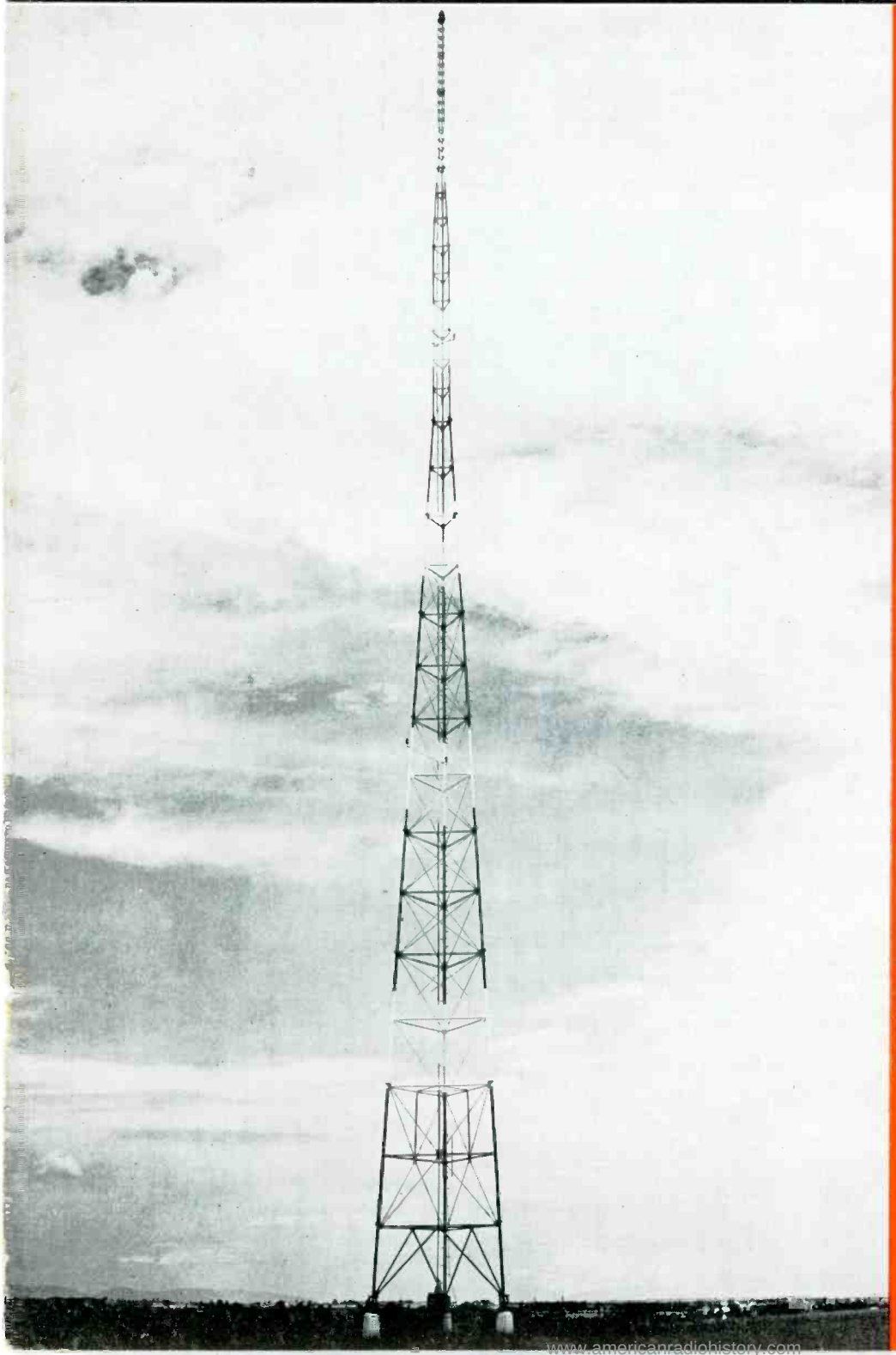
FEBRUARY, 1961

BROADCAST ENGINEERING

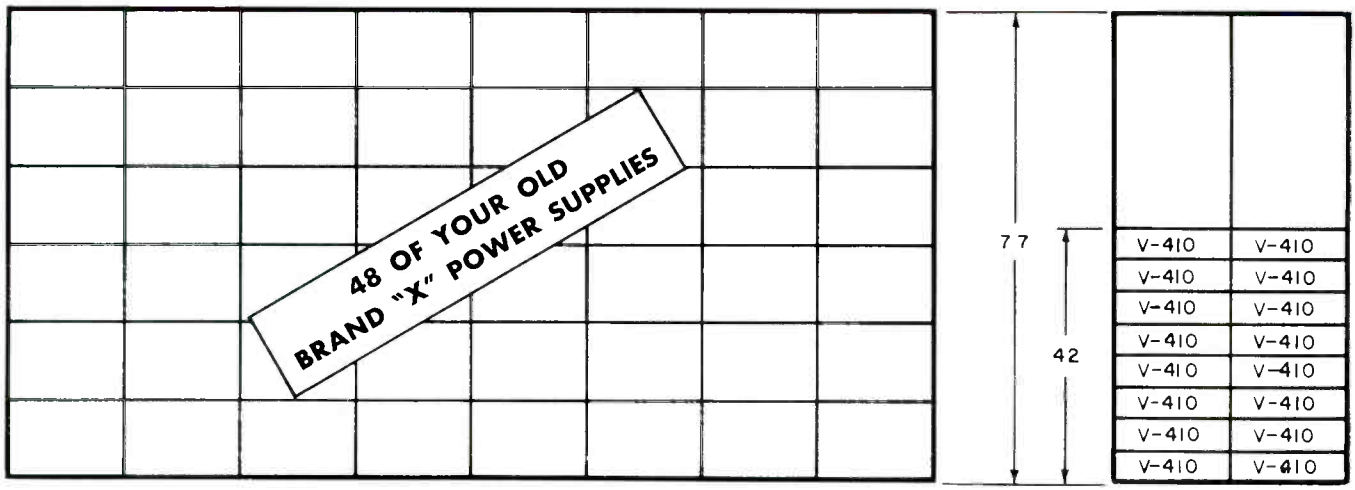
THE TECHNICAL JOURNAL OF THE BROADCAST INDUSTRY



In This Issue

A GUIDE FOR STUDIO PLANNING

Slash – Your Operating Cost 1,000% With the FOTO-VIDEO V-410 Power Supply



COMPARE!	48 BRAND "X"	16 FOTO-VIDEO V-410
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Constant Current for Focus	No	Yes
Centering Supply	?	Yes
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Rack Space	616 inches	84 inches
Extra Power Costs	$2,880/yr.	
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Total Extra Costs	$4,000 Fixed $9,360/yr.	

Yes - the V-410's May Be Easily Paid For By Cost Savings in less than one year - and Save Space Besides!

FIELD PROVEN ALL-TRANSISTOR V-140 REGULATED POWER SUPPLY SYSTEM

Semiconductor rectifier — filter and All-Transistor Regulator provides the following broadcast voltages and currents:
Load current 200 ma. to 1.5 a.

Output voltage	275 to 285 V DC	Regulation vs. Line	± 0.5% maximum
Ripple	5 MV RMS maximum	Source Impedance	0.5 Ohms maximum DC to 100 KC.
Regulation vs. Load	± 0.5% maximum	Unregulated Output	Approx. 350 V up to 200 ma.
Metering	Built-in Voltmeter for output DC voltage and line input selector.		
Overload Protection	Built-in.		

V-410 MON — Same as V-410, plus centering current. Adequate for centering of a broadcast master monitor or TV camera.
V-410 CAM — Same as V-410 MON, plus metering, plus a constant current supply of ma (metered) with control on front panel.
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Highest reliability, optimum use of space and equipment, superior regulation, tubeless system means lowest maintenance. Modules available from Foto-Video easily converts a V-410 to a V-410 MON or a V-410 CAM.
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BROADCAST ENGINEERING

THE TECHNICAL JOURNAL OF THE BROADCAST INDUSTRY

VOLUME 3 FEBRUARY, 1961 NUMBER 2

Contents

Departments

Cover

The AM and FM tower on the cover symbolizes the planning series which begins in this issue with a guide for planning studio installations.

ERRATA

The January issue of Broadcast Engineering contained an article by J. Bruce Glaab of the Electro-Plex Company entitled "Multiplex Demodulator Circuitry." The title was erroneously published as "Modulator Demodulator Circuitry." Mr. Glaab's name was misspelled as Glabb. Our apologies are extended to Mr. Glaab and the Electro-Plex Division of Nuclear Electronics Corporation.

Stereophonic Broadcast Tests by the National Stereophonic Radio Committee

Transmission and reception tests of the various stereo systems were made at Pittsburgh and Uniontown, Pa., to obtain data which is being used by the F.C.C. to select a standard for stereophonic broadcasting.

With the Federal Communication Commission's decision on stereo FM standards anticipated momentarily, broadcasters look toward implementation of the new system as soon as it is established.

Featured at the eight National Assn. of Broadcasters regional conferences last fall were reports on the exhaustive field tests of proposed stereo FM systems. A. Prose Walker, manager of the NAB engineering department, presented the reports and demonstrated the tests. He earlier had supervised the tests, which were conducted under the direction of the National Stereo Radio Committee and instituted for measuring performance of the proposed systems.

Since the NAB regionals involved almost split-second scheduling, Walker found himself dashing from city to city via commercial air-liner, usually traveling during the wee hours of the morning. It was impossible to have equipment for the demonstrations set up in advance at the eight locations. So Walker carried his own—an Ampex PR-10 professional tape recorder and two Ampex SA-10 speaker units—as regular baggage on the flights. Test tapes of the stereophonic program material used during the field tests were played for the NAB audiences in New York, Atlanta, Dallas, San Francisco, Denver, Omaha and Chicago.

FCC commissioners recently listened to the same tapes. They are now proceeding toward a determination of an acceptable national multiplex standard.

Following its formation by the Electronic Industries Assn., the National Stereophonic Radio Committee studied the 14 proposed multiplexing systems and reduced that original number to six considered as having individual characteristics. These systems were those proposed by Crosby Teletronics, Calbest, Multiplex Services, Inc. (Halstead), Electric & Musical Industries, Ltd. (Percival), Zenith and General Electric.

Arrangements were made for the field tests by a panel of some 50 engineers headed by Walker and Ross

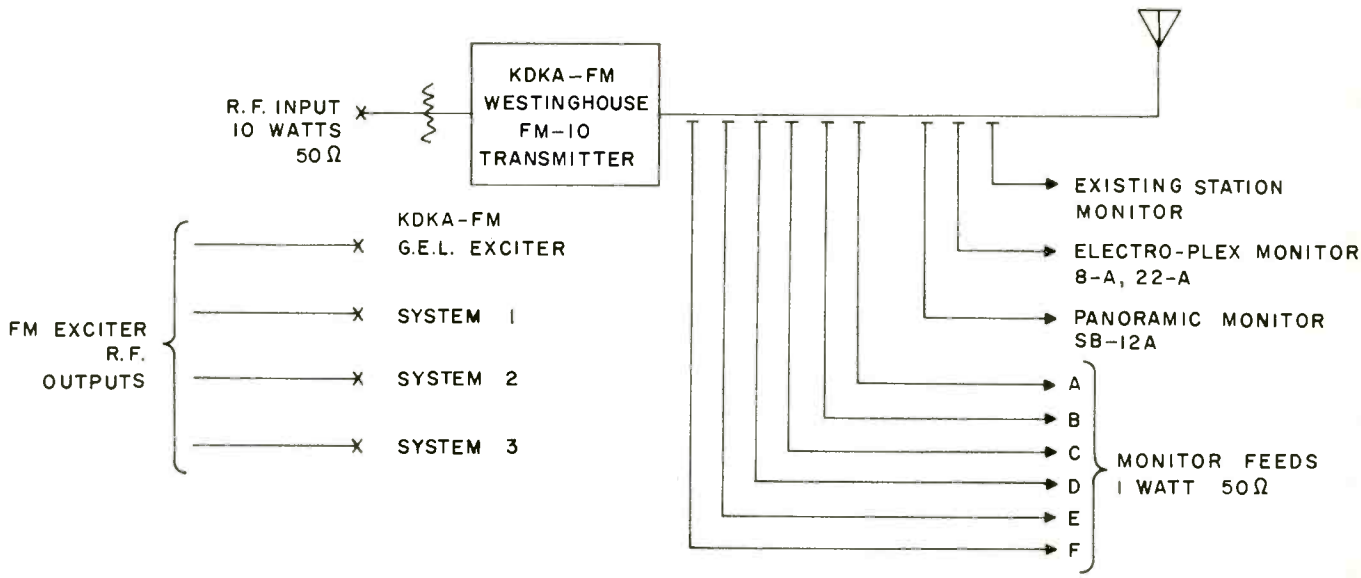

Figure 1. Transmitter facilities and R. F. test equipment.

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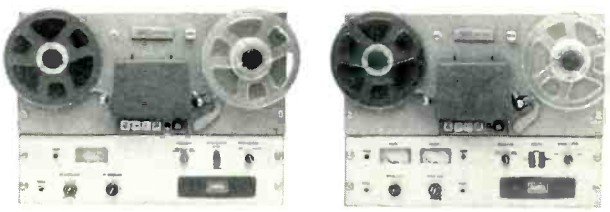
In sound quality... in features... in lasting economy... these four Ampex professional recorders maintain the highest performance standards for broadcasters, recording studios, educators and other critical users. For 7" reel requirements—the PR-10 series—newest in studio quality compact recorders, priced from $845. For 10½" reels—the 351/354 series—proven by more than 10,000 units in use throughout the world. Other 10½" Recorders include the 300 series multi-channel Mastering series with up to 8 tracks. Your Ampex dealer will aid you in selecting the Ampex which best fits your needs. And ask him about the new Ampex Finance and Lease Plans.

7" REELS

THE PR-10-1 MONOPHONIC,

Full or half-track. Single-channel electronics include built-in mixer to mix line and mike or two mikes (with plug-in pre-amp). Portable, or fits 14" of rack space. 3¾ and 7½; or 7½ and 15 ips speeds. Exclusive self-threading option. Alignment controls in front panel. New frictionless tape handling. All-electric push-button controls permit remote control operation. Write for Bulletin 212.



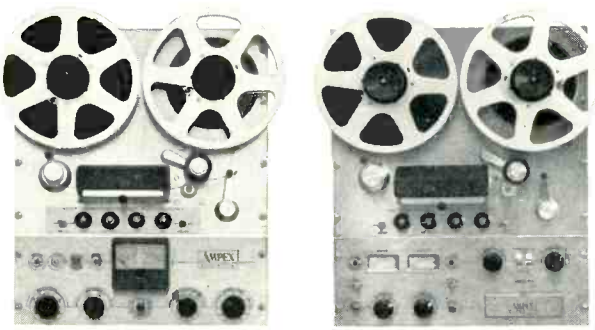
THE PR-10-2, STEREO/MONO

Two-channel electronics fit same rack space as PR-10-1. Portable for remote pickups as well as in-studio use. Split erase permits stereo recording, half-track mono recording, cue track, and sound-on-sound. Two line inputs convertible (with pre-amps) to two mikes – one per channel. Additional mike and line inputs possible with MX-10 mixer. Write for Bulletin 212.

10½" REELS

THE AMPEX 351 MONOPHONIC

Available in full or half-track models. Input switchable to mike, balanced or unbalanced line. Takes reels from 3" to 10½". Speeds: 3¾ and 7½ or 7½ and 15 ips. Available as console, two-case portable or mounts in 22¾" of rack space. All-electric push-button controls permit remote control operation. Large 4" VU meter reads input or recorded level plus bias and erase current. For more information, write for Bulletin 203.



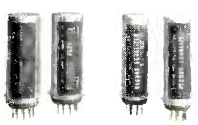
THE AMPEX 354, STEREO/MONO

Two-channel electronics. Compact and portable version as well as console. Requires only same rack space as 351. Same heavy duty tape transport as 351. Two line inputs, convertible to two mikes (one per channel) with pre-amps. More mike and line inputs with MX-35 mixer. Convenient balancing of stereo-channels with side-by-side VU meters. Split erase for stereo recording, half-track mono, cue track, sound-on-sound. Alignment controls in front panel. Bulletin 208.

ACCESSORIES AND ASSOCIATED EQUIPMENT

MONITOR SYSTEM
SA-10, Console quality, 40 watt speaker-amplifier unit. Portable, rack or wall mounting. Bulletin 214.

STEREO/MONO MIXER
MX-10 or MX-35, Four position, two channels, matches PR-10 or 351/354.



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provide NAB AME or CCIR curves as required.

PLUG-IN INPUTS
match various inputs. Balanced bridging or mikes.

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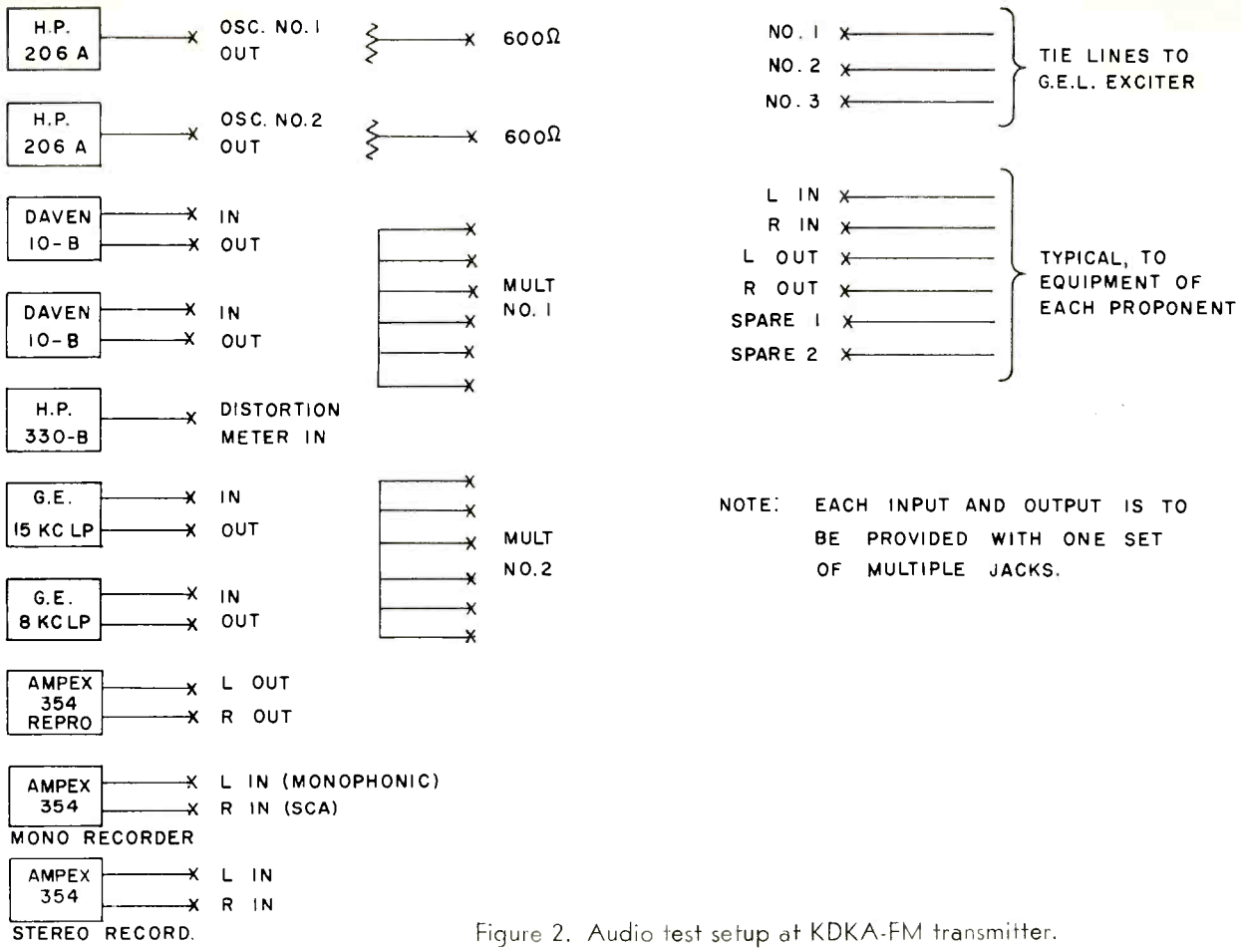


Figure 2. Audio test setup at KDKA-FM transmitter.

