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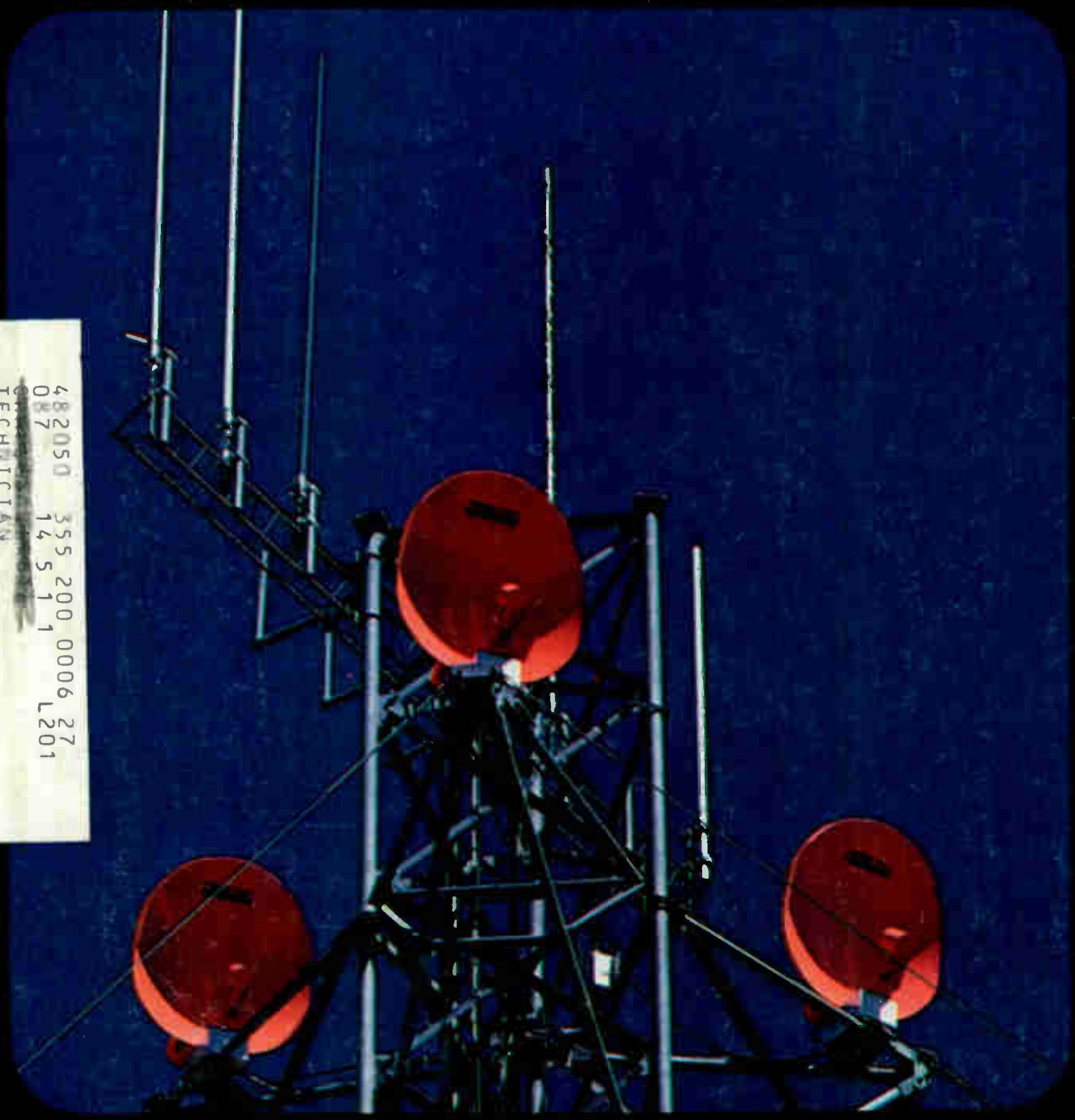

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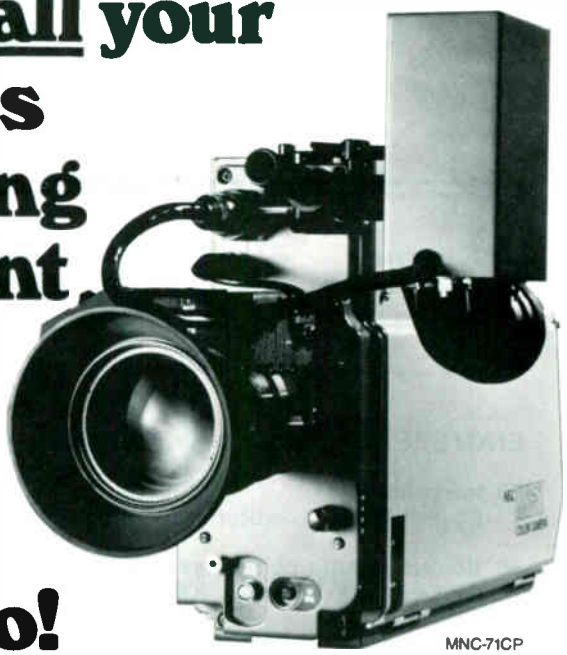

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On a recent visit to the U.S., Sadayuki Ikeda (right), Supervisor of NEC's Video Development Dept., Broadcast Equipment Division, and Cinema Products' Chief Engineer Robert Auguste exchange views on ENG/EFP practices and equipment requirements.

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At the recent NAB Conference, Ed DiGiulio (right), President of Cinema Products Corp., and R. Dennis Fraser, Vice President and General Manager, Broadcast Equipment Division, NEC America, Inc., display the Oscar and Emmy awards won by their companies for their respective "state of the art" contributions to the motion picture and television industries.

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BROADCAST engineering

The journal of the broadcast-communications industry

January, 1979 ☐ Volume 21 ☐ No. 1

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THE COVER

Reflecting the ENG/emphasis of this issue, the cover shows three Nurad "SUPERQUAD" receiving antennas located atop Sierra Peak in Southern California. Together with other quad-polarized antennas situated at the KJOI tower and Mt. Wilson, they give NBC the capability for extensive live ENG/EJ operations throughout the whole LA basin and beyond. The arrangement of the Sierra Peak antennas affords full overlapping coverage so that live pickups can be conducted simultaneously and independently from any two locations of the complete 360° of azimuth.

The SUPERQUADs shown here are claimed by Nurad to be the "highest performing ENG/EJ receiving antenna system available today." Nurad has recently completed an installation of a repeater system with a fixed intercity link for CBS at Verona, NJ for use by WCBS-TV in New York. A dual-band system is slated for operation at NBC in Chicago in March.

The cover photo is by courtesy of Nurad, Inc., Fred Hock photographer.

February Issue

To complete our picture of electronic journalism, we'll touch on RENG. We have scheduled a roundup on broadcast microphones, and we'll include this material if our inputs don't get held up by the season's mail. And, we have major articles on FM antenna and line measurements; basics of color video; and the status of solid state TV pick-up tubes to be included. This, also, is our NAB pre-convention issue, and we have some exciting things to report.

March Issue

Our NAB Convention special with all the goodies! Plus, we'll have an update on ATS, some timely technical articles, and a continuation of the microphone round up if further space is needed to complete what was planned in February.

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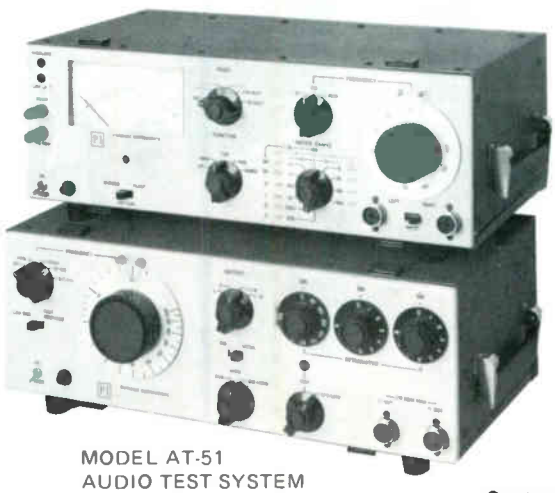

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FCC update

January, 1979/by Howard T. Head

Commission Takes Position in WARC '79

The commission has announced its recommended proposals for the United States position in adopting new international radio regulations at the general World Administrative Radio Conference in September 1979 (WARC '79). Recommendations adopted at this conference will establish world-wide frequency allocations for the rest of the twentieth century.

Although the conference will adopt recommendations in all frequency bands, those of most direct interest to broadcasters involve expansion of the AM broadcast band, sharing of the UHF-TV broadcast band with other non-broadcast services and the allocation of a band for direct satellite-to-home broadcasting.

In AM, the commission proposes an expansion of the present AM band, now extending from 530 kHz to 1610 kHz, upward to 1860 kHz. Of the new band, the portion from 1615 kHz to 1800 kHz would be shared with other services, while the 1800-1860 kHz portion would be allocated exclusively to broadcasting. No recommendations will be made relative to AM bandwidth, which is dealt with regionally. However, only Region 2 (the Americas) still uses a 10 kHz bandwidth; the rest of the world has gone to 9 kHz, or in some cases even 8 kHz.

In the UHF-TV broadcast band from 470 MHz to 890 MHz, the struggle continues between broadcasters, who want the band reserved exclusively for TV broadcasting, and other users, principally land-mobile, who would like to have access to the band on a shared basis with TV broadcasting. The US position on this point isn't the last word in the matter since many of the other of the 154 nations participating in the conference (including Canada) want the band held for exclusive TV use.

In satellite-to-home broadcasting, what the commission technically proposes is the allocation of the entire range of geostationary orbit for the 12/14 GHz band to be allocated equally to fixed and broadcast services. Although such an action would make orbit slots and frequency space available, domestic FCC action would be needed to make satellite-to-home broadcasting a reality. Some people are already jumping the gun, however, by picking up satellite relays already in operation for their own use. There have been several reports of individual experimenters building their own receiving stations, and at least one case of a CATV system picking up and making unauthorized use of a domestic network feed.

Television Scanning Problems II

We reported in the November column on the rather considerable uproar

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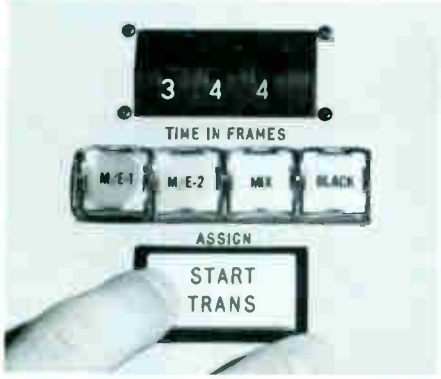

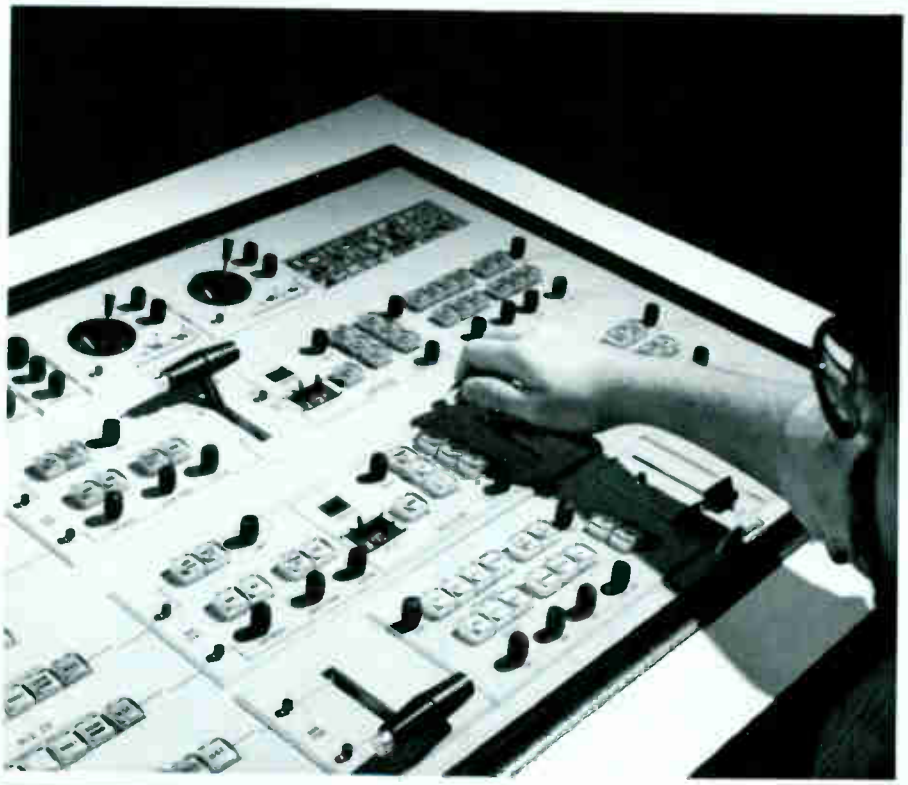

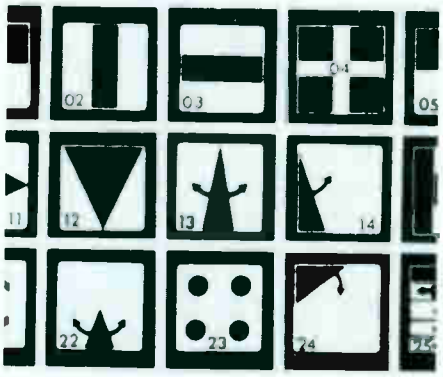

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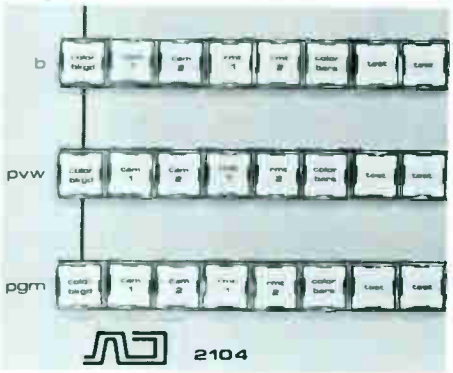

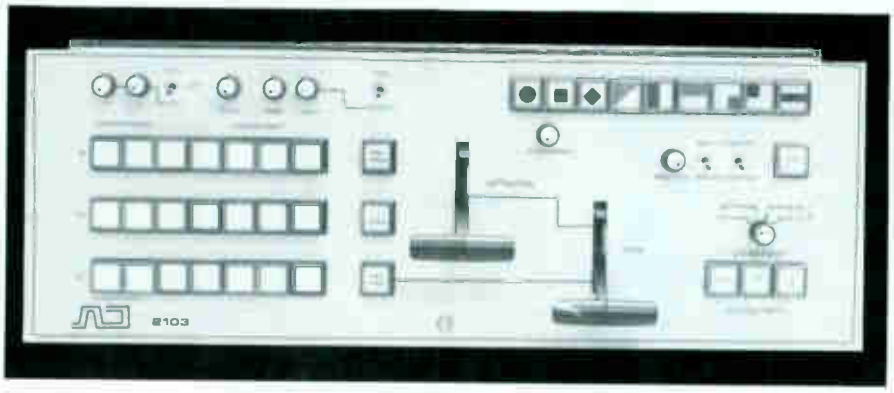

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then being generated by horizontal and vertical TV scanning problems, with stations being supplied with tapes and other material which failed to meet the waveform requirements of the commission's standards. As of this writing, little appears to have been done to solve the basic problem. This doesn't mean that no help is on the way, though, since, for the time being, the commission has turned its back and has suspended enforcement of this portion of the rules. There's no official notice out yet, but an announcement is expected shortly confirming this suspension until July 1, 1979.

AM Stereo Continues to Plod Along

As the commission continues to debate the future of AM stereo and the choice of permanent standards, the water has been further muddied by the request of one of the system proponents that the FCC labs repeat the original testing, originally undertaken cooperatively under the auspices of the National Association of Broadcasters (NAB). Some of the system inventors oppose, while others support, the idea of further testing by the FCC.

Just to make things even more interesting, a Canadian firm has proposed still another system of AM stereo, claiming advantages over the systems already tested by NAB and the original system advocates.

Pushbutton System Predicts Station Coverage

A new system for predicting the coverage areas of TV broadcast stations, named AREAPOP II, has been announced jointly by three organizations interested in public TV station coverage. The system, relying almost entirely on computer techniques, works like this: you feed in the frequency, power, height and geographical coordinates, and stand back! The machine draws terrain profiles, automatically, in as many directions as may be necessary; draws the necessary curves of field strength vs. distance· draws coverage contours using an x-y plotter, including tiny enclaves and exclaves where they are found to exist; counts the population and calculates the area within the contours; and also automatically (I am not making this up) supplies demographics - where desired.

The weakest link in the chain is the prediction of the field strength, although the method used is probably as good as any and better than some. Although the system was devised and set up for the prediction of the coverage of public TV stations (both VHF and UHF), it has obvious applicability to commercial TV stations as well as to FM broadcast stations.

Short Circuits

A manufacturer is pushing a system to deliver printed messages to individual receiving locations, using FM broadcast SCAs; better check the FCC rules on that one...The United Church of Christ wants a "freeze" put on all FM and TV allocations that might serve Indian reservations so as to assure future Indian ownership...Bell Labs is experimenting on the communications needs of the deaf, using frequencies in TV channels 3 & 4...The commission, after 45 years, is publishing criteria for protection of its 13 monitoring stations...The commission has once turned down a request to increase the power of FM translators from 1 W to 10 W east of the Mississippi River...The commission declined to order a new AM station off the air because of blanketing interference within the 1 V/m contour...While the commission continues to debate the matter of interference to TV Ch. 6 stations from non-commercial educational FM stations in the 88-92 MHz band, it continues to grant new FM stations over the protests of the TV stations, in two cases in Indiana and Tennessee...You can now carry those commercials for "Love Affair Douche" without violating the NAB Code.

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A pretty dramatic statement, we'll admit.

But Sony Broadcast has dramatic equipment to back it up.

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Next, look at our BVU-50 recorder.

It saves space and weight by having record-only circuitry. Yet a unique video confidence head system lets you know you're getting adequate RF signal on the tape. Framing servo insures proper frame orientation. And professional picture quality makes the BVU-50 equal to any ENG or EFP situation.

Now look at them both together. And see how far ahead of the field Sony Broadcast really is.

Your BVU-50/BVP-300 system will operate for up to 74 minutes on a single BP-90 NiCd battery.

You can start and stop the recorder by the camera trigger.

At the end of each shooting sequence, the BVU-50 automatically backspaces the tape for clean scene-to-scene transitions. You get continuous usable video for the full length of your recording tape.

While you're recording, you can monitor all VTR warning functions in both camera viewfinder and earphone.

And while you're in standby mode, the BVU-50 head drum rotates at slower speed, reducing power consumption by two-thirds.

In short, you get an ENG/EFP package that gives you the size, weight, and convenience you'd normally expect from 16mm film equipment. Yet retains all the economic and electronic advantages of video.

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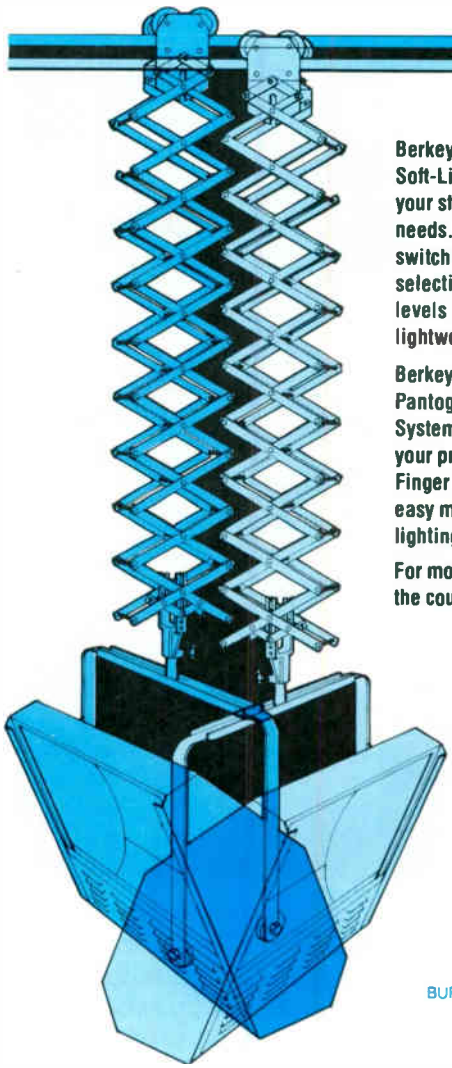

Berkey Colortran's new 1k/4k Soft-Lite is the answer for your studio or location needs. Four individually switched lamps provide quick selection of four intensity levels in a 19.25 lb. lightweight package.

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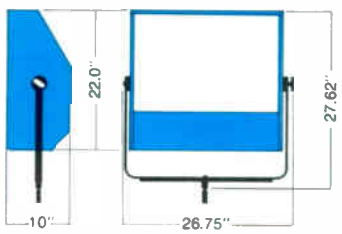

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industry news

Television producer receives award

Danny Arnold (second from left), executive producer of the *Barney Miller* series, accepts the Man of the Year Award from the American Society of Lighting Directors for his contribution to the look of realism in television lighting. Giving the award is ASLD co-founder George Dibie (right) of Sherman Oaks and Edwins S. Hill, president of the ASLD. Joining the ceremony is Max Gail (left), who plays Wojo on the TV show.

Video market projected in study

Kalba Bowen Associates has launched its multi-client study, *The Home Video Programming Market, 1979-1983*, scheduled to be completed in February 1979. It will project the market for pre-recorded videocassettes and discs for the next 5 years. It will analyze consumer response to pricing segmentation and distribution options and propose appropriate corporate strategies for entering this growing market.

Dr. Konrad K. Kalba, president of the company, stated, "The results of our study will be of special value to decision-makers who are still uncertain if, when, or how to enter the home video programming market. The study will also help suppliers already in the market who are too busy to stand back and assess how the market will change two or three years from now."

Moseley petitions FCC for UHF use

Moseley Associates has recently submitted a Petition for Rule Making to the FCC requesting an amendment to permit aural broadcast studio-trans-

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mitter links and intercity relay stations to operate in unassigned UHF TV channels on a secondary, non-interfering basis when frequencies in the 947-to-952 MHz spectrum are unavailable. Moseley feels that the adoption of their 12-point petition would result in alleviating congestion in the present STL band, especially if AM stereo standards are adopted, and would benefit FM broadcasters as well.

For the complete text of the Moseley Petition, contact John E. Leonard, Jr., executive vice president for Moseley in Goleta, VA or circle 324 on the reader service card for more information.

NAB meeting results

The National Association of Broadcasters' executive committee authorized the establishment of an engineering laboratory, invited the Inter-American Association of Broadcasters to hold their 1979 annual meeting in Washington, D.C. and authorized several minority task force actions.

The engineering laboratory probably will be located in NAB headquarters. Plans for the laboratory are being compiled by the NAB's engineering advisory committee with association Vice President George Bartlett coordinating.

NAB's legal department is to prepare an application to be filed with the IRS for the creation of a charitable trust to administer an investment fund designed to promote minority ownership of broadcast stations. And the NAB's Office of Community Affairs is to be renamed the Office of Minority Affairs.

ITA discusses tape standards

On October 5, 17 companies of ITA's Audio Technical Executive Committee met to discuss the possibility of industrywide standardization of metal audiocassette tape.

Although the committee did not reach any firm conclusions and the companies agreed it was too early to begin setting standards, a number of companies at the session stated plans for metal tape production.

The committee chaired by John E. Jackson, of Maxell, consisted of makers of record and playback equipment, audiotape, duplicating equipment and oxide suppliers.

1978—A big year for film business

According to Allan Williams, manager of the Pacific southern region of the motion picture and audiovisual markets division of Eastman Kodak Company, motion picture film has not only kept its big edge as the dominant production medium for TV and theatrical entertainment fare, it has actually gained and lengthened its lead.

A number of factors added up to making 1978 a big year for film production. At this time in 1977 approximately 75% of the programs scheduled for network prime-time evening programming were produced on film. In 1978, at the start

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QSI systems, inc.

See us at NAB Dallas
Booth 2800

For more information on QSi Systems' full line of broadcast equipment, call or write: QSi Systems, Inc., 993 Watertown St., West Newton, MA 02165
Phone: (617) 969-7118

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when cost is more important than price

Value conscious broadcasters specify the Studer B67 because it outperforms its competitors on the really significant broadcaster criteria:

- Studer state-of-the-art quality
- Long service life with low failure rate
- Speed and ease of user maintenance

If you're more concerned with *total* cost than just initial price, write to us for complete information on the superiority of the Studer B67 Broadcast Recorder/Reproducer. We'll show you why it's your best tape recorder investment.

Circle (8) on Reply Card

STUDER

Studer Revox America, Inc., 1819 Broadway, Nashville, Tenn. 37203 / (615) 329-9576 • In Canada: Studer Revox Canada, Ltd.

of the new season, 81% of the prime evening-time programs originated on film. That means approximately 2½ hours of programming that was originated on videotape last year are on film this season.

TV production accounted for about 70% of all Hollywood-based entertainment film production last year. In effect, the three networks programmed the equivalent of 30 feature films a week just in prime evening-time.

Williams projects 1979 will see the industry in its most fruitful year ever in terms of color negative film exposed for theatrical and TV release.

Consumers talk back to FDA

More than 3,000 consumers in Columbus, OH, using a computer-based two-way TV service voted electronically from their homes to help shape the course of federal regulations for food labelling in the US.

Using the Warner Cable TV participatory Qube system, they told Dr. Donald Kennedy, commissioner of the US Food and Drug Administration, what they thought of food labelling practices and what information they want such as the percentage of sugar and cholesterol in food.

The Qube system enabled viewers to talk-back to their TV sets and served as the platform for official hearing conducted by the FDA to find what consumers want in food labelling.

Seminars train technicians

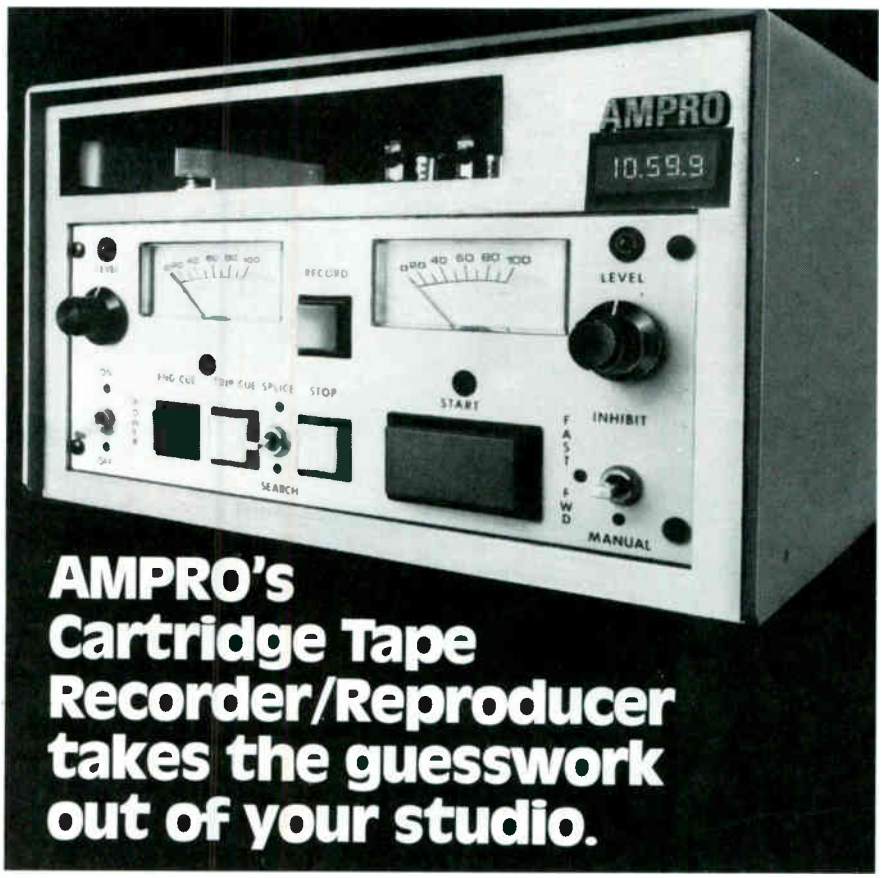
Convergence Corporation is holding a series of technical training seminars for instructing their distributor service people in the proper operation and maintenance of the ECS-100 Series Superstick Editing System.

Two schools have been completed resulting in the training of 20 service technicians. Future seminars are scheduled for Dallas, Chicago, San Francisco and Los Angeles.

Snazelle wins medals at festival

For the 10th year in a row, Snazelle Films/VTR, San Francisco, won at the International Film and Television Festival, held in New York. Gregg Snazelle, president of the facility accepted gold, silver and bronze medals for an industrial film and two television commercials.

The gold medal was awarded for *A Taste of Paradise* which was entered in the product presentation category. Created through Allen and Dorward, San Francisco, for the Pineapple Growers Association of Hawaii, the 26-minute color film was produced in the Islands December, 1977.



AMPRO's Cartridge Tape Recorder/Reproducer takes the guesswork out of your studio.

1. **DIGITAL MESSAGE TIMER** gives a continuous 5-digit LED display of elapsed playing time to the tenth of a second.
2. **RELOAD INDICATOR** flashes ready light after play until cartridge is reloaded.
3. **LED PEAK LEVEL INDICATOR** warns of excessive record level.
4. **SELF ALIGNING PINCH ROLLER** improves stereo phasing.
5. **ELECTRONIC SPLICE FINDER** positions splice between play head and capstan.

Available in 34 different mono and stereo models to suit your studio's exact needs. Built for long, trouble-free life. Don't settle for less than Ampro perfection. Take a closer look for yourself. Send for a FREE brochure on CARTRIDGE TAPE RECORDER/REPRODUCERS.

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Circle (9) on Reply Card

OUT OF THE WEST COMES THE TOUGHEST AND THE ONLY 5/8" WIDE FADER.

Duncan's new Series 400 Slideline® Fader is the narrowest you can buy. It's also the best. Interchangeable with other professional models, more Series 400 Faders can be positioned in a smaller space because of their slim 5/8" width. That makes them ideal for portable equipment.

Designed for high performance, the Resolon® conductive plastic element is remarkably durable, has low-noise characteristics and enjoys an eight-year, failure-free record in audio/broadcast use.

Other unique features include extremely low profile, linear and audio outputs, single or dual channel in the same size package. Internal SPST or DPST cue switches with goldplated contacts are also available, with no increase in package size. Series 400 high-impact cases are solvent-resistant plastic with built-in moisture and dust seal. Terminals accept quick-connect receptacles. Temperature range: −55°C to +125°C.

Offered as a complete drop-in module with knob and escutcheon, they are also available in separate components and two stroke lengths with 2¾" and 4¼" travel.

Custom knobs include our new low-profile, round and square designs in your choice of six colors.

So give it your best shot. Write or call today for complete information.

DUNCAN ELECTRONICS
SUBSIDIARY
SYSTRON DONNER

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Circle (10) on Reply Card

NRBA announces reorganizational changes throughout bureaus

Robert Herpe, board chairman of the National Radio Broadcasters Association, announced a reorganization of NRBA's Washington office.

NRBA is seeking an executive director to direct the association's development and to accelerate NRBA's growth.

Abe Voron has been appointed convention coordinator. He will fill the need for on-going, long-range planning as well as give attention to details which is required for large trade shows such as the San Francisco Conference and Exposition.

Current NRBA projects include an active membership solicitation campaign, development of a national, state-by-state liason with radio broadcasters and state associations, expanded Washington lobbying activity, development of the minority aid program, support for all-channel legislation, regional sales seminars, and the complete deregulation of the radio industry.

Quality at $850

THE PD II RECORDER plays mono tapes in "A" size cartridges. Stops automatically on 1kHz cue. Big and small buy it for the same reason: nothing else does this task so well, so long, so reliably, with so little maintenance. Also available in Reproducer Only for $650.

CALL TOLL-FREE
800-447-0414

Ask about our no-risk, 30-day trial order. Call collect from Illinois, Alaska, Hawaii: (309) 828-1381. Standard 2-year warranty.

INTERNATIONAL TAPETRONICS CORPORATION
2425 South Main Street, Bloomington, Illinois 61701

Marketed exclusively in Canada by McCurdy Radio Industries, Ltd., Toronto

Circle (11) on Reply Card

Datel announces award winner

Datel Systems has been named a recipient of the Presidential "E" Award. This award is given annually for contributions to the increase of US trade abroad.

The "E" Award citation and flag was presented to Datel by Raymond DePaulo, deputy assistant for Field Operations Industry and Trade Administration of the United States Department of Commerce, in the name of the secretary of the US Department of Commerce, Juanita M. Kreps and President Jimmy Carter.

Accepting the award for Datel were Nicholas Tagaris, president of Datel, James Zaros, vice president of sales, Arthur Pappas, vice president of finance and operations and John Gallagher, vice president of marketing.

Sprague wins medal of honor

For the second time, the Electronic Industries Association, voted the EIA Medal of Honor to Robert C. Sprague, Sr., founder of the Sprague Electric Company, North Adams, MA.

Sprague is being honored for his service to the Association and the industry since receiving the award for the first time 25 years ago. Presentation will take place during EIA's spring meeting in Washington, DC. □

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

The portable HITACHI SK-80

The remarkable new SK-80 has three superior ⅔" 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.

