

AUGUST 1971

BME

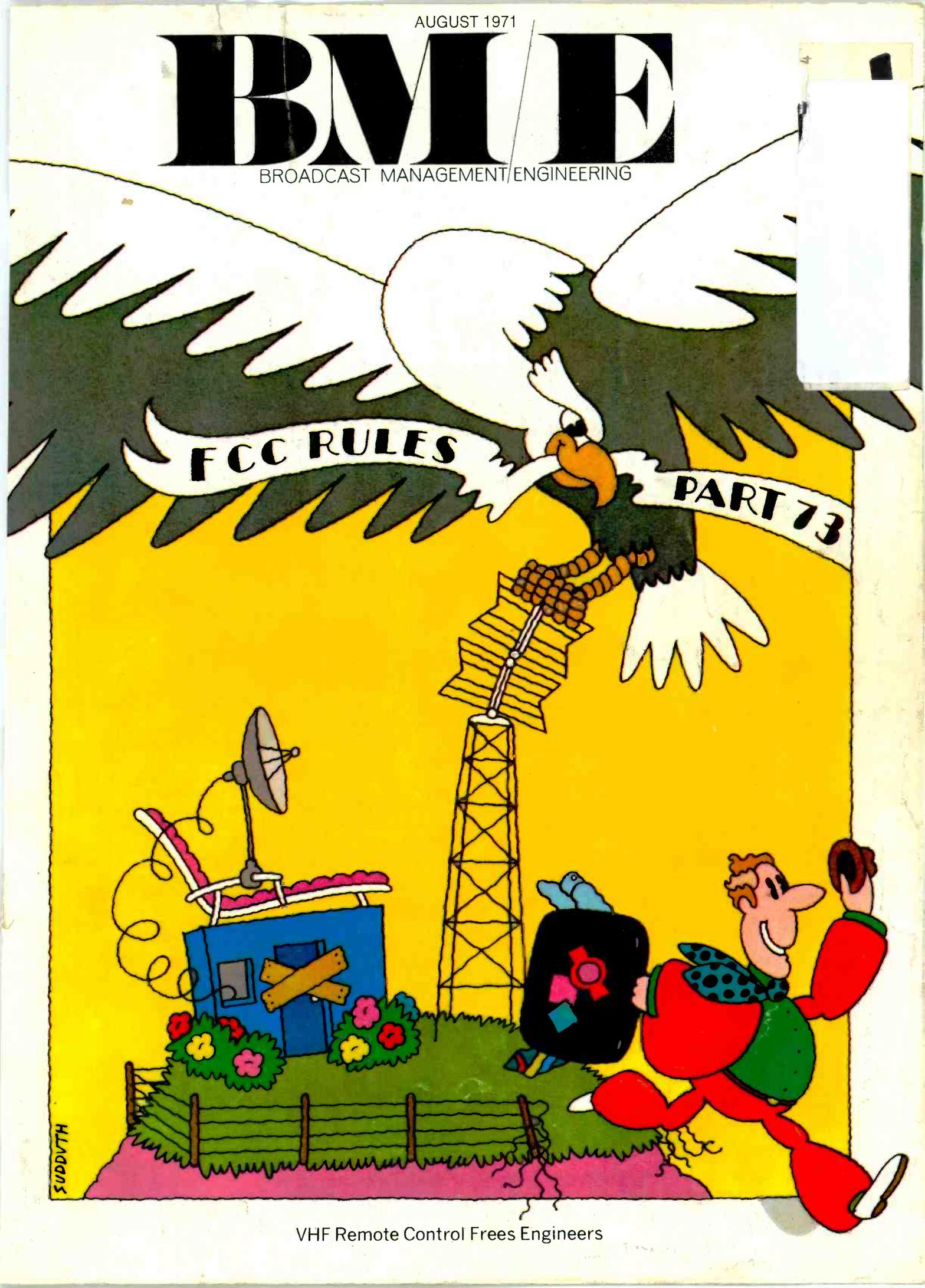
BROADCAST MANAGEMENT/ENGINEERING

FCC RULES

PART 73

SUDDUTH

VHF Remote Control Frees Engineers



from professional-quality local origination
... all the way to testing, switching and distribution

DYNAIR OFFERS MORE THAN 200 DIFFERENT PRODUCTS FOR THE TELEVISION INDUSTRY

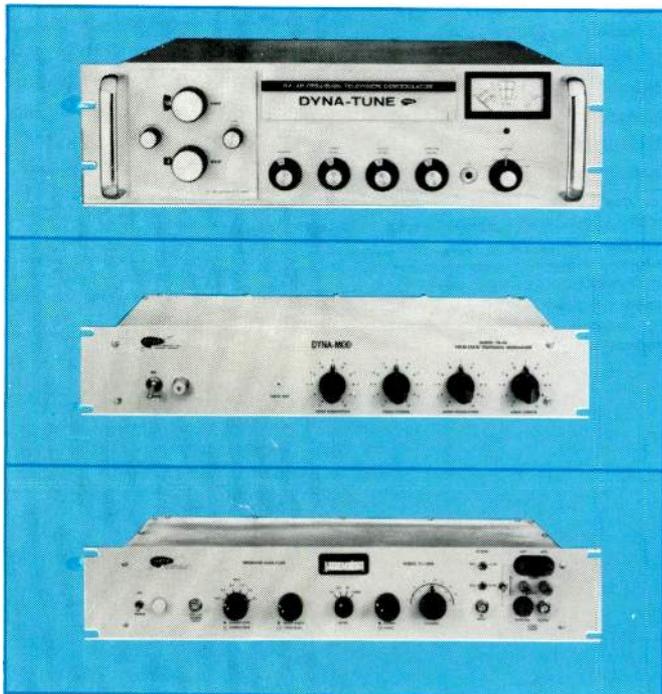
DYNAIR concentrates its major effort in one technical area: Equipment for the television industry. More than a decade of pioneering design experience has produced a

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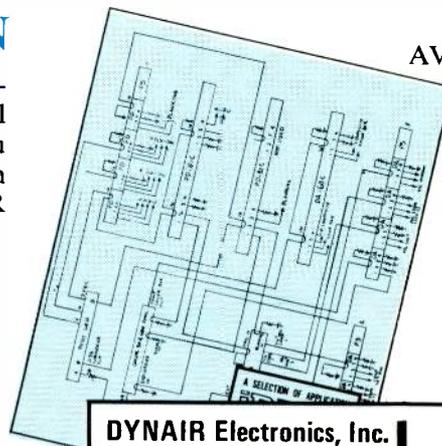
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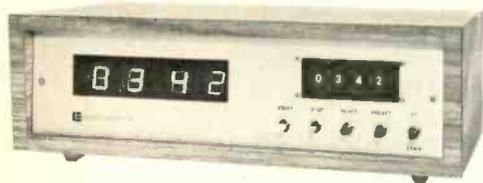
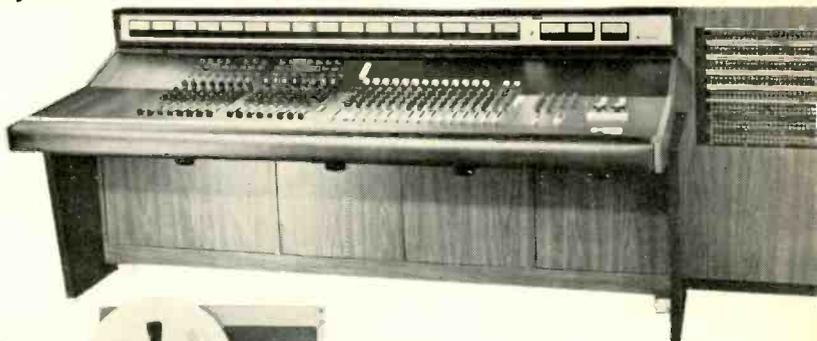


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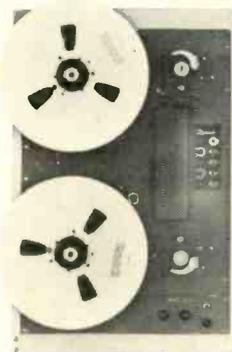
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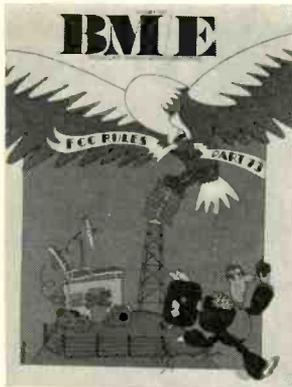
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BM/E

BROADCAST MANAGEMENT/ENGINEERING



Before and after the changes in Part 73, Subpart E Rules. Remember the BM/E cover in January of 1970 (the one on the left) which said transmitters were rock stable enough for unattended operation? Well, now the FCC agrees. Or as the RCA ad puts it, "A VHF transmitter site is a nice place to visit but you don't have to live there."

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MANAGEMENT:

We think every article is must reading this issue but you can skip Lighting a Sports Arena unless you are interested in the cost data. The article on VHF Remote Control gets ponderous when we describe signal flow, but skim the article—the beginning and end are interesting. And if you take the issue to heart, reread the FCC Rules and Regulations column which has a warning on moving your studio.

ENGINEERING:

This is an issue to read and file. You ought to find an idea worth noting on every page. The last word isn't in yet on VHF remote control, but the article on page 29 ought to get you thinking.



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BROADCAST INDUSTRY NEWS

Let Cable Grow, But Don't Kill Broadcasting: Aims of FCC, Says Burch

After the thinking-out-loud speech by FCC Chairman Dean Burch, given to the Communications Subcommittee of the Senate Commerce Committee in mid-June, the biggest question was what Chairman Pastore (D-R.I.) would do in opposition to the proposals—if anything.

To recap briefly the proposals: Burch revealed that the FCC feels a lack of experience and data for "wholesale revamping of the communications market." Instead, said Burch, the Commission is determined to find a formula that will not undermine the existing broadcasting system, but will let cable grow toward its true potential. Burch said he wants cable to bring new and diverse services into the home, and to promote both UHF and educational broadcasting. He said that the Commission recognizes the need to promote the good health of those agencies that create

program material, by whatever medium it is distributed. But he eschewed Commission action on the copyright front, relaying that hot potato straight to Congress. (Later NCTA and copyright holders reached agreement on compulsory licensing and non-duplication.)

Burch outlined some plans that are evidently high in FCC thinking at the present time. One is a minimum service, or "3-1" concept, with every American home entitled to at least three network programs and one independent. Cable could fill in coverage in many localities to bring them to this standard, and would also be free to carry as many educational signals as were available.

In top markets, Burch said, the thinking is for cable to carry at least two "outside" signals, but in any event to fill in coverage for a 3-3 (three network, three independent) complement in the 1-50 markets, and for 3-2 (three network, two independent) in the 51-100 markets. Also Footnote 69 would be liberalized.

The general idea, Burch went on, is to prevent any area from being flooded with distant signals, but to insure the minimum of needed service, and the minimum required for cable's development.

The way to promote increasing use of the inherent capacity of cable for new services, he said, might be a requirement that for every broadcast channel carried the cable system provide an additional channel, available free or on a rental basis, for educational, instructional, and civic purposes. He also said the FCC was considering a requirement that capacity for two-way non-voice communication be built into each system. And he said that the Commission was in the process of formulating technical standards to insure proper quality for all cable subscribers.

At press time the proposed FCC rule making was expected in August.

NAB Asks Congress to Sidetrack Burch Plan

The FCC proposal for letting CATV bring a limited number of distant signals into most communities (above) drew a heavy blast from the NAB. Nub of the NAB argument was the prediction that the plan would seriously weaken, and in some cases destroy, local broadcast service, thus depriving many viewers of free television service. A delegation of broadcasters carried the message to members of Congress, with "encouraging results," according to Hamilton Shea, chairman of NAB's Television Board of Directors. Unofficially, however, many broadcasters admit the FCC plan will be adopted and that everybody can live with it.

Will Duplication Help Firm Up the Cassette Revolution?

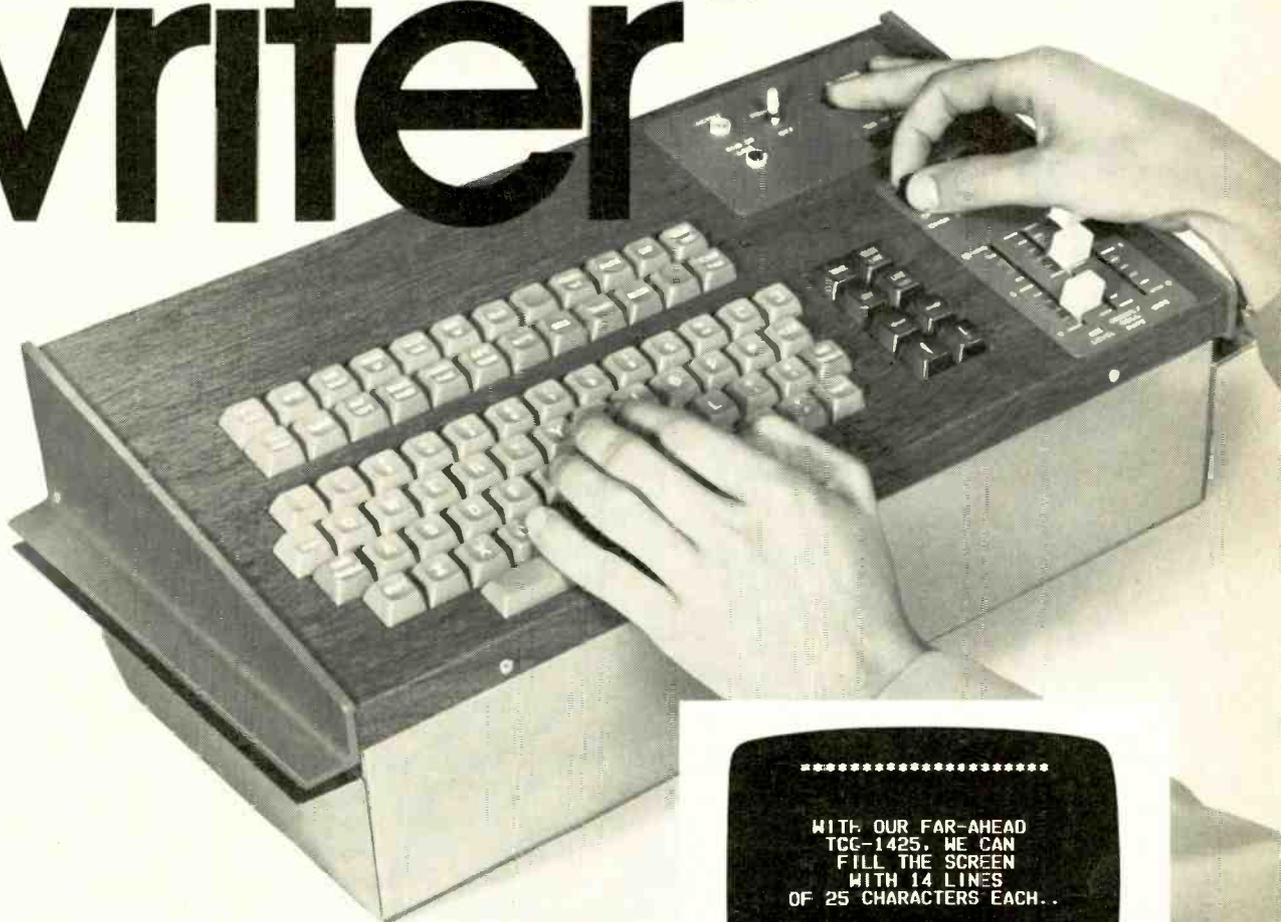
Announcement from California that a new firm, Consolidated Video Systems, Inc., will manufacture a broad range of thermal

Continued on page 8



Film's varied uses in television are the subject of a new exhibit at Eastman Kodak's Regional Marketing Center in New York City. In picture above, Robert Bernstein of the National Association of Television Program Engineers, gets story from Thomas Hargrave (left) and Hunter Low of Kodak.

Easy writer



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TELEMATION

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duplicators for cassette video recording turns more heat on the boiling video cassette pot. Duplication much faster and cheaper than one-to-one recording is essential if the video cassette is to become a real product, and not just a hot topic for free-lance prophets. On paper, thermal duplication seems to have great advantages that might get the video cassette over this basic hurdle. Using chromium dioxide tape, which promises a 50 percent reduction in tape speeds because of its high packing density, thermal duplication transfers video, audio and control signals from master to slave in one fast pass. Temperature at the point of contact is between about 100 and 125 C, a range in which the chromium dioxide tape is very sensitive to external fields. After the transfer the tape is brought down rapidly to room temperature and becomes normally resistant to further magnetic changes.

Broadcasters and cablemen probably won't have to confront the video cassette, whether for good or ill, for a couple of years at least. But a wary eye to windward is obviously in order and thermal duplication might turn out to be one of the most significant technical moves on the cassette front.

Another firm to watch on this is 3M, which has piqued curiosity with its promises to market duplication equipment that does not need a mirror-image intermediate master. This would eliminate one production pass, in effect cut the process in half. Apparently some form of endless loop within the system would act as the transfer medium.

Meanwhile, Video Cartridge Firms Move Ahead on Software

The main aspect of the video cassette field at the present time is the churning and turning by the various firms with competing systems, each trying to build not only acceptable hardware, but extensive programming that will make the hardware attractive to the general public. AVCO Corporation, which has been heavily publicizing its

Cartrivision system, has announced a new group of feature movies acquired for the system, including classics with John Wayne, Henry Fonda, Jack Benny and Carole Lombard. Film dates for availability of the equipment, and the programs, have not been set.

A public offering of 60 percent of the stock of Cartridge Television, Inc., the active developer of the Cartrivision system and formerly owned mainly by AVCO, has just been made in an effort to raise \$22 million. Success of the offering was not known at press time. The new issue, in the view of many on Wall Street, was overpriced at \$20 a share because of the hazards in the business and the line-up of heavy-weight potential competitors which include among others, Sony, Columbia, RCA, Philips, Ampex and Telefunken.

[Ed Note: At press time the CTI issue was withdrawn.]

