

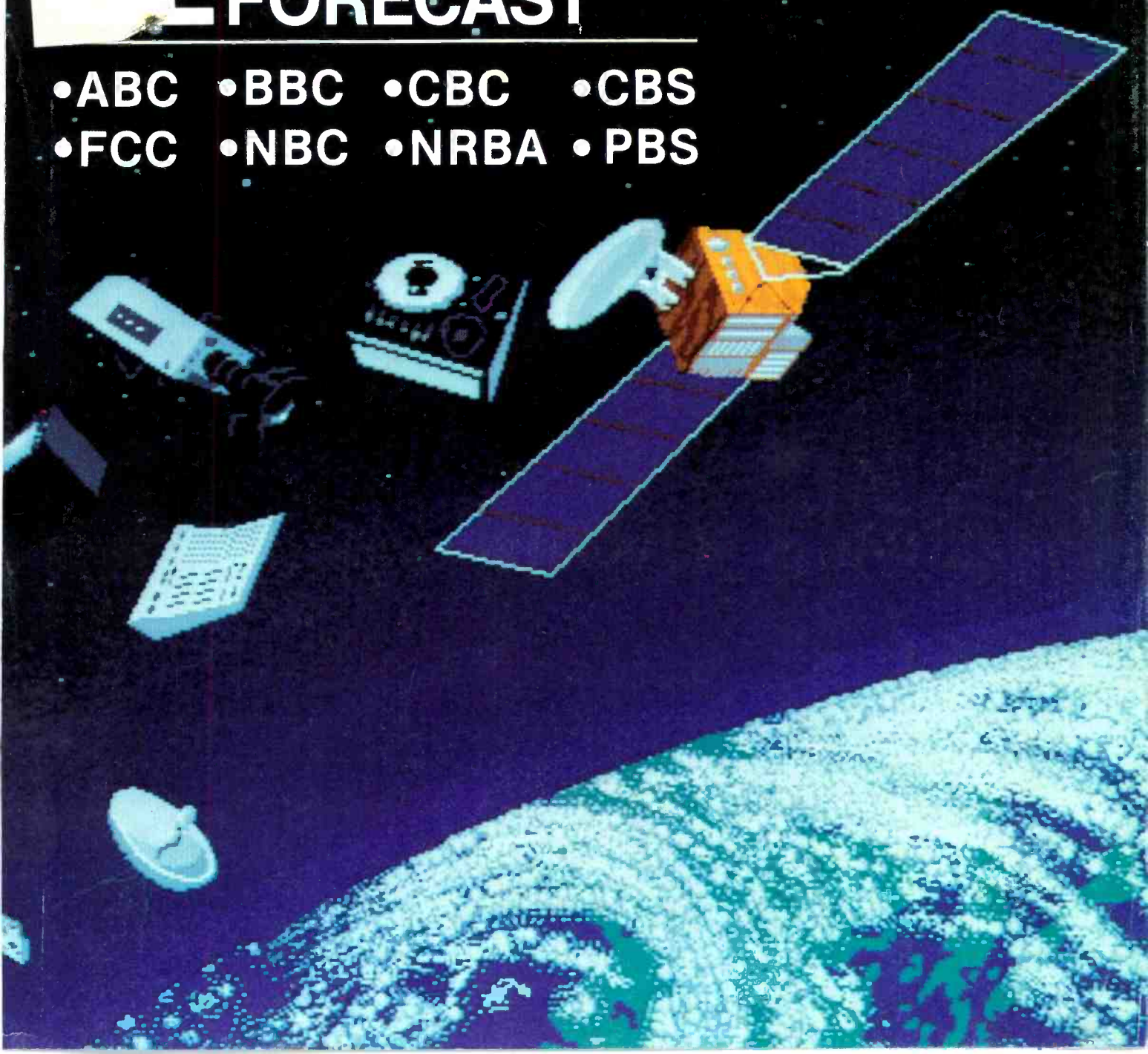
BROADCAST engineering

October 1981/\$3

Broadcast technology:

2 FORECAST

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BROADCAST engineering

The journal of broadcast technology

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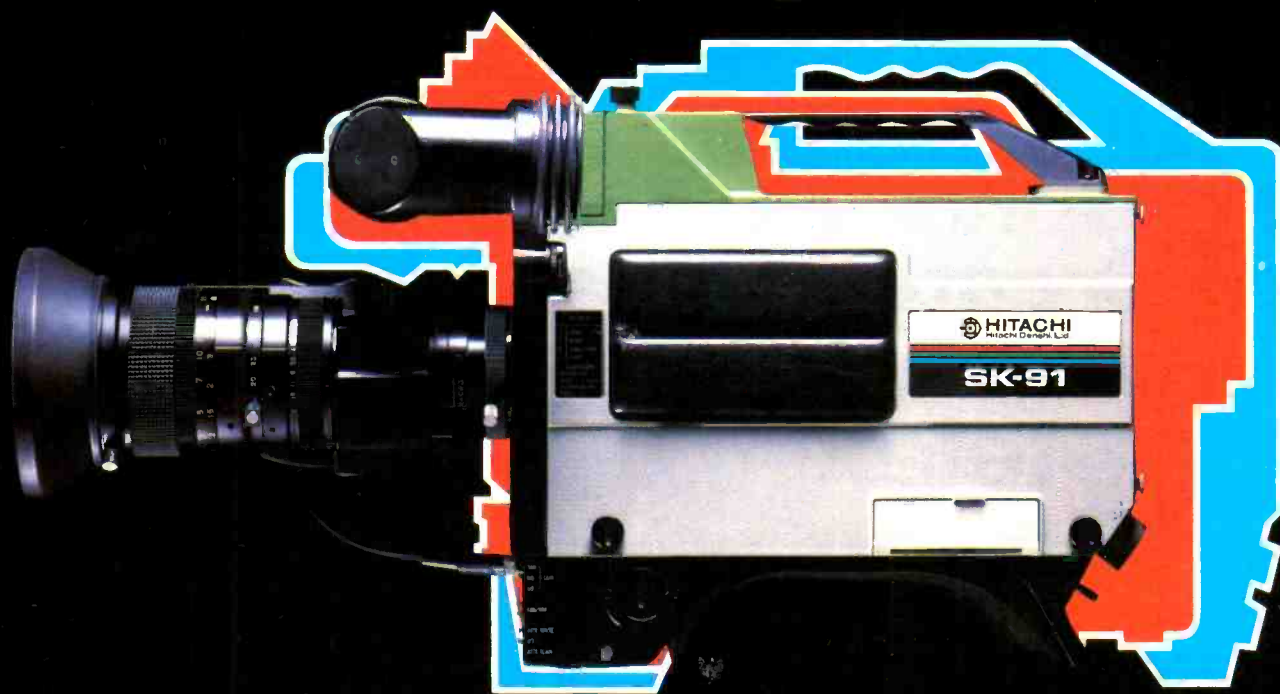
THE COVER this month was provided courtesy of Damon Rarey and Dick Shoup of Aurora Imaging Systems, San Francisco, CA. The graphic was produced on the company's *Digital Videographics and Animation System*, which was introduced at NAB '81 in Las Vegas. Another graphic prepared on this system appeared on the cover of the June 1981 wrap-up issue of that convention. At the time that this month's cover was created, the system was being demonstrated in Japan at that country's "NAB" convention.

The staff of Broadcast Engineering wishes you a happy holiday season.

NEXT MONTH we will enter our 24th year of broadcast engineering coverage. The January 1982 issue will give special emphasis to ENG/EFP topics for radio and television. Included will be a case study of KRON-TV4's coverage of protests against California's nuclear power plant at Diablo Canyon, an article on techniques used at WDX radio to air trouble-free remotes, and a roundup of color cameras designed for ENG/EFP action.

Highlights of the fall SMPTE meeting in Los Angeles and of the fall AES conference in New York will be included as part of BE's continuing effort to keep readers aware of advancing technology in broadcasting.

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FCC update

December 1981



Authorization applications for remote control TV operation dropped

The commission has eliminated the requirement whereby TV stations must file an application (FCC Form 301A) for authorization to operate by remote control.

In revising Sections 73.677 and 73.3548 of the rules, the commission noted that FM and AM stations using non-directional antennas have been operating by remote control without specific FCC authorization since 1978. These stations need only advise the commission by informal notice upon commencing remote control operation.

With the advanced remote control technology now available, the com-

mission added, the present application and authorization requirements for TV remote control operation served no useful regulatory purpose, but imposed unnecessary work on both licensees and the FCC staff. The amendments became effective on October 22.

Emergency equipment shutdowns rejected

The commission has declined to empower itself to temporarily shutdown equipment, licensed under Part 74, that causes harmful interference jeopardizing life or property.

Reports of interference to the space shuttle Columbia during its maiden flight in April were traced to TV elec-

tronic news gathering (ENG) microwave transmitters operating near the shuttle's landing site. Operators of the offending equipment stopped using it voluntarily. The potentially life-threatening interference was eliminated before the shuttle landed.

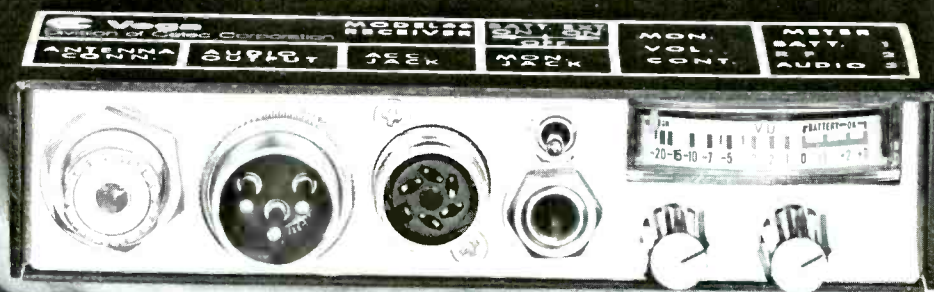
The commission was initially concerned about situations in which it might be necessary to act immediately to eliminate harmful interference and proposed to give itself the power to order equipment shutdowns in threatening situations where the licensee could not or would not correct the problem.

Commenters on the change, including the three major TV networks, argued that the rules were unnecessary and that the record did not justify the adoption of such far-reaching regulations, pointing out that only one instance of life-threatening interference has been documented and that voluntary cooperation was achieved.

Elimination of public letter file proposed

As part of an ongoing effort to eliminate unnecessary rules and paperwork, the commission has proposed to stop requiring broadcasters to keep an inspection file of letters

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The dc servo, Hall effect motor with flutter-filter belt drive, provides exceptional speed stability (to 0.05%), totally unaffected by line voltage or frequency fluctuations. And it runs so cool, no ventilation is required.

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Unlike some other cart machines, the MagneCORD MC-II comes with the extra features broadcasters desire at no added cost. Built-in full remote control capability. Automation compatible cue tones (stop, secondary, tertiary) with LED indicators and contacts for external cues switching. Cue track input and output access for FSK logging. A universal mic/line input and front panel headphone jack to "preview" or time new carts and for servicing convenience.

Flexible Broadcast Use

The MC-II is so flexible it virtually defies obsolescence. You can choose mono or stereo models, play only, or with record capability. Best of all, play models are field-convertible to record/play. The record electronics come in a separate housing for convenient, space-saving installations.

Rugged MagneCORD Design

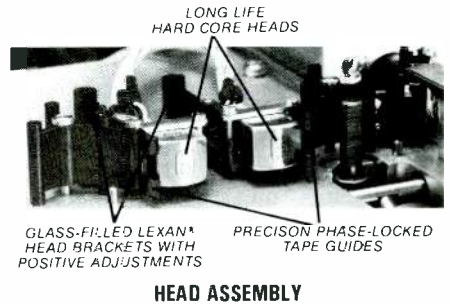
As with all MagneCORDs, the MC-II is designed to work long and reliably. For example, the woven polyester drive belt and polyurethane pressure roller are virtually indestructible. The regulated dc

power supply has universal line capability (100-140V, 200-280V, 45-65Hz), consumes nominal power and is brown-out proof. Computer grade push buttons are rated at 10 million operations. A single piece chassis and machined base plate assure positive alignment of all tape transport parts. Hard core, long life heads are mounted on unique, glass-filled Lexan® head brackets with precision, phase-locked tape guides. Carefully designed circuit boards and a Mu-metal shield make the MC-II immune to RFI, even when operated directly under a transmitting tower.