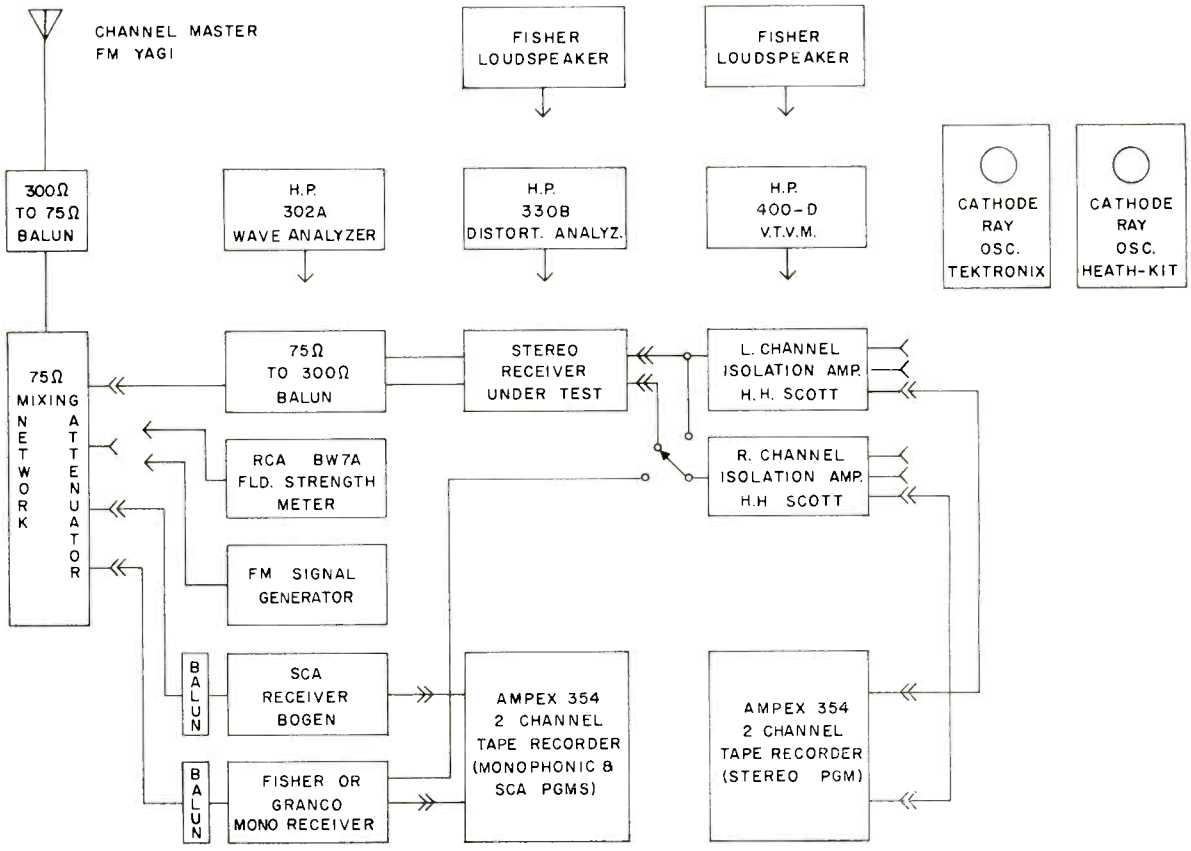


Figure 3. Receiving and test equipment at Uniontown.

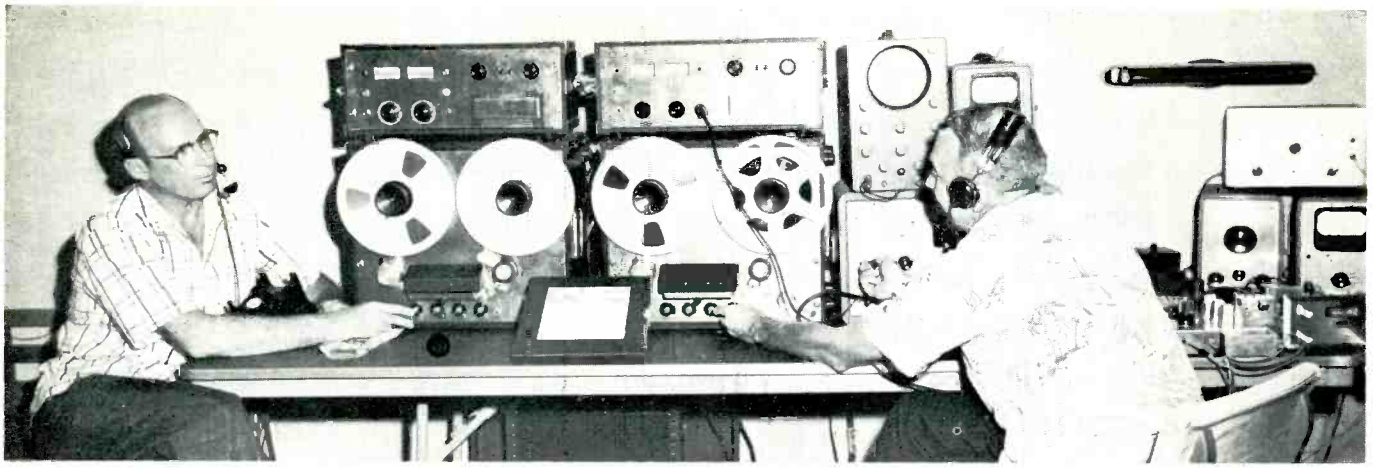


Figure 4. A. Prose Walker (left), NAB manager of engineering, and Harold L. Kassens, FCC's chief of aural existing facilities, coordinate measurements at Uniontown receiving site during field tests of proposed stereo FM systems.

H. Beville of station WWDC-FM, Washington, D. C. The field test panel was one of six set up by NSRC. Others included groups working on system specifications, interconnecting facilities, transmitters, receivers, and subjective aspects.

Chief differences between the six systems tested lie in composition of the main channel (monophonic) and subcarrier signals, which differ in the subcarrier frequency, bandwidth, deviation, and type of modulation, *i.e.*, AM vs. FM.

For the field tests, NSRC's panel 5 was organized into six subcommittees with the following chairmen: Transmitter and Receiver Site Selection (A. C. Goodnow, Westinghouse Broadcasting Co.), Specifications for Measurement (B. F. Tyson, General Telephone & Electronic Laboratories), Transmitters (R. N. Harmon, Westinghouse Broadcasting Co.), Receivers (D. R. Von Recklinghausen, H. H. Scott Inc.), Data Correlation (Norman Parker, Motorola), Recorded Program Considerations (R. A. Isberg, Ampex Professional Products Co.).

Facilities for conducting the tests were provided by KDKA-FM, Pittsburgh. Parameters to be measured included frequency response, total harmonic distortion, signal-to-noise ratio with respect to 400 cycles per second (cps) and 100 per cent modulation, stereo separation and crosstalk, spectrum requirements of system and subjective listening tests of tape recorded program material. Other considerations were such receiver qualifications as ease of tuning, selectivity, capture ratio and the performance of adapters.

The block diagrams (Figures 1

(Continued on page 32)

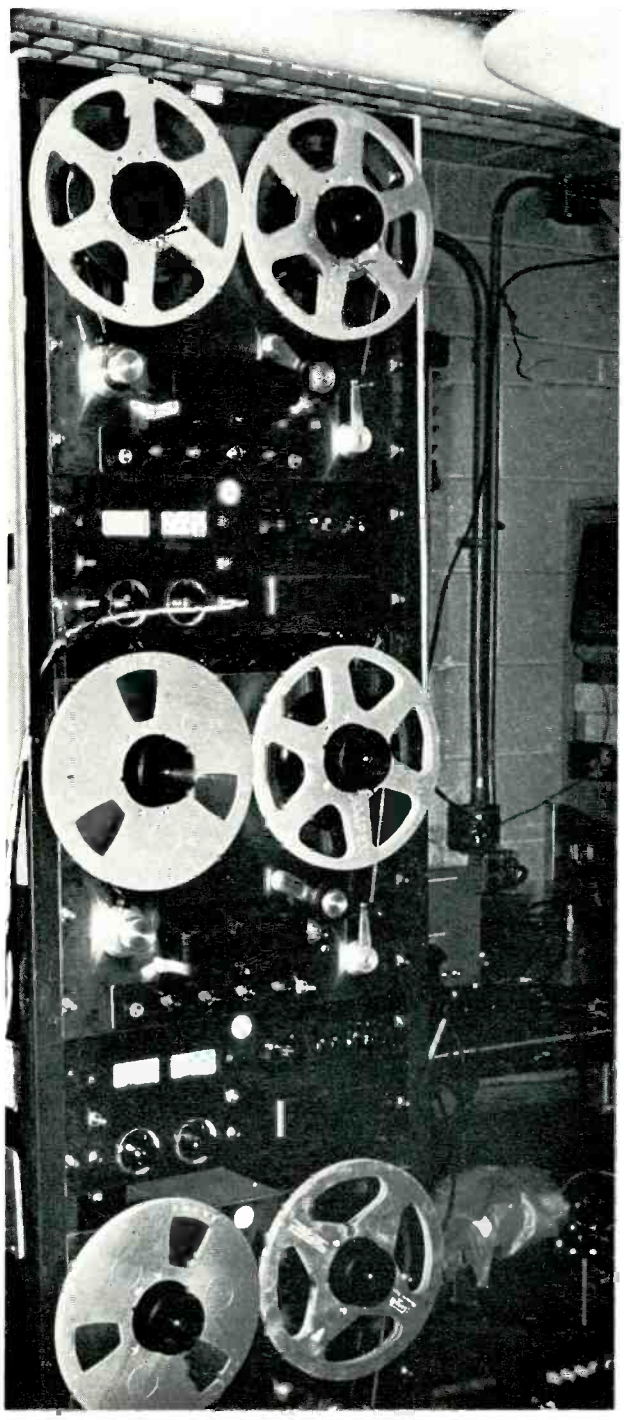


Figure 5. In the field tests of stereo FM systems, Ampex tape recorders at the KDKA-FM transmitter were used for reproducing the test tape, recording the stereo transmission and recording the monophonic and SCA transmissions.

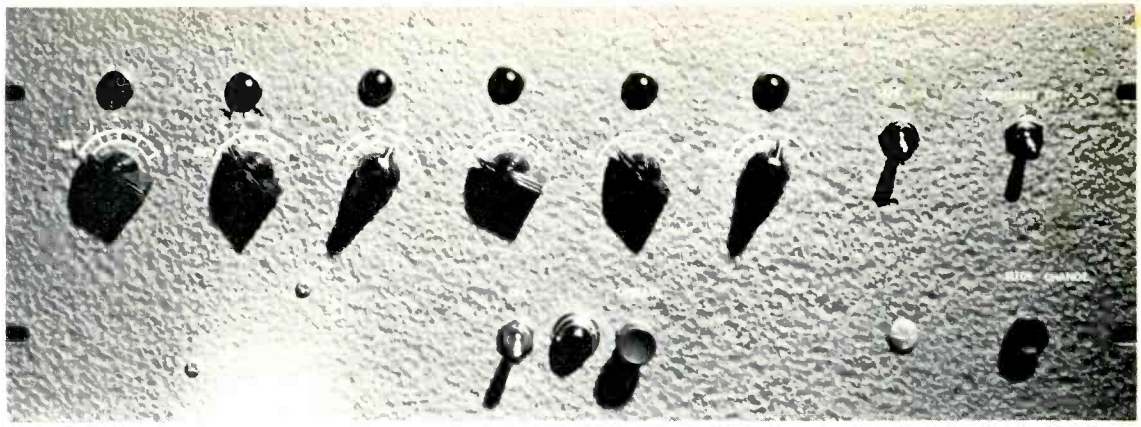


Figure 1. The above picture shows the simplicity of the control panel. Presetting is performed with the black knobs.

AUTOMATIC PRODUCTION MANAGER SIMPLIFIES TV SWITCHING

By EDWARD L. COVINGTON*

In recent years, the desire has increased among television station operators to simplify, and therefore increase reliability of switching operations. Such simplification is particularly desirable where the size of the operating staff is limited, as in small and medium market stations. The equipment to be described was designed primarily for these operations.

Previous efforts along this line have varied from the use of "total" automation down to timer operated "panic-period" switchers. The total automation systems carry a memory tape or other such device, and are built to handle all segments of a day's programming. The job of the operator is simply to watch that all operations are properly performed and to take over in emergencies. The cost of such equipment naturally runs into many thousands of dollars due to its required complexity.

The panic switchers are designed with the station break period in mind. The operator presets all the operations to take place during the break and at the desired time gives control to the unit. A timing device then controls all the break operations, switches back to network, and returns control to the operator.

To determine the most usable system, an analysis of station operation was made. This produced the following requirements:

(1) *Pre-setting adjustments must be simpler than normal operating controls.* If pre-setting is at all complex, the possibility of human error is increased. Such complexity may even cause operators to avoid use of the device. In one station visited by the author, an automation system was standing idle because presetting was too involved.

(2) *Continuous operation of the unit should be possible.* With the system on the air, the operator should be able to preset or change preset of upcoming program material. It must not be necessary to switch back to normal operation except at the desire of the operator.

(3) *Timer control is to be avoided.* Unfortunately, there is often a variation of several seconds in the time allocated for an operation. In addition, many station breaks and cut-ins from network are made on cue without a precise time being specified. Operators with whom the problem was discussed voiced a desire to retain control of the time and occurrence of each aired material segment.

(4) *Normal projection controls must be able to override the automatic system.* In the event an error were to occur, it would be possible to make an instantaneous correction, (*i.e.*, to stop a projector with a broken film instantly) without first having to take control from the automatic unit.

*Chief Engineer, KCMC-TV, Texarkana, Tex.

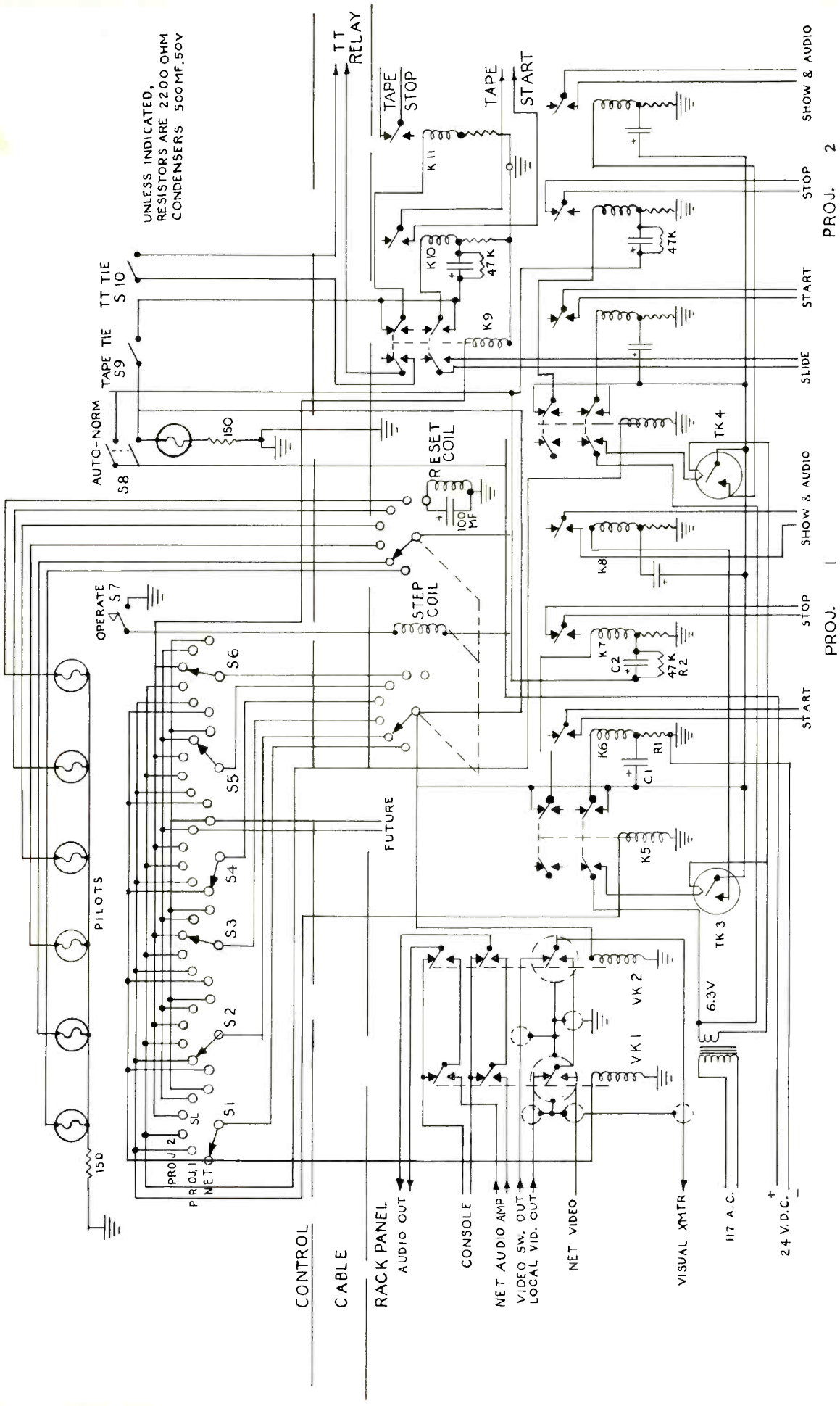


Figure 2. Circuit diagram of automation system.

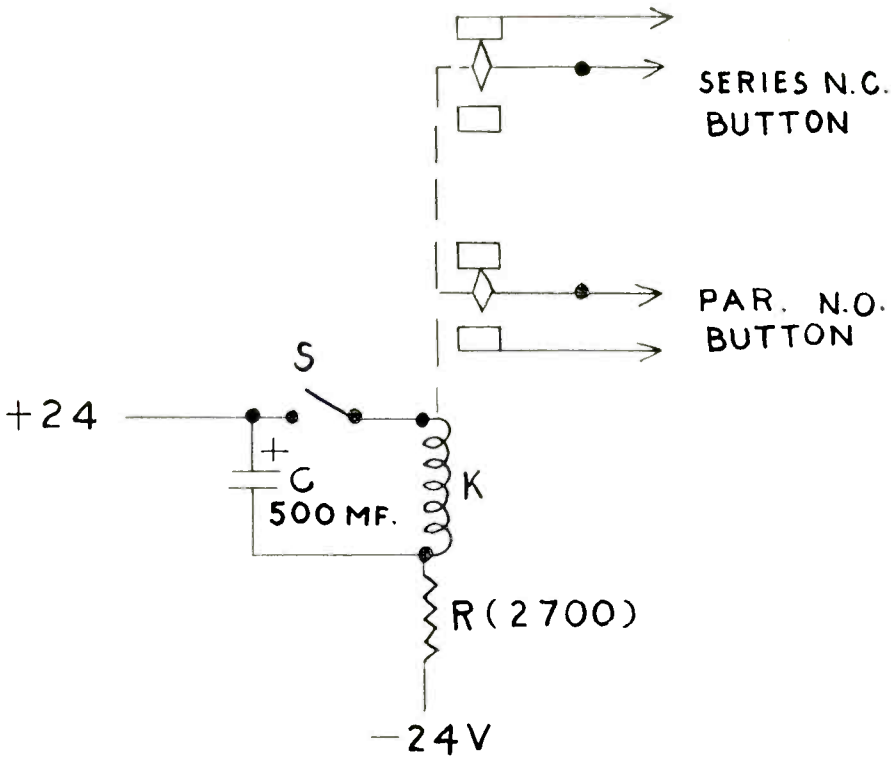


Figure 3. Momentary contactor.

(5) *The unit must be simple circuit wise.* Only a relatively small amount of time should be taken from an already crowded maintainence schedule for fabrication and installation. Circuit simplicity will also contribute to reliability.

(6) *Cost must be reasonable.*

All requirements were met in a preset switcher affectionately dubbed "The Production Manager" by the KCMC-TV control room staff. Of preset switching, it is interesting to note that even total automation proponents have called it automation's "most important contribution" in simplifying operations.

System Operation

Referring to Figure 1, the simplicity of the control panel is apparent. A row of six rotary switches functions as the memory for the sequence of sources to be used. Note the indicated positions of each knob are identical (net, projector 1, etc.) and that each has an adjacent pilot lamp. This indicates which knob is controlling material on the air.

On application of an operate pulse, the next knob to the right will become the "hot" one and whatever is selected with it will be put on the air. When a knob to the right end is hot and an operate pulse is applied, control is returned to the extreme left switch, etc. It is possible to preset the switches for material to follow, even with the unit on the air, as long as the hot knob is not disturbed. In practice, only a few seconds are required to preset a complete sequence of operations.

In line with the requirement to keep the presetting of the system simpler than normal operations, it was decided to retain slide changing as a manual operation (the change button appears to the lower right). Analysis of possible circuitry showed the inclusion of automatic slide changing to be the item which would increase complication of the control panel many times over.

The tape-tie switch to the right of the rotary switches functions to put a tape recorder on the air simultaneously with the slide projector. This feature is provided as announcers often pre-record station breaks. The turntable-tie switch functions in the same manner as the tape-tie for instances where disc recorded announcements are called for.

The "operate" button appears at the front center of the control panel. This is the only control, excepting the slide change button, used during operation—pressing it causes the system to perform all operations to put the next pre-selected source on the air. In this manner, the operator retains control of "when."

Adjacent to the operate button is the "auto-normal" switch. To put the Production Manager into operation, the rotary switch indicated by its pilot to be hot is turned to a position to coincide with material on air and the auto-normal switch is thrown to auto. The pilot lamp at the front of the panel lights to indicate the system has control. To return to manual operation, the switch is reversed. In either instance, there is no interruption to the material on the air at the time of the switch.

Circuit Details

Operation of the Production Manager centers about the familiar stepping relay (refer to Figure 2). One deck is used to supply control voltage to the hot selector switch. As corresponding contacts of the rotary selectors are wired in parallel, the voltage will be routed to the selected function. This voltage is available to the stepper only when S8 is closed. Opening S8 disables the system.

Pressing the advance button (S7) energizes the step coil, advancing control voltage to the next selector. When the stepper is in the number six position and the advance button is closed, the wiper arm on the second deck contacts the reset coil which returns the stepper to the number one position.

