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'78 NAB SHOW -IN- PRINT

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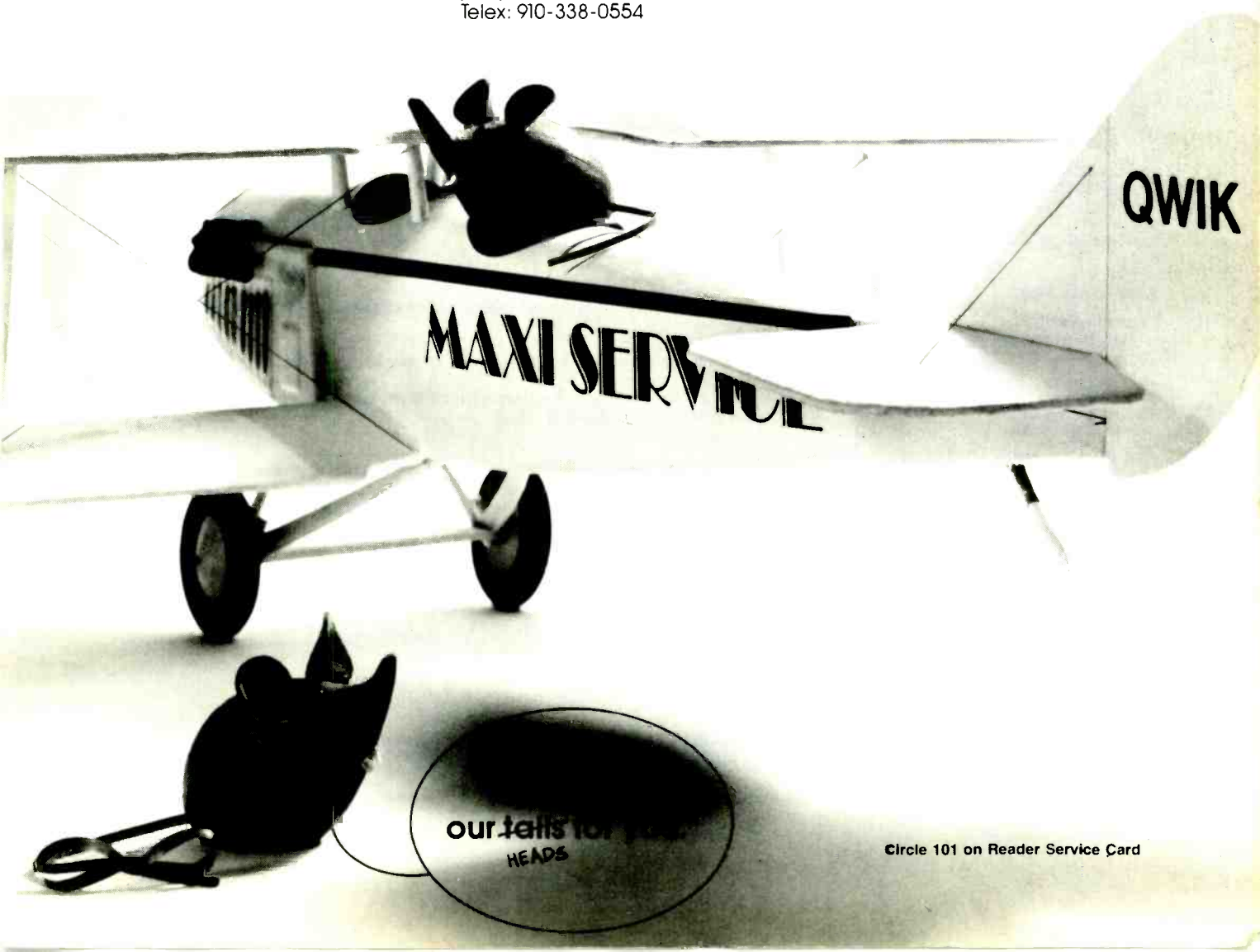

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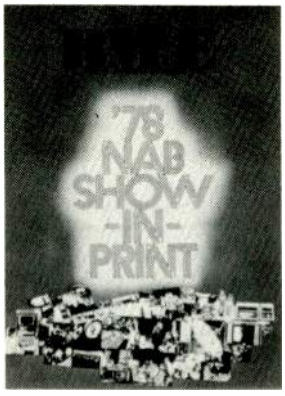

The NAB put on a truly spectacular convention and exhibit in Las Vegas. This month, our special issue covers in detail what was new and exciting in broadcast technology.

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295 Madison Ave.
New York, N.Y. 10017
212-685-5320

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Managing Editor
David Hawthorne

Senior Editor
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Associate Editor
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NAB '78 — Biggest and Best Show Yet

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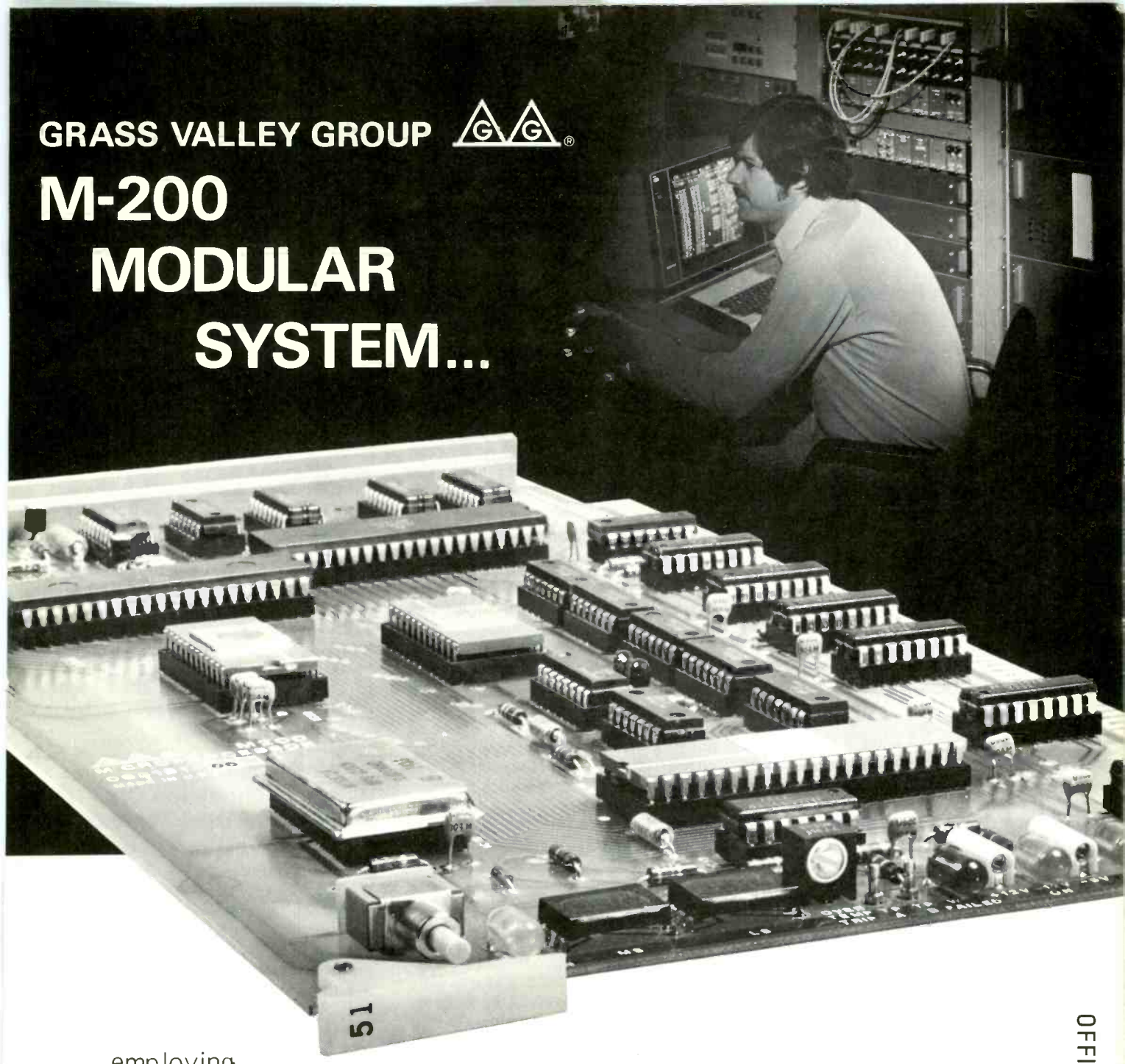

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BROADCAST INDUSTRY NEWS

Short-Term Renewal For CBS 0&0's Threatened

In the latest development stemming from CBS's "winner take all tennis tournament," the FCC has asked the network to show cause why the Commission should not issue short term renewals for some or all of CBS's 0&0's as punishment for the networks "deception of the viewing public."

The Commission was angered over the network's failure to tell the public that its tennis matches, which were broadcast from Caesar's Palace in Las Vegas and the Cerromar Beach Hotel in Puerto Rico, were not in fact, "winner take all," since each player received a guaranteed minimum fee for his appearance. The network promoted the matches as "winner take all" and, according to the FCC, this strongly implied to the public that losers would receive no compensation.

The FCC has decided that short-term renewals for CBS 0&0 stations may be "appropriate," and has sent a letter to CBS giving it 30 days to respond and show "mitigating factors" which might satisfactorily explain this "deception of the public."

CBS officials and other industry observers are admittedly shocked by the strength of the FCC action. Though the network admits that there may have been an error of judgment in promoting the events as "winner take all," few people inside CBS or in the industry feel that the deception was purposeful or serious. Most observers feel that few, if any people expected tennis stars of the stature that participated in the matches to have appeared without some sort of minimum guarantee.

Japan Communications Satellite Inaugurates Direct-To-Viewer Television Programming

Launched for Japan by NASA late in March, an experimental Japanese communications satellite is now providing direct to home television programming to formerly inaccessible areas of Okinawa and remote parts of Japan's home islands. NASA sent the satellite into orbit with a three-stage Delta 2914 launch vehicle.

The satellite, dubbed Medium Scale Broadcast Satellite for Experimental Purposes (BSE) is currently used to test new methods of economically transmitting high-quality color television to the Japanese islands and Okinawa. Residents and other domestic users pick up the telecasts with antennas as small as one to 1.6 meters, and once these antennas are in mass production, the cost will probably be about $200 each.

The 1494 lb. satellite, in synchronous orbit at an altitude of 22,252 miles, is designed to test TV service to the three percent of the home islands' population currently inaccessible to the present Japanese TV network, and into some larger cities where tall buildings seriously degrade reception.

BSE is a high-power satellite which may be the first step in establishing more universal TV communications for the Japanese islands. Previously, two U.S. space vehicles experimented in relaying high-quality, high-power television signals to small, low-cost ground receivers. They were NASA's Applications Technology Satellite 6 (ATS-6), launched in 1974, and the joint U.S.-Canda Communications Technology Satellite (CTS), launched in 1976. BSE's effective transmitting power is close to that of its two predecessor satellites.

The BSE was built by General Electric Co., Valley Forge, PA, under contract to Tokyo Shibaura Electric Co., for NASDA. Also sponsoring and participating in the program are the Japanese Broadcasting Corp. (NHK), the Japanese Ministry of Post and Telecommunications (MPOT) and the Radio Research Laboratories (RRL) of Japan.

TV/Radio Spots Up, Continue Growth

The increase in TV/radio spot revenue for last year's fourth quarter has been continuing its upward push during the first quarter of 1978, according to Merrill Lynch's *Broadcasting Monthly*. The report maintains that "advances, combined with a continued good pace in local business, should provide stations with a good estimated gain of 9 to 12 percent in revenues for the first quarter. That prospect is also encouraging for the full year because first quarter spot-billing gains were expected to be the most difficult of the year to achieve.

"For all of 1978, we estimate that spot billings will increase by eight to 11 percent after a nine percent gain in 1977; that forecast is based on an estimated national spot gain of seven to 10 percent, compared with seven percent in 1977 and a projected local spot increase of nine to 12 percent, compared with 11 percent in 1977.

"As was the case in 1977, leadtime is short, and the estimated first-quarter revenue increases vary widely from market to market and station to station. On an average, the larger markets continue to experience smaller gains than do medium-size and small markets. The gains in billings are primarily attributable to the stations' selling an increased number of commercial minutes because prices are only a little higher than levels in the first quarter of last year."

Black Media Coalition Blasts FCC Inaction On Petitions To Deny Renewal

A spokesman for the Black Media Coalition told delegates to the recent NATPE Convention, "We are not relying on the FCC anymore . . ." as an instrument for pressing civil rights issues regarding broadcasting.

Pluria Marshall, the spokesman, said that the FCC had "summarily dismissed" all petitions to deny license renewals regardless of the merits of the individual petition.

In the future Marshall said that the Coalition will apply pressure on individual broadcasters through agencies, advertisers, network and local program producers. According to Marshall, the tactics to be used will not be something that broadcasters' lawyers can get them out of.

NAB also came under criticism from Marshall, who said that the organization has frightened members into believing that groups like the Black Media Coalition were "revolutionaries" bent on taking over the station.

Telex Heats Up Over Solar Energy

In what is probably a broadcast industry first, the Telex Communications, Inc.

continued on page 8

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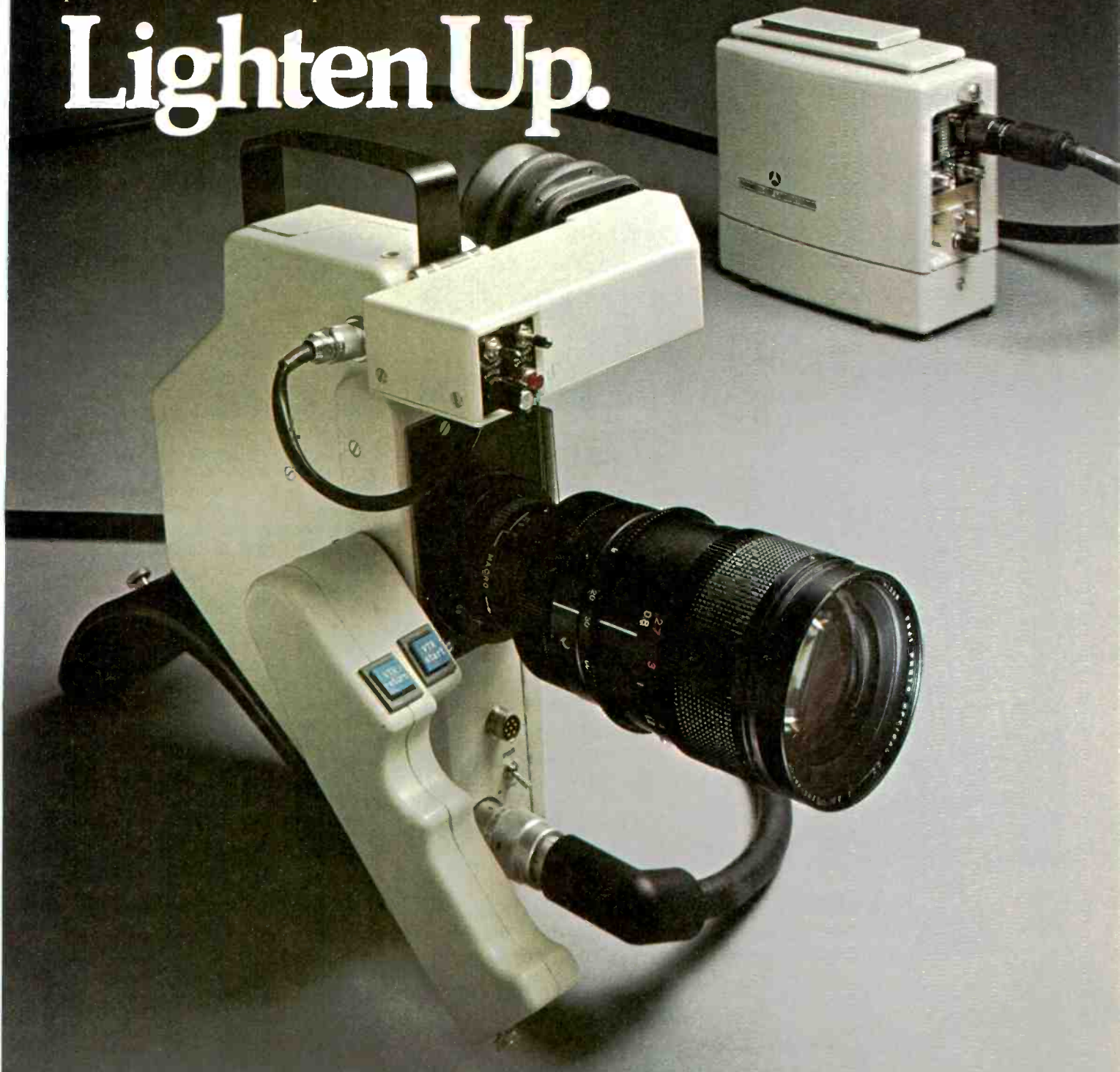

Circle 102 on Reader Service Card

tape recorder manufacturing plant in Blue Earth, Minnesota is now heated by solar energy. Climate conditions make Minnesota an excellent test and demonstration area, since Blue Earth averages 58 percent sunny days over the year. Some heat is collected even on cloudy days because ultraviolet light penetrates the clouds. Called the nation's largest industrial solar heating system, the complex cost some $430,000 and was jointly funded by Telex (supplying 24 percent of the cost) and by the Federal Energy Research and Development Administration (ERDA). The new system is expected to supply about 70 percent of the heat required for the 94,000 square-foot facility, while the plant's existing heating system is being used to supplement the solar system when required either because of the area's extremely cold temperatures or when cloudy weather lowers the system efficiency.

The system has solar collectors mounted on the ground and covers an area the size of a football field. Ten rows of 36 collectors, each measuring four by eight feet, provide a total collection surface of 11,520 square feet.

Soft water, treated with an anti-rust agent, is used in the collectors. This is expected to provide a more efficient heat output than other systems that use water and anti-freeze chemicals.

When Telex originally proposed the system in 1975, it was one selected by ERDA from among 300 projects submitted to the government. Telex is cooperating with ERDA to gather information on the system's functions so scientists and engineers can improve future solar installations. Based on current energy costs, the solar system will be amortized over a period of 12 years. However, Minnesota offers no industry incentive for conversion to alternate energy sources, and in fact, may levy real estate improvement taxes on projects like this one.

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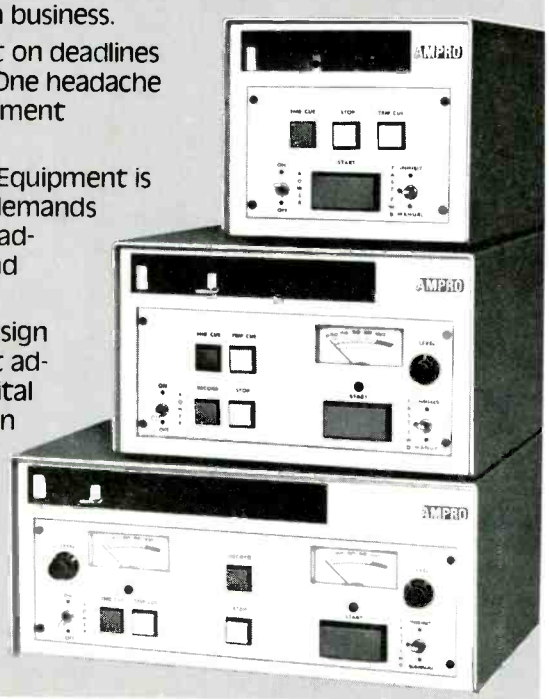

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New Company Makes Heavy Use Of Off-Air Recording To Supply Home VCR Market

Video cassettes largely consisting of material recorded off the air are to be distributed to subscribers in the form of a 'television magazine' by a new firm, Instant Replay. Chuck Azar, the founder of the company, doesn't anticipate serious copyright problems since he believes that the publicity provided by the tapes will be adequate compensation for the stations and producers involved.

As yet, there has been no challenge to the legality of the practice. But Azar says that if objections are raised, the practice will be discontinued on a complaint-by-complaint basis. Currently, stations and programs are provided with credits on the finished tape, and a copy of same.

Instant Replay's ten 'correspondents' in this country and abroad tape programs such as news, commercials, and public affairs programming from local TV stations. The tapes are then submitted to be edited and distributed. Correspondents are compensated with a no-cost subscription and a distributorship. They are also given a credit on tapes used.

Subscribers now number 200, and pay $500 per year for 24 one-hour programs. Azar says that expansion, with the hope of capturing a 60 percent share of the home VCR market, will bring the cost down to as little as $240 per year. He also hopes to increase the number of correspondents to 200.

In addition to off-air recording, Instant Replay will look to their own production facility for programming as well as independent producers who will receive a flat fee.

continued on page 10

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News

New Rechargeable Lithium Battery Developed at Bell Labs

It might just be a breakthrough development — a combination of lithium's high-energy density with a new kind of structure and chemical combination that will make possible a new generation of rechargeable batteries.

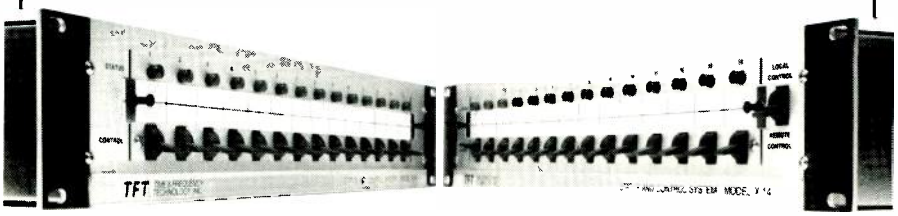
Developed by Donald W. Murphy and Frank J. Di Salvo at Bell Labs, the new battery is constructed of "layered compounds," a special class of materials which includes vanadium disulfide, which forms the positive electrode in the new battery. The negative electrode is lithium.

The new cell is very light in weight and has an energy density at least eight times that of lead-acid batteries. Each cell's nominal output is 2.5 volts, about twice the per-cell voltage rating of nickel-cadmium batteries so commonly used in ENG and other portable applications. One principle advantage of the layered compound cell structure is that the materials show no permanent change regardless of the number of charge/discharge cycles the battery goes through. Other rechargeable batteries go through some kind of irreversible chemical change, which in turn limits their useful life, and also limits their ability to be fully charged.

Another advantage is that the lithium/vanadium battery does not leak off its electrical charge during storage, maintaining full charge for an extended period of time. The new battery is entirely developmental, and Bell does not indicate a date for production of this device.

TFT

X-14A



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- "Double-check" circuitry prevents false data
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Ma Bell May Have To Move Over As Alternate Common Carriers Expand

The common carrier communications industry will undergo more changes over the coming decade, according to a study just released by Frost & Sullivan. The report finds that Non-Bell specialized common carriers will account for nearly $1.3 billion in equipment sales over the next 10 years.

Highest on the new equipment shopping list is multiplex gear, with 10-year sales totals of $586 million. Other product categories on the list include: RF equipment, $264 million; termination equipment, $166.9 million; antennas, $55.9 million; towers, $43.4 million; waveguides, $20 million; and miscellaneous categories accounting for the remaining $111.2 million. Added to this these figures is what the research firm calls a forecast for short-haul, intra-city communications, which, they say, will account for an additional $59.5 million over the next 10 years. This amount, however, is highly speculative. "Such hardware is not yet on the market," the report notes. This is especially true of such short-haul gear as 15-GHz-plus microwave gear and high-density optical systems.

F&S warns that the Consumer Communications Reform Act of 1976 would "drastically restrict and possibly eliminate" the specialized common carriers, but "the Bill in its present form is unlikely to pass." The study further notes that the Datran bankruptcy should serve as a warning. Datran concentrated on data communications, and this mistake is not lost on the other specialized carriers.

MCI, Southern Pacific/Communications Corp., and the new United States Transmission Systems (subsidiary of ITT), among others, all plan to establish facilities that are suitable for voice transmission. Such companies now operating are restricted from further expansion pending new legislation and rulings.

continued on page 12

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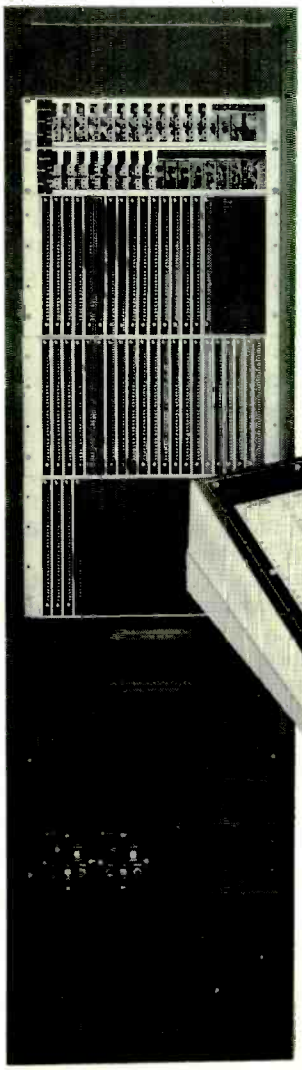

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Description of System The Model 8332 Communication System provides both intercom and/or monitor functions with broadcast quality audio. Each intercom terminal is connected by means of 4 wire telephone-type cable to solid state cross point switches in the central station rack. Two way audio is carried on one pair, and the two way digital data on the second pair.

Applications	Inter-office	Central Control
	Production	Field Remote
	On-Air	Audio Routing - Monitor, Cueing, Programming

Features

- Flexible and Expandable. Requires only 4 Wire Cable
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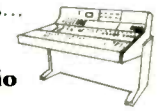

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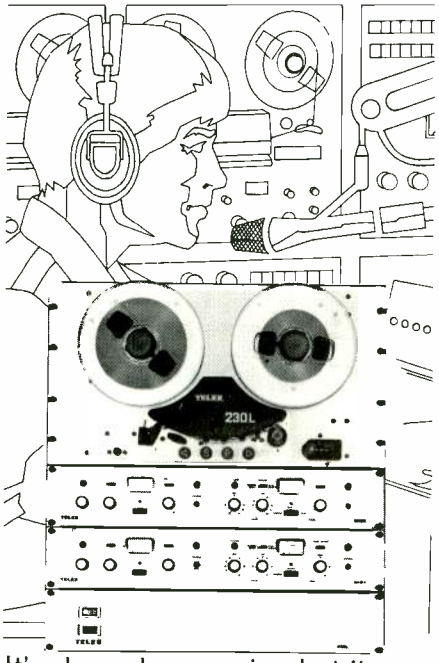

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News

KSL-TV First To Use Fiber Optic Link for ENG Operation

KSL-TV, Salt Lake City, is the first station to use a fiber optic cable in its news gathering operation. The quarter-inch thick cable contains six ultra-thin glass fibers capable of carrying up to six television channels between KSL's microwave relay receiver and its station, 1700 ft. away. KSL is currently using just two of the fibers.

The cable is lashed to a steel reinforcing cable between the two locations and is strung six stories above the ground. Originally, director of engineering William Loveless approached the telephone company about running the cable through the telco's underground conduits. This, said Loveless, would have cost about $40,000. Instead, this overhead approach was completed for less than $2000.

The new link replaces a laser link that has been in operation for about 18 months. The fiber cable is immune to weather conditions and other types of electrical interference. The link was built and installed by Telemet, division of Geotel, Inc., of Amityville, New York, and the cable was manufactured by Times Fiber Communications of Wallingford, Conn.

FCC TV Ban May Violate Anti-Trust Laws

Calling the FCC's 1952 rules on VHF TV station licensing "obsolete and anti-competitive," Justice Department's John Shenefield, assistant attorney general, Antitrust, has leveled the department's guns at the FCC, an agency that often has to call on Justice for support in other, non-broadcast radio services.

The Justice Dept. official urged the FCC to open up its VHF television entry rules to allow up to 100 new VHF stations to open in the top-100 markets. He asserted that the rules are hopelessly outdated, and that when minimum distance spacing requirements were written into the rules in 1952, variations in terrain and environment weren't taken into consideration.

Shenefield noted that last year, the commission did relax the rules to permit four new VHF licensees to set up shop. He said that this shouldn't be the end of it, but that the FCC should go further and open up more VHF channels. He indicated that under the present rules, the TV industry has no real incentive to more efficiently use the available spectrum space, and that the result has been sloppy broadcast practices.

The official noted that in Japan, there are far more VHF television stations operating over a much smaller geographical area, and the Japanese have encountered none of the problems that the FCC anticipates.

Broadcaster/Union Relations May Ease In New Informal Meetings

Something new was attempted in Los Angeles a few weeks ago. It was an informal luncheon get-together for about 20 representatives of the networks, the unions, and federal mediation agencies. They conferred over lunch, not to iron out any problems, but to get to know each other in a friendly atmosphere.

According to the participants, this type of luncheon, envisioned as an every-other-month happening, will pave the way for easier negotiating sessions when new contract time comes up.

"It's a lot easier to deal effectively and reasonably when the adversary across the table is somebody you know on a personal level," was the way one union representative summed it up.

Federal mediation officials, who suggested the luncheon, were optimistic about the future of negotiations. They felt that the luncheon was an unqualified success, and that future luncheons could assure painless contract talks.

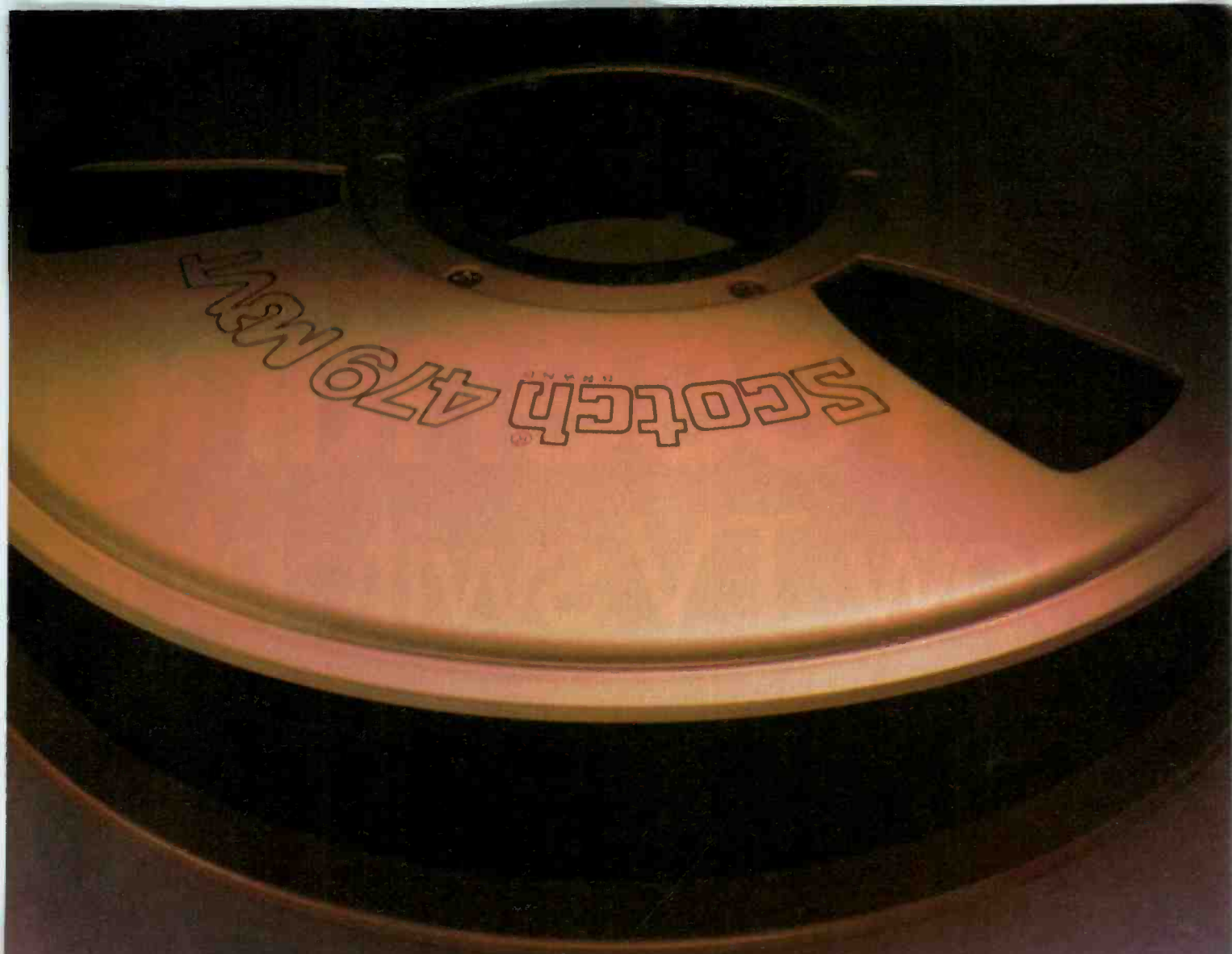
New Transfer Technique Eliminates Film-To-Tape Problems

A new proprietary system for film-to-tape transfers is said to eliminate a number of problems ordinarily associated with this type of reformatting, and it also provides some extra benefits.

Developed by Image Transform, Inc. for use in their tape transfers, the system concept combines new hardware with the firm's own image enhancement and color correction techniques to provide virtually error-free transfer of either 16-mm or 35-mm film to videotape. According to marketing vice president Jack Mauck, "It will be physically impossible for the picture to be out of registration, or to experience color field shading problems with our new system."

The unusual scanning system was developed under direction of vp/

continued on page 16



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Scotch® has been state of the art in broadcast videotape for more than twenty years. It's an industry-wide fact that nobody knows tape like 3M.

So when the industry looks at a new format, the industry looks to Scotch.

3M COMPANY

In broadcast quality one-inch, it's Scotch Master Broadcast 479. 479 has all of the qualities you've come to expect from a tape named Scotch. Like superior color noise and signal-to-noise. And nobody gives you better RF output.

Scotch Master Broadcast 479.

When you come to that new format, you'll have an old friend.

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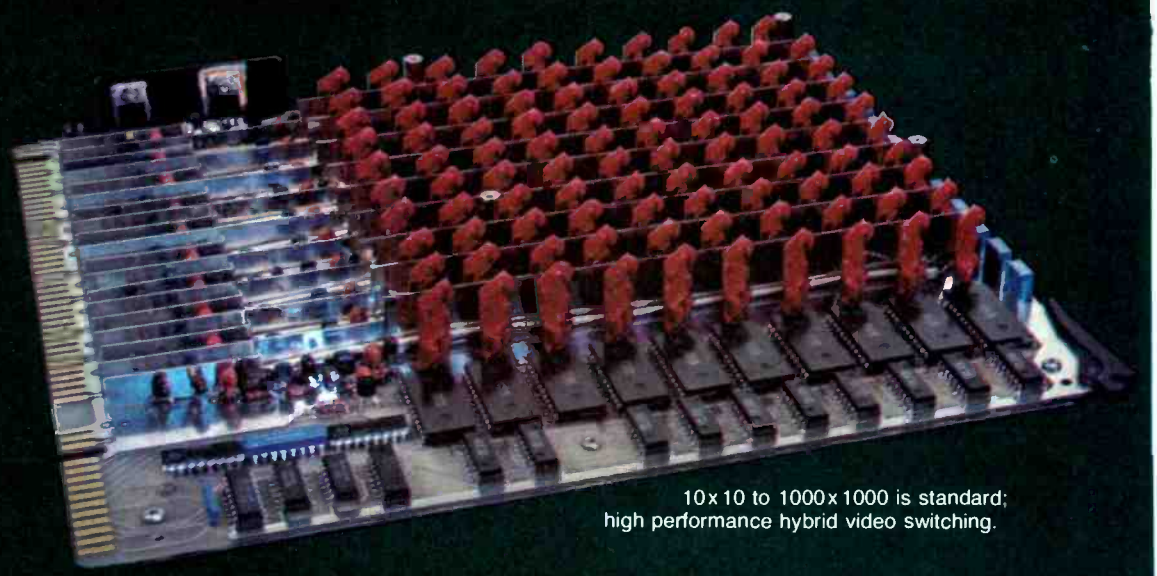
Presenting
now TV switching



10x10 to 1000x1000 is standard; high performance hybrid video switching.

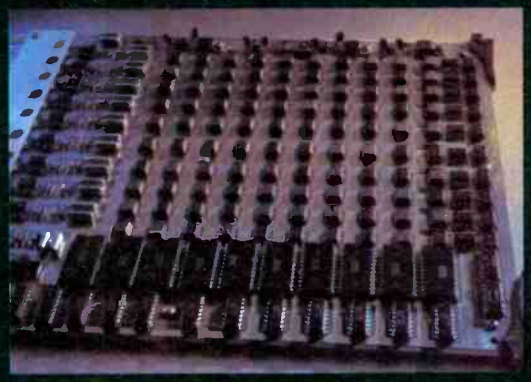
Refresh memory scans the switch each field; change a switch module and the refresh sets it automatically; battery backup preserves memory during power failure.

Microprocessor control; self-diagnostics for fast troubleshooting; constant status output keeps tabs on where you are.

It's a big memory machine with total switch preset-take; single command salvo switching; up to 8 separate control levels with simultaneous follow or breakaway.

System 21: has come of age.

It's a neat package; compact enough for 180x10 to 270x15 in a single module frame.



Air quality, "pop-free," integrated circuit audio switching; 30 dBm at 150-ohm output available.

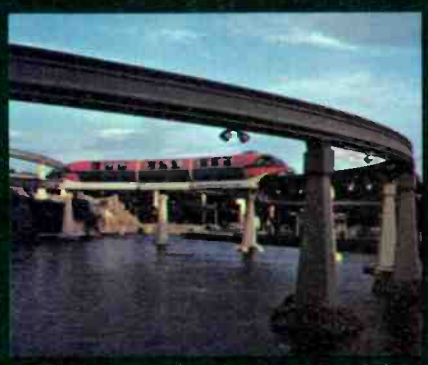
System 21 is a very *mature* routing switcher. Highly intelligent, it gives you the flexibility and capability you need to fill constantly changing systems requirements. It's what other switching systems would like to be when they grow up.

21 is a major milestone in anyone's life. That's why as we turn 21 years of age, DYNAIR, America's most experienced manufacturer of switching gear, is pleased and proud to present System 21.

It marks a significant stage in the development of broadcast switchers, by combining technologies brought to maturity over a 21-year period of innovation and progress with the sophisticated capabilities of microprocessors and integrated circuitry.

With automation-compatible control, and plug-in video, audio, hard contact and data switch modules that are instantly replaceable — with power on — it delivers performance unmatched in the industry. From video specifications like 0.15% differential gain and 0.15° differential phase, to incredibly low power consumption.

There are many reasons why you should look into System 21. So if you're ready for the mature system, we're ready to show you that DYNAIR's System 21 stands head and shoulders — a whole generation — above other routing switchers. Why fool with the minors when you've got a major job to do!



A single line for multi-station, serial data control; choose from CRT, touch pad or alphanumeric controllers.

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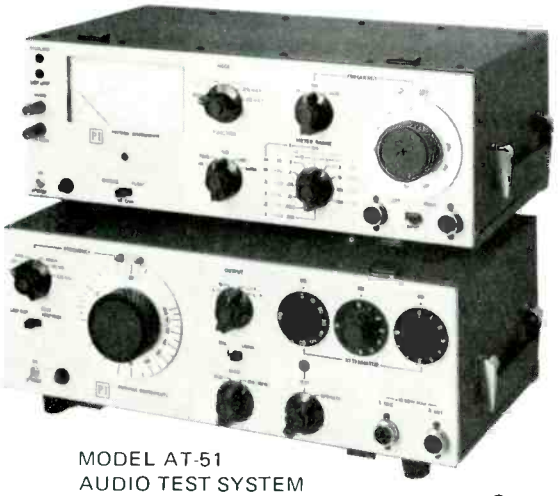

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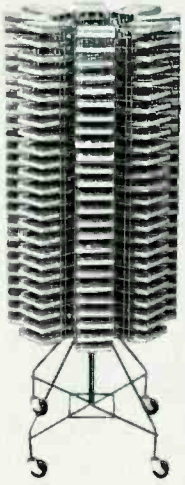

WR-25 $ 15.10
MR-200 $156.55

TABLE TOP CARTRIDGE RACK (not shown) Model TR-96 holds 96 Type A cartridges. Model TR-48 holds 48.
TR-96 $73.85
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News

engineering Ken Holland, and has a number of advantages. The first is that image size and position can be adjusted to meet any need, such as a 10 percent enlargement or reduction. The system avoids the need for conventional cameras and projection equipment, and provides a full 16-mm and 35-mm interlock with a single audio channel or three-stipe magnetic sound.

With this transfer technique, both negative and positive film can be transferred, and there is absolutely no flicker or geometrical distortion. The improved gray-scale dynamic range is said to provide greater detail in highlights and shadows of each picture.

Mauck said the Pan/Scan function, an additional feature which will permit extracting a normal 3-by-4 TV picture from wide-screen Cinemascope/ Panavision theater format, is expected to be on line by midyear. The proprietary system will not be available as hardware for use by broadcasters, but will be retained for transfers made at Image Transform, which has offices in Marina del Rey (Los Angeles), New York, Chicago, Washington, D.C., Toronto, London, and Tokyo.

EuroComm 78 To Feature Advances In Worldwide Communications Gear

Slated for Copenhagen, Denmark, showing from May 30 to June 1, EuroComm 78 will be the first international trade show to cover broadcasting and telecommunications equipment. Equipment on display will come from the U.S., Japan, Britain, the Scandanavian countries, Austria, Switzerland, Belgium, France, and others.

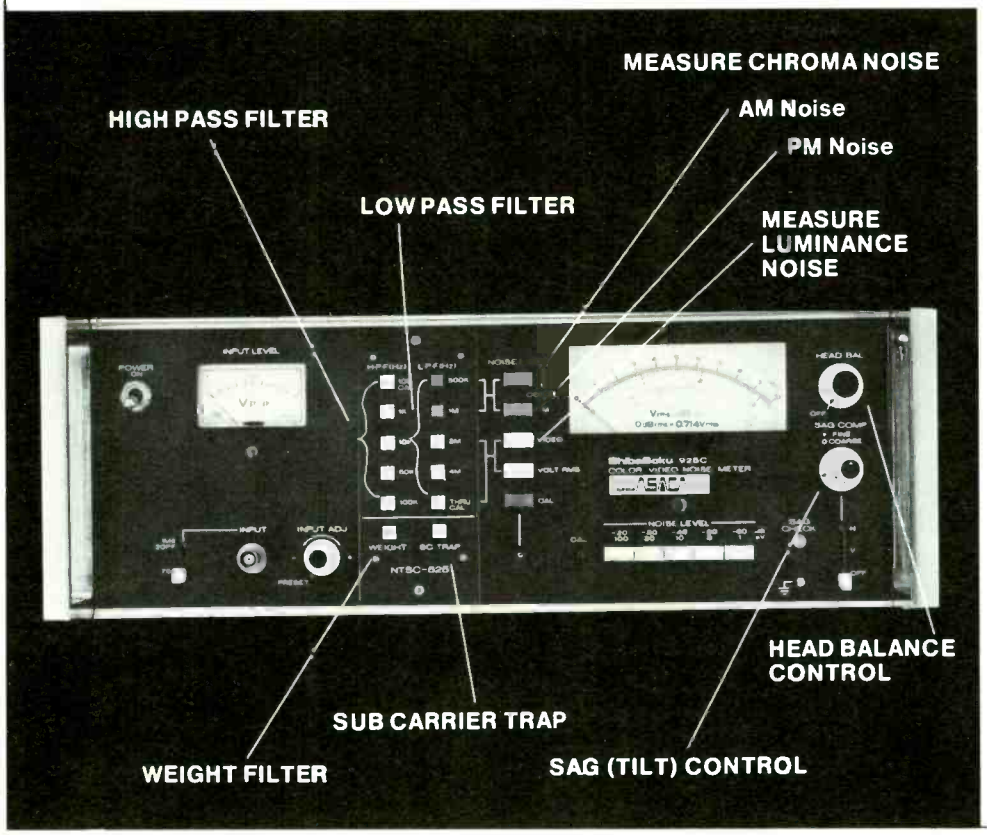
The three-day show will be at the Bella Center on Amager, near Copenhagen, Denmark's largest exhibit center which is a short distance from Copenhagen's International Airport.

Display categories will include institutional and home videotape equipment; satellites and antennas; new types of TV services including teletext; special-purpose combinations of telephone and TV equipment; special forms of data processing and graphics; optical cables, and equipment for private communications systems.

Conferences and seminars are also being scheduled to run concurrently. For more information: Bella Center A/S, Center Boulevard, DK-2300 Copenhagen S, Denmark. Phone: (01) 51-88-11.

continued on page 20

MEASURES CHROMA NOISE AND LUMINANCE NOISE



World's first Instrument to Measure Chroma Noise Generated In Color and Black and White Television Transmission Equipment, TV Cameras, VTRs, Video Disc Units, Digital Image Processors.

Measure the value of this unique instrument*, Model 925C Video Noise Meter, and you'll see why it has been purchased by a major USA network. It measures chrome band noise with a single color signal of desired level that contains both a sync signal and a color burst signal. Chroma noise can even be split into AM and PM components which can be measured separately. Unbalanced 2 head of VTR can be corrected for proper measurement.

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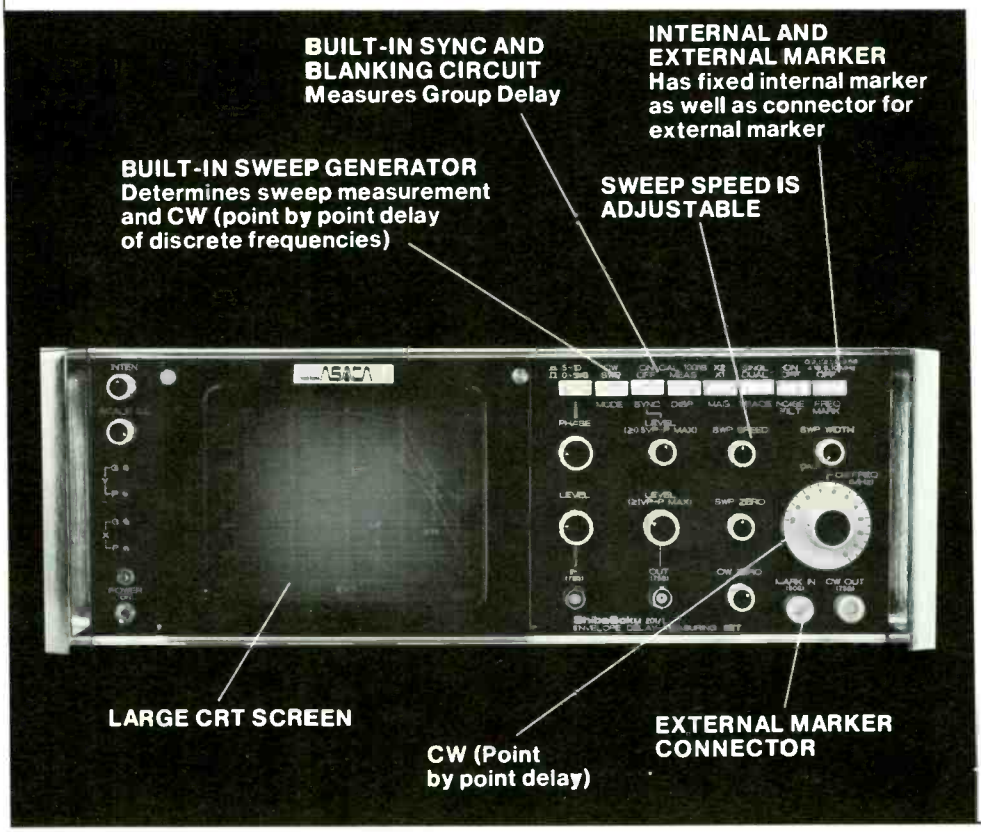

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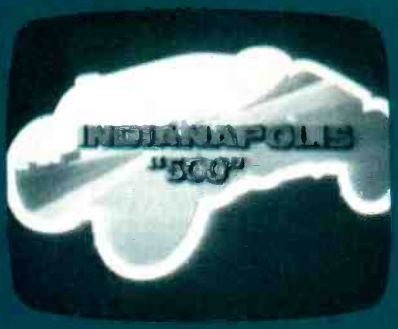

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News Briefs

Sen. Robert P. Griffin, (R-Mich.), has introduced **legislation to permanently ban TV blackouts** of sold-out professional sports events. The bill would prohibit local TV blackouts of regular pro football, baseball, basketball and hockey games (and football playoffs) which were sold out 48 hours before game time. For other playoffs, the time period would be 24 hours . . . . In order to cut service call response time, **RCA Americom** has established toll free numbers for subscribers. Dial 800-526-3566 from anywhere in the U.S. except New Jersey, where the number is 800-352-4939.

A **new satellite, Intelsat IV-A** (F6) will provide international communications services to some 40 countries in the Indian Ocean region. It has the capacity to relay more than 6,000 simultaneous telephone calls and two television programs, and was scheduled for launch by NASA on March 31, 1978 . . . . **WCET and WLWT,** Cincinnati, broke ground for a new tower to support antennas for both stations. The tower will be built at maximum height/maximum power and will use a two Mega-watt transmitter . . . . Emergency power came to the rescue at **KCBQ-AM** during San Diego's recent blackout. The station's two 250 kW emergency generators permitted broadcasting at the full 50 kW transmitter power . . . . **WHUG-FM,** Jamestown, New York, is the first station in its market to use its SCA to provide a full schedule of informational and entertainment programming for the visually or physically handicapped.

KYOK-AM, Houston, has converted a 25-foot Winnebago motor home into a "complete radio station" with full broadcast capabilities while in motion and total independence of external power support . . . . **WQLR-FM,** Kalamazoo, began airing four business reports a day prepared by the editors of the *Wall Street Journal* . . . . WFSB-TV, Hartford, CT, will extend for another year its **comprehensive broadcast training** program for educationally or financially disadvantaged minorities and women living in southern New England.

Home Box Office reports that 27 new cable TV affiliates began offering its program package in January, bringing network membership to 461 . . . . **Showtime,** a premium entertainment service for cable systems, has begun national satellite service via RCA Americom's domestic communications satellite . . . . **Long Island's first satellite** earth receiving station on the Suffolk Cable-vision system in Islip, N.Y. will bring Showtime to the homes of 70,000 subscribers.

Penn State will work with the Museum of Contemporary Art Foundation in Caracas to train the Museum's video lab staff in the production of video cassettes and maintenance of video equipment, and will demonstrate 'video-art' techniques . . . . Suffolk Cablevision, Islip, N.Y., will introduce **"Stereo Sound"** with its new Showtime entertainment service beginning May 1, 1978. It will be available to subscribers who have cable connected to their FM stereo receivers . . . . NAB to publish booklet on **broadcasting courtroom proceedings.** Dr. Allan Wurtzel, University of Georgia, is to head the project and is now soliciting comments on: 1) equipment and its operation in the courtroom, 2) procedures for requesting access, and for trial coverage, and 3) journalistic issues relating to TV coverage of proceedings. All information should be sent to Dr. Wurtzel, School of Journalism and Mass Communications, University of Georgia, Athens, Ga. 30602.

NAB has compiled a primer to help broadcasters **fight new taxes.** The booklet, to be distributed by state broadcaster associations, reviews various taxes and constitutional issues, offers policy arguments urging rejection,

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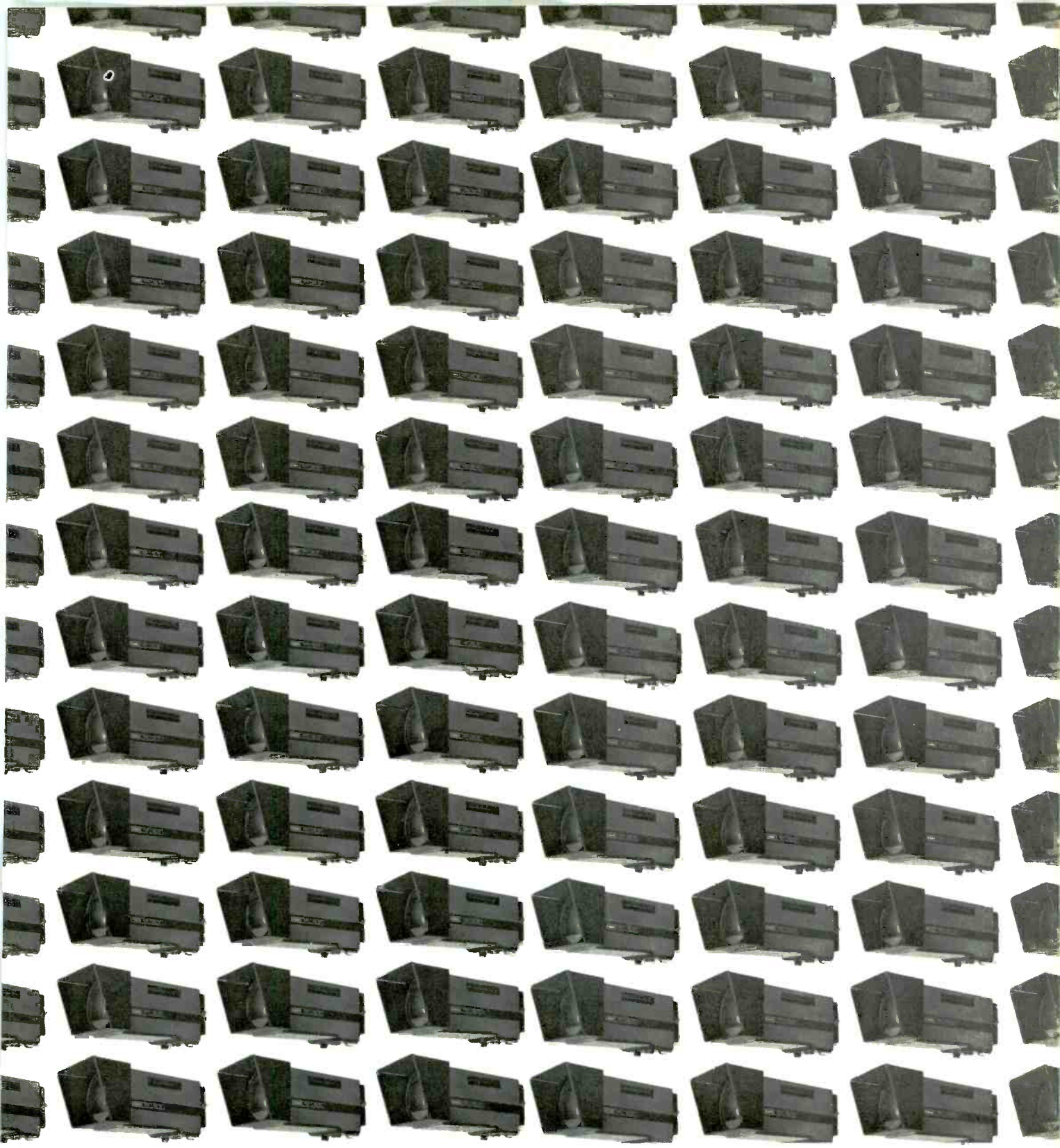

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News Briefs

and presents a status report on broadcast related taxes . . . . NAB senior vice president for Government Relations, Donald P. Zeifang, criticized the government for not keeping up with the times which **dictate a trend away from "regulation** and reliance upon the judgment of bureaucrats." Speaking at the Indiana Broadcasters Association's spring conference, Zeifang noted that "while more and more Americans relay upon the broadcast media for news and information, the government steadfastly refuses to abandon its position of discrimination against the broadcast media in the application of full First Amendment freedoms" . . . . NAB has asked the Copyright Tribunal to **make it easy for broadcasters to collect fees** from CATV systems. NAB suggested that the Tribunal: 1) require stations to retain affidavits stating that programs for which they claim royalties were recorded and to keep the recordings at the station rather than submit them with the claims; 2) devise a standardized form requiring minimal information; and, since broadcasters will not have access to cable system's accounting statements prior to July 31, 3) require an initial short form due July 31, and a full form due November 27 . . . . NCTA has launched the 1978 **Cable Services Competition.** Awards will be presented for overall community programming format, best single program, development of innovative services, and best program produced for pay cable. Cable system employees and educational, government, or public access users are eligible. Contact Public Affairs Dept. NCTA, 918 16th St. NW, Washington D.C. 20006 . . . . NCTA renews **affirmative action** by hiring minority rights specialist, Ruby White, to promote minority involvement in cable system ownership and operation.

Hughes Aircraft Co. has scheduled **June seminars on Ground Terminals and AML Equipment** to be held in Torrance Calif. Contact Hughes Microwave Communications Products, Building 237, P.O. Box 2999, Torrance, Calif. 90509, 213-534-2146, ext. 2763 . . . . AES held its second meeting on digital audio in Feb. Several reports were presented **proposing the use of 44.05594 kHz** sampling frequency for all consumer and professional applications. Reports will be published in the Journal of the Audio Engineering Society . . . . ITVA's N.Y. Chapter will conduct a day-long **EFP/ENG seminar** as part of its Visual Communications Congress, June 6, at the New York Hilton.

The board of directors of the NAB

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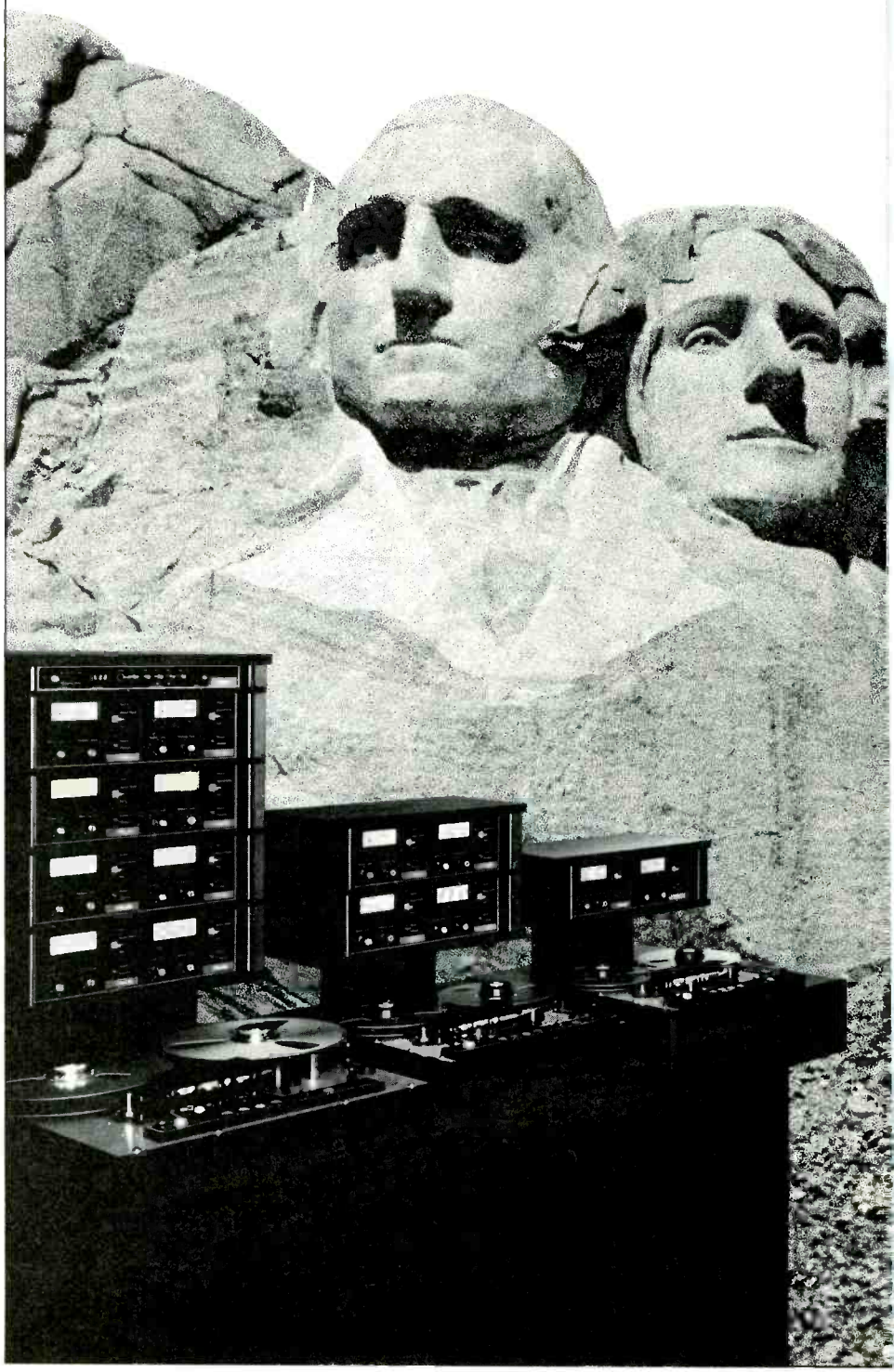

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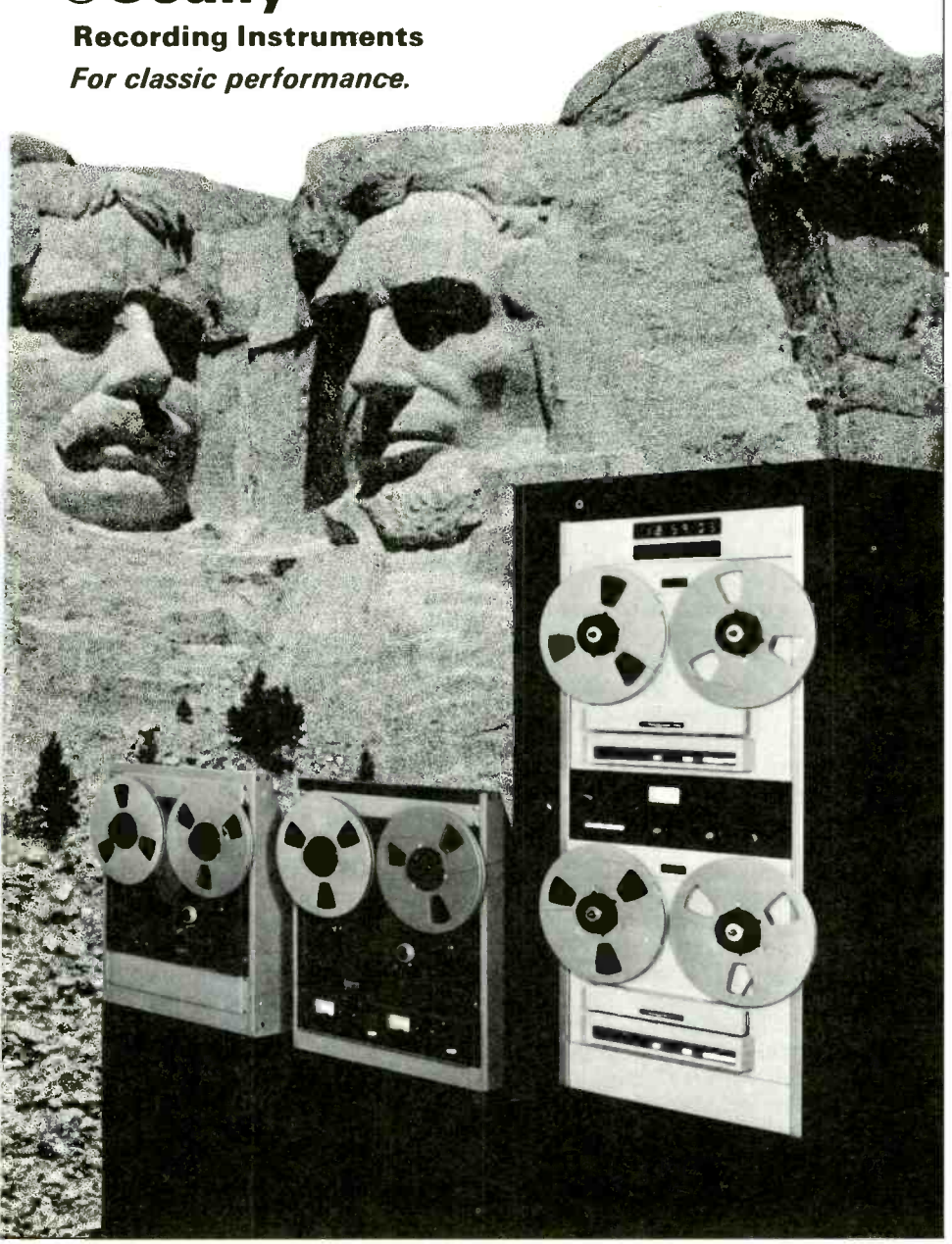

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and the Canadian Association of Broadcasters have scheduled a **joint meeting in Toronto,** June 29 . . . . SMPTE's **120th Technical Conference** and equipment exhibit is planned for Oct. 29-Nov. 2 at the Americana Hotel in New York City. Conference topics include Electronic Editing, Special Effects in Film and Video, and Film Lab Practices. Persons interested in presenting papers at the conference should contact Lynne Robinson, SMPTE Conference Program Secretary, 862 Scarsdale Ave., Scarsdale, New York 10852, 914-472-6606 . . . . The annual convention of Associated Press Broadcasters will feature NBC newsman **John Chancellor as the keynote speaker,** June 1-3 in Cincinnati.

Business Briefs

Dartmouth College radio station WDCR just celebrated its 20th anniversary as the nation's first commercial AM outlet entirely staffed and directed by college students . . . . National State Broadcasting organization of Greece (ERT) has contracted with **RCA for $450,000 worth of ENG equipment** including five TK-76 portable color cameras, HR-1020 portable ¾-inch videocassette recorders, and HR-1060 editing recorder/reproducers — all on PAL standard.

Farflung holding company Wometco Enterprises has acquired WZZM-TV, an ABC television affiliate in Grand Rapids, Michigan. It's the company's fifth TV station . . . . **Pye TVT Ltd., Cambridge, England-based broadcast company of Philips, has been awarded contract** to equip four remote broadcast vehicles in Romania. Contract award was by Electronum on behalf of Radioteleviziunea Romana, the State broadcasting service. Each vehicle will take four LDK 25 cameras, an LDK 15L portable production camera, and video, audio communications and test equipment. Equipment will be assembled in Bucharest on locally produced trailer chassis over a 15-month period.

In a move to new transmitter site atop New York's World Trade Center, Spanish-language UHF TV station **WXTV (Channel 41) is installing Philips Broadcast Equipment Corp.'s new 110 kW transmitter.** The new transmitter, combined with site atop tallest building in New York will give the station increased reach of about 50 percent of the Spanish-speaking market . . . . **RCA Broadcast Systems is providing more than $500,000 worth of TV studio systems**

continued on page 24

A group of the staff meet in the Broadcast Studio of the Station

It was a College broadcast facility; Now it's a public radio station; KUSC, Los Angeles, still has a Stanton in every table...

It is interesting that the station which provides top quality classical music service to Los Angeles was an outgrowth of a College Radio Station.

It now has been incorporated into the public broadcasting system and serves all of Los Angeles, Ventura and Orange Counties, with a format of 85% classical music and 15% informational programming primarily from the National Public Radio Service. KUSC goes direct from disc to air and uses the Stanton 600E on its turntables.

Since the station has received substantial university support for upgrading their sound, which includes a new transmitting system ... new tower antenna ... new control board ... new turntables ... and new cartridges ... KUSC plans to install Stanton's Calibrated 681SE cartridges in all their turntables.

So, their sure-to-improve sound is certain to have a favorable impact on their growing audience.

Stanton's 681 Calibration Series cartridges offer improved tracking at all frequencies. They achieve perfectly flat frequency response to beyond 20 Kc.

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Business Briefs

to CFRN-TV, Edmonton, Alberta, Canada. Included in the sale are two TR-600 quad VTRs, both equipped with AE-600 time code editing systems, a TCR-100 video tape cartridge recorder, and a single TK-46 studio camera.

Collins Transmission Systems Division is a new entity at Rockwell International, formed to combine Rockwell's microwave and satellite communications into a single division. As a part of the Commercial Telecommunications Group, the new division will be headquartered in Dallas . . . . The **NAB will hold its 11th management development seminar** for broadcast executives at the Harvard Business School, July 16 to 28. The two-week seminar is designed to "further develop the executive skills, techniques and capabilities of general managers and group/network officers in equivalent managerial positions" . . . . Eight major market TV stations have brought a package of 13 animated classics for children from D.L. Taffner, Ltd., an international program distributor and packager. Program source is Air Programs International of Australia.