Channels for ITFS in 2500-2690 MHz Band Reduced to 28

The FCC has given the Instructional Television Fixed Services exclusive use of 28 channels in the 2500-2690 MHz band, after a number of years during which ITFS had 31 channels in the band, in a trial to see if educational agencies could develop full usage. Evidently a review of the trial, made last year, indicated that three of the channels could be returned to the Operational Fixed Services, which had earlier shared usage. Allocations in that frequency range, under discussion for a number of years, would now seem to be firmly set.

Ampex To Lease Closed-Circuit TV

Users of Ampex closed-circuit television equipment can lease it, or buy it on the installment plan, under a new program announced by John R. North, marketing manager of that firm. The plan covers not only Ampex equipment but that of other manufacturers included in Ampex-installed systems, such as videotape recorders, cameras, monitors, and accessories. Equipment financing will be available at attractive rates competitive with local financial institutions, Mr. North

said. Further, up to 85 percent of lease payments may be applicable to the purchase price on a later sale.

IN BRIEF . . .

Business: Century Cable Communications is a new company with plans to acquire and develop interests in cable television. It starts with \$2 million of equity capital. Among the founders are H. Lee Druckman, R. G. Laventhol, H. R. Goldstein, and R. R. Morriss. Offices will be in Tucson and in San Diego . . . **Assets of Edecor**, Salt Lake City, have been acquired by Product Assurance Corporation of Lincoln, Nebraska. Ron Salestrom, president of PAC, announced that the wireless microphones, amplifiers, public address systems and other products of Edecor would continue to be available under that name . . . **CBS** will be allowed to spin off its CATV and television program syndication operations to Viacom International, Inc., according to an announcement of the FCC. The Commission was satisfied that Viacom was sufficiently separated in control from CBS to validate the spin-off as a divestiture of interest . . . **On the business front:** The EIA reports that consumer electronics' sales in all categories in the first five months of 1971 were ahead of the similar period a year ago. Radio units were up 21.9%, television 18.1%, and phonographs 26.8%. But the NAB says that profit margin of the typical commercial TV station dropped about 3.4% during 1970, in spite of a 6% increase in revenues . . . **Magnetic Media** has been sold to Sam Sokoloff, a private investor of Montreal, Canada, by GRT, the former owner. The company appointed a new sales firm, A-V Tape Sales Corp. of Westwood, N.J. . . . **RCA** has sold \$700,000 in color studio TV equipment to the Chinese Television Service, operating on Taiwan. Included in the sale were nine of the TK-44A cameras, a three-tube model of advanced design . . . **Noram Communications Ltd.** have occupied a new plant and office building in Mississauga, Ontario, Canada. The 16,000-square-foot facility is part of an expansion program now in process.

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AUDIO FILE:

FOR BETTER IDEAS
FROM AUDIO ENGINEERS

Consumer Equipment Surpassing Broadcasters'?

THE MAMMOTH Consumer Electronics Show that ran in the McCormick Place exhibition hall in Chicago the last week of June carried a big message for the engineer responsible for audio in a broadcast station, most particularly for the FM stereo station but to some extent for AM too.

Remember, this was not a "high fidelity" show, but was designed to cover the whole range of home-use electronic entertainment devices, from tiny portable radios up to TV-plus-stereo home "entertainment centers." It was designed to show the retailer what the manu-

facturers would have ready for the 1971-72 selling season; the "consumer" in the title refers to the *products* on display and not to the people at whom the show was aimed. The general public was not invited and didn't come.

All this puts additional weight on the fact that products that are fundamentally *audio*—audio components and packaged goods, tape and disc stereo systems—made up something like two-thirds of all the products shown. Small portable radios, TV receivers in all classifications were there in plenty, but almost without exception the

firms showing those products also showed very elaborate lines of audio components and console equipment: it was obvious that nobody wanted to be caught short in the audio department. This applied to the American giants: Sylvania, RCA, GE, Westinghouse, Motorola, etc., as well as many other firms, including all the major Japanese contenders: Hitachi, Panasonic, Sony, etc.

The show also included a high proportion of the leading old-line "high fidelity" manufacturers, to further put emphasis on top-grade audio. Fisher, Scott, Pickering, Harman-Kardon, British Industries, Altec, Marantz, KLH and a dozen more were there.

The message comes down to this: From top to bottom the electronics industry judges that the 1971 consumer is sold on good audio, wants it, will buy it in large quantities. That is the same consumer you are trying to reach with your radio signal. So your audio had better be good too, if you want to grab and hold today's sound-conscious listener.

This point has been made in the trade press before, but the June CES gave it tremendous backing. There is a further, definitely startling point which this writer offers some-what tentatively, since only scattered evidence is in so far. In some departments equipment designed for the consumer has pushed ahead of the typical pro audio equipment in use in many broadcast stations around the country. As everyone knows, advances in technique have historically almost always moved the other way, from professional to consumer equipment. The early fight for better movie sound was the original breeding ground of the consumer "high fidelity" stir: people concerned with or familiar with the movie developments adapted the new technology there to home use.

Without pretending to be comprehensive we offer a few examples that seem to make one case. Take headphones. In the last two or three years the quality of stereo headphones sold to the audio fan has soared fantastically. The good electrostatic phones in the audio salons now are simply in a different world from the phones most engineers have depended on for years; they have much wider frequency range, depended on for years: they have

(Continued on page 45)

TV REMOTE CONTROL WITH "STACKABLE BUILDING BLOCKS"

Flexibility and system compatibility for TV remote control are available with the Moseley Associates Stackable Building Blocks. Each individual Building Block is a completely separate and self-contained system. Building Blocks are available for remote control, automatic logging and status/ alarm.

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WITN-TV eclipsed local news programming with a mini ME-4 color processor.

"We were the first in our market to go full color," says Dick Paul, Vice President—Operations, for WITN-TV in Washington, North Carolina. "And the amazing thing was that we made the switch overnight.

"We hooked it up in one day. A representative from Kodak showed us how to use Kodak's packaged chemicals and run test strips through our mini processor. And the following day we were on the air with color film.

"Sooner or later you have to go full color. The viewers demand it, and they're right. They want to see things as they are—not in black-and-white. When we covered the total eclipse last year, it was the first time our viewers were able to see it on television as it really was.

"We've had tremendous response from viewers and advertisers for our color eyeWITNESS news programs. And part of the success is due to the fact that we now have much more flexibility in the area of local news and documentaries. And, of course, with a processor we have fewer problems with deadlines. In short, it's been just as big a success with us as it has been with our viewers."

If you're considering the move to full color, mini ME-4 processing may be just what you're looking for. And you can get all the help you need from your nearest Kodak Representative. All it takes is a phone call. And before you know it, things will be looking up.

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INTERPRETING THE **FCC** RULES & REGULATIONS

Main Studio Moves

IT IS ALWAYS SURPRISING to find that many broadcasters are not familiar with Federal Communications Commission requirements governing the relocation of main broadcast studios.

The Commission has recently adopted new rules concerning the relocation of main FM studios. It is therefore appropriate to discuss and review the rules pertaining to main studios for all services—FM, AM and TV.

New FM Rules

In September 1970, the Commission initiated rule-making proceedings designed to clarify licensee questions as to when Commission authorization is required for FM main studio moves to points outside the community of license. Section 73.210 of the Commission's rules formerly indicated that FM licensees could relocate their main studios at the authorized transmitter site, wherever it may be, without prior Commission approval. A simple reading of this former rule would seem to indicate that if an FM station had its main studio in its community of license, City A, and its transmitter in adjacent City B, the main studio could be moved from City A to City B without Commission approval. Not so. The Commission has admitted that the old rule was "misleading." Actually, Section 73.257 of the Rules would govern such a situation. Section 73.257 provided that FM licensees "must obtain specific authority for a main studio move to a different city from that specified in the license." Thus, in spite of the supposedly "clear" language of Section 73.210 noted above, licensees who moved their main studios from the city of license to the transmitter site (located in another city) incurred the wrath of the Commission for violating another section of the Rules.

In its February 1971 *Report and Order*,¹ the Commission, with obvious understatement, declared that the rules mentioned above "have . . . been a basis for uncertainty by some FM licensees. . . ."

In its *Order* designed to remove this confusion, the Commission reiterated the policy underlying the main studio rules:

The main studio rules . . . are intended to make broadcast stations readily accessible to the people in the communities which they are primarily licensed to serve, and they constitute one of the

essential ways we have for insuring that stations realistically meet their obligation to serve their communities of license as outlets for local self-expression. Since location of a station's main studio within the corporate limits of the principal community it is licensed to serve can reasonably be expected to be consistent with those goals and the public interest, we consider it unnecessary in the public interest to require prior Commission approval for main studio relocation within the community, whether this involves a move from one location to another within the community or from a location outside the community to one within it. For such main studio relocation within the community of license, it is sufficient, we believe, that the Commission be notified when the move is made. We are, however, of the view that the location of a station's main studio outside the community of license does raise a question as to whether it can, in fact, meet its primary obligation to the city of license. We therefore consider it important to require prior Commission approval of main studio moves to points outside the principal community before they are made.

It is therefore clear that prior Commission approval is not necessary for the relocation of the main FM studio within the corporate limits of the city of license. However, if an FM licensee desires to relocate his main studio outside the corporate limits of the city of license, prior Commission approval must be obtained. This rule applies even if the proposed relocation is to the transmitter site, if the transmitter site is situated outside the community of license. Similarly, Commission approval must be obtained if the proposed move is from an existing main studio location outside the city of license to another site outside the corporate limits of the city of license.

These new rules will also eliminate a rather circuitous route used by some licensees to move their suburban FM station to an adjacent large city. Much like the proverbial "camel with his nose in the tent," some FM broadcasters had sought permission from the Commission to relocate their transmitting antenna on top of a tall building in a large city adjacent to their suburban community of license. As soon as this construction had been completed, the FM licensee would, without seeking approval, move his main studio to the transmitter site—the tall building in the large city! Clearly, such practices have been eliminated by the adoption of the new FM main studio rules.

There is one exception in the new rules. The exception is for commonly-owned AM and FM

(Continued on page 14)

1. FCC 71-150; 21 RR 2d 1501.

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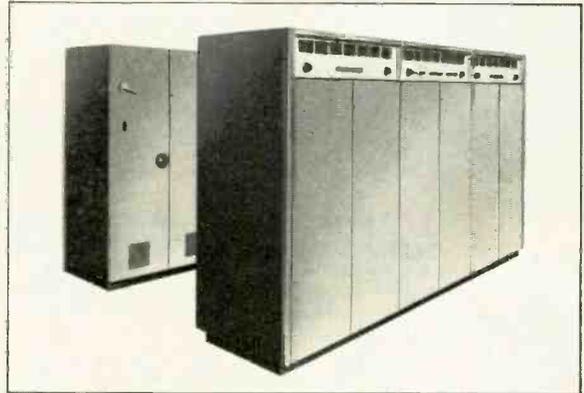
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FCC continued

stations licensed to serve the same community. If an AM station is licensed to serve City A, and has its studios located outside the corporate limits of the city of license, then the commonly-owned FM facility may move its main studios from inside the city of license to the AM studio site without prior Commission approval. However, where commonly-owned AM and FM stations in the same area have different communities of license, prior Commission approval must be obtained to relocate the main FM studios at the AM studio site.

In sum, under the new rules, *prior Commission approval of all proposed FM main studio relocations must be sought, except for relocation within the city of license, or relocation to the main studio site of a commonly-owned AM facility licensed to serve the same area.* It should be noted that if prior approval is not necessary, licensees must promptly notify the Commission of the relocation. More specifically, the pertinent provisions of revised Section 73.210 of the Commission's Rules now read as follows:

(2) The main studio of an FM broadcast station shall be located in the principal city to be served. Where the principal community to be served is a city, town, village or other political subdivision, the main studio shall be located within the corporate boundaries of such city, town, village or other political subdivision. Where the principal community to be served does not have specifically defined political boundaries, applications will be considered on a case-to-case basis in the light of the particular facts involved to determine whether the main studio is located within the principal community to be served.

(3) Where an adequate showing is made that good cause exists for locating a main studio outside the principal community to be served and that to do so would be consistent with the operation of the station in the public interest, the Commission will permit the use of a main studio location other than that specified in subparagraph (2) of this paragraph. No relocation of a main studio to a point outside the principal community to be served, or from one such point outside the community to another, may be made without first securing a modification of construction permit or license, except for relocation at the AM main studio location of a commonly-owned AM station licensed to the same community. FCC Form 301 shall be used to apply therefor. The main studio may, however, be relocated within the principal community to be served, or be moved from a location outside the community to one within it, without specific authority, but the Commission shall be notified promptly of any such relocation.

AM Studio Relocation

The long-standing rules governing the relocation of AM main studios have not been affected by the February 1971 *Order*. Declared the Commission:

We are not, however, similarly amending the AM main studio rules to require prior Commission approval for main studio relocation at a transmitter site outside the community of license, since technical considerations governing AM transmitter site selection usually place such sites in close proximity to the community of license and not in another larger city. For this reason, AM's studio relocations at the authorized transmitter site have seldom raised questions of studio accessibility or de facto station relocation.

Therefore, AM licensees may relocate their main studios at the transmitter site, regardless of location, without prior Commission approval. However, as in the FM and TV rules, an AM

licensee may not move its main studio location outside the limits of its community of license without first securing Commission approval. Section 73.31 of the Rules provides that . . .

The licensee of a station shall not move its main studio outside the borders of the borough or city, state, district, territory, or possession in which it is located, unless such move is to the location of the station's transmitter, without first securing a modification of construction permit or license. The licensee shall promptly notify the Commission of any other change in location of the main studio.

TV Studio Moves

The rules governing television main studio moves have remained essentially the same; however, certain changes have been made in the February 1971 *Order*. Specifically, the major change involves the removal of language which could be construed as requiring prior Commission approval for a main studio move from a location outside the principal community to one within the community. No such prior approval is necessary. However, as with FM facilities, no relocation of a television main studio to a point outside the community of license, or from one such point outside the community to another, may be made without prior Commission approval. More specifically, the newly-amended Section 73.613 of the *Rules* provides as follows:

The main studio of a television broadcast station shall be located in the principal community to be served. Where the principal community to be served is a city, town, village, or other political subdivision, the main studio shall be located within the corporate boundaries of such city, town, village, or other political subdivision. Where the principal community to be served does not have specifically defined political boundaries, applications will be considered on a case-to-case basis in the light of the particular facts involved to determine whether the main studio is located within the principal community to be served.

Where an adequate showing is made that good cause exists for locating a main studio outside the principal community to be served and that to do so would be consistent with the operation of the station in the public interest, the Commission will permit the use of a main studio location other than that specified in paragraph (a) of this section. No relocation of a main studio to a point outside the principal community to be served, or from one such point outside the community to another, may be made without first securing a modification of construction permit or license. FCC Form 301 shall be used to apply therefor. The main studio may, however, be relocated within the principal community to be served or be moved from a location outside the community to one within it without specific authority, but the Commission shall be notified promptly of any such relocation.

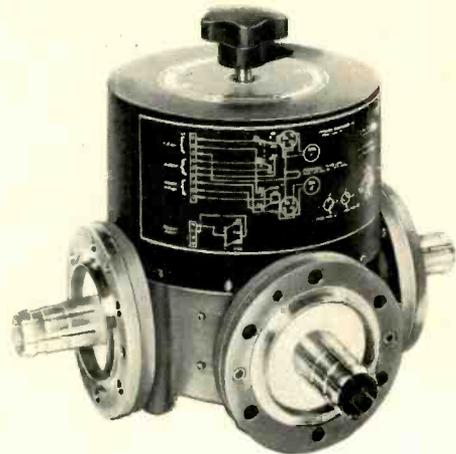
Conclusion

As the Commission has repeatedly declared, the main studio rules are intended to make broadcast facilities readily available and accessible to the people in the communities which they are primarily licensed to serve.

Failure of a licensee to seek prior Commission approval of proposed main moves can result in serious sanctions being imposed. Similarly, even if a minor move (one not requiring prior approval) is contemplated, it should be remembered that the Commission must be notified promptly following the actual move.

If you have any questions concerning this important area of station operation, your counsel should be consulted. **BM/E**

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Station Planning and Modernization

WFIR:

State of the Art in Commercial Radio

A METAMORPHOSIS IN RADIO began in Roanoke, Va., on November 1, 1969, as new owners took over operation of WDBJ(AM). In addition to changing the call letters, changing ownership required the establishment of all accounting and personnel procedures, as well as a relocation of the station's studios. Why? The station sale was part of a broadcast spin-off by a newspaper group, which had previously performed all administrative services and provided studio space. Also, the call letters were sold to the TV buyers.

The new call letters are WFIR—"First in Roanoke"—to symbolize the station's position as second oldest in the state. Broad plans were made for new studios at a shopping center where the station's 5-kW transmitting facilities are located. The new owners, WHBC, Inc., of Canton, Ohio, retained Joseph D. Coons, himself a station owner-operator and management consultant, to complete the transition and supervise planning, installation, and training in the new techniques to be used.

Several basic philosophies were hammered out by the WHBC management team and Coons prior to the actual takeover. First, WFIR was to be as modern as possible with as many final changes in operating techniques instituted as quickly as possible. The reason for this approach was management's realization that people change slowly, especially when there appears to be no reason for flexibility. It was believed that employees would accept change more rapidly at first under new ownership, both through insecurity and through "new-broom" discipline. It was also felt that moving the studios provided more of the proper atmosphere to accomplish operating changes. (There were only two staff changes in the first year's operation.) Second, WFIR was to expend maximum effort on sales and programming with minimum personnel involved with paperwork and technical matters. It was felt that this could be accomplished by using the most modern trouble-free hardware available and by installing high-volume, accurate paperwork systems.

Third, WFIR's new owners committed themselves to a long-term program of investment in facilities and start-up expense, with the realization that once the staff had the proper hardware, the job could be done.

Construction begins

The FCC approved ownership transfer on October 30, 1969. On November 1, the new

owners assumed control. On November 3, a staff meeting detailed plans, expressing firmly the new broadcast philosophies, especially in such sensitive areas as minority employment, editorial policies, and ethical standards. It was made clear that the new owners were interested first in quality; that they believed profits would follow in due course. Immediately, a station bookkeeper was employed and station records were begun.

