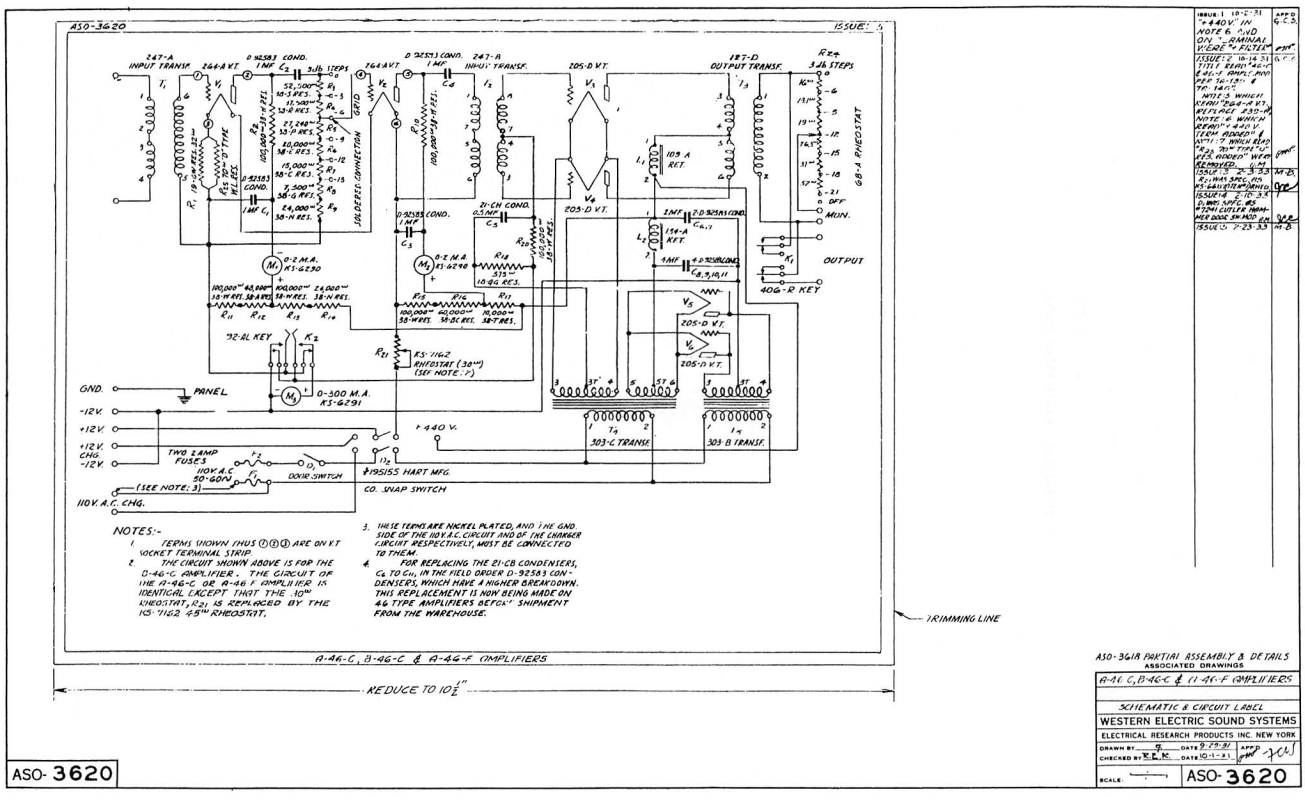
1 - Set AQ-1256 Modification Parts.

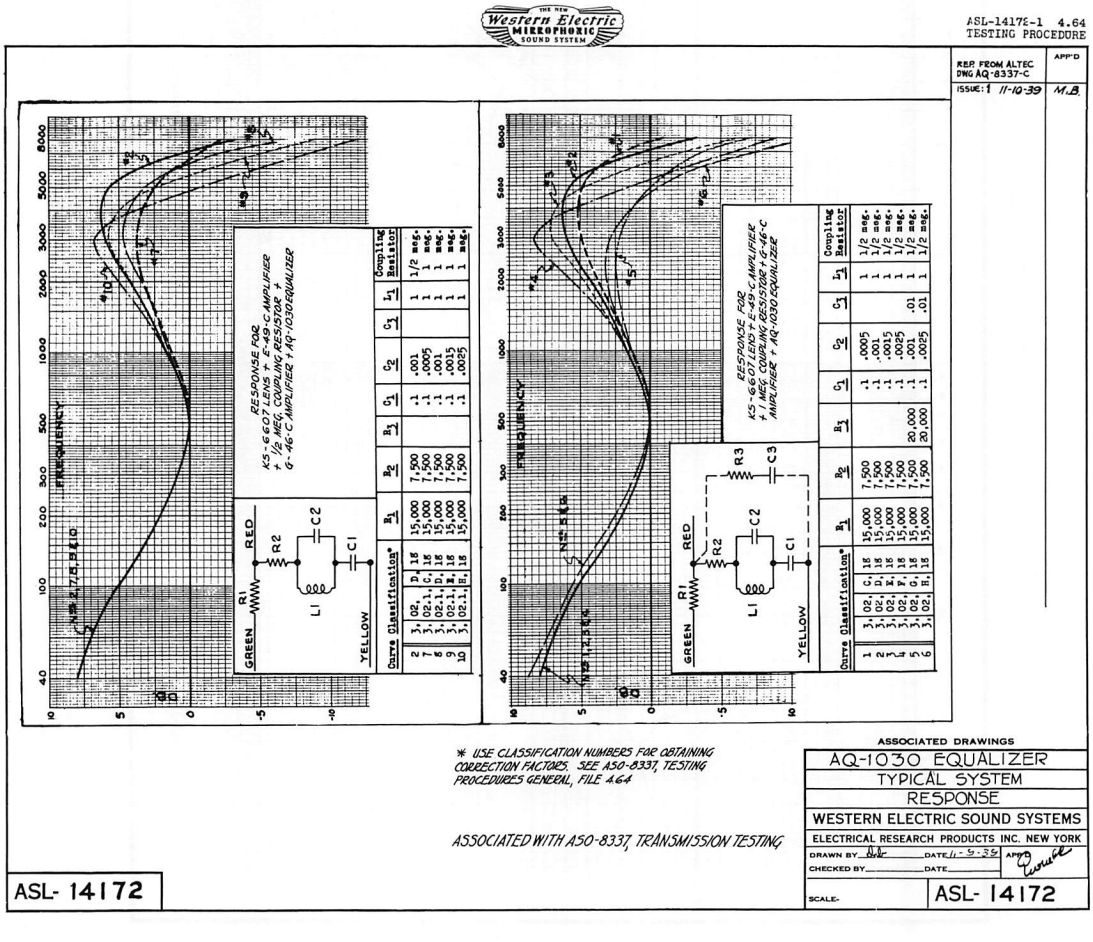
7.2 Where gain modification has not been made it will be necessary to order:

1 - Set AQ-1157 Modification Parts.

1 - Set AQ-1256 Modification Parts.

