

Enlarged WOAI/WOAI-FM Studio Technical Facilities



The master control room showing a part of the console, turntables and equipment racks. Rack on left contains the preset switching equipments, while the others contain the equipment for the large auditorium studio (A), medium music studio (B), a-m announcing studio (C), and f-m announcing studio (D).

WHEN WOAI, NBC affiliate in San Antonio, Texas, prepared for the installation of an f-m transmitter, with requirements of separate programming, complete revamping of studio facilities was necessary.

Existing facilities were installed in 1938, when the station's studios were

rebuilt throughout. At that time the plan consisted of one large control room and three studios: a large auditorium studio; a medium music studio; and an announce studio. One studio was located on each of three sides of the control room, permitting control of program origination in any

studio from a single, custom-built console, having three separate control positions, one for each studio. All network, remote and transcribed programs were handled through the control panel for the announce studio.

By means of relay switching, any or all of the studio output amplifiers could be switched to a line amplifier feeding the WOAI transmitter located at Selma, some 17 miles from San Antonio. Recording and outgoing network feeds were handled by means of two bridging amplifiers equipped with rotary input switching. Since, normally, all programs originating in the studios were carried on the WOAI transmitter, this system proved very flexible and quite satisfactory.

In the planning for the new dual operation, a number of other factors were taken into consideration in order that the new facilities would provide for future expansion. The final plan called for a second announce studio for the f-m operation, a larger recording room to handle more conveniently

Figure 1

The control panel for studios C and D, the a-m and f-m announce studios.



the increasing recording load, a control booth for the auditorium studio¹ and a preset-type switching system in the master control room.

The initial planning on this construction was started in the fall of 1946 and completed one year later, the rather long time being due principally to delays in the delivery of materials and equipment. Further, it was impossible in 1946 to secure a custom-built preset switching equipment, which necessitated our assembling and wiring this equipment in our shop.

The second announce studio was obtained by dividing the fortunately large announce studio into two studios. A sound lock was provided between the entrances for better sound isolation. To provide for a more desirable recording room, the end of a large and little used rehearsal room was made available with a single wall. This permitted moving the recording equipment out of the 5-kw auxiliary transmitter room, thereby providing room for an interim operation 3-kw f-m transmitter. Space for the last construction, the auditorium studio booth,

Installation of F-M Transmitter Required Complete Revamping of Studio Facilities for Dual A-M and F-M Operation. Additional Facilities Include Second Announce Room, Larger Recording Room, Additional Control Booth and Preset-Type Switching System in Master Control Room.

