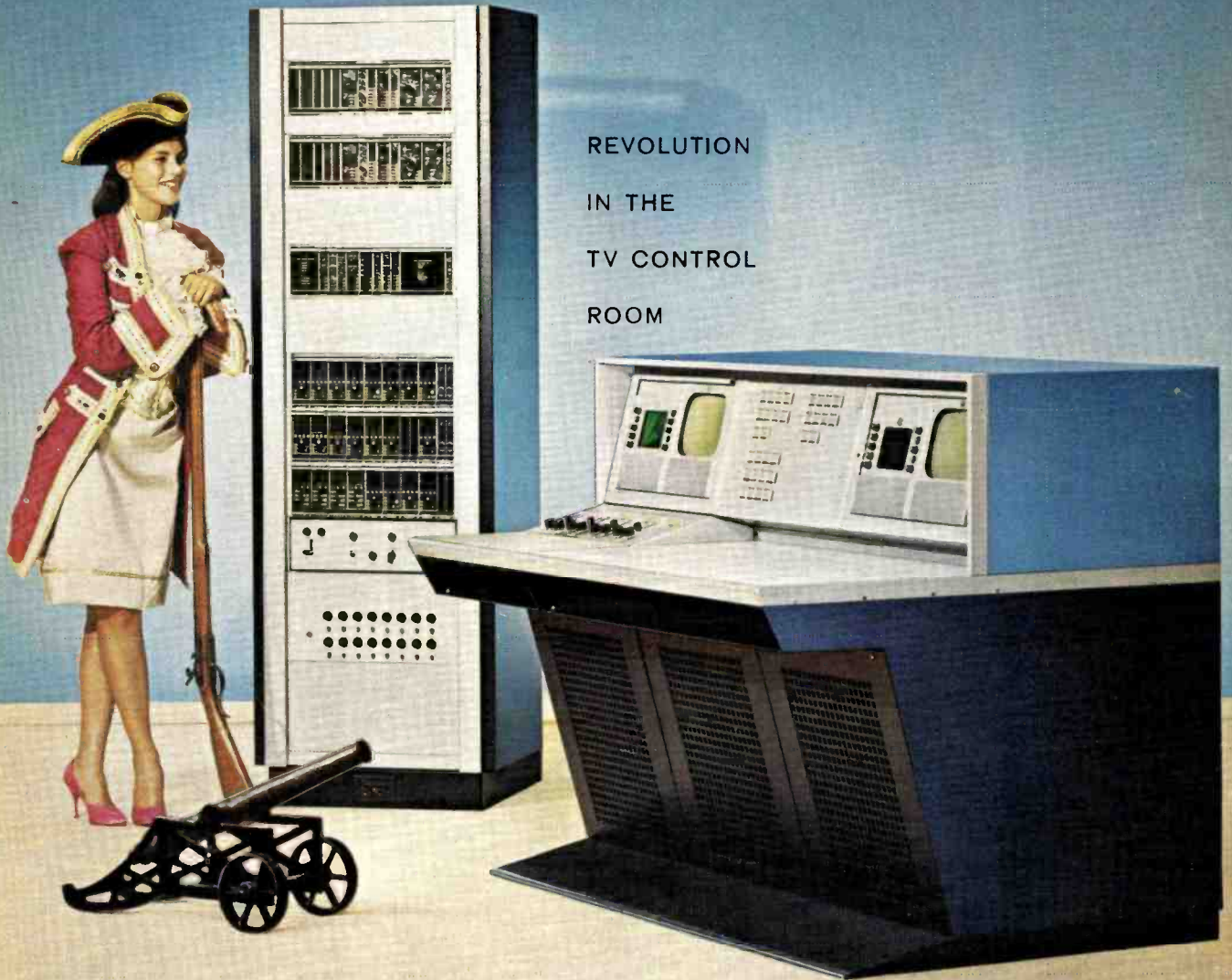


BROADCAST NEWS

REVOLUTION
IN THE
TV CONTROL
ROOM



Vol. No. 128 DEC. 1965



*New Studio
Console and
Rack Equipment*

Revolution in the control room affords savings and opens new operating possibilities

... to improve television program quality

SPACE SAVINGS

Use of RCA "New Look" equipments, such as transistorized sync generators, power supplies, and distribution amplifiers greatly reduces the amount of rack space required by a television station. It is possible to install the few racks required in the control area, eliminating need for a separate equipment room. Moreover, use of transistorized monitors and simplified camera controls can greatly reduce space required for control consoles.

OPERATION LESS COMPLEX

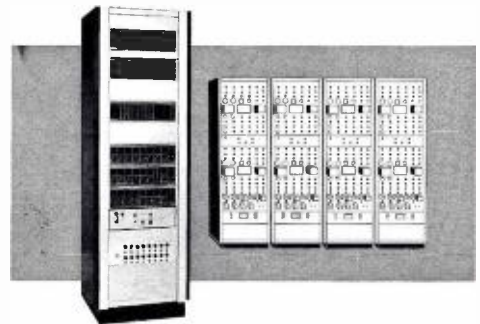
In many cases only one control position is required using the "New Look" system. Since cameras are stabilized and self-adjusting, the second position normally used for the "shading" operation can be eliminated. Using this new method, there are fewer demands for human hands to "ride controls" and, more importantly there is better control of program quality.

NEW OPERATING POSSIBILITIES

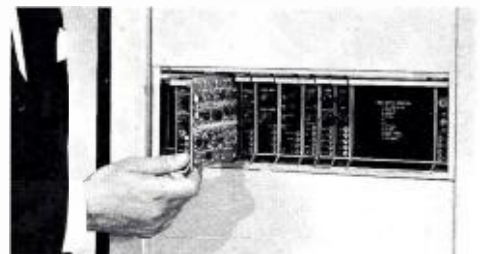
"New Look" tape recorders and film projectors are as stable and self-sufficient in operation as the "New Look" self-adjusting cameras. No longer is it necessary to isolate these machines in separate tape and film areas. They may be installed in one large master control area. And, since they are designed for remote operation, they may be started and stopped from the control console. Other new possibilities include preset station-break switching, preset program switching, and full time automation.

DOLLAR ADVANTAGES

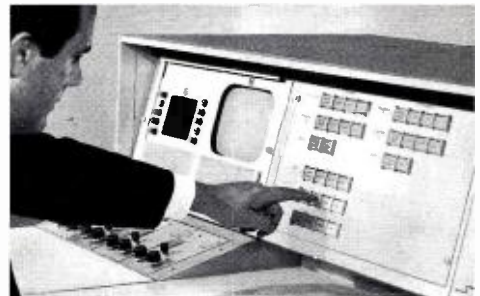
"New Look" equipments cost less to install and less to operate. Long life of transistors and speed of module change lead to a new high in reliability, and a cut in maintenance costs. Reduction of controls reduces possibility for errors; hence fewer rebates. Overall the revolutionary "New Look" approach to equipment operation makes picture quality more uniform (more pleasing) through use of stabilized self-adjusting circuitry, focusing human attention on control of creative facilities for improving production of programs and commercials.



The sync and distribution equipment mounted in this one rack formerly took as many as four.



Standard transistorized modules improve performance, cut maintenance costs.



Revolutionary "New Look" compact design console showing machine control from one position.

For further information about using RCA "New Look" equipments in a system, write RCA Broadcast and Television Equipment, Building 15-5, Camden, N.J. Or call your RCA Broadcast Representative.



The Most Trusted Name in Television

BROADCAST NEWS*published by***RADIO CORPORATION OF AMERICA**

BROADCAST & COMMUNICATIONS PRODUCTS DIVISION, CAMDEN, N. J.

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*As We Were
Saying*

OUR COVER for this issue is intended to be a lead-in to the article "Revolution In the Control Room" which you will find on Page 48. The equipment you will recognize as some of our New Look console and rack units. The lass—Miss Linda Kennedy—is supposed to call attention to the revolution these equipments are causing. Our photographic editor, Miles Moon, went to great pains to locate an authentic costume—and a real (albeit small) cannon. He even managed to rent some supposedly authentic cannon balls—of which he was real proud. Unfortunately the older hands who selected the particular photo to be used picked one in which the cannon balls had somehow got lost. Which may or may not prove something about verisimilitude. Anyhow, to assuage Miles' feelings we show, on Page 48, a different photo of Miss Kennedy—and in this one you can see, if you look twice, the cannon balls.

REVOLUTION is a strong word to use in connection with equipment. It is, in truth, too strong a word to use just to describe a change in equip-

ment design. (And we hope our readers have noted that we carefully avoid the use of the word "revolutionary" in our advertising.) But when it comes to talking about the **effect** the introduction of our new equipment will have, we believe the word revolution is justified.

Webster defines **revolution** as:

2 : alteration or change in some matter or respect
 as a : a sudden, radical, or complete change (a ~ in thought) : a basic reorientation and reorganization (a ~ in technology)

Those who read the article "Revolution in the Control Room" (Page 48) will note that a radical change in thinking (viz a **revolution** in thought) is involved in planning a "new look" control room. And those who think through the implications of the radical changes in arrangement, in operation, and in maintenance will surely agree that "a **revolution** in technology" is taking place.

The advantages of the new equipments and the new technology are such that many stations

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are planning to throw out their old equipment and install everything new. With apologies to Dodge we call it the New Look Rebellion. In the next issue of BROADCAST NEWS we will describe, in detail, the planning of two of these stations.

SPEAKING OF EXPLOSIONS, there's one taking place in educational television—and it's not just in the growing number of stations and closed-circuit systems. Equally impressive is the way educators are thinking in terms of the most advanced-type equipment. Not too long ago they were content (had to be, maybe) with commercial castoffs, vidicon cameras, low-power transmitters. Today they want the best and the newest, 4½" I.O.'s, maximum power—and even color.

As We Were Saying

When you think about it—they **should** have it. Kids are not going to sit still for pictures that are poorer than those they see on the home TV. In fact, educational programs need better pictures than commercial programs—because they depend more on detail, on continued attention—on the viewer being able to see exactly what is going on. The best pictures the state-of-the-art affords are barely good enough.

There is another reason why ETV's need good facilities—and that is the programming problem. They can't "ride the network" for many hours a day—as do many commercial stations. They have to program, themselves, all of their on-air hours. And they have to do it with widely varying formats, oftentimes experimental programs, and, more likely than not, with inexperienced performers.

In the beginning none of these things were recognized. A vidicon plus a monitor was an ETV system. But gradually they learned. And today we are beginning to see ETV installations which rival the better commercial stations. KCET, Los Angeles, is one of these. The extent and flexibility of KCET's plant is noteworthy. The thinking that has gone into it should be helpful to other ETV planners. That's why (in the article starting on Page 10) we have included a rather detailed description of KCET's equipment and equipment arrangement.

COLOR IT CAREFUL is the word at WCAU-TV as the CBS key station starts local programming in tint. Story on Page 31 tells how Chief Engineer Bob Gross and staff are working with painstaking care to insure that WCAU-TV will have absolute top-quality local color—right from the beginning. Step-by-step program they have laid out takes station to full local color in two years. Includes training, testing and tryout at each step. Covers everything from lighting on sets to lighting on monitors. Contrasts sharply with push-em-off-the-end-of-the-dock (or finger-painting) school of thought. Wish all stations would do it—and then that they would all get together and use the same chroma setting. Knob twisting viewers would bless them.

MORE COLOR ADS, from our continuing series appear in this issue. One is on the page opposite, another on Page 65, adaptations of two others on the front and back covers. These ads are symbolic of our great new series of equipment—which is now nearing completion. To us they mark the accomplishment of a program which began some five years ago. At first it was just an idea—an idea that we ought to have an all-new, all-modern, all-different line of equipment. From an idea it progressed to a plan—and from plan to prototypes—some of which you have seen at two NAB's. And now, glory be, all of these new equipments are in production—and starting to go out to customers. At the forthcoming NAB you will see production models of all of them. The only fully complete, fully matched, all-new, all-modern line of equipment available today. Praise the Lord, and pass the superlatives!

LOVE THAT 60 could be title for ad opposite—and for the way stations feel about the TK-60 Camera. It wasn't always that way. Scorned by the early handicappers and coming late out of the stall, the TK-60 had to come from behind in the stretch. It did—and today it is the undisputed king of the monochromes—used wherever the very finest pictures are desired. And soon now it will have a little sister—the TK-33, a brand-new, all-transistorized, 3-inch image orthicon camera. Designed especially for field use it's a two-piecer—as you can see in the ad facing the continuation of this column on Page 65.

CADILLAC OR COMPACT—the choice is not difficult—if you know what you want. If you want the best, you don't buy the smallest, or the lightest, or the cheapest. There is no such thing as a small-sized Cadillac—or even a medium-sized Cadillac. And if you think we are leading up to talking about color cameras—well, we are. If you believe that "the picture is the thing"—if you want the very best picture you can get—you don't go shopping for the smallest or the lightest camera you can find. Nobody faults the Cadillac for being big—or heavy. It has to be—because it has a lot more in it than smaller cars. Ditto our TK-42 Color Camera. It has in it a lot more than smaller color cameras—in fact, just about twice as much. To begin with there are, of course, the usual three color channels. These are, in themselves, practically the equivalent of a three-tube color camera. But that's only half the story. In addition to the three color channels, the TK-42 Camera has built into it a complete 4½" Image Orthicon monochrome channel (the so-called "black tube"). This is practically the equal of the TK-60 Monochrome Camera shown on the page opposite. Its purpose, of course, is to get the best possible pickup of the detail in the picture (without having to depend on perfect registry of the color channels to do it). So the TK-42 is, in effect, two cameras—

(Continued on Page 62)



RCA
TK-60

Television

RCA
NEW
1963

BIG PICTURE TK-60... BIG TV FAVORITE!





*TK-60 deluxe
4-1/2 inch I.O.
monochrome camera*

RCA "Big Picture" TV Camera with 4½ inch image orthicon

... TK-60 is symbol of deluxe television

The fact that the TK-60 has attained widespread acceptance in television stations is a tribute to its fine features and superb performance.

BIG PICTURE TUBE

Using a large 4½-inch I.O. tube, the TK-60 produces the ultimate in fine pictures—with greatly improved gray scale and resolution. It's the same "black tube" that's making the big difference in color pictures with the revolutionary new TK-42 color camera.

BIG BRIGHT VIEWFINDER

The viewfinder features an 8½-inch rectangular kinescope, with maximum useable highlight brightness—at least 150 foot lamberts. Viewfinder can double as a setup monitor. A combined picture from the special effects system—as well as output from the processing amplifier—can be punched up on the viewfinder.

BIG PERFORMER

TK-60 cameras do not need to be adjusted from day to day, nor do they need extensive warmup before being used "on air." Pictures "snap in" each time the camera is turned on, and are ready for use in a short time. Once set up, high quality pictures are there to stay.



This is the camera design that says "television at its best."



This is the big 4-1/2 inch I.O. tube for sharper pictures.



This is the big bright viewfinder for quality control.

*For further information, write RCA Broadcast and Television Equipment,
Building 15-5, Camden, N.J. Or call your RCA Broadcast Representative.*



The Most Trusted Name in Television

TK-42s ON MOVE, COLOR'S BIGGEST YEAR BEGINS

When TV industry denizens drained their glasses and joined the New Year's Eve din it could have been in celebration of color TV's biggest year, as indeed 1965 was. And then again the clamor may have been for 1966, for it promises to be an even bigger color year.

In the relative quiet of RCA-Camden's Building No. 17, the first working day of the new year found the camera builders bending to their tasks. While they had made and shipped nearly 300 color cameras during 1965, the old year had left a legacy of a huge backlog of new orders.

The 1965 deliveries had included the first units of RCA's four-tube TK-42, a camera of revolutionary design. Prospects are, as the production rate moves up, that more than 300 of the new cameras will be shipped to customers at home and abroad during 1966.

The television industry that awaited the four-tube camera knew full well it was backed by ten years and more of camera designing and building experience. They



RCA Camden steps up TK-42 camera production to keep pace with big broadcaster demand.

knew too that its forerunners, the TK-40 and TK-41, had demonstrated the commercial practicality of color TV and the technical excellence of the color medium.

Like its predecessors, the TK-42 underwent years of testing and refinement before its design engineers were willing to flash

“Go” to the factory crews. Now the signal has been received, and production is humming. Come December 31, 1966 and the first TV closeups of Guy Lombardo and his stick, the industry will be toasting another winning year for color, and the TK-42!

TRACY SEES A RAINBOW ON THE EDUCATIONAL TV HORIZON



Edwin C. Tracy

Educational television is poised for an all-out shift to color that eventually will be as complete as the color surge now under way in commercial broadcasting. This was the forecast made by RCA's Edwin C. Tracy in a talk at the National

Association of Educational Broadcasters convention last November. Mr. Tracy is Division Vice President, Broadcast, Technical and Scientific Sales Department, Broadcast and Communications Products Division.

While the transition to color may not come with a rush as in commercial broadcasting, it is inevitable that educational TV will follow the move to color destined for the rest of the industry, he said. He urged his audience of educational TV station management and engineering personnel to “begin to plan now so that your move into color will be made on a carefully-calculated basis.”

“This is a good time to plan because of the cameras, tape recorders and other ‘new generation’ color equipment becoming available—equipment that is solid-state in design, modularized and virtually trouble-free. While color's penetration in educational TV has been minimal thus far, those who have employed color program-

ming have found that it heightens attention and impression factors many times.

“To the station manager, color represents a challenge in programming, and to the engineer it offers an opportunity to broaden his technical skills. While color programming does bring added technical complexity, station engineering personnel who are competent to work in black-and-white can make the transition to the new medium with appropriate training.”

The many commercial stations now converting to color operation are providing a pool of technical experience and know-how that the educational broadcaster can draw on when he makes the move to color, Mr. Tracy concluded.

(The complete text of Mr. Tracy's talk, with illustrations, will appear in the next issue of BROADCAST NEWS. Pre-prints will be sent to those requesting them from The Editor, Broadcast News, Building 15-5, RCA, Camden, N. J.)

DIEBOLD'S PURCHASE OF 400 CCTV CAMERAS IS LARGEST ORDER FOR SUCH EQUIPMENT



Lunch-hour banking can be a "fun" errand when it's transacted by television.

Diebold, Inc., the banking equipment firm, has ordered 400 closed circuit television cameras from RCA, representing the largest single order ever received for this type of equipment. The Canton, Ohio, company will install the all-transistorized PK-301 cameras in its "Auto-Teller" units which provide two-way "hear-see" communications between a bank customer at an unattended outdoor station and a teller inside the bank building. The new order brings Diebold's total purchases of RCA TV cameras to well over the 800-mark.

The Auto-Teller system uses a camera and a TV picture monitor at the drive-in location outdoors, and a similar camera-monitor arrangement indoors. With the TV link established by cable, customer and teller can transact business face-to-face, although they may be 100 or more feet apart. A voice circuit between the two points carries the two-way conversation and a pneumatic tube is used to exchange bankbooks, checks, currency and other banking items at high speed.

The RCA cameras were introduced early in 1965 as part of a new line of "Professional Television" equipment for closed circuit use in industry, education and elsewhere. The line includes other cameras,

monitors, switching and distribution systems and related equipment.

All solid-state construction and operating simplicity make the PK-301 especially suited to applications like the Diebold drive-in system where good picture quality and freedom from adjustments are essential over long periods. The camera makes use of a 1-inch electrostatic focus pickup tube of a type originally developed by RCA for spacecraft cameras.

Meet Diebold's sleek Auto-Teller unit.



NEW JUNGLE RADIO FOR TROOPS SENDS DIGIT MESSAGES IN CODE

RCA has developed a self-powered device about the size of a pocket transistor radio for the U.S. Army to permit voiceless communications between allied jungle fighting groups speaking different languages. Called a Jungle Message Encoder-Decoder (JMED), it is used in conjunction with standard Army pack radios to send and receive 32 special five-digit messages.

The coded messages make it possible to overcome the communications barrier which exists where friendly troops speak different languages—or dialects—and also provide a means of communicating silently in dense jungle where the enemy may be only a few yards away. A number of the devices have been delivered to the Army Electronics Command, Ft. Monmouth, N. J., for evaluation under a program sponsored by the Advanced Research Projects Agency, Washington, D.C.

While JMED employs digital techniques similar to those used in communications equipment and in computers, its operation has been kept simple so that it can be used by field personnel with minimum training.

To operate, a soldier sends a selected message by operating five switches on JMED, each capable of transmitting either an "X" or an "O". When the fifth switch is activated, the message is automatically sent and the unit is cleared for the next transmission or reception. The 32 messages, selected to suit the unique needs of jungle troops, contain five digits each and are received on a special display panel on JMED.

To read a message, a soldier checks the five-digit code received on his unit against a printed message card. Pictures, symbols or the user's own language on the cards eliminate the need for translators and help avoid misinterpretation. The messages or codes can be changed periodically to confuse the enemy.

JMED weighs about three pounds and draws power only during transmission or reception. Rechargeable, self-contained batteries supply enough power to send or receive up to 200 messages. The unit also incorporates automatic error detection.

BIGGEST EQUIPMENT ARRAY SHOWN AT NAEB CONCLAVE

The giant strides educational TV is taking these days were clearly evident in the size and range of RCA's exhibit at the National Association of Educational Broadcasters 1965 convention in Washington, D.C. The cameras, TV tape machines and other items assembled there added up to the largest array of electronics equipment ever shown to educational broadcasters.

The market for educational TV equipment has doubled in the past two years, and the heavy traffic and keen interest at RCA's exhibit was proof positive that the growth rate would continue. A reflection of this healthy state of affairs, the RCA display indicated as well the company's efforts to provide a wider choice of improved electronic tools for education.

Educational TV currently can count more than 100 broadcast stations on the air and well in excess of 1,000 closed circuit systems in regular use. This represents a total investment topping \$80,000,000, according to the best available estimates.

The NAEB exhibit gave visitors a glimpse of how TV might have looked in a turn-of-the-century classroom. In the studio set where new RCA "Professional



Turn-of-the-century classroom served as exhibit setting for RCA's spanking-new cameras.

Television" cameras were demonstrated, two pert lasses in sweeping gowns played the role of yesteryear's pupils. A blonde model cast as the "school marm" proved that fourth grade couldn't have been all bad in grandpa's day.

The PK-301 and PK-330 cameras represent a new class of television equipment, falling between broadcast-type cameras which are too complicated and expensive for many educational applications and the low-end "industrial" type cameras of uncertain quality and dependability.

Displayed for the first time was an

equipment system for the new Instructional Television Fixed Station Service (2500-megacycles). The system includes a 10-watt transmitter, a translator, a solid-state down converter, and antennas for omni-directional or point-to-point service.

The NAEB display also included two compact TV tape machines, the TR-3 tape player and the TR-5 transportable recorder. Used by both educational and commercial broadcasters, the quadruplex machines provide "on-the-air" quality and are capable of playing back tapes made on any other broadcast-level TV recorder.

KOZANOWSKI WINS SMPTE AWARD FOR COLOR TV BROADCAST EQUIPMENT CONTRIBUTIONS

New honors have come to Dr. Henry N. Kozanowski, Manager of Television Advanced Development for the RCA Broadcast and Communications Products Division. "Hank" as he is known in the broadcast industry's labs, studios and offices, is recipient of the 1965 Herbert T. Kalmus Gold Medal Award of the Society of Motion Picture and Television Engineers.

The award, named for the developer of the Technicolor process, recognizes outstanding achievement in color motion pictures for television or theater use. It was presented to Dr. Kozanowski at the SMPTE's 98th Semiannual Technical Conference in early November in Montreal.

Some of the advanced developments in color TV for color film credited to Dr.

Kozanowski in the citation: 3-vidicon color TV equipment for 16 and 35mm color film; completely stabilized 3-vidicon color TV film reproduction; demonstration of live pickup separate luminance 4-tube color camera; completely transistorized separate luminance channel 4-vidicon color film chain using modular construction, and many others.

Dr. Kozanowski received his PhD in physics from the University of Michigan in 1930 and joined RCA in the research area in 1935. In 1963 he received the SMPTE's David Sarnoff Gold Medal Award in recognition of his accomplishments to improve the quality and practical operation of TV studio and film camera equipment.



SMPTE President Ethan Stifle makes presentation.

PUERTO RICO'S FIRST COLORCASTS SLATED AS NEW UHF STATION BUYS COLOR FILM SYSTEM

The first color television broadcasts are in prospect for Puerto Rico viewers with RCA's recent announcement that it will supply a new San Juan station with the island's first color TV studio equipment. The color apparatus will be delivered to El Imparcial Broadcasting Company for WITA-TV, its UHF station scheduled to begin broadcasts on Channel 30 in March.

The agreement, valued at approximately \$175,000, covered a complete color TV film system, including the latest TK-27 four-tube color camera, film projector, and other equipment needed to originate color broadcasts from motion picture film. For "live" broadcasts in black-and-white, El Imparcial ordered three 4½-inch image orthicon TK-60 studio cameras, marking

the first time a Puerto Rican station has purchased this new RCA monochrome camera.

Armando Cosme, Vice President of El Imparcial Broadcasting, said installation of the RCA color equipment would open a new market for both color film programming and color receivers in Puerto Rico. Puerto Ricans now watch many popular U. S. color shows in black-and-white, with the sound track carrying dubbed-in Spanish.

Meanwhile, in the cooler climes of Alaska, KENI, Anchorage, was preparing to begin broadcasts in May of the first color shows in the 49th state. The station has purchased an RCA color film system, along with a TR-4 TV tape recorder.



Armond Cosme with RCA's Roy Giles (standing).

MICROWAVE UNIT AN ELECTRONIC RELIC FOR SMITHSONIAN

A 20-year-old piece of equipment from that relatively young communications medium—microwave radio relay—already has joined other relics of communications history in the Smithsonian Institution. The item, a "head-end" transmitter unit, saw two decades of service atop a 100-foot tower as part of the world's first commercial microwave beam system.

Early last fall the transmitter, about 20 inches square and a foot thick, was presented to the Institution jointly by Western Union, which began operation of the first system in 1945 between New York and Philadelphia, and RCA, which designed and built the electronic equipment.

The two companies also donated a "head-end" receiver and a microwave station control rack. The items were removed from a relay station at Bordentown, N. J., a part of the original system, and replaced with new RCA equipment of advanced design and much greater capacity.

The first system was an 85-mile link between New York and Philadelphia with intermediate relay towers at Bordentown, 27 miles from Philadelphia, and at New Brunswick, N. J., 38 miles from New York. Later, an additional tower was built at Woodbridge, N. J. to improve the system's performance by dividing the New



"Head-end" transmitter unit from nation's first microwave system rests among RCA's Ed Hart (left), Western Union's George Shaffer, and the Smithsonian's Dr. Bernard Finn at Washington, D.C. presentation ceremony.

York-New Brunswick leg into two "hops."

The original type CW-1 equipment was the first commercially available for microwave radio relay. Its transmitter power output was 100 milliwatts and it included such features as automatic frequency control, a "party line" service channel and a fault-reporting system.

The first system's peak load was 109 simultaneous messages during its first year

of operation. By contrast, Western Union last year placed in service a new \$80,000,000 transcontinental microwave system capable of handling a million data signals in one second. This system uses RCA's MM-600-6 (600 channels at 6,000 megacycles) microwave equipment which is capable of handling data, voice, facsimile, telegraph, television and other communications services over long distances.

NEW YORK CITY, MIAMI LEAD ETV MOVES INTO 2500-MC

Multiple-channel educational broadcasting in the 2500-megacycle band, formally known as Instructional Television Fixed Station Service, gathered momentum late in 1965 with the installation of RCA equipment for two major systems.

The first system, purchased by the Roman Catholic Diocese of Miami, began broadcasts in November with programs beamed to 38 elementary and high schools, comprising a student population of approximately 23,000 in Dade County Florida.

Under construction in preparation for a spring on-air date, the second system ultimately will bring educational TV programs to 400 elementary and secondary schools in the vast Roman Catholic Archdiocese of New York. This will make tele-

vised instruction available to more than 225,000 pupils in the Archdiocese which includes Manhattan, the Bronx and Staten Island in New York City and seven New York State counties northward. Thus the New York system will become one of the largest ETV facilities in the nation.

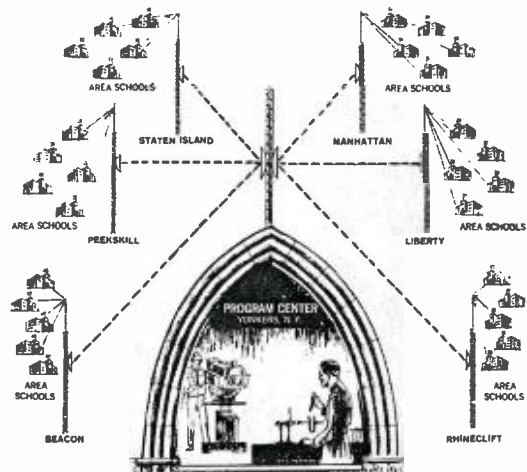
Programs will be radiated from omnidirectional antennas at seven locations, with point-to-point microwave relaying signals to the transmitting points from studios in Yonkers, N. Y. The studio installation will include the custom-built switching and control system used in the RCA Pavilion at the 1964-65 New York World's Fair. The switching equipment was purchased by the Archdiocese, along with a complete RCA color film chain.

While its range is limited, the new 2500-megacycle service permits the simultaneous use of up to five channels by one licensee, giving it a decided capacity advantage over single-channel UHF-VHF service. It sometimes is described as "on-the-air-closed circuit TV" since its microwave frequency signals cannot be picked up by home TV receivers.

At receiving locations, roof-top microwave dishes collect the signals and pass them to a down converter which changes them to frequencies that can be received by a standard TV set. The signals are amplified and sent through a distribution system to classrooms, auditoriums and other points. VHF-UHF broadcasts also can be handled by the system.



