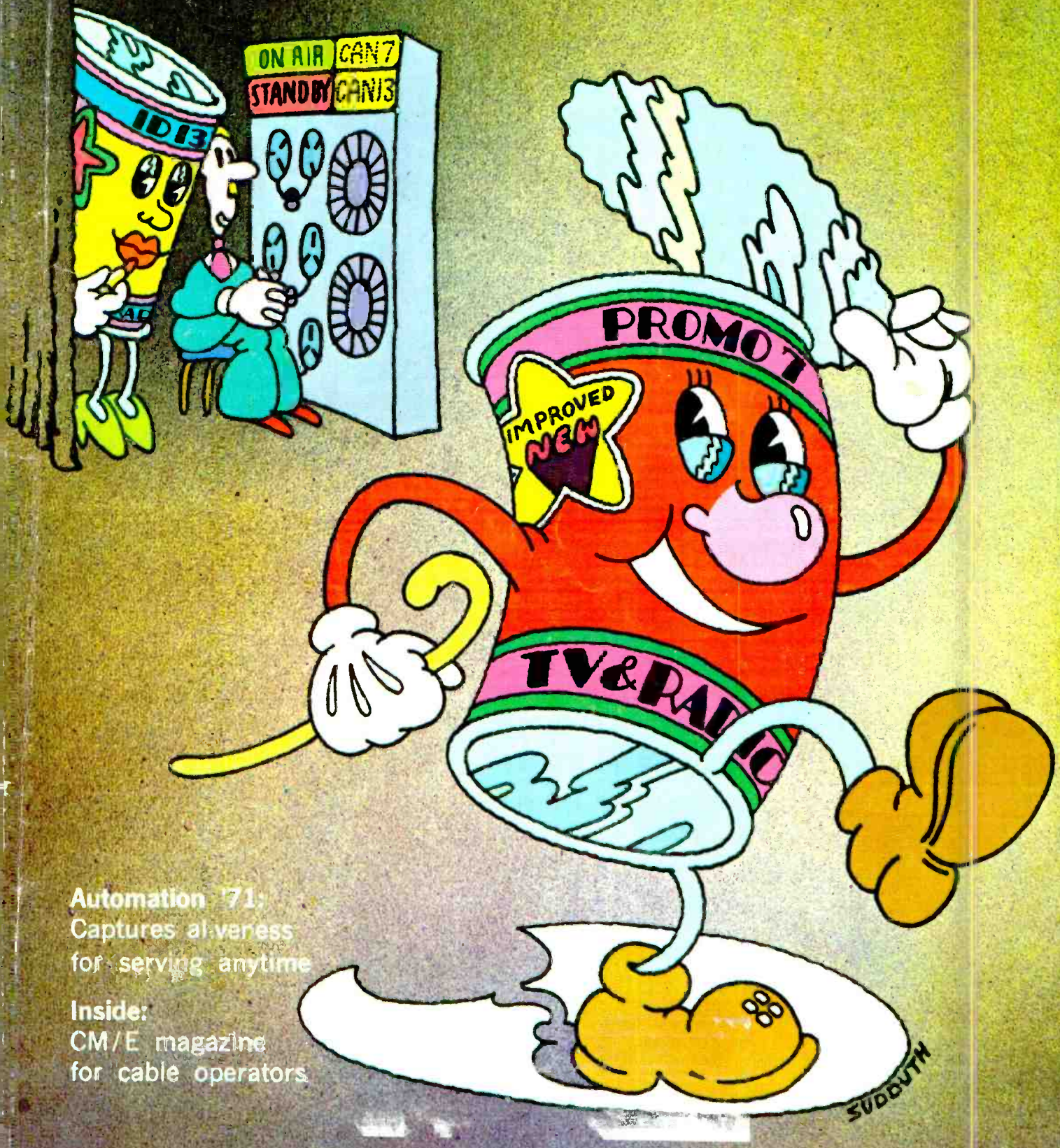
SEPTEMBER 1971

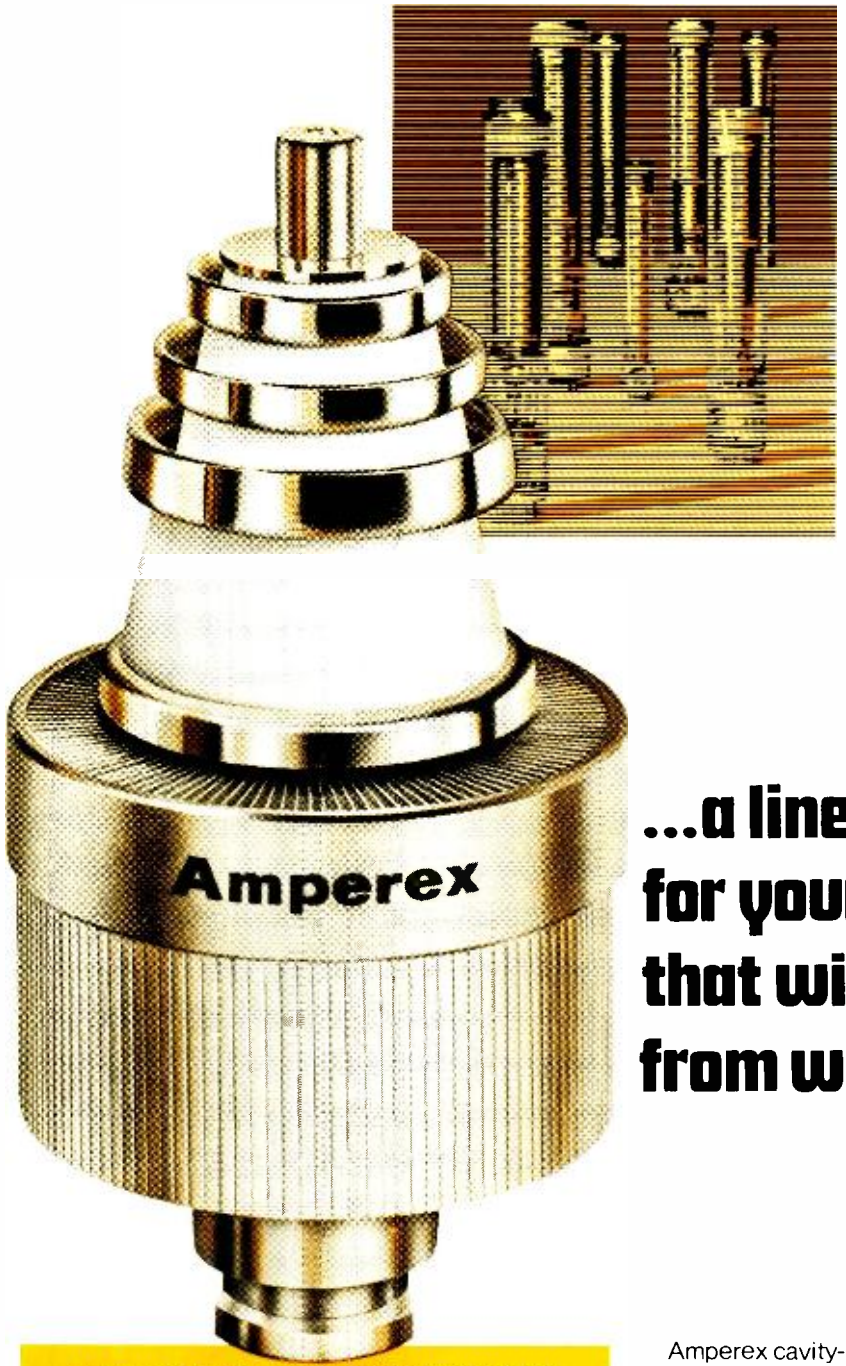
BM/E

BROADCAST MANAGEMENT/ENGINEERING



Automation '71:
Captures alertness for serving anytime

Inside:
CM/E magazine for cable operators



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8812	6.25	8.75
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You can make that canned sound more alive than if you are on the air live. How? Improve the quality of ingredients by capturing only fresh announcers and dj's; then serve piping hot on 1971 automation gear. Illustration by Sudduth.

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200 Madison Ave.
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BPA BM/E, BROADCAST MANAGEMENT/ENGINEERING, is published monthly by Broadband Information Services, Inc. All notices pertaining to undeliverable mail or subscriptions should be addressed to 200 Madison Ave., New York, N.Y. 10016. BM/E is circulated without charge to those responsible for station operation and for specifying and authorizing the purchase of equipment used in broadcast facilities. These facilities include AM, FM, and TV broadcast stations; CATV systems; ETV stations; networks and studios; audio and video recording studios; consultants, etc. Subscription prices to others: $15.00 one year, $25.00 two.
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DIGITAL MACHINE CONTROL SYSTEMS

(FOR FILM CHAINS, VTR'S, ETC.)

With the new GVG machine control system, pushbutton commands from the studio are encoded into digital form and transmitted serially on a single audio pair. The information is decoded at film or VTR locations to provide contact closures. The status of the control relays is then transmitted back to the studios for confirmation of proper operation. Each controlled machine has a unique address, so that only desired equipment will be operated.

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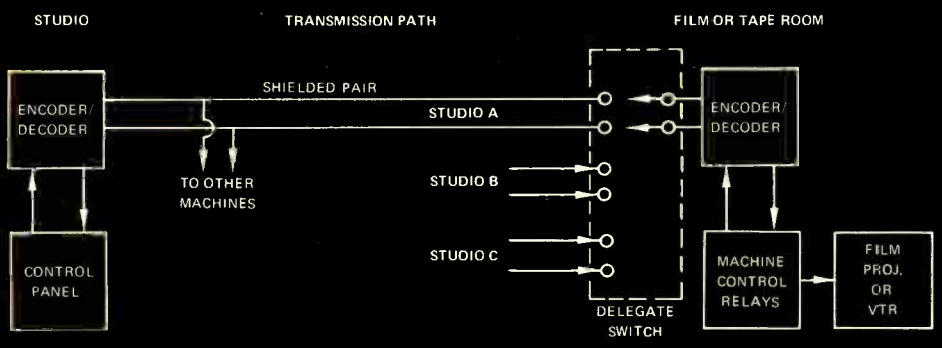
BLOCK DIAGRAM



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BROADCAST INDUSTRY NEWS

FCC's Cable Proposal: Half of All Bandwidth to Non-broadcast

The FCC's plans for CATV regulation as outlined to Congress August 5 have been reported widely. As expected, the FCC has now judged that distant signals (two) in top 100 markets can, and overlapping signals (if viewed significantly) shall, be carried. Mandatory and minimum standards have been set and, in return, cable must provide "substantial nonbroadcast bandwidth." What the FCC expects to see in the way of additional channels, access to them, total capacity and requirements for two-way have been detailed.

The report also said that technical standards will be required (within a five-year compliance period) covering frequency tolerances, visual and aural carrier levels, frequency response, terminal isolation, and radiation. Performance tests once a year will be mandatory.

Federal-state and local relations were covered. The Commision backed away from specific rules but said it would hold up applications and ask for a showing if the franchise fee to the local government was in excess of three percent, if legal and financial qualifications of the operator appeared inadequate, if the entire franchise area were not built up at a rate of 20 percent per year, and if there was no reasonable limit to the franchise duration (such as 15 years).

The FCC held off on cross- and multiple-ownership rules, rates on public access, carriage of radio, and modification of TV sets, but said it would be making further inquiries on all these issues.

The Commission promised it would tackle the copyright problem within two years if it had not been solved in the meantime. The formal rule making will come before the end of the year and would go into effect March 1, 1972.

The FCC proposal is clearly based on the premise that cable operators will usher in a new milennium in communications by happily providing half of their bandwidth for other public services in exchange for the right to carry two distant signals. UHF is protected by certain mandatory rules. The old footnote 69 rhubarb is hopefully solved by permitting carriage of overlapping Grade B signals if significantly viewed.

To figure out what is permissible, you have to follow a chain of logic. It's mandatory to carry all stations licensed to a specific market that are within 35 miles of the cable system (in markets smaller than 100, all Grade B signals shall be carried upon request). Further, it's now mandatory to carry Grade B signals coming in from adjoining markets if the system is wholly within 35 miles of the station and if the station gets at least a three percent share of viewers at any given time and has net weekly circulation of 25 percent or more (meaning one-quarter of all TV households have tuned to the station at least for five minutes a week—using ARB measurements).

Under the new rules, viewers are guaranteed a certain minimum service which is three networks plus independent stations as follows: markets 1-50, 3; markets 51-100, 2; smaller markets, 1. If these minimums aren't met by the mandatory requirements, distant signals will be required.

If, in the top 100 markets, two distant signals are not necessary to meet the minimum requirement formula, they are available as bonus additional services. Preliminary FCC studies show that significant viewing of overlapping market signals will make up minimums so that most top 100 markets will have a choice of two additional distant signals. Distant UHF stations get priority and leapfrogging rules have been set.

Further, all educational stations within 35 miles must be carried and, on request, those delivering predicted Grade B signals. Others can be carried if there is no objection.

The FCC report envisions "a future in which the principal services, channels used, and potential sources of income will be other than over-the-air signals." Accordingly, the Commission spelled out priorities for non-broadcast use. Basically for each broadcast signal carried, equivalent bandwidth is required. One free dedicated, public-access channel will be required. Two other channels—one for educational use and another for state and local government use—must be set aside for five years for "development" purposes.

After these three channels are made available, the remainder of the bandwidth shall be made available for leased uses. Part-time users get priority over those who would lease full-time. No rigid rules governing access and control are expected. The FCC is looking for experimentation.

The FCC said that new cable systems have built-in the capacity for two-way communications. No details were given, but one sentence said viewers should also have a capability enabling them to choose whether or not the feedback circuit is activated.

CRTC Sets Policy: Less Bold Than USA

The Canadian Radio-Television Commision declared a public policy for cable in mid-July which is designed to integrate cable with broadcasting—mainly Canadian broadcasting.

Significantly, the CRTC decided that cable TV should pay for the Canadian programs it takes from stations. It suggests a payment based on gross revenue per mile and requested the broadcast-cable industry to decide the fee. Copyright payments (not yet set) were viewed as not equitable to stations.

A priority system for carrying Canadian services was set up after which up to three USA signals could be imported. The CRTC authorized substituting Canadian ads for USA commercials if desired by Canadian stations. Cable TV is still prohibited from selling time.

(Continued on page 8)

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If you are contemplating a switching system, you should take a look at DYNAIR's Series-5100 equipment.

- 30-MHz Bandwidth
- No limitations on input/output configuration or capacity
- Any type of control including pushbutton, thumb wheel, dial, or computer interface
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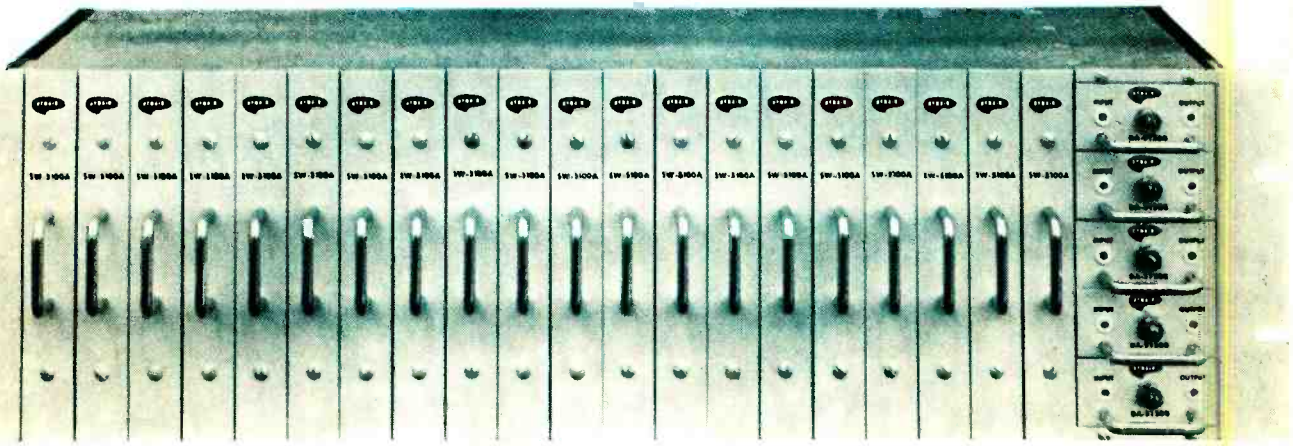

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Available in 3, 6, and 12 KW capacities, 120 or 240 volts, 50 or 60 Hertz. All UL approved.
Colortran lighting control systems are the most reliable and outstanding performers on the market today.
So . . . for the system that can't be beat — go Colortran.
For more information, write for illustrated brochure.

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Five-year licenses are anticipated. Heavy local programming was encouraged but the topic of two-way communications got no attention. Use of midband was anticipated as necessary.

TV From the Moon: Great

Anybody who watched the marvelous colorcasts of Dave Scott and Jim Irwin at work on the moon knows that the pictures had high quality, considerably above that of TV from earlier Apollo missions. That was a triumph of collaboration between the main antagonists in the great color war of the 1940's.

The moon camera was built by RCA, but uses a revolving color disc installed by Columbia and operating in its sequential field system, the system that lost out to RCA's color dots in the drag-down fight over color methods. The higher resolution and light efficiency of the color disc method presumably won it a berth on the moon trip. Also essential to the fine results was RCA's silicon intensifier target tube, with an image matrix of silicon diodes and a light amplifier which make the tube usable over the extreme light range, from near darkness to blinding sun.

Other communications giants had large shares in the Apollo 15 TV production. Comsat's Intelsat satellites relayed a good part of the live moon material to the Houston Spacecraft Center, and then took it from there, along with the domestic networks, and spread it around the world. Western Union, ITT, and AT&T, under special FCC authorization, furnished various links in the splash-down coverage, joining the USS Okinawa with Intelsat III, New York, San Francisco, and the Jamesburg, California, satellite earth station.

"Public Access" Cable Channels Get Big Start in New York

Both of Manhattan's cable outfits gave elaborate send-offs to the opening of their "public access" channels, required under their franchises with the city. Sterling Manhattan, which serves the southern half of the island, announced a contract with the American Foundation on Automation and Employment, under which the Foundation will establish a Community Television Center with complete studio and recording facilities connected directly by cable to Sterling's system. The facilities will be

(Continued on page 50)

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140-Series Generators give you the solid foundation needed to originate sync and subcarrier and to test all, or parts of the total TV system with highest-quality test signals.

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For many applications just one generator is required. See the chart for a summary of performance. Other TV Products are available from Tektronix, Inc. Ask your Field Engineer about the 140 Series and Picture and Waveform Monitors, Vectorscopes, TV Oscilloscopes and TV Accessories.

Features	140	144	146	147
EIA Sync	●	●	●	
Gen-Lock			●	●
Color Bars	●	●	●	
Linearity	●	●	●	●
Multiburst				●
Pulse & Bar				●
Window				●
Field Squarewave				●
Noise Test				●
Two VITS Composite				●
APL Bounce				●
VITS Addition	●	●	●	
VITS Deletion & Insertion				●
Remote Control				●
Video Insert		●		
Convergence Pattern	●	●	●	
Vertical Interval Reference (VIR)				●

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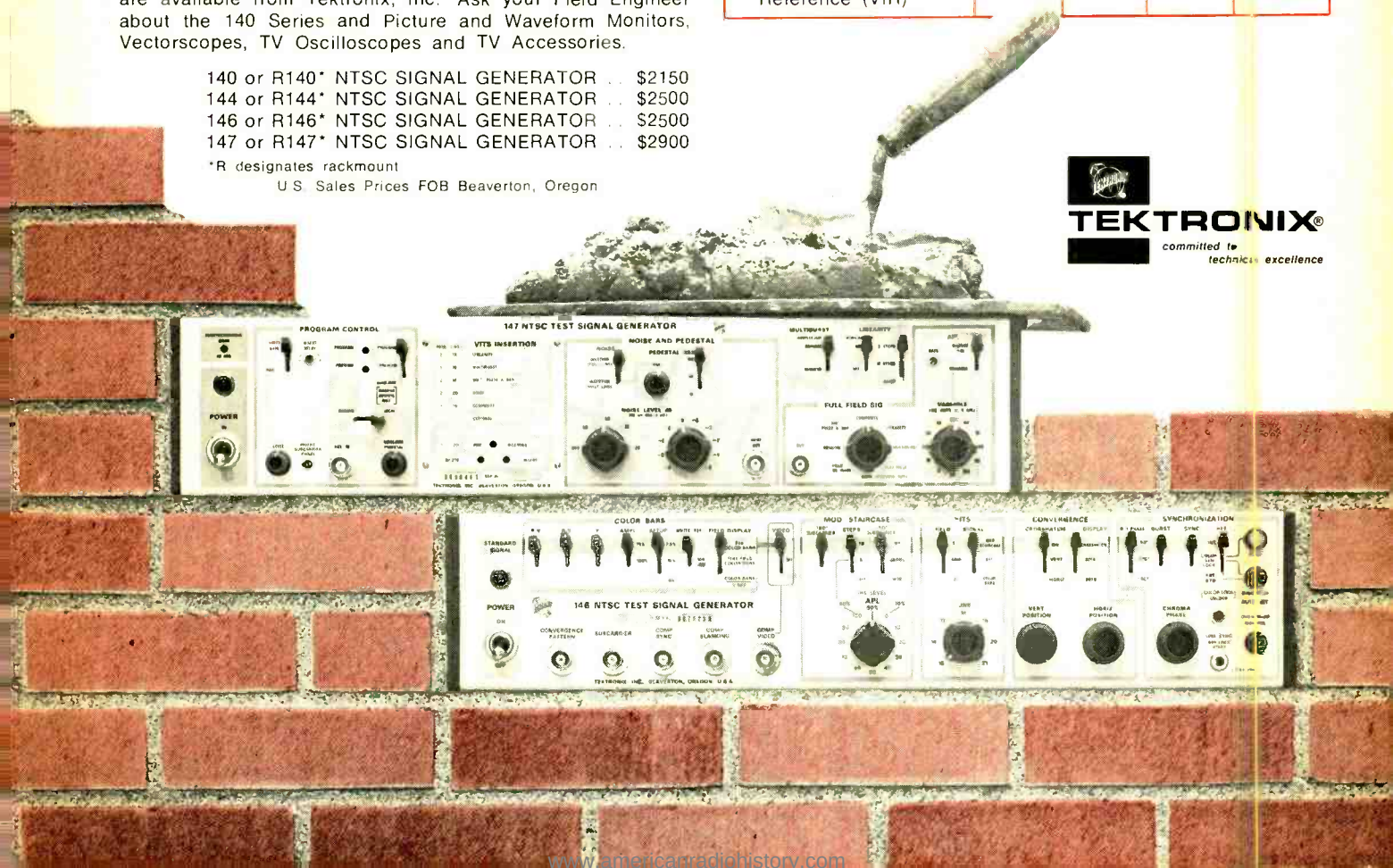

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with a Norelco color camera that uses triaxial cable.

