SOUND EFFECTS CONSOLE

By W. W. STRATHY
Sound Engineer
WHOLESALE RADIO SERVICE CO.

IN these days of lavish expenditures on radio broadcast productions the job done by the W. P. A. radio unit in New York City with Vernon Radcliffe as production manager is worthy of notice. Started early in 1937, this organization has put on over twenty-five-hundred broadcasts. This is something of a record in itself but is even more impressive when it is realized that every one of these broadcasts is built up in all details within the organization. Research, scripts, talent, direction, production; these are all a part of the activity.

The presentations represent the most intensive program of adult education ever undertaken by a single group; not alone in the great volume of programs, but in their diversity. The primary object is the rehabilitation of the underprivileged through educational entertainment; giving listeners and particularly the foreign elements, a keen insight into American institutions.

The very fact that the entire program is educational in nature makes the job just that much more difficult but so cleverly are the presentations handled, and so skillfully dramatized, that they are acceptable to sixteen radio stations in the New York metropolitan area.

With unlimited finances this would be considered a real accomplishment. But in this instance stark economy is necessary throughout. There can be no highly paid talent, no "name" bands, no world-famous authors. As with other W. P. A. activities, such money as is available must be devoted almost exclusively to salaries, providing jobs for those who need them. And it might be added that through understanding and sympathetic direction excellent talent has been developed which has found its way back into private industry.

That is the general story of the W. P. A. broadcast activities in New York City. At present there are ten weekly productions running and two more about to be added. Each is a part of a series and some of the serials have been running for more than a year. Each serial has a definite objective. Several are concerned with citizenship, others with history, music, popular law and science. Some are carried over national and regional hook-ups, others over individual stations, depending largely on their nature. There is no outlay for station time.

From a technical standpoint, the variety of stations employed complicates the picture considerably. With all programs dramatized, sound effects naturally play an important role. It was found, however, that the equipment afforded by the smaller stations was inadequate. A complete sound department was therefore organized and sound effects constructed within this organization to insure a uniform high standard of quality in al programs. Turntables for the playing of sound recordings were likewise designed within the organization and were built to W. P. A. specifications by Wholesale Radio Service, Inc. Because of its relatively low cost, its flexibility and the advantage which similar equipment offers to broadcast stations and program production organizations, this Lafayette sound effects console is described in detail.

The block diagram of Fig. 1 shows the general circuit arrangement and the photographs illustrate physical layout.

The entire unit is mounted in a sturdy telephone-black cabinet approximately five feet in length, with rubber tired castors and push-bars on the ends for ready mobility (Fig. 2). Metal trim is chromium plated except the control panel which is gray crackle. All controls except those involved in "spotting" are mounted on the sloping control panel and each is clearly labelled.

Provision is made for operation from either a-c or d-c to meet requirements for universal use in New York City where both types of current are supplied. While the same line plug is used, regardless of the type of supply, the equipment automatically adapts itself through a relay switching arrangement (Fig. 5) developed by Lafayette engineers. The converter is built-in and the operating characteristics of the entire equipment remain identical on either type of supply.

Four input circuits are provided, three for the self-contained record pick-ups and one for microphone input. Following is a 4-channel mixer-fader system with key switches which permits any one or more to be cut in on either of the two main amplifier channels.

Fig. 4 shows the arrangement of amplifier equipment. It is all mounted on a swinging rack where it is instantly accessible. Fig. 3 shows this rack in normal position. By removing the two panels shown in this view the under-

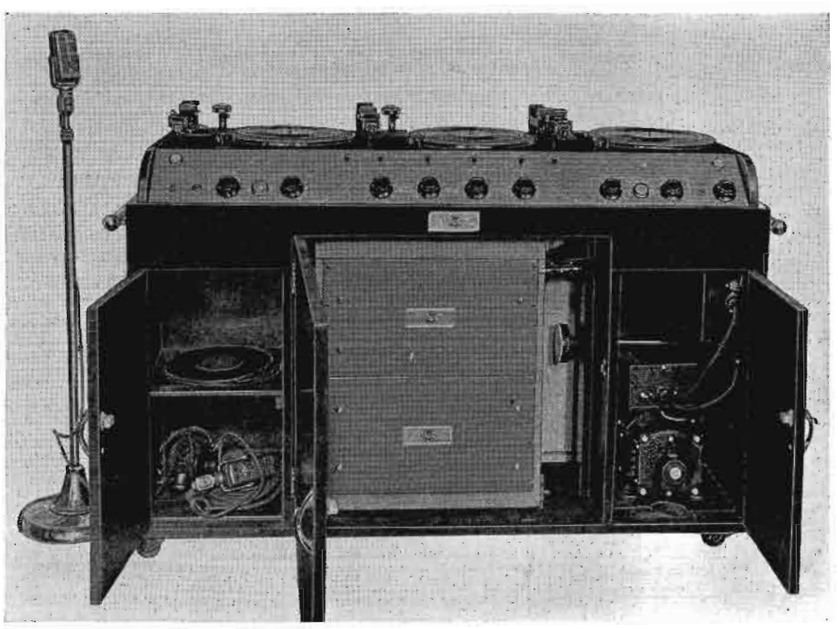


Fig. 2. Front view of console with doors open showing equipment.

