

BROADCAST NEWS



BIG TUBE Color Film System



Vol. No. 130 OCT. 1966

Get “Big picture” performance from your color films



The 1½-inch vidicon in the luminance channel of RCA's color film camera provides a 50% larger image—50% larger than any used in other cameras. This gives improved signal-to-noise ratio, high resolution capability. Result: Unusually sharp reproduction of color films and slides.

All four of the vidicon pickup tubes are electrostatic-focus, magnetic deflection type. They require no focus coils — eliminating heat problems — and are independent of high voltage variations.

Completely transistorized, the TK-27 employs compact, plug-in circuit modules. They provide top performance and easier maintenance. Circuits are highly stabilized, assuring unvarying picture quality — over extended periods.

The entire “Big Tube” system is made by RCA, including camera, film projectors, slide projector and multiplexer. These are “matched” equipments—all designed to work together in an integrated system to best advantage. It's ideal for turning out top quality color film programs and commercials.

Your RCA Broadcast Representative has the complete story on this “Big Tube” color film system. Or write RCA Broadcast and Television Equipment, Building 15-5, Camden, N. J.



The Most Trusted Name in Television

BROADCAST NEWS*published by***RADIO CORPORATION OF AMERICA**
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*As We Were
Saying*

BONUS comes with this issue of BROADCAST NEWS. It's a reproduction of the very first issue of BROADCAST NEWS (Volume No. 1, October 1931). It was printed from plates made by photographing the original pages — on paper very closely matching that used in the original printing. Some of the illustrations (because of the rephotographing) are not as sharp but otherwise it's an exact facsimile of our first offering. By today's standards it would be rated a puny effort — but in 1931 it was considered quite an accomplishment, and it aroused a lot of interest among broadcasters. Maybe it still will.

HOW AND WHY we started BROADCAST NEWS is explained in some detail in the article on

Page 48 — along with some comments on the intervening years. It's a story we've told several times before — and some will find it tiresome. But for the old-timers it invokes a pleasant and harmless nostalgia, and for the young-squirts — well, it's something we'd like them to know about. Hopefully they'll consider it so far "out" that it's "in." Who knows, maybe it's even "camp."

EMBARRASSMENT AND AMUSEMENT — we hope more of the latter than the former — will come to the people whose names appear in this reprinting of Volume No. 1. Most embarrassed, we suspect, will be the authors (including this writer) — for the cornball copy they perpetrated. In defense we can only plead that it was the

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first time we had ever written anything other than catalog pages, and the sudden freedom from prescribed form made us a little giddy.

WE'LL HEAR from some of the people pictured or mentioned. Among these, no doubt, will be Ben Adler. Ben—who is now a Vice President of Litton Industries—was then one of our field salesmen, and he was shown (Figure 3, Page 8) operating what we labeled a “cumbersome old-style field intensity measuring equipment.” Actually, we had never seen his equipment but from the photograph judged it to be much larger and heavier than it actually was. Ben quickly and gleefully pointed out that, in fact, our fancy new gadget was heavier than his. It may have been the first time that we had to point out that

real quality usually comes in big, and heavy packages — like Cadillac, like Lincoln, like Chrysler, like the TK-42 Color Camera!!!

IT WAS A BIG MONTH — October 1931. During the same weeks that we were struggling with the writing and printing of our first issue, there were two eager beavers in Washington doing likewise. Names — Sol Taishoff and Marty Codel. Their baby — BROADCASTING. Our first issue and their first issue came out in the same week (October 15, 1931) — and it's hard to say who was the most surprised — they or we. It could have been worse. In our early planning we had intended to use the name “Broadcasting” — only changing at the last minute when we couldn't get copyright clearance. Later Sol told us that at one point they had thought of calling their magazine Broadcast News. Fortunately the gods of chance and/or copyright prevailed — and we've both been happy ever since.

BROADCASTING dismisses their anniversary in three short paragraphs. It is the studied understatement of a group that doesn't need to brag. In its 35 years BROADCASTING has done a truly superlative job. Not just by reporting the news of the industry — but by being a part of the industry, by living with it, by supporting it — and by never-faillingly speaking for its best interests. Sol Taishoff, Ed James, Maury Long — and all your cohorts — we salute you. May the tradition you have established live forever — and may the industry keep trying to live up to it.

REDUNDANCY FOR RELIABILITY is a well-developed trend in VHF transmitter installations. Time is the broadcaster's stock-in-trade. Broadcasters have nothing but time to sell. Any they lose from “off-air” is gone forever — money down the drain. They figure savings from eliminating or reducing breakdowns will pay for

extra equipment. Not many feel they can justify a complete spare, full-power transmitter (and it costs money to keep it warmed up) — but most have something to fall back on. In the past it was a low-power spare — but more modern thinking is that the “interim” power should be at least half of full power. Thus the best recent VHF installations have included twin transmitters with outputs paralleled, or diplexed power amplifiers with switchable inputs. Such arrangements provide for half-power operation under most failure conditions.

Now comes the same for high-power UHF. Don Mason's article on Page 14 describes new 55 KW UHF Transmitter with built-in switching flexibility that will keep it on the air at one half power even when one of the big Klystrons goes. This, plus other features of this transmitter, makes it just about the ultimate in deluxe UHF.

MR. LIGHTING, himself, otherwise Bert More, Manager of Kliegl Brothers Lighting, is the author of the story on color lighting starting on Page 24. To use or not to use Quartz-Iodine lights has been a subject of hot controversy for the past two years. Some of the argument — maybe most of it — is due to confusion about the advantages and disadvantages (vis-a-vis incandescents) and the relative cost. We asked Bert to straighten us out on these points. He's close to the action and should know better than anyone what's going on. Moreover, he sells both types (and claims he doesn't care which) so he should be unbiased. His story is, we think, a model of straightforward reporting of the facts. We think it should help clear the air. Later we hope to have some articles on actual installations of Quartz-Iodine lights and how they are working out.

YOU'LL LOVE THIS, whatever it is (we almost called it an article), that starts on Page 37 and is entitled “Digesting the New TK-27 Big Tube Color Film Camera.” Guy Welch of KFTV, San Francisco, created the original of this for his own amusement and the amazement (and education) of his colleagues. Our merchandising manager saw it and liked it so much that he asked Guy for permission to reproduce it. For a quick idea



of how the four-tube color film camera works you can't beat Guy's explanation. We've printed—and already mailed out — hundreds of copies. If you didn't get yours (or want more copies), let us know. Also, whether you'd like to see more of Guy's work.

WE'RE AWED by the KFTV/KTIV Tower story on Page 43. Maybe 2,000 feet doesn't sound so high to you. But the way we look at it 2,000 feet is 4/10 of a mile, and that's a long way up.

*As We Were
Saying*

*As We Were
Saying*

Putting a 100-foot antenna 4/10 of a mile in the sky is something. Putting two of them there is something. Putting one on top of the other is the somethingest. We can hardly believe it — but there it is, and working fine.

PREDICTIONS made in this column have a way of coming true — some sooner, some later, but most all eventually. You may say “sure, you have inside information” — and you would be right. But it’s surprising how many scoffers there are when these predictions are first made. Some people just can’t understand (or forget) how much experience means when it comes to building complicated equipment — in quantity. They see us left at the post — and bet against us — only to lose in the end. They should remember that it takes longer to do it better.

PREDICTION COME TRUE is found in the record of our TK-27 “Big Tube” Color Film Camera which is shown on the cover of this issue. We first showed this camera at the 1964 NAB Convention. In the next issue following the convention we predicted that the TK-27 would sweep the boards and become the standard of the industry — as had its predecessor, the RCA TK-26 Camera. And, despite production difficulties and shipping delays, we kept predicting this in one column after another. Finally, a little over a year ago we started shipping in quantity. And what happened? Immediate and overwhelming acceptance. There are now over 300 of the TK-27’s in use — and they’re still going out at a rate of 25 to 30 a month. The number in use should double in another year. The TK-27 is the favorite of the networks and of stations across the land. Probably never before has a camera received such a quick and enthusiastic acceptance. We’re tempted to say we told you it would happen.

PREDICTION COMING TRUE is what’s happening with our TK-42 Big Tube Color Studio Camera. Here, too, we showed early — a lab model in 1962, a pre-production model in 1965 — and then had to sweat out a long year getting into production. But we kept our chin(s) up and kept predicting that the TK-42 Color Camera would be the ultimate favorite in TV station studios — just as its predecessor, the TK-41, has been for over 10 years. What’s happening? This — with over 100 of the TK-42’s now in the field a flood of very gratifying comments is coming in — and this despite the fact that most of the stations are only just learning to use it — many of them, in fact, using live color for the first time. Some of the things station engineers are saying appear in the report on Pg. 31-36. It’s early in the game, but there’s no question we have another winner. With TK-42’s now being shipped at 30 a month there will be nearly 300 in use by next NAB — far more than any other “modern” color camera. It’s what we predicted.

NEW PREDICTION for your future book — and one which may be hard for you to accept right

now — but remember our course record. Here it is! We predict that our TR-70 High-Band Tape Recorder will turn out to be the finest TV Tape Recorder made. We’ve labored a long time on this machine, and we’re later with it than almost anything we’ve ever attempted to build. But now we are almost ready to start shipping — in quantity. And when stations get their new TR-70’s, they will find that they have a TV Tape Recorder which is unexcelled in performance and which surpasses in operating and convenience features anything now available. Remember — you read it here.

WHO WANTS A MATCH? No one we know. The name of the game is leapfrog. We make a machine — they design a new one and leapfrog our design. Then we make a new one and leapfrog them. And so on. Lately they’ve had a field day. Now it’s our turn! Our TR-70 doesn’t match — it leapfrogs. It does everything, has everything the best previously available recorder could boast of — plus a whole host of features that make it work better, work easier, work surer. It’s too long a story to relate here — but ask your RCA man to give you the details.



MARK OF EXCELLENCE announced in recent General Motors advertisements has some similarity to our New Look emblem. Resemblance has been noted not only by our own people but also by some of our customers. GM’s ad copy is wonderful. Says, in part, “We are proud of the things we make, and we want our customers to be able to identify them easily and to know that we stand behind them.” These are simple words — and eloquent. It’s an ad we wish we had written. It expresses, better than we have been able to do, how we think of our New Look emblem.

MARK TWAIN once said, in referring to a false report of his demise, that it was “greatly exaggerated.” In like manner we (editorially speaking) want to say that the rumor of our retirement (circulated at NAB time) was “very premature.” Of course, our missing NAB for only the second time in 20 years could easily give rise to such a report — but we are more inclined to attribute it to wishful thinking on the part of our competitors. They should know better. The pugnacity with which we automatically react to competitive claims may someday cool — but that time is not yet. Sorry to disappoint you, fellows.

— The Armchair Engineer

...now No.100 joins the RCA ships 100th TK-42



“Big Tube” Color Camera

No. 100 went to WLBW-TV in Miami—one of an order of five. Sixty have gone to independent stations, the remainder to network-owned stations, TV-station groups, the U.S. Government and foreign broadcasters.

To keep pace with the unprecedented demands for these new cameras, facilities have been expanded so that RCA is now turning out the TK-42 at a rate of 30 per month. Nearly 300 are expected to be in service by the next NAB in April 1967.

Use of a 4½-inch image orthicon in the separate luminance channel is an exclusive feature. Besides improving color picture quality, the “big tube” assures highest quality pictures on black-and-white sets.

Broadcasters everywhere who are now using the TK-42 tell of its superiority in producing consistently better color pictures—including ability to handle details too fine to be passed by the chrominance circuits. No wonder color pictures are getting better and better!

For more information about the TK-42 Color Camera call your RCA Broadcast Representative. Or write RCA Broadcast and Television Equipment, Building 15-5, Camden, N. J.



THE MOST TRUSTED NAME IN ELECTRONICS

Big Parade!



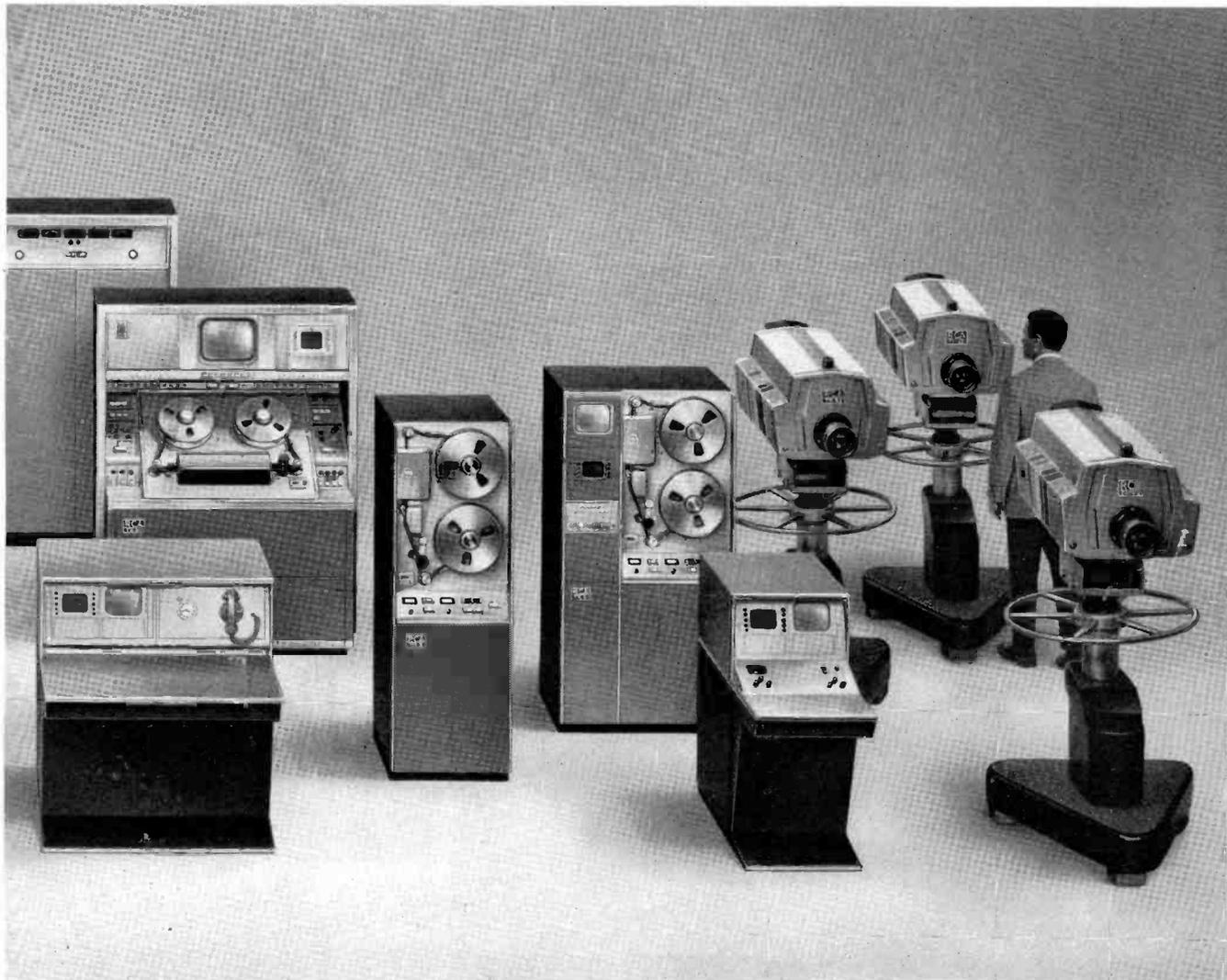
RCA
NEW
LOOK



FILM CAMERAS AND PROJECTORS ■ TV TAPE EQUIPMENT ■ TRANSMITTERS

RCA...the

"MATCHING" MEANS A BETTER INVESTMENT



CONTROL CONSOLES, SWITCHING AND EFFECTS ■ LIVE CAMERAS

matched line

The "Matched Line" is the end result of a multi-million-dollar engineering program to produce a new generation of broadcast equipment. RCA Matched Equipment reflects the newest in styling, performance and operation.

Matching means equipments that are designed to provide the ultimate in performance when used together... equipments that are designed and styled to fit together efficiently, and to provide the finest, most modern appearance for the whole station. It means installations that are compact, yet easily expandable, that offer greater reliability, and that provide for easy operation and maintenance. It means simplicity in ordering, easier follow-up and guaranteed satisfaction... from one factory, one ultimate source of responsibility, one set of designers and engineers. And it means equipment that is designed for tomorrow, assuring a better investment.

If owning equipment that performs and looks better together, and lasts longer, appeals to you, why not consider RCA's Matched Line? From "big tube" cameras, advanced quadruplex recorders, film and slide projectors... to transistorized switching, controls, transmitters and antennas, the RCA Matched Line is a good thing, all the way, for you.

See your RCA Broadcast
Representative. Or write RCA
Broadcast Television Equipment,
Building 15-5, Camden, N. J.



The Most Trusted Name in Television

DELIVERY OF 100TH TK-42 CAMERA MARKS BIG COLOR SURGE

Early October saw a major milestone reached in the big color TV boom: delivery of RCA's 100th TK-42 "live" color camera. It was one of five ordered by WLBW-TV, the L. B. Wilson, Inc. station in Miami whose new color studios were described in the June 1966 issue of Broadcast News.

After the 100th TK-42 had left the Camden shipping dock, the camera makers turned again to the task of producing at least 25 TK-42s a month.

During the winter months the TK-42s will be going out the door at an ever-faster clip and nearly 300 will be in broadcast service by the time the 1967 N.A.B. convention rolls around. The first 100 went to TV networks, network-owned stations, TV station groups and individual stations, the U.S. government and to foreign broadcasters.

Field reports from broadcasters using TK-42s affirm the superiority of the four-tube design in producing consistently better color pictures. Most other camera makers are adopting the four-tube concept which was pioneered by RCA and first demonstrated publicly at the 1962 N.A.B.



Camera No. 100 gets a Camden sendoff from (left) Charles H. Topmiller, President, and William M. Latham, Chief Engineer, WLBW-TV, Miami, with Roy Giles, RCA broadcast equipment Florida sales.

Exclusive with the TK-42 is the use of a 4½-inch image orthicon to produce the separate monochrome channel. Besides improving color picture quality, the 'big tube' assures sharp, high-quality pictures when color broadcasts are received on black-and-white sets.

Four-tube cameras enjoy a number of advantages over the early three-tube models. One is the fourth channel's ability to handle detail too fine to be passed by the chrominance circuits. This puts more information into the finished color pictures and gives it a photographic quality.

FIRST TV STATION IN CONGO BEING INSTALLED UNDER \$900,000 EQUIPMENT CONTRACT WITH RCA



Congolese government and RCA representatives dine after signing contract agreement.

RCA broadcast equipment is being prepared for shipment to the Congo where the Congolese Democratic Republic shortly will establish that nation's first TV station in Kinshasa, the capital city formerly known as Leopoldville. The approximately \$900,000 contract calls for RCA to supply a complete studio facility, two transmitters and antennas and a three-camera mobile unit.

Key items of studio equipment include PK-330 vidicon cameras, two TV film islands using the TK-22 film camera, TR-4 TV recorders, studio lighting and switching equipment. The studio will be linked by microwave to the transmitting site on the summit of Binza Hills outside the capital.

Programs broadcast from Kinshasa are expected to reach a potential audience of some 1,700,000 persons. A second transmitter, scheduled for installation at Brazzaville, will bring the station's planned programs of news and entertainment to an additional 300,000 viewers. Programs will be broadcast in French, the national language, for the most part but various Congolese dialects also will be used.

TR-4 TV TAPE RECORDERS SLATED FOR ULSTER USE

Ulster Television Ltd., a broadcast company whose programs are seen regularly in Northern Ireland, has ordered two TR-4 TV tape recorders to augment its present studio equipment facilities. Currently the company operates two fully equipped "live" studios and four TV film chains.

Under an agreement with the United Kingdom's Independent Television Authority, Ulster Television produces about seven hours of live programming weekly. The remainder of its broadcast schedule is made up of live shows of other companies and of filmed and taped fare.

Two VHF transmitters radiate the company's programs in Northern Ireland where there are some 242,000 sets capable of receiving them. The new RCA tape recorders will handle the bulk of the company's program taping and playback assignments.



News camera records signing of contract by Ulster Television Ltd. for RCA TR-4 TV tape recorders.

FIVE-CAMERA CCTV SYSTEM AT N. J. RACE TRACK GIVES FANS 'THE ACTION' AT 60 SPOTS

At Monmouth Park, N. J. Racetrack this past season there was more to watch than a faltering filly or a lagging long shot. It was "the action" on sixty 25-inch TV monitors in bars, restaurants and elsewhere on the park grounds. They are the distribution end of one of the most versatile CCTV systems ever installed at a race track.

Five cameras - one TK-60 image orthicon and four PK-301 vidicons - fed the RCA system almost every scrap of visual information a bettor would want: the odds, coverage of the race, official results, a photo finish, and entries for the next race. And, in between, beer and cigaret commercials!

The TK-60 was mounted high up on the grandstand roof where its zoom lens commanded a full view of the track. The smaller cameras were positioned to pick up the tote board, stills of the finishes and the other information. A PTS-1 switching system, with special effects, tied it all together.

The photo-finish camera enabled fans to see televised stills of the finish within



TK-60 camera commands sweeping view of track.

30 or 40 seconds after the race was run. Before TV's advent, still pictures were pulled from the developing tank, hurriedly dried and rushed by messenger to posting locations. All this required up to 10 minutes.

The Monmouth system is one of several designed and installed at race tracks by Video Projects, Inc., distributors of RCA Professional Television equipment.



PK-302 camera focused on rear-lighted glass slide televises photo-finish pictures of race just run.

KAISER BROADCASTING ORDERS \$3 MILLION IN COLOR EQUIPMENT FOR 2 NEW UHF STATIONS

Kaiser Broadcasting has ordered approximately \$3,000,000 in RCA color studio and transmitting equipment for new UHF television stations in Boston and San Francisco. The equipment packages will give the proposed Boston station and KHJK-TV, Channel 44, San Francisco, full capability to originate color programming "live" or from film or tape.

The 13 color cameras on order include both types TK-42, with built-in zoom lens, and TK-43, with external zoom lens. The purchase also includes, for each station, a color mobile TV unit capable of carrying four color cameras.

RCA television tape facilities at each station will include two type TR-70 and two TR-22 recorders, all equipped for high-band color operation. Film programming will be handled at each station by two color film "islands," using the TK-27 four tube color film camera with associated slide and film projectors. Transmitting plants will use RCA's newest and most powerful UHF transmitter, a 55-kilowatt unit, and pylon-type antennas.

The equipment order for the Boston station was placed on behalf of WKBG, Inc., a new corporation formed by Kaiser Broadcasting and the Boston Globe.

INGLIS, HAMMERSCHMIDT HEAD NEW DEPARTMENTS FOR BROADCAST GEAR

Two organizational changes of interest to broadcasters were made in the RCA Broadcast and Communications Products Division during recent months. Andrew F. Inglis, a Division Vice President, has become responsible for a new, consolidated Engineering and Merchandising Department. Andrew L. Hammerschmidt has been named Manager of the newly-formed Electronic Recording Products Department.

Activities now reporting to Mr. Inglis include engineering of broadcast, communications and microwave products and scientific instruments, as well as engineering administration; merchandising of broadcast studio and transmitting equipment, and sales support and services for all Division product lines.

The new department brings together planning, development and design of new products. It will place heavy emphasis on evaluating changes in the broadcast industry's needs and in product development programs that will anticipate the industry's future requirements.

Mr. Inglis formerly was Division Vice President, Communications Products Operations. With RCA since 1953, he has held several executive posts, including responsibility for the Division's broadcast product development program and systems engineering. In 1958 he became Manager, RCA Closed Circuit TV Department and later was in charge of film recording and scientific instrument activities. Before beginning his RCA career he was associated with a Washington, D. C. consulting firm to the radio and TV broadcast industry.

The Electronic Recording Products Department under Mr. Hammerschmidt is accelerating product development and marketing of TV tape equipment. The surge in color programming and such technical advances as all-solid-state design and high-band recording are among factors that have stimulated the tape equipment market's growth and prompted RCA's decision to set up the separate department.

Until his new appointment, Mr. Hammerschmidt had been Manager, Operations Plans, for the Division which he joined in 1965 after serving for four years as

NOW MAYFLOWER MOVING MAN CAN CALL DIRECTLY FROM VAN TO LET YOU KNOW HE'S ON THE WAY

Voice communications between a moving-van operator on the road and any telephone-equipped household expecting a pickup or delivery are possible for the first time with a new RCA two-way radio system being supplied Aero Mayflower Transit Company, Indianapolis.

Super-Fleetfone mobile radios are being installed in 200 vans of Aero Mayflower's 1500-truck fleet. The initial order followed a successful test of the system which combines two-way radio and telephone communications.

To call a home telephone or his dispatcher, the van operator uses his two-way radio to reach a nearby radio common carrier (RCC) message center. The RCC office, one of more than 350 across the nation providing radio service, interconnects the incoming call with the telephone system.

The RCA mobile radio equipment, completely solid state in design, provides four communications channels in the 150-megacycle band, thus assuring two-way service with RCC centers in virtually every part of the country. With the Mayflower-developed system in use, dispatchers in the company's Indianapolis home office, in New York, Los Angeles, and ultimately all Mayflower agents, will be able to maintain voice contact with any company van operator.

Calls from the dispatcher are placed by long-distance telephone to RCC in the vicinity where the van is traveling. The



Van operator uses RCA solid-state Super-Fleetfone.

message center relays the call via radio, transmitting signals in a radius of up to 150 miles. This enables a dispatcher several hundred miles away to divert, re-route, stop or otherwise control a moving van while the vehicle continues to roll along the highway. In addition, the van operator is able to give local agents precise information on his arrival and make advance arrangements for unloading help at his destination.

Chief Engineer, RCA Surface and Missile Radar Division. Previously he had been with NBC for more than 20 years and during his network career he was assigned to Cleveland where he set up NBC's new TV station and became its Television Operations Supervisor. He held other positions of increasing responsibility and in 1955 became NBC Vice President of Engineering and Facilities Administration.

ELECTRON SCOPE BECOMES TEACHING TOOL WITH TV

The worlds of television and electron microscopy, already linked by their common dependence on the electron, are drawing still closer together. This summer, as one indication, RCA demonstrated a new TV display system that permits its electron microscopes to be used in teaching the sciences.

The system provides TV monitor display of images produced in the powerful instrument and the pictures can be carried by any TV distribution system and recorded on video tape. With TV display, entire classrooms and auditoriums share the microscopist's view as he scans a specimen, and 'transient phenomena' — one-time changes occurring in the specimen — can be recorded for later viewing.

The system uses an RCA PK-301 all-solid-state vidicon camera which can be removed and operated separately for producing "live" TV pictures, with an optical microscope, or for any other television application.

Earlier, RCA introduced and has delivered a TV image intensification system for the RCA electron microscope which is regarded as the first practical merger of television and electron microscopy. It uses a two-stage image intensifier to brighten and make visible dim images of specimens as produced by an electron beam of relatively low intensity. This technique allows examination in the instrument of specimens that would be destroyed or altered by a beam of normal strength.

The TV system also improves image contrast and provides specimen enlargements on the TV viewing screen well beyond the 200,000-time direct electronic magnification of which the instrument is capable.

TV display will enable entire classrooms to share what a handful of people now can see.

SIX TK-42 CAMERAS GET 'WHEELS' AS WHDH-TV ORDERS 2 COLOR MOBILE UNITS FOR REMOTES

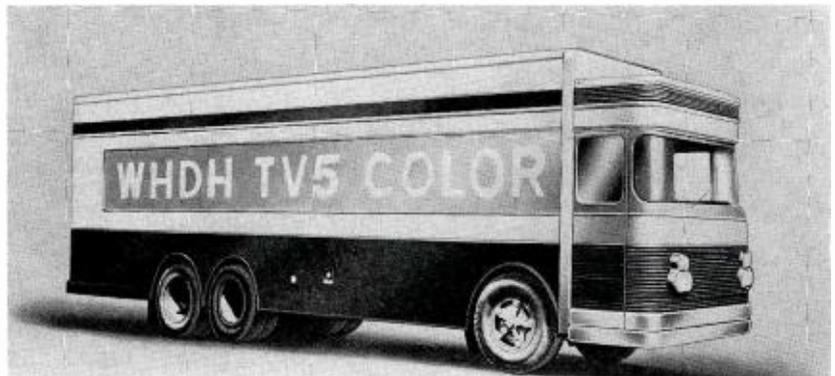
WHDH-TV's recent order for two color TV mobile units brings the Boston station's current purchases of RCA color broadcast equipment to more than \$1,400,000. The new order is in addition to an earlier contract for seven color cameras: four TK-42's for "live" programming and three TK-27's for film.

One of the 35-foot mobile units will be equipped with four TK-42 cameras and the second unit will carry two TK-42's and color tape recording equipment.