Simultaneously, Coons presented plans for studio construction to the station's chief engineer. Sketches of the studio layout were drafted and redrafted, then revised again. Equipment suppliers, both of radio hardware and of office machines, were brought in for discussions. Contractors began submitting bids for remodeling.

Ultimately, a plan was undertaken to integrate completely the bookkeeping-traffic-switching functions through the use of IBM card equipment and an IGM 630-14 switcher. The idea was that the IGM unit would turn on and off all station functions, logging as it did so, allowing personnel to work only at live spots, live music programming, and live talk. Because the IGM equipment is programmed with the same punch cards used to set up the log and later to bill, it would put the traffic girl in charge of switching, thus eliminating mistakes and the need for elaborate hardware in every location.

The new studio space was a 25 × 25 ft. unfinished storeroom in the shopping center. Because of the odd size, the rear half was excavated enough to allow that portion of the room to have a second floor, increasing floor space to 4500 sq. ft.

On the main level, a large reception area includes the traffic desk, as well as a showcase installation of the station's central equipment, including all automation and house gear. Opposite this hardware is a row of four rooms, all with windows: the newsroom (including an announce booth and four desk/work areas), the air control room, a discussion studio, and a production room. Also on the first floor are the record library and program/sports offices. All rooms are 10 ft. wide, allowing a 5-ft. center aisle.

The rear, two-story area of the station houses sales, management, and conference rooms on the second floor, and bookkeeping, IBM, continuity, storage, shop and announcers' offices on the first floor. All parts of the building are carpeted. Because the lower rear floor is below the level of waste lines, rest rooms and janitor's closets are on the second floor only.

Because of the station's shopping-center location, extremely high pedestrian traffic counts are recorded in front of the station, and an attractive display highlighting personalities and programs is maintained. In addition, the carpeting

colors are used as accent colors throughout.

Thus, with a blue tweed carpet on the first floor, one room has a bright blue door with pastel blue interior, another has a green door and green interior, another has a contrasting burnt orange door and interior, and so on. In addition to the contemporary feeling this imparts to the interior, it eliminates the need for door signs and hides the fact that the building is largely concrete-blocked and painted. The construction techniques used were quite economical. Total remodeling expense including the excavation, carpeting, air conditioning, wiring, and so on, (but utilizing the existent shell of the center), was on the order of \$70,000.

Work on the studios was begun in late November 1969. In spite of excavation difficulties and other delays, operations began from the new rooms on April 18, 1970.

RF problem

The studios are immediately adjacent to the station's tower, and are saturated with RF which ranges from 5-6 volts at floor level to well over 10 volts at the ceiling.

The RF problem was solved by extra-careful grounding of all equipment. Chief Engineer "Red" St. Clair had solid copper ground cables brought up through the concrete at every console and rack. In addition, all wiring was run in conduit; panelled walls have a sheath of outdoor-type insulation under them, with a foil layer carefully grounded around each studio area. So effective is the shielding and grounding that St. Clair had to put up an outside antenna to get the station signal on a monitor receiver in the rack area! WFIR had no installation problems caused by RF. It is estimated that this extra RF effort cost at least \$5000 of the amount above, but could well save far more by elimination of the various transient problems that a sloppier installation could cause. The station had no crosstalk problems at all.

New switching system

While early construction was going on, Chief Engineer St. Clair and his associate, Willie Carr, began assembly-line construction of switching modules for each console location (air studio, news booth, and production) as well as for the rack area in reception. Each module consists of sockets and wiring for eight Potter and Brumfield KHP series relays, with a small DC power supply. In each room a two-row panel of Clare Pendar push-buttons is mounted in a box identical to that used by IGM for remote control of its automation equipment. In each room, the top row of buttons is labelled with the names of things to which the console can be connected (FEED, CART, TAPE, etc.). Five of these buttons are available. The lower row of buttons is labelled with what can feed the transmitter, (AIR, PROD, NEWS, NET, IGM) and all buttons are common in each room's lower row. Since the buttons are illuminated, it is easy to see the status of the room at any time. And as the "feed" button and the button for that room in any location are both red, it is obvious

that the motto has become, "If both are red, use your head!" With the capability to feed network directly to the transmitter, the station has all consoles free for other work during network programs. Of course, the system also allows the elimination of much patching for routine recording, or for emergency operation from an unusual location.

A basic signal (such as network) is distributed through a gang of three Spotmaster distribution amplifiers. Since these units have individual level controls for each of their five outputs, padding was



Announcer Norm Shockley works in the WFIR air studio. Newsroom is straight ahead through glass at right, with news announce booth to left of clock. Air studio is used during live segments of programming.



The IGM program automation system at WFIR includes a logging typewriter (foreground) and card reader just past it. Next are two racks of Instacarts and two more of Scully reel-to-reel decks. Finally, a Moseley automatic logger and transmitter remote controls.



Mary Ann Ratliff and Debra Graybill, WFIR traffic clerks, discuss card preparation for the station's automation system. They are working at the IBM 526 printing summary keypunch; in foreground is the 402 accounting machine. Cards for the system cost \$0.98 per thousand, and WFIR uses about 10,000 per month.

unnecessary. The amplifiers distribute the network, the output of the mobile unit receiver (fed by three Marti-equipped autos) and the modulation monitor output.

Speaker monitoring is also solid-state, utilizing three Altec house-monitor amplifiers connected to some 30 speakers (70-volt line) through five-position switches AIR, MOBILE, NET, SPARE and volume controls. Like the relay units, switches, speaker/transformer assemblies, etc., were assembled in advance during the early construction period.

Automation system

The IGM system has 14 inputs, with a 15th (spare) channel already designated. The first four inputs accommodate IGM's new Instacart 48-tray cartridge players, thus allowing 192 cartridges to be automatically played and logged on a fully random-select basis. Since any cart can hold up to 10 minutes, it was felt this would be adequate, although the station has designated channel #5 to accommodate a possible future Instacart.

Input #6 is for network, #7 is the air studio, #8 is the news booth, #9 is the production room, #10, #11, #12, and #13 are four Scully 14-in. tape players for use late at night and on weekends (when the station is fully automated), and #14 is a cartridge machine used for fill, also during automated periods. A time announcer is #15. Thus, the deck of cards which programs the station throughout the day can turn on either a live control room for a disc jockey, or a tape player for a recorded program. In all cases, each switching operation is logged by the system typewriter with exact times shown, and all cartridges are automatically verified. Thus, the announcer worries only about his contribution to the program and pushes

a button when he wants a spot, net, or what have you. The system switches on the right source. This feature is a real boon during news programs; since the newsmen can use his remote control in exactly the same way, the air man need not wait around to play spots for news, nor keep the log.

Control can move fluidly from room to room whenever desired. Conversely, if the station doesn't want a certain kind of program opportunity to present itself, the cards are arranged accordingly and the air man cannot change it without management's awareness . . . an excellent control.

Control-room gear

In addition to console, each room has three cartridge machines (one of which also records) and a mike. The air studio also has two turntables and a Scully recorder. The production room has two turntables and two Scullys, one of which is stereo for spot production. Both the air studio and the production room also have a second mike for talk or two-voice shows.

The discussion studio has an eight-person table, and a switching installation for the microphones allowing them to work into production, air, or an Ampex 601 located permanently on a corner shelf. Using this machine means that routine interviewing can be done without tying up a room.

The newsroom itself has a rack outside the booth with a Scully reel-reel recorder and an ATC Criterion cartridge recorder for network actualities, phone interviews, mobile reports, and so on. Here also is located the CBS NetAlert System, with slave indicators in the production and air rooms. With this separate installation, one newsmen can record news events while another is reporting in the booth.

Finally, the reception-area racks enclose two vintage but well-maintained Ampex 300's for network delays, phone-show air-checking, etc. Also here is a Moseley automatic transmitter logger, for daytime operation.

WFIR's disc jockeys and newsmen need only provide the news and the entertainment; the hardware plays all recorded matter, does all switching, keeps the logs, both transmitter and program, and warns if something is going wrong. At any time the announcer can take control for emergency situations, but when he does such manual control is logged. Also, when time comes for marginal-hours operation such as all-night or during weekend lulls, changeover to automation is merely a matter of stacking the deck a little differently.

Financial systems

Handling the bookkeeping, accounting, payroll, and traffic work at WFIR requires the equivalent of two people. Actually, three staff members share the work, but one of the three is part-time, working a six-hour day. These three employees also handle the record library files and sales correspondence. It is estimated that this latter work accumulates to about six hours' effort daily; thus the two-person estimate for the main jobs.

Supporting these two workers is an IBM office-

machine system of three units, including an IBM 526 Printing Summary-Punching Keypunch, an IBM 402 (Series 50) Tabulating Machine, and an IBM 082 Card Sorter. This unit-record equipment is modest, a compromise between capability and expense. Says Coons: "A radio station has, by data-processing standards, a very small number of transactions, but each one is relatively complex. Thus, the ability of the punched card to be processed a number of ways for a number of reports is helpful. Even though with this equipment each way of processing requires a little time, there are not all that many transactions that re-using and re-sorting takes very long." Each day's deck has about 1000 cards in it and, of these, perhaps 500 or 600 are events which must be accounted for. The IBM 402 runs at 50 cards per minute, so a printing run only takes 10 or 12 minutes including totals.

"The first reaction we got from data-processing people was that we should use time-sharing of some kind," says Coons. "When they got the facts, they changed their minds."

The essence of the system is simple, although setting up the procedures and designing the necessary card formats and forms is very complex. Each day has a deck of cards and the decks are reused each week. For example, the Monday deck is used every Monday, and so on. In this way, the cards are like the Mylar forms that many stations used, or the Acme Visible Index or Kardex systems. (See *BM/E*, April, 1965). A carbon of the log thus produced is used as a worksheet to note changes for the subsequent week and new cards are punched only for new spots or moved spots. An IBM Unit Record system of this kind is made possible by the punch card itself which allows extraordinary flexibility in sorting. The cards are placed in the sorter in any order desired at the rate of 650 cards per minute. Since a sort is required for each digit of the number by which the cards are being arranged, sorting a 500-card deck to be in order by a four-digit number would take four minutes.

At WFIR, four daily reports are prepared:

- **Program Schedule:** This is a pre-print of tomorrow's log showing the usual FCC information. In addition, it shows start date, end date, competitive category, time charges, other charges, etc. Confidential price information is on the right side of the log, and that portion of the original copy which goes to the control room is sliced off on a paper cutter. The log shows commercial seconds per hour sold and also breaks out FCC totals for the day at the conclusion of the run, indicating how many PSA's, promos, CA's, etc., are run. A gross billing figure is also shown for balancing purposes. This run is all cards for the day in order by time. Two copies: about 15 minutes.

- **Daily Summary.** Cards from the run above are sorted by price and customer number. Non-sale-item cards are thus rejected by the sorter, and the deck becomes smaller. This listing shows business by customer in alphabetical order for the next day. As it runs, it also automatically punches new

cards to be posted to customer's accounts receivable. The one copy produced is then manually compared to orders to verify that all ordered is running, and vice versa. Run time: 15 minutes. Check time: 15 minutes.

- **Sales Report.** Cards from run #2 above are sorted by salesman number and run on a two-copy form. This listing shows business written by each salesman and by national reps for the next day, including time charges, other charges, and commissions earned. The original goes to the station manager; the carbon goes to the sales manager for distribution to salesmen. The report also shows ending dates of all business, so the salesman knows what he needs to renew and what avails he has to sell. Run time: 15 minutes.

- **Daily Transaction Report:** This is a management information and balancing run. All cards automatically produced during the runs above are listed and totalled to be sure they balance; cash receipts and disbursements are itemized; accounts payable entries are listed; and any other cards punched during the day are shown. This report goes to the manager. It shows business for the day by revenue category (national, regional, local, spot, program, or political) and for the year-to-date or month-to-date. Run time: 10 minutes.

Handling orders

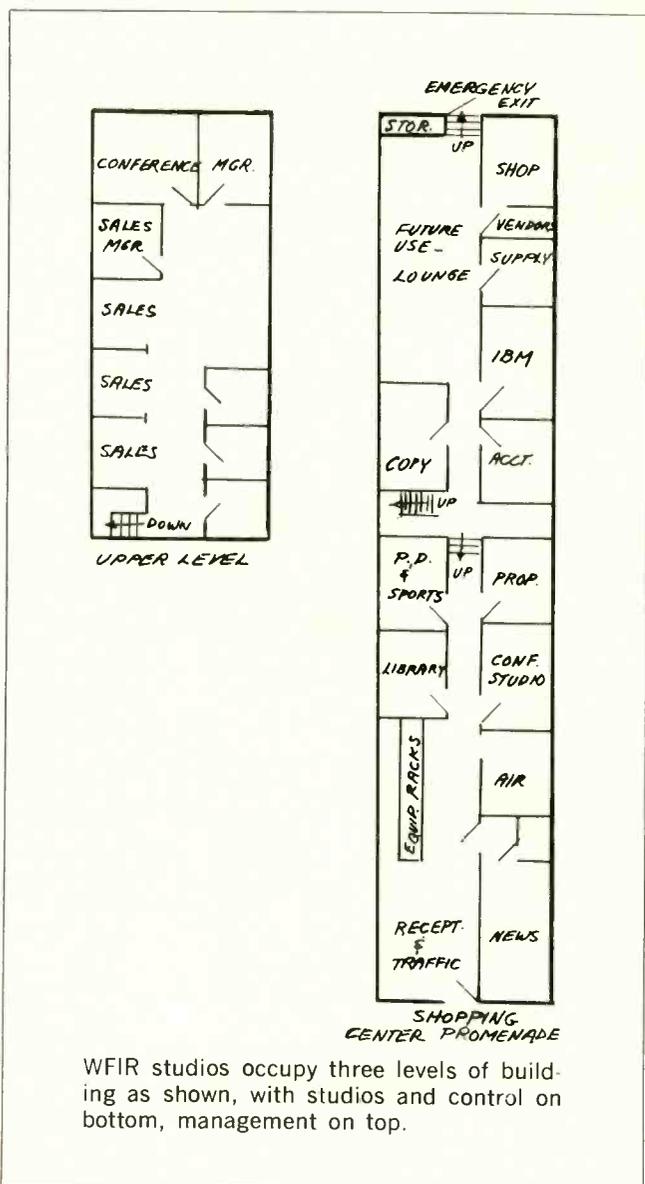
These processes are begun at 3:30 p.m. for the next day. Whenever an order is received prior to 3:30 p.m., the cards for the entire order are punched, a process that calls for punching the first card manually, then duplicating all additional copies. In this way, if a customer runs 30 spots per week, 30 cards are made as soon as the order is received. At this stage in card preparation scheduled time is not punched in the cards; this data is added later when traffic has assigned the



WFIR Chief Engineer E. F. St. Clair checks readings on the Moseley automatic logger, and reviews correctness of signatures on the cover sheet attached to each day's log.



Production studio at WFIR includes two Gates turntables (not shown) plus reel-to-reel and cartridge tape equipment. Under clock are remote controls for automation, cart encoding, and audio control.



WFIR studios occupy three levels of building as shown, with studios and control on bottom, management on top.

time for each spot and then the card is put in the appropriate day's deck. Orders received after 3:30 p.m. are handled by writing the item on the log and then punching a card manually for accounts receivable, salesmen's commission statements, and so on. Again, this becomes a matter of card data duplication rather than an original entry punching job for every spot.

Once the fourth run of the day is completed, the cards are resorted by time scheduled and the deck is back in order for the following week. The traffic girl deals with only one deck at a time (tomorrow's) using last week's carbon as a worksheet for all decks. The carbon also, as noted above, gives her ending date and competitive information.

Invoicing is then a simple matter. At month's end, cards with names and addresses of customers are combined with cash receipts cards and sales cards (produced during the daily summary run) as well as balance due cards from the previous month's invoices. This sorting is done in sequence so the cards fall in order by date and by customer. Then, the sorting completed, the cards are loaded in the 402 and out come the invoices. Hard to believe, but exact-time invoices, balance due statements, affidavits, and so on, are produced in this manner with about three hours' machine time.

The biggest part of the job is notarizing affidavits and putting the invoices in envelopes. Billing is out in one day and management has sales figures that same day for the previous month.

As each invoice is produced on the 402, cards are automatically punched for next month's carry-forward balance due. These cards are compared with those of previous months to indicate slow-pay or delinquent accounts, so that collection efforts can begin. Aging of accounts and quick follow-up thus become routine matters. The overdue list is also produced the first day after month end.

When the month's billing and overdue work is run, the machine is used to run profit and loss, general ledger, and budget comparison statements. A detailed print-out of every transaction is prepared and then summarized in profit and loss form, with year to date, last year to date, this month, this month last year, budget this month, budget year to date, all shown and compared. Total run time for these helpful management reports is less than six hours and this work is also done promptly . . . on the second day after month's end.

The IBM equipment is also used in several other ways of interest to broadcasters: It is used to prepare sales presentations and for the record library index.

The Pulse survey figures for quarter-hour circulation have been punched into cards, as have the general figures for the station's total operation. When a salesman wishes to present accurate cost/impression figures, he gives the proposed spot times and days to the IBM operator who runs out a listing of the times requested, their impressions, and thus produces a listing of gross impressions. The salesman then can write in cost or other data so the client can see why WFIR is a sound value.

Time required: 5 minutes.

Advantages here are obvious: library cards can be keypunched, duplicated for artist, title, and (if required) category files, and then sorted rapidly, thus avoiding hand alphabetical sorting. The duplicating function of the keypunch is the real time-saver, however; the first card punched for an album with the first song on it differs from the next only by title; artist and number remain the same. Since the keypunch can be programmed to copy repeatedly any desired part (or all) of the preceding card, no time is wasted. It takes about 20 or 30 seconds to punch the 24 cards, 12 title and 12 artist, for an average album.

What about errors?

Self-checking balancing figures have been used in all WFIR procedures and machine programs to allow proving reports and punching. Since copies of essential daily postings go to management, the manager has the opportunity to carefully review the details of his accounting operation if he wishes to. Errors occur, but they can be corrected before they are serious. Perhaps the best example is the log preparation which confirms whether tomorrow's schedule is right—the day before tomorrow. A make-good can be scheduled before a spot is actually missed!