A-46-C/AQ-1030 Equalizer





1. DESCRIPTION - 3 stage, combined voltage and medium power amplifier, resistance and transformer coupled, in a metal cabinet arranged for wall mounting. Dimensions 20" x 12" x 16½". Weight 113 lbs.

1.1 Upon receipt of this bulletin, amplifiers are to be recoded, as follows:-

Previous Code Number	Recode	Input Transformer 247-A	Input Transformer 233-J	Output Transformer 127-D	Output Transformer 127-A	Output Transformer D-96736
46-A, 46-B, B-46-A, B-46-B, 46-C, 46-F, D-46-C, C-46-F, A-46-A, C-46-A, A-46-B,	46	X		X		
C-46-B, A-46-C, B-46-C, C-46-C, E-46-C,	E-46	X			X	
F-46-C, G-46-C, A-46-F, G-46-F, D-46-F,	H-46	X				X
E-46-F, F-46-E, B-46-F, 46-E, B-46-E,	J-46		X	X		
A-46-E, C-46-E, D-46-A, D-46-B, H-46-C,	JE-46		X		X	
F-46-F, G-46-E, H-46-E, J-46-E, K-46-E, L-46-E, D-46-E, E-46-E.	JH-46		X			X

Notes: 1 - Amplifiers modified for increased gain - add the letter "G". (Example - 46-G)
2 - Amplifiers modified for high power - add the letter "P". (Example - 46-P)
3 - Amplifiers modified for full AC operation - add the letter "A". (Example - 46-GA)
4 - Amplifiers to which equalizers have been added - add the letter "Q" for AQ-1030 Equalizer, or "L" for AL-4086 Equalizer. (Example - 46-Q or 46-L)

2. TYPES AND CHARACTERISTICS - Refer to Amplifiers, General, Page #4030.01.

3. MAINTENANCE

3.1 Parallel contacts of K-1 (output key);removing and splicing together Red and Grn wires.

3.2 In Wide Range Systems where the 46 Type Amplifier is followed by a 43 Type, noise level may be reduced by installing an ESA-341225 Shield over T-1 input transformer.

3.3 To reduce filament rheostat noise (DC only) connect a TA-4115 or BRH-255, 500 mf., 25 V Condenser between -12V and terminal of R-21 having two wires connected thereto.

3.4 Install D-91938 Heat Shield over amplifier PP stage to keep heat from interstage transformer.

4. MODIFICATIONS

4.1 Increased power - (9 watts output) -(If H-46 or JH-46 Type Amplifier is installed, convert to 46 or J-46 Type, by installing 127-D Output Transformer, before making this modification).

4.11 Material Required:-

300-B Vacuum Tubes	1276 Vacuum Tubes
1 set AP-1050 Conversion Parts consisting of - 3 - 300-B Vacuum Tubes (1 spare) 1 - AQ-1070 Bracket 1 - AP-1044 Auto Transformer - (Do not install unless line voltage is less than 115V.) 1 - IRC - DHA - 1000 ohm Resistor 1 - 8/36 x 3" R.H. Machine Screw 1 - #10 Washer 2 - #8 Asbestos Washers 1 - 8/32 Hex. Nut.	1 set AP-1041 Conversion Parts consisting of - 3 - 1276 Vacuum Tubes (1 spare) 1 - IRC - DHA - 1000 ohm Resistor 1 - 8/36 x 3" R.H. Machine Screw 1 - #10 Washer 2 - #8 Asbestos Washers

4.12 Modification Procedure (Refer to Fig. 1.)

a. Remove the two amplifier tube sockets V-3 and V-4 from amplifier panel.
b. Remove the SL and SLRD wires leading to the filament terminals of V-4 socket from T-4. Leave the wires running from filament terminals of V-4 to same terminals of V-3. (V-4 socket is right-hand socket looking at front of amplifier panel.)
c. Mount AP-1044 Transformer to AQ-1070 Mounting Bracket, using bolts and nuts supplied.
d. Fasten AQ-1070 Mounting Bracket to amplifier panel with screws supplied, using former socket mounting holes as shown in Fig. 1.
e. Fasten tube sockets previously removed from amplifier panel to AP-1070 Mounting Bracket, making sure to reinstall the fiber insulator between sockets and bracket. If AQ-1030 Equalizer is installed at time of power modification, the #8 round head screw supplied with modification parts is held in place by the threaded hole in the equalizer supporting bracket. If equalizer is not installed, this screw is held in place by a nut furnished as a separate part of AP-1050 modification parts.

f. Connect primary leads (black) of AP-1044 auto-transformer to leads removed from V-4 socket.
g. Connect secondary leads (brown) to filament terminals of V-4 socket.
h. If the amplifier is not already equipped with the D-91938 heat shield, it will be necessary to install one before completing this modification with 300-B Tubes due to the new position of the tube mounting.
i. Short out L-1 (109-A Retard Coil). In all 46 Amplifiers which have been modified for rapid filter disconnection, L-1 may be shorted out by running a jumper wire between the proper disconnect lead and the center tap of the primary winding of the output transformer. An ohmmeter placed across the center tap of the primary winding and this lead should measure 120 ohms, which is the resistance of L-1.
j. Remove R-18 (575 ohms) and replace with DHA 1000 ohm adjustable resistor. Mount this resistor at right angles to panel, as shown in Fig. 1 by means of 8/36 x 3" round head iron machine screw, steel washer and two asbestos washers using tapped hole in right-hand bracket supporting TS-4. Unsolder the leads from present R-18 resistor and solder them to new resistor. Adjust value of new resistor to 825 ohms by sliding contact.

NOTE:- When 1276 type Tubes are supplied for this modification, the only changes necessary will be to short out L-1 (109-A Retard Coil) and install DHA 1000 ohm adjustable bias resistor.

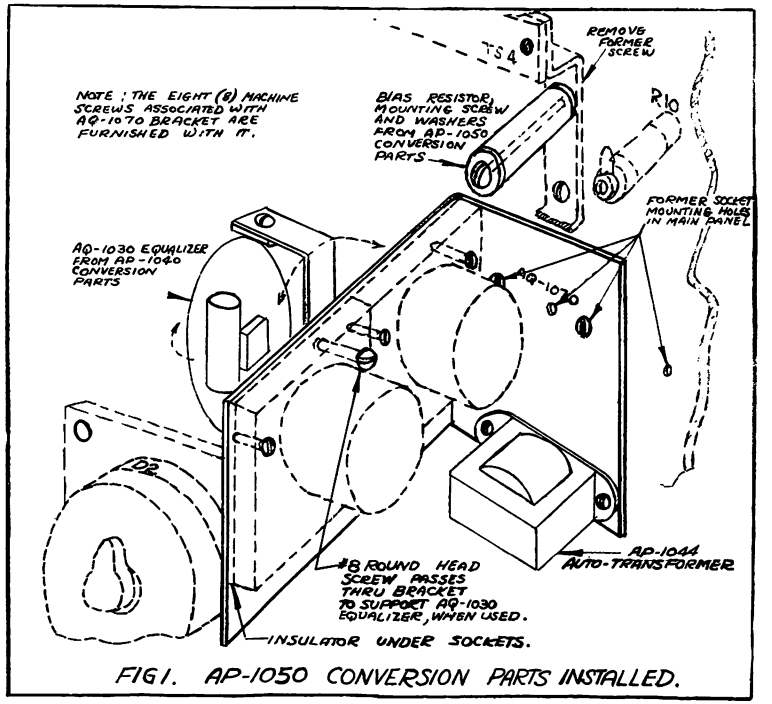


FIG1. AP-1050 CONVERSION PARTS INSTALLED.