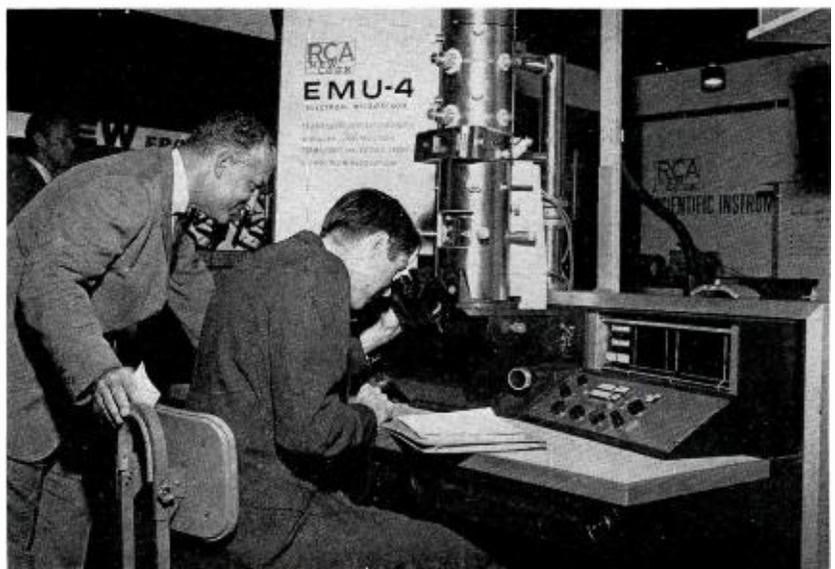
George E. Akerson, President of WHDH-TV, said the station's total commitment

to color was demonstrated by its nearly nine years of local color originations, dating back to November 26, 1957, its first day on the air. The station also is equipped to originate color shows from network feed, TV tape and film.

With the color mobile units in operation, the station will be in a position to cover, in color, any news or special event in greater Boston. The mobile units will carry audio and switching gear and power generators to serve as complete "color TV production studios on wheels," about to roll swiftly to the scene of a remote pickup.



What's happening, baby? Sleek mobile units will have answers, in color pictures, for Boston viewers.



MULTI-ANTENNA TV TOWER FOR DETROIT WILL SERVE THREE UHF BROADCASTERS

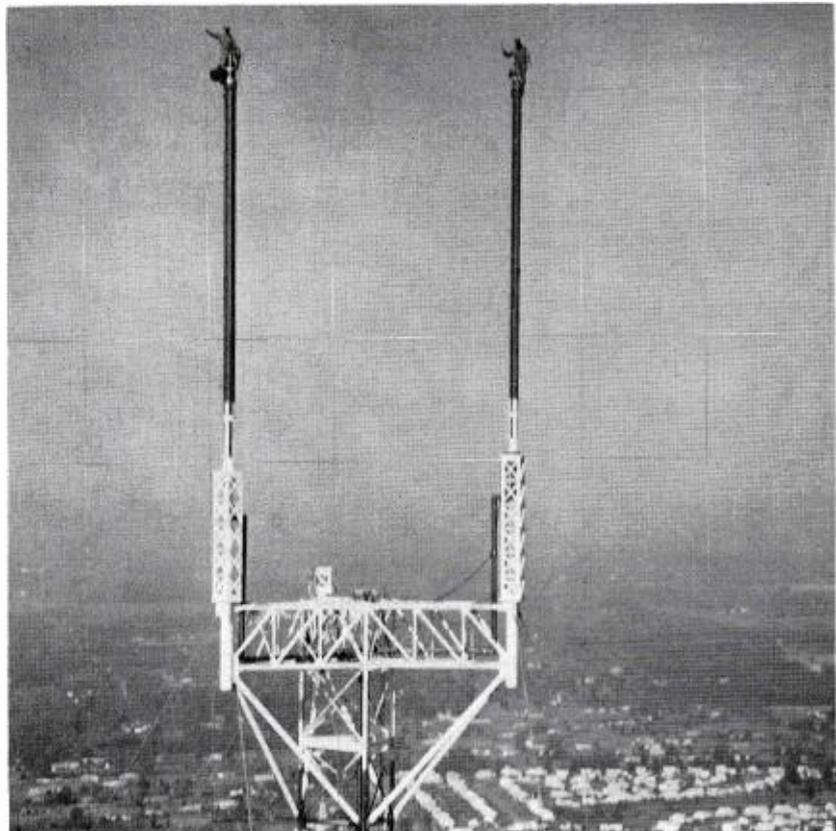
It was a clear day and from where the Kilgore brothers stood, atop the first multi-antenna tower for UHF television service, they could almost "see forever."

The maintenance company owners had climbed the 1,050 feet over suburban Detroit for an unofficial christening of the tower, erected originally by Stainless, Inc. for WKBD-TV, Kaiser Broadcasting's Channel 50 station.

Last summer a triangular platform, 30 feet on a side, was added to the tower's top and WTVS, the Channel 56 Detroit educational station, became the first tenant. Later this year WJMY, United Broadcasting's Channel 20 station, is expected to mount its antenna on the third corner.

The intrepid Kilgores made the inspection trip on assignment for Al Martin, WKBD Chief Engineer, to make certain all was shipshape aloft. They assumed the no-hands stance to wave to our photographer who "happened" along in a helicopter at the time.

Their twin perches are RCA pylon antennas, type TFU-30J, which combine functions of radiator and supporting structure in a heavy-duty slotted cylinder.



Kilgore(s) was here is the message wig-wagged from 1,050 feet up by iron-nerved maintenance brothers.

SCRIPPS-HOWARD BROADCASTING ORDERS 16 TK-42 CAMERAS

Scripps-Howard Broadcasting Company has ordered 16 TK-42 color cameras as part of a \$2,850,000 package of RCA color equipment for its four television stations. The order is the largest received thus far for the new "live" color cameras from a station group. Scripps-Howard owns WEWS, Cleveland; WCPO-TV, Cincinnati; WMCT, Memphis, and WPTV, Palm Beach, Fla., and is converting them to all-color operation.

In addition to the TK-42s, the group has ordered nine TR-70 high-band color TV tape systems and eight TK-27 color film systems. Some of this equipment already has been delivered.

Scripps-Howard's move to color for all local programming is being directed by Jack R. Howard, its President, and M. C. Watters, Executive Vice President. Cur-

rently, the stations are originating color programs from film and tape. Three stations use color film extensively in news coverage.

By late October, the station officials said, WMCT nearly will have completed its conversion to color and will be broadcasting only two shows in black-and-white. The Memphis station recently added 500 square feet of floor area in preparation for the color move.

WCPO-TV's entry into all color programming early next year will coincide with occupancy of a new studio building in downtown Cincinnati. The studios, being relocated from suburban Walnut Hills, are adjacent to Cincinnati's new convention hall, a future source of color programs.

Mr. Watters said the studios were

designed for color "from the ground up" and would give WCPO-TV unequalled technical facilities for originating color. Programming plans include all news broadcasts and new "live" entertainment shows in color.

The WEWS conversion to all color will fulfill the design of its studio building which was constructed in 1957 with color broadcasts in view, Mr. Watters said. The Cleveland station will use color for news shows, then will colorize its entire local schedule plus a syndicated program, "Upbeat," which is distributed on tape.

WPTV plans to add a new studio wing to accommodate its color originating equipment and, upon receipt of its cameras, will add more local programming to the news and other shows now broadcast in color.



Velocity error corrector shown by Eileen Adinolfi.

MODULE FOR RCA HIGH-BAND TV TAPE MACHINES MARKS FIRST USE OF INTEGRATED CIRCUITRY

A new module for high-band color TV tape recorders that marks the first use of integrated circuits in RCA broadcast equipment was announced in early October by RCA. The module, a velocity error corrector, improves color program playback quality by compensating for defects caused by mechanical tolerances inherent in the TV tape system.

Integrated circuits are employed in about half the module's circuitry, the maximum amount that can be used to advantage. This results in a module about one-fourth the size of a comparable one using transistors and other discrete components. The integrated circuits, which are about the size of a dime, also provide a degree of reliability even beyond the high

level established by solid state components.

The new module corrects electronically for shifts in hue that are caused, for example, by the amount of tape stretching during recording as compared with the stretching that occurs during playback. The module plugs into RCA's new TR-70 high-band color TV tape system which was demonstrated at the National Association of Broadcasters convention last April and currently is in volume production.

The module also may be used on three other RCA color TV tape recorders, types TR-22, TR-3 and TR-4, after they have been modified for high-band operation. Retrofit kits to accomplish this modification will become available during the second quarter of next year.

EDUCATORS SEE RCA DIAL ACCESS TV STUDY SYSTEM

In Tulsa, Oklahoma, whose 800 oil companies enable the city to proclaim itself "the oil capital of the world," some 250 educators from around the country gathered last month to see an electronic study system that could change traditional methods of learning.

The half-million-dollar system was designed and installed by RCA at Oral Roberts University whose new and ultra-modern educational plant occupies a 400-acre campus on Tulsa's outskirts. Controlled by a computer, the system makes use of TV, film and sound recording for stored programming that is available to the University's 560 students at almost any daylight hour.

To tap the pre-recorded lessons, the student seats himself in a booth equipped with a TV screen, headphones and telephone-type dial. He dials a number corresponding to the program he wants to see and hear. The computer receives the call and automatically triggers playback equipment to reproduce the lesson in sight and sound.

On the day of the educators' visit 33 different programs were available from the system: 25 from audio tape, four from film that was loaded into the system's four TV film islands and two from video tape. In addition, the student could dial for off-air pickup from two Tulsa TV stations.

In the University's six-story Learning Resources Center where the system is

situated there are 130 individual and group stations equipped for electronic study. Eventually University officials expect to extend the system to dormitories so that a student, in the privacy of his room, may dial in for a review of the day's history lecture, for example, or for supplementary course material.

The University, a four-year liberal arts institution which opened its doors in 1965, sees study by electronics as freeing the student from "lock-step" education. This is symbolized, they say, by the 50-minute class period or similar time allotment in which the student has a single opportunity to grasp what is directed at him. When class work is supported by review material, recorded in picture and sound, the student gets a second chance at it and proceeds to learn at his own pace.



Electronic and traditional study methods contrasted in this view of ORU library.



"Select-a-Lesson" system uses newest in broadcast-quality television equipment.

ULTIMATE RELIABILITY IN A NEW HIGH POWER UHF TV TRANSMITTER

55-KW UHF TV Transmitter TTU-50C and TTU-50C1
Have Diplexed Output, Vapor-Cooled, Integral-Cavity
Klystrons, Built-In or Optional Spare Exciter

by D. R. MASON
*UHF Transmitter Product Analyst,
Transmitter Merchandising Dept.*

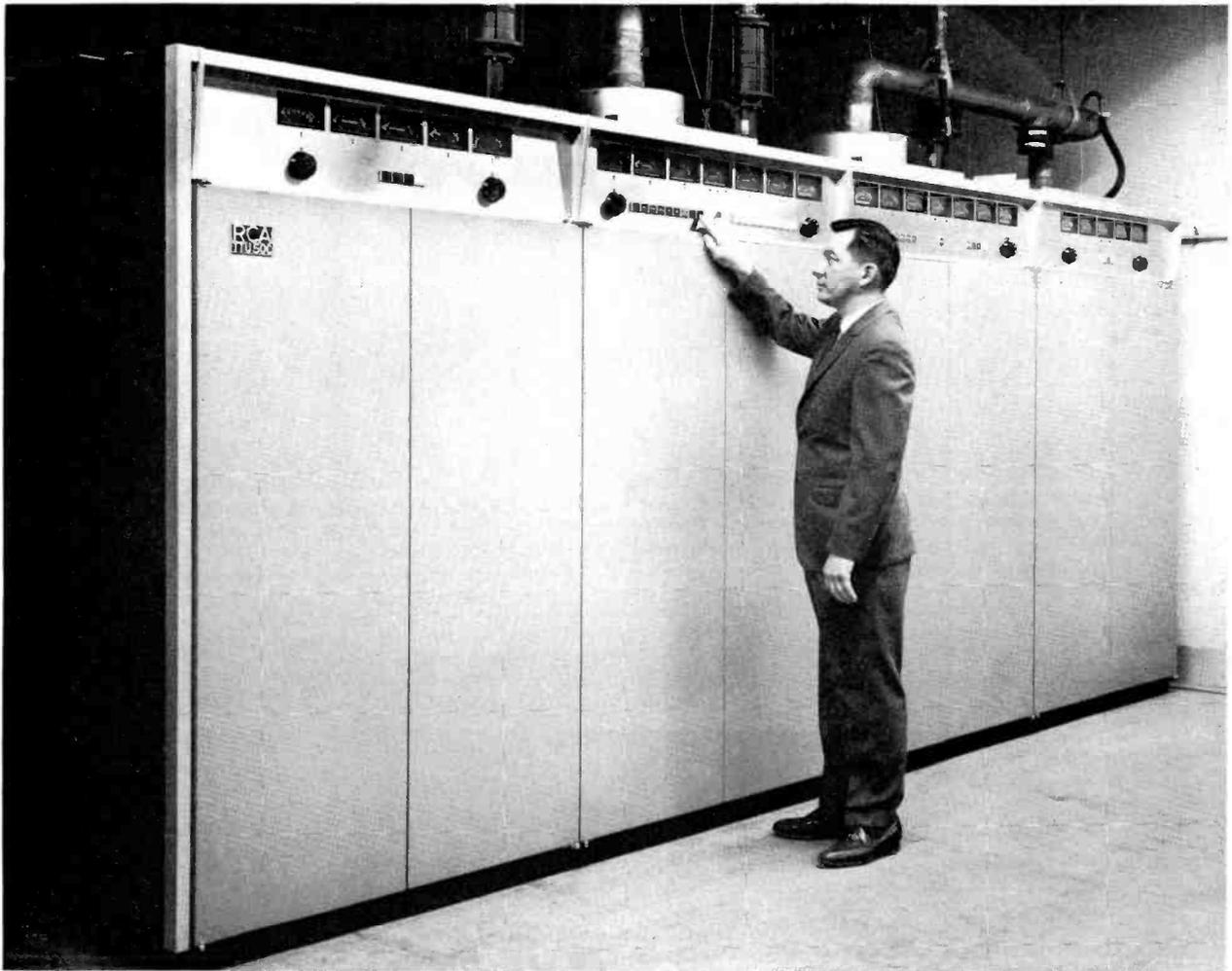


FIG. 1. TTU-50C 55-kW UHF TV Transmitter

Although only recently introduced at the last NAB Convention this transmitter is already in operation at WDCA in Washington, D.C., WHNB in New Britain, Conn., WKBS and WPHL in Philadelphia, Pa. WTVS Educational TV in Detroit, Mich. will be operational in the near future. The reasons for this quick acceptance will become obvious as you read about this equipment that raises reliability and performance for UHF TV transmission to new levels.

Built-In Redundancy

The TTU-50C and TTU-50C1 offer a measure of backup that almost equals a second transmitter, which could solve the problem for a broadcast station that had ruled out a second transmitter for backup because of the cost involved. These transmitters use diplexed visual power amplifiers, the virtues of which, are well known in VHF transmitters. A built-in "hot" spare exciter comes with the TTU-50C1, or an optional "hot" spare exciter can be provided with the TTU-50C. During normal operation both exciters are operating, with one working into a small dummy-load, and the other into the transmitter. By turning a switch on the front of the transmitter the normal or spare exciter can instantly be selected.

Identical IPA and PA stages for aural and visual, plus unique patch facilities provide a redundancy that permits up to fifty percent normal transmitter power to be maintained in the event that any of the three klystrons fail.

If necessary, the aural IPA can be substituted for a disabled visual IPA, or one of the visual PA's can replace a

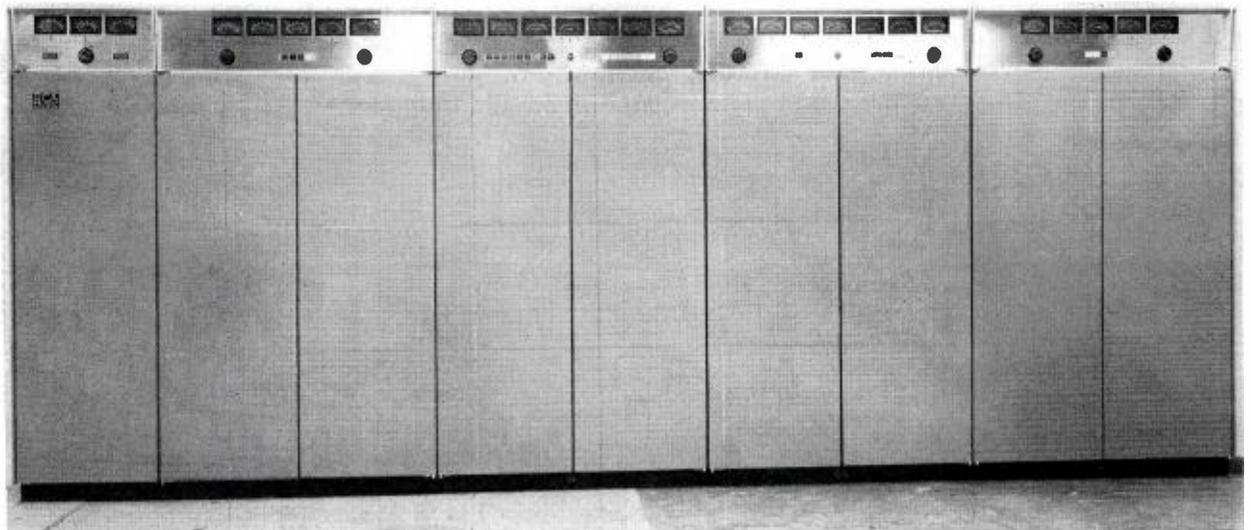
Advantages of TTU-50C

- Unique Patching Allows Tube Substitution
- 2,500,000 Watts of ERP with High-Gain Antenna
- Full-Fidelity Direct-FM Aural Modulation
- Built-In Readiness for Remote Control
- Simplified, Push-Button Operation

Additional Benefits With TTU-50C1

- Spare "Hot" Exciter
- Isolation of Disabled Cabinet
- Detached Power Supply for Separate Location

FIG. 2. TTU-50C1 55-kW UHF TV Transmitter incorporates spare exciter-modulator (left end cabinet), remote power supply and other features.



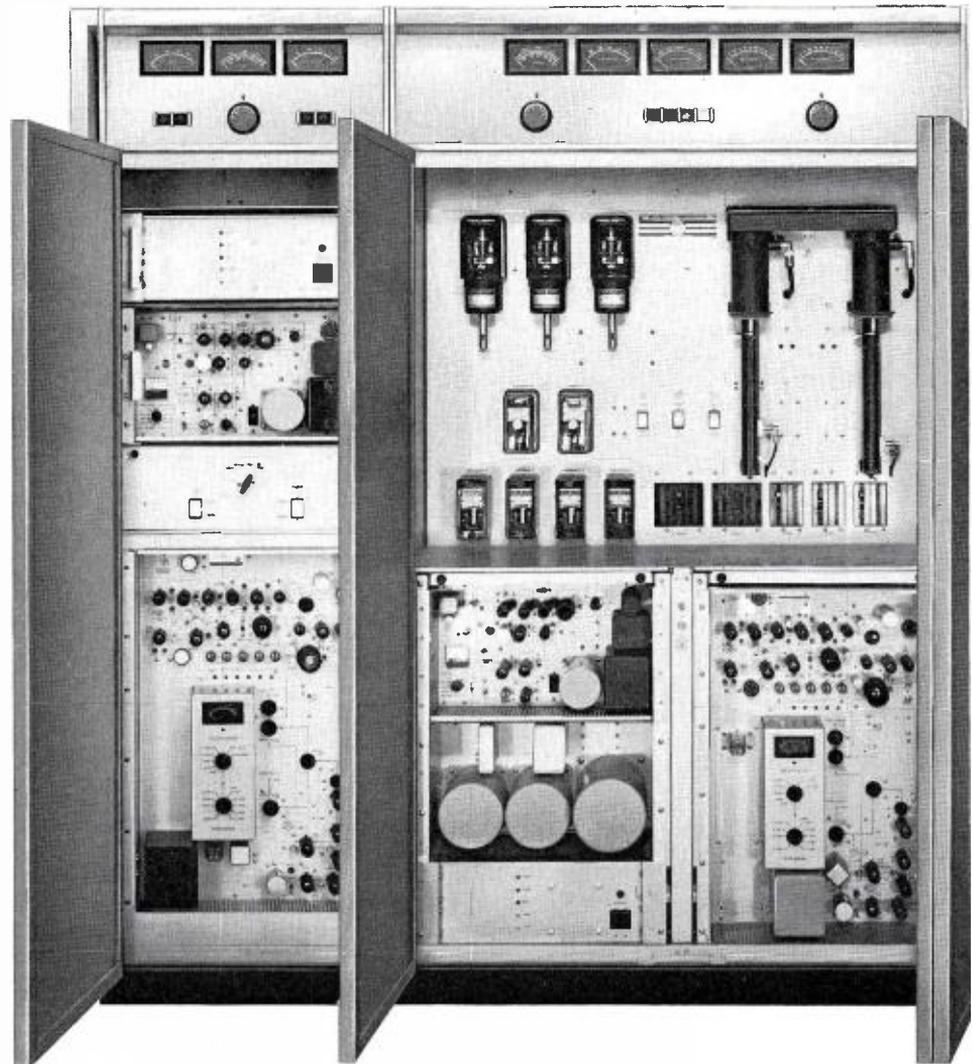


FIG. 3. TTU-50C1 aural and visual IPA and exciters (right) and spare aural and visual exciters (left).

disabled aural PA, and thus stay on the air. Coaxial patching facilities can provide further utilization of this redundancy, which is limited only by the imagination and economics of the station using this equipment. There are several manual or automatic switching system possibilities for patching around the diplexer directly into the filterplexer.

In the TTU-50C1 each klystron cabinet contains a control circuit disabling switch for isolating a disabled cabinet from the circuit to permit repairs without interrupting operation of the transmitter. In stations where half-power operation would be satisfactory for short periods, maintenance could be performed during regular operating hours, such as, tuning or testing a klystron into the dummy

load. This feature could eliminate the "wee-hour" maintenance required at television stations.

Diplexing Increases Reliability

The aural and visual amplifier assemblies using identical klystrons are basically alike. Three vapor-cooled integral-cavity klystrons are utilized. One is employed in the aural PA, and two klystrons in a diplexed arrangement are used in the visual PA. Diplexing is more than just paralleling two tubes. If either tube fails, the other continues to operate, unaffected. According to studies made, diplexing achieves a 150 percent improvement in reliability in any redundant system employing identical elements.

The 3-dB diplexing device that com-

bines the two visual klystron outputs into the common antenna load is shown schematically in Figure 5. The two signals enter the diplexer at Ports 1 and 2 in phase quadrature: that is, one signal lags the other by 90 degrees, due to the quarter wavelength phasing loop inserted in the PA output. Thus both signals arrive at Port 4 after traveling three-quarter wavelength, thereby adding in-phase and doubling the output. Unwanted reflections from the antenna are equally split as they are fed to Port 4, then recombined 180 degrees out-of-phase resulting in a complete cancellation in the diplexer. An inherently superior picture is the final result.

The reject load for the diplexer is two 5-kW air-cooled loads in parallel with demand type air systems. Should one

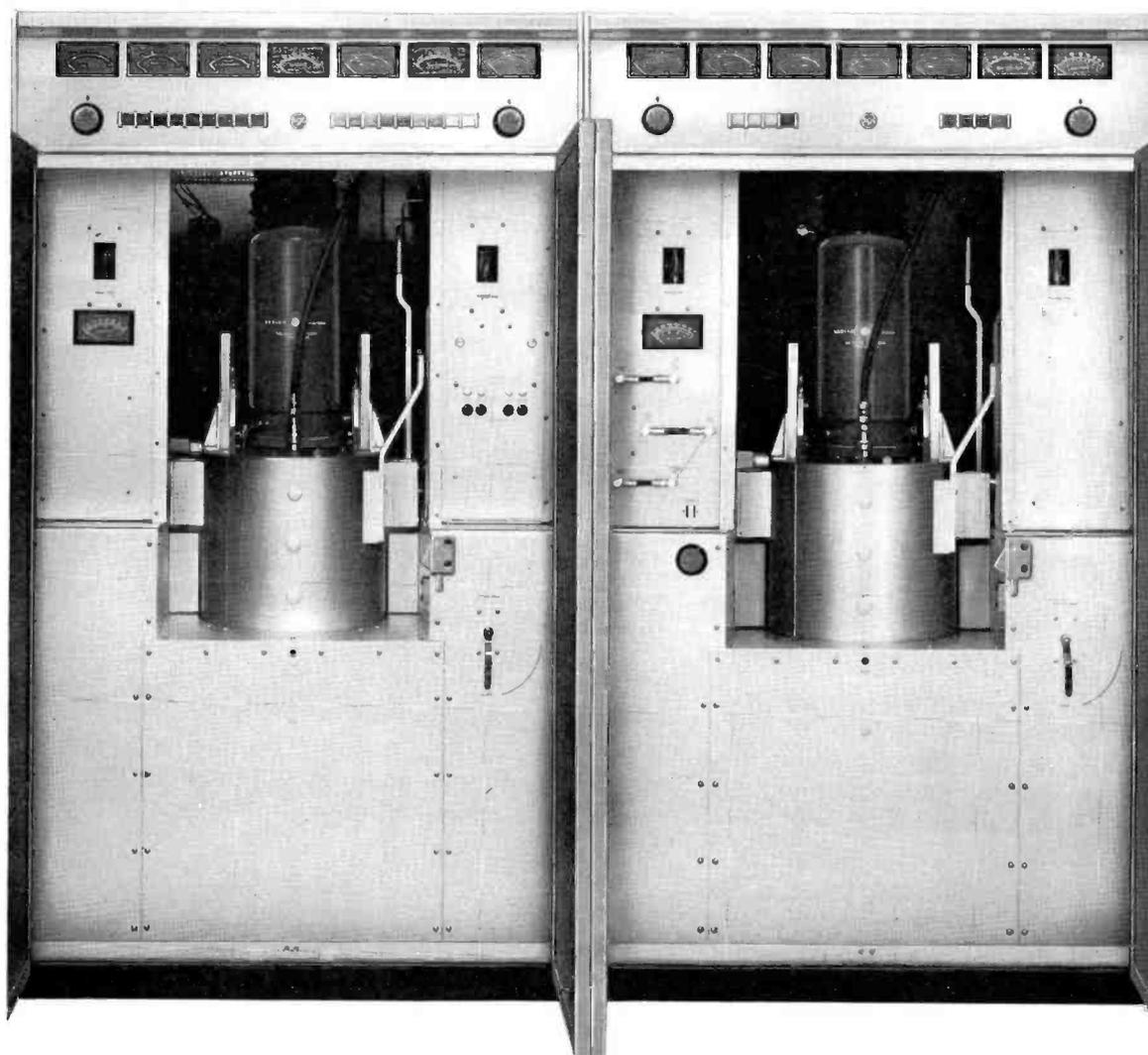


FIG. 4. Both Transmitters employ diplexed visual power amplifiers.

amplifier fail, and one quarter of the transmitter power go to the antenna, and one quarter into the reject load, the blowers will automatically come on, which eliminates the need for a water circuit, for this high-power level.

IPA Stages

The aural and visual signals are amplified separately by identical cavity tuned IPA stages, each employing a ceramic-insulated, coaxial triode (type 7289) in a tuned cavity designed for quick and precise tuning. Both IPA stages are broadband tuned and capable of operating as a visual amplifier. A simple change of small coaxial connectors at the front of the transmitter permits the visual signal to be fed through either IPA stage, while

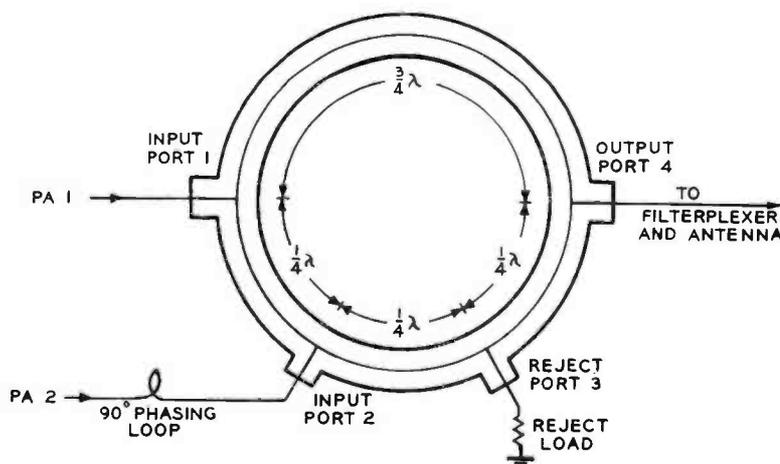


FIG. 5. Simplified schematic of PA diplexer.

the aural signal may be fed directly to the aural klystron. For example, should a visual IPA fail, the cables are long enough to disconnect the visual circuits and attach them to the aural IPA. The output of the exciter/modulator has the power available to drive the aural klystron. This gives complete backup in the signal processing area, the most complex portion of the transmitter. These changes can be made without retuning the transmitter.

The design also offers the possibility in an emergency of patching in one of the diplexed amplifiers to take over for a disabled aural PA and thus stay on the air. For this, klystron inputs are changed at the transmitter patch panel. Output connections require an accessory rigid line patch panel (available from RCA in $3\frac{1}{8}$ and $6\frac{1}{8}$ -inch sizes). See Figure 7 for simplified diagrams of this patching capability.

The transmitters have the capability of spare circuits in all RF, video and audio circuits. The only items that are not duplicated are proven high reliability items, such as, beam transformers, silicon rectifiers, control type relays and industrial voltage regulators.