Miami Diocese (left) uses professional gear, while diagram shows scope of big New York Archdiocese system.



'BUDGET-PRICED' TV FILM RECORDER IN DEBUT

A budget-priced television film recorder for transferring TV pictures to 16mm film has been introduced by the RCA Broadcast and Communications Products Division. The \$14,500 recorder is the latest product in RCA's "Professional Television" line of TV cameras, switchers, monitors and other gear for high-grade closed circuit systems.

The PFR-10 recorder uses a special camera, designed to be vibration-free, to photograph TV images as they appear on

a display tube. The equipment, with associated circuitry, is contained in a compact cabinet needing less than six square feet of floor space.

Since the unit's ten-inch display tube is coated with P4 phosphor, a variety of panchromatic film types may be used with consistently good results. The system includes 2,400-foot film cassettes for one hour of recording time, and provision for audio signal input to an optional optical or magnetic sound recording channel.



RCA's Sven Swanson and the PFR-10.



FIG. 1. In its studios KCET uses RCA TK-60 Deluxe 4½-inch Image Orthicon Cameras.

Editor's Note: Planning an ETV installation is more difficult in many ways than planning a comparable-sized commercial station. First, there is the fact that an ETV station—because of the diversity and oftentimes experimental nature of its programming—requires more operating flexibility than a commercial station. Second, because an ETV station produces so much of its own programming, it must be able to utilize its studio facilities for more hours of the day (including rehearsals) than does the average commercial station. Third, and this is the most surprising to those who haven't thought of it before—the ETV station should have "better" quality than the commercial station (because the educational process depends on detail and requires apt attention—whereas the entertainment process depends on the story line and is carried along by emotion).

KCET is an educational station where much thought was given (during the planning) to the need for flexibility, utilization and quality. The result is one of the best ETV installations we know of. We think the story of how KCET did it will be useful to other ETV planners and have, therefore, included more technical detail than usual. The video schematic diagram on Page 18 should be particularly useful in that it shows in detail the video components and circuits required to give KCET the desired flexibility. A similar audio schematic is available and will be sent to ETV planners on request.

KCET, LOS ANGELES AN OUTSTANDING EDUCATIONAL STATION

Model Studio Facility Uses RCA Broadcast-Type Equipment
to Insure High Quality, Maximum Flexibility

by THEODORE P. UNTIEDT, *Director of Engineering, KCET*

When KCET went on the air on September 28, 1964, it was the 97th educational station in the United States. Because of the contributions from some of the commercial broadcasters, other large corporations, numerous individuals and matching funds from the Department of Health, Education and Welfare of the United

States government, KCET was able to build and start operation of the country's most powerful educational station with one of the best equipped studios of any of the educational stations.

KCET is operated by Community Television of Southern California—a non-profit corporation. Dr. Lee DuBridge of

the California Institute of Technology is Chairman of the Board; Samuel Bowlby, President; and James Robertson is Vice President and General Manager. People such as Steve Brody, Jack Wrather, Art Linkletter, James H. Doolittle and Dr. Frank Baxter are members of the Board of Directors. These people, as well as

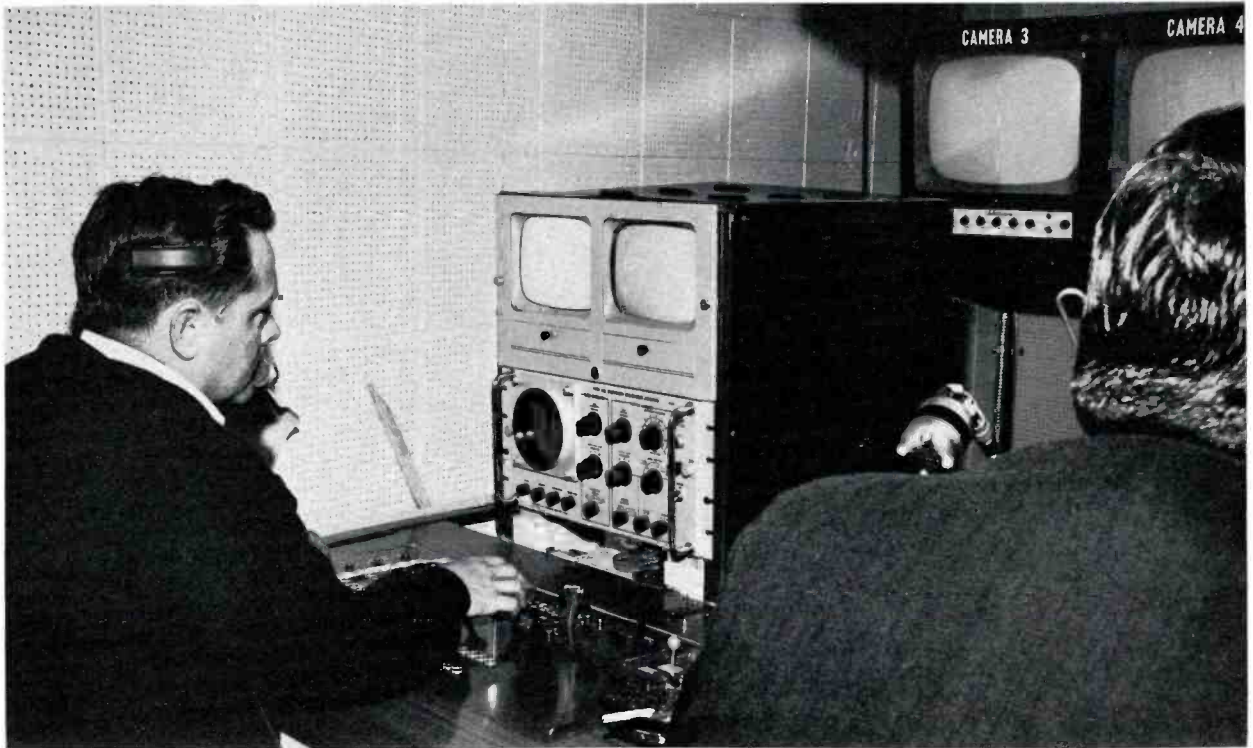


FIG. 4. Control room video positions include a TS-40 Switcher, On-air and Preview monitors and scope. Individual camera monitors are mounted above studio window (top right).

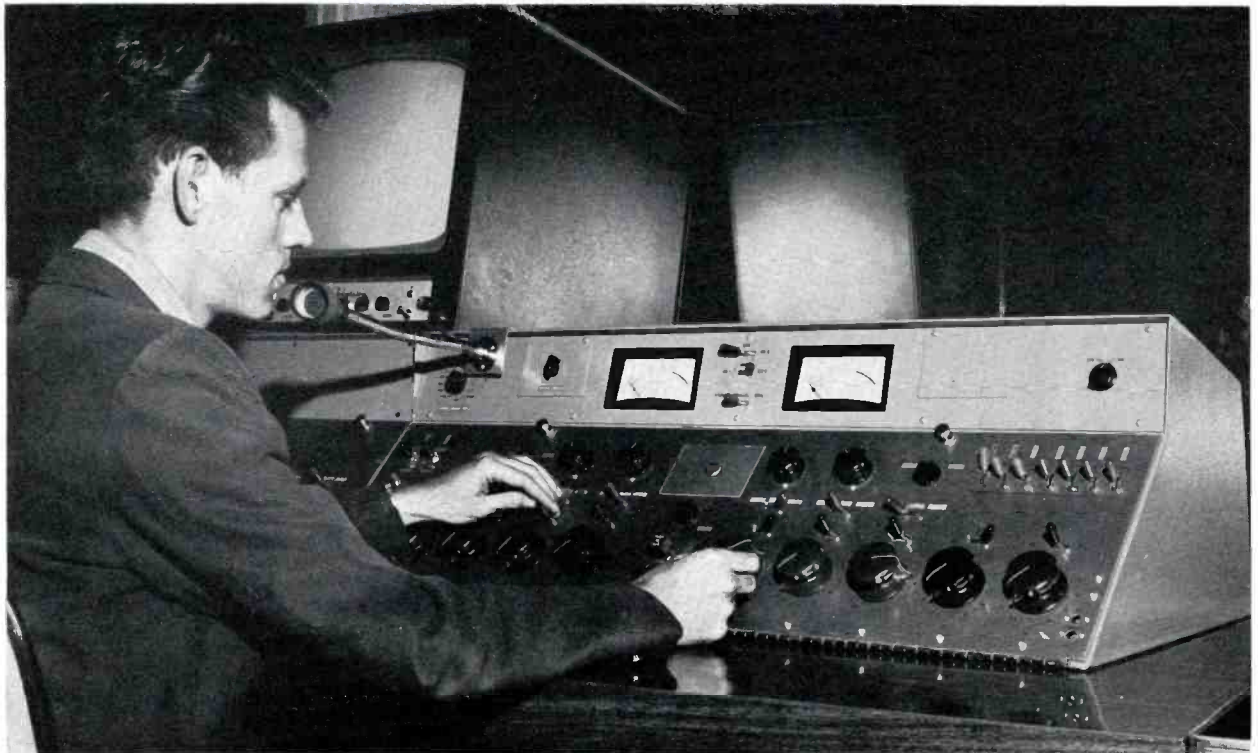


FIG. 5. Studio A Control Room audio position has an RCA BC-7 Console (foreground) and an RCA BCM-2B Consolelette (at left, behind operator).



FIG. 6. (above) At the right of the audio position in each of KCET's control rooms there is an RCA BQ-2C Turntable. LC-1A Speakers are mounted above the control room window.

FIG. 7. (left) In each of KCET's studio control rooms there is an audio rack containing an RCA RT-21 Tape Recorder (reel-to-reel) and two RT-7 Cartridge Audio Playback units.

Master Control-Telecine Area

Basically all of the technical equipment is located in the Master Control-Telecine area and it is the heart of our "on-the-air" programming which at the present time is largely either videotape or film with a very small percent being live. This area is a new addition and built largely as a building within a building and is 36 feet by 48 feet. It has its own air conditioning system and all of the air supplied to this area is electro-statically filtered in an attempt to minimize the dust problem which is so detrimental to both film and videotape. With this new addition we were able to design a system layout which is very functional, and enables KCET to take advantage of compact, solid-state, modern equipment wherever possible. Above the Master Control-Telecine area is a mezzanine floor which is used for film and videotape storage and engineering offices.

The master control switching system is both complex and compact. It is here that an engineer controls all programming being fed to the transmitter. The engineer has controls at hand to control the starting and stopping of videotape recorders, cartridge tape playback units, film projectors, slide projectors and also control the video and audio levels as they go through in their

electronic state. There is a bank of 14 repeat monitors located in this area which serves the switching engineer, the video man who is controlling video levels for productions taking place in either studio, or to serve the director if he elects to direct the program from this area.

Equipment

Equipment has been chosen to give the greatest amount of flexibility to the operation. Some of the larger items are:

5 RCA TK-60 Cameras—which use the 4½-inch image orthicon tube and are capable of high resolution, ideal grey-scale pictures and are very well suited to making excellent high-quality master videotapes or live telecasts.

2 RCA TK-21C Film Vidicon Chains with the RCA TP-15 Optical Multiplexers. The TP-15 multiplexer was chosen to make it possible to go to color film later more economically. This multiplexer is equipped with four inputs and two outputs, therefore making it possible for KCET to use existing projection equipment when the station goes to color programming.

3 RCA TP-66 16mm Film Projectors which have many excellent features—such as optical or magnetic sound, automatic changeover of either or both the projection

lamp or exciter lamp in case of failure; automatic loop restorer, still frame, and a reverse function which is very useful in rehearsals and in checking out films.

3 RCA TS-40 Switchers—Video vertical interval switchers complete with program, preview, lap dissolve and special-effects busses. In the special-effects equipment we purchased one complete unit with joystick, one unit with seven basic wipes and one frame blank. These units, being modularized, are transferred into whichever studio production has requested these types of effects.

2 RCA TR-22 Tape Recorders—all-transistorized videotape recorders complete with automatic timing correctors, dropout compensators, and one video tape recorder is equipped with an electronic splicer.

1 TR-4 Tape Recorder and 1 TR-3 Tape Player—which enable KCET to conveniently handle all of KCET's recording and playback tape requirements.

2 RCA BC-7 Audio Consoles—one of these completely transistorized units is used in each control room. In studio A Control Room there is also a BCM-2B Consolette so that additional microphone input positions can be provided for larger productions.



FIG. 8. (above) KCET Master Control includes a master switching position at the far left and film and tape control, right foreground. Monitors in back wall show individual camera outputs as well as studio outputs, tape outputs, line, etc.



FIG. 9. (right) A closer view of the master control console. The operator at this position can perform individual switching of cameras, tape and film as in program production, or he can perform master switching of studio outputs, etc., to the transmitter. In a pinch he can do both. Audio mixing is provided by the RCA BC-5 mounted in the console just above the TS-40.

FIG. 10. (right) A view of KCET's Telecine room showing one of the two film "islands." Each position has an RCA TK-21C Film Camera, a TP-7 Slide Projector, two TP-65 Film Projectors and a TP-15 Multiplexer. Space is available in each island for later installation of film color cameras.

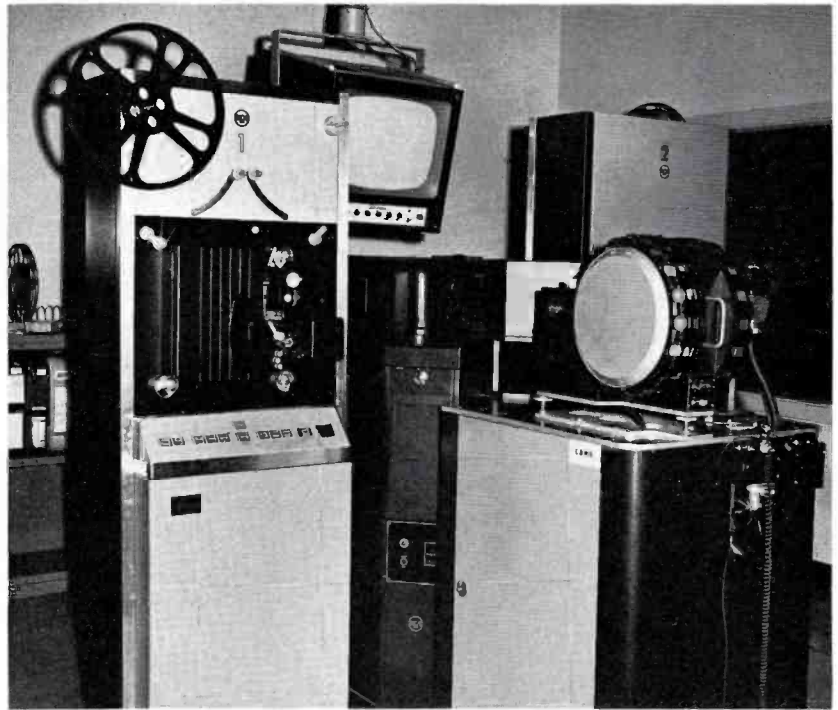
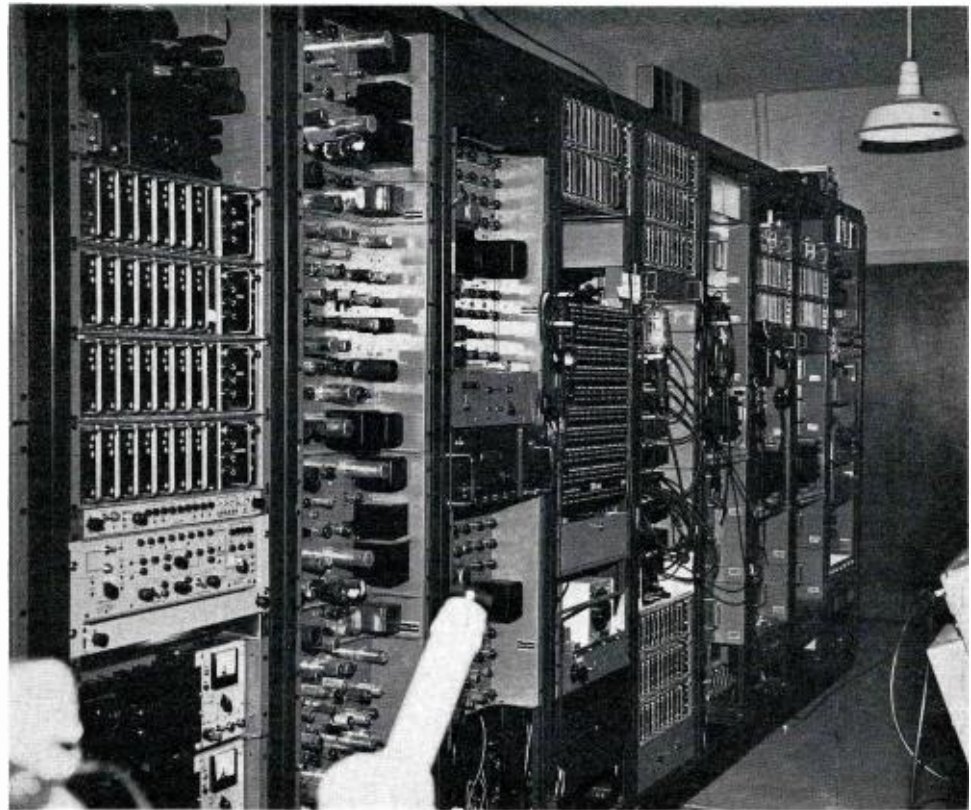


FIG. 11. (below) The other side of the Telecine area showing KCET's two RCA TR-22 Tape Recorders. There is also a TR-4 Tape Recorder and a TR-3 Player.



FIG. 12. (right) Auxiliary equipment, TS-40 equipment, distribution amplifiers, power supplies, sync generators, etc., are mounted on these equipment racks located along the back wall of the Telecine area.



5 RCA RT-7 Cartridge Audio Playback Units—which are used very extensively for station breaks, promos and program theme music . . . and many other items. Two of these are located in each control room and one in master control.

3 RCA RT-21 Tape Recorders—for reel-to-reel recording, playback, background music, etc.—one located in each studio control room, and one in master control.

Audio and Video Circuits

In order to provide three flexible, operational areas, the audio and video distribution system gets quite large (see video circuit diagram, Fig. 13, Pg. 18). As many as eight outputs are required from each of our live cameras feeding such inputs as 3 video switchers, 3 repeat monitors and two video control positions. The live cameras Nos. 1 to 5 and film cameras 6 to 7 are fed to these positions in all 3 switchers to make it more standard as personnel shifts from one operational area to another. Complete video patching is also available to bypass any system giving trouble or to help in a production where changes are necessary. A camera patch panel is installed for the TK-60 cameras to connect the processing amplifier and remote controls

to one of several camera cable outlets in various locations throughout the studios. The camera is then plugged into one of these outlets at the appropriate location. Switches are installed at the patch panel to select which video switcher supplies tally voltage to the proper camera.

The audio system is designed so that either of the studio consoles have film, VTR and other studio audio available to it on one of its keys at all times to eliminate patching. All three console line outputs feed into split-out pads with an end result of ten outputs for each of these, five at "0" level for the VTR's and microwave feeds and five outputs at -20 to feed various consoles and monitoring positions. The BC-5 RCA Audio Console is a four-fader console that is located in master control. This console was chosen for its size in that it fits a standard 22-inch console housing. To increase the flexibility of this audio console, either external pre-select position banks are fed into two faders. The pre-selects have a delegate switch which can be assigned to a manual push button close to the switching engineer or assigned to switch with video from the master control switcher and it is in this mode we normally operate. Audio

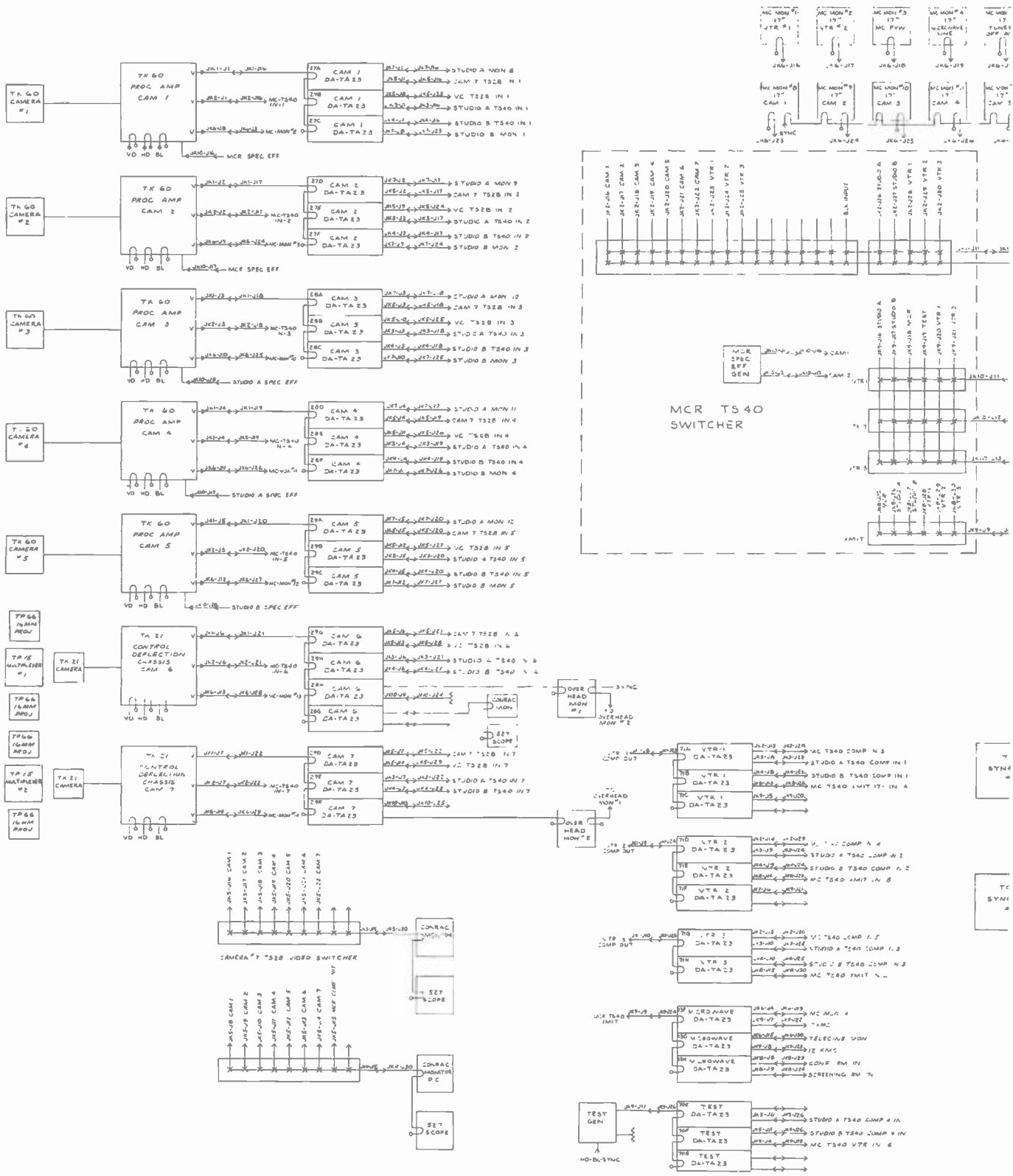
cartridge playback units are fed to the other two faders since almost all announcements and promos are pre-recorded.

Programming is fed to the transmitter from our studios at 1313 North Vine Street simultaneously over two microwave links: a 7 kmc link as primary and a 13 kmc link as standby. The audio and video is duplexed in both systems so that a complete standby microwave source is provided for video and audio at the transmitter location.

KCET at present has no color facilities although all planning has been so that color facilities could be added very easily.

Conclusion

The technical and production facilities which we have described here allow KCET to operate as a very efficient television station. Our experience—during KCET's first year of operation—has proved conclusively that the investment was very worthwhile. We are able to handle almost any kind of production and can run several operations simultaneously. And we pride ourselves on providing on-air quality equal to that of the commercial stations. All of this, we think, is no more than what a good ETV station should do.



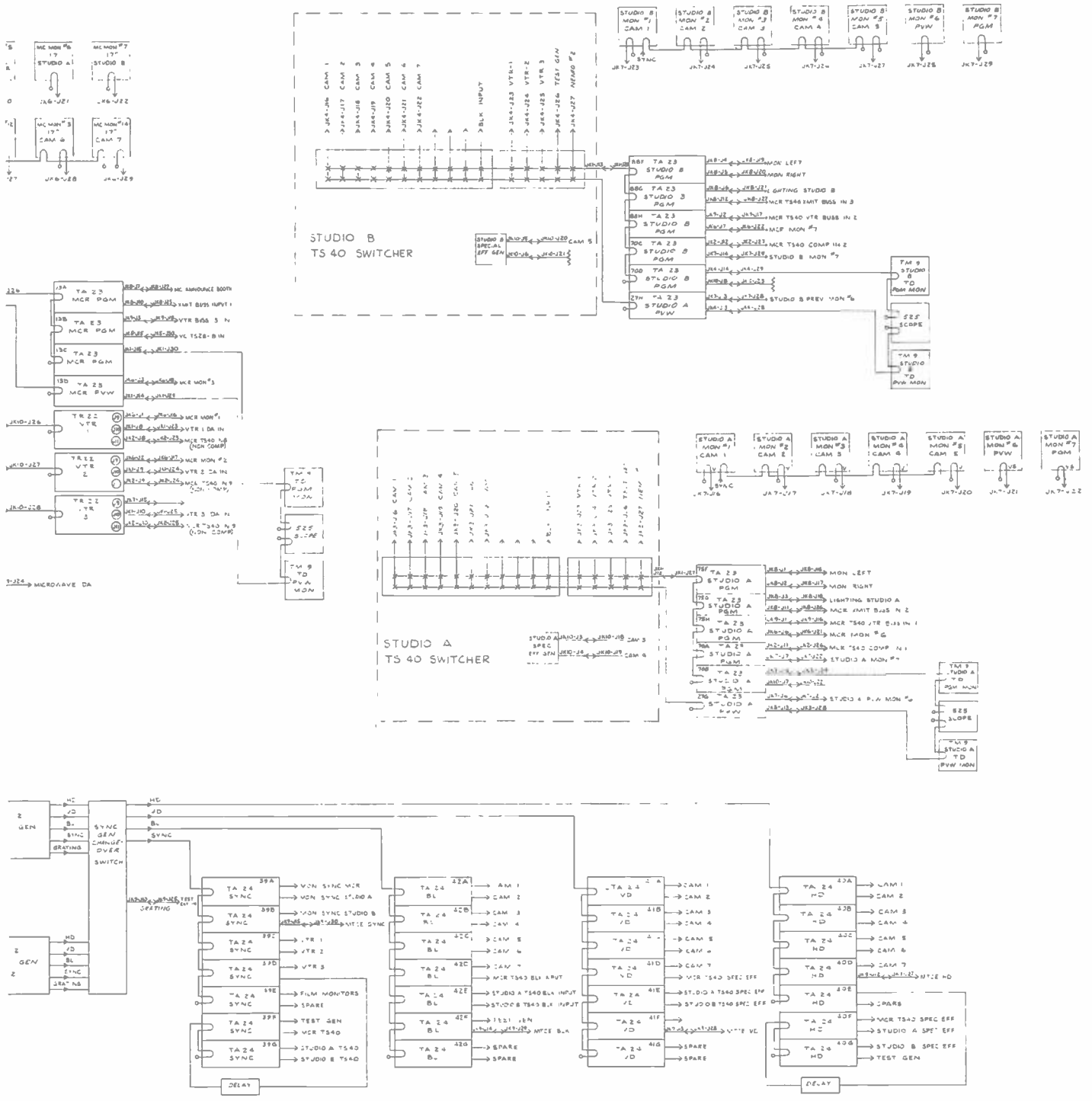


FIG. 13. Simplified diagram of the video circuits in the KCET installation described in the preceding pages.

RCA EXPANDS ANTENNA ENGINEERING FACILITIES

New Equipment and Additional Land
Paves Way to New Developments and Speedier
Delivery of Broadcast Antennas

by D. S. NEWBORG

Mgr., Broadcast Antenna Merchandising and,

R. L. ROCAMORA

Mgr., Broadcast Antenna Engineering

For more than a decade, RCA has owned and operated a "wide-open-spaces" antenna-engineering and production facility some 18 miles southeast of the RCA complex in Camden. This installation started out as a few acres of land with just a single building. Over the years, additional land acquisition has increased its size so that it now encompasses almost 76 acres.

In the beginning, the site was dedicated to the development aspects of antenna systems with production facilities at various other locations. Although production was performed at these other locations, the finished antennas were transported to the test site for pattern and other tests. As the demand for antennas increased, this separated production and test became more

cumbersome and time-consuming and the need for additional facilities at one place became apparent.

So, a series of changes took place and the greatest of these has just been completed. This latest enlargement is engineered to significantly shorten the time cycle between antenna order and antenna delivery.