Control voltage is available at all times to the step coil and the pilot lamps. This permits the stepper to be advanced to a desired position when not in use and lets the operator know which selector will be hot when put on the air.

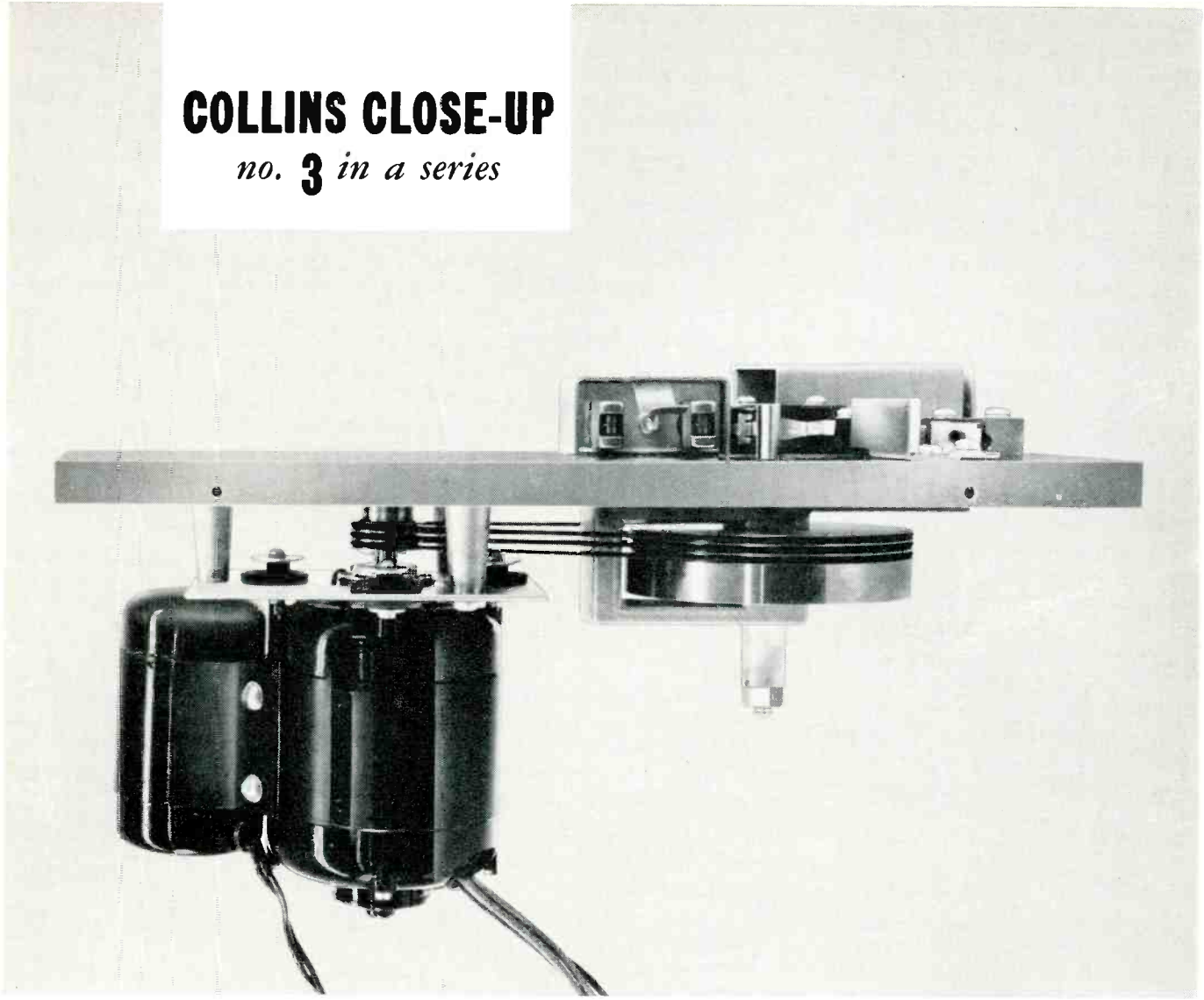
Video and Audio Control

Video switching is straightforward, using coax relays. Relay VK2 follows the action of S8 selecting the output of either the regular station switcher or the Production Manager. VK1 closes with voltage from any hot selector in the net position and opens in all others.

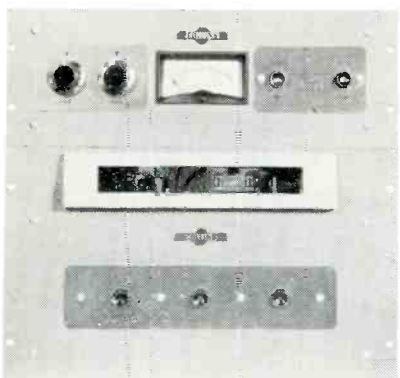
Since the slide and both projectors all originate from the same camera, and this device was built with no live camera considerations, local video is fed to the relaxed contacts of VK1. If it were desired to select more than one local video

COLLINS CLOSE-UP

no. 3 in a series



PROFILE OF COLLINS AUTOMATIC TAPE DECK



Collins Automatic Tape Control is available in console models and 15" or 19" panels for rack mounting.

Collins Automatic Tape Control bears close inspection. As individual components or as a unit, the quality of Collins automatic tape programming equipment is unmatched.

Notice, for example, the heavy-duty, aluminum deck plate shown above. It's guaranteed to keep its associated components in perfect alignment. The Bodine synchronous motor, solid brass flywheel and steel capstan hold flutter and wow to less than 0.2% rms. The precision of these components and maximum torque make possible syllable-splitting cueing and a 99.96% tape speed accuracy.

The sound center of the Collins unit is mounted on the deck plate. A record/playback head is built on a laminated core and provides a uniform resolution of the complete audio range, with a ±4 db frequency response at 50-15,000 cps (typical performance ±2 db, 50-12,000 cps) and a signal-to-noise ratio of 55 db or better.

These are just a few of the reasons why there are more Collins Automatic Tape Control units in U.S. radio stations than those of any other two manufacturers.

Ask your Collins broadcast equipment sales engineer for a demonstration, and compare Collins — component-for-component, price-for-price — with any other. You'll see why Collins is the indisputable leader in automatic tape programming equipment.

COLLINS

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source, it would be a simple matter to connect the appropriate selector contact to an electronic or relay video switcher.

Local, network, and automatic audios are switched with auxiliary contacts on the coax relays. When one of the local program sources is in use, the regular audio console output is used. Local audio switching is done ahead of the console and is described later. When network is on the air, a separate amplifier is used. This completely frees the audio console for other purposes and makes it impossible for unwanted cueing etc. to get on the air accidentally.

Projection Controls

The usual projector remote control consists of three push-buttons (start, show, stop) of the momentary contact type. A system requirement was that normal controls be able to take over at any time. Projector modification being undesirable, it was necessary to duplicate the momentary contact action of the regular controls using the continuous voltage from the hot selector. The basic circuit of Figure 3 was devised for this purpose.

Capacitor C charges to 24 volts by way of current through R. When the switch is closed, C becomes a power source, energizing K. In about one-half second, C has discharged through the coil to the point it can no longer hold in the relay, thus having provided the momentary contact required. The voltage drop across R is sufficiently high that the relay will remain open. C cannot recharge to the source voltage until S is opened.

Typical Operation

Assume the stepper in the number one position (Fig. 2) with S8 closed. Network will be on the air via the energized positions of VK1 and VK2. The advance button (S7) is depressed advancing control to selector 2 which energizes K5 and permits VK1 to relax, selecting local video and audio.

Due to the closing of K5, K6 will energize momentarily, starting the projector; the K7 coil circuit will be opened permitting C1 to charge, and heater voltage is applied to thermal delay relay TK3. After a lapse in "black" of two seconds the projector will be up to operating speed. At this time the TK3 contacts close and cause K8 to momentarily energize. As the K8 contacts parallel the show button, the projector douser will be opened. To get the audio on the air, a relay across the douser connects the projector preamp to the console input.

On the next depression of S7, the stepper will advance control to selector three. K5 relaxes and completes the K7-C2 circuit. Opening the K7 contacts stops the projector, closes the douser, and opens the audio relay since these circuits all "make" through the normally closed stop button and the K7 contacts. If the operator returns to manual operation before advancing to selector three, S8 will open the K7-C2 circuit to prevent unwanted stopping of the projector when the control voltage is removed from K5.

With selector three hot, a slide will be on the air due to the closing of K8. When the tape-tie switch is closed, K10 and K11 control start and stop of the tape recorder in the same manner as the corresponding projector controls. Contacts are also provided on K9 to energize a turntable relay.

During its several months of operation, the Production Manager has proved very reliable and versatile. A second operate button has been installed in the projection room in case the operator is "caught" with an unexpected break or cut-in. If completely automatic operation should ever be desired, it will be necessary to connect an appropriate timer to the operate and slide change buttons.

The unit was built and installed in less than 80 manhours at a most reasonable materials cost of slightly over $100. Since very few station operations are identical, the circuit could probably not be used exactly as shown in most instances. However, due to circuit simplicity, it should be adaptable to the individual case with minor modifications and will pay for itself in operating reliability and convenience many times over.

The author wishes to extend thanks to Mr. Lloyd Cox of the KCMC-TV engineering staff for construction work and helpful suggestions.

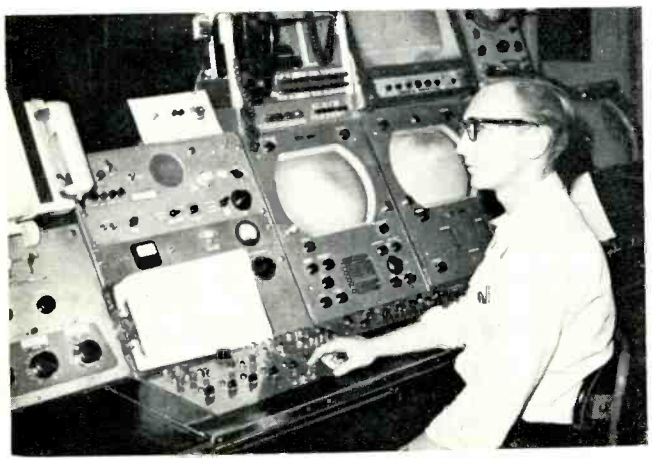

Figure 4. The operator with the only control used during routine switching at his fingertip. The unit performs all of the switching and projection control excluding only live cameras.

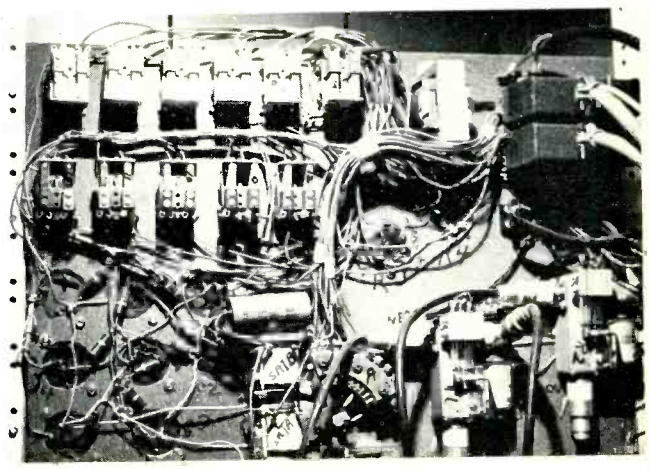

Figure 5. Rear view of the rack mounted section of the Production Manager. The stepping relay is at bottom center. Cables to control and projection are at upper right.

Stay on the air with CBS Instrument Tubes especially designed for broadcast replacement

These CBS Instrument Tubes are the first specifically designed for utmost reliability as replacements of commonly used broadcast receiving tubes. The "new-concept" tubes incorporate many of the advanced features of military types, without costly ruggedization controls not required for broadcast use. In addition, they offer important new controls for tight, stable characteristics and long life.

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Unique Features

- 10,000-hour warranty
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*Include unique 100-hour life assurance tests, comprehensive 1000-hour life tests, 5000-hour informational life tests.

CBS 7728	replaces	12AT7
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CBS 7731	replaces	6U8
CBS 7732	replaces	6CB6
CBS 7733	replaces	12BY7A
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STUDIO PLANNING CONSIDERATIONS

This article outlines the considerations in choosing equipment for a new broadcasting studio. Plans are given for three different sizes of operation which are intended as a guide in planning new facilities.

Material and illustrations courtesy of Radio Corporation of America.

THE EARLY planning of a radio station usually involves consideration of: the market to be served, site selection, transmitter power, tower height, station policies, personnel, the extent of programming, the hours of operation and available capital. In this article we confine ourselves mainly to the selection and arrangement of equipment to achieve the desired results. First, and foremost of the decisions to be reached, is whether the studio and transmitter are to be combined under one roof or to be in separate locations.

In the past few years there has been a trend toward combined studio and transmitter facilities rather than separated facilities. More recently, however, there has again been a trend toward separated installations, with the transmitter operated by remote control from the studio—*where permissible*.

It is generally agreed that wherever practical it is most economical to combine the studio and transmitter facilities. The initial equipment requirements are less and more important, is the fact that day-to-day operating expenses are

Table I

PLAN A — EQUIPMENT LIST

Quantity	
	CONTROL ROOM
1	Audio Consolette With Tubes
1	Dual Headphone
1	Microphone
1	Microphone Mounting
1	XLR-3-11C Microphone Plug
1	XLR-3-32 Microphone Receptacle
2	"On-Air" Lights
2	Three-Speed Turntables
2	Transcription Tone Arms
2	Pickup Heads
2	Transcription Equalizers or Filters
1	Tape Recorder
1	Input Transformer for Tape Recorder
1	Output Transformer for Tape Recorder
1	20db, 600 ohm Fixed Pad
1	Monitor Speaker
1	Monitor Speaker Housing
1	Speaker Matching Transformer
1	16 inch Clock
100 ft.	Interconnecting Cable No. 22 AWG Shielded Pair, With Cotton-Braided Outer Cover
2	Tape Cartridge Recorders
	STUDIO
1	Ribbon Microphone for Desk
1	Desk Stand for Microphone
1	Ribbon Microphone for Studio Floor
1	Floor Stand for Microphone
3	XLR-3-11C Microphone Plugs
3	XLR-3-32 Microphone Receptacles
2	"On-Air" Lights
1	Studio Monitor Speaker
1	Monitor Speaker Housing
1	Speaker Matching Transformer
1	16 inch Clock
100 ft.	Interconnecting Cable No. 22 AWG Shielded Pair, With Cotton-Braided Outer Cover
	AM TRANSMITTER INPUT AND MONITORING
1	Cabinet Rack
1	AM Frequency Monitor
1	Modulation Monitor
1	40db, 600 ohm Fixed Pad
1	AGC Program Amplier With Tubes
1	Mounting Shelf for Amplifier
1	20db, 600 ohm Fixed Pad
1	Limiting Amplifier With Tubes
1	Double Jack Panel
1	Single Jack Panel Mat
400 ft.	Interconnecting Cable for Audio Rack Wiring, No. 20 Shielded Pair, Solid Conductor
200 ft.	Interconnecting Cable for AC and Filament Circuits, No. 18 Shielded Pair, Stranded Conductor
1	Terminal Board Mounting Bracket
1	Terminal Power Strip
1	Terminal Audio Block
4	Audio Patch Cords, 2 ft. in length
1	Switch and Fuse Panel
1	$3\frac{15}{32}$ inch Blank Panel
1	$1\frac{23}{32}$ inch Blank Panel
2	$8\frac{23}{32}$ inch Blank Panels
1	$5\frac{7}{32}$ inch Blank Panel

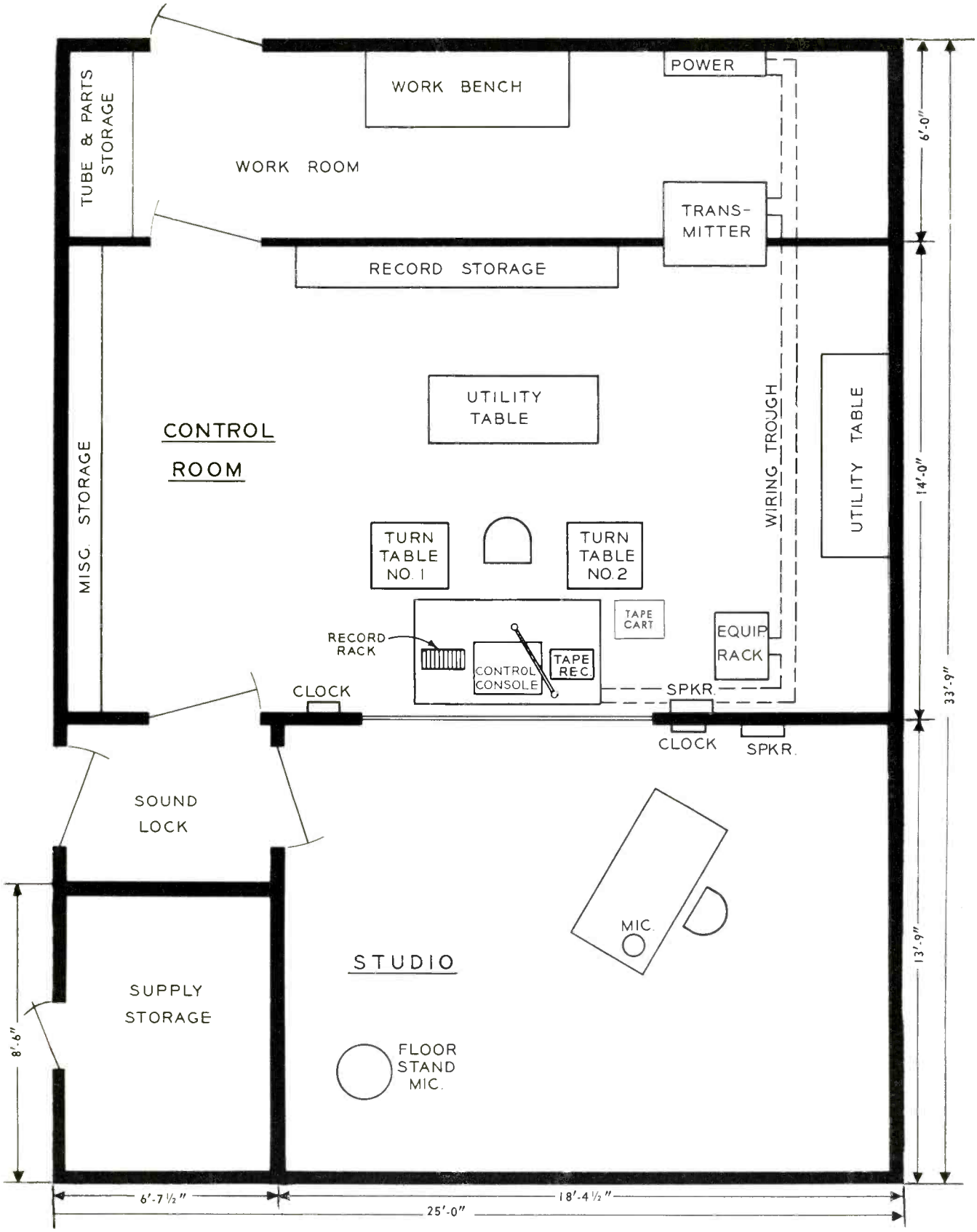

Figure 1. Floor Plan A shows a typical arrangement of studio and control room for a small station with the transmitter located at the studio.

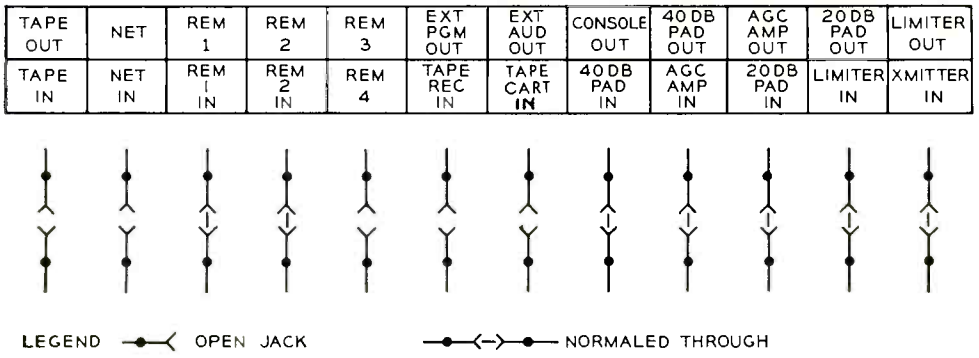

Figure 2. The suggested jack panel for the studio and control room of Plan A.

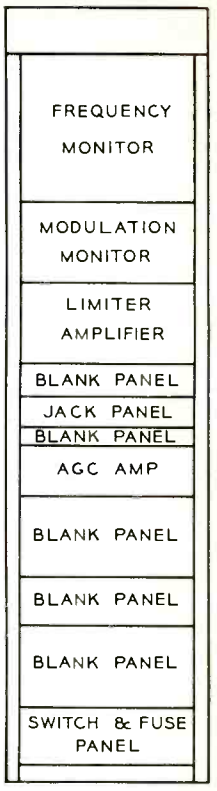

Figure 3. The rack used in Plan A contains the monitors and amfiers. Other optional equipment could be installed in place of the blank panels shown in the illustration.

lower. With the plant "all under one roof" there are savings in heating and air conditioning, building maintenance, travel time and, in addition, less technical personnel is required. A "combined" operation, however, is not always practical. There are several important considerations:

1. Is the combined location the best spot for the transmitter site? (By that we mean is there sufficient room for installation of tower or towers, and an adequate ground system? Furthermore, is it more advantageous from a standpoint of providing the desired coverage?)