by **CHARLES JEFFERS**

Technical Director

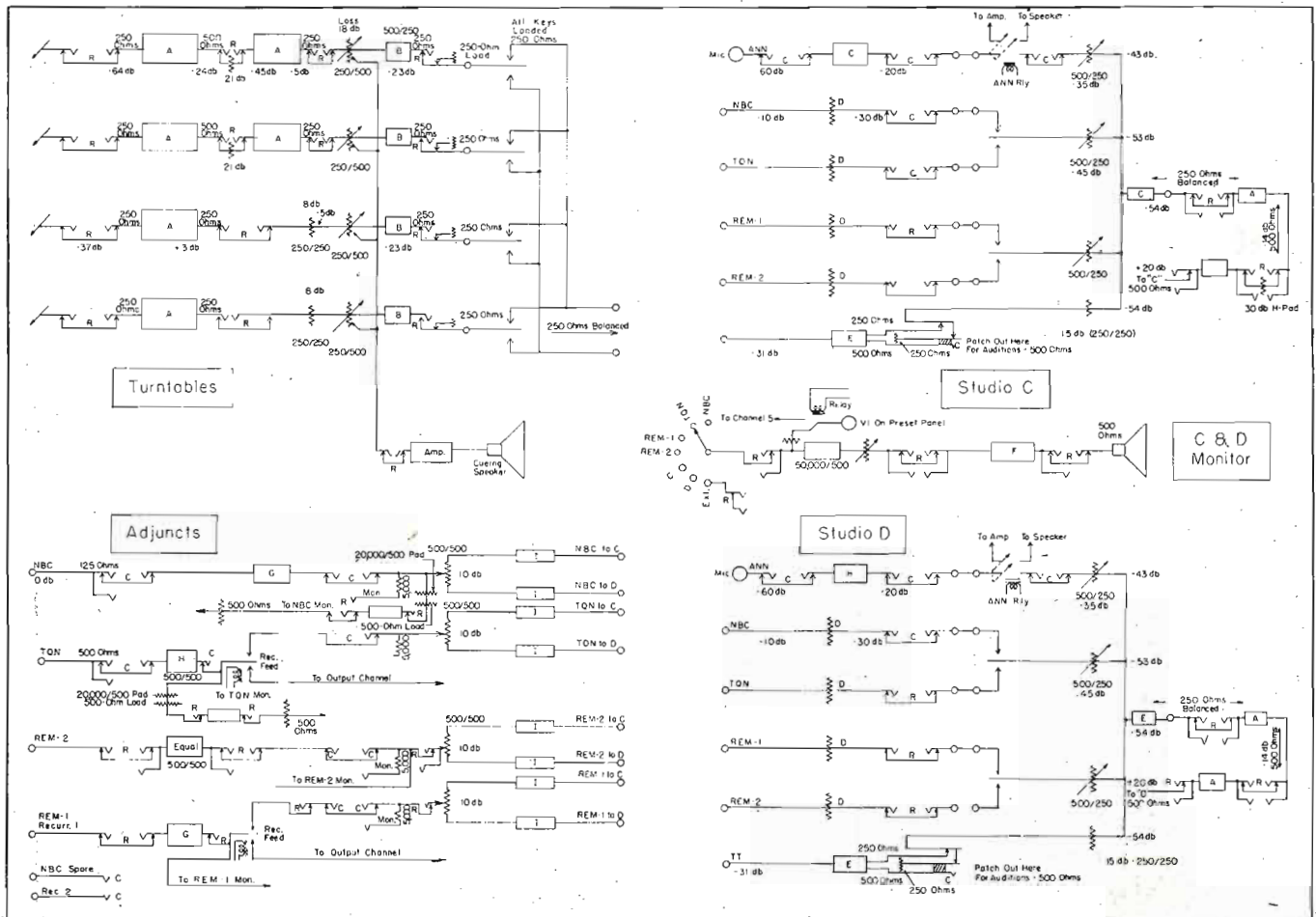
was secured from a store room adjoining the auditorium studio.

To obtain as great a flexibility in operation as possible, the old announce studio control panel was replaced with the panel shown in Figure 1. This single panel contains two separate but identical control positions, the first, for the announce studio of WOAI and

¹Contains a custom-built console and two turntables. All amplifiers and associated equipment are in lower part of console.

the second for the announce studio of WOAI-FM. The mixer circuit of each half, as shown in Figure 2, upper and lower right, has six inputs. These are announcer microphone, National Broadcasting Company or Texas Quality Networks, remote 1 or 2, and turntables. The volume level of any channel except the turntables is adjustable on the panel. The selection of the network or remote line is made by panel keys and the announce micro-

Figure 2
Mixer circuits for the announcing studios, C and D, and circuits of the turntable and adjunct systems. In these schematics, R indicates the jacks mounted on the rack, and C the jacks mounted on the console. The 500/500 ohm pads are 20 db Daven 950 types, identified as D in the circuits. The secondary of the coil in position E is loaded with a 500-ohm resistor. TQN are symbols for the Texas Quality Network.