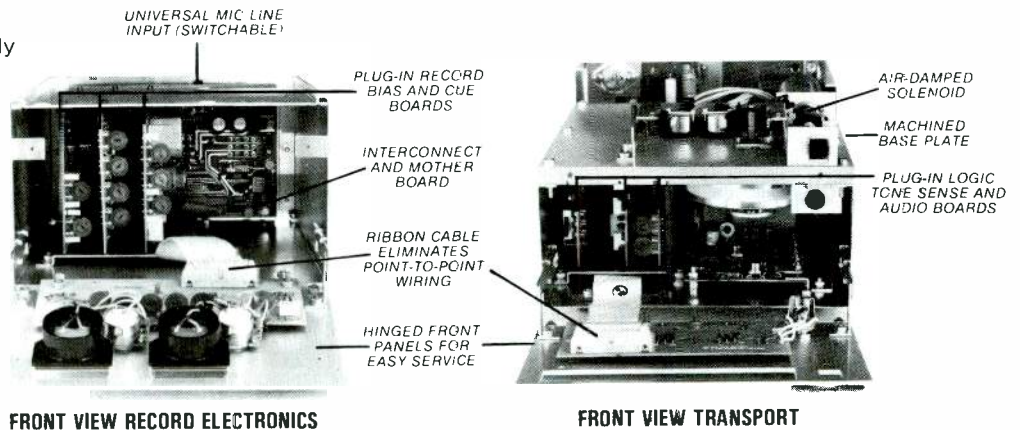
Convenient Service Access

When a MagneCORD MC-II needs service, downtime is minimized. The covers and front panels are hinged for convenient access. All solid state circuitry is on plug-in

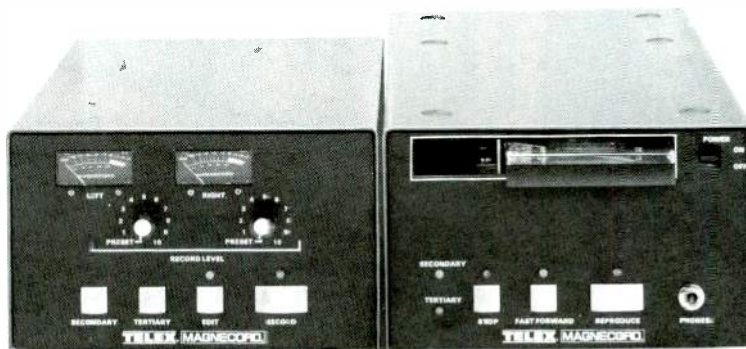
epoxy boards. Plug-in ribbon cables eliminate point-to-point wiring. And, of course, the MagneCORD MC-II is made in the U.S.A. so parts are readily available.



When you compare performance, reliability, and cost, the MC-II is indeed a modern tool worthy of the name MagneCORD, because it's made in the tradition of rugged excellence.



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Circle (7) on Reply Card

FCC update

received from the public. The proposal was prompted by the commission's actions in the radio deregulation proceeding under which commercial radio licensees are no longer required to keep logs, which would also support elimination of the less important letter file.

Since 1973, broadcasters have been required to retain each letter from the public in an inspection file for three years. The requirement was intended to help inform the public about the kind of community feedback a station received, opinions about community problems and needs and/or the licensee's broadcast operation. The commission also intended that the letters might be considered in connection with its review of a petition to deny license renewal.

The letter retention requirement was instituted for radio on an experimental basis, with the intention of evaluating its usefulness within a year or so after the requirement was in effect. This review was never made.

In proposing to drop the requirement for all radio and TV licensees, the commission noted that there is no significant evidence that the public

has benefited from the requirement, that it has not made significant use of the letter file for any purpose, and that all agencies must review the paperwork burdens they impose on the public. Those favoring retention will be asked to show the benefits provided.

Deregulation of modulation monitor requirements proposed

The commission has proposed a deletion of requirements for type approval of modulation measuring devices used by AM, FM and TV stations, giving licensees new freedoms in the technical operation of their stations.

Modulation monitors continuously measure the percentage of modulation produced by a station's transmitter. The modulation level must be properly maintained if licensees are to cover their entire service area and avoid causing interference to other stations. Such monitors must presently be approved by the FCC's testing laboratory to ensure compliance with technical specifications in the rules.

However, because of technological changes in the 40 years since monitors were first specified, the commission said that detailed monitoring specifications are no longer necessary to ensure proper operation of a broad-

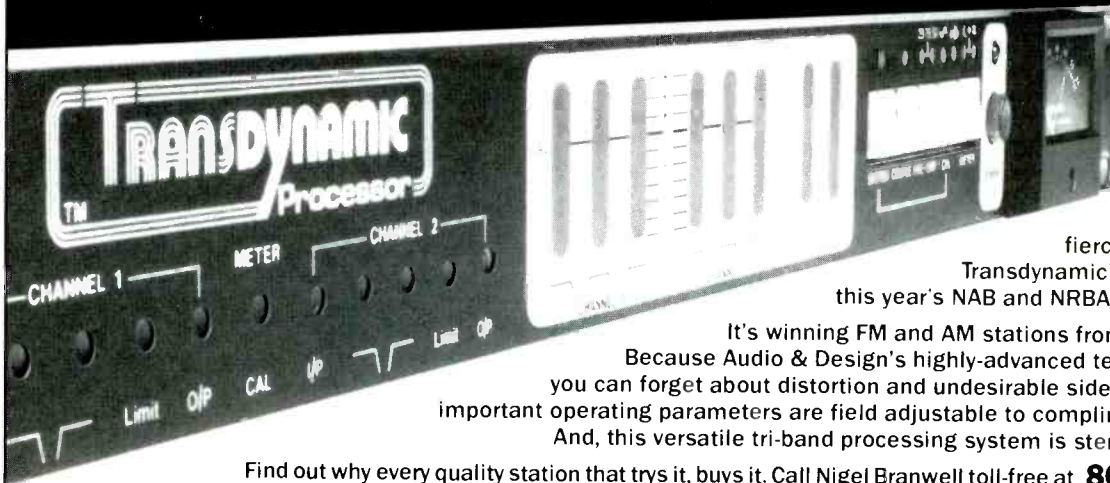
cast station. It also questioned the need for modulation monitors to contain various measurement devices besides the monitor, and instead proposed to place the entire responsibility both for maintaining the modulation level and for having an accurate means of measuring it on the licensee.

The rules would be changed to delete the requirement for type approval of modulation monitors and would allow licensees to use any suitable method for measuring modulation levels. The requirement that modulation level indications must be continuously available to the operator on duty would not be changed, but the commission seeks comments on the desirability of retaining this condition.

Elimination or reduction of financial report proposed

The commission has proposed eliminating or greatly reducing the annual financial report of broadcast stations (FCC Form 324). The commission said that it had been 18 years since it last completed an overall review of its financial reporting requirements and that the National Association of Broadcasters had filed a rulemaking petition seeking deletion of the requirement that financial reports be filed. The commission said

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FCC update

that the value to the FCC of the data received from the present form did not justify the number of hours the licensees had to spend filling them out.

Dawson names engineering assistant

Commissioner Mimi Weyforth Dawson has selected Gary L. Stanford to serve as her engineering assistant. Stanford joined the commission staff in 1961 immediately after graduating

with a B.S.E.E. from North Carolina State University. He began his career with the FCC in the Broadcast Bureau's Facilities Division. In 1970, Stanford joined the FCC's review board staff where, in 1974, he became chief of Engineering and assistant chief for Administration. Returning to the Broadcast Bureau in 1977, he worked with the Policy and Rules Division, Technical and International Branch. With that branch he began work in 1979 on the Region 2 MF Broadcast Conference preparations. He served as a US delegate to the First Session of the Region 2 MF Broadcasting Conference held last year in

Buenos Aires, Argentina. In 1981 Gary served on Commissioner Robert E. Lee's staff.

License examination outline available

Interested individuals and organizations may obtain a draft outline of topics to be included in future revisions of the FCC examinations for the General Radiotelephone Operator License. To receive a copy, write to Chief, Regional Services Division, File 1410, Federal Communications Commission, Washington, DC 20554. The commission expects to begin using updated examinations, based on this outline, by mid-1982.

Reconsideration of simplified renewal procedure denied

The commission has denied reconsideration of its simplified radio and TV license renewal procedures, including the 5-question postcard application form, adopted earlier this year. It also clarified several provisions of the new procedures, which were published May 11.

Henry Geller, former assistant secretary of commerce for Communications and Information and director of the National Telecommunications and Information Administration, petitioned for reconsideration, contending that the Communications Act requires the FCC to review the programming practices of every licensee before granting renewal.

Geller also objected that only TV licensees selected for audit are now required to tabulate the composite week data from their program logs. Urging the commission to reimpose that requirement on all licensees, he said the change puts the burden of tabulation on private citizens who need the information.

The commission said that the simplified renewal application provides adequate information to make the necessary determinations. The Communications Act gives the FCC substantial discretion as to the information it requires on license applications. Continuing to place the burden of tabulating log entries on all licensees would be unwarranted.

Clarifying the May 11 order, the commission said licensees need not prepare new statements on their program promises for their public files at renewal time if the statement on file is current. Completion of a new Statement of TV Program Service, with a copy sent to the FCC, would be required only in case of a substantial program change, defined as a change of 15% in any of the three nonentertainment program categories or 20% overall. □

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resulting in a final product that doesn't accurately reflect the broadcaster's professional standards. NBC discovered that the DO56 takes the pushes, the shoves, the rubs and finger taps in stride. And when handling *really* gets rough, the DO56's unique internal shock mount virtually eliminates the bell-like clang transmitted by other shock-mounted mikes.

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For an in-depth description of this and other case histories, get on the Electro-Voice "Mike Facts" mailing list. Write on your letterhead to Mike Facts, c/o Electro-Voice, 600 Cecil Street, Buchanan, MI 49107.

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Picture shows Model 5315/32 TV Audio Console customized for WRC-TV, Washington, D.C.

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Emmy presentation honors five companies

The National Academy of Television Arts and Sciences played host to the Annual Engineering Emmy Awards Sept. 21, 1981 at the Roosevelt Hotel in New York.

After cocktails and dinner, John Cannon, academy president, presented four awards and one cita-

tion for distinguished achievement in the science of TV engineering. More than 400 TV engineering professionals, including international representatives, witnessed the prestigious awards presentation.

The winners for 1980-1981 are Ampex Corporation, CBS Inc., Ikegami Electronics, RCA CCSD Video System and Marconi Electronics.

Jock Diermann, general manager of the Audio Video Systems Division for Ampex Corporation, accepted the Emmy for the engineering development of the first digital electronic still-store system.

The ESS is an advanced digital recording system that stores thousands of images and provides control in varying the video playback speed from still-store to normal play.

The system electronically converts the analog TV signal into digital form and stores the information on magnetic disc packs. Slides and still pictures can be randomly selected from bulk memory with an access time of less than 70ms.



Ampex executives display their Emmy Award for the company's role in the development of the first digital video production system. Pictured (left to right), are Charles Steinberg, chief operating officer; Jock Diermann, general manager of the video systems group, Audio-Video Systems Division; and Donald Kleffman, vice president/general manager of the Audio-Video Systems Division.

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Ampex introduced its first digital video production system in 1976. Two years later the ESS-2, with real time record and playback capabilities, was unveiled.

The ESS was used first by CBS Television in 1976 during its pre-election and election night coverage. ESS provided CBS with the added advantage of random and immediate access to hundreds of still visual effects used by its election reporting team to provide visual background material.

ESS has been purchased by the TV networks, local TV stations, post-production houses and the US government. Systems have been installed in the United States, Japan and Korea.

William G. Connolly, managing director of the Development Department of CBS Engineering, accepted the Emmy for the original concept

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a surprisingly low cost, to all existing TC-80 series cameras in the field, and is fully compatible with the Harris Triax system. You can teach your older cameras new tricks!

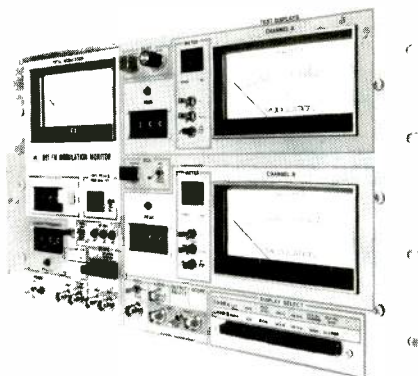
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News

assisting in the development and on-air use of the first digital electronic still-store system, which made the magnetic storage and electric broadcasting of film slides and graphics easier to manage and more reliable with consistent high quality.

Nick Nishi, president of Ikegami (USA) Inc., accepted the Emmy for the development of digital computer techniques for the automatic alignment of color TV studio cameras. These techniques contribute to the consistency of performance and ease of setup of the company's broadcast TV cameras.

The digital techniques are used in the microcomputer control that may be employed with several Ikegami TV cameras, including the Model HK-312. The HK-312 was Ikegami's first studio camera to use the system for automatic setup. Complete registration, black balance, gamma correction and setup adjustments are completed in 45 seconds at the touch of a button.

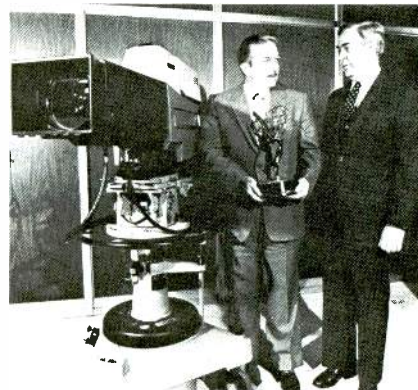


Nick Nishi, president of Ikegami, accepts Emmy Engineering Award.

The Model HK-357 field/studio camera also employs the digital microcomputer control, along with the Model EC-35 electronic cinematography camera. The EC-35, an alternative to the 35mm film camera, features the digital techniques applied in the design of the unique memory and remote setup system.

Joseph B. Howe, division president and general manager of the Commercial Communications Systems Division for the RCA CCSD Video System, accepted the Emmy for the development of digital computer techniques for the automatic alignment of color TV studio cameras through the use of microprocessor-controlled circuitry.

The RCA camera, the TK-47, automatically makes adjustments in all three color channels, automating almost 100 setup control functions, at



RCA's TK-47 automatic color TV camera is discussed by Joseph B. Howe (left), division vice president and general manager of RCA Commercial Communications Systems Division, and Anthony H. Lind, scientist for the division.

the touch of one button. The automatic setup of the TK-47 takes minutes, instead of the usual one or two hours, which increases the time the RCA cameras are available for program production and origination, and frees technical personnel for other assignments. Computer control of the setup function also provides more consistent picture quality by eliminating variations caused by subjective adjustments by technicians. In addition, the high level of automation achieved in the TK-47, as well as the stability, simplifies its operation and leaves the camera operator free to concentrate on creativity and picture composition.