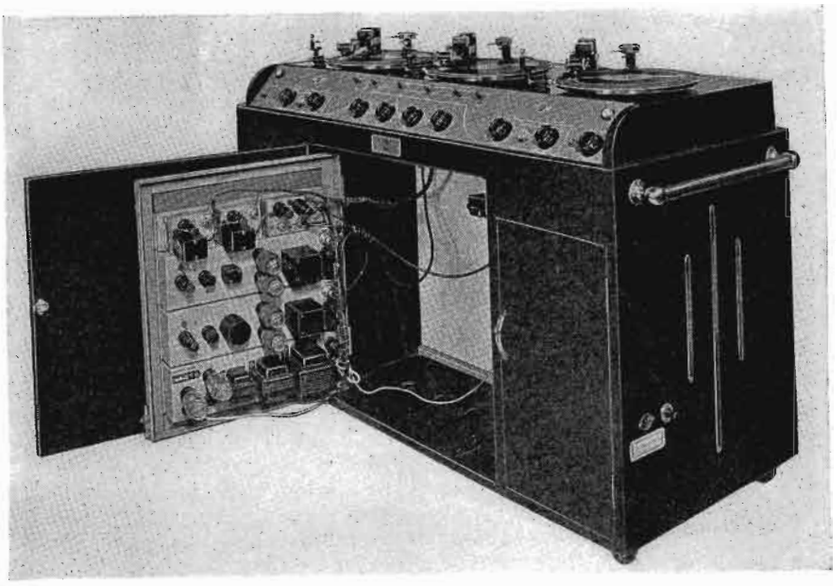


Fig. 4. Another view of the console. Note accessibility of amplifier.

chassis assemblies of the amplifiers are exposed should servicing be necessary.

With reference to Fig. 4, the 2-stage microphone amplifier is shown in the upper right-hand corner of the amplifier rack and to the left of it the preamplifiers which feed the two main amplifiers. These main amplifiers are shown directly below and at the bottom is the dual power supply, one section of which provides the plate supply for the power output stages and the other the plate supply for all other tubes as well as the fixed grid-bias voltage for the power stages.

The entire rear half of the console serves as the loudspeaker enclosure, within which two 12-inch speakers are mounted with appropriate grills in the rear wall of the console. The light colored partition at the rear of the amplifier compartment (Fig. 4) serves as a ventilation as well as acoustic baffle. Behind this, at the bottom of the loudspeaker enclosure, an exhaust fan is mounted. Air is drawn in through the ports in the bottom of the amplifier compartment, circulates around the amplifiers, over the top of this baffle, around the turntable motors and down through the loudspeakers. Thus complete ventilation of the entire equipment is effectively maintained.

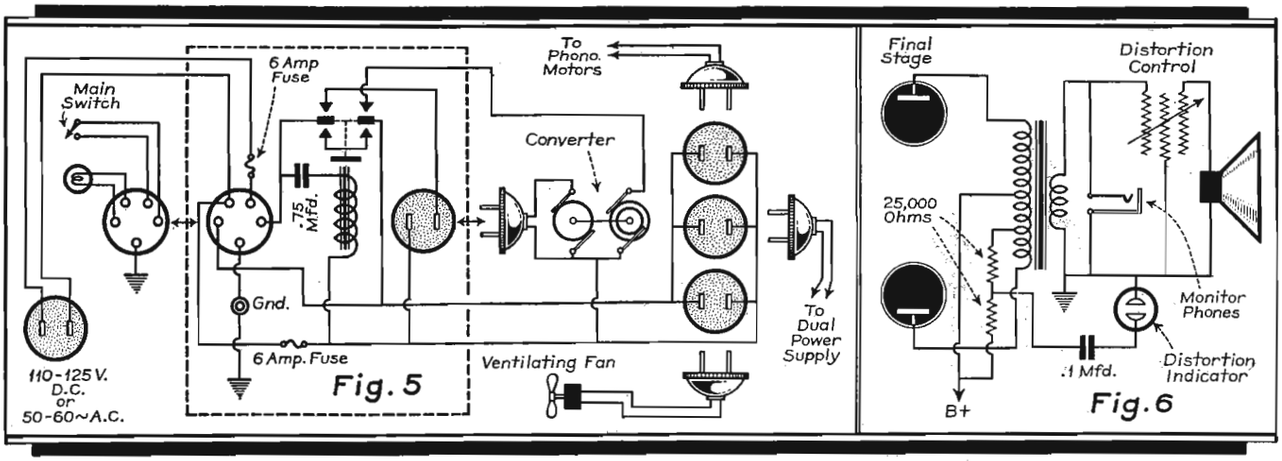
Two of the three turntables are of the constant-speed 78-33-1/3 rpm type while in the case of the third the speed is completely variable by means of a speed-control knob at the extreme right end of the control panel. Many unusual sound effects are obtained by varying the record speed, while other effects are more simply obtained in this manner than by the more common means.