What it costs

The first year at WFIR, equipment was rented for less than \$410 per month, including service. Supplies, including special forms, plain paper, and all punch cards, are cost-estimated at less than \$75 per month. The cost of new card files, program panels for the 402 and 526, and other special hardware, was under \$1000. The IBM unit-record equipment described is readily available on the used office-machine-equipment market and it is estimated that outright purchase of such equipment on a used basis would cost less than \$7500. The service contract with IBM would then be \$103 monthly after an initial refurbishing charge.

Operating the IBM system is simple for the programmer sets up operating procedures in step-by-step detail and arranges special program panels that fit into the machines for each different job. Machine operators are easily trained and merely follow these checklists.

On the other hand, programming work (software), designing the systems and forms, and writing the procedures, is complex and requires a constant compromise between station requirements, system capacities, and economic viability. Part of the difficulty in having this work done by the usual programmers is that they don't know the demands of the radio business or its terms. "Adjacencies," "availabilities," "PSA's," and so on are new things to these people, as are all FCC requirements.

To tie the whole package together into a marketable concept, WFIR has retained a local advertising agency, Associated Advertising, Inc., which promotes the station as a "Best of Everything" radio broadcaster. New motifs for all printed

materials are being phased in as supplies are re-ordered and a new atmosphere is permeating the station's presentations, both on the air and to clients. Heavy promotional budgets have been established and WFIR's performance in the surveys has started to improve, overcoming an image as an old-fashioned radio station.

Of course, the station staff isn't small. WFIR's news-talk-CBS-music format dictates many "talk" people, including four full-time newsmen plus a full-time sports director; four featured air personalities; a sales manager and three salesmen; two copywriters; two engineers; three full-time administrative girls and one part-timer; plus the station manager and several part-time program and engineering people. The station's round-the-clock schedule plus excellent (5 kW full-time) coverage make it a leader in information programming to the area and its audience quality and quantity have allowed it the highest grosses in the region.

The concept that an investment in quality will pay off in the long run is being proven true at WFIR, Roanoke . . . an exciting station to hear, to visit, and to own or operate . . . and a station which is really "State of the Art."

Lighting a Sports Arena for Color TV

IN THE PAST, sports arenas have been constructed and lighted primarily for spectator viewing, with little thought given to the color TV cameras that now visit them regularly for video coverage. Recently in Dayton, Ohio, a sports arena was lighted to give best viewing for both spectators and color cameras. According to the lighting director of a national TV network, the new installation has good balance, color temperature, and cross lighting.

In Dayton, basketball is the game; the University of Dayton Flyers, the team; and the new U of D Arena, the place. It seats 13,450 fans in theater-type seats, some as much as 175 ft. away and 65 ft. above the court.

Various games handled

U of D officials designed the \$4.5 million basketball arena to serve a number of diverse needs. Primarily it was to be the home court for 12-16 regular season games by the varsity team. But it would also house high school tournament games, U of D freshman games, NCAA tournaments, and practice sessions. Plans also called for the arena to be the site of community events, inter-collegiate wrestling, professional tennis matches, and variety shows.

Lighting designer Donald R. Shell (Helmig Lienesch & Associates) explained the two basic requirements of the system: To put a lot of light on the court floor, and also to illuminate the

vertical surfaces (faces, uniforms) of the players. Shell consulted with other major arenas, and with TV station lighting directors, about their needs for high illumination levels. He cites as most helpful a report by Henry G. Williams of the General Electric Lamp Division. The GE staff had investigated the relationship between type and amount of light on TV pickups, and had prepared design recommendations for lighting an arena for color.

"We compared ten different lamps of four types—high-pressure sodium, metal halide, 1000-watt Deluxe White mercury, and 400-watt Deluxe White mercury—for installation over the court," said Shell. "The 1000-watt Deluxe White mercury lamps gave what we considered the most stable source at the time, the best color rendition for both spectator viewing and color TV, and illumination that was compatible with the light from the GE Quartzline® (tungsten-halogen) lamps used to light vertical surfaces."

Lighting is versatile

Kastle Electric Co. installed four electrical circuits to control floor light. Herb Dintamann, Director of Facilities, explained that he uses circuit A for intramural sports. It handles 36 1000-watt Deluxe White mercury lamps (26 lamps are on circuit B) mounted 40 ft. above the floor in Abolite industrial fixtures. These fixtures have a 0.8 ratio of beam spread to mounting height, and produce lighting levels on a horizontal plane 30 in. above the playing floor that range from 70 footcandles in court corners to 110 fc in center court. According to some, these illumination levels are better than those in most existing college and school gymnasiums.

For freshman and nontelevised games, Dintamann switches on circuits A and B, bathing the court in light from all 62 Deluxe White mercury lamps. The lighting level on horizontal surfaces jumps to 150 fc in the corners, and 210-220 fc at center court. With all overhead lamps on, vertical illumination at the near sideline is 25 fc, and at center court and the far sidelines, 80 fc.

Circuits C and D control 30 1500-watt GE linear Quartzline lamps mounted in Widelite flood-lighting fixtures, and six 5-lamp groupings. Three of these groupings are along each side of the court at the quarter and halfway points. The fixtures are suspended from the ceiling about 80 ft. from the sideline (60 ft. outside the sideline and 60 ft. above the playing floor). They light the vertical surfaces for TV and spectators from both sides of the court. Circuit C controls the top three lamps in each group, and circuit D the bottom two lamps.

The lamps are aimed at the near sideline to minimize glare in both players' and spectators' eyes. An adjustable cloth shield suspended from the ceiling about 10 ft. in front of the lamps prevents cross-court light from directly entering the eyes of those sitting on the players' benches or at the courtside press table.

The Quartzline lamps boosts illumination on

vertical surfaces at the near sideline to 60-70 fc, and at the far sideline, to 90 fc. The lamps add a small amount of horizontal illumination on the court to bring the level to 230 fc at center court.

System proved out

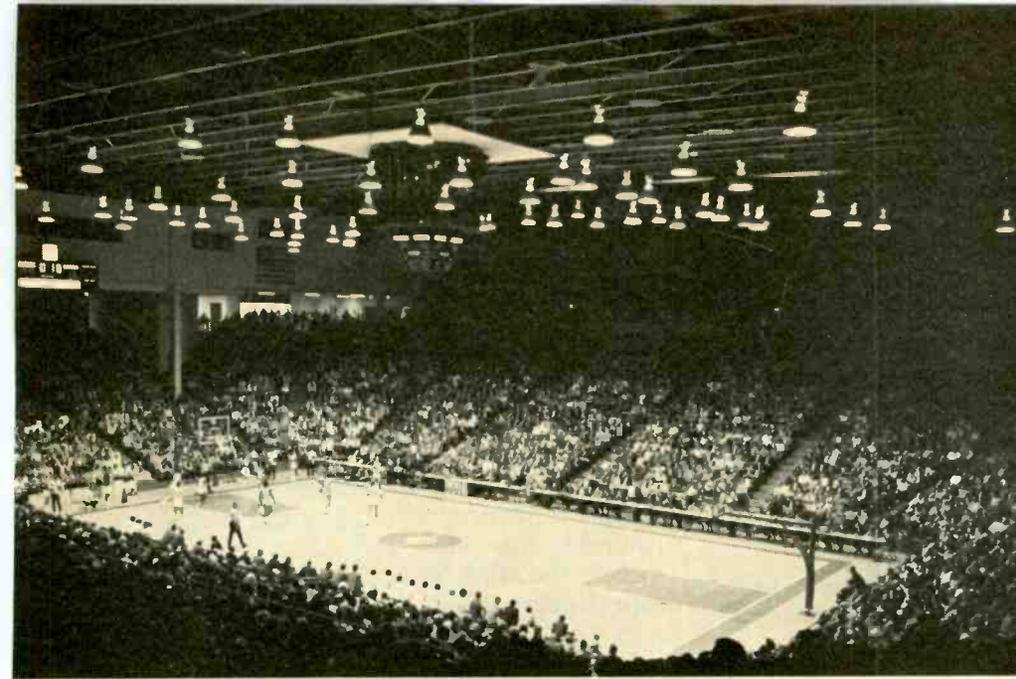
During the 1969-1970 season, arena lighting served well. Practices were held with only the Deluxe White mercury lamps on. Cleanup and maintenance were done with only one mercury circuit on—a savings on operating costs. And when TV crews showed up for a game, they didn't have to install any supplementary lighting—the house lighting was more than adequate.

Dintamann claims maintenance is easy. Architects Pretzinger and Pretzinger designed a series of wide catwalks intermingled with the ceiling trusses. Thus maintenance personnel can work on fixtures from the catwalks, without having to erect scaffolding.

Two additional circuits control lighting in other areas of the arena. Circuit E controls incandescent lamps over the spectator areas, and circuit F, area emergency and exit lighting. Locker and shower rooms are also well lighted with moisture-sealed fixtures.

Cost and maintenance

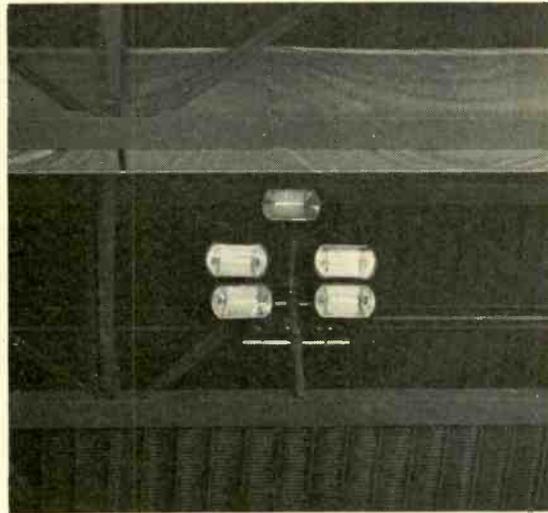
- The 1000-watt Deluxe White mercury fixtures are rated at 24,000 hours' life. If used 10 hours a day, 6 days a week, 52 weeks per year, they would burn 3120 hours per year. Lamp replacement would cost \$5.33 per year per fixture to maintain, and would be replaced in about 7½ years.
- The 1500-watt Quartzline fixtures are rated at 2000 hours' life. If used 5 hours, 30 times per year, they would burn 150 hours per year. These units will only be used during varsity games and a few other occasions. Lamp replacement would cost \$2.33 per year per fixture to maintain, and would be replaced in about 13 years.
- TV broadcast facilities include a 24 × 48 × 10 in. cable pull box outside the building, common to house power service for the TV remote truck. This feed consists of an individual 75-kVA, 480-V, three-phase service to 120/208-V, three-phase, four-wire secondary day-type transformer, with two 100-A, three-phase, four-wire fusible disconnects for TV power. There are two 50-A, 208-V, single-phase receptacles on separate circuits, and an eight-circuit load center for small circuit demands. Also from this point, a 6-in. pipe runs to courtside for video cables, and a 6 × 16 in. sheet-metal chase for video cables runs to the camera platform via catwalk.
- Audio pickup can be made from 32 locations at courtside, and can be easily patched to telco lines in the communication room near the floor. A separate telephone jack and audio cable is available at each location.
- Cost to operate all court lighting for six hours is \$10.35.
- The designer feels that very little, if any, maintenance should be required for this system.



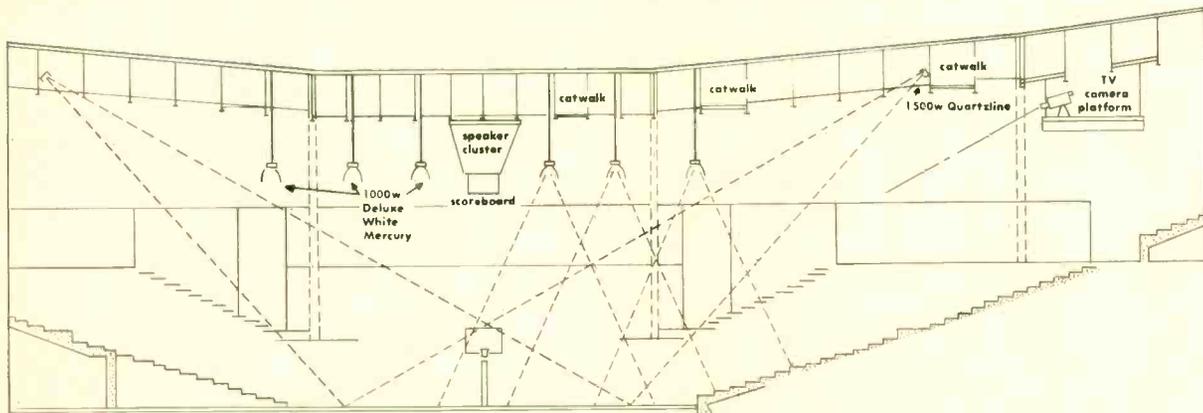
At the University of Dayton Arena, overall court lighting is ample and even. A row of mercury lamps 40 ft. above and 15 ft. outside each sideline assures coverage there and reduces contrast between the first few rows of seats and the court.



Good top and side lighting is maintained on players, floor, and baskets at the U of D Arena by a total of 62 mercury 1000-watt lamps and 30 Quartzline 1500-watt installations.



Mounted 60 ft. outside the court sideline, and 60 ft. above the playing floor, three 5-lamp groupings of 1500-watt Quartzline lamps provide illumination on vertical surfaces on the playing floor, to assure good TV pickup from both sides of the court. Catwalk behind lamps permits easy maintenance.



As shown in this cross section of the University of Dayton Arena, three clusters of five Quartzline lamps mounted 60 ft. outside and 60 ft. above each sideline provide additional vertical surface illumination on the court. Close spacing of the fixtures containing mercury lamps over the court assures high and even illumination level on the playing floor. TV camera platform (upper right) suspended from ceiling trusses provides unobstructed non-glaring vantage point.

KANW (FM): School Radio Expands

IN 1970, THE FM STATION of the public school system in Albuquerque, New Mexico, made it to one-roof operation after years of being scattered in various locations on school property. With a building of its own, a new transmitter eight times up in power, a new studio, new tape-duplicating equipment, KANW is serving 83,000 children in a three-county school system so much more efficiently that the city is delighted with its \$65,000 investment in the expansion.

KANW was started about 20 years ago (then the only FM station in New Mexico) as one way to help integrate the far-spread county schools and their in-city counterparts, while raising all to a higher level of achievement and instructional efficiency. Over the life of the station, the school administration was convinced that radio teaching can be highly successful if the lesson material is carefully prepared and the classroom teacher is trained for an integral role in the presentation.

At first the entire station, including the 350-watt transmitter, was housed in a penthouse over the main stairway of the Albuquerque High

School administration building. A planned move in the 1950's was aborted. The station staff managed some expansion by moving offices to a barracks one mile from the studios, and by storing master tapes in various locations, including a cellar subject to flooding.

In 1967, under the prodding of Mrs. Rose Jeanne Jones, director of the station and one of its founders, the city fathers came up with the answer—enough money to build the station a home of its own. Completed in 1970, the building is a double hexagon of brick (see photo). As shown on the floorplan, one hexagon houses a studio (with a capacity of up to 15 people at once), two control rooms, and the transmitter, a Collins 2-kW model. The other hexagon houses offices and the tape duplication and storage room. The reception area is between the two hexagons.

The studio gets heavy use because KANW produces and tapes about 40% of its program material. A Schafer 800 automation system is used for broadcasts. The staff of four student engineers, using an Ampex high-speed duplicator and a home-made duplicator built from a venerable Magnecord PT-6, turns out about 250 copies of the taped programs every week. These are distributed to the few schools still out of range of the transmitter, or for use when KANW is off the air. The staff also duplicates programs from a master library of more than 1200 titles for other schools across the country.

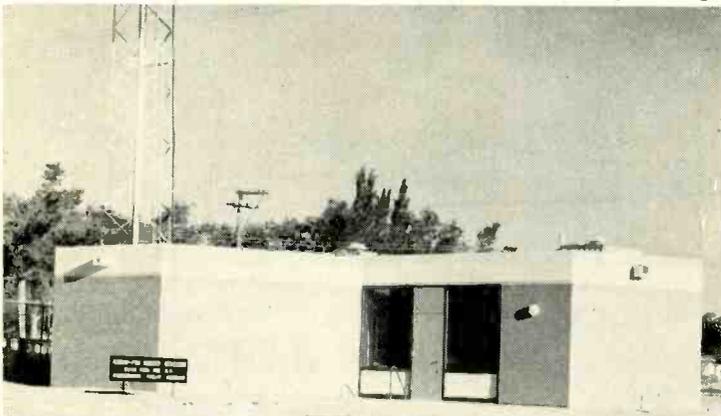
The differences between old and new are striking. The old transmitter/antenna could reach satisfactorily only a fraction of the schools in the system. With an ERP of 7.5 kW, the new transmitting system reaches all of Albuquerque's Bernalillo County, and substantial parts of two adjoining counties. Now about 80% of the children in the elementary and middle-grade schools get some radio instruction every day.

In the old location, originally designed for only 90 minutes a day of broadcasting, program recording had to be done at night and on weekends to free the facilities for the expansion to 30 hours a week of broadcasting. And duplication was slow, producing only a fraction of the tape copies that could have been used.

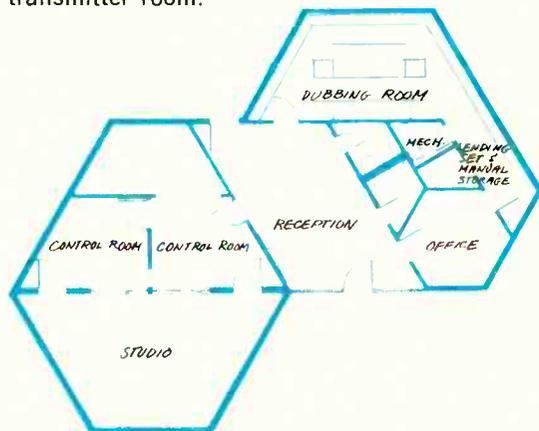
The new studio is free during the day for recording programs, and one man can serve as recording engineer, at the same time supervising the automated broadcast program simultaneously underway. He can also easily oversee and maintain the transmitter, directly behind one of the control rooms.