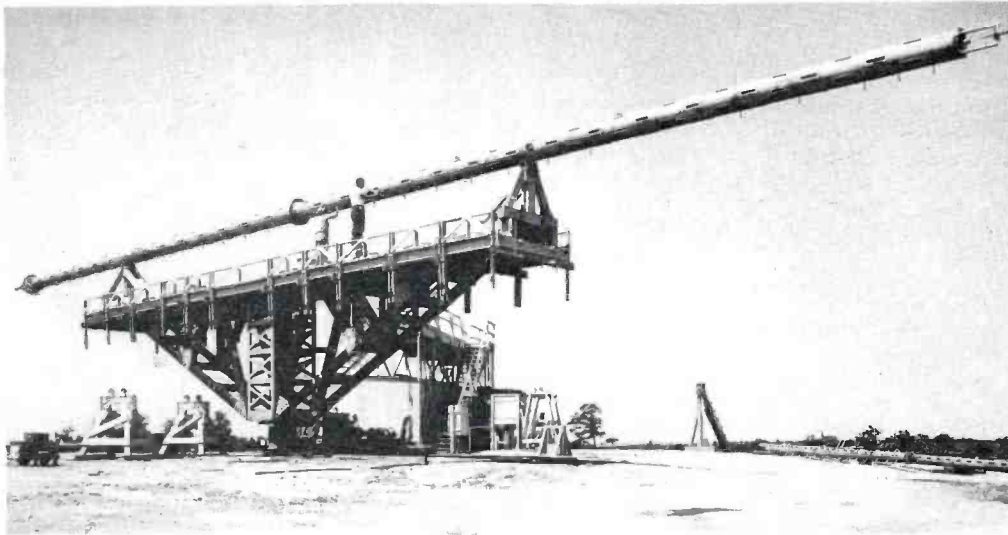


FIG. 2. The south turntable is one of two such devices used in the measurement of antenna radiation patterns. Antenna shown here is 46-gain TFU-46K.

Antenna Skill Center

As a result, the enlarged site is a full-fledged antenna skill center for the design, development and production of a dozen or more separate, yet related, products: superturnstile antennas, traveling-wave antennas, UHF-Pylon antennas, supergain

antennas, "V-Z panel" antennas and "Z-panel" antennas. In addition, the facility designs and produces TV and FM harmonic filters, television transmitter filterplexers, diplexers, special waveguide components and related equipment.

As of this writing, more than 600 RCA

Superturnstile antennas have been produced along with almost 100 Traveling-Wave and 150 UHF-Pylon antennas with dozens of Super Gain antennas in between.

Major Features

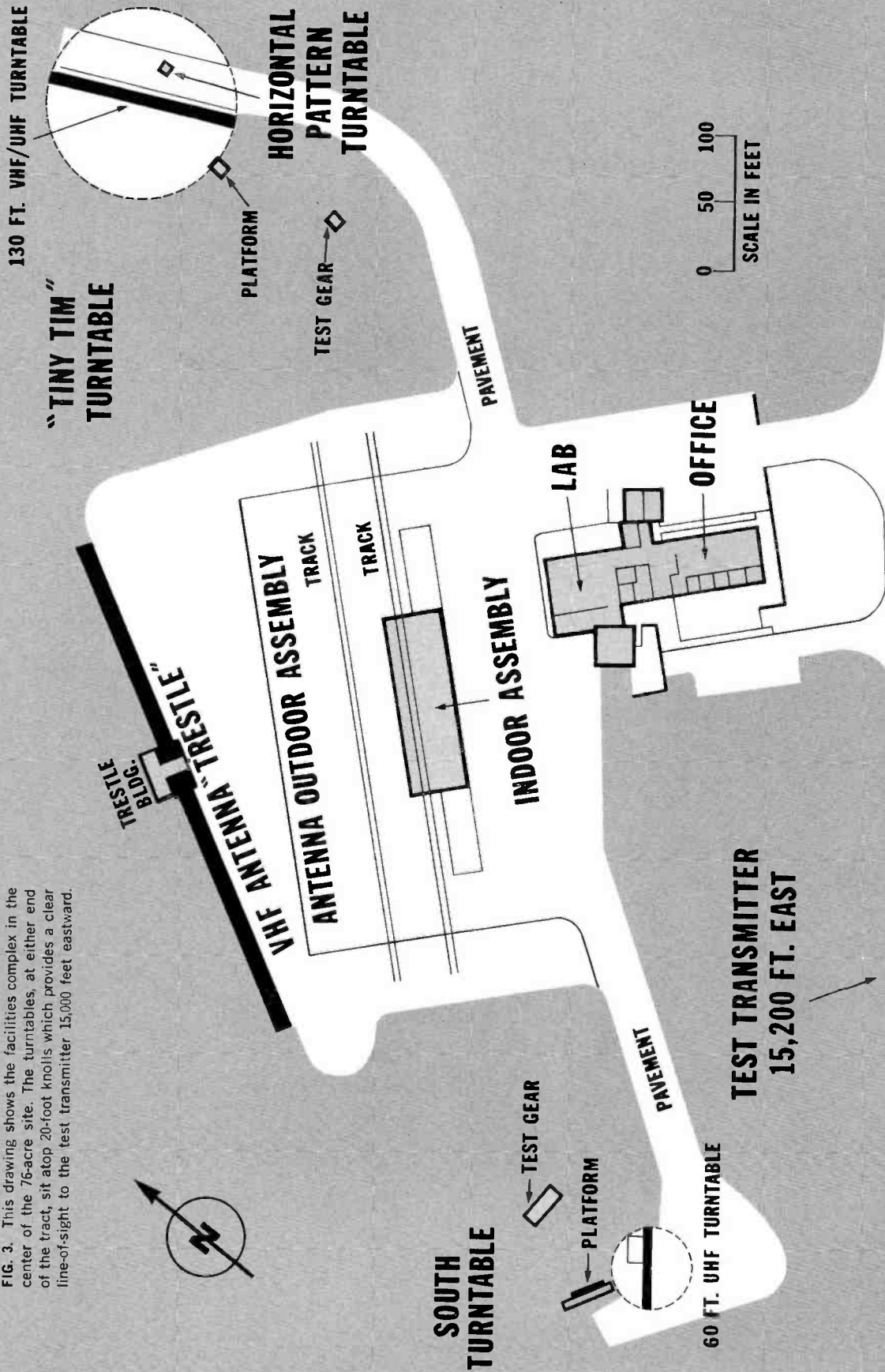
The facility occupies a parcel of ideally-contoured land on the edge of South

FIG. 1. Center 20 acres at the RCA Antenna Engineering Center. At left is the VHF antenna-testing trestle; in background is the Tiny Tim turntable for pattern testing. In

foreground are the indoor and outdoor antenna-assembly facilities; at right is the office/lab building. Not shown are the south turntable (Fig. 2) and the test-transmitter (Fig. 4).



FIG. 3. This drawing shows the facilities complex in the center of the 76-acre site. The turntables, at either end of the track, sit atop 20-foot knolls which provides a clear line-of-sight to the test transmitter 15,000 feet eastward.





Jersey's vast pine barrens. It has become known as the "Gibbsboro" site as a result of its Gibbsboro post-office address.

The land is at an average elevation of about 150 feet above sea level. Fig. 3 is a drawing of the "center" 20 acres upon which most of the buildings are located.

Further southeast is another parcel of land set aside for the test transmitter and tower, see Fig. 4. This "far-field" transmitter serves in the testing of antennas and is discussed later.

Illustrating the ideal topography of the site, the "center-20" encompasses two 20-foot knolls separated by some 900 feet of hollow. Each knoll supports an antenna turntable well above ground level as shown in Figs. 1 and 2. The north knoll actually supports two turntables: one for vertical antenna patterns and a smaller one for horizontal patterns.

In the hollow between the two knolls are the buildings that house the offices, labs and shops for the facility. These buildings are shown in Fig. 1.

Also in the hollow is a major structure used in the check-out of traveling-wave VHF antennas: the so-called "VHF trestle". This can be seen in the photos of Figs. 1 and 14.

In the area between the UHF-antenna assembly building (see Fig. 3) and the VHF trestle is a paved apron upon which assembly work is performed, particularly when the space under cover is occupied and when weather permits.

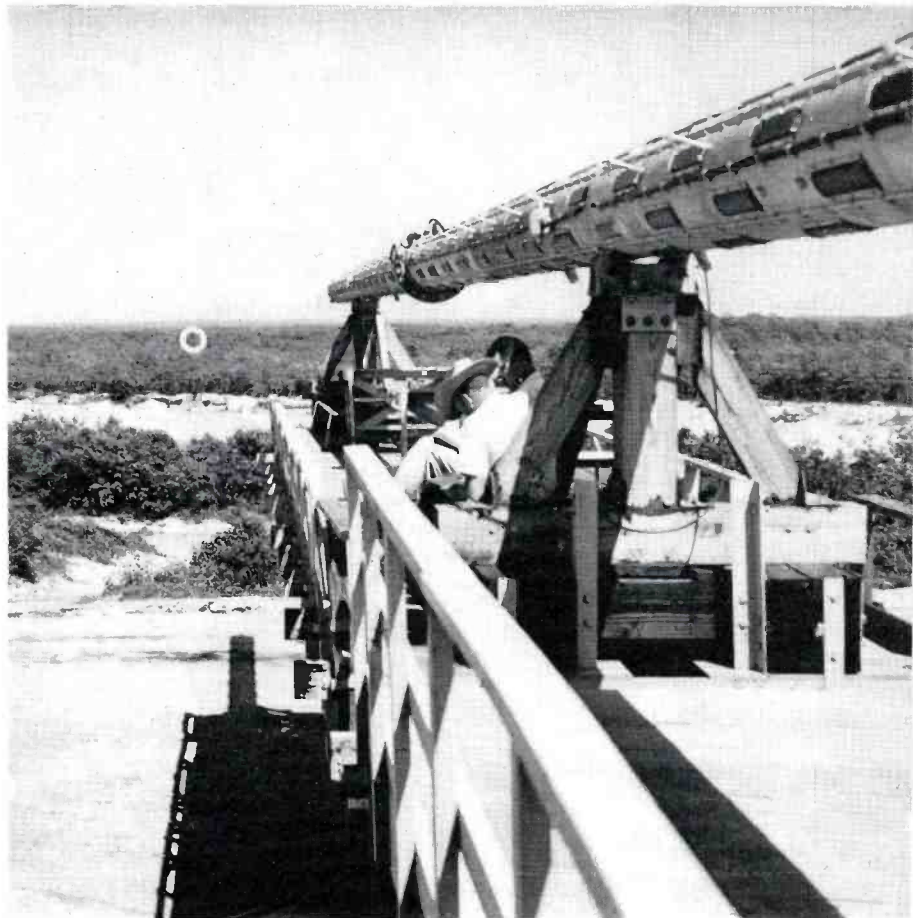
Transportation of the heavy antenna assemblies is accomplished with specially-built "Travelit" machine as shown in Figs. 11 and 19.

Test-Transmitter Site

Located just about three miles east of

◀ FIG. 4. During antenna-pattern tests, radio energy is beamed at the antenna from this tower almost three miles east of the test site. The 100-ft. tower supports several antennas.

FIG. 5. Looking toward the test transmitter from the south turntable. The small white circle (left) indicates the location of the transmitter site. ▶



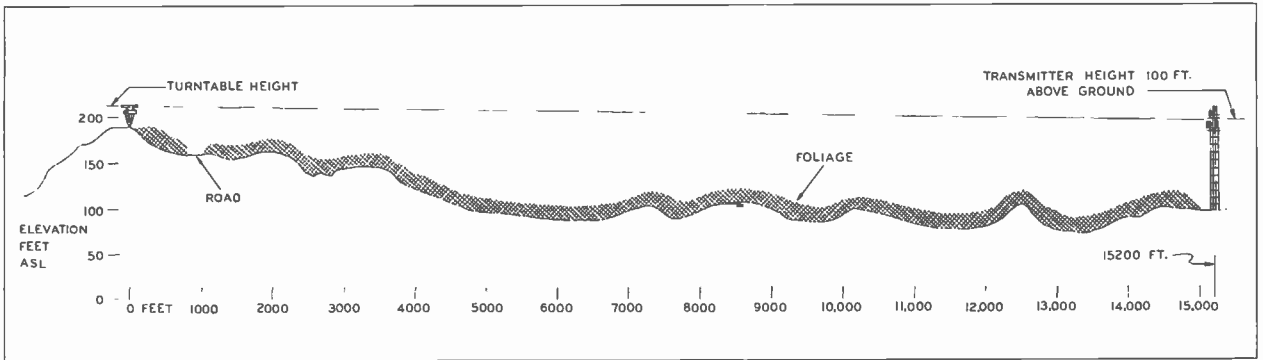


FIG. 6. Scheme of the terrain between the test-transmitter site and the test center. Note the ground cover of scrub pine and oak. This foliage absorbs and diffuses radio energy thus preventing its reflection toward the test center.

the antenna facility is the "test" transmitter site, a parcel of land about the size of a homesite atop a knoll. Here are two structures: a 100-foot tower and a small, box-like building. The tower, (see Fig. 4) supports two platforms upon which several antenna systems are mounted, three of which are dishes. Other antennas can be seen on the face of the tower below the lowest platform. The building houses sev-

eral racks of transmitters, precision signal generators and appropriate power equipment.

The range is approximately three miles long which places the transmitting antenna in the far field of the antenna under test. Fig. 6 shows a cross section of the terrain between the transmitter and the antenna under test. No large hills exist near the antenna range, thereby eliminating any

possibility of reflections appearing as a field originating from another direction. The surface of the ground between the transmitting antenna and the receiving antenna is covered with foliage which diffuses and absorbs that portion of the transmitted electrical energy which could otherwise be reflected into the antenna under test.

Vertical-pattern tests are made with the

FIG. 7. Overall view of the antenna lab. An engineer conducts a waveguide experiment in the foreground, at top right is the drafting department with duplicating services opposite



antenna, a UHF-Pylon, for example, lying on its side as shown in Figs. 2, 5, 16 and 17. Since the pylon antenna is a horizontally-polarized device lying on its side, the energy beamed at it must be vertically polarized. Hence, the antennas at the test-transmitter site are vertically polarized for these tests.

Horizontal-pattern tests are usually performed with the antenna mounted on the vertical turntable which is located within the track of the "Tiny Tim" turntable as shown in Fig. 3. Naturally, the energy beamed toward this antenna is horizontally polarized.

Office and Lab Building

The largest structure, in terms of floor area under cover, is the 7000-sq. ft. office and lab building which lies in the hollow between the knolls. Figs. 7, 8, 9, 10 and 19 show the exterior and interior of the major areas within this building. At the front end is the office space which includes the manager's office, a large conference room, several smaller offices and a general office area.



FIG. 8. Exterior view of the lab/office building. Note the wooden pillars which support laminated-wood girders which, in turn, support the all-wood roof. All wood construction assures accuracy of antenna tests.

The building was specially designed for the facility and uses laminated-wood girders instead of the usual steel. The reason for this is that large masses of metal might have an effect on the antennas under test. So that the various tests performed on the antennas are as accurate as possible, structural steel was ruled out for all of the buildings at the antenna facility. Another area in this building serves as the laboratory and drafting department.

Also located here is the storage area for test equipment and various materials and, the "short-order" machine shop where all of the special components used in the building of antennas and other products are turned out. This shop is equipped with the usual metal-working machines, lathes, cut-off saw, milling machine, drill press, etc. Thus, the facility is a self-contained installation, including purchasing and other support services.

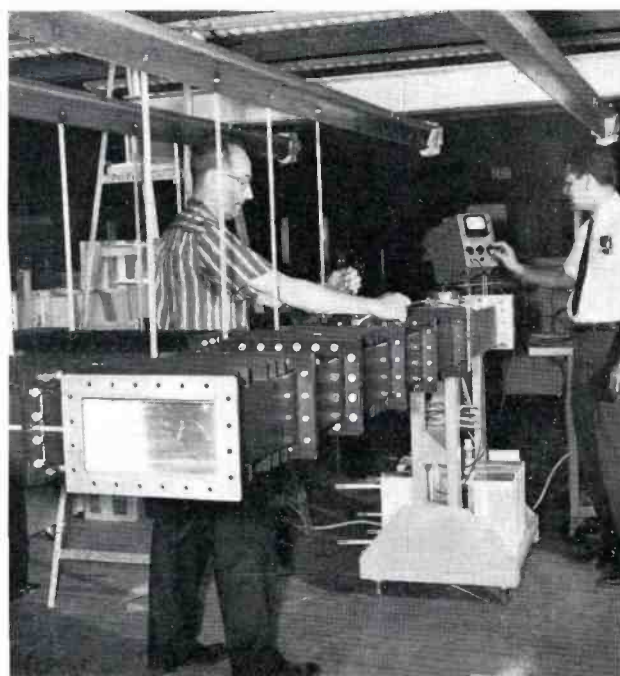
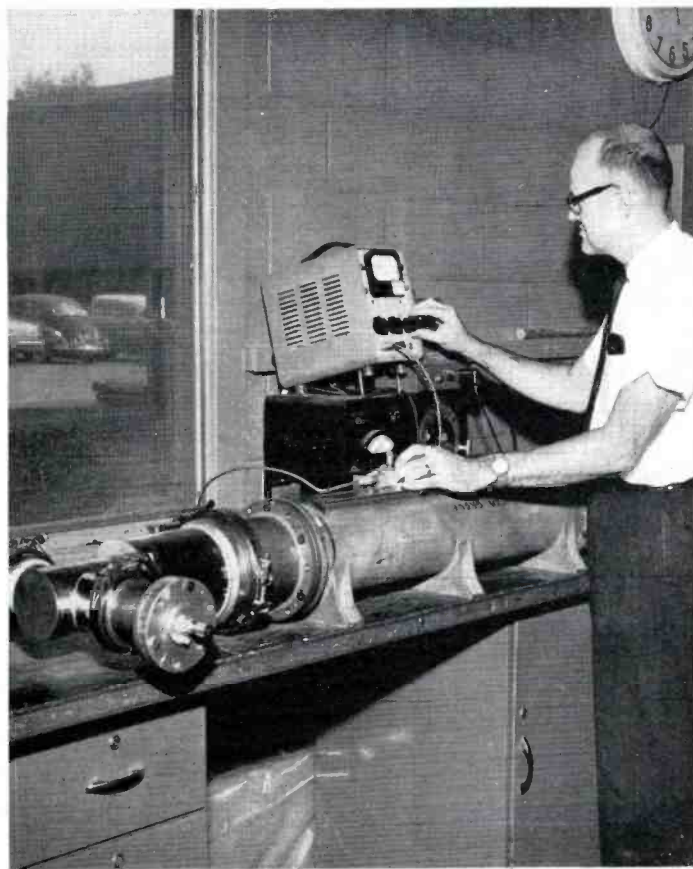
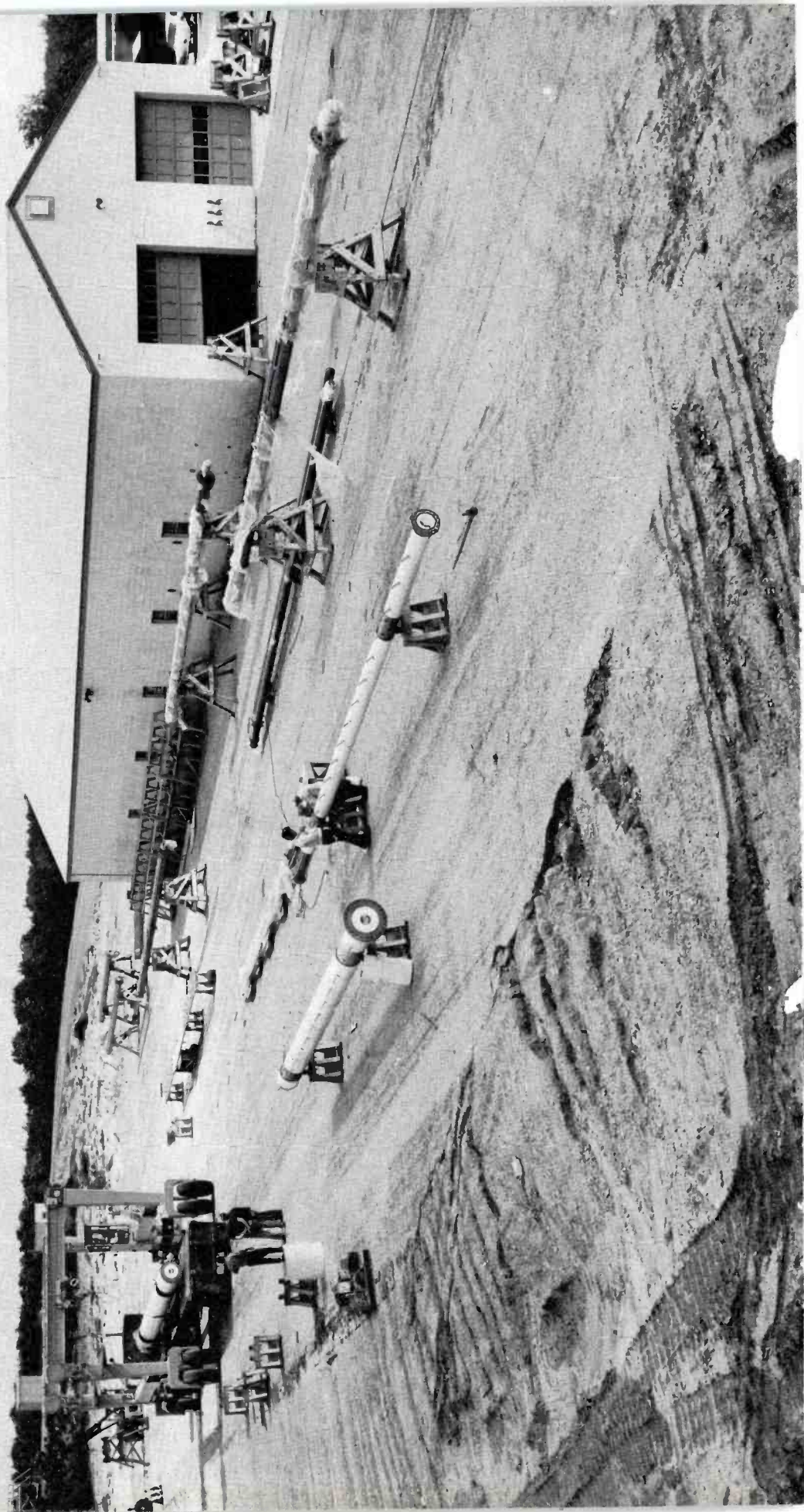


FIG. 10. Prototype waveguide filterplexer during assembly and test. Bench beyond supports test equipment.

FIG. 9. One of the slotted-line test setups used to evaluate transmission-line designs in the lab.

FIG. 11. This 30,000-square-foot outdoor-assembly area is used during the milder months of the year for assembly of traveling-wave and UHF-Pylon antennas. The Drott Travelift (left) is used for handling and transporting the assembled antennas.



Antenna Assembly Building

Located close to the center of the site is a 5200-square-foot building which serves as the shop where antennas are assembled (see Figs. 1 and 11). Inside, several test stands (see Fig. 12) serve in the gathering of single-layer antenna data. This data is then used to calculate the slot dimensions for production antennas.

Constructed of concrete-block walls with a wood-truss roof, the building features a "railroad" track imbedded in its concrete floor. This track aids in the movement of assembled antennas, mounted on wheeled "horses," to the outdoors for transport to the testing turntables. (See Figs. 12 and 13). Large, overhead doors at either end of the building permit excellent access to the floor area.

Outdoor Assembly Area

Like most businesses, antenna manufacturing is seasonal. Seasonal because of the fact that antenna installation atop a tower—usually a tall tower—is difficult and expensive during winter and, also, the desire of stations to have new equipment for the start of the new TV season in September. As a result, production facilities are hard pressed for assembly area during the milder

FIG. 12. Inside the antenna-assembly building are a series of single-layer test stands. Here, design data is gathered prior to actual antenna design via electronic computer.

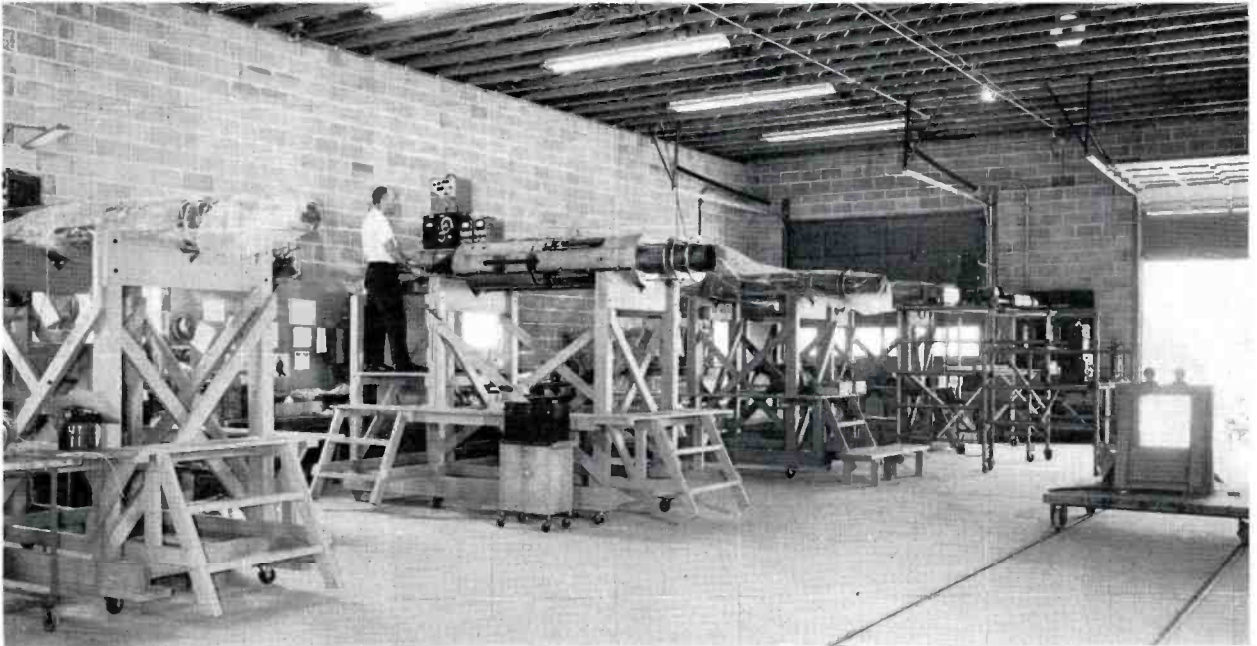
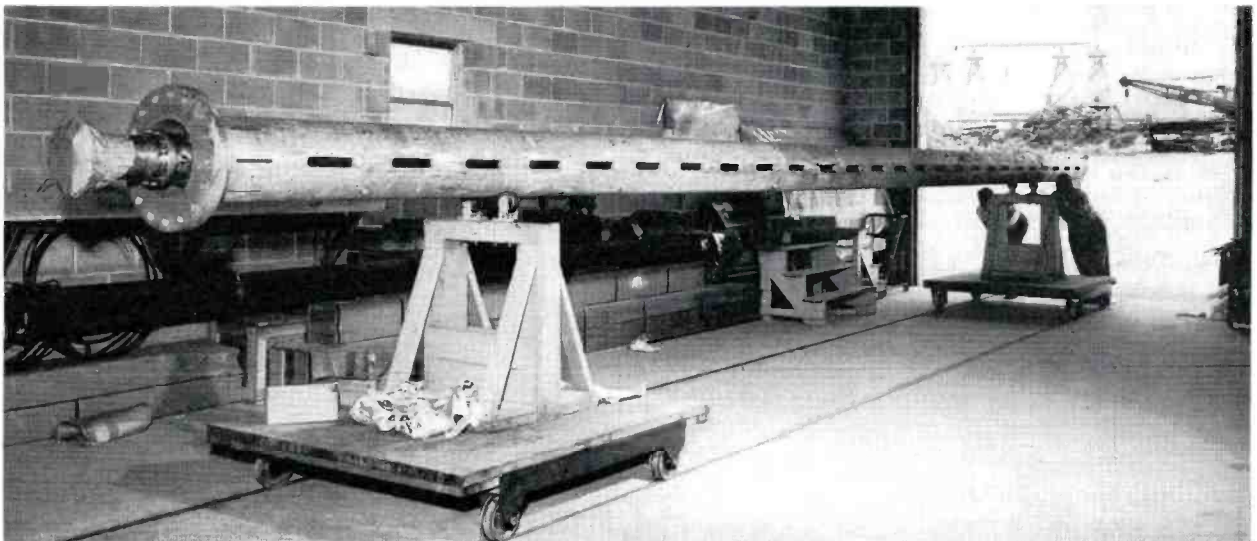


FIG. 13. A "railroad" track, laid in the floor of the assembly building is used to move antennas to the outdoors for various tests.



months of the year. The RCA antenna facility takes advantage of this situation by providing some 30,000 square feet of outdoor assembly area in the space between the assembly building (see Fig. 11) and the VHF trestle.

The entire area is hard-surfaced with "soil cement", a process that adds a binder to the sand and gravel of the site. The resulting pavement withstands heavy loads without the pock-marking common to blacktop and the expense of poured concrete.

A "railroad" track, laid the entire length of the area, allows easy movement of even the largest antenna assemblies on wheeled horses.

VHF Antenna "Trestle"

By far the largest structure on the site, the VHF trestle (Fig. 14) measures almost 400 feet long and rests on dozens of wooden piles driven some 40 feet into the ground.

