Western Electric

NO. 705A
SPEECH INPUT BAY

INSTRUCTION BULLETIN
NO. 907-P

705A SPEECH INPUT BAY

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The Western Electric 705A Speech Input Bay is designed for use at radio transmitter locations as the connecting link between the telephone lines from broadcast studios and the input to the radio transmitter. It provides input and output switching, gain control, volume indication and amplification with automatic volume limiting for incoming programs and input switching, gain control and amplification for loud speaker monitoring at either the input or output of the radio transmitter.

Space and wiring have also been provided in this bay for the addition of two 23A Equalizers when required for equalization of the two program line circuits, a 260A Telephone Panel for order wire service, and a 106A Amplifier together with 119B Repeating Coil for use as a local announcing channel or as a spare line channel.

The minimum single frequency input level at which this bay can be operated and obtain compression is -35 db where zero db equals 6 milliwatts. The longest program line which can be equalized will have after equalization an output level, as read on a volume indicator, of -35 to -30 db which is adequate for operation of this bay. The maximum output level obtainable for driving the radio transmitter is plus 20 db.

A level of not less than -14 db is required on the circuit from the radio transmitter monitor to obtain the full output of 12 watts from the monitor amplifier. A level of -5 to zero db is recommended on this circuit to provide ample adjustment margin.

The internal input impedance for either of the program line inputs is 150 ohms. This input arrangement provides partial equalization when used with non-loaded cable circuits of lengths up to about five miles. The equipment is designed to work into 500 to 600 ohm radio transmitter input impedance and from the radio transmitter monitor circuit. The monitor amplifier output is normally arranged to work into a 500 ohm impedance loud speaker but may be connected for an 8 ohm loud speaker.

The standard 705A speech input bay operates from a 105-125 volt 50-60 cycle a-c. power supply with a maximum power consumption at 125 volts of approximately 187 watts. The addition of one 106A Amplifier will increase the total maximum power consumption to about 235 watts.

The following vacuum tubes are required for operation of the 110A and 94C Amplifiers in the standard bay. These may be either the glass or metal type but only one set, totaling 14 tubes, is required per bay. Vacuum tubes are not supplied with the equipment but must be ordered separately.

Quantity	Glass	Metal
4	6J7G	6J7
3	6C5G	6C5
1	6F6G	6F6
1	6H6G	6H6
2	5V4G	5Z4
1	885	885 (glass - no metal equivalent)
2	6L6G	6L6

Description

The 705A Speech Input Bay consists of the following standard equipment panels and blank mats assembled on a 17 type equipment cabinet.

For convenient reference the panels are designated by letters which also designate their relative positions on the bay in alphabetical order from top to bottom.

Panel Designation	Panel Space	Equipment
A	5-1/4"	993C Mounting Plate equipped with 119C Repeating Coil position 5. Positions 1, 2, and 3 drilled for 23A Equalizers. Positions 4 and 6 drilled for 119 Type Repeating Coils. Wiring installed for all apparatus except at positions 3 and 4.
B	7"	Blank mat - Space for two 279A Equalizer Panels.
C	19-1/4"	110A Program Amplifier.
		Note: Some 705A Speech Input Bays are shipped less 110A Amplifier. Information for installing and wiring the 110A

Panel Designation	Panel Space	Equipment
		Amplifier in the field is given in the section entitled "Installation".
D	3-1/2"	261B Control Panel
E	5-1/4"	751A Volume Indicator
F	5-1/4"	Blank Mat - space and wiring for 260A Telephone Panel
G	5-1/4"	222A Jack Mounting with 96 jacks
H	7"	Blank Mat - space and wiring for 106A Amplifier
J	5-1/4"	288A Terminal Panel and Mat
K	7"	Blank Mat
L	7"	94C Amplifier

The equipment cabinet is 83-3/4" high, 21-1/2" wide and 13-1/8" deep and is available in two styles, one with dark gray trim and the other with stainless steel trim. Both styles have dark gray finish on all equipment mats and on the sides and rear door of the cabinet. A perforated plate on the top of the cabinet provides the necessary ventilation.

All mats are held in place by machine screws which are accessible from the rear, or inside of the cabinet. By loosening these screws the mats may be removed and the terminal strips and internal wiring of the equipment panels exposed for testing.