2. Is the combined location convenient and accessible for station personnel and for clients? (A combined location is generally more practical in smaller cities, since an accessible and satisfactory location for both studio and transmitter can usually be obtained near the city limits.)

When a combined operation is not practical, the second most economical approach, where permissible, is to operate the transmitter by remote control from the studio. Then one can select a transmitter site that is most advantageous from a radiation and coverage standpoint, and the studio could logically be placed at its most convenient location. The building requirements at the transmitter can be the very minimum, requiring only space for the equipment, a small work area and a small room-heating unit. The studio contains conventional equipment and a remote-control unit. This type of installation is one of the most desirable for larger cities.

Control Room

All control-room installations, large or small, are alike in many respects. The differences are mainly a matter of the number of microphones, turntables, tape recorders and other program sources to be served. This, in turn, will dictate the type of consolette or control console that is most suitable. Beyond this, there are various arrangements of facilities to suit special conditions and personal tastes. For economic reasons, most stations locate the control console in front of the studio viewing window. They locate the turntables on either side of the operator's position at the console, a microphone over the console for control-room announcing, and tape-recording equipment within easy reach of the operator. Such an operating arrangement is shown in Fig. 1.

House Monitoring

A house-monitoring system is an important function, and proper planning before construction begins will provide a much neater installation. Provisions should be made to carry audio to several locations throughout the building, the lobby area, offices, clients' room, etc. Besides normal program material, it provides a convenient closed-circuit system for auditions and special monitoring.

Ductwork

The careful planning and layout of trenches and ducts for wiring is essential to economical installation and efficient operation. Once the technical equipment has been accurately determined, it is then time to plan trench runs. These should provide for some measure of future expansion. A typical trench layout is shown by dotted lines in Fig. 1.

Studio Considerations

As we examine present-day operations, we find the studio receiving less consideration because fewer live programs are being originated. However, we have further discovered that neglect in the planning of the studio places a later handicap on the average operation, which could have been prevented with only a small additional expense and a little careful consideration at the time of construction. Hence in this article we present plans that provide for normal expansion without undue expense.

Equipment Planning

The next most logical step after early plans have been completed is the careful and considered planning for the technical equipment. This goes hand-in-hand with the building design and construction. Equipment planning is the proper selection and layout of technical equipment to satisfy contemplated programming requirements.

We are going to cover three versatile radio station equipment plans, which do not necessarily represent any existing stations but they do illustrate several ways in which the very latest equipment may be arranged to perform efficiently with a minimum of capital and personnel.

Since programming requirements vary, we present three plans, which represent three specific categories of operation:

1. Plan "A" covers a typical

"combined" studio-transmitter operation, with programming requirement of records and transcriptions, control room announce, one studio, tape facilities, network and remotes. This is a small station, requiring minimum investment.

2. Plan "B" also covers a "combined" operation, but incorporates additional facilities to allow for an announce booth and other local program material. It is a typical *community* station of moderate size.

3. Plan "C" covers a fairly large two-studio station with separate studio and transmitter locations, but with optional remote operation of the transmitter. It is designed for large city operation, providing a high degree of flexibility and facilities for extensive programming.

The three plans are considered adequate for the majority of cases, and each is so arranged that modification of the plan may be made to suit individual requirements. The choice of the equipment layout will depend to a large extent on factors which are already determined: type of programming; area to be served; station policies and personnel.

Plan "A"

Plan "A" is a desirable layout for the small station that proposes to start operation at minimum investment. It includes the necessary technical equipment for handling the following programs: (1) announcements, (2) record and tape shows, (3) network, (4) remotes, and (5) local live originations such as interviews and newscasts.

It will be noted in Fig. 1 that the floor plan is separated into: combined transmitter and control room, small studio, engineering work room and parts storage, supply storage and a sound lock.

The major items of equipment required to perform the programming operation are identified on the floor plan. A block diagram, Fig. 4, shows how the system is connected together. An Equipment List, table 1 itemizes the requirements, including the miscellaneous small items necessary to complete the system. The rack layout, Fig. 3, further details the location of the various equipments.

The choice of transmitter, of course, depends upon the power of the individual station. Regardless of

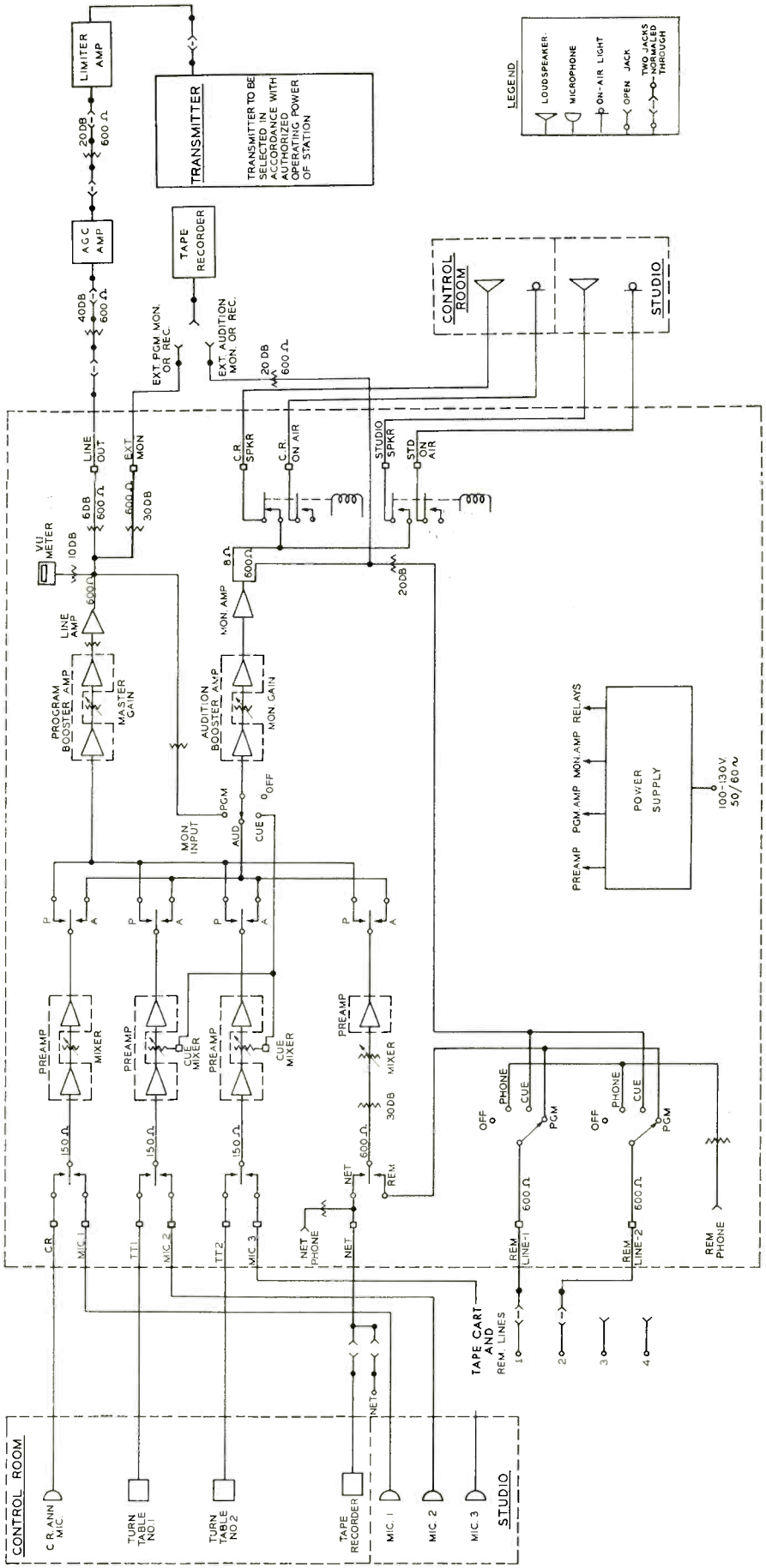

Figure 4. The block diagram showing the connections to the studio console in Plan A. The console diagram shown is an RCA BC-5.

Table 2

PLAN B — EQUIPMENT LIST

Quantity	
	CONTROL ROOM
1	Audio Consolette With Tubes, and Additional Speaker Light Relay
1	Dual Headphone
1	Microphone
1	Microphone Mounting
1	XLR-3-11C Microphone Plug
1	XLR-3-32 Microphone Receptacle
2	"On-Air" Lights
2	Three-Speed Turntables
2	Transcription Tone Arms
2	Pickup Heads
2	Transcription Equalizers or Filters
2	Utility Amplifiers
1	Tape Recorder
2	Tape Cartridge Recorders
1	Input Transformer for Tape Recorder
1	Output Transformer for Tape Recorder
1	20db, 600 ohm Fixed Pad
1	Monitor Speaking
1	Monitor Speaker-Housing
1	Speaker Matching Transformer
1	16 inch Clock
100 ft.	Interconnecting Cable No. 22 AWG Shielded Pair, With Cotton-Braided Outer Cover
	AM TRANSMITTER INPUT AND MONITORING
1	Cabinet Rack
1	AM Frequency Monitor
1	Modulation Monitor
1	40db, 600 ohm Fixed Pad
1	AGC Program Amplifier With Tubes
1	Mounting Shelf for Amplifier
1	20db, 600 ohm Fixed Pad
1	Limiting Amplifier With Tubes
1	Double Jack Panel
1	Single Jack Panel Mat
400 ft.	Interconnecting Cable for Audio Rack Wiring, No. 20 Shielded Pair, Solid Conductor
200 ft.	Interconnecting Cable for AC and Filament Circuits, No. 18 Shielded Pair, Stranded Conductor
1	Terminal Board Mounting Bracket
1	Terminal Power Strip
1	Terminal Audio Block
4	Audio Patch Cards, 2 ft. in length
1	Switch and Fuse Panel
1	Monitor Amplifier With Tubes for House Monitoring System (Speakers to be selected as required)
1	Plug-in Transformer for Amplifier
1	Mounting Shelf for Monitor Amplifier
1	$3\frac{15}{32}$ inch Blank Panel
1	$1\frac{23}{32}$ inch Blank Panel
1	$5\frac{7}{32}$ inch Blank Panel
1	$8\frac{23}{32}$ inch Blank Panel
	STUDIO AND ANNOUNCE BOOTH
1	Ribbon Microphone for Desk
1	Desk Stand for Microphone
1	Ribbon Microphone for Floor Stand
1	Floor Stand
1	Uniaxial Microphone
1	Desk Stand for Above Microphone
4	XLR-3-32 Microphone Receptacles
4	XLR-3-11C Microphone Plugs
4	"On-Air" Lights
2	Studio Monitor Speakers
2	Monitor Speaker Housings
2	Speaker Matching Transformers
2	16 inch Clocks
150 ft.	Interconnecting Cable No. 22 AWG Shielded Pair, With Cotton-Braided Outer Cover
	RECORD LIBRARY
1	Turntable
1	Transcription Tone Arm
2	Pickup Heads
2	Transcription Equalizers and Filters
1	Utility Amplifier
1	Monitor Amplifier for Audition
1	Plug-in Transformer for Amplifier
1	Selector Switch for Input of Amplifier
1	Bridging Pad for Automatic Turntable Audition
1	Monitor Speaker for Audition
1	Monitor Speaker Housing
100 ft.	Interconnecting Cable No. 22 AWG Shielded Pair, With Cotton-Braided Outer Cover

power, all other items included in Plan "A" remain the same.

Plan "A" incorporates many features to permit operation with a minimum of personnel. It is designed for a single operator-announcer to work directly from the control room. The equipment location makes this practicable since turntables, tape recorder, control console, and record rack are all within easy reach of the operator. The equipment rack is situated for convenient reading of the frequency and modulation monitor meters without leaving the operating position. Record storage racks are easily accessible within the control room. Furthermore, the small utility storage rack and table, located directly behind the operating position, provides a handy place for keeping the daily program material ready for use.

Entrance to the control room or the studio is via the common sound lock. The small engineering work room with storage cabinet and workbench is sometimes neglected in planning, but will prove its worth many times over. The wiring trough shown in dotted lines in Fig. 1 makes the wiring readily accessible for service, or making additions to the system.

Technical Facilities of Plan "A"

The control console is the heart of the audio system. Considerations in choosing a control console include operational simplicity, number of inputs and outputs, accessibility of controls and versatility. The console suggested in Plan "A" has facilities for the control room mike, two turntables, tape recorder, cartridge tape, net, three studio mikes, and four remote lines. It is single channel and has line, audition, and recording outputs as well

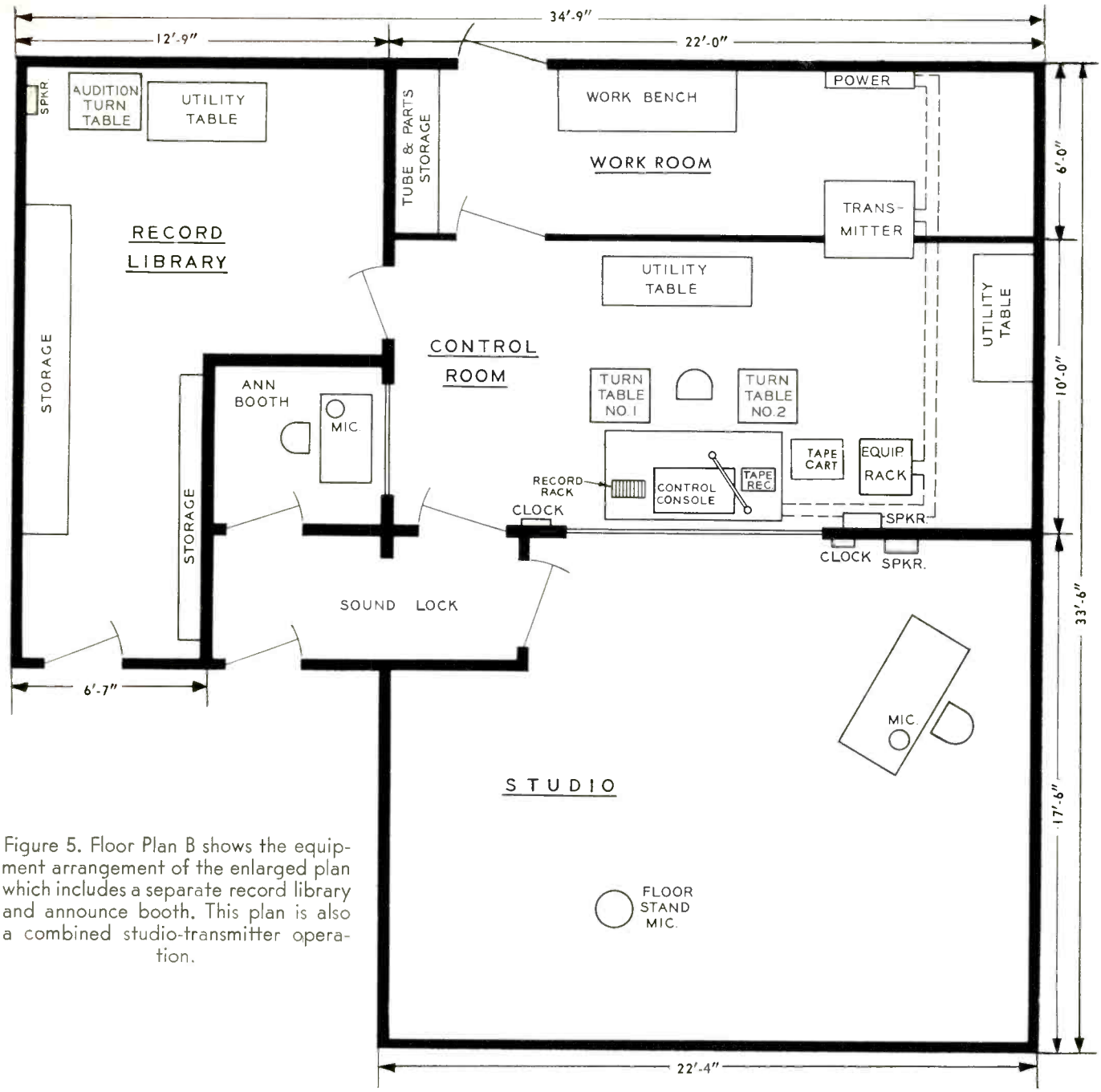

Figure 5. Floor Plan B shows the equipment arrangement of the enlarged plan which includes a separate record library and announce booth. This plan is also a combined studio-transmitter operation.

as a monitor amplifier for loudspeakers.

The turntables selected are three speed units: 33-⅓, 45, and 78 rpm. A smooth starting, reliable, turntable with a simplified speed-changing mechanism and a hysteresis synchronous motor is a must.

The tape recorder should be a professional model using a synchronous motor. It may either be rack mounted, console type, or mounted on a table top if a portable version is used.

An Automatic Gain Control Amplifier and a Limiting Amplifier are located in the equipment rack. The functions of these two units in the system are related, and a description of their importance follows: It is a well-known fact that station coverage, regardless of power, is definitely related to the ability of maintaining the highest possible average level of modulation without distortion. The use of a limiting amplifier has been common for several years with reasonably good results, however, it has some limitations. In a Limiting Amplifier, the gain is constant up to a certain output level. Above this level, there is so much gain reduction that the output level will be maintained virtually constant. Thus, a limiting amplifier is effective only on high levels of program material. On the other hand, the Automatic Gain Control Amplifier (AGC) will serve to maintain a relatively constant output, much in the same manner that an operator might, by carefully and constantly "riding gain" on the program. A gain control amplifier and a limiting amplifier are sometimes used together to supplement one another. This combination permits a higher average level of pro-

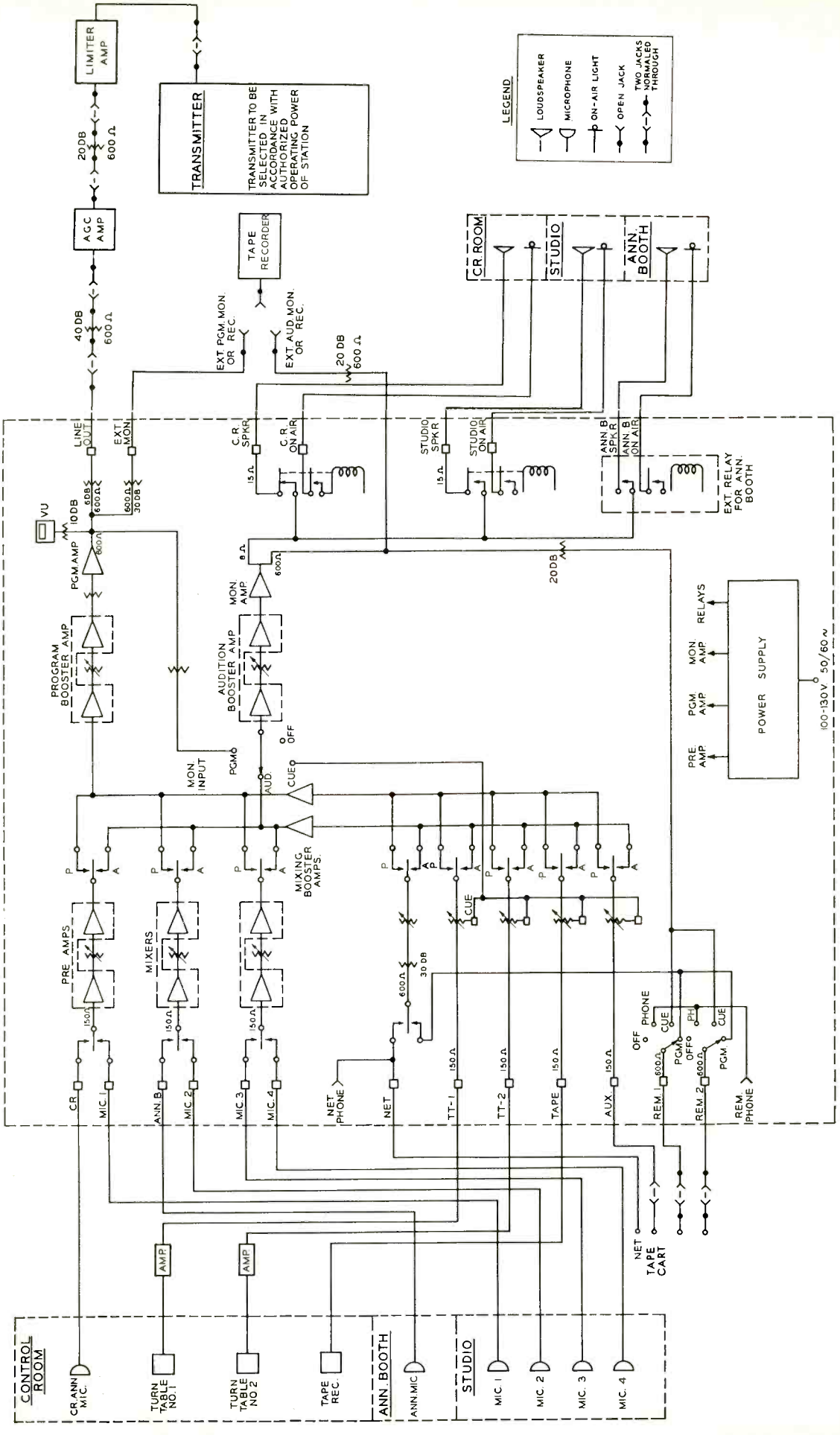

Figure 6. The system diagram for Plan B. A console with additional inputs is used in order to handle the additional mikes and additional equipment such as tape cartridge units. The console shown is an RCA BC-3.

