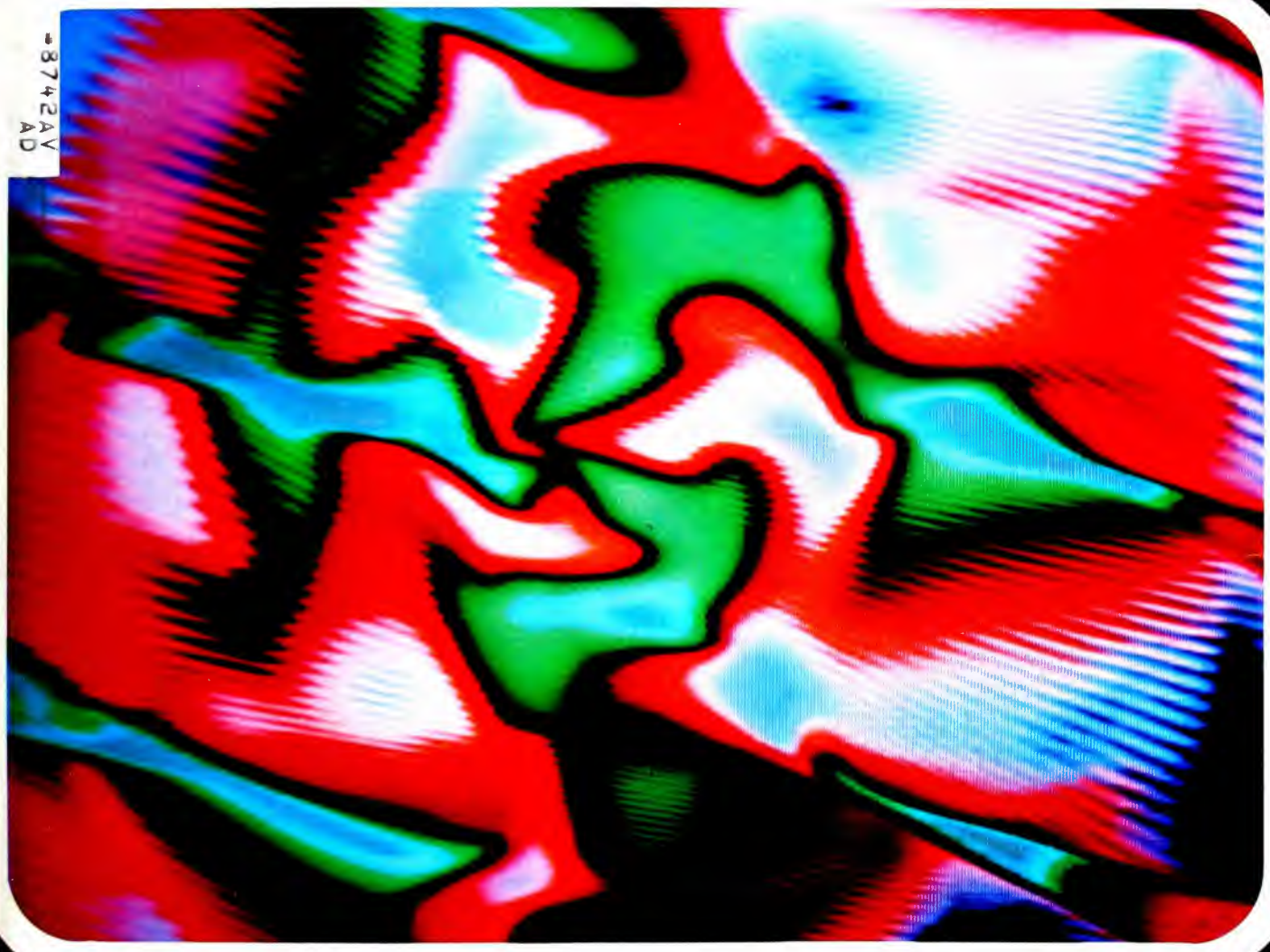
JUNE 1973

BM/E

BROADCAST MANAGEMENT ENGINEERING



Is it pop art? See video production techniques report.

Also NCTA convention preview.

We'll help you fill in the wide open spaces.

If you're planning a microwave communications system, talk to us. We'll take care of path engineering, frequency selection, and construction. And we'll provide you with the finest equipment available. Ours.

After all, we've been making microwave components and subassemblies for more than twenty years. And since we entered the communications systems business, we've delivered 1500 systems in 43 countries.

Write, and we'll send you a brochure describing our equipment and capabilities.

MICROWAVE ASSOCIATES

Microwave Associates Communications Equipment Division, Northwest Industrial Park, Burlington, Mass. 01803 (617) 272-3000

We're Microwave Associates. We know how.

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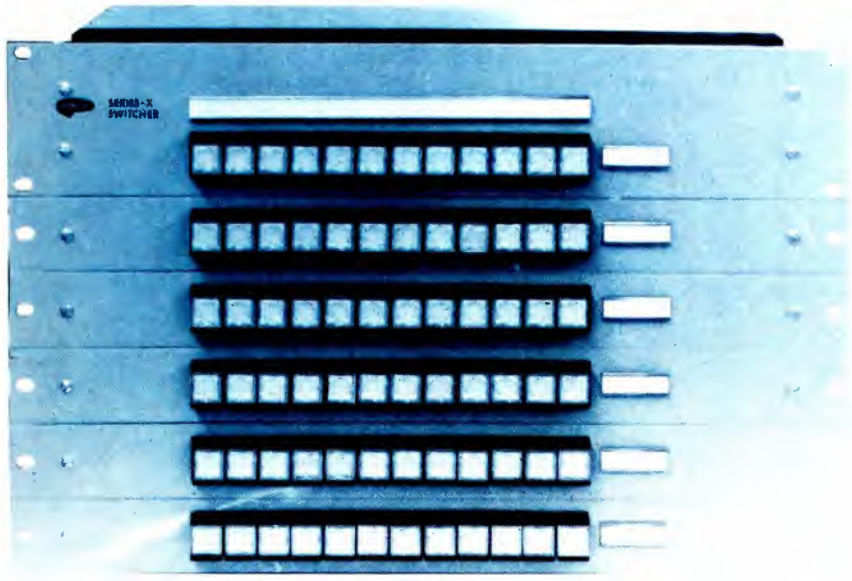
New.



(Patch Cable Eliminator)

Now you can forget about messy patch cables and the tedious task of re-patching to change distribution. DYNAIR's new Series-X Switchers eliminate the costly custom fabrication usually required for routing switchers. These units are totally modular, allowing off-the-shelf assembly of almost any input-output configuration, either video-only, or audio-follow-video. And, expansion is easy too . . . you simply add input or output expansion modules as required. The switchers are field expandable up to 36 inputs and 120 outputs.

The basic unit is video only, with options including audio-follow, sync-mixing and tally provisions. Illuminating pushbuttons are standard, with provisions for easily labeling the individual inputs and outputs. The new Series-X provides exceptional performance at prices which are, in many cases, much less than the earlier version of the Series-X.

TYPICAL BASE PRICES			
Capacity	Video Only	Video and Audio	Panel Height
6 in, 3 out	890.00	1,140.00	7.0
12 in, 3 out	1,220.00	1,570.00	7.0
6 in, 6 out	1,550.00	1,950.00	12.25
12 in, 6 out	2,045.00	2,545.00	12.25
6 in, 9 out	2,210.00	2,760.00	17.50
12 in, 9 out	2,870.00	3,520.00	17.50
6 in, 12 out	2,870.00	3,570.00	22.75
12 in, 12 out	3,695.00	4,495.00	22.75

Other input/output configurations available. Options include terminated inputs, sync-mixing and tally provisions.

Master Switch Unit

Switch Expansion Unit

Wouldn't a Series-X Switcher solve some of your distribution problems? Write today for full details.

DYNAIR

DYNAIR Electronics, Inc.

6360 Federal Blvd., San Diego, Calif. 92114
Telephone (714) 582-9211

Have you seen "Video Switching Techniques"? ☐ Yes ☐ No
Have you seen "Video Transmission Techniques" ☐ Yes ☐ No
Please send information concerning Series-X Switchers ☐

NAME _____ TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

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BM/E
BROADCAST MANAGEMENT/ENGINEERING

JUNE 1973/VOLUME 9/NUMBER 6

This month's cover can be interpreted several ways. Some think it's a scrambled pay TV picture. Actually, it's TV looking at TV, as produced by Eric Somers, Creighton University.

VIDEO PRODUCTION TECHNIQUES

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NOW, SUCCESSFUL CHROMA KEYING THROUGH GLASS, SMOKE, AND OTHER TRANSLUCENT MATERIALS

GVG'S NEW 1600 SERIES SWITCHERS EMPLOY LINEAR ELEMENTS FOR CONTROL OF ALL KEY, WIPE, AND MIX FUNCTIONS. THIS NEW TECHNIQUE ESSENTIALLY ELIMINATES THE ABRUPT, SOMETIMES RAGGED, ARTIFICIAL APPEARING EDGES WHICH OCCUR WHEN KEY SIGNAL AMPLITUDES VARY AS A RESULT OF SHADOWS, REFLECTIONS, AND NOISE.

LINEAR KEYING, SOFT WIPE, ELECTRONIC VIGNETTE AND OTHER OPERATIONAL IMPROVEMENTS ARE STANDARD FEATURES OF ALL 1600 SERIES SWITCHERS.

THE GRASS VALLEY GROUP, INC.

SOLD EXCLUSIVELY IN USA BY GRAVCO SALES, INC.

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OVERSEAS - GRASS VALLEY INTERNATIONAL, BOX 1114, GRASS VALLEY, CA 95945, USA

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BROADCAST INDUSTRY NEWS

MDS Gets Big Send-off At Washington Demo

The new Multipoint Distribution Service (MDS) got a loudly-touted demo in Washington from Microband Corporation, firm which has won FCC licensing to use the system in Washington and in other cities. Pictures sent from a central transmitter and picked up on receivers at the demonstration, the 2150 to 2160 MHz band, were of high quality. Microband stressed the ability of the system to reach small "targets"—it provides a point-to-point service by scrambling transmission, using unscramblers at the chosen receiving points. Microband also claimed operating cost below that of other comparable systems, putting the cost per viewer of delivering a video program at $.53 for MDS, against $4.02 for Super 8 cartridge, $1.55 for a ½-inch to 1-inch video cassette, $2.65 for ½-inch to 2-inch videotape, etc. Microband has applied for licenses from some 35 cities. Tieing those cities (and others) together into a network, the obvious next step, has been assigned to Microband National System, an affiliated organization.

New Firm, Cablewave, To Make RF Products

A new company in the cable field is Cablewave Systems Inc., a joint venture of Phelps Dodge Industries and Kabel-und Metallwerke Gutehofnung-shuette, of Hanover, West Germany. Cablewave will make and sell many products for RF and microwave distribution, including coaxial cable, wave guides, rigid lines, delay lines, cable assemblies and connectors, as well as complete RF distribution systems. Headquarters is in North Haven, Conn.

Combined Communications, P. & S. Are Merging

Combined Communcations Corporation, Phoenix firm operating a number of broadcast stations, and Pacific and Southern Broadcasting Company, also a multi-station owner, said they would merge, subject to exchange of information schedules satisfactory to both, and stockholder and FCC approval. The announcement said that P. and S. would have to dispose of stations in Atlanta and Denver to win FCC consent to the merger. An exchange of stock will effect the merger.

Western Union To Operate China-U.S. Communications Link

Western Union International has entered an agreement with the People's Republic of China to set up a direct communications channel between Peking and the United States, with a telegraph link to be established as quickly as possible, R. P. Romanelli, president of WUI, has announced. The facilities will be expanded for telex, data, and leased channels later in the year. Western Union International served in China last year, during President Nixon's visit, through supplying the earth station for satellite transmission and reception there.

Channel 3, Jackson, Miss., Goes To Dixie Broadcasting

What might be the final disposition of a TV assignment that has been in and out of the FCC, and the courts, for more than five years came with decision by Judge Lenore Ehrig, in an FCC hearing, to award Channel 3, in Jackson, Mississippi, to the Dixie Broadcasting Corporation. As WLBT, with Lamar Life Insurance Co. as the licensee, the channel was the focus of one of the earliest renewal controversies, with opponents, led by the United Church of Christ, alleging that the station was sharply biased against its black audience. The FCC agreed to the extent of cutting the renewal to one year; the court of Appeals upset that, put WLBT on full renewal; the court later reversed itself, said Lamar could stay only until an interim operation was started, and directed the FCC to open the assignment to all comers. Five applicants, including Lamar, entered the contest; Judge Ehrig's decision will become the final FCC order in 50 days, unless an applicant appeals it.

Shibaden, Hitachi, Become One Company

The merger in Tokyo of Hitachi Electronics Co., Ltd., and the Shiba Electric Company, Ltd., has brought about a similar consolidation of marketing branches of the two firms in the United States. The new joint U.S. subsidiary, according to a company announcement, was named Hitachi Shibaden Corporation of America, effective April 1, 1973. It will market all product lines of the two formerly separate firms.

NAB Urges FCC To Keep Side Issues Out of Technical Study

The National Association of Broadcasters has petitioned the Federal Communications Commission not to consider, in the current inquiry into CATV technical standards, such other issues as non-duplication, federal subsidies, and fees. NAB based its position on the Administrative Procedure Act, which "prohibits adoption of any rule outside the notice of proposed rulemaking." NAB also pointed out that the non-duplication question had been settled in the agreement between broadcasters and cable operators a year ago.

African Firm Buys 12,000 Cassette Film TV Players

What appears to be a competitor for the new Eastman Kodak Super-8 Videoplayer (see page CM/E-6 of this issue) emerged in an announcement by the developer, Cassette Sciences Corporation of New York, of a sale of 12,000 units to Cassette Television, African marketing firm. The new machine, described as a Super-8mm TV film player, will get its first public demonstration in mid-May, after this issue goes to press. The maker claims advantages over the Eastman machine, including a maximum playing time of one hour against one-half hour, and a price of $495 against Kodak's $1195. The pertinence of the device to Africa lies in the lack of television service there (due in South Africa beginning in 1975), so that a film

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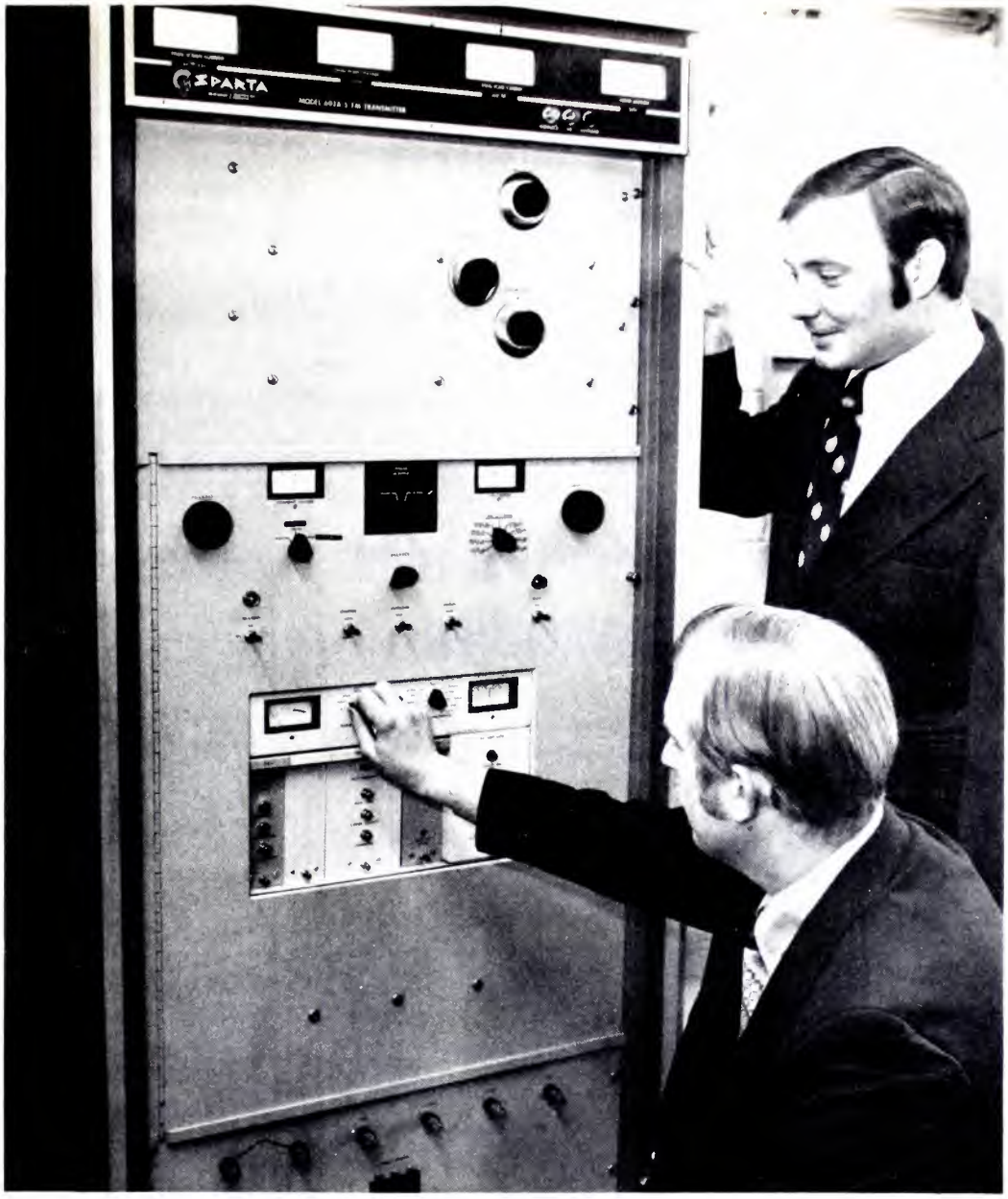

MILES ARE MEANINGLESS TO 'JUST RIGHT' SERVICE

Time was when Illinois and other Midwestern broadcasters were reluctant to consider equipment made 'way out in California. But times change. Sparta's reputation for 'just right' efficient and fast service has become *world wide.*

WRMN manager Rick Jakle (right) and Director of Engineering Hal Cattron (left) put their heads together with group station entrepreneur Joe McNaughton. Now sister stations WCRA in Effingham and WRMN in Elgin are Sparta-equipped. WCRA uses Model 701 AM and 620 FM transmitters, WRMN the Model 603A5 FM Rick and Hal are checking above. Plus famous Sparta studio equipment.

We measure TIME, not miles or meters. Sparta 'just right' service reaches out to beat deadlines for its friends on every continent. Just tell us your equipment needs and deadlines . . . we'll do the rest. Ask Rick and Hal.

SPARTA, the 'just right' company . . . small enough to be first name friends, big enough to supply EVERYTHING. Call us. Collect.

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ELECTRONIC CORPORATION
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A DIVISION OF COMPUTER EQUIPMENT CORPORATION

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videoplayer could, in effect, pre-sell the TV market.

Zenith Makes 10-Millionth Color Set

The Zenith Radio Corporation produced its 10-millionth color TV set in April, according to a company announcement. Joseph S. Wright, chairman, said that all 10 million sets have been made in the United States, and added that the policy of all-domestic production would continue. The company gave the set to President Nixon, who in turn gave it to a Veterans Administration hospital.

RCA Will Market Liquid Crystals For Clocks, Other Displays

RCA said in April that it would initiate full commercial production of liquid crystal displays for use on watches, clocks, calculators, and test and laboratory instruments. Design of several production models has been established, and an organization for manufacturing and marketing set up in Somerville, N.J. The liquid crystal displays will show numerals at the output of solid-state circuits, with very small power demand and what is said to be very high reliability.

Goldmark Asks USA-Canada Join For "New Rural Society"

Dr. Peter C. Goldmark, for many years Columbia's head innovator (the LP, EVR) and now heading Goldmark Communications Corporation, which is studying the effects of telecommunications on society, urged American and Canadian engineers to make a joint effort to help develop a new lifestyle in rural communities. In an address to officials of the Province of Manitoba, Goldmark said it was essential that new telecommunications technology be used to bring big-city education, medical care, and entertainment directly to rural areas, so millions of people could live happily and well away from the cities. Goldmark's group is now engaged in a pilot study of the feasibility of some of his concepts, in an area of rural Connecticut.

FCC Knocks Down Network Vertical-Interval Plan

The Federal Communications Commission has informed ABC, CBS, NBC and PBS that their proposal to use the 20th line of the vertical interval for program identification is "not authorized by existing rules." The networks, relying on earlier approval of use of the vertical interval by CBS for in-station identification, had agreed on a 20th-line system for broadcast signals that would provide a series of identification and control functions. The FCC pointed out that use of the vertical interval for a variety of purposes was under study and that the network proposal must "stand in line" while a comprehensive plan was worked out.

Schafer Auto Systems Set For New British Network

Capitol Radio, the London central station of the new British commercial radio network, will install a Schafer automation system for program control and production, James M. Cunningham, president of Schafer, said recently. The sale was arranged through EMI London, which represents Schafer in Britain and other countries outside North America. The system for the Lon-

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don station is the Schafer 903, a new model shown at the recent NAB Convention in Washington, D.C. Mr. Cunningham also announced that Schafer had sold more than $250,000 of equipment during the convention, and now has an order backlog of just under half a million dollars.

Report Gives Cable Job Descriptions

A new report, "Cable Television Manpower: Job Descriptions and Educational Requirements," issued by the U. S. Department of Commerce, gives 45 draft descriptions of technical jobs in cable. The Office of Telecommunications, Department of Commerce, prepared the report when it became evident that there were no widely accepted job descriptions for cable television. Designated "OT Report 73-2," it is available from National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22151, at "nominal cost."

Cox Broadcasting Sees Record Year, Asks License Legislation

At the ninth annual meeting of Cox Broadcasting Corporation, the president, J. Leonard Reinsch, told stockholders he expected higher earnings in 1973 than the record high of 1962, with the first quarter of 1973 showing a 10% revenue gain over the same 1972 period. He also strongly supported legislation before Congress that would extend the license period to five years, as an essential contribution to stability in broadcasting. Without some such reassurance, ". . . there is no justification for financial commitments totalling millions of dollars," he said.

Telco "Phone-Power" Program Helps Station Sell and Collect

A program of instruction for effective use of the telephone in selling advertising and in collecting past due accounts, developed by the Bell Telephone Company of Pennsylvania and called the "Phone Power Program," has greatly helped the staff of Station WTAJ-TV, Altoona, according to J. Thomas Conners, local sales manager. Mr. Connors said that with more and more TV adver-

continued on page 12

CP-16/A
(with Crystasound)

A Cameraman's Kind of Camera

Tired of the daily struggle with backbreaking body braces, unwieldy tripods, and heavy, poorly balanced cameras? Tired of dangling power and sound cables? Encumbered by quickly exhausted battery packs? Frustrated by a noisy camera movement? Annoyed with "tack-on" sound equipment? Feeling crushed under the weight of it all?

We, at Cinema Products, believe that we have designed a unified camera and sound system that will solve all of these problems.

Take backaches, for instance. Backaches may sound funny to some people. To a TV-newsfilm cameraman they're no joke. More and more TV-newsfilm cameramen have been reporting severe and crippling backache conditions as a result of carrying heavy and poorly balanced cameras, mounted on uncomfortable body braces, over many long hours.

The CP-16/A 16mm camera has been designed and specially balanced for convenient *on-the-shoulder* shooting. It weighs a little less than 17 pounds when fully equipped. And "fully equipped" means *fully*. With 400-ft. magazine loaded with 400 feet of film. With a 12-120mm Angenieux zoom lens. With a plug-in Nicad battery pack. With a critically accurate crystal-controlled DC servo-motor for single and double system sync sound. Plus the Crystasound recording system with built-in amplifier. That's right. Less than 17 pounds!

As for noisy camera movement problems, you've got to "not hear" the CP-16/A to believe how quietly it runs. Our sound tests show approximately 31 dB at 3 feet. But the real sound test is your professional ear, and the actual quality of the sound recording.

Out-of-sync problems? Our CP-16/A is crystal-controlled to the extremely critical tolerances required by *cordless* double system recording, with a frame rate accuracy of ±15 parts per million over a temperature range of 0° 140° F. And if something should go wrong, the easily visible out-of-sync warning lamp, located at the front of the camera, will instantly light up.

As for magazine capacity, the CP-16/A accepts standard 400-ft. and 1200-ft. Mitchell-type magazines, and we even designed a special locking stud so that magazines can be easily and instantly snapped on and off the camera.