The bottom of the cabinet is open to provide entrance for external connecting cables from ducts or conduit.

All cables, except that for the a-c. power supply, should be run up the right side of the bay, viewed from the rear, to the terminal strip located near the center of the bay. The terminal block for the a-c. connection is located on the left side of the cabinet near the bottom.

The schematic for the 705A Speech Input Bay is shown on Figure 1. The positions of apparatus on panels are indicated on this drawing by numbers within circles. A letter shown beside the circle corresponds to the panel designation, thereby locating each part on the bay. Positions of the jacks on panel G and functional designations of the jacks are shown on Figure 2.

The numbers shown on the schematic opposite the contacts of keys are used to identify the key terminals and correspond to those shown on the key terminal designation drawing Figure 3.

Referring to the schematic, the main program channel may be traced as follows: Beginning with two program line inputs at terminals 5-6, 7-8, this circuit passes through key K1, the 119C Repeating Coil, key K2, gain control attenuator P2, 110A Program Amplifier, key K4, and ends with two outputs at terminals 41-42, 43-44.

Keys K1 and K4 provide a means for selecting either one of two inputs and outputs, respectively. It is intended that program line No. 1 and output line No. 1 be the lines regularly used, with program line No. 2 and out-

put line No. 2 available for alternate or emergency use. With this arrangement normal operation will be effected with all keys in the down position which is designated 1 on the schematic and also on the nameplate of the 261B Control Panel.

Key K2 in the standard bay should be left in position 1 at all times as it has no operating function except in conjunction with a 106A Amplifier for making local announcements. In bays where the 106A Amplifier and 119B Repeating Coil have been added Key K2 when operated from its normal position 1 to the center position will disconnect the loud speaker in the control room by opening the input to the monitor amplifier. Further operation of Key K2 to position 2 connects the control room microphone and 106A Amplifier, used as a pre-amplifier, to the input of the main gain control P2 and 110A Program Amplifier in place of the program line from the studio.

The attenuator P2 is used as a main gain control for the program channel. Its attenuation increases in counter-clockwise direction in uniform steps of 1 db from 20 on the dial to a total of 32 db at 4 on the dial, thereafter increasing in attenuation in tapered steps to a total of 51 db at 1 on the dial with infinite attenuation at 0 on the dial.

The description, adjustment and operation of the 110A Program Amplifier is given in Instruction Bulletin No. 868 covering this amplifier.

The 751A Volume Indicator is connected to a switch in the 110A Amplifier which transfers the volume indicator either to the output of the 110A Amplifier or to the output of the second stage of the 110A Amplifier ahead of the volume limiting network. This volume indicator is a general purpose type for operation across a 600 ohm line and is adjustable in 2 db steps to indicate mid scale deflection on the meter for input levels from -10 to +10 db. It may be used for testing on other 600 ohm circuits by patching to jacks 43-44.

Key K3 provides for selecting either of two sources for connection to the input of the 94C Monitor Amplifier. Position 1 (down) on K3 connects to a monitor winding on the output transformer in the 110A Amplifier. The level on this winding is approximately 20 db below the level on the main winding. Since this operates at a constant level of +15 db, for any predetermined level to the radio transmitter, the corresponding level on the monitor winding will be -5 db. Position 2 (up) on K3 connects to the external monitor source, usually the monitor circuit from the radio transmitter. Potentiometer P3 provides gain adjustment in this circuit and potentiometer P1, which is identical to P3, provides gain adjustment for the 94C Amplifier.

Detailed information on the 94C Amplifier is contained in Instruction Bulletin No. 881 covering the 94C and

94D Amplifiers. Copies of this bulletin and Bulletin No. 868 on the 110A Program Amplifier are supplied with each bay and should be read to supplement the information contained herein.

INSTALLATION

External connections to the 705A Speech Input Bay should be made with shielded twisted pair copper wire, and all joints should be securely soldered. The shields should be electrically continuous and grounded by wrapping with several turns of No. 20 bare tinned copper wire, soldering, and connecting the free ends to the nearest panel ground lug or to the bay ground bus.

The bay should be grounded by connecting a copper wire not smaller than No. 14 gauge from the bay ground lug located near the bottom of the cabinet to the nearest good building ground or to the ground bus of the radio transmitter. Solder both connections.