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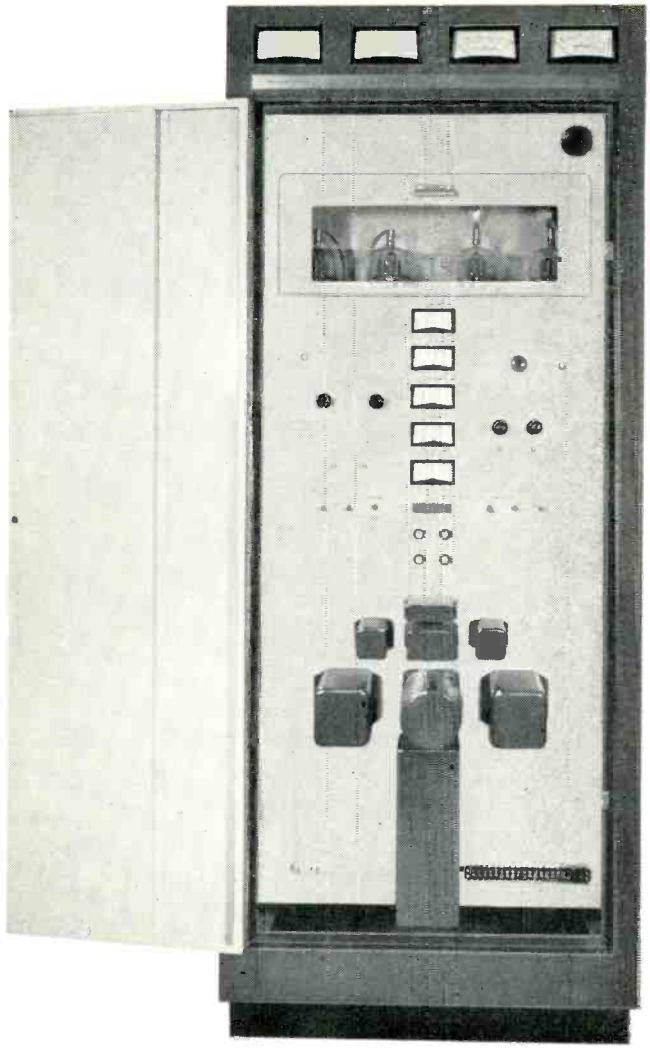

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Bauer keeps pace with the fast moving field of electronics to give you a modern *transmitter for the "sixties"... at a price that proves the economy of superior design.*

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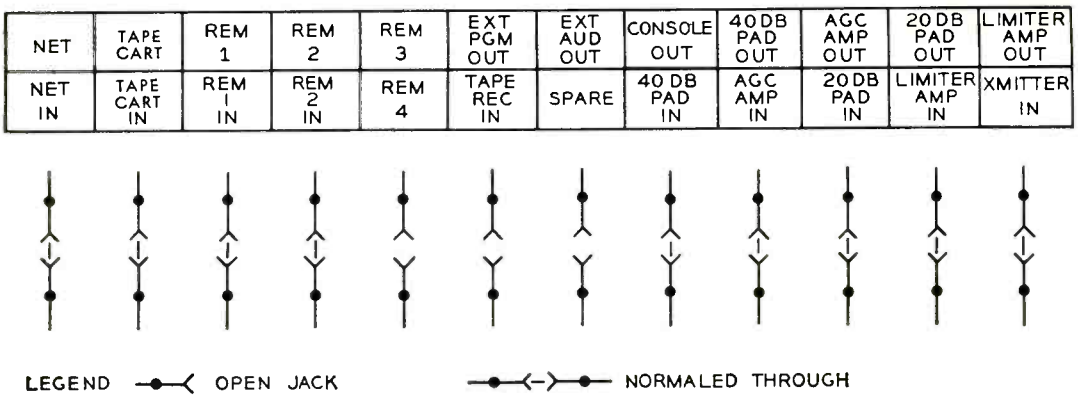


Figure 7. The jack panel for plan B.

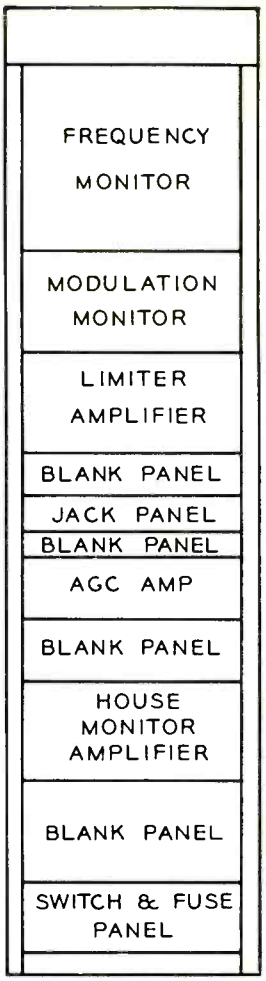
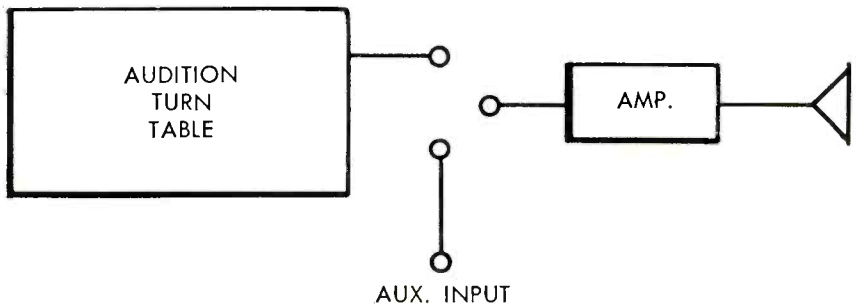


Figure 8. The Plan B rack shown here is similar to the rack of system A except that a house monitoring amplifier has been added.

Figure 9. The block diagram of the record audition system. The amplifier may be mounted in the turntable cabinet. A switch is shown for the amplifier input to accommodate other equipment such as tape or other source.



gram material, and prevents overmodulation on sudden program peaks, which effectively improves reception in fringe areas and extends coverage without increasing transmitter power.

Other major equipment items located in the equipment rack are the frequency and modulation monitors (required by the FCC), and a jack panel. The complete rack layout is shown in Fig. 3.

Plan "B"

Plan "B" typifies the most desirable arrangement for the community-type radio station. This plan fulfills all the requirements, from a space and facility point of view, for handling a very diversified program schedule. It incorporates technical features that make for an adequate, yet economical, operation.

While Plan "B" is identical in many respects to the Plan "A" station, it includes larger and additional facilities (see Fig. 5). The major difference is a larger studio, the addition of an announce booth, and a record library room. The console recommended for Plan B has more facilities than the one described in Plan A. Provisions for an announce booth and an additional studio mike are provided. It also provides loudspeaker monitoring facilities for the announce booth.

Now programming can be expanded to include the origination of a fairly substantial live studio show. Another important aspect of this plan is that with the announce booth serving as another point of origination, it becomes very practical to record announcements and other program material while on the air.

Again we have utilized a common sound lock, in the interest of economy, with the announce booth, studio and control room all accessible from this area. The record library being separated from the point of program origination makes possible, with the facilities provided, auditioning of records, building of shows, cataloging, filing, etc., to be carried on without interruption during the program day.

Technical Facilities of Plan "B"

Three turntables are specified in the Equipment List for Plan "B". The additional turntable, along with some accessory equipment, makes up a small system for auditioning records. Figure 9 gives the details as to how this system goes together.

Plan "C"

Plan "C" approaches the ultimate for the "larger"type of radio station as we know it today. From the floor plan, Fig. 10, it will be apparent that a high degree of flexibility is maintained, offering facilities for handling very extensive programming. Furthermore, it will be noted that Plan "C" incorporates many of the same general considerations described for the other two stations but with several additions. There is also one significant deletion—the transmitter. In this plan we have assumed that the transmitter would be located separate from the studio, with its own building, at its own site.

First there is a large studio, the size to be determined by just what

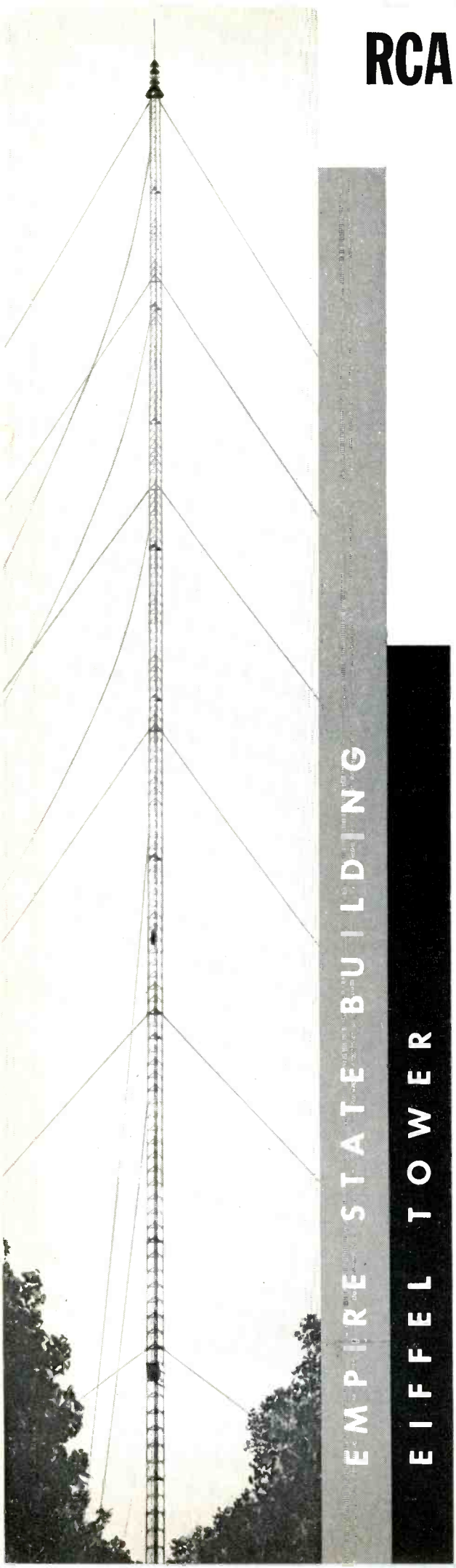


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Table 3

PLAN C — EQUIPMENT LIST

Quantity	
	MAIN CONTROL ROOM
1	Audio Consolette With Tubes, and Additional Speaker Light Relay
1	Dual Headphone
1	Microphone
1	Microphone Mounting
1	XLR-3-11C Microphone Plug
1	XLR-3-32 Microphone Receptacle
2	"On-Air" Lights
2	Three-Speed Turntables
2	Transcription Tone Arms
2	Pickup Heads
2	Transcription Equalizers or Filters
2	Tape Recorders, Remote Control, Rack Mounting
2	Cabinet Racks
2	40db, 600 ohm Fixed Pads
2	AGC Program Amplifiers With Tubes
2	Monitor Amplifiers, With Tubes
2	Tape Cartridge Recorders
2	Monitor Speakers
2	Monitor Speaker Housings
2	Speaker-Matching Transformers
1	16 inch Clock
4	Double Jack Panels
2	Double Jack Panel Mats
8	Audio Patch Cords, 2 ft. in length
1	AM-FM Tuner
2	Line Equalizers
1	VU Meter Panel
1	Sound Effects Filter
2	Terminal Board Mounting Brackets
2	Terminal Power Strips
2	Terminal Audio Blocks
2	Switch and Fuse Panels
4	$10\frac{15}{32}$ Blank Panels
1	$1\frac{23}{32}$ Blank Panel
4	$5\frac{7}{32}$ Blank Panels
2	$8\frac{23}{32}$ Blank Panels
2	$3\frac{15}{32}$ Blank Panels
200 ft.	Interconnecting Cable No. 22 AWG Shielded Pair, With Cotton-Braided Outer Cover
400 ft.	Interconnecting Cable for Audio Rack Wiring No. 20 Shielded Pair, Solid Conductor
200 ft.	Interconnecting Cable for AC and Filament Circuits No. 18 Shielded Pair, Stranded Conductor
	STUDIO AND ANNOUNCE BOOTH
1	Pressure Microphone
1	Desk Stand for Above
2	Ribbon Microphones
1	Floor Stand for Microphone
1	Microphone Boom Stand
2	Uniaxial Microphones
2	Desk Stands for Above
8	XLR-3-32 Microphone Receptacles
8	XLR-3-11C Microphone Plugs
3	"On-Air" Lights
2	Studio Monitor Speakers
2	Monitor Speaker Housings
2	Speaker Matching Transformers
1	16 inch Clock
300 ft.	Interconnecting Cable No. 22 AWG Shielded Pair, With Cotton-Braided Outer Cover
	RECORD LIBRARY
1	Turntable
1	Transcription Tone Arm
3	Pickup Heads
3	Transcription Equalizers and Filters
2	Utility Amplifiers
1	Monitor Amplifier for Audition
1	Plug-in Transformer for Amplifier
1	Selector Switch for Input of Amplifier
1	Monitor Speaker for Audition
1	Monitor Speaker Housing
150 ft.	Interconnecting Cable No. 22 AWG Shielded Pair, With Cotton-Braided Outer Cover
	MULTI-PURPOSE ROOM EQUIPPED AS STUDIO
1	Pressure Microphone
1	Microphone Mounting
2	XLR-3-11C Microphone Plugs
2	XLR-3-32 Microphone Receptacles
2	"On-Air" Lights
1	Monitor Speaker
1	Monitor Speaker Housing
1	Speaker Matching Transformer
1	16 inch Clock
50 ft.	Interconnecting Cable No. 22 AWG Shielded Pair, With Cotton-Braided Outer Cover
	MULTI-PURPOSE ROOM EQUIPPED AS A SUBCONTROL ROOM
1	Audio Consolette With Tubes
1	Dual Headphone
2	Three-Speed Turntables
2	Transcription Tone Arms
2	Pickup Heads
2	Transcription Equalizers and Filters
1	Tape Recorder
1	Input Transformer for Tape Recorder
1	Output Transformer for Tape Recorder
100 ft.	Interconnecting Cable No. 22 AWG Shielded Pair, With Cotton-Braided Outer Cover

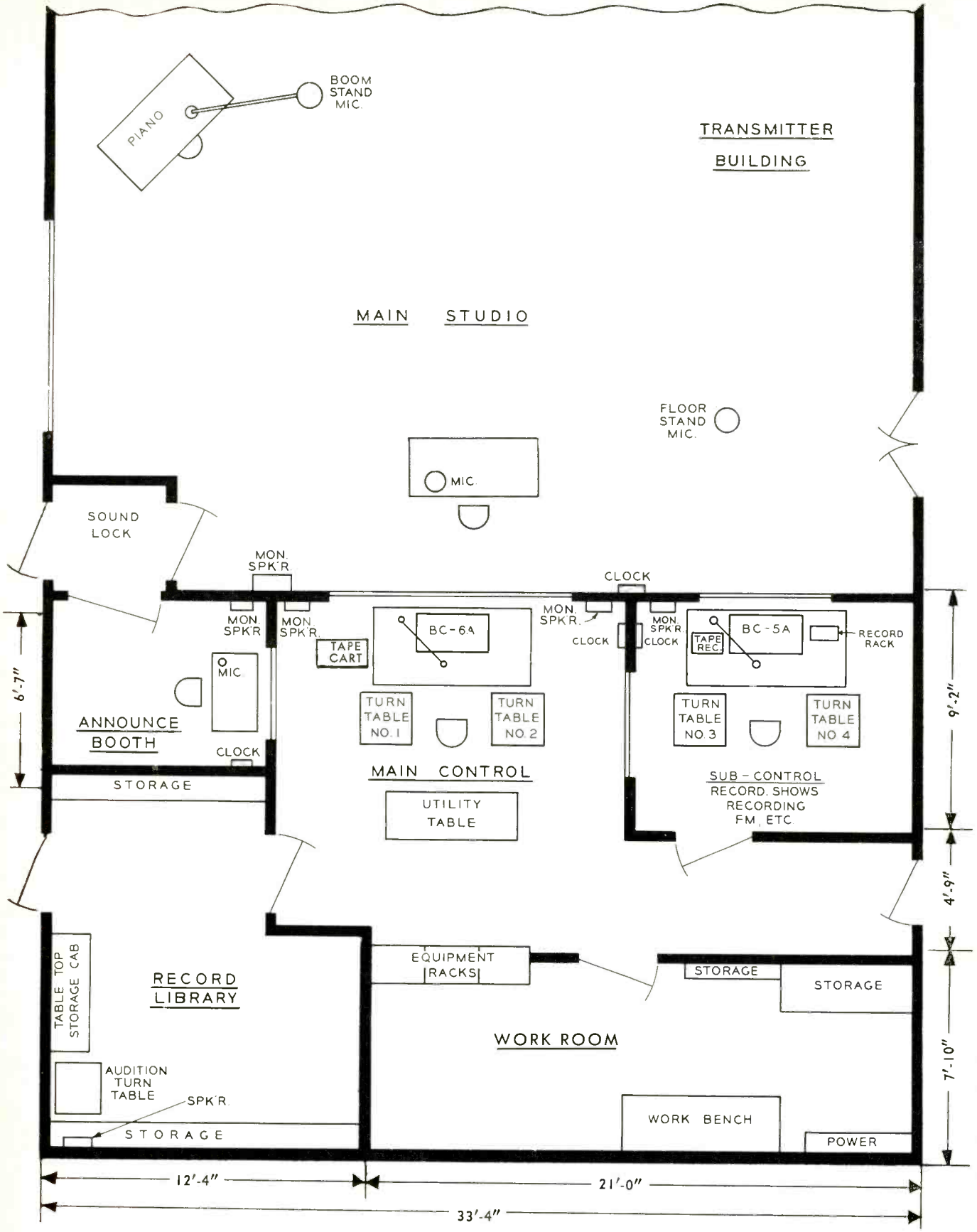


Figure 10. The Floor Plan C above is a very complete arrangement which includes a large studio that may be expanded if desired. The transmitter is not installed at the studio in this plan which is for a larger station where a separate transmitter location would be desirable.

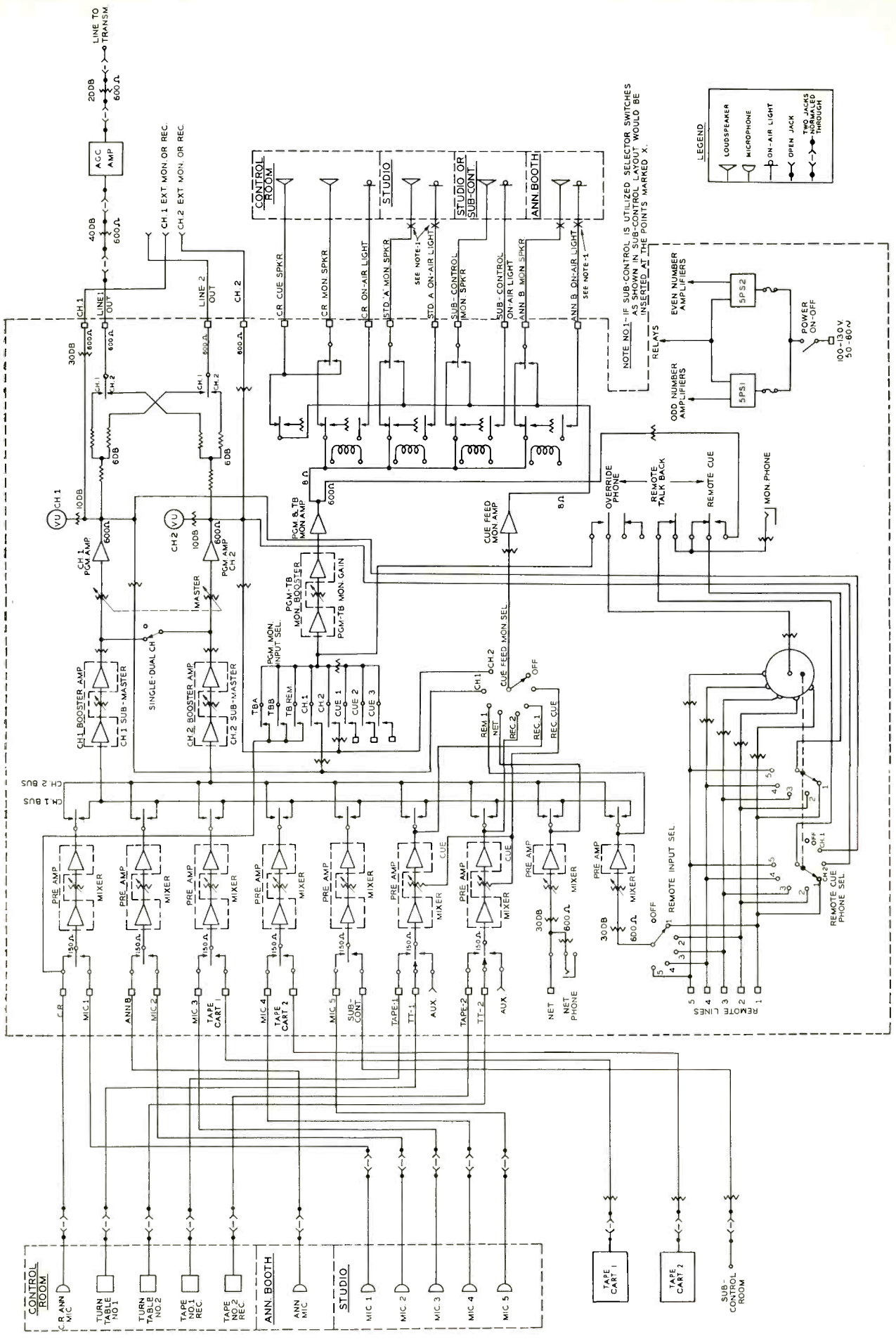
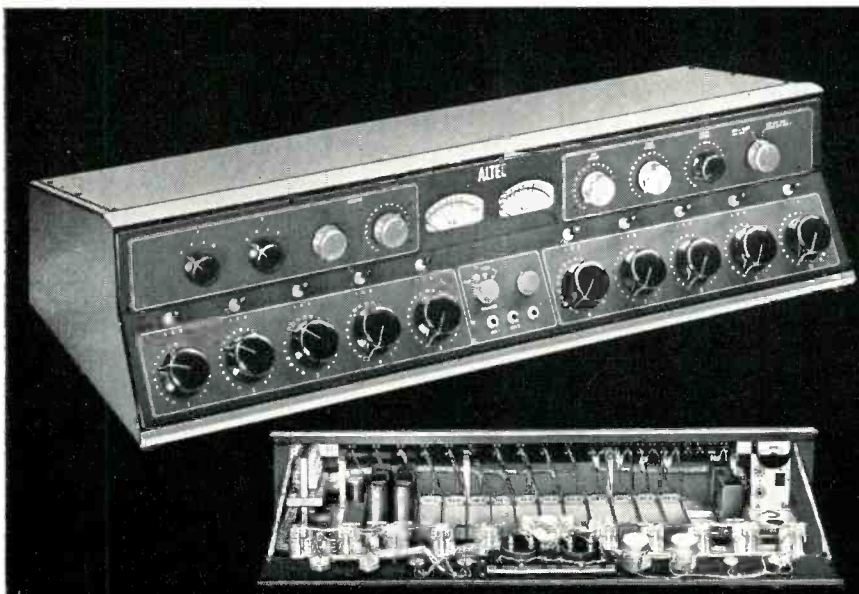


Figure 11. This diagram shows how the main control room of Plan C and associated equipment go together. The subcontrol contains a smaller console similar to the one in Plan A and is brought into the master control console. The console shown is an RCA BC-6.