R.T.J. (Dick) Baker, manager of the Broadcasting Division for Marconi Communications Systems Ltd., flew in from Chelmsford, England to accept the citation for engineering innovation in the design and development of a system for the automatic



Pictured (left to right) are John White, manager of communications and broadcasting for Marconi; John Cannon, NATAS president; and Richard Baker, manager, Broadcasting Division.



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News

alignment of color TV studio cameras. The Marconi VIII color TV camera, developed and introduced in 1970, was a major breakthrough in color TV camera technology. About 550 camera channels were sold to more than 30 countries before the introduction of the Marconi Mark IX in 1978. In 1981, the Mark IXB with microprocessor control of the automatic registration sequence was introduced, a further technological advance.

Worldwide viewdata connection progressing

Worldwide viewdata service is rapidly becoming reality following a series of recent agreements announced by European and other countries. At Viewdata '81, held in October in England, Richard Hooper, director of Prestel, announced that a number of European countries proposed to take the initial steps toward the interconnection of their national viewdata systems in 1982-83.

Following its success in West Germany, the gateway facility, which gives viewdata customers easy access

to a wide range of existing, non-viewdata computers, is to be implemented in the Netherlands and Italy, as well as the United Kingdom. Austria and Hong Kong are considering the introduction of the facility, and France is already testing gateway facilities.

In addition to allowing the connection of non-viewdata computer systems, gateway will result in the interconnection of national viewdata systems. This means, for example, that a Prestel user in the United Kingdom will be able to access the Bildschirmtext service in Germany, and vice versa. This interworking is further evidence of the close relationships that have been established in the European viewdata community since the adoption, in May 1981, of a CEPT (European Conference on Posts and Telecommunications) agreed European viewdata standard.

The imminent interconnection of national viewdata systems, coming so much faster than had been foreseen, means that overseas viewdata operators will gather users for the international viewdata system, of which Prestel is a major element.

Prestel will continue to give widespread overseas access to foreign users, but as national systems develop and interlink direct access to Prestel, computers in the United Kingdom will be gradually replaced by access via national gateways.

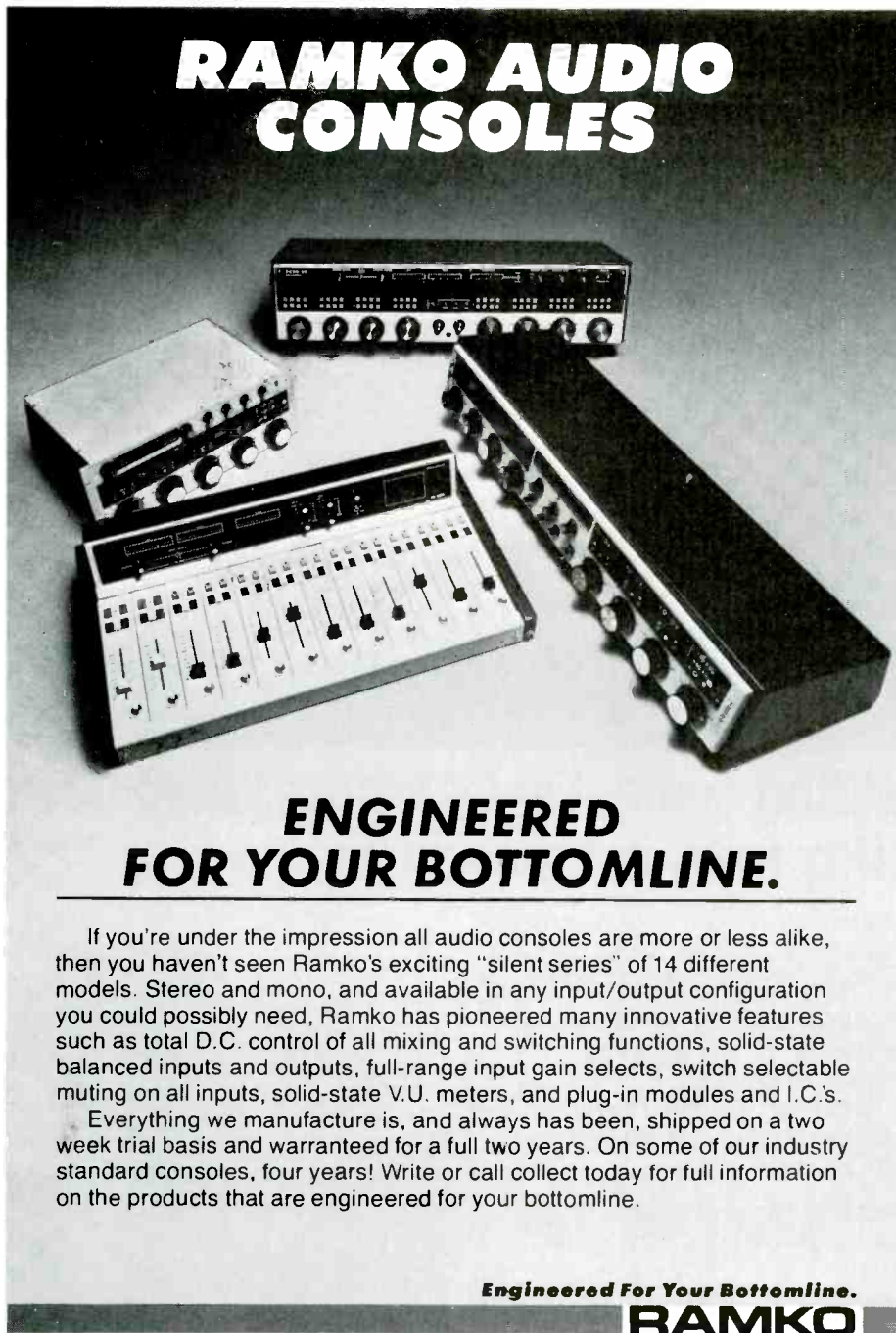
Prestel continues to sell its systems overseas where to date seven countries have purchased Prestel viewdata technology. Enhancements to those systems already purchased by Italy and Austria, which include gateway software, were also announced at Viewdata '81.

Dow Jones to test market for subscriber radio news

Dow Jones & Co. announced recently that it would begin test marketing a new subscription radio news service early next year in four cities.

The service will enable subscribers to select subjects and companies of interest by coding instructions into a specially designed receiver. When a news story on those subjects or companies is transmitted, the receiver will automatically either broadcast it or record it on a cassette for playback later.

Dow Jones said the service would be broadcast over an FM subcarrier, but could also be carried via telephone circuits or cable. The four test cities have yet to be selected, the company said. Dow Jones added that it would purchase an initial 10,000 special receivers from Johnson Electronics Inc., Casselberry, FL, for about \$3.4 million. □



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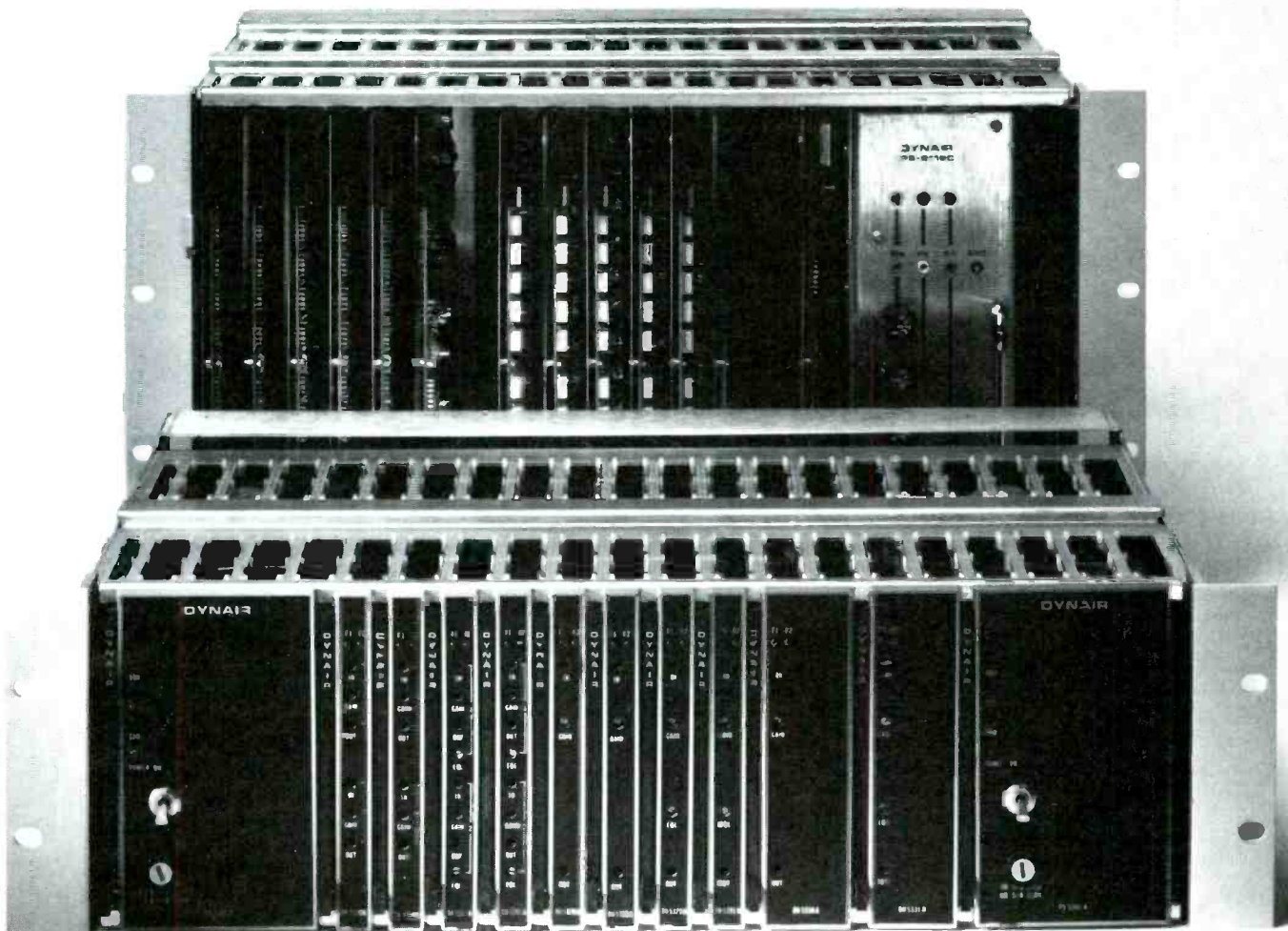
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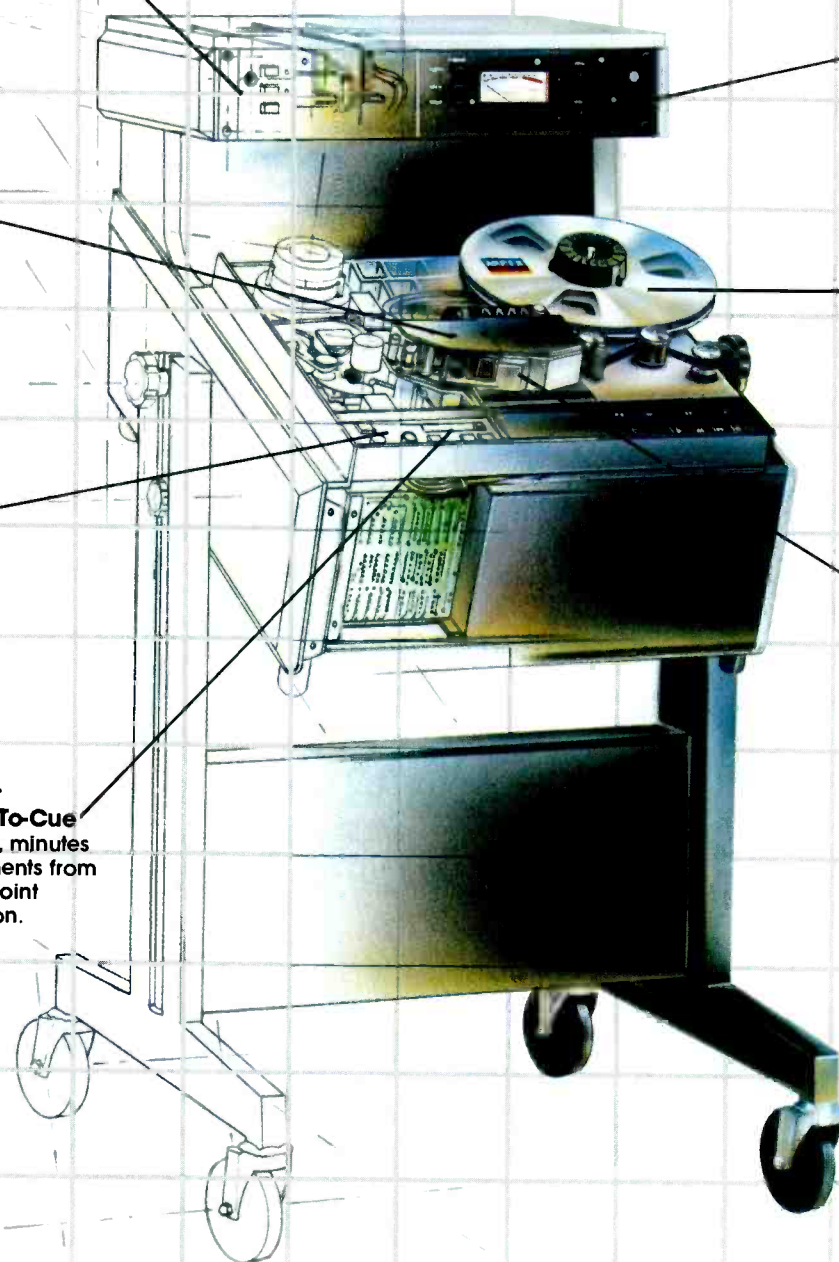
Converts from one to two to four channels, or back quickly with no mechanical re-alignment.