The power connection should be made with No. 12 gauge 600 volt rubber covered twisted pair copper wire.

TERMINAL NUMBERS AND CONNECTIONS FOR 705A SPEECH INPUT BAY

Terminal Nos.	External Connections	
*1-2	Announce microphone	
5-6	Program Line No. 1 (Telephone Line)	
7-8	Program Line No. 2 (Telephone Line)	
9-10	Program Line No. 3 (Telephone Line)	
11-12	Program Line No. 4 (Telephone Line)	
*21-22	Order Wire Line No. 1 (Telephone Line)	
*23-24	Order Wire Line No. 2 (Telephone Line)	
*31	Transmitter D6D-9 Cord, Red-Red	(No. 206A Hand Telephone Set)
*32	Transmitter D6D-9 Cord, Blue	
*33	Receiver D6D-9 Cord, Green	
*34	Receiver D6D-9 Cord, White	
*35	Switch Contacts D6D-9 Cord, Red	
*36	Switch Contacts D6D-9 Cord, Yellow	
41-42	Output Line No. 1 to Radio Transmitter	
43-44	Output Line No. 2 to Radio Transmitter	
45-46	Spare Jacks	
47-48	Spare Jacks	
51-52	Monitor Loud Speaker	
53-54	Spare Jacks	
57-60	Radio Transmitter Monitor Circuit (See Schematic for balanced or unbalanced terminations)	
63-64	Spare Jacks	
*67	Negative 12 volt d-c. (if used) for 260A Telephone Panel	

Terminal Nos.	External Connections
*68	Positive 12 volt d-c. (if used) for 260A Telephone Panel
*71-72	Plate current meter for 106A Amplifier (72 Positive)
*73-74	Auxiliary Control Current Meter for 110A Amplifier (73 Positive)
	Note: When auxiliary control meter is used remove strap from terminals 73-74.
*79-80	Auxiliary peak indicator lamp for 110A Amplifier

*It is not necessary to make any external connections to terminals marked with an asterisk (*) in the standard 705A Speech Input Bay. This connection information is for use only when the associated auxiliary equipment has been added.

After completing the external connections insert the vacuum tubes in the amplifiers and adjust the taps on the power transformers of the amplifiers for the normal line voltage in accordance with the instructions given in the bulletins for the individual amplifiers.

The equipment is then ready to be turned on by operating the power switch D3 on the 110A Amplifier. This operation applies power also to the 94C Amplifier. Additional adjustments will be necessary at the 110A Amplifier to secure the desired input and output operating levels and to

check its operating characteristics. The procedure given in the bulletin for the 110A Amplifier should be followed in placing this amplifier into service.

Installation of 106A and 110A Amplifiers, 260A Telephone Panel, 119B Repeating Coil and 23A Equalizers in 705A Speech Input Bay

Wiring for the above apparatus has been included in the bay at the factory. Such units as are required should be mounted on the bay in the positions designated under "Description".

Note The rear cover and cover support (sides) of the 110A Amplifier are not used and must be removed before mounting the amplifier on the bay.

To facilitate identification and connection of the factory wiring in accordance with the schematic the following wiring information should be followed.

Pair No.	Wire Color	Panel No.	Terminal No.	Apparatus
*1	Blue	A	1	23A Equalizer - Position 1
	Blue-Red	A	2	23A Equalizer - Position 1
*2	Orange	A	1	23A Equalizer - Position 2
	Orange-Red	A	2	23A Equalizer - Position 2
*5	Red	A	2	119B Repeating Coil - Pos. 6
	Red-Green	A	5	119B Repeating Coil - Pos. 6

Pair No.	Wire Color	Panel No.	Terminal No.	Apparatus
*6	Yellow	A	4	119B Repeating Coil - Pos. 6
	Yellow-Green	A	7	119B Repeating Coil - Pos. 6
54	Yellow	C	3	110A Amplifier
	Yellow-Green	C	4	110A Amplifier
*7	Blue	C	5	110A Amplifier
	Blue-Red	C	6	110A Amplifier
	(Use terminal 7 on TS2 Panel C for grounding shield of pair 7)			
*8	Orange	C	13	110A Amplifier
	Orange-Red	C	14	110A Amplifier
*9	Yellow	C	15	110A Amplifier
	Yellow-Green	C	16	110A Amplifier
*10	Slate	C	17	110A Amplifier
	Slate-Red	C	18	110A Amplifier
*11	Red	C	19	110A Amplifier
	Red-Green	C	20	110A Amplifier
Single	Black	C	20	110A Amplifier