Plug-in reliability with ALTEC professional audio equipment

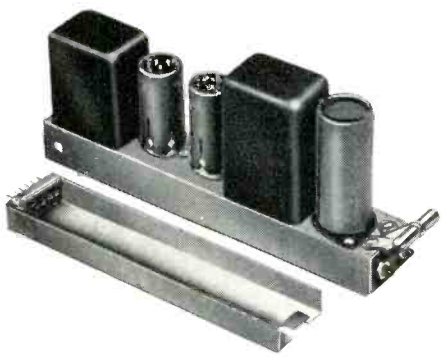
250 SU CONSOLE Combining compact simplicity with maximum flexibility through Altec advanced design, the new 250 SU Altec has proven to be the ultimate in control consoles for TV, AM, FM, recording studio or sound system use. Newly designed miniature plug-in preamplifiers, and utility input devices of uniform size and interchangeability permit free range in number and type of amplifiers used per console.

Characterized by single unit construction for simplicity (amplifiers and controls within same housing) and economical installation, Altec's 250 SU features an externally mounted power supply for cool operation and isolation of strong magnetic fields.

Providing complete circuitry for all stereo or universal operating functions, there is no finer, more reliable control console serving the audio industry. Individual components are available complete with plug-in trays for custom and rack installation.

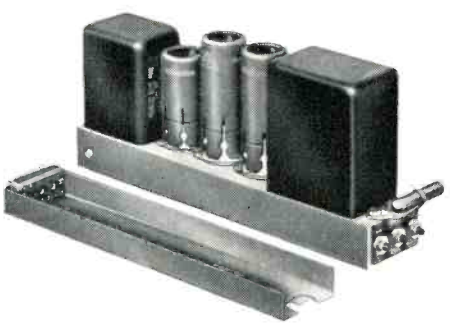
THE 250 SU FEATURES:

- Meets NAB, EIA, and recording requirements
- "Plug-in" units completely interchangeable
- Low impedance mixing
- Speech-music filter
- D.C. heater supply
- Utility input devices for tape-disc-line-networks, etc.
- Tube testing provisions
- Expandable to jack fields, equalizers, etc.
- Up to 10 mixing channels
- Single channel operation
- Two channel operation
- Two channel/three channel operation
- "Stereo" operation
- Illuminated meters
- Color coded controls
- 16 connected inputs
- Microphone level or "high level" on any input



458A "PLUG-IN" PREAMPLIFIER An extemely simple, highly reliable, low noise preamplifier, the 458A incorporates a single stage push-pull cross-neutralized vacuum tube circuit, transformer coupled to source and load. Maximum reliability with unfailing performance are achieved through simplified design featuring fewer components, extremely accurate balance of input and output transformers, and premium quality pre-aged, shielded tubes. The failure of either tube will not cause loss of program.

SPECIFICATIONS **GAIN:** 40db unterminated input, 34 db terminated. **POWER OUTPUT:** +20 dbm at less than .5% THD 50 to 15,000 cps. +25 dbm at less than 1% THD at 1 KC. **FREQUENCY RESPONSE:** ± 1 db 20 to 20,000 cps. **SOURCE IMPEDANCE:** 150 or 600 ohms (centertap for 600 ohms). **LOAD IMPEDANCE:** 150 to 600 ohms (centertap for 600 ohms). **OUTPUT IMPEDANCE:** Equal to load impedance. **NOISE LEVEL:** Equivalent input noise: −126 dbm. **POWER SUPPLY:** 15ma at 275vdc and .7a at 6.3vdc. **TUBES:** 2—6072/12AY7. **DIMENSIONS:** 1 3/4" W x 3 15/16" H and 9 11/16" L. **COLOR:** Cad plate, dichromate dip. **WEIGHT:** 3 1/2 lbs. (including tray). **SPECIAL FEATURES:** Push buttons for individual tube test. 40ma dc can be applied to center taps for simplexing. **ACCESSORIES:** 13225 Rack Mounting Assembly (for 9 units). 13401 Mounting Tray Assembly. 5981 Tube Test Meter. 535A Power Supply.



459A "PLUG-IN" PROGRAM AMPLIFIER A highly reliable, low noise program amplifier with exceptionally large power capability, the 459A consists of a 2-stage push-pull circuit with a balanced negative feedback loop. Push-pull operation of all stages provides reliability, interchangeability with preamplifiers for added gain and power. Superior overall performance results from special input and output transformer design of ultrafine balance combined with premium quality pre-aged shielded tubes. Program transmission is not interrupted by failure of either output tube.

SPECIFICATIONS **GAIN:** 56 db unterminated input, 50 db terminated. **POWER OUTPUT:** +30 dbm at less than .5% THD 30 to 20,000 cps. +35 dbm at less than 1% THD at 1 KC. **FREQUENCY RESPONSE:** ±1 db. 20 to 20,000 cps. **SOURCE IMPEDANCE:** 150 or 600 ohms (centertap for 600 ohms). **LOAD IMPEDANCE:** 150 or 600 ohms (centertap for 600 ohms). **NOISE LEVEL:** Equivalent input noise: −126 dbm. **POWER SUPPLY:** 40ma at 275 vdc and 1.6a at 6.3vdc. **TUBES:** 1—6072/12AY7, 2—12BH7. **DIMENSIONS:** 1 3/4" W x 3 15/16" H x 9 11/16" L. **COLOR:** Cad plate, dichromate dip. **WEIGHT:** 3 1/2 lbs. (including tray). **SPECIAL FEATURES:** Push buttons for individual tube test. 40ma dc can be applied to center taps for simplexing. **ACCESSORIES:** 13225 Rack Mounting Assembly (for 9 units). 13401 Mounting Tray Assembly. 5981 Tube Test Meter. 535A Power Supply.

535A POWER SUPPLY Compact, highly reliable, the 535A is the DC power supply for furnishing the operating voltages to the Altec 458A and 459A amplifiers used together with the Altec 250 SU Console. Externally mounted to preclude hum, the 535A employs silicon rectifiers in both the filament and "B" supplies. The 535A connects to the 250 SU by means of a 4-foot multiple conductor cable terminated in a type P306CCT Jones plug which "mates" with a Jones receptacle in the 250 SU Console. A single screw frees the power supply unit from its mounting bracket for inspection.

SPECIFICATIONS **POWER OUTPUT:** 275vdc at 275ma. At 275ma ripple is .02v peak to peak max. 6.3vdc at 13a. At 13a evc ripple is 1.5v peak to peak max. **POWER INPUT:** 117v 50-60 cps 245 watts at full load. **RECTIFIERS:** Silicon. **CONTROLS:** 1. Power Switch. 2. Circuit Breaker (Push to reset). 3. 4 Position tap switch (provides adjustment of voltage by autoformer action to accommodate 2 to 1 range of loads). **COLOR:** Dark Green. **WEIGHT:** 16 pounds. **SIZE AND MOUNTING:** 7 3/16" W x 9 5/8" H x 7" D overall.

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type of programs one wants to originate. The associated technical facilities suggested will handle choral groups, full orchestra, audience participation programs, etc.

Then there is the main control room equipped with a dual-channel control console. These two full channels, each with its own monitoring amplifier and power supply, provide maximum flexibility and reliability. Two three-speed turntables are employed. Two remote-controlled tape recorders and two monitor speakers, together with miscellaneous amplifiers and accessory items are included.

A highlight of this plan is the inclusion of a multi-purpose room. It may be a small studio, or, as it is shown equipped (Fig. 10), may serve many purposes as follows:

1. A subcontrol room serving the main studio for regular programing auditions or recording.
2. For disc-jockey type shows.
3. For separate programming of another channel such as FM or to another AM station.
4. As a recording control room.
5. Announce booth.
6. Auditioning special programs.
7. Standby, or
8. As a program "make-up" facility for automatic program utilization in the future.

The announce booth, record library, engineering work room and storage area follow closely the preceding plans.

Technical Facilities of Plan "C"

The major equipment item new to this plan is the dual-channel control console. A block diagram of the unit is shown within the system diagram in Fig. 11.

As used in the Plan "C" system this consolette is made to serve on command as: a master control, a "combo" or operator-announcer's control board; a program on one channel while running an audition or recording on the other. Figure 12 shows the rack layout for Plan "C."

At the beginning of this series of plans it was stated that they did not necessarily represent any existing stations, but that they illustrated several ways in which the equipment could be arranged, and the plans or combinations of them would satisfy a majority of cases. As Plan "C" is examined, it becomes

(Continued on page 31)

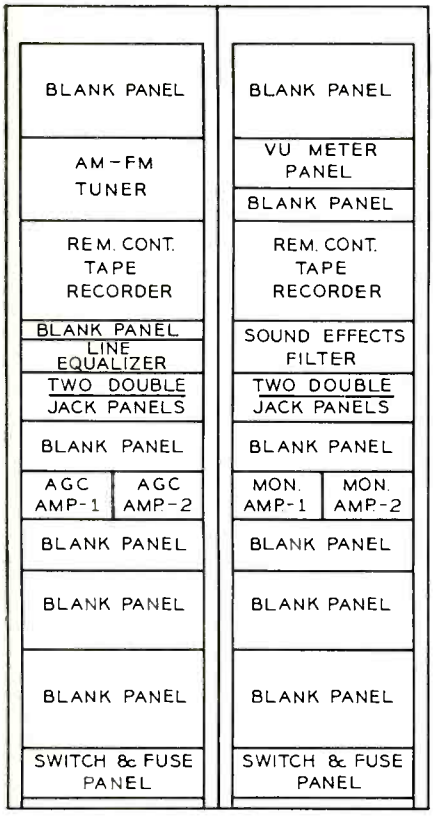
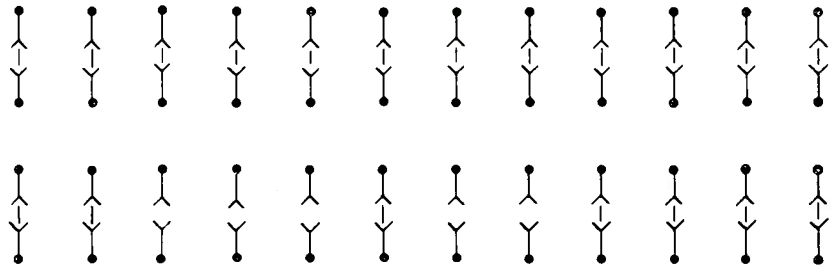


Figure 12. The Plan C rack includes optional features which may be desired in a larger broadcast operation.

C.R. MIC	ANN. B MIC	MIC 1	MIC 2	MIC 3	MIC 4	MIC 5	TT 1	TT 2	TAPE 1 OUT	TAPE 2 OUT	SUB CONT OUT 1
PRE AMP 1-A	PRE AMP 2-A	PRE AMP 1-B	PRE AMP 2-B	PRE AMP 3-A	PRE AMP 4-A	PRE AMP 5-A	PRE AMP 6-B	PRE AMP 7-B	PRE AMP 6-A	PRE AMP 7-A	PRE AMP 5-B
TAPE CART 1	TAPE CART 2	SPARE	SUB CONT PRE-AMP 1-B	SUB CONT PRE-AMP 3-B	TAPE 3 OUT	SUB CONT REM-1 IN	SUB CONT MON OUT	SUB CONT CONSOLE OUT	40DB PAD OUT	AGC AMP OUT	20DB PAD OUT
PRE AMP 3-B	PRE AMP 4-B	SPARE	SUB CONT PRE-AMP 2-B	NET LINE	SUB CONT NET IN	SUB CONT REM-2 IN	SUB CONT AUD OUT	40DB PAD IN	AGC AMP IN	20DB PAD IN	TAPE 3 IN



REM LINE 1	REM LINE 2	REM LINE 3	REM LINE 4	REM LINE 5	NET LINE	LINE EQ-ZR 1-IN	LINE EQ-ZR 2-IN	CONSOLE LINE-1 OUT	40DB PAD OUT	AGC AMP OUT	20DB PAD OUT
REM INPUT 1	REM INPUT 2	REM INPUT 3	REM INPUT 4	REM INPUT 5	NET IN	LINE EQ-ZR 1-OUT	LINE EQ-ZR 2-OUT	40DB PAD IN	AGC AMP IN	20DB PAD IN	LINE TO X MTR
SPARE	AM FM TUNER OUT	HOUSE MON 1-OUT	SPARE	SPARE	SPARE	SPARE	SPARE	HOUSE MON 2-OUT	SPARE	EXT MON 1	CONSOLE LINE-2 OUT
SPARE	HOUSE MON 1-IN	HOUSE MON CKT	SPARE	CUE 1-IN	CUE 2-IN	CUE 3-IN	HOUSE MON 2-IN	HOUSE MON CKT	SPARE	EXT MON 2	SPARE LINE TO XMTR

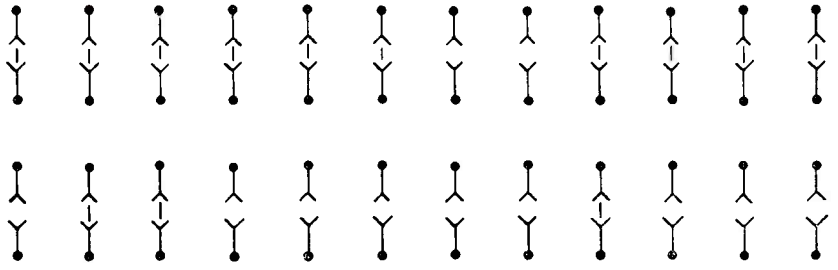


Figure 13. The jack panels for Plan C show how the additional facilities of the larger installation are arranged.

An Automatic Conelrad Attention Signal Unit

Construction details of a Conelrad actuating device are described which automatically provides the carrier interruption cycles and tone transmission.

By EUGENE SEIER*

THE UNIT described in this article does not perform all of the functions necessary in switching to the Conelrad frequency; however, it does relieve the operator of the critical operations involved, namely, the 5 second off, 5 second on, 5 second off, back on and 15 second 1000 cycle tone sequence. It can be built at nominal cost with tools and materials readily available in the average radio station. The only tools used, beyond the ordinary hand tools, were a quarter-inch electric drill and a sabre saw. The last mentioned item, although handy for cutting sheet metal, is not absolutely necessary.

The switching unit is built around a 1-rpm motor rotating a shaft on which four notched discs are mounted, with the notches so arranged as to actuate micro-switches to perform the necessary switching functions. This unit is built on a 5" x 9" sheet metal (16 gauge) sub-chassis, details of which are shown on the detail drawing (Fig. 1). Note that the bracket which supports the far end of the shaft must be a separate piece bolted on, to facilitate assembly and alignment. This is in turn mounted on a standard 5" x 17" x 2" chassis as shown in the photo. A large square hole was cut in this chassis to clear all bolts protruding from the bottom of the sub-chassis and was fastened by a bolt on each corner. The main chassis also contains a 1000-cycle RC oscillator and one stage amplifier with power supply.

The 1-rpm motor was obtained as a surplus item from Barry Electronics, New York, N. Y., at a cost of $1.95; however, if these are no longer available, a Hurst Type SM-1 motor available at most large electronic supply houses may be used with only slight modifications in the mounting needed.

The particular motor used in this model had a small gear just slightly over 3/8" in diameter mounted on a 1/8" shaft. It was decided to leave this gear intact and a 3/8" shaft bushing was reamed out slightly with a rat tail file to fit over this gear and fastened with a set screw. A 1/4" shaft bushing was then ground down on one end to fit into the 3/8" bushing by inserting a 1/4" rod, chucking in a drill clamped in a vise, and using a file as a lathe tool. This then gave a fitting for a 1/4" rod which is used as the shaft to rotate the discs.

The rod was obtained from a local hardware store and threaded its entire length except for the inch or so which is inserted in the 1/4" bushing on the motor. The shaft was cut approximately one inch longer than necessary so that the excess length could be chucked in a drill and the far end turned down to 3/16" using the file method. The excess length was then cut off. The outer bearing is a 3/16" bushing salvaged from an old filament rheostat.

The discs were fashioned from 1/8" aluminum and were first cut out using a 2-1/2" circular hack saw. Each disc was then fastened to a short 1/4" bolt, chucked in the drill, and trued with a file, after which all four discs were fastened on the bolt together and turned to the same diameter. The notches to operate the microswitches were made with a rat tail file and are approximately 7/16" across and 1/8" deep. The first disc has only one notch and is used to control the power to the motor. When the microswitch

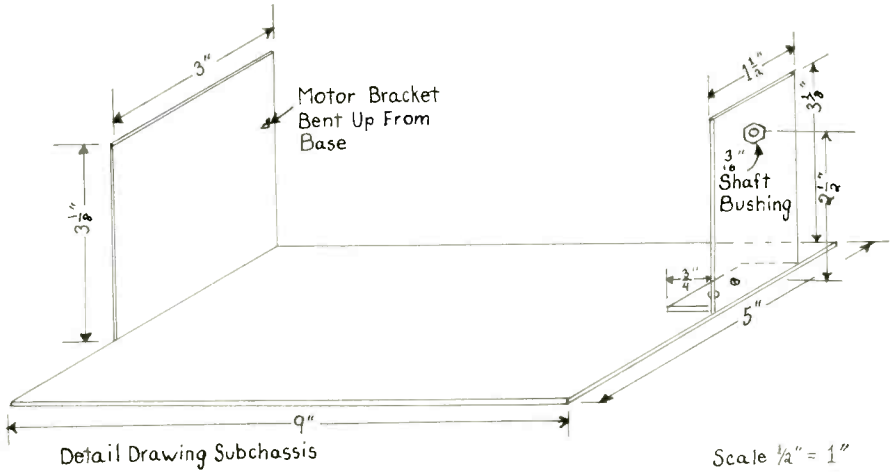
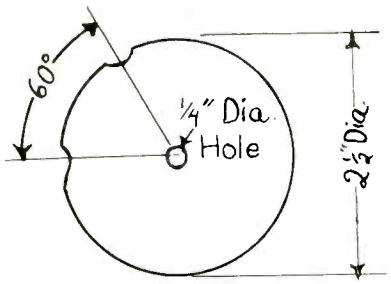


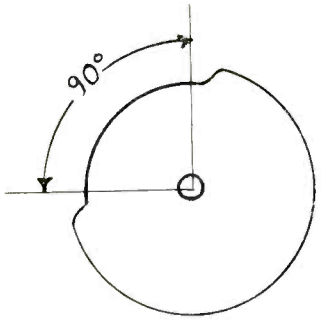
Figure 1. Detail drawing of subchassis for Conelrad device.

*Technical Supervisor, KMMJ, Grand Island, Neb.



Detail On & Off Disc.

Figure 2. Disc which operates the cam operated switch and interrupts the transmitter carrier.



Detail Tone Disc

Figure 3. Disc which keys the tone signal.

roller is in the notch, the circuit to the motor is broken and the motor is started by either the push button or the remote relay. As soon as the microswitch climbs out of the notch the motor will continue to rotate until the switch again drops into the notch or when it completes one revolution.

