

ABC'S VANDERBILT STUDIOS

by **BEN ADLER**

Facilities Engineer — General Engineering Department — American Broadcasting Company, Inc.

In the fall of 1941 ABC was faced with the problem of equipping the Vanderbilt Theater in New York to render it suitable for broadcasting purposes. To add to the ordinary difficulties of accomplishing such a task in wartime, we were told that it would be necessary to be on the air within about ten weeks. As it worked out, we were able to place the theater in operation within six weeks after the priority was received from the WPB in Washington.

Operating requirements for this installation were obtained from American Broadcasting Company's Production and Operations Departments before an attempt was made to locate suitable equip-

ment. It appeared that with the type of shows that ABC was to produce in this theater, it would be necessary to have a minimum of ten microphone mixer positions on the studio control console. In order to get on the air within the allotted time, it was necessary to select existing equipment rather than to have equipment custom-built for the job. It was found that RCA had two 76-B2 consolettes in stock and a priority was requested for these particular items. Each of these consolettes had only four microphone mixer positions, but it was felt that the two auxiliary mixer positions on each consolette could easily be adapted for microphone use by adding a preamplifier for each position. Of course, locating the preamplifiers was a separate problem which



FIG. 1. View of Vanderbilt Theater Studio showing control booth overlooking stage.



FIG. 3. Block Schematic Diagram—Vanderbilt Theater Studio Installation.

we finally solved after many indications of possible failure. In selecting the two consolettes for this particular use, many ideas were discussed as to how the two of them could be combined to permit a single studio operation with all twelve microphone mixer positions tied together.

Among the various ideas was the one that was finally used. The mechanical arrangement for combining the two consolettes is shown in Figures 4 and 5. It was necessary to design and construct a special desk to house the two consolettes in the manner shown, i.e., with one mounted above the other. Before this desk could be designed it was necessary to find out from the various control engineers the optimum panel angles and control knob locations relative to the desk itself. The answers to these questions were arrived at through the use of a full-size cardboard model. This model was so arranged that the angle of the part which represented the two consolettes could be adjusted. The final answer was arrived at by taking the average of votes of some twenty control engineers, any of whom might be called upon to operate the equipment at the Vanderbilt Theater.

Figure 6 shows the final console with the upper unit raised and the bottom unit lowered for servicing. The bottom unit is suspended by a system of counterweights and pulleys so that it is easily opened and closed for maintenance. The upper unit is opened and closed in the usual manner.

In addition to working out a mechanical arrangement for combining the two consolettes, it was necessary to change the circuits so that the final result would be a single console with a twelve-position microphone mixer. The final circuit of the entire system is shown on the block schematic diagram Figure 3. It will be noted that any of the mixer positions of the twelve-position mixer may be assigned by means of key switches to either of two output channels, which are designated as red channel and green channel. A booster amplifier has been provided in each of the two output channels to compensate for the loss in the twelve-position mixer. Each output channel is equipped with its own submaster control. The outputs of the two submaster controls are combined, together with a nemo fader, to feed both regular program amplifier and emergency program amplifier. Both program amplifiers are in active use at all times, each feeding its own telephone line to master control back at Radio City. The monitoring bus, which also feeds the VU meter on the console, may be switched from regular to emergency by means of a key switch on the front panel of the upper consolette. Most of the push keys in the two consolettes were disconnected. The upper right-hand bank of push keys was reconnected so that the outputs of all sixteen keys are tied together. These outputs feed into preamplifier No. 12 which is located on the equipment racks. The input to each key may be connected across the input of its corresponding microphone preamplifier. This provides an emergency setup which permits switching preamplifier No. 12 into any of the other eleven positions in the event of failure.

The monitoring amplifier in the upper console is used for control booth monitoring. The monitoring amplifier in the lower console is used for studio address during rehearsals.

The relays in both upper and lower consolettes have been rewired as shown on the diagram in order to accomplish this.

Sound reinforcing in the theater is handled by means of an RCA 82-C amplifier that feeds loudspeakers on each side of the proscenium arch. The circuits are so arranged that any four individual microphones may be reinforced at the same time. This is accomplished through the use of a portable four-position mixer which may be plugged into a receptacle in the control room or into one located underneath one of the balcony seats. The portable mixer box is shown on the shelf in the photograph of the control room racks (Figure 7), where it may be reached by the control engineer. For elaborate shows the portable mixer is used by a separate control engineer seated in the balcony. In this way he can control the sound reinforcing to suit the audience. A signal system is provided between the control engineer in the booth and the one located in the balcony. Arrangements are included for reinforcing the entire program or for feeding the house speakers with program material arriving over a telephone line from a remote source. This particular feature is required where the same program originates in more than one studio. Through this means the audience in the Vanderbilt Theater may listen in on the portion of the program which originates elsewhere.

