

BME

BROADCAST MANAGEMENT ENGINEERING

Focus On TV Automation

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SEP 27 1972
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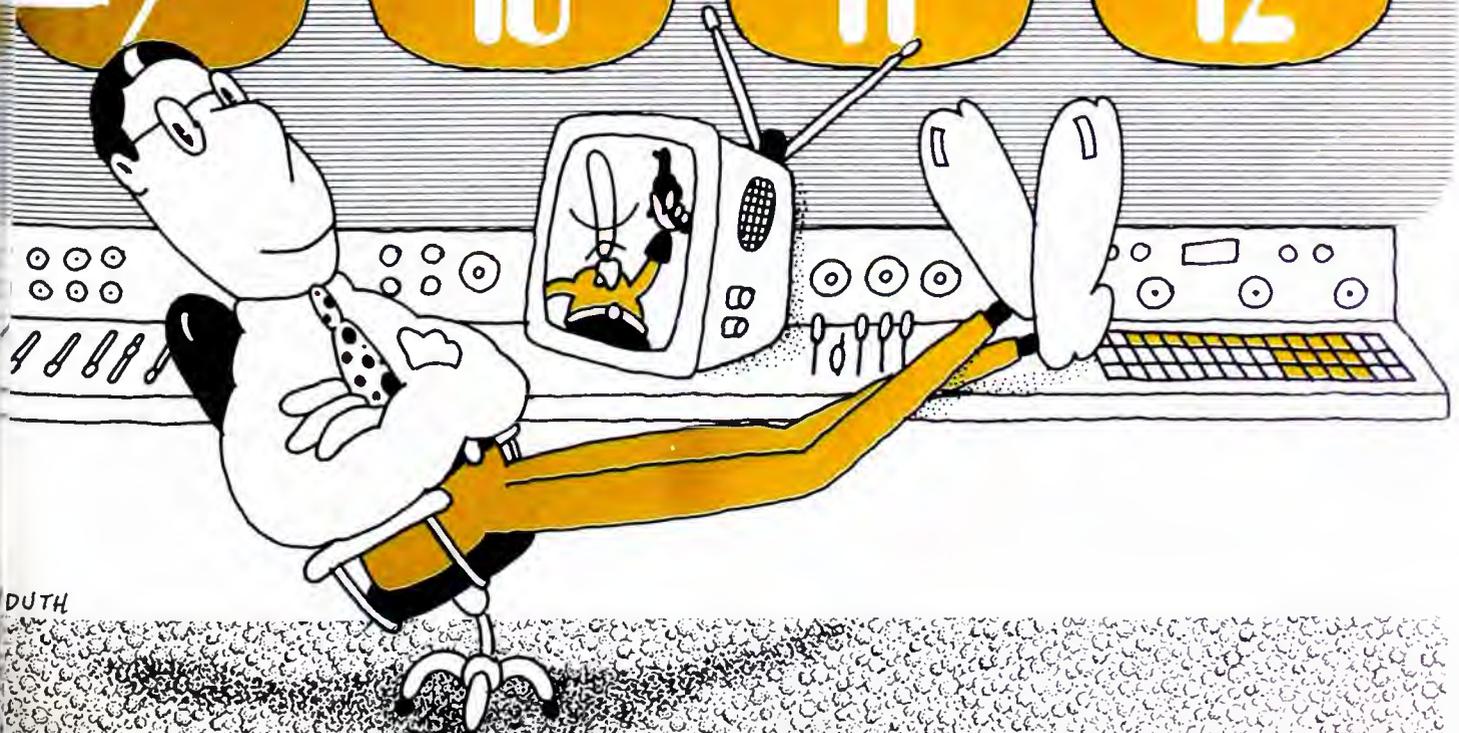
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DUTH

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It's that good!

A super-sharp teleproducer can see the superior quality of a VPR-7950 picture compared to one from any other 1" recorder.

What is a VPR-7950?

The world's highest performance 1" color/monochrome, helical-scan videotape recorder. It incorporates the same advanced design features of the Ampex VPR-7900 and the TBC-790 time base corrector in a handsome, highly functional console.

Video waveform and picture monitor selector switches may be used together or independently. An eye-level panel includes both monitors as standard equipment and an optional vector display scope.

The VPR-7950 is a complete recorder/reproducer which features:

- Very high carrier mode (7-10 MHz) for exceptional quality in color dubs even down to 3rd and 4th generations; 5th, in black and white.
- Precision, fast, *total*, electronic insert and assemble editing from any signal source.
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*Ampex VPR-7900 recorder/reproducer
with TBC-790*

digital approach to time base correction that affords the most stable video signal ever produced by a helical-scan recorder. It produces clean fades, lap dissolves and special effects as well as dubs of edited material of outstanding quality to 1" and 1/2" videotape recorders, quadruplex recorders and transfers to film.

Like the VPR-7950, the combination of the VPR-7900 and TBC-790 produces recording capabilities that meet all standard broadcast requirements. The TBC-790 may be purchased with the VPR-7900 you may now own. The VPR-7900/TBC combination is portable enough for use as a mobile unit for location work. Tapes made on the VPR-7900 are completely interchangeable with those made on the VPR-7950.

Round out your teleproduction system with the Ampex CC-500 color camera system, which incorporates professional features, is simple to operate and low in price.

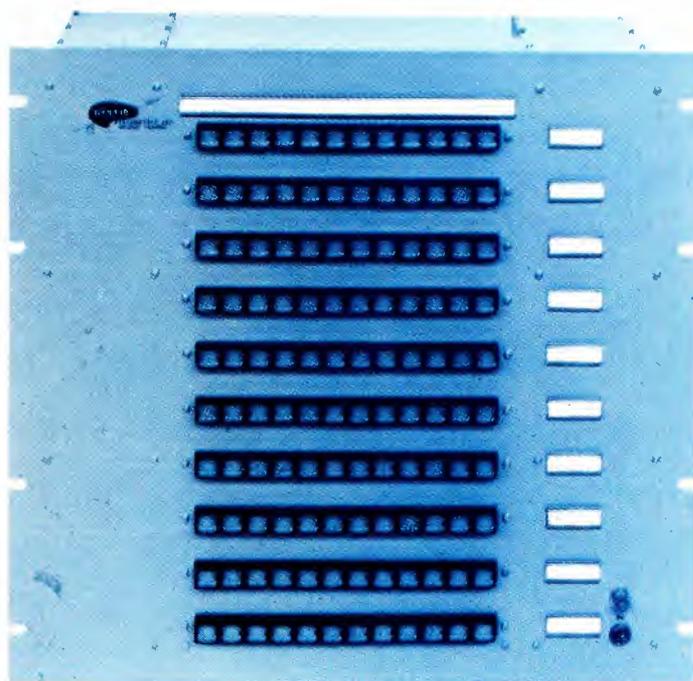
CC-500 Camera



Call your Ampex Dealer or write: Audio-Video Sales, Ampex Corporation, 401 Broadway, Redwood City, CA 94603.

AMPEX

Circle 100 on Reader Service Card



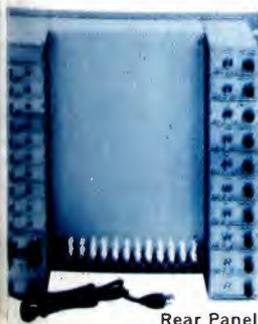
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12 in, 6 out	1,645.00	2,815.00	12.25
6 in, 9 out	2,070.00	3,675.00	15.75
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BM/E

Focus On TV Automation



This month's cover implies that a monitor for every input won't be necessary—the computer will take over. That's obviously an exaggeration, but the computer will permit hands-off operation.

BROADBAND INFORMATION SERVICES, INC.

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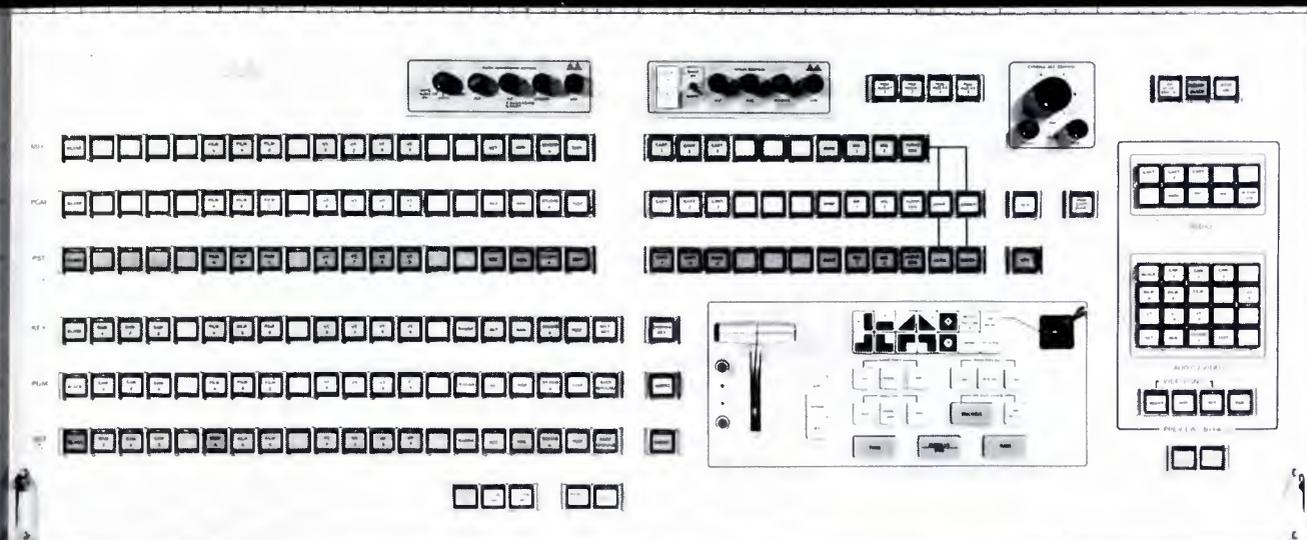
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FEATURES

VIDEO ● 20 Inputs, including black and color background ● 11 Wipe patterns, including "special" pattern ● Output buses: PGM, PST, KEY, and PVW* ● Operational modes: PGM and PGM w/INSERT ● Transition modes: Take, Dissolve, Fade, and Wipe ● Pattern positioner ● Manual and programmed dissolves, fades, and wipes ● Automatic black burst system ● Automatic non-sync inhibit ● Automatic sync add for non-composite inputs ● Processing amplifier (optional) ● Color insert generator (optional) ● Chroma Key (optional) ● **AUDIO** ● 29 Inputs (19 follow, 10 non-follow) ● Output buses: PGM, PST, MIX, and PVW* ● Operational modes: Direct (PGM) and MIX bus "over" or "under" PGM ● Transition modes: Take, Dissolve, and Fade ● Choice of manual or follow modes for PGM and PST buses ● Remote control audio line amplifiers ● Audio cartridge tape start relays (optional) ● **AUTOMATION** ● Complete interface provided ● No down-time for automation installation ● **SPECIAL FEATURE*** ● Audio and video PVW bus can be used as on-air bus (bypass mode), thus freeing balance of switcher for production use

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BROADCAST INDUSTRY NEWS

MOR Is Top FM Format Country-Wide Survey Shows

A survey of programming at FM stations across the country, released by the National Association of FM Broadcasters, shows that "middle-of-the-road" music is the most popular program format for FM broadcasters, with 21 percent of respondents reporting that they use it. "Beautiful music" was a close second with 19 percent, country-and-western third at 10 percent. Top 40 hard rock was reported by about 6 percent; classical by about 3 percent; jazz by 1.7 percent. The report lists individual stations in each category.

Of the 1016 stations responding (out of 2257 licensed commercial FM stations), 70 percent reported stereo operation. (This figure would be high, the survey notes, if stereo operators tended to respond more than monophonic.) The survey also determined the average commercial "load" at seven minutes/hour and ten spots/hour, still "unclutter"

compared with most AM stations.

The survey is available at \$5.00 each from NAFMB, 420 Madison Avenue, New York 10017.

Rooney Urges Broadcasters To Defend Their Freedom

Addressing the Pennsylvania Broadcasters Association, U. S. Representative Fred Rooney (Dem., N.Y.) said that broadcasters must fight effectively and together to prevent either citizen pressure groups or government from eating away their freedom. He predicted that Congress would pass a bill putting license renewals on a more stable basis (he himself, together with others, is currently sponsoring such a bill). Rep. Rooney also deplored what he saw as the efforts of the executive department to intimidate broadcast news personnel. He said to the broadcasters: "Fight back. Tell your story to the public . . . you have an honest and honorable story to tell . . . the time to begin is now."

Report Says Loss of Children's Ads Would Be Serious Blow

A study made for the FCC by Dr. Alan Pearce, communications economist, shows that elimination of commercials from children's programs would cost the networks about \$56 million in revenue. The loss would be all the more serious, Dr. Pearce said, because the networks could not replace the lost advertising without eliminating children's programming entirely. He suggested as an alternative the underwriting of production costs by large corporations, as is done with some public programs. The report will be considered along with comments from other parties in a current FCC inquiry into children's programs (Docket 19142). The FCC said that Dr. Pearce's report does not represent official FCC findings or conclusions, but presents his views only.

FCC To Consider Pleas Against Cable Importation of Sports

The opposition of the Commissioner of Baseball, the National Hockey League, and the National Basketball Association to the importation by cable firms of distant signals covering live sports events will be considered in a current rule making on this topic (Docket 19417), and not on a case-by-case basis, the FCC recently announced. Under the new cable rules adopted in February, cable firms in a number of circumstances can import distant signals. The sports groups have objected to importation when the distant station is carrying a live sports event, as this obviously reduces the potential advertising revenue from the event.

Harris Electronic Editors Prepare Convention News

A complement of Harris Electronic editing terminals aided United Press International in preparing spot news at the Democratic National Con-



How a minicomputer could eventually monitor, control, and log a TV transmitter was demonstrated by RCA at the 1972 NAB Convention. How a minicomputer is being used for TV switching applications today is covered in the feature article section of this issue.

7L12 Spectrum Analyzer Facts



Specifications like this:

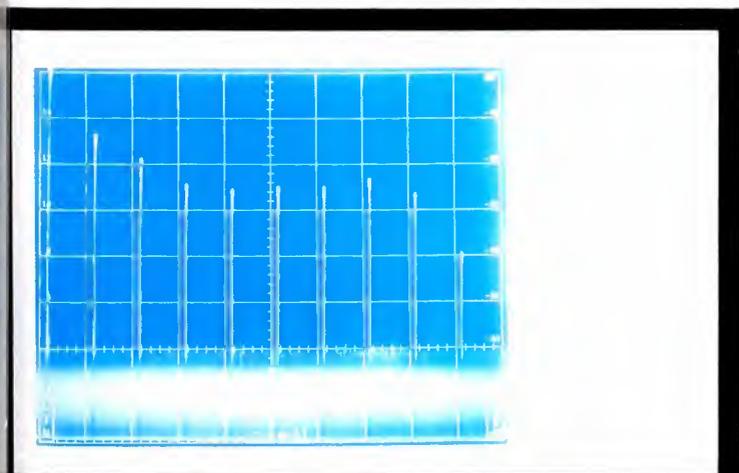
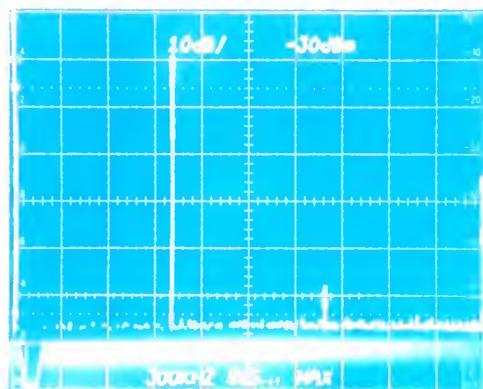
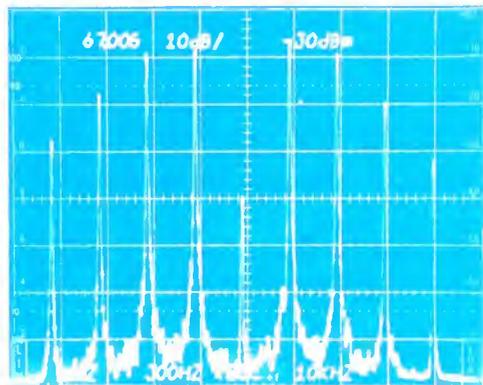
- DC coupled front end
- Maximum frequency span 1800 MHz

Mean

that signals *below* the specified tuning range of 100 kHz to 1.8 GHz can be accurately displayed. In the display at right a **FM stereo multiplex subcarrier** is shown. The subcarrier (center screen) is at a level of -70 dBm. Subcarrier frequency is 67.005 kHz, determined by a 7D14 Plug-in Counter and displayed by CRT READOUT* in the upper left readout slot. Display reference level, dB/div, resolution and frequency span are also indicated by CRT READOUT.

and also Mean

that you can see more of your signal. In the example at right, the fundamental and the second and third harmonic of a 600 MHz signal are displayed. The zero marker is at the extreme left with the 600 MHz fundamental and the second harmonic at left and right center. The third harmonic (1800 MHz) is at the extreme right. Measurement of the second harmonic level of -88 dBm falls well within the capability of the 7L12 which has better than 70 dB dynamic range.



TEKTRONIX 7L12

Spectrum Analyzer Features

- 0 Hz to 1800 MHz in one display (swept front end)
- Fully calibrated displays
- 70 dB dynamic range
- Intermodulation distortion 70 dB below full screen
- Spurious free operation
- 300 Hz to 3 MHz resolution
- 4:1 resolution bandwidth shape factor
- -115 dBm sensitivity
- Automatic phase lock
- Front panel and CRT READOUT* of display factors

fact

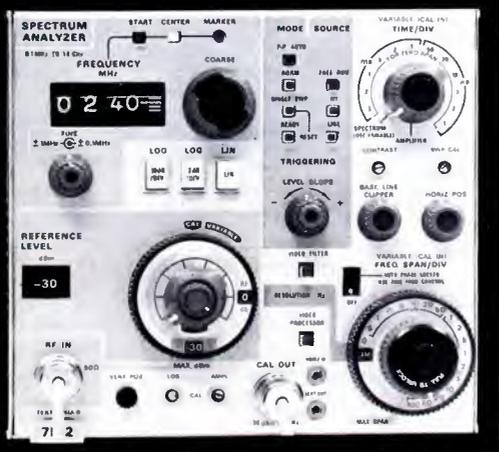
Any 7000-Series Oscilloscope with a 7L12 Spectrum Analyzer Plug-in is an excellent 100 kHz to 1.8 GHz spectrum analyzer. There are 7000-Series mainframes for all your applications including variable persistence and bistable storage.

fact

For \$5806 the 100 kHz to 1.8 GHz spectrum analyzer at left is an excellent value. It consists of a 7L12 Spectrum Analyzer Plug-in (\$4850) in a 7403N mainframe (\$950) and a blank panel (\$6) to cover the reserved-for-future-use compartment. Of course you can use the compartment now, if you choose, with one of many 7000-Series Plug-ins.

Note — The 7403N does not feature CRT readout.

*CRT READOUT is a feature of many 7000-Series mainframes.



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(for Demonstration)

vention in July. Newsmen "wrote" their copy onto the video screen, using the input keyboard of the electronic editors. When copy had been edited and approved, it was transmitted automatically to UPI's central computer in Manhattan, where it could be held in memory or sent by wire around the world.

Big Growth Seen For Medical Electronics

A forecast by a leading technological market research firm puts medical spending for electronic communications at a total of \$462 million during 1970-75, and at \$1.2 billion in the five years 1976-1980. Frost and Sullivan, Inc. of New York has recently issued a study titled "Medical Communications," which presents these estimates, and also predicts that a number of systems now in development or introductory stages will be widely used, such as telemetric patient monitoring; dial access medical data retrieval systems; computer-aided diagnosis; and others.

Audio and video equipment designed to be on the air longer

Reliability, fewer service calls, and easier tuning were the "buy-words" among television receiver and AM/FM radio manufacturers as they unveiled their new 1973 lines this spring. Broadcasters, as a consequence, can expect larger audiences—equipment sales are booming—with fewer interruptions for breakdowns.

In virtually every TV line, the key words are modular and solid state. The modular concept is intended to make the receiver easier to service in the home or in the shop. And the day of throw-away modules, circuit boards performing a specific function such as IF audio input or automatic fine tuning, has arrived. All solid-state sets are predicted to achieve a 50 percent cut in service calls over previous hybrid and tube sets.

In addition, TV manufacturers are now gearing up to bring out new picture tubes designed to improve picture quality. Since Sony Corp. achieved success with its Trinitron tube, other advances have been made in the U.S. Sylvania, RCA and GE have all developed tubes that either eliminate or reduce con-



Cable TV services were topic of recent Urban Technology Conference. Gov. Schafer, head of TelePrompTer, gets rundown on Theta-Com equipment by A. H. Sonnenschein.

vergence steps and cause brighter pictures. By next year the only tube left in television receivers will be the picture tube.

On the radio tuner front, reliability is also the main theme. For example, Fisher Radio, Long Island City, N.Y., is now using a phase lock loop circuit to improve tuner reception. H. H. Scott, Maynard, Mass., has adapted an aerospace technique for circuit boards that eliminates 95 percent of discrete wiring. Individual modules plug into a "master board" using plugs rather than soldered wires. This promotes mechanization, reduces assembly costs, and increases performance, says Scott. Hi-fi manufacturers have decided that even if four-channel broadcasting is still years away, audio equipment will sell on its own merits while the consumer waits for competing quadrasonic systems to iron out a broadcast system to be approved by the FCC.

"VidExpo 72" and "Video Expo III" To Hit New York

Apparently what we will have the most of in the 70's is expositions devoted to directed video programming and delivery systems—cassette, closed-circuit, or whatever. Before this issue of *BM/E* is distributed, there will be VidExpo 72 (August 21 to 24th, Hotel Roosevelt, New York City), sponsored by the Billboard Publications Group and Vid-News, with distinguished speakers and forums on Corporate Video, Educational Video, Consumer Video ("When do we tap the multi-billion market?"), and In-House Video, as well as an exhibit of equipment. Then, September 19th through 21st, there will be Video Expo III at the Commodore Hotel, New York City, also with authoritative speakers on hot topics plus equipment exhibition. Show will cover CCTV, film projection, and pay TV, as well as videoca-

ettes. A similar show will be held on the west coast, also in September (see *BM/E*, July 1972). Video cassette makers: you can waltz on stage a half-dozen times this year!

Philips Forms Company To Market Test Gear

North American Philips announced the formation of a subsidiary, Test and Measuring Instruments, Inc., to market the Philips line of oscilloscopes, pulse generators, counters/times, and other test gear for TV set makers, laboratories, broadcasters, and servicing. Address of the new firm is 224 Duffy Avenue, Hicksville, N. Y.

Warner and Cypress Join to Make Second-Largest Cable Firm

Warner Communications Inc. and Cypress Communications Corporation announced a merger. It will be the nation's second-largest cable firm with more than 360,000 subscribers in 30 states. Cypress would be absorbed into Warner's subsidiary, Television Communications Corporation of New York. The agreement was still subject to stockholder and FCC approval as this issue went to press.

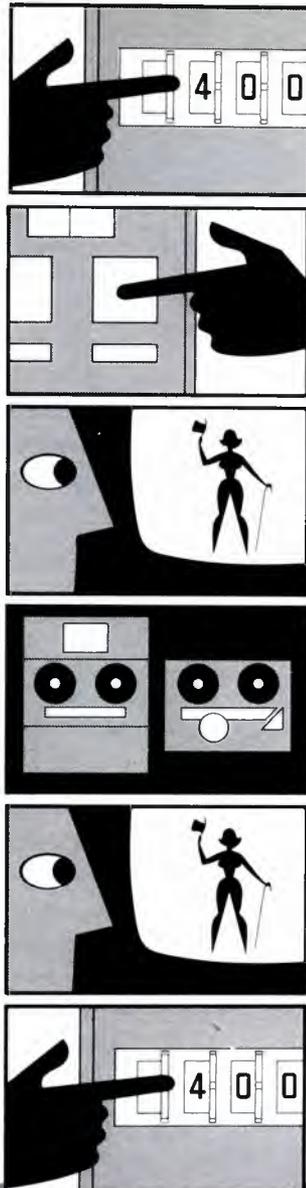
WAGO First With Strobe

The article, "Strobe Lights Get First Installation." *BM/E*, June 1972, drew the following message from Bob Daly, engineer, WAGO Radio, Oshkosh, Wisconsin: "We installed similar strobe lights on each of our three towers when our station was built in the spring of 1969. We believe we were the first commercial AM broadcast station to use this type of tower lighting, in addition to regular red beacons. Our lights were designed to turn on at sunset and off at sunrise, along with the red beacons. The only problem we have experienced is short life of the flash tubes. We are currently in the process of correcting this, but at the present time our strobes are inoperative. Otherwise, the lighting was very effective and clearly visible for many miles at night."