Then there is the power supply problem. There are no lost shots with our rechargeable plug-in Nicad battery pack. It snaps instantly in and out of the camera body, and drives from 3200 to 4000 feet of film on a single charge. That's a lot of footage from a little battery pack which weighs a mere sixteen ounces. It is so compact – a spare, fully charged battery pack will slip easily into your shirt pocket. And it also powers the CP-16/A sound system.

Lately, more and more TV-newsfilm and documentary cameramen have had to "go it alone," with the responsibility of capturing *both* picture and sound. Designed and engineered from an overall total systems approach, our CP-16/A with Crystasound makes it seem almost easy.

The Crystasound amplifier is part of the camera, and it is powered from the same battery pack. Switchable, variable compression Automatic Gain Control let's you concentrate on filming the event. The headphone monitoring channel automatically switches from live mike to playback when the camera is turned on. We've even provided a special line feed to a tape recorder for those instances where the cameraman is recording simultaneously for TV and radio. The built-in amplifier has two microphone inputs and one line input, all with independent volume control. Other features include automatic bias level, with no adjustment required, preview switch, VU meter, and low power consumption.

Our Crystasound recording system features a special record and playback head, encapsulated in the same module to guarantee absolute alignment for its entire life.

Should you need an auxiliary mixer, our Crystasound auxiliary mixer features: four channels of mike input, one channel of line input, and one condenser mike channel. It also features individual and master volume controls as well as switchable AGC.

For the TV-newsfilm cameraman, the name of the game is lightweight, extremely mobile and reliable equipment, so that he can capture the spontaneous *live* feel of a news event as it happens. We are confident that the CP-16/A provides just that.

With no backaches.

For further information, please write to:

SYSTEM CP-16

cinema products CORPORATION

Technology In The Service Of Creativity

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Telephone (213) 478-0711 ■ Telex 69-1339 ■ Cable Cinedevco

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tising coming from local sources, the telephone has become increasingly important to local sales staffs especially when a station covers a large geographical area, as does WTAJ-TV.

EIA To Resume Work On Engineering Standards

The Electronic Industries Association has reactivated an engineering standards committee on broadcast equipment, under the chairmanship of Charles W. Rhodes of Tektronix, Inc. The committee, designated TR 4.4, will first work on updating EIA #RS-170, "Monochrome Television Studio Facilities," then go on to a number of color television standards. First meeting since 1967 will be on June 13 this year. Interested parties should write to Mr. Rhodes at Tektronix, Inc., P.O. Box 500, Delivery Stop 39-310, Beaverton, Oregon 97005.

MPL Seminar To Be Held July 21 in Memphis

Motion Picture Laboratories of Memphis will hold its 15th annual seminar on July 21 at the Memphis State University Center. It is a joint session with the Nashville Section, SMPTE, and is open to anyone interested in motion pictures. Address: F. M. McGeary, president, Motion Picture Laboratories, Box 1758, Memphis, Tennessee 38101.

General Cable, Elia, Join For Buried Cable Installation

General Cable Corporation and the Elia Corporation of Scranton, Pa., announced formation of a joint enterprise, General Cable Elia Corporation, which will specialize in buried cable installations. The new firm offers to take over the entire job, from survey to final connection, of putting cable systems underground for CATV or other applications. Headquarters is at 817 Prescott Ave., Scranton, Pa., 18510.

EIA Market Report Ready: Shows 1972 Sales at $30 Billion

Electronic products sales in 1972 reached the record figure of $30.6 billion, according to the annual Market Report issued by the Electronic Industries Association. Every category of electronics sales was up from 1971, when the total was $27.9 billion, with consumer electronics showing a 19.5% increase to $6.6 billion. The 100-page report, presenting detailed breakdowns, statistical analyses, and market descriptions, is available from EIA, 2001 Eye Street, N.W., Washington, D.C. 20006, at $15 a copy.

Maze Opens New Plant With Audio Seminar

The Maze Corporation, started six years ago in Birmingham, Alabama, celebrated early in June the opening of a greatly enlarged plant, built to accommodate what the company calls the largest independent supply operation in the U.S. for new and used broadcast and recording equipment. The new plant has 6000 square feet of warehouse space, 12,000 square feet for expansion, a tuned-studio showroom for recording equipment, as well as shop and lab facilities. Part of the three-day "grand opening" was an audio seminar, with experts from around the country discussing quad recording, automated mixdown, reverb theory, and other main topics in recording technology.

continued on page 14

Before you buy microwave or multiplex, see what Farinon has to offer.

Farinon microwave systems

FREQUENCY BAND	CHANNEL CAPACITY					
	6/24/36	60/120	300/420/600	1200	1500/1800	VIDEO
890–960 MHz	SS900W	SS900W	—	—	—	—
1700–2300 MHz	TR2000	SS2000W	SS2000W	—	—	—
	FM2000	FM2000	FM2000	—	—	—
2450–2500 MHz	TR2500	—	—	—	—	—
3700–4200 MHz	SS4000	SS4000	SS4000	—	—	SS4000
	FM4000	FM4000	—	FM4000	FM4000	FM4000
4400–5000 MHz	—	—	SS4500	—	—	SS4500
5925–7125 MHz	—	—	SS6000	SS6000	—	SS6000
	—	—	FM6000	FM6000	FM6000	FM6000
7125–7750 MHz	—	—	SS7000	SS7000	—	SS7000
	—	—	FM6000	FM6000	FM6000	FM6000
10550–11700 MHz	—	—	SS11000	SS11000	—	SS11000
11700–13250 MHz	—	—	SS12000	SS12000	—	SS12000

Narrow-band radio

FREQUENCY BAND	CHANNEL CAPACITY
	6/12 24/36/60
72–108 MHz 132–174 MHz 216–328 MHz	PT80 PT150 PT300 TR300
400–470 MHz	PT400 TR450

Multiplex

Type LD3 — A very flexible system to provide up to 60 voice or data channels on light-density routes at minimum cost.

Type FC — A universally usable system meeting all Bell system and international standards. Master-group terminals and supergroup converters are available, as well as terminal configurations for light and medium density routes.

Farinon Electric, 935 Washington St., San Carlos, California 94070 (415) 593-8491
Farinon Miltech, 166 San Lazaro Ave., Sunnyvale, California 94086 (408) 732-3921
Farinon Electric of Canada, Ltd.

Farinon

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NEWS

'Chicago Guide' Circulation, Ads, In Sharp Rise

Monthly magazine *Chicago Guide*, published by station WFMT, Inc., reported circulation up 50% and advertising up 62% for the last six months, compared with the year-earlier period. The magazine carries as many as 3000 critical listings of current events, movies, restaurants, etc., in each issue, plus several feature articles. Management says its ad cost of $9.35 per thousand is lower than that of most "class magazines."

Jersey FM Station Floods Phone Circuits with Contest

To celebrate an ARB showing that it had the top audience draw of any FM station in the area, WHDA-FM, Dover, N.J., put on an audience contest on April 2 that flooded phone circuits, and left station management happy. More than 5300 calls came in, spurred by the $800 in prizes the station put up. The station's ID, "Mostly Music," was changed temporarily to "Mostly Fool's Day—One Day Late."

VidExpo Will Run Sept. 4-6 At New York's Plaza Hotel

The third VidExpo, sponsored by the Billboard Company, will run September 4 through 6 at the Plaza Hotel, New York City, an announcement from Stephen Traiman, general chairman, said in April. The talk sessions will be focussed on management communications, and pro training and specialized applications. Product exhibit still accompanies the show. Information: VidExpo 73, Billboard Publications, 1515 Broadway, New York, 10036.

Stations Swap Channels, With Benefits To Each

Undoubtedly one of the rarest kind of assignment action, a direct swap of channels, has recently put educational station WDCN-TV, Nashville, on Channel 8, while General Electric's WSIX-TV, formerly on Channel 8, took over the vacated Channel 2. Far from being a simple case of "greener grass," the swap gives each station broadened coverage among the viewers it aims for. The FCC approved the exchange.

Financial Briefs

Metromedia Inc. reported record

continued on page 62

DL42

It does more than just reach.

It helps you to better sound. Every take. Every day. Anywhere.

Since 1962 when the E-V odel 642 earned an cademy Award certifi- ate for contributions to otion picture sound, there have been lot of attempts to better this pioneer- g design.

Admittedly, some similar-appearing icrophones were lighter and a bit naller. But often it was at the ex- ense of uniform polar response and ide range. Now there's a long reach icrophone that's both smaller and ghter, yet maintains wide range re- ponse even off mike.

It's the E-V DL42.

Weight has been reduced to 1/4 of e 642... even less than most highly- rectional condenser microphones. nd size has been shaved wherever ossible. The DL42 is a unique com- nation of line microphone (at the gh frequencies) and cardioid micro- phone (at low frequencies where a line microphone must be very long). The combination has been chosen to provide uniform polar response, so important to consistent sound quality. Off-mike pickups even sound good (although lower in level), a particular advantage to documentary units and free-wheeling shows where the unex- pected is always happening.

The good pickup quality off axis has another practical benefit in the studio. Because maximum rejection is at the sides (where most of the noise comes from) you can work at a remark- able distance when necessary. So when a long shot is called for, the DL42 can be moved upward and cover the entire area with good quality and level. In fact the DL42 is more like a *super*- super-cardioid. And it covers with less racking and panning of the micro- phone than you ever needed before.

But rather than just read about the DL42, we urge you to try it yourself. Ask any of our cooperating sound distributors to lend you a DL42 to try on your next production. No cost or obligation to serious professional users. Write today for a DL42 technical data sheet. Good reach with good sound. We think you'll like what you hear.

Electro-Voice®

a Gulton COMPANY

lodel DL42 Cardiline® Dynamic unidirectional microphone including shock-mounted bail, noise-isolating coil cord, screw-on handle for hand-held use, Acoustifoam™ 2-piece windscreen, and carrying case, $300 suggested professional net.

ELECTRO-VOICE, INC., Dept. 631EM, 614 Cecil Street, Buchanan, Michigan 49107

INTERPRETING THE **FCC** RULES & REGULATIONS

New Broadcast License Renewal Rules

By Frederick W. Ford and Lee G. Lovett
Pittman, Lovett, Ford and Hennessey
Washington, D.C.

In a recent "Interim Report and Order" adopted and released in early May, the Commission moved to streamline broadcast license renewal procedures and improve communication between licensees and the public they serve during the license period. In the main, the "Report and Order" changed certain requirements re 1) license renewal applications, 2) public notice and public announcement of licensee obligations, and 3) Annual Report compilations. These Rule changes were proposed in a Rulemaking Notice issued in February 1971. As both the new Annual Report forms and the Revised TV Renewal Application forms are subject to approval by the Office of Management and Budget, the instant renewal Rules will *not* take effect until such approval is granted.

License Renewal Applications

For purposes of providing community groups "ample time" to examine renewal applications and to "discuss" any problems with the licensees and file applications to deny, the Commission now requires applications for license renewals to be filed *four* months in advance of the expiration date instead of three. *Exceptions:* Renewal applications for "experimental" or "developmental" stations shall be filed at least *two* months in advance of the expiration date. The first group of licensees to which the new filing dates will apply will receive *eight* months advance notice. Toward the end of cutting down on the volumes of materials it receives each year in support of renewal filings, the Commission was also moved to *streamline* the Renewal Application forms. Page limitations have been imposed on what can be submitted, and the open invitation to send in more on current forms has been eliminated.

Petitions to *deny* renewal applications must be timely filed at least *one month* prior to the expiration of the license. Time extensions will not be granted unless all parties, including the renewal applicant, agree to the request, or unless the petitioner makes a "compelling showing" that the extension is warranted because of "unusual circumstances." Applicants may file an opposition to a "Petition to Deny" and petitioner may file a reply to same so long as such is supported by an affidavit of a person or persons with personal knowledge of particular facts. Opposition petitions may be filed within *30 days* after the "Petition to Deny" is filed; replies to oppositions to petitions may be filed within 20 days after the opposition is due or within 20 days after the opposition is filed, whichever is longer.

The Rules also specify the nature and frequency of *announcements* notifying the public of forthcoming renewals. In general, the operator must make twice-monthly announcements to inform the public of the impending renewal and how members of the public can file comments with the Commission. An old Rule requiring stations to publish notice of their renewal applications has been dropped. The Commission is also going to require stations to keep in their public files all the comments received from the public.

More specifically, the Commission has detailed two separate, but similar, announcement forms to be broadcast by all applicants for renewal during the periods from 1) six months prior to the expiration of the license to the renewal application date, and 2) from the application date (presumably four months

continued on page 18

You can save a big piece of your bleach costs and a small piece of our environment

with the Hunt Cine Color Bleach Regeneration System.

Would you believe over a 20% saving on bleach costs? You should, because Hunt has developed the unique, low-cost Hunt Cine Color Bleach Regeneration System. It's reliable, easy to use and completely free of complicated procedures.

The system is based on reuse of your Hunt Cine Color Bleach overflow. By restoring the active bleaching agent. And that means your need for "new" bleach is drastically reduced.

Pollution abatement is another valuable benefit you get from the exclusive Hunt Regeneration System.

Professional laboratories and TV news departments will probably find that the most satisfying part of the Hunt System is its simplicity. All you need is a collection tank for the bleach overflow, the Hunt Cine Color Bleach Test Kit and Bleach Regeneration Chemistry.

This "uncomplicated," low-cost bleach regeneration system is only one reason why you should join the ranks of professionals using Hunt Cine Color Chemistry for processing Ektachrome films.

If you want to do something about lowering your bleach costs, and saving a piece of the environment, you should call a Hunt branch or sales office.

MANUFACTURING CHEMISTS · HUNT · ESTABLISHED 1909

Imaging Specialists in Photographic and Platemaking and Reprographic Chemical Systems

PHILIP A. HUNT CHEMICAL CORPORATION

PALISADES PARK, NEW JERSEY · PHILIP A. HUNT COMPANY (CANADA) LTD. TORONTO

FCC Rules & Regulations

continued

prior to the expiration date) to the expiration date. The specific announcement to be made for the latter period, i.e., from the application date to the expiration date, reads as follows:

> On *(date of last renewal grant) (station's call letters)* was granted a three-year license by the Federal Communications Commission to serve the public interest as a public trustee.
>
> Our license will expire on (date of expiration). We have filed an application for license renewal with the FCC.
>
> A copy of this application is available for public inspection during our regular business hours. It contains information concerning this station's performance during the last three years and projections of our programming during the next three years.
>
> Individuals who wish to advise the FCC of facts relating to our renewal application and to whether this station has operated in the public interest should file comments and petitions with the Commission by *(date first day of last full calendar month prior to the month of expiration).*
>
> Further information concerning the Commission's broadcast license renewal process is available at *(address of location of station's public inspection file)* or may be obtained from the FCC, Washington, D. C., 20554.

This announcement shall be broadcast during the following time periods. *Commercial television stations* shall make at least *three* of these announcements between 6 p.m. and 11 p.m. (5 p.m. and 1 p.m. Central and Mountain Time), and at least *one* announcement in the three separate time periods between 1) 9 a.m. and 1 p.m., 2) 1 p.m. and 5 p.m., and 3) 5 p.m. and 7 p.m. *Standard and FM broadcast stations* must make at least *three* between 7 a.m. and 9 a.m. and/or 4 p.m. and 6 p.m., and at least *one* between the three separate periods of 1) 9 a.m. and 12 p.m., 2) 12 p.m. and 4 p.m., and 3) 7 p.m. and Midnight. *Non-commercial educational stations* must make said announcements according to the same time as commercial stations, except that such stations need not broadcast the announcement any month during which the station does no operate. *Note:* Television broadcast stations and non-commercial education stations must display signboards with the licensee's address and the Commission's Washington address at such times when these addresses are being given by the announcer.

During the period from six months prior to the expiration of license to the date of filing the renewal application, applicants are required to broadcast, every *15th* day, an announcement nearly identical (with minor variations and tenses) to that required in the post-application to pre-expiration period. The number and times of such announcements is restricted to the following: Commercial televison stations must make at least two such announcements between 6 p.m. and 11 p.m. (5 p.m. and 10 p.m. Central and Mountain Time) and non-commercial education stations must do likewise. Standard and FM broadcast stations must make at least two of said announcements between 7 a.m. and 9 a.m. and/or 4 p.m. and 6 p.m.

The Commission is requiring this six-month schedule of announcements notifying the public of

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RCI PRIME TIME

Now that it's got the station break under control, the "Cart" moves on to other things. In production.

Broadcasters from one end of the country to the other are discovering that our TCR-100 Cartridge Video Tape Recorder is a lot more than the best "station-break machine" around.

They're using it in production, too . . . not only to free up reel-to-reel recorders but also directly as a production tool.

And it's paying off in better quality, more efficient operation, smoother production . . . an all-round improved budget picture.

At WTVC, Chattanooga, for example, simple in-studio commercials are routinely recorded directly on the Cart. Typically they're spots featuring only one product, requiring only a flip card or a short intro and slides. One big advantage to this method is that retakes are easy, because the TCR-100 cartridge is rewound and cued up in a matter of seconds.

Adding a dealer tag at WTVC is easier now, courtesy of the Cart.

Another task made easier since the advent of the Cart at WTVC is adding dealer tags to commercials.

This used to be panic-button time at the station break, what with the director attempting to coordinate three machines—film, slide and audio—with split-second precision.

The Cart way of handling news segments at KPRC-TV.

Now it's all done beforehand on the Cart Machine and played automatically at the break. Adding different dealer tags to the same commercial is easily handled by making A to B dubs and supering the new tag slide at the end of each cart. The time per cartridge from start to finish: only two to three minutes!

Sometimes WTVC uses the Cart as the master in making reel-to-reel dubs of commercials for use by other stations.

Another way the TCR-100 helps pay its way at WTVC: recording news segments for later broadcast.

KPRC-TV, Houston, also records news segments onto the convenient-to-handle cart format. Besides dubbing from network for rebroadcast, the station also receives tapes from several subscription services, including NBC and Newsweek. Tapes are catalogued and either used on the day received, or later as fillers. This system of multiple carts permits using the TCR-100 to facilitate the assembling of daily news items and quickly updating them for later broadcasts.

News segments are delegated to the Cart Machine at KHQ-TV, Spokane, too. As are other short "takes" like sequences of slides with audio, promos, and psa's.

Other TCR-100 production in-

(Continued on last page)

Reel-to-reel dubbing sessions are a thing of the past at KHQ-TV.

TCR-100 Box Score

Number delivered	107
Number of commercials broadcast	3,343,500
Present rate (commercials/day)	13,500
Man hours saved	138,375

TCR-100's Delivered

ABC, Network, N. Y. C.
KARD-TV, Wichita, Kan.
KATU-TV, Portland, Ore.
KBTV, Denver, Col.
KCAU-TV, Sioux City, Iowa
KCEN-TV, Temple, Tex.
KFSN-TV, Fresno, Calif.
KHQ-TV, Spokane, Wash.
KIRO-TV, Seattle, Wash.
KMGH-TV, Denver, Col.
KNOE-TV, Monroe, La.
KNTV, San Jose, Calif.
KOB-TV, Albuquerque, N. M.
KOCO-TV, Oklahoma City, Okla.
KOMO-TV, Seattle, Wash.
KOVR-TV, Stockton, Calif.
KPLR-TV, St. Louis, Mo.
KPRC-TV, Houston, Tex. (2)
KPTV, Portland, Ore.
KRIS-TV, Corpus Christi, Tex.
KRON-TV, San Francisco, Calif. (2)
KSD-TV, St. Louis, Mo.
KSLA-TV, Shreveport, La.
KSTP-TV, St. Paul, Minn.
KTBS-TV, Shreveport, La.
KTEN-TV, Ada, Okla.
KTRK-TV, Houston, Tex.
KTSM-TV, El Paso, Tex.
KTVW, Tacoma, Wash.
KVRL-TV, Houston, Tex.
KVUE-TV, Austin, Tex.
KWGN-TV, Denver, Col.
KWTV, Oklahoma City, Okla.
KXLY-TV, Spokane, Wash.
KYTV, Springfield, Mo.
NBC, Network, Burbank, Calif. (2)
NBC, Network, N. Y. C. (4)
WAFB-TV, Baton Rouge, La.
WAPA-TV, San Juan, P. R.
WATE-TV, Knoxville, Tenn.
WBAL-TV, Baltimore, Md.
WBAP-TV, Fort Worth, Tex. (2)
WBAY-TV, Green Bay, Wisc.
WBNS-TV, Columbus, O. (2)
WBRC-TV, Birmingham, Ala.
WBRE-TV, Wilkes Barre, Pa.
WBTV, Charlotte, N. C.
WCPO-TV, Cincinnati, O.
WDAF-TV, Kansas City, Mo.
WDAY-TV, Fargo, N. D.
WDBJ-TV, Roanoke, Va.
WDCA-TV, Washington, D. C.
WEAT-TV, W. Palm Beach, Fla.
WECT-TV, Wilmington, N. C.
WEWS-TV, Cleveland, O.
WFMY-TV, Greensboro, N. C.
WGN-TV, Chicago, Ill.
WGR-TV, Buffalo, N. Y.
WISN-TV, Milwaukee, Wisc.
WJAR-TV, Providence, R. I.
WKBW-TV, Buffalo, N. Y.
WKRC-TV, Cincinnati, O.
WKRG-TV, Mobile, Ala.
WKYC-TV, Cleveland, O.
WMAL-TV, Washington, D. C.
WMAQ-TV, Chicago, Ill.
WMC-TV, Memphis, Tenn.
WNCT-TV, Greenville, N. C.
WPTV, W. Palm Beach, Fla.
WRAL-TV, Raleigh, N. C.
WRC-TV, Washington, D. C. (2)
WRTV, Indianapolis, Ind.
WSAV-TV, Savannah, Ga.
WSB-TV, Atlanta, Ga.
WSOC-TV, Charlotte, N. C.
WSPA-TV, Spartanburg, S. C.
WTAE-TV, Pittsburgh, Pa.
WTAF-TV, Philadelphia, Pa.
WTMJ-TV, Milwaukee, Wisc.
WTNH-TV, New Haven, Conn.
WTOP-TV, Washington, D. C.
WTVC, Chattanooga, Tenn.
WTVD, Durham, N. C.
WTVN, Columbus, O.
WUAB-TV, Cleveland, O.
WUTV, Buffalo, N. Y.
WVUE-TV, New Orleans, La.
WWL-TV, New Orleans, La.
WXYZ-TV, Detroit, Mich.

Austarama TV, Melbourne, Australia • CFRN-TV, Edmonton, Alberta, Canada • CFTO-TV, Toronto, Ontario, Canada • BTW, Bunbury, Australia • CHAN-TV, Vancouver, B. C., Canada • London Weekend TV, London, United Kingdom • TIMSA, Mexico City, Mexico • TV-Q, Brisbane, Australia • Venevision, Caracas, Venezuela

More production. Our switching, mixing and effects team in action.

RCA has the most advanced special effects system you can buy. It's a combination of the TS-70 Switching System, the TA-70 Mixing Amplifier and the TE-70 Effects Generator.

How does it work? Let's look over the shoulder of a busy Technical Director at a production session and watch how he uses our team for fades, wipes, dissolves and a multitude of effects.

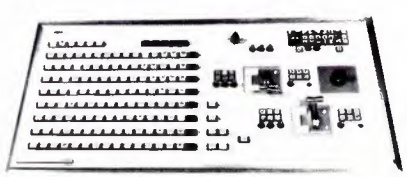
There at the left is the TS-70 Switching System itself.

And chroma key input switching, chroma key and hue generating controls are on the TS-70 Switcher panel where they're easily reached. In fact, all controls are arranged for an easy flow of activity from left to right.

Now let's turn to the TA-70 Mixer. It has six controls for its six modes:

"Lap" for normal lap dissolves.

"Effs" turns the TA-70 into a switching amplifier for the TE-70 Effects System.



Our TS-70 System production team ready for action.

"Fade to Black". Color burst is maintained at normal level so you can fade to and from black even though the signal may be nonsynchronous.

"A-B Insert". A and B inputs to the TA-70 Mixer are nonadditively mixed.

"C-Signal Insert" features a new concept in mixers. Lap dissolves, keys or wipes can be performed without disturbing titles.

Titles on A and B may be wiped or dissolved over a picture on C or other inserts on the TA-70 C input.

On to the TE-70 Special Effects Generator. Key pulses from the TE-70 are fed simultaneously to each effects switch and its mixer.

(Continued from preceding page)

The TD can perform all of the following transitions with little effort: effects into mix . . . into effects . . . into mix or effects . . . into effects . . . into effects . . . into effects!