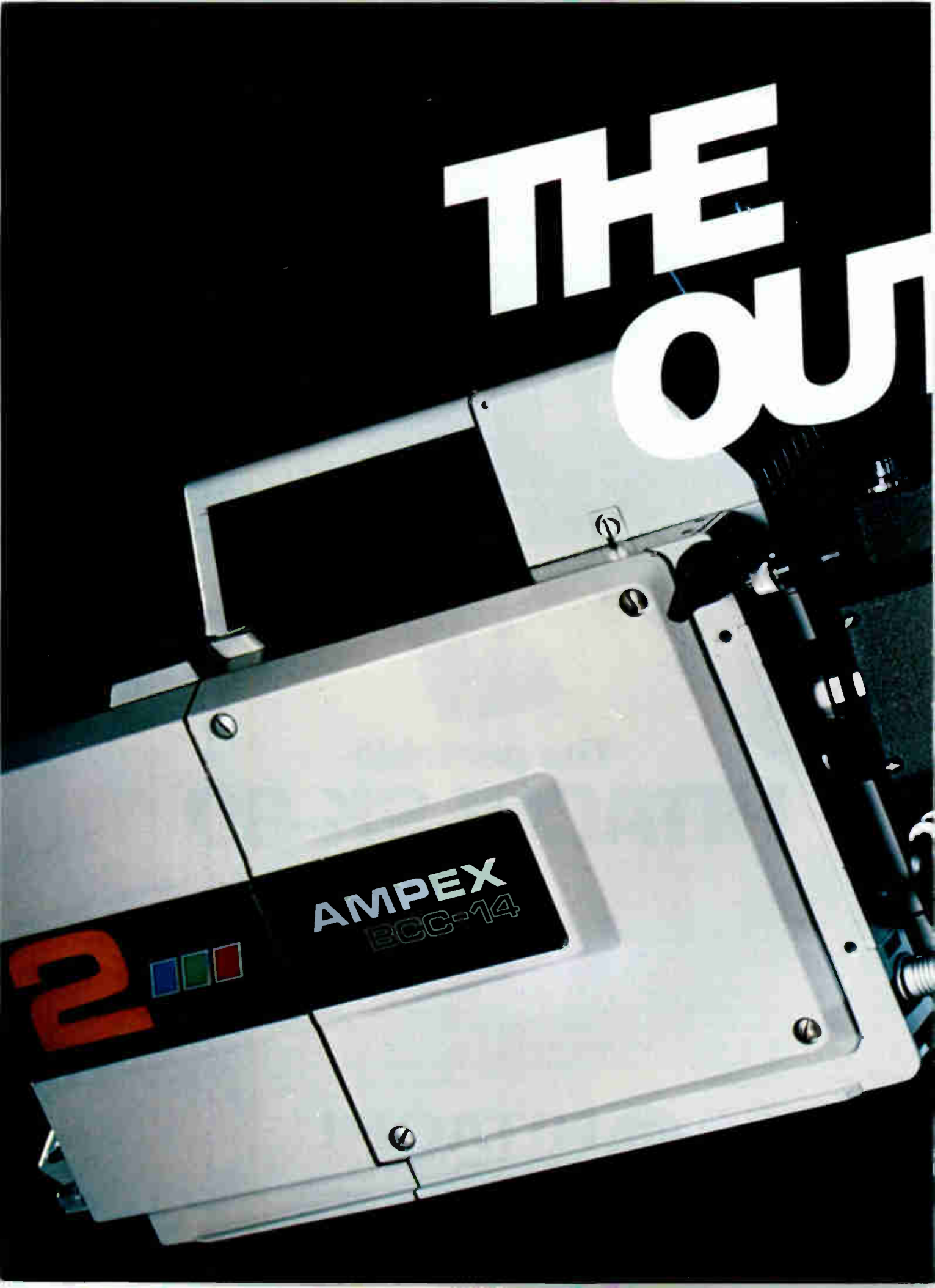
But performance is only half the SK-80 story. A special training tape on videocassette is available with complete camera set-up and maintenance instructions, to help you keep your SK-80 making its excellent pictures. Beyond this, our six Hitachi regional offices are all staffed with qualified engineers 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.

HITACHI
Hitachi Denshi America, Ltd.
FORMERLY HITACHI SHIBADEN CORP. OF AMERICA

Executive Office: 58-25 Brooklyn-Queens Expressway, Woodside, N.Y. 11377 (212) 898-1261 **Offices in:** Chicago (312) 344-4020; Los Angeles (213) 328-2110; Dallas (214) 233-7623; Atlanta (404) 451-9453; Denver (303) 344-3156; Seattle (206) 298-1680.

Circle (12) on Reply Card


THE
AMPEX
BCC-14
2

FIELDER

BCC-14

The farther you get from your studio, the more you'll appreciate the new Ampex BCC-14. This lightweight color camera brings back uncompromised pictures from the field.

Designed with the camera operator in mind, the BCC-14 is easy to use. It has full automatics, plus a viewfinder display that indicates color balance, auto centering, iris, tally/VTR running and battery condition. All this in a camera that weighs just a shade over 12 pounds and uses only 27 watts of power.

There's another surprise when you unlock the cast magnesium case and fold the BCC-14 into two sections: All the circuit cards and adjustments are in one half, all optics and easily accessible Plumbicon* tubes are in the other half. No other camera is easier or less costly to service.

Back at the studio, attach the optional 5" viewfinder and the remote control unit, and you'll have a tripod full of total video capability, including chroma key output. The BCC-14 is a superlative all-around camera.

So take the BCC-14 wherever there's action, and trust it to catch the excitement. Indoors or outside, in rain or shine, for ENG or EFP applications, there's just no other lightweight color camera like the Ampex BCC-14.

*Trademark N.V. Philips

AMPEX MAKES IT EXCITING.

Ampex Corporation, 401 Broadway, Redwood City, California 94063 415/367-2011

Circle (13) on Reply Card

SOFT WIPE
YOUR
1400 SWITCHER

Add Soft Wipe and other effects to your existing Grass Valley 1400 Switcher with our 1400-RC1 Kit for **less than** $4,000.00. Bring your switcher up to today's **state of the art NOW!**

CHARACTER GENERATOR

- 24 different character sizes
- Absolute centering
- Color letters row by row
- Crawl and Roll—2 speeds
- Flash
- Built-in maintenance program
- Color Lock Capability
- 12 pages built-in memory
- Floppy Disk expansion storage optional
- Many other features found only on units costing 3 or 4 times as much

SMALL ROUTING SWITCHERS

8 × 1, 12 × 1, 16 × 1, 20 × 1
or
multiples thereof

Vertical Interval Switching
Video Only
Audio Follow Video
Audio Only
Line by Line Clamping
Self-Contained Packaging
Just the thing for mobile vans, ENG or VTR consoles

Call or Write Bob Hansen
INTERNATIONAL COMMUNICATIONS & CONTROL
333 S. Troy Circle,
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Circle (19) on Reply Card

business news

Cinema Products expand

Due to an increase in sales volume of CP-16R reflex cameras and Steadicam film/video camera stabilizing systems, the sales department of Cinema Products has been expanded and reorganized.

In conjunction with the expansion, the company has introduced the MNC-71CP ENG/EFP camera and a complete line of video accessories.

Staff appointments include Ron Kelley as national sales manager, Susan Lewis as CP-16 equipment sales manager and Wayne Weichel as video sales manager.

CBN places order

The Christian Broadcasting Network has placed an order with Ampex Corporation for 22 VPR-2 1-inch helical scan videotape recorders, 22 TBC-2 digital time base correctors and seven VPR-20 portable helical video recorders.

The equipment will be used at the new CBN international headquarters in Virginia Beach, VA, in a broadcast school and four teleproduction studios.

Service for sales staff

Broadcast Computer Services' Demos program can provide a station sales staff immediate in-station access to all rating book information and computerized printouts of standard 4A availability submissions.

The system allows for multiple books, combining of books, competitive station information, printing of messages and selective searching of the data by over 1000 combinations.

RCA files cut

A rate reduction proposal filed recently by RCA Global Communications will save users of overseas telex and leased channel (private line) services as much as $7.29 million in 1979.

The reductions would be for Alternate/Voice Record (AVR) leased channel service from San Francisco to the far east where rates will drop $1900 a month.

For telex service from the US to Hawaii proposed reductions are to reduce the $4 a minute rate to $3.60, its $3 rate to $2.90 and its $2.55 rate to $2.50.

1978 sales increase

Computer Image Corporation, creator of video animation devices used for television commercials and entertainment, announced recently profits of $67,000, or 5 cents per share on sales of $836,000 for fiscal year ending June 30, 1978.

Sales increased 51% over the preceding year.

Companies to combine

Negotiations to combine Cox Broadcasting with General Electric's radio and TV broadcasting and cable TV businesses presently are underway; and, if completed, the transaction will be one of the biggest in broadcast history.

Terms are based on a tax-free exchange of 1.3 shares of GE common stock for each share of Cox stock, representing a minimum dollar value of about $440 million and a maximum of $488 million of GE stock.

Increase for 3-M

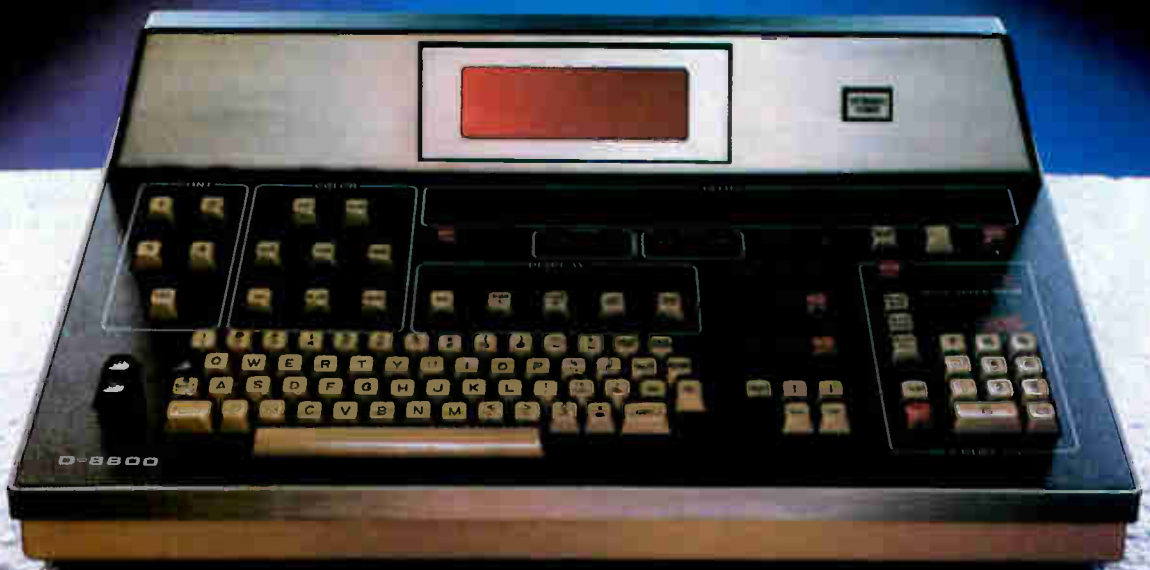
3M Company recently reported third-quarter net income rose 40.9% on an 18.7% gain in sales. Net income for the period ended September 30, 1978 was $153.4 million or $1.31 a share, compared with the 94 cents per share figure of last year.

NAB voices position

According to the National Association of Broadcasters, the Federal Trade Commission has no legal basis to require warning disclosure information in advertising and should not attempt to establish such a rule for all over-the-counter antacid advertisements, including radio and television commercials.

In support of its position, the NAB stated that: lack of consumer awareness of particular label cautions is insufficient cause; broadcast commercials cannot accommodate

If you think their character generator is easy to operate, just go ahead and exawkm.



Before you invest in a top of the line character generator, you should know more than just what it can do. That's why the versatile new 3M D-8800 character generator could be just the one for you. You see, all instructions are in English, not in code. And we've put them on a convenient L.E.D. panel above the keyboard for less wasted eye motion. So even a beginner can soon be composing in all kinds of fonts and colors. See your 3M representative right away for the character generator any of your people can run, or call 612-736-1032 for more information. Unless of course, you'd rather exawkm.

3M

Circle (23) on Reply Card

them; and, they will mislead consumers generally and discourage broadcast advertising of the products.

Acquisition plan

A lease/purchase plan to facilitate acquisition of major equipment packages has been implemented by Cinema Products Corporation. The plan provides a practicable opportunity for customers to obtain film and video products with a minimum of capital outlay.

The plan may be used for any system that the company offers or for any combination of equipment representing a major purchase.

Ampex sells equipment

Ampex Corporation has received an order for three VPR-2 1-inch helical scan videotape recorders and accessory equipment from the CBS TV Network.

The system's slow motion capability will be used in the coverage of sports events to supplement coverage provided by traditional disc recorders.

CBS's application of the system takes advantage of the 1-inch helical continuous-field format, including the versatile video performance and the compact size of the machine.

Air Force contract

E-Systems Montek Division has been awarded a contract to provide the Air Force with nine highly mobile tactical air navigation (TACAN) systems and equipment.

The agreement, made under the foreign military sale procurement provision which enables the Air Force to buy systems for friendly nations, will supply five systems to a Mediterranean nation, while four will be delivered to a far eastern nation.

New division

The Video Corporation of America has established a consumer video division which will be marketing videocassette hardware and software directly to consumers and in association with leading hardware manufacturers.

Richard Kelly, former vice president of Time/Life Films, will head the new division.

Station adds equipment

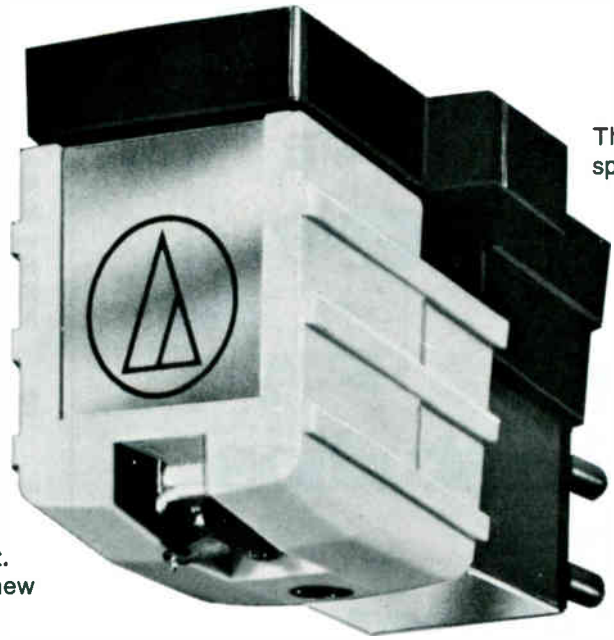
RCA ENG television cameras and a digital frame synchronizer have been added to the facilities of CHAN-TV, Channel 8, Vancouver, British Columbia, which is operated by the British Columbia Television Broadcasting System.

The order includes two TK-76 ENG cameras and a TFS-121 digital video frame synchronizer which will be used to synchronize remote signals into live news programming.

Cox quarterly report

Cox Broadcasting Corporation recently reported revenues and

Audio-Technica rewrites the book on professional phono cartridges.



Introducing The Professionals

The new Audio-Technica ATP Series Dual Magnet™ Stereo Phono Cartridges

What do you really need from a professional phono cartridge? Impeccable quality. Reliability. Uniformity. And reasonable cost. The goals we've met with the new ATP Series cartridges.

The new ATP Series are flat, smooth, low distortion performers that will do your station, studio, disco, library, or commercial installation proud. They are also very tough... the next best thing to "bullet proof". Because we know that "needle drop" isn't just a way to pay for music or SFX. It's a fact of life!

Both ATP cartridges and styli are *uniformly* excellent. When you at last need to replace a stylus, you always get "like new" performance again, and again, and again.

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.

The all-new ATP cartridges were specially developed for the working environment. Three models provide a choice of either spherical or elliptical styli. Each cartridge is hand-tuned for optimum performance, with stereo channels matched within 1.5 dB to eliminate balance problems.

All ATP cartridges feature tapered cantilever tubes that combine high strength with minimum moving mass. There's no problem with back cueing, and the brightly colored cantilever tip is readily visible so that you can spot an LP cut quickly and accurately.

ATP cartridges are priced from $30.00 suggested professional net. Write for complete specifications. Try the ATP Professionals on your own turntables. We know you'll be pleased with what you hear. From the thoughtful pros at Audio-Technica.

Upgrade your entire record-playing system with new ATP tone arms. Rugged and precise, like ATP cartridges. Professional in every respect. Model ATP-12T or ATP-16T just $125.00 suggested professional net.

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INNOVATION □ PRECISION □ INTEGRITY

AUDIO-TECHNICA U.S., INC., Dept. 19 BE, 33 Shiawassee Avenue, Fairlawn, Ohio 44313 • In Canada: Superior Electronics, Inc.

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earnings for the third quarter and nine months ended September 30, 1978. Net income for the three month period was $8,701,000, or $1.30 a share, compared with $5,119,000, or 80 cents per share for the same quarter last year.

For the nine month period, net income was $23,500,000, or $3.52 per share, an increase of 42% over the 1977 period.

Fairchild doubles earnings

Fairchild Camera and Instrument Corporation recently reported third quarter earnings of $6,718,000, or $1.20 per share, more than double the earnings reported in 1977.

For the first nine months the company earned $18,724,000, or $3.39 per share, compared with $6,693,000, or $1.24 per share last year. Net sales rose from $343,917,000 in 1977 to $377,954,000 this year.

Headquarters dedicated

Granger Associates recently dedicated its corporate headquarters complex in Santa Clara, CA.

Located on 10.5 acres, the complex is comprised of two 50,000 square foot buildings used for manufacturing operations and a 2-story 70,000 square foot building for administrative, marketing and engineering personnel.

Company adds distributors

Dielectric Communications, a division of General Signal, recently announced the addition of seven more distributors to its North American suppliers of RF instrumentation products.

Included are: Electronic Merchandising Enterprises, High Point, NC; EME-II, Decatur, GA; EME-3, Melbourne, FL; PLM Sales, Streamwood, IL; C.H. Electronics, Clifton, NJ; Hurley Electronics, Las Vegas, NV; and Juneau Electronics, Juneau, AK.

Price change announced

TRW RF Semiconductors has announced price changes on its linear hybrid amplifier line. The OEM prices on its CA-2800 series have been cut as much as 21%.

Distributor discounts have been boosted by up to 30% and a 25-99 unit price break for small-volume users was also ended.

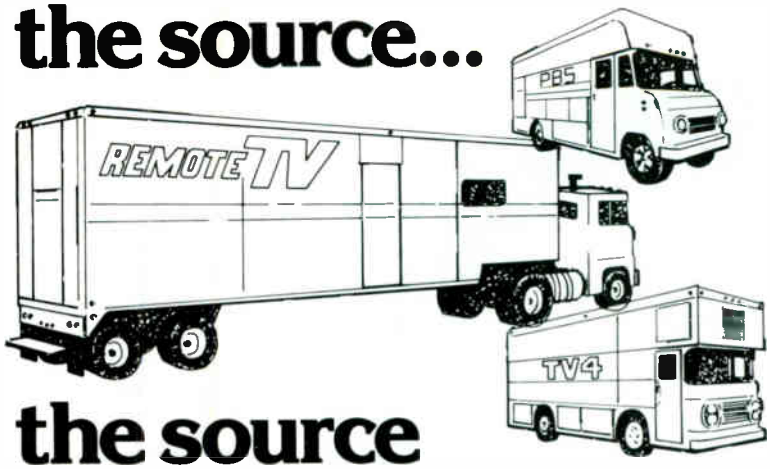
The firm also announced the availability of 35 new packages and pin configurations.

Cohu 9-month report

Cohu recently reported 1978 nine months income of $361,851 or 21 cents a share on revenues of $14,032,950 compared to income of $443,503 or 25 cents a share on revenues of $12,972,048 in the same period last year.

Third quarter income was $145,092 or 8 cents a share on revenues of $4,969,547 compared to last year's income of $140,208 or 8 cents a share on revenues of $4,205,558. □

When you cover the action from the source...



the source for mobile studios should be Gerstenslager.

In a van or trailer, your most modern, best equipped studio could be your Gerstenslager. It all starts when you tell us what you need. The job to be done. Then we'll work with your engineers and principal equipment suppliers. Develop the plans. Detail placement of every piece of equipment, generators, wiring, climate control, consoles. Exactly as you want it. Then, build the unit from the frame up. A studio on wheels that is actually a dependable broadcasting station comparable to conventional studio systems.

How we do it with examples of work we have done for others is included in this brochure. It's yours for the asking. Write or call: (216) 262-2016.

GERSTENSLAGER
The Gerstenslager Company, Wooster, Ohio 44691

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Lighten Up.

The Thomson-CSF Laboratories Microcam® is the lightest broadcast-quality portable color television camera in the business. And if your business is covering news, sports or special events, you want to make sure it all gets covered. While other cameramen are pausing for a breather, you're still going strong.

Total system weight is:

- Camera head (with 6:1 lens) and viewfinder 8½ lbs
- Shoulder pad 6.3 oz.
- Electronics pack 3 lb. 8 oz.
- Interconnect cable 1 lb. 2 oz.

Microcam will go anywhere. Capture anything. Live or on tape. And Microcam's ability to operate at extreme low-light levels makes it especially valuable for ENG.

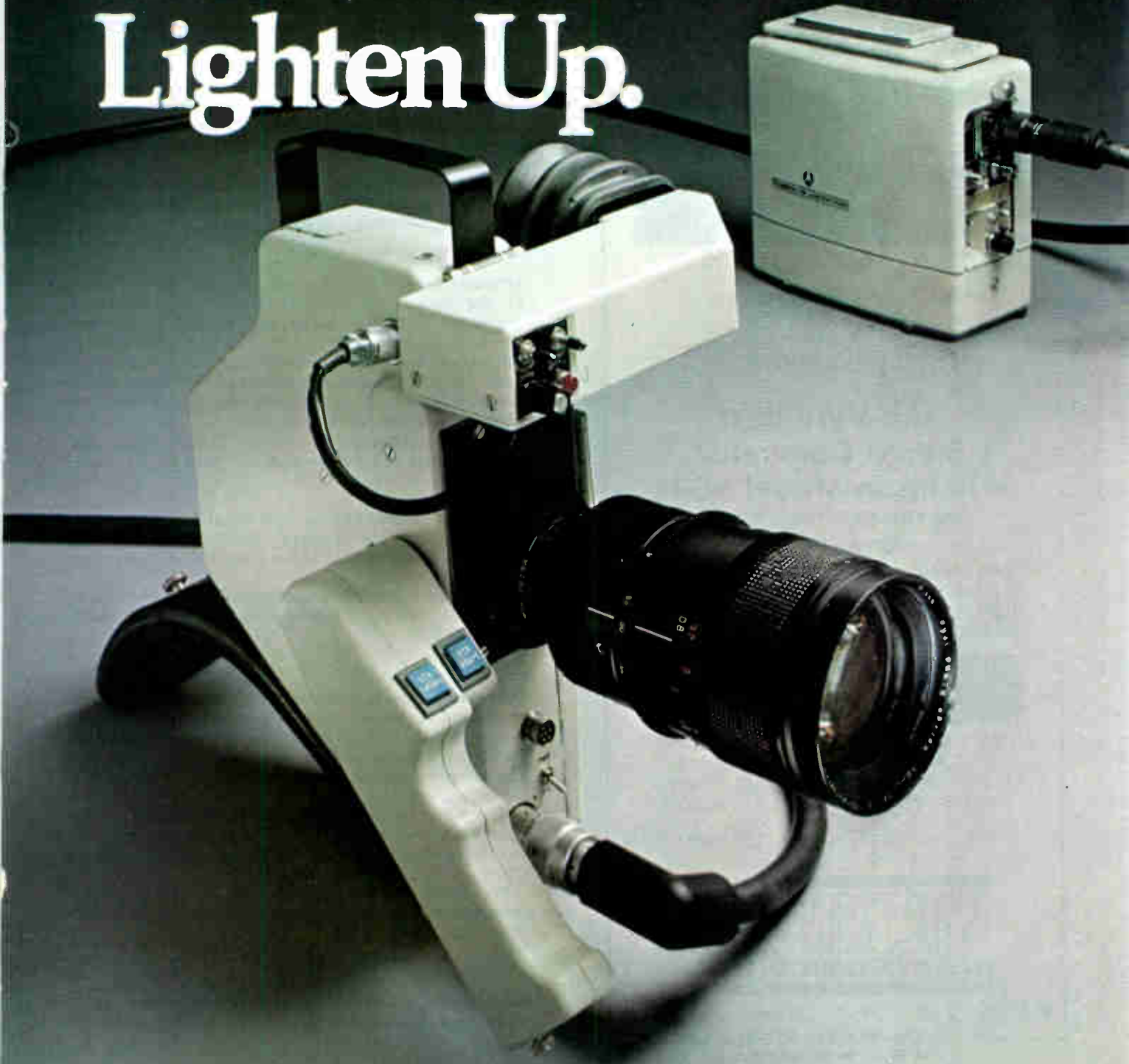
Microcam's low power consumption of 24 watts provides a full hour of operation from a 2½ lb. built-in battery pack. And for extended operation, a 4 lb. silver-cell battery belt operates Microcam 5 hours on a single charge.

With a two line vertical image enhancer and comb filter as standard equipment, Microcam will effectively upgrade your present system. And Microcam is priced lower than most portable cameras.

The Thomson-CSF Laboratories Microcam. Less weight. Less power consumption. And less on your budget.

THOMSON-CSF LABORATORIES, INC.

37 Brownhouse Road, Stamford, Connecticut 06902
(203) 327-7500 / TWX (710) 474-3346



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THE VERY BEST
STEREO SOUND

The Very Best FM Exciter
Wilkinson Model FME10

253 TRANSMITTERS USE IT!
POSITIVE PROOF!

* Frequency response ±¼DB 15 HZ-350KHz.
* FM Noise Level — 70 DB below 100% Mod.
* Distortion — 0.3%
* Power Output — Adjustable to 18 watts.
* Stability 1 part in 100,000.
* Requires no oven and is not susceptible to rumble and microphonics.

FCC Type Accepted

• POWER SUPPLY INCLUDED.
• COMPLETELY METERED.
• REQUIRES 7" VERT. SPACE.
• ADJUSTMENT FREE.

The Very Best
Stereo Generator
Wilkinson Model SG1E

196 TRANSMITTERS USE IT!
POSITIVE PROOF!

* 60 db separation ..... 50 Hz-7500 Hz
* 55 db separation ..... 7500 Hz-10000 Hz
* 50 db separation ..... 10 KHz 15 KHz
* FM Noise — 75 db .... Cross Talk — 60 db

COMES COMPLETE WITH POWER SUPPLY
REQUIRES ONLY 3½" RACK SPACE
ONLY ONE FRONT PANEL ADJUSTMENT
REMOTE STEREO ON/OFF FUNCTION

NO ONE CAN MATCH THIS COMBINATION

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ELECTRONICS, INC.

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meetings, events&seminars

January 21-24—The 36th annual convention of the *National Religious Broadcasters* will be held at the Washington Hilton in Washington, DC. The convention has scheduled a roster of speakers, musicians and broadcast experts as well as sacred music celebrities and specialists in the field of religious radio and TV.

For more information, contact: Ben Armstrong, National Religious Broadcasters, Dept. BE., Box 2254R, Morristown, NJ 07960.

January 22-24—*The 1979 Regional Television Lighting and Staging Seminar* presented by Imero Fiorentino Associates will be held at the WFAA Communications Center, Dallas, TX. The seminar will feature such experts as E. Carlton Winckler, David Clark and John Leay and is designed for those engaged in broadcast, as well as non-broadcast, television production operations.

For more information, contact: Education Division, Imero Fiorentino Associates, Dept. BE, 10 W. 66 St., New York, NY 10023, (212) 787-3050.

February 2-3—*The 13th Annual Television Conference* of the Society of Motion Picture and Television Engineers (SMPTE) will be held at the St. Francis Hotel in San Francisco, CA. Subjects will include production and post-production operating experience with 1-inch videotape, digital video effects and digital video recording. Equipment relevant to the technical program will also be on display.

For more information, contact: SMPTE, Dept. BE, 862 Scarsdale Ave., Scarsdale, NY 10583.

February 11-15—The second annual *Management Conference of the National Electronic Distributors Association* will be held at the Vacation Village in San Diego, CA.

For more information, contact: Toby Mack, NEDA, Dept. BE, 3525 W. Peterson Ave., Chicago, IL 60659, (312) 583-8535.

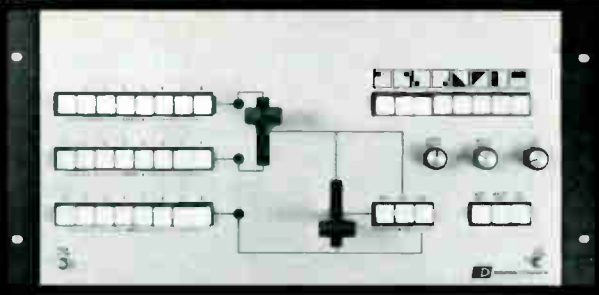
February 14-15—Information Gatekeepers will sponsor a series of 2-day marketing conferences entitled *Future Trends in Fiber Optic Markets and Technology.* Featuring experts in their field, the conference will place heavy emphasis on marketing opportunities and future applications.

The 2-day conference is planned to be held at the New York Sheraton, New York City; March 19-20 at the Hyatt Regency O'Hare in Chicago; and June 4-5 at Dunfey's, Hyannis (Cape Cod), MA.

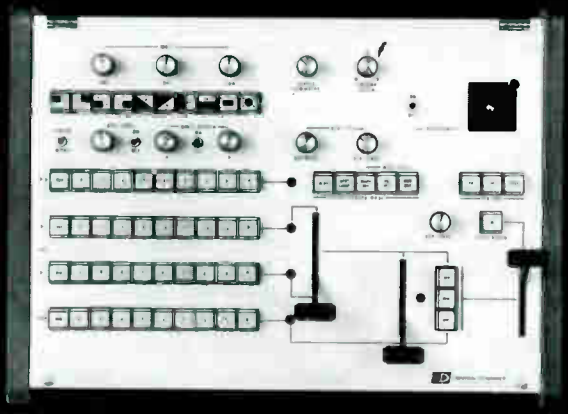
For more information, contact: Barbara Coffin, Information Gatekeepers, Dept. BE, 167 Corey Road, Brookline, MA 02147.

February 20-22—*Video Expo*, the non-broadcast video trade show sponsored by Knowledge Industry Publica-

small... sophis-ticated & super



VS-10



VS-14

AFM-10

CDL's Video Switchers & Audio Mixer Switcher team up for flexibility, compact size & price!

small...

The VS-10 . . . an 8-input, 3-bus, compact, self contained, vertical interval, solid state switcher. Impressive special effects, Mix Amplifier, Wipe/Key Amplifier, output selector and broad operational capabilities provide exceptional production flexibility. Includes automatic Preview; can wipe and dissolve to keys; has true On-Air Tally system. Chroma Keying also available.

sophisticated

The VS-14 . . . a 10-input 4 bus switcher with a combined Mix Amp, Wipe/Key/Mask Key Amp and a Downstream Keyer that allows execution of a complex effects sequence . . . such as . . . dissolve from one source to a masked chroma key . . . then dissolve a color matted title over a chroma key, and finally dissolve out of the chroma key to a different source while retaining the title. Standard features also include Soft Wipes, Soft Keys, Color Titles, Split Screens and Spotlight. Downstream Keyer can insert or dissolve titles.

& super

AFM-10 . . . its "teammate" power and flexibility allows it to automatically operate as an Audio Follow or an Audio Mix/Follow Switcher with the VS-10 or VS-14 . . . *plus* it has a "hands-off" automatic gain riding Compressor/Limiter.

In the Follow Mode, the AFM-10 becomes an automatic remote controlled switcher.

In the Mix/Follow Mode, the AFM-10 beautifully performs a "voice over", manually or automatically.

As a Mixer, the AFM-10 handles many jobs with its 7 inputs with individual channel gain pots, independent Master and Auxiliary Line level outputs, and Comp/Lim that can be switched IN or OUT.

Actually, *Super* is what you'll say when you realize how much you can do for the price . . . and remember, that includes CDL Quality and Reliability

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Circle (18) on Reply Card

tions, will be held at the Jack Tar Hotel in San Francisco. The show will feature over 100 exhibits by major manufacturers, three general sessions and a series of seminars geared to meet the needs of video users in medicine, business, education, industry and government. More than 3,000 users of video hard and software are expected to attend.

For more information, contact: Sheila Frank, Knowledge Industry Publications, Dept. BE, 2 Corporated Park Drive, White Plains, NY 10604.

February 27-March 1—*The Electronique '79* show sponsored by the Michigan Chapter of the Electronic Representatives Association and the Society of Manufacturing Engineers will be held at the Detroit Light Guard Armory.

For more information, contact: Don Dorshkind, Michigan Chapter of ERA, Dept. BE, 165 W. Liberty, Plymouth, MI 48170, (313) 427-7460.

March 5-6—A conference, *Cogeneration: For large users*, will be held at the Mayflower Hotel in Washington, DC. Senator J. Bennett Johnston, chairman of the Energy Conservation and Regulation Subcommittee, will speak on the key cogeneration provisions of the National Energy Act. Other speakers will examine cogeneration installations, the vital web of legislation and regulation affecting cogeneration's future, the financing and incentives relating to cogeneration and the landmark studies probing cogeneration's past and future.

For more information, contact: Robert W. Nash, executive director, The Energy Bureau, Dept. BE, 101 Park Avenue, New York, NY 10017.

April 2-4—*The 1979 International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, sponsored by the IEEE Acoustic, Speech and Signal Processing Society, is the fourth in a series of annual conferences. It will be held at Washington, DC, at the International Inn.

The conference will cover the areas of: general signal processing; speech processing; underwater acoustics, seismic signals and radar; and psychoacoustics, electroacoustics. The annual award banquet will feature America's only underwater band accompanied by a brief technical explanation.

For more information, contact: Dr. G. Robert Redinbo, Electrical & Systems Engineering Department, Rensselaer Polytechnic Institute, Dept. BE, Troy, NY 12181.

April 2-7—*The 1979 Electronic Components Exhibition* will be held in Paris. Electronic components, measuring instruments, materials and products of special interest to the electronics industry, and equipment and methods specific to the manufacture and installation of electronic components will be presented.

For more information, contact: Janine Aubouy, Dept. BE 20, rue Hamelin, F 75116 Paris, France. □

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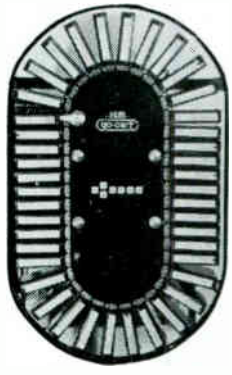
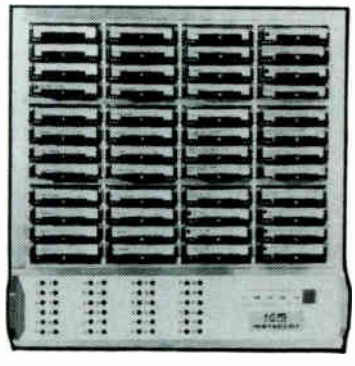


INSTACART®



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When you need FAST RANDOM ACCESS and LARGE CAPACITY. Go-Cart is available in 42-cart and 78-cart models (lowest per-cart cost in industry with the 78). FIRST to use microprocessor in broadcast equipment!

Advance Search and Cueing ... Self-diagnosing Error Detector ... Hinged to Swing Open for Maintenance, even while on air ... Cartridge plays on a stationary deck for top fidelity.

Let Go-Cart handle the music, and Instacart provide instant back-to-back play of all the commercials, ID's, short items.

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For absolute flexibility in your format. Instant random access to any cartridge in the 48-cart unit. Every cartridge position has its own head, pre-amp and I kHz stop detector.

QUIET! Cartridge only moves 1/16" to contact rotating capstan shaft. No other movement.

QUALITY enough that some stations place entire music library in Instacart units.

IGM'S CARTRIDGE PLAYBACK UNITS GIVE YOU FLEXIBLE FORMATS FOREVER
*Interfaced to most automation systems, ours or "theirs."

Circle (20) on Reply Card

HI-BAND U-format VTR

"Quad" Quality in a ¾" Format

The model HBU-2860 (Hi-Band U-format video cassette recorder) is a modified SONY VO-2860 with Recortec electronics mounted on top of the unit. The modification provides direct hi-band video recording made possible by tripling the scanner speed and the linear tape speed.