RCA TV cameras for ENG and for TV film originating systems valued at about $1.25 million have been ordered by the Canadian Broadcasting Corp. The order includes 19 TK-76 ENG cameras and 11 TP-66 16mm film projectors for use at various CBC stations . . . . **Emerson Electric Co. of St. Louis, and Avantek, Inc. of Santa Clara, Calif.,** have mutually agreed to terminate all merger negotiations which began last year . . . . The annual convention of **Associated Press Broadcasters** in Cincinnati, June 1 to 3, will be addressed by two professional sports executives — Paul Brown, vice president and general manager and part owner of the Cincinnati Bengals; and Bob Howsam, recently named vice chairman of the Cincinnati Reds.

Videotape may be replacing film in Hollywood — at least at the audition level. Actress Lin Shaye recently had vignettes from TV programs she had appeared on edited into a video cassette by **Devlin Productions.** In Hollywood, the cassette was screened by casting agents faster and more easily than conventional footage, and it landed the actress a couple of major roles . . . . The **NRBA has scheduled its annual Radio Sales Days** for four different cities this month. First is Chicago at the Marriott O'Hare on May 11; on May 16, the session meets at the Sheraton Harbor Inn in San Diego; May 17, it's the Airport Sheraton in Philadelphia; the final session is on May 23 at Atlanta's Airport Hilton.

Reeves Teletape Television Facilities Group has added the latest CDL switcher, the CB 480, to its mobile unit. This unit handles such remotes as *Live From The Met* telecasts on PBS. The new switcher has 24 inputs, and the mobile unit typically uses four RCA TK-46 cameras, one RCA TKP-45 camera, and four VTRs . . . . **Continental Specialties Corp. has expanded its manufacturing facilities** with the opening of a new 50,000 square foot building . . . . **M.P. Video, Inc. has moved into larger quarters** in Newton, Mass. The new building totals 4500 square feet.

NEC will build the **"world's largest routing switcher"** for NBC. The Model TKA-105 contains 40,500 cross points configured as 150 inputs by 270 outputs. A 120 input by 60 output portion of the switcher will be used to distribute NBC's Olympics coverage in Moscow. After the summer games, the complete switcher will be moved to the NBC Burbank Studios.

Name change at **Micro Components Corp., wholly owned subsidiary of Cherry Electrical Products Corp.,** reflects new image. Now it's called **Cherry Semiconductor Corp.,** manufacturer of custom bipolar integrated circuits. It's in final stages of an expansion program.

Listeners have been talking back to TV sets in Long Island communities served by **Suffolk Cablevision, subsidiary of Viacom International, Inc.** A survey was mailed to all subscribers late last year and the volume of replies "was overwhelming." Completed survey forms came back from 6.75 per cent of all subscribers overall, while subscribers to extra-cost motion-picture service channel showed a 10.11 percent response . . . . A new multi-million-dollar 1200-mile-long cable system for Albuquerque will be expedited by **new contract signed between Magnavox CATV Systems, Inc., Manlius, N.Y. and Albuquerque Cable Television, Inc.,** a subsidiary of WGN Electronics Systems Co., Chicago . . . . Magnavox **CATV Systems, Inc. is offering a two-day technical seminar,** "Cable Television: Fundamentals of Design, Operation and Maintenance," May 18-19 at Hardford, Conn. Holiday Inn.

The Telemine Co., New York, N.Y. has acquired exclusive pay-TV distribution rights to *Volunteer Jam,* a full-length southern rock motion picture. Movie was filmed at Middle Tennessee State University before a live audience of 13,000 . . . . **Cox Cable Communications,** based in Atlanta, **has picked Scientific-Atlanta's series 6500 distribution equipment** for rebuilding and expanding about 1000 miles of its cable systems. **BM/E**

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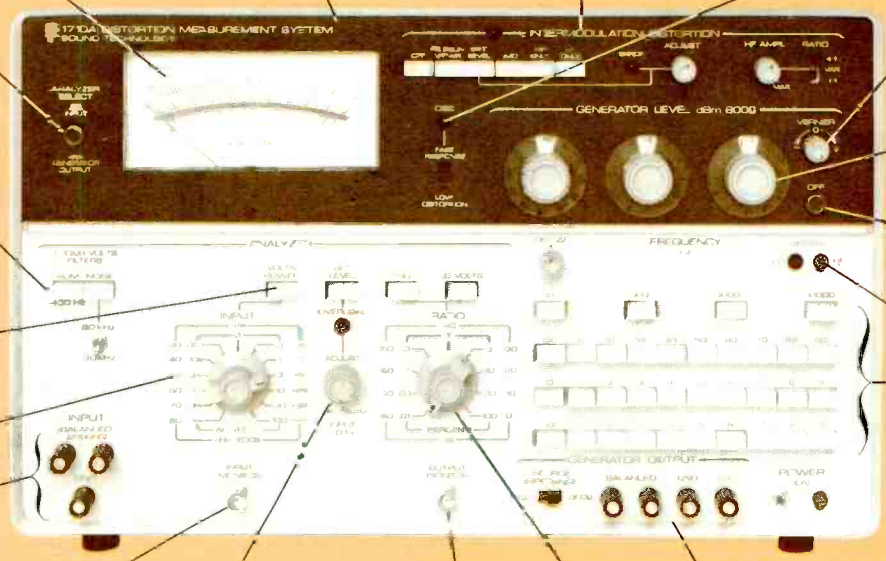

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RADIO

PROGRAMMING & PRODUCTION FOR PROFIT

Which Way The Radio Listener?

WHERE IS HE (SHE) GOING — to "soft rock," or "adult contemporary," or carousel music, or where?

BM/E talked to about twenty individuals whose bread and butter depends on spotting — even, perhaps, keeping a little ahead of — shifts in taste for radio programs. There is unanimous agreement that a big shift *has* taken place in, say, the last five to eight years. Different experts saw this from somewhat different angles, but in the end the composite picture had excellent consistency.

It has become a cliche of trade-paper analysis of programming trends in recent years that the young adult group of today is the "rock generation" of the 50's and early 60's grown up, and as such is tuned in to a "softer" sound, rejecting the hard, "metallic," screaming rock that dominated the 50's and 60's. This view — that a person's taste in music is rigidly determined by age — may seem an attractive simplifier of programming choices to some people, but most will probably regard it as too disrespectful of the individual taste.

Fortunately for this second group of observers, the situation is more complicated than the cliche suggests. Two or three broad trends emerge that are far more interesting and hopeful from a humanistic point of view than a simple "hardening of the atteries." Observant sociologists tell us there is a broad shift away from the "alienation" that dominated the landscape of the young in the 1950's and 60's, and that this shift applies to all age groups. Warm personal relations and sustained productiveness are back in fashion. Music that literally "socks," that is deliberately harsh and mechanically propulsive, does not fit with this. A warmer, more romantic style is the natural accompaniment, and in this sense "softer" is right. The movement is away from the *unnatural* — vocal hype, the speciality of the circus-barker DJ, will not be a winner in the 1980's. The DJ has to talk like a straightforward friend who is deeply committed to the music, and wants each listener to join him in enjoying it.

But this does *not* mean that the young adult is going back wholesale to pre-rock musical perceptions and reactions. Many observers agree that a large number of young adults today have gained a degree of musical sophistication during their immersion in rock. The simplistic "hard stuff" first captured them, but their natural intelligence and taste led them after awhile to want something more mature musically.

Another aspect of the super-availability of popular music over the last decade is that listeners, whatever their taste in musical quality, are aware of current music and are used to hearing it. Thus, programming must be attuned to the recent, more "contemporary" sound, even though listeners want it less raucous and metallic than was popular in the 1960's. This fact is acknowledged by many of the programmers *BM/E* consulted, whether they use beautiful music, MOR, "soft rock," or other formats.

Also widely accepted is the increasing need to put programs together with sensitivity for the "feel" of each piece and its relation with the others. The beautiful music programmers have emphasized for a long time the seamless quality produced by their "matched flow." But the MOR and AOR programmers are becoming more attuned to the necessity of getting each number right in "feel" and sequence.

Here are paraphrases of a few of the comments made to *BM/E* in our recent survey of programmers, which taken together stimulated the preceding observations. All the programmers quoted are doing extremely well in attracting audiences — and station clients, in the case of the syndicators.

Ed Peters of Peters Productions pointed to the ebbing of "alienation" among the young and a return of "romance." Couples are embracing each other again while dancing, at least in many parts of the country (in spite of the strong disco trend in large cities). He pointed to his very popular "Natural Sound" format which mixes music from all styles, from rock to beautiful music. But all selections are chosen for a smooth flow, with nothing metallic or obtrusive in the sequence. The "Natural Sound" uses recognizable current music and is winning the young adult market across the country.

Lee Tate, of Cavox Productions, says his most popular Beautiful Music format is now Contemporary Beautiful Music, with a heavy admixture of

continued on page 28

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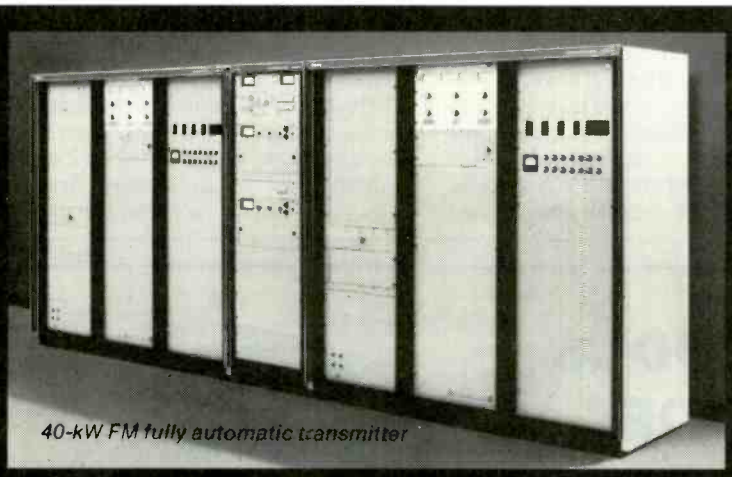

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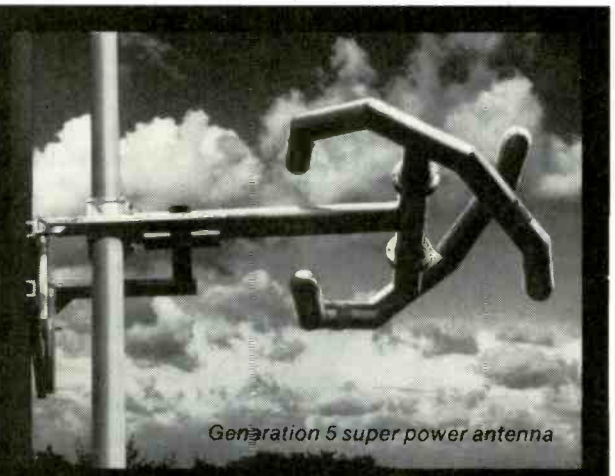

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Circle 119 on Reader Service Card

Radio Programming

fresh, current tunes carefully blended in. And Tom Kriborian of Radio Programming/Management had a similar comment. His beautiful music format is his most popular, but it has contemporary music added, carefully chosen. Krikorian comments that today's young adult wants *music,* and not just noise, but it must be current, recognizable and "uptempo."

Lew Abrams, of Burkhard-Abrams, says that his company's most popular formats are their MOR and rock. But the rock must have complex arrangements that are *musically* interesting, in strong contrast to the "primitive period" rock. This encouraging trend is mirrored by two teenagers related to this writer, who proselytize for their favorite rock musicians by saying, "listen to what they're doing — it's really *complicated.*"

Bo Donovan, of Tuesday Productions, made the point that even for jingles (his firm's specialty) the trend is to a softer, one-on-one approach. This means a quieter, more "sincere" solo voice approach, perhaps backed with choruses, but avoiding the screaming group music of many older jingles. He said that old-style jingles were still being produced, but were largely failing to get results.

Tim Powell, who instituted a "mellow music" format at New York's WKTU after his recent appointment as program director, had some interesting comments on the subsequent substantial improvement in the station's ratings. Simply going to an unadulterated "mellow" sound is not the trick, Powell explained. He includes a wide range of music, with a bright, uptempo feel, but nothing "hard" or extreme. The range is from jazz to rock to MOR, with DJ's who talk but never "yell." It concentrates on current, fast music that doesn't "grate."

Ron Nickell of TM Productions reported that his firm already has 32 clients for its fairly new "soft rock" format (among the more than 200 stations in its roster). Nickell says that "soft rock" will be called MOR in a few years. He believes that the soft rock is extremely hard to do, and must have the right "feel," with no sharply obtrusive elements. The pieces must be known and by known artists, for that contemporaneity that is a requirement in winning the young adult audience.

That is all the commentary we have room for, but the strong agreement among the surveyed programmers should convincingly support the new trends noted here.

BM/E's Program Marketplace

Syndicators For Radio

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THIS SERIES HAS again and again supplied examples of two aspects of successful radio syndication. One is that good programming comes out of the specific good taste and skill of one or more individuals. These individuals have invariably had long experience in devising programs that work for particular stations.

The other general fact is that radio syndication today supplies an extremely wide variety of programming. This is more than just a choice of standard formats. Having several formats is, of course, necessary to meet various market situations, but the good syndicators carry it beyond that. Each good programming series has a specific "personality." A radio management, by sampling a program series thoroughly, can get a sense of that personality and decide whether or not it fits into the station's objectives.

In the case of the Music Works, up for examination this month, the taste and experience comes mainly from Bill Robinson, president and founder. With a February, 1977 start and the first regular on-air use in June, 1977, the Music Works has grown to 21 subscribers (as of March, 1978), an excellent first year

continued on page 32

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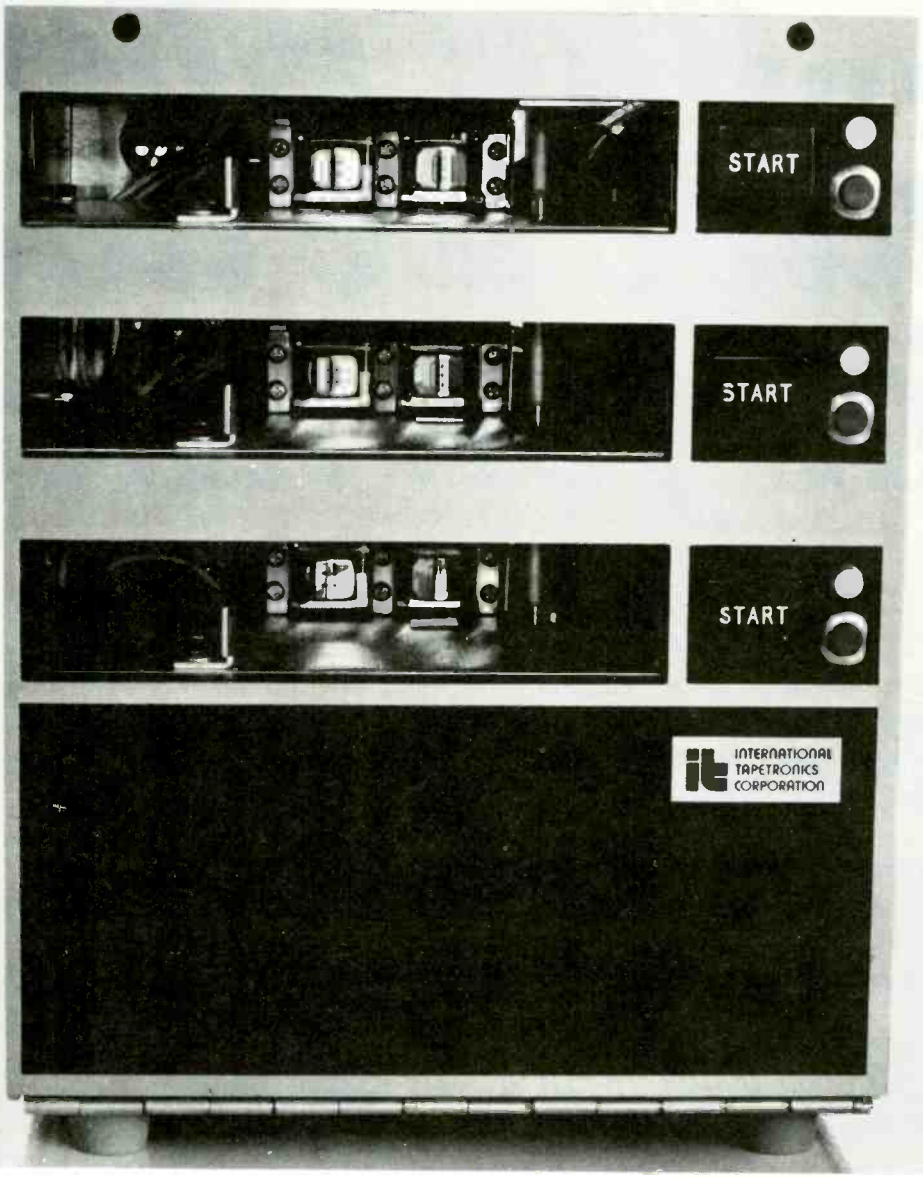

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Two of the most recent improvements in the Plumbicon pickup tube line, (the 30mm XQ1410 and the 2/3-inch XQ1427) are described here. These tubes, like all Plumbicon TV camera tubes, offer unmatched resolution and sensivity, superior color rendition . . . excellent highlight handling . . . low and steady dark current . . . high signal-to-noise ratio . . . minimal lag . . . stable operation over a wide temperature range . . . and long life.

Type XQ1427: Offers significantly higher resolution than earlier versions; modulation depth is 60% typical at 320 TV lines giving sharper, clearer pictures and allowing operation at lower light levels. New gun design and 1500-line mesh construction result in improved registration and geometry, reduction of flare by a factor of 3 and reduced beam landing error.

Type XQ1410: The XQ1410 gained immediate acceptance by the television industry as a significant advance over all previous 30mm tubes. This recognition is based on the XQ1410's dramatic reduction in lag (typically 37% below that of our XQ1020.) The XQ1410 ends color-fringing, greatly reduces picture-smear and gives better dynamic resolution—even under poor lighting conditions. With its internal bias lighting, all three channels can now be balanced for identical lag characteristics. New gun construction gives improved resolution, (60% typical modulation depth at 400 TV lines). New mesh construction results in better geometry and registration and significantly reduces microphony.

Make no mistake—these are vitally important improvements on vitally important camera pickup tubes . . . but these developments are only part of the answer to—"What have we done for you lately?"

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Radio Programming

record.

Robinson has been both on the air and directing programming for nearly 25 years for a series of stations. He broke into syndicated programming early as a top on-air man with one of the "Source" organizations, Broadcast Programming International, when it was part of IGM (see *BM/E*, June, 1977).

But, in addition to that work, he was, and still is, a program director and an on-air man for a particular station, WIRE in Indianapolis. Robinson has continued his work for WIRE while operating his syndication business. As a long-time specialist in country music, he has made WIRE a commercial success with country, and won for himself and the station a stunning series of awards.

For himself, Robinson has been given the accolade as "Country DJ of the Year" by the Country Music Association (CMA). *Billboard* has named him "Country Program Director of the Year." And his station, WIRE, has been CMA's selection as "Country Station of the Year" six times out of the last nine.

That glittering panel of recognition added to the station's success leaves no doubt that Bill Robinson has a way with country music. It is the high personal skill that counts most in the quality of syndicated programming.

Robinson's own ideas on syndicated programming spring from his objective to make automated programs sound "liver and live." He fervently believes that this is the way for many radio stations to go: automation for *control*, with programming designed to be very personal, very specific to the station, and very "foreground."

Each subscriber gets the complete market analysis and detailed program recommendation which is fairly standard with the better syndicators today. To allow for the kind of "personalizing" that Robinson wants, the music is delivered on the usual 10½" reels, with the talk on separate "personality" tapes. The talk segments are transferred to carts by the station so that the talk for each record can be injected into the programming by the automation system, at the right points. The music numbers are laid out on the music tapes for "ping-pong" sequencing: one from reel A, one from reel B, then back to A, with the talk inserted between. This implies an automation system with at least two open-reel playback machines and a multicart machine.

As suggested, putting all the talk on a separate reel allows Robinson and his associates to "personalize" the talk for each station. The DJ talk will include PSAs, IDs, promos for the station, references to local personalities and events. The programming and the announcer become totally identified with that station.

Furthermore, the talk never refers to the format name (see below) or the source of the music. Robinson says the Music Works never shoves its image down the station's throat, but works very hard to foster the station's own image throughout the talk sequences.

The Music Works has three formats in active use. "A Live Country" is the original format, and consists mainly of current country hits and standards sequenced for the flow and day-part character that Robinson believes are most effective. The "Live Country" subscriber gets a choice of one, two, or three announcers, each with a series of songs that can be used for complete programming. Each announcer series starts with 36 reels of music to which are added four updated reels with the latest hits each month. Thus, if a subscriber wants all three series (some do) he will get 108 reels to start and 12 updated reels a month.

One series has Robinson himself as the announcer and on-air personality. Currently working with him on the other two are, respectively, Lee Shannon and Gary Havens, both with long experience in handling country music on the air.

The second format, "Casual Country," is described by Robinson as a blend of arrangements of country songs in string versions by a variety of singers of differing styles. It is not downtempo, but "foreground" programming. Robinson may recommend it as an alternative in a market saturated with "beautiful music." The choice of series is similar to that of the "Live Country," and the music and talk come on separate reels, again so the talk can be totally identified with the station.

The third format, "Canned Pop," is described by Robinson as "Soft Rock." It is hit oriented, with a new "hit" tape and a "recurrent" tape every ten days. The "recurrent" tape carries tunes that are just off the top 50, but still very much in the audience consciousness. Robinson says he has found the strong pulling power of such material over his many years in programming a variety of stations.

The Music Works has its own equipment for making masters and copies. All copies are made on virgin tape with duplication at playing speed, 1:1. "Quality control," says Robinson, "is fanatical." Like a number of other syndicators covered in this series, the Music Works is making its own strong contribution to uplifting the technical quality of music heard on American radio. **BM/E**

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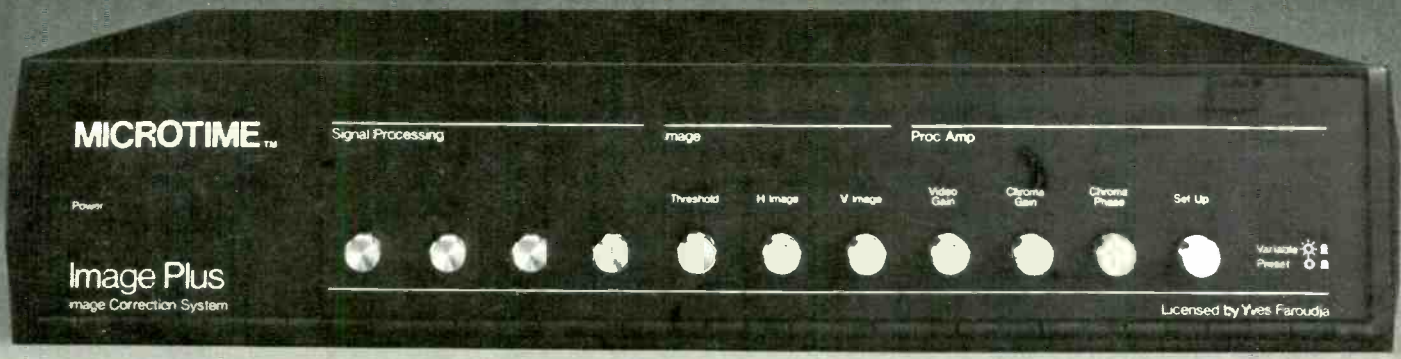

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NAPTE Convention In LA Gives Insight To New Programs From Syndicators and Local Programming Activity

by Frank Wyman

Iris Awards for top local productions, 'fourth network enterprises,' and a boom in quality and quantity of syndicated programs are among highlights of the March convention.

TELEVISION PROGRAMMING EXECUTIVES from around the nation flocked to the Hotel Bonaventure in Los Angeles in March for the National Association of Television Programming Executives' 15th Annual Convention. Many of the delegates arrived at the convention grateful to be out of the harsh winter weather that prevailed in the East and the Midwest and found themselves unwilling participants in one of the worst storms to ever hit the southern California region. Though many area residents were busy trying to deal with the rapid disappearance of their real estate due to mud slides, the worst most conventioneers faced was the unlikely prospect of having to take umbrellas with them on the outboard elevators common to the Hotel Bonaventure.

The first order of NATPE business was the Iris Awards Banquet hosted by Dick Clark, who was accompanied by a dazzling array of big name stars as presenters. Jerry Lewis was honored with the NATPE Award of the Year for his long service to the industry and, more importantly, for his contributions of time and effort to what has by now become a regular Labor Day feature — the Muscular Dystrophy Telethon.

Among the Excellence Award Winners, WBTV, of Charolotte, N.C. garnered top honors in two categories. John Hutchinson of WBTV accepted the Iris statuettes for WBTV's programs, *The Rowe Quartet Plays On Your Imagination,* in the Performing Arts category, and for *Diamonds Aren't Forever,* in the Sports category. (For other Iris winners, see accompanying box on page 36.)

During a seminar on "To Produce or Buy," chaired by Don Azars of KGO, San Francisco, a number of directions were suggested. Panelist Bill Hillier of Group W demonstrated how member station KPIX, San Francisco, took a chance on its own access time production, *Evening Magazine*. They gave the show a top budget and came up with a quality product that bumped the opposition with impressive rating numbers. With a solid winner under its belt, Group W put the show into its four other stations. By using a full scale promotional campaign, all but one of the member stations took first place in their time slots. And even the odd man out scored a healthy second place, and was rising fast. (For a more complete explanation of the *Evening* format, see *BM/E,* April, 1977.)

Obviously a show of this kind is a costly venture, not only in actual cash spent, but in sustained creative output. It's not an easy task coming up with innovative ideas on a local level. There just aren't that many stories to go around. The answer to this problem is in the sharing of feature segments. This takes the pressure off production teams and allows them the time to come up with well-planned quality stories. This kind of exchange gives the show a truly professional quality, which in turn guarantees a positive viewer response.

Shortly after the close of the convention, Group W announced that *Evening,* under a new title, *PM Magazine,* had been sold to nine additional non-Group W stations. The new stations will take at least one third of the Group W produced segment, and may complete the program with segments produced either by themselves or by another cooperating station. There is a committment to produce at least part of the program locally. Hillier will take the role of executive producer and will be available to consult with accepting stations on setting up their own *PM Magazine* production unit.

In addition to magazine and talk-show style programming, Bruce Marson of WCVB, Boston, further demonstrated what kind of quality local producers could come up with. With specials like *Dying to Grow Up* and *Learning to Care,* children's shows like *Catch A Rainbow,* and religious programs like *The Baxters,* he showed that high quality local programming gave the producing station a unique and positive image — one that gave the staff a feeling of company pride, attracted an impressive number of viewers, and encouraged local advertisers to join the bandwagon.

The seminar provided many ideas and more questions, but produced few positive answers. The bottom line was the problem of cost. No independent station can afford to go it alone, not without some form of cooperative effort. Nevertheless, access slots and independent prime times have to be filled with something. It was no secret, according to the panel, that the day is passing when three swivel chairs and a coffee table or the umpteenth rerun of

continued on page 36

Frank Wyman is a freelance writer covering NATPE on assignment from *BM/E.*

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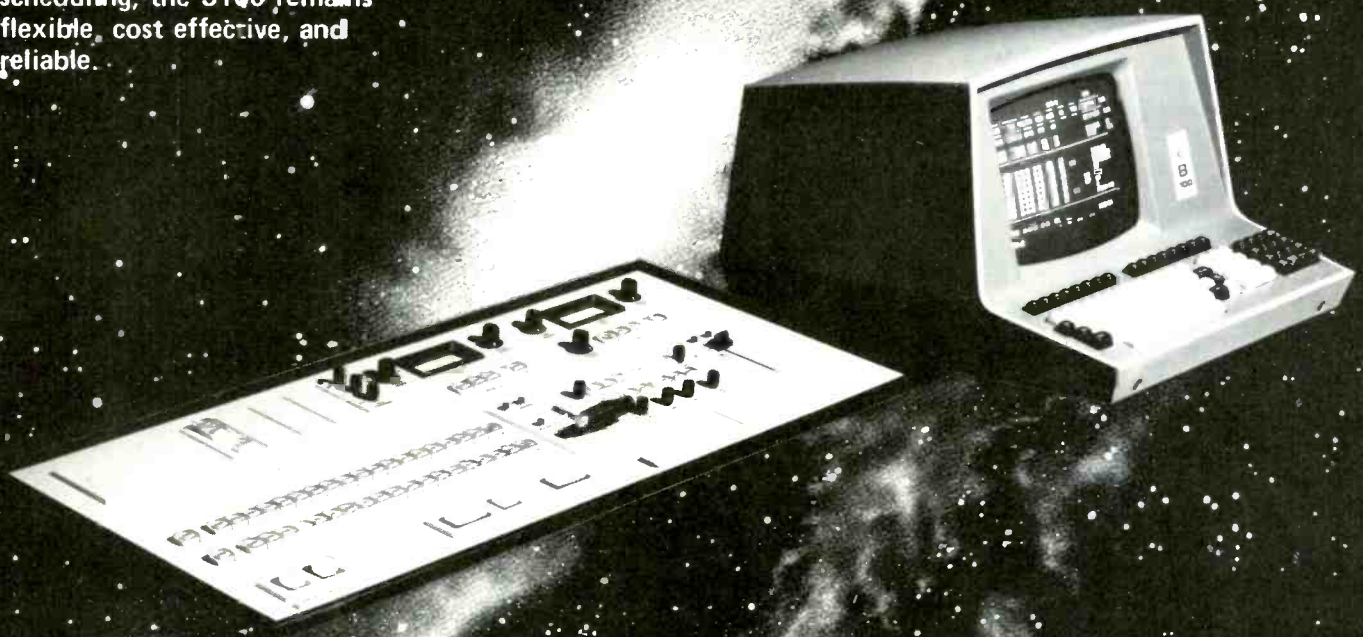

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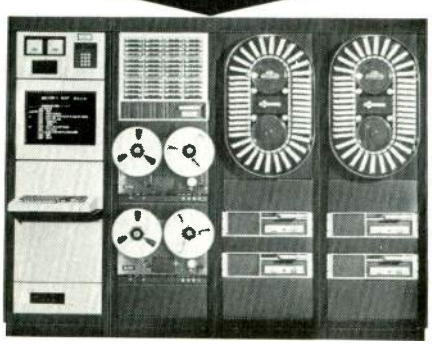

Circle 125 on Reader Service Card

TV Programming

an old John Wayne movie is going to be enough to attract more than a handful of viewers.

Many of the syndicators are trying to answer part of the problem by producing original shows for these empty areas. But if local producers want to compete with network and syndicated products, they'll have to provide the public and the advertisers with something they want to look at. With costs of production the way they are, it seems the only sensible way to achieve this is in coproduction or some form of cooperative syndication.

"Fourth alternative" discussed

With the success of last year's *Testimony Of Two Men,* the subject of many a conversation in and around the convention centered on whether or not another network could survive against the Big Three. Viacom's Todd Gaulocher expressed the opinion that a fourth network per se was not a feasible undertaking, but added that there was already 'a fourth alternative' in PBS and independent programming. Arthur Ludwig of WTCN, the Metromedia outlet in Minneapolis, took a somewhat opposing view stating that another network was inevitable. He made his judgment on the knowledge that as more telecommunication satellites become available, independent stations would have a better chance of carrying national shows.

The seminar, "Beyond the Three Networks," also suggested some steps in that direction. Moderator Richard Thrall of Multimedia TV, and panelists Dick Cox (Dick Cox Associates, Young and Rubicam), Rich Frank (Paramount Television), Al Masini (TeleRep), and Ted Turner (Turner Communications) discussed possible beginnings.

Rich Man, Poor Man began the mini-series which made possible the universally acclaimed *Roots,* which made possible *Testimony Of Two Men,* a courageous experiment that showed that non-network programming could pull in the viewers. Now, new titles are being prepared for independent programmers. *The Bastards* by John Jakes, *The Immigrants* by Howard Fast, and other popular titles by well known writers are being offered soon by TeleRep. Paramount is planning strongly to go into fourth-network production with original movies for television and all new *Star Trek* episodes. Daytime isn't being left out, either. Dick Cox's company already has a soap in the works and others are preparing game shows and original sitcoms. All these programs are being aimed directly at the 'other' network.

These are samples of the beginning. Its success ultimately remains to be

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Sports/Top 25 Markets:
Walter Alston – The Quiet Man, KTTV, Los Angeles, Calif.
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Interview/All Other Markets:
Paramount Back Stage: The Sound of Music, WMT-TV, Cedar Rapids, Mich.
Public Affairs/Top 25 Markets:
Uncommon Cold, KING-TV, Seattle, Wash.
Public Affairs/All Other Markets:
Nobody Ever Asked Me, WJXT, Jacksonville, Fla.
Variety/Top 25 Markets:
Evening Magazine, KYW-TV, Philadelphia, Pa.
Variety/All Other Markets:
Extra, KUTV, Salt Lake City, Utah.
Other/Top 25 Markets:
Once A Priest . . ., WBBM-TV, Chicago, Ill.
Other/All Other Markets:
To Ordain Or Not To Ordain, KETV, Omaha, Neb.

seen; the seminar couldn't come up with a positive answer. It appears, however, that whatever happens, a fourth network would be in no way like the Big Three. What seems likely, to coin the more apt phrase of Viacom's Todd Gaulocher, is a fourth alternative. Local stations would be free to slot whatever is available to them in time slots that most suit their particular needs.

Considering the two topics, alternative programs from the syndicaters and cooperative local production, the end result could be a truly balanced schedule. It could provide independent stations with a positive image, and offer the other 'other' networks some real competition for a change.

Then there was Ted Turner of Turner Communications. Chosen as a panelist to give his views on the fourth network, he chose instead to give his views on television. "Quality," he said, "is a word that is frequently used to describe shows that distributers want you to buy. The truth is . . . shows that make money are quality shows; shows that do not, aren't." He then compared 99% of all shows to something that should be wrapped in yesterday's newspaper. There were a few red faces and quite a few cheers. Perhaps Mr. Turner should produce his own shows.

There were other topics and other seminars and even a "masked session" that gave buyers and sellers a chance to complain about each other. Despite wearing "Lone Ranger"-type masks, participants managed to raise just the usual complaints between "buyers and sellers." For the most part, the convention was an opportunity for old friends to get together, to swap ideas, and compare programming schedules. There were more hospitality suites than opportunities to visit them, especially in the first few days when the storm knocked out a couple of elevators. As one delegate put it, "It gets a bit scary when you need an umbrella to ride the elevator."

Amid all this activity, there was a man by the name of Paul Schatzin who spent most of his time trying to whip up support for a pet project of his — a network tribute to the man most responsible for the industry that made this convention possible — Philo T. Farnsworth, who, at the tender age of thirteen, first conceived the idea of the image dissector. Paul Schatzin has for the last few years been trying to get the networks to tell the public by way of a special or "docu-drama" about this television pioneer. Edison, the Wright Brothers, and Mr. Bell need no introduction, but there's hardly one in a hundred who knows who Philo Farnsworth was. Perhaps we'll learn about him after the next convention. **BM/E**

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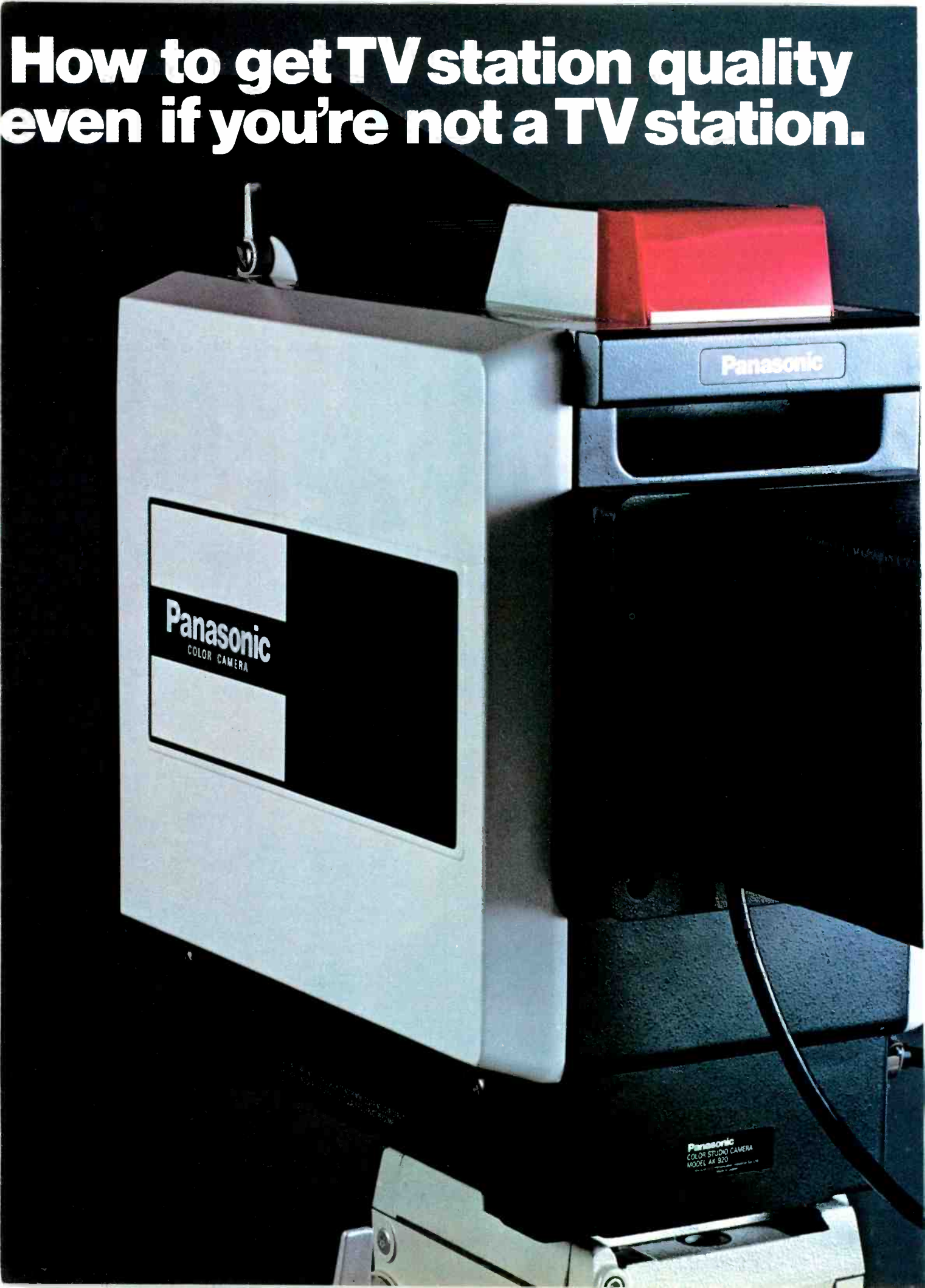
Circle 126 on Reader Service Card

How to get TV station quality even if you're not a TV station.



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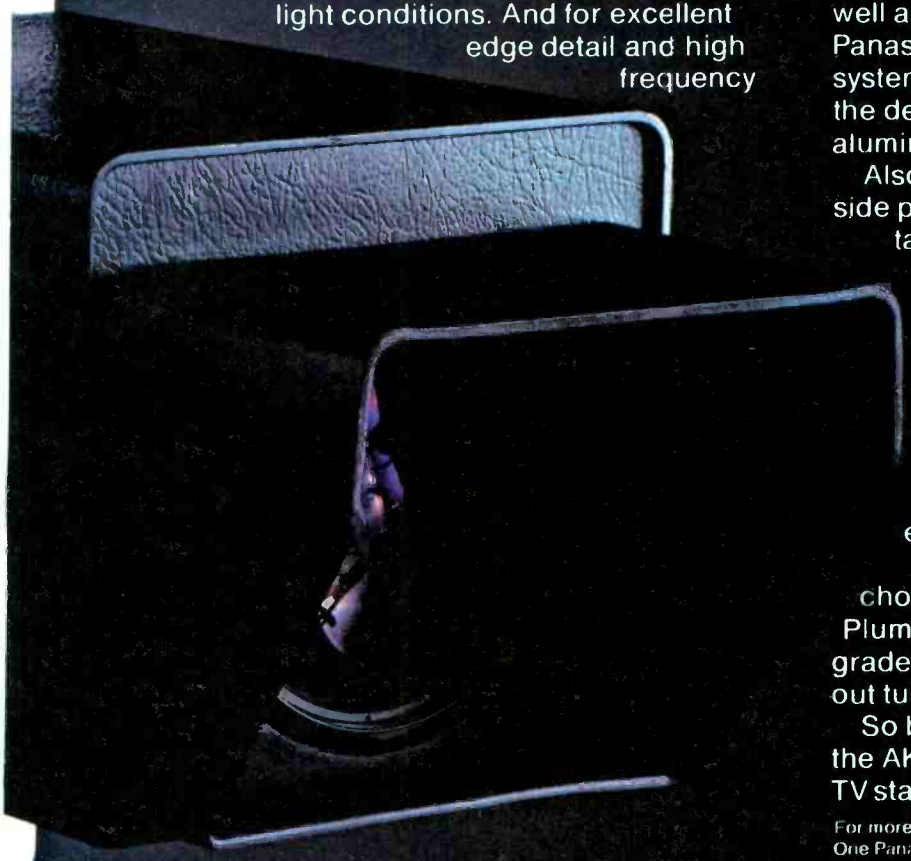
But perhaps the best part about the AK-920 is the technology that has been put into it. Like a new color-trap circuit in the encoder and level-dependent circuit for reduced color noise, which is particularly important under low-light conditions. And for excellent edge detail and high frequency response, there's an adjustable horizontal aperture circuit built into the camera head.



And since the AK-920 is a Plumbicon camera, you get performance that's hard to beat. Like low noise, low dark current and lag, high sensitivity, as well as the capability to reproduce high brightness details without burn-in or blooming.

The result of all this very impressive technology is equally impressive performance. Like horizontal resolution of more than 500 lines at center. A S/N ratio of 48 dB with recommended illumination of 150 footcandles at F/4. And a + 6 dB gain switch for minimum illumination of just 15 footcandles at F/1.8.

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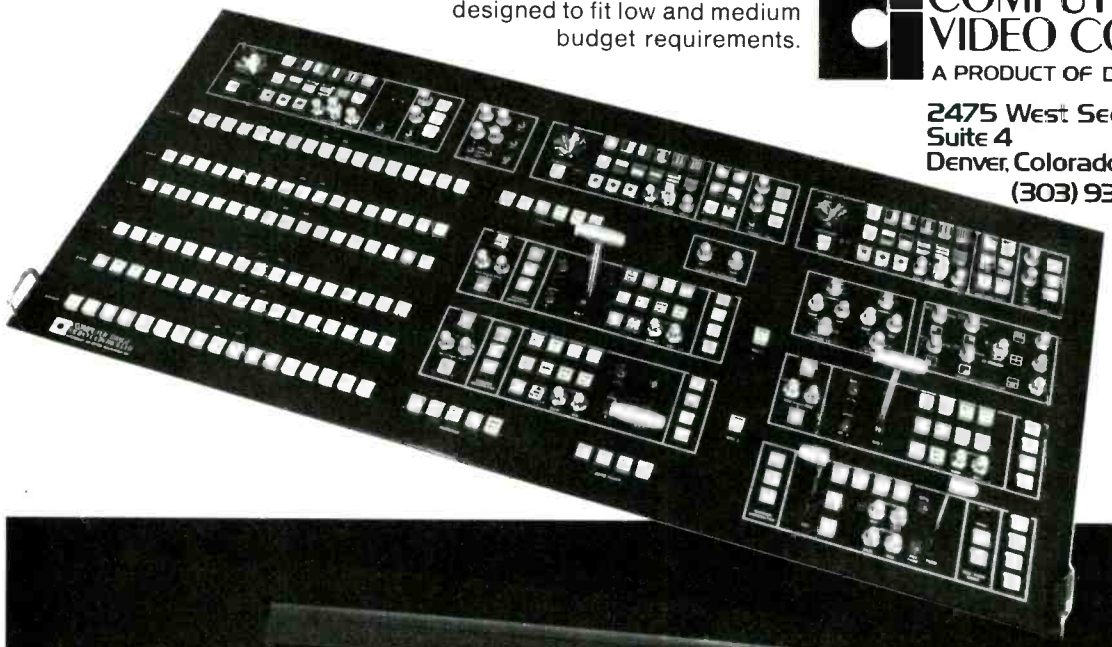

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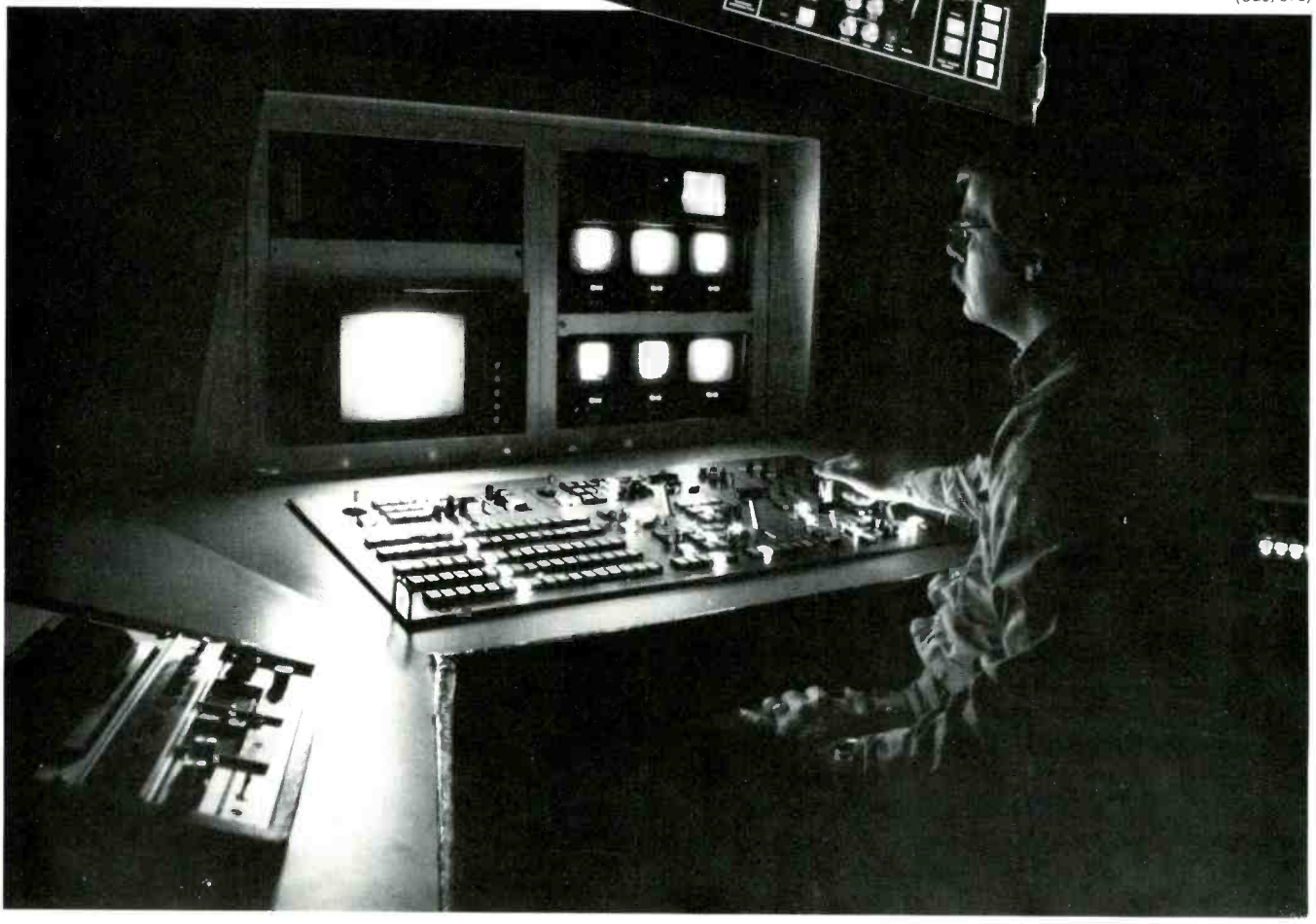


Circle 128 on Reader Service Card

How Station Computer Keeps Tabs On Blizzards

The Big Blow of January, 1977, taught WBEN a lesson. Now when the snow flies, they're loaded for bear with a computer-based system that beats out the competition.

ON DECEMBER 5 AND AGAIN on December 9, quite a bit of snow came to Buffalo, New York. Hearing this, most people naturally would say, "So what's new about snow in Buffalo?" This year, there is something new to add to Buffalo's more-than-adequate snowfall — and to help alleviate the mass confusion resulting from it.

The week of December 5 saw the unveiling under fire (or under snow) of WBEN radio's new computer-assisted snow emergency information service. Every radio station in the northern half of the country had to tackle the problem of receiving and disseminating information about school cancellations, factory closings, and a myriad of other messages important to its listeners during times of extreme weather. Most stations did a truly commendable job of informing their listeners. A few were outstanding. But there's always a better way.

In a city where bad winter weather can be a way of life, WBEN has always been the station most relied on for its community service. But the blizzard of January '77 taxed even this efficient organization, and pointed out that a better method must be developed. In late summer the programming department conceived an idea for a vast improvement in the internal workings of this task and enlisted the aid of the engineering department in realizing the goal. The result was the new system which made its debut early this December. The system combines human efforts with the capabilities of the microcomputer to present a quick, concise, and complete presentation of extensive information.

Unlisted numbers

The hardware consists of an 8080-based microcomputer, several high-speed terminals, and an array of telephone lines with unlisted numbers. The software consists of a computer program written in-house, identifying code numbers given to authorized representatives of schools, businesses, industrial organizations, etc., and a few people. The system goes into action when an organization representative calls a specified unlisted telephone number, and presents his unique code number and organization name to the computer operator. The combination of the unlisted telephone and the proper code number for an organization, is the means to confirm the validity of the call.

The computer operator inputs the code number to the system, and is immediately supplied by the computer with the organization's name and normal listing for validation. If the message is simply that the organization is closed, the operator enters a simple code which adds the listing to the "active" list. If the caller has additional information such as that a school will open, but will do so two hours late, the message immediately may be added to the caller's normal listing, and the entire new message added to the active list. In some unusual instances, information given may require

Morning man Jeff Kaye reads the school closing update prepared by the computer. "It's easier to read than the news," he says.

Office personnel, like Eileen Tobias, take turns receiving telephone calls and entering the information in the computer at "Computer Central."

rewriting an entire listing or deleting some or all of the previously given information. Provisions have been made ... the operating program to do so. Generally, the handling of a single telephone call requires only about 10 seconds of the operator's time. So a single individual can handle a substantial number of calls during peak periods.

Once an announcement has been put on the active list, the computer compiles several different groupings of listings for use on the air. Lists usually are designated as school-related or business/industry-related. On command from the computer operator, a list of all school announcements, or a list of all business/industry announcements, is printed at high speed in the on-the-air studio at the announcer's side. Thus, the announcer has his information shortly after reception of the call, in a form he can read, with no one to distract him by entering his studio. As more calls are received, the operator has the option of printing out entire new lists, or simply updating the last one. Each master list of either type is given a sequential number to identify it as superseding any list of that type with a lower number.

If the operator calls for an update, the computer prints out only those announcements of the type requested which have been received since the last printout of a list of the same type. This update is identified by the number of the master list it supplements, along with a number identifying how many updates have been made to this master list. If, for instance, the announcer has received a school-closing master bearing the number "Master List 7," and if the operator has since provided three updates to the school closing announcements, the announcer will have in possession, and will know to read, "Master List 7," and the three updated identified as "Master List 7, Update 1, 2, and 3." If the operator calls for a new master list at this point, it will be given the heading "Master List 8," and the announcer discards all his printouts bearing lower master-list numbers. The same holds for lists of business/industry announcements.

If an organization decides to re-open after having announced itself closed, the second call to the station is as simple as the first. The operator enters the code number for the caller, the computer provides the current listing of the organization for verification, and then a simple code directs the computer to remove the listing from the active list. At the same time a special message is printed on the announcer's terminal indicating that the organization is no longer listed as closed. If an announcement is merely outdated, (i.e., the announcement of no second-shift work at a plant when the time for starting the second shift has already passed) such an announcement can be removed from the active list without printing a message to the announcer. It just does not appear on any further lists. This type of housekeeping is done periodically between incoming calls.

From a computer-operating standpoint, one person can handle the computer and all incoming calls, except during extremely crowded periods. Early experience in operating the system at WBEN has shown that a second person can be useful in checking lists for outdated announcements, keeping track of all the lists printed, and handling some of the calls that require special listings and calls from organizations who have not received code numbers.

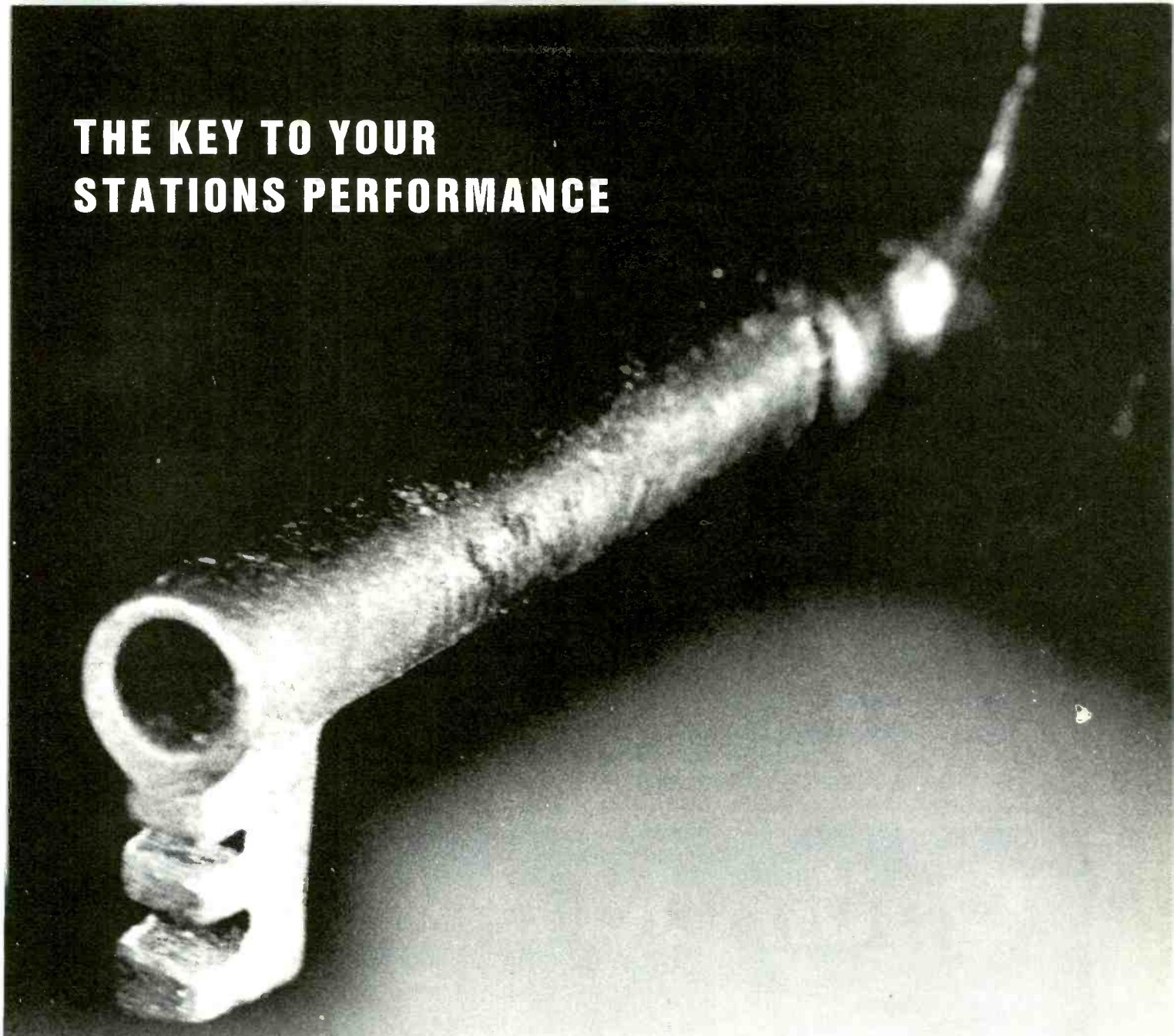
There are relatively few organizations which lack code numbers. During startup, WBEN invited *all* schools and businesses who requested an announcement during last year's blizzard to participate in the new program. That year was taken as a "worst-case" situation; using it as a standard, it was thought that the overwhelming majority of community establishments would be included. This has proven true with many of the calls from non-participants coming from organizations which were invited to participate, but did not respond until the snow started falling by the megaton. Provision was made in the program for handling these organizations, and a second invitation has since been sent to them asking them to join the group. Consequently, the system should become even more streamlined in the future. At present there are more than 500 individual listings stored in the computer for instant response to the next major snowfall. In the first two snow emergencies alone, close to half of these listed members used the service which was handled with an ease and expediency impossible during the previous winter.

The on-the-air sound with more than 100 school closing announcements to give during morning drive came off almost as smoothly as regular broadcast announcements. The computer conveniently provided an easy-to read, up-to-the-minute, single list with the schools listed in alphabetical order. What announcer could ask for more?

WBEN's Jeff Kaye did not have to contend with the

continued on page 44

THE KEY TO YOUR STATIONS PERFORMANCE



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confusion and hassle that the other Buffalo morning men did; he was able to concentrate on the normal aspects of performing in a highly competitive time slot. His delivery certainly showed on the air where it counts, and he still provided what the station termed the city's best coverage of emergency information.

"Our magic school-closing machine is as remarkable a programming aid as I have ever had the good fortune to use," Jeff commented. "For the past 20 years, when we've had bad weather, I've had to wade through reams of paper, and barely legible handwriting, to try to present information in good order for easy listening. Now, I've got it! The ease of operation is remarkable, and the rapid-fire printout literally comes faster than I can read it. Thus, the announcer is confident. He *knows* the list is going to be ready when he needs it. No more . . . uhhh . . . we'll check that and have it . . . uhhh . . . in a minute. I'm delighted with the way it's all been set up. I know a lot of thought and preparation went into it, and all toward one end — to make it easy for me and the rest of the guys in the hotseat to absorb all the incoming information and get in on the air in a professional manner. To be firstest with the mostest. That's what it's all about!"

Engineering's computer

From a technical standpoint, the microcomputer used for this task belongs to the engineering department, which purchased it to handle various utility functions. So far, the unit has been used to provide routine technical reports covering the evaluation of the station's directional antenna system, etc.

A major program was written which assists in the required annual proof-of-performance measurements. The program guides the engineering staff through the proof, listing what measurements should be taken and in what order, and accepting the results of the measurements as they are taken. It then prints out the complete proof-of-performance report as required by the FCC including all charts, curves, and graphs. It provides as many copies of the report as are required.

Another interesting use of the machine by WBEN's creative engineering staff was in the production of computer software needed to program WBEN-FM's program automation system. In this instance, one microcomputer programmed another. The job was completed in several hours instead of several days. Other uses are constantly being explored by the engineers, and now that programming has seen the value of the unit, computer time may soon have to be booked in advance.

WBEN is aware of the hardware/software combinations available to broadcasters in ready-to-use packages. All traffic, billing, payroll, and accounting functions have been using computer technology for quite a few years. But it is in the engineering staff's success in solving broadcast problems with this powerful microcomputer that the real advantages emerge. This relatively low-cost hardware system is programmed for the specific job by in-house staff who fully understand their particular problems. And so far, the system has turned out to be an extraordinary solution. **BM/E**

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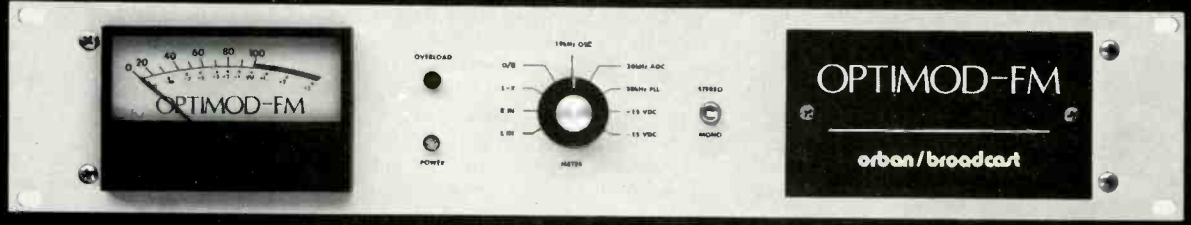

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Equipment Replacement — Financial Considerations

By David E. Schutz

This is Part 2 of an article that examines the financial considerations involved in equipment replacement and similar capital projects. This is an important topic to all broadcasters since capital projects effect a station's overall operations for many years.

IN PART I OF THIS ARTICLE, which appeared in *BM/E*, January '78, we presented a method for logically and consistently estimating the costs and benefits associated with the acquisition of any major piece of broadcast equipment. This portion of the article builds upon those concepts by presenting specific methods for evaluating the financial aspects of different equipment investment alternatives. Before proceeding, it is crucial to recall that there are two broad assumptions that underlie modern capital budgeting theory. First, the benefits to be derived from a capital project can be reduced to a monetary equivalent. Second, there is significance to the time span during which the benefits from a project will accrue. This is caused by the "Time Value of Money." If you are unfamiliar with these concepts it would be helpful to consult the January issue (pg. 70), where they are examined in detail.

Cost of capital

The cost of money invested in capital projects has a pronounced effect upon the minimum acceptable return that they must produce. In essence, there are only two sources of capital available to any business — debt and equity. In the case of equipment purchased with the use of borrowed money (debt), the expected future returns must *at least* equal the interest expenses associated with the loan.

The other major source of capital is provided by stockholder's equity. This is supplied either through the outright sale of stock in the company or by retention of earnings. The important concept for the broadcaster to grasp is that issuing additional shares of stock or retaining operating profits DOES NOT represent a "Free" source of capital. Investment of equity capital in low yielding capital projects will have deleterious effects upon the company's ability to raise additional capital in the future. There is a general rule that a broadcaster can employ to assure himself that he will not impair his future access to equity capital. It is determined by calculating the company's current Return on Assets, where:

$$\text{Return On Assets} = \frac{\text{Net Operating Income}}{\text{Total Assets}}$$

This then becomes the lowest acceptable return that a new project must produce.

The time value of money

Modern capital budgeting techniques are based on the proposition that a "dollar received today is worth more than one received tomorrow." In Part I of this article we compensated for this by discounting future monetary benefits to determine their present value. There are two ways of formally including these discounting techniques into the capital budgeting decision process.

Net Present Value. The simplest of the two methods is the Net Present Value (N.P.V.) method of capital investment analysis. It simply compares the sum of the present values of the future monetary benefits expected from a project with the initial cost of the project. If the difference

Table A — Expenses And Benefits For Proposed New Transmitter

Initial cost of new transmitter:	$300,000
Less: Salvage value of old equipment (after consideration of taxes):	$10,000
Investment Tax Credit (10%[1]):	$30,000
Immediate Cash Outlay For Project	$260,000
Annual Operating Expense Savings and Value of Increased Operating Capabilities	
Reduction in labor costs:	$45,000
Reduction in maintenance & electricity:	$7,000
Value of increased operating capabilities (ie, reduction in outages, etc.):	$13,000
Total Annual Savings and Benefits:	$65,000

[1]It is assumed that the station has sufficient income to fully utilize the potential tax credit.

Table B — Application Of Discount Factors To Future Benefits[1]

Year	Annual Savings & Benefits	Discount Factor (8%)	Present Value
1	$65,000	.926	$60,190
2	65,000	.857	55,705
3	65,000	.794	51,610
4	65,000	.735	47,775
5	65,000	.681	44,265
6	65,000	.630	40,950
7	65,000	.583	37,895
8	65,000	.540	35,100
9	65,000	.500	32,500
10	65,000	.463	30,095
Total	$650,000		$436,085
Less: Initial Investment			260,000
Net Present Value			$176,085

[1]Hypothetical transmitter replacement referred to in figure A. The new unit is expected to provide savings & benefits beyond the current transmitter for a period of 10 years.

David E. Schutz is an independent consultant located in Arlington, Virginia, who specializes in the economic aspects of the broadcasting industry.

Equipment Replacement Part 2

is positive, that is, if the present value of the benefits exceeds the initial cost, then the project should be accepted. In contrast, if the difference is negative, the present value of the future benefits does not match the required investment and the project should be rejected. The discount rate employed in the calculations reflects the station's cost of capital or minimum acceptable rate of return on investments. The formula for determining the N.P.V. of a project is:

$$N.P.V. = \frac{R_1}{(1+k)^1} + \frac{R_2}{(1+k)^2} + \ldots + \frac{R_n}{(1+k)^n} - C$$

Where: R = annual monetary benefit
k = discount rate (minimal acceptable return, etc.)
C = initial cost of the project

To illustrate the use of the N.P.V. method of analysis we will use the same example cited in Part I, which involved the acquisition of a new transmitter. Pertinent data concerning this example is presented in Table A. In Table B an eight percent discount factor has been applied to the future benefits expected from the project. These factors are available for different periods and interest rates in the appendices of most accounting manuals. In the example it is assumed that eight percent is the station's minimum acceptable return. Referring to Table B, the aggregate total of the project's discounted future benefits is $436,085. Since the initial cash outlay for the project is $260,000, its N.P.V. is $176,085 and the project should be accepted.

There is one characteristic of N.P.V. analysis that must not be overlooked. It arises when two projects with different initial expenditures are analyzed. In such a situation the project with the largest N.P.V. *does not* necessarily generate the highest return on investment. In essence, N.P.V. analysis produces only an acceptable/unacceptable evaluation of an individual project. In order to select the project with the highest return an additional series of calculations is required.

Internal Rate of Return. Another method of investment analysis involves determination of the Internal Rate of Return (I.R.R.) of a project. This is nothing more than determining the discount rate that will reduce the sum of the future benefits to its initial cost. The I.R.R. of a project is vital information when a station has limited financial resources and must carefully choose between several alternative capital investments.

The equation for determining the I.R.R. of a project is very similar to that used to find its N.P.V. However, we are now solving for "k."

$$0 = \frac{R_1}{(1+k)^1} + \frac{R_2}{(1+k)^2} + \ldots + \frac{R_n}{(1+k)^n} - C$$

Where: R = annual monetary benefit
C = initial cost of the project
k = rate of return (expressed as a percentage)

While this equation is a convenient method of representing the mathematical concepts involved, it is difficult for most people to solve directly. Even if you do not have a calculator that is programmed to handle I.R.R. problems the solution can readily be determined using standard accounting tables and simple arithmetic. Table C illustrates a hit-or-miss approach that can be used to find the solution. In our example the rate is approximately 21 percent.[1]

There is a short cut that can be employed if a project is expected to produce a constant level of benefits throughout its life, as is the case in the example. The method utilizes the ratio of the initial cost of a project to its annual benefits.

$$\frac{\text{Cost}}{\text{Annual Benefits}} = \text{Annuity Factor}$$

The resulting quotient is then related to standard accounting tables that provide the present value of annuities. Table D is an abbreviated version of such a table. To use the table, select a period that corresponds to the life of the

continued on page 50

[1]The exact solution is 21.401 percent. If linear interpolation is utilized it is 21.412 percent.