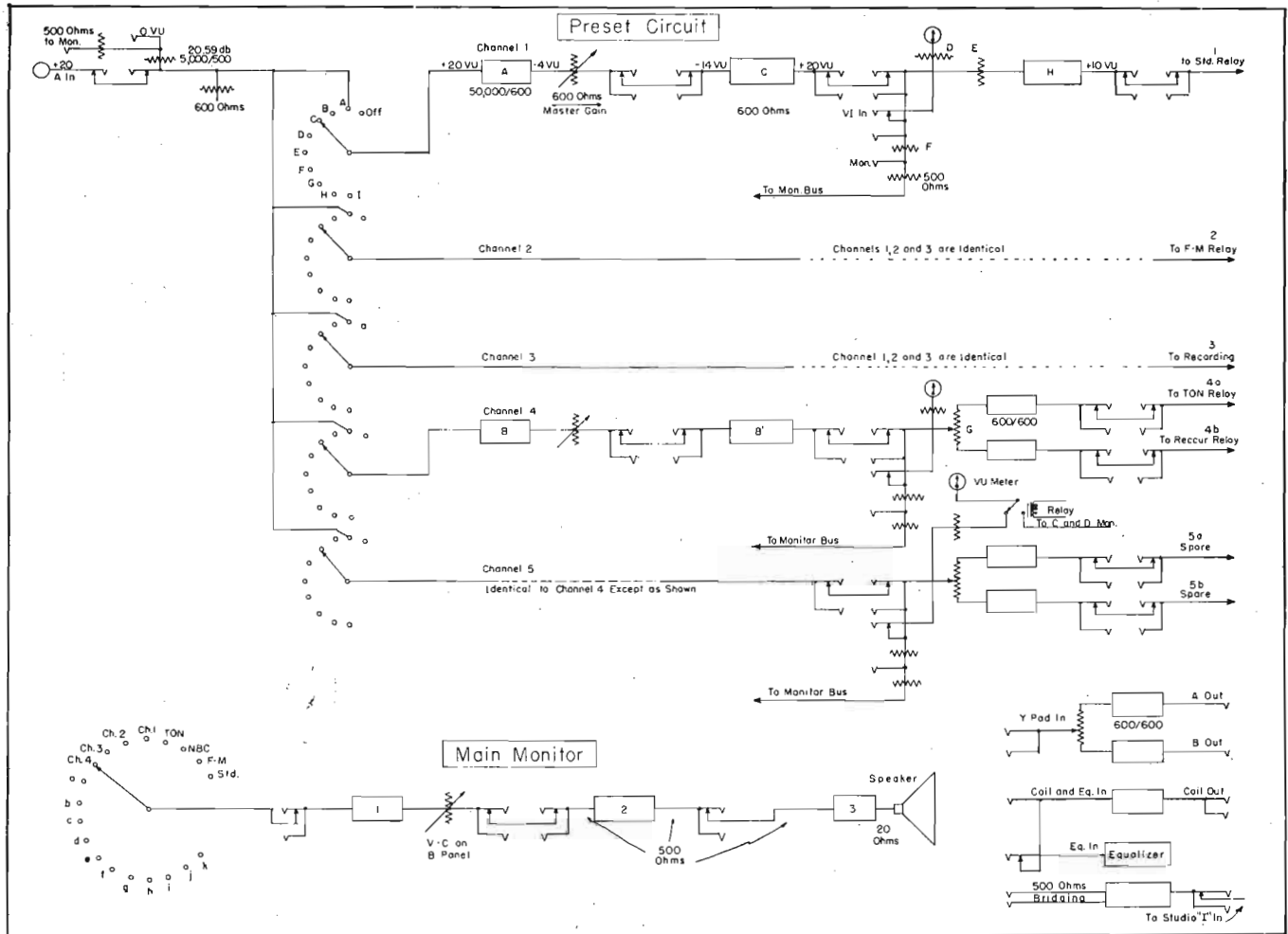


Figure 4

Schematic of the preset and main monitor circuits. This circuit shows how the number of amplifiers, normally required for monitoring, was reduced by using pads on studio as well as channel outputs. The pad used in position *D* is a Daven 1031 and 991. The pad used in position *F* is a Daven H-154, 20.59 db unit, with the value of 5000/500 ohms. Pad shown in position *E* is another Daven 600/600, 10 db model 1030. The pad in position *G* is an RCA type MI 111705.

phone off-on relay is operated by push buttons in the studio.

The volume output from the four turntables is controlled by individual faders, mounted in the turntable cabinets. These faders are of the cueing type for easier cueing of transcriptions. The selection of the desired turntables for the announce studios is made with the four keys in the center of the panel; this is shown in the upper left portion of the schematic of the turntable circuits. Since it is often necessary to play a musical background or an e-t spot on programs originating in the auditorium and medium-music studios, two means of patching the turntables into these mixers were provided. If only a single table is required, its output is secured by patching into the mixer out pack (through a L S-30 coil) and if more than one is required, by patching into the announce turntables-out jack, shown in lower input line of the announce-studio mixers. Proper choice of amplifiers and pads provides the correct levels for operation into the studios with the

table fader at the same attenuation setting.