BM/E's article should have qualified WSMW-TV's "first" as using the new FAA type approved strobes, Spec L-856. First CATV system to use these strobes was Gerity Broadcasting, Bay City, Michigan. L-856 calls for a minimum life of one year continuous operation without replacement.

continued on page 10

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NEWS

VHF, UHF, PBC, cable: everybody's got a network

Television manufacturers and their dealers attending the recent Consumer Electronics Show (CES) in Chicago got unanimous agreement—in words, if not actual performance—that television programming will become more varied and exciting than today and thus promote the sale of more TV sets.

Wallace E. Johnson, chief, broadcast bureau of the FCC, assured the group that the Commission has a solid means of determining public tastes through its ascertainment program and through the new ground rules for license renewal. He also added that communications satellites will extend television broadcasting.

Three spokesmen for broadcasting's also-rans—UHF, public broadcasting, and cable TV—predicted that their respective segments of the industry are expanding at such a rate that they can be considered national networks in the making. Richard Block, vice president and general manager for Kaiser Broadcasting, stated there are some five million people in cities presently watching UHF channels. And now programming to be shown nationally on these channels is being prepared, including prime time sports events, to draw even more viewers. He added parenthetically that summer reruns on the VHF networks actually increase UHF audiences.

David Foster, president of the National Cable Television Assn., suggested that the future of cable cannot be cemented by simply picking up network signals, but will move to more and more program origination. "Local origination, public access, and expansion of educational TV will be invaluable in making cable networks for the cities," he predicted.

Outlining the rapid growth and acceptance of public broadcasting, Philip Rubin of PBC suggested that the 220 stations linked to public broadcasting already form a fourth major network and, with superior drama as well as children's shows, often outdraw the larger networks. He added that programming from Great Britain and France shown in this country can be obtained for one-quarter the cost of U.S. productions and that their critical acclaim attests to the quality.

And William Carlisle of the National Assn. of Broadcasters contributed to the unity of the day among the erstwhile competitors by suggesting to the makers and sellers of TV sets that there are many forces behind getting more receivers in use. Better programming, one of those forces, depends a great deal on getting the government regulators out of the way. Too much regulation, he warned, will work against free broadcasting and thus reduce one of the encouragements to buy television sets.

There were sources of conflict between the receiver producers and the program producers, however. The programmers complained about the quality of TV sets and the manufacturers complained that broadcasters have not united on transmission standards. Johnson stated that the FCC can set standards on transmission; however, the programmers in turn insisted that receiver manufacturers set their own standards on tuning performance and picture tube quality.

Cablecom Using Home Theatre's Pay TV System

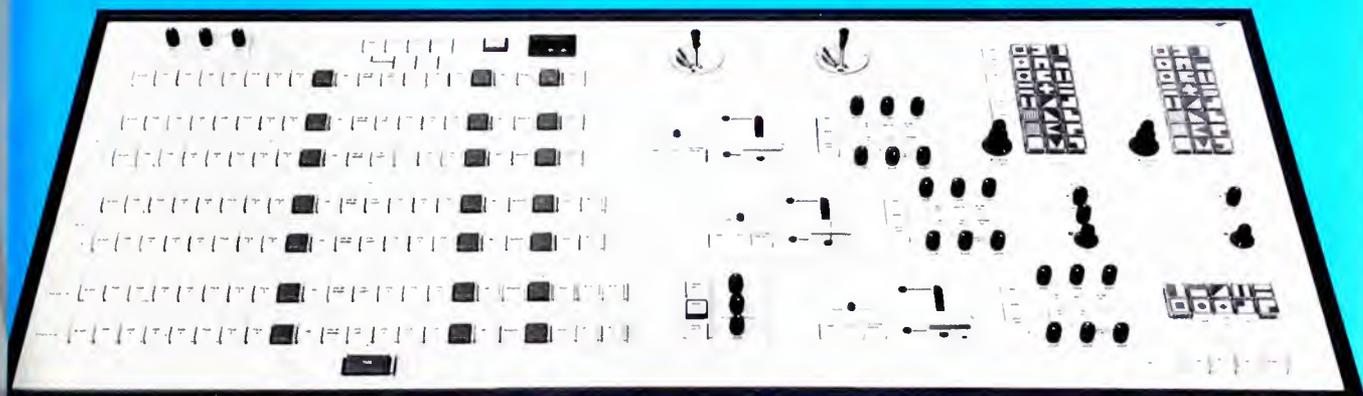
Pay TV will get another opening on cable when Cablecom, multiple-system operator headquartered in Denver, installs in one of its systems the service developed by Home Theatre Network, Inc. of Los Angeles. Planned for November 1972, the installation will allow the subscriber to make a coded phone call to headquarters, which will be followed by automatic activation of a down-converter on the subscriber's receiver. Material, which will include first-run movies, concerts, sports, etc., will originate in a few points, be delivered to the CATV system headend by microwave. Home Theatre Network envisions an eventual nationwide network.

Two-Way System of VIS Gets U.S. Patent

Two-way cable communications system developed by Video Information Systems Inc. has been granted a U.S. patent, according to a company announcement. The system, which got a trial in New York in 1971, uses a converter box on the receiver to link the subscriber to a central computer. Subscriber can make choices by pushing buttons on the converter for such services as at-home shopping, voting, pay TV, fire and burglary reports, and many others. System is currently being in-

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Datatron's Girl Gabby

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frame! This saves hours of time, and head wear on expensive video recorders too.

But don't fret. Once your husband's Datatron Model 5050 is installed, he'll have more free time to sing the praises of your jams and jellies.

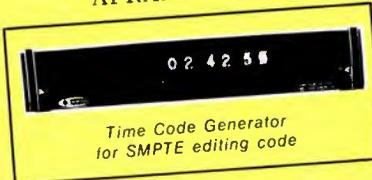
GABBY

★ ★ ★

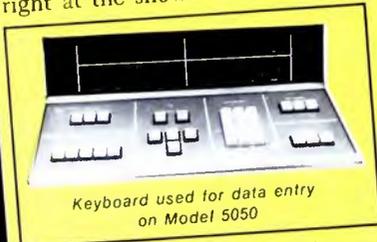
DEAR NEGLECTED: Many NAB visitors fell in love with Datatron's Model 5050 — a Video Tape Editing System with keyboard entry which works with helical or quadruplex VTRs, yet is priced at \$10,000, thousands under competition. In fact, a number of TV stations placed orders right at the show.

DEAR GABBY: How can Datatron sell a SMPTE edit code reader for \$1500 and a generator for \$1750 when competitive models go for over \$2500?

AFFRAID OF BARGAINS



Time Code Generator for SMPTE editing code



Keyboard used for data entry on Model 5050

The jam-sync feature is important since it eliminates the need to pre-record the SMPTE time code on tapes for add-on editing from masters or live sources.

DEAR AFFRAID: Don't be afraid of these bargains. Datatron's edit code reader & generator are fallouts from their Video Tape Editing System project. The low prices reflect simple construction and dedicated design. Actually, they cost less than capstan revolution counters which aren't nearly as accurate.

GABBY

★ ★ ★

Instead, during pre-roll, the built-in time code generator is set & sync'd so that time picks up exactly where it left off — to the

Send your questions — either straight or humorous — to Gabby. We'll mail a Flair pen for all received and pay \$100 if we use question in future ad.

datatron inc.

1562 Reynolds Ave / Santa Ana, Calif. 92711
(714) 540-9330

moving up fast in...



NEWS

stalled in a cable plant in South Orange, New Jersey.

Pre-Testing Of TV Ads Will Go On Cable

The pre-testing of TV commercials by putting them on cable programs that compete directly with major network programs is the plan advanced by Television Testing Company of New York. Effectiveness of ads will be determined by interviewing separate, non-recruited respondents both before and after the cablecasts. Paul Murphy, president of TTC, gave this rationale: "This system combines on-air realism with the high degree of control obtained by theatre and trailer methods."

Unique Four-Way Split Screen

If you were watching CBS-TV during the Dem/Rep Convention or Moon flight of Apollo 16, you may have noticed an occasional four-way split screen. Perhaps you merely passed it off as a rather simple gimmick—four local cameras, each using only a corner of its frame on the air.

Well, you were wrong. The Quad Monitor, as CBS calls its creation, accepts any video source—local or remote, composite or non-composite. And it puts the entire frame from each camera into one corner of the transmitted four-way split screen.

So what super-sophisticated electronic magic was used to compress each frame into one-fourth its original size? Think about it a minute: how would you go about reducing frame size while maintaining linearity, gray scale, and color rendition?

Actually, CBS does it with mirrors—almost. Four World Video color monitors using 12-inch Trinitron picture tubes, are arranged next to each other in a rectangle. In front of each monitor faceplate is a plastic lens approximately the same size. The entire assembly sits in CBS Studio 41, a dozen feet or so from Walter Cronkite's anchor desk, and a single Norelco PC-70 studio camera picks up the images from the four monitors and lenses. When the camera is precisely in position, the four images fit into the final transmitted frame, with black bordering between, formed by masking between the lenses.

Obviously by wiping with special effects, you can do one or more in... continued on page 58

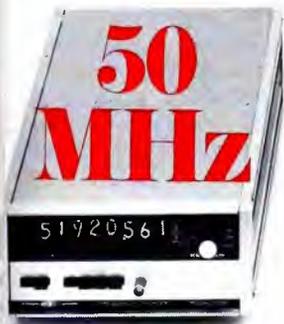
Sensitivity 10 mV

Stabilities to ± 5 parts in $10^{10}/24$ hrs.

Battery option

\$770 up, delivery 30 days

All models frequency expandable
Resolution to 9 digits or 0.1 Hz
Small size, 3½" H, ½ rack W
BCD output for systems use
Remote programming



\$770



\$1,050



\$1,395



\$2,295

Now choose from the industry's widest selection of **frequency counters!** For details or a demo, contact your Scientific Devices office or Concord Instrument Division, 10 Systron Dr., Concord, CA 94520. Phone (415) 682-6161. In Europe: Systron-Donner GmbH Munich W-Germany; Systron-Donner Ltd., Leamington Spa UK

SYSTRON  DONNER

The Systron-Donner Instruments Group:

Alpha Scientific Computer Systems Concord Instruments Datapulse Kruse Electronics Microwave Trygon Electronics

Circle 109 on Reader Service Card

look who's going



You may have heard it already—or you may not have—but more and more recording artists, more and more recording labels, and more and more engineers and producers are using Sansui's QS four-channel technique to encode their records in the four-channel mode. The list, growing from week to week, is quite impressive. But more important than the list itself is the fact that all these independent artists and companies have conducted extensive testing and actual use procedures before they made up their minds. What speaks for Sansui's QS System is not the pressure of a major software company nor exaggerated statements and promises; it's simply the performance.

Whether it is such an outstanding artist as Carole King or Joan Baez; or perhaps eminent musicians and producers like Enoch Light or Dick Schory add to the list such a beloved figure as B. B. King—they all are going Sansui's QS way because they think it is the best way. Some of these artists have actually produced with other matrix four-channel encoding methods, but have found that the most satisfactory results, in terms of the freedom of the producer and the artistic results, are in the one and only balanced and symmetrical system—that is, Sansui's QS method.

The QS way — and why

(Report on the Sansui QS Coding System)

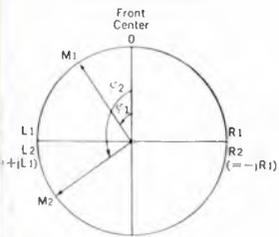
There are now almost three hundred — yes, three hundred — Sansui-type matrixed four-channel record albums available all over the world, most of them encoded with Sansui QS encoders. In this country alone, almost 30 albums are already on the market. And we hate to hold anything back from you, but there are a number of artists who will, in the very near future, be on the market with their QS four-channel recordings. Also, major labels.

While we do not know the particular reasons each of these artists and producers selected Sansui's QS System, we know that it could be any or all of those enumerated here. These are the qualifications that make Sansui's QS matrix system uniquely efficient and effective and musically satisfying. In fact, we believe Sansui's QS System is the only matrix system that can claim that it has no known major drawbacks, that are not subject to refinement. These are the features of Sansui's QS system:

TOTAL, ACCURATE SOUND-SOURCE LOCALIZATION in every direction and at any point *inside* the sound field. No dropouts, cancellations or irritating shifts in position. The "overhead" effect, with a performer in the dead center,

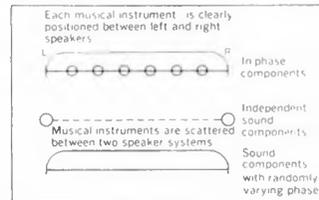
is readily achieved. This means there are no problems about having to place performers in some positions and avoiding other areas. It means that the total acoustic perspective is the same as that for discrete tape.

Recording and Localization of Sound Images in 360°



TOTAL COMPATIBILITY. Sansui's QS Coding System is compatible with two-channel stereo playback of encoded recordings. With four-channel playback (ambience synthesis) of conventional two-channel recordings. With other matrix decoders. With all existing home hardware and with all existing

Location of Various Sound Components in Left and Right Channels



professional equipment. With present broadcast standards and equipment.

There are many important implications in this comprehensive situation. For

example, when QS-encoded material is played back in conventional two-channel stereo, it produces an entirely correct stereo perspective. The rear-channel information serves to produce a broadened and enhanced stereo perspective instead of jamming rear-channel information unnaturally into the wrong places to confuse directionality and obscure the stereo effect.

We believe that it is in the interest of the entire industry that the very best system be selected, regardless of politics, regardless of cross-currents and undercurrents, regardless of alliances and pride or even some dent in someone's reputation.

We have no other ax to grind than to play the fiddle that will make the best music for the industry. If you care to know more about Sansui's QS System, please contact our New York office for a demonstration and materials. It may interest you that the RIAJ (Record Industry Association of Japan) has adopted the Sansui system under the name of Regular Matrix to be the standard for recordings in Japan. An application for acceptance of our standards is now with the Recording Industry Association of America.

It's no wonder, then, that everybody who is anybody in the four-channel medium is going the QS way. Why not join the trend? The QS encoder is very simple to adjust, easy to use and reliable. Try it. Check out our claims with your own material, in your own way. Learn for yourself what the present members of the Sansui QS bandwagon have already discovered.

Labels Using Sansui QS Encoding

A&M • Audio Treasury/ABC • Black Jazz • Command • Impulse • Ode • Ovation • Project 3

Artists Encoded with Sansui QS

The Awakening • Count Basie • Doug Carn • Ray Charles Singers • Alice Coltrane • Henry Franklin • Free Design • Urbie Green • John Lee Hooker • Sammy Kaye • B. B. King • Carole King • Bonnie Koloc • Enoch Light • Tony Mottola • Doc Severinsen • Beverly Sills



For full details, contact your nearest Sansui office now.

SANSUI ELECTRONICS CORP.

Sansui Electronics Corp.

New York

32-17, 61st Street, Woodside, N.Y. 11377. Tel.: (212) 721-4408. Cable: SANSUILEC NEW YORK.

Telex: 422633 SEC UI.

Sansui Electric Co., Ltd.

Los Angeles
Tokyo

333 West Alondra Blvd. Gardena, Calif 90247 Tel (213) 532-7670

14-1, 2-chome, Izumi Suginami-ku, Tokyo 168, Japan Tel (03) 323 1111 Cable SANSUIELEC.

Telex 232-2076

Sansui Audio Europe S.A.

Belgium

Diacom Building Vestingstraat 53-55 2000 Antwerp Tel 315663-5 Cable SANSUIEURO ANTWERP

Telex ANTWERP 33538

Vernitron Ltd.

Germany, W.
U.K.

6 Frankfurt am Main, Reuterweg 93 Tel 33538

Thornhill Southampton S09 50F Southampton 44811 Cable VERNITRON SOTON. Telex 47138

Circle 110 on Reader Service Card

Charge Dissipation Gives, For The First Time, Lightning Prevention

Protecting exposed structures from lightning has always been a partial and chancy enterprise; and broadcast installations have often suffered lightning damage. But now comes a California outfit claiming, apparently with justification, that they can **prevent** lightning in a protected area by charge dissipation.

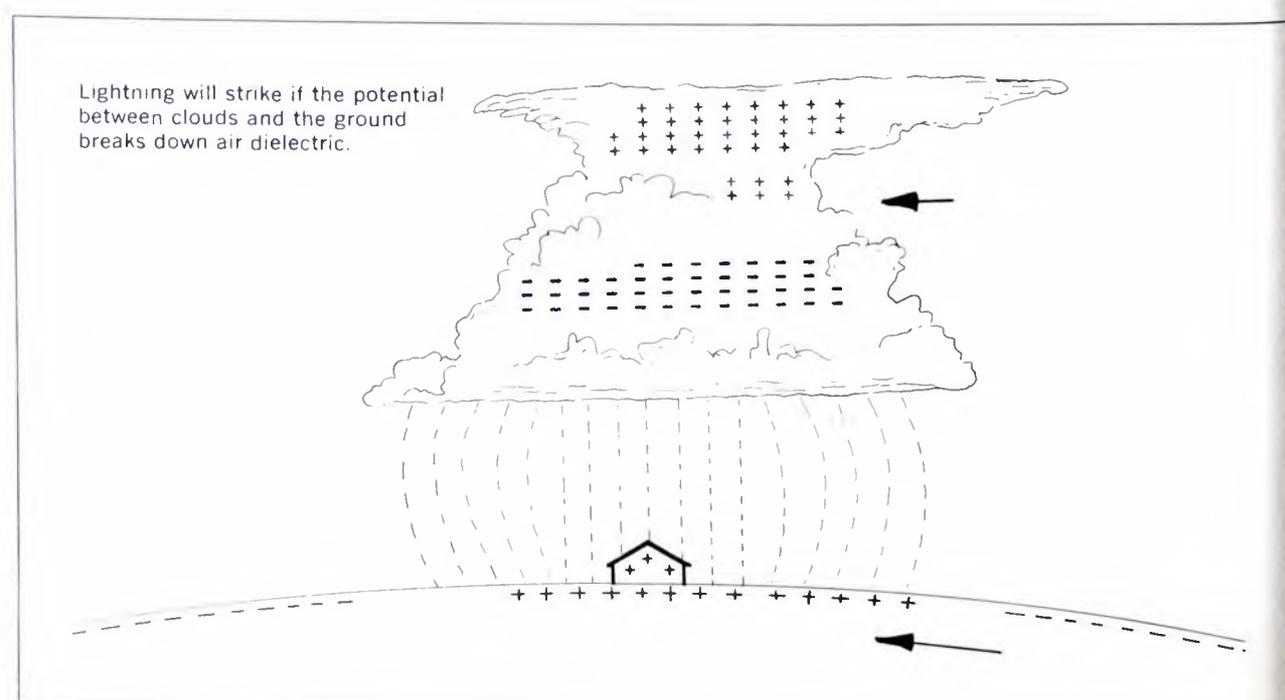
TO THE BROADCAST INDUSTRY, as to many others, lightning has always been an unpredictable and uncontrollable force, the dangers of which could be lessened by careful design and prudent procedures. But lightning could not be prevented from breaking through human defenses from time to time, especially at high-altitude installations. As is well known, a direct hit is not at all necessary to the production of plenty of damage. The induced current from a nearby lightning bolt can destroy any current-carrying device, the power line, the antenna transmission line, etc.

A startling development by a firm calling itself Lightning Elimination Associates of Downey, California, has apparently opened the era of *lightning prevention* in a protected area. The station operator who has had repeated lightning trouble can look

forward to total relief, at small cost, if the new technique lives up to its promise. Such a development obviously represents, for *every* kind of human installation and enterprise, an historic shift away from the purely defensive response to lightning.

The basic idea is most simple. The lower part of a thunder cloud becomes highly charged, usually negatively. As the cloud moves, it carries beneath it along the earth's surface an area of induced opposite charge (below). If the potential between cloud and earth gets higher than the breakdown point of the air between, there is a lightning stroke. High structures make lightning more likely by shortening the air path from cloud to earth.

If the difference in potential could be substantially reduced by a dissipation of charge across the air gap, the chance of lightning occurring should be



substantially reduced. This is just what the LEA system sets out to do, with an array of very many sharp metal points, connected to the ground and pointing upward. The ability of a sharp point in a strong voltage gradient in air to start a current across the gradient has been known since Ben Franklin flew his kite. The LEA dissipation array "leaks" the charge across the air gap.

The number of points in a given installation can be many thousands. The array in which they are mounted may have a variety of shapes, the particular configuration being chosen to suit the structures being protected. The antenna in the photograph supports a series of radial dissipation wires (barely visible).

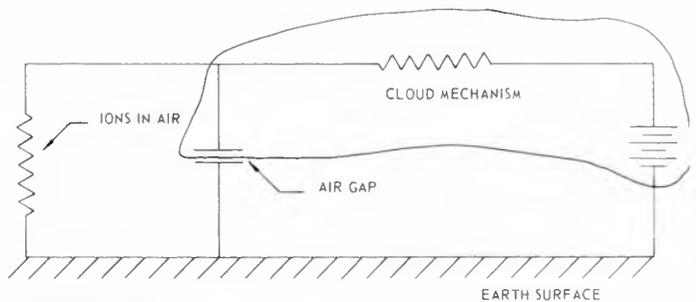
Is a device of these comparatively modest dimensions up to the job of preventing lightning, one of Nature's truly outsize phenomena? Apparently so. LEA cites, among others, the case of the transmitter of station KHOF-TV, on a peak 5500 feet high near Los Angeles. The station and the incoming power line had been knocked out repeatedly by lightning. The station engineer had even been knocked off the roof, with only one small black cloud in the area. One of LEA's dissipation arrays, installed last year, got KHOF through the lightning season without a single hit.

It seems a terrible loss that this relief from lightning's ancient danger has been stuck on the back burner for more than 40 years. The idea occurred about 1926 to Willard Starr, a young California engineer, after he saw lightning start a fire in an oil-refinery tank (the oil industry is one of the heaviest losers to lightning). After some experiments, he convinced himself that the idea was sound. A trial installation at an oil refinery was virtually forgotten when the executive who sponsored Starr died. No one else could be interested until the 1960s, when another engineer finally noticed that the tanks protected by Starr's arrays had never been hit by lightning. Starr was called back into lightning prevention after a long career as a consultant to the movie sound studios. He is now a principal in LEA, along with R. B. Carpenter, an engineering executive with much experience.

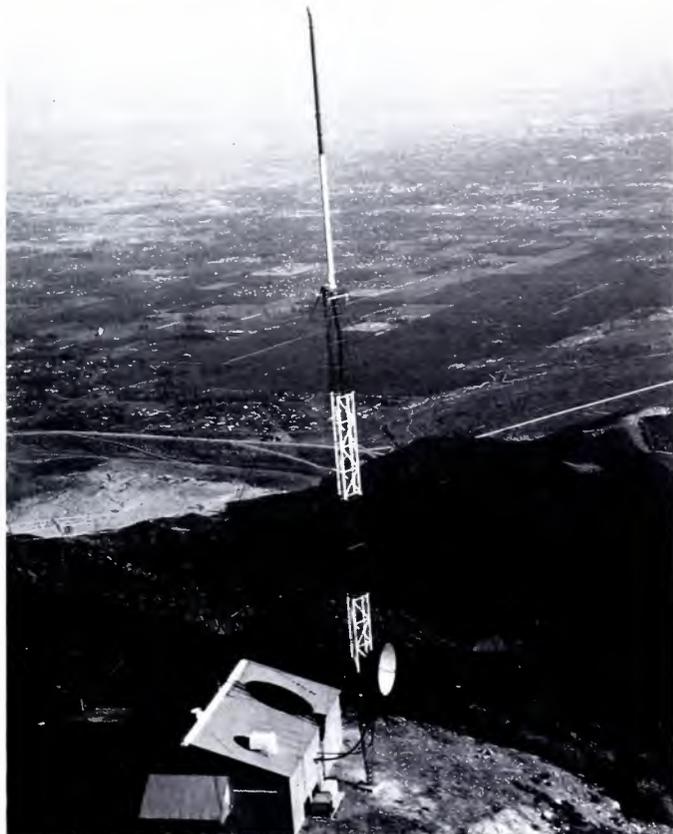
Broadcast engineers will be interested in the parameters of the array operation. LEA reports tests and calculations that indicate sustained currents through a typical array ranging up to more than 200 amperes. Lightning bolts, of course, often exhibit hundreds of thousands—or millions—of amperes of current, but over very short time intervals, measured in milliseconds. Evidently the system works by spreading the discharge between cloud and earth over a very longer, safe interval.