And of course, pattern modulation is built in. The TE-70 has 24 different patterns. As the TD selects a pattern and positions it, the pattern doesn't repeat when placed at the edge or corners of the screen. No lap, bounce or shape change as the pattern is moved. Not only that—the pattern can be changed off-screen and moved back on from a different direction. An RCA exclusive.

Another RCA exclusive is the halo effect. Put a colored circle, diamond or ellipse around the subject, and the rest of the picture doesn't get muddy as it does with the spotlight technique.

With the TE-70, you can even preset effects and then dissolve or wipe into them.

And if you want to dissolve insert and background, or both sides of a split screen at the same time, our team lets you do it.

You can also split the screen three, four, five, six, seven, eight, nine ways —all with one TA-70 Mixing Amplifier. With a dual mixer system, the results are even more spectacular.

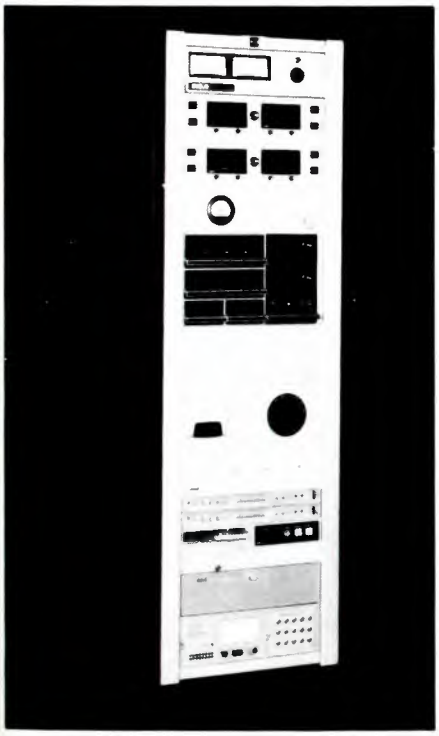
To find out exactly how our production team can help your production team, see your RCA representative. He'll explain all the ways it can captivate your clients. With just the right system for your station.□

Answers to questions about Automatic Radio Transmitters.

The Automatic Radio Transmitter demonstrated by RCA at this year's NAB Convention attracted considerable attention from broadcasters. Here are some of their questions, along with our answers.

Q. What is an "Automatic Radio Transmitter"?

A. While everyone seems to have his own pet answer to this question, the philosophy behind the Automatic Transmitter RCA demonstrated dictates that the system be practical, built from off-the-shelf components, and that the transmitter operate within legal limits automatically. Further, it must be economically feasible and not so complex that the average broadcaster is unable to use it or afford it.



Q. What is it?
A. An Automatic Radio Transmitter.

Q. How does an Automatic Transmitter differ from remote control?

A. Considerably. Remote-controlled transmitters still require an operator to make manual adjustments to keep performance within prescribed tolerances. An Automatic Radio Transmitter, as the name denotes, performs these functions automatically, without human interface.

Q. Is automatic operation limited to either low-power or high-power systems? Does it apply to both AM and FM?

A. It applies to both AM and FM transmitters, both low and high-powered. The one at the NAB was an FM transmitter with standard exciter and monitoring, and new signal-processing equipment.

Q. What transmitter functions were controlled in that system?

A. Although we at RCA recognize that many functions can be controlled automatically, the demonstration system featured control of only the following functions, which are considered the most important: frequency, power, modulation.

Automatic control of these functions can be achieved on current RCA transmitters and most others now in use with easily installed, readily available equipment. And we feel that just about any transmitter can be adapted with only minor modifications.

Q. How is frequency control automatically maintained?

A. First, control over frequency drift is an automatic function of the crystal and oven built into the transmitter. Then, an RCA Automatic Transmitter monitors frequency at two levels.

One level is at half the tolerance allowed. When this tolerance is exceeded, the system issues a warning —sounding an alarm, flashing lights, etc.—either at local or remote points, or at both.

Operation continues with the warning still in effect until the second monitoring parameter is reached. This is at slightly less than maximum tolerance. At this time, either the faulty transmitter is shut down or operation is switched to a standby unit.

(Continued on last page)

Your FM tower should help broadcast your signal, not interfere with it.

That's the main reason for RCA FM panel antennas, including our new model BFB.

It's getting a lot of attention from broadcasters, now that FM popularity is growing so fast—and more and more stations are reviewing their coverage patterns.

Coverage is where the BFB excels. It has excellent horizontal pattern circularity. The panels are mounted around the *outside* of the tower, so signals aren't obstructed, and the FM sound is crisp and clean.

(With side-mounted antennas, the tower is a reflector in the immediate field of the antenna, which can be a problem.)

An optional radome may be ordered to enclose the BFB panel feed system.

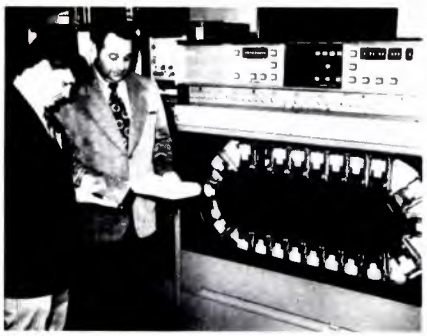
Antennas of this type have been delivered to KRON-FM and KFOG-FM, San Francisco as a part of the Mt. Sutro antenna complex. Others are on order for WGAL-FM, Lancaster, Pa., and WSB-FM, Atlanta.

"Cart" *(Continued from first page)*

cludes standard openings and closings on programs and to add interest to fixed-camera news shows.

In fact, KHQ-TV has reached the point where virtually all short segments that go on the air are Cart-recorded and played. Goodbye to reel-to-reel dubbing sessions!

With the Cart handling production functions in addition to station breaks, it's easy to realize why KHQ's workday flows more calmly than it used to before the Cart arrived.



Program assembly at KARD-TV, using the Cart as "assembly line".

KARD-TV in Wichita, Kansas, uses the TCR-100 to assemble programs which integrate live production, tapes and film. The Cart handles opening and close sequences plus pretaped musical numbers for the Elmer Childress Show, a daily KARD-TV gospel music program.

The TCR-100 will be used as a production tool for a nationally syndicated feature, "Revival Fires," a weekly religious program. Vice President Bill Sikes of KARD says, "As it's running in 150 markets, the best production quality we can provide is essential. We know the TCR-100 will handle all the repeat material involved with consistent quality for each program."

Statements like this illustrate the status of the TCR-100 in the art of production: substantial, and expected to grow with the growing production capacity of the broadcast industry.

And the nicest thing about it is that while you're growing in the ability to take advantage of the Cart's uses in production, it's paying for itself every day. By making each station break an automatic series of events, rather than a cliffhanger occurring every few minutes, on which potential revenue is risked in timing complicated arrangements of equipment.

The Cart is an idea whose time has come! □

"Answers"
(Continued from preceding page)

Q. How about power output control?

A. Motor-driven devices keep the transmitter within the legally prescribed tolerance.

At half the specified tolerance, the system increases or decreases power to maintain output at optimum level. If the transmitter doesn't respond, it's automatically shut down or switched to standby.

Q. How is modulation controlled?

A. A series of "automatic" signal-processing equipment using new techniques in positively preventing over-modulation was introduced by RCA at NAB this year. These units are so versatile that they can be programmed for either symmetrical (FM and TV) or asymmetrical (AM) modulation. The FM/TV unit can also be programmed to take into consideration the pre-emphasis of its respective transmitter.

Q. What was the purpose of RCA in demonstrating an Automatic Radio Transmitter at this time?

A. Automation of functions is a growing trend in broadcasting, and as an equipment supplier, RCA obviously has a stake in developments which affect the industry.

Our purpose was to demonstrate the simplicity and feasibility of the concept and to solicit reactions from broadcasters and regulatory bodies. From our point of view, the feedback has been gratifying. And we welcome your ideas on the subject.

Products in the news.

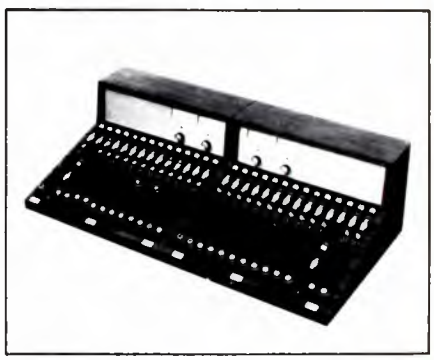
Versatile new audio cartridge tape machines offer 140 system choices. RCA Type RT-125, RT-126 and RT-127 systems will handle just about any cartridge tape requirement. Users can select mono and stereo; playback only or record/playback, plus choice of cartridge size combinations: 300, 600 and 1200 NAB sizes. All systems exceed NAB cartridge tape specifications.

Reliability and performance are excellent, with solid-state logic and switching. Air cushion solenoid pinch roller action for smoother operation.

Fast forward option available. All systems may be either rack or desk-mounted.

New BC-50 Custom Audio Console uses a series of modular sub-assemblies to give TV and radio broadcasters as well as recording studios a superb audio control center which is custom-built by RCA to match specific needs.

Standard input, output, switching and other modules are combined to handle an almost unlimited variety of audio signal assignments.



A new addition to the extensive RCA aural broadcast line, the **Type BTF-5E2 FM Transmitter** offers a combination of economy and quality in a 5 kW transmitter. The BTF-5E2 is self contained and has operating characteristics comparable to more expensive models, with such advanced features as a built-in harmonic filter and RCA's all-solid-state BTE-15A exciter system.

FCC Rules & Regulations continued

the impending expiration of a broadcast license for purposes of 1) stimulating a dialogue between the licensee and the public toward the end of resolving problems between the two on a local level, and 2), by so doing. alleviating the number and extent of petitions to deny renewal applications by bringing about greater licensee service to the public.

Public Notice Of License Obligations

The Commission further requires all licensees to solicit comment from the public by announcements twice a month, once in prime time. The licensee is required to make an announcement informing the public of its obligation to the public and of the appropriate method for individuals to express their opinions of the station's operations. Such announcements shall be aired once every *15th* day throughout the license period, except the aforementioned six months to expiration period (when "renewal application notices" will be broadcast).

The Commission details explicit requirements for information to be included in both radio and television "Public Notices." *Sample* announcements for radio and television follow:

For radio:

On *(date of last renewal grant) (station's call letters)* was granted a three-year license by the Federal Communications Commission to serve the public interest as a public trustee. We are obligated to make a continuing, diligent effort to determine the significant problems and needs of our service area and to provide programming to help meet those problems and needs.

We invite listeners to send specific suggestions or comments concerning our station operation and programming efforts to *(name and mailing address)*. Unless otherwise requested, all letters received will be available for public inspection during regular business hours.

For television:

On *(date of last renewal grant) (station's call letters)* was granted a three-year license by the Federal Communications Commission to serve the public interest as a public trustee. Each *(anniversary date of deadline for filing renewal application)* we place in our public inspection file a list of what we consider to have been some of the significant problems and needs of our service area during the preceding 12 months and some of our programming to help meet those problems and needs.

We invite viewers to send specific suggestions or comments concerning our station operation and programming efforts to *(name and mailing address)*. Unless otherwise requested, all letters received will be available for public inspection during regular business hours.

For *commercial television stations*, such announcements shall alternate between the 6 p.m. to 11 p.m. time period (5 p.m. to 10 p.m. Central and Mountain Time), and the following two-hour time periods in rotating order: 7 a.m. to 9 a.m., 9 a.m. to 11a.m., 11a.m. to 1 p.m., 1 p.m. to 3 p.m., 3 p.m. to 5 p.m., 5 p.m. to 7 p.m., and 10 p.m. to 12 a.m. For *standard and FM broadcast stations*, these announcements shall alternate between the 7 a.m. to 9 a.m. and/or 4 p.m. to 6 p.m. time periods, and the following two-hour time periods in rotating order: 5 a.m. to 7 a.m., 9 a.m. to 11 a.m., 11 a.m. to 1 p.m., 1 p.m. to 3 pm, 5 p.m. to 7 p.m., 7 p.m. to 9 p.m., 9 p.m. to 11 p.m., 11 p.m. to 1 a.m. For stations which neither operate between 7 a.m. to 9 a.m. nor between 4 p.m. to 6

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FCC Rules & Regulations

continued

p.m., the announcement shall alternate between the first two hours of broadcast operations and every other two-hour time period during the broadcast day in rotating order, beginning with sign-on.

Annual Reporting Requirements

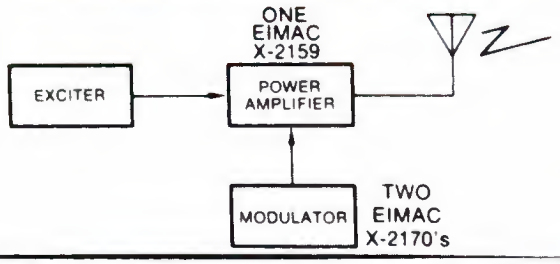
The Commission further requires commercial television station licensees to compile Annual Reports for the Commission which include a statistical breakdown of types of programs presented in various categories. Similarly, stations must place in a public inspection file each year a list of significant problems and needs of the community being served and a list of the programs aired to meet those needs. These Rules are part of the Commission's continuing effort to encourage communication between stations and community groups. As mentioned herein, the Commission is hoping to promote resolution of citizen complaints at the local level as they arise, thus reducing the number of complaints filed at renewal time. Should a problem not be resolved, the Commission will have the Annual Reports—giving it detailed statistical information on the station's programming—as an additional source of data for its renewal decision.

These yearly reports will not constitute a form of annual renewal, but, rather, will be used during the license period only to compile nationwide statistics. Only as renewal time approaches will the individual reports be looked at by the Commission to see what the station has been doing. **BM/E**

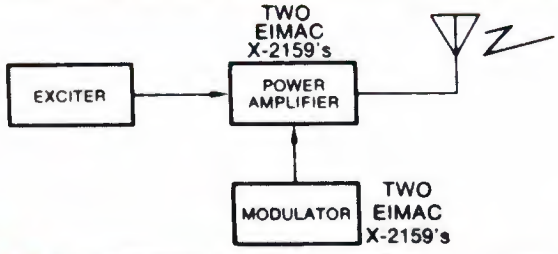
10,400,000 Watts!

EIMAC super-power tetrodes provide transmitter "building blocks" up to 10.4 megawatts, 100% modulated.

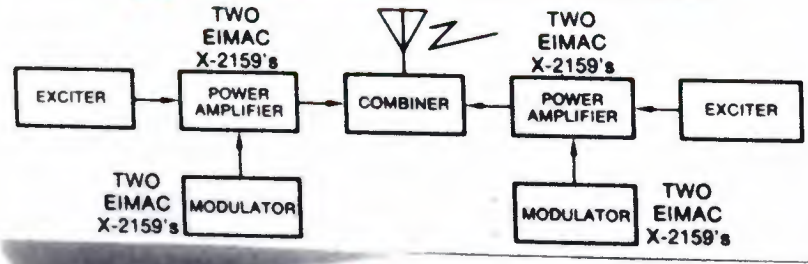
1.3 megawatt carrier 100% modulated



2.6 megawatt carrier 100% modulated



5.2 megawatt carrier 100% modulated



Draw your own 10.4 megawatt transmitter here.

X-2159

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X-2170

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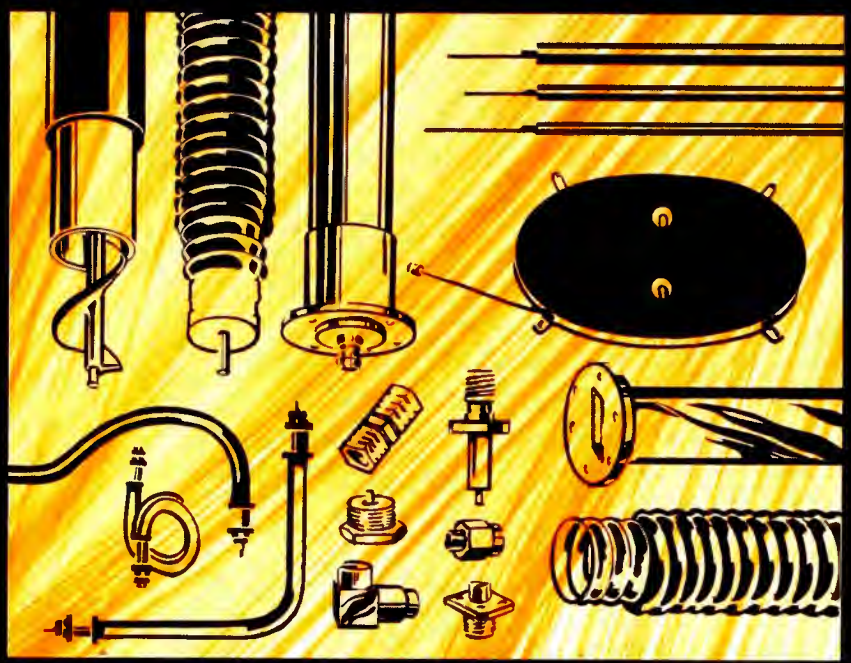

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Visual Thinking — Television In The Design Revolution

By Bentley Nelson

A short verbal discourse on getting with it visually—addressed to the disadvantaged "local" TV producer.

WE ARE IN THE MIDST OF A VISUAL REVOLUTION. Everything around us—advertising, architecture, graphics, record album covers, paintings, packages and containers, industrial design, uniforms, even landscaping for freeways—reflects conscious design style. In all circles there is an effort to produce what looks and feels right.

In television the examples are many. Commercials, titles, programs, IDs, set designs, costumes, and graphics reveal efforts to create and maintain identity in a visual world. Images—multiple, colorized, solarized, tinted, trailing, matted, contorted, animated, reversed, edited, duped, A-, B-, C-, and D-rolled—opticals and effects abound.

But the dollars available to produce a local series of 30- and 60-second spots are tight. The sponsor wants his money spent on exposure, not on production. What does this mean for the local production manager or producer/director faced with budget, personnel, and equipment limitations? Can he avoid costly visual spectaculars? Many of the techniques in vogue today will probably reach the saturation point shortly. But, the development of new ones seems to be snow-balling rather than falling off. There are just too many people catching on, and the new technology seems boundless. One cannot afford to risk being dull.

It's quite easy today to identify commercials and programs coming from the major production centers. The quick-edited, hyperactive visuals emanating from Hollywood and New York have a look and feel quite apart from the local output featuring shouting car salesmen, kitchen gadgets, and one-time offers.

In the past, the local man could get by with these commercials by attributing them to his client's wishes, or by excusing his lack of image for lack of budget. Though these problems may be valid to those involved, they aren't acceptable to the viewer.

Today's viewer is visually primed and educated. He lives in a sea of aural and visual material. It is not uncommon to read the morning newspaper while watching "Today," conversing with one's spouse, and catching up on the latest offer from one's favorite cereal box, all at the same time.

Packaging and presentation have become increasingly important. In commercials, the quality of the product takes on the quality of the image through which it is sold. Thus, national commercials and programs coming from the network feed become the scale on which local stations are judged.

Television is most effective when it *communicates* in form and content. To think of television simply as a visual medium is a fallacy. The visual image is derived from content—a practice which can be forgotten if the producer gets carried away with new techniques. If we are to be truly effective in our attempts to communicate, we must put these elements in their proper perspective.

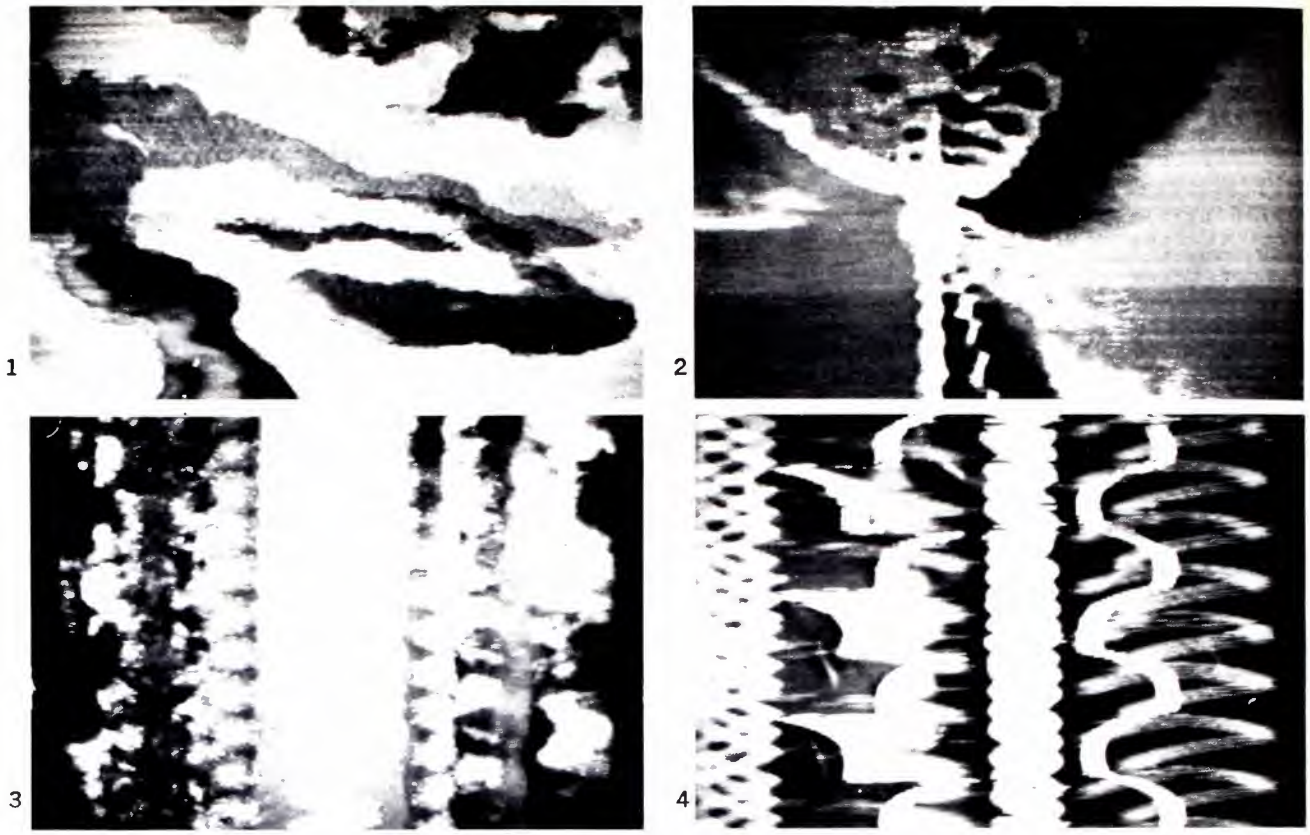
Pure "televisual" communication that is effective is rare. For the most part, television is radio with pictures. Radio allows one's personal imagination to provide the visuals; television may not do as good a job. Indeed, the audio track may convey the message. For television to become a truly visual communications medium, it is necessary for the visual to become an integral part of the information stream itself. Sight is a swifter means of expression and communication than speech.

For this to happen, it is necessary to re-educate ourselves and widen our vision in the process. We can begin by learning from other media and disciplines far-removed from kinetic story-telling. It is not necessary to go to school to get our visual thinking going—look around, study, and interpret what you see in package designs, billboards, and magazine layouts. Adapt some of these designs to your own needs. Make a conscious effort to keep up with the imaginative and technological "state-of-the-art" within our own industry. With new techniques being developed every day, this is an unending job.

Low budget need not be a limitation

It is one thing to produce a commercial for $10,

Mr. Nelson is a producer-director for Matrix Image, a visual design service company located at Canoga Park, California.



Synthetic imagery is an example of the visual potential being explored by engineering and production personnel today. 1) Raw video feedback was combined with four color-matting generators to produce this pattern. By adding a circle wipe, 2) vertical wipe, 3) or a combination of modulated wipes, 4) any number of patterns may be generated.

and quite another to have $60,000 to spend. But it isn't necessary for the $10 spot to "look" like $10. Simplicity is the most effective means of communication. With $10 it is hard not to be simple. The question is what to do for the money. Do you put up a card with Helvetica Bold and read a V.O., or do you use a typestyle such as Cooper Black, Kable Heavy, Davida, or any one of a thousand other styles? A simple change could make all the difference in the world.

The man located in the major production center is constantly bombarded by both aural and visual happenings which cause his mind to spin and ideas to generate. The local man is thus at a more distinct disadvantage than by budget alone.

But the answer really lies with the man himself. He can expand his knowledge about his industry, and he can foster competition where there is none. He does this by stepping into the learning society, keeping abreast of the latest developments through a myriad of inputs—including technical, news, and idea publications—as well as attending conferences and seminars, maintaining memberships in overlapping fields, and actively participating in film festivals, museum showings, and other similar events.