The success of KANW's expansion has turned the thoughts of station director Jones, and the school administration, to further enlargement: multiplex equipment for SCA channels, so program diversity can be increased to better serve the compartmentalized curriculum of the high schools; evening broadcasts for the community; expanded lending of taped programs via duplication on cassettes. The double hexagon will be a triple, or quadruple, if KANW's hopes are realized.

This material was prepared by Michael R. Vasey, KOB(AM) transmitter engineer, who assisted in the KANW renovation.



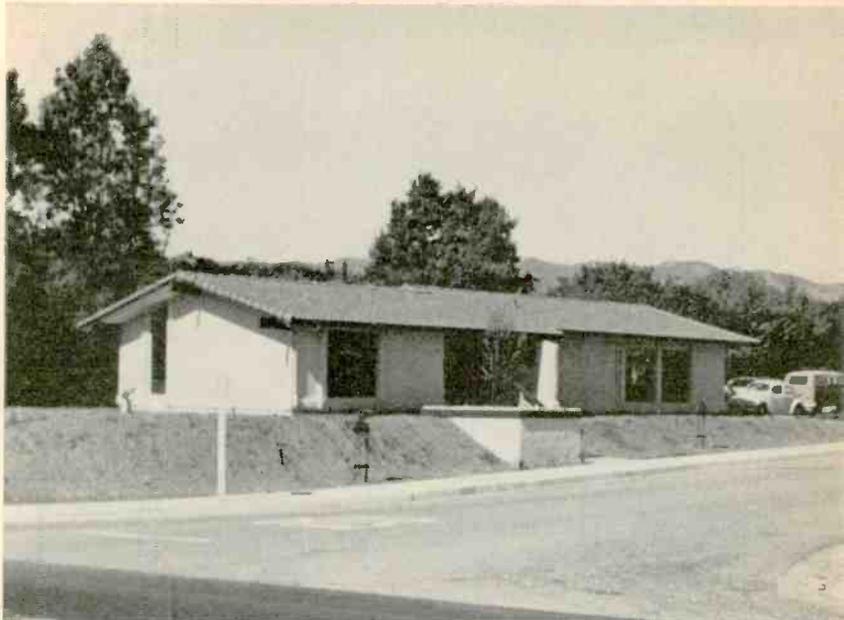
Compact, efficient KANW studio-transmitter building is a double hexagon, minimizes parallel walls in studio. Tower is behind building, adjacent to transmitter room.



One half of KANW space is devoted to control, studio, and transmitter areas. Large reception area is between twin hexagons. Remainder of space is dubbing, office and washrooms.

KVEC: Radio Before and After

SAN LUIS OBISPO, CALIF., IS A PLEASANT CITY with Spanish-mission architecture. Blending with the local terrain, the new facilities of KVEC(AM) are housed in a building of adobe stucco finish with a red tile roof. Inside, the reception and production offices are color-coordinated with desks and files. A highlight of the facility is the EBS shelter. With walls over 21 in. thick and ceiling and floor to match, the room insures that KVEC can stay on the air and keep the public informed during an emergency. The shelter and transmitter building each have emergency power generators in case of commercial power failure. The shelter also has food supplies for 14 days, and fallout detectors.



For 11 years KVEC personnel operated out of this old control room full of added-on, patched-in devices. Crowding and clutter eventually made for inefficiency, confusion.

Present KVEC control room is clean, uncluttered and functional. Console is a solid-state Sparta A-20. Consulting engineer Glenn Daly designed and built the smaller attached board, which provides two additional inputs, as well as warning lights that tell when KVEC is off the air, the network is calling, or the phone is ringing. Next to the three Sparta cart machines is a Craig tape recorder which is always patched directly into an incoming telco line, for fast taping of phone-ins.



There is easy access to the control console at KVEC. Consulting engineer Glenn Daly checks wiring at the console rear. All audio cables run through plastic Panduit to a slide-out rack in the back of the console, or to patch panels in various in-built racks.



Old KVEC production room was a hodgepodge of equipment in a cramped space. Especially lacking was tabletop work area.



New production room at KVEC is still small, but more efficient use of space has been made. One space-saving feature is solid-state Sparta equipment. Window looks into center studio where recording or live broadcasts originate. Beyond that is control room. All three rooms are temperature-controlled and soundproof.

KPRC: Third Home for Pioneer TV Station

EARLY NEXT YEAR, KPRC-TV Houston will move into its third studio complex—possibly the first station to do so. The station took the air in 1949 from a small quonset hut, moved in 1953 to its

present 41,000-sq. ft. building. The new KPRC broadcast center will occupy 83,375 square feet.

Construction began in November 1970, and KPRC president Jack Harris says work is about half completed. Largest part of the complex will house two 50 X 70-ft. and one 40 X 50-ft. TV studios, with four control rooms and prop storage area. Other sections of the building include three radio studios, the news department, film and tape facilities, and a garage for remote vehicles.

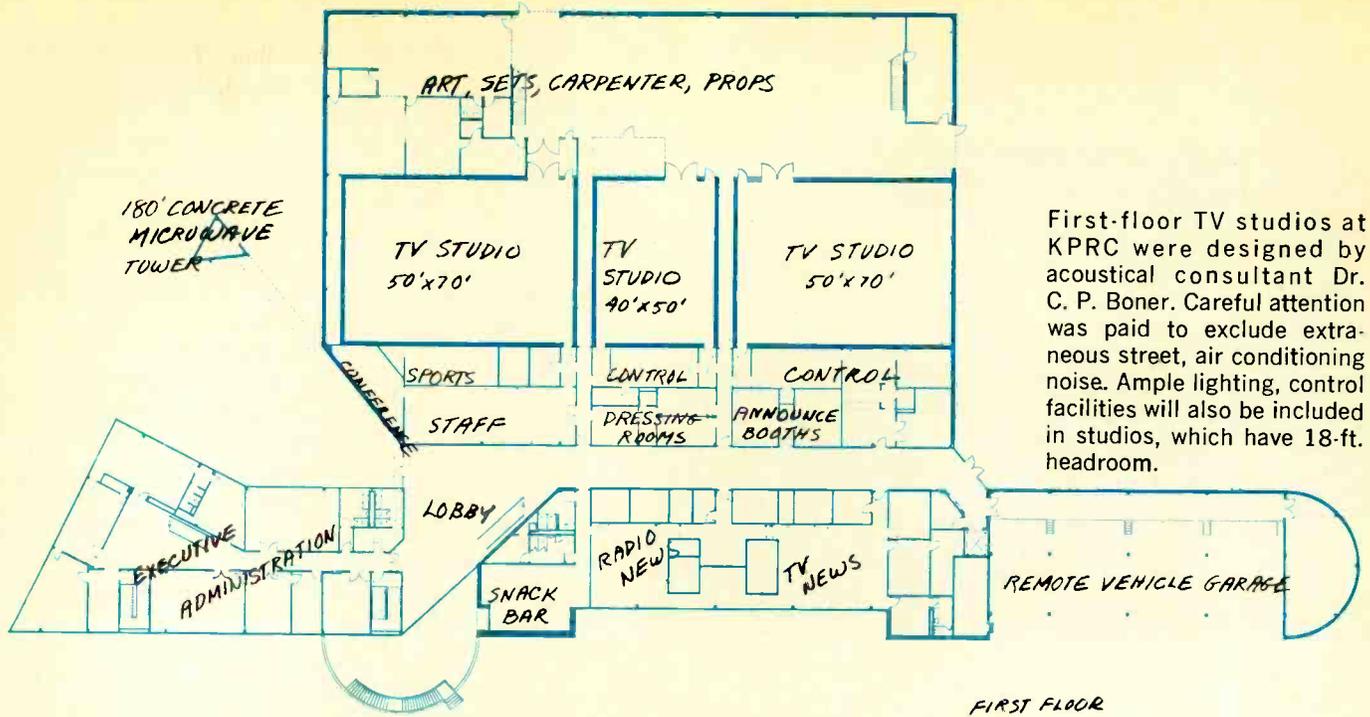
Planning took a year, involving architects Wilson, Morris, Crain and Anderson, along with KPRC operations manager Paul Huhndorff and other station staff.



Artist's sketch shows planned KPRC broadcast complex. Striking triangular concrete tower is 180 feet high with microwave STL gear at top. High-vaulted gallery separates TV studios (left) from other facilities.

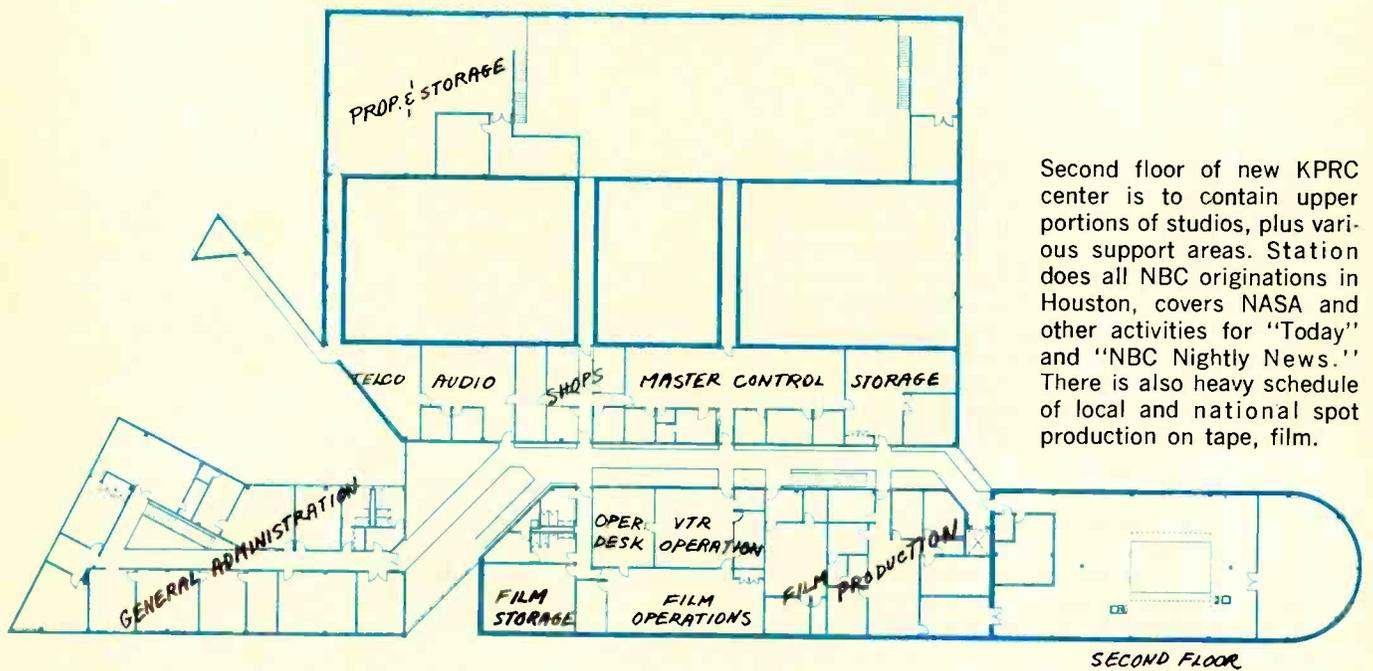


By June, construction had progressed this far on KPRC studios and microwave tower. In foreground, two-story administrative/executive office wing, with radio studios/offices below. TV studios are at rear.



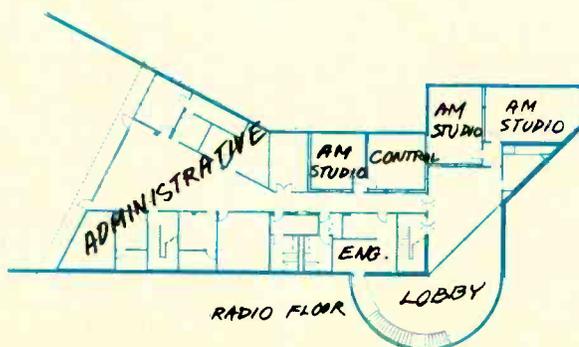
First-floor TV studios at KPRC were designed by acoustical consultant Dr. C. P. Boner. Careful attention was paid to exclude extraneous street, air conditioning noise. Ample lighting, control facilities will also be included in studios, which have 18-ft. headroom.

FIRST FLOOR



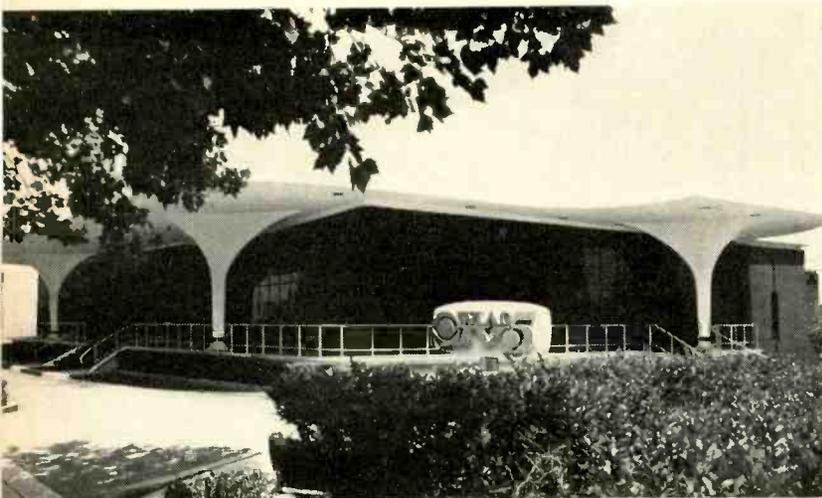
Second floor of new KPRC center is to contain upper portions of studios, plus various support areas. Station does all NBC originations in Houston, covers NASA and other activities for "Today" and "NBC Nightly News." There is also heavy schedule of local and national spot production on tape, film.

SECOND FLOOR



KPRC radio studios, control, and offices are planned for basement level under general and executive offices. Approximately 85% of building space will be used for program production and transmission.

WLAC-TV: A Video Production Center for the South



BEHIND THIS STRIKING FACADE is a video production center with 60,000 sq. ft. of working area, including live color and video tape, plus film production facilities. Optical, special effects, editing rooms, and sound recording equipment are also in the house. In addition to WLAC-TV programming, 21st Century Productions does such programs as the CBS-TV feature, "Hee Haw."

A system of equipment delegation permits excellent utilization of all equipment regardless of the studio in use, according to Bill Jay, operations manager of the Nashville station.

The modern design of the building has caused very favorable community comment. The use of one-way glass across the entire front provides privacy during the day and shows off the attractive interior at night.

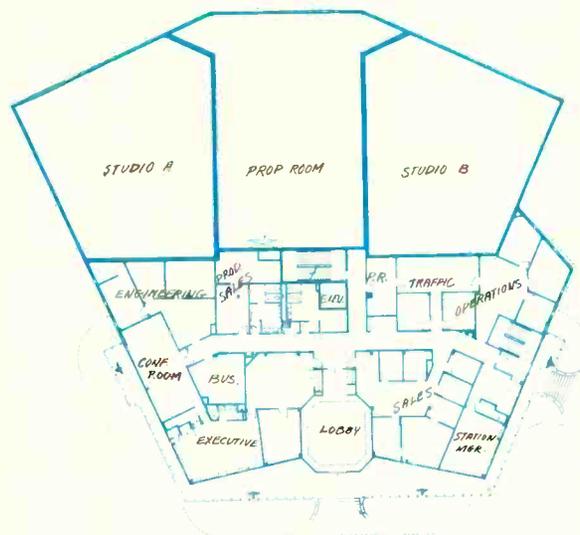
The first level of the WLAC-TV production center is primarily paperwork-oriented. Here are the administrative offices, engineering administration, employee dining area, main reception area, sales offices, operations area, the upper part of both studios and the prop room. Note that first level is on the ground floor.

The second level at WLAC-TV is the main working area. Studios are 3500 sq. ft. each, with 28-ft. ceilings. Studio A has a 20-ft. turntable for product display or dramatic effect. Any equipment can be delegated to either production control room for use with a studio production. The separate audio control rooms have custom-built consoles which include reverb. Telecine, the workhorse of air programming, includes three projector islands, with six film projectors, three slide projectors, three VTR playback machines, two high-band VTR's, and audio cart equipment.

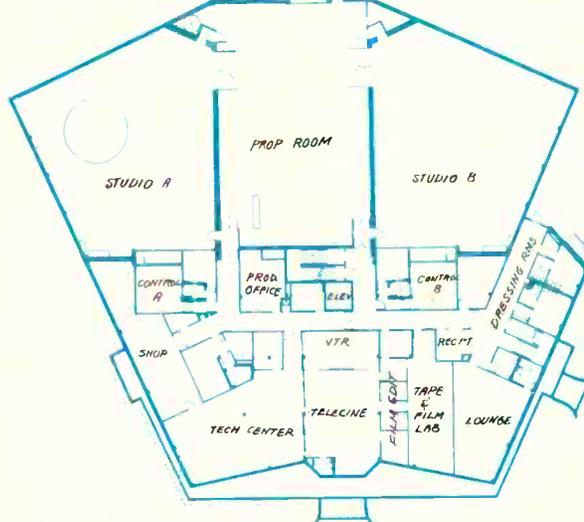
Station-break automation is used in the master control area—a system called PSC (programmed self-control). The film library stores various features and spots, as well as films and videotapes produced by 21st Century Productions. The client audition room includes film and tape preview facilities, while the hospitality room accommodates visitors or performers before they go on camera.

WLAC-TV's third level contains the newsroom, which is equipped with an internal filming studio, storage, projection and editing facilities, individual desk space for copy writers, police and fire radio monitors, and two-way radio for mobile use. There are also UPI teleprinters and Unifax newspaper service. Also on the third level is a color film lab for both still and movie film. This last year a weather central has been added. Rounding out station facilities are the art department and the scene shop. A large area now unused is reserved for future expansion.

FIRST FLOOR



SECOND FLOOR



STATUS REPORT:

VHF Remote Control



Bill Kelly checks print out of transmitter parameter reading at WNEW-TV studio location.