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Savings with the new Norelco triax cable cameras are immediate and substantial. Our $63,000 figure is a *conservative* estimate, calculated by determining such normal (and inevitable) costs as initial outlay for cable, set-up and strike, cable repair and storage, and depreciation, and extending the good news over a five year period. We repeat, $63,000 is conservatively estimated. In checking our cost figures against your own, it is almost a certainty that you will arrive at an even greater saving. For the down-to-earth facts, send for our paper, "The Economics of Triaxial Cable Color Television Cameras." It will allow you to define *your* savings in detail.

Norelco PC-100A...the only camera with A.C.T. Plumbicon* tubes ... solve high-contrast problems at the source.

Here's the camera that introduced two revolutions in color television. A cable revolution—using light, low-cost triaxial cable. And a tube revolution with the new Anti-Comet-Tail "A.C.T." Plumbicon.

A new gun design gives the A.C.T. Plumbicon tube an unprecedented dynamic range (inherent overbeaming capability equivalent to five or more f-stops overexposure) with no washout or loss of detail even in action scenes with brilliant highlights and deep shadows. It's standard in the PC-100A, and the contrast problem is defeated at the source . . . not partially offset through complicated, costly, extra-option hardware. As a bonus, the A.C.T. tube handles low-light situations with matchless fidelity.

This is the camera that stunned every audience at NAB with its remarkable reliability . . . with quick, easy assembly . . . three and one-half minute cable butting . . . and sparkling color pictures that were called "the best color television picture ever achieved."

Norelco PCP-90B...the only broadcast-quality portable. It operates ☐ RF fully system-integrated ☐ Triax system-integrated ☐ Backpack-to-VTR fully N.T.S.C.

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AUDIO FILE:
FOR BETTER IDEAS
FROM AUDIO ENGINEERS

CBS Labs Quadraphonic System Is A Quality Answer

COLUMBIA'S "SQ" FOUR-CHANNEL SYSTEM, announced in early summer, is shaping up as a powerful entry in the great race to find a way of bringing four-channel to a wide public in a system compatible with records, tape, and FM broadcast. In demonstrations heard so far, it seems easily the best of the methods of encoding four channels into two, for recording and broadcast, and decoding back to four in playback.

Columbia and Sony have announced that they will join in commercialization, with Sony readying decoders and Columbia getting a batch of encoded records in hand for early winter release. Other firms are already negotiating for licenses to build the decoders, which will be issued on a royalty-free basis by Columbia. At press time there was no positive news of other record companies joining the SQ parade.

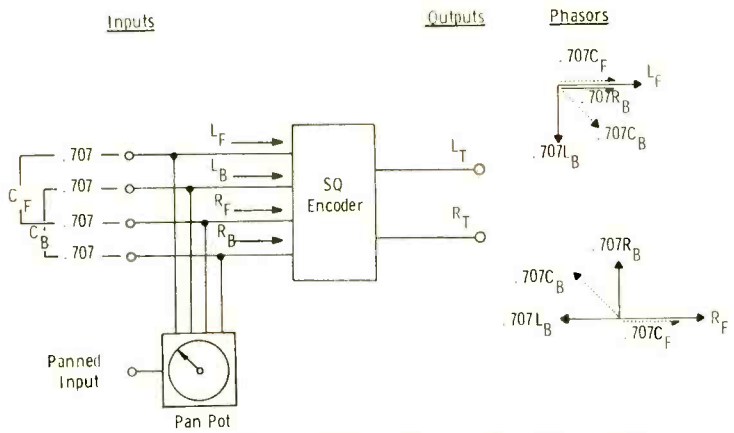
An earlier version of SQ was demonstrated to the record industry (but never to the public) about two years ago. The Columbia management apparently did not catch fire on the earlier method, and the project was allowed to rest in limbo while other encoding systems came on the market and were aggressively promoted.

The trade talk is that pressure from Sony, with which Columbia is associated in Japan, caused the Columbia management to take another look at SQ and spurred a renewed effort to improve the system on the part of CBS Laboratories, the technical developer.

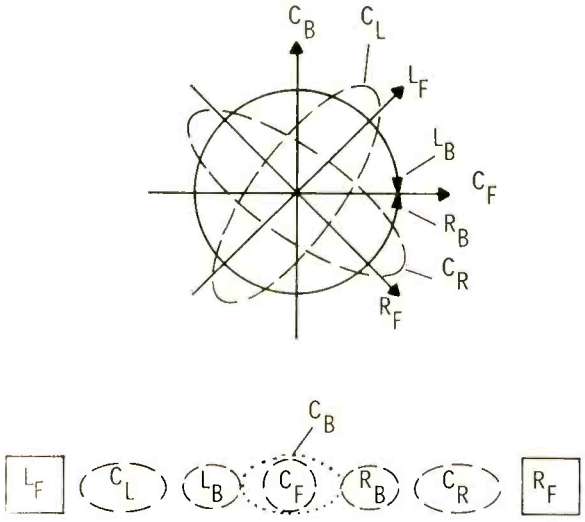
That fresh effort, by a Columbia Laboratories team under the direction of Ben Bauer, vice president of the Labs, has obviously sharpened SQ considerably, and the Columbia financial and artistic managements are now said to be whole-heartedly behind the system. In a private demonstration, *BM/E*'s reporter could understand why. Program material encoded and decoded by the new SQ system can be compared directly with a discrete four-channel reproduction of the same material, with truly insignificant perceivable differences. The sound image seemed to stay where it was supposed to be just about all the time; the listener was never assailed by a sense of uncertainty as to who was where or what was going on around him. Sound poured from any corner of the room, or from all-four together, just as the maker of the original recording had intended that it should.

A complete technical description of the SQ system is slated for an early issue of *BM/E*. Here we mention a psychoacoustic principle which has been put to use, and also note the novel "helical modulation" method used to encode the two back channels.

(Continued on page 48)



Input and output phasor relationships in the SQ encoder.



Upper diagram shows stylus motions as related to placement of stereophonic images on SQ encoded record.

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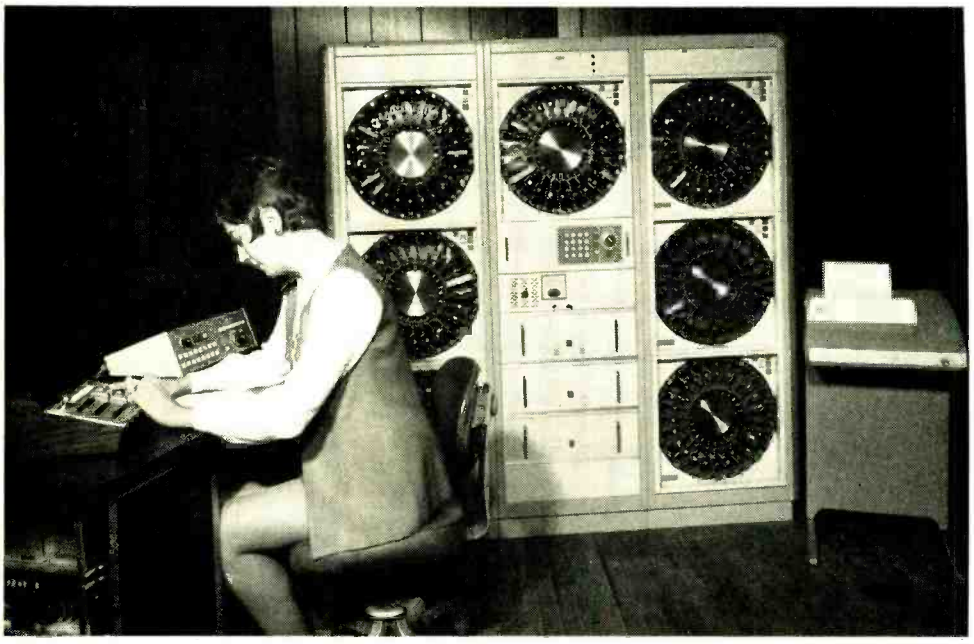
AUTOMATION SYSTEMS

— by the makers of the Carousel



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dp-1
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system

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INTERPRETING THE

FCC RULES & REGULATIONS

Multiple Ownership Rules

In March 1970, the Federal Communications Commission adopted far-reaching rules designed to restrict multiple ownership of broadcast facilities. Broadcaster reaction to these rules was swift. The Commission received a barrage of Petitions requesting the FCC to reconsider its actions.

In response to the hue and cry of the nation's broadcasters, the Commission modified its initial order restricting multiple ownership and adopted new, important rules.

Since all licensees are affected by the rules on multiple ownership, the following data should be carefully read and analyzed.

Background of New Rules

The FCC's multiple ownership rules (§73.35, §73.240, and §73.636) are essentially divided into two parts: (1) the "duopoly" rule and (2) the "concentration of control" rule.

In effect, the "concentration of control" rule attempts to foster maximum competition in broadcasting and to promote diversification of programming sources and viewpoints by limiting one party's ownership of broadcast facilities to seven AM, seven FM, and seven TV stations (with no more than five VHF stations). The "duopoly" rule attempts to promote additional diversification and competition by forbidding ownership of identical facilities (e.g., two AM's) with overlapping contours. For example, a party cannot own an AM station in community "A" if he already owns an AM station in community "A," or in an adjacent community if the two 1 mV/m contours overlap. More broadly, the duopoly rules prohibit the same party from owning, operating, or controlling more than one station *in the same broadcast service* in the same area. However, this rule has not prevented the ownership of stations of a *different* service in the same area; hence, many communities have an AM, FM, and TV facility owned by the same licensee. It is this latter situation that the Commission's *Order* of March 1970 was designed to restrict.

The new provisions adopted by the Commission in March 1970 retained all the preceding standards, but proscribed future acquisitions of common ownership interests in different broadcast facilities in the same area or "market."

As initially set forth, the new rules would not allow an additional grant of a license to a party who already owned one or more full-time stations in the same "market" as the proposed new station. Thus, a party owning an FM station in a community, for example, would not be allowed to construct or purchase an AM and TV station in the same "market" or community.

Initially, there were exceptions to the new rule, but they were highly restrictive and affected only a minute number of licensees.

The basic exception involved Class IV AM stations (those assigned to 1230, 1240, 1340, 1400, 1450 and 1490 kHz) in communities of less than 10,000 population. The Commission in its initial *Order* said that, in these areas, AM licensees would be allowed a license for an FM station *even though the two stations would be in the same market*. However, the converse was not permitted: an FM licensee in a community of less than 10,000 population could *not* obtain an AM station or construction permit for a new AM station in the same "market."

Certain other Commission "exceptions" were directed to the many AM-FM combinations that now operate throughout the country. One exception covered facilities in which an FM station has been constructed as an integral part of the AM station: the same tower has been utilized, the same studios are used for production, and the like. This exception allowed a broadcaster to receive a license for an existing AM-FM combination in the same market or a "proper showing;" that is, a demonstration that economic or technical considerations preclude separate sale and operation of the AM-FM combination.

March 1971 Rules

The Commission's rule to prohibit common ownership of AM-FM combinations in the same community received the greatest comment from broadcasters. Strong opposition was received. The opponents strenuously argued that the restrictive new rules would hinder FM development, that in many communities independent FM operation is not viable, that FM channels would lie fallow as the result of the rules, and that in selling AM-FM combinations often there would be no buyer for the FM station separately and the result would be that the FM station would go off the air. It was also argued that the AM-FM non-duplication rule recognized that AM-FM combinations in small markets are not in a position to program even 50 percent separately, yet the rules would not only require 100 percent separate programming, but separate ownership as well.

In response to the deluge of broadcaster petitions, the Commission reconsidered its rules with respect to common ownership of AM-FM combinations in the same community. By *Memorandum*

(Continued on page 16)

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A new number one from number one.

RCA's TT-50 FH. The latest from the company that's been number one in TV transmitters since TV began. It's the most solid state VHF color television transmitter ever made. It uses the latest technology.

Performance specs are 100 percent better than any previous generation transmitter.

For example, visual amplitude vs. frequency response went from ±1.5 dB to +0.75 dB. Modulation capability (visual) from 10% to 3%. Subcarrier phase vs. brightness from ±7° to ±2°. Differential gain from 1.5 dB to 0.5 dB maximum. And harmonic radiation from −60 dB to −80 dB.

The TT-50FH has solid state diode modulation at carrier frequency and sideband shaping at the output, so you get greater assurance of spectral purity than from any other transmitter. With only two tuned visual amplifier stages, the TT-50FH is easy to maintain. The fewer stages, the less adjusting, the less chance for trouble. You make an adjustment and it lasts. Because the design is reliability itself. Circuits are solid state design up to the IPA. Only three tubes in each transmitter. Only two tube types. And solid state control logic. That's more solid state than any other transmitter. Planning unattended operation? The TT-50FH is designed for it, with provisions for automatic logging and remote control. It's the only VHF transmitter specifically designed as a twin system, which fulfills the FCC's requirements for remote operation with once-a-week inspection. Because it has built-in redundancy.

That's what superior performance is all about. That's what the TT-50FH is all about. The number one transmitter from the number one company.

RCA

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FCC continued from page 14

Opinion and Order (FCC 71-211) released in March 1971, the Commission declared:

> . . . [T]here will be no rule barring the formation of new AM-FM combinations.

In arriving at its 1970 decision to preclude future common ownership of such AM-FM combinations, the Commission acknowledged the fact that in most cases existing AM-FM combinations in the same area may be economically and/or technically interdependent, and that financial data submitted to the FCC by independent FM stations indicated that they are generally losing money. Therefore, the Commission initially adopted rules permitting the assignment or transfer of combined AM-FM stations to a single party *if* a showing was made that established the interdependence of such stations and the impracticability of selling them and operating them as separate stations. In so doing, the Commission observed that although "this would not foster our objective of increasing diversity, it would prevent the possible closing-down of many FM stations, which could only decrease diversity." However, in reconsidering its initial *Order*, the Commission declared:

> The matter of common ownership of AM and FM stations in the same market is raised again in the petitions for reconsideration. Having consequently reviewed the subject once more, we are now of the opinion that although it is a close question, it is the better course to delete the rules pertaining thereto. Hence, there will be no rule barring the formation of new AM-FM combinations. And there will be no requirement of a special showing on the sale of such combinations. In other words, applications involving such matters will be treated in the same fashion as before the institution of this proceeding. The so-called one-to-a-market rules will thus apply only to combinations of VHF television stations with aural stations in the same market. (As indicated hereafter, combinations of UHF stations with aural stations will be handled on a case-by-case basis.) As a consequence, all conditional grants of applications for assignment of licenses, or transfer of control of licensees, of AM-FM combinations in the same market made since this proceeding began will have the condition deleted.

Obviously, the new rule is a boon to all licensees who are contemplating the sale of their commonly-owned AM-FM facilities. So too, the prospective purchaser may realize he is receiving a more economically-sound package. However, there may be an ominous cloud on the horizon. As the Commission further declared in its new rule:

> We are deleting the rules concerning common ownership of AM and FM stations, partly because we intend to examine the matter further. Thus, attention is called to the fact that in the *Further Notice of Proposed Rulemaking* issued in this proceeding, we stated, as we have on other occasions in recent years, that FM should not be an adjunct or supplement of AM, but that both AM and FM should be integral parts of a total aural service.

Noting that its initial *Order* invited comments on possible forced divestiture of commonly-owned stations, the Commission said that the record compiled as a result "may prove helpful in dealing with the AM-FM problem." Additionally, the Commission declared that it will soon institute a rule-making proceeding to explore the question of whether broadcasters should provide *additional* hours of non-duplicated programming on the FM facility of commonly-owned AM-FM stations.

What will the future bring? It is difficult to forecast in light of the Commission's sudden reversal of its policy; however, it is safe to assume there has been a substantial relaxation of the previously restrictive rules governing common ownership, and there will be lengthy future studies before new rules are again adopted.

Conclusion

In sum, there is currently no rule barring the existence of present, or formation of new, AM-FM combinations.

Additionally, the multiple ownership rules have been somewhat relaxed concerning common ownership of UHF and radio stations. Under the March 1971 *Order*, UHF licensees (or transferees or assignees) may file applications to build or acquire radio stations (AM, FM, or AM-FM combinations) in the same market; however, such applications will be handled on a case-by-case basis by the Commission.

It should be noted that the rules prohibiting VHF television licensees from acquiring AM and/or FM facilities in the community still apply. Conversely, AM and/or FM licensees may not acquire a VHF television facility in the same market.

Existing licensees, and those who desire to acquire broadcast facilities, should be intimately aware of the Commission's rule governing common ownership of broadcast facilities; in case of doubt, your counsel should be contacted. **BM/E**

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the long and short of it

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21-210MM Zoom

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Radio Automation '71

AMERICAN TECHNOLOGY gives us wealth, power, and human freedom from many inhuman monotonous jobs. So the litany goes. But, as critical analysts are quick to point out, instead of mastering our new environment with our new tools, we often become slaves to them. We accept mechanical constraints and end up having to direct human effort in service of the machine! If this description was once true of radio automation, it is certainly less so in 1971.

In 1971 you can get the benefits of automatic switching without compromising your format in any way. You can get equipment tailor-made for your station or you can buy flexibility that can do almost anything now or in the future.

Extreme flexibility, however, may be quite costly. The material that follows presents automation from the perspective of both users and manufacturers who are trying to serve users.

These pieces should erase the mystery of automation and ease any apprehensions that have heretofore blocked you from seriously considering automation for your operation.

Plan before buying

Program Director Al Rogers, WFRE, says you can get what you want, but *know* what you want.

SO YOU'VE DECIDED TO AUTOMATE your radio station because you heard where some guy in Bigmouth, Texas, is running his whole station with one office girl and a spastic watchdog for $72.50 a week? Forget it. If that's your reason for automating, you're dead before you start. Even though you'll probably wind up saving money, the only real reason for automating is programming efficiency and control.

Ideally, automation will enable you to program what you want, when you want it, the way you want it, without having to worry about a hung-over morning man, a hypochondriac not showing for the night shift, or where to find a part-timer for the 6 a.m. Sunday trick.

Let's look at how we automated WFRE, a 9000-watt stereo station in Frederick, Maryland, with its fair share of personnel and program control problems. Hopefully, it'll give you an insight into how to plan for automation.

We began our planning for automation about 18 months before we ever put the system on the air. It soon became apparent that if we were willing to spend the money, we could come up with a system that would do everything from programming the station for six months in advance to turning on the coffee pot ten minutes before sign-on. Obviously, we had to decide just what we needed to do the job, and at the least possible cost.

Our first step was to analyze our programming in detail. Since we were contemplating a format change to try to offset some sagging ratings, we started from scratch. We wanted a good music station—mostly music, with at least four unannounced songs in each cluster. We would limit ourselves to no more than 12 commercials in each hour—with eight as the ideal. We would carry ABC-FM news at :25, local news at :55. We'd carry both community news items and a station promotion feature once each hour. We wanted the correct time after every music cluster, and Uncle Sam required station identification at prescribed times. It all totaled to over 40 separate program elements each hour. In addition, we noted certain existing programs we wanted to retain—locally-sponsored sports shows, weathercasts, and the like.

We now knew that our automation system had to program about 40 functions an hour, 18 hours a day, without a full-time babysitter. However, since our AM operation, WFMD, was always manned in the next room, we decided we could live with a machine that required some manual manipulation.

Having decided to lease our music tapes from Altofonic Programming of California, we required four music tape decks to get the mix the way we wanted it—one deck each for up-tempo, medium-tempo, and down-tempo instrumentals, plus one deck for vocal selections. To accommodate our commercials, we decided that the system should accept programming for enough commercials to last us as long as one set of music tapes. That being six hours, we elected to use two 24-bay sequential carrousel units: eight spots an hour for six hours gave us 48 spots. For time checks, a time announcer was required. Two outboard single-play cart machines would be required for our features, local news, and community news items. And, since we wanted to carry ABC-FM news at :25 instead of live at :55, our system not only had to insert the network news, but record it and cue it up as well.

Since we are required to keep a program log, and since the system would eliminate the guy who could never find his pen to check off the spots, the system had to keep a legal program log. There are three basic types of logging used in automation today: English Language Logging, where a teletype spits out a fully-legible log as the day pro-

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gresses; Digital Logging, where a specially adapted adding machine spits out a coded log as the day progresses; and Audio Logging, where you simply record everything you broadcast. Since our traffic department prepared a daily schedule, we chose Audio Logging combined with verified loading. The logging tape would be our legal log, while the checked-off program schedule would be our billing and internal log.

We then had to decide on the basic control concept for our system. The big rage these days is the programmable memory unit which enables you to store all kinds of programming data in a computer-like memory system. However, since *all* automation systems are basically sequential switching systems—where one event follows another in a pre-determined sequence—your choice of system control can best be determined by deciding if your programming will require frequent changes in the basic format. If every hour is different from every other hour, you're going to need a memory system of some kind. However, since WFRE's programming was essentially the same every hour, we went for a sequential system that could set up the sequences for an hour's time and then repeat that hour's sequence over and over.

As is apparent, we had now decided three crucial things: what we expected of the machine; what the machine could expect of us; and what we wanted our on-the-air sound to be. The next step was to decide who would build our system. We were pretty sure that our system should be built to our specifications and not be an off-the-shelf unit.

We began talking with representatives of the three major manufacturers of automation systems. We gave them our requirements; they gave us their bids. It is interesting to note that all three tried to talk us out of our decision to delay our network news by ten minutes. Two of them wouldn't include an automatic network delay in their bids. The third included it in the bid, but emphasized that it was a jury-rig system. Frankly, this turned us off. We wanted our system to program our way. We weren't about to bastardize our programming just to accommodate the machine.

In checking with other automated stations, we found a general dissatisfaction with inflexible systems. Thinking that our best bet might be one of the smaller manufacturers, we put in a call to Broadcast Products, Inc., of Rockville, Maryland. Within 48 hours, Jim Woodworth was in our offices and we were designing our system. We gave Jim our requirements . . . he made a few suggestions . . . and within a matter of hours he submitted a bid on a system that would do everything we wanted plus quite a bit more. And we were especially pleased when the bid turned out to be about two-thirds that of the other companies.

The rest is best documented by the fact that we took delivery of our system nine weeks later and ten weeks later had it on the air. It's been running merrily ever since.

To recap, our system includes ten inputs of recorded material, plus the option of going live at any time. Four music-tape decks provide the melody. Two sequential carrousels program up to 48 commercials without reloading. A time announcer, synchronized with the master clock, announces the time four times each hour and, when necessary, also gives the station identification within the legal

Automation at WFRE. Rack at left includes, from the top, silent sense unit, VU monitoring panel, digital master clock and time-activated control circuit, slow-speed audio logger, and, at the extreme bottom, the automatic time announcer. The automatic network delay cart to extreme left was cropped out of photo. Four reel-to-reel music transports and two carrousels make up the two remaining racks.