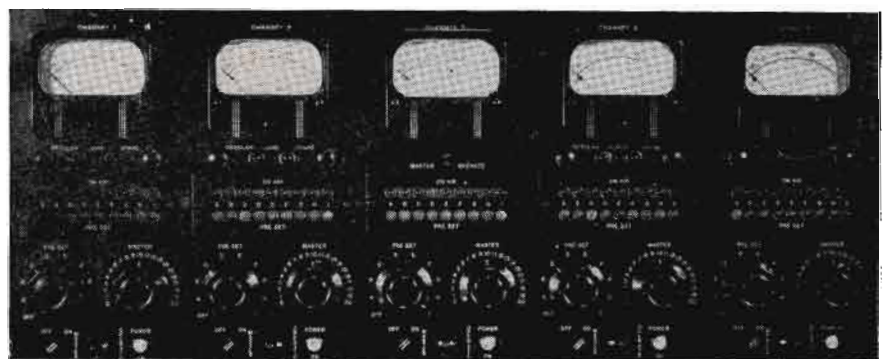
The method used in dividing the incoming network and remote lines to provide the two necessary outputs is shown in Fig. 2, lower left. The two way pads are of the wheatstone type, providing 60 db isolation between outputs.

The TQN and remote 1 lines are reversible by means of push-button op-

erated relays, so that a program can be either received or fed on these lines without the use of any patch cords. Remote 2 is normally used for local remote pickups and an equalizer is permanently wired into this circuit.

The monitoring circuits for the NBC and TQN lines are conventional in that bridging isolation amplifiers are used. However, since remote 1 and 2 are not carried in the main

Figure 3
The master control panel.