4.2 Equalization - One Way Speaker Systems - (AQ-1030 Equalizer) - Refer E.B. Equalizer, AQ-1030.

4.21 Material Required - 1 set AP-1040 Modification Parts consisting of -
1 - AQ-1030 Equalizer, including as loose parts:
1 - BT-1/2 - 20,000 ohm Resistor R-3
1 - .01 mf Condenser C-3
1 - .0005 mf Condenser
1 - .0015 " "
1 - .0025 " "
1 - 1/4" Brass Spacer
1 - 8/32 x 1/2" RHBM Screw
2 - Aerovox Type 484 - 1 mf Condensers (For use in 49 type Amplifier)

4.22 Modification Procedure

a. On amplifiers using 1276 Tubes, drill a hole with #18 (11/64") drill in fibre plate supporting sockets V-1 and V-2, midway between sockets and 1-1/4" from front edge. Providing the drill is held in a small tapwrench, the hole may be drilled without removing socket assembly. Attach the equalizer to the underside of this plate by means of the 8/32 x 1/2" screw and brass spacer furnished.

NOTE:- When 300-B Tubes are used, the equalizer is mounted on the AQ-1070 Bracket.

b. Disconnect from attenuator strip wire running from C-2 to "0" terminal of strip and connect green wire from equalizer unit to this wire.
c. Connect red wire from equalizer to "0" terminal of attenuator strip.
d. Connect yellow wire from equalizer to top terminal of R-9.
e. Orient unit for minimum hum and tighten all holding screws. This hum must be checked from stage horns or by means of a headset, as it may not be perceptible in the monitor horn output.
f. Modify 49 Type Amplifiers for increased gain (where required). - Refer E.B. 49 Type Amplifier.

4.3 Equalization - Two Way Speaker Systems -(AL-4086 Equalizer) - Refer E.B. Equalizer, AL-4086.

4.31 Material Required - 1 - AL-4086 Equalizer including as loose parts:
1 - 50,000 ohm 1 watt resistor
1 -100,000 " " " "
1 -150,000 " " " "
1 -200,000 " " " "
1 -300,000 " " " "
2 -500,000 " " " "
1 -1 megohm " " "
1 -.001 mfd. mica condenser
2 -3/4" x 8/32 R.H.B.M Screws (for 46 amplifier only)
1 -Detail 1 Mounting Bracket with 4-1/2" x 6/32 R.H.B.M. Screws & Hex Nuts (for 86 amplifier only)

4.32 Modification Procedure

a. Remove the two top screws holding the switch D-2 and install the equalizer unit with two 3/4" x 8/32 screws. This places the unit directly under the fibre plate supporting sockets V-1 and V-2.
b. Remove strap from grid terminal on TS-4.
c. Connect yel.-bl. wire to grid terminal on TS-4.
d. Connect yel. wire to "0" terminal on TS-4.
e. Connect red-wh. wire to terminal 1 of T-2 transformer.
f. Connect Wh.-blk. wire to ground lug of T-2 transformer.
g. Modify 49 Type Amplifiers for increased gain (where required). Refer to E.B. 49 Type Amplifiers.

4.4 Increased Gain AQ-1172 Schematic.

4.41 Material Required - 1 set AQ-1157 Modification Parts consisting of -
1 - AP-1162 Apparatus Unit (DC) or 1 - AP-1162-A Apparatus Unit (AC) (See Note 4)
3 - 262-A or B Vacuum Tubes (1 spare)
2 - 6-32 x 5/8" RH brass machine screws N.P.
2 - 1/4" x 20 steel hex nuts N.P. 3/16" thick.
2 - National Standard Tube Grid Grips
10'- #22 Stranded Black Lenz #1329 Push Back Wire

4.42 Modification Procedure

a. Remove wires from "G" of V-1 and V-2, fold back and tape.
b. Remove wire from "-F" of V-1 and connect to "G" of V-1.
c. Remove wires from "+F" of V-2 and connect to "G" of V-2.

d. Add new wire, connecting "G" of V-1 to "G" of V-2.
e. Add new wire, connecting "-F" of V-1 to "+F" of V-2.
f. Add new wire, connecting "-F" of V-1 to "-12" of TS-2.
g. Connect 6" piece of wire with grid clip to term. #6 of T-1.
h. Connect 6" piece of wire with grid clip to "GRID" of TS-4.
i. Remove wiper strap on filament rheostat R-21.
j. Remove R-25 (70 ohms), found connected across R-1.
k. Remove strap between "2" and "4" of K-2. See Fig. 3.
l. Remove strap between "3" and "5" of K-2.
m. Add strap between "4" and "6" of K-2.
n. Add strap between "1" and "3" of K-2.
o. Remove wire or wires from Term. 5 of T-1.
p. Install AP-1162 Apparatus Unit on mounting brackets now supporting TS-4 by remounting TS-4 using new screws with the hex nuts supplied as spacers in the original tapped holes. The spacers must be placed between the apparatus unit panel and the TS-4 Strip to keep the back of the terminals on TS-4 from striking the metal panel of the AP-1162 Apparatus Unit. (See Fig. 2). Connect Apparatus Unit leads in accordance with legends on Fig. 4. The cable form should be run to door panel and tied to existing cable.
q. Install 262 Type Tubes.
r. Adjust Resistor (R-28) in heater and bias circuit and power unit or MG voltage until voltage across heaters is exactly 10 volts.
s. On front of panel, paint out lettering "Fil. Control", "Press to Read", "Plate Total 3 and 4" under Key and "Fil. 1 & 2" with flat black paint.

