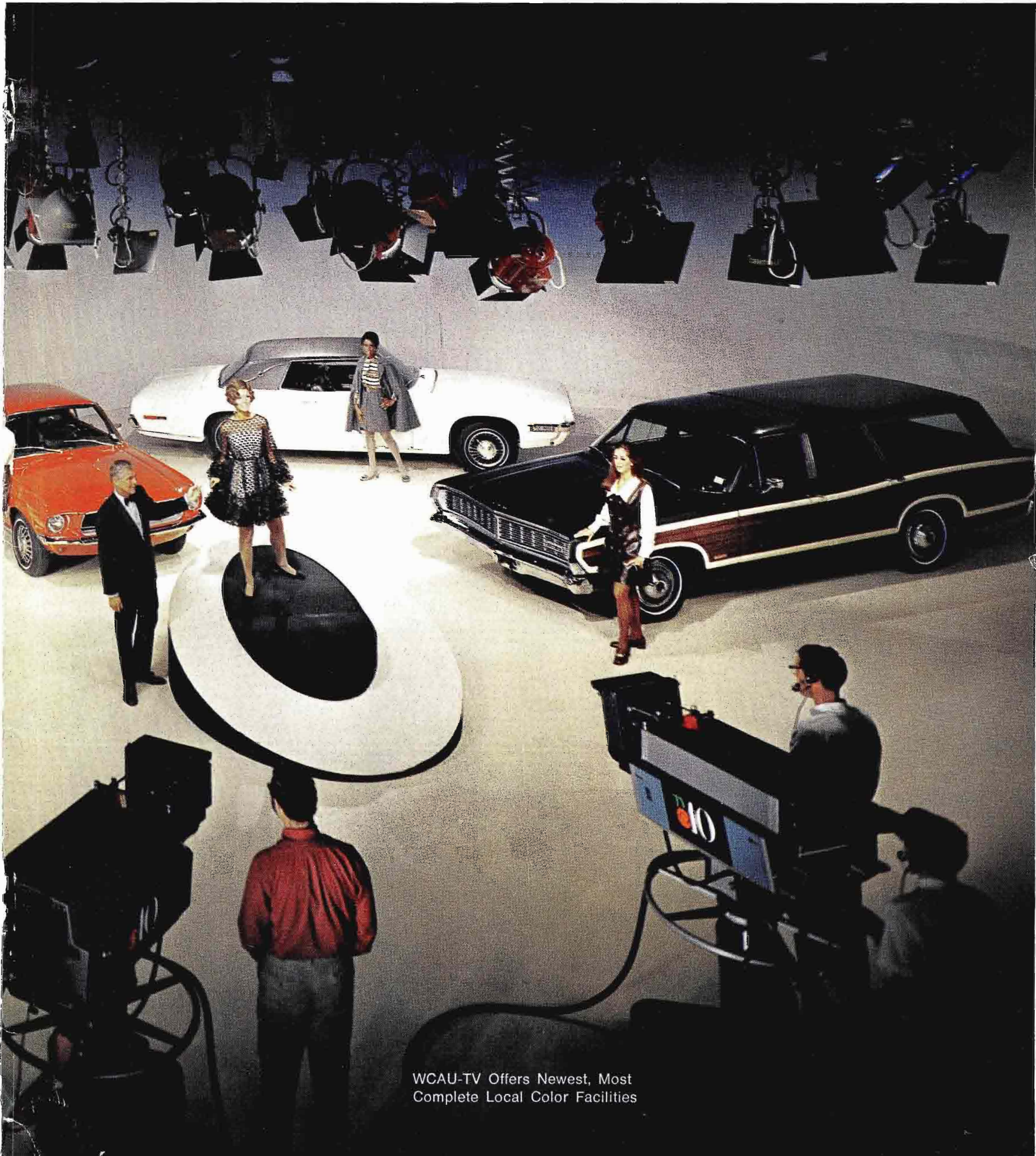


# WCAU

Broadcast News

Volume No. 142, June, 1969



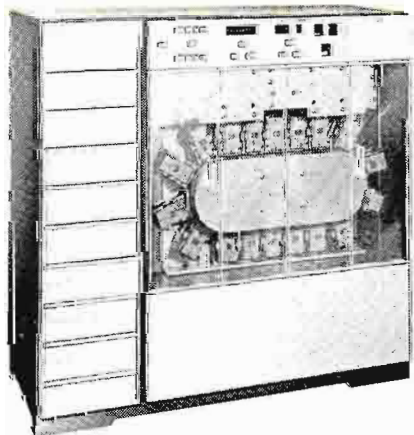
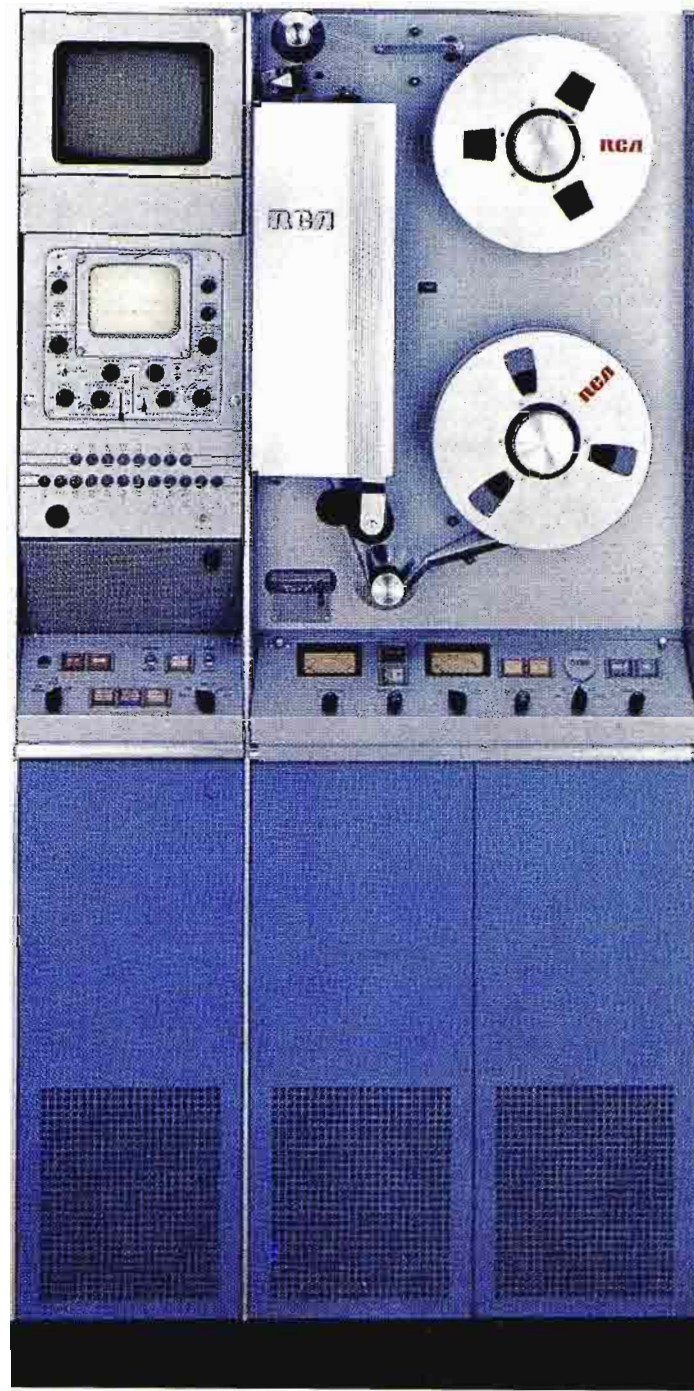
WCAU-TV Offers Newest, Most Complete Local Color Facilities

# A modest miracle from RCA...

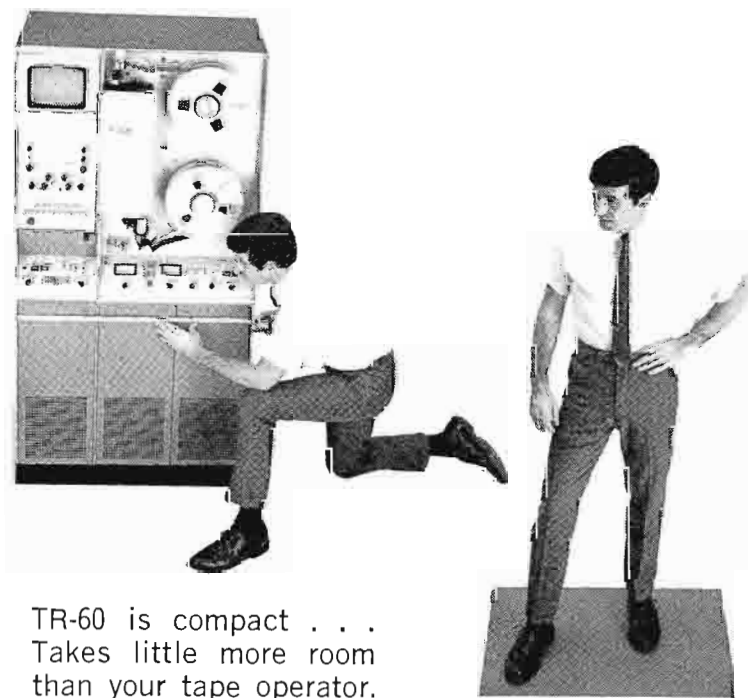
## or how to get more VTR for your money

The TR-60. The only thing modest about this unique studio and mobile VTR is the price. It's lower. But it's capable of superior performance! What's the secret? An RCA exclusive. 48 years of experience in the broadcast business. The most. With that kind of background, it's easier to make the best for less.

Only RCA could have produced a modestly priced VTR with correct color field editing carried down to a single frame (to avoid color disturbance). **Plus** line-by-line correction of hue and saturation error with (optional) "CAVEC" for life-like playback reproduction. **Plus** a rear side erase head that makes tape scratching impossible. **Plus** total remote control over editing sessions. **Plus** in-phase color dropout correction (optional) that puts the right color back in the picture. **Plus** reactance and resistance controls that give you more uniform color. Leave it to RCA to get all the imperfections out of the VTR color picture . . . and, for less money.



**Newest Miracle . . .**  
**TR-60/Tape Cartridge System**  
Your TR-60 may be connected to the VTR Cartridge Machine for playing as many as 18 Cartridges automatically at one loading. Each Cartridge contains up to 3 minutes of tape. Use this system for programming promos, news clips, commercials. Its the way of the future to automate your station breaks. Join the future and get your TR-60 now.



TR-60 is compact . . . Takes little more room than your tape operator.

**RCA** Broadcast Equipment

# **RCA** Broadcast News

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Published by BROADCAST SYSTEMS DEPARTMENT  
RCA COMMERCIAL ELECTRONIC SYSTEMS DIVISION

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PRICE . . . single copies, \$2.50 each

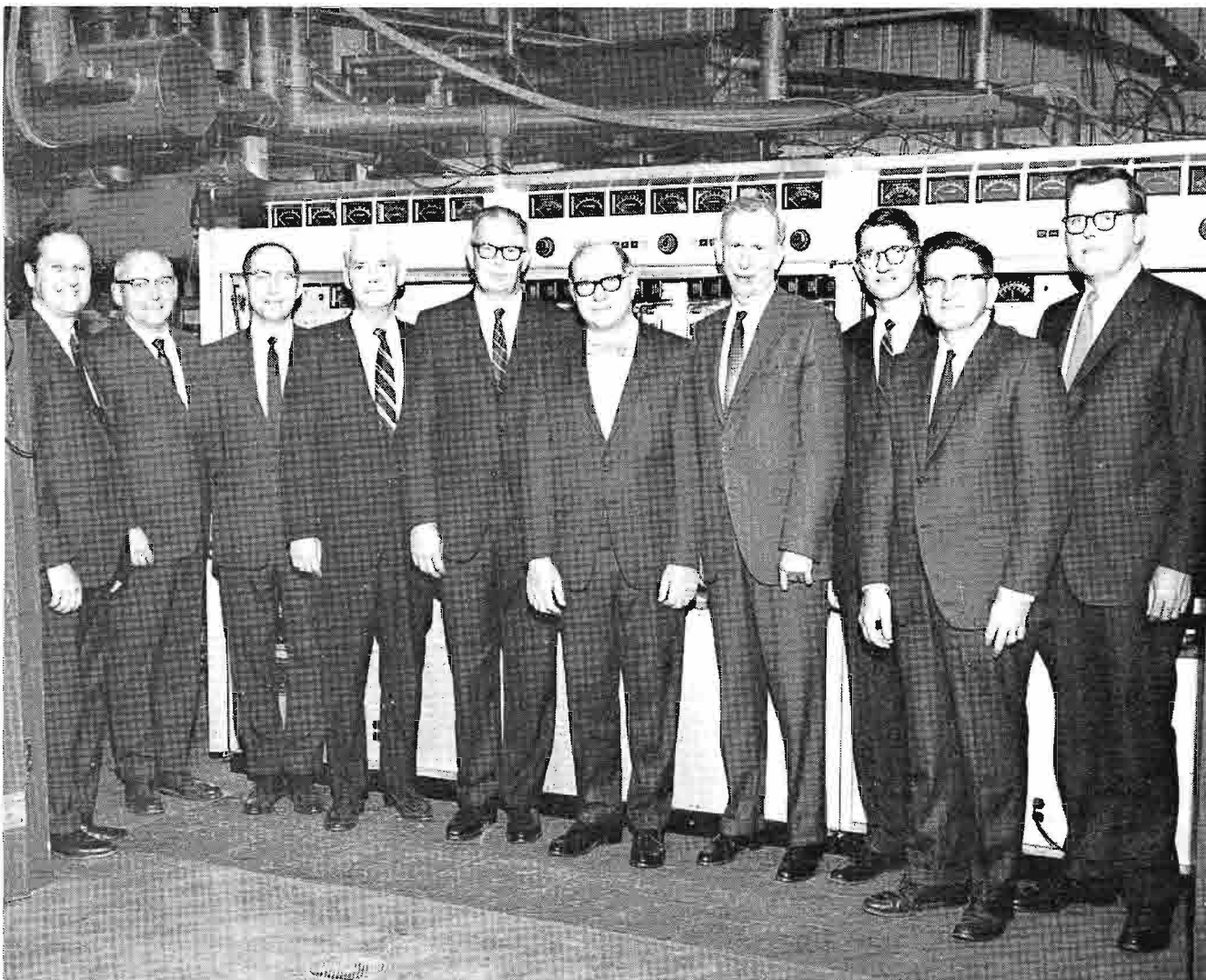
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## Group W Gets First Maxim-Air Transmitter

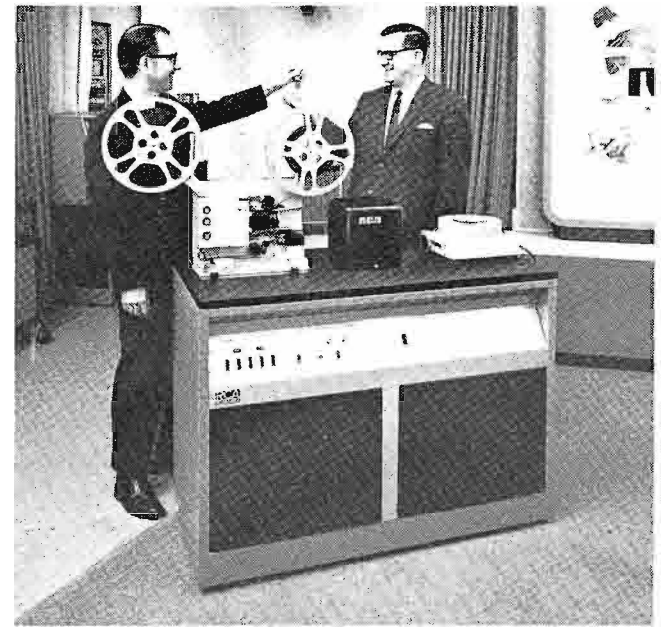
Photo taken in Customer Tuning area of the RCA Meadow Lands Plant after completion of performance tests for the first RCA TT-30FL. The transmitter will be shipped this month to KDKA and is one of three units purchased by Westinghouse Broadcasting Company, Inc. for their Group W Stations. Development of the transmitter was a joint project with the Westinghouse Broadcasting Company engineers and RCA.

The TT-30FL represents a completely new solid-state design that gives a noticeable improvement in picture quality. It reduces operating costs and improves reliability. It's actually two 15-kW transmitters working in parallel to give maximum on-air assurance.

Those in the photo from left to right are: D. R. Musson, Manager of VHF Transmitter Engineering, RCA; T. M. Gluyas, Manager of Broadcast Audio & Transmitter Engineering, RCA; Charles Magee, Manager of Engineering, Westinghouse Group W; A. C. Goodnow, Manager of Transmitter Engineering, Westinghouse Group W; Ray Holtz, Chief Engineer of KPIX, San Francisco; Ben Wolfe, Vice President of Engineering, Post-Newsweek Stations (former Vice President of Engineering, Westinghouse Group W); W. A. Hauser, Engineering Manager of WBZ, Boston; R. Ellis, Chief Engineer of WBZ-TV, Boston; R. Donahue, Assistant Chief Engineer of KDKA-TV, Pittsburgh; and R. T. Monroe, Vice President of Engineering, Westinghouse Broadcasting Company, Inc.



## Alaska TV Companies Plan First Single-Tube Color Film Originations



Mr. E. W. Christiansen, vice-president and chief engineer of two cable companies, receives the symbolic key of ownership for new RCA color TV film system from Gordon Bricker, manager of RCA Burbank plant.

Two Alaska community TV companies will originate the state's first color film programs via cable beginning this summer, marking the initial commercial use of RCA's new single-tube color TV film system.

Some 2200 subscribers of Ketchikan-Alaska TV and Sitka-Alaska TV will be able to watch full-length features and other film fare in color with the new RCA equipment.

The companies, which have been originating films in black-and-white since 1953, would each install an RCA PFS-710 system including a color TV camera, motion picture and slide projectors and multiplexer.

The PFS-710 was introduced late last year as the world's first color TV film originating system to employ a single pickup tube.

The new equipment is in production at RCA's Burbank, Calif., plant and is being marketed to broadcast stations, educational institutions, industrial and other users as well as to cable TV operators.

## Best View For Hue

The TV industry's most advanced color studio camera, the new TK-44A is in volume production at the RCA Camden, N. J. plant. First units of the new three-tube camera were shipped to WBAP-TV. Other TK-44A cameras have been shipped to KLZ, NBC, MTS, KBHK, WTOG, KDNL, KOGO, WSOC, WHIO, WPBM, KOMO, WGN, WISN, WCOT, WTOK, KCET, KSL.

The new camera was introduced in prototype at the NAB convention in March 1968, and commercial production began late in the year. The plant is working on a substantial backlog of orders from TV networks and stations in this country and overseas.



## Video Cartridge System At RCA Exhibit In Montreux

The world's first system for automatically recording and reproducing color TV programs from video tape cartridges made its European debut May 19 as the highlight of the largest exhibit of RCA broadcast equipment outside the United States.

The system, which will play back as many as 18 small video tape cartridges of up to three minutes duration each, was demonstrated for visitors to RCA's exhibit at the Sixth International Television Symposium in Montreux, Switzerland.

The big display covered 3400 square feet of floor area and marked the first European demonstrations of RCA's new three-tube and one-tube color TV studio cameras.

Cartridges used in the VTR system measure approximately 2½ x 3 x 5 inches and contain enough two-inch wide magnetic tape to provide up to three minutes recording at the standard machine speed of 15 inches per second. The cartridges are loaded sequentially into a traveling belt-like device and automatically positioned for recording or playback through the use of the system's built-in digital computer.

Designed to operate with an RCA high-band color TV tape recorder, the system was demonstrated at Montreux in conjunction with the TR-70 recorder whose electronics controlled some of the cartridge system's function.

For televising the "live" scene, RCA demonstrated its new TK-44A three-tube color camera, now in commercial production, and the low-cost PK-730, the first practical color camera to employ a single pickup tube.

The TK-44A incorporates a new contour enhancer in which high frequency details in the picture are amplified without an accompanying increase in noise. A highly-efficient prism and other features give the camera extra sensitivity and the ability to make broadcastable pictures at only 15 foot candles.

## RCA Ships \$600,000 In Broadcast Equipment For New TV Station In Ecuador

A new TV station in Guayaquil, Ecuador, will reach approximately three-fourths of the nation's 100,000 receivers when programs begin later this summer. The new station CETV, Channel 10, will use a mountain-peak broadcast antenna and seven repeater locations to cover the wide area. Equipment includes a 40-foot mobile TV van, with 20-foot camera boom which will be used to cover horse races, soccer matches and other remote events.

The mobile unit will carry two TK-60 image orthicon cameras, a TR-5 video tape recorder with electronic editing capability, and switching and audio equipment for complete television program production. A rooftop microwave unit will link the mobile unit

## Christian Broadcasting Network Orders \$2½ Million In RCA Equipment

To establish a new Atlanta, Ga., TV station and to modernize an existing TV station and FM radio network, the Portsmouth, Va.-based company is acquiring the TV industry's most advanced color cameras, video tape systems, and TV transmitters. A total of seven TK-44A color cameras has been ordered for WHAE-TV, the new Channel 46 station for Atlanta, and WYAH-TV, Portsmouth, which has been broadcasting on Channel 27 since 1961. The equipment contract also includes four units of the TR-70B video tape recording system which produces the highest color fidelity ever achieved in that medium, along with a high degree of machine automation.

Equipment destined for the Atlanta station also includes a complete color television film originating system, Type TK-27, along with a 60-kilowatt UHF transmitter and a Vee-Zee type panel antenna which is designed for mounting on three sides of the broadcasting tower.

The Portsmouth flagship station will be fitted out with a completely new transmitting facility, including a 60-kilowatt transmitter, high-gain antenna and 1,000-foot tower, which

will enable it to produce 2,250,000 Watts of effective radiated power.

Five FM stations operated by Christian Broadcasting in upstate New York will be re-equipped with RCA's new circularly-polarized broadcast antenna and four of the stations will install new RCA transmitters with solid-state exciters. A new transmitter also will be installed at a sixth FM station WXRI, Norfolk, Va., for parallel operation with the present transmitter.

Christian Broadcasting was founded in 1960, also operates a radio station in Bogota, Colombia. The network is the only evangelical broadcaster in television, and WYAH-TV features religious programming along with news, travel and adventure shows. With the new RCA color equipment in operation, the company will operate a full-time production center and will be in a position to produce 50 to 60 per cent of its own programs.

Discussing the new 60 KW UHF Transmitter are (l. to r.) P. G. Walters, RCA Representative, Atlanta, Ga.; W. T. Gregory, Chief Engineer, WYAH-TV; E. C. Tracy, Vice President, Sales, RCA Broadcast Systems; M. G. Robertson, President and General Manager, Christian Broadcasting Network Inc., and Fred Huffman, RCA Representative, Washington, D. C.



with the main TV studio.

Studios in Guayaquil, Ecuador's largest city, also will use TK-60 cameras and two complete TV film originating systems. At the outset the station will broadcast in black-and-white but the basic technical system has full color capability for later conversion to color.

The studio also will be equipped with a Type TR-4 TV Tape Recorder along with special effects and teletitling systems for production of taped programs. Broadcasts will make use of locally-produced tapes and others shipped in from Mexico, Peru and Europe.

At right, equipment destined for the new TV station in Ecuador is examined by Serafin T. Montero (left) Executive Director of the station and J. P. Ulasewicz, Division Vice President for International Sales, RCA Commercial Electronic Systems Division.



# TEXAS STYLE WELCOME FOR NEW TK-44A COLOR CAMERAS

The television industry's most advanced color TV camera, the new RCA TK-44A, was given a typical Texas style welcome at Fort Worth as the first four cameras off RCA's Camden, N. J. production lines arrived at the WBAP-TV studios in February.

Glenda K. Propes, Miss Texas 1969, and the Channel 5 station officials were on hand to mark the event and to observe the cameras' initial performance. After crews train with them, the TK-44As will be assigned to WBAP-TV's big mobile unit.

James a Byron, Director of Broadcasting, WBAP-AM-FM-TV, said the new three-tube camera's extra sensitivity and advanced optical system enable it to produce true-to-life color pictures that are virtually free of technical faults.

"This new camera is so sensitive that it will make acceptable color TV pictures at only 15 foot candles.

"Few if any scenes will be televised when the light is so poor, but our engineers like the reserve capacity these new cameras have for handling abnormal light conditions."



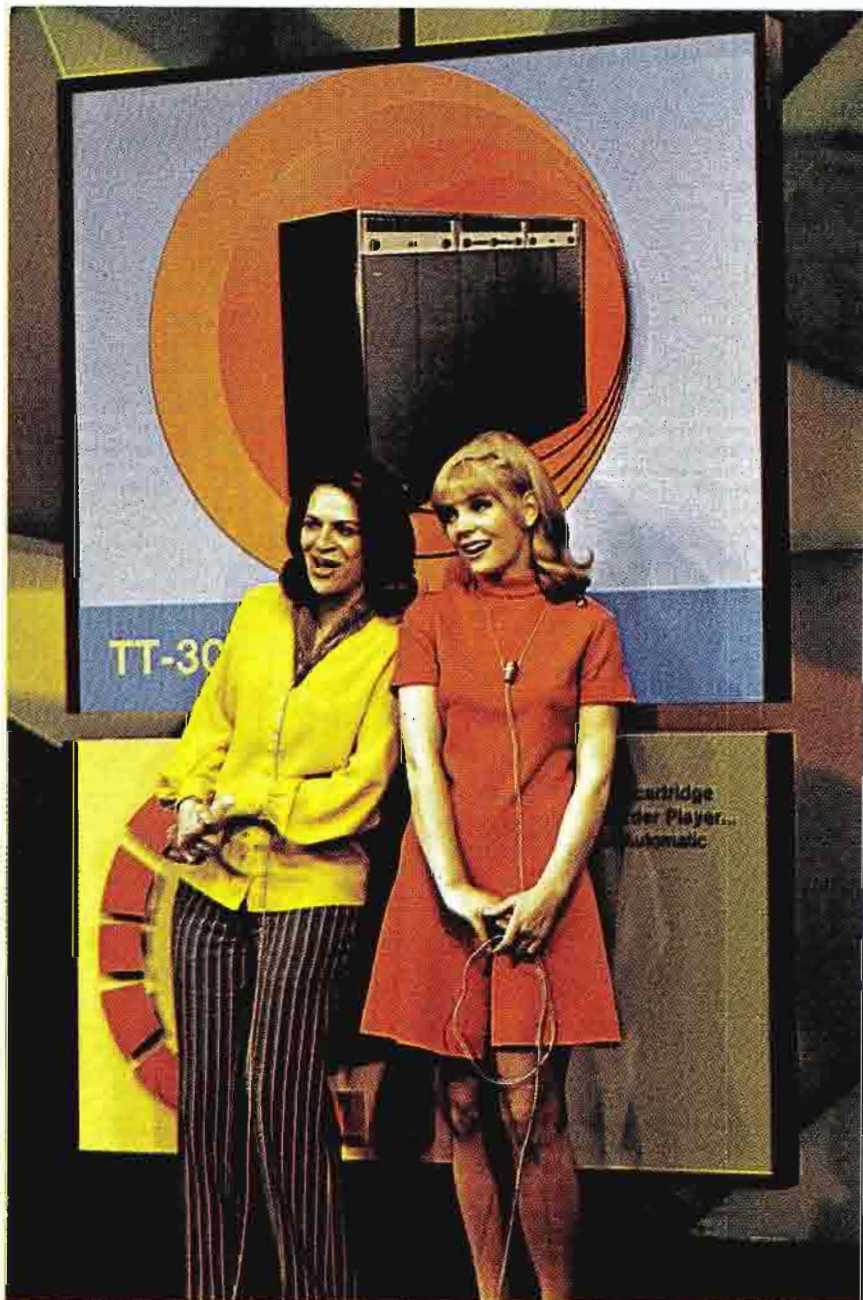
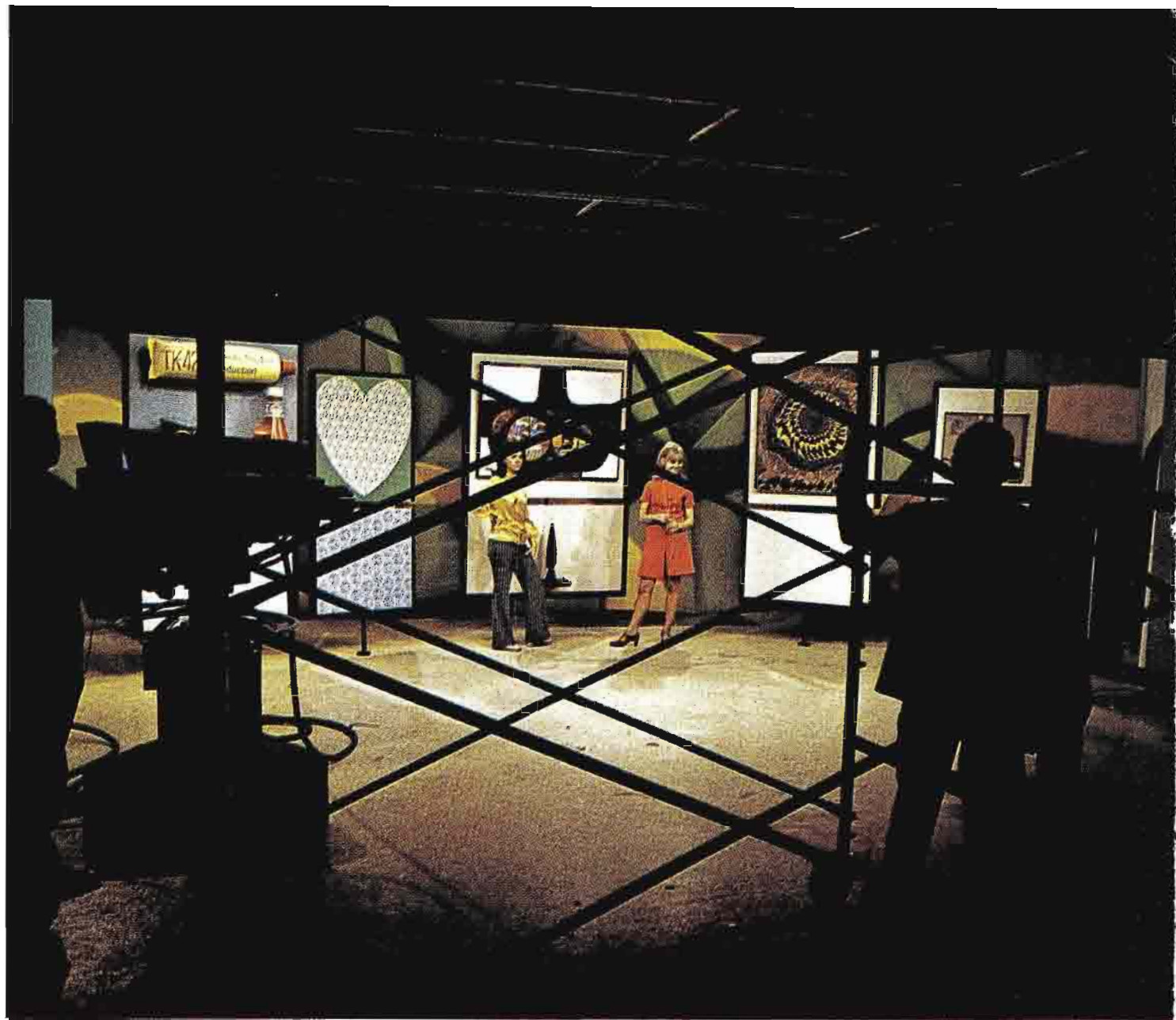
FIG. 2 Rupert Bogan, chief engineer of WBAP-TV, accepts delivery of the No. 1 TK-44A Color Camera.



