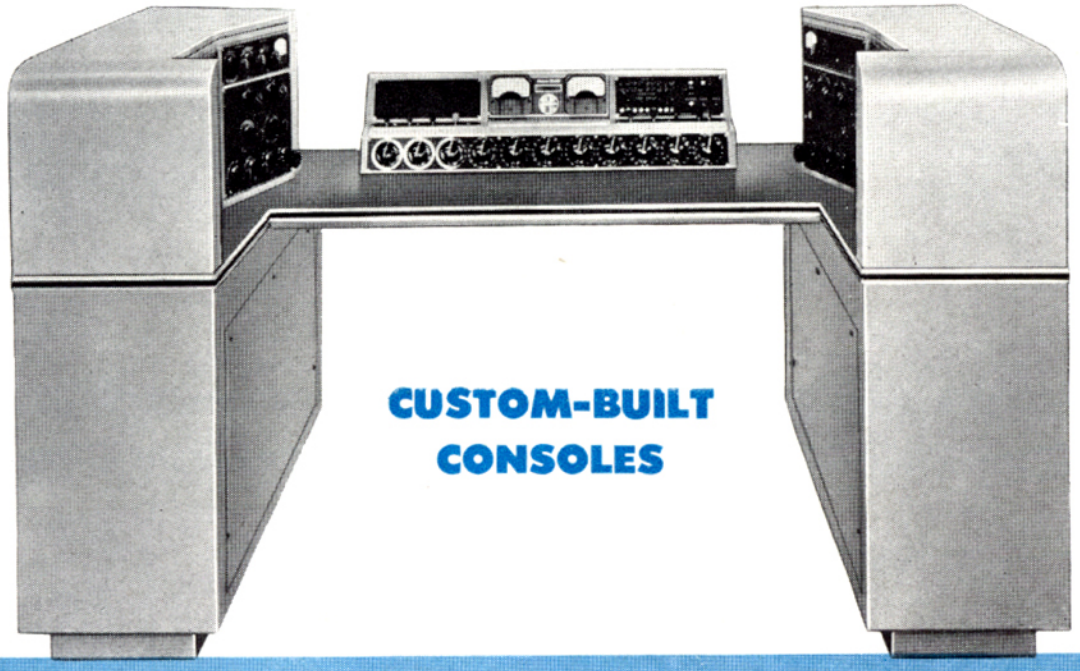
Western Electric

Speech input consoles



CUSTOM-BUILT CONSOLES

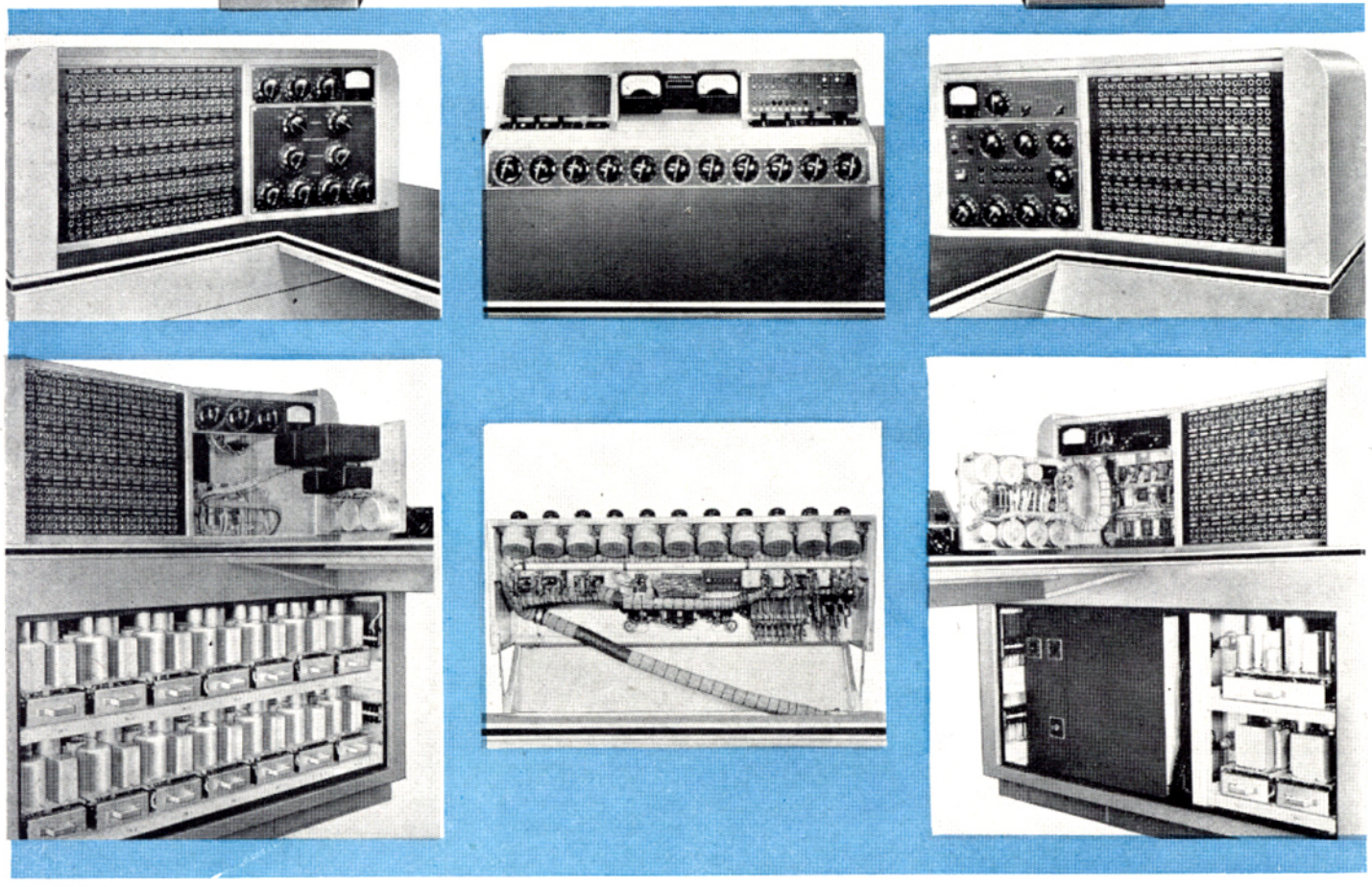


Figure 1 — Typical Custom-built Console showing convenience of controls and accessibility of all components.

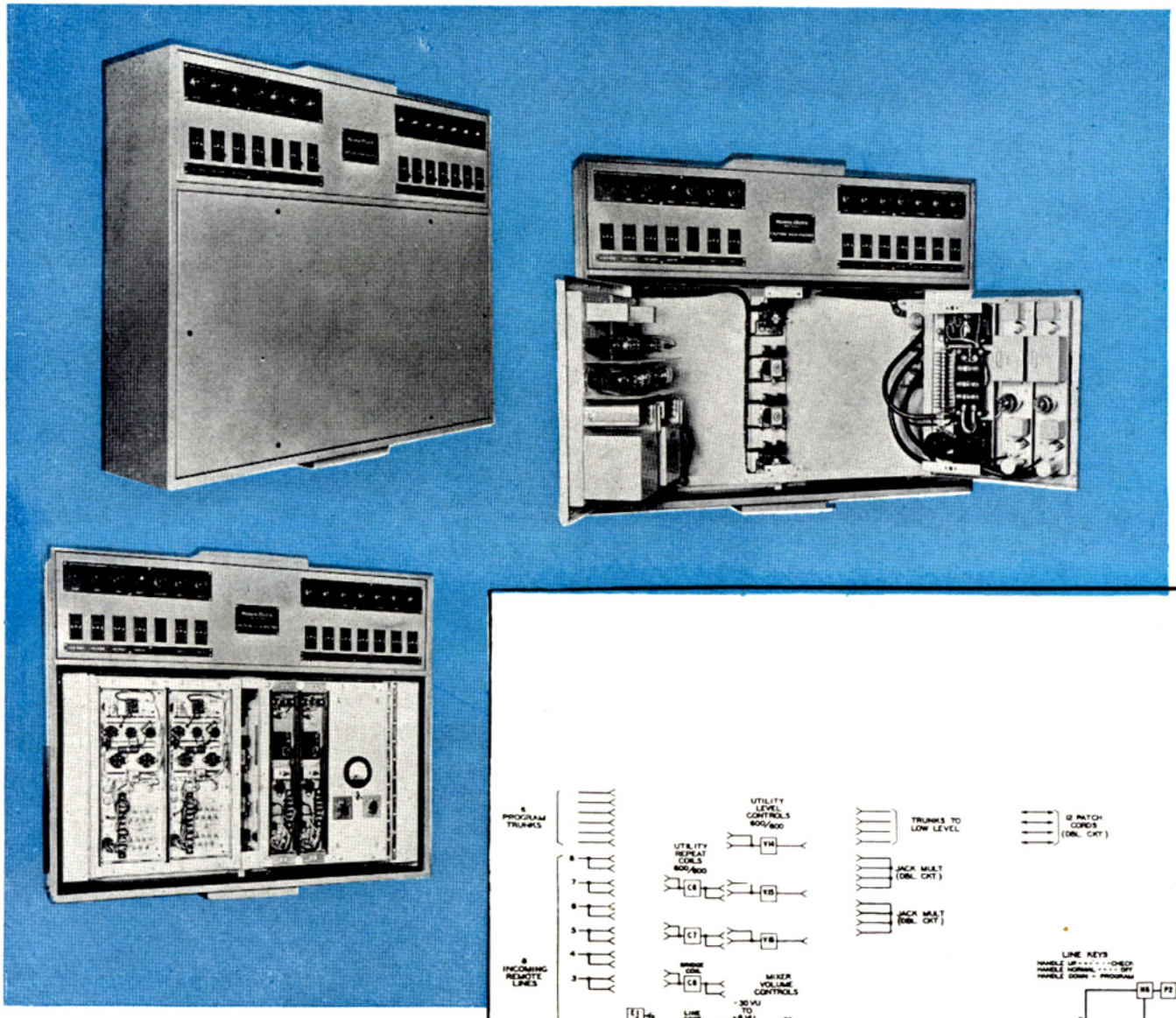


Figure 2 — Typical Custom-built Power Supply showing accessibility of all components for easy maintenance routines.