4.5 AC Operation - AP-1254 Schematic

4.51 Material Required - 1 set AQ-1157 Modification Parts with AP-1162-A Apparatus Unit (omit if gain modification has already been made) and 1 set AQ-1256 Modification Parts consisting of -
1 - Thordarson T19-F25 110V/10V 60 cycle Transformer, or equivalent.
1 - AP-1255 Mounting Plate
1 - BT1 - 2000 ohm Resistor
1 - 25 mf - 50 V Condenser
4 - #6 x 3/16" Parker Kalon Type Z Binding Head Cadmium Plated Screws
10'- #22 Stranded Black Lenz #1329 Push Back Wire

4.52 Modification Procedure (Increased gain modification already made - AP-1162 Apparatus Unit installed.)

a. Remove wires from G of V-1 and G of V-2.
b. Connect strap between G of V-1 and G of V-2.
c. Remove wire connecting -F of V-1 to -12-V of TS-2.
d. Remove wire(s) from + "12V Charge" Terminal.
e. Remove wire(s) from - "12V Charge" Terminal and connect to - "12V". Disconnect strap between - "12V Charge" and - "12V".
f. Connect wire from -F of V-1 to - "12V Charge" terminal.
g. Connect strap tying GND., -12V and + 12V terminals.
h. In the AP-1162 Apparatus Unit, disconnect black and green wire in cable form leading to R-28 5 ohm variable resistor.
i. Connect wire from slider of R-28 to + "12V Charge" terminal.
j. Mount 2000 ohm resistor on spare terminal of AP-1162 Apparatus Unit and shunt it with 25 mf condenser.
k. Connect + terminal of 25 mf condenser to G of V-1.
l. Connect - terminal of 25 mf condenser to wire removed from F of V-1.
m. Mount the transformer in amplifier case by attaching transformer to AP-1255 Mounting Plate and mounting whole unit on two lower brackets supporting power switch. Ground center tap of transformer low voltage winding.
n. Connect 10V winding of transformer to - "12V Charge" and + "12V Charge" terminals respectively.
o. Connect primary of transformer to AC fuse block and power switch so that it is turned off by switch.

4.53 Modification Procedure (including increased gain - AP-1162A Apparatus Unit furnished.)

a. Remove wires from G of V-1 and V-2. Fold back and tape.
b. Remove wire from -F of V-1.
c. Remove wires from + F of V-2, making sure that the wires removed remain connected together. Tape ends.
d. Add new wire connecting G of V-1 to G of V-2.
e. Add new wire connecting -F of V-1 to + F of V-2.
f. Proceed according to Section 4.42 omitting steps a, b, c, d, e, f and i. Connect AP-1162A Apparatus Unit leads in accordance with Fig. 5.
g. Then proceed according to Section 4.52 omitting steps a, b, c and h.

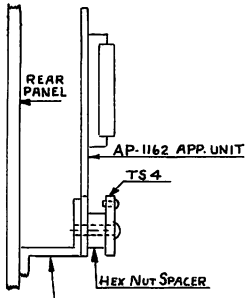


FIG. 2

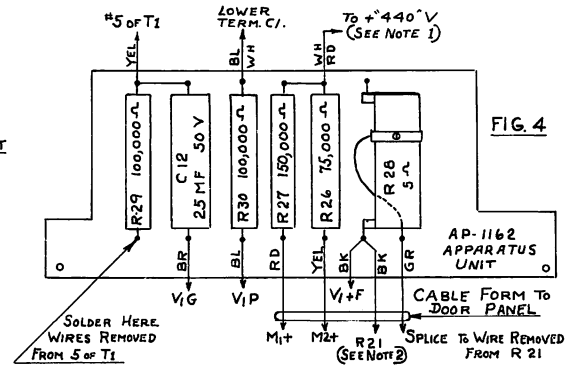


FIG. 4

NOTE 1. "+440" indicates "Rapid Disconnect" terminal connected to Terminal #1 of L2.

NOTE 2. One outside terminal of R21 (filament rheostat) contains one wire which runs to "#12" Terminal of TS2. Remove this single wire from R21 and connect black lead from AP-1162 App. Unit to R21. Splice the removed wire to green lead from apparatus unit.

NOTE 3. Two wires marked "A" are in 3' long cable form with (GRN & BLK) unused wires; latter needed if AP-1162-A App. Unit is demodified to AP-1162.

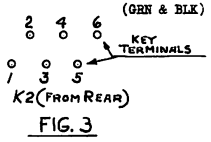


FIG. 3

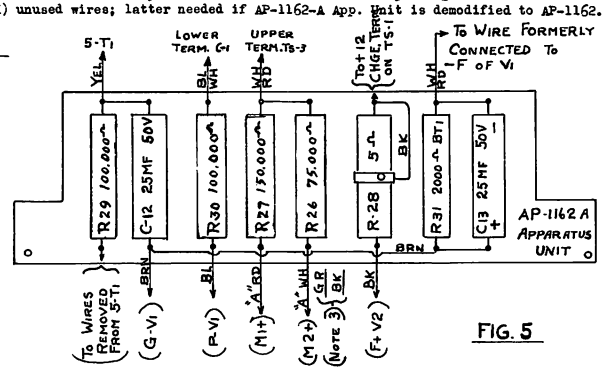


FIG. 5

NOTE 4. It is possible that the AP-1162-A Apparatus Unit will be supplied when the AP-1162 is ordered. In this case, change wiring of AP-1162-A Apparatus Unit to agree with Fig. 4 (AP-1162).

ASSOCIATED DRAWINGS

AP-1571	Evolution of Coding, 46 Type Amplifier
AASO-3369	E-46 & H-46 Amplifier Schematic
AASX-5141	E-46 Amplifier Wiring Diagram
AASO-3014	46, J-46, E-46, JE-46 Amplifier Schematic
AASX-5011	46, J-46, E-46, JE-46 Amplifier Wiring Diagram
AASO-3761	46 Type Amplifier rapid filter disconnect wiring
AQ-1172	46P Type Amplifier Schematic
AP-1254	46 Type AC Heater and Cathode Schematic

Original Code #	Old Modifications Code #	OLD MODIFICATIONS: 264 Tubes	D94814 or D96101 Filter	Rapid Filter Disconn.	D96736 Output Transf.	D94813 Current Supply Set	127A Output Trans.	Recode as follows (see Notes)
46-A	A-46-A	x						46 or J-46
	B-46-A		x	x				
	C-46-A	x	x	x				
	D-46-A	x	x	x	x			H-46 or JH-46
46-B	A-46-B	x						46 or J-46
	B-46-B		x	x				
	C-46-B	x	x	x				
	D-46-B	x	x	x	x			H-46 or JH-46
46-C	A-46-C	x				x		46 or J-46
	B-46-C	x	x					
	C-46-C	x						
	D-46-C		x	x				
	E-46-C	x	x	x		x		
	F-46-C	x	x					
	G-46-C	x	x	x				
	H-46-C	x	x	x	x			H-46 or JH-46
	E-46-E						x	E-46 or JE-46
	G-46-E	x					x	
	H-46-E		x	x			x	
	J-46-E	x	x	x			x	
	K-46-E	x	x				x	
	L-46-E	x	x	x			x	
46-E	A-46-E	x						E-46 or JE-46
	B-46-E		x	x				
	C-46-E	x	x	x				
	D-46-E	x	x					
	E-46-E	x	x	x				
46-F	A-46-F	x				x		46 or J-46
	B-46-F	x						
	C-46-F		x	x				
	D-46-F	x		x		x		
	E-46-F	x	x	x				
	F-46-F	x	x	x	x			H-46

Note 1 - In the new system of coding the letters preceding the amplifier type number designate certain input and output transformers.