LEA says that operation is critically dependent on size, shape, material, and distribution of the points, and on many other factors, all of which they have thoroughly investigated. Each installation must be custom-made to fit the requirements of the structure to be protected. Prices have ranged from about \$3800 to about \$6800 for a complete installation. LEA looks forward to cost reductions that would put many broadcast installations in the neighborhood of \$3000.

BM/E



The equivalent electrical diagram. The LEA dissipation wires start a current flowing through ions to reduce the cloud-to-ground potential.



Antenna of station KHOF-TV supports a series of radial dissipation wires (almost invisible in photo).

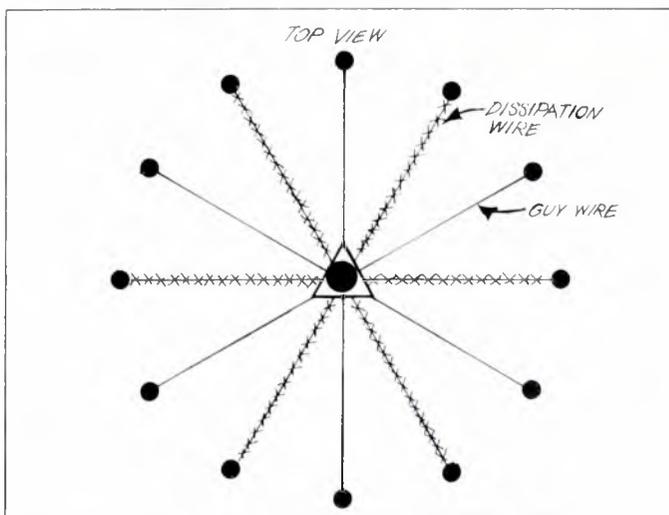


Diagram shows six dissipation wire radials strung from antenna (held up by guy wires). Antenna height is 225 feet. Dissipation wires are insulated from the tower and form angle of 35 degrees with respect to the ground.

Video Delay Lines Eliminate Costly Coax

Phase and timing errors are cleared up in nothing flat by these new equalized delay lines from Great Britain. ABC Television has a rackful of them, and finds them great for long-distance remotes.

IT'S A MAJOR PROBLEM in all TV stations—video delay to compensate for line phase changes. Coaxial cable coils have been the traditional answer, but this technique is loaded with problems.

For one thing, the cable coils take up too much space for the small amount of delay they produce. Also, when installing cable delays, the cable must be trimmed a few inches at a time and tested each time to produce a precise length to correct a particular timing error. Cables need equalizers; cable expands and contracts with changes in temperature and humidity introducing new errors of its own.

An easy answer to the phase and timing error problem has come out of Great Britain. It's the Matthey equalized video delay line no. M200/47001. It consists of five sections and, depending on which leads are used, the basic unit can provide delays variable from 5 to 155 nanosec. The 155 ns. figure is approximately equivalent to 100 feet of coax.

These modular delay lines have an insertion loss of 0.5 dB maximum at 5.5 MHz and come in neat little metal boxes with BNC connectors.

ABC Television uses delay lines

A major user of these delay lines is ABC-TV in New York. With its far-flung sports coverage, the ABC network is constantly plagued by phase and timing errors, and these units have solved what had been a major problem.

In addition to the 5-155 ns. devices, the product line also includes values of 50, 100, 200, 500, and 1000 nanosec. Combinations can be cascaded for a maximum delay of 4000 ns. An optional unit provides switch-selectable delays with a vernier adjustment over the range of 10 to 165 ns for an infinitely variable delay.

Immediate use of the delay lines at ABC has been for the network's convention coverage from Miami and the Summer Olympics relayed from Munich. Matthey repackaged the variable delay box per ABC's specifications, and produced units for the network with equalized delays variable from 10-165, 50-215, 110-265, 210-365, 510-665 and 1010-1175 nanosec. The modules have front panel mounted switches and a vernier adjustment and are rack-mounted in the ABC installation.

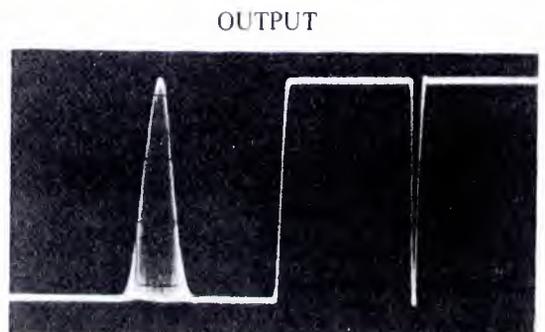
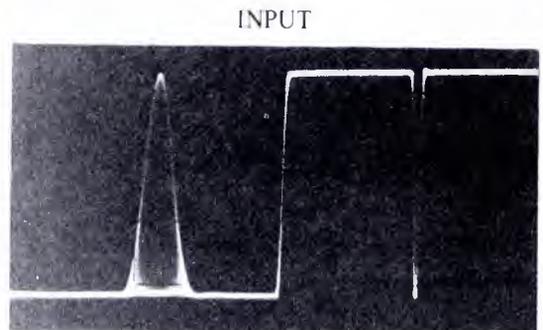
Several equipment manufacturers are now incorporating the delays into equipment: Marconi, Fernseh, and Vital Industries are typical. **BM/E**



Delay lines in use at ABC network facilities, New York.



Fixed and variable versions. Other packages are available for incorporation into equipment.



Input and output waveform characteristics for 2T luminance and 10T chrominance pulses.

REB

PRIME TIME

Today's transmitter systems. Which one is right for you?

At one time, selecting a TV transmitter was relatively simple.

It was a matter of choosing one transmitter with a specified output that delivered a signal to one antenna.

Today, however, there are any number of transmitter system options available. Making the *right* selection can save your station money—and also make life a lot easier for you and your engineering staff. The best system for you will depend on whether or not you plan to operate your transmitter by remote control, how easy it is to reach the transmitter site, and other factors. The trend is toward various types of "backup" facilities that protect against lost air time.

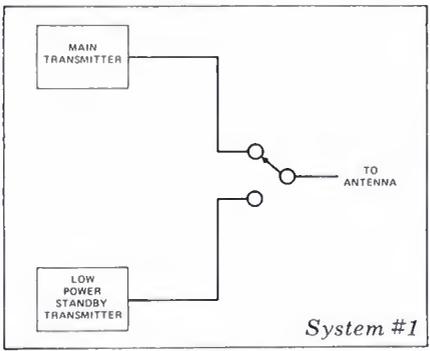
Four different transmitter systems are illustrated here to indicate the range of options now being offered.

Four TV Transmitter Systems

System #1 Low-Power Standby Transmitter

The primary transmitter in this system delivers full licensed power output with a lower-power transmitter serving as "backup". If the primary transmitter falls, the operator brings the backup unit into service and transfers the aural and visual output connections—either manually or by remote control. The advantage of this system is the availability of emergency standby protection with minimum investment in the standby transmitter. (In many cases the standby can be an earlier model

transmitter capable of remote control.) The disadvantage is the reduction of signal strength while operating in the emergency standby mode. To meet FCC requirements for once-



a-week inspection, the standby transmitter must be capable of delivering at least 20 percent of the station's licensed power.

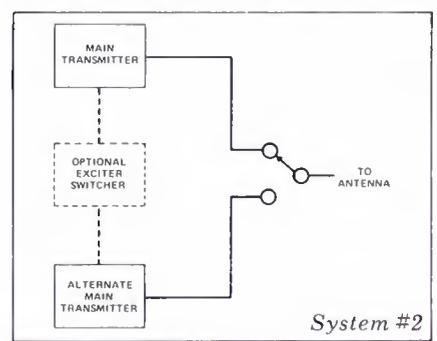
System #2 Alternate Main Transmitter

This configuration employs two identical transmitters, capable of operating at the full licensed power output of the station. Only one transmitter is operated at a time, but either can be operated on the "main" unit with the other available for 100% backup. One transmitter may be serviced while the other is on the air. Maintenance can be scheduled at your convenience.

If desired, automatic circuits can be employed to detect failure of either the aural or visual output of the "on-air" transmitter and to switch the other transmitter on auto-

matically. Exciter switching permits either of the two exciters to drive both transmitters, with automatic switchover to the spare exciter.

"Alternate-main" transmitter operation provides a high degree of protection against loss of air time, with only a momentary interruption to activate the alternate transmitter in the event of failure of the "on-air"



unit. Also, the availability of two identical transmitters simplifies servicing by providing a cross-reference for testing and evaluation of performance.

System #3 Parallel Transmitter

This system also employs two identical transmitters. The difference is that both transmitters are operated simultaneously into a combining system, each contributing half of the visual power and half of the aural power. If either transmitter fails, there is no interruption of program transmission, since the other trans-

Continued on page 3

How well informed are you about the Cart?

You probably already know about some of the advantages of the RCA TCR-100 Cartridge Tape Recorder.

But maybe there are important capabilities you've overlooked.

Try this quick quiz and find out for sure.

1. How long does it take an operator to load, optimize and cue a tape commercial on the Cart? A. 3 sec. B. 30 sec. C. 3 min.

2. How many passes is a cartridge message good for before it starts to deteriorate? A. 25 B. 50 C. 100 D. 200 or more.

3. How many cartridges can be loaded into the TCR-100 at one time? A. 12 B. 22 C. 100

4. If you schedule 4 tape commercials during a break, how many Cart machines would be needed to play them back? A. 4 B. 2 C. 1

5. What's the typical life expectancy of the Cart's Alfecon II headwheels? A. Less than 200 hours B. About 300 hours C. More than 500 hours

6. What about tape costs, compared to a reel-to-reel VTR. A. about twice as much B. about half as much C. about the same

7. From what source can the TCR-100 record cartridges? A. The line B. Other cartridges in the machine C. Both

8. The Cart can free up your reel VTR's for which of the following tasks? A. Teleproduction B. Promos C. Previews

9. What can the Cart do about tape rebates? A. Virtually eliminate them B. Cut down on them drastically C. Nothing much

10. How much more storage space do reels take as compared to cartridges? A. About 75% more B. About 100% more C. About 200% more.

When you check for the right answers (upside down, below), you'll probably realize more than ever how much the Cart offers in cost-performance advantages.

If you got more than five answers wrong, the chances are you need a TCR-100 right now. If you got them all right, you probably just ordered one.

And if you haven't already ordered one, ask yourself why not.

(1) A (2) D (3) B (4) C (5) C (6) B (7) C (8) A, B & C (9) A (10) B

TCR-100 Box Score

Number delivered	34
Number of commercials broadcast	648,000*
Present rate (commercials/day)	3,500*
Man hours saved	26,800*

*Estimate

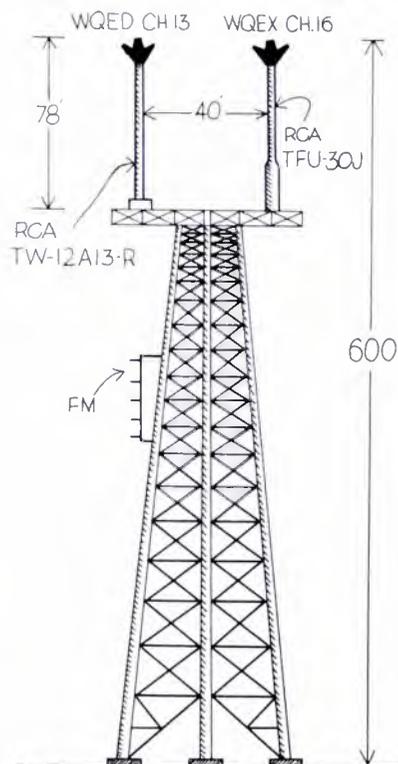
TCR-100's Delivered

KHQ-TV, Spokane, Wash.
 KIRO-TV, Seattle, Wash.
 KNTV, San Jose, Calif.
 KPLR-TV, St. Louis, Mo.
 KSLA-TV, Shreveport, La.
 KTSM-TV, El Paso, Texas
 NBC, Network, N.Y.C. (4)
 WAFB-TV, Baton Rouge, La.
 WAPA-TV, San Juan, P. R.
 WBAL-TV, Baltimore, Md.
 WBAY-TV, Green Bay, Wisc.
 WBNS-TV, Columbus, O. (2)
 WBRE-TV, Wilkes Barre, Pa.
 WDCA-TV, Washington, D. C.

WECT-TV, Wilmington, N. C.
 WFMY-TV, Greensboro, N. C.
 WGR-TV, Buffalo, N. Y.
 WISN-TV, Milwaukee, Wisc.
 WJAR-TV, Providence, R. I.
 WKBW-TV, Buffalo, N. Y.
 WMAQ-TV, Chicago, Ill.
 WPTV, West Palm Beach, Fla.
 WSB-TV, Atlanta, Ga.
 WTAE-TV, Pittsburgh, Pa.
 WTAF-TV, Philadelphia, Pa.
 WTVG, Chattanooga, Tenn.
 WUTV, Buffalo, N. Y.
 WWL-TV, New Orleans, La.

London Weekend TV, London, United Kingdom
 Venevision, Caracas, Venezuela
 Austarama TV, Melbourne, Australia

World's first "T-bar" TV antenna going up in Pittsburgh.



A self-supporting tower and antenna system with a unique "T-bar" structure is now under construction for Pittsburgh's two educational TV stations—WQED and WQEX.

Both stations will have their antennas mounted atop a 518-foot tower at either end of a 40-foot crossbar. Each antenna is 78 feet in height.

WQED, a VHF station on Channel 13, will use RCA's Traveling Wave antenna. WQEX, operating on UHF Channel 16, will use an RCA Pylon.

Innovations like the "T-bar" keep our antenna experts where they want to be. On top.

RCA PRIME TIME

SEPTEMBER, 1972—BM/E

Continued from page 1

mitter continues to operate independently. An inherent advantage of parallel transmitters is the natural ability of the combiner to absorb reflections from the transmission line and antenna system, resulting in better picture performance from the combined transmitters than from either transmitter alone. Also, since

on the particular configuration.

With remote control of the main and standby transmitter, only once-a-week inspection and calibration is required by the FCC. The result is considerable savings in manpower—especially when the transmitter and the studio are some distance apart.

The backup transmitter protects against outages. And lost air time

24-hour-a-day transmission is practical and economical because maintenance can be performed during normal program transmission.

Operation of parallel systems at one-half power provides full reserve power for emergencies and tends to extend tube operating life.

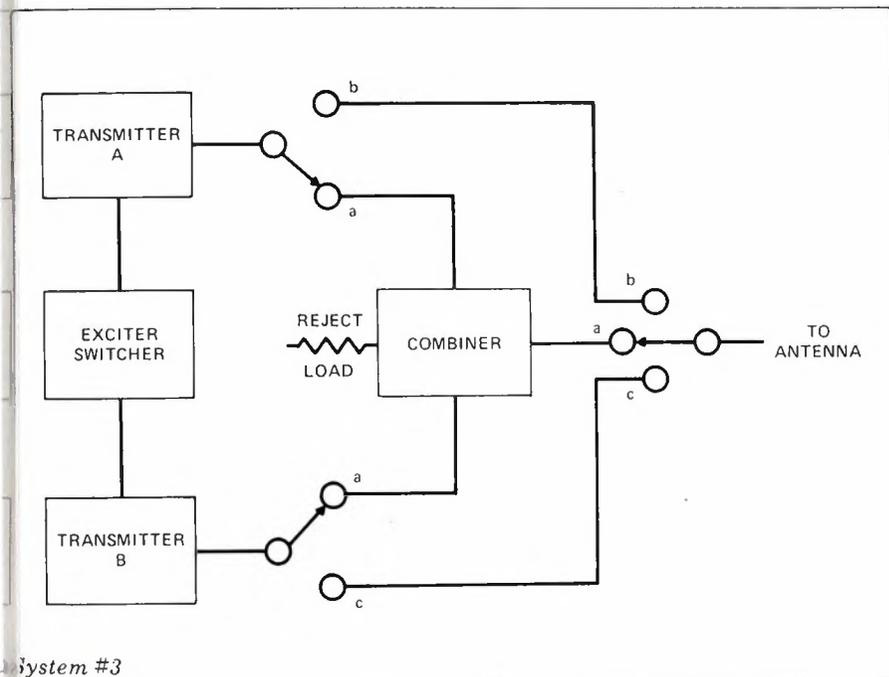
Which RCA TV transmitter system is right for you?

The versatile RCA TV transmitter line offers features and options to handle the needs of a variety of systems—future needs as well as present ones. The circuitry is the most completely solid state of any TV transmitter ever made. So you can expect long-term stability with few operating adjustments and simpler maintenance. Plus more reliability, cleaner color signals, and lower operating costs.

They're capable of remote control, remote logging and unattended operation. And their design includes built-in automation for such functions as exciter switchover, turn-on sequencing, power output control, pedestal level control and status logging.

Which means you can benefit today from transmitters that are right for tomorrow.

Why not talk to your RCA representative? He'll help you explore the many options now available in VHF transmitters and help you decide which system is best for your station . . . both now and for many years ahead. And he'll help save money, too.



System #3

both transmitters are normally in use, the chance of total loss of signal is extremely unlikely for any cause except total power failure.

System #4 Parallel Transmitter with Alternate Main Capability

In this parallel system, either transmitter independently is capable of delivering the full station licensed power. Normally, the two transmitters are operated parallel with each unit delivering half of the licensed power load. However, in case of failure of one transmitter, the power output of the remaining transmitter may be doubled—by push-button control—to restore full licensed power output. No change in setup adjustments is needed when the power increase is made. This system configuration combines the advantages of "parallel" with those of "alternate main" operation. Failure of either transmitter will not interrupt program transmission, and either transmitter may be serviced while the other is delivering full visual and aural power.

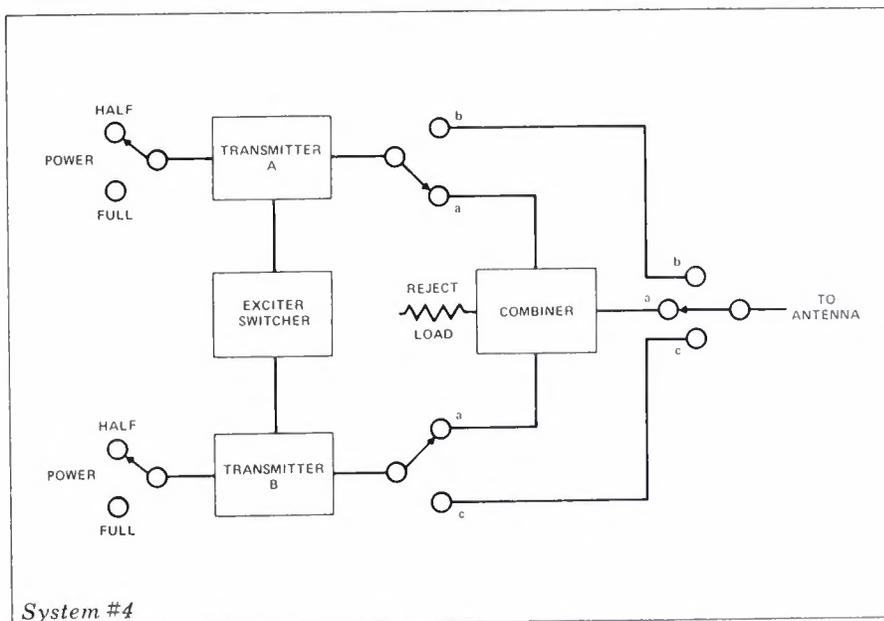
Advantages

Standby transmitter systems provide a variety of advantages, depending

can cause expensive make goods.

With parallel or alternate main systems, maintenance is simpler, too. Direct comparisons—meter readings, tests and the like—can be performed while servicing. Direct module substitution can be made and spare parts inventories simplified.

With alternate main transmitters,



System #4

The surprising new TK-630-- it's alone in the middle.

The cost-effective TK-630 color studio camera is in a class by itself. Right in the middle, between the deluxe, premium quality cameras and the marginal performance economy models.

What's really surprising about the TK-630 is the superb quality pictures it delivers—quality that you'd expect only from cameras in the higher price bracket.

Which means the TK-630 is an ideal primary camera for the studio or on remotes. For studios already equipped with color, it's a welcome addition for handling special assignments like news and weather.

Feature for feature, the TK-630

offers outstanding performance/cost value. It uses a sealed prism optical system like the highest quality broadcast cameras. And for stability, the entire optical system is mounted on a sturdy bedplate for extra rigid support of lead oxide pickup tubes, lens and the prism.

The totally solid state design includes extensive use of integrated circuits for compactness and extended reliability.

The list goes on and on. But, to give you a better picture of what the TK-630 is and what it can do, we put it on video tape. Ask your RCA Representative to bring along this demonstration tape on his next visit. It's a real eye-opener.



Easy-to-carry TK-630 color camera with plug-in detachable viewfinder becomes a portable at moment's notice.

Products in the news.

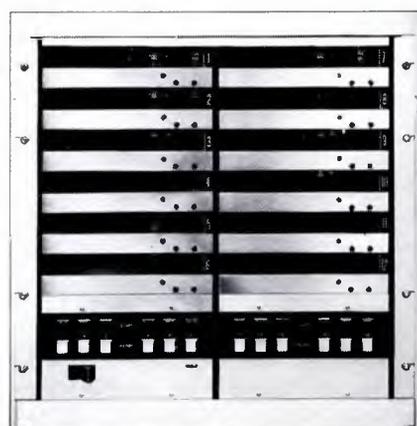
The RT-21D is a fourth generation model of long-popular RCA reel type recorders. It meets rigid broadcast standards for monaural or stereo operation. Variable cue speed permits one hand cueing. Other key features include solid state design: push-button operation: rack, console or portable mounting: and choice of tape speeds: $7\frac{1}{2}$ and 15 or $3\frac{3}{4}$ and $7\frac{1}{2}$ IPS. A new playback-only version, RT-20, is now available.



The Type RT-22B automatic tape recorder is a reel-to-reel machine with the electronics and cueing versatility of cartridge equipment. Playback only, or record/playback models are offered for both monaural and stereo operation. The RT-22B has a four-head transport and the same quality features as the RT-21D. It utilizes the same head configuration and cue tones as standard NAB cartridge tape equipment.



The RT-16 and RT-26 multicartridge playback systems permit sequential or random accessing up to 12 size 1200 cartridge decks (30 min.). Monaural and stereo versions more than meet NAB specifications. Both systems include heavy duty synchronous motors and solid state circuitry for added reliability of operation.



Future-compatible broadcast equipment...Tomorrow Systems Today

RCA PRIME TIME

Fitting A Transmitter Into The John Hancock

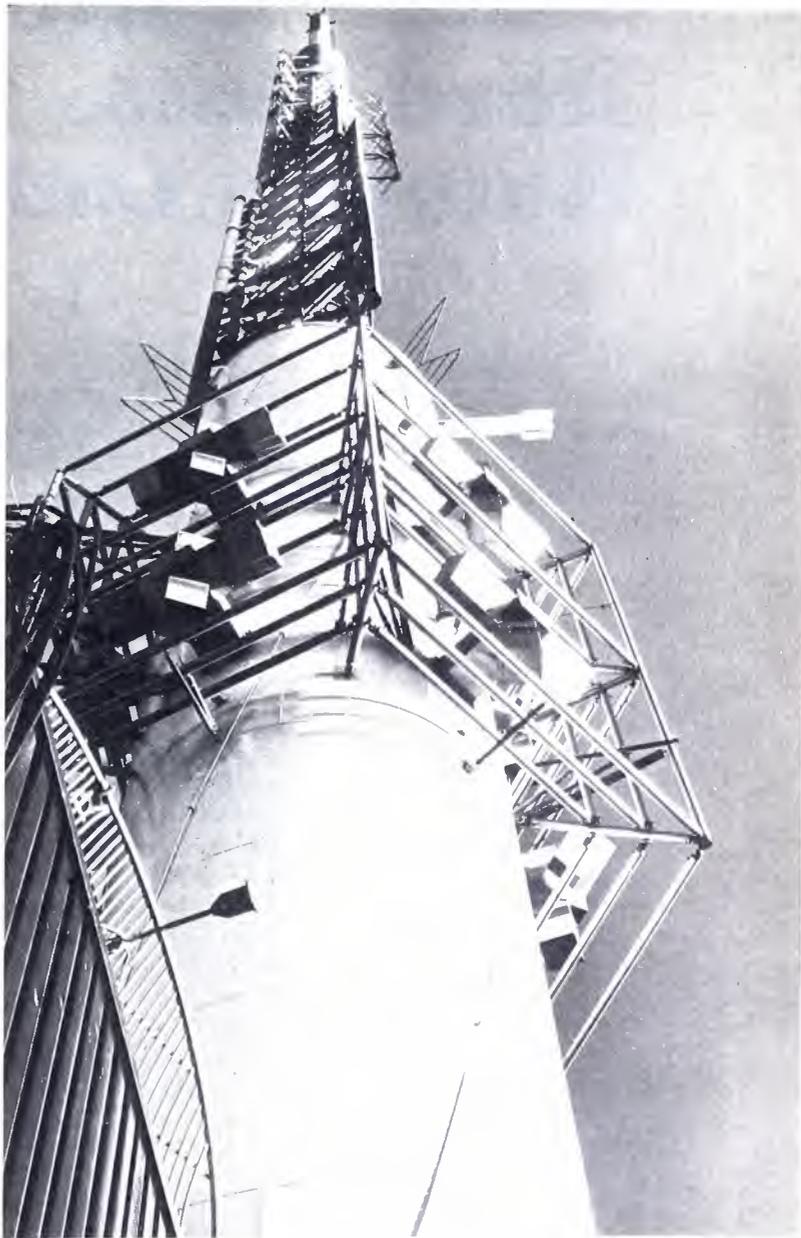
WDHF JUST WASN'T GETTING THE COVERAGE it needed for the Chicago market from its suburban antenna tower (230 feet). So, when it became possible to move to the John Hancock Center, it did. There it shares a crossed-dipole, circularly-polarized antenna system with eight other stations. The antenna system, designed by Alford Manufacturing Co., will soon serve 12 FM broadcasters.