Precise "spotting" is accomplished by means of a new development by Lafayette engineers in which the ordinary dial method is employed to select the proper groove but the exact portion of the groove is selected by this new, simple and inexpensive scheme. This arrangement involves a large plate with "V" shaped cuts around its edge. The plate rests on the turntable but provision is made whereby it can be stopped without stopping the turntable; the record, of course stopping with this plate. On the console top beside each turntable a stop or "trigger" is mounted in such a position that its bolt can engage with the cuts on the edge of the plate and when so engaged the plate will idle.

To "spot" any portion of a record a notation is made during a preliminary playing of the dial reading, both main and "second" hands, and the number of the cut (cuts are numbered from 1 to 10) nearest the trigger when the exact desired portion of the record is reached. Thereafter when it is desired to start the record at this particular point it is only necessary to engage the trigger with that cut, move the pick-up arm across the record until the dial shows readings as noted and there place the pick-up on the record. When the trigger is released the plate (and record) assume normal speed instantly. So exact is this system that a record can be "spotted" to start at a given word in the recording, or a single note in a musical score.

Another unusual means for obtaining desired sound effects involves provision for overloading the amplifiers to a controllable degree. By turning up the master gain control to a point where the amplifier overloads, speech and other sounds become distorted and in this distorted form simulate desirable sound effects. With the master gain employed in this way it is of course necessary to provide other means of controlling actual sound output and for this purpose an overall gain control is included at the input to each loudspeaker, the circuit of one of which is shown in Fig. 6. To assist the operator in the use of this feature is a visual distortion indicator in the form of a neon lamp so arranged in the circuit that it will glow whenever on overload condition exists in the amplifier.

Fig. 5. Relay switching arrangement. Fig. 6. Gain control circuit.



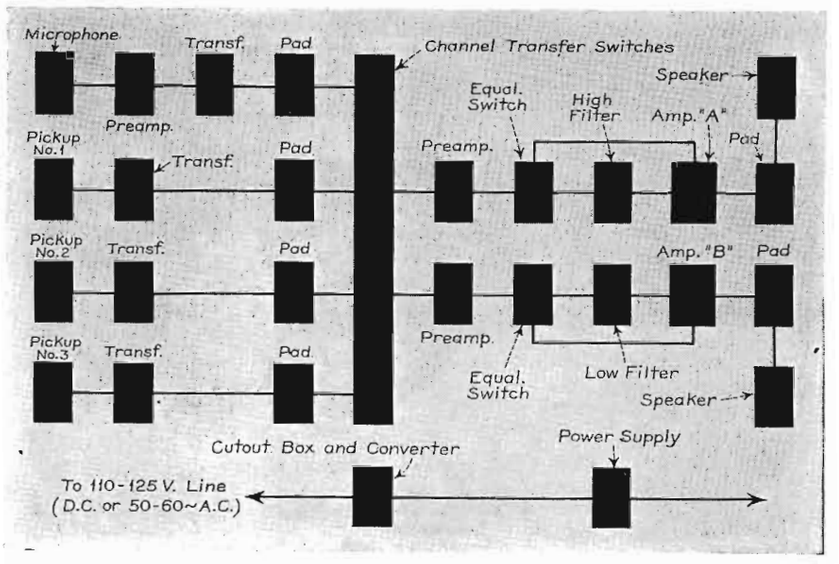


Fig. 1. Block diagram showing general circuit arrangement.

Another feature which has more than justified its use consists of two fixed equalizers which may be cut in and out as desired by means of key switches. One of these cuts off frequencies above 200 cycles, the other cuts out all frequencies below 200 cycles. When not in the circuit resistance networks compensate for the equalizer insertion loss, maintaining the volume level constant. This arrangement has been found to offer definite advantages over variable equalizers in certain applications, particularly where instantaneous changes are required.