FIG. 1 The first four TK-44A cameras shown here are being used in WBAP-TV's big mobile TV unit for covering remotes. Additional TK-44A's have been added for studio programs.

# CROWDSTOPPERS AT 1969 NAB





## THREE MAJOR PRODUCTS STAR IN THE RCA EXHIBIT

Among the many pieces of equipment that caught the eyes of broadcasters at the 1969 NAB Convention were RCA's TK-44A 3-Tube Color Camera, the new "Maxim-Air" TV Transmitter, and the world's first Video Tape Cartridge System.

Unique "Chromacomp" and "Contours-with-a-Comb" features of the TK-44A Color Camera attracted much interest as they were dramatically demonstrated in the RCA studio.

"Maxim-Air" is an advanced design transmitter that improves the technical quality of color transmission by a two-to-one margin.

TV video cartridge is a system that puts automation of tape subjects within reach of the broadcaster. The equipment records and automatically plays program material or commercials on small tape cassettes.





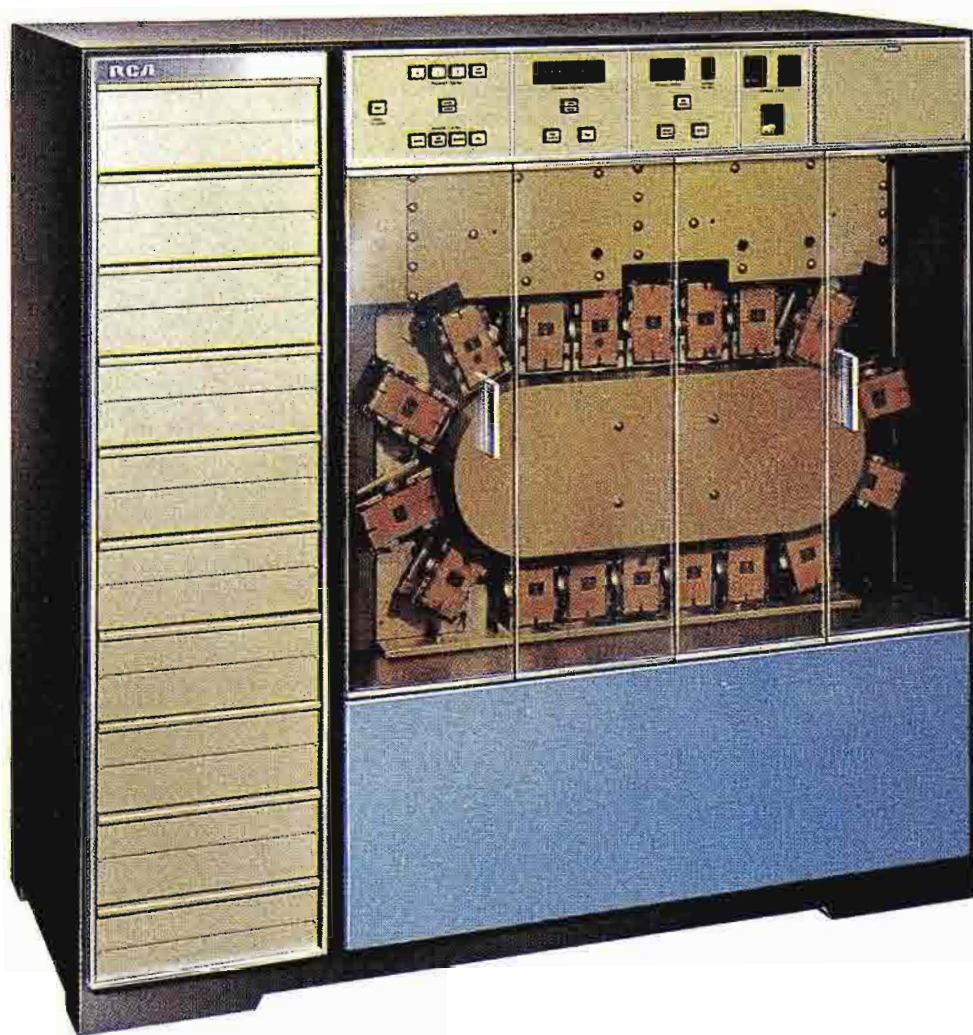


FIG. 1 Type TCR-100 Video Cartridge Recorder as demonstrated at 1969 NAB Convention. Cartridge measures only 2½ x 3 x 5 inches.



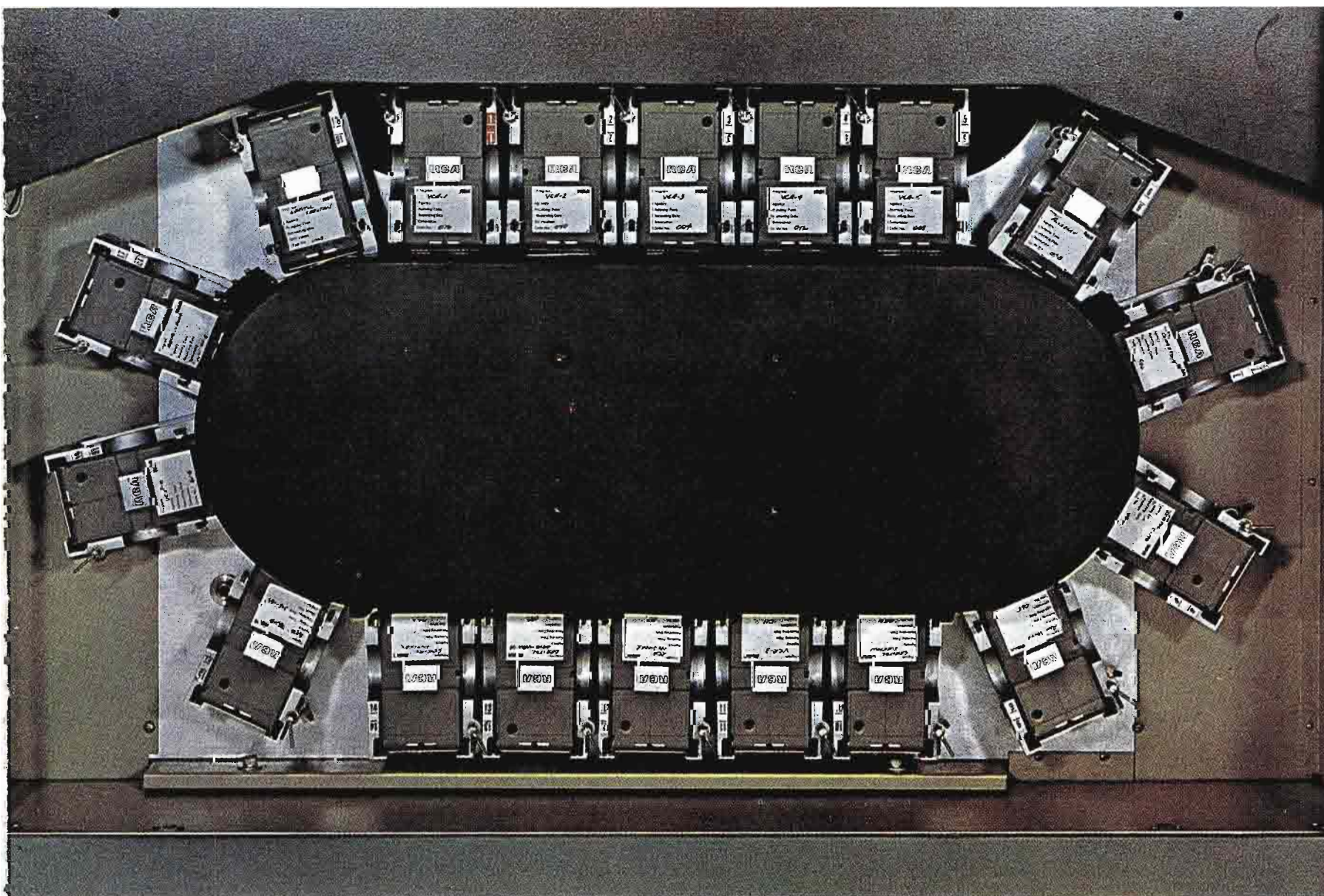
## WORLD'S FIRST VIDEO CARTRIDGE TAPE SYSTEM

An industry exclusive, the RCA Video Cartridge machine records and automatically puts on air tape commercials and programs housed in small preloaded cassettes. Only 2½ x 3 x 5 inches in size, each cassette holds up to three minutes of tape. The machine can handle up to 18 cassettes at one loading. A small digital computer, built into the machine, executes the instructions for automatic operation. Once the machine is loaded, switching from one cassette to another is accomplished in microseconds. All 18 cassettes are automatically cued up to play in predetermined sequence. It's a quadruplex system, employing standard 2-inch tape, embodying RCA high band color standards. The system utilizes standard RCA TR-60 or TR-70 recorders. Broadcasters using the system will be able to preprogram several station breaks, for automatic airing of commercials, promos, announcements, or short programs.



FIG. 2 Close up of "Carousel" mechanism that accepts cartridges and transports them to play positions.

FIG. 3 Crowds watching audio-visual presentation that revealed principles and profits of new Video Cartridge System.



# LATEST DESIGN THREE TUBE COLOR CAMERA



FIG. 1 NAB 1969. From this small studio, demonstrations of TK-44A technical features originated.





FIG. 2 "Keep your eye on the gray bird". With the aid of birds and blond, "chromacomp" features were demonstrated.

The TK-44A 3-tube color camera made its debut last year and commercial shipments began February, 1969. In its NAB color studios RCA demonstrated exclusive camera features to show how they improve color pictures. For example, a most critical test of sensitivity produced satisfactory pictures at the unbelievable level of 15 footcandles! Another feature, "Chromacomp" enables the broadcaster to color match the TK-44A with any other color camera, or to adjust colors creatively without unbalancing the gray scale. A third exclusive feature, "Contours-with-a-Comb", produces pictures that are as sharp and well-defined as desired—without noise. This is especially important in making high quality video tapes and dubs. Production runs of the TK-44A have been virtually doubled to meet the greater demand.

FIG. 4 Highlight handling test . . . demonstrates high efficiency prism and newly designed optics, as shown in off-monitor photo below.

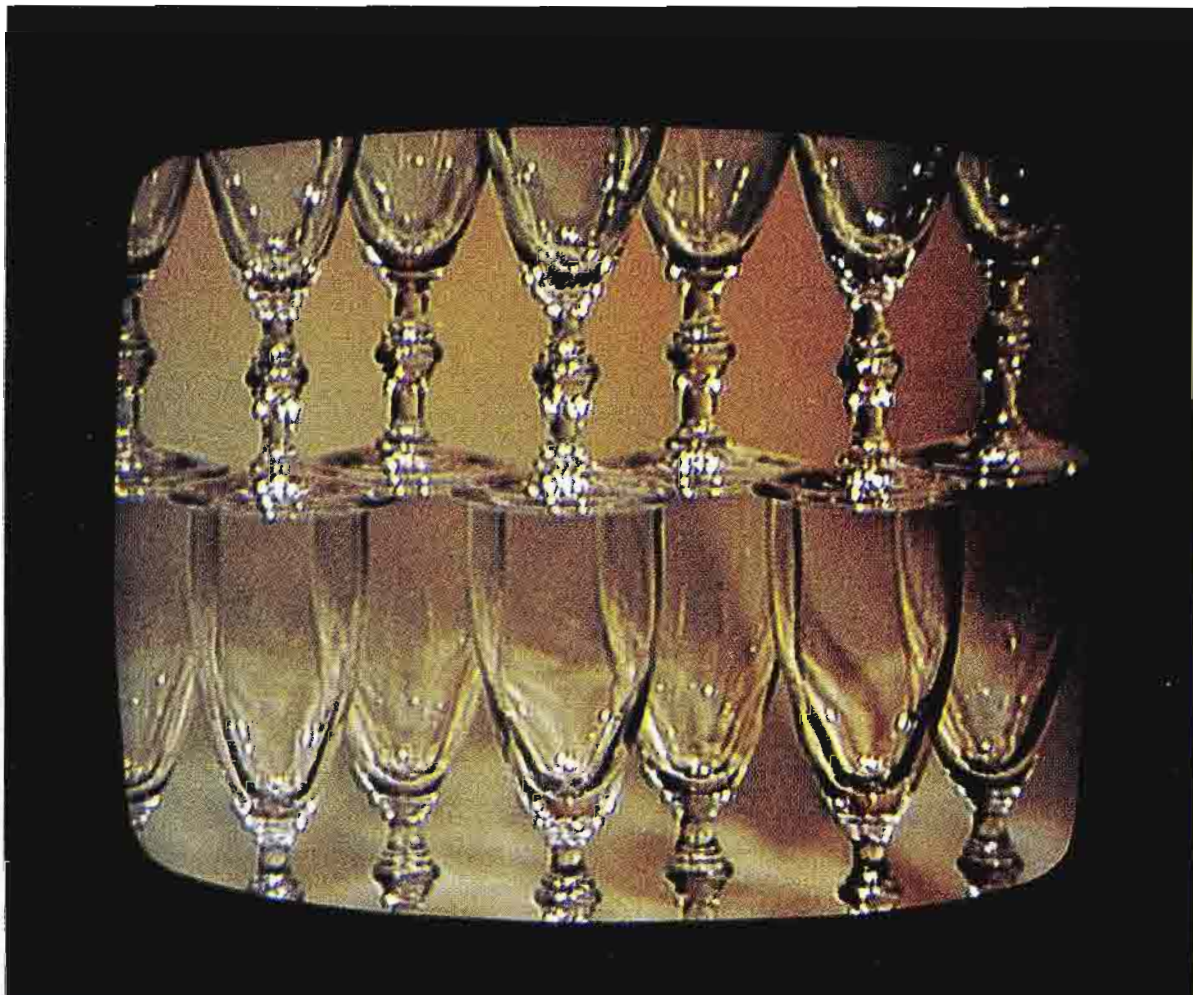
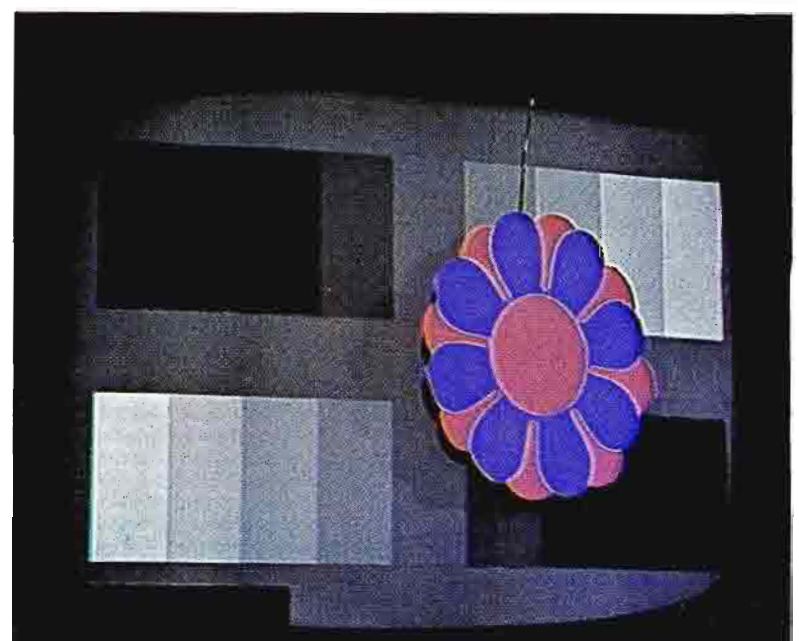
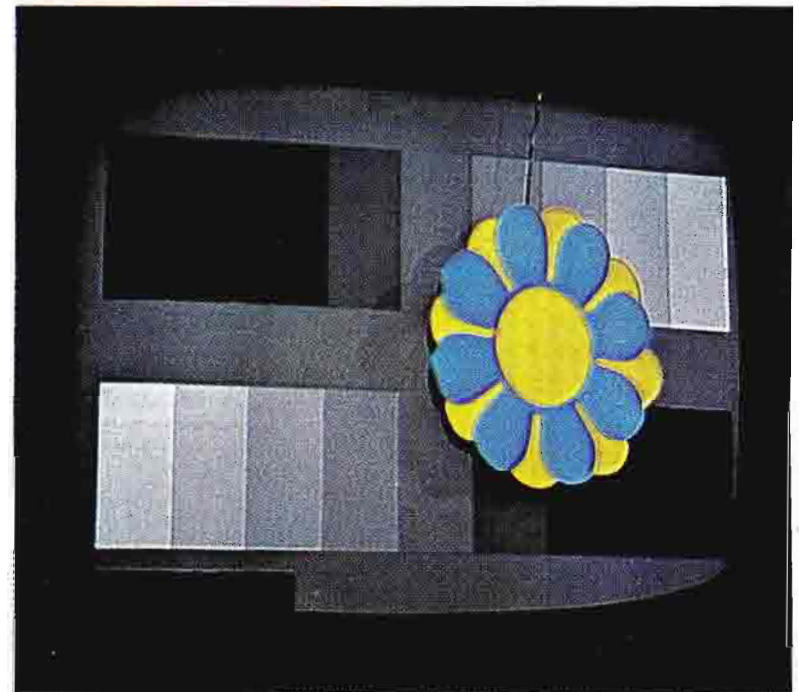
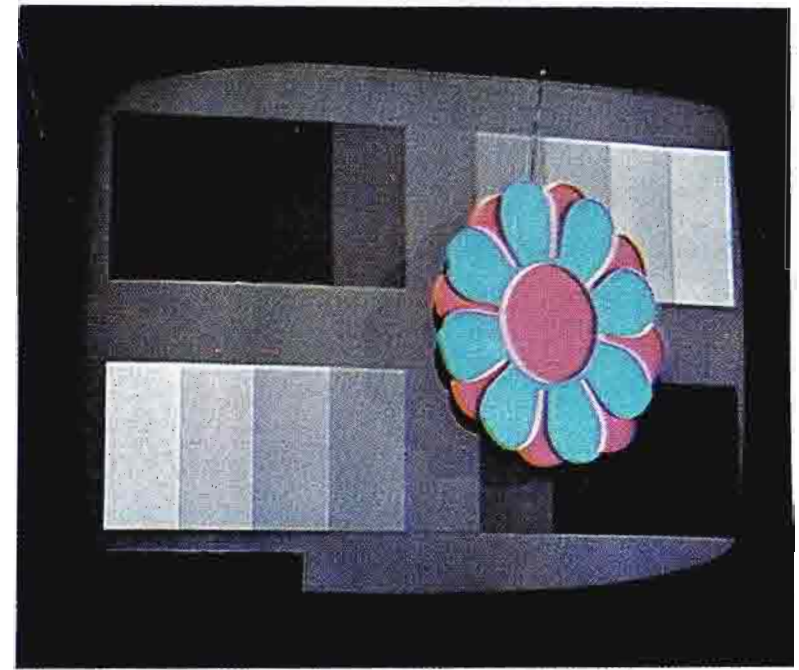


FIG. 3 Video operators favorite chart . . . a gray scale demonstrated how chromacomp works. Off-monitor pictures show gray scale with normal blue-and-red flower (top) . . . red control adjusted (center) . . . and blue control adjusted (bottom).



# MAXIM-AIR . . . IMPROVES COLOR TRANSMISSION 100 PERCENT

First major breakthrough in transmitter design in 15 years is represented by the 30-kW "Maxim-Air". The highest quality of color transmission available today has been obtained from extremely reliable solid-state circuitry. Also, remote control features include circuits that can eventually be computer sensed and controlled.

The "Maxim-Air" takes advantage of all the known improvements of operating characteristics in solid-state devices. By carefully selecting new solid-state circuit designs, performance specifications are generally improved over other transmitters by 2 to 1.

Two identical 15-kW transmitter units are operated in a parallel system to practically eliminate off-air time. If one unit fails, the other continues to provide a signal. Loss of advertising revenue is further minimized by using automatic exciter switching. Two identical solid-state exciters feed into an automatic exciter switchover circuit. If the operating exciter degrades or fails, it is automatically replaced by a standby exciter . . . without interrupting the video or audio.



FIG. 1 Only three tube types are employed in the new TT-30FL "Maxim-Air" TV Transmitter.

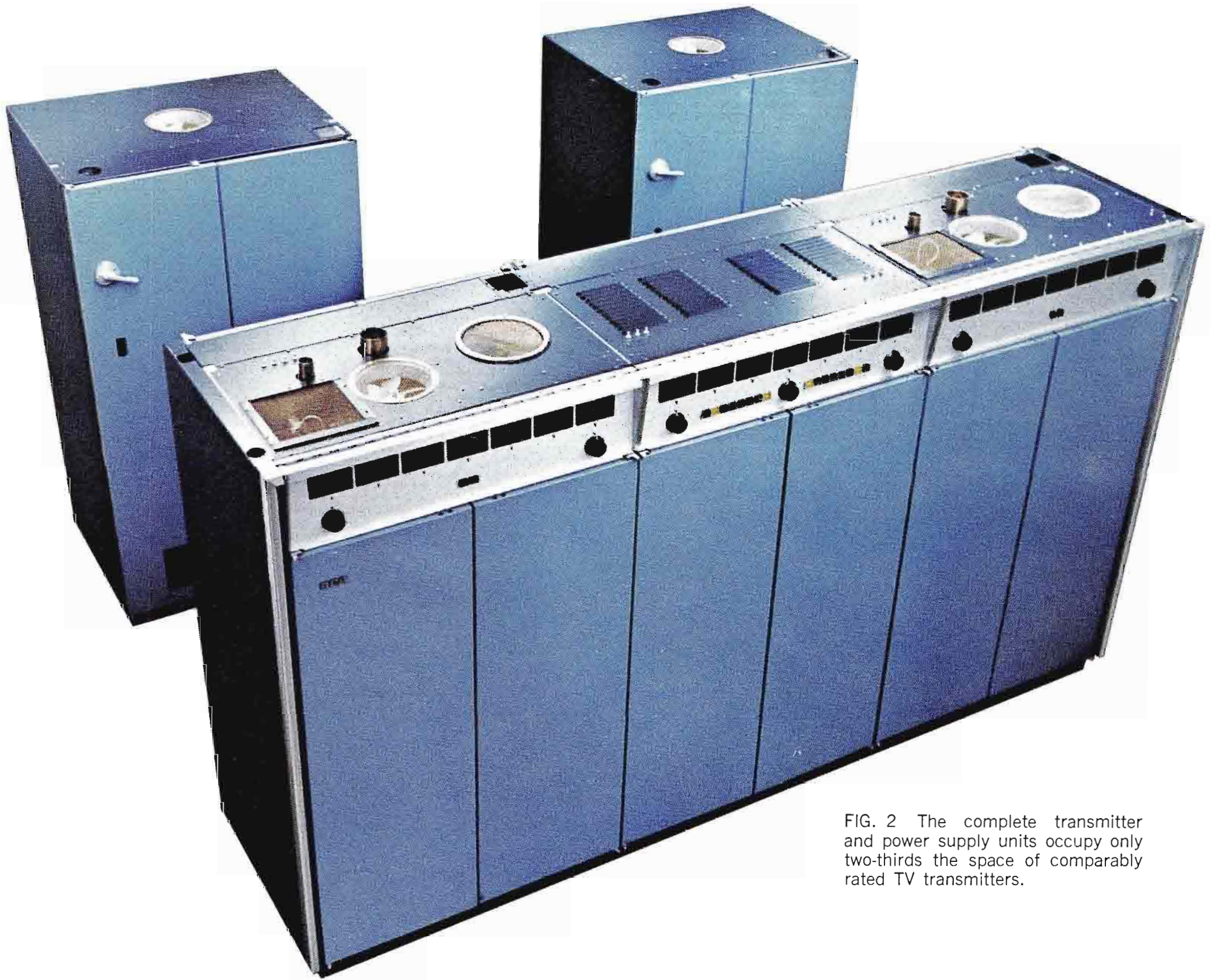


FIG. 2 The complete transmitter and power supply units occupy only two-thirds the space of comparably rated TV transmitters.

FIG. 3 Solid-state design "Maxim-Air" uses small 1½ hp blower shown at right (in contrast to 7½ hp used by older transmitters).

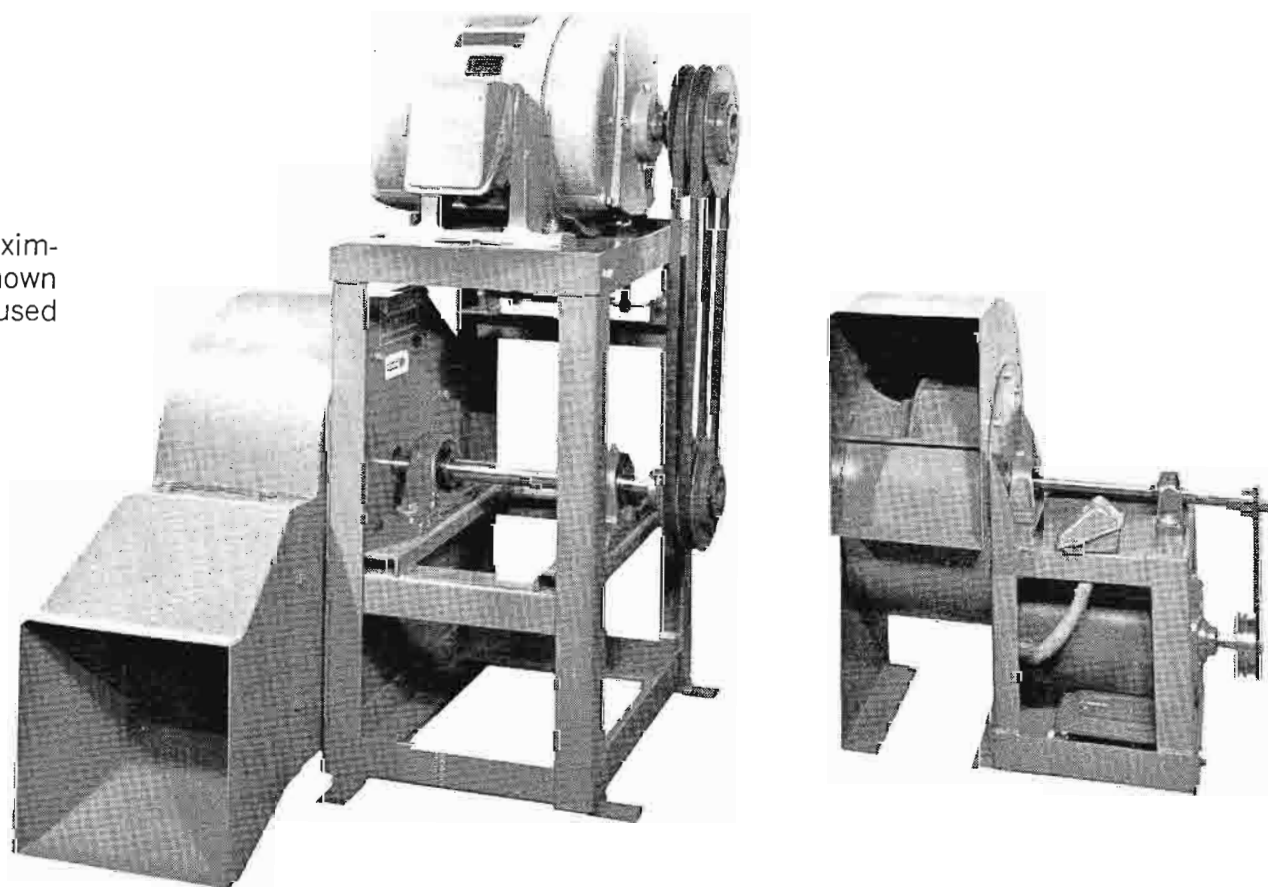




FIG. 1 Operations Manager Jim Horkey (seated) shows color film camera operation to (L to R) Ron L. McIntyre, Coordinator, Community TV; Al Ribas, Chief Engineer; and Dr. Clifford Lawrence, Superintendent of Instruction, Clark County School District.