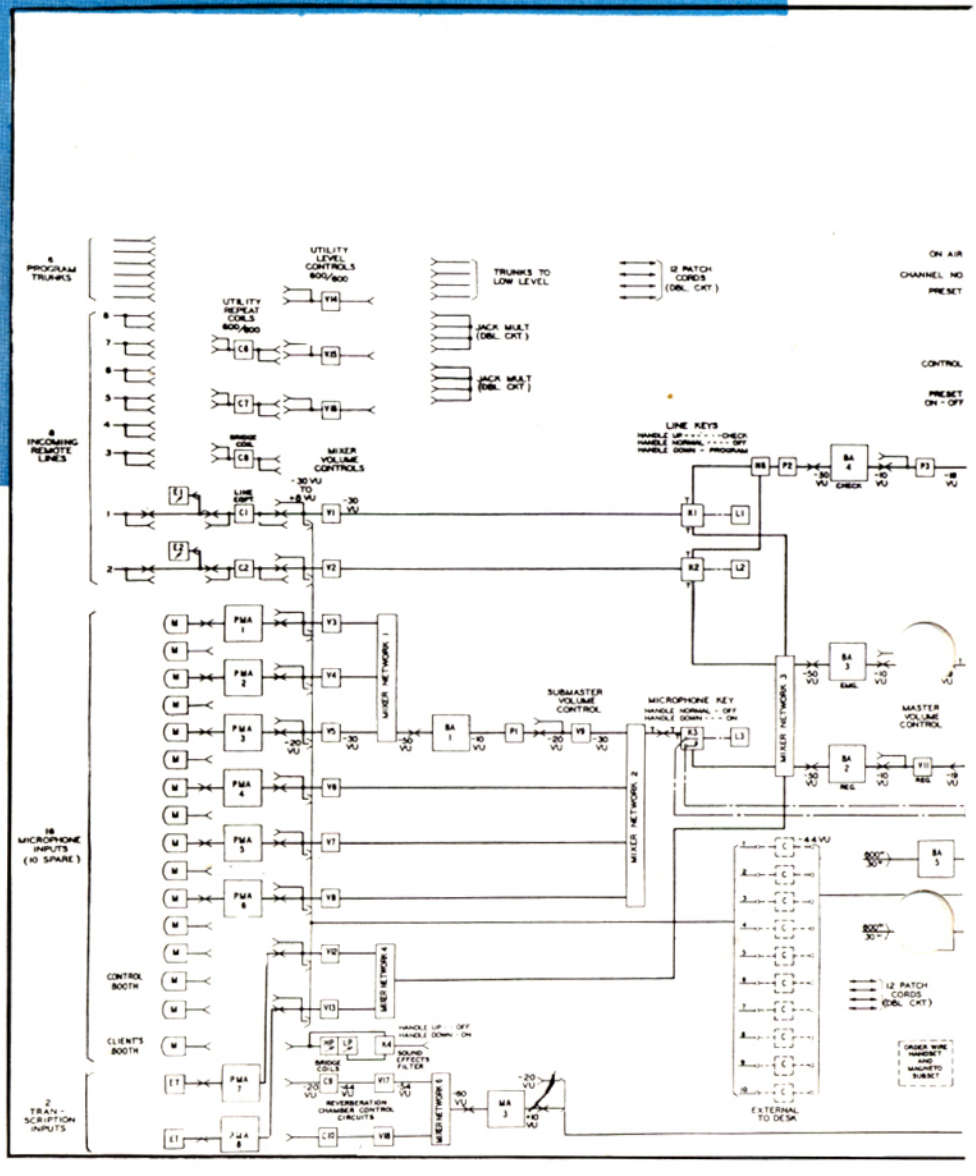


Figure 3 — Functional Schematic of Typical Custom-built Console.

CUSTOM-BUILT CONSOLES

The Custom-Built Consoles, now being engineered to customer requirements by the Western Electric Company, are keynoted by their versatility, utility, and attractive appearance. They are as modern as tomorrow and have been designed for application-plus.

Western Electric Broadcast Equipment specialists in cooperation with the engineers of the broadcast stations have designed a number of Custom-Built Consoles. Each installation incorporates standard Western Electric components combined into circuit arrangements and cabinet designs to meet individual requirements.

The equipment layout and cabinet construction are planned to provide a maximum of accessibility to all equipment for inspection and maintenance. The desk frameworks are metal and are normally finished in attractive aluminum gray colors with a narrow bright chromium strip around the front sides of the desk at shelf level. However they can be finished to harmonize with any architectural treatment.

Separate cabinets, for wall mounting, contain the rectifier units supplying the plate and filament power to the amplifiers, and the rectifier for the signal supply. Also located in these cabinets are the switches, circuit breakers, relays, and pilot lights for the operation and control of the power supply equipment, as well as relays for loudspeaker and studio sign control.

Western Electric Custom Built Consoles are designed to have frequency response, inherently low distortion level, and low noise level all better than the limits set by the FCC for the highest quality AM and FM broadcasting systems.

Some designs use standard amplifiers, rectifiers, etc., assembled into desk structures like those shown on pages 19 and 20. Others use standard consoles plus auxiliary cabinets like that for the 25B illustrated on page 93.

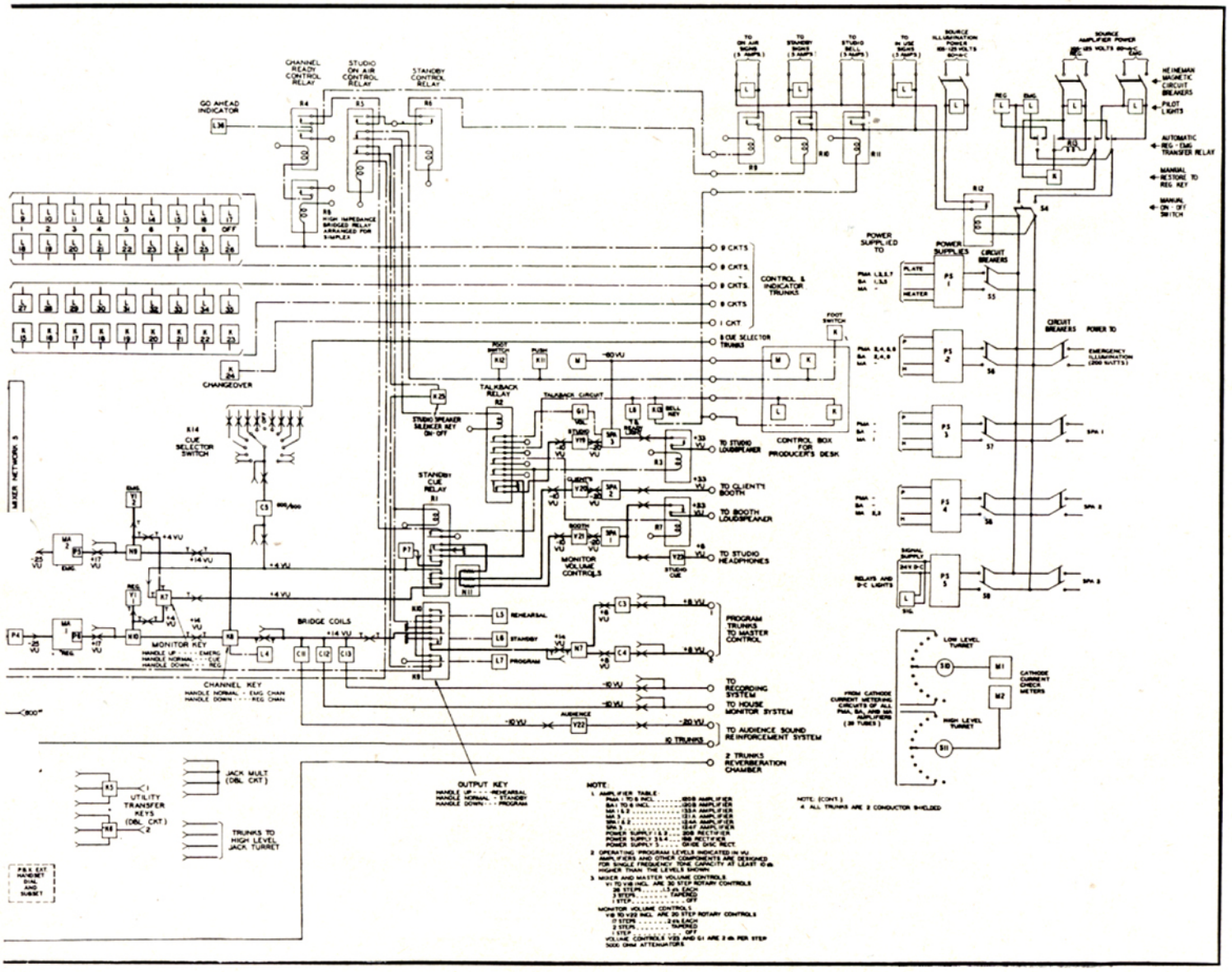


Figure 4 — Operator at 40A Console of 25B Speech Input Equipment. Controls are grouped functionally with frequently used controls nearest operator and all controls within convenient reach.