The two middle discs control the carrier off and on operations respectively and are identical, with notches 10 seconds or 60 degrees apart, the only difference being the relative position of the notches with respect to the rotation of the shaft. It was found easier to cut one notch in these discs, mount them in position on the shaft and with the microswitch also in position, finding the correct spot for the second notch by running the motor and timing with a stop watch. The notches can then be touched up with a file and the microswitch adjusted to get exactly ten seconds between actuations. When one disc is completed it can be used as a pattern for the second disc. The details on this can be seen by referring to the drawing (Fig. 2).

The fourth disc has a notch 15 seconds long or 90 degrees between actuations and is used to control the length of the tone by grounding the grid of the amplifier stage until the microswitch drops into the notch. This notch was made by making two notches 15 seconds apart using the same method described above and then filing out the material in between as shown in Fig. 3 of the drawing. All discs were then mounted on the shaft in their proper positions, as shown in the photo, by using a hex nut on each side. By loosening one nut the discs can be rotated to obtain the proper relative positions necessary to turn off the carrier for 5 seconds, on for 5 seconds, off for 5 seconds, back on and transmit a 1000 cycle tone for 15 seconds.

The microswitches used were Acro Type RD-70-1S, Roller Type, SPDT, and at $1.88 each are the most expensive item in the unit. They are mounted on right angle brackets fashioned from 16-gauge sheet metal. Tht brackets are fastened to the sub-chassis by tapping a hole for a No. 6 screw in the sub-chassis with the hole in the bracket being slotted so that the position of the microswitch relative to the discs can be adjusted. Although this system has been satisfactory so far it could be improved upon by making the bracket wide enough so that two screws could be used.

The tone oscillator, as can be seen from the schematic diagram, is a straight forward RC oscillator using one section of a 12AX7, the other section is used as an amplifier. The parts arrangement is not critical, however it is a good idea to mount the middle condensers in the RC network in an accessible location so that the value can be changed to adjust for proper frequency. The values shown were determined by zero beating against an audio oscillator. The maximum output of the amplifier is plus 10 dbm and can be varied over a wide range with the gain control to cover most input arrangements.

The power supply is not critical and almost any booster or preamp type power transformer with a selenium rectifier and the necessary filtering should be sufficient.

It will be noted that the microswitches are wired to actuate other on and off relays. In our case these are the Rust momentary type relays used in the Rust remote control system. This was a matter of convenience since this then only involved the running of one low voltage cable between the transmitter and the unit. Since the microswitches are SPDT, the contacts can easily be arranged to work with most momentary push-button transmitter control systems by changing the connections on the "off" microswitch and connecting in series with the "Plate Off" button on the transmitter. The "on" microswitch with the connections as shown can be connected across the "Plate On" button.

Another little innovation incorporated into the unit as a safety factor is the use of a DPST on-off switch. As can be seen from the schematic, when the switch is turned off it not only opens the ac to the tone oscillator but also breaks the control circuit while the motor circuit remains completed. This is in case the actuating button should be inadvertently pushed. The unit can be immediately deactivated before it goes through the entire cycle. The motor will continue to run until it completes its revolution after which the on-off switch may be turned back on. This arrangement would have to be changed slightly if the unit were to be used to control the plate on-off circuits directly instead of with the Rust relays.

Final adjustment of the unit was made with the unit hooked to the transmitter and with the plate circuit-breakers open, the relay operation was timed with a stop watch. It was necessary to make some slight adjustments by rotating the on-off discs on the shaft to compensate for the delay caused by relay operation in the transmitter. When adjusted the timing of the five second sequences was plus or minus 0.25 seconds. The tone level was adjusted during the experimental period for 75 per cent modulation by temporarily removing one wire from the tone microswitch and adjusting the main control. In our case the audio is fed into the system through a spare channel in a four-channel mixer which is part of

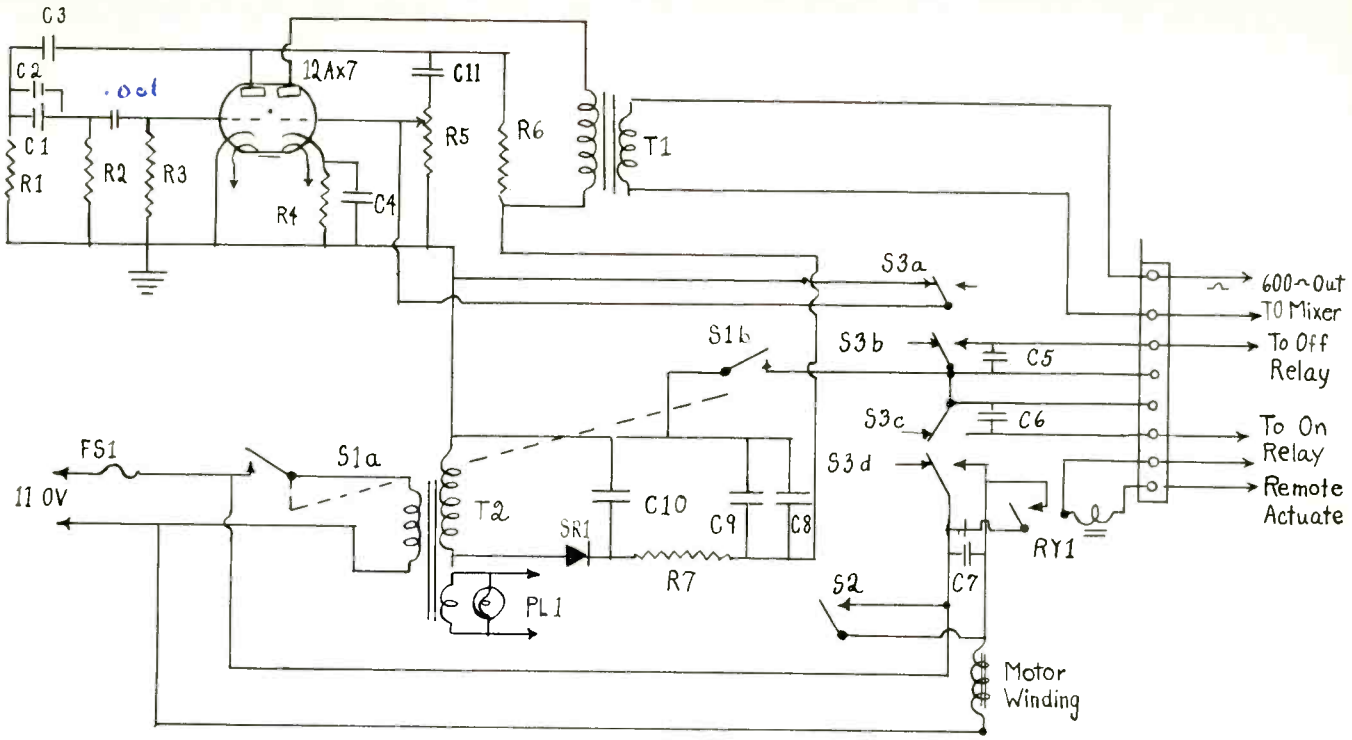


Figure 4. Schematic diagram of Conelrad unit which includes the tone oscillator. Parts values are as follows.

R 1—47000 ohms
R 2—47000 ohms
R 3—270000 ohms
R 4—2200 ohms
R 5—2 megohms
R 6—47000 ohms

C 1, C 2, C 3 — .001 mfd
C 4—25 mfd
C 5, C 6, C 7 — .5 mfd
C 8, C 9—20 mfd
C 10—50 mfd
C 11 — .01 mfd

T1—Stancor A3250
T2—TV booster transformer
FS1—3 ampere
SR1—50 ma selenium rectifier
PL1—No. 47 pilot lamp
S1a, S1b, DPST toggle switch
S2—Pushbutton actuate switch
S3abcd—SPDT microswitches
RY1—Remote operated relay

the audio system at the transmitter and this channel is left switched in at all times.

The remote actuating relay, if desired, can be any relay which will fit under the chassis with the coil voltage determined by the control voltage available.

This unit has been under weekly test for several months with one failure due to a defective oscillator tube.

Although this unit was first built as a noble experiment and no further functions were contemplated at the time, it readily lends itself to further modifications by adding extra discs and more microswitches on the upper side to perform additional functions in conjunction with Conelrad. For instance, another microswitch mounted exactly opposite the motor control microswitch can utilize the same notch in this disc to actuate a tape playback machine to broadcast a short Civil Defense message.

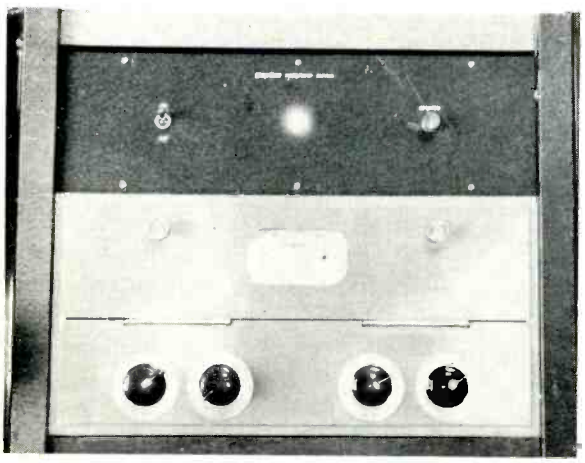


Figure 5. Panel view of Conelrad Attention Signal shown mounted above limiting amplifier.

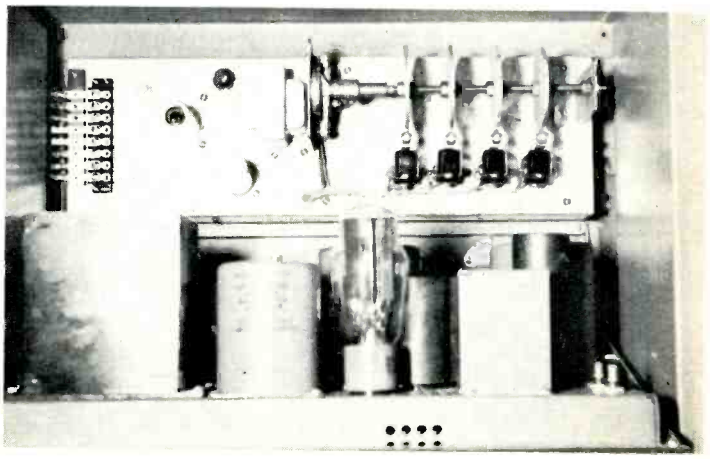


Figure 6. Rear view of unit shown mounted in rack above limiter.

". . . an additional phase of operation significant . . ."

STUDIO PLANNING starts on page 12

evident that some of these features would readily adapt themselves to Plan "B." With the cross-application possibilities of these plans, practically all programming requirements can be met.

Now that we have covered the station's plant facilities, there is an additional phase of operation that is a very significant revenue producer in many markets, and that is "on-the-spot" program origination. This phase of operation may be divided into three categories:

1. "On-the-spot" tape recording—accomplished with a portable tape recorder for playback at a later time.

2. Direct pickup at a remote location, using a remote amplifier and telephone lines.

3. Direct pickup at a remote location using a radio link between the remote point or program origination and the radio station. This method of remote pick-up warrants some discussion.

Remote Pickup Via Radio Link

Presently there is authorized by the FCC several remote pickup channels for use by the broadcaster. Categorically, they fall into three different frequency bands identified as the 26-mc band, the 150-mc band and the 450-mc band. Recently, the 450-mc band has become the most popular for this application. In this frequency range there is less interference from man-made noise. The equipment, especially the antenna, is much smaller physically, so higher gain antennas can be conveniently used. The channels authorized in this band are not shared by other services.

It is necessary to file an application with the FCC for authorization to use this service. At this time FCC Form 313 is to be used for this purpose. With a little imagination many revenue-producing applications can be readily recognized. A few well known ones are: sporting events, special events, on-the-spot accident and other newsworthy reports, traffic information during rush hours, farm programs and origination of special shows directly from sponsor locations.

". . . site selected offered a good receiving location . . ."

STEROPHONIC starts on page 2

and 2) show the facilities and test equipment used at the KDKA-FM transmitter in Pittsburgh. Figure 3 shows the facilities used at the Uniontown receiver site.

Selection of the Uniontown Motel in Uniontown, Pa., for the reception test site was based on its affording a good receiving location for the three field strength conditions (1,000, 200 and 50 microvolts per meter) and living accommodations. For 1,000 microvolts field strength levels a Channel Master 5-element FM Yagi antenna (furnished by General Electric) was used at a height of approximately 20 ft. above the ground. The low field strength levels were obtained by lowering the antenna height to 10 ft. and 40 inches above ground level, respectively. It was originally intended to utilize a dipole antenna at the receiving site. But initial tests resulted in such great multipath effects because of the terrain surrounding Uniontown that a more directional antenna proved necessary in order to measure accurately such parameters of the system as distortion, crosstalk, etc.

In addition to the measurements already mentioned, recordings of each system were made at both the transmitting and receiving site for subjective evaluation of the monophonic main channel, the simultaneous stereophonic transmission and an unrelated program on the 67 kc. SCA multiplex channel.

Representing the FCC at the tests were Harold L. Kassens, chief of aural existing facilities branch of the broadcast facilities division; John T. Robinson, office of chief engineer, and Commissioner Robert T. Bartley.

For subjective program quality evaluation of the systems, panelists used a 42-minute test tape prepared by F. K. Harvey under the direction of Dr. M. R. Schroeder of Bell Telephone Laboratories. The test tape included signals for adjusting the azimuth of the reproduce head, reference level tones, white noise and stereophonic recordings of representative types of music at widely separated dynamic levels.

Reproduction of the test tape and all related recording was handled by Ampex Model 354 two-channel recorder/reproducers, featuring electronic circuitry specifically designed for recording and reproducing stereophonic programs.

At the KDKA-FM transmitter, three Ampex 354's were used—one for reproducing the test tape, one for recording the stereophonic transmission and one for recording the monophonic and SCA transmissions. At the Uniontown receiving site, one Ampex 354 was used to record the stereophonic program while a second 354 recorded the monophonic main channel as well as the SCA reception.

One wing of the motel served as the receiver laboratory as well as living quarters for some of the field test personnel. The Yagi receiving antenna required to reduce multipath effects was mounted on an adjustable mast situated on a small hill behind the building. This antenna fed an impedance matching transformer and a 200-ft. length of 75-ohm coaxial line which terminated in a distribution-attenuation box in the receiver laboratory. This box, in turn, fed the RCA field strength meter directly, whereas baluns again were used to feed the respective 300-ohm receiver inputs.

A Fisher and a Granco FM tuner were used for receiving all compatible monophonic main channel transmissions. The 67 kc multiplex program was received by a Bogen SCA receiver. The outputs of the stereophonic receivers were measured through isolation amplifiers supplied by H. H. Scott, Inc.

All of the receivers had been calibrated previously in the H. H. Scott laboratory as an assignment of the receivers subcommittee. Although this materially reduced the work of the field test group, more than 3200 measurements were made at Uniontown to evaluate the respective systems.

Once the FCC establishes a standard and compatible monophonic and stereophonic broadcasting becomes a reality, present day FM receivers will receive a monophonic rendition of stereo programs, while new FM receivers, or older FM receivers fitted with inexpensive adapters, will receive the full stereo broadcast.

AMENDMENTS AND PROPOSED CHANGES OF F.C.C. REGULATIONS

REQUIREMENTS FOR FREQUENCY MONITORS

Order Extending Time for Filing Comments

In the matter of amendment of Part 3 of the Commission rules governing TV Broadcast Stations concerning requirements for frequency monitors.

The Commission has before it for consideration a request of the National Association of Broadcasters (NAB) filed on December 20, 1960 for an extension of time within which to file comments in the above-entitled proceeding from December 26, 1960 to March 13, 1961.

NAB states that it contemplates submitting the proposal outlined in the proceeding to its Engineering Advisory Committee but that, due to the holiday season, this cannot be done in time to submit comments by the date set by the Commission. It urges that the grant of the additional time will enable it to submit information which will assist the Commission in reaching a final decision in this matter.

The Commission is of the view that the public interest would be served by granting the requested extension of time in order that parties may have the fullest opportunity to submit meaningful and useful data on the proposal which would have an impact on the television broadcast industry. NAB points out further that the present rules waive the requirement for television broadcast stations to install type-approved frequency monitors to February 28, 1961 and that a grant of the instant request would require an extension of the waiver. This may, however, be accomplished at a later date by separate order.

In view of the foregoing: *it is ordered*. This 21st day of December, 1960, that the request of National Association of Broadcasters for an extension of time is granted, and that the time for filing comments in response to the Notice of Proposed Rule Making is extended from December 26, 1960, to March 13, 1961, and the time for filing reply comments is extended from January 6, 1961, to March 23, 1961.

CONELRAD DRILLS AND TESTS

Operator Requirements

1. The Commission has before it for consideration a proposal to amend the operator requirement rules insofar as they pertain to standard broadcast station operation in the Emergency Broadcast System.

2. The Commission, on January 26, 1953, in Docket No. 10214, amended Parts 3 and 13 of its rules to provide that a person holding any class of radio operator license (or permit) who is authorized to perform limited operation of a standard broadcast station, may make adjustments "when a CONELRAD Radio Alert is called * * *" provided that the station's responsible radiotelephone first-class operator shall have previously instructed such person in the adjustments to the transmitter which are necessary to accomplish CONELRAD operation.

3. Under the provision of the above rules, a holder of a restricted radiotelephone operators permit may switch the broadcast transmitter to the Emergency Broadcast System frequency, in the event of a real CONELRAD Radio Alert, but does not permit such an operator to make the necessary transmitter adjustments in order for the station to take part in a test or drill of the Emergency Broadcast System.

4. Emergency Broadcast System drills have been conducted during the past years in accordance with the provisions of § 3.971. There is reason to believe that such drills will continue to be held in the future under the provisions of § 3.970. Many stations conduct tests of the Emergency Broadcast System on a local basis as well as on state and regional basis.

5. Many of the CONELRAD tests have been called when the required radiotelephone first-class operator was not available and thus authorized stations were unable to participate in the necessary tests. The same situation occurred in many instances during the once a year drills.

6. In order to properly train lesser grade operators and to keep them familiar with the necessary Emergency Broadcast System operating procedure as well as to insure operation by all stations having a National Defense Emergency Authorization, it appears necessary to amend the rules to provide that the lesser grade operator may make the necessary transmitter adjustments in order to participate in tests and drills of the Emergency Broadcast System, as well as during a real CONELRAD Radio Alert.

7. The Commission is of the view that a rule-making proceeding should be instituted in this matter in order that interested parties may submit their views on the proposed amendments as set forth below.

8. Authority for the adoption of the proposed amendments is contained in sections 4 (i), 301, 303 (b), (c), (f), and (r) of the Communications Act of 1934, as amended.

9. Pursuant to applicable procedures set out in section 1.213 of the Commission's rules, interested parties may file comments on or before January 23, 1961, and reply comments on or before February 3, 1961.

10. In accordance with the provisions of § 1.54 of the rules an original and 14 copies of all written comments shall be furnished the Commission.

1. It is proposed to amend that portion of § 3.93 (b), which precedes subparagraph (1), to read as follows:

§ 3.93 Operator requirements.

* * * * *

(b) A station which is authorized for non-directional operation with power of 10 kilowatts or less may be operated by persons holding commercial radio operator license of any class when the equipment is so designed that the stability of the frequency is maintained by the transmitter itself within the limits of tolerance specified, and none of the operations, except those specified in subparagraphs (1) through (4) of this paragraph, necessary to be performed during the course of normal operation may cause off-frequency operation or result in any unauthorized radiation. (A person holding any class of radio operator license or permit who is authorized thereunder to perform limited operation of a standard broadcast station may, when a CONELRAD Radio Alert is called, or for the purpose of participation in a drill or test of the Emergency Broadcast System, make adjustments necessary to effect operation in accordance with a National Defense Emergency Authorization: *Provided,* That the station's full-time radiotelephone first-class operator shall have previously instructed such person in the adjustments to the transmitter which are necessary to accomplish operation in the Emergency Broadcast System.) Adjustments of transmitting equipment by such operators, except when under the immediate supervision of a radiotelephone first-class operator, shall be limited to the following:

2. It is proposed to amend § 13.62 (d) to read as follows:

§ 13.62 Special privileges.

* * * * *

(d) When a CONELRAD Alert, or a drill, or test of the Emergency Broadcast System is called a person holding any class of radio operator license or permit who is authorized thereunder to perform limited operation of a standard broadcast station may make any adjustments necessary to effect operation on an Emergency Broadcast System frequency in accordance with the station's National Defense Emergency Authorization: *Provided,* That the station's responsible first-class radiotelephone operator (s) shall have previously instructed such person in the adjustments to the transmitter which are necessary to accomplish operation in the Emergency Broadcast System.

Industry News

Altec Advances Sales Executives

Effective Jan. 1, 1961, Altec Lansing Corp.'s president, A. A. Ward, announced the appointment of H. S. Morris as marketing director for the corporation. Concurrent with this appointment is that of G. L. Carrington, Jr., as general sales manager.

H. S. Morris has served as product sales manager for Altec for the

H. S. Morris

G. L. Carrington, Jr.

past 18 years and will direct the enlarged sales activities from the corporate offices in Anaheim, Calif. H. S. Morris has had extensive field sales and marketing experience and is an alumnus of the Graduate School of Sales Marketing and Management at the University of Syracuse.

G. L. Carrington, Jr., has served with Altec as commercial and marketing manager for the past eight years with prior experience in both its engineering and production departments.