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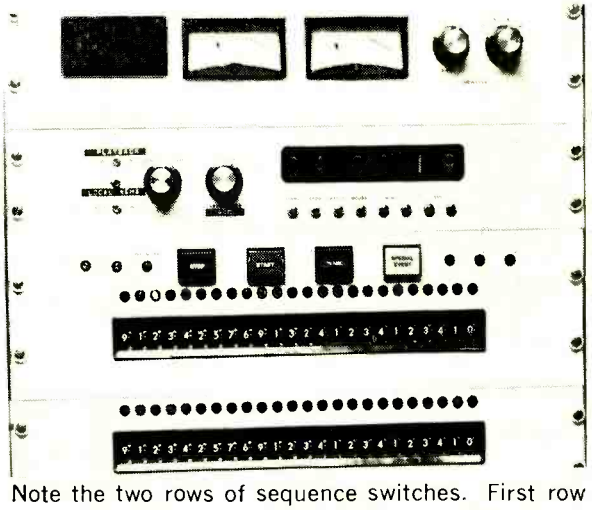
windows. The entire system corrects itself to real time twice each hour. News is added as described earlier. We can insert special events without disturbing the programmed sequence at the push of a button, and we can re-program as much as 90 minutes in advance. Since installation, we have discovered versatility we hadn't counted on.

We attribute our successful automation at WFRE to pre-planning. Before the system ever went out for bids, we knew exactly what we wanted. Once the machine was installed, we dry ran it until we all knew what everything would do. We made sure our entire staff understood the system, how to operate it, and how to get it to do what we wanted of it.

Our automated programming has been extremely well received both by the listeners and by the sponsors. Phone calls and letters have been both significant in number and complimentary. Sponsor response has been very satisfactory. In fact, as I write this, we are in the middle of the first "Sold Out" day on WFRE. That spells sponsor acceptance in any man's book!

Before automation, WFRE required a staff of three full-time and two part-time announcers. After automation, we were able to operate with only one full-time air-man. It takes the equivalent of one-man-hour each week to program, load, and take care of the additional recording work required by automation. The system itself operates for less than the cost of one air-man a week. Our rented music tapes add another half-man's pay. Each station, of course, would have to determine its own cost factors, based on local pay scales, depreciation time, and system cost. Obviously, without our AM station next door, we would have required a more sophisticated and more expensive system.

Each automation installation is different, and the end result—the on-the-air sound and operating convenience—is entirely up to you. If you don't pre-plan and know exactly what you're going to do before you do it, you'll be disappointed. We planned our system. It works the way we expected and we're happy!



Note the two rows of sequence switches. First row normally takes care of first half hour, the second one the latter half. There are nine sources: 1, 2, 3, and 4 are music decks; 5 and 6, the carrousels; 7 and 8, carts; and 9, time announce and station ID.

For maximum flexibility, consider the computer

Jack Krebs and Earl Bullock of Schafer Electronics sing the praises of computer control— smoothness and resourcefulness

THERE IS HARDLY A BROADCASTER TODAY who doesn't express some interest in producing his daily programming automatically. Although a variety of reasons are given, there are two that seem to stand out markedly: 1) He needs to improve his overall sound, and 2) he needs to make better use of his personnel.

He would like to provide a good consistent sound from sign-on to sign-off, but finds this difficult in a live operation, particularly in markets outside the top twenty-five. He simply cannot afford consistently good voices or experienced operating personnel. Through automation he can achieve a professional sound all day long.

He very often is fighting the problem of too much overhead and would dearly like to cut back in personnel, but cannot because his live operation requires the people to be there at all times. He observes much non-productive time of various members of his staff throughout the day. The use of an automation system would free people from many routine operational procedures so that they could be used more creatively elsewhere.

Most broadcasters firmly believe that their format is the one that satisfies the listening audience best, and are highly reluctant to make any changes for fear that they will lose in ratings and revenues.

For that reason, the broadcaster is concerned about what changes in his format, if any, would be forced by the automation system.

He should know that a well-designed computer system (the Schafer 8000 is one and our functional description applies to it) will make it dead simple to use his present format exactly, or any other format he develops a desire for in the future. Such a system can be set up to control a broadcast station's programming all day, 24 hours, for seven days of the week, without repeating itself. No two time segments need to be alike unless the operator sets it up that way.

Besides controlling the broadcast programming, the computer can do a lot of other things around the station, like turning on or off the news wire, the air conditioner, the coffee pot; also putting power on the transmitter filaments and plates, automatically signing the station off the air, and beginning the daily on-the-air stint. Whatever other routine chores you would like the computer to take over from your people, it will take over and carry out perfectly. The staff can arrive at 8:30 a.m., for example, and immediately give all attention to important people-activities,

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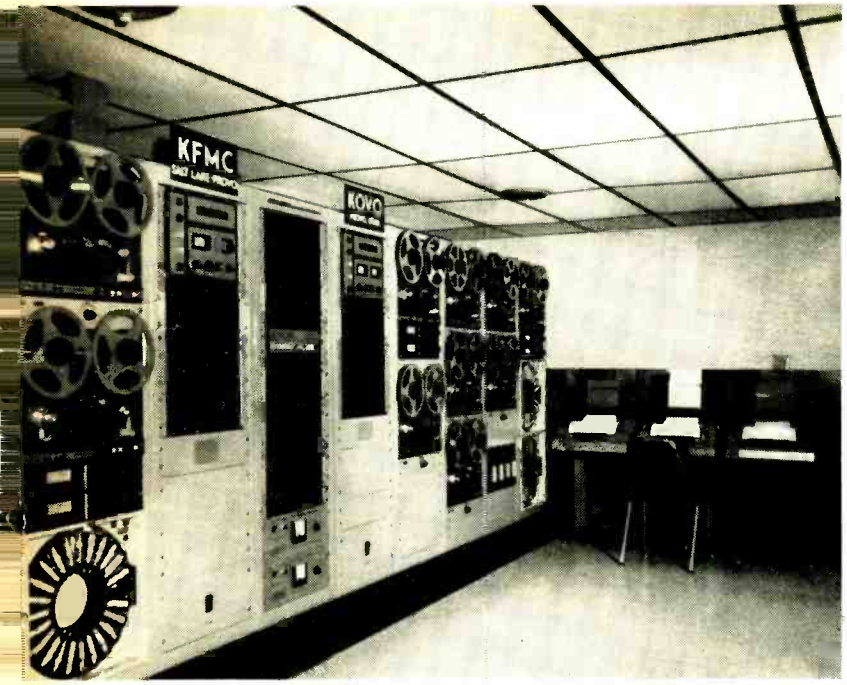


```
* 11:54:57A  FORMAT 06
* 11:57:16A  P FILL          AMEN'S THEME                    A  C
* 11:58:41A  SPTR 1    57    AKRON STORE     :59 LC GG    105.00
* 11:59:40A  AUDCLK                         :18 LS KKKK STA   0
* 11:59:58A  J NET
* 12:05:31P  L NET
* 12:05:31P  FORMAT 03
* 12:05:31P  MUS 05          PEPSI #3        :30 NC BBDO   48.00
* 12:06:01P  AUDCLK                          :20 LS KKKK STA   0
* 12:06:21P  MUS 06          CAMPBELL #1     :30 NC JWT    55.00
* 12:06:51P  MUS 01          DICK CLARK SHOW    LC PART
* 12:09:05P  MUS 02          MIMI                            A  C
* 12:12:23P  MUS 05          NEW CAR #4      :30 LC TIM    55.00
* 12:12:54P  MUS 03          WINDY                           B  1
* 12:13:30P  FORMAT 04
* 12:16:12P  SPTR 1    54    PEACE CORP #2   :59 PSA
* 12:17:13P  AUDCLK          COCA COLA TS    :21 LC GY     30.00
* 12:17:34P  SPTR 2    43    BELL TELE #5    :61 NC JWT   105.00
* 12:18:35P  MUS 01          WHAT NOW MY LOVE                A  C
* 12:20:46P  MUS 02          LULLABY OF BIRDLAND             B  1
* 12:23:08P  MUS 03          CECILIA-V                       A  C
* 12:25:38P  SPTR 1    55    JELLO           :59 NC BBDO  105.00
* 12:26:37P  AUDCLK          BOY MKT TS      :15 LC TM     60.00
* 12:26:51P  MUS 04          SPINNING WHEEL                  B  1
* 12:28:30P  FORMAT 05
* 12:29:40P  MUS 06          LAURA SCUD #2   :30 NC FRD    48.00
* 12:30:11P  AUDCLK                          :15 LS KKKK STA   0
* 12:30:27P  MUS 05          PEPSI #3        :30 NC BBDO   48.00
* 12:30:57P  MUS 01          NORWE GIAN WOOD                 B  1
```

A Schafer 8000 system controls two stations at one studio in Provo, Utah (see separate report on KOVO, page 25). Partial listing of daily log from computer above.

like sales or preparation of commercials on tape in the production room.

The system can produce a verified log that will satisfy fully the requirements of the FCC. The log is entirely in clear language, on a printed form as specified by the station. This is a big help to the program director in checking what has just been aired. It does the job much faster than the conventional tape logger.

The computer has been around for quite awhile now and computer technology is very highly developed. All a computer needs to have the kind of total resourcefulness outlined in the foregoing is sufficient memory capacity and software worked out to meet the needs of broadcast control. The software can even (as in the Schafer 8000) be designed so the computer is programmed in *plain language*—no special computer language or code need be learned by operating personnel.

As a result, the system is so easy to handle that it takes only one or two people. That's why the word "computer" should not scare the broadcaster: it is much more comfortable to live with than many "simpler" systems.

Let's see in more detail how programming can be done.

The computer is programmed to control various reel-to-reel and cartridge playback devices by the operator who simply types *in plain language* various commands, such as . . . "Play station ID on the hour and the half-hour, and play random-access spotter number 1, cartridge 3, every quarter-hour on Monday morning and . . . musical selections." These commands are typed on a typewriter keyboard located at the system or the secretary's desk. As we said, no special codes are necessary.

The reels of tape and cartridges are then loaded into the system. Music is usually on reel-to-reel playback decks because of their inherent high fidelity characteristics, and commercials can be on either reel-to-reel or cartridge playback devices.

Now, let's go back to format programming of a radio broadcast. As stated earlier, the computer system can handle 24 hours of daily programming with seven different days of advance scheduling. That's a lot of events to be stored in the computer memory files, but today's computer can handle it.

How many events can be stored in advance? The question should be turned around: how many do you want? How many do you need for a week—normally? How many station ID's, time announcements, weather, commercials, music selections, network joins, studio joins, and other events are necessary to provide one full week of station programming? Two 8,192 × 8 memory stack modules normally supplied in the Schafer 8000 computer are enough for most stations, but if more are needed they can easily be added.

Determination of memory requirements is made initially by a study of the station log. Since it is typical for a radio station to repeat its format on a weekly basis, the software can be designed so the computer will program next Monday just like last Monday, except for the changes that do occur, such as an account lost or one gained. The new commercial is recorded on a cartridge, which is inserted into the system. The operator tells the computer when to play it merely by typing in a command. It's that simple.

The computer also does a remarkable job of time keeping. Auxiliary functions, start/stop, commercials, network join and leave, and other events normally done at precise times in a live operation are handled easily. Synchronized to the line frequency, the computer not only calls for all time

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events when scheduled, it also tells the logger typewriter to print the time before each log entry.

A page from a Schafer 8000 log is shown on page 21. The time, playback identification, and what was aired are listed in each entry. The time and playback identification is entered by the computer but the rest of the data is printed only if a tape did in fact play. Encoded digital information on the cartridge tape is read by the computer which feeds it to the logger typewriter. Music selections will log the title, artist, and licensing source. Schafer recommends that commercials be encoded with the advertising client's name, length of commercial in seconds, whether local or national, who gets the selling commission (by showing the salesman's initials or agency's initials), and dollars for the airing. With this information, automatic billing can be accomplished on a weekly or monthly basis.

Simultaneously with the automatic typing of the log, a paper punched tape is fed out of the logger. The tape has the same information as shown on the typed log punched in ASCII code. It can be fed into a data processing computer for billing purposes. If the station is near a data processing center, the tapes can simply be taken to the center for processing. If the station is not near a processing center, or is part of a group ownership, a time-sharing computer terminal might be installed.

The quantity and type of playback devices required for an automation system differ from station to station. Some require more commercial playback devices than others, or some will want 12 or more hours of walk-away time, which takes more music playback capacity. The number of hours of music storage on an automation system largely determines the walk-away time.

The computer senses 25 Hz and 150 Hz switch tones at the end of each taped event so as to go on to the next event. Should a tape be broken or a playback malfunction, the computer senses "silence" and automatically goes on to another event with no resulting change of program timing. Should the station manager hear something being aired that shouldn't be, such as a dated commercial that should have been removed from the system, he simply punches a button on the front panel and the system will clip the wrong event and immediately play the next event scheduled. This button is labeled "panic" and these situations always seem to be just that.

Even if the power fails, the system knows where it is in its programming schedule. When the power is restored, the logger types out the time and prints the statement "Recovery." The broadcaster knows what has to be made up in the way of commercials.

This computer system, when used properly, can make your programs sound *better* than "live." There is incredibly smooth control from event to event, with overlaps and segues at the proper places to enhance a station sound immeasurably. No longer does automation need to produce a "canned" sound. The new advances in computer technology make it possible to give programs more "life" and smoothness than most broadcasters can achieve with available personnel.

The broadcaster will certainly wonder about maintenance of a computer. He might say, "We have no computer-knowledgeable people around," or, "How do we fix the thing if it fails?"

The computer itself is all solid state, and is the device in the system that is likely to give the least trouble. Should a rare failure develop, however, the station engineer can easily service the computer, because the *type* of failure will help identify the plug-in printed circuit card that should be repaired or replaced. In addition, field service is available from the manufacturer.

Any playback device can be removed from service for maintenance simply by telling the computer to ignore it in the scheduled programming. A simple command restores it to operation. Provision for manual control of all playbacks is also included. Thus maintenance of the computer system is no more of a load factor than the usual station maintenance.

To sum it all up: The reasons for automating are simple. Today's advanced state of the art in computer technology has made it possible to produce a system that reduces operating costs in four areas:

- Production (better use of disc jockeys and other production personnel).
- Preparation of the daily log.
- Accounting—customer billing can be automatic.
- Walk-away time.

In addition, every program can have a professional, truer-than-live sound that can only benefit a station's ratings. These should be welcome advantages to the broadcaster with competition as keen as it is today.

Achieving cost effective automation

We asked IGM to discuss picking just the right amount of equipment to save dollars. Lee Facto, v-p station relations, responds.

EVERY BROADCASTER KNOWS TODAY that automation can save money. It's much more than just the payroll dollars: automation can boost profits in a number of other ways, too.

Consider:

- Automation can eliminate, substantially or wholly, the operator errors that cost money in lost revenue and make-goods.
- It can take over the mechanical, button-pushing jobs so that people are free to do the creative

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things that only people can do. That translates into dollars and cents through, for example, more effort and imagination in selling.

- It can drastically reduce recruiting and training costs. Most broadcasters are eternally looking for, and training, new people. Automation will let you operate with fewer, better, and better-paid people who are more efficient and more stable on the job. That can put you ahead in dollars and cents even if the actual payroll saving is small or non-existent.
- Automation can give you for the first time, or at the very least greatly improve, continuous managerial control of the whole program format and of each element in it—music, talk, spots, etc. That might be your biggest plus from automation because finding *and holding* the right format is, as everyone now acknowledges, essential to a broadcaster's success.

Those are things that automation *can* do and, if it does produce any or all of those benefits, it is "cost effective" and a good investment.

But what automation actually *will* do in your case depends on careful matching of the automation system to your operation. How does the broadcaster go about making the right choices? If he chooses wrong he can be worse off with automation than without it.

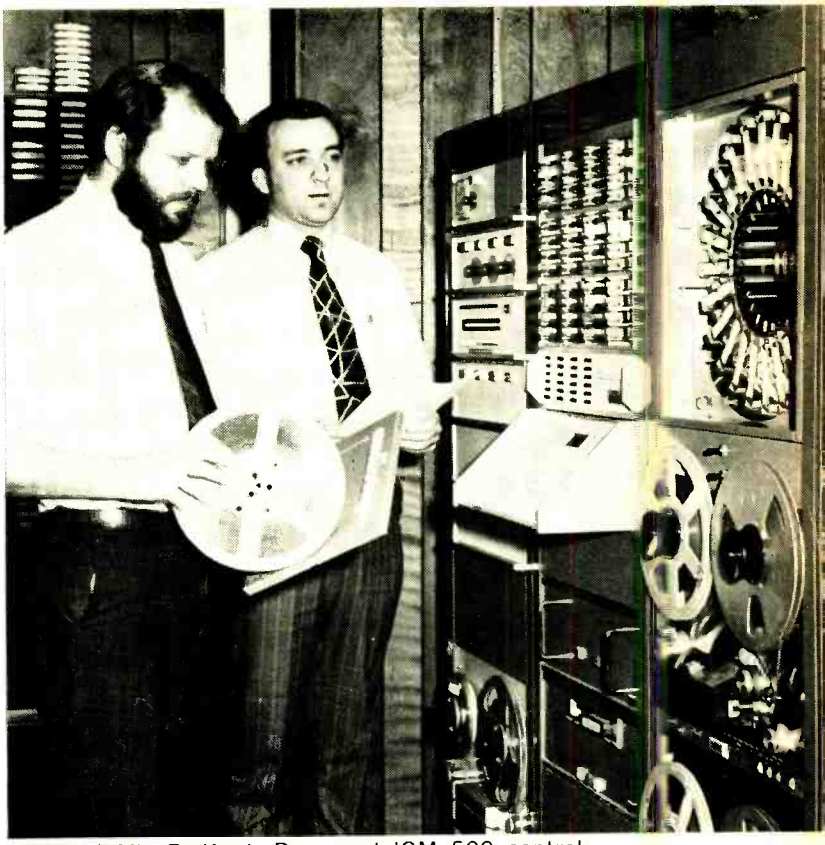
The first step is *not,* as some broadcast managers have contended, to turn the engineering department loose on the problem and wait for their recommendations. The results are sure to be less than optimum and they may be disastrous.

The *right* first step is a careful analysis of your program requirements by the management and programming departments. After the format requirements have been spelled out, the engineering department should focus closely on *satisfying those requirements* with equipment of reliability, and reasonable cost. If engineering on its own tries to put together a system that will do anything programming might ever ask for, the system will probably not do any one thing particularly well and will be far too costly besides.

The first thing to pin down is your music format, particularly the sources of programming. What class of inputs will you need—open-reel, cartridge, whatever? How many of each? What kind of control over the program sources will be needed? For example, if you will use pre-programmed music tapes with a complete balance of music on each reel, including the announcer, each reel represents a "show" in itself. There is no need to mix two or more tapes together to make the program.

In this case, a "module," or standard control system, will do the job. Even if two tape transports are to be mixed on a simple basis, as by alternating, no special control will be needed.

If, on the other hand, your format calls for two or more transports to be mixed in more complicated patterns, you will need some form of music sequencer. This unit sets the order of play among the tape transports and can be preset for some period such as a half-hour or hour. The



WBFM (AM), Bedford, Pa., used IGM 500 control system. Format is locally-recorded, unannounced MOR music. Voice track (which averages eight minutes per three-hour show) is separate. Set up includes three transports, a carrousel and Instacart with 200-step MOS memory.

music sequencer will also schedule the intros, if they are on a separate source, putting them fore, or back, or both, as desired.

By adding together the total number of sources, you can choose the number of "modules" and the class of sequencer you need. We at IGM feel it is very important that you choose the combination of control units you need *now* for the format you have decided on *now*. If your format changes later, then, with our equipment, you can add or delete modules, as needed, at minimum cost. We think this kind of add-on capability is desirable in most automation installations.

You must also analyze the "talk" elements of your format—news, spots, PSA's, time, etc. Will news be live or recorded? If it is to be recorded you need a playback device and input module. If it's from the network, you need a network joiner. An analysis of the network schedule will indicate how simple or sophisticated the network joiner need be. The same analysis applies to ID's, jingles, time announcements, temperature. You need an input control, such as the IGM "talk module," for each source. If these features go out on a formatted basis, every hour or within each hour, always at the same times, no other control is needed.

But if you broadcast them in some hours but not in others, you need some form of pre-settable clock matrix to turn them on at the right times.

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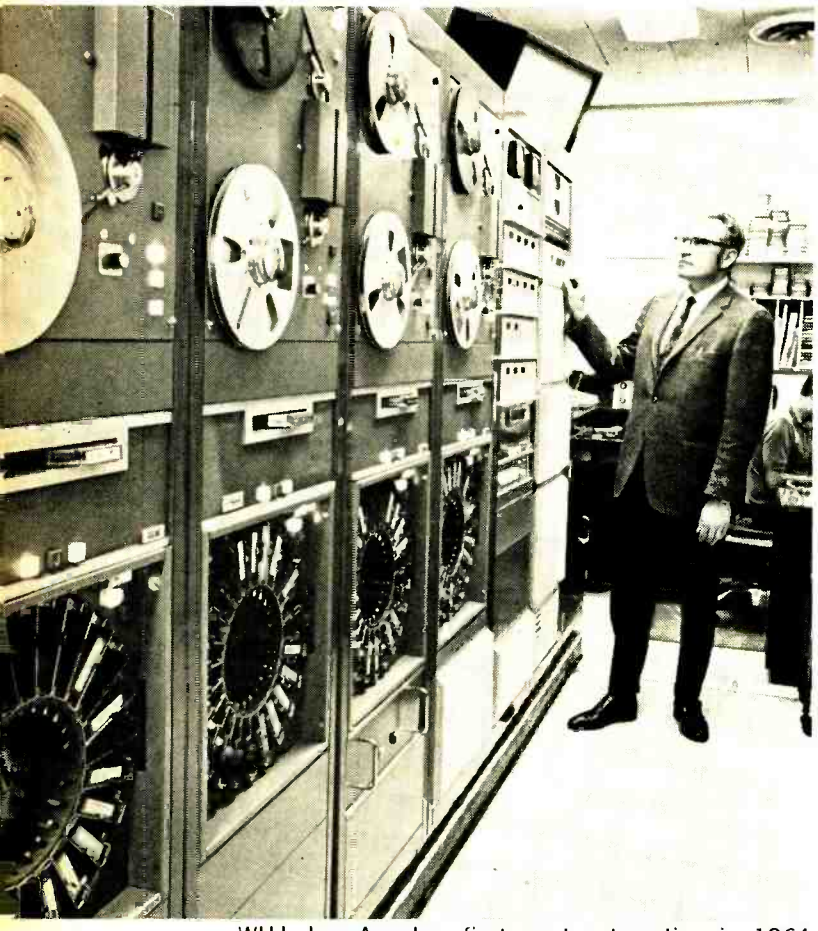
IGM peg clocks can pick out five-minute intervals in a 24-hour day.

The spot load usually takes more study. First, determine the number of accounts active at any one time. If you get all the copy for one account on one cartridge, then you need the same number of carts as you have accounts. If this is too expensive you must establish what you consider to be a reasonable loading period, and then refigure how many carts you need to hold your accounts. That way, you can determine how much investment in cartridge storage is justified with your operation and your budget. You have to find the trade-off point between equipment expense and increase in loading labor.