25B SPEECH INPUT EQUIPMENT

Tops for FM

Use — Several basically new ideas in speech input console design and operation have been built into Western Electric 25 Type Equipment. This console was designed by Bell Telephone Laboratories for use in High Fidelity AM and FM broadcasting stations. It is designed for operation over a 15,000 cycle range with low harmonic distortion and high signal-to-noise ratio.

Description — Precision controlled assembly and wiring contribute to assure a high signal-to-noise ratio and low distortion under studio operating conditions. The 25B Speech Input Equipment is a complete a-c operated console type program production unit for the amplification, control, and monitoring of programs originated by microphones, transcriptions, remote lines or equivalent sources. It has two main program channels, capable of simultaneous operation on separate programs without interference. Such combinations as the following are only a few of the many applications for which these consoles can be adapted. One program can be fed to the AM transmitter through one channel and the other channel can be used to feed the FM transmitter, thus permitting separate announcements to be made to each station. A studio program can be rehearsed while feeding a network program to the transmitter. A network program can be fed to the AM transmitter while originating a studio program to the FM transmitter. In addition, it has an independent monitoring channel for loudspeaker listening to programs being transmitted through the main channels, or direct from incoming lines or cue circuits. The monitor channel may also be used to feed cue programs back to the remote line circuits or for talkback to either of two studio loudspeakers in conjunction with one of the program channels.

The equipment has a seven channel mixer. Four of these mixer volume controls are associated with four preliminary amplifiers provided in the equipment for operation from a maximum of eight connected microphones (four simultaneously) or equivalent low level sources. The other three mixers are associated with the high level inputs which may be either incoming program lines or three additional microphones or other low level inputs by the use of three externally mounted pre-amplifiers.

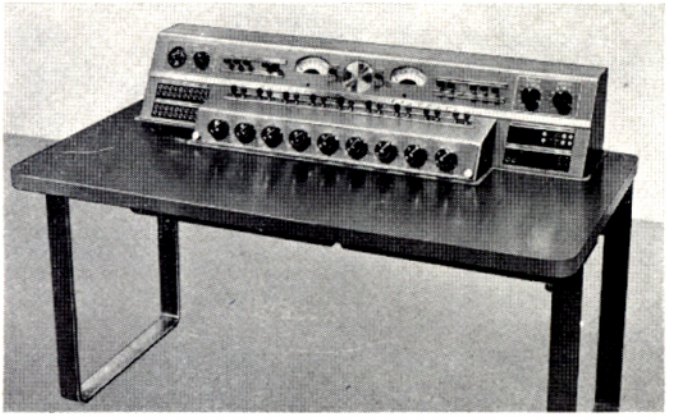


Figure 5 — 40A Console mounted in KS-10284 table.

Any combination of the seven simultaneous inputs may be connected to either one of the two main amplifier channels. Other facilities provided are: Two Volume Indicator Meters, Headset Monitoring Jacks, Studio light and signaling circuits, an audition or sound reinforcement output control; Jack terminations for four other lines in addition to those mentioned above.

In addition to provision for use of an external talkback microphone a mounting is also provided in the console for such a microphone. Every convenience for ease of operation has been incorporated into this console. The volume control knobs are the mushroom type with wide skirts, raised pointers, and knurling to facilitate fingertip control. Two colors of flat type key handles with concave finger surfaces are used. The arrangement of the equipment permits good visibility to the studio. All controls are located so that the operator may control a program or programs without the need for tiring movements or positions. The design is greatly simplified as to mounting and installation, requiring only a minimum of effort to put the fully assembled and wired console and associated power unit into service.

The 25B Speech Input Equipment consists of five principal units. The main unit is a desk style 40A Console Control Unit which contains all the amplifiers and controls. The writing table top of the KS-10284 Table in which the console is mounted stands 27½ inches from the floor and is about 55 inches long by 28 inches deep. The over-all height is 36 inches and the controls occupy about 13½ inches in depth at the rear of the table top. The amplifiers are housed in a hinged tray type enclosure in the console below the table top toward the rear. The control and amplifier enclosures are hinged so that complete and easy access is obtained to all internal wiring and components.

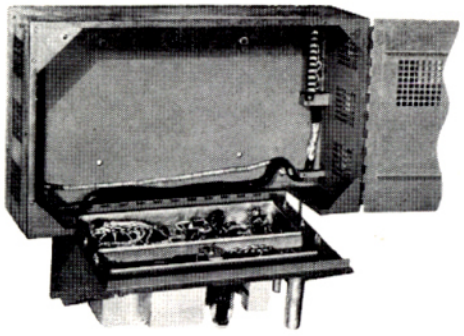


Figure 7 — 12A Power Unit. View shows equipment swung down to expose wiring.

The third unit, a compact 12A Power Supply, is about 28 inches wide by 10 inches deep by 16½ inches high. It is arranged for wall mounting, and is generally located in the Control Booth but separately from the console. This unit contains the power supply units, rectifiers and transformers for plate and filament power to all vacuum tubes, and for the loudspeaker cut off relays. These units are mounted on a swinging frame for easy inspection and maintenance access. Thus the only need for any other auxiliary power supply is the usual d-c signal supply for operation of indicating lights and external relay systems where employed. A supply unit suitable for this is the KS-7593 Rectifier.

Two flush type wall mounting connections or junction boxes also form parts of the 25B Equipment. These are furnished with terminal strips to which the permanent con-

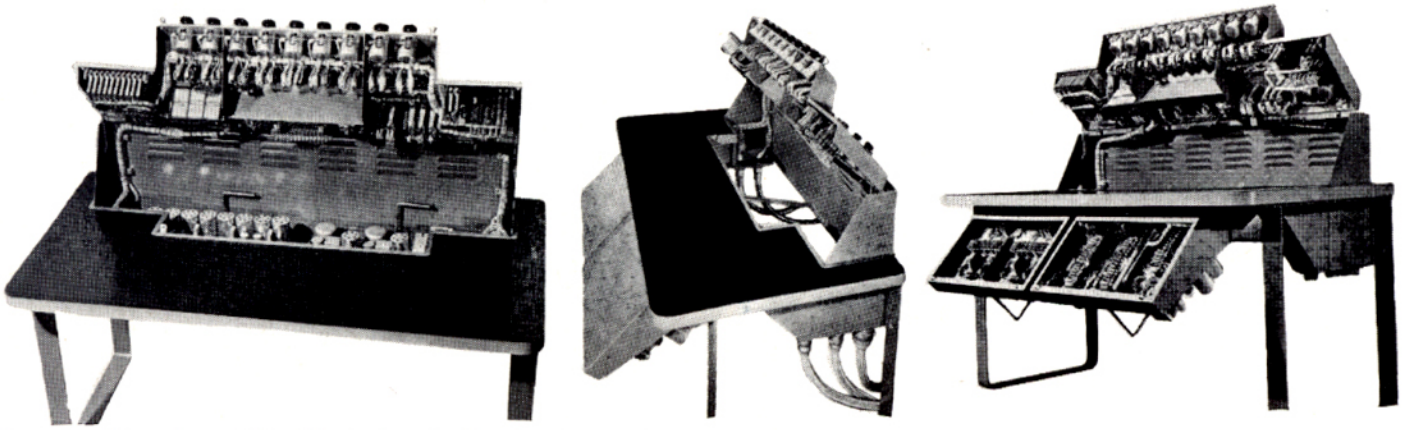


Figure 6 — Three views of the 25B showing the 40A Console and the KS-10284 table with control panel raised and amplifier racks lowered. View at left shows the control panel lifted for access to all keys, jacks, potentiometers and control apparatus and wiring in 40A Console. Lifting this panel also exposes tube side of all amplifiers. Center photograph shows the control panel raised and the amplifier racks swung forward with dust covers in place, and the flexible cables leading to the 7A and 7B junction boxes. At the right the control panel is raised and both amplifier racks swung forward into convenient position for servicing the wiring side of the amplifier.