Four applause microphones are distributed throughout the audience, two of them being suspended under the balcony to pick up orchestra applause and two others suspended from the corner of the balcony booths to pick up balcony applause.

Twelve microphone receptacles are provided in three groups across the front of the stage. No. 1 of the first group is paralleled with No. 1 of the second and third groups. This scheme was used so that any microphone located anywhere on the stage may be assigned to any of the twelve microphone mixer positions on the console without the use of jacks. No. 11 is duplicated in the fly loft to provide for a hanging microphone when required.

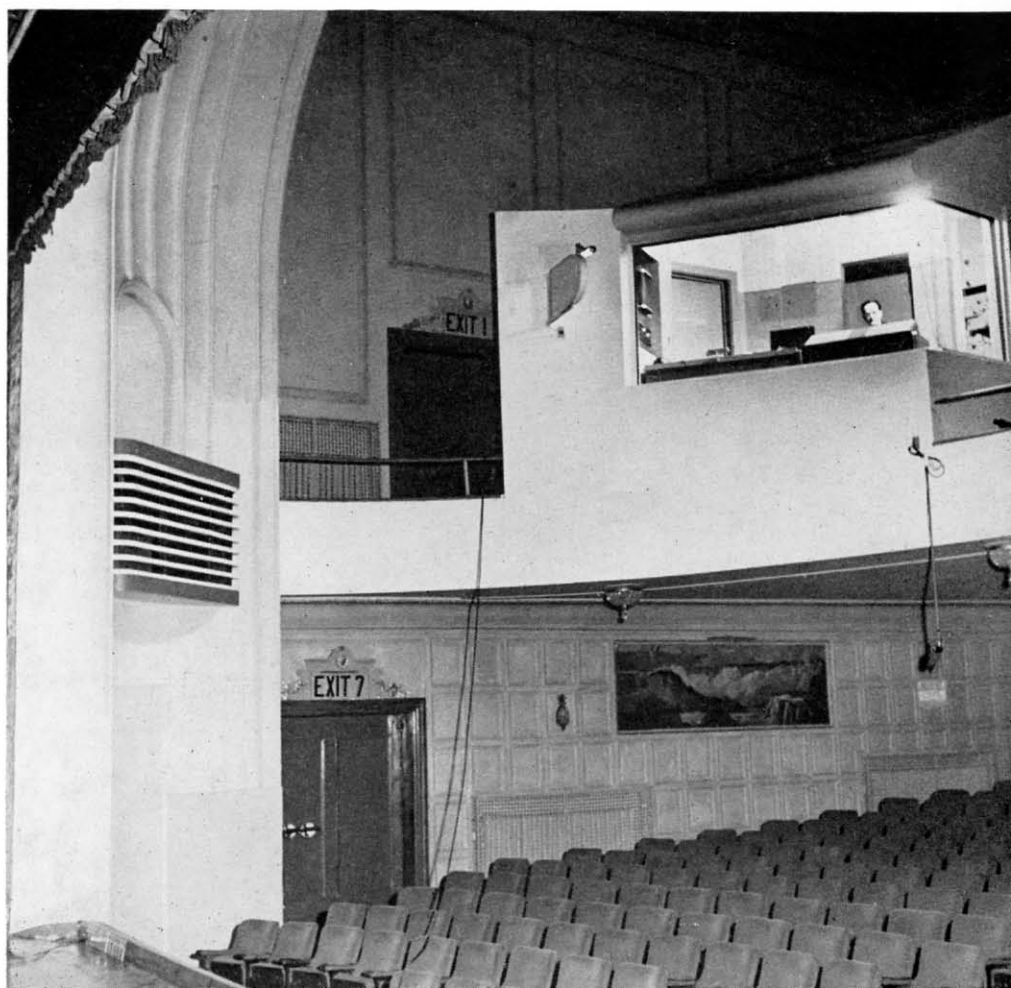


FIG. 2. Another view of the Vanderbilt Studio Auditorium.



Associated with the microphone receptacles on the stage is a system of troughs for concealing the microphone cables while they are in use. This concealment is mainly for the purpose of eliminating the possibility of an artist tripping over the cable and, of course, provides a much neater setup than the usual arrangement in which cables are strewn along the floor. This is shown in Figure 9.

In order to prepare the theater for use as a broadcast studio, it was necessary to construct a control room and a clients' booth. Because of a lack of space anywhere else in the theater it was necessary to place these booths on each side of the balcony. The booth housing the control equipment is so arranged that the audio equipment racks are accessible through double doors in the rear.