GOING REMOTE may not be as simple as one might expect. True, new transmitters are equipped to have critical parameters raised or lowered automatically, but the FCC is asking for a lot more. The control point must contain considerable telemetry, control and testing gear.

Instruments used to indicate quality parameters must be highly accurate. The number of control circuits have to be sufficient to cover all normal adjustments. Continuous "accurate" monitoring is required. A type-approved aural modulation monitor, complete with an rf amplifier if necessary, must indicate peak and quasi-peak percentages of modulation. (So far there is no such thing as a type-approved rf amplifier.) Frequency must be monitored. The picture, waveform and modulation percentages must be monitored. Special test signals must be injected during the vertical interval. These vertical interval signals have not yet been pinned down.

The telemetry equipment must be of a design so that a malfunction, or accident, will not activate the transmitter. If the remote control system fails, and stays out for 60 minutes, the transmitter must automatically shut itself off.

The waveform monitors must be calibrated against a monitor at the transmitter. All remote control and monitor equipment shall be calibrated and tested five days a week. The transmitter must be inspected five days a week. There is one exception to this weekday chore—if the transmitter can automatically shift to 20 percent of authorized power for any malfunction, the inspection need be done only once a week.

Before you can go remote, you must file a Form 301-A. These forms aren't yet available. (What's needed is spelled out in box.) And it goes without saying that any remote control system including the multiplexing scheme should not degrade the signal in any way. (See box.)

In short there is no cookbook formula for going remote. You have to propose something and hope it will pass the FCC scrutiny.

And so far as we know, there are no complete remote control systems available just waiting to be plugged in. There are parts of a system on the market, but each station considering going remote will have to do considerable planning of

its own. A list of equipment available accompanies the article.

To report an example of what has been done, *BM/E* visited Bill Kelly of WNEW-TV.

WNEW-TV operated by remote control under experimental authorization between February and April in 1968. Now that remote control is a rule, the system will be put in use again. This will occur when WNEW-TV moves its transmitter to the World Trade Center.

The only modification Kelly will have to make to conform to the new rules is to add some test and monitoring equipment.

WNEW-TV uses land lines between the studio and the transmitter. Two lines are used for both video and audio. During the experimental phase, the transmitter system was two RCA TT6's. In the new installation, WNEW-TV will use Philips transmitters.

The remote control system at WNEW-TV was built by Hammarlund. This equipment is no longer available commercially but its capability is illustrative of what needs to be done. The studio is connected to the transmitter terminal via two parallel and separately routed telephone data-class land lines.

The system utilizes a combination of frequency and time multiplexing techniques to insure maximum reliability. The four basic functions are:

1. Remote control of 96 on/off relays.
2. Analog telemetering of 48 transmitter plant parameters.
3. Automatic Status and Alarm monitoring of 40 critical transmitter plant parameters.
4. Automatic Data Logging of 30 transmitter plant parameters.

A solid state scanner, which is an electronic stepping device, maintains a constant status check on the operation of the drivers, the final power stages, the diplexer and antenna. The scanner generates a signal for an audible and visual alarm whenever any of the monitored parameters exceeds its normal value.

A digital printer periodically logs the operating parameters at the transmitter. Frequency shift audio tone signalling units transmit the various control and data pulses between the studio and the transmitter which are then applied to the

RBC 6600 system via solid state logic and relay circuits.

To insure maximum reliability, frequency multiplexing is used for control, while time multiplexing techniques are used for status and alarm indications. Telemetry is accomplished by the variable frequency method; the frequency being directly proportional to the measured quantity.

Frequency shift tone telemetry transmits information and control command data by shifting the frequency of a carrier over a narrow band. The advantages of frequency shift techniques are reduced susceptibility to interference (noise), and greater independence of channel propagation characteristics. Also positive indication of channel or equipment failure is instantly provided since the carrier frequency is always present under normal operation.

A three-state FSK unit can be keyed to transmit either mark, space or center frequency. This type of unit is particularly suited for forward-stop-reverse type of control.

A two-state FSK unit can be keyed from mark to space or space to mark. This type of unit is used to transmit digital coded information, since one state represents logic "1" and the opposite state represented logic "0."

The block diagram of the Studio/Transmitter Remote Control System is shown. The Telemeter Select and Status Panel at the studio is matrixed to four of the five FSK transmitters sending a combination of four mark/space codes to the telephone line. At the transmitter terminal the mark/space code signal is recovered by the FSK receivers, decoded and routed via matrix to the appropriate set of on/off control relays. Operating the on or off button on the studio Control and Meter Panel transmits a mark or space signal to operate the on or off relay. Consequently, control action requires the simultaneous operation of two pushbuttons. Loss of the carrier signal of any one of the studio's five FSK transmitters will de-energize the transmitter terminals' failsafe relay thus opening all transmitter interlocks. Forty-eight on/raise and 48 off/lower control circuits are provided.

When a Telemeter Select pushbutton is operated a corresponding reed relay in the analog telemeter input circuit closes, thus transmitting a voltage-dependent variable frequency back to the studio analog receiver and demodulator where

it is applied to the meter on the Control and Meter Panel.

Twenty-four visual/audible alarms are displayed on the studio Alarm Panel and 16 lighted push-button status points are provided on the studio Telemeter Select Panels. The transmitter terminal alarm/status input requires dry contact closures which are continuously scanned at the rate of 30 points per second. An alarm condition will result in a pulse width reduction thus keying an FSK transmitter from space to mark and in turn activating the appropriate alarm at the studio terminal. Any alarm indicator, once activated, will remain lit until the fault is corrected.

The automatic data logging equipment at the studio terminal provides automatic print out, at pre-selected intervals, of up to 30 parameters each with its own scaling and selection circuits. The internal digital clock sends an FSK command to the transmitter terminal where a 30-point programmer, or electronic stepper, sequentially selects each scaled data logging input feeding it to a digital voltmeter where it is converted to a parallel 1-2-4-8 BCD binary code and is then transmitted by FSK to the studio terminal where it is fed through an FSK receiver to the autolog printer still in the binary code. Each data logging input is scanned twice and if both sets of data pulses agree then the autolog print out takes place.

New monitoring equipment

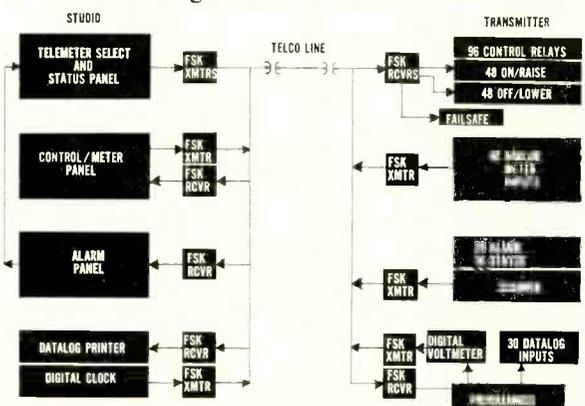
Kelly will replace all original monitoring equipment with the latest available. This will include a Tektronix test signal generator, model 147, which, Kelly hopes, will be able to produce the VITS signal eventually settled on by the FCC. Belar TV monitoring equipment (aural modulation and frequency) has been selected. A Telemet demodulator 4501-A has been ordered. Whether or not this demodulator will meet the station's or FCC requirements is not entirely certain at this time. If it does not, the Rohde & Schwarz demodulator can be substituted (at a considerably higher price). Demodulators have been a weak link in past, but both Telemet and R & S feel they have equipment to do the job.

New remote equipment

Although the Hammarlund equipment is no longer on the market, several manufacturers of remote control equipment for radio have models that will go as high as 30 channels which is suitable for TV (15 channels may be okay). Marti, Moseley and Rust now, or shortly will, have equipment that can be used both for remote control and automatic logging.

A brand new company, Spantronics, was formed in 1970 to come up with an ideal system for vhf remote control. Principals are Robert Rulifson, who worked an RCA remote-controlled transmitter, and Bob Herrman, a utility telemetry expert.

Unlike most remote equipment on the market,



Block diagram of remote control system at WNEW-TV.

What's Needed On a 301 for VHF Remote Control

(1) The location of the control point, the reason for its choice if at other than the main studio, and the approximate airline distance to the transmitter site.

(2) The number and purpose of the control and telemetry functions.

(3) The method by which control functions will be transmitted.

(4) The method by which telemetry data required by the rules will be transmitted from the television transmitter to the control point.

(5) A description of the fail-safe features of the remote control system which will insure that loss of either required control or telemetry will place the television transmitter in a non-radiating condition, pursuant to §73.676(c) of the rules.

(6) Measures taken to prevent tampering . . . by unauthorized persons.

(7) A description of all apparatus maintained for off-the-air monitoring, with particular attention to features intended to insure that the demodulated visual signal is free from noise, interference, or from distortion introduced at the receiving point.

(8) A description of apparatus which will be maintained at the control point for the generation and reception of test signals.

(9) A description of any features of the transmitting plant intended to insure continuity of operation in the event of malfunctioning or failure of the main transmitter, and of the automatic or remote control switching arrangements to be utilized in connection therewith.

(10) A description of means employed or procedures which will be followed to make the daily fre-

quency check required by §73.690(c).

(11) The method of determining, at the control point, that tower obstruction lighting is functioning properly.

(12) A description of the facilities maintained at the control point to permit compliance with the Emergency Action Notification Procedures of §73.932.

Transmission Standards

Multiplexing of the aural carrier may be employed for transmitting telemetry and alerting signals from the transmitter to the control point, subject to the following conditions:

(i) No observable degradation shall be caused to either the visual or aural signals.

(ii) The use of multiplexing shall not produce emissions outside the authorized television channel.

(iii) Multiplexing is limited to the use of a single subcarrier.

(iv) The maximum modulation of the aural carrier by the subcarrier shall not exceed ten percent of the maximum permissible degree of modulation.

(v) The total modulation of the aural carrier, including that caused by the subcarrier, shall comply with the requirements of §73.687(b)(7).

(vi) The transmitter output noise level (frequency modulation) resulting from frequency modulation of the main carrier by the subcarrier and other sources shall, in the frequency range 50 to 15000 cycles be at least 60 decibels below the level corresponding to 100 percent modulation of the main carrier.

(vii) The instantaneous frequency of the subcarrier used to modulate the aural carrier shall fall within the range 20 to 50 kc/s.

Press Time: Form 301A now available at field offices.

Spantronics uses a full digital approach throughout. As a consequence, random access to any control or metering point with instant feedback is possible. More important, digital control makes it possible to interface with a computer for full automatic control of the transmitter. The Remote Control System controls and meters 31 functions and provides for 12 status alarms. It operates with a two-way voice-grade circuit. Automatic data logging is provided.

Modulation information from the Transmitter Modulation Monitor is transmitted separately from the frequency deviation information obtained from a frequency modulation meter such as the H-P 335BR or 335ER. A limited bandwidth analog channel is used for transmission to the studio over the same voice-grade circuit that is used for remote control. Modulation metering and peaks are displayed on the Modulation Monitor Studio.

The remote control unit RCS-31 terminates the control communications link at the studio location and contains push buttons for the selection of points to be metered and/or controlled and for the initiation of On/Raise or Off/Lower control commands. A digital readout is provided for the quantitative display of the parameter selected for metering. An adjunct to this display is a multiple message indicator in which the appropriate unit (amperes, kilovolts, percent power, etc.) is illuminated. For alarm and fault monitoring a group of 12 two-state indicator

lamps is provided. Two of these indicators are reserved for the display of up-link and down-link status, a third is dedicated to the display of manual mode status at the transmitter unit. The remaining nine indicators are available for the display of equipment overloaded, over-temperature, building intrusion and the like.

The RCS-31 also contains the coders, decoders and tone transmitter/receivers necessary for the two-way serial transmission of the control data and alarm signals via a full-duplex voice-grade communications or microwave circuit. A single pair telephone circuit operation is possible since the send and receive frequency bands are separated. Decoded selection and control command bits transmitted from the studio are delivered by the remote control transmitter unit, RCT-31, to the control modules which in turn perform the necessary switching functions. The RCT-31 also accepts alarm voltages or contact closures from the alarm modules for transmission back to the studio. The On/Raise and Off/Lower relays and necessary interlocking circuits are contained in Switch Modules.

An Automatic Data Logger in conjunction with an Input/Output Writer can provide logging of up to 20 parameters plus date, time and calibration. The ADL contains logic circuits which originate continuously cycling digital input signals to the encoder of the RCS-31 unit. These signals are transmitted to the RCT-31 unit which is thus commanded to continuously scan selected

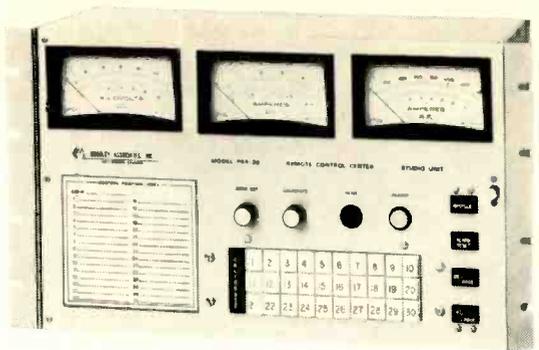
metered parameters. A digital comparison between the metered quantity and limits stored in a memory matrix as determined by the customer is performed by the ADL unit. If any parameter is outside the stored limits an alarm is displayed and a print-out occurs.

The up-link and down-link transmission systems are similar to each other in that the various data bits are time-multiplexed, i.e., the status (high or low) of one bit is transmitted during a particular interval, than that of the next and so on, until all bits have been sent. The process repeats after transmission of receiver synchronizing signals.

Each word of the up-link transmission contains 14 information bits. Five of these bits are utilized to indicate the selection. Four bits are utilized to transmit the commands generated by the On/Raise or Off/Lower switches. One bit is transmitted during the automatic data log mode to maintain the digital voltmeter in a read-and-hold rather than a free-running state. Two bit positions are provided for transmission of the fail-safe transmitter shut-down command.

The down-link transmission word contains 30 information bits. Five of these bits are used to confirm the 5-bit selection code, 14 bits are used for transmission of the meter reading (three binary-coded decimal digits plus over-range "1" plus polarity) and 11 bits are utilized for fault and status indicators. One of the bits in this latter group indicates the ready/failed status of the up-link transmission and a second bit is used to indicate manual/remote status of the terminal. On special systems the word length may be expanded to 46 or 62 information bits to accommodate additional metering and/or fault alarm transmissions.

The encoding of these bits is accomplished by circuits which sequentially scan the various command/data/alarm lines. This causes a frequency-shift-keyed (FSK) tone generator to



This system meters 30 channels and controls 60 functions.

send out tones at the mark center or space frequencies in sequence. These tones are in turn converted back to mark and space pulse trains by the corresponding FSK receiver. A center-frequency tone is sent first followed by a mark or space frequency tone depending upon whether the bit is high or low.

To allow error checking, at least one additional bit is sent during each cycle or "word," to indicate the parity (odd or even) of the number of high (or low) data bits.

The total round trip response time of a message transmission is approximately 450 milliseconds. (Up-link frequency is 1200 Hz, down-link, 1900 Hz.)

Spantronics is currently building a preproduction model of the RCS which will be finished in August. Preproduction of the data logger and digital status alarm will follow.

Although the two systems described use telephone alarms, the Rust Corporation points out that control commands can be sent to the transmitter by means of STL microwave and telemetry information can be returned to the control by means of a subcarrier on the aural signal.

A tabulation of some of the equipment available for remote control systems follows.

Equipment for Going Remote

Numbers in parentheses refer to reader service card. Circle for more info.

Remote Control	Measuring Equipment	Monitoring Equipment
<p>Marti Electronics Remote control system, 10 and 24 channel (310); automatic digital logging equipment, ACL-100 (311).</p> <p>Moseley Associates Remote control systems, 15 and 30 metering channels, 30 and 60 control, PBR-15 (312) and PBR-30 (313); status control system, 14 channels, SC5-2 (314); Tolerance Alarm Unit, TAU-2 (315); Automatic Data Printer, ADP-220 (316). Systems have been designed to remove TV transmitter from air after one hour, meeting FCC requirements.</p> <p>Rust Corp. Remote control RC-2600A (317); RC-1000, 22 controls (318); Status/Alarm Display CPX-10 (319); Auto Log, AL-400 (320).</p> <p>Spantronics Engineering Digital remote control systems (334).</p>	<p>Rohde & Schwarz VSB demodulator, type AMF (321). Also front-end receiver HS-2064 for off-air (322). Switchable sound trap and group delay complementary to FCC transmitter specs.</p> <p>Tektronix Test signal generator 147 NTSC. Source of all recognized vertical interval and full field test signals (eight) including VIRS (323).</p> <p>Teletet (Div. of Geotel) Broadcast demodulator 4501-A1. Field-tested. Input 5mV or 5V. Has frequency response and group delay response meeting FCC requirements. Switchable sound trap. (324). Price \$3000.</p>	<p>Belar Electronics Lab Inc. TV remote monitoring system includes RF amplifier, RFA-3 (325); digital clock (326); aural modulation monitor TVM-1 (327); and frequency monitor, TVM-2 (328).</p> <p>McMartin Industries Inc. VHF aural modulation monitor, TBM-5500 (329). Price, \$1300.</p> <p>Time & Frequency Technology TV frequency and modulation monitors, Model 701, has high sensitivity and includes peak flasher (330); aural modulation monitor, model 702 (331); remote meter and peak flasher (332); automatic logging adaptor and digital clock (333).</p>

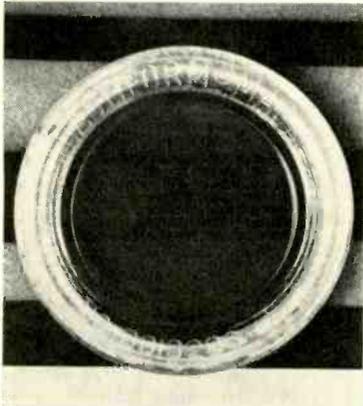
BROADCAST EQUIPMENT

New and significant

For more information, circle boldfaced numbers on Reader Service Card.