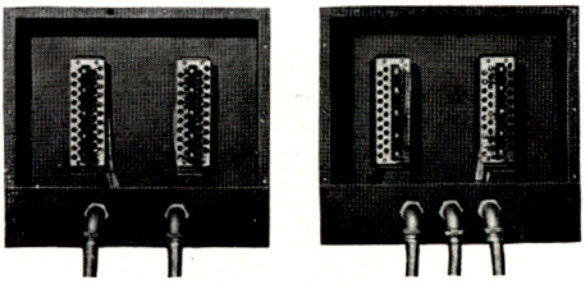


Figure 8 — 7A Junction Box (left) and 7B Junction Box (right) with cover plates removed.

nections are made. Extending from the front of the boxes are flexible cables terminated in plug-in connectors, with which all connections to the control console are made.

The terminal strips and cable assembly can be removed so that the junction boxes may be installed during preliminary construction in new installations, thus permitting connecting conduit to be installed when most convenient. It is not necessary to install the console until after all construction is complete. Connections to the console are plug-in type to provide a maximum of utility.

The 25B Speech Input Console Provides a Whole Alphabet of Features

A. Four microphone preamplifiers.

B. Switching keys, for selecting either of two low level inputs for each preamplifier.

C. Eleven microphone or low level input circuits, seven of which can be used simultaneously (assuming three external preamplifiers are provided).

D. Three remote line input circuits, each with its own repeating coil.

E. Three remote line switching keys for selecting any one or combination of three lines for monitor, for cue, or for program feed.

F. Three utility keys for selecting any one or all of the three line mixers or for other line level sources for microphone or transcription inputs (using external preamplifiers).

G. Patching jacks, for substituting four additional remote lines, on a line-for-line basis. Thus, a total of seven input lines or trunks are available to the operator.

H. Seven mixer potentiometers, for individual level adjustment on four microphone input circuits, and three line input circuits, or outputs of external preamplifiers.

I. A seven channel mixer circuit, with individual mixer transfer keys, for switching each of the seven mixer potentiometers between the two main amplifier channels.

J. Two main amplifier channels capable of simultaneous operation on separate programs without interfering cross-talk.

K. Two master gain controls, one for adjusting the overall level of each main channel.

L. Two output switching keys, allowing either of the two main channels to be fed to either or both of two outgoing lines.

M. Line isolation and branching pad for each output line, which provides two channel impedance matching and serves to stabilize the impedance into which the amplifiers work, aiding in maintaining high grade transmission.

N. Two volume indicators one for each main channel, for visual monitoring of program level on each of the output lines.

O. Jacks for individual head phone monitoring on each of the two main amplifier channels.

P. A monitor amplifier for aural monitoring, with the control room loudspeaker, of programs on the two main amplifier channels, on the incoming line circuits, or on an external cue feed circuit from master control; also for feeding cue programs to the studio speaker and to the remote line circuits.

Q. Monitor transfer key, giving the monitor amplifier input access to programs on either of the two main amplifier channels, and to the cue transfer key.

R. Cue transfer key, for switching between the conditions of monitoring on the remote lines, receiving cue from master control, and feeding cue to the remote lines.

S. Gain control for monitor amplifier.

T. Loudspeaker cut-off relays, for control room and two studio loudspeakers, with strapping arrangement for interlock with regular microphone input keys automatically to prevent operation of loudspeaker in same room with a live microphone.

U. Contacts for closing control circuits to relays outside this equipment for operation of studio warning signs, buzzer cut-offs, master control equipment and other auxiliaries.

V. A branching circuit, with gain control and channel switching key, for feeding a separate local amplifier system external to this equipment. This is useful for audition purposes or for sound reinforcement in large audience studios and similar applications.

W. Tube check circuit with meter and rotary tap switch, for quickly checking cathode currents, to determine the operating condition of all amplifier tubes between microphones and broadcast lines.

X. Power source for operating loudspeaker cut-off relays.

Y. Adequate pre-wired plug in terminal facilities to accommodate incoming and outgoing line and program circuits and power supply feeds.

Z. Talk-back control key switches, talk-back microphone input circuit, and the loudspeaker control circuits for talk-back from the control room into the associated studio.

Specifications

Frequency Response: See Figure 10.

Signal-to-Noise Ratio: 70 db unweighted, with 70 db net gain and with +18 dbm peak signal for single frequency output level.

Harmonic Distortion: See Figure 11

Source Impedances

Microphone Inputs	30-50, 250 or 600 ohms
Line Inputs	600 ohms
Utility Inputs	600 ohms
Air Cue Input	600 ohms

Load Impedances

Line Outputs	600 ohms
Audition Output	600 ohms
Monitor Amplifier Outputs	Furnished adjusted for loudspeaker impedances of 3 to 10 ohms. May be adjusted to a wide range of impedances, between 1 and 1200 ohms. Cue to line circuit is 600 ohms.

Over-all Gains

	Max. Gain	*Typical Operating Gains (Approx.)*
Microphone Inputs to line outputs	100 db.	70 db.
Remote Line Inputs to line outputs	38 db.	24 db.
Utility Inputs to line outputs	58 db.	30 db.
Cue Input to Monitor Output Loudspeakers	44 db.	38 db.
Cue Input to Remote Line	6 db.	2 db.

Volume Controls

Mixer Network Loss	Approx. 16 db. (mixer vol. controls on minimum loss).
Mixer Volume Controls (600 ohms to 600 ohms ladder type attenuator)	20 steps total; 34 db. loss in steps of 2 db., then tapered to "infinity" in 3 steps (one of about 8 db. and one of about 10 db. and "off").
Master Volume Control: (100,000 ohm potentiometer)	Has same steps as mixer volume control.
Audition Volume Control (600 ohm to 600 ohm ladder type attenuator)	6 db. minimum loss: Control has same steps as mixer volume controls.
Monitor Volume Control (600 ohm to 600 ohm ladder type attenuator)	6 db. minimum loss. Control has same steps as mixer volume control.

Output Power: +18 dbm. Allows 10 db. margin for peak factor above +8 vu which is the normal program output for the equipment.

Power Supply: 105-125 volts, 50-60 cycles a-c. Approximately 225 watts. Power for signal light and external relay operation must be supplied from external source. Western Electric KS-7593 Rectifier furnishing 1.2 amperes at 12 volts d-c or Western Electric KS-5653 Rectifier furnishing 1 ampere at 24 volts d-c is recommended. The lamps included in the equipment are for 12 volt operation and must be changed for the 24 volt supply.

Dimensions:

	Height	*Length*	*Depth*
Console	36"	55"	28"
Power Unit	16½"	28"	10"
Junction Boxes	18"	20"	4"

Essential Elements:

40A Console: Approximate weight 200 pounds.

129A Amplifier
130B Amplifier
131A Amplifier

12A Power Unit: Approximate weight 60 pounds.

18B Rectifier
20B Rectifier

Junction Boxes, 7A & 7B: Approximate total weight 70 pounds.

Table KS-10284: Approximate weight 75 pounds.

Vacuum Tubes:

40A Console

Quantity Required	*Western Electric*		*Commercial Receiver Type*
8	348A	or	1620 (6J7)
4	349A	or	6F6
6			1603
18			

12A Power Unit

Quantity Required	*Western Electric*		*Commercial Receiver Type*
2	274A	or	5Z3
1	300B	or	2A3
1	348A	or	6J7
1	313C		
1	351A	or	6X5
6			

Accessories:

P-2AA Cord 1 foot long equipped with 241A (black) or 241B (red) plugs, for patching purposes.

Monitoring headset 1002F or the D-97690.

Repeating coils 177C for changing unbalanced input or output circuits of 40A Console for balanced operation. Brackets and Mounting Plates for mounting 8 such coils are provided in the 40A Console. Space is also available in the console to mount brackets for 5 additional coils. A 42-A shield may be added to the coils externally where further electro-magnetic protection is necessary.

12 Volt Signal Supply: No supply is provided for the signal and lamp circuits; the KS-7593 (12 Volt) or KS-5653 (24 volt) is recommended.