The structure is actually a three-story building flanked by two trestles: the "south" trestle is the longest, measuring

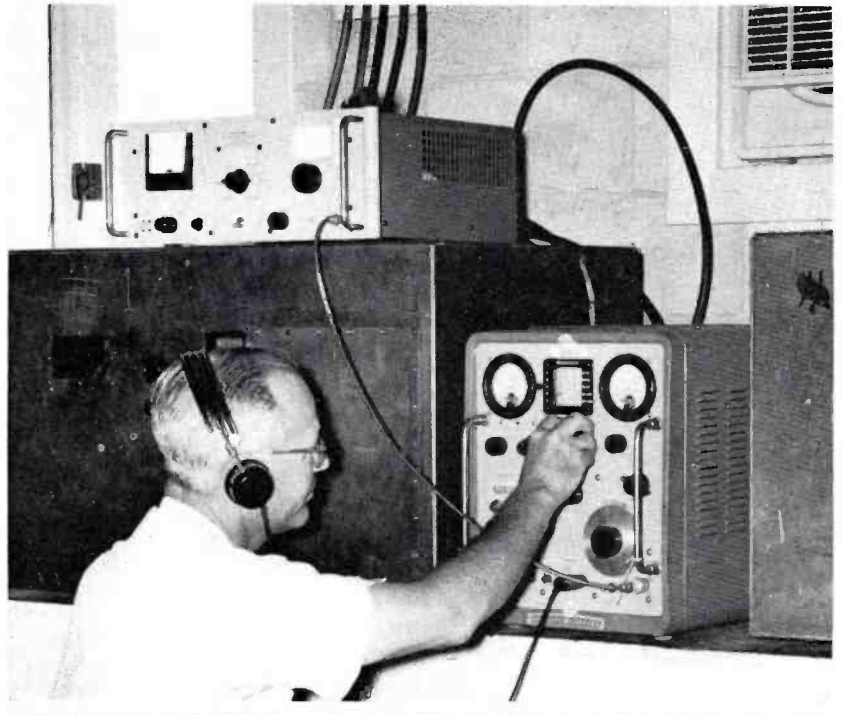
185 feet long while the "north" trestle provides 115 feet of length.

Referring to the drawing in Fig. 3, notice that the trestle is somewhat "on the bias", running essentially parallel to an imaginary line stretched between the two knolls. This orientation is deliberate to prevent reflections of radio energy from the transmitter toward either of the knolls.

The three-story building, with a floor plan in the shape of a "T", offers a total of 600 square feet on each level. The stem of the "T" houses the stairwell and sani-

FIG. 15. Inside the VHF-trestle house, an engineer performs a typical test incidental to the checkout and adjustment of a traveling-wave antenna. ▶

FIG. 14. The VHF antenna trestle measures almost 400 feet end-to-end. This structure is used in the test and final adjustment of traveling-wave and other VHF antennas. Test gear is in building at center. ▼



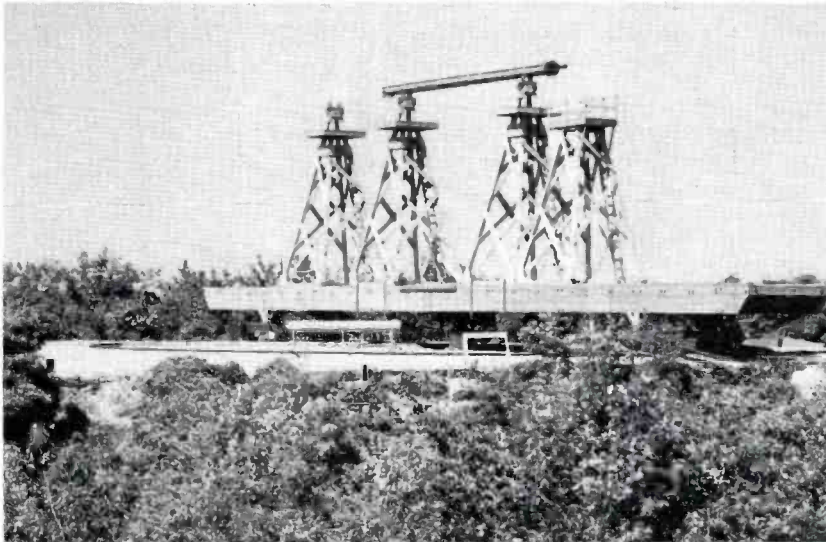


FIG. 16. The "Tiny Tim" turntable is 130 feet long, weighs 15 tons and carries a 15-ton load on its wooden deck. Two wheeled trucks support this mass on a circular track 90 feet in diameter. Antenna is a 30-gain TFU-30J UHF pylon.

tary facilities which reduces the work-area space to some 450 square feet on each level.

The lower level serves as a storeroom for the various materials used in the tests made on this trestle while the second level is used for a small shop. Here, parts may be modified or, sometimes, tailored to the needs of a particular antenna.

The upper floor houses all of the test gear used in the final adjustment of VHF antennas. (See Fig. 15.)

Because of the length of the trestles flanking the building, as many as four TW antennas can be adjusted at the same time depending, of course, on the total length of the antennas.

Each trestle is a deck with an open center. An antenna under test straddles this open center. The opening is necessary to the accuracy of the adjustments because of electrical reflections of the energy released by the antenna during test.

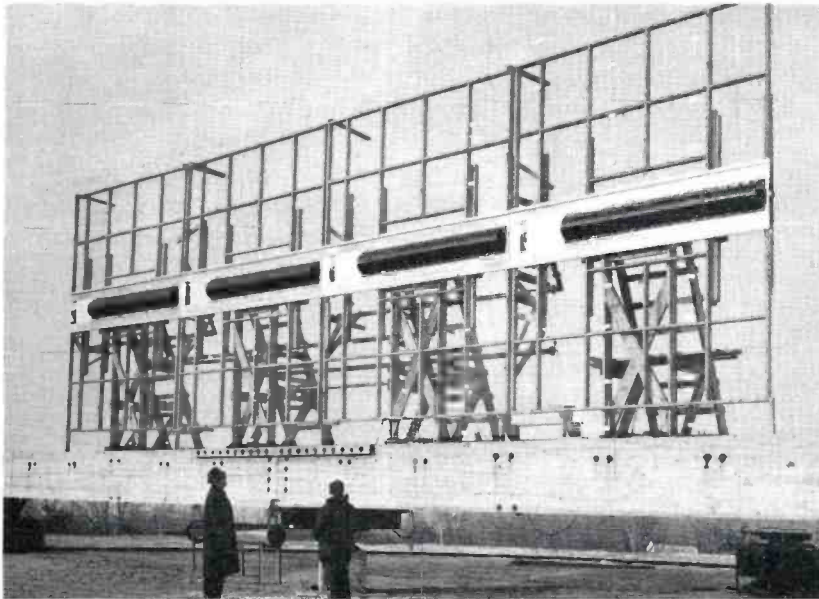


FIG. 17. "Tiny Tim" was used for the first time in pattern testing the WNJU-TV (Ch. 47) antenna prior to its installation on the Empire State Building in New York City.

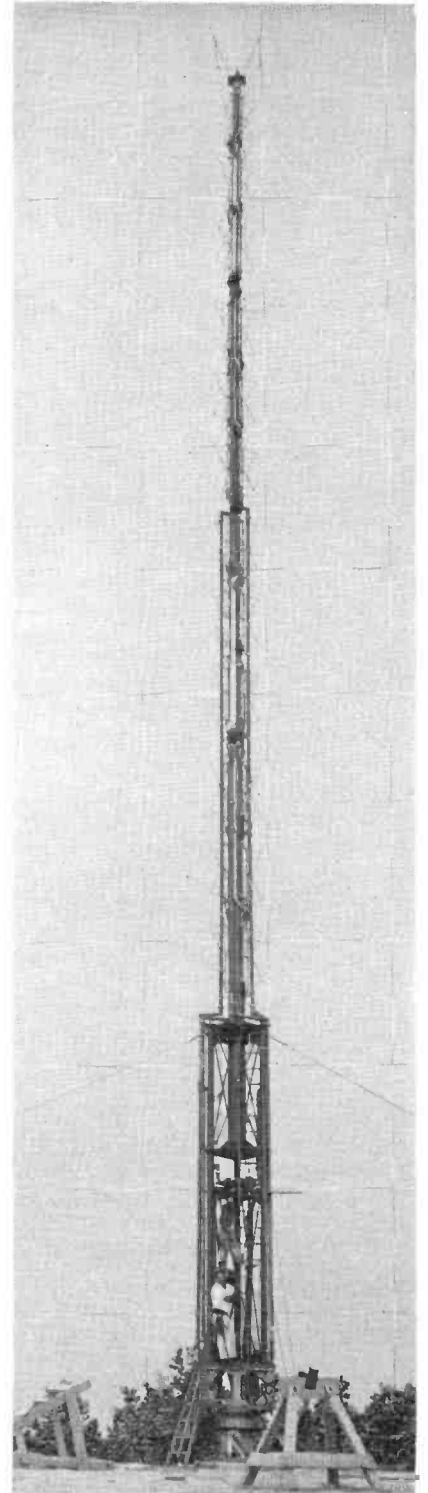


FIG. 18. The horizontal-pattern turntable supports the antenna in a vertical attitude. This turntable can support a 130-foot, 15-ton antenna. Electrically driven, the turntable rotates through a full 360 degrees.

Since the opening in the deck is a hazard to personnel (the deck is 30 feet above ground) cargo nets are stretched between the pilings at a level approximately 10 feet below the deck. These nets prevent serious injury in the event of an accidental fall.

Tiny Tim Turntable

Largest of the turntables at the facility is the one at the north corner. This giant device, entirely of wood (save for hardware), measures 130 feet long and weighs 15 tons. With a maximum load capability of 15 tons, the turntable is specially designed to support even the largest of the antennas produced here. The photo in Fig. 17 shows "Tiny Tim" supporting a custom-built antenna for the Empire State Building in New York (WNJU, ch. 47). The mammoth size of the turntable becomes apparent when compared to the size of the men in the picture.

"Tiny Tim" swivels on a circular rail 90 feet in diameter and motive force comes from two electrically-driven "trucks" mounted under the turntable deck. Variable-speed motors drive the wheels through high-ratio gearing and the turntable can be slowed to a crawl that compares to that of the minute hand on a clock.

High-ratio gearing provides two important advantages: one, the turntable can be stopped quickly and precisely without brakes and, two, the gearing provides a high degree of rotational resolution.

Antennas to be tested are hoisted via caterpillar crane (shown in Fig. 1) while transport from the assembly areas is provided by the *Drott Travelift*.

A second, smaller turntable occupies this hill as shown in the drawing of Fig. 3. This horizontal-pattern turntable is located inside of the circular rail. Fig. 18 shows a superturnstile antenna mounted on the turntable during horizontal-pattern measurements.

South Turntable

Located in the southeast corner, the smaller of the two vertical-pattern turntables is a pivoted device measuring 60 feet long. Used primarily for pattern-testing of UHF antennas (because of the distance between the prone antenna and the ground), the south turntable is the oldest of the three. The photo in Fig. 2 shows the turntable supporting a TFU-46K UHF-Pylon antenna (power gain: 46, approx. 100 feet long).

Travelift Transport

Because of the weight and size of the antennas, handling and transport from one

part of the site to another requires special equipment. This special equipment is a modified *Drott Travelift* which is shown in Fig. 19. This 40,000-pound giant is essentially a bridge (or *traveling or, pillar*) crane that operates on wheels and tires instead of a track.

Maximum load for the Travelift is 50,000 pounds which it will move from place to place at speeds up to 1.4 mph, up or down a 10 per cent grade on a concrete or asphalt surface. Usually, machines of this capacity operate on just four wheels; the one here is equipped with twice that many to aid in traction and weight distribution on the paved surface.

Tires are aircraft-type pneumatic with a 54-inch outside diameter. The Travelift is powered by a 6-cylinder (263 cu. in.) gasoline industrial engine through a hydraulic pump/motor system. Traction motors, too, are hydraulic.

A few more vital statistics: overall height; 20 feet; width, 23 feet, inside width, 15 feet; overall length, 35 feet;

wheelbase, 21 to 30 feet (adjustable); inside height, 15 feet.

Finest Antennas Built Here

It is evident from the foregoing that the RCA Antenna Engineering Center Affords the finest facilities for research and production of broadcast antennas. This is its historic tradition. It was in this tradition that television's Superturnstile, the UHF Pylon and the currently popular Traveling Wave Antenna were developed. Also, the first successful multiple stacked system employed at the Empire State Building and the candelabra system inaugurated in Texas. In addition, well over half the nation's stations attest to the excellent performance of antennas produced here either by choosing them originally or by switching to them after unsatisfactory experiences.

With this unexcelled background of experience and the new unmatched facilities for test and manufacturing, it is no boast to say that the finest broadcast antennas are built here.

FIG. 19. This photo shows the last stages in loading a traveling-wave antenna aboard the flatbed truck that takes it to its new owner.



**WCAU-TV
TACKLES
COLOR
EXPLOSION**

Beginning With Two TK-27 Color
Film Systems, This Pioneer
Philadelphia Station Has Planned
Thoroughly and Expertly for
Complete Conversion to Color





FIG. 1. WCAU-TV has installed two of the New Look RCA 4-channel color film chains Type TK-27, complete with TP-15 Multiplexers, TP-66 Film Projectors and TP-7 Slide Projectors.

Technical Equipment

As plans were made for the entry of WCAU-TV into color, a fundamental requirement was that the image presented to the viewers be very high quality. Neither time nor money were to be spared in order to get this impression. It was determined to plan, test and train sufficiently before going on air in order to present highest quality color pictures.

The Master Plan for color divided itself into three general areas: Technical, Programming and Promotion. The technical area included the master plan for equipment procural and installation, technician training, and general overall plant changes required for color.

The Programming area was concerned with the overall philosophy as well as the details of make-up, art, scenic and costume design, lighting, and production of color programs.

Promotion efforts centered on making the public aware of the coming color from TV10 and then a continuing campaign for forthcoming color programs.

Steps to Color

The current plan encompasses three steps to consummate the transition to color. First is procuring color film equipment;

second, color tape equipment; third, live color cameras. The changeover will probably be completed within two years. It has been purposely planned over this period of time in order to train properly and to accommodate the entire plant to produce the best in color.

Technical Equipment

In taking the step to programming color film, investigation led to purchase of two complete systems consisting of:

- 2 TK-27 Color Film Camera
- 4 TP-66 16mm Film Projector
- 2 TP-7 35mm Slide Projector
- 2 TP-15 Multiplexer

Together with associated sync generator equipment, pulse distribution amplifiers, video amplifiers, switching gear, and monitors, this comprises the entire installation for putting color film and slides on air.

To display the new programs in tint throughout the station occasioned the installation of color monitors in strategic locations such as conference room, client viewing room, and offices of department heads.

Technician Training

In order to prepare WCAU-TV personnel for the "color explosion," technicians were sent to schools conducted by equipment suppliers and were trained on the job for the intricate business of obtaining the finest color TV transmission possible.

Not the least of the problems facing broadcasters converting to color is the fact that the finest color equipment is a completely new breed. The transistor revolution, development of modular construction and stabilized circuits is leading to necessity for relearning fundamentals. Operation

and maintenance is different from what it once was. Not only new principle, but also new procedure, had to be taught and experience acquired. In some cases, this is being done by having the manufacturer's design engineers work together with the station's technicians. This way the technician rapidly learns how to master the new techniques.

In addition, each employee who works with color in any way is being required to undergo the Farnsworth-Munsell Color Test to insure that he is qualified to work with color. This test employs a series of some one hundred colored discs ranging in hue from one end of the color spectrum to the other. These must be placed in proper order within the color spectrum. Upon the outcome, it is possible to detect even small discrepancies in color vision. Only those who are "color oriented" handle that which affects color performance.

Quality Control

There are numerous ways in which color has created changes in the technical aspects of WCAU-TV programming. For example, all color prints of feature movies are screened in advance to determine quality; many are returned because they do not meet the station's air standards. In every phase of color there is rigid quality control, for this is uppermost in all station plans for color programming.

Color monitors present new problems, in that room lighting for screening rooms and master control areas must be such that technicians can obtain an accurate color picture without degradation. Currently, there is underway a complete update on room lighting in areas where color monitors are installed. Indirect type fixtures are to be employed, levels are to be adjustable, mixtures of fluorescent and tungsten sources are to be avoided—like-wise mixture of artificial and daylight.

In studios where color filming takes place there are lighting changes underway to assure color fidelity in filmed commercials and programs. Hence, the station is now using 3200K lighting for all in-studio stages where color film and slides are shot.

On location, also, changes are taking place. For instance, in order to keep sunlight constant during filming of outdoor scenes, giant reflectors are now used to obtain true color reproduction. WCAU-TV film crews have used these to great advantage in the filming of the station's recently aired special "Incredible Incident at Independence Square." This turned out to be a notable example of fine color reproduction in a local film as a result of carefully prescribed techniques.



FIG. 2. C. Robert Gross is Director of Engineering and Chief Engineer for WCAU-TV. Mr. Gross has the major responsibility for the technical aspects of TV10's entry into local color programming. Mr. Gross has been a pioneer in color television. In 1954, he started working with CBS's first West Coast color efforts when he planned, installed and supervised the color equipment at Television City, Los Angeles. He continued as Supervisor for West Coast CBS Television Network color originations. Mr. Gross has been with CBS since 1951, and has headed engineering operations at WCAU-TV since June, 1963.

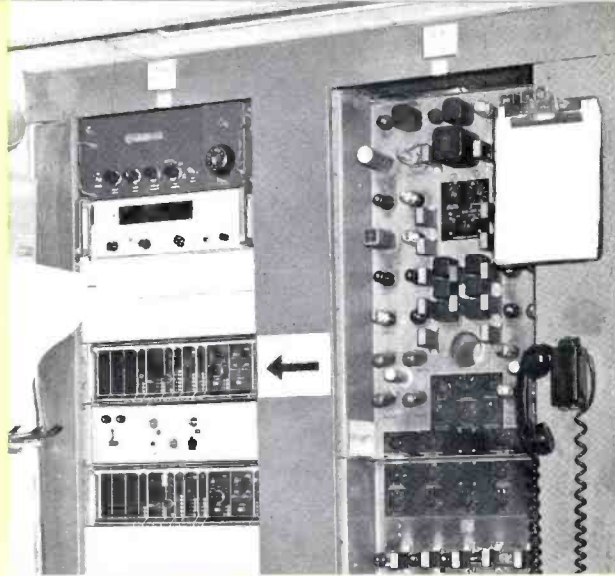


FIG. 4. New transistorized sync generator Type TG-4 near top of Rack 1-1 (at left) occupies only 5½ inches, whereas old TG-1 occupies all of Rack 1-2.

FIG. 3. Auxiliary modules for the color film cameras are installed in center of two nearby racks (note numbers 5 and 6).

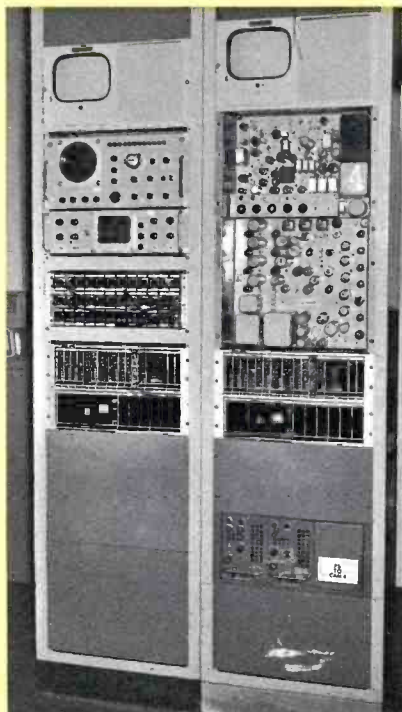


FIG. 5. WCAU-TV employs color testing for all personnel concerned with color TV. This Farnsworth-Munsell 100-Hue Test requires about 20 minutes to administer and 10 minutes to score. By plotting out the score on graphs, it affords a simple method for rating color discrimination. (This test set is available from: Munsell Color Co., Baltimore, Md.)

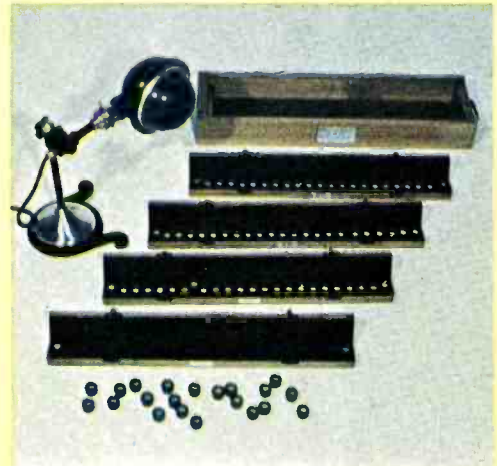


FIG. 6. Control panels for the color film system are installed in this console at WCAU-TV main control room.

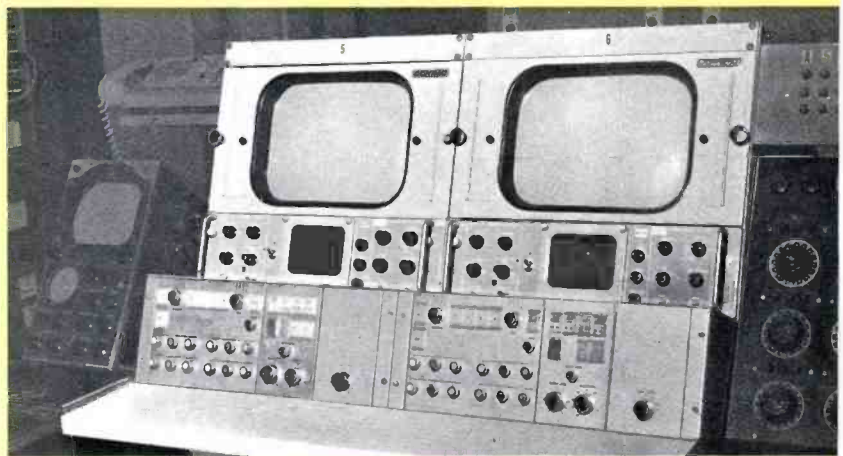




FIG. 7. WCAU-TV film crew at work on a scene in current color production. Note use of giant reflectors. These assist in keeping uniform color temperature, assuring color fidelity.

Programming and Production

WCAU-TV prepared its production and technical staff for the color changeover with an intensive two-day seminar held in its Philadelphia studios, at which E. Carlton Winckler and John R. Whittaker of CBS, New York, presided.

The seminar covered all phases of color for both film and television, and was basically a technical discussion of what to look for to achieve the best possible color in on-air operation. Topics included:

- Film Production, Processing and Editing
- Color Film Printing Practices
- Color Television Film Shooting Practices
- Color Television Film Evaluation

Film and Film Evaluation for Color Television

Designing for Television in Monochrome or Color

Make-up for Color Television

Graphic Arts and Color Television

Lighting for Monochrome and Color Television

With this background, the various departments involved in programming find their own approaches to the color explosion. However, until color video tape equipment is installed by the end of 1965, only film programs will be locally produced in color. This currently includes some prime-time specials, many feature movies, and



FIG. 8. Scene from prime-time color film production "Incredible Incident at Independence Square" featuring Imogene Coca. This full hour program will be aired in color by CBS stations across the nation.

approximately half of the 30-minute documentaries in the TV10 Sunday Special series.

Problems for Programmers

Color has presented some interesting new challenges. A fundamental problem is that the station in process of conversion to color is simultaneously programming in black and white. Therefore, a color picture must also be designed to look well in the monochrome dimension. Furthermore, the great majority of viewing is done without benefit of color—and this situation will continue (with gradual diminishment) for years to come. For sets and on-air artwork especially, this presents a continuing challenge.

In the determination of grey-scale values for the various hues and shades, station artists frequently employ a viewing filter. (Other stations use the Munsell charts that show exactly the grey value of various colors.) WCAU-TV artists feel that ultimately, however, their own color judgment is being so sharpened that they will be able to determine with the unaided eye grey scale values. Naturally, the final test is how it looks through the eye of the television camera—which comes through at rehearsals and previews.

Lighting in the art department and scenic shop has had to be altered to simulate studio conditions, so that artists may judge how their colors will look when

picked up on the camera. In both studios and these departments, completely new lighting fixtures, with dimming facilities, have been installed. These are Quartz-Iodine Luminaires, operating at 3200K.

Make-up is more natural than for monochrome. It must be blended skillfully to avoid "stage" make-up effect—which is easily picked up by the sensitive color film (and also by live color television cameras).

Also, since people on a set should be the focal point, they should wear the brightest colors while the set itself is played down. This necessitates a closer working relationship between set designers and costume designers than ever before.

Color Logos and ID's

An important rule of thumb has been established for changeover to color in order to retain identity. The station logo (and certain fixed logos for programs, such as the Early Show and the Late Show) are being retained *but reworked in terms of color*. For example, the original artwork (sky and clouds) over which the station printed its call letters (TV10 WCAU-TV) for station breaks, was done in black and white and reproduced that way on a slide. This was fine for monochrome. For color WCAU-TV Art Director, John Ferlaine, came up with very much the same effect (and identity) during a recent vacation in Colorado. He went into the desert country to shoot hundreds of color stills of sky and cloud effects. From these he got the correct cloud formation and sky color for a remake of the logo.

Another rule of thumb concerns indiscriminate use of color. The station seeks an atmosphere on the home receiver that

is in correspondence with its quality image developed over the years. This is partially achieved by seeking artistic values in all that it does with color on air. Naturally, this results in a rather restricted palette, rather than color just for the sake of color.

Color Programs

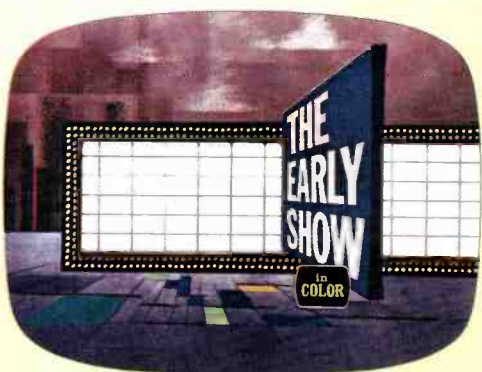
As far as actual programs are concerned, WCAU-TV has already aired color programs concerned with the Port of Philadelphia, the city airport, new school superintendent, pro-football team (the Eagles) and the summertime farm visit of a child from Harlem. These were produced by the station's own staff on color film.

TV10's feature film schedule kicked off its season with a solid week of color feature films (an excellent way to draw attention to so dramatic a change as color) on the daily Early and Late Show, September 13 through 19. Since then, numerous feature movies have been presented in color.

Currently, the station has a film production crew in Vietnam and another in Malaysia, filming two color productions. These will provide two typical prime-time specials in color—one to air in December, the other early in 1966.

Finally, the station recently aired its first prime-time special ever to be presented in color, "Incredible Incident at Independence Square," starring comedienne, Imogene Coca. This one-hour program was a delightful spoof, utilizing color as well as on-location film to focus attention on Philadelphia with its metropolitan environs as a tourist and vacation area. It was received with excellent results by local audiences and during the coming season will be aired in color by CBS owned stations across the nation.

FIG. 9. The problem of retaining station identity already established by monochrome I.D.'s is successfully solved by staff of WCAU-TV as illustrated on opposite page. Note that the color logos retain the original image of the black and white logo. These monochrome logos have merely been reworked in terms of color.



Promotion Efforts

TV10 let the public know of its entry into color with a campaign that embraced four major areas: Newspapers, TV Guide, radio and outdoor advertising. The campaign was based on the CBS promotional slogan, "Hey, look us over!" and utilized color extensively.

TV10 ran a total of 27,194 lines of newspaper advertising promoting CBS color in the Philadelphia market. In addition, the station ran a 10-page article, "This is TV10", in the SUNDAY BULLETIN MAGAZINE September 12. The article utilized many pictures in full color of the station's personalities and programs.

A premiere week of color movies on THE EARLY and LATE SHOWS was heavily promoted both in the newspaper and in TV GUIDE, which announced the color movies with a double-page spread of advertising.

Color was also promoted in outdoor and transportation advertising which invited viewers to "look over" TV10. Colorful banners and signs were carried on buses, Yellow cabs, and giant sign-boards in key locations throughout the local area.

Using radio to promote the "color explosion," TV10 utilized twelve Philadelphia-area radio stations to carry its message about color and the Fall color lineup.

Mailers proclaiming the color hits to be seen on TV10's local movie programs were sent to 50,000 charge customers of Gimbel Brothers, and colorful posters inviting color television set prospects to "look over TV-10!" were supplied to 200 Philadelphia-area television retailers and 125 television service centers throughout the city and its suburbs.

In addition, personal letters from WCAU-TV's Director of Engineering, C. Robert Gross, and the station's Director of Promotion and Information Services, Robert N. Pryor, went to 1,000 color television retailers and 1,800 television service men, inviting them to "climb aboard the TV10 Color Bandwagon" by participating



FIG. 10. Some advertising and promotion of station's entrance into color television is presented here. It embraced four areas: Newspapers, TV Guide, radio, and outdoor advertising. 50,000 mailers, and posters to several hundred TV dealers were also used.



in the station's extensive color promotion campaign.

Thus, through the means of mass advertising and the most personal, direct approach of individual letters to key persons involved in color television set sales, WCAU-TV greatly enhanced public receptivity to the "color explosion" when it finally made its entrance into the program lineup on September 12.

First Results

Thus far, an indication of the excellence of TV10 color has come by word of mouth from viewers themselves. The Engineering Department, which heretofore

usually heard from viewers having some complaint about reception or technical matters, has received a number of calls from local viewers who simply want to compliment the station's color programming. Many have even ventured the opinion that WCAU-TV is originating some of the very best local color on the air.

The station is looking forward to installation of color videotape by the end of 1965, and live color will be operational by the end of 1966, with at least one studio fully equipped for color. It is estimated that within the next three years, WCAU-TV will be originating most of its local programming in color.

TRENDS IN COLOR TV TAPE SYSTEMS

Tips on How to Plan a Color TV Tape System for Today's Programming Needs

The fast-paced requirements of color programming places new emphasis on the role of color tv tape systems. Many stations are finding that one or two recorders are no longer enough to handle tv tape's part in the color program boom. In equipping to meet new tape requirements, the concept of matched color tape systems is particularly interesting from both economical and production standpoints.

