RCA

Broadcast News

Volume No. 154, October 1974

The TR-70C . . .
A teleproduction machine with something extra.

At a list price of $103,500, which includes CAVEC & DOC, our TR-70C teleproduction machine has a lot of important extras. Extras that you probably won't find in lower cost machines.

Unsurpassed in its video and audio specifications, the TR-70C is for the broadcast station or other television facility that demands the very best in quality and performance. Operational conveniences include automatic stop cue, automatic FM standards selection, variable shuttle speed, two switchable-previewable video inputs, built-in record current optimizer and a list of others too numerous to mention here.

For assurance of day-in, day-out performance, monitoring facilities include 17 fault indicators, 13 metering readouts, and audio and control track simulplay.

Still another extra is "Cart" capability. The TR-70C is an ideal master for the TCR-100. In this capacity it doubles as both a reel-to-reel recorder and a signal processor for the Cart Machine. Its built-in Chroma Amplitude and Velocity Error Correction (CAVEC) and Dropout Compensator (DOC) are the same as those employed in the TCR-100's Signal Processing Unit (SPU).

There's a lot more to the story. Check your RCA representative for complete details.

The TR-70C . . . its most important extra is value.

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Videomobile Puts TPR-10 Portable Quad Tape Recorders "On the Road"

The teleproduction van designed and equipped by Videomobile Systems, Hollywood, gets the crew wherever it has to go—fast, and ready to shoot.

"The new production vehicle is maintaining the busy schedule projected for it, producing program material and commercials for television," reports Cleve Landsberg, Marketing Manager for Video Mobile.

Neatly nested in the van are two TPR-10 portable video tape recorders, the first of these units delivered by RCA. With limited space available, the TPR-10's are mounted one above the other in roll-out drawers. Separate drawers are provided for the transport and for the electronics of each of the recorders.

Additional controls for the two tape machines are remoted to the van's technical director's console, only a few feet away. The drawer-mount arrangement provides a smooth, shock-resistant ride for the tape units and permits easy access for operation and maintenance.

While designed for portability, the TPR-10 is fully compatible with quadruplex tape machines in tape speed, format and high-band signal-handling systems. It provides 20-minutes of "on-location" studio quality recording in full color.

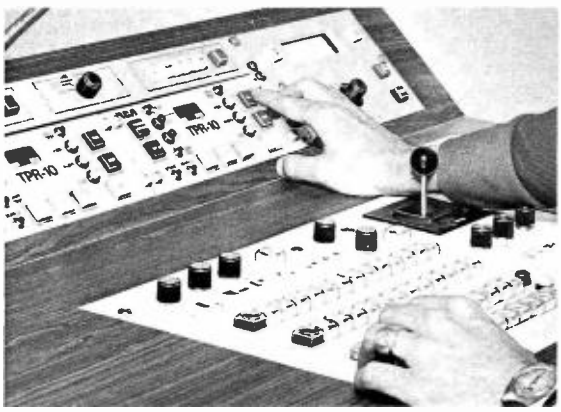
Recent assignments for the Videomobile van include a two-day, ten-location shoot in Las Vegas. The TPR-10's proved equal to the task of handling the fast-paced action, delivering high quality color tapes. Another credit for Videomobile was the "on-location" outdoor recording of a "Lawrence Welk Show".

Having two TPR-10 tape machines provides Videomobile with added flexibility for different recording situations, Mr. Landsberg says. For example, the second VTR can be used to simul-record a protection master. Or each can be used to record from separate cameras. And, of course, when not needed otherwise, the second unit serves as a system backup.

Two features that Videomobile has found particularly useful in operating the TPR-10 are the color playback and erase capability. Instant playback, in color, is especially helpful to a client for evaluating the take just recorded, while the erase feature saves time and tape stock.

Van on the Run. Videomobile Systems teleproduction vehicle is compact but complete, with cameras, tape, audio and video switching.

TPR-10 quad VTR's are drawer-mounted in van in front of video switching position.



Remote control of portable VTR's is delegated to technical director's console.

Commercial Communications Satellite Services Inaugurated By RCA

A new chapter in America's communications history began early this year when RCA inaugurated the nation's first domestic communications satellite system.

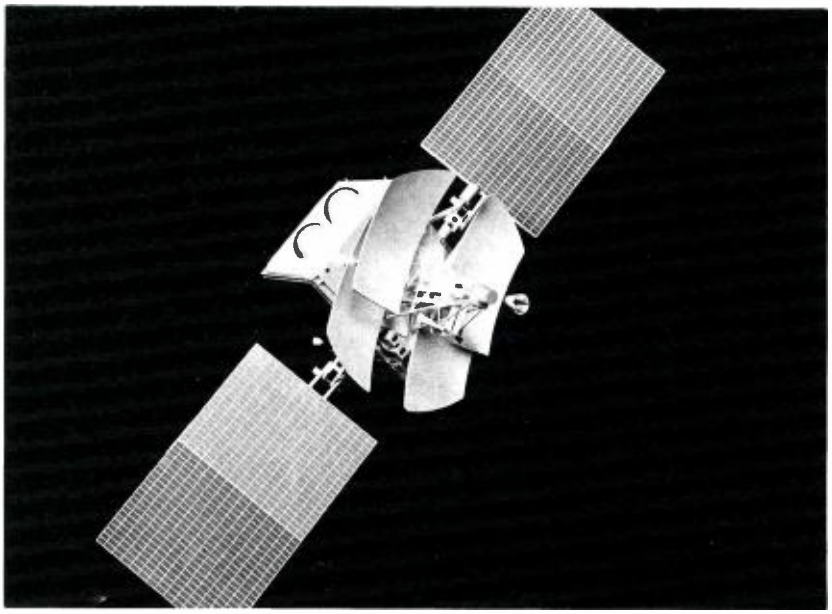
RCA Satcom (Phase I)—employing four earth stations and using leased circuits on Telesat Canada's Anik II satellite—is a forerunner of the much larger system RCA plans to place into operation in 1976, according to Howard R. Hawkins, Executive Vice President of RCA.

"The unique value of the RCA Satcom system is its ability to bridge the continent at low cost, carrying all forms of electronic information in vast quantity—voice or image, message or data," he said. "And it permits us to do this without digging trenches for underground cables or building relay towers."

Mr. Hawkins said RCA Satcom's rates for a private line voice circuit between New York and San Francisco are as much as 25 per cent below those for a comparable terrestrial circuit. For example, the present monthly rate for a leased voice-grade circuit between New York City and San Francisco is $2,298 for a terrestrial line. Equivalent service via the RCA Satcom system is $1,700 plus local facilities charges.

An Alternate Voice/Data circuit between the two same points is presently $2,566 a month via a terrestrial system, compared with $1,700 per month via the RCA Satcom system, plus the cost of local lines.

The RCA Satcom system is operated by RCA Global Communications, Inc., and RCA Alaska Communications, Inc. The four initial earth stations in operation near New York City, San Francisco, Juneau and Anchorage cost approximately $10 million.



Design model of one of three domestic communications satellites which RCA Astro-Electronics Division is building for RCA Global Communications. Each spacecraft will have 24 transponders, each of which can carry telephone conversations, color TV transmissions, high-speed computer data and other communications traffic.

Besides message telephone service, the RCA Satcom system may also be used for network television transmission services.

Orders for cross-country circuits on the Satcom system have been received from companies in such diverse industries as finance, data processing and shipping, as well as from government agencies.

Looking ahead, Mr. Hawkins said the RCA Satcom (Phase II) system is expected to be in operation by 1976 and will employ technical features that are expected to make it the most cost effective of all domestic communications satellite systems now planned.

It will use three RCA-owned satellites and ground stations to provide these communications services for the United States. In addition to the four earth stations now operating, the others will be located in or near Atlanta, Chicago, Dallas, Denver, Los Angeles, Seattle and Washington, D.C. Several earth stations will be built in Alaska, including those at Valdez, Prudhoe Bay, Nome and Bethel.

First Black-Owned TV Station To Be RCA-Equipped

WGPR-TV, a new UHF station slated for Detroit, Mich., has ordered RCA studio and transmitting systems valued at approximately $1.1 million. The order includes a complete transmitting facility, color TV cameras, and tape, telecine and cartridge tape systems.

Dr. William V. Banks, WGPR, Inc.'s President, and General Manager, said the station will be the first black-owned and operated TV station in the nation, and is scheduled to begin broadcasting late this year.

WGPR-TV, which will operate on Channel 62, will install an RCA TTU-60C UHF television transmitter and a TFU-25G pylon antenna.

RCA's latest video tape cartridge system, the TCR-100A, will automate airing of sequences of commercials, promotional material, station identifications, and other short taped segments. The cartridge machine will operate in conjunction with a TR-61 reel-to-reel recorder, with both systems sharing the same signal-handling electronics.

A second TR-61 will handle production and other video tape recording and playback. The station also will install a complete TK-28 color TV film originating system and two RCA TK-45A live color cameras.

George White, WGPR-TV's vice president and program director, said that most of the station's programming will be locally produced. "We plan to create at least 85 percent of our own programs," he said.

Mr. White noted that the station plans a full range of popular programming, including the "dance party," quiz and game shows and black "soap operas," much of which will be broadcast "live".

IN THE VIEWFINDER

KSTW-TV Adds $1 Million In New Studio Facilities

KSTW-TV, an independent station serving the Seattle-Tacoma, Wash., market, has ordered RCA color TV broadcast systems valued at more than $1 million for its new studio facilities. The order is for a full range of studio equipment, including: TCR-100 video tape cartridge systems; TK-28 color telecine systems; TR-70C video tape recorders and TK-44B cameras.

RCA's video tape cartridge system, the TCR-100, will automate KSTW-TV's station breaks by broadcasting sequences of commercials and other short taped program segments at the touch of a button. A second TCR-100 will be used primarily for production of local commercials, promotional announcements and public service messages.

Crawford Rice, KSTW-TV's Vice President and General Manager, said the video tape cartridge format is essential to the efficient operation of the independent station. "We carry the full burden of originating commercials, promos, public service announcements and other short programming material," he said. "During our broadcast day, that adds up to a tremendous number of spots. With two cartridge machines, we'll be able to meet these on-air requirements and still have production equipment available for our own needs and those of local advertisers," Mr. Rice added.

The station's call letters were KTNT-TV until its recent acquisition by WKY Television System Inc. It wil continue to serve the Seattle-Tacoma market on Channel 11, and is building and equipping a complete new studio complex, with occupancy expected early next year.

Cox Broadcasting Group Orders Six TCR-100's

Cox Broadcasting Corp. of Atlanta, Ga., has ordered six TCR-100 video tape cartridge recorders, valued at approximately $1 million, for its television station group.

The purchase is one of the largest for the TCR-100. The Cox group was one of the earliest users of TCR-100's. Its stations in Atlanta, WSB-TV, and in Charlotte, N.C., WSOC-TV, installed systems in the fall of 1972.

Walton Enterprises Orders Six RCA Transmitters

Three radio stations and a TV station in the Walton Enterprises group, based in El Paso, Tex., will install new RCA transmitting equipment.

The six-transmitter purchase includes a 50-kilowatt VHF unit, TT-50FH, and a Superturnstile antenna for KELP-TV, Channel 13 in El Paso.

Walton's radio outlets, KIKX, Tucson, Ariz., and KDJW, Amarillo, Tex., each will receive a 5-kW and a 1-kW AM transmitter to provide a 5-kW authorized daytime power, and a reduced power signal for nighttime. The 5-kW Ampliphase units, Type BTA-5L, will have power cut-back capability allowing them to be used for night standby.

In Fort Worth, Tex., the third radio station, KBUY, will install an Ampliphase 50-kilowatt AM transmitter, BTA-50J.

Rubin Masters, Director of Engineering for Walton, said the KELP-TV antenna will be mounted on a tower atop Franklin Mountain in El Paso. The tower rises over 6100 feet above sea level, making it the highest TV antenna platform in Texas.

The equipment will be transported to the tower base site via overhead cable tramway, which provides the only access to the transmitter building. Equipment for remote control operation of the transmitter is included in KELP-TV's order.

Studio and Transmitting Equipment Ordered by the Outlet Company For Two TV Stations

The Outlet Company, headquartered in Providence, R. I., has ordered RCA television transmitting and studio equipment to update two of its TV stations.

The order includes a 50-kW VHF transmitter; a 25-kW unit; two TK-45 color TV cameras, and RCA's new TCP-1624 automatic cartridge film projector.

The film projector is the TV industry's first automatic system for broadcasting an uninterrupted sequence of short subjects from 16mm film cartridges, and is the film counterpart of RCA's TCR-100 video tape cartridge recorder. The Outlet Company was one of the first U. S. broadcast groups to install the cartridge tape system in 1971, and is again leading the way in modernizing its film-handling equipment.

Billy Patton, Director of Engineering for the station group, said the addition of the new film equipment will provide flexibility in station operations. "We will be able to automate our station breaks in the cartridge format and still choose film or tape for commercials, news clips, station identifications and other program segments," Mr. Patton said.

The TCP-1624 projects into a television camera a maximum of 24 film cartridges in a continuous sequence. Each cartridge contains up to two minutes of film. Transitions from one film cartridge to the other, on each of the unit's two film transports, occur in less than 200 milliseconds, making them virtually imperceptible to the TV viewer.

WJAR-TV, Channel 10 in Providence, will install a TT-50FH, 50-kilowatt transmitter, replacing an RCA unit in operation for nearly 20 years. The new parallel transmitter features solid state circuitry and has only six electron tubes.

The 25-kilowatt unit on order, RCA's TT-25FL, is slated for WDBO-TV, Orlando, Fla., which also will install a TBF-6AM butterfly-type antenna.

KCST-TV To Broadcast 5-Megawatt Directional Signal

KCST-TV, San Diego, Calif., will be broadcasting a five-million-watt, maximum-power directional signal later this year when it switches on a new RCA transmitting system.

The Western Telecasters Inc., station has ordered a 110-kilowatt transmitter and 25-gain pylon antenna, an equipment combination which will enable the station to broadcast a directional signal at the maximum radiated power for UHF outlets.

Two parallel 55-kilowatt UHF transmitters, Type TTU-55, are included in the order, along with monitoring, terminal and remote control equipment. The new RCA TFU-25 DAS (skull pattern) antenna will be installed on the station's existing tower.

Mel Wheeler, KCST-TV's President, said that Channel 39's higher power transmitter and new antenna will provide signal saturation of the station's coverage area.

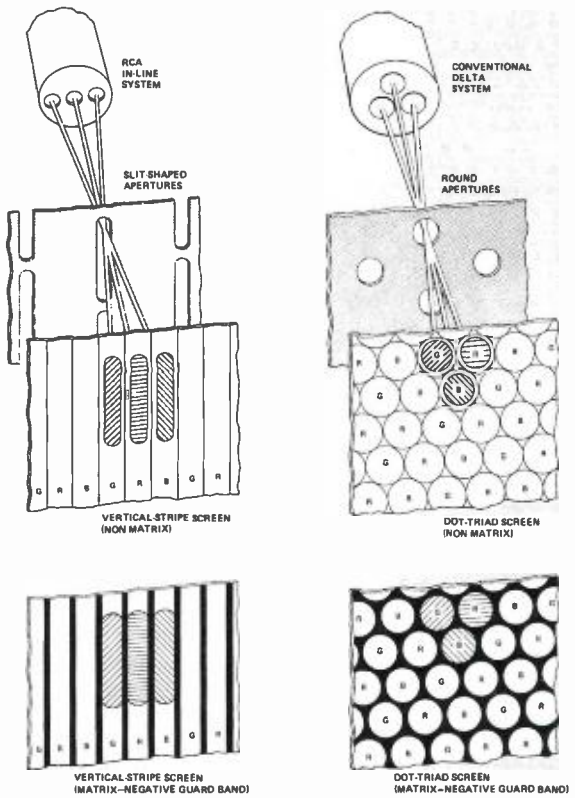
New Color TV Picture Tubes

The latest advancements in color television tube technology, which include the extension of the precision in-line concept to large screen color tubes employing 110-degree deflection angles, were demonstrated at the 1974 IEEE Spring Conference by RCA Electronic Components.

As part of the demonstration, the company showed a complete 13V, 15V, 17V and 19V line of the highly successful 90-degree matrix precision in-line tube system as well as 110-degree delta tri-color-dot tubes in 19V and 25V sizes.

Wide angle (110-degree) deflection color tubes provide a smaller diameter electron beam spot size which results in improved picture resolution (sharpness). The wider deflection angle also reduces the over-all length of the color tube by 4 to 5 inches, thus offering the potential for more attractive cabinet styling.

The extension of the precision in-line concept to 110-degree deflection color tubes provides a system which, in addition to improved picture sharpness, offers the potential of cost savings through the elimination of complex circuit components and dynamic convergence adjustments. The RCA precision in-line system permits the permanent attachment of the deflection yoke to the tube, thus simplifying installation and eliminating costly and time consuming color tube alignment at both the factory and the home.



Comparison between new RCA precision in-line and conventional tri-color-dot delta color television picture tube systems.

WREC-TV Memphis, Orders $2 Million RCA Studio Package

WREC-TV, Memphis, Tenn., will equip a complete new television studio facility with RCA broadcast equipment valued at more than $2 million.

The studio package includes live color TV cameras, video tape and film systems as well as switching and audio equipment.

The New York Times Broadcasting Service Inc. station is building its new studio and office complex on a Mississippi River bank site in downtown Memphis.

Five RCA TK-45A automated color cameras are included in the order, as well as two TR-70C video tape recorders. Two RCA TCR-100 video tape cartridge systems will automate WREC-TV's station breaks and will be used for airing commercials, program promotional material, station identifications and other short taped program segments. Color film programming will be broadcast by four TK-28 color film originating systems.

Two TS-70 production switchers and a TS-70 master control unit will provide transitions and special effects during program preparation, and sound will be controlled from two BC-100 custom-built production audio consoles.

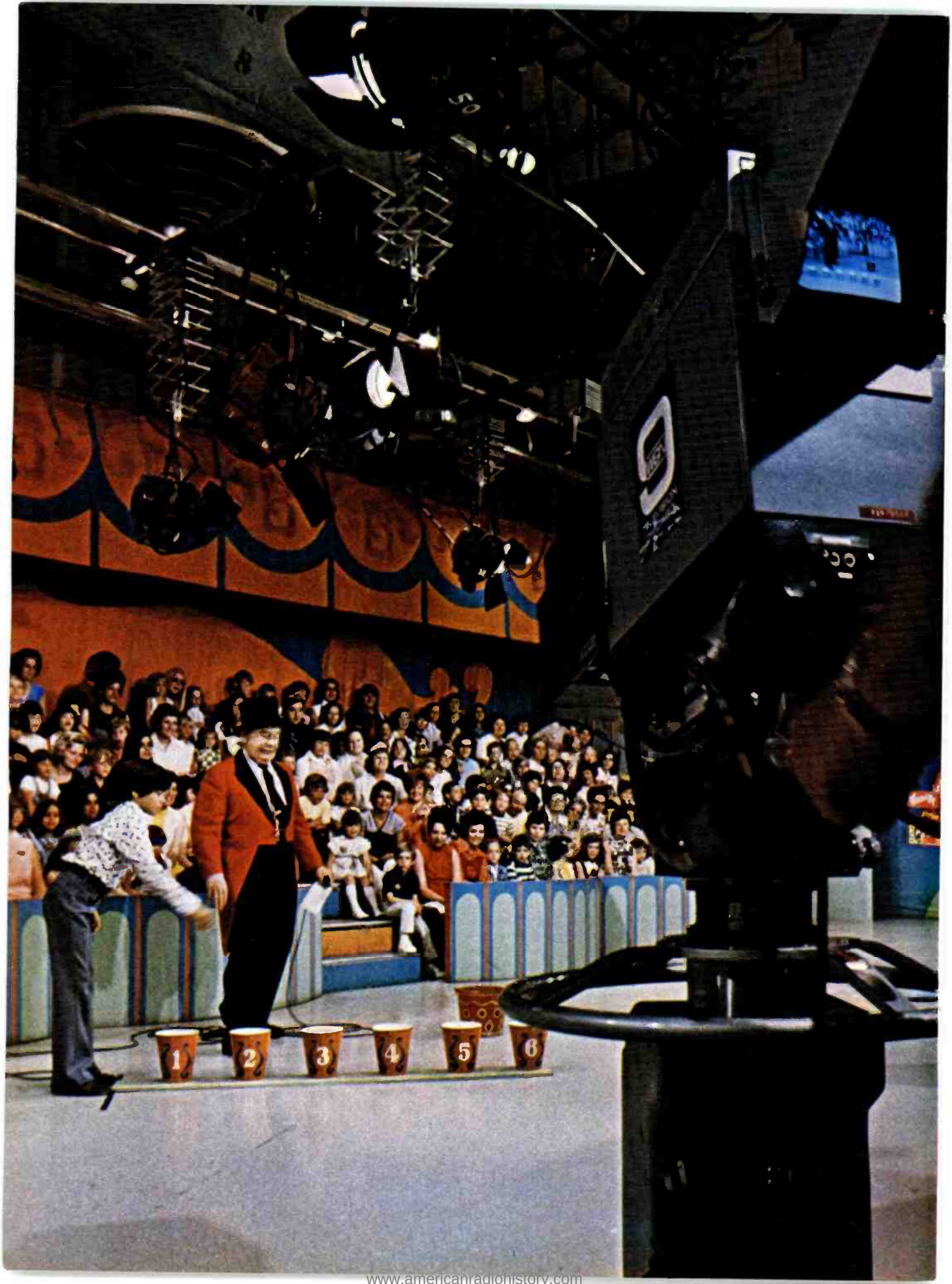
Charles B. Brakefield, WREC-TV's President and General Manager, said the RCA system is scheduled for completion before January 1, 1975, the date marking the beginning of the station's 20th year of broadcasting.

RCA will design the layout of the dual-studio facilities and begin installing equipment in mid-1974. Until the new complex is ready for use, Channel 3 will continue broadcasting from its present studios in the Sheraton Peabody Hotel.

Mr. Brakefield explained that the need for additional space prompted the construction program. With the new facilities WREC-TV will have complete technical capability for producing entertainment, news and public affairs programming as well as commercials.

The 37,000 square-foot two-story building will be constructed of glass, rock and concrete to blend into the river bluff overlooking the Mississippi. The station plans to originate some local programming from an outside patio using the picturesque river bluff as a backdrop.