New Generation Integral-Cavity Klystrons

The TTU-50C and TTU-50C1 offer 55-kW visual power output, designed with color transmission in mind. Coupled to a high-gain antenna, they are capable of 2500 kW ERP . . . only 3 dB below the "legal" maximum. The outstanding performance of the TTU-50C and TTU-50C1 is, in large part, due to the type of power tubes used in the visual and aural power amplifiers. They are integral-cavity, vapor-cooled klystrons that operate with such exceptional efficiency, stability and reliability that they must be classed as a "New Generation" of klystron. The increased efficiency and high power sensitivity of the new klystron offers considerable savings in operating costs.

Integral-cavity design makes available, among others, two important advantages: factory pretuning and no-drift operation. Tuning the klystrons to the stations operating channel frequency at the factory, prior to delivery to the end user, dispenses with the expense and tedium of klystron "preparation" at the transmitter site. Since the cavities are never separated from the tube, the unit is, essentially, a "plug-in" device.

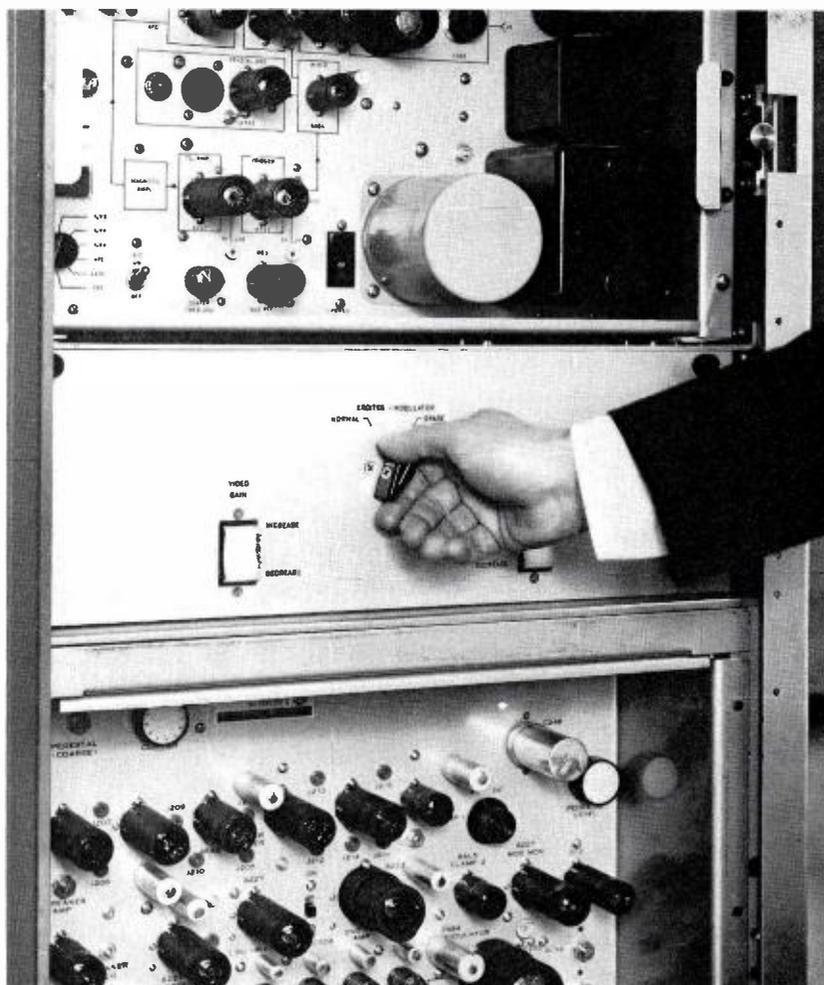


FIG. 6. Instant switching to standby exciter/modulator.

No-Drift Operation

No-drift operation is the result of the integral-cavities being temperature-stabilized by coolant. The temperature of this coolant is rigidly controlled and, as a result, maintains cavity temperature within close limits. constant cavity temperature is important to attain consistent klystron power gain and bandpass characteristics as temperature changes will cause detuning in any cavity.

Vapor Cooling

Increased operating economy is provided in the TTU-50C and TTU-50C1 through the use of a vapor-cooling system (as opposed to water cooling) because the coolant changes state, from liquid to gas. In the case of these trans-

mitters, the coolant is water-to-steam. The increased efficiency of the change-of-state cooling system becomes apparent when one remembers that vapor cooling is almost 1000 times more efficient than water cooling (volume for volume). In practical operation, vapor cooling requires approximately one-tenth the coolant flow of a comparable liquid-cooled system. The water-to-steam system saves as much as 10 kilowatts of utility power by reducing the size of pump motors, etc.

Quick-Change Klystrons

A unique quick-change system is used to perform a klystron change in the TTU-50C and TTU-50C1. This system is made possible because the cavities are integral to the tube and the magnetics remain

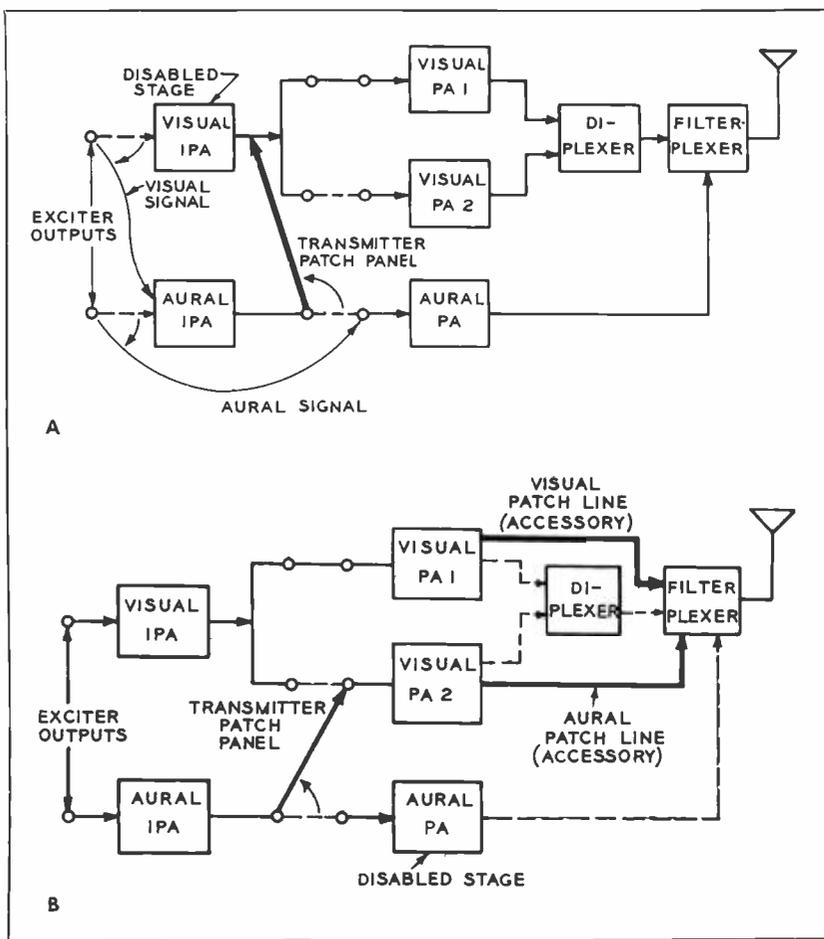


FIG. 7. Diagram (A) shows substitution of aural IPA for visual IPA; (B) use of one visual PA for disabled aural PA.

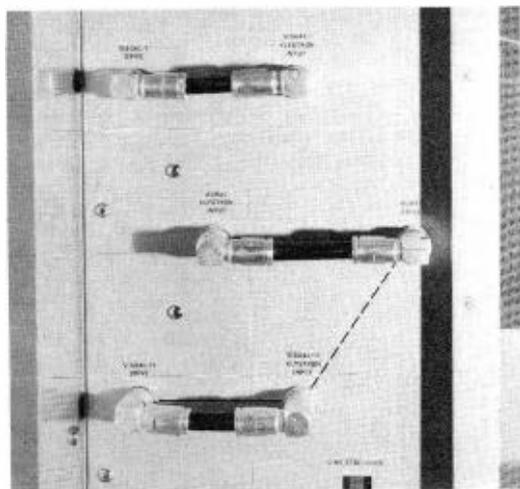


FIG. 8. Patch panel at front of transmitter permits access to klystron inputs.

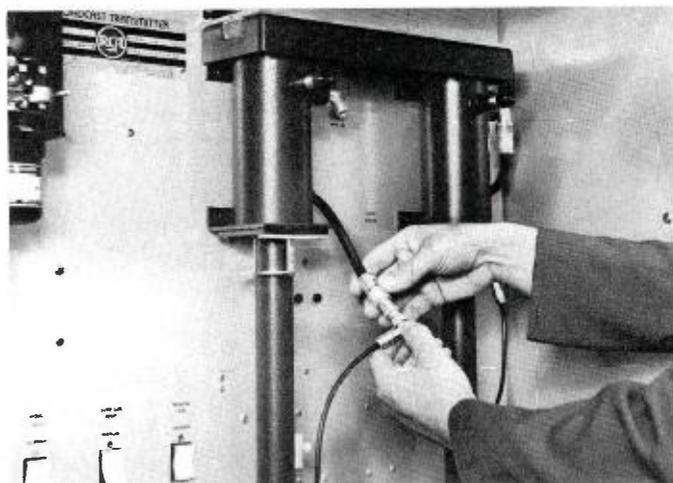


FIG. 9. Simple cable change substitutes aural for disabled visual IPA.

within the transmitter during tube changes. Experience with transmitters already in daily operation, has shown that complete tube change can be accomplished in less than 5 minutes by *one man* working alone. The factory-tuned klystron is transferred in a horizontal position directly from the shipping container into the klystron "carriage." An ingenious loading device, allows the klystron to be easily installed in the transmitter from the klystron carriage. No unusual ceiling height is required because the klystron remains in a horizontal position until completely installed in the transmitter. It is then tilted to a vertical position by a device that is an integral part of the transmitter.

Visual Modulation at Two-Watt Level

The picture signal is applied to the visual carrier at the two-watt power level in the visual exciter/modulator. Its main advantage is reduced modulator complexity and markedly improved picture quality . . . particularly color-picture quality.

Modulation occurs at the grid of a type 4055 "pencil" triode that operates in a tuned cavity designed for easy tuning and no-drift operation. Visual carrier frequency is developed in a crystal-controlled oscillator operating between 7 and 11 megacycles, depending on the frequency of the assigned channel. The crystal operates within a temperature-controlled oven to maintain extremely tight-tolerance control over crystal frequency. This precision signal is raised, through appropriate frequency multiplication, and heterodyning to the assigned-carrier frequency. A novel circuit arrangement maintains tight control over the intercarrier frequency or, the separation between aural and visual carriers. Use of high gain klystron tubes makes it possible to effect high amplification in a single pre-tuned RF stage.

RCA's New Look

The TTU-50C and TTU-50C1 are part of RCA's "New Look" transmitters that represent a major advance in UHF technology. This new concept incorporates all the benefits of reliable solid state devices, new broad-band amplifier tubes with much higher gain and greater power capability, video and audio modulation take place at a low level, eliminating the need for a high power modulator. They also have simplicity and small size with more power per cubic foot than their predecessors, and reliability that is the result of engineering design that anticipates the effects of age upon components.

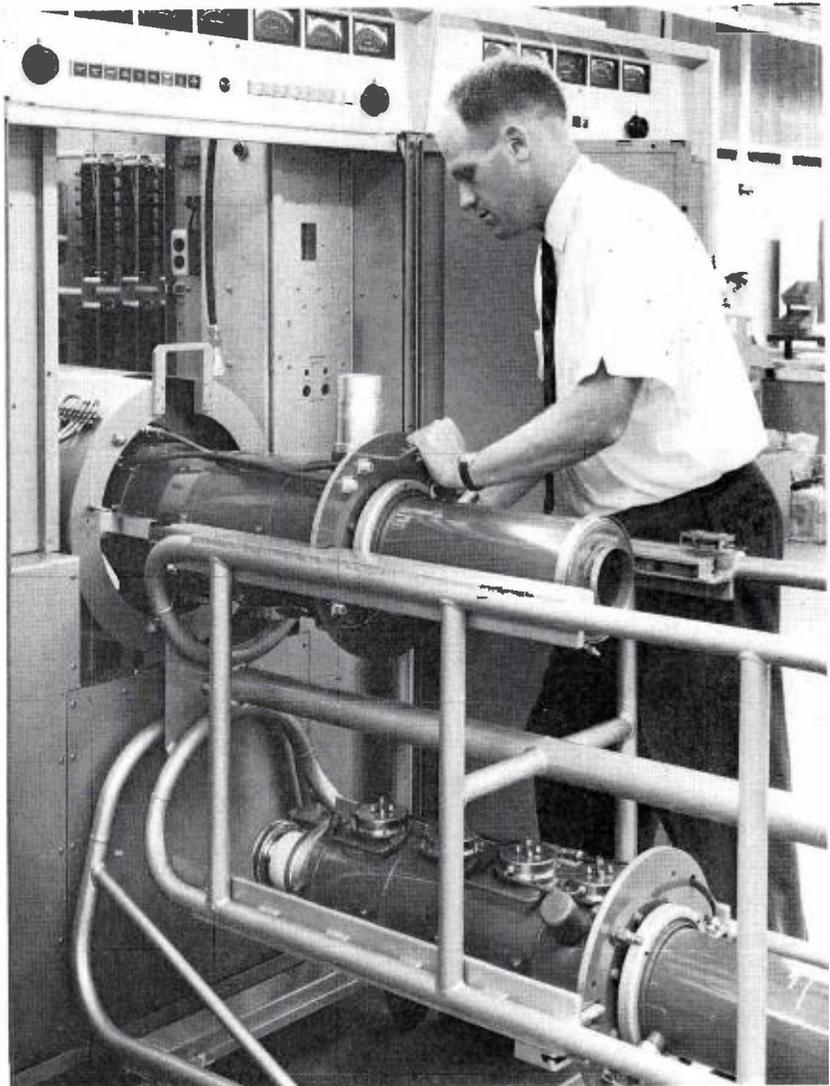


FIG. 10. Klystron change can be handled easily by one man.

Less Space

Compared to the earlier 50-kW UHF transmitters, the TTU-50C and TTU-50C1 are greatly reduced in size. Although the physical space required is small, effective planning of component placement for maximum accessibility makes the transmitter easy to maintain. Both small physical size and ease of maintenance result in direct savings in installation and operation and will minimize building expense in the case of a new station. These "New Look" transmitters are housed in low profile cabinets with eye-level meters and convenient finger-tip controls. As a result of RCA's "New-Look" design engineering, the TTU-50C and TTU-50C1 can fit into a relatively small room, as

can be seen in the floor plans in Figures 11 and 12.

The narrow cabinet on the left is the operating spare exciter. It is included with the TTU-50C1 and is optional with the TTU-50C. The cabinets for the TTU-50C1 are deeper to accommodate the auxiliary equipment necessary to allow electrical isolation of any one of the cabinets, so they can be serviced without affecting the operation of the remainder of the transmitter. The TTU-50C1 also allows building and floor plan flexibility since the main rectifier cubicle can be detached from the RF cabinets and located in an adjacent room or even on another level in the broadcast station.

FIG. 11. Floor plan diagram of TTU-50C1 Transmitter.

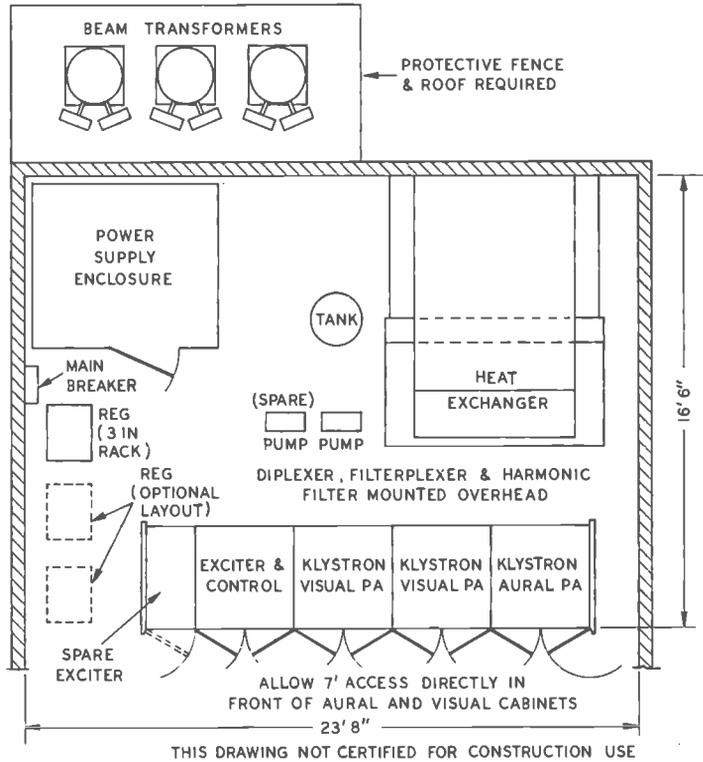
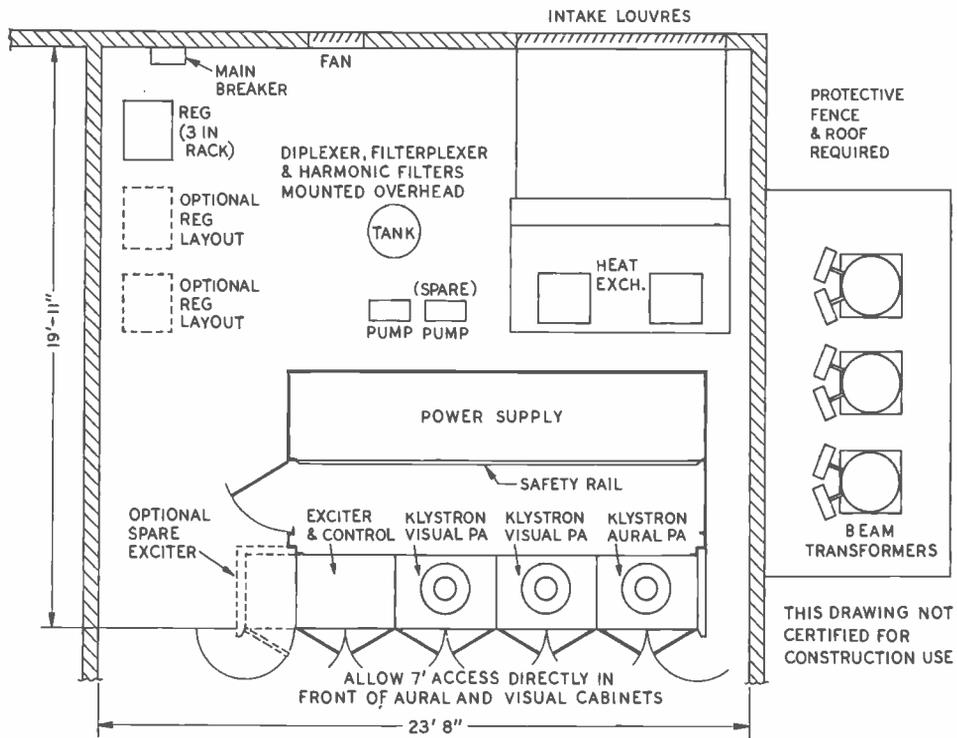


FIG. 12. Floor plan diagram of TTU-50C Transmitter.



Built-In Remote Control

As are all RCA transmitters, the TTU-50C and TTU-50C1 are fully ready for operation via remote control, including metering points for remotely monitoring operating parameters. All wiring, relays, motor-driven controls, etc. are included at no extra cost. This built-in readiness for remote control eliminates transmitter modification.

Newly discovered devices and techniques are incorporated to simplify routine operation to little more than turning the transmitter "on" in the morning and "off" at the end of the broadcast day. This is particularly important to a transmitter operated via remote control. New mechanical and electrical features permit one-man operation of this high power transmitter either locally or from a remote point.

High-Speed Overload Protection

The TTU-50C and TTU-50C1 employs two separate overload systems. The electronic antenna-overload system and the electro-mechanical power-supply overload system. The antenna system uses a cycling type of overload protection that cuts off the visual and aural output in *six microseconds* after an overload occurs in the antenna system (including the filterplexer and transmission line). Another system, using overload relays, protects the transmitter against power-supply overloads.

Full-Fidelity Aural

The aural-channel exciter/modulator in these transmitters is the same unit used in the new line of RCA FM-Broadcast Transmitters. The aural carrier is generated, modulated and amplified in only four stages. The AFC circuits use four more stages and the ninth is a voltage-regulator. This simplicity results in stability and dependability.

True frequency-modulation is applied to the aural carrier through a vari-cap diode. This solid-state component offers virtually-unlimited life and stability. The AFC system maintains precision control of the carrier frequency through the use of a counter-detector, magnetic amplifier and vari-cap diode. These devices overcome the drift problems inherent in earlier multi-tube systems making the new AFC system virtually drift-free.

Modular Silicon Rectifiers

The TTU-50C and TTU-50C1 utilize modularized silicon high-voltage rectifiers. Twelve individual rectifier units are

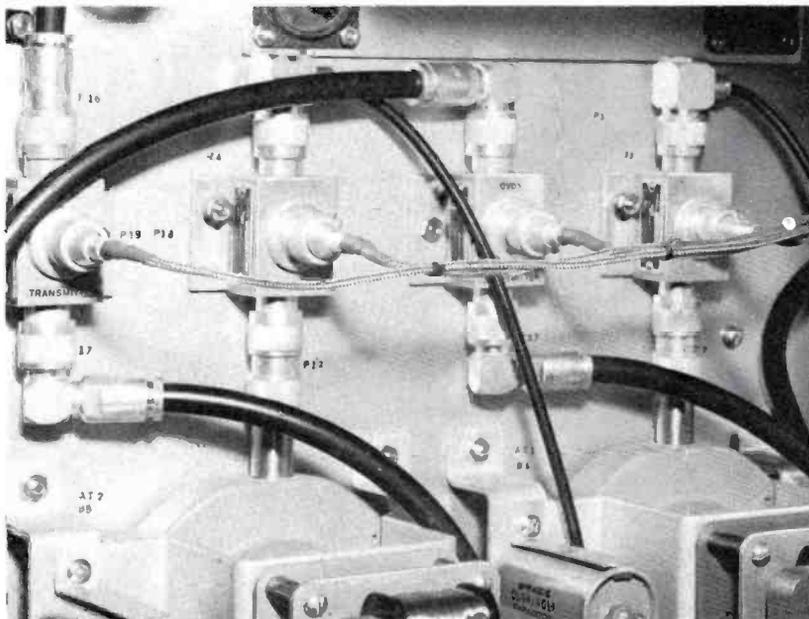


FIG. 13. Portion of built-in remote control equipment.

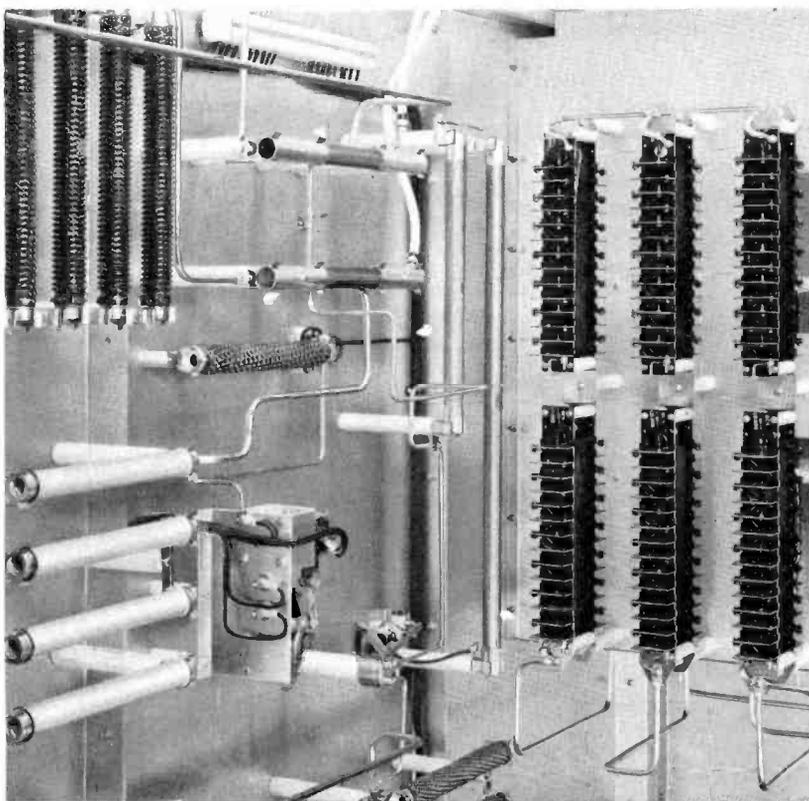


FIG. 14. Note modularized silicon rectifiers.

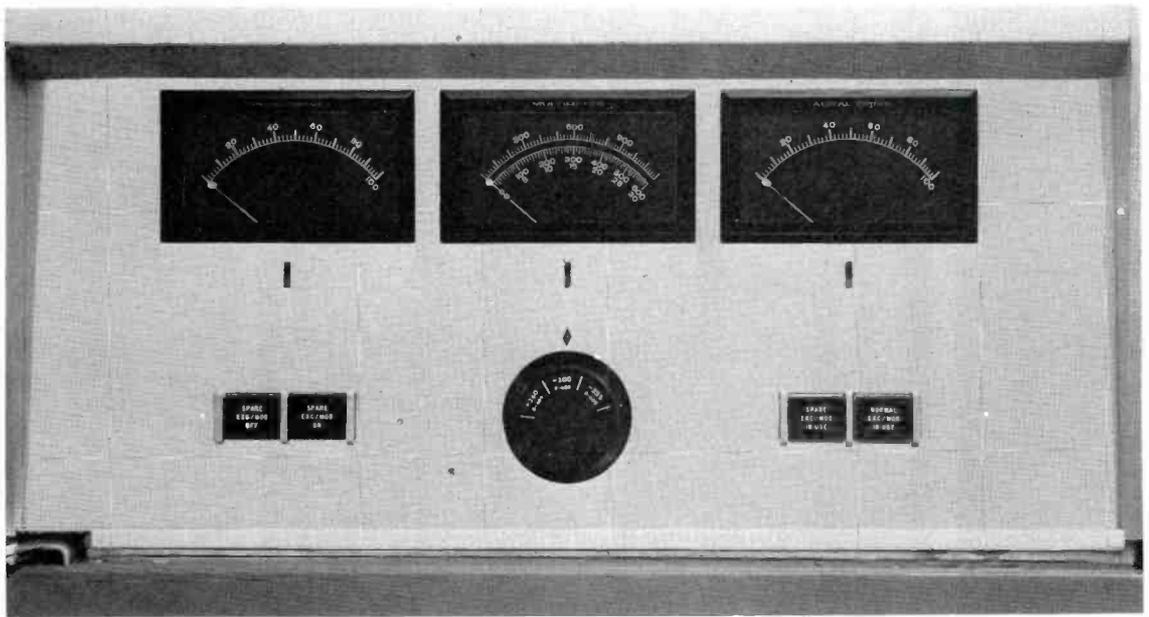


FIG. 15. TTU-50 features easy-to-read meters and eye-level controls.

assembled into matched units. This modularization reduces rectifier maintenance time, improves cooling and occupies little space. Figure 14 shows modules of the high-voltage rectifier.

New Look Cabinetry

Reflecting the new circuitry and components on the inside, the cabinetry of the TTU-50C and TTU-50C1 represent the "New Look" in UHF transmitters, which is a fresh approach to the packaging of equipment so that it occupies the least amount of valuable floor space, but, sacrifices none of the accessibility necessary to inexpensive maintenance and servicing.

Conclusion

Every TTU-50C and TTU-50C1 UHF TV Transmitter is thoroughly checked-out as a complete unit at RCA's factory and testing facility at Meadowlands, Pa. to insure that it is operating at design specifications, on the customers channel. The purchaser is supplied with the test data that results from the factory check-out.

These transmitters sum up as an excellent combination of reliability, dependability, outstanding performance, operational ease and everyday economy.