Table D — Present Value Of An Annuity

Year	Discount Rate 20%	21%	22%
7	3.605	3.508	3.416
8	3.837	3.726	3.619
9	4.031	3.905	3.786
10	4.193	[4.054]	[3.923]
11	4.327	4.177	4.035
12	4.439	4.279	4.127
13	4.533	4.362	4.203

Table C — Determination Of Internal Rate of Return

Year	Annual Benefits	Discount Factor 20%	Present Value	Discount Factor 21%	Present Value	Discount Factor 22%	Present Value
1	$65,000	.833	$54,145	.826	$53,690	.820	$53,300
2	65,000	.694	45,110	.683	44,395	.672	43,680
3	65,000	.579	37,635	.564	36,660	.551	35,815
4	65,000	.482	31,330	.467	30,355	.451	29,315
5	65,000	.402	26,130	.386	25,090	.370	24,050
6	65,000	.335	21,775	.319	20,735	.303	19,695
7	65,000	.279	18,135	.263	17,095	.249	16,185
8	65,000	.233	15,145	.218	14,170	.204	13,260
9	65,000	.194	12,610	.180	11,700	.167	10,855
10	65,000	.162	10,530	.149	9,685	.137	8,905
Total			$272,545		$263,575		$255,060
Less: Initial Investment			260,000		260,000		260,000
Balance			$12,545		$3,575		(−$4,940)

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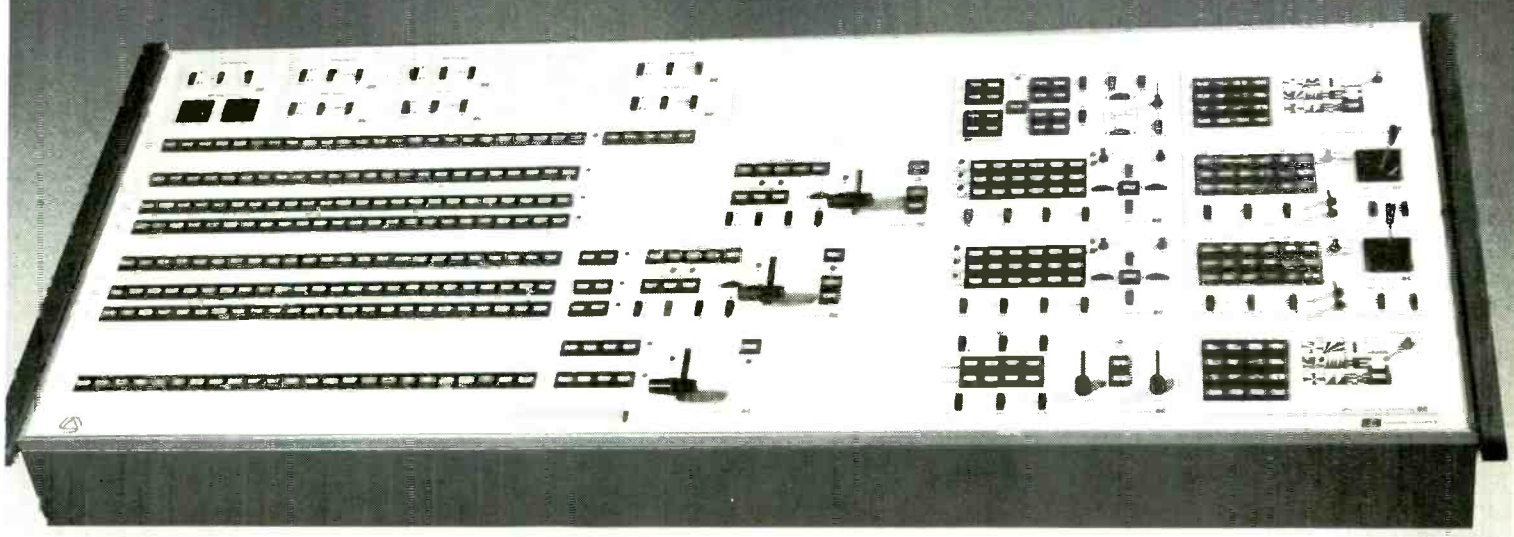

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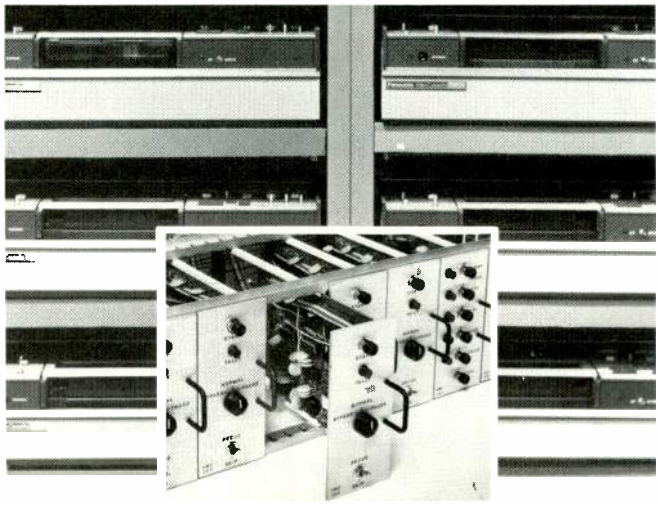

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Equipment Replacement Part 2

equipment or project. Now read across until you find a value that most closely correlates with the annuity quotient already calculated. Next, check the interest rate at the top of this column; it is the effective I.R.R. of the project. It is unlikely that your annuity quotient will exactly match the values in the tables. In such a case, linear interpolation will provide a very close answer. The beauty of this method is that it eliminates the more laborious calculations required when there are uneven benefits throughout the life of the project.

Although determination of the Internal Rate of Return of a project is a more cumbersome undertaking than determining Net Present Value, it does indicate the precise return that will be generated by a project. Unlike N.P.V. analysis, direct comparison can then be made between projects with differing initial cash expenditures.

Thoughts on risk and uncertainty

What a different world we would live in if it were possible to predict perfectly the course of future events; yet, we do not live in such a world. However, all of the capital budgeting techniques discussed in this article rely upon the accuracy of the estimates of future monetary benefits that will arise from a capital project. The accuracy of these projections is inversely correlated to the period of the projection. It is far easier to project the economic conditions for next year than it is for ten years from now. In the example of the transmitter replacement, technological innovation could render the new equipment obsolete in only a few years.

Because of the varying levels of uncertainty present in all capital budgeting problems, additional subjective considerations may be required. To illustrate, suppose a station has two investment alternatives, each of which has an identical I.R.R. Which is the more desirable (safer)? Generally, the safest decision would be to choose the project with the shortest payback period since there is less chance for error in estimating the future benefits. However, there can be exceptions to this rule. A new antenna, tower, building, or similar investment with a stream of benefits extending over as much as twenty years may be no more risky than new E.N.G. equipment which will produce benefits for only a few years. This apparent contradiction results from the fact that towers and buildings have a relatively low risk of obsolescence while E.N.G. equipment is constantly subject to technological advances that could render it obsolete.

Closing thoughts

The personnel of every broadcast station are continually confronted with the dilemma of having "limited means and unlimited wants" in so far as capital projects are concerned. The process of selecting the projects that are most advantageous is not easy. In the long run, the very existence of the station may hinge upon the capital budgeting decisions that are made today. In both parts of this article, specific techniques for collecting and analyzing capital investment projects have been presented. It is important to realize that these are only "tools" that provide all departments with a common means for evaluating their alternatives. They are *not* a direct substitute for the knowledge and experience of the chief engineer, program director, sales manager, or station manager. **BM/E**

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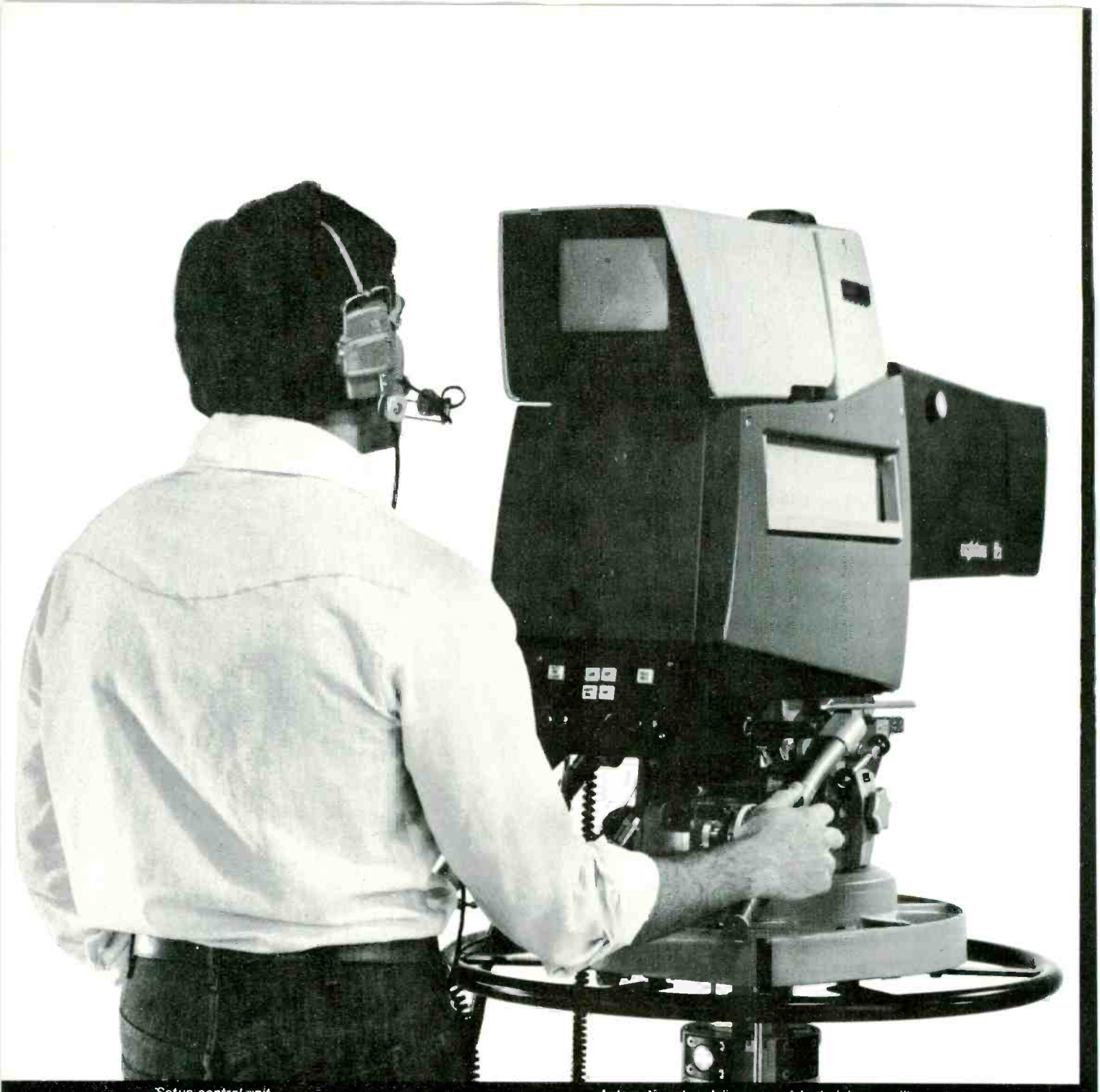

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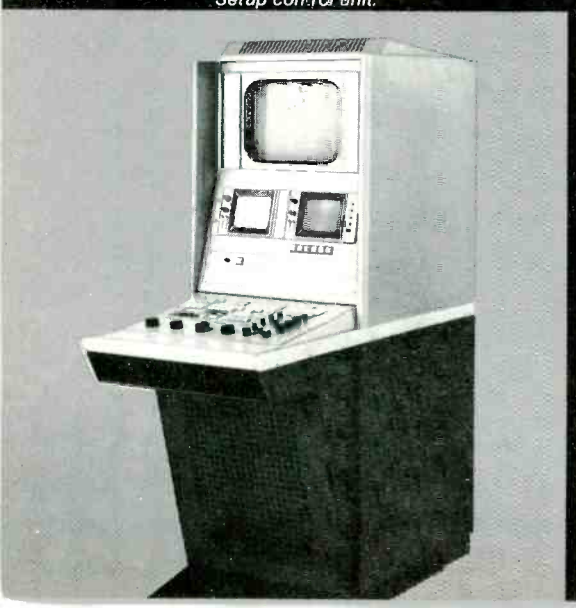

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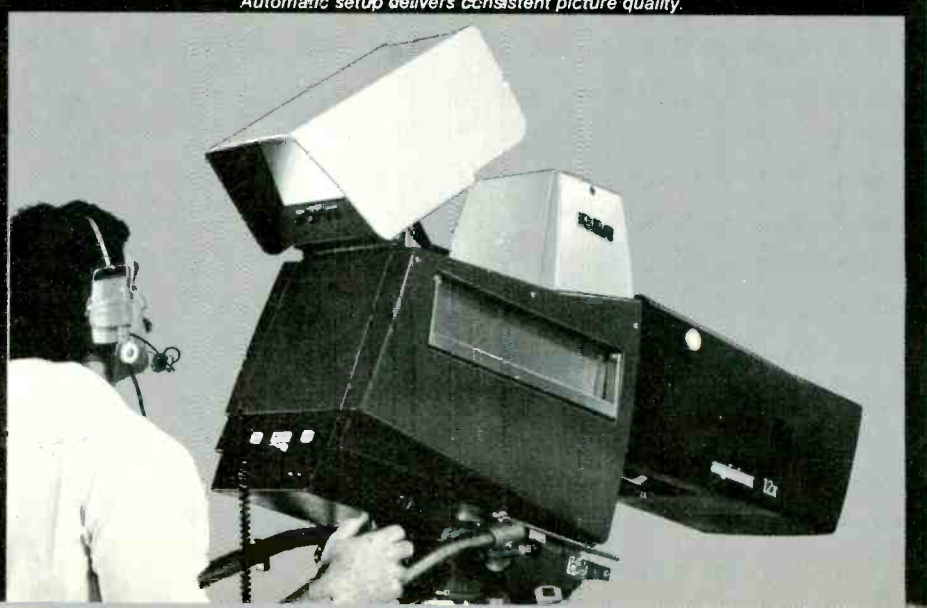

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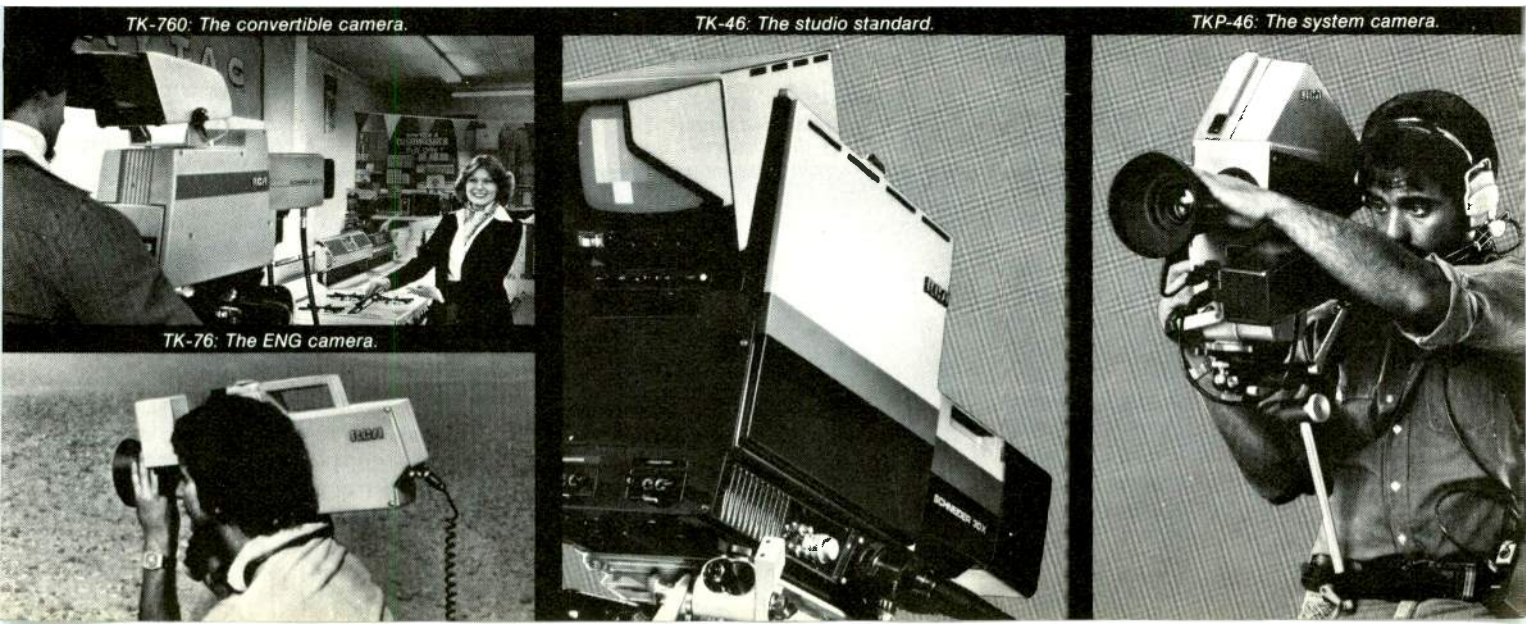


NAB '78 Biggest and Best Show Yet

The massive Las Vegas Convention Center played host to more than six thousand U.S. broadcasters; NAB's "Broadcast International" theme brought 300 broadcasters from overseas; and nine thousand exhibit personnel put on the most powerful display of mature broadcasting technology ever seen under a single roof.

To help you get more information on products introduced at NAB, Reader Service Numbers are provided in specially marked boxes.

IN OUR PRE-NAB CONVENTION issue we predicted a bonanza of new ENG cameras, an intense interest in the new one-inch helical videotape recorders and some significant advances in audio quality for radio from both the input and processing sides. The four days in April (April 9 through April 12) succeeded beyond our wildest expectations. What became clear on the exhibit floor was that broadcast technology has taken a decisive step into the age of computers.

The thousands of official registrants, plus uncounted hundreds of exhibitors' guests and others from here and abroad, were shown through booth after booth of new equipment offering powerful new capabilities attributable to computerization.

Microprocessors are no doubt the most common computing power element to be found in the broadcast equipment, and they are being put to use in extremely imaginative ways. Microprocessors are revolutionizing everything from production switchers, audio consoles, and character generators to test equipment.

Because there are a limited number of manufacturers of microprocessors, semiconductors, and LSIs, the guts of much of the new generation of equipment look very much alike. Imaginative systems design and software are the characteristics that tend to separate one approach from another. And, because of the structure of the industry surrounding microprocessors and semiconductors, we are already beginning to witness dramatic price reductions in equipment following close upon the heels of volume purchases. Frame synchronizers and field synchronizers, once priced out of the reach of many broadcasters, are dropping in price to the point where medium size stations are able to consider multiple unit purchases. ADDA Corp. introduced a frame synchronizer for under $20,000 and DVS had a field synchronizer for under $18,000.

Another dramatic example of the impact of the microprocessor is the enormous increase in the number of companies finding their way into the broadcast marketplace. With concepts for the solution of some common broadcasting problems and talented staffs of computer experts, companies are emerging into business automation, video processing, radio technical automation and just about every other area of broadcast equipment manufacturing that can be improved by the judicious application of microprocessor technology.

Just a portion of the vast Las Vegas Convention Center that housed 293 exhibitors for 4 days in April

Two of the hundreds of international convention guests get a run through on the Duca Richardson Switcher

So this year, when the inevitable question was asked, "What's the hottest thing at the show?" the only possible answer had to be, "Computing power." But that's just the general answer. The specifics were to be found in individual exhibits as the ubiquitous microprocessor was applied ingeniously to individual products.

Sub-currents at the show

Besides the microprocessor, certain other categories showed tremendous movement over previous years. Editing in television has reached a new level of

flexibility and maturity, as shown by the numerous new systems which were exhibited. Moreover, the gaps that have existed between on-line and off-line systems were narrowed as several companies took the idea of multi-format, multi-machine type systems that permit a project to proceed through a series of refinements using inexpensive off-line approaches until it is ready for a final cut on a full-blown super-sophisticated editor.

Television also saw the introduction of a new generation of cameras for both ENG and studio use. The modular camera approach that developed last year was further refined this year so that the all-purpose camera looks like a real possibility.

Another area that saw great advances this year was the "intelligent switcher." The enormous number of effects made possible through digital frame synchronizers are being brought under the control of switchers using computer intelligence to make the operation of the switcher panel more humanly manageable.

For radio, we saw great improvement in the quality of input devices. Tape recorders are much improved, as are turntables. Audio consoles were present in large numbers, and again, much improved over earlier ones. One definite trend was that AM radio broadcasters seem convinced that AM stereo is here. Stereo consoles and recorders were selling extremely well as stations prepared for AM stereo to become an accomplished fact.

Another clear trend in radio is the bypassing of AT&T's long lines. Satellites are here in strength, offering economy and quality unparalleled in the history of radio. Mutual Broadcasting and UPI made strong cases for their switch to the "Birds," and Harris, Scientific Atlanta, California Microwave, Rockwell International, and a number of other companies brought out satellite equipment for radio which left little doubt in anyone's mind that radio stations would be looking skyward for their signals in the coming years.

Automation for radio also stepped forward, showing greater flexibility and intelligence than earlier systems. Transmitters, especially for AM, showed improvement with the maturing of solid state components and designers' focus on the higher quality that AM stereo will require.

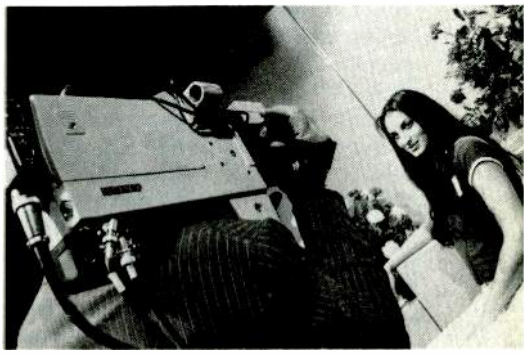
Television's hottest products

We've already mentioned some of the general areas of improvement, so let's get on to some of the specifics.

• The area of digital special effects which caused such a stir at last year's show continued this year. Vital Industries' 'Squeezoom' took a radical and dramatic new approach to obtaining these effects. Last year's showstopper, the Grass Valley Group's DVE package, showed new power under the control of its new E-MEM "intelligent switching system." MCI's Quantel DPE 5000, which has achieved remarkable success in the area of digital

The premier of one-inch Type C helical VTRs was applauded at the show

The Datatron 2000 was one of several powerful new editors that became a surprise theme of the convention



The Sony VP-300 was just one of a score of new ENG cameras

FCC Chairman Ferris spoke before the NAB for the first time since taking office

It Was a Super Fantastic Show and Convention

"Absolutely the best NAB ever" was the unanimous opinion of veteran exhibitors at Las Vegas, and the official statistics bore them out. Some 6200 broadcasters (the highest number ever) registered for the entire event, another 8,695 (also a record) toured the exhibit floor as guests of exhibitors. (We suspect the latter figure was even higher as guests, once inside, surreptitiously passed their cards back to others.) The official count, including exhibitor personnel, came to 20,879.

Broadcasters attending were not just "looking." They were definitely in a buying mood, and had money to spend (bearing out *BM/E's* Panels of 100 predictions). Indeed, Harris's Broadcast Equipment Div. called a press conference at the show to report a significant sale of its new Cyclotran Transmitter CP antenna system to WWL-TV, New Orleans. Down the same aisle, CCA was ecstatic over the new business booked at the show. It was that way in every aisle.

Traditionally, some pre-sold orders get officially signed at the NAB show to give the event an upbeat note. This year, honest-to-goodness new sales were made at the show, surprising all. There were more exhibitors in 1978 than ever before: 293 compared to 213 last year. This made it almost impossible for any one person to see it all. "If they keep this up, they'll have to extend the show another day," grumbled one tired engineer who was overwhelmed by it all.

The convention as a whole was upbeat. Broadcasters had the opportunity to hear from new FCC chairman Charles D. Ferris, who spoke out for the first time since taking office six months ago.

They liked what they heard. As reported in *Broadcasting,* Ferris's views on "zero-based regulation" were favorably received. More deregulation was promised by all commissioners present. House Communications Subcommittee chairman Lionell Van Deerling, whose Communications Act rewrite proposals have been making broadcasters nervous, won some friends at NAB. He came out strongly for less regulation of radio and against the Fairness Doctrine. He termed ascertainment a waste of time and mandatory access foolish.

Sex and violence appear to be no big problem. Children's ads on TV had sharp critics, but there were signs of self-regulation in the making. EEO practices of broadcasters don't please everyone, but again there are positive signs. All in all there was no evidence of any Davids who might appear in the near future to slay the giant Goliath.

special effects, was interfaced this year to both a Grass Valley 1600 production switcher in the MCI booth and to the CDL CD 480 in the Central Dynamics booth. Quantel's DFS-3100 digital framestore synchronizer provided digital effects power to switchers from Duca Richardson (recently acquired by Ampex), American Data, and Dytek.

• Cameras were abundant beyond expectations. In studio cameras the big step was to full automation of setup procedures. Ikegami expanded the system for its HK-312, and RCA showed a totally new TK-47 studio camera which steps through 100 setup and test procedures with little or no human interference. Toshiba also showed an automated camera.

But ENG and field cameras proliferated by the score. Almost every camera manufacturer showed something new in this area.

• Noise reduction saw new entries from TeleMation, NEC and CVS, and changes in the Thomson-CSF and Microtime approaches.

• One-inch Type C helical videotape recorders made it and are now a major factor in the videotape recording field. The success of Type B remains in question as Bosch-Fernseh reports good results overseas but troubled waters here in the U.S. The impact of marketing arrangements here in the U.S. will play a major role in the outcome of this confrontation. With RCA and Sony teamed up on the Omega system and Ampex and Philips together on the VPR, Bosch will have its marketing problems cut out for it. Bosch has made some significant sales to TV stations and Hollywood production houses, so the issue is yet to be settled.

• Electronic still storage and slow motion is catching on well. Big systems were sold at the show and new entries in this field auger well for broadcasters looking for a variety of approaches from which to choose.

Audio consoles, like this one from Ward-Beck Systems, got increased attention from both radio and TV broadcasters

• Microwave for ENG is vastly improved in quality and size. There were transmitters at the show small enough to be mounted on a camera head for cable free movement and units with new degrees of power and range.

Radio's hottest products

• Tape recorders were high on the "wanted products" list of our panels of 100, and one of the "hot" products was the brand new Studer A800, which includes a microprocessor, another area of use for this almost-universal device. The microprocessor controls all transport modes and many electronic functions in this splendid new machine, which is described in more detail below. There were other machines of extremely high quality on the floor (named further on) all demonstrating the continuing upward trend in open-reel tape machines.

• Turntables have entered a new era of greatly improved performance with several servo-controlled machines on the market in the last several years, and this trend reached a kind of zenith with the introduction at the show of the new EMT 950 by Gotham Audio. This machine has "ultra" performance characteristics and a "dream world" of operating conveniences, such as motorized back cueing (as it should have at a price around $5000): more on it below. Important in another sense was the introduction by Russco of an electronic control table, claiming excellent characteristics, for a price around $400; this modestly priced table apparently may outdo many of the older mechanical tables now in use.

• There were enough new consoles of super quality to make the broadcaster's choice in this area most difficult. Perhaps most outstanding were new units from Neve, McCurdy, Ward-Beck and Pacific Recorders; these will be described along with other important consoles. This marked trend to top-grade audio consoles for television airing and production is an integral part of the upgrading of television audio that is on the way.

• Radio automation, another beneficiary of the ubiquitous microprocessor, looked more flexible, more responsive to the operator, easier and surer to use, in new systems from Cetec, IGM, Broadcast Electronics — and more compact and somewhat less expensive as well. More on these and other systems below.

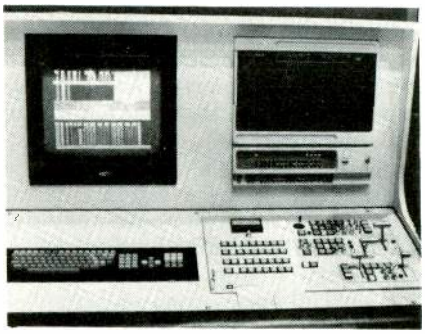
• The satellite as a means of distributing radio programs has come into its own, with fully developed uplink and downlink systems, especially from Scientific Atlanta and California Microwave. Scientific Atlanta showed earth terminals with antennas of all practical sizes, from six to 30 feet. California Microwave is building the more than 500 terminals with 10-foot antennas to be used by Mutual in its network; the system was in actual use at the convention to demonstrate "the future of radio networking."

• In transmitters, the steady trend to higher quality could be seen in a series of all-solid-state FM units, up to 2 KW, from Wilkinson, and in AM transmitters from several makers, described below.

TV AT NAB

Electronic editing takes giant step into computers.

To the casual observer on the NAB exhibit floor, it might have appeared that computerized editing has been with us for some time. Up until last year, there were only the various models by CMX Systems and some developmental types from Ampex and RCA. This year, however, RCA and Ampex were ready with full-blown systems, and new entries showed up under the banners of Datatron, CVS, Sony, and a new company, Mach One Digital Video Systems, Inc.



The monitor display on the Datatron 2000 offers different backgrounds to separate functions for the operator

The key to this explosion of new computerized editors is the emergence of the microprocessor as the basis for "intelligent interfaces" between various machines. Most of the new systems, such as the Datatron 2000, the RCA AE6000, the Mach One, Sony BVE-5000, CVS EPIC, Ampex EDM-1 and CMX 340X, provide enormous editing flexibility through imaginative software that is both easy to understand and capable of performing interfaces with switchers for special effects. When these editors are used in conjunction with the new breed of "smart switchers" which learn transitions and event sequences, editing enters a powerful new era.

RCA's AE6000 can control up to 8 TR600 quadruplex recorders, two of

continued on page 58

What's 5'7"...22" wide... delivers up to 3000 watts... and is priced under $10,000?

CCA proves good things do come in small packages.

Our new CCA FM2500R FM transmitter is compact. Trim. Attractive. And FCC type-accepted up to 3000 watts. We call it The Little Rascal.

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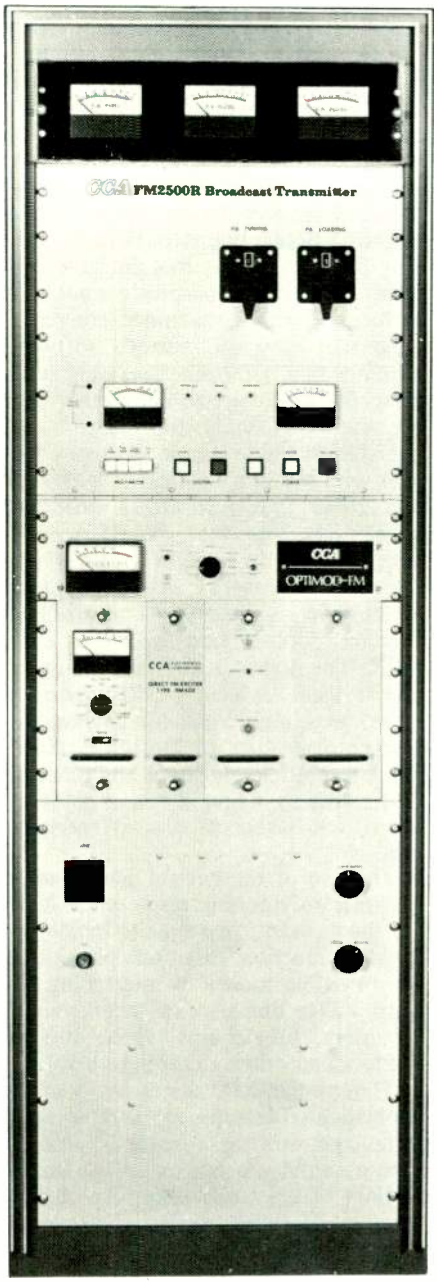

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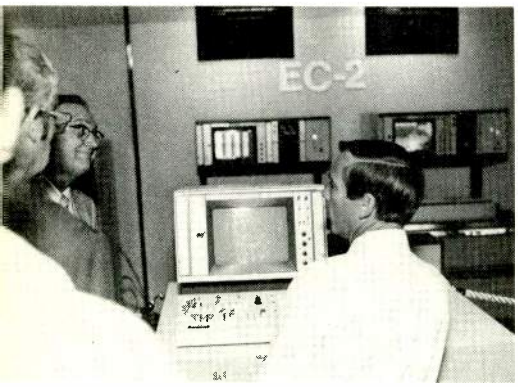

RES-1, from Ampex, offers remote control of eight AVRs

The HPE-1 editor controls both VPR and U-type machines

which may be used for recording, while either 6 or 7 of the VTRs may be used for playback. The AE6000 also interfaces with an "intelligent switcher," in this case a Grass Valley Group 1600 with E-MEM. (E-MEM is a "learn mode" switcher option that we'll discuss later.) With additional interface modules, the AE6000 can control another two recorders, either video or audio.

The AE6000 uses the AE600 time code editor as its interface to the TR600s. The software in the system provides such features as automatic continuous assembly, with the edit decision list running all machines and performing all editing functions including control of the switcher for effects.

The keyboard panel is divided into functional sections; most keys control one function only and are clearly identified. Most of the complex functions are preprogrammed into the system and the operator is only required to give simple yes/no responses to interrogatories on the CRT. For instance, when the VTRs are cued, the CRT registers a simple question, "Cut?" If the operator wants to cut (the most frequent editing function) he simply presses the "yes" button. If he hits the "no" key, the question, "Dissolve?" appears. If the answer is yes, the machine asks which sources are to be used and what duration the dissolve is to have. The "no" response to the dissolve question prompts the "effect?" request and the operator then sets the desired effect on the switcher. E-MEM learns the position of all crosspoints and controls for the effect and registers the settings as a single event. When the effect is called for, the switcher will automatically perform the transition.

The system permits the operator to make, store, alter, preview, and execute editing decisions. Information is stored on a floppy disk memory which can be used to control the continuous assembly function or saved as an edit history. An optional hard copy printout of the decisions is also available.

Many of the new editors have similar software structures and switcher interfaces, so we won't go into much detail on the particular operations of each system. Suffice it to say that the advent of the microprocessor has made it possible to have all these machines converse. Now that they do, various software schemes that determine precisely what these machines say to each other will become increasingly important.

Datatron made major advances this year with the introduction of its Datatron 2000 and numerous edit aid peripherals. The 2000, like RCA's system, controls up to eight VTRs of any format. A central mini-computer processor supervises dedicated "smart" controllers linked to each VTR. The operator interfaces with the 2000 system via a color CRT which has large, extremely readable characters. The color feature of the CRT allows quick referencing to status and function of the system, using different colors to identify different blocks of information.

The use of the central processor to perform only certain tasks while leaving the "smart" interface to handle individual machine functions provides a very flexible means of interfacing not only VTRs but also switchers, audio recorders, film chains, video disc recorders and other video peripherals.

Though the 2000 shares many of the sophisticated features of the other computerized editing systems, such as auto-assembly, it makes unique use of SMPTE Time Code user bits. A film producer wishing to take advantage of the speed and flexibility of electronic editing may transfer his original film footage to videotape using SMPTE Time Code with User Bits. The film edge numbers many be entered as the user bits, and when editing is completed on the electronic system a hard copy print-out of all editing decisions can be rendered with the edge numbers given for easy film editing reference.

Datatron also showed a series of "Editmates," which are off-line edit decision listers, and two VTR editors. The three models shown offer varying

Convergence's new "Superstick" holds the attention of broadcasters

degrees of sophistication, but their principal function is to generate edit decision lists in industry standard format on either hard copy print-out or punched paper tape. Using SMPTE time code and formatted edit instructions, the resulting tape can command a wide range of edit controllers capable of using punched tape drives. The Editmate I is simply a list generator, while Editmate II is a low cost two-VTR editor and Editmate III is both editor and lister.

Consolidated Video Systems (CVS) jumped into the editing business with both feet, introducing a sophisticated computer controlled editor, EPIC. EPIC operates on- or off-line with multiple VTRs of any format from quad to 1-in. and U-type ¾-in. EPIC will interface to computer-compatible switchers without loss of any switcher functions. An eight by two audio switcher (on plug-in boards) is standard.

CVS explains EPIC as a "software based" system which accomplishes many tasks through software rather than hardware. For instance, SMPTE time code reading and generation is accomplished by the software, so separate time code hardware for the VTRs is not required. Though the basic system is set up to handle three VTRs, it is easily expandable to an eight or more machine system by the installation of additional interface cards. Any VTR equipped for remote control can be used and different format machines can be mixed.

EPIC also features multi-tasking — the ability to do more than one thing at a time. For example, users can execute one decision while simultaneously storing another and printing out still others. While editing on some CTRs, the user can also be writing time code on other VTRs in the same system.

Other features include VariShuttle, which permits each VTR to search at variable speeds independently, and a floppy disc edit storage capable of storing 10,000 edits on each disc.

The software package that comes with EPIC includes programs for multi-tape EBU or SMPTE time code generation and reading, color frame accurate edits, jam time code for rewrit-

continued on page 60

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ing poor time code, look ahead machine control for setting up machines for upcoming edits, continuous editing assembly, edit list management, a variety of edit entry methods, adjustable time cues, and other features. CVS supplies software updates for one full year after purchase, and then supplies future updates at nominal cost.

Keyboard and CRT display are again the main operator features and no computer programming knowledge is needed. Cost of the CVS system is "competitive" with other high-end systems. A fair ball park price for the basic system would be around $50,000, according to a spokesman, although no direct price quote could be made without knowing the full complement of features.

Another powerful computer-based system comes from a new company, Mach One Digital Systems, Inc. Jim Adams, who figured prominently in the development of the CMX light pen editing system when he was with that firm, got together with noted Hollywood editor Art Schneider, president of Electronic Video Industries, Inc. to design Mach One's system. Schneider was responsible for several "editor"-oriented features that went into the system.

The first Mach One is currently used by Off-Line/On-Line Editing of Burbank, California. This system handles almost any number and combination of VTRs depending on the number of interfaces. Some of its features are the ability to insert edits in the middle of a list, a readable title punched at the head of the CMX compatible paper tape feature, ability to designate any or all VTRs as either play or record, an active edit list display at all times on the CRT with no computer dialogue needed to modify the edit, a "mark in, mark out" feature that eliminates the need to type in time code locations, and the ability to mix drop and non-drop tapes. Like several of the other systems, there is also a feature that allows the user to make "editing notes" as he goes along; the notes remain tied to the memory location where they were written. Mach One Digital Systems will build an editor to a client's specifications, from a simple two-VTR system to a fully equipped version.

The JVC RM-95U/CR-8500LU offers low-cost sophistication

Spectra-Vision announced that RCA will market its JBT-104-BA editor

Ampex, which introduced the EDM-1 last year when it was still pretty much in development, showed the editor this year as a fully matured system. EDM-1 is another fully computerized system featuring multi-machine, multi-format editing, though it's intended primarily as a controller for the AVR-3s and VPR VTRs. The basic EDM-1 consists of an operations control unit with audio and video monitoring, an advanced switcher with special effects, video display monitor, a convenient four function calculator, a typewriter-style keyboard, special job-oriented selector keys, and a computer processing unit.

The system features a floppy-disc memory that can store as many as 32,000 edited scenes, and an Autolearn accessory that enables the switcher to learn all crosspoints and operational control positions and store them as a single event. The computer filing system allows the operator to store and recall scenes by either digital time code address or a real language tag.

As with some of the other systems, EDM-1 will automatically "ripple" other edits if an edit modification affects timing. Many systems, including EDM-1, are offering a full range of peripherals such as high-speed paper tape punch and reader, high-speed printers, and teletype terminals.

Sony brought out a computerized editing system for its one-inch Omega VTR series, the model BVE-5000. The BVE-5000 uses both SMPTE Time Code and Vertical Interval Time Code information. It automatically switches from reading one type of time code to the other so that frame identification and "marking" can be done at all speeds. The system will also store 500 edits for automatic assembly on its editing list.

Like some of the other systems, BVE-5000 can interface with a switcher for special effects which may be entered automatically or manually. During editing the operational sequence is displayed on the CRT for confidence while an automatic look ahead feature searches out and cues upcoming edits. If any incorrect or illogical command is introduced to the machine, an alarm system gives a warning to the operator. The system will not proceed until the error is corrected.

Recortec brought out the Edimatic 200 for R-Mod equipped quad machines

CMX Systems, which kicked off computerized editing some years back, picked 1978 as the year to bridge the gap between the relatively expensive computerized editors and the lower cost editing controllers like TRI's, Convergence's ECS-1m, and others common to small format videotape systems. At NAB, CMX announced an exclusive licensing deal with Vidtronics to manufacture and market the Videola™.

Videola was developed by Vidtronics to permit the use of off-line editing of video material on low cost cassette formats while simultaneously producing a CMX-compatible edit decision list. U-type cassette dubs of original master material are edited on ¾-inch machines using any type of edit controller desired. Certain types of data required by Videola are added to the SMPTE Time code during dubbing.

Videola consists of a control panel with a number of instruction oriented buttons, including "cut," "dissolve," "wipe," "key in," "key out," and "fade." Using the U-type edit controller, the operator works normally, but when a decision point is reached, the operator indicates the desired transition with the Videola controller. The nature of the decision is stored in CMX instruction format in the floppy disc recorder, the second element in Videola. Thumbwheels are used to indicate the rate of any dissolve by entering the number of frames, up to a maximum of 225. Another switch allows the operator to designate the number he selects as either the start of the dissolve or the midpoint.

In this way, the edit list is built up and stored in the Videola logger, which

continued on page 63

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For faster, less expensive news distribution, Harris offers a Satellite Data Broadcast Terminal receiving high and low speed teleprinter signals, facsimile photographs, and cable (visual) news simultaneously; *any combination of image and data* – analog and digital – through a single channel processor. This versatile Harris terminal can be equipped to receive up to 56,000 bits of digital data per second (56 Kbps).

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The CVS 516 is ideal for ENG, teleproduction, studio VTR backup and much more because it comes with features that, before, you'd find only in TBCs costing up to twice as much.

For example, correction of chroma/luminance delay problems, a 3 dB chroma noise reduction, velocity compensation and color dropout compensation are standard.

So is "Gyrocomp," an exclusive, use-proven CVS memory design that easily handles severe gyroscopic distortions—without breakup.

There's also a broadcast stable, gen-lock sync generator, automatic VTR advanced sync and a built-in completely adjustable processing amplifier.

If all that's not enough, add our optional, moderately priced Image Enhancer/Noise Reducer. This plug-in card substantially reduces luminance and chroma noise and significantly improves subjective resolution. And, to tame even the wildest instability, you can add our optional 16 line window.

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All this, and more, is contained in a package that weighs only 25 pounds, is only 3½ inches high and uses only 175 watts—major advantages with today's increasing emphasis on ENG and field production.

So, to give your heterodyne productions the quality they deserve, get the one digital TBC made and priced to do the job—the CVS 516. For full details and/or a demonstration, contact your authorized CVS Distributor or CVS. And ask for our new booklet about the basics of digital time base correction. It's free.

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contains the microprocessor control system and the floppy disc recorder. When the list is completed to the editor's satisfaction, the work tape and floppy disc with the edit list are sent on to a conversion system which automatically removes any extra edits, links all dissolve elements, and produces a ready-to-assemble CMX edit decision list. If everything is satisfactory, this edit list can be used to automatically assemble the master on the CMX 340 system.

Ampex brought out two new editing systems to complete the line, from the super-sophistication of the EDM-1 down through their one-inch VPR line and on into the ¾-inch U-type equipment. The EC-2 edit controller is a front panel addition to the AVR-2 and offers control of numerous editing functions on up to eight quad VTRs. A remote control panel, the RES-1, provides a sit-down editing system with the same functional controls as the EC-2.

Up to four of the AVR-2s can be directly controlled and designated as either record or playback machines while the other four are remotely controlled as slave record VTRs only. The EC-2 package is also the basic interface device for using the AVR-2 as part of a computerized editing system. EC-2 is factory installed and requires the addition of one internal component and a simple instrument panel change to the VTR.

Another Ampex editing system is the HPE-1, a microprocessor-based modular system designed for on- or off-line editing of helical VTRs, either one-inch or U-type. The basis of HPE-1 is the Convergence Corp.'s new "Superstick" ECS-100 editing controller. The HPE-1's microprocessor will command up to four VTRs with one simple control. Its standard features include SMPTE Time Code, A/B rolls, special effects, split edits, CRT display of all edit data, and a hard copy edit decision list for auto assembly.

Convergence's ECS-100 Superstick Series includes a basic system, the ECS-101, the 102 with insert editing, and the 103 with multi-source editing.

The basic table top control panel includes the "Superstick," which will control variable speed search functions on two VTRs. By moving the stick upward, the record machine is engaged and leftward or rightward movement controls search speed. By moving the stick downward, the record machine is disengaged and the source machine is engaged. On top of the "Superstick" is a cruise control button which, when pressed, maintains a constant search speed regardless of stick position.

Other features of the ECS-100 system include auto tag, replay, automatic return to edit, transport controls, adjustable pre-roll, automatic audio monitoring, record mode controls, and accessory controls. From this basic system, numerous options can be added, including the Convergence Liplock feature for audio inserts, an animation remote control feature, time code readers, a conversion kit for the insert function of the ECS-102, and a conversion kit for the ECS-103 multi-source feature.

Numerous interface modules are available to suit ECS-100 Series editors to almost any VTR.

Convergence introduced a special effects feature for the new system called the "Cut/Lap" transition programmer which permits simulated dissolves and soft transitions between cuts.

Spectra-Vision Corp. of Philadelphia brought out its new JBT-104-BA editor-programmer. At the show, it was announced that RCA would market this unit for use with its licensed 1-inch and U-type machines.

The JBT-104-BA has complete VTR remote control on the operator's panel. It features frame-by-frame stepless search and still frame for locating edit points. Programming modes and other features include manual and automatic insert timers, static and rolling preview, stopwatch, animation, deck selector, variable pre-roll, Time-Trak digital on-screen tape counters, on-screen tracking indicators, pulse-cross, program-clear, optional black burst, and optional routing switcher. The editor will interface with nearly all U-type editing VTRs and the new one-inch recorders.

Panasonic and JVC showed editing systems for their U-type systems. The Panasonic NVA-950 edit controller works with the NV-9200 cassette machine as a source unit and with the NV-9500 as the editor. These units were introduced previously.

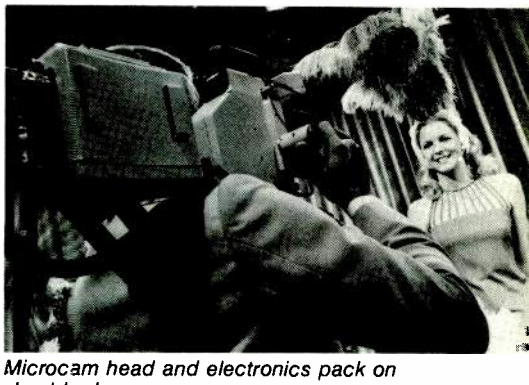
JVC's system uses the CR-8500LU editing recorder and an RM-95U edit controller. This system will provide automatic pre-roll, variable speed auto search at 10 times normal speed in forward or reverse and $^1/_5$ or $^1/_{20}$ normal speed search. An automatic feature permits the operator to allow the machine to step through the available speeds automatically. A horizontal sync phase compensation feature is employed to minimize timing error at edit points. The machine logic permits the VTRs to switch between play modes without returning to hit the stop button. All control buttons are illuminated for ease in identifying modes. The complete system is priced at about $16,500.

Recortec showed a precision edit controller for quad VTRs, the Edimatic-200. This edit controller is using a tape time system that is more accurate than control track pulse counting type systems, according to the manufacturer. When used with quad VTRs equipped with Recortec's Reel-Servo Modification kit (R-Mod), the machines will accurately track even at zero-speed.

The operator's panel is simple and easy to understand. All controls are one button/one function to eliminate confusion. Edit in/out points are selected by pressing simple mark in/mark out buttons. Edits can be previewed and trimmed with single frame accuracy. Displays show tape time for both VTRs and edit duration or number of frames being trimmed. The unit sells for $4,500.

Electro & Optical Systems, Ltd., from Canada, showed a new editor using microprocessor control. The ES2P will fully remote the functions of any helical editing VTR by use of an interface card. In and out points may be logged into the editor using either SMPTE Time Code. The machine will compare the time codes of the various machines and compute their differences in order to achieve lock-up. The numerous functions which are now common to editors are present in the ES2P, which is expected to sell for between $11,000 and $19,000 depending on options selected.

For more information circle bold faced numbers on Reader Service Card: RCA AE6000, **240;** Datatron 2000, **241;** CVS EPIC, **242;** Match One Dgtl Sys, Mach One, **243;** Ampex EDM-1, **244;** EC-2, **245;** HPE-1, **246;** Sony BVE-5000, **247;** CMX Videola, **248;** Convergence ECS-100, **249;** Spectra Vision JBT-104-BA, **250;** JVC RV-95U/CR-85000LU, **251;** Recortec Edimatic, **252;** E&O Systems ES2P, **253;** Panasonic NVA-950, **254.**



Microcam head and electronics pack on shoulder brace

Another round of cameras

Judging from what was on display at the 1978 NAB Convention, there has been no letup in camera design activity. The third generation of ENG cameras dominated the scene. Flexibility and versatility were the obvious trends, re-

continued on page 66

FOR TOUGH SHOTS...

MNC-61A Color TV Camera

A TOUGH CAMERA.

From shoe-top to tree-top, this tough-built ENG camera was designed to go where the action is. A rotating eyepiece lets you frame what's happening from almost any angle. While you're shooting, an LED display in the viewfinder keeps you informed of critical camera functions, including tally and video levels, so you can compensate instantly.

White and black balance, bias light, flair and aperture compensation and shading correction are adjusted automatically, so that you can concentrate on capturing the action. You can also use the viewfinder for H and V centering adjustment of R and B channels. In addition, both camera and VTR output can be monitored in the viewfinder, to make sure you get the coverage you came for.

The MNC-61A's rugged, cast-aluminum exterior houses integrated LSI pre-amp, processor, encoder, and sync generator. A weight of 16½ pounds and shoulder-pad pivot point let you track the action surely and smoothly. Parallel optical systems give accurate registration when you pan and tilt.

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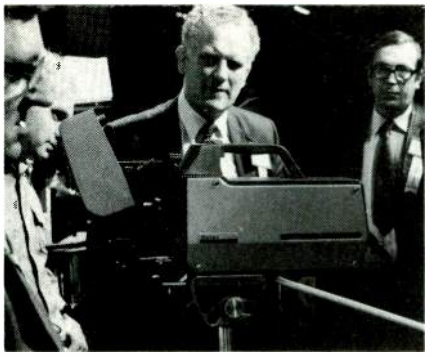

Marconi surprise: an ENG camera

Compact Toshiba PK-39 ENG camera

Cinema Products MNC-71 with Steadicam

flected by more hand-held ENG cameras that could be converted to studio or field use and more field cameras that could double as studio cameras or be broken down for hand-held applications.

Two new developments that gave camera manufacturers plenty to talk about were the new one-inch diode gun Plubicons (high resolution, low lag) and automatic beam optimization circuits which reduce flaring. Another big trend is toward more automatics — including automatic camera set-up and simpler, more automatic operation. Taking the prize for the most automatic camera was the RCA TK-47.

While some manufacturers cut back on the number of cameras displayed, others (e.g., Hitachi and Ikegami) showed increases in their lines. And Toshiba, a newcomer to this scene, made its maiden voyage to NAB with a complete lineup of ENG, field and studio types, all popular in Japan. Other big newsmakers were Ampex, Marconi, Philips and Sony. In this article, we'll be examining the specific developments and trends in the three big areas — ENG cameras, studio cameras, and modular field cameras.

Big boom in ENGs

New ENG cameras at this year's NAB show ranged from several high performance types to some improved under-$10,000 units. The new high performance types were shown by Ikegami, Philips, Ampex, Sony, Thomson-CSF, Cinema Products, Marconi, Toshiba and Hitachi. Hitachi, in fact, exhibited top-of-the-line cameras as well as new low-cost cameras. Others offering inexpensive models were Sony and Sharp, while Panasonic, JVC, Sony and other manufacturers had entries in the in-between range. Last year's licensing/manufacturing agreement between Sony and Thomson-CSF produced the new all-in-the-head configuration of the Microcam, shown by Sony as the BVP-300 and by Thomson as the Mark I.

Only RCA resisted offering major changes — apparently it saw no need, since the delivery of the 100th TK-76 was announced at the show. RCA did, however, demonstrate a new belt-worn camera control interface unit which allows the ENG TK-76 to be connected to a TK-760 — part of the flexibility trend.

Elimination of the battery belt was a big feature of the new Ikegami top-of-the-line entry, the HL-79. The battery is built into the head. Without dangling cables, sliding through crowds and getting in and out of vehicles is made easier. Battery drain of the new HL-79 is 30 watts — 25% less than that of the earlier HL-77. Signal noise has been upped 2 dB (to 52 dB) and sensitivity bettered 20%. The HL-79 has a +9 dB and a +18 dB gain switch which allows a useable signal to be put out with only 3 footcandles at f 1.4. The camera takes either Plubicons or Saticons without circuit modification. It also incorporates auto beam optimization (ABO) — a feature of many cameras this year, as noted earlier. ABO eliminates comet tails by automatically increasing beam current in low highlight areas (equivalent to stopping the lens down). Also featured by the HL-79 are individual RGB outputs (along with NTSC encoded outputs) for chroma keying. The unit will be available in January of 1979 at a price of $34,000.

A major new ENG camera at this year's NAB was the Philips LDK-14, which got double billing because Ampex selected it as its ENG camera (calling it the BCC-14). All in a single head, the Philips LDK-14 is a rugged-looking unit of die cast magnesium alloy, and claims outstanding broadcast quality (comparable to Philips colorimetry). The optical axis is at normal eye level, giving the operator better control of the picture. It has many built-in features and automatic controls, including auto black and auto white color balance, auto iris, and auto centering. The numerous indicators available in the viewfinder include signal level, color bars, spot measurement window (to check operation of auto color balance and auto centering), indication of VTR tape remaining, iris or zoom position and low battery voltage.

The LDK-14 has dynamic beam control (Philips's name for ABO), which permits automatic operation over about 4f stops. Externally switchable black stretch provides contrast compression with a minimum of added noise. A separate contrast expansion switch enhances picture quality in low contrast highlight scenes by reducing black level about 10 percent. Two lines of color correction are provided, as well as a 360 degree hue-selectable chroma key. The LDK-14 draws 27 watts and has a standby switch to reduce power to six watts between takes. Weight is only 12.1 lbs. The camera is designed for field use and offers very good accessibility for servicing, according to Philips.

The top of the line Hitachi for ENG use is the SK-90, shown in prototype form last year. Because of a good preamp, S/N is 51 dB for 200 nA signal. This camera can also be used for field applications and can be run by a video operator through a Remote Operation Unit or a long-distance Digital Command Unit. More on this in the section on field cameras. Hitachi's SK-90 uses three Saticons and an extra small-sized efficient beam-splitting prism rated at f 1.4. Among its features are an automatic beam optimizer circuit, auto iris,

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With a single unit, you can edit with full functions and broadcast quality. Even if you don't happen to have special technical knowledge.

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Here's how the CR-8500LU gives you that kind of precision:

- **Frame to frame editing** is made possible with the capstan servo/built-in rotary erase head/blanking switcher frame servo design. A design that also ensures true assemble and insert editing with no distortion at the edit points. Plus horizontal sync phase compensation to minimize timing error at the editing points.
- **Variable speed auto-search** lets you perform both high speed and low speed search. You can search at approximately 10 times in fast forward or reverse to find edit points faster. Or slow speed search at 2 times, 1 time, 1/5 time and 1/20 time. Or use the special auto-speed shift feature to automatically slow you down from 2 times, real time, 1/5 time, 1/20 time.
- **Automatic pre-roll** enables you to pre-roll tape between edits, with an automatic on/off switch. Which can come in especially handy during successive assemble edits using camera signals.
- **Self-illuminated control buttons,** allowing easy identification of the operation mode.
- **Full logic control** for direct mode change without pressing the stop button.
- **Remote control** of all operations, with the optional remote control unit RM-85U.
- **Audio level control with meters,** preventing over-level recording without audible distortion, with attenuator. Also, manual audio level controls let you adjust the audio recording level by checking the level meters.
- **Auto/Manual selection for video recording level control,** adjustable by the automatic gain control circuit or manually by referring to an independent video level meter.
- **RF output** to connect an external drop-out compensator.
- **Patented color dubbing switch** for stable color multi-generation dupes.
- **S.C./sync input connector** allows connection of time base corrector and allows for two second pre-roll.
- **Chroma level** can be controlled manually for convenient connection to an external system.
- **Built-in comb-filter** for playback (switchable on-off).
- **Servo-lock indicator** to check the tape transport condition.
- **Counter search mechanism,** permitting Auto-Search of a particular section of the tape.
- **Solid construction for easy maintenance:** both side panels, top and bottom panels are detachable for easy access to the inside.
- **Tracking control meter** for maximum tracking adjustment.
- **Heavy fan motor** for better circulation.

All that with one editing unit. But when you combine two editing units with our new RM-85U automatic editing control unit, you'll enjoy all the benefits of a total-performance system.

Starting with the kind of control only JVC's RM-85U can give you:

- **Independent LED time counters** for player and recorder, read out edit points in minutes, seconds and frames.
- **Edit-in and edit-out automatic control.** Four built-in memories let you control edit-in and edit-out points of both the player and recorder. And once starting and ending points are determined, accurate editing is memory-controlled automatically.
- **Edit shift control** allows frame-to-frame edit point correction.

• **Lap time indicated** for each insert edit length by LED display.
• **Edit preview mode available,** for "rehearsals" of actual edits.
• **Edit-in point search mechanism.** After each edit, a Return button rewinds the tape automatically to the edit-in point, so it's easier to check edit conditions.
• **Auto-shift search mechanism** to step down the tape speed automatically, and ensure quick and accurate location of the editing point.
• **Tape safety guard circuit.** Because leaving the unit in the still-frame mode can eventually cause damage to tape or video heads, a tape safety guard circuit places the unit into the stop mode automatically if it is left in the still-frame mode for more than 10 minutes.
• **Selective editing modes**—assemble editing, insert editing for audio channel-1, audio channel-2 or video.
• **Versatile editing capability** offering techniques like "edit-in/out," pre-roll, and automatic pre-roll.

You'll find that nothing in its price class performs anywhere near the CR-8500LU/RM-85U videocassette editing system. And that you'd have to spend a *lot* more on the competitive unit that offers many of the same features.

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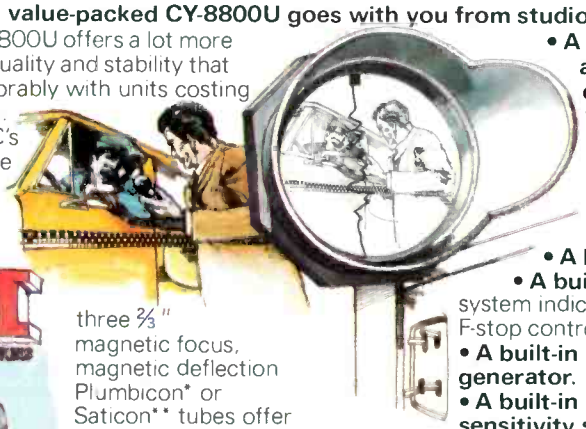
And JVC's value-packed CY-8800U goes with you from studio to location.

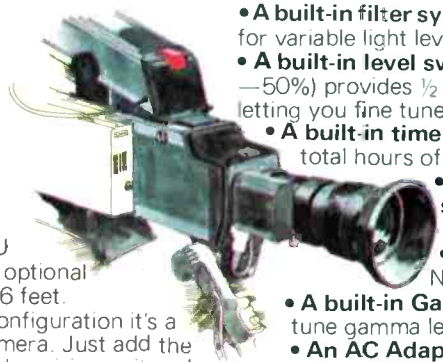
Our CY-8800U offers a lot more than picture quality and stability that compares favorably with units costing twice as much. Thanks to JVC's technology, the CY-8800U camera, utilizing three ⅔" magnetic focus, magnetic deflection Plumbicon* or Saticon** tubes offer total flexibility. And a rugged die cast chassis in front and back to hold up under the toughest conditions.



With the **Basic** configuration, it's a compact ENG/EFP camera that's completely self-contained —no CCU required. It's easy to operate, ready to plug into our CR-4400LU/CR-4400U portable recorder, with optional cables available up to 66 feet.

With the **Studio** configuration it's a hard-working studio camera. Just add the RS-8800U remote Synchronizing unit and the large screen, top mounted viewfinder.

And as for big-ticket features, we've built in what the others would let you add on later:



• **A built-in 1.5 Inch adjustable electronic viewfinder** for the convenience of the operator.
• **A built-in battery warning system.**
• **A built-in tally light.**
• **A built-in VSI**—video system indicator for precision F-stop control.
• **A built-in color bar generator.**
• **A built-in +6dB, +12dB sensitivity switch** for low light level applications.
• **A built-in auto white balance.**
• **A built-in fast warm-up capability.**
• **A built-in electrical color temperature adjustment** for different applications (variable from 3000°K to 10,000°K).
• **A built-in filter system** (neutral density) for variable light levels.
• **A built-in level switch** (+ 50%, 0, —50%) provides ½ F-stop adjustment, letting you fine tune for added contrast.
• **A built-in time lapse meter** to show total hours of camera use.
• **A built-in intercom system** for studio applications.
• **An RGB output,** and NTSC encoding (Y, I, Q).
• **A built-in Gamma control** to fine tune gamma level.
• **An AC Adaptor**—standard.
• **Lightweight—17.4 lbs.—portability.**
• **Optional 12-to-1 zoom lens** with automatic iris and power zoom.

• **Built-in horizontal and vertical contour correction circuits.**
• **Signal-to-noise ratio of 49dB,** F 4/3000 lux.
• **Resolution of 500 lines at center.**
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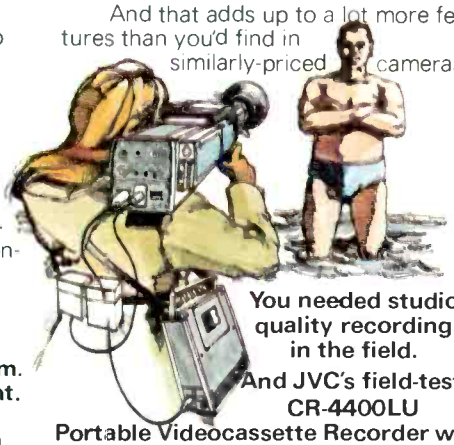
• **Minimum illumination** F 1.9/300 lux (+6dB switch on).
• **A comfortable hand grip** to stop and start the recorder. With a switch to operate iris control and a switch for return video.
• **A built-in CCU.**

And that adds up to a lot more features than you'd find in similarly-priced cameras.



You needed studio quality recording in the field.

And JVC's field-tested CR-4400LU Portable Videocassette Recorder with automatic editing lets you bring your recording/editing capability wherever you need to shoot.

If you spend time on location in either ENG or EFP applications, you need a portable video system that can shoot, edit, and give you something to show in no time flat. Without awkward equipment hassles.

JVC's CR-4400LU is the one to take along when you can't bring a studio.

Because it's the lightweight machine with heavyweight features:

• **Weighs in under 27 lbs.** So you can take it anywhere, and assemble edit on the spot. You enjoy total flexibility. Complete freedom. Fast results.
• **AEF (Automatic Editing Function)** gives you clean assemble edits.
• **Built-in, full color recording and playback circuitry.** No need to buy an adaptor.
• **Low-power consumption** that lets you operate on a miserly 13.5 watts, for longer battery life. A multi-purpose meter checks battery, audio, video and servo levels for precise control of all functions.
• **Flexibility to record with the CY-8800U** or other high quality color cameras.

So if you need a field-tested recording system with the features you want at a price you can afford, check out our CR-4400LU Portable Videocassette Recorder.

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and auto white balance. The operator shoots a black and white object and then presses the white balance button; balance is shown as a vertical white line in the viewfinder. Auxiliary gains of +6 dB and +12 dB give a usable picture in low light. Camera has a built-in two line contour enhancer with comb filter for crisp pictures. Weight of the camera with 1.5-in. viewfinder is 8.7 lbs.; power consumption is 35 watts.

The performance ratings of the new Sony BVP-300 and the Thomson-CSF Mark I are identical to the original specs of the Thomson-CSF Microcam, but the configuration is different: Sony put the works in a single head weighing 12.4 lbs. (without lens). Power is a low 19.8 watts (a BP-90 Ni-Cd battery runs it for two hours). Camera has extra gain settings of +9 dB and +18 dB, which gives a picture at two footcandles. A new Sony FET in the preamp gives a luminance S/N ratio of 54 dB — about the highest claimed by anyone. The camera has automatic controls, automated beam optimization, auto lens iris, auto digital white balance and auto digital black balance (digital means that the black and white balances are stored in and preserved by a digital memory which holds even if battery power is interrupted). This camera, too, has two line enhancement with comb filter for clear, crisp pictures. It also has other built in features such as generators and compensation. The BVP-300 also has a power standby switch which slows the drum rotation of a BVH-500 or BVU-50 VTR when standing by.

As mentioned, Thomson-CSF calls this camera the Mark I. The *original* Microcam is now dubbed the Mark II. If you are wondering why the original is a Mark II and the latest version is a Mark I, the logic is that the Mark I is a one-piece unit and the Mark II a two-piece unit. Simple, right? Well, maybe not. The Mark II happened to be displayed by Thomson-CSF as a one-piece system! That is, the Microcam's separate electronic pack was shown built onto a shoulder support, thus making it a one-piece system. On the shoulder support could be hung a battery, making it truly a one-piece system. Price of the Mark I is $34,000 and the Mark II is $30,000.

A surprise ENG camera was the new single-head model shown by Marconi. The camera appeared comparable to other high quality types but because it was so new, detailed specs were not available. The camera is in production in the U.K. and it will be marketed in the U.S. later this year, according to Marconi spokesmen.

A quality/modular ENG-type camera that comes as one piece or two was the Toshiba PK-39. In the one-piece configuration, weight with viewfinder *and* a 10x zoom lens was $22^{7}/_{16}$ lbs. Removing the camera control unit, the camera head and lens weigh $17^{3}/_{16}$ lbs. It has built-in color encoder, sync generator, color bar generator, contour enhancement and monitoring system. Auto white balance, auto beam control and auto iris are also built in. The optical system is a high efficiency prism type for good sensitivity, and a gain selector switch permits adding +6 dB or +12 dB. Price was not set since Toshiba wants to sample the market before announcing availability.

Very much in the market is the MNC-71CP camera built by NEC for Cinema Products. This camera, first introduced at the SMPTE meeting in Los Angeles last fall, was tested extensively by Cinema Products so that they might claim the same ruggedness and reliability that has hallmarked their CP 16 film cameras. The LSI microcircuits developed by NEC for this camera are claimed rock stable and low in power consumption (approximately 30 watts with 1½-in. viewfinder — a 5-in. viewfinder is optional). Cinema Products offers a one-year warranty and availability of parts anywhere in the U.S. within 24 hours. The single head camera boasts high-transmittance prism optics, with a maximum aperture of f 1.4. Additional gain of +6 and +12 dB can be switched in. Signal to noise is 51 dB. Built-ins include easy-to-use filter wheel, microphone, automatic white and black balance circuits, flare compensation circuit, linear matrix for fidelity tracking of colors from high to low light levels. Remote production control capabilities include the ability to balance the MNC-71CP to match the colorimetry of any number of cameras in the field and studio. The camera has genlock, master pedestal control, servio iris control, etc. A wide range of lenses and accessories are available, making the camera well suited for ENG or EFP applications. Basic camera price is $32,900. Over in the NEC booth, the MNC-61 was exhibited. Insides of this camera, described extensively last year by *BM/E*, are similar to the MNI-71CP.

Broadcasters not wanting to invest over $30,000 in a camera that is sure to get some hard street knocks had a good selection to choose from, including new and not-so-new models. In the new category was Panasonic's first truly ENG camera, the AK-750. This self-contained camera complies fully with NTSC broadcast standards and includes a prismatic optical system. Among its features are white and black analog memory circuits for balancing and a built-in bias light to reduce after images. Other built-ins include a color bar generator, vertical aperture, Y, I/Q encoder, and level indicators in the monitor. Signal to noise ratio is 46 dB luminance signal, but this can be improved to 48 dB with other options.

Production model of Hitachi SK-90


One-piece Thomson-CSF Microcam, MK I


Philips LDK 14 lightweight ENG camera

A color trap in the encoder and a level dependent circuit reduce color noise under low light conditions. An adjustable horizontal aperture correction circuit can be built into the camera head, and vertical aperture correction can be added. Gamma correction is adjustable from 0.45 to 1.0. The camera has a +6 dB gain switch and can operate in 15 footcandles at f 1.8. Three different sets of tubes can be used: Plumbicons ($26,740), industrial Plumbicons ($23,620) or vidicons (Newvicons at $20,500). For field use, various options are available including a Remote Control Unit.