Fitting the station to the market was less of a problem than fitting the transmitter into the mammoth John Hancock Center. The licensee, National Science Network, was leasing bare real estate on the 93rd floor. It needed walls put up and electrical-, air conditioning-, and plumbing-work done. Eric Small, who was technical director for NSN at that time (1970), decided he'd better have an architect, so he retained Justing Henshell, 461 Eighth Avenue, New York, to specify details. This turned out to be a wise move. A skyscraper is a peculiar environment.

There are extreme variations in wind and temperature which can mightily affect the transmitter cooling system. And less artificial cooling is needed if you have the right exposure. The WDHF facility has two three-ton air-conditioning condensing units, each rates at 5920 watts—which means the mains for the a-c units are as large as that feeding transmitter No. 2, a 10 kW unit. (Transmitter No. 1 is 20 kW.)

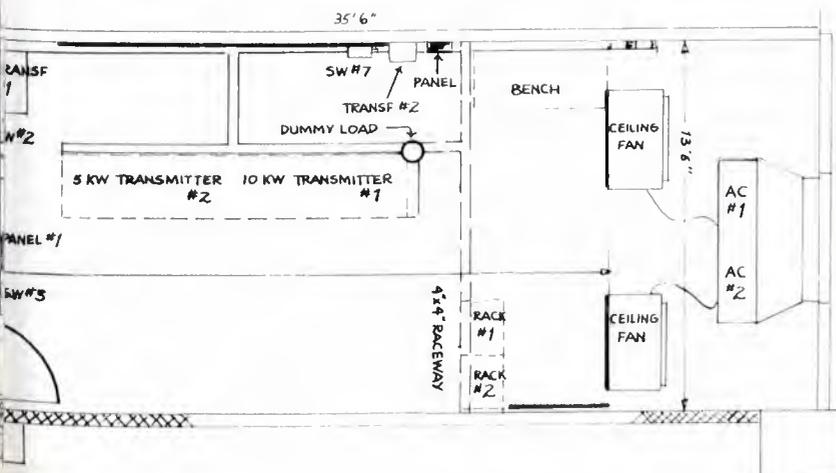
In addition to the condensers are two air-handling units. An air exchanger is used so that inside and outside air do not mix. This calls for a plenum chamber, louvres, baffles, motorized air dampers, and controls (run by thermostats in the transmitter rack). These requirements were beyond the expertise of even experienced transmitter salesmen and an architect did more than pay for his fee in coming up with smart dollar-saving solutions.

The antenna structure is by far more photogenic than a transmitter room as several views of the latter show. The transmitter control rack, incidentally, was built and tested in New York City before being shipped to the John Hancock. **BM/E**



Photos by Eric Small

Floor plan (left) and photo (below) show general layout.



Filling The "Fill" Gap In Studio Lighting — Hard-Glass Halogen Lamps

By Robert M. Griffin and John J. Gutta

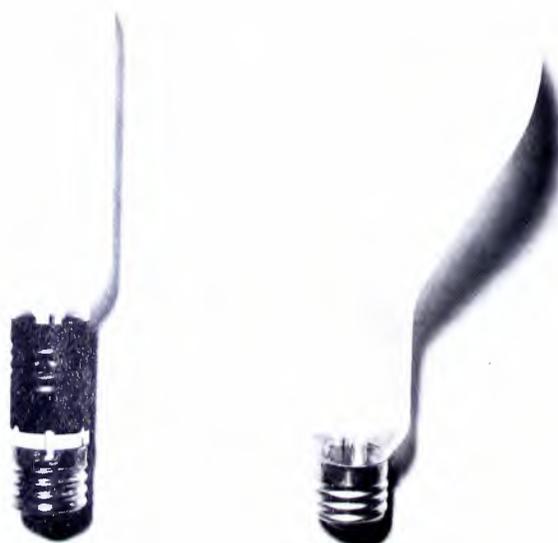
The long life and constant light output of quartz halogen lamps have caused them to be widely used as "hard" keylights in studios, but shorter-lived, less constant incandescents had to be used for diffuse "fill" lighting. Now long-lived halogens are available for fill lighting, too.

SINCE THE ADVENT of tungsten-halogen lamps in the late 1950's, applications in many fields have been developed. One of the largest is color television and theatre lighting, where constant light level and color temperature are of prime importance. Quartz-halogen lamps are now widely used in compact spotlights that render a specular or so-called "hard light" output and are most effectively used as keylights to establish the character of the subject.

Soft "fill" lights must be used to control the harsh shadows produced by the quartz halogen keylights. The workhorse of fill lighting has been the scoop

Authors **Griffin** and **Gutta** are engineers at GTE Sylvania, Salem, Mass.

Fig. 2. Halogen fill lamp, left, is much smaller than incandescent.



fixture in conjunction with the PS52 incandescent lamp. This combination of open-type fixture and large frosted bulb produces soft, diffuse lighting qualities. Unfortunately, the PS52 studio lamp is a nonhalogen source and, as such, its lumen output and color temperature both decrease throughout life as the lamp is operated. Attempts have been made to design a scoop fixture around a small quartz halogen lamp to eliminate this light loss over life but, because of the very compactness of the quartz-halogen source, the light is still more "hard" and in some cases less desirable than that of the original PS52 scoop. A void therefore existed which represented the last barrier to complete upgrading of studio lighting to tungsten-halogen quality, with its long life and constant color temperature.

The obvious solution here would seem to be to use a tungsten-halogen lamp with a larger quartz envelope that would produce the necessary diffusion for this application. Unfortunately, the cost of material and manufacturing would raise the price of such a lamp to the point where it would be unacceptable on the studio market.

A large hard glass envelope would greatly reduce material costs while providing the needed diffusion. Also, it would lend itself to high speed manufacturing techniques normally restricted to conventional incandescent lamps, thereby providing additional cost reductions.

Despite many inherent problems including the incompatibility of halogens with materials and processes formerly associated with glass lamps, a new family of hard glass tungsten-halogen studio lamps has now emerged to fill the critical void in studio lighting.

Called the 1500 Watt DSF and 1000 Watt DSD, they are directly interchangeable with the old-style PS52 incandescent studio lamps. They have been in production for over a year and are readily available from stock.

Table 1

ANSI Code	Lamp Type	Watts	Bulb	Life (Hours)	Lumens	Lumen Maintenance	Fill Gas	Coil	M.O.L.
DSF	Halogen	1500	T20 Frost	250	41000	98%	Krypton	CC8	12"
YFY	Incandescent	"	PS52 Frost	100	"	75%	Argon	C7A	13"
DSD	Halogen	1000	T20 Frost	200	26500	98%	Krypton	CC8	12"
XEX	Incandescent	"	PS52 Clear	75	"	75%	Argon	C7A	13"

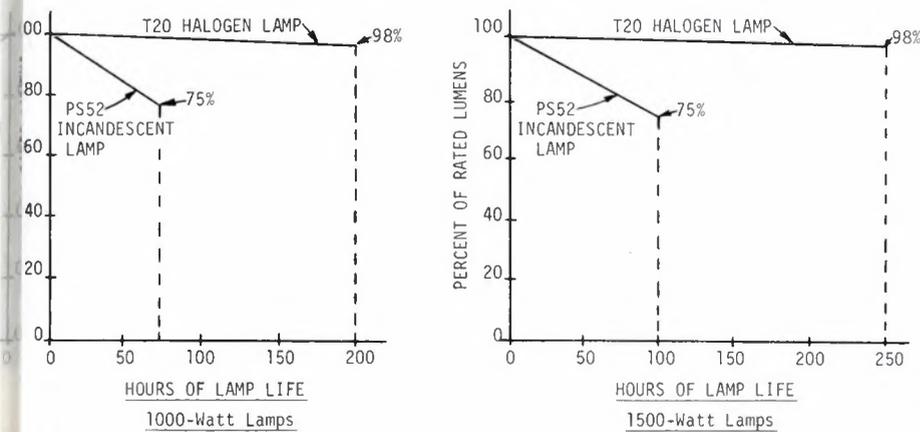


Fig. 1. Halogen lamps have longer life than incandescent counterparts.

Table 1 gives a general description of the new lamps and a comparison with the PS52 lamp that each replaces. All lamps have a 9½ L.C.L., a mogul screw base, a voltage rating of 120, and a color temperature rating of 3200° Kelvin.

It can be seen from Table 1 that the electrical and photometric parameters of the lamps are identical, but longer lamp life and high lumen maintenance reveal the outstanding advantages of the halogen lamps. They have two-and-one-half times the life of their incandescent predecessors and maintain lumen and color temperature levels virtually 100 percent throughout this long life. This is the result of using krypton fill gas in conjunction with a highly efficient coil design and a gaseous halogen additive.

Figure 1 is a graphic display of the advantages these halogen lamps have over their incandescent counterparts.

A point to be made here is that though the 1000-watt and 1500-watt incandescent lamps are rated at 75-hours and 100-hours respectively, their useful lives are considerably shorter due to the drastic reduction in light output which is caused by tungsten blackening of the bulb wall. The useful life of each type is more realistically placed at 70 percent of rated life, but may vary from this according to the requirements of each particular application. Such is not the case with the halogen lamps whose useful lives are the same as their rated lives, due to the presence of the halogen regenerative cycle, which eliminates bulb blackening.

Figure 2 compares the physical size and shape of the new halogen lamp with those of the old style PS52. Extensive on camera tests in major studios have shown that, despite the smaller size of the halogen lamp, its light is just as "soft" and diffuse as the incandescent light. There were no discernible differences between the optical qualities of the two in typical scoops. The T20 bulb of the halogen lamp represents the optimum size that would produce the

maximum possible diffusion while maintaining those bulb wall temperatures required by the halogen cycle and hard glass.

Ahead on economics, too

An economic comparison between the new and old lamps reveals a decided advantage to using the T20 Halogen sources. Referring back to Table 1, the area under the particular curve for each lamp represents the total average lumen-hours that it will deliver over its entire rated life. This is a direct measure of lamp performance.

A) 1000 Watt Comparison

Assumptions:

- 1) Installation cost per lamp: \$3.00
- *2) Lamps are replaced at end of rated life

T20 Halogen	PS52 Incandescent
List Price \$17.95	List Price \$5.60
Lumen-Hours 5.25 × 10 ⁶	Lumen-Hours 1.74 × 10 ⁶
Life 200 Hours	Life 75 Hours
Lumen-Hour Ratio: 1000T20	5.25 × 10 ⁶ = 3.0
1000PS52	1.74 × 10 ⁶
Life Ratio: 1000T20	200 = 2.7
1000PS52	75

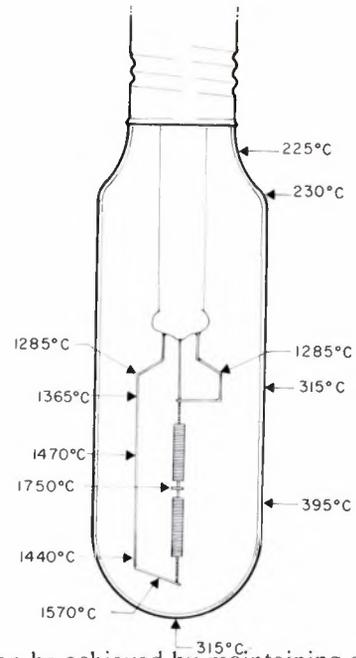
Lamp Cost: (Per 200 Hours)	Lamp Cost: (Per 200 Hours)
1 × \$17.95 = \$17.95	3.0 × \$5.60 = \$16.80
Installation Cost:	Installation Cost:
(Per 200 Hours)	(Per 200 Hours)
1 × \$ 3.00 = \$ 3.00	2.7 × \$3.00 = \$ 8.10
Total Cost/200 Hr. \$20.95	Total Cost/200 Hr. \$24.90

*It is understood that it is common practice to replace both standard incandescents and halogen studio lamps, in critical locations, prior to the end of rated life in order to avoid lamp burnouts during programs or taping sessions. In addition, incandescent lamps are often replaced when lumen output starts to drop seriously or color temperature shifts. Although this was not taken into account in

Halogen lamp principles

Though the term tungsten-halogen is familiar to most, it might be of interest to briefly describe its principles as applied to the hydrogen bromide used in these lamps. In all incandescent lamps the coil releases tungsten atoms which move to the bulb wall and condense, thus forming a black film which reduces light output. But the addition of hydrogen bromide gas reduces this because tungsten atoms, upon reaching the bulb wall, chemically combine with the bromine instead of condensing on the wall. The resulting tungsten-bromide compound then moves back toward the coil, where it is thermally decomposed into free bromine and free tungsten. The free tungsten atom will generally redeposit on some relatively cool portion of the coil, while the free bromine atom will move back toward the bulb wall to combine again with another tungsten atom. This regenerative process is repeated time and again by the vast multitude of tungsten and bromine atoms in the lamp atmosphere, thereby keeping the bulb wall clean.

The temperature at which a halogen compound changes from the gaseous to the liquid or solid state is the temperature below which the halogen cycle ceases to operate. For tungsten bromide, operating in a fill gas of krypton and nitrogen, this temperature is in the vicinity of 200°C. This temperature is quite compatible with all of the requirements imposed by lamp burning positions and glass operating temperatures. Also, the temperatures of the various internal tungsten parts which come in contact with the bromine are just as critical as the bulb wall temperatures. It has been found that successful lamp



operation can be achieved by maintaining all tungsten parts close to or above 1400°C. The problem here lay in the difficulty of operating the long tungsten internal lead wires at this temperature, since they were not in close proximity to the coil and therefore could not be adequately heated by radiation or conduction. It was decided to make these wires of a much smaller diameter than those normally used in ordinary incandescent lamps of similar power. This was done to increase their electrical resistance to the point where they became incandescent during lamp operation.

the foregoing comparison, it would appear that the relative percent of life rating at which changes would be made would tend to further favor the halogen lamp over the standard incandescent.

B) 1500 Watt Comparison

(Same assumptions as 1000 Watt)

T20 Halogen		PS52 Incandescent	
List Price	\$17.95	List Price	\$6.70
Lumen-Hours	10.2×10^6	Lumen-Hours	3.6×10^6
Life	250 Hours	Life	100 Hours
Lumen-Hour Ratio: $\frac{1500T20}{1500PS52}$		$\frac{10.2 \times 10^6}{3.6 \times 10^6} = 2.8$	
Life Ratio: $\frac{1500T20}{1500PS52}$		$\frac{250}{100} = 2.5$	
Lamp Cost: (Per 250 Hours) $1 \times \$17.95 = \17.95		Lamp Cost: (Per 250 Hours) $2.8 \times \$6.70 = \18.95	
Installation Cost: (Per 250 Hours) $1 \times \$3.00 = \3.00		Installation Cost: (Per 250 Hours) $2.5 \times \$3.00 = \7.50	
Total Cost/250 Hr. \$20.95		Total Cost/250 Hr. \$26.45	

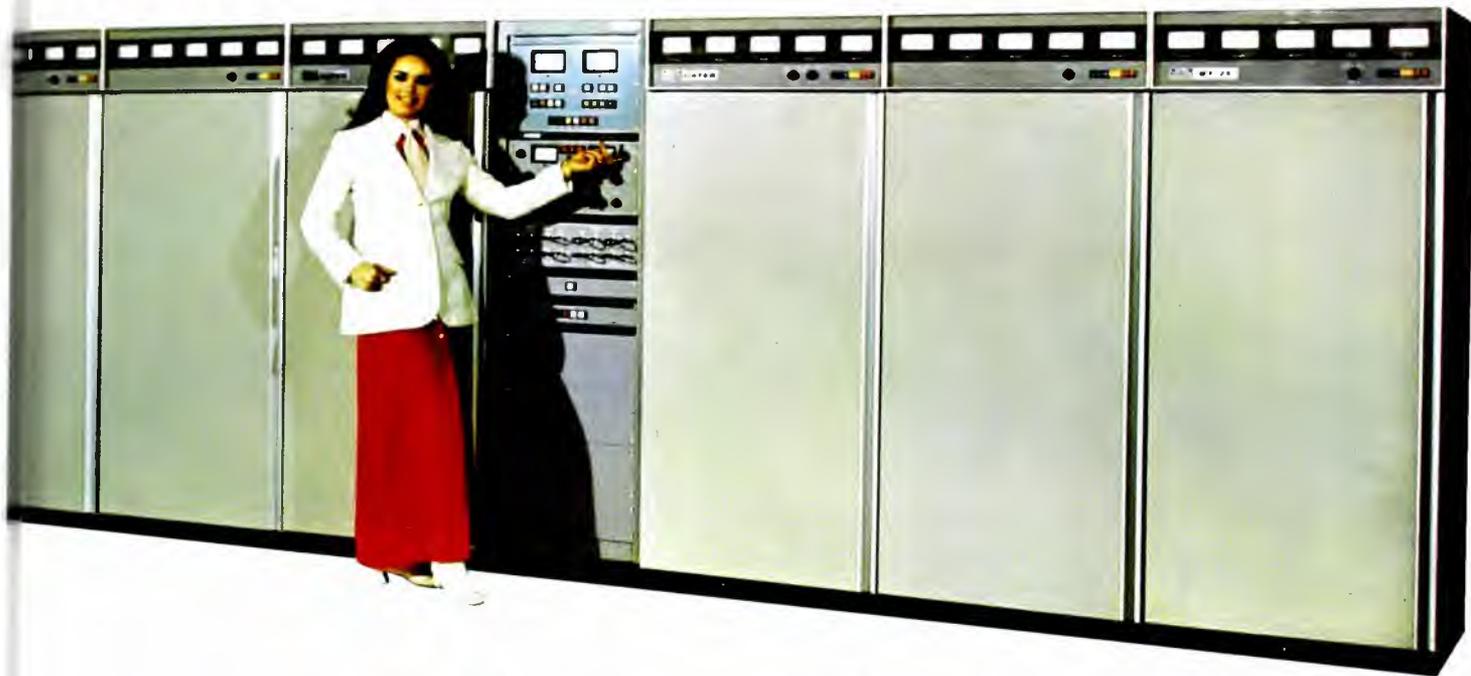
Additional benefits

There are many more benefits in addition to economic savings obtained through a constant light level maintained over a longer life.

1) Excellent dimmer performance is realized with these lamps because the bulb wall remains clean throughout life at any voltage setting. In addition the very irritating problem of audio noise is almost non-existent with this lamp. The internal parts have been designed and clamped so as to inhibit oscillations in the audio frequency range. Non-magnetic materials were used throughout to avoid the magnetostrictive phenomenon which gives rise to these audio vibrations. The result is that this is the quietest lamp available today for dimmer application in studio scoop lighting.

2) The shape and compact size of the T20 lamp allows for very easy storage and handling when

continued on page 28



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Filling the Fill Gap

compared with the bulky PS52, but the lamp still has the diffusion of the incandescent. This is the only tungsten-halogen lamp available today with desirable diffusion properties that does not use double construction: i.e., a bulb within a bulb, so it avoids the light loss of double construction.

3) The hard glass envelope provides high resistance to thermal shock, giving the T20 halogen lamp a decided safety advantage over the soft glass PS52. For instance, normal end-of-life failures can result in extremely hot particles from the tungsten filament dropping onto the bulb. No problem is experienced with the hard glass T20 bulb.

4) Safe operating characteristics are obtained with krypton fill gas at low pressure. Most quartz-halogen lamps obtain their life increase over equivalent incandescents by an increase in the gas fill pressure, to reduce evaporation of tungsten from the coil, but pressurized lamps of any type pose a potential hazard whenever they are used in open type fixtures where no facing such as a fresnel lens is present to protect against violent failures.

For this reason, it was decided to avoid such pressurization techniques to gain additional life. Longer life was gained by: (a) a coil redesign from the C7A single coil of the PS52 to a more efficient CC8 vertical coiled coil; (b) a change in fill gas from an

argon-nitrogen mixture as used in the PS52 to a krypton-nitrogen mixture. The thermal conductivity of krypton, being slightly greater than one-half of argon, reduces filament energy losses due to gas conduction and convection. And the atomic weight of krypton (and thus the size) being slightly more than twice that of argon, increases the collision rate between atoms, which retards the evaporation rate of the filament. But the krypton fill pressure in the T20 lamp is such that, when the lamp is operating, its internal pressure rises to only one atmosphere thereby reducing the hazards of violent failures.

5) Direct interchangeability with the PS52 means that it is now possible to raise studio lighting completely to tungsten-halogen quality without adapting present PS52 scoops, or scrapping them altogether.

6) A unique base-extension design is coupled to the T20 bulb to provide the required 9½ L.C.L. The mogul screw base is nickel plated brass which resists corrosion and thermal oxidation, thus insuring good socket maintenance and easy lamp removal at the end of life.

The addition of a hard glass halogen lamp as a direct replacement of the PS52 fills a void in studio lighting. Longer life and constant light output are now available without sacrificing the necessary diffusion. Now, for the first time, it is possible to upgrade studio lighting completely to tungsten-halogen quality.

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Canon offers the perfect zoom lens for the camera of your choice

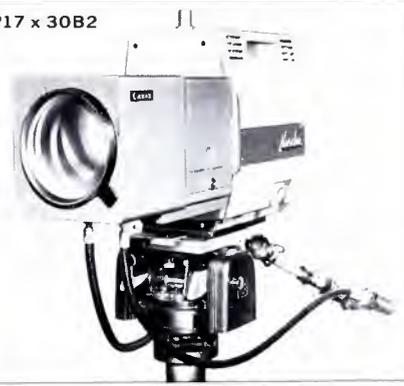
P10 x 20B1



P17 x 30B1



P17 x 30B2



PV10 x 16B



PV17 x 24



PV10 x 15



More and more people are discovering how significantly superior Canon Zoom Lenses are for TV broadcasting purposes. Their outstanding color characteristics, even in dim light, is one of the many reasons why Canon was chosen for telecasting the Munich Olympics.

Canon's wide range of excellent zoom lenses encompass three types of operation control—all-servitized, via flexible cables and by effortless manual control. And it can be attached to fit and

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	P17 x 30B1	
	P17 x 30B2	
1" Plumbicon® color camera	PV10 x 16B1	12.8 x 9.6mm (16mmφ)
	PV10 x 15B2	
	PV17 x 24B1	
	PV 6 x 18B1	

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The Canon TV Lenses Naming System



Symbol	Image Format	Applications
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Circle 113 on Reader Service Card

TV Automation Systems — Now On Their Way

The industry has gone through several generations of pre-event switchers using card, tape, or limited-electronic memories that simplified operations. Now we are witnessing new equipment that uses the mini-computer, incorporates more sophisticated software, and interfaces with large memory business computers.

THERE ARE A NUMBER OF major TV automation systems on the market today—each one with its own constellation of features and capabilities. Some systems go the easy and short-program route; others provide an incredible array of features. In between these extremes lie no happy medium, since every station manager has his own ideas about what he wants.

The usual course of events is to install some kind of data processing hardware in the station's management end, to handle billing and other mundane day-to-day paperwork details. The next step is to install automated TV switching. And somewhere along the line, managers opt to tie the two systems together forming an integrated package of automated station operations.