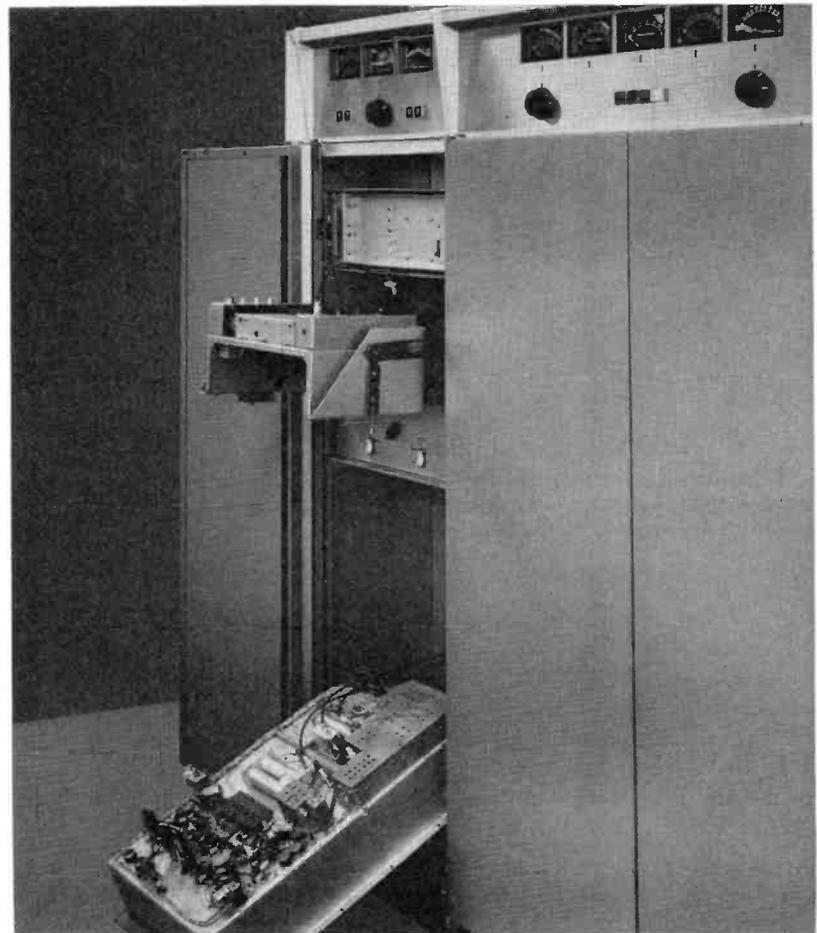


FIG. 16. New Look design affords complete accessibility.



FIG. 1. Color TV Studio at 1966 NAB Convention for demonstration of TK-42 Camera used 100 percent Quartz-Iodine lighting.

Introduction of the Quartz-Iodine luminaire is making the move to color less costly and less complex. Although not an absolute necessity, this innovation has so many advantages that it warrants very serious consideration. First, however, consider the three possible ways of lighting for color television:

- 1) 100 per cent use of the standard incandescent spotlights and floodlights. This is the present general practice and although it produces satisfactory results, it's at high cost because of greatly increased power and air conditioning requirements.
- 2) 100 per cent use of the new Quartz-Iodine spots and floods. This method requires a minimum increase in power and air conditioning expenditures.
- 3) A mixture of both incandescent and Quartz-Iodine lighting. Here the increase in power and air conditioning is somewhere in between the foregoing extremes.

Basic Requirements

Before discussing the relative values of these three lighting methods, review two basic requirements of the color system. First, the lighting level: This is 250 fc plus a "holy factor". In order to under-

stand this factor, it is essential to recognize that, in color, shadows are more critical than in black and white. If the contrast range is not carefully controlled, shadows become an unacceptable dark color, and may also cause video noise. Therefore, it is desirable to fill in these holes (shadows), by using additional luminaires.† These may be either fresnel lens spotlights or scoop floodlights as the situation may indicate. Since the fresnel in the flood position and the scoop both deliver a broad and soft edged light beam, their coverage not only lightens the shadow (fills the hole) but also overlaps the main object being lighted. With several such "holy" luminaires being employed, it is possible to have the total overlap add 75 to 100 fc to the overall lighting level. This results, then, in a level from 300 to 350 fc of total illumination on the subject. This is why one winds up with from 250 to 350 fc for color.‡

A second major requirement is Kelvin temperature, or the actual color of the light being used in the studio. Many are prone to dismiss this subject as being non-essential, since the color camera may be adjusted to give satisfactory color pictures at temperatures from 2800 to 10,000 K. It may be well to add that the former temperature is found in a scoop with a 1000/IF lamp and is considered yellow or orange light, whereas the latter is found

in bright sunlight and is considered blue light. The problem lies in the fact that once the camera is adjusted for a particular Kelvin temperature, it may respond poorly to a different temperature unless it is again adjusted for the change. This may require from several minutes to several hours. Since normal production techniques preclude taking studio time for such re-adjustment — this is a problem that requires consideration.

The Kelvin Problem

Until Quartz-Iodine luminaires came along, it was standard practice to mix 2800 K scoops, 3000 K 1-kw fresnels and 3200 K 5-kw fresnels. The economics of lamp costs established this pattern throughout the TV industry. Assuming that the scoops are used for base and fill light, and the fresnels for key, modeling, and back light, the camera "sees" (or more properly, receives, reflected from the subject) a mixture of approximately 3050 Kelvin light. With the camera adjusted to this value, there is established the requirement that every camera angle, every set this camera is used on must be illuminated with the 3050 K mixture. If one set uses all scoops (such as a cooking demo), and another all fresnel spots (such as a dramatic sequence), the same camera may deliver pictures with orange highlights in the former and blue highlights in the latter. Such an unnatural change in the skin tones becomes very noticeable to the average television viewer.

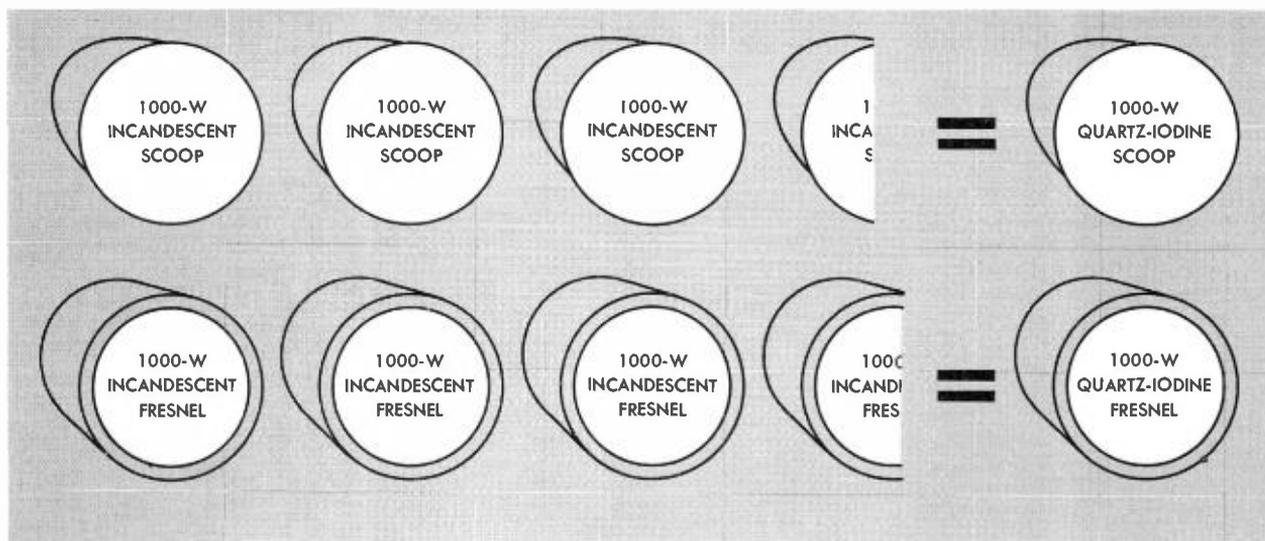
Until now the mixing of light sources has been standard practice among many

* Much of the information given here was first presented at the Symposium on Theatre-Television Lighting sponsored by the Illuminating Engineering Society (IES), at Chicago, Ill., May 1966.

† Luminaire: An I.E.S. term synonymous with fixture, instrument, unit.

‡ Editor's Note: The TK-42 Live Color Camera requires nominal studio background and subject lighting of 250 foot candles.

FIG. 2. A graphic comparison of the number of Standard Incandescent Luminaires required to furnish the same footcandle level as one properly designed Quartz-Iodine Luminaire.



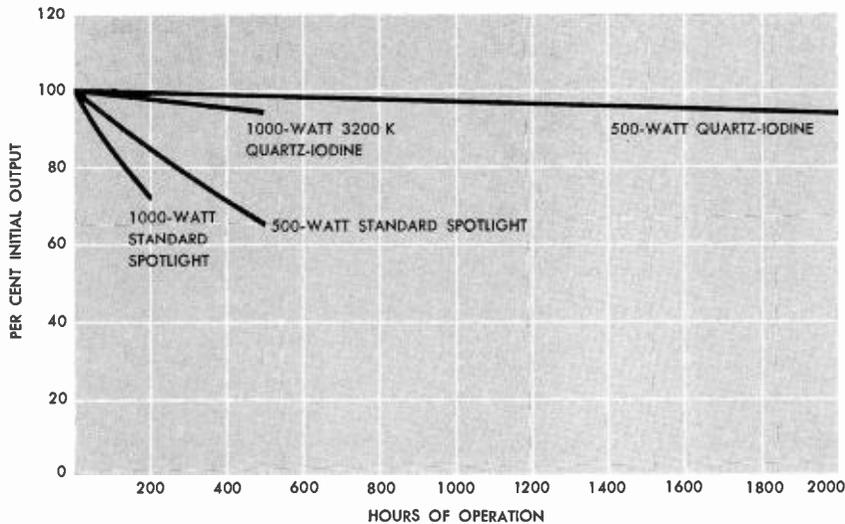


FIG. 3. Lumen output fall-off curves comparing typical conventional incandescent spotlight lamps with Quartz-iodine spotlight lamps.

color telecasters but, suddenly, in view of the newly developed Quartz light, mixing becomes an unnecessary burden on the production staff.

Solution of the Problem

By going to 100 per cent Quartz, one now has the opportunity to obtain an entire family of lamps and luminaires in either 3000 or 3200 Kelvin temperature. By and large, the TV industry has shown a preference for 3200-K lamps for color work. Telecasters may now obtain scoops, fresnels, pattern and iris projectors — all with the same (3000 or 3200 K) color light temperature. When this is done, cameramen may move from one set to another without worrying about the light mixtures, since they all will have the same color.

A direct comparison of light, life and temperatures between standard incandescent and quartz luminaires may be helpful at this point, see Table I.

The first observation from Table I may very well be that the Quartz lamp, although it may produce two to four times

the light of its standard incandescent counterpart, gives a lot less life. This may be true if the absolute term "life" is used, but will not be so if the limited term "useful life" is employed. Many TV studios, in order to avoid degradation of color as lamps age, make it standard practice to change lamps at the 50 per cent of life mark. This practice gives quartz a longer "useful life" since such lamps maintain color as well as light output throughout "life". Furthermore, the production staff is relieved of the burden of compensating for such color degradation — when the lighting is 100 per cent quartz.

Economics of Three Basic Methods

To go to color with all incandescent lighting fixtures, involves adding approximately 150 per cent capacity to the power and air conditioning load. Technically speaking 100 per cent increase is sufficient, but the "holy factor" adds an additional 50 per cent. The luminaire complement would roughly double, with some 5000-watt Fresnels added to the 1000 and 2000-

watt Fresnels now in use. This method has been producing excellent color pictures, while being used by networks and many independent stations, however, unless the station already has a large luminaire complement and has installed the increased power and air conditioning in anticipation of the move to color, it represents the most costly way of lighting for color.

By providing 100 per cent quartz-iodine fixtures in place of the incandescent — and by adding 50 per cent more luminaires for the "holy factor" — one may go to color with only a 50 per cent increase in power and air conditioning. Not only does this method afford production of color TV pictures more inexpensively, it also makes it a far easier process for the production staff.

If existing equipment is re-used rather than starting from scratch, the method used by many telecasters who convert to color is to use existing units for fill and background lighting, adding quartz for key and back lighting. Providing for 75 per cent Quartz enables the station to meet color requirements. This adds 75 per cent to the power and air conditioning costs. Incidentally, this method produces excellent results although it requires color balancing and mixing, and is subject to some of the color degradation exhibited by the old incandescent method.

Favorable Features of Quartz

The question is frequently asked: How can one use quartz lamps for color TV when fluorescent and mercury lamps are thought to be unacceptable? The answer lies in the fact that quartz has a continuous spectrum, has a tungsten filament and is, in effect, an incandescent lamp. To be sure, it has a quartz (or quartz-glass) envelope, and iodine vapor atmosphere that acts as a catalyst in the re-cycling process—which keeps the lamp burning at full output and at full color temperature throughout its life — but it has all the good characteristics of standard incandescent lamps as well as the many already enumerated. A second point is that quartz fixtures may be dimmed with the same results as present incandescents — and with various dimmers now on the market.

Dimmers and Color Lighting

It may be well to digress for a moment to discuss the ever-present question "Why do I need dimmers in color?" The answer is you don't and you do. Most camera manufacturers have a history of discouraging the use of dimmers in color and are thus on the "don't" side. However, over 90 per cent of the stations actually telecasting live color shows use quantities

TABLE 1 — INCANDESCENT AND QUARTZ-IODINE COMPARISON

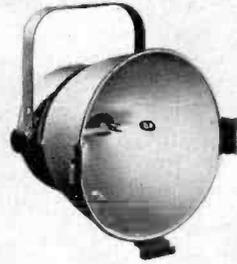
	Incandescent Scoop	Quartz-Iodine Scoop	Incandescent Fresnel	Quartz-Iodine Fresnel
Life (hours)	1000	500	200	150
Light (lumen output)	Decreases with Age	Unchanged with Age	Decreases with Age	Unchanged with Age
Temperature (Color)	Decreases with Age (to Orange)	Unchanged with Age	Decreases with Age (to Orange)	Unchanged with Age

INCANDESCENT

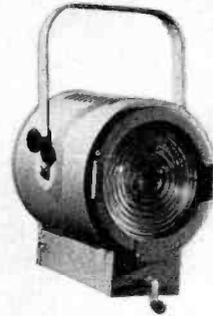


SCOOP

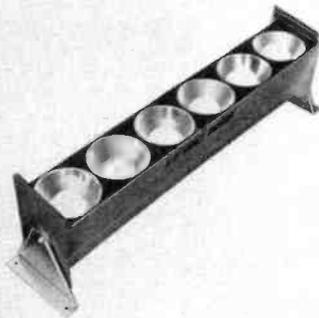
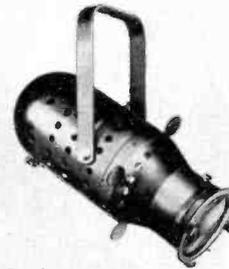
QUARTZ-IODINE



FRESNEL



**ELLIPSOIDAL
(KIEGLIGHT)**



**CYCLORAMA
STRIPLIGHT**

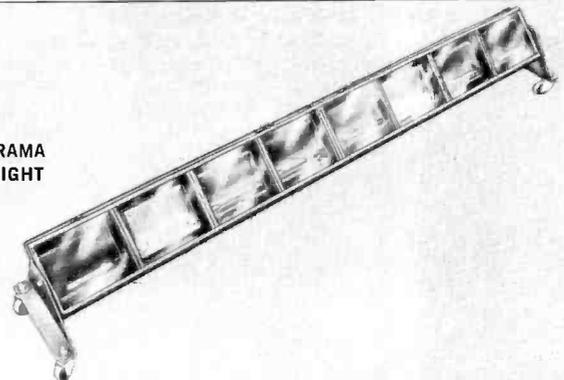


FIG. 4. The luminaires on the left show examples of Incandescent units and the luminaires on the right show their Quartz-iodine counterparts.

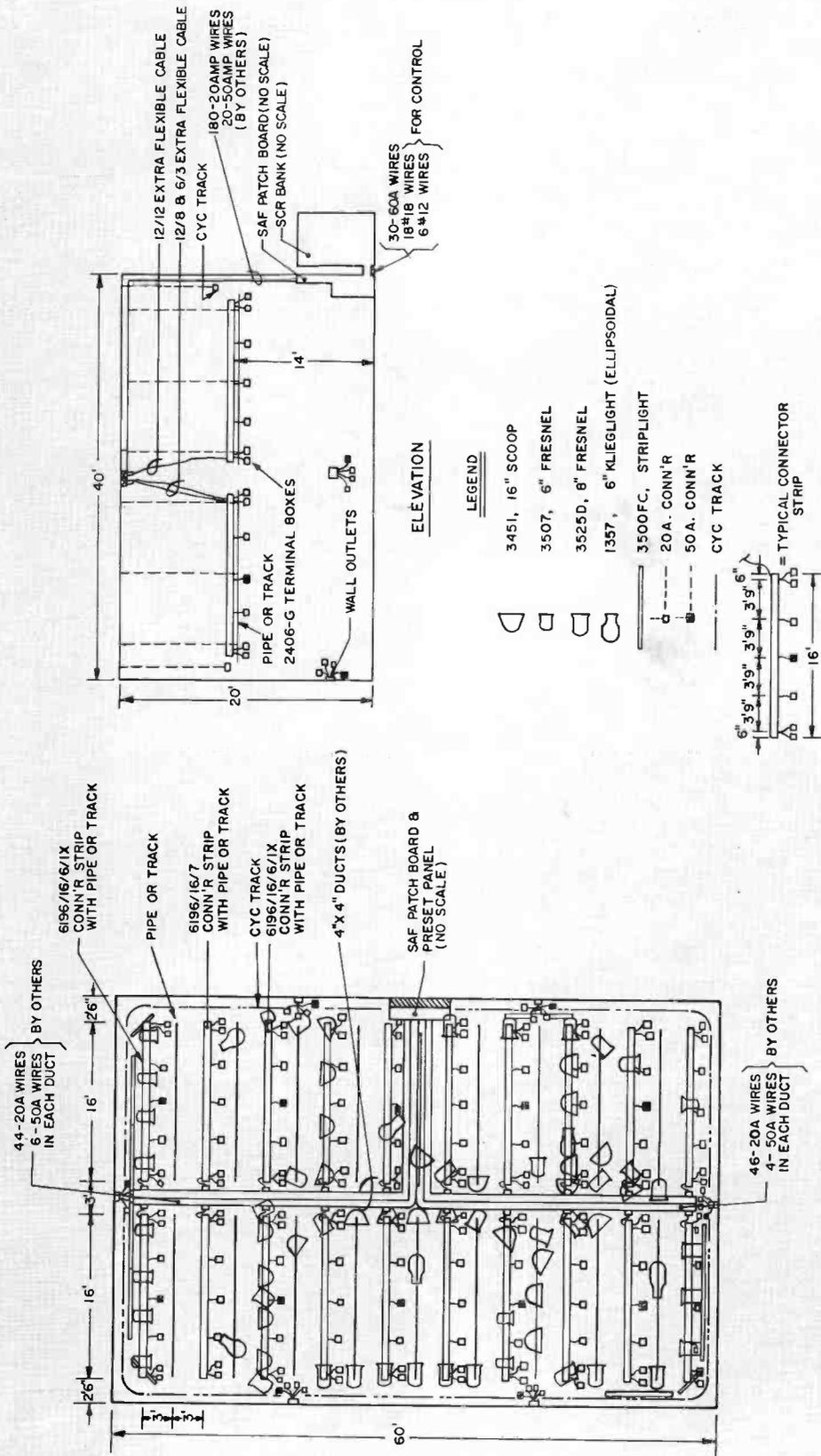


FIG. 5. All Quartz-iodine color lighting arrangement for 40 by 60 ft. studio (light plot for six sets).

of dimmers and are thus on the "do" side. In actuality, both are quite correct, but for different aspects of the total subject.

In black and white, although one uses dimmers for special effects and for on-scene cues, for the most part they are used to adjust the contrasts in the picture, e.g., if the back-lights are too intense (hot), or the base light so bright that the picture is flat, they may be dimmed down until a more pleasing picture is obtained. The point is that these dimmers are almost invariably used when the lights they control are aimed at people's faces.

In color one does just about the opposite. One tries never to disturb the Kelvin temperature of the lights on the faces but permits unlimited changes in the rest

TABLE II — COMPARISON OF LIGHTING DESIGN PARAMETERS FOR A TYPICAL 40 x 60 FT. COLOR STUDIO

	Standard Incandescent	Quartz	Mixture
Lighting Levels (foot candles).....	250-350	250-350	250-350
Power (kilowatts).....	180	108	126
Watts per sq. ft. (NPA)*.....	100	60	75
Air Conditioning Heat Load** (kw)....	108	62.4	75.6
(tons).....	31	17.1	21.6

* NPA—Net Production Area. This is not the wall to wall area but the actual area used for lighting and is usually the area within the cyclorama curtain. The NPA may be approximated by subtracting a 4 ft. wide area all around the perimeter of the studio — thus the NPA for a 40 x 60 (2400 sq. ft.) studio is 32 x 52 or 1664 sq. ft.

** Calculated on the basis of 60% of Input Power since the air-conditioning is designed on a continuous 12 hr. or longer basis, whereas the lighting is sporadic with peak lighting (heat) loads having only a 30 minute to 1 hour duration.

EQUIPMENT LIST

For 100% Quartz-Iodine Lighted 40 x 60 ft. Color Studio (Package #27CQ)

FIXTURES & ACCESSORIES

- 27 - #3451 1000W Quartz Scoop
- 2 - #44N3TVB 150W Cameralight
- 6 - #3507 650W Quartz Fresnel
- 36 - #3525D 1000W Quartz Fresnel
- 3 - #1357P/6W 1000W Quartz Pattern Klieg
- 2 - #1357/6/1 1000W Quartz Iris Klieg
- 4 - #1106A 4-way barn door for 650W Fresnel
- 18 - #1081A 4-way barn door for 1000W Fresnel
- 14 - #585A 16" color/diffuser Frame for Scoop
- 3 - #1097 Sets of 16 Patterns for Kliegs
- 2 - #1421 Castered Floor Stands
- 9 - #111TV Pantograph Hangers
- 9 - #10E955G 10 ft. Extension Cables for Pantographs
- 2 - #25E955G 25 ft. Extension Cables for Floor Stands

WIRING DEVICES

- 10 - #619G/16/7 connector strips each 16 ft. long and wired with 2 double and 3 single 3 ft. pigtail outlets on five 20 amp. circuits
- 10 - #619G/16/6/1X connector strips each 16 ft. long and wired with 2 double and 2 single 20 amp. 3 ft. pigtail outlets and one 50 amp. outlet
- 10 - #2406G/10 Ceiling Terminal Boxes
- 10 - #2406G/10X Ceiling Terminal Boxes
- 1 - #12/8 100 ft. multi-conductor drop cable
- 1 - #6/3 100 ft. multi-conductor drop cable
- 1 - #12/12 100 ft. multi-conductor drop cable
- 6 - #24330/3/1X wall outlet boxes each with three 20 amp. and one 50 amp. pigtail outlets

CONTROL CENTER

- 1 - Composite one scene, two sub-scene Lighting Preset System containing: 108 - 20 amp. and 16 - 50 amp. counterweighted male plugs, 75 Automatic Cold-Patching 20 amp. Female Jacks with associated circuit breakers and 15 - 50 amp. 1 Boardlight, 8 - 7000W SCR (Solid State) Dimmers, 7 - 7000W plug-in non-dims which permit future insertion of dimmers, 1 - 300 amp. 3 pole Main Breaker, a preset section with 15 pots with selector switches and 2 submasters and lock and key switch

LAMP PACKAGE

- 27 - #Q1000T3/4 - Quartz Lamps for Scoops
- 2 - #150G16½/3DC - Lamps for Cameralights
- 6 - #FAD - 650 Quartz Lamps for Fresnels
- 36 - #DXW - 1000 Quartz Lamps for Fresnels
- 5 - #1000T6Q/RCL/1 1000W Lamp for Kliegs

CYC PACKAGE

- (Sufficient to light an "L" shaped cyc covering one 40 ft. wall, 1 curve, and ½ of the 60 ft. wall)
- 8 - #3500FC - 7 ft. striplights with 4 reflectors and glass color filters
- 3 - #3500AFC - 3½ ft. striplights with 2 reflectors (for curve)
- 2 - #453TVG/3 - threefer adaptors to convert a 50 amp. outlet to 3 - 20 amp. outlets

of the lighting. This is actually what is done to create moods in color, and is what dimmers in color are largely used for. For example, to create an evening mood in a garden or on a water-front you leave the key and modeling lights aimed at the subject at full Kelvin but dim all the others until the desired effect is obtained. Since all lights except face lights are being dimmed, more dimmers rather than fewer are required for color than for monochrome. Then, too, the lights that are used with filters (gelatin, cinemoid, or glass) to illuminate the cyclorama curtain in various colors are almost always dimmer controlled. This explains why network as well as independent colorcasters demand more dimming capacity than they used for monochrome.

In summary then, it would seem that the "don't's" actually mean "don't change the skin tones" whereas the "do's" acknowledge this fact but want dimmers for the mood and background effects.

In addition to the above two schools there are some who insist that they are getting away with dimming faces. Within limits this may be done. Station color-casting practices have established that a drop of 200 K can be tolerated even on skin tones before the public (not studio engineers) can notice a change. This actually gives the lighting man a great deal of leeway, since the 200 K drop amounts to a 20 volt drop at the lamp socket and a footcandle drop of 33 per cent. This means that if a luminaire delivers 300 ic on the subject's face, it

may be dimmed down to 200 fc before the skin tones change objectionably. One must be careful, however, to stay within this 200-K range. Although this breed of lighting man can prove that he is right, many station managers and chief engineers prefer not to take the risk of over-dimming or meddling with the skin tones.

Conclusion

There are, then, three ways of lighting for color. Each can give good color pictures, however, the operational ease of obtaining quality pictures and the modest cost, indicate quite clearly that quartz is the preferred way. It is to be hoped that the yardsticks and explanations given will enable the reader to choose the method best suited to his situation.

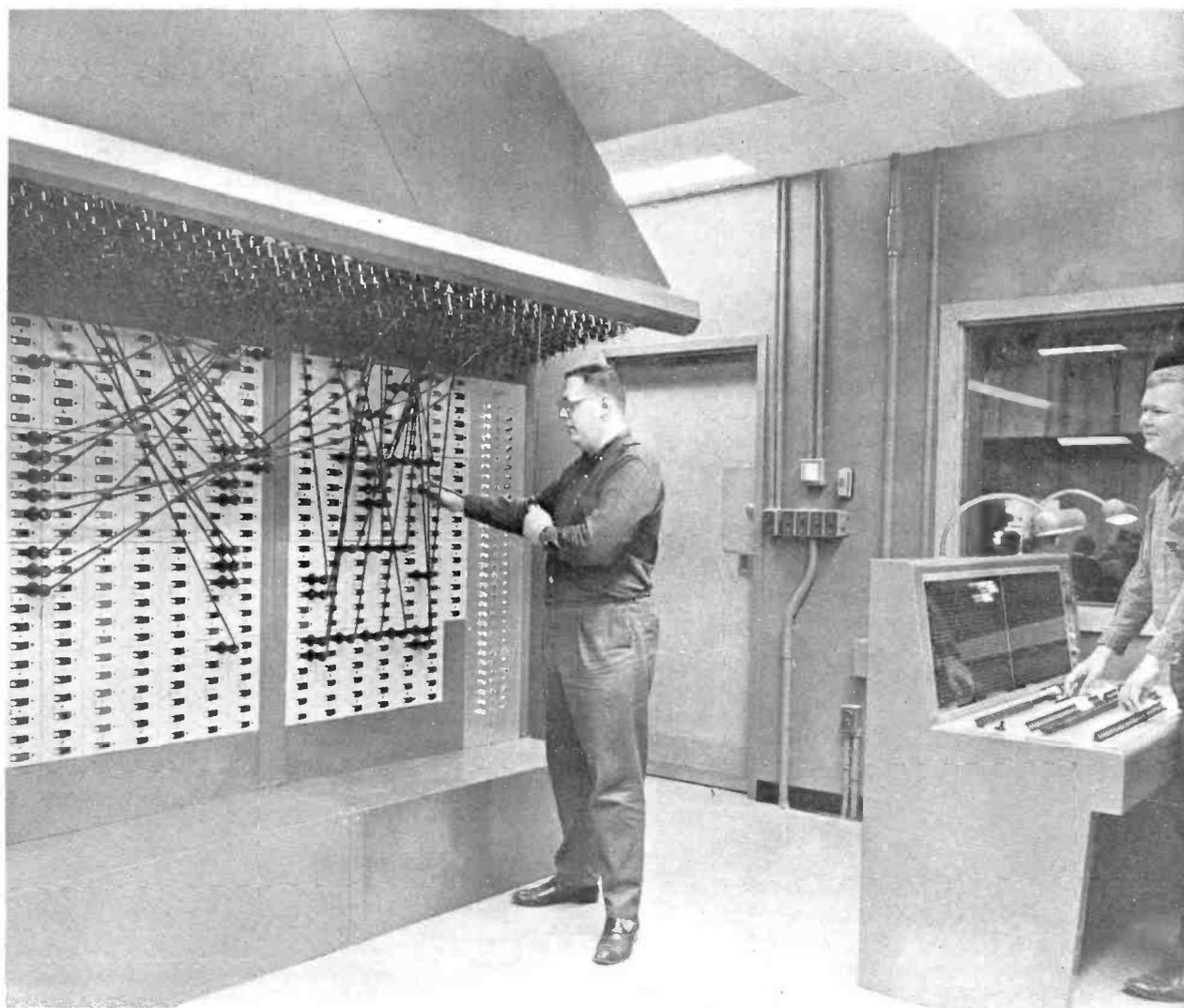


FIG. 6. Typical modern lighting control center with pre-set console on right and cross-connecting and SCR (solid state) dimmer delegation shown on the left.