The recently introduced series of tape machines—TR-3, 4, and 5—offer many new and interesting system possibilities. Many of these are outlined here. All three machines are designed for color, however, each is designed for a particular taping need. Combining them in a system multiplies their effectiveness and makes possible individually tailored equipment groupings for color.

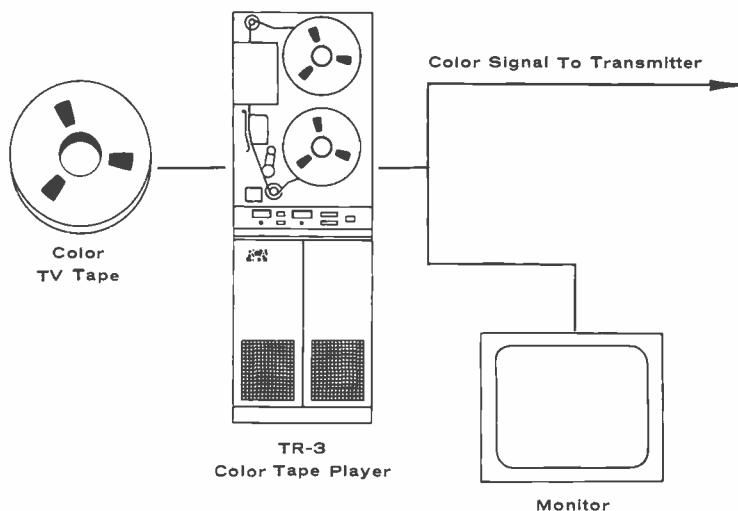
A number of system possibilities and their particular advantages are described in the following paragraphs. These start with a simple playback system for getting started in color taping and range through multiple equipment systems for a variety of production requirements.

USING TAPE TO GET INTO COLOR: SYSTEM NO. 1

The TR-3 is a compact player—the *only player* in the industry—and therefore the most economical tape program origination unit available. With a fidelity matching that of the higher priced equipments, the TR-3 plays color and monochrome tapes on air or over closed circuit systems. It provides the quickest and most economical way to get started in color.

All other TV tape machines are designed to include both the recording and playback function. So, up to the time the TR-3 was introduced it was too costly to buy a recorder just for playback use. However, as part of a system, two TR-3's can provide two playback sources at about the same cost as a single recorder/reproducer.

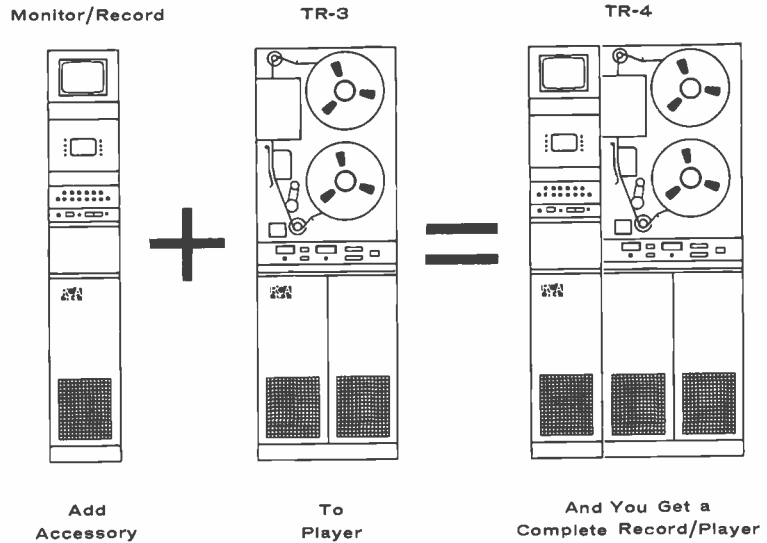
Beside its on-air capability the TR-3 is a "selling machine" when it comes to showing clients upcoming programs and commercials, especially in color. It has already proved its ability in screening commercials for agencies, to help station sales reps and for previewing program materials.



EQUIPPING THE PLAYER TO RECORD

A slim, upright rack accessory can be used with the TR-3 to hold optional picture and waveform monitoring equipment. The operator can look at the picture and see the corresponding waveform at selectable points in the system. At the turn of a switch, tone wheel dots can be superimposed on the display.

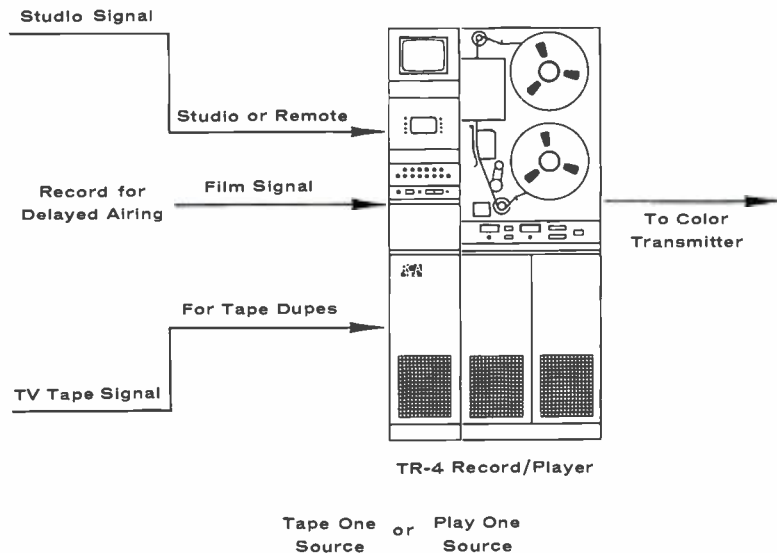
A station with the player as the only tape facility may later decide to make color tapes of their own. For this, a record accessory can be added to the TR-3 and installed in space provide in the accessory rack previously described. The TR-3, once equipped with these two accessories—the monitor rack and record assemblies—becomes in essence an identical instrument to the TR-4 record/player, even to the record control panel and space in the rack for addition of accessories such as electronic splicer, cue/record playback, drop-out compensator and others.



BASIC RECORD AND PLAY: SYSTEM NO. 2

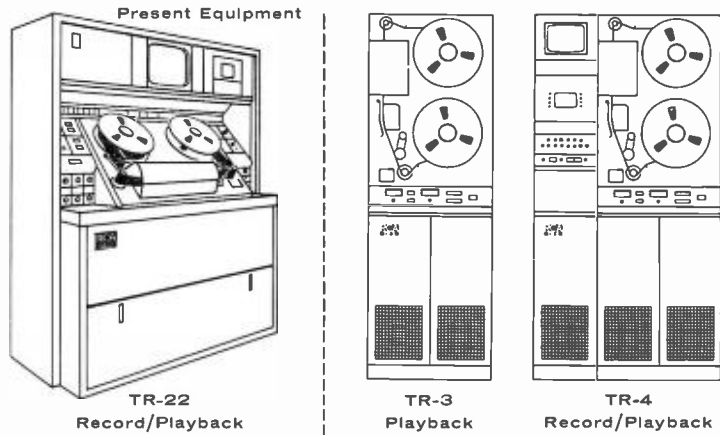
The dual purpose TR-4 is the building block for all color TV tape systems. It is extremely compact and will record as well as play both monochrome and color tapes. The slim, upright cabinet is only 5½ feet high and requires less than six square feet of floor space. Equipment includes built in picture and waveform monitors together with complete metering facilities.

The electronics in the TR-4, as in all other machines of the TR series are packaged as compact modules. They can be inserted and withdrawn by hand for inspection and repair. Circuit standardization in these equipments has now reached a point where similarities make several of these modules completely interchangeable between machines. This simplifies servicing, familiarizes personnel with circuits and reduces the need for spare parts. It results in economy, too. Color operation is provided by adding a set of plug-in modules. This is important because the broadcaster who wants to add color to his tape operation at a later date, need not invest in these color accessories now.



SUPPLEMENTING PRESENT TAPING FACILITIES: SYSTEM NO. 2A

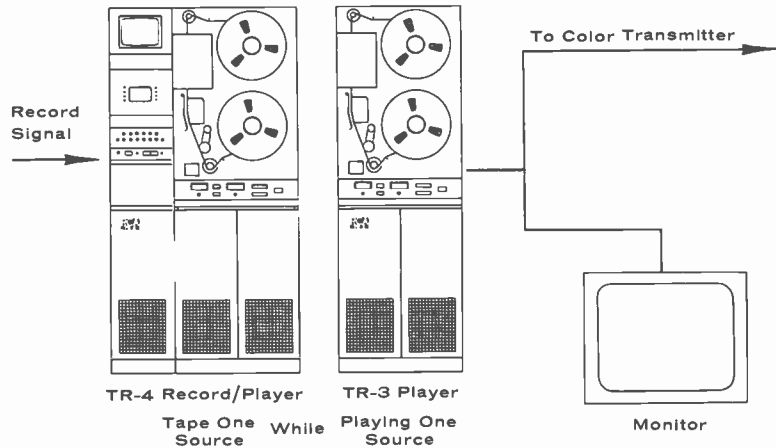
Stations wishing to expand or modernize present taping facilities will find the right selection in the TR-3 and TR-4. Either machine, beside offering color, can be used with existing machines that may still be in service. The TR-3 player might be particularly useful. For example, tapes may be transferred to the TR-3 for airing while the old machine is busy recording, in effect providing a two-machine system at little additional expenditure. Looking further, addition of a new recorder/player such as the TR-4 would provide dual record facilities for such an installation.



SIMULTANEOUS RECORD AND PLAY: SYSTEM NO. 3

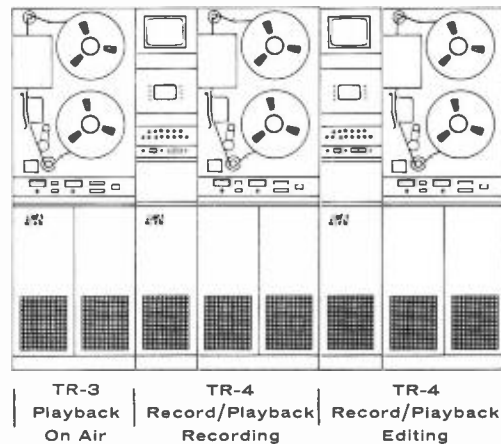
All TV tape recorders perform either the record or play function but not both at one time. It is therefore necessary to have two machines if simultaneous recording and playing of tapes, or any editing of tapes, is required while a tape is being played or aired.

This limitation is overcome by mating the TR-4 with the TR-3 player, a combination that permits recording, for example, on the TR-4 recorder/player while the TR-3 player is being used to air tape. The combination is unmatched anywhere for economy. It can be used for color.



SIMULTANEOUS PLAY, EDIT, RECORD: SYSTEM NO. 4

Many will find it desirable to add a second TR-4 to the TR-3/TR-4 combination to meet the unexpected and emergency taping jobs that might spell the difference between successful programming and pandemonium. Adding the second TR-4 to the pair makes it possible to play, edit and record simultaneously, just as in a three-recorder setup but in less space and with considerably less cost. In fact, this unique TR-3 and TR-4 combine provides facilities that users of other tape systems can get in no other way than by purchase of three complete recorder/player machines.



Mobile Tape Equipment for Field, Studio, and Duplication Uses

Addition of the TR-5 mobile facility is an excellent idea where there is a requirement for taping outside the normal tape area such as on location or in other parts of the station. Only half the size of other recorders, the TR-5 can be rolled between studios and control rooms, is easily transported, for example, to remote locations for client viewings or for taping commercials or shows.

Color recording ability is built-in the TR-5. Although playback is limited to monochrome, color tapes made on the machine can be played back on TR-3 or TR-4 machines. When used for color recordings in the field, the TR-5 is usually first checked out using the studio color system as a reference. Space in the module deck permits adding a cue channel and electronic splicer.

Tape Duplicating Center

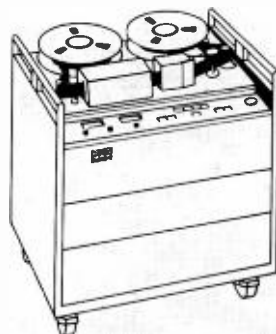
A bank of TR-5's provides an easy way

to get high quality recorded tapes for distribution. Often, it doesn't make sense to record copies when the recordings could just as well be master tapes. This may be especially important for group ownership stations, or for those sharing programs, or for anyone with a requirement for multiple production of masters at a low investment. The TR-5 permits considerable savings in space as well as capital outlay. When set up in the plant or in a mobile unit, the compact center can be overseen by one man.

MOBILE TAPE OPTIONS

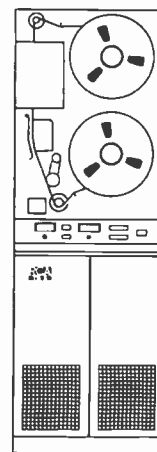


Mobile Recording

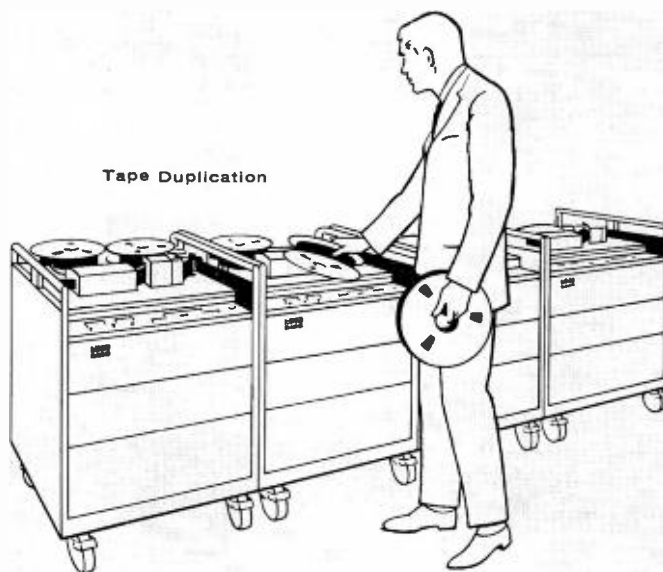


In Studio

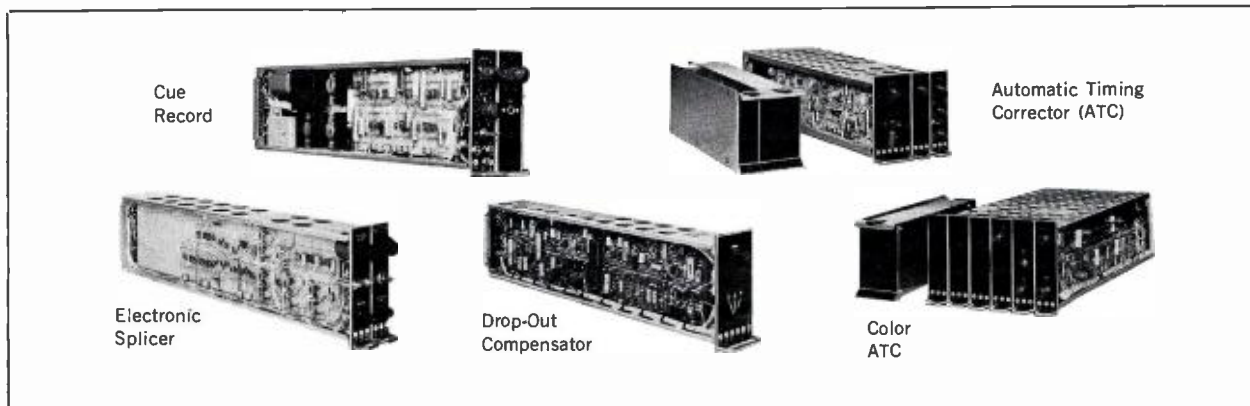
TR-5 Record



TR-3 Playback



Tape Duplication



Electronic Accessories for TV Tape Systems

The standard TR-3, 4, 5 equipments incorporate advanced circuits that provide TV recording and reproduction of the highest broadcast quality. Employing the "direct recovery" system of color processing, the design of these equipments features the additional flexibility and economy offered by plug-in transistorized modules.

Beside all the module concept offers in reliability, compactness and attention-free operation, the design makes it practical and economical to package plug-in circuit accessories that modify performance or extend capabilities to meet the customer's special requirements. The accessories are optional, and the user who has no need for them at the time can defer adding them to his system without compromising performance. Also, as is often the case with tape systems, it is possible to gain the desired facility by adding an accessory to only one machine in the system. For example, it might be practical for a station with several TR-4's to completely satisfy the editing requirement by adding the accessory to only one of the machines, saving the expense that would be necessary if it were standard equipment.

Facilities offered by the accessories to the TR series of tape equipments include color performance, achieving extraordinary picture quality by precise and automatic circuit timing and dropout compensation, electronic splicing, cue record/playback, and a record monitor accessory for use with the TR-3 player.

Automatic Picture Corrector

This is in reality called an "automatic timing corrector," or simply ATC accessory, and its purpose is to assure the highest possible picture quality with minimum

timing errors. Sometimes delays creep into the recording of a signal. This is noticeable in playback as skewing, joggling, scalloping or other forms of geometric distortion of the picture. Applicable to all the TR Series, ATC provides the precise timing and automatic delay necessary to eliminate this defect. Monochrome and color ATC accessories are both required for color operation.

Tape Dropout Eliminator

Irregularities in tape surfaces sometimes cause brief reductions of RF carrier amplitude that appear as white or black dots or streaks on the TV screen. The effects of these "dropouts" are virtually eliminated by a memory device known as the dropout compensator. If your tapes have many of these imperfections, the time spent in screening can be eliminated by use of this accessory.

Electronic Splicing

The electronic splicing modules provide a fast, accurate means of electrically adding or replacing a sequence in recorded color or mono video tape program material without mechanically cutting and rejoining the tape. The operation is fast, accurate, requires little skill on the part of the operator. Video may be recorded while retaining previously recorded audio or cue information.

Cue and Record Playback

This equipment includes an accessory head and provides a means of recording cue information along one edge of the video tape. Cue can be in the form of voice, tone or digital information. A feature of the program and cue channel is that recording can be done independently of video record-

ing, that is, sound may be dubbed in while playing back or previewing the video signal.

Monitor/Record Accessory

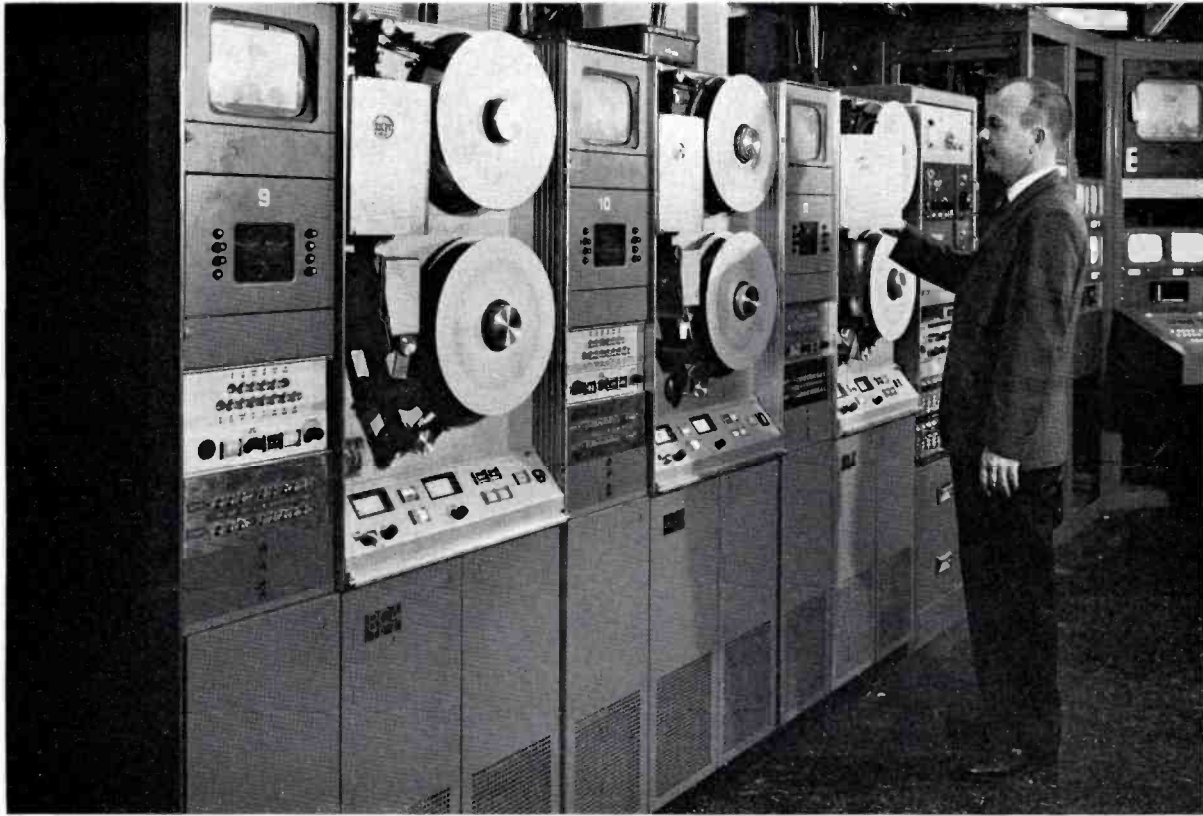
Two accessories mounted in a slim rack make it possible to expand the TR-3 player system to incorporate monitor and record facilities to match the TR-4 recorder/player. In the rack, there is also space for other tape accessories such as the Electronic Splicer, Cue Record/Playback, Dropout Compensator and others. The Monitor/Record unit can be a desirable addition to the TR-3.

Monitoring equipment includes picture and waveform monitors, monitor switchers and an audio monitoring system. The Record Accessory, which requires the Monitor Assembly as a prerequisite, includes a pre-wired harness and module frame, record control panel, erase head, erase transformer and an audio record head post and necessary record modules.

Conclusion

Anyone who is planning tape facilities will do well to consider carefully the extent to which color tape will be used in programs, how it will be employed and the ability to integrate new tape equipment into existing program facilities.

The TR-3, 4 and 5 series of tape machines provide in just three basic designs every facility required for the smallest or largest tape installations. Two of these machines are unique in industry. Just as importantly, the various combinations permit the user to acquire only the facilities he may need now, with the opportunity to expand in the future. Finally, the TR series employs compatible recording techniques that provide high quality TV tape color reproductions for both broadcast and closed circuit applications.



**FOUR TR-4 RECORDERS
PACE WMAL-TV'S MOVE TO COLOR**

WMAL-TV, Washington is presently keeping four TR-4 recorders busy on its monochrome tape programs and commercials. In a plan to present all local programs in color, the station will add color ATC accessories to all recorders.

Volume of tape recording and playback requires the use of three machines at the plant. All station promos are taped. Everyday network delays are encountered. Many local shows are taped, including some for syndication. Furthermore the number of tape commercials is growing.

One TR-4 machine has been installed in a mobile unit (see photo, left). This is used to handle on-location program and commercial—at present primarily the "Close-Up" series of news features taped on the steps of the nation's Capitol.

As a major market station, WMAL finds they need a minimum of three studio recorders to handle all their taping needs. For example, in preparing a composite show, one machine records while two handle playback of previously recorded sequences. By colorizing this full complement of tape equipment WMAL is ready to implement plans for all-color originations.





**MULTIPURPOSE TV TAPE SYSTEM
AT ETV STATION, WCVE**

The tv tape system at Richmond, Va.'s educational tv station, WCVE provides a unique answer to the station's individual needs. Here two TR-4 Recorders and a TR-3 Player handle the production and airing of from eight to twelve hours of tape programs per day.

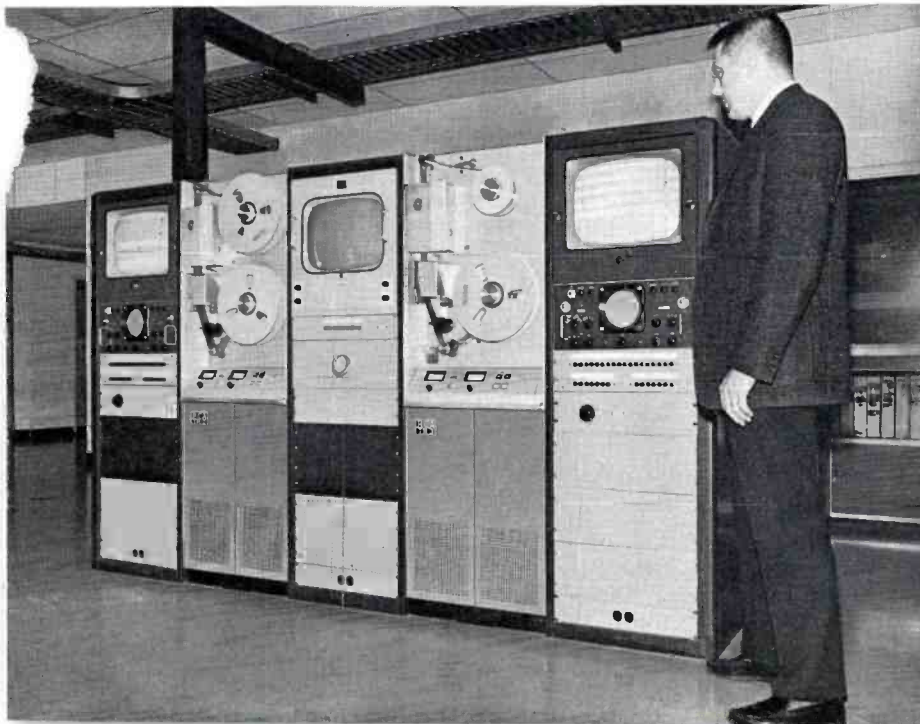
The player is delegated for daily airing of programs, while the two recorders

fulfill local production assignments. This permits simultaneous airing and recording in an economical system which for all practical purposes has all the facility of three recorder/reproducers.

Another economy feature of the WCVE system is the ability to record all local tapes at $7\frac{1}{2}$ ips tape speed, thereby halving the cost of tape stock. In addition, these $7\frac{1}{2}$ ips tapes are programmed back-to-back with 15 ips tapes as supplied by the

National Educational Network. This is possible since tape speeds on both TR-3 and TR-4 are instantly switchable.

Use of compact, NEW LOOK tape equipment permits a highly efficient layout of the station's master control area, shown above. At this single location are installed all three tv tape machines, a film equipment island, a master control console and the station's 30 kw UHF television transmitter.



**COLOR TV PLAYERS AT WBAL-TV
FREE EXISTING TV TAPE RECORDERS**

One of the first stations to install RCA TRT series tape recorders WBAL-TV, is also one of the first to use TR-3 Players for color playback. Both TR-3's are fully equipped with color ATC modules which employ the "direct recovery" system of color tape processing.

From the very first delivery of tape equipment, the station has kept pace with tape developments, modifying their equipment to provide the very latest in tape services. This latest move to color tape players, frees the recording equipment to handle the new influx of color tv tape production.

The two new TR-3 Players are shown (left) installed in the WBAL-TV tape room. Station designed monitoring racks are included in the system. Virtually all the station's on-air tape programming is originated from here.



LOW-BUDGET COLOR TV TAPE SYSTEMS

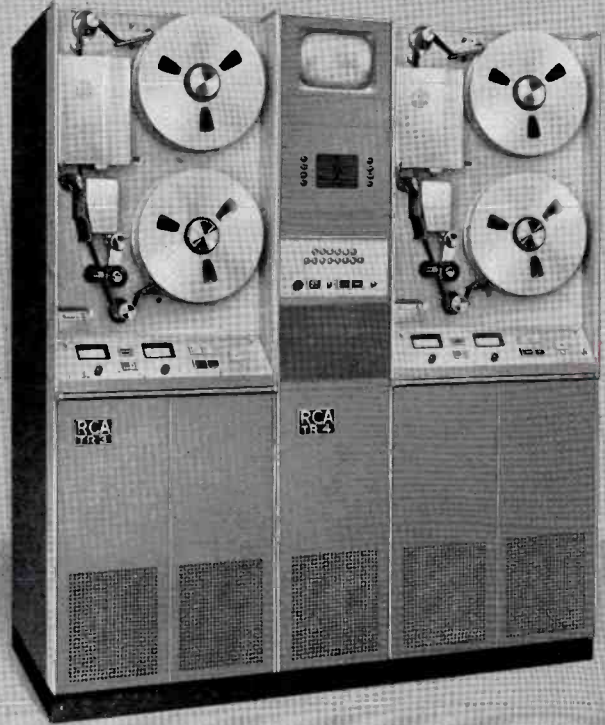
...the easy way to make



TR-4 Recorder/Player

For recording or playing.

This colorized TR-4 affords the most economical way to record or playback color tapes. It's complete in a 22 x 33 inch cabinet, 5½ ft. tall. It includes suitable metering facilities, built-in picture and waveform monitors, and other provisions for good quality pictures.