Subsequent to the studio purchase, WREC-TV ordered two 25 kW TT-25FL transmitters to replace their current 20-year old original transmitter. The new transmitting plant will be operated as an Alternate-Main system, with automatic switchover in the event of a failure in the on-air transmitter. □



Long-running favorite, "Bozo's Circus" is more popular than ever with WGN-TV audiences. It is one of many live programs presented by Television 9.

WGN Continental Broadcasting Company Marks Fifty Years of Service

The "Next Event" tag supered on this TCR-100 might refer to the second "Cart" machine being installed in WGN-TV's tape room. The new system is the 200th TCR delivered by RCA.

"The history of WGN is a long and proud one of service, quality in programming, integrity and creativity. Today, just as in 1924 when our call letters first went out on the airwaves, we live and abide by one of our first beliefs . . . 'to be the very best broadcasting operation in the nation.'"

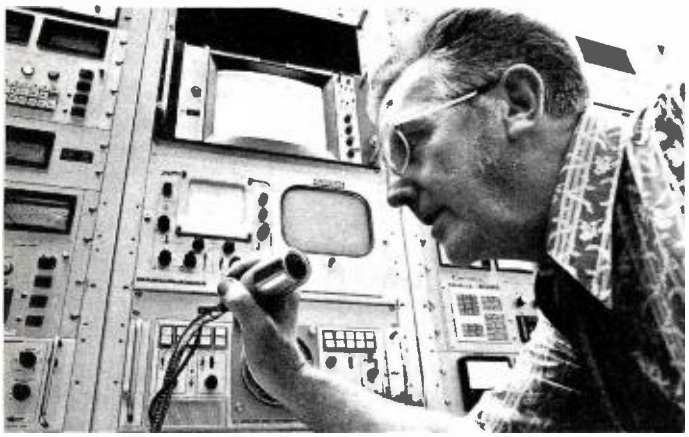
This statement by Daniel T. Pecaro, executive vice president and general manager of WGN Continental Broadcasting Company, befits the Company's fiftieth anniversary in broadcasting.

"Fifty Years of Service" is a mantle worn proudly but not lightly by WGN, Chicago. It is a logical and fitting extension to the Company's long-standing creed "The most respected call letters in broadcasting". Since the WGN call letters were first aired in 1924, the emphasis has been on excellence in both quality of service and in technical facilities. Innovations, awards and achievements came early and continue as an on-going tradition. The list of broadcasting "firsts" scored by WGN radio and television is imposing. Display cases line several walls of the WGN Continental Broadcast Center, and contain many WGN broadcasting awards and memorabilia.

The magnitude of the WGN Continental broadcast operations is readily appreciated by visitors to the Center. The main building is an attractive two-story window-wall structure which houses the world's largest independent broadcast facility. It sits on 21 acres of ground, with generous parking area, its own heliport, and ample unused acreage for future growth. The staff numbers more than 550.

Included in the Center are administrative and operating offices as well as complete radio and television studio and production facilities. Remarkably, the Center has been able to keep pace with changing technology and expanding production requirements.

BROADCAST NEWS, Vol. #112, December 1961 included a cover feature article on WGN's new broadcast facility and its early commitment to color programming. The



"RF" Room at WGN Continental Broadcast Center houses remote control and monitoring for AM and TV transmitters. It is located adjacent to Master Control.

In the Film Room, machine controls for the four TK-27 film systems are remoted to a central panel. A second set of remote panels is in Master Control.

article depicted the facilities, planning and the then-current color programming. Since that time, there has been virtually a complete update of the equipment complement and considerable expansion in the area of equipment.

In spite of a substantial increase in production, the facility was so well planned that it has been able to adapt to the increased workload.

A moving force in the planning and design of the WGN complex at 2501 Bradley Place was Carl Meyers, Vice President for Engineering. Mr. Meyers, a broadcast industry pioneer and a veteran of four decades with WGN has retired. Technical operations are now the responsibility of Ralph Batt, Vice President and Engineering Manager, and Woodrow "Woody" Crane, Chief Engineer.

Technical facilities for television bear out the fact that the WGN Continental Broadcast Center is a major production facility. The equipment complement includes:

- 9 Quad VTR's (3 assigned to WGN Continental Productions Company)
- 12 TK-44 Cameras (4 assigned to the TV-9 mobile unit)
- 4 TK-27 Film Islands
- 2 Mobile units (a new 4-camera 40' trailer, and a smaller 3-camera unit for WGN Continental Productions)

The Broadcast Center includes three large television studios identical in construction and completely isolated from each other. Studio #3 is assigned to WGN Productions. A fourth studio, garage-like, has a large turntable for displaying cars, trucks and other large products. One additional small studio is on the second floor and is used for some news broadcasts and station breaks. Two large and fully isolated radio studios are also on the second floor.

Utilization of the studios is such that the sets are removed after each show, even those used daily such as the news set. Even with this flexibility, the facilities are strained. Without it, some production and programming would have to be curtailed or handled elsewhere.

Cameras

Twelve TK-44 cameras are in use—eight in the Bradley Place studios, and four in one of the mobile units.

The cameras, which Mr. Crane calls "the best on the market," have performed very well for WGN. From the technical side, the reliability, fast warm-up and minimal maintenance requirements of the TK-44's are noteworthy.

Production and programming people are even more enthusiastic in commenting on the quality of color. Bill Lotzer, Production Manager, says "you can really tell the cameras when doing a sporting event—like a Black Hawk hockey game. When the puck leaves the ice and zooms into the darkness of the stands, the '44's adjust to changes in the scene and pick up the detail. The others don't make it."

The TK-44 cameras work a rigorous schedule. The three studios are usually scheduled solid during the day, with two or three cameras used for each show.

Control positions for the eight studio cameras are located in Master Control. A patch panel next to the Master Control console provides flexibility by permitting camera switching among the studios. Up to four cameras can be used in any selected studio.

WGN's new 40-foot mobile unit with its complement of four, and wired and capable of six, TK-44's rarely has a day off. Because of WGN's extensive live sports programming, the utilization of the mobile unit is remarkable. During the baseball season, the van shuttles between Wrigley Field and White Sox Park, covering the home games of both the Cubs and the Sox.

In the Fall, Black Hawk Hockey is broadcast, along with a number of high school sports events, including football, basketball and swimming. In some cases, regional championships and tournaments are covered simultaneously, so that outside remote units must be rented to supplement WGN's two mobile vans (one owned and operated by WGN Continental Productions).

Video Tape Operations

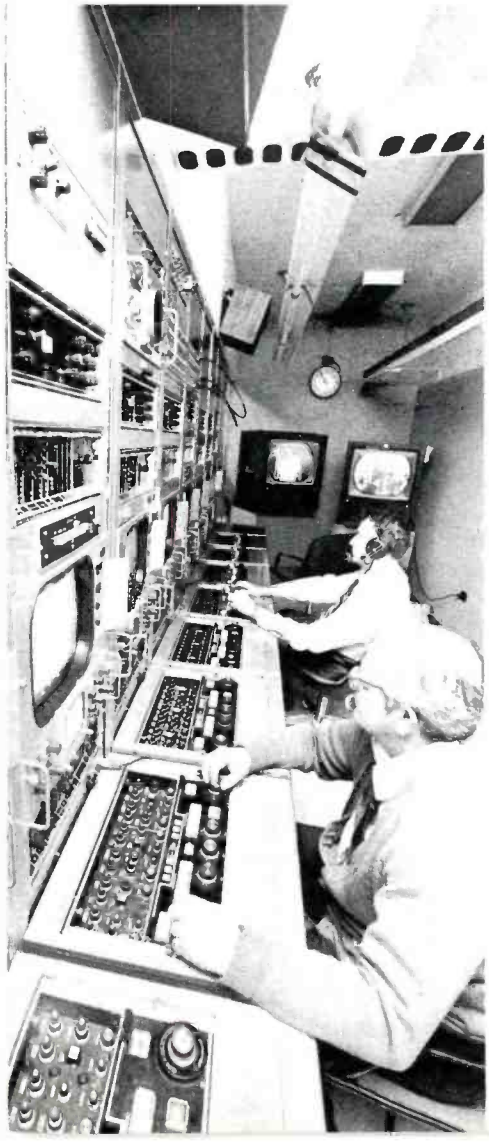
With heavy programming, production and syndication requirements, the WGN video tape operation is bustling. Three VTR's in a separate Tape/Editing Room are for WGN Productions' use. Six quad machines are in the main Video Tape Room, sharing the space with a TCR-100. The "cart" machine has been in use since early 1973, and has made its presence felt. It has relieved the burden on the VTR's so that more production can be accomplished with the available machines, and with fewer scheduling conflicts.

As a result of the TCR-100's effective performance, WGN-TV ordered a second machine. Their new "Cart" system has a special significance: it is a milestone for RCA, representing the 200th TCR-100 delivered.

The first "Cart" machine is used for dubbing and playback of commercials and PSA's, and is averaging 140 plays per day. It has become accepted to the point where a failure of the TCR-100 causes a mini-crisis in the tape room, recovering spot tape reels and loading the reel VTR's.

With the installation of the second TCR-100, Chief Engineer "Woody" Crane sees much more flexibility of operation. There will be ample back-up capability to avoid panic situations.

And there will be extra capacity to move into other operational areas with the TCR's. More film spots and ID's can be moved into the "cart" format. And the TCR's might be utilized for standard show



"Phil Donahue Show", nationally syndicated by Avco Broadcasting, is telecast live from the WGN studios. Here Phil and Bob Hope exchange pleasantries during a June 1974 performance.

openings and closings, sign-ons and sign-offs. Further along is the potential for using the "cart" machines for selected production assignments. Since WGN Continental Productions Company often requires multiple dubs of many commercials, the TCR can be used as the master for making dubs on a reel VTR.

Smooth switching and uniformity of on-air color are two TCR-100 technical features that Mr. Crane appreciates.

Mr. Crane notes that the second TCR-100 will result in increased productivity for the video tape room. More production can be accomplished, since more VTR's will be available for dubbing and production assignments as well as for programming.

Current plans call for a complete rearrangement of the crowded tape room, with the two TCR-100's positioned opposite each other, separated by an aisle. More space must be provided for "cart" storage, since the station now maintains an active file of 2,000 cartridges, with the number growing constantly. A recent addition is the accessory Cartridge Winder.

Film Projection Room

The WGN-TV film projection room includes four complete TK-27 islands, with six TP-66's; four TP-100's; two TP-7A's and two 35mm Film Projectors.

According to Mr. Crane, the film systems are used extensively for programming, commercial playbacks and for production. There has rarely been a requirement for making up a spot film reel, and with the addition of the second TCR-100, the need for doing so is most unlikely.

Camera shading for twelve TK-44 cameras. Bottom photo shows eight shading positions in Master Control. Top photo is of interior of WGN's mobile unit which includes a normal complement of four cameras, with controls available for six.

Four film screening rooms adjoin the film projection room, and are in regular use, since WGN's policy and practice is to screen every piece of film and tape received for content, technical quality and moral acceptability.

Machine controls for all four film islands are remoted to a central panel in the Film Projection Room as well as to Master Control.

"RF" Room

Remote control and instrumentation for both the AM and TV transmitters is centralized in a small area near Master Control which is designated as the "RF" Room.

In addition to the studio Remote Control equipment and Automatic Logging outputs, the room includes the radio and television STL microwave racks, and a two-way radio system for communicating with the traffic helicopters, and for dispatching news, film crews and motorcycle couriers. Also mounted in this area is a RCA AVQ-10 weather radar display monitor.

The WGN engineering group modified the weather radar, cutting the scan speed in half, thereby resulting in a substantial increase in sensitivity. In addition, a flat-plate antenna was installed to increase gain and eliminate side-lobe response.

A TK-21 monochrome camera is focused on the weather radar display tube. The signal is fed through a colorplexer and is distributed around the building on an assigned channel.

TV Transmitter/Antenna

Since 1969, WGN-TV's Antenna and Transmitter have been located atop the John Hancock Center. The transmitter is a TT-12/12EH, a 25 kW parallel system, and the Ch. 9 antenna is a Zee Panel mounted on the West Tower of the Center. "Woody" Crane is a firm believer in the parallel transmitter configuration because of its reliability and protection against lost air time.

The TT-12/12EH Transmitter replaced a 50 kW TT-50AH which was installed in 1956 in the Prudential Building, then Chicago's tallest structure.

Engineering Trends

The Engineering Department for the WGN Continental operation numbers more than 130 persons. With the operation and maintenance for the television and radio stations, seven studios, two video tape rooms, a film projection room, two mobile units and transmitters, even this sizable staff is extended.

In coping with ever-increasing workloads, Mr. Crane acknowledges a number of encouraging technical developments, including reduced equipment size, and simpler, more reliable circuitry, with more automated functions. He sees this trend extended in the future to increased application of "black box" modular technology—with plug-in replacements or even "throw-away" modules which are already being utilized in some consumer products.

Programming An Independent

As an independent operating in a market with three network-owned stations, Television 9 had to carve a niche for itself.

Identity was essential, as was alternative programming. WGN-TV met the challenge by stressing live programming, especially sports, and by relating closely to the community. The theme line "WGN *is* Chicago" is not limited to programming, but is carried through all levels of operation at WGN.

"WGN probably carries more live programming than any station in this country," says Jack Jacobson, Vice President and Group Program Manager. Exclusive of sports, about a third is syndicated tape and the balance film.

Strong News Department

While counter-programming is a major consideration, frequently the network offerings are met head-on. News is one such area. The WGN evening news at 10 P.M. is pitted directly against the three network station news programs, and holds its share of audience. Television 9 also provides a half-hour of news for the late-late audience before sign-off. Comprehensive local news reporting and coverage of special interest areas accounts for WGN's ability to compete directly with the network news.

The news staff is a combined operation, covering both radio and television. News Manager "Chuck" Harrison has a full-time staff of 55, plus "stringers" throughout the coverage area. News bureaus are also maintained in Washington and in Springfield, Ill.

To expedite delivery of fast-breaking news film, the station operates a squad of radio-directed motorcycles as well as news mobile units. These motorcycle couriers rush film from the news site to WGN for fast processing and airing.

WGN's extensive news facilities include a daily feed of national and international news from TvN Inc. as well as from UPI, AP and City News wire services. The station is also superbly equipped for weather reporting, including the radar system. The accuracy of weather reporting has been such that WGN provides a weather service to selected subscribers.

Programming Pattern

"For an independent to succeed," Jack Jacobson says, "it must establish a solid identity with the market and the audience."

Television 9 signs on week-days with "Top-of-the-Morning", a live half-hour farm program, the only station in the market to offer a farm show.

The morning program format is a proven winner for locking-in viewers. WGN-TV's live children's programs have dominated the market for years, with personalities that youngsters readily relate to. The "Bozo the Clown" Show is an elaborate daily production with a complete 16-piece band and guest acts to support "Bozo" and his troupe of regulars. The show has been such a phenomenal success in the market that the waiting list for tickets now extends to *seven years*. It is said that couples apply for tickets at the same time that they apply for their marriage licenses.

"Garfield Goose" has been a popular puppet/cartoon show aired by TV-9 since the early fifties, hosted, written and produced by Frazier Thomas.

Counter-programming is most evident in the important 5-7 P.M. period. WGN-TV fills this slot with highly successful sit-coms which carry the audience into prime time. During the prime period, sports events or first-run syndicated series such as "World at War" are shown, along with non-network specials and movies. WGN's film vault includes hundreds of first-quality movies. On Sunday afternoons, "Family Classics" hosted by Frazier Thomas draws excellent ratings, even when matched against the NFL football game.

In maintaining its high ratio of live programming, WGN-TV is constantly seeking out special events to cover, as well as new sports. The station broadcasts more local parades than any in Chicago, including such perennials as St. Patrick's Day, Columbus Day, Christmas, and "Pet Parade". Five state high school championships are televised.

Extensive Sports Coverage

From the beginning, sports programming has been the hallmark of WGN and WGN-TV. In addition to the customary baseball, football and hockey games, other sports events covered include basketball, swimming, tennis, golf, bowling, horse racing and soccer plus hunting and fishing shows. The quest for sports events with audience appeal is never-ending. This year, the Chicago Fire World Football League and WFL network games will be carried by TV-9. WGN radio will be broadcasting the Chicago Bears for the 22nd consecutive year along with "Big Ten" football every week.

Nationally recognized Jack Brickhouse, busiest of America's baseball television announcers and the radio voice of the Chicago Bears, is Vice President and Manager of WGN's award-winning radio and television sports department.

Programming Trends

In keeping with its community-oriented tradition, WGN provides extensive public service programming. "People-to-People"; "Issues Unlimited" and "Charlando"—the latter a Spanish language program—are some of the shows produced at TV-9.

Harry Trigg, Program Director for WGN-TV observes a number of trends in the area of programming. There is a large increase in the "made for television" movies, he notes. More three- or four-part "Mini-Series" are also being produced now.

The proliferation of advertisers on movie schedules is producing a counter-trend, Mr. Trigg adds, where a single sponsor buys the total time period and is able to develop better identity with fewer commercial breaks.

"Trade-out" or "barter" programming (such as the Lawrence Welk Show) is also occurring more frequently according to Jack Jacobson.

On the negative side, Mr. Trigg says, rising costs coupled with confusion and controversy on commercial content, are making it increasingly difficult for local stations to produce quality children's programs.

Programming for television was never easy and, with the trend to longer operating hours, the demand for suitable material to fill the time slots is making it increasingly tough. WGN-TV is now on-air over 20 hours a day, 144 hours weekly. WGN Radio is a 24-hour a day operation.

Innovation Easier for Independents

An uncommon programming practice which is working at WGN, Mr. Jacobson reports is that a new program concept is developed first and is approved and scheduled *before* being presented to Sales.

Operating as an independent is not without its advantages, Mr. Jacobson remarks with a smile. It permits more flexibility in scheduling as well as added opportunities for innovations in service. This Fall, for example, WGN-TV has rented time on a communications satellite to provide direct live coverage of the Chicago Fire football game from Hawaii—which probably qualifies as a "first" for a non-network station.

The sponsorship ratio of WGN-TV, Mr. Jacobson concludes, reflects the independent status of the station, with 70 percent being local and 30 percent national.

Production Dept. Handles Facilities Scheduling

Fortunately, Bill Lotzer, Production Man-

A familiar sight in Chicago's sky, WGN helicopters have logged over 19 million miles, receiving the first citation awarded by the FAA for broadcast helicopter service.

Weather reporting facilities at WGN include the radar system shown here.

Baseball is a major part of WGN's extensive sports coverage which keeps the TV-9 mobile unit busy year 'round.

ager, Television, has the knack of keeping cool under fire. The "cool" is necessary, since his department, in addition to handling production for WGN-TV, is also responsible for the scheduling of all studio facilities, including the mobile unit. All screenings are scheduled by Mr. Lotzer's department. On occasion, as many as five screenings, tape and film, are going on simultaneously.

WGN-TV carries 148 baseball games and provides facilities and manpower for producing 138 White Sox games. Black-Hawk hockey games are also aired, along with regular coverage of other seasonal competitive sports.

The video tape operation, Mr. Lotzer says, goes on practically around the clock. During the day, sometimes two or three events are going simultaneously, straining the facilities and resulting in scheduling problems. All of the baseball games are taped, as are many incoming programs which are broadcast on a delayed basis (Hughes Network Sports, for example).

WGN Continental Productions, while having three VTR's assigned specifically for their use, sometimes has a need for additional machines.

The Phil Donahue Show is produced at WGN studios and aired live from 10-11 A.M., and is also taped. Within an hour after the show, a tape of the program is hand-carried to Dayton by messenger for syndication by AVCO.

Because of its excellent facilities and central location, WGN-TV serves as the origination point for independent network programs (such as CBC in Canada). Big 10 basketball games are covered by the TV-9 mobile unit for the TVS Television Network. In these cases, a tape dub is made for back-up.

As a result of all the tape activity, a tape spot reel had to be assembled for trouble-some time periods—especially the evening news show. This usually occupied an engineer and a production man for two or three hours a day, according to Mr. Lotzer. And, he adds, "The 'cart' machine has helped production by relieving the strain on the VTR's. The spot reel is no longer necessary, and the tape spots are aired smoothly and automatically with the TCR-100."

WGN Continental Productions Company

"Brad" Eidmann, Executive Vice President and General Manager of WGN Continental Productions Company, is responsible for a good share of the usage of the WGN Continental Broadcast Center.

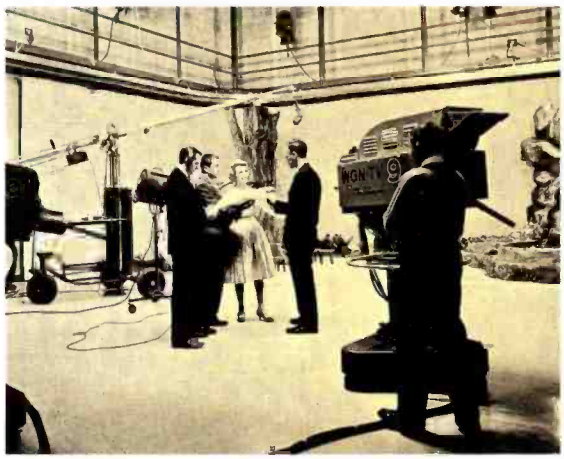
A subsidiary of WGN Continental Broad-casting Company, the Production Company has its own separate tape room, operates its own 3-camera mobile unit, and is assigned Studio #3 for in-house production work.

WGN Continental Productions, Mr. Eidmann notes, is the largest production/post-production facility between the Coasts. In production work, he quickly adds, quality personnel outrank equipment and physical resources. Mr. Eidmann is con-vinced that his staff of producers, directors

First remote broadcast of the Kentucky Derby in May, 1925. A corps of eight radio observers included Quin Ryan, Frank Dahm, Charles Correll and Freeman Gosden.

Young "old timers" at WGN gather around historic microphone used at the famous Scopes trial which took place in 1925 at Dayton, Tenn. Pictured (left to right) are Carl Meyers, V. P. for Engineering; Quin Ryan (seated) who reported the trial via radio broadcasts; Jack Brickhouse, nationally known sportscaster and now V. P. and Manager of WGN's Sports Department; Bob Elson, announcer and sportscaster, and announcer Pierre Andre.

An early WGN-TV color production was the widely acclaimed "Treetop House".