Hitachi offered a wide choice of lower-priced cameras, starting with the single tube FP-3030 G which uses a tri-electrode vidicon image tube. This camera has been on the market for some time. The really interesting camera in

this price range was the FP-3060 which uses a new tri-electrode Saticon. This tube gives the camera a good S/N (better than 46 dB), good sensitivity, and low lag. The camera had a number of built-in features, making it, Hitachi said, "truly a professional ENG camera," at a price of only $9400. Weight is approximately 11 lbs. and power coverage is under 16 watts. The camera will be available in July.

JVC's ENG (and EFP/Studio) camera was the CY-8800U color camera, introduced last year. This camera used Plumbicons or Saticons. Optics are a dichroic mirror.

Sony offered two lower-priced ENG cameras. The one tube DXC-1610, familiar to most broadcasters, was the least expensive. The BVP-200 is a two-tube color self-contained camera (shown in prototype form last year). Color in the BVP-200 is picked up in a 1-in. Trinicon; luminance by a ⅔-in. Saticon. Result is a good picture at a modest cost. Because luminance is separated from chrominance, registration error is eliminated. Weight is 12.5 lbs. and power is 20 watts. The camera features automatic white balance and has a number of built-in features.

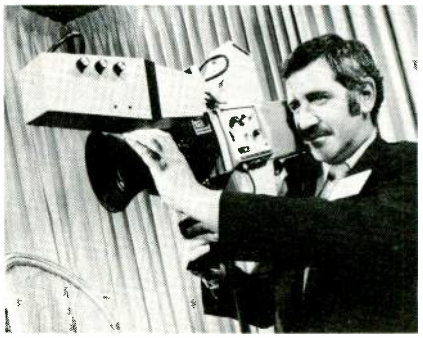
A company that surprised itself at NAB was Sharp. A representative said Sharp took an exhibit "to get dealer exposure for our closed circuit line." Instead it found broadcast interest in its XC-520 3-tube camera, which uses industrial grade Saticons. Circuits are apparently quite good in this modest camera. Resolution is 400 lines and S/N is 46 dB. Wide gamma correction is a feature and this ENG system (under 10 lbs.) will sell for under $10,000 late this summer.

Among the previously shown cameras at NAB were the GBC CTC-7X (now at a lower price of $19,995), the Bosch Ferseh KCA-90 and the Asaca ACC-2000. The last offered a separate large viewfinder option this year which makes it more convenient for field production work. Asaca stressed the modularity aspect of the ACC-2000 — bringing us to the subject of cameras designed as much for EFP applications as ENG.

New Marconi Mark IX portable

RCA TK-760 field/studio camera strips to TK-76B ENG type

CEI-310 field/portable



IVC-7000P portable

Convertibles make the scene

EFP hand portable/studio convertible types were shown this year in full force. Most of the cameras discussed above as ENG types can be used for more exacting electronic field production work, or in the studio. To get this versatility, most could be equipped with larger viewfinders and tied to remote control units. With remote control, some functions can be handled by a video operator rather than the cameraman. AC power can be used, and a wide variety of cabling arrangements are usually possible. Another characteristic of these flexible cameras is use of ENG lenses with servo control (another new trend) that can be mounted on the handles of a dolly or pedestal.

Other cameras at the show were designed with field applications foremost in mind, and ENG as a secondary application. Typical of this category is the Ikegami HL-52, "a dual-unit portable TV camera designed expressly for working from small vans." Others in the class are the Hitachi SK-96, described as a studio/field hand-held convertible, and the Toshiba PK-36. Last year RCA introduced the TK-760 as a studio/field unit. This year RCA stressed the camera's use as a three-in-one system. Because of complete modularity, the main frame can be removed, leaving a standalone portable, the TK-76B.

Still another is the Commercial Electronics CEI-310, the 1978 modular version of the CEI-300 which was a hit of the last year's show. The Marconi Mark IX portable, part of the new Mark IX line, is strictly an EFP type.

Ikegami's HL-52 camera head, weighing 9.3 lbs. and using three ⅔-inch Plumbicons or Saticons, incorporates automatic beam optimization to compensate for extreme picture highlight. It is a high quality camera using a high efficiency prism beam splitter, two filter wheels, automatic iris, etc. Automatic white balance, optical black and dark current stabilization, flare compensation and other features indicate the camera's quality. Its unique feature, though, from a field production viewpoint, is the camera control unit format. The CCU incorporates a removable miniature remote control unit (RCU), which can be placed in the control console in a production van with the CCU stowed well out of the way. The very small size of the RCU makes it possible to control several HL-52s from a small van. With AC power available, the van-to-camera distance can be as great as 200 meters. The cable is super-flexible, light in weight and only 12mm in diameter.

For further indications of the quality and flexibility of this van-oriented unit, consider the following: a 50 dB S/N ratio and 500 lines resolution, white and black shading corrector, adjustable linear matrix, plus horizontal and vertical contour correction with coring and comb filter. The output includes individual R, G, and B signals for chroma keying. The viewfinder includes a zebra video level indicator. Sync is available from a genlock.

Although not convertible to hand-

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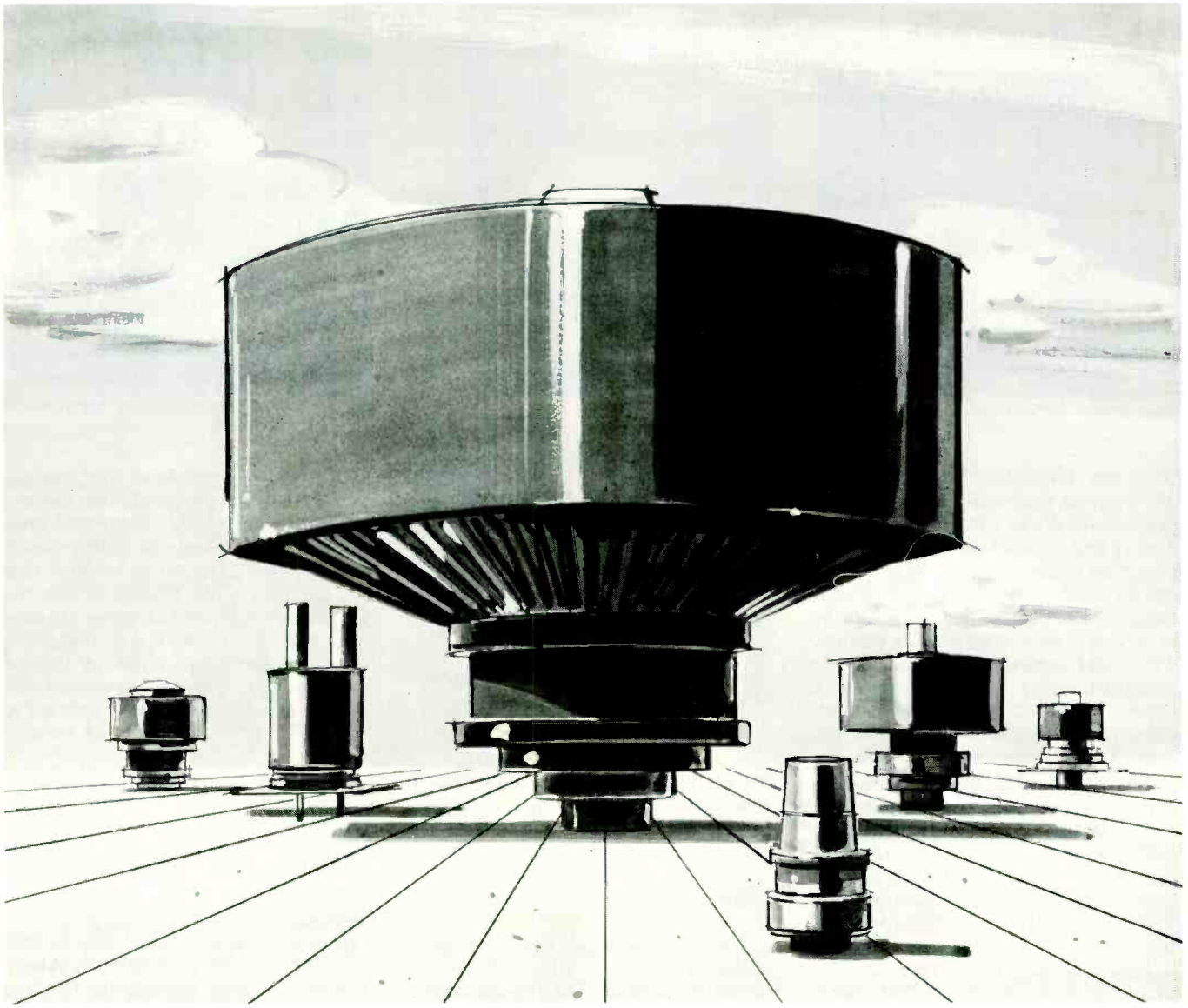

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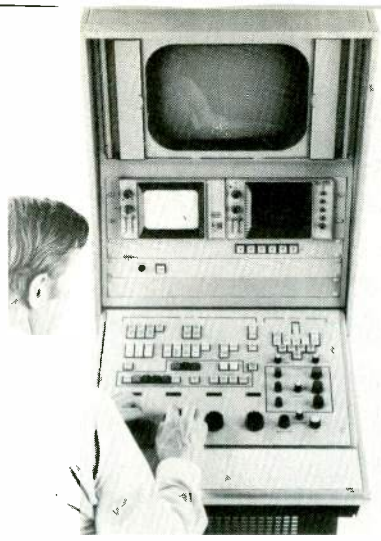
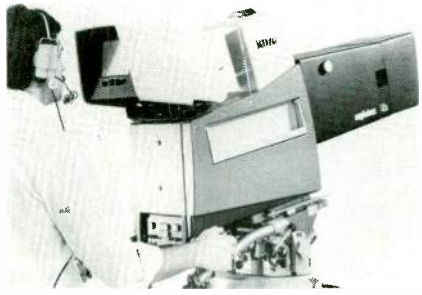
New Ampex BCC-10 studio camera





Set-up control unit, above, for RCA's TK-47 automatic camera

Marconi's new studio camera, Mark IX

held use, Ikegami's brand new HK-357A is best described as an all-in-the-head, studio/field camera. It's a high quality unit that can take the new diode gun Plumbicons and the 73XQs, and can be automatically set up by a microcomputer. With triax the head can be separated a mile from its base station. The head includes the color sync generator, color bar generator, color encoder, contour corrector plus intercom, tally and return video input circuits. Other options are available.

The Toshiba PK-36/SK-36/PK-36A series of larger portables, intended for field use, utilizes high quality heads with one-inch tubes. A wide range of lenses are accommodated, including those from wide angles (fixed focus) to 25:1 zooms. The SK model works in moonlight (1 footcandle).

Hitachi's SK-96 is a camera considerably like the RCA TK-760, introduced last year. For studio use the camera comes in a studio housing, but the head can be taken out of the housing for hand-held use. The studio version can work with a 10x standard zoom lens or a 22x field zoom. The SK-96 can be remotely controlled by a digital command unit located at the base station. Signals can be transmitted through coax or triax cable up to 3000 feet. The SK-96 has automatic beam optimization, many automatic features, large viewfinder options, etc., making it an easy-to-operate camera. Using three ⅔-in. Saticons, the sensitivity is good and S/N is better than 51 dB.

The new Marconi Mark IX portable camera using one-inch tubes is not a convertible in the same sense as the cameras just described. Strictly speaking, it is a portable version of a studio camera. But it is relatively lightweight (14 lbs. w.o. viewfinder and lens) and can be operated 90 meters from the CCU, or 890 meters with an inline adaptor (1.5 kilometers with a triax converter). Its features are indicative of its value as a field production camera. The camera control unit is small — only 8¾-in. high — so that it can be used in small vehicles such as station wagons. Low power consumption makes the cameras suitable for use from boats, helicopters, etc. A triax package option makes it useful in many outside broadcast applications.

The Mark IX uses a 7-in. viewfinder in the studio; for portable operation, 3 inches is standard. The camera takes a very wide range of lenses, from 6:1 to 42:1. The portable boasts many automatic facilities which are described later along with the studio version.

New studio camera announced; others are refined.

Both RCA and Marconi unveiled brand new studio cameras at NAB, and Ampex spotlighted its new BCC-10 — the first major U.S.A. showing of this camera following its introduction at Montreux, Switzerland, last year. Philips made a big fuss over new performance capability for its LDK-25 series, the result of using the new one-inch Plumbicons 73XQ. All of this made the Las Vegas NAB exciting.

Readers who have seen RCA's NAB and post-NAB advertisements are undoubtedly aware that RCA has gone all out to make the new TK-47 camera as automatic as possible. Heavy use is made of the microprocessor to provide totally automatic set up and computer aided semi-automatic operation. Large scale integrated circuits and digital memory circuits are used to replace adjustment potentiometers.

The TK-47 consists of four components; the camera head, the camera processing unit (CPU), the remote control unit (RCU), and, for setting up operations only, the set-up control unit (SCU). The CPU functions like the CCU of conventional cameras, but controls have been removed so that it becomes a black-box interface for the camera chain. The remote control unit (RCU) is a digital device connected to the CPU through a pair of twisted wires.

The SCU setup unit is digital, of course, and serves as the technical control center of the camera system. It can handle up to six cameras in a studio.

RCA described the microprocessor setup sequence as an "electronic instrumentation book" which guides the operator through a logical step-by-step camera setup procedure. Alpha numeric displays indicate the function to be controlled.

Adjustments are made through control knobs which operate with the feel of a pot but which actually generate a digital signal that controls the circuit to which it is delegated. Switching of camera functions, test signals, and monitor modes is done automatically. The operator can, however, randomly select any control function through the pushbutton keyboard.

The automatic option for the TK-47 automatically sets the camera for optimum performance. The microprocessor-controlled system adjusts more than 80 control functions, cycling through the complete camera setup sequence without operator involvement.

A preprogrammed electronic memory continually monitors, compares and corrects itself with data measured from keypoints in the picture, automatically adjusting registration, shading, level set, gamma tracking, electronic focus, and beam alignment.

The total setup procedure is normally required only after camera tubes are changed or major repairs are per-

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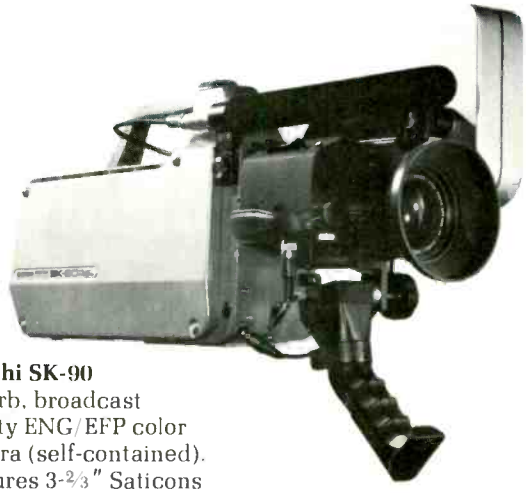
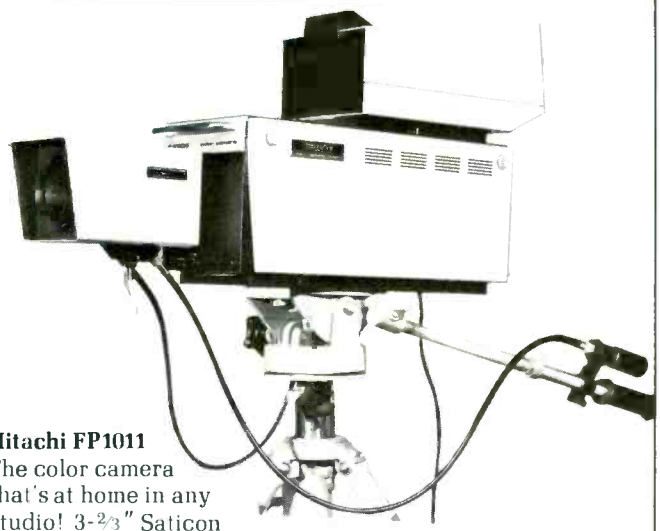
Hitachi's Latest from NAB... Plus More!

Hitachi FP1020
Performance *PLUS* from a self-contained 3-Saticon (⅔") ENG/EFP color camera. Low power consumption, built-in vertical enhancer, plug-in PCB, auto white and black balance circuits, and much more.

Hitachi FP 3060
For professional quality pictures from a modestly priced, one-piece ENG color camera! Features new tri-electrode Saticon® tube, low power consumption, aluminum die cast body, tiltable and adjustable viewfinder, and an optional single coaxial power supply system.



Hitachi SK-90
Superb, broadcast quality ENG/EFP color camera (self-contained). Features 3-⅔" Saticons with extra small prism optics, built-in ABO (Automatic Beam Optimizer) circuit, 2H Contour Corrector and Masking Amplifier, and low power consumption.



Hitachi FP1011
The color camera that's at home in any studio! 3-⅔" Saticon tubes, multifunction RC panel, optional kit for conversion self- contained use, tiltable and detachable 7"viewfinder.

Plus:

- Hitachi SK-96: our newest broadcast convertible.
- Hitachi FP3040: the new economy convertible.
- Hitachi FP3030-G: a self-contained Gen-lock economy portable.

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formed. Routine daily operation checks are handled by the automatic option. The preoperational performance check instantly confirms that the camera is set for optimum performance, and can be initiated from the SCU, the RCU or the camera head.

Auto setup got a play by other exhibitors also. Ikegami, the first manufacturer to use a microprocessor for this purpose, increased the interface capability of its unit so that one microprocessor could handle six cameras. The new version sets up six cameras in sequence, taking less than a minute per camera. Each camera is set for white balance, black balance, flare correction, gamma correction, video gain, and beam alignment, plus eight registration functions. Anytime a camera needs "refreshing," a button push at the microprocessor does it all again. And, as mentioned under EFP cameras, Ikegami incorporated these features in its studio/field camera, the HK-357A.

An automatic color camera was Toshiba's billing for its studio camera, the PK-31A. Again, a microprocessor (self-contained) is used to accomplish automatic centering, size and linearity adjustment, automatic white level, black level, gamma setting and flare control. These settings are done within 50 seconds after the switch is on. The PK-31A is a 30mm tube camera and boasts more than 600 TV lines resolution. It has many notable features, and *BM/E* will look more closely at it if Toshiba decides to actively pursue the American market — a decision that will be made shortly, according to a Toshiba spokesman.

A brand new camera line at the NAB which will be sold vigorously in the U.S.A. is the Marconi Mark IX. The line is designed for a variety of operational situations — studio use, field use or portable use either with AC power or with batteries. The system was dedesigned to draw minimum power — 350 watts for the studio camera, 250 watts for the portable. The Mark IX, as the successor to the Mark VIII, also incorporates a considerable amount of automatic circuitry. Marconi has elected to stay with analog methods, however, and has not gone to digital memory.

All units of the Mark IX system are small in size and weight and include convenient cabling arrangements for remote jobs. The CCU fits in a 19-inch rack and is only 8¾ inches high. The power supply is operated in a switching mode at 20 kHz, which helps reduce the size and cuts power consumption. The portable version of the Mark IX, described in the preceding section, can operate for several hours using two standard car batteries.

The camera head of the Mark IX retains the compact optical assembly of the Mark VIII. Tubes are 30mm Leddicons with light overload protection. Automatic dynamic gain — a feature of most new cameras this year — is also offered in this line. The electronic package includes new head amplifiers, talk-back circuits, etc. Two filter wheels are incorporated, one controlled from the camera CCU or remote control unit. The many monitoring facilities available at the viewfinder make setup and operation easy. Most of the automatic features are available on an optional basis: automatic registration using a diascope, automatic centering, automatic black balancing, auto white balancing, auto iris. The portable camera uses light weight material and the quality is compatible to the studio camera. Cables are standard multiconductor or triax.

Although unveiled last year with PAL encoding, a new camera for most visitors was the Ampex BCC-10. The BCC-10 is Ampex's way of saying it's serious about being a leader in the camera market. The picture produced was very low noise. The luminance S/N ratio is stated as 54 dB, due to a unique video processing system using a low noise FET preamp. The camera can work with regular, ACT or the new diode gun Plumbicons without modification. The BCC-10 is highly automated, with auto white balance, auto black balance, auto iris, and auto centering, all incorporating digital memories. The automatic system includes out-of-range indicators. A successful balancing operation causes the lights to extinguish.

Digital transmersion of the camera control signal means that light weight camera cable is used.

Manual control of the paint controls at the CCU is incorporated with an on/off "instant paint feature" that allows simplified control for creative special effects. The camera also has a black stretch feature to bring out fine detail in shadow without increaing chroma noise. The viewfinder has a high brightness and can be seen easily when rotated or tilted. Over 25 different lens models can be accommodated.

Philips made a big point that its LDK series, shown last year, was different in 1978 since the 25, the LDK 5 triax, and the LDK 15 portable were redesigned to use the 73XQ one-inch Plumbicon. The tubes are rear loaded for easy replacement and top performance (there is no need to realign yokes assembly). Additionally, Philips said it lowered capacitance in the signal coupling element of the tube face, resulting in low noise. A precision-mounted ceramic ring at the front of the tube elements eliminates the need for optical alignment adjustments.

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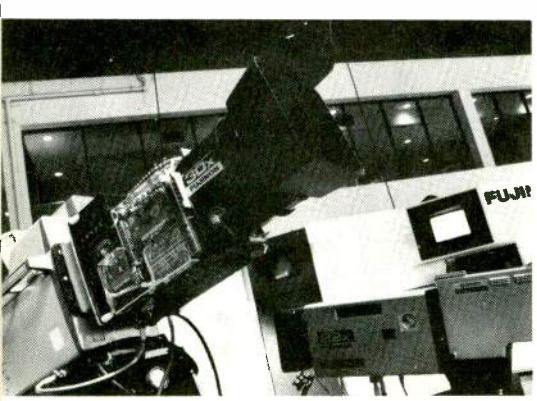
Big lenses on small cameras was a trend at NAB

Angenieux 15X for ENG gets close study



Fujinon had a large variety of lenses at NAB

Canon 13X with built-ins offered big performance at low weight

First Hitachi developed the revolutionary Saticon tube. Then Hitachi designed the perfect camera for it...

The new portable

HITACHI SK-80

The remarkable new SK-80 has three superior 2/3" Saticons at its heart, for unexcelled image and color fidelity. Hitachi's sophisticated electronics coupled with the high resolution capability of the Saticon set a new high level of performance for a portable EFP camera under the most demanding conditions.

Moreover, the SK-80 feels and handles like a true portable should. And its 2-hour battery belt with 1-hour charge time assures you of adequate power for continuous long-term shooting when you're on location. The standard C-mount and optional Arri adapters give you the added versatility of selecting the exact lens that fits your shooting requirements.

But performance is only half the SK-80 story. A special training tape on videocassette is available with complete camera set-up and maintenance instructions, to help you keep your SK-80 making its excellent pictures. Beyond this, our six Hitachi regional offices are all staffed with qualified engineers and fully stocked with parts. They stand ready to back up our vast national network of servicing dealers.

We urge you to check out the performance features of the SK-80, as well as its low price, before specifying any other camera. Arrange a demonstration with your local Hitachi dealer or call the Hitachi regional office nearest you.

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There were other studio cameras on the floor, but most of them were familiar to attendees since they had been introduced before. Harris showed the TC-80 and Panasonic the AK920. Bosch Fernseh had several cameras at the show but did not concentrate on them. Hitachi also showed several models of low-priced studio cameras.

Camera lenses meet challenge of new cameras

Getting the most out of your ENG camera with a more flexible lens system pretty much sums up what *BM/E* saw in lenses at NAB. Canon's new J13X9B zoom (for ⅔-in. image tubes) is a good example of the advances that have been made. This 13X zoom is smaller than most 10X zooms, yet it boasts wide angles (aided by accessories), focal length from 9 to 111mm, a minimum object distance of .8m (31.5 inches), and speed — an aperature of f 1.6. The unit weighs a mere 3.7 lbs. complete with servo drive. Accessories include a teleside converter (1.5x) and extenders (1.5x, 2x) and a variety of controls, remote zooms, iris servo drive, focus control, and grips.

Angenieux's hot item at the show was a 15X system for ⅔-in. and 1-in. tubes (and 16mm film cameras) that has a normal wide view angle of 54° and a MOD of 2 ft. These are extendable to 70° and 1 ft. with retro zoom. Normal narrow angle is 4°, which can be brought down to 1° with the tele attachment and two 1.6x extenders. Maximum aperature is f 1.8.

Large zooms for ENG was the name of the game at Tele Cine's booth. There, a Schneider 30X system was fitted, through an adapter, to a TK-76, no less! Tele Cine was saying on the Hilton hotel some 1000 yards away. This lens was going to NBC to pick up a baseball game in Cleveland at the close of the show. Tele Cine said several news bureaus were planning to buy 30X16 zooms for ENG (at about $20,000) just to get closeups of events normally out of range (e.g., terrorists holding hostages, fires, and other disasters). Tele Cine showed 20X zooms as a special lens for ENG camera and as a standard for the field/portable TK-760.

Fujinon showed a range of lenses including 14X10 for the TK-76 (which had a focal length of 20 to 280mm) with built-in 2x extender. The unit weighted only four pounds. Fujinon showed a 22X zoom with 2x extenders built in also. The plethora of accessories and attachments (pistol grip, remote servo drive, etc.) all designed to increase small camera flexibility mark a clear cut trend, according to Fujinon and other lens manufacturers.

The theme at Rank Precision was the virtue of the Varotal multi-role lens, which needs no re-registration when changing to wide angles, telescopics, etc. This concept was introduced last year at NAB. In 1978, Rank was offering lens systems for a wide range of cameras, both studio and portable.

Another lens at Angenisux that was of special interest was their 12X zoom with an extremely good moculation transfer function. The high resultion type is intended for exacting teleproduction jobs.

Significant camera tube advances

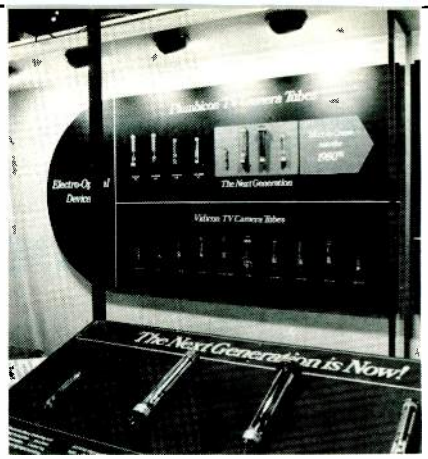
It's been a couple of exciting years for camera tubes. Last year the big news was improvement in Saticons and RCA's commitment to them; high overload protection Leddicons by EEV also created a stir. This year, the spotlight is back on Plumbicons — high resolution low lag Plumbicons with diode guns. Also noteworthy is increased dynamic range of Saticons through the use of automatic beam optimization circuits. Leddicons, too, with small pots in their bases to control variable light bias, deserve attention. And not to be ignored is the XQ1427 ⅔-in. Plumbicon, a tube much improved over the original versions.

The most talked about tube at NAB was the one-inch diode gun S73XQ Plumbicon, a tube destined to displace XQ1070s. The introduction of a new electron gun assembly that operates in the diode mode significantly improves resolution (to 1000 times) and lag. The beam in the S73XQ has uniform energy distribution (smaller spot size), and improved beam acceptance which reduces signal delay lag; it also provides very high-beam reserves which minimizes comet tailing and blooming. A low-capacitance target contact allows overall maximum signal to noise ratio. The one-inch tube equals or betters 30mm conventional tubes.

Another in this class is the 45XQ tube for electronic cinematography. This 30mm tube has a resolving power of 1600 TV lines. The 45XQ has a modulation depth of 90 percent at 400TVL per picture height, a low target capacity, an improved S/N ratio and, therefore, greater sensitivity.

Production of diode gun tubes in all sizes is expected in late 1978.

The Saticon has always been characterized as having high resolution and low lag. Its dynamic range has been improved to increase picture quality. Automatic Beam Optimizer circuits (ICS) provide enough beam current for pickup tubes to discharge highlighted parts on the target. This prevents a too small beam current which leads to comet tail and blooming. The circuits control beam current by means of an "equivalent return beam method"



Diode gun Plumbicons were big news at NAB

whereby the return beam parameter representing the beam current reserve is detected by the difference between signal output and beam current so that the beam current is always adequate. Dynamic range increases to more than four lens stops without detracting from resolution and registration.

Introduction of variable light bias potentiometers in the sockets of 30mm P-8400 Leddicons enables light bias levels to be set during camera line-up, and individual adjustment of each channel reduces picture smearing to a minimum, especially in "low key" lighting. This process will allow better pictures from all existing popular cameras.

The XQ1410 family of Plumbicons introduced this year adds internal bias light to reduce lag as much as 37 percent. Color fringing is eliminated, and picture smear is reduced. This tube is interchangeable with standard XQ1020s.

For more information circle bold faced numbers on Reader Service Card: Ikegami HL-79, **255,** HL-52, **256;** HK-357A, **257;** Philips LDK-14, **258,** LDK-25, **259;**Ampex BCC-14, **260,** BCC-10, **261;** Hitachi SK-90, **262,** FP-3060, **565,** SK-96, **263;** Sony BVP-300, **264,** BVP-200, **265;** Thomson-CSF Mark I, **266,** Mark II, **267;** Marconi ENG, **268,** IX portable, **269,** IX studio, **270;** Toshiba PK-39, **271,** PK-36, **272,** PK-31A, **273;** Cinema Products MNC-71CP, **274;** Panasonic AK-750, **275;** Sharp XC-520, **276;** CEI-310, **277;** RCA TK-76B, **278,** TK-47, **279;** *Lenses:* Canon J13X9B, **280;** Angenieux 15X, **281;** Schneider 30X adapter, **282;** Fujinon, **283;** *Tubes:* Amperex Plumbicon S73XQ, **284,** 45XQ, **288,** XQ1410, **286;** EEV Leddicon P-8400, **287.**

One-inch VTRs capture rapt attention

Working models of SMPTE Type C videotape recorders were big news at NAB 1978. Quad was there, and so were lots of ¾ in. U-matics, but the "must see" exhibits were those showing the new one-inch formats.

One-inch surprises

It was expected that both Ampex and Sony would have machines capable of

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HITACHI SK-70

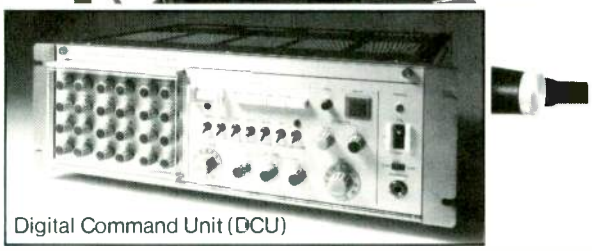
The One Camera That's Right for Both Field Production and the Studio!

The modular SK-70 converts easily from a fully equipped, self-contained color studio camera to a modified studio camera. In the field, the studio version of the SK-70 can be connected directly to a VTR with only a co-axial cable. And for hand-held portability, the camera head features a shoulder mount, an auto-iris portable zoom lens, and a 1.5" viewfinder, along with a DC and process pack. The Digital Command Unit (DCU) with up to 3000 feet of single co-axial cable strongly enhances the capability of the SK-70. Another striking option is a 22:1 zoom lens that can be used for the studio version of the SK-70 in the field.

No matter which configuration you choose from those shown in the photo and three diagrams, the Hitachi SK-70 offers the precision and reliability of three 2/3" Saticon tubes in the camera head to insure excellent picture quality, combined with all the latest advances in broadcast camera technology.

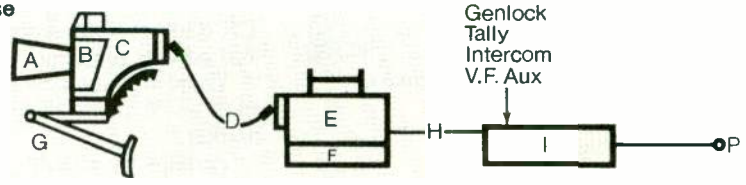
As you can see, our outstanding Hitachi SK-70 is a sound investment for broadcasters, production studios, and universities who need broadcast quality performance in a wide variety of assignments, all for the price of a single camera. We'd be pleased to arrange a demonstration of how the SK-70 can fit the following camera requirements inside or outside your TV studio, and more:

1. Fully studio-equipped

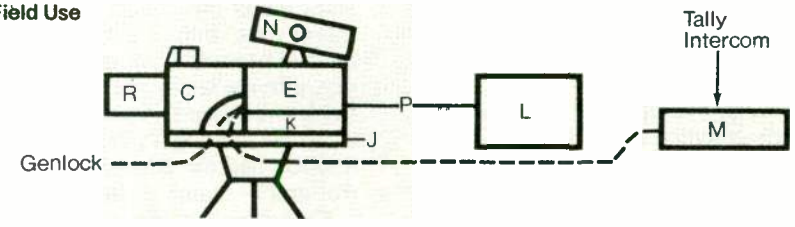


Digital Command Unit (DCU)

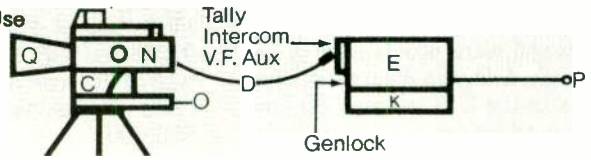
2. Portable Use



3. Field Use



4. Modified Studio Use



A)	Portable lens
B)	1.5" viewfinder
C)	Camera head pack
D)	Camera cable (300 ft.)
E)	Process pack
F)	D.C. pack
G)	Shoulder Mount
H)	Co-axial cable (3000 ft.)
I)	DCU
J)	Mount adapter
K)	A.C. pack
L)	VTR or FPU
M)	Operation panel
N)	5" viewfinder
O)	5" V.F. Mounting Plate
P)	Co-axial cable (video)
Q)	Portable lens w/conversion adapter
R)	Studio lens

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Bosch-Fernseh challenged VTR competitors on points of cassette loading, availability of portable units

playing the recently agreed-upon format. There were surprises, however, in terms of technology and marketing developments.

On the technical side, Ampex showed a slow motion control panel, the SMC-60, which made the VPR-2 (designation for the SMPTE-Type C machine) comparable in function to the HS-100 slow motion recorder. Its success hinges on the capability of an automatic scan tracking system which permits slow motion and still frame without a noise bar. This application development was unexpected.

The other surprise was that Sony showed, in a hotel suite, that it too had achieved absolute tracking control without breakup. Referring to its approach as dynamic tracking, Sony had a machine that could shuttle tape from ¼ speed in reverse to 2x speed forward without a noise bar or breakup. Just how this is done was not stated, but it apparently uses bipolar heads.

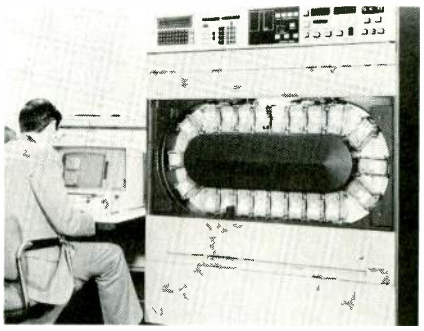
The big marketing surprise was the announcement that N.V. Philips will market the VPR-2 and the VPR-20 portable recorder on a worldwide basis. This put both Philips and Marconi (who had announced its intention to produce the VPR-1 last June) in the SMPTE-Type C/Ampex camp.

RCA was siding with Sony. At Las Vegas, RCA prominently displayed the Sony SMPTE - Type C VTR under its own label, the TH-100. Since Thomson CSF has already committed itself to the Sony format, six major companies in the world will be promoting SMPTE-C. Actually the count is seven since NEC announced its intention to make a SMPTE - Type C. While it is true that RCA and Philips (and IVC) are also identified with the BCN SMPTE - Type B format, it is clear that the SMPTE - Type C will be favored — at least in the U.S.

Something quite similar to SMPTE - Type C may become an EBU standard too. An EBU committee is quite far along in its deliberations. In Europe a fourth audio track is quite desirable. It is quite likely that EBU will achieve this by giving up the sync track, now part of SMPTE-C.

Sony showed new SMPTE-Type C one-inch VTR

Crowds thronged to see Ampex SMPTE-C VTRs



RCA introduced automation feature to TCR-100

The new marketing alliances that clearly emerged at NAB did not visibly crush Bosch Fernseh's spirits. It aggressively promoted the BCN as the logical recorder for now and the future. Recent BCN sales to both WNEW-TV in New York and to a production house in Hollywood were proclaimed in the Bosch booth, bringing the total operating BCNs in the U.S. to over 50 (and over 350 worldwide).

As it did at the SMPTE meeting in Los Angeles last fall, Bosch-Fernseh emphasized that practical digital storage techniques now give the BCN the operating advantages that normally might have been assumed to be the exclusive domain of the field-per-track machines. Fast threading cassette loading and compatibility of the BCN transport to digital recorders of the future were also stressed at Las Vegas.

The BCN got its share of attention at Las Vegas, but the buzz word was, "Did you see the SMPTE-C recorder yet?" For its part, Sony boldly declared the BVH-1000 an advanced highband recorder "destined to revolutionize video production and recording techniques." Sony took credit for starting the revolution. According to Sony, the BVH-1000 offered broadcasters, for the first time, a video recorder that combines the electronic advantages of quadruplex with picture continuity and non-real time editing ease of film.

Both Sony and Ampex touted SMPTE - Type C advantages — picture quality equal to quad (S/N 48 dB), three tracks of audio, and economy. Sony sold Bidirex as a single control that gives fast bidirectional search capability from still, step, ¼ speed, normal speed, 3x, 5x, 10x, 25x, up to more than 60x normal speed.

Ampex said the VPR-2, when coupled with built-in variable play and shuttle features, provides editing systems with unprecedented capability.

Both Sony and Ampex showed portable units — the Sony BVH-500 and the Ampex VPR-20. All of this equipment is now in production.

Three-quarter-inch formats

Although there were four manufacturers of ¾-inch format machines present — Sony, JVC, Panasonic and NEC — there were no new developments save for JVC's adding of a 7x normal forward speed and 10x reverse to its CR-8300 cassette recorder, making it a full editing recorder.

There were no new format surprises, such as ½-inch, to vie for the ENG market.

Perhaps we should not have dismissed the JVC CR-8300U so quickly. Besides the bi-directional search control, there were other features (preview, built-in pre-roll, a counter with a memory, a frame servo that locks to the odd field, and others). And the price is low. A whole editing system — two CR-8300Us and the RM-83U editing control unit — come in for $18,500.

Cassette recorders with full editing capability was the theme of not only JVC, but of Panasonic (model NV-9200) and NEC (model VC-1010) as well. JVC won on speed and total features, Panasonic on price — under $10,000.

Quad was subdued

Quad definitely took a back seat at NAB 1978. There were no new announcements except for a new automatic accessory for RCA's TCR-100 video tape cartridge recorder. The

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Looking for full camera mobility with "on the air" picture quality? Find it...in our Hitachi FP1020!

If you need professional performance from a hand-held color camera, Hitachi FP1020 is your answer.

No matter what the assignment, the FP1020's three ⅔" Saticon* tubes deliver broadcast-worthy resolution and colorimetry. And like all Hitachi portables, the FP1020 combines lightweight handling with heavyweight performance features such as: auto white and black balance controlled by an 8-bit digital memory ...three-way power via 2-hour battery belt, AC, or 12V DC...built-in color bar generator...vertical enhancer...and a 5-position color temperature filter disc.

Two key options extend the versatility of the FP1020: built-in Gen-Lock for multi-camera system use and a remote Operation Panel which controls camera functions from up to 150 feet away.

For documentaries, for training programs, for any field production applications, see the Hitachi FP1020 first. At your Hitachi dealer.

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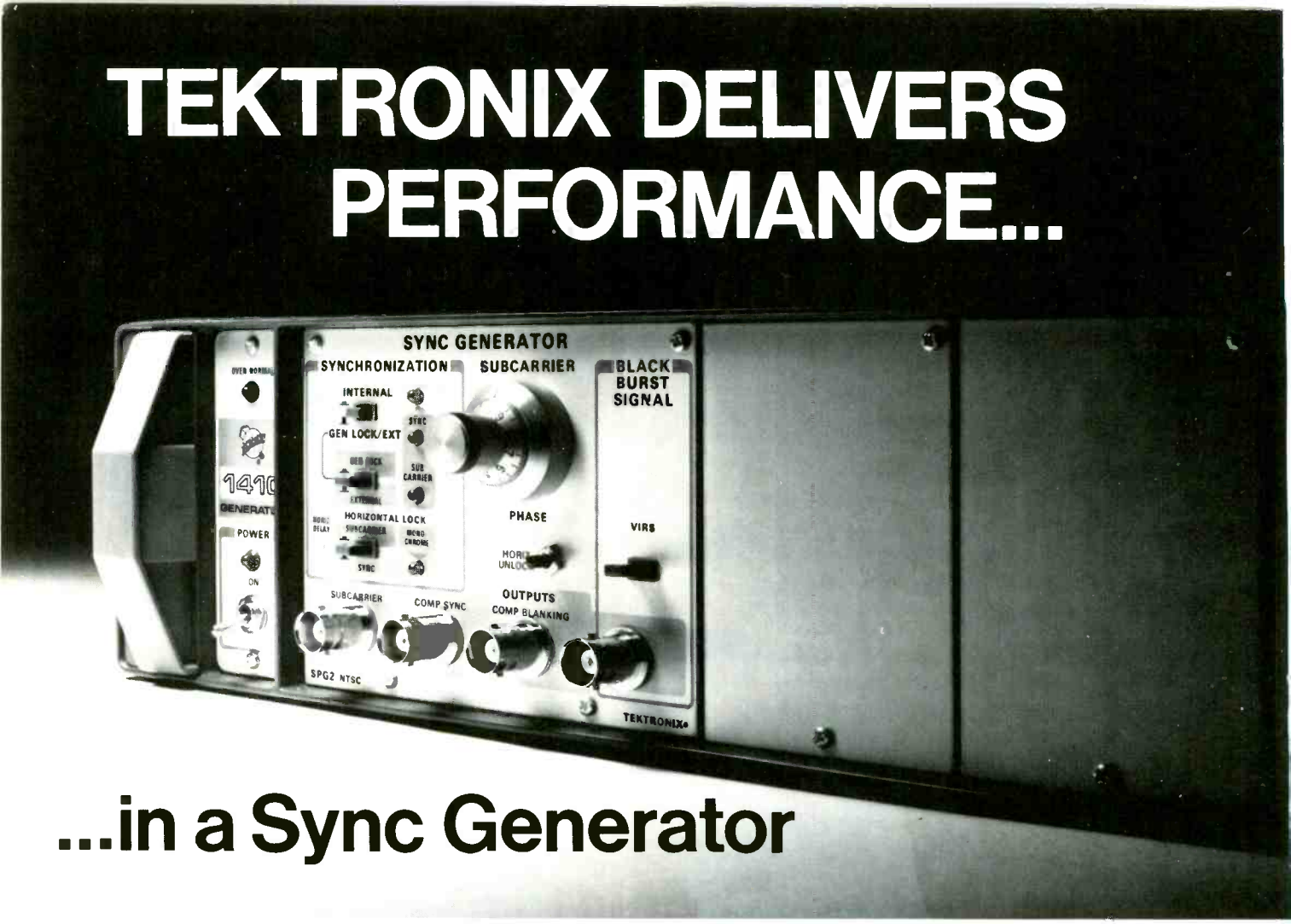
TEKTRONIX DELIVERS PERFORMANCE...



...in a Sync Generator

Get Tektronix quality and dependability in a sync generator. The TEKTRONIX 1410.

Check these key benefits:

☐ Add on picture sources easily. The 1410 Sync Generator is ideal for single-line sync distribution system application.
- Genlock provides fast or slow lock
- Programmable horizontal and vertical sync phasing supplies advance/delay range of +10 to −4 μsec with respect to incoming reference signal
- Includes 360° subcarrier phase control
- Black burst output

☐ Minimize possibility of illegal horizontal and vertical blanking widths
- Variable horizontal and vertical blanking widths

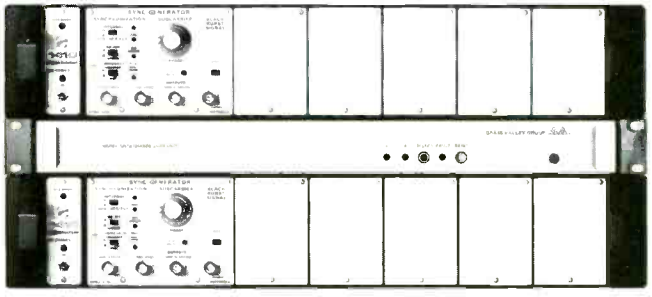
☐ Minimize non-phased edits on video tapes
- Precise subcarrier to horizontal sync phasing is maintained at all times, including when genlocked. Color field identification is provided by a field identification pulse output.

☐ Greater sync system stability
- Optional ±1 Hz color subcarrier stability performance (±10 Hz is standard)

☐ Sync system status easily determined
- LEDs indicate internal or external reference source, monochrome signal incoming, loss of sync or external subcarrier lock

☐ 1410 Mainframe easily accommodates additional test signal generators.

☐ Put your total sync system together with TEKTRONIX
- Automatic Changeover Unit provides switching to back up sync generator
- Systems available for NTSC, PAL and PAL-M



Typical NTSC sync generator system comprised of two 1410R Option 01 mainframes with SPG2 sync generator modules, and one GVG 3257A Automatic Changeover Unit.

Tektronix quality, performance and reliability in a sync generator. Get the whole story from your nearest Tektronix Products Field Engineer. Or circle the reader service number below for more information.

Tektronix®
COMMITTED TO EXCELLENCE

Circle 145 on Reader Service Card

built-in automatic accessory provides for electronic cartridge identification (external bar code labels similar to those used in supermarkets are employed), automatic registration interface and programmable random play of any cartridge loaded in the TCR-100.

By using external bar code labels, fast identification of up to 22 carts is accomplished without threading or recueing. The labels are simply scanned and read as the magazine carries them past the sensing device.

Scanning and identification takes only 11 seconds. The resulting information is combined with the proper bin location and stored in the system's memory. The data is then supplied to the station's technical automation system as a table of contents. Programming can be accomplished from a local play control panel on the TCR-100 or remotely through the technical automation system.

IVC hangs in

IVC claimed a strong comeback at NAB. Its news was a $504,000 profit for six months ending Jan. 31. The 9000 was on display as was the IVC-1070. In the works for some time, it was termed "a new generation of IVC one-inch recorders: new in appearance, new electronically, new mechanically and new operationally."

Electronically, the 1070 has a high luminance signal-to-noise ratio and excellent chroma. Resolution is equivalent to 300 lines. There are two good audio channels. Tape handling has been improved. Electronic assemble and insert editing is possible. All existing IVC one-inch libraries can be played back on the IVC-1070. Since old machines can be retrofitted, IVC sees good business ahead for this system.

Trichroma-U bids for acceptance

Three-quarter-inch videocassette recorders can be fine mastering machines with the Trichroma-U concept, according to TRI. You can do multiple generation work on a ¾-inch recorder with a Trichroma U kit, and TRI showed NAB visitors just how to do it. The system avoids the use of NTSC amplitude modulated signals on the tape, thus eliminating much chroma noise, velocity errors, and non-linearities. Instead, an input transcoding module extracts chrominance from the incoming video and converts it into an R-Y/B-Y FM signal for recording. An output transcoding module recovers the compents and encodes them into a stable NTSC signal. Available for a year now, Trichroma showed signs of catching on at this year's NAB.

For more information circle bold faced numbers on Reader Service Card: Ampex VPR/2, **289**, SMC-10, **290**; Sony BVH-1000 type C, **291**; Bosch-Fernseh BCN, **292**; JVC CR-8300 U, **293**; RCA TCR-100 automation, **294**; IVC 1070, **295**; TRI Trichroma, **296**.

ENG microwave telescoping to new highs

No one could have missed the ENG microwave hardware so prevalent at the show. Nearly every exhibitor in this category had a visual eye stopper. Microwave Associates made its own news by rolling onto the exhibit floor a sleek white Ford Galaxy sedan customized into a microwave news relay station. If the car itself didn't stop you, the revolving turret antenna on top of a mast jacked 30 feet over the car did!

Telescoping masts at Van Ladder, ENG Manufacturing Co., Wolf Coach and High-Lite Corp. called attention to these exhibitors. Tayburn's readily pointable microwave dish looked you right in the eye at times — you couldn't miss it. Nurad's Golden Rods hung from the rafters. The Farinon, International Microwave Corp. and TerraCom exhibits were less flashy, but their microwave gear was easy to spot. Notable this year were systems operating on new frequencies — 770 MHz and 40 GHz — and a tiny 2 GHz system for mounting on a camera!

For the details, let's start with Microwave Associates and that shiny Ford. It was designed by ENG Manufacturing Corp. for M-A to demonstrate that standard autos were an efficient low cost way of getting news events and reporting them back live or for recording back at the studio. A modified car is less expensive than most vans now in use — 25 percent less, said M-A. The lower direct cost and lower operating expense would allow broadcasters to put more news teams on the road for better coverage. With more microwave-equipped news crews on the road, film *and* tape could be done away with — film because of its cost, tape because of the low quality of portable VTR units.

The ENG car was equipped with a rotatable, pneumatic-driven, 30 foot retractable antenna mast that projected through the roof of the car. Packaged compactly in the rear of the car was the MA13CP transmitter and receiver and the MA2CP transmitter. All this microwave equipment was mounted on movable carts in case the news team must travel a considerable distance from the car or the car's location prohibits the transmission of a signal to a relay point or the home studio.

Signals transmitted during the four days of the show were processed in an analysis center in the M-A booth which gave viewers an opportunity to measure the quality of the signal. The analysis center was equipped with a waveform monitor and vectorscope as well as picture monitors.

ENG microwave installed inside a sedan

Telescoping mast is mounted on car roof

ENG microwave van shown by ENG Mfg. Co.

Microwave Associates had other goodies: a new higher power 13 GHz system, and a portable seven GHz system. They demonstrated a portable frequency-agile eight-watt two GHz system and a mini two GHz system (along with a two GHz receiver). These last items, except for the receiver, were introduced in 1977. What was brand new, though, was an omni-directional backpack transmitter/receiver called the "manpack."

The new MA13FA system was a ten-channel frequency agile rig. Its

continued on page 86

Exclusive from Cinema Products:

Our kind of ENG/EFP

The reliable MNC-71CP!

If you know our CP-16 — the 16mm sound camera that is recognized worldwide as the standard in TV-newsfilm — you know Cinema Products!

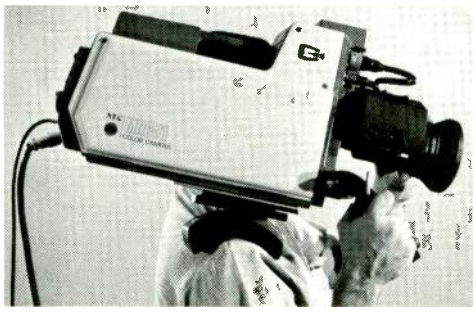
You know of our responsiveness to the needs and requirements of the working TV-newscameraman... our sensitivity to his input from the field.

And you know of our commitment to provide him with the most reliable, highest-quality, cost-efficient TV-news gathering tools: lightweight, rugged and dependable equipment, with a minimum of downtime.

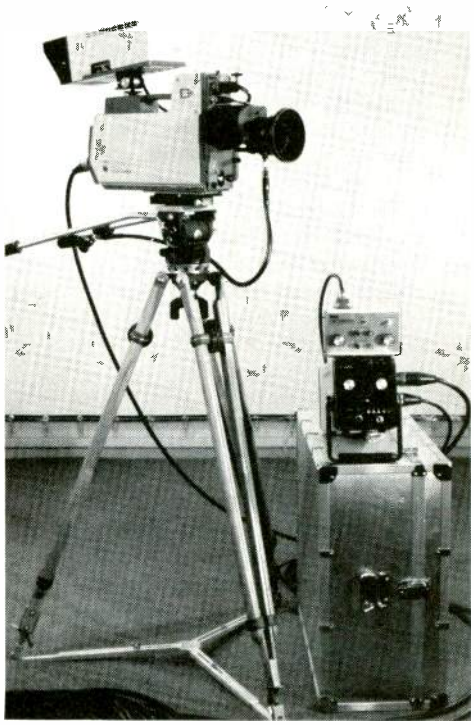
We are therefore extremely pleased to introduce the all-new MNC-71CP — the only ENG camera that bears the Cinema Products logo.

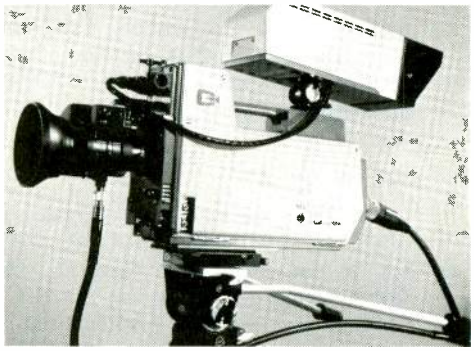
A breakthrough in ENG camera design

Manufactured by NEC, Japan's largest manufacturer of broadcast equipment, the MNC-71CP is, without a doubt, the finest and most advanced camera of its class — specifically designed from its inception to be used both as a compact, lightweight, fully self-contained ENG camera as well as a broadcast-quality, versatile field production camera (with sophisticated remote production control capabilities, such as the ability to balance the MNC-71CP to match the colorimetry of other cameras in the field or in the studio).



Lightweight and compact (no backpack), the MNC-71CP is ideally balanced for on-the-shoulder operation.





MNC-71CP with 5" viewfinder, mounted on Universal 2030 fluid head tripod (equipped with double handles). Also shown: Remote Production Control Unit and Remote Control Panel ("Paint Box"), camera case and related accessories.

Optimum performance

Extensive use of LSI micro circuits developed uniquely by NEC dramatically reduces the number of individual components in the camera. As a result, the MNC-71CP is significantly more stable in performance, 7 to 14 times more reliable in circuit operation, as well as considerably lower in its power consumption.

Logical functional design

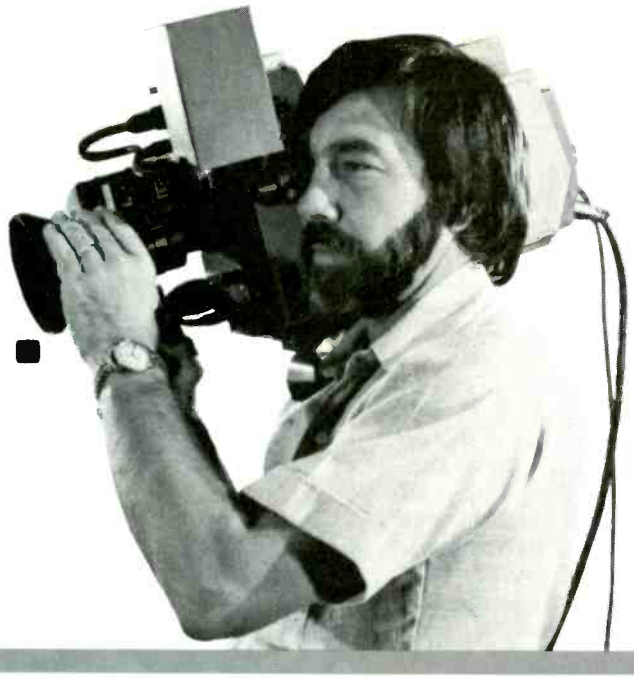
Everything about the MNC-71CP has been designed from the ground up for simple operation and easy maintenance. It is therefore logically and simply laid out in terms of control placement, fast set-up and registration, and accessibility of parts.

For example, merely opening the camera sideplates exposes all internal circuit boards without requiring the use of a module extender, and the removal of just six screws permits access to the pickup tubes for quick replacement even in the field.

Service and parts availability

Behind the MNC-71CP is Cinema Products' outstanding reputation for after-sales service. The same consistent and dependable backup we have always provided for our CP-16 line and Steadicam™ — an extensive dealer organization and full factory support.

camera...



Since NEC directly manufactures all circuit components for the camera, you are guaranteed a full supply of replacement parts for the life of the camera. And we will make these available anywhere in the United States within 24 hours!

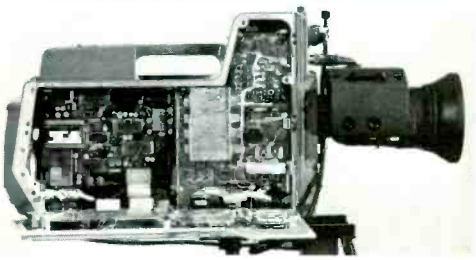
Unprecedented 1-year warranty

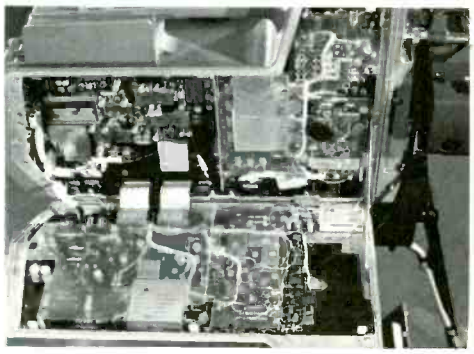
So confident are we of the MNC-71CP and its reliable performance, that it is covered by the standard Cinema Products full one-year warranty (unprecedented in the broadcast industry!). And, there is no service charge ever for warranty work.

Available here and now

Make the most of your ENG dollar with the all-new MNC-71CP — the reliable ENG/EFP camera with reliable CP backup. What's more, it is available here and now to take care of your immediate needs.

Steadicam (Universal Model) enhances MNC-71CP production capabilities in the field: providing utmost flexibility and fluidity as well as saving time and cutting costs. It is ideal for TV specials, documentaries, and commercials.





Merely opening the sideplates of the MNC-71CP permits checking all internal circuits without using a module extender.

OUTSTANDING FEATURES & OPTIONS

- *High-transmittance prism optics (maximum aperture f/1.4).*
- *3-tube RGB system features Saticon® or Plumbicon® 2/3" tubes, as desired.*
- *Built-in linear matrix for high fidelity in tracking colors from high-to-low light levels.*
- *Three-position gain control: 6 to 12 dB additional gain for greater flexibility in boosting for extremely low light levels.*
- *Built-in, easy-to-use filter wheel arrangement.*
- *Automatic white and black balance circuits.*
- *Built-in microphone and intercom amplifiers.*
- *Signal-to-noise ratio: 51 dB.*
- *Complete accessibility of circuit boards and pickup tubes for easy maintenance.*
- *Fast set-up facility for converging the camera.*
- *Remote production control capabilities include the ability to balance the MNC-71CP to match the colorimetry of any number of cameras in the field and in the studio, as well as genlock, master pedestal control, servo-iris control, etc.*
- *A full range of options and accessories further enhances the MNC-71CP's capabilities as an outstanding ENG/field production camera for battery or AC operation.*

For further information, please write to:

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ability to select a variety of channels insures interference-free reception, and the high power (150 mw) means there is opportunity for direct relay to a central ENG receiving location, eliminating the need for a field relay van. The MA 13FA can be powered by a single 12V car battery.

The new seven GHz portable system operates on the 6.875 to 7.725 frequency band. It can relay either video or message signals (or two audio subcarriers above video). The 7 EPI, rated at one watt, can be used as a portable unit or incorporated into a fixed tower mounting array. Power is AC or 24 V DC. The 7 EPI is an all solid state, frequency modulated, wideband system.

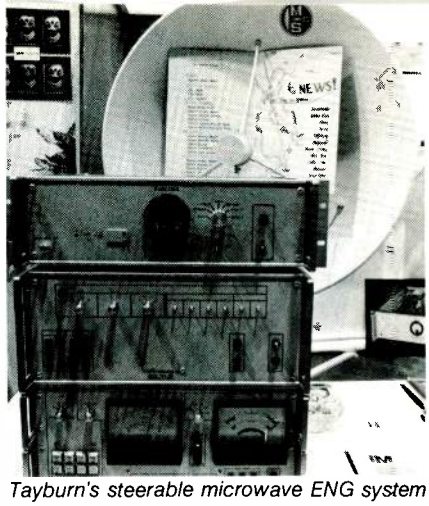
M-A showed a more elaborate control system for its frequency agile (one, seven, or twenty-one channel) eight-watt MA2EP system, introduced last year. The mini (18 lb) two watt MA2CP system was also back, this time with a new mini receiver. M-A also showed a central site receiver, the MA2GU, which can cover seven or 21 offset channels. A 3.5 dB noise figure preamp is used. Adjacent channel rejection is high.

Another most interesting product was a 17 lb. backpack transmitter/receiver that was omni-directional working on 770 MHz (a frequency not yet allocated for broadcast use in the U.S.). The system puts 880mwatt for a range of about a mile. This low frequency reduces multipath radiation which normally results in distortions or ghosts.

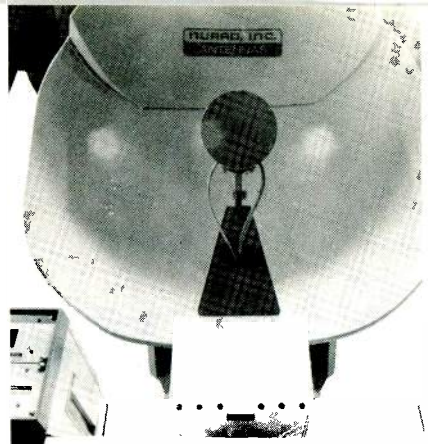
M-A also showed a multi-frequency rotatable antenna system introduced last year — the RMFA-25.

New to NAB but considerably in the news lately because of the success of its easily steerable antennas was Tayburn Electronics. The key to Tayburn's instant success in the ENG market is its "intelligent modems" which permit rapid set and precise alignment of the transmitting antenna *from the studio*, over long distances, in less than a minute. The TBM-100 master controller provides simultaneous control and display of all parameters needed for control. The digital commands can go out over low cost telephone lines or radio. There are 16 command functions that are initiated by simply pressing a button (antenna azimuth slow fast left, etc). Four receive frequencies can be selected. Up to four remote ENG systems can be operated from a single controller, making it possible to get news feeds from multiple sources.

An integral part of the system is the receive system. Using techniques borrowed from the company's aerospace



Tayburn's steerable microwave ENG system



Nurad Superquad had new controls

TerraCom 13 GHz system

Farinon had new FM audio diplexer

work, the transmitter's signal strength is seen and manipulated before pictures come in. The receiver eliminates adjacent channel interference, and a unique limiter device increases picture quality in a noisy picture environment.

By virtue of the way the antenna is mounted and controlled it can operate even in high winds (60 to 100 mph depending on model selected).

Tayburn frequently puts power gain amplifiers right in the antenna feed horn to reduce transmission line losses.

Microwave power that gets your signal through was the theme at Farinon. Farinon's 20 watt two GHz transmitter, the frequency agile FV-2MF, helps one find the right path through tall buildings and high rises. The audio subcarrier on this system can be relocated to get audio through. Also available is a 20 watt two GHz amplifier (model 60515) and a preamp for the receiver end, the model 60576.

A new product at Farinon was the FV43-02 FM transmission channel system for use with Bell systems (5.8-6.4 GHz) or CCIR work. It's a high performance audio subcarrier diplexer that permits an audio cs signal to be transmitted with a video signal over a single channel.

Other microwave ENG manufacturers were International Microwave Corp. and TerraCom. International had no new product but showed 13 GHz portable system conveniently packaged in two transport cases. TerraCom showed no new ENG gear but stressed their TCM-7 series for field tuning to any channel in the two, seven, and thirteen GHz bands. TerraCom had some new pcm transmission equipment on display (described in the section on transmitters).

Nurad exhibited its full line at Las Vegas: quad antennas, Superquad, rods, and horns. It did not display brand new products, but did feature digital control of Superquad panning antennas. Bogner showed disc-rod antennas for both transmitting and receiving. The receiving model was new.

One of the most remarkable products at the NAB Show was the subminiature two GHz video microwave system shown by Thomson-CSF. Weighing only two pounds and measuring but six by 4.5 by one inches in size, the tiny unit can be mounted directly to a camera head! The unit, also frequency agile, is capable of operating on 13 channels. It's called the Mini-2^R. There are two versions: 200mw and 1 watt. When equipped with an omni transmitting antenna and a low gain receiver, range is from 500 to 1000 feet at 200mw out and up to five miles with one watt and high gain receiving antennas. Thomson-CSF expects that multipath will not be a serious problem.

continued on page 88

We've shown you our Domsat video receiver. Now take a look at the Intelsat version.

Pushbutton tuned synthesizer provides 0.25 MHz intervals in 3.7-4.2 GHz band. LED readout indicates actual receive frequency.

Video level adjustment allows adjustment at the final video output by at least ± 3 dB.

Optional video threshold extension demodulator replaces standard demodulator for impulse free reception at up to 3 dB lower carrier to noise ratio.

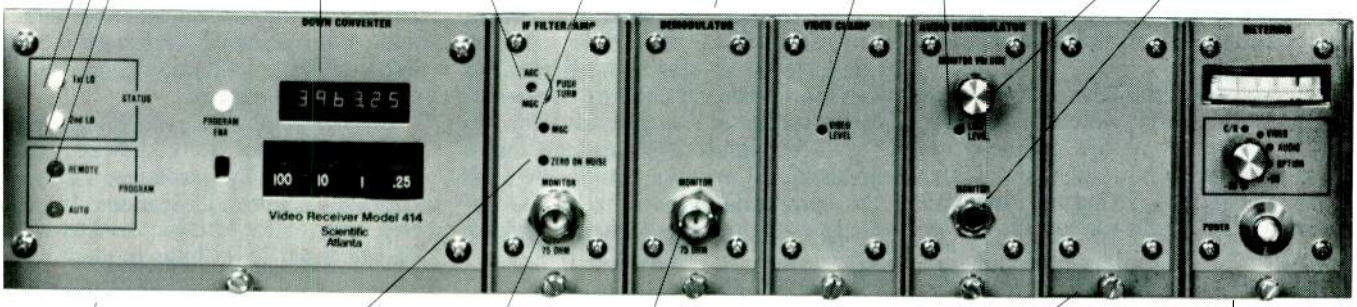
Phone jack output allows monitoring audio using conventional 8Ω headphones. Volume is adjustable using volume control.

LED's indicate status of local oscillators and frequency selection mode (local or remote).

Automatic (AGC)/ Manual (MGC) Gain control switch.

Manual gain adjustment range of 40 dB.

Line level adjusts final audio output. Adjustment range is 0 to +10 dBm at test tone frequency.



Zero-on-noise control zeros the C/N meter on noise (in AGC position) allowing accurate C/N indications on the meter.

Baseband monitor of composite signal entering the video clamp and audio demodulator(s).

Metering Module provides indication of voltages, output levels and C/N ratio. An optional combination metering/alarm module provides a contact closure if the receiver fails.

All modules, including Downconverter, are front panel plug-in.

IF monitor provides an isolated output of the signal entering the Demodulator. This can be used for spectrum analyzer monitoring or C/N measurements using a power meter.

Additional slot intended for future expansion requiring a subcarrier Audio Demodulator or a SSB-AM Cue Demodulator. The mainframe is wired to accept either unit.

*3½ inches high, 19" wide, 21¼" deep (8.9 x 48.3 x 54 cm)

All this is the Model 414B. A new generation receiver from Scientific-Atlanta. We recognized the need for a modular, compact 3.7-4.2 GHz unit coming with a full complement of quality features yet with an economical price. And we made it in two versions.

The 414A for video receive only of domestic communication satellites. And 414B to meet all Intelsat requirements. Both can easily be integrated into single channel installations or complex systems with redundancy switching.

For complete information, call M.L. Hudspeth at (404) 449-2000. Or write us.

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The NEC 40 GHz system offers an alternative to seven and thirteen GHz microwave systems which may get hashy as a result of too much traffic. NEC says 40 GHz is far enough removed from conventional relay transmission to reject multi-directional RF intrusions. The result is studio quality video and audio signal.

The standard horn of the NEC system supplies 40 dB of gain and will cover a range of approximately 0.7 miles. By adding optional lens horns or parabolic antennas and precise alignment, the range can be increased to 10 miles. Polarization is changed with one touch. *BM/E* understands 40 GHz is under consideration as an authorized frequency for this use.

A variety of extension ladders, telescoping lifts, etc., including hydraulic and new electric types were shown by Van Ladder. One new unit which would raise 30 feet collapsed to only 18 inches high for minimum clearance and drag while on the road. For EFP jobs, or advance-scheduled news assignments where road mobility isn't necessary, Van Ladder showed a ladder lift that could be mounted on a golf-cart type vehicle. This system collapsed so that it could fit inside a standard van or on a pickup truck. (With a bucket replacing the antenna, this cart is also useful inside a studio.)