Next: Can you do the job with sequential loading of cartridges, or do you need random access? Generally, if you run even a comparatively small number of accounts, say less than 100, more than twice a day each, random access will quickly pay for itself in labor savings and program flexibility.

But you need random access equipment that will make each cart instantly available.

IGM "Instacarts," or carrousels operated by IGM's MOS random select memories, are available in various configurations and can be tailored to fit almost any requirements. If your traffic schedule calls for double or even triple spotting, an Instacart is ideal in that every cartridge is instantly available for play without search and cue-up time. Carrousels or random access reel-to-reel spot sources can often present real problems for the traffic department because spots must be scheduled in an order that makes it possible for the equipment to find them and cue them up in time. In many systems, this means the equipment is dictating to the traffic department as to when a particular spot can be run. The busier the station is, spot-wise, the bigger the problem.



WHJ, Los Angeles, first went automation in 1964 but updated in 1970. It selected IGM 600 system which works on punched cards because of compatibility with accounting equipment.

Of course, it should be the other way around. The traffic department should be able to put the spots exactly where they want them. Equipment like our Instacart and memory system combination has the ability to do exactly that. Whatever equipment you choose for this job, you must look for the qualities that will let you handle *your* spot load, easily, surely, with minimum labor input. And some form of modular plug-in construction, which lets you expand or contract the system to meet changes in the load, at low cost, will be a good investment probably in a majority of installations.

However, a simpler and less expensive unitized system may be right if its functions satisfy your needs, and if the probability that you will *change* your format is very low. Again, you have to figure the trade-off between the chance you will later need more capacity than the unitized system has, and the saving on the original investment.

What about program loggers? Unless you go to a far more expensive computerized system, you must make up the original programming "by hand," as a guide to loading the automation equipment and setting up the memory control. Automatic loggers give you a printed record of what actually goes on the air, showing the exact time in hours, minutes, seconds. Depending on the complexity and cost of the logger, it may tell you simply that a certain *program source* was on the air at the stated time; or it may identify programs *within* that source. The latter kind is right if you use an automatic cart machine for spots: the traffic and billing department will have positive evidence that each particular spot and feature actually went on the air.

If you want to integrate your switching system completely with your traffic and billing departments, a way to do it is with automated switching actuated by a *punched card* system, rather than by selector switches and music sequencers. The same cards form the basis for completely automated billing, traffic, and accounting. Our Model 630 is such a system. With standard card-handling equipment, you can get in very short order an avails report, a prelog or schedule, produce the FCC log, get out your bills, provide accounting reports, etc.

Finally, it is possible to mix automation with some "live" operation with excellent results, if that fits your format and the personnel you have. For example, some stations use either the card-

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controlled system or the memory-controlled system with live announcers. The automation frees the announcer from any operation chores: he can concentrate on being creative and entertaining on the air. Such a combination operation can bring you the profit-boosts and smoothness of automation even though it perhaps does not make a substantial reduction in your payroll.

The conclusion is: just about *any* station can benefit from automation, in money saved and in smoothness of operation, *if the automation is matched to the station's needs.*

Announcers prefer automation to platter spinning

Mel Elza, KGRC, Quincy, Illinois, told the NAFMB conference last spring that the staff can learn to love automation.

ELECTRONIC EQUIPMENT, which functions automatically when instructed by a highly qualified and knowledgeable programmer, can clean up a rather unpredictable format. It's time to get the announcer out from behind the turntables and give the true programmer a chance to show his talents.

The key to good automated radio is not whether the equipment manufacturer can come up with the system to fit your needs, but can you come up with the personnel to format automation.

When we decided to go to automation at KGRC, we had to overcome doubt by our people who were sure a live operation would sound better. Our first step was to set a goal that KGRC would have a live sound.

We analyzed the approaches used by old-pro announcers and picked the best ideas and techniques used in various markets as a standard for us. By the time we signed on, we had created a sound more alive and professional than anything else in the market.

We don't have a manager, secretary, and janitor operating our automated station. It takes professional radio personnel—fewer than a live operation, but all automation believers.

KGRC deejays take 15 to 20 minutes to do their three-hour show and the other seven hours and forty minutes are spent creating effective commercials and station image. Automation has increased their efficiency—we feel each man is equivalent to three in a live operation.

A deejay's concentration span during those 15 minutes of recording produces a better product then when he is on the air three hours at a time. Result: a professional sound 24 hours a day.

Those announcers who said it would never work now tell us that you couldn't get them behind a live turntable again.

Southern Illinois University Automates

WSIE-FM, Edwardsville, Ill., a part of the Broadcasting Service Department at Southern Illinois University, has three racks of Gates automation equipment. It handles about six hours of the daily 18-hour schedule.

Fred Crimmings, general manager, says automation has a two-fold purpose: tighter program control and student training.

As with commercial stations, more experienced studio announcers can be utilized wisely with automation. They can be on the air at critical times no matter what their class schedule.

And, in this age of education relevancy, broadcast automation is a necessity. Students get experience operating equipment that they are bound to see again.

Student programs Gates system at WSIE.

Prerequisite for alive sound: jocks who can preplan

You can rock with automation, says Jim Huffman, KOVO, if dj's can "pre-plan" spontaneity.

IT SEEMS THAT nearly everyone has said at one time or another, "Automation is okay for some formats, but it can never work at a rock station." One station, a medium-market top-40 station in the center of Utah which was a solid number one before automation, doesn't believe it. Automation has made it better than ever!

Management at KOVO is now convinced that automation will be commonplace in the future, "to give the medium and small market stations a more professional sound—and to make them competitive with their bigger brothers."

The overall sound at KOVO is consistant,

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with few mistakes and sounds alive. Few listeners even know that KOVO is automated. All day long, young and old alike keep the phones alive with requests, wanting to speak to the dj on the air, etc.

Problems with personnel will come up but fortunately most can be solved. Increased training time is needed. The old days of having a man spend an evening learning the board and then putting him on his own the next day are gone forever with automation. Assuming the operator has had no previous experience with automation, the average time planned for a man to break into this job has increased from about a week to a month. Jocks who already preplan to achieve an overall entertainment picture for the listeners (as opposed to winging it with spur-of-the-moment spontaneity), will not have much trouble in getting used to this preplanning idea.

A man who can, or already does, preplan will cost more money. KOVO manager, Glenn Shaw, confirms that "pay scales at KOVO are comparable to our nearby competition, Salt Lake City. We realize this, but with automation we have the same professional sound 20 hours a day and seven days a week and do it with only three jocks."

But more than that, the jocks at KOVO get a choice of their hours and days off, something that is pretty rare at most radio stations! Such a feature might help you attract a top jock who is willing to let the advantages offset the fact that his salary is not as high as he is capable of earning at some larger operation.

But not everyone can do it! At least not right away. It's difficult for some jocks to sit down and do a show to a tape recorder knowing that no one else is there to respond at the moment. That steady barrage of sound that keeps a dj rocking on is also missing. Pushing a button at the end of an event turns on a light to signal the occurence of a 25-cycle tone. The mind must recreate what will happen in the system when that button is pushed.

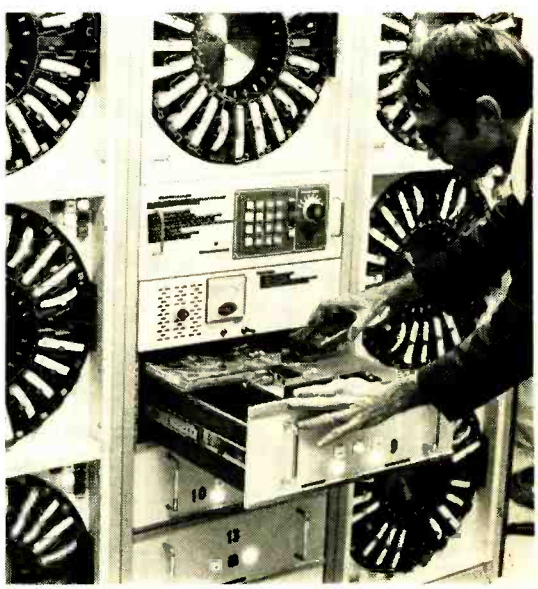
If a manager will spend some extra training money, and let his new man sit and listen to his whole show and critique himself at least once or twice, the experience will prove invaluable.

KOVO anticipates being able to do some interesting things in the future with its system (the Schafer 8000). For instance, using a spotter tape machine for music will allow KOVO to run music lists in any order they want. Early morning music formats can start with an easy, down-tempo, top-40 sound like the Carpenters, etc.; then, as the morning becomes older, the tempo of the selected music can be increased by adding the more "up" sounds such as Credence Clearwater. The automated system could be programmed to play requests. Telephone requests are merely converted to their corresponding number on the spotter and the requests are entered by number into the computer. The computer then integrates the requests into the format that is being used. The listener will have his request entered into a file and the computer will play them off in the most honest "first come, first served" basis around.

Three hours air-time in 15 minutes

WMBR, Jacksonville, Florida, the city's second oldest radio station has gone completely automatic with a Sono-Mag Corporation system which has as its brain an all-digital control unit, dp-1. A digital program controls commercials, weather, ID's, promos, records (MOR), and the announcer's voice introducing the records.

Station Manager William Earman says announcers can program a three-hour on-the-air segment in less than 15 minutes. At WMBR, most of the format is fixed. The digital encoding for every event (around 100 an hour) is stored in the computer memory (capacity, 2048 events). Encoding can be introduced by keyboard, punched tape or prerecorded on a cartridge and then stored in the control memory. Seven 24-cart carrousels were used along with three standard cart players. A special cartridge recorder for encoding purposes is used. Coding fades up music selection after dj finishes intro. Several commercials (for a given client) are put on the same cart.



WMBR's radio operation manager Bill Breland loads its computer-controlled system with voice announcements.

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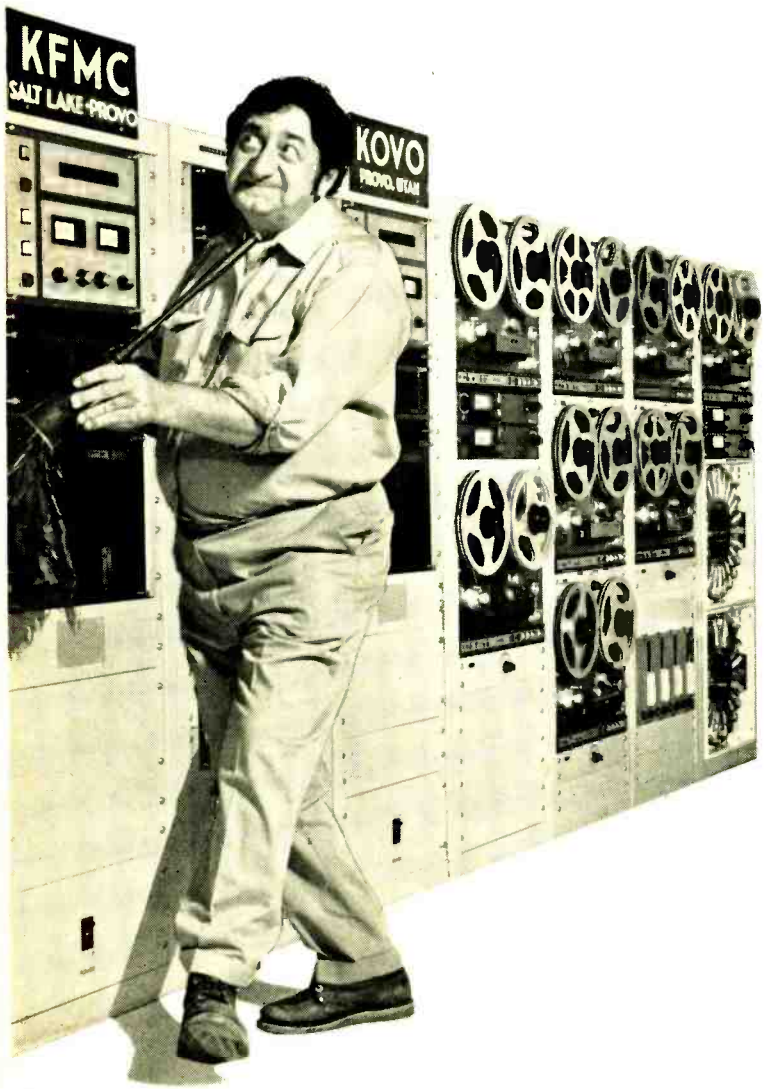
At KOVO/KFMC, Provo, should he listen to the AM or the FM in the PM and the AM?



Joe is all alone. But certainly not lonely.

His only dilemma. Should he listen to the swinging Top 40 sound of top-rated KOVO-AM? Or the bright contemporary Middle-Of-The Road sound of KFMC-FM?

You see, a powerful Schafer PC8000 Automation System simultaneously controls the separate programming of these two popular Utah radio stations. Up to a week in advance too, with additions, deletions and changes made in seconds merely by typing a few simple commands on the teletypewriter.

The system pays for itself by eliminating the need for several part time announcers. Yet the regular staff has far more time for selling, community affairs and more creative programming.

KOVO/KFMC is the world's first simultaneous automation system installation. However, the powerful 8000 computer is flawlessly controlling the programming at KWOW, WCKO, WPBC, WZBN and WKZN as well.

By the way, Schafer now has verified encoded logging for cartridge *and* reel-to-reel.

Call us. We care.

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Goleta, California 93017
(805) 968-0755

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The Video Cart Machine: RCA's Approach to Station-Break Automation

By Paul Weber

Premiered at the 1970 NAB Convention, the prototype of RCA's TCR-100 Television Cartridge Recorder has been in daily use for more than a year at a major-market TV station. This operational report gives details of the field test, and explains how the TCR has increased station-break efficiency while freeing reel-to-reel VTR's for other jobs.

TV STATION OPERATIONS are influenced and often limited by the availability of various types of equipment. RCA's introduction of the Television Cartridge Recorder has influenced all departments concerned with TV operation, programming, traffic, production, and promotion. What I hope to do here is describe the far-reaching effects the TCR-100 has had upon the entire staff of WDCA-TV since June of 1970. I would like to mention the operational trends that have evolved through the use of this equipment at our station in Washington, D.C.

WDCA is an independent UHF station operating in a top-ten market. The number of commercials broadcast in one day is approximately 280. Our control room equipment consists of three film chains, two videotape recorders, and two live studios. We have a 220-kW transmitter and put out over 4 MW of ERP. In late May of 1970 a prototype Television Cartridge Recorder was installed at WDCA during a period of approximately two weeks. During this time, the equipment was installed and technical personnel were trained to operate and maintain the equipment during the subsequent field test.

Market choice

The selection of WDCA as a field test site was a logical choice for RCA, as we operate a medium-sized station in a large market. Traditionally, UHF stations have a severe problem competing with VHF stations to gain desirable ratings. It was decided that the cartridge machine's effect would be best felt in a situation where operational economies are vital to station profit. As with most UHF stations, WDCA handles much videotape material. We had reached the point of having to make a spot reel to handle the evening tape load, and soon would have needed additional personnel in addition to the spot reel.

At the conclusion of the installation and training session we began on-air use of the cartridge machine with promotional material. As with any new format and any new piece of equipment, we were concerned with operator errors in handling the equipment, as well as with machine operation and interface with our own station equipment. We naturally wanted to find and solve these problems with noncommercial material. Fortunately, machine problems were nil and operator problems were few. Most troublesome, oddly enough, was getting used to the video cart's fast lockup time. The standard reel-to-reel VTR has a lockup time of approximately 6 seconds. This gave us 3 to 4 seconds of good, solid black before commercial content, in which the operator had time to take the tape machine on the air. But now, with the video cartridge machine, you have only a half to three-quarters of a second of black prior to program material. Our operators soon developed their own techniques and within a week a much smoother program switching operation evolved.

The next step was to put commercials on a cartridge. As each commercial appeared day-by-day on the log, we dubbed the spot from reel-to-reel to cartridge format. Within a couple of days we had a library of some 200 commercials on cartridges. We went directly from reel-to-reel to cartridge with no backup; cartridge reliability made such a precaution unnecessary. Within a couple of weeks we had all our promos and reel-to-reel commercials on cartridges, and we asked the Traffic Department to group the videotape spots within each break so that they would appear sequentially. We did this to take advantage of automatic switching by the cart machine, which has proven infinitely better than an operator. This led to the first trend, the operator grouping the commercials together within a break—even if the

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Paul Weber is an engineer on the staff of WDCA-TV, Washington, D.C. This article is a revision of material presented at the January, 1971 SMPTE Conference, the March, 1971 NAB Convention, and the May, 1971 International Television Exhibition at Montreux, Switzerland.

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Traffic Department hadn't done so.

Freeing standard VTR's

Our first department to take full advantage of the TCR-100 was the Promotion Department, whose people could now place their promotions wherever they wanted to. They previously were limited by the number of videotape machines available in a break. Almost concurrently, we notified the Production Department that the cartridge machine was in use on the air, thus freeing our reel-to-reel time during the day for the Production Department's use. Previously, with our two reel-to-reel machines being scheduled for on-air playbacks, the Production Department couldn't do local productions. Now, we do multi-tape productions even during prime time with no problems.

Historically, if we could turn the clock back, a number of clear patterns would emerge to reflect the influence the video cartridge machine has had upon our station's operation. In order to understand these changes in operator and maintenance attitudes, one must understand some of the operational parameters of the machine we are field testing. It has a storage capability of 22 cartridges, which are loaded in numeric order, 1 through 22.

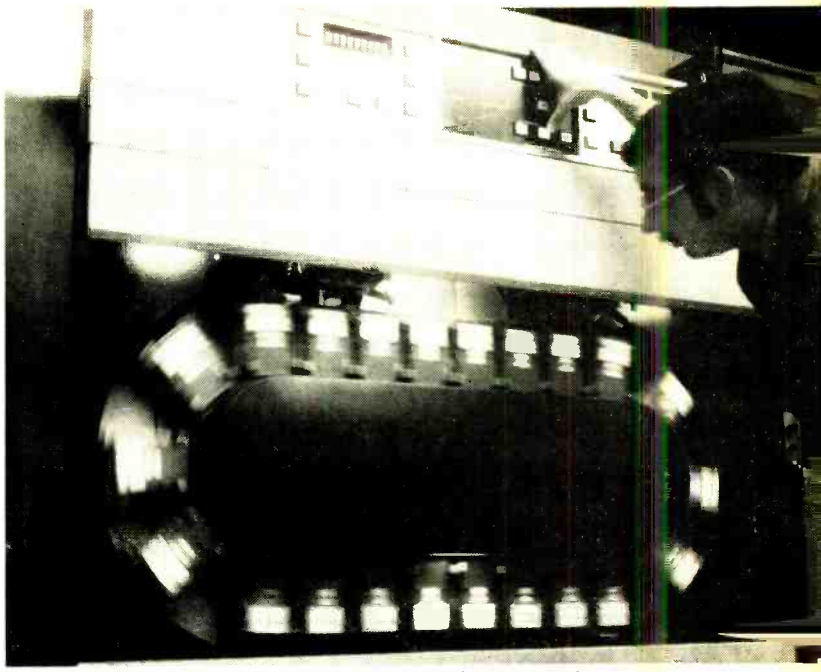
The length of each taped segment on a cart may be from 2 seconds to 3 minutes. Up to eight spots may be programmed to play back-to-back with vertical-interval switching—full pixlock— between each. Nine breaks may be programmed in advance.

We have no random access for the carts. We have found through more than a year of operation that it is technically much less complicated and operationally much more successful to have all carts visible at all times. If changes must be made, it's a simple process of changing the cart that you can actually see. Operating controls are few, well organized and labeled, and have provided the complete operational flexibility we have needed.

Day/night differences

Another trend that evolved was that day operators never loaded the machine to anywhere near its full extent. In fact, the operator only loaded approximately a half hour's worth of video cartridge commercials, whereas the night operator loaded the magazine to its full capability. This operational trend was in no way dictated by the station; it evolved purely through the use of the cart machine. For example, during the day numerous changes must be accommodated quickly, whereas on the night shift, when almost everyone has gone home, log changes are minimal. In fact, we then have a status quo condition dictated by the earlier prepared schedule.

We found another trend developing: the daily maintenance using the test cartridge supplied by RCA. This maintenance routine has become part of the daily operational procedure and is the key to the success of the TCR-100, as it eliminates many of the quadruplex errors that people have previously been accustomed to. Adjustments such as burst phase, control-track phase, audio and video levels, centering the channel equalizer ranges, adjusting the chroma ratio, are all keyed to the test cartridge. Although the manufacturer had recommended approximately 10 minutes for the setup procedure, we have found that 15 to 20 minutes is more desirable. Of that time, 10 to 15 minutes are used to make the recommended adjustments. We use the other 5 minutes for a physical inspection of the machine for any obvious discrepancies. In our opinion, this 5-minute inspection is a valuable insurance policy.



Author Weber brings his video cart machine to start position.

Film/cart dubbing

A further operational trend which developed rapidly is transferring films to cartridges. For example, a client recently asked if we obtained 600 plays from one film print. As you know, this is almost impossible. We could have asked the client for more prints. In our opinion, however, the logical step was to transfer that film to cartridge format. From an operational standpoint, dubbing it once to cartridge is far easier than threading up the film 600 times. I might add that our experience also indicates that cartridge playback quality is more consistent over long periods than any type of film projection in use today. Dubbing films to tape could even be taken to the extreme, where agencies would supply only one print of the film, and the station would transfer it to cartridge for ease of handling.

Spot sequence

Another operational practice has been made much easier by the video cartridge system. Some videotape commercials (in particular, 30-second spots) that are used in piggyback combination are

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now being supplied as individual recordings on one spot reel. The station is expected to rearrange the 30-second spots in accordance with agency schedules. For example, four 30-second commercials may arrive on one spot reel and have to be rearranged in 4-1, 1-2, 3-2, 3-4, and 4-2 combinations. By simply transferring these 30-second spots to individual cartridges, operators can easily, with no increase in station expense, provide the agency with the piggyback combination it requires at will. Although I'm not primarily reporting on the effect the video cartridge might have on commercial distribution, during the last Christmas advertising period, agencies (in particular those associated with toys) were distributing piggyback commercials arranged in different orders that were constantly rearranged. A more logical way for the agency could have been to supply us with the 30-second spots in individual reels, let us transfer them to video cartridge format, and then rearrange the spots at will. This explanation sounds repetitive, but it should be considered a significant fact that TV station operators will have to face in the very near future.