## LAS VEGAS HAS MAJOR STAKE IN ETV

Clark County School System  
Includes VHF Broadcast,  
2500 MHz ITFS, Translators  
Microwave and CCTV

AL RIBAS  
Chief Engineer, KLVX

When KLVX, licensed to the Clark County School District, Las Vegas, went on the air March 25, 1968, it signaled the first major step in Nevada's master plan to utilize all forms and methods of transmitting television programs to the schools and the general public.

For this master plan includes not only the present broadcasting from this channel 10 station, but also four 2500 MHz ITFS channels, TV translators to cover the sparsely settled outlying sections of the state, CCTV systems in all schools, and microwave transmitters for an eventual state network.

During the past several years, the Nevada State ETV Advisory Committee had been working on plans for instructional and public television. In May of 1966 the state obtained a one year grant from the United States Office of Education for what was known as Project INNOVATE. One of the realized goals of that unusual project was the present master plan for television.

These plans became a reality when the Nevada Legislature, in the closing days of the 1967 session, enacted a bill giving the state an Educational Communications Commission. This enactment has since been hailed by many persons as one of the finest bills of its type in the United States, for Nevada had taken the strongest parts of all similar bills passed in 35 other states and combined them into one. They had also wisely used and applied the experience that had gone into studies and decisions of other state ETV commissions when writing their bill.



### Scope of Project

From no instructional or public television at all to a complete system using state-of-the-art methods and technology constitutes the scope of the Clark County project based in Las Vegas. KLVX is now broadcasting day and night with a power of 295 kilowatts (the most power of any TV station in the state). With the addition of five translators to cover rural schools and homes, the entire county with an area of more than 8,000 square miles will be blanketed with an excellent signal.

By the Fall of 1969, four 2500 MHz Instructional Television Fixed Service channels will be in operation and providing instruction to schools in the Greater Las Vegas area where more than 90 percent of the county students reside. These signals will also be beamed to the city of Henderson, about 15 miles southeast of Las Vegas.

In the interim, a six-channel TV distribution system to handle color and monochrome was installed in all the elementary schools of the Las Vegas area. Work was also progressing for a similar distribution system

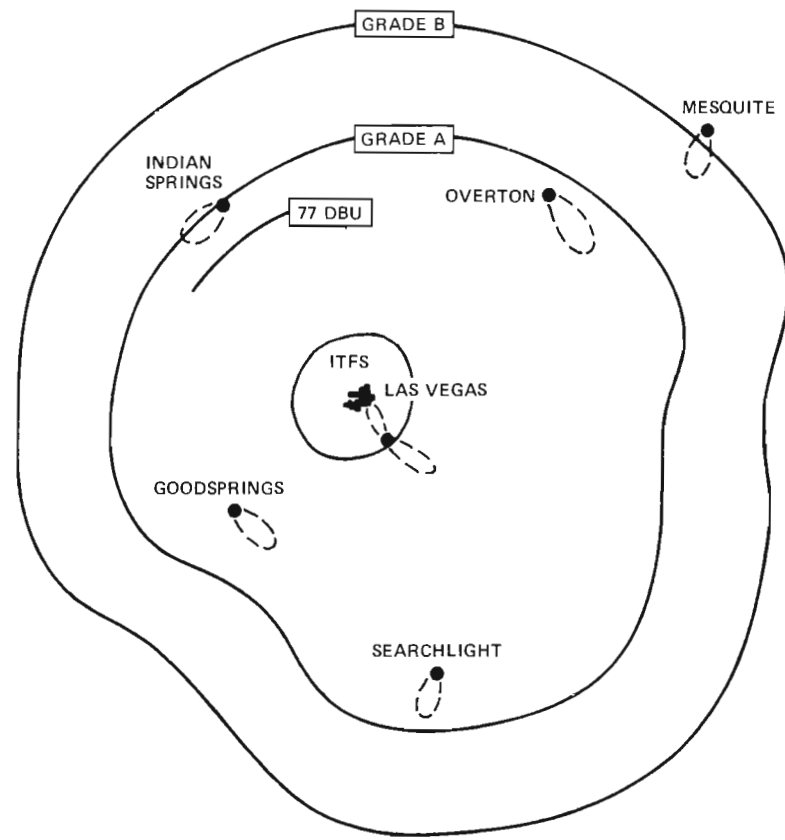


FIG. 2 Shows contours of KLVX; the ITFS system for the Las Vegas Valley; and the locations of the five translators covering the rural sections of the County.

FIG. 3 Drawing shows the typical school television reception and distribution system in each school in the county.

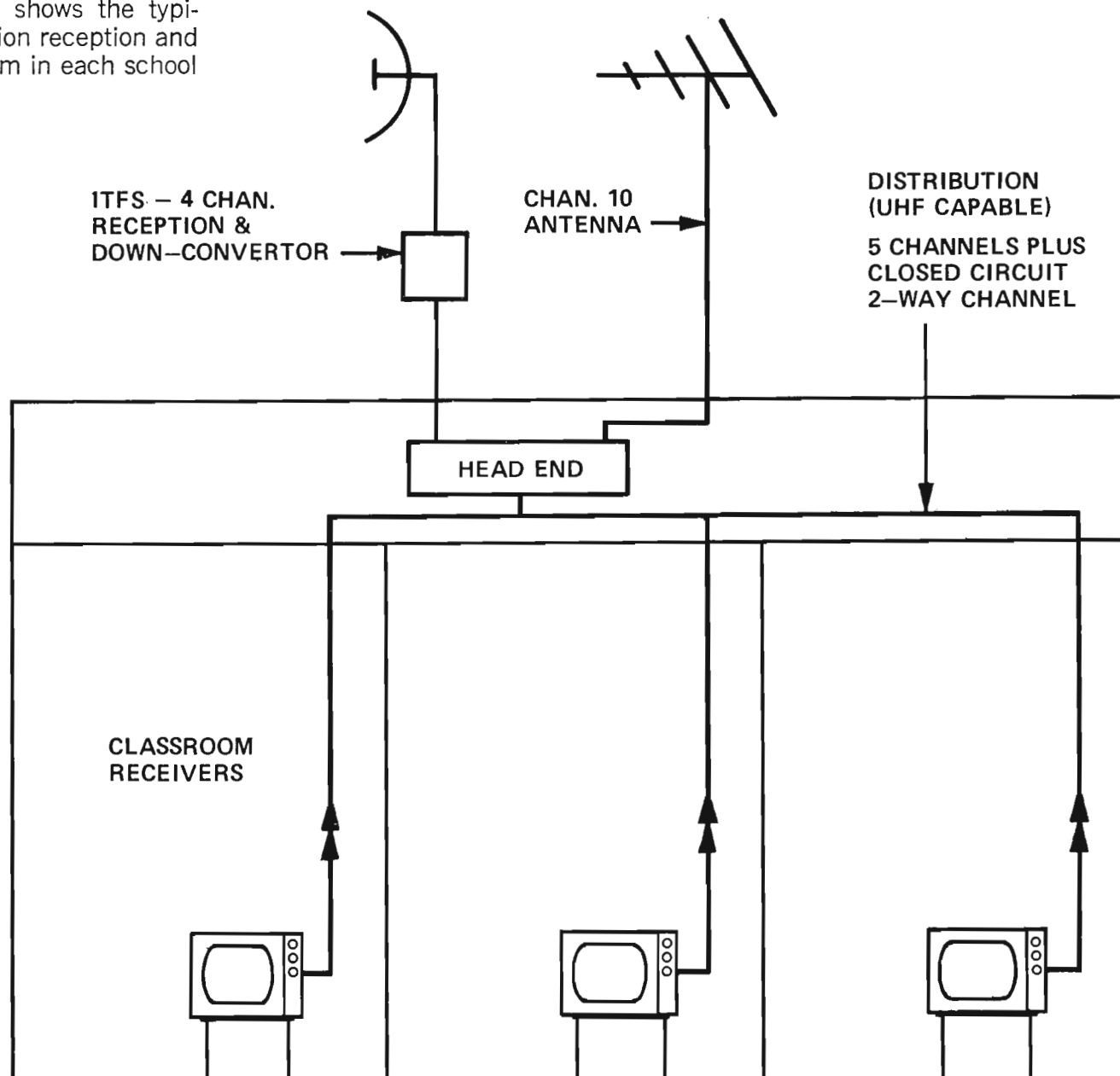




FIG. 4 View from control room into the studio during the taping of a lesson in Art for the elementary grades.

FIG. 5 TV rehearsal of a High School Choir for a special program presented on tape during the Christmas season.

in each of the 24 Junior and Senior High Schools in Clark County. Each of these high schools has also been allotted money to purchase equipment for a modest sized studio—helical scan recorders, two viewfinder cameras, modulators, a switcher, and a timer for taping off-air programs as desired. Each H.S. can thus produce its own ITV programs as well as receive programs of interest produced by other schools.

### Programming

For the first eight months of operation, KLVX broadcast only in the evenings, utilizing NET tape and film programs primarily, plus some live local interest programs. In October of 1968, KLVX began daytime broadcast of instructional programs to the elementary

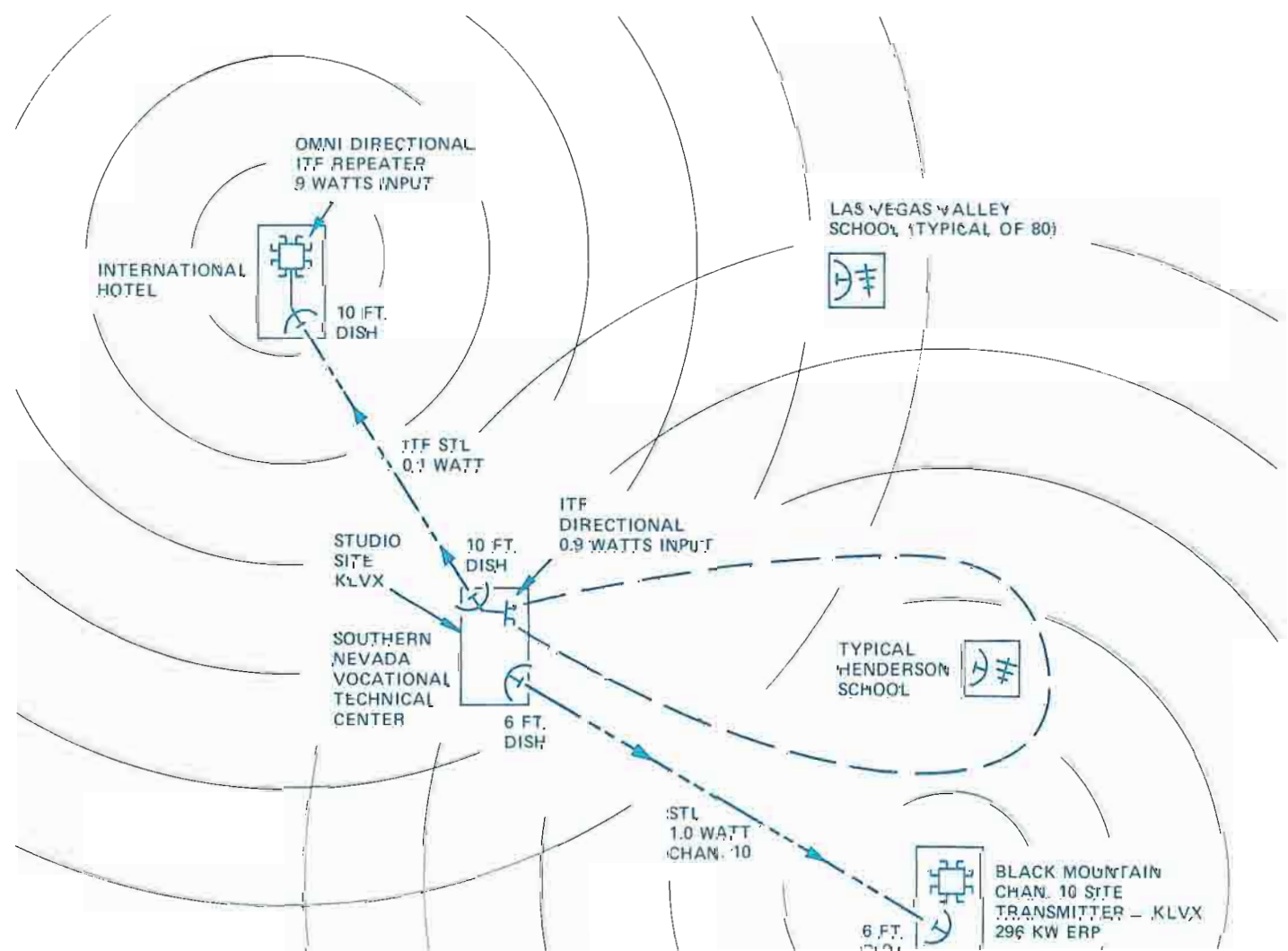


FIG. 6 Clark County School District RF transmission system (exclusive of translators). Programs originate from studio in the Southern Nevada Vocational Technical Center, are beamed on a STL link to KLVX transmitter. An STL link is also beamed to the four 2500 MHz transmitters on the Mint Hotel. A separate ITFS transmitter beams the signal in a directional pattern to the Henderson area schools.

schools in the areas of mathematics, art, science, music, etc.

In the present planning, almost all instructional broadcast programming will be aimed at the elementary schools. TV programs, as such, will be developed in coordination with the on-going curriculum process in the district. If the curriculum task force identifies an area or objective which can best be met by the use of television, such programs will then be developed to meet that need. In Las Vegas, television will be an adjunct to the classroom teacher and is not expected to replace the teacher in any way.

### Plans Become a Reality

When the project began, Nevada was one of the three states without ETV. Applications for a construction permit for channel 10, and for a Federal grant under PL 87-447 (Educational Television Facilities Act), were submitted in June 1966 to FCC and HEW, respectively. Both applications, submitted on behalf of the Clark County School District Board of Trustees, were approved in February 1967.

Specifications were written for building construction, and for transmission and studio equipment to be supplied on a "turnkey" basis. The transmitter was to be installed on the Black Mountain site in Henderson, Nevada, and the studio in the new Southern Nevada Vocational Technical Center in Las Vegas. After considering proposals from various companies, RCA was awarded both the transmitter and studio contracts.

The transmitter, tower, and antenna were hauled up piecemeal by 4-wheel drive vehicles and caterpillar tractors, then installed on the site. The studio control equipment complex was delivered assembled in rack and console sections, fabricated and pre-wired in the RCA Burbank, California plant. This equipment needed only to be interconnected by local labor under the supervision of the RCA engineer assigned to the studio project.

### Studio Area and Cameras

The studio area was formerly a 30-foot wide hallway never intended for television use. But walls were treated with fiberglass sheets, a false ceiling removed to gain height for a lighting grid, and the exposed roof insulated and treated. As a result, the former hallway evolved into a fine studio facility with excellent acoustics. Quartz lighting was then installed with enough capacity for future color productions.

In the studio are three TK-60 cameras, a modern 4½-inch image orthicon design. In operation they have proven to be very stable, producing high quality monochrome pictures for taping. They will be used until such time as color cameras are available.

### Tape and Film

Program taping is handled by four recorders: one high-band color TR-50, two TR-4C's, and a mobile

FIG. 7 Drawing shows efficient layout of the studios, control and telecine rooms, and offices.

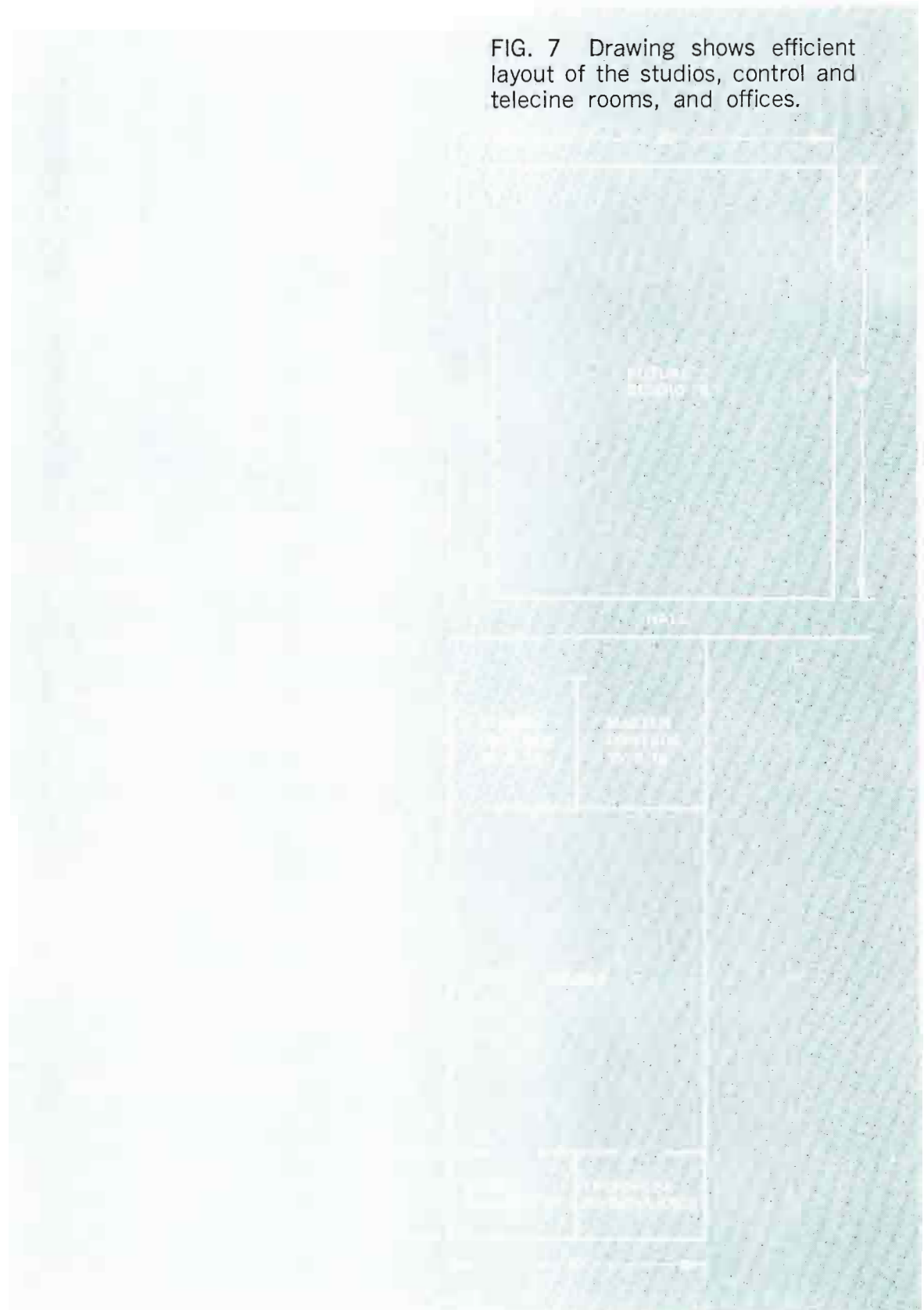


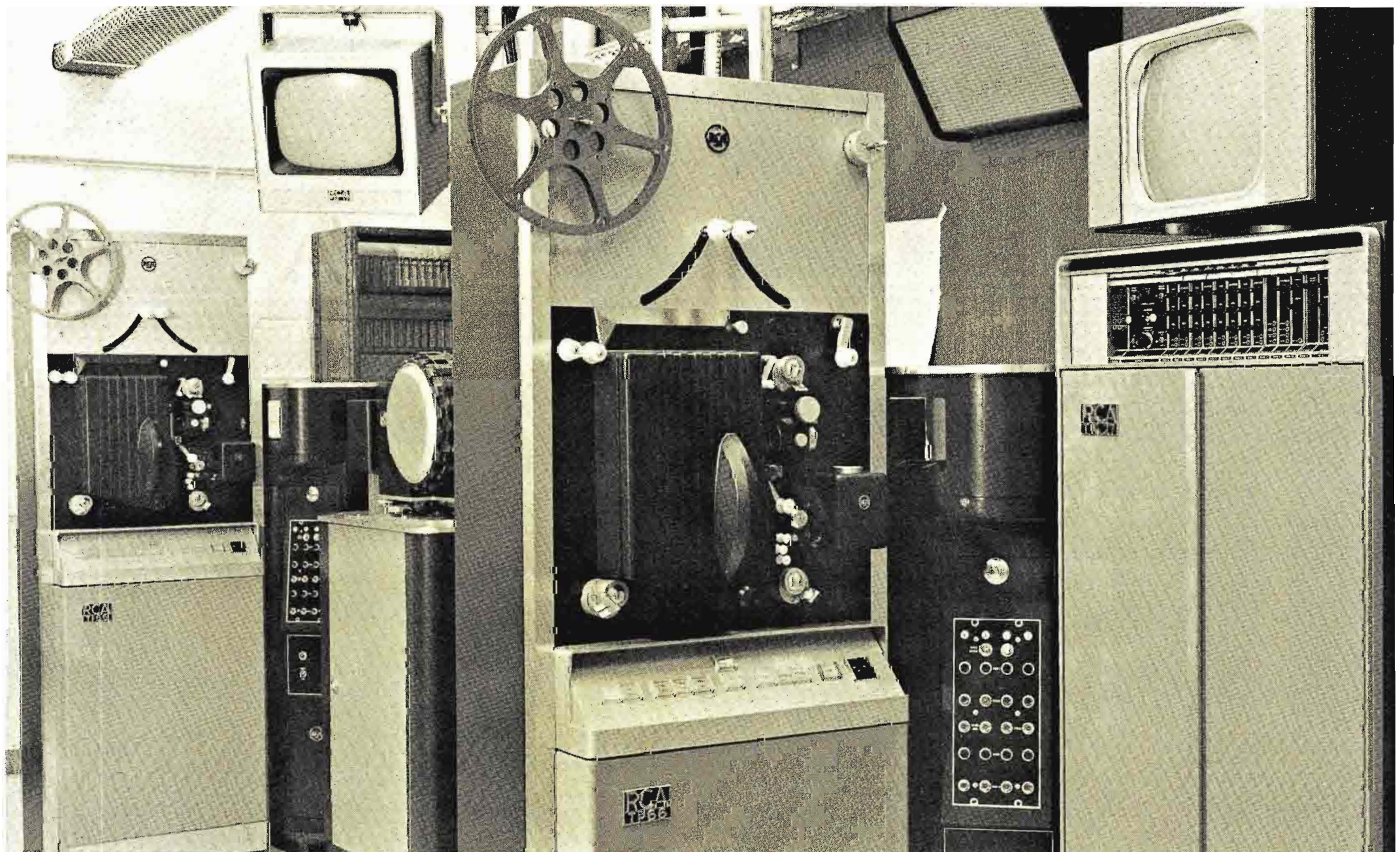
FIG. 8 Studio engineer checks the playback of program on the TR-50 highband color recorder. To the right are the two TR-4 recorders. Not shown is the TR-5 mobile recorder used both in the studio and their mobile van.





FIG. 9 Bill Hought, left, engineer and Jim Horky load the station's TR-5 mobile recorder into the TJ-50 field unit preparing for a tape remote.

FIG. 10 Telecine room equipment includes a TP-66 projector and TK-27 color film camera, and to the rear, another TP-66 with a TK-22 monochrome camera and TP-7 slide projector.



TR-5. Dropout compensation and electronic splicing accessories are used. The TR-5 when used in studio service, is aired by passing the output signal through an external rack-mounted processor which is easily disconnected for use when the recorder is needed for remote pickups in the station's mobile unit.

The Telecine Room contains two multiplexer islands, each with a TP-66 projector equipped for optical or magnetic sound, a TP-7 slide projector, and a film camera. One film island has a TK-22 monochrome camera, the other a TK-27 color film camera. Future space has also been planned for additional cameras and projectors.

### Terminal Equipment

Terminal equipment for the system is housed in six racks facing front-to-front in two rows with sufficient area for future expansion. Cabling is overhead in wiring trays. This was both the preferred and most economical way to utilize space in the existing room.

Synchronizing signals are provided by two TG-3 generators with changeover and pulse distribution amplifiers. Color standard, grating and remote signal processor modules are installed. A 10-position video, audio-follow monitoring system is rack mounted to see or hear signals from such sources as film, tuner, STL video, master control or studio line.

A signal generator provides test signals to the three switching systems. The video patch panel is constructed with self-normalling jacks, and provides complete access to all equipment. Video distribution, using TA-34 one input-four output amplifiers, routes signals to all locations. Spare units are installed for standby and future expansion.

### Studio Control Room

The studio control room contains the TS-40 switching system with 13 inputs, including black burst. The switcher can handle the four tape recorders, film cameras, live cameras, and a test signal plus spare inputs. Switching can be either with synchronous or non-synchronous signals. Automatic sync-adders are included, as well as non-additive mixing and multiple effects provided by the TA/TE-60 special effects unit.

A 10-channel BC-7 audio console mixes all video-tape, film, reel tape and cartridge tape sources, plus 15 microphone inputs. Two reel-to-reel audio recorders are available, one rack mounted and one in a mobile console for use in other areas. A turntable and a cartridge tape recorder are used to produce the station's I.D.'s and promotional spots. Remote panels are provided for audio tape machine control.

### Master Control

The master control console was planned for operation with minimum manpower—short of automation. All necessary controls are within easy reach so that one man can control all TV tape machines, film and slide projectors, announcements on cartridge or reel tape,



FIG. 11 Bill Spencer, studio engineer, loads film on TP-66 projector.

FIG. 12 Compact arrangement of studio controls showing audio operator at the BC-7 console, and video operator at the TS-40 switcher.



or switch a simple live program. The design of automatic level circuits in the film cameras, audio-follow video switching, and AGC amplifiers make it possible to operate smoothly.

All master control equipment is assembled in seven in-line console sections with the exception of a ceiling suspended color monitor which is an ordinary 25-inch quality receiver modulator driven by line or tuner video. Most of the components are standard, but the switching and 2500 MHz audio control panels were custom made, and the BC-9 console for Channel 10 audio was modified into two sections for console-mounting.

The camera controls for the three TK-60 live cameras occupy only one console section in which there is also an oscilloscope and a picture monitor switchable for camera matching and level control. The Channel 10 switcher has an A and B preview bank, and uses the TA-60 non-additive mixer for inserting visual ID's without disrupting the program in progress—often over an hour on a non-commercial channel.

The two switching panels control 5X1 and 3X1 PTS-1 modules assembled in a 13 input, 8 output system. Momentary pushbuttons actuate PRF relay frames which, in turn, control crosspoints for video and provide audio-follow for all switching. The 2500 MHz switcher shares the 13 inputs with the Channel 10 system, and has five outputs, four to the microwave transmitters, plus a preview output. This switcher is essentially a routing switcher for the programs on film and tape, which are directed to schools only. The five outgoing audio feeds to the five transmitters (four 2500 MHz and one 7000 MHz STL) are leveled by AGC amplifiers and monitored by headset or switchable monitor amplifiers.

### Transmitter

The TT-25EH transmitter, with its 76-foot TF-12AH superturnstile antenna on a 100-foot tower, was in-

stalled on a mountain site shared with the Channel 5 commercial station. This location is 1200 feet above average terrain and permits good coverage not only of Las Vegas, but also Henderson and Boulder City.