Once one is well-immersed in an idea-generating environment, the low budget is no longer an obstacle to the imagination. In fact, it becomes a challenge to work with what you have.

Understand, thoroughly, the technological process. It is necessary to recognize that the tools you work with are an extension of your mind. As the painter mixes color and the photographer paints with light, it is necessary to fully understand the technological process in which you are working. Many times, this is where you throw in the towel and say it can't be done. However, this is the one area which may hold the key to your future.

Electronics can be made to perform to your bidding. Study the articles in this issue; if you don't understand why this or that was done, call your production switcher salesman and ask him. A painter translates a scene into a two-dimensional form by using his knowledge of textures, toning, and brush strokes. The TV man understands very little about the techniques which allow him to work magically in real-time.

The images illustrated here were produced in real-time with equipment not much different than your own. They were made possible by a team effort among production and engineering personnel with a clear understanding of television systems and equipment.

New switchers have been developed with pre-programmed effects, chroma key, re-entry, revolving wipe patterns, and digital effects whose possibilities seem endless. Unless these items are understood and placed in the proper perspective, they will work against us rather than for us. Techniques are translation devices which enhance the communication process; they are not ends in themselves.

In a future issue, we hope to show how technical knowledge can help you extend your vision. **BM/E**

You wouldn't have to make good if you didn't send bad.

Every time a heavy dropout burst from your VTR causes lost sync, your viewers might as well be watching the radio.

And if it happens during a commercial, you know the ad agency is going to be right in there demanding another "make-good."

But it doesn't have to happen at all, because with the 3M Brand Color Dropout Compensator (DOC) you can solve the problems caused by dropouts.

Our DOC works with any quad VTR and replaces lost video information, in color or monochrome, with correct video.

Fill-ins are undetectable because they're perfectly matched in brightness level, and chroma.

Horizontal sync and color burst are correct, so there's no color flashing. Servo lock and color lock are automatically maintained so you get full color interlace and VTR stability even through multi-generation dubs.

There's just nothing else that works like the 3M DOC.

It replaces the lost video information in full color within the video signal itself. Luminance and color are processed through separate delay lines, with the color phase-inverted to achieve color interlace with the stored signal. When dropouts are detected, our unique self-balancing switch replaces the lost signal with stored information from the previous scan line of the same field. It does this without introducing switching transients, or white flashes.

The 3M DOC comes with an adjustable dropout replacement threshold, with rf agc to maintain the level set; a chroma auto-phase corrector; and a built-in dropout simulator for alignment without a test tape. All standard features, not expensive options.

You'll find that the 3M Brand Color Dropout Compensator works better and is easier and less expensive to use than anything else you've tried.

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Video Production Switchers — A New Breed Is Available

Today's television switching equipment is production-oriented, not engineering oriented as it once was—even though some of the technical advances are indeed spectacular.

THERE WAS A TIME when video production was a simple matter. All a switcher needed was a couple of inputs to accommodate live cameras. With a few basic controls, some editing could be done at the switcher. The vocabulary was self-evident: fade up from black, cut, dissolve (or cross-fade), superimpose, fade to black.

The first switchers were crude indeed. The picture would break up during switch. Quality commercial work was done by the film department. The advent of the videotape recorder and the ability to store a picture changed that, and a new generation evolved. Clean switching was necessary. Mix, fade, keying, and split-screen arrived, along with a special effects generator.

When color TV arrived, color phase problems came with it, and switchers had to be designed with coax delay lines. About this time, vacuum tubes gave way to solid state. This made it much easier to solve differential phase and gain problems and eliminated the trouble of frequent breakdowns. But with the advent of color, and before highband evolved, production emphasis switched back to the film department. No major switching advances took place. Even when highband arrived, switching was minimized because most production work was taking place in the VTR editing room.

The high cost of such post-production work which tied up two or three VTRs, film equipment, and personnel, coupled with degraded quality resulting from multiple recording and re-recording, led to a reconsideration of the production switcher. A new generation of switcher is now appearing.

This new breed of switcher brings production and editing back into the studio control room. Exacting specs are met and maintained; extreme flexibility is offered, and operation is simple.

Control panel layout has evolved into easier selection of functions and operational buss and control functions are organized so the video cross-points can be visualized. Machine control is included as an integral part of the switcher. These controls are presented in a logical format. Special effect control panels have been located adjacent to buss controls. "Human-engineered" is a term bandied about loosely, but the new switchers do recognize operator's control problems, including easy monitoring.

What follows are reports on some of these new switchers and how they are being used. Additionally, several by-lined articles discuss production.

State-of-the-Art in Television Switching Equipment

FOR YEARS THE DESIGN OF PRODUCTION SWITCHERS has been primarily geared to the engineering requirements of the TV stations. Now, engineering directors, recognizing the need to involve production-oriented personnel in operations, emphasize that production switching designs incorporate features which allow the creative talent of the TV station a high degree of flexibility. Working cooperatively, engineering and creative production personnel have caused switching system designs with tremendous diversity to come into existence.

The recent NAB Convention is a good case in point. Production people steered their engineering and administrative people to exhibits to point out the dollars and cents advantages the new production switching equipment could mean to a station. The increased potential such tools provide for local stations wishing to expand their production capability was readily apparent to engineering, production and administrative people alike. Production people saw versatility and new creative possibilities; engineers, reliability they consider mandatory; the station manager got a vision of a producing department that could increase revenues.

It was obvious from discussions with TV people attending the NAB Convention that production of locally-produced spots is on the increase and has become of great importance to TV stations. It's a great hedge against curtailed national business. Unfortunately, most stations have been limited in their local production activities. They have lacked video

Material for this section was provided by Biagio Presti, general manager, Sarkes Tarzian, Inc.

equipment and production switching equipment other than that required for on-air purposes. Thus, a station was really a poor competitor to the independent production house.

Creative talent was limited to chroma key, rear screen projection, videotape editing, and maybe a few other tricks. There was an obvious need for more sophisticated equipment—equipment to produce travelling mattes, for example, to get on a par with independent commercial film houses.

The introduction of the digital electronics video processing and wide-band delay timing into the latest in switching equipment goes a long way in providing this sophistication. Today it is common for production switchers to have six to eight channels with multiple chroma keying, wipe keys, matte keying, modulated keys, and mix/effects. The new equipment allows them to do both on-air coverage and independent production coverage at the same time.

Some idea of the significance of new switches to practical operations are afforded by looking at the switcher developed for Station KOOL-TV, Phoenix, Arizona.

Panel layout shows a reduced physical size to accommodate the operator's span of control. Video processing controls are logically grouped so that the operator visually sees the extension of his signal flow. The following gives some idea of operating range:

- 21 inputs (with a 10 × 2 preselect switcher effectively increasing source switching capacity to 31).
- 8 output switching busses: MIX/EFF 1 (A,B), MIX/EFF 2 (A,B), KEY 1 (EFF 1)/KEY 2 (EFF 2), MASTER MIX (A,B).
- Reentries of the following:

—MIX/EFF 1 TO MIX/EFF 2, MIX/EFF 3, ROTEC, MASTER MIX, EFF 3, C AND D INPUTS (QUAD)
—MIX/EFF 2 TO MIX/EFF 3, ROTEC, MASTER MIX
—MIX/EFF 3 TO MASTER MIX
—KEY 1 TO EFF 1, MIX/EFF 3, ROTEC
—KEY 2 TO EFF 2, MIX/EFF 3, ROTEC

Some of the group features are itemized below:

- MIX/EFFECTS 1—three-input mix w/burst processing and timed black on input 3. Cinematte I digital effects with positioner, modulator, color matte of keys, reverse keying, adjustable wipe limit, key flash of any keying signal (internal, external, chroma key), preselect wipes* and preselect keys*.

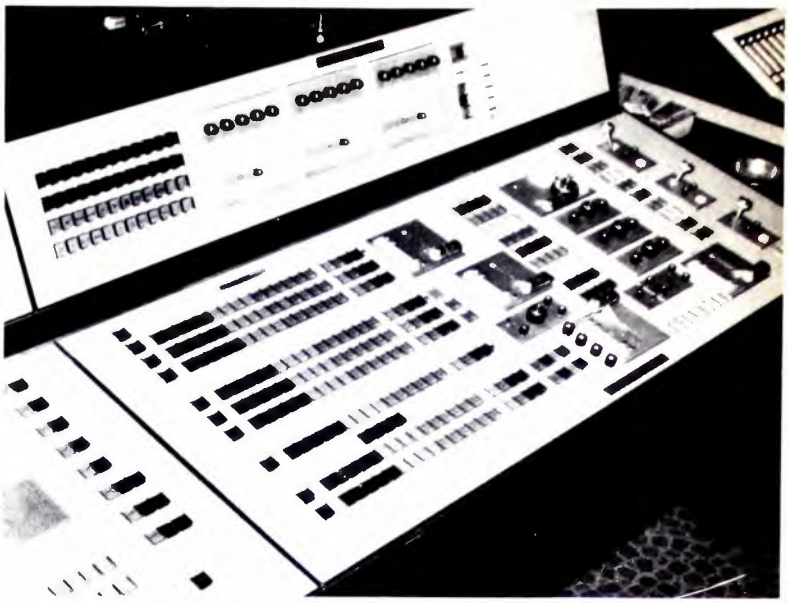
Automatic monitoring is possible. The preview monitor normally monitors mixer out (mix, wipe, keys). The monitor switches to preselect output as long as preselect mode button is depressed. Feature facilities quick and easy setup of preselect mode.

Chroma key (RG&B) with four input source switcher is integral. Select control at chroma key remote panel.

- MIX/EFFECTS 2—Operating features same as #1 with the following exceptions: analog effects with monochrome/color border of patterns; chroma edge effect; soft wipe.
- ROTEC—A, B, C, and D inputs from four-inch switcher: KEY 1, 2; MIX/EFFECTS 1,2. A selectable drive input—HOUSE, or EFFECTS 1—provides for variable positioning of QUAD, or SPLIT SCREEN effects.
- MIX/EFFECTS 3—Three-input mixer w/burst processing and timed black on input 3. Mini I digital effects with six wipes (H split, V split, four corner inserts); QUAD (all inputs switchable); QUAD/WIPE; monochrome/color border on *all* wipes; insert key; chroma key with four input source switcher; edging effects on keys (border, shadow, outline); color matte of keys; white or black keying; adjustable wipe limit; preselect wipes; preselect keys; automatic monitoring.
- MASTER MIX—The operating features same as #1 with the following exceptions: chroma key 3 (EFF3) available through timed feed; preselect monitoring altered to switch a fader limits so operator previews source he is transitioning to; master mix bypass switch goes to master mix buss A so down stream effects can be set up without any possibility of program line interference.
- VIDIFONT CHARACTER GENERATOR CONTROL—Special logic, in/out switching and signal timing allow Vidifont to be assigned to MC or the

continued on page 33

*In preselect mode, preselect source may be dissolved to by mixer, thus providing simultaneous mix-effect operation on any two busses.



KOOL-TV's production switcher.

New Video Production Tools

The articles in this issue do not discuss all of the equipment that is available. Some of such equipment, of course, is proprietary and has been developed by production houses for their own work. Vidtronics, for example, has a replacement for chroma key called Technimatte. There are others. BJA Systems Inc. of Oreland, Pennsylvania, has a device called Chromaton, the electronic palette for video art in motion. It provides animated patterns in motion and full color. Video Devices Co. has a pulse delay system which, in essence, delays the sync signal, thus creating multiple images on a videotape. Sarkes Tarzian's Cinematte II provides circular wipes on a travelling-matte basis. These are only a few of the production tools available—the list will be growing.

For a glossary of terminology, refer to page 38.

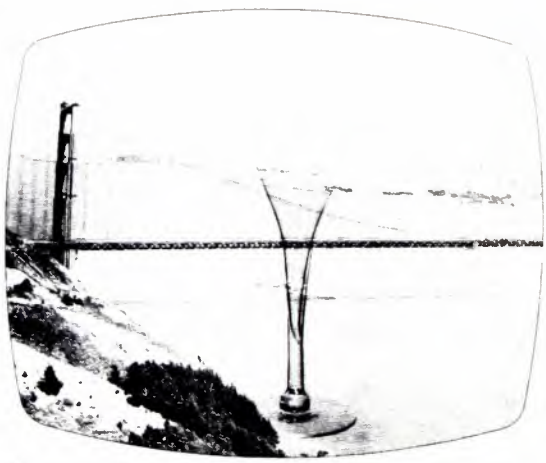
New Generation Switcher—The Grass Valley 1600

A soft wipe is possible by controlling pattern signal rise time.

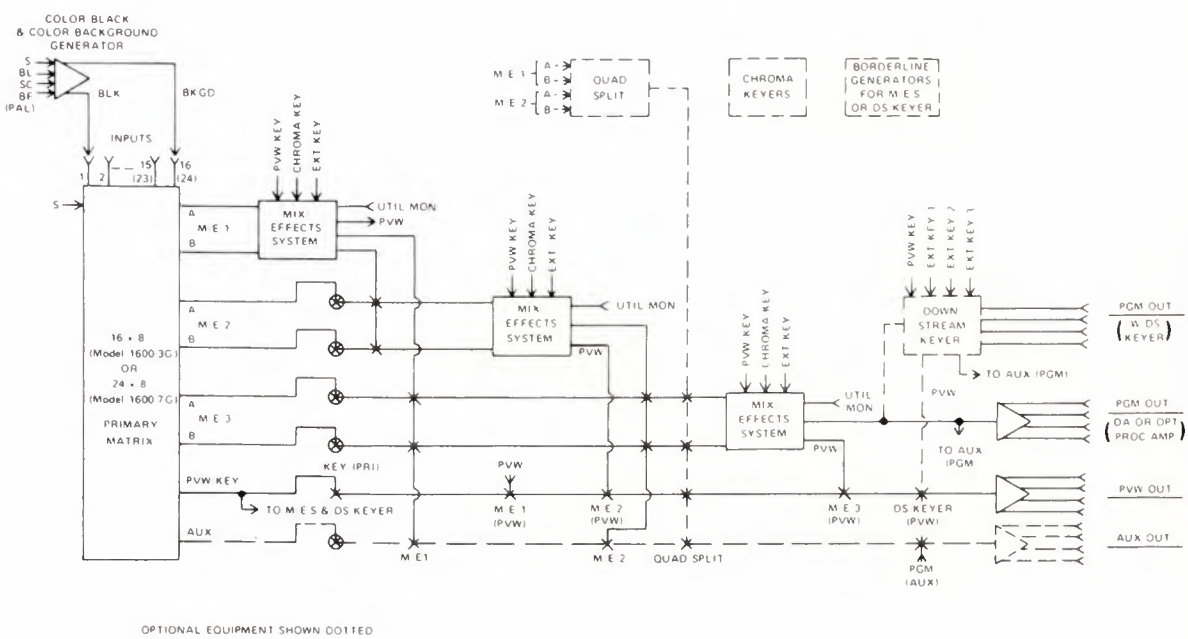
Shown for the first time at the 1973 NAB Convention was the Grass Valley 1600 Series. Literature describes the 1600 as "a new design in response to customer requests for improved special-effects capabilities . . . and a high standard of electrical performance." The Mix/Effects system is the heart of the new design. Each M/E system receives input signals from two switching busses plus a keying signal derived from another switching buss or a chroma keyer, etc. Signals are mixed in a new voltage-controlled video amplifier.

The significance is described this way by Grass Valley: "In the case of keying or matting operation, the gain of the background channel is reduced in direct proportion to the keying signal amplitude, while the gain of the insert video source is increased in direct proportion to the keying signal amplitude. The effect of this **linear** type of control is to greatly reduce the noise in keying situations, when compared to systems employing the conventional electronic switching method. The improvement in keying is particularly noticeable when using the chroma key technique. In addition, matted inserts have considerably less crosscolor (color crawl), due to the fact that the background and insert channels are turned off or on by signals having rise times comparable to normal video transitions.

The use of linear control elements also permits soft wipe patterns to be generated by control of switching signal rise times. The effect of the soft wipe mode of operation is to produce a blend between pictures at their junction point. The effect might be described as an "electronic vignette."



Linear control permits successful keying through glass—a difficult task in the past.



Simplified diagram of the new Grass Valley 1600-7G switching system.

production facility by single button control.

In summary, some of the complex system capabilities include:

—Triple chroma key within an effect.

—Two effects and two switchable sources within a quad effect (ROTEC).

—An effect (#1) within an effect (#2) within an effect (ROTEC) within an effect (#3) within an effect (MASTER)—six different, switchable sources on program simultaneously through a combination of patterns, keys, etc.

—Simultaneous mix/wipe, mix/key operations on all mix/effects units (#1, 2, 3 and master).

—Double-double reentry combinations.

—Title over a multiple effect program.

—Quad wipe to an effect, insert or chroma key.

The KOOL-TV Production Switching system design concept represents the kind of flexibility required to do present-day commercial and studio productions.

Three Mix/Effects Busses For WDCA

THE NEED FOR THE NEW SWITCHER at WDCA has been very real for quite a while. The original production unit, consisting of a single effects buss and a single independent mix buss, was inadequate for the kind of production and post-production effects that many agencies wanted. Several valuable features, such as colorized title inserts with borders, were missing entirely. The switcher was also inadequate for live air work since it could not easily accept all of the station's available inputs, such as mono film chain inputs.

One could not do a four-way split screen—not without a lot of trouble, that is. When WDCA did, indeed, produce such a spot for Denniberg Advertising, it was necessary, because of the single effects buss, to run multiple passes between machines to get all of the desired video. By the time this was done, the dubs were nine or ten generations down, resulting in a very definite loss of quality. The new switcher, obviously, has quad-split capability. Selection of a new production switcher at WDCA was a joint effort. Production Manager Sandy Whiteley wanted a lot of sophisticated effects demanded more and more by advertising agencies. Chief Engineer Don Doughtly wanted, more than anything, a reliable unit that would perform flawlessly day after day. After a lot of evaluation, Visual Electronics was selected to custom-design the unit. The new production switcher incorporates the same maintenance-free digital design that Visual had already used in WDCA's Master Control Air Switcher. This switcher has been most reliable.

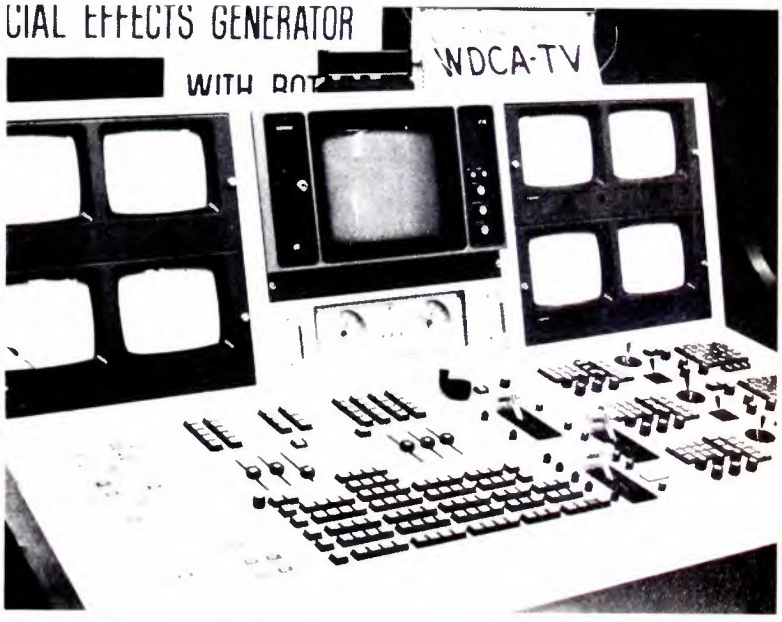
In actuality, the new switcher more than exceeds Channel 20's current needs. For example, the switcher is capable of mixing as many as eight separate signals and four key inputs at one time. However, that is greater than the number of sources ordinarily available for production during the broadcast day. All told, 16 inputs are available on each of the three Mix/Effects busses which permit eventual expansion to include new film chains, VTRs, video discs, etc.

By using the full visual capabilities of the new switcher, Channel 20 hopes to make the total on-air look of the station even more exciting and colorful than it already is. For example, several years ago the station purchased a set of animated IDs and sigs that have been used much the same way a radio station might use a jingle package to spice up the air. With the new switcher, it will be possible to produce similar material without having to resort to outside production facilities. The station places high priority on promos and the new switcher makes a multitude of new, visually exciting techniques available.

To facilitate the switcher's use for live programming, such as the daily "Money Movie," all film inputs have a color/mono selector switch. In addition, remote machine controls for all VTRs and film chains are available on the switcher panel to give the director/switcher complete control over all potential sources.

An effects unit for each buss

Each of the three Mix/Effects busses includes an identical effects unit which produces all of the special effects desired by both broadcasters and advertisers today. In addition to 30 pattern wipes with full positioning capability, the effects units are able to produce such effects as pattern modulation, pattern rotation, key borders, soft-edge transitions, chroma key, and, of course, the quad split. The use of special key insert, in addition to the regular key effects, permits up to seven individually-colorized keys to be added.



WDCA-TV's production switcher.

Material for this section was supplied by Sandy Whiteley, production manager, WDCA.

Another unique feature, multi-mix vertical attenuators, permits up to six sources to be mixed on a single Mix/Effects buss. Operation of the audio-type multi-mix faders sets proportional levels between several switchable signals while the total level is maintained automatically at 100%. However, if desired this auto-level feature can be overridden to allow special matte-type effects to be produced. The versatility of the multi-mix unit is increased since both groups of three multi-mixers constitute either the A or the B side of the third Mix/Effects buss.

Automatic fade-through-black for non-synchronous signals to avoid unpleasant "glitches" is another feature of the new switcher. The Visual Electronics vertical interval switching design permits effects and patterns to be changed while on-air without any "glitches."

It will undoubtedly take a while for Channel 20's creative production staff to discover all of the possible effects that the new switcher will allow. But it looks forward with eager anticipation to learn as much as it can as quickly as it can.

Commercial Production Essential

As the only commercial UHF station in Washington, D.C., WDCA-TV must be ever-ready to exploit any area of potential profit. This includes commercial production. Channel 20 has found in its seven years of operation that commercial production is an ideal way to use existing studio facilities to increase profits. In fact, it has captured a large percentage of Washington's commercial production business by emphasizing fast, highly-professional production at the lowest prices in town. The newly-purchased production switcher described here will improve the quality of production services that it can offer its clients.

Precision Transitions Using Digital Mix/Effect Control; Complex Transitions Using Computer

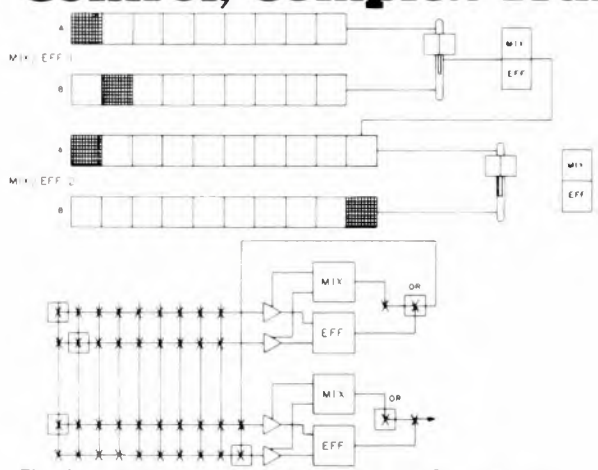


Fig. 1. Panel layout and video path for OR switcher.

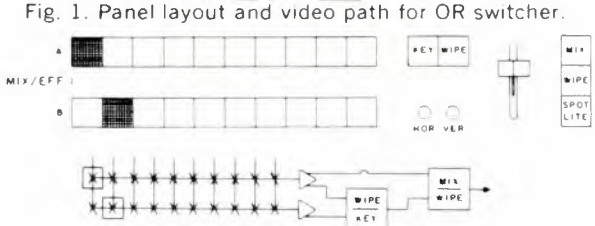


Fig. 2. Panel layout and video path for AND switcher.

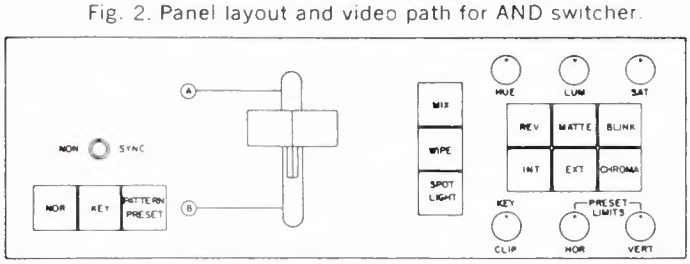


Fig. 3. Mix/Effects preset panel layout.