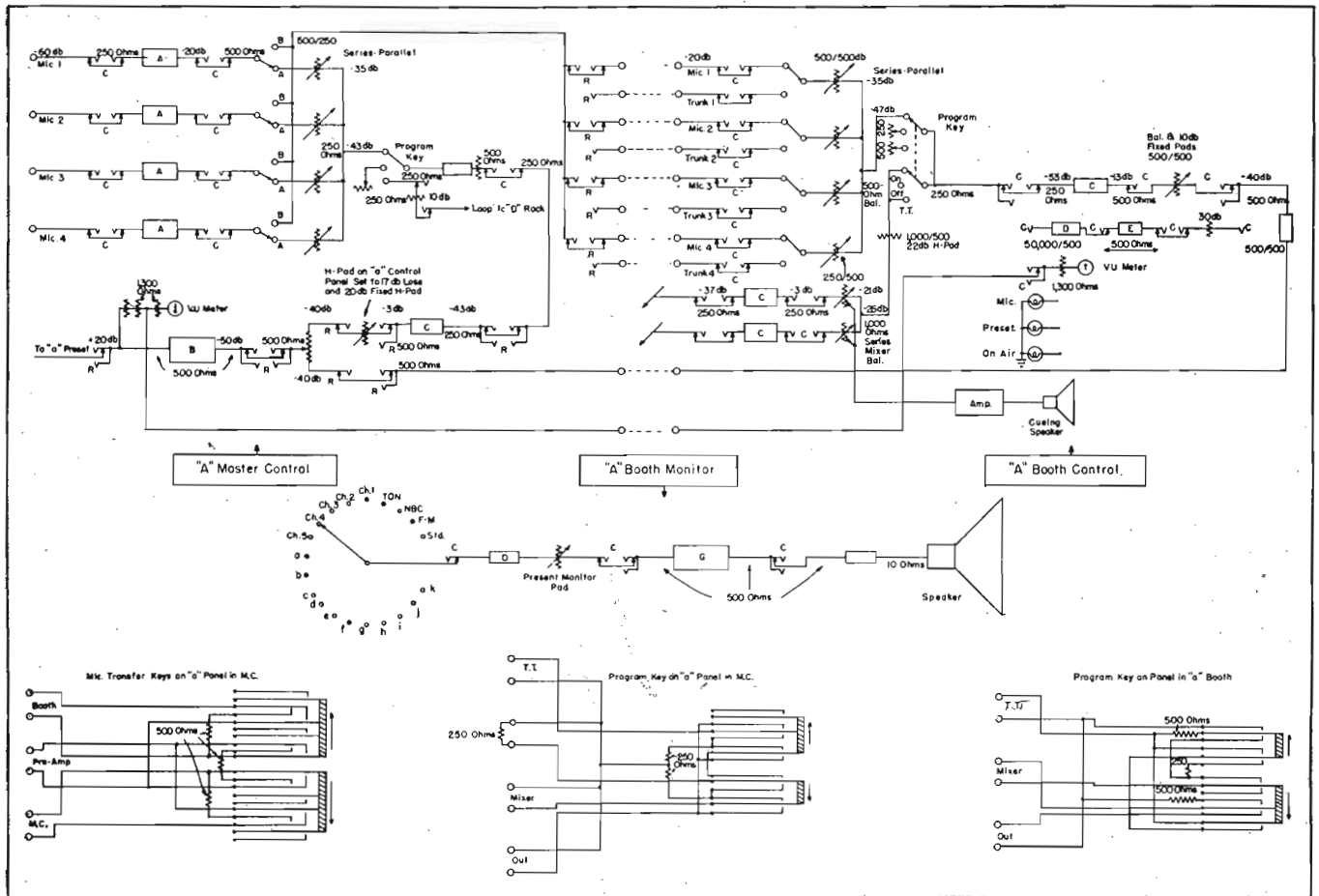


Figure 5

Control circuits for the auditorium and booths. In the microphone transfer key circuit, the bottom key makes contact with the four microphones. The transfer keys are wired in series to actuate a microphone light in the booth when all keys are in up position. The two mixer outputs are amplified by booster amplifiers and combined in a two-way pad to feed the program amplifier. The four-channel mixer system can, by means of keys, be switched from the microphone circuits to anyone of the four trunks for remote or network feeds.

monitor bus, but show up only on the monitor selector switch on the announce-studio panel, isolation was not considered necessary. The announce-studio monitor, Fig. 2, right center, has a bridging input across which a VU meter may be relay switched to permit both aural and level checking of incoming programs.

Figure 3 shows a view of the master control panel.

A switching system provides for nine inputs to five outgoing channels, with two channels being divided to feed two lines each. The switching system is relay operated and permits presenting the programs for the next period. The individual channels can be switched independently by throwing a key associated with that channel to *operate* or several can be switched simultaneously by throwing the same keys to *master* and then operating the *master operate* key at the correct time. Three *master-operate* keys are provided, one

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Figure 6
The meter panel of studio A, which is the large auditorium studio. The three master keys are used to switch channels. The key on the left of the mixer panel operates the talk-back relay. Next four keys are for the microphone circuits and the key on the right switches the output of the mixer. When the key is down, the mixer is connected to the amplifier. In the center position, the mixer is off and when up, a trunk is connected to the booster amplifier. This trunk is used to patch to a turntable mixer out for *electrical-transcription spots*.



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on the *master-control panel* and one each on the auditorium and medium-music studio meter panels, as illustrated in Fig. 6.

The system is interlocked to permit any one studio to feed any one or all channels at the same time, but will not permit two studios to feed one channel at the same time. When production requirements necessitate the origination of a program from two studios, the second studio is made a remote through either remote 1 or 2 to the a-m and f-m announce studio mixer panel. This operation can similarly be used for transcribed backgrounds for programs from the auditorium and medium music studios.

Green lights on the *master control panel* indicate which studios are preset, while red lights are used to show the studios on the air. Similar lights are located on the meter panels of the larger studios and in the new control booth. In addition, the *VU* meters for these positions are illuminated by the on-the-air relay circuit contacts. Since the a-m and f-m announce studios are directly opposite the *master control panel*, the signals and *VU* meters on channels 1 and 2 are used for these two studios. The usual on-the-air warning lights at the larger studio entrances are illuminated when that studio feeds a channel. For the announce studios the warning lights are controlled by the microphone relay.

To the left of the preset switches are master gain controls to regulate the outgoing levels to the lines. Directly under the *VU* meters of channels 1 and 2 are push buttons and signal lights for switching from regular to spare lines to the standard and f-m transmitters, respectively. The similar controls on channel 4 are for starting and stopping a 5-kw emergency power supply, powered by a gasoline engine, while those on channel 5 are to switch that *VU* meter to the a-m and f-m announce studio monitor.

A considerable reduction in the number of amplifiers normally required for the monitoring circuits was obtained by using bridging pads on the studio as well as the channel outputs; Figure 4. These pads drop the 20 db level to a zero level, thereby providing 20-db isolation for a single circuit and 40 db between circuits.