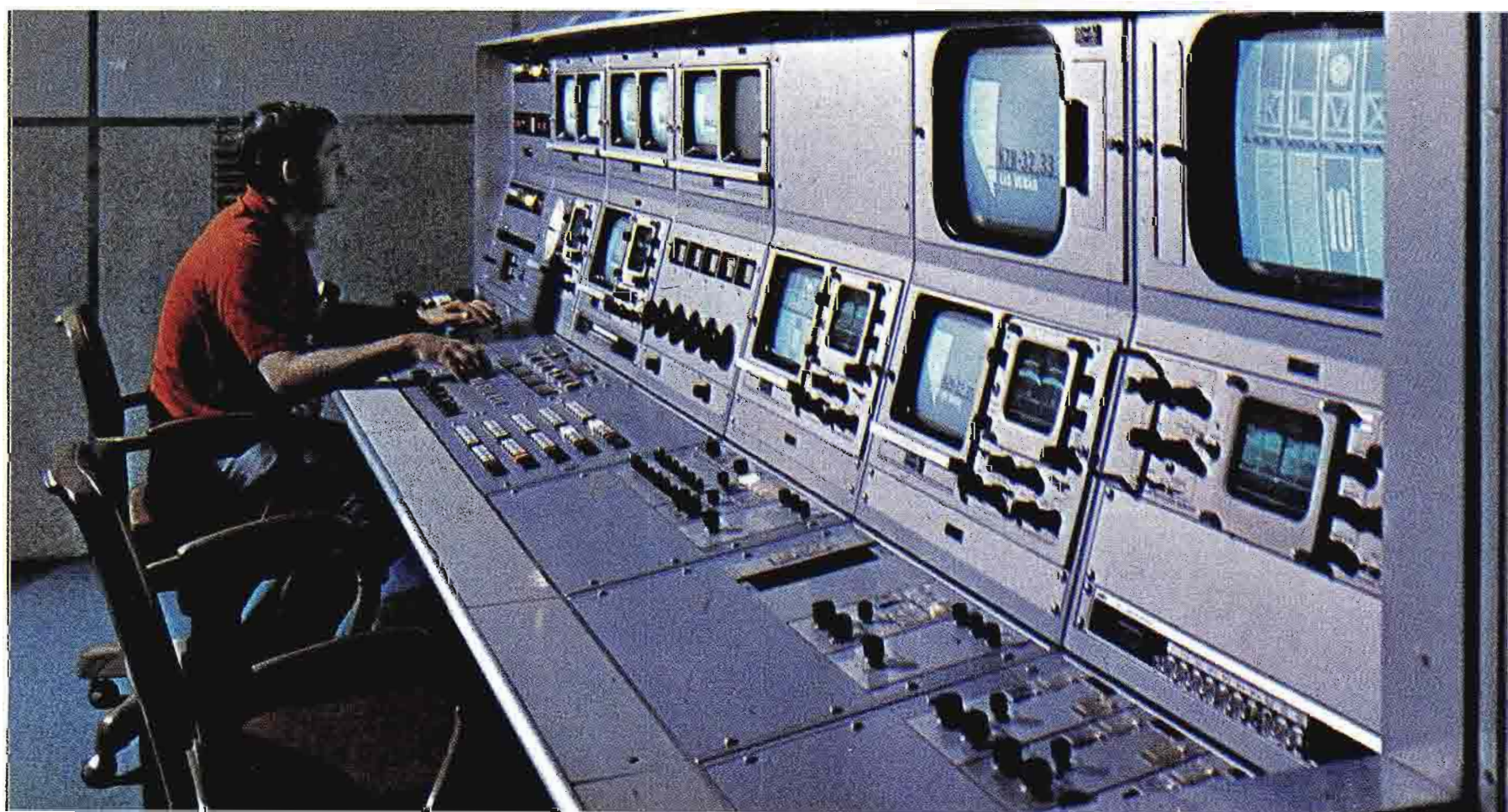
The transmitter building is air-conditioned to handle outside temperatures which on occasions reach 120 degrees. Two systems are employed, one to cool the transmitter air intake, one for operating areas. Diverted equipment heat and electric space heaters take care of winter conditions, when the temperature may fall close to freezing in the early morning hours. All input equipment is solid state, including the TVM-6 microwave receiver, stabilizing amplifier, audio and video amplifiers, and limiter. A sync generator, video test generator, and a TK-21 vidicon camera permit transmitter origination of test signals.

### 2500 MHz ITFS System

A unique feature of the Clark County project is the potential of the four additional low cost, low power microwave channels. Almost all school districts and communities with ETV are limited to one VHF or UHF channel. The combination of these four Instructional Television Fixed Service channels and KLVX should take care of multiple program needs and scheduling problems far into the future of the rapidly growing Las Vegas area.

Both the ITFS and VHF systems will share all studio facilities. Four one-watt originating transmitters, to be located in the telecine equipment room, will mix and supply signals to two antenna systems. One antenna will beam programs directly to the Henderson area schools; the other will divert part of the radiated power for a STL to four 10-watt unattended repeaters on the top of a new high-rise hotel. From there the programs will be retransmitted in an omnidirectional pattern to all of the 88 schools in the Las Vegas area.

FIG. 13 The master control was designed for operation with a minimum of manpower. Shown operating the switcher is Hal Hickman, former Project Director for "Project Innovate".



### Plans For Color

All equipment was purchased with the eventual intent of going to complete color capability. The tape recorders can be colorized up to the high-band mode; the monochrome film camera could be used as a transmitter source of stand-by programs when replaced by a color system; when live color cameras are installed in the studio, the monochrome I.O.'s can be moved to the mobile unit to replace the TK-30 types. All other transmission, lighting, projection, switching, and terminal equipment is now state-of-the-art, ready for full color.

### The Future

Much credit must be given to the School Board of Clark County for its decision to use the finest quality equipment to provide the community with Instructional and Public Television service. Although Federal assistance was obtained in the amount of \$400,000,

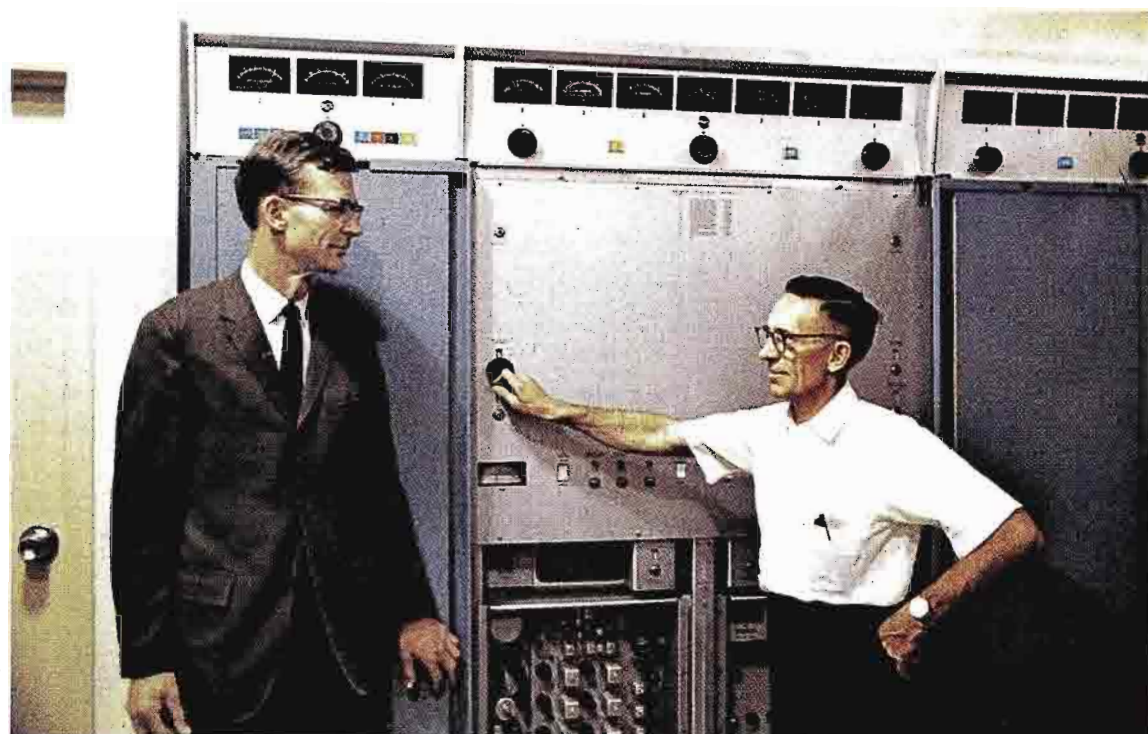


FIG. 14 Ev Carner, transmitting engineer, and Chief Engineer Al Ribas discuss adjustment of the TT-25 transmitter.

most of the project money (\$1,200,000) was appropriated out of school bond funds.

As a member of NET, KLVX can now broadcast first-rate programs on tape and film, and, in December, 1968 was interconnected to Network Microwave to provide live programs and interchange, including the experimental Public Broadcast Laboratory. With eventual full-color capability and live interconnection, the Nevada operation can join the commercial services as an equal but different type of television.

In its other major role of an Instructional Television Service, the four ITFS channels can provide the school system and the classroom instructor with the potential enrichment of library and locally produced programs and courses at all school levels, including the University. In Las Vegas there is the firm belief that instructional television will become a very important, if not the most important, tool the teacher can have in the foreseeable future.

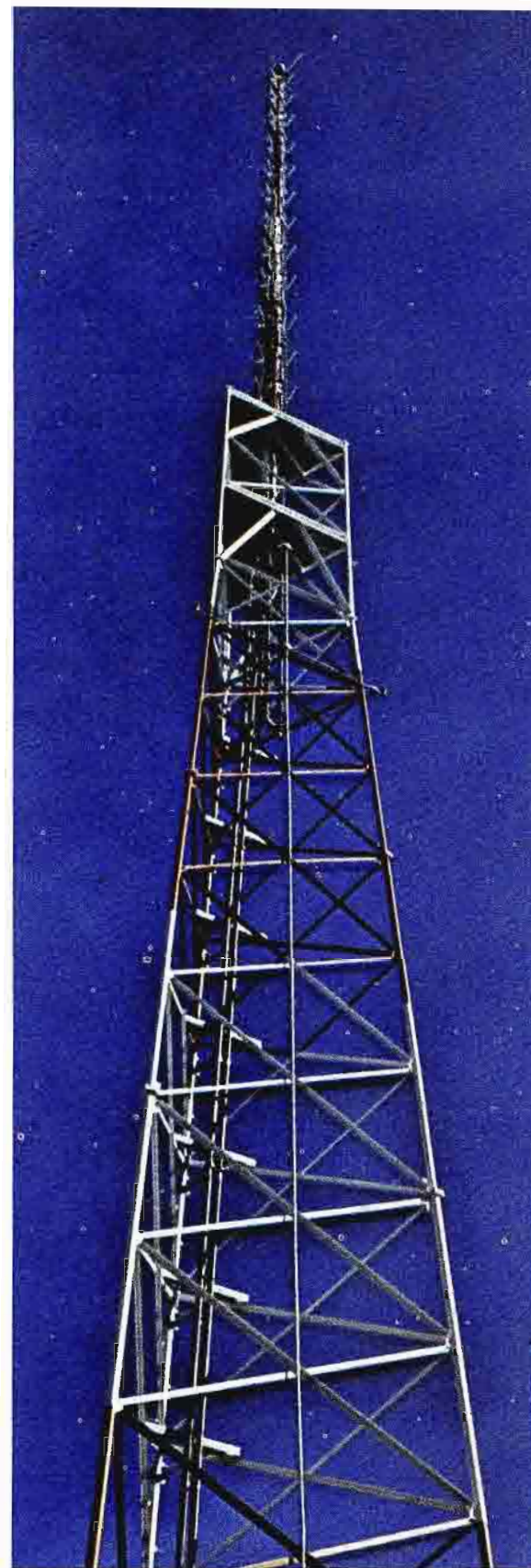


FIG. 15 The TF-12AH superturnstile antenna tops the 100-foot tower on Black Mountain—1220 feet above average terrain. This is also the site of KHBV, the Channel 5 commercial station.



FIG. 16 Each classroom can plug into the school's distribution system to receive VHF or 2500 MHz instructional programs.

# WCAU-TV CREATES AN OUTSTANDING COLOR TELEVISION CENTER

Back in 1933, when WCAU moved into its new base in downtown Philadelphia, someone wrote that this—generally regarded as the first building designed exclusively for radio broadcasting—was “an example of what can be done in the way of building an ideal broadcasting station, sparing neither expense nor effort to accomplish the highest perfection in keeping with the most advanced knowledge of the art.”\* In 1952, WCAU (and WCAU-TV) again made history when it took up residence in its present 100,000 square-foot building situated on an 8.75-acre site at the intersection of City and Monument Avenues. The new horizontal plan represented a break with traditional architecture and established a precedent in the design of radio and television production centers that has continued to this day.

A modernization program was recently concluded in which WCAU-TV again exhibited the same kind of leadership—this time in color television. The station was designed with careful attention to “human engineering”: centralized operations and specialized areas promote efficiency. Equipment selection and arrangements create a color television center that gives advertisers and production people fast action and finest pictures for programs and commercials. By using automation during station breaks, the operator is freed from the task of manual switching and is able to concentrate on touching up audio or video from whatever source while on-air.

## To Revamp or Construct?

The decision is seldom an easy one when facing the question: Whether to revamp the existing building or to construct a new one. But with WCAU-TV, the solution was relatively simple since its steel “I” beam building had neither supporting walls nor outmoded architecture. It lent itself very readily to modernization. Furthermore, the 100,000 square-foot area was

\* BROADCAST NEWS No. 7, April 1933, p.2.

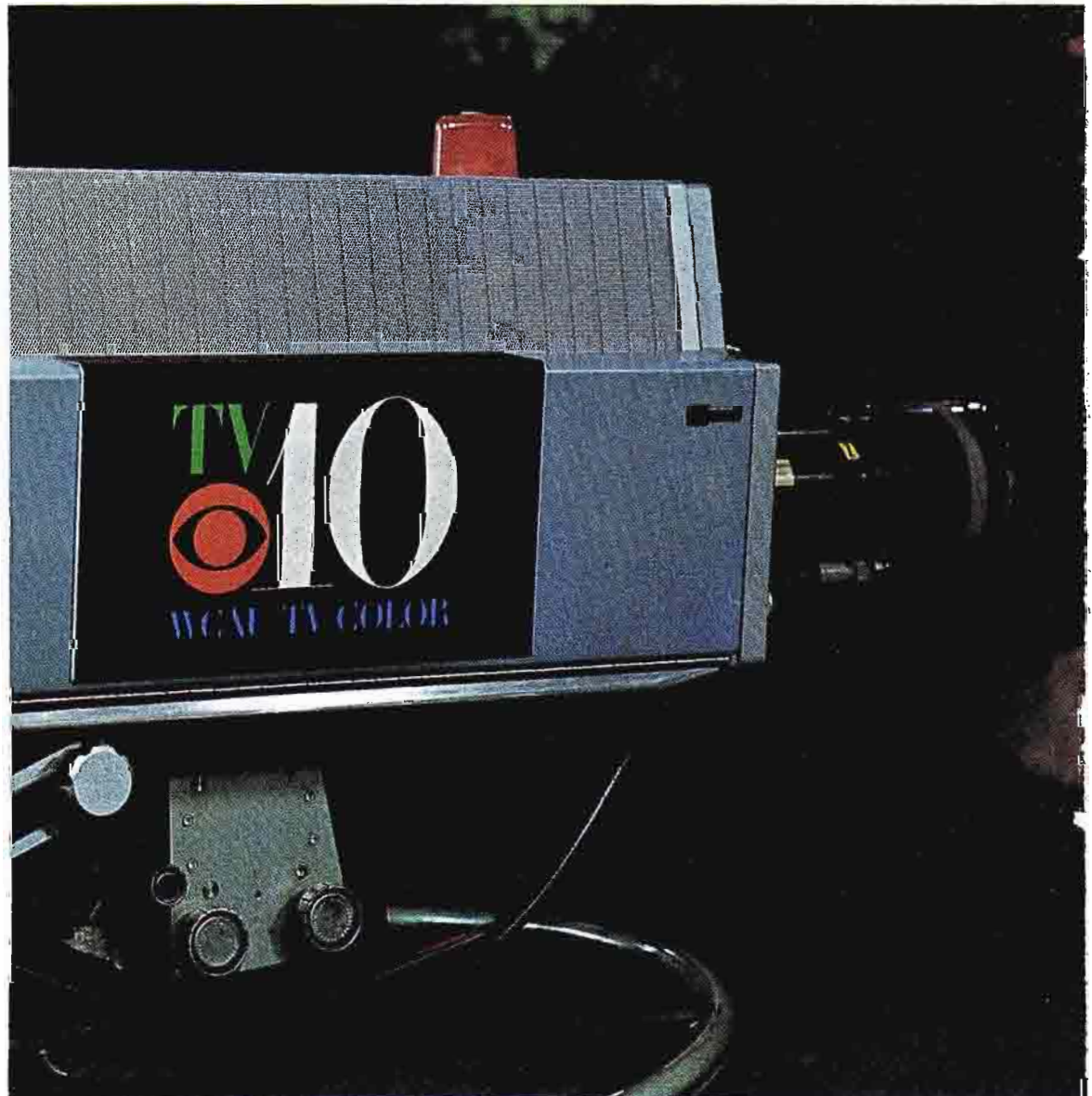






FIG. 1 At City and Monument Avenues in the Philadelphia area, the WCAU-TV building houses a most modern television broadcast center.

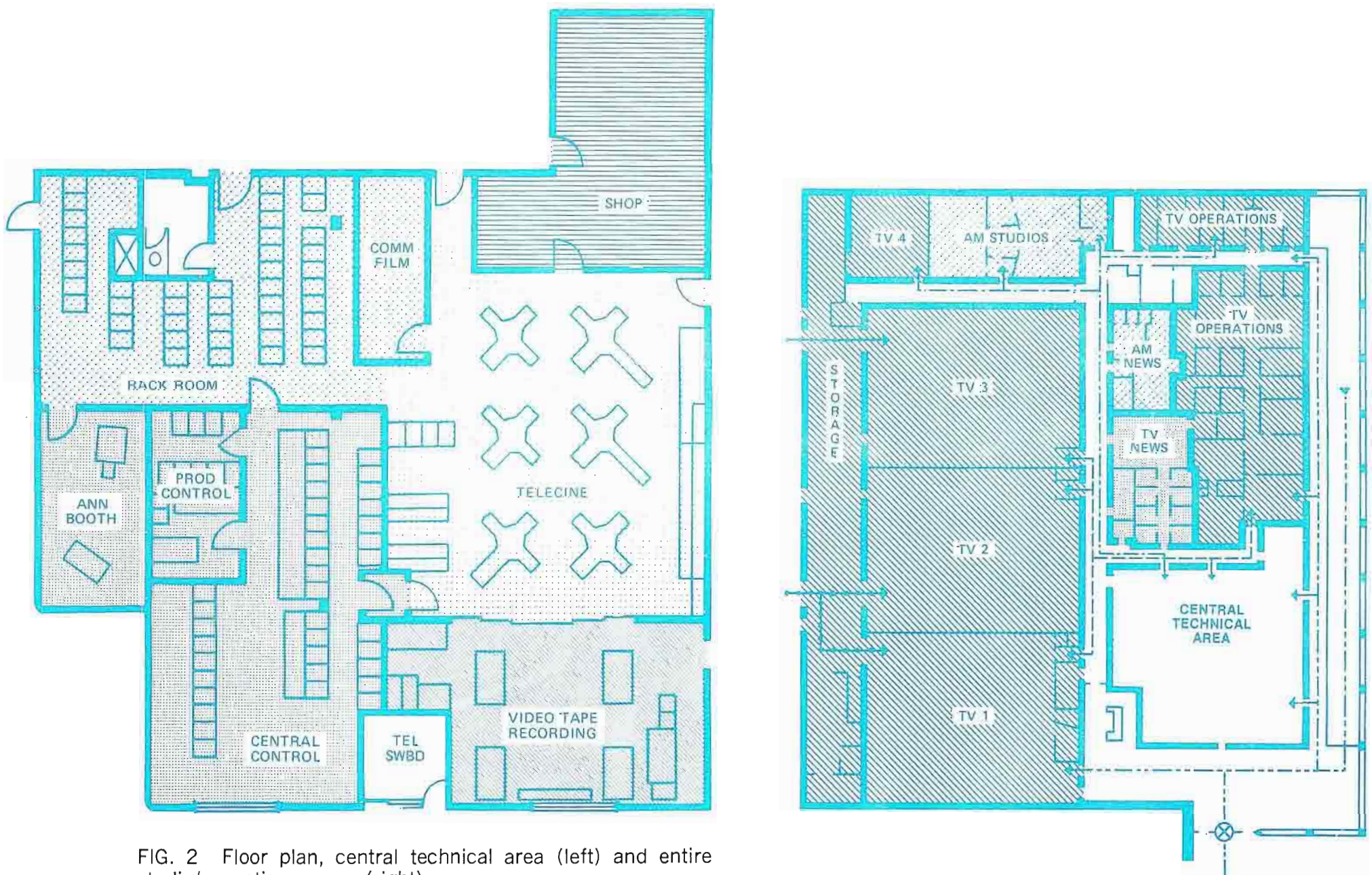


FIG. 2 Floor plan, central technical area (left) and entire studio/operations area (right).



FIG. 3 Telecine consists of six color film islands. Each is multiplexed with two 16mm projectors and one 35mm slide projector.

more than adequate. By modernizing, however, it was not the intent of CBS\* merely to replace obsolete equipment; rather, to design an entirely new color television center, incorporating a new philosophy of operation. The entire plant was re-designed to these CBS specifications.

### Design Goals

Chief objectives of the re-design were to achieve greater efficiency and flexibility of operation, enabling the station to do more things in production of programs and commercials and, at the same time, reduce overall operating costs. For example, the studio operating area was developed in a manner that would lend itself quickly to the requirements of the Program Department, without time-consuming rearrangements. A small production studio/announce booth with one camera was set up exclusively for news bulletins, updates, simple commercials or auditions. Two larger

\* In 1958, WCAU-AM, WCAU-FM and WCAU-TV were purchased by the Columbia Broadcasting System, Inc.

studios are always ready for a two or three-camera production, and can have up to five cameras (with equally extensive support facilities) for special broadcasts. Two studios can be "tied together" for super productions. With such expansive facilities WCAU-TV can be simultaneously rehearsing in one studio and producing in another—while on-air with network programming.

### Other Decisions

Following the basic decision to modernize within the existing building, many other important decisions had to be made: (1) size of completed plant; (2) number of studios and control rooms; (3) equipment in each, and (4) number of people required in each location of the new plant.

The most difficult problem encountered was to remain in the same area of the building yet completely modernize the technical facilities while "on air." The only practical approach was to build a temporary control room and move the workload into that area

FIG. 4 Videotape room —all recording, playback and editing are accomplished here.

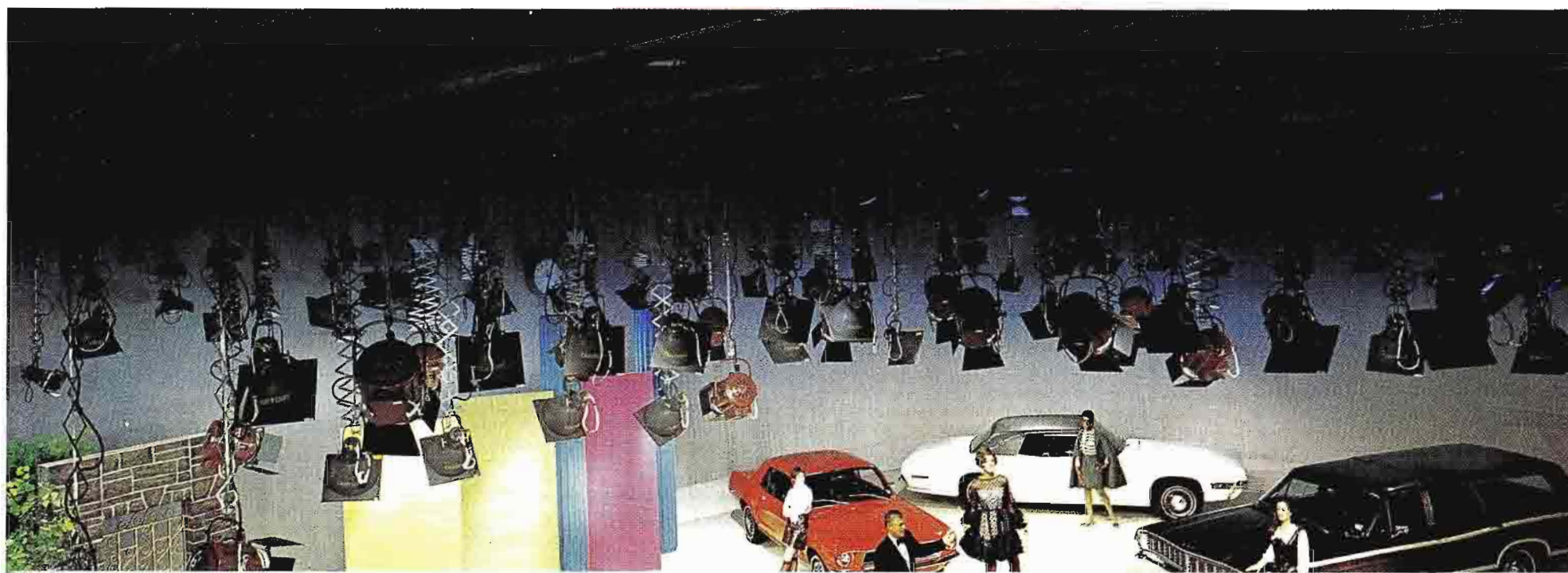


FIG. 5 New lighting system employs prewired raceways, SCR dimmers, and pantographs on most fixtures.

in order to relieve the regular operating areas for modernization. A PERT Chart was prepared, setting dates for all important moves so that the scheduled completion date could be met.

### Developing Plans

WCAU-TV planned to modernize two studios (No. 2 and 3), including control rooms; to design a completely new Central Technical Area, and to physically arrange for an efficient operation. For example, the workload swings heavily between film and tape. The film and tape rooms were planned to be separated by a rolling glass partition. Thus the two areas became one, with men helping each other during peak loads, yet the two areas can be acoustically separated when recording or editing could cause confusion. The new Central Technical Area was established to contain all rack-mounted equipment not physically required within operating areas, yet remotored to these areas when required. This arrangement achieves considerable operating efficiency.

Other decisions dictated that WCAU-TV would have 6 film islands, 5 videotape machines and 8 live color cameras. Studios 2 and 3 would have new lighting and air conditioning systems to handle the increased heat load. Central Control would be equipped with remote controls for film and live cameras.

Before work started the PERT Chart revealed a very complex job of logistics to get all operating areas into their new location. A beginning was made by moving the maintenance shop to clear space for the proposed Central Technical Area, and for part of the new Central Control. The second move was to demolish the old master control and rack room. This would be the new VTR room. Since Telecine was to end in its original area, it was temporarily moved into the VTR area. A storage area was chosen to serve as a temporary control room and master control, using new equipment shipped in advance by the manufacturers. Incidentally, this gave operators and maintenance technicians an opportunity to become familiar with the new equipment. It also made the overall moderni-



FIG. 6 Studio control room—console contains 3-scene preset lighting control, video switching, director position and audio control (identical for two studios).

zation schedule possible and completely successful.

### New Lighting System

A completely new lighting system was designed for Studios 2 and 3. Pre-wired raceways were hung from a grid system 20 feet above the floor. Silicon-controlled rectifiers are used for dimming with a 3-scene pre-set console. Twenty dimmers are permanently assigned to Studio 2, 20 to Studio 3 and 20 are switchable between studios. This permits as many as 40 dimmers in one studio, while leaving a total of 20 in the other. (Note that each dimmer can handle a 12KW lighting load.) In addition, there are 15 direct switchable hot circuits in each studio.

Instead of the regular "telephone type" patch panel, a newly-designed lighting selector panel was chosen, using a sliding cross-bar system. Every outlet in each studio is numbered, likewise each slide has a corresponding number and may be put on any dimmer or hot circuit by merely selecting that circuit in a vertical plane. Pantographs on most lighting fixtures reduce the need for ladders. Studio lighting feeders tie through a transfer switch as backup in the event of a feeder burnout. Current meters are provided on feed-

ers in control rooms to monitor loads.

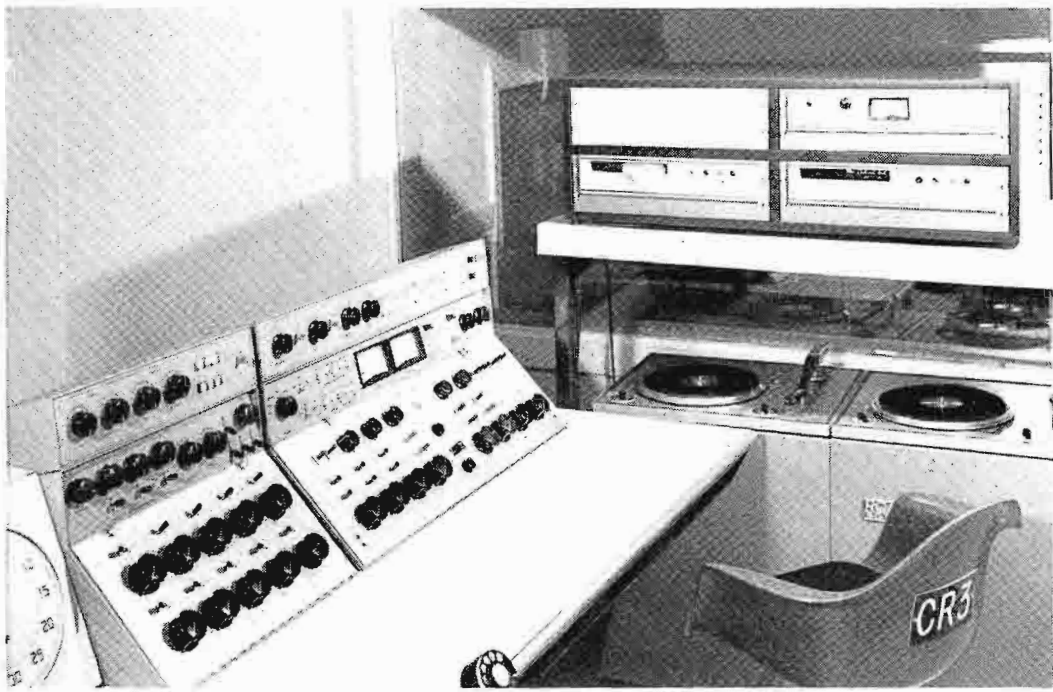
A special lighting console in each control room has been designed with provision to preset three separate scenes, using any of the 40 dimmers. It's a fast, effective method. Each scene bank has a master fader, and transition can be easily achieved between any two scenes. In addition, 15 non-dim circuits are always available on this console.

### Redesigned Control Rooms

Identical control rooms for Studios 2 and 3 are provided. Each studio control console has three permanent cameras and may receive two more from the assignment switcher. All film and videotape sources are available on each switching panel, as well as remote and network lines.

Cut-bar pre-set switching, providing a one-cell memory, is utilized. This encourages the director to request his next "shot" as he views it on the "pre-set" monitor—a "cut" call causes immediate reaction, reducing errors. Direct "on air" switching is provided via the line bus. Fading is also provided between pre-set and air, as well as a 50 percent non-additive mix and "insert"—all pushbutton controlled. A double

FIG. 7 Audio control position in studio control room.