Amplifier (Type)	Input Transformer	Output Transformer
46	247-A	127-D
E-46	247-A	127-A
H-46	247-A	D-96736
J-46	233-J	127-D
JE-46	233-J	127-A
JH-46	233-J	D-96736

Note 2 - Letters are to be used following the amplifier type number to indicate new circuit modifications, and /or the addition of some component.

Modification	Add Letter
Increased Gain - 262 Tubes	G
Increased Power Output - 1275 or 300 Tubes	F
Full A C operation	A
AQ - 1030 Equalizer	Q
AL - 4086 Equalizer	L

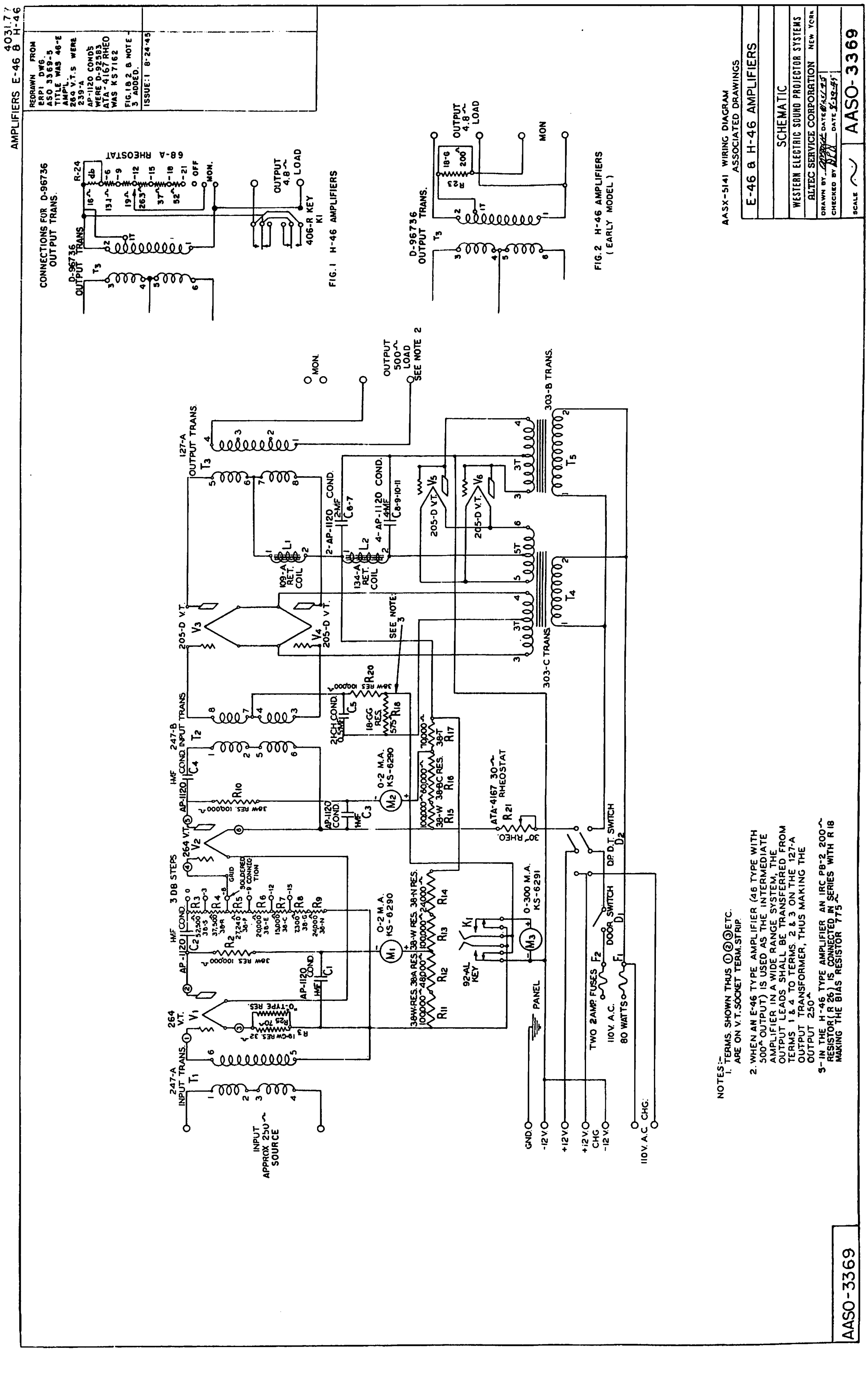
ASSOC. DWG'S.

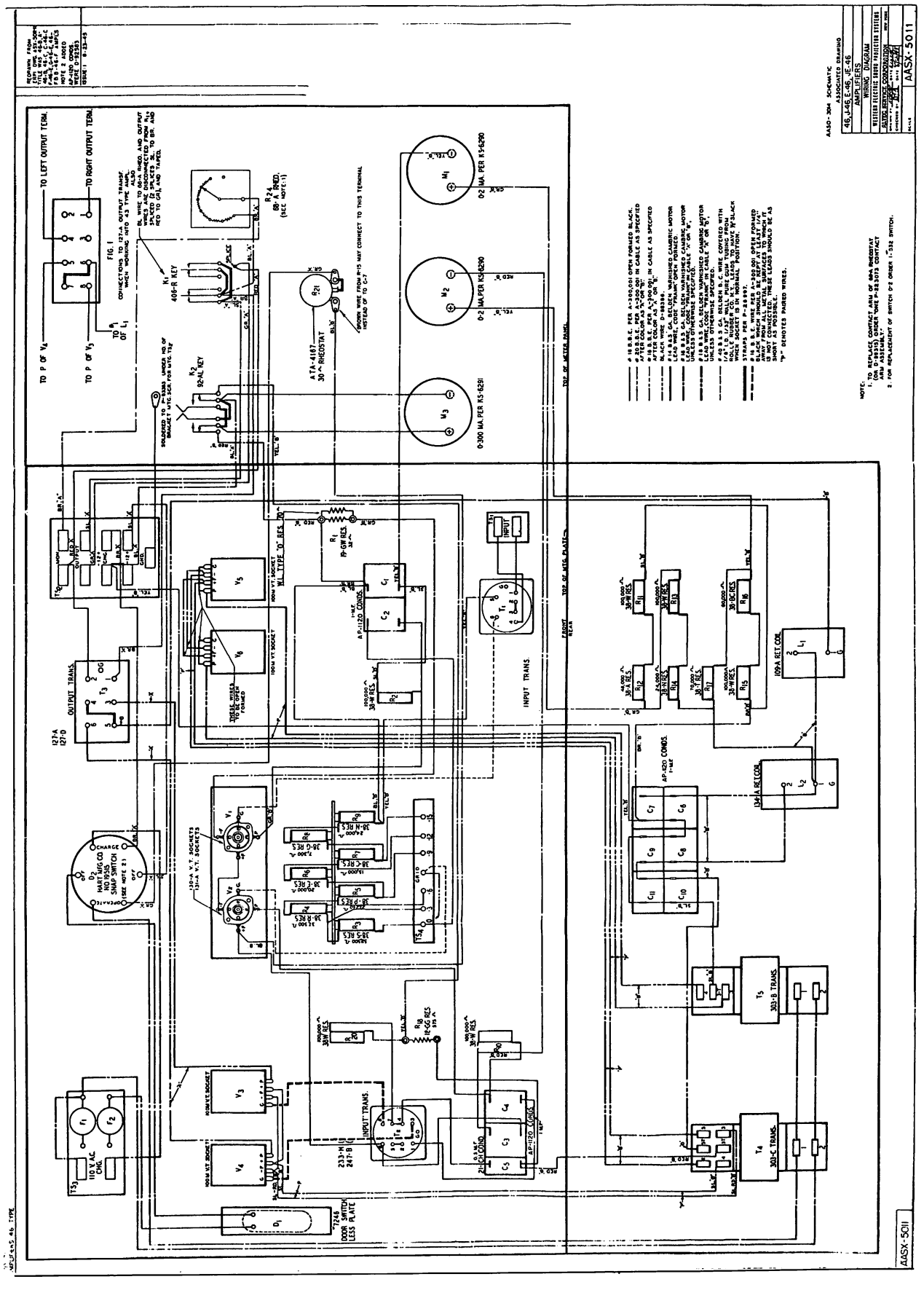
ISSUED 12-27-45 | DRAWN BY | DATE 12-27-45 | APP'D | DATE