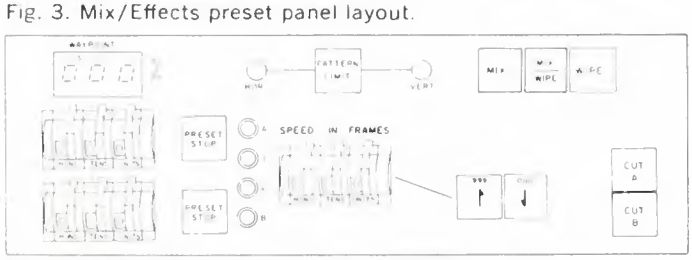


Fig. 4. Digital Mix/Effects panel layout.

When the magic of television was first introduced to the public, it was possible to capture the attention of a viewer for long lengths of time with nothing more than a test pattern. A quarter of a century later, the average American television viewer is so blasé that every trick of showmanship has to be used to catch his attention.

Today's switching equipment goes a long way in making it possible to be creative and to, therefore, capture attention. A modern human-engineered switching control panel provides instant access, at one central point, to a host of inputs: multiple cameras, film cameras, cartridge machines, tape recorders, character generators, network and other remote signals. Literally, the producer has at his fingertips the ability to splice, edit, and add effects to transitions between all of these sources.

This new switcher, incidentally, reflects the rapid advance of electronics technology—today the life cycle of sophisticated switching systems is only three to four years. The advances are essential for the stability that provides true NTSC color fidelity.

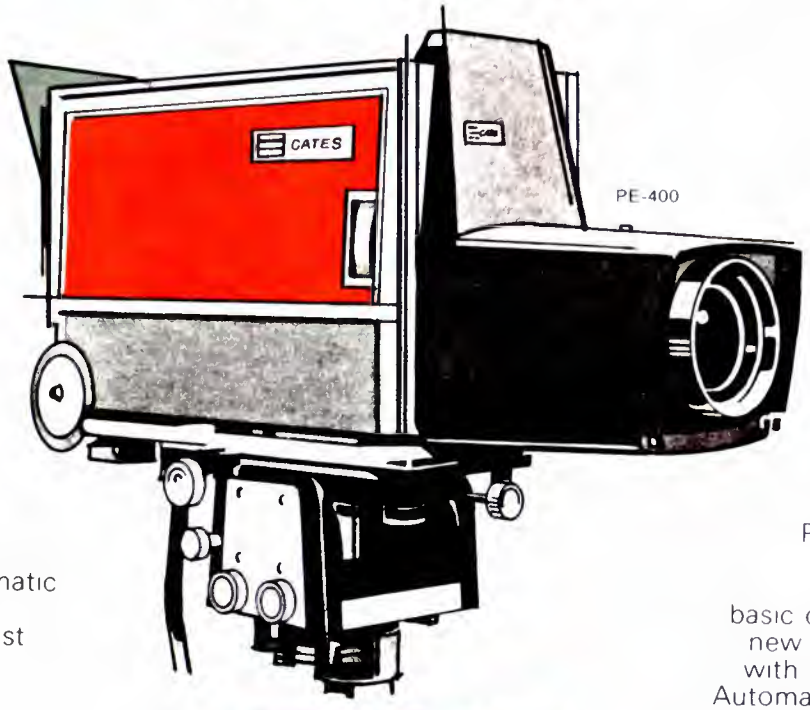
A switcher must provide more than cute circuits. A switcher manufacturer must understand the operational problems of the broadcaster and offer equipment and systems that will solve not only people problems, but economic problems as well. Vital Industries, Inc. feels it is responsive to today's and tomorrow's needs of broadcasters. At the NAB Convention, we were able to show—through the use of computer techniques—a method of presenting complicated picture transitions in real time without flaw—transitions that would be virtually impossible to perform manually by an operator.

To achieve precision presettable picture transitions, controllable to one-thousandths of the raster size, we also introduced a digital mix/effects system.

A quick look at continuing improvements offered

Material for this segment was provided by Nubar Donoyan, president of Vital Industries.

Color TV cameras from Gates



PE-400

PE-400 live color TV camera. Outstanding color fidelity. Excellent pick-up tube life. Automatic contrast gain control reproduces high contrast areas. Simplified setup and registration.

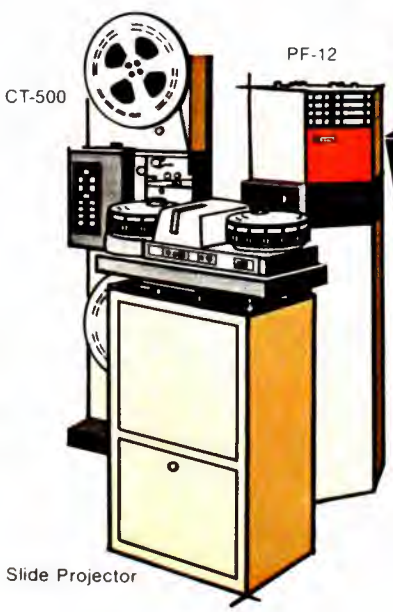
TE-201 live color TV camera. Economical long-term operating stability and excellent color fidelity in an extremely versatile, lightweight (40 lb.) camera. Superior low-light-level lag performance. Operating controls located at camera control unit. Simple setup.

PE-245 color TV film camera. Praised for excellent performance and reliability. Proven basic design enhanced by new solid-state preamps with S/N ratio of 50 db. Automatic contrast control compensates for film variations.

TE-202 color TV film island. Integrated film island offering highly stable, reliable performance at low cost. Easy setup, hands-off operation.

TE-201

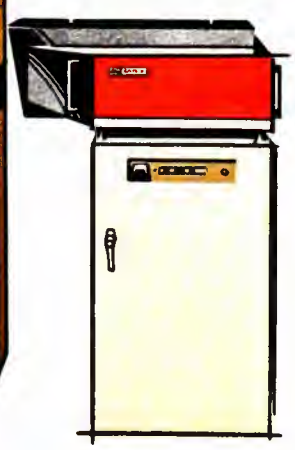
HARRIS
GATES DIVISION
Quincy Illinois 62301 U S A



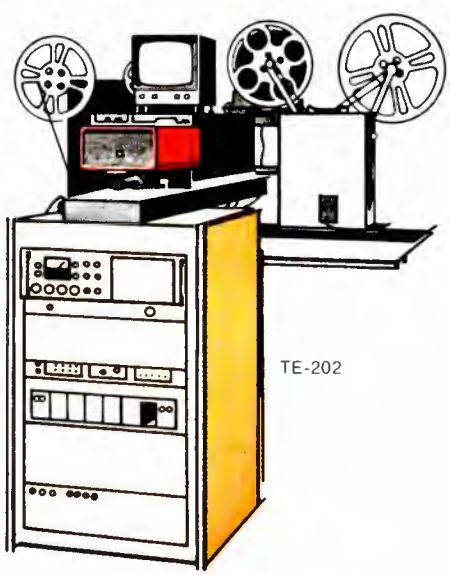
CT-500

PF-12

Slide Projector



PE-245



TE-202

Electronic editing so precise you might kiss tape splicing goodby!

The new Tape-Athon 1001 Recorder/Reproducer has everything the professional studio demands in a precision instrument, plus some exciting innovations we've added to make the 1001 a must-see-it-before-you-invest. Here are the basics: dual capstan, closed loop tape drive for clean, even tape travel with minimum wow and flutter; tach-controlled motion sensing to eliminate tape breakage, stretching or spillage; newly designed tape head section for easy threading, fast lifting; illuminated push button controls, flush mounted.

Now for the innovations, take a look at this control panel.

With the Tape-Athon 1001 you can initiate a "balanced torque mode" on the tape drive by activating the PLAY (or FAST FORWARD) controls simultaneously with the REWIND control. Both drive motors are balancing against one another, allowing the user to manually move the reels in either direction without drag, skipping or tape stretching. You can actually move the tape so precisely for editing purposes that splicing is virtually eliminated.

Call for complete details and specifications on the professional's professional 1001 Recorder/Reproducer (also now available in Reproduce-Only, 14 Inch Reel, and Logger versions for the broadcast industry) or write to:

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production switching systems shows the progression that's possible.

The VIX-100 series was designed to satisfy three prime motives:

1. Change the *OR* in Mix or Effects to Mix *AND* Effects on each two busses.
2. Eliminate the *"T"* in production *CAN'T*.
3. Maintain high reliability within the budget of television operations.

Changing the *OR* to *AND* in mix and effects equipment opened up a complete new vista in programming flexibility. Heretofore, all switching was accomplished using a single function on each two switching busses. Therefore, to dissolve from camera 1 into a split screen or key of camera 1 and camera 2, four switching busses, a mixer, and an effects generator were fully used (see Fig. 1).

In the above example, one mixer and one effects generator were used, leaving one mixer and one effects generator unused. This unused equipment represents approximately $8000 waste, plus four busses needed to perform simple tasks—all because of the word "or."

With a little ingenuity, Vital rearranged the mixer and effects to produce the Mix and Effects Package shown in Fig. 2.

This new system organization, the Mix/Effect Preset System, is capable of performing most complex operations on just two switching busses. The operations eliminate the busses stacking problems of which buss to use, and when, as well as trying to remember which fader handle to pull.

The Mix/Effect Preset System can perform ten multiple production requirements, namely:

1. Dissolve from A to B buss videos.
2. Wiping from A to B buss videos.
3. Dissolve into or out of a key of A and B buss videos (chroma or insert).
4. Wiping into or out of a key of A and B buss videos (chrome or insert).
5. Dissolve into or out of a split screen.
6. Wiping into or out of a split screen.
7. Dissolve into or out of a key and wipe (chroma or insert).
8. Wiping into or out of a key and wipe (chroma or insert).
9. Dissolving into or out of a spot-lighted or halo portion of the picture.

Computer-Generated Animation and Pictures

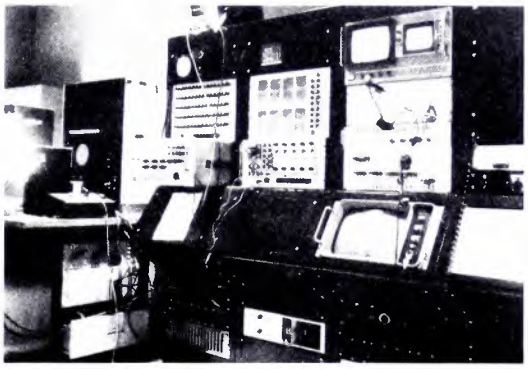
Introduced some three years ago as a "revolutionary" technique, Computer Image's hybrid computer and CCTV system made it possible to create animated effects never before possible. It quickly became known as the place to go for unique IDs and logos—if you could afford the $2000-$8000 typical cost. Today, through its Dolphin Productions operation, the company describes itself as a "creative television group with advanced computer-animation effects . . . for effective TV visuals." Computer Image/Dolphin has a room full of expensive equipment to generate these miracles. The system, before recording, lets you "see it first."

Few, if any, stations are prepared to make the investment necessary to achieve Computer Image's results, but the company has announced a Station Package Plan that entitles broadcast personnel to 25-hours time on the computer-animation equipment at one-half the rate schedule—which currently is $3600 a day. The only restriction is that an appointment has to be made to catch equipment during a free block of time.

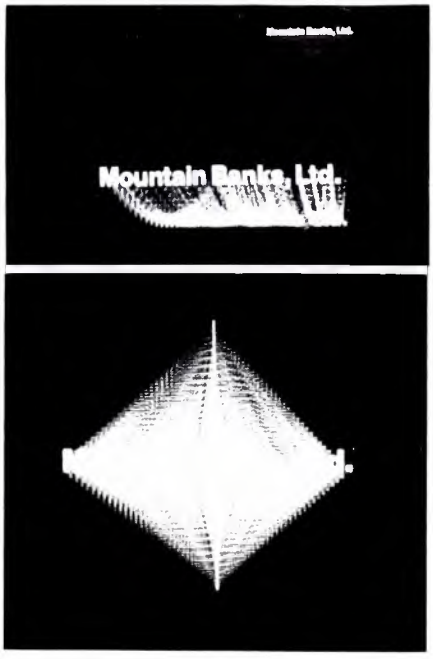
The Scanimate system does not do character animation, but can produce simple line animation. Black-and-white artwork is prepared on transparent sheets and placed in front of a modified TV camera which transmits the image to a high-resolution X-Y CRT display. On its way, the camera signals are processed by the hybrid computer which adds and subtracts, multiplies and divides, integrates and differentiates, and takes roots and powers. The CRT image goes through a variety of motions: exploding, zooming, plasticizing, growing, shrinking, pulling, twisting, squeezing, undulating and more. Control potentiometer settings adjust for position, size, and aspect on three dimensions.

The output can be recorded by videotape (via a TV camera) or on film using a standard cine camera. In the TV system, color is added by an NTSC encoder.

The Mountain Bank logo shows two possible effects from an infinite variety. For more information, write Computer Image/Dolphin, 305 East 45th Street, New York 10017, or use reader service card number 350.



Equipment for computer animation.



Logos show possible effects.

10. Wiping into or out of a spot lighted or halo portion of the picture.

Thus, each two-switching buss system becomes a real production tool. Four-, six-, and eight-buss systems unleash the production department to new heights of creativity.

Through human engineering, the number of pushbuttons has been held to a bare minimum. Automatic logic is employed to perform the necessary actions required such as transfers from mask key or wipe key to straight key, color to monochrome, and synchronous to non-synchronous operations (see Fig. 3).

The sync lock problem associated with special effects generators and color matte equipment has been eliminated by self-locking and generating the necessary pulses and subcarrier signals from the incoming A and B buss video signals. Thus, no external reference signals are required.

The built-in pulse, subcarrier, and colorizing equipment produces the capability of fading or wiping non-synchronous signals, such as network, to black or blue color background without locking the plant to network.

Keying, playing the workhorse role it does, calls for all the aids possible to relieve setup and control time. Therefore, a Blink Key, a Reverse Key, and an automatic gain controlled clip system, was designed. The blink permits titles or keyed-in material to "pop" in and out with the operator constantly switching. The reverse feature allows black or white material to be used for keying. The AGC clip control enables slides of varied density to be used without constantly monitoring and changing the clip level.

Since the Mix/Effects Preset System is capable of so many functions, most complex products can be preset in advance for minimum on-air confusion.

To achieve minute accuracy and to accommodate television artistry, normally considered impossible by a human operator, two new tools were designed—the Digital Mix/Effects Controller and the Random Production Programmer.

The Digital Mix/Effects Controller, DM/E, is a precision control unit whose accuracy is measured in minute percentages. This plug-in assembly replaced the fader handles with speed controls calibrated in vertical frames or fields and directional pushbuttons. The directional pushbuttons are labeled A to B and B to A. The speed control range from instant (000 fields) to 16.666 seconds (999 fields) for dissolves, wipes, or wipe dissolves combined, totally eliminates the guess work.

The DM/E also has incorporated two presettable travel stops with a digital readout depicting the percentage of travel from A to B, or B to A, Fig. 4.

The Random Production Programming System is a means of combining all video switching functions such as direct cuts, dissolves, wipes, quad splits, or eight splits, key inserts, and chroma keys into one operation. Since even an ambidextrous TD is short some eight arms and hands, a random Production Programming System is vital (pun intended) to perform the above functions simultaneously.

The Random Production Programmer, RPP-100 Series, is available for the VIX-100 Series switching systems as an add-on sub-system or self-contained unit.

The RPP-100 enables mixing, wiping, keying, or multiple picture splits to be accomplished directly on a single bus. As an example, a 20-input system has the potential to be a 20 Mix/Effects system with one Mix/Effect entered into the next. With all possibilities existing for unlimited program sequences on a single video bus, the video patch is virtually transparent to signal characteristics.

With the video signal patch simplified and nondegrading, the logic problem is simply handled by a small programmable controller. Thus, the ultimate in performance, ten-handed television artistry if you will, is accomplished with only one hand. **BM/E**

Glossary

Fade—A transitional effect. One fades out to black, or fades in from black to normal scene density.

Cross-fade—Outgoing scene as well as incoming scene fade to a selected color or shade of gray rather than to black. In a cross-dissolve, the outgoing scene dissolves to the selected color. In the second, the selected color dissolves out as the incoming scene dissolves in.

Mattes, matting—Inserting a picture from one source into that of another. As used in the film industry, an area is masked during the filming or printing and new picture information is then inset into the previous matted area. A travelling matte masks several portions corresponding with the constantly changing position of the subject matter within those areas.

Key insert—An electronically-controlled matting process in which key picture information previously recorded can be inserted into a second recording to produce a composite. In a typical use, the keying signal triggers a switch when the brightness of one image exceeds a certain level. White letters can be positioned on a second image, not by superimposition, but by switching out that portion of the second image during scan.

Chroma key—Same as key insert except that keying signal is derived from one color. If the color camera is keyed to a particular color, it can "refuse" to transmit the color. Thus an electronic hole is in the image. Usually the color key is blue since there are virtually no blues in skin tones.

Solarization—A reversal effect. Electronically, color is removed and image converted to a high contrast or negative image and then unnatural color of varying intensity is added.

Stop motion—Fields are presented frame by frame. Freeze frame shows one frame only.

Slow motion, speeded motion, reverse motion—Fields previously recorded are presented in a new time frame or sequence. Usually a disc recorder is involved.

Split screen—Field is divided into a number of areas horizontally, vertically, or both—such as quad.

Superimposition—Two pictures exist with nearly equal exposure.

Wipe—One screen is gradually replaced by another. Both scenes receive full exposure during the transition. Many stock wipes are generated by special effects generators.

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 servorized, via flexible cables and by effortless push pull rod control. And it can be attached to, fit and operate with any make of TV camera.

Shown on this page are only a few examples of the quality lenses Canon has available to more than meet your particular demands. Specify Canon to stay ahead.

The following are Canon TV Zoom Lenses for the Plumbicon® color cameras currently available on the market.

Size of image tube	Lens	Image format diameter
2/3" Plumbicon® color camera	P10 x 20B4	11 mm
	P17 x 30B1	4 mm
	P17 x 30B2	
1" Plumbicon® color camera	PV10 x 16B1	16 mm
	PV10 x 15B2	
	PV17 x 24B1	
	PV 6 x 18B1	

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The Canon TV Lenses Naming System

Apart from the above, Canon has available TV zoom lenses for 3" or 4 1/2" image orthicon cameras and can also build special lenses to fit your requirements.

Canon

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Circle 148 on Reader Service Card

Television's Creative Palette

By Eric Somers

Techniques used to create abstract television "art" can add appeal to local studio productions at minimum cost. Along with a little patience and imagination, even the smallest operation can put out video productions of considerable aesthetic appeal.

ANY IMAGE THAT DOES NOT CORRESPOND to real life visual perception—a matte effect for example—is considered a "special effect." Often such "special effects" are used as gimmicks to attract attention to a commercial, or to make a song or dance number look "arty." At the Creighton University Communication Arts center we are experimenting with techniques for creating entire television "programs" from "special effects."

In the context of our research we no longer consider non-representational images "special effects." We are developing a kind of television programming not committed to the traditional role of television, that of accurately reproducing images seen by the naked eye. We are creating visual structures, television "programs" or art pieces, made up of images *generated* by electronic and electro-optical systems.

For purposes of our research we have collected a fairly complex assemblage of equipment we call an electronic video design system. It consists primarily of commercially available electronic and optical devices (although some devices are being used for purposes other than that intended by their manufacturer), along with some equipment built by Jon Olerich, Creighton CCTV chief engineer, and me.

We have resisted calling the system a "video synthesizer," since it is not quite as versatile visually as modern music synthesizers are aurally. Our system is not a single video "machine," but is a constantly changing electronic system, as is a television studio, designed to create abstract and semi-abstract television pictures. We believe our system has greater image generating capability than any of the so-called "synthesizers" currently in use. Nonetheless, many of our image generating techniques can be duplicated by commercial broadcast and cable studios since many parts of our television system consist of devices found in most television studios.

Some broadcasters may shy away from the concept of abstract images, associating such images only with "far out" art pieces rarely seen over the air (except occasionally on public stations). But the creative producer can often borrow valuable techniques from the visual artist, even though his video productions may be aimed at a general audience. The painter, Pieter Mondrian, for example, influenced commercial advertising design tremendously. And many unusual photographic techniques seen frequently on the advertising and feature pages of today's magazines were developed by photographic artists like Man Ray and "weegee."

Mr. Somers is associate director of Communication Arts at Creighton University, Omaha, Nebraska, and was workshop director of the First National Videotape Festival, Minneapolis, Summer 1972. He also works independently as a communications software designer (film, television, holography, graphics, and sound design) and as a hardware systems designer.

Abstract images shouldn't be overdone: three categories

Electronically created images must have considerable variety if they are to be used often. Computer art often fails because it seems incapable of being developed (within the present state of technology) beyond the level of geometric tricks. Every work of pictorial art contains elements of tone value (brightness) and color (even though there may be only a single color, i.e. monochrome). Ability to control the tonal value and color to a great extent will help make interesting images.

The forms, or shapes, found in pictorial art can generally be categorized into one of three types: lines, masses, or textures (actually *apparent* texture since the term "texture" in its strict sense relates to the sense of touch). A producer who wishes to use abstract images effectively should know techniques for generating images of all three types. In that way he can avoid the trap of over-repetition of the same forms.

Changes of color and tonal value in a television picture can alter the overall image immensely. Often changing these elements in the picture produced by a conventional television camera is sufficient to create a semi-abstract image of great interest. Reversing polarity or altering the balance between the outputs of the pick-up tubes in a color camera are obvious and somewhat crude methods of changing tonal value and color.

Use the colorizer and quantizer

A more sophisticated technique is to use a colorizer or quantizer. A colorizer takes a monochrome video signal and inserts color information related to the brightness component (i.e., voltage) of the sig-

nal. The resulting colors, of course, bear no relationship to the colors in the scene being photographed. The results can be startling.

A video quantizer changes both the tonal values and color values. It consists of a series of gates which "slice" the gray scale (voltage range) into a number of divisions. Each division is assigned a certain tonal value (voltage) and color which need bear little relationship to these components of the original signal. The "slice" is a segment of a continuum, but the electronically generated signal which replaces a slice is of constant brightness (voltage) and color. Therefore, the result is a series of colored contours, the number determined by the number of "slices" selected, which give the impression of a picture created by overlaying colored paper cutouts.

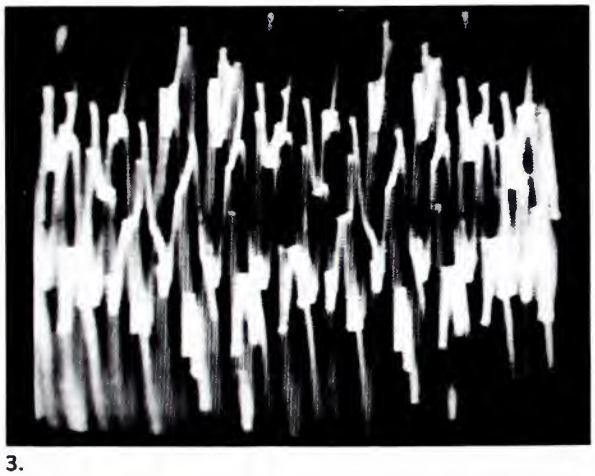
We are always looking for effective ways of creating synthetic color at Creighton, since our best image generation techniques are capable of providing monochrome pictures only. Of all the techniques and devices we have tested to date, the Colorado Video model 606 quantizer is the most versatile. It is capable of up to 16 "slices" and produces an R-G-B output suitable for encoding to the NTSC, or any other, system. Although its $3500 price tag may be a bit steep for very low budget operations, it is an extremely versatile production tool that should find considerable use in the hands of a creative production team. In day-to-day production not using abstract effects, the quantizer can be used to create color effects in titles and graphics that would otherwise require considerable skill and time on the part of a graphic artist.

Video feedback produces abstracts

An easy and inexpensive method of producing interesting abstract shapes is by controlled use of video feedback. We are talking about optical feedback—pointing a television camera at a monitor displaying the output of the camera. If one is totally

1.

2.