Quality—At the 1200 ips head-to-tape speed the HBU video quality is as good as the "quad" or the new one-inch format. Professional audio quality is also obtained with this modification.

Convenience—Standard and widely available 3/4-inch video cassettes for the HBU allow for simple loading, handling and storage.

Dependability—The HBU does not alter the U-type recording format and thus takes advantage of the proven interchangeability of the U-type recorders.

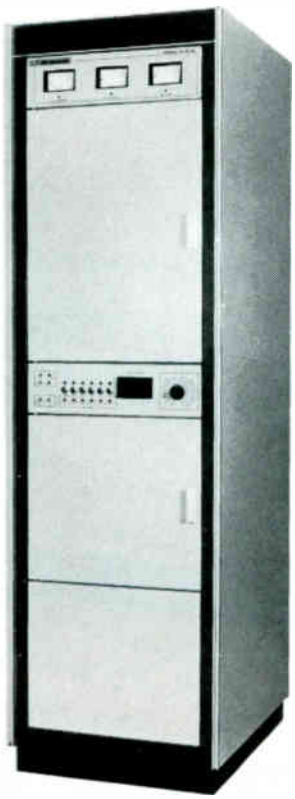
Economy—Lowest cost in equipment, media and operations for any Hi-Band VTR.

Availability—Ready for delivery at the introductory price of $14,500 direct from Recortec.

RECORTEC, INC. 777 PALOMAR AVE. SUNNYVALE, CALIF. 94086 TEL: (408) 735-8821

Circle (21) on Reply Card

Solid State at Tube Prices.



Sintronic Model SI-A-1S
1kW AM Transmitter

And when we say solid state, we mean 100% solid state. So you get all the energy savings and improved reliability that solid state technology implies. But price isn't the only thing that's exciting and important about the new Sintronic SI-A-1S 1 kW AM transmitter. It's also loaded with features that save downtime and reduce maintenance.

Most of the circuitry is on 26 computer-type plug-in cards, even the power amplifier. Circuit monitoring and maintenance is a cinch. Panel indicators and a direct reading digital multimeter monitor all critical circuitry. Card extenders allow easy access to components for in-service maintenance. The operating frequency is precisely maintained by a synthesizer referenced to a high stability crystal requiring no oven. It has 125% positive peak modulation capability, but does not use a modulation transformer which can cause phase shift distortion.

Multiple muffin fans move a column of air *slowly* and *evenly* through the transmitter, reducing filter cleaning and eliminating the worry of catastrophic failure as when a single, high-speed blower suddenly quits. The output power is monitored and automatically adjusted to maintain the correct output power . . . precisely and continuously. The RF drive and modulation are constantly compared and the drive is automatically regulated for the optimum level *throughout each audio cycle.*

A strappable 7.5 khz low pass filter is standard so you can use your audio energy where it will do the most good. We have added a switchable peak-riding audio clipper too, removing those sharp, low energy peaks causing the modulation meter to flash prematurely.

Remote control facilities are standard.

Of course Sintronic makes transmitters other than the SI-A-1S. They can provide you with the transmitter you need from 10 Watts to 55kW FM, or to 50kW AM.

There are many more impressive facts about this transmitter we would like to tell you about. Contact Tom Humphrey at Sintronic Corporation, 212 Welsh Pool Road, Lionville, PA 19353. Telephone: (215) 363-0444.

Sintronic CORPORATION

Sintronic is a subsidiary of Singer Products Co., Inc.

Circle (22) on Reply Card

people in the news

Radio/Television

James R. Sibert, who has been a member of the KPTV engineering department for the past five years, has just been named engineering crew chief, with primary responsibilities including master control and all on air material.

Broadcast engineer **Morris "Court" Courtright** has been elected by the Yuma County voters to the Arizona State Legislature. A national director of the Society of Broadcast Engineers, Courtright is a registered professional engineer in five states, has operated a consulting firm that was responsible for most of the facility changes and new station engineering in Arizona, and is currently southwest district manager for Rockwell's Collins Broadcast products.

Snazelle Films/VTR has announced the hiring of **Walt Lloyd** as video operations director. Lloyd was formerly a producer and director with WTVI-TV in Charlotte, NC, where he adapted plays for television, produced several public affairs series and a concert program for regional distribution.

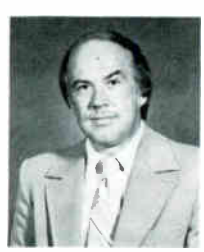
The appointment of **Robert M. Unetich** as manager, Television Transmitter Engineering, for RCA Broadcast Systems has been announced. Prior to joining RCA, Unetich was manager of TV Transmitter Engineering for the Harris Corporation. Previously he had been vice president of engineering for EMCEE Broadcast Products.

Manufacturers/Distributors

Morton S. Russin has joined the professional products department of Sharp Electronics as national sales manager. Russin comes from Ikegami Electronics where for the past 2½ years he has been vice president of sales and marketing.

Altec Lansing Sound Product Division has announced the appointment of **Allan L. Anderson** to the position of district manager for Altec's southwestern territory. Anderson was previously affiliated with a number of sound contractors.

Russin



Anderson

Ostrom

SCOTCH IS FIRST IN BROADCAST. GIVE OR TAKE AN INCH.

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.

"Scotch" is a registered trademark of 3M Company, St. Paul, MN 55101 © 1977 3M CO

Winsted

EDITING CONSOLE

Holds all sizes of ENG/VTR equipment!

This totally modular console has every feature for editing efficiency—shelves that adjust on 1" increments, sliding pullouts for added working space and easy maintenance, total access to VTR's, editors, monitors and equipment. Rolls easily on large casters—even into a van to create a mobile unit! *For full-line catalog of video consoles, tape and film trucks, film / videotape storage systems, call or write*

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(612) 888-1957 Toll Free Number: 800 328-2962

Winsted

Circle (24) on Reply Card

People in the news

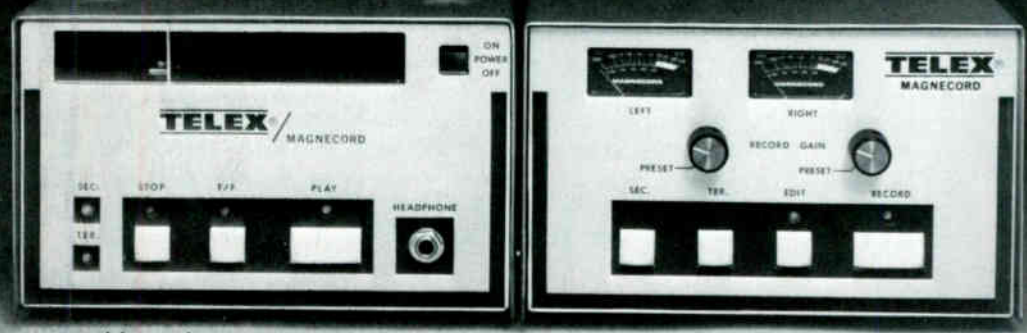
Philip G. Ostrom has been appointed marketing and sales planning manager of Memorex's Home Video Product Section. Ostrom has seven years experience in sales and marketing management at Memorex. He previously managed domestic and international sales and marketing programs for Memorex consumer audio and professional video products in the Americas and Asia.

Alberto Paz has joined Consolidated Video Systems as a product manager. Prior to joining CVS, Paz was manager of the video products division for Television Research International.

Conrac Corporation has announced the appointment of **Frank L. Maltese** as manager, internal auditing. Maltese was most recently employed as corporate auditor for the Ogden Corporation.

Roger Pryor has been named general manager of Sony's newly established Digital Audio Products Division. Pryor joined Sony in 1976 as midwestern regional sales manager for Sony Video Products. In January, 1978, he was named manager for market development for the Video Technology Center. Later he was selected to manage the Video Products special project development section. □

At Last,
a Cart Machine that Keeps its Cool



Telex/Magnecord broadcast cart machines run cool and steady. So cool no ventilation is required, so steady not even voltage or frequency fluctuations will alter their speed. Thanks to our dc servo flutter-filter drive.

The MC series offers broadcasters a host of options, including field convertability from mono to stereo or play to record and, of course, end of message, secondary/tertiary cue tones.

Designed for type A or B carts, the MC series meets all NAB specifications, offers full immunity to EMI and RFI, is remote controllable and automation compatible with CMOS digital logic. Audio muting, air damped low voltage dc solenoid and fast forward are standard features on every MC unit.

Four broadcast cart machines to choose from in the Telex/Magnecord MC series. Running cool and steady. With a pleasant surprise—they're affordable.

For detailed information please write:

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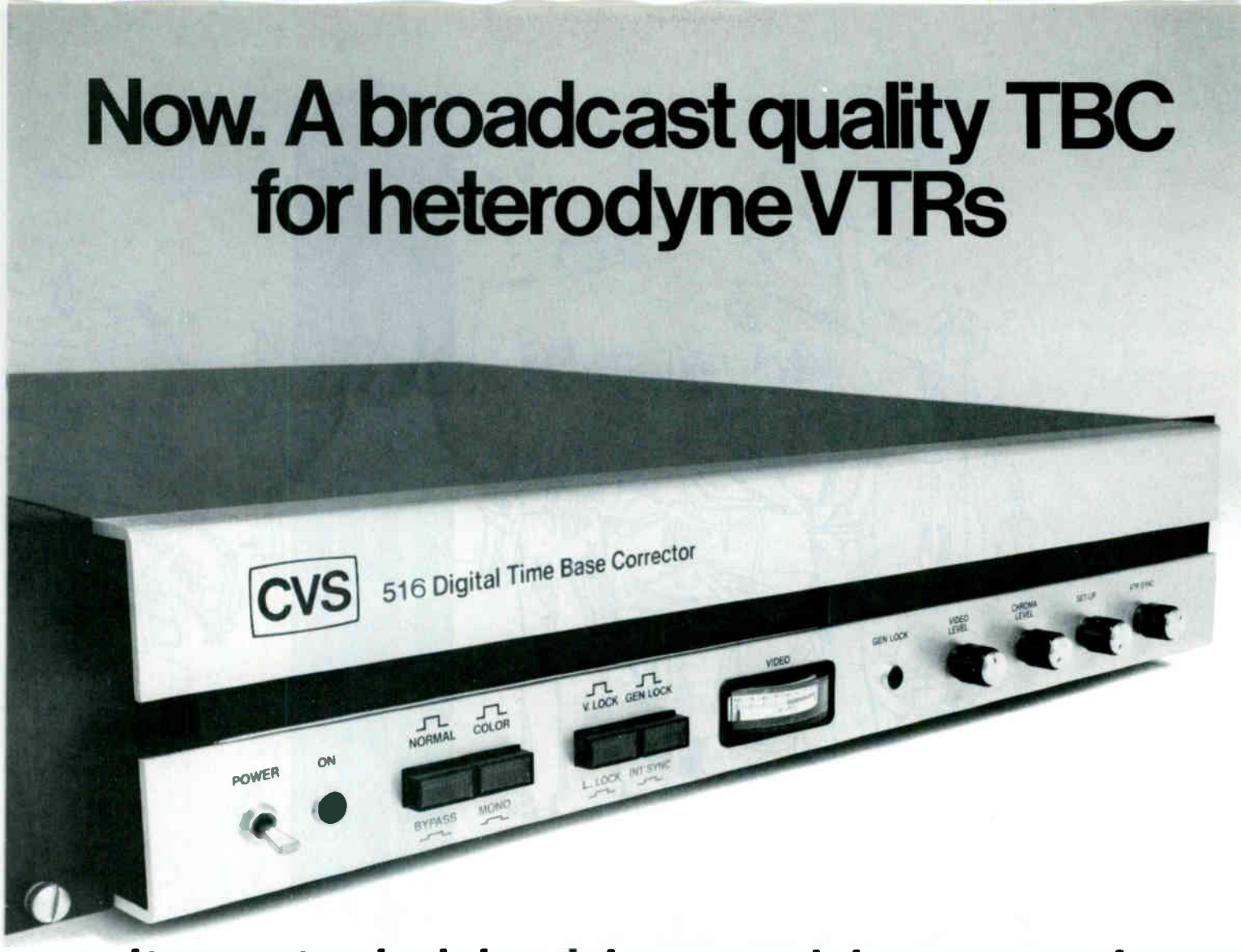
Canada: Telak Electronics, Ltd., Scarborough, Ontario

Circle (25) on Reply Card

Now. A broadcast quality TBC for heterodyne VTRs



it controls blanking problems too!

It's the CVS 516, first digital TBC made and priced to give users of non-segmented, heterodyne VTRs all the proven advantages of modern digital video processing.

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

Correction of chroma/luminance delay problems, a chroma noise reduction of 3 dB, velocity compensation and color dropout compensation are all standard. So are a broadcast stable, gen-lock sync generator and a built-in, completely adjustable processing amplifier.

The 516 also includes circuitry to closely control FCC blanking problems. For example, it combines exclusive CVS Gyrocomp memory organization with a 2 line (or optional 16 line) memory, automatic VTR advanced sync and available H and V blanking adjustments. The result is complete control of output blanking.

Simple operation is another plus. Front panel controls give you total mastery of your video signal. Each control also has a preset unity position to give you a consistent starting point for all your tapes.

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.

The CVS 516 weighs only 35 pounds, stands just 3½ inches high and uses only 175 watts—major advantages with today's increased 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, today. Also, be sure to ask for our popular booklet about the basics of digital time base correction, and a reprint of the article "TBCs, Blanking and the FCC."

CVS Consolidated Video Systems, inc.

1255 E. Arques Avenue, Sunnyvale, California 94086 (408) 737-2100 Telex: 35-2028

Circle (26) on Reply Card

Some day, somebody may imitate the Product...

...but nobody will ever duplicate the Service!

And in TV Broadcasting, it's the service behind the product...that keeps the product out front

On the way to selling more than 50,000 Plumbicon* TV camera tubes, we learned how important Service is to the broadcaster. The first thing we learned was about availability—No TV station, commercial or educational, can ever afford to shut down an operation while "waiting for parts." Plumbicon tubes are instantly available, at all times, through local franchised distributors and through Amperex factory sales representatives.

And we learned the importance of the name Plumbicon to TV stations who have come to depend on it as their assurance of consistent performance and quality.

Because no product is ever "good enough," we taught ourselves to build smaller and smaller Plumbicon tubes that provide performance standards similar to the original (we're down to ⅔ inch tubes now,) and we learned to produce tubes with reduced comet tailing, with higher resolution and modulation depth, with extended-red response, and minimum lag. Contemporary Plumbicon tubes outperform the original Plumbicon by a wide margin.

We learned that the TV camera user is concerned about the operation of his camera... not merely about the performance characteristics of our tubes. So we provide him with a wide range of expert and valuable information, in print and via our field engineers, to help him get the most out of his TV camera-system. Plumbicon users who are about to install a new camera need only give our field engineering staff a call and we'll have an expert there to help with the job.

Our franchised distributors, (your own local businessmen,) are carefully selected for their ability to support Plumbicon TV camera systems with on-the-spot customer support and service. We, in turn, support our distributors with two kinds of "seminars" for Plumbicon camera users. One is on video tape, the other is presented "live" by an Amperex field engineer. The purpose of both is to maximize the value of Plumbicon camera systems.

Finally, we learned that the best way to deal with warranty questions was to design the warranty for the customer's benefit—not to protect ourselves... and even then, to interpret the warranty in the customer's favor whenever possible. For example, a customer may return any Plumbicon tube for testing (even one that's technically out of warranty) and we'll subject it to a complete technical evaluation at our expense... and send the customer a detailed engineering report on the tube.

Yes, we've learned a lot about the importance of Service in tne 13 years, in the more than 50,000 tubes sold, in the 600-plus TV stations served, since the Plumbicon tube won the Emmy award. Little wonder, then, that the Plumbicon, after all this time, still offers the best all-around package of performance, price, reliability and service available. Little wonder, then, people keep on saying, "There's only one Plumbicon."

Amperex Electronic Corporation, Slatersville Division, Slatersville, Rhode Island 02876. Telephone: 401-762-3800

Amperex®

A NORTH AMERICAN PHILIPS COMPANY

There is only one Plumbicon

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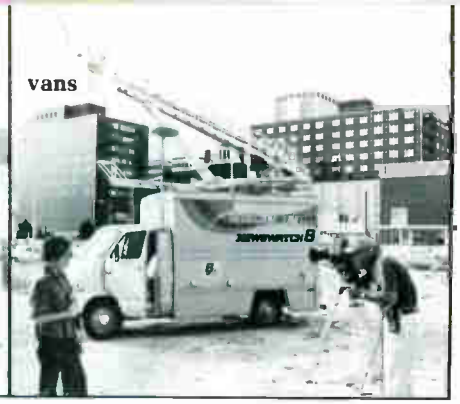
* Reg. T.M. of N.V. Philips of the Netherlands

antennas/links

'copters

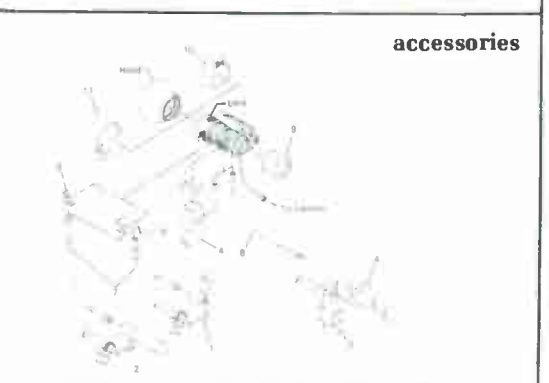


vans

cameras

lenses

tubes



accessories

ENG/EFP: Emphasis on a growing technology

Introduction

By Bill Rhodes, editorial director

The impact of modern circuitry and miniaturized TV pickup tubes has certainly made itself felt on the ENG/EFP industry. Past issues of **Broadcast Engineering** have covered this industry from its inception: cameras, lenses, accessories, links, antennas, vans, 'copters and applications.

Historical notes

Before taking a look at what **BE** will be presenting in this issue to emphasize ENG/EFP, let's take a look first at some steps in TV pickup tube miniaturization which have made progress possible:

- 1964—Philips introduced the 30mm Plumbicon that revolutionized TV broadcasting and for which they won an Emmy Award in 1967.
- circa 1968—RCA introduced the ⅔-inch Vidicon to spark further tube miniaturization.
- 1969—Philips introduced the 1-inch Plumbicon for more compact TV cameras.
- 1974—Philips ⅔-inch Plumbicon tubes brought broadcast quality to small cameras and served as a turning point in ENG/EFP.

And, the research goes on. Next month we expect to present a special article on the status of the Saticon tubes that will play an important role in future cameras.

Camera at SMPTE

At SMPTE in New York in October we saw lots of emphasis on the latest TV cameras—both studio and ENG/EFP. One of the more striking papers was on the design features and performance of the fully automatic, microprocessor-controlled studio TV camera by John Adison of RCA. With the touch of a button, this unique camera will automatically adjust registration, shading, level set, gamma tracking, electronic focus and beam alignment. Undoubtedly, design achievements in this camera will play an important role in advanced designs of ENG/EFP cameras in the future.

Hands-on use of ENG cameras was in evidence throughout the SMPTE floor exhibits.

An interesting application of the ENG camera was revealed at the Hitachi booth. One of their cameras has been adapted to undersea research with use of a special waterproofed enclosure for deep shots. In this application, color balance is made remotely on shipboard for high-quality video. At the other extreme, this same camera was being used in South American jungles to tape remote documentaries.

ENG: what's ahead

In this issue we will take a peek at ENG/EFP from several points of view. First, Lincoln will discuss the links that make ENG in a California based network a dynamic force in news coverage. Second, Nurad discusses developments in news gathering using helicopters. Third, our staff has assembled a wealth of information on ENG/EFP cameras, lenses, accessories and product sources.

Although a great deal of effort has gone into covering several aspects of the ENG/EFP industry in this issue, we recognize that we have barely scratched the surface of the subject. Consequently, we will continue to present advancing aspects of this industry throughout the year as new developments occur. □

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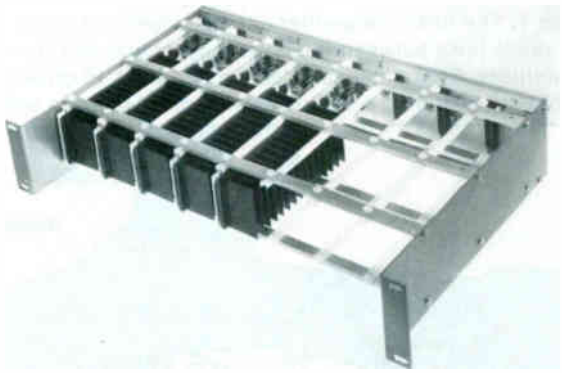
A NEW "STATE OF THE ART" DC POWER AMPLIFIER . . .

from **SPECTRA SONICS,** the pioneer and leader in bi, tri, quad, and *five-way* professional amplification systems!

As the most experienced manufacturer of multi-way amplification systems, **SPECTRA SONICS** has consolidated over seven years of field experience into the design of a second generation DC modular power amplifier, the Model 701.

With such improvements as increased power output, lower noise, higher damping factor, LED fuse indicator, and less susceptibility to physical abuse, the new Model 701 warrants consideration as the most advanced power amplifier available today.



If you have not heard the new **SPECTRA SONICS** Model 701 Power Amplifier, it just might mean that you are missing the privilege of listening to the best. For complete specifications, see your Professional Audio Dealer, or contact:

SPECTRA SONICS

LEADER IN ADVANCED TECHNOLOGY

3750 Airport Road ■ Ogden, Utah 84403 ■ (801) 392-7531

Circle (28) on Reply Card

Unique remote control system streamlines ENG operations

By Donald E Lincoln, transmitter supervisor, KPIX, San Francisco.

When KPIX entered into electronic news gathering in early 1975, we set out to build a really versatile and flexible control system, not only for news gathering, but to enable us to run the entire transmitter site remotely and perform an unusual amount of technical surveillance—more, I think, than is usually possible with conventional remote control systems.

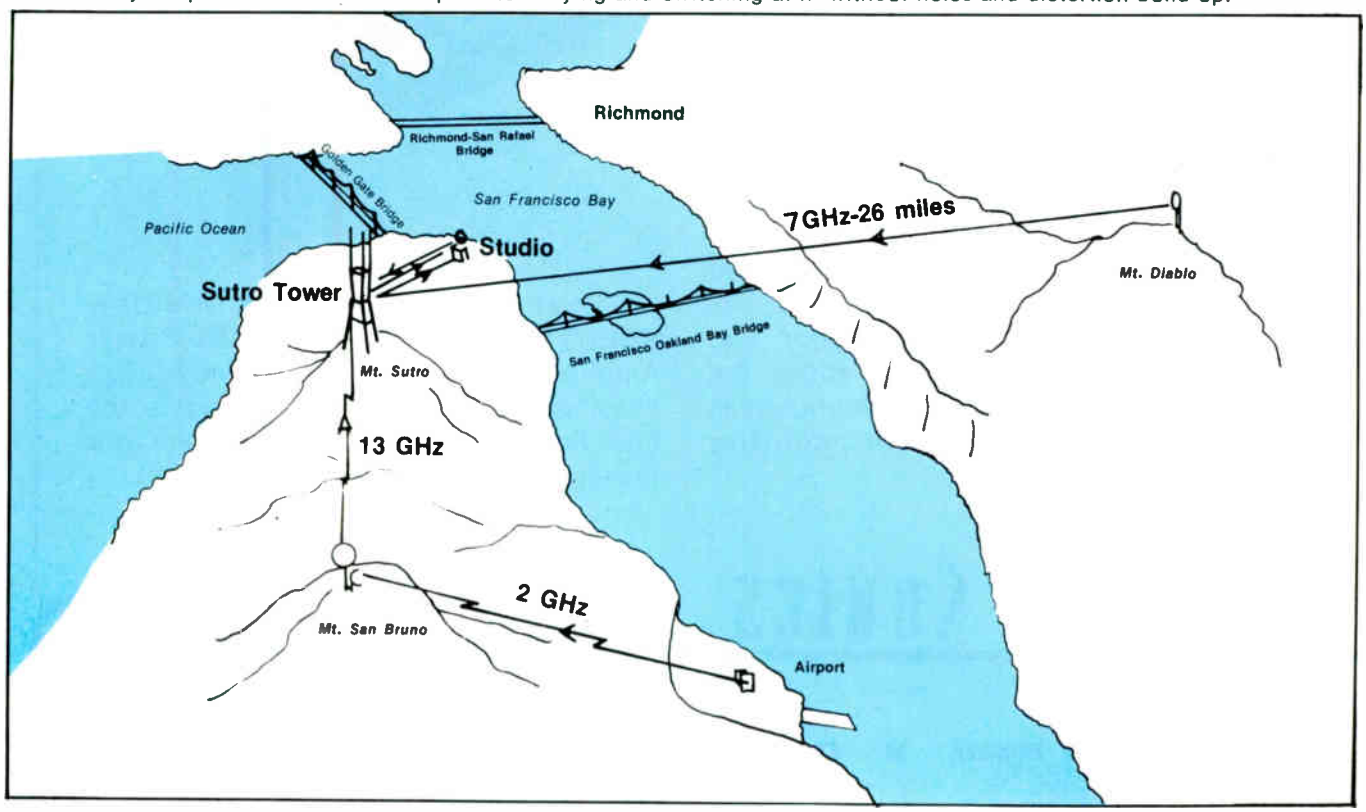
The capability we sought to develop included remote selection of the appropriate sector antenna for the 2 GHz microwave signals from our ENG pickup vans, and the ability to switch from one microwave link to another to accommodate changing transmission requirements. In addition, we wanted personnel at the studio to be able to select and view the various video signals passing through our remote transmitter site, whether ENG van-to-tower, tower-to-studio, studio-to-transmitter or an off-the-air sample. We also wanted the ability to monitor the various signal processing equipment which control transmitter video signal characteristics.

The problems to be considered included a mixture of the standard ones of telemetry and remote control of the TV transmitters, but also establishment of a sophisticated microwave communications capability which would allow us to monitor and operate the transmitter site remotely, including the ability to sample and view the various video signals passing through the transmitter terminal equipment and the transmitter itself. Because of the number of functions we proposed to handle, we were, as far as we knew, plowing new ground. No one made control equipment capable of permitting all the functions that we hoped to include in our setup.

Good communications vital

We have the problem of serving one of the hilliest major TV markets in the United States, and this has

Figure 1. The KPIX transmitter site overlooks the entire bay area and is the hub of the communications network. Microwave links between the downtown studio and the master control enable complete remote monitoring and control of transmitters, ENG antenna selection and links to other pickup points on Mt. San Bruno and, later, Mt. Diablo. IF heterodyne operation on microwave permits relaying and switching at IF without noise and distortion build-up.



at KPIX

strongly affected our direct pickup capability and the overall design of our ultimate system. Unlike most American cities, San Francisco and the surrounding area is very hilly and studded with small mountains. Our primary coverage area ranges from Santa Rosa, about 40 miles north of the Golden Gate, to San Jose at the southern tip of San Francisco Bay, as well as the rapidly growing population centers beyond the Oakland-Berkeley foothills across the bay. Even in the close-in high-population areas where most news events usually occur, our local hills and valleys complicate remote pickups because of the difficulty of getting a good line-of-sight path back to our tower, which is the hub of our communications network.

Because there is increasing growth and activity in outlying parts of our coverage area, we have planned for more news coverage from many parts of the region, not just San Francisco itself. But this, of course, has added to our potential communication problems.

Like most stations, we have been striving to achieve the highest degree of automation in our operations technically and economically practicable. This, plus the new emphasis on electronic news gathering, is highly dependent on good, solid communications. Although we still use telephone lines for certain control functions between master control and the transmitter, we have been increasing the capabilities of our microwave links in order to minimize operating expenses and to assure maximum reliability under all circumstances.

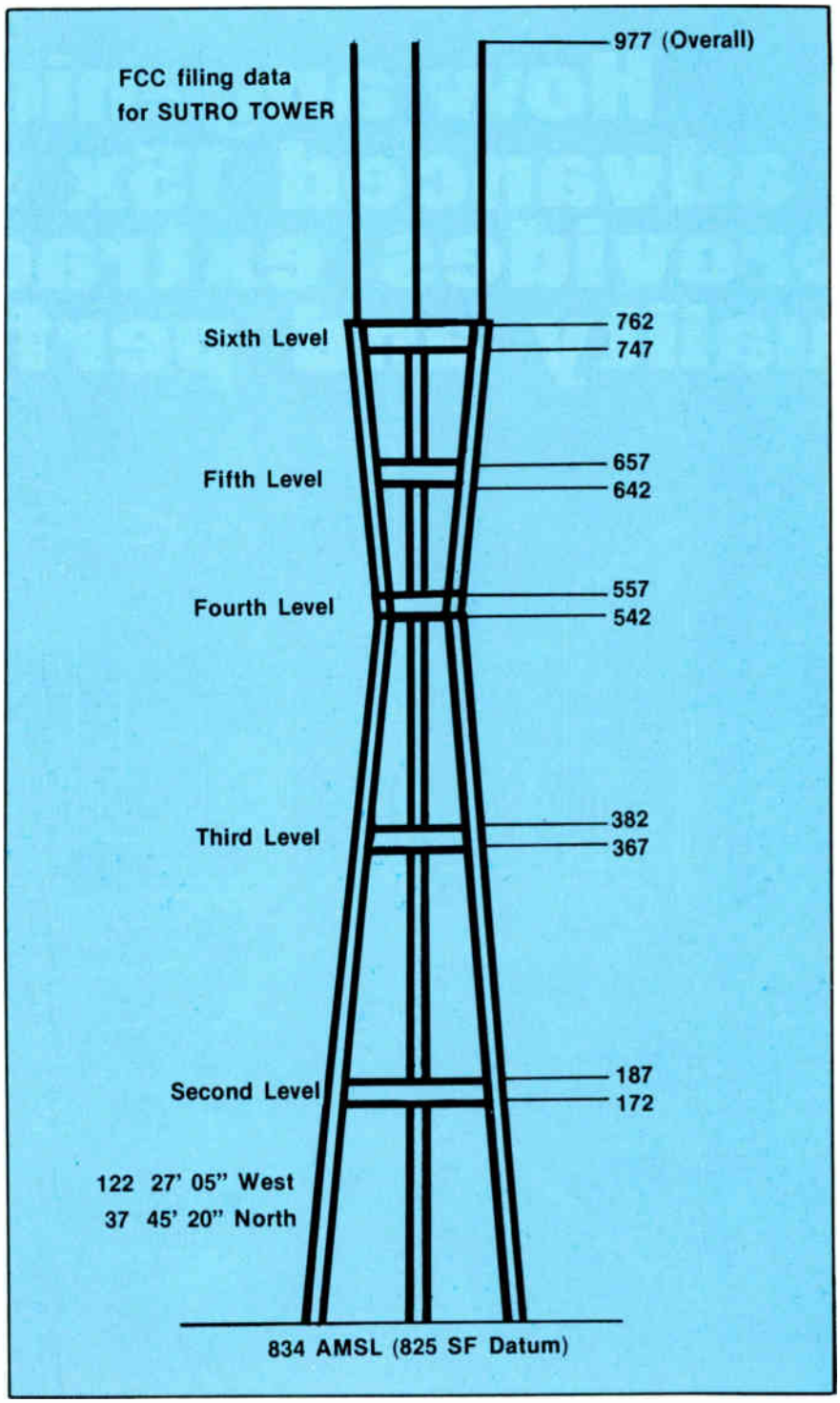


Figure 2. Massive tower on San Francisco's highest point is shared by numerous TV and audio broadcasters as well as many other communications services. A passive reflector on the 5th level is used for down-link to studio. ENG and 13-GHz incoming signals and picked up on the 4th and 2nd levels, respectively, down-converted to IF and sent to equipment room over coaxial cable.

Microwave transmission

Because microwave transmission is a line-of-sight process, the topography and other microwave transmission characteristics of the area are of particular concern. Perhaps a word about our transmitter site and how it relates to the local area is in order at this point.

Back in the 1950s and 1960s, the entire San Francisco Bay Area and most of the communities around San Francisco underwent rather dramatic growth, as did local television. Television stations and their transmitters were scattered all over the area. Because of the hilly terrain, viewers in various parts of the metropolitan area had difficulty with reception, mostly due to the scattered transmitter locations. It became increasingly important to bring all the TV stations together at one site.

Beginning in the early 1960s, the four major local TV stations began

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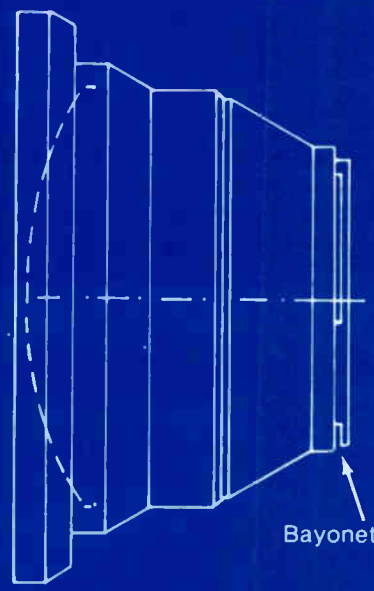
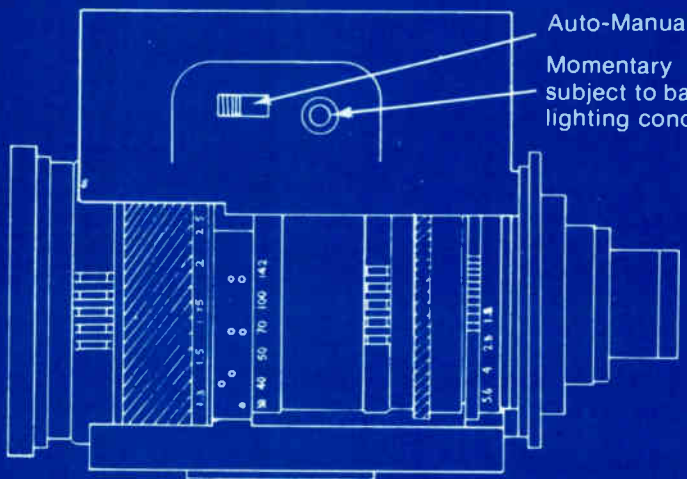


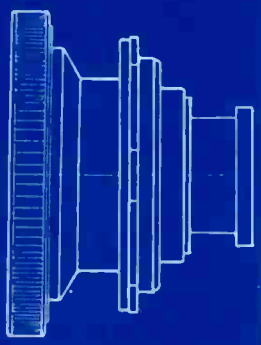
Bayonet mount.

Retrozoom: Front bayonet mount.
Maximum horizontal angle: 70°
Changes focal length to 7 — 105mm retaining f/1.8 aperture.
Retains full zoom capability.
M.O.D.: 0.30 meter (1 foot).