Pair No.	Wire Color	Panel No.	Terminal No.	Apparatus
#20 Ga. Pair	Slate	C	2 on TS1	110A Amplifier
	Slate-Red	C	1 on T7	110A Amplifier
	(This pair connects to T3 on 94C Amplifier. Test with buzzer to distinguish from following pair).			
#20 Ga. Pair	Slate	C	12 on T7	110A Amplifier
	Slate-Red	C	13 on T7	110A Amplifier
Lead Cable	White	C	2 on TS1	110A Amplifier
	Black	C	1 on TS1	110A Amplifier
*30	Yellow	F	1	260A Telephone Panel
	Yellow-Green	F	2	260A Telephone Panel
31	Blue	F	3	260A Telephone Panel
	Blue-Red	F	4	260A Telephone Panel
32	Orange	F	5	260A Telephone Panel
	Orange-Red	F	6	260A Telephone Panel
33	Slate	F	7	260A Telephone Panel
	Slate-Red	F	8	260A Telephone Panel
34	Red	F	9	260A Telephone Panel
	Red-Green	F	10	260A Telephone Panel

Pair No.	Wire Color	Panel No.	Terminal No.	Apparatus
Single	Black	F	Ground Lug	260A Telephone Panel
*47	Blue	H	1	106A Amplifier
	Blue-Red	H	2	106A Amplifier
*53	Slate	H	9	106A Amplifier
	Slate Red	H	10	106A Amplifier
*38	Orange	H	11	106A Amplifier
	Orange-Red	H	12	106A Amplifier
Lead Cable	White	H	24	106A Amplifier
	Black	H	25	106A Amplifier
Single	Black	H	Ground Lug	106A Amplifier

*Ground shield of each pair marked by an asterisk (*) to ground lug of panel at which connection is made. Solder shield connection and insulate with tape. Exposed ends of shields of all other pairs not thus marked shall not be grounded but shall be insulated with tape.

Strap terminals 1 to 6 and 3 to 8 on the 119B repeating coil, panel A. Strap terminal 15 to 19 on the 106A amplifier, panel H.

MAINTENANCE

Instructions for maintenance of the amplifiers incorporated in the 705A Speech Input Bay is given in the respective Instruction Bulletins for the amplifiers. Supplementary maintenance information is covered in Instruction Bulletin No. 517, "General Instructions for Maintenance of Speech Input Equipment", a copy of which is furnished with each bay.

Spare Parts

It is recommended that one complete set of vacuum tubes duplicating the list mentioned previously and a number of fuses be kept on hand at all times as spares for this equipment.

Patching cords equipped with plugs while not required for the normal operation of this equipment are useful for testing purposes and for special circuit arrangements in connection with equipment of this type. It is recommended that a number of these be obtained and kept on hand for this purpose. The cords ordinarily employed are Western Electric No. P2AA Cords each equipped with two No. 241A Plugs. These cords are obtainable in white, red, green and black colors and 1, 2, 3, 4 and 6-foot lengths as specified. The plugs are obtainable in black (No. 241A) and red (No. 241B) shells. In ordering these accessories the colors and lengths of cords and the code numbers of the plugs must

be specified. If cords equipped with plugs are required this must be mentioned also, otherwise the cords and plugs will be furnished as separate unassembled units. A sample wording of an order for two complete cords would be:

"2 - No. P2AA White Cords, 2 feet in length, each equipped with two No. 241A Plugs."