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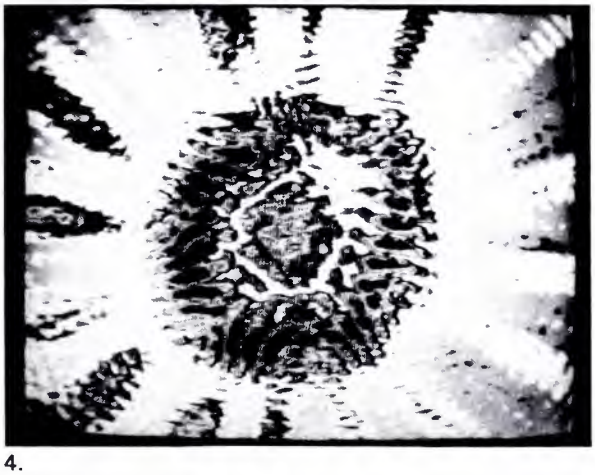


4.

1. Television images of dancer, Robyn Chickinell, as colorized on Colorado Video model 606 video quantizer.
2. "Pure" feedback image. No other images or techniques used in generation.
3. Complex oscilloscope pattern is picked up by television camera and colorized. (Riker's colorizer was used.)

4. "Sunburst" effect created with laser diffraction patterns. Laser diffraction patterns having an oriental quality can also be made. Simple shapes are drawn in ink and photographed on Kodalith film. Complex patterns are produced on vidicon tube by diffraction of laser beam (collimated to about 1/16-inch in diameter) through simple Kodalith "slit" image.

Another abstract design created completely with specialized electronic equipment.

unfamiliar with feedback images, it is perhaps best to start by placing a studio monitor directly in front of a camera and focusing the camera on the screen. The output of the camera should then be fed to the monitor and an object placed near the monitor, between the camera and the monitor. If the camera is then shaded correctly, and the monitor brightness and contrast controls set properly, a "tunnel" of image repetitions will result, similar to the effect produced when two mirrors are placed opposite each other.

Instead of placing an object between the camera and monitor it is also possible to display on the monitor two images, one from the camera aimed at the monitor and one from another camera. Repetitions of the image of a person, for example, can be created this way. By mixing the images from the camera photographing the person and the camera generating feedback, an image can be put on the line which contains a well defined subject and a series of less defined "shadows."

But feedback can be used alone to create images of great complexity. Returning to our original camera-monitor set-up, but without an object placed between the camera and monitor or a secondary image displayed on the monitor, gradually rotate the monitor through at least a 180 degree arc. At various points around the arc stop and adjust camera iris and pedestal (and possibly monitor brightness controls) and various circular or polygonal shapes of varying degrees of complexity should occur. The camera may be zoomed or dollied to change the effect. When certain factors interact together, images in motion may result even while there is no manipulation of camera or monitor controls. Reversing polarity will also create new images. If images from another camera are also displayed on the feedback monitor, these forms will be integrated into the abstract display. A moving point of light, such as a candle held in front of the monitor, will produce multiple spot patterns.

Feedback images require much patience and considerable knob twisting to produce really impressive results. But careful and patient experimentation will reveal that a seemingly endless array of images can be produced. Certain camera-monitor combinations work better than others. Often low-cost CCTV cameras, especially those having an RF output feeding an ordinary home receiver, produce the most complex patterns. But we have also achieved excellent results with broadcast type cameras. The lack of specialized equipment needed and the variety of shapes which can be produced have made feedback a popular technique with young people having access to portable equipment.

Feedback images are probably best generated in monochrome and colorized synthetically. But some color camera/color monitor combinations are capable of producing excellent color feedback images, especially if the output levels of the color pickup tubes are altered as the images are being produced. We have achieved especially good results with a Norelco LDH-1 Plumbicon camera and a Sony Trinitron monitor.

Oscilloscope images resemble computer-generated patterns

Line images, often resembling computer generated images, can be inexpensively obtained with one or more function (or audio) generator, an oscilloscope, and a television camera capable of reproducing the image from the oscilloscope screen. The technique is simple. Produce a visually interesting design (preferably one that moves) on the oscilloscope CRT and photograph it with the television camera. Synthetic colorization is almost a necessity unless your favorite color is green.

Ben Laposky, an artist who began making still photographs of images produced with an oscilloscope as far back as the early 1950s, uses a white phosphor cathode ray tube (as found in flying spot scanners) and adds color with a rotating color wheel. Since the image is "drawn" on the face of the CRT over a period of time, various portions of the image take on different colors corresponding to the segment of the wheel that is in front of the moving spot at a particular time. The light output of such a setup is so low that only exotic color cameras designed for extremely low light operation could probably reproduce a complex trace (containing fine lines).

Most engineers probably know how to produce a large number of interesting shapes on an oscilloscope. Such images are frequently displayed at science fairs and are a favorite pastime with technical students and others—a PhD professor in Creighton's School of Medicine admits to occasional electronic "doodling" with an oscilloscope and function generator used in his research. For those who may have used a scope only as a test instrument, however, some review of image producing techniques may be useful.

A signal from a function or audio generator may be used to affect the CRT display in one of four ways. It can drive the vertical axis of the scope and be displayed horizontally using a horizontal sweep signal generated by a built-in time base. (On some scopes it is possible to reverse the arrangement and feed a signal to the horizontal axis to be displayed along a vertical time base.) A signal can also be fed to either the vertical or horizontal axis of the scope and a second signal fed to the remaining axis input. By use of a simple phase shift circuit the same signal can be fed to both axes, but one out of phase with respect to the other. Finally, a signal can modulate the Z-axis (brightness) of the CRT display.

Complex signals often make the most interesting display patterns. Simple forms from several generators can be mixed. Some scopes also allow for elec-

continued on page 61

NAFMB Convention Highlights

Quadcasting, programming, deregulation, community ascertainment, "all-channel" radio, and FM auto radio got keen attention at NAFMB annual convention.

THE NAFMB KICKED OFF WITH ITS VERY FIRST discussion meeting on quadcasting. Almost universally, broadcasters who participated in the discussions felt that four-channel had given them an edge in their markets—in some cases with substantial increases in station revenues.

Leading the meeting were Jac Holzman, president of Elektra Records; Jerry LeBow, director of Special Projects/East for ABC-FM Spot Sales, Inc.; John Mosely, consultant for Sansui Electric Co.; Claude Hall, radio/TV editor of "Billboard;" Jim Gabbert, president and general manager of FM station KIOI, San Francisco; and Dick Schory, president of Ovation Records. The meeting was moderated by Ray Nordstrand, president and general manager of WFMT, Chicago.

In commenting on the meeting, Dick Schory said, "It was basically a very open-minded audience. They had come here to listen and to learn. The matter of discrete vs. matrix had a very good airing. The matrix people are very much alive and will continue to be increasingly vocal in getting the message across to broadcasters, record manufacturers and, ultimately, to the consumer."

Most broadcasters present at the convention are using matrix four-channel—obviously since this is the only system they can use within the framework of existing FCC regulations. Broadcasters seem to play both SQ and QS records with little overt preference for one or the other. However, questions and comments from the floor indicated that the QS matrix does indeed have an edge in the marketplace.

FMers indicated from the floor that they are making money in four-channel broadcasting, and directly because of such broadcasts. Some examples cited showed substantial added revenues for some stations resulting from quadcasts. Also cited was the ease of getting into quadcasting via matrix records—the station operator simply plays an encoded record with no additional equipment needed—and suddenly he's in four-channel.

Four-channel has done well for the stations. WNCR (Cleveland) made an extra $75,000 in revenue last year; KSLQ (St. Louis) projected $25,000 to $35,000 extra for this year in local sales alone because of four-channel. They're very high on quadcasting for obvious reasons. Other broadcasters indicated that while quadcasting hasn't resulted in any additional revenue as yet, it has given them an enormous promotional advantage over the competition.

Present industry estimates place over a million matrix decoders in the hands of listeners, which makes for a huge, ready-made audience. Claude Hall of "Billboard" magazine, known as a staunch advocate of discrete broadcasts using the Dorren system, admitted that matrix systems are now very viable. He further stated that of all available matrices, the Sansui QS system is the best one. He has made side-by-side comparisons of all of these systems. He said, "SQ with logic is 500 times better than stereo and the QS with vario matrix is 700 times better than stereo." Dick Schory's reaction to the discussion meeting: "Broadcasters are now in a mood to get into four-channel broadcasting in large numbers."

John Mosely commented on the mystique of specifications: "People are looking at numbers—how many dBs of separation there are—without understanding the significance of these numbers. I believe that the industry must understand that the basic purpose of any encoding or broadcast system is to satisfy an art form. I hope a lot more attention will be paid in coming months to a sensible artistic evaluation of the various systems, instead of simply looking at the numbers by themselves."

Ed Kenehan (left), gets award and applause from Elmo Ellis for his many years of service to the FM radio industry.

FM programming comes of age

Five industry experts reported on radio programming—Charley Whitaker of Tempo 2 (a commercial and jingle production service) in Dallas; Claude Hall, radio/TV editor of "Billboard;" Jerry Stevens, program director of WMMR, Philadelphia; Mike Shain, music editor, "Broadcasting" magazine; and Bill Gavin, publisher of "Gavin Reports."

Whitaker's comments on conventional MOR stations showed his displeasure with the way they typically handle commercials. "They're terrified of com-

mercials that might get some attention," he said. "You can listen to a station like that all day and not even realize they have any commercials at all. If a station is afraid of commercials, it's not really a commercial station."

He thinks that the current growth of country and western as a format is nothing short of astounding. "It's the most honest buy an advertiser can get today," he stated, and feels that a commercial message won't disappear in the midst of mediocrity, the way too many of them do with other types of programming.

Claude Hall complained of the tendency of stations to copycat one another in the same market. He cited the Los Angeles market as having no less than eight rock FM stations, but not a single one for MOR, C&W or bubble gum. He also feels strongly that many do-nothing FM station owners should have the stations taken away from them for lack of service to the public.

Radio today has outgrown (tragically) its original level of imagination, lamented Jerry Stevens. No matter what the format, radio he feels, has arrived at general mediocrity. "Today's announcers use their voices, but not their minds," Stevens said.

The oasis amid this wasteland is progressive rock. This format has been refined and has been a good reaction to the blandness of the rest of the programming being offered. But, Stevens contended, broadcasters still tend to underestimate their audiences. "Radio is still missing humanism and that important one-to-one contact," he said. "We need 'human radio' today. At WMMR, we don't even have a format as such, but have instead a 'concept.' We're in touch with the listener constantly and provide him with a full measure of respect, information and education."

Mike Shain feels that the NAFMB's original statement some time ago that "FM is radio" is no longer rhetoric, but has come true. He feels that beautiful music as such will always have an audience no matter what. "After all," he said, "beautiful music is what put FM on the map." He feels that progressive rock is finally trying to get out of its reactionary phase and is now a major force in programming.

"FM was soft-pedaled at first," Shain continued, "but people listen to FM because they want to." He lauded the growing trend toward talk programs on FM, and bemoaned the fact that FM is still virgin territory for C&W music. He feels that AM stations are so irrevocably locked into their existing formats that any innovative or new programming must appear on FM. As an example, he cited the rise in "oldies" programs now being aired by a number of FMers throughout the country.

One of FM's greatest feats, according to Bill Gavin, was restricting the number of commercial minutes aired per hour. He pointed out that AM broadcasters are now beginning to do the same. He feels that FM has provided new opportunities for experimental programming, and that this freedom to experiment has led to some exciting new musical discoveries.

From the purely musical standpoint, Gavin continued, FM is not bound by old, sterile formats. Radio still has room for creative people, and he implied that they are to be found in FM.

Some problems in FM broadcasting cited by Gavin: vast proliferation of stations; the switch from automation to live programming with its resulting increase in demand for free promotional records from the disc manufacturers. This has resulted in restricting if not eliminating the availability of such promo copies for small AMers who can't afford to buy them. Personnel problems also exist. New men on the air for FM stations have thinned out the ranks of AM people, and there is a limit to the supply of such qualified air personalities. Thus, the price paid for these people is constantly being inflated.

The benign FCC

The FCC's Reregulation Task Force set itself up as a target for questions during an hour-long dialogue. Present for questioning were Commissioner Harold Kassens and Task Force members Steve Crane, Phil Cross, and John Taff. Moderator for the session was Edward Kenehan, Washington communications attorney.

Mr. Kassens opened the dialogue by affirming that broadcasters must get involved with the Task Force or reregulation simply isn't going to happen. "One of our main objectives on Reregulation Day was to get you people involved," he said. He emphasized the importance of ascertainment, and the fact that this is far different for radio than it is for television. He pointed out that the next step is a kind of 1040A form—an abbreviated short-form application for stations to fill out—something that is much needed by broadcasters.

One small-station broadcaster questioned the panel on filing fees that he felt were burdensome and excessive for the small broadcaster. Mr. Kassens said that these fees were not really the Commission's doing but that, since Congress has forced the FCC to finance its entire operation from fees, such filing fees must be charged to the industry.

Another FMer asked if the Commission could do something to keep the licensee informed. Mr. Crane replied that this is a major chore for the Task Force —to chart priority items for consideration. Heading this list, he said, is improved communications between the Commission and the licensee. Viability of such communications is presently limited by the FCC's funds and manpower. Possibilities include direct contact with the local Field Office and a new WATS line to the Washington office which has been proposed by broadcasters.

Mr. Kassens indicated that, even internally, there are communications problems with the Commission. A milestone that he commented on occurred recently; for the first time in the FCC's history, all of the Commission's engineers met in one place at the same time.

A question raised by KIOI's Jim Gabbert dealt with ascertainment, and the great deal of time that it required on the part of the broadcaster. He point-

ed out the difficulty of reaching appropriate public officials in his own community (San Francisco) to determine priorities of public service needs. His station finally discovered that the number one public problem in San Francisco's streets was that of dog droppings on sidewalks. The station then began a project of giving plastic shovels bearing the station's call letters to listeners.

Mr. Cross answered by posing a question. He asked, "How do *you* feel you can best do the job of serving your community?" He pointed out that the new Notice of Inquiry (March 22, 1973, Docket No. 19715) asks the broadcasters what they feel can be done to best serve the public interest. He emphasized the vast difference between radio and TV and said that these two media should have totally different sets of Rules and Regulations. "We must ask ourselves," he said, "just what is the role of radio vis-a-vis television? Then, just how should ascertainment be applied?"

One small-station FMer asked about more personal contact between the station and FCC personnel. Mr. Kassens replied that the Commission has been encouraging members to visit small stations.

One questioner asked about the highly restrictive nature of forms used for station license renewals. He asked why the station couldn't simply tell what they had done in their market. Mr. Cross answered by outlining the purpose of the Inquiry. "It's to determine just what can be done to remedy these problems," he stated. "If you've done a good job, how can the Commission review your station's performance objectively without having some guidelines? That's why the renewal forms are set up this way—to set standards to go with in reporting on your station's performance."

Mr. Crane amplified on this theme. He pointed out that there is a very definite reason and need for these guidelines. But he also urged broadcasters to respond to the new Inquiry to help change rules that are felt to be too restrictive. Mr. Kassens indicated that the Commission must be assured that the important problems of the community are being served by the broadcaster. "Some people," he contended, "feel that the only function of a radio station is to entertain."

Know who your friends are

In a spirited session on the opportunities for developing FM audiences on the highways, broadcasters heard from: Ken Cox, chairman of the Joint Committee for All-Channel Radio Legislation; Jack Wayman, Electronic Industries Association; Robert Earle, director of marketing services, Delco Electronics Corp. (Div. of General Motors); Bart McLendon, general manager of KNUS, Dallas; and Harry Maynard, contributing editor to a number of audio publications.

Mr. Cox discussed the All-Channel Radio Committee's activities and said that it included representatives from every major industry and broadcaster group, committee, and association. He pointed out the high degree of interest in all-channel legislation for educational radio, since virtually all educational assignments are for FM stations.

A new all-channel bill has been introduced by Senator Ted Moss of Utah in this session of Congress. The Committee would like to have hearings bearing on the bill this Spring, since the feeling is that this is the year to try to get the bill through Congress. The Committee has just prepared a new brochure in question-and-answer form, which will be available to the public. Mr. Cox emphasized the need for total public support for this legislation. He indicated that the Corporation for Public Broadcasting has been making studies of production costs of AM/FM receivers in conjunction with this proposed legislation.

Jack Wayman, speaking for the Electronic Industries Association, espoused the EIA's strongly anti-legislation stance. In citing facts and figures, he pointed out the enormous growth of FM sales in the U.S. in the last decade. Of 55 million radios sold in the U.S. in 1972, an overwhelming percentage had FM capability. He emphasized that the consumer electronics industry is built on price. The EIA totally opposes the legislation, feeling that it violates the basic American free-enterprise system.

Wayman pointed out that 80% of all U.S. homes have an FM receiver of some kind, and that the buying public is continuing to buy FM sets in large numbers. "There's nothing we would like better," he continued, "than to see an increase in FM sales."

He indicated that an all-channel bill's major thrust would be toward car radios, since more than 70% of all home radios sold today have FM capability. The results, feels the EIA, would be a substantial increase in the price of all car radios. Further, the Association feels that such a law would arbitrarily limit the choice of hardware to the consumer. The EIA feels that the public's freedom of reception and of choice must be upheld.

Delco's Robert Earle described the dramatic growth of FM auto radio production since the first AM/FM sets came off the production line in 1963. A measure of this growth: 1970 production included 17% AM/FM radios; in 1972, FM represented 30% of production; 1973 estimates are 35 to 38%; forecasted for 1975 is a 50% figure.

The marketing strategy is to make sure the GM car buyer knows he can opt for FM in his new car. There is an active program of advertising in all media, and special task force personnel visit the dealerships to promote FM radios sales. "We manufacture radios only for cars," Earle continued. "We make no home receivers. Our aims are your aims—to expand the FM auto radio market."

One broadcaster who doesn't want to see all-channel legislation because he believes it isn't needed, is Bart McLendon, general manager of station KNUS in Dallas. He feels that it's up to the FM broadcasters themselves to promote the concept of highway FM listening. In his own market, his station inaugurated a highly successful promotional campaign with FM converters.

KNUS banded together with other FM broadcasters in Dallas and initially purchased 780 converters

for promotional purposes. Involved were nine FM and three AM stations. The first thrust was through the local Volkswagen dealer, who received an enormous amount of free publicity as part of the program.

Volkswagen owners were invited to come to the dealership where they could buy a $29.95 FM converter for $19.95 including free installation. It took exactly 45 minutes to sell all 780 converters. "It took that long," said McLendon, "because I couldn't make change any faster. There was still such a long waiting line after we sold out, that I sold 800 rain checks for $19.95 each.

"Soon afterwards, I got a call from the local Ford dealer. He wanted a piece of the action. We ultimately used Toyota for our next promotion, and this time tied in also with the Fort Worth FM stations. We sold 1500 units in an hour and a quarter. We couldn't sell any rain checks that time, because we had completely cleaned out the importer's stock."

McLendon feels that this type of promo is dynamite in almost any market. There are a lot of converters available, he pointed out—some better than others. By the end of this year, he expects to have sold over 50,000 converters, which should make an appreciable difference in audience ratings.

"But we weren't all that happy with the technical performance of the converter we were selling," he continued, "so we sent one of our people to Japan where we contracted for converters built to our specifications." These are starting to come in now, and KNUS will be offering them to other stations on a no-cost, consignment basis to help promote FM nationwide. He reiterated his feeling that all-channel legislation is simply not needed, since a promo campaign of this kind works wonders in any market with very little effort.

"A bonanza is waiting for you in the car listening audience," said Harry Maynard, staunch FM advocate and well-known contributing editor for a number of high fidelity publications. "There are more than 110 million moving vehicles out there that are your potential market," he continued. "Even truck drivers are installing stereo rigs in their cabs."

He pointed out that FM radio has become the listening booth for the record industry. He affirmed that the FM broadcaster has a friend in every car and car stereo dealership in America.

"Last year, 3.5 million car stereo systems were sold; this year more than 4.5 million will be sold. Most of these contain some kind of FM capability," he asserted.

He related how some new car buyers are more impressed by the kind of sound system the car has than with the car itself. "A new car buyer often thinks to himself, 'poor sound, poor car,' " Maynard continued. He pointed out how perfect a listening environment is provided by a car, and closed by saying that at least 15% of the U.S. population spends more waking hours in their cars than they do at home.

BM/E

Radio Marries Cable; Everybody is Happy

By Bob Moss

In Naples, Florida, Palmer Broadcasting has WNOG (AM), WNFM (FM), and Gulf Coast CableVision all under one roof, sharing staff and facilities.

Lobby of Radio-Naples new combined radio-cable headquarters has bank of monitors at right showing program on each cable channel, cable sales area, and subscriber files in rear.

Cable control room, next to two-story studio, has switching in front of studio window. Norelco LDH-1 film chain at the right. IVC 1-inch and Sony ¾-inch cart machines are primary sources of recorded video programming.

The cable origination studio has light grid across ceiling, is shown with set used for daily weather report. One of the Norelco LDH-1 color cameras is in the center.

COMBINED RADIO AND TELEVISION OPERATIONS are all over the landscape; they may complement each other in a given market in obvious ways, and there are "economies of combination" that often make the marriage attractive.

Can radio and *cable* make it together? The answer can be an emphatic "yes," judging from the record of Palmer Broadcasting with "Radio Naples," in Naples, Florida, an AM-FM-cable operation that recently moved into a new home designed specifically to accommodate all the needs of each member of the family.

Palmer owns WHO/AM-FM-TV in Des Moines, and WOC/AM-FM-TV in Davenport, so combination operations are nothing new. The company bought Gulf Coast CableVision in 1964, planning from the start to combine it with the radio operations at an appropriate time. Before the construction of the new headquarters, though, Palmer undertook, in 1970, a $1.5 million rebuilding of the cable system. The entire 250 miles of plant is underground. Channel capacity was raised from five to 24, tube amplifiers retired for up-to-date solid-state equipment. The rebuild gave Gulf Coast the high picture quality and channel capacity it wanted. The area is very poor for over-the-air television. Gulf Coast has brought TV abundance, with four to five Miami stations (including the network outlets), two from Fort Myers, and one from Fort Lauderdale. Gulf Coast now has about 15,000 subscribers, as a result of very steady growth in recent years.

In 1971, ground was broken for the new all-system home, constructed by the Austin Company and completed in January 1973.

The half million dollar plant is known as Radio-Television Centre. Administrative offices and the CATV operations moved in immediately.

WNOG/WNFM operations transferred in early May when installation of all new studio equipment was completed. The old combined WNOG/WNFM studio-transmitter site is being retained, linked to the new studios by STLs with remote operation of the transmitters including WNFM's stereo channel with sideband background music channel. The old studio facilities are being converted to a warehouse and construction headquarters for the CableVision personnel.

Mr. Moss is broadcast operations manager, Radio Naples.

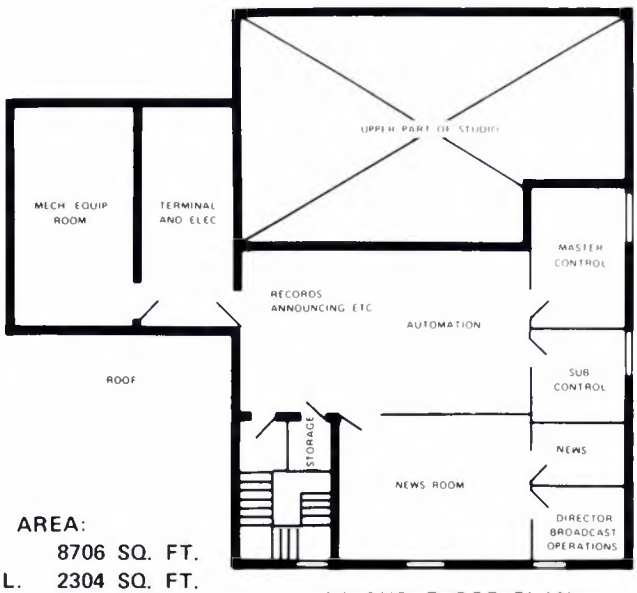
When the FCC held that cable systems with more than 3500 subscribers would be required to begin their own local program origination, the unusual relationship with the broadcast properties began. From the beginning, it was felt that hiring personnel to staff the CableVision program channel for local origination would be an inefficient way of approaching the problem and also that the available advertising dollar in a community as small as Naples would not support that much overhead. Besides, Palmer officials felt there was a wealth of established, locally-known talent already in the radio properties from which to draw.

The first move was creation of a one-hour information block Monday through Friday from 5:30 p.m. to 6:30 p.m. The radio news department was given responsibility to get the programming started on a professional level. Today, the CableVision Two local origination schedule has been upped to some 20 hours per week including the information block, an afternoon women's interview show, evening travel, hunting and fishing shows. Local government is also liberally covered with live broadcast of regular meetings from their meeting rooms, as are Sunday church services.

The theory behind the Naples local origination is simple: "Where else can subscribers get exclusive, detailed coverage of what's happening in their community?" It's all local and this is the prime selling point of the block.