A company brand new to NAB was the High-Lite Corp., which, as you can easily guess, is in the business of mounting lights on masts, and quickly and pneumatically raising and lowering them. After selling a van installation to WXIA-TV, Atlanta (antenna by Nurad, pan and tilt by Quick-Set), High-Lite decided to show the broadcasting fraternity what it could do. The company uses dual masts in its designs.

As mentioned, ENG microwave systems were also shown by the customizers and packagers. We've already described the microwave mini-cam sedan made by ENG Manufacturing for Microwave Associates. (Both ENG Manufacturing and M-A will sell this system.) But ENG Manufacturing is also extensively involved in larger vans and portable carts that can be transported in such vans. An ENG van with numerous built-ins was on display. Wolf Coach was also an exhibitor of ENG (and EFP) vehicles. It promoted the "ENG Mini Module," a complete self-contained work space made out of riveted aluminum (with lots of built-ins) that can be bolted onto a truck chassis. The final vehicle is no wider than a van (wheel base), but you get another 6½ inches width working space. The module will outlast several trucks, said Wolf. A changeover can be made in two days.

An interesting ENG-related item was the Video Source Identifier Model 9200 shown by Dynasciences. This unit allows mobile units in the field to be identified to the base station location as required by FCC regulation 74.682. The identification is done by inserting a row of characters in the vertical interval of the mobile unit's video signal.

For more information circle bold faced numbers on Reader Service Card: Microwave Associates ENG sedan, **297,** 13 GHz FA, **298,** 770Mhz, **299;** Tayburn TBM-100, **300;** Farinon FV 43-02, **301;** Thomson-CSF 2 GHz, **302;** NEC 40 GHz, **303;** Van Ladder systems, **304;** High Lite masts, **305;** ENG Mfg. vans, **306;** Wolf Coach mobiles, **307;** Dynascience 9200, **308.**

TBCs, noise reducers, and image enhancers

The predicted rapid price decline of digital time base correctors did not materialize. Instead, time base correctors have been given more power to elevate them to the level of field or frame synchronizers. Broadcasters looking for a price reduction on time base correctors will have to turn to the new breed of charge coupled device (CCD) based machines. Edutron, a company that had to exhibit its wares in a hotel suite in Washington last year because of tight space on the three exhibit floors, got a booth this year and turned out a brand new CCD TBC, the ccd-1h. Though not up to on-air standards, this $2995 TBC is suitable to dubbing operations or for use in editing systems. The design is straightforward enough that a nontechnical operator can handle it. A 1H correction window tracks accurately enough to handle most time base errors, and its differential phase and gain figures are excellent.

Another CCD time base corrector was shown by Microtime. This unit, the Model 1600, had been previously shown but is now a full broadcast quality device. This $9995 device weighs just 30 lbs. and includes a four line instantaneous correction range governed by Microtime's Auto-Trac II™ which automatically centers the TBC-VTR combination into the center of the 1600 window over a ± 6-H line range. This assures that vertical blanking is in accordance with FCC requirements. The 1600 is available with Image-Ex, Microtime's noise reducer/image enhancer option.

TeleMation entered noise reduced field

Microtime's Model 2020 TBC was shown with a new wider window. According to Microtime, many factors have lead to increased FCC citations to stations for extra wide V-blanking. The new ± 12 line correction range of the 2020 together with its Auto-Trac feature should eliminate this problem.

Ampex brought out a new TBC, the TBC-2, which is designed to work with all non-segmented helical VTRs as well as with the VPR series of Ampex 1-in. helical machines. The new TBC has a 10-line correction window and maintains the combined "averaging and line-by-line correction technique" developed for the TBC-1. This means that when the 10-line window is overloaded, the TBC-2 automatically shifts from a line-by-line approach to the averaging technique. Ampex refers to this feature as Dynamic Correction.

When used with the VPR series VTRs, the TBC-2 makes possible continuous slow motion and picture shuttle. Color pictures can be maintained at 10 times normal speed in either direction. A universal VTR interface is built into the TBC so that true "single wire" operation is achieved.

Several companies, including NEC, MCI, CVS, and Sony showed TBCs they had formally introduced last year with only slight modifications. In general, the quality of these devices were up and some slight bugs in them have been ironed out. For many manufacturers, this was not the year of the "new" TBC but rather the year of the more "versatile" TBC.

Digital Video Systems is one company that is taking the convergence of broadcast technology and computer technology to heart. No sooner does one neatly categorize various pieces of equipment than John Lowry, president of DVS, comes along with his Digital Processing System, DPS-1.

DVS is taking an approach common to the computer business. The broadcaster makes an initial purchase of a "mainframe." The mainframe costs $9600 and consists of standard modules: the input analog interface, the digital "proc amp;" the output analog interface, the output sync generator, and the microprocessor control system. The power supply is also a plug-in module.

Once equipped with this basic mainframe in its cabinet, the creation of a low cost TBC, typical TBC, field TBC,

continued on page 90

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A good switcher can help you make those crisp moves and subtle effects that lift an average production right out of the ordinary. And we make a line of production switchers that pack top performance in four affordable price ranges.

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full frame TBC, field store synchronizer or digital special effects package involves only the addition of selected PC boards and memory options. For instance, the addition of an input buffer, 16 line memory and I/P sync generator creates a low cost ($12,500) TBC, while a larger 256 line memory, a different I/P sync generator and a test generator, gives the user a $17400 field store synchronizer.

Lowry is very optimistic that this concept will hold for the forseeable future. His optimism is based on the development of the TRW monolithic video A/D converter (TDC1007J) which is an A/D converter on a single chip that will cost just $485 as compared to the much larger A/D converters of present that cost between $1400 and $1800. This, Lowry believes, will not only improve the pricing of the devices but provide room on the mainframe for additional boards for other functions. Moreover, his boards are designed so that, though they currently fit vertically into the cabinet, more boards can be placed in the "box" by laying them out horizontally.

Noise reducers were another hot topic at NAB as several companies entered the field for the first time. Though many of the companies had offered noise reduction and image enhancement as integral parts of total systems, it was the standalone noise reducer that took off this year. MCI introduced the Quantel DIC 350, TeleMation the TDF-1 Digital Noise Filter, CVS showed the CVS310 Image Enhancer/Noise Reducer, and NEC showed the TNR-15A Television Noise Reducer in several configurations.

Thomson-CSF, which last year brought out the first standalone digital noise reducer, the DNR-9000, kept their promise and made the unit available in a frame synchronizer package or image enhancer/color corrector configuration. The image enhancer/color corrector features are on two new plug-in boards. These new features are operated either from the control panel or can be remoted. The enhancer offers combined H and crispening, vertical and horizontal enhancement, dynamic black or white detail clipping selectable in or out of system operation and luminace/chrominance timing. The color corrector will provide instant painting without adjustment; its colorimetry is consistent for outdoor events and it can be used with telecines, VTRs, or cameras as well as other color sources. The frame synchronizer will be discussed in another section of this report.

The CVS 310 Image Enhancer/Noise Reducer is designed for standalone use with any analog or digital TBC or other video source. The noise reducer and enhancer features can operate either simultaneously or independently. In the reducer mode, the CVS 310 reduces luminance and chrominance noise by 6 dB and chroma-to-luminance crosstalk by 20 dB. It also corrects chroma/luma delay errors up to +350 ns and minimizes fine grain noise, streaking and moire.

The enhancement mode of the CVS 310 provides adjustable enhancement in both the vertical and horizontal detail range. Automatic enhancement limiting automatically adjusts the amount of detail generated to match the amount preselected by the front panel control. The unit is priced at $5995.

TeleMation's TDF-1 Digital Noise Filter is another high-powered noise reducer for almost any video source, including microwave and satellite links. Fully equipped, the TDF-1 will cost about $23,900. It will provide up to 18 dB broadband noise reduction. The TDF-1 digitizes each incoming frame, using a 4 fsc sampling frequency. The resulting 477,750 picture elements are stored in CCD memory. A motion detector compares these stored elements with the corresponding elements of the next frame and determines the amplitude of video level change. Automatically, the unit adjusts itself for high noise on still pictures and lowers the amount of noise reduction as scene motion increases in order to avoid lag. The adjustment is controlled by a PROM that can be custom programmed for each customer. The unit is supplied with four standard PROMs, each corresponding to one of the filter switches on the front panel. After evaluating his program material, the user can select the "formula" or combination of filters which works best. Output of the device always meets the proposed EIA RS-170A specification.

NEC's new noise reducer, TNR-15, includes many of the noise reduction features mentioned above and includes an auto threshold control which automatically selects the operating point most suitable for the input video. An Auto Mode feature automatically selects the operating point most suitable for the input video source and can pass a live signal as well. Signal-to-noise ratios can be chosen at 6, 9, 12, or 15 dB by dialing the setting. The TNR-15 is available in several configurations from studio to field portable, to compensate for poor lighting or other degradation commonly found in the field.

Image Plus, which was reported on by *BM/E* last year although it was shown in developmental form in the Microtime suite, made it to the booth this year as a fully developed product. An analog device, the Image Plus provides luminance and chrominance reduction of 6 to 12 dB and allows more than one pass through the unit without adversely affecting the picture. Enhancement is provided in both the horizontal and vertical planes. The front panel provides controls for a full proc amp as well as enhancement and noise threshold adjustments which are pre-set or adjustable. A switch allows the user to select his frequency response to match signals from U-type VTRs or full bandwidth direct color. This unit is priced at $6995 as a standalone.

Another noise reducer using CCD memory is the new DIC 350 from Quantel, shown in the MCI exhibit. Although noise reduction is the primary purpose of this new digital video device, it also includes digital image enhancement, chrominance-to-luminance delay correction, chroma gain adjustment, and horizontal/vertical aperture correction. The DIC 350 measures noise automatically and applies the optimum amount of noise reduction feasible without causing the introduction of artifacts. Its adaptive nature makes it ideally suited for complete standalone operation, perhaps permanently placed in the transmission chain. Its small size, just 3.5 inches high, makes it equally well suited to mobile operations.

For more information circle bold faced numbers on Reader Service Card: Edutron 1H, **309;** Microtime 1600, Image Plus, **310;** Ampex TBC-2, **311;** DVS DPS-1, **312;** MCI DIC350, **313;** Telemation TDF1, **314;** CVS 310, **315;** NEC TNR-15A, **316;** Thomson-CSF DNR-9000, **317.**

John Lowry holding the $485 A/D converter which is lowering prices of digital devices

Frame and field synchronizers

Frame and field synchronizers at NAB were central figures in two dramatic developments. First, in contrast to the area of TBCs, dramatic price reductions were the rule in frame and field synchronizers. NEC dropped the price of its FS-15 by some $7000, ADDA Corp. brought out its VW-1 Frame Synchronizer for under $20,000, and Digital Video Systems showed its DPS-1 Field Store Synchronizer for less than $18,000.

The second dramatic application of frame store and field store technology

continued on page 92

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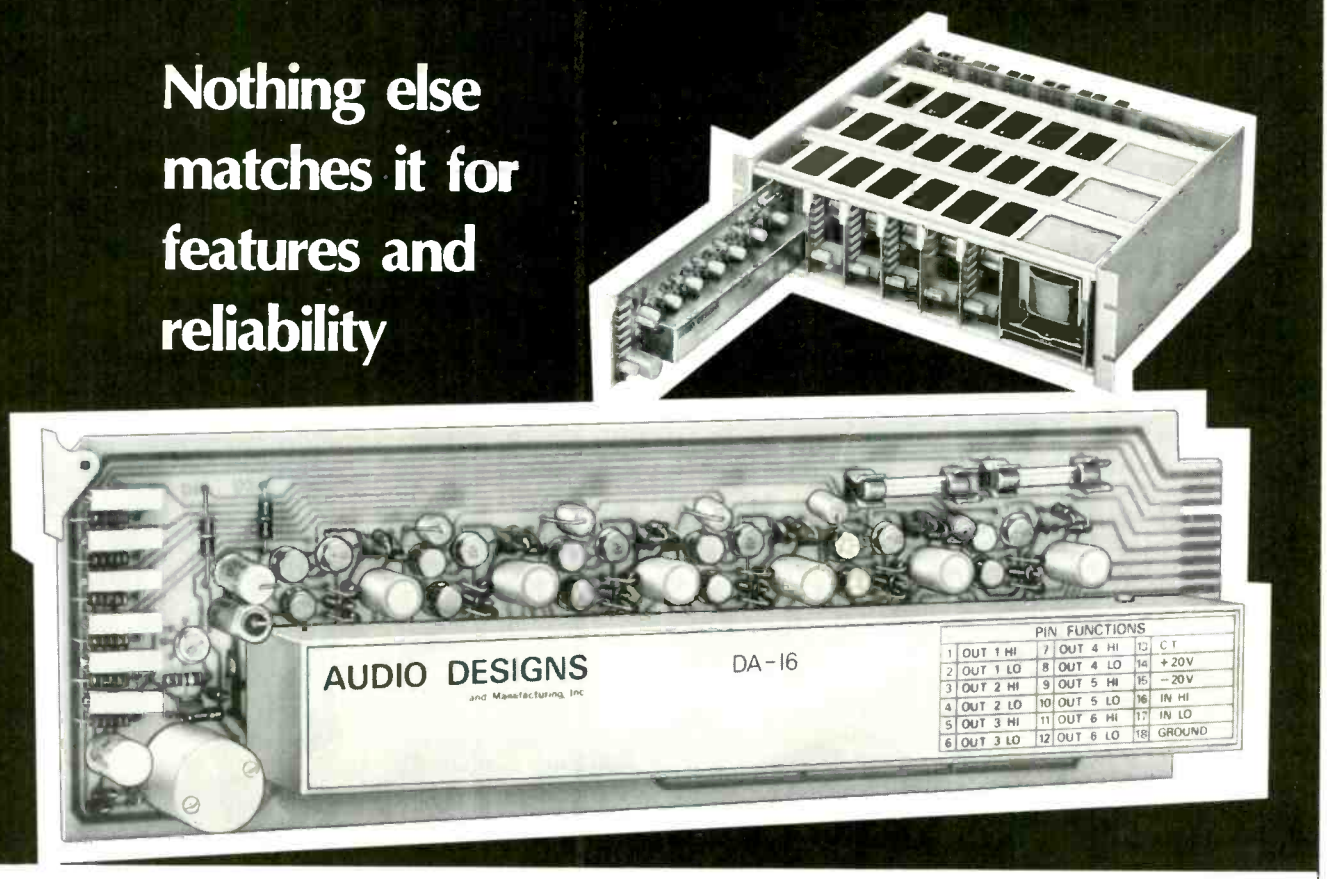

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was in the area of special effects. Though several of the frame store synchronizers mentioned here are available as standalone effects packages, we will discuss their special effects capabilities in the context of production switchers.

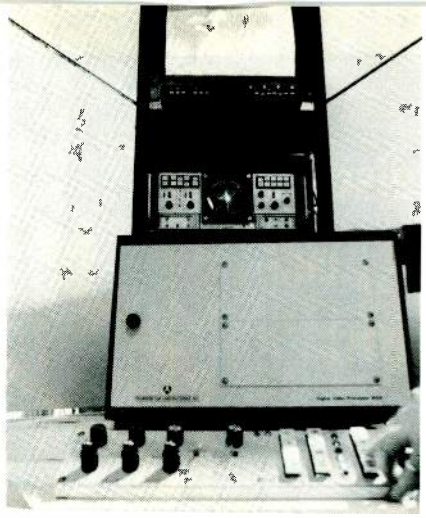
The ADDA Corp. VW-1 and the DVS DPS-1 are two responses to the demand for synchronizers that do little but synchronize. ADDA said that it did an extensive survey of stations asking them what they wanted in a frame synchronizer. By the time the figures were in, said ADDA, it was apparent that many stations could live without "the bells and whistles." They wanted a frame synchronizer primarily for its ability to synchronize remote ENG feeds. Thus, ADDA designed the VW-1 to perform just two essential functions — frame synchronization and time base correction for heterodyne color U-type VTRs with a 4 fsc sampling rate.

The DVS DPS-1 is again an outgrowth of the DVS Mainframe concept. DVS economized by using 16K RAM chips, which are a little slow for their intended computer use but can be organized for efficient use in the field store at about half the cost of the faster chip. Again, the main function of the DPS-1 Field Store Synchronizer is to perform necessary synchronization jobs. Even in the worst cases, according to John Lowry, a "hot switch would result in no more than a 1H error," and vertical blanking is always correct while VITs and VIRs are treated separately.

The NEC FS-15, which was introduced last year and is the foundation of the GVG DVE package, showed off some of its own capabilities. Another addition to the system, the TVS 751 (TVS 754 for black and white), can send and receive color pictures in minutes over telco lines. This is a promising outgrowth of frame store technology which permits a picture to be read into memory at normal 30 fps rate and read out at any rate useful to the transmission system.

The new DVC-151 option for the NEC FS-15 is capable of compressing non-synchronous video input to one-quarter normal size and positioning it anywhere within the raster with the use of a joystick. The compressed picture retains all the information of the input video with a 3 dB gain in the signal to noise ratio.

The DPE-5000 from MCI was shown to only a few broadcasters in the MCI suite and not officially introduced, but its superb digital effects capabilities and its early introduction into ABC and CBS operations make it seem like a



Thomson-CSF noise reducer/frame synchronizer

product that has been with us for some time. Since its major function is its production effects, we'll discuss it later with production switchers and other effects devices.

RCA's TFS-121 displayed extra prowess this year. New features include a picture freeze accessory activated by a button which can be made to pulse automatically by adjusting a knob. The adjustable pulsing rate produces a "real time slow-motion" effect which can be adjusted to the beat of background music.

Another TFS-121 feature, new this year, is the "quad freeze" which enables the unit to display four compressed (¼ size) frozen pictures in any of the four raster quadrants. Additional effects are made possible due to the feature's flexibility.

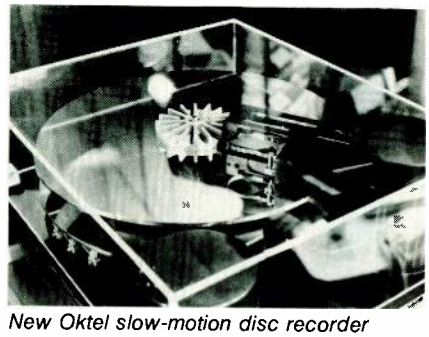
With the Digital Noise Reducer as a foundation, Thomson-CSF stepped into the frame synchronizer field. One of its major features is a built-in four by one switcher for convenient source selection. Any one of four incoming non-synchronous sources can be assigned to the frame synchronization features of this new device, presenting the source to a switcher as a synchronous feed. This feature is in addition to the noise reduction in the basic device. In a sense, this is another example of the "mainframe approach" profferred by DVS, in which an elemental device takes on several functions with the addition of new PC boards.

Still stores and slow motion devices

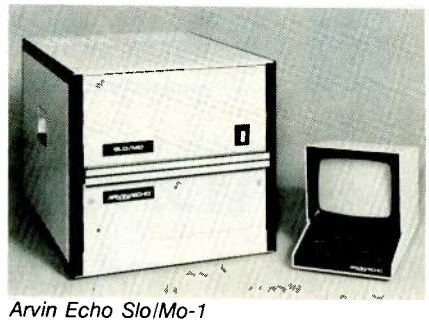
Still storage and slow motion continued to develop this year, with new features and new companies entering the marketplace. There were no major technical advances in either digital or the analog systems, though Eigen Video did go to a component signal method of storing the video in their slow motion disc recorder.

This new signal storage is called Chroma III. It features 46 dB signal-to-noise in the luminace channel and 43 dB signal-to-noise in the chrominance channel. Differential phase and gain of three degrees and three percent respectively mark a substantial improvement for color slow motion. The new encoding system is available in both the 20 second slow motion and 10 second slow motion versions of the Eigen disc recorder. With the new "J" control feature that permits fast cueing and slide show capability, the units are now priced at $35,000 for the 20-second version and $25,000, for the 10-second version.

A number of new products and developments were highlighted at the



New Oktel slow-motion disc recorder



Arvin Echo Slo/Mo-1

Arvin/Echo exhibit. The company announced a deal whereby RCA will market the Slo/Mo-1 Motion Recorder as part of the RCA System Package. Slo/Mo-1, which was to be shown last year, was eventually introduced at the Fall SMPTE Conference in San Francisco. Its debut at NAB drew good attention from broadcasters interested in an under-$50,000 slow motion device. The picture was very steady, even when the machine was demonstrated on a rotating and wobbling table.

The newest machine at the show came from a company new to the broadcast market, Oktel. The Oktel BDR-400 Slow Motion Broadcast Disc Recorder includes a CCD time base corrector and uses rigid disc analog recording technique. The slow motion unit is available on a single channel unit with 30 second recording capacity for $36,000 or with a dual channel option for an additional $2000. The option also has a "save" feature to permit retention of one segment while another is being recorded.

Oktel also showed the BDR300 Slide File Recorder, which has a 1200 frame

continued on page 94

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storage capacity. The electronics of the BDR300 is similar to the slow motion recorder, though configured for slide storage. The stored frames have full vertical resolution, and the unit features a Preset/Reset address control which will move the head to any track with an access time of 2.6 seconds maximum. Two buffer channels are available for program continuity.

Ampex showed its new ESS-2 Digital Video Production System. ESS-2, which was first seen at SMPTE's mid-winter conference in Atlanta this past February, is an impressive advance over the earlier ESS-1. Not only has the price dropped to $121,500 for the basic two disc drive system, but many new features have been added. In addition to its massive storage capacity (79,772 slides on two drive, with 2442 on line at any time) it now features slow motion recording and playback. Eighty-one seconds of real time video can be recorded and played back at any rate from freeze to real time or faster. Automatic sequencing is another feature of the unit. ESS-2 is available in one-, two-, or three-disc drive configurations.

ADDA Corp., which made news with its under-$20,000 frame synchronizer, announced the sale of a third ESP system to GTE Labs. Though the ESP system is essentially unchanged since the introduction of the ESP-200, 300, and 750 models in the autumn of 1977, the company has altered its price structure. The basic ESP-100 system with two disc drives and an on-line frame capacity of 200 frames has increased in price to $63,800. The ESP-200, with 400 frame capacity, is now down from $82,000 to $78,000, and the ESP-750 with a 1500 frame capacity is down from $120,000 to $103,000. There are two additional models of ESP with storage of 2,250 frames and 3,000 frames.

Arvin/Echo showed a new setup for its still storage system, the SS-2 Slide Station. The SS-2 incorporates the EFS-1A Video Discassette Recorder/Reproducer with video switching, time base correction and remote control. The new system enables the operator to have on-line access to 400 stored stills with preview capability. Another addition to the Arvin/Echo product line is the DDS Dual Disc System, which allows the operator to use the keyboard of a character generator to control two EFS-1A units. This means that one operator can control both visual and graphic operations at the same time.

Another Ampex introduction in this line was the demonstration of its new SMC-80 Slow Motion Controller for use with its VPR 1-in. VTR series. The system is configured similarly to the popular HS-100 system used with quad recorders. It features a 60 second clock display, normal playback, variable speed slow motion (either ½ speed or 1/5 speed), freeze frame, variable shuttle, auto search to cue, and reverse jog. The SMC-80 provides full remote control of the VPR recorders.

For more information circle bold faced number on Reader Service Card: *Frame Syncs:* NEC FS-15, **318;** ADDA VW-1, **319;** DVS DPS-1, **320;** MCI DPE-5000, **321;** RCA TFS-121, **322;** Thomson-CSF 9000 Frame Sync, **323.** *Slo-Mo/Still Stores:* Eigne Chroma III, **324;** Arvin/Echo Slo/Mo 1, **325,** SS-2, **326;** Ampex SMC-80, **327,** ESS-2, **328;** Oktel BDR-400, **329,** BDR-300, **330;** ADDA ESP, **331.**

Production switchers and special effects

This year's NAB produced chapter two in the saga of the "super switcher." In general, the large production switchers are getting more intelligent and offering far greater effects capabilities than ever before.

Digital frame synchronizers and other digital video applications are responsible in no small measure for this growth in effects power. Last year The Grass Valley Group garnered enormous attention from the broadcasters on the exhibit hall floor each time they put their Digital Video Effects (DVE) package through its paces. This year, crowds gathered in a number of booths to watch the phantasmagoria created by digital effects. The Grass Valley Group's DVE was joined this time by Vital Industries truly original "Squeezoom" system, and by CDL, using the Quantel DPE-5000 with its CD-480 production switcher.

Duca Richardson, American Data, and Dytek used the Quantel DFS-3100 framestore synchronizer to achieve somewhat less dramatic, though still spectacular, digital effects.

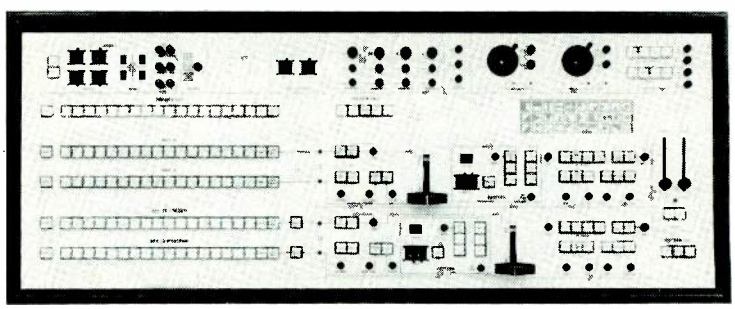
According to a spokesman for Quantel, the wide application of their synchronizers confirmed the simplicity of interface that they claimed for their product last year. In fact, at the MCI booth where both the DFS-3100 and DPE-5000 were displayed, the 5000 was interfaced witha GVG-1600 production switcher. The interface, said Bill Kesser, MCI's president, was a simple two wire hookup that took very little time to achieve.

The Vital "Squeezoom" had some people shaking their heads in amazement. Not only was the machine handling multiple (four) non-synchronous inputs simultaneously, but it was doing it without using four separate synchronizers as some people had suggested. Instead, by using a series of memory buffers, incoming video and its address are stored separately before being read into the main memory. This means that this buffered video can be readdressed (· assigned a new address when being read into the main memory; thus all four sources can be displayed in the same raster simultaneously, as a quad split or in some other combination.

Vital's presentation included compression of the video, expansion, numerous combinations and permutations of basic patterns, auto tracking of chroma key, freeze on any one or all four sources, and many other effects. To demonstrate the programmable nature of the effects software, Vital designed one effect especially for Las Vegas. Using the four non-synchronous sources, the pictures were compressed out of frame to one-quarter size and then dropped into the middle of the monitor's raster with a momentary jitter effect reminiscent of hitting the jackpot on a one-arm bandit.

The full four channel "Squeezoom" is available modularly as a standalone. The basic "Squeezoom" includes all effects and one video channel; the next three channels are purchased separately. The total system could ultimately cost about $350,000. Vital's president, Nubar Donoyan, sees "Squeezoom" as an original "teleproduction tool, conceived of and designed exclusively for the needs of television."

Vital also showed the system in conjunction with PSAS (Production Switching Automation System). This is a method of storing up to 35 sequences, each consisting of as many as 25 events. The VX-114 switcher, under the control of PSAS, will go through all sequences automatically. Events and sequences are stored on floppy disc memory.



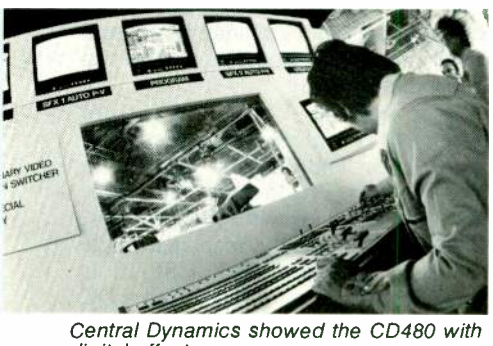
The American Data 558-4 was shown with the DFS-3100 for digital special effects

The continued expansion in number and complexity of effects prompted The Grass Valley Group to develop its E-MEM system. E-MEM is a microprocessor-based system which "learns" complex switcher setups and transitions. The operator uses the switcher normally and is never locked out by the automatic function. An effect is set up and then a "learn effect" button is pressed. E-MEM then learns all crosspoint locations and the positions of other operations controls. This information is stored in a single event register of E-MEM.

Since there is no data entry required from keyboard or other type terminal, "learn" effectively describes what E-MEM does. To recall the complex effect for later use, the operator simply presses the register button, number one. There are 11 registers for storing such effects, and 11 more are available through the use of a "shift key."

Another learn mode for E-MEM governs dynamic transitions such as a wipe rate. A thumbwheel switch is used to describe the rate in numbers of frames. To register the length of the transition, a "Learn Rate" key is punched. Another "learn mode" is "Learn Transition." This mode learns the last manually executed transition and stores it as a single event. An "Effects Dissolve" feature is used for extremely complex functions such as wiping a bordered box out of one corner to a full screen or changing size, position, aspect, border width, and border color. With E-MEM, the beginning of the sequence is stored in one register and the end positions are stored in another. Then the operator uses the "Effects Dissolve" key to cause the switcher to move through the contents of both registers smoothly. Grass Valley has great expectations for E-MEM and will soon be offering an E-Card option on which register contents can be stored for repeated use, such as a standard news program opening. Other plans call for E-MEM to be able to learn functions of peripherals, such as a character generator, and to eventually become a major part of an editing system.

In addition to Central Dynamic's demonstration of the Quantel DPE-5000 interfaced with the CD-480 switcher for digital special effects, CDL added new effects to its SFX group. This year CDL has added both soft and color effects to its exclusive matrix wipe technique. This "extended effects" package can be added to any CDL-480 switcher. More than 50 of the switchers have been sold world-wide. CDL has also placed two pattern generators under the control of a single function bar, which means that in combination with the other SFX features, it would be possible to have four individually manipulated pictures within the same raster.



Central Dynamics showed the CD480 with digital effects

The SFX concept in switcher design has been undergoing continual development ever since its introduction several years ago. The modular approach whereby new features are frequently added without obsoleting previous features seems to prove out the viability of the SFX concept. The basic SFX module with two background buses, one foreground bus and a utility bus permits "four level" effects to be controlled on one mix/effects bus through the use of a single lever. The Auto Preview feature makes things much simpler by automatically showing the effect on preview before it is aired.

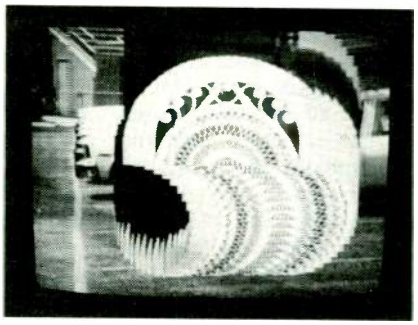
CDL also took the opportunity to announce the beginning of a new service, VideoCel. VideoCel is an electronic animation service located in South Bend, Ind. The process used was created by Computer Creations, Inc. and involves the colorization and computer animation of almost any standard storyboard. All animation is accomplished within the scope of the computer hardware. Only a few key storyboard frames are needed; all subsequent frames are derived by the computer. Once the basic artwork is entered in the computer, all subsequent manipulation is under the control of the artist, aided by the computer.

Duca Richardson showed another model production switcher in its 4000 series. In addition to the 4000's normal features such as three to eight output buses, multi-level video processing and auto transition, this model was interfaced with a Quantel DFS-3100 offering digital effects. Among the effects demonstrated were freeze, compression, full frame positioning nd automatic wipes. The interface was straightforward and did not appear to complicate the operation of the switcher.

Industrial Sciences showed their top of the line production switcher, the ISI-1208. Model 1208 is a complete eight bus switcher, with triple M/E system. Each of the M/Es has mix, wipe, key, mix/key, wipe/key and a fade thru black mode which permits a fade out of video source "A" to pass through black to video source "B." The 1208 is a remarkably powerful switcher for its $50,000 price tag. American Data also showed one of its top of the line production switchers, the 558-4, equipped with the Quantel DFS-3100 for digital special effects. The 558-4 features a Graphics Key manipulator, 2 mix/effects systems, and a flip-flop keyer in addition to the downstream keyer. The model shown, with other standard features, was priced at $44,000 exclusive of the Quantel synchronizer.

Vital's "Squeezoom" with PSAS and VX-114 switcher

The Squeezoom quad split can take four non-synchronous signals



This spiral effect combines V and H expansion with positioning for dynamic impact

Dytek Industries showed the Computer Image Video Controller, which is now a part of Dytek's line. They demonstrated the SL 6000 with a couple of new things. The SL 6000 now has an additional pattern generator and a new auto fade feature. This switcher was another of the large production units interfaced with the DFS-3100 for digital special effects capabilities. Another large switcher in the Dytek booth was the SL3000 computer editing video controller, especially designed for interface with computerized editors although it can operate manually. It was this model that was interfaced with the

new Mach One editing system mentioned elsewhere. Depending on features, the SL3000 will go for $22,000 and up.

Ross Video, Inc. introduced its new 500 MLE series production switcher. The 500 MLE series is available in three models. The new MLE amplifier can manipulate four signal sources including RGB and encoded chroma keys. It has its own downstream keyer and a variety of standard rotary wipe effects patterns with spin and pattern multiplier. A Transition Preview System permits previewing of complicated transitions with the same MLE amplifier that is on air. The MLE 500 can also display four signal sources, each with effects, on the same raster without tying up any switcher bus.

Beaveronics, which was new to NAB last year, brought out its largest production switcher for the show. The Model BI-156 is a 15 input, six output bus switcher. Standard features include two mix/effect units with keying, a joystick positioner, pattern modulation, mix key and wipe key functions, and numerous other effects common to big production units. Optional features include additional chroma keyer, a downstream keyer, a downstream border generator, and quad split.

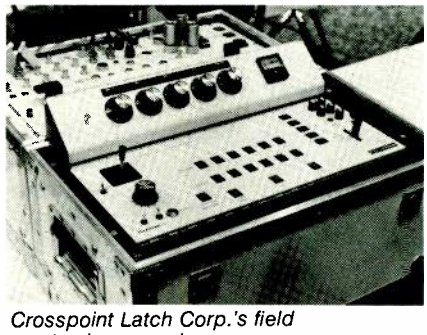
Microtime brought out a new production switcher aid designed to simplify complex source-switcher routing problems. The $15,000 unit is called Zero Studio Delay (ZSD) and was originally developed by Microtime for NBC. ZSD delays the switcher output 1-H less the switcher delay, dropping the picture by one line. The first line of active video is stored digitally for one frame less 1-H and displayed on line 21 or 22 of alternate fields, assuring proper blanking regardless of the number of passes. Switcher delays of one to five microseconds are equalized with an adjustment resolution of 2.25 nanoseconds. The unit contains an advance sync generator plus full proc amp controls, and occupies seven inches of rack space. It is intended for use in-house and for outside pool-feed situations.

For more information circle bold faced numbers on Reader Service Card: GVG DVE/E-MEM, **332;** Vital "Squeezoom"/PSAS, **333;** MCI DFS-3100, **334,** DPE-5000, **335;** CDL CD-480 SFX, **336,** VideoCel, **337;** Duca Richardson 4000, **338;** ISI 1208, **339;** American Data 558-4, **340;** Dytek SL6000, **341,** SL3000, **342;** Ross 500 MLE, **343;** Microtime ZSD, **344;** Beaveronics BI-156, **345.**

Small production switchers

The smaller production switchers shown at NAB took advantage of microprocessor technology to pack in sophisticated functions that often rival those of the larger switchers. The switchers designed for ENG/EFP use are also getting very sophisticated, frequently offering control room functions like waveform monitors, audio mixers, vectorscopes and other devices that make for a control room in a carrying case.

Centro Corp.'s FPS-500 weighs just 80 pounds



Crosspoint Latch Corp.'s field production console

3M's Mincom Division highlighted the incorporation of the Comtec line of video production and routing switchers with the exhibit of the Model 3100 and Model 3300. The 3100 is a three-bus, self-contained 11-input color switcher with 19 different patterns and effects. It also features computer-type momentary pushbutton operation. The 3300 is a five-bus, remote control 11-input switcher. In addition to its 18 patterns, chroma key and digital matrix effects are available as options.

3M's 9000 Video Production Switcher is one of the more powerful small switchers because it incorporates a microprocessor. Its use of the microprocessor has made it possible to simplify the control panel, and a built-in memory permits the prepration and storage of up to eight panel setups for recall. More than 20 effects are selected by a 10 key input bank. Effects can be either hard-switch, soft-switch or border-wipe and, with an optional chroma keyer, wipe behind key, dissolves behind key, and dissolves or cuts to key are possible. The 12-input switcher is priced at $11,900.

Dynasciences showed their ultra compact production switcher, the Model 7400A, which measures just 8¾ inches by 7 inches. The panel is radically different in appearance. Instead of the usual banks of switches and levers, the 7400A uses a numerical keyboard entry approach to provide a four bus switcher with 13 wipe patterns, two mix/effects systems, a mask key and a matte key. Wipes can be either hard or soft, and there is a "spotlight" feature.

All features of the switcher are numerically identified and the appropriate numbers are entered on the touch pad keyboard. Function buttons are pressed to describe the transition desired. The system is priced at $8400.

Another small switcher along more traditional lines was the model 712 from Beaveronics. American Data, ISI, Grass Valley, and CDL all showed their small switchers. CDL has added a new encoded chroma keyer to their VS-14.

Field production systems abounded at the show. In a corner of the CVS booth was the production console from Field Video. This unit, first shown last September in New York at Video Expo, is a microprocessor controlled system offering audio and video mixing, pre-selectable cues, real time clock, tally and intercom. Three monitors, one of which is color, are provided. Cost of the unit is about $18,500. Another powerful field console was seen in the Centro Corp. booth. The FPS-500 Television Field Production System offers just about everything necessary in an 80 lb. package. Most of the features are on plug-in modules, so expansion of the basic unit is simple.

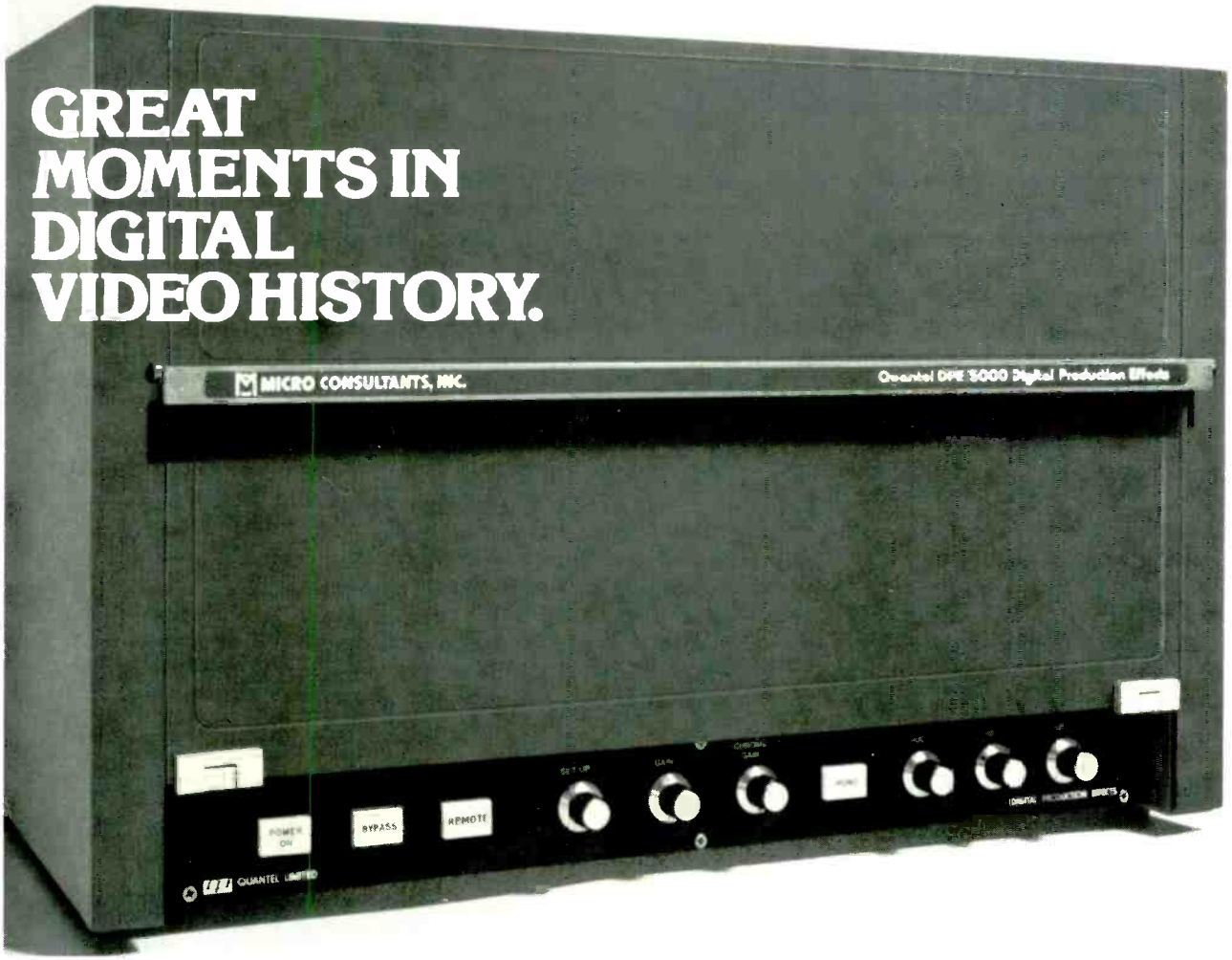
Included in the system, which is priced at $10,000 to $18,000 depending on options, is an integral color sync generator with genlock, pulse and subcarrier distribution amps with phasing and timing adjustments for up to four cameras.

The video switcher features a seven input, three bus design with color background generator, pattern generator, and 10 special effects with hard or soft edges. There is also an optional encoded chroma keyer and a downstream title keyer. Three monochrome monitors for camera preview and a color line/preview monitor are provided. Both a colorbar test generator and waveform monitor provide system set up. Talley and intercom circuitry is also present. The audio portion of the boards is a four input mixer with switchable mic./line levels, and equalization is available. VU meters and audio monitor are included. The entire unit is in a cast aluminum case. The camera connector panel is modular so that any set of connectors needed can be installed quickly.

Other systems "in a box" were shown by Toshiba and Crosspoint Latch Corp. The Toshiba unit is the CSP-10 Sub Production Console, which contains video and audio mixers, monitors, and special effects in a single "suitcase configuration." CSP-10 is designed to work on AC, though a DC battery pack is available. The video

continued on page 99

GREAT MOMENTS IN DIGITAL VIDEO HISTORY.



DIGITAL EFFECTS ARE COMPUTERIZED– WITH OPTICAL QUALITY.

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The DPE 5000. The most advanced device for digital effects ever offered to broadcasters. It brings the world of computers to the world of television. And it does wonderful things to television pictures.

Digitally.

It cleans them up.

It freezes them. Squeezes them. Flips them. Wraps them around.

It positions them. Pushes them. Wipes them. Pans and tilts them.

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It tracks a chroma key area and fits a compressed picture into the slot, automatically maintaining aspect ratio and perspective.

Through the use of a minicomputer and internal microprocessors, the DPE 5000 gives the producer electronic control over the television picture —control that up to now has been available only through the camera.

And it does all this with a quality that is breathtaking—as if it had been done by the camera itself, or on film.

We're bringing the world of computers to the world of television so that you can create your own great moments in digital video history. Get full details on the startling new DPE 5000 from your local Micro Consultants representative. Or get in touch with us directly at P.O. Box 10057, Palo Alto, California 94303, (415) 321-0832.

The digital video people

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The Big Game on Sunday is no ghost story

The image is clear and sharp when it leaves the transmitter. That's the way it should be when it arrives on home TV receivers, too. No triple chins or fuzzy outlines. No ghosts. No snow. No distortions.

Until just now, man-made and natural terrain could distort video signals so that the big plays were haloed with ghosts. Or snowbound by poor indoor antenna performance.

Circularly polarized transmission can change all that, as exhaustive field-testing under FCC authorization has proved. Proved well enough that CP transmission is now FCC-authorized for VHF and UHF broadcast.

Circular polarization brings to TV what FM radio has had for 25 years or more: Signal transmission that rotates more than 55 million times per second between *horizontal* and *vertical* planes.

The result, shown in the field tests, can mean elimination or dramatic reduction in snow and ghosting on home TV sets. In Manhattan's concrete jungle. Over hill and dale. In just about any tough reception area. (And in good ones, too.)

Naturally, we think Jampro's unique spiral CP transmitting antenna design is the premier one. After all, we already have more than 1600 CP FM radio antennas operating around the world. And our half of those year-long FCC-authorized tests demonstrated our ability to deliver all the action in sharp, clear profile to home receivers — no matter what the receiving antenna: rabbit-ears, UHF rings, bow-ties, or outdoor antennas.

Picture quality is a competitive consideration, not just an esthetic one. If your signal isn't picture-perfect throughout your service area, it will be well-worth your time to investigate the Cetec Jampro CP transmitting antennas.

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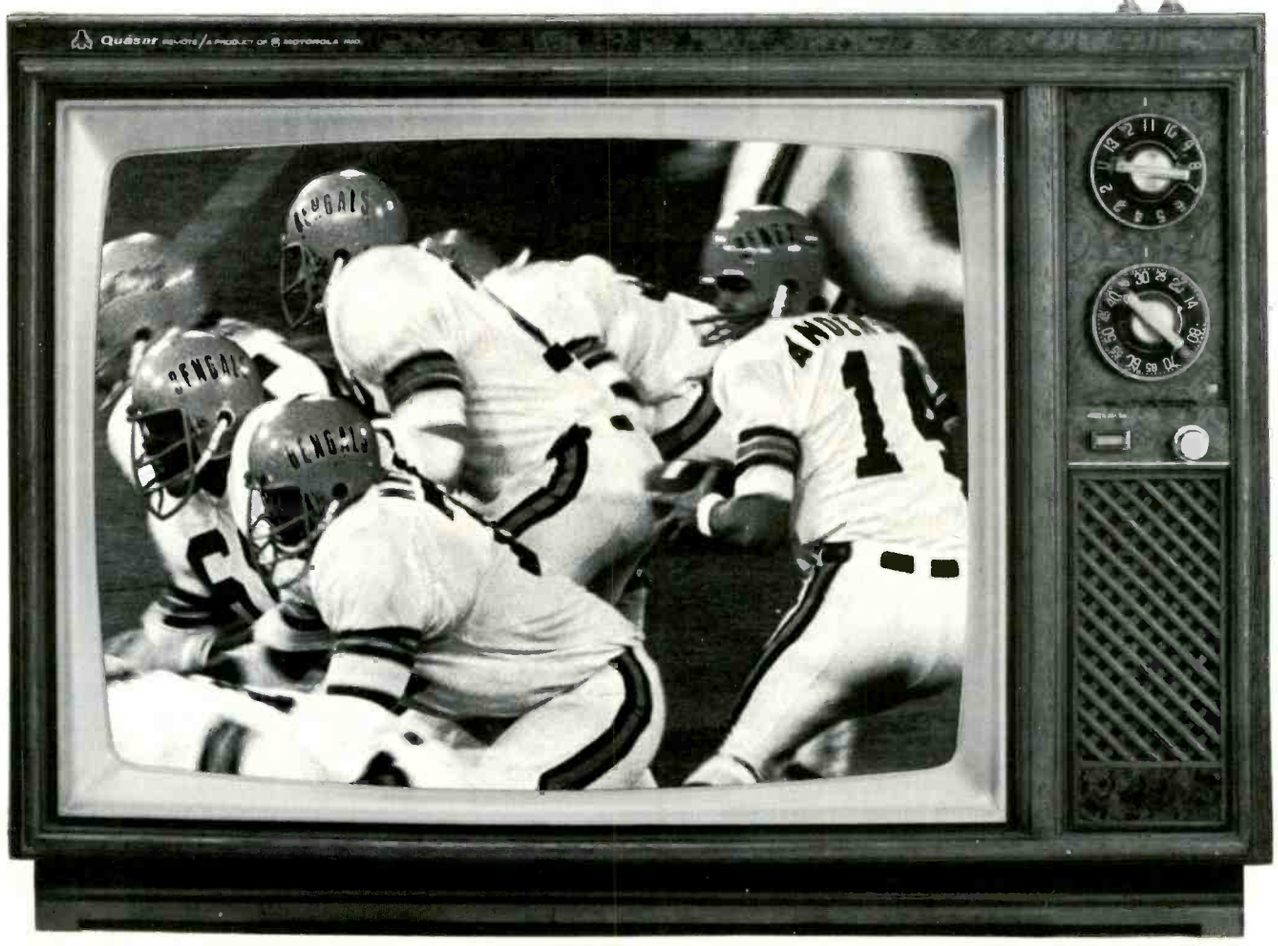


Circle 151 on Reader Service Card

switcher is a three-bus, four input model with two ME amplifiers. The audio portion of the unit has four-channel input with fixed pads and monitoring. An intercom system is integrated. The entire unit weighs about 77 lbs. and is about the size of a small steamer trunk.

Crosspoint Latch's unit is the CLC 6104A. It is a five input switcher offering automatic or manual fades and twelve wipe patterns. Other features include external keying, a mix-wipe or key-wipe, and mixing within a wipe. The audio portion of the unit is a three-input mixer with vu meter. Intercom, sync generator and other options are included. The unit is contained in a fairly small two part trunk that fits together for transporting. It is priced at $9500.

Shintron announced at the show that RCA would be marketing its Model 373-BP Integrated Production Unit Switcher. This unit is a compact professional switcher with effects, keying, waveform monitor, and numerous other necessary production components.

Shintron, which last year gave away a Model 370 production switcher to KDIX-TV in Dickinson, ND, held a drawing this year for its Model 505 Video Typewriter. Other new products from Shintron included a Model 350 encoded chroma keyer and a Model 644 Edit Code Reader which displays the information in the monitor and on LEDs. The 644 will also provide a hardcopy printout.

Listec is distributing the SEG-800 from Image Video Ltd. This $2995 model is a six input switcher with mix/effects, downstream keyer, 12 wipe patterns and built in black and color/mono matte generator. The unit fits into a standard 19-in. rack.

International Communications & Control Corp. announced the addition of several new modification kits for the Grass Valley 1400 series production switchers. New modules add wipe to key functions and soft wipe to key. Several other kits are available to expand the 1400's capabilities.

Master control and technical automation

The big three powers in technical automation, CDL, Vital, and Grass Valley, all showed off aspects of their systems. Not much new was coming from these three since they have entered an era of evolution from their earlier systems. The Grass Valley Group continued with their M200 Series TV Automation System, which they introduced last year. The M200 offers a low-cost modular approach to automation for medium and smaller market stations.

The more surprising story in technical automation this year was the entry of two new competitors. Both American Data and a company new to the national TV market, Centro Corp., showed off very sophisticated automation systems.

American Data jumped into the field with its 3100 Series ACTS system. ACTS is another modular approach that offers numerous control schemes ranging from manual operation of the 3110/3111 Master Control Switcher to complete automatic control of machine switching and event scheduling, and a business computer interface. There are seven basic steps to the full ACTS system. First is the 3110 or 3111 MC switcher which offers 20 or 24 AV inputs with two buses plus five high level audio inputs. Also present are other features that would be expected in a high end master control switcher. The next module is a one-event system with machine pre-roller, digital auto fade system, and a computer interface. From there the system can be expanded to a 32 event controller with CRT display of real time operation. Events are entered manually. The system then expands to 1024 events and picks up a log printer, magnetic recorder and a second interactive terminal. A floppy disk memory for 11K storage can then be added, followed by a sixth step, which provides pull log capability and specialized printouts. The last step is the interface with the traffic computer.

One outstanding feature is the ease of use in the CRT terminal. It is logically organized and provides simple means for editing or override. The characters are large, and colored character headings over each column increase readability.

Centro Corp. showed its CASS (Computer Assisted Switching System) and CATS (Computer Assisted Traffic System). The Centro approach is really one of systems design and software. They will interface their system to any Master Control switcher and do not make the switching hardware themselves. The CASS and CATS computer systems are to a large degree, redundant. In fact, CATS and CASS contain each others' programming on disc, and differ only in purpose and the presence in CASS of two additional microprocessor boards.

CATS can be used either as a standalone or as an interface to a full blown business system. As a standalone, the traffic operator enters a skeleton log of each day's events (longer logs can be entered if desired). New information is entered into the schedule, or the schedule is changed by editing and deletion. Once the log is prepared, it is turned over the CASS,

CASS, from Centro Corp., operates from log on floppy disc

either by physically taking the diskassette memory and placing it in CASS or by a hardwired hookup, if desired.

The schedule will then control the master control switcher in all functions such as machine control, pre-roll, and switching. Interfaces to all operation gear are supplied by Centro, as are printers and other computer peripherals. Each of the two computers possesses software for the other, so that during long running events in master control, some traffic work could be accomplished. This also makes it possible to edit the log right up to the last minute. This redundant software also makes it possible for CATS to take over master control should CASS fail. All that is required is the installation of two boards which can be kept on hand as spares. The approach is designed to let the station proceed with automation as its own pace, adding features whenever necessary. The basic system shown at NAB was priced at $49,000.

For more information circle bold faced numbers on Reader Service Card. *Small Switchers:* 3M 3100, **346;** 3300, **347,** 9000, **348;** Dynasciences 7400A, **349;** Beaveronic 712, **350;** CDL VS-14 Keyer, **351;** Field Video, **352;** Centro FPS-500, **353;** Toshiba CSP-10, **354;** Crosspoint Latch CLC-6104A, **355;** Shintron 373-BP, **356;** Listec SEG-800, **357;** ICC GVG-1400 kit, **358.** *Master Control:* American Data ACTS, **359;** Centro CASS/CATS, **360.**

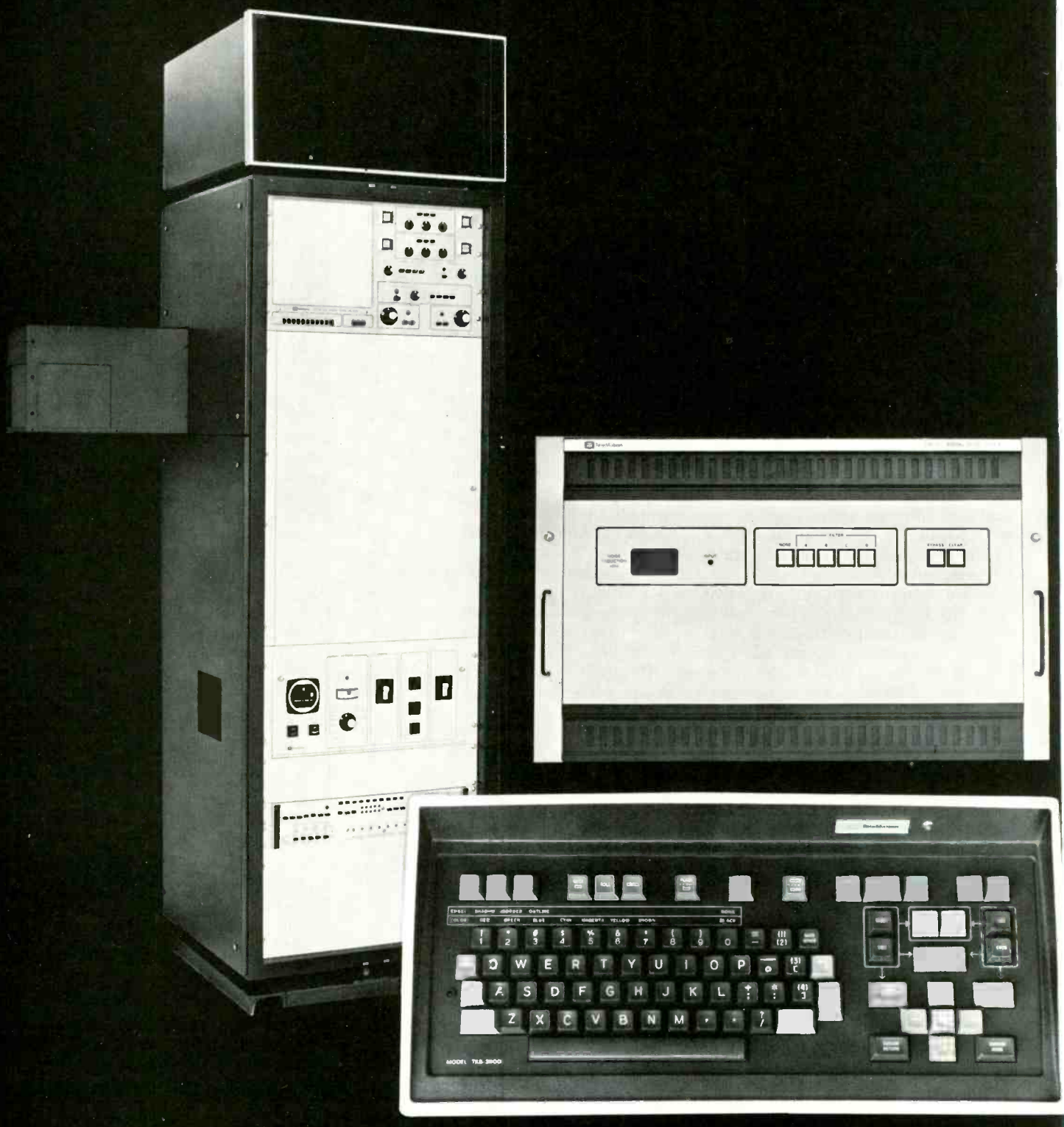
Time code and synchronizing equipment

New time code equipment and equipment for synchronizing audio and video recorders as well as audio/video combinations was abundant.

CMX Systems exhibited three new time code products, a Master Time Code Generator, a new time code reader, the TR3036, and a portable time code reader, the PG-3051. All three units featured low power consuming LED displays. The MG-3094, a master time code generator, includes a microprocessor and has remote and slave capability as well as drop frame and

continued on page 102

New from TeleMation



Introducing a state-of-the-art digital noise filter that costs less.

From input to output, the 8-bit TDF-1 represents an entirely new approach to digital noise reduction. At the input, we've included a full, broadcast-quality processing amplifier that completely regenerates incoming sync pulses. The TDF-1's charge-coupled device (CCD) memory offers the same high performance as RAM systems at a significantly lower cost. We've also increased the video sampling rate from three-times-subcarrier to four-times-subcarrier for greater bandwidth and resolution. And maintenance of the TDF-1 is made simple by a built-in diagnostic system.

A graphics system with off-line archival storage.

Everyone who uses an electronic graphics system has their own artistic requirements. With the new Compositor I™ memory system, each of your clients (or departments) can use the fonts they like and logos they need to create up to 999 graphics on a low-cost, removable cartridge disk. At the end of their taping session, they simply take out the cartridge and put it on the shelf. The next user (such as your news department) can then load another cartridge containing different fonts, logos, and pages and be on line in seconds. And, with the new dual disk system, you can copy directly from one cartridge to another.

What else is new with Compositor I? Fonts! More than 40 fonts are now available, including weather symbols, graph characters, and foreign fonts. And Compositor I's are now in use in PAL countries.

A microprocessor-controlled distribution switcher.

The new TVS/TAS-1000 Distribution Switcher microprocessor option can be programmed to perform salvo switches of multiple crosspoints simultaneously. Eight (or more) different salvos can be loaded into the system's memory and previewed by the operator before the live switch is executed, virtually eliminating the possibility of error. Other new control options include X-Y panels, where the source is selected with one button and the destination with another, and category-number selectors, where the input is selected by a name key (such as "VTR," "Camera," "Studio," etc.) and a number key.

A telecine camera that replaces GE units quickly and easily.

A new optics kit allows the TCF-3000 Broadcast Color Film Camera to replace GE 240 and 240-format cameras without so much as moving a projector or changing a lens. The TCF-3000 also gives you true hands-off color balance and color correction, automatically correcting poor-quality film without disturbing balance or gamma tracking of good film. This long term operational stability is made possible by unique, temperature-compensated sampling and control techniques. The TCF-3000 has several other advantages over competitive units, such as lower noise, more detail in black, and superior color separation. And a fully-remotable six-vector color corrector is available as an option.

For more information about these TeleMation products, circle one of the numbers below or contact:
TeleMation, Inc., P.O. Box 15068, Salt Lake City, Utah 84115. Phone:(801) 972-8000.

TeleMation

Circle 152 on Reader Service Card for TDF-1 literature
Circle 153 on Reader Service Card for Compositor literature
Circle 154 on Reader Service Card for TVS/TAS-1000 literature
Circle 155 on Reader Service Card for TCF-3000 literature

non-drop frame operation. The TR-3036 will decode user bits, in addition to normal reader functions. The portable model operates on either composite video or composite sync.

Ampex showed its EECO line of time code and synchronizing equipment, including an MTG 550 that generates either SMPTE or EBU code. Datametrics offered two new products, a Television Edit Code Generator that weighed in at just 2 lbs., and the new SP 722 SMPTE Time Code Generator/Reader. The miniature edit code generator, Model SP-105 SM, is designed for field use with U-type recorders like the Sony VO3800 and other portables. The SP 722, which sells for $3700, has several PC board plug-in options for user bits, VI time code, and character generator.

International Communication & Control Corp. (ICC) showed a wide range of time code products including readers, generators, and character generators for time code. TRI showed their line of Pro-SUN time code products which allow time code with user bits to be placed on helical recorded tapes in such a way that they can be read in normal playback as well as in still frame.

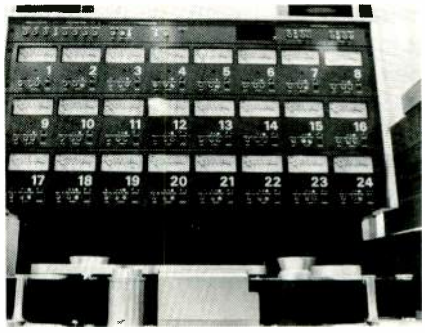
The TCG Mk III portable desktop or waist mounted Time Code Generator shown by Electro & Optical Systems is an extremely small compact model about the size of a common pocket calculator. In fact, the Mk III bears a striking resemblance to the pocket calculator in its keyboard data entry system for user bits and initial time code. The unit sells for $1995, plus another $500 for a factory installed reader option. The Mark II Time Code Series are rack mounted types.

Datatron exhibited numerous time code and editing aids, including the Model 5152 SMPTE reader/jam sync generator, a Model 5260 SMPTE time code reader with user bit decoding, and its partner, the Model 5170 generator with user bits. Datatron also showed a Coincidence Comparator Model 5900, for use with its editing system.

A full line of clock systems, time code readers/generators, and video backtimers were shown by QSI. The VBT-1 Video Backtimer will give accurate back time in a digital stop-watch fashion.

Spectra-Vision displayed ETG/ETD time code readers and generators for use with its editing system. This type of time code provides continuous readout of hours-minutes-seconds-frames at all playback speeds including still frame. Encoders are available for use with field recorders. Sony also brought out a Vertical Interval Time Code Generator/Reader for use with its editing system which reads both standard SMPTE and VITC. The BVG-1000 unit compresses the time code normally associated with the frame into the vertical interval. Glentonix showed the Telcom Research Time Code Centre. The "Centre" combines a generator with reading and calculating features which are fully integrated so that the different functions can "converse." This permits many time code jobs to be done with the one machine, including the repair of poor time code.

BTX-4500 will synchronize any two audio and/or video players



The Studer Revox TLS-2000 will synchronize video machines with audio machines, like the multi-track unit above

Sophisticated sync

Synchronizers reached a new level of sophistication. Ampex showed its MQS 100 microprocessor-based synchronizer. This is another of the EECO synchronizing and time code products distributed by Ampex. The MQS 100 Series will synchronize up to three machines, either video or audio. It has chase features which allow two machines to be slaved to the master and offset adjustments which will keep machines separated by a precise number of frames once you have established the offset desired. BTX Corp. showed its low-cost synchronizer, the Model 4500, which will sync any two audio or video machines. The microprocessor will synchronize any two available sources of SMPTE time code. If additional machines are needed, each slave machine requires its own edit code synchronizer.

Tapes to be synchronized with the BTX 4500 need only to be parked within 30 seconds of one another. The synchronizer will then bring them into alignment. Off-set and other features are available. The 4500 was exhibited as part of the BTX line of time code products, but got a lot of attention from people beginning to explore the new options of audio mix-downs and desirous of doing more complicated work with their audio tracks.

Another new powerful synchronizer came from Studer Revox. The TLS-2000 will interface any multi-track recorder, including video recorders, as long as there is SMPTE time code on one track. The Tape Lock System has a complete remote control panel for machine control and time code display. It also has calculator and offset features with a wide range of audio editing functions. This unit, in combination with the new A800 Multi Track recorder from Studer, should offer a system of the highest quality.

For more information circle bold faced numbers on Reader Service Card: CMX MG-3094, **361,** TR-3036, **362,** PG-3051, **363;** Ampex MTG 550, **364,** Datametrics SP 105 SM, **365,** SP 722, **366;** TRI Pro SUN, **367;** E & O Systems TCG Mark III, **368;** Datatron Model 5152, **369,** 5260, **370,** 5170, **371,** 5900, **372;** QSI VBT-1, **373;** Spectra Vision ETG/ETD, **374;** Sony BVG-1000, **375;** Glentronix Time Code Centre, **376;** BTX 4500, **377;** Studer Revox TLS-2000, **378.**

Character generators: more powerful, more prolific

Another impact of the microprocessor has been the tremendous increase in the number of character generator manufacturers and the increased power of the devices. Several manufacturers this year were offering numerous new features like multiple fonts, colorizing schemes, animation, graphics entry, and other extras that are often software-based. The increasing role of software in these devices is beginning to play havoc with notions of differences in hardware. The machines are looking more and more like each other, and it is not until you actually sit down and watch the machines go through their paces that you begin to see the difference between good software and bad. If programming can be seen as a kind of road map, and different programs can be seen as alternate routes to the same points, it becomes clear that some of those "routes" will be better and simpler than others.

In earlier, simpler days, you could get some idea of the merits of different devices by comparing their specifications and hardware features. Today, however, the broadcaster actually has to see the machine in action, and oper-

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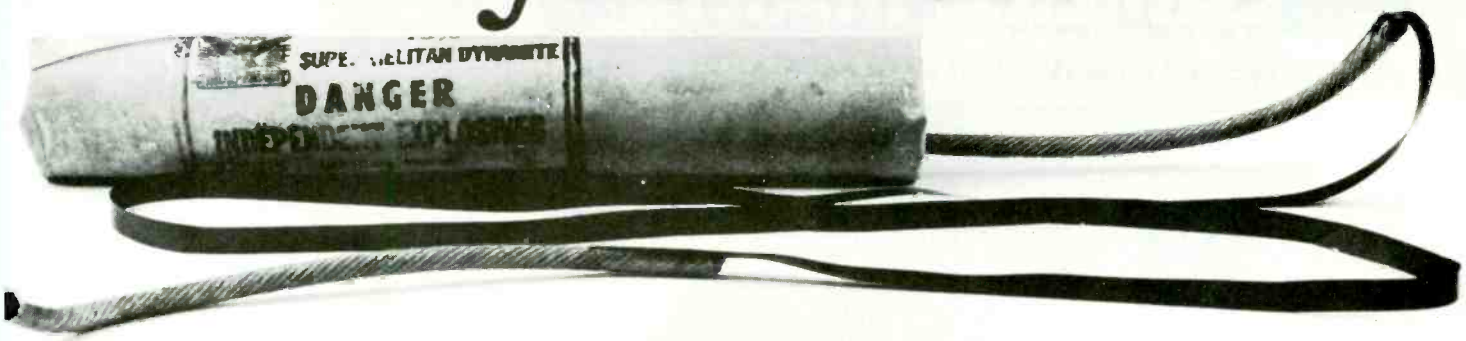
Talk shows can be dynamite!



(The risk is less with our 4 foot fuse.)

A four-function tape cartridge machine: normal cartridge recording and playback, plus network and continuous program delay. And that delay feature provides lots of insurance for little extra cost. Against libel suits, FCC actions, alienated audiences, estranged advertisers. Just insert an erased cartridge. A seven second tape (that's about four feet) for talk shows. Five minutes or longer to record a network program. Our three head, dual playback amplifier design results in no audio compromises. Four functions for little more than the price of two.