Recently, the 30-second TV spot has become a national standard. About a year ago, 64% of all national commercials were 60 seconds, while 27% were 30 seconds. At the end of 1970, 50% of spots were 60 seconds, with 47% being 30 seconds. The trend is obviously toward 30-second spots. To the station operator, this means an increased number of handling operations. Previously, to air 60 seconds of commercials, he perhaps had one threading operation. Now with the increase of 30-second spots he has two threading operations. Thus more human intervention is required to air the same amount of commercial time. As far as WDCA is concerned, all I can say is that if we had to handle an increase of videotape or film commercial spots with existing equipment, we couldn't do it. With the TCR-100, it's a very simple matter for us to handle these commercials with no increase in manpower or programming complexity. We leave the programming up to the machine switching system and rely upon the operator to insert more cartridges into the magazine.

TCR stability

Earlier, I touched on some errors common to quadruplex recorders. At this point, I'd like to report some other experiences I've had while field-testing the Television Cartridge Recorder. We have obtained total interchange of all types of quadruplex recordings with any number of headwheels. We have proven that recordings and replays can be made with a consistency that can only be believed through viewing the results. To date, we've never had to touch the control-track phase knob. This almost sounds like an exaggeration when compared to the number of times you have to touch it on a reel-to-reel machine.

Even after changing headwheels throughout a year of on-air operation, we have yet to change the original servo control settings. To us, as users of the video cartridge machine, it's obvious that manufacturers have overcome instability in electronic circuit design, and are now capable of building servo systems that don't require adjustment over long periods of time. Also, headwheels and FM systems are totally interchangeable with one another and provide high-quality performance for a long time. One could also take a look at the logic system in the TCR-100. It consists of approximately 1000 integrated circuits, of which I can honestly say we have only had trouble with one. That was a poor contact with the plug-in socket of one of the IC's. The manufacturer advises that he is not using these sockets in the production model.

Today at WDCA, the video cartridge machine is considered almost as something that has been with us since television itself started. The transfer of reel-to-reel to cartridge format, the transfer of film to cartridge format, and operator reliance upon cartridge switching are all taken as matter of fact. Each day the Traffic Department comes in with new commercials just received. They're put on top of the cartridge machine in their reel-to-reel form. The next morning, after equipment warmup and setup, the first job is to dub the spots onto cartridges. There are usually three to four new items to be put on cartridge. The total time taken for this operation is the length of the material plus approximately a minute or two for reel-to-reel machine setup. And we take considerable care in order to maintain the proper burst phase, saturation, etc. I might add in transferring from film to cartridge, this includes painting the commercials that have been sent to us incorrectly color balanced. We use flesh tones as reference on film and video tape.

We consider extra time in painting or setting up the reel-to-reel machine in the dubbing process as well spent, as this insures a perfect cartridge playback each time. This exact time match, coupled with precise cartridge switching, has gone a long way toward improving the quality of our station's air signal. It has been a remarkable improvement, noticeable to the average viewer as well as to our competition.

The TCR-100's reliability has been well beyond our expectation. Overall presentation when replaying from one cartridge to another has been a great improvement over manual activation of several reel-to-reel machines. Video switching from one deck to another is not apparent to a home viewer, except for the change in program content. Furthermore, the TCR-100's cost of operation is much less than that of a reel-to-reel machine, and tape life is in the order of 300 passes per cartridge. Actually, I believe that this is really not a limitation but simply that we have not been able to put more passes on some of the cartridges in our library. We feel certain that when manufacturers begin to deliver video cartridge machines in quantity, our experiences will be shared by many others, and there will be general operational changes at many television stations. **BM/E**

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Design Features of the Ampex Video Cassette Recorder

By Howard W. Town

Promising savings in cost, time, and labor, Ampex's newly-introduced video cassette machine is designed for full or partial automation of spot commercials and other brief program segments. It holds up to 24 cassettes, each with as much as six minutes playing time (at 15 in./s), and with complete random access. Other features include third-generation electronics and computer control techniques.

AMONG THE HIGHLIGHTS of the equipment shown at the 1971 NAB Convention was the first demonstration of a production model of the Ampex ACR-25 Automatic Video Cassette Recorder/Reproducer. (An engineering prototype, demonstrating the concept, had been shown the year before.)

This demonstration came at a time when utmost interest was expressed by broadcasters in station automation—i.e., streamlining present complex operations, eliminating the risks of human error, and automating tedious and repetitive tasks that consume the time of talented personnel and expensive equipment.

So much has been said and written about station automation in the past few months, that the mass of information and misinformation can easily become confusing. This is particularly true in an industry that is just becoming familiar with the computer, and with the potentials of automatic equipment control in a broadcast facility.

Yet the basic aims of automation are few and simple:

- Simplify broadcast operational complexities.
- Provide flexibility and efficient utilization of plant equipment.
- Provide optimum system reliability and on-air performance.
- Modernize broadcast facilities for maximum profit.

These guideposts of automation were the ultimate objectives undertaken by Ampex in designing the ACR-25. I shall briefly describe the equipment, then explain how it was designed to satisfy the basic objectives mentioned above.

The ACR-25 comprises two consoles: One is a transport console containing two tape transports (which operate at 15 or 7½ in./s), and a rotating carrousel storage bin which holds up to 24 cassettes. The other is a control console containing monitoring and all operating control panels and electronics.

An automatic, 40-event memory programmer located in the control console allows the operator to program the play sequences of the 24 cassettes, which may be randomly loaded in the carrousel.

The cassettes, each capable of handling as much as six minutes of programming, are alternately selected and presented to the two transports. The video tape is automatically threaded by a vacuum load system, then cued, played, stopped, rewound and withdrawn from the transport. The cassettes are automatically replaced in the carrousel. Furthermore, the entire operation is accomplished with hands-off control.

Transport operation is fast enough to permit segments as brief as 10 seconds to be played in back-to-back sequence. This means that in the time it takes one transport to play a 10-second segment, the other transport may rewind and unload a previously played commercial, of up to 60-second duration, then receive and cue the next pre-programmed spot

Simplified operational complexities

One purpose of the ACR-25 is to eliminate the playback complexities and reduce the time-consuming function of playing brief segments (six minutes and under), such as spot commercials, station breaks, promos, ID's, news clips and sports and weather briefs.

Traditionally, brief segments have been individually placed on separate reel-to-reel units which require considerable handling of video tape and set-up adjustments. By contrast, a single ACR-25 handles all such short events that are aired by a station in a broadcast day. This allows operators to return to the production function and use reel-to-reel recorders for the purposes for which they are best suited.

While the automatic cassette reproducer provides relief for the short-segment programming

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complexities by automatically accomplishing the playback of brief materials, it also has, inherent in its design, several labor- and time-saving functions so that it can function as a truly automatic playback center.

The operator may place up to 24 cassettes (each containing standard two-inch quadruplex tape on which is recorded a commercial, ID, etc.) into the carrousel in any convenient order. It is necessary only that he note on the station log the position or carrousel bin occupied by each cassette. Once he has determined the order in which the cassettes are to be aired, according to the log, the operator uses the automatic control panel on the front of the transport console to enter the proper cassette playback sequences. Once the cassettes have been so programmed, the ACR-25 memory controls cassette playback sequence.

The rotating carrousel delivers the first programmed cassette to Transport A. There, a vacuum system threads the transport by drawing the tape into the tape path. Next, the transport advances the tape into the leader and parks it at the cue-up point, 200 milliseconds before the start of the recorded material. A second command rolls the spot (or PSA, ID, etc.). In the meantime, an identical loading operation is occurring in Transport B.

When one transport has finished playing a commercial, it may automatically trigger the roll command for the second transport. The following operation then occurs in the first transport: The video head guide block, audio shield and capstan retract into the transport, the tape is shifted away from the head area and is rewound onto the supply reel of the cassette. By this time, the carrousel has presented the appropriate bin to the transport so the cassette can be replaced in its home position. The carrousel then delivers the next scheduled cassette to the transport and the vacuum load system begins threading the commercial. The guide block, audio shield and capstan re-enter the tape path and the tape is moved into contact with the heads so it may be cued to the ready position.

Since the guide block, audio shield and capstan are retracted from the tape path, and the tape is moved away from the head area during load and rewind operations, head and tape wear is minimized.

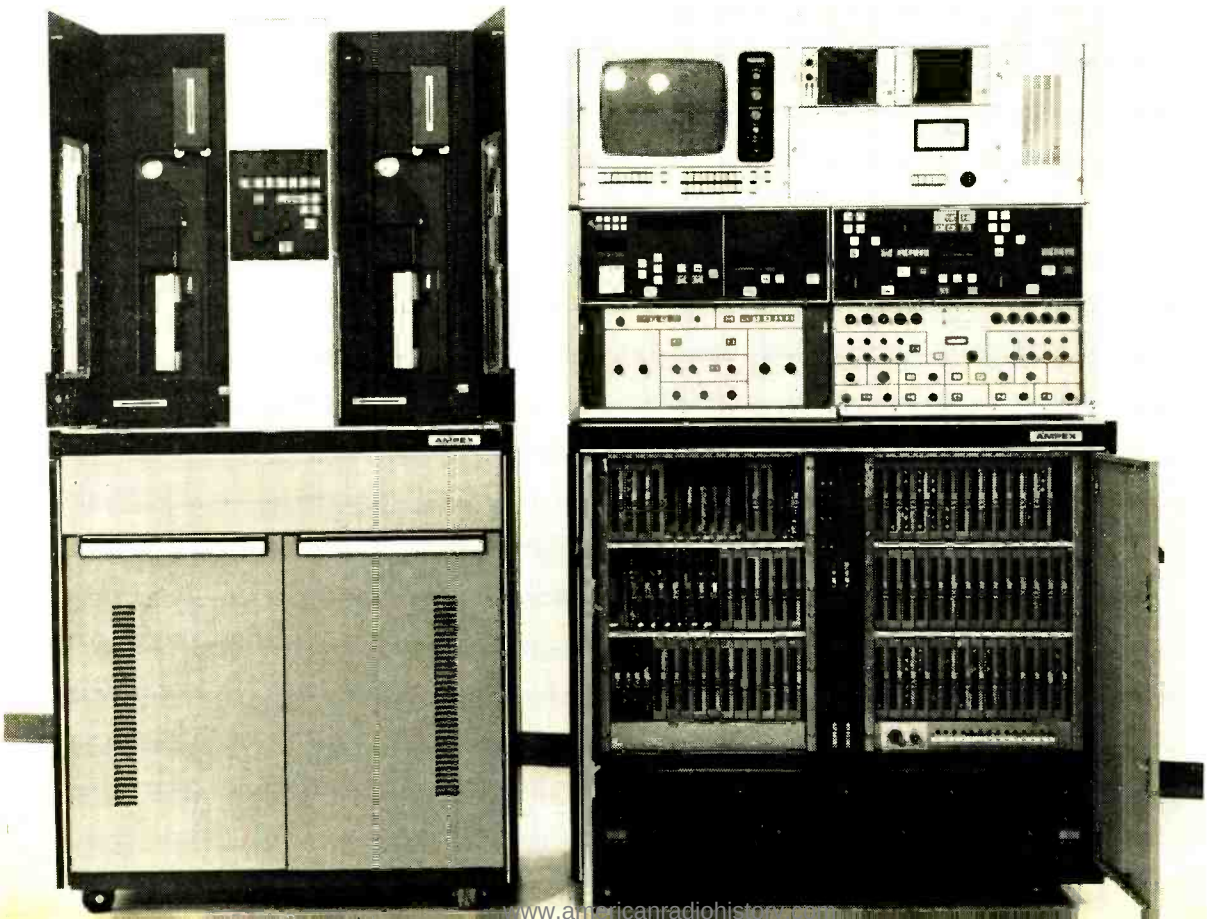
Cassettes are simple. Each cassette is merely a vehicle to deliver tape to the transports. The tape is actually stored on two-inch-wide spools which are inserted into a cassette when required for active use on the ACR-25. When the tape is to be placed in inactive storage or mailed, the spool is simply removed from the cassette (by an operation roughly equivalent to extracting a 35-mm film roll from a camera) and placed in a mailing/storing container for further disposition.

Flexibility in station programming

Part of the automation concept is the capability of responding to last-minute program changes and providing alternate methods of accomplishing required tasks, so that equipment can be totally useful in all circumstances.

Random access, for instance, not only simplifies loading and programming operations, but also insures accurate playback sequence—even in panic situations.

ACR-25 transport console (left) can be separated by as much as 200 feet from control console.



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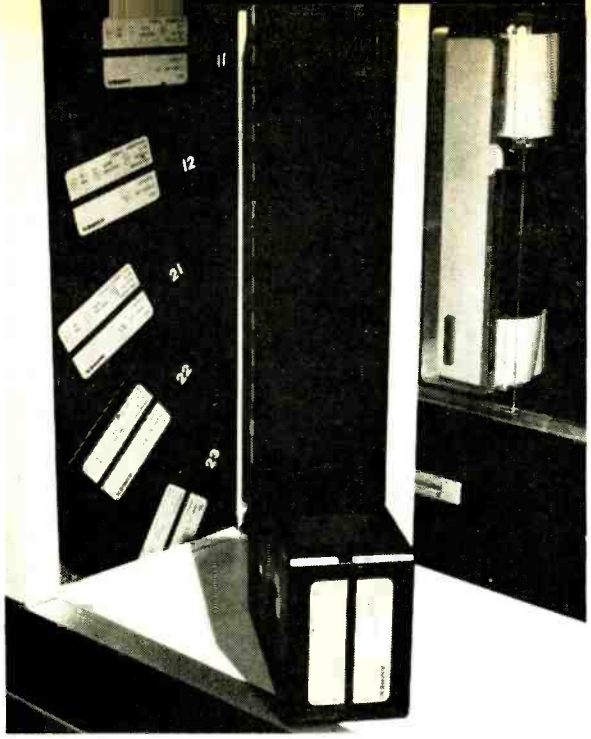
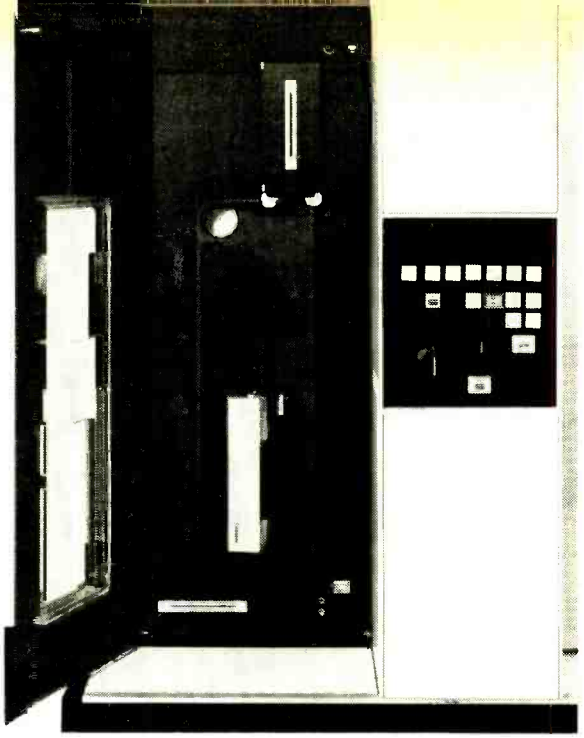
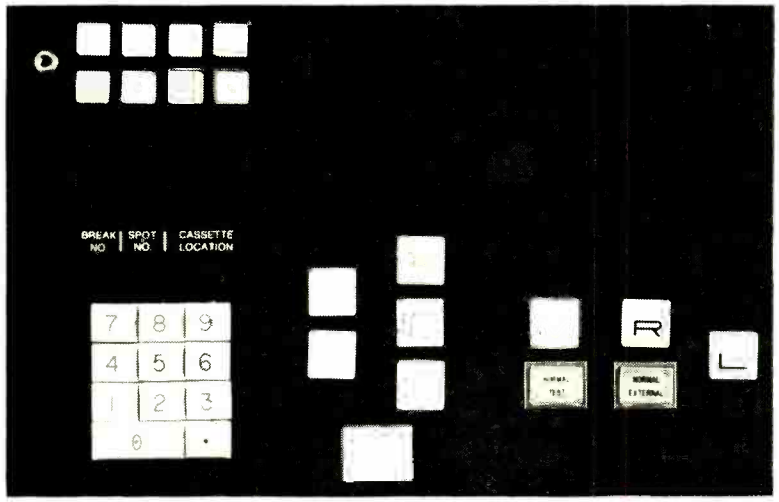


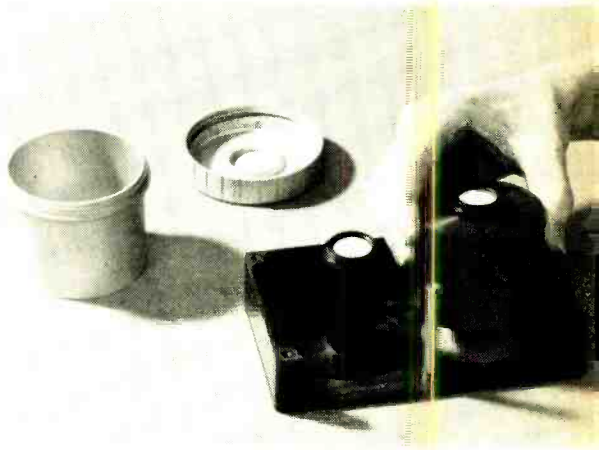
View of transport with carrousel door open and five cassettes installed.



Close-up of one transport mechanism. Front access facilitates cleaning and change of heads.



Automatic control panel. Display of next five upcoming events, upper right, are washed out.



Spool of two-inch-wide tape being loaded into cassette. Container at left is for storing and mailing.

Once the ACR-25 is filled with cassettes and programmed, the operator is not stuck with the sequence in the system's memory. A late request for programming alteration—such as an insert, deletion or transposition of material—can be handled merely by entering the needed change on the control panel. This may be done right up to the very "moment of truth."

If a requirement for late insertions is anticipated, the operator can prepare the ACR-25 to receive late-arriving cassettes by programming an alternate sequence. Last-minute materials can then be loaded into the carrousel and the memory will call for their use at the proper time. If an alternate program is not used, the memory continues using available cassettes without interruption.

Although the ACR-25 holds 24 cassettes, its memory is capable of handling up to 40 events, and thus may be instructed to repeat cassettes or to start other equipment.

Random-access features

A variety of design alternatives were analyzed when we decided upon the programming capabilities that would be built into the ACR-25. More elementary alternatives were available, such as placing the cassettes in the required playing order prior to operation. Greatest equipment value is realized, however, by a design which offers true random-access control and broad flexibility.

The Ampex broadcast cassette system permits the 10-second back-to-back cycle speed to meet the growing requirement for increasingly shorter commercials. The trend toward facility automation demands that the ACR-25 permit simple and automatic operation and allow simple interface

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into computer-controlled facilities.

Third-generation VTR design

All major features designed originally into the Ampex AVR-1 third-generation videotape recorder, are incorporated into the ACR-25 to allow its use as an automatic record/reproduce system. They include:

- Automatic tracking . . . uses information off the recorded video tracks to modulate the capstan-drive signal and allow perfect head-to-tape positioning, even in the absence of a standard control-track signal.
- Automatic standards selection . . . determines the recorded broadcast standard (highband or lowband), and automatically switches the reproduce electronics to accommodate that standard.
- Auto chroma . . . normalizes equalization of reproduced individual channel chroma by allowing correction on a band-by-band and line-by-line basis.
- Velocity correction . . . performed by measuring and correcting color hue errors on each particular line.
- Remote and automated operation . . . allows operation of many controls from a remote location with a dc voltage that may be transmitted in digital form over conventional communications links or from a computer.

In addition to the features common with the AVR-1, the ACR-25 also provides pre-set chroma phase control, which permits recording, on the tape's cue track, the desired position of manual chroma phase adjustments. During all subsequent playbacks of the tape, the reproduce signal from the cue track generates a correction identical to the original manual adjustment.

Flexibility is also provided in cassette tape lengths. Any length of tape required for a cassette program, from one second to six minutes at 15 in./s and up to 12 minutes at 7½ in./s, may be used in an ACR-25 cassette.

Various system uses

The ACR-25 may be used in any broadcast system configuration. It may be controlled from its own console, from a central control panel or by a computer program. Although designed for totally automated operation, the system can instantly be switched into semi-automatic control for special requirements.

Previously recorded quadruplex materials made on a reel-to-reel or cassette system may be spooled for play on the ACR-25. Machine operation is not confined to certain tapes produced on specific recorders, or to tapes that have been prepackaged into locked cartridges.

Conversely, a high-quality blank two-inch broadcast video tape, of any length required, can be spooled, placed in a cassette and loaded into the ACR-25. It may then be recorded in a format that is fully compatible with all other standard quadruplex videotape machines.

To facilitate dubbing, the ACR-25 may record on both transports simultaneously, or may record on either transport while the other is in the playback mode.

Another innovation in the ACR-25 is the opportunity of making adjustments to tapes recorded elsewhere. An automatic cue sequence record feature permits simple and automated insertion of roll cues, out cues and control information onto the cue track of videotape spots for precise automatic cueing and playing. The operator merely needs to know exact program duration in hours, minutes, seconds and frame numbers, and the location on the videotape of the exact beginning of the program.

All cue sequence recording data required for automatic operation may be placed on the cue track along with chrominance phase correction information (when required) without disturbing the original pictures and sound. All adjustments entered in this manner are automatically performed each time the spot is replayed.

Optimum reliability and performance

Of utmost importance, the ACR-25 is designed and built according to the requirements of third-generation broadcast videotape equipment. This concept denotes a marriage of the most up-to-date electronic circuitry, video technology and computer techniques. The vacuum transports, for instance, utilize methods developed and proven in computer tape drives to provide precise, positive tape control, gentle handling and rapid operation.

No combination of mechanical arms and levers is capable of handling tape motion nearly as accurately or carefully as the vacuum-control system. The vacuum transports allow precise and uniform tape tension throughout fast forward, play and rewind operations, and insure an even, uniform tape pack for storage and shipping. The vacuum transports also permit tape handling in a dust-free environment. Transport loading is accomplished with an absolute minimum of mechanical parts.

The ACR-25, like its third-generation brother, the AVR-1 reel-to-reel VTR, permits fast lock-up with fully synchronous operation. Instead of phasing the output of the recorder to local studio sync, the ACR-25 is driven from the local sync generator and the signal output is mixed with local sync, blanking and color burst. This results in fully synchronous operation at all times, so the output of the ACR-25 may easily be mixed with that of other in-plant equipment.

A special feature of the ACR-25 permits time-sharing the video signal—processing, time-base stabilization and velocity compensation—with an AVR-1, so the two units may perform as companion broadcast centers in a television station.

The third generation electronics and transport used in the ACR-25 permit start-response times of 200 milliseconds to eliminate preparatory procedures such as leader count-downs, and to permit truly precise and streamlined playback of brief segments of broadcast material. **BM/E**

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WBNS-TV found profits in color film, and Columbus discovered America.

"Thanks to the Kodak ME-4 process, our viewers are getting a more complete picture of what's happening around the country," says Ed Eakins, Promotion Manager for WBNS-TV in Columbus.

"We've increased our news and sports coverage to over one million feet of color film a year. And since we no longer depend on outside processing, our deadlines are more flexible. When a big story breaks we can film around the clock—updating our news for each broadcast.