Auto-Manual Iris switch

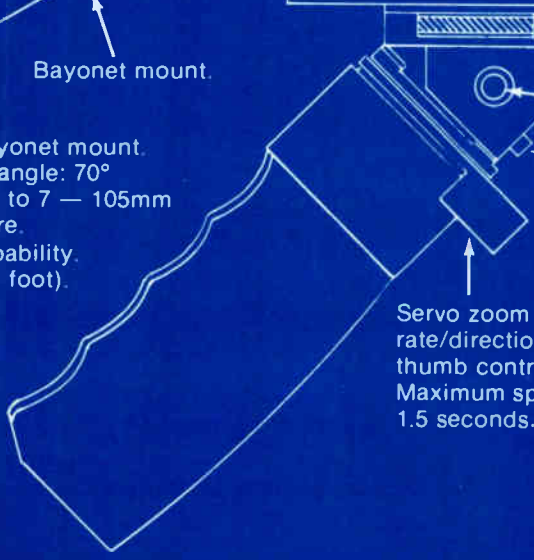
Momentary Auto Iris button for subject to background differential lighting conditions.



Range Extender
1.6X Range Extender changes focal length to 15 — 225mm, f/2.9 (see Note A above)

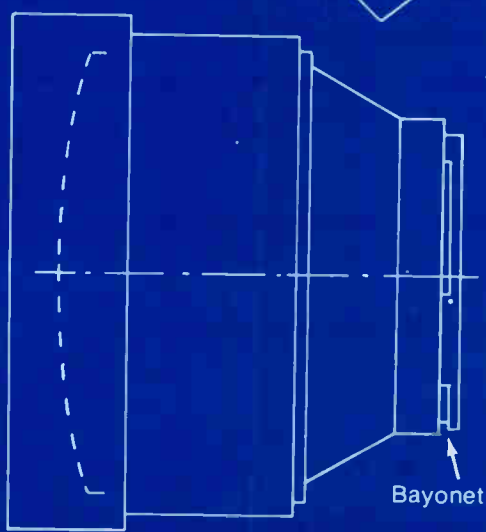
VTR Switch

Servo/manual zoom switch enables either servo or manual zoom operation.



Servo zoom rate/direction thumb control. Maximum speed 1.5 seconds.

Detachable **Pistol Grip.** Adjustable forward and back for proper balance of camera on shoulder. Accessory bracket available for adjustable angular rotation.



Bayonet mount

Tele-attachment: Front bayonet mount.
Minimum Horizontal angle: 2°
Provides 40 to 240mm zoom capability without changing geometric aperture.

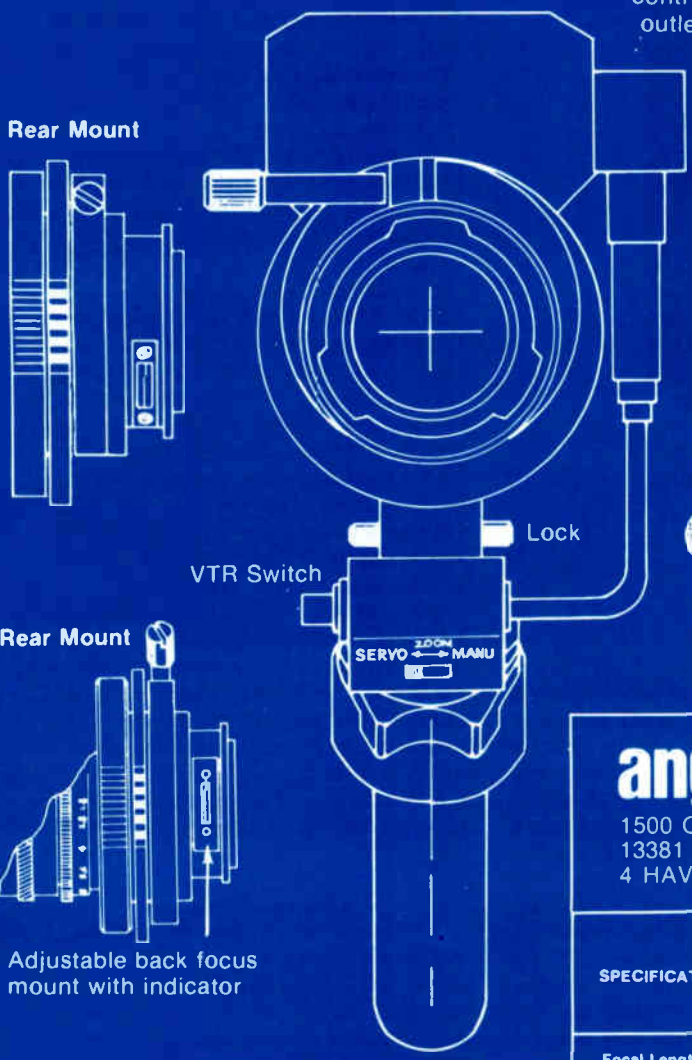
Range Extender

Note A

Second Range Extender (1.6X) may be mounted in tandem providing 2.56X factor, changing focal length to 25 — 365mm, f/4.6

Accessory Focus Control outlet available to accept flexible cable for manual focus hand control.

Rear Mount

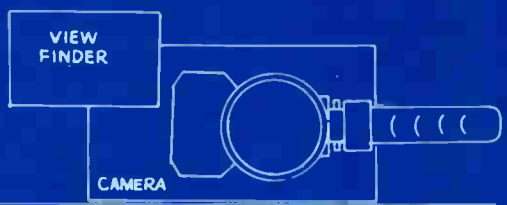


Manual focus hand control for rear-camera operation.

Accessory attachment utilizes servo zoom pistol grip on pan handle of tripod for studio mode operation.

Rear Mount

Adjustable back focus mount with indicator



The camera can be placed on its side without interference from the lens.

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SPECIFICATIONS	BASIC LENS	WITH RETROZOOM	WITH TELE-ATTACHMENT	WITH 1.6X RANGE EXTENDER	WITH TELE-ATTACHMENT AND TWO 1.6X RANGE EXTENDERS
Focal Length	9.5 - 142mm	7 - 105mm	40 - 240mm	15 - 225mm	41 - 615mm
Continuous Zoom Range	15X	15X	6X	15X	15X
Maximum Aperture	f/1.8 - f/2.6	f/1.8 - f/2.6	f/1.9 - f/2.6	f/2.9 - f/4.2	f/4.7 - f/6.7
Photometric factor	1.20	1.27	1.27	1.24	1.35
Minimum Object Distance	0.60m 2 ft.	0.30m 1 ft.	1.50m 5 ft.	0.60m 2 ft.	1.50m 5 ft.
Horizontal Angle of View	54° - 4°	70° - 5 1/4°	9° - 2°	34 1/2° - 2 1/2°	3 1/2° - 1°
Vertical Angle of View	41° - 3°	53 1/2° - 3 3/4°	6 1/2° - 1 3/4°	26° - 2°	2 1/2° - 3/4°
Smallest Object Field	27 X 35mm 1.1 X 1.4"	20 X 26mm 0.8 X 1"	46 X 60mm 1.8 X 2.4"	17 X 22mm 0.7 X 0.9"	18 X 24mm 0.7 X 0.95"
Weight of Total Package: lens, iris/zoom, servoes, pistol grip, mount and attachments.	2.5 kg 5.5 lbs.	3.8 kg 8.4 lbs.	4 kg 8.8 lbs.	2.7 kg 6.0 lbs.	4.6 kg 10.1 lbs.

15 x 9.5 FOR 2/3" PRISM COLOR CAMERAS

Figure 3. Nurad ENG pickup horns are mounted on the 4th level. Catwalks are sheltered up through the 4th level to protect equipment and permit all-weather access. Specific antennas are selected by remote control from the downtown ENG control point. Signal is down-converted to 70 MHz IF and piped down to equipment room over coaxial cable, as with point-to-point links.

KPIX operations

planning a joint-usage facility. The site ultimately chosen was Mt. Sutro, one of the highest points in San Francisco, 834 feet above sea level, and near the city's geographic center. KPIX was one of the original occupants of Mt. Sutro. At the time, we were located in an old mansion on the site of the present tower structure, and which we shared with KGO-TV, KSAN-TV and several FM stations.

After nearly 10 years of planning and negotiation, construction of the present facility was begun in early 1971 and completed in July, 1973. It is presently occupied by the four owner television stations, three tenant TV stations, four FM stations, as well as numerous other communications tenants.

As shown in Figure 2, the triangular tower structure itself is 762 feet high, with some antennas reaching another 215 feet, or more than 1800 feet above sea level, overall. There are five levels (above ground level), consisting of structural members and catwalks which can be reached by a small elevator which runs within one of the legs. On these are located an amazing variety of antennas, reflectors, microwave relay equipment, etc., for just about every conceivable kind of communications service. The location has proven to be outstanding. All seven TV stations and the various FM stations are received well locally, as well as by CATV head ends 150 miles or more away.

Obstructing terrain

However, the hilly terrain still presents problems for electronic news gathering. Many important areas to the south, such as San Jose, the San Francisco peninsula and the nearby San Francisco airport, are blocked from line-of-sight paths by Mt. San Bruno, even to the fourth level of the tower, nearly 1400 feet above sea level, where we have located the four Nurad 20QP1 quadrant antennas we use for direct pickup of the 2-GHz transmission from our ENG vans.

We overcame this blockage by installing an ENG pickup station and a 13-GHz relay on Mt. San Bruno itself, which overlooks the shadowed area. As our ENG vans transmit at 1999.0 or 2084.5 MHz, we installed a Farinon FV-2 (A)P receive RF head and a Farinon FV-13P transmit RF head.

The receive head down-converts the 2-GHz ENG transmission from the van to the 70-MHz intermediate frequency (IF), which is fed directly to a 70-MHz input on the 13-GHz RF head for transmission to our Mt. Sutro tower. We also have a 70-MHz demodulator and associated video and audio output units at Mt. San Bruno so that the signal can be monitored locally, if desired, during maintenance visits.

In addition, we include an AGC-switched 70-MHz re-supply so that the 13-GHz transmitter will continue to operate on the correct frequency despite the absence of the 70-MHz signal from the receive head. Receiver AGC voltage is encoded and telemetered back to the studio ENG control point by telephone company control circuit. This line is also used for control signals which select the 2-GHz receiver channel frequency, and to control the azimuth of the receive dish. The telemetered AGC voltage signal is used to "fine tune" the azimuth of the steerable Nurad pickup dish on Mt. San Bruno.

Each of our ENG vans is equipped with a Farinon FV-2(A)P transmit head supplying RF power at 1999.0 or 2084.5 MHz to twin stacked helical (Goldenrod) antennas. This combination is approximately equivalent in gain to a 4-foot dish, but is much easier to transport at highway speeds and to deploy at a pickup site.

IF heterodyning

At the time of this installation, Farinon was the only quality supplier to offer 70-MHz IF heterodyne opertion, which is so vital to many aspects of our operation. IF heterodyning permits us to relay signals from one microwave link to another, even if they are on different frequencies, without having to demodulate and remodulate the signal each time it leaves one transmission facility and enters another. By avoiding remodulation, we eliminate a source of signal distortion and noise, which would otherwise build up with each remodulation.

IF heterodyne operation is used again at the Sutro Tower, where we have located the antenna for the 13-GHz link from Mt. San Bruno. Unlike the ENG pickup horns, the 13-GHz dish is located on the

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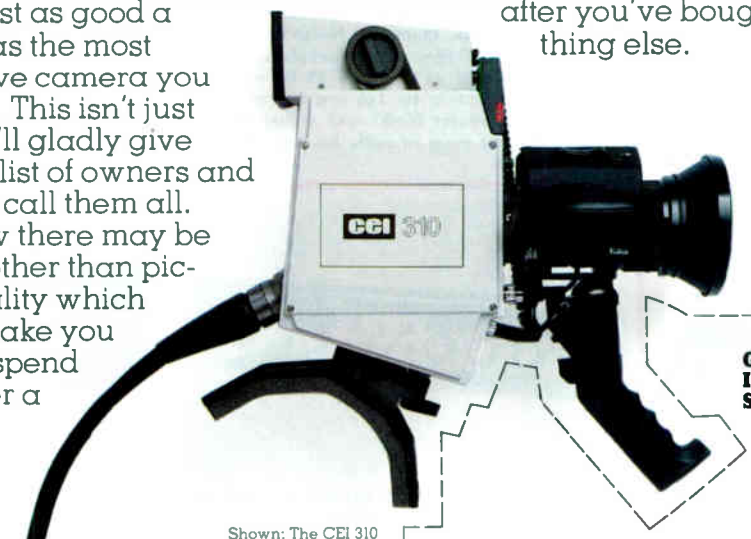

Shown: The CEI 310 in field configuration.

cei

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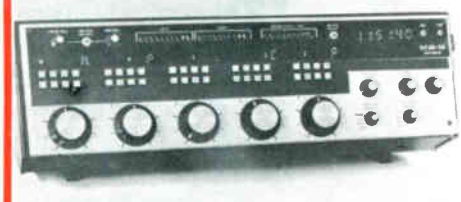
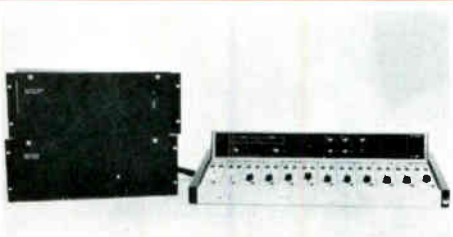
ESP-38 — Bal. out; 0.03% distortion; S/N, —85dB down referred to 12mv in @ 1kHz and +8dBm out; ±0.5dB RIAA; remote & local scratch, brilliance, rumble filter and mono activation; +8dBm out (+21dBm max.), +60dB gain. Left & right Hi/Lo equalization trimmers and recessed level controls. Built-in turntable remote start/stop relay. Stereo only. Price — $325.

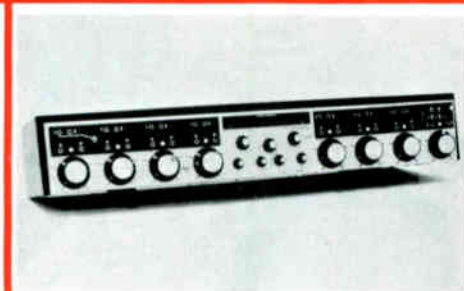
AUDIO DISTRIBUTION AMPLIFIERS. Available in 12 different rack and table top versions. All inputs and outputs may be used balanced or unbalanced and in any combination on the same amplifier. All outputs are individually amplifier isolated and will work into any load over 125 ohms without change in distortion or response. Response 10Hz to 30kHz, ±0.5 dB. Distortion 0.1% or less. Hum and Noise 98dB down referenced to +20dBm out. Channel separation —75dB. DA's start as low as $145 for our 1x30 mass feed model, thru our 1x6 line and mic level units, to our modular 20x80 rack mount design. No need to pay more or settle for less. Price — $145 to $2,276.



DC38 SERIES AUDIO CONSOLES. Outstanding versatility and advanced technology. Unparalled features such as 4 inputs per mixer, high Z balanced bridging inputs accept mic level thru high level, patch-panel input gain select, DC control of all audio, back lit alpha numeric readouts above each mixer, solid state LED VU meters, dual channel (plus mono mixdown channel on stereo), solid state switching and muting for noiseless operation, selectable muting, plug in electronics, and optional built in Clock/Timer. Available mono or stereo and 5, 8, or 10 mixer versions. 4 year warranty with 2 week trial period. Price — $2,400 to $4,980.

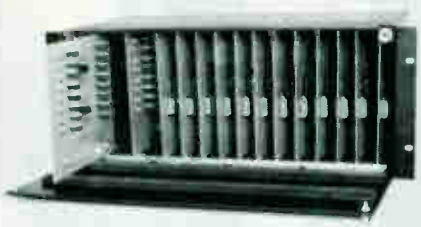


DC-12 SERIES AUDIO CONSOLES. A remote control console with low profile control head and rack mount electronics that may be located up to 90 feet away. Features 2 inputs per mixer, silent illuminated touch switches, dual channel (plus mono mix down channel on stereo), solid state LED VU meters, DC control of all audio, patch panel input gain select, selectable solid state muting and switching, slide faders with dual cue entry and plug in electronics. Since the DC-12's are totally modular you may order any number of mixers and add on later. Twelve channels may be accomodated and an additional 8 may be added via the DC-12 extender. 4 year warranty. Price — $4,700 to $5,900.

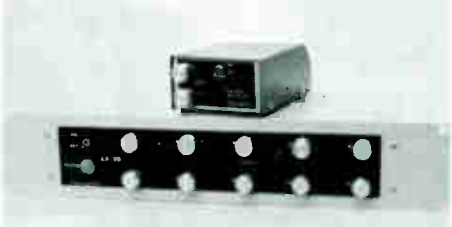


SC-5, DC-5, & DC-8 SERIES AUDIO CONSOLES. This series of consoles, whether single or dual channel; table models or rack mount; 5 or 8 mixers, mono or stereo, feature illuminated touch-pad audio select switching, solid state LED VU meters, Simul-Q monitoring capability, full-range gain selects on each input, selectable solid state cue and monitor muting on all channels, and plug-in electronics. DC control of all audio with built-in relays for on-air lights and aux. muting. Options include 4 and 8 channel extenders, Simul-Q latching and remote control of AC equipment. These popular consoles have recently been up-dated to incorporate many new features. Price — $864 to $2,298.

PORTABLE CONSOLE. P5M — A full 5 mixer audio console in miniature. Bal. in & out, 8 inputs, 3 of which are mic/line selectable & individual compressors on mic channels #1 & #2. Tone gen., cue and monitor feed with gain controls & phones select with gain control. Last 3 channels equiped with Q switch & the first 2 channels provide muting. A folding stand is part of the unit and may be removed for rack mounting. +8dBm out nominally (+18dBm max); ±2dB, 20Hz to 20kHz; S/N —75dB high level and —62dB mic level. Max gain of 90dB and distortion of 0.3%. Compression/limiting range of 35dB and a slope of 50:1. 9¾" W x 9½" D x 3½" H. Price — $545.



AUDIO ROUTER/ AMPLIFIER. The most versatile, feature loaded switcher on the market. Plug in cards for up to 16 inputs & 12 outputs. Each input has an amplifier and level adjust for attenuation and up to 17dB of gain. Output cards feature dual bal. 600 Ohm outputs, momentary BCD coded controls (may be slaved from other locations), LED output status lights show thru the front panel, and on-board mono/stereo select switch. A smoked plexiglass front panel allows the operator to tell the status of any output. Also on the front panel are 2 rows of silent momentary contact switches. One row for output selection & one row for input select. Contact RAMKO for further information and specs. Price — $716 - $2,108



LINE AMPLIFIERS. The ideal solution for your line level problems can be found in one of the 4 different models offered. LA-2 (table top or rack) and LA-5S/10M: mono or stereo, balanced or unbalanced high impedance inputs, +21dBm maximum input level, +21dBm maximum output into 600 ohm balanced line, frequency response +0 —1dB 10 Hz to 50kHz, distortion 0.008% at +8dBm out. The LA-2 is a 2 channel amplifier. The LA-5S/10M is a modular rack mount unit with up to 5 stereo or 10 mono channels. The LE-3 is a 3 channel mono line amplifier with equalization for high and low frequencies and is also modular. Gain of all units, variable to +20dB. Price — $16 to $469.

DUAL MIC COMPRESSOR/AMPLIFIERS. Portable dual mono & stero mic limiters that amplify, mix, limit and control gain. The DML-dual mono is used where 2 separate mics must be independently amplified and compressed and mixed into a common 600 ohm output. Primary and backup batteries (or an optional AC supply). Includes tone generator & talkback ability. The DML-1S is an AC powered, stereo version. Input: —60dB nominal, —18dB max. Gain: 90dB max. Limiting Output Level: DML-2M, +10dBm. DML-1S, +18dBm or +8dBm. Balanced Inputs and Outputs. Dist.: 0.3%. Attack Time: 2 microseconds. Noise: 60dB below limiting output. Size 2½" H x 5¼" W x 8½" D. Price — $239 to $274.

MIC/LINE AMPLIFIERS. Dual function for microphone or line. The MLA series are ideal for remote broadcasts, churches, mixer expansion, and emergency situations. Front panel controls for mic or line selection and level. Mic input —60dB in for +4dBm out. Line input balanced bridging with gain variable +26dB. —18dBm in provides +8dBm out with an additional 13dBm of headroom. Distortion is 0.1% or less. Response: Mic channel ±2dB 20Hz to 20kHz. High level channel: ±1dB 5Hz to 30kHz. Inputs may be used bal. or unbal. XLR Mic connectors. Single or dual channel, table top or rack mount. Price — $128 to $195.

STUDIO MONITOR AMPLIFIERS. Exceptional reproduction with high performance and versatility. 7 different models to choose from. MA-7 (mono), MA-14 (stereo): 5W per channel into 8 ohms. Response: +0, —2dB 20 Hz to 19kHz at rated output. Distortion: 0.4% max. at 1kHz and rated output. Input: 5k unbalanced, 0.7V in for max. output. Table top or rack mount. SMA series: mono or stero, table top or rack mount. 25W RMS per channel into 8 ohms. Inputs: high Z balanced bridging. Response: ±1dB 15Hz to 90kHz at rated output. Distortion: 0.6% at rated output. Built in muting circuit with input and output level controls and bass contour adjust. Price — $96 to $269.

AUTOMATIC CARTRIDGE & CASSETTE LOADER. Precision wind your own carts and cassettes and save up to 40% on reloading costs. The ACL-25/E is simple to use, just dial in the time desired and push the run switch. The ACL stops automatically, precisely to —0, +1 second of playback time. The exclusive playback speed selector ends mental gymnastics figuring tape length versus playback speed. Simply set the selector to 1⅞, 3¾, or 7½ i.p.s. and the ACL does the rest. An optional cassette adaptor enables you to wind both carts and cassettes on the same machine. An optional pancake adaptor is also available. The ACL-25/E has a nominal winding speed of 30 i.p.s. Price $325.

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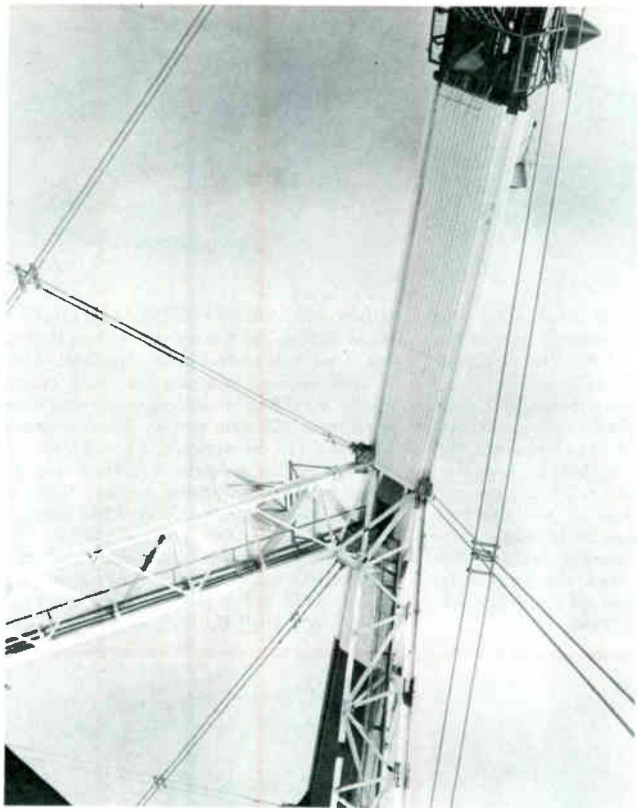

Figure 4. View from the 6th level looking downward shows passive reflector on the 5th level, used for transmission to studio, numerous other antennas of many kinds, including ENG quadrant pickup horns on narrower 4th level. Famous San Francisco fog obscures ground from upper level, which is usually in the clear.

Figure 5. Protected dish on the 2nd level, some 1020 feet above sea level, receives 13-GHz signals from Mt. San Bruno. Passive reflector on right is from some other service.

KPIX operations

tower's second level. Rather than run 400 or 500 feet of waveguide to our equipment bay below, we mount the receive head near the dish and down-convert to 70 MHz and pipe it down on inexpensive coaxial cable, thus providing a rather substantial cost savings, as well as avoiding another possible source of RF signal degradation.

Down below, the incoming IF signal is passed through an AGC-controlled IF amplifier-splitter. One output from this unit is applied to video and audio demodulators for local viewing of the relay signal.

Two additional outputs are available to feed the two 13-GHz down-links, using a 26-position function selector of our own design and construction. Each down-link input selector can be controlled locally or from the studio master control via the Moseley remote control system, or from the ENG control point in the news room, using a modified Time and Frequency Technology X-14 controller. The latter is not fully operational at this writing.

The first four steps of each switcher control IF input selection, and the remaining positions are used for video monitoring of the transmitter plant. In this manner, when the system is not being used for ENG purposes, maintenance personnel at the studio can monitor various points in the signal chain at the transmitter.

The video monitoring points include such items as STL output, video processing system (input and output), transmitter (input), modulator (input and output), demodulated RF signal (via Tektronix 1450 demodulator), Tektronix 1440 (input and output), and so forth.

A digitally-derived telemetry signal indicates to the studio operator which step the switcher is monitoring. The control of the switcher is by use of two of the channels of the Moseley DCS-2 Remote Control System.

All inputs to the down-links are independent of each other, and each link may transmit the same or different signals at the same time. This makes an ENG system in which two different ENG pickups can be used back-to-back in a live news show.

At the time we were planning our new facility and the control and communications links, we were impressed with the extra capacity of the Moseley unit, and decided to take advantage of that capacity to permit more remote control or monitoring functions than previously available.

Versatile microwave net

Some of the characteristics we thought very important when we planned our present setup were reliability and protection, high performance and versatility. The Farinon equipment line included RF equipment in the 2-, 7- and 13-GHz-bands, all patchable at the 70-MHz intermediate frequency. In addition, they had a scheme which they call "dual on-line protection," similar to that used in our RCA TT30FL broadcast transmitter, in which two transmitters are phase locked to-

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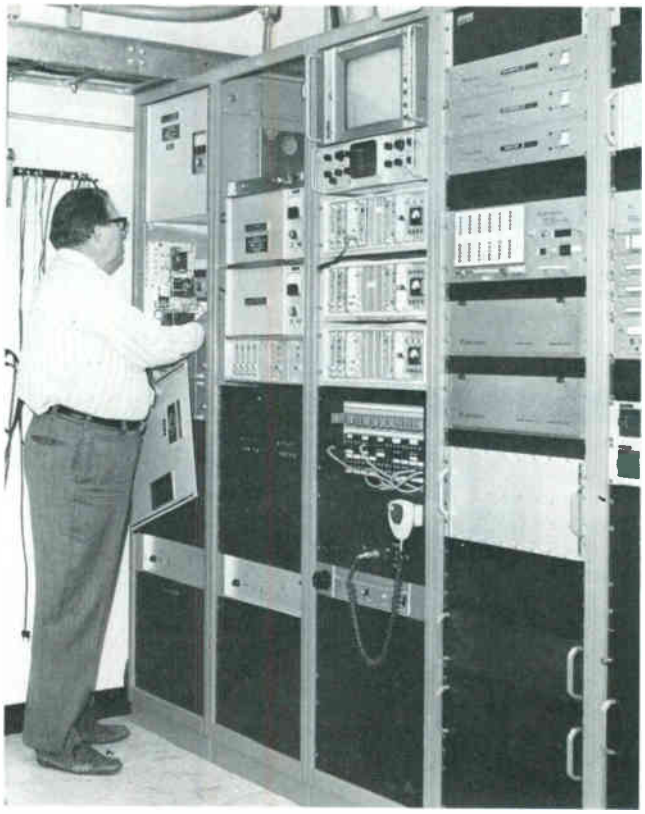

Figure 6. Author Don Lincoln inspects Farinon microwave equipment in communications room at Mt. Sutro transmitter site. Dark panel at waist height is the studio-controlled stepper switch apparatus by which most video functions at site can be remotely called up for monitoring.

Figure 7. Charles Rose, KPIX studio technical supervisor, examines the remote control unit in downtown studio master control room. Unit enables any of 26 communications functions to be dialed up remotely, allowing picture quality, wavefo:ms and other functions to be inspected.

KPIX operations

gether, doubling output power during normal operation, yet providing a "graceful" degradation instead of catastrophic failure in case of the demise of some component or other in the microwave transmitter, and avoiding the hits or switching transients often associated with various hot-standby protection schemes.

At the receive end, the incoming STL signal is divided in a hybrid splitter and applied to two parallel receivers. Their respective outputs, in turn, are recombined in an 'optimal selection' baseband combiner which monitors the output signals from both receivers and selects the one with the better signal-to-noise ratio, or automatically switches to the alternate receiver in case of failure, as evidenced by loss of pilot or excessive noise.

Because of its crucial nature, we use this dual on-line protection option in our 12962.5 MHz studio-transmitter link. For the down-path, however, we opted for two separate frequencies: 13087.5 and 13187.5 MHz. Because the transmitter-studio down-link is not as vital to our operations as the up-link, these two channels are not tied together in an automatic protection scheme, but are independent. This gives us the option of using each for a different signal.

We are able to use a common waveguide and antenna at each site for the three 13-GHz signals on this path because they are spaced at least 100 MHz apart, well within the capabilities of the diplexing filters of the Farinon microwave equipment.

To obtain adequate path clearance between the dish on the roof of our downtown studio, and the tower on Mt. Sutro, we transmit from the tower's fifth level, some 600 feet above our equipment room. In order to avoid the very high signal loss that 700 or more feet of 13-GHz waveguide would impose, we use an 8x12-foot Microflect passive reflector on the fifth level and illuminate it with a roof-mounted 6-foot dish just above the transmitter control room. Although so-called periscope arrangements of this sort have been ruled out in some microwave services, because of possible interference with others, it is acceptable in the broadcast relay service at 13 GHz.

Future challenge

Our next step will be a 30-½ mile hop to Mt Diablo, to the east. This will give us direct ENG access to the state capitol in Sacramento, as well as a tremendous area in the central valley, including many communities such as Concord, Modesto and Stockton, presently blocked by the coastal range.

As in the case of our present microwave link from Mt. San Bruno to Sutro Tower, we will be able to remotely sweep the ENG receiving antenna on Mt. Diablo over the entire area to the east, optimizing antenna azimuth by peaking the receiver AGC voltage, which will be telemetered back to the Mt. Sutro tower, then back down to the studio and the ENG control point.

At Mt. Sutro, we already have the stepper switch positions assigned and wired, as well as the rack space for the new microwave equipment. Thus, we expect that the new additions will slide right in, with no disruption to our normal operating procedures, yet expanding our horizons greatly. □

"this Auditronics 110 in the Louisiana Superdome...

...handles over 80 events a year ranging in complexity from Saints football and NBA basketball, to the Spinx-Ali fight to rock festivals and religious revivals", says WWL's Hugh Burney, Director of Technical Operations. "Its 22-in by 6-out flexibility lets us use it for on-the-air TV and radio as well as network feeds, and some commercial production."

"We needed a board to handle a great variety of tasks at the Superdome, and we checked out half a dozen different brands. The stretched version of the Auditronics 110 gave us the greatest flexibility for the lowest cost, and they customized it for exactly what we needed. With Auditronics modular design, we essentially got a custom board with the quality we required for the Superdome at the price of a standard item."

"How does it work? Well, in two years on the air, it's done everything we've asked of it, and it's never failed in use. We like it well enough that we've since bought a second Auditronics 110 that's working eight hours every day in our commercial production studio."

If you'd like to know what WWL and over 300 other broadcasters and studios have learned about Auditronics quality and reliability, circle reader service number or call us.

Louisiana Superdome, largest indoor arena in the US, site of WWL's sports broadcast studio shown above.

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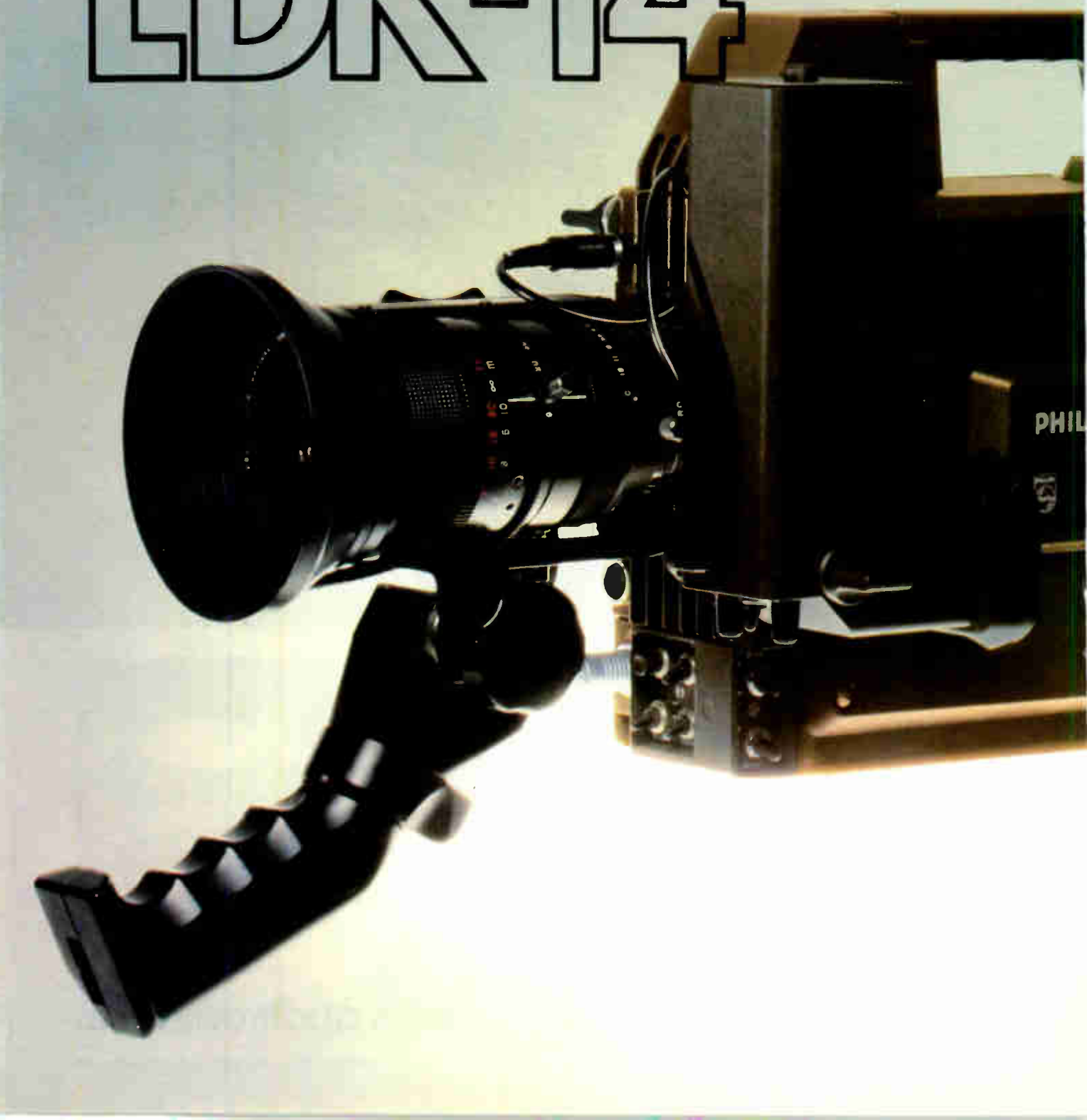
LDK-14



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1976...LDK-11 A smaller, lighter, lower cost field and studio camera.