BROADCASTERS REPORT ON EXPERIENCE WITH RCA TK-42 BIG TUBE COLOR TV CAMERA

WMAR-TV
Reports
Extraordinary
Tube Life from
TK-42 Color
Camera

Expected
Operating
Costs Down
50%

by C. G. NOPPER
*Director of Engineering
WMAR-TV, Baltimore, Md.*



WMAR-TV has had considerable operating experience with two TK-42 Cameras, one for five months, the other for nine months. Problems have been of a minor nature - such as dislike of the "D" handles - for which zoom kits have been made available. There has been no trouble to speak of. The station has been using studios in parallel, switching from one to the other with patch panel transfer. We like the way the camera is designed — it's easy to pull modules for servicing and maintenance.

At times the colorcasting was done with one camera, using the colorized TR-22 VTR to air pre-recorded commercials (especially on news shows) and usually the professionals thought that two color cameras were being used (the color match was so good).

In general, there's been a great deal of enthusiasm at the station. The camera is a consistently good performer and it's in operation daily on color shows. Production people are making color commercials for national and local clients.

We swing from back-to-back shows with only a short rehearsal. There are no color fringes, no noisy pictures from deep shadows.

Lighting has been supplemented with new quartz-iodine fixtures, along with 3200 K incandescent fixtures. At first, flat lighting was employed. Now, effects lighting is being used a great deal. The level ranges from 250 to 350 foot candles. We also changed color of studio floor making it lighter epoxy grey. This semi-gloss paint throws a soft reflection on performers, eliminating dark pockets under eyes, chin, etc.

Incidentally, we have been getting good tube life from our color vidicons. There's over 4500 hrs. on the tubes in our first camera at this writing (Oct. 11) and they are still going strong.

At first, it was estimated that tube costs would probably run about \$5.00 per hr. (based on mfr. guaranteed hours). With our experience, however, we believe we will arrive at a budget figure as much as 50 percent lower.

We could use some sort of standard color chart for set up and for matching cameras — like the grey scale chart used for the TK-60.

In summary, the picture is great. Advertiser and management reaction has been good. The audience likes the color picture, and integration between tape and live is so good they don't detect the difference.

BROADCASTERS REPORT ON TK-42

KCRA-TV...Picture is Superior

Reproduction is Sharper...Color is Better

by WM. KARPISEK
Chief Engineer
KCRA-TV, Sacramento, Calif.



We have two TK-42 Cameras. The first was delivered in February, the second in May. Very good results have been obtained — especially considering the complexity of color.

Our picture quality is very good. We put out the best color television picture in town. Resolution is sharper in our picture. Our monochrome picture is better — and there are many of these receivers around. Our color is more dramatic — there's a greater range. We're not limited to pastels, we can get greater saturation in colors. This is important to us, since we have over 20 percent color penetration in our area, and all our local programming is in color.

Our problems are non-existent. Camera matching was something of a complexity — until we learned how. The key here is to have one color monitor in master control for checking both cameras.

Our production people are quite well satisfied. They produce local color commercials, taping them on the TR-22C. Sponsor product identification is good.

We use incandescent lighting with a general level of around 300 ft. candles. Mostly flat lighting is used because it's easiest to handle. However, our people are beginning to work into effects lighting.

We don't shut cameras down during the day — so there's no realignment or readjustment — because they stay in tune all day. We go through the complete IB set up procedure weekly, taking about one hour of time. For daily check we use registration charts, try achieving good white and black level — with good transfer characteristic between them. Twice a day we use the registration chart, checking balance with camera log grey scale. There's no color checking because there's no standard and people see things differently. We also do vectorscope checking daily.

Management is well sold on the camera — they have ordered two more — giving us a total of four.

WSB-TV...Pleasing Picture

Real Nice Skin Tones...Real Happy with Color Fidelity



by HENRY WHITE

Chief Engineer

WSB-TV, Atlanta, Ga.

We have been operating the TK-42 Camera for on-air productions since December 1965 when we received our first live color camera. We got the second several months later. Both have been in daily operation and we're well pleased with results.

We're doing really well in set-up time and operating procedure. Our production people like the camera fine. We're using quartz iodine lighting around 300 ft. candles. We were using flat lighting but are now going for effects, and doing quite well.

Our management people like the results. The audience is pleased with the picture and our live commercials show good color fidelity. It's a real nice camera and we're real happy.

Of course, the whole color situation could be improved (and probably will be improved in time). It's not scientific enough. For example, the amount of color saturation is not uniform — it varies from one operator to another, one state to another.

Measuring the amount of chroma relative to a standard would be a scientific approach. We have spoken to some people regarding the color standards problem.

Going color was the biggest breakthrough in local television at WSB-TV since Channel 2 became Georgia's first television station in 1948, according to our general manager, Don Elliot Heald.

We began telecasting in color before the end of 1965. Producer Jerry Johnson is experimenting almost every day with new colors on the Ruth Kent show. We have found that even an extremely colorful painting shows a great deal of density and resolution on a black and white receiver through the use of the TK-42.

All of our news programs are now being shown in color. News Director Ray Moore has found color to be a tremendous advantage in broadcasting the news.

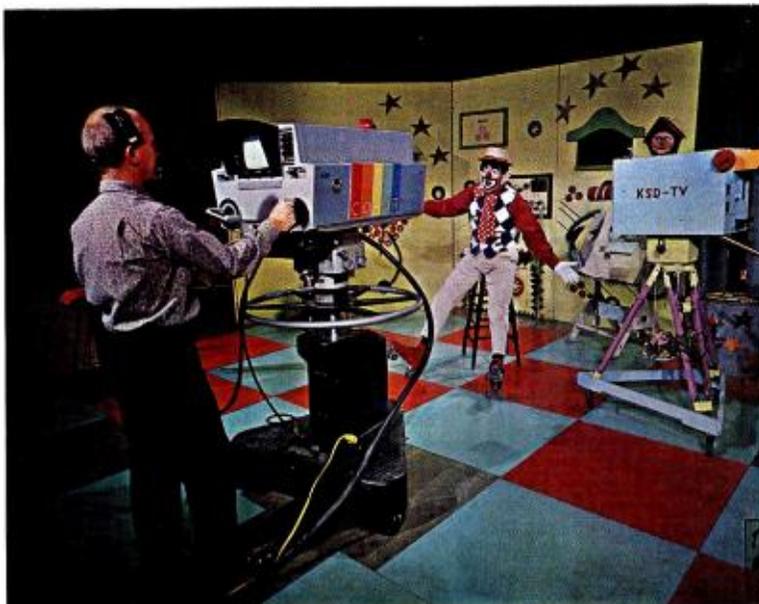
The "Popeye Club," a daily children's program, calls for live color commercials with the use of colorful props. The new TK-42 cameras consistently deliver a high quality picture for all our color shows.

BROADCASTERS REPORT ON TK-42

KSD-TV...Reliability is Tremendous

When You Turn It On – You Know It's Going to Work

by ED RISK
*Chief Engineer, KSD-TV,
St. Louis, Mo.*



KSD-TV received its first color camera February 11 and went on the air with it next day. The second camera arrived in April. The station had been carrying color network programs, films, slides and taped replays of color shows. With the advent of the TK-42 Camera, KSD-TV became the first St. Louis station to be completely equipped for color.

KSD-TV's early order for two TK-42 cameras was placed through the foresight of Mr. Harold Grams, general manager. This gave KSD-TV the first live cameras in the city.

We have already covered a remote — a parade — using the TK-42's and 350 ft. of cable. We expect to do the "Veiled Prophet Ball" with both cameras on location and with light levels between 150 and 200 fc. However, our experience makes us feel this can be done satisfactorily.

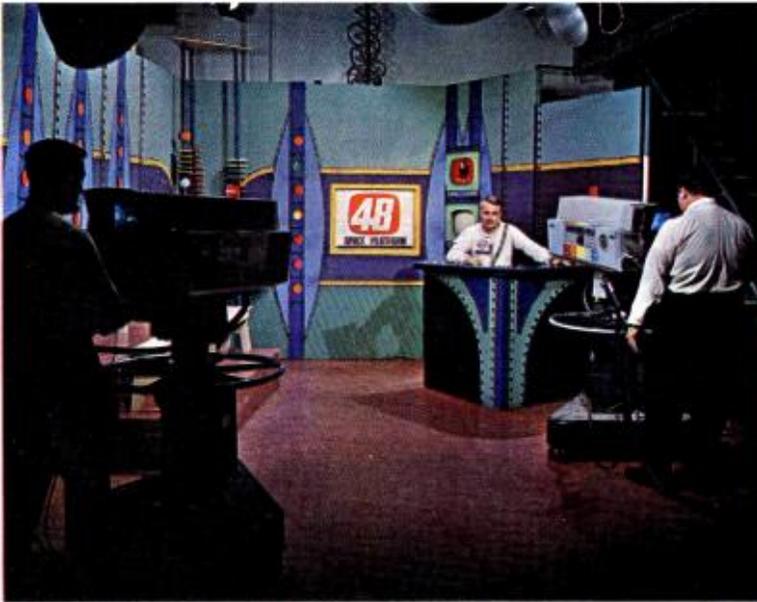
We have learned to set up fairly rapidly. KSD-TV produces live color commercials for local accounts quite successfully. Several programs are taped each week for delay purposes and commercials are recorded before a weather program each day.

Production people have considerable experience with the TK-42 and are quite happy with what it does. Management has received good reports on picture quality from audience and sponsors.

From the reliability standpoint, we think it's tremendous. The TK-42 is a fine camera. When you turn them on — you know they're going to work. They're much more reliable than we expected.

Altogether KSD-TV is getting a good reputation in the area for the kind of color programming and the quality of the color pictures being delivered. Audience reaction has been consistently congratulatory. Advertisers like the kind of color commercials produced. The color cameras have played a large part in our color success story.

WKBS-TV...Exceptionally Good Color Picture
Very Pleasing to Production People and to Advertisers



by **GENE GILDOW**
Chief Engineer, WKBS-TV,
Kaiser Broadcasting, Phila., Pa.

Our station has been designed from the first for full color operation. We went on the air with color film in September 1965 and added color tape in October. The first live color camera was received in April 1966. The second TK-42 was received in May. Both have been on the air daily since we received them.

We do all our own productions from kiddie shows featuring live talent and puppets to commercials. Practically all commercials are done in color. We are getting consistent day-to-day high-quality pictures while observing a minimum of setup time.

Our technical staff had to learn the new concepts embodied in the new cameras. The setup, while straightforward in the instruction book, in reality required actual experience in performing the operations before these consistent results were obtained. If a station has technically qualified personnel willing to move ahead with the state of the art, as WKBS-TV has, no unsurmountable problems with these new cameras should be encountered.

Incandescent light fixtures are used throughout our studio and we attempt to light for 250 foot candles although at times the lighting level may be somewhat higher. We are doing some lighting that requires special techniques to obtain specific effects requested by the director but the major portion of our lighting duties revolve around standard lighting setups that have evolved from black and white TV. We attempt to go beyond mere flat lighting by positioning fixtures to give pleasant modeling.

The ability of the camera to distinguish between close colors such as those found on the packages of Newport and Salem cigarettes is gratifying to observe by both the production and technical personnel as well as the never-to-be-slighted client. Undoubtedly the ability of the TK-42 to distinguish between colors and its faithfulness of reproductions of colors is most important to the client.

The station has set aside a large block of its programming to children's shows, many of which are in color accompanied by live hosts and talent which are, of course, also in color. As a result of the acceptance of our color programming we will inaugurate live color wrestling from our studio beginning in September 1966.

BROADCASTERS REPORT ON TK-42

WAVY-TV...Color Picture Used as Standard

Shows Color as Color Should Be

by **ANDREW JACKSON**
*Chief Engineer, WAVY-TV,
Portsmouth, Va.*



Generally speaking our TK-42 Color Cameras have performed better than expected or hoped for. There has been no real operating difficulty — only minor readjustments on the camera—plus some learning of new techniques for personnel. At the present time our operation is so efficient that we have one video man running as many as eight cameras — four color and four monochrome — both live and film.

We make quite a few local color commercials. They are all put on tape. We get good color fidelity. We can match sponsor's products exactly.

Although, at the first, our production people thought the camera was too large (especially for remotes) now they like them fine — since they have seen what this camera can do. They especially like the better viewfinder and the easier way the camera operates.

We use incandescent lighting fixtures. Our normal level is 250 foot candles. Mostly we use flat lighting — it's much easier and a good way to begin. However, we do some effects lighting when needed — with exceptionally good results.

In engineering we like the fact that we can let this camera run for weeks without doing anything to it. We have had our first TK-42 since March, second since April.

Both match well and work well. We employ the standard set up procedure (modified somewhat from IB) once a month. This takes 20 minutes. For daily operation we warm up for 10 minutes after turn-on, check white balance (10 seconds) then let it go.

The quality of our pictures is as good as or better than the network. Of course, the subjective esthetic sense enters into this judgment. Moreover, there are no color standards. We are still debating how to check the camera for color reproduction. At the present time, we set the RMA grey scale chart alongside some color swatches and check once a day against these. Since there are no chroma standards, there's lots of variations and we must continually crank our system up and down to match what's coming down the "pipeline". For example, the chroma content for one show may be 35 IRE units for another 40 IRE units. Chroma content for commercials of one large food advertiser is always pegged at 50 IRE units. Of course, this problem is a matter for our engineering committees to work out — same as the need for a color video test tape.

Pretty much everybody is happy. Servicemen in the area say they use the WAVY color picture as standard. As far away as Richmond (78 air miles) the audience says: "That's what color should look like." Our management likes this reaction and so do our advertisers.

DIGESTING THE NEW TK-27

BIG TUBE COLOR FILM CAMERA



BLOCK DIAGRAMS AND SIGNAL PATHS ♦
SIMPLIFIED VIDEO FLOW OF MONITORING SYSTEM ♦
EXPLANATION OF NEW NON-ADDITIVE MIXING TECHNIQUE ♦

TECHNICAL INFORMATION COMPILED FROM RCA BROADCAST NEWS
FEBRUARY 1965 ISSUE

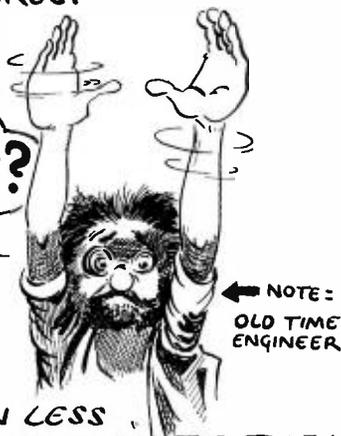
TEXT AND ILLUSTRATIONS BY GUY WELCH KTVU ENGINEER
SAN FRANCISCO-OAKLAND TELEVISION
A DIVISION OF COX BROADCASTING CORP. ATLANTA GEORGIA

PUTTING THE FINGER ON THE POINTS OF INTEREST



SO WE JUST GET USE TO THREE V COLOR-NOW
WHY FOUR VIDICONS?

WITH THE STANDARD 3-V CHAIN THE MONOCHROME SIGNAL IS THE RESULT OF A MIXTURE OF THE OUTPUT OF THE THREE VIDICONS AFTER THEY'VE BEEN REGISTERED-ADJUSTED-AND COMPENSATED ETC. ETC.- RESULTING IN LESS THAN AN EXACT MONOCHROME REPRODUCTION OF THE TELEVISED SCENE. IN THE 4V SYSTEM THE FOURTH VIDICON IS USED TO PRODUCE A TRUE BLACK AND WHITE SIGNAL WHICH RESULTS IN INCREASED DEFINITION, GREY SCALE AND OVERALL PICTURE QUALITY ~ AS WELL AS ENHANCING THE ENTIRE COLOR PRESENTATION



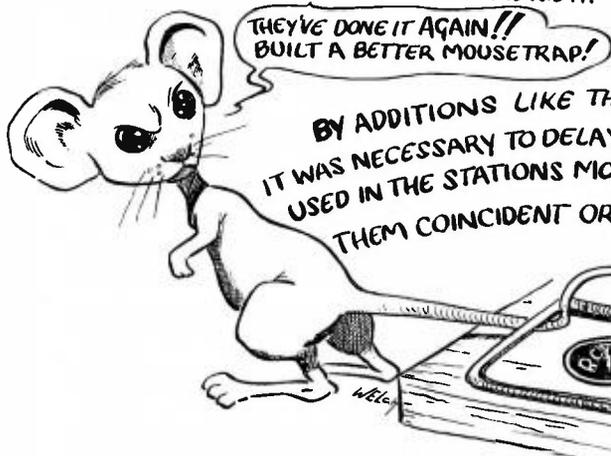
← NOTE - OLD TIME ENGINEER.

NOTE THAT THE VIDICON USED IN THE MONOCHROME CHANNEL IS AN IMPROVED 1½" VIDICON - CAPABLE OF 800 LINE RESOLUTION AND FULL BAND VERTICAL RESOLUTION !!

THIS DEFINITION IS NOT NECESSARY IN THE COLOR CHANNELS BECAUSE OF THEIR LIMITED BANDWIDTH



YOU'LL LEARN TO LOVE THIS VALVE!



THEY'VE DONE IT AGAIN!! BUILT A BETTER MOUSETRAP!

BY ADDITIONS LIKE THIS TK-27 FEATURE - FORMERLY IT WAS NECESSARY TO DELAY H.DRIVE AND BLANKING USED IN THE STATIONS MONOCHROME SYSTEM TO MAKE THEM COINCIDENT OR "IN PHASE" WITH THE COLOR SIGNAL....

THE COLOR SIGNAL INCURS A TIME DELAY IN THE ENCODING PROCESS DUE TO THE I AND Q BANDWIDTH LIMITING

THE TK-27 GENERATES ITS OWN H.DRIVE AND AUTOMATICALLY SENSES ANY TIME DELAY IN THE SYSTEM-COLORPLEXER(ENCODER) OR CAMERA CABLING WITH RESPECT TO REFERENCE SYNC-AND CORRECTS THE DIFFERENCE! THE OUTPUT SIGNAL IS THUS TIMED CORRECTLY FOR MONOCHROME AND COLOR SIGNALS

NOT ONLY DOES THE TK-27 FEATURE NON-ADDITIVE MIXING TO INSURE ACCURATE MONITORING - AUTOMATIC BLACK AND WHITE LEVEL CONTROLS - 800' RESOLUTION - STABLE COLOR CONTROL - ELIMINATES THE NEED FOR A SEPARATE PULSE DELAY SYSTEM - AND INCLUDES ELECTROSTATIC FOCUSING - BUT THE TK-27 GOES EVEN FARTHER IN OFFERING NEW GIMMICKS... ER... TECHNIQUES! LIKE FR'INSTANCE...



RADIO RESEARCH CORPORATION OF AMERICA RESEARCH AND DEVELOPMENT

LIKE FR'INSTANCE YOU GOT'UM AUTO-MATIC CONTROL TO COMPENSATE FOR FILM AND SLIDE DENSITY VARIATIONS? YOU GOT'UM THAT...HUH?



MATTER OF FACT - YES - TO COMPENSATE FOR FILM AND SLIDE DENSITY VARIATIONS ALL **FOUR** CHANNELS MUST BE SIMULTANEOUSLY CONTROLLED TO MAKE THOSE COMPENSATIONS

THE TK-27 DEVELOPS A CONTROL VOLTAGE WHICH CAN BE USED TO OPERATE AND CONTROL A NEUTRAL DENSITY DISC SERVO SYSTEM FOR AUTOMATIC CONTROL. IMAGINE EACH VIDICON AS A PEAK READING LIGHT METER - IF THE OUTPUT OF EACH VIDICON IS SAMPLED AND INDICATES A CHANGE FROM A PRE-SET VALUE, THAT DIFFERENCE CAN BE DETECTED INTO AN ERROR VOLTAGE AND USED TO ADVANCE OR RETARD THE DENSITY FILTER ACCORDING TO THE DENSITY VARIATIONS IN THE FILM OR SLIDES



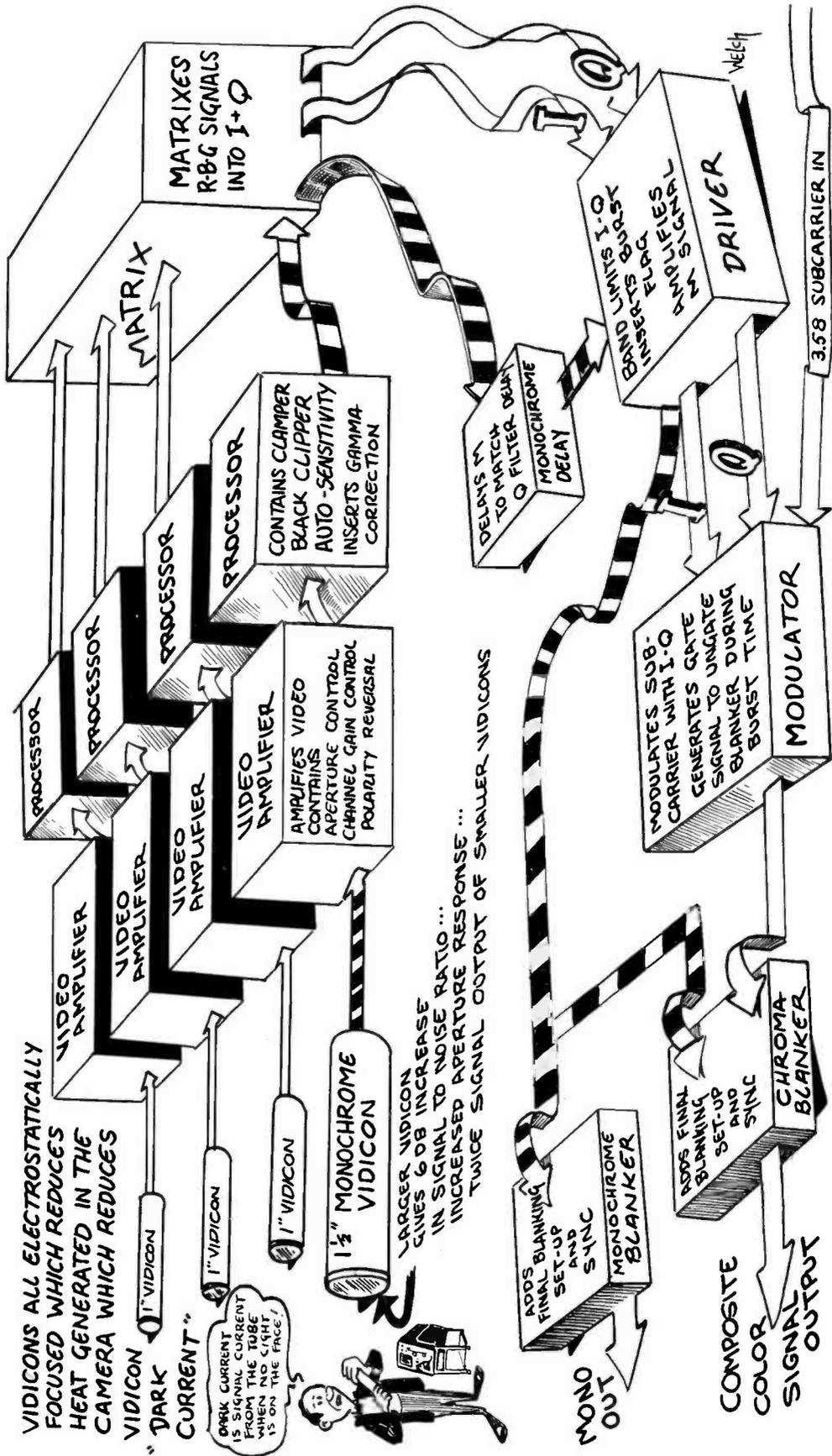
NOTE - THE SAMPLE VOLTAGES MENTIONED ABOVE ARE TAKEN BEFORE ANY VIDEO GAIN CONTROL ALSO - THIS CONTROL VOLTAGE CAN BE USED TO CONTROL VIDICON TARGET SENSITIVITY INSTEAD OF THE FILTER SERVO IF DESIRED

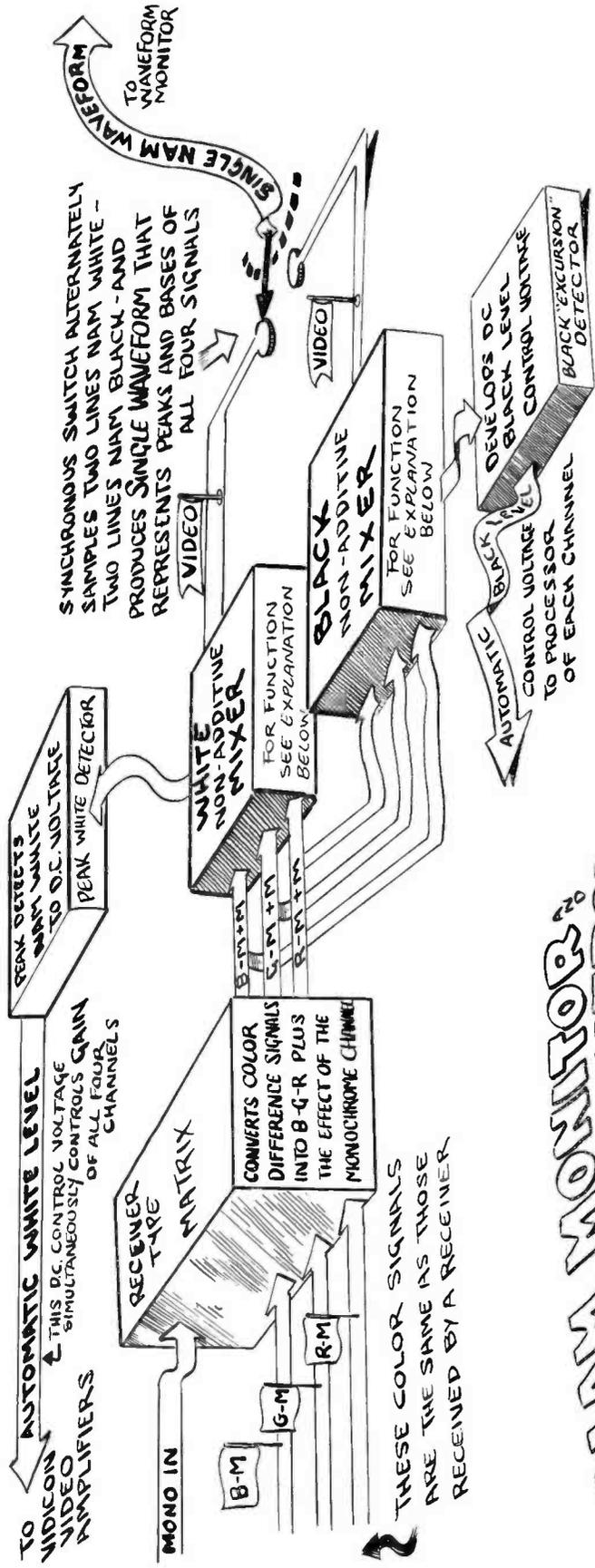
ANOTHER POINT OF INTEREST IN THE TK-27 IS THE FACT THAT WHITE BALANCE (GAIN) AND BLACK BALANCE (PEDESTAL) DO NOT INTERACT WHILE BEING ADJUSTED!

HOW'S THAT GRAB YOU?



SIGNAL FLOW OF MONOCHROME + COLOR SIGNALS THRU THE TK-27





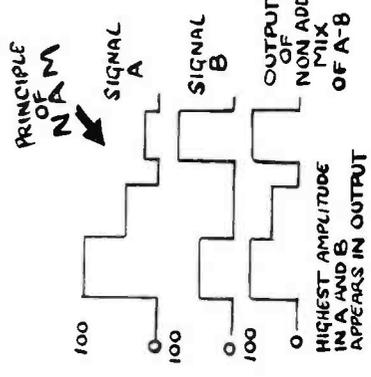
NAM MONITORING CONTROL

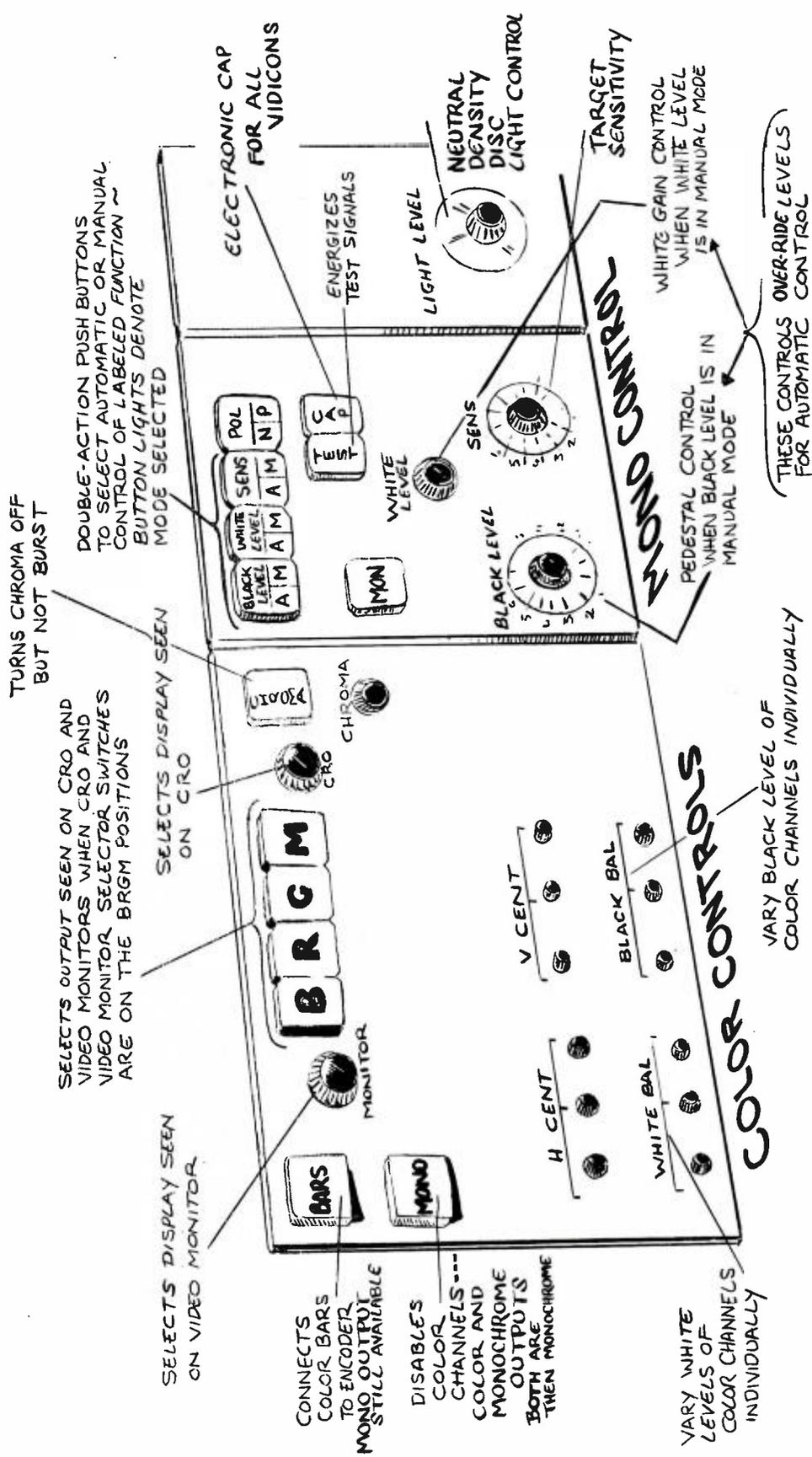
THE FOUR-TUBE COLOR SYSTEM CANNOT BE MONITORED IN THE SAME MANNER AS THE 3-V CHAIN BECAUSE OF THE HIGHER LUMINANCE VALUE OR GAMMA OF THE NEW-LARGER MONOCHROME VIDICON!