"The actual switch to ME-4 processing was no problem at all. Thanks to the ease of operation and Kodak's packaged chemicals, we were getting first rate film quality right from the start.

"And once you have a color processor, the word gets around pretty fast. We're processing commercials for advertising agencies, industrial films for a nearby research institute and sports films for one of the State Universities. At the rate we're going, our outside business alone should pay for the investment!"

Want to improve *your* profit picture? Check out the commercial processing opportunities in your local area. And if you don't have the Kodak ME-4 process yet, contact your nearest Kodak Representative right away. Before your competitors make the discovery.

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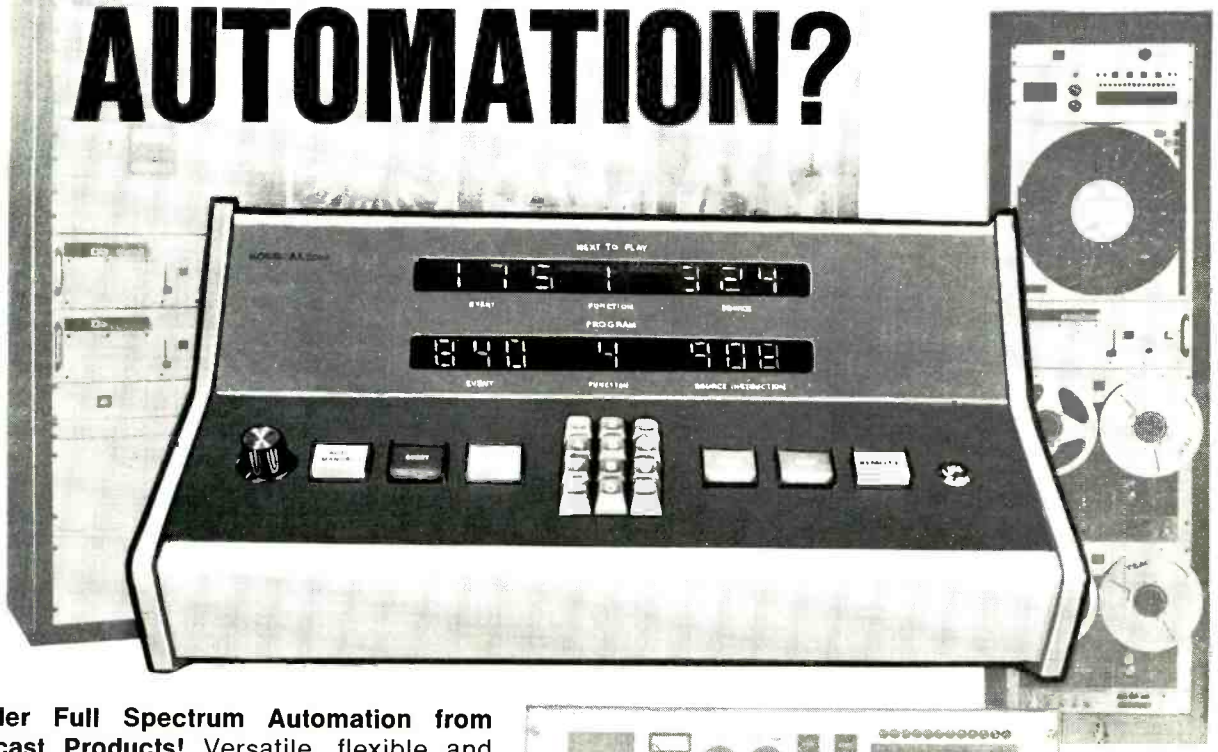

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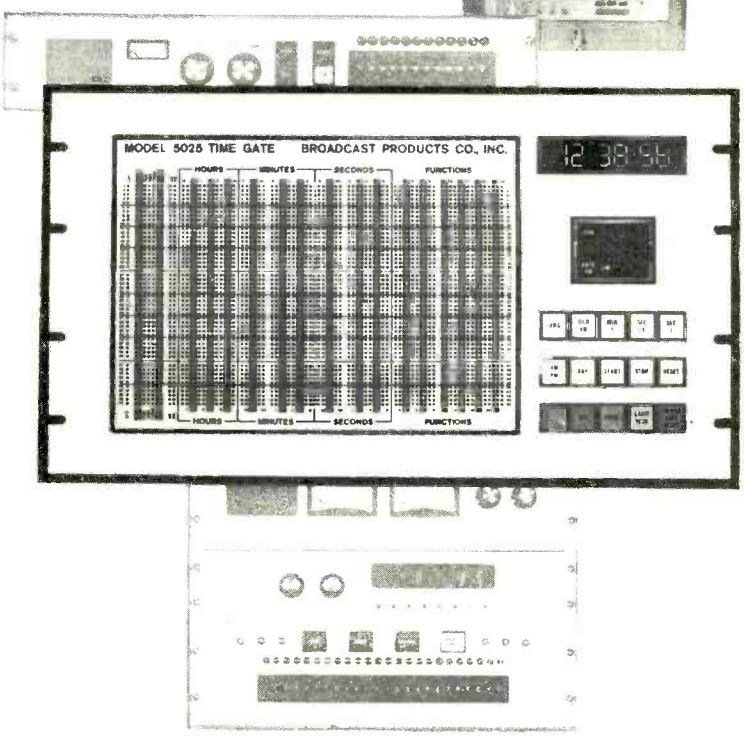

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Quadraphonic encoder puts four stereo channels into two for FM broadcasting or recording. A front panel switch allows choice of either the Dynaquad or Electrovoice Stereo-4 matrixing parameters. The QE-1 Encoder

is on a standard 19″ rack, is 1¾″ high, and puts out more than 20 dBm into 600-ohm lines. It is available either with unbalanced output, or with transformer output for driving balanced lines. Also available is a matching monitor, the MP-2. $250 for unbalanced-output model, $300 for balanced, $125 for the monitor. GATELY. **275**

Video processing amplifier series will restore signal to correct level, remove hum, restore proper vertical interval, clip black-and-white overshoots without affecting chrominance. Sync Generator provides new blanking and burst pulses. The series thus allows the operator to control video gain, pedestal, sync level, chroma level, and burst phase. The complete series includes the 6100 processing amplifier, 6500 sync generator, genlock and power supply units. DYNASCIENCES CORPORATION. **276**

Digital timer/switcher measures video tape footage by counting the control track signal on the

tape. The DTS-100 shows elapsed time and remaining time, in digital readout, in hours, minutes, or seconds (frames optional). It can be reset to zero at any point in time. Provides clocking for all modes of tape motion: record, play, fast forward, or rewind. It can be preset to turn equipment on or off automatically at a prescribed time. KAITRONICS. **277**

Broadband two-way cable series includes units for complete systems. New in the Starline Twenty series for two-way operation are: SCD-2W and SCL-2W standard connector chassis; SPP-S power packs; TF-30 and TF-108 high-low split trunk filters; DF-30 high-low split distribution filter; and the TRA-108 and TR-130 return amplifiers. Together with other units in the Starline Twenty series, the new units provide broadband two-way service adapted to future CATV requirements. JERROLD. **278**

Bonded-gap magnetic recording heads use intimate molecular bond of gap spacer material to the magnetic core. Ferromolecular gaps can be from below 50 microinches to above 500 microinches, use a long-wearing gap material that doesn't develop a void, avoid magnetic poisoning of core tips, to keep magnetic and physical gaps close. NORTRONICS. **280**

Function generator has .0001 Hz to 11 MHz bandwidth, and produces sine, square, triangle, ramp, pulse, and sync waveforms. Model 7060 makes pulses from 100 ns to 1000 seconds in width. Operator can set start and stop frequencies in sweep operation. Modes are run, gate, burst, or sweep. For transmission line testing it produces the sine² pulse throughout its frequency range. External sync or triggering can be used. $845. EXACT. **281**

Preformed shield connector has arrow-shaped contactor with one-way sawteeth for making positive contact with cable shield. Smith-Bond Shield Connector eliminates punching holes in cable covering, makes tight, low-resistance contact, with shield compressed between arrow and cover. PREFORMED LINE PRODUCTS. **282**

Tunable band-pass filters with detented controls give accurate repeatability. DTF Series each has 24 positions, can be supplied in any octave range from 48 MHz to 4 GHz. Dial can be calibrated in frequency, numerically, or alphabetically. $350-700. TEXSCAN. **283**

Base station extension control allows remote operation of two-way radio station. XR-4 has push-to-talk handset, transmit indicator light and volume control. It can be had with intercom operation, multi-frequency switching, or handset volume control. $89.50. ALPHA ELECTRONICS **285**

DBM meter has extended range from −70 to +10 dBm. Model 81

is battery operated, responds from 20 Hz to 20 kHz between −40 and

(Continued on page 38)

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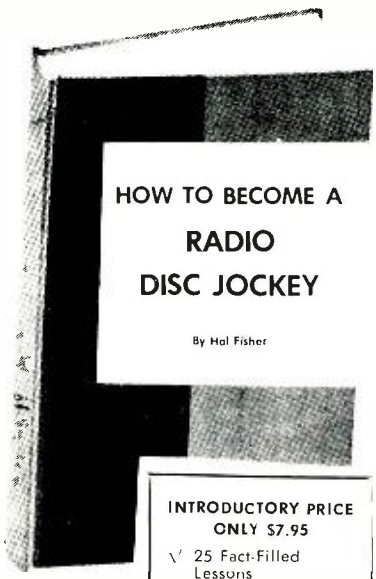
BRAND-NEW—An Indispensable Guidebook For Anyone Who Wants To Improve His On-The-Air-Ability!

How to Become a Radio Disc Jockey

By Hal Fisher

Improve your skill as a DJ! Learn how to capture more listeners . . . with this authoritative, complete study and practice guide.



Now, from the author of **The Man Behind the Mike** and **The Radio Program Ideabook** comes the most extraordinary book of its kind. Written by a broadcast consultant and coach, **How To Become a Radio Disc Jockey** is expressly formulated to serve a dual purpose—as a self-improvement guide for new DJs who want to sound like veteran announcers, and as a self-study guide for those who want to break into announcing. This comprehensive 25-lesson course can be used by any talented person who wishes to go it alone with his tape recorder in the privacy of his home, or it can be used as a classroom text for group instruction purposes.

A Veritable Course in Radio Showmanship

How To Become a Radio Disc Jockey is a revolutionary departure from the cut-and-dried home-study textbook. The author has devised a unique, quick, and amazingly easy method to orient you toward a career of fun and profit in a fascinating field. A veritable course in radio showmanship, this book was designed to make self-improvement pleasant and enjoyable. You'll save valuable time as you study in the privacy of your own room, in your spare time. (Saves you money, too—no registration or tuition fees!)

Makes You Feel at Home at the Controls

During the 25 lessons in the first part of the book, the author virtually leads you by the hand and expertly guides you to the doorstep of your first commercial assignment. He tells you about commercial production practices and how effective promotion will increase your popularity. He explains how easily and almost effortlessly—without technical knowledge—you can obtain your FCC operator's permit. The duties of a DJ in a commercial room are explained in detail, so you'll feel at home the first time you walk into one. **How To Become a Radio Disc Jockey** contains drills, exercises, illustrations, professional scripts and commercials—all the material you need to polish your skills. This handbook is also very suitable for use as a standard outline for classroom teachers in educational radio, for instructors in communications in teacher's colleges, and in the studio-classrooms of schools of broadcast techniques.

Improve Your Skills—Get a Better Job

Learn how you can gain necessary poise, develop a sparkling air personality, acquire all the little-known techniques of the professional DJ, and attain an authoritative news delivery—all in this one authoritative guidebook. For the beginner, the author tells you how to write effectively-worded classified ads and job-getting letters of application. You'll learn how to prepare a professional presentation and how to compose an effective resume. And perhaps most important of all, the author tells how it is from the "other side of the desk" as he draws from his experiences as a broadcast executive who was responsible for interviewing and hiring. Everything you need to launch your career in the exciting world of radio is here, presented in an easy-to-learn way. 256 pps. Indexed. Hardbound.

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How To Become a Radio Disc Jockey contains drills, exercises, illustrations, professional scripts and commercials—all the material you need to polish your skills. This handbook is also very suitable for use as a standard outline for classroom teachers in educational radio, for instructors in communications in teacher's colleges, and in the studio-classrooms of schools of broadcast techniques.

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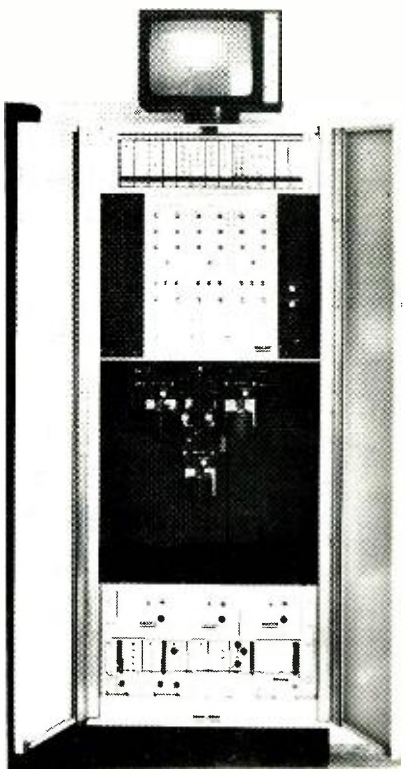
Circle 111 on Reader Service Card

+10 dBm. $189. DBX, INC. **284**

Audio programmer for video programs works with matching video programmer. Model 1018 Audio Follow Programmer is tied to 8V4 FER video programmer; audio switching then automatically follows program and cues bus selections on video programmer. $3995. VISCOUNT VIDEO. **286**

Program equalizer gives exacting control of the "power region" in audio material, 200 Hz to 7500 Hz. Model PEQ-4 has six selectable low-frequency points for each peak and dip, and seven positions for mid-frequency dip and boost. S/n ratio is 89 dB, distortion below 0.1% at 24 dBm output. LANG. **287**

Broadcast color film camera has automatic control of luminance and black levels. The 1500 Series has three separate mesh vidicons, image



enhancer to take detail from green signal for horizontal and vertical aperture correction, instant paint control, triple action automatics for hands-off operation. COHU. **279**

Fresnel spotlight, first in new line, has ring focus which allows focusing from any point around the housing. The 10-inch Ring-Focus Fresnel has 2000-watt rating, and movable lens that lets the socket stay stationary, to eliminate flexing of input wiring. Quick-access rear

(Continued on page 40)

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Expensive?

That's one thing Jamieson's new Compac 16/8 color film processor isn't.

Jamieson's new Compac 16/8 is priced at just $6,980. And that's complete, even to the crate it's shipped in.

Study the picture of our new Compac 16/8. What you see is a completely operable machine. And what you see is what you get for the low, $6,980 price.

Jamieson's Compac 16/8 conducts the standard ME-4 process at 20 feet per minute. With the advanced EH-101* you can run it at 30 feet per minute.

Our new Compac 16/8 runs 16mm and 8mm completely interchangably. It warms up and is ready to go in 10 minutes flat. It can force two stops without slowing down.

That's quite a bit for $6,980. But there's more.

Jamieson's Compac 16/8 has a 2000 ft. magazine that's standard and a feed elevator. It has our patented tube tanks with features of high picture quality and economical cost, which are well known in Jamieson's larger models.

This new, low-cost color film processor has a new, quiet buffer squeegee. It has the automatic controls featured in larger machines and a complete set of flow meters.

We'd like to tell you more about our new Compac 16/8 and what it can do for your station. So write or call us.

How about 35mm Slides?
If you use many color slides, take a look at Jamieson's Compac 35/16. It processes 35mm slides as well as 16mm news film and commercials and at the same low price as the Compac 16/8.

*The EH-101 procedure uses standard ME-4 chemistry at slightly higher temperatures.

EQUIPMENT DIVISION

JAMIESON FILM COMPANY

9171 KING ARTHUR DRIVE, DALLAS, TEXAS 75247 (214) 638-2660

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Two men from Australia are coming to get you

(or at least have a darned good try!)

Communications Engineers are Australia's most wanted commodity. And the Australian Post Office will pay good money to get them. Two men from the Australian Post Office are coming to get you – or at least have a darned good try! They'll be in the U.S. in September and October, armed with all the facts and figures about the A.P.O. and Australia.

But here's just a preview: The A.P.O., Australia's biggest business, controls Australia's postal and public telecommunications services, and provides all T.V./Radio transmission and relay services. Value of the telecommunications network is about $US2,500,000,000 increasing by about $US350,000,000 annually.

Australia has a different environment – sure. But most Americans take to Australia. They like the big beaches, the weather, the friendliness. Ask anyone who's been to Australia. Cost of living? Some things are dearer, most things aren't. And Australia is a great place for children to grow up. Really great.

You'll need at least two years' professional experience – preferably more. You should hold a degree in a recognised branch of Engineering from a U.S. University (if awarded following a course accredited by the Engineers Council for Professional Development). Alternatively, any degree which satisfies graduate membership requirements of the Institution of Engineers (Australia).

If you're selected, you and your family will be flown out first class, and return at the end of three years. Extensions and permanent location are also possible. Salary will be negotiated according to qualifications and experience, and accommodation allowances will apply in most cases.

There's a wide variety of work – administration, design, planning, development, research, construction, installation and maintenance in communications and general engineering services.

Here's how to arrange an interview:

Send a brief personal and career résumé to – Mr. L. Mead, Executive Officer, Australian Embassy, 1601 Massachusetts Avenue N.W., Washington, D.C., U.S.A. There's no obligation. And rest assured your letter will be treated with absolute confidence.

The A.P.O. representative will arrange convenient interviews for all suitable applicants.

Are you ready to look at this exciting new challenge from Australia? Then write **now!**

Communications for a Continent . . .
in a multi-million-dollar national business!

The Australian Post Office

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door gives easy relamping. Both grid and floor-stand models available. $225. BERKEY-COLORTRAN. **288**

Broadcast video switcher primarily for smaller broadcast production studios and remote mobile operations will accept up to 15 non-composite or composite signals. Model VBS-250-ME uses solid-state, plug-in switch points, input/output amplifiers, and SCR electronic control circuits. It has bounce-free switching, four operating busses, 11 effects with external and internal keying, tally control, and remote control panel. INTERNATIONAL NUCLEAR. **289**

Zip-on cable harness allows quick assembly of cables into protective "tube" or groups of tubes. Zipper-tubing opens and shuts along its entire length, and can be re-opened and reshut at any time, allowing easy addition or removal of cable. Tubing wall can be of Teflon, Mylar, asbestos, PVC, or other material chosen for physical and dielectric characteristics to match the application. ZIPPERTUBING CO. **290**

Amplifier chain for "L" band cascades up to 10 kilowatts. With four stages, which are separately available, the chain goes to 16, 160, 1200, and 10,000 watts. A-2027 first stage is solid-state. A-2019, A-2001, and A-2000 stages that follow use vacuum tubes. The chain provides a maximum of 3.0 microsecond pulse width with maximum duty cycle of 0.1%. Chain, less than $10,000. ACRODYNE. **291**

Color studio package includes a color videotape recorder, a color recorder with assemble-and-insert electronic editing, control console, camera sync generator, waveform and color monitors, portable lighting system, monochrome camera. Colorcaster IV is designed as a system, and is completely installed by the maker. $39,914. INTERNATIONAL VIDEO CORP. **292**

High-power switching combiner provides parallel operation of two TV transmitters. Series 56000 Combiners will automatically switch a failed transmitter to a dummy load, shunt the remaining transmitter directly to the diplexer. Operation can be manual or by hand-wired logic circuits MICRO-COMMUNICATIONS INC. **293**

FM receiver-modulator for weathercasts provides pickup of forecasts and warnings of the National Oceanic and Atmospheric Administration.

(Continued on page 42)

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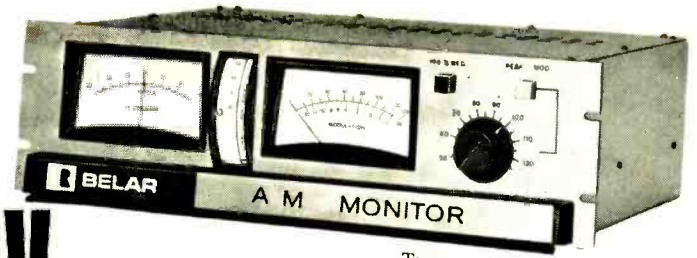
now... a company that has AM, FM and TV frequency and modulation monitoring systems.



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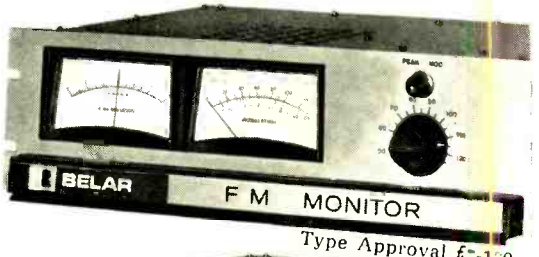

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Now . . . Belar. Belar is the only company that has the necessary type approvals on all three monitoring systems. Belar accuracy permits use of the maximum power allowable and maximum power means maximum profit. Add to this that all Belar equipment is immediately available.

Isn't it time you stopped running around and finally settled for a company that can handle *all* your frequency and modulation monitoring needs? Contact Arno Meyer . . . he'll show you the way.

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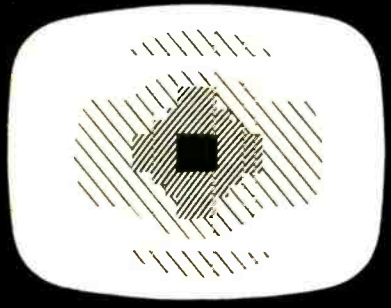
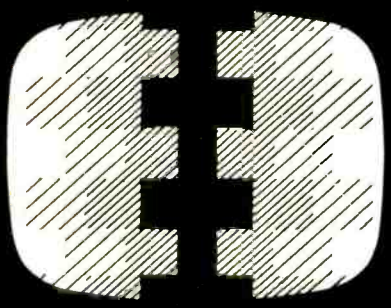
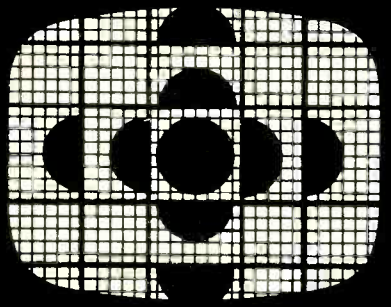
new cinematic techniques for TV



Bursting circle wipe



Animated ladder wipe



Animated psychedelic wipe

More than 50 sophisticated electronic wipes and transitions

Enjoy the competitive edge in your market with these exclusive production techniques.

Write or call: 812/332-7251.