The managerial staff is very strong, to a man, for the "local approach," starting from the top with Division Vice President and General Manager William J. Ryan, and including the other members of the administrative team: myself as broadcast operations manager; Quane Fletcher as CableVision operations manager; and Homer Dixon as sales manager whose staff handles both radio and TV.

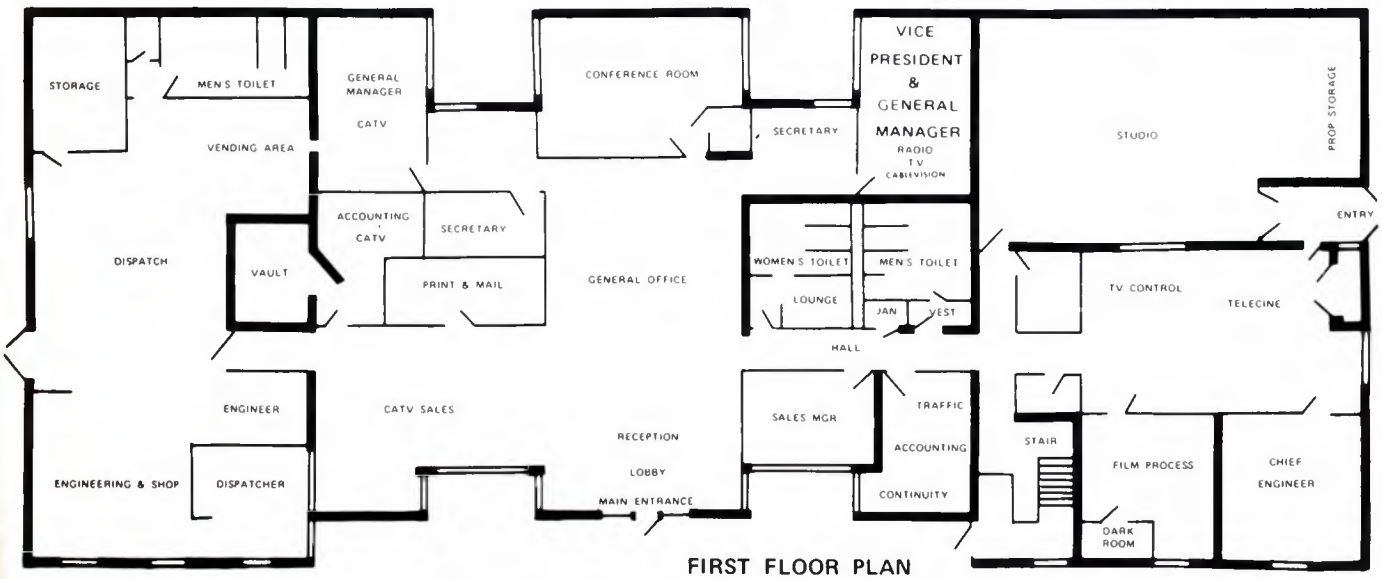
Exterior of building for combined operation was designed to match the "conservative and tasteful" atmosphere of Naples.



SECOND FLOOR PLAN

AREA:

FIRST FL.	8706 SQ. FT.
SECOND FL.	2304 SQ. FT.
TOTAL	11,010 SQ. FT.



FIRST FLOOR PLAN

Floor plan of two-story building shows careful layout for convenience in sharing staff and facilities for radio and cable operations. Technical operations are grouped in right end of building, with cable on first floor, radio on second, studio adjoining both.

The approach has paid off in every sense of the word. At the end of 1972, CableVision Two was at the breakeven point. Other CATVs have reported breakeven on local origination an elusive goal.

The only TV personnel hired at the outset were a director and two part-time studio floormen. Traffic and continuity were incorporated into the radio operation.

During the first days of the local origination, the CableVision studio and Radio Naples plant were ten miles apart. Thus, management's full concept of utilizing personnel interchangeably between radio and television could not be fully realized. Now, with both operations under one roof, that concept of common personnel is moving ahead full steam.

It is one goal of the Radio-Television Centre to make the radio staff completely usable on CableVision Two, both as talent and as technical staff. Already many of the radio staff are capable of moving into television to direct, run camera, do prop set-up, or whatever else is needed including use of their on-air talent. Over the course of the next several months, the goal is to make all of the staff proficient in both areas.

Above are two of the radio production rooms used by both AM and FM stations; room seen through window is primarily for the news department, room in foreground for commercial production.

Dispatcher-customer relations desk takes all service calls, sends out service crews, watches all cable channels for proper operation.

Advertising sales for CableVision Two have been handled by the radio sales department without additional personnel, which gives account executives additional opportunities for commissionable sales. The interchangeable radio personnel are given a chance to pick up additional income from cablecasting talent fees.

In the planning stages, to be introduced in August, will be an attempt to establish a unique identity for cablecasting. We want to get away from appearing as just another television station, but still retain a professional look in content and production.

The Palmer concept is that cablecasting, because of its highly selective audience, should take a more "living room" approach, be more personal with its viewers. It won't be governed so much by pre-set blocks of time. It will delve into community problems at greater length. It will utilize on-the-air audience participation by telephone to give subscribers the chance to talk with the newsman who covered a particular story.

Also in the picture for coming months are the prospects of using some syndicated material. I believe the flexibility of closed circuit local origination is enormous. We should capitalize on that, instead of just trying to do standard broadcast by wire.

Currently, in addition to CableVision Two and the off-the-air signals, three other channels are offered: a news-ticker channel (Reuters), a weather and program-schedule channel (sometimes bumped), and a stock channel.

Dr. David D. Palmer, company president, has expressed pride in his staff's achievements and innovative thinking. "We are pleased that a new approach to community service can utilize Radio-Television Centre for Naples' benefit," Palmer said. "This is the concept motivating our services and I am especially happy with the innovative techniques our staff has developed to achieve them in our Naples operations."

The CableVision Two local origination equipment complement includes: studio camera—Norelco Color LDH-1; film chain camera—Norelco Color LDH-1; remote van equipment—TeleMation with two black-and-white cameras; VTRs—two IVC 800s, one IVC 700, two Sony U-matic VO 1600 cart machines, one Sony AV 3650, two Sony 3400 portables; 3M video processor; RCA consolette for audio mixing.

The CableVision Two system uses a Jerrold headend and Jerrold Starline 20 distribution system.

The new building, as shown in the floor plan and photographs, has been thought through fully to supply convenient, integrated facilities for the combined operations. Business operations are all in the center and left end. Cable has its own two-story studio with control room, telecine, etc., adjoining on the first floor. Radio program production is over cable, on the second floor. Economy of joint operation has been fully exploited in the layout of the plant. Radio Naples is ready for an expandable future! **BM/E**

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BROADCAST EQUIPMENT

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Audio frequency power meter covers 20 Hz to 20 KHz, has scale for 0 to 50 milliwatts, with 10- and 100-times multipliers. Model OP-182C has ad-

justable impedance, 2.5 ohms to 20,000 ohms in 40 steps, is calibrated in dB as well as watts. McGRAW-EDISON COMPANY, EDISON ELECTRONICS DIVISION. **275**

Digital voltmeter has delayed slope integration to reduce noise, internal autozero without kickback. Model 5000 has five-digit display, five DC ranges covering 1 microvolt through 1000 volts. It has autoranging, mechanical interlocks to prevent inconsistent range and function. $995. DANA LABORATORIES. **276**

AML transmitter monitor allows determination of signal quality at VHF, without an auxiliary microwave receiver. Model AML-TM1 can be retrofitted to AML microwave systems in the field or ordered with new systems. Output connects directly to a TV set, field strength monitor, VHF spectrum analyzer or frequency converter. THETA-COM. **277**

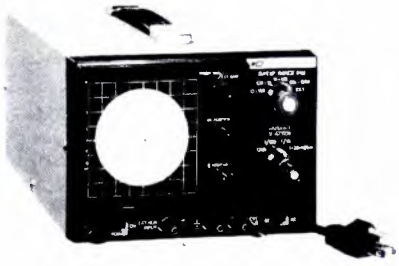
Variable-persistence display unit has a range from 300 msec to 100 sec. Model 711, in addition, can store an image for up to six hours. Intended mainly for audio and baseband spectrum analysis with high resolution, requiring a slow scan rate, it has plug-ins for audio, baseband, and video frequencies, and with an external converter, the communications and SSB bands. $2600. SYSTRON-DONNER. **278**

Zero carrier keyer demodulator provides for setting depth of modulation of a TV modulator. Zero Carrier Keyer covers all CATV channels without tuning. COMSONICS, INC. **279**

Vidicon camera test tools allow for checking centering and tilt in relation to camera lens mount. Centering Test Tool is a precision tapered viewing tube; Tilt Test Tool is a precision pattern and iris diaphragm mounted to produce a tilted pattern on the monitor if the vidicon is tilted. PHOTO RESEARCH. **280**

Spectrum analyzer covers 0.1 to 1500 MHz, is a plug-in for HP-180 series oscilloscopes. Model 8558B analyzer has ± 1dB response over the frequency range and greater than 70 dB distortion-free dynamic display range. Center or start frequency setting is shown on a 3½ digit LED readout; frequency span is adjustable, 50 KHz to 1000 MHz. Level setting is directly calibrated in absolute power units. $3350. HEWLETT-PACKARD. **281**

General purpose oscilloscope with three-inch screen covers DC to 2 MHz,



can view waveforms to 150 MHz direct-connected. Model B&K 1403 "Miniscope" is 100% solid state, has a new wide-angle CRT, 20 mV/cm vertical sensitivity, is only 5¼" x 7⅜" x 11¼", has four time bases, 10 Hz to 100 KHz. $179. DYNASCAN. **282**

High-input impedance multimeter has a floating input eliminating user hazard, when measuring in circuits not grounded on the low side. "Masteranger" Model 639 has a six-inch scale with mirror, accuracy 1.5% of full scale, 90 dB common-mode rejection, battery or AC operation, 80 ranges of voltage, current, resistance, frequency response to 20 KHz, optional RF and high-voltage probes. $165 (Canadian). CONWAY ELECTRONIC ENTERPRISES. **283**

Swept-frequency data enhancer provides automatic frequency response error updating, rapid comparison measurements, and digital logging of analog signals. Model 1716 Reference Storage Unit works with the GR 1710 RF network analyzer, or with other swept-frequency measurement systems; it simplifies tracking and repeatability measurements of RF devices—switches, relays, etc. $1600. GENERAL RADIO. **284**

Amplifiers—AF, RF, Video

Audio distribution amplifier has six highly isolated output circuits. Model 1AD has 600 ohm balanced input on

each, gain unity to 20 dB, noise −70 dB, distortion less than 0.5% at 18 dBm output. SYSTEMS ENGINEERING CO. **286**

Voltage controlled amplifier has power bandwidth of 20 KHz, with 10 v p-p. Model 1300.3 is on a nine-pin module, provides up to 80 dB attenuation at 1 KHz, 60 dB at 10 KHz. $75.00. TOTAL TECHNOLOGY. **287**

High-impedance private-line amplifier is for TV-crew and other large-field intercommunication jobs. "PLAMP" is mounted on a 1-11/16-inch by 1-inch printed circuit board, increases terminal impedance by a factor of six. Output transformer isolates from phones with duo-diode limiter; zener diode prevents feedback with mike switch off. FAIRCHILD SOUND EQUIPMENT CORPORATION. **285**

AM-RF amplifier raises off-air AM signals to level needed to drive approved modulation and frequency monitors. Model TBM-8800 uses ceramic ladder filters for IF, has separate power amplifiers to drive frequency and modulation units. $485. MCMARTIN. **288**

UHF preamplifiers for MATV systems are available for channels 14 through 70. CMA-UB series have noise figure of 4 dB, gain of 22 dB minimum, are mounted on glass-epoxy circuit boards, $54.00. BLONDER-TONGUE. **289**

Video amplifier for long cable runs has adjustable gain up to 13 dB. Model

continued on page 54

PRODUCTS

V200A has capacitive by-passed stage for highlighting high frequencies. VICON INDUSTRIES. **290**

Indoor distribution amplifiers for CATV give up to 1000 outlets of push-pull CATV amplification. The I-400 Olympic Series can be powered by 117 volts or through cable power, is available with bandwidth 50 to 270 MHz, or in optional model to 300 MHz. Two-way filters are accessory, splitters can be added later. C-COR ELECTRONICS. **291**

Consoles, Mixers

Console equalizer module includes a three-knob switched frequency equalizer, a graphic equalizer, and an active

program equalizer. Model MEP-130 Parametric Equalizer has continuously variable controls, three overlapping ranges (10-800 Hz, 100 Hz-8 KHz, 400 Hz-25 KHz), and three "Q" controls to alter skirt slope. Noise is −84 dBm, distortion 0.03% THD up to + 24 dBm. $670.00. INTERNATIONAL TELECOMM, INC. **292**

Studio mixer has five mixing channels, four with built-in preamps adjustable for mike or hi-level input, fifth with five hi-level balanced inputs selectable by push-button. Studio/Master 505

has 25-watt monitor amplifier, cue speaker, FET monitor muting, LED indicators. Under $500. RUSSCO ELECTRONICS. **293**

Recording/remixing console accommodates 24-channel recording and

quad mixdown. Model 501 is expandable to 26 channels, each with linear fader, mike gain trim, echo selectable from monitor or input, echo level and send to four chambers in any combination, four-knob equalizer, quad pan pot, and a number of other control facilities. All outputs have 24-dB capability, are balanced, transformer-isolated. AUDITRONICS, INC. **294**

Eight-input audio mixer uses plug-in boards for each input to match application—mike, phono, balanced line,

etc. Model 900 has built-in generator for set-up, linear attenuators, response ± 1 dB, 20 to 20,000 Hz. $800 to $1000. ELECTRO SOUND, INC. **295**

Stereo AV console is a unit adding higher-powered audio amplification and larger speakers to any video cassette player or ½-inch video recorder. Unit has space for video player/recorder and TV set acting as monitor, also includes 50-watt stereo amplifier and two 6 x 9-inch high-efficiency speakers. Mike input jacks allow recording thru unit. VIDEOSONICS, INC. **296**

Radio and Video Switchers, Controls, Etc.

Relay modules for antenna control systems can control RF contactors in existing systems to adapt them to most recent FCC requirements. Model FSR Series has adjustable time delay, 0.1 to 1 seconds, interlocked circuitry to remove plate power if contactors do not switch, can be installed in existing phasor cabinets or in racks. MULTRONICS, INC. **297**

Hybrid network for UHF signal processing is a four-port stripline coupler, for 500 MHz to 1000 MHz. Model

continued on page 56

PRODUCTS

QTM-3 750G "Que-Tee" network provides specified phase relations at outputs, depending on which port is used as input. VSWR is 1.3, impedance 50 ohms, amplitude balance ± 0.4 dB, isolation from 15 to 20 dB. $140. MERRIMAC INDUSTRIES. **298**

Phono Pickups, Microphones, Headphones

Phono pickup for discrete four-channel discs has entirely new stylus tip design, for full response to high-frequency carrier with no damage to record. Model UV15/2400Q has flat frequency response beyond 45 KHz. About $125. PICKERING AND CO. **299**

New phono cartridge claims lower stylus mass, extended dynamic range compared with predecessor. Model V15 Type III also claims trackability at lower tracking force, extended frequency response, compared with Type II. $72.50. SHURE BROTHERS. **300**

Microphone for mobile applications incorporates amplifier with FET circuitry for speech clipping and compression. Model DX-116A has frequency response of 300 Hz–5 KHz, impedance 600 ohms, includes wiring for relay and electronic switching. $23.95. MURA CORPORATION. **301**

Four-channel headphone set has two speakers in each headpiece. Dynaphase 65 Four C produces 100 dB sound pressure level with 0.1 volt input, with distortion less than 0.5% at 110 dB level. $64.95. STANTON MAGNETICS. **302**

Four-channel headphone set has large coupling volume of 100 cc, claims flat response 30Hz to 16 KHz. Model Clark/4 CH-A can be bought with a separate matrix decoder unit, Model DC-2A providing "derived ambience." With decoder, $95; headset alone, $80. DAVID CLARK COMPANY. **303**

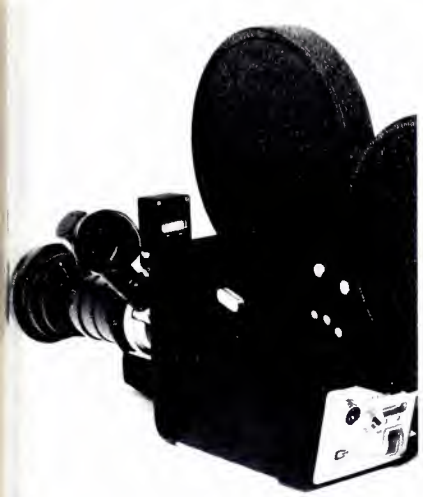
Film Cameras, Related Equipment

Quick-charge, instant-change battery pack can run 12 to 15 200-ft. film loads (or 7 400-ft. loads) in ACL or NPR camera. BAP battery pack has built-in 2-ampere-hour, 12-volt assembly of nicad cells; matching ZAP charger takes two hours for full charge. BAP plugs directly into HIP connector on camera. BAP, $130; ZAP charger, $175; HIP connector, $45. ECLAIR. **304**

New 16mm TV news/documentary camera is available in single or double sound system. Model LW-16 also pro-

ides Super 16 option, crystal controlled sound system, 10/million sync ccuracy, runs on internal, quick-harge battery or on AC (while battery harges). FREZZOLINI ELECTRONICS. **305**

Front-mounted VU meter for CP-16/A 16mm cameras allows camerman o check recording level rapidly dur-



ng shooting. Auxiliary Front-Mounted VU Meter is directly across from eyepiece; pilot light also indicates amplifier is on. CINEMA PRODUCTS CORP. **306**

Precision animation 16mm camera has ixed-pin registration, 167 frame/min top-motion motor, 170-degree manual ade and dissolve rotary shutter. Model 86 is for single-frame animation and special effects, has manual nd auto focus down to 1-inch-field, eflex viewfinder with electrical interock to prevent exposure while viewng. About $7500. NEILSON-HORDELL, LTD., (UK). **307**

Audio and Video Tape Products

Alignment tape for cartridge systems establishes references for standard operating level, 50-microsecond playback response, and precise azimuth alignment. Model 50-STA tape is recorded at 7½-inch ips, is designed for both mono and stereo systems, has an unrecorded control track to avoid misreferences from cue tones. $35.00. FIDELIPAC. **308**

Low-noise audio-range tapes for general use have heavy-duty polyester backing. Scotch Nos. 176 and 177 are moderate-cost tapes replacing Scotch Nos. 111, 150, 201, 202, and 203. No. 176 is 1½-mil, available in 600, 1200, and 2500 feet. No. 177 is 1-mil, 1800 and 3600 feet. 3M COMPANY. **309**

continued on page 58

PRODUCTS

Ten-and-a-half inch plastic reels for ¼-inch tape represent reactivation of former Amerline line. No. 6280 has NAB hub; No. 5908 has RETMA (ETA) hub. POLYLINE CORP. **310**

One-inch tape for color video is designed for all one-inch helical scan video machines, equipped with time-base correction. The 170 series uses standard ferric oxide formulation, claims improved print-through and pressure demagnetization characteristics compared with cobalt or chrome-dioxide tape. $65.00/100 feet. AMPEX CORP. **311**

Audio tape recorder has dual capstan drive, is available in 7½/15 ips or 3¾/7½ ips versions. Model 1000 has a mechanical tape lift system operated automatically or manually, comes in cabinet, rack-mount, or carrying case. TAPE-ATHON CORP. **312**

Backspace editing unit handles up to three helical scan videotape recorders, providing very fast, easy tape-to-tape or insert editing. "Backspacer" has sync between starting point and edit point, gives preview of precise edit point. Also adaptable to handling ½-inch audio recorders, 8mm and 16mm film projectors. SPECTRA-VISION CORPORATION. **313**

Bulk eraser handles reels, cassettes, and 8-track cartridges with tape up to ½-inch width. Model QM-211 has a microswitch operated by fingertip pressure that turns off unit instantly when it is put down. NORTRONICS CO. **314**

Rewinder for cassettes spins a C-60 back to beginning in 22 seconds. Model R36005 runs on self-contained D-cell battery, can be operated in one hand, is only as wide and long as a cassette. $15.00. ROBINS INDUSTRIES CORP. **315**

Video Products

Video fader/switcher provides two-camera switch and fade functions at low cost. Model PVA-901 has superimpose, dissolve and fade, accepts two composite or non-conposite video signals, has third input for external sync. AUDIOTRONICS CORP. **316**

Television time/date generator puts single-row clock and calendar data on any video signal. Model 3201 has a 100-year calendar, is time referenced to power-line frequency or an external standard, is adaptable to broadcast logging, surveillance, etc. GBC CLOSED-CIRCUIT TV CORP. **317**

Electro-optical isolator kit converts Sony Trinitron receivers into color monitors, eliminating ground-loop noise. Model A-1 Isolator Kit has high isolation voltage, is mounted on one printed circuit board, comes with mounting hardware and instructions for attaching to TV receiver. $129 to dealers. VIDEO AIDS CORP. OF COLORADO. **318**

Color TV camera has three vidicon tubes, fully automatic circuits, opera-

tion with illumination as low as 250 lux. Model NU-1003 has a minimum video s/n ratio of 46 dB, power consumption of 70 VA, less than one amp, eliminating need for usual heavy cable. Built-in color bar generator allows adjustment and conformation on a monitor, VTR, or VCR. JVC INDUSTRIES, INC. **319**

Color video camera weighing 5¾ pounds has more than 300-line resolution. Model CCS-150S uses a separate ⅔-inch mesh vidicon for luminance, an original color dissector assembly for blue and red, with s/n ratio better than 30 dB. Wide-angle f/2 lens has six-to-one zoom, automatic iris adjusting to light. Under $4000. AKAI AMERICA. **320**

CATV

Seven-channel amplifier for supertrunk signal systems operates in the 6-48 MHz sub-channel, is designed for 25 dB spacing. "Sub-Nova" has dual pilot carrier for gain and slope control and closed-loop AGC. It is symmetrical, can be reversed in the housing, which holds the power supply and up to eight amplifiers, for 56 channels forward and reverse. AMECO. **321**

Remote Switching System for non-duplication switcher allows operation via the existing CATV coax while system is carrying normal program. Remote Switching System does not need reverse carriage filters, uses the present non-duplication switcher timer, which can be moved to an office for easy use. COMSONICS, INC. **322**

Indoor splitters for CATV distribution cover 5 to 300 MHz with isolation of 30 dB. Models 92, 93, and 94 give two-, three-, and four-way splits, respectively, have full RF shielding. MAGNAVOX, CATV DIVISION. **323**

NEW LIT

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

Hundreds of electronics instruments and devices for rent are listed in 1973 catalog. Rental Electronics, Inc. **200**

Full line of **trenchers** is shown in 20-page illustrated color brochure, including models from 7 hp to 65 hp. Davis Manufacturing Division of J. I. Case. **201**

Brochure describes Telsta equipment vans with aerial lift for **one-man sweeping of CATV plant,** using removeable CATV sweep module supplied with units. Apparatus Division, General Cable Corp. **202**

Patching devices and switching systems for computers, TV, cable, instrumentation, process control, etc., are listed and described in new 60-page catalog. Trompeter Electronics, Inc. **203**

Series 500 function generators and **Series F200 waveform generators** are covered in two technical brochures, with complete specifications. AIL Tech. **204**

"Sound Systems" is a technical pamphlet giving **basic design data for sound reinforcement,** including paging, music, speech, etc., with speaker choice and placement, system assembly, etc. DuKane Corporation. **205**

Low-cost lasers and laser accessories are the subject of 32-page catalog, which includes a selection guide and application notes. Metrologic Instruments, Inc. **206**

Application note describes **low-frequency gain-phase measurements,** with comprehensive circuit and operation data, together with resume of available instruments. Hewlett-Packard. **207**

Methods of improving business and controlling costs with **two-way radio** are the topics of a 16-page brochure. Motorola, Inc. **223**

Catalog covers line of **waveform and function generators** with complete specifications and application notes. AIL Tech. **224**

TV's CREATIVE PALETTE cont'd from page 42

tronic switching of two or more signals feeding the same axis. A voltage controlled amplifier (inexpensively bought or built) will allow one signal to be used to amplitude modulate another. If a function generator possessing a voltage controlled oscillator is used, frequency modulation will be possible. A little experimentation should lead to many visually pleasing line patterns and textures on the display tube. Mixing oscilloscope images and feedback techniques will allow for the creation of countless "hybrid" designs.