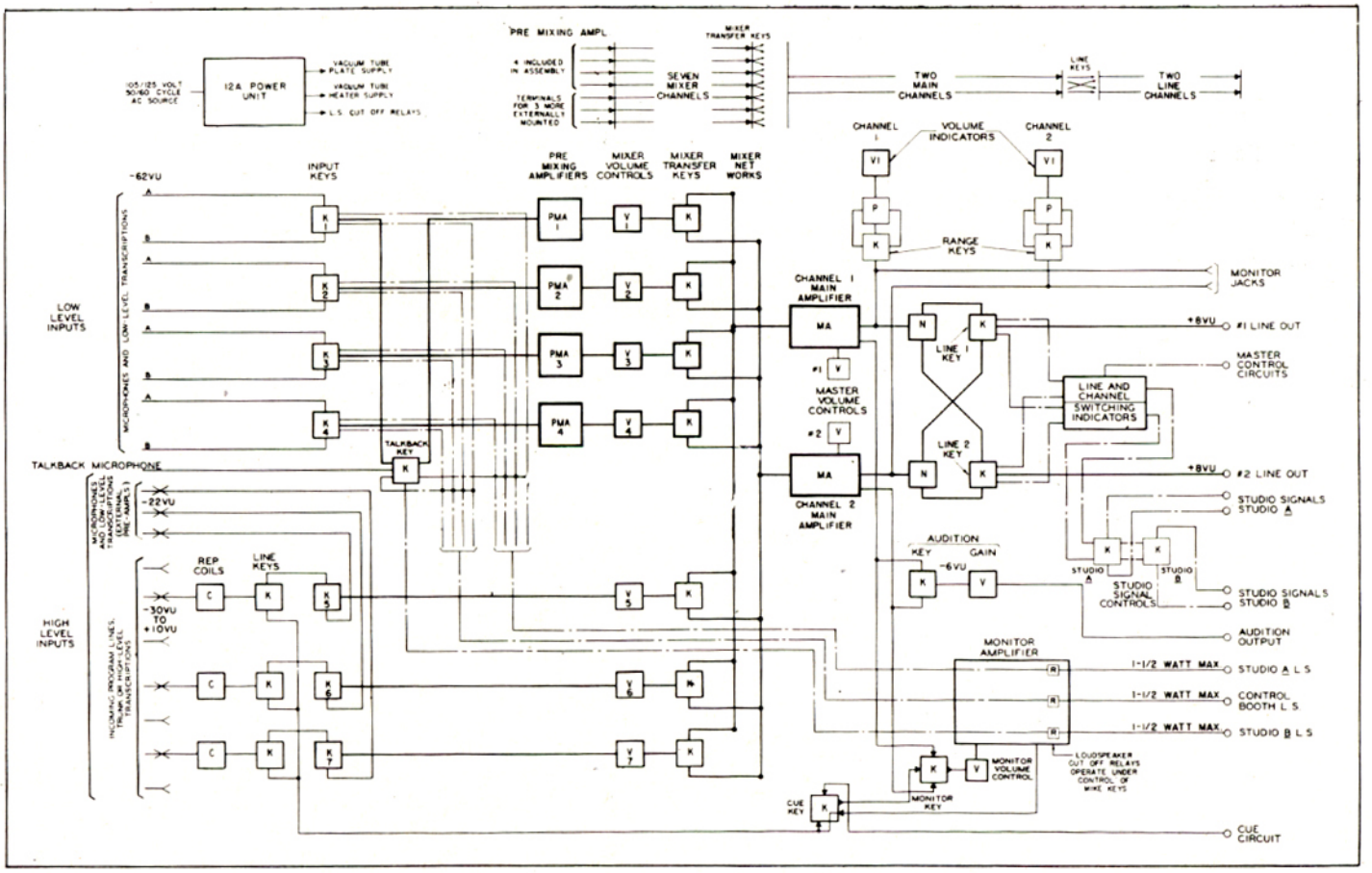


Figure 9 — Functional schematic of 25B Speech Input Equipment.

External Preamplifiers: Preamplifiers mounted externally may be provided for use of the "Utility" inputs for additional microphone or low level transcription sources. The following equipment is available for this purpose:

For 19" Relay Rack or Bay Cabinet Mounting, the following apparatus is recommended:

3 — 120 B Amplifiers
1 — 177A or B Mounting Plate
1 — 296A or B panel (face mat)

or

1 — 129A Amplifier
1 — 190B Mounting Plate

For mounting in a 21A Wall Cabinet the following apparatus is recommended:

1 — 21A Cabinet
1 — Terminal Strip per BA-44609 (has 3 terminals)
2 — Terminal Strips per BL-44607 (each has 10 terminals)
1 — 190A Mounting Plate
3 — 120B Amplifiers, or 1 — 129A Amplifier
1 — Mounting Plate per BO-74389 (for mounting up to four 177C Repeating Coils in 21A Cabinet)

The three external 120B Amplifiers, or one 129A Amplifier, may be operated from the 20B Rectifier in the 12A Power Supply in addition to the 129A Amplifier and 130B Amplifier in the 40A Console. Under this condition the 20B Rectifier is approximately ten percent more heavily loaded which may shorten tube life somewhat.

The 40A console may be ordered separately for installation in other types of desks; for example, see page 93.

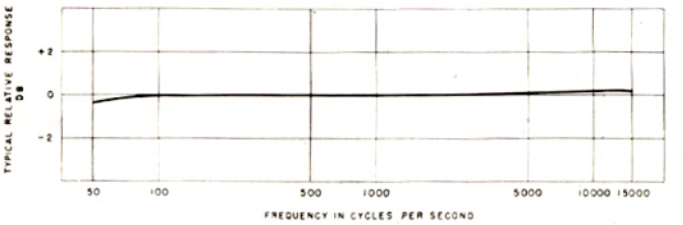


Figure 10 — Typical overall frequency response characteristic from input terminals for microphones to output terminals to lines.

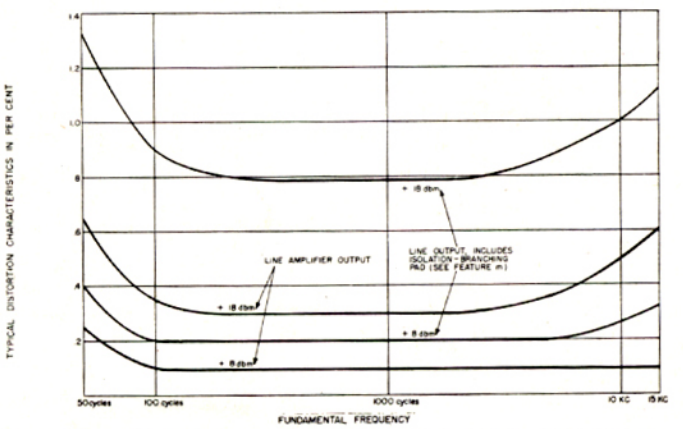


Figure 11 — Typical harmonic distortion characteristics for Amplifier Channels Microphone to line. (Includes harmonics to 30 kc.)

MASTER CONTROL ROOM SWITCHING SYSTEMS

The Western Electric Company is producing custom built master control switching and program dispatching systems for use in broadcast stations that use multiple studio installations. These systems employ standard components but are designed to customers' individual requirements.

A typical functional schematic of a relay type system is shown below.

This system provides for ten studios and six outgoing lines. Other combinations of studios and lines and integrated switching systems can be arranged.

A typical key type system is shown as part of the functional schematic on pages 90 and 91.

For further information on specialized switching systems consult our nearest distributor.

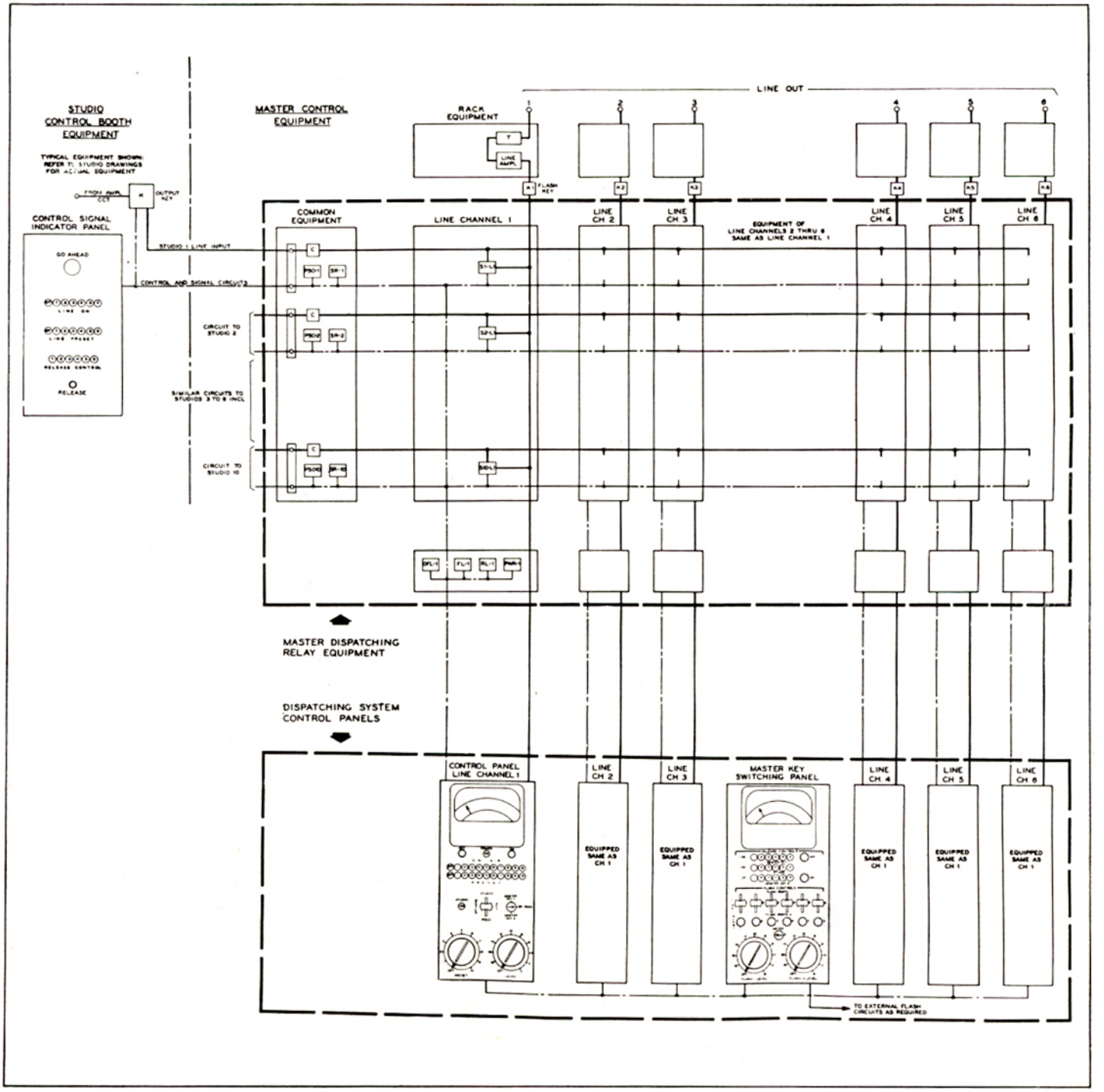
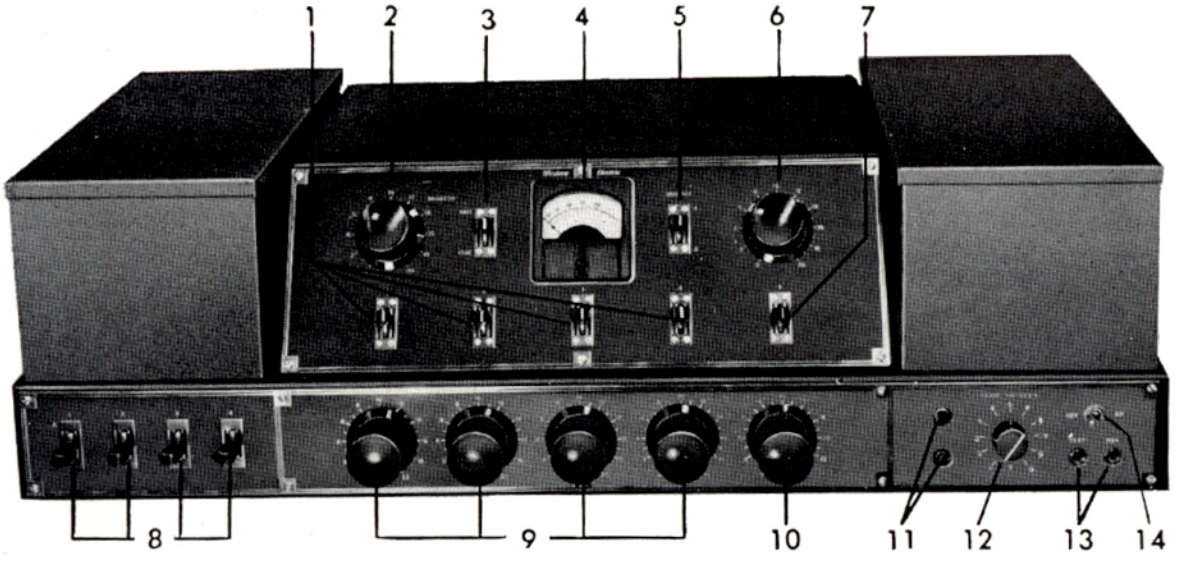