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Bloomington, Indiana 47401

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The FMW-2000 Weathermod converts the weathercasts to any frequency in the 88-108 MHz FM broadcast band. Audio output is also provided, so broadcasts can be put on CATV weather channel. CATEL CORPORATION. **294**

Portable interference and noise meter covers 31-250 MHz band. Model 31A uses a calibrated attenuator to set reading of noise signal equal to reference reading of circuit noise. This allows high-accuracy reading of field strength, or tracing signals to source by direction finding or intensity comparison techniques. EDDYSTONE RADIO. **295**

Color TV monitor has 23" diagonal screen, accepts RF or bridged direct TV video and audio line feed. Model JP-968WX has AccuColor automatic tuning, black matrix kinescope, automatic fine tuning, 75-ohm video output jack for off-air recording. RCA. **296**

Antenna for STL and point-to-point radio has minimum gain of 14 dB over half-wave dipole. Model MF-960 covers 940-960 MHz, with VSWR under 1.3 : 1. Horizontal beam is under 18°, vertical under 32°. SCALA. **298**

"Dry-clean" Your Video Tapes to Cut Drop-outs

If you have some older video tapes that have become unusable because of drop-outs, don't resignedly chuck them out. Send them to the dry cleaner!

That's a service being offered by Television Equipment Associates at 9 Cliff Drive, Bayville, New York. TEA uses a Magnetek tape cleaner to take off the dust, oxide clumps, and other crud that can get between tape and playback head, lowering the quality of the video image. The Magnetek uses a combination of a precisely adjusted cleaning blade and multiple tissue wiping.

TEA says that the machine has removed up to 70 percent of all dropouts on tapes brought in, more than enough to move a tape from the unusable to the usable column. Rates for cleaning range from $10 for a one-hour tape, on orders of five to nine, down to $7 for a one-hour tape, on orders of 20 and more. Tapes are shipped prepaid to TEA and are ordinarily returned in four days. Half-hour tapes run from $6 to $9 each, depending on quantity. Tapes showing no noticeable improvement are charged at half the regular price.

GBC CUTS VIDICON PRICES IN HALF!

If you're not buying your replacement vidicons from GBC, you're wasting money. These are brand new, first quality, fully guaranteed tubes in factory sealed cartons. Made by Hitachi. How do we do it? The answer is volume. GBC sells more than 90% of the replacement vidicons used in this country.

Model 7735A Very high sensitivity. Provides sharp clear pictures even at low light levels, with minimum lag . . **$34.50**

Model 8507 Similar to 7735A, but separate mesh design allows overall beaming without loss of detail. Improves resolution and high amplitude response. **$74.50**

Model 7038 Used in many live cameras and film chains **$34.50**

Model 7262A Exact replacement for Sony and Panasonic **$34.50**

Model 20 PE11 2/3" vidicon. Used in many low priced cameras **$34.50**

Model 8823 2/3" vidicon. Used in Sony battery operated portable **$34.50**

1" Tivicon Silicon diode faceplate **$695.00**

2/3" Tivicon Silicon diode faceplate **$695.00**
Prices shown are in lots of 5. Add 10% for lesser quantities.

EXTRA! We also carry a full line of GE broadcast and industrial vidicons. Name your own poison. Whatever you need, we can supply . . . at incredibly low prices.

GBC **GBC Closed Circuit TV Corp.**
74 FIFTH AVE., N.Y., N.Y. 10011/(212) 989-4433

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Spotmaster

Degaussers

• Bulk Tape • Tape Head

BULK TAPE ERASERS assure clean, noiseless tape . . . on cartridges, reels or cassettes. Our new Model 300C is a heavy-duty table-top unit with spindle that even erases 10½"-dia., 1"-wide

300C 200C/220C

video tape reels (and everything smaller), costs just $44.95. Model 200C is hand-held, pushbutton-operated eraser, $22.60. Similar Model 220C for 230 VAC/50 Hz use is $24.60.

HEAD DEMAGNETIZER is indispensable for proper tape head maintenance, maximum frequency response, low tape noise. Pole piece will not damage head. Only $8.00.

Order direct or write for details.

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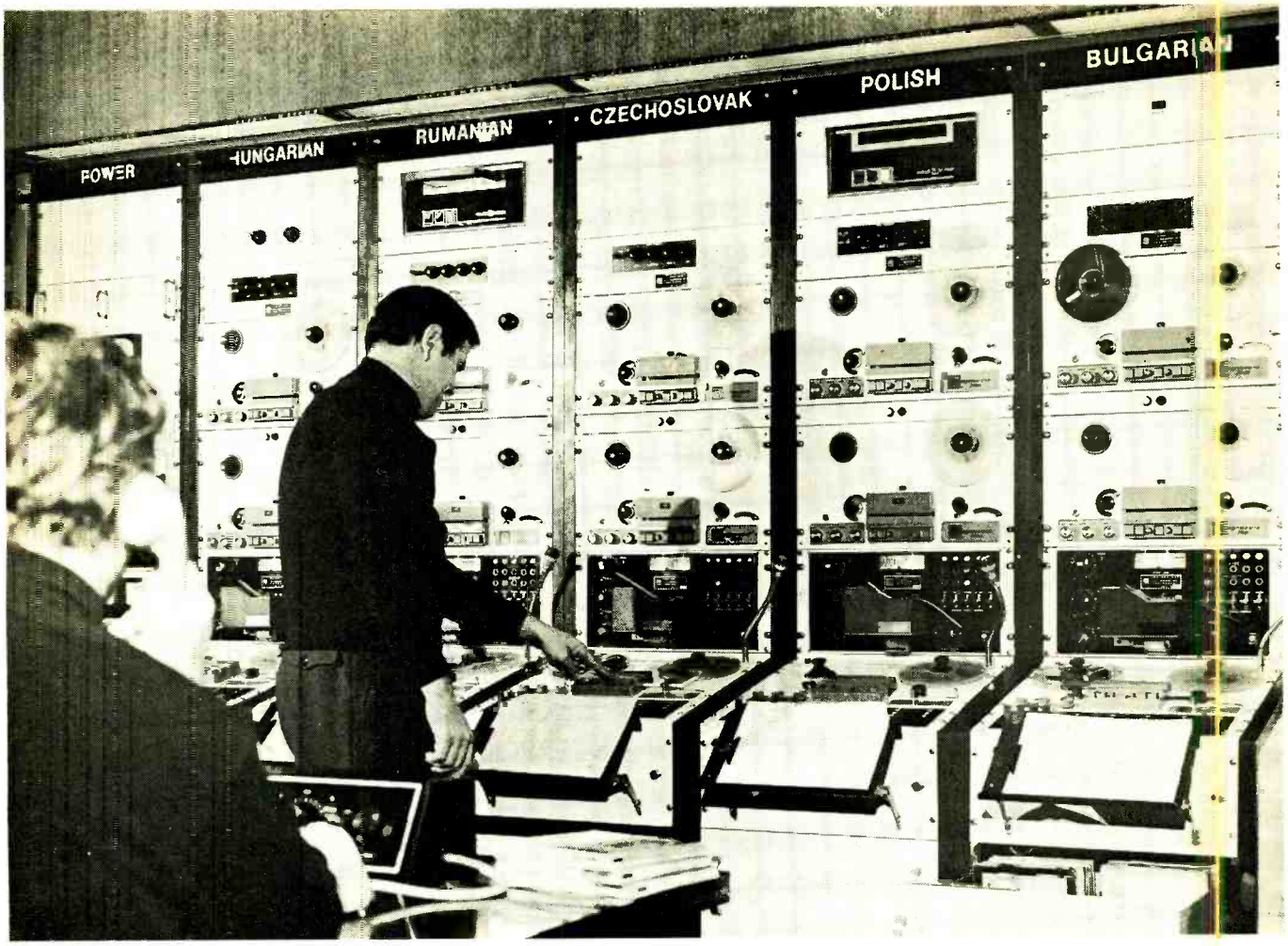

Thirty million people behind the iron curtain rely on Radio Free Europe... and Radio Free Europe relies on MAGNECORD

RFE is the leading free radio station broadcasting to East Europe. These Magnecords are a key part of RFE's master control system, the heart of their broadcasting operation.

RFE designed and built the master control system and had to meet unique engineering requirements with the best possible equipment. That's why they chose Magnecord.

Magnecords are used to program simultaneously in five languages, beamed to five separate countries. Each language has a bank of rugged, reliable Magnecords for consistently high performance under the most demanding conditions.

Magnecord die-cast mainplate assures permanent mechanical alignment. Program timing accuracy is held constant by the hysteresis synchronous capstan drive. And, each reel has its own heavy duty permanent split capacitor motor.

RFE can't afford to take any chances with its equipment. When field proven dependability and professional quality are available, why settle for anything less? Select Magnecord. Made in the U.S. by Telex

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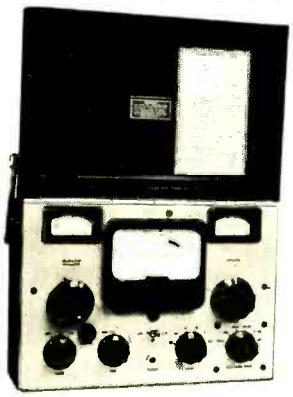
READY TO TRADE IT IN?



We're offering these two solid-state replacements in trade:

FIM-21
535 KHz to 1605 KHz

or

FIM-41
540 KHz to 4.8 MHz
(Measures AM Broadcast Harmonics to -80db)

Typical Features:
☐ Front Panel Speaker ☐ Illuminated Meter and Dial ☐ Ganged Osc/Receiver Tuning ☐ High Adjacent Channel Rejection ☐ Stable over Wide Temperature Range ☐ Long Battery Life (standard D cells) ☐ External RF Input Jack

If you're ready to trade up to the next generation of Field Strength Meters from the manufacturer of the 120(WX-2), please write or call:

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Phone: (301) 589-3125

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NEW LIT

For copies of these literature offerings, circle numbers for appropriate items on Reader Service Card.

Single-ended CATV amplifiers are covered in a position paper which reviews advantages and disadvantages as against push-pull, split band, and distributed amplifiers. AEL Communications Corp. **200**

High-speed broadcast video contact duplicator is covered in data sheet with all specs and functional description. Ampex Corporation. **201**

Automatic time and temperature announcers, real time (network) switchers, and solid state random memory, with functional descriptions, specifications, are the subject of data sheets. International Good Music. **202**

Miniature twin plugs and patch cords are described in a four-page bulletin. Switchcraft. **203**

Selected articles from the Lenkurt Demodulator, covering the period 1966 to 1970. It is Volume II in a series. (Volume I covered pre-1966 articles.) With 468 pages, it sells for $7.50. Lenkurt Inc., 1105 County Road, San Carlos, Calif.

Short-form catalog covers HF receivers, mixers, electronic switches, amplifiers, frequency doublers, filters, directional couplers, power splitters, and other related products. Lorch. **204**

Coaxial load resistors, absorption watt-meters, RF attenuators, calorimeters, and coax switches are shown in four-page short-form catalog. Bird Electronic. **205**

Pamphlet, "ABC's of Radio and Television," has been issued as a giveaway for broadcast station visitors, a community mailer, and school resource book. It covers the history and nature of American broadcasting, includes the FCC's "Broadcast Primer," and extensive statistics on the industry. Copies are $.35 each. Television Information Office. 745 Fifth Ave., New York 10022

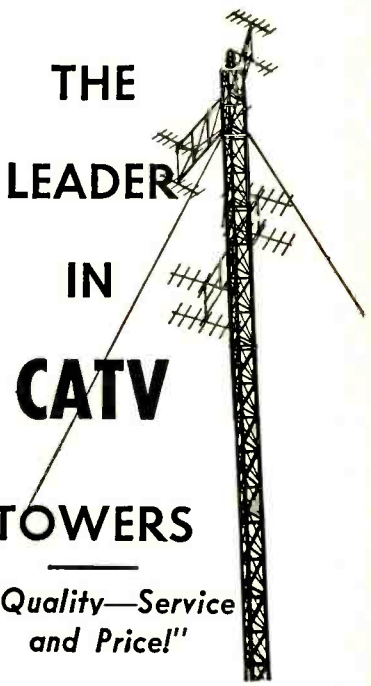
Automation 12-page brochure discusses the philosophy, advantages, equipment, engineering of automation in television broadcasting. Block diagrams of complete automated stations are shown. Ampex Corporation. **206**

Prepared music programs for broadcast stations on tape, some with announcements, includes separate programs of classical, contemporary, big band, strings with swing. R. A. Campbell. **207**

Instrument databook and rental catalog lists more than 3600 electronic instruments from a wide range of manufacturers, giving specifications and prices. Equipment is classified by types. A section covers rental rates and "blue-book" values for used instruments. Sales offices of

(Continued on page 46)

THE LEADER IN CATV TOWERS



"Quality—Service and Price!"

Yes, quality, service and price on CATV systems are the reasons for Fort Worth Tower's position as the industry's leading supplier. Experience gained as a pioneer supplier of CATV enables Fort Worth Tower to provide you with a quality product at a price that is reasonable and attractive.

Take advantage of our experience. For assistance in systems planning, engineering and complete systems quotations . . .

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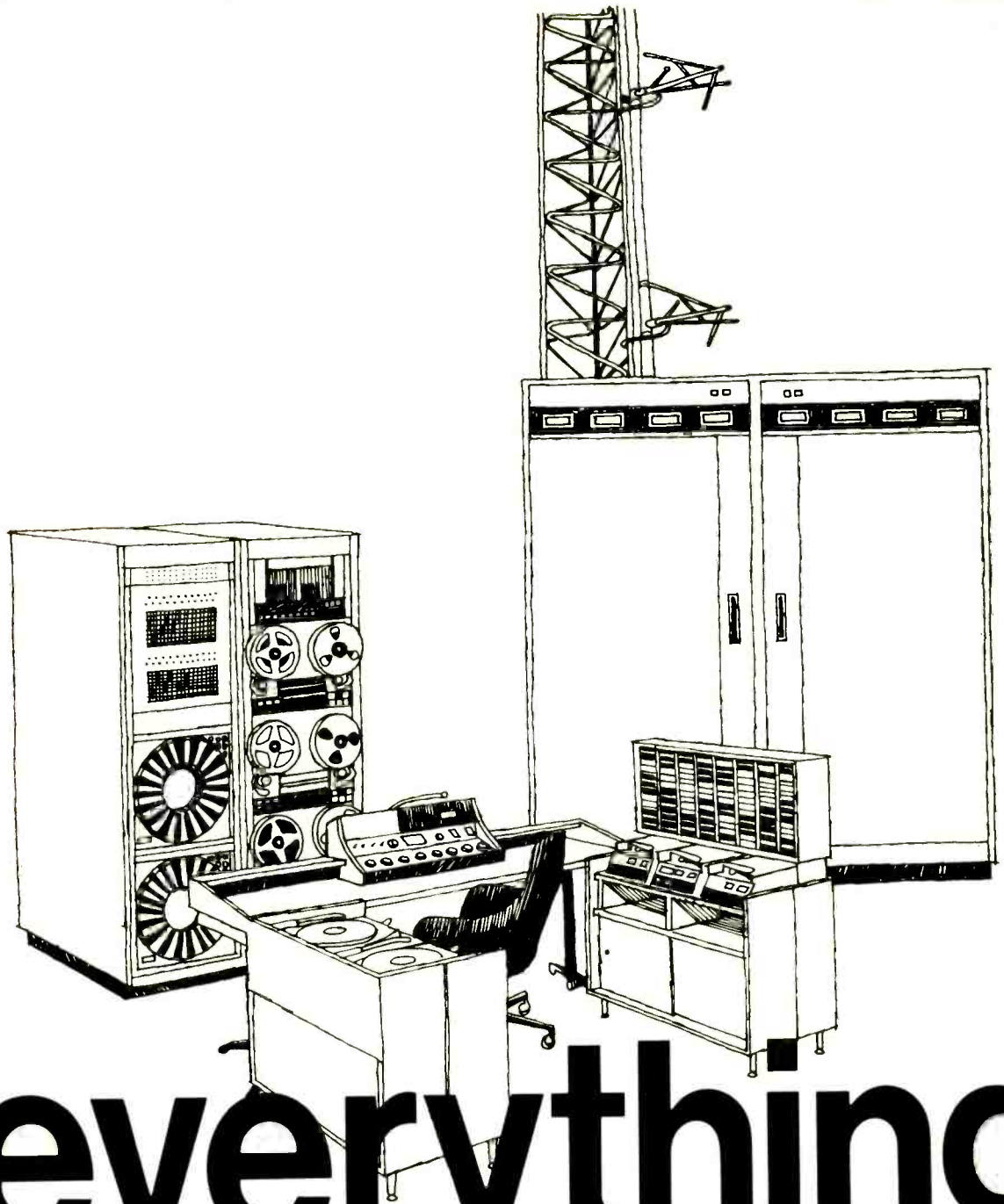

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. . . for your every broadcasting need, and with 100% financing!! It's faster, easier, and less costly for you to let SPARTA service your needs.

A telephone call right now will put you in touch with people familiar with the entire spectrum of broadcasting, including audio consoles, tape cartridge systems, automation, transmitters and antennas. Plus a wide selection of accessory products!

A smooth and profitable operation is yours with SPARTA equipment because value is built in, in such a way that dollar for dollar you can't find a better buy in quality broadcast products. From a complete station-transmitter package to a microphone for your production studio, SPARTA can fill your requirements faster, easier, and less costly than ever before!!

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Spotmaster

The Top Turntable

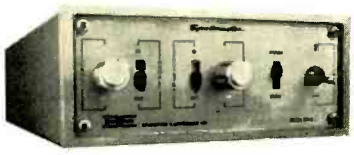
. . . is Spotmaster's new Studio Pro B, offering instant start and the tightest cue potential in the industry. Heavy duty hysteresis motor drives a 6½ lb. machined aluminum platter in a solid-cast aluminum chassis for inaudible rumble, lowest wow and flutter. Indicator lights tell speed (33 or 45) at a glance, and speeds can be changed with platter in motion. Detachable mounting plate (accepts any tonearm), integral 45 spindle and neutral cue position are other features . . . all for just $198.00.

And an Outstanding New Tonearm

. . . is the Spotmaster stereo BE-402 (mounted on Studio Pro B above), which combines reasonable cost, rugged design and professional specs. Features include high compliance for modern stereo cartridges, minimum tracking error, anti-skating, low mass, quick-change head, easy single-hole mounting . . . for only $54.95.

Complete line of Gray professional arms and all broadcast quality phono cartridges also available at competitive prices.

And the Best Turntable Preamp



. . . is our new Model TT-22, all solid state, modular, stereo equalized and completely self-contained. Features separate balance/level controls, high output (+8dbm), phone jack . . . plus switchable and remotable rumble and scratch filters. Both stereo and mono models are available, starting at $121.50. Our time-tested TT-20B mono preamp and PR-4C power supply (will power up to 4 preamps) are also available, providing top performance at economy prices.

. . . all from Spotmaster

PLUS a complete range of accessories for both turntable and cartridge tape operation. Write for details.

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(301) 588-4983

NEW LIT continued

manufacturers are listed. Leasametric. **208**

Automatic broadcast video cassette recorder/reproducer, ACR-25, is described in six-page brochure, with complete specifications. Ampex. **209**

"Sampled Video Techniques," by Glen R. Southworth, covers the use of TV camera tubes as data collectors in sampling applications. Paper shows how the high data rate and other characteristics of vidicon tubes can be put to good use in research and industry. Colorado Video. **210**

Drop-line materials and grounding equipment for CATV are covered in two catalogs. Included are cable, attachment hardware, connection devices, passive devices, rods, clamps, straps, ground wire moulding. Anixter-Pruzan. **211**

Intrusion and fire alarm products are listed in a 64-page catalog. Applications, principles of operation, and specifications are covered in detail. Mountain Alarm Supply. **212**

Digital audio delay, a 6-page brochure, describes the Delta Tau Model 101 Digital Audio Signal Delay Unit. Use in a number of applications is outlined, including public address, studio recording, satellite transmission, film transfer, quadraphonic sound. Gotham Audio. **213**

A-V Catalog, lists products of 115 manufacturers of audio-video tape and accessories, tape recorders, language laboratories, high fidelity equipment, CCTV, motion picture equipment, video recorders, broadcast equipment. Sonocraft, 29 West 36th St., New York 10011.

Microphone bulletin on microphone cord with on-off switch built in describes construction and application. Switchcraft. **214**

Booklet for dx hobbyists tells how to get started, equipment to use, operation plans, on TV, FM and VHF public service radio bands. Twenty-five cents. TV-FM DX Association, P.O. Box 5001-BM, Milwaukee, Wisc.

Audio/video equipment, including 27-channel media mix control, four-channel Quadra Que programmer, automatic dissolves, projectors, others described in catalog. Spindler and Sauppé. **215**

Cable-holding devices booklet for single, dual coax and figure-8 cable, including dead-ends, teletap connectors, telegrips, telesplices. Preformed Line Products. **216**

McMartin

SCA Multiplex Receivers

"State of the art" design. Exclusive UNI-STRUCTION™ provides high quality reception, minimum maintenance, field-proven reliability. Meet FCC Rules, Part 15.

TR-66B
Most advanced SCA receiver on the market.
Accommodates plug-in amplifier modules plus balanced mike input.

TR-55
McMartin's unequalled combination of high performance and economy.
Available with matching 10, 25 and 75 watt (RMS) amplifiers.

For complete information including details on new TR-E1 educational receiver write:

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• Background Music
• Commercial Sound

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KTMS-FM Santa Barbara—another happy user of the new AITKEN INTEGRATED CIRCUIT AUTOMATION

WE'VE COME A LONG WAY . . . TOO. We started in 1959 providing the budget minded station with reliable state-of-the-art Automation We've never lost sight of our goals. We still produce ultra-reliable low cost automation, now with all Integrated Circuit Control. Pictured are the main units—Random Access Carousel Control (not pictured) also available. We'll send you the HOW and WHY from the Instruction Manual.

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Taft, California 93268
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Location photograph courtesy KTTV Metromedia Television/Channel 11, Los Angeles.

New low price for instant replay: $5/hour

TeleMation's* VIDEODISC® VDR-1000 Instant Replay NTSC Recorder

The $19,000 you save when you buy it (initial cost of chief competitive unit, about $75K; of VIDEODISC, about $56K) is just the beginning. Our single-disc, two-head design (much simpler than our chief competitor's two-disc, four-head unit) means fewer dropouts, higher reliability, and lower operating cost.

When you average out initial equipment purchase and disc/head replacement costs for the leading competitive unit—we'll call it Brand A—you come up with $18.00 to $20.00 an hour. The VIDEODISC VDR-1000, on the other hand, costs about $5.00 an hour. That's a saving of up to $15.00 for every hour that you use it.

So much for the *economy* story—there's more.

For example, the clearest, sharpest stop-action, slow-motion and time-lapse images you've ever seen. The *only* disc recorder that provides full 4.2 MHz bandwidth, with retention of luminance level in stop action and slow motion. Five speeds instead of two or three. Visual fast-forward and fast-reverse at any speed, including time lapse. Joy-stick speed control. Twenty indicator lamps to show you exact head position second-by-second. Chromecote® proprietary protection to extend disc and head life. Disc design proven in long-term computerized data processing applications. Rugged construction and packaging for outstanding mobile operation. Modular design and built-in test circuits for easy maintenance anywhere. Test-panel access to all critical signal test points. Plus the fact that you don't have to replace heads just to change a disc.