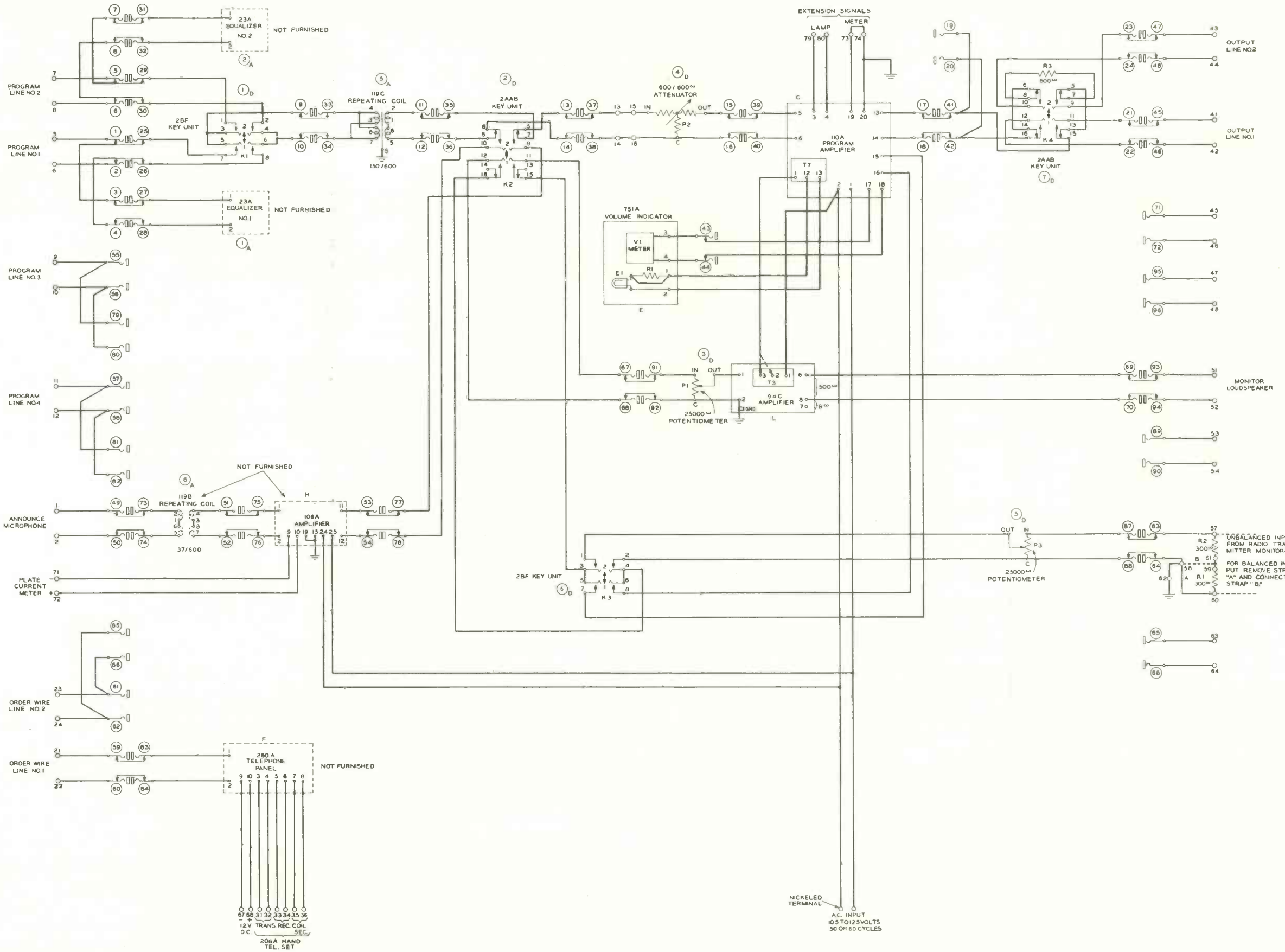

Figure 1 - Schematic

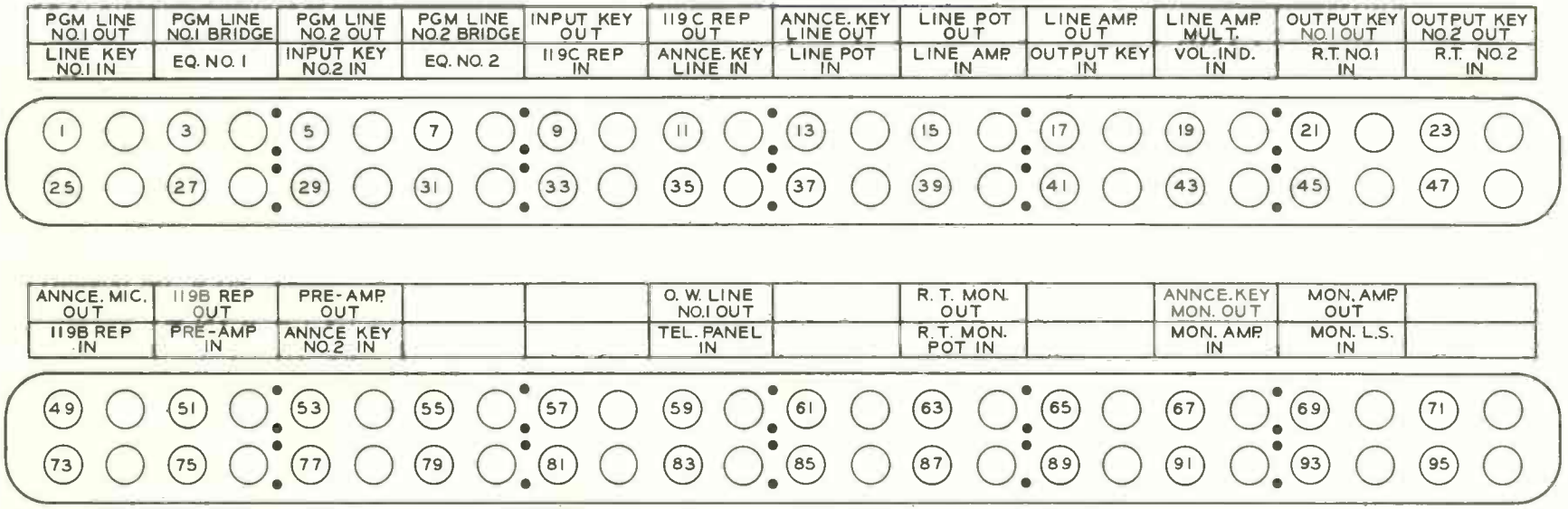

Figure 2 - Jack Designations