1977...Video 80 An innovation in lightweight camera and production system...**LDK-15L** Latest version of the LDK-15.

Evolving from this long history of portable equipment leadership, Philips' engineers have created a new concept in portable and field equipment. *The LDK-14 broadcast systems camera.*

A futurized camera offering three *advanced* configurations for field and studio use...all achieved *without equipment repackaging:*

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2. *EFP*—studio quality portable, with remote control; timing and phase adjustable gen lock; instant convertibility to studio camera use by simple change of viewfinders.
3. *Studio*—compact, maneuverable; full broadcast quality; 5" viewfinder.

The LDK-14 combines innovative design and unique capabilities in a state-of-the-art 2/3 inch camera that is *much lighter* and *uses significantly less power* than the competitive ENG-only camera. Plus the LDK-14 gives you additional advantages in size, picture quality, stability, maintainability and cost.

Among its many other unique features for portable and studio use are:

- Only 27 watts power consumption (almost 1/3 less than the ENG-only competitive portable) gives longer continuous operation with choice of battery belt or small battery pack affixed to camera. A standby switch further conserves battery power between takes.

- Viewfinder displays include: contour enhanced camera picture or external video signal; status monitors for video level, color balance, bars on, battery discharge, VTR functioning, intercom call and camera tally.
- Automatics include: color balance; white and black level; centering; noise reduction when operating with extra gain; auto iris with set and hold facility.
- Externally switchable black stretch and contrast expansion.
- Dynamic Beam Control (DBC), regulates beam current to suppress comet tailing and blooming.
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- Optional remote control facilities.
- Easy access for set-up and maintenance. Rear casing flips up for access to five main plug-in circuit boards.
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- Other features include electronic raster rotation for better registration; linear matrix for optimal and Philips compatible colorimetry; and 360-degree hue-selectable chroma key.
- Other competitive cameras may have some of these LDK-14 features—no one has them all.

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With this unmatched combination of performance and portability, the LDK-14 is *also the ideal camera for field recording of ENG and EFP.*

And just as Philips has always offered the widest selection of portable and studio cameras to meet your specific needs, the same policy now applies to your choice of 1" VTR's and TBC's. Offering 'C' format and 'B' format VTR's in both portable and studio configuration, Philips can provide the greatest objectivity and cost-effectiveness in packaging systems to match your requirements.

Philips, the company that started it all, now introduces the latest portable breakthrough, the LDK-14 broadcast systems camera. It will be the industry standard for years to come. And for a camera-recorder package to match your requirements, your choice of 1" VTR formats. Only from Philips.

For all the facts on this innovative new camera or camera-recorder system (please specify) write: Philips Broadcast Equipment Corp., 91 McKee Drive, Mahwah, N.J. 07430 (Canada: Philips Broadcast Equipment, 601 Milner Ave., Scarborough, Ontario M1B 1M8)

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Airborne microwave television systems

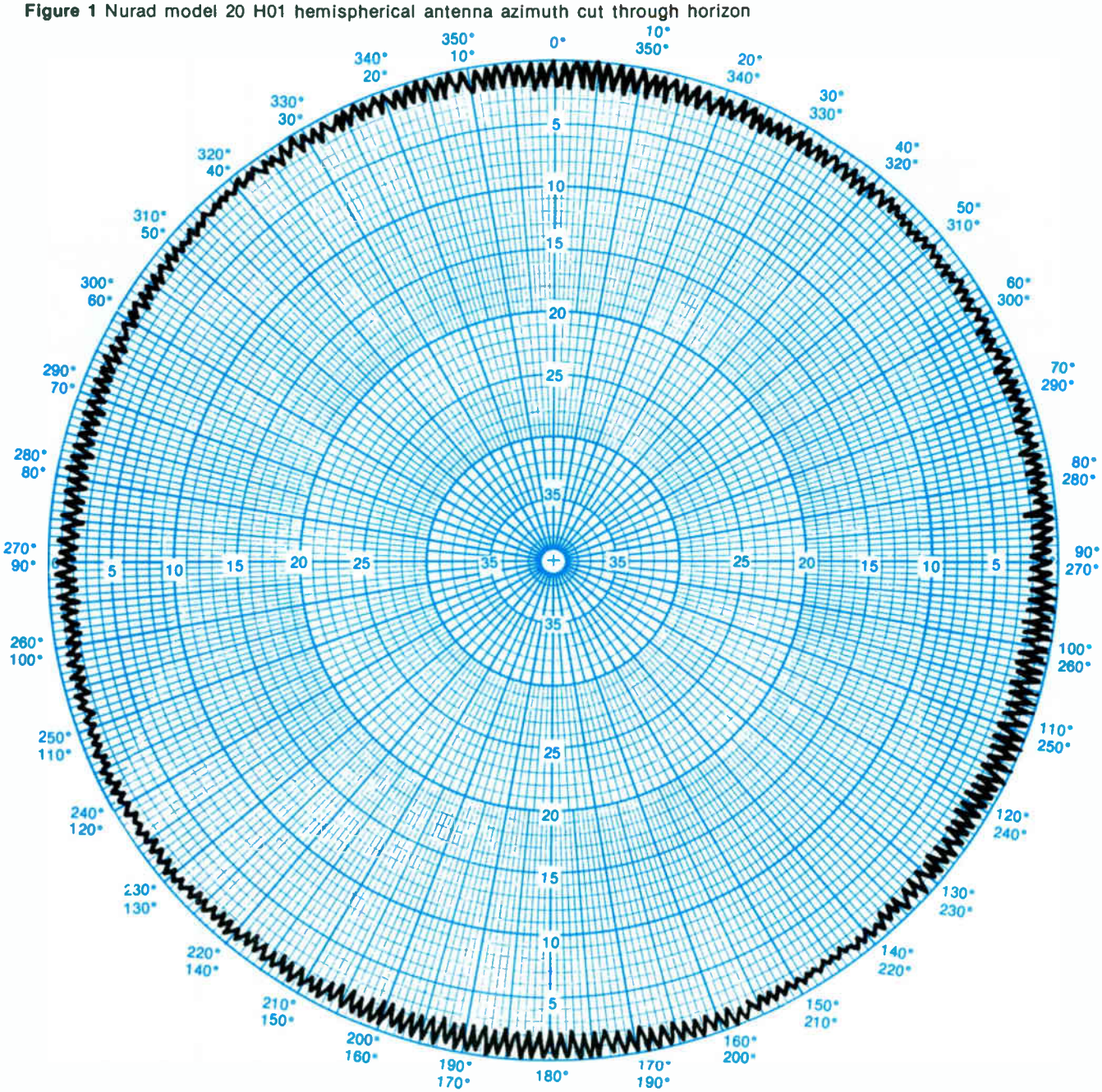
By Vincent E. Rocco, Nurad Incorporated

Television helicopters or *telecopters* and, to a lesser degree, fixed-wing light aircraft are becoming increasingly popular as a production tool with television newsrooms. The agility of such aircraft makes it possible to go to the most difficult of locations in a minimum of time. It is well-known that the dream of every television news director is someday to "scoop" all of his competitors by being at a new location first with live and accurate coverage of a big event, and the telecopter constantly holds out the promise of fulfilling that dream.

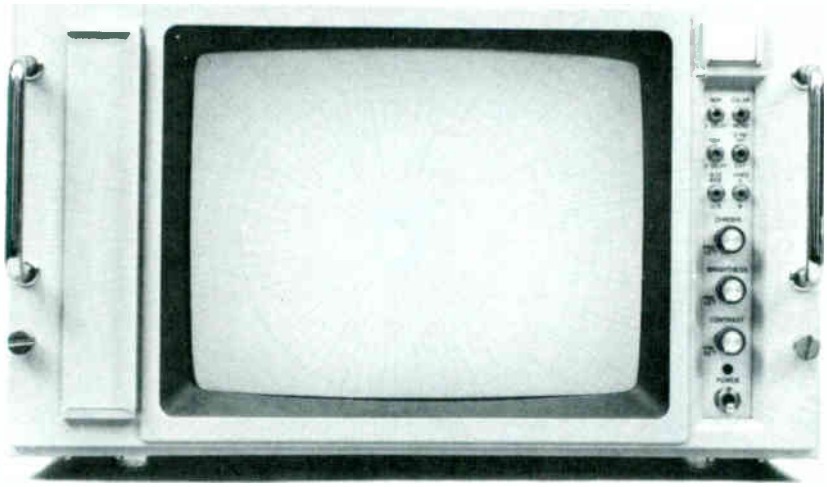
High cost of past systems

Back in the dim past of the 1950s and 1960s, the microwave state of technology was such that receiver noise figures were in the range of 11 to 12 dB and the power outputs of reliable 2 GHz transmitter suitable for airborne use were less than 10 W. These factors, when considered in terms of microwave television systems, translated themselves into low system sensitivity. Because of the relationship between sensitivity and usable system transmission range, the net result was airborne television systems of very limited useful range. In order to increase range, antenna gain was increased at both the transmit and receive end. Antenna gain of the transmitting end was obtained by the well-known and accepted tech-

Figure 1 Nurad model 20 H01 hemispherical antenna azimuth cut through horizon



It takes guts to run your video through an Ikegami broadcast monitor.



With twice as many image-making dots on its tube, an Ikegami color-tv monitor can show up in unnervingly high resolution a dozen or more things that could go wrong in your picture. Not just purple cows, but the smallest anomaly in linearity, the slightest picture distortion, the most marginal overload.

This one is our Model TM14-2RH. A comb filter helps maintain resolution to more than 600 lines. It gives you a choice of over- or under-scanned picture display.

Damage to its picture tube is prevented by power-protective circuits. Up front are all adjustments for its 14-inch CRT and inside are modular PC boards for simple servicing and maintenance. A keyed back-porch clamp system keeps the black level constant for maximum picture stability.

There are both pre-set and adjustable controls. Video response is from +1 to –2 dB from 60 Hz to 8 MHz.

It has extemely rigid, sturdy construction and is available in a free-standing cabinet or for standard 19-inch rack mounting. Its built-in degaussing circuit and magnetic shield to fend off external magnetic effects make it possible to move the Ikegami monitor without affecting its picture.

Also available from Ikegami are our Series Eight monitors for broadcast studios. There are four models, 25, 20, 16, and 14 inches. All use integrated circuits for high stability, long service life, and very modest appetite for power. Their picture tubes have black matrices for maximum contrast and best color fidelity. A keyed back-porch clamping circuit keeps pictures stable with proper black level. Video response is +1 to –2 dB from 60 Hz to 5 MHz.

You can get an optional remote control for brightness, contrast, and chrome.

We really shouldn't have to give you all the specs. The name Ikegami alone is enough to tell you how good they are. But if you do insist on more, ask Ikegami. Ikegami, the leading manufacturer of ENG cameras, manufacturer of the best in studio cameras, and now the best in monitors, too.

Ikegami

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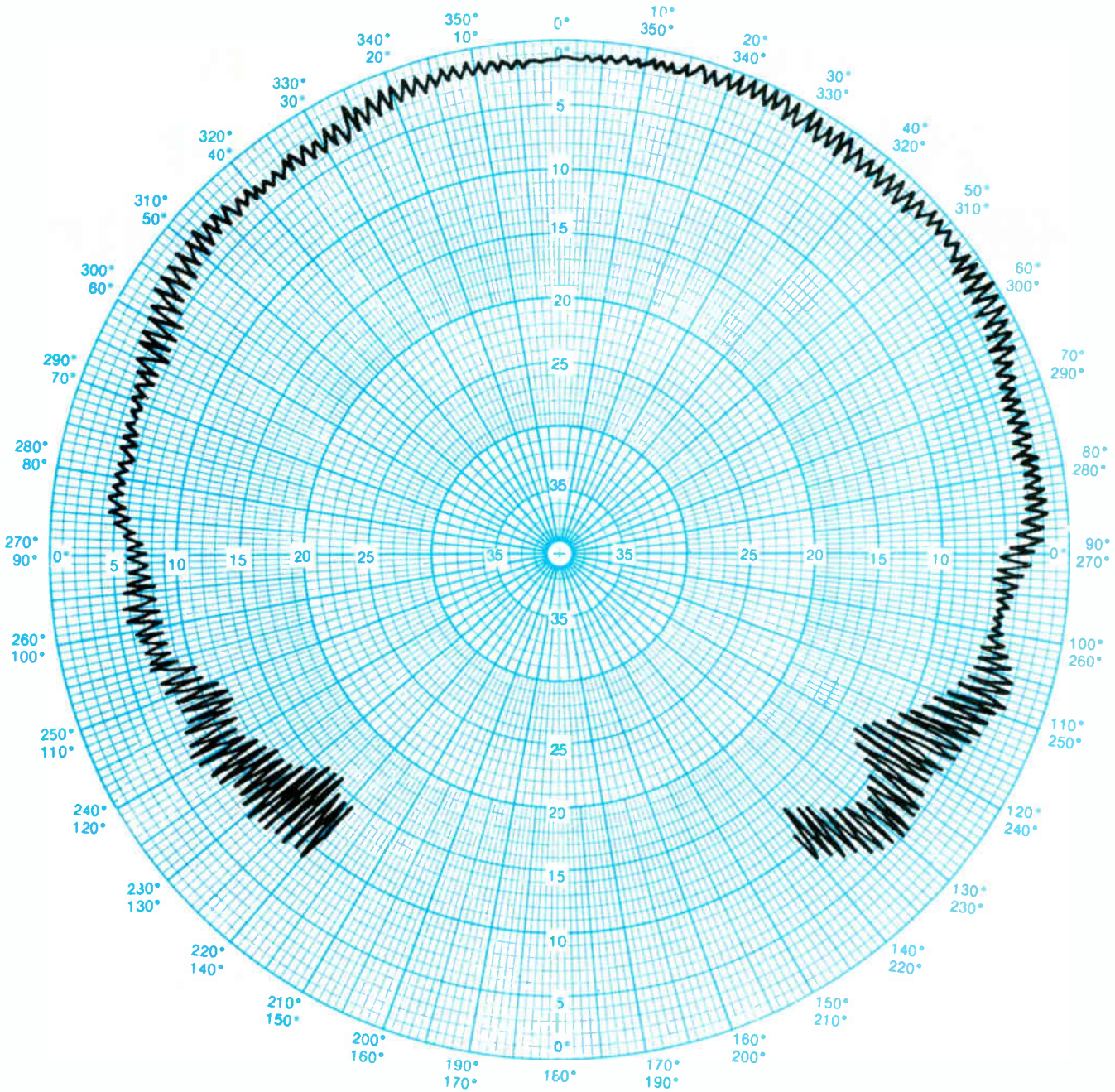

Figure 2 Nurad model 20 H01 hemispherical antenna elevation principal plane, forward and aft

Microwave TV

nique of limiting the radiation direction of the antenna, which made it necessary to aim the airborn antenna towards the receiving site.

Such simple schemes as poking a hole through the aircraft floor and manually aiming the directional antenna proved to be of limited utility, and it soon became apparent that some automatic tracking was required. However, the cost of providing automatic tracking capability actually exceeded the total cost of the rest of the system and thus became a limiting factor. Further, automatic tracking systems are notoriously complex and introduce the potential problems of decreased overall system reliability and increased maintenance.

Therefore, a great deal of improvement was needed in airborne television systems component design before they could be widely acceptable to competitive commercial organizations like those in the broadcasting industry.

Development of system components

The required development effort has been applied to three major areas: transmitters, receiver front ends and antennas.

Improvements in transmitter size, the transmitter power output and the transmitter frequency agility were certainly called for. A dramatic decrease in transmitter size occurred with the advent of a stable 1 GHz oscillator made possible by the development of reliable power transistors at 2 GHz. As a result, several stages of frequency multiplication and frequency up-conversion were eliminated. At the same time, thermionic power devices such as traveling wave tubes were also replaced with high-power solid-state devices. The resulting 3-pronged approach to reducing size by eliminating stages, eliminating large power devices, and reducing the primary power requirements as a by-product has culminated in miniature high-power frequency-agile

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CH15S Hypercardioid System

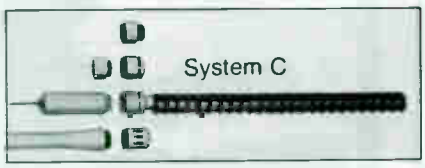
The CH15S is actually more directional than a mini shotgun mike – in a package that's only 4 inches long that weighs less than 6 oz. Specially designed for boom and fishpole use in TV and motion picture studios, but equally at home wherever working space is small and you have need for a compact, highly directional microphone.

Compatible with phantom or AB power, the CH15S comes complete with windscreen, shock mount and carrying case. And, this microphone is rugged.

The Electro-Voice Warranty

Electro-Voice backs up these two microphones with the only unconditional warranty in the business: for two years we will replace or repair your CL42S or CH15S microphone, when returned to Electro-Voice for service, at no charge – no matter what caused the damage!

We can do this because we build these microphones to meet our standards for performance, ruggedness and durability. We accept nothing less, and if you're a professional, buying a professional quality microphone, you shouldn't either.



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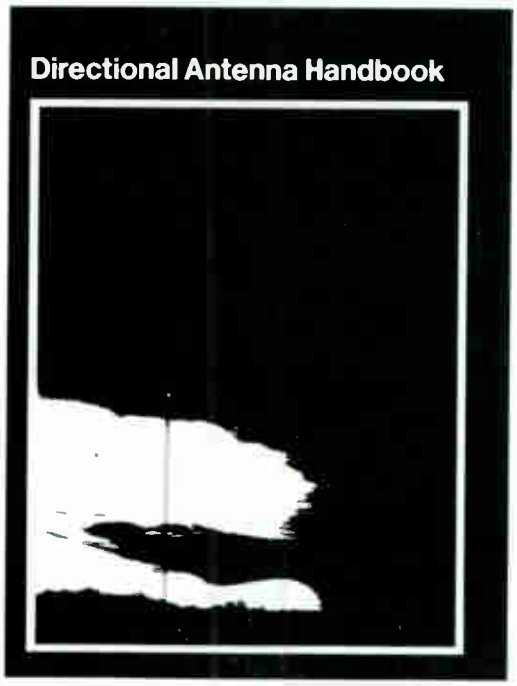

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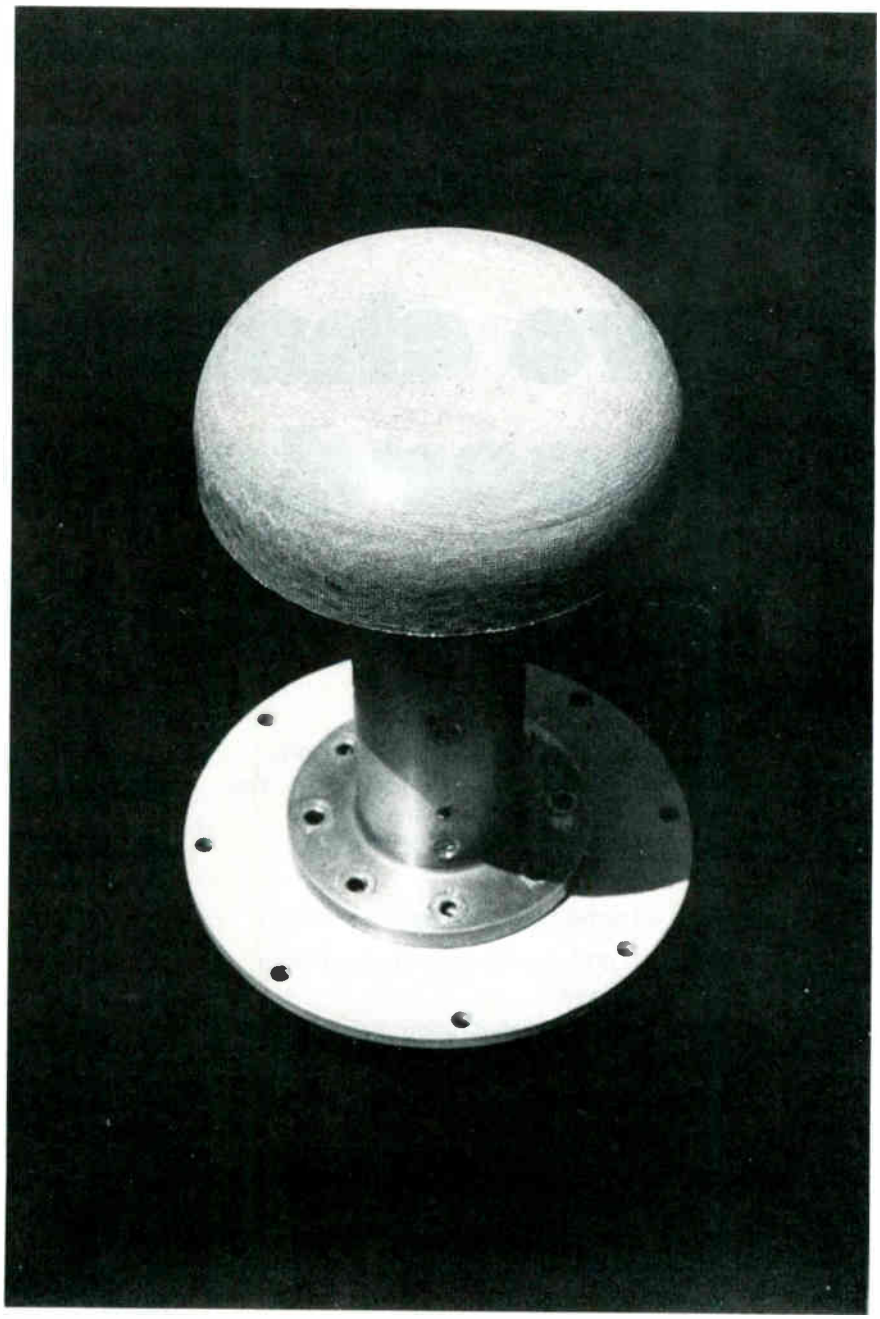

Figure 3 Nurad model 20 H01 hemispherical antenna

Microwave TV

units eminently suitable for airborne use. Both Farinon and Microwave Associates now offer miniature ENG transmitters suitable for such applications.

At the other end of the transmission link, the salient development was the appearance of low-noise bipolar transistors and gallium arsenide field-effect transistors (GASFET). These devices have made possible the design of low noise microwave preamplifiers with noise figures as low as 1.7 dB.

This improvement alone can account for as much as a four-fold increase in transmission range. Ultra-low-noise preamplifier assemblies with bypass circuitry are available through Nurad.

Somewhere in between the two ends of the link already considered are the antennas. With an increase in system sensitivity gained from the already mentioned improvements in component design, part of the performance burden carried by the antenna system is lightened. For the first time, it is possible to put emphasis on antenna design pa-

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rameters other than gain and instead give consideration to somewhat more sophisticated antenna properties such as radiation beam shape and complex electromagnetic polarization. Fortunately, because of allied developments in the aerospace industry, the technology already existed and could readily be applied to the design of microwave antennas for the broadcast industry.

Greater efficiency, lower cost

An experimental TV helicopter system using the new, improved components was put together and tested during the summer of 1978. The system, operating at 2 GHz, consisted of a lightweight, dc-powered 20-W transmitter (Farinon FV2MP with 60515 Power Amplifier), a miniature color television camera (RCA TK-76) and a circularly polarized antenna with a special hemispherical radiation pattern (Nurad Model 20 HO1). Figures 1, 2 and 3 show this antenna and its radiation patterns.

The companion receiving system was a standard electronic news gathering/electronic journalism (ENG/EJ) microwave receiver (Microwave Associates MA2-Series) and a circularly polarized horn antenna (Nurad Model 20 QP1) with a low-noise preamplifier. The receiving antenna was mounted at a height of 1000 feet, putting the radio horizon at about 40 miles. At a range of 30 miles the signal into the receiver was computed at -76 dBm, which is about 10 dB above the receiver and preamplifier threshold of 33 dB signal-to-noise ratio. The television pictures at this range were subjectively judged to be of broadcast acceptable quality. Several factors are responsible for a simple system such as this performing at this level of quality, the first being the extremely sensitive receiver.

The circular polarization of the transmitting and receiving antenna and associated control system greatly minimizes multipath transmission particularly at the angles of transmission encountered on an air-to-ground microwave link. The major factor affecting range was the significant improvement of the microwave receiver threshold with the use of the receiver low-noise preamplifier even with low antenna gain.

Another important characteristic of the airborne transmitting antenna was its hemispherical radiating pattern. Since there is no cone of silence in the axial plane of the antenna, the aircraft can fly directly over the receiving site without loss of signal.

It is estimated that this system can range as far as 80 miles before the signal level falls below the microwave receiver's threshold.

Costs for typical systems

The costs associated with airborne television systems are to a great extent dependent upon their size and complexity. However, within the guidelines for simplified systems as treated in this discussion there are only three types that are considered as being low in cost. The first is a transmit-only system which is to operate with an existing microwave receiving subsystem; the second, a complete airborne transmit and ground receiving system; and the third, a system in which the airborne portion will have television relay capability, i.e., simultaneous transmit and receive.

Representative and approximate current costs are as follows:

Case I	
Camera and accessories	$50,000
Transmitter	12,000
Antenna (airborne)	3,000
Engineering, installation, misc.	5,000
TOTAL	$70,000
Case II	
Airborne package (same as above)	$70,000
Receiving system	15,000
TOTAL	$85,000
Case III	
Camera and accessories	$50,000
Transmitter	12,000
Receiver	10,000
Diplexer	2,000
Antenna	3,000
TOTAL	$77,000

Of course, there can also be a large variation in the complexity and cost of the receiving system alone. Automatic or remotely operated receiving systems can add as much as $50,000 to their cost. However, since such a receiving system will be used for several purposes, the greater cost of the more sophisticated receiving system may be justified on the basis of its greater all-around usefulness. □

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The tape cartridge is a handy little device. Unfortunately the sound quality of programming varies noticeably between "live" and "canned."

dbx has overcome this problem by developing a tape noise reduction system especially for broadcast use. It provides 30 dB noise reduction and 10 dB headroom improvement. This dbx system offers the same benefits as the dbx tape noise reduction system used by recording studios.

The new dbx 148 provides 8 channels of playback (decode) noise reduction in a plug-in modular chassis (space is provided for a spare module). There are two modules available—the 408, for tape playback, and the 409, for playback of noise-free dbx-encoded discs. Typically, the 148 is used in the control room to play back tapes recorded in the production studio with the dbx 142, a 2-channel, switchable (encode-decode) tape noise reduction unit.

Besides "un-canning" carts, the dbx system extends the useful life of old reel-to-reel machines, quiets audio tracks on VTR's, and even cleans up full-frequency telephone lines and microwave links. Because it prevents noise from coming between you and your listeners—and you and your advertisers—it just may be the most important investment you will ever make.

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Dr. Richard Alter, Convocom director of community relations, stands in the antenna impact crater and surveys the damage.

William R. Ellis, author and director of engineering at Convocom, studies the wreckage to discover what went wrong.

Case study:

Icing destroys tower and transmitter building

By William R. Ellis

When the telephone rang at 7 AM March 26, 1978 (Easter Sunday) I knew the news could not be good. I was right. It was a call from the closest resident to our transmitter site in Bluffs, IL, informing me that our 1588-foot tower had collapsed, demolishing the transmitter building in the process.

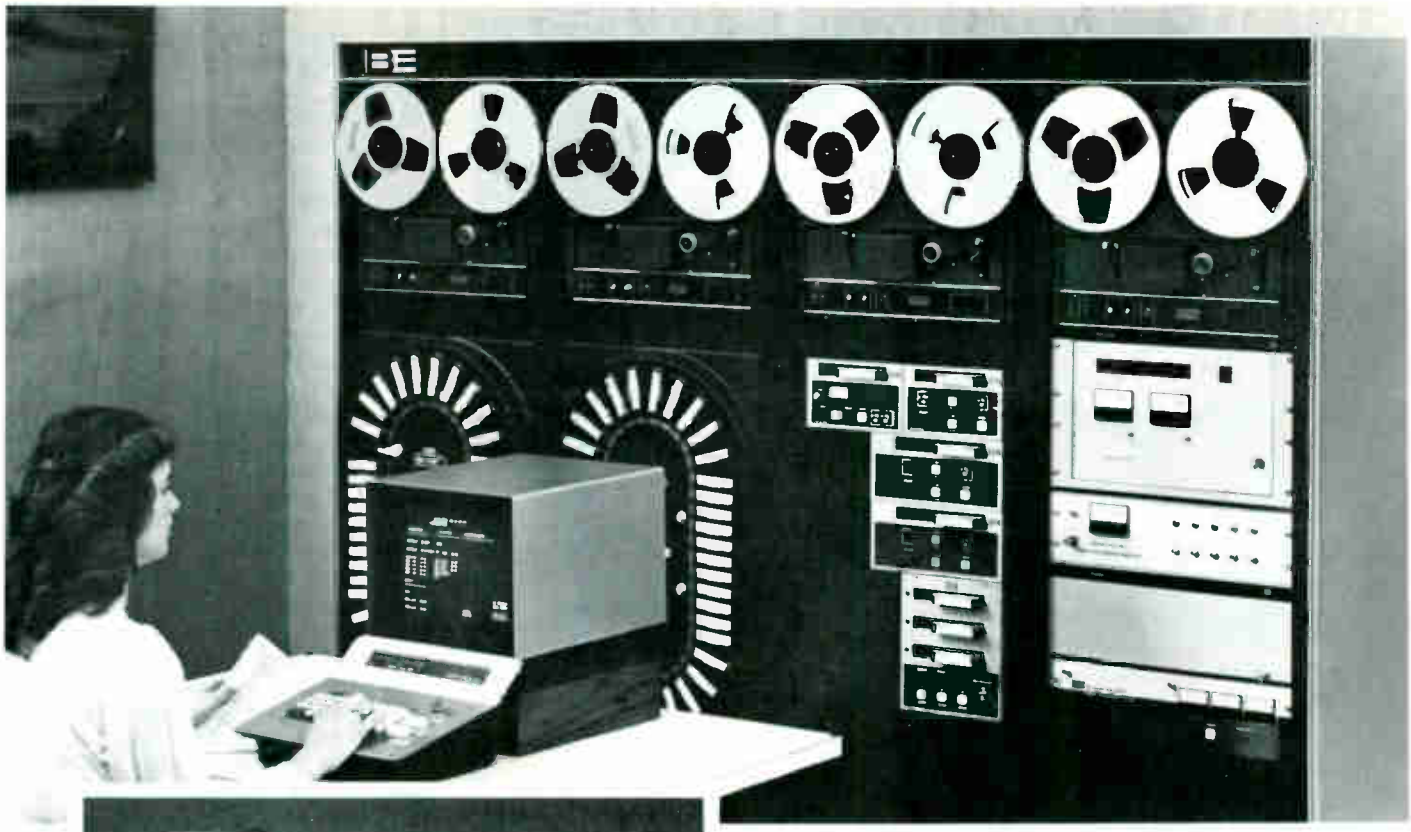
My first reaction was two questions: was anyone hurt and was anyone's property, other than our own, damaged? With both questions answered in the negative, I breathed a little easier, and made plans to travel the 50 miles to the site.

The WJPT-TV transmitter site, located 50 miles west of Springfield, IL, and 50 miles east of Quincy, IL, had not yet been put in operation. The site was formerly operated by a commercial broadcaster on UHF Channel 14 but had gone dark some four years earlier. Convocom had purchased the tower and transmitter building approximately one year before the tower collapse and had spent over $150,000 to rehabilitate the tower and transmitter building. The transmitter had not yet been installed, but the tower was certified to be in perfect condition approximately six months prior to the collapse. It was fully insured.

The tower

The tower was a 1465-foot AGL guyed at seven levels of three guys each, built by Stainless in 1969. The tower face was 8 feet and was supported on a hinged base.

The tower legs were round structural tubes 5-inch OD, made of 60,000 PSI minimum yield strength steel. The horizontal struts were round tubes 2-inch OD made of 42,000 PSI minimum yield strength steel. Diagonals were solid round rods, ranging from 5/8 inches to one



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This chunk of ice was recovered from the tower leg. Other chunks of ice bearing the imprint of the leg were found that weighed between 30 and 40 pounds.

Tower icing

inch in diameter, made of 60,000 PSI minimum yield strength steel.

Sections of the tower were of bolted construction. They were bolted together by three sets of splice plates on each leg.

The structural integrity of the tower depended mainly on the buckling load capacity of the legs and struts and the tension load capacity of the diagonals and the guy cables.

Top-mounted on the tower was a channel 14 RCA Zig Zag antenna, 122-feet long and weighing 25 tons. The antenna was equipped with a fiberglass radome, making the total diameter to the wind 36 inches. A rigid transmission line (6-1/8 inches) extended the full height of the tower. A 12'x15' Advance Industries passive reflector was mounted at the 378-foot level on the southeast leg, and just above it was a 15'x15' ice shield with a one-inch floor grating covering it. It is my opinion that this reflector and the associated ice shield and floor grating was a significant factor in the tower's collapse. More about that later...

The EIA RS-222C standard classifies the Bluffs, IL, area in Zone A which requires a design wind pressure of 50 PSF (constant). As previously stated, this tower had undergone complete refurbishment six months prior to its collapse, after which it was certified to meet the EIA standard of 50 PSF.

The weather

On the drive to the transmitter site that Easter Sunday morning it was obvious that wind pressure did not play a part in the collapse of the tower. Ice was everywhere, on roads, trees and telephone poles. Roads were treacherous, tree limbs were broken, the ice encased parts laying helter skelter on the ground. Telephone poles were broken like match sticks, their split stumps sticking from the ground coated with ice.

My thoughts were on the previous Friday morning when I had visited the transmitter site to check the tower lights. I recalled how it was necessary to use a ball-peen hammer to break the ice on the gate latch to get into the transmitter building and how I had observed that the chain link fence around the transmitter building was solid ice. That was about 40 hours before the tower collapsed, and the ice storm had continued over a 48 hour period. The tower must have been one tall icicle just before it collapsed.

The damage

I had mixed emotions as I arrived at the transmitter site. On one hand, I was relieved that there were no casualties and no one's property other than our own was damaged. On the other hand, the sight of such massive destruction was reminiscent of the destruction I had observed many years ago right after World War II in Munich and Frankfurt, Germany.

Two-thirds of the transmitter building was completely pulverized by one or more tower sections having fallen on it. Twisted tower sections protruded from the debris of the concrete block building, most of the pre-cast concrete roof was a part of the pile of rubble.

It appeared that the 25-ton antenna hit end first just to the north of the building, breaking in half on impact, but digging a crater six or seven feet deep before doing so.

The bottom 400 or 500 feet of the tower fell to the northeast over the top of the remaining 800 or 900 feet of the tower. Because the top 800 or 900 feet of the tower reached the ground before the bottom 400 or 500 feet, the tower probably snapped at approximately the 400 foot level.