No Risk Trial Offer
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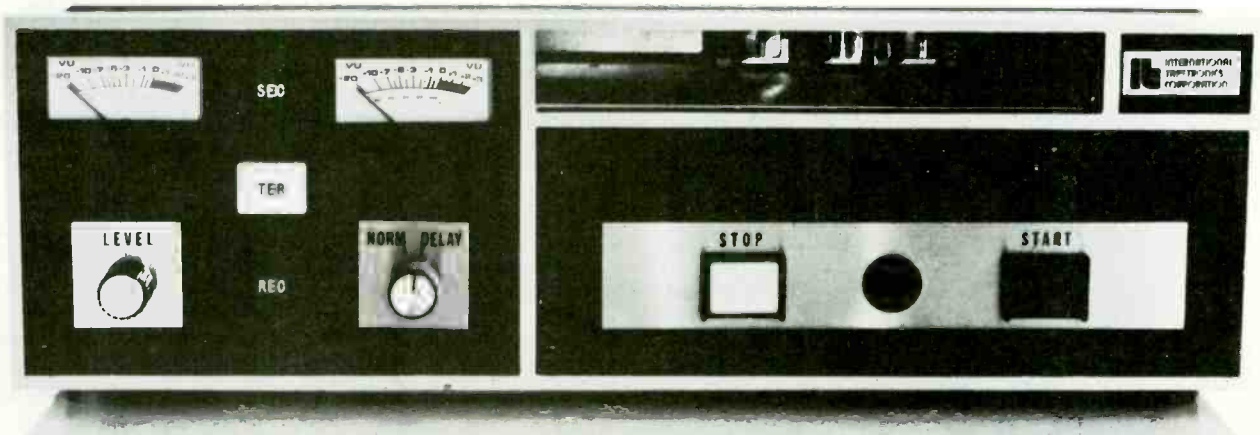

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The lens: The Canon f/1.6 10-100mm zoom, for wider wide-angles and tighter tele's.

The recorder: Sony's easy-to-operate VO-3800—a 30-lb. package that gives you up to 20 minutes of NTSC color on a single U-Matic* cassette which can be edited on the 2850.

*Also available with HL-35.
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Custom-designed to make production safer and smoother, with reduced set-up and strike time, easier transport and fatigue-free shooting. Sturdy, welded construction with 2-position handle lets you transport or operate in upright "handtruck" or horizontal "dolly" position. So it can go virtually anywhere your crew can go.

Holds camera backpack, recorder, AC adapter, cables—even extra cassettes.

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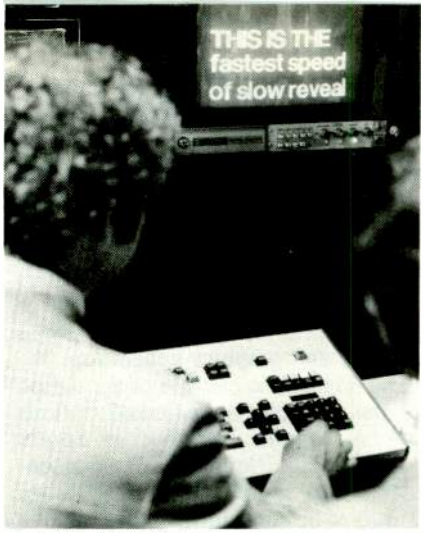
ate it, in order to judge its suitability. Animation in one machine may be relatively simple to achieve, while in another it could be an operator's nightmare. One of the good things coming out of microprocessor control, however, is that the program can be rewritten. Depending on how well the program was written in the first place, rewriting can be relatively easy or difficult.

Thomson-CSF has added important new features to its Vidifont Mark IV electronic character-graphic display system, long recognized for its changeable fonts and flexible disk storage. The new Mark IV A options introduce some interesting capabilities. Background colors can now be chosen on a full row or page basis during composition. Color windows of varying size may be randomly positioned, outline-only characters can be created by removing the dropping out character after selecting its edge, and black characters are accentuated by one of nine positions of edging in various levels of white. The Mark IV A also makes some new options available such as color preview, RS-232C interface, and a sequencer that will automatically play back prerecorded messages at selectable time intervals. The RS-232C interface makes it possible to connect a wide range of data processing devices to the Vidifont IV Display Control Unit. This interface should make implementing computer connection of election returns and other computer generated data much simpler. The complete package is available for updating existing Vidifont Mark IVs or as part of a new system.

Another top of the line system was shown by Chyron. While maintaining many of the features of earlier systems, the new Chyron IV offers some strong new characteristics. A Color Pallete is provided that presents 64 colors in a color grid arrangement. Used with an optional colorizer/keyer, color can be produced on a character-by-character basis. Background colors can also be selected and can range in size from full screen to as small as four TV lines. Height of the background color is independent of character height and characters may be positioned over a multicolored background.

Another Chyron IV feature is Instant Italics, which permits any word, text, or graphic to be automatically "sloped" in 14 degree increments with the push of the Italic Control Key. A Slow Reveal feature allows characters or words to be displayed in a staccato, typewriter-like fashion at nine rhythms. A new Program Sequence Controller (PSC) provides a good animation capability with automatic recall in high



"Slow reveal" is a new feature for the Chyron IV

Dynasciences 9048 uses microprocessor and diskette memory

New model of Vidifont, the IVA offers new features

speed to enhance the smoothness of the display.

This mini-computer based system with flexible disc storage contains programming that includes diagnostics, video debugging, disc duplication and other housekeeping capabilities, in addition to the operations software. There are at least a dozen other notable features in the system's software. The "typical" Chyron Mark IV will go for between $45,000 and $50,000.

TeleMation's super character generator and graphics system also sported new features for its Compositor I. The most interesting of the additions is a digital font building system which allows the station to create its own logos and font styles. Like the other high end systems, Compositor I offers numerous software-based features and systems diagnostics. However, Compositor I did have some new hardware, too. A new input device for composition of graphics allows an artist to place any drawing (or other image) on a drafting table-type surface. The date entry device looks like an engineer's drafting table equipped with a parallel bar-type instrument. On the parallel bar is an electronic sensor that is moved over the artwork. In three passes, the image is entered into the system.

Once in the system, the image can be colorized, positioned, and manipulated in various ways. Another new image entry system involves using a slide projector with a 200 mm zoom lens to rear project an image onto the translucent table top. Again, the "digital wand" on the parallel bar is passed over the projected image in order to enter it into the system.

Systems Concept, which manufacturers the microprocessor-controlled Quantafont VI Television Production Titler, did not bring out any new systems this year, though it is expected that it will be ready with a new Merchandizer system in the near future. An interesting feature of their exhibit was the use of a specially produced 7½ minute videotape loop to present the story of the Quantafont system. The tape was probably one of the easiest presentations to understand since the whole basic Quantafont story could be told both visually and aurally. Armed with this basic information, a prospective client was then prepared to ask more in-depth questions of the booth personnel.

New at NAB this year was the Vista 80 Graphics System from MPB. MPB Technologies, Inc., is a Canadian firm located in Ste. Anne de Bellevue, Quebec. Their new system is a versatile sophisticated character generator/graphics system using microprocessor control and diskette bulk storage. Most of the operational features of Vista 80 are software-based.

The operating program is stored on a diskette and is loaded into memory at the beginning of operation. This approach lends itself to easy operational program changes. As soon as the system has its instructions, another diskette is loaded to store message and on-air presentations as composed on the system.

The system is capable of five fonts, and each character can be displayed in any of six colors. Backgrounds may be

continued on page 106

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colored separately. Additional fonts are available as options. Character sets range in height from 12 to 64 lines in various styles, but the character size will determine the number of characters stored in each font style. A full range of common features are available for character and graphics generation.

The Vista 80 is capable of animation and has several sophisticated options such as camera compose, a Sports Clock for race timing, and a concentrator which enables up to eight Vista 80 units to be controlled by any one of a number of keyboards, either local or remote. Complex graphics composed on the system can be stored on diskette and recalled as single events with the use of the standard "take" key. Sequencing is also available. The system sells for approximately $39,000 in a two-channel configuration.

3M's Mincom Division showed the D-3016 character generator, replacing the D-3000. The new model has a 16 page memory, compared to four pages of storage in the older unit. Three font styles are available with the D-3016 including Video Gothic, Piper Roman, and Helvetica Semi-Bold, in upper and lower case. The unit will simultaneously accommodate either two different upper case styles or a matching upper and lower case font style.

Each page of memory will accommodate 10 rows of 22 characters each. The D-3016 has a three-speed vertical roll and horizontal crawl and automatic centering. A title mode allows a maximum of 160 single row titles to be stored internally for recall. The system is priced at $6900.

The MCG-5000 is a new character generator system from ICC. This system costs about $9500 with an additional $2500 for a floppy disc memory. Another microprocessor-based system, it offers 24 fonts, six colors, a multi-speed crawl and 12 pages of internal memory. Dynasciences showed its microprocessor-based system, the Model 9048 Video Graphics System. This unit is also full-featured, offering a wide range of software for flexibility. Two interesting features are a Vari-Text Zoom feature which allows a variable size change in characters by ± 50 percent and a Panic Button that provides instant access to a set of operating instructions stored in memory, should an inexperienced operator forget a function. The instructions appear on the preview monitor while the operator goes on composing the page.

Laird Telemedia Inc., added a new option to its microprocessor-based character generator 3600 series. The 3690A Auto Center Option for automa-

tic horizontal and vertical centering includes a 1K memory that will roll, crawl, and pop-up titles. Each 3600A chassis with the new option will also get three additional card connectors for future field expansion. The option is priced at $550, plus $300 for an optional 4K memory.

Knox Ltd. added an option to their K128 generator that provides five font capability while improving the resolution of the characters to 1536 elements per character. A new option is also available for the KC50 and KC60 systems that doubles the number of characters per line capacity, effectively doubling the number of characters per page of memory. Video Data Systems announced two new products, the T-2000 and Microsystem II. T-2000 is a basic Titling Generator with 32 pages of solid state memory, crawl, editing features, etc., and is priced at $5995. The Microsystem II Titling/Graphic Generator has 128 pages of solid state memory and offers limited graphics capabilities, in addition to a wide range of character generator features. The price of this unit is $7595. Both systems are deliverable in 90 to 120 days. Knox also showed the prototype K600, which is a microprocessor-based system providing high resolution characters and five font styles. Background and character color can be handled independently. Three microprocessors are used, one for keyboard operation, one for display control, and one for the disc memory interface. The basic unit will sell for about $8900, with the disc memory options adding approximately another $3900 to the system's cost.

Beston Electronics Inc. was there with its line of low cost systems. Beston now offers a modular system using a "building block approach" that begins with the housing, power supply character generator, microprocessor and blue matte generator. The system, known as Marquee, builds from there to offer such options as a News Wire Interface, Weather Information package and others.

For more information circle bold faced numbers on Reader Service Card: Thomson-CSF IVA, **379;** Chyron IV, **380;** TeleMation Compositor I, **381;** MPB Vista 80, **382;** 3M D3016, **383;** ICC MCG-5000, **384;** Laird Telemedia 3690A, **385;** Knox 128 options, **386;** K6000, **387;** Video Data Systems T-2000, **388,** Microsystem II, **389;** Beston Marquee, **390;** Interrand Model 6000, **391,** Dynasciences 9048, **392.**

One of the more unusual offerings in the graphics field came from Interrand, manufacturers of Telestrator. The system permits an artist to draw with a "pen" on a special monitor screen. Seven different colors are available to the artist, as are different width "brush strokes." The heart of the system is the Model 600 Scan Converter System, an all solid state digital device. The 6000 is a standalone device and can be added to existing character generators to expand data manipulation and display dynamics.

Routing switchers are far more sophisticated

Routing switchers are one of the areas that have been drastically improved in recent years through the use of solid state electronics and microprocessor control. Incredible reductions in size have been achieved that now provide thousands of crosspoints in a space that formerly would have provided room for only a few hundred. Digital technology has eliminated delay problems and at least one manufacturer has digitalized the audio portion for much improved signal-to-noise as well as improved timing.

The use of microprocessors has also increased the flexibility of the new systems. Salvo switching is achieved in a number of ways. Essentially, salvo switching permits complete or partial re-routing of signals through the switcher simultaneously. It can be achieved by the pressing of a single button or under the control of a master clock at a predetermined interval.

One of the new additions to the Telemation line of video/audio routing switchers is the use of a real time clock and salvo switching system. As part of the TVS/TAS-1000 solid state routing system, the new feature, which uses microprocessor control, permits the switching on of any or all of 1000 possible crosspoints to be done automatically at predetermined times. A teletype entry terminal is used to program the real time clock, which triggers the desired switch through the microprocessor. Another new feature in the system is a mimic panel consisting of LEDs that show the status of all crosspoints.

Dynair not only introduced two new systems to their line but also brought some order to the chaos of pricing a routing switcher system. Routing switchers, as everyone knows, are one of those things where the variables that affect price are so numerous that even getting a ballpark estimate can be treacherous. Dynair used a Radio Shack Home Computer to help visitors to their booth get some idea of what a system might cost. The visitor was asked to describe what he wanted in a system; this information was entered in the computer, which printed out specific price figures on each feature and the system's total cost.

One new product from Dynair was the System 21 Microcomputer Controlled Matrix Switcher. System 21 of-

continued on page 108

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fers both small and large systems in a basic 10 by 10 matrix expandable to 1000 by 1000. The System 21 will handle video, audio, data, and machine control signals.

The system will interface (RS-232) external automation systems, and features high-speed crosspoint address, power fail-safe memory, self diagnostics, status read-back for computer or CDT display, and salvo switching. The power supply that comes with the system can be mounted externally to provide room for additional audio/video cards.

Another new system is the Dynair Series 10 Video and Audio Switching System. Also solid State and based on a 10 by 10 matrix, the unit is available for video, audio, or audio follow video switching with up to three slave levels. Microprocessor control is another aspect which makes the system capable of being controlled locally or remotely. Both systems use vertical interval switching, and in the System 21, even salvo switchers are vertical interval.

Datatek announced several new products, including the D-640 video routing switcher which replaces the older D-700, a D-481 Time Code/Cue Track Routing Switcher capable of passing time code accurately even at fast search speeds, and a new D-470 Video Routing Switcher in a 20 by 20 matrix configuration.

These new products expand the D-400 Datatek series, which consists of a number of solid state routing switchers for video, audio, audio follow video, and now, time code. The 400 series uses standard BCD positive logic and is compatible with computer controlled systems.

Utah Scientific made its NAB debut with the AVS-1 routing switcher system. AVS features two types of control, either BCD or Party Line. The Party Line control includes a Refresh Memory feature with a 24-hour battery. The standard configurations are 10 by 10 to 100 by 100, and provide audio, video, or audio follow video switching. Multiple audio channels are available as an add-on or with the initial unit.

Video and audio crosspoints are separate for better performance and easier stereo update if required. The crosspoint cards are interchangeable, so no ribbon wire bussing or factory programmed PROMs are needed. LEDs provide constant monitoring of crosspoint status. Six different control panel configurations are available.

Di-Tech showed a model 5800 series of Audio-Video Vertical Interval Routing Switchers. This series uses all solid state components with proprietary components so that replacement parts

Dynair used hobby-type computer to help price...

. . . routing switchers like their new System 21

are generally available. The system is another building block approach using 20 by one switching modules which, if removed from the frame, affect only the one output bus. The 20 by 15 basic AFV matrix fits in a 10½-inch rack space. The power supply takes another 7½-inches of rack space and includes battery back up. Control is BCD parallel and status of all crosspoints are monitored by LED numerical readouts.

Other companies showing routing switchers were ISI, which showed the 1100 series of AFV Routing Switchers; Dytek, with its Computer Image Video Controller Model 12AV1 (a 12 by one system); Datatron, which displayed a nine by three Model 5900 for audio and time code; and 3M, showing the Comtec 40X Series, a microprocessor controlled system, and the 15X and 20X series.

International Communications & Control Corp. (ICC) showed some older models, but did announce that they would be introducing shortly the BRS-A/V-300 Series Routing System. The new series will be modular, using a 16 by one matrix.

Responding to the demand for more than one audio crosspoint per video crosspoint, Lenco brought out a new Audio Follow Bridging Switcher, intended as a companion to the PSW-467 Video Switcher. The new unit is the PAF-467, a 12 by one unit with multiple remote capabilities. The unit is connected to the video switcher through a 13 conductor cable.

American Data has a newly designed 3900 Series Audio-Video Routing System. The 3900 features two audio levels and one SMPTE time code level in addition to the video level. With a basic matrix of either 20 by 10 or 40 by 10, the 3900 is expandable to 1000 by 1000. This is another microprocessor-based all solid state system. It is computer compatible and has a five day emergency power supply in the form of NICAD batteries. The audio portion of the switcher is a 20 by one matrix or 20 by two, with time code channels completely isolated. American Data's 900 series is still available, and the 3900 is a completely new alternative.

For more information circle bold faced numbers on Reader Service Card: TeleMation TVS/TAS-1000, **393;** Dynair System 21, **394,** System 10, **395;** Datatek D-640, **396,** D-481, **397;** Utah Scientific AVS-1, **398;** Di-Tech 5800, **399;** ISI 100, **400;** Dytek 12AV1, **401;** Datatron 5900, **402;** 3M 4OX, **403;** 15X, **404,** 20X, **405;** ICC BRS A/V 300, **406;** Lenco PSW-467, **407;** American Data 3900, **408.**

Film, film cameras, telecines

The news from Kodak was not a film, but a process. RVNP (rapid video news process), currently under test at five TV stations, allows for a 58 percent increase in processing machine speed over that now realized in the VNF-1 process. Package chemistry for the new process is expected to be offered for sale in October. There were no new film cameras, but the standards could be seen at Cinema Products, Camera Mart and Cine 60. In the line of accessories, Cinema Products did introduce a new CP-16R Information Display. The system employs LED code letters which light up — 'B' when the battery is low, 'S' when the camera is running out of sync, 'F' when film is about to run out, and 'VU,' which varies in intensity, indicating modulation levels in the CP-16R/A camera with built in Crystasound amp.

Cinema Products also showed a new telecine, the KM 16. This unit consists of a small box containing an optical system into which 16mm film is projected. An ENG camera is then pointed into the 'box' and the audio is routed to the line input on the VTR. Cinema Products believes that this "low cost" system operates with reasonably good results, and will be useful for off-line film transfers when a station's on-line telecine is not available.

Ikegami introduced a new option for their TKC-950B film chain color television camera, an Automatic Color Balance unit. This new accessory offers automatic white balance, black balance, and gamma balance. Rank Cintel offered new options on their Mark 3 Flying Spot telecine: Digiscan, a 525/60 option which eliminates flicker, jitter, and the need for critical machine alignment and shrinkage compensation; a facility which allows preprogramming, color balance, picture enhancement, panscan functions, and more; and a super 8 conversion offering

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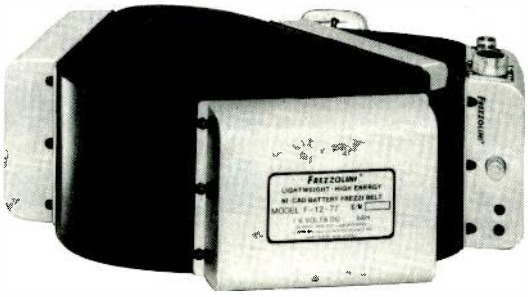

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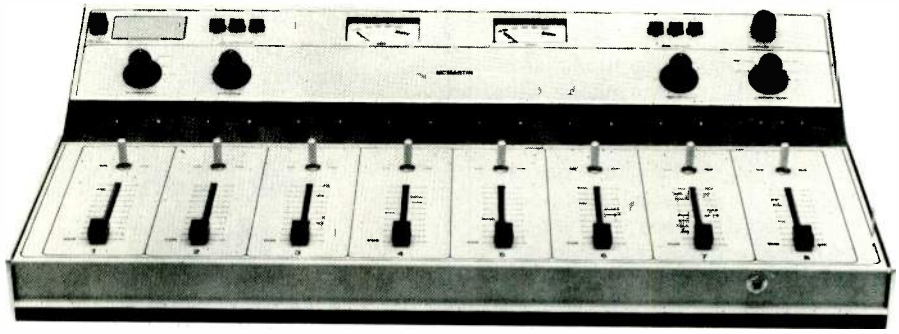

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high quality reproduction suitable for newscast and cassetting applications. Laird showed their new miniature telecine, the Mini-Plexer, and a new automatic light control for telecines.

Cohu improved their 1550, adding bias lighting. Options for the 1550 include automatic differential gamma balance and a color compensation variable masking system. The TCF 3000, introduced several years ago by Telemation, is sporting adapted optics to make it compatible for use with the old GE 240 and 245 series TV cameras. The TCF 3000 is now available with automatic color balance and remote color corrector options.

New to the NAB this year was Zei-Mark Corp., showing their 750 and 4305 optical multiplexers. Both models are capable of handling up to three inputs. The 750 has a remote control option. Options for the 4305 include remote and automatic light controls.

RCA demonstrated the TK-28B, using one inch Saticon tubes for a clearer, sharper picture with minimum lag. BEI had their automatic light control system for telecines, and L-W showed the Athena 4000 and 5000.

Lighting systems

Broadcasters looking for lights found an increase in the number of halogen types available. Those seeking control systems saw more mini-computerized and memory systems than ever before.

New to the NAB was Electro Controls Inc., who showed their Intelligent Lighting System (ILS), a computer-controlled memory system. The ILS consists of a high speed mini-computer with dual floppy disc storage system, display terminal, typewriter-style keyboard with some 27 special function keys (including blackout, preview, and delete), and a line printer. The software program provides such features as control of up to 400 channels/cues, ability to define and assign up to six dimmer curves, unlimited remote control and manual over-ride, to mention only a few. Electro Controls also had a line of portable dimming systems, Parellipsphere spots, and ellipsoidals.

Olesen showed the Promptor, a computerized, compact control system for storing and retrieving cues in standard configurations of 24, 36, 48, and 60 control channels. This easy to operate, modular system can be interfaced with any existing TTI lighting control system. Features include a large storage capacity (up to 544 cues without peripheral equipment), two-scene operation with split dipless cross fader, manual or automatic sequencing, and recordable time fade. Options can be factory-installed or purchased sepa-

rately. They include memory field (expandable in blocks), control channel field (expandable in blocks of 12), visual display monitor, cassette tape library storage, and mini-floppy disc library storage.

Berkey Colortran displayed its Channel Track, a full high power lighting control system with memory capability and full manual over-ride for better operator interface. New from Berkey was the Pantograph suspension system with adjustable spring counterbalance, and a barrel roller trolley system with a special bypass pipe grid.

Strand Century was on hand, showing a full line of HMI Fresnels ranging from 575W to 4000W, as well as complete lighting control systems (some with memory) fr studio and location. Camera Mart displayed a line of HMI floods, spots, and long range spots from 200W to 400W. Kliegl showed their portable nine dimmer control package and a line of Compact Source Iodide fresnels ranging from 575W to 2400W. The CSI provides three times the light of quartz, and has the color temperature of daylight.

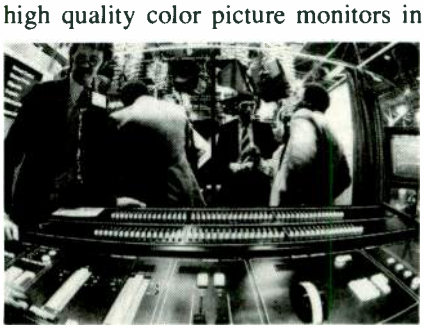
Mole-Richardson displayed a new 4000W and 2500W HMI Solar-Arc Spot. Also shown were a new Molepower 30-volt battery pack with fast charge and a new 2000W Molite kit.

Lowel Lighting Mfg. Inc. introduced the new Omni-Light, a compact spotlight featuring a broad spot-to-flood focusing range and an extensive system of front end accessories to meet the demands of location lighting situations. The light can operate on 120 or 220/240 volt line sources or 30 volt battery supply,and is available in kit form.

Packaged Lighting Systems had a full line of lights and accessories, and The Great American Market showed a line of Fresnels ranging from one to five kW. Bardwell & McAlister was there with a line of lighting and grip equipment. GTE Sylvania showed an improved tungsten halogen lamp more resistant to shock and vibration and a new 650W Halogen capsule in a aluminized reflector.

Monitors

Amtron introduced a new series of high quality color picture monitors in the 7800 series. The two models available are the 7813, with a high resolution 13-inch shadow mask CRT, and the 7819, with a 19-inch CRT and a vertical rack height of only 15¾ inches. Both models feature adjustable aperture correction, phase controls, vertical and horizontal delay, and degauss and underscan pushbuttons. A unique calibrate switch will restore the monitor to "factory correct" at any time. Amtron also had the AM series, which employs the Trinitron color system and is available in five- and eight-inch half-rack models. Features include A-B inputs, internal/external sync, individual RGB gunswitches, deguass switch, and optional pulse cross display. Twelve and 17 inch models are available with switchable underscan and DC restoration.



Channel Track was the feature at Berkey Colortran

Electrohome showed its new 2000 series of monitors, also employing shadow mask CRTs, with optional comb filter providing full luminance response and reducing luminance cross color interference in the chroma display.

Rohde and Schwartz featured their line of Barco monitors, including the new CTVM 2/35, a 14-inch high resolution monitor perfect for mobile van application. The CTVM 2/35 features shadow mask CRT, wide band RGB signals, and, with the exception of power supply plug-in cards, the CTVM 2/35 offers complete interchangeability of PC boards with the 15", 20", and 26" Barco monitors. Tektronix displayed the 650 HR, a new addition to the 650 series of 12-inch color monitors. The 650 HR features a new, high resolution Trinitron picture tube, which has over 50 percent more resolution capability than the standard Trinitron. Also featured are both manual and automatic removal of the subcarrier notch filter from the luminance channel, variable aperture correction, and a unique "blue only" mode which makes it easy to see noise in the video signal.

Ikegami added three new color monitors to its series 8 line. Both the TM20-8RH (high resolution with comb filter) and the TM20-8R (conventional resolution) use 19-inch screens. The TM14-8R offers conventional resolution in a 13-inch screen. All series 8 monitors are solid state units with shadow mask picture tubes. Also featured are a keyed back porch clamping circuit that maintains exact black level, countdown pulse systems in vertical circuits for excellent interlace, pulse cross, and normal and underscan deflection functions. A phase lock loop in the horizontal circuit eliminates the need for horizontal hold control. All monitors use three unit modular construction with interchangeable PCs.

World Video introduced the CDR

continued on page 112

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8000, an AC-DC eight-inch color monitor designed for EFP or studio applications. As in all its color monitors, World Video uses the Sony Trinitron tube and some circuitry here again, but by the time the monitor is finished, new circuitry has been installed for professional tasks, and some 11 Sony automatic tuning circuits have been bypassed. The CDR 8000 can be mounted singly or with a B&W monitor or waveform monitor. The CDR 8800 consists of two eight-inch color monitors mounted side-by-side. Both models feature pulse cross, underscan, keyed back porch clamps and special circuitry to eliminate drifting with temperature variations. The CDR 8000 has a fully regulated high voltage power supply to eliminate blooming.

Videotek displayed its new line of eight-inch monitors which employ the Trinitron tube. These new models feature A-B inputs, keyed back porch clamping, manual deguass, front mounted background controls, and blue gun. Options include pulse cross, underscan and external sync. The eight-inch is available as a single unit (VM-8PR), dual unit (VM-8PRD), and single unit with space available for the Tektronix 528 waveform monitor (VM-8PRM).

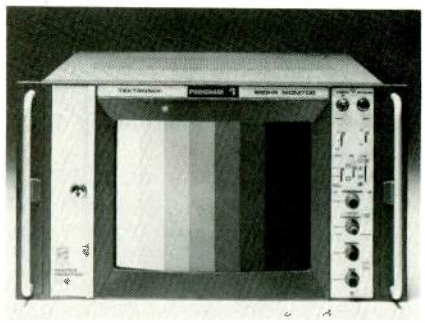
Conrac was there, of course, introducing a new monitor in addition to their already impressive display. The new 6100 series features a 19 V color-match CRT (shadow mask) for precise colorimetry, BCF (beam current feedback) which automatically stabilizes the picture tube color temperature, and an optional comb filter separator which provides full bandwidth capability. Pull-out drawers provide simple maintenance of convergence, signal processing, decoding, and pulse generating functions.

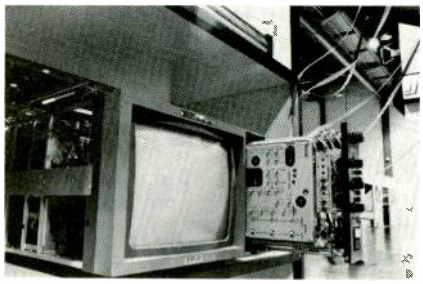
Bosch-Ferseh had their color monitors prominently on display. Above their booth hung a 15 by 20 foot screen upon which Conrac demonstrated the new Eidophor. This impressive video projection system is capable of delivering a contrast ratio of 100:1 and requires no special screen.

Unimedia showed a complete new line of high resolution monitors utilizing the Diatron SSS System, which uses a slotted mask, self-converging in-line gun, internal magnetic shielded striped screen CRT. The new monitors feature chroma masking, R-Y, B-Y vector outputs, aperture control, black calibrate, blue gun display, adjustable scan size, and binary select pulse cross. The Diatron SSS System is presently available in 14 and 17 inch versions.

Lenco Inc. introduced a line of monochrome video monitors. Available in screen sizes from nine to 23 inches, all models of the 900 Series offer 900 lines resolution and optional pulse cross and underscan.

A member of Conrac's new 6100 series


The Tektronix 650 HR has a new Trinitron resolution tube


Barco's new CTVM 2/35 in the Rohde & Schwarz booth

For information circle bold faced number on Reader Service Card: *Monitors:* Amtron 7800 series, **409;** AM series, **410;** Electrohome 2000 series, **411;** R&S Barco CTVM 2/35, **412;** Tektronix 650-HR, **413;** Ikegami Series 8, **414;** World Video CDR 8000 series, **415;** Videotek VM 8 series, **416;** Conrac 6100 series, **417;** Eidophor, **418;** Unimedia SSS Systems, **419;** Lenco 900 series, **420.**

Videotape and accessories

A wide range of videotapes were shown by Ampex, Fuji, 3M, Memorex, and The Video Tape Co. Ampex introduced a new ½ inch Beta-format video cassette designed for commercial, industrial and educational broadcasters. Also shown were an improved version of the Ampex 175 series high-band color videotape, and a ¾ inch videocassette designed to be handled, still-framed, and played repeatedly.

3M showed its new Scotch brand 479 Master Broadcast Video Tape, with higher RF output and color noise improvement. The 479 MBVT is rated at 740 oersted coercivity. A rugged base permits stop motion, frame-by-frame editing, jogging and slow motion. Memorex had an improved version of its one-inch MRX-716 (500 oersteds), also designed to meet the demands of slo mo, still frame, manual jogging, and editing. New from Memorex was the Q_2 HD video cassette (560 oersteds), designed to hold a still-picture and to withstand extremes in tension that occur in editing and extremes in temperature encountered in location recording and ENG.

Studio Film & Tape Inc. displayed its line of dropout monitors, DOM. When connected to the dropout compensator and servo system of a VTR or VCR, it monitors instantaneous rate of RF signal loss, overall totals of RF signal loss, and loss of servo-lock. Results are available by means of numeric displays, printouts or specific signals to external equipment. The DOM is available in formats suitable for applications ranging from ¾-inch cassettes to operations monitoring quad cart machines. The DOM Printer is an option that provides a 12 column five by seven dot matrix printout identifying the condition that caused the printout and numeric data relevant to that condition. By analyzing the data it is possible to determine whether the fault is in the tape quality or whether there has been tape stretching due to editing stop-starts. It is also possible to back-track through records to isolate field recorders which are creating problems. Most importantly, instant warning of dirt pick-up at the playback unit head will prevent damage to taped sequences during editing.

Television Equipment Associates introduced the Elcon Magnatek VC 2000 tape cleaner/evaluator for both two- and one-inch videotape. The cleaning technique employs continuously advancing tissues which wipe both the front and back of the tape while a tungsten carbon blade decapitates particles in the oxide surface, thus realizing a 70 percent reduction in the temporary video dropout. With the tape cleaned twice and then erased, signals are recorded by the headstack. These signals are immediately played back and analyzed, and the results are recorded by three pens. The profile is free of temporary dropouts. Any recorded are due either to loss of oxide or deeply imbedded particles. Edge tracks are individually profiled. A signal of about 500Hz (15 ips) is recorded near each edge of the tape. The signal is played back, peak detected and amplified logarithmically to simulate a "VU" type of response. This technique reveals areas that are not suitable for audio recording. To profile the center (video) section of the tape, a

continued on page 115

The Best.

New 5315/24 Console for Television
Affordable 5402 Console for Radio
Standard Consoles to 40 Channels
Custom Designed Consoles
NECAM Computer Audio Editing

Our business is sound. Sound of the highest quality and reliability, for Television and Radio. Our standard and custom consoles need no color advertising or fancy words to convince you of our quality. Neve consoles are built to last. Frame construction is of heavy gauge aluminum and steel. Most electronics are housed in metal enclosed plug-in modules for maximum RF rejection and ease of maintenance. We give you the finest reputation, reliability and performance. Call our customers. They'll tell it to you straight. Neve is the best!

Take the 20 channel Model 5305 console pictured above. This is one of the most successful sound production consoles ever built by any console supplier. From Boston to Los Angeles, from Toronto to Austin, this range of consoles is widely used by network and independent broadcast facilities. And now we are introducing the 5315/24P, an expanded version with 24 input channels, 4 auxiliaries, 4 subs and stereo output. With these and other consoles, Neve offers you a real choice to suit your requirement. Standards, modified standards or custom consoles. Give us a call or drop us a line. You'll be working with the best!

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Take power, for instance. Our rechargeable Powerbelts mean you *can* take it with you. More ampere-hours than ever before. Evenly distributed around your waist to give you the same kind of mobility TV film cameramen have relied on for years. Our fast-charge versions are at full capacity in just one hour, to give you more shooting and less waiting. □For more light on the go, compact Cine 60 Sun Guns fill the bill. Color-balanced for video, they give you lots of fresnel-soft lumens in the smallest spaces. Plus wide angle and focusing, too. □And if you prefer your Sun-Gun power packaged differently, we can give you Cine 60 NiCad reliability in a Powerpak/Sun Gun combination. □Our rechargeable Powerpaks are also available separately. In a variety of sizes, voltages and capacities to power just about anything you have in mind. Video. Audio. You-name-it. Just slip it on your belt or into a pocket...and go! □While our rugged, reliable power systems take a load off your mind, we can take a load off your shoulders, as well. With a complete line of comfortable shoulder pods and body braces that let you concentrate on what you're shooting...instead of your aching sacroiliac. Whatever the configuration of your camera, we've got a pod to match. □Cine 60 has a lot of other valuable tools to make life easier for video people. Like our Snaplok, to let you snap-on, snap-off cameras and other equipment from tripods, stands, pods, etc.—in less time than this sentence took to read. Plus suction mounts, compact quartz lighting... and that's just the beginning. With all the things you're asked to do these days, it pays to have all the help you can get. Why not call or write for our catalog today?

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Checking out the printout of the DOM series at the Studio Film & Tape Inc. booth

high frequency signal is recorded on each track, played back individually and buffered. The resultant signals are compared to a percentage of the average return signal, and half cycles which fall below the average are used to define a dropout. A combination of the Sensitivity and Threshold controls defines the size and extent of a damaged area to be counted as a dropout. The dropouts are then treated digitally and counted with two stages of binary counters. The first stage is used as a primary divider. The results of the second counter are processed by an A to D converter and displayed as one of 16 discrete levels on the graphic profiler. A one hour tape can be cleaned and evaluated in ten minutes.

Videotape erasers were shown by Garner Industries, Taber, and Optek. Computer Magnetics Corp. introduced their new XPL (extended prime life) video heads with a new Head Tip design for improved performance with extended life. XPL heads are available for all hi band and super hi band quad machines.

Other video processing tools

Two methods for transmitting still frames were demonstrated this year at the NAB. The new NEC Telephone Video System equipment receives an incoming video signal (camera, videotape, etc.), captures one full image, digitalizes it in a solid state memory and translates the picture to data for transmission on phone lines. The Slow Scan system from Colorado Video has the "picture" read into the system through the camera input on the graphics table, then modulated onto the station's SCA for transmission. Uses for the system are expected to be found in satellite communications, news operations, and new communication services.

3M introduced the Model 6200, an in-line Image Enhancer/Decoder that accepts composite NTSC color video signals and provides both vertical and horizontal enhancement. An aux output provides RGB keying signals which may be applied to the RGB chroma key input of a switcher for chroma key effects. An "automatic detail gain" control adjusts detail gain, coring adjust, level dependent aperture equalization, horizontal and vertical balance and by-pass switch. Telemet introduced new distribution amplifiers, each with six outputs. VDA 3315 equalizes up to 1000 feet of 75 ohm cable (10 dB loss at 10 MHz). An all new clamping circuit features simultaneous feedback and back porch clamping. PDA 3320 accepts input levels from one to five V p-p, front panel gain control adjusts output levels in the three to five V p-p range. Pulse DA 3325 features an adjustable delay. These distribution amplifiers are powered by a dual power supply with automatic changeover.

Lenco Inc. showed a wide variety of video processing and distribution equipment, including a new line of compact video, subcarrier and pull distortion amplifiers. Datatek had a new subcarrier distribution amplifier, the D-605, which is a plug-in printed circuit board module with individual AC supply that provides three 75 ohm outputs from each of two independently adjustable channels. A band pass filter with leveling amp provides a subcarrier frequency sine wave which is free of harmonics and at a standardized level even with a distorted input.

Yves Faroudja Inc. introduced a Record Booster designed to act as a signal pre-processor in the record mode. It may be used with a Crisp Matic or any Microtime product employing YFI enhancement circuitry. It can also be used as a standalone unit. The unit overcomes normal playback deficiencies, helps improve S/N ratio, and provides a black stretch capability. YFI also introduced a new Comb Filter Decoder.

Computer Magnetics Corp. showed a Differential Gain Channel Amplifier, the DG 1200, plug-in compatible with all VR 1200s. The CMC Auto Equalizer series adds line-by-line and channel-by-channel auto-equalization capability to existing VR 2000s and VR 1200s. Also shown was a Velocity Error Corrector for VR 1200s and VR 2000s. International Communications & Control Corp. was on hand with a Color Background Generator & Colorizer, a Studio Video Clamp, and a Color Black Generator.

Miscellaneous "input" devices

Q-TV (Telesync) and Telescript both showed their prompting systems with single beam splitting mirrors and above or below the lens counterbalanced mounts. New from Listec was the Telecue prompting system, employing a "totally new" semi-reflective mirror and a 12-inch monitor specially designed to eliminate previous limitations on camera pan and tilt.

Power-Optics demonstrated their Scene Sync, which solves the chroma-key user's problem of the "actor" appearing to "float" against the background when the foreground camera is panned. Quite simply, a transmitter fitted under the pan/tilt head of the foreground camera controls the movement of an easel holding the "background." When the foreground camera pans, the background is moved in sync. Broadcast Video Systems introduced the SA-100 Safe Area Generator, a device that generates horizontal and vertical boarders and a cross hair pattern. The SA-100 is useful for positioning graphics and/or other information.

For information circle bold faced number on Reader Service Card: *Videotape:* Ampex 175 series, **421;** 3M 479 MBVT, **422;** Memorex MRX-716, **423;** Q_2HD, **424;** Studio Film & Tape DOM series, **425;** TEA VC-2000, **426;** CMC XPL, **427;** *Video Processing:* NEC TVS, **428;** Col Video Slo Scan, **429;** 3M 6200, **430;** Telemet 3000 series, **431;** Datatek D-605, **432;** CMC DC 1200, **433;** AE series, **434;** VE Corrector, **435;** YFI Record Booster, **436;** Comb Filter Decoder, **437;** IC&C Color Generators, **438;** *Input devices:* Listec Telecue, **439;** Power Optics Scene Sync, **440;** BVS SA-100, **441;** Q-TV Telesync, **442;** Telescript Prompter, **443.**

Audio for TV taking big leap in quality

So many factors indicate that audio is becoming an increasing concern to TV broadcasters. At NAB many console manufacturers were either expanding their lines of audio consoles for television or getting into the field for the first time. (See Audio Console portion of Radio AT NAB for details.) The new Bell diplexing system that now offers a 15 kHz channel for audio transmission is causing a rise in expectations for the eventual development of stereo/audio for TV.

Microphones are also improving in performance. Wireless mic systems are numerous (see microphone section in Radio AT NAB) and the new Calrec microphone system seems marvelous.

The sophisticated synchronizing equipment mentioned earlier is a breakthrough in double system audio production for television. This will lead TV broadcasters to show more than the usual interest in audio recorders, and if you read this section of the Radio At

continued on page 118


SONY
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The Sony BVH series. Consider the accomplishment.

Two years ago, 1" helical-scan recording was just a gleam on the broadcast horizon.

Now, there's the new SMPTE Type C Standard.

We're kind of proud of that. From the start, Sony Broadcast was a leader in the 1" revolution. We pioneered many of the technical innovations incorporated into the 1" helical-scan VTR. And it's good to be part of a movement so beneficial to the broadcast industry.

How does our new SMPTE Type C machine differ from the more than one hundred BVH-1000's already in use across the nation? Frankly, very little.

And we're proud to be able to offer you SMPTE-standard 1" machines that maintain all the unique advantages of the Sony Broadcast equipment already in the field.

Consider the advantages. Advantages like BIDIREX, which gives you full bi-directional search capability in both shuttle and jog modes. And that means 100% post-production creative freedom, with all the ease and flexibility of 35mm film techniques.

Advantages like the incredible economy of the 1" tape format. Far lower acquisition costs. Smaller size, so you save valuable studio space. Lower maintenance costs. Plus major savings in 1" videotape alone.

Advantages like three high fidelity audio tracks. Color framing, to maintain perfect timing continuity during editing and animation sequences. And more.

Consider the possibilities. Think about the local programming capabilities that open up with the BVH-1000 and portable BVH-500. Capabilities quad can't match. With an economy that leaves film far behind.

Think about creating your own documentaries. Taping your own commercials. Think about taking 1" tape out into the field, then bringing it home and going directly on the air without the need for converting to another format.

Think about the kind of panoramic production once possible only on film. And think about what single-camera film editing techniques will mean to your creative effort.

Consider the source. There's one more thing you should think about as you consider the move to 1".

The source of your equipment.

And when you consider Sony Broadcast, you'll find benefits no other source can give you.

Like our years of experience in research, engineering, and production of advanced video systems.

And access to a complete family of professional video equipment from a single manufacturer. With the kind of reliability and performance only a single manufacturer system can guarantee.

The BVH Series, from Sony Broadcast.

All things considered, it's quite an accomplishment.

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NAB report, you'll find that quality here, too, is way up.

Recognizing the demand for better audio, routing switcher manufacturers are offering multi-channel audio crosspoints in their systems. Some, as reported, are also offering another audio grade level for SMPTE time code that will make the computerization of editing and double system audio production more feasible.

With all this new equipment in audio, many TV broadcasters will find sections of the following Radio At NAB report intriguing.

RADIO AT NAB

AM stereo

The hottest radio topic at this year's show was not hot on the exhibit floor, with few companies displaying their AM stereo equipment. Harris, however, did demonstrate its system (described in detail in earlier issues of *BM/E*), and the purchase of stereo consoles by AM stations (see console story) signalled a spreading move to get

Among stereo consoles going into AM stations: Pacific Recorders System 1

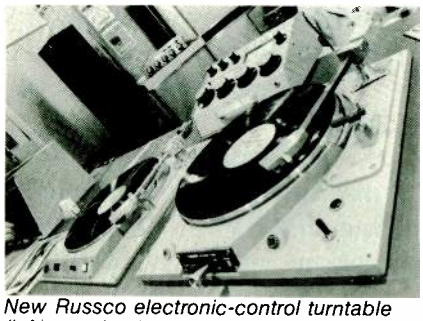
ready. But the intensity of AM stereo interest came through clear and strong in the engineering session, "Getting Ready for AM Stereo," described in the accompanying box.

Turntables: the best yet

The move toward AM stereo was also served by a quality upswing in audio input equipment; improving this part of the operation will be a necessary part of the changeover for a great many stations. Turntables have made great strides in recent years, with the spread of the servo-controlled units that have speed stability and signal-to-noise ratios far beyond those previously regarded as "standard."

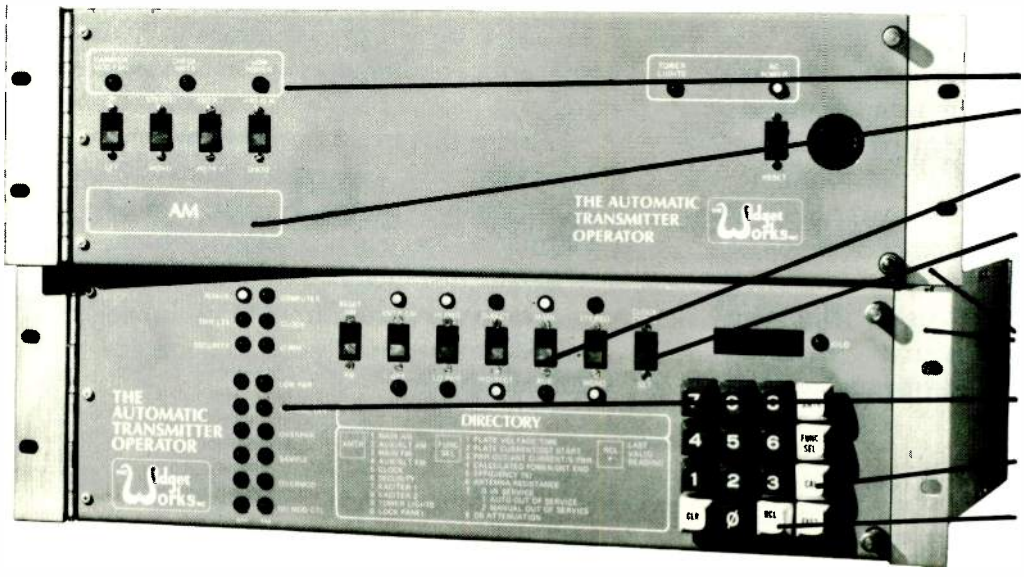
As noted in the introduction, the German-made EMT 950, introduced at the show by Gotham Audio of New York, took this trend about as far as it conceivably can go. The performance characteristics are uniformly more than adequate for distortion-free operation. The machine is most notable, though, for operation convenience and flexibility, the result of clever use of microprocessor control. The controls are large, square buttons arrayed across the front, with large identifying symbols. The system has such refinements as motorized back-cueing; there is a button for this. In addition, the pickup can be put down anywhere in the middle of the music and the table started; the signal is muted just long enough to let the platter reach speed, a small fraction of a second.

Technics by Panasonic displayed the latest version of their SP10, the Mark 2. As reported in *BM/E* over the last couple of years, this turntable is used by



New Russco electronic-control turntable (left), mechanical-control table (right)

THE AUTOMATIC TRANSMITTER OPERATOR



FEATURES

- Intuitive studio operation.
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EMT-950 turntable, introduced by Gotham

a great many radio broadcasters, and was the pioneer in the recent marked advance of broadcast table quality. Technics also showed the SL1500, Mark 2, a somewhat less expensive version which may appeal to many broadcasters, with performance comfortably at the new high level.

A welcome addition to the turntable family is the new Electronic Control table introduced by Russco. It has a DC brushless servo motor for high speed stability, combined with idler/rim drive, a design simplification that helps keep the price down to around $400. It can be remote controlled (as can all the new electronic control tables) and has a 1/12-revolution start-up. Broadcasters with tight budgets who still want the new high quality should investigate it.

Tape recorders

Another essential unit in most stations' audio input systems, the tape recorder, also appeared on the floor in many high-quality versions.

The brand-new Studer A800, noted in the introduction, presented an attractive flexibility and resourcefulness in operation — produced, again, by use of a microprocessor in the control system. The microprocessor software "knows" a great many operating procedures, such as how to go directly from fast forward to play without straining or spilling the tape. This eliminates the need for a lot of hard-wired switching and relay equipment. The microprocessor has allowed the resourceful designers unusual operational refinements; just one of many is that the pinch roller stays away from the capstan until the tape has been brought to exact playing speed by the reel motors.

Technics (Panasonic) RS-152OUS tape deck

The A800 is an analog recorder; the digital tape recorder was hardly present at the show. Technics of Panasonic displayed a prototype version of a PCM digital recorder, under development by that company but some time away from marketability. Whatever the rate of entry of digital machines, however, we are going to see a long period of coexistence of the two technologies. This will be positive for the industry because the top analog machines — like the A800 and several others mentioned below — are getting so good they can easily carry their end of broadcasting's new, super-grade Audio of the Eighties.

Technics of Panasonic contributed to this trend with their RS-1520US tape deck, a "professionalized" version of the RS1500, originally developed for the hi fi market. The specs of this machine put it in the top ranks; professionalizing consisted largely of having the proper connectors for broadcast and recording studio use, and putting continuously variable bias and equalization adjustments on the front panel. The output, too, has been modified to

continued on page 120

Superior SMPTE from BTX

4100 Edit Code Generator $2,850

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4200 Reader and Digital Display $2,850

BTX guarantees superior performance from 1.5 to 1200 IPS even at -18dBm or with any degree of time jitter.

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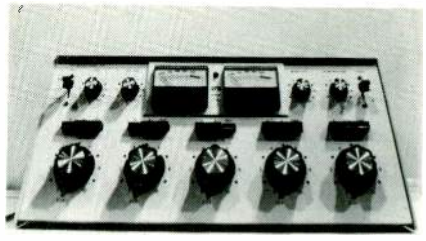
+4dBm for interface with standard line level. At $1900, this machine rates as one of the best buys.

MCI showed a new version of their tape recorder system aimed particularly toward the broadcaster, with a below-deck-level monitor panel that makes the machine easy to assimilate into a broadcast studio. MCI's tape machines have been among the most active advancers of the state of the art over a number of years.

Gotham Audio showed a new version of the AEG-Telefunken Magnetophon, the Model 12 Series, which has the general characteristics of the Model 15 series (introduced a couple of years ago) at a somewhat lower price. Ampex had on display their ATR-100, introduced last year, also at the top of the art for analog recording.

Popular machines at a somewhat lower price level were the familiar models shown by Otari, ITC and Telex. The new Series 250 introduced by Scully last year in prototype appeared at the show in marketable form, and deliveries were promised for about the time this article sees print.

An interesting specialized machine is the CCS-1 crystal sync portable cassette recorder, introduced at the show by Alan Gordon Enterprises. This unit, weighing 8.8 pounds with batteries, claims 45 — 16000 Hz response, ±3dB, and flutter at 0.09 percent WRMS, on a standard cassette. The crystal controlled sync circuitry makes it usable for lip-sync location recording with movie film, eight, 16, or 35mm. It has built-in ANRS noise reduction; its price of around $850 should make it attractive for ENG as well.



LPB "Omega," new five-channel console

McCurdy's new SS7900, for television audio

Auditronics 110A, new production console

Audio consoles

As usual, there were more consoles than anything else, and the intense competition among console makers is having the expected effect of pushing quality up. McCurdy, like some others known for top-level systems, showed mainly new units designed for the audio end of television production and broadcasting. McCurdy's SS7900 consoles have every operation facility that could be considered useful in TV program production, including a score familiarized by the large recording consoles of recent years. The specs are, of course, stratospheric.

Ward-Beck Systems had a massive display of no less than 10 large-scale consoles, undoubtedly setting a record for NAB "console density." Included was a new series, R1200 and R2000, designed specifically for FM and AM stereo; the consoles could be bought with mono modules and converted to stereo later by a simple module substitution. A wide variety of optional equalizers, filters and compressors may be added to the consoles. Ward-Beck also introduced two new models specifically for television audio — the L2042 for medium market stations and

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They Want To Get Ready For AM Stereo

An engineering session titled "How To Get Ready For AM Stereo" drew a full house of around four hundred conferees, but could not be expected to produce definitive directions for this great changeover in AM broadcasting, in the absence of system definitions by the FCC.

The panelists were earnest and most informative. Ed Edison, of Hammett and Edison, San Francisco consultants, described the main problems in adapting directional antenna systems to stereo. Getting a symmetrical load on the transmitter will require very careful handling of the commonpoint impedance, and the distribution to each tower as well. Chris Payne, moderator, noted that AM stereo is going to "send us back to school on antenna engineering."

Dave Harry, Potomac Instruments, said that monitoring for AM stereo was about the same as for mono on frequency and power, but on modulation could be a "bare bones," overall measurement, or could go on to show efficient use of spectrum by measuring L+R and L−R levels, separation, and other characteristics. Because of the susceptibility of the AM stereo signal to sideband spreading, the monitor system might well also include some form of spectrum analyzer to show whether or not sidebands are under control. Chris Payne followed Harry's talk by asking the audience if they would prefer a "bare bones" modulation monitor or the much more elaborate and presumably much more expensive one described by Harry. The audience voted nearly unanimously for the more elaborate monitor.

Jim Loupas, consultant of Chesterton, IN., talked about the changes in studio equipment that will be necessary. After the required new stereo console and stereo processing system, he recommended a sharp upgrading of turntables and cart machines—if these are more than a few years old. The whole audio line must have much better frequency and distortion characteristics than those long acceptable for mono AM. For example, the old standard signal/noise figure of turntables of around 36 dB won't be good enough. Carts and microphones can be left in mono, as many FM stereo stations are doing. But open reel tape machines in most cases must be replaced.

Loupas also estimated the main cost of conversion at around $3500 for the new exciter, $3500 for the monitor, with the studio changes to be added. The last can cover a wide range, with each management deciding just how far to go.

W.D. Mitchell, Continental Electronics, discussed the prospects for AM stereo receivers. He said that costs studies had shown that a car receiver for AM stereo would cost a little less than an AM/FM car receiver, now a very popular type. So there seems little difficulty on that score in developing a large market for AM stereo.

But while the responsible broadcasting management personnel are looking toward AM stereo with eager hope, the proponents of the various systems and the FCC are locked in a many-sided struggle to disentangle the comparative merits and demerits of the systems. Apparently the testing done so far was neither comprehensive nor conclusive enough to eliminate large gaps in comparative analysis. In reply comments, each of the system proponents took advantage of those gaps to uncover faults in the competitive systems. The differences between what one proponent says about his system, and what the others see in it, are quite large in many cases.

The FCC has not set any date for appearance of the decision on AM stereo. This will, presumably, suggest a definite system and invite industry comment. FCC personnel have said they are hoping for action by the end of this year.

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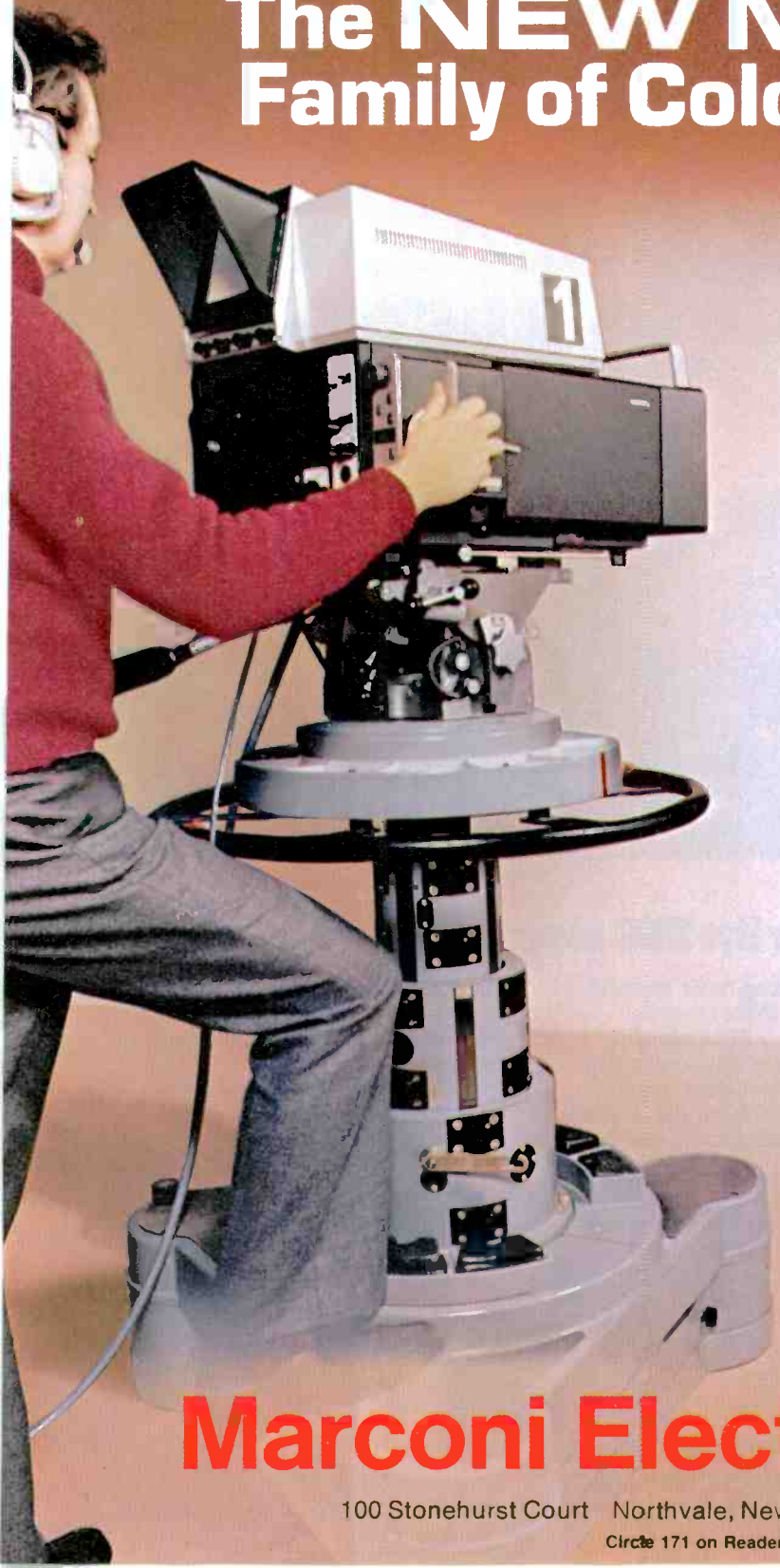

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the L3242 for larger stations. Another unit in the huge display was the M2484 console, for multi-track recording and television broadcasting. And there was also the M1002 transportable console, with 10 channels each boasting mic/line capability, two outputs, PFL/SOLO functions, 100 Hz internal oscillator, and a number of other features.

Neve also emphasized television sound production with their new Model 5315/24, designed specifically for that function in medium to large TV stations. It has an array of dozens of operating features, comparable though not identical to those of the other top-grade "boards" already described. In this console Neve's designers have eschewed integrated circuits in many spots for what they assert is better control of performance with carefully chosen discrete components — an interesting counter-trend.

Pacific Recorders and Engineering brought the new BMX-12, another unit aimed specifically at the medium-market broadcaster, which has performance characteristics on a par with those of this firm's larger System 1 units (introduced at earlier NAB shows). It has up to 14 input positions, stereo program and audition outputs, CMOS channel status and remote control logic, plus fully modular assembly, for flexible expansion or rearrangement. Price is in the $7500 to $10,500 range, depending on options.

Audio Designs and Manufacturing also had a totally new series of consoles aimed especially at the broadcaster. Models 1600, 2400 and 3200 have 16, 24, and 32 inputs respectively. They are more thoroughly modular than earlier designs, with high flexibility to meet customer requirements. The specs are at the expected top level, and operating refinements are plentiful, in line with those of other "state of the art" consoles noted here.

Ramko, showing their line of DC controlled consoles, the DC-12 and DC-38 (introduced at earlier shows), emphasized that the use of transformerless high impedance inputs allows the units to be used as mono consoles by bridging inputs, if a station wants to get ready for AM stereo.

Auditronics, a main supplier of broadcast consoles for a long time, brought the new Model 110A, a refinement of earlier similar consoles with a full complement of operating features aimed at program production. There are 18 inputs, four outputs, PPM indiciators, digital clock, and many other aids to production. They also showed the 501A, a redesign of a larger console with the input section enlarged to 32 channels.

Neve's 5315: TV audio in large stations

McMartin brought the new B-1000 Series of consoles with five or eight channels, mono or stereo, all inputs convertible to mic or line, vertical or rotary faders. Each has a 15-watt monitor amplifier and modular design. The series is aimed at simple, reliable performance for the smaller broadcast stations.

LPB, a specialist for many years in consoles and other systems for the smaller stations, had the new Omega Series of five-channel units, in stereo and mono. With many flexible operation features comparable to those of much larger boards, and excellent specs, the stereo model S-22 costs $1595, while the mono S-23 goes for $1295.

Another new unit for small to medium stations is the Beaucart Console brought by UMC, with eight channels expandable to 16 by top of board plug-ins. Modules plug into the mother board with gold-on-gold contacts. Each channel has three switchable inputs. The console has many operational refinements, and distortion is rated typically less than 0.07 percent at 1000 Hz at rated output.

Some new console makers were on hand — and there are new ones every year in this endlessly expandable sector of the industry. Richmond Sound Design, a Canadian manufacturer out of Vancouver, showed the Model M82B, an eight channel system, expandable to 24, with many operational refinements taken over from the recording industry and now standard in broadcasting. The consoles are marketed in this country by Listec Television Equipment Corp. of Plainview, NY. Price of the eight-channel model is $2545.

Hallikainen and Friends, another firm new to the NAB, brought a television audio system, the TVA Series, which consists of rack-mounted units designed specifically to handle television audio. The system has six channels, expandable to 36, and both audio-follow-video and manual control are provided. Switching, metering, cue, etc., are all highly flexible.

Another console maker new to NAB was Satt Electronik, of Stockholm, Sweden, whose American agent is Bayly Engineering of Ajax, Ontario, Canada. The board shown is a portable mixer called SAM-82 which has eight mic/line inputs and two main outputs. It will run on AC or on a battery, for which space is provided in the cabinet. There are two auxiliary outputs for cue, and echo and studio playback, monitoring test oscillator. Meters are PPM.

Audio Designs' new broadcast console series

MCI: automated console in JH Series

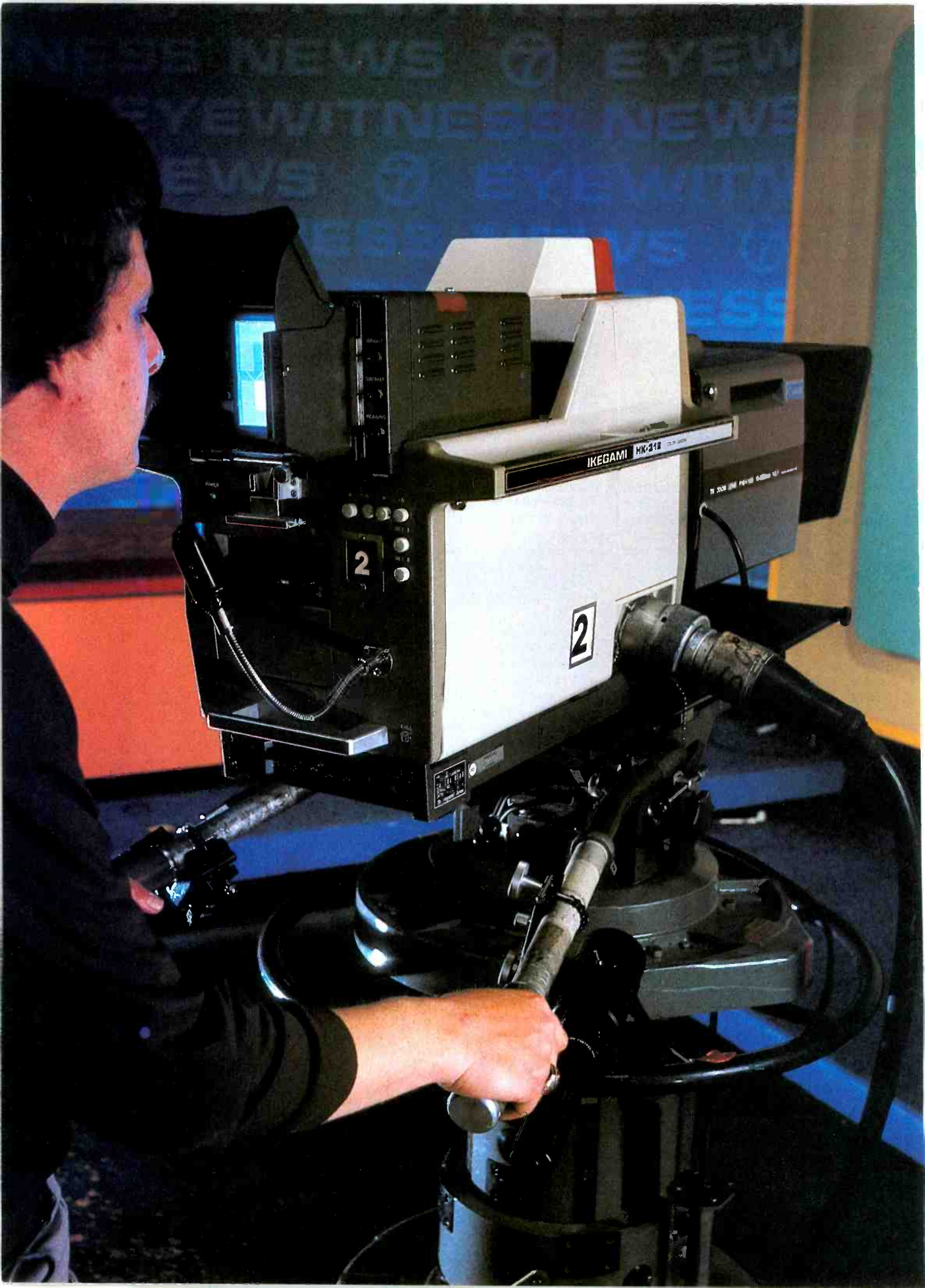
Consoles were also on display from many firms supplying them over a period of years, including Ampro, Cetec, Harris, RCA, Automated Processes, and MCI, who produce among them some of the finest boards available. Like most preceding NAB conventions, this one was a great show for buying consoles.

Audio processors

The pressure for higher audio quality in radio is evidenced particularly by the high interest in audio processing equipment, as was clear in the engineering session, "AM/FM Quality Versus Coverage" (see box). FM has made great strides in the last few years in this area, but AM, which starts much farther back, still has great problems, as the panelists in the engineering session emphatically pointed out.

The general approach of the new Orban Optimod-AM, promised at last year's show and demonstrated at this one, seemed right for the difficult situation of the AM broadcaster. The main difficulty is, of course, the very low quality of the average AM receiver and the high variability in that quality. The Orban processor, as described by Robert Orban in the March issue, puts the audio through a highly sophisticated

continued on page 126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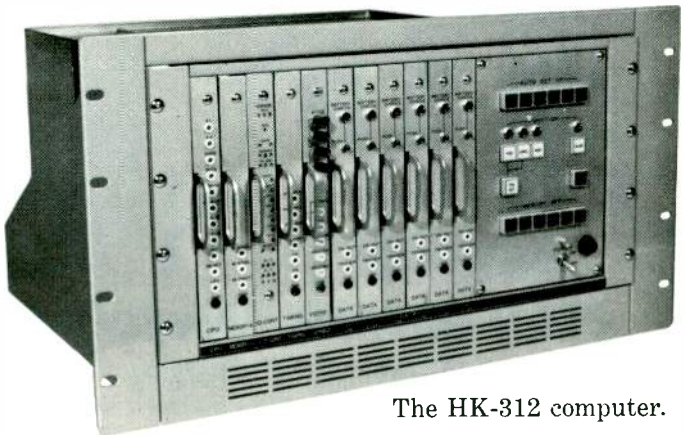
For details or a demonstration, ask Ikegami Electronics (USA) Inc., 29-19 39th Ave., Long Island City, N.Y. 11101; (212) 932-2577.



The HK-312 computer.

Ikegami

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series of six "treatments" designed to get the most out of a bandwidth of about 100 Hz — 11 KHz, considered the optimum for the existing AM transmission link. The Orban design takes into account in a fundamental way the average AM receiver, and this was emphasized in the demonstrations of the unit: results were shown by a small "broadcasting" operation in the Orban suite, with an array of small car and table radios, completely typical of the super-abundant low-grade equipment that is out there in the millions.