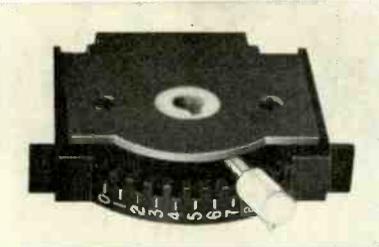
Sound effects simulator uses a separate plug-in printed circuit board for each sound; sound signals are produced by solid state circuitry. Up to five boards can be plugged at one time into interconnect assembly, along with controls, amplifier. Many sounds have controls for repetition rate, frequency, or decay time. Universal Sound Simulator System offers more than 30 sounds, ranging from a rocket launcher to an animal squeal, from a bowling strike to an audience cheer. Others on special order. **UNIVERSAL RESEARCH LABS.** **275**

New magnetic tape signal viewer uses finely-divided magnetic particles suspended in a liquid and held between glass in a disc-shaped housing which can be placed over the tape. Any re-



corded signal causes particles to collect into easily-seen patterns. Plastiform tape viewer will aid head alignment, track placement, pulse definition, interblock spacing, drop-out search, and other operations in which a view of the recorded track is useful. Resolution is sharp at the 800 bpi. level and gross flaw detection is possible up to 3200 fci. **3M.** **276**

Professional cassette system made specifically for broadcasters has high-speed automatic cueing, selective erasure, push-button control on front panel, connection for complete remote control, three-motor transport with syn-



chronous capstan drive motor, solenoid-operated capstan drive assembly. Also: a cue position for safe monitoring in fast forward and rewind. Broadcast cassette recorder and playback system has all amps, oscillators and logic modules on plug-in boards. **GATES.** **277**

Low-light TV camera can operate at one foot-candle of illumination, useful for remote live or film pickup for school sports, parades, other events with too little light for standard cameras. Moonlighter can be mounted on

any tripod, dolly, or pan-tilt assembly able to carry 25 pounds, has full complement of viewfinder controls, mechanical focus control to compensate for different lenses. Full set of standard "C" mount lenses is available, including 5:1 and 10:1 zooms. Basic price: \$1900. **K'SON/RCA.** **278**

New hi-band color video tape can record a 100 percent saturated color-bar signal, without picture break-up on playback. Chroma 90 has s/n ratio 2 dB higher than standard tapes, and a conductive back-coating which prevents cinching of the tape pack during operations or shipping and attraction of particles that cause drop-outs. Audio sensitivity and uniformity are kept within 1 dB.



Drop-outs are measured according to definition recently proposed to SMPTE. Wear of rotary heads is below 7 microinches per hour. Price no higher than current high-quality tapes. **MEMOREX.** **279**

Compact lawn plow. Used for direct burial of CATV housedrops, it has 25 hp air-cooled engine and can lay in cable at depths up to 18 inches and at speeds up to 200 feet per minute. Mini-Sneaker Lawn Plow has one-hand control of speed, direction, and braking, oscillating knife that slices ground, skid shoes that hold cut in place so no restoration

is needed. **DAVIS MANUFACTURING.** **280**

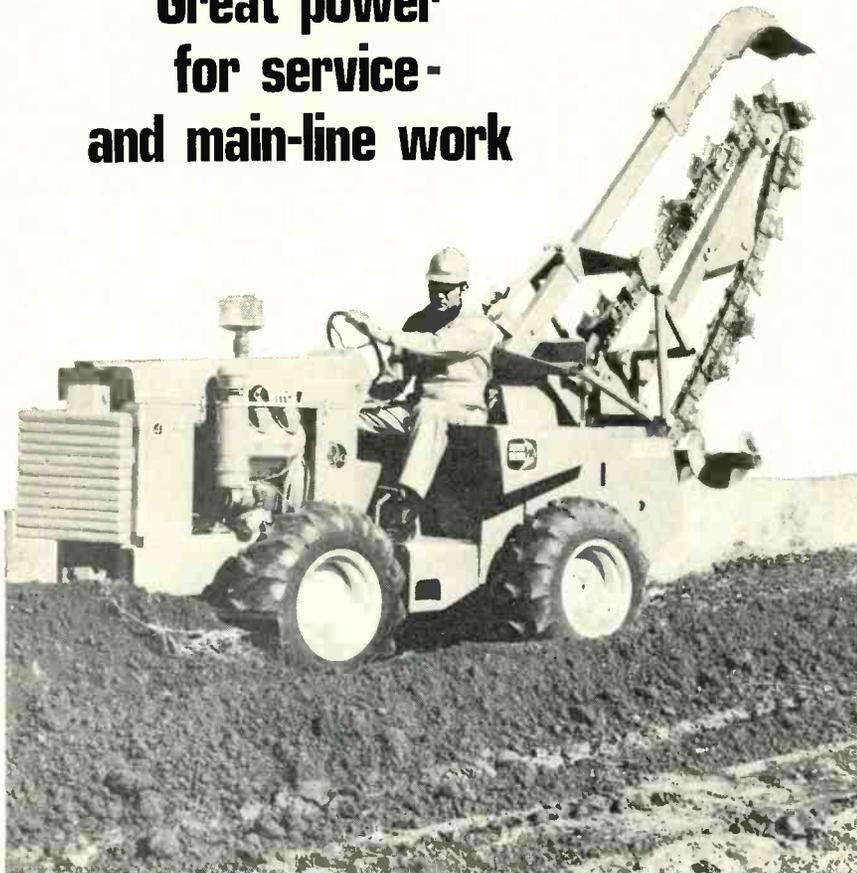
Cassette unit with DNL. Player-recorder is first machine with new Dynamic Noise Limiter for suppression of noise. DNL works with any cassette recording. Norelco 2100 also has three-position bias and equalization switch for adjustment

to regular, high performance, or chromium dioxide tape. \$219.95. **NORELCO.** **281**

Modular CATV amplifier has dual capability; can be a trunk amplifier or a line extender, depending on modules selected. Bandwidth is 50-270 MHz, and bi-directional opera-

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tion is optional in either application. **GTE SYLVANIA. 282**

Elapsed time indicator uses an electrolyte sealed into a precision glass capillary tube with metal electrode at each end. Current causes a bright copper column to lengthen. Scale on tube is calibrated in hours. Tamper-proof device is available with 1M, 2M, 5M and 10M hour scales. **FREDERICKS COMPANY. 283**

Stereo audio console. For the emerging FM radio station, it has 8 full-stereo input mixing channels; stereo output channels; optional monaural output; audition and monitor outputs; on-the-air lamp relays. BC-8A Broadcaster Console also has cueing amplifier, talkback switch, and two power supplies. \$3550 list without options, \$3975 with options. **LANGVIN. 284**

Tape deck for pro applications has 3 $\frac{3}{4}$, 7 $\frac{1}{2}$ and 15 ips speeds, built-in test oscillators at 700 Hz and 10 kHz, plug-in head assemblies for one to four channels. MX7000 also offers two- to six-pole reel motors and switching for sound-with-sound and sound-on-sound. \$1980. **OTARI. 285**

Two new loudspeakers in the Dynamic Force line have contemporary cabinet styles. 878A Santiago uses 15-inch woofer with 17-pound magnetic structure and a sectoral horn for high frequencies. Price \$399. The 874A Segovia is a three-way system with 12-inch woofer, 4-inch mid-range and dome tweeter. \$250. **LTV LING ALTEC. 286**

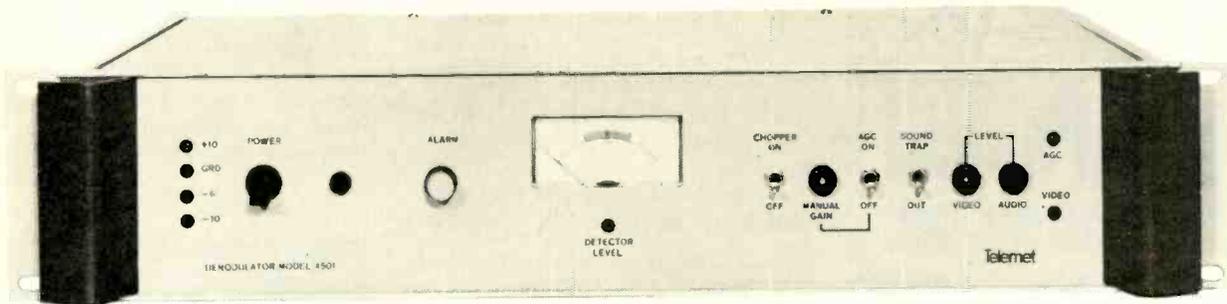
Non-trip circuit breakers give additional security in such applications as fire alarms systems, emergency power or lighting, communications gear, and so on. Series JC Security Breakers turn on manually, turn off only with a true fault condition or by remote electrical tripping. **HEINEMANN ELECTRIC COMPANY. 287**

Shotgun condenser microphone has increased resistance to pops and wind noise, compared with predecessor model. MKH 815 has the electronic and mechanical aspects of predecessor MKH 805, but increased number of slots lets new

(Continued on page 36)

GOING REMOTE ???

REMOTE REQUIREMENTS OR NOT, YOU MAY STILL BE LOOKING FOR A BROADCAST DEMODULATOR YOU CAN TRUST. SUCH A DEVICE IS MANUFACTURED IN NEW YORK BY TELEMET COMPANY, OFFERING COMPETENT SERVICE AND PERIODIC RECALIBRATION, ALL AT A REASONABLE PRICE.



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Sound traps OUT: 0 to 4.5 MHz \pm .5 dB.
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Sound traps IN: According to FCC requirements \pm 25 nanoseconds from 0 to 3 MHz then linearly increasing to 4.08 reaching 170 \pm 25 nanoseconds at 3.58 MHz.
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mike work well without windscreens or shock mount in some spots where these used to be needed. SENNHEISER. **288**

Splicers for cassette tape have felt-covered hold-down fingers. #30-652 EZE-Splice is an open block for hand cutting. #30-650 is semi-automatic, with built-in blade. GC ELECTRONICS. **289**

Stereo headphones have impedance of 200 ohms, output of 115 dB at 1 mW input. DT 480 dynamics have stated frequency range of 20-18000 Hz. Five-foot connection cable has open ends. BEYER. **290**

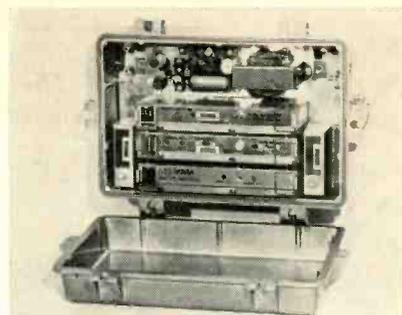
Miniature high-power dummy load gives reflection-free termination of 50-ohm systems, dissipates up to 3 kW of continuous power or 35 kW of pulsed power. Termaline Model 8701 weighs 2½ pounds, runs cool to the touch with one gallon of water per minute. Operating range is dc to 1500 MHz, with 1.1 VSWR at 1 GHz. It is useable with CW, AM, FM, SSB or TV transmissions. BIRD ELECTRONIC CORP. **291**

Eight-channel multiplexer. For medical monitoring, psychological research, engineering, physics, it can be connected to a variety of display and recording systems. Channels are identical, have differential inputs for noise cancellation, calibrated time base, triggered modes, other signal processing. Model 4701 also has automatic erase, three chopping rates, dc to 1 MHz bandwidth. TEKTRONIX. **292**

Portable support units for TV. Two compact units hold all electronics for remote or studio TV programming. Gypsy System comprises a Camera Control Console with complete multiple camera drive electronics, and a Program Control Console with monitoring and control equipment for video and audio. Each unit has handles for field manipulation. K'SON. **293**

Split capstan used on one-inch closed-circuit videotape recorders is now available in an updating kit. Ampex split capstan, standard on recent closed-circuit video tape machines, can now be installed on earlier machines that have single-piece capstans. Prices, \$100 to \$150. AMPEX. **294**

Compact cable test generator is used with any VHF field strength meter to measure many parameters of cable systems, eliminating the need in many cases for oscilloscope/sweep generator methods. Porta-Bridge, plus the meter, will measure VSWR, response and gain of ampli-



fiers, filters, and cables, noise figure, return loss. Frequency range is 48-230 MHz. SADELCO. **295**

(Continued on page 38)

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(Being more a progress report than an advertisement.)

The Promise

Thousands of people have heard 4-channel stereo reproduction at hi-fi shows and special demonstrations in the last few years. Others have read about this fascinating and rewarding technique that promises more faithful reproduction of musical performances. Early experiments have also shown 4-channel to be an effective tool in creating new sonic environments for both serious and popular musical forms. The concept has met with almost universal critical acclaim, and strong general approval.

The Problem

But alas only a handful of enthusiasts are actually enjoying this advance today. Because only a few 4-channel tapes have been produced for sale. The problem is simple, but basic: 4-channel means just that—four separate signals. And to reproduce it properly demands four of everything, right down the line.

It's possible (albeit expensive) with reel-to-reel and cartridge tape. But the stumbling block has been to put four completely independent signals in a record groove, or to broadcast them over a standard stereo FM station.

And if you can't make 4-channel discs, or play them on FM, the market is limited to a precious few 4-channel tape owners. But their numbers are so small that the record industry just can't afford to release four channel material. So the industry continues to produce 2-channel stereo that anyone *can* play (and that can be sold in volume).

The Way Out

Now Electro-Voice has moved to break the impasse. With a system that can offer the significant advantages of discrete 4-channel, yet is compatible with present record manufacturing and playback equipment and present FM broadcasting. It is called STEREO-4.

STEREO-4 is a system that encodes four channels into a stereo signal that CAN be transmitted over FM or recorded on a disc, stereo cassette or cartridge. The home listener adds a STEREO-4 decoder, plus another stereo amplifier and a pair of rear speakers. The result is reproduction that closely rivals the original 4-channel sound. Four different signals from the speakers, with a feeling of depth and ambiance you have never before heard from any record.

Admittedly, STEREO-4 is not quite the equal of 4 discrete signals. But while there is some loss of stereo separation, there is no reduction in frequency response or overall fidelity. We might note that this reduced separation actually seems to aid the psycho-acoustic effect for many listeners in normal listening situations. And on the plus side, STEREO-4 offers an advantage that even discrete 4-channel cannot provide.

The Remarkable Bonus

Playback of almost all present 2-channel stereo discs and tapes is greatly enhanced when fed through the STEREO-4 decoder. It's the result of multi-microphone recording techniques that include a remarkable amount of 4-channel information on ordinary stereo discs and tapes. Adding STEREO-4 releases this hidden information for all to enjoy.



Model EVX-4
STEREO-4
decoder

The Decoder

A STEREO-4 Model EVX-4 Decoder costs just \$59.95. And with it, plus 4 speakers and dual stereo amplifiers, the listener is equipped for almost any kind of sound available. Encoded 4-channel, enhanced stereo, regular stereo, and discrete 4-channel (assuming suit-

able source equipment). Even mono. So STEREO-4 is the one system that is compatible with the past, present, and foreseeable future.

The Present

And what about encoded 4-channel discs and broadcasts? Well, that's where you come in. Already recording companies have started mastering STEREO-4 records, and their ranks are growing. And STEREO-4 is now being broadcast in many major cities around the country.



Model 7445
Professional
STEREO-4
Encoder

The Encoder

All that is needed is a Model 7445 Professional STEREO-4 Encoder \$795.00 net, direct from the factory. The encoder is patched into your console. No other changes in equipment or handling, whether broadcasting or recording (except that you'll want to add 4-channel monitoring, of course). No increase in costs. And your performance standards are unaffected. The encoder doesn't add noise, distortion, or limitations on response. And listeners without a decoder still enjoy all the music in conventional 2-channel stereo. Some record producers even feel that the STEREO-4 encoder results in better 2-channel stereo than conventional mix-down techniques.

The Future

Like you, we hope for the day when discrete 4-channel sound will be commonplace on records and FM, and when STEREO-4 decoders will be relegated to enhancing present libraries. But that day will have to wait until some very knotty design problems are solved. And probably after a host of new FCC regulations define an utterly new system. Indeed, there is serious question whether these problems can be solved at all.

In the meantime, the STEREO-4 system is getting 4-channel recordings into the marketplace in increasing numbers, in a form that people can enjoy. EVX-4 STEREO-4 decoders are now on the market in quantity. And STEREO-4 decoder circuits are being designed into mass-produced stereo phones and receivers. Even STEREO-4 juke boxes are now in use!

What Can You Do?

Write us today for all of the technical details, plus up-to-date news of STEREO-4. Make news yourself by adding compatible STEREO-4 for your audience. It's not too soon to start planning for tomorrow!

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Camera pedestal carries up to 85 pounds, moves easily on superthane-tired wheels, has constant torque springs in center housing for finger-pressure camera raising or lowering. The 270220 Steerable Pedestal also has trimming weights to compensate load variations. Prices about \$1200 to \$1450. **POWER-OPTICS. 296**

A kit for fast title production uses white letters and numerals on black flipcard boards. Magnetite kit has four boards, four alphabet fonts, with others coming. \$120. **TELEVISION EQUIPMENT ASSOC. 297**

Microphone isolation mount is smaller than standard mounts, cuts mechanical noise in mike. The A55M gives at least 20 dB of noise isolation with many Shure mikes. It can be used on desk stands, floor stands, booms, lecture podiums. \$25. **SHURE. 298**

Cleaner for video and data tape has a sapphire knife blade in contact with the tape. The tape-cleaning blade is rated to process 12 million feet of tape before being replaced. The VI-15 tape cleaner also has a packing wheel that rewinds tape precisely even, and an automatic wiping tissue system. **KYBE CORP. 299**

Lever-operated modular switch gives access to any of eleven circuits without contacting any in between.