At Creighton we presently use a Synthi AKS analog synthesizer, designed for electronic music, as a signal source for electronic image generation. Although the device is limited to audio frequencies, it does provide a nice array of voltage controlled oscillators, voltage controlled amplifiers, filters, etc. in one package. We have added a dual channel phase shifter (two inputs, four outputs) to the unit. Since some of us who use the system are also trained in music, the synthesizer is useful for creating music and sound effects tracks also.

But we originally began generating electronic images with a few inexpensive Eico audio generators and a voltage controlled amplifier built out of junk box parts. With a little imagination most any engineer can probably put together a useful set of components without much expense.

Better quality electronic image displays can be achieved by replacing the camera-oscilloscope combination with a scan converter of the type used for computer readout purposes. But the cost of such a system would probably exceed its usefulness to most broadcasting or cable studios.

Studios lacking colorizers or quantizers can feed three monochrome camera signals into an NTSC encoder to get three-color effects. This technique should work especially well with oscilloscope images since often they are not very dense.

Lasers can also be used

The techniques described in this article should provide the creative director with many useful abstract and semi-abstract images to add color and life to television productions. In addition to the techniques described, we are experimenting at Creighton University with three other types of image generation devices and techniques: *1.* monitors modified to distort the sweeps with various control signals (cameras re-shoot the images displayed on the monitors); *2.* Z-axis modulation of the television raster (i.e. non-video signals displayed as video, a simple technique in principle, but requiring complex and expensive systems of specialized generators and modulators to achieve complex images and good control—the Beck Video Synthesizer uses this principle); and *3.* diffraction and interference patterns generated with a laser and specialized optical systems which display the image on the face of a vidicon tube, an extremely useful image tool because of the textural complexity and great beauty of the moving and still images created. **BM/E**

NEWS

continued from page 14

net income of $1,523,612 for the first quarter of 1973, up 39% from 1972 . . . **Cohu, Inc.** put first quarter 1973 profit at $227,218, against $90,972 a year earlier . . . **Cox Broadcasting Corp.** increased the quarterly dividend rate from 7½ cents a share to 8¾ cents a share, effective with the April 16 payment.

CCA Electronics Corp. said net sales were $5,789,137, and net income $246,525, after taxes, for the year ended October 31; net income in previous year was $305,621 . . . **TelePrompTer Corp.** reported record earnings of $3,780,794 for the quarter ended March 31, 1973, up 36.8% over the 1972 first quarter . . . **TelePro Industries** also has record earnings for the year ended December 31, 1972, of $378,364, against $82,492 in 1971 . . . **RCA's** first-quarter profit was $41.7 million, a record, on sales of $1.01 billion, up 10% from 1972's first quarter.

Zenith Radio Corp. also had record sales and earnings in the first quarter, $16 million, up 58%, and $221 million, up 22%.

Business Briefs

Singer Instrument has issued an application note, #21, describing how to measure frequency to meet the new FCC CATV requirements (see New Lit) . . . **Anixter-Pruzan** will be the national distributor of the **EG&G** CATV connector line . . . **AEL Communications Corp.** has won a turnkey contract for a 350-mile cable system for Jackson County cable systems, Independence, Mo.

Matsushita Electric (Panasonic) is moving its U.S. headquarters from New York City to a new office-park couplex, 20 minutes from Manhattan in Secaucus, N.J. . . . **RCA** supplied a high capacity data storage system and other electronics to the Nimbus experimental satellite, recently orbited . . . Patent suit against **Amperex** on sales of the Plumbicon tube has been terminated by admission of the plaintiff that the Plumbicon was invented by **N. V. Philips,** of Holland, parent company of Amperex.

E-Systems, Inc., of Dallas, has bought **TAI,** engineering consulting firm now engaged in support of the Government of Iran in telecommunications projects . . . **Unicorn Films**

is a new subsidiary of **Sutherland Learning Associates,** Los Angeles, for the production of TV films and motion pictures for theatre distribution . . . **Gates Division** of Harris Intertype has received a contract for $4.5 million to supply 22 television broadcast transmitters to the government of Yugoslavia, said to be one of the largest orders for TV transmitters ever received by an American manufacturer.

L. K. Production Co. of Houston, producers of the "Larry Kane Show," has been bought by **Septer, Inc.,** of Cottage Grove, Oregon, which will continue the Larry Kane show and produce others for distribution in the South.

Colmar Productions is a new subsidiary of CCD of Hollywood, which will produce children's shows for local television stations . . . **Avco** and Meredith Broadcasting's "Young People's Specials," syndicated children's programs, got a 1973 Children In Television Achievement Award from the consumer group, Action for Children's Television.

John Lewis, of the British Broadcasting Corporation's engineering design department, will spend some time at **Tektronix,** in Beaverton, Oregon, on a collaborative design project . . . **United Church of Christ's** Office of Communication got a $157,000 grant from the Ford Foundation to aid the church group's program of action against racial discrimination in broadcasting . . . "Freedom of the Press for Whom?" is the title of a new book by **Jerome A. Barron,** dean of the college of law at Syracuse University, which offers a guide to maintaining public access to the media.

Corporation for Public Broadcasting announced grants to 16 public radio and television stations to enable them to hire or upgrade minority personnel; the grants pay up to one-half the salary costs for 24 months . . . **Atlas Sound** will enlarge its plant in Parsippany, N.J., by about 60%, adding expanded laboratory facilities and up-to-date acoustic testing chambers . . . **Ampex Corporation** sold to **Consolidated Film Industries** an AVR-1 third generation VTR and an ADR-150 high-speed duplication system, to be used in the latter firm's expanded program of videotape duplication for television stations.

Videodetics, Southern California video marketing and engineering firm, has set up offices at 2250 N. Druid Hills Road, Atlanta; 2 West 45th St., New York; and 200 E. Devon Street, Des Plaines, Ill., to market their Videosette systems and video products of other manufacturers . . . **Marconi Communications Systems** will supply color television studio and transmitter equipment to the government of Jordan, under a half-million-pound contract.

CBS Radio gave free airing in 1972 to 5117 spot announcements for 72 different public service organizations. Jack Hinton, director of program practices, has recorded what he considers the best on a single reel of audio tape, available to any public service organization looking to improve its spots.

AilTech has reduced prices on all instruments in the F200 series of function generators by $100 . . . **TeleMation** received a $575,000 order from the Los Angeles police department for 20 television systems, including surveillance, production facilities for precinct houses, and a complete studio at headquarters . . . **Information Film Producers of America** has called for entries in its 14th annual "Cindy" contest for non-theatrical films; deadline is July 1; address IFPA

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NEWS

Box 1470, Hollywood, Calif., 90028.

Denlen Electronics Corporation Ltd. of Toronto is the exclusive distributor in Canada of television studio and transmitting equipment of EMI Telecommunications, British manufacturer . . . The **IEEE Group on Broadcasting** has sent out a call for papers for its 23rd annual Fall Broadcast Symposium, September 20-21, at the Washington Hotel, Washington, D.C. Address: R. M. Morris, 60 Sunset Lake Road, R.D. 1, Sparta, N.J. 07871. . . . **Scientific-Atlanta, Inc.,** has delivered to the National Research Council of Brazil a $400,000 earth receiving and tracking system for the Earth Resources and Technology Satellite, for the study of the resources, geology, meteorology and other aspects of the Brazilian land mass.

The first and only commercial TV station on Long Island, N.Y., **WSNL-TV,** went on the air in April on Channel 67 serving an area recognized as the fourth largest metropolitan statistical area in the country . . . **TCOM Corporation** of Rockville, Md., got a CP and experimental license for a mobile Research Station, to test a communications system operating on 6286.19 MHz and using a tethered balloon. . . . **HF Photo Systems Division, Technology Inc.,** opened an office at Harlow, near London, to serve the UK and European markets.

Telcom Engineering, Inc., of McLean, Va., has been given the contract to keep property records on 6500 miles of CATV plant for **Television Communications Corp. . . . Public Communications** is a new firm in Vienna, Virginia, specializing in public relations for firms in technological fields.

NEWS

People

James Gabbert, president of KIOI-FM, got a "Golden Mike" award from the Institute of High Fidelity at its San Francisco show for his innovations in high fidelity . . . **R. Brent Judd** was promoted to be chief engineer of San Diego Video, Inc. . . . **Eldon Campbell,** vice president of WRTV, Indianapolis, got the Horatio Alger Award of the Boys Club of Indianapolis.

Robert C. Osborne is the new manager of KMOX-FM, and **Virginia Dawes** of KMOX-AM, CBS stations in St. Louis . . . **David Grover** became assistant chief engineer of WNEM-TV, Flint, Michigan . . . **James J. Johnson** will coordinate and supervise development of RCA's "Selectavision," home videoplayer/recorder.

Maury H. Bechten is now director of manufacturing engineering services for Jerrold Electronics Corporation . . . **Daniel J. Ryason joined** Theta-Com as manager of field operations, CATV division; he came from Ameco, Inc.

Shirley Gilbert was named executive vice president of Suffolk Cablevision by Ralph Baruch, president of Viacom, parent company. Mrs. Gilbert has been associated for some years with her husband, Peter, in running the firm . . . **Robert Sewak** is national director of sales and marketing for TelePrompTer Corporation's cable division . . . **Brenda Lee Fox,** formerly a trial attorney with the Federal Trade Commission, joined the legal department of the National Association of Broadcasters.

Stephen E. Wickstrom became field sales representative for Phelps Dodge Communications Company . . . **Larry Fry** was promoted to the position of customer service supervisor for Anaconda Electronics.

Officers of the Association of Maximum Service Telecasters, elected at their recent Washington meeting, were: president, **Terry H. Lee;** first vice president, **Arch Madsen;** second vice president, **Robert F. Wright;** secretary-treasurer, **Franklin Snyder;** assistant secretary-treasurer, **Lester W. Lindow.**

W. Clinton Powell, who retired from the U.S. Foreign Service, is now special assistant to the president, Corporation for Public Broadcasting . . . **Stephen J. Fouce** was named director of syndicated sales, Spanish International Network . . . **John J. Santeen** is the new manager of TelePrompTer's Oakland, California, cable system.

Edward R. Tabor became vice president and general manager of Channel 13, Inc. of Las Vegas . . . **Barry D. Lemieux** was named director of corporate development, Continental Cablevision of Ohio . . . **Gerald A. Nordsiek** was promoted to be chief engineer of WJXT/TV, Jacksonville, Florida.

Richard DeAngelis became a vice president of Meredith Corporation's broadcast division; he is already general manager of WNEM-TV, Meredith station in Flint, Michigan . . . **Charles G. Perry III** joined Jerrold Electronics Corp. as manager of applications engineering.

John M. Reppa is newly named manager of system administration for Television Communications Corp. . . . **Clifford M. Kirtland Jr.** was elected to the board of directors of Cox Broadcasting Corp.

C-Cor Electronics named **Joel A. Stroback** systems engineering administrator . . . **Stephen D. Kerman** has the new position of marketing product manager, television, at Tektronix . . . **David M. Stern** is the new production engineer for L-W Photo, Inc. **BM/E**

BM/E CLASSIFIED MARKETPLACE

CLASSIFIED ADVERTISING RATES

DISPLAY CLASSIFIED ADVERTISING: $22.50 per inch 1x; $22.00 per inch 3x; $21.00 per inch 6x; $20.00 per inch 12x. ALL OTHER CLASSIFIED ADVERTISING 25¢ per word; minimum $3.00. BLIND BOX NUMBER: No extra charge. Replies sent to address below will be forwarded to you. PAYABLE IN ADVANCE; send check with order. CLOSING DATE: 5th of 2nd month preceding issue date.

BM/E, Monterey and Pinola Avenues, Blue Ridge Summit, Pa. 17214 Phone 717/794/2191

HELP WANTED

TELEVISION ENGINEERS

Need 2 First Class engineers for expanding TV operation in Southeast. One should have experience and capability sufficient to assume future assistant chief engineer position. Other man should have at least 1 year experience in TV studio operation. Reply to Box 673-2, c/o BME, Blue Ridge Summit, Pa. 17214.

California major market VHF in one of nation's fastest growing areas needs studio technician. Requirements include First Class radio telephone license; minimum 3 years experience; maintenance and operation ability; Technical school graduate or equivalent technical education. Wage scale $220 to $250 per week. An Equal Opportunity Employer. Write Box 673-3, c/o BME, Blue Ridge Summit, Pa. 17214.

AN OPENING EXISTS for a mobile technician in the Detroit area. Experience in maintaining and operating VR 3000 and color cameras in the field is a prime requisite. Extensive travel may be necessary. Resumes and inquiries should be made to Editel Productions Inc., 24151 Telegraph Road, Southfield, Michigan 48075 or call (313) 353-1660.

CHIEF ENGINEER for like new non-directional AM and Automated FM. Southwest Resort area. Full Maintenance. Light Air watch. Excellent working conditions. Medium-small market. Local ownership. $800.00 per month start. Successful operation. Write to Box 673-1, c/o BME, Blue Ridge Summit, PA. 17214.

Educational network seeks experienced transmitter supervisor for transmitter site. Send resume, salary requirements and availability to: Director of Engineering, Iowa Educational Broadcasting Network, P.O. Box 1758, Des Moines, Iowa 50306.

EQUIPMENT FOR SALE

RECORDING STUDIO CONSOLE

Ideal for sophisticated TV audio. 18 microphone or high-level inputs with EQ & echo on each. EQ on each of the 4 output channels. Built-in multi-freq. oscillator. Group submastering; channel masters; grand master. 4 reverb devices. 4 dual-60 watt amps. Intercom while recording; talkback (mic's. included). Audition any input while recording. "Silence" button prevents performer ruining audio by disturbance during echo "overhang" at end of "take". Producer's desk; all audio in accompanying rack. Very compact! Slightly used, guaranteed. Sacrifice for half of new value.

SounDesign, Box 921,
Beverly Hills, Calif. 90213

QUALITY AUDIO CONSOLES are our specialty. Modern styling with slide faders. We manufacture eight standard consoles at very competitive prices. However, if you prefer, we'll manufacture a custom system to your specifications. Also, plug-in audio modules including distribution amplifiers, pre-amplifiers, monitor amplifiers, etc. Write or phone for prices and specifications. SYSTEMS ENGINEERING COMPANY, P.O. Box 49224, Atlanta, GA. 30329. (404) 482-2446.

SCULLY TAPE RECORDERS: Mono, 2, 4, 8, 12, & 16 track models plus 270 automatic players. Some models in stock now. W.A.L custom audio control console & console modules. Solid state 120 Watt power Amps. We buy and rebuild Scully lathes. WIEGAND AUDIO LABORATORIES, INC. R.D. 3, Middleburg, Pa. 17842, 717-837-1444.

Surplus Audio Patch Panels All Standard Configurations. Gulf Telephone & Electronics, Inc. 6235 Beverly Hill, Houston, Texas 77027.

EQUIPMENT FOR SALE (Contd)

AMPEX VR660C two inch helical broadcast quality color VTR with electronic editing. Colorcon, alignment tape, manuals, three extra pairs matched heads factory sealed, three hours tape. List price over $11,100.00. Purchased February 1972, less than 31 hours, $6,000. Channel One Videotape, Inc., Box 763, Miami, Fla. 33133. (305) 947-2044.

CARTRIDGE TAPE EQUIPMENT—Rebuilt. New paint, heads, flywheel, pressure roller, belts etc. Spotlessly clean and thoroughly tested. 30 day money-back guarantee, 90 day warranty. Also contact us for possible discounts on new equipment and accessories.
AUTODYNE, Box 1004,
Rockville, Maryland 20850
(301/762-7626).

MOTORS FOR SPOTMASTERS
NEW Papst hysteresis synchronous motor HSZ 20.50-4-470D as used in series 400 and 500 machines. Price $39.00 each prepaid while they last. 90 day warranty. Terms check with order only, no COD's. Not recommended for Tapecaster series 600 or 700.
TAPECASTER TCM, INC., Box 662
Rockville, Maryland 20851

Solid-state audio modules-console kits, power amplifier kits, power supplies. Octal plug-ins—mic, eq, line, disc, tape play, tape record, amplifiers. Audio & tape bias oscillators. Over 50 audio products. Send for free catalog and applications. Opamp Labs, Inc., 172 So. Alta Vista Blvd., Los Angeles, Calif. 90036. (213) 934-3566.

PARTS—for SPOTMASTER & TAPECASTER cartridge units. IN STOCK. Immediate delivery, overnight to Penna, New York and New Jersey. Pressure rollers for all machines. LOW PRICES. Some used parts in stock. COMMUNICATION MEDIAS, Box 54, Allentown, PA. 18105. (215) 437-0607 or 437-9447.

Color time base correctors. Model 4102 for Broadcasting IVC 900 and 960 Series, VTR's. Excellent condition. 2 units recently factory updated. Units list for $9,350. Asking price is $5,580. Call (904) 354-2806.

FIELD STRENGTH METER, 540 KHz to 5MHz, Ten microvolts to 10 volts per meter. New solid state design, long battery life. Stable accurate calibration. Free literature. Solar Electronics, 901 No. Highland Ave., Hollywood, Cal. 90038.

AMERICA'S LARGEST STOCK AND CONSIGNMENT LISTING of new and used broadcast and recording equipment. We trade-sell and buy. THE MAZE CORPORATION, P.O. Box 6636, Birmingham, Ala. 35210.

The complete and reliable source for new and used broadcast equipment. Request our free listings. Broadcast Equipment and Supply Co., Box 3141, Bristol, Tennessee 37620.

CAPSTAN IDLERS for AMPEX 300, 35 440. Series, self aligning with replaceable ball bearings, $22.50 net. VIF INTERNATIONAL, Box 1555, Mtn. View, Ca. 94040.

MICA AND VACUUM transmitting capacitors. Large stock; immediate delivery. Price lists on request. SURCOM ASSOCIATES, 1147 Venice Blvd., Los Angeles, Cal. 90015 (213) 382-6985.

4—650 ft. towers $6500.00 each. Many more. Ground wire 85¢ per xx. lb. Bill Angle, Box 55, Greenville, N.C. 27834. Tel. 919-752-3040.

One stop for all your professional audio requirements. Bottom line oriented. F.T.C. Brewer, Box 8057, Pensacola, Fla. 32505.

RCA TFE-10A· 200 MHz transmitting antennas. Broadband, omnidirectional. New, in original packing. Bob Reynolds, (609) 877-0881, 32 Mosshill Lane, Willingboro, N.J. 08046.

WE BUY TUBES, TRANSISTORS & CAPACITORS. Send your lists of sale items. Specialty Supply Ltd., P.O. Box 22391, Denver, Colo. 80222.

EQUIPMENT FOR SALE (Contd)

QUALITY AUDIO CONSOLES are our specialty. Modern styling with slide faders. We manufacture eight standard consoles at very competitive prices. However, if you prefer, we'll manufacture a custom system to your specifications. Also, plug-in audio modules including distribution amplifiers, pre-amplifiers, monitor amplifiers, etc. Write or phone for prices and specifications. SYSTEMS ENGINEERING COMPANY, P.O. Box 49224, Atlanta, GA. 30329. (404) 482-2446.

AMPEX 7500 COLOR VIDEO TAPE RECORDER, mint condition, spare head. $575.00. Stan Nazimek, Jr. (201) 777-4168.

EQUIPMENT WANTED

USED IMAGE ORTHICON CAMERAS MARCONI MARK V NEEDED

Two 4½" Marconi Mark V Image Orthicon Cameras, used, needed.

Please contact:
Mr. Saul Raden or Mr. Ed Sawits

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New York, N.Y. 10020
Phone: (212) 246-1320

Magnecord Record/Playback amplifiers identified by Model/Type Numbers P60C, P75C or M9C. Please write: The Nancy Willard Group, Inc. 6311 Southwood Avenue, St. Louis, Mo. 63105.

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CUSTOM CARTRIDGE RELOADING and refurbishing. Fidelipac replacement parts and cartridges. Write us today for prices. PROFESSIONAL AUDIO SERVICES, BOX 1953. FT. WORTH, TEX. 76101.

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Deejays! 11,000 classified gag lines. $10.00. Unconditionally guaranteed. Comedy catalog free. Edmund Orrin, Box 679-M, Mariposa, Cal. 95338.

OLD RADIO PROGRAMS FOR SALE. Send $1.00 for a fabulous catalog listing 25 years of radio's greatest shows. Vintage Radio, P.B. Box 2392, Culver City, CAL. 90230.

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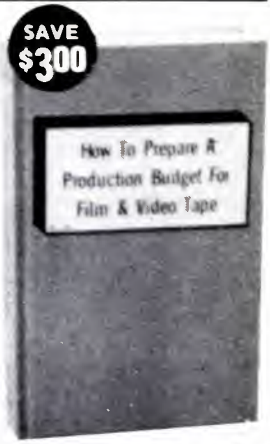

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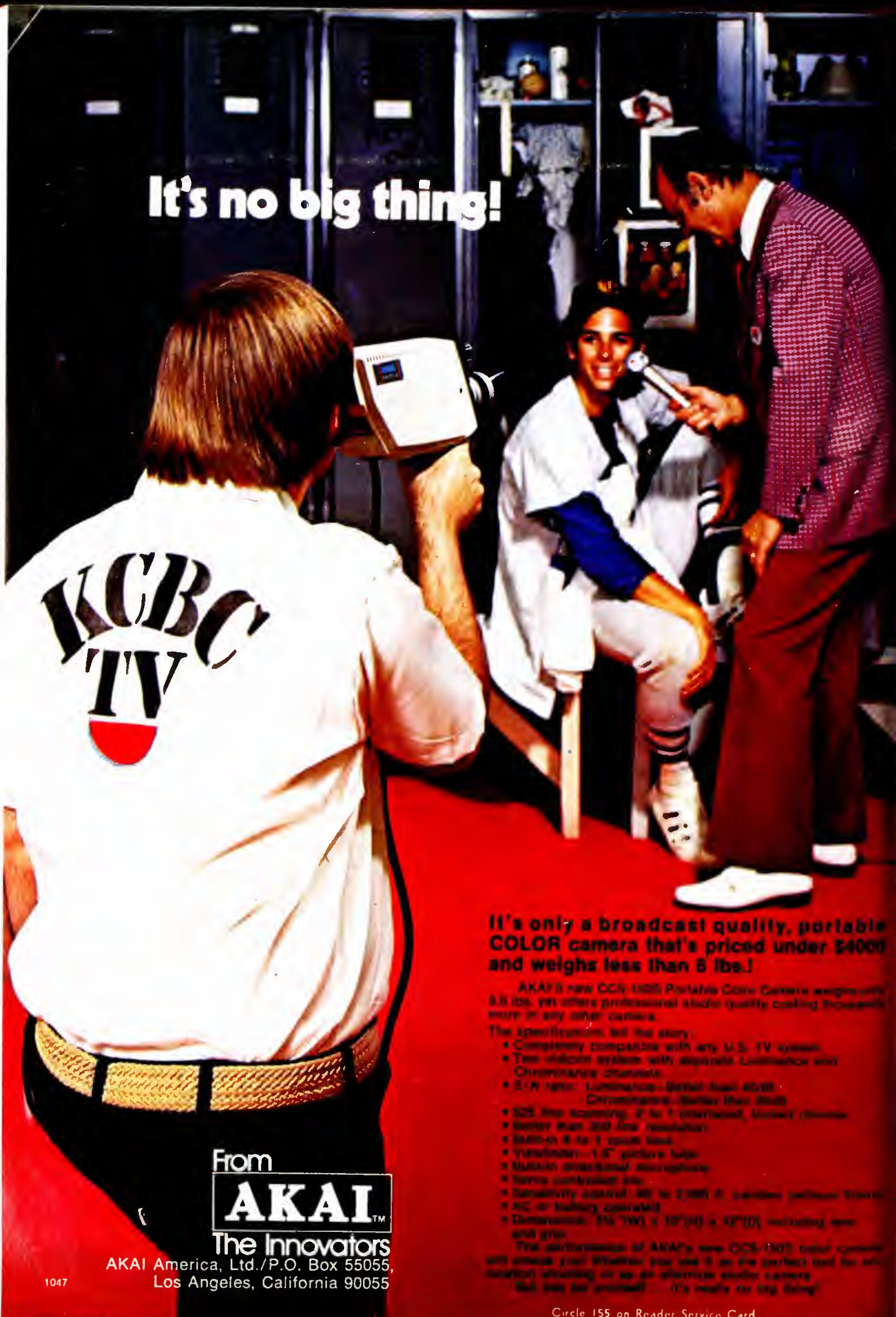
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