This approach is summed up nicely by Robert Wehrman, the chief engineer at Pittsburgh's WHC-TV: "We bought the master video control switcher, which could be interfaced to future automation. We got that going; it is running manually, and is working quite well. The next step is to add the computer and the computer interface to this switcher; then we'll operate the master control switcher with the mini-computer. Then, if everything's working the way we want it to, we'll tie into Cox Data Systems.

"The first two steps—the acquisition of a master control switcher with automation capability—have already been implemented. With the Grass Valley system that we have on order, we're going to start with a 250-event pre-programming capability, and will probably expand to use its 2000-event capacity eventually."

Up to 2000 events

The Grass Valley system selected by WHC-TV—the APC-2000—provides storage for 2000 switching events, along with automatic printout of station logs. For the user who wants to start small and build, the system can be supplied with a 15-event station break for starters, and then expanded by the addition of more hardware and software. GVC points out that expansion of this system never requires the discard of previous equipment in the total package; the pieces are designed to be building blocks.

The APC-2000, as a total system, can provide on-air continuity switching, control of machine sources, modification of switching data, preparation of FCC station log, bulk data entry, printing of modern program schedules and interfacing with other computers.

The basic job of any automation equipment is on-air continuity switching; this is basic to everything else that follows and involves the automatic control of film and slide projectors, videotape recorders, videotape cassettes, video-audio switchers, and all related equipment.

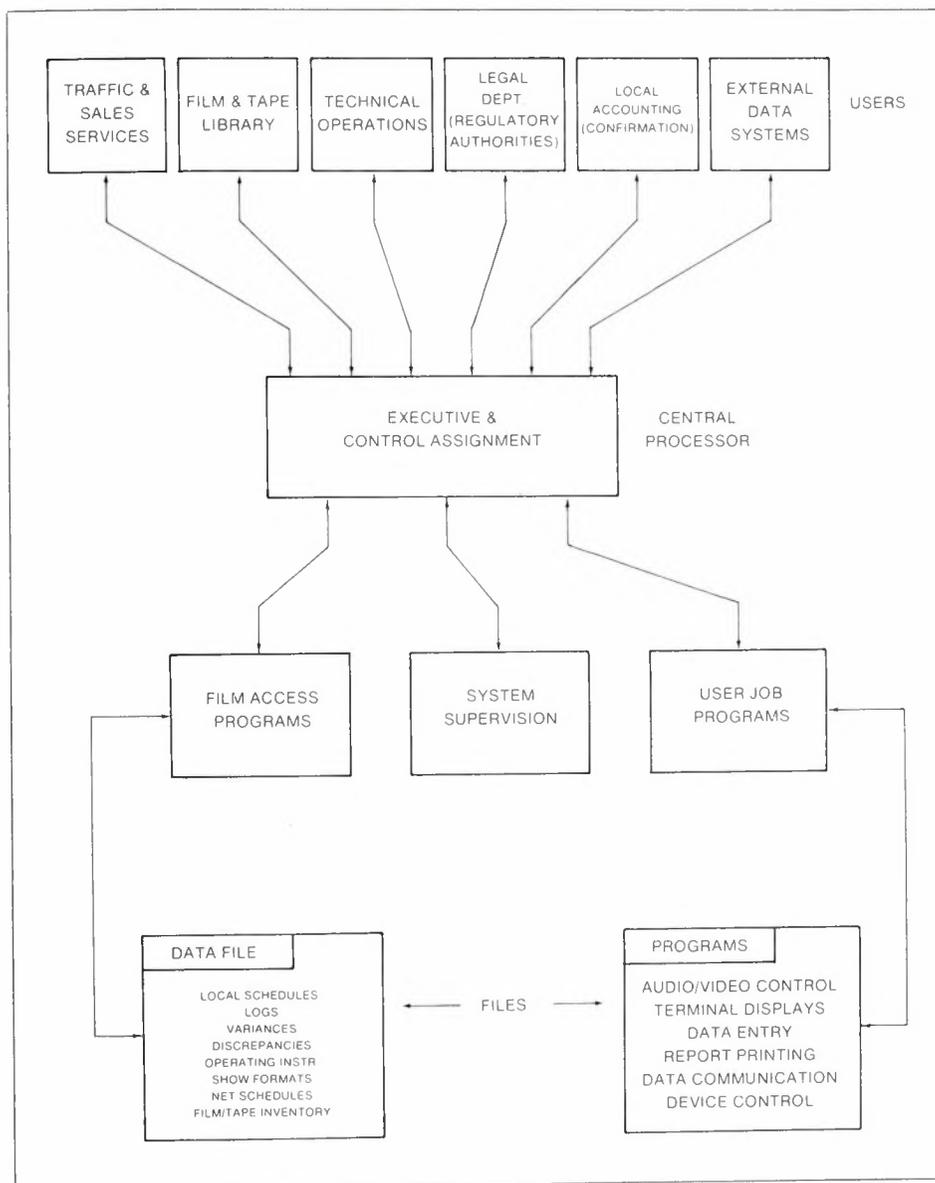
All these functions are controlled by the computer via a program schedule stored in a core or disk memory. A digital clock provides timing reference for these operations, and this can be synchronized with the station's master clock system. Grass Valley has worked hard at developing a software program that can be easily modified to meet individual needs.

Different station, different system

WCVB-TV in Boston (the successor station to WHDH which lost its license) went on the air with Central Dynamics master control switcher which will accept a total automation system when the station is ready for it. In the present setup, the switcher is configured as a standard preset/take switcher with automatic machine control and a solid-state 17-event memory. This memory automatically refreshes the preset bus on a "take."

Complicated station breaks and commercials can now be aired smoothly with this semi-automatic system. The switcher is also equipped with a keying bus, automatic video, and audio mixing amplifiers, color background generator for matte keys, and six unmarried audio sources that are assigned to cartridge tape machines and announce booths. Split audio, split video, dissolves, fade-to-black, keys, matte keys, and inserts can be preset.

Station management expects to interface a computer-controlled CDL station automation system—specifically the APC-610—which will work with the present switcher. A mini-computer will be the focal point of the system, and it will also handle the sales/service/traffic departments and technical



System arrangement for Central Dynamics' APC-610-200 shows how large files are incorporated.

operations.

Central Dynamics' engineers actually dissuaded WCVB's management from automating from the start. "They wanted to automate right away," said Central Dynamics' vice president Bob Hueffed, "but we talked them out of it. At that point, because of their tight schedule and lack of key management personnel in their early days, they didn't have a complete station. Automation comes after a station has been operating for a while and management can decide how they want it to operate."

On-line with automation

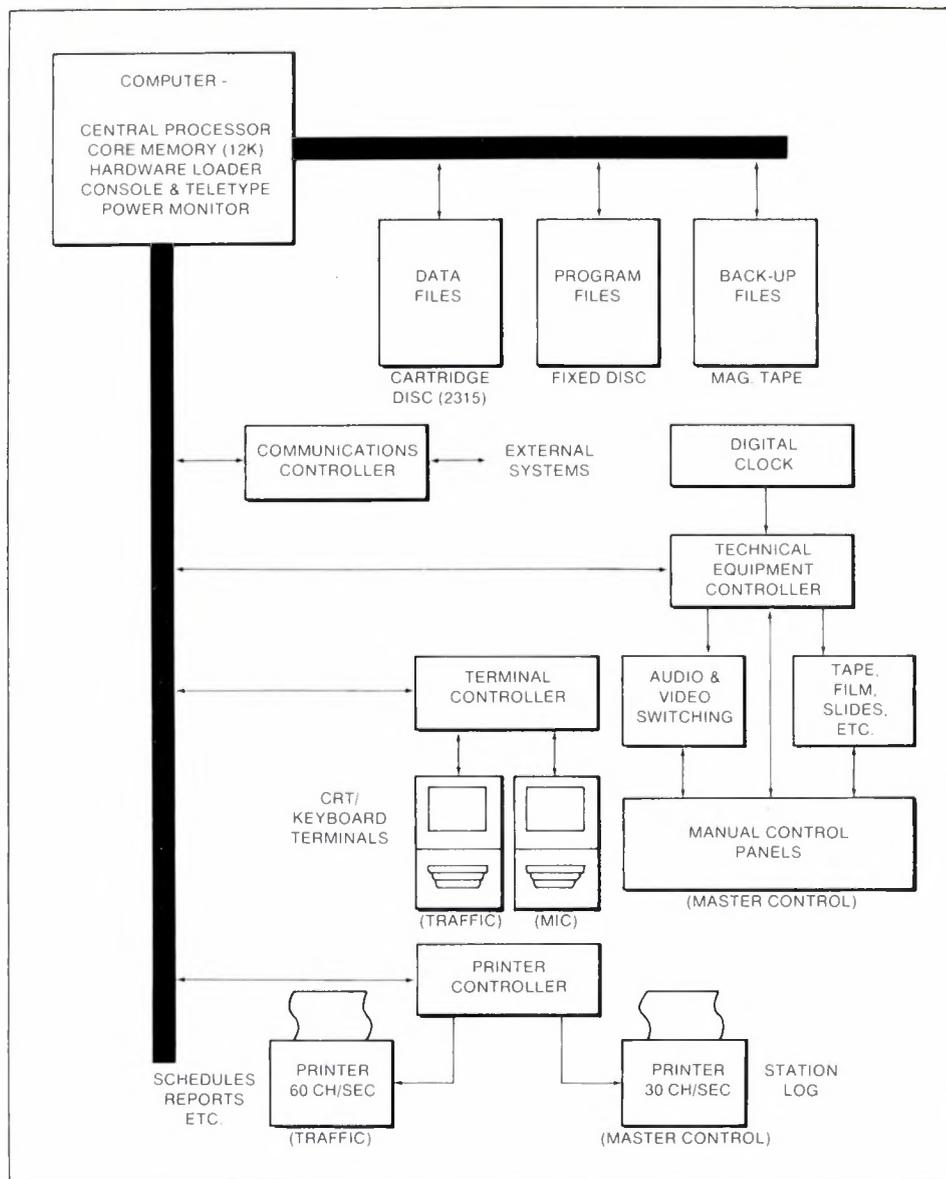
The APC-610, which WCVB will eventually buy, has been in regular use for over a year by the CBC at Vancouver, British Columbia, and Sidney, Nova Scotia. These installations use a mini-computer, but the software is limited to controlling technical operations.

Several completely-integrated station automation systems, encompassing both traffic and technical operations, are being installed in the United States at this time—KYW-Philadelphia, and KDFW, Dallas. Both of these stations have selected the CDL APC-

610-200 system that performs real-time tasks and also interfaces with larger data processing systems for handling invoices, payrolls, etc. The accompanying diagrams show that the central processor is the heart of the system. The system can stand alone and operate separately, or it can be linked to a host computer. Three categories of tasks that can be assisted with automatic control are 1) real-time technical operations; 2) on-line tasks such as order entry and scheduling; and 3) batch tasks related to routine business operations.

Some real-time tasks that the system can perform:

- Maintenance of an up-to-date real-time clock and program duration counter.
 - Operation of on-air and video production equipment, including selection of crosspoints, audio and video transitions, pre-assignment of machines, and automatic operation of associated reproduction and recording equipment.
 - Automatic printout of FCC log.
 - Updating operational displays to the current state of the system.
 - Internal self-checking of equipment.
- Typical of the on-line tasks that can be handled



Simplified diagram by Central Dynamics of key elements of free-standing computer system.

by this system are these:

- Building, maintenance, and retrieval of daily program schedules and logs. This includes order entry, availabilities, and inventory.
- Variance reports.
- Maintenance of reference files that include repetitive program formats, look-up tables, and operational aids.
- Printing, on demand, of schedules, run-sheets, summaries, performance reports, and log files.
- Communications via telephone lines with other data systems.

Large batch tasks such as invoicing, bookkeeping, payroll, regulation reports, etc., are best handled on a larger data processing system, such as the Burroughs 3500 or the IBM 370, and the APC-610-200 can communicate effectively and securely with such computers located anywhere. The data processing computer can be owned and operated by a single group broadcaster (the route being taken by Westinghouse), or it can be managed by a service bureau and used on a time-sharing basis by the broadcaster.

The mini-computer in the APC-610-200 system is a 16-bit high-speed type, the PDP-11. Removable

disc packs store program schedules and log information. A disc has a capacity of about 9000 event records representing about two weeks of programming (depending on the station's event/day ratio). Disc packs may be interchanged to permit editing of the schedule in advance. The event coding structure allows file sorts of various events such as commercials, pre-emptables, program or political events. All VTR events or film/slide events could be pulled out separately.

Event files are addressed and edited by means of CRT/Keyboard terminals, one of which is generally located in the traffic department and the other in the Master Control. The high-speed printer for generating hard copies of schedules, or run sheets, is located in Traffic. The log printer (a slower-speed unit) is located in Master Control.

Many stations, many systems . . .

Probably the most variegated system concept is the one being integrated by Cox Broadcasting for its far-flung station operations. Tying together its various TV stations is a communications network that ultimately connects to a host computer—a Honey-

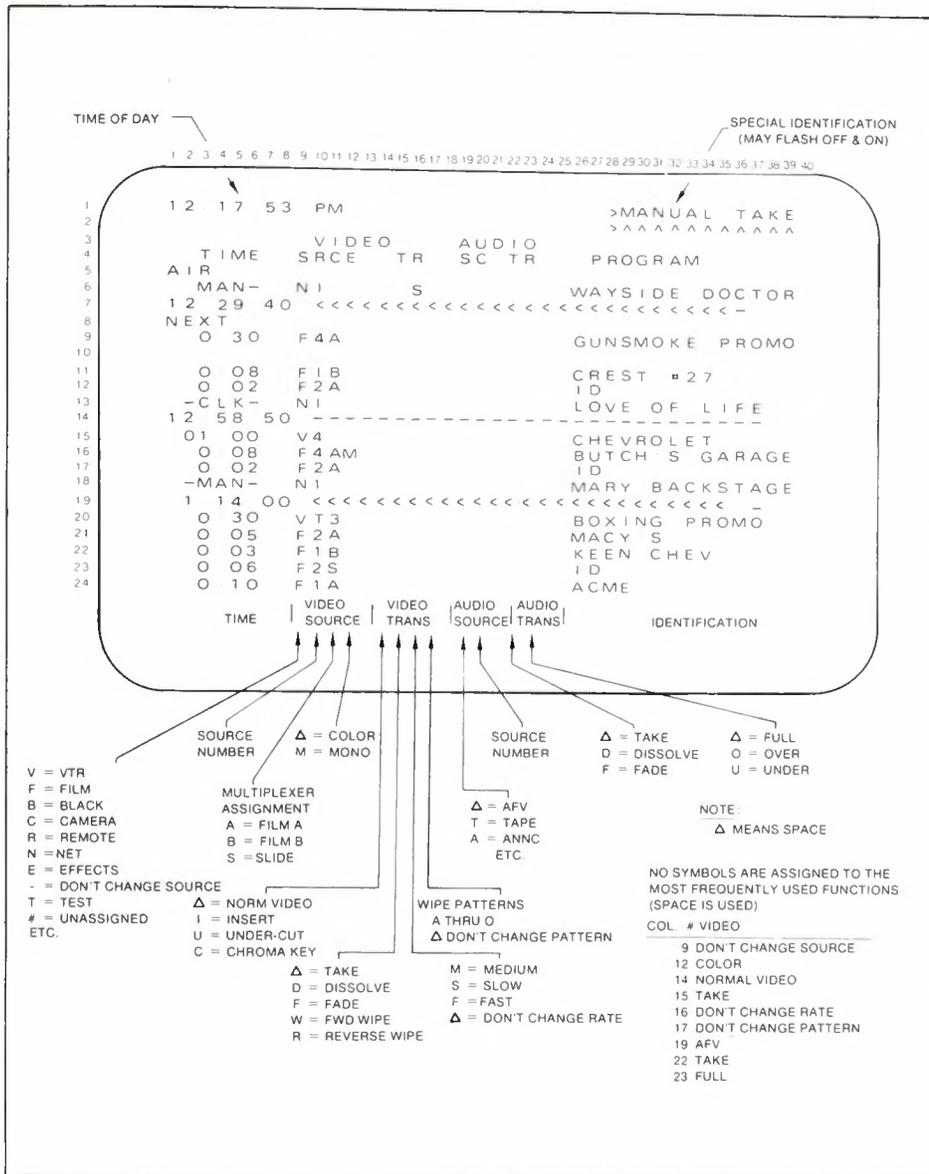


Illustration from Grass Valley brochure shows typical coding used on CRT display.

well 1648A—located in Atlanta.

The computer service is currently installed and operating at two Cox stations—WSB-TV in Atlanta and WIC-TV in Pittsburgh. Two non-Cox stations are also tied to the computer: KSD-TV in St. Louis—owned by Pulitzer Publishing; and Oklahoma Publishing's WTVT in Tampa, Florida. These stations receive the same services as the Cox stations and are tied to the Atlanta computer via leased telephone lines.

While the particular equipment at each station can vary widely, they all have these elements in common: a Honeywell 316 mini-computer, Memorex printers, Hazeltine CRT displays, and standard teletypewriters.

All participating stations are serviced totally by the Cox Data Systems computer receiving:

- Computerized inventory of spots.
- Computerized availabilities search and automatically-produced availability submissions and suggested schedules.
- Automatic preparation of confirmations including modifications and changes of contracts.
- Sales analysis reports.

- Sales forecasts.
- Daily program schedules.
- Broadcast log processing.
- Film library inventory control—including feature films, syndicated programs, commercials, public service announcements, and promotional announcements.
- Invoicing and accounts receivable.

Subscribing stations can reap immediate benefit in: improved sales, and traffic procedures with automated program schedules and invoicing, automated accounts receivable, reduction of overall costs, standardization of clerical procedures, and better overall control of the business of running a television station.

The Cox System is being developed to the point where it can be totally tied to and integrated with automated switching at each participating station—no matter what type of switching is used. WIC-TV, mentioned earlier, is a Cox station that will use the Grass Valley switcher. In Dayton, however, Cox station WHIO-TV has installed the Vimax-27 system (Vital Industries). The Vimax-27 is discussed later in this report.

BIAS real-time system

BIAS (Broadcast Industry Automation System) is a multi-station-service organization that is on-line. Operated by Data Communications Corporation, the BIAS network uses a Burroughs B3500 system located just outside Memphis, and is now linked by leased phone lines to 12 television broadcasters all over the country.

Early in 1971, WMC-TV, Memphis, installed a computer terminal in its traffic department and went on-line with the computer center located 20 miles away. The terminal is a Burroughs TC 500, and it maintains constant communication with the computer. It provides the station with availability information, spot confirmations, contracts, logs, sales analysis reports, invoices, statements, aged accounts receivable listings, FCC reports, and all other required operating documents.

To go on-line with the BIAS system, a station just installs the already programmed terminal, hooks up to a leased telephone line, and starts its own age of automation.

One of the computer system's features is the way it can rotate ads horizontally and vertically when requested to do so. Availability information is instantly accessible, with the computer providing all needed information within six seconds of being queried.

Any changes in the program scheduling, such as specials, presidential announcements, special news events, etc., can be entered into the terminal as soon as such information is available. New promotion information, deletions and corrections of old promos, PSAs and IDs can also be entered at any time.

In addition to WMC-TV, other stations now subscribing to the BIAS system are: KIRO-TV, Seattle; KPIX-TV, San Francisco; KOB-TV, Albuquerque; KSTP-TV, St. Paul/Minneapolis; KRNT-TV, Des Moines; WREC-TV, Memphis; WBRZ-TV, Baton Rouge; WWL-TV, New Orleans; WAVE-TV, Louisville; WESH-TV, Daytona Beach/Orlando; and WBRE-TV, Wilkes-Barre/Scranton.

All these additional subscribers for on-line service has meant that Data Communications has had to add another B3500 computer to its central facility. In addition to real-time servicing of these 13 TV stations, the computer center does batch processing for several furniture companies.

In a typical day's operations for any given station, the computer prints out a conflict list; enters times and deviations from previous day's log; makes entries to resolve conflicts; enters new promos, PSAs and IDs; enters facility information for tapes, files, etc.; enters promos, PSAs and IDs for next day's log; prints next day's log; enters changes in program schedule for any time for next year; enters orders with horizontal and vertical rotations; enters new accounts; continues entering orders as needed; prepares daily reports. The system also provides sales analyses, prepares invoices, and handles all other appropriate paperwork—all automatically.

The BIAS system now handles order entry and inquiry work from 33 terminals. According to the system operator, work is now completed for a system

for radio stations and, in fact, one Memphis station is already using the new system.

Starcom goes on-line

One of the newest systems to go on-line is the much-heralded Sarkes-Tarzian "Starcom" television data processor, which has just been installed at the company's station, WTTV, in Indianapolis/Bloomington. The programs have been completed and the system is now being demonstrated at WTTV for prospective system customers.

Starcom makes the original document, contracts handling the sale of spot and program time, and performs such subsidiary functions as reporting sales backlog, commercial instructions, etc.

Its primary function is to expose the time available for sale, time oversold, and allow for rescheduling, since many subscribing stations would want to use rotating spots. The system provides for not only rotating spots within programs, but for rotating entire programs and handling changing demographic requirements.

The Starcom system can handle sales of blocks of time, preferred times within specified blocks, pre-emptions, specified time slots.

As pointed out by Jim Moneyhun, manager of S-T's Computer Service Department, "The system puts absolutely zero restrictions on whatever wild things the salesman wants to sell. The system is designed to operate functionally no matter how fluid the sales department wants to get." The time can be sold almost on a random basis, and the computer will put everything in order and chart availabilities.

Audit functions of two kinds are also handled by the computer. It writes contracts and all derived paperwork, and indicates conflicts. Also, after the final log is printed out, it runs a complete audit of everything that has been reported, generating a daily billing discrepancy report, showing all problems that may have occurred—extras, misses, and other such items. It is also the only system that permits the entry of new contracts covering time that has already run—where spots have been requested before the contract can be completed for one reason or another.

Starcom will do standard and calendar billing with two invoice runs. It will also invoice on demand, so customers who want to be invoiced on a weekly basis can be serviced. To speed up receivables, it automatically invoices all expired contracts. Thus, if a contract expires at the beginning of a calendar month, the customer will be billed immediately instead of at the new billing cycle.

Other special features include log-generating facility that will prevent such things as a wine commercial running back-to-back with an aspirin spot.

The basic computer consists of twin IBM 360/67s operating in dual configuration, and is located in Boston. Station gear consists of mini-computer terminals made by Sycor. Terminal capacity ranges from 30 characters/sec. up to 300 lines/min.—depending on station volume requirements.

The Starcom system includes the appropriate design features for interfacing with automation equipment whenever a station wants to couple the systems.

Another new specialized automation service is being offered by Broadcast Computer Services. Based in Colorado Springs, this newly-formed computer operation is programmed and structured entirely for the broadcast industry. The system's computers will handle on-line as well as batch processing operations.

If you are not ready to go the whole way

Some stations automate paperwork first; others feel the programming must be automated ahead of everything else. For those in the latter category, a new system from Vital Industries—the VIMAX-27—may provide just the degree of automation they require.

The basic automation system consists of a computer, keyboard, character generator, monitor, real-

time clock, hard-copy log printer, and interface to control the video-audio switcher and machines. Switched equipment includes VTRs, film islands, and cartridge tape equipment.

The basic system can store the Now On Air information and 27 full upcoming events—approximately one full hour of programming.

One event is defined as the information needed to place On Air one program segment. Such an event could be entered this way: "At 09:59:01 PM: Hold Network Video and Dissolve in 2 seconds to a title from Film Island 1, with the Slide Projector into the Network Video. Breakaway from Network Audio with an Audio Segue to Cartridge Tape under the Announce Booth, and change 3 slides from the Cue signal on the Cartridge Tape, and print out a hard copy of the event."

The system is organized to be programmed by exception. The most-used functions are assumed to be normal, such as audio following the video source, and the new event is to be a cut or an instant direct



A view of the master control room at WLWD, Dayton, Ohio (an Avco station). Note the Vital Industries' automation system on the extreme right of the switching console.



Close up of the Vital Vimax-27 console. The 27 events that this system handles are more than adequate for WLWD's chief engineer, Harold Thompson.

take. With this system, the needed entry is a bare minimum. In the example just cited, Net and Time were all that were needed for the full event.

Information with the system is stored in a non-destructible core memory and an automatic memory-protect circuit is built in to preserve the program during turnon/turnoff and during power failures. It's possible to make program corrections at any time before actual On Air switching. Program changes can be as extensive as removing complete events or inserting new events in the middle of a pre-loaded program, or as minor as a source change—which alters only one character in the event.