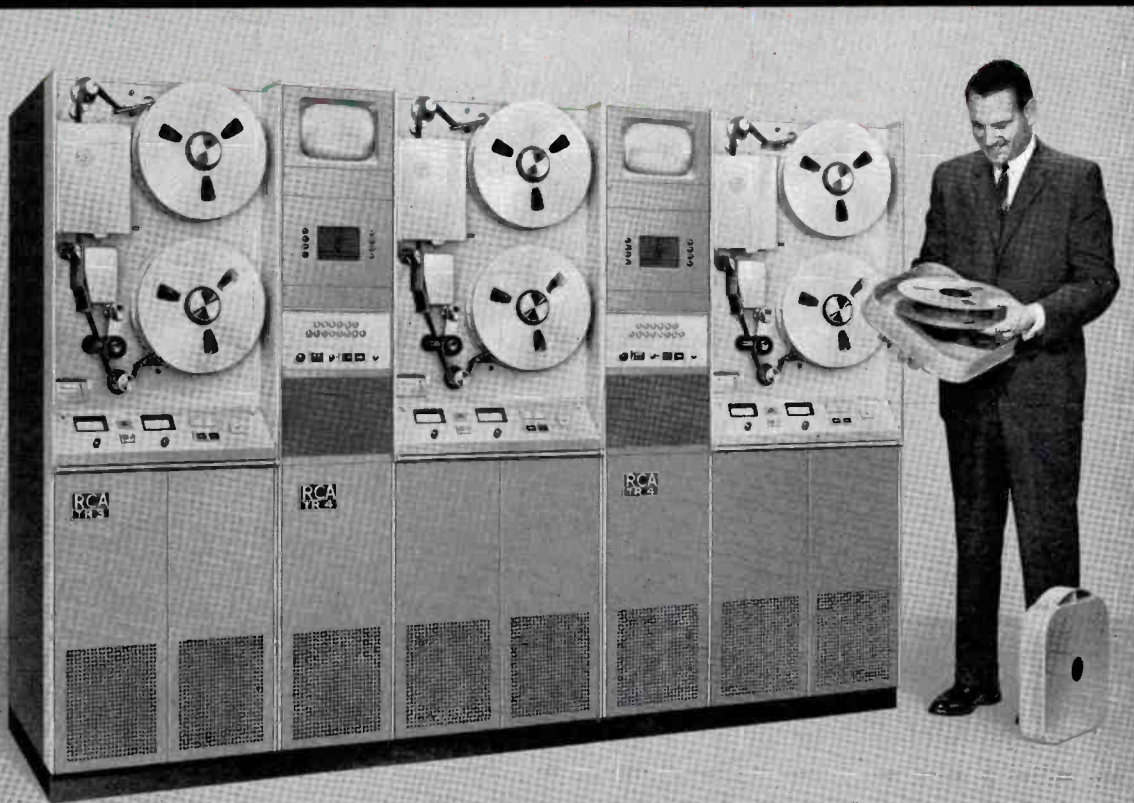


TR-3 Player TR-4 Recorder/Player

For recording and playing - at the same time.

Combining the TR-4 with the TR-3 Player enables you to record on the one while the other is on the air. The colorized TR-3 Player performs to the same high RCA broadcast standards and is compatible with all quadruplex recorders. When recording and playback must be done at the same time, the TR-4/TR-3 combination is the most economical.

and play color tapes!



TR-3 Player TR-4 Recorder/Player TR-4 Recorder/Player

For simultaneous record and playback, with spare function.

Adding a second colorized TR-4 to the TR-4/TR-3 combination provides a system that is extremely versatile. It permits you to record and playback simultaneously—and still have a machine available for those unexpected jobs. It provides practically the equivalent, in studio time, of a three recorder setup.

See your RCA Broadcast Representative for complete details on these economical systems for color recording and playback. Or write RCA Broadcast and Television Equipment, Building 15-5 Camden, N. J.



The Most Trusted Name in Television



THE NEW LOOK REBELLION

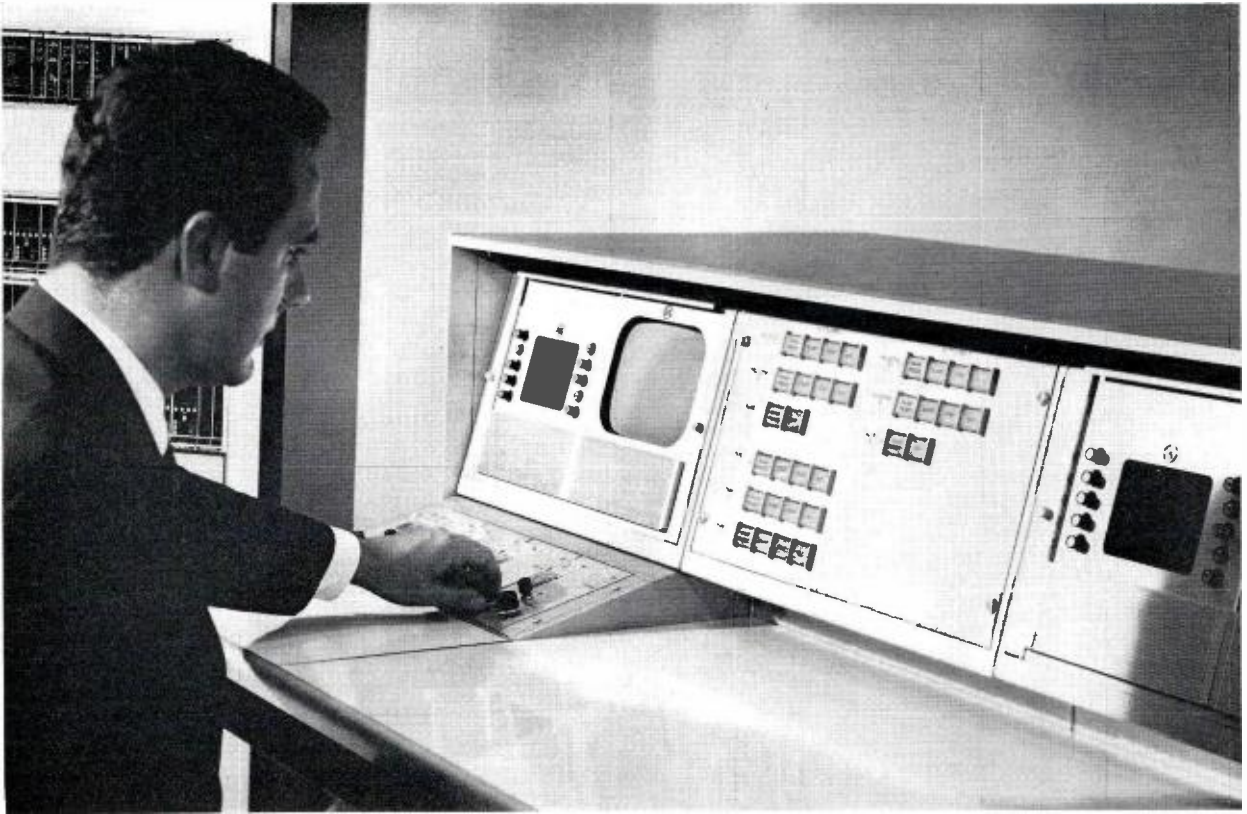


FIG. 1. New console and rack units require much less space, perform far better, and provide a new degree of flexibility. They are designed to fit together, mechanically and electrically, to make up highly efficient systems of varying com-

plexity—from all-manual to full automation. The savings in space, air conditioning and operating expense which they make possible may amortize the cost of a new installation in a relatively short time.

REVOLUTION IN THE CONTROL ROOM

RCA "new look" TV equipment is bringing about an equipment "revolution" deep in the heart of TV technical operations—the control room. The "revolution" has been triggered by dramatic changes in the new equipments (as compared to old-style equipment). These changes have led in turn to new concepts in control-room arrangement and operation. For stations who are presently planning new installations or equipment modifications a study of these new concepts will certainly lead to more efficient and economical operation. Even stations with no present plans for rebuilding may find the savings that could be effected by a control-room "re-do" would pay for the new equipment in a very short time. The achievement of this, of course, requires a full understanding of the new concepts and a carefully thought-out plan for taking advantage of all the possibilities.

Free Form for the Control Room

To realize the full significance the new technology holds for stations of the future, the planner must "unlearn" most of what he knows about control-room design—about equipment needed, its capabilities, operating costs, layout, space requirements, power consumption, maintenance, reliability and automaticity. The new look TV equipment brings a new dimension to all of these. But more importantly, it provides almost complete freedom from the physical and electrical limitations of previous equipment. Because of this, new look equipment does not "dictate" a specific arrangement or layout but rather gives the planner the freedom of choosing the configuration that best fits his purposes. It opens up the possibility of entirely different arrangements—not just of equipment per se but of entire operating func-

tions. It may lead to different use of personnel—and even to quite different ways of operating.

Inherent in this new flexibility is the possibility not only of saving money (on space, maintenance, operation), and of improved performance, but also for doing new things in the way of production and programming—things which may actually create new sources of revenue for the station. The best method of taking advantage of these new possibilities will vary from station to station. It depends on the size of the market, the amount of local programming, the arrangement of studios, the present facilities, etc. Thus no single equipment layout—nor any single approach—will serve for all. However, the basic considerations are the same and the generalized discussion which follows will attempt to indicate some of these possibilities.

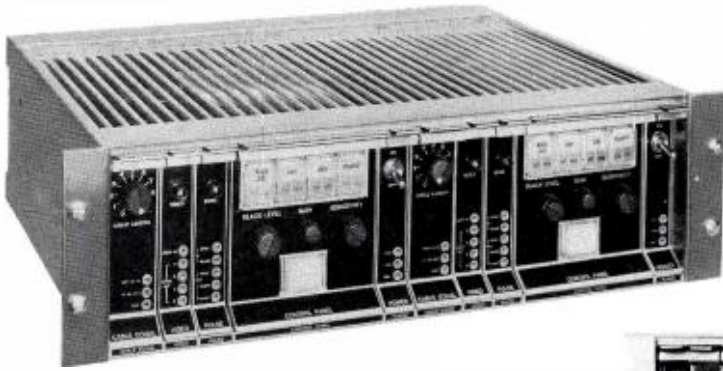


FIG. 2. (left) The complete auxiliary units for two TK-22 Monochrome Film Cameras are shown here mounted in one 5½-inch-high rack unit. With older model film cameras the auxiliary units for two cameras required 84 inches of rack space.

FIG. 3. (right) The auxiliary units for the new TK-27 Color Film Camera occupy two 5½-inch-high rack units—a total of 10½ inches. This compares with 90 inches of rack space required for the auxiliary units of older color film camera chains.

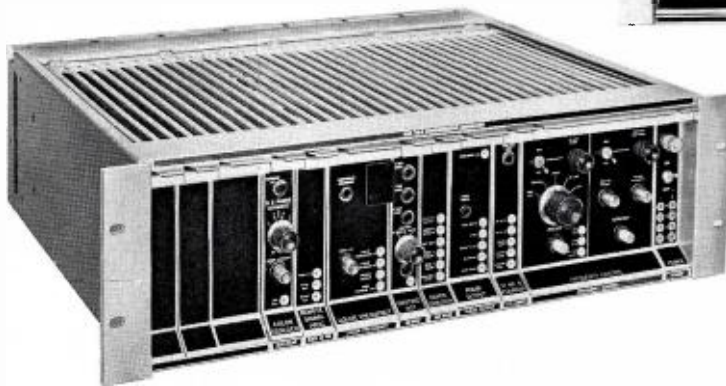
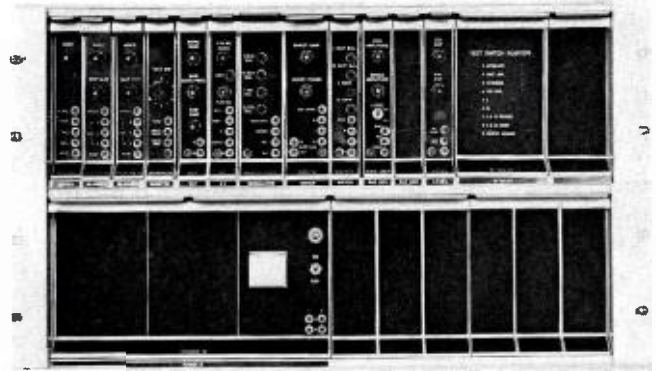


FIG. 4. (left) The new TG-3 Synchronizing Generator performs the functions not only of the old TG-2 Sync Generator but also of the color frequency standard and the color burst generator used with older systems. The TG-3 goes in one 5¼-inch frame, where the older units required a total of 47 inches of rack space.

Less Space Needed

The most obvious feature of the “revolution” in control rooms is that the equipment requires much less space—or, conversely, more equipment can go in the same space. There are at least five reasons why this is so:

- (1) *The equipment units are smaller.* Transistorization reduces the size of rack-type units by a factor of at least five-to-one, in some cases even more. Some comparisons are shown in Figs. 2 and 3.
- (2) *The equipment units do more.* New circuit developments enable new units to perform the functions of several old-style units. For example the new TG-3 Sync Generator (Fig. 4) occupies only one module frame but performs the same functions as the TG-2A tube type generator, color

frequency standard, and burst flag generator plus many new functions such as color genlock and remote signal processing.

- (3) *Large power supplies are eliminated.* Because the transistorized units require far less power, the old racks of power supplies are unnecessary. Most units have their own small power supplies built in.

(4) *New mounting arrangements are possible.* Because the auxiliary equipments are so small, they may sometimes be mounted in the equipment proper (rather than on separate racks). For example the half-rack-width, 5¼-inch-high unit for the TK-22 Film Camera may be mounted in the camera pedestal (Fig. 5). The two 5¼-inch-high units for the TK-27 Color Film Camera may be mounted in the base of the camera housing (Fig. 6).

- (5) *Fewer control units are required.* There is considerably less hardware required for any type operation, color or monochrome. With the new look cameras, equipment including the power supply and auxiliary unit for each chain occupies less than a foot of rack space. Cameras no longer require continual shading touchup. Circuits are now stable enough to stay adjusted with only an occasional check; their performance is uniform enough to permit use of a single monitoring unit to observe more than one camera. It will soon be common practice to utilize one or two console-mounted picture and waveform monitors for as many as four or more studio or film cameras. It is altogether practical with the new look equipment to completely eliminate the “video control” area of a few years back (Fig. 7).

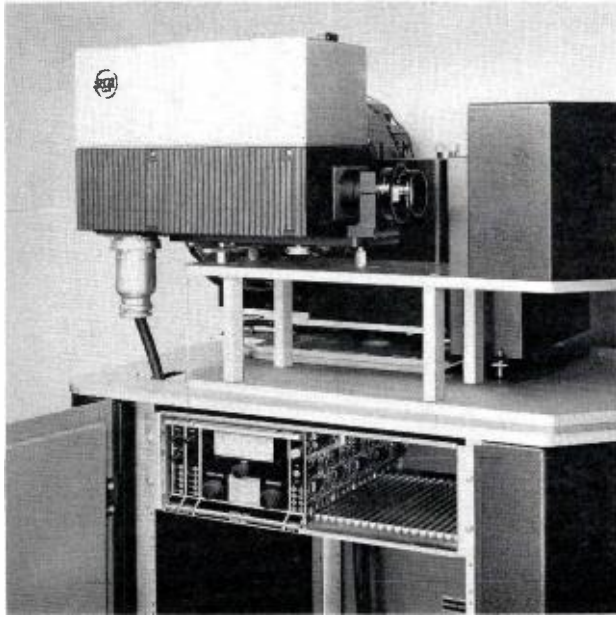


FIG. 5. The auxiliary units of the TK-22 Monochrome Film Camera are small enough that they can be mounted in the camera pedestal for some types of operation. Or they can be placed in any convenient location where a 5¼-inch-high rack unit can be mounted. The small size of the new units makes for greater flexibility in equipment arrangement, and enables the station planner to break away from traditional equipment configurations.

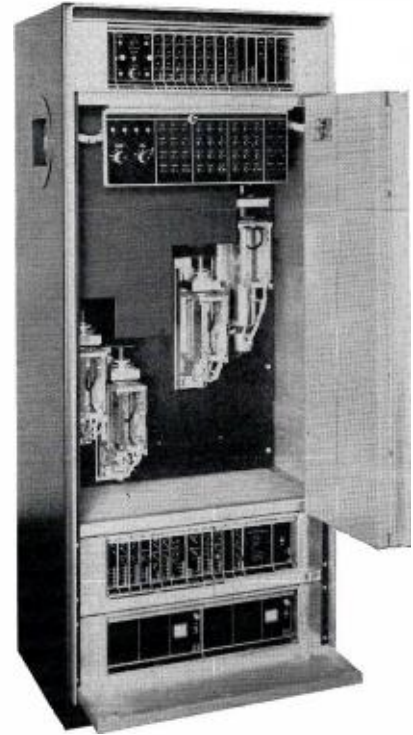
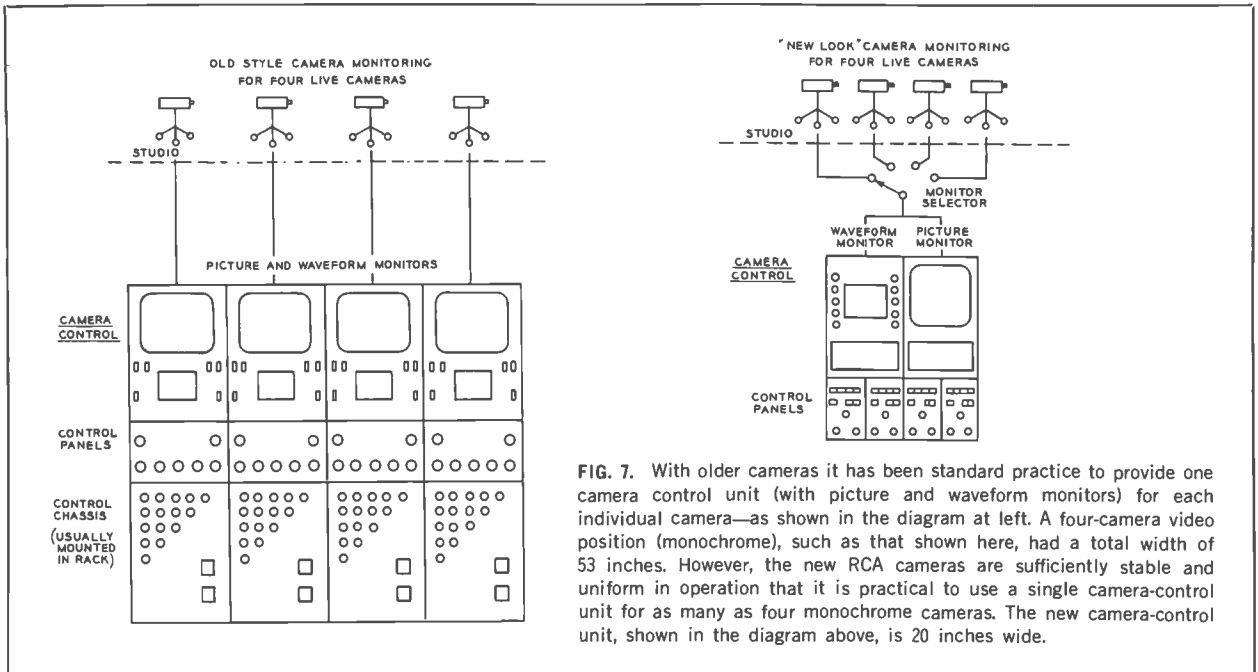


FIG. 6. The auxiliary units of the TK-27 Color Film Camera can be mounted in the base of the camera cabinet as shown here, or in any convenient location where 10½ inches of rack space is available. Requirements for accessibility, ventilation and wiring space must, of course, be considered.



Facilities Can Be Centralized

The space-saving features of the new look equipments will probably accelerate the trend to centralization of technical facilities. Most modern station planning concentrates all of the technical equipment in a compact central "technical area." Some stations have gone so far as to remove the partitions that separate the control room containing the monitoring and switching consoles from the "equipment rooms" housing tape and film islands. The net effect is to make space available for additional equipment and also to add a line-of-sight capability so that control-room personnel can monitor all operation and, in some cases, perform operations such as reloading tape recorders and film projectors without having to walk from room to room. Some engineers also feel there is closer supervision of equipment.

This approach has been hindered up till now by equipment requirements. To early TV planners, separate equipment rooms for a station of any size were almost a necessity. It was largely a matter of finding adequate space for the many TV units and the technical people to operate them. Equipments were bulky, produced considerable heat and required frequent attention. Camera accessory equipment, for example, included at least two large chassis units for each camera (camera control

and power supply). A sync generator occupied half a rack. Power supplies often required two or three racks—and so on. As a result the auxiliary equipment, even in a small station, occupied a dozen or more racks. At first the practice was to place these racks across the back of the control room. But as the rows of racks grew—and the heat they gave off increased—this became impractical. As a result the "equipment racks" were relegated to a separate "equipment room." The new look equipments may reverse this trend. With these new equipments all of the equipment units formerly housed in several racks can easily be mounted in just one new look cabinet (Fig. 8). Not only is the size much smaller—so also is the heat given off. As a result it may, in many stations, be practical to return the equipment racks to the control room.

Perhaps more important in facilitating centralization is the greatly reduced space required for new look control consoles. In part this is due to the smaller size of the units themselves. This is particularly true for color where the width of the color camera control used with the new look TK-42 Color Camera is 20 inches compared to the 35 inches of the camera control unit used with the TK-41 Color Camera. But more important is the reduction in the number of control units required.

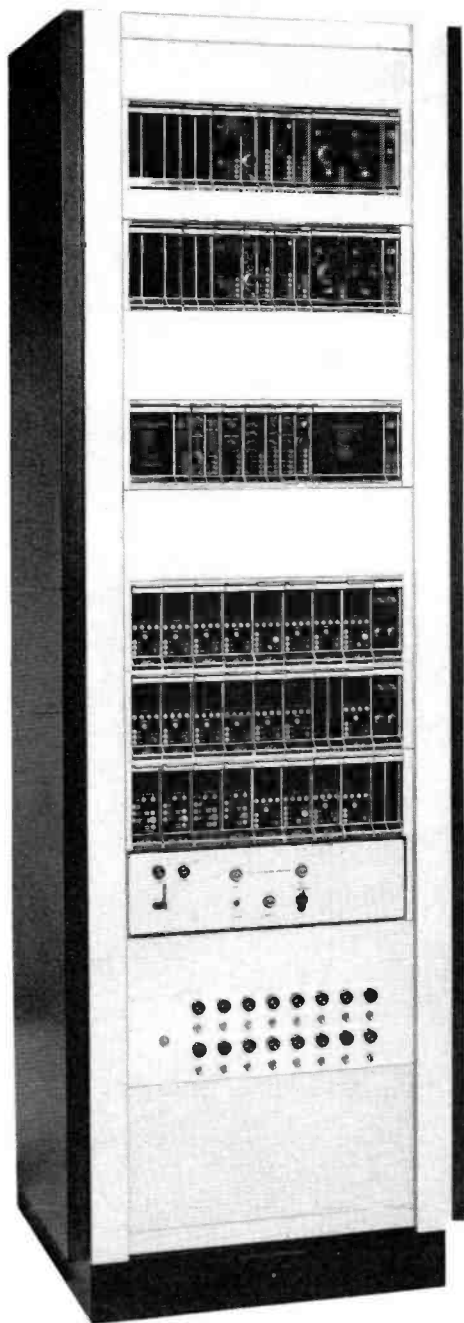


FIG. 8. (above) Using new look units a single rack houses the equipments formerly mounted in three or four racks.

FIG. 9. (right) All of the new look equipments are made up of plug-in modules which are easily removed for service or replacement. Modular arrangement makes it possible to start with basic equipment then add features as required simply by adding modules.

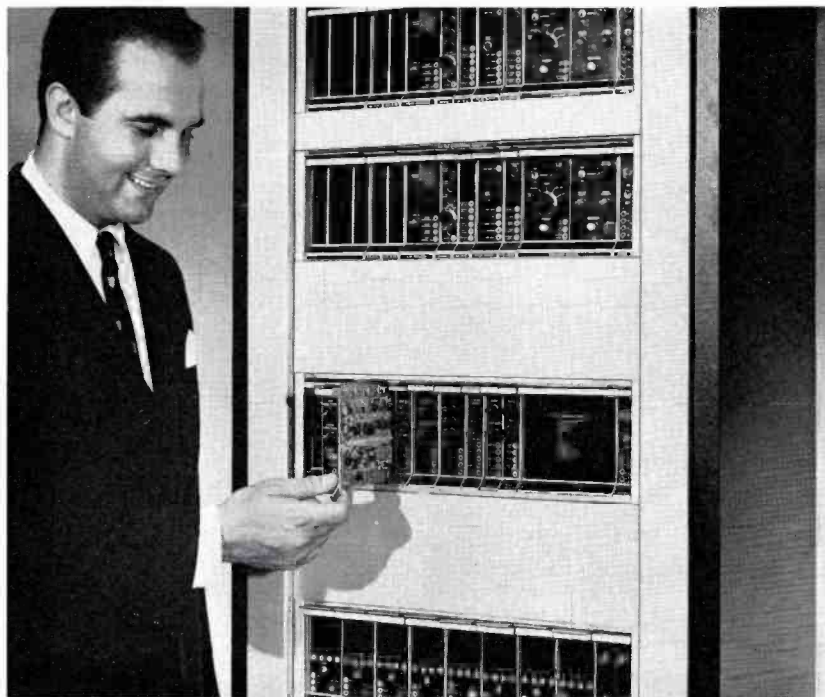




FIG. 10. New-style consoles are made up of modules which can be assembled to fit any requirement. Left section of this 3-section console contains picture and waveform monitors and controls for four monochrome cameras.

Fewer Control Units Needed

In earlier installations a console-mounted camera control with picture and waveform monitor was permanently connected into each studio and film camera chain and continually monitored and adjusted by video operators. With the new look equipments, as we have previously noted, the cameras are sufficiently stable so that this is no longer necessary. A single switchable picture and waveform assembly may serve one to four cameras (Fig. 10). Thus in most small- to medium-sized stations (and some larger) it may be possible to eliminate the separate "live" and "film" video control positions—either combining them in one, or even combining them with studio or master-control switching positions. For those who like to concentrate technical equipment in a single area, the small space occupied makes it feasible to do so while retaining visual as well as electrical monitoring of studios. Alternatively, equipment stability, because it requires less attention, also makes practical remote, unattended operation for those who prefer separated facilities.

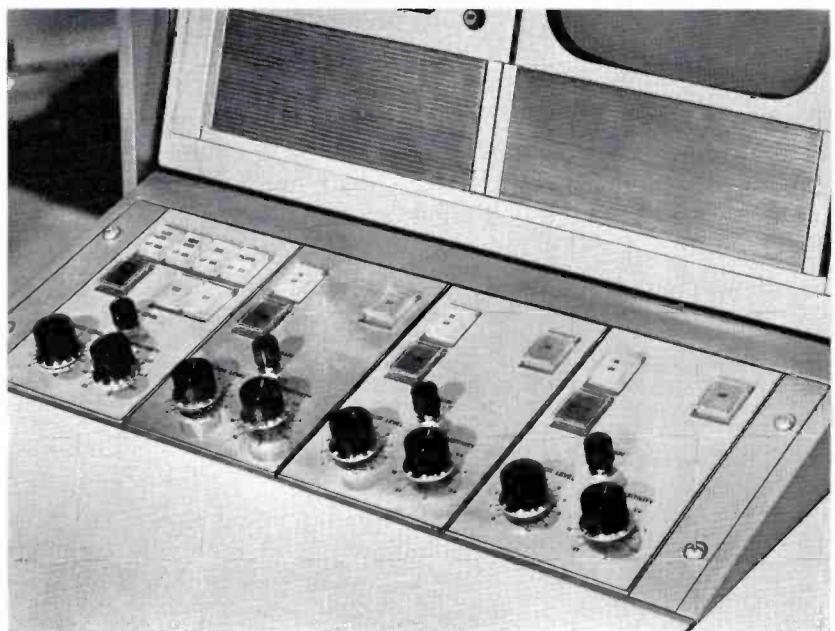


FIG. 11. Close-up of camera controls mounted in console shown in Figure 10. The panel at the left is a monochrome film camera control; the other three panels are monochrome studio camera controls. Since this picture (of a prototype assembly) was made, the panel at the left has been standardized for use with all the new RCA Cameras.

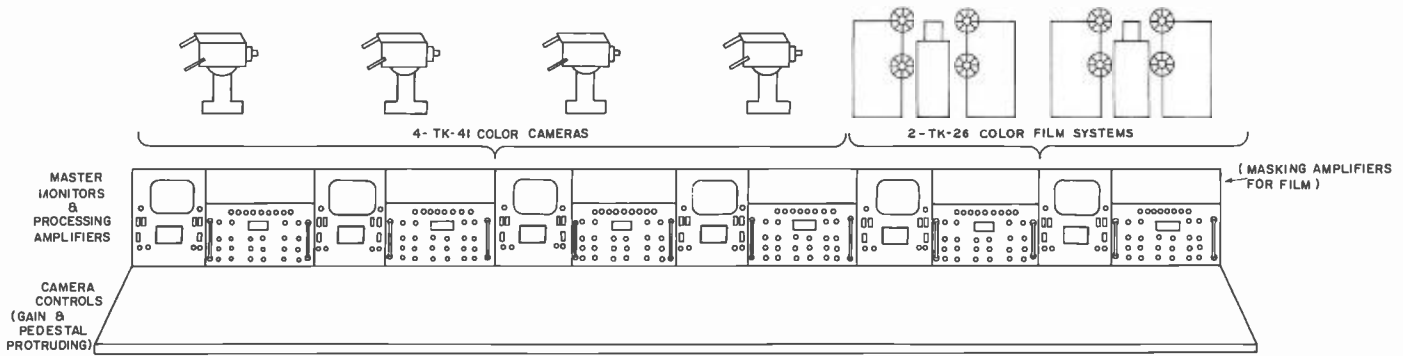


FIG. 12. (above) With older color cameras a 35-inch-wide control position was needed for each camera. Thus a video control console for four studio color cameras and two film color cameras had a total width of 210 inches. The camera controls were recessed in the shelf of the console.