I SEE - SO IF THE R-G-AND BLUE OUTPUTS WERE MATCHED TO THE MONOCHROME OUTPUT AT 100% WE'D BE IN REAL TROUBLE LIKE FOR INSTANCE OVERLOADING THE TRANSMITTER-RIGHT CHET?

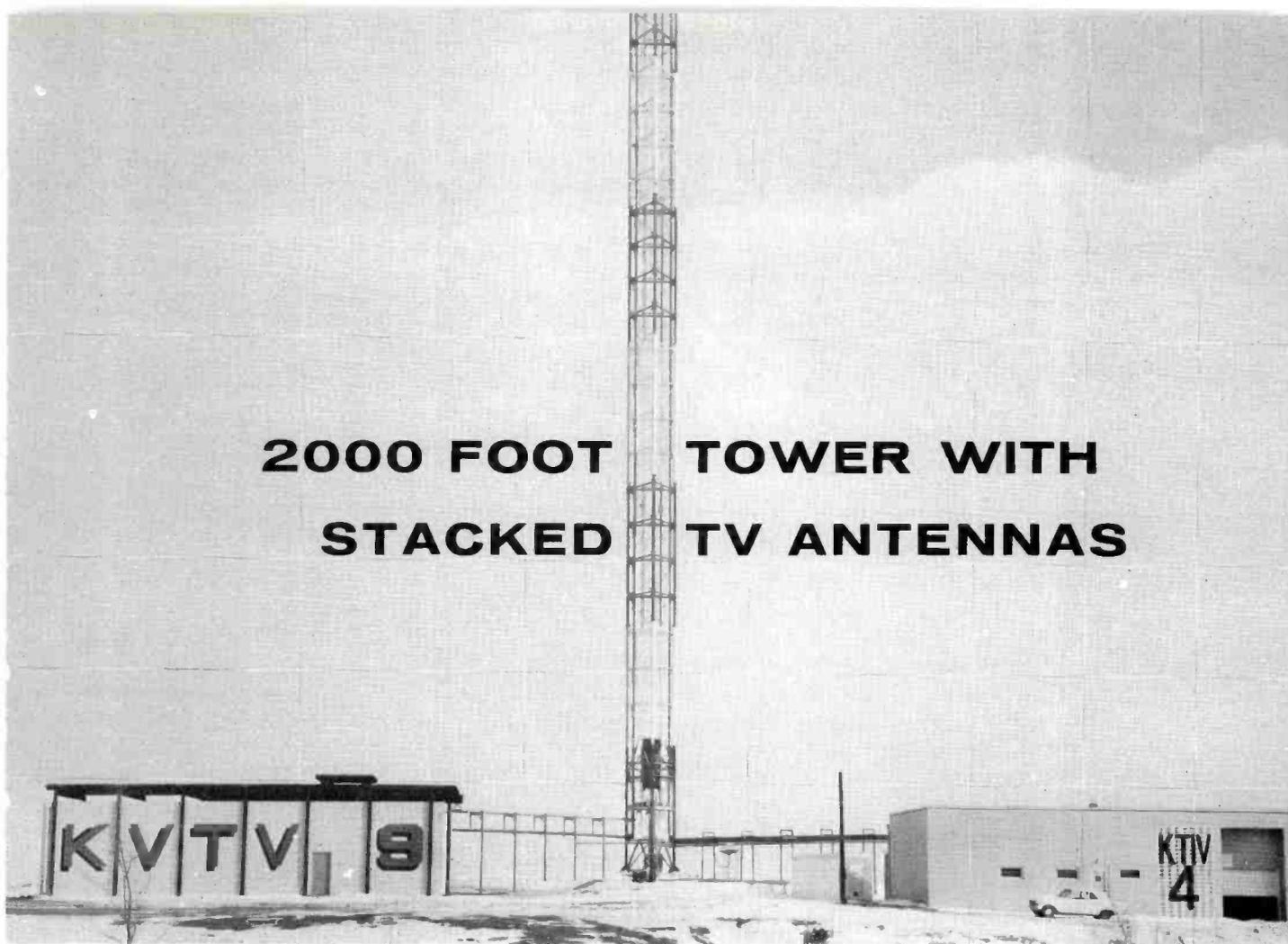
RIGHT DAVID, SO Non-Additive Mixing IS USED IN MONITORING CR0 LEVELS AND NAM USES DERIVED COLOR SIGNALS - THE SAME THAT WOULD BE FED TO THE RECEIVING PICTURE TUBE - HOW ABOUT THAT!?

NOTE THAT THIS TECHNIQUE PROVIDES INFORMATION RELATIVE TO PEAKS AND BASES ONLY - WHICH IS THE PRIME CONCERN IN ADJUSTING SIGNAL LEVELS ANYWAY! GOODNIGHT DAVID - SLEEP ON WHAT I'VE JUST TOLD YOU!





TK 27 REMOTE CONTROL PANEL



2000 FOOT TOWER WITH STACKED TV ANTENNAS

KTIV and KVTU of Sioux City Push Superturnstile and Traveling Wave Antennas Skyward to Double Coverage Area

by A. SMITH, *Chief Engineer, KTIV*
and R. G. ENGELHARDT, *Chief Engineer, KVTU*

On December 6, 1965, the first 2000-foot television structure with stacked antennas began operating in Sioux City, Iowa, broadcasting the respective programming of television station KTIV, Channel 4, and KVTU, Channel 9. This climaxed seven years of effort on the part of these two stations in the form of a very unusual and yet most practical approach to serving each station's coverage requirement.

Initial Planning

The first stages of planning began in 1958 when the two stations began, independently, investigating the possibilities of utilizing the property each owned for the construction of taller towers. Each station soon learned that aviation interests would permit some height increase, however, the permissible increase was not sufficient to satisfy either the immediate or the long range needs of either station.

A transmitting site which would accommodate an overall height above ground of 2000 feet was limited in two general directions by topography, and in a third direction was limited by existing air craft traffic patterns. Consequently, both stations found that they were looking in the same general area for a new transmitting site, and that they each had designs for the same property.

The Federal Aviation Administration eventually established an area designated as a tower farm and suggested the feasibility of a single tower for both stations. Investigation of this possibility led to the decision of utilizing a common structure for the two stations' antenna facilities.

Tower Site

A common tower site was selected to accommodate an overall height of 2000 feet above ground, in an area that would satisfy the requirements of both FAA and the FCC. This location is 12 air miles from the center of metropolitan Sioux City, and is approximately seven miles farther from the downtown area than the old transmitter installations. Some seven acres of land were leased for the two trans-

mitter buildings, the tower, and the nine associated guy anchors. Construction was scheduled to begin as soon as weather would permit in the Spring of 1965.

Tower Specifications

A great deal of research was done on the wind load of tower structures throughout the Midwest and on the existing stacked antenna installations throughout the United States. After all of the assorted wind loading information had been carefully analyzed and compared to the local climatological data, a uniform 60 lb. EIA design was selected.

The basic tower structure was designed and constructed by Kline Iron and Steel Company, Columbia, South Carolina. It includes galvanizing of all component

parts with the exception of legs. A full length climbing ladder is located approximately 18 inches from the elevator door, while hand rails and platforms are located at every light level and at the microwave passive reflector levels. The tower contains a fixed rather than a pivot base, so as to permit the elevator to go as near the ground as possible.

Electrical utility outlets with a 1500 watt capacity were placed at each of the platform levels. Provisions were made for dual flashing 300 MM beacons at each of the seven levels, in the event that lighting specifications, which may be later established or changed by special aeronautical studies of the FCC and the FAA, indicated such a need. A remote indicating panel was installed in one transmitter building to

FIG. 2. Construction began early in the spring with the first spade of frozen earth about to be turned by Detrich Dirks, President of KTIV Broadcasting Co. (Left to right) Al Smith, Chief Engineer of KTIV; Detrich Dirks, President of KTIV; Donald Sullivan, Vice President and General Manager of KVTV; and Robert Engelhardt, Chief Engineer of KVTV.



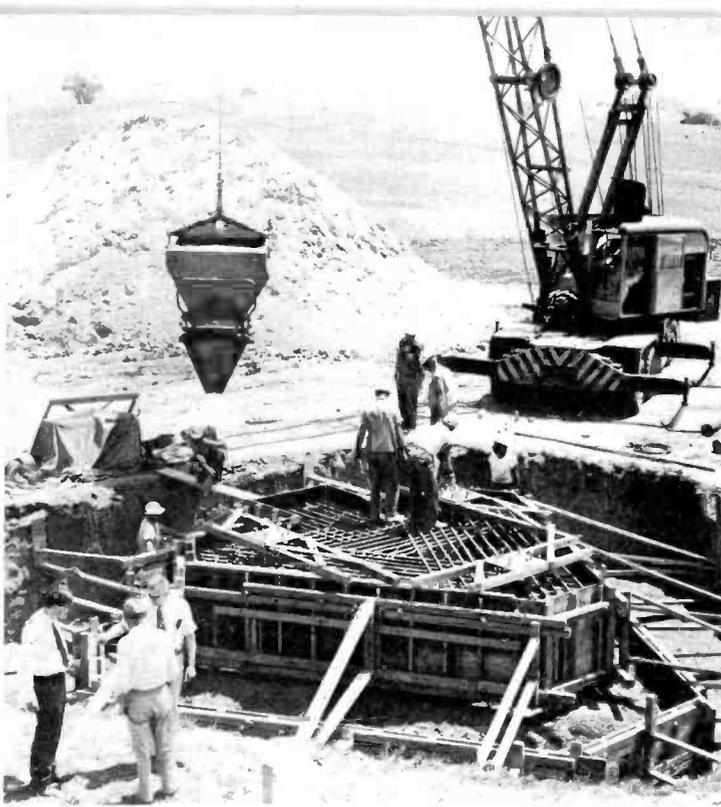


FIG. 3. The foundation for the tower was the first major piece of construction in order that the poured concrete could age for a period of 28 days prior to the erection of tower sections. The soil conditions required that the foundation be 35 feet wide and 10 feet thick at extremes.

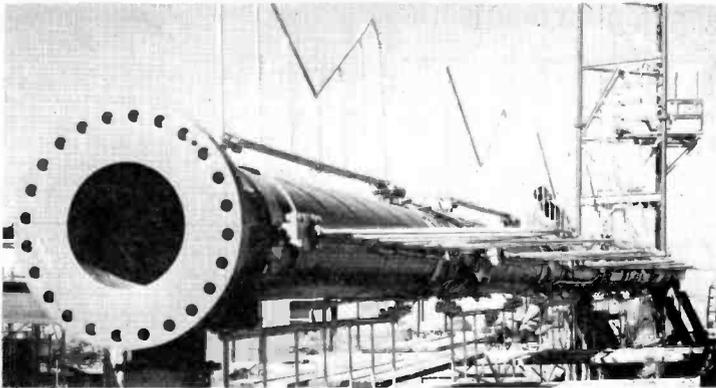


FIG. 4. This special 6-Bay Channel-4 Superturnstile for station KTIV weighs 46 ton and has a mast diameter of 20 inches just below the pedestal flange and 25 inches at the opposite end of the antenna.

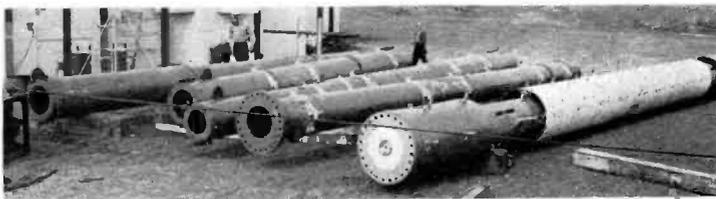
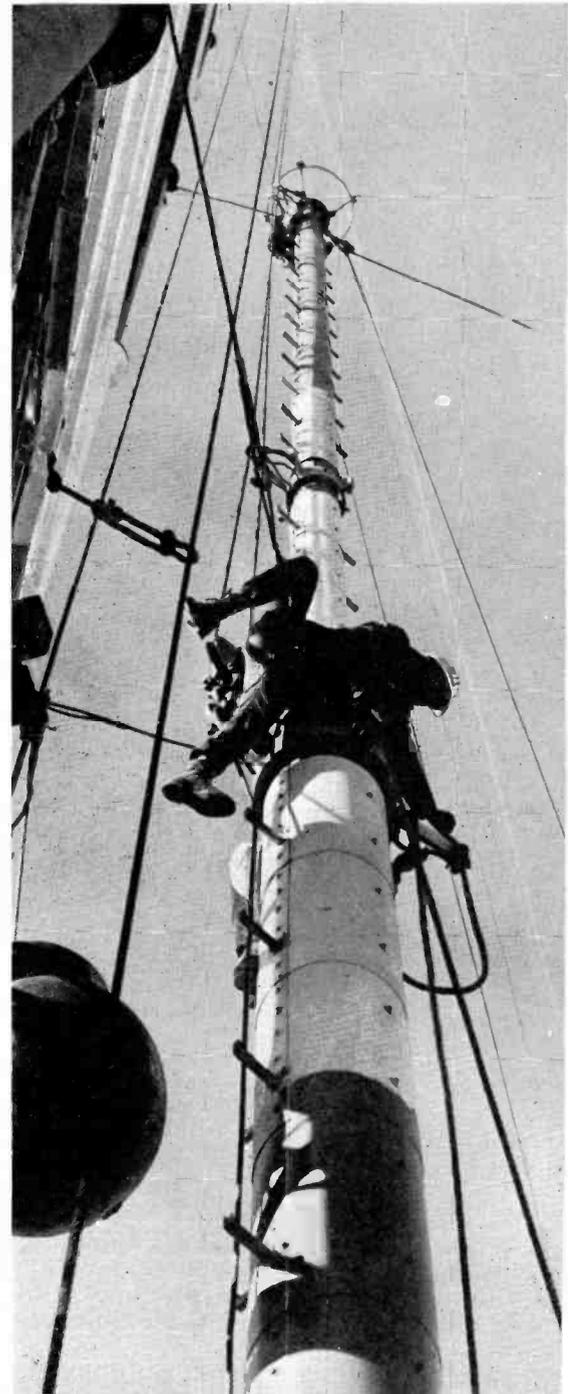


FIG. 5. The first three sections (left to right) will compose the bury section, the 6-Bay Superturnstile and pedestal (when stacked and welded together at the top of the tower). The fourth section (on the far right) is the bottom third of the 18 gain Traveling Wave Antenna, with a portion of the radome ice shield removed.

FIG. 6. The top two sections of the TW-18 Traveling Wave Antenna are being prepared in anticipation of calm winds for their final trip to the top. This photograph shows the overlapping detail of the fiber glass radome.



indicate that all beacon and obstruction levels are lighted properly.

The elevator design incorporated a 800 lb. load capacity at a speed of 100 ft. per minute, with solid state electronic controls throughout. The entire elevator installation will meet the National Code Safety Specifications.

Each guy line is equipped with high frequency oscillation dampers and each guy level has targets attached to the corresponding legs for the purpose of plumb-ing the tower with a special transit that attaches to the guy line near the anchor.

The tower also supports two 8 by 12 ft. passive reflectors, which are used by the stations in their individual studio to trans-mitter paths.

Antennas

Each station had a specific antenna gain requirement and in this case, KTIV, Channel 4 required a gain of 6, which was best served by a batwing type antenna (Superturnstile), equipped with special matching transformers, for the purpose of optimizing the standing wave ratio across the entire channel. Electrical resistance type de-icing elements were used and a single thermostat was used to control de-icing on both antennas. The input of the KTIV Superturnstile was fed by two 3 $\frac{1}{8}$ inch "Universal" lines.

Figure 4 shows the Channel 4 Super-turnstile during ground assembly and checkout. The outside diameter of the mast ranges from 20 to 25 inches with an average wall thickness of 4 $\frac{1}{2}$ inches. Four sections of mast which made up the bury, the antenna, and the pedestal sections are shown in Fig. 5 (left to right) as they lay on timbers, while being prepared to be lifted and welded in place. At the far right in Fig. 5 is the bottom third of the Traveling Wave Antenna for KQTV, Channel 9. The heaviest single section of mast weighed in excess of 13 tons, and the combined antenna assembly (which was a free standing array, 213 foot above the top of the tower) weighed more than 61 tons. The circularity of the coverage pattern was within the ± 8 dB specification established for KTIV.

Channel 9, KQTV, required an antenna gain of 18. The Traveling Wave Antenna (TW-18) met this gain, and also the mechanical requirement specifications for stacking purposes. The TW-18 was a special 60 lb. pedestal-mount design, with a partial radome for ice protection. Seven-tenths of a degree of electrical beam tilt was added to the antenna, which theoretically is the optimum amount based upon horizon at 2000 ft. Four and a half

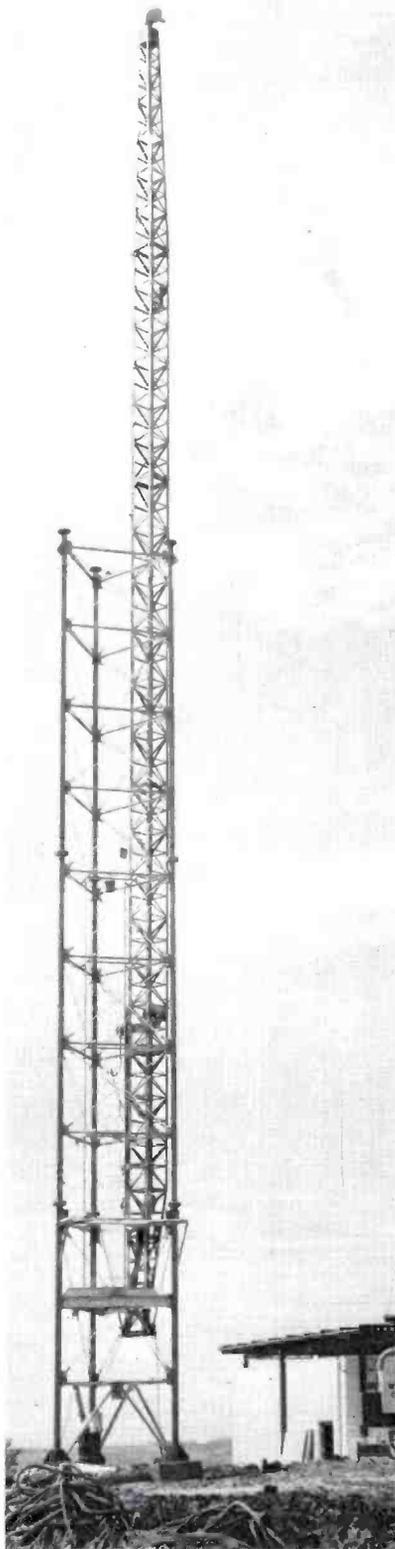


FIG. 7. The first 80 foot of tower harnessed with the gin pole is being prepared for the erection process. The "best" working day produced 300 feet of erected sections. The protective covering on the transmitter building was designed to withstand the forces of falling ice.

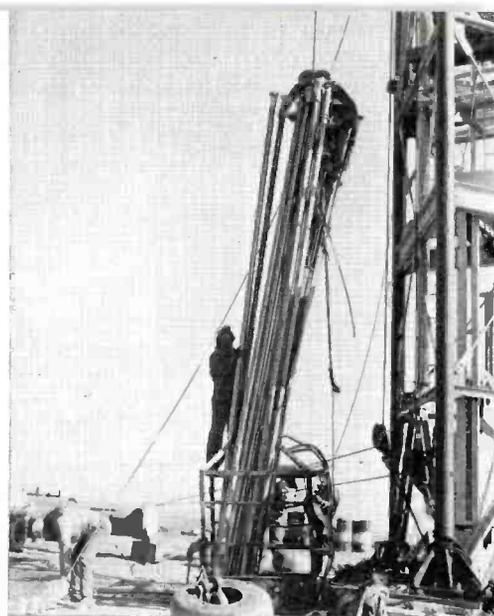


FIG. 8. Three hundred sections of combined 6 $\frac{1}{8}$ inch and 3 $\frac{1}{8}$ inch UHF Universal transmission line were installed for separate feeds from the individual transmitter buildings to the respective antennas. Each line was carefully swabbed and the open ends were covered with plastic until they were assembled on the tower.

kilowatts of electrical heating were used on the top-loaded section to reduce wind loading of the entire antenna structure, however, the remaining portion of the TW antenna was covered with a laminated fibre glass radome. This permits formation of ice away from the critical focal point of the radiating slots and is most satisfactory in its operation. Figure 5 shows a portion of the radome covering removed for the purpose of handling this section of the antenna. The circularity of the TW was also within ± 9 dB with a SWR at visual carrier of 1.025.

Special Field Tests

RF and DC pulsing techniques were used to optimize both antennas and transmission lines, to insure proper installation and operating performance. In addition, cross coupling between the two antennas was measured to insure a minimum of 26 dB separation, which was guaranteed by RCA. Final tests indicated that the cross coupling was in excess of minus 40 dB.

Transmission Lines

Channel 4, KTIV, used two 3 $\frac{1}{8}$ inch Universal lines and Channel 9, KQTV, used a single 6 $\frac{1}{8}$ inch Universal line. Specifications were established for all lines to be gassed at the base of the tower and to hold the initial gassing pressure plus or minus one-quarter pound for a period of 72 hours after compensating for temperature differential. This permits operation without the use of dehydrating

equipment by simply adding dry nitrogen a few times a year.

Improved Station Coverage

The new coverage area is equal to the combined areas of Washington, D.C., Rhode Island, Delaware, Connecticut, Hawaii, New Jersey and half of Massachusetts for a total of nearly 27,000 square miles. This represents two and one-half times as many television homes as were covered by the stations' previous facili-

ties, and is greater than twice the number of square miles previously covered.

All television sales and service dealers within a radius of 100 miles were invited to attend two special promotion meetings for the purpose of showing the service industry the new facility which would now produce their customers television service. This has been a very effective and necessary vehicle in the promotion and growth of the new as well as the old coverage area.

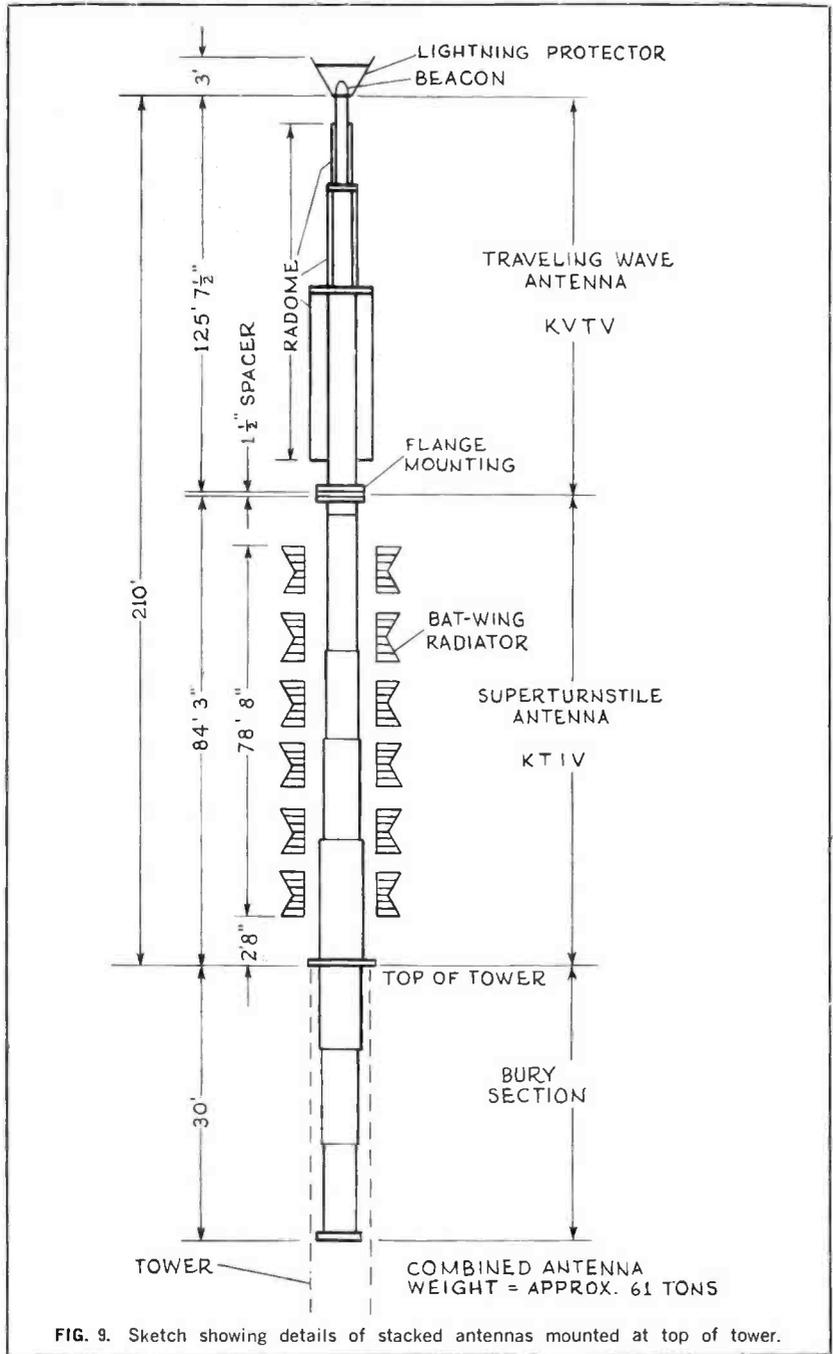
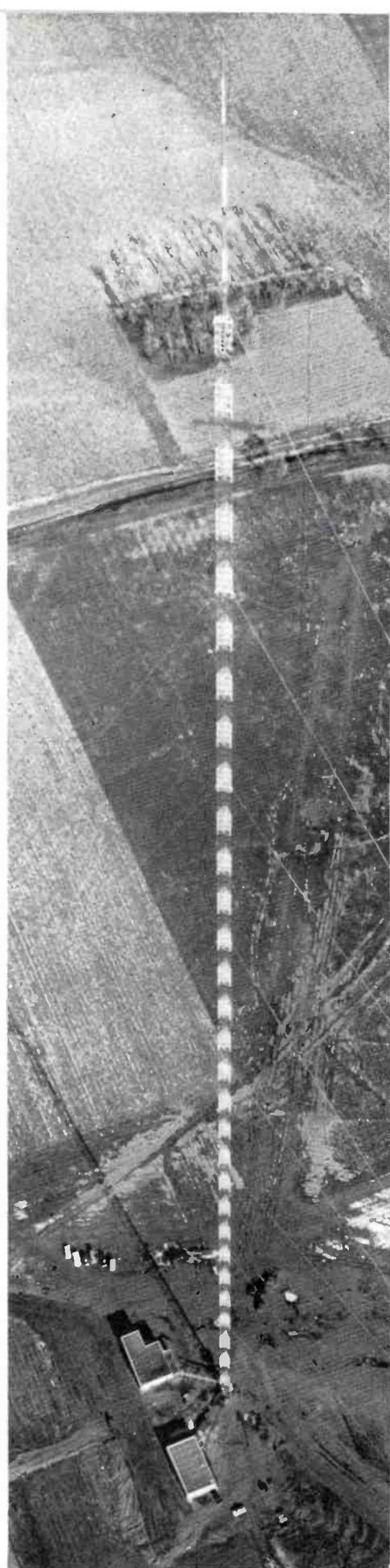


FIG. 9. Sketch showing details of stacked antennas mounted at top of tower.