As stated previously, the 12'x15' passive reflector and just above it the 15'x15' ice shield, was mounted at the 378 foot level. One can only guess at the ice build-up and the off-center weight distribution produced by these protrusions from the tower.

Chunks of ice bearing the imprint of the tower leg were recovered at the site, weighing between 30 and 40 pounds, indicating a radial ice build-up of four to five inches. Guy wires on the ground still had the radial ice on one side up to two to three inches.

None of the guy wires pulled loose from their anchors and none of the anchors were damaged. The antenna base was not damaged. Only one guy wire was found to be broken and it appeared that a falling tower section had severed it.

Aside from subjective weather observations, it is difficult to determine exactly what the weather conditions were for the three days, March 24, 25, and 26. But, by interpolation of Springfield and Quincy weather bureaus' records we can get a fairly good idea what was going on at Bluffs.

For the 48 hours previous to the tower collapse there was an accumulation of 4.4 inches of snow, freezing rain, drizzel, and ice pellets. Total precipitation was 1.08 inches of water. The temperature ranged between 28° and 30°F for the entire period.

Over the same period of time the surface winds remained, out of the north between 7 and 23 miles per hour with gusts to 34 miles per hour.

At the time of the tower collapse the surface wind was out of the north at 8 miles per hour and the

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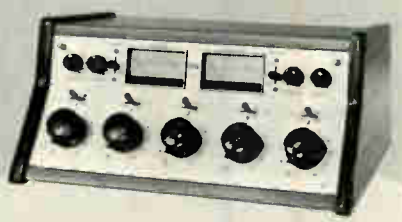

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Two-thirds of the Channel 14 transmitter building was completely pulverized by one or more tower sections having fallen on it.

Tower icing

temperature was 30°. It is interesting to note that by 12:52 PM on the same day, the precipitation had stopped and the temperature had risen to above freezing for the first time in 48 hours. By 3 PM the temperature was 35°, giving rise to the theory that if the tower had stood four or five more hours it would have survived.

I am told that theoretically, a guyed tower will fall within a radius of 1/3 the height of the tower, if the guys remain intact. In this case this tower collapse reinforced the theory, falling within a radius of 500 feet of the tower base.

Rebuilding

What about the future plans of Convocom to rebuild channel 14? We do intend to rebuild on the same site. However, we also intend to take steps to reduce the likelihood of a similar collapse. I say "reduce" the likelihood because I do not believe, given the same weather conditions, anyone can build a steel tower guaranteed to withstand the conditions that the tower at Bluffs was subjected to-at least not within budgetary limitations of most broadcast stations.

Our new tower will be of the same height as the old tower. It will be a 10-foot face tower instead of 8-foot and will be designed to meet the requirements of EIA-RS-222C standard, Zone B, even though Bluffs is considered Zone A.

The tower will be designed for 65 PSF wind unit pressure or 35 PSF wind unit pressure with 1-inch radial ice (56 pounds per cubic foot) on all tower members, antenna, and transmission lines, whatever produces the most severe loading.

In addition, due to the advancement in antenna technology, the replacement antenna, having the same power input capability and pattern, will weigh one fourth that of the previous antenna.

The diameter to the wind of the new antenna will be 12-3/4 inches instead of the 36 inches, as was the case of the old antenna equipped with a radome.

Some tips

I can't look back at this experience without asking myself what I have learned that could be passed on to other broadcasters. Consider the following:

- If you are contemplating building a tower, especially a tall tower, do not take the EIA RS-222C standard as gospel for your particular area. Remember, a few extra thousand in initial construction cost could save you a million in the long run.
- Make sure you have adequate insurance in the amount of the *replacement* value of not only your tower and antenna but also the transmitter building and its contents.
- Remove all antennas, transmission lines, reflectors, etc. from the tower for which you do not anticipate an immediate or near future need. (The passive reflector on the Bluffs tower was in this category.)
- In this age of energy conservation the preferences of antenna radome over antenna de-icing has a lot of merit, but when considering antennas of the size and weight used at Bluffs, it is my opinion that antenna de-icing is preferable, due to the reduced wind loading. □

Microprocessors: Key to Broadcast Automation/Instrumentation

By Bill Rhodes, Editorial Director

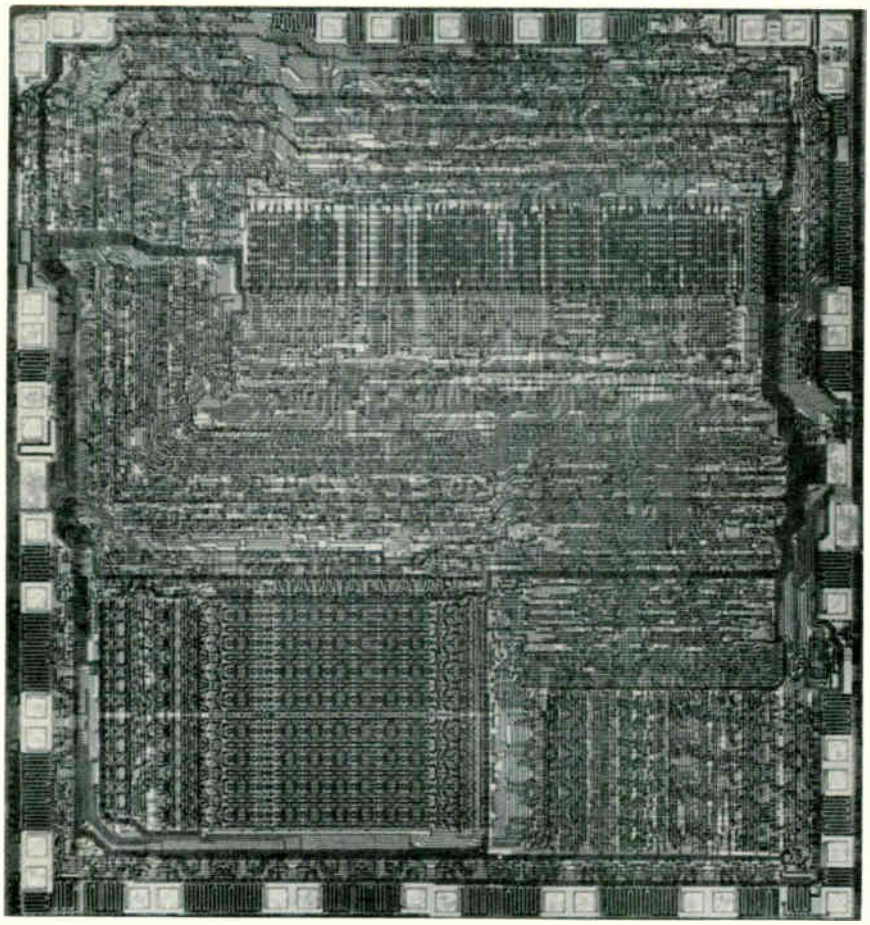
The impact of microprocessors on systems and instruments for the broadcast industry has been profound. At NRBA in San Francisco we saw a host of automation systems for the radio broadcaster that have been made possible by the microprocessor. The essence of these systems was reported in our November and December issues.

At SMPTE and AES in New York we saw new cameras and digital instrumentation systems with unexcelled performance that were made possible and economical with microprocessors. Some of these are highlighted elsewhere in this issue; others will be covered in our February issue.

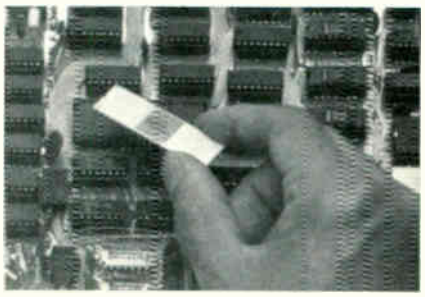
While many microprocessors are available for the industry to adapt to broadcast instrumentation and automation, two in particular appear to be widely used: the Z80 and the 8080.

The Z80 microprocessor, shown at the right, is used by Cetec in its 7000 automation system described on page 63 of our December issue. At NRBA we walked through the programming features of this system with Hugh Wilcox, Manager, Automation Systems, and were impressed with beauty of the Cetec system and completeness of its programming package.

While the Cetec 7000 system is impressive, it is the microprocessor which has made the system possible and economical. But, there's more to the story than just the microprocessor (CPU) itself. The evolution of the Cetec 7000 system represents a dedicated effort by two different firms to merge two technologies—broadcasting and solid state chips—to achieve a new generation of instrumention.



Microprocessors, such as the Zilog Z80 shown here, are providing the tools needed by broadcast equipment manufacturers to develop a new generation of instrumentation.



Cetec's System 7000 automation system is a multi-processor concept based on the Z80. On the left is shown the Z80 hand held next to a plug-in memory board. On the right, the dedicated CRT terminal (with conversational keyboard) is being used with a phone link to "talk" to a System 7000 in the field for trouble shooting or training.

The Z80

The Zilog Z80 is a third generation single chip CPU which, according to Zilog, has unrivaled computational power and which is very easy to implement into a system because of its single voltage requirement of 5 Vdc. The circuit is implemented using an N-channel, ion implanted, silicon gate MOS process.

The internal register configuration of the Z80 contains 208 bits of Read/Write memory that are accessible to the programmer. The registers include two sets of six general purpose registers that may be used individually as 8-bit registers or as 16-bit register pairs.

Besides microprocessor sophistication, the Cetec 7000 system features human-engineered ease of operation; fail-safe performance; English conversation for editing and programming; and software dedicated to broadcasting. Cetec claims that this system sets all-new standards for radio automation versatility, quality, and expandability.

If you'd like to study detailed data on the Zilog Z80-CPU, circle 161 on the reader service card and we'll pass along your interest. If you want a colorful brochure describing the Cetec 7000 automation system, circle 162 on the reader card.

Next month we'll discuss the 8080 microprocessor and illustrate its use in the Harris automation system. □

continued from page 60

ENG/EFP color camera round-up

ENG/EFP (Electronic News Gathering/Electronic Field Production) has been a rapidly growing field. The proliferation of excellent equipment has made the choice of cameras and accessories increasingly more difficult. This section presents a tabulation of comparative data from ENG/EFP camera manufacturers to help simplify equipment choice. A section to follow will discuss some of the accessories and ENG/EFP lenses available to go with these cameras and still another section presents a brief description of selected cameras and includes address or reply-card numbers through which detailed manufacturer's data may be obtained.

A brief explanation is given here of selected terms, abbreviations, and specifications to clarify certain aspects of camera selection.

Specifications

Unfortunately, camera manufacturers still use many different methods of presenting electronic facts and prices. Although every attempt has been made to present information in a fair and accurate manner, all information must be viewed as approximate. **Broadcast Engineering** assumes no responsibility for specifications and price changes.

Terms and abbreviations

Sensitivity—is listed in lux, rated at f/4, 60% reflectance except as noted. One fc = 10.76 lux.

	Weight (kg)	No. of Tubes	Tube Type	Sensitivity (lux)	S/N	Enhancement	Max. Gain Boost	Horizontal Resolution (Center)	Registration Error	Geometric Distortion	List Price $
Ampex											
BCC-14 (self contained)	7.0	3	2/3 "P	2400	50	H.V	12	both 40% Depth modulation at 400 TV lines (uncorrected)	0.1%	1.5%	34,500
BCC-14 (EFP with remote control)	9.2	3	2/3 "P	2400	50	H.V	12		0.1%	1.5%	40,500
Asaca											
ACC-2000	10 (w/o lens)	3	2/3 "P or S	2000	50	H.V	9	500	0.1%	1.5%	29,600 (w/o lens)
Cinema Products											
MNC-71CP	8.5 (w/o lens)	3	2/3 "P or S	2600	51	H.V	12	500	0.1%	0.5%	32,900
Commercial Electronics Incorporated (CEI)											
310	12.27	3	2/3 "P or S	2100	52	H.V	12	600	0.1%	1.0%	25,375 (w/o tubes & lens)
Bosch Fernseh	8.5 (w/ o lens)	3	2/3"P	2600	50	H.V	9 (12	500	0.1%	0.5%	36,600

	Weight (kg)	No. of Tubes	Tube Type	Sensitivity (lux)	S/N	Enhancement	Max. Gain Boost	Horizontal Resolution (Center)	Registration Error	Geometric Distortion	List Price $
GBC											
CTC-7X	7.95	3	⅔"C	2000	50	H	6	500	0.1%	1.5%	26,000
CTC-5X	3.5	1	1"V	1000 (at f1.9)	40	No	No	240	NA	NA	2,334
Hitachi											
SK-90	8.5 (w/o lens)	3	⅔"S	2700	51	H,V	12	500	0.1%	1.0%	36,675 (w/o lens)
SK-80	8.5 (w/o lens)	3	⅔"S	2000	50	H,V	6	500	0.1%	1.5%	28,728 (w/o lens)
SK-70	14.7	3	⅔"S	2000	50	H,V	6,12	500	0.05%	1.0%	36-45,000
FP-3060	5	1	1"S	2000	46	No	No	270	NA	NA	9,400
GP-5	2.2	1	1"V	400	40	H	No	300	NA	NA	1395
GP-7	5.2	1	1"V	100 f2	40	H	No	250	NA	NA	3,750
FP-1020	7.0	3	⅓"S	200 f1.8	46	1	6	500	0.1%	1.0%	17,115
Ikegami											
HL-51	6 (w/o lens)	3	1"P	3000	55	H,V	12	600	0.1%	1.5%	47,250 (w/o lens & tubes)
HL-52	3.8 (w/o lens & VF)	3	⅔"P	2000	50	H,V	12	500	0.1%	1.5%	46,200 (w/o lens & tubes)
HL-37	3.8 (w/o lens & VF)	3	⅔"P	2000	50	H,V	12	500	0.1%	1.5%	29,925 (w/o lens & tubes)
HL-79A	4.5 (w/o lens)	3	⅓"P	2000	54	H,V	18	-	-	-	-
ITC-240	4.5 (w/o lens & VF)	3	⅓"S	1600	48	NA	NA	550	0.2%	1.0%	NA
IVC											
IVC-7000P	7.3 (w/o CCU)	3	1"P	2000	51	H,V	12	100% depth modulation at 400 TV lines	0.06%	1.5%	47,500 (w/o lens & tubes)
JVC											
CY-8800	7.3	3	⅔"P	3000	49	H,V	12	500	0.1%	NA	16,945
Marconi											
Mark IX P	7.5	3	1"L	1100	46	H,V	12	100% depth modulation at 400 TV lines	0.1%	0.25%	59,000 (manual) 66,500 (automatic)
NEC											
MNC-61A	7.85	3	⅔"P	2600	50	H,V	6	500	0.1%	NA	24,500
Panasonic											
AK-750	7.3 (w/o lens)	3	⅔"P	2000	48	H,V	6	500	0.1%	1.0%	20,000 (w/o lens)
Philips											
LDK-11	6.8	3	⅔"P	1900	48	H,V	12	600	0.1%	1.5%	49,260
LDK-14	5.5 (w/o lens)	3	⅔"P	2600	50		12	600	0.1%	1.5%	37,500
Video 80	9.2	3	⅔"P	1200	49	H,V	6	600	0.15%	1.0%	23,800

Camera roundup

Tube type—is listed as follows: V, Vidicon; P, Plumbicon; C, Chainicon; S, Saticon; T, MF Trinicon; and L, lead oxide. Since many cameras will accept more than one type of tube, the tube listed is that one presented first in the published specification sheets.

Signal-to-noise (S/N)—the ratio of the peak value of the video signal to the value of the noise present. Usually measured in decibels (dB). The higher the number, the less noise in the picture.

Gain boost—an increase in voltage or power, usually expressed in dBs. Gain boost for an ENG/ EFP camera enables the camera to produce a usable picture in lower light levels than is normally possible.

Horizontal resolution—the number of individual elements that can be distinguished in a horizontal scanning line.

Prices—are listed and do not include the full range of options available. Also note that prices are subject to change without notice. □

	Weight (kg)	No. of Tubes	Tube Type	Sensitivity (lux)	S/N	Enhance-ment	Max. Gain Boost	Horizontal Resolution (Center)	Registra-tion Error	Geometric Distortion	List Price $
RCA											
TKP-46, System I	9 (w/o CCU)	3	1"P	1250	48	H,V	9	100% depth modula-tion at 400 TV lines	0.1%	0.5%	52,600
TKP-46, System II	9 (w/o CCU)	3	1"P	1250	48	H,V	9	100% depth modula-tion at 400 TV lines	0.1%	0.5%	47,195
TK-76C	10 (w/o CCU)	3	2/3"S	2500	51	H,V	9	600	0.1%	0.5%	47,500
TK-76B	10	3	2/3"P	2500	51	H,V	9	400	0.1%	0.5%	38,400
Sharp											
XC-530U	4.5 (w/o lens & CCU)	3	2/3"S	2500	46	H	6	400	1.0%	5%	Under 10,000
XC-500U	9.8 (w/o lens)	3	2/3"S	2500	46	H	6	400	1.0%	5%	10,000
XC-320U	4.5 (w/o lens)	3	2/3"V	2500	46	No	6	400	1.0%	5%	5,000
Sony											
BVP-300	5.6 (w/o lens)	3	2/3"P	3300	54	H,V	18	500	0.1%	1.5%	37,000 (w/o lens)
BVP-100	4.7 (w/o lens or backpack)	3	2/3"P	4000	50	H,V	6	500	0.1%	1.5%	28,000
BVP-200	5.6 (w/o lens)	2	1 2/3"S 1-1"T	4000	50	H,V	9	500	NA	NA	18,200
DXC-1610	4.2 (w/o lens)	1	1"T	NA	45	H	6	300	NA	NA	
Thomson-CSF											
Microcam	5.27	3	2/3"P	2100	53	H,V	12	100% depth modula-tion at 300 lines	0.05%	1.5%	30,275 (w/ o tubes & lens)

ENG/EFP color camera catalog

The following section presents a brief description of selected ENG/EFP color cameras along with photos and a reader service number or address through which full camera descriptive literature may be obtained. Although we have reviewed manufacturer's literature in preparing this review, ***Broadcast Engineering*** has not tested this equipment to verify all details. In any event, full details on cameras for ENG/EFP may be obtained by using the reader service card and the number following with each entry in this section (except in cases where the manufacturer wants a direct letter inquiry). In a later section we will take a look at lenses for ENG/EFP cameras.

Ampex Corporation

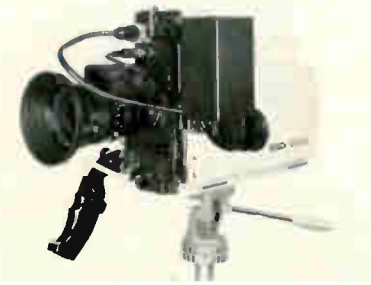
BCC-14—Features include automatic white and black balance, automatic centering, automatic iris, automatic beam control, viewfinder flexibility offering adjustable left or right mounting, intercom and effects microphone and 5-position filter wheel. Options include remote control unit for studio use and 5-inch viewfinder.

Circle (84) on Reply Card

Asaca Corporation

ACC-2000—Features include quick start with pre-heat system, self-contained microphone amplifier, VTR start/stop switch on the grip, low battery voltage indicator, tally lamps, self-contained color bar generator, test signal generator and bias light.

Circle (33) on Reply Card



Bosch Fernseh

KCA-90—Features include warning indicators in 1.5-inch viewfinder, battery belt operation, single cable to VTR, video level indicators in viewfinder, bias light or low light levels, flare compensation, automatic sync timing, automatic white and black balance, linear matrixing and RGB chroma key. Options include automatic or manual iris control, base stations options and remote control.

Circle (85) on Reply Card

Cinema Products Corporation

MNC-71CP—Features include built-in linear matrix, 3-position gain control, built-in filter wheel arrangement, microphone amplifier and automatic white and black balance circuits. Options include AC adapter. Cinema Products Corporation, 2037 Granville Avenue, Los Angeles, CA 90025.

Commercial Electronics Incorporated

CEI-310—Features include 3-inch viewfinder for portable use, 8-inch viewfinder for studio use, carrying case, AC adapter, remote control panel and battery belt and snap-on battery pack.

Circle (86) on Reply Card

GBC

CTC-7X—Features include automatic digital color balance, a viewfinder which is switch selectable for various camera outputs, self-contained color bar generator, and video output level shown in the viewfinder.

Circle (170) on Reply Card

CTC-5X—Features include built-in microphone, VTR start/stop switch, automatic sensitivity control, and 1.5-inch electronic viewfinder. Model number CTC-5X0F is available without electronic viewfinder.

Circle (87) on Reply Card

Hitachi Denshi, Ltd.

SK-90—Features include built-in automatic beam optimizer, automatic white balance, automatic iris control, built-in color filters and neutral density filters, built-in two-line contour enhancer with comb filter, built-in microphone amplifier with AGC, a 1.5-inch electronic viewfinder and LED lamps for tally and battery warning. Options include digital command control, triax or coaxial operation.

SK-80—Features are the same as SK-90. Options include ABO and comb filter.

Circle (88) on Reply Card

SK-70—Features include high efficiency prism optics, modular design permitting field, studio or hand-held operation. Options include digital command and triax and coaxial operation.

Circle (89) on Reply Card

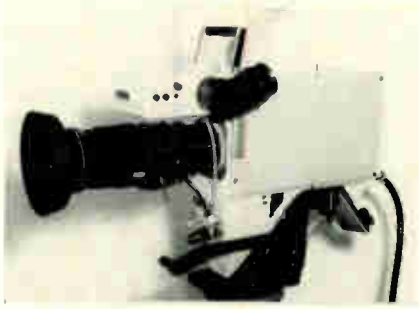
FP-3060—Features include 15-watt power consumption, an aluminum diecast body, built-in color temperature filter, automatic iris control, built-in color bar generator, built-in bias light, white balance indicator and video level indicator. Options include electronic viewfinder and built-in vertical contour enhancer.

Circle (90) on Reply Card

Camera catalog

GP-5—A self contained single tube camera. The camera is equipped with a single wheel color correction control enabling correction from 30-10,000 K. Additional features include built-in condenser microphone and 1.5-inch electronic viewfinder equipped to monitor audio and video.

Circle (91) on Reply Card



Ikegami

HL-51—Features automatic white balance, built-in sync generator, operates off of AC or DC power, built-in microphone amplifier, and remotable iris and pedestal.

Circle (92) on Reply Card

HL-52—Features automatic beam control, automatic iris, automatic white balance, video level indicator in the viewfinder, and genlock.

Circle (93) on Reply Card

HL-37—Features include automatic iris, automatic white balance, automatic black level control with optical black, quick start with pre-heat system, video gain switch, and built-in sync generator.

Circle (94) on Reply Card

IVC

IVC-7000P—Features lag reduction, flare correction, automatic white pulse gain stabilization, switchable RGB/YRB matrixing, white and black level color paint controls, automatic color balance and total remote control. Options include triax connector.

Circle (95) on Reply Card

JVC

CY-8800U—Features built-in color bar generator, built-in automatic white balance, built-in waveform sampler, battery warning circuit, automatic iris circuit, sensitivity doubling, built-in horizontal and vertical contour correction, built-in filters and electronic and manual color temperature correction.

Circle (96) on Reply Card

Marconi Electronics

Mark IX—Features 1-inch, 3-inch or 7-inch viewfinders, wide range of lenses, remote control panel, 19-inch rack mounted camera control unit, full talkback facilities and program microphone circuit. Options include triax converter and battery operation.

Circle (97) on Reply Card

NEC

MNC-61A—Features include switchable gain boost, automatic white and black balance circuits.

Circle (98) on Reply Card

Panasonic

AK-750—Features include built-in color bar generator, color temperature conversion filter and color temperature /neutral density filter, built-in electronic circuitry with three-position switch for color temperature conversion, vertical aperature correction and detachable 1.4-inch viewfinder. Options include 2H-type vertical enhancer and blue chroma key unit plugs.

Circle (99) on Reply Card

Philips Broadcast Equipment Corporation

LDK-11—Features include built-in sync generator with genlock capability, two commentator microphone channels, VTR remote control, built-in VTR playback monitoring capability, automatic white balance, automatic iris, bias light, remote controlled portable capability, tripod mounting facilities for field or studio use. Options include battery or AC operation.

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LDK-14—Features include 12-volt low power consumption and 6-watt stand-by, colorimetry, fully automatic operation with switchable black stretch and contrast expansion, 6 and 12 dB gain switch with noise reduction, five position filter wheel and built-in sync lock suitable for all system standards. Options include remote control facilities, full bandwidth chroma key and triax facilities.

Circle (101) on Reply Card

Video-80—Features include manual or automatic iris control, 4½-inch slide-on studio camera viewfinder, 4½-inch slide-on reflex viewfinder, built-in color bar generator, stand-by mode and genlocks to a variety of color and monochrome signals. Options include triple camera remote control unit, and adaptors from studio camera to two-piece hand-held version and vice versa.

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RCA

TKP-46—Features include scene contrast compression, built-in program microphone input at camera head, small diameter lightweight camera cable, shock-mounted optical system, wide range of lens options, choice of mounting equipment, automatic iris control, automatic white and black balance and automatic pulse advance.

Circle (103) on Reply Card

TK-760—Features include automatic white balance control, automatic iris control, automatic flare control, automatic cable equalizing and timing, built-in contour enhancer, switch-selectable gain boost of 9 dB and 5-inch diagonal viewfinder. Options include RGB chroma key.

Circle (104) on Reply Card

TK-76B—Features included in this self-contained unit are automatic white balance, prism optics and bias lighting, adjustable viewfinder, built-in filter wheel, viewfinder cable connection and extra video gain of 9 dB.

Circle (105) on Reply Card

Sharp Electronics Corporation

XC-500U—Features include tiltable 4-inch viewfinder, incident light level indicator, built-in color bar generator, connector board system and "C" lens mount. Options include 1.5-inch viewfinder, hand grip, shoulder mount, electret condenser microphone, manual zoom lens, and 19-inch rackmount junction box.

Circle (106) on Reply Card

XC-320U—Features include moulded housing block which contains the lens, beamsplitter, coil assemblies and tubes. It comes with a manual zoom lens, AC power adapter, DC power cord, 1.5-inch viewfinder, handgrip with VTR start/stop switch, microphone, shoulder pad, "C" lens mount and incident light level indicated on the viewfinder screen. Options include AC power adapter and 12-voit DC battery pack.

Circle (107) on Reply Card

XC-53OU—Features include moulded housing block which contains lens, beamsplitter, coil assemblies and saticon tubes. It comes with external sync and genlock capabilities, manual zoom lens, AC power adapter, DC power cord, 1.5-inch viewfinder, handgrip with VTR start/stop switch, microphone, shoulder pad, "C" lens mount and incident light level indicated on the viewfinder screen. Options include AC power adapter and 12-volt DC battery pack.

Circle (108) on Reply Card

Sony

BVP-100—Features include switchable +6 dB gain boost, horizontal and vertical enhancement, 1.5-inch viewfinder and a resolution of more than 500 lines at center.

Circle (109) on Reply Card

BVP-300—Features include automatic beam optimizer, automatic lens iris circuit for lenses with iris servo, automatic digital white and black balance with automatic lens closing, 2-line image enhancement, built-in masking circuitry, gen-lock, split-field color bar generator, test signal generator, IQ encoder, flare compensation, bias light shading compensations and microphone attachment.

Circle (110) on Reply Card

BVP-200—Features include digital automatic white balance, built-in color bar generator, color temperature converter filters, and ND filter, warning indicators and 9 dB gain booster switch.

Circle (111) on Reply Card

DXC-1610—Features include electrostatic deflection and magnetic focus, zoom lens, built-in color temperature filter, white balance control, built-in electret condenser microphone, four-way power supply and video outputs. Options include external sync facility and remote recorder control.

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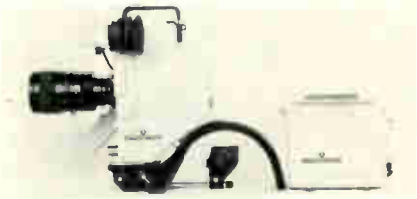

Thomson-CSF Laboratories

Microcam—Features include power consumption of 24 watts, pistol-grip control of zoom lens rocker switch and VTR switches for start and monetary viewfinder monitoring, automatic master black level with on/off switch, hinge mounted viewfinder with magnifier, and complete signal processing circuits on four micro-circuit boards.

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ENG/EFP Lenses and Accessories

As shown in the previous sections, there are numerous sources of ENG/EFP cameras from which prospective buyers may choose in terms of features, performance and price. However, there are fewer sources of lenses to go with these cameras. In this section we will cover these sources from the manufacturers point of view, but keep in mind that the camera manufacturers may have designed their products for optimum performance with specific lenses.

Standardized systems

From the standpoint of the end user of ENG/EFP cameras it would be desirable to have a universal lens/camera system such that any lens of special performance and specs would work with any camera available on the shelf. That ideal situation will probably never occur because it would require a level of industry standardization that will quite likely never be achieved. There are reasons for this status in the industry that are founded on both technology and economics.

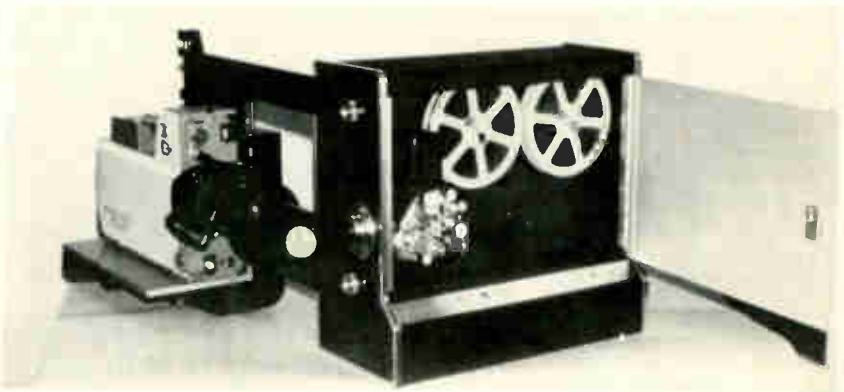
First, cameras may be designed to perform at their best quality when used with a specific lens or set of lenses. Other lenses may work as well, or nearly as well, provided adaptors are used in the mounting; however, there is always the need to fully research the exact combinations of lenses and cameras with manufacturers to be assured of the level of performance to expect in a mix-and-match operation.

Second, manufacturers appear to be quite content to continue their present design-and-supply procedures without undertaking extensive standardization efforts that do not appear warranted. From their viewpoint of the economics of the industry (plus the age-old law of supply and demand), such efforts in lens/camera standardization may not be warranted. However, in discussing this topic with both camera and lens manufacturers at the SMPTE convention in New York on October 29-November 3, they appeared willing, though reluctant in some cases, to comply with standardization if someone else did all the groundwork for the industry as a whole.

At SMPTE we discussed standardization, lenses, accessories and special systems for ENG/EFP with a

The Steadicam by Cinema Products was demonstrated with wild exuberance around their booth at the SMPTE convention in New York. Shown here with an RCA TK-76 ENG camera, the Steadicam is a unique and revolutionary camera stabilizing system designed to damp out camera vibrations and motion effects for a steady picture.

Film-to-tape transfer system



An interesting support system for ENG was also displayed in the Cinema Products booth at SMPTE. As shown here, their KM-16 system is a 16 mm film-to-tape transfer system that allows field users of film cameras to convert from film to tape with an ENG camera and transmit back to a studio or base facility over a transmission network.

number of prime sources. In this section we will present a few of the many lenses available for these cameras plus other notes regarding special systems and accessories. Data on these items may be obtained by contacting the manufacturers directly or by using our reader service card. However, keep in mind that camera manufacturers may suggest specific lenses for their cameras and that such data may be obtained through previous sections of this issue of **BE**.

Lens sources

The industry sources for ENG/EFP lenses are (alphabetically): Angenieux, Canon, Fujinon, Rank, and Schneider. While the first three appear to have the most extensive line of lenses, the final two also share the market in selected areas.

A comprehensive ENG/EFP lens roundup would logically include an extensive tabulation of lenses, specs, performance and special features. However, that has not been possible because of the complexity of the tabulation, the lack of standardization in data presentation, and technical aspects of matching lens and cameras for best performance. Until these factors can be sifted, sorted and put into proper perspective we felt it best to avoid tabulation that would only serve to add to the confusion. Instead we will present details of some of the latest lenses, notes on sources, and supply a reference number through which detailed literature may be obtained from the manufacturers.

Angenieux

The new 25x10 lens by Angenieux is specially designed for ⅔-inch cameras. It features continuous zoom range up to 25:1 (10-250 mm); wide horizontal angle of view of 46° and

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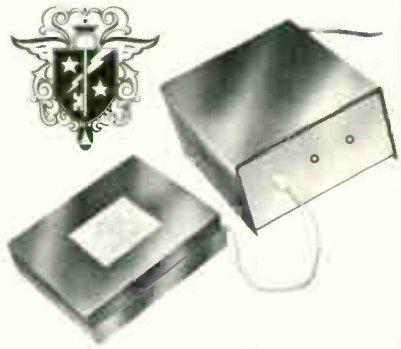

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Lenses

narrow angle of 2°; f/1.4, F=10-60 mm and f/2.8, F=250 mm; servo zoom and iris, manual focus; back focus adjustment; minimum object distance of 0.90m (3 feet) with closeup lens yielding 0.60m (2 feet); weight with servos: 5 kg (11 lbs.). To obtain details on this lens plus other Angenieux lenses, circle the number below on our reader service card.