If you can't see the point in working harder, worrying more, and paying four times the price for performance that falls short of ours, call or write us for a VIDEODISC demonstration. Instantly.

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AUDIO FILE

Continued from page 12

In any matrix system, the designer must choose his trade-offs between separation from front-to-back, or from side-to-side; total separation between each channel and all the others is not possible with a coded system. Columbia chose to put very high separation between the two sides, and less between front and back, as a result of extensive investigation of the psychoacoustics of four-channel listening. A principle Columbia calls "Front Source Dominance" gives the listener the sense that a sound is in front, if the front signal is moderately stronger than the back.

Thus in the SQ system the two front channels are carried unaltered through the encoding and decoding, providing very high left-right separation and giving the recording full stereo effectiveness when played on a two-channel system.

The back channels also are given very high left-right separation by means of the helical modulation. This is produced as follows: the left-back signal appears in both of the encoded channels, but the two versions are in quadrature relation. When they are applied to the stereo cutter, the tip motion will be circular, and the track on the record helical. The right-back signals are similarly encoded, but in such phase that the tip of the cutter circles in the opposite direction from its motion for the left-back signal. The decoder can separate the two signals with extremely small cross-talk.

Several other novel psychoacoustic effects are put to use in the system; they will be covered in our detailed report on the system.

Decoders will be available in an inexpensive "straight" version, and also in a somewhat more costly version that includes simple logic circuitry to increase the separation automatically under certain signal conditions. In listening tests, the two versions produced identical results a good part of the time; there was a sense of a slight opening up and sharpening of placement with the logic version at times.

However, *BM/E* believes that most listeners will judge the results in either version substantially "perfect" as four-channel stereo: only careful comparison with discrete four-channel reproduction, as already noted, brought out the system's tiny lapses from the four-channel "ideal." —**Robin Lanier**

Audio File Feedback

"Your new audio section is GREAT," has been the acclaim of hundreds of readers. We thank you. Ed Johnson, Bedford, N.Y., was definitely positive when he said it was "definitely a good section." However, John Foote, Pittsburgh, Pa., was a little more cautious in his praise. He saw it as "a potentially good idea." We'll go along with Foote. This section will be as good as our inputs. Let's hear from you. (Thanks, W. A. Craig, Grayson, Ky., for your comments on Berliner's comments. We'll publish them next month.)

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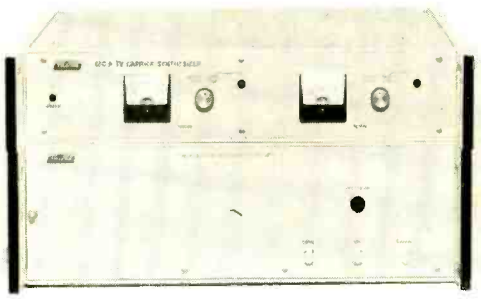
Carrier Generator System



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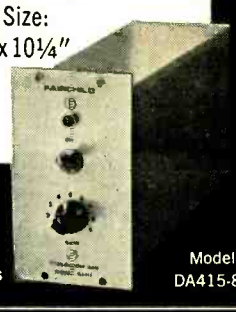

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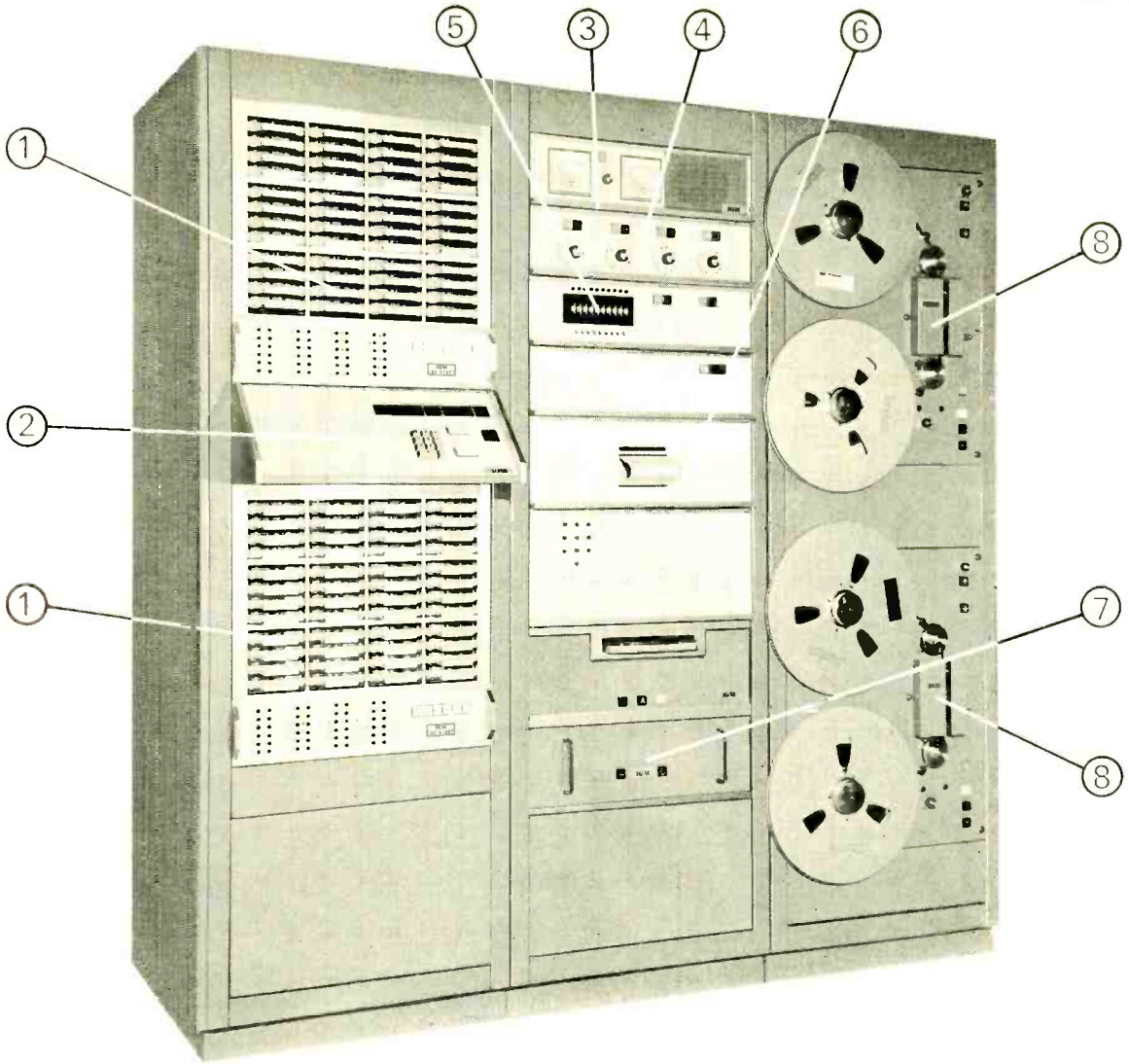

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IGM

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NEWS continued from page 8

available at moderate cost to community groups and individuals. The Center will also supply an advisory and technical service to help users develop material suitable for cablecast.

TelePrompTer, which serves the northern half of Manhattan, invited a passel of officials, celebrities, and community leaders to an all-day block party. Many of them took part in "opening-day" programs on the public channel.

Irving Kahn, TelePrompTer chairman, called the new channel "an electronic soapbox, as open as possible to all segments of the community we serve."

Kodak Center to Train Film Users

Eastman Kodak Company opened an elaborately equipped, four-building Marketing Education Center at Riverwood, N.Y. The MEC will train users, dealers, and Eastman personnel in every aspect of film utilization.

Texscan, Jerrold Will Combine Test Equipment

Jerrold Electronics and Texscan Corporation jointly announced that the CATV-MATV test products of the two companies will be combined under a single Jerrold-Texscan label, to be manufactured by Texscan and marketed by Jerrold.

TCI to Supply Web Links for NBC, CBS, ABC in West

A 436-mile microwave relay route linking Portland, Oregon, with Seattle, Yakima, and Spokane, Washington, is being installed by Telecommunications, Inc. of Denver, to supply video network paths for NBC, CBS, and ABC. The FCC granted authority for the microwave trunk in May 1971. Previous service over the route has been by AT&T microwave. The new trunk is slated to be ready in November 1971. TCI already supplies microwave network links for CBS and NBC between Denver and Salt Lake City, and for ABC for various links in Arizona and Texas. In addition, TCI facilities feed 111 cable systems in 17 states.

Business Briefs . . .

In one of the largest deals ever made, **Fairchild Industries** bought KLIF, Dallas, for $10.5 million cash. The 50-kw-daytime, 5-kw-nighttime, AM station was sold by the McLendon Corporation, which retains a number of other radio and television stations . . . **Cypress Communications,** of Los Angeles, which has added 28 systems to its cable chain in the past year, is seeking additional franchises in more than 40 cities, the company announced. Cypress is already the fourth largest CATV firm in the U.S. with about 2500 miles of trunk line in about 100 communities . . . According to the Television Bureau of Advertising, **viewing per TV home** climbed again in the first six months of 1971 to an all-time peak of 6 hours 12 minutes a day. The 1970 January-June figure, previous high, was 6 hours 5 minutes . . . In the same period, says the EIA, **sales of color TV** were 21% above the corresponding 1970 period, monochrome was up 5.2%, and total radio sales were almost precisely the same, gains in FM offsetting losses in AM . . . **Temple University** will offer the first post-doctoral studies in communications, according to Dr. K. A. Harwood, Dean of the School of Communications and Theatre. Program starts this fall (1971) . . . **Snelling and Snelling, Inc.,** an employment service with 550 offices in North and South America, will merge with **Comcast Corporation** of Bala Cynwyd, Penna., which operates CATV systems with 16,500 subscribers and holds franchises for additional systems in Philadelphia and other cities. Take note, anybody looking for sharp tips on how to apply for CATV jobs.

FCC Actions:

UHF Tuning

The Commission has proposed amendment of the rules to allow use of a 70-position detent tuning system for UHF, with maximum variation from correct frequency limited to 3 MHz, and numerical readout for each channel; or, if all numbers are always visible, with every other channel numbered and markers between.

The system was proposed by Sarkes Tarzian, and is said to take almost no space inside the receiver and to be low in cost. Noting that the system would not be as accurate as VHF tuning or the UHF memory systems now in use, the Commission nevertheless recommended its use on a pro-tem basis while the industry worked to develop a UHF system fully comparable to the VHF system.

Land Mobile Given Air Space in UHF-TV Band

The Commission has adopted a plan for sharing of the 470-512 MHz band between UHF television and land mobile stations. Each of the TV channels, 14 through 20, is divided into 120 land mobile channels, each of those consisting of two 25 kHz frequencies, one for base station use and one for mobile unit use. The frequencies will be assigned in "pools," each pool to cover a compatible group, as a public safety pool, a business and taxi pool, etc.

FCC Briefs . . .

Rules limiting **radiation from television cameras and TV cartridge and video players,** to confine interference potential within a few feet from the device, were proposed by the FCC. Motorola petitioned for the rules to guide design of its Electronic Video Recorder (EVR) playback unit. The rules would also apply to the many other video playback units now sold or soon to appear . . . Broadcasting the **winning lottery number** in New Jersey is illegal under the law prohibiting the "promotion of a lottery," the FCC ruled. It cannot be considered simply a news broadcast (although it has a news value), because it is helpful to the conduct of the lottery and mainly of interest only to those who actually hold tickets.

Association Actions

NAB—At its regular semi-annual meeting at the end of June, the National Association of Broadcasters elected the following, among others: Chairman of the Board, R. W. Chapin, president of Stuart Enterprises, a chain of midwest stations, Lincoln, Nebraska; Chairman of the Television Board, A. Louis Read, president of WDSU-TV, New Orleans; Chairman of the Radio Board, Andrew M. Ockershausen, secretary-treasurer of the Evening Star Broadcast Group, Washington, D.C. . . . Chapin pinpointed major issues facing broadcasters as the political spending bill and broadcast license renewals . . . Vincent Wasilewski, president of the NAB hit the proposed agree-

(Continued on page 52)

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Both are ideal for a variety of situation, including dim lighting and open areas like field events.

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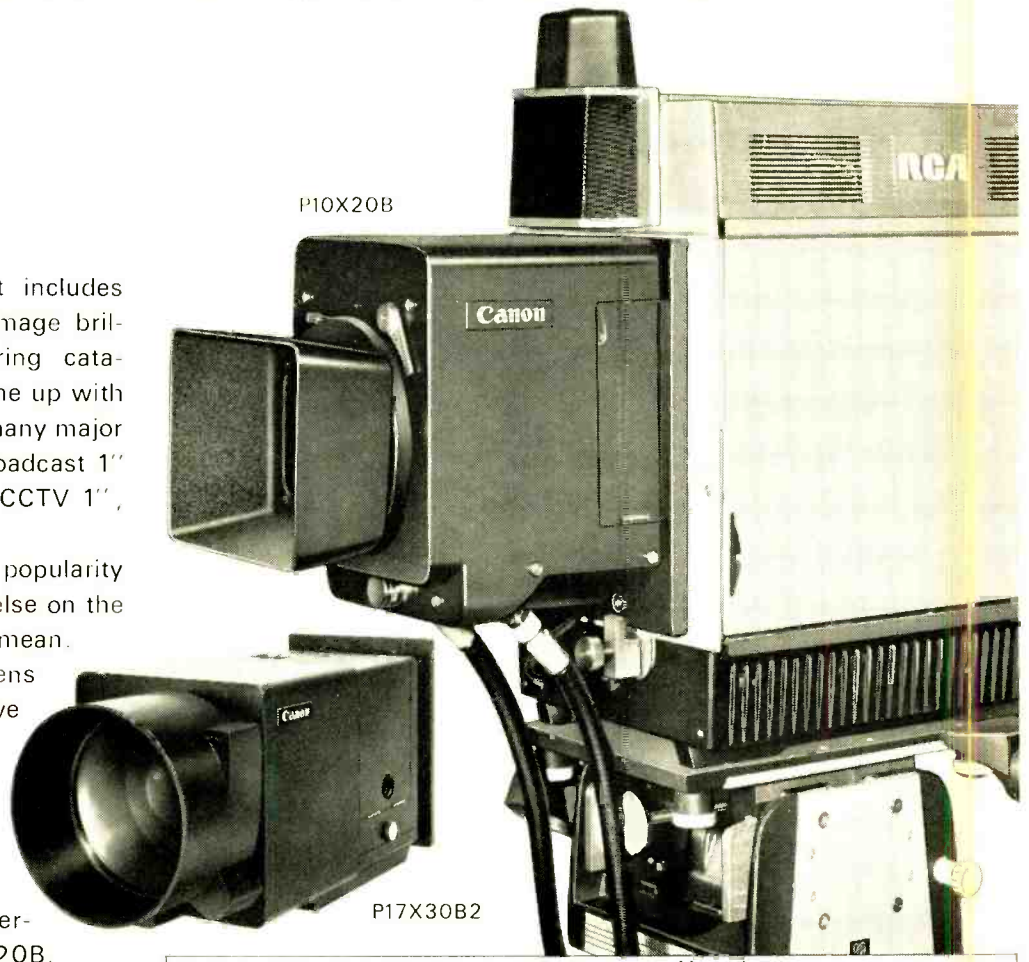

	Name	Range of Focal Length	Zoom Ratio	Maximum Relative Aperture
	Manual			
1¼" Plumbicon	P17 x 30B2	30—500mm	1 : 17	F 2.2
	P10 x 20	20—200mm	1 : 10	F 2.2
1" Plumbicon	PV17 x 24B	24—400mm	1 : 17	F 1.8
	PV10 x 16	16—160mm	1 : 10	F 1.6
	PV10 x 15B	15—150mm	1 : 10	F 2.0
1" Vidicon	V10 x 15	15—150mm	1 : 10	F 2.8
	V6 x 16	16.9—95mm	1 : 6	F 2.0
	V5 x 20	20—100mm	1 : 5	F 2.5
	V4 x 25	25—100mm	1 : 4	F 1.8
2/3" Vidicon	J10 x 13	13—130mm	1 : 10	F 2.8
	J 6 x 13	13—76mm	1 : 6	F 1.9
	J 5 x 15	15—75mm	1 : 5	F 2.1
	J 4 x 12	12.5—50mm	1 : 4	F 1.8
	Servorized/Motorized			
	Name	Range of Focal Length	Zoom Ratio	Maximum Relative Aperture
1¼" Plumbicon	P10 x 20B4	20—200mm	1 : 10	F 2.2
1" Vidicon	V10 x 15R (DC)	15—150mm	1 : 10	F 2.8
	V6 x 16R (AC/DC)	16.9—95mm	1 : 6	F 2.0
	V4 x 25R (AC/DC.EL)	25—100mm	1 : 4	F 2.5

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NEWS

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tween CATV operators and the movie industry, on **payments for copyrighted material,** as potentially destructive of the audiences of local TV stations. He said the proposed agreement would allow CATV operators to import distant signals, in competition with local stations, on payment of nominal fees . . . Wasilewski applauded the appointment by President Nixon of a panel to develop proposals for a **comprehensive CATV policy.** He said it was "heartening" that the White House recognized the importance of developing CATV in such a way that free broadcasting is not disrupted . . . Research findings published by the NAB early in July show, according to the NAB, that **newspaper ownership of broadcast stations does not cut down the free flow of news.** The study was made for the NAB by the Ohio University Broadcast Research Center. The analysis covered over 700 broadcast news scripts and newspaper tear sheets from 49 different communities. A major finding, according to NAB, is that newspaper-owned stations were likely to show more divergence from their sister papers in handling the news than stations not owned by the newspapers in the comparison . . . The NAB's newly-formed engineering advisory committee, which will serve for two years, met and discussed coding of commercials, new coverage contours, new test signals and remote control of TV. Chairman is Ben Wolfe, Post-Newsweek Stations. William Honeycutt, KDFW-TV, Dallas, was named to head up a subcommittee on automatic transmitters and Al Chismark of Meredith Corp., Syracuse, was named to chair the tower-icing subcommittee. A yet-to-be-named representative from CBS will head the unit on aural modulation.

NCTA—Capacity for program origination is spreading quite rapidly through the cable industry, according to a report issued by the National Cable Television Association. Of 1206 respondents to a survey, 422 had origination equipment, an increase of nearly 30% over last year. At the time of the survey, 284 cablecast on a regularly scheduled basis. Some 348 systems in the survey have over 3500 subs . . . NCTA asked the FCC to **solve the problem of TV receiver incompatibility** with the multi-channel (more than 12) cable systems that apparently will be required by the FCC in the near future. The cable systems can easily add the additional channels, said NCTA, but for practical reasons they must all, with present receivers, be converted at the set to the 12 VHF assignments. This adds a cost and tuning burden on the viewer. An FCC requirement that TV sets have 20, 40, even 60 positions of electronic or detent tuning would eliminate the trouble.

NAEB—President W. G. Harley of the National Association of Educational Broadcasters said, after Congress approved $13 million for the facilities program of educational stations: "We are grateful that Congress has appropriated the highest level of funding so far for educational broadcasting facilities" . . . More than 6000 persons are expected at the October 17-20 annual convention of NAEB in Miami Beach, being planned under the direction of James Fellows, NAEB Secretary. About 60 firms will exhibit equipment.

new production techniques

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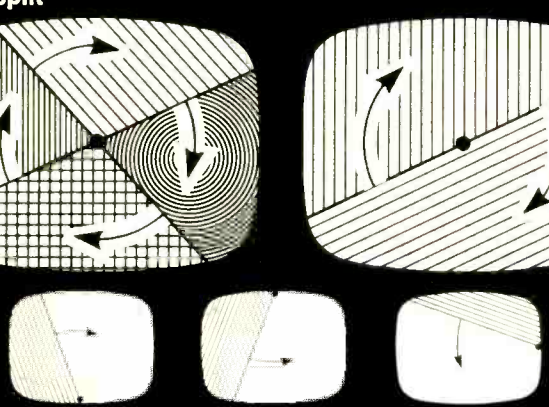

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KR-1 Kinescope Recorder, Auricon camera NOT included. Make offer. C. E. Productions, Inc. RR#3 Box 256, Valparaiso, Ind. 66383. 219-462-1842.

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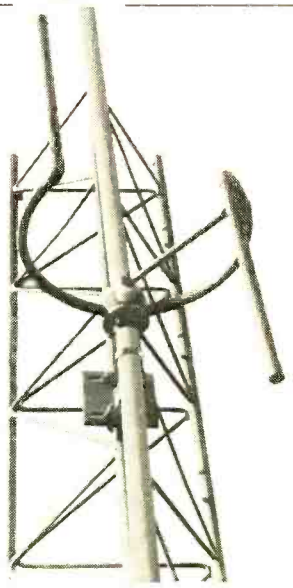

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Teledyne announces the introduction of their new Color Telefilm Recorder that transfers color tape to color film with remarkable quality.

Teledyne Camera Systems' CTR-2 Color Telefilm Recorder.

Extraordinary quality and practical economy from the outset.

Teledyne has developed the first broadcast quality Color Telefilm Recorder. They knew that excellence was mandatory. A piece of equipment that wouldn't deliver sharp, clear, color-balanced 16mm film transfers would not stand up to your criteria. So, the system was perfected and then it was introduced.

Engineering bottom line.

Primary heart of the system is the camera (DBM-64B) which uses compressed air to pull down and stabilize the film in less time than the television vertical blanking period. Result is full frame recording without mid-field splice or shutter bar.

System works for operator not the other way around.

Human engineering, ease of operation, and maintenance maximizes productivity. All components are immediately accessable. Test points on the printed circuit cards used with the built-in waveform monitor allow operation, adjustment, and trouble shooting without a separate oscilloscope. Slanted camera optical path is very convenient for magazine loading.

It almost had to be Teledyne.

You expect innovation from pioneers. Because the camera came first, from Teledyne, the system's development was only an extension. That camera revolutionized tape to film transfer and is clearly the industry's standard.

Partial list of nomenclature that makes the point.

DBM-64B Camera. Conrac RHM-19 Display. Tektronic 528 Waveform Monitor. Modified Tektronic 602 "X-Y" Display. CBS Labs Mark II Image Enhancer. Rank Decoder. Maurer "F" Prime or Auricon "Modulite" Variable Area Recording Galvanometers. Teledyne CK-120 Magnetic Recording System. And so on.

Giant step for the state of the art.

Video tape production and 16mm broadcast and dupe transmission are now a quality reality. To learn more about this capability and making it available to your operation, contact Teledyne Camera Systems at 131 North Fifth Avenue in Arcadia, California 91006. Telephone (213) 359-6691. They'll send you a reel sample.

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