The system is designed to be obsolescence-proof. Major modifications to the system can be made by simply changing the software. If a format change is needed, or the time of a machine pre-roll is needed, a punched tape can be fed into the terminal for reprogramming. A complete format change requires 2½ minutes.

By adding the Edit system, the automation is expanded throughout the total TV plant to include traffic and scheduling departments. Total capacity of direct on-line programming events to master control is more than 600, or greater than an entire day's programming.

Complete days and weeks of programming schedules can be prepared and stored in advance. At the time the schedule is prepared, a hard copy of the schedule is automatically typed for distribution. The complete advance schedule is always available for recall for any needed changes or corrections.

The Vital system can be interfaced with total system automation such as in the Cox Data System setup, where several different technical automation at different subscribing stations are all tied into the same central host computer. This way, actual performance data is made a part of the computer's memory as soon as a spot goes on the air, and appropriate paperwork can be produced.



Semi-automatic broadcasting of break material: The Ampex ACR-25 cassette broadcast videotape recorder/player holds up to 24 cassettes that can be played manually, semi-automatically, or automatically. The unit pictured is the first of its kind to be delivered. It's at KTEW, Tulsa, Oklahoma.

WJAR-TV Chief Engineer Philip B. Taylor demonstrates the operation of the station's RCA TCR-100 cartridge videotape machine to Robert Crohan, v-p and g.m. Taylor believes that a cartridge or cassette videotape machine is the wisest improvement that can be made in existing facilities.



Videocassettes and videocartridges— partial automation

A key element in some of the new technical automation systems—or a substitute for full automation—is the videocassette (Ampex) or videocartridge (RCA) machine.

Television station KTEW in Tulsa, Oklahoma, started semi-automatic broadcasting of its commercials and promotional spots on June 28. The station was the first in the world to place in operation an Ampex ACR-25 cassette broadcast recorder/player.

The ACR-25 utilizes a permanent rotating carousel that holds 24 tape cassettes, each of which stores up to six minutes of recorded material. When the cassettes have been loaded into the carousel, they may be selected individually or programmed as a group via a control panel which offers the flexibility of push-button selection. While one cassette is playing, the next is in the ready position in the ACR-25's second transport.

Operation may be completely automatic, semi-automatic, or manual. The Ampex cassette recorder/player may be interfaced with a computer for unattended operation.

At present, KTEW uses the ACR-25 in its semi-automatic mode. Incoming tape commercials and spots are transferred to cassettes, each of which is assigned an appropriate place in the carousel. As the first recorded cassette is playing, the next is ready to play, and a third is being selected by the operator.

One of the benefits of the ACR-25 is the elimination of many manhours previously required to record the break material for long program segments of the broadcasting day.

Wally Dunham, KTEW assistant general manager, said, "At present, we're just in the first phase of using the ACR-25. We don't intend to rush into certain areas without adequate experience, but our plans do call for eventual total utilization of the unit's capabilities.

"Even with our limited exposure, we can see the potential of the ACR-25 in two distinct areas. For airing commercials and other short duration material, we can now state that it's simpler, cuts down on programming time, and lends a versatility not possible with an ordinary videotape recorder. Second, we're looking forward to a day in the not too distant future when we can use the ACR-25 as a production tool. We're probably the busiest commercial production center in the Tulsa area, and we expect the cassette recorder/player to expand our capabilities," Dunham concluded.

Prior to acquiring the ACR-25, assembling break material for 90-minute videotape shows was a tremendous chore. It took one man eight hours each day just to record the material in proper sequence on videotape. During broadcast of a movie, all three of the station's Ampex VR-1200 videotape recorders were at work, leaving no available machine for backup and production. In effect, the ACR-25 frees one recorder for other use.

KTEW's engineering staff has also given the ACR-25 high marks. John Barth, chief engineer, said,

Software Problems Likely

We've tended to look at computer automation through rose-colored glasses in this report. Problems in software are likely to appear and a program will have to be debugged. R. A. Buhr, Carlton University, Ottawa, told users at the SMPTE 110th Technical Conference to specify precisely what the system should do or the software programmer is likely to trip up somewhere along the way.

"This part of our operation has substantially improved with addition of the ACR-25. Reliability of the unit impresses us. KTEW averages 120 commercials a day during the week and 150 on a weekend, so reliability is extremely important."

A station completely sold on the use of cartridge video players is WJAR-TV, Providence, Rhode Island. Phil Taylor, chief engineer, says videotape cartridge equipment offers "potentially more return on investment than any other improvement that can be applied to an *existing* facility."

The station has an RCA-TSA-3 ten-event sequential machine and switcher control and, after the preroll is initiated, a timer will automatically "take" audio and video on air at the proper instant.

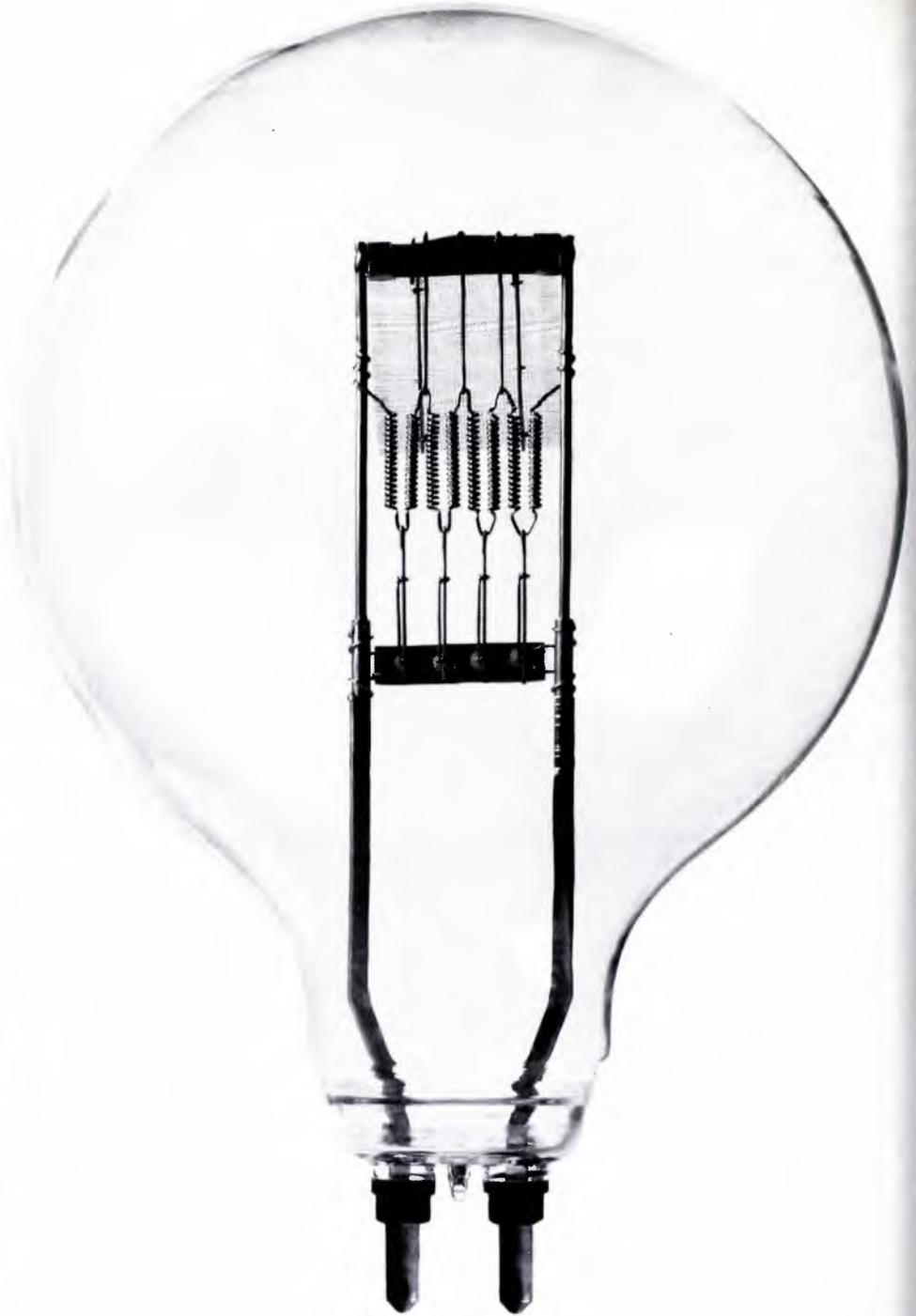
Since the timer for on-air switching of film projectors was set for three seconds after preroll, it was decided to handle videotape cartridge in the same way as far as preroll was concerned. This is easily accomplished with the RCA machine as it has an adjustable timer for starting the machine from the remote location which will roll the videotape cartridge at a predetermined interval after the remote start switch is closed. (At the machine, preroll is always two seconds.) This greatly simplifies production and accuracy of performance as there is only one preroll time for all elements that are to be aired and it is not necessary for the operator to consider differing preroll times.

Videotape cartridge equipment will interface well with nearly any imaginable existing control room facility, whether there is a manual, semi-automatic, or fully-automatic operation. Because it is unnecessary for an operator to "set up" each tape before it is played, the rendition is virtually as good as the original material for play after play after play. (The fact that the tape itself is not handled by personnel greatly adds to its life and to head wheel life. Scratched or otherwise damaged tape is truly a rarity.)

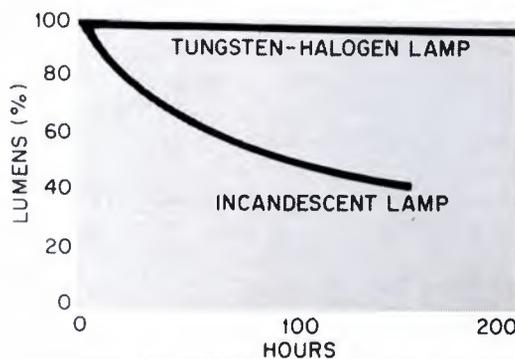
The use of videotape, especially for spot announcements of various lengths and types, is growing at an ever-increasing rate. Thus it has become necessary to spend increasing numbers of man hours (often in overtime) to dub material onto master reels in groups or clusters in order to keep videotape machines free for production of new material. Newscasts, with much of their story material on tape from network or other news services, have become virtual nightmares to produce. Labor can become a sizable cost under these conditions. Taylor feels one cartridge videotape machine can effectively replace four reel-to-reel videotape machines as far as spot load and most production problems are concerned. **BM/E**



10 KW TUNGSTEN-HALOGEN LAMP.



10 KW INCANDESCENT LAMP.



WE'VE CONQUERED THE DROOP.

If you've ever watched those big, fat incandescents deteriorate, you know what a big, fat pain-in-the-neck that is. Their lumen output sinks and their color temperature drops, as the graph shows.

Now Sylvania tungsten-halogen lamps have come to the rescue.

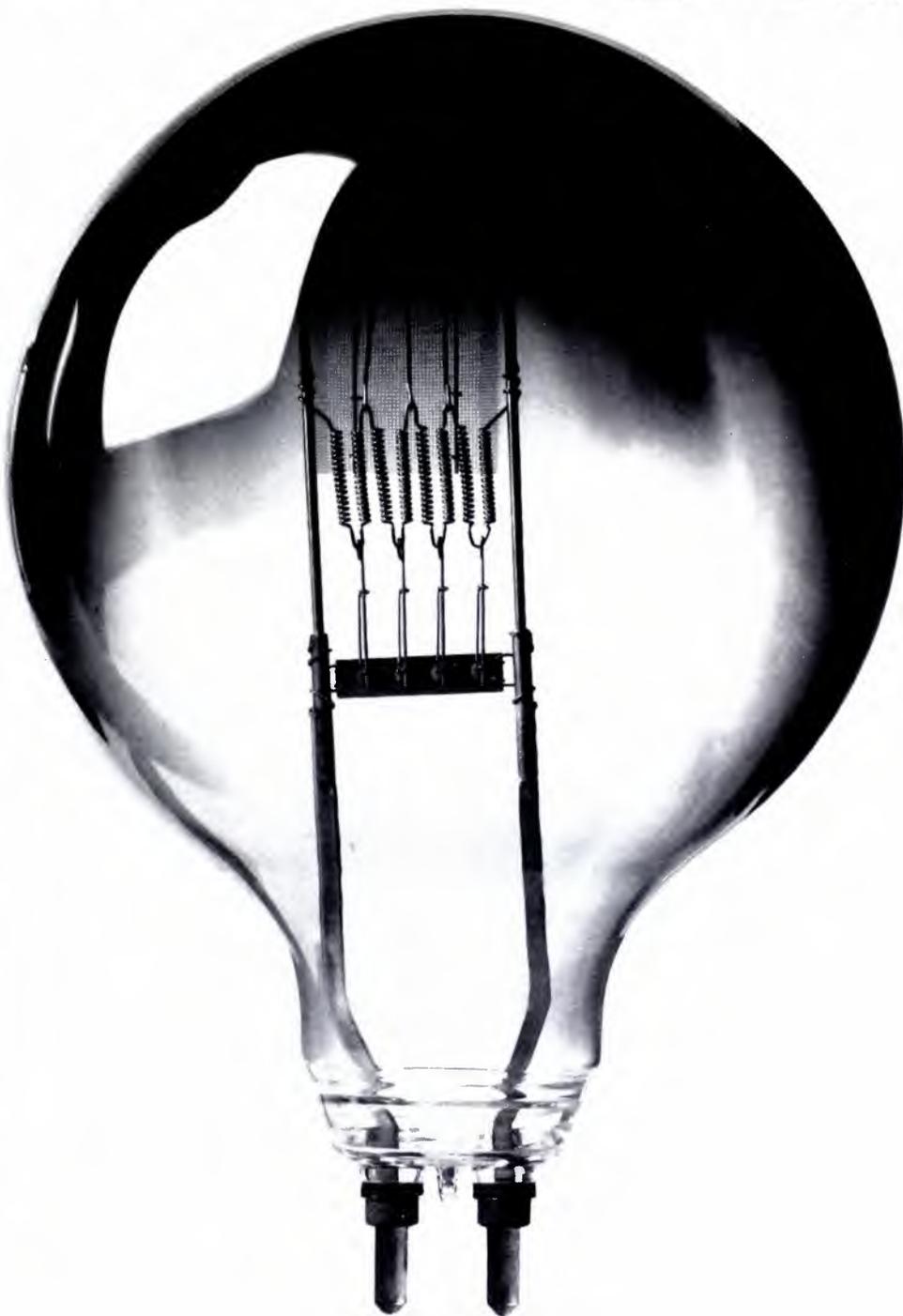
They don't blacken with age, they don't lose light output and color temperature, and they don't go into a slump.

That means you don't have to keep

70 HOURS LATER.



10 KW TUNGSTEN-HALOGEN LAMP.



10 KW INCANDESCENT LAMP.

...dling with the studio lights or cam-
...er settings. You get constant color
...dition on color film and save
...oney on print correction.

Tungsten-halogen lamps outlast
incandescents 2-to-1. (Or even
3-to-1, since you may have to throw
away the blackened lamps before they
bark out.)

Then there's size. Why should any-
one want big, heavy glass balloons
when he can have nice, slim little

lamps that are easy to handle and
store?

We've developed two complete
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lamps.

The first is a line of direct replace-
ments. These lamps fit into the big,
old sockets vacated by the big, fat in-
candescents.

The second is a line of even smaller
tungsten-halogen lamps that you can
use to replace our replacements once

you've gotten rid of the old sockets
and fixtures. They fit into entirely
new, smaller, more efficient fixtures.

Ask us about both our lines. Right
away.

Before another 70 hours go by.

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trated brochure on each line. For
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Compact Video's Compact Trucks Take Product Afield

With Compact Video's mobile studio small trucks, you can go just about anywhere and do a studio-grade video production job. The maker says they will save you 60 percent in production costs, and increase production 40 percent, as compared with the large mobile studios commonly used.

THE HEAVY DEMAND for easier, quicker "on location" production, with the "realism" it gives TV material, inspired the development of mobile TV-studios-on-wheels by Compact Video Trucks of Bur-

bank, California. Aiming for very compact, easily operated units that get into action quickly, Compact built the studio into a van-type vehicle with an overall length of 20 ft 2 in., and the power supply into another truck only 16 ft overall.

The studio van carries two Norelco PCP-71 cameras, either of which can be hand-held, or shot from a base on top of the van, or mounted on a tripod for off-the-van use. Cameras feed an Ampe VR-3000 highband color VTR. Sound is recorded on two Nagra 4L sync recorders.

There is a generous complement of switching and signal processing equipment including: Grass Valley SE-2 special effects unit, chroma key, and sync generator; Tektronix 520 Vectorscope and two 521 Waveform scopes; Conrac monitors. On the audio side there is a CTV-6 six-input, two-channel mixer.

The unit comes supplied with a large complement of microphones, tripods, camera heads, camera accessories, about 3000 feet of mike cable in various segments, several walkie-talkies, power megaphones and director-stage manager-audio-camera communications system.

The power van carries an Onan 5kw power plant and a Colortran electrical lighting system, "C through "L"; scrims, barn doors; 1000w 3200K quartz lamps; and much other gear for location lighting.

Compact Video claims that their miniaturization and rationalization of the production process have resulted in a savings of up to 60 percent and output increases of up to 40 percent, as compared with the much larger mobile studio rigs that have been commonly used. They say the cameras can be adjusted electronically on the way to the location, leaving set-up time, barring unusual circumstances, of no more than ten minutes. The trucks are rugged and comparatively light, can go on back-country roads that the very large trucks can't negotiate.

All right, TV-men, where do you want to shoot

BM/1



Camera-studio truck operating with camera on roof, another on open rear platform. Complete control studio is inside roofed part of truck. Power truck can be seen in background.



Control and monitoring equipment fills forward wall of truck cabin in back of driver. Operator sits with back near studio doors.



Location shoot with Compact Video's mobile studio and camera on tripod away from truck. Scene was for one of TV series, "Imagine That."



**“When I suggested
to the staff that we try
out other cartridges,
they were unanimously
against it.”**

Ernie McDaniel, Director,
Technical and
Broadcast Operations,
WCBS Newsradio 88

“We’re an all-news station.
Cartridges are one
of our basic tools.
A substantial portion
of our programming
is on carts.

“We’ve got to be able
to depend on them.

“We use Audiopaks exclusively.
Our people prefer them.

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we had a problem with
cartridges. We talked
to the Audio engineers.
We worked with them
to come up with
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We’re happy with it.

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A Lot Of Station Operators Don't Realize They Have A Stereo Phase Problem!

By George E. Riggins

More on the stereo phase problem from a tape equipment supplier and rebuilder who has had plenty of experience on the firing line.

SEVERAL RECENT ARTICLES in *BM/E* on the phase problem in stereo tape cartridges hit an area in which I have had plenty of experience. In working with and talking to many engineers and program directors, I've discovered that a lot of them are not aware what the phase problem is in stereo carts, what really causes it to happen, or what the results are.

I can recap it this way: If the tape skew in playback is different from the skew in recording, there will be a phase shift between the two channels that in small amounts can mess up the mono (summed) signal and in very large amounts may also degrade the stereo signal. Many operators know that their mono signal often doesn't sound good when derived from a stereo cart, but they don't know why or what to do about it; they simply stop making commercials or IDs, etc., in stereo.

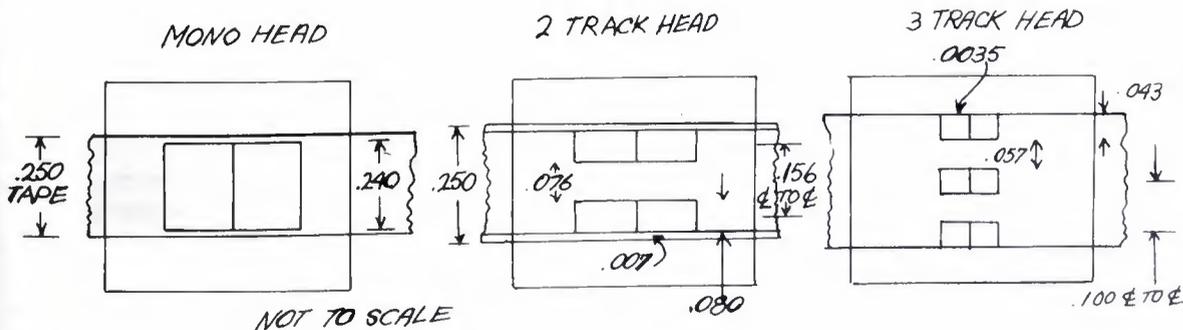
One way it often happens is that the cart is

recorded on a machine with two heads, record and play, but is played back on a machine with one head. Very slight differences between the two machines in tape tension, tracking, and azimuth alignment can make a damaging phase shift. Very careful maintenance would be required to keep both machines lined up on the nose, and many station operators don't know they need it. This problem is likely to come up whenever a cart is recorded on one machine and played on another.

The equipment manufacturers, generally speaking, have not made it easy for us. They all go to great lengths to make the head assembly rigid and adjustable. All use tape guides to try to compensate for slight differences among the carts. But, except in a few cases in which the guides are integral with the heads, none of the guides is adjustable. We can adjust the head for elevation, but not the guide.

What is the engineer supposed to do if, as has often happened to me, a guide is too high, too low, or out of tolerance—say .240 inch instead of .248 to .250? An expert rebuilding job has to be done in many cases. Station personnel may or may not be equipped to do this, but at least they should know

Mr. Riggins operates Riggins Electronic Sales, Long Beach, California, a supplier and repairer of sound equipment for broadcasters.



Cartridge head dimensions (from Nortronics' catalog) show that slight misalignment could wreck havoc.



* New low cost digital multimeter \$299

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S-60	1/5 sec.	60 min.	±.1 sec.
SM-60	1/100 min.	60 min.	±.002 min.
S-10	1/10 sec.	1000 sec.	±.02 sec.
S-6	1/1000 min.	10 min.	±.0002 min.
S-1	1/100 sec.	60 sec.	±.01 sec.
MST-100	1/1000 sec.	6 sec.	±.001 sec.
MST-500	1/1000 sec.	30 sec.	±.002 sec.

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that the problem exists.

Beyond that, the manufacturers give little information on guide adjustment. Even for the crucial azimuth adjustment, which is basic to proper phase performance, there isn't enough information. Some engineers tell me they have been instructed to use a mono alignment tape to set the stereo heads. Referring to Figure 1, we see that a *full-track* alignment tape, loaded into the cartridge, will allow the engineer to find the best compromise between track A and track B adjustment, which is basically what he is after. But most engineers reach for a *mono car* alignment tape, which is a *half-track* tape. We can observe that the alignment signal doesn't quite reach the middle (cue) track on a stereo cart, much less track B. So we are aligning only for track A! I haven't seen any manufacturer maintenance information on this problem, and need real standardization of alignment tapes, which we certainly haven't got now.

How do you best read out the alignment signals? You can use a meter or scope; the most accurate method is a scope with identical horizontal and vertical amplifiers. This way you can quickly check the phase angle between the two tracks at several frequencies.

Here are some results I got which will give an idea of the magnitude of the phase shift problem:

1. A 10-degree shift at 7000 Hz brought no appreciable loss in a summed signal until past 16,000 Hz.
2. A 90-degree shift at 7000 Hz brought a loss of 10 dB at 10,000 Hz and 20 dB at 14,000 Hz.
3. A 150-degree shift at 7000 Hz put the 10 dB loss at 6000 Hz and the 20 dB loss at 10,000 Hz.
4. A 180-degree shift at 7000 Hz gave significant audio loss starting at 4000 Hz and a 35-dB loss at 7500 Hz.

Items 2, 3, and 4 are very serious results because a large part of the FM audience is using mono equipment, and there are increasing numbers of mono FM receivers in automobiles; and also because very small azimuth errors or skew can produce phase differences of this order.

Some cart makers have given us the adjustable corner post, which is a big forward step. It takes a load from my shoulders when I am rebuilding carts. I have seen every conceivable kind of cart gremlin. There are no magic tricks in my tool box. I simply try to treat each misalignment as it comes.

That is essentially what the station engineer has to do, once he understands the problem. He may be hampered by old equipment, no repair or replacement budget, no time, etc., but it has been my experience that if he does his absolute best with what he has, he is in a strong position when he asks management for more repair money or a new cart machine.

On behalf of the manufacturers, I want to say that most of them are trying to do a good job within the price station operators are willing to pay for carts. I hope, though, that this article helps to stir up discussion of the phase-error problem; it won't get solved until all of us learn more about it. **BM/E**

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Now, for the first time, commercial equipment can produce video-to-film transfers of a quality



formerly obtainable only in the laboratory.