The addition studios (*E*, *F*, *G*, and *H*) in positions are for future expansion, while *I* is used in conjunction with an amplifier to permit placing

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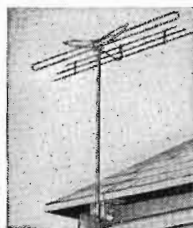
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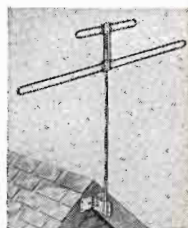
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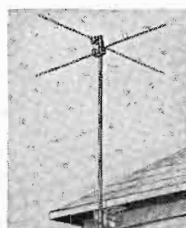
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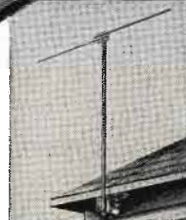
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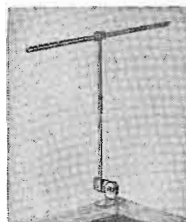
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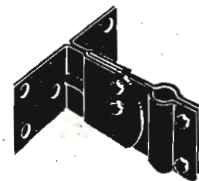
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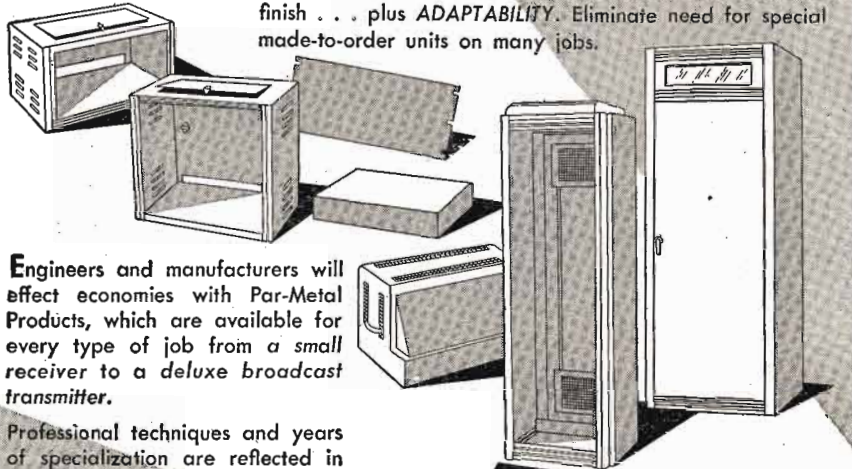


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any incoming program directly on this position.

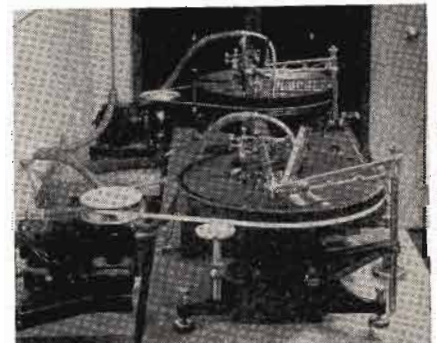
The main monitor is similar to the a-m and f-m announce studio monitor, but differs in the number of switch contacts on the selector switch. The twenty circuits provide for monitoring of the radio outputs of the standard and f-m transmitters, NBC, TQN, the five output channels, all studio positions and two spare positions, J and K. The selector switch is mounted in the console just to the right of the medium-music studio mixer panel, and the volume control is located on that panel. The same monitor circuits are carried in lead-covered cable to the new auditorium control booth and to the offices.

The signal circuits of the preset switching circuit are conventional.

Programs originating in the auditorium studio A had to be, for operating convenience, controllable either in the control room or in the A control booth. To eliminate the use of two sets of microphones or the inconvenience of a double set of microphone receptacles, the keys on the A control panel were rewired to switch one input to two outputs. With this revision, the four microphone preamplifiers could be switched to the mixer circuit of the A panel or the booth panel. Signal springs of the four keys were wired in series to a signal lamp in the control booth to indicate when the control was at that position. As shown in Figure 5, the two mixer outputs are amplified by booster amplifiers and combined in a two-way pad to feed the program amplifier.

Operational experience since improvements were completed, has proved the soundness of the modifications which more than meet the requirements of today's programming and still provide room for future expansion.

The recording room, which is equipped with two lathes, each with a complete set of amplifiers contained in two racks in the rear. The room also houses a portable recorder and a wire recorder.



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