"Stop, Look and Learn"—one of TV-9's initial television presentations.

and creative people are second to none. Their performance credentials are most impressive.

WGN Continental Productions has been in business since 1960 and has produced thousands of commercials, hundreds of "series" syndicated shows, and a host of "specials". The "Great Music" series won a Peabody Award and gave the Production Company a start in syndication. This was followed by the long-running "Barn Dance" and the popular "Evening With . . ." series featuring top-name entertainers. Recent credits include the "Pearl Bailey Special" and "Phyllis Diller is a Circus".

Emphasis on Video Tape

The client roster for commercials reflects the consistently high quality standards maintained by WGN Productions. Sears-Roebuck, Household Finance, Texaco, Pabst Brewing and Englander are a sprinkling of the companies whose commercials are currently on the production schedule.

At WGN Continental Productions, Mr. Eidmann remarks, 80 percent of the end product is video tape and 20 percent film. This ratio probably does not hold for the teleproduction industry, he says, but was a natural consequence of WGN Productions' origin as the outgrowth of a television station, rather than a film house.

In addition to commercial and program production, WGN Productions is frequently involved in closed circuit television presentations. One such was a 61-city CCTV feed of AT&T's annual meeting. A Dental Convention at the Conrad Hilton Hotel was highlighted by a large-screen live television pick up of oral surgery by the WGN Productions remote unit.

Production Trends

Mr. Eidmann, too, is aware of the TCR-100 and its role in increasing productivity by releasing tape machines for programming and production.

In teleproduction work, he sees a quickening trend toward merging film and tape techniques. In video tape, for example, much more use is being made of the single TV camera moving about, covering a number of angles—then going to post-production, using editing effects, sharp cuts and inserts to achieve the final result. More emphasis on creativity, particularly in video switching and effects as well as in camera work is also a welcome trend, Mr. Eidmann observes.

Public Affairs—A Strong Voice

In station organization, Public Affairs can be relegated to a symbolic, catch-all operation. However, under the capable direction of Alexander C. Field, Jr., Vice President and Manager of Public Affairs for group stations, it is definitely not that at WGN group stations.

Public Affairs is endowed with a separate staff, management muscle and strong involvement in all community-related operations, including, of course, programming. It maintains its own staff of writers, film crew and other creative people. From four to six public affairs documentaries

WGN . . . A Few Historical Highlights

1924 Radio station purchased by Chicago Tribune, and call letters WGN were assigned (an acronym for the Tribune slogan, "World's Greatest Newspaper").
. . . baseball play-by-play was inaugurated.
. . . coverage of Republican and Democratic Presidential Conventions.
. . . Radio's first Amateur Hour started.
. . . Football broadcasting began, with live coverage of #77—Red Grange —leading the Illini to victory over mighty Michigan.

1925 Direct coverage of Scopes "Monkey" trial from Tennessee.
Kentucky Derby broadcast for first time.
Indianapolis "500" race broadcast.

1926 Comedy team of Sam 'n Henry—later to achieve fame as Amos 'n Andy.

1928 First musical variety commercial program.

1932 First direct coverage of football from West Coast.
Staff of engineers and announcers sent to Lost Angeles to broadcast Notre Dame vs. California game.
During Thirties—built new radio broadcast studio, complete with theater, adjoining the Tribune Tower.

April
1948 First Ch. 9 telecast—Jack Brickhouse covering Golden Gloves Boxing from Chicago Stadium.
Early TV shows included the long-running "Great Music from Chicago", "Blue Fairy", "Amateur Hour", and "Garfield Goose and Friends"—which is still on the air, hosted by Frazier Thomas, and just as popular as ever with succeeding generations of children.

1956 New antenna and TV transmitter installed at Prudential Building— "Maximum power from the highest tower".
First color programming started.

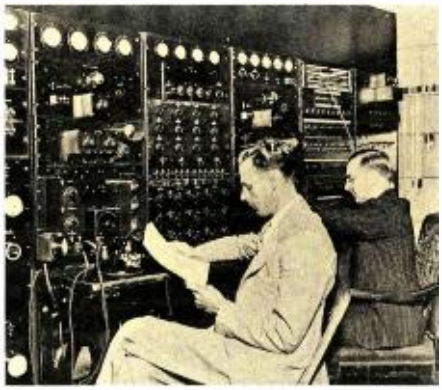
1959 Peabody Award for musical entertainment.

1961 Dedication of Mid-America Broadcast Center (now the WGN Continental Broadcast Center), one of the largest and finest radio and television facilities under one roof.

1964 WGN granted the first, non-governmental heliport license in Chicago.

1969 New antenna and transmitter installed at John Hancock Center.

1973 New 40' TV Mobile Unit put in operation.



Radio Master Control at the Drake (circa 1928). Shown at the controls are Engineers Clyde White (deceased) and Ken Curtis.

"Calling All Cars!" WGN's Chief Engineer Carl Meyers (extreme left in picture) giving first test of police radio when WGN relayed messages to wide-eyed detectives in squad cars, in March, 1929.

are produced yearly, and these are separate from the series of "docs" and investigative studies developed by the News Department.

Program planning is done six to 12 months in advance according to Mr. Field.

Traffic is a major program responsibility of WGN Public Affairs. The station maintains a Heliport on its Bradley Place grounds, from which two jet-powered traffic helicopters operate for morning and evening commuter traffic coverage. The 'copters are manned by assigned police officers who can—and do— use the traffic 'copters for police work such as emergency rescues, fires, vehicle chases.

The WGN helicopters have logged over 19 million air miles, recently receiving the first citation ever awarded by the FAA for broadcast helicopter service.

A number of religious programs are carried by WGN as a public service, but all are locally produced by the stations with one notable exception—that being the Mormon Tabernacle Choir.

WGN, as a policy, does not accept political advertising of less than five minutes, on the premise that it takes this length of time to properly develop a viewpoint. Since this eliminates the saturation spots common to most campaigns, the stations get little political advertising revenue.

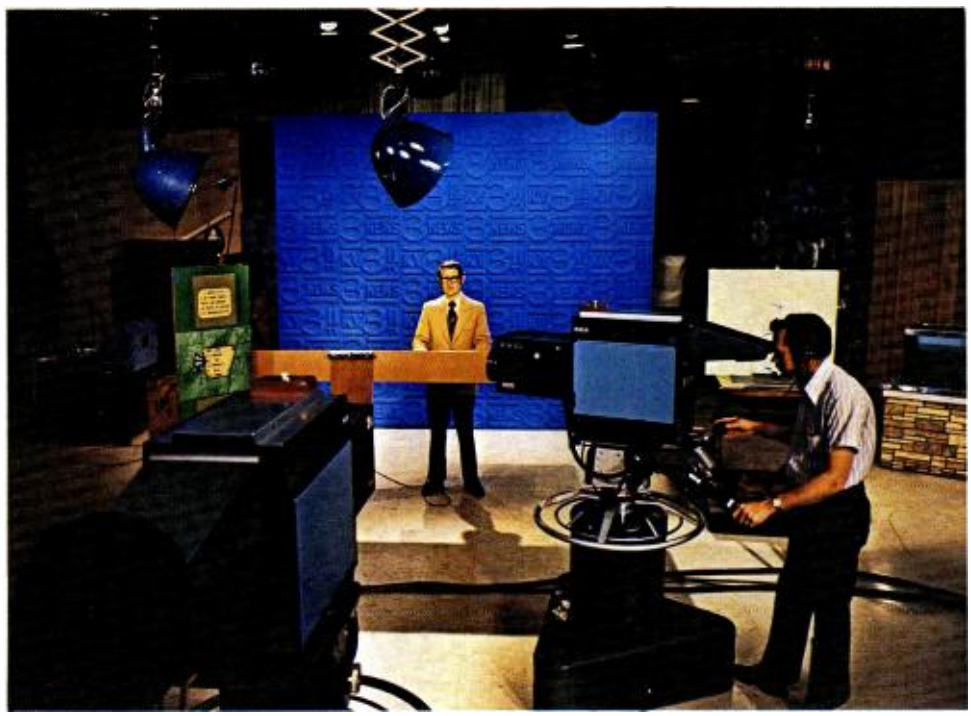
In building strong community ties, Public Affairs representatives meet with local groups on a regular basis to discuss needs and exchange ideas for community betterment.

As an extension to the Public Affairs participation in many local functions, WGN, as a company policy, encourages all of its people, particularly department managers, to be active in their communities.

WGN also advocates active membership and participation in job-related organizations. Consequently, the company is well represented on many NAB committees. Mr. Pecaro is on the Television Board of Directors; Mr. Batt is a member of the Engineering Advisory Committee; Mr. Field is Chairman of the Minority Affairs Committee, and Patricia Nealin, WGN-TV Film Manager, was recently elected President of AWRT (Association of Women in Radio and Television).

Fifty Years of Service

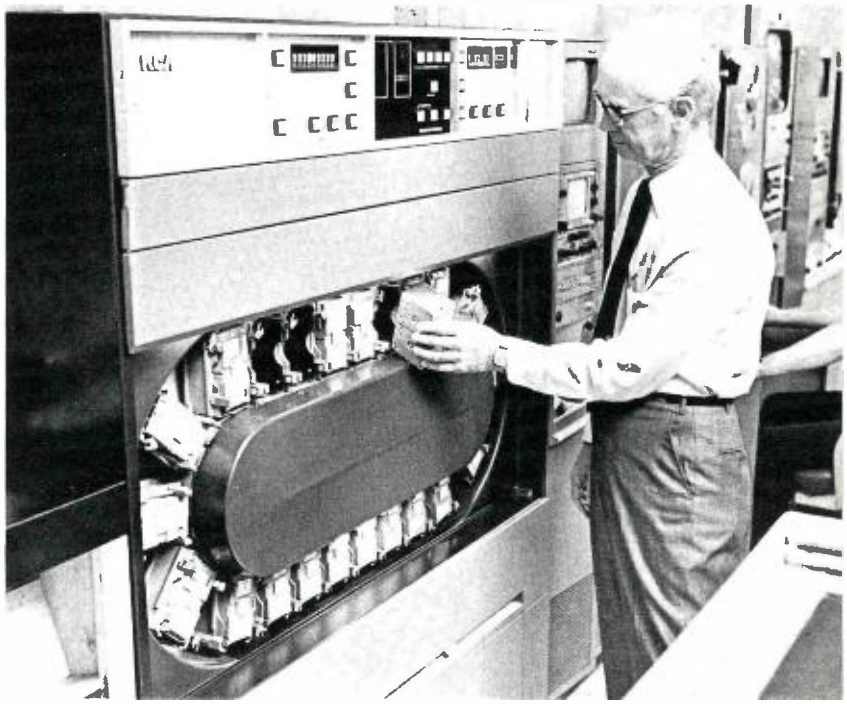
The WGN Continental Broadcasting Company success story of fifty years might well be summed up in the phrase "the public be served". The innovations in programming, the constant improvement of technical facilities, the on-going community/human relations activities all focus on bringing the best in broadcasting service to Chicagoland. And it follows that this dedication to service relates directly to the WGN credo: "the most respected call letters in broadcasting". □



RCA TK-45 Cameras focus on Dick Willingham's mid-day news.

Sound Station Management Keeps KYTV's Picture Bright

Chief Engineer E. Dennis White, left, discusses station plans with General Manager Donald Moeller.



Dennis White operates the RCA Basic Buy Console during the glorious 1950's. Today, Dennis loads one of his latest acquisitions, the TCR-100 Cart Machine.

May 16, 1953, was a memorable day for KYTV Channel 3, Springfield, Missouri. On that day the first piece of equipment was rolled through the station's doors. At the same time, KYTV adopted an investment principle of planned replacement and updating of equipment. Continuous innovation in technology and operation, along with an overall profit-oriented policy, has kept this pioneering Ozark station on a par with most of the major market giants.

The results of this policy are evident in today's facility. RCA TK-45 Cameras in the studio, a TCR-100 tape machine, and a TT-30FL Transmitter have helped the station to keep pace with the latest state-of-the-art.

One of the men most responsible for instituting and carrying out this business plan is E. Dennis White, KYTV's first employee. It was engineer Dennis White who carried in the first piece of equipment in May of '53. Now, twenty-one years later, it's chief engineer Dennis White who continues to be a prime mover in the growing success of KYTV.

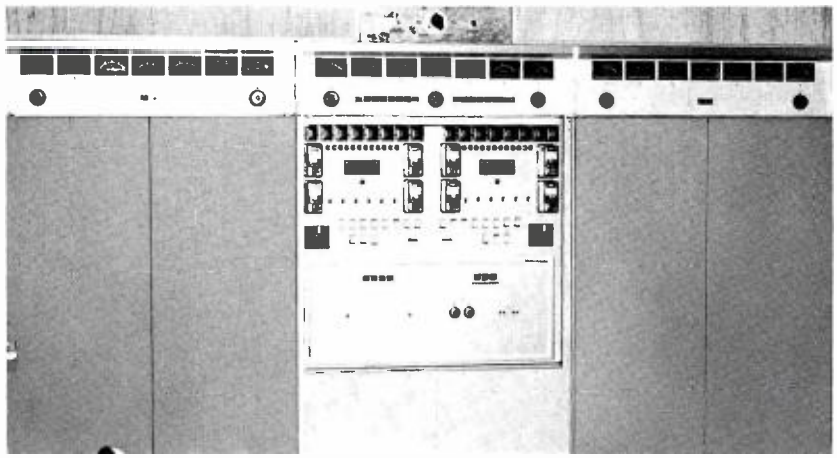
From the outset there has been a constant effort to keep the technical facility of the station as modern as possible. In fact, while still working out the "bugs" in their initial RCA TT-10AL Transmitter, the station was moving ahead with another new piece of gear . . . microwave. In August '54 microwave was carrying live programs from the Ozark Empire Fair. And plans were already in order for the installation of a new 25 kW transmitter that would give the enterprising station maximum authorized power.

Early mobile videotape unit

Video tape was introduced to KYTV in 1959, and by the summer Dennis and his crew were riding through Middle America with one of the most complete and earliest mobile video tape units in the country. Meanwhile, back in the studio, 1960 saw the original RCA TK-20C "ike" vintage film chain updated with the addition of a new TK-21 vidicon model.

In 1962, the biggest addition to the innovating station arrived in the form of a 1609-foot tower that was erected at the

At the transmitter site in Fordland, Missouri, this RCA TT-30FL Transmitter, with twin 15 kW transmitting units, provides maximum redundancy.



station's new transmitter site in Fordland, Missouri, twenty-one air miles from the studio. At the time, the tower lacked by only sixty-one feet of being the tallest tower in the world. The TT-25AL Transmitter was moved from the studio to the new location.

Today, an RCA Superturnstile Antenna and tower stands 2000-feet above the ground. A TT-30FL Transmitter is found in the building below. The decision to replace the reliable TT-25AL Transmitter in 1970 was rather basic decision making for KYTV. The old unit was in its fifteenth year and future plans called for remoting the transmitter operation. The more efficient TT-30FL, with twin 15 kW transmitting units offering maximum redundancy, was a logical choice.

Network origination from KYTV studios

While aggressively pursuing their policy of planned replacement and updating of equipment, KYTV has never lost sight of the big picture—their responsibility to inform and entertain the viewing audience. During a continuous 5 year period in the 50's, the ABC network chose to originate programs from KYTV's modern studios in friendly "down-town" Springfield. The big network show was Ozark Jubilee starring Red Foley. This 60 minute, initial network country music show, was fed live to the network. This was quite a tribute to the station's reliable equipment and professional personnel.

The present production schedule often requires the studio crew to work around-the-clock producing commercials for both their own local advertisers as well as some advertisers from the other stations in their market. General Manager Donald S. Moeller proudly views this as a strong measure of the station's position in this 85th market.

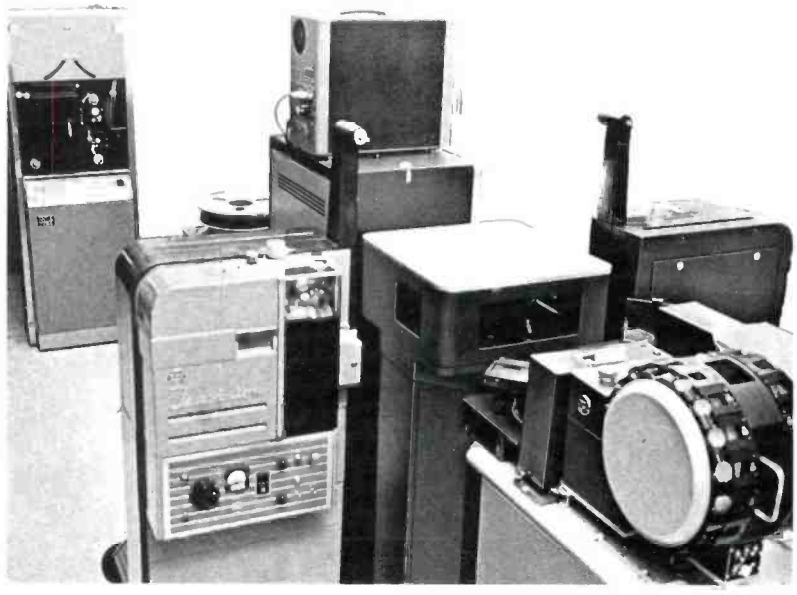
New TK-45A Cameras

The KYTV studio is well prepared to handle this ever increasing production work. Just recently the station took delivery of two RCA TK-45A Cameras, as replacements for the old TK-42's which helped the station go color in 1966.

The old cameras had performed reliably for over seven years. The time was right to invest in the superior TK-45's. "Because we do so much video taping, it's very important that we get the cleanest tape possible," said Dennis White, "and that means we have to start out with the very best pictures from our cameras."

"The TK-45 with its advanced automatic features and ease of operation is one beautiful piece of equipment. I can't honestly imagine another camera coming along to replace it. Perhaps its replacement will be an even smaller camera, but I can't conceive of a better picture. The 45's should be good for at least ten years," added Chief Engineer Dennis White.

KYTV plans to experiment with one of the TK-42 models by using it as a third studio camera. The other TK-42 will be used exclusively for televising their regularly scheduled Sunday church services, which up to now were done in mono.



The two film islands both contain TK-27 Cameras, but future plans call for the inclusion of an RCA TK-28 Camera with advanced automatic correctional features.

Director Larry Wood calls the shots from behind the TS-70 System 260 Video Switcher. Elevated location allows full visibility of studio, master console, monitors, and all film and tape sources.

TCR-100 Cart Machine and TR-60 reel-to-reel slave unit were purchased in 1973. The cart has eliminated set-up headaches usually associated with the station's hectic 10 PM News Show, which is jammed with 15- and 20-second spots.

The studio's two color film cameras are both TK-27's. One dates back to '65 and the other to '68. Dennis White anticipates that the station's next major equipment investment will include a couple of new RCA TK-28 film cameras, with features such as automatic color balance, pre-selectable "Chromacomp" color masking, and automatic white-level and black-level control.

TCR-100 for station breaks

The studio's tape equipment presently includes an RCA TCR-100 "cart" machine, plus four TR-60 reel-to-reel recorders. The TCR-100 was purchased as a slave to a TR-60 with which it time-shares the signal-handling electronics. Thus, the station also received an extra reel-to-reel recorder to help with its growing production assignments.

This cost-effective package can record cartridges from the line or from reel-to-reel tape. It can record reel-to-reel from cartridges.

At KYTV, the TCR-100 is really appreciated during the 10PM News which is loaded with 10-, 20-, and 30-second spots. "Normally we would have to load and stack all these commercials and then literally run to the different sources," explained Dennis White. "Now, most of these spots are dubbed to carts. The operator simply loads the carts, programs the sequence register according to the program log, and cues the cart. He can then forget the TCR-100 and concentrate on the film islands. It's truly a mechanical marvel," Dennis White added. The TCR-100 practically takes care of all the station's programming assignments and frees the reel-to-reel machines for production.

Looking at the station's four TR-60 tape machines, one quickly sees that their compact size is ideally suited to the neatly tailored physical layout of Master Control. Two of the units have the capability of the Tape Editing Programmer (TEP). The TEP functions in conjunction with the electronic splicer to determine the actual splice position. Splices to an accuracy of one TV frame can be accomplished by programming TEP.

Nationally syndicated productions

In handling the production work for the nationally syndicated "Virgil Ward Championship Fishing Show", TEP permits the editor to preview the many edits without destroying the original material. KYTV has been producing this show for the past nine years. Masters are recorded every Friday. Dubbing usually runs from Monday to Wednesday, and the show is then distributed to over ninety stations across the nation. Dennis White points out that the station has never received a complaint of any serious nature on the quality of the finished products. That's strong praise for the performance of the TR-60's.

The TR-60's, along with the TCR-100 and the two film islands are all tied-in to the RCA TS-70 System 260 Video Switcher. This custom switcher was purchased in 1973 to provide increased switching capability to adequately meet the increased production demands put upon the control room staff.

In addition to added switching capability, the TS-70 delivers more stable effects and cleaner lines. The new unit has sixteen video sources, two chromakeys, and two complete special effects systems. At KYTV, it is strategically located atop an elevated platform directly behind the master console, giving the director a full 360 degree view of the studio and control room.

The evolution leading to the TS-70 Switcher included an early model TS-4A Switcher, then a TS-5A with only five inputs and a lap dissolve, a TS-11A with eleven inputs, and then a TS-40 which remains in the master console as an auxiliary switcher.

Also included in the master console is an RCA BC-100 Custom Audio Console. KYTV's system consists of ten mike inputs feeding two output channels. Five of the inputs have an equalizer submodule to provide separate low and high peaking freqency equalization. One output channel goes directly to air while the second channel feeds the audio distribution amplifiers which in turn feed every recorder in the room.

Unique audio production room

The station's emphasis on audio is clearly evident in the custom designed audio production room located just off the master console. The room provides an excellent facility in which an announcer can leisurely record the station breaks and promos for the following day, without any interruption of production or programming in the master control room. The announcer's booth audio can go straignt to air or be mixed with the audio console.