Two dressing rooms were selected for use as echo chambers. These were completely sealed up and plastered for maximum reverberation with a loudspeaker and microphone placed in each. The circuits showing connections to these units in each echo chamber are shown on the block schematic diagram. Arrangements are provided for patching the echo circuit into any microphone position or into the overall program if required. The echo controls are located on the console.

Since the entire theater was originally operated on d-c from the public service supply, it was necessary to bring a-c into the building. In doing this two separate phases of a Wye distribution system were brought up to the distribution panel in the control room. Automatic contactors are provided for switching to the emergency phase in the event of failure of the preferred phase. If both phases go out, automatic contactors start an alternator in the basement which operates from the house d-c. With this system it is possible to continue operation without any interruption whatsoever in the event of an a-c failure. Other emergency features for preamplifier power supplies and for the consolettes are included so that in the event of a failure it is simply necessary for the control engineer to operate any one or all of three toggle switches located on the wall behind him to substitute emergency plate and filament supplies for the various amplifiers.

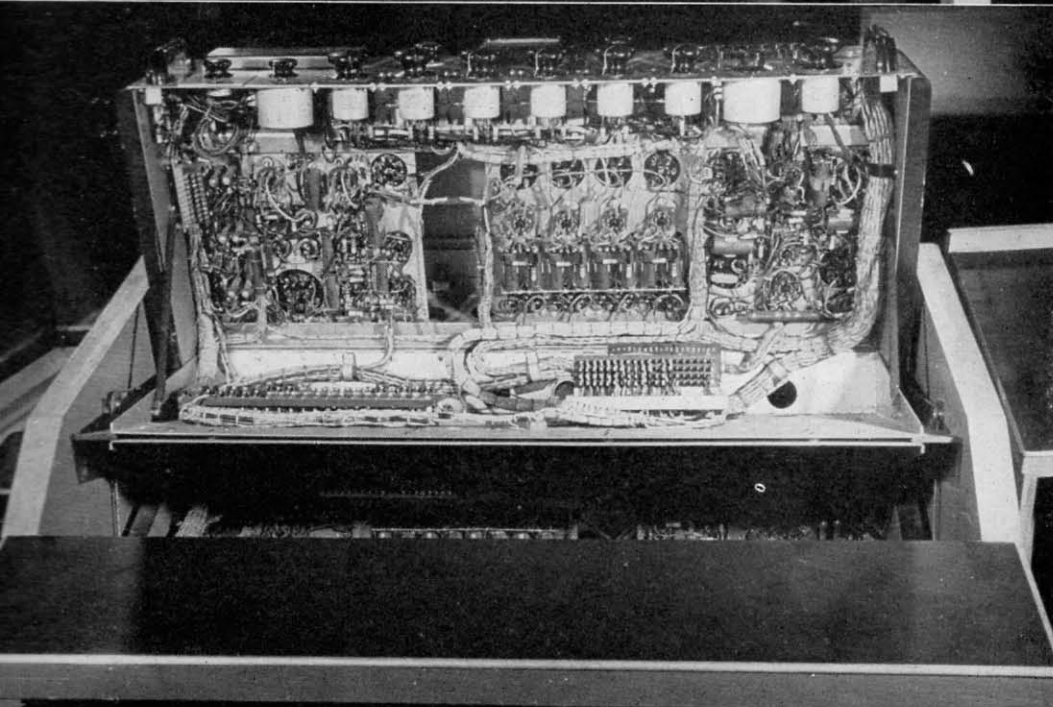
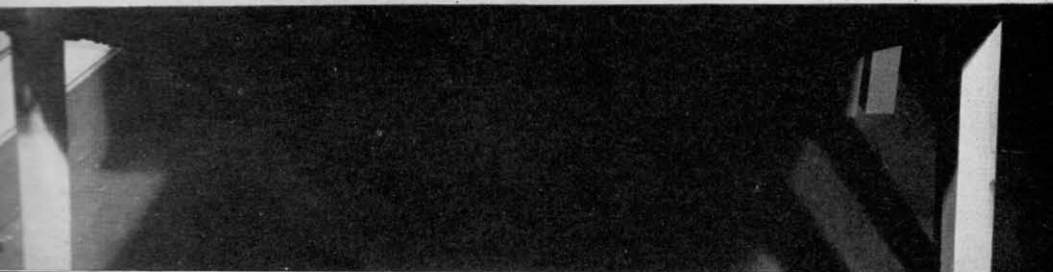
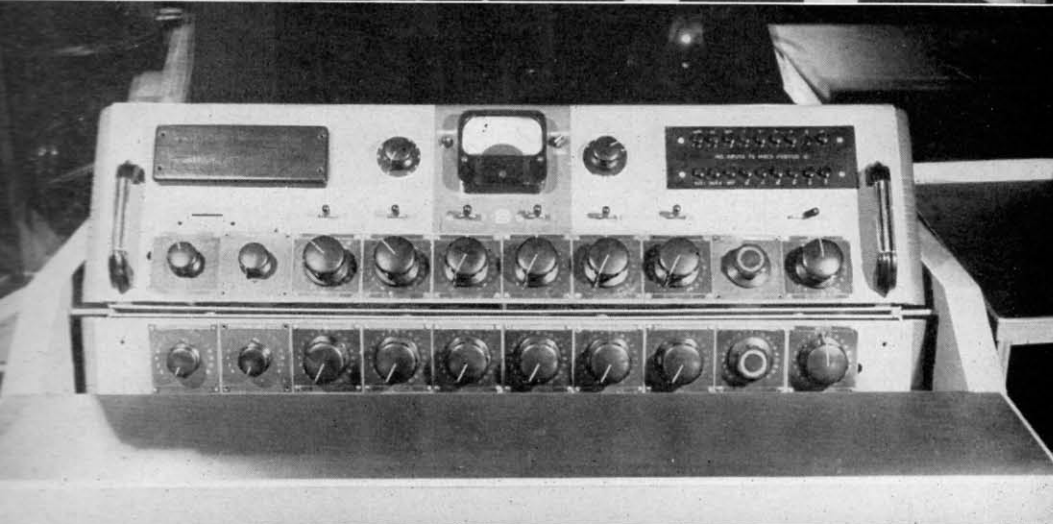