EVOLUTION OF CODING
46 TYPE AMPLIFIERS

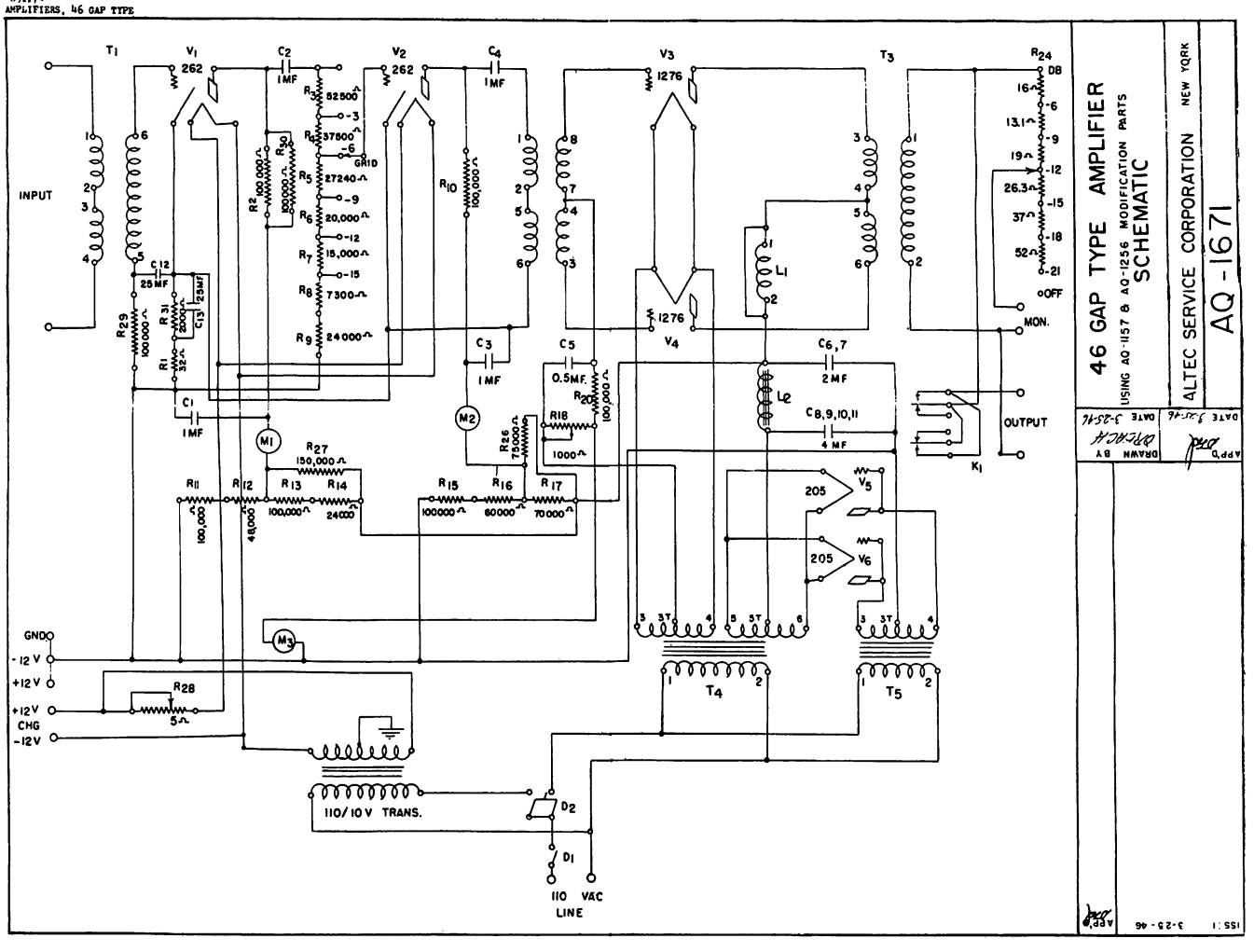
ALTEC SERVICE CORPORATION NEW YORK

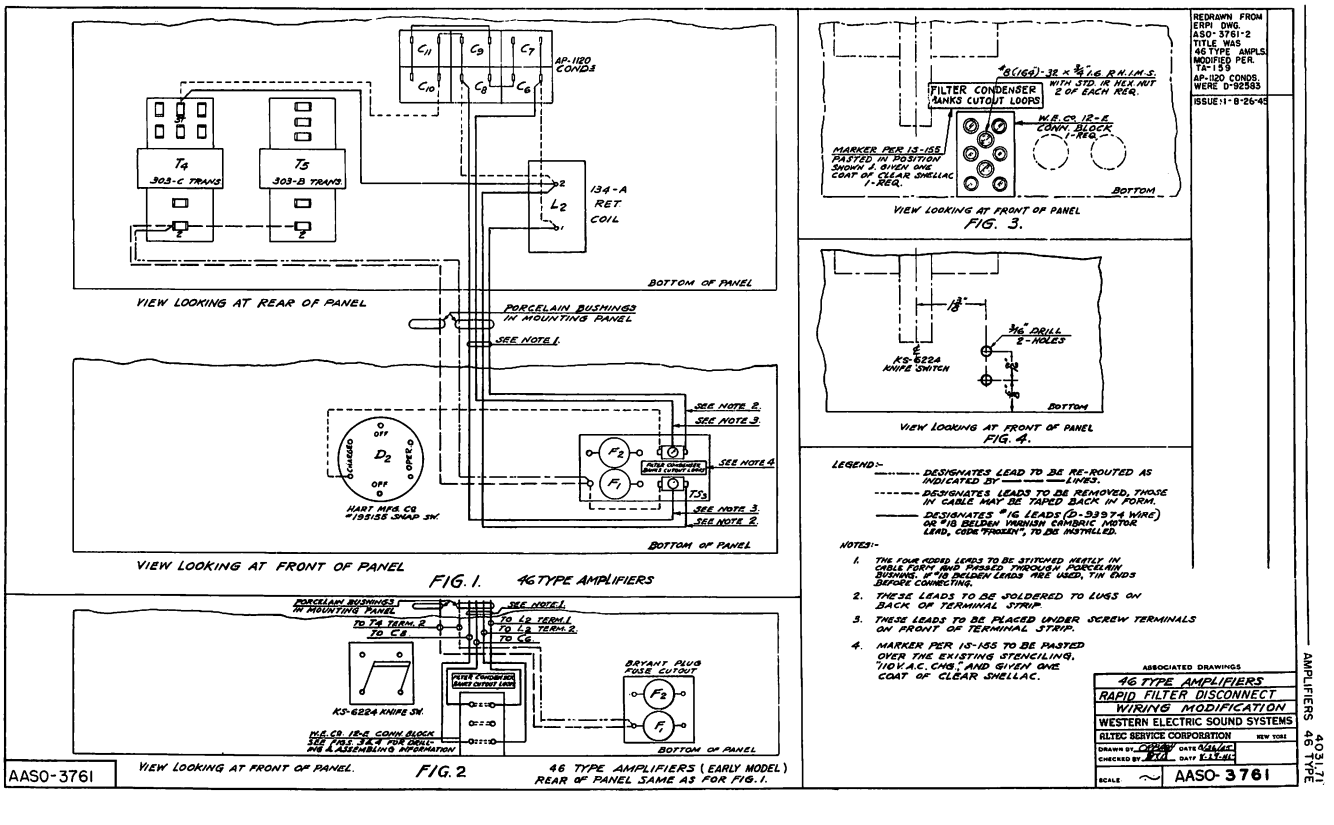
A P - 1571


AMPLIFIERS E-46 & H-46
AASX-5141 WIRING DIAGRAM
ASSOCIATED DRAWINGS
E-46 & H-46 AMPLIFIERS
SCHEMATIC
WESTERN ELECTRIC SOUND PROJECTOR SYSTEMS
ALTEC SERVICE CORPORATION NEW YORK
AASO-3369
FIG.1 H-46 AMPLIFIERS
FIG.2 H-46 AMPLIFIERS (EARLY MODEL)
NOTES:-
1. TERMS. SHOWN THUS ①②③ ETC. ARE ON V.T. SOCKET TERM. STRIP.
2. WHEN AN E-46 TYPE AMPLIFIER (46 TYPE WITH 500^ OUTPUT) IS USED AS THE INTERMEDIATE AMPLIFIER IN A WIDE RANGE SYSTEM, THE OUTPUT LEADS SHALL BE TRANSFERRED FROM TERMS 1 & 4 TO TERMS. 2 & 3 ON THE 127-A OUTPUT TRANSFORMER, THUS MAKING THE OUTPUT 250^
3- IN THE H-46 TYPE AMPLIFIER AN IRC PB-2 200^ RESISTOR (R 26) IS CONNECTED IN SERIES WITH R 18 MAKING THE BIAS RESISTOR 775^


TO LEFT OUTPUT TERM.
TO RIGHT OUTPUT TERM.
TO P OF V4
TO P OF V5
FIG. 1
CONNECTIONS TO 127-A OUTPUT TRANSF WHEN WORKING INTO 43 TYPE AMPL
K1 40F-R KEY
K2 92-AL KEY
A-4187 30^ RHEOSTAT
M1 0-2 MA. PER R5-6290
M2 0-2 MA. PER R5-6290
M3 0-300 MA. PER R5-6291
R21 80^ A. RHEO. (SEE NOTE 1)
R1 19-GW RES. 5W
C1 1-MF. AP-1120 CONDS.
C2
R2 100000^ 30-W RES.
T1 INPUT TRANS.
T2 OUTPUT TRANS.
127-A 127-D
V1 V2 V3 V4 V5 V6
130-A V.T. SOCKETS 131-A V.T. SOCKETS
ROHM V.T. SOCKET
THESE WIRES TO BE OPEN FORMED
R3 R4 R5 R6 R7 R8 R9
30-B RES. 30-C RES. 30-D RES. 30-E RES. 30-F RES. 30-G RES.
R10 19-GG RES. 10 W
R11 R12 R13 R14 R15 R16 R17
100000^ 30-W RES.
50000^ 30-W RES.
20000^ 30-W RES.
10000^ 30-W RES.
5000^ 30-W RES.
C3 C4 C5 0.1 MF. AP-1120 CONDS.
C6 C7 C8 C9 C10 C11 AP-1120 CONDS. 1 MF.
T3 T4 T5 300-C TRANS. 300-B TRANS.
L1 L2 109-A RET. COIL 134-A RET. COIL
T6 115 V. AC CKG.
D1 7244 DOOR SWITCH LESS PLATE
HART MFG. CO. NO. 1935 SNAP SWITCH
CHARGE DISCHARGE
TOP OF METER PANEL
FRONT REAR
INPUT
AASX-5011
AASX-5011 SCHEMATIC