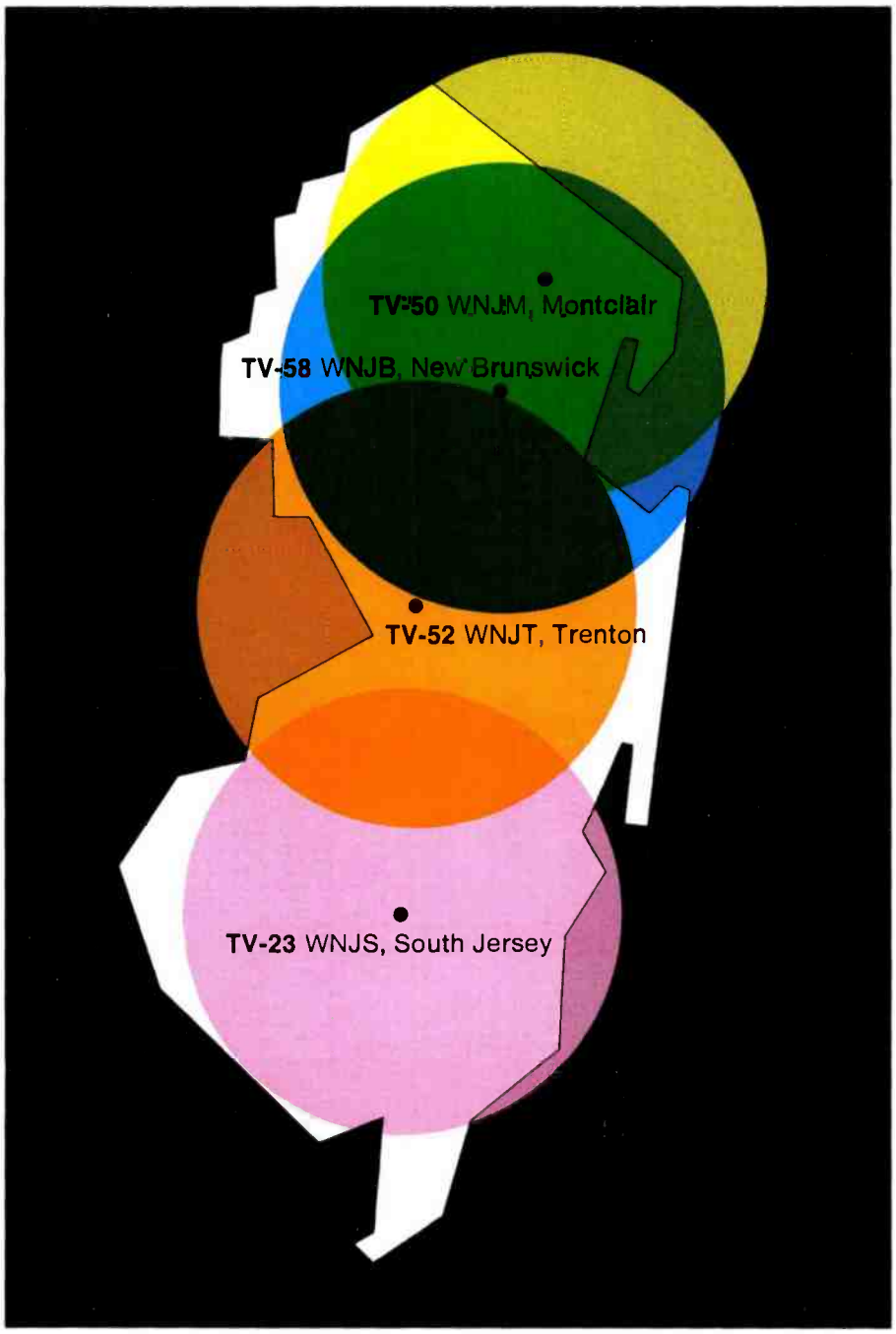
The rear section of the audio room is specially designed for doing voice-overs on 16mm films. A 16mm projector has been carefully recessed into the wall, with insulation limiting the noise leakage from the machine to an acceptable level for recording.

In a one-man operation, the announcer conveniently runs the film and strikes the necessary voice-over information. Again, everything is done without disruption to activity in master control.

The new audio production room, although relatively insignificant to the overall station activity, typifies KYTV's constant concern with bettering itself. Innovation is something the station has never shied away from. To remain "number one" the station realizes it must constantly strive to improve itself.

In summing up the station's success over the years, Dennis White gives special credit to the business acumen of KYTV's Board of Directors. "They have always taken pride in the station's accomplishments and have never hesitated to invest dollars to maintain and improve its profit picture," Dennis White concluded. □

(Top) Custom designed audio production room includes first class announcer's booth in foreground, and unique production area in rear for doing voice-overs on 16 mm film.
(Bottom) Handling the chores at the master console during a busy taping session of "Championship Fishing" are Truman Krumholz, left, working the camera controls, Clinton Deason, center, at the TS-40 Switcher, and Dan Woodall, right, at the BC-100 Audio Console.



Color overlays on map show coverage areas of the four Jerseyvision UHF broadcast stations.

Wielding the shovel for this distinguished groundbreaking crew is Dr. Edward J. Meade, Jr., Chairman of the New Jersey Public Broadcasting Authority. Other participants include (left to right) John Wilner, Director of Engineering; Maurice M. Veneri, NJPBA member; Henry P. Becton, NJPBA member; and Dr. Lawrence T. Frymire, Executive Director.

JERSEYVISION: *A New Vision for New Jersey*

A major mission of any broadcast station is to serve the needs of its community.

But what if the "community" is an entire state of the union?

That's the job cut out for the New Jersey Public Broadcast Authority and its network of four public TV stations, collectively known as "Jerseyvision".

The state of New Jersey is in a unique position as far as television goes. Located between the number one (New York) and number four (Philadelphia) national markets, it has no commercial VHF stations to serve its own people's needs for information about local events.

To fill this gap, New Jerseyites voted $7.5 million in public funds to establish the Authority.

Since all the VHF channels in the Northeast area were assigned, it was decided to set up a network of four UHF stations to blanket the state.

The first of these, Channel 52 in Trenton, went on air in February of 1971. Its call letters are WNJT-TV.

Then in October 1972, WNJS Channel 23 in Waterford Works joined the net to cover South Jersey.

Finally on June 2, 1973, WNJM Channel 50 in Montclair and WNJB Channel 58 in New Brunswick were activated to serve the North Jersey area.

The entire complex was equipped by RCA on a turnkey basis. "We have as fine a facility, from a production point of view—the tools that we work with—as any station I'm familiar with," according to Dr. Lawrence T. Frymire, Executive Director of Jerseyvision.

Information please

Since its inception, Jerseyvision has rapidly grown to serve the needs of New Jersey people. The visitor at its Trenton studio and headquarters is immediately struck by the spirit of dedication exhibited by the Jerseyvision staff. The most pressing immediate need was for local news and public affairs programming, which had been covered only sketchily by New York and Philadelphia commercial outlets. Now the state is served by a nightly half hour of news at 7:30 p.m., repeated and updated at 10:30. Programming at the moment is the same on all four Jerseyvision channels, but the installation of microwave return equipment this year, and the erection of a studio for each transmitter location in the next few years, will mean that eventually each station will be able to originate programming.

Keeping the public informed about statewide issues is the task of the locally produced "Assignment: New Jersey" series, which focuses on important state problems and opportunities such as offshore oil drilling, floodplain housing, management of environmental resources like wetlands and the Jersey Pine Barrens, development of port facilities, and mass transportation.

In the first years of its existence, Jerseyvision provided filmed coverage of the state legislature. Since the beginning of this year, however, it has become one of the few stations in the nation to offer extensive live and taped coverage of both floor debates and committee hearings, further carrying out its mandate to serve community needs. Some town meetings are taped, edited, and broadcast, too.

Sports coverage

Another lack remedied by Jerseyvision is the coverage of a wide and expanding range of local sports, both high school and college. This past year saw the first airing of the girls' high school state basketball tourney and the state wrestling championships.

The cultural heritage

New Jersey's historical and artistic resources get broad exposure from Jersey-

vision, also. This ranges from programs featuring New Jersey symphony orchestras, music festivals, state fairs, through programs on just about every visual art endeavor, to explorations of the area's historical heritage like a recent three-day series of remotes on the life and times of Atlantic City. Two locally produced special programs will be picked up by the Public Broadcast Service for nationwide broadcast. One, called "Gomberg at 82," traces the life of an aged immigrant to the state. The other is "Edison: The Old Man." PBS will also air "Caught in the Act," a Jerseyvision jazz series.

Excellence in this area of broadcasting has been recognized by the Corporation for Public Broadcasting and the National Endowment for the Arts with a grant to institute a filmmaker-in-residence program at Jerseyvision. Besides producing materials for the air, the filmmaker will be available to aid and encourage film students.

Minority access

Minority and local access programming is not forgotten, either. "Jerseyfile" is an access program in which groups from all over the state are given a platform to air their views, with production help from the station's staff. This program is one of the highest rated in the station's schedule.

Black staffers at Jerseyvision produce "Express Yourself" for the black audience, and "Imagenes" is produced by the Spanish-speaking staff for that audience, primarily Puerto Rican in the New Jersey area.

Education birth to death

Fully fifty percent of Jerseyvision programming is "instructional," in the strict sense of being primarily intended to augment the state's educational facilities. Business and industrial training programs are included, too.

This area of NJPB programming is the responsibility of Mrs. Mary Jane Phillips, who sees her assigned task as encompassing "education: birth to death," from preschool programs to adult continuing education.

Nine months of the year, instructional programming is presented from 9 a.m. to 3:30 p.m. It consists of fifty-two different program series aimed at all grade levels. Some higher-level courses are repeated in the early evening hours.

While locally produced educational programming will not get off the ground until next year, Mrs. Phillips draws on a broad spectrum of sources, prescreening some 200 educational series a year. The best of these are shown in November of each year for evaluation by teachers. Those best meeting teachers' needs are included in the following year's schedule. Jerseyvision supplies instructional materials so that each instructor can make the fullest possible use of the programming in his or her individual curriculum.

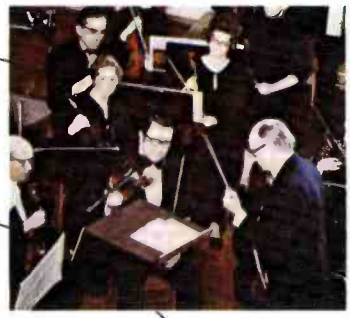
Mrs. Phillips points up the potency of television as an instructional tool by citing the fact that we remember 80 percent of what we see but only 12 percent of what we hear. She sees a trend in the field "to push out the classroom walls"— to show actual events rather than a lecturer at a podium.

She views the television experience as "the next best thing to everything." That is, most children in rural areas can rarely if ever travel to a symphony concert, but can see "the next best thing"— a TV performance in the classroom. And be enriched by it.

Jerseyvision participates in a nationwide system of educational stations that produce programming under the aegis of the Agency for Instructional Television, which will soon offer a program on career development for the fourth through the sixth grade. Titled "Bread and Butterflies,"

A TTU-60, 60 kW UHF transmitter is installed at each of the four statewide NJPB transmitting locations. The WNJT-TV, Ch. 52, Trenton facility illustrated is typical.

Outstanding musical performances highlight cultural programming for Jerseyvision.



New Jersey State Legislature sessions are covered regularly, both live and on video tape.

"Mi Casa, Su Casa" is a Spanish-language program originated by Jerseyvision.

Another local production is a crafts show with the "Tin Lady", Jean Ventrone.

New Jersey News Report is a half-hour program presented twice nightly.

Dizzie Gillespie is featured in a locally produced series of Jazz specials.

the program will help youngsters to set career goals and will stress a respect for all kinds of work.

To be locally produced as matching funds become available is a bicentennial series of programs featuring students' own productions. They will be encouraged to "do their own thing"—original dramas, music and dance, historical or cultural presentations—and the best will become programs in the series. A very good example of the constant striving at NJPB to relate the activities of the station to the lives of the people.

Programming is rounded out in the evening hours by offerings from the national schedule of the Public Broadcast System.

Geting it all on the air

The physical plant at Jerseyvision measures up to the programming challenge, according to John Wilner, Director of Engineering. Identical 60 kW RCA TTU-60B UHF transmitters at the four locations cover the state. And although the transmitters are alike, the antennas are different. The Trenton and New Brunswick antennas are RCA TFU-40Ks, while in the flat land of South Jersey's Channel 23, the high-gain TFU-46K is used. For the mountainous area around Montclair, the TFU-25G was chosen.

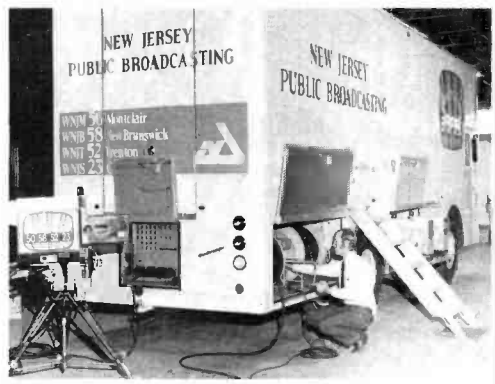
Jerseyvision studio equipment includes six TK-44 color cameras, four TR-70 video tape recorders, two TK-27 color film islands, and complete master control, video switching distribution, lighting and audio facilities. A TK-28 telecine system is being installed now. (Interestingly, the station processed about a million feet of its own film last year—mostly for news.)

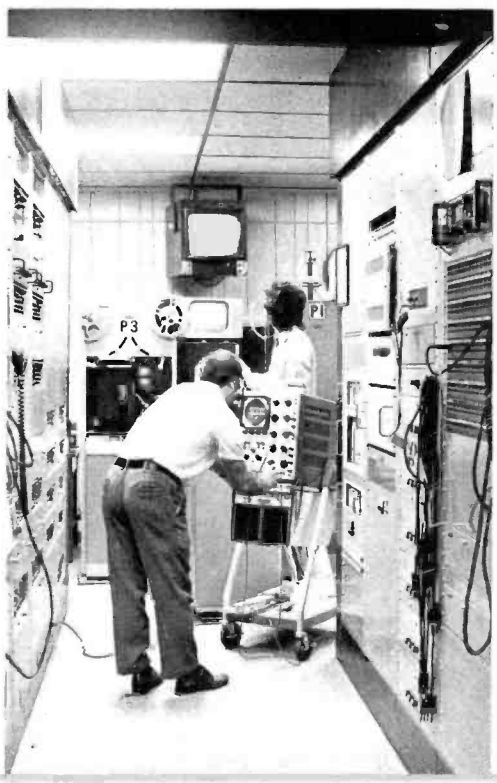
Executive Director Frymire has commented, "This equipment works well, and has done the job for us."

Engineering Director Wilner, a veteran commercial broadcaster, and the first recipient of the NAB Engineering Award is appreciative of the performance of the color cameras, and especially so with the TR-70 VTRs. He noted that with the new Alfecon II headwheel material, average headwheel life is above 1000 hours.

In addition, Jerseyvision has an RCA-equipped mobile van that gets more than its share of hard use, what with Jerseyvision's full schedule of news, public affairs, and sports. The expanded schedule calls for more than a hundred remotes this year. The van houses three TK-44 color cameras, a TR-60 video tape

Mobile unit houses three TK-44 Cameras; a TR-60; TS-51 Switcher and complete audio facilities.





Rows of audio and video distribution, patching and system control racks in Master Control area provide a convenient, fully accessible equipment arrangement.

Production console for one of two fully equipped studios at Jerseyvision's teleproduction center in Trenton.

recorder, a TS-51 switcher, and complete audio facilities.

And plans are under way for a "minivan," which will contain two portable color cameras and a VTR. It's planned that each camera will be a self-sufficient entity so that they can cover separate stories simultaneously, which could be particularly valuable for hectic election coverage. The minivan will be able to either supplement the existing van or to cover news on its own.

The next state of construction will be the installation of studio facilities in association with each transmitter, so that eventually each station can have its own individual program schedule. And a program initiated at any one site can be simulcast by any (or all) of the others.

Nothing succeeds like success

Jerseyvision is governed by a fifteen-member commission, including five cabinet officers, and is headed by Dr. Edward J. Meade, Jr. The rest of the board comprises ten private citizen members drawn from all professions and representing all areas of the state.

Funds come from the state of New Jersey and various governmental and private grants. A public funding program is in its initial stages. The Friends of New Jersey Public Broadcasting now number about 1000, and it's expected that fund-raising events will eventually include a broadcast auction like those that have been so successful at many other public TV stations.

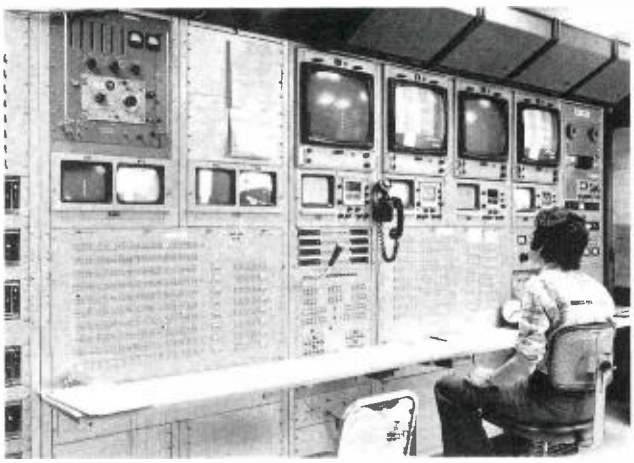
The success of Jerseyvision in its short life can be deduced from its substantial audience growth (25 percent in the last year alone).

Another stamp of approval for Jerseyvision is the awards it has garnered. In its first year it won the DuPont-Columbia School of Journalism Award for excellence in broadcasting. And in the past year, Jerseyvision was presented with two of the four television awards from the Philadelphia Press Association. One was for the best editorial content of news programs, the other for the outstanding public affairs program of the year. This was "Should the Lady Take a Chance?" It dealt with the pros and cons of extending legalized gambling in New Jersey.

Executive Director Frymire comments: "We realized as we came on the air that we were going to have to grab the brass ring the first time around, as far as quality in programming is concerned."

And: "We're pretty bullish about where we're headed, and about the support and acceptance of our activities."

And then he adds, "We're most proud of the people we have here and of the quality of our television product." □



Master Control for Ch. 52 (left).
(Right) Heavy tape production and program schedule keeps reels spinning on four TR-70 VTR's.

AT&T's Piscataway Teleproduction Center Shows Results of Extensive CCTV Experience

The AT&T Teleproduction Center occupies 6,000 square feet of this sprawling Piscataway, New Jersey complex.

Located in the rear of a large, one story industrial park building in Piscataway, New Jersey, AT&T's modern new Teleproduction Center is in the geographic center of at least a dozen other Bell System work locations within a radius of thirty miles. Its design and operating capabilities reflect the steady growth of the television medium as a major tool of corporate communications. As a capital investment, AT&T looks at its return on this investment as more cost effective training programs and improved employee communication and understanding.

With these goals in mind, and with six years of experience from its heavily used and smaller facility in lower Manhattan, the Piscataway Center is the translation of some definite communications plans into the hardware and staff to accomplish them.

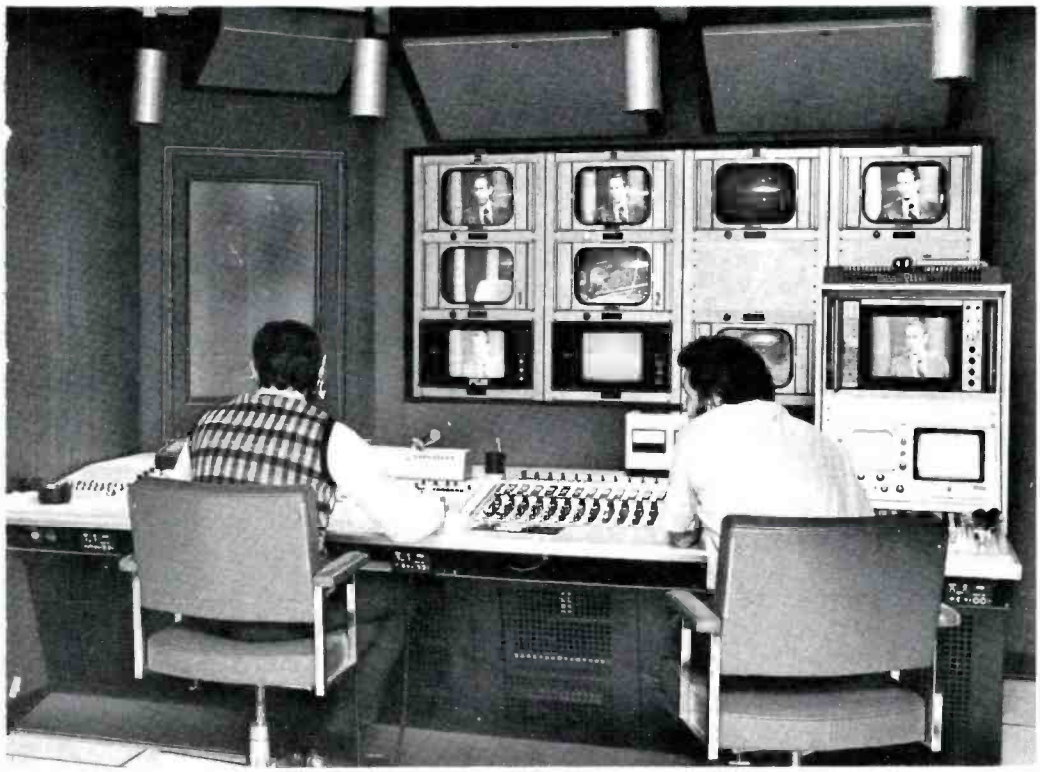
Studio and Control Room Facilities

RCA-TK-44 cameras were chosen for their cost effectiveness and quality. A 40 by 40 studio is equipped with a two-scene, pre-set lighting system with remote control at the director's console.

In the control room an RCA TS-51 System 14 Switcher and a BC-100 Audio Console are combined on a large production/engineering table which faces a bank of preview and program monitors. Behind these racks and the other control and switching equipment is a "work-way" for easy maintenance and accessibility. In addition to this master console the control room holds two VTR's, a film island with a 16mm and random access slide projectors, two 3/4 inch videocassette recorders, reel to reel and cartridge audio recorders, patching bays and an announcer's booth.

Designed to Meet Corporate Communications Needs

Although the facility might resemble a broadcaster's version of a studio, the reasoning behind the specifications is based on some unique corporate communications needs. For example, high resolution and low signal to noise cameras were an absolute necessity for the production of training material which requires changes and revisions due to pre-testing procedures. Editing and re-editing of



Compact master console includes an RCA TS-51 Video Switcher and BC-100 Custom Audio Console. Two-scene, pre-set light dimmer control is on side wall with preview and program monitors in background.