Slide 'n Switch is operated by pulling out lever, moving to contact wanted, and pushing in again. **SEALLECTRO. 300**

Long-life video head is made of hot-pressed ferrite, is said to increase head life four to eight times. Model 200112 uses SP-8 ferrite, and is directly interchangeable with heads on Ampex models 5100, 5200, 7500, 7800, and older recorders with rotary transformers. \$135. **SPIN PHYSICS. 301**

A color video machine with rotary 2-head system, using 1/2-inch tape, has automatic gain control and automatic color control for easy operation. Model FV-3500 is about 10" X 16" X 15", weighs 33 pounds, and uses a contactless signal transmission system. The head emits no noise. **JVC AMERICA. 302**

Field strength meter for broadcast stations has crystal controlled operation at any selected frequency in the broadcast band and reads the field strength from 100 uV/m to 1 V/m on a mirrored logarithmic scale. Model SFSM-1 has a ceramic lattice bandpass filter to cut harmonics and adjacent channel signals. It uses six standard "C" batteries and weighs 4 1/2 pounds. Certified calibration comes with each unit, at the frequency specified. Plug-in modules for other frequencies are available. \$725. **DELTA. 303**

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Two reasons why you'll probably never return a Conrac Monitor

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The high quality DZA series monitors are all solid state with quick disconnect boards, are test instruments full of features. Dual matched switchable inputs, excellent stability, keyed backporch clamp, pulse cross. DZA's are the best monochrome monitors there have ever been.

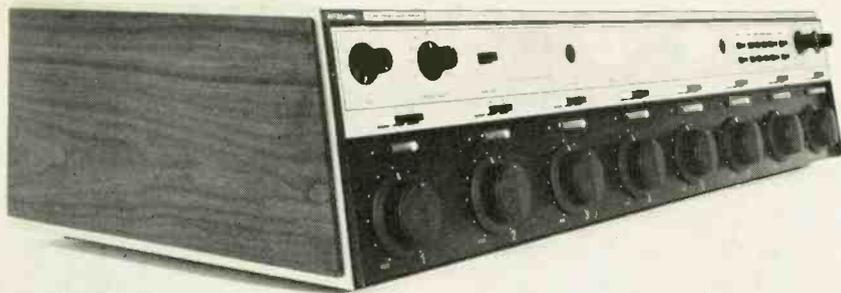
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The new 8-mixer McMartin consoles feature outstanding flexibility, ease of operation and clean-cut styling. All modules are plug-in. Up to 27 inputs may be accommodated. Highest quality components, including maintainable step-type attenuators, are used. Typical program circuit program specifications are: ± 0.5 dB frequency response; distortion of 0.5%, 20 to 20,000 Hz; and signal-to-noise ratio of 74 dB for all models. Full cue, intercom and monitor facilities are standard. Mono, stereo or dual channel models are available. The new McMartin B-800 series consoles deliver performance, operating flexibility and are priced right.

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	STEREO	
B-802.....	\$3,200.	
	DUAL CHANNEL	
B-803.....	\$2,650.	

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Broadcast Product Manager

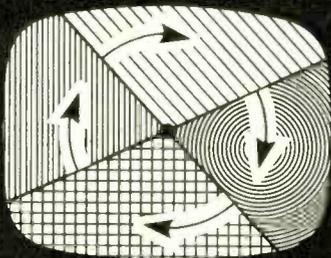
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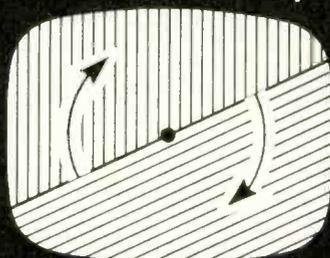
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SALE

OF THE MONTH

**Radio builds super-dairy;
21,000 come to see cows
milked**

Ken Brooks

*Account Executive, KUJ
Walla Walla, Washington.*

The Challenge: Could we carry over to a new automated milking and farming plant the image we had previously built for the dairy firm constructing the plant? Our earlier campaign had made use of the jingle, "Milk So Fresh It Almost Moos." Could we persuade a lot of people to drive to the new plant, 25 miles from town, for opening ceremonies, including a guided tour on which they could see 600 cows milked automatically?

The Solution: We sold the dairy owner a campaign of radio spots, running over eight months, to give listeners a day-by-day running account of the construction of the new plant. The plant was to be one of the only six of its kind in the U.S. Our spots played heavily on curiosity, telling how many tons of cement were poured, how much roofing paper was laid on (enough to cover three football fields). These teasers ran right up to Grand Opening Day.

And a grand opening it was, with 15,000 people on hand through two days, and about half that many more turned away because we couldn't get them in. We made the Grand Opening a month-long affair and invited people for the guided tour throughout that period. We ended up with a total gate of over 21,000. It seems safe to say that never before had a few hundred cows done their thing in the presence of so many thousands of people. About ten years ago the Los Angeles Rams and the Dallas Cowboys drew 14,500 fans to an exhibition game in Walla Walla. With the help of our how-the-dairy-got-built campaign, the Cows outdrew the Rams!

Salesmen—Let's hear you!

Send us your best sale in local market radio and TV. Follow the style you see above and, if we print your story, you'll get \$10 plus a handsome SALE OF THE MONTH certificate. Who can say NO?

CROSS-TALK

AM stereo

Dear BM/E:

With reference to your March, 1971, issue, I would like to take issue with several points mentioned in the article "A M Stereo: Just Around the Corner?"

I think the Kahn System will prove to be impractical for several reasons. The article mentioned that the system would be completely compatible with existing A M receivers—the mono listener would simply tune to the "center of the channel (to) get an L + R signal." How does the listener know if he has tuned to the center of the channel? In fact, he wouldn't and would, therefore, receive a more or less completely mixed L + R signal depending on exactly what frequency his receiver was tuned to. Can you imagine the frustration of the recording engineer who spent many hours in the mixdown of his song to achieve a good "mono" mix from his stereo record only to have all his work undone by an incorrectly tuned receiver? One can imagine the confused listener thinking to himself that he could have sworn he had heard "horns" in that song the last time he listened—or vice versa.

A statement was made that receiving stereo would be easy by simply tuning one radio to the lower sideband and the other to the upper and placing the receivers "about six feet apart and you've got stereo." What about speaker phasing? What about the probable different frequency response characteristics of each receiver? How does one determine when his receiver is tuned about "1000 Hz off center" for each sideband? I would venture to say that the reception would be a poor substitute for stereo at best.

I disagree with the statement that the Kahn System would require no more bandwidth than the conventional A M signal. If the broadcaster did in fact allow frequency response up to 13,000 Hz, as proposed, then total bandwidth would be at least 26,000 Hz. I think that's pushing a 10,000 Hz channel allotment a little bit. I also would wonder about the 100 kHz suppressed carrier used in the "encoder." If not completely suppressed—or in the case of modulation—would it not add to the bandwidth substantially? I would like to know how Mr. Kahn comes up with his assertion that the FM sub-channel suffers a loss of more than 20 dB. I don't understand that statement at all.

The article states that stereo FM in cars has "bombed." I wasn't aware that it was finished yet. Everyone

I've talked with about stereo FM is really enthusiastic. I haven't found one car stereo FM owner who would give up his "sound" for the old A M sound. And more new cars are being equipped with stereo FM than ever before. Let's not forget that A M has its unique mobile reception problems as well. Remember the fading experienced in downtown tall building areas or going under bridges? Not so with FM although FM does suffer from ignition noise problems when an unshielded Ford ignition system pulls up beside you. Mobile FM reception also suffers from occasional fluttering of the signal and even some multipath distortion in stereo reception. However, because of the shorter wavelengths, such problems are usually limited to short distances. Let's face it, mobile reception of every type is a compromise.

Because of today's already too

crowded A M band, wide selectivity receivers would be impractical—especially at night when better sky-wave conditions really jam the band. Heterodynes and crossmodulation would be unbearable in a wide-band receiver. Therefore, an A M receiver's practical upper frequency response limit is on the order of 5 kHz at best. Especially if all A M stations were using the Kahn System, meaning a lot of the receiver's band-pass would overlap the adjacent channel or even two adjacent channels.

Finally, I would question the statement that Kahn's proposed stereo A M receiver would cost only thirty percent more than a mono receiver. I can't believe that a mono transistor portable radio selling for say, ten dollars, would cost only thirteen dollars in the stereo version.

Greg L. Dean
Program Director
KEYN AM-FM STEREO

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NEW
LIT

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Catalog of precision tools for electronics and telecommunications covers, in 36 pages, adjusting tools, cleaning tools, drivers, gauges, pliers, many others. Jonard. **200**

Brochure on new oscilloscopes describes the 54 Series, which have solid state design, FET inputs, vertical bandwidth dc to 10 MHz. Tektronix. **201**

CATV Capability brochure sets forth the services and equipment available to CATV operators AELC. **202**

FCC listing of acceptable radio equipment shows licensable equipment for Domestic Public Radio, Maritime Mobile, Radio Broadcast, Aviation, and many other services. May be purchased from Cooper-Trent, Inc., 1130 19th St., N.W., Washington, D.C., 20036.

Paper on three-D television reviews a number of methods proposed, gives details on divided-frame method. Stereotronics. **204**

FM station atlas shows all U.S. and Canadian FM stations in a map format that locates instantly all the stations in each city. \$2.00. WUWM Radio, University of Wisconsin, Milwaukee, Wisconsin, 53201.

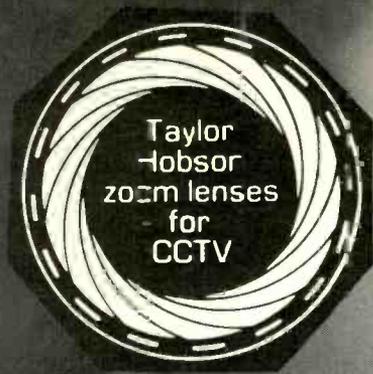
Brochure on color videotape recorder gives operating instructions and detailed specifications of Ampex AVR-1 "third generation" broadcast automated machine. Ampex. **206**

Guide to cassettes is a layman's introduction to cassette recording and playback, with use instructions and care tips. TDK. **207**

Bulletins on microwave relay equipment have specifications, functional diagrams and applications notes on MA-2H 10-watt and MA-7H 3-watt television relay system for 7000 MHz; the BX series of remodulating repeaters for the 2000-13000 MHz range; and the PAC-4 modulator and demodulator system for microwave relay. Microwave Associates. **208**

Bulletins on cable and accessories describe dielectric coaxial cables, rigid transmission lines, connectors and accessories. Phelps Dodge. **212**

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the long and short of it



Monital 5:1 f3.8
17-85MM Pocket Zoom



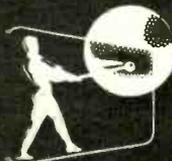
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Magnetic Products Division  COMPANY

Circle 122 on Reader Service Card

August, 1971—BM/E

Audio File Continued

an altogether far more accurate account of an audio signal than earlier phones—or than most monitor speakers, for that matter. The same applies almost imperceptibly less to the good dynamics around. I recommend a trial of the top electrostatics of Koss or Stanton, the top dynamics of Koss, Stanton, KLH, Fisher, among others, for conviction on that point.

Or take such a long-standard workhorse item as a turntable. Traditionally the turntables made for broadcast stations were much better and more rugged in design, and sold for a lot more, than home-style tables. But the competitiveness of the consumer audio industry has pushed turntable design way, way up. We can get a unit like the electronic-drive table introduced by Norelco at the show, which claims a wow figure of .06%, and there is no reason, on form, to doubt it: a number of the top designs are coming near that figure. Rumble specs are similarly state-of-the-art. It has the hydraulic lift-and-drop cue lever which makes a turntable particularly handy for broadcast station use.

Of course, we won't know for some time how reliable under hard use this, or any other, new turntable is. The significant fact is that in general design and in important specifications it is ahead of the run of turntables that have been available to the broadcast engineer for some years.

Tape machines for the consumer, both open-reel and cassette, seem to be responding faster to new technology than the pro machines. Many of the new tape machines at the show had built-in, switchable adjustment of bias and equalization for the new hi-density and chromium dioxide tapes, which take higher bias and signal than older standard tapes. A lot of them had hot-pressed ferrite heads, just coming over from video machines and not yet, unless I am mistaken, very common on pro audio machines.

Three possible examples don't necessarily make a big trend, but they do suggest that the broadcast audio engineer would do well to examine his equipment, particularly any older equipment, to see if replacement wouldn't sharply upgrade his audio signal. It might be a comparatively small investment that would pay off well in listener satisfaction.—**Robin Lanier**

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Join TelePrompTer, the largest and most active CATV operator for the best opportunities! Send resume to Roger Wilson, TelePrompTer Corporation, 50 West 44th Street, New York, New York, 10036.

WANTED: Experienced video technician. NO-RELCO PC-70 cameras, for Washington, D.C. area commercial production center. Mickey Lynch, Administrative ass't., Tele-Color Productions, Inc., 708 N. West Street, Alexandria, Va. 22314

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Broadcast journalist. Currently commentator/analyst. Ten years' radio experience. Seek position as major market reporter or medium market news director. University graduate. Married. Available immediately. Jack Marlowe, 1748 S Willard Ave., Janesville, Wisconsin 53545.

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Seven years ratings. Seeking permanent location. Contemporary preferred. "Sonny" Dodd, 204 14th St. N.W., Fort Payne, ALA. 35957 (205) 845-4158

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EQUIPMENT FOR SALE: KWVL-TV, Waterloo, Iowa, has converted its VTR machines to high band and has available three rebuilt RCA low band air bearing Head Wheel Panels, Type MI-40790-BZ. These units contain the new Alfecon II pole tip material, are in their original, factory-sealed cases, and are fully warranted by RCA. They are available for \$600 each with a used head wheel as a trade in or for \$1100 each without trade in. Contact: E. M. Tink, Director of Engineering, KWVL-TV, East Fourth and Franklin Streets, Waterloo, Iowa 50703.

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Color videotape recorders for sale. Two IVC Model 860. Almost new, excellent condition. Cost \$7,800 each. Make a reasonable offer. Phone: 904-354-2806.

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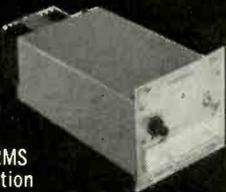
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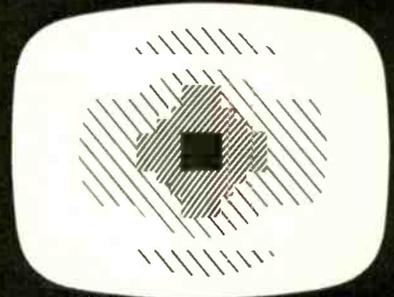
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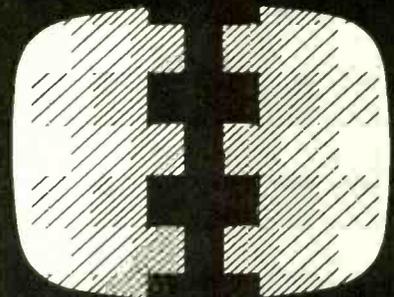
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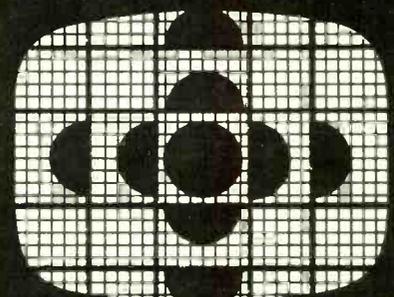
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FROM THE EDITOR

A Carrot for Cable

If it wasn't clear before, it is now. The FCC is authorizing cable TV to import distant signals into the major markets as the quid pro quo for getting some new services for the public in return.

Chairman Dean Burch spelled out the ground rules when he addressed cable industry leaders at the NCTA convention last month. It's the "supplemental non-broadcast benefits of cable that are the game," said Burch, "not sometime in the next century, or even the next decade, but starting now . . . it's not promises that will get cable moving, but performance . . ." At the very least, Burch amplified, the industry must build into every system the capability of performing a great variety of broadcast services.

It's up to the cable industry to determine what to do, Burch said, but if the only response in return for distant signals is to move broadcast signals around the country, it could expect no more favors from the FCC.

From Chairman Burch's remarks, and those of Clay T. Whitehead, director of the Office of Telecommunications Policy (who will be working with the new Cabinet Level Committee to study cable policy), it is clear that the federal government, in one form or another, will push or pull cable systems into greatness.

There is no choice now for cable except to move ahead in bold risk-taking steps. Some 13 services, which hopefully could solve some of the urgent problems of the cities, have been pinpointed by the National Academy of Engineering's Committee on Telecommunications. These services include closer communication—and interaction—between government and citizens, providing quality education, improving medical care, unclogging transportation, clearing the air of pollution and aiding crime prevention and law enforcement.

What must be understood today is that cable TV is no longer the exclusive province of private interests—of mom and pop or MSO's. Worried city governments want part of the action (and not just for tax purposes). So do educators, minority groups, visionary citizen groups of all colors, and some angry dissidents outside the establishment. The benefits of the new technology are claimed on behalf of the public by just about everybody. Some of these forces—most likely some organized black groups—will end up with franchises.

There remains, however, the reaction of investment capital before the millenium arrives. Traditional sources of capital may finance plants with two-way capability, but they are not about to underwrite new speculative unproven one-way services, let alone the installation of interactive terminals that may cost a \$100 per subscriber or more.

There are dangers ahead then in either direction: (1) from public groups and (2) from private groups who can raise capital but who will shirk in providing pioneering public service.

Let's hope the carrot will keep an impasse from developing. Let's hope that public franchisees and private enterprenuers will find ways of competing together and, in cases where private groups control all, let's hope they launch with dispatch some feasibility or demonstration projects that will bring the blue sky down to earth.*

And, since it's obvious that all new services will be hurt by exorbitant franchise fees, let's get some legislation passed that will control such regressive and unjustifiable taxes. Let's go for the carrot.

James A. Lippke, Editor

*Broadcasters not in cable might try leasing a channel to provide extra service.

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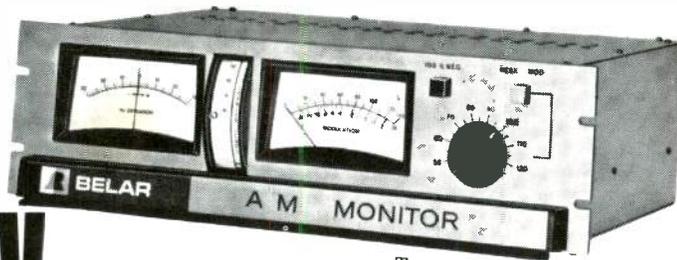
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