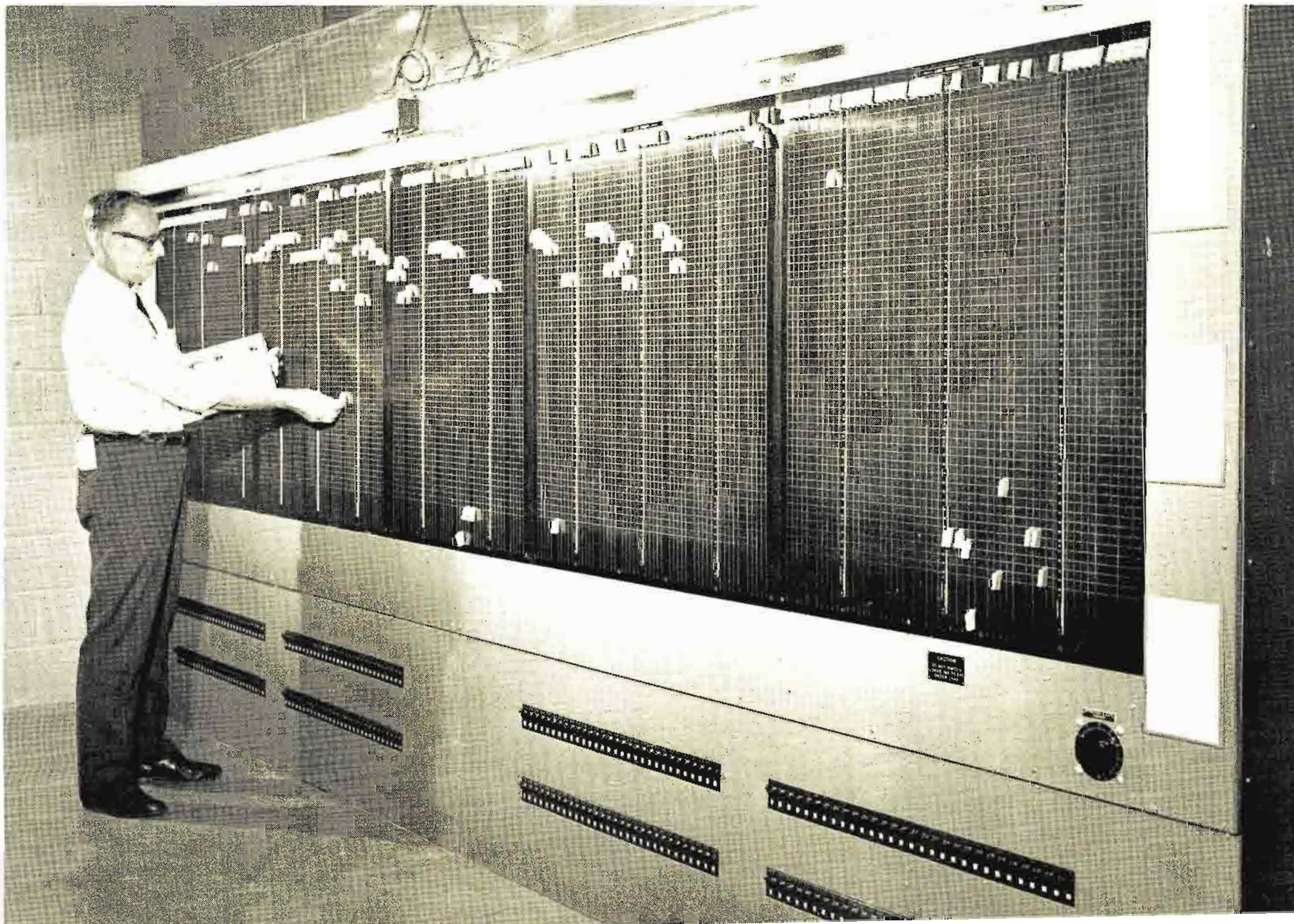
row of special effect inputs is installed which feed the special effects switcher. The special effects generator is capable of many patterns. A pattern positioner enables the operator to place an effect on any portion of the screen. The special effects generator and positioner can be switched on either the air or effects rows. Two preview rows feed monitors and the "matte" input of the effects generator. Preview switching inputs are always available for "on air."

The basic audio console is a 2-channel, 8-input mixer, modified to 3 submasters and expanded by 10 additional microphone inputs. One audio switching bus can be ganged with the air bus of the video switcher for combined audio and video switching. This combined switching can be inhibited for A-B rolls. Turntables and audio tape cartridges are provided. Reverberation, sound reinforcement and effects filters are available.

### Central Control

Very significant to a local station operation is the kind of flexibility that permits an operator to handle many diverse functions easily and accurately. Central Control, in WCAU-TV philosophy, affords this versatility. The CC console contains audio/video switching, an automatic programmer, remote control for network, announcer, 6 film chains, 5 videotape machines and 8 live color cameras. Grouping all 8 live color cameras together with two master monitors makes an excellent operational area for the video operator (or operators), should there be more than one

FIG. 8 Studio lighting panel—240 outlets on the lighting grid can be tied to any of forty 12KW dimmers or 15 "hot" circuits.



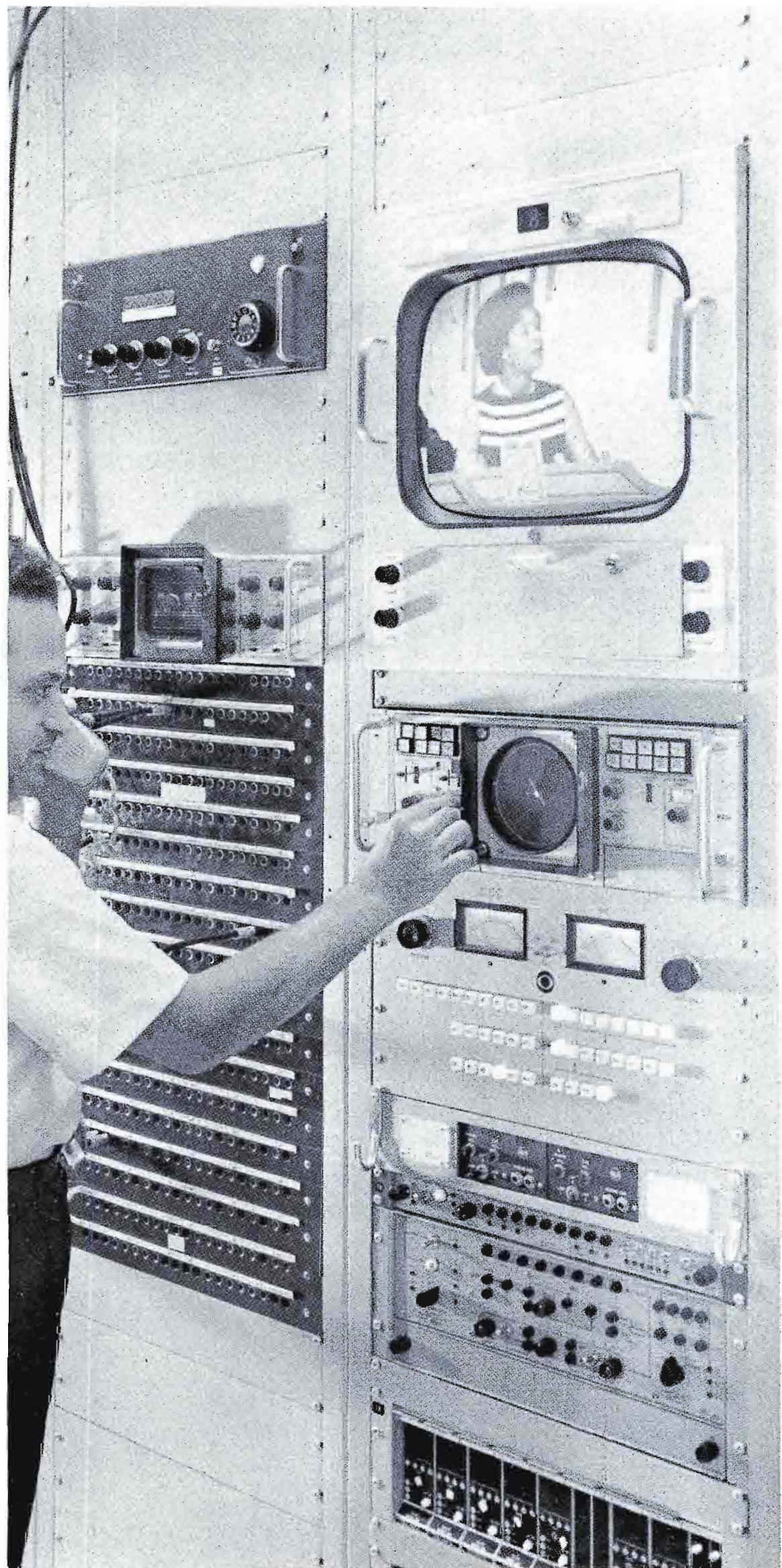


FIG. 9 Test monitor switching system helps locate trouble, check levels and quality—provides display on oscilloscopes, vectorscope, and monitors.

FIG. 10 Central Control—human engineering places all controls within easy reach of operator.

production in progress). To patch cameras to their desired studio outlets, a camera patch panel is available for increased flexibility.

### Input Switching

Cut-bar switching and fading are provided in Central Control. Preview switching, gen-lock control, as well as all start, stop, still and reverse controls for film and videotape are part of the input switching panel. All of these manual functions can also be controlled by the automatic programmer (except for gen-lock). A 4-channel 3-position audio push button switching system is provided: Channel 1 "switcher" (audio follow video); channel 2 and 3, audio cartridges and utility; channel 4, station announcer. Each channel can be put in a "full", "under" (adjustable) or "off" condition. The A/V switching system, as well as 4-channel audio mixer, is completely automated.

### Automation System

Today it is possible to automate many phases of station operation, such as switching, equipment assignment, writing of program logs, availabilities and billing. At the outset, WCAU-TV decided to automate the CC switching system, reserving other areas for the future.

The 30-event automatic programmer has been designed to hold approximately three station breaks of information. It automatically provides a pre-roll pulse for film (3 seconds) and videotape (7 seconds), without separate data input. It will switch or fade (2 rates) any video with audio, pre-select any of 60 slides and 20 audio cartridges. It can be started manually, by external cue, or clock time.

In the WCAU-TV system, each time the automatic programmer switches an "on air" event, a clock prints the time, to help in the preparation of the program log. By employing automation during station breaks, the operator is freed for the control of quality. He is able to touch up audio or video from whatever source while "on air." Thus automation relieves the operator, during the "panic period," from the complex task of manual switching—contributing to an error-free station break.

### Speeding Trouble Shooting

A test and monitor switcher is rack mounted in the central control room to set levels, check quality and help isolate trouble. (Incidentally, this switcher may

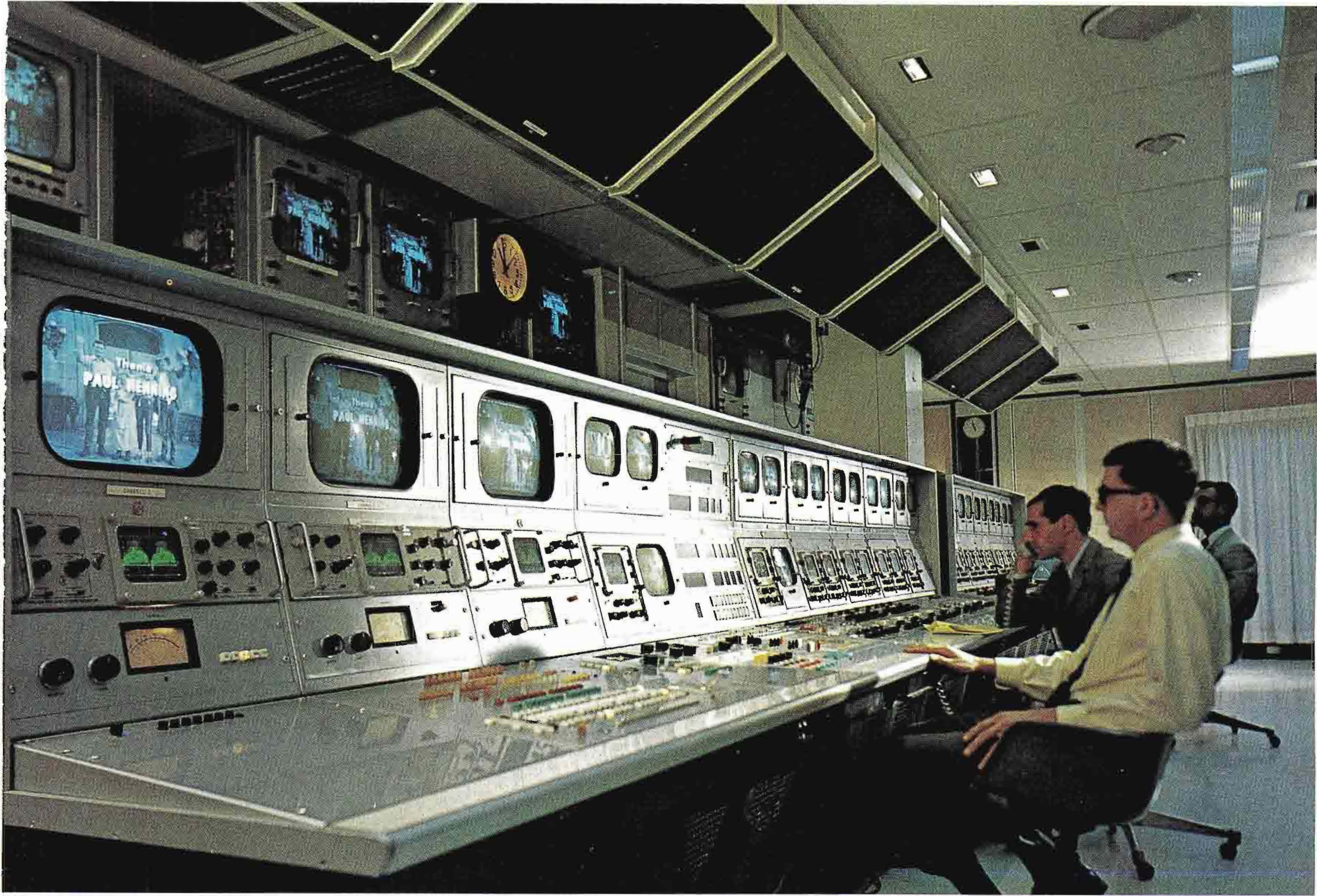


FIG. 11 Automation remote console—showing read-in panel, where program log information is recorded in memory for upcoming station breaks.

be used to place any source on air in an emergency.) Centralized audio and video patch panels are located in the Central Control rack area. Self-normalizing jacks are used, which relieve the need for normalling plugs. Sync generators and pulse distribution, audio and video test equipment (with distribution), and a 20-cartridge audio tape machine are also located in Central Control.

### Assignment Switcher

An essential feature of the new plan is the ability of studio control rooms, Production Control, or Central Control to perform as an operations center. In an emergency, Production Control can take over completely the Central Control functions. A delegate switcher was installed to automatically tie film and tape to any control area, giving that area complete control. For example, when a projector is assigned to an area, that operator controls still, start, stop, reverse. Automatically, upon assignment, the film camera or the videotape recorder gets the same pulses as the



area to which it is assigned. The control of this switcher is remoted to the film or tape machine involved and control of the switcher is also duplicated on the central control console.

### Production Control

The new philosophy conceived a Production Control Room for processing of program material—whether live, videotape or film. Its switching console accepts all sources available to any other control room, as well as studio outputs (which appear as inputs). It is designed for one-technician operation. It includes control of video, audio, start, stop (of film and tape) and control of one live camera. The net result is unusual flexibility in operation, freeing the studios for more profitable sessions.

### Production Studio/Announce Booth

A Production Studio/Announce Booth is located adjacent to the Production Control Room. It is 19 by 10 feet and contains one live color camera. It is very useful for news events, bulletins and updates. Occasionally, it is used for short commercials and auditions. Usually the live camera is left in this studio and the announcer can be put "on air" live within a few minutes. Air conditioning handles a 5kW lighting load. A ceiling grid is provided for lighting fixtures, and for hanging drapes, maps, charts and props. The

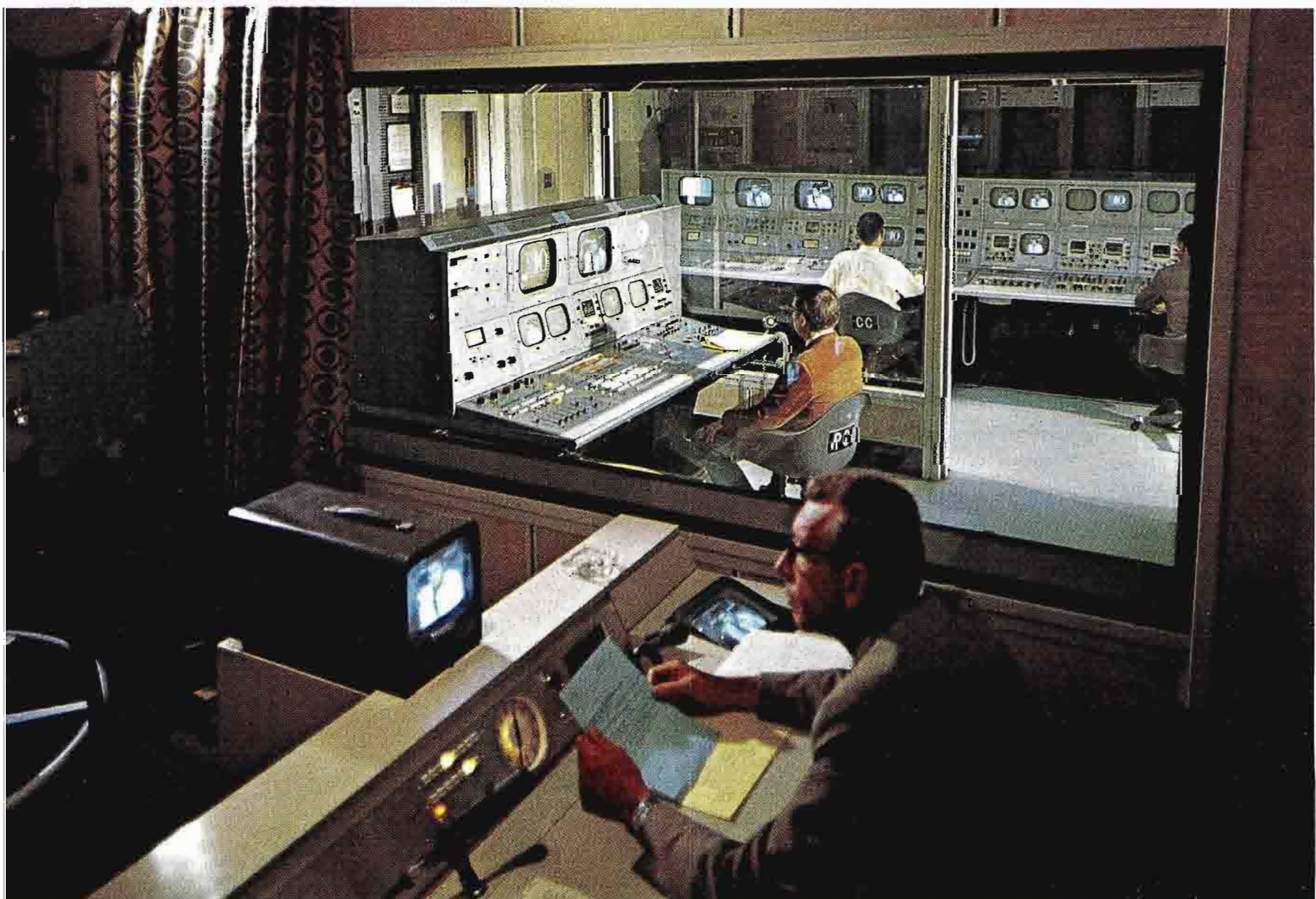
announcer's console contains two switchers, providing program cue, director's cue, and intercom to the studio with which it is assigned. Automation provides a digital readout display of "time available" when the announcer is in the "next event", "time remaining" when automation places him "on air."

### Centralized Electronics

The Central Technical Area houses equipment for control rooms, Production Control, Central Control, announce booths, Telecine and Videotape. Wherever possible, equipment was remote controlled to these areas. Forty-four racks house video and audio switching systems, amplifiers, power supplies, automation, talk-back switching and amplifiers, control units for film and live cameras, as well as spare microwave transmitters. Four empty racks provide for future expansion.

Many advantages accrue when major portions of electronic equipment are centrally located. Maintenance men need not travel throughout the plant when difficulties occur. Test equipment is always available. Downtime is substantially reduced, as unused equipment in adjacent racks may be borrowed to replace equipment requiring servicing. Further, the inventory of spares is reduced. Another equally important advantage is that it minimizes video delays. All video

FIG. 12 Announce booth—note visual contact between announce booth, Production Control and Central Control.





switching is done within a few racks, thus reducing the number of equalizers and amplifiers required. Having a rack room acoustically separated from the operating area eliminates blower noise from rack-mounted equipment which keeps the operating area conveniently quiet for audio monitoring.

### Technical Telephone Dial System

Intra-building communications is of utmost importance. Urgent calls must get thru (a busy signal often can be very costly). Therefore a special "no busy" technical dial system was installed. For quick identification all technical telephone are gray in color and have a number starting with #1. Calling a busy party merely makes it a conference call and an urgent message can override the conversation. Although a technical telephone can only be called by another technical telephone, a person using it may dial any other telephone in the building. This system services all technical areas including its management personnel. Off-premises stations include the transmitter and the telephone company.

### Emergency Power

Both studio and transmitter buildings receive power from two separate substations. In the event of power loss at the studio building, automatic switching will

transfer the technical load to the alternate feed. A loss of both feeds will automatically start a 600 KW emergency generator and transfer the technical load. Transferring the building load to the generator is a manual function, as is the return to normal power. A 175 KW generator automatically supplies the emergency requirements at the transmitter.

### Training Technicians

Before any work started on the modernization program, a rather extensive training program was put into effect. Men were relieved of their regular operating duties and permitted to work with the new equipment as it arrived. A mock setup was temporarily installed, using the automation unit. Although it did not actually operate equipment, this gave the technicians an opportunity to "load" the automation unit and become familiar with operation. Long before the automatic programmer was put into service, it became apparent the station program log had to be changed considerably to be used with automation. These changes were put into effect before the equipment was permanently installed. By the time automation went into service the entire staff of technicians was eminently qualified. Each person was afforded proper training in the operation and maintenance of all the new equipment. Several sessions were set up with

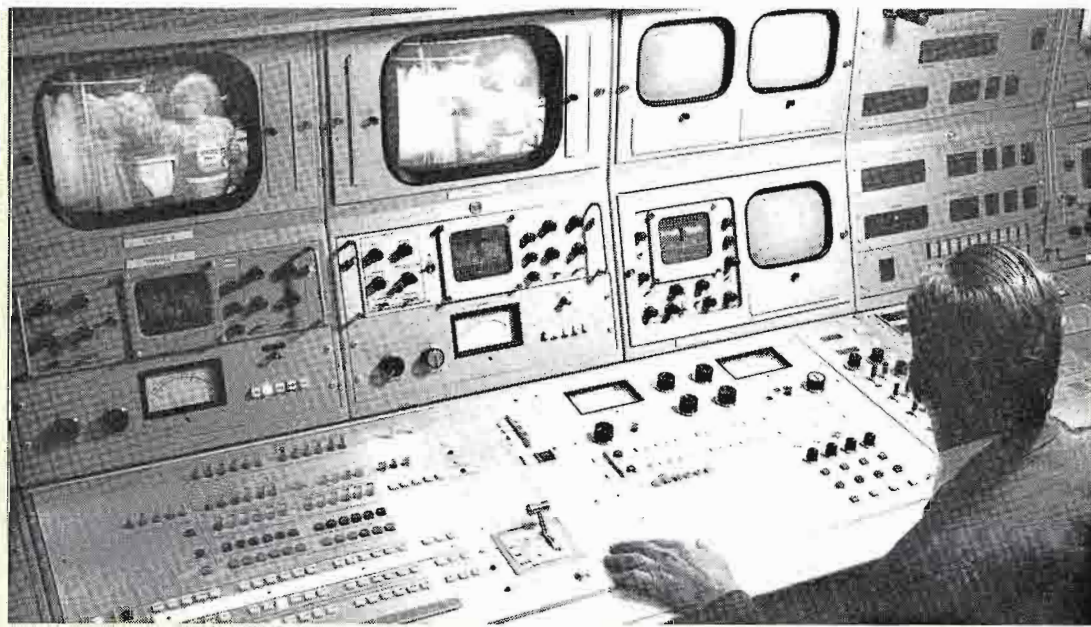


FIG. 13 Remote panel—for control and assignment of videotape, film and network.

FIG. 14 Video and audio switcher includes machine control of film and videotape.

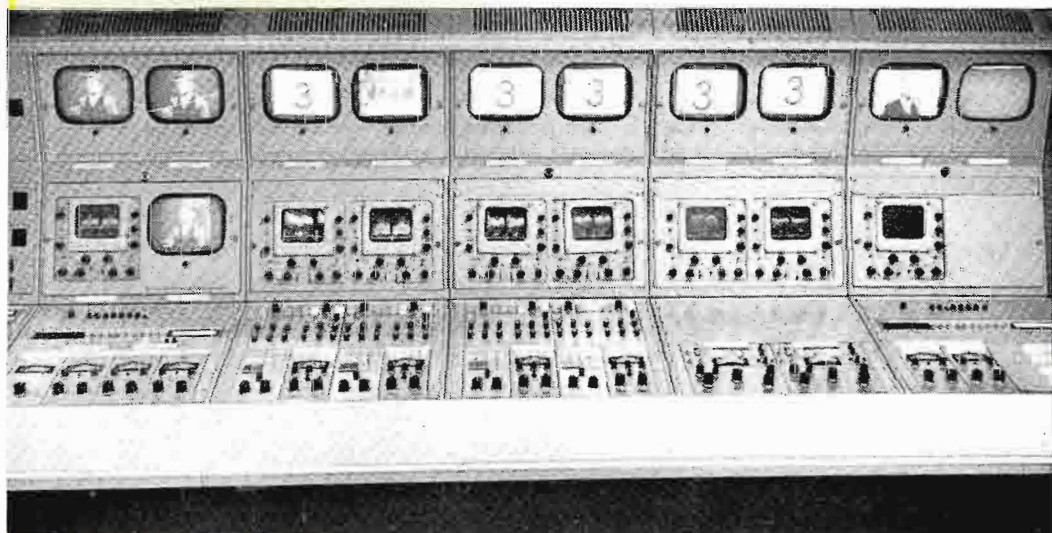


FIG. 15 Live camera control for eight color cameras; with studio output monitors, and two color camera match-monitor switchers.

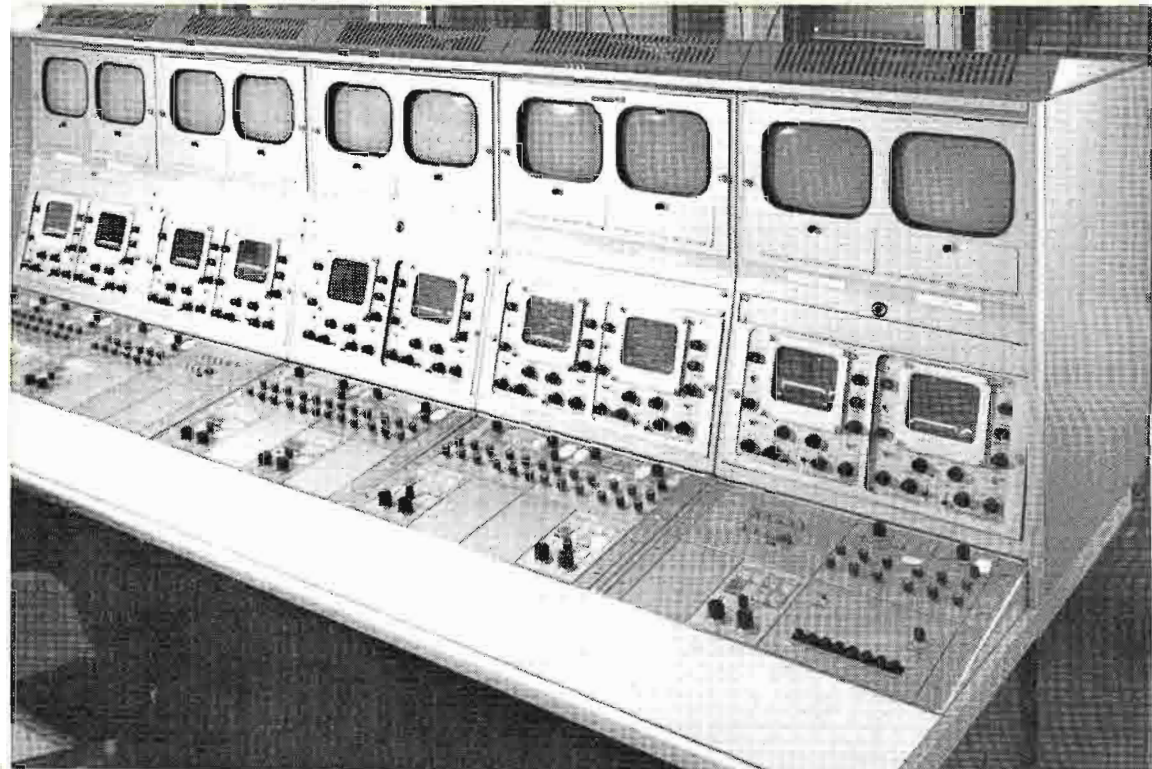


FIG. 17 Centralized electronics—an area for all rack-mounted equipment, which speeds servicing and reduces video runs.