Director, left, calls on special effects of TS-51 System 14 Video Switcher. Four bus unit has two bus panels assigned to mix and effects and two for preset/preview and program. Engineer, right, operates joystick control for #2 studio camera while also keeping a hand on the audio fader controls. The BC-100, with 18 mike inputs and 2 channels out, is an audio-follow-video system that works especially well in quick-turnaround news shows and in cuts between local and remotes on network productions.

tested programs might take sequences into fifth and sixth generations before final approval is gained. Such material must maintain picture quality if it is to be acceptable in mass videocassette distribution and sometimes film transfer.

From "Talking Face" to "Soap Operas"

Television has progressed a great deal beyond the "talking face" at AT&T. At one time a studio which was able to handle a lectern or a panel of speakers could satisfy a client's needs. But with the increased dialogue between the "show-biz" audio visual experts and the new generation of instructional technologists, new techniques of communication require more space and studio versatility. One such training production involved two half-hour dramatic "soap opera" programs involving 18 sets and 20 professional actors. Each half-hour program was shot in two days and edited in one day apiece.

Proper Planning Extends Studio Outdoors

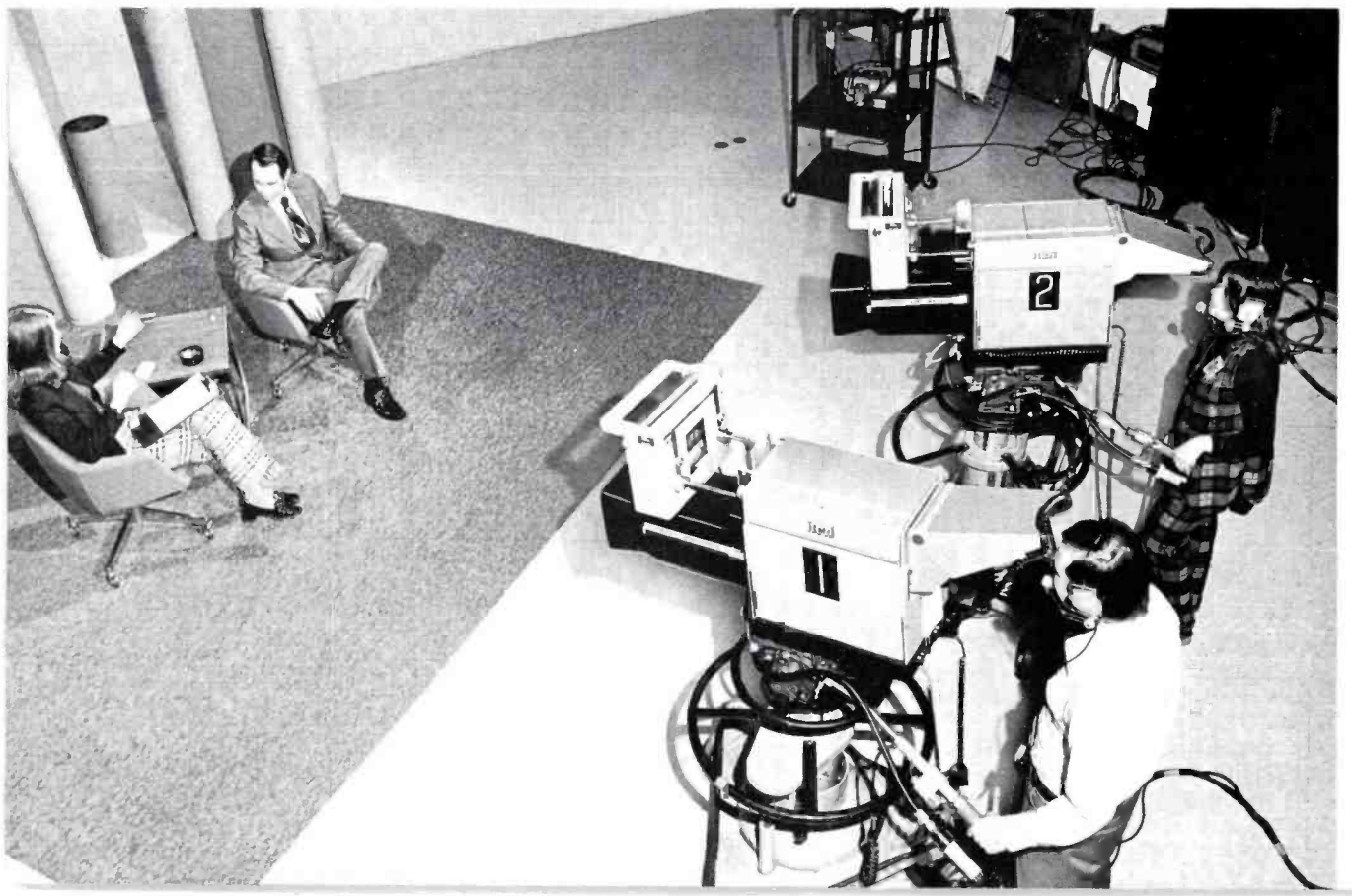
Several factors designed into the studio contributed to making that tight schedule. For example, camera cable holes in the control room wall to the outside parking lot and lawn "extended the studio" for shooting telephone trucks, booths and realistic job situations. Similarly, cameras were rolled out of the studio to offices, classrooms, hallways and other natural settings within cable distance, making the entire building a shooting area. With this capability, each set was lighted and ready to go with the movement of cameras and crew down the hall or into another room. Construction of the studio next to the building's loading dock also helped solve the scenery logistics problem common to Manhattan skyscrapers.

Center Broadcasts Live to 30 Point Nationwide Network

In a company of such size and diversity, the luxury of time and planning are often put aside in order to get information out to the 23 telephone operating companies of the Bell System. For this reason people and equipment have to have fast turn-around capability to do programs that range from a three to five minute daily news show for local distribution via master antenna to a live policy announcement by the Chairman of the Board to a 30 point nationwide network. Responding to such communications needs of a corporation requires a studio design to handle it.

The nationwide network programs often include a management conference type format with question and answer capability for the viewers across the country. One way video from the studio is transmitted to telephone company headquarters. To establish the Q & A capability, a conference telephone call is set up to the viewing locations. Viewers use push-to-talk phones which feed into a conference bridge in New York and then into the

RCA TK-44 cameras shoot weekly interview show featuring company personnel. TK-44's perform equally well as both studio and field cameras. Studio was designed to provide easy movement of cameras to all areas of the building and the outside grounds.



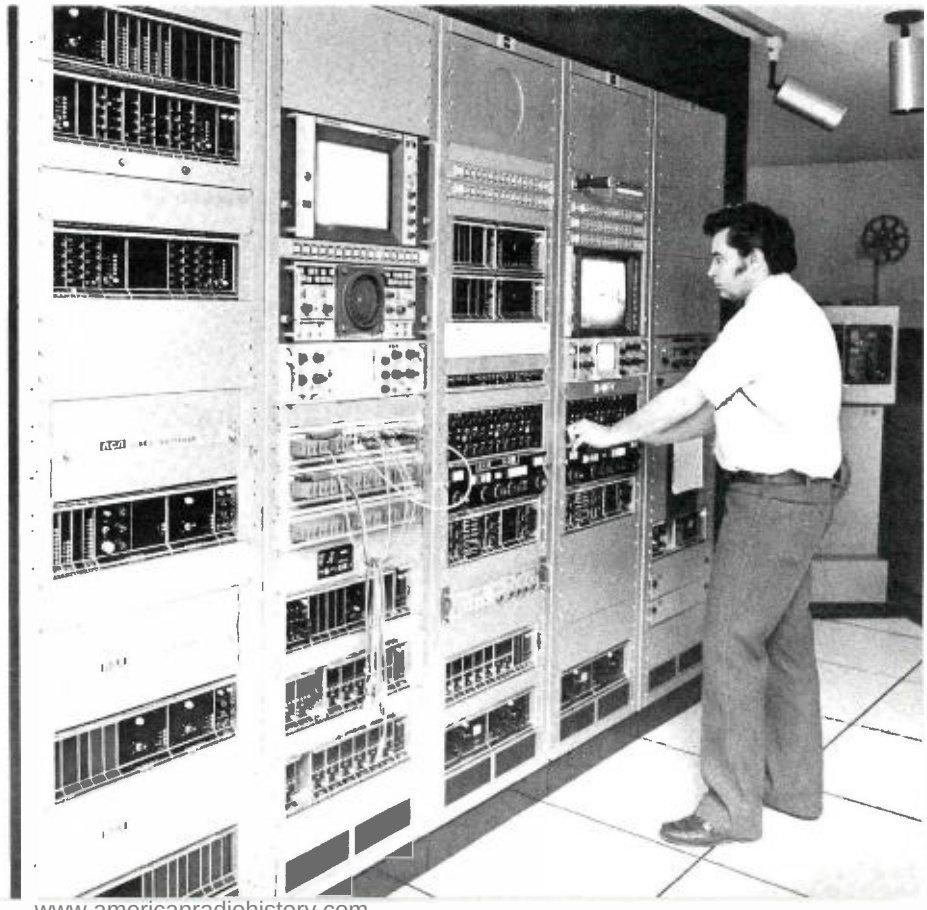
BC-100 audio console in New Jersey. This now allows viewers to ask questions of the studio talent while being heard by all other locations. The push-to-talk feature avoids network feedback.

To help serve the local AT&T office complex with programming, a distribution system feeds both the immediate building and a 3,000 employee building a half mile away. This enables one videocassette library to serve geographically separated locations as well as being the channel for noontime film and news programming.

Basic Studio Staff is Supported with Free-Lance Specialist

The basic staff of the production center is regularly supplemented by free-lance crew, lighting specialists, producers, directors, actors, engineers, etc. The AT&T permanent production staff falls more into the category of "translators" whereby they use their company knowledge, hardware or software expertise and communications skills to translate a corporate problem or need into the finished product. With this approach, the TV specialist becomes more a part of the business rather than a technician. Being aware of the company's needs and operations is also more beneficial in the promotion of broader uses of television among all departments of the company.

Proper planning based on company needs has proven to be a successful formula for AT&T to the degree that another similar but smaller facility will soon be operational in a major corporate campus now under construction. Television has become another tool in the complex machinery necessary to run a business. And although the medium grew up in the world of show business, entertainment and mass audiences, an entirely new medium is slowly developing out of that mold which is custom designed to the corporate society. □



All video racks were pre-assembled at RCA's Camden, New Jersey plant and shipped intact for fast, efficient installation. Normal rack complement includes video switchers, distribution amplifiers, camera control units for TK-44 cameras, vectorscope, waveform and video monitors.

West Coast Teleproduction Firms Make TK-28 Unanimous Choice in Color Film Cameras

. . . When Compact Video Systems opened their new production and post-production center in Burbank recently, the equipment complement included a TK-28 (and a TK-27).

. . . Editel Inc. of Hollywood post-production facility was recently revamped to fit in a TK-28 film island.

. . . A TK-28 system is a vital part of Trans-American Video's magnificent television production complex in Hollywood.

. . . Two-year-old Video Cassette Industries is another expanding Los Angeles teleproduction operation equipped with a TK-28 film system.

The TK-28's unique ability to handle a wide range of picture quality problems and to actually enhance the reproduction of film is a major reason for its rapid acceptance by critical film users in broadcasting and in teleproduction.

Among the problems handled automatically by the TK-28 are: variations in film density and contrast range; low color saturation; film base errors; scene-to-scene matching and color fidelity.

The TK-28 takes care of them all—with automatic balance, automatic level control, a pre-selectable Chromacomp color masking system and other high performance features.

COMPACT

COMPACT VIDEO SYSTEMS recently opened a new 20,000 sq. ft. production and post-production center in Burbank. The facility includes a comprehensive, fully computerized video tape editing capability and an RCA Telecine system, complete with 16 and 35mm magnetic interlock.

Bob Seidenglanz, President of Compact Video, notes that from its inception, his company has been involved in tape and film technology, particularly in adapting commercial products and adding features uniquely suited to teleproduction needs. Compact's new teleproduction center reflects much of this ingenuity—in facility layout, in the high-speed computerized tape editing system, and in the Telecine operation.

After carefully evaluating available TV film systems, Mr. Seidenglanz was convinced that the TK-28 measured up to his performance quality standards. Its colorimetry comes closest to matching that of live color cameras, Mr. Seidenglanz says, and color fidelity is essential in the extremely quality-conscious teleproduction industry.

Operational controls for Compact Video's system are remoted to a special console near client viewing room.

VIDEO SYSTEMS, INC.

The two-output system uses a TK-28 and a TK-27 camera on the same island, equipped with 16 and 35mm film projectors and a TP-7 slide projector. Multiplexer/machine controls and joystick camera controls are remoted to a central control/monitoring location.

Compact Video's film system also includes an FR-10 Master Recorder with interchangeable 16 and 35mm magnetic head assemblies and a composite interlock system. The totally interlocked operation assures a sound track that's always in sync with the film, and enhances the film-to-tape transfer quality.

Telecine system at Compact Video's new Burbank teleproduction center includes a TK-28 and a TK-27 with TP-55 multiplexer.

TAV TRANS-AMERICAN VIDEO, INC.

TRANS-AMERICAN VIDEO is one of the young giants in teleproduction. Founded just three years ago, the company has a wealth of resources in talent and facilities. The multi-million dollar equipment investment includes completely equipped mobile vans as well as a comprehensive post-production facility on Vine Street in Hollywood.

There a TK-28 color film system functions with computer-aided tape editing and audio/video mixing equipment to help TAV make consistently outstanding film-to-tape transfers.

The TK-28 system at TAV includes 16mm and 35mm film projectors and a TP-7 for slides. It runs for ten to twelve hours a day. A magnetic master interlock system ties in with both the 16 and 35mm machines. In its film operation, TAV also uses an electronic color corrector for precise color adjustments.

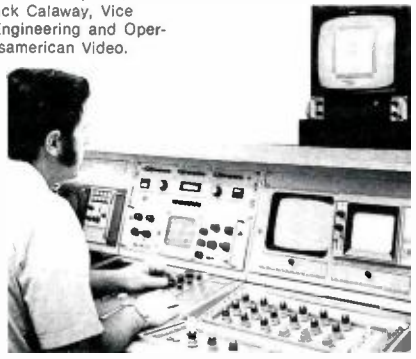
"The TK-28 produces pictures of the highest quality with nearly zero downtime"—Jack Calaway, Vice President for Engineering and Operations for Transamerican Video.

Jack Calaway, Vice President for Engineering and Operations at TransAmerican Video, sums up camera performance like this: "The TK-28 produces pictures of the highest quality with nearly zero downtime. It is far and away the most stable and easily operated camera I have ever been associated with." And, he adds, "The picture quality in all critical areas is excellent, and we are particularly pleased with the low noise and excellent resolution.

"Since the installation of the camera, we have transferred all types of material, from home movies to features for network airing. In every case, our clients have commented on the quality of the product, and this is what counts."

The TAV film operation occupies two rooms—one for the film island and the other housing rack equipment and the console for monitoring and joystick controls. This small area is action-packed, particularly when clients cram in for screenings. Jack Calaway credits Senior Video Operator Bill Buck with the magic touch in the film room. With the TK-28's remote joystick controls and the scene-by-scene color corrector, he is able to produce the exact color desired—on the spot.

In production work, requirements are even more stringent than in broadcasting, according to Mr. Calaway. Quality is paramount. And, since the clients frequently are the creative decision-makers, the ability to improve their product—or permit them to adjust color to suit the concept to be conveyed—is an important asset.



Senior Video Operator Bill Buck operates joystick controls for TAV's TK-28 system.

Modules and auxiliary set-up control panel for TK-28 at TAV are rack-mounted directly behind the video operator's console.

VIDEO CASSETTE INDUSTRIES

VIDEO CASSETTE INDUSTRIES started barely two years ago as a software supplier, duplicating and dubbing materials to the cassette format. Rapidly expanding, they are now a total production house, encompassing studios, remote unit, and a fully-equipped post-production operation.

VCI is set up to utilize every practical production technique: live, tape, film, even slides and film-strips. The Telecine operation uses a TK-28 film camera with Plumbicon pickup tubes.

The 4-input, 2-output Telecine system includes a TP-55 Multiplexer, TP-7 slide projector and 16 and 35mm film projectors. In addition to the TK-28, a monochrome camera is used for titling.

Ernest Rinaldi, Chief Engineer and Thomas Tcimpidis, Engineering Supervisor, chose the Plumbicons for the VCI TK-28 film system for their lag-free characteristics and low dark current. Extended green and red tubes are used to insure excellent picture resolution, according to Mr. Tcimpidis. In addition, their colorimetry matches that of live cameras, Mr. Rinaldi says, and the Chromacomp masking system is helpful in achieving the match.

They add that the slightly increased operating cost of the Plumbicons is considered to be more than justified by the increase in picture quality, and quality is the prime objective of VCI.

While the major function of the Telecine system at VCI is for film-to-tape transfers, the system is also used to transfer filmstrips to cassette format. Tape is always the end product at VCI, according to Mr. Rinaldi.

Both Mr. Tcimpidis and Mr. Rinaldi are emphatic on the need for quality performance from teleproduction equipment.

Ernest Rinaldi, Chief Engineer of Video Cassette Industries, chose Plumbicons for his TK-28 for their lag-free operation and excellent picture resolution.

Machine and joystick controls for TK-28 system at VCI are remoted to a custom panel only a few feet from the film island.

editel inc.

EDITEL INC.'s Hollywood operation is referred to by its Sales Manager, Dennis King, as a "Total Service" facility. These services include mobile, studio and video tape post-production.

Editel's Telecine operation includes a complete TK-28 Film System: TP-55 Multiplexer with TP-7 slide projector and a 16mm and a 35mm film projector. An FR-10 interlock magnetic master recording system provides for double sound operation.

In most cases, Mr. King says, the transfer process is from film to tape. Sometimes, however, the video tape is first transferred to a 35mm work print for preliminary editing. The video tape is then conformed to the edited film for "mastering", duplication, and distribution on video tape.

The end product at Editel is almost always tape, according to Mr. King, with more use being made of tape because of its quality and speed of completion.

Film is shot in 16mm or 35mm, and the sound track is almost always 35mm magnetic. The final version must be played back in sync for final transfer to tape, and the FR-10 Master Record system handles this operation.

Film operations at Editel, Hollywood, are centered in one compact room, housing the telecine system, operating console, and composite interlocked sound system.

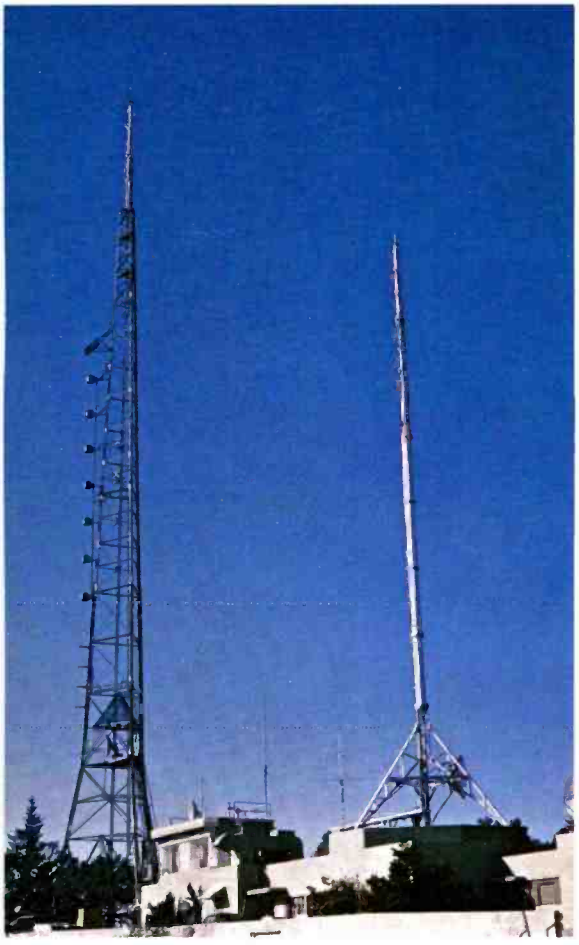
Summary

The selection of the TK-28 by all of these highly competitive West Coast teleproduction firms is justified by its performance record.

More than 200 TK-28 telecine cameras are now in use around the world in teleproduction, broadcast and closed circuit television systems. Many more are on order, with deliveries scheduled as fast as production permits.

The success of the TK-28 is based on advanced circuitry and technology which permit users to get the best film pictures possible from any film. □

KTTV "Right Angles" New



KTTV transmitter building and antenna towers atop Mt. Wilson. Main tower (left) is topped by Superturnstile TF-6AH antenna, with radomed BFC antennas for KMET-FM mounted lower on tower. Standby TV antenna is on tower at right.

Transmitter Supervisor Bill Blacksher checks KTTV's 50 kW TT-50FH Transmitter.

50 kW Transmitter for Perfect Fit

The transmitter and antenna site for Metromedia's KTTV, Ch. 11, Los Angeles, is ideally located atop Mt. Wilson, with a commanding view of the coverage area.

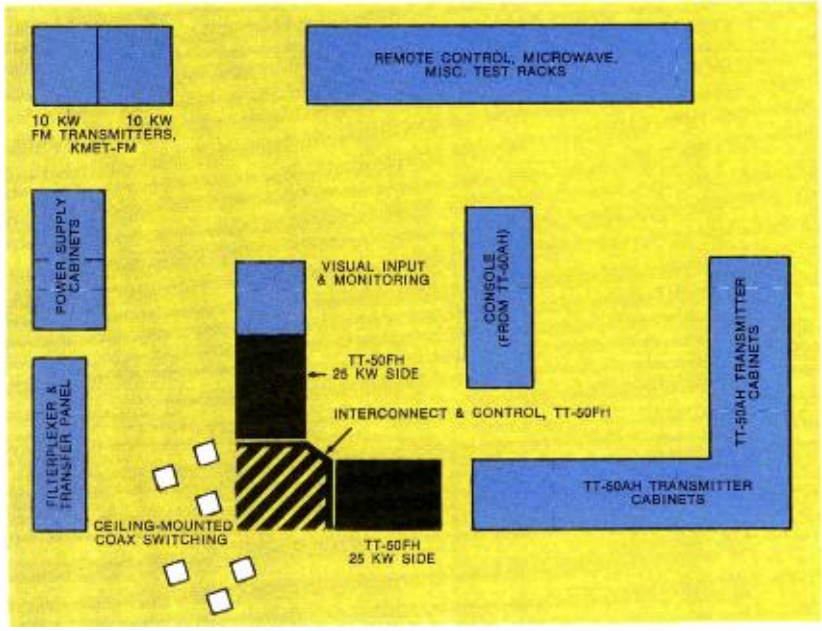
When the station management looked into replacing their 18 year old transmitter, they were confronted with a serious problem: not enough space.