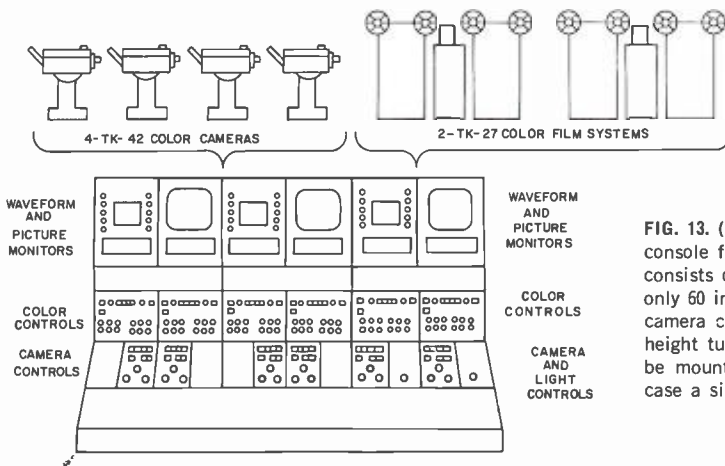


FIG. 13. (left) With the new equipments a video console for four studio and two film color cameras consists of three 20-inch sections—a total width of only 60 inches. To obtain space for the two sets of camera controls in each console section a double-height turret can be used—or all the controls can be mounted on a sloping shelf section, in which case a single-turret height suffices.

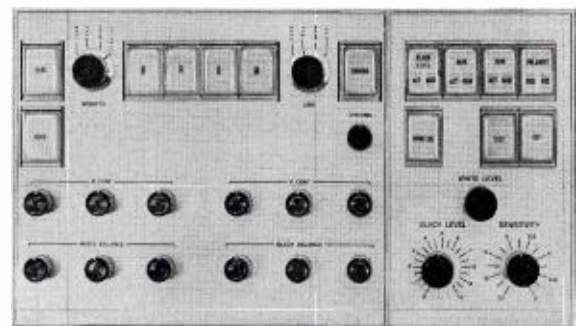
Simplified Control Console

The smaller size of the new camera-control units, and the fact that one waveform-and-picture monitor may serve for several cameras means that much less space is needed for the video-control position. This permits studio-control, master-control and even transmitter-control positions to be combined, if desired, in a simplified console providing all necessary facilities for monitoring and switching. Console housings are available in single- or double-turret styles, and are modular in design so that numerous configurations are practical. The result is essentially a custom console for any requirement. Sloping turrets provide comfortable viewing of picture monitors and minimize light reflections. Double-turret types provide mounting positions for preview and program line monitors. Station operators in the process of updating their installations will find the console to be only a fraction of the size of previous consoles with comparable facilities. This

is partly due to the compactness of the new equipment and partly in the way it can be used. For example, a single, switchable picture and waveform monitor may serve two, three or four live cameras. The same is true for film chains. In all but the largest installations, studio- and master-control switching can be combined on one panel and performed by one operator.

The space saved by the new console can be used for additional camera chains, for panels that provide control of tape machines and projectors, or for the addition of automatic programming panels. Being modular in design, the console can be extended to any length and assembled to mount any type of studio- or transmitter-control-room facility.

FIG. 14. The color control panel (left) and camera control panel (right) used with the new RCA color cameras. One set is required for each camera. They may be mounted in various arrangements as suggested by Figures 13 and 16.



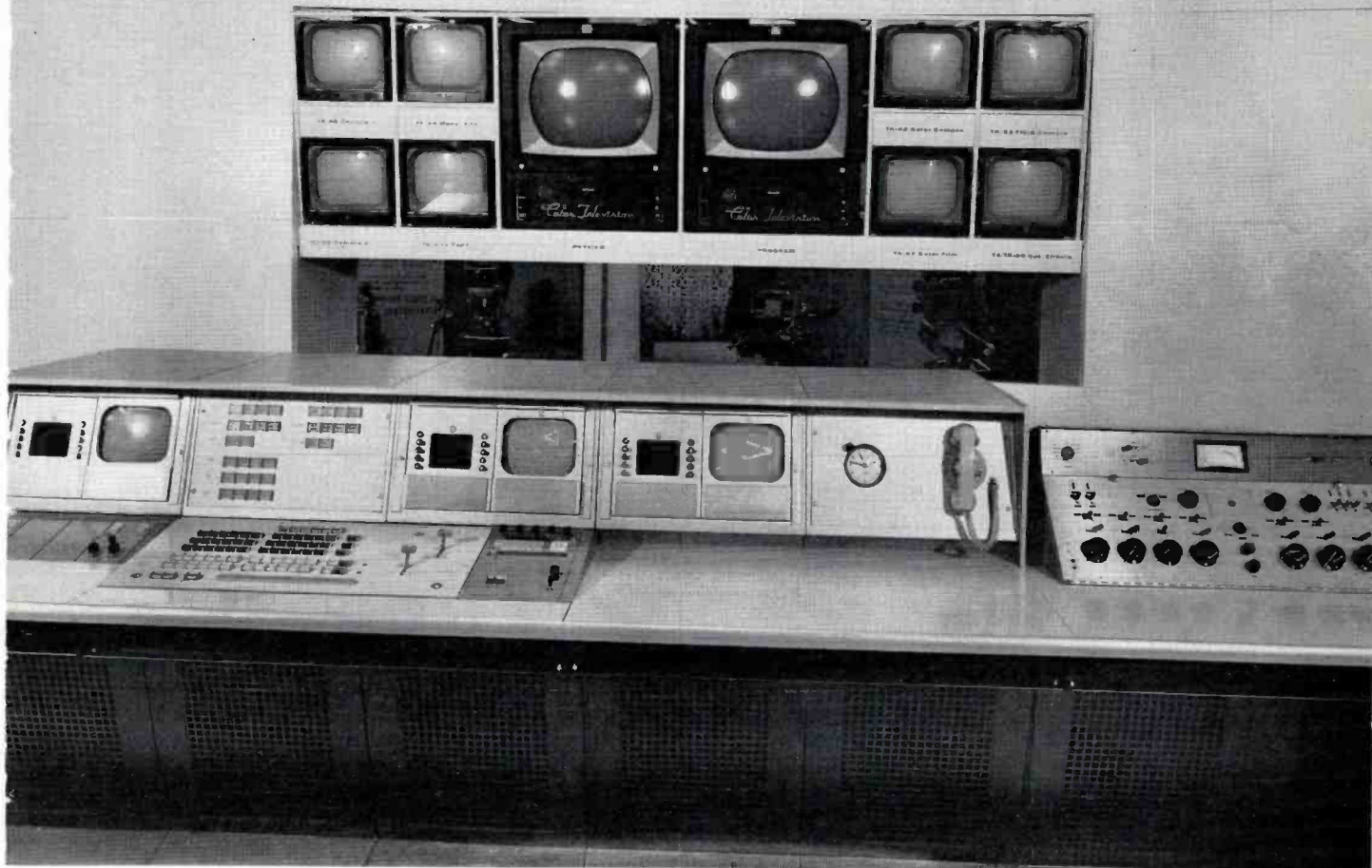


FIG. 15. A new-style console consisting of a video and switching position (left), a director's position (center) and an audio position (right). Additional camera-control positions can be added at the left as indicated in the diagram below.

NEW LOOK CONTROL CONSOLE FOR ELEVEN COLOR AND MONO PROGRAM SOURCES

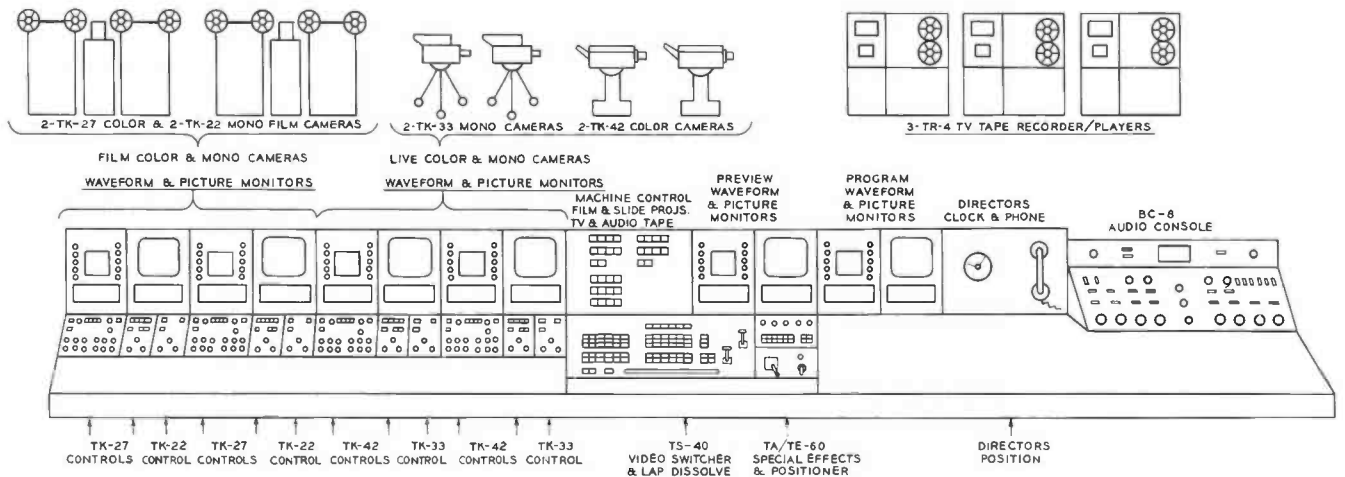


FIG. 16. Diagram showing one of many possible arrangements of components in a new-age control console. With the exception of added camera-control positions, this console arrangement is similar to that pictured in Figure 15.

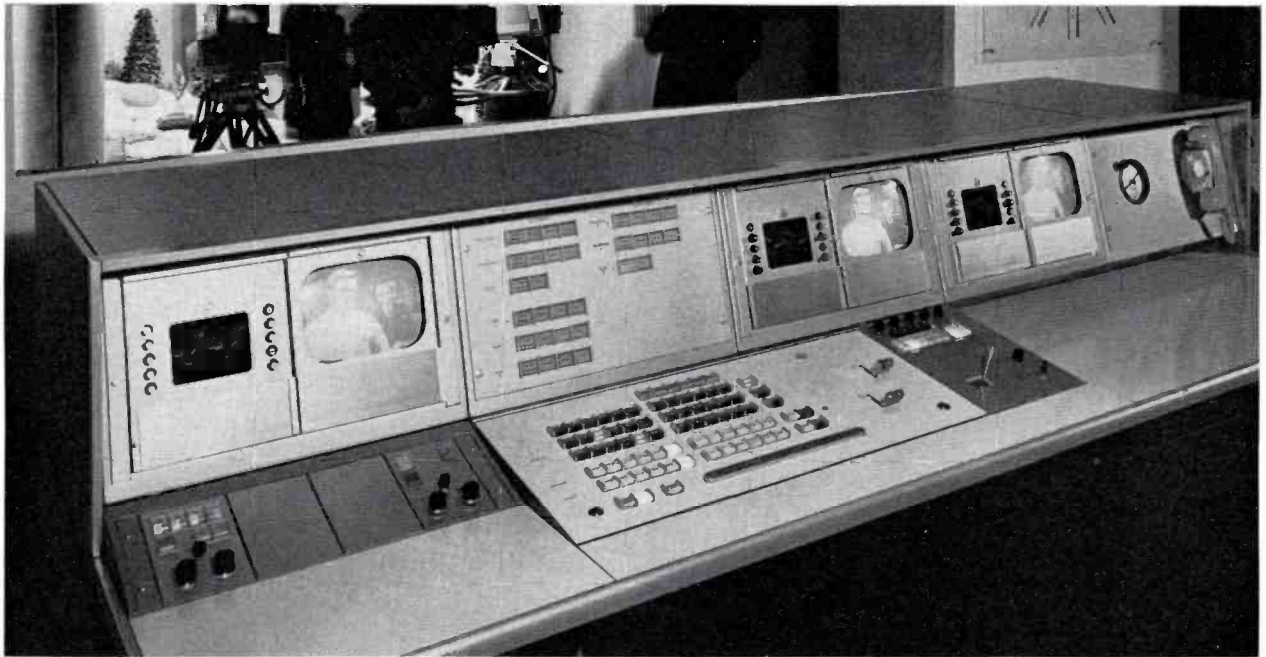


FIG. 17. The switching position in a new-age control console may look like the one shown in the console above. A TS-40 Switcher and a TA/TE-60 Special Effects Equipment are mounted in the sloped-shelf section of two console units (the second and third from the left). In

the turret above the TS-40 is a machine-control panel. Picture and waveform monitors at the center of this console would normally show preview and on-air pictures. If desired, two picture monitors can be mounted in a single console section.

Universal Switching Concept

The new look design incorporates a completely solid-state switching system known as the TS-40 Transistorized Vertical Interval Switcher. The TS-40, the first completely transistorized unit to be seen by the broadcast industry, and bringing with it an impressive record of TV experience, performs equally well in the roles of studio- or master-control switching. Entirely electronic, the basic switching function is actuated by push-button switches and performed remotely by high-speed transistor circuits rather than by relays, tubes or mechanical-switch contacts. Built into the TS-40 is the precise timing accuracy necessary for the mixing and dissolving of color signals. In addition to switching video, the system provides simultaneous switching of tally lights on the cameras, and also provides circuits to control studio warning lights, to operate an audio switcher, or for any other switching functions.

Since the TS-40 is a remote switching system, all of the video cabling is kept in the racks rather than being brought to the console. This offers the best opportunity for properly locating and reducing the length and cost of video cabling. Increased input and output density of the system affords expanded program produc-

tion facilities. Moreover, solid-state design has overcome heat dissipation problems, greatly reduced size, and has given the TS-40 almost unlimited life and reliability.

Simplified Switching Operation

An important feature of the TS-40 New Look Switcher is its ability to handle composite or non-composite synchronous or composite non-synchronous signals in a pre-determined manner. This makes it possible to directly mix signals from different picture sources received from virtually any point in the system—and to do so without additional action on the part of the operator.

Previously, lap dissolve amplifiers and special-effects equipment available could accept non-composite synchronous signals only. With the unique design of the new transistorized lap dissolve amplifier and the TA/TE-60 Mix and Effects equipment, both these equipments will accept either non-composite or composite synchronous signals interchangeably. Thus, with these equipments now an integral part of the switching system, the TS-40 Video Switcher will accept both composite and non-composite synchronous signals into one set of inputs—thus eliminating the need for a secondary set. Provision is also made to accept composite non-synchronous sig-

nals into the same set of signal inputs on a switchable predetermined basis. In this latter case, however, lockout is provided to inhibit lap dissolve and effects action when both synchronous and non-synchronous signals are used simultaneously. This has resulted in operational simplification of switching systems with an attendant reduction in control panel size. Some simplification in the station's system layout has resulted, also.

With the use of composite and non-composite synchronous signals indiscriminately into the mix and effects equipment, some device must be provided to insure a constant sync level on the output signal. A newly developed sync adder automatically adds the proper amount of sync to the video signal applied to it in order to maintain a constant sync level on the output. Thus, if a dissolve, insert, wipe or super is attempted between composite and a non-composite signal interchangeably, the sync adder makes sure that sync is present in the proper amount during the transition. Sync-adding action is inhibited when a non-synchronous signal is applied.

Standard TS-40 Switching Systems

The TS-40 is often referred to as a custom switching system although there are actually six standard package designs available as a series of prewired, assembled and

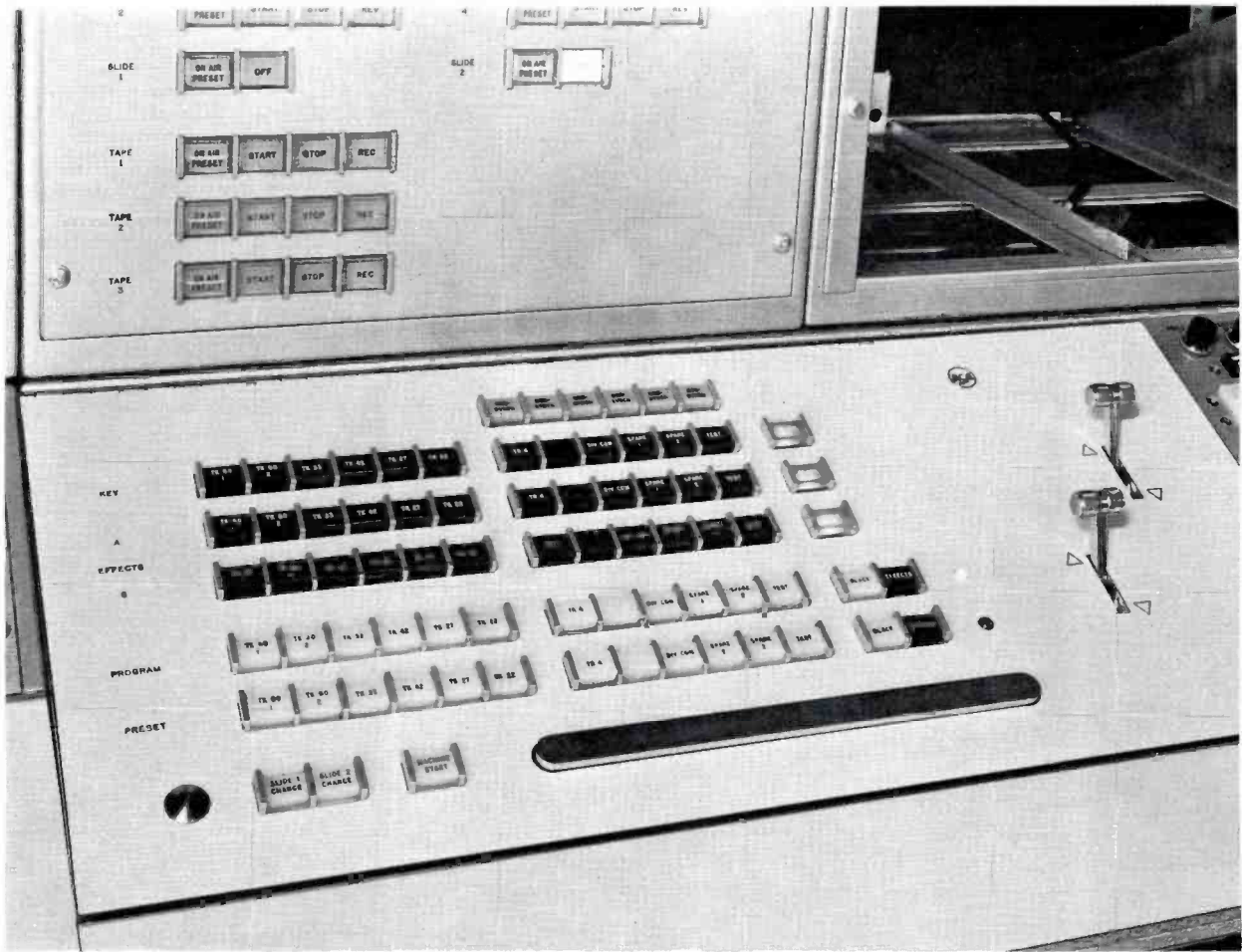


FIG. 18. This is a close-up of the TS-40 Switcher in the console of Figure 17. As noted in the copy, there are six standard versions of the TS-40 offering a choice of number of inputs accommodated and extent of special effects provided. In addition TS-40 components can be custom-assembled to fit almost any imaginable requirement.

tested systems, one or more of which serve well in practically all applications. The six designs differ mostly in the number of program sources accommodated and in the extent of special effects that can be performed. These TS-40 package systems incorporate tried-and-proved techniques and can be used to great advantage by large and small stations. Broadcasters are urged to consider using these standard designs to avoid the expense of custom-designed systems.

The six basic designs follow.
*Single Studio System with
 Lap Dissolve and Special Effects
 with Dual Re-Entry (System N-1)*

TS-40 System N-1 is the most versatile of the standard systems and includes the necessary flexibility to handle almost any type of transition in a simple manner. It includes both the TA/TE-60 Mixer and Special Effects Equipment and Lap-Dissolve facilities which may be used sepa-

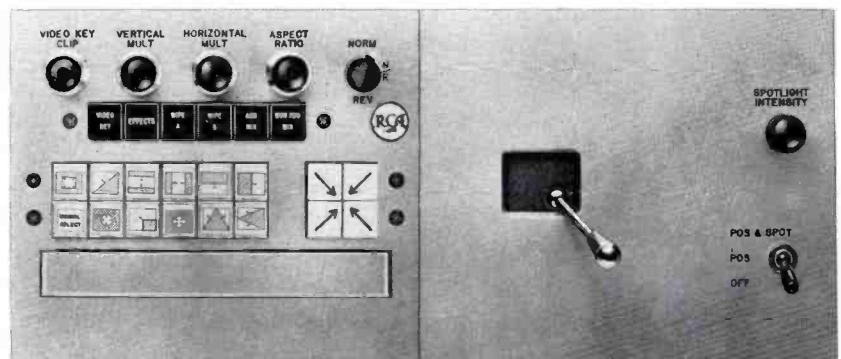


FIG. 19. This is a close-up of the TA/TE-60 Special Effects control panel (in a slightly different configuration from that shown in Figure 17). Any of twelve insert shapes can be selected by depressing the button on which it is pictured. The "joy stick" at right can be used to move the keyed insert as desired.

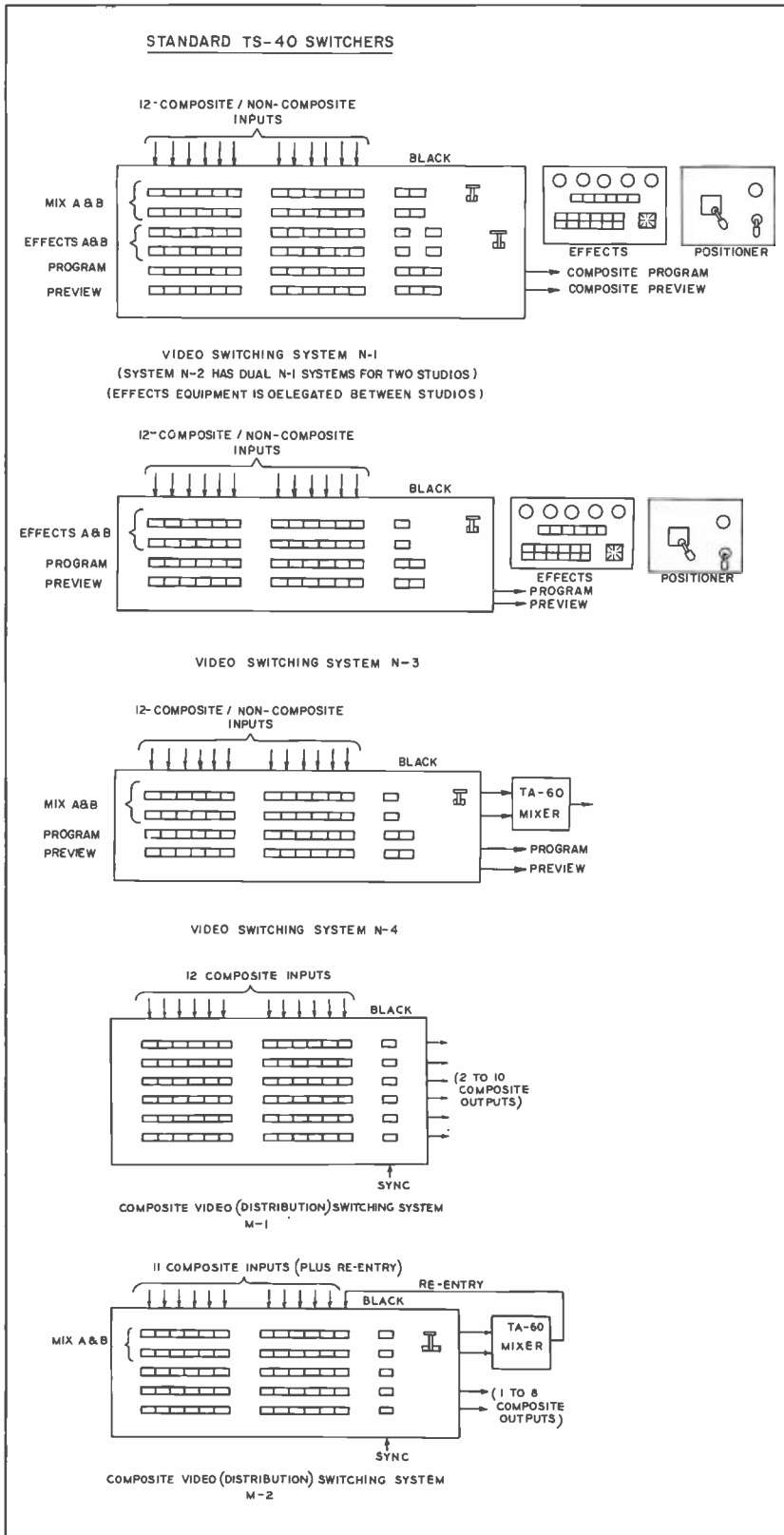


FIG. 20. (left) The six variations of the TS-40 Switcher which are available as standard packages are indicated in diagrams shown here. A more detailed diagram of the N-1 System is shown in Figure 21. In addition to these six standard systems the TS-40 can be furnished on a custom basis in almost any desired configuration.

rately for simple wipes, inserts and dissolves or they may be used in combination to dissolve to an insert or to wipe to a superimposition. Input facilities include 12 sources, plus black. Any of the input sources may be selected on the lap-dissolve A and B, special effects A and B, program and preview busses. In addition, the output of the effects amplifier may be selected on the lap-dissolve A and B, program and preview busses and the output of the lap-dissolve amplifier may be selected on the effects A and B, program and preview busses. Sync adds on the output of the program and preview busses automatically add or adjust for correct local sync. The system is available with interconnecting cables entering either the top or bottom of the racks.

Dual Studio System with Dual Lap Dissolve and Delegated Special Effects and with Dual Re-Entry (System N-2)

System N-2 provides the same facilities as System N-1 but for two studios. Two control panels are supplied which are identical in layout to the system N-1 con-

RCA to aid in the planning of custom-built video switching systems upon request. Provision for integrating machine control in TS-40 Switching Systems can easily be provided on a custom basis.

Freedom for Production Creativity

The new look equipment affords a choice of practices for monitoring and for producing programs and commercials. New techniques are incorporated to relieve the operator of some tricky aspects of monitoring, especially color, while retaining conventional methods to which he may be accustomed.

Special effects such as dissolves, fades, keyed inserts and split-screen transitions can be obtained by either the conventional "additive" or a newly developed "non-additive" mixing of signals. Either type mix is selected by a switch on the TA/TE-60 Video Mixing Inputs and Special Effects equipment.

Non-additive mixing, which is a feature in the monitoring of composite color signals from RCA four-tube studio and film cameras, produces exceptionally sharp transitions with greater simplicity. White letter inserts may be displayed merely by moving the dissolve levers to mix together two signals. No effects generating equipment is needed. Non-additive mix prevents signal overload at the viewer's receiver and consequent poor color. Operating on the principle that between the A and B signal inputs, the signal with the greatest amplitude at any instant is the one gated to the output, non-additive mixing assures constant amplitude and black level without any compensating adjustments by the operator. Either or both signals to the mixer may be color signals.

Operators preferring to use the additive mode will find that sufficient addition of the two signals is provided to permit conventional lap-dissolves, and that enough non-additive control remains to prevent excessive signal levels during a super or dissolve, making split-lever operation unnecessary.

Freedom for Imaginative Planning

The revolution brought about by new look design offers opportunities to all, whether planning brand-new plants or considering modernization. The dividends are multiplied in a completely new and fully integrated system, but there are valuable advantages to be gained also by those who have to update in gradual stages. New designs are made to work along with the old.

features of the



Transistorization
+ Modularization
+ Stabilization
+ Standardization
= a revolution
in the control room

FIG. 22. The basic features of the new equipments make possible not only new arrangements of equipment but also new methods of operation. The possibilities are so portentous that they seem adequately described only by the term "revolution."

Those who embark on a modernization program, replacing item-by-item, may soon find growing areas of empty space. This may be the time to consider adding facilities, perhaps color, more monitoring positions, or panels that will permit automatic operation of projectors or tape machines. Possibly the outdated switching system should be "customized" to combine studio-control and master-control switching on one panel and set up with a preset or semi-automatic switching panel. The compactness of the new equipment will definitely make it possible to do many of these things in existing space.

Unified Design

The new look equipment is a family of standardized, modularized and completely transistorized equipments for monochrome and color that presents an attractive, unified appearance for every type station.

Standardized sets of plug-in modules and similarly styled control panels comprise the electronics for each equipment such as live cameras, tape machines and film. Because of circuit identities, certain of these assemblies are interchangeable between equipments. For identical equipments, all are replaceable with spare units.

Standardization is carried to details such as the Form A (single-pole, single-throw, normally open) contacts used in control and switching panels, a seemingly minor but nevertheless important contribution simplifying the design of an efficient TV system, and adapting it to future requirements for machine operation.

The new look family of equipment is a thing of beauty as well as a power- and space-saving facility. It gives a modern image with an ultimate simplicity of design and arrangement. It provides an efficient production center as well as a precise and reliable technical system.

Conclusion

The new generation equipment embodies unprecedented flexibility for the system planner. It multiplies the facilities offered by previous equipments while reducing space requirements, power consumption and complexity. It is of the most modern design and achieves highest standards of performance, stability and reliability. With its provisions for judicious use of manpower, its compatibility with existing facilities, and its appeal to both operator and client, the New Look system is the first step to the station of the future.

RCA
NEW
LOOK

"BIG TUBE" COLOR TV FILM SYSTEM





HOURS OF COLOR WEEKLY

COLOR PIONEERS since 1954.

WBAP-TV now makes available to Dallas-Fort Worth viewers over 115 hours of local and NBC network color weekly—more than any other station in the area. We'll be proud as a peacock to have your color commercial on WBAP-TV where the color set viewers are. No extra charge... Full live, tape, slide and film facilities. See your PGM rep.