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Once Again: Quality Takes The Ring Against Loudness, This Time With A Heavier Punch

As did a number of industry meetings of recent years, NAB Las Vegas staged a rematch between Quality in a radio signal and the Loudness considered by many managements necessary for profitable coverage, in an engineering session titled "AM/FM Quality Versus Coverage."

This time, quality had a beefed-up attack drawn from the accumulation of evidence on audience reactions to poor quality, plus the foreshadow of AM stereo, which will offer a growing segment of the public a much higher-grade AM signal than that now commonly available (if the receiver manufacturers join up; see below).

Panelist Jim Loupas said that today the main challenge to both AM and FM coverage is *quality,* namely the much higher quality available to millions in their hi fi equipment. AM is hopelessly outclassed; FM suffers less, but nonetheless definitely because of the heavy audio processing considered necessary by many managements. Panelist Harvey Rees corroborated this by pointing out that the listener is not necessarily for loudness. He (she) wants a station he can listen to without fatigue. A careful study of ratings shows that whatever the format, good sound tends to keep the listener tuned in. He doesn't know why he tunes some stations out; the real reason is distortion-fatigue. Rees remarked that cascading new black boxes won't solve the quality problem for the radio station with older equipment. The relationships all along the audio line must be carefully controlled; but before that, the station must start with high-grade equipment. For many AM stations, this is inevitably going to cost money—but the investment will be necessary to keep the station competitive.

Dick Schumeyer of Capital Cities Communications said there is a point of no return on loudness, with distortion cascading to the point of driving the listener away. He said that in the last ten years AM quality has got worse and worse, as delivered by the average small AM radio. He is worried about what will happen if and when AM stereo takes the pass band of the AM receiver up to six or eight kHz, which will let a lot of the "crud" on the air come through.

Jack Williams of Pacific Recorders and Engineering backed up Schumeyer on the abysmal quality of many AM receivers. He described tests in which he recently participated, which uncovered receivers beginning to roll off sharply at 1500 to 2000 Hz. He was hopeful, though, that with the incentive of AM stereo a number of set manufacturers would develop improved receivers. He reported his experience that most station managements are objective about most parameters of the broadcasting plant, but not about audio processors—on processing they move in counter-productive directions.

Eric Small introduced a radical idea with some hope attached to it. He said a number of specialists are asking: is it really necessary to keep the FM signal from going over 100 percent modulation for very short peaks? Does anybody really know what this does to the spectrum of the signal? It may be that even 200 percent or 250 percent modulation for very short peaks will not cause troublesome interference with adjacent channels. If this proves to be true, and if the FCC rules on modulation are modified to conform to the reality, it is possible that unprocessed audio at a high average level can be applied directly to the transmitter, with a great improvement in quality and loudness both. An FCC inquiry into the matter is now underway.

A station manager in the audience added a personal note that strongly reinforced the sense of the meeting. He runs a simulcast station, and said that recently by operator error the dummy load got left in on the AM transmitter for a short time. There were exactly two calls from unhappy listeners. But several days later, when the FM transmitter went off the air for a *very* short period, the phone rang off the hook. Surveys show that between 80 percent and 90 percent of his audience are now listening to the FM signal.

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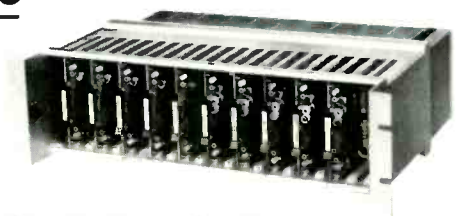
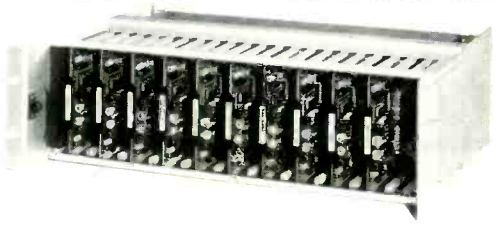
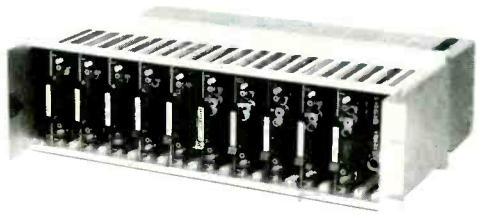


D-603 Video Distribution Amplifier, individual P.S., 6 outputs, optional continuously adjustable cable equalizer for up to 1,000 feet coaxial cable



D-606 Video Distribution Amplifier, individual P.S., 6 outputs, DC restorer, optional continuously adjustable cable equalizer for up to 1,500 feet coaxial cable



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D-605 Subcarrier Distribution Amplifier (not shown), individual P.S., three outputs from each of two independently adjustable channels.

DF-603 Rack Frame, 5¼", for up to ten D-603, D-604, D-606, or D-507.

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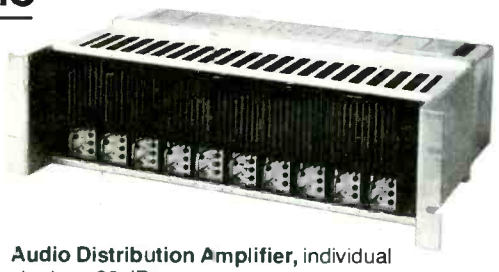
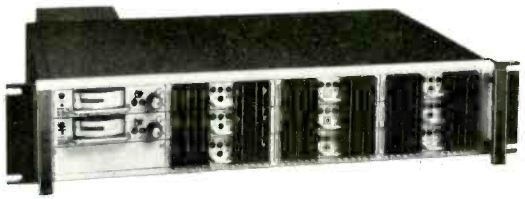
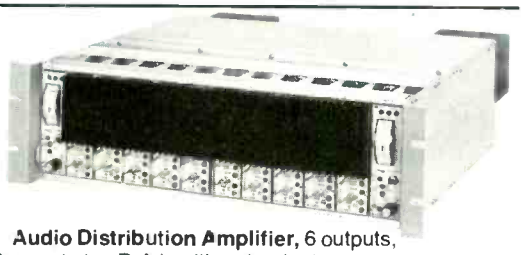


D-507 Audio Distribution Amplifier, individual P.S., 6 outputs, +30 dBm



D-501 Audio Distribution Amplifier, 6 outputs, +24 dBm, up to nine D.A.'s with redundant common P.S. in 3½" rack frame



D-509 Audio Distribution Amplifier, 6 outputs, +30 dBm, up to ten D.A.'s with redundant common P.S. in 5¼" rack frame

NEW PRODUCT!!!

D-518 SMPTE Time Code Signal Distribution Amplifier (not shown), individual P.S,. six outputs, balanced.

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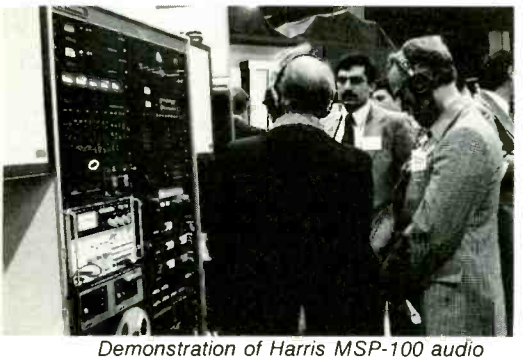

Demonstration of Harris MSP-100 audio processor, now ready for both AM and FM

Eric Small "Telesis," computerized ATS

By switching from an unprocessed broadcast to one incorporating the Optimod, Orban showed the tremendous difference in sound quality available on each of the receivers: highs came way up, distortion dropped. The *variability* among receivers is met by having wide *adjustability* on the processor, and the instructions emphasize that the program director of the station using the unit has a trade-off among loudness, brightness, and distortion: he must decide, taking into account his format and the receivers the majority of his listeners have, how to balance these factors.

Orban said that the system is AM-stereo compatible, with provision for plug-in of a stereo adaptor when the time comes.

Similar broad adjustability is incorporated in the Harris MSP-100A, the AM version of the Harris FM processing system introduced at the last NAB. The Harris FM processor, like the Orban Optimod-FM, has sold extremely well, further evidence of the pressure for a state-of-the-art resolution of the processing problem. The AM version, released later, is now just beginning to find a market. The design approach is similar in a number of ways to that of the Optimod, with a broad complement of adjustments allowing choice of many performance parameters. Harris says the system is fully AM-stereo compatible. The demonstrations of the system on the exhibit floor were convincing on the point that the system could be adjusted to handle just about any processing requirement, AM transmitter character, or sound-format philosophy.

Orange County Electronics also demonstrated their VS-1P AM processor, also designed to get the "sparkle" back into the small AM radio. The trials were less comprehensive than those of the other two systems described, but the results certainly made the system seem worth investigating, particularly with a price around $2500.

Track Audio, a firm new to the NAB, with headquarters in Federal Way, Washington, showed their TA Discriminate Audio Processor II, which they say is for AM, FM, and TV audio. It has a three-band compressor system and an array of controls: "you decide what you will sound like." Evaluation of the unit must wait on a period of use; at the least, it reinforces the trend to the "new style" in processing, with split-band compression and great flexibility of adjustment.

RCA brought an interesting unit, the "DOC Processor" (digital overshoot compensator), which is *added to* standard FM processors for the purpose of reducing the distortion from filter overshoot. This clever system uses digital circuitry to keep the signal-plus-ringing at 100 percent, when the over-

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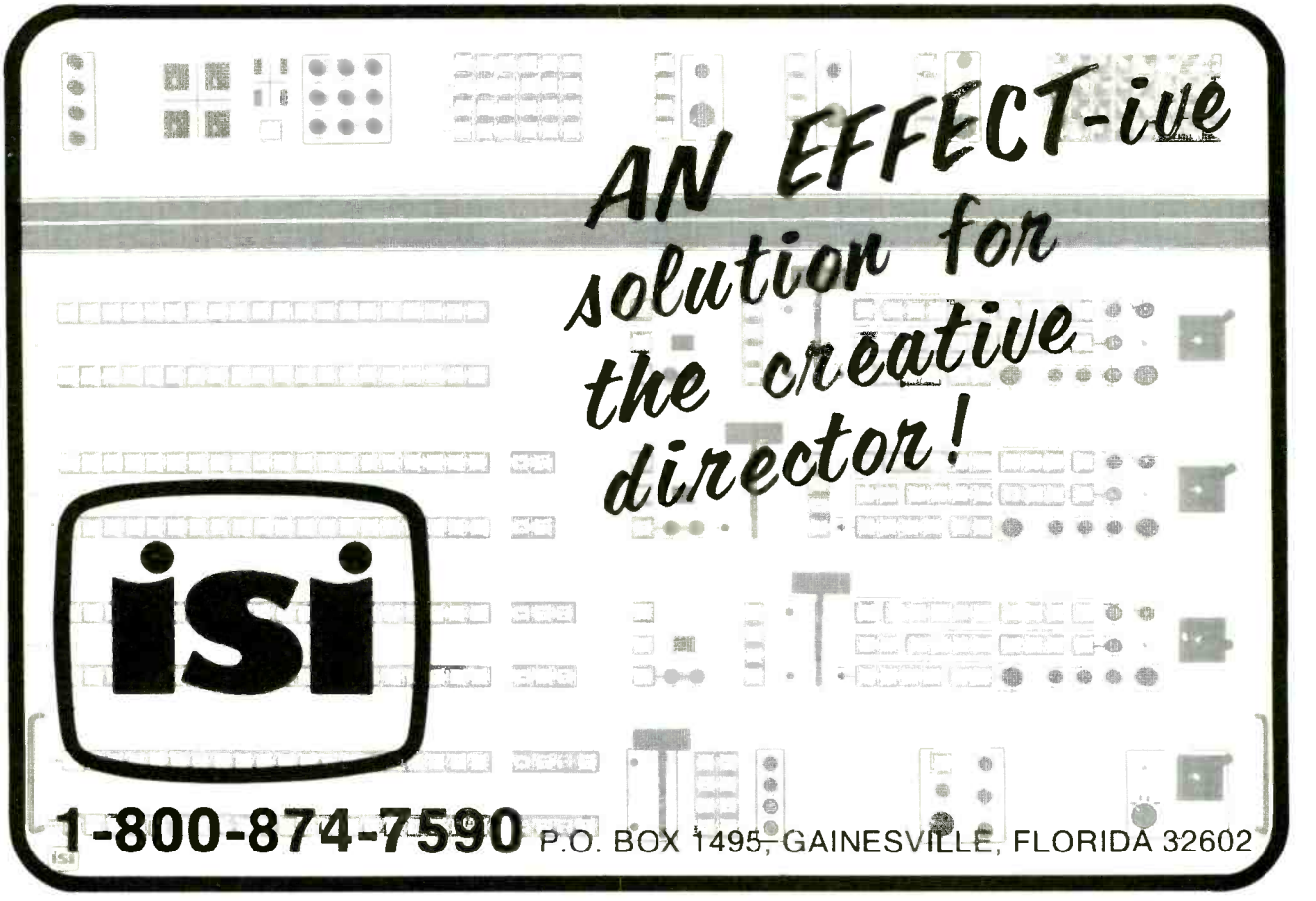

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shoot would have gone higher, with its overmodulation and distortion. A demonstration of the DOC in the RCA booth showed the "clean-up" effect with heavily modulated FM signals.

Among firms showing processors that have been on the market for some time, and are doing well, were Inovonics, Moseley and Pacific Recorders and Engineering.

BM/E concludes that audio processing is going to be a very active field for a long time to come. AM stereo, and the probable broad lifting of AM quality that will accompany it, makes new approaches to audio processing certain.

What should be a useful special-effects device was shown by MICMIX: the "Dynaflanger," which provides flanging that is controlled dynamically by the frequency of the signal or the amplitude; or, it can be controlled manually or by external signal. It has LED indicators for peak level and notch spacing. It also provides reversible dynamic tracking: the flanging can go "down" as amplitude goes up, for example. The unit is already on the market.

Automatic transmission systems

ATS got a good start at last year's NAB with several firms showing ready, or almost ready, equipment. But the market did not develop with the strength that many people (including, we are told, the FCC) expected.

ATS manufacturers reported at this year's show that there is positive movement, but it is slow. All the systems on the market meet the FCC requirements for ATS, differing in the refinements of control.

QEI, with their Model 7775, designed so far for FM transmitters and introduced last year, reports about half a dozen installations, with a number of others on the way. They promise to have an AM version soon, probably in Fall 1978. They're finding useful a leasing plan which eases the capital problem for the smaller stations. As in many such plans, purchase can be at a later date, with lease payments taken into account.

The Widget Works of Medina, Ohio, who also brought a system last year, have also made a number of installations. Their Automatic Transmitter Operator is billed for both FM and AM. Like others in the field, they are waiting for the FCC to pin down the rules for directional antenna stations and TV, and promise equipment when the requirements are known.

Eric Small and Associates had information and prototype units of the "Telesis" control system described at last year's NAB. This is much more elaborate than the others listed, with computer software replacing the hard-wired switching functions, and easily adding almost any additional functions the user wants. The system will be offered for AM, directional and non-directional, FM, TV, or any combination. It combines conventional remote control, tolerance alarms indication, and auto-logging, but is essentially unlimited in the functions available. It is correspondingly more expensive than the switched systems — prices will vary according to the functions wanted — but a "standard" system, according to Eric Small, will be priced at something like $30,000.

Potomac Instruments had on display a developmental system for complete control and telemetering of a station with directional antenna arrays. It uses a microprocessor, with software to set up a wide range of functions: control in accordance with the FCC ATS rules; tolerance limits with wide and narrow bands; clock functions; control of the antenna system, etc. The system was brought to get broadcaster reaction as a guide to marketing plans, and will later be set up on an experimental basis in a Washington station. Final determination of the design must, of course, wait

continued on page 132

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"We selected the Series 4000 because of its outstanding practical features. Your choice of ten different key sources...and the ability to key in eight different places, make it a beautiful addition to our production facilities.

Also the ability to do titles and composite chroma keys over buses before entering mixed effects was a big selling feature.

"All this, plus the downstream keyer's ability to do title keys as well as composite chroma keys. The switcher has opened a whole new world of creative possibilities for our directors." Thanks Herb, for the kind words!

For details on the full line of DRC switchers, call or write. Carl A. Hedberg

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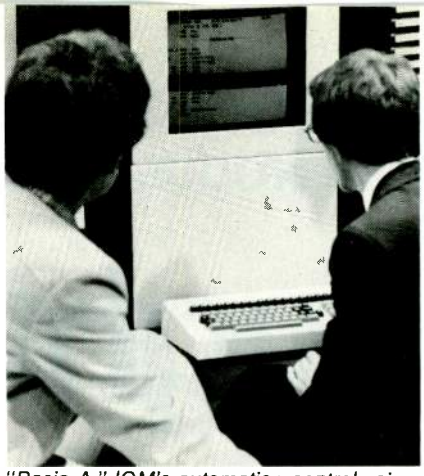
for the issuance of the FCC rules for directional antenna stations.

Micro Controls, Inc., new to the NAB, had preliminary information on their ATS, due on the market in a few months. It is designed as a single stand-alone unit, and provides all the functions required by the FCC. Modulation monitor is built in, and LED display shows overmodulation counts per minute. The number of bursts allowable in a one minute period is selectable with a front panel control.



"Basic A," IGM's automation control using plain English commands and system replies

Program automation

Automation has been a fact of life in radio stations for more than a decade, but it keeps moving ahead. As noted in the introduction to this show coverage, the invasion of nearly every part of broadcast technology by the microprocessor is one of the most important technical facts of the moment. And it is mainly the microprocessor that is giving automation equipment its latest "look."

The changes can be summarized as large increases in flexibility, capability and simplicity of operation, coupled with a reduction in cost and space requirements.

Three new systems at the show exhibiting these advances were the Cetec Schafer 7000, IGM Basic, and Broadcast Electronics "Control 16": the last is the first venture for this firm into station automation.

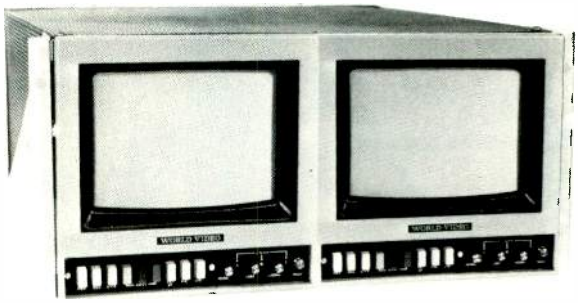
All include greatly simplified keyboard operation, with CRT readout to show the operator what is going on at all times. All three companies emphasize the fact that a non-engineer can run their systems after a very short indoctrination.

The Cetec Schafer has a standard 1,000 event memory expandable to 10,000; capacity for 16 audio sources, expandable to 64; and can use up to four separate keyboard-CTR channels for control and monitoring. Entries and system responses are in plain English. The read-out looks ahead 19 events, or can look back five and ahead five at the same time. Changes in the sequence can be made right up to air time. Real-time operation is available, as is "load/list programming," using a digital cassette to hold up to seven days'

Broadcast Electronics' "Control 16," another system with microprocessor control

Cetec-Schafer 7000 automation demonstrates itself in 15-minute trial run

The Ultimate In Color Monitors For EJ And EFP



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programming, off line, for insertion when needed.

BM/E watched the 7000 go through its paces and was impressed by the ease of entry and correction and the simplicity of operation. The same characteristics were strongly evident, also, in a demonstration of the IGM "Basic A" system. Again, plain English was used in addressing the control, and by the control in responding to, or correcting, the operator.

The IGM control has something a little different, though. The various groups of entries shown on the CRT are in *color*, a different color for each kind of information. This is a help to the operator in reading the CRT when there are many entries or other information displayed.

The IGM system can be used to control a wide range of automation configurations: large and small multi-cart installations plus any number of reel-to-reel machines, plus live studios, etc. It can be a full automation system, with nearly everything that goes on the air stored in recorded form, or it can be a "DJ assist," with the announcer doing a lot of talking and using the system to get the music on the air without effort on his part. The Cetec system does this beautifully, too, as do most current automation systems.

UMC demonstrated their system for automatic recording of audio news bulletins and actualities sent out by the wire services (AP, UPI, etc). The system holds as many carts as are needed (UMC believes eight is the minimum for efficient use). Recording is started by the touch-tone sent out from the wire service, and stops automatically at the end. Indicator lights show the status of carts — recorded, blank, etc. — so that a full-time operator is not needed.

Broadcast Electronic's "Control 16" is, as noted, the first product of this kind for this firm. Again, the combination of powerful capability and simplicity of operation is emphasized. BE says the system can be used for Sequential Programming (for cartridge programming), for Main/Sub (for reel-to-reel syndicated programming), or for Time Insertion. The memory holds 3000 events, each of which can be put through any of 11 functions. In the time mode there are 500 entries, with 18 functions each. This system, too, can be used as a DJ assist.

Automation systems available for some time — Harris System 90, Sono-Mag DP-2 — were on display and, as reported in this magazine in earlier years, have similar capabilities.

Sono-Mag did have a new automation programmer, the ESP-1, applicable to most automation source configurations, and intended to bring the new high-capability automation at moderate cost. It has a 4000 event memory, CRT readout, built-in diagnostic routines, and according to Sono-Mag is fully compatible with all high quality format services and audio processors. It supplies a series of standard functions available with number codes applied to the numerical keyboard, and has fail-safe underprogramming.

The multi-cart scene was a continuation of last year's. International Tapetronics had their 1K, 1000-cart machine on display, still in a prototype stage though advanced over last year. The machine will not be marketed directly to broadcasters, but will be available as a unit in automation systems from the regular automation equipment builders. IGM had one of the ITC systems in their booth and were demonstrating its operation under control of the IGM "Basic" system.

The Cuerac Australian 500-cart machine, marketed here by Consolidated Electronics, has moved onto the market in some force since last year. It is now made entirely in this country with mainly American parts. According to Consolidated, interest at the show was extremely high with many station managers agreeing that the 500-cart size was attractive for holding a station's entire active cart library.

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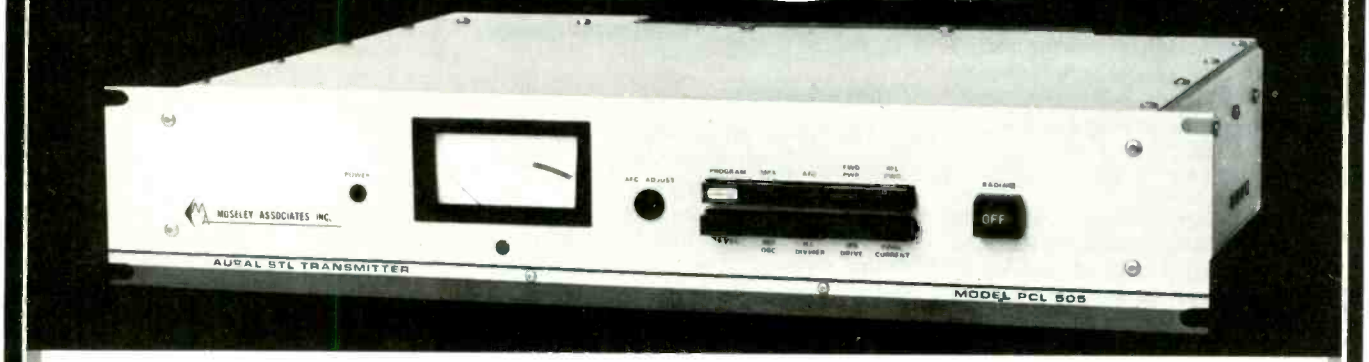
"THE STL"



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Cart machines

Cart machine manufacturers continue to compete, vying with each other to offer low prices and no-cost extras.

Harris introduced a new addition to its 'inflation fighting' Criterion 90 series. The 90-3 is a three deck playback unit in a single space-saving package, employing a high torque motor, phase lock circuitry, and air damped solenoids for pinch roller actuation. Ampro showed the Tri-Deck, a new, low cost triple deck cartridge reproducer. The Tri-Dek includes completely independent control systems for audio playback, cue detection, logic control, and power supply regulation. Featured on this model are remote digital logic control, low distortion, and individual hi level audio outputs from each deck. Ampro is also offering a reload indicator and LED peak record level indicator on their cartridge tape equipment at no cost.

Other cart lines seen on the floor were those of Cetec/Sparta, UMC, Telex, and Audi-Cord.

Capitol Magnetics promised a new cart last year. This year they delivered it — a new high output, low noise tape in a new cartridge with a redesigned tape path for tension stabilization, and other features aimed at quality improvement and stereo phase stability.

3M company demonstrated a new electronic editor for audio cassettes. The CE-20 eliminates the need to master and edit on reel-to-reel before transferring to cassette. This system offers speed and convenience and the ability to preview edits, which assures matched sound levels and perfect spacing between words or sound segments.

Microphones

The most innovative development in microphones came from Calrec — the CM4050 Sound Field Microphone. Strictly speaking, the unit is a system rather than a "microphone." Using mathematical sampling techniques and special electronic circuitry, the system picks up sounds and records several levels of sound intensity discretely on a special format tape system. Thus, the directional character of the "microphone" can be synthesized by varying the relationships of the different orders of intensity recorded. All standard acceptance patterns, from omnidirectional to figure-of-eight, can be synthesized in real time or in post production of the special format recording.

Wireless microphone systems were shown by a number of exhibitors. Cetec-Vega had their new models 66 and 67 portable dual channel diversity systems. Thomson-CSF showed a wide range of five- and dual-channel diversity receiving systems. HME displayed their System 22 lapel model with pocket transmitter, and the System 25 with handheld transmitter.

Sony introduced a wireless mic for ENG. This system is extremely compact and uses the WRR27X receiver and K1010 transmitter. Also shown was the K1055 full diversity system which uses a Standard Base Station and is modular in design.

Shure featured the SM81, a rugged, highly directional mic for studio recording and broadcast. Emphasis at the Electro-Voice booth was on the System C, a group of components, modules, and accessories that can be configured into any type of condenser microphone needed.

Loudspeakers

QRK showed the DB-1 "Mini-Monitor," designed for use in radio and TV control rooms. Basically, it is a two-way system incorporating a 10-inch passive radiator that smooths out low frequency response. An eight-inch acoustically suspended woofer and a 1¾ inch phenolic-ring, flair-domed tweeter employ a cross-over at 4500 Hz. Frequency response is 55 to 18000 Hz, and power handling capacity is 30 watts. Electro-Voice showed their well-known line of monitor speakers. Russco was also on hand with a line of ALC loudspeakers and columns. Technics showed the SB-7000A, a three-way bass-reflex monitor speaker system with a 13¾ inch woofer, cone-type midrange 4¾ inch driver and dome tweeter in a Linear Phase configuration. The SB-7000A will handle a 150 watt peak power input.

Intercoms plus

There was an upsurge of intercom systems of advanced design, another technique benefitting from microprocessor resourcefulness. Automated Processes called theirs a "Communications System," since it distributes audio signals at broadcast quality levels (rated ±0.5 dB, 20 Hz to 20,000 Hz, 0.25% THD Max). This allows the system to be used not only for standard intercom purposes but for cueing, monitoring, and even program distribution in the broadcast plant. It is a "hub and spoke" system, with each terminal connected to the central switching unit by an unshielded, four-conductor, standard telephone cable. Two conductors are used for two-way audio, two for data and switching instructions. The switching is accomplished with solid state crosspoint cards, under control of a microprocessor. All electronics units are on plug-in cards. With functions established by software, the system has great flexibility and variety. Two-way conversations, conference loops, privacy mode, and many others are available, with either push-to-talk or hands-free two-way operation. The standard system allows up to 80 terminals; larger systems can be had on order. Automated Processes points out that since the system is highly modularized, with all main electronic functions in the central unit on plug-in cards, customizing can be rapidly carried out.

The system is also marketed independently by Thomson-CSF.

Audio Designs and Manufacturing showed their new 2000 Series intercom, well adapted to many requirements, with standard 10 x 10 up to 40 x 40 configurations. It distributes audio at line level, with preamps at the mics and power amps at the speakers. It allows for two-way conversations and conference loops of various sizes, and also has high-quality audio for auxiliary monitoring functions.

A simpler system shown at the show is the Nova-Com made by World Video, and sold by them in the East, and in the West by System Associates of Conoga Park, California. Nova-Com consists of individual call-talk terminals all connected in parallel on a four-wire cable, such as standard telephone installation cable. The power supply, 24 VDC, can be connected anywhere along the line. Additional terminals can be connected on the line at any time. Standard capability is up to 14 stations, each of which can call any other station, or can call all stations. The calling station is push-to-talk; the called station is hands free.

RTS Systems of Hollywood, a firm not previously seen at the NAB, showed units from their elaborate "TW" series of intercoms designed primarily for "entertainment and industrial use," and finding wide use, according to the maker, in television production operations. Stations are connected by a two-wire cable that carries both signals and power. Up to 50 stations can run on one power supply, and distance from supply to station can be up to 2000 feet (further with heavy-gauge wire). Portable stations use belt

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For more information circle bold faced numbers on Reader Service Card. *Turntables:* Gotham EMT-950, **477;** Technics SL1500, **478;** Russco Electronic, **479.** *Tape recorders:* Studer A800, **480;** Technics RS-152OUS, **481;** MCI Broadcast, **482;** Telefunken 12, **483;** Alan Gordon CCS-1, **484;** Scully 250, **485.** *Consoles:* McCurdy SS7900, **486;** Ward-Beck R1200, R2000, L-2042, M1002, **487;** Neve 5315/24, **488;** Pacific Recorders BMX-12, **489;** Audio Des. and Mfg. 1600, 2400, 3200, **490;** Auditronics 110A, **491;** McMartin B1000, **492;** LPB S-22, S-23, **493;** Rich. Sound M82B, **494;** Hallikainen TVA, **495;** Satt SAM-82, **496;** UMC Beaucart, **497.** *Audio Processors:* Orban Optimod-AM, **498;** Harris MSP-100A, **499;** Orange Co. VS-1P, **500;** Track Audio TA, **501;** RCA DOC, **502;** MICMIX Dynaflanger, **503.**

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packs and headphones with attached mic; rack mount stations use the same headphone/mic combinations. There is also a wall-mount station consisting of a plug-in module which replaces the intercom module on the RCA TK-44, TK-45, and TK-46 television cameras. A number of other variations and accessories are available.

Loggers

Automatic logging is, of course, an integral part of most automation systems, but a separate logging system may be needed in some cases. Hallikainen and Friends showed a two unit logging system with straightforward operation. The two units are the encoder and decoder. The first takes ASCII-coded English data from a CRT terminal and records it on the cue track of the program cart: the logging data is recorded in very small space, so that even a 10-second cart will carry it. When that cart is put on the air, the logging data goes to the decoder, which provides an English language printout, fully capable of acting as the official log.

Audio input equipment-phono preamps

The broadscale upgrading of audio quality now under way was strongly evident in the new preamplifiers for phono pickups at the show. Micro-Trak introduced the Model 6405 stereo preamplifier, with integral power supply, 44 dB of gain, RIAA equalization (±0.5db), and THD rated less that 0.05% at one kHz at +10 dBm output. It has individual level controls for each channel. Output is 600 ohms balanced, 0 dBm nominal, +12 dBm maximum.

Technics of Panasonic showed their SU-9070 preamp, developed for the hi-fi market, with multiple switched inputs, but providing very high quality on phono inputs (100dB S/N ratio is claimed).

QRK had a new compact phono preamplifier, the Alpha I for mono and Alpha II for stereo, again with the extremely low distortion and flat response of the latest generation of preamps. Gain is adjusted by an attenuator at the output, to maintain the signal-to-noise ratio.

A new stereo phono cartridge from Stanton Magnetics, the Model 881S, has a different design from the company's earlier pickups: it is a moving magnet type rather than moving iron. The claimed chaacteristics carry it a little beyond the company's earlier models, which have been very popular in broadcast stations, and the price of $150 makes it the premium cartridge for this company.

Another supporter of the audio quality upsweep is the new audio distribution system introduced by Audio Designs and Manufacturing. Each DA16 amplifier is a plug-in unit with one input and six outputs, all transformer coupled for input and output levels of +24 dBm. Distortion is under 1 percent at that level, and other characteristics are similarly top-grade.

For more information circle bold faced numbers on Reader Service Card: *ATS:* QEI 7775, **504;** Widget Works ATS, **505;** Eric Small Telesis, **506.** *Automation:* Cetec 7000, **507;** IGM "Basic," **508;** BE Control 16, **509;** Sono-Mag ESP-1, **561;** Cons. Elec. Cuerac, **510.** *Cart machines:* Harris 90-3, **511;** Ampro Tri-Deck, **512;** Capital cartridge, **513;** 3M CE-20, **514.** *Intercoms:* Auto. Processes System, **515;** Audio Des. and Mfg. 2000 Series, **516;** World Video Nova Com, **517;** RTS "TW" series, **518.** *Automatic Logging:* Hallikainen auto-logger, **519.** *Audio input:* Micro-Trak 6405 preamp, **520;** Technics SU9070 preamp, **521;** QRK Alpha I and Alpha II preamp, **522;** Stanton 881S phono pickup, **523.** *Microphones:* Calrec CM4050, **524;** Cetec-Vega 66 & 67, **525;** Thomson-CSF Diversity, **526;** HME System 22 & 25, **527;** Sony wireless, **528;** Shure SM81, **529;** Electro-Voice System C, **530.**

RADIO AND TV RF AT NAB

HEAVIER COMPETITION in the TV transmitter area, a new AM entry from Rockwell-Collins, more solid state transmitters (2 kW from Wilkinson), klystron advances, more remote pickup equipment, and new remote control equipment gave broadcasters with RF responsibilities plenty to see. (There were also new developments in ATS, a subject covered in Radio Equipment at NAB.)

Weather radar systems blipped their way into this year's NAB with four sources, no less! (See below.) And as was predicted, circularly polarized TV antennas got plenty of attention. The status of CPTV was reviewed by Peter Onnigan of Jampro, Dr. Matti Siukola of RCA, and G.W. Collins of Harris on April 10. New products for this market are reviewed later on in this section.

Competition in transmitters — especially TV — heats up

There were several notable developments in TV transmitters — some marketing, some technical. From a marketing point of view, NAB 1978 was remarkable by virture of the larger number of manufacturers. NEC was there with VHF & UHF, as was Townsend as a new VHF supplier. Thomson-CSF became prominent as a supplier of exciters which are incorporated into CCA's new VHF line. A new-to-NAB translator supplier was Television Technology Corp.

Technically, the news was more efficient klystrons, more solid state transmitters/translators, and high-power internal IF diplexing, wherein visual and audio carriers use the same

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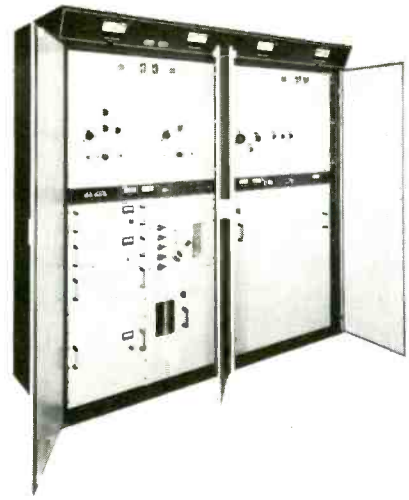
RF components. This concept, being used in other countries, was promoted by Acrodyne, and its engineering v-p, Nat Ostroff, delivered a paper on the subject. The FCC is considering allowing this approach in the U.S.

While NEC is a new transmitter source as far as U.S. broadcasters are concerned, the company has been in the field with both TV and FM transmitters since 1956. It claims to have over 60 percent of the market in Japan, and has more than 450 transmitters installed in 35 countries worldwide. NEC was an early developer of IF modulators. At NAB 1978, NEC announced their new PCN-1000 series which uses solid state RF power amplifiers and air-cooled tubes.

The use of high-powered transistors and newly developed high gain tubes makes it possible to reduce the number of tubes. Solid state exciter/drivers offer additional performance, reliability and better color standards than conventional transmitters, says NEC. Since the same type tube is used for both visual and aural power amplifiers, replacement inventory is cut in half. Power consumption is reduced with the aid of avalanche-type silicon rectifiers.

Pre-correction for phase distortion is made by an active circuit which can be compensated to the minimum value of group delay response. Automatic control equipment is optional.



Philips 22kW lowband VHF transmitter is compact

Linearity correction is provided at the IF stage for good control. The following adjustments may be made from the front of the exciter: sync, video ratio, white limit, visual and aural modulation depth, and output power.

To facilitate impedance matching, a high-powered circulator is inserted between stages of cascade-connected individual power amplifiers, making bandwidth adjustments easy. Use of wide band transitorized power amplifiers results in perfect impedance matching.

Townsend Associates announced at NAB a 1000 watt all solid state VHF transmitter and teamed up with Microwave Power Devices Inc. to build a solid state transmitter capable of one kW of peak visual power output. Townsend says this is the first stage in developing a complete line of VHF transmitters. In the last two years, Townsend has established itself as a substantial UHF transmitter source through sales of its TV exciter, TN-2EU, for UHF klystron amplifiers.

Townsend's entry into the VHF market results from the development of an IF VHF exciter patterned after their UHF version and tying into Microwave Power devices. Microwave Power has supplied one kW solid state VHF transmitters for operation on tethered balloons in foreign countries. The result is the TA-1000NM VHF transmitter. Townsend points out that VHF stations with older transmitters can overhaul them by replacing tube drivers with the new exciter. A VHF transmitter with visual modulation powered at one kW or less can be modified without appreciably altering the physical

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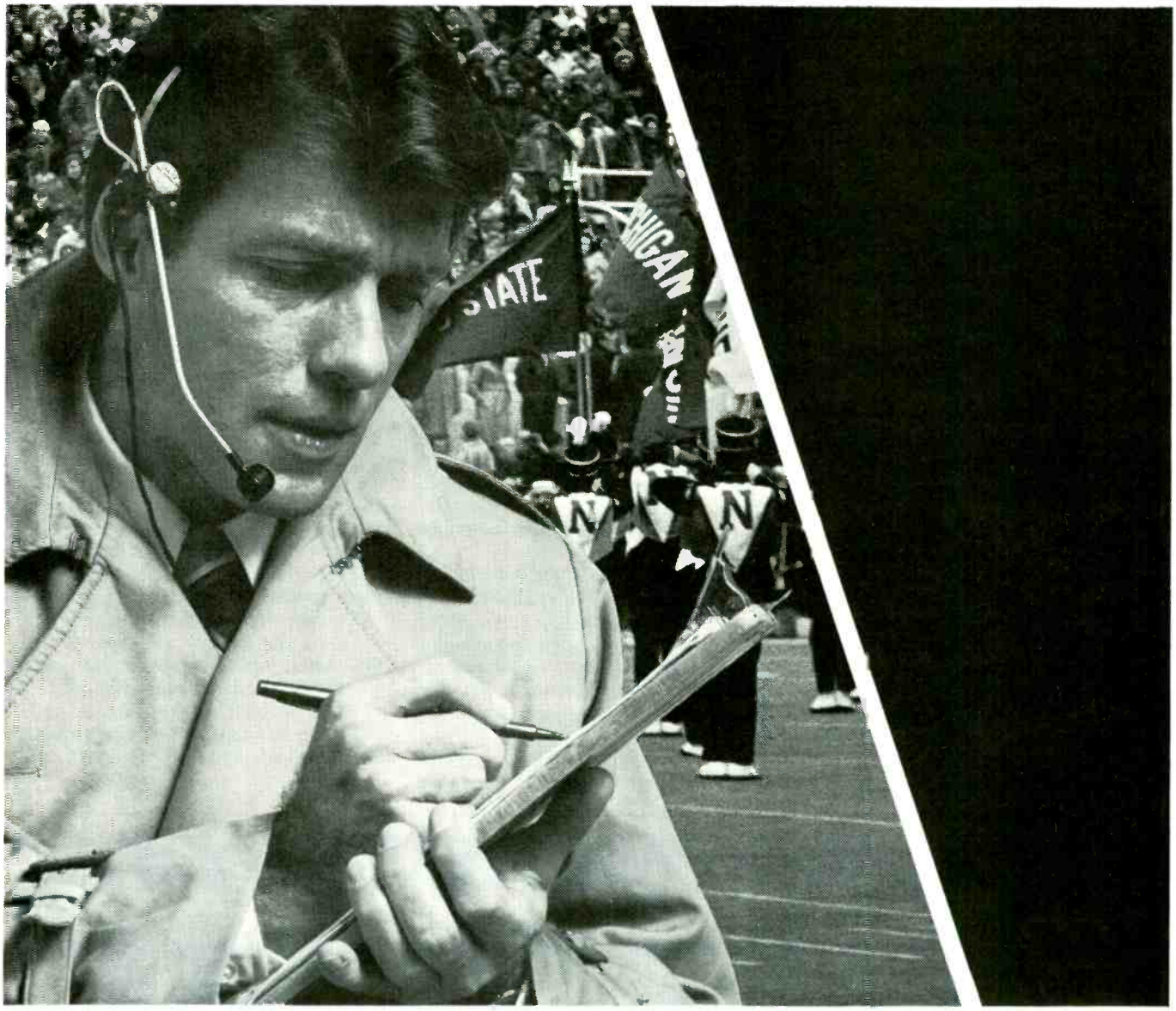

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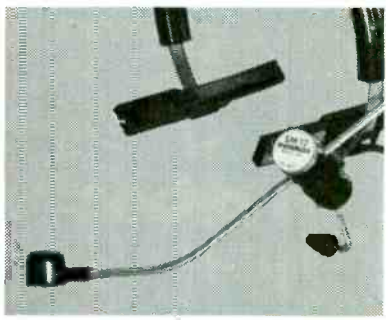

Shure's new headset microphones are coming through loud and clear. With their unique miniature dynamic element placed right at the end of the boom, Shure's broadcast team eliminates the harsh "telephone" sound and standing waves generated by hollow-tube microphones. The SM10 microphone and the SM12 microphone/receiver have a unidirectional pickup pattern that rejects unwanted background noise, too. In fact, this is the first practical headset microphone that offers a high quality frequency response, effective noise rejection, unobstructed vision design, *and* unobtrusive size.

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makeup of the transmitter, according to Townsend.

The Townsend exciter employs an IF frequency of 38.9 MHz. Modulation is produced in an extremely linear double balanced mixer. The vestigial sideband filter is a low level SAW filter, and the aural exciter employs an IF frequency of 34.5 MHz. Frequency modulation is accomplished with two varicap diodes operating in parallel with an LC oscillator. Up conversion is effected in double balanced mixers getting a stable signal from a crystal-controlled oven stabilized oscillator.

Harris introduced new 10 kW color TV transmitter of particular interest to international broadcasters. The Harris BT-10H3 is suited for CCIR Band III, systems B and M.

The BT-10H3 employs a three-tube design and features a solid state IPA. This enhances reliability and reduces tuning requirements — as well as cutting size. The BT-10H3 can be front-serviced.

The IPA requires no tuning. It is fully metered for monitoring and maintenance. Surface acoustic wave (SAW) technology was applied to vestigial sideband filtering — the bandpass function meets CCIR B and M bandwidths.

Fiber Optics Replaces Cable

Fiber optics invaded the domain of broadcasting at the 1978 NAB Show. Telemet showed a video transmission system as a standard off-the-shelf piece of hardware. The Model 4210 optical transmission system transmits video over optical fiber cables. The beauty of fiber optics, says Telemet, is the elimination of equalization and correction circuitry associated with conventional coaxial transmission systems. No equalizers, phase correctors, pre-correctors or post-correctors are necessary. (Envelope delay is less than 10 nanosec.) Amplification is not necessary unless the line runs into several thousand feet.

The 4210 system, consisting of a transmitter and receiver, is specified as a 10 dB loss system, meaning that with fiber rated at 10 dB attenuation per kilometer, the video output from the optical receiver would be one volt peak to peak with a one volt peak to peak input.

The system shown by Telemet has been in operation at KSL-TV, Salt Lake City, since March of this year. It connects a microwave receiving station through 1700 feet of cable to the studio. The fiber used is 5.5 ten-thousands of an inch in diameter. Cost of the transmitter/receiver is $3950.

The output tube is a single-ended visual PA (8807 tetrode). DC filaments are used for improved signal-to-noise.

This Harris transmitter uses IF modulation, true linear power amps and solid state exciters.

Philips' line of PYE transmitters has been expanded. A new 22kW VHF lowband TV transmitter, shown at NAB, is completely solid state except for one aural and two visual stages. Physically, the transmitter is smaller than any other of equal power, Philips said.

Philips, too, uses SAW transveral sideband filters. Air-cooled tetrodes are used, and the switching sequence and monitoring is by solid state logic control. It has automatic power regulation (though feedback), giving a high degree of stability.

The transmitter is designed for unattended operation through ATS or remote control.

The new transmitter can be operated as a single unit, parallel or in an alternate/main system. Philips also showed 55kW UHF transmitters.

RCA unveiled nothing new, but it did issue information that its modulating anode pulser for UHF is able to save

continued on page 142

The Reverb Price/Performance Leader

The Orban dual-channel 111B combines solid, industrial-quality construction with unique signal processing and an unmatched pedigree. Since the first Orban Reverb was introduced in 1970, the line has been acclaimed for its outstanding cost/performance ratio.

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As always, you can count on Orban's reliability and prompt service.

Although the 111B interfaces perfectly with "home-studio mixers," its quality makes it equally at home in professional studios, radio stations, and travelling shows. Its rugged construction stands up to the rigors of the road, and many top acts carry the Orban Reverberation with them on tour.

If you're serious about sound and quality, and if your cheaper consumer-quality reverb doesn't quite cut it any more, now is the time to step up to Orban's professional performance.

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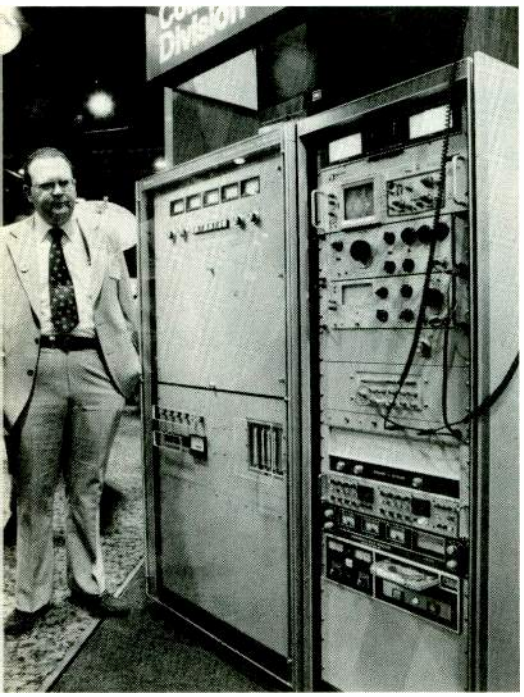
money — at least $1.58 per hour — by increasing the efficiency of the visual power amplifier. This is working into the TTU-60 transmitter which uses "high efficienty" klystrons.

CCA showed itself to be a strong contender in the VHF market (its Townsend-designed UHF systems have been selling) by incorporating an exciter and IF modulator in its system built by Laboratoire General Des Telecommunications (a Thomson-CSF company).

The LGT system offers several unique and patented circuits, according to CCA: an automatic intermodulation cancellation board, an agc video level setter which holds modulation up, and an automatic power regulator to hold carrier up. There is also a linearity corrector. The IF modulator and IF processors are modular in construction and units come with their own power supplies. Thus, they are readily incorporated into CCA racks. In Europe, common amplification of vertical and aural carriers is permitted through diplexing. Separate amplifiers are used in the CCA unit, but a switch is included so that in the event one amplier fails, diplexing can be done on an emergency basis.

In the Bayly Engineering Ltd. exhibit (AEG-Telefunken) the subject of TV transmitters with combined video/sound carrier signal amplification was also discussed.

Acrodyne introduced a 5kW VHF TV transmitter that utilizes internal diplexing and IF modulation. The use of internal diplexing (simultaneous amplification of visual and aural carriers in common amplifiers) eliminates the need for separate visual/aural power amplifier circuits, thus reducing equipment complexity. As mentioned, such use is currently prohibited in the U.S. (except for emergency use), but Acrodyne is petitioning the FCC to make it legal.



Rockwell-Collins had new five kW AM transmitter with automatic modulation control

News at EMCEE was the type acceptance of larger units — the TTV-5000 (5 kW) and the TTU-1000 (one kW).

A newcomer to NAB was Television Technology Corp., a TV and FM translator manufacturer carrying on the Adler line. They featured their new 100 Watt UHF translator using a low-cost final tube. More eye catching was a practical solar powered translator. If you have to take ac power more than a mile, a solar collector pays!

Radio transmitters — modestly forward

The promise of AM stereo and the general uptrend in audio standards, which are putting the pressure on audio processing for AM stations, are widely expected to push AM transmitter standards up too. On the evidence of Las Vegas, this is more for the future than the present, perhaps because many AM transmitter makers feel themselves in a kind of interregnum now: AM stereo is not here yet, but its imminence makes earlier approaches obsolete.

There were a handful of new AM transmitters of high quality, as noted below. RCA has put off indefinitely marketing the five kW solid state transmitter, shown in prototype last year and promised for about now, reportedly because the high-power transistors turned out to be too expensive for competitive pricing of the unit. From the claimed characteristics, this transmitter would have brought a real upward breakthrough in AM quality, in addition to pioneering solid state design at the five kW level.

Rockwell-Collins showed a one kW and a five kW AM, both with fresh design ideas contributing to low distortion and high efficiency. The 828E-1, five kW, and the 820D-2, one kW, use a band-pass rather than a low-pass filter in the output, with flatter, wider "top" and steeper "skirts" to provide good sideband and harmonic performance. Harmonics are rated at 73 dB below the carrier. The transmitters also have automatic modulation control, plug-in modular construction and built-in indicators for troubleshooting.

Adding to the small group of all solid state transmitters on the market is the Cetec-Sparta SS1000A, rated at one kW. It is already in use at a number of broadcast plants. Performance charac-

continued on page 144

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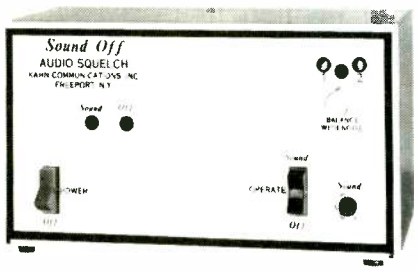

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NAB SHOW-IN-PRINT

Continental Electronics AM transmitter

teristics make it a sharp advance over most earlier one kW designs, in addition to considerably higher overall efficienty as compared with tube systems. Cetec-Sparta is projecting similar units for 2.5 kW and five kW, but has not set marketing dates as yet.

CCA Electronics brought new AM and FM transmitters. The FM is the 2500E, solid-state up to the PA, rated at 2.5 kW.

McMartin introduced the new BA-10K, a 10 kW AM unit with built-in reduction to five kW. It uses a high-level plate modulation with two tubes in the modulator and two in the power stage; everything else is solid state. Audio response is rated ±1.5 dB to 10,000 Hz. Harmonic and spurious radiation are considerably lower than the FCC limits for those distortions.

Three more transmitters were added to the all solid state family by Wilkinson Electronics, all FM units, at 500 watts, one kW, and two kW respectively. Wilkinson expects to have them on the market a month or so after this magazine appears, which will evidently make the two kW model the first all-solid-state transmitter above the one kW level to reach the U.S. market.

Used in each is a power module with four transistors in parallel/push-pull, rated at 500 watts; the one kW unit uses two modules, and the two kW uses four. The design has the advantages exhibited by other solid-state transmitters that have reached the market, including the fact that failure of one output transistor does not bring operation to a stop, but simply reduces power output a little.

A series of transmitters new to the US, although in use for some time in many parts of the world, were shown at the NAB by NEC America, Inc. The FBN-7000 series are FM transmitters, all solid state from 150 watts to one kW, and using one tube only in models up to 20 kW. The power amplifiers cover 87 MHz to 108 MHz without adjustment; a harmonic filter is housed inside the cavity for low-pass filtering. The control unit is all solid state, and can run on NiCd batteries, maintaining the logic software active if AC power fails. There is a photo coupler in every signal input to reduce noise input.

Other companies showing one or more transmitters from lines previously introduced were Continental Electronics, CSI, AEL, Harris, RCA and Sintronics. The last named said their one kW solid state AM, shown first last year, is now ready for delivery. Bayly Engineering of Ontario, Canada, again had on hand information on the extensive line of transmitters made in Germany by their parent company, AEG, which includes all solid state FM units up to three kW.

Transmitter tube news

At Eimac/Varian the proud news was the award of an "Emmy" last fall for improving the efficiency of UHF klystrons to reduce power consumption some 10 percent. Varian also offered a videotape seminar on klystrons for television.

Eimac/Varian displayed high-power transmitting tubes for AM, FM, VHF, UHF

English Electric Valve, Inc., displayed a complete line of RF tubes, including high efficiency klystrons, power tetrodes and vacuum capacitors. Their four-cavity vapor cooled klystron, the K-3276H, was stressed for UHF. Townsend and CCA will use EEV tubes in their UHF transmitters. Power tetrode and cavities were highlighted by RCA Electro Optics and Devices. Application guide AN-4869, "Forced-Air Cooling of RCA Power Tubes," was popular.

Remote pickup equipment and studio-transmitter links

As *BM/E*'s recent special issues on ENG have reported, under the pressure for faster, better news gathering for radio stations the remote-pickup

continued on page 146

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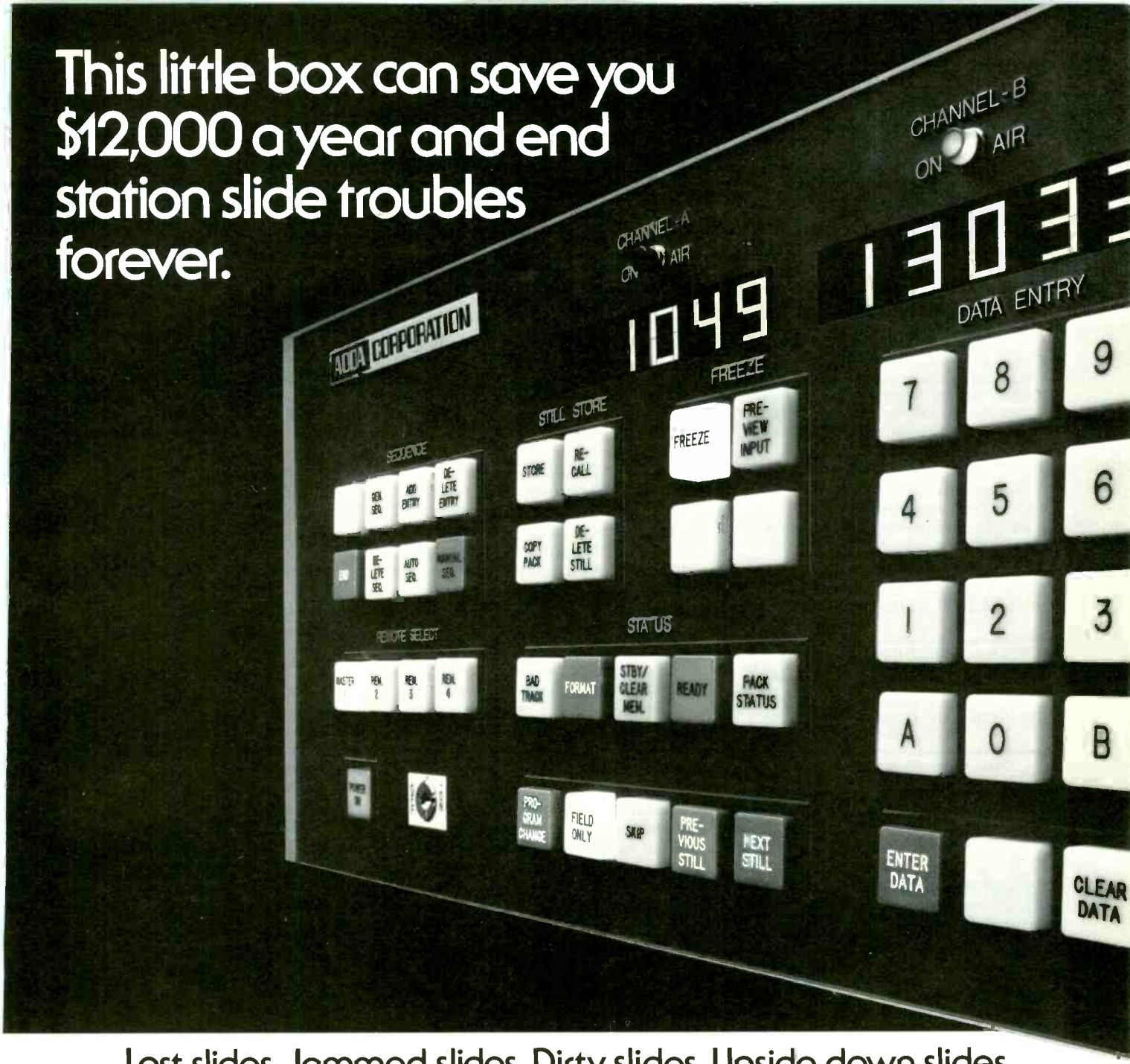

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McMartin showed new transmitters, receivers for picup of remote radio broadcast programs

equipment makers have in the last few years greatly improved their units.

McMartin, one of the most important in this advance, brought several new units to Las Vegas that further enhance radio ENG. As a complement to their RPU-1103 and 1403 portable transmitters, which have been outstanding successes in the market, they have a small receiver in a thin, flat case that attaches to the transmitter case; portability is hardly affected. The receiver provides studio-to-remote cueing more reliably than do the standard broadcast pocket receivers that have often been used for this purpose.

A new kind of product entirely is the McMartin TVR-1, a portable receiver for cueing, paging, monitoring, etc., directed to television personnel in the field, using an SCA sub-carrier on the aural TV channel, or the aural channel itself. The set is easily attached to the waist with a cloth strap that is supplied: weight is only 6 ounces with the battery. Sensitivity is rated 0.5 microvolt for 20 dB of quieting on channels two through six, 1.6 microvolts on channels seven through 13, and from five to 13 microvolts on the sub-carriers, depending on injection level. AGC provides 50 dB of gain reduction, for dynamic range over 100 dB.

McMartin also brought new improved base station receivers for the 150 MHz and 450 MHz bands, and promised a little later a new mobile receiver for those bands.

Marti, another leader in remote pickup and studio-transmitter systems, introduced the ARS-150 and ARS-450 automatic repeater stations which let ENG field men fan out much farther from the studio. The repeaters can be reached with hand-held portables or with mobiles, and have 25-watt relay transmitters that can send the program on to the studio from a number of miles away. As in other remote pickup systems of this new generation, the audio quality is at broadcast levels; systems are designed for continuous operation (unlike conventional two-way radio systems, as in taxi cabs, etc.), and there is a continuous sub-audible tone transmission that keeps the system in readiness.

Marti also announced a new STL system ready for AM stereo. In addition, the current AM STL has been modified so that it can be retrofitted for stereo later on.

Moseley, also important in the new ENG for radio, announced type acceptance of their mobile transmitters RPL-3A, 4A and 4B, which put out 50 watts on the 150 MHz and 450 MHz bands.

Time and Frequency Technology showed their new Model 7700 studio-transmitter link, a fully redundant FM system which has automatic changeover to standby when a fault is detected. It can be used to operate two STL systems on one 500 kHz bandwidth, with unmeasureable crosstalk, or a composite system for stereo with a hot standby. Overall system distortion is 0.4 percent 50 Hz to 15 kHz, and signal-to-noise ratio 70 dB.

Micro Controls showed their studio transmitter link made up of the PTS-10C transmitter and PRS-10C receiver. Operating in the 890-960 MHz band, it will carry a stereo composite or other data such as remote control information or background music. Distortion is rated less than 0.4 percent 30 Hz to 60 kHz, signal-to-noise better than -65dB below 100 percent modulation.

Remote control

Stations with remote transmitters that adopt ATS will, of course, lose the need for separate remote control systems (or incorporate their remote controls into the ATS). But the changeover is evidently going to be most gradual, and the traditional remote control technology will be needed for a long time.

The changeover will be eased, in a sense, by the fact that manufacturers

continued on page 148

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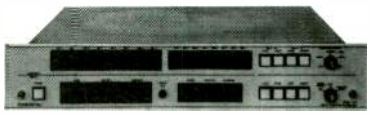

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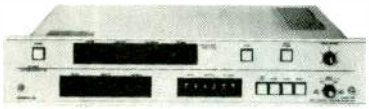

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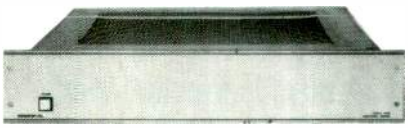

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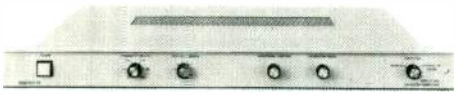

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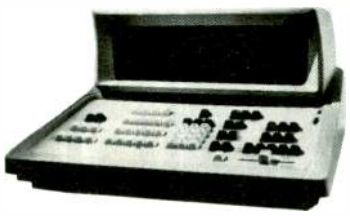

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NAB SHOW-IN-PRINT

long established in remote control technology are well placed to produce ATS, and nearly all of them are, in fact, preparing ATS equipment while continuing to advance their remote control systems.

Time and Frequency Technology, one of these firms, introduced at the show their Model 7640 "Telescan," a computer assisted option for the firm's Model 7610 digital remote control system. It can be used to expand functions of any remote control system, or as a standalone for data acquisition, status monitoring, and logging.

The 7640 includes an entry keyboard and a CRT readout, and can monitor up to 120 channels — with 30 being called up for simultaneous display. The microprocessor control also provides for setting upper and lower tolerance limits for each parameter, with an automatic alarm when limits are exceeded. The use of software to supply operation functions makes the system highly flexible.

TFT also introduced the X-14A ENG antenna controller, which allows push-button control from the studio of the quadrant alignments and polarization of remote microwave antennas. It has fourteen independent LED status indicators, and uses all-digital data transmission, with each word sent twice for error detection.

Moseley Associates showed their new Model TCS-2 telecontrol system for independent command, telemetry, and status reporting. It requires only a single telco line or radio link, and two systems can use one link. Capacity is more than adequate for all parameters needed in remote transmitter control.

Micro Control Associates showed the "Digi-Log" system, which consists of the DLT-9 transmitter and the DLC-9 studio unit. It has push-button channel address, digital transmission for command accuracy, analog for telemetry speed and continuous channel verification. The mode frequencies are field programmable. Standard model is nine channels basic, expandable to 19, 29, or 39 channels. It is available for radio or wired operation.

All the makers of remote control systems say that their current systems are ATS-compatible; that is, the remote control maker will design ATS to make use of the remote control system.

A unit designed as an add-on for the Moseley TRC-15AW or TRC-15AR remote controls was shown by Hallikainen and Friends, a firm new to the NAB. It is the TEL 171, which incorporates a digital loop for the telemetering functions. The system supplies digital operation for both the transmission and

New telecontrol system from Moseley Associates

the reception functions, as well as digital read-out.

Microwave at Las Vegas

Aside from ENG microwave, reported extensively elsewhere, relay systems were discussed. The Collins Transmission Systems Div. of Rockwell International's Commercial Telecommunications Group showed a simple single channel transmitter-receiver system for STL or intercity relay service. Rockwell-Collins said this series marks the company's return to the broadcast television relay field.

The Rockwell-Collins MVR radio is suited for remote pickup applications and covers all STL bands: Model MVR-2S for 2 GHz, model MVR-6S for 6-7GHz, and MVR-12S for the 12-13 GHz band. Systems are solid state and have a frequency stability of ±0.0005 percent.

A variety of microwave antennas were shown by Anixter Mark. Microwave manufacturer TerraCom featured in its booth a new program channel multiplexer. The THP-2T20 uses pcm encoding to multiplex four 15 kHz program channels into a 1.544 Mb/s data format. A high performance A to D to A codec is the heart of this multiplexer.

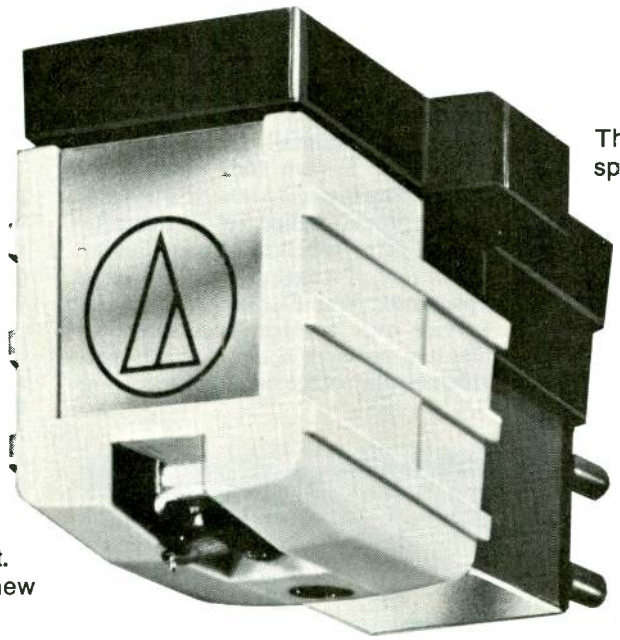
A weather radar report

A compentitive chill settled in on the floor of the convention center in Las Vegas as four vendors began showing their wares. Last year there was only one source in this line of equipment: TSC Development Laboratories.

TSC pioneered the scan converter which transforms the fading polar coordinated radar picture into a TV raster format which is refreshed at TV

continued on page 150

Audio-Technica rewrites the book on professional phono cartridges.



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Don't confuse the ATP Series with other "professional" cartridges that are merely modified home units. ATP units don't have to be treated with kid gloves. And yet we haven't sacrificed tracking ability to make them rugged.

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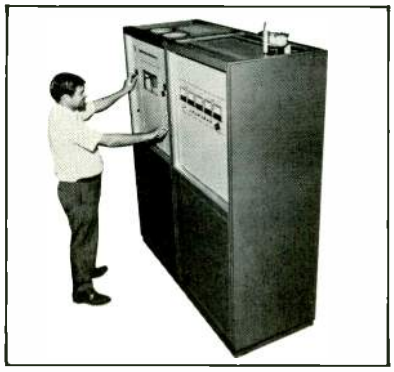

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NAB SHOW-IN-PRINT

rates. TSC's scan converter, the WRT-75A, contains its own color encoder to produce a standard composite NTSC signal.

Now the company has such equipment as digital video integrators and processors to show the amount of rain, adjustable contour levels to color the amount, a clutter canceller to eliminate ground clutter, a rabbit track eliminator which obliterates pulses, and the electronic (map) overlay. Now TSC can store weather on discassettes so that private subscribers can call up and get their own report. Weather radars cost between $36-48 thousand, converters another $15,000, and options about $3000 each.

Vitro Services Div. of Automation Industries has always been a manufacturer of radar and meterological systems. It provided the National Weather Service with its first digital video integrator and processor. It then set out to build a 200-mile range system ideally suited to broadcasters' needs. The system is called the MR-785. It consists of the antenna pedestal unit, a transmitter/receiver unit, and the display control unit. The radar receiver output is quantized into six level color representations of rainfall intensity.

Arvin System Inc. purchased a small company and showed a weather service product called Tel-Weather Receiver. The receiver accepts radar-generated weather information transmitted from the National Weather Service over a voice grade telephone line and provides a colorized 24-hour video display of the radar scope, changing every 90 seconds. A simulation of the familiar radar "sweep" line rotates around the screen.

TSC showed weather radar on discassettes to be dialed up by private subscribers

Animated weather is possible by taking time lapse video inputs and storing them on Arvin/Echo's Frame Stor. These can then be played on the air to show a weather front moving across the TV screen.

A similar service was offered by Enterprise Electronics Corp. Its WR100/77 Radar Data Remoting System operates with meteorological radars. Major units are a Data Transmitter terminal which connects to the radar, stores data and includes a transmitting modem for a telephone line. The Data receiver terminal has a telephone dialer, receiver modem, scan conversion system refresh memory, colorizer, and overlays.

EEC, which offers a complete service to customers, reports many broadcasters can connect into the National Weather Service simply by buying a receiver.

New concepts in CP antennas for TV

The Jampro Antenna Co. introduced a new directional Ring Panel CP transmitting antenna and a new slot antenna for UHF translators at Las Vegas. These are additions to its patented spiral omnidirectional CP types, now available for any channel, two through 69.

The Ring Panel consists of four panels mounted to form a square around the sides of a tower. Radiation patterns can be adjusted for any specific requirement by distributing up to 70 kW of power to each panel.