Even though the new solid state transmitters take up half the space of the former system, there was not enough space in the transmitter building for straight-line mounting of the cabinets.

The problem was solved with a TT-50FH, 50 kW parallel transmitter system in a custom-designed "L" configuration. At the same time, the antenna was also changed, with a TF-6AH Superturnstile replacing the previous antenna.

Third TV Transmitter

Bill Blacksher, Transmitter Supervisor for KTTV is the man responsible for the planning and installation of the new transmitting system. This is the third TV transmitter he has been involved with since coming to KTTV more than 25 years ago to put it on the air (January 1, 1949 air date).



Transmitter room floor layout at KTTV shows "L" configuration of TT-50FH Transmittter.

The first transmitter installed was a TT-5. Then in 1953, the 50 kW TT-50AH was "shoehorned into the building".

This transmitter gave good service over the years, Mr. Blacksher says, but with the station going to 24-hour operation and virtually 100 percent color programming, it was necessary to consider a change. New generation solid state transmitters were available, designed for color, with improved performance specifications and with remote control capability.

Richard Anderson, Vice President and Chief Engineer for KTTV and Mr. Blacksher prepared specifications, talked to broadcasters with new transmitters, and visited supplier manufacturing facilities for "hands-on" demonstrations. Transmitters were evaluated on the basis of performance, without regard to modulation technique—IF or Final Frequency—and the TT-50FH system was selected.

Installation Logistics

Installing the transmitter was an interesting logistical problem which required considerable pre-planning and also a large amount of work by the KTTV transmitter staff.

First of all, a custom system had to be fitted into a space in the transmitter building which was already occupied by a part of the station's TT-50AH transmitter. Normally, the TT-50FH is a straight-line installation, with the two amplifier cabinets flanking the control cabinet.

To fit into the KTTV floor space, the two 25 kilowatt transmitter units had to be positioned at right angles to each other, and the control cabinets joined physically and electrically by a corner cabinet mounted between them.

To make room for the new 50 kW system, the three visual cabinets from the old TT-50AH had to be re-located. These were moved, and one 25 kW side of the new transmitter was installed in that space—with inches to spare.

This transmitter was checked out and put on-air. At this time, the Ch. 11 transmitter crew had some nervous moments, since there was no backup for the new 25 kW transmitter if it failed. Fortunately, all went well except for minor problems.

At the same time, the TT-50AH was re-harnessed and readied for alternate service—an arduous task for a minimum staff. Then the second side of the new parallel transmitter was positioned, and the interconnections made.

Visual input and monitoring controls are mounted in two racks directly beside one of the transmitter amplifier cabinets. There has been no problem with this arrangement, which is indicative of effective isolation.

Aural input and monitoring equipment is rack-mounted in the rear of the old transmitter console. A custom-built panel by KTTV engineering on the front of the console provides for monitoring and modulation control.

Blower Ducting System

In addition to the "L" configuration, with the control cabinet as a custom-built corner between the two right-angle 25 kW transmitter units, KTTV engineering made other changes in the system. For example, the two blowers (one for each transmitter side) were not mounted in the base of the transmitters.

Instead, they were relocated in a separate room in the building—and blow air through a floor duct up through the bottom of the cabinets. This was done to take advantage of an existing ducting system used with the TT-50AH transmitter. The blower room is equipped with precipitrons for cleaning the air. Without this system additional modifications would have been required on the transmitter building to allow for air intake.

The exhaust air is ducted out of the top of the transmitter into a temperature-controlled ducting system which discharges the hot air out of the building during warm weather. When the temperature drops, the hot air is routed back into the building to heat it.

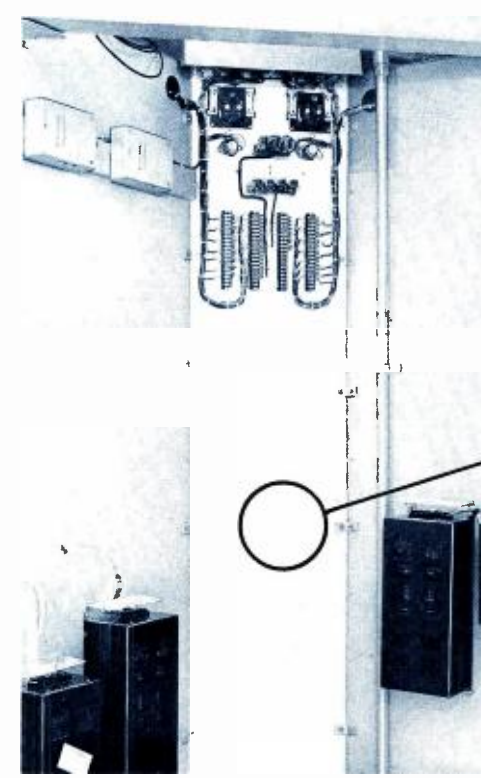
An extra benefit of the "L" transmitter arrangement is that it allows extra space at the rear of the cabinets, providing complete accessibility for maintenance. Power supply cabinets, filterplexer and test loads are mounted along the building walls behind the transmitter cabinets.

Custom OPTO-Switcher

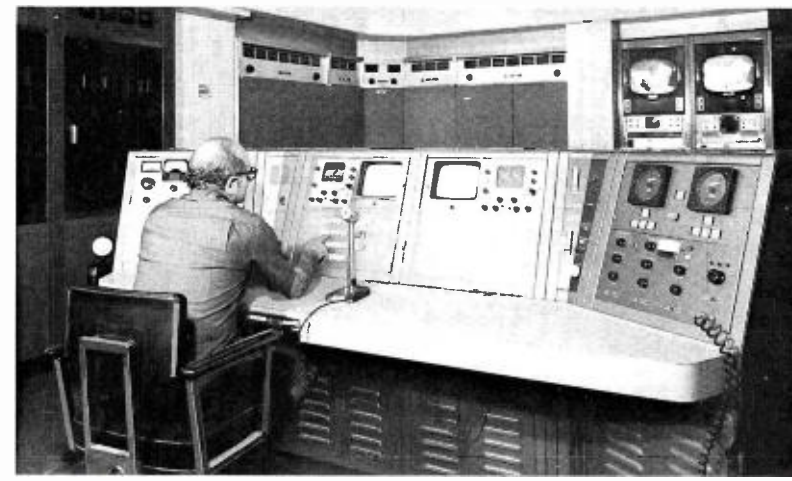
Another unusual configuration of the KTTV system is the OPTO-Switcher. Taking into account the cramped space available, RCA Antenna Engineers in Gibbsboro designed a custom switcher for ceiling mounting. The switcher consists of two separate sides, each with three motor-driven coax switches. The system was completely assembled and electrically optomized at Gibbsboro, then the parts were carefully labelled, the system dismantled and shipped to Mt. Wilson. There the pieces of hardware were re-assembled, and the system worked fine—perfectly tuned.

Remote Control System

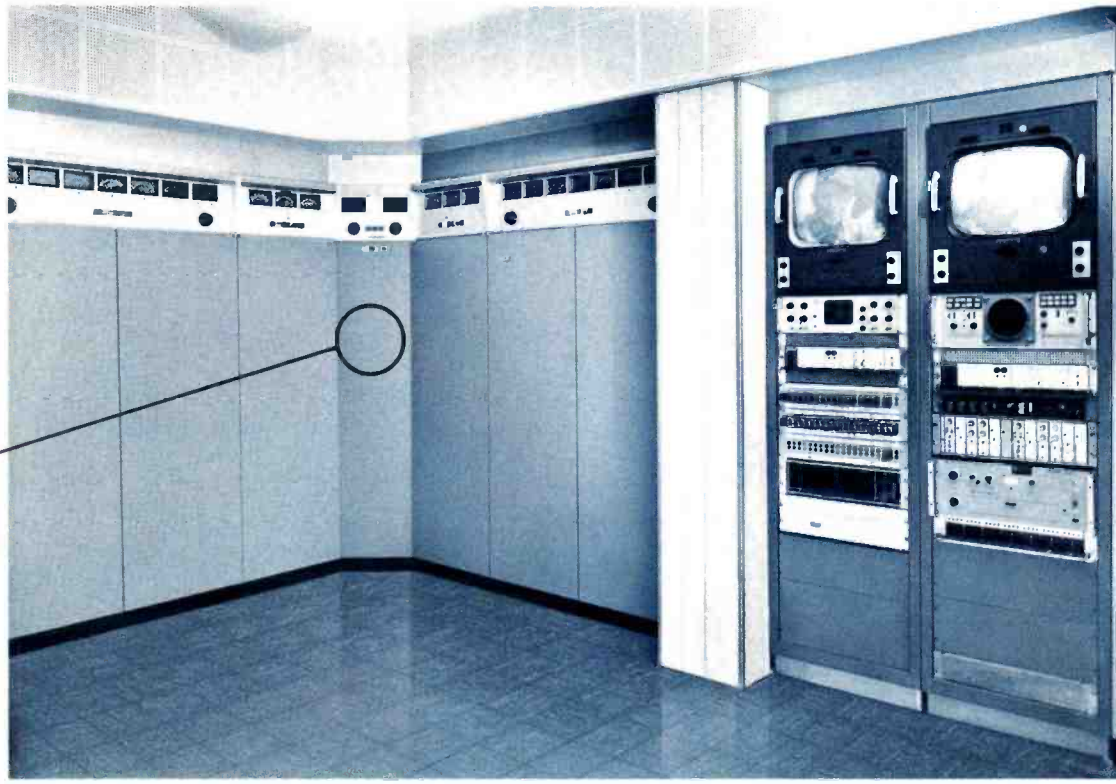
KTTV started with remote control in 1967 with the old transmitter. With the stability of the TT-50FH there is no sacrifice in video or aural quality, Mr. Blacksher says, making it ideally suited for remote operation.



(Right). Rear and front views of corner control cabinet for TT-50FH. Right angle arrangement permitted installation in limited space and provides ample space at rear of cabinets for ease of maintenance.

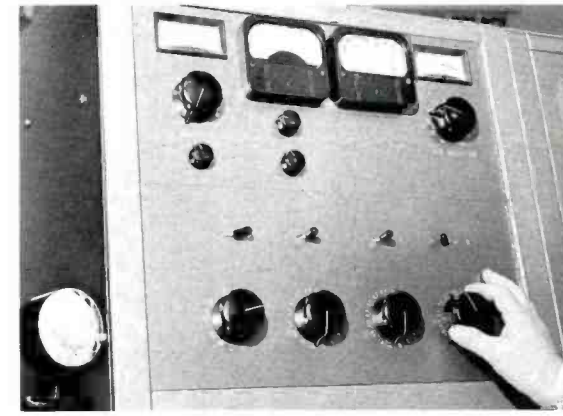


Console installed with earlier TT-50AH Transmitter finds temporary use for monitoring and switching during initial operational period for new TT-50FH system.



(Above) Visual input and monitoring racks are located next to one of the 25 kW amplifier cabinets.

Amplifier cabinets for TT-50AH system occupy much of transmitter room area.



Special panel built by KTTV provides for monitoring and modulation control.

With 'round the clock programming, back-up systems are essential

Ch. 11 uses a 30-function Mosely Digital Remote Control System (DCS-2) which has performed well. Bill Blacksher's philosophy on remote control (and on other equipment) is "keep it simple". In the case of remote operation, he believes in providing control of needed functions without becoming overly complicated. Reliability of the system is essential, but it should be set up so that the less technical people at the studio who aren't acquainted with the transmitter can readily identify a particular problem and take proper action.

It is 17 air miles from the transmitter site to the KTTV studio on Sunset Boulevard. The ground distance is twice as far. And sometimes during winter snowstorms, the road to the top of Mt. Wilson is closed for a number of hours. This inaccessibility means that the transmitting and remote control systems must be extra reliable.

At present, while adjusting to the new system, the transmitter is manned for 12 hours and unmanned for 12. Manning requirements at the transmitter will be reduced through normal staff attrition and relocation of personnel into studio operations.

In keeping with its 24-hour-a-day television schedule, Ch. 11 has all systems backed up 100 percent with standby equipment. There is nothing common in the transmitter building (except the main power source). Dual STL microwave receivers are installed, so that even if one receiver goes out, the second can be switched in from the studio. Main and standby antennas are on separate towers.

As a further back-up, a high capacity Diesel generator is available for emergency power failures.

Solid State Design

Performance is a word used often by Bill Blacksher, and he is emphatic in demanding 100 percent performance from his equipment, including noticeably sharper, better quality pictures. Stability, automatic sync and power levels as well as solid state design are important features to KTTV. The solid state design of the new transmitter system is helpful in reducing both maintenance and power consumption. The old 50 kW system includes more than 120 tubes, Mr. Blacksher says, while the TT-50FH has only six. And the difference is power usage is noticeable, he adds.

Accessibility for servicing is another useful feature of the TT-50FH, according to Bill Blacksher. As an example, he noted that once, while another broadcaster was visiting to look over the installation, the aural tube on one transmitter side shorted. It was removed, replaced, and back on-air in just five minutes—which really impressed the visitor.

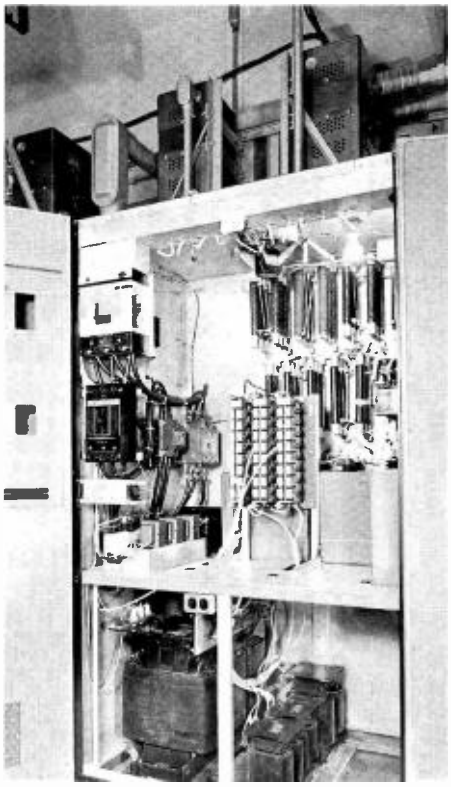
While the new transmitter was being installed, the filterplexer for the old TT-50AH developed a problem, and the new filterplexer had to be rushed into service to keep the station on air. Later, the old filterplexer was re-furbished, brite-dipped, re-tuned—and restored to like-new condition in both appearance and performance.

No Change In Coverage Pattern

The new Superturnstile antenna is mounted on the existing 200 foot tower which did not require modification. The TF-6AH antenna was a direct replacement of the obsolete antenna, involving no change in coverage or pattern. Transmission line was not changed, since it had only been in service for six years. Also mounted on the tower, below the Superturnstile is the new BFC antenna with radomes installed last year by KMET-FM, which is also owned by Metromedia. KMET's two BTF-10E 10 kW transmitters have been on full remote control since 1968. They are installed in the same room with the TT-50FH.

Original Antenna Now Standby

An interesting sidelight on the KTTV standby antenna is that it was the original RCA antenna installed when Ch. 11 went on-air in 1949. It was taken down and completely re-built, complete with latest harness and modifications. The antenna was designed for the 5 kW transmitter and needed beefing up to handle the present power. Much of this antenna re-work was handled by Mr. Blacksher's crew.

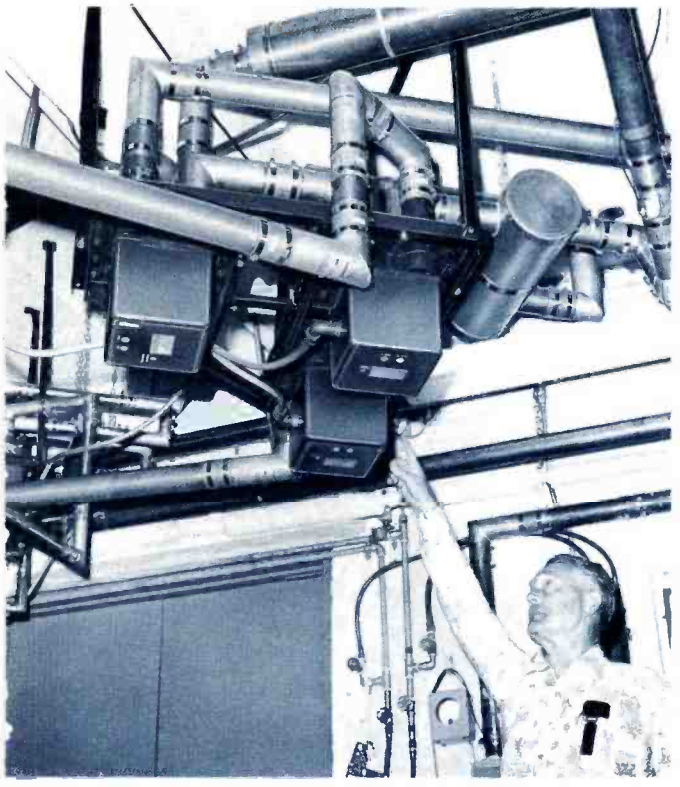


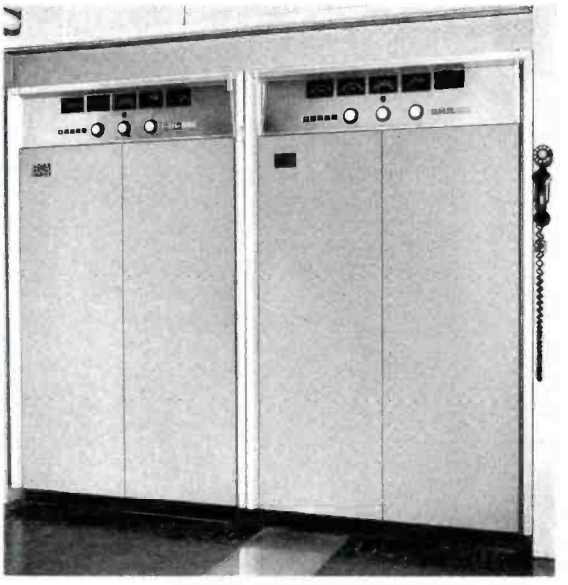
Power supply cabinets, filterplexer and test loads are wall-mounted behind transmitter cabinets.

Erecting the original KTTV transmitter facility was a carefully planned project which was accomplished in 1948. The building is constructed of poured concrete, with pouring done continuously via an endless chain of cement mixers wending their way up the mountain, operating around the clock. The entire pouring job was completed in 72 hours.

Since the building was designed to accommodate the original TT-5 transmitter, there was no room to spare when the TT-50AH was installed in 1953.

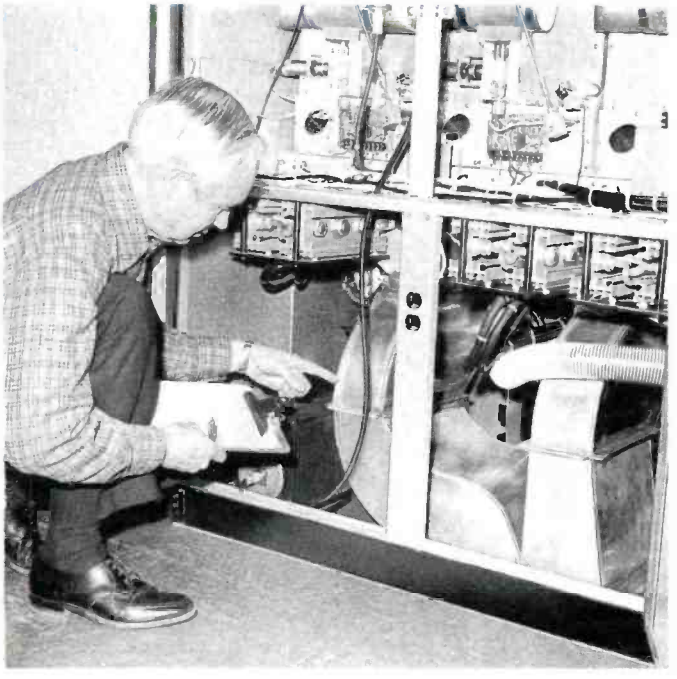
By re-arranging its existing transmitter and adapting the new compact TT-50FH system to the available "L" space, KTTV was able to add a new transmitter without the need for costly construction or renovation. □





Two 10 kW BTF-10E Transmitters, owned by Metromedia's KMET-FM, occupy a corner of the Mt. Wilson transmitter room, and have been on full remote control since 1968.