Figure 12 — Functional Schematic of a Typical Master Control Room Switching System.



1. Keys for Microphone Switching
2. Monitor Gain Control
3. Monitor Transfer Key
4. Volume Indicator Meter
5. Output Switching Key
6. Mixer for Incoming Lines
7. Key for Talkback
8. Program Line Keys
9. Mixers for Microphone Inputs
10. Main Gain Control
11. Lamp and Push Button for Signalling
12. Plate Current Selector Switch
13. Test and Headphone Monitoring Jacks
14. Main Power Switch

Figure 13 — 23C Speech Input Equipment.

23C SPEECH INPUT EQUIPMENT FOR AM OR FM BROADCAST

Use — A complete a-c operated Amplifier and Control Assembly designed for AM or FM radio broadcasting service. It can serve either one or two studio layouts and can be used as part of a system incorporating additional units whose outputs are coordinated and switched at a common point such as a Master Control Room.

It has facilities for program production, audition and monitoring, as well as for monitoring on incoming lines. Eight studio microphones or low output level transcription tables, control room announce and talkback microphones and four remote lines or other medium level inputs can be accommodated.

The use of a pre-mixing amplifier stage for each low level input, stabilized feedback and factory controlled assembly and wiring all contribute to assure high signal-to-noise ratio and low distortion under actual operating conditions. See page 92 for typical studio layout.

Description — The 23C has a frequency range which makes it ideal for FM service.

The equipment includes four microphone input circuits with pre-mixing amplifiers, and one input circuit for incoming program lines, all of which are combined in a 5-channel mixer. A three stage amplifier, with master gain control, following the mixer, amplifies the signals to the level required either for outgoing program lines or for switching systems in master control rooms. An indirectly lighted volume indicator meter is connected across the output circuit and terminals are provided for an extension meter. The equipment also includes a monitoring amplifier with provision for operating three loudspeakers. Cut-off relays operated from contacts on the microphone keys are included in the loudspeaker circuits.

Switching keys permit the selection of any of four microphones or equivalent program sources in each of two studios. A "talk-back" key substitutes a microphone in the control room for a studio microphone for talking back into the studio during rehearsals or for making announcements from the control room. The program line input circuit has four keys arranged to connect any one of four incoming program lines either to the mixer circuit or to the monitor amplifier for preliminary monitoring. An output switching key connects the output of the equipment to either of two outgoing program lines and in the intermediate position terminates the unit in 600 ohms.

The output of the line amplifier operates into a line isolation pad which, in turn, feeds the output line terminals. The volume indicator meter is bridged across the input to this pad and is calibrated to indicate the 0 vu or 100% mark when the level is +8 vu at the output line terminals. For lower levels to the line, the resistances of the isolation pad may be replaced by other standard resistances of the same type, as required.

Monitoring is carried on through a separate monitoring amplifier which has a level control and a three-position input switch for monitoring the output of the main amplifier, for preliminary checking of line programs, and for connecting to some external source such as a radio monitor or a master cue line.

Provision is made for a duplicate volume indicator meter at a remote point; jack and rotary switch for measuring plate current of vacuum tubes with external meter; jack for

headphone monitoring of main channel when loudspeaker cannot be used; and key and lamp for use in signaling system.

Mushroom type mixer knobs with wide skirts, raised pointers and knurling facilitate fingertip control. Two colors of flat type key handles with concave finger surfaces are used.

Features

Tops for FM. Excellent frequency response and low distortion.
Accessibility of components.
Minimum of maintenance.
Multiple studio operation.
Controls conveniently located.
Selector switch permits checking of tubes.
Self-contained power supply.

Specifications

MAIN SYSTEM:

Frequency Response: See Figure 14.

Signal-to-Noise Ratio: 64 db with 70 db net gain. Under normal operating conditions, referred to a single frequency output level of +18 dbm*. See Figure 15.

Harmonic Distortion: See Figure 16.

Source Impedances: Microphone Circuits-30 or 250 ohms. Program Line Circuit-600 ohms.

Load Impedance Maximum: 600 ohms.

Maximum Gain: 96 db through microphone channels. 64 db through incoming line channels.

Volume Controls:

(a) ***Mixer Controls:*** 20 steps. 17 steps of 1½ db each; tapering to cut-off on last three steps.

(b) ***Master Gain Contol:*** 20 steps. 17 steps of 2 db each; tapering to cut-off on last three steps.

Maximum Output Level: See curves of distortion vs. output level. Figure 16.

MONITOR AMPLIFIER:

Source Impedance: 600 ohms.

Load Impedance: 750 ohms — Three 250-ohm loudspeakers in series or combination of 250-ohm loudspeakers and 250-ohm load resistors in series.

Maximum Gain: 51 db.

Volume Control: 19 two db steps and "OFF."

Maximum Output Level: 2.5 watts with approximately 5% distortion at 400 cycles. 1.5 watts with approximately 1% distortion at 400 cycles. (Divided among three loudspeakers).

POWER SUPPLY:

105 to 125 volts, 50 to 60 cycles a-c. Approximately 90 watts. Power for relay and signal light operation (12 volts d-c, 0.25 ampere) must be supplied from external source. Western Electric KS-7593 Rectifier is recommended. A Western Electric KS-5653 List 3 may be used if signal lamp is changed for 24 volt operation.

Dimensions: 34" long, 14½" wide, 9¾" high.

Weight: 110 pounds.

Construction: Console Type Cabinet designed to mount on table.

Finish: Chassis and covers — dark gray crinkled lacquer. Control Panels — black photo-etched.

VACUUM TUBES:

Quantity Required	Commercial Receiver Types
7	1603
2	42
1	83V
—	
10	

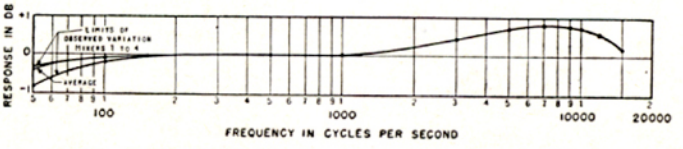


Figure 14 — Typical frequency response characteristics.