The new slot antenna for UHF translators is available in both directional and omnidirectional models. The antennas have safe input power rating of 10 kW and are competitively priced, according to Jampro. The slot antenna is marketed by Acrodyne.

A method of enjoying the benefits of CP transmission with a minimum capital investment was shown by Harris. They call it the Cyclotran system, and it incorporates the BTD-100H3 (100 kW) transmitter and the Harris CPV antenna.

The CPV antenna may be installed as a direct replacement for existing top-mounted batwing or travelling wave antennas. This eliminates the need for costly tower modifications or tower replacement — leading to a savings of about $65,000. The CPV is fed from a single transmission line, reducing tower requirements needed in dual feed systems.

The BTD-H100H3 employs two new BT-50H3 50 kW transmitters and a central control cabinet. This 100 kW configuration takes up about the same floor space as existing 50 kilowatters. Using only six tubes (compared to 14 in most

continued on page 152

You're coverirg live news. Capturing a story as it unfolds. Ready for a shift in emphasis at a second's notice. In a situation like this, the last thing you can afford to be concerned with is power failure... because no news s bad news.

The revolutionary Christie Reflex 20 charger and battery give you the reliability you need, as well as provide **full recharge of completely discharged battery packs in 12 to 20 minutes.** Even faster recharge of partially discharged battery packs. And there's more.

90 to 97% net charging efficiency keeps the batteries cool during charge and **extends battery cycle life** up to 10 times that of conventional ni-cads. Patented "Negative Pulse" **minimizes capacity fading (memory).** Christie's unique "Trough Voltage Sensing" **assures charge tu:n-off at precisely the right moment.** To insure long life, the Reflex 20 System battery-temperature-lockout **automatically delays recharging of overheated batteries** due to high current discharge. The system includes a **state-of-charge indicator.** The net result is the **least expensive battery** on a cost per cycle basis.

Con:act Christie for complete information on the Reflex 20 line. For dependability in DC power supply, Christie is the source.

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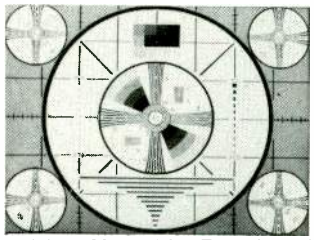
- Since the signal is generated electronically, there is no deflection distortion of the signal source itself, such as that of conventional monascope cameras.
- The same picture quality as that of the camera is generated, DRC (Digital Rise time Controller) system.
- Single source generation system promises precise horizontal resolution.
- APC system in a constant size picture generates a perfect measurement signal.
- Built-in sync signal generator. External sync also possible.
- Grating and overscan signal can be turned ON/OFF.
- Extremely simple maintenance plug-in unit type.
- The final edition of the ultimate monoscope. Can be used with confidence for years to come.

■ **MODEL 525A12 picture**

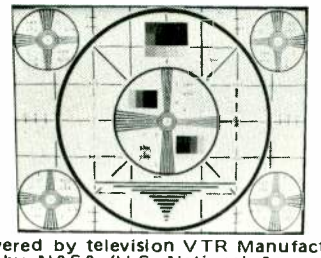


Delivered by Matsushita Electric Industry, used by RCA.

◉ **Features**

- With acclaimed 10-step interleaved contrast
- Generates the same pattern and picture quality up to letters as a conventional monoscope.
- Production line oriented test pattern

■ **MODEL 525 A11 picture**

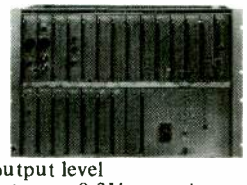


Delevered by television VTR Manufacturer, used by NASA (U.S. National Aeronautics and Space Administration).

◉ **Features**

- With acclaimed 10-step interleaved contrast
- 525AH generates a horizontal resolution of up to 100 lines, and is ideal For research and developement.

■ **Exterior view**



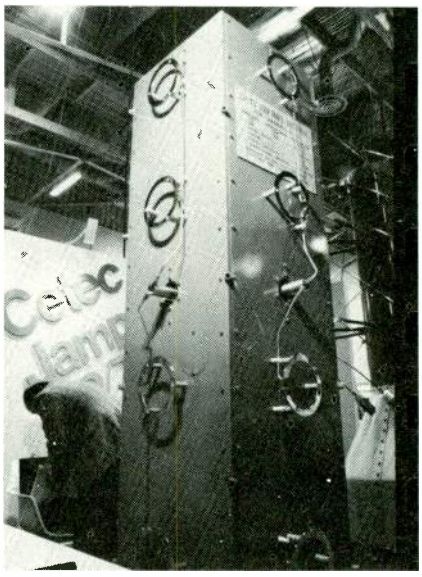
- Video output level 1Vp-p (sync 0.3Vp-p, picture 0.7Vp-p 2 system
- Video output impedance 75Ω
- Input/output connectors BNC
- Ambient temperature 0°C ~ +45°C
- Power requirement 100, 117, 200, 220, 240V ±10% 50/60HZ Approx 50VA (As specified by the customer)
- SIZE (Inch) 19" (W)× 12.2"(H)× 12.6"(D)
- Weight Approx 27kg

NTI America, Inc.

1680 North Vine Street LOS ANGELES California 90028
Phone 213 462 8945

Circle 201 on Reader Service Card

NAB SHOW-IN-PRINT



New ring-panel CPTV antenna from Jampro

other 50 kW jobs), the transmitter is more compact and extra reliable. Tubing adjustments are reduced; solid state IPA's are used.

Since each 50 kilowatt unit provides a single visual output stage, the plumbing is simpler, the building smaller, and upkeep less.

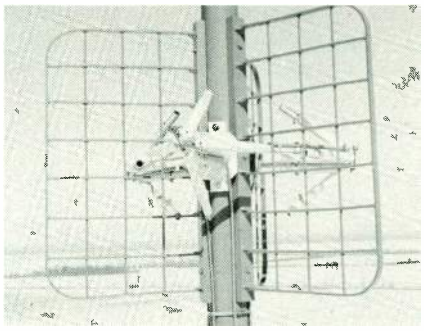
The CPV antenna features excellent circularity, low axial ratio (less than two dB), VSWR less than 1.05:1 at visual carrier and below 1.1:1 over each channel, directional horizontal pattern capability and a variety of vertical patterns.

During the course of the show, Harris announced that WWL-TV of New Orleans had become the first station to purchase the Cyclotran system. WWL-TV's technical director, Hugh Burney, said the CPV antenna eliminated his tower loading and changeover fears. "We can replace our existing antenna with no modification to our existing tower," he asserted. Burney expects that going to circular polarization will help the high percentage of viewers with rabbit ears. Since New Orleans stations are in quite different locations and 90° apart, reception has been a problem.

At the NAB show, RCA said the antenna for the World Trade Center in New York City was being readied. WABC intends to use CP in NYC.

A new idea in CP antennas was shown by SWR, Inc. It's a slotted antenna that uses an anisotropic grid polarizer to obtain circular polarization. The slot in the mast is at 45° to the polarizers, which are simply a double set of hoops spaced along the slot area. The 45° polarized energy is resolved into horizontal and vertical components. The polarizer lets the component

Bogner's approach to CPTV antennas



Harris's Cyclotran CPTV antenna

that is perpendicular go through the hoops unchanged, but alters the phase of the signal that is parallel to the hoops by 90° — resulting in a CP signal. Building parallel hoops is simple, says SWR, and it reduces costs. The antenna has a low windload.

Bogner had several things to say about CP antennas. To solve the quandary of UHF broadcasters who worry about the high operating cost of CP, Bogner will make all standard horizontally polarized slots in its high power B series capable of being converted to CP in the future at minimum cost. At the show, Bogner claimed it was "on top of the world" by virtue of having a UHF circularly polarized antenna operating on a regular basis atop the World Trade Center. Wometco's Channel 60 subscription TV station uses Bogner's patented combination of standard horizontally polarized slot arrays and standard vertically polarized dipole arrays to achieve circular polarization. To derive the maximum information on the value of CP, the antenna was designed so that polarization and radiation patterns can be modified easily and quickly.

The subject of CP was also discussed in the Micro Communications, Inc., booth. Among other things, MCI showed a high power diplexer for CP, the Series 91935. The center attraction there, however, was a model of the WNEW-TV transmitter system includ-

continued on page 154

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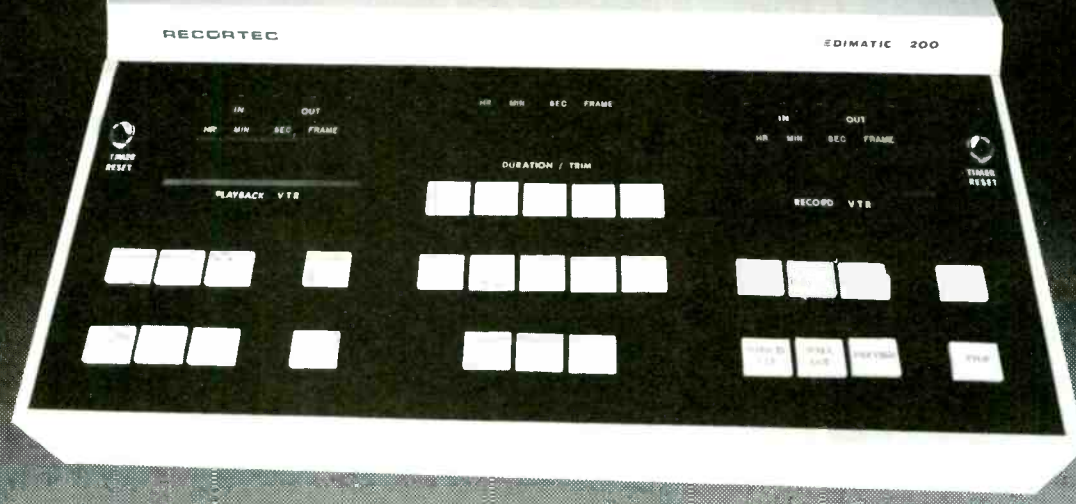

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NAB SHOW-IN-PRINT

ing all hybrids, plumbing, switches, etc., now being readied for installation in New York's World Trade Center. MCI is the system's designer.

Andrew Corp. drew attention to the capabilities of its more conventional antenna by displaying a scale model of the custom-designed slotted array antenna it is building for Channel 50, Youth for Christ. The unit will be located on top of a 1100 ft. support tower. By controlling the phase and amplitude of energy distributed to each slot (typically 20 to 40), null-free patterns can be achieved.

Emphasis on towers

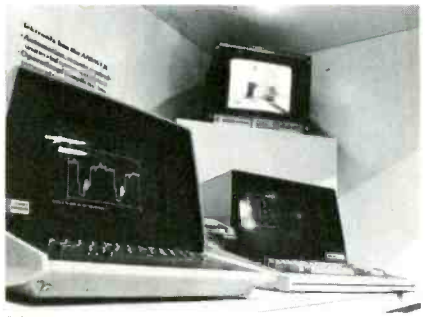
Several tower manufacturers were at Las Vegas, including Fred A. Nudd Corp., Utility Tower and Rohn Products. Rohn showed a new idea — solid rod legs for guyed towers. Solid rod legs give more strength and less bulk, said Rohn.

For more information circle bold faced numbers on Reader Service Card: *TV Transmitters:* NEC PCN-1000, **444**; Townsend TA 1000NM, **445**; Harris Cyclotran system, **446**; Philips 22kW, **447**; CCA VHF systems, **448**; Acrodyne 5 kW UHF, **449**; Emcee 5 kW VHF, **450**; Television Tech. Corp 100 W, **451**. *Radio Transmitters:* Rockwell-Collins 828-E, **452**; Cetec-Sparta SS100A, **453**; CCA 2500E, **454**; McMartin BA 10kW, **455**; Wilkinson s-s types, **456**; NEC FBN-7000, **457**. *Remote Pickup:* McMartin TVR-1, **458**; Marti ARS 150-450, **459**; Moseley RPL, **460**; TFT 7700, **461**; Micro Control PTS-10C, **462**. *Remote Control:* TFT 7640, **463**, X 14A **464**; Moseley TCS-2, **465**; Micro Control DL 7-9, **466**; Hallikainen & Friends, **467**. *Microwave equip:* Rockwell-Collins MVR, **468**; TerraCom THP-2T20, **469**. *Weather Radar:* TSC developments, **470**; Vitro Services, **471**; Arvin, **472**; Enterprise, **473**. *CP antennas* Jampro ring panel, **474**; Harris CPTV, **475**; SRW, **476**; Bogner **562**.

TEST EQUIPMENT AT NAB

If you can see, feel or hear it, you can measure it

Test equipment was bursting out all over at the 1978 NAB Convention. Some of it was basic, while some was rather esoteric. The trend in the industry is to measure more. If signal quality is going to be controlled, you have to diagnose and then improve. Test procedures have tended to be laborious and lengthy. The 1978 NAB confirmed the trend to automatic measurements — running through tests on a preprogrammed sequential basis (using, more and more, the microcomputer), doing calculations within the test instrument so that results can be read directly. This trend is illustrated by the Bird digital



Display equipment associated with Tektronix ANSWER system

RF Calorimeter (1000 W to 80kW). No more reading of separate thermometers, no more waiting for stabilization, no more calculating. This digital calorimeter automatically processes all sensor inputs and displays power directly, without charts or calculations. Kilowatts are expressed after multiplying flow rate by temperature differential by specific heat by a conversion constant.

The Tektronix ANSWER system for checking out TV components, equipment and systems epitomizes what we are saying. ANSWER, which has been described earlier but never demonstrated, is a microprocessor-based automated television measurement set that will measure: video signal timing, blanking, sync, and burst parameters; transmission quality parameters, including signal-to-noise ratio per NTC-7; and any VIT, VIR, or full field test signal.

This programmable digital instrument runs through 37 basic measurements and can do a complete in-service NTC-7 and timing measurement routine in less than one minute, with worst case accuracies of 0.5 percent, or 0.5° for most measurements. A customer can further program in any test he desires quite easily. The test system can also analyze the FCC Remote Transmitter Control VIT signal.

Although ANSWER's answers are in ASCII code, they can be recorded in English on a peripheral printer as a permanent record. By programming measurement limits, ANSWER warns the user when out-of-limit signal distortion occurs.

ANSWER's high degree of mea-

VIRs inserter from Video Aids of Colorado

surement accuracy is made possible by signal offset and gain control, dither generation, and signal averaging (which by itself can reduce noise on the incoming signal by up to 15 dB). These techniques provide an effective resolution of 12 bits, making ANSWER suitable for the most stringent measurements, according to Tektronix. The equipment also features a self-diagnosis routine.

Since amplitude and phase measurements alone do not tell everything, ANSWER also provides a complete set of timing measurements, e.g., front porch 1.79 *m*sec.

ANSWER employs all digital circuitry. All input and output communication is made through RS-232-C (or GPIB) interfaces. ANSWER, through modems, can use the telephone to check out a piece of equipment long distance. Other applications include automatic transmitter systems and microwave and satellite systems testing.

The primary negative about ANSWER is that it won't be available until 1979. That's two years after the concept's announcement (Winter SMPTE TV meet, 1977).

There were other examples of elaborate automatic measuring shown at NAB. One developed as early as 1975 was Marconi's T.A.M.E. system (Television Automatic Monitoring Equipment), which inserts VIT signals and then measures them along the way. It is appropriate for monitoring transmitters but less valuable for testing the quality (or transparency, if you will) of, say, studio equipment. Accuracy for some close measurements is wanting.

Philips Test and Measuring Instruments, Inc., displayed a number of pieces of equipment that capitalize on VIT signal measurements. Included is the PM5578 VIT Analyzer that checks out 21 parameters. An out-of-limits alarm indicates any function in excess of preset limits.

The Philips VITs Analyzer was shown last year at NAB, as was the Philips PM 5560 demodulator. What was different this year was that all of these instruments can be used together to check out networks and systems as the accompanying diagram illustrates. A great deal can be done to diagnose the performance of equipment.

Although the PM 5560 precision demodulator was not brand new, it was emphasized heavily this year as a now-available piece of equipment very important in checking transmitters. Philips was not alone in showing advances in this area. Telemet introduced a new unit and a new Barco democulator was shown by Rohde and Schwarz. Competing with these were the Tektronix 1450 (introduced last

continued on page 156

Your TV Studio may as well be a radio station without the right lighting.

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At Kliegl, we want your video to be up to par with your audio. Or even better. That's why we have a team of seasoned engineers who design studio lighting systems that meet your exact requirements.

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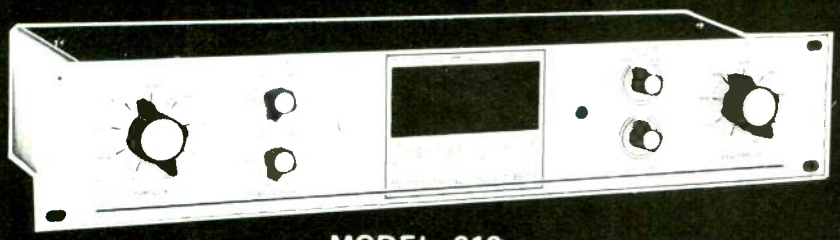

MODEL 610

Used in recording studios; disc mastering studios; sound reinforcement systems; TV, AM, FM broadcast stations to maintain a *sustained average signal* at a level *significantly higher* than that possible in conventional limiters, and with performance that is seldom attained by most *linear amplifiers.*

Rack mounted, solid state, *new* functional styling, the Model 610 is in stock for immediate shipment.

Specifications are available from:

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Circle 206 on Reader Service Card

year) and the R & S synchronous detector, which was lower in price. Broadcasters now have quite a choice in this class.

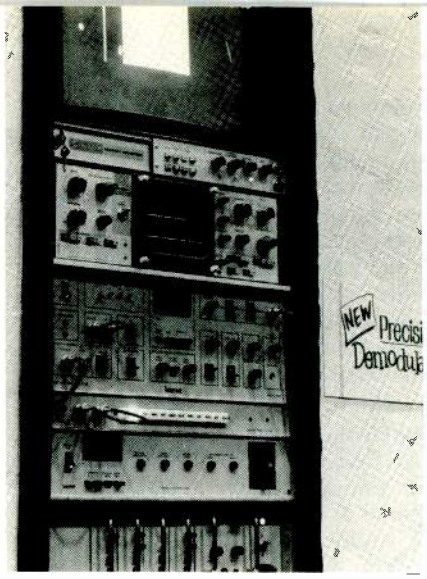
Synchronous detectors permit measurements of most types of distortion (at full and over modulation) including phase modulation. The PM5560 permits completely automatic monitoring simply by dialing in the channel selection via thumbwheel switches and punching up the input desired. The 5560 has carefully tailored filters and equalizers as a result of computer-aided design. Sound detection is separate from visual detection.

Envelope detectors are useful if a sweep signal without sync is applied, or if the transmitter carrier is heavily phase modulated. And, as brought out at the engineering session on using VIR signals, envelope detection is necessary.

The single channel broadcast demodulator from Telemet, model 3710, is both a synchronous and envelope detector. Priced at only $6500 (compared to $12,000 for the all-channel Philips unit), the 3710 has some nice features. Because of a multiplexed output with a built-in Hi/Lo filter, both synchronous and envelope outputs can be seen on a single trace scope. The output is a digital display. Alarms indicate out of tolerance level.

Sound traps preceding the main IF circuit can be switched in or out. With traps switched out, video response is flat to 4.5 MHz ±0.5 dB and envelope delay is flat within ±15 nsec.

From the foregoing it becomes obvious that the Philips instrument is more of an all-round instrument suitable for several purposes, while the Telemet unit is designed to look at one transmitter. Unfortunately, we do not have data on the new Barco demodulator. (The Tektronix and R & S units are not described here, having been shown earlier.)

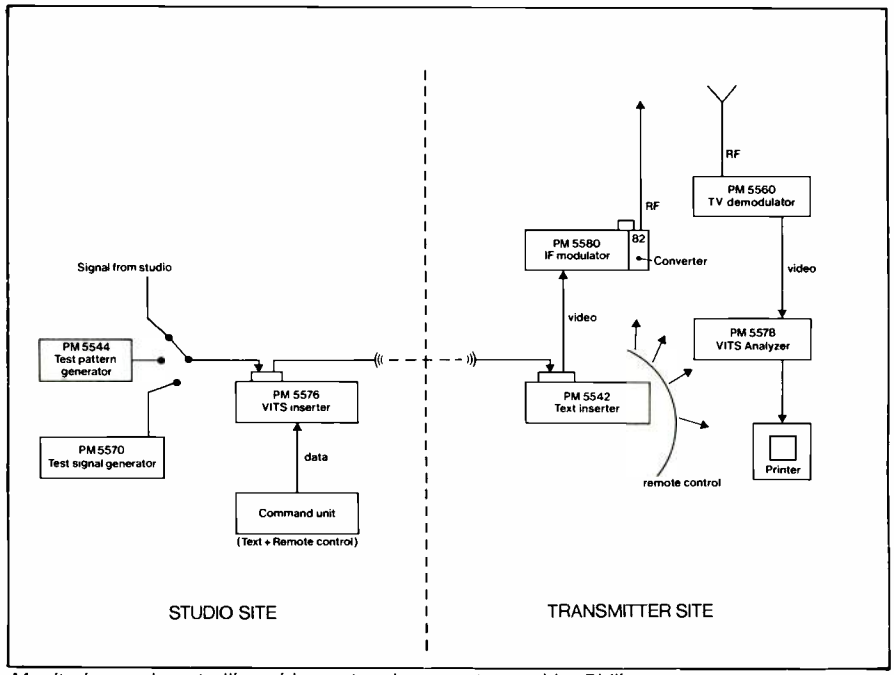


Telemet's new precision demodulator

Aside from the new Barco demod at Rohde and Schwarz, there were a number of new Barco monitors which are described under Monitors earlier in this report. R & S also showcased its familiar line of test equipment.

Prominent in the Telemet booth was the model 3709-A1 Spectrum/Sideband Analyzer, introduced last year.

There were several new VIRs generators. Lenco had one as part of its 300 series, the PVT 327. It can add VIR or VIT signals. It's programmed, and can insert up to eight test signals on



Monitoring and controlling video networks was stressed by Philips

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Telex 1320 series headsets offers you six models for all general communications requirements, indoor or out. Single or dual dynamic drivers are impervious to environmental humidity or temperature changes. With optional boom mikes, noise canceling dynamic or carbon. Designed for comfort. Dependably made for heavy duty use. Complemented by the compact Telex IC-10, amplified common talk intercom system for dynamic mike headsets. For "whatever the job," please write for free information:

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lines 16 through 20 in either field. Video Aids of Colorado introduced a VIRs Inserter, the model 4000, priced at $1200. This instrument reads burst or VIRs and phase.

Several exhibitors had new video sweep generators. At Asaca's booth Shiba Soku test instruments were on hand. Model 205 video sweep generator has a built-in color sync signal generator, color burst and sync which can be switched on or off. The output can be video sweep, chroma sweep, CW and multiburst. At $2490, it's said to be an ideal instrument for checking performance of ¾-inch VTRs. Datatek added the D-631 video sweep generator to its line. It is similar to the 630, which is useful as a station test signal, but includes a very linear detector and attentuator. Calibrated readings as low as 20 dB below one V p-p are possible.

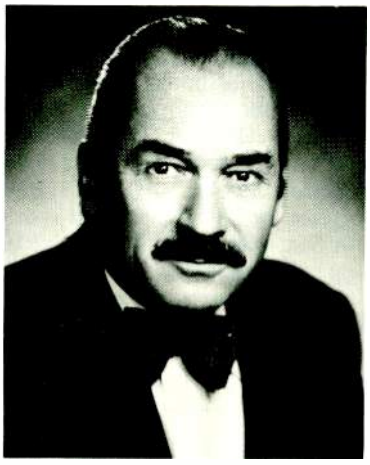
Other Datatek measuring equipment included the video envelope delay test set, the D-640. Asaca's line of instruments (Shiba Soku) also included an envelope detector delay measuring set, the 201. It includes a phase compensator to meet CCIR requirements. Envelope delay and frequency response can be measured over a broad video frequency range and can be used to adjust filters. Price is $5900. Other Asaca products included a high quality color bar generator, Model 216, priced at $1450; a color video noise meter which measures thermal and color noise (chroma noise is further split into amplitude and phase components) which is priced at $9000; and TV test pattern generators.

For audio, Asaca displayed an oscillator/distortion meter ($3550). It can run through tests automatically.

Several new products from Leitch included a master synchronizing pulse generator at $2650, which features absolute accuracy, low time base error and a color frame identification pulse; a digital source synchronizing pulse generator featuring good horizontal resolution (4.4 nsec increments) and showing correct sync to subcarrier relationships on the front panel; plus a master clock system, the CSD-510.

NTI America, Inc., was back at NAB after making a first appearance last year. Its specialty was digital test pattern generators that bypass the need for a monoscope tube generator (which would introduce deflection distortion and instability). The 535 NTSC color unit included a picture of the Mona Lisa. Is $19,575 a fair price for a perfectly reproducible digital Mona Lisa? Yes, says NTI, particularly since George Washington is shrinking in value compared to the yen. NTI also offered other test generation and master program timers.

continued on page 158



THANKS WINNERS!

I've been telling you in these ads that if you bought a routing switcher without talking to me first we'd both lose -- and who wants to be a loser? Especially in Las Vegas.

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- zero differential gain distortion -- even after ten passes
- differential phase at .05° per pass
- 0.4% THD @26 dBm, 20 KHz
- other ten-pass measurements meeting or nearly meeting our single-pass specs

Or was it --

- our eleven different control panels, including XY panels and a $450 supervisory control panel that does just about everything. . .
- our compact 20 x 20 AFV in a single card frame. . .
- our use of everyday components with no custom hybrids or microprocessors. . .
- or our positive crosspoint confirmation feature?

Whatever it was, you came, you saw, you liked --you won.

Thanks Winners!

Lyle O. Keys

P.S. It's not too late to be a winner. Just circle our number on the reply card, or give me a call.

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NAB SHOW-IN-PRINT

Some new monitors by Tektronix are mentioned elsewhere. A rather special video monitor is the 634 Video display. It has a high resolution (1400 lines), which gives good gray scale renditions. It is ideal for photographing displays. Shintron had a model 704 four inch portable oscilloscope/waveform monitor for TV waveform display and ENG purposes. Electro & Optical Systems had some UK-produced waveform monitors. Ultra Audio Pixtec offered its Syncpak as a simple sync generator and test pattern unit for O.B. vans.

We started this section with a reference to Bird calorimeters. Electro Impulse Inc. also has a digital readout calorimeter worthy of notice.

Among some of the miscellaneous test items noted at the show was a new electronic color analyzer (Grafikon), offered by Power Optics. It is designed for fast, accurate and objective balancing of TV monitors. Unit is designed to quickly set up a number of monitors. Also on the exhibit floor was an "energy use gauge." For $249 you can buy (from Television Products Inc., Inglewood, Calif.) this solid state amp/hr meter to check the status of your ENG batteries.

Tentelometer had a new tape tension gauge specifically for BVU-200 VTRs.

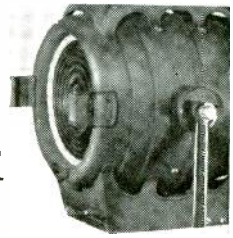
Sound Technology audio test source (right) and automatic distortion meter (left)

Belar had stereo modulation monitor; it measures L and R channels separately

Radio and audio test equipment

In contrast to the wealth of TV test units described in the preceding section, new radio and audio test equipment was scarce. An instrument new to the NAB that represents a real advance for its unusual compactness (it has been seen at conventions of the Audio Engineering Society), was the hand-held audio spectrum analyzer Model IE-30A of Ivie Electronics Corp. This instrument has an LED display for showing ⅓ octave (thirty bands) or one octave (ten bands) amplitudes, with a display range up to 45 dB in one, two or three dB steps. Frequency range is 25 Hz to 20 KHz. It has dual memories, for holding two sets of data, and push-button recall to compare either stored pattern with a real-time one. It has a gating mode for remote control analysis of delayed signal events. Also incorporated in the 8"x 3⅞"x 2⅛" package is a precision sound level meter with digital read-out; fast, slow, impulse, and peak modes; and calibrations for all the standard weighting curves. The condenser microphone is supplied.

Another new spectrum analyzer of similar characteristics, but in a much larger table-top cabinet, is the Model 500 of Inovonics, new to the NAB. It too provides readings on ⅓ octave and one octave bands; the display is a 13x31 LED matrix. There are two memories, gated input, digital readout for reference level, an RT_{60} mode for reverbera-



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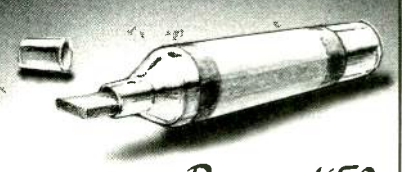

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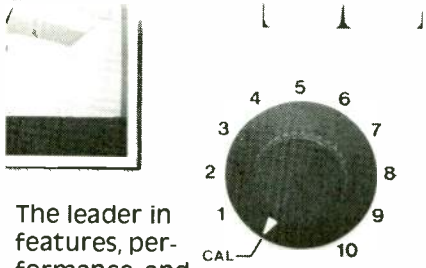

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tion analysis, display resolution of 0.5, one, two or three dB per step, and many other operational features for precision acoustic analysis.

Firms with test equipment familiar from earlier shows were Sound Technology, with their automated distortion measuring equipment; Belar, with AM and FM monitors; Fidelipac, with their wow and flutter meter; and MICMIX, with their program meter supplying both PPM and VU readings.

Master clock systems

We mentioned earlier the Leitch master clock system. This was but one of many. The Leitch CSD-510 system has an accuracy of 1/10 second per month on internal crystal. Auto sync to WWV maintains the output to within five milliseconds of accuracy. It will accept one or five MHz reference inputs from cesium or rubidum standards. Output can run 200 clocks. It has FSK serial time for digital clocks, and audio tone on hour and half hour.

PWH Electronics Ltd. showed the Cenchyron master/slave timekeeping system. It can also run as a forward/back timer, or as a digital data transmission system. Other options allow one to drive impulse or synchronous clocks or superimpose data on a video signal. Time base is a built-in temperature compensated crystal controlled oscillator. Accuracy is +2 seconds per month.

ESE was another source of master clock systems which are familiar to most broadcasters. They also had up and down timers, plus a programmable clock for ATS systems.

Glentronix showed a master clock using Torpey control. Driver is the NTSC color subcarrier. High speed reset was a major feature.

QSI Systems Inc. showed television clock systems which display time and date digitally on television screens. A video back timer was another QSI product. Digital timers were also shown by Vamco engineering.

For more information circle bold faced numbers on Reader Service Card: Bird digital calorimeter, **531;** Tektronix ANSWER, **532,** 634, **533;** Philips PM 5578, PM 5560, **534;** R & S Barco demod, **535;** Telemet 3710, **536;** Lenco PVT 327, **537;** VAC Model 4000, **538;** Asaca Model 205, **539;** Datatek D-631, **540;** Leitch master sync, **541,** CSD-510, **542;** NTI 535 NTSC, **543;** Electro Impulse calorimeter, **544;** Ivie IE 30A, **545;** Innovonics Model 500, **546;** PHW timekeeper, **547;** ESE ATS clock, **548;** Glentronix master clock, **549.**

NAB SATELLITES REPORT BEGINS ON PAGE 165

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INTERPRETING THE

FCC RULES & REGULATIONS

Inflation Hits Broadcast Regulation: $20,000 Forfeiture Ceiling

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

CONSUMERS SEEM TO BE GETTING used to paying more every week for their milk, bread and vegetables. Inflation has become an all pervasive fact of life. But the next broadcaster to be tagged by the Commission with a forfeiture penalty will be in for a shock. The Communications Act of 1934 has been amended to permit a forfeiture of up to $20,000.[1] This represents a doubling of the forfeiture ceiling from the previous $10,000 maximum.

More than ever, it is important for broadcasters to be familiar with the Commission's forfeiture powers and the factors involved in FCC rule violations. It may make a great deal of difference, in terms of dollars and cents, to the penalty ultimately exacted by the Commission.

In *Lenawee Broadcasting Co.*,[2] the Commission imposed a forfeiture of $400 upon the licensee because the station failed to make equipment performance measurements, as required, and because the station failed to make operating log entries for daily inspection of tower lights. The fine imposed may not seem like much, but the Commission voiced some views in the decision which should make broadcasters sit up and take notice.

The licensee, operator of an FM station, is required by the Commission's Rules to make equipment performance measurements at least once each calendar year. These measurements must be made no more than 14 months apart. The licensee failed to do so within the 14 month period and proferred what appeared to be a fairly plausible argument in mitigation. The licensee stated that the delay in making the equipment performance measurements was *not* the result of any deliberate omission on its part but, instead, was an "unexpected consequence of a good faith attempt of the licensee to comply with the Commission's regulations." Apparently, the licensee began taking equipment performance measurements but discovered that its noise distortion meter was malfunctioning. It returned the meter to the manufacturer's representative, who assured the licensee that the meter would be repaired within two weeks. The assurances were never realized, and the station did not receive the meter back from the manufacturer until more than 14 months after its last equipment performance measurements.

The Commission found — and broadcasters should take special note of this — that the station had "repeatedly" violated the equipment performance measurement rule. That is, the Commission relied upon Section 503(b) of the Communications Act which states that: ". . . each day during which such violation occurs shall constitute a separate offense." Thus, a licensee that takes equipment performance measurements 15 months after the last set of measurements can be found guilty of *30 separate violations* (one violation each day after the fourteenth month).

In light of this finding, the licensee applied for review to the Commission and argued that finding of multiple violations is a "rigid and irrational" application of Section 503(b). The licensee argued that this is clearly unjust in light of the *passive* nature of its violation (i.e., failing to do a required act rather than *affirmatively* acting in derogation of a rule.

The Commission rejected the licensee's assertion that failure to take timely performance measurements constitutes an uninterrupted continuing violation. The Commission stated that it believes that Section 503 of the Act authorizes the Commission to assess forfeitures against

continued on page 162

[1]Section 503(b) (2) (A) of the Act.
[2]42 RR 2d 390 (1978).

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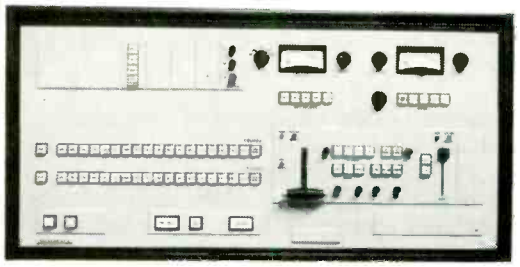

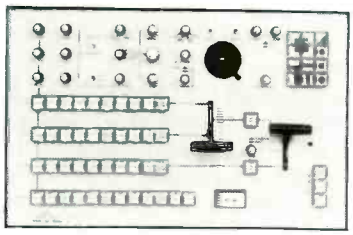

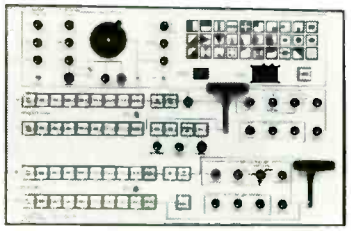

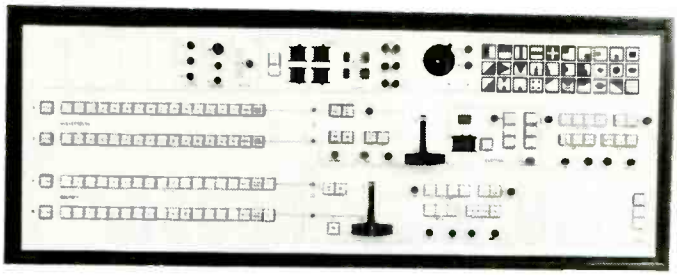

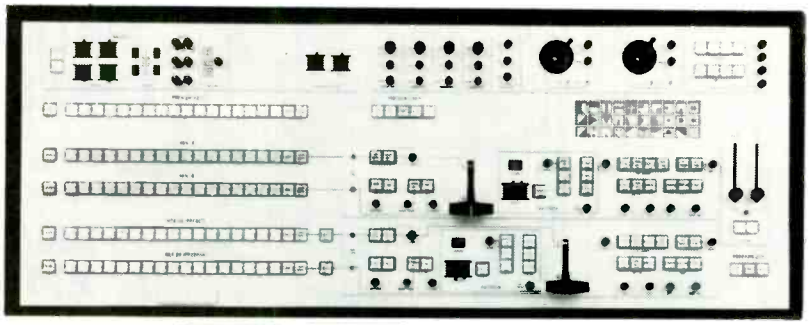

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This holding of the Commission takes on special importance for broadcasters in light of the new $20,000 forfeiture ceiling. As an illustration, if a broadcaster fails to take equipment performance measurements until 14 months and 10 days after the last set of measurements, the Commission would have the power to levy a forfeiture in the amount of $20,000 ($2,000 for each separate violation on each of the 10 days).

There are a number of situations in which "passive" non-compliance with the Commission's Rules can constitute *separate* violations and, hence, expose a broadcaster to the risk of a maximum $20,000 forfeiture. Several are listed below to illustrate how easy it can be to "chalk up" repeated violations.

(1) Unauthorized Transfer of Control: A licensee may delegate management and control of his station without filing any appropriate application for transfer of control with the Commission. If a licensee does so, each day during which operation of the station with an unauthorized "controlling entity" occurs, constitutes a separate violation of the Commission's Rules.

(2) Daily Inspection of Tower Lights: If the station employee that is in charge of making a daily inspection of tower lights is out for a week, and no other employee makes the inspection, the licensee may be guilty of seven separate rule violations and subject to forfeiture of up to $14,000. The Commission can be even more stringent. In the *Lenawee Broadcasting Co.* case, discussed above, the Commission found that the licensee had violated the Commission's rules repeatedly by failing to *log* the daily tower light inspection, *even though the inspections were actually made.*

(3) Public Inspection File: Failure to file the results of community leader interviews in the public inspection file within a "reasonable time" after the interviews occur, may result in a finding of multiple violations. This should be of special concern to licensees because, oftentimes, 100 or more community leaders are interviewed in a year, giving rise to a possible catalog of 100 separate violations if the public inspection file is not updated in a timely matter.

(4) Fradulent Billing: Each instance of fraudulent billing is a separate violation of the rules, even if a station does so only in respect to one advertising account or one product.

(5) Program Length Commercials: Sometimes, it is difficult to make an accurate determination of whether a program constitutes a program length commercial. If a station broadcasts a program which turns out to be a program length commercial, any *repeats* constitute multiple violations of the Commission's rules.

(6) Lotteries: Not too long ago, a number of Washington, D.C. area stations got "burned" by broadcasting

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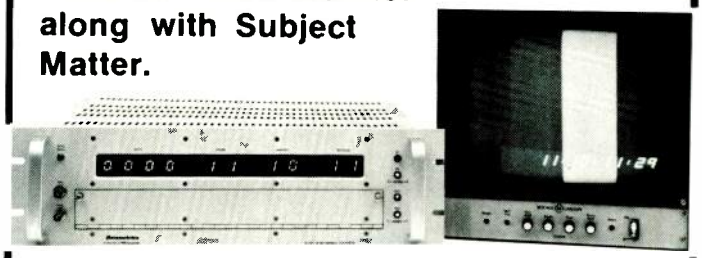

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what appeared to be a simple advertisement for a clothing store, but turned out to constitute a lottery. Many of the stations repeated the commercial advertisement numerous times over the course of many days and were tagged for repeated violations of the Commission's rules against lottery broadcast.

(7) Program Logs: Most broadcast stations have systematized their program logs to the point that they meet the Commission's requirements consistently. However, especially when new personnel take over logging responsibilities, there is a danger that incorrect logging procedures can result in multiple Commission rule violations. A careful check of logs should be made at all times, but especially after new personnel are hired. Management level personnel should make these reviews.

(8) Station Identification Announcements: Overzealous station promotional personnel have been known to convince a licensee to broadcast a station identification announcement that sounds great (for promotional purposes) but violates the station identification rules (which prohibit extraneous manner which might hinder listener identification of the station). Each station identification announcement that is broadcast and does not comply with the Commission's rules on same, will be considered by the Commission to be a separate violation.

There are dozens of other rules which are especially susceptible of being inadvertently violated more than once by a station. The foregoing should be helpful in getting broadcasters on track in thinking about the dangers in this area.

There are several additional points which ought to be brought up when considering the new $20,000 forfeiture ceiling.

First, Section 503(b) of the Communications Act permits forfeitures for either *willful* or *repeated* violations. Although it is seldom that the Commission actually proves *willful* violations, it has been most successful in imposing forfeitures on broadcasters due to *repeated* violations. A broadcaster cannot escape a forfeiture because it did not willfully violate a rule. The Commission's rationale, of course, is that violations can be avoided easily if the licensee is familiar with the rule and has adopted proper operating procedures. Moreover, the Commission *requires* that the licensee be familiar with the Rules.

Second, a licensee is *always* responsible for the acts of its employees. This applies whether the licensee had no knowledge of a rule violation, or even if it had the best of intentions in complying with all Commission rules. A licensee's only consolation is that comprehensive supervision of employees will diminish the chances that rule violations will occur.

Third, the Commission will *not* excuse a rule violation simply because the licensee institutes prompt corrective action. Once a violation occurs, the licensee will be held responsible. The Commission's rationale for this position is to force licensees to redouble their pre-emptive efforts against rule violations.

Fourth, the Commission rejects any "substantial compliance" argument when it takes a licensee to task for a rule violation. The *Lenawee Broadcasting* case is a good illustration. A station employee made daily inspections of tower lights, but failed to log them. Nonetheless, the Commission held the licensee responsible for a violation of the logging rule. **BM/E**

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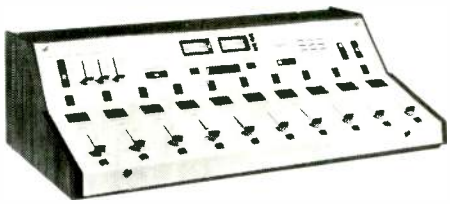

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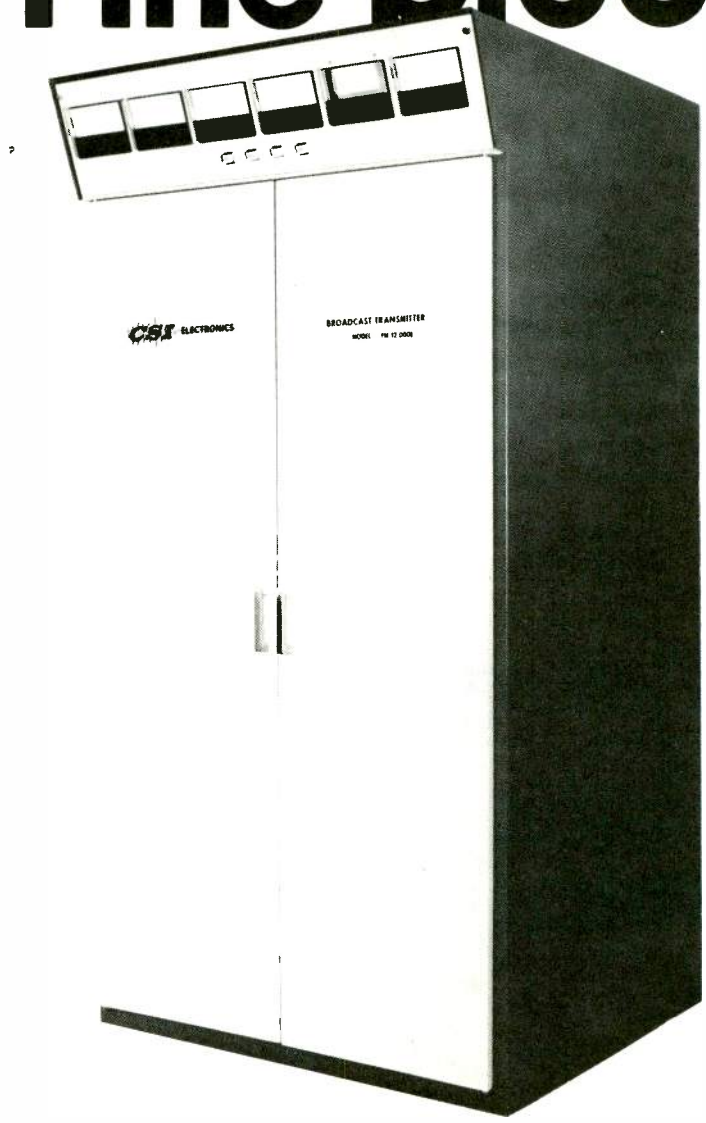

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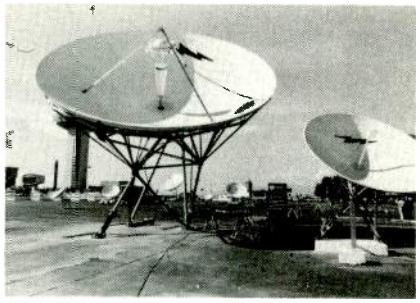
SATELLITES AT NAB

This Harris satellite earth station was on exhibit floor



Some of the earth station antennas in outdoor exhibit area

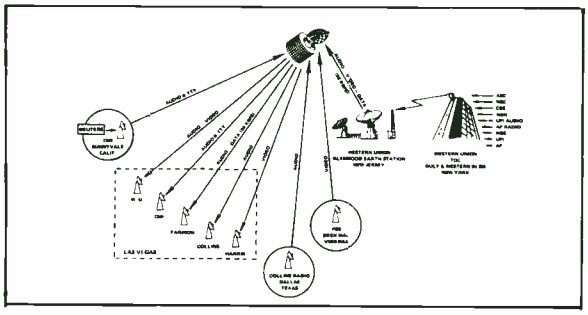


Diagram shows antennas tuned to Westar satellite

Era of satellite distribution begins

A casual visitor coming up to the Las Vegas Convention Center the week of April 9 might have assumed an outer space convention was taking place. What else could the presence of six large dishes, all aimed skyward, signify? Indeed, all of these antennas were being used to bring in signals — satellite feeds from Westars and RCA Satcoms. Signals spilling into the exhibit floor came from many different points of origin — the ABC, NBC, and CBS radio nets (now used for long hops), Mutual demonstration signals, AP, UPI, Black Network, Channel 17, Atlanta, HBO, and others.

On the exhibit floor, satellites included the Andrew Corp., Farinon, Harris, NEC, Mutual, RCA Americom, Rockwell, Scientific Atlanta and United Press International displays. Omnipresent was Mutual Broadcasting System, with events of one sort or another scheduled almost every day. Both Mutual and Western Union staged demos in hospitality suites.

Two sessions dealt with satellite distribution systems for radio: one for engineers on Monday, April 10, and another for managers the following day. At these sessions, visitors learned that radio satellite distribution systems are now at hand. Mutual Broadcasting will set up 500 earth stations replacing 22,000 miles of telephone cable, said Gary Worth, Mutual v.p., as soon as the FCC approves its application. Satellite distribution means Mutual can put up three programs simultaneously, extend the bandwidth to 15 kHz (from the present five kHz), and ultimately go to six simultaneous programs. It will be able to distribute programs and commercials on a strictly regional basis on real time. In addition, the same channels can carry data for hard copy printing. Eventually, said Andrew Inglis of RCA, stations will use data channels for selecting automated programming and commercials from a satellite source. Both Worth and Inglis asserted that satellite distribution is technically and economically feasible now for radio programming, provided the FCC waives site selection and frequency coordination requirements. Such a move, as requested by Mutual in its March 3 application, would mean that the receiving station owner would not complain later to the FCC if interference increased due to more intense use of terrestial microwave. This shouldn't be a problem, however. Most carriers and operators who have conducted reception tests feel terrestial interference, if present, may be rendered unobjectionable by slightly repositioning the receiving antenna or by adding shielding.

RCA said that in July it would file a brief with the FCC providing reception data supportive of Mutual's waiver request. There was no apprehension expressed by speakers from Mutual, Western Union, RCA or California Microwave on the suitability of satellite transmission. Technical/cost trade-offs can be made that will enable users to get the service they desire.

Walter Johnson of California Microwave, outlining the components of a system before the engineering audience, stated that the 10 ft. dish was an ideal compromise, at the present, for radio distribution. Significant factors include the antenna size, the LNA (Low Noise Amplifier), and the demodulator. Essentially, trade-offs operate like this: the larger the antenna, the less susceptible it is to interference (smaller dishes have broader beams). If the signal-to-noise margin is good, it is possible to reduce power at the transponder and put more carriers on; or, one could keep the power and perhaps reduce the cost of the LNA. On the other hand, power could be reduced to reduce energy dispersed. Large antennas give a wider noise margin but cost more, have higher shipping costs and are more difficult to shield. The cost of an antenna above 10 ft. goes up faster than the cost of an LNA comes down, said Johnson. Below ten feet, however, the cost of the LNA is higher, wiping out the advantage.

Keeping the carrier to noise ratio reasonably close to the margin is worthwhile because the threshold of the demodulator can be increased to pull in signal if it drops to a low point.

Total spectrum management is a broader concern that the FCC must address. Powerful satellites require longer spacing arcs, thereby putting a limit on total channels available. If the carrier-to-noise can be reduced by using sensitive LNAs and demodulators, satellite spacing can be reduced, thereby multiplying the number of channels. (Not discussed was the prospect for more channels as a result of multi antenna arrays on larger satellites — something that could happen after 1980.) Inglis of RCA did predict the advent of small transmit antennas which would make interactive transmission possible.

Several participants saw earth station prices coming down because of high volume and keener competition. The most cautious person on the panel was Ralph Green of CBS, who conceded the advantages — improved S/N, more versatility for regional use, more flexibility for data transmission — but said the real issue was return on capital investment. Green felt the $2-3000 installation costs being quoted were optimistic. For a 300-receiving station system, equipment and installation would run $4.5 to $6.5 million with annual operating costs of $1.5-$2.5 million. At the moment, Green does not feel the economics justify the investment. Although equipment costs are coming down (and telco costs are going up), digital transmission via terrestial long

lines is entering the picture, and this mode may mar the attractiveness of satellite systems.

Moving from the big picture to equipment details, here is a rundown of what the manufacturers exhibited. California Microwave, tied in with Mutual, stressed FM Single Channel Per Carrier (SCPC) systems as ideal for small aperture terminals (SATs) for radio. Three configurations are available: a full 15 kHz program channel, an eight kHz program channel with three voice/data chanels, or an all digital 56 kilobit channel. California Microwave feels it has all components under control: the antenna, the LNA/down-converter, and the demodulator. By using their audio compander (dynamic compression at the uplink, expansion at the receiver end), an optimum cost/quality system can be engineered. Ten or more channels per transponder can be handled with an audio signal to noise ratio in excess of 65 dB.

Harris showed terminals for both TV (including cable TV) and radio reception. For television it showed 11 meter receive-only terminals (ROTs) equipped with redundant downlinks, automatic transponder switching, remote switching between satellites and dynamic status monitoring and control. For radio broadcasts, Harris displayed an eight foot receiving antenna terminal (six and 10 foot terminals are also available). Harris uses a SCPC processor, as does California Microwave. Harris stressed that it has obtained over $100 million in satellite communications systems business in the last two years from Nigeria, Sudan, and Saudi Arabia.

Scientific Atlanta stressed its ability to produce the right equipment for all users, with antennas ranging from five to 11 meters for TV and two to five meters for radio. The company makes its own LNA, video modulators, demods and processors. As an experienced supplier to the cable TV industry, SA was very prominent at the NAB show. For radio, the 8000 series Program Audio and Data Channels equipment was shown. Bandwidth can be set from 3.1 kHz to 15 kHz. SA provides flexible companding capability, threshold extending demodulators and other features.

Rockwell International, with contracts to build 150 ROTs for the Corporation of Public Broadcasting and PBS plus 192 earth stations for the National Public Radio system, has clearly positioned itself as a major satellite supplier. Satellite capability was a prominent part of Rockwell's Commercial Telecommunications Group

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exhibit at the NAB. The new NPR system, incidentally, will be capable of quadraphonic broadcasts.

Moseley Associates joined the ranks of satellite suppliers at NAB by building an earth station control system for Rockwell's CPB contract. The ESC-10 provides remote command, telemetry and status. Remote digital frequency control and telemetry, LNA switching and alarms, power supplies, deicers, and heaters, as well as building security, are part of the Mosely equipment.

Microwave Associates came out with two new low cost video broadcast satellite receivers at the NAB show — the VR-3B and the all channel VR-4B. The VR-3 employs a single conversion hetrodyne circuit which uses a crystal referenced phase-locked oscillator and precision filter channel. The all channel set uses a frequency synthesizer in the down converter to tune in present or future channels. Receiver noise figure is 12 dB. At a C/N of 16 dB, the video S/N is greater than 53 dB typical, audio 63 dB.

Another exhibitor stressing video receivers in the 4 GHz band was Farinon, whose FST 3001/3002 uses plug in construction and C/N metering. It is a single conversion type with single channel tuning. The IF in the Farinon system is 70 MHz, and the video S/N ratio is 53 dB for a carrier noise ratio of 15 dB. The FM audio program channel has a S/N of 60 dB typical.

Showing TV ROT capability was Andrew Corp., which has installed some 40 systems for TV alone. Andrew is primarily in the antenna and feed line business (Heliax Coas cables), but will do a complete turnkey system. Its exhibit explained how to make calculations for earth station performance.

Anixter-Mark demonstrated its six ft. and 10 ft. earth station antennas for the 12 to 14 GHz band. These are spun aluminum antennas with heli-arc welded back frames. NEC also showed a six ft. (1.83 meter) antenna in its booth. This antenna is currently being used in Japan to test direct satellite reception.

Another related device was the new computerized satellite receiver controller shown by Channelmatic. This device, which can be programmed to operate for seven days on real time (32 events daily), was designed to automatically switch from one satellite channel to another or from satellite feeds to locally-originating material and back again — ideal for cable TV. **BM/E**

For more information circle bold faced numbers on Reader Service Card:
California Microwave, **550;** Farinon, **551;** Andrew, **552;** Harris, **553;** Scientific Atlanta, **554;** Rockwell, **555;** Anixter Ark, **556;** NEC, **557;** Moseley ESC-10, **558;** Microwave Associates VR3-4, **559;** Channelmatic, **560.**

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GREAT IDEA CONTEST

Share your ingenuity with other broadcasters, and win an electronic calculator. Rules and entry blank form are on page 173. Enter now!

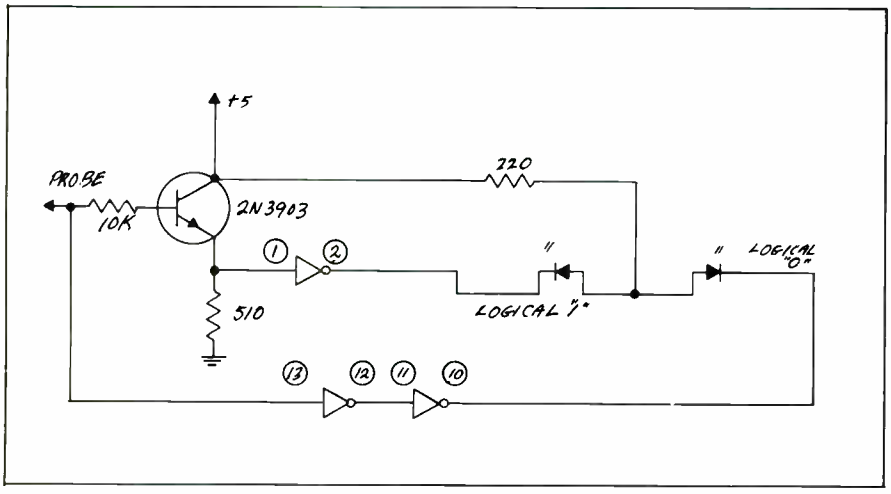
39. Troubleshooting TTL and DTL Circuits.

Joseph Zaroff, Consultant, WTTM/WCHR-FM, Trenton, NJ.

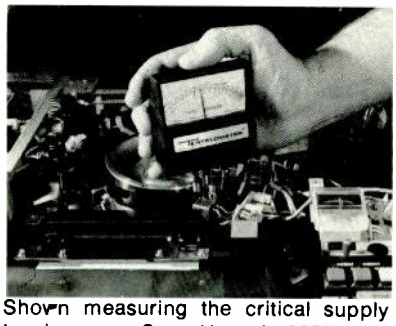
Problem: The need exists to determine the logical state of the input or output of a given gate or flip-flop. The test instrument must react to only "0" and "1" voltages, be physically small, inexpensive, and have a high input impedance.

Solution: The circuit shown has been successfully used to troubleshoot TTL and DTL family circuits. The device can be easily built into a plastic dime-size translucent coin box available at many hobby shops. Total parts cost less than $5. The inverter input at pin 13 remains high while the probe is open. This forces a high state at pin 10 to keep the logical "1" indicator extinguished. When an "0" is applied, the dual inverters drive the L.E.D. on while maintaining a high input impedance. With a floating input, the 2N3903 is operating near cut-off. The 510 ohm pull-down resistor maintains a high state at pin 2. A logical "1" brings the transistor into conduction. As emitter current flows, the voltage developed across the 510 ohm resistor is enough to drive the output of the inverter low. A high input impedance is maintained by the 10 K probe resistor. The 220 ohm resistor limits display current during prolonged operation. Power is delivered from the circuit under test by using Pomona Electronics Grabber clamps across the supply rails.

continued on page 170



VTR VIDEO PROBLEMS?
WHAT'S THE TAPE TENSION?



Shown measuring the critical supply tension on a Sony U-matic 2850.

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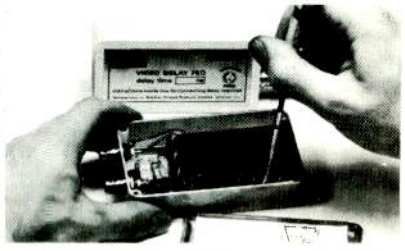

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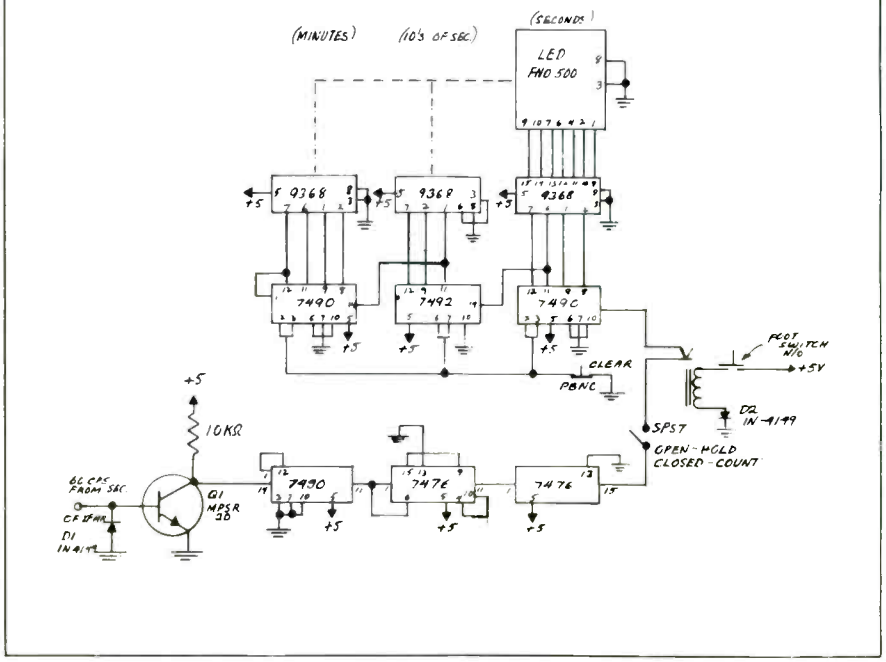
40. Timing A 3-Minute Newscast.

Kelly Klaas, Chief Engineer, KEEP/ KEXJ, Twin Falls, ID

Problem: It was found to be very difficult to time a 3-minute newscast for our automated FM on a regular watch with a second hand, or a conventional stop-watch. A commercially available digital stop-watch would have sufficed, except for the size of the numbers, and no remote control.

Solution: The FND 500 LED's used in the timer are large enough to see from several feet away, and the foot switch lets you start the timer when both your hands are busy. The timer also has a switch on the unit itself for "HOLD," for the operators convenience. Additional stages can be added for hours, tens of hours etc. Since the timer was built, our 2 to 4 minute newscasts have settled down to a very constant 3 minutes.



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In the USA, please call or write:
PENTAX CORPORATION
Atrium Building, 98 Cutter Mill Road, Great Neck, New York 11021
(516) 487-9800

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41. Automatic Timer Reset For Cart Machine.

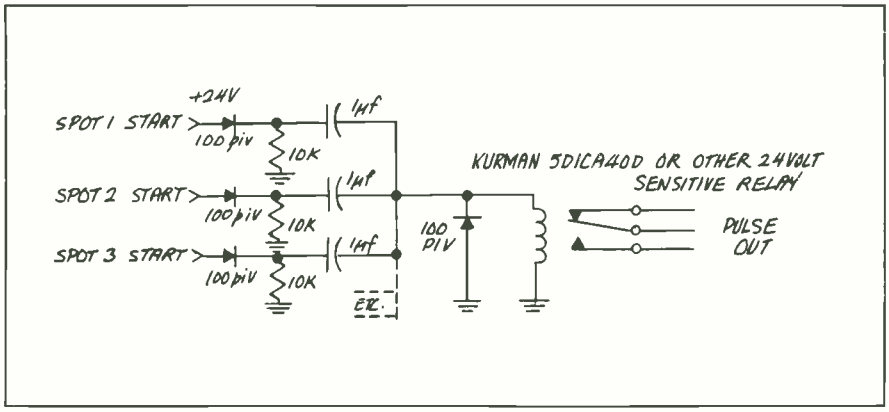
Neil Hill, Engineer, KBIQ, Seattle, WA.

Problem: To hook up ESE 60-minute timers on air-cart machines for a running indication of the amount of time left before the end of a commercial.

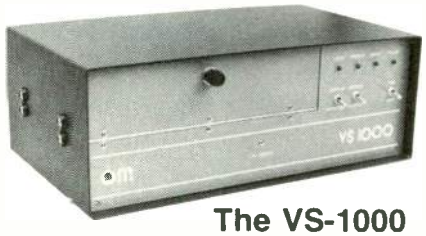
Solution: We needed to reset the timer each time a commercial was started and we desired the reset feature to be operated by the normal start switch, which put out a continuous +24V as long as that cart's audio was desired on the air. As we sometimes overlap commercials the reset feature must work even though another cart with its +24 Volt was already in the 'on' position.

Each time +24V is put on a line it causes the relay to pulse, resetting the timer to zero to start counting again. Any number of lines can be used, and resetting a timer is only one use of this simple circuit. Use only one line to convert +24V continuous to pulse start a cart machine.

continued on page 172



LEGALIZE YOUR VERT BLANKING



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Great Ideas

42. Restoring Transmitter Power After Momentary Outage.

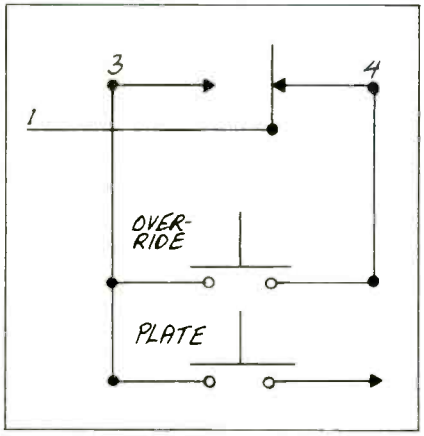
Alex Fraser, Chief Eng., WVNH, Salem, NH.

Problem: To eliminate the three minute recycle time of our transmitter after experiencing a momentary power outage . . . doing so as inexpensively as possible.

Solution: We have been plagued with numerous one to ten second power interruptions from the local utility company which have knocked our transmitter off the air with a three minute recycle period. (The power company's excuses have typically placed the blame on a squirrel getting into one of their sub-stations . . . honest!)

We have a CSI T-10-A rig which uses a three minute filament time delay relay, K1, in its control circuitry. The circuit is closed when the relay is energized, making contact between pins one and three; when not energized, contact is made between pins one and four. A normally open SPDT switch was placed in circuit between pins three and four so that when closed, the control circuit would be completed, no matter which position the relay contactor is in. After relay K1 is energized, the override switch is normaled by the transmitter operator.

For the switch I used a Switchcraft 84206-L which has the feature of being illuminated with either an amber color in the normally open position, or green when closed. Power for the lamp was taken from the transmitter's 24 volt supply. The illuminated switch is an option . . . but one appreciated by the transmitter operators as it is easily located when needed; and the two colors remind the operator to normalize the switch after K1 energizes.



Rules for BM/E's Great Idea Contest

1. Eligibility: All station personnel are eligible. Consultants to the industry may enter if the entry indicates the specific station or stations using the idea or concept. Manufacturers of equipment or their representatives are not eligible.

2. How to Enter: Use the Official Entry Form on this page or simply send *BM/E* a description of your work. State the objective or problem and your solution. Include diagrams, drawings, or glossy photos, as appropriate. Artwork must be legible but need not be directly reproducible but not exceeding three in number. Camera reproducible material is preferred. Length can vary, but should not exceed 500 words. *BM/E* reserves the right to edit material. Entry should include: Name, title, station affiliation, and the class of station — TV, FM, AM. Indicate if idea is completely original with you.

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3. Material Accepted for Publication: *BM/E* editors will make all decisions regarding acceptability for publication. If duplicative or similar ideas are received, *BM/E* editors will judge which entry or entries to accept. A $10 honorarium will be paid for each item published.

4. Voting: Every reader of *BM/E* is entitled to rank the ideas published. This can be done on the Reader Service Card in the magazine or by letters or cards sent to the *BM/E* office. To vote, readers should select the three ideas they like best and rank them 1, 2, or 3.

5. Winners: Top rated entries in the year long tally will become winners in each of the three major categories (AM, FM, TV). Final winners will be picked in February 1979 and announced in the March 1979 issue of BM/E.

6. Prizes and Awards: Three top prizes will be awarded: a programmable electronic calculator will be awarded for the highest rated entry in the respective categories of AM, FM, and TV. Ten engineering slide rule calculators will be awarded as second prize for the highest rated entries in the following additional categories (top three winners are not eligible for these prizes): audio (three prize, one each in the AM, FM and TV categories); RF (three prizes, one each in the categories of AM, FM, TV); Control (three prizes, one each in the AM, FM and TV categories); Video (one prize in TV).

Mail to: Editors, BM/E
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1978 Entry Form

Name_____ **Title**_____
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Licensee _____
Class of Station at which idea is used (check one) TV____ **FM**____ **AM**____
Category: Audio____ **RF**____ **Video**____ **Control**____
Objective or Problem: *(in few words; use separate sheet for details* _____

Solution: *(Use separate sheet–500 words max)*

I assert that, to the best of my knowledge, the idea submitted is original with this station; and I hereby give BM/E permission to publish the material.
Signed _____ **Date**_____

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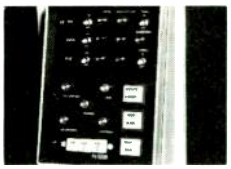

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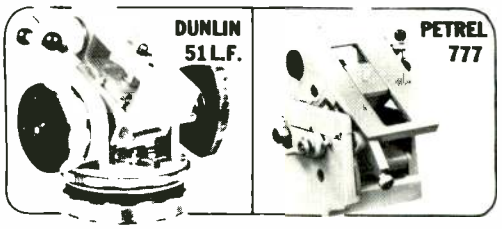

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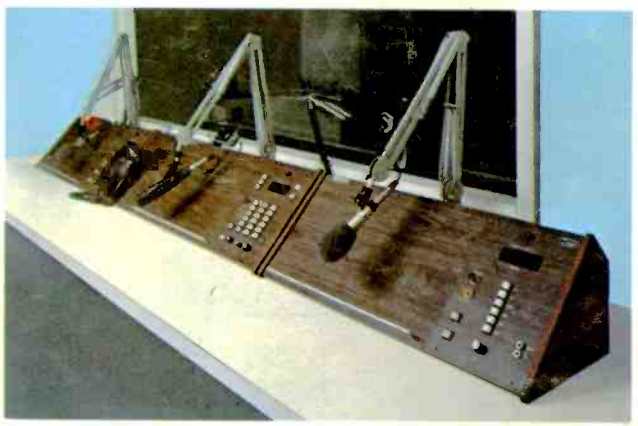

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