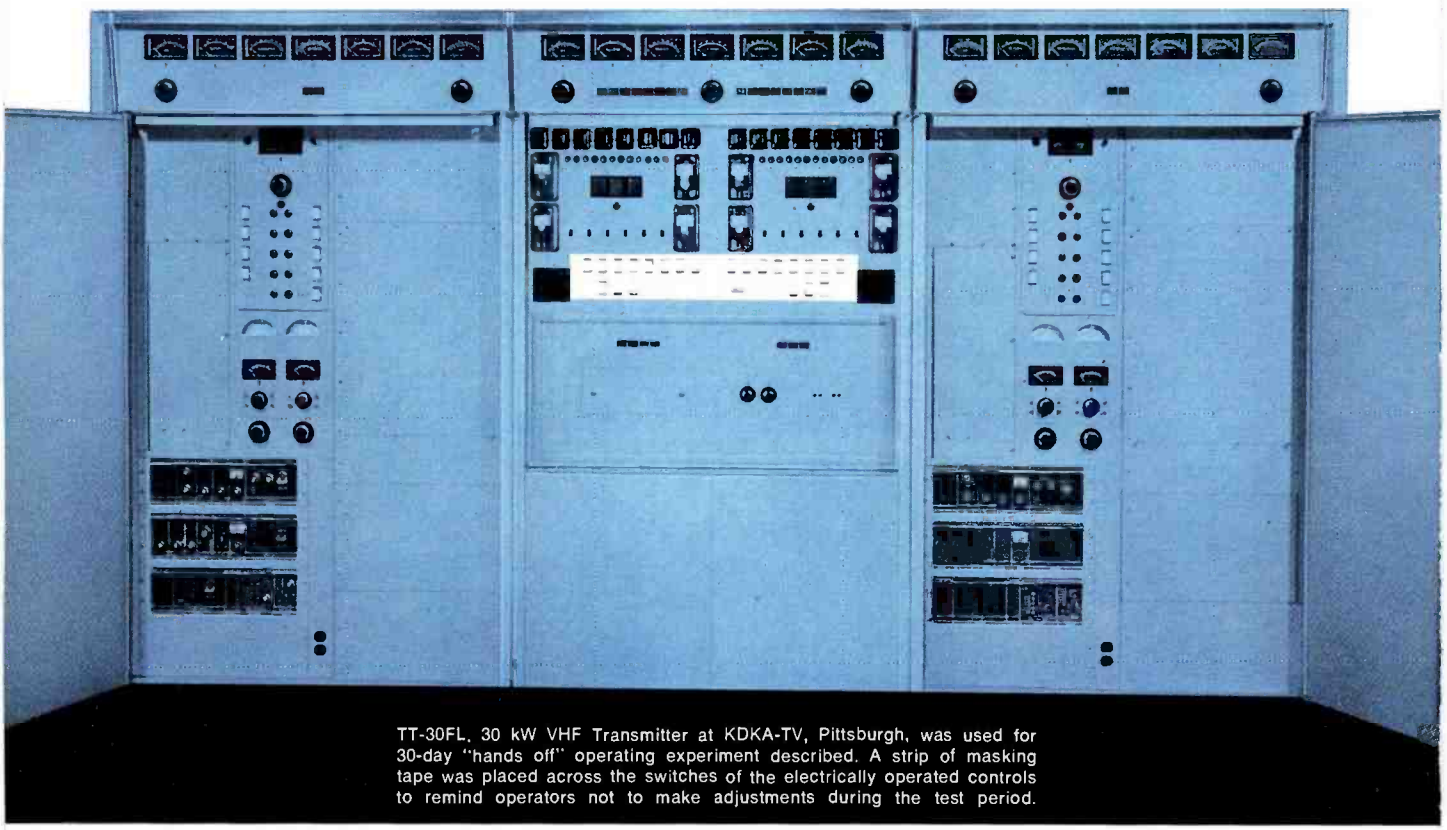
Optimized combiner/switcher (left) is a custom-designed, ceiling mounted system which was pre-fabricated by RCA, dismantled, and re-assembled on site.



Blowers for the KTTV transmitter are located in a separate room. Air flows through the transmitter from the duct at the bottom of the cabinet.

TV Transmitting Systems for Unattended

T. M. Gluyas, Staff Engineer
RCA Broadcast Systems



TT-30FL, 30 kW VHF Transmitter at KDKA-TV, Pittsburgh, was used for 30-day "hands off" operating experiment described. A strip of masking tape was placed across the switches of the electrically operated controls to remind operators not to make adjustments during the test period.

More than seven years ago, the FCC was petitioned to consider licensing automatic FM transmitters. Since then there has been a continuing interest in unattended broadcast transmitters—including not only FM but also Standard Broadcast and TV transmitters.

Early in 1973, the NAB submitted a report to the FCC supporting the case for unattended transmitters and suggesting rule changes to permit such operation. Later in the year, responding to the NAB report, the FCC indicated that they are working toward rules covering automatic transmitter systems. Therefore, it is timely at this time to consider how an unattended transmitter plant might be implemented and what special considerations are appropriate for the hardware.

What is an automatic transmitter?

For reasons that will be amplified later in this article we prefer the phrase *transmitting system for unattended operation* to the term *automatic transmitters* which has been used in the past to mean nearly the same thing. However, the term automatic transmitters will be applied, where appropriate, to bridge the gap between earlier publications and the present discussion.

What is meant by the term *automatic transmitters*? The 1967 Collins Radio Company petition to the FCC stated:

- An automatic transmitter is self-monitoring and self-adjusting of essential operating parameters.

That statement describes an automatic transmitter, but what are the essential operating parameters?

We define essential operating parameters as the parameters required to be logged by the FCC plus parameters that normally would be observed *and corrected* by an operator during the broadcast day.

Operation

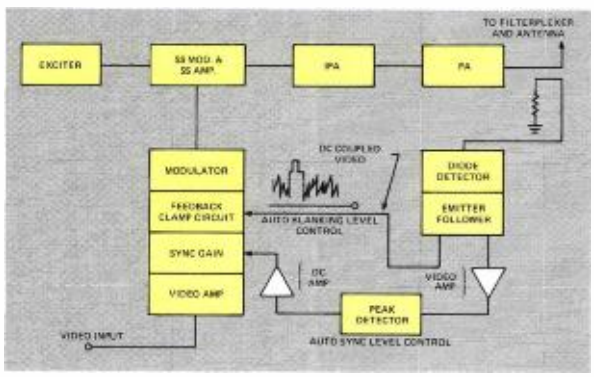


Fig. 1. Block Diagram. Automatic blanking level and automatic sync level controls in RCA "FL" and "FH" transmitters.

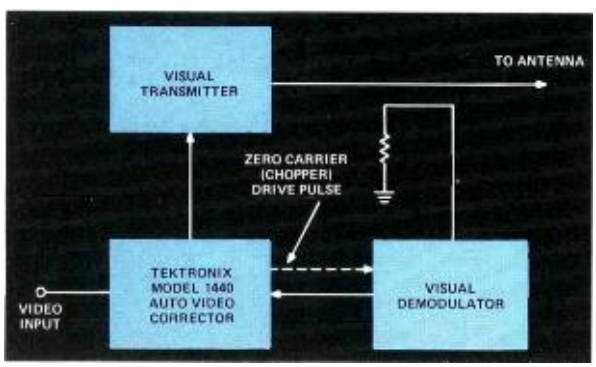


Fig. 2. Automatic modulation control using Tektronix Model 1440 Automatic Video Corrector.

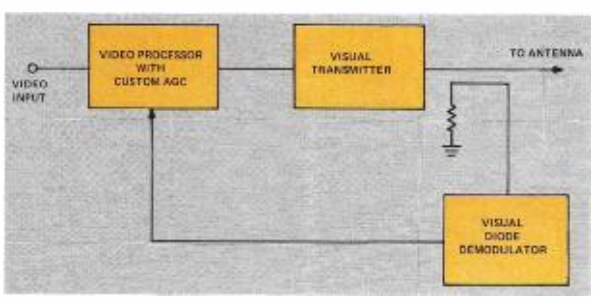


Fig. 3. Alternate concept for maintaining modulation depth at ouput of visual transmitter.

For example:

- Power output—Aural and Visual
- Modulation levels:
  Visual reference white
  Visual sync-to-picture ratio
  Aural modulation
- Frequency

These items and others to be covered here deal mainly with television transmitters but obviously many of the concepts apply equally to aural broadcasting.

Flexible requirements for unattended transmitting systems

Unattended TV and aural broadcast transmitters have been used in other parts of the world for many years but the system complexities vary widely with local requirements and the economics of the situation. For example, in the thinly populated areas of northern Canada the simplest, least expensive, kind of transmitters are simply turned on and off by a clock or by a video presence detector. There often is no logging, automatic control, standby facility, or anything special to distinguish an unattended transmitter system from an attended one.

On the other hand, in Great Britain, the BBC serving London and other heavily populated areas, has been evolving unattended TV stations with many automatic features including automatic switchover to alternate subsystems based on automatic assessment of picture quality and output signal comparisons.

These extremes may not be required for typical U. S. broadcast stations but adequate system flexibility should be maintained to satisfy varying needs. Also, a choice of manual local control, remote control, or automatic systems should be accommodated. It follows that it is better to produce a reliable and stable basic transmitter, that can fit into manned situations and into unattended plants, than to proliferate an uneconomic variety of transmitter types including various versions of "automatic" transmitters. That is why we prefer the term "unattended transmitting systems" over "automatic transmitters".

Current generation TV transmitters designed to operate as unattended systems

RCA has designed current generation transmitters to be stable and reliable with circuits to permit external control by electrical means of all normal operating adjustments. An ample number of metering circuits, status indicator circuits and mode control circuits are wired to interface terminals in the transmitters. These circuits accommodate manual control, remote control, computer control, or dedicated logic circuits as desired by different broadcasters for custom systems. They can be wired into automatic systems of varying degrees of complexity. These transmitters are available now and suitable for use in unattended transmitting systems.

Automatic power output control

It is basic that the transmitter power must stay well within FCC limits over long periods of time without manual intervention. We are inclined to believe that this should be accomplished by automatic supervision and control. An overall transmitter system feedback loop qualifies as such a system.

With present technology, it is possible, but expensive, to design circuits that are so stable that no automatic control is required for *normal* operation. However, it is all too easy to develop an "exception" to normal operation in the form of a weak, or out-of-tolerance component, a poor cable connection, or a temperature sensitive RF connection that can cause a power drift, that would be handled easily in an automatic control system. Therefore, we prefer an automatic control system.

In the case of the visual transmitter it is sufficient to regulate either blanking level power or sync peak power, provided that automatic means are included to maintain the various modulation levels in proper *ratio* to each other at the output of the transmitter. The use of an automatic VIR corrector to do this is described later. Alternately, each modulation level (i.e. white, blanking, sync.) could be regulated independently.

RCA's current line of VHF-TV transmitters—the "F" line—provide separate automatic power control loops at the blanking level and at sync. level. Either or both control loops can be turned on or off. Both loops are standard in the "FH" (highband) transmitters. In the "FL" (lowband) series, automatic blanking level control is standard and automatic sync level control is optional. The principle of operation of these automatic power circuits are described with reference to Fig. 1.

A diode demodulator samples the output of the transmitter. The video signal is passed through an emitter follower, preserving the dc information and then through two parallel paths. One path includes the automatic blanking level control circuits and the other the sync level control. The blanking level at the output of the transmitter from the demodulator is sampled during the back porch of horizontal sync. This sample is referenced against a regulated dc potential and the difference, or error signal, is stored between samples and used to adjust the modulator bias. This constitutes an overall feedback clamp circuit, which holds the blanking level steady at the transmitter output.

The second video output from the demodulator is amplifed and peak detected to obtain a dc voltage proportional to sync peak power. This is filtered, amplified, compared to a reference voltage and the error signal is then used to control the sync gain circuits between the video amplifier and the modulator. These circuits have dc gain control capability and can either expand or compress the sync. The automatic sync level (ASL) loop gain is approximately 50 dB so that the transmitter peak power output is very closely held to its initial setting equal to the licensed power.

Until now, there has been little incentive to build automatic control circuits for aural power. Aural power stability has been adequate for remote control; however, automatic aural power control will be made available for unattended transmitter systems. All that is required is to close the loop between existing power output monitor and aural power control circuits.

UHF TV transmitters are normally operated close to saturated power for best efficiency. With anode supplies regulated to ±1%, visual peak power output stability has been good. However, for automatic transmitters, a blanking level automatic power output control option will be made available.

Automatic control of modulation levels and signal parameters

We have found that a most convenient way to automate modulation levels and signal parameters is to use a Tektronix model 1440 Automatic Video Corrector in a closed loop mode around a transmitter, such as an RCA TT-30FL (VHF 30kW Lowband) or TT-50FH (VHF 50kW Highband). These transmitters have built-in automatic power output control. The arrangement is shown in the block diagram, Fig. 2.

The automatic video corrector keeps the important signal levels in the correct *ratio* and the built-in transmitter power output control then established the proper absolute signal levels. The Model 1440, used in this way, automatically maintains correctly, at the transmitter output, the following parameters:

- Reference white level
- Blanking level
- Transmitter power output
- Setup
- Sync./Pix ratio
- Burst amplitude
- Burst phase relative to VIR
- Chrominance/Luminance ratio

If the transmitter includes both built-in automatic sync level and automatic blanking level controls, then the automatic Sync/Pix ratio circuit of the Model 1440 can be disabled by a simple internal modification.

For the system of Fig. 2 to function, it is necessary to insure the presence of a VIR signal and one that is properly related to the picture signal. A Tektronix model 1441 VIR Signal Deleter/Inserter or model 147 or 149 NTSC Signal Generator can be used at Master Control to sense the presence of incoming VIR signal and, if absent, to automatically insert VIR on the signal going to the transmitter. If the VIR signal is locally inserted it will be necessary for an operator to monitor the video signal level to properly maintain white level relative to VIR. The automatic VIR inserter can be programmed to insert VIR, minus the burst, when the incoming signal is in monochrome.

Fig. 4. System for comparing (A) corrected video input and (B) transmitter output signals.

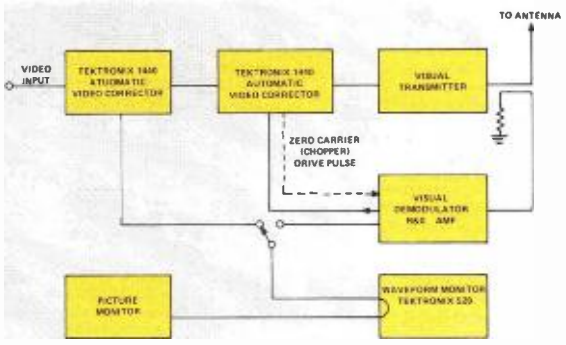
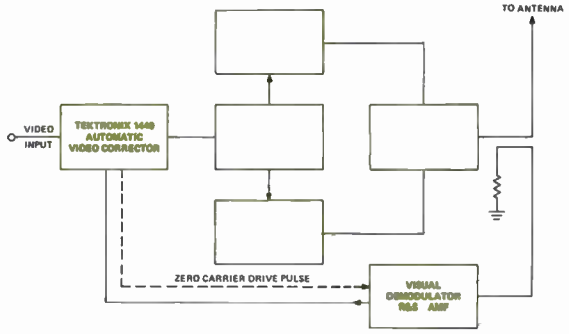


Fig. 5. Automatic modulation control loop around a pair of parallel transmitters.



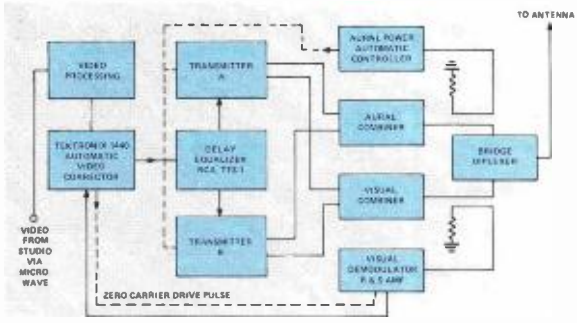


Fig. 6. Block diagram. Transmitter system, "hands off" experiment at KDKA.

The use of an automatic VIR corrector in a closed loop mode around the transmitter is not the only way to automatically maintain correct modulation levels. As stated earlier, current generation RCA VHF TV transmitters have the capability for automatic control of blanking level and peak power. A closed loop video AGC could be added as illustrated in Fig. 3. This would maintain correct depth of modulation. In this case an automatic VIR corrector, or manual means, could be used to provide a good video signal at the transmitter input. Then, the inherent long term stability of modern transmitters in regard to frequency response, envelope delay, differential gain and differential phase makes it unnecessary to provide automatic correction around the transmitter for signal parameters other than power output and modulation levels.

Even if an automatic VIR corrector is provided, closed loop around the transmitter, consideration should be given to an additional VIR corrector on network signals or remotes, or at Master control, or at the transmitter input, to establish a good signal for comparison with the transmitter output. This is illustrated in Fig. 4. The capability for comparing the corrected transmitter input signal to the transmitter output is a useful addition for inspection, trouble-shooting and maintenance. If VIT signals are inserted, they should be inserted between the two VIR correctors to prevent correction of incoming signals from overmodulating the transmitter during VIT interval.

Parallel transmitters in unattended systems

If an automatic control loop is closed around a pair of parallel transmitters as shown in Fig. 5, then it is possible for the performance of one transmitter to drift

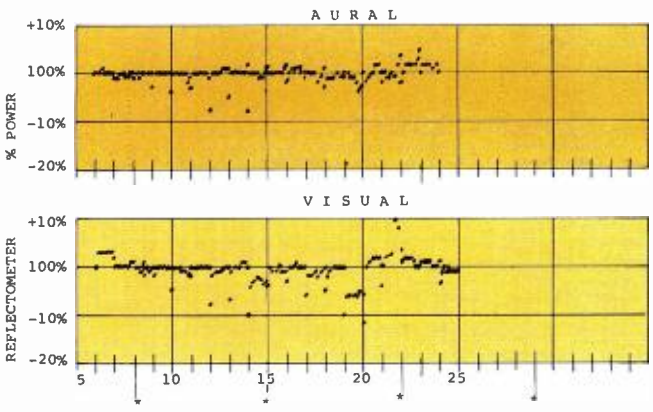


Fig. 7. "Hands-off" experiment. Aural and visual power output stability. Combined transmitter.

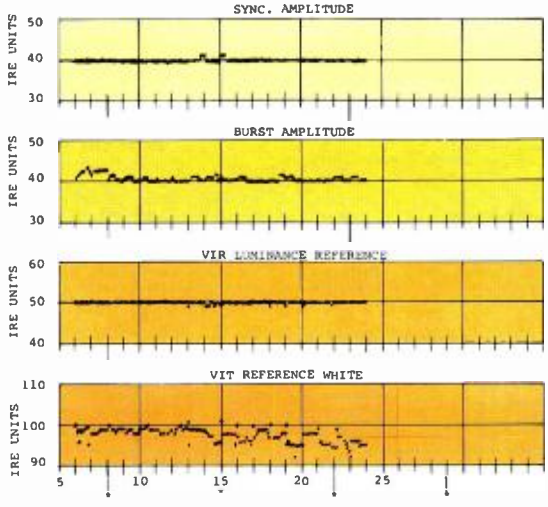


Fig. 8. "Hands-off" experiment. Stability of modulation levels. Combined transmitter.

relative to the other while the combined output remains stable. In the case of RCA TT-30FL or TT-50FH transmitters, the blanking level of each of the parallel transmitters is automatically controlled but small differential drift can occur in white level or other signal parameters. The question then is, can the differential drift be troublesome? We have found that it is not.

Only small differential drifts occur in practice over extended periods but much larger differential drifts are tolerable. Depth of modulation (reference white level) and "per cent sync" can be purposely unbalanced by 25%, or so, with negligible effect on combined modulation levels, frequency response, differential gain, differential phase, or other important signal parameters.

If individual transmitter automatic blanking level and automatic sync level controls are both available, there is greater tolerance to tube aging when using both compared to operating on only automatic blanking level control but either operating method is satisfactory.

Frequency control and monitoring

The FCC rules for attended or remotely controlled stations, require carrier frequencies to be measured and recorded on a monthly basis with intervals between successive readings not to exceed 40 days. Frequency measurements are mandatory but the use of a frequency monitor to serve licensee's purposes is optional. It is presumed that the same rule, or a similar one, will apply to unattended transmitters.

Automatic means to shut a transmitter down based on an off-frequency indication from a frequency monitor seems pointless since it is difficult to design a frequency monitor to be both more accurate and more reliable than the transmitter it is intended to supervise. However, an interesting concept has been proposed for parallel or alternate/main transmitters. It is anticipated that most unattended transmitters will be of one or the other of these types and that the transmitters will include two exciters.

The exciters or transmitters will be automatically switched in the event of failure of the in-use exciter. It has been proposed to expand the logic to switch exciters if the in-use exciter appears to be off-frequency based upon a majority vote among the two exciters and the frequency monitor. For example, if exciter A were on air but the monitor indicated a frequency error, exciter B would be substituted provided that its frequency read correctly. If A and B each produced a similar off-frequency reading, then A would remain on air and a frequency monitor fault would be reported through a status and alarm system. A majority vote system could also be devised using a single transmitter exciter and two frequency monitors.

Either of the subsystems just described could be provided as a custom option but it is doubtful that it will be included in a standard product offering since the probability of off-frequency operation is too low to warrant the design of the additional logic circuits.

Automatic start-up and shut-down

If automatic start-up and shut-down are desired in order to have completely

automatic system operation, then the simplest way to accomplish this is with a video presence detector to turn the transmitter on whenever video from Master Control is sensed. Initial program material fed to the transmitter plant at the start of a broadcast day could be a test pattern or station call sign to allow time for the transmitter to cycle on. On the other hand, it might be desirable to leave filaments, cooling systems and everything but the high voltage supplies run 24 hours a day. Video presence could then turn on the high voltage.

A refinement to simple video controlled turn-on is an additional subsystem to automatically insert locally generated visual and aural announce and identification signals at the transmitter plant and inhibit turnoff in the event of program loss during times set in the memory of a transmitter control clock.

Other automatic means of transmitter turn-on are clock control or vertical interval command signals. However, these require manual effort to program or initiate a control and have little if any advantage, except possible cost advantage, over manual turn-on using a remote control link or separate order wire.

In fact, remote control manual turn-on and turn-off takes so little effort that providing equipment at the transmitter, for automatic operation of this function, hardly seems worthwhile.

Automatic logging

For manually operated stations, the present FCC requirements for operating logs are few and not especially burdensome. For unattended transmitters, the NAB Engineering Sub-Committee on Automatic Transmitters went further and recommended against any specific logging requirement, partly on the grounds that it creates unnecessary paperwork. In the absence of any confining requirements on logging, the system designer will have freedom to decide what should be logged, if anything, and this will vary with the system concept.

We are inclined to think that some stations may want more, not less, information on the health of an unattended system compared to an attended one. Also, a record of parameter trends can be used to anticipate component wearout or the requirement for readjustment. To avoid unnecessary accumulation of paperwork, most parameters might be logged only once per day, or not at all unless the value changed by some percentage from the previously logged value. Our view would be to provide flexible and extensive options for logging and alarm. Current generation RCA transmitters provide interface terminals to many monitoring points and some new ones may be added as the optional logging and alarm subsystems evolve.

It has often been suggested that automatic systems should provide an indication or alarm when the key parameters of power output, modulation levels, or frequency have drifted to some fraction—say half—of the permissible tolerance. Perhaps so; but for automatically controlled parameters with substantial control loop gain, the values may not change very much until the control system has approached the end of its range. Logging and possible alarm of the control loop error signals would seem to be more useful than alarming the controlled parameter, itself. Interface terminals to control loop error signals is a minor addition worth considering for future transmitters.