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Machines are shipped with three speeds, 7½, 15 and 30 in/sec. Field convertible to 3¾, 7½ and 15 in/sec.

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For accurate timing in hours, minutes and seconds. Rehearse segments from exactly the same cue point at the touch of a button.



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Introducing the Ampex ATR-800. More features than ever before in a broadcast audio recorder.

In a busy broadcast environment, every minute counts. That's why Ampex designed the ATR-800 with saving time in mind. With more standard features than any other recorder in its class, the ATR-800 is the perfect choice for the special audio needs of the broadcast professional. And recording studio engineers? Take note.

The ATR-800 was designed for tape editing. The wide open head assembly gives you fast, accurate tape access. Recessed head gate and transport controls prevent tape snag. And a continuously variable shuttle, under control of the microprocessor, regulates tape speed and direction.

You'll find hands-on-reel and tape dump edit modes included for convenience. The standard cue amplifier will allow monitoring of any or all channels, right at the machine while it's being cued. And with flexible transport controls, you can now mount them either to the left or to the right side of the machine —whichever way

you choose.

But the features don't stop there. You get a quick change head assembly, a digital tape timer with single-point search-to-cue, three tape speeds with built-in vari-speed, fader start for remote control from a console, simple service access from the front of the recorder and much, much more. All standard. And with a switchable NAB/IEC setup, the ATR-800 is a true international recorder in every sense of the word.

Look around, no other audio recorder has the number of standard features that meet the needs of the broadcast professional like the Ampex ATR-800. It's shipped

for rack mount installation, and it's available in console and pedestal versions as well. Look into the ATR-800. Call your Ampex dealer or write Ampex Corporation, Audio-Video Systems Division, 401 Broadway, Redwood City, CA 94063 (415) 367-2011. Sales, spares and service worldwide.



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Switchable NAB/IEC Setup

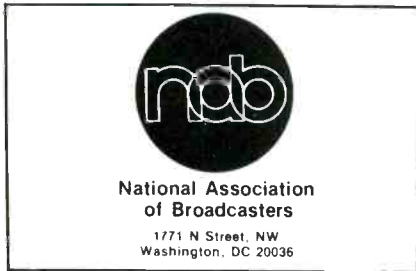
At the flip of a switch, the recorder converts between NAB and IEC setup, including bias and levels as well as equalization curves.

Microprocessor Control

New tape transport design is under the full control of the microprocessor system, ensuring safe, gentle and foolproof tape handling.

Designed For Editing

Head assembly is wide open for unequalled accessibility. Optional tape cutter and marker available. Dump edit and hands-on-reel editing modes included.



Interference standards needed for LPTV

Any technical and allocations standards set by the FCC for the development of the proposed low-power TV service must ensure that LPTV stations will not interfere with full service broadcast facilities, the NAB said recently.

The NAB said that while it supports

the development of LPTV by the commission, the FCC must provide interference standards and protections to full service stations when it considers deleting technical standards to expedite the processing of LPTV applications.

The FCC's proposed deletion of the mileage separation requirements will increase the potential for interference, NAB said. In lieu of mileage requirements, the commission proposes to afford the Grade B contour "protected" status. NAB does not support this proposal because meaningful and important service beyond the Grade B contour exists and deserves protection.

NAB also does not support the use of additional receiving antenna directivity as an allocations tool. There is presently consideration given to antenna directivity in the definitions originally announced for Grade B service contours, NAB said. Also, the uncertain nature of TV and FM propagation and the many varieties of home installations inhibit the development of a uniform, standard home receiving system. For that reason, consideration of additional receiving antenna directivity in LPTV allocations is inaccurate and without merit, the NAB said.

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Interim rate increase needed for copyrighted TV programs

The Copyright Royalty Tribunal (CRT) should institute immediately an interim rate increase to better reflect the true value of copyrighted programming now being used by cable TV operators, according to the NAB. However, the NAB said a permanent rate adjustment should not be made at this time, because the lawfulness of the FCC's decision to eliminate the distant signals and syndicated exclusivity rules is now before the US Supreme Court.

The National Cable Television Association has asked for a rate increase proceeding and the waiver of CRT rules so its members will know the long-term financial implications of adding signals.

NAB said an immediate interim increase, retroactive to July 1, 1981, would alert cable operators to the cost of adding additional distant signals to their systems. However, it said no legitimate purpose would be served by a permanent rate adjustment while the issue is still being litigated. □

Circle (19) on Reply Card

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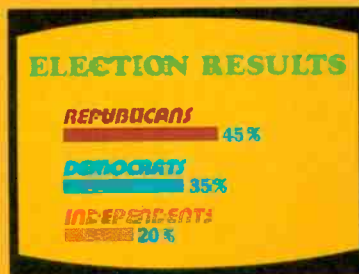
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Broadcast technology: '82 FORECAST

By Bill Rhodes, editorial director

The economic directions of broadcasting cannot be accurately foretold because factors controlling its future are elsewhere—in politics, legislation and world economic trends.

Nevertheless, spirit within the industry remains high. Broadcasters are forging ahead with new construction and equipment purchases dedicated to optimistic growth plans.

For the past three years, **BE** has invited leading broadcasters and agencies to vocalize their thoughts about industry trends in the *What's Ahead* section of the December issue. Their insights, which appear on the following pages, provide interesting views about the future of broadcasting in the coming year.

Several key points became apparent as we prepared this issue:

- Broadcasters generally are planning and budgeting for positive industry growth.
- The new FCC leadership is providing a refreshing outlook for broadcasters, and hopes are high that the new staff will benefit the industry.
- None of the remaining problems besetting the industry are technically insurmountable. But a concern remains about the acceptance of technical solutions to the Cuban interference problem.
- An acceptable agreement for broadcasting in the Americas is hoped for as a result of the Region 2 meeting.
- Increased program distribution and use of satellites are being viewed as positive growth areas.
- Industry leaders are confident that standards for digital video and audio are forthcoming, permitting the introduction of a new generation of equipment.

In short, 1982 looks promising.

Broadcast Engineering takes this opportunity to wish you happy reading and a prosperous 1982. □



TABLE A	OUTPUT AT FULL FLOOD POSITION:	
BRAND X 4k		
DISTANCE	FOOT CANDLES	SPREAD
50 ft	94 fc	52 ft
40 ft	150 fc	41 ft
30 ft	260 fc	30.5 ft
20 ft	650 fc	20 ft
ARRI 4k		
DISTANCE	FOOT CANDLES	SPREAD
50 ft	128 fc	45 ft
40 ft	200 fc	36 ft
30 ft	380 fc	28 ft
20 ft	880 fc	18.5 ft



Above: Lighting Director Peter Edwards aligns ARRI 4k beam on plaster cyclorama.

Emmy-winning Lighting Director tests the ARRI 4k HMI versus the competition: [®]

After testing twice, Peter Edwards finds the ARRI has more output and less fall-off at the edges.



Photocell centered in beam with remote meter scale near lamphead.

TABLE B	FULL FLOOD OUTPUT, EQUALIZED SPREADS:		
LIGHT	DISTANCE	FOOT CANDLES	SPREAD
BRAND X	28 ft	340 fc	30 ft
ARRI	36 ft	360 fc	30 ft

aligned. By the time another unit was available, we had bought the better of the other two brands. To satisfy our curiosity, we later decided to compare the second ARRI with the brand we'd bought."

"We duplicated our earlier test procedure. As Table A shows, the second ARRI unit had greater output than ours. The ARRI beam spread was more even, edge-to-edge, with a sharper drop-off. It wasn't as wide."

"To compare apples with apples, we pulled the ARRI unit back until its beam spread exactly matched the other light's. Table B shows the results. The ARRI's out-

put was greater, even with the unit 20% further away."

"The ARRI's beam had almost the quality of a hard-edged spotlight," says Mr. Edwards. "Very linear across its field — unlike most Fresnels."

"To blend with another source, you could feather the ARRI's edge by spotting the fixture up a little and either pulling it back or dropping in a scrim. For single-source lighting, the ARRI's even field would make exposure much more consistent right across the subject."

"The ARRI unit is built like a tank. It's a handful, compared with the brand we bought; but you could rely on it to work in any weather, I should think, which is important for a location tool."

Peter Edwards is Supervising Lighting Director at CFTO-TV in Toronto; and he is Chairman of The Society of Television Lighting Directors, Canada. He has won two Emmy Awards for his lighting.

"CFTO wanted to buy HMI lights for a series to be shot on location," says Mr. Edwards. "So we ran side-by-side tests comparing the 4k units of three imported brands. The ARRI 4k had by far the worst output."

"It turned out, as I suspected, that the ARRI unit had been mis-

ARRI

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Circle (21) on Reply Card



By Mark S. Fowler,
chairman of the FCC

Unregulation: How will it affect broadcast engineering?

"Unregulation?" It is a term that neither English teachers nor engineers will find in their dictionaries. It has been coined to describe the final stages of communications deregulation—a process that began several years ago to eliminate onerous and unnecessary regulations, according to the FCC. In the broadcasting arena, unregulation reflects the commission's desire to defer to the decisions of broadcasters in determining the best way to compete for viewers and listeners. No longer will broadcasters find the commission to be an obstacle to new competitors; nor will it be found placing obstacles in the path of business efficiency and self-expression.

Recently, the commission has acted to "unregulate" the broadcast industry in a number of non-engineering areas. For instance, in October the commission sent a package of legislative proposals to Congress that included the elimination of both the equal-time provision and the fairness doctrine in Section 315 of the Communications Act.

Previously, in its radio deregulation proceeding, the commission had eliminated advertising, news and public affairs time guidelines and our formal ascertainment procedures. These and other recent commission actions reflect a recognition that government second-guessing is generally second-best to letting market forces determine what consumers receive.

What about engineering areas that might bear "unregulating?" Here, too, the FCC has begun to relieve broadcasters of regulations that too often have increased costs and reduced operational flexibility...unnecessarily, I believe. Recent actions include:

eliminating the examination requirements for broadcast operators, approving aural subcarriers for program cueing in television, authorizing the source identification signal for television, and eliminating the application process for remote control authorization in television.

In addition, the FCC has recently proposed the following rule changes: eliminating type approval and detailed specifications of modulation monitors, deleting the specification of vertical interval test signals and the requirement that remotely operated TV stations transmit them continuously, and authorizing non-licensed operation of part 74 transmitters for 30 day periods. In all these actions the FCC re-emphasized that responsibility for meeting the technical specifications of the broadcast service remains with the licensee. There remain, of course, other broadcast regulations that we may wish to address to see if shifting responsibility to the licensee is appropriate.

Some of these deregulatory actions were opposed by various segments of the broadcast industry. The operator licensing proposal, for example, was opposed by many station engineers. At this time some engineers are voicing concern about the proposal to eliminate the type approval of modulation monitors. Before adopting this proposal, the commission will carefully consider all comments, although engineers should consider that the type approval of a monitor does not guarantee its accuracy.

In spite of some opposition, the general industry feeling is that easing these types of restrictions is good. The overall impact of these actions on licensees, consumers and the commission is, however, unlikely to be signifi-

cant. Real public impact will probably occur only in those instances in which the commission shifts most of the technical responsibility to licensees. I see two areas in which such a shift might occur: (1) the technical review of applications; and (2) the mandating of detailed intra-channel technical standards.

In considering a relaxation of our technical review of applications, practical as well as philosophical justifications arise. Austerity is affecting all areas of government, including the FCC. It may be appropriate to examine our current practice of closely reviewing and coordinating applicants' engineering showings at taxpayer expense. A more efficient procedure might be to take advantage of the engineering expertise most applicants employ. We could develop a presumption that all technical aspects of an application are in order and condition the grant or license on that assumption. This presumption would shift responsibility for meeting the FCC's technical criteria to the licensees or their engineering consultants. In the event of interference or some other technical problem, the licensee would need to correct the problem or face FCC enforcement action.

Although this system would provide the commission with processing line cost savings and save applicants waiting time, enforcement and perhaps other costs could increase. Moreover, the commission would need to retain engineering expertise to be able to resolve disputes. For these reasons, the decision to proceed with a reduction in application reviews by engineers is not clear-cut. But there is a value in considering to what extent the FCC has absorbed engineering

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Unregulation

responsibilities that should belong to the station.

With regard to mandating detailed, intra-channel technical standards, we are currently examining our role, particularly for new services. Traditionally, the FCC has been involved in making detailed standards for conventional radio transmissions. With a technology explosion that is creating new services, we will be considering the balance between retaining control over allocation of spectrum space while permitting the marketplace to develop some standardization details.

Allowing flexibility for non-broadcast services while retaining technical rigidity for broadcast would not, I feel, be in either the public's or the broadcasters' best interest. Such an approach could hinder broadcasters' ability to compete with new services. Lack of competition could ultimately lead to fewer consumer choices. These observations particularly apply to intra-channel standards.

Consumers are demanding more variety in video services. These demands create incentives for engineers to develop innovative ways of delivering more video over limited

bandwidth channels. Almost every week, stories of new video techniques appear in the trade press. Yet existing regulations and policies may retard their introduction into the broadcast market. In a video market devoid of government regulation, many of these new video delivery technologies might be more attractive to investors.