Each channel is capable of 30 watts output and each main amplifier provides gain in excess of 100 db.

A control panel arrangement providing instantaneous changeover from one channel to another and from one input to another is, of course, essential for this type of work, as are also facilities for mixing and fading as required. A brief summary of the panel controls as shown in the photographs, will illustrate the flexibility and utility provided in this design.

Directly in the center are the noiseless mixer-fader controls for the four input channels and immediately above are the key switches by means of which any of these inputs are cut in on either of the two main amplifiers. When thrown to the up position these switches connect the corresponding inputs to main channel "A", the controls for which are at the left and the loudspeaker is also at the left of the operator. To avoid confusion the etched line above the switches extends to the right where its controls are located. These amplifier controls consist of a master gain control, distortion regulator control and distortion indicator lamp. The "hi" equalizer and "lo" equalizer switches are conveniently placed, on either side of the row of input channel switches. At the extreme left is the master power switch with the main pilot light above it and just to its right a headphone jack for monitoring Channel "A" output. At the extreme right is the speed control for the variable speed turntable and above it is pilot light to indicate when this motor is in service. Next to the speed control knob is the monitor jack for Channel "B". Off-on switches for the turntable motors are located near each turntable on the top of the console.

Flexible as this sound effects console is, there is almost a certainty that future requirements will require some alterations or additions. This is one of the reasons that every unit comprising the assembly is provided with plug input and output and all interconnections made by means of cable plugs. Thus each of the three preamplifiers, the two main amplifiers, the loudspeakers, the distortion regulating output networks, the equalizer networks, the power-supply unit, the individual input channel transformers, and the a-c, d-c power system including the converter, can be removed bodily and other units substituted without the use of a soldering iron and with the expenditure of only the time required in loosening their mounting bolts or screws.

With twelve productions per week, put on at the studios of eight different stations in and around New York City these consoles are easily rolled into a truck, transported to the stations and there rolled directly into the studio. Completely self-contained and with operators trained in their use, they are adding their daily bit to the excellent work being carried on by the W. P. A. Radio Unit and helping to overcome at least some of the obstacles encountered in such a comprehensive schedule as this organization is conducting.

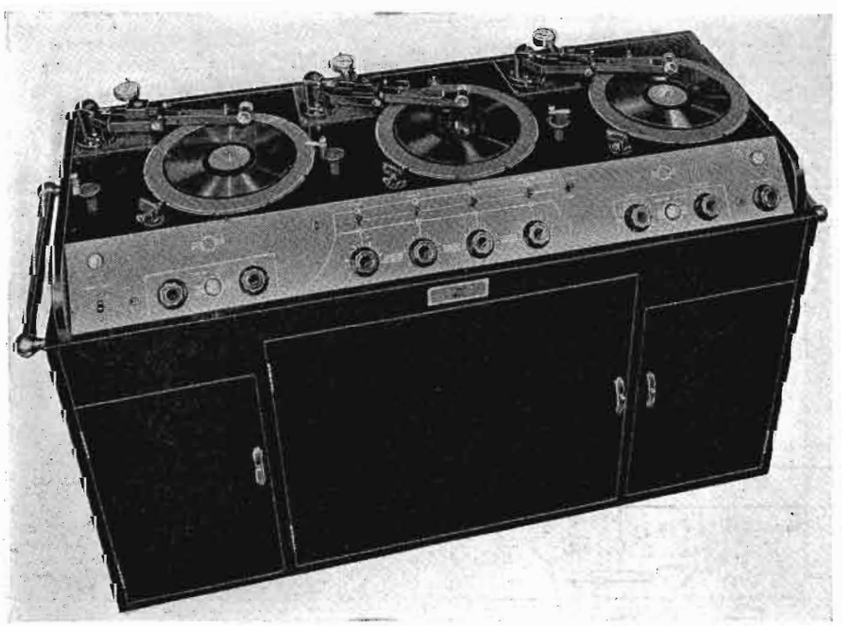


Fig. 3. A third view of console showing turntables and controls.

• • •

APARTMENT HOUSE TELEVISION

Negotiations for the permanent installation of individual television outlets in every apartment are now in progress between Radio Corporation of America and Twenty Park Avenue, the new 23 story apartment house located at the northwest corner of Park and 35th Street, New York City, it is announced by Pease & Ellimen, Inc., renting agents for the structure. When completed, this will mark an advancement for general consumer distribution of television usage in the metropolitan area.