WBAP-TV 5
FORT WORTH DALLAS

PETERS, GAFFIN, WOODWARD, INC.
NATIONAL REPRESENTATIVES



A century ago, paddle-wheel steamships on the Missouri brought supplies for pioneer Chashead who were starting western construction of the Union Pacific railroad. Photo from the Burnstock-Peterson Collection, owned by KMTV.

KMTV WAS A PIONEER, TOO.

We've had live color for over 10 years.

We were the first station in the nation to go a full day, sign-on to sign-off, in color.

We were the first non-O and O station to do an opera live and in color. And Olympic boxing. And wrestling.

Now, we're one of the nation's color television centers. We're Omaha's only full color station, serving one of the most advanced color markets with complete color facilities... and the kind of experience you get only if you have the guts to be a pioneer.

To join the almost 50 spot advertisers who now use KMTV color, call another pioneer named Petry.

KMTV OMAHA

These December 1965 Ads are those of early live color pioneers.

(Continued from Page 2)

(1) a 3-tube color camera, and (2) a 4½" I.O. monochrome camera—built in one box. There's also a completely built-in zoom lens system—and an 8-inch viewfinder. All of these take space, add weight—it's what you pay to get the best possible picture. Of course, if you can do with less than the best, you can get it smaller.

ADS OF THE MONTH, to us, are those of the "pioneer" color stations (WBAP-TV and KMTV shown above). Now days it's easy to be for color—it's the "in" thing. But it wasn't always thus. And surely it's appropriate to give a little credit to the pioneering stations who started in color a decade ago—and who by sticking to it developed the know-how and experience which the whole industry will now make use of. They were WBAP and WKY and WTMJ and WLW, KMTV, KOMO, WGN, WNBQ, WJAC, WGAL, WRCV and others. By December 1956, there were 33 stations with live color cameras (see RCA ad, top right, which appeared that month). Not all, of course, stayed with it. But many did—and we think they have some right to brag about it.

If we may be permitted a small brag, too—we would simply point out that we furnished all of the cameras these stations used. In fact during color's first ten years we built nearly all of the color cameras used on the air. In building the RCA TK-41 Color Camera (and the 41A and

41B and 41C) our engineers gained experience which is unmatched—anywhere in the world. They have utilized this experience in designing and building the new RCA TK-42 Color Camera—the camera which we believe will be the camera of color's second decade—as the TK-41 was of the first.

WHAT IS MODERN? An ad we saw recently talked about **modern** color cameras. Got us to thinking—what is a **modern** color camera? Seems to us a **modern** color camera can be distinguished by three things. First, it would certainly be a four-tube camera. After all, we've been building three-tube cameras for more than ten years. We've gradually modified and updated our original TK-41 to make it a very good camera. In fact, we think the TK-41C is just about the best three-tube camera than can be made. But our engineers decided several years back that a four-tube camera would be better. The industry pretty well agrees with us. Even our competitors have indicated (at the NAB Conference last spring) that they might someday build one. So, there's no gainsaying it—a **modern** color camera has just got to be a four-tube camera. Second, a **modern** color camera must be all solid-state. And, third, a **modern** color camera must certainly be all-modularized—preferably with the same types of plug-in modules used in the stations' other equipment. There are, of course, other features which

*As We Were
Saying*

COLOR means business!

STATIONS NOW USING LIVE COLOR
TO BUILD HIGH SPONSOR INTEREST



RCA LIVE COLOR CAMERA

"ALL-IN-ONE"
PROCESSING
AMPLIFIER

All-electronic unit provides identical control equipment for both live and film camera chains.

NEW
POWER
SUPPLY

Occupies only 1/2 space of former d-c power supplies . . . high efficiency plus high output . . . 1500 ma.

SPACE SAVING
EQUIPMENT

Only 100 inches of rack space required for all equipment necessary to operate camera chain. With modules and processing amplifier in the cabinet, only 1/2 of a rack needed for efficient complete installation.

CENTRALIZED
CONTROLS

Minimal setup time . . . only two controls in "stand" operation. In addition, over-all stability, peak camera performance and picture quality are assured.

Equipped with RCA Live Color Camera Equipment, select station management can lead the way along the new frontiers of television . . . adding brilliant dimensions to programming techniques, transforming commercial products into thrilling reality. These progressive television stations are using local color origination to build prestige and stimulate sponsor interest.

LIVE COLOR STATIONS

KHQ, Spokane	WBAL, Baltimore	WJAC, Johnstown
KJEO, Fresno	WBEN, Buffalo	WKY, Okla. City
KMTV, Omaha	WBTV, Charlotte	WNBQ, Chicago
KOMO, Seattle	WCBS, New York	WQAI, San Antonio
KRCA, Los Angeles	WCCO, Minneapolis	WRCA, New York
KRON, San Francisco	WDSU, New Orleans	WSAZ, Huntington
KTLA, Los Angeles	WFBM, Indianapolis	WTMJ, Milwaukee
WBAP, Fort Worth	WGN, Chicago	WTVI, Miami
WFIL, Philadelphia	WRCV, Philadelphia	WCAU, Philadelphia
WBRE, Wilkes-Barre	KARD, Wichita	WGAL, Lancaster
KCMO, Kansas City	WJBK, Detroit	KGW, Portland

Local studio origination, and live commercials in color are making sponsors sit up and take notice. Your station can spark the same type of advertiser interest in production of live color with RCA's color camera equipment! For complete technical information call your RCA Broadcast Sales Representative. In Canada write RCA VICTOR Company Limited, Montreal.



RCA PIONEERED AND DEVELOPED COMPATIBLE COLOR TELEVISION

RADIO CORPORATION OF AMERICA
BROADCAST AND TELEVISION EQUIPMENT CAMDEN, N. J.

This December 1956 Ad listed stations then on the air with live color programs.

*As We Were
Saying*

a modern camera should have (such as stabilized circuitry, operating convenience and low maintenance) but the three obvious features—i.e., four-tube pickup, transistorization, modularization—are enough to judge by. You make the decision.

EQUIPMENT DELAYS are hard for our customers to understand. And they are difficult for our salesmen to explain. As an ex-field-salesman we know the embarrassment and anguish of having to tell a good customer that we are not going to meet the delivery date he is counting on. And we've dealt with station people long enough to appreciate their feeling of disappointment, frustration, and sometimes disbelief, when this happens.

How do such delays come about? How can it be that an equipment supposedly well along and promised for two or three months delivery can turn out to take six months—or more?

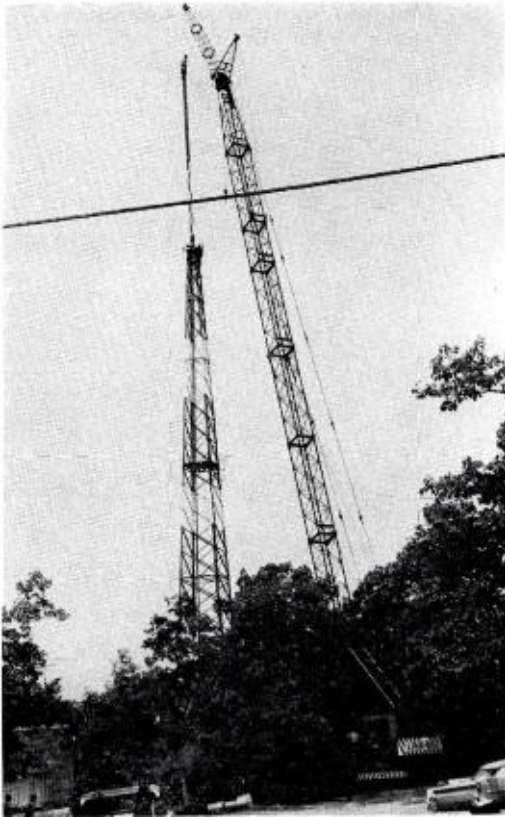
Customers are often inclined to think that someone else got the equipment marked for them—or that the salesmen's information about availability was wrong. The first is never the case, and the second very seldom.

What then is the reason? The answer is almost always some unexpected delay in the long process of getting set up to produce—in quantity—some of the most complicated equipment known to man (a color television system, for example, is as complicated, and difficult to build, as a giant data processing machine). The process of devel-

oping, designing, and building such equipment involves a lengthy series of steps. And it involves many groups of people—researchers, development engineers, designers, purchasing agents, production people, testers, quality control and shipping.

At each step in the process unexpected things can happen. And sometimes very small things cause disproportionate delays. For example, the transition from prototype to production model is always a difficult time. The prototype is usually assembled in the engineering model shop—under the direct supervision of the design engineers. If little things go wrong they are easily fixed. But production models are made in the factory—from drawings, by factory workmen. If the drawings are the slightest bit wrong the equipment will not pass test. And to fix it the drawings must be fixed. If it's a large equipment there may be numerous "fixes"—requiring many contacts back and forth between engineering, factory and test. If new parts have to be ordered there may be a procurement delay. And sometimes, when the new parts finally arrive, they are found to be unsatisfactory—and the process starts all over again. It is not unusual for such delays to add four and five months to the overall schedule.

The step between prototype and production is just one of the places where delays may occur. But it is an important one because it comes so



New RCA Antenna going up at WAAY-TV.

WAAY-TV

Channel 31

TELEPHONE
539-1783

1000 MOUNT SARD BOULEVARD, S. E.
HUNTSVILLE, ALABAMA

Mr. Byron E. Fincher
Radio Corporation of America
Broadcast and Communications Products Division
2110 Airways Blvd
Memphis, Tennessee 38114

Dear Byron:

I wanted to take this opportunity to write to you and RCA expressing our satisfaction with our NEW R.C.A. TFU-24DM UHF Traveling Wave Antenna for Channel 31.

Enclosed you will find several pictures of the erection of the new antenna with a 200 foot crane. Pre-installation checkout with the RCA engineer went without a hitch...the antenna was perfect. It was erected in what we felt was record time.

There can be no doubt, that our new RCA traveling wave antenna is doing an excellent job, far exceeding our expectations which were based on the signal we had with the old antenna. There are no longer any "dead spots" as before, there is no "R.F." in the station" and the class B signal area is now as good as Class A, whereas with the old antenna, it was difficult to even see the picture before. If we had known what a tremendous difference the TFU-24DM was going to make, I think we would have bought it a long time ago. And, the amazing part is, that it cost much less than the antenna we had been using. At the home of M. D. Smith, III, President of the Corporation, in Birmingham which is 100 miles away, the signal to noise ratio of the picture was doubled over what it had been. THAT'S A GOOD ANTENNA YOU FELLAS MAKE!

Sincerely,

M. D. Smith, IV
Operations Manager

What WAAY-TV says about their new RCA Antenna.

As We Were Saying

close to delivery time. Ordinarily the sales department will start taking orders (and estimating certain delivery dates) at the time the prototype passes final tests. They base their estimates on all-goes-well cycles. If all does go well everything comes out on time. But if it doesn't, an estimate of three months delivery can become four, or five—or even more. That's where the salesman has a bit of explaining to do. It's particularly distressing in the case of brand new far-out equipments. They are the most wanted—and the most likely to be delayed.

There is a gold lining to it, though. Once we get all the kinks out of the production process we can build even the most complex equipments rapidly—in large quantities. Our TK-27 Color Film Camera is a good example. We were nine months late in getting first production models out the door. But once we did our production rate accelerated rapidly and within six months we were shipping more than thirty a month. The same thing should happen on our TK-42 Live Color Camera. Production, just now starting, should step up very rapidly and reach thirty or more a month after the middle of the year. By this time next year something like three hundred should be in use. If it turns out as well as the TK-27 everyone will be very happy they waited.

WE'D RATHER SWITCH says another station. This time it's WAAY, Huntsville, Alabama. They've put an RCA TFU-24 Antenna in place of you-know-what. And they report the same improvement in coverage as others who've switched—not to speak of reduced maintenance. Nice letter from M. D. Smith, IV, Operations Manager at WAAY (see above) says "That's a good antenna you fellas make"—and, of course we couldn't agree with him more.

UNBINARABLE is our word of the month. It comes from a POST ad and means, according to them, a quality that is inexpressible in binary numbers—i.e., computer language. That appeals to us. Partly, no doubt, because we constantly (though futilely) revolt against the "progress" which is inexorably changing us into a collection of nine-digit numbers. But more so because the word "unbinarable" describes so well the qualities we are constantly striving to portray. The qualities that can't be shown in the specifications, that can't be guaranteed in fixed terms, that can't be pictured, nor even very adequately described. The qualities that we know are important, and that we want you to know about. These are the unbinarables. Do we reach you? As the POST ad concludes "we didn't mean to incloudate."

—The Armchair Engineer



RCA
NEW
TOKI

2-PIECE FIELD CAMERA... GOES TO THE GAME!





*New transistorized
field camera, Type TK-33*

2-piece RCA camera takes apart for easy carrying

...sets up quickly for network-quality remotes

TRANSISTORIZED 3-INCH I.O. CAMERA

This first all-new 3-inch image orthicon camera in a decade is a really functional field camera. It's ideal for covering the ball game and other sporting events. Two-piece design and light weight make it today's most versatile camera for remote applications. Also makes an attractive and efficient studio camera.

SEPARATE CAMERA AND VIEWFINDER

Can easily be carried as two units. Viewfinder, mounted on top of camera case, may be quickly detached (or assembled) by moving a simple finger catch. Two field cases house the modules for auxiliary equipment and power supply.

SEMI-AUTOMATIC OPERATION

New solid-state circuitry adjusts itself—offers many automatic features which reduce manual operation to basically one control (lens iris). The camera provides uniform day-after-day operation in the field without adjustment. Uses standard plug-in modules, interchangeable with other RCA transistorized cameras.

DELUXE FEATURES

Contains features such as electronic lens cap, automatic cable compensation, centralized setup panel, built-in test and alignment signals. One man can test and align this camera, using internally-generated test pulses. The viewfinder employs an 8-inch, high-brightness 150 ft. lambert kinescope.



Separate viewfinder and camera units make the TK-33 easy to carry—always ready for remotes.



Plug-in transistorized modules, high-brightness 8-inch viewfinder are deluxe features of this new field camera.

*For further information, write RCA Broadcast and Television Equipment,
Building 15-5, Camden, N.J. Or call your RCA Broadcast Representative.*



The Most Trusted Name in Television

**NEW HEIGHTS OF POWER
ON KIRO-TV...**

**DELIVERS
A CLEARER
STRONGER
PICTURE!**



**REACHING MORE HOMES...BETTER
WITH TOP-RATED CBS PROGRAMMING!**

This newest technical improvement is another step in the planned progress of a great STATION-ON-THE-GO in the growing Puget Sound Market. Tested and proved by some sixty of the nation's leading stations, the traveling wave antenna delivers a clearer, cleaner and higher-powered signal.

Your PGW "Colonel" will give you the full story on the many other STATION-ON-THE-GO plans and accomplishments of the new KIRO-TV, the station to buy because it's the station-to-watch in the nation's SIXTEENTH market!

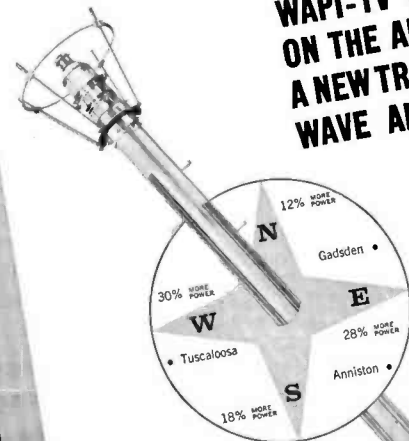
**KIRO
TV 7**

CBS FOR THE GREAT NORTHWEST

KSI-AM/FM/TV KID-AM/FM/TV KBOI-AM/FM/TV

Affiliated with: WRUL RADIO NEW YORK WORLDWIDE

just in time for the new Fall Season
**WAPI-TV IS NOW
ON THE AIR WITH
A NEW TRAVELING
WAVE ANTENNA!!**



12% MORE POWER
Gadsden

30% MORE POWER
Tuscaloosa

28% MORE POWER
Anniston

18% MORE POWER

INCREASING PICTURE POWER IN EVERY DIRECTION

Especially designed WAPI-TV's new Traveling Wave Antenna assures excellent circularity of signal pattern increasing picture power in every direction. This means much greater signal strength in the major metro areas of Anniston, Gadsden, and Tuscaloosa with a total of 71,800 TV homes.

SUPERIOR METRO COVERAGE

A special feature of the Traveling Wave Antenna is null free vertical radiation patterns for superior close-in reception.

WAPI-TV BIRMINGHAM

WAPI-TV BIRMINGHAM

Representative territory of Huntington, Boston, and Newark, Inc.

They switched... and are they glad!

KIRO and WAPI are two of a growing number of TV stations that have switched from another type of antenna to the RCA "Traveling Wave" Antenna. Both of these stations are so pleased with the improvement that they have taken ads (above) to tell about it.

Naturally, we are pleased, too—but we are not surprised. Some sixty stations have

installed RCA "Traveling Wave" Antennas in the past few years.

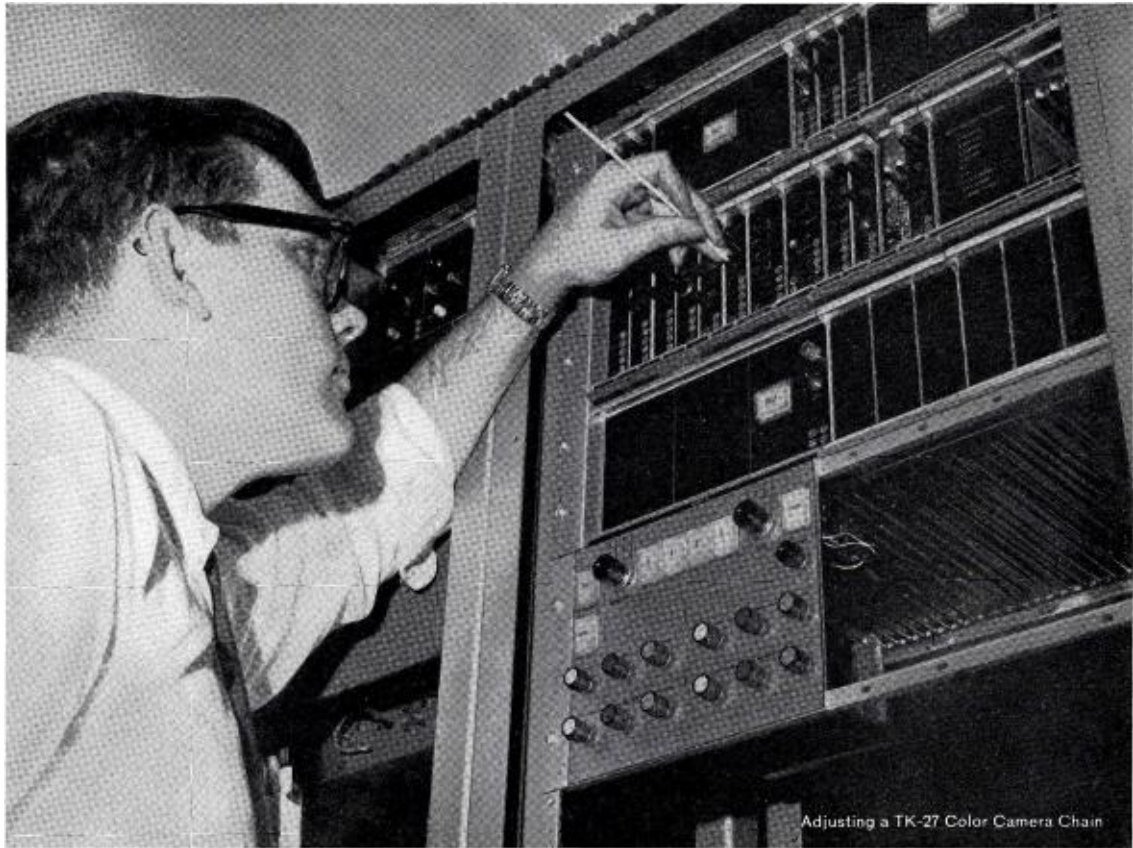
The "Traveling Wave" Antenna, like other RCA broadcast equipments—cameras, tape recorders, transmitters—is for those who want the best. Your RCA sales representative will be pleased to tell you about it in detail. RCA Broadcast and TV Equipment, Building 15-5, Camden, N.J.



THE MOST TRUSTED NAME IN TELEVISION

RCA SERVICE

keeps all your AM, FM, TV equipment in top condition



Adjusting a TK-27 Color Camera Chain

Take advantage of the following services offered by RCA

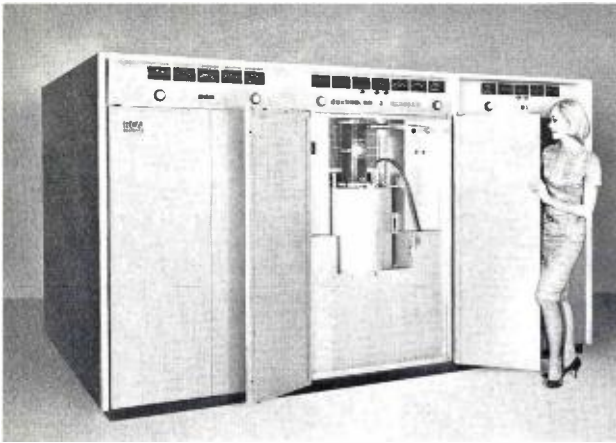
- Video Tape Recorder Service • TV Camera Overhaul • TV Transmitter Overhaul
- Installation Supervision • Microphone and Pick-Up Repairs • Transmitter Performance Measurements • Antenna Inspection Measurements • Console Repairs • Microwave Service
- TV Projector Service • Custom Fabrication • Teletypewriter Maintenance

Your audience demands a superior signal which requires top performance from all your station equipment. RCA Broadcast Service is planned to assure you of meeting this objective. More than 30 years in the broadcast industry have provided a background of solid service experience. This is the type of protection broadcasters have relied on for years, the kind of protection you can count on . . . contract or per-call . . .

from the experts in the service business, RCA Service Company. To guard performance of all your equipment . . . simply telephone one of the following field offices: Atlanta (phone 355-6110), Chicago (WE 9-6117), Phila. (HO 7-3300), Hollywood (OL 4-0880). Or contact Technical Products Service, RCA Service Company, A Division of Radio Corporation of America, Bldg. 203-1, Camden, N.J. 08101.



The Most Trusted Name in Electronics



New High-Power 30-KW
(or 50-KW)
UHF Transmitter

**New-type klystrons
...reduced costs
...advanced engineering**

signal UHF breakthrough in high-power transmitters

HIGHER POWER

Here's a brand new 30-kw UHF Transmitter, combining top performance with low operating cost. Features new integral-cavity klystrons, new space-age electronics, and modern design. Provision for power increase (in the field) to 50-kw. With high-gain antenna can radiate up to 2 million watts ERP.

REDUCED COSTS

Standard ceiling height means reduced installation costs. Space-saving walk-in design requires less floor space. Vapor-cooled, integral-cavity klystrons permit smaller, more efficient heat-transfer equipment—saving space and costs. Klystrons warranted for 8000 hours aural, 4000 hours visual.

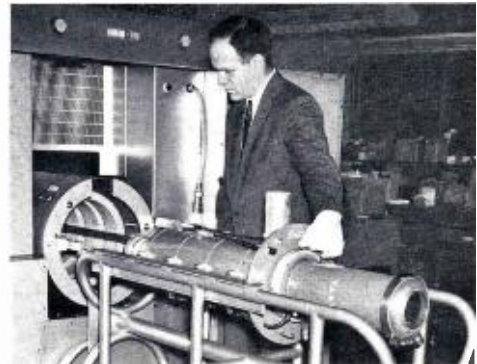
ADVANCED ENGINEERING

Direct FM aural modulation for finest sound. Plug-in silicon-rectifier modules improve power supply efficiency—and servicing. Built-in provision for remote control.

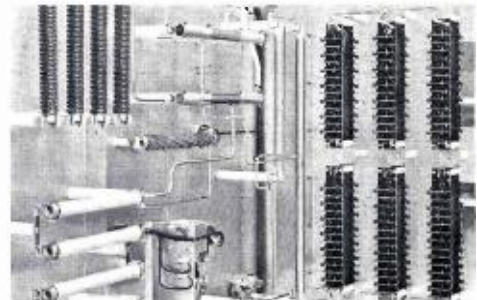
NEW LOW POWER 2- AND 10-KW

Also in this line are a completely new air-cooled 2-kw and a 10-kw UHF transmitter. Ideal for medium power or just-starting stations. The 2-kw can be expanded to a 10-kw (in the field).

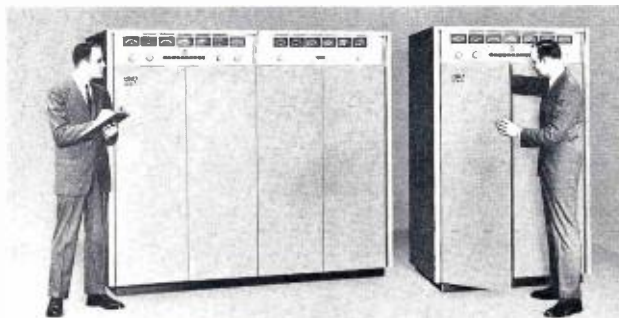
COMPLETE LINE OF ANTENNAS—Gains from 6 to 46 . . .
ERP to 2 million watts . . . omnidirectional or directional
. . . low wind load . . . simplified low-cost maintenance.



New klystrons are easily changed with special carriage.



Long-life silicon rectifiers are modularized for top efficiency.

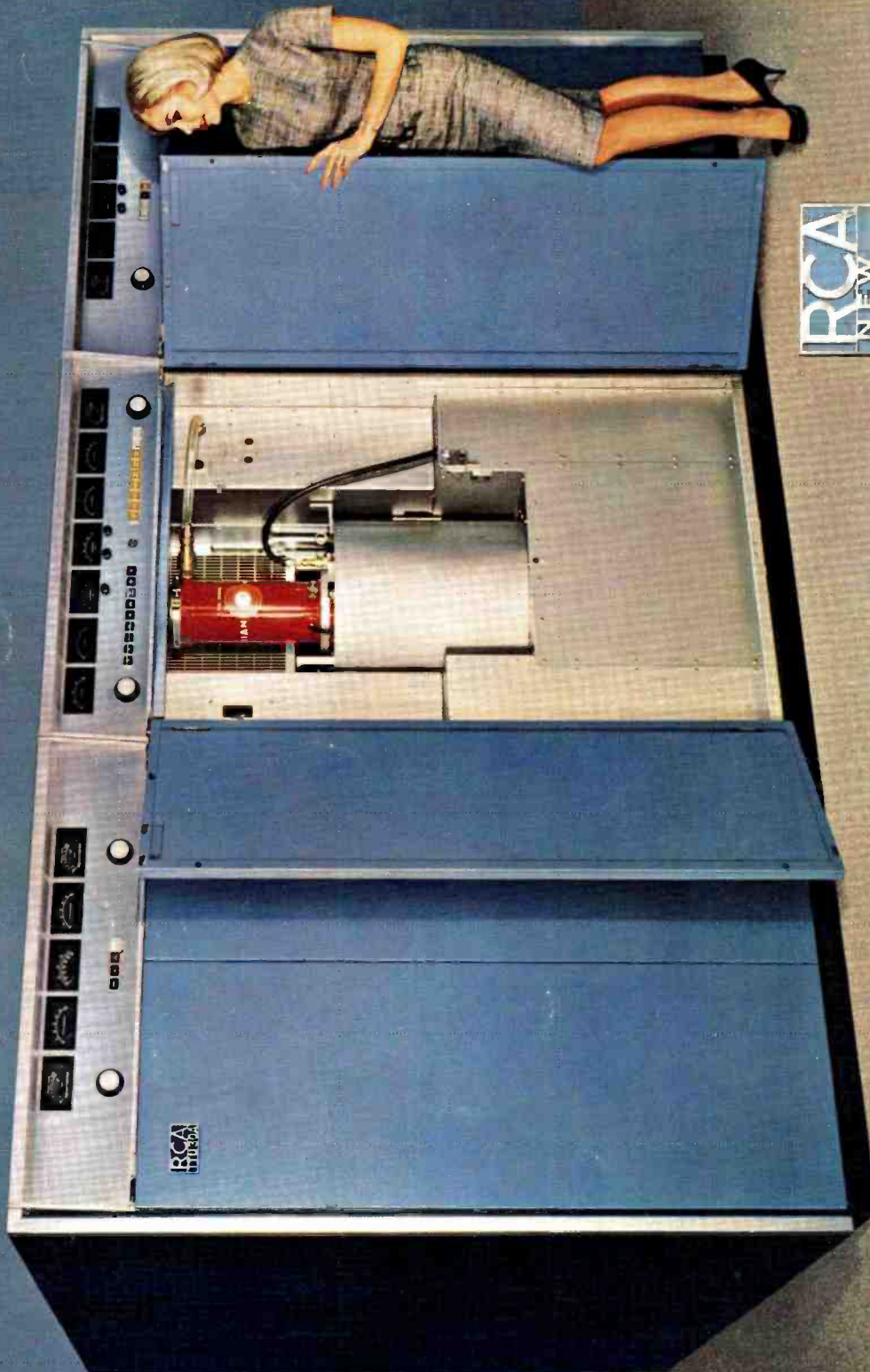


**NEW LOW-POWER
UHF TRANSMITTERS
ARE AIR COOLED**

For further information, write RCA Broadcast and Television Equipment,
Building 15-5, Camden, N.J. Or call your RCA Broadcast Representative.



The Most Trusted Name in Television



RCA
NEW
LOOK

RCA NEW LOOK TRANSMITTER... UHF BREAKTHROUGH

314961

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