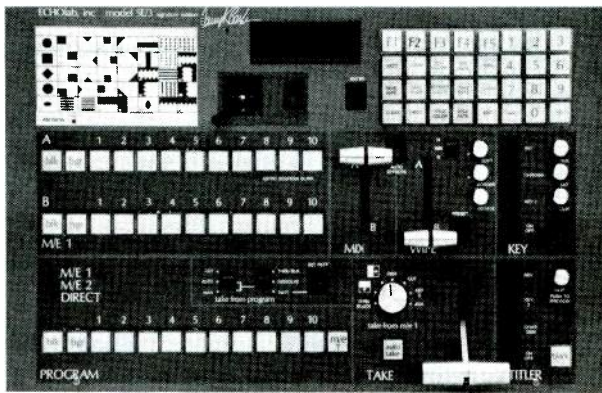
Standard-setting has a long history at the FCC. Many good arguments support its continuation. Some argue, for instance, that mandating technical standards eliminates consumer uncertainty, providing a less hostile environment for new technologies. Establishing standards can result in economies of scale, allowing the cost of design to be recovered by the sale of many units. These economies can, of course, translate into lower equipment prices and a larger sales volume that raises profits and further lowers prices, all to the benefit of consumers.

However, the down side of government-mandated standards is a built-in bias against new products that could provide higher consumer satisfaction or greater spectrum efficiency. This bias may be healthy when it comes to rules affecting interference levels, but not to rules setting standards that do not affect those levels. Suppose a licensee dreams up a modification of the makeup of its transmitted signal that would not increase interference to other co- and adjacent-channel users. Why should the FCC require a rulemaking to allow it? After all, the licensee believes the public will want the new, different service.

Yet we know that once industries and products are established around specific standards, new technologies and techniques are likely to be greeted with a protectionist attitude. Established industries have strong incentives to lobby heavily against any change. The rulemaking process may present substantial barriers to the introduction of potentially valuable technologies.

The commission can play a role in preventing obstruction to new technologies by manipulation of the standardizing process. One way would be to establish a "sunset" date on many FCC-adopted technical standards, at which time the mandated standard would no longer be required. If, in a particular service, the FCC determined that mandated standards would provide substantial benefits to consumers, a sunset provision would prevent the standards from foreclosing the introduction of newer, and perhaps better, ideas as the state-of-the-art evolves. The sunset approach could apply to existing and proposed standards too, like the specification of the TV waveform, the specification of multiplex stereo, SCA's in both FM

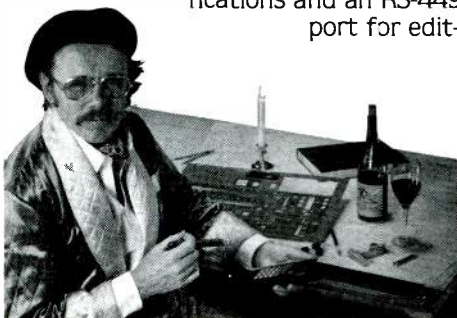
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Isaac Hersly, Equipment Planning Engineer for ABC Broadcast Operations, selected Convergence ECS-100 joystick videotape editing systems for his Network for many reasons – dependability, easy operation, affordability – But most of all, for the standard features that make these microprocessor-based editing systems top performers in the most demanding broadcast environment.

ABC uses Convergence editing equipment for ABC Network News, 20/20, sporting events, and countless other productions such as their outstanding coverage of the 1980 Winter Olympics,

and the 1980 Republican and Democratic National Conventions. Hersly says, "With Convergence editing systems, expanded use of ENG camera crews is possible, and the American public sees better prime time network news."

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Unregulation

and television, AM stereo and FM quadrasonic broadcasting. In each of these areas the commission could eventually retire the intra-channel technical standards while retaining the inter-channel interference limits.

How might increased technical flexibility be attractive to broadcasters? Video delivery has already been mentioned and may be the area with the most potential. But other areas could be developed if certain unregulatory initiatives are adopted by the commission. Some radio programmers are investigating consumer interest in subscription radio. Initial reports indicate that demand may exist.

Subscription radio might best be delivered through some innovative scrambling/subcarrier technique. In fact, some stations might wish to program two stereo channels—one pair delivering conventional commercial fare, the other delivering subscription programming.

Existing STV stations could be formally licensed instead of operating on indefinite program test authority and would be free to change their waveform to better meet demands of their subscribers or prevent unauthorized use of their signals. A nod in the direction of flexibility in intra-channel technical standards might also be made to our approach toward broadcast textual services (for example, teletext) and stereo TV. This

approach could allow broadcast frequencies to help relieve the so-called "shortage" of frequencies experienced by other services.

As part of the push to unregulate the broadcast service, I have instructed the staff to look at every one of our rules, including the technical ones, and ask, "Does it foster or does it forestall competitive forces? Does it create artificial barriers to entry?" We will move to change rules found to be anti-competitive and anti-consumer, including technical rules. Broadcast engineers are in the unique position of being able to monitor technology and advise the FCC on rules that hinder the adoption of desired technologies. I urge and encourage you to take advantage of your position. □



Television: What the future holds

By Bebe Ferrell McClain, president, B. F. McClain Productions, Asheville, NC

At the 1981 SMPTE convention in October in Los Angeles, engineers from all over the world convened to exchange technology on every conceivable subject that touches the world of TV broadcasting. In addition, manufacturers displayed their state-of-the-art equipment and

much that represents the future of the art.

This international exchange gave, to many, a glimpse into the future and a shadowy outline of the broadcast world to come. The following interviews reflect the way various people are interpreting these technological advances.

Pointer: ABC

"A standard for 1/2-inch tape format in cassette appears promising as a SMPTE committee has now been formed to study this matter.

"The integrated camera/recorder with high quality 1/2-inch tape will offer many more functional uses of electronic field production for entertainment, news and special feature programs, for example narrow casting.

"High definition television (HDTV) may develop more rapidly than originally perceived. A 655-line non-interlaced system was demonstrated at the SMPTE show. This is another analog system with considerable promise.

"Original production work using HDTV cameras and tape recorders replacing 35mm film cameras will undoubtedly be the first application for HDTV, and this product will be

distributed by satellite and/or cable systems to the viewers."

Verne Pointer
Vice President
Engineering
ABC, New York

Himmelbarb: NBC

"We can expect further improvements in the general picture quality at home. New innovations in many areas will bring this about. Digital, I feel, is sometime off. It's not around the corner—at least not if you are talking about going digital from origination to receiver. I don't think I'll see it.

"Concerning cameras, they will end up solid-state. They will be better because tubes intrinsically have problems that chips don't have—such as geometric distortion, registration error, smear, lag burning and sticking.

Chips don't age like tubes do, and they don't have shelf life problems.

"I believe that ENG is going to go 1-piece, but not in a fixed, 1-piece configuration. It needs to be able to be used in one or two pieces. You need to be able to break it apart and use it in either configuration.

"Also, the 1-piece type camera needs to be much better than the present quality I've seen. It is better than 3/4-inch and is approaching that of 1-inch. But it's got to be a lot better than 3/4-inch and even better than 1-inch if we are to justify a change—just like 1-inch had to be much better than 2-inch to make the total conversion worthwhile. You are talking about the possibility of totally changing formats. This involves all new, different equipment. The 1/2-inch format will have to offer a significant improvement in quality over what we are

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TV's future

presently using.

"Over the next few years we are going to see things on TV that you can't even imagine. We are going to do things that have never been done before—especially in the area of live pickup—to make it more exciting. Like the marathon in New York that was also a live travelogue of five boroughs."

Fred Himelbarb
Engineering
NBC, New York

Berger: NBC

"We will be seeing the all-digital studio within five years. This means total video production, cameras, recorders, switchers, editors, etc."

Paul Berger
Project Director
NBC, Burbank, CA

Messina: ABC

"Concerning film going directly to tape, you are going to see changes because of the CCD. Flying spot scanners have done a tremendous amount for the industry, but it is at a maximum.

"Assuming you are transferring negative film, the CCD is for the future. If you're talking about positive film, the TK-78 or 79 will still be used.

"Film is going to be around a long time, especially because of the new Eastman Kodak film shown at the SMPTE Convention.

"As far as the networks are concerned, we are going to see very little film going straight onto the air. It will all be transferred to tape.

"I do not think that video can ever have the film look—at least not with today's technology. Now tomorrow, that's another story. The major differences involve lighting ratios and depth of field.

"The resolution is good on the new videotape cameras. Still, there are things that you can't do with videotape cameras that you can do with a film camera. You can't do a car chase with video. You can't undercrank like you can with film and play back at normal speed and appear to be going 80mph when you were actually going at 40mph.

"Concerning the future, you are going to see things at the 1984 Olympics that you've never seen before. ABC is going to be very innovative. We will be using all the new stuff. It will be very fast paced—the way ABC Sports is. That innovative approach is what makes ABC Sports so great.

"At the SMPTE show, the electronic graphics demo by Dubner was unbelievable. This type of equipment is going to play a major part in the future of television."

Ed Messina
Director of Film Operations
ABC, Hollywood

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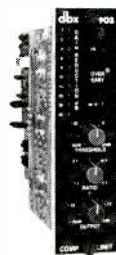
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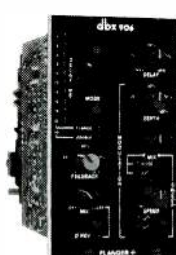
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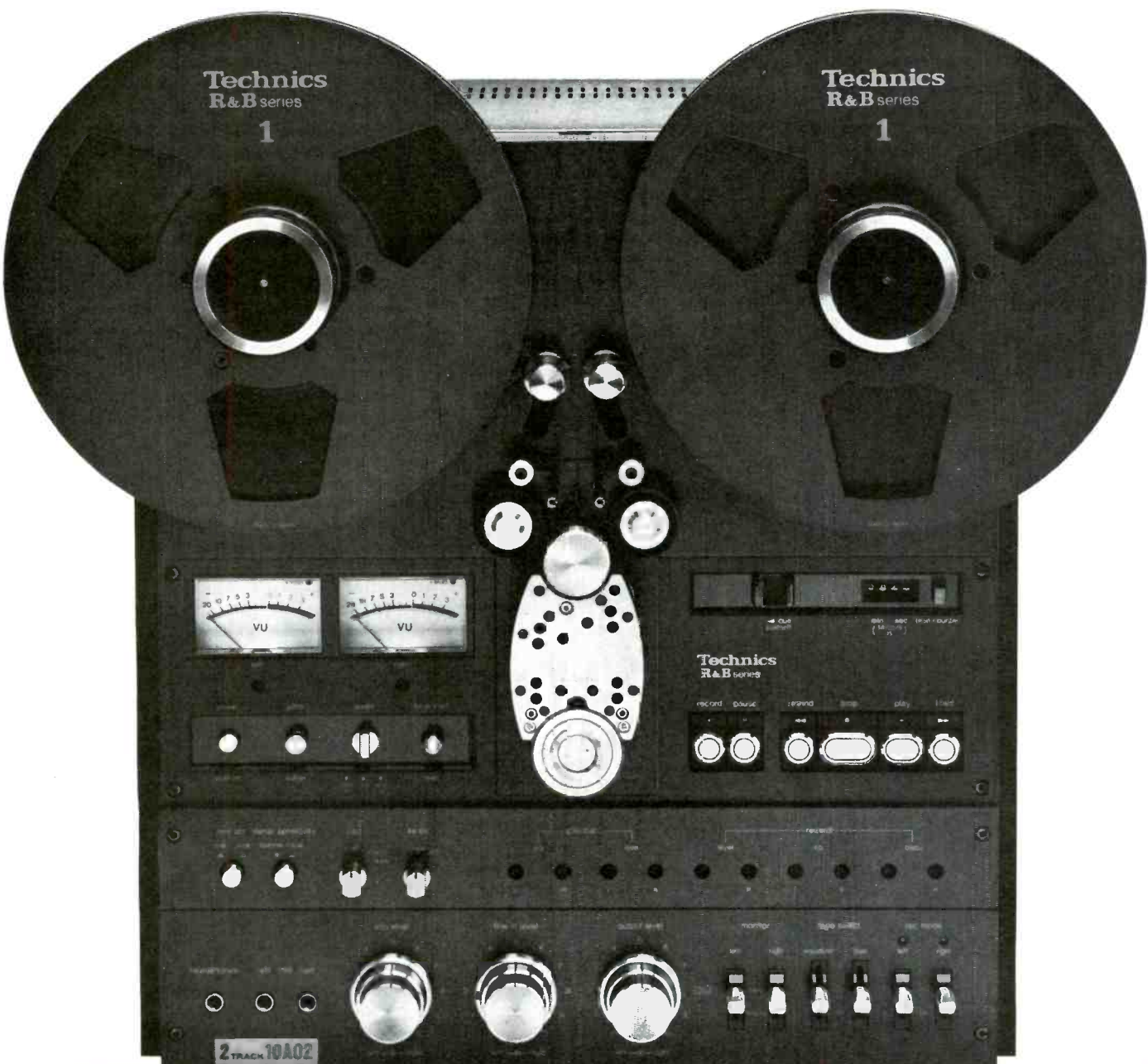
"The future is very exciting. Many changes are about to occur. The impact of digital will be tremendous, even though there is disagreement on the timetable. The impact on post-production is significant. One of the biggest challenges, electronic cinematography, has the potential of having the same impact on our business as ENG has had.

"Young people in this business are going to see things that they never dreamed of.