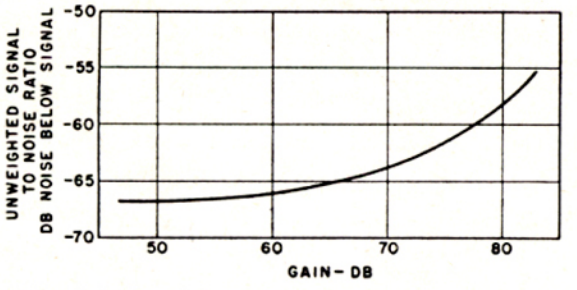


Figure 15 — Typical uweighted signal-to-noise ratio for output level of +18dbm. (Master gain set at 14db and mixer control changed to obtain various values of overall gain.)

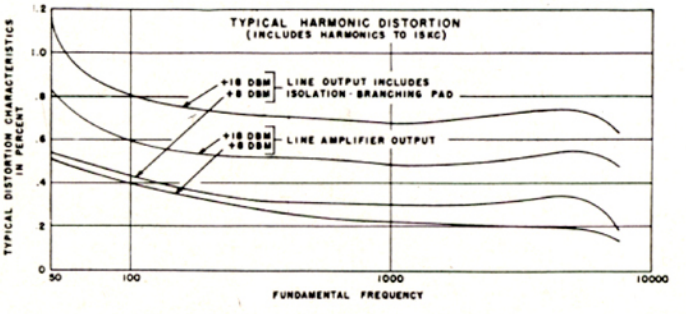


Figure 16 — Typical harmonic distortion.

* dbm Single Frequency Level referred to 1 milliwatt.

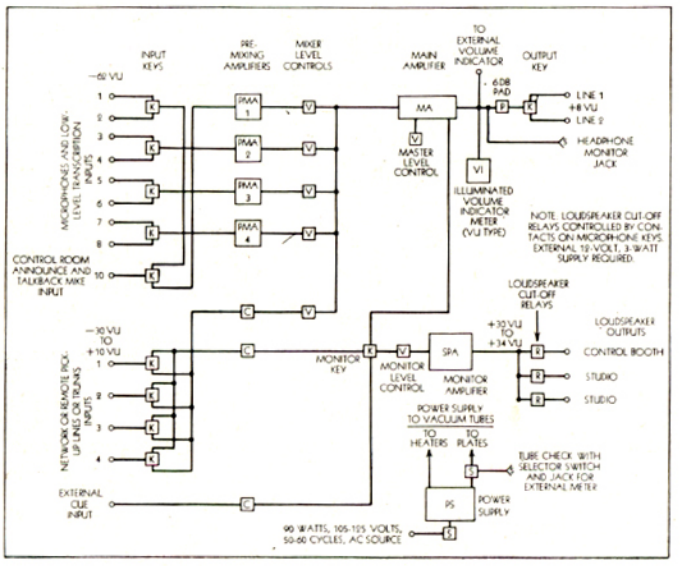


Figure 17 — Block diagram of 23C Speech Input Equipment.

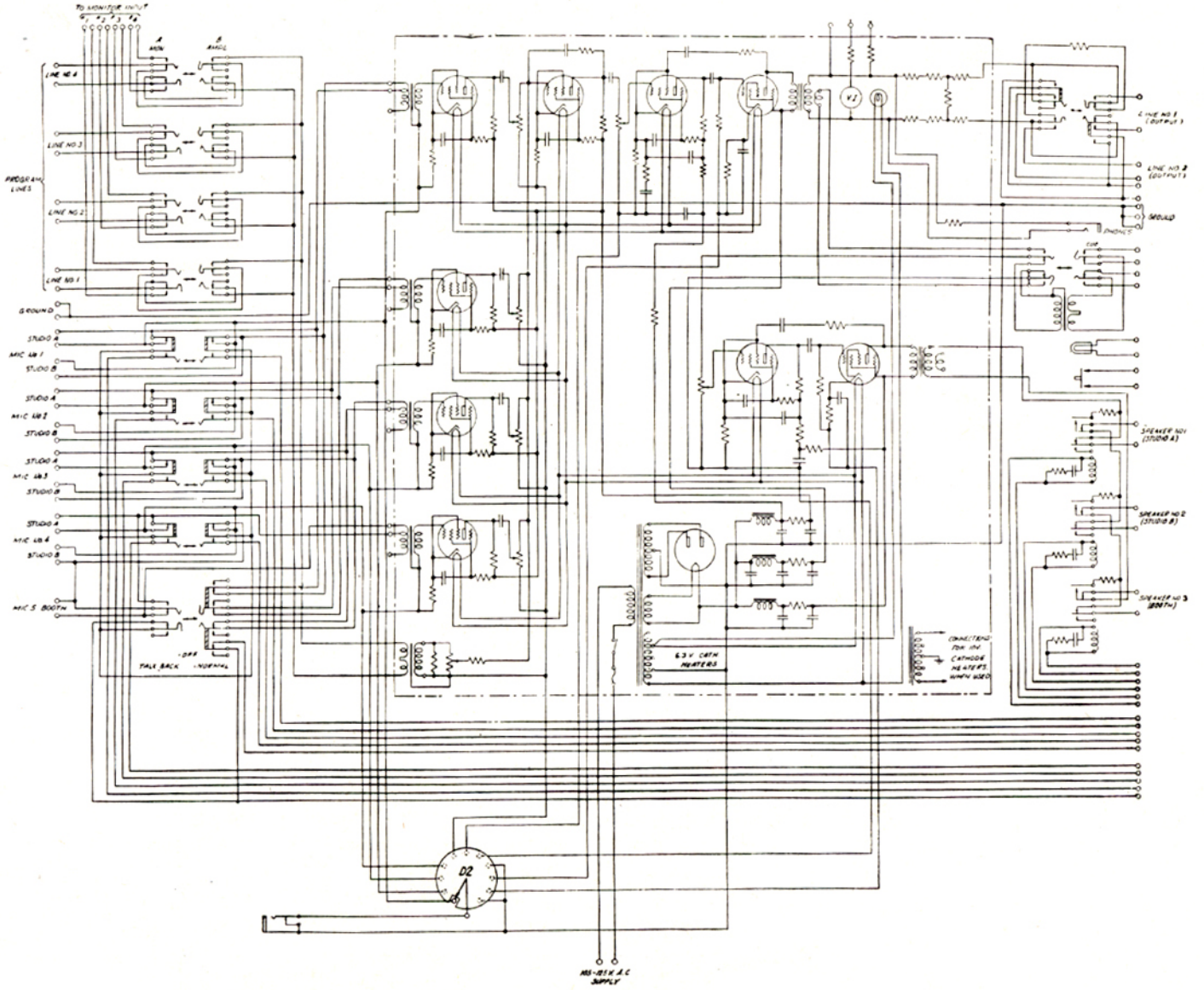
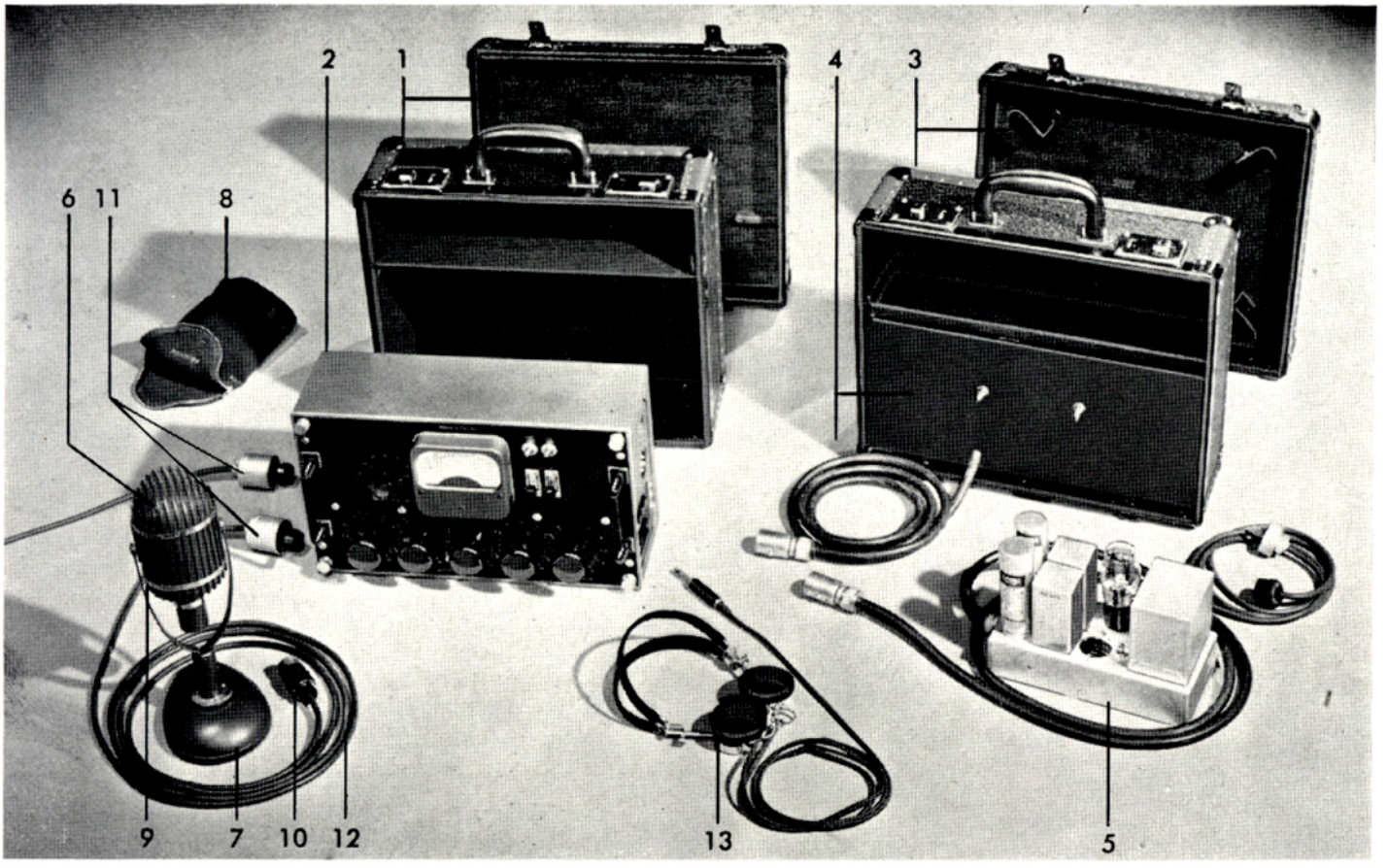


Figure 18 — Functional schematic of 23C Speech Input Equipment.