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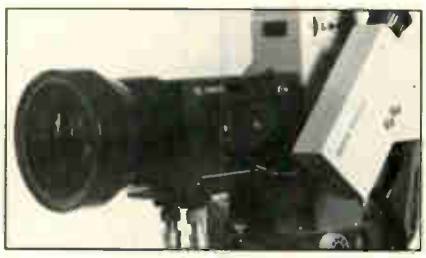

Canon

The Canon broadcast TV zoom lens model J13-x9B is a 13x system lens specially designed for ENG/EFP cameras with ⅔-inch image tubes. It provides high quality and compactness and is the basis for a wide lens system when used with optional accessories. Small and lightweight, it features: practical focal length from 9-118 mm; short minimum object distance of 0.8m; high zoom ration, 13X; excellent maximum relative aperture of 1:1.6; weight: 1.7 kg; macro shooting possible to 11mm; and diverse accessories for full lens systems. For data:

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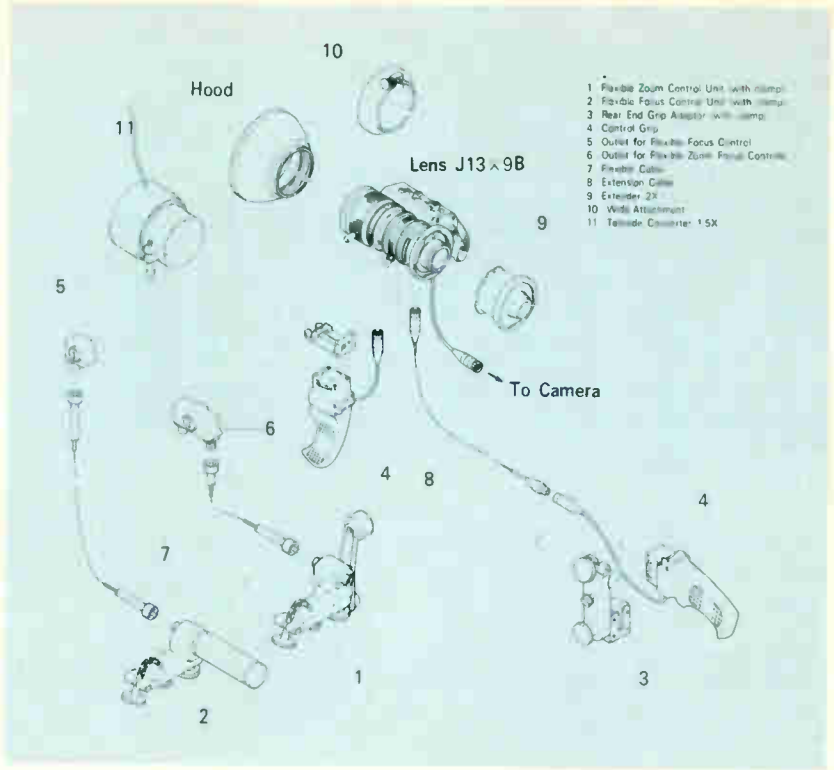
Fujinon

The Fujinon literature lists seven ENG/EFP lenses for prism-type cameras and three for relay-type cameras plus many optical and mechanical options: all are for the ⅔-inch format. The lens shown here is their A14x10 which features high zoom ratio of 14X; built-in 2X range extender; focal length from 10-140 mm; 20-280 mm; minimum object distance of 0.8m; macro focus to 5cm; and weight of 1.6 kg.



Lens manufacturers and ENG/EFP camera suppliers make available a wide variety of accessories to make the end user's job simple and flexible. Shown here is such an assortment as available from one lens source: Canon. It is shown as representative for the industry in terms of available accessories: zoom and focus controls; selectable grips; outlets for flexible focus and zoom controls; lens extenders and hood; and magnification converters. The exact accessories selected might well depend on whether the camera is being used in a hand-held or mounted fashion.

Fujinon will be introducing a new lens into the marketplace about March which is a 12:1, f/1.9 lens having a focal length of 14-168mm and built-in 2X extender for a 1-inch format.

For full details on the Fujinon line:

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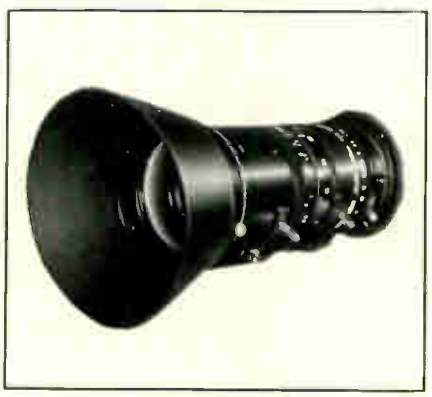

Rank

The Rank Taylor Hobson Varotal MRL (Multi-Role Lens), though reported too heavy for ENG work, is eminently suitable for EFP where a tripod may be used. It comes in a standard and portable types. Both comprise a compact lens body with controls and choice of three interchangeable lens fronts. A novel precision location arrangement and release gives instantaneous lens interchange which requires no re-registrtion or adjustment of the camera. The interchangeable lens fronts comprise wide, narrow and economy to give a range of 1° to 52° field of view. For details:

Circle (116) on Reply Card

Schneider

NBC has been using 19 RCA TK-76 and TK-760 cameras for network sports programs equipped with Schneider 30X lenses. News programs have used the TK-76 and TKP-45/46 cameras, and similar usage has been made by TV production companies and government installations.

Schneider has a complete family of lenses, including 10X, 20X, 15X, and 30X lenses to provide a wide range of flexibility. Reportedly, these will soon be adapted to other ⅔" cameras.

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station-to-station

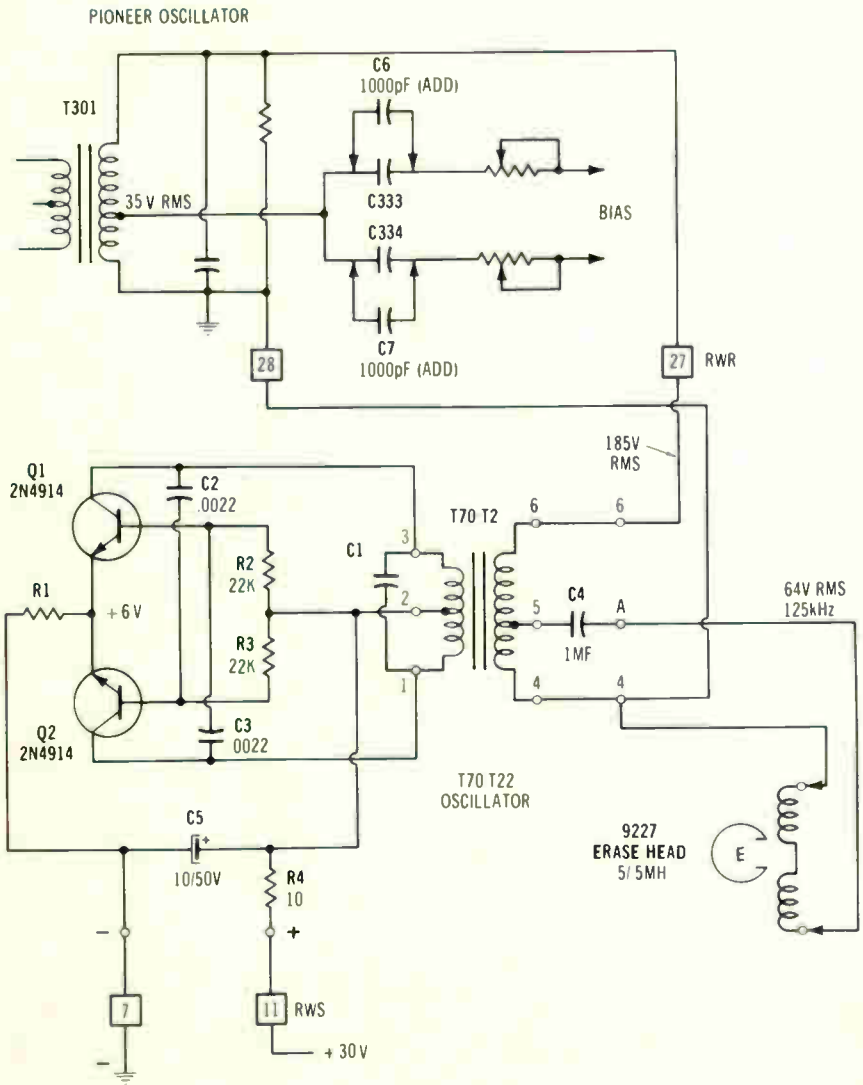
Converting the Pioneer RT-701

By Joseph F. Dundovic, Nortronics Company, Minneapolis, MN

Old timers in broadcasting sometimes wax nostalgic about the old Magnecord PT-6 tape recorder of the early 1950s. Readily recognized because of its unique transport design, the PT-6 required only seven inches of rack space for the tape transport. Thousands of these recorders are probably still in use, although they haven't been built for over ten years.

Pioneer's new recorder, the RT-701, looks like the PT-6, rack mounts in nine inches, and includes all of the electronics in the same package. Priced below $450, it has a three motor drive with a pitch controlled synchronous capstan motor. Unfortunately, the machine is available only in quarter-track stereo, which is not particularly useful in the broadcasting station.

Conversion of the RT-701 to full-track or 2-track stereo can be readily accomplished by replacing the three quarter-track heads with



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a set of appropriate professional heads. The original bias oscillator does not have sufficient power to adequately drive the new erase head, and must be assisted with a booster erase oscillator built up on a PC board and installed inside the cabinet. Bias to the record head continues to be supplied by the original oscillator.

The original heads are first removed and replaced with Nortronics models chosen from the table below. The shield cup for the record head is discarded as it is too small for the new head. The record and play heads each require a QK-102 mounting bracket and are mounted on the original head plates. The erase head is installed with the aid of a QK-94 bracket. Full, detailed conversion instructions are furnished with the QK-94. Final head assembly is illustrated in Figure 1.

The erase oscillator circuit may be built up around the T70-T2 bias oscillator transformer. Figure 2 shows the new oscillator diagram and how it is connected to the original oscillator for synchronization and to the erase head and DC power. (The oscillator is also available as a fully assembled item, model T70-T22.) The oscillator circuit board is then bolted to the metal brackets behind the RWS board. Connections are made as indicated to DC power terminals on RWS, to the bias oscillator terminals on RWR and to the new erase head.

Parts list

Heads	2-Tr.	F.T.	Mount
Erase	9227	9125	QK-94
Record	9203	9103	QK-102
Play	9213	9119	QK-102

T70-T22 Oscillator

T1 T70-T2	C5	10 mF/50 V
Q1,2 2N4914	C6,7	1000 pF
C1 8200 pF mica	R1	47/2 W
C2, 3 0.0022/ 100 V	R2,3	22K/½ W
C4 0.1/100 V	R4	10/½ W

To increase bias current to the record head, C6 and C7 are tacked across the bias caps, C332 and C333, on the back of board RWR. Bias, record level, azimuth and equalization are adjusted as described in the service manual. (Be sure to request manuals ART-231 and ART-254 as they are very important for the conversion and maintenance of the recorder.)

A line amplifier should be added, as the RT-701 has only an unbalanced 5,000 ohm "line output" delivering 450 mV rms at O-VU meter reading. Circuit board add-on line amplifiers with balanced 600 ohm transformer outputs are available from manufacturers such as Automated Processes (model 325). They deliver line levels of plus 4 dBm up to 20 dBm and can be operated from the 30 V DC supply in the recorder.

We wish to thank Carl Zimmerschied, chief engineer of KSIS Radio in Sedalia, MO, for his valuable assistance in converting, testing and placing into operation the first machine. Also, helpful cooperation has been extended by John Brozda of U.S. Pioneer Corporation. □

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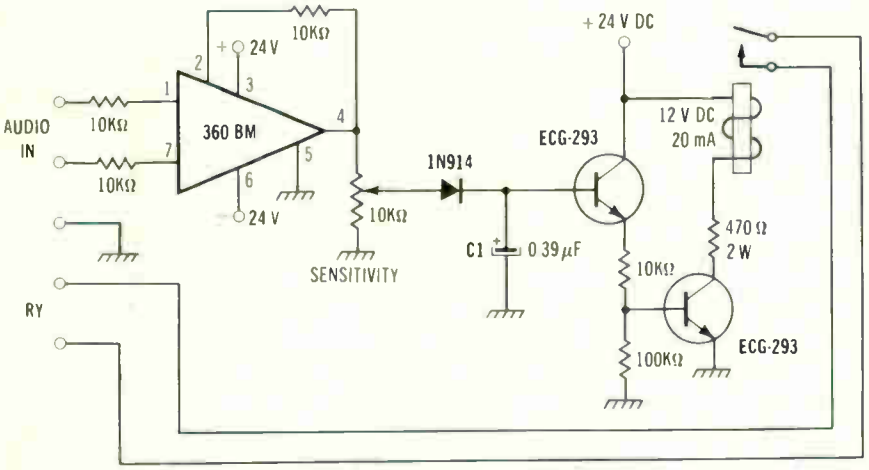
Two-way light indicates radio in use

By John Shepler, chief engineer, WROK/WZOK, Rockford, IL

Many stations use two-way radio equipment for news actualities and remote broadcasts. Unless the control board operator is listening on the channel, there is often no way of knowing when someone is trying to call in on a mobile unit.

At WROK, we have a tally-board that lights to indicate that the 2-way system is in use. Since no relay



NOTE: AUDIO IS PICKED UP FROM TWO WAY LINE AT TRANSCEIVER. CIRCUIT WORKS LIKE A VOICE OPERATED SWITCH. AUDIO AT -20 dBm OR BETTER ACTIVATES RELAY. TIME OUT IS 3 TO 5 SEC. AFTER END OF AUDIO.

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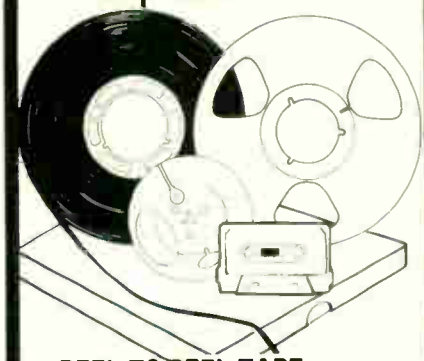

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contacts were provided by the manufacturer to operate the light, I devised the following circuit. It is connected to the control/audio line that goes from the 2-way head to the transceiver located near the antenna. Any audio that is on the line (either transmit or receive) is amplified by the op-amp and then converted to DC to trigger a relay that lights the lamp in the tally-board.

The circuit is sensitive to about -20 dBm and adjustable for various line levels. To prevent flickering of the lamp, the filter capacitors keep the relay energized for a few seconds after the audio ceases. The circuit is suitable for any 2-way unit that has a separate transceiver and control head, even if the transceiver section is some distance away and connected by telephone line. The high input impedance of the amplifier will not affect levels or any DC control voltages present on the line.

The parts used are fairly standard except for the op-amp which is made by Op-Amp Labs and is a microphone preamp module. Other similar units should be suitable. The transistors are general purpose replacement types. Power requirements are ± 24 VDC at 25 m_a or so depending on the relay used.

The capacitor—C_1 is used for the time-out delay. When the audio stops, the relay will hold in for a few seconds longer. This keeps the light from flashing with slight pauses in the transmissions. In this circuit the 0.39 UF capacitor provides a fast response time; for slower responses, use a 1 μF capacitor.

Mono/stereo alarm

By Koh Hock Seng, Radio-Television Singapore, Republic of Singapore

FM transmissions are broadcast either in stereo or mono using the same transmitter according to the program schedules. The stereo encoder at the transmitter station of Radio-Television Singapore is remotely controlled from the studio center via a pair of landlines.

The alarm circuit shown in the sketch enables the technical staff at the control room to keep track of each mode of operation and to detect operational errors or technical faults in the landlines or in the stereo encoder at the earliest opportunity.

From the sketch, it can be seen that:

- When switch S1 is off during a mono broadcast, the landline is not energized to operate the encoder and an alarm will be actuated via relay contacts A3, B3 and C2. The alarm is then switched off by depressing the cut-off key S2 when relay C is operative. The diodes D1 and D2 will prevent the DC voltage from affecting the encoder circuit.
- The encoder will only be operative when switch S1 is depressed for stereo broadcasts. The alarm will be actuated via relay contact B2 and the relay D incorporated in the stereo receiver. Depressing S2

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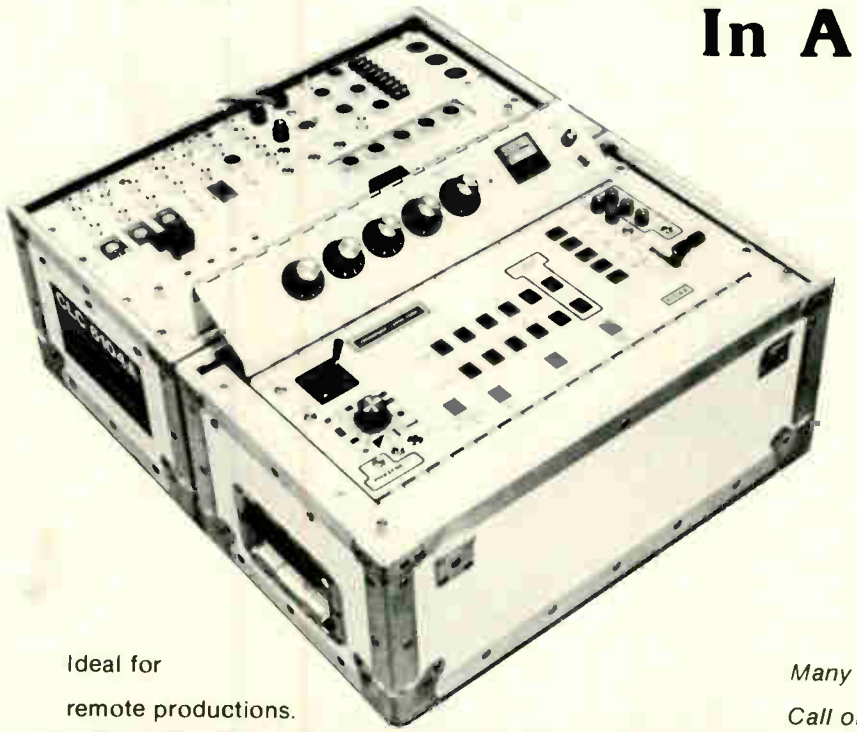

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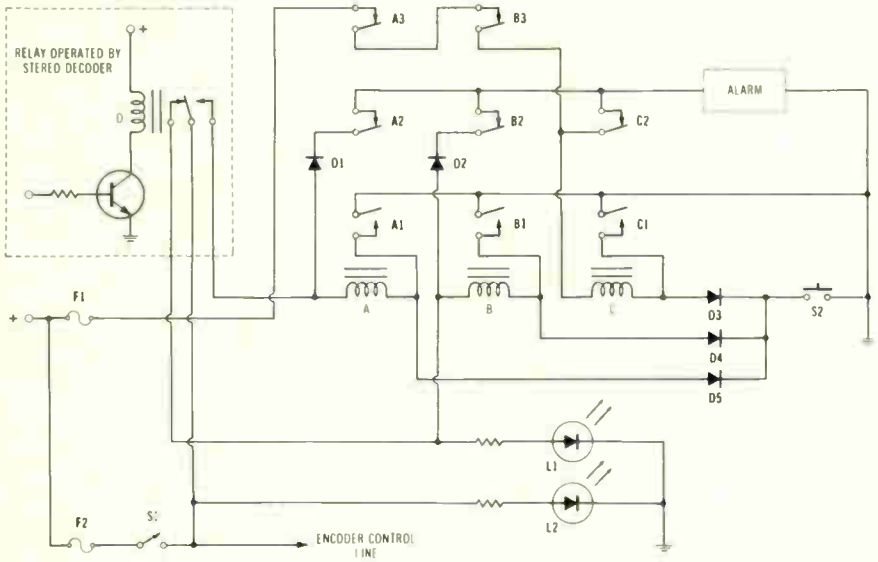
again, switches the alarm off. Both lamps L1 and L2 will light under normal operating conditions during a stereo broadcast.

• The alarm will be triggered during a stereo broadcast when:

1. The encoder/decoder circuit is faulty or if there is a fault on the encoder line. Only lamp L2 will remain lit.
2. Switch S1 is accidentally switched off. Both lamps will turn off. □



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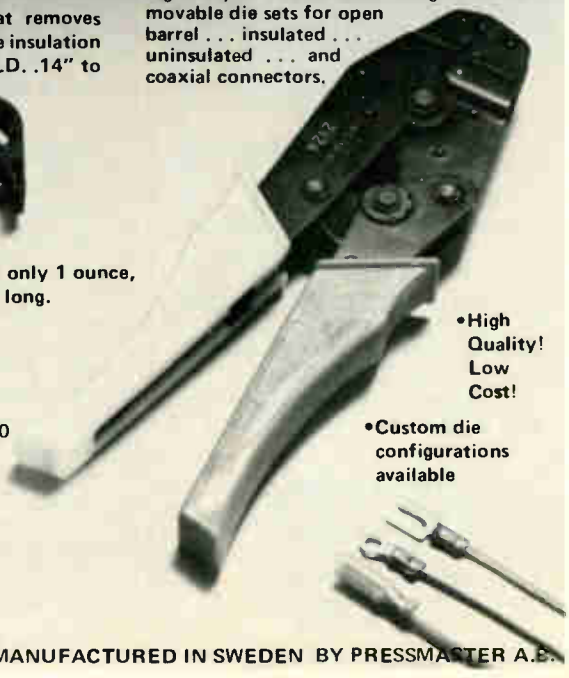

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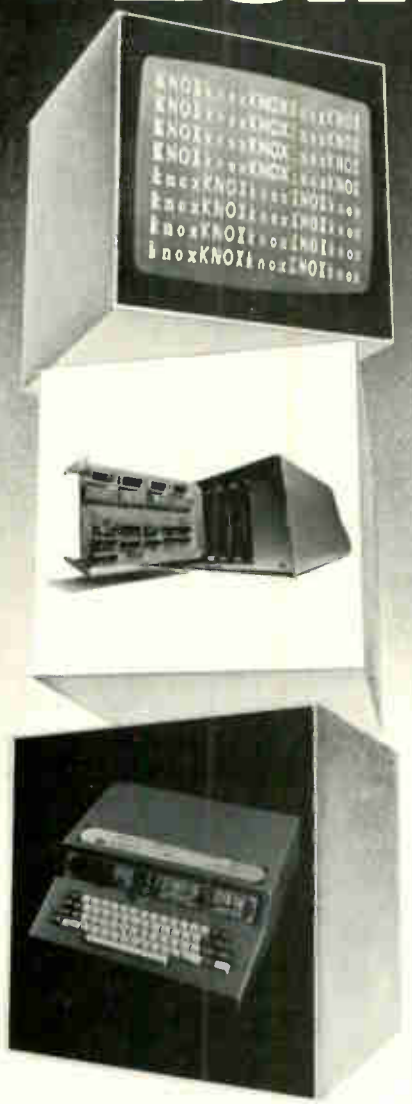

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association news

AMERICAN SOCIETY OF
TELEVISION CAMERAMEN, INC.

P.O. Box 296, Sparkill, NY 10976

(**Editor's note:** The material for this issue of **BE** was sent by Arnold Posner, a member working at Audio Video Corporation, Albany, NY. AVC is a production house for industry, education, ad agencies and broadcasters.)

Take 1—

With winter and freezing temperatures decending upon those of us on ENG and field crews we again begin to play *beat the battery*. Temperatures approaching freezing will cut battery time about in half. Battery belts worn inside coats are one option to help preserve precious battery time.

Another suggestion we recently heard seems worth passing on. It involves the use of pocket warmers normally made for use by hunters and campers. Sold in most sporting goods stores, these operate like giant cigarette lighters and are placed in coat pockets to keep hands warm. These warmers burn for hours at a time and when placed inside a styrofoam container with fully charged batteries they do an excellent job of maintaining a full charge until you're ready to replace a dead battery in the field. Styrofoam containers normally sold to carry six packs of beer work very well, especially with batteries designed for the Sony 3800 or BVU machines. Using other size containers of custom constructing your own container to battery size also works well.

Take 2—

Some of the best features of the big equipment exhibitions that pass through every few months are the very useful complimentary production aids given by manufacturers. If you take one of everything offered, you're bound to end up with at least one freebie data sheet or pocket calculator card which is just what you've been looking for. One such item is a pocket range calculator put out by Canon Lenses. This handy tool allows you to predict what the area of your shooting frame will be based on the focal length of the lense you're using and the distance you are from your object.

This tool can be used in a number of different ways in pre-planning the choice of a lens, determining the minimum and maximum distances you can place your camera in order to frame a specific size area. The readout is graduated to include a 10% allowance for the overscanning of the monitor. It's also calibrated for ⅔-inch or 1-inch camera tubes. This is definitely a tool designed specifically for TV use and of course it can be used with lenses made by manufacturers other than Canon. (**Editor's note:** ASTVC members will be receiving lens cards, courtesy of Achro-Video, Ltd., in the next mailing.)

Take 3—

With the use of film and TV crossing paths occasionally, the TV camera operator finds himself faced with some new terminology from the film industry. A TV cameraman using a lens normally used on a film camera may find it calibrated in T/stops as well as F/stops. What is a T/stop?

While F/stop by definition is the ratio of the focal length to the aperature, this ratio does not necessarily take into account light losses caused by reflection of air to glass surfaces. These light losses become especially significant in zoom lenses which have many air to glass surfaces.

Motion picture lenses are often calibrated in T/stops (for transmission) which indicate the transmission of light actually passing through the lens and reaching the focal plane. Thus the T/stop is actually the *effective* F/stop. T/stops are defined as the same number F/stop of a lens of 100% transmission. All lenses absorb some light, so T/stops will always be higher than F/stops. It should be pointed out that depth-of-field calculations always are based on F/stops, not T/stops. □

SOCIETY OF
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(317) 842-0836

CHAPTER REPORTS

Chapter 9—Phoenix, AZ
The Chairman's Report on the recent Chapter Chairmen's meeting in Kansas City was included in the November 27 meeting. Conducted in the KAET-TV studios on the ASU campus, a demonstration of Telemet's model 4210 fiber optics video transmission system was presented by Paul Welcome of Telemet.

Chapter 16—Seattle, WA
Members gathered November 9 for a program presented by several members on the highlights of the recent NAB in San Francisco and the SMPTE meeting in New York.

Chapter 18—Philadelphia, PA
The November 21 meeting included a report by Irv Ross, CE of WPVI-TV, on the latest equipment demonstrated at SMPTE in New York and a discussion on the problems arising from the FCC rulings on the TV blanking interval plus the blanking problems.

Chapter 20—Pittsburgh, PA
The program for the November 16 meeting was presented by Norman Cleary, Audio Inovators, and Steve Zelenko on the "Nuts and Bolts of Location and Studio Processing," and how it can help and hurt.

Chapter 21—Spokane, WA
The weekly luncheon meetings in November included general discussions on many radio and television subjects from portable storage batteries to blanking adjustments.

Chapter 22—Central New York
The Computer Shop of Syracuse presented a demonstration of mini computer hardware and software at the October 19 meeting.

Chapter 25—Indianapolis, IN
The November 14 program, entitled "Logic Analysis in Broadcasting," was presented by Steven Brant, midwest field engineer for the communications division of Tektronix, and included a "hands on" demonstration of the model 7D01 logic analyzer and DF 2 display formater by Tektronix.

Chapter 37—Washington, DC
The November 15 meeting concentrated on SBE business with the prime goal being to get the chapter running as a viable professional society again.

Chapter 39—Tampa, FL
The highlight of the November 13 program was a tour of the GTE earth station in Homassa.

Chapter 40—San Francisco, CA
The November 15 meeting featured a demonstration of two pieces of test equipment for TV from Marconi including a television interval timer that measures horizontal and vertical blanking with a hard copy output option plus a VITS analyzer that continuously monitors off air VITS and provides a readout of all relevant transmission parameters.

Chapter 41—Central Pennsylvania
The November 16 program by Ted Bennett, the mid-atlantic states representative for Vega Wireless Microphones and William Sien, eastern representative, discussed and demonstrated the broadcast wireless microphone.

Chapter 43—Sacramento, CA
Paul Welcome of Telemet presented the technical program for the November 28 meeting which included a working demonstration of an optical fiber transmission system.

Chapter 45—Charlotte, NC
The November 13 program presented by Fred Huffman, manager, radio sales development of RCA, included a slide presentation on FM antennas and featured a lengthy question and answer period.

Chapter 46—Baltimore, MD
The November 16 meeting included a program presented by Floyd Daisey, chief engineer of WFBR/

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SBE news

WKBZ AM-FM, on AM stereo and the various systems presently being tested in the field.

Chapter 47—Los Angeles, CA
Joe DeAngelo, Harris Corporation, presented a comparison of the 5 AM stereo systems at the November 21 meeting.

Chapter 48—Denver, CO
Joe Kemplet, Capitol Magnetics Engineering Department, was the speaker at the November 9 meeting. He discussed cartridge design and the factors of cartridge machine design and maintenance that make possible master quality stereo cartridge performance.

Chapter 49—Central Illinois
The November 27 program was presented by Bill Lyon and Jim King of Tektronix on audio and RF spectrum analyzers.

Chapter 50—Fort Collins, CO
The November 6 program was presented by Jim French, chapter chairman. Entitled "Synchronizing Signals and the H Phase and Burst Phase" specifications put forth by the FCC were demonstrated.

Chapter 52—Central Ohio
The November 30 meeting was held in Dayton with Chapter 33, Southwestern Ohio. Joe DeAngelo of the Harris Corporation gave a demonstration and led a discussion on the various AM stereo systems presently being evaluated by the FCC.

Chapter 53—South Florida
The November 28 meeting was held jointly with SMPTE and the AES. Greg Silsby, sales manager of the Electro-Voice microphone division, gave an informative and interesting presentation on microphone uses.

Chapter 54—Tidewater, VA
The November 11 program was presented by Joe DeAngelo of Harris Corporation on the proposed AM stereo systems and an explanation of Harris' system.

Chapter 55—St. Louis, MO
The October 26 program was presented by Howard McClure, Bruce Blair and Dick Lawrence of Lenco and included a demonstration of the Lenco line of waveform monitors and measurement equipment. □

new literature

CP/TV antennas

Cetec—This colorful, 6-page brochure fully describes the Cetec Jampro circularly polarized TV transmission antennas. The cover illustrates the CP antenna that serves Boston for Channel 68, and the brochure provides the background on the development of CP television transmission, discusses its advantages and limitations, and describes CETEC Jampro's design and manufacturing capabilities in this exciting new field.

Circle (118) on Reply Card

Product summary

Telectro—A 3-page brochure contains information on the company and its products. Such information includes Telectro's assembly, testing, design and engineering, plus a list of products such as tape transports, commercial audio equipments, electronics test equipment and telemetering equipment.

Circle (119) on Reply Card

Wire/cable catalog

Belden—More than 1300 electronic wire and cable constructions are listed in the 1978 catalog. The 180-page Publication 878 documents standard product lines in seven individually indexed categories.

Circle (120) on Reply Card

Video products pamphlet

Sony—A 40-page foldout covers the company's complete range of video products for business, government and other institutional users. Besides highlighting the major product lines (Betamax cassette decks, Trinitron receivers, ¾-inch cassette decks and Trinicon cameras), the pamphlet also discusses reel units, and monochrome cameras.

Circle (121) on Reply Card

Resistive pads guide

Electric Sound of Minnesota—An audio reference guide discusses resistive pads. The booklet includes charts of various types of pads as well as a brief explanation on each.

Circle (122) on Reply Card

Circuits catalog

Cherry Semiconductor—The 36-page catalog includes differential amplifiers, level detectors, dc to dc converters, timing circuits, motor speed controls, optical detector systems, camera control systems, flip chips, and a brief description on custom capabilities. This full-color catalog features diagrams, photographs and specifications plus application information.

Circle (123) on Reply Card

Industrial catalog

Continental Specialties—A catalog of electronic prototyping, troubleshooting and measurement products aimed specifically at the professional and industrial user is now available. It includes solderless breadboard products; Experimentor modular solderless breadboards; QT (Quick Test) solderless breadboard elements; Proto-Board solderless breadboard arrays, some including regulated power supplies; Proto-Clip IC

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P-34-1	P-34-2	P-34	**Pink Noise**—20-20000Hz, ∞/50μsec. For stereo phase check, and frequency alignment when used with a ⅓ octave analyzer.	35.00
F-34-1	F-34-2	F-34	**Sweep**—700 to 15000 Hz, 100 ms log sweep repeated for 4 minutes with a dead section between sweeps to facilitate scope synchronization—Useful for fast response checks	35.00
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____	____	35	**Flutter & Speed**—1½ min. 3150 Hz, tape accuracy —.03% RMS Flutter—0.1% Speed at 74°F.	25.00
____	____	36	**Flutter & Speed**—1½ min. 3000 Hz, tape accuracy .03% RMS Flutter—0.1% Speed at 74°F.	25.00
____	____	Q-34	**Q Track Test**—Upper and lower limit frequencies, upper and lower limit levels, long and short duration, on and off at zero crossings. Voice announced.	35.00

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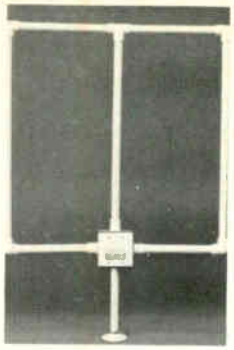

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New literature

Test Clips, both with and without connected ribbon cable; The Logical Force family of digital troubleshooting equipment and more.

Circle (124) on Reply Card

Engineering handbook

RCL Electronics—An engineering handbook, covering the complete line of precision and power wire-wound resistors, is now available. Included in this handbook is a cross reference chart, including MIL-style numbers, max and mil resistance, MIL tolerance ranges, MIL temperature coefficients and MIL wattage requirements. Also included is an engineering section on special products, ranging from temperature sensors, automotive temperature sensors and solar control sensors, to high temperature resistance probes and bridge reference junctions.

Circle (125) on Reply Card

Cable brochure

Brand-Rex—A brochure of the various configurations in signal transmission cables examine twisted pairs, three types of coaxial cable, twin-and-tri-lead, flat flexible transmission Tape Cable and fiber optics. Charts range from a comparison of signal transmission cables to coaxial cable characteristics.

Circle (126) on Reply Card

FET probes operation

Tektronix—An application note, *FET Probes: The Next Step in Quality Signal Measurements* (AX-3580) by Ron Lang, answers questions from oscilloscope users. Also presented are graphs, schematic diagrams and simple equations dealing with probe response to various types of signals and signal sources.

Circle (127) on Reply Card

Data acquisition

Datel—A 16-page brochure describes an analog data system. System 256 will accept up to 256 single-ended or 128 differential analog signals plus 64 simultaneous sample and hold channels in the basic package. A wide range of the options are detailed permitting interface with such mini-computers as the PDP-11 and NOVA/Eclipse series.

Circle (128) on Reply Card

Breadboarding catalog

Vector Electronics—A short form catalog describes the range of breadboard, prototype and production hardware. Particular emphasis is given to Vector's line of microprocessor boards, plugboards and pre-punched boards. A total of 120 are listed. Other sections cover terminals, cases, kits and tools.

Circle (129) on Reply Card

Computer components brochure

National Semiconductor—A 24-page brochure on its range of components if available. The glossy-page booklet is a guide to more than 100 components including microprocessors, memories, CRT controllers, LED displays, floppy disk interfaces, serial and parallel interfaces, sould synthesizers, analog interfaces and printer interfaces.

Circle (130) on Reply Card

Coaxial cable guide

Belden—Selection and use of broad line of CATV

coaxial cables, including flooded, dual and messengered constructions are covered in this illustrated guide. Cataloged are some 60 styles of 59/U-type and 6/U-type drop cable plus converter and accessory cable. A number of alternative shielding methods are described that enable matching the cable to its operating environment.

Circle (131) on Reply Card

Condensed catalog

Dynascan—The entire line of B&K-Precision test instruments has been condensed into a compact catalog, suitable for inclusion in a 6¾ size envelope. The BK-9 catalog is illustrated and describes specifications, features and applications of oscilloscopes, semi-conductor testers, multimeters, frequency counters as well as specialized test instruments for CB, radio and TV maintenance and repair.

Circle (132) on Reply Card

Interface bulletin

Rockland Systems—A 4-page bulletin on a series of bus interfaces provide complete compatibility between three families of Rockland instruments and any system based on the IEEE Std. 488 (1975) instrumentation bus. The bulletin devotes a page to bus compatibility data transfer, program sources (most programmable calculators, mini- and micro-computers and ATE systems based on the IEEE Std. 488 bus), rear panel controls, command coding and other specifications. The final page gives details for programming each of the three models.