That's the 3M Color EBR System — the result of 12 years of research and development by the company that pioneered electron beam recording.

The 3M Color Electron Beam Recording System.



Field-proven and backed by an unmatched depth of expertise, the 3M Color EBR System brings new picture fidelity to the motion picture and television industries. Contact 3M for the full story.



Tape-to-Film Transfer at Its Finest.

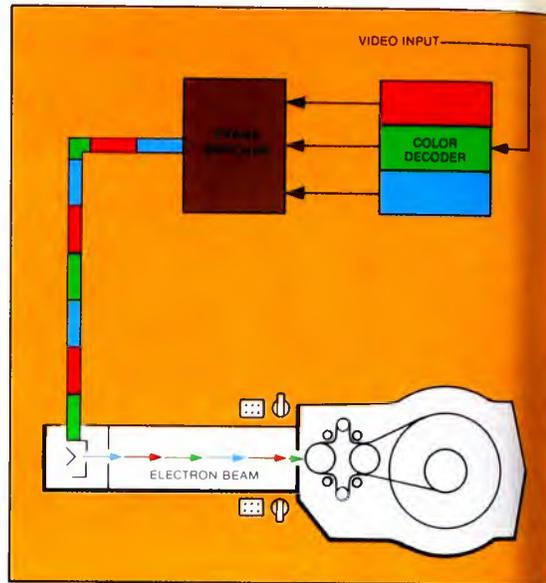
Superior Film Transfers.

The 3M Color EBR System utilizes direct electron exposure to produce video-to-film transfers that are superior to those made with CRT/Optical recorders.

Working in real-time, our EBR System provides black-and-white film separation masters directly from the live or taped NTSC video signal in a single pass. There are no optics, phosphors or CRT faceplates to degrade image quality.

The resulting positive color prints or internegatives consistently exhibit true color saturation and freedom from "color crosstalk", have accurate image registration, high resolution and low noise, and are free from mid-field splice, shutter bar and other frame rate conversion anomalies.

The 3M Color EBR System provides you with video-to-film transfers as close to perfect as is possible today.



Electron Beam Recording.

3M's electron beam recording technology has been field-proven in many commercial and space imaging applications. It now brings true color fidelity to video-to-film transfers.

Color prints are produced by the three-color separation process, with the separation masters recorded on high-resolution black-and-white 16mm film.

The NTSC video signal — live or taped — is electronically decoded into its red, green and blue components. These are stored parallel on a video disc, then played back sequentially for recording.

The interlaced fields that make up a television frame are recorded during a single raster scan by deflecting the electron beam between two adjacent line positions at a 15.75 MHz rate and synchronously switching the video signal between the two interlaced fields. The image corresponding to each color signal is recorded on a separate frame of film by the successive frame color process, a process known for its superb color quality. A television monitor and



Waveform monitor permit the operator to electronically make all necessary video adjustments and calibrations prior to recording.

Real-time operation is achieved in the 3M Color EBR System by recording on film moving continuously, rather than intermittently. A servo film drive gives registration accuracies of the separation images consistently better than 0.0001 inch (a fraction of a TV line on the 16mm format used). The film drive is designed to be the simplest and most reliable ever to be used for television recording. Color registration is inherent in the EBR recording process because all images are recorded by the same electron beam on the same film. Any shift in image position, whether due to the recording process or film shrinkage, affects all colors equally; it does not disturb their registration.

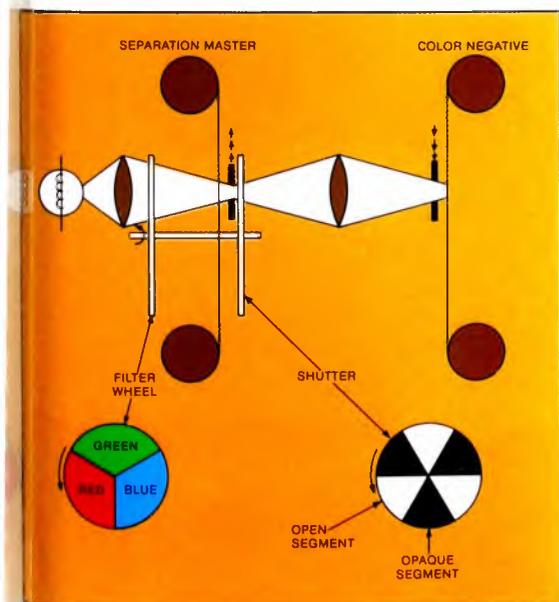
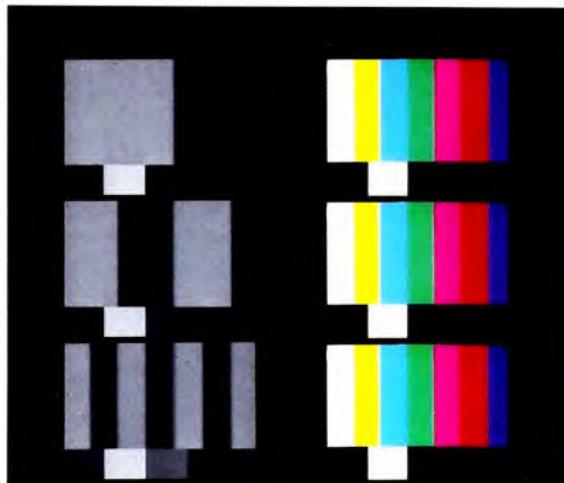
After the separation film is recorded, it is developed by normal black-and-white processing, then loaded into the step printer. A great deal of versatility is possible, because the separation film may be recorded as a positive or negative. The printer

camera may be loaded with any standard 16mm internegative or positive color stock (35mm optional).

The printer automatically exposes each frame of the color film to the red, green and blue separation images through a rotating color filter. The three colors may be individually controlled, permitting optimum color balance in the final print.

For sound recording, a signal is available from the Color EBR System for synchronization of an external sound recorder. An electronic "sync mark" is recorded on the separation master film and on the sound negative.

The final film produced by the 3M Color EBR System has the color quality of the separation process plus the control and image excellence of electron beam recording.



System Features.

- True saturated colors, no color crosstalk, no color fringing
- Superior image quality
- One-pass, real-time recording
- Inherent color registration
- Independent control of color balance
- Precise operator control of separation exposures, focus, size and linearity without test films
- Low cost film and processing
- Archival separation master not subject to color dye fading
- Perfect interlace assured by simultaneous even/odd field recording

General Specifications

EBR Recorder.

Film Transport: Film magazine, film chamber and mechanism operated in vacuum. Continuous motion film drive locked to incoming TV sync. 72 frames/second.

Film Magazine: 3300' coaxial magazine contains both supply and take-up reels. Recording time: 30 min (4.7 mil base).

Vacuum System: Fully interlocked for loss of power and film runout.

Electron Source:

Tungsten filament replaceable in approximately 10 min (warranted life 300 hours).

Focus:

Electromagnetic, monitored by secondary emission direct

display of magnified test pattern surface.

Beam Current Control (Exposure): Servo-controlled at TV line rate and monitored by waveform monitor.

Spot Wobble: 15 MHz sampling rate.

Input: NTSC composite video or separate sync. 0.6 to 1.4 volts peak-to-peak.

Dual Gamma Amplifier: Independent set-up for positive or negative recordings. Adjustable break points for proper gray scale in the developed film.

EBR Printer.

Projector Lamp Type CTT, 1000 watts. Printing Speed: 4.2 frames color film/second.

Projector film capacity: 3300 ft. 16mm film (4.7 mil base thickness).

Camera film capacity: 1200 ft. 16mm film. Optional interchangeable 35mm camera with 1200 foot capacity available.

Support.

Ideally, the operator of a Color EBR System should be familiar with television recording techniques, experienced in op-

erating sophisticated electronic equipment and in photographic processing. If this combination of experience is not readily available, Mincom offers various training programs. Further information is available through any of our branch offices.

A planned maintenance program is available through the Mincom field service organization. The initial installation of the Color EBR System is made with a factory engineer and a field service engineer present. Informal training of the customer operators is given during the installation.

The Color EBR System is available on direct sale, lease or a conditional sale basis. For further technical and sales information contact one of our branch offices. Demonstration films are available.

Sales/Service Facilities:

ELECTRON BEAM PRODUCTS
MINCOM DIVISION, 3M COMPANY
300 South Lewis Road
Camarillo, California 93010
Telephone (805) 482-1911

MINCOM DIVISION, 3M COMPANY
4701 Lydell Avenue
Cheverly Industrial Center
Cheverly, Maryland 20681
Telephone (301) 773-9033



ELECTRON BEAM PRODUCTS
Mincom Division **3M**
COMPANY

BROADCAST EQUIPMENT

Scissors work platforms allow work at heights up to 25 ft above the floor. ECONS Model hydraulic platforms have



42-in. railing, operate on 115/1/60 power, and have duplex receptacle at the platform for power tools. ECONS MODEL ENGINEERING. **275**

Modulation meter covers AM and FM carrier frequencies from 6 to 1001 MHz. Model AFM3 is especially intended for AM and FM on narrow-band VHF/UHF mobile transmitters. Five measurement scales range from 1 to 100 kHz for modulation of 30Hz to 15 kHz. Automatic level control keeps output within 0.5 percent for input variations to 40 dB. THE LONDON COMPANY. **276**

Cassette maintenance kit has six items for care of cassette recorders and players. QM-1 Kit includes a degausser, spray cleaner, head cleaner, splicer, splicing tape, cotton wipers. NORTONICS. **279**

Programmable tracking filter covers 20-to-1 frequency range, can be phase-locked to input signal or external reference. Models MBF-724 and SBF-721 have bandwidths and ranges programmable with DTL/TTL

logic, zero phase error at center frequency, 0.1 dB amplitude error, bandwidths to .01 Hz, skirts 10 Hz wide at 40 dB down with 1 Hz bandwidth. UFAD CORP. **280**

Frequency synthesizer has 80-dB signal-to-spurious ratio, 100-microsec switching speed. Model 1061 ranges from 400 kHz to 160 MHz, with levelled output from 0 dBm to +20 dBm, and 10 kHz (5-digit) resolution. A search-sweep mode takes resolution to 100 Hz, can be remotely controlled by a DC signal. There are no front panel controls, though they are available as an option, as are ten-digit resolution, internal frequency standard, and phase-modulation capability. \$4700 up. GENERAL RADIO. **277**

Video terminal controller provides alphanumeric display at asynchronous data rates to 1200 characters/second, plus full graphics, monochrome or



color. Model 206 comes with serial or parallel RO33- or KSR33-equivalent interface with RS232C, TTL, or current-loop capability. Format is 80-character, 16-line, with page or roll mode switch selectable; built-in memory conserves computer space. Delivered plug-compatible. \$945. ANN ARBOR TERMINALS, INC. **282**

Audible VU meter provides audible tones which indicate that program is below, within, or above a 4 dB range set by pushbutton. AVU-11 is primarily intended for the blind, but also allows recording, broadcasting, and sound system technicians to adjust or monitor without watching meter. BPH RECORDINGS, INC. **281**

Trencher digs to six feet, up to 18 inches wide. Model R30 has 30 horse-



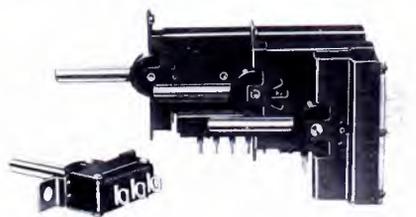
power, hydraulic control of all working functions, 64-inch backfill blade. DITCH WITCH DIV. OF CHARLES MACHINE WORKS. **283**

TV color monitor uses Trinitron tube, Unimedia models have added direct video conversion circuitry, power line isolation, new mountings. UNIMEDIA. **284**

Universal DC line termination panel facilitates remote control of two-way radio base stations. Model LT-7 provides all interconnect circuitry for DC control, plus monitor and transmit relays. Input and output impedances are 620 ohms. ALPHA ELECTRONICS SERVICES. **285**

Low-light-level TV camera uses a wafer of silicon and vidicon electron optic structure for a broad spectral range. Model VCS-3000 operates at as little as 0.001 foot-candle, has electronically-controlled f/1.4, 25mm iris lens for extreme light variations. SANYO ELECTRIC, INC. **286**

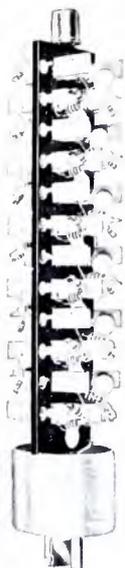
Lever switches have two or three active positions, two to eight poles. Baton Lever series has new straight



lever arm for good sense of grasp, and a positive "feel" at contact position. ALCO ELECTRONIC PRODUCTS. **288**

Dual-pin plug for matrix-board programmers is available for shorting

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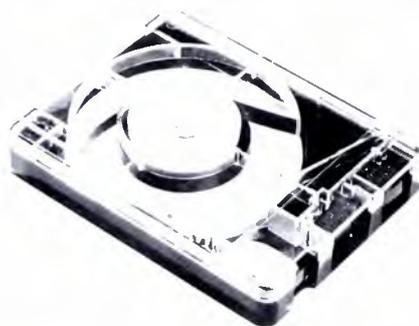
Circle 119 on Reader Service Card

PRODUCTS

type and skip type pins. Pins are silver plated (gold on order). SEALECTRO CORP. **293**

Car player for eight-track cartridges is 2 in. high by 4¾ in. wide by 6½ in. deep, one of smallest available. Model TP-222 mini eight-track car stereo has automatic and manual track change. 3.8 watts per channel output, power by 12-volt battery. PIONEER ELECTRONICS. **295**

New broadcast tape cartridge has special braking to hold cue positions in place. "guide by angle" system for



accurate tape motion over heads, precision molded tape guides. Model A-2 meets all NAB specs and is available in 12 different playing times from 20 seconds to 10.5 minutes. CAPITOL/AUDIO DEVICES. **296**

Telephone coupling transformers connect voice/data modem equipment to voice-grade telephone lines. Series meets telephone company requirements for data and voice access, includes models for isolation, coupling, hybrid, bridging, and holding. Distortion is 0.5% maximum over range -45 dBm to +7 dBm, longitudinal balance 45 dB minimum. MICROTRAN. **300**

Two-way AM base station provides up to 6 channels in 118-136 MHz range. Model APSB-330 has 30 watts

output, can be used on desk or table top, or remotely operated from desk microphone. Power can be 120/240 VAC or 24 VDC. HALLICRAFTERS. **301**

Ceramic power SCR's have high I²t rating of 420,000 A²sec., and maximum on-state current of 785 amperes. Series 500PA "Hockey-Puk" SCR's have repetitive peak inverse ratings from 50 to 600 volts, one-cycle ratings of 10,000 amps surge current. Similar 550PA series rates I²t of 500,000 A²sec. and maximum on-state current of 865 amperes. INTERNATIONAL RECTIFIER. **302**

Channel amplifier/equalizer for use in audio consoles has HF and LF cut and boost, HF and LF presence, all with high Q/low Q switching, plus high-pass and low-pass filters, in a 12 in. x 1.8 in. unit. RUPERT NEVE INC. **303**

Computerized mixing system is designed to be added to existing console or mixer to provide completely automated mix-down. "Compumix," with ordinary multi-track audio recorder connected, records in real-time all fader and switch positions. These are converted to control voltages that automatically reperform all mixing and switching functions. Correction



of any error can be made at any time without affecting the rest of the mix. Preceding mix is always retained. System also has six submixing or grouping faders, and a master fader. Standard 24 inputs; expandable. QUAD EIGHT ELECTRONICS.

Solid-state circuit tester has 12 current ranges starting at 1 microamp,

Matthey Video Delay Lines



Infinitely variable range of 10-165 ns. in 5 ns. steps, selectable by switches, with fine trim of ± 4 ns. by screw adjustment. Cascade with fixed delay boxes of 50, 200, 500 and 1,000 ns. 75 Ω—fully-equalized—insertion loss .1 dB. In service at all three networks, numerous stations.

Price \$75.00 qty. 1-3. Try one at no obligation.

Complete literature and prices on video delays (boxed and PCB modules)—pulse delays—pulse cleaners for under- and over-shoot—low-pass video filters from

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Take that high school game everyone's interested in:

When your announcer arrives, the broadcast equipment is plugged into a Voice Coupler provided by the local Bell Company.

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Your local Bell System Communications Consultant can give you the details. So why not call before your next remote broadcast?
AT&T and your local Bell Company.



PRODUCTS

18 voltage ranges, 100 mV to 1000 volts, and 14 resistance ranges. Model 666 has "drop-proof" construction, FET input circuit with 10 megohms impedance, diode meter protection, temperature and frequency compensation. \$132.50. WESTON. **298**

Dual-channel electronic switcher allows rapid comparison of two signals in 5 to 1000 MHz range, for testing of active and passive devices. Model 255E uses pin-diode switch, can select either channel or mix for dual-trace oscilloscope measurements. External



switching rates are 0.2 to 200 Hz; internal sync, 5 to 100 Hz. 75 or 50 ohm input: BNC, TNC or F connectors. \$260.00. KAY ELEMENTRICS CORP. **299**

Tone generator produces groups of up to four tones for testing tone-selective systems. Gertsch Model TG-1 can be set anywhere in range from 0 to 10

kHz, with each frequency selectable to 0.1 Hz with thumbwheel control. Durations are calibrated; continuous, burst, sequential, simultaneous, etc. modes are available. Tone sequences can be repeated indefinitely at precise intervals. Frequency accuracy is .005%. SINGER INSTRUMENTATION. **289**

Dual-trace oscilloscope has simplified operator's panel, with only four signal controls. Model PM3110 has automatic internal circuits for DC balance; level and stability for triggering. Selection of A, B, or both is



by input control switch; chopped or alternate presentation is automatic, depending on time base. Bandwidth is 10 MHz, sensitivity 50 mV/cm. Ten-times sensitivity magnification, and five-times sweep magnification are available. 500 volts peak input can be accepted indefinitely. PHILIPS. **290**

Subcarrier multiplex system adds up to 24 voice channels or a 250 kilobit data channel in the space above video portion of a microwave or cable TV



channel. Model SBC-400 Voice-over-Video Subcarrier Multiplex has modularized units for different configurations, works with any microwave or cable TV link. COASTCOM. **297**

Switchlights have rolled silver contacts rated at 250,000 operations for logic levels or 100,000 at 2 amps resistive (30 VDC or 125 VAC). Monoform series have wiping action and rotating cam alternate action, single or dual light, seven cap colors. \$2.00. CLAIRE-PENDAR Co. **291**

continued on page 54

"8" CHANNEL AUDIO CONTROL console

B-800 series

the B-801 monaural

\$2350

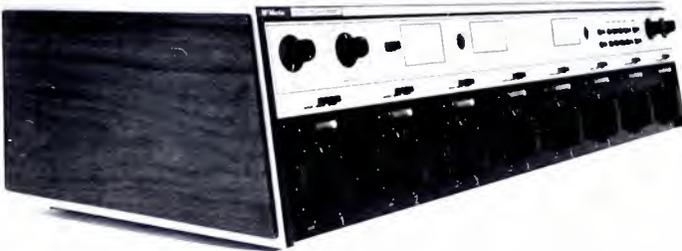
the B-802 stereo

\$3200

B-803 dual channel

\$2650

for complete information please contact: the Director of Sales Dept. B-80



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on. All "switching" is done automatically. Accurate time control predetermines wide range of timing intervals available. The time duration (or delay) is adjustable from 0.1 seconds to as long as 30 minutes, depending on your application. There are many more features that make the compact 553 A/V AUDIO/VIDEO AUTOMATIC LINE PROGRAM ALARM valuable in audio/video monitoring and control applications.

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Canon Sound Scoopic 200



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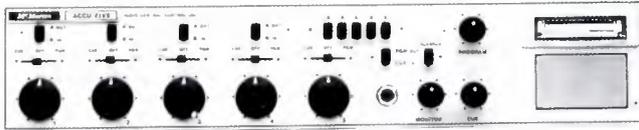
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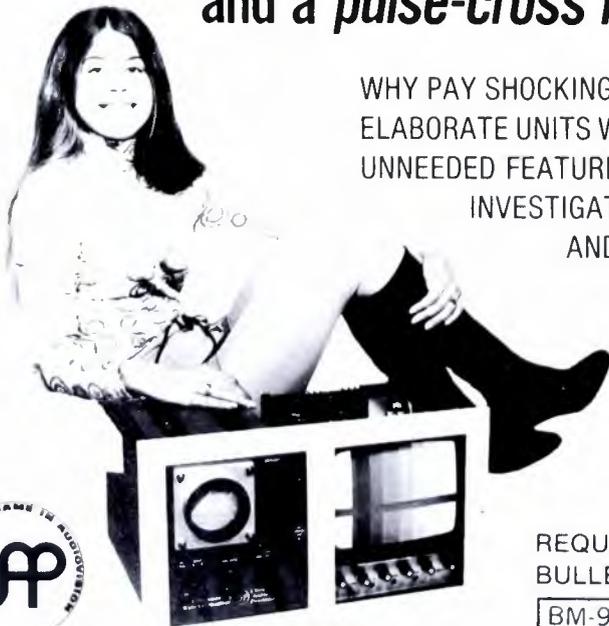
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PRODUCTS

Color video monitors consist of modified Sony Trinitron color receivers. Models are available with 9-, 12-, 15-, and 17 in. screens with



BNC looping input connectors, power-line isolation. VIDEO AIDS CORP. OF COLORADO. **278**

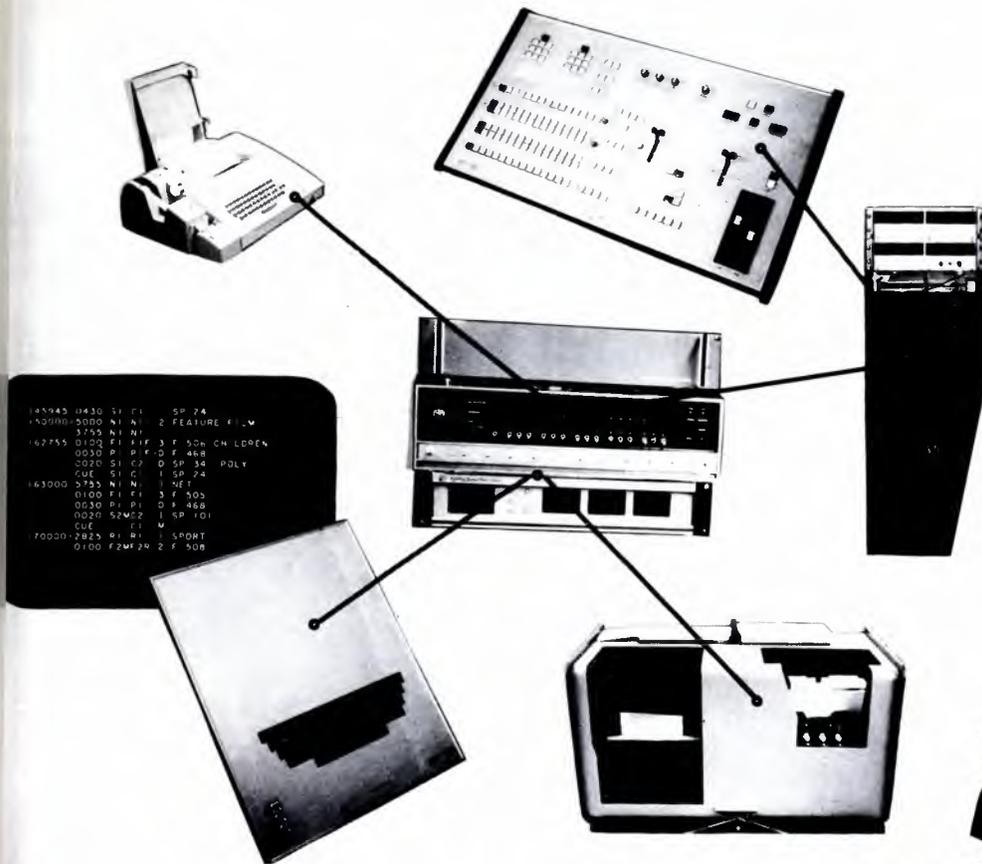
Open-reel tape deck has three motors, 7½ and 3¾-ips speeds, pushbutton controls. Model 407A provides automatic reverse (with sensing strips), sound with sound, sound on sound, line and mike mixing. \$459.95. ASTROCOM. **292**