FIG. 10. The 2000-ft. structure is complete and in operation, serving many thousands of new viewers now a part of the Sioux City television market.





VOLUME NO. 1, October 1931, was a thin 12 pages, with a single color cover, which by today's standards looks a bit old-fashioned. Contents, however, were not too different from our most recent issues. The feature story was a description of KFI'S then brand-new RCA 50B installation — "the first 50 KW west of Texas." It was the first of twenty RCA 50-B's that went on the air during the 1930-33 period. In addition, there were two engineering "know-how" stories: one of them on Microphone Placement by T. A. Smith, now Assistant General Manager of the Engineering Products Department; another on Field Intensity Measurements by the writer.



VOLUME NO. 21, July 1936, was much flossier. By this time BROADCAST NEWS had grown to a nice big 36 pages. The cover of this volume, a special Convention Number, was unusual in that it featured a picture of I. R. Baker, who managed RCA's broadcast transmitter business from 1930 to 1943. It was Bake who formulated RCA's policy of building the best in broadcast equipment and of merchandising it with directness and honesty. BROADCAST NEWS, too, was Bake's idea — and certainly no one deserved more to grace the cover. However, such was his modesty that he was considerably irked when this cover appeared.



VOLUME NO. 30, May 1939, marked a milestone in BROADCAST NEWS, when, for the first time, a piece of "commercial" television gear appeared on the cover. The TT-1A Television Transmitter shown on this cover, and described in following issues, was announced coincidentally with the start of "commercial telecasting" in New York. Although the "start" was somewhat premature, it was an unmistakable portent of things to come, and of postwar issues of BROADCAST NEWS which have been more and more marked by the gradual ascendance of television as a main topic of conversation among non-TV broadcasters as well as present telecasters.

35 YEARS OF BROADCAST NEWS

Established to Provide Equipment Information for Station Engineers,
BROADCAST NEWS Has Recorded the Technical Progress of the
Broadcasting Industry Since October of 1931

by JOHN P. TAYLOR
Manager, Marketing Services

This issue marks the 35th anniversary of BROADCAST NEWS, a magazine we have published continuously — and fairly regularly except for the war years — since the first issue in October 1931. BROADCAST NEWS was started when broadcasting was young — and it has lived and prospered with the industry. In its 130 issues the technological development of the industry has been portrayed in word and picture as in no other place. In its 7,289 total pages have appeared

the first articles on the velocity microphone, the first air-cooled, high-power transmitter, the first 500 KW transmitter, the first AC-operated speech input, the first commercial TV transmitter, the first image-orthicon camera, the first commercial color equipment, the first vidicon film camera, the first 4-tube color camera and many more. Its articles on planning — and the hundreds of stories on stations built and building — have been a gold mine of ideas for chief engineers planning their new installations. In total, BROADCAST NEWS has published more technical information on broadcasting than any other journal.

If, at this point, you get the idea that we are proud of BROADCAST NEWS — you are correct. And being proud, we take the opportunity of this, our thirty-fifth anniversary, to recount, for those who have not heard it before, the story of BROADCAST NEWS — why it was started, how it has progressed, and what we hope for it.

The First Issue

The parade of covers at the top of this page, and the following three pages, portrays some of the "milestones" in the development of BROADCAST NEWS. To better show how it all started we are enclosing with this issue a facsimile copy



VOLUME NO. 37, September 1941, marked another important milestone. By this time BROADCAST NEWS covers had gone through several metamorphoses. (As the parade of covers above indicates.) Only the masthead stayed reasonably constant. But it remained for this issue to strike a really different note. Although Pearl Harbor was yet to come, its shadow was on the land. BROADCAST NEWS, on cover and in editorial, recognized the state of national emergency. And, within months thereafter, it, like everyone else, went to war. From this time until V-J Day, issues were few and far between.



VOLUME NO. 44, October 1945, symbolized the post-war boom of the television industry — and of BROADCAST NEWS. Now a big, grown-up boy of 72 pages, with a four-color, varnished cover, this issue of BROADCAST NEWS featured the new RCA TK-30A TV Camera — the first commercial TV camera to use the RCA-developed image orthicon pickup tube — and the first TV camera to be produced in quantity. The TK-30A was a revolutionary development and an immediate hit. In the following five years over a thousand of these cameras were sold. The TK-30A made modern television practical.



VOLUME NO. X, October 1952, was a special "extra" edition devoted exclusively to the advent of the first commercial UHF TV station — KPTV in Portland, Oregon. The inauguration of UHF telecasting was of tremendous interest to the whole industry and everyone wanted to know how it was working out — including us. In order to find out we made an on-the-spot survey of picture quality, field intensities, area coverage — and viewer acceptance. We wrote it up for BROADCAST NEWS and had this special edition in the mails four weeks after the station went on the air.

of the very first issue. The plates for printing this reproduction were made by photographing the pages of an original copy. Our printer searched the supply houses to find paper—including cover stock—which would closely match the first printing. Of course, the original illustrations suffer some in the rescreening process—but otherwise this reprint is an almost perfect reproduction of our first issue. It will give you an idea of how we started—and how far we've come—as a magazine, and as an industry.

That Was the Year

Lest you judge our first issue too harshly, though, we should point out that it was in proportion to the size and technology of the industry in 1931. That industry was a good deal different from today's. Broadcasting — as a business — was just in its infancy. The total gross income of all the stations in the United States in 1931 was only 56 million dollars — about 4 per cent of 1965's total revenue.

On the technical side the difference was almost as great. The camera-shaped condenser microphone was the high favorite in the studios. Audio equipment (or "speech input" equipment as it was usually referred to) was large and clumsy—mostly battery-operated (Fig. 2, Pg. 52). Transmitters, too, were large-sized and many-metered (Fig. 1). Most of them used motor-generators for filament and bias supply. Radiating towers were only just coming into use—and directional antennas were only a subject of conversation.

Of some 700 stations on the air in 1931, most were of "composite" manufacture. Many of them were really "homemade" in the homiest sense of the word. This was not surprising, for many, if not most, of the broadcasting stations taking the air during the twenties did so by the grace, if not the inspiration, of some aspiring amateur. However, by 1931, quite a few stations were making money (a development which originally came as something of a surprise). As the cash registers started

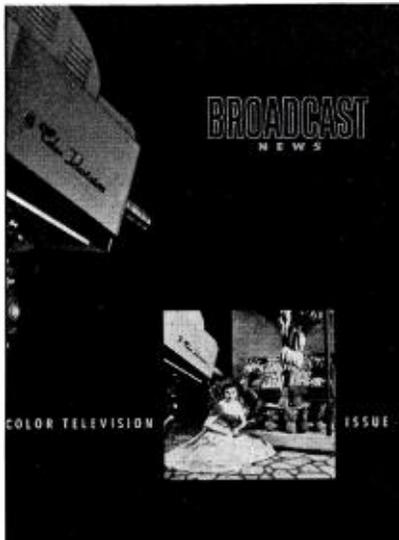
ringing, broadcasters stopped looking on their stations as hobbies, or prestige operations, and began running them like businesses. That's where we came in.

How Broadcast News Was Started

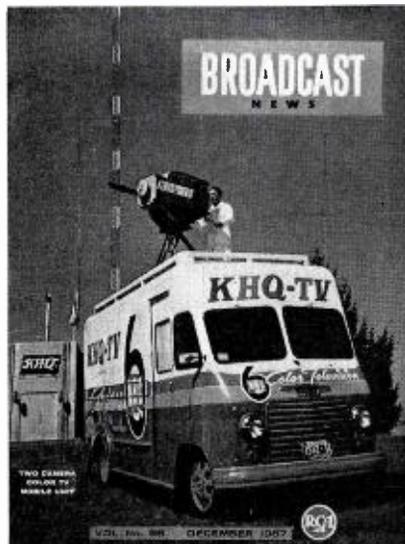
RCA had started selling broadcast equipment in 1927, but did not aggressively go after the market until its manufacturing operation was established in Camden, New Jersey, in 1930. In the early part of 1931, there were just 30 RCA transmitters on the air. Six RCA transmitter salesmen were running themselves ragged trying to sell all the other 670 stations on the advantages of RCA equipment.

It soon became evident that in order to get information about our new equipment out to 700 stations in a hurry we would need some other means to augment personal calls. But how?

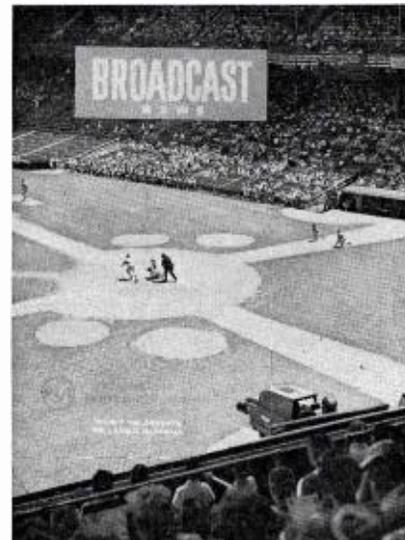
The answer we arrived at was BROADCAST NEWS — our own magazine, for our own customers (and fair prospects). A magazine devoted to the interests of



VOLUME NO. 77, January-February 1954, was one of the most significant we have ever published. It was devoted entirely to color television. The FCC had finally approved compatible colorcasting on December 17, 1953. We had been anticipating this and had our engineers and staff working up the information we thought station engineers would need to jump into color. As a result within 30 days after the FCC action we were able to mail an 80-page issue of BROADCAST NEWS which covered every aspect of color broadcasting — including how to plan, system layouts and descriptions of all of the individual equipment items.



VOLUME NO. 98, December 1957, featured a picture of KHQ-TV's color mobile unit on the cover — and inside a 12-page article on the station's color facilities, mobile and studio. Over the years BROADCAST NEWS has continually reported on how stations are using their equipment. KHQ-TV was one of the first stations to do remotes in color and the mobile unit they built especially for the purpose we knew would be of great interest. So our editor made a trip to Spokane and came back with a detailed story including numerous photographs of the unit inside and out — and on location at the Lilac Festival.



VOLUME NO. 105, September 1959, continued our series of reports on how stations were using their color TV equipment. This time the lead story was on WLW-T's color telecasts of Cincinnati Red's baseball games. WLW-T was the first station to do local games in color. The cover of this issue was a view of Crosley Field with one of WLW-T's three RCA TK-41 Color Cameras in the foreground. Story inside showed several other views of camera positions as well as views—inside and out—of WLW-T's color mobile unit. Also shown were interesting views of WLW-T's rig for moving cameras in and out of the studio and mobile units.

broadcasters — particularly those of a technical bent — and carrying only information of interest and usefulness to them.

The Purpose of Broadcast News

The selfish purpose of BROADCAST NEWS, of course, was to present information on our equipment, its uses, its advantages, and its operation to the broadcast station engineers who are RCA's customers. That was, and still is, the primary purpose of this publication. We soon found, however, that this need not be a one-way street. From the very beginning we had sugarcoated our message by using at least half the page space for presentation of engineering "know-how" articles. To our delight station engineers all over the country received BROADCAST NEWS with obvious pleasure. Best of all, they sent in not only their kind comments, but also pictures of their installations, and articles on various ideas they had used successfully. Most of this material found its way into BROADCAST NEWS pages . . . and thus the magazine

became a sort of meeting place for station engineers.

Naturally we were very happy with this development and have done our best to encourage it. To this end the articles printed in BROADCAST NEWS have not been limited to those authored by RCA personnel but, from the first, have included articles by station engineers, consultants and others. Moreover, the subjects discussed have included many not directly related to RCA equipment. The happy result is a publication which serves our engineer-customers (by helping them in their work) while at the same time serving us by publicizing our products.

Who Writes It?

As we have noted, broadcast engineers early accepted BROADCAST NEWS as an ally in their work, and have supported it not only with letters of approval but, more importantly, by contributing to its pages. Other members of the industry — including some of the best-known

consultants and designers — have done likewise. In some cases station engineers have sent us finished articles, at other times they have furnished us with basic material from which we could put together a story. One way or the other nearly half the content material of BROADCAST NEWS has come from sources outside RCA.

In order to have more engineering-type articles we have enlisted the assistance of our own large corps of engineers. Nowadays almost every issue carries at least one article by one of these engineers. Ranking at the top of the profession, and working day-to-day on the newest and most advanced developments, they speak with authority, whether they write about theory, equipment design, or operation.

To these articles by station engineers and our own engineers, we add station stories and equipment news stories written by our own staff. Thus nearly all of our material is written either by broadcasters or by broadcast-oriented people within our



VOLUME NO. 112, December 1961, contained a notable example of the "station stories" which have been a staple of BROADCAST NEWS from the first issue. This particular article described WGN's new "Mid-America Broadcast Center" with emphasis on the facilities WGN had installed in order to originate 1700 hours of local color — which in 1962 was far more than any other station was doing. As with other station stories it included numerous drawings and photographs showing equipment arrangements. Articles of this kind have always been a source of good ideas for engineers of other stations who are planning new installations of their own.



VOLUME NO. 120, April 1964, was, perhaps, the most special of all our issues. In it we introduced the "New Look" — a program for redoing — and modernizing in a revolutionary way — our whole line of broadcast equipment. In it we discussed at length the thinking that led up to the New Look, the features of the New Look equipment and, finally, the meaning of the New Look — not only for ourselves but also for our station customers. Following this came detailed descriptions of the major New Look equipments. It was the most significant announcement we had made since we introduced our first line of color equipment.



VOLUME NO. 127, August 1965, featured our new TK-42 Color Camera on the cover and in the feature article of the issue. The predecessor of the TK-42, the RCA TK-41, had been the world's standard for live color pickup for ten years. It had established an outstanding record — and every one of the three hundred made were still in use and still making very good color pictures. In fact we were still making and selling them. Thus the announcement of a totally new RCA live color camera was indeed a notable event. It deserved, and we tried to give it, a send-off in keeping with its importance. The result — more than 400 on order.

own organization. We like to think that we speak the language of our broadcast customers.

The Subject Matter

The subject matter, over the years, has touched almost everything of interest to station engineers. Only one limitation has been imposed. It was early decided that BROADCAST NEWS was properly concerned *only* with broadcast equipment design, installation and operation. While broadcast engineers certainly have other — and wider — interests, it was felt that these were adequately covered in general magazines. On the other hand, broadcast equipment per se received relatively little attention in the radio journals existing in 1931. And even today, the trade journals devote relatively little space to the technical side of broadcasting. BROADCAST NEWS, at least to a degree, fills the gap. By strictly limiting its coverage to the subject, it is able to print more information on broadcast equipment than can be found anywhere else.

Through the Years

The "milestone" covers shown above give some indication of the range of subjects covered in BROADCAST NEWS over the years. In the early years, of course, it was all radio. New developments such as a-c operated equipment, velocity microphones, portable amplifiers, Class B modulators, radiating towers, directional antennas, limiting amplifiers, studio design and acoustical treatment were the titles of the day — and all were described and discussed in the pages of BROADCAST NEWS.

In the middle thirties came FM, and then, in 1939, the start of television. The first BROADCAST NEWS article on television appeared in the August 1933 issue — and it was quite a "scoop." In it the Iconoscope — the first camera pickup tube — was described in detail for the first time by its inventor, Dr. V. K. Zworykin. Actually, it was a paper prepared for I.R.E. — but BROADCAST NEWS published it several months before

it appeared in the I.R.E. PROCEEDINGS. In 1936, BROADCAST NEWS reported the first of RCA's "progress reports" to the industry on television development. On the May 1939 cover appeared the first piece of RCA "commercial" TV equipment — the RCA TT-1A Transmitter. In the July 1939 issue we described the reception of "commercial television" at the World's Fair — along with pictures of RCA TV equipment used there and offered for sale to broadcast stations. From that date the pages of BROADCAST NEWS were more and more occupied with television. Not because we were dropping radio — or were less interested in it — but simply because there were more new things in TV — it was what everyone was talking about, even those who were not yet in it.

Before the new TV industry could get going the war came — and all TV commercial activity ceased — as did BROADCAST NEWS. When V-J day came, we took up where we had left off. There was new equipment in profusion — AM,

Broadcast Equipment RCA was offering at the time BROADCAST NEWS was born

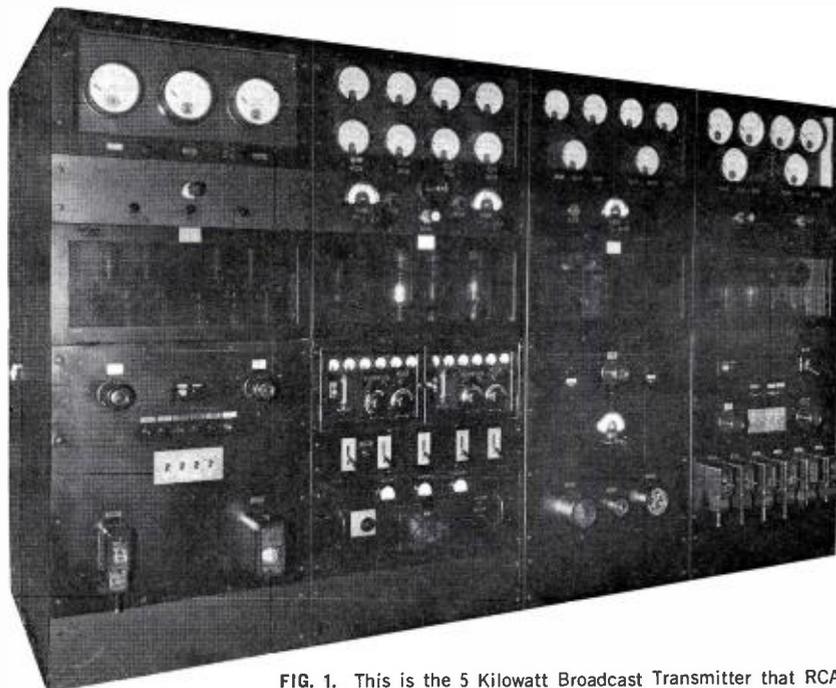


FIG. 1. This is the 5 Kilowatt Broadcast Transmitter that RCA was selling in October 1931. In addition to the main units shown here there were two large motor-generator units (supplying D.C. for filaments and for grid voltages) and other auxiliary units such as a power switching panel and a large water-cooling unit.

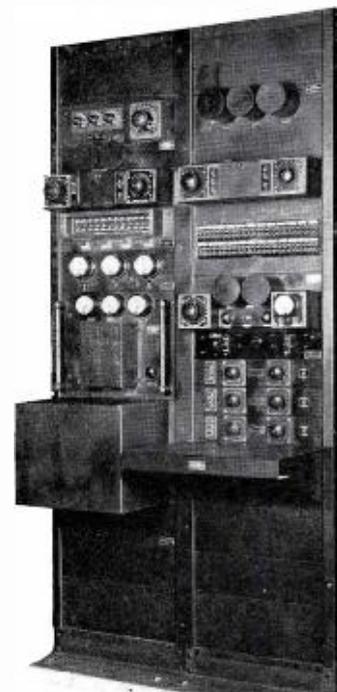


FIG. 2. This is a typical 1931 "speech input" (audio) equipment. In the right-hand rack are three pre-amplifier units (just above shelf), a volume indicator panel and a program amplifier. In the left rack is a plate-voltage supply (the first of its kind), a meter panel and a monitoring amplifier.

FM and TV — and we tried to do it all justice. New developments came in waves — and almost overwhelmed us. First there was the re-equipping of almost all pre-war stations, then the rush to TV in 1947 and 1948, followed by the freeze, the un-freeze, the first UHF boom and finally color. During the early fifties most of our articles were on equipment and planning. However, as the new stations became established, we turned more and more to stories describing these new stations. In between there were new equipments — tape, 3-V, 4½-inch I.O. cameras and then, in 1964, our whole new line of "New Look" equipment. That in itself took a whole issue and since then we have had a continuing series of articles on details of New Look equipment. But we have continued our policy of including

one or more station stories in every issue — plus articles on planning and operating technology. It's the formula we started with years ago — it has served us well, it seems to be liked by our customers — we expect to keep right on with it.

A Record for Longevity

The continuity of BROADCAST NEWS is something of a record. Company magazines have always been notorious for their short lives. Usually a publication of this kind is the brainchild of some enthusiastic individual who launches the magazine, carries it for a while — and then moves on to another job. When he moves, the enthusiasm dies — and so does the magazine.

BROADCAST NEWS was the brainchild of I. R. Baker, who was the first

manager of RCA's broadcast transmitter business. One of the things he worried about in starting BROADCAST NEWS was the question of whether we could keep it going. It was his idea — it was almost a "fetish" — that we should build our broadcast business on the basis of quality and service. He felt that to start a magazine, and later drop it, would not be in keeping with the "image" of our business that he wanted to create.

"Bake" need not have worried. So strong was his leadership — and so inspiring — that he inculcated all those around him with his ideas — and they in turn indoctrinated the following generation, and so on. In this way a tradition was established. Thus, although Bake himself has been gone for many years, our broadcast business is still conducted pretty much accord-

ing to the tenets he laid down in the beginning. The record of our equipment line through the years, the kind of people who represent us, the way our customers think of us are all evidence of this. So is BROADCAST NEWS which, although it has grown in size and sophistication, is still much the same magazine that was launched 35 years ago this month.

The Staff

During its 35 years BROADCAST NEWS has had six editors, numerous assistant editors, and literally scores of editorial advisors and consultants. Many of these have lavished on it time and effort far beyond the possible return in either pay or glory. The responsibility for creating, printing and distributing BROADCAST NEWS has always rested with the Advertising and Promotion activity of the Broadcast Department. Thus by necessity (but also by inclination) our Manager of Broadcast Advertising has always been our editor. The past editors, in order, have been E. Jay Quinby, Edward T. Jones, Paul V. Lutz, John P. Taylor and William O. Hadlock.

The present editor is Paul A. Greenmeyer, who is also Manager, Broadcast Advertising and Promotion. He is assisted by Associate Editors Miles G. Moon and Albert A. Gans. The "Viewfinder" section is written by our Manager of Press Relations, Edward J. Dudley. Our Art Director is J. L. Parvin and Peter Gallo is assistant art director. Distribution is handled by E. T. Griffith who is Manager, Sales Services. All of these people are members of the Marketing Services activity of the RCA Broadcast and Communications Products Division. In addition to getting out BROADCAST NEWS they conduct all of the advertising, promotion and publicity activities of the Division. And while we are giving credits we should note that BROADCAST NEWS is printed by the Advertising Printing Company, Camden, New Jersey. Mr. Ray Raff, the general manager of this company, takes an active part in putting the magazine together.

In addition to the people we have noted there are many others who in one way or another contribute to BROADCAST NEWS. These include our engineers, merchandising people, sales representatives and even our Division management. All of them (us) have the feeling that BROADCAST NEWS is an expression of our interest in the broadcast business and our close relation to it. We want to keep it that way.

RCA Broadcast Representatives have been helping stations with their planning and equipment for over forty years - why not call your RCA man now - his phone number is listed here.

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NEW LOW-BUDGET COLOR TAPE RECORDER

Compact, Completely Equipped Transistorized
TR-4B Accepts Full Line of Accessories,
Including High-Band for Maximum Picture Quality

by WM. TRIPPEL
TV Tape Product Specialist

FIG. 1. New RCA Type TR-4B Color TV Tape Recorder.



The introduction of the TR-4A Tape Recorder proved to be a significant step in bringing Color TV tape within reach of many more budget minded broadcasters and closed circuit TV users. The design achieved important reductions not only in cost, but in size, weight and power consumption, while meeting the high standards of broadcast performance.

TR-4B Improvements

The new TR-4B model follows the same quadruplex design as the TR-4A, incorporating all subsequent modifications and special circuitry. An example of the latter is the capability of playback of front porch switch dubs. The 4B is prewired and ready for addition of a full line of accessories such as ATC (automatic timing corrector), Color ATC, and electronic splicing. These modules now can be plugged in without need for any wiring changes (or it may be purchased with

FEATURES OF THE TR-4B

- Wired and Pre-tested for Color at the Factory
- Contains Basic Capability for High Band Color
- Switchable Television Standards
- Built-in Pixlock and L.L.O. Operation

APPLICATIONS OF THE TR-4B

- Makes and Plays Monochrome or Color Tapes
- For Preset Operation and Remote Control
- Half-Speed Operation for Tape Economy
- Compatible with all Quadruplex Machines

Color modules installed at the factory). In addition, the TR-4B incorporates much of the advanced circuitry of the deluxe RCA TR-22D Tape Recorder.

High Band Operation

The TR-4B contains the basic capability for high band operation, a technique using higher frequencies to gain the ultimate in picture quality. With the addition of the high band accessory, the TR-4B will provide maximum picture quality, especially when using color and dubs. High band is designed to virtually eliminate moire and significantly improve video signal-to-noise ratio and "K" factor.

Switchable Standards

To facilitate the international exchange of program material, the TR-4B is available in two basic models: (1) a 60-Hz, 525-line machine; and (2) a 50-Hz switchable standards machine for 405/-525/625 line operation. In the switchable

standards version, 819 line may be selected in place of 405 line, if desired, as the third standard. Selection of standards is accomplished simply by moving a selector switch to the desired position. This changes all circuitry including picture and waveform monitors to the desired standard.

Two-Speed Operation

Circuits are built into the TR-4B permitting switch selection of either 7½ or 15-ips tape speeds. Using the slower tape speed, three hours of program material can be recorded on a single reel of tape. Operators have found that tape costs and storage space requirements are reduced by using the 7½-inch speed, and picture quality is not visibly affected. The built-in speed selection feature makes it possible to conveniently utilize tapes recorded at either speed.

New Color Capabilities

Color operation is easily obtained either by ordering the color machine in the first

place, or by adding the ATC and color ATC modules to the monochrome machine. The ATC/CATC units offer the precise stabilization responsible for the excellent color pictures produced by the TR-4B. The units are complemented with a new servo mode (LLO) for improved color playback.

Built-in L.L.O.

A major contributor to the high quality color of the TR-4B is a new "Line Lock Only" (LLO) mode of servo operation. Built into the TR-4B, LLO permits horizontal lock of signal from tape with local sync signals without regard for vertical framing. The result is a restoration of color playback in less than one second should a discontinuity of signal unlock the machine while in playback.

Built-in Pixlock

Pixlock, long an important feature of more sophisticated RCA TV tape recorders

FIG. 2. Typical installation at WMAL-TV keeps group of TR-4 recorders busy on color programs and color commercials.



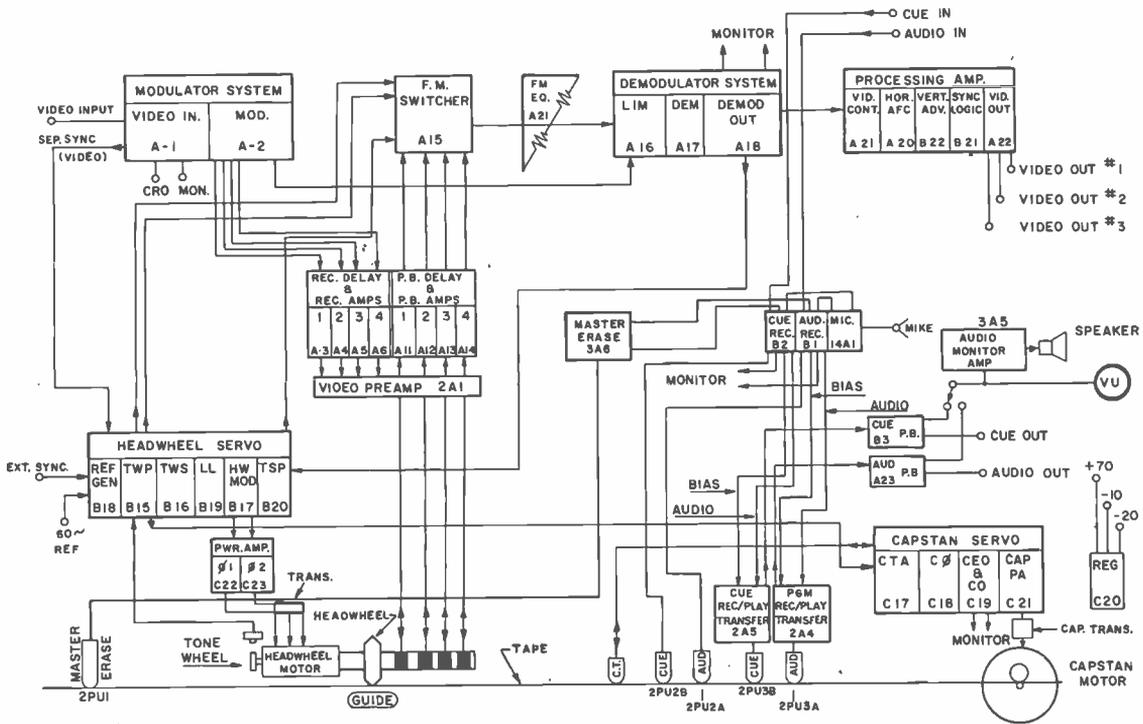


FIG. 3. Simplified functional diagram of TR-4B.

FIG. 4. Drop-out Compensator accessory eliminates need to screen tapes for imperfections.