"Of great importance, and something that is difficult and time consuming, is the agreement of standards. But there is the common desire for worldwide standards. No longer is it enough to have standards in the United States. We need them worldwide, and world organizations are willing to work toward that. Digital is a good example."

Richard Streeter
Engineering
CBS, New York

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TV's future

Davies: CBC

"When I think of the future, I think of the new technology that is 18 months to two years hence. That's what I'm involved with—especially concerning digital technology and TV production and distribution.

"Within a couple of years, digital technology will muscle its way into the current analog composite plant. By the 1982 NAB, fully digital studio switches will be interlaced into current DVE units. Within one year, you will see a digital recorder—not necessarily a component digital recorder, but a beginning.

"Certain technological things are needed for component to happen—such as resolution of the metal tape issue. If that happens, the digital video recording will use significantly less tape and have a high level of performance. This will have a great impact on the format; the track lengths could be shorter.

"Transmitting digitally is not yet feasible technically nor socially. Technically, because current receivers that don't store pictures cannot put enough in the 4MHz bandwidth to make a decent picture. Socially, the FCC could not approve

digital broadcast because it takes up too much of the spectrum.

"By 1990, it may be feasible to put storage space in receivers. By that I mean we might have receivers with frame store.

"Another big change will be the transmission of network TV signals, audio and video, in the digital form over normal digital distribution.

"We must find clever ways to pack the digital TV signal in a limited-capacity digital channel."

Ken Davies

Senior Consultant

Canadian Broadcasting Corp.

Auclair: CBC

"In the 1980s, we will see improvements in image transducers and camera tubes. The flat array, CCD, will lead to an all-digital camera.

"We see emerging other analog video recorders— $\frac{1}{2}$ -inch and $\frac{1}{4}$ -inch. These will be analog component recorders. The first digital recorder will probably be a composite recorder, and later the component will arrive on the market.

"A new recording medium of videodisc, a read-after-write system, will initially start in the analog format and, as technology is better known, will be in digital format.

"In the '80s a rationale will take

place on portable TV equipment. Film will still be there in a lesser degree. As film costs go up people go to electronics."

Marcel Auclair

Assistant Director

Studio System

Canadian Broadcasting Corp.

Godfrey: ABC

"ENG will probably graduate into cameras with built-in recorders. Several manufacturers have introduced unique camera/recorder combinations that will fit the need of the ENG cameraman. It will only be successful if the manufacturers involved can get together and agree on a common standard, as was done with the type C format.

"The successful introduction of new products in the future is going to depend largely on the broadcasters encouraging the many manufacturers in industry to agree upon performance and interface standards for their products.

"A classic example of cooperation among manufacturers has been the acceptance in this country of the 1-inch type C videotape format.

"In the interest of standardization, I would like to see the major Japanese manufacturers involved come to terms with this problem and stan-



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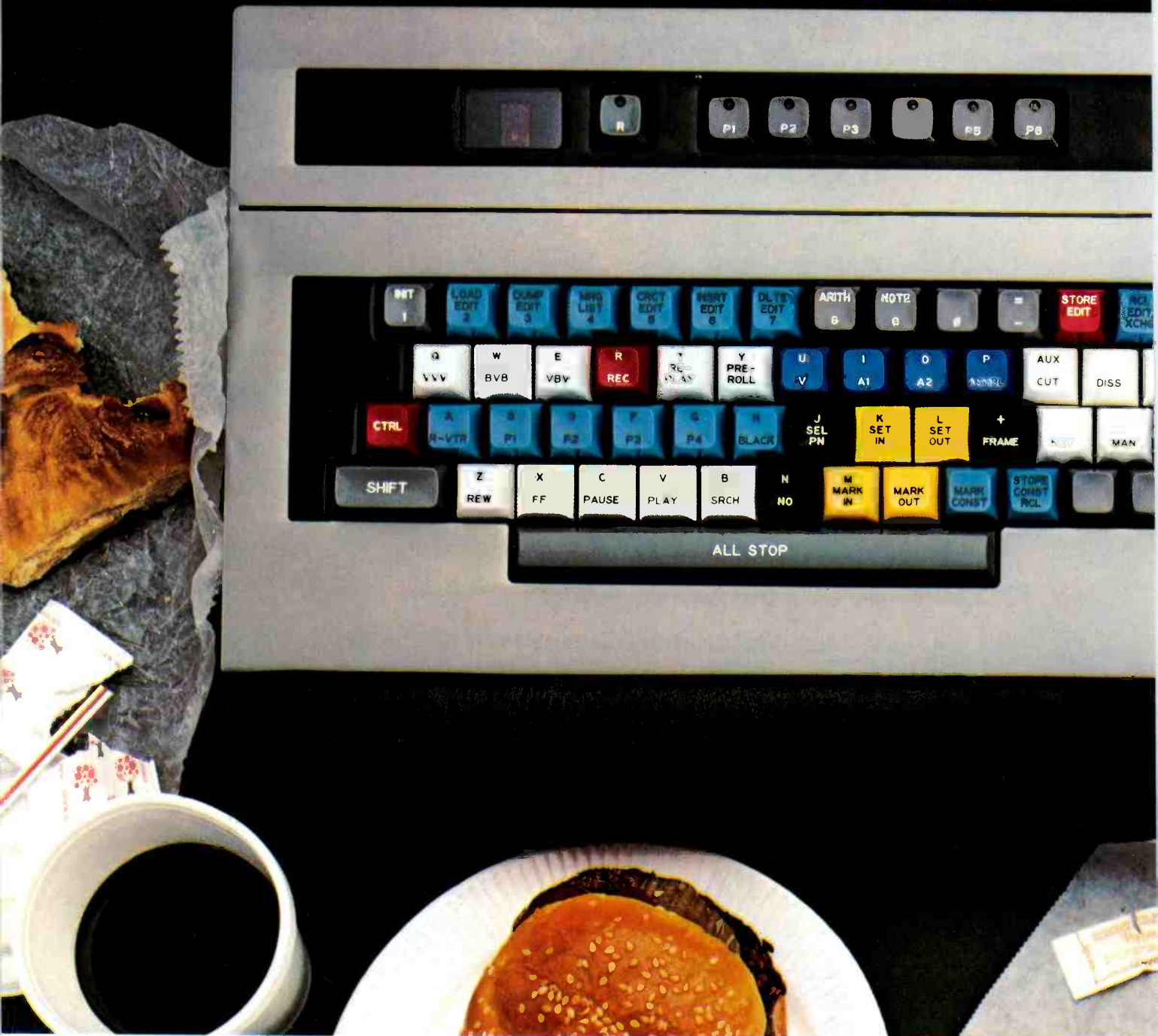


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—Randy Cohen, *Broadway Video*



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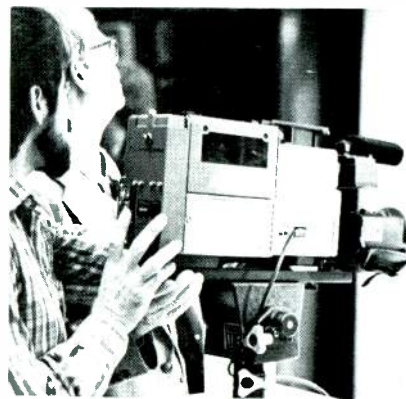
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TV's future

standardize on 1/2-inch high performance videotape format. Certainly I realize that right now they may be miles



Sony's combined camera/recorder, displayed at the SMPTE Convention, showed dramatic improvement since its prototype demonstration at NAB '81 in Las Vegas.



Panasonic's combined camera/recorder, also shown at the SMPTE convention, is scheduled for early '82 delivery.

apart; however, I would hope that initially some form of standard could be accomplished.

"Perhaps, we as broadcasters could get them, as an interim compromise, to agree upon a mechanical interface standard. This would encourage the camera manufacturers to design their cameras with a standard interface and leave the choice of the VTR to the user. This concept is similar, in some respects, to our *de facto* use of the battery interface connector on the back of most ENG cameras.

"The future of electronic equipment in the industry is automating so fast that the day-to-day setup functions can be accomplished with a micro-processor. The introduction of the automatic telecine is a step in the right direction.

"What is needed in the future is more concern with the human engineering of the product than the over-concern for compactness."

Phil Godfrey
 Engineering Lab Manager
 ABC, New York

Zavada: Kodak

"I anticipate that during this decade

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“Now I can do match frame editing without picture shift. Ever.”

Ed Dudkowski,
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“For today’s kind of editing, you need Phaser II. I didn’t just come to that by accident. I knew exactly the results I needed.

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“We had four separate criteria.”

“We had four separate criteria that had to be met. First and foremost was match frame editing. Second was joy-sticking ability (at all tape shuttle speeds). Third was drop out compensation.

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“Phaser II filled the bill.

“If you want to do back-to-back dissolves, you have to stop the second machine. Re-cue the first machine for the next dissolve. And then pick-up record a back-to-back match frame edit.

“The requirement for both 3/4 inch and one inch is that the play machine and the

source machine must frame up exactly horizontally and vertically at the same precise place every single time. If it jumps one cycle, or is off by 180° in color framing, then you’re going to have a visible picture shift.

We explored fourteen different models.”

“Phaser II gives you the precision you need. Match edits are invisible every single time.

“We explored fourteen different time base corrector models and this is the only one that met our criteria.”

Ed Dudkowski looked to Digital to solve his problem. It was one that most people didn’t even think could be solved. From the solid foundation of the DPS-1 and the Phaser, the solution came easily with just a slight modification.

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Ed Dudkowski chose the Phaser II because he knew he could expect great picture quality. But it also solved his problem of match frame editing: that was unexpected. From Digital you learn to expect the unexpected.

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TV's future

the home viewer will realize significant improvement in the visual and oral presentation through a combination of advancements in technology highlighted by digital developments from studio to receivers."

Roland Zavada
Engineering
Eastman Kodak Company

Mason: Kodak

"As a supplier of film, which is the medium used for production of so much TV programming, Eastman Ko-

dak Company has a vital interest in the future of the broadcast industry. Looking at the decade ahead, we anticipate continued evolution of basic home TV entertainment form—adventure/drama, situation comedy, sports and news.

"New technology coming on stream in this decade—digital video, satellite distribution, high definition video—will have a major influence in several areas. Perhaps most important to us at Kodak is that the intrinsic imaging capabilities of photography will enhance its importance as a high quality, cost effective original re-

ording medium as high definition video systems are commercialized. The great impact for the consumer over the years ahead is the wide array of available program delivery methods—broadcast, cable, tape, disc, pay TV, low power TV and satellite—which will doubtless provide a sound business base to support increased production of TV programs as well as feature films.

"In short, we see technology broadening the entertainment business base, more competition for viewer attention leading to increased and improved programming and the film production community, which is well equipped to meet these creative challenges, enjoying significant new opportunities as a result."

Ken Mason
Vice President
Eastman Kodak Co.
Rochester, NY



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Connolly: CBS

"In my opinion, the most significant aspect of the agreement on a compatible worldwide digital standard may well be that international agreements become habit forming. This would be particularly true if a standard for high definition television is to become an issue. The economics dictate equipment built to a single standard for the economic viability of a high definition broadcast service.



Ikegami's new EC-35 with auto setup paves the way for electronic cinematography.

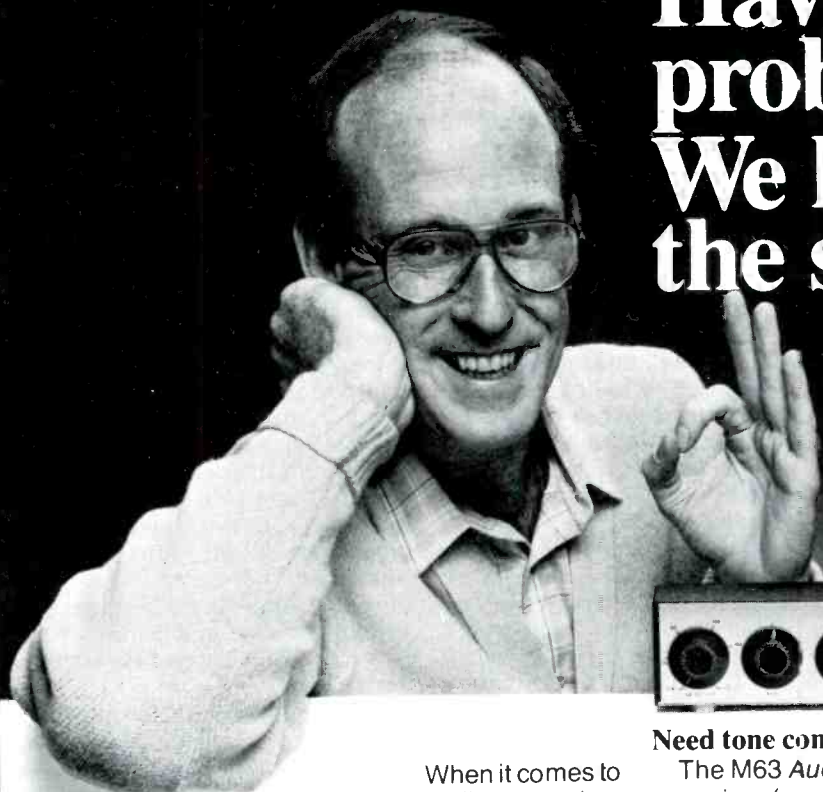
"The EC-35 camera developed by Ikegami has been designed for the production of action drama series for TV. Presently these series are almost exclusively shot on film. The similarity of the EC-35 to a film camera is not accidental. The intent is that the film camera be replaced with the electronic cinematography camera with as little change in method as possible."