FIG. 4. (Top): Control desk construction.

FIG. 5. (Center): Front view of consolettes.

FIG. 6. (Bottom): Consoles opened for servicing.



FIG. 7. *Audio equipment racks. On the wall shelf is a portable mixer box.*

The control console design has been entirely satisfactory without a single program interruption during the ten months that it has been in operation. Even though the equipment was accumulated and placed in operation on extremely short notice, many novel features have been introduced. It is expected that some of these will be adopted as standard in future equipment layouts for the American Broadcasting Company.

One of the most desirable features from an operations standpoint is the arrangement for assigning any group of microphone mixer positions to one submaster. This is particularly advantageous in a variety type of show where a group of four or five

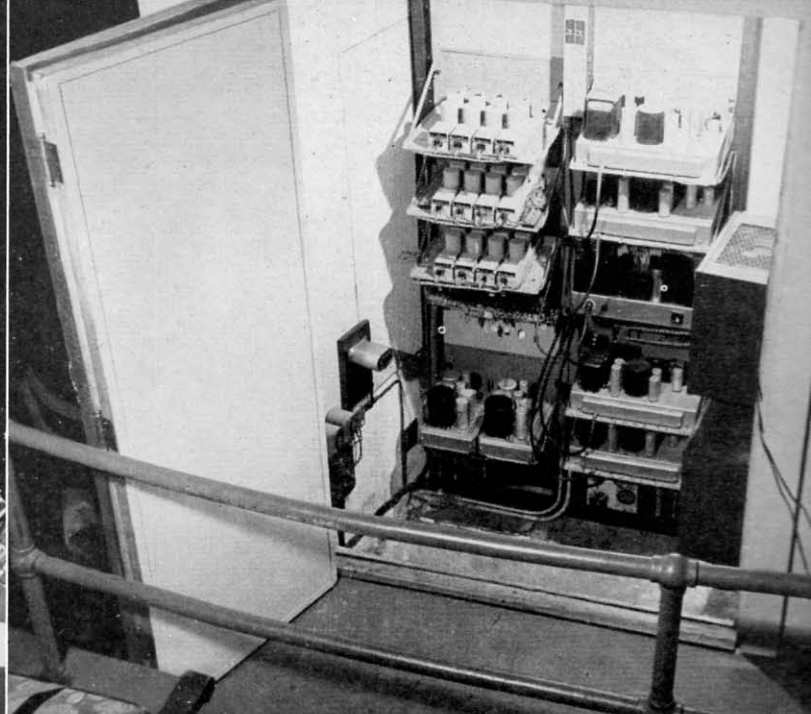


FIG. 8. *Equipment racks are accessible through double doors in rear of control booth.*

microphones are used for orchestra pickup. The entire orchestra may be wiped out and brought back again with the submaster without affecting setting of the mixer positions or microphones used for other purposes on the same show. Of course, the idea of combining two consolettes which were originally designed for entirely different purposes would not be considered practicable under normal conditions of equipment availability.

All construction work on this project was planned by and carried out under the direction of Mr. Rene C. Brugnoli, ABC architect. The entire project was under the direction of Mr. Frank L. Marx, Director of General Engineering.

FIG. 9. *Twelve microphone receptacles are mounted across the front of the stage. Note hinged floor boards for mike cords.*