NAB Asks Rule Making On Automatic Logging

The National Assn. of Broadcasters has filed a petition for rule making with the Federal Communications Commission asking that electro-mechanical automatic logging devices be allowed in lieu of manual logging for the required recording of operational measurements in radio and television stations.

Under current FCC rules, operating logs must be kept manually. Granting of the request for rule making would give licensees the authority to maintain their operating logs either manually or with new automatic logging systems.

A. Prose Walker, manager, and George Bartlett, assistant manager of the NAB engineering department, cited specific examples of superior accuracy by the automatic systems over manual methods in exhibits made a part of the petition. Many of the exhibits were in the form of automatic and manually kept operating logs submitted by those stations participating in the experiment for the NAB. Among those stations were: WSJS, Winston-Salem, N. C.; WTOP-AM-FM-TV, Washington, D. C.; WIP, Philadelphia, Pa.; and KFI, Los Angeles, Calif.

The petition was filed after many months of experimental operation of the equipment. Members of the NAB engineering staff followed the progress and success of the automatic loggers with an eye to adoption of this system by member stations, and the broadcast industry as a whole.

The logging apparatus, manufactured by the Broadcast Division of Radio Corp. of America, Texas Instruments Inc., and the Brown Instrument Division of Minneapolis-Honeywell Regulator Co., was successfully operated at several radio and television stations, at both the transmitter site, and through remote lines at the studio site. In the case of remote operation, the automatic logging equipment used existing control lines to the transmitter site, so the need for additional lines was eliminated.

The automatic loggers can be installed to record all parameters normally entered manually. It records such readings as output current, final stage plate current and voltage, obstruction lighting, frequency deviation, operating hours, and any interruptions to the carrier. In tests, all readings were recorded with an unusually high degree of accuracy, and all at the precise times called for by the operating logs or sooner.

The petition said this logging system is an extension of actual remote control of equipment, and this control has not brought about any degradation in the technical operating standards of stations. It added that this system would virtually eliminate improperly maintained operating logs, the most cited category of violation of FCC rules.

Included within the petition for rule making was a request that the FCC relax its rules concerning frequency deviation readings for AM broadcast stations. More than 1700 stations reported to NAB that a six-month average deviation rarely exceeded plus or minus three cycles per second. The NAB had asked in an earlier petition that AM broadcast stations be permitted to make entries of frequency deviation only at the beginning and end of each broadcast day, or in the case of 24 hour stations once in each 12-hour period. In reviewing the earlier petition, the Commission left the door open to further consideration when the information on automatic logging was filed by NAB.

ITA, Inc. Appoints New Sales Director

Bernard Wise, president of ITA, Inc., Lansdowne, Pa., one of the world's largest manufacturers of broadcast transmitters, has announced the appointment of R. Paul Comstock, Jr., as director of sales. In his new position, Comstock will direct and coordinate the activities of the company's three sales divisions — broadcasting, government and industrial, and export. Joseph Novik continues as manager of broadcast sales and Eliot Baker as manager of government-industrial sales.

Comstock comes to ITA, Inc., from Schafer Engineering, a division of Textron Electronics, where he was marketing manager.

NAB Opposes FAA Hearings on Tall Towers

The National Assn. of Broadcasters has opposed as unnecessary and tremendously wasteful in time, money and manpower a proposal for formal hearings by the Federal Aviation Agency in determining whether new broadcast towers would constitute a hazard to air safety.

The association also suggested several modifications of other FAA proposals concerning heights and locations of tall structures. NAB said the modifications would assure "fair and equitable" treatment for all parties concerned.

NAB's position was outlined in testimony by Charles H. Tower, its vice-president for television, at an FAA hearing.

Mr. Tower was accompanied by A. Prose Walker, NAB manager of engineering, and Douglas A. Anello, NAB chief counsel.

Mr. Tower said broadcasters believe that a procedure which would produce a decision on tower structures "quickly and informally" would be advantageous not only to their industry but to aviation as well.

Noting that the Federal Communications Commission is the final authority on granting broadcast licenses and must hold a hearing on the evidence before denying an application, he said an "elaborate and extremely formal" hearing by the FAA on the very same issue would be an unnecessary duplication of effort.

"The requirement that two hearings be held," he added, "would only serve to make even longer an already time-consuming procedure and would seem to be a tremendous waste of manpower, time and money from both the governmental and industry point of view."

Mr. Tower also suggested elimination of an FAA proposal to require broadcasters to notify the FAA administrator of any proposed construction or alterations that might involve a hazard to air navigation. He said the proposal is unnecessary since such notice to the FCC already is required and the FCC never acts on such applications until it receives the FAA's views.

The NAB vice-president also suggested modifications in FAA's proposed rules for evaluating the aeronautical hazards of proposed towers and other tall structures. If adopted, he said, the procedures then would be "fair and equitable."

It would work this way:

Applicants and those who might have objections should appear in person at an informal hearing in the area prepared to cite the facts and to answer questions posed by others.

Findings should be sent to Washington within 20 days, with copies mailed to each participant.

Participants would have 20 days after receipt of the findings to file their comments with the Washington office.

FAA's Office of Airspace Obstruction Evaluation would issue its findings to the FCC and, in case of an adverse recommendation, would recite the facts used in reaching its conclusion, cite changes in air operations necessary should the construction go through, and state the maximum height and location the FAA would approve, along with suggested alternate locations.

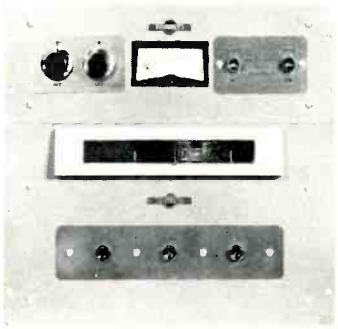
1961 IRE International Convention Set for March 20-23

March 20 through 23 have been selected as the dates for the 1961 IRE International Convention, which will again be held at the Waldorf-Astoria Hotel and New York Coliseum in New York City. More than 70,000 engineers and scientists from 40 countries are expected to attend what has become the world's largest technical meeting and exhibition.

A comprehensive program of 275 papers, covering the most recent developments in the fields of all 28 IRE Professional Groups, will be presented in 54 sessions at the Waldorf-Astoria and the Coliseum. The high point of the program will be a special symposium on new energy sources to be held Tuesday evening, March 21, at the Waldorf. The complete program will be announced in January.

The IRE Show, filling all four floors of the Coliseum, will accomodate approximately 850 exhibitors. Some $15,000,000 worth of the latest electronic equipment will be on display, most of it for the first time.

Product News



NEW AUTOMATIC TAPE UNIT

A new model of Collins Radio Co.'s automatic tape programming equipment was introduced to broadcasters during the 1960 NAB Fall Conferences. The equipment, now in production, features an improved record/playback assembly superior to the original model introduced to the broadcasting industry by Collins 1½ years ago.

The record/playback assembly of the new Collins automatic tape programming equipment is mounted on a machined, cast aluminum deck which increases the precision of the unit. An adjustable capstan

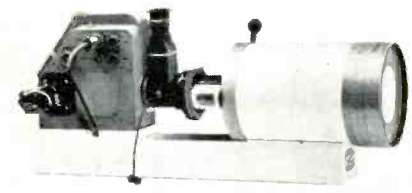
Advertisers' Index

pressure roller and its linkage system are powered by a heavy duty solenoid that has withstood two million test activations without showing any appreciable wear.

The unit is powered by a Bodine synchronous motor driving a balanced, solid brass flywheel. The tape speed of 7½ inches per second is 99.6 per cent accurate with less than 0.2 per cent wow and flutter. The driving torque of the flywheel permits syllable-splitting cueing and a start and stop time of less than 0.1 second.

Frequency response is ±2 db at 70-12,000 cps, with a signal-to-noise ratio of 55 db or better. Silicon diodes are used throughout in the power supplies. Various auxiliary connections are built-in for remote operation and sequencing of multiple units.

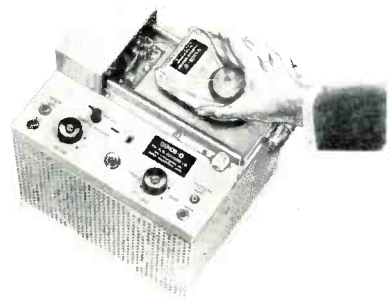
Cueing is a completely automatic process. Tone bursts recorded on the bottom half of the endless tape, contained in a cartridge, cue it for the next play or for activating other units.



NEW TELEPHOTO LENS

Zoomar, Inc., of Glen Cove, N. Y., and Hollywood, Calif., originators of the first zoom lens for motion picture cameras, has announced its latest development in high precision optics—the F/4-20-inch Zoomar Reflectar. The new lens is light, compact, and apochromatically corrected. It has an internal focusing device like all the high precision Zoomar lenses, has great resolving power, brilliance, and easy adaptability to all types of motion picture and ITV cameras. All lens elements are anti-reflection coated.

Several of the most important features of the lens include: Adaptability to all types of 16mm and 35mm motion picture and TV cameras; high resolution resolving power; compactness and light weight . . . distance from front to film plane—14 inches; outside diameter — 6¼ inches; weight — approximately 7 lb.; closest focusing distance—500 ft. A filter frame or filter wheel is available as optional equipment.



TAPE CARTRIDGE UNIT

The C. H. Alvord Co. announces Quick-Q, a compact, packaged instrument designed to speed and simplify radio stations' use of spot commercials.

A tape cartridge unit, Quick-Q performs precisely in proper sequence, handling a number of spots that can range from five second to five minute duration. Engineered for simplicity of operation, Quick-Q requires only insertion of desired cartridge and depressing of a conveniently placed starting lever to become "airborne."

For further information write to the C. H. Alvord Co., 1000 Farmington Ave., West Hartford, Conn.

NAGRA III B RECORDER

Shown above is a view of the Nagra portable recorder. The tape is driven by a dc motor, speed is electronically stabilized by a transistorized FM tachometer and servo-amplifier. Response at 15 ips is 30 to 15,000 cps plus or minus 1.5 db. At 7.5 ips the response is 40 to 12,000 cycles. Further information is available from Electronic Applications, Inc., Stamford, Conn.

Product News

PARABOLIC ANTENNA PROTECTOR

Tower Construction Co., Sioux City, Iowa, has devised an inexpensive means of protecting parabolic antennas from the buffeting of severe winter weather.

Protection can now be obtained with a parabolic antenna cover, which is cone shaped and made with molded fiberglas.

According to Tower engineers, the fiberglas Para-Dome costs from 35 to 50 per cent less than other protective type covers.

The Para-Dome has been designed to withstand wind force of 50 lb. per square foot. Tests have proved that signal attenuation between 2000 and 6200 megacycles is within .1 db.

Officials at Tower pointed out the Para-Dome is available for use with reflectors of 4 ft., 6 ft., 8 ft., and 10 ft. sizes. Special sizes are available on request.

Additional information can be obtained by writing Tower Construction Co., 2700 Hawkeye Drive, Sioux City, Iowa.

MICROWAVE BROCHURE

Electronic Systems, a division of Mechanical Products, Inc., Jackson, Mich., offers a descriptive brochure describing its new line of microwave equipment. The microwave systems operate in the 10,500 to 13,200 megacycle range for point-to-point FM transmission of television signals, one-way voice communications channels and data channels. Power output is 0.1 watt and the baseband width is 5 megacycles.

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Advertising rates in the Classified Section are ten cents per word. Minimum charge is $2.00. Blind box number is 50 cents extra. Check or money order must be enclosed with ad.

EQUIPMENT FOR SALE

Brand new dehydrators, with spare parts kit. Take your pick of Dielectric Products Model 22 for $150 or Andrews 1910 for $135. P & O Sales, 1236 - 40th Avenue, Sacramento 20, California. 1-61 3t

Magnecord 8 hour automatic players $350, brand new, originally $800, make excellent spare machine for Multiplex operators. Station KCFM, 532 DeBaliviere, St. Louis, Mo. 1-61 2t

Perfect Condition Fairchild 524A two speed Lip-Sync turntable, Presto RC-10-24 studio tape recorder, Altec M-11 condenser microphone system, RCA 44BX microphone. Original cost $2,500, will sell $1,200. Reco-Art Sound Studios, 212 North 12th St., Philadelphia, Pennsylvania. 1-61 2t

Commercial Crystals and new or replacement crystals for RCA, Gates, W. E. Bliley and J-K holders; regrinding, repair, etc. BC-604 crystals. Also A.M. monitor service. Nation-wide unsolicited testimonials praise our products and fast service. Eidson Electronic Company, Box 31, Temple, Texas. 12-60 tf

Motorola Mobile 152-174 MC System. Two sixty watt base stations, with sensicon receivers, Models PA8491BP, and TA-192 (with AC and DC power supply) PA-8270 remote control console. Three bay, high gain Coaxal antenna, 100 ft. of Coaxal system presently operating on 166.25 MC, for broadcast remote pickup. Only two hundred hours operating time. Priced low. Call or write chief engineer, WWOK, Charlotte, N. C. 2-61 1t

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EDITOR—Technical magazine in communications field offers real opportunity to man with knowledge of AM, FM and TV industry operations. Engineering background desirable but not essential. Industry experience counts most. Should be able to write and to enjoy editorial work. People with experience in editing industry house organs will find this position of particular interest. Salary commensurate with ability. Steady advancement. Send complete resume and indicate salary desired. Broadcast Engineering, Dept. 77, 1014 Wyandotte St., Kansas City 5, Mo. 2-61 1t

Major TV and FM Transmitter Manufacturer seeking representatives to sell TV and FM Transmitters to the Broadcast Industry. Only those selling to the Broadcast Industry with companion items need apply. Good opportunity! Broadcast Engineering, Dept. 76, Kansas City 5, Mo. 2-61 2t

BUY, SELL OR TRADE

Will buy or trade used tape and disc recording equipment — Ampex, Concertone, Magnecord, Presto, etc. Audio equipment for sale. Boynton Studio, 10-BE Pennsylvania, Tuckahoe, N. Y. 11-60 4t

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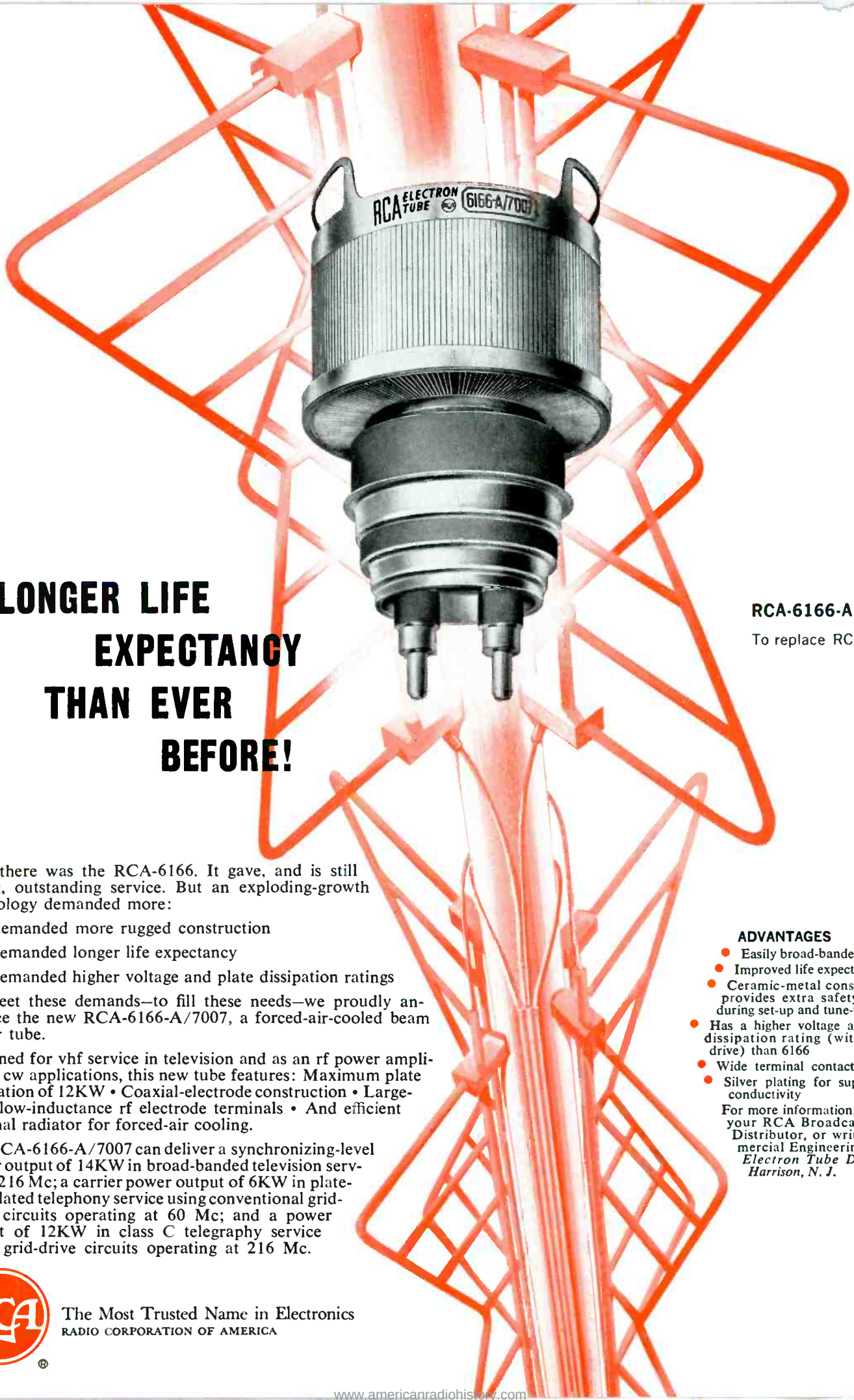

LONGER LIFE EXPECTANCY THAN EVER BEFORE!

RCA-6166-A/7007

To replace RCA 6166

First there was the RCA-6166. It gave, and is still giving, outstanding service. But an exploding-growth technology demanded more:

– It demanded more rugged construction

– It demanded longer life expectancy

– It demanded higher voltage and plate dissipation ratings

To meet these demands—to fill these needs—we proudly announce the new RCA-6166-A/7007, a forced-air-cooled beam power tube.

Designed for vhf service in television and as an rf power amplifier in cw applications, this new tube features: Maximum plate dissipation of 12KW • Coaxial-electrode construction • Large-area, low-inductance rf electrode terminals • And efficient external radiator for forced-air cooling.

The RCA-6166-A/7007 can deliver a synchronizing-level power output of 14KW in broad-banded television service at 216 Mc; a carrier power output of 6KW in plate-modulated telephony service using conventional grid-drive circuits operating at 60 Mc; and a power output of 12KW in class C telegraphy service using grid-drive circuits operating at 216 Mc.

ADVANTAGES

- Easily broad-banded
- Improved life expectancy
- Ceramic-metal construction provides extra safety factor during set-up and tune-up
- Has a higher voltage and plate dissipation rating (with lower drive) than 6166
- Wide terminal contact surface
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For more information, contact your RCA Broadcast Tube Distributor, or write Commercial Engineering, *RCA Electron Tube Division, Harrison, N. J.*

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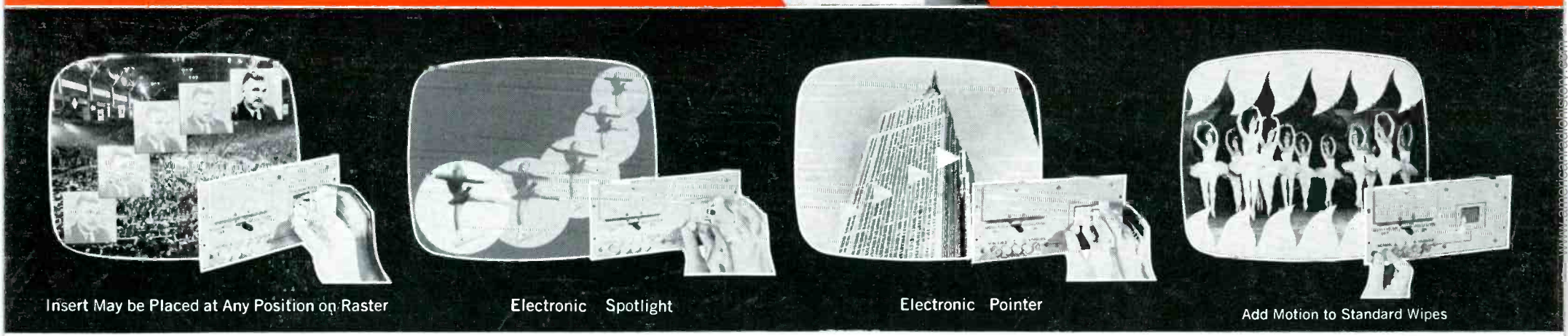

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Now, You Can Offer Your Advertisers the Newest Facilities and Your Viewers the Most Varied Programming.

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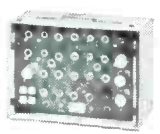
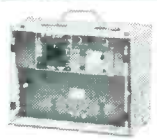
Full Specifications & Details or Demonstration Available on Request

TELECHROME

490WA1 Waveform generator. Generates keying signals for the 72 different wipes.



490SA1 Switching Amplifier. Combines two picture signals in accordance with applied keying waveform.



490RA1 Remote Control Unit. Selects and controls desired effect. Designed for console or desk mounting. Easily modified for integration into existing studio facilities. Complete with power supply—Model 512C1

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