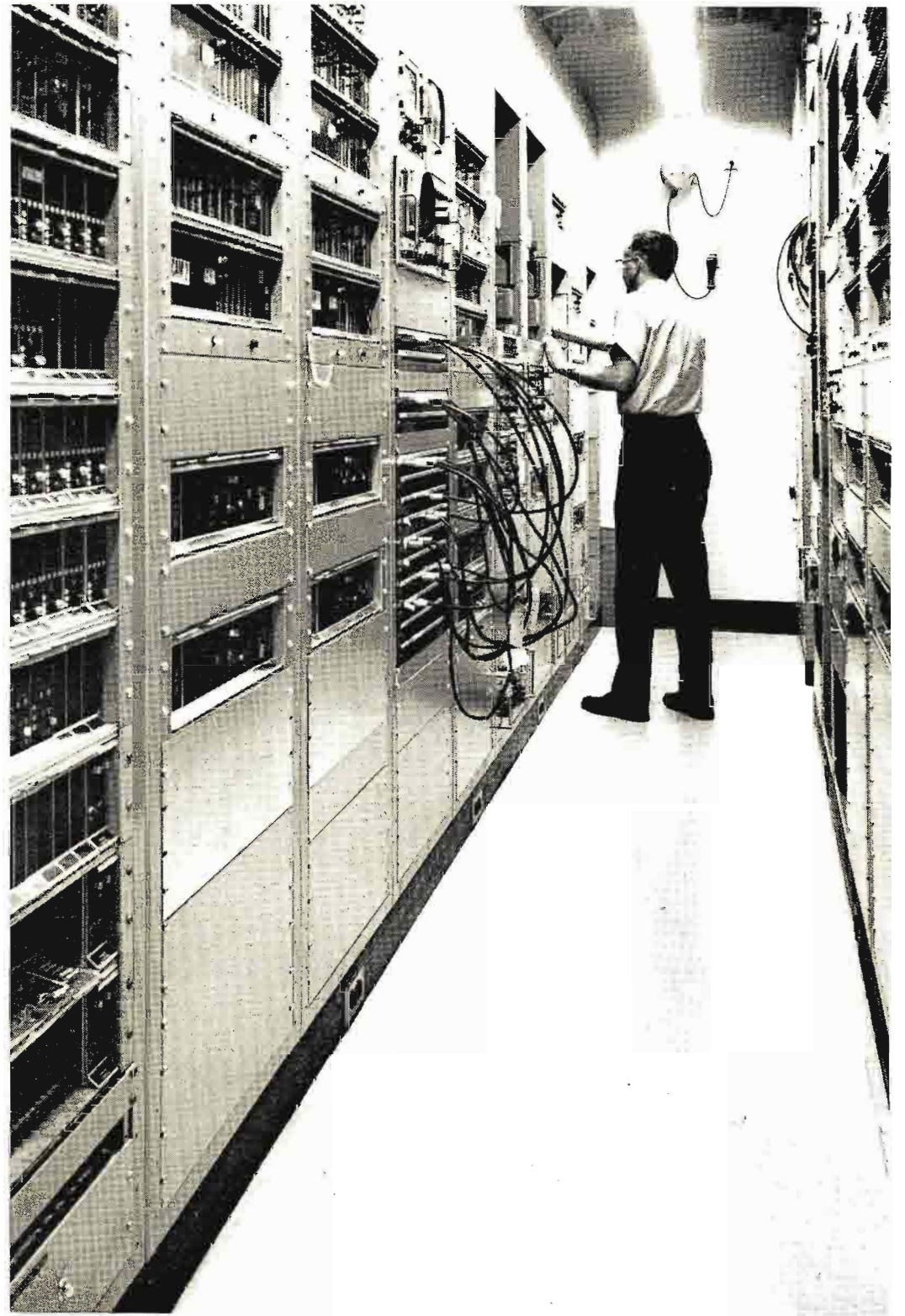
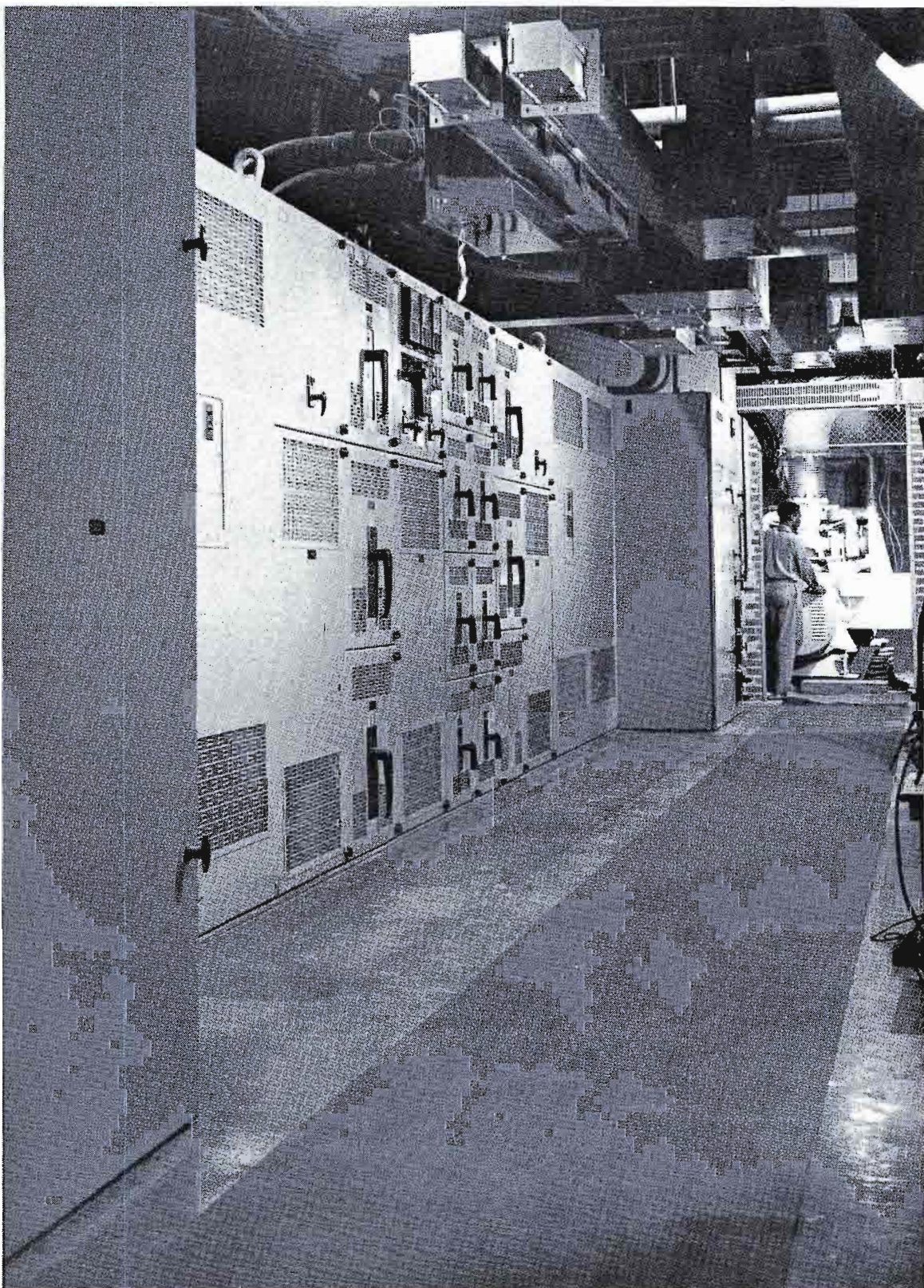


FIG. 16 Power room. Two sources of commercial power supply the studio building. An emergency generator takes over in event both commercial services fail.



manufacturers' engineers, teaching WCAU-TV personnel how to operate and service their products. As a result, WCAU-TV was able to achieve a very smooth and fault-free transition.

### Color Programming

Most of the program day at WCAU-TV is broadcast in color. From inspiration, education and news that follow sign-on at 6:15 a.m., through the entertainment, information and news that comprise the major program day, to prime-time favorites and local specials—practically everything is offered in color.

Half of the programming in the 22-hour day is originated locally. Two outstanding children's shows are presented in color: "The Gene London Show" and "Pixanne." Daily at 6 p.m. and 11 p.m. "The Big News" is presented with a team of 65, and an on-air line-up of 8 articulate voices anchored by Philadelphia's veteran news broadcaster, John Facenda. In ad-



FIG. 18 John Facenda, popular newsmen in Philadelphia, heads WCAU-TV team of reporters.

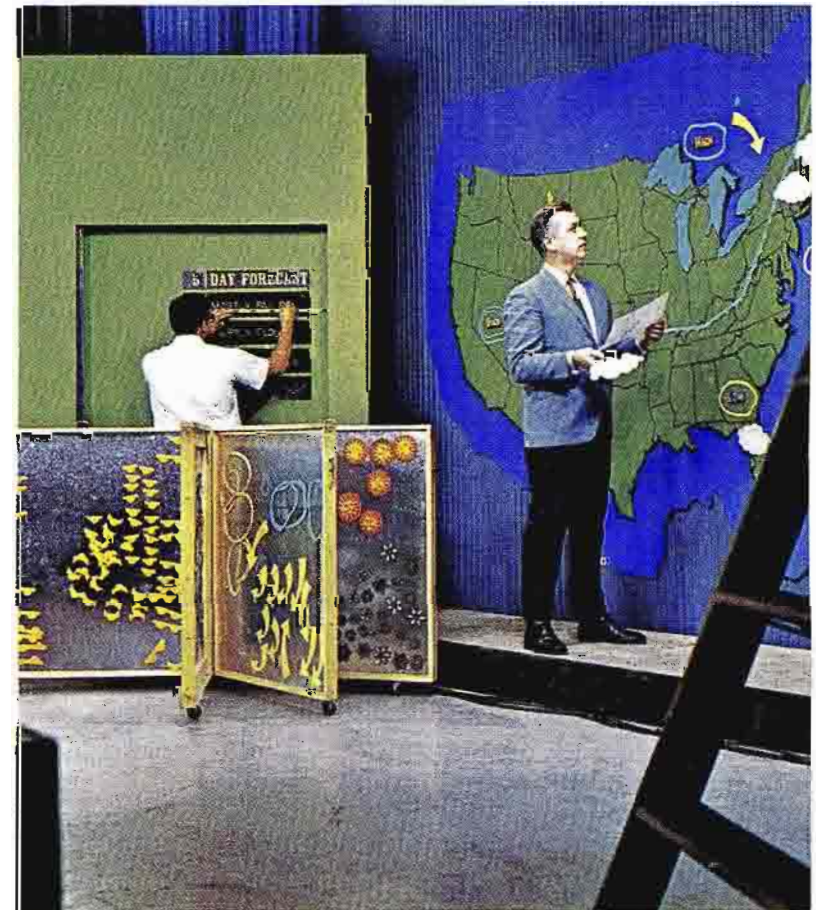
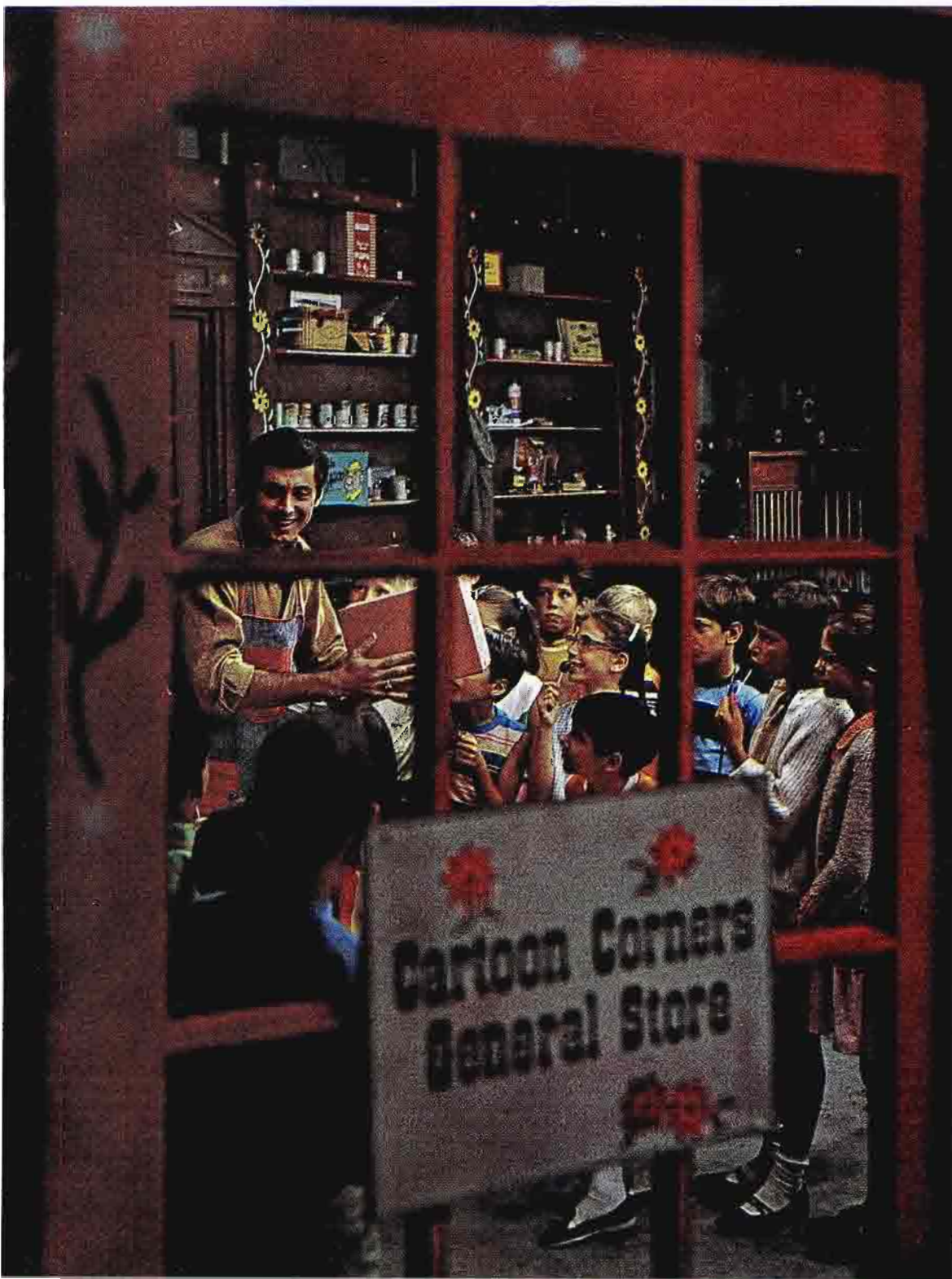


FIG. 20 Typical color staging of WCAU-TV weatherman, Herb Clarke.

FIG. 19 Gene London Children's Show is locally produced by WCAU-TV in color.



FIG. 21 The Bill Bennett Show provides staging for productions of agricultural commercials and programs.



FIG. 22 Pixanne is another popular daily attraction produced by WCAU-TV in color.





FIG. 23 Part of WCAU-TV news team in action on daily broadcast in color (left to right) Dr. Charles Lee, Edith Huggins, Donald Barnhouse, Pete Retzlaff and Tom Brookshier.

dition, the Program Department produces an average of 12 weekly series—over 500 half-hour programs a year. Traditionally, a one-hour special is produced annually, featuring Eugene Ormandy and the Philadelphia Orchestra. Another important local program is the annual Thanksgiving Day Parade in full color. For many hours it traverses the main thoroughfares to the delight of visitors and local citizenry. Community effort is reflected by the National Emmy Award bestowed in 1968 for “Now is the time.” Other recent national award-winning programs include “Design for Danger”, “Who Speaks for the Poor”, “The Franklin Institute: ‘Launching Pad to Science’”, and “Leon Sullivan Restless Giant.” With an eye toward helping prevent civil unrest, a forum for both black and white leaders was initiated; “Divided We Fall” is the title of this continuing series which tackles community problems.

### Color Commercials

With its newest color facilities and experienced production staff, WCAU-TV provides commercial-producing services for both national and local advertisers. Local clients include: Schmidt’s of Philadelphia, Acme Markets, Philadelphia Savings Fund Society, John Wanamaker Stores, Continental Bank & Trust Company, Ford Dealers’ Association, Gimbel Stores, A&P Food Stores, Sears Roebuck Company, Philadelphia Electric Company, Hardwick & Magee Stores. Na-

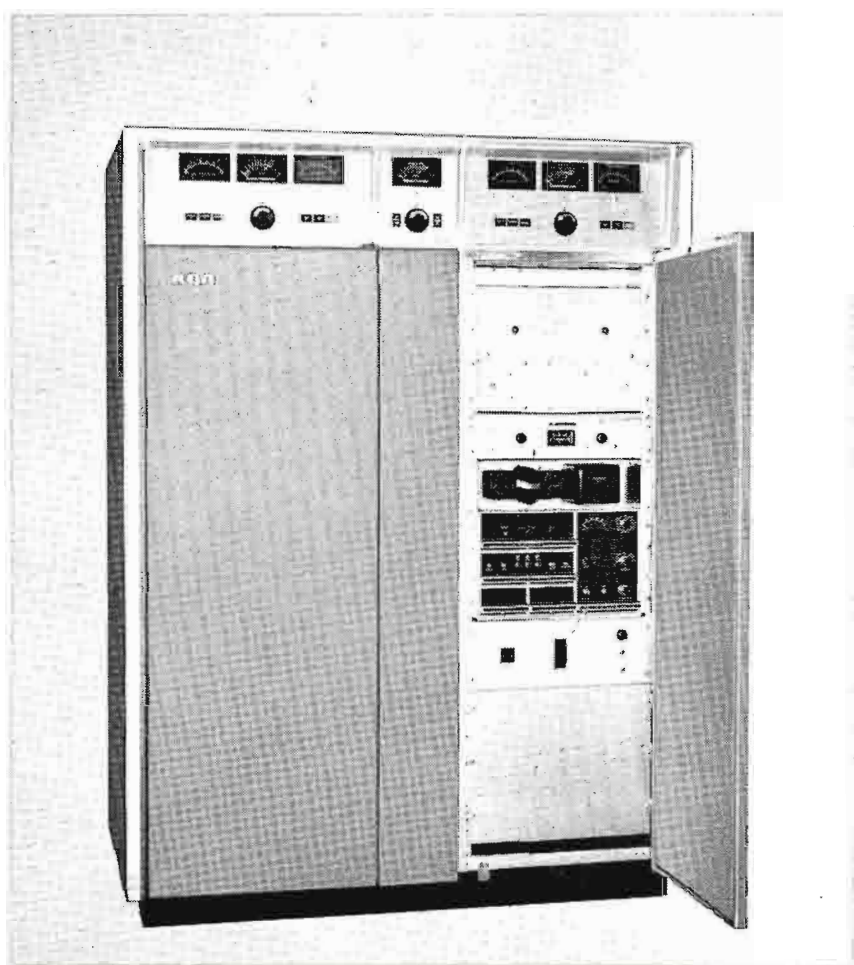
tional advertisers include Standard Brands, Ray-O-Vac, Women’s Day and Motorola. Special fashion show productions are created for department stores, either by filming on location or by videotape in the commodious studios. The studios can accommodate automobile commercials when large-scale color production is desired.

Special emphasis is being placed on the development of department store advertising, which has led to the formation of a special retail unit, whose function is to have knowledgeable manpower deal effectively with the special advertising needs of retail stores.

### Conclusion

The WCAU-TV building has a useful area of over 100,000 square feet of space devoted to studios and offices, together with support facilities. The studios are among the largest found at the local station level, accommodating up to four automobiles for larger productions. The technical facility is a thing of beauty, not only because of the impressive matched equipment that immediately strikes one’s eye, but especially because of the new concepts that were developed to achieve efficiency and flexibility. In short, WCAU-TV, the first affiliate of the CBS Television Network and now a CBS owned station, today offers what is felt to be the newest, most complete color broadcast facility available in local television.

# Products in the News



## Ultra-Reliable 2 kW FM Transmitter

The RCA concept of paralleling transmitters to achieve the highest order of dependability, particularly for remote-control stations, is now extended to a new 2 kW FM transmitter, Type BTF-1+1E2.

Two kilowatts of output power are obtained by combining (diplexing) two Type BTF-1E2 transmitters driven by a single exciter. Diplexing automatically assures a continuous on-air signal—without any switching—should the PA of either transmitter be shut down for maintenance or repair. Controls and metering are located in the center cabinet of the parallel transmitter which has a total width of only 60 inches.

The BTF-1+1E2 employs the new BTE-15A direct FM exciter, with all solid state components, wide frequency response and extreme stability, making it particularly desirable for unattended remote stereo and SCA operation. The parallel transmitter uses two 4CX1000A power amplifier tubes driven directly by the output stage of the exciter. No intermediate amplifier is required.

Other features include long life silicon rectifiers, vertical chassis accessibility, complete overload protection and provisions for remote-control. The BTF-1+1E2 transmitter, with the proper antenna, will provide an economical 3 kW-ERP package with the utmost reliability.

## New, Ruggedized Camera Cable

A camera cable especially adapted to field service is now available for the TK-44A, TK-42 and TK-43 color cameras.

The cable uses the new BIW TV-85C connectors. These connectors, which mate with existing 85-pin connectors, have several design features to resist injury from rough handling. An outer sleeve protects threads from being bugged and assures positive alignment of pins, preventing damage due to mis-mating. Pins and sockets are firmly anchored against pushout, but at the same time, are easily released from the front of the connector and removed from the rear. A woven cable grip and molded rubber boot provide bend relief and help prevent the cable from being pulled out.

The new cable is supplied in 50, 100 and 200-foot lengths with the following MI- numbers and list prices:

MI-557540-1	Camera Cable, 50 ft.	\$ 660.
MI-557540-2	Camera Cable, 100 ft.	\$ 810.
MI-557540-3	Camera Cable, 200 ft.	\$1,110.

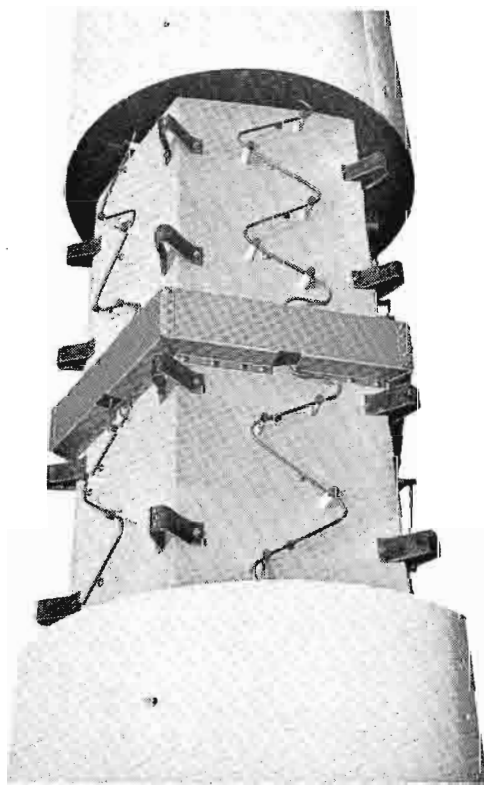
The MI-557315 standard series of cables for these cameras is now available at reduced prices.



## New Color Slant Track Video Recorders

Two new color helical-scan tape recorders have been added to the 800 Series, Models 825 and 860. Featuring improved time-base stability and higher signal-to-noise ratio, Model 825, contains a capstan servo which compensates for changes in tape tension and signal timing by varying the capstan speed. Model 860 features refinements in the color processor, higher signal-to-noise, is equipped with color editing and slow motion facilities.

All RCA 800 Series helical scan recorders are UL approved to meet certain procurement specifications. Service has been expanded, also replacement parts, to support field requirements. The warranty period on heads has been extended to 1000 hours (does not apply of course to broken heads) for machines purchased after May 1.



### New UHF Polygon Antenna for the Television Broadcaster

This new antenna development provides the means for attaining a wide variety of horizontal and vertical pattern combinations to meet practically any requirement for any channel in the UHF band.

With an appropriate UHF transmitter and transmission line, values of ERP can be obtained ranging from modest for the limited market to the maximum (5 megawatts) allowed by the FCC. Because of its unusual design, the Polygon Antenna admirably fits the requirements for either a top-mounted antenna or a customized supporting antenna in a vertical stack of several.

Designated the TZP-500 series, the numeral 5 indicates that the antenna has five panels around, while the remaining two digits specify the number of panel layers (from 01 to 11). For example, the Type TZP-509 is a five-sided antenna with 9 panel layers.

All hardware is of corrosive-resistant material, either stainless steel, non-ferrous alloy, or galvanized steel, with the main panels made from zinc-sprayed CORTEN steel plates. Thus, the inconvenience of painting the antenna periodically is eliminated. Radome covers of rugged fibre-glass construction are provided as protection against the effects of weather and climbing damage.

The antenna consists of a number of layers of panels. Each layer has five panels, similar to those used in the Zee-Panel Antenna, joined together at the edges to give a pentagonal appearance. The reflecting portions of the panels thus become the supporting structure of the antenna. Control of the relative amounts of power on each of the five panels in a given layer produces an almost infinite variety of possible horizontal patterns.

A 12-page brochure entitled *Type TZP-500 Polygons* is available through your local RCA Broadcast Sales Office.

### Circularly Polarized FM Antenna for Diplexing

Designed for multichannel requirements, the type BFD FM antenna is a broad-band panel type antenna which provides true circular polarization and either omnidirectional or directional radiation patterns. It is intended for side mounting on 3- or 4-sided towers having face widths of 5 to 10 ft.

The panels are six feet square and constructed of aluminum alloy angle members and substantial open wire mesh. Two crossed, inclined dipoles mounted in the center of the screen are protected by a pyramidal shaped fibre-glass radome.

Each layer of three or four panels (depending on the tower configuration) provides a gain of approximately 0.5 per polarization, and normally yields an omnidirectional radiation pattern that is circular to within  $\pm 3.0$  dB. A variety of directional patterns can be achieved by varying the number of panels and by controlling the power distribution. The panels are fed with a branch type feed system terminating in a single input line, the size commensurate with the total power input requirements.

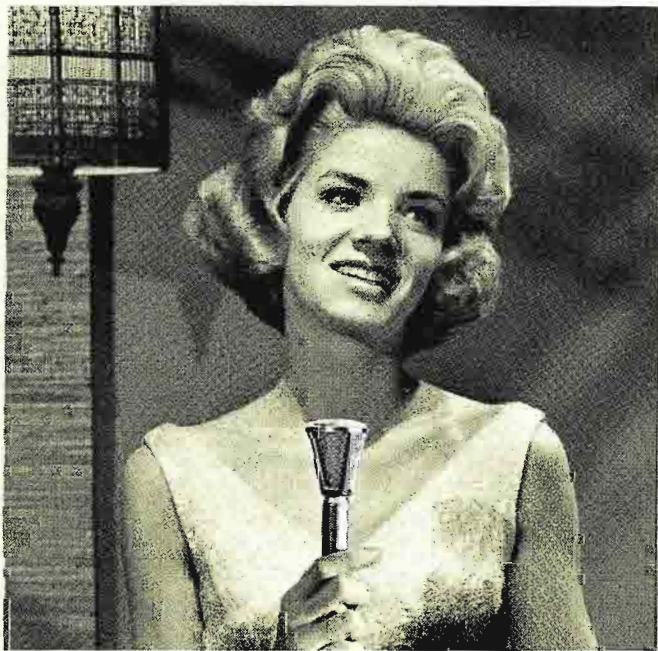
Each panel has a power input rating in excess of 5.0 kW and a bandwidth of 6 MHz. Thus, a 10-layer BFD antenna mounted on a three sided tower, each layer having three panels, has a total power input rating of 150 kW and will yield a power gain of approximately 5.0 per polarization. In conjunction with suitable combining equipment, it can handle the outputs of up to seven 20-kW transmitters simultaneously if all transmitters are within a 6-MHz band.

## Solderless BNC and UHF Connectors

For a new and easier way to attach connectors to dual shielded coaxial cable one will value these new BNC and UHF connectors and their crimping tools.