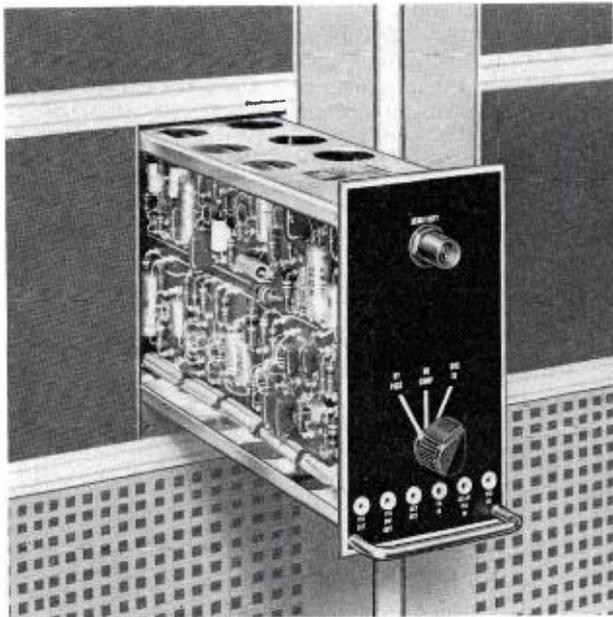
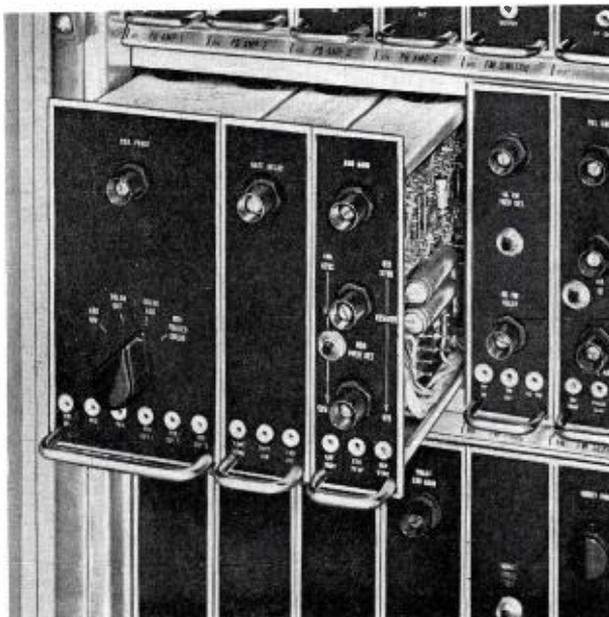


FIG. 5. Transistorized Automatic Timing Corrector (ATC) accessory maintains near perfect picture geometry.



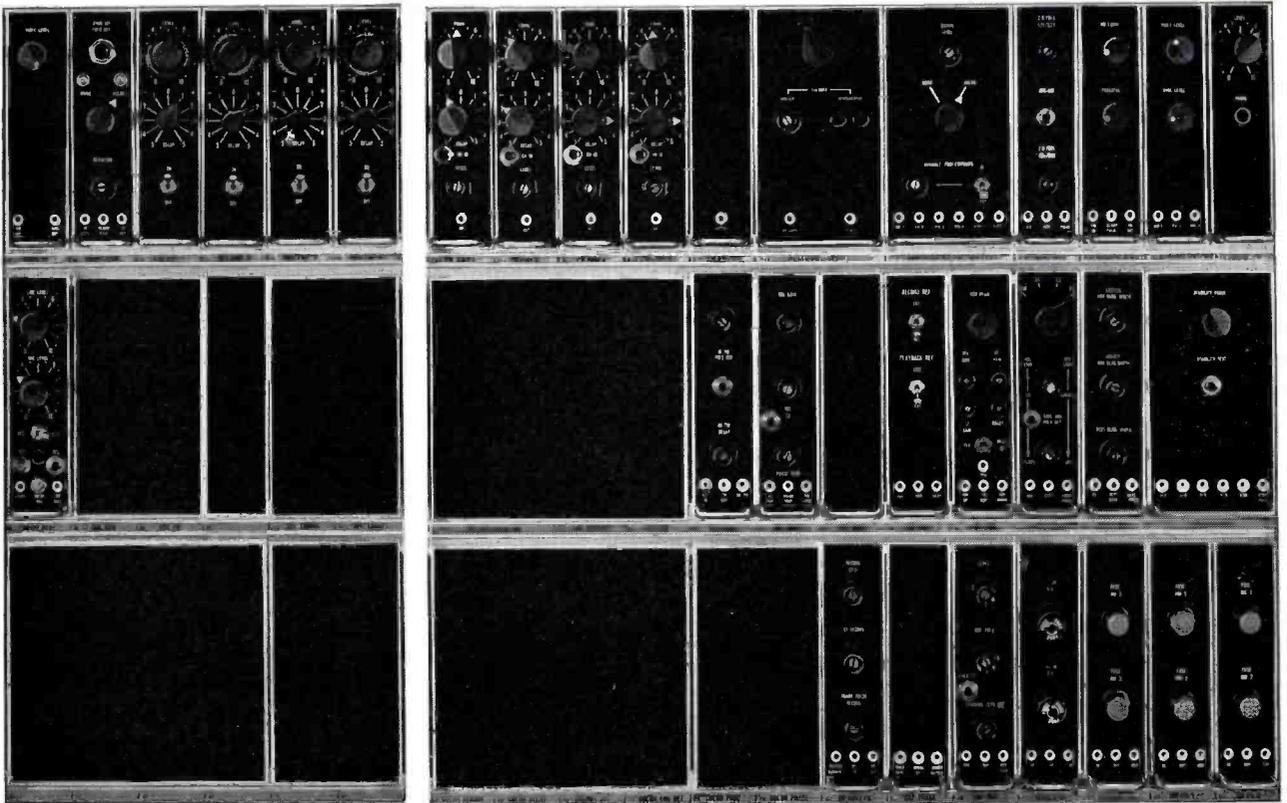


FIG. 6. Complete TR-4B plug-in module bank containing circuitry for record and playback functions.

FIG. 7. Color Automatic Timing Corrector accessory operates with monochrome ATC to provide precise time base.

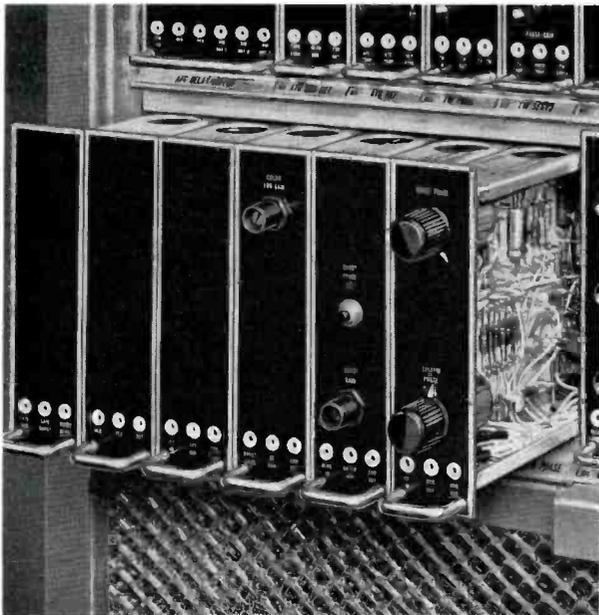
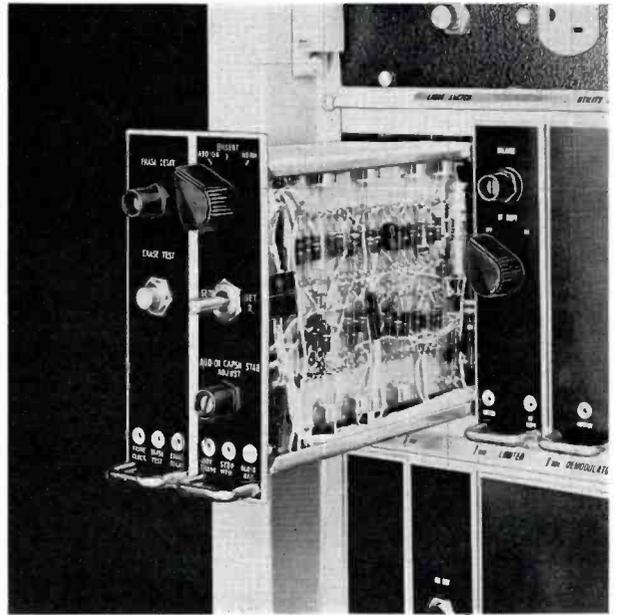


FIG. 8. Electronic Splicer accessory inserts or adds program segments electronically.



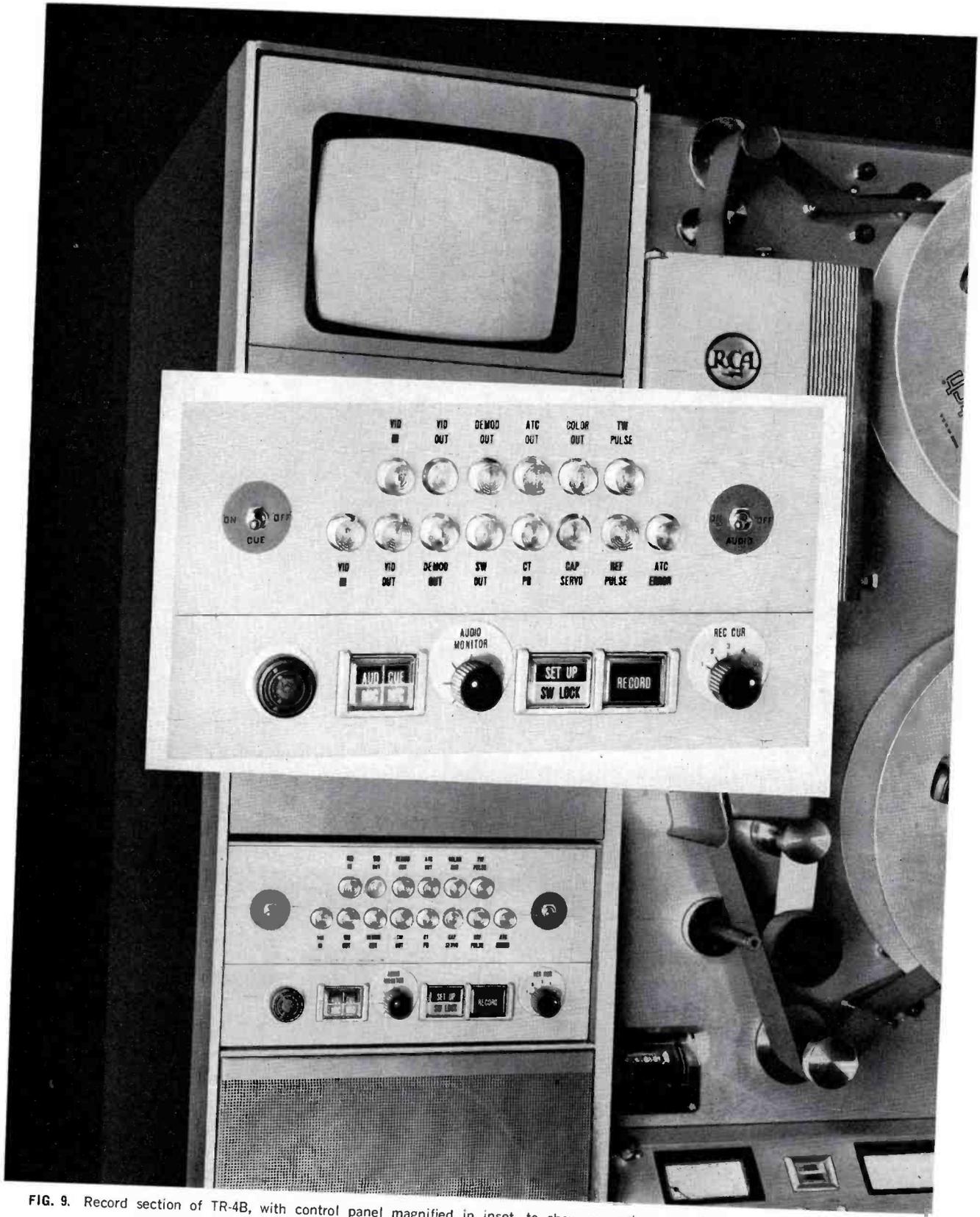


FIG. 9. Record section of TR-4B, with control panel magnified in inset, to show convenient grouping of recording functions.

is now standard in the TR-4B, equipping the machine with full production capabilities. Accurately timed with pulses from the sync generator, the extremely stable pixlock permits fully synchronized productions, combining pre-taped segments and other TV signals, and incorporating supers, lap-dissolves and special effects.

Electronic Splicing

With the addition of this accessory, the TR-4B is ready for electronic splicing. Often more effective than a mechanical splice, the Electronic Splicer permits "add-ons" and "inserts" without cutting the tape and with little or no skill on the part of the operator. The equipment consists of three transistorized splice modules, a new selective erase head, and auxiliary modification material. The associated Harness assembly, for the electronic splicing accessory, is factory installed in the basic machine. The splicing accessory will operate with pushbutton ease at both tape speeds and at any selected line standard.

Dropout Compensator

A dropout compensator eliminates or greatly reduces the effects of dropouts or streaks caused by irregularities in video tape. Available as an accessory, the equipment is in the form of a plug-in module with harness assembly, and is completely transistorized.

Cue Record Playback

Cue Record Playback, a standard feature of the RCA TR-22 can also be supplied as an accessory. It provides for recording voice, tone or pulse cue information along one edge of the video tape. Cue recording can be done independently of video recording, that is, sound may be dubbed in while playing back or previewing the video signal.

Semi-Automatic Operation

An exceptionally high order of stability in the TR-4B permits semi-automatic "pre-set" operation. After setup for either recording or playback, controls need little or no attention. This enables operators to perform multiple functions in the TV tape area.

Remote Control

The operational stability of the TR-4B also makes the equipment particularly dependable when remotely operated. For this operation, remote control panels are available as accessories. A "mode" panel permits remote operation of mechanical functions such as record, play, stop, fast forward wind and fast reverse wind. A

"signal" panel provides for remote adjustment of video, sync and pedestal levels. Either panel, with adapters, can be mounted in a standard console housing or rack.

"New Look" Design

The TR-4B is completely self-contained in a beautiful space-blue cabinet 33 inches wide, 24 inches deep, and 66 inches high. The newly styled cabinet separates record from playback facilities for convenience and ease of servicing. Record functions in the left compartment include picture and waveform monitors, pushbutton switches, record controls, speaker and associated electronics. The tape transport, playback control panel and playback modules are in the right hand position. Mounted on casters, the TR-4B may be moved readily through doorways to any desired location. Compact size permits it to be used in close quarters. In fact, the machine lends itself to installation in a mobile unit to handle on location programs and commercials.

Matched Equipment Line

Styling, functional layout of controls, and even circuit design of the TR-4B correspond closely with other TV tape recorders in the RCA matched line. Many of the electronic modules are interchangeable

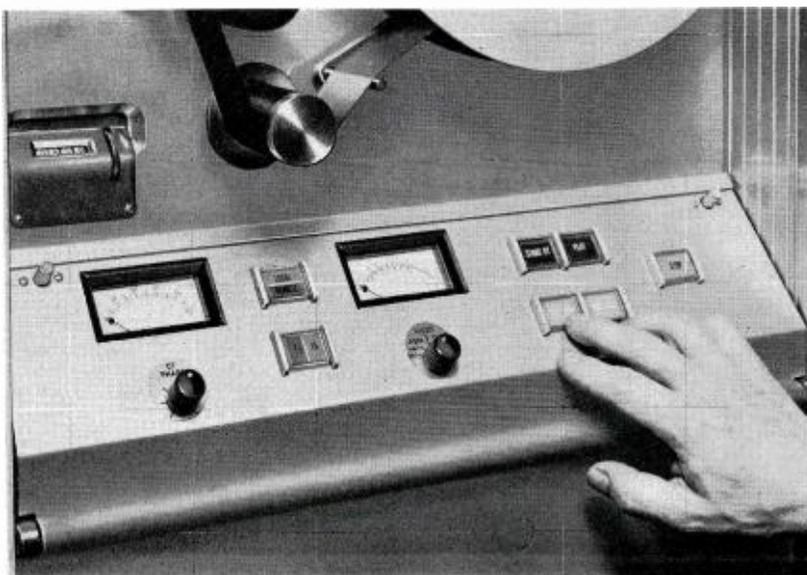
with those in other RCA TV tape machines. This simplifies servicing and reduces the number and cost of spare units required.

Conclusions

The TR-4B Tape Recorder is designed to fill the need for a low cost compact and versatile equipment with application in every broadcast taping operation. Most tape users find need for a minimum of two or sometimes three recorders to handle their taping needs. Thus, the lower initial cost of the TR-4B is important. Another economy feature of the machine is the switchable tape speeds, making it possible to record at 7½ ips and thereby halving the cost of tape. Some broadcasters and closed circuit users, particularly those in education, use the TR-4B machine this way, programming 7½ ips tapes back-to-back with the 15 ips tapes, which are most often supplied by the program sources.

Modular design facilitates the expandability of the machine, making it possible to add production capabilities as the need grows. The TR-4B is a machine that meets today's needs for an economical start in tape, and one that is ready for tomorrow's high-band operation and improved color of the future.

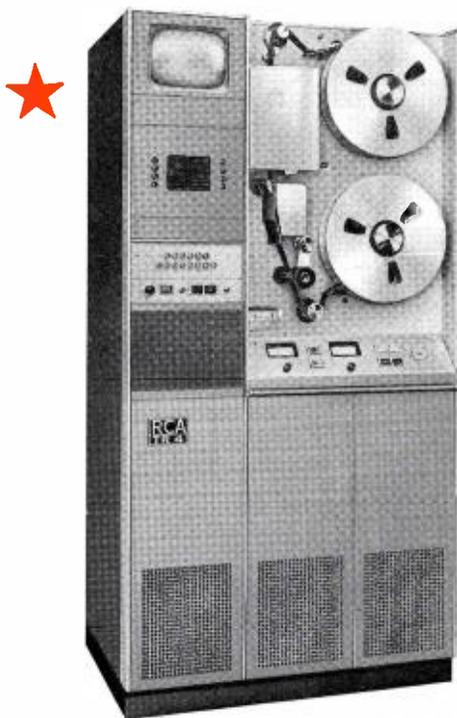
FIG. 10. Playback control panel is designed for simplicity and ease of operation.





LOW BUDGET COLOR TAPE SYSTEM NO. 1

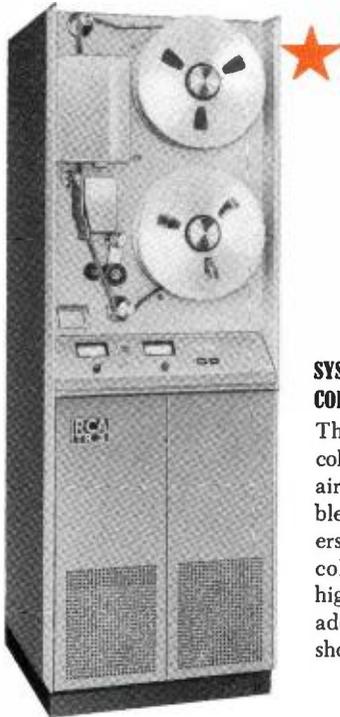
...here's the simplest system for making and playing



SYSTEM 1B ECONOMY RECORDER/PLAYER

With this machine you have a recording and playback facility. It contains built-in picture and waveform monitors and other provisions for good quality pictures. The TR-4 records and plays back in monochrome or in color. (High band accessory is available.)

- All this equipment is part of a matched line for broadcasters—matched in performance, features and appearance.
- All engineered and built by RCA, assuring single source responsibility.
- All designed for color television.



**SYSTEM 1A
COLOR PLAYER**

The easiest way to get into color is to acquire the TR-3 for airing color tapes. It's compatible with all quadruplex recorders. Plays in monochrome or in color—and is convertible to high band. Easily expanded by adding the record accessory as shown below (System 1B).

color tapes!



**SYSTEM 1C
RECORDER/PLAYER
WITH REMOTE RECORDER**

Here you have a recording and playback machine, with TR-5 mobile unit. The TR-5 provides for on-location recording of commercials and special events. It also gives another recording facility in the studio while the TR-4 is on the air. (Note: the TR-5 is for low band only.)

★ HIGH BAND COLOR

is optional accessory for TR-3 and TR-4 machines.

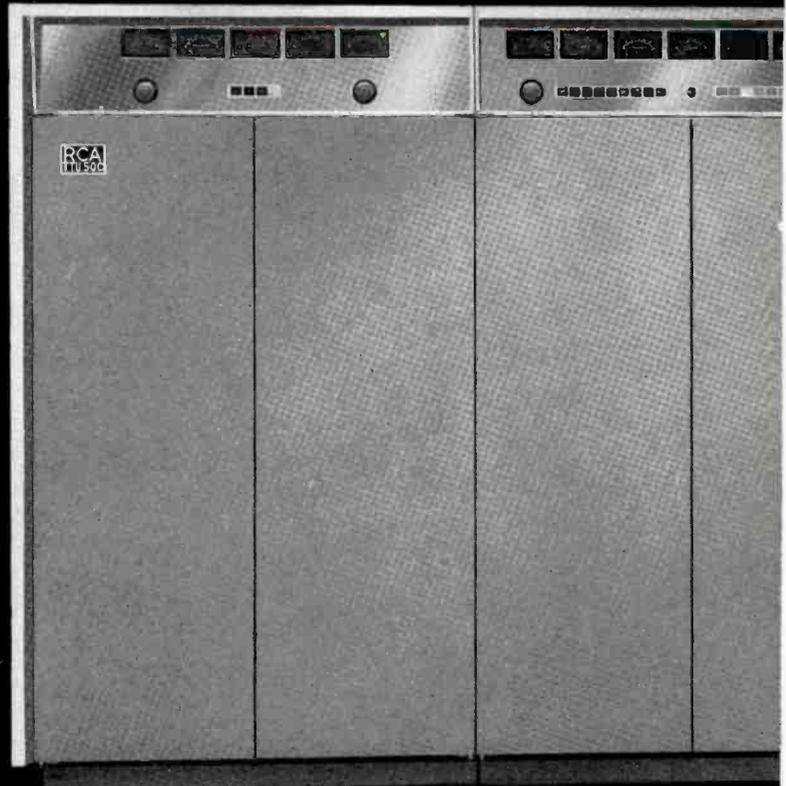
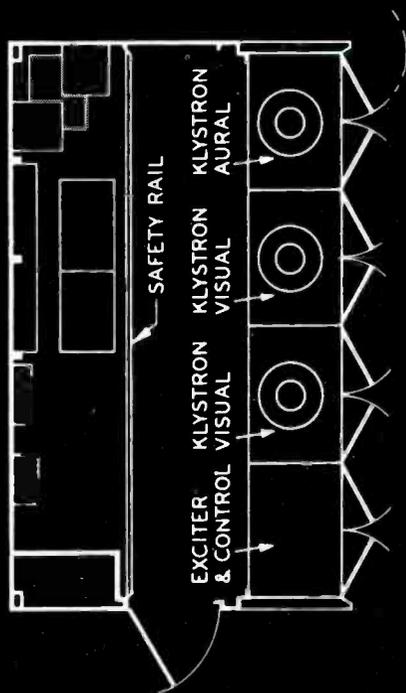
See your RCA Broadcast Representative for complete details, or write RCA Broadcast and Television Equipment, Building 15-5, Camden, N.J.



THE MOST TRUSTED NAME IN ELECTRONICS



55 KW UHF transmitter



Diplexed Power Amplifiers...

Two separate visual power amplifiers in this new UHF Transmitter will mean it is never at a loss for power. One is always ready to back up the other thus providing a new high order of reliability for the transmitting plant. This is added assurance of uninterrupted operation.

2½ MILLION WATTS ERP

Combined with a TFU-46K antenna, this transmitter provides RCA's most powerful transmitter-antenna package, giving up to 2½ million watts, ERP.

KLYSTRON POWERED

Its unique integral cavity vapor-cooled klystrons are

the same klystrons used in proven RCA 30KW transmitters. They offer high reliability and long life.

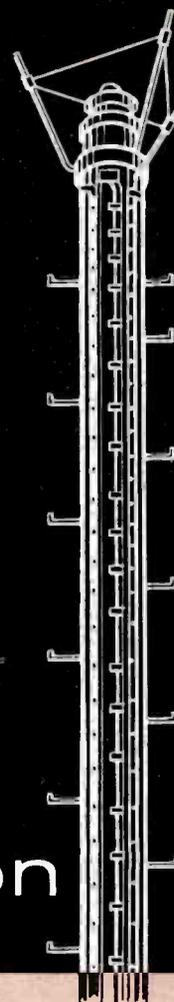
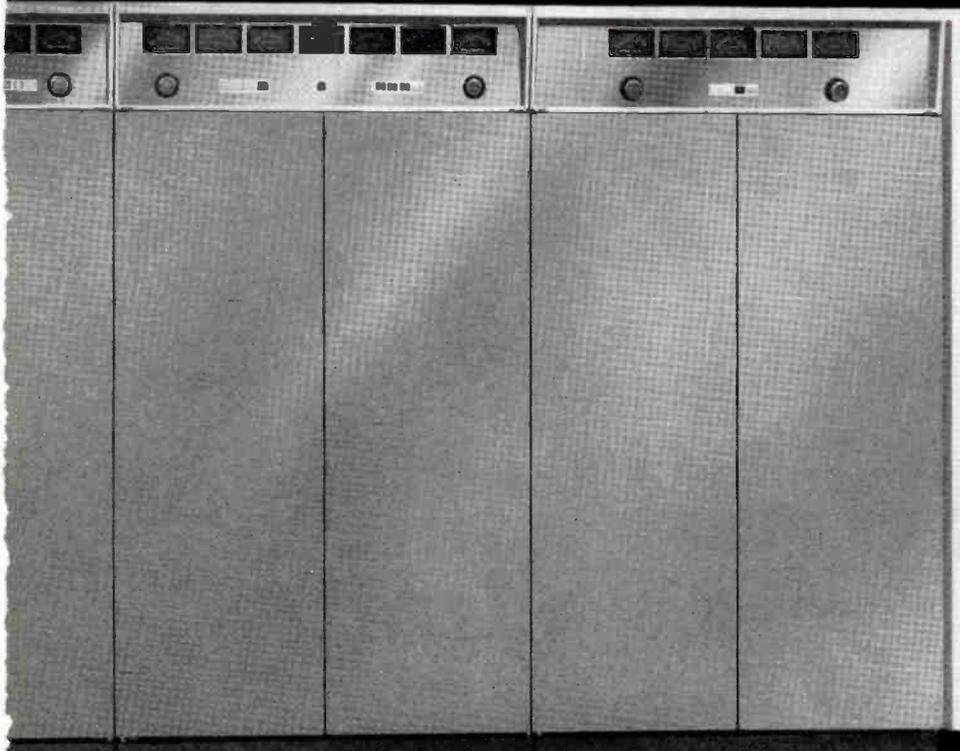
VAPOR COOLED

Vapor cooling is better than water cooling. Volume for volume, vapor cooling is more efficient resulting in lower transmitter operating expenses.

WALK-IN DESIGN

Walk-in cabinetry is not only an important factor in the reduced size of the TTU-50C, but also of value in speeding maintenance and reducing expense.

for 2½ million watts ERP



More Reliable Operation

ANTENNA CHOICES

A choice of three antennas is offered...the TFU-46K, delivering a gain of 46 and up to 2½ million watts; the TFU-30J delivering a gain of 27 (vertical with 0.5 electrical beam tilt); the TFU-25G delivering a gain of 25.

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

OTHER UHF TRANSMITTERS

Also in this new line are the 30KW (with integral cavity, vapor cooled klystrons), a completely air cooled 10 KW, and a 2 KW that is easily expanded to a 10 KW.



The Most Trusted Name in Television

RCA SERVICE KEEPS ALL YOUR AM, FM, TV EQUIPMENT IN TOP CONDITION



TK-42

TAKE ADVANTAGE OF THE FOLLOWING SERVICES OFFERED BY RCA:

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

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



The Most Trusted Name in Electronics

Look for the “BIG” Black Tube

*for sharpest
color pictures!*

You'll find the “big” black tube in the luminance channel of the RCA TK-42 Color Camera. No other live color camera has this advantage. The “big” tube is a 4½-inch image orthicon—same as in the deluxe TK-60 Monochrome camera. Because of a larger image, this tube adds greater sharpness to color pictures. It produces the detail for finest monochrome and full fidelity color.

This is the camera with all the wanted new features that contribute to the finest color reproduction ever offered: Superb, specular response to avoid reflected light “explosions.” Highest sensitivity to the complete range of color . . . from vivid reds to coolest blues, assuring color fidelity. Self-correcting circuits permit operation for days without picture deterioration. Transistorization for top reliability. Modular design for highest performance and easy maintenance.

See the big, big difference in the TK-42 color system by RCA. See how the “big” black tube gives the selling touch to your color television pictures. Your RCA Broadcast Representative has full details. Or write RCA Broadcast and Television Equipment, Building 15-5, Camden, N. J.



The Most Trusted Name in Television



COLOR TV CAMERA . . . "LUMINANCE MAGIC"

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