William G. Connolly
Engineering & Development
CBS Television, New York

Rainger: BBC

"Picking some highlights, we feel that there will be a growth of new

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The M610 Feedback Controller is specially designed to control feedback in PA systems. Also excellent in post-production rooms for eliminating unwanted background noise from broadcasts, tapes.

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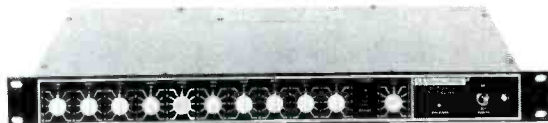
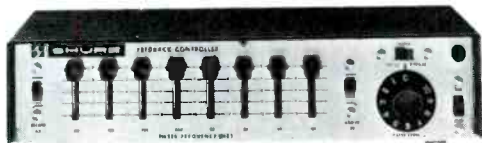
The SR107 Audio Equalizer provides "audio sweetening" in post-production rooms for audio and video tapes, and room equalization for hotel, restaurant, church public address systems—perfect where rack space is at a premium.

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TV's future

facilities for the home and for broadcasters.

"In the home, we are seeing the rapid growth of television on demand—that is, breaking free of schedules. The VCR and teletext both offer this facility, and there is rapid growth in both of these areas. The low cost of teletext is also promoting its development to provide direct communication to computers in the home.

"For the broadcaster, these many new facilities are mainly provided by digital signal processing. The virtue of the decision to go into telecommunications is becoming more clear each day. There is a growing market for this equipment, and it will change much of the broadcasting operation.

"At the same time, the financial pressures will become even more severe in both the home and in broadcasting. This will give greater strength to the development of compatible systems which will limit the amount of new investment which is required."

Peter Rainger
Engineering
BBC, London

Wells: PBS

"In the last year, a great deal of attention has been given to digital stan-

dards in TV production and to digital standards for TV sound and for consumer audio products. Agreement on the basic elements of an international standard for TV production is a truly remarkable achievement.

"However, virtually no work is being done in developing standards for national and international long-haul transmission of television either by terrestrial microwave or satellite. Digital transmission of television could be very significant. In the past, we have thought of a channel provided by a common carrier as having a defined bandwidth for a defined service. With digital transmission that will no longer be necessary.

"A single bit stream can be used for different services (television, voice, data) and the number of bits used can be on a demand basis according to the type of service.

"Bit reduction techniques can be used selectively. For example, a teleconference may require far less capacity in a satellite transponder than a broadcast quality TV signal. Through TDMA (Time Division Multiple Access) techniques, various services could be carried simultaneously, accessed from different points, and the user could decide how much of the transmission capacity (number of bits) should be allocated to each ser-

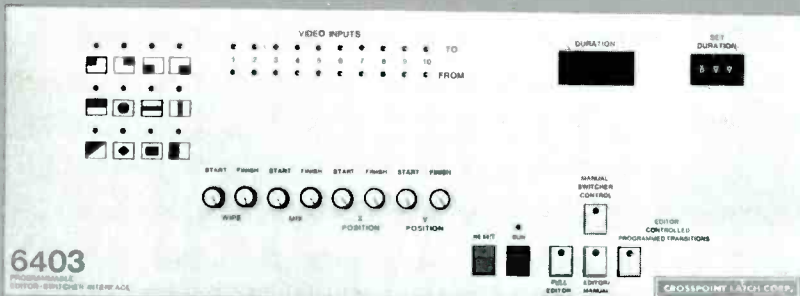
vice, depending on cost and quality considerations.

"In public broadcasting we think it is important that UHF improvement continue to go forward both in terms of reducing costs to stations by utilizing transmitter efficiency techniques and in terms of improving reception (the antenna installation and the TV set). In order to make UHF service comparable to VHF, receiver manufacturers who claimed that a 12dB noise figure was impractical for UHF receivers on a production line basis are, in fact, producing to that newly adopted FCC standard, and there is evidence that the UHF noise figure can be further improved using components that have become available in the last two years.

"Also, consider multiple channel TV sound. The EIA/VTS committee on multiple channel TV sound has completed over-the-air testing in Chicago. These tests have shown that stereo, plus a separate audio program channel, are practical and can be achieved in a way that is compatible with present TV sets.

"Based on this work, the filing to the FCC for a recommended standard will be ready in 1982. Standards work that has taken place has had the participation and support of both broadcasters and manufacturers. The prospect is

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Do it with style. Better still, do it with *three* styles. Knox calls it Multifont, and it's built into each Mod-16 character generator. It's upper *and* lower case. It's accented letters. And it's resolution down to a *single scan line*. It's just one of the features standard with every Mod-16. It's also by Knox. Plain enough?



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Circle (40) on Reply Card

TV's future

that, once rule making is completed by the FCC on separate audio program channels, multiple channel TV sound will be available as features on new TV sets soon thereafter. We think that stereo, which may also stimulate more attention to TV sound quality, will make performing arts and sporting events more realistic—not only for conventional TV sets but also for large screen projection systems. The separate audio program channel will be useful for such applications as a commentary channel for the blind and foreign language translations.”

Dan Wells
Vice President
Engineering and Operations
PBS

McCormick: PBS

“In a nut shell, we *ain't* seen nothing yet because of all that is coming up. The satellite system that we at PBS have has enormous potential. We have four times more transponders on Westar I and options for a couple more. It means we can distribute all

kinds of things from a central location.

“Cable, also has enormous potential. It's going to eat up programming like you wouldn't believe. You have to have facilities and distribution centers. As programming demands increase, facilities have to expand to accommodate them. Ours is brand new and I don't think it's any secret that CBS is planning a giant distribution center for CBS Cable among other things.

“It looks like experts are rapidly coming to agreement with the entire world on digital standards. The SMPTE conference saw a great step forward. I think they're headed in the right direction for the frequencies they're using—the line sampling rates are consistent, and interchanges are rather easy. All of these things are tremendous advances. We've been fighting with the various systems that we've had—NTSC, PAL and SECAM—which are to a great measure incompatible. Now if we come up with a worldwide compatible system, it will be a good thing.”

Robert McCormick
Director of Engineering
PBS



Syndicated TV programming: From bicycles to satellites

By Gary J. Worth, president,
Wold Communications,
Los Angeles, CA

By mid-1982, it is predicted that more than half the nation's 762 commercial TV stations will have their own satellite dishes.

And as far as the producers and distributors of syndicated TV programs are concerned, it's about time.

For too long, the syndicated program distributors and the independent and affiliated TV stations around the country were playing the old chicken and egg game, waiting to see which would come first: the program-

ming or the earth stations. The distributors were waiting for a sufficient number of earth stations to be in place to justify the cost of satellite transmission. The stations, for their part, were waiting for enough satellite-delivered programming to justify installation of a dish.

It was Paramount Television Domestic Distribution, with its new daily blockbuster, *Entertainment Tonight*, and the Robert Wold Company that finally broke the stalemate.

There's been a little switch . . .

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on

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The acquisition of Colortran by Forward Technology Industries, Ltd., of London, England, was concluded recently and, as a result, many of Colortran's customers, friends and associates have asked what this will mean in the future.

This can best be answered in terms of Forward Technology providing a sound financial foundation for Colortran to increase its already significant investment in new product development and to build a more aggressive marketing effort to satisfy a rapidly changing marketplace.

Colortran's management provides the continuity from the old to the new, and the combination of Colortran and Forward Technology is a partnership that promises increased product innovation, continued excellence in product quality and service, and industry leadership that has become Colortran's trademark.

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TV programming

Entertainment Tonight, with its up-to-the-minute news of the entertainment world, had to be delivered by satellite. The standard tape bicycle would not work for this topical program, and land lines were prohibitively expensive.

Connected with Wold's contract with Paramount to deliver Entertainment Tonight via the Wold Satellite Network, Wold installed dishes at approximately 40 of the TV stations carrying this program. This move, combined with the attractiveness of the program itself and the fact that Entertainment Tonight would be available only by satellite, encouraged dozens of other independent stations and network affiliates to install their own satellite earth stations.

Entertainment Tonight, which debuted Sept. 14, opened the floodgates for the satellite distribution of syndicated programming. Since the first announcement of Entertainment Tonight last spring, the Wold Satellite Network has delivered *Roots of Rock 'n Roll*, a 6-part miniseries distributed by 20th Century-Fox Television Distribution; *Dance Fever*, a weekly entertainment program also from 20th Century-Fox; *Solid Gold*, a weekly from Paramount Television Domestic

The Merv Griffin Show will become more topical in January when it makes its debut on the Wold Satellite Network. Shown (left to right) are Lenore Hershey, editor-in-chief of *Ladies Home Journal*, Merv Griffin, Loni Anderson and Suzanne Somers.



The Solid Gold dancers are featured each week on Paramount Television Distribution's *Solid Gold*, one of the first syndicated TV programs to be delivered via the Wold Satellite Network.



Distribution; *Saturday Night*, a nightly strip from Filmways Enterprises; and *Louis Rukeyser's Business Journal*, a half-hour weekly business/financial news series distributed by Viacom.

In January, *The Merv Griffin Show*, distributed by Metromedia Producers Corporation, makes its debut on the Wold Satellite Network.

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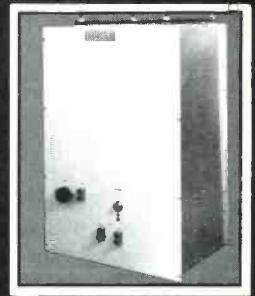
Tube Type	Output	Gain	Efficiency	Cavity Model
8986	15kW	20db	80%	Y1393D-V1
8985	25kW	20db	80%	Y1393D-V2
9011	30kW	21db	80%	Y1393D-V3
8984	55kW	16db	78%	Y1369

There's a very persuasive reason for using a tube with high efficiency: lower operating costs. Over the lifetime of a transmitter this can mean considerable savings.

And RCA tubes are designed for long life.

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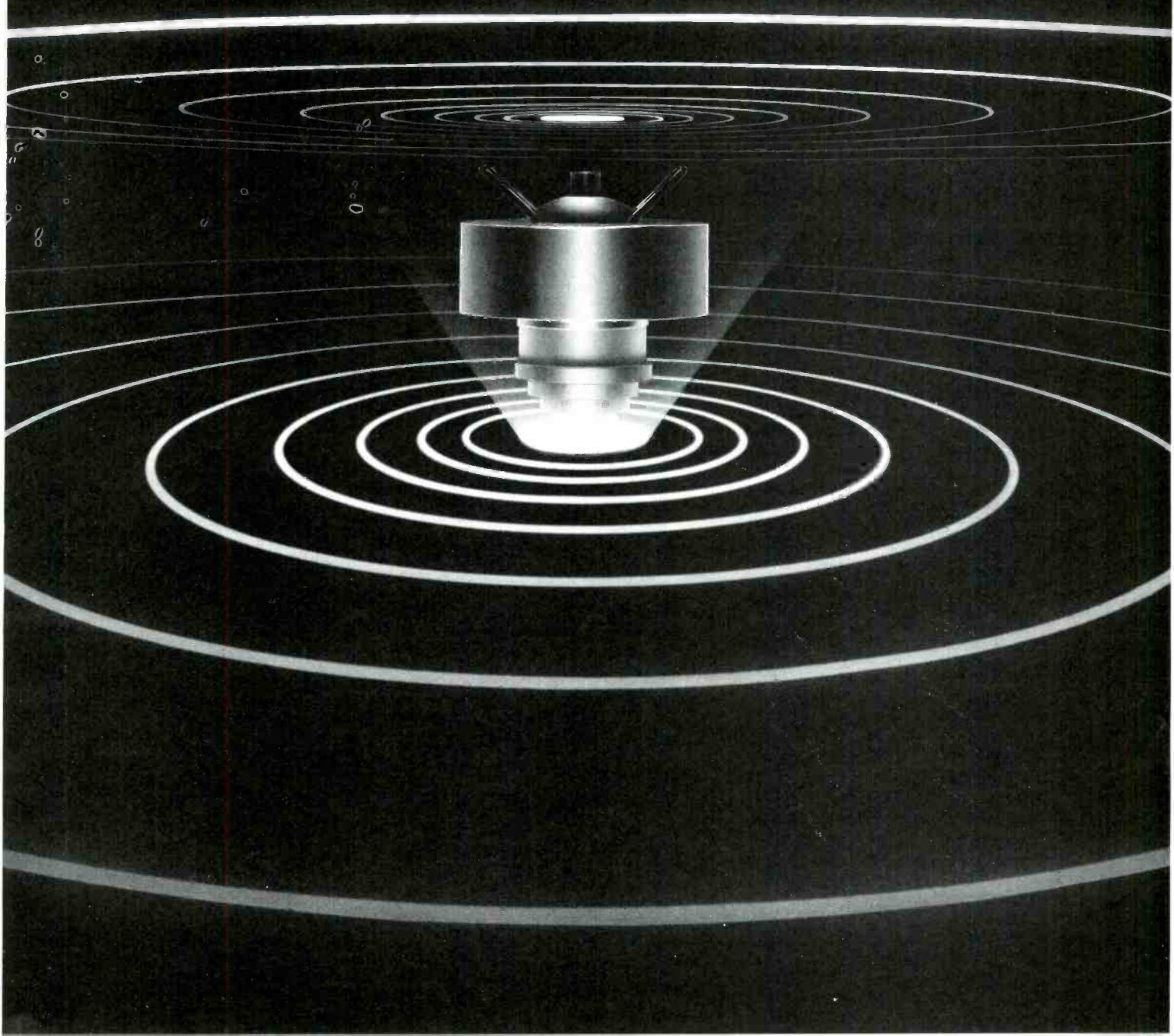
Along with our power tubes, and the cavities that bring out their best performance, we also supply service and application engineering. Find out more today. Contact RCA Power Tube Marketing, New Holland Avenue, Lancaster, PA 17604. Call (717) 397-7661. Or get in touch with RCA, Brussels, Belgium. Sao Paulo, Brazil. Sunbury-on-Thames, Middlesex, England. Paris, France. Munich, West Germany. Mexico 16 D.F., Mexico. Hong Kong.