ASSOCIATED DRAWING
46, J-46, E-46, JE-46 AMPLIFIERS WIRING DIAGRAM
NOTE:
1. TO REPLACE CONTACT ARM OF 80A RHEOSTAT ORDER 1-532 SWITCH OR ORDER P-823075 CONTACT ARM ASSEMBLY.
2. FOR REPLACEMENT OF SWITCH ORDER 1-532 SWITCH.

4031.74
AMPLIFIERS, 46 GAP TYPE





1. SUBJECT - Modification of 46 Type Amplifier filter condenser circuit to provide better security of operation, longer condenser life and greater accessibility.

2. MATERIAL REQUIRED

1 - Set AP-1785 Modification Parts, consisting of:

1 - AP-1786 Bracket
3 - Aerovox #1010 Condensers, 2 mf., 1000 V.
42" - #16 Super-Core Wire

3. MODIFICATION PROCEDURE - (Recode by adding letter "C" following existing code number).

(a) Amplifier need not be removed from cabinet. If AC power line to 46 Amplifier permits, the modification parts assembly can be installed as received. If necessary, the center condenser can be remounted above bracket.

(b) At "filter disconnect" screws remove leads from old condenser banks and tape ends.

(c) Install new bracket assembly in place of lower door switch bracket.

(d) Connect common lead to -12V on TS2.

(e) Connect lead from 2 condensers in parallel to bottom screw on "filter disconnect" panel.

(f) Connect remaining lead to top "filter disconnect" screw.

(g) "Filter disconnect" facility remains available.

(h) At first opportunity remove and return all replaced filter condensers in good condition.

4. MERCHANDISING

4.1 The AP-1785 Modification Parts will be furnished only on the bases of the following charge classifications:

SERVICE	SOUND R & R	CHARGE CLASSIFICATION
On Service	Yes	Repair
On Service	No	Net Repair
Off Service	-	Net Repair

4.11 The replaced condensers must be returned to the New York Warehouse, 533 West 57th Street, New York 19, N. Y., together with an R.G. Tag, form ASC-75, giving the "Reason For Return" as "AP-1785 Modification Parts Installed".