Circle (133) on Reply Card

Transistor catalog

Amperex Electronic Corporation—A RF power transistor catalog outlines the broad spectrum of RF power transistors and RF modules that are available from the Hicksville Division of Amperex. The catalog divides the transistors into two categories. The first category is for those transistors used at collector voltages of 12.5 to 13.6 V. The second is for those used at collector voltage of 28 V. These devises are designed for military and base station applications where low current power supplies are used.

Circle (134) on Reply Card

Portable equipment guide

Motorola—Major portable communications systems are described in a guide brochure. Included are Motorola's MX 300 Series Handie-Talkie radios; the MT 500 and HT 220 Handie-Talkie radios. Also included are specialized portable communications systems such as Motorola's Vehicular Repeater Systems, for increased area coverage and Coronary Observation radios. The brochure also outlines personal portable FM radio maintenance programs offered by Motorola.

Circle (135) on Reply Card

Data communications equipment

Granger Associates—An 8-page catalog describes the complete line of UHF voice and data communications equipment. The publication features the 400 MHz, 900 MHz and 1.5 GHz UHF radio equipment, the line of multiplex systems, transportable communications systems, rural radio systems and the supervisory control and data acquisition (SCADA) system.

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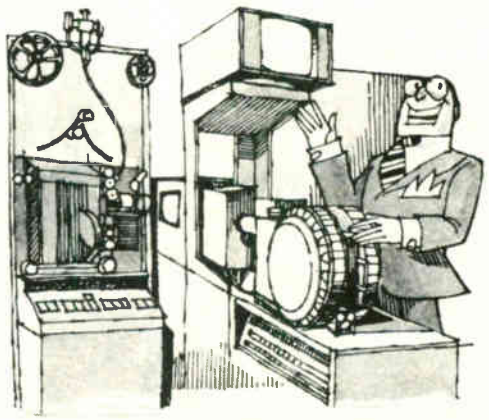

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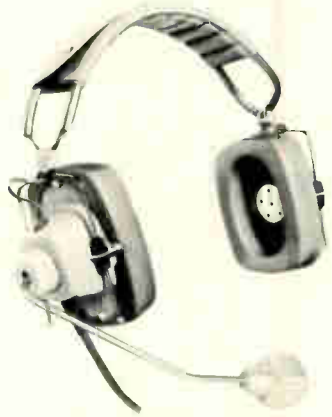

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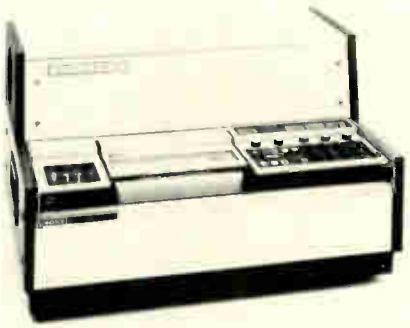
new products

¾-inch VCR

Model HBU-2860, Recortec's high band ¾-inch videocassette recorder incorporates full editing capabilities.



Standard features include 7 to 10 MHz high band color, quad quality without banding, two audio tracks and independent video and audio editing with insert. Frame identification is maintained in the still frame mode.

Circle (138) on Reply Card

Tonearm lifter

Elpa Marketing Industries have devised a simple, automatic tonearm lifter for use on most manual turntables. The Q-Up, a self-contained unit, attaches to the turntable deck with double-sided adhesive tape.

A sensitive tripping bar triggers the lifting lever when the tonearm reaches the end of the recording.

Circle (139) on Reply Card

Audiocassettes

Ampex has introduced a series of high performance, low noise-high output cassettes to meet the needs of users in the professional, industrial and educational markets.

The cassettes feature 5-screw shell assembly, precision torqued for improved azimuth control, consistent performance and longer life. Also featured are welded viewing windows and precision-molded roller guides.

Circle (140) on Reply Card

Vacuum relay

ITT Jennings offers the RF4T, a single pole, single throw vacuum relay. The relay is designed for hot switching of high current and high voltage.

Ground isolation and internal shielding allows the unit to maintain high insulation resistance.

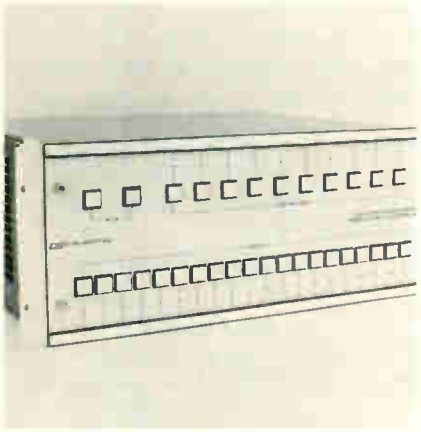
Circle (141) on Reply Card

Routing switchers

Utah Scientific has introduced its CAV-7 series of compact audio and video routing switchers.

The switchers utilize the same circuit cards and perform to the same broadcast specifications as the firm's larger AVS-1 series switchers.

Seven basic configurations are available for video-only, audio-only, audio/video and tally voltage



switching. The maximum matrix sizes are 20 x 10 audio/video, 50 X 10 video or audio-only and 20 x 20 video or audio-only.

Circle (142) on Reply Card

Cue generator

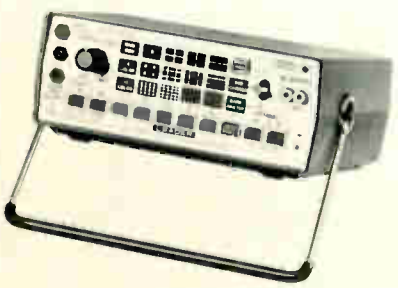
Adcom Communications has designed a cue generator to automatically create a complete 60-second VTR leader signal. The Dynatel LPG-1 includes a countdown character generator, 400 Hz audio tone oscillator and 2 x 1 AFV routing switcher.

Reference for the entire process is derived from the head signal input and must be maintained at least composite sync at all times.

Circle (143) on Reply Card

Color TV analyzer

A battery operated, color TV analyzer is available from *Leader Instruments*. Designated the LCG-397, the test instrument features a variable color burst control, 18 patterns, 12 convergence and 3 color bars, an RF carrier, color subcarrier and zero level black raster.



The unit operates on four, 1.5 V "C" batteries and will accommodate an external dc power supply.

Circle (144) on Reply Card

International ¾-inch systems

Recent introductions by *Sony Video Products* include the Trident VP-2030 player, VO-2630 player/recorder and the multi-system 17-inch Trinitron monitor, PVM-1850PS.

The units, when used with the 1850, can play videocassettes recorded on the NTSC, PAL and SECAM television systems.

Special filters and a noise eliminator result in a S/N ratio of 45 dB and resolution of 250 lines. Other features are logic-controlled function buttons, DUB circuit and a Still Adjust lever for still picture display.

Circle (145) on Reply Card

Clock oscillators

Motorola has introduced two tight tolerance hybrid clock oscillators. K1144A is available in a frequency tolerance of ±25 PPM K1145A in a tolerance of ±50 PPM and tolerances include calibration, operating temperature range, load change and voltage change.

Circle (146) on Reply Card

Pulse generator

The 4001 pulse generator from *Continental Specialties* offers independently variable pulse width and spacing controls from 100 ns to 1 s in 7 overlapping decade ranges.

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New products

settings are calibrated within ±5% at each end of the vernier ranges.

The pushbutton modes are run, trigger, gate, single-shot, square wave and complement.

Circle (147) on Reply Card

Rotary wipe unit

Broadcast Video Systems recently announced a plug-in rotary wipe unit to use with any video switcher. The unit is fed sync and blanking and its output is fed into the external key input of the switcher.

The remote control panel features fan, clock, rectangle and bar wipes as well as ganged faders to control the speed of rotation.

A joystick positioner enables positioning wipes anywhere in the picture.

Circle (148) on Reply Card

Digital reverberation

URSA Major has announced its SST-282 space station, a digital reverberation system for recording studios, musicians, sound reinforcement, and audiophiles.

The system features a 9-in/2-out mixer, multi-tap delay line, echo/reverb synthesizer and 16 pre-set delay programs.

Circle (149) on Reply Card

Audio processor

The TA Discriminate Audio Processor II from *TA Track Audio* features multiband processing with precision components for reliability and stability.

Version DAP II-A0 gives 0 level output while the DAP II-A8 gives +8 level output. Both feature an input of 600 Ω or higher and an output of 600 Ω.

Circle (150) on Reply Card

Reed switch

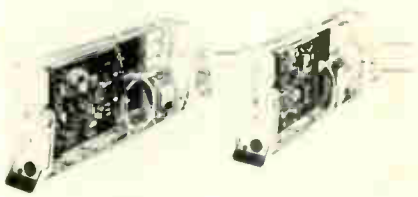
Amperex Electronics has introduced the RI22 series reed switch for computer and instrumentation applications where production consistency is important.

The switch has a 0.6mm wire diameter which reduces resistance to 60 mΩ. The 3-ampere turn selections available are: R222-3A, 16-27 AT; RI22-3B, 23-39 AT; RI22-3C. 37-55 AT.

Circle (151) on Reply Card

Optical fiber system

Video transmission through laser excited optical fibers is now possible through developments at Bosch *Fernseh*.



Applications cover all situations where a high quality video signal needs to be transmitted from point to point. Pulse responses are satisfied in all color systems, PAL, NTSC and SECAM.

The system can be mains or battery operated from a 12 V source, power consumption being approximately 6 W per side.

Circle (152) on Reply Card

Computer fiber optics

Valtec offers a flexible, crush-resistant fiber-optic computer cable for distances up to a kilometer.

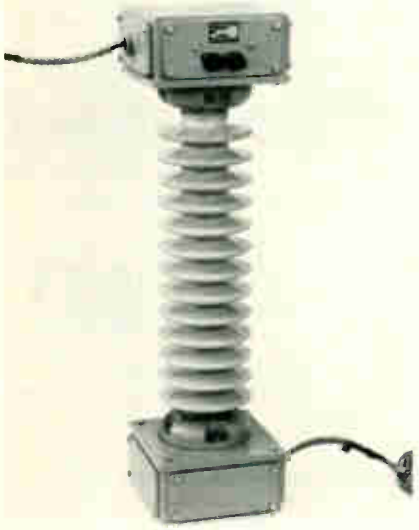
The cable is designed for computer and data terminals transmis-

sions, is dielectric and immune to induced noise. The cable, designated DC-PC08-02, is available with connectors as separate components or pre-terminated to special lengths.

Circle (153) on Reply Card

Optical link

The *Flash Technology Electro-Flash* optical link FTB-205-OL is an electronic device for two-way optical coupling of digital signals across an RF gap.



The unit permits remote control and monitor systems to be installed on the ground side of the assemblies. Inputs of 120/240/480VAC, 50 or 60 Hz allow both sides of the link to be independently powered.

Circle (154) on Reply Card

Logging system

The program logging system offered by *Hallikainen & Friends* consists of an encoder and decoder system.

The encoder takes the ASCII coded English message from a CRT data terminal and generates NAB standard tones which are recorded on the cue track. The decoder picks up the logging data and prints the time, any current alarm code and the English message encoded on the cue track.

Encode verification is provided from the encoded data which is displayed on the CRT data terminal from the tape.

Circle (155) on Reply Card

Micro-miniature switches

A line of micro-miniature switches featuring completely enclosed contacts for maximum reliability and minimum size has been introduced by *CW Industries*.

A button/spring-loaded actuator assembly creates a torque that forces a moving contact to rotate and electrically connect the center and end contacts. The switches are rated at 0.5A ac-dc at 125 V and come in SPST and SPDT configurations.

Circle (156) on Reply Card

Videocassette label

Multi Media Productions has designed a 13-in-1 videocassette label designed to fit ¾-inch, ½-inch Beta and ½-inch VHS formats and their boxes and slides.

The label size is 6"x5" and is sold in 500 units.

Circle (157) on Reply Card

Microwave equipment shelf

Dantel announced an addition to its line of equipment for microwave communications systems. Model 90024 CCITT compatible equipment shelf allows mounting the unit against a wall or bulkhead with the placement of the I/O connectors up front.

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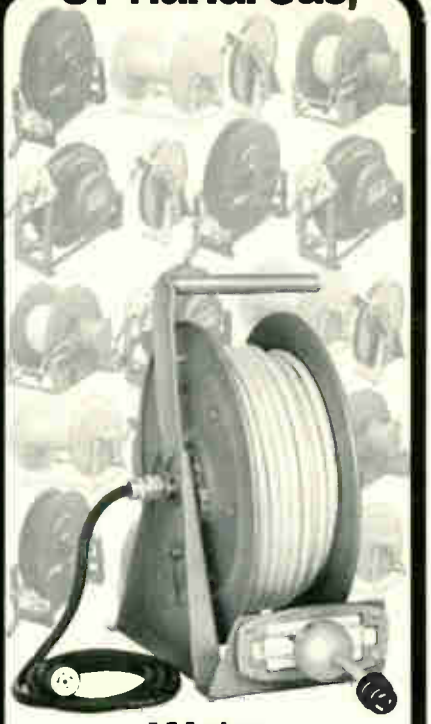

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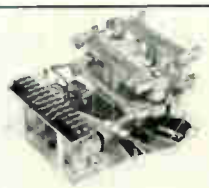

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Circle (70) on Reply Card

New products

The shelf will accomodate any Dantel 40000 and 90000 series plug-in modules and has a 25-slot capacity.

Circle (158) on Reply Card

Storage scope

Phillips Test and Measuring Instruments has introduced a portable dual-trace 100 MHz storage oscilloscope which utilizes a high speed transfer storage cathode ray tube with scan magnification in the vertical direction.

The scope has writing speeds up to 1000/div/μs over the entire screen area and can store single shot signals up to the maximum vertical bandwidth.

Circle (159) on Reply Card

Power transistors

A series of epitaxial-base high current transistors are available from *International Rectifier*. Designated 2N5683 to 2N5686, the transistors are designed for use in power amplifiers, power supplies and servo-motor applications.

The units are available in both PNP or NPN types and feature saturation voltage of 1 V. A minimal gain-bandwidth of 2.0 MHz and collector-to-emitter voltage ratings from 60 to 80 V are also included.□

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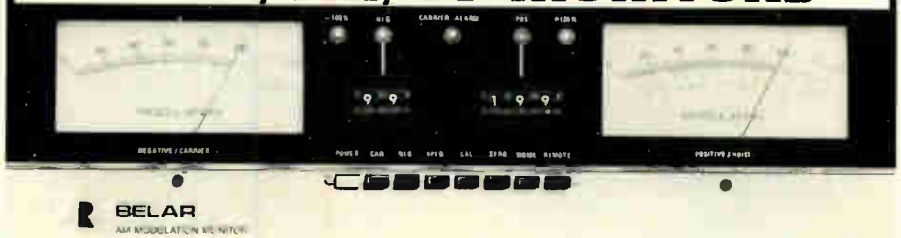

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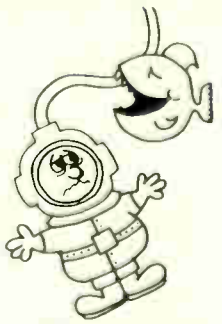

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3M EQUIPMENT—Model 1114 SEG with Chroma Key: Model D-3000 High Resolution Character Generator with or without D-4000, 1000 Page Random Access Disc Memory; Model D-2000 High Resolution Character Generator, and Model D-1032 Character Generator. Phone 518-439-7613 for special low prices. Ask for Ted. 1-79-2t

EQUIPMENT FOR SALE:

(2) LDH-1 cameras, Loaded	$12,500.00 ea.
(2) Ikegami HL-33 ENG cameras	$22,500.00 ea.
(1) RCA TK27 film chain	$16,500.00
(1) RCA TP66 film projector	$11,950.00
(1) RCA PFS710 film chain	$ 6,000.00
(1) Ampex Edicon 660 2" quad editor	$ 2,850.00
(1) QRK Futura 10S mixing board	$ 4,750.00
Microtime 2020 time base corrector	$10,950.00
CVS 510 time base corrector	$ 4,500.00
100 reels 2" quad "Scotch" 400	$ 150.00 reel

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East Rockaway, NY 11518
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EQUIPMENT FOR SALE (CONT.)

REMOTE PRODUCTION VAN—Fully equipped with two (2) Broadcast Cameras, full effects with Chroma Key, ¾" Decks with Automatic Editing Controller, Digital T.B.C., Character Generator and complete Audio System with all accessories. Write Dept. 446, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 1-79-2t

AMPEX MODEL 1011 colortec, Model 1060 Amtec in excellent condition. Contact Mike Neibauer at 512-855-2213. 1-79-3t

DEMO EQUIPMENT/CLEARANCE SALE: BROADCAST ENG/EFP CAMERAS, MONITORS, SCOPES, Etc. SONY VO3800 PORTABLE & VO2600 RECORDERS; DXC 1610 Color Camera. **PANASONIC** Cassette Editing System NV9200/9500; (2) NV3160 Open Reel Color Editors; (2) WV342 Studio Cameras w/Zoom Lens & Tripods; WJ 545 Special Effects Generator; Color Film Chain...**AND MUCH MORE—AT REAL SAVINGS! KVC, INC., 215 LEXINGTON AVE., N.Y.C., N.Y. 10016, (212) 889-7144.** 1-79-1t

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- RCA multiplexer
- Simplex 35mm interlocked TV projector
- Spindler & Sauppe slide projector

Cameras

- Two Norelco PC 70 cameras with Schneider 11:1 lenses, CCUs, 400' camera cables
- One Norelco PCP 70 with Angenieux 6:1 and film-lens adapter

Switchers

- Grass Valley 1400-3 production switcher
- ADC 553 video switcher
- ADC 560 audio switcher

Colortran Crab Dolly with case and accesories
Ampex 440G four-track audio recorder
Sony D-100 4-channel professional ¾-inch videocassette duplicating system
Yamaha PM-1000 16-channel audio mixer
Lighting equipment and dimmers
Other miscellaneous video and audio equipment
Call Blair Benson, Video Corporation of America (212) 355-1600 1-79-1t

HELP WANTED

ELECTRONICS TECHNICIAN. We are seeking an experienced electronics technician who has demonstrated exceptional talent in all TV operations. Applicants should possess superior skills covering air and production switching, video tape editing and operation, audio, lighting and camera control with strong maintenance capabilities on the above equipment. A thorough knowledge of current solid state electronics is necessary as well as a valid FCC First Class Radio Telephone License. Pay scale will be commensurate with experience. References required. Write: P.O. Box 1986, Pittsburgh, Penna. 15230. An Equal Opportunity Employer, M/F. 1-79-1t

PROGRAM DIR.: Contemporary daytimer WDDT, Greenville, Miss. Call Jim Karr, Manager, (601) 338-0526. 1-79-4t

TV MAINTENANCE ENGINEER capable of becoming chief engineer. First Class License required, small market, CBS affiliate, ENG equipment, pleasant seacoast living, clean air, fishing and hunting. Write Don King, Box 3E, Eureka, California 95501. 12-78-2t

FLORIDA LIVING: R & D positions now open for Analog and/or Digital Engineers. Video experience is desirable. Excellent career growth and job satisfaction. Contact Dale Buzan, Vital Industries, Inc., 3700 NE 53rd Avenue, Gainesville, Florida 32601. Tel: 904-378-1581. 1-79-1t

ENGINEER with knowledge and ability to maintain radio and television broadcast equipment. First Class License required. All new radio and television studios. New TV transmitter site with four year old Harris Gates transmitter run by remote control. New microwave equipment. Some TV switching required. Many company benefits. Wayne Pash; Tech Dir; KLOE AM TV. Goodland, Kansas 67735. P.O. Box 569. Ph. 913-899-2321. 1-79-1t

HELP WANTED (CONT.)

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VIDEO ENGINEER/Technician: Experienced in Maintenance of Professional Video Studio Equipment. Quad and Helical VTR's, Projectors, Telecine, Monitors & Signal Processing Equipment. Strong Digital background preferred. Immediate vacancy in position of Engineer/Operator exists. Outstanding benefit program includes company paid retirement and free parking. Call or come to Byron Motion Pictures, 65 K St., N.E., Washington, D.C. 20002, 202-789-1100. 1-79-1t

EXPERIENCED AM/FM Engineer position available immediately in the Memphis area. Preferred experience with Directional Systems 50 KW AM and 100 KW FM Systems. First class FCC required. Send resume to Chief Engineer, WDIA Radio Station, P.O. Box 12045 Memphis, Tennessee 38112. An Equal Opportunity Employer. 11-78-tfn

TRANSMITTER ENGINEER—Progressive VHF station has an immediate opening for a first class FCC engineer with maintenance background. Will work with Harris and RCA transmitters, allied microwave and remote control equipment. Prefer someone with past experience in this area. Excellent working conditions plus the climate on the scenic Central California coast is never too hot or cold. Salary commensurate with qualifications and experience. Send resume to Jim Bassett, Chief Engineer, KSBW-TV, Box 1651, Salinas, California 93902, (408) 422-6422. EOE M/F. 1-79-1t

SYSTEMS ENGINEERS: Immediate opening TV, RF, A/V systems, broadcast BSEE or Equivalent Experience. System design, maintenance & operation. Your video & audio visual background will guarantee success. Deal with America's largest companies. If you possess drive, want to earn highest industry salary, receive merit raises, bonuses and profit sharing, professional training program. State your salary requirement and send detailed resume at once to: INTERNATIONAL VISUAL PRODUCTS, INC., 333 Route 46, Fairfield, N.J. 07006. An Equal Opportunity Employer M/F. 1-79-1t

SYSTEMS DESIGN AND MAINTENANCE ENGINEER/SUPERVISOR: With following training and experience: at least 7 to 10 years on the job experience, successfully completed advanced maintenance course for CMX 340X and AVR-3 course. Must have working experience with VR-1200, experience in design and installation of post production and dubbing facilities, capable of supervising such installation, willing to locate in Los Angeles area. Write to: Lazarow Rettig & Sundel, Ste. 302, 9454 Wilshire Blvd., Beverly Hills, California 90212, Attn.: Richard MacNaughton. 1-79-1t

ASSISTANT CHIEF ENGINEER—Knowledgeable in maintenance of studio and transmitter equipment; attractive location. Salary in mid-teens, depending on experience. Write or call Larry Young, Chief Engineer, WMBB-TV, Box 1340, Panama City, FL 32401, Phone 904-769-2313. 1-79-2t

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CMX SYSTEMS PDP-11 PROGRAMMER

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Please contact:

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CCTV VIDEO MAINTENANCE ELECTRONICS PERSON (TELEVISION): University located on Long Island, New York. Requires thorough knowledge of the technical field of electronics with training equivalent to two years of technical college. Excellent fringe benefits including free tuition. Send resume and salary history to: Mr. George Nave, Hofstra University, Plant Department, 1000 Fulton Avenue, Hempstead, New York 11550. 1-79-1t

CHIEF ENGINEER—TV-Radio unit of Illinois Information Service. Immediate opening. Requires Associate Degree in electronics or equivalent. Two plus years experience in operations-maintenance of quad and helical VTR's, ENG, production, audio systems, first phone preferred. Salary dependent on qualifications (min. $17,500). State coded position/A.A.-E.O.E. Resume to: Thomas Mosgers, IIS, 201 West Monroe, Springfield, Illinois 62706. Call (217) 782-4880. 1-79-1t

CHIEF ENGINEER-for new public TV station. Assist in initial construction. Responsible for complete electronic maintenance and operation. Minimum 5 years TV experience required, including transmitter, studio, color VTR, STL. 1st class FCC license required. Prefer minimum 2 years technical school. No application by phone. Submit resume, salary history, and 3 professional references by Feb. 15 to Search Committe, Northern Minnesota Public Television, Box 188 - Bemidji State University, Bemidji, Minnesota, 56601. An Affirmative Action EOE. 1-79-2t

STATION MANAGER-for new community-based public TV station. Responsible for total administrative leadership including all phases of station operations. Requires management experience in broadcast administration; minimum of bachelor's degree. No application by phone. Submit resume, salary history, and 3 professional references by Feb. 15 to Search Committee, Northern Minnesota Public Television, Box 188 - Bemidji State University, Bemidji, Minnesota, 56601. An Affirmative Action EOE. 1-79-2t

HEAVY RCA VTR & STUDIO CAMERA MAINTENANCE ENGINEER WANTED. Good working conditions with growing Number One rated station in the Southeast. Send resume and salary requirements to Dept. 440, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212, E.O.E. 12-78-3t

TV BROADCAST ENGINEER familiar with RCA TR-600 and 70's Tape Machines, to assemble tapes for mastering and operate AE-600 Editor during production. Fast growing Southern market. Send resume to Dept. 441, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212, E.O.E. 12-78-3t

HELP WANTED (CONT.)

TV TECHNICIAN: TV closed circuit operations and maintenance technician for major NYC production company to work with helical computer editing, time code, cameras, switchers, color monitors and receivers, audio mining, related distribution and test equipment. Must be familiar with analog and digital circuits. AAS degree in EE or equivalent technical school training with 1 years experience is required. Please send resume indicating salary requirements to: Dept. 447, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. An Equal Opportunity Employer, M/F. 1-79-1t

CHIEF ENGINEER for a large, modern well equipped, AM carrier current broadcasting system. Must have experience in AM and have strong performance in audio and studio maintenance repair and construction. Supervisory and carrier current experience highly desirable. Will supervise 1-2 student assistants and be responsible for 6 studios and 13 transmitters. This is a full-time year round position. Starting salary $11,000 or more depending on qualifications and experience. Good fringe benefits package. Reply to: Michigan State University Personnel Office, 110 Nisbet Building, East Lansing, Michigan 48824. 1-79-1t

TEN YEAR OLD COMPANY SPECIALIZING IN VIDEOTAPE DUPLICATION and standard conversions is looking for two experienced maintenance technicians. We have the latest test equipment to work with, pleasant Florida environment, fantastic customers and some international travel available if you want it. You will work with over 50 videotape recorders operating on various worldwide standards. If you're good we will pay you for your talent. Contact James Petrowski, 305/843-8982. 1-79-1t

EVANGELICAL CHRISTIAN MINISTRY has frequent needs for experienced network level and station TV engineers and operators. Locational needs vary but include Boston, Atlanta, Dallas and Tidewater area of Virginia. Send resume to Personnel Office, CHRISTIAN BROADCASTING NETWORK, INC., Virginia Beach, Va. 23463. Equal Opportunity Employer. 1-79-3t

CHIEF ENGINEER—University of Maryland Television System. To head operations of new, multichannel TV system to broadcast TV of classes to remote locations in the metro-D.C. area; includes responsibility for maintaining, repairing and testing of broadcasting and associated equipment; first class FCC license and experience in color TV facilities are required. Send resume to Employment Office, University of Maryland at College Park, College Park, Maryland 20742. EOE M/F. 1-79-1t

TELEVISION ENGINEER—needed immediately for operating position at Educational TV Station. Must have first class phone and at least three years experience. Must operate Ampex VTR's and edit. $258.00 per week to start. Union Shop. An equal opportunity employer. Send resume to Dept. 445, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 1-79-1t

TV STUDIO ENGINEER. Heavy maintenance experience on video tape, quad and Helical as well as studio cameras and ENG cameras. Knowledge of digital systems a prerequisite. Must be familiar with FCC Rules. We are located in a beautiful summer and winter recreational area in the upper midwest. Salary commensurate with experience. EOE. Write Dept. 444, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 1-79-1t

SWITCHER/ENGINEER—First Class License, experience necessary. Quad and ¾" equipped. NBC affiliate. Write or call Larry Young, Chief Engineer, WMBB-TV, Box 1340, Panama City, FL 32401, Phone 904-769-2313. 1-79-2t

PRODUCTION ENGINEER and Video maintenance personnel needed for teleproduction company in the Reno, NV area. Looking for growth oriented person. Call (702) 322-2225 or write CENTURION PRODUCTIONS, INC., P.O. Box 11676, Reno, NV. 89510. 1-79-1t

HELP WANTED (CONT.)

ENGINEERS: KOA-TV in Denver has immediate openings for 2 TV Technicians experienced in operation and/or maintenance. You'll be joining major market group owned affiliate. Excellent benefits and working conditions. Salary in mid-teens commensurate with experience. Send your resume to Karrin Sathra, Employee Relations, KOA-TV, Box 5012 T.A., Denver, Colorado 80217. An equal opportunity employer. 1-79-1t

TELEVISION HELP WANTED: Technical TV Maintenance Technician experienced with color studio production equipment, including quad and helical VTR's. Studio and Eng. Cameras, Editing Systems. Many benefits including 3 weeks vacation plus 10 holidays, free hospitalization insurance plan. Large TV Production Facility in Southeast. Write Dept. 443, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. AN EQUAL OPPORTUNITY EMPLOYER. 1-79-1t

HELP WANTED—MAINTENANCE ENGINEERS: Three to five years prior experience in maintaining studio equipment required. Applicants must have expertise in one or more of the following areas: Audio-Video-Microwave-Radar-ENG-Digital-Slant Track and quad VTRs. Station has modern facilities, good wage levels and extensive hardware with challenging activities. Contact: Chief Engineer, **KCRG STATIONS**, 2nd Avenue at 5th Street, SE, Cedar Rapids, Iowa 52401. (319) 398-8407. **EQUAL OPPORTUNITY EMPLOYER.** 12-78-2t

TELEVISION HELP WANTED: Technical video/audio technician to supervise technical operation of large multi-studio production facility in Southeast. Must be experienced in set up and operation of color cameras, film chains, VTR, multi-track audio equipment. Supervisor ability important. Many benefits including 3 weeks vacation, 10 holidays, free hospitalization plan. Send detailed resume to Dept. 442, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. AN EQUAL OPPORTUNITY EMPLOYER. 1-79-1t

WANTED

SHURE M675 Broadcast Production Master. Box 80751, Lincoln, NE 88501. 1-79-1t

WANTED: Tape recorders twelve Mincom 41 serie manufactured by 3M at bargain prices. Western Equipment, 19 West 44th Street, New York 10036. 1-79-1t

WANTED: Pre-1926 radio equipment and tubes. August J. Link, Surcom Associates, 305 Wisconsin Ave., Oceanside, Ca. 92054, (714) 722-6162. 3-76-tf

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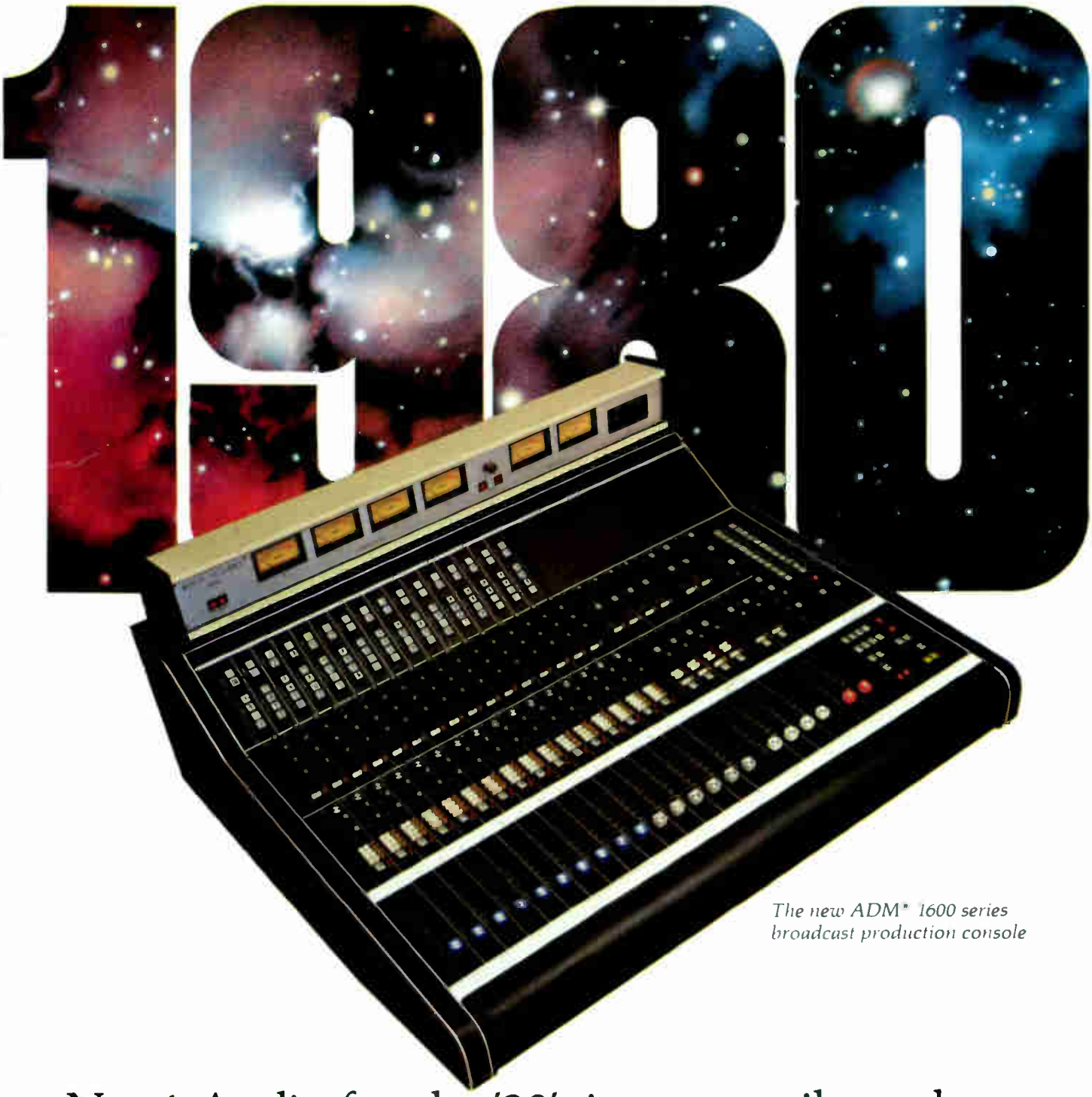

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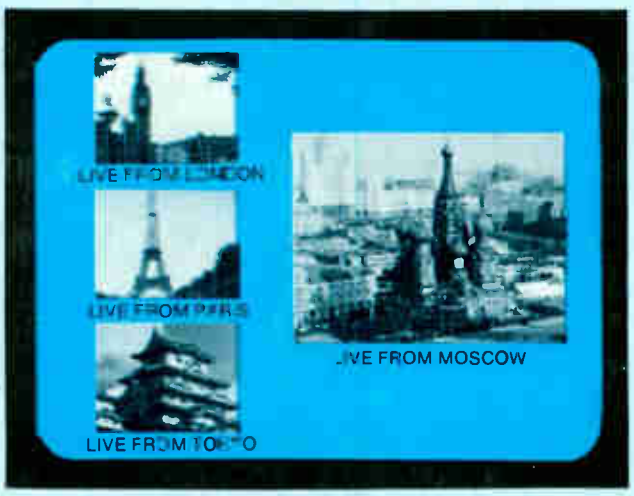

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