Large "scoop lamp" is tungsten-halogen design for TV and movie lighting. Model Q1000/PS52/4 is 13 × 6½ inches, has 1000-watt rating, is frosted, produces diffuse shadows. It fits standard 16- or 18-inch scoop reflectors and can be burned in any position. Under \$20. GENERAL ELECTRIC. **310**

CATV drop cables have 97% braid shielding of copper-clad aluminum. Braid-shield cables have copper-clad steel center conductors, and are available with solid or foam polyethylene dielectrics, PVC or polyethylene jackets, with or without integral steel messengers; also in single or dual construction, in RG-59, RG-6, and RG-11 sizes. CERRO WIRE AND CABLE. **311**

Bias tap allows introduction of DC voltage on RF signal line with maintenance of well-disciplined 50-ohm impedance. Model FTP-07 mates with BNC connectors, has 1.25/1 VSWR, and maximum insertion loss of 0.5 dB. AMERICAN ELECTRONIC LABORATORIES. **312**

Zippertubing material shields cable over full 360 degrees from RFI and electrostatic interference. Type ZRP-SH is constructed flat; it is placed around cables and zipped closed; it can be unzipped at any time for access. Material is 3-mil aluminum foil laminated to 8-mil vinyl. ZIPPERTUBING Co. **313**



CDL series 610 automation

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145943 0430 SI CI 5P 24
150000 2000 NI NI 2 FEATURE FILM
3755 NI NI
162755 0100 FI RIF 3 F 50% CH LDREN
0030 PI P F 2 F 488
0020 SI C2 0 SP 34 POLY
CUE SI C 1 SP 24
163000 2720 NI NI MET
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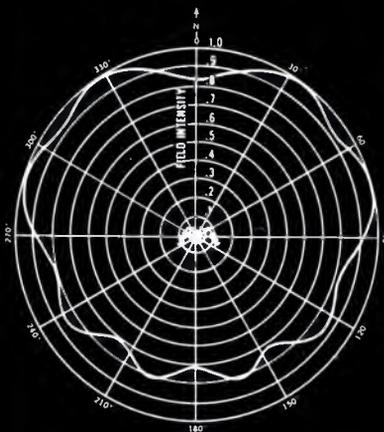


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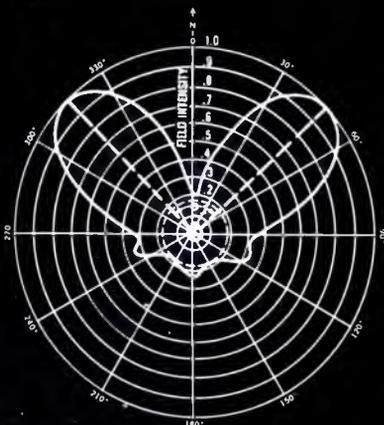
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NEW LIT

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

Short-form **potentiometer catalog** lists trimming, precision, conductive plastic, and other potentiometers, switches and multidials. Spectrol Electronics. **200**

Oscilloscope accessories, including probes, camera systems, trolleys, cables, plugs, etc., are described in full technical detail, with charts, application notes. Phillips. **201**

Product bulletin shows **automatic dialing devices**, from single address dialers to units capable of 66 eight-digit or 44 fourteen-digit addresses. G-V Controls. **202**

Catalog gives full technical data on **function generators, waveform synthesizers, digitally synthesized generators**. Exact Electronics. **203**

VR-420 videotape recorder, a half-inch closed-circuit model, is covered in new data sheet. Ampex. **204**

A 30-page catalog shows **RFI shielding materials**, including conductive gaskets, adhesives, and compounds, and a conductive heat-shrinkable cable shield. Chomerics. **205**

How to lay out an airlink CATV system gets full explanation in booklet, including criteria for site selection, antenna siting, power, and other technical aspects, as well as frequency requirements, cost factors. Laser Link. **206**

A 16-page catalog covers **custom van interiors** and equipment for use in customizing vans. Crown Steel Products. **207**

Miniature phone jack coupler is subject of data sheet. Switchcraft. **208**

Push-to-print recorder which makes hard copies of voice-band-television, with a maximum frame rate of eight seconds, is described in new technical data sheet. Alden Electronic and Impulse. **209**

Application bulletin for **telephone coupling transformers** includes gen-

eral background on telephone line characteristics, as well as on connecting modem equipment or other types through coupling transformers. Microtran. **210**

Electronic editing systems for video quadraplex recorders are described in 12-page brochure, which includes extensive general background on electronic editing. Electronic Engineering of California. **211**

Audio/video receivers for feeding TV monitors, CATV headends, VTRs, etc., are the subject of a new data sheet giving full technical information. Conrac. **212**

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serts between local, i.e., non-composite camera or VTR signals driven from a common sync generator. But the big advantage of the Quad Monitor system is that it can handle four video signals being driven by four different sync generators at four different locations. For example, the four segments might include anchorman Cronkite in New York City, live video from the Moon, a guest expert in Washington, and video from Mission Control in Houston. As you probably noticed during Apollo 16, the four-way split is useful for such situations where several people are discussing action occurring elsewhere—even at more than one location.

Just prior to the 1970 elections, CBS production people asked Hy Badler of the Studio Shows Division if a four-way split screen could be developed. The result was an array of four Sony monitors which had been physically modified so the pix-tube faceplates were as close together as possible. While that ar-

angement worked, it wasn't satisfactory. For one thing, there were video level shifts from one screen to another. The World Video monitors and the plastic lenses have solved the problems, and dc clamp circuits hold video levels so the final transmitted picture is amplitude and black-level constant across the entire frame.

In practice, one studio camera is assigned to the Quad Monitor, whose inputs are crossbar-switched in the control room. It's possible to "take" the Quad Monitor camera, putting all four pictures on the screen instantaneously. It's also possible for the cameraman to zoom in on any one of the four monitors, as a production technique for getting back to a single picture. Furthermore, he can zoom in still farther on a single monitor, thereby achieving a blowup of a remote picture. That is, suppose CBS is carrying pool video and cannot order the pool camera to zoom in. By using the Quad monitor, the CBS director can get a closer shot. Of course, resolution is degraded due to the monitor-to-camera conversion, but this can be tolerated briefly for a special effect.

News In Brief

Eastman Kodak Co. is sponsor of a five-part TV series, "The Life of Leonardo Da Vinci," which began on the CBS Network August 13 . . . **SC Electronics** of St. Paul has expanded into the Canadian market by appointing Advance Industrial Electronics distributor in Western Canada, Whittaker Electronics in Eastern Canada . . . **EIA** reported **color sales to dealers** up 21.1 percent in first half of 1972 over same period in 1971 . . . and **TVB** says that **June advertiser investment** in network television was \$121 million, up 7.9 percent over June 1971.

Zenith Radio Corp. sold its assets, inventory and technology in the night-vision business to a group of former employees who set up as **Night Technology Corporation** with headquarters in Niles, Illinois . . . **Dyma Engineering**, Taos, New Mexico, announced sales of its second-generation automated consoles to **KTRH**, Houston; **KFDI**, Wichita, and **WBEN**, Buffalo . . . **Jerrold Electronics** obtained contracts from **TM Communications** for turnkey construction of five Florida cable systems.

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Office of Communication, United Church of Christ and a number of affiliated groups in Boston withdrew an objection they had filed with the FCC to license renewal for WBZ-TV; original objection had been to alleged discrimination in station's hiring, but groups were satisfied by station's showing of "improvement"

Hewlett-Packard will offer about 300,000 shares of its common stock, proceeds to go to certain beneficiaries of gifts made by David Packard.

SMPTE will have a Technical Conference at the Century Plaza Hotel, Los Angeles, October 22-27, with five-day technical program and 12-booth exhibit area; info from 9 East 41st Street, New York 10017.

CCA Electronics shipped four 1 kW AM transmitters and related studio equipment to stations damaged in floods: KKLS, Rapid City, South Dakota; WYPR, Danville, Virginia; WLMD, Laurel, Maryland; and WENY, Elmira, New York . . . **Wonetco Enterprises, Inc.** reported half-year earnings up 21 percent to \$2,795,538 on sales of \$49,824,803, up from \$45,370,410 a year ago.

Ampex Corporation announced the beginning of deliveries of the WYPR-7900 closed-circuit VTR with time base corrector, against an or-

der backlog of about \$1 million . . . **Trans-World Communications**, hotel tele-movie outfit, will install its system in **Rodeway Inns**, a motor inn chain with more than 100 locations; and also in nine **Loews Hotels** in New York, Florida, and Washington, D.C. . . . **AEL Communications Corp.** appointed Southern Telephone Supply Co., Atlanta, as southeastern distributor.

Precise Power Co. of Bradenton, Florida, manufacturer of frequency-precise rotating generators, bought all the stock of **Lampkin Laboratories**, maker of frequency and modulation meters . . . **Office of Education, HEW**, announced that more than \$4 million had been granted to help establish or improve 33 non-commercial radio and TV stations, bringing the total grants for the current fiscal year to \$13 million, with 69 grantees.

People

Del Vaughn, news anchorman on the CBS radio network, died June 26 when the helicopter in which he was inspecting the flood areas in Pennsylvania fell near Harrisburg. Also killed were **Sid Brenner** and **Lew Clark**, of station WCAU in Philadelphia, and the pilot, Sam

Sedia . . . **Marshall Henderson** has been appointed midwest regional manager and **Robert L. Black** manager of the Robinson, Illinois, cable system of **Cox Cable Communications**, Atlanta-based MSO . . . **James Hawley** joins **ADC Products, Inc.** as product manager for communications test systems; he was formerly industrial marketing manager at Honeywell . . . **Peter Odell** will be manager of the new **Cherry Electrical Products** subsidiary being set up in St. Albans, England.

Murray Cunningham has joined L-W Photo, Inc. of Van Nuys, California, as director of marketing; he was formerly regional sales manager for Bell & Howell . . . **Bob Inman** is the new assistant news and information manager of WBTV, Charlotte, North Carolina.

John Hokin was promoted to sales manager of the Chicago office of RKO Radio Representatives . . . **Steed Richards** will be associate producer-director for Starr's Professional Programming studios in Miami, Florida.

James G. Babb Jr., has been named vice president for television of the Jefferson Standard Broadcasting Company, and general manager of that firm's Charlotte, N.C., station, WBTV. **BM/E**

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CROSSTALK

Feedback on Videotape Editing Report

The July issue of *BM/E* featured four articles on videotape editing: an overview; KTLA's use of the Datatron system; a description of the SMPTE 80-bit code, and the EECO system; the role of the computer as represented in the CDL system.

This issue has drawn comment from both readers and manufacturers, and we present some of the reaction. Michael Fisher of ABC comments on a problem not covered: the need for standards on interface equipment (see letter). W. O. Fordiani of EECO is perturbed over what he views as excessive commercialism in the KTLA article and a possible misleading impression that might be gained (see letter).

Another manufacturer, Dynasciences Corp., was disappointed that the issue did not discuss another class of equipment which does not use time code generators but which does contain a memory and control circuitry to enter "starts" and "ends" for material to be inserted into the record tape.

This editor-programmer made by Dynasciences also controls the start transfer point on the playback tape. Both record and playback tape edit points can be previewed before record takes place. This equipment, priced at \$3000, may be all that an educational or industrial tape producer needs. The equipment works with one-half-inch helical scan or quad machines. Another source for a low-cost editor that produces a transfer pulse is Video Aids of Colorado.

Fisher on need for interface standards

"I have read with interest the various excellent articles on videotape time-code editing in the July issue of *BM/E*. I am writing you this letter to point up a very real problem that exists in time-code editing. A production house or TV station performs many types of editing from simple inserts to complicated program editing. It will not be unusual to see one or more types of editors in the same plant.

"As you know, all of the editing systems control the videotape machine. Each of the manufacturers of editing equipments have what they call a "VTR

Interface." These interfaces range in price from several hundred dollars to a few thousand dollars, and each one is different. Just as our industry has standardized on the SMPTE videotape time-code, there is a need for a videotape recorder standard interface. Some of the reasons for this standardization are: 1) The manufacturer could install the interface in the tape recorder while it is being built; 2) videotape recorders may be interchanged in a plant without rewiring; 3) the interface could be used on helical or cassette machines; 4) with two or more types of electronic editors, in order to use any of the tape machines with different editors, each machine will require two or more types of interface which is expensive and probably unreliable.

"I would like you to publish this letter to bring this problem to light and to get the opinion of other electronic editing users as to how and when we can adopt a standard interface common to the whole industry."—M.T.F.

Fordiani on possible misleading impression

"As happy as we are to see *BM/E*'s July issue feature electronic editing of videotapes, and the kind mention of EECO's special commendation, we are deeply distressed by certain general aspects and specific inclusions that can be very misleading to your readers.

"EECO's article was submitted on the premise that the issue would feature the basics of electronic editing without undue commercialization. Our article is not only obviously eclipsed by the adjoining heavy product-selling copy, but our product image is degraded by advertising-testimonial type copy.

"Most disturbing to us was the boxed article on page 10 attributed to Mr. Silva. These comments seem to negate EECO's capabilities with about 175 words. The EECO equipment that compares to the Datatron unit is not just "early," it is three generations removed from current EECO units.

"A normal reader's impression can too easily be that EECO pioneered electronic editing, but dropped the ball to "progressive" companies with new state-of-the-art capabilities. Actually nothing could be farther from the truth. In electronic editing equipment built for OEM as well as EECO systems, our company has: . . . produced more electronic editing systems that are now in successful

operation than all other electronic editing system developers combined; . . . produced the first units to use the SMPTE Edit Code, and includes keyboard entry, arithmetic-free, automatic single-glide preroll parking (with "sit-down convenience" if desired). TTL/MSI and many other state-of-the-arts improvements; . . . now offers the widest selection of electronic editing equipment on the market—including units that reliably synchronize two or more tapes with either "drop frame" or "non-drop frame" edit code formats which assure edit scenes exactly as previewed, with accuracy to a single frame, and with easy automatic sequencing.

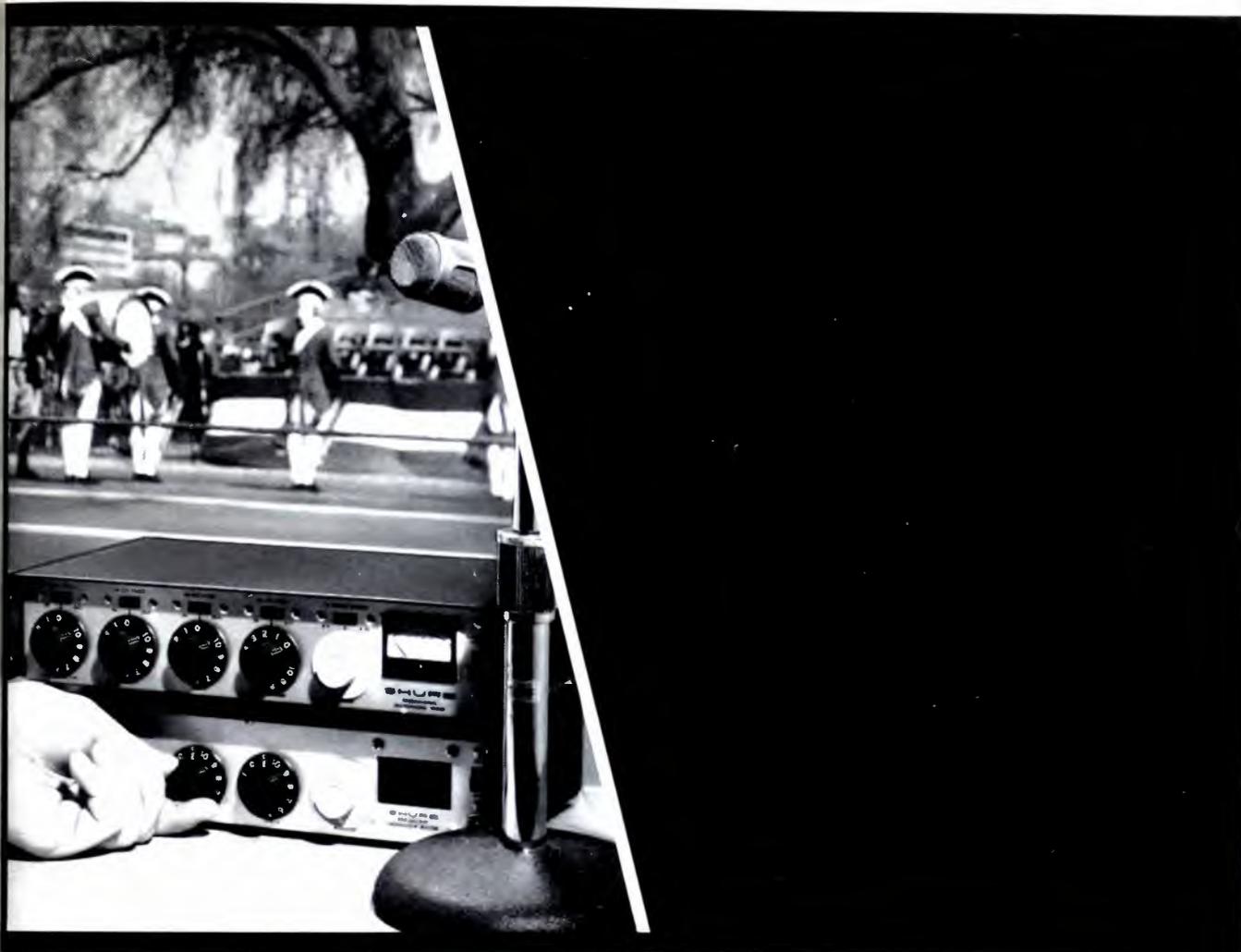
"The editing of almost all major network shows, as well as significant commercials, now use EECO-produced editing electronics.

"We hope that helpful, unbiased analysis, that obviously won't appear in brand advertisements, will appear in future editorial pages. For example one of the basic choices that future users must make is between modular systems, computer-centralized systems, and building-block systems that can use either computer input, tape entry, memory storage, or simple hand-set entry. There are specific advantages in favor of each type of system and readers should appreciate a clear, unbiased view of these.

"We've also found that many broadcast people are not familiar with the basics of the digital electronics used in electronic editing. We are preparing literature about the SMPTE edit code itself as well as its applications in synchronizing audio and videotapes.

"We'd certainly appreciate some contra-action to what we feel is an unfair, misleading, and harmful impression of EECO and its electronic editing products."—W.O.F.

Editor's note: *We obviously didn't assume, as does Mr. Fordiani, that the normal reader will conclude EECO makes obsolete equipment. We thought Mr. Silva's reference to an early model clearly implied that there were later models using state-of-the-art integrated circuits. Mr. Silva intended no testimonial of Datatron, nor any knock of EECO—the material was written as historical perspective. The Datatron model became available in 1969 and was the first "second generation" equipment available.* **BM/E**



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continued on page 64

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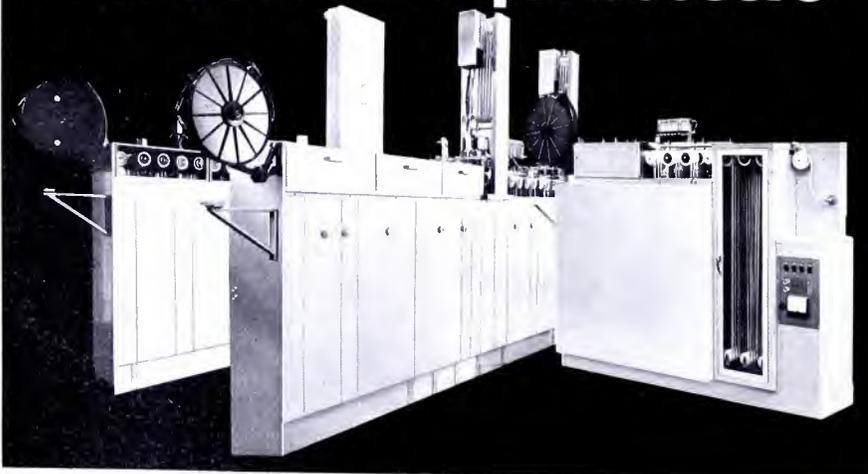
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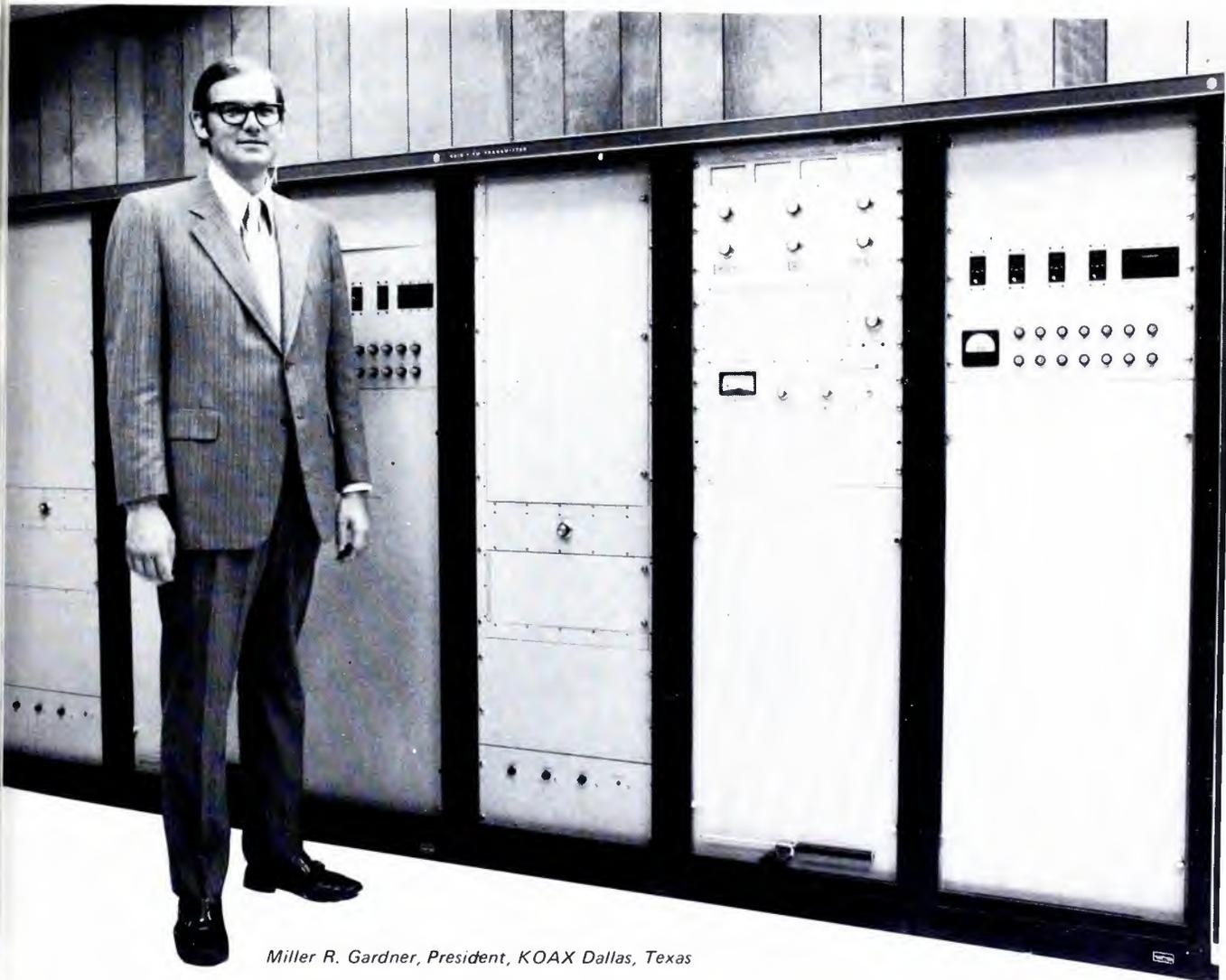
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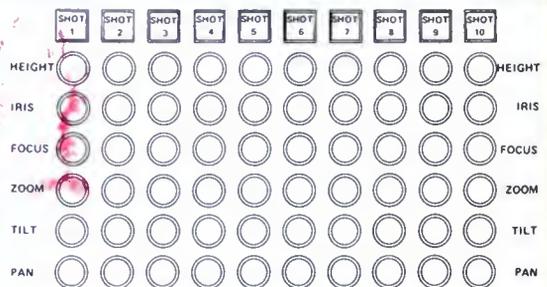
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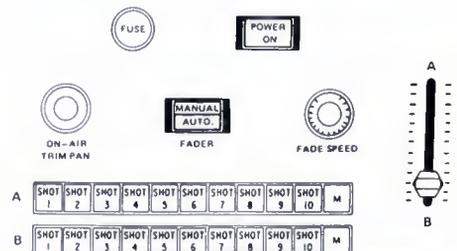
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