4.2 The AP-1785 Modification Parts will become available in limited quantities about April 1, 1947.

4.3 Order as:

1 - Set AP-1785 Modification Parts

1. SUBJECT - Modification of the 46 type Amplifier to provide hum and noise reduction.

2. GENERAL - It has been determined that by rotation of the input transformer and increasing capacity of C-1 considerable reduction in hum and noise level may be obtained. This procedure is of particular importance in the case of 46 Amplifiers modified for AC operation, and/or when Voice of the Theatre Speaker Systems are installed.

3. MATERIAL REQUIRED - 1 Set AP-1907 Modification Parts, consisting of:

1 - AP-1908 Adapter Base (includes 4 #8-36 x 3/8" FHIMS)
1 - AP-1909 Mounting Plate (for 247-A Transformer) (includes 4 #8-36 x 3/8" RHIMS and lockwashers)
1 - AP-1910 Mounting Plate (for 233-J, A-247-A, or TB-106 Transformer) (includes 4 #8-36 x 3/8" RHIMS and lockwashers)
1 - AP-1911 Condenser Mounting Bracket
1 - Aerovox type G-EP 8-8 mf, 475 volt Condenser 1-3/8" diameter x 2-1/4" H

4. MODIFICATION PROCEDURE

(a) Remove C-1 Condenser (AP-1120 or equivalent)
(b) Slip AP-1911 Mounting Bracket on U shaped part of strap used to secure C-1 and C-2 Condensers. (Mounting ears may be crimped over strap to secure bracket).
(c) Mount G-EP Condenser in hole provided in bracket and reassemble over C-2 Condenser in the normal manner.
(d) Reconnect wires, removed from old C-1 Condenser, to new C-1 Condenser strapping the two 8 mf sections in parallel (BR & BL-Neg., SL & Yel-Pos.).

(e) To suppress meter kick when amplifier is turned on, reconnect + side of new C-1 Condenser to + side of M-1 Meter. This is easily accomplished by soldering and taping YEL & SL. wires (from R-2 & M-1) after removal from C-1, and running new wire from +C-1 to +M-1, or, to lower end (Red wire) of R-27 Resistor on AP-1162 Apparatus Unit, if used.
(f) Disconnect and remove input transformer.
(g) Install AP-1908 Adapter Base in Amplifier using #8-36 x 3/8" FH screws supplied.
(h) Slip AP-1909 Mounting Plate (247-A Transformer) or AP-1910 Mounting Plate (233-J, A-247-A, TB-106 Transformer) over transformer and assemble on the AP-1908 Adapter Base with #8-36 x 3/8" RH screws and lockwashers supplied.
Note: For 247-A & 233-J Transformers mounting plate is assembled with spacing bushings toward panel.
For A-247-A & TB-106 Transformers invert plate so that spacing bushings point toward transformer terminals.
(i) Reconnect transformer, lengthening leads as may be required to allow orientation.
(j) Orient transformer for minimum noise (Make final check with mounting screws tight, amplifier door closed and all booth equipment operating).

5. MERCHANDISING

5.1 The AP-1907 Modification Parts will be furnished on a "Net" basis (all customers). They will become available about August 1, 1947.

5.2 Upon completion of the modification, return the unused mounting plate (AP-1909 or AP-1910 with screws and lockwashers) to the New York Warehouse, attaching an R. G. Tag marked "Surplus AP-1907 Modification".

1. SUBJECT - Modification to allow use of GZ-34 Rectifier and EL-34/6CA7 Amplifier Vacuum Tubes.

2. REASON FOR ISSUE - The use of 205 type Vacuum Tubes was discontinued some years ago in favor of the 1276 type in order to obtain increased power output from these amplifiers. The 1276 type has now become obsolete and unobtainable even on special order.

3. MATERIAL REQUIRED -

1 Set AP-3351 Conversion Parts consisting of
2 GZ-34 Vacuum Tubes (1 spare) - Mullard
4 EL-34/6CA7 Vacuum Tubes (2 spares) - Amperex or Mullard
3 Socket Assemblies including
ICA-2489 Sockets, or equivalent, and
IOA-2437 Terminal Strips, or equivalent, mounted on bakelite plates
1 Stancor P-5014 Transformer
1 Ohmite BD-600 ohm - 10 W Resistor
1 Ohmite BD-1 ohm - 5 W Resistor
4 #8-32 x 1/2" B.H. Machine Screws with flat washers, lock washers, and nuts
6' #16 Stranded Hook-up Wire

4. MODIFICATION PROCEDURE

a. Drill four holes - #18 drill - in the right-hand side of the cabinet behind the door latch. Use the door latch as a center line and drill two of the holes in a vertical line 2-1/2" in from the front edge of the cabinet on 1-3/4" centers. Drill the other two holes 4-1/2" in from the front of the cabinet on the same centers.

b. Mount the P-5014 Transformer by means of hardware furnished at this location with the lugs down.

c. Connect a twisted pair to the 117 V primary of this transformer and connect one wire of this pair to the common side of the fuse block and the other to the load side of the ON/OFF switch.

d. Remove vacuum tube sockets VTS3, VTS4, and VTS6.

e. Mount the new sockets in the same locations. Sockets that have pins 3 and 4 strapped together replace VTS3 and VTS4.

f. Wire sockets in accordance with Drawing AP-3352.

The P-5014 Transformer supplies 6.3V AC to the heater circuits of the new amplifier tubes. Use a twisted pair for this run. No connection to center tap.

If the amplifier is found to have been modified for increased power and an adjustable 1000 ohm resistor installed in place of the original R2 Resistor, change the adjustment to 300 ohms instead of shunting it with the 600 ohm resistor as called for on Drawing AP-3352.

g. Shunt meter M3 terminals with the 1 ohm resistor.

This shunt reduces the meter reading by approximately 40%. If filamentary vacuum tubes are in use in the voltage stages, the filament current should be checked with a service meter and the meter scale marked to indicate the normal reading.

EQUIPMENT BULLETIN AMPLIFIERS, 46 TYPE
ADDENDUM #4

5. TYPICAL OPERATING CONDITIONS – OUTPUT STAGE (2 Tubes)

Plate Voltage	410 V
Plate Current	100/110 ma
Shunted Meter Reading	50-60 ma
Grid Bias	-32/-34 V
Output	10 ohm load 10 W
Internal Output Impedance	5 ohms

6. MERCHANDISING – For the present continue to order 1276 Vacuum Tubes in the regular manner except indicate "For 46 Amplifier". When our stock of 1276 Tubes is depleted, orders for 1276's, for use in theatres with R & R contracts, will be filled by shipping one set AP-3351 Conversion Parts.

All 1276 Vacuum Tubes on hand and in good condition must be returned to New York tagged "SURPLUS".

7. CODING – Amplifiers modified as above will have the symbol R-1 added after the number. For example:

46 ..... 46P-1
46GP 46GP-1