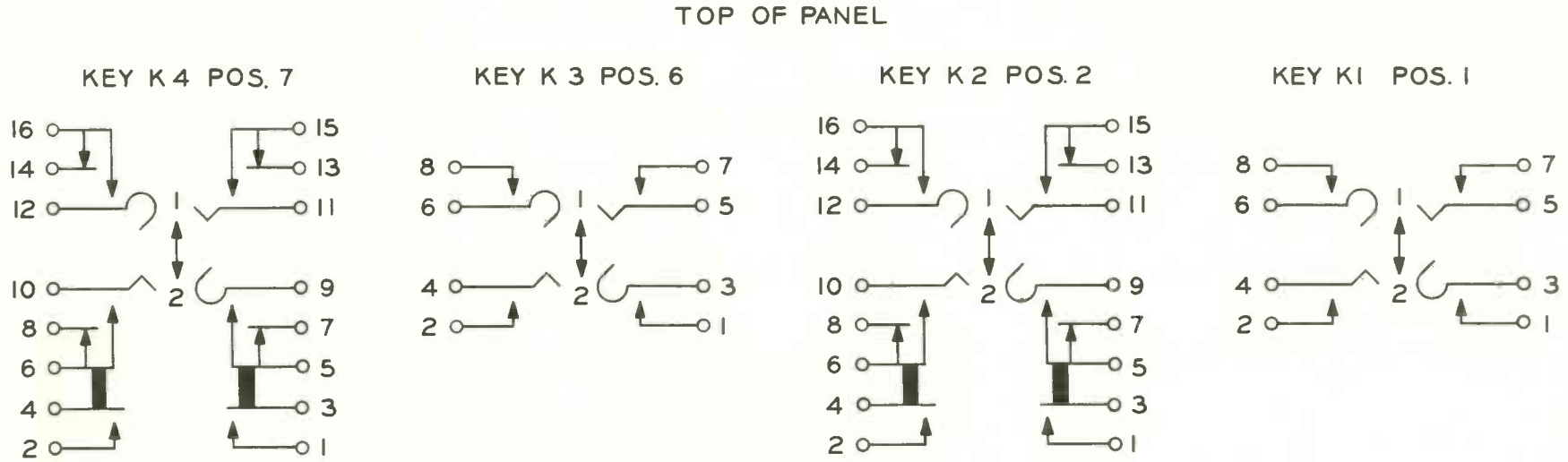

Figure 3 - Key Terminal Designations

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