1. *Amplifier-control Unit Carrying Case with Cover*
2. *Amplifier-control Unit*
3. *Power Supply Carrying Case with Cover*
4. *Battery Rack Assembly with Cord and Plug*
5. *A-c Power Unit with Cord and Plug*
6. *639 Type Microphone*
7. *KS-12000 Transmitter Cover*
8. *24A Transmitter Mounting*
9. *11A Transmitter Attachment*
10. *442A Jack and 712A Adapter*
11. *Microphone Plugs*
12. *KS-7133 Cordage*
13. *1002F Headset*

Figure 19 — Components of the 22D Speech Input Equipment.

22D SPEECH INPUT EQUIPMENT

Use — A compact portable speech input system, light in weight and designed to provide complete pick-up facilities both for established remote and for on-the-spot broadcasts.

Description — It consists of a combination amplifier and control unit with a carrying case, and either a power unit for a-c operation or a battery holder for battery operation or both, as specified, with a carrying case and a power supply cord. The long and dependable service experienced with this high quality light weight equipment has made this unit a favorite among broadcasters.

The 22D includes a four channel parallel mixing circuit designed to work with 30 ohm dynamic microphones or other sources of comparable impedance. Master gain control, indirectly illuminated volume indicator, binding posts for two program lines, jacks for two monitoring headsets, and both binding posts and a jack for an order wire telephone set are provided. There is ready accessibility to the interior without disconnecting any cords or wires by simply removing the rear cover.

Outstanding Features

Real portable equipment — compact and light in weight.

Divided into two packages, each approximately 30 pounds, for balanced carrying.

Highly efficient performance.

Operates from an impedance of 30 ohms and into 150 or 600 ohms. A maximum gain of approximately 92 db when operated between these impedances.

Frequency response uniform within ±1 db from 30 to 10,000 cycles.

Stabilized feedback.

Low harmonic distortion. Low noise level.

Operates from either a-c or battery power supply. The a-c unit has switch for instant change to battery supply in case of a-c power interruption.

Flexible control — four paralleled mixers and a master gain control.

Contacts on output line keys, in unoperated positions, short-circuit inputs of outgoing lines, enabling station

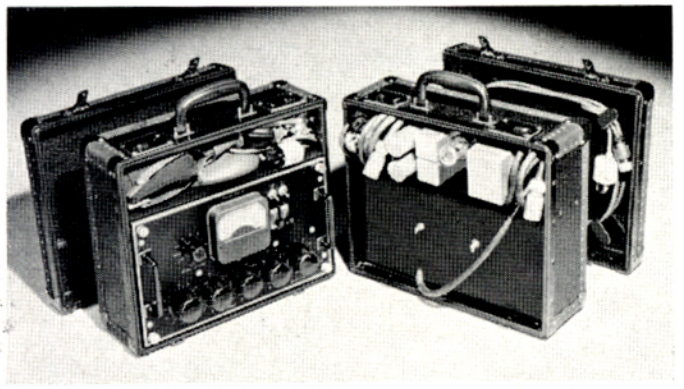


Figure 20 — Amplifier-control and Power Supply Units. Each case is divided into two compartments, providing space for accessories. The lower compartment of the Power Supply Carrying Case holds the batteries when battery operation is desired. The upper compartment holds the a-c power supply.

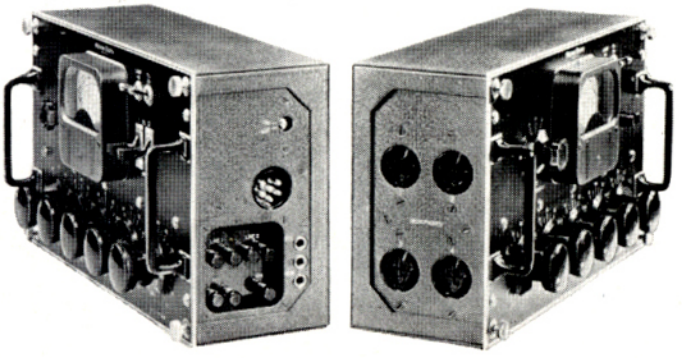


Figure 21 — Left: Right end of the Amplifier-control Unit showing line terminals, telephone binding posts and plug, plug for monitoring headset and the multi-pronged socket for the power supply plug. Right: Left end of the Amplifier-control Unit showing four plug-in type microphone receptacles.

operator to test the loops from master control.

Instantaneous interchange of program and order wire lines in emergencies.

Indirectly illuminated volume indicator gives output level in vu. Battery condition may be checked on volume indicator meter during operation.

Range switch for adjusting normal level indication of the volume indicator meter to correspond to output levels of +4, +6, +8, +10, +12, or +14 vu (0 level calibration 1 milliwatt)

Non-glare Alumilite finish on control panel.

Mushroom type mixer knobs with skirts and raised pointers facilitate fingertip control and avoid cramped hands.

Accessibility — ready access to interior without disconnecting any cords or wires, simply by removing rear cover.

Microphone receptacle mounting plate removable and readily adapted to substitution of other microphone receptacles.

Provision for two monitoring headsets.

Rugged construction assures long service and dependability.

Specifications

Frequency Response: Uniform within ±1 db from 30 to 10,000 cycles.

Signal-to-Noise Ratio: 66 db for battery operation and 60 db for a-c operation; at 72 db gain and referred to peak output signal of +18 dbm.

Source Impedance: 30 ohms. (Use 172A Repeating Coil in cord for 250-ohm microphones).

Load Impedance: 150 or 600 ohms.

Gain: Maximum 92 db. Typical operating 70 db.

Mixer Controls: 45 db in 20 steps. 12 steps of 1½ db each increasing on the last eight steps to cut-off.

Master Volume Control: Seventeen 2 db steps, last three steps have increasing attenuation to cut-off.

Maximum Output Level: +20 dbm single frequency fundamental with less than 1 per cent harmonic distortion. +10 vu program level with 10 db peak factor.

Power Supply: A-C operation — 110-120 volts, 50-60 cycles. Power consumption is 28 watts at 115 volts. Battery operation — Filament 1.6 amperes at 6 volts and plate 21 ma. at 180 volts. Batteries not supplied with the equipment.

Vacuum Tubes:

	Quantity Required	*Commercial Receiver Types*
Amplifier:	2	6J7
	1	6F6
Power Unit:	1	80
	4	

Dimensions and Weights: Total weight of two units and full equipment 50-60 pounds.

Components	*Dimensions*	*Weight*
Amplifier-Control Unit	9"x15"x5"	15 lbs.
Battery Rack Ass'y (Eqpd.)	7"x15"x5"	14 lbs.
A-C Power Unit	7"x12"x5"	9½ lbs.
Carrying Cases (2 Required)	14"x16¾"x7¾"	12 lbs. ea.

Accessories: 633 or 639 type Microphones, and the 1002F Headset for monitoring purposes, are recommended.

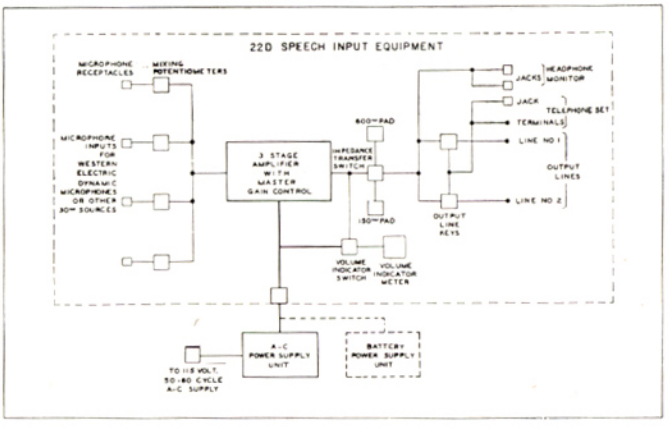


Figure 22 — Block schematic of 22D Speech Input Equipment.