In both cases, the inner conductor and the shield are crimped to the connector in a one-shot, solderless operation. The connectors are for use only with MI-13325 75-Ohm Double Shielded Cable. The necessary crimping tools are available for purchase with the connectors. Connectors and crimping tools are identified as follows:

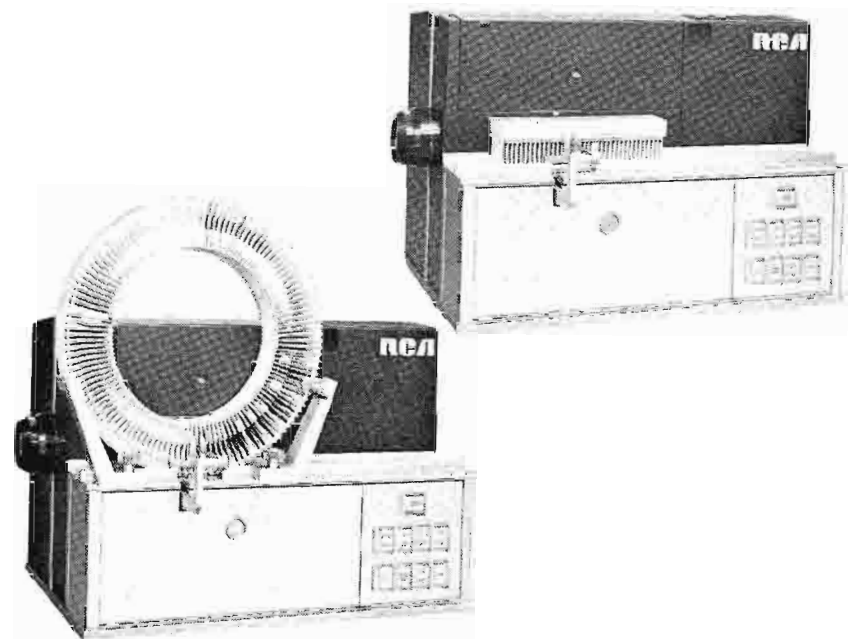
UHF Connectors (10 in package)	MI-556670-10
UHF Crimping Tool	MI-556671
BNC Connectors (10 in package)	MI-556673-10
BNC Crimping Tool	MI-556674



## New Series of Microphones

Smooth response, light weight, an ultra-slim silhouette and high resistance to shock are features of the new BK-14A and BK-16A Galaxy mikes just introduced for broadcast, recording and public address applications. Carefully designed shock and isolation filters assure high quality, noise-free speech and music pickups. The BK-14A is ideal for outdoor as well as indoor use, having special screening against wind and pop noises.

Both microphones are omnidirectional dynamic types with replaceable cartridges and provision for stand mounting. They are smartly styled in non-reflecting satin-nickel housings 8 inches long by 3/4 inches in diameter. A swivel mount with 30-foot cable and connector is supplied with each microphone.



## High Capacity, Solid State TV Slide Projector

This new TV slide projector, Type TP-77, features use of both circular and linear magazines. It has solid state control circuits, pushbutton preview, and forward/reverse operation. Its many other advances may just about revolutionize slide programming.

The circular magazine accepts up to 120 standard 2x2 slides and may be removed from the machine in a matter of seconds—then replaced with another magazine that has been pre-loaded for a given program period. Repeat sequences or “packaged” slide programs can be stored also in the smaller, linear magazine which holds up to 36 slides. Slides are quickly and easily removed or inserted in either magazine.

Pressing a “preview” button permits viewing the next slide on the film island monitor while the “on air” slide is in the gate. The next slide may also be viewed on a built-in optical preview screen while the on-air slide is being shown. When the machine is operated in reverse, slides are presented in exact reverse order without loss of sequence. Transitions between slides are made rapidly and smoothly by a moving mirror of new design.

Solid state, integrated circuits completely eliminate relays and switches in most control functions, making the projector extremely reliable and virtually maintenance-free. There is one operating lamp plus a spare. Both lamps are tungsten halogen types with much longer life and maintain color temperature more uniformly. Should failure occur, lamp change is automatic within 3/4 second, preventing loss of air time. Practically all functions of the TP-77 may be remote controlled, using desired accessories.



## Two Video Processing Modules

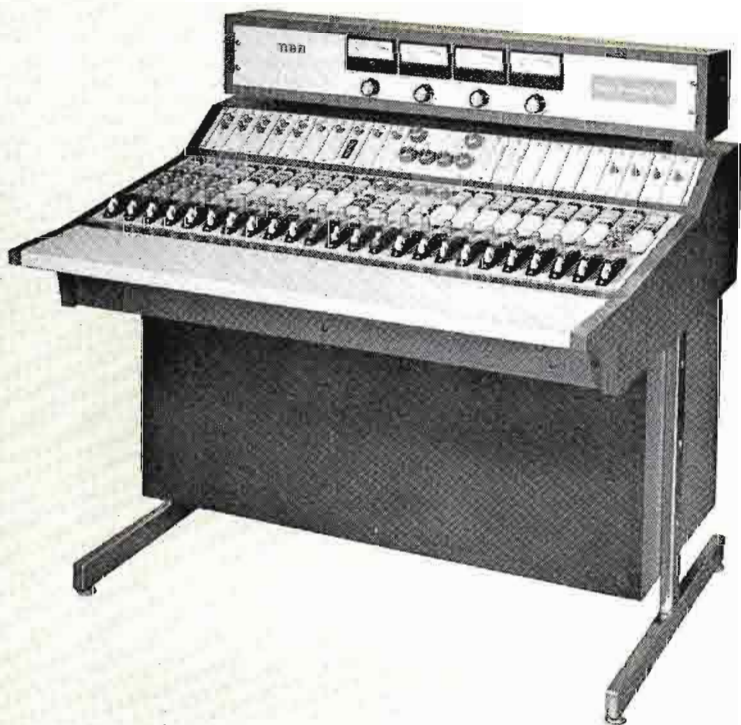
Burst regeneration and precise, automatic video level control (AGC) are achieved in two plug-in, solid state modules now available as accessories for the TA-19 Video Processing Amplifier. The TA-19 is already wired to accept these modules.

The Burst Regenerator (MI-556646) allows independent control of burst amplitude, phase, position and width. It provides a constant burst output, determined by the setting of the module controls, that is independent of TA-19 burst input level, so that the engineer may easily check the regenerated signal with respect to the incoming signal to avoid color errors. Regenerated burst output is automatically deleted when a monochrome signal is at the input of the TA-19.

The Video AGC (MI-556647) uses a unique dual detection method and two-step AGC action to provide extremely precise automatic video level control. Luminance and chrominance information is not separated, and color saturation and hue are undisturbed over the complete gain range. Adverse overshoots due to lag which are common in AGC recovery systems are eliminated. The action is very fast giving the impression of a correct output level at all times. Three modes of control are selectable. Output level is also manually adjustable and automatic AGC action may be switched off.

## "Creatra" Series Audio Console

A *standard custom* console sounds like an anomaly. But that's precisely what the fully modularized, solid state BC-100 is. Standard, because it uses separate, block-building modules for preamplifiers, mixers and masters; custom, because its



extreme flexibility offers almost unlimited opportunities to create individual design.

The beautifully styled, laminated cabinet accommodates any number of standard mixer and submaster modules. Approximate dimensions for a 20-input, 4-output console are only 45 inches wide by 42 inches high by 37 inches deep.

Standard mixer modules consist of an equalizer, vertical attenuator, OP-AMP booster amplifier, echo select and level control, 4 submaster select switches and foldback select switch. Each submaster module contains an echo mixing network, echo return and level control, attenuator, 3 program output selectors, and a submaster monitor gain control.

Illuminated, alternate-action pushbuttons permit simultaneous multiple output feeds such as in a simulcast with break-away capabilities for separate commercials or announcements. Master gain controls are rotary attenuators which may be ordered either ganged or separate.

Permanently connected to output channel 1 are a control room monitor and VU meter. A second VU meter is tied to the other outputs through a selector switch. Use of a foldback monitor eliminates any need for microphone muting circuits. The studio speaker feed provides high level sound into the studio with the microphones on.

The BC-100 was planned with the flexibility to provide enough variations around a basic design to meet most requirements in an audio mixing console, and therefore should find wide application in TV and radio studios, in production facilities and recording studios, and wherever there is the need for high quality custom audio.

## Film Image Enhancement Accessory

An accessory that provides the broadcaster with a method for creating greater apparent picture sharpness for all 16mm film has been developed for the TK-27 color film camera.

The enhancer, which is being used so successfully on the TK-44A studio camera, gives an order of improvement so high that even poorly focused film has apparent sharpness. The effect is to enhance the edges, and the device employs RCA "combing" and "coreing" expertise to perform this with virtually no change in signal-to-noise ratio.

Supplied as a kit (MI-557806), the Contour Enhancement Unit fits any TK-27 camera. It is a simple modification to the camera head requiring only the addition of a wiring harness and two solid state modules.

# For over three years nothing could shut down our 2-way radio.

## Now we offer an even better one ... the Super-Fleetfone/500.

You've probably heard about the RCA Super-Fleetfone. But did you know it has been on a marathon talk-test for over three years? And it's still operating. Not a single component has failed.

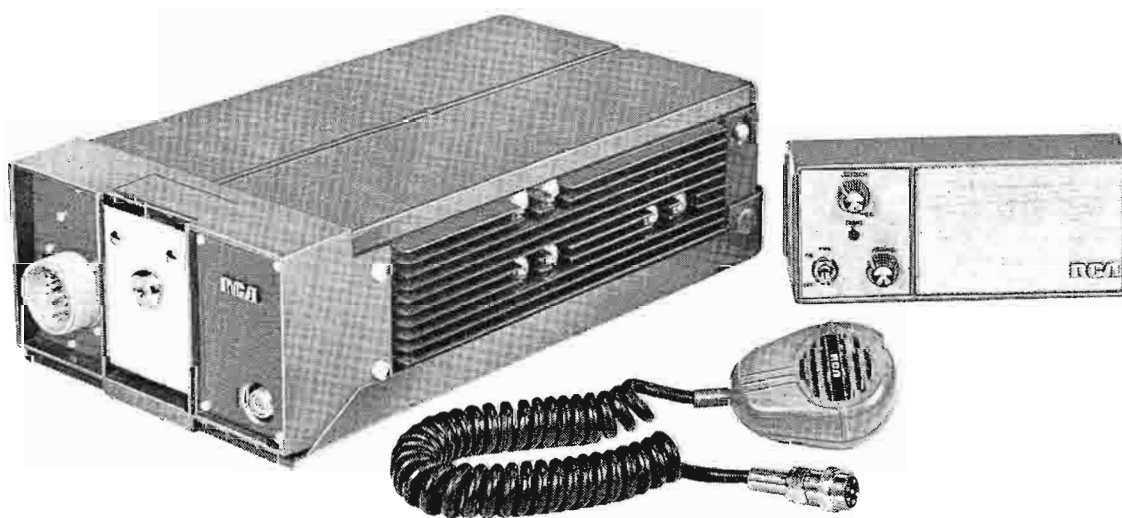
We had a long way to go to beat it for rugged reliability. But the new Super-Fleetfone/500 has done it!

The Super-Fleetfone/500 has an integrated circuit in the receiver, eliminating a complex of components, interconnections and potential

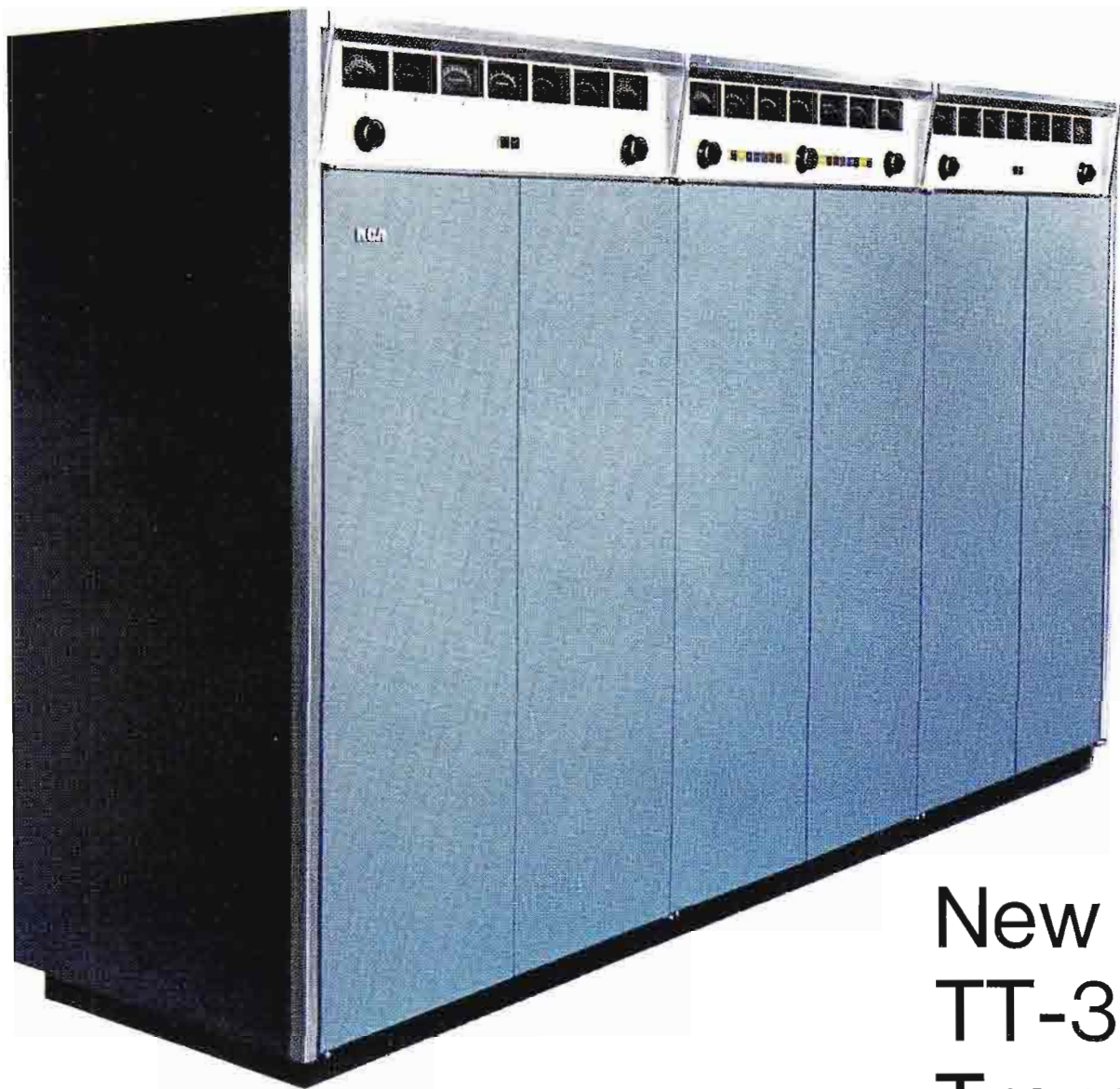
trouble sources. Not even a crystal oven or heater in either the transmitter or receiver, thanks to modular temperature-compensated crystal oscillators that keep you always on frequency.

You can really put the heat on this radio. It has built-in thermal protection to compensate for excessive operating temperatures. Power output automatically adjusts and the transmitter doesn't shut down like some others do when the going gets too hot.

It's a completely solid state radio. Right through to the antenna switch. No relays. No tubes. No failure-prone components. And to give you an idea of its reliability—the 500 is the only standard 2-way radio that's rated for continuous duty.



RCA Super-Fleetfone/500 gives you a choice of output power ratings and up to four frequencies with optional plug-in modules . . . a system tailored to your exact needs. Just write us on your letterhead for full information. Write RCA, 2-Way Radio, Bldg. 15-5 Camden, N. J. 08102



## New "Maxim-Air" TT-30FL VHF-TV Transmitter

Better Performance . . .  
182 Less Tubes



The "Maxim-Air" . . . the VHF transmitter of the future . . . available today. This 30-kW transmitter is designed for solid-state operation . . . and will provide the best color signal in town. Color that captivates your audience from a futuristic transmitter that just won't quit . . . that's what "Maxim-Air" is all about.

Imagine . . . almost no transmitter off-air time . . . what a savings!! The TT-30FL has two transmitters operating in parallel . . . if you lose one, the other keeps you on the air . . . and your audience in the primary coverage area can't see a difference. Also, redundant exciters . . . with automated switching that is unnoticed in case of a failure. But that's only part of what the "Maxim-Air" TT-30FL can do . . . the basic reliability is built into the high-quality solid-state design—where no corners were cut to achieve a sharp, clear, stable color signal. And only ten tubes have been used . . . ingeniously, at much less than their ratings. We've reduced the two most likely sources of failure—tubes and circuit compromises.

The "Maxim-Air" is far ahead of current transmitters. It has motor-driven controls and remote metering—is ready for full remote control and automatic logging . . . and is even ready for eventual computer control.

# Take the 5-second “instant expert” test

New RCA Super 1600 Automatic. It threads itself.

Five seconds—that's all it takes. Flick on the switch—the Super 1600 16mm sound projector does the rest. You're an “instant expert” because *it threads itself*. In just five seconds! Thanks to RCA's exclusive “Safe-Threader”, movies are easier to present than ever before!

But there are many reasons for buying the Super 1600. Economy, for example. Unlike other automatic threaders, the RCA “Safe-Threader” never touches the film. So it never causes wear.

Convenience, for example. Set-up

takes all of one hand. Flip-up reel arms, a smooth tilt mechanism for quick picture alignment, and a precision rack and pinion focus control, get your picture on the screen in a hurry.

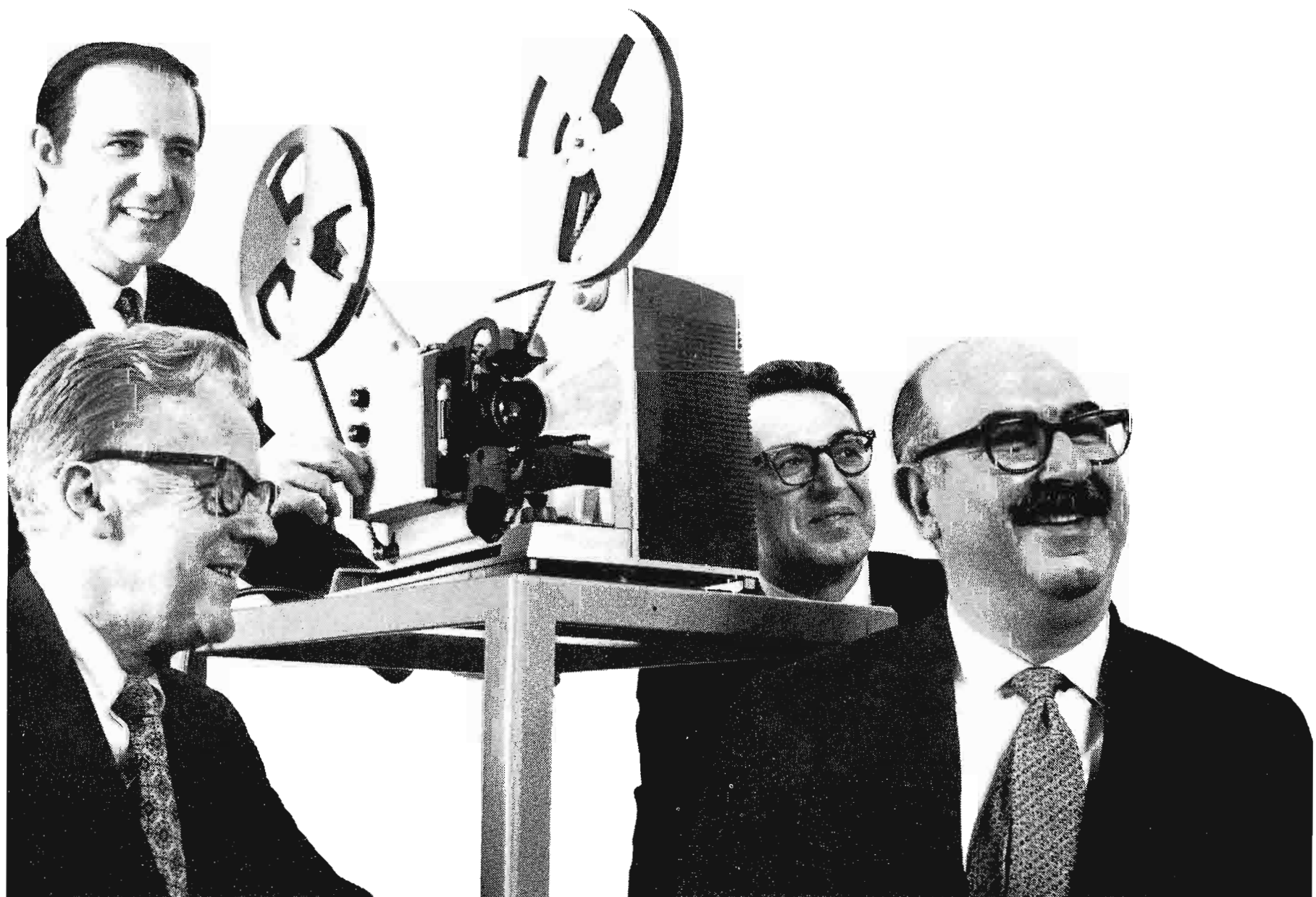
Ease of operation is another reason. Fewer and easier operating controls virtually eliminate the age-old headache of fumbling around to get the show started. If you want to reverse the film—just throw a switch. It's that simple.

Naturally, the sound from the Super 1600 matches its brilliant

pictures. The new 15-watt all transistor amplifier and built-in speaker brings you sound as close to life as you can get.

Call your local RCA Audio-Visual Distributor. Ask for a demonstration. Then run it yourself. You'll feel like an expert—*instantly*. For instructive brochures, write: RCA Instructional Electronic Systems, Bldg. 15-5, Camden, N. J. 08102

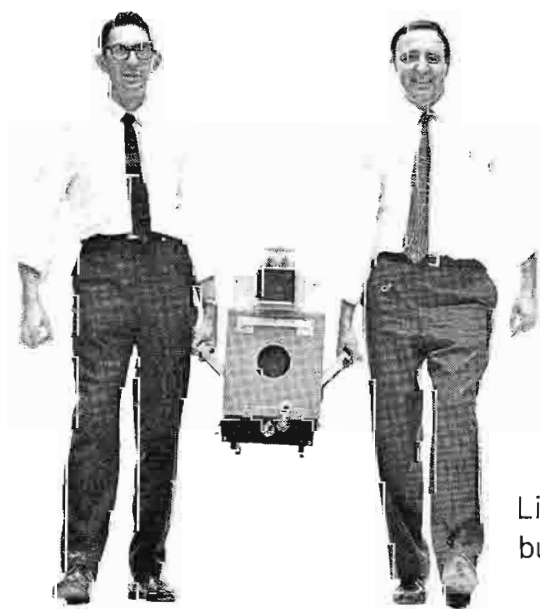
## RCA





So what's new  
about a 3-tube  
color camera?

This . . . we made  
it better to  
suit your needs



Lightweight . . .  
built to travel.

The new TK-44A. It's the latest design in 3-tube cameras. It uses RCA's exclusive "contours with a comb" that produces snappy, brisk color without raising the noise level. It's lightweight, easily toteable from studio to field, extremely maneuverable under all conditions.

The TK-44A can color match any color camera you may own. It delivers NTSC color with greater accuracy than any other PbO color camera available today. The reason: a unique "Chromacomp" color masker.

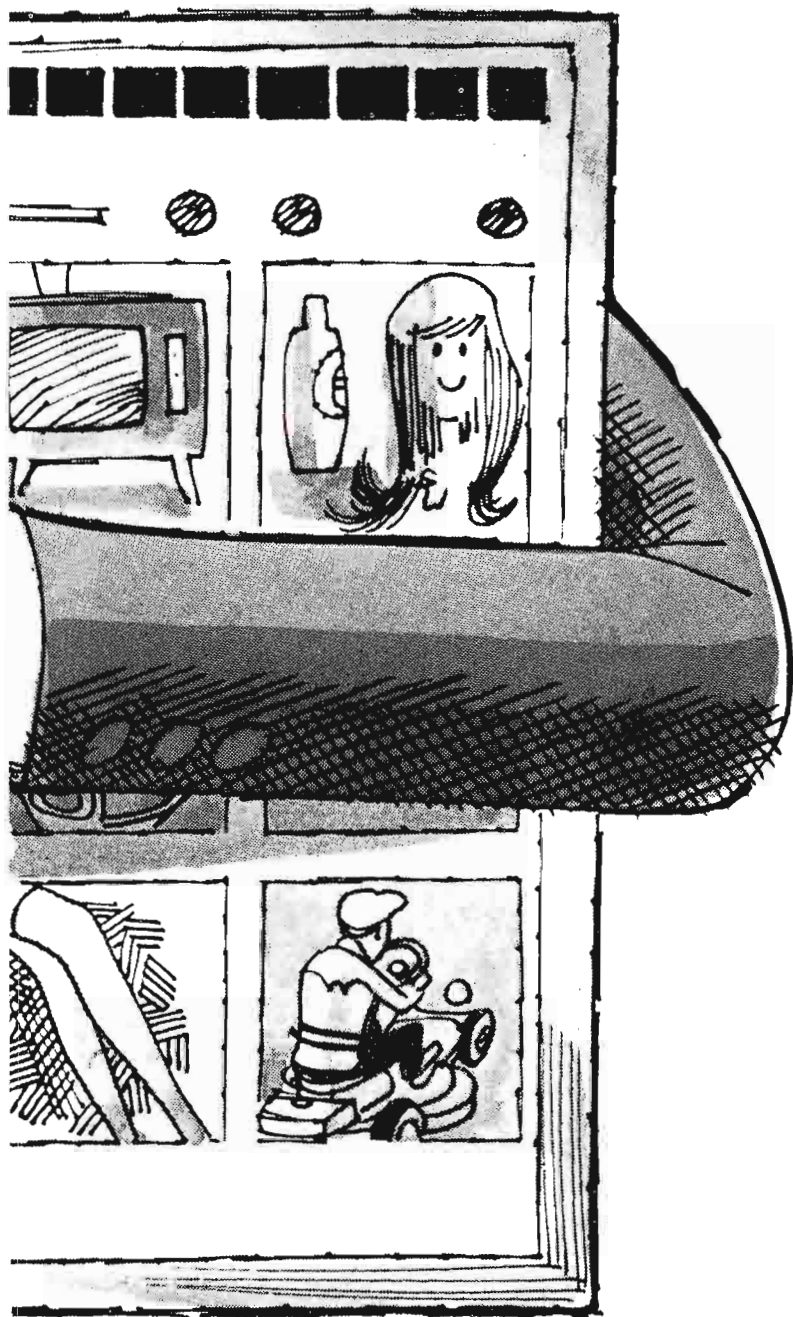
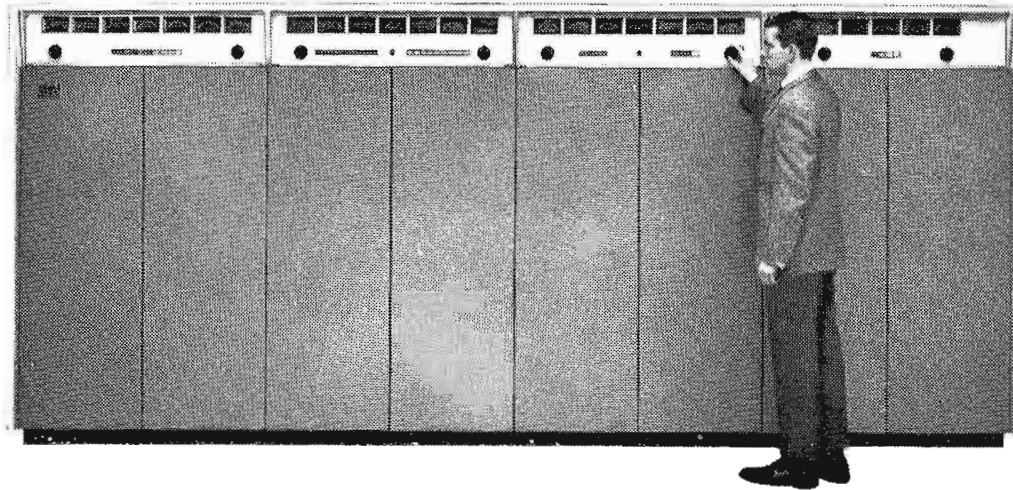
Get the facts on all the features that mean better color, more time for operators to spend thinking instead of tinkering, less tension, and greater efficiency indoors and out!

The new TK-44A. It just might be the color camera for you.

# The High Power UHF



# Selling Machine



It's the world's most powerful UHF transmitter-antenna combination. Turn it on and you can sell more of everything advertisers want to sell. You can blanket your territory with the most authoritative message in UHF — up to 5 million watts of effective radiated power!

This selling combination is the 110-KW RCA Transmitter, plus the new high-gain directional antenna. It puts power into your coverage pattern. It's tailored to your customer signal requirements — horizontally, vertically or both. Put this combo on air and you can go a long way on UHF — all the way to Madison Avenue and back with the bacon (also soap, automobiles and green giants)!

Its diplexed visual amplifiers assure the utmost in reliability, since one is always ready to back-up the other. Integral-cavity klystrons with vapor-cooling provide efficient, economical operation. They feature factory pretuning, faster warm-up time, less weight. One man can change klystrons in less than five minutes. Walk-in cabinet design gives you ease of operation and maintenance, plus substantial savings in installation. So wherever you are — small town or big city — let RCA high power UHF put you in the national time-buying picture. Call your RCA Field Man or write: RCA Broadcast Equipment, Bldg. 15-5, Camden, N. J. 08102

**RCA... Totally Responsive**

**RCA** Broadcast  
Equipment





# The NEW RCA 70B is the first VTR to safeguard quality automatically!

In many ways, the 70B can make the VTR operator feel he has more command of tape quality than ever before. Because he can get the highest color fidelity ever achieved—with the most reliable automatic instrumentation ever devised for a VTR.

**Automatically**, the 70B eliminates costly replays. Sensing circuits just won't let you play tape on the wrong FM standard. Instead, the proper playback standard is selected for any tape—highband, lowband monochrome or lowband color—automatically.

**Automatically**, the 70B pinpoints problems through its visual-audible central alarm system and alerts the operator immediately.

**Automatically**, the 70B can save your operator time by eliminating the need for manual cueing. Now he can pre-cue several tapes so they are ready to roll automatically—eliminating tension during the critical station break period.

**Automatically**, the 70B can eliminate saturation and hue errors. Use the RCA exclusive Chroma Amplitude and Velocity Error Corrector (CAVEC), and the 70B will not only correct chroma errors between bands—but between each line of a band as well!