Reliability

It is self-evident that a transmitting system for unattended operation must be reliable; but, no matter how well designed and manufactured, there is always a chance of a random component failure. Program interruption can be avoided, in spite of such failure, by parallel redundancy or automatic switchover to a standby subsystem. Then, no matter what fails, a replacement automatically will be inserted or an alternate mode selected. It is probably this system characteristic that most distinguishes an automatic transmitter system from a manual one.

Remotely controlled transmitters usually have a degree of remotely switchable subsystems and it is a small step to make such switchover automatic. How far the concept of full automatic backup of all subsystems is carried, is largely a matter of cost and the importance to the market of a possible service interruption. For these reasons, system design should be flexible and sub-system options available.

One example of the many alternate modes possible in modern TV transmitters is found in the RCA "FL" and "FH" lines of parallel transmitters. An option permits parallel operation, switchable to single transmitter mode. The single transmitter power automatically doubles in the alternate mode while maintaining proper modulation levels, thus maintaining a full power normal signal in either mode.

Transmitters selected for unattended operation should be of modern design. Today's transmitters, which are largely solid state with ample cooling and over-designed power supplies, are about as reliable as the state-of-the-art will permit without a major jump in equipment cost to military type of reliability testing and reliability enhancement techniques. Elimination of fuses and manually resettable circuit breakers is important for unattended operation where there is no opportunity to manually reset at overload. The current foldback, regulated power supplies in the RCA TT-50FH, which require no overload protection, is an example of progress in equipment development toward unattended operation.

Maintenance

For whatever maintenance schedule and periodic performance tests that may be recommended by the manufacturer or evolved, from experience, by the broadcaster, there will be a need for local manual control. How then, can the engineer be assured that the station is left unattended in the automatic mode, with the antenna connected, all necessary switches on, interlocked doors closed, etc.?

The author had the pleasure of visiting a high power unattended TV transmitter system in another country during 1971. Above the exit door was a panel with large yellow lights. It was called a "GO HOME" panel. If all lights were on, the maintenance and test engineer could leave with assurance that the plant was in the automatic mode and operational. It was a manual function in an otherwise automatic plant, but it was effective.

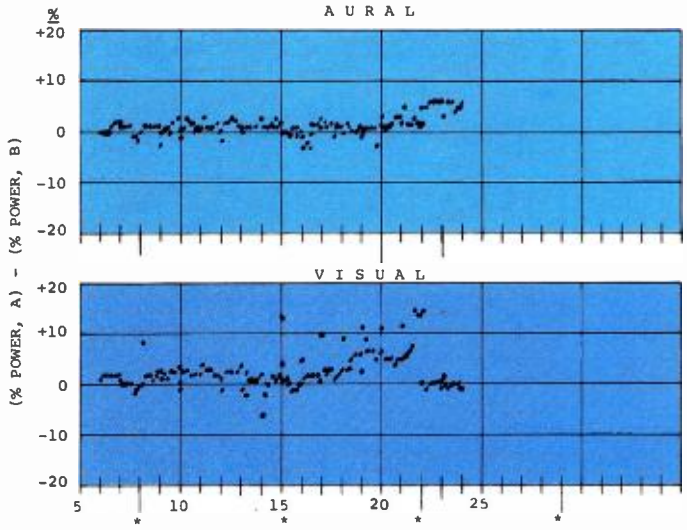


Fig. 9. Differential power output of combined transmitters. Aural power (A-B) and visual power (A-B).

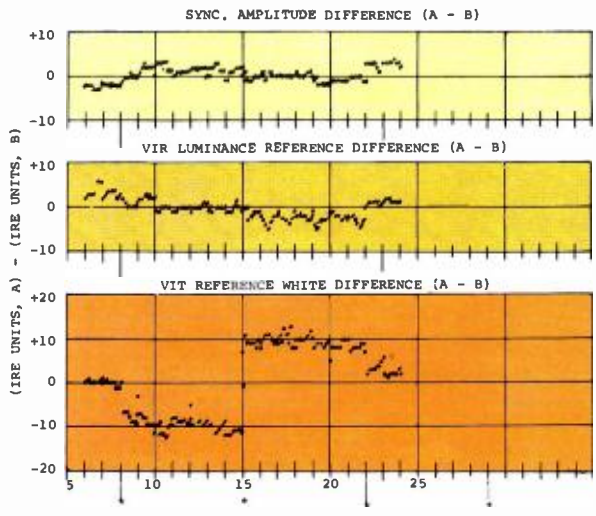


Fig. 10. Differential modulation levels of combined transmitters.

The TV transmitter "hands-off" operating experiment

Through the courtesy and cooperation of the Westinghouse Broadcasting Co., a 30 day "hands-off" experiment was performed at KDKA-TV to simulate unattended television transmitter operation. The transmitter system was, in fact, attended by licensed operators as required by the rules, but operators were instructed to keep "hands-off' the controls, except for scheduled maintenance sessions, to demonstrate that the system need not have been attended. Touching any control, except for the on-off control, was "verboten", unless the system performance should approach limits set by the FCC rules. The plan was to carry out all maintenance, performance measurements and adjustments on a regular basis; and to operate the transmitter "hands-off" between these sessions. To begin in a conservative way, maintenance and adjustments were scheduled on a weekly basis with the hope that the interval could be extended in the future after a shakedown and "debugging" period.

The transmitter system configuration for the tests is shown in Fig. 6. The parallel transmitter is an RCA model TT-30FL. The ancillary automatic aural power control device, shown in the diagram, was purposely not operated for the first three weeks of the test in order to evaluate aural stability without automatic control.

A VIR signal was inserted at Studio Master Control by means of a Tektronix model 147 NTSC Signal Generator.

The aural automatic power control equipment and the Tektronix 1440 Automatic Video Corrector with its optional meter panel were mounted in the auxiliary racks of the KDKA-TV transmitter used for this experiment. These were in addition to existing equipments such as: RF oscilloscope. TFT frequency and modulation monitor, picture monitors and Tektronix 529 waveform monitor for comparing transmitter input and output signals, a Rhode & Schwarz AMF demodulator, Tektronix 520 vectorscope, Grass Valley video processing amplifier, RCA TTS-1 envelope delay equalizer and various test equipment items. The vectorscope A + B input was used to display superimposed test signal waveforms supplied by diode demodulators on the outputs of the individual transmitters. This gave a very graphic display of any differences in modulation levels between the two paralleled transmitters.

In addition to the FCC operating log, a special log was maintained with an entry immediately at sign-on, at sign-off and every three hours during the broadcast day.

Entries are noted on the table below.

Also, error correction signals were recorded from a Tektronix 1440 Auxiliary Meter Panel. The meter panel displays six parameter corrections but only three were recorded. It should be noted that these are corrections for total transmission system errors including master control output circuits, microwave link, transmitter plant auxiliary equipment and transmitter errors.

The error correction signals recorded were:

- Sync Gain
- Burst Gain
- Master Gain

The thirty day test was begun on February 6, 1974. Approximately 2400 meter and oscilloscope data points were recorded during the test period. Data from the first 19 days of the test are plotted on the graphs. Similar variations, all within tolerances of FCC rules, resulted from the remaining 11 days of the test. The aural data is with the automatic power controller disconnected to check the basic stability of the aural transmitter.

Fig. 7 shows the "hands-off" stability of power output. Approximately 95% of the readings are within FCC power output

Special Log Entries

Parameter	Transmitter A	Transmitter B	Combined
Plate Voltage, Aural PA	•	•	
Plate Current, Aural PA	•	•	
Reflectometer, Aural	•	•	•
Reflectometer, Visual	•	•	•
Frequency Monitor, Aural			•
Frequency Monitor, Visual			•
Sync, IRE Units	•	•	•
VIT Reference White	•	•	•
VIR Luminance Reference	•	•	•
Burst Amplitude	•	•	•

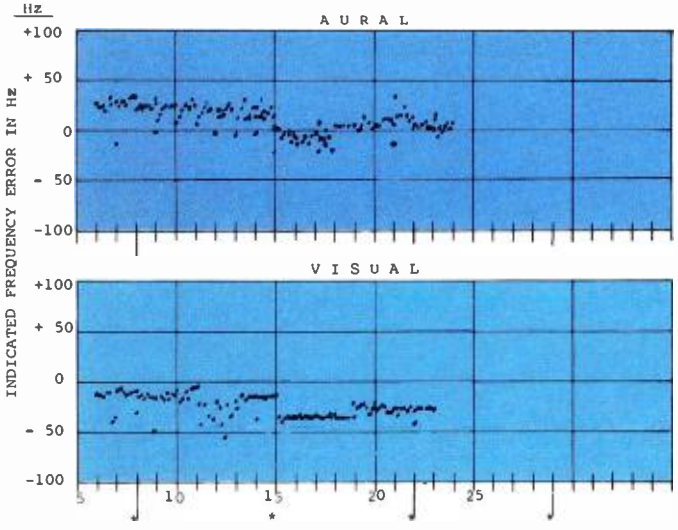


Fig. 11. "Hands-off" experiment. Aural and visual indicated frequency errors.

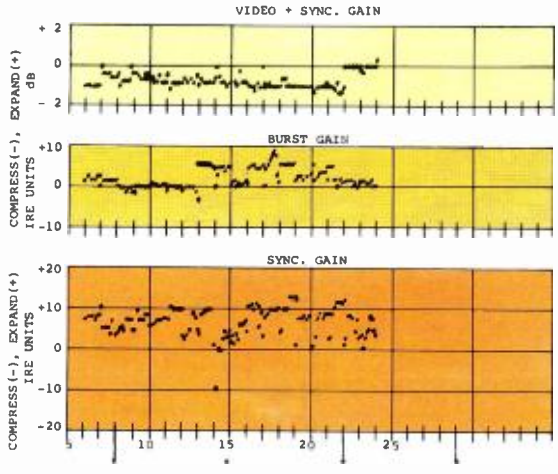


Fig. 12. Tektronix 1440 error correction signals for total system comprised of microwave, auxiliary equipment and TV broadcast transmitter.

tolerance by a 2/1 margin. The single low data point on certain days is the initial turn-on reading which climbs to normal in approximately ten minutes. If these are discarded, only the two high readings on Feb. 22 are of consequence.

There was one, perhaps unnecessary, manual adjustment made shortly after turn-on on Feb. 20 because the power ran low on Feb. 19. However, the Feb. 19 low readings were, nevertheless, within FCC tolerance by almost a 2/1 margin.

Fig. 8 shows the stability of modualtion levels. The stability of all modulation levels was excellent. Sync amplitude remained within 2 IRE units. Actually the number is not significant since the waveform monitor readings are not repeatable among the four different operators to that precision.

Burst amplitude ranged up to four IRE units high during the first week. Then the Automatic VIR corrector was adjusted to reduce the level to be correct as read by the operators. After that, it was stable within the precision of observation. It is a moot question which adjustment is really correct. Eliminating part of one chrominance sideband by the 4.5 MHz low pass filter at the transmitter input, distorts the burst envelope, producing a double lobed peak. The operators tended to read the tips of the burst envelope including the transient.

The VIR luminance reference remained within 2 IRE units! Again, this is beyond the reliable precision of reading the waveform monitor.

The VIT reference white remained within 6 IRE units except for three isolated readings. This is probably closer control than routinely achieved under manual operation.

Fig. 9 shows how the power of one of the parallel transmitters drifted with respect to the other. The differential aural drift without automatic control was surprisingly small. The differential visual drift was larger than expected but of no consequence in the output of the parallel transmitter operation. It is partly caused by some sync compression in one of the transmitters. Since the blanking level is regulated, sync compression shows up as differential peak power. Notice the improvement after transmitter adjustment on Feb. 22.

Fig. 10 shows the differential drift of modulation levels between the two transmitters. The observed drift was small and the data supports the statement, made previously in this report, that it is unnecessary to individually control the modulation levels of two transmitters operated in parallel when the parallel combination is automatically controlled.

Apparently, the individual VIT reference white levels were not precisely set during the adjustment sessions (identified by asterisks) since they are stable between adjustments but vary from one adjustment period to another.

Fig. 11 is the indicated frequency error or, more correctly, the difference between the monitor frequency and the transmitter frequency. All 262 frequency readings except one were within ±50 Hz of the assigned frequency.

Fig. 12 shows the signal amplitude corrections automatically introduced by the Tektronix 1440 Video Corrector when keeping the transmitting system within the close limits recorded in the present test.

At times, the video gain was automatically increased by amounts up to +1.5 dB, the burst was expanded up to +1.8 dB and the sync was expanded up to +2.2 dB.

Conclusion

The experiment at KDKA-TV dramatically demonstrates that a modern television transmitter with auxiliary automatic controls can operate in an unattended mode. In fact the experiment indicated that such a system probably will maintain modulation levels to closer tolerances than typically attained in manual operation.

With existing technology and equipment, it is a relatively small step to implement an automatic TV transmitter system comprised of:

- Current generation transmitter.
- Off-the-shelf terminal products including video and audio presence detectors.
- Available automatic logging and alarm.
- Closed loop connection between visual demodulator and video processor (e.g. Automatic VIR Corrector) for automatic white level control.
- Custom automatic switching systems tailored to the choice of transmitter and degree of subsystem backup selected by the customer.

We are confident that as soon as automatic transmitting systems are authorized, a practical and reliable system can be delivered. After that, through operating experience and technical progress, future generations of automatic systems will be further simplified and improved toward minimal maintenance attention. □

When a low-priced broadcast camera looks like a good buy, keep right on looking.

Take a good look inside. Check out the design and construction features.

Then think about what they mean in terms of reliability, maintenance, and long-term picture quality after the camera has been put to a lot of hard, daily use.

Look at the RCA TK-630 color camera.

The heart of its optical system is a simple one-piece sealed prism rather than the ordinary arrangement of mirrors.

It's simpler to maintain; stays in perfect alignment; eliminates the secondary reflections that even slight contamination of mirror surfaces can cause.

And for stability, the entire optical system is mounted on a sturdy bedplate for extra rigid support of pickup tubes, lens and prism.

The result? Less shock and vibration. Extra dependability. And pictures that stay sharp and true.

Components are easily accessible so maintenance is fast and simple. The pickup tubes for example, can be replaced in two minutes. Without disturbing the optical alignment and causing deterioration of picture quality.

Circuit modules are easy to get at, too. And they're totally solid state for compactness and long life.

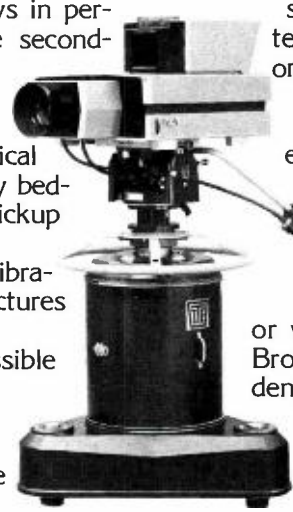
And the TK-630 is made for portability —with a plug-in detachable viewfinder and carrying handle that make it easy for one man to carry.

There are other quality features which set the TK-630 apart: Calibrated test pulse; built-in encoder with color bar generator; automatic pulse timing; deflection failure protection; electronic lens capping, easy setup. And many more.

The new low price is the first thing that looks good about the TK-630.

But by no means the last.

Ask your RCA Representative, or write for new brochure. RCA Broadcast Systems, Bldg. 2-5, Camden, N.J. 08102.

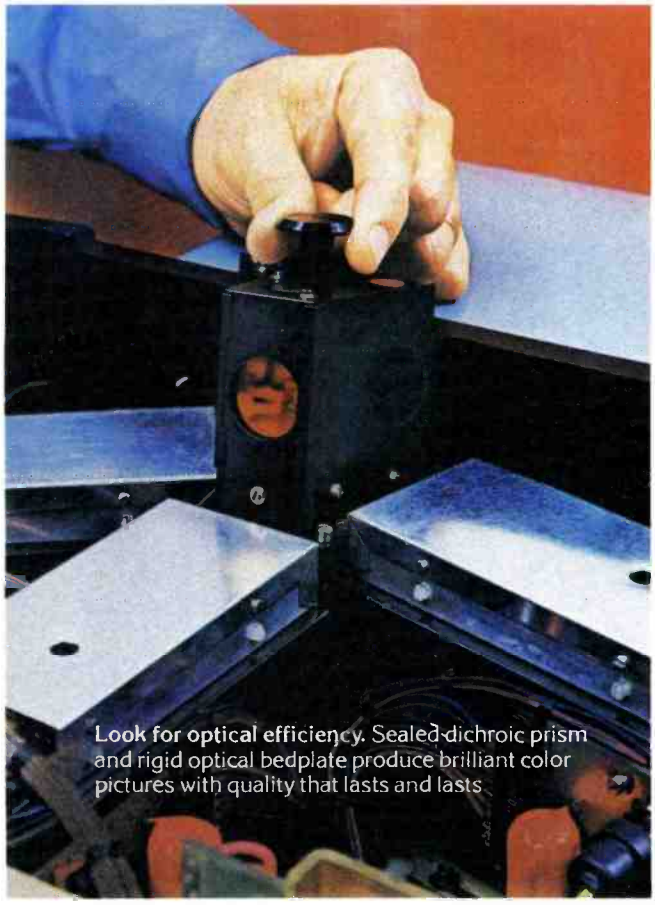


RCA

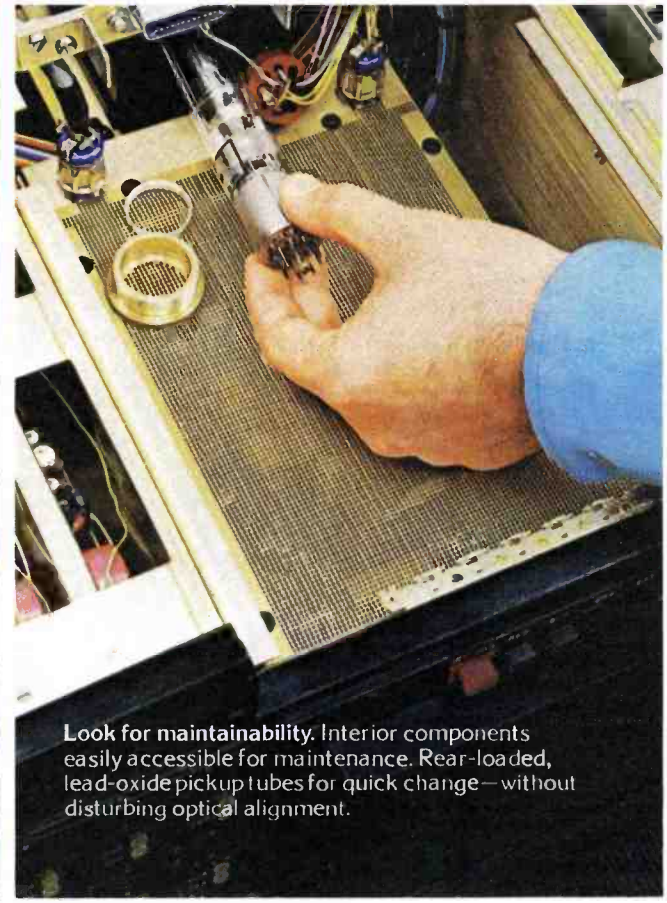
New TK-630 color camera.

Look for versatility in field or studio use. Plug-in viewfinder quickly detaches for easy portability.

Look for rugged construction. An extra measure of design integrity. Sturdy circuit boards take hard knocks. Premium components for extra life.

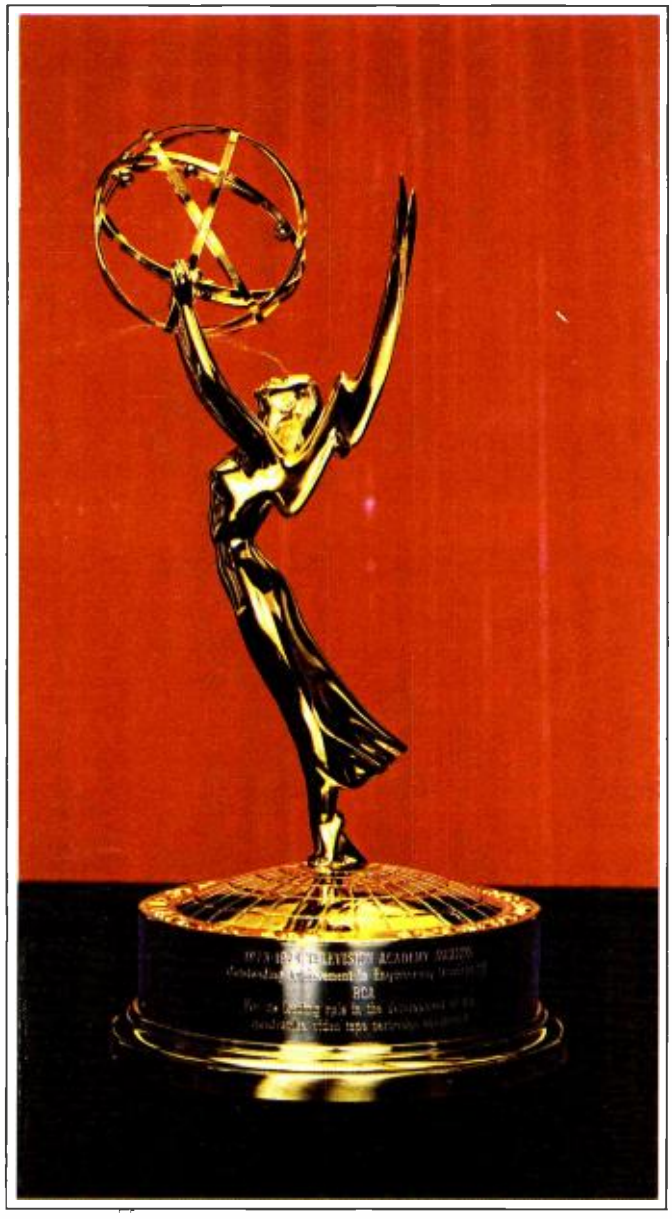


Look for optical efficiency. Sealed dichroic prism and rigid optical bedplate produce brilliant color pictures with quality that lasts and lasts.



Look for maintainability. Interior components easily accessible for maintenance. Rear-loaded, lead-oxide pickup tubes for quick change—without disturbing optical alignment.

1973-1974



The National Academy of Television Arts
and Sciences Emmy . . . awarded to
RCA Broadcast Systems
for its leading role in the
development of quadruplex
video tape cartridge equipment.

Printed in U.S.A. 3J5901