**Automatically**, you get better color. The 70B has broadcasting's highest specs—K factor of 1% with 2T and 20-T pulse; differential phase and gain 3° and 3%; moire down 43 db and S/N of 46 db.

The RCA 70B is the dream VTR come to life. For all the reasons why, call your RCA Broadcast Representative. Or write:  
RCA Broadcast Equipment, Bldg. 15-5, Camden, N.J. 08102.

**IMPORTANT NEWS:**  
The TR-70B can also be used as a master VTR with the world's first automated video cartridge tape recorder/player—the show-stopper of the 1969 NAB! Write for details.

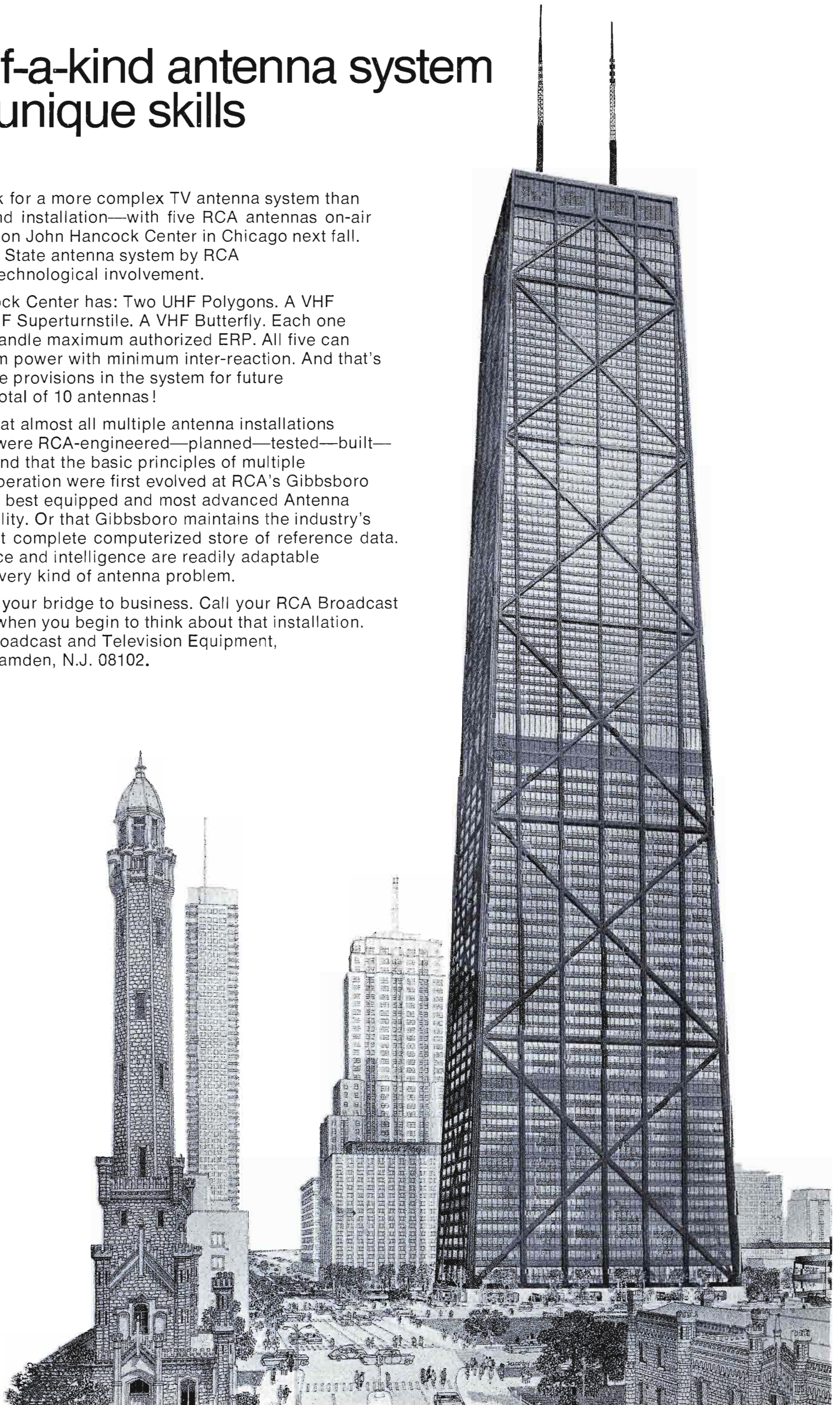
# One-of-a-kind antenna system takes unique skills

You couldn't ask for a more complex TV antenna system than this one-of-a-kind installation—with five RCA antennas on-air from twin masts on John Hancock Center in Chicago next fall. Only the Empire State antenna system by RCA paralleled it in technological involvement.

The John Hancock Center has: Two UHF Polygons. A VHF Zee Panel. A VHF Superturnstile. A VHF Butterfly. Each one is designed to handle maximum authorized ERP. All five can radiate maximum power with minimum inter-reaction. And that's not all: There are provisions in the system for future expansion to a total of 10 antennas!

Did you know that almost all multiple antenna installations in the business were RCA-engineered—planned—tested—built—and installed? And that the basic principles of multiple array antenna operation were first evolved at RCA's Gibbsboro Center—world's best equipped and most advanced Antenna Engineering facility. Or that Gibbsboro maintains the industry's largest and most complete computerized store of reference data. RCA's experience and intelligence are readily adaptable to solutions of every kind of antenna problem.

Your antenna is your bridge to business. Call your RCA Broadcast Representative when you begin to think about that installation. Or write RCA Broadcast and Television Equipment, Building 15-5, Camden, N.J. 08102.



Owner/Developer:  
John Hancock  
Mutual Life  
Insurance Company

# The standard of the broadcast industry

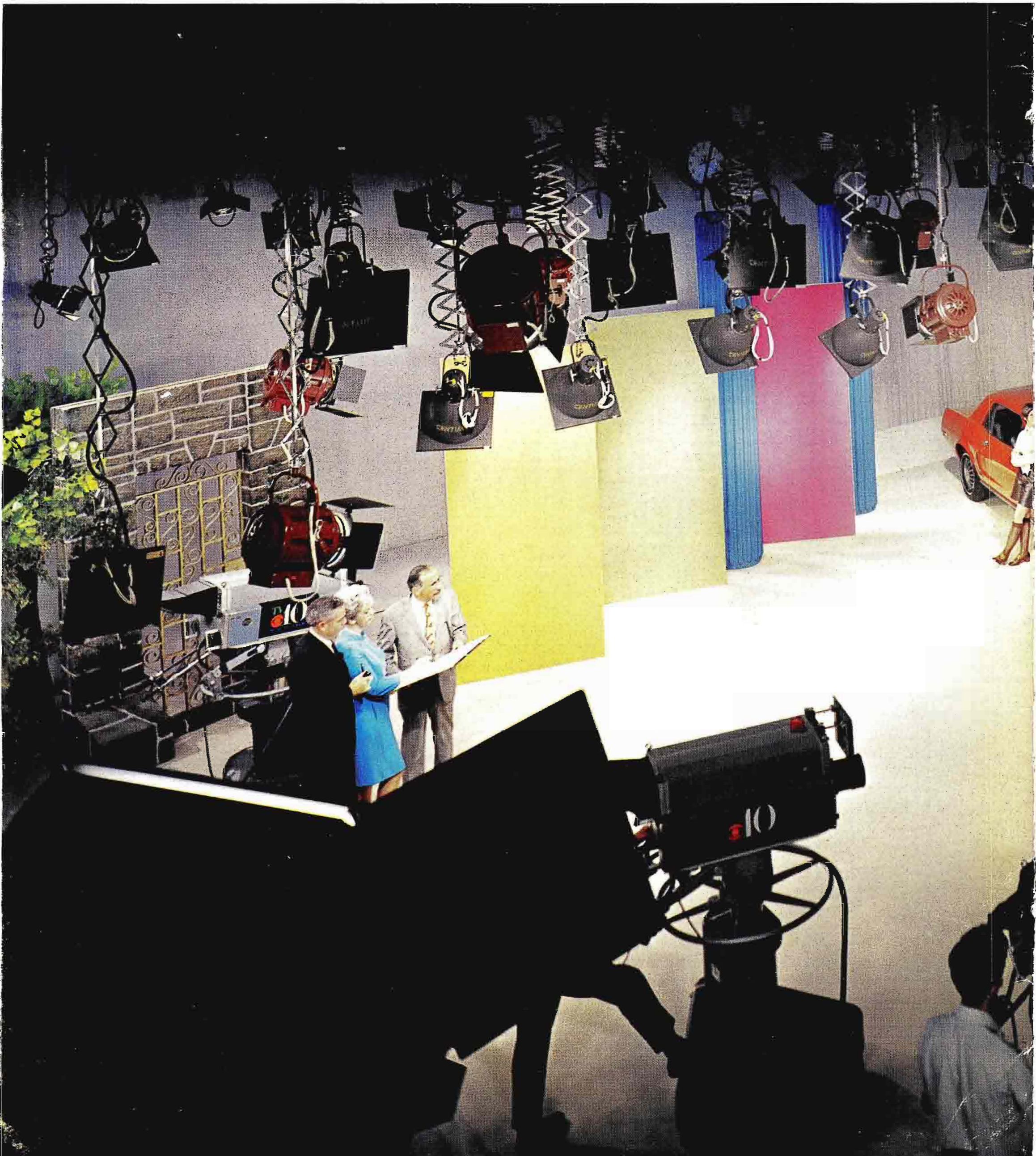
The RCA TK-27 "Big Tube" color film system makes the big difference



Your color film programs and commercials . . . will sparkle . . . come alive . . . and entertain more . . . SELL more. Which is why more television stations use the TK-27 system than any other—why it has become the "standard" in an industry where a standard is the exception rather than the rule. The TK-27 Film Camera with its "Big" 1½-inch pickup tube—50% larger than others use—gives a sharper picture, greater resolution, uniform focus all over the screen and less "noise" for high quality, consistently brilliant color pictures.

This unequaled TK-27 color camera is the heart of a "Matched Design" film system which includes the TP-66 16MM Film Projector designed for "hands off" operation, the new solid state TP-77 Slide Projector with its unique circular magazine for 120 slides and the new TP-55 Universal Multiplexer with an advanced design 4-mirror system for complete integration of color and monochrome films and slides.

**RCA** Broadcast Equipment



# One-of-a-kind antenna system takes unique skills

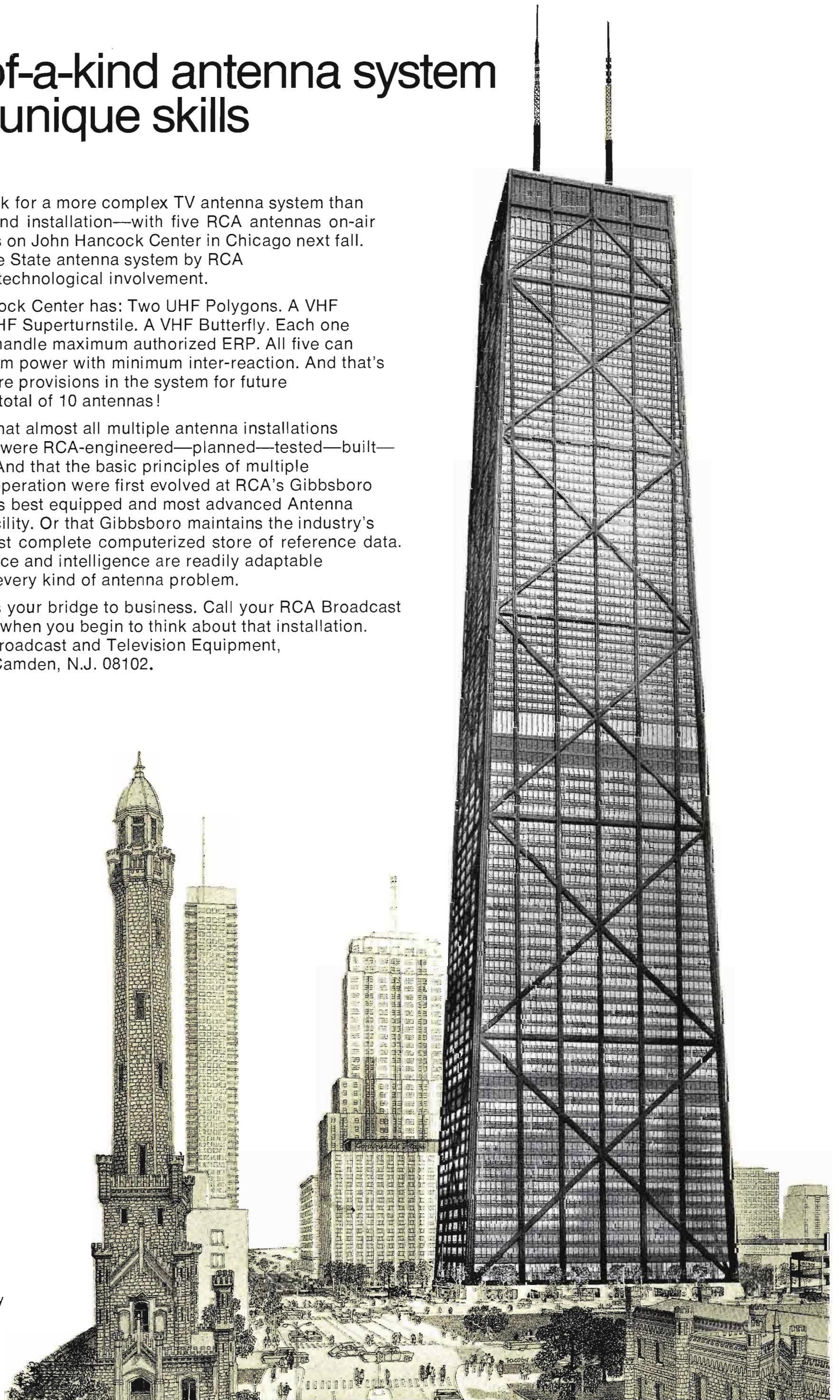
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Owner/Developer:  
John Hancock  
Mutual Life  
Insurance Company



# ...100% transmitter redundancy... 100% transmitter standby...

Off-air time—even just when switching from main transmitter to standby—is one budget-spoiler that parallel operation can take care of once and for all. Our parallel VHF-TV's have been logged at 150,000 hours of combined operation—with less than 60 minutes off-air!

But that's only one of the budget advantages of parallel operation.

**Consider initial cost.** If you bought a 25KW main and a 25KW standby, you would invest about \$279,000. Reduce the standby power to 12.5KW and you would still spend about \$245,000. But a pair of RCA transmitters—parallel mains for 25KW—cost only about \$237,000.

**Consider day-to-day costs.** In many areas, operating costs, maintenance costs, power costs, tube costs all drop markedly. (See new brochure for substantiating data)

**Consider performance.** Parallel operation assures 100% redundancy for full-time dependability. By diplexing two transmitters you gain a standby "hot" exciter that is ready to go when needed. And, of course, with RCA transmitters you deliver superior monochrome and color pictures all the time.

We've worked out a number of standard packages that meet most of the standard requirements. For low-band systems, we offer parallel 6KW, 12.5KW, or 15KW's. For high band, channels 7-13, we offer parallel 5KW, 12.5KW or 25KW systems.

As soon as you're ready for "paralleling", call your RCA Broadcast Representative. Or write for our new brochure to RCA Broadcast Equipment, Bldg. 15-5, Camden, N. J. 08102.



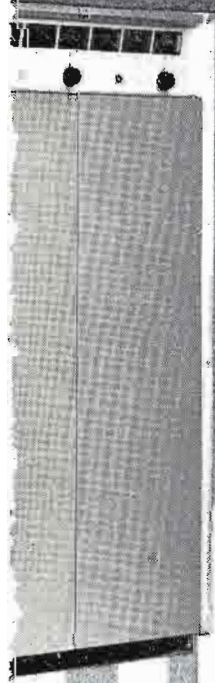
ON AIR ON AIR ON AIR

ON AIR

ON AIR ON AIR

ON AIR ON AIR ON AIR

ON AIR ON AIR



# Relia- bility...

**the long-term "extra" with Super-Carfone/500**

Here's a 2-way radio designed with one goal in mind. Reliability. RCA engineers designed in components that can take it and are built to get the best performance out of every section of the radio.

Consider. All transistors in the transmitter/receiver are the silicon type. They withstand heat almost indefinitely without deterioration or loss of stability.

Temperature compensated crystal oscillators keep the radio always on frequency. No frequency drift even from "cold" start-ups.

And it's the first complete line of 2-way radio equipment to use an integrated circuit. Inherently more reliable. Eliminates some 30 components and 120 soldered



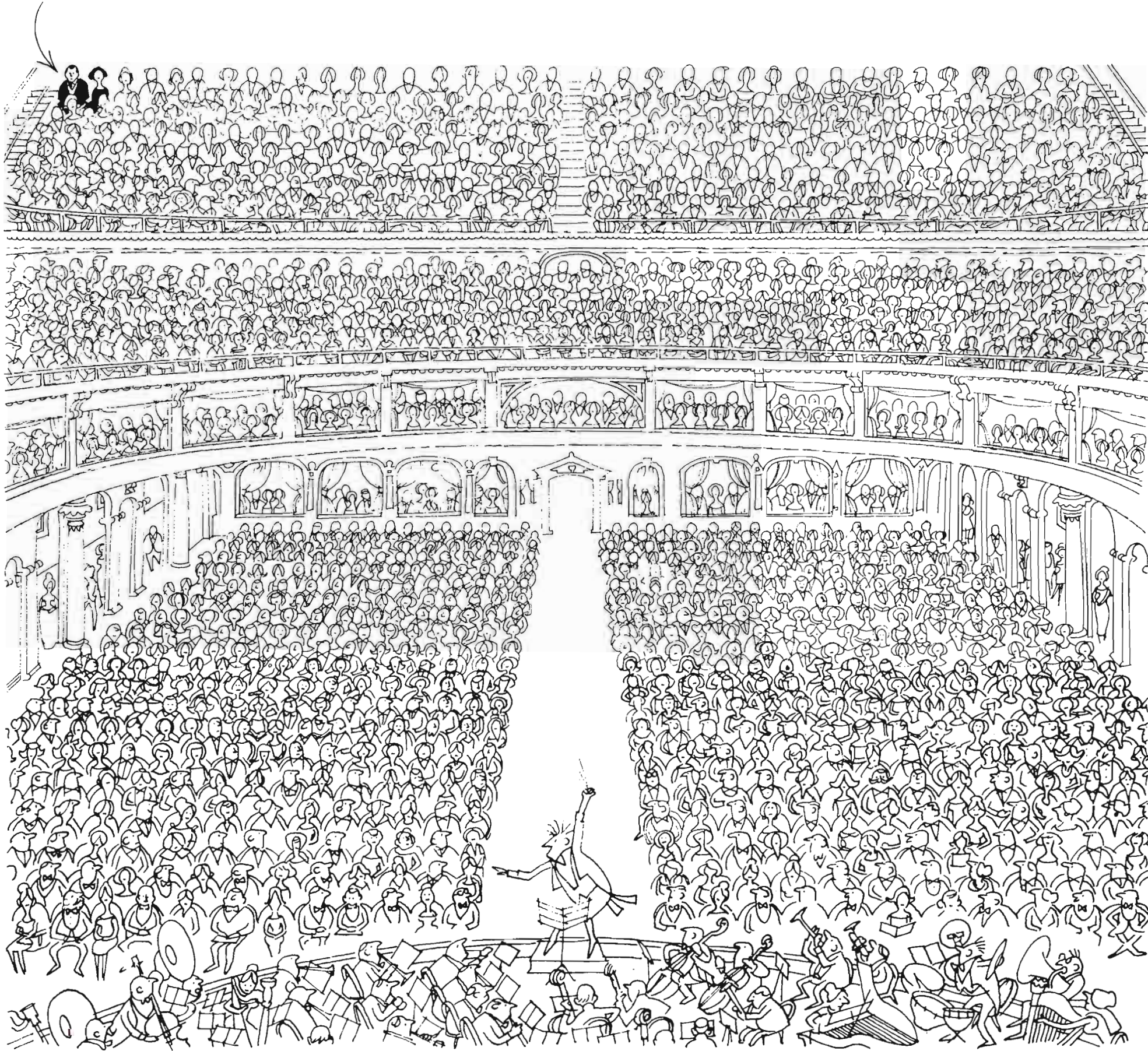
connections. Nobody else is that far ahead.

Better reliability combines with better performance to bring you a better 2-way radio. The Super-Carfone/500 is available in all frequency bands and in a wide range of powers. With up to four frequency operation. And for convenience, a one unit speaker and control panel. Compact. Smart looking. One less unit to clutter the cab.

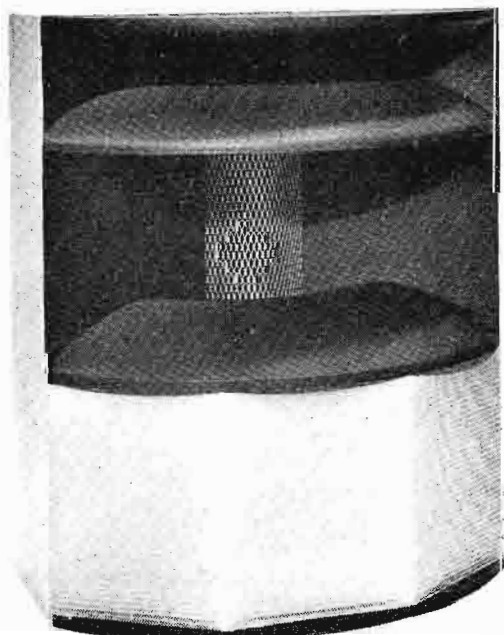
Ask your RCA Communications Specialist for the full Super-Carfone/500 story—how long-term reliability can make it your best communications investment ever. Or, for a detailed brochure, send your letterhead request to RCA 2-Way Radio, Dept. R-471, Bldg. 15-5, Camden, N.J. 08102.



When the man  
45° up and 120° across  
gets full-fidelity  
sound...



You'll be  
using this  
new RCA  
LC-9A speaker



This new auditorium loudspeaker looks good, and sounds even better. It's a high efficiency speaker which puts the "obsolete" tag on thousands of sound systems—old and new.

The unusual thing about the LC-9A isn't the extent of its dispersion, the 50 watts power input, or the 32 to 22,000 Hz frequency response.

It's the way the high and low frequency horns provide matched acoustical wavefronts for smooth response over the entire frequency range at all listening angles.

Have your RCA Professional Audio Distributor demonstrate the LC-9A. Walk across the back of the room while you're listening. Then open a door, and listen from further out. It'll get to you. It'll get to your clients and their audiences, too.

# RCA service keeps all your AM, FM, TV equipment in top condition

## 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: Chicago (WE 9-6117), Phila. (HO 7-3300). Or contact Technical Products Service, RCA Service Company, A Division of RCA, Bldg. CHIC-225, Camden, N. J. 08101.





So what's new  
about a 3-tube  
color camera?

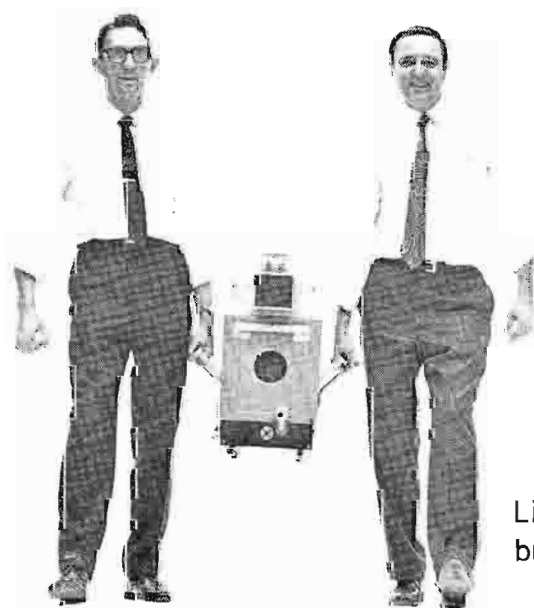
This . . . we made  
it better to  
suit your needs

The new TK-44A. It's the latest design in 3-tube cameras. It uses RCA's exclusive "contours with a comb" that produces snappy, brisk color without raising the noise level. It's lightweight, easily toteable from studio to field, extremely maneuverable under all conditions.

The TK-44A can color match any color camera you may own. It delivers NTSC color with greater accuracy than any other PbO color camera available today. The reason: a unique "Chromacomp" color masker.

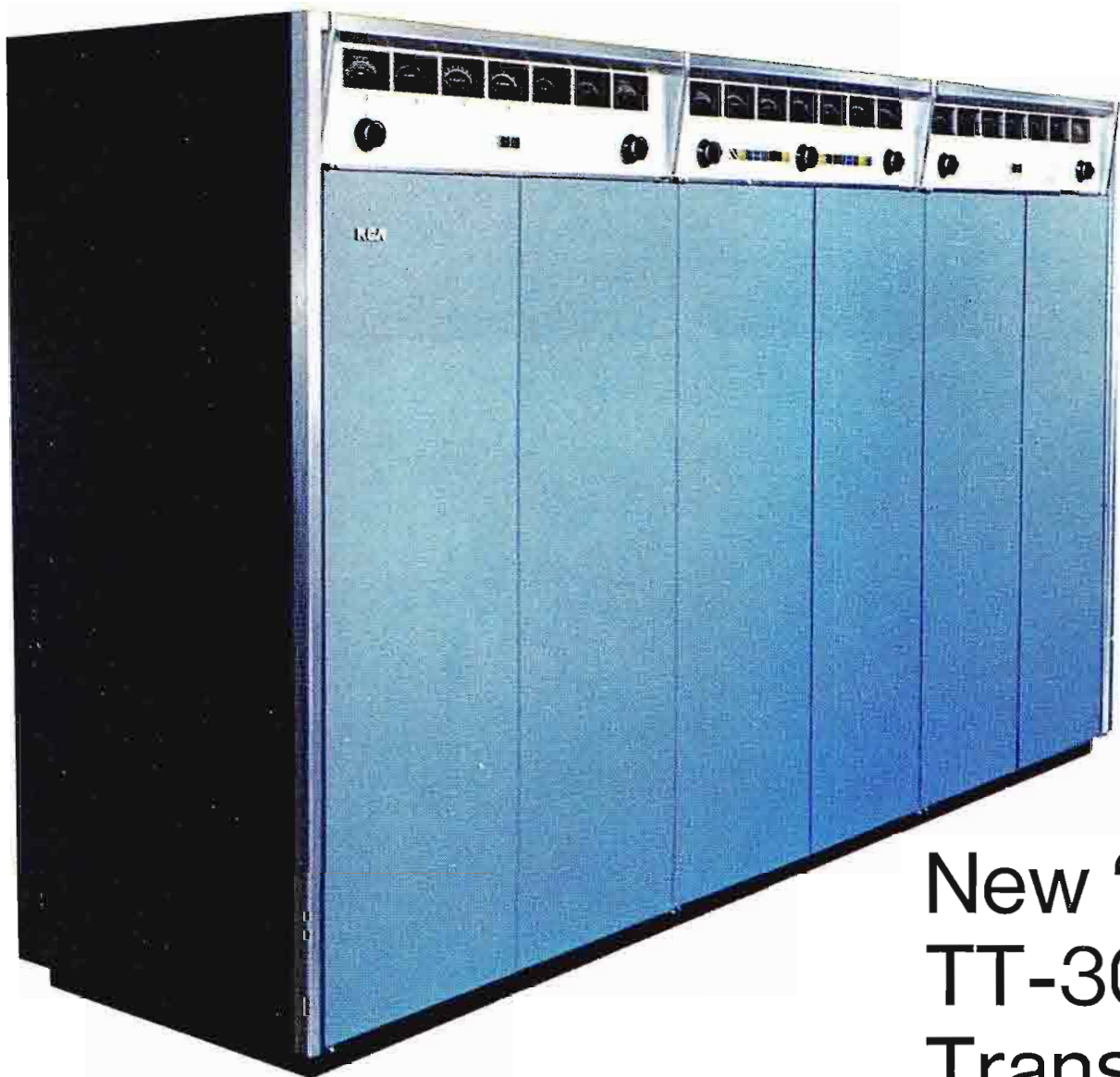
Get the facts on all the features that mean better color, more time for operators to spend thinking instead of tinkering, less tension, and greater efficiency indoors and out!

The new TK-44A. It just might be the color camera for you.



Lightweight . . .  
built to travel.

**RCA** Broadcast  
Equipment



## New "Maxim-Air" TT-30FL VHF-TV Transmitter

Better Performance . . .  
182 Less Tubes



The "Maxim-Air" . . . the VHF transmitter of the future . . . available today. This 30-kW transmitter is designed for solid-state operation . . . and will provide the best color signal in town. Color that captivates your audience from a futuristic transmitter that just won't quit . . . that's what "Maxim-Air" is all about.

Imagine . . . almost no transmitter off-air time . . . what a savings!! The TT-30FL has two transmitters operating in parallel . . . if you lose one, the other keeps you on the air . . . and your audience in the primary coverage area can't see a difference. Also, redundant exciters . . . with automated switching that is unnoticed in case of a failure. But that's only part of what the "Maxim-Air" TT-30FL can do . . . the basic reliability is built into the high-quality solid-state design—where no corners were cut to achieve a sharp, clear, stable color signal. And only ten tubes have been used . . . ingeniously, at much less than their ratings. We've reduced the two most likely sources of failure—tubes and circuit compromises.

The "Maxim-Air" is far ahead of current transmitters. It has motor-driven controls and remote metering—is ready for full remote control and automatic logging . . . and is even ready for eventual computer control.

**RCA** Broadcast  
Equipment