We supply both the power tube and the cavity. In our pictured Y1393 cavity the 9011 tube delivers a measured gain of 20 db with an efficiency of 80%.

RCA

Circle (43) on Reply Card



TV programming

Tonight, Louis Rukeysers' *Business Journal*, and *The Merv Griffin Show* (which is in the process of being restructured for satellite delivery), the immediacy associated with satellite transmission is the primary reason for its usage.

Historically, syndicated programming has lacked freshness. Lengthy delays between a show's taping and its airing around the country—brought about by the time-consuming process of tape duplication and bicycling—have ruled out any opportunity for topicality.

The immediacy associated with satellite delivery can breathe new life into syndicated programs. Talk shows no longer have to be bland because of their reliance on timeless material, or worse, appear stale because of a reference to a once-timely subject. Program hosts can engage in lively, topical discussions with today's newsmakers.

Satellite delivery of syndicated programs carries with it many other advantages as well, not the least of which is superior tape quality. If you happen to be the 10th or 15th station on a tape bicycle, the quality of the tape you finally receive is markedly inferior to one received by satellite

directly from the distributor.

Simultaneous satellite transmission, with every station receiving the same tape on the same day, is a tremendous boon to the distributor of syndicated series with sequential episodes, such as game shows and soap operas. No longer do station personnel have to contend with tapes getting lost in the mail or being sent to the wrong station on the bicycle.

Traditionally, syndicated programs have not been very popular among national advertisers. Because no one episode or show ever played on the same day or even during the same week (or month) in every market, advertisers could not buy syndicated programs for their national ad campaigns. The national retailer wishing to tie his TV ads to in-store promotions during the Christmas season could very well end up having those ads run in Des Moines or Fargo during Easter.

With simultaneous satellite delivery to each market, advertisers can know in advance the exact day and date on which their ads will run in each city and, thus, conduct coordinated national campaigns.

The attractiveness to advertisers of satellite-delivered syndicated shows is in fact one of the primary reasons why Filmways Enterprises elected to put

its Monday through Friday edited reruns of the *Saturday Night Live* series up on the bird, with the title shortened to *Saturday Night*. According to Jamie Kellner, president of Filmways Enterprises, both Warner Brothers and 20th Century-Fox Film Corporation are major advertisers on *Saturday Night*. "If a film company has a new picture opening, they know the commercial will run on the same day nationally," Kellner said. And, he said, satellite delivery also means advertisers are willing to pay higher rates than they would pay for bicycled syndicated programming.

Currently, about 250 TV stations have satellite dishes. As more and more stations get their own dishes—and as fewer stations will have to receive satellite-transmitted programs via land lines from a neighboring earth station—the cost of satellite delivery will decrease. In many cases, in fact, satellite delivery already is more economical than tape dubbing and bicycling. And whereas the costs associated with dubbing and bicycling (namely, tape stock and postage) are always rising, the cost of satellite transmission has declined steadily through the years.

Who knows, maybe one day even Lucy, Ricky, Fred and Ethel will come to us by satellite. □

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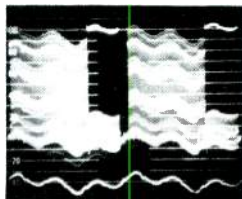
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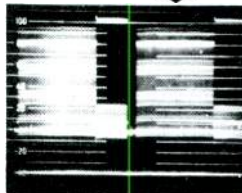
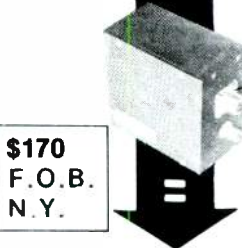
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Diagnosing/servicing: A future look

By Raymond J. Smith, director of technical operations, WKYC-TV3, Cleveland, OH

The future success of any new technology must rest, at least in part, on some method by which that technology can find sustenance. A new combustion engine presupposes a source of fuel, a microwave oven assumes a continuing source of electricity. Where a new, complex technology is intended to provide a

continuing service, there must be a means of handling the component failures that will occur eventually. This article will attempt to define a problem in simple terms and to suggest ideas for the maintenance of the new technologies, as they affect broadcasters.

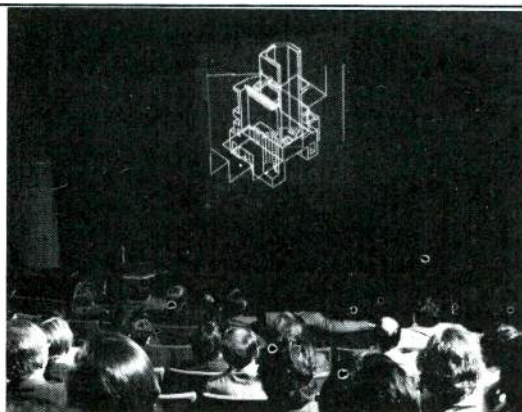
There is an old saying that "Everyone keeps talking about the weather, but no one does anything about it." It is possible that we may have a corollary when it comes to the complexity of today's broadcast equipment, particularly that used in television.

Anyone who has the responsibility

of keeping a modern broadcast plant operational, and who spends some time in consideration of that charge, will eventually become afflicted with the cold-sweat syndrome. This occurs if one of those microprocessor-controlled wonder gadgets goes out when your best maintenance man has just started a 2-week camping vaca-

tion. The loneliness will rival that experienced by Admiral Byrd at the South Pole.

The obvious solution to that problem is to train more people to service such equipment, and to try to ensure that at least one of them is in town. Experience shows that obvious solutions tend *not* to work as planned. The



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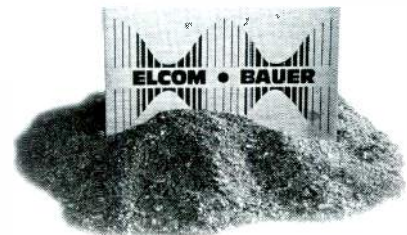
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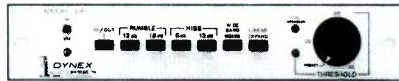
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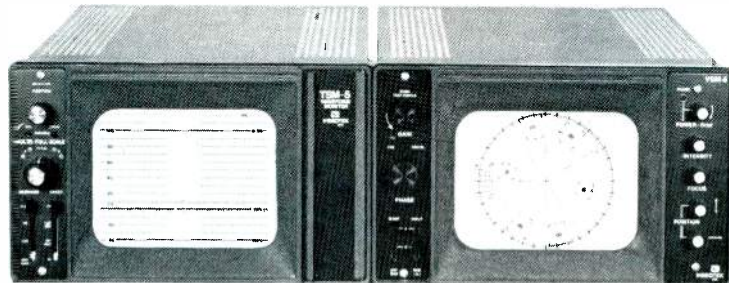
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facts indicate that there are fewer technically adept persons available in broadcasting than there once were.

Retirement and competition have taken their toll. The industry is losing good technicians faster than they are being replaced, at a time when the need for their services is increasing. Those engineering supervisors and managers who can find the time may be able to help a bit, but in the long run it is a losing battle for most stations.

That brings us back to our original problem. We all talk about the competitive need to provide these wondrous devices for the news and program departments; we all talk about the geometrical progression of equipment complexity; and we all talk about the shortage of technicians who are willing, or able, to deal with this complexity. We all talk about such things—but it seems that nobody is doing anything about them. Some answers to the problem could be quite simple, but their implementation would be an enormous task.

Servicing revolution

If we are not to go back to the old tube, resistor, capacitor days, then we will have to admit that a revolution in equipment servicing must take place. Having come to that point, some company or person will then have to take the first step toward starting a new discipline, namely diagnosing and servicing today's technology without the use of scopes, meters and schematics. Moreover, the design of the new diagnosing and servicing schemes will have to become a part of product development.

What kind of thoughts come to mind along these lines? Suppose a company is about to embark on the design of a new device, something along the line of a frame synchronizer. There may be a few microprocessors, a megabyte of RAM, a couple of A/D and D/A converters, and a couple of other special purpose chips. After deciding what broadcast purpose the device is to accomplish, the next step would be to decide whose responsibility it will be to troubleshoot it and how that will be accomplished.

The first thought that comes to mind, an old one, has worked in some instances. This calls for sending the equipment, or at least a few of its boards, back to the factory, which is generally unsatisfactory because the equipment is then completely out of service. When a unit such as a DVE used for a fast paced newscast is out of service, this results in management being unhappy. Even if this procedure

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Actual unretouched photograph showing TK-86 picture without Contrast Compression.



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were acceptable, what techniques would the factory technician use and could the cost and time frame be kept at a reasonable level?

Automatic test equipment

In factories in which automatic test equipment is involved in the manufacturing process, a board or a chassis could be run back through the system, which would be a fairly rapid way to turn-around a unit sent in for repairs. It could also be a way for a manufacturer to amortize the heavy development cost of its test equipment. The assumption is that the equipment would be available at the time needed and could be quickly reprogrammed and set up to test the various types of devices sold by that company. This is a solution, but not a very good one.

If problem diagnosis in such a complicated device could be made an integral part of its design, the process would be free of the negative aspects of trying to use automatic test equipment, and it would spread out the possibilities for diagnoses to three areas: the station, a field service representative or the manufacturer. As we have seen, self-diagnosis is part of some equipment being sold, but that is not what we are talking about here.

A few manufacturers have built in simple diagnostics as part of their system designs. Basically, this consists of inter-module checking or confirmation that certain important conditions exist, which is helpful but does not go far enough. What is needed is to get closer to the actual problem quickly, because in digital technology, cause and effect are often not as obviously related as they were in the days of analog.

Common logic bus

The emergence of the common logic bus with modules and microprocessors operating on a parallel/protocol basis is both boon and bane in assembling complicated systems. Yet, it appears that it could be a distinct advantage in setting up new schemes for diagnosing problems. It is not difficult to imagine that each module connected to the logic bus would have its own on-board diagnostics stored in PROM, manipulated and analyzed with a microprocessor.

The home computer has shown what can be done with relatively few components. We have versatile monitors coupled to PROMs containing all sorts of utilitarian software from memory tests to interpreters. In shopping plazas, airports, saloons and homes, we see a mind-boggling assort-

ment of electronic games. In simplest terms, each one contains circuits that analyze the actions taken by the player, and then give a response. It is a form of troubleshooting when you consider that the performance of a device (the player and his controls) is compared to a reference (the other player, or a perfect score) and the result is displayed.

The actual method by which the tests and diagnosis would be made can take a number of forms. Each has advantages and disadvantages. For instance, newly developed circuitry and chips could be incorporated to isolate an individual card or module. This could be done by electronically lifting out the circuit to be tested and moving it to a special diagnosis bus. Or all boards could be left in place and all but the one of interest could be isolated from the data bus with something like a tristate digital directional coupling chip.

Once isolated from the others, a board could be analyzed by software that operates on the diagnosis bus, using appropriate test signals and exercising the circuit while results are checked. A simpler technique might be to isolate the board and check each chip with a probe that feeds its findings to the microprocessor/PROM for analysis and comment. This method would simplify the design of a diagnosis bus.

Alternatively, a single pin probe or a multipin clamp-on probe could be used to provide a performance map of each chip, the results to be checked against an ideal map stored in PROM.

It is not difficult to imagine that, as an alternative, an external testing device using a microprocessor along with PROM or ROM could be tied on to the logic bus; either directly, or through a serial interface adaptor.

Obviously, when analysis is being done on many components simultaneously, the software becomes extremely complex. It would not be unreasonable to speculate that software development cost could outpace the cost of developing the product itself. It may be that checking dynamic performance would be the wrong direction to go. Perhaps a better route would be to synthesize the circuit, in software, where all possible failure modes are modeled for comparison to the device under test.

Computer software

Having established this train of thought, we can see how the business of diagnosis could be handled by a station, field representative or factory, working with a display device of some sort, and a keyboard or key pad. The diagnostics could be exercised in sequence or randomly, based on pat-

terns suggested by the designer or based on interpretation of the results being encountered. What is important is that the process will be carried on without test equipment of the sort traditionally used. Within the realm of possibility would be the connection of the malfunctioning device to a field representative office, a tech center, or the factory through the use of a telephone coupler.

It must be kept in mind that underlying what is being discussed here is the fact that many of the new devices in the TV plant of today and tomorrow represent complexity unheard of only 10 years ago. Digital technology, and some of the fancy analog efforts, accomplish fantastic results through a massive application of intricate timing, feedback and storage. Because most of this was derived from the age of the computer, it seems logical that computer techniques will have to be applied to keep it operating properly. Remember, also, experience teaches that adequate test equipment must, by definition, be at least as sophisticated as that which it tests.

New breed of designers

No one at this stage can predict exactly what form the servicing of future generations of equipment will take. One thing is clear however: If broadcasters are going to demand production equipment of ever increasing complexity, then keeping those tools working will likewise become more complex. This suggests the need for a radical departure from present thought. We may see a new breed of designers emerge whose role will be to think only in terms of diagnosis. They may develop something called a diagnosis bus, where many critical circuit points can be brought out for analysis. They may suggest that some form of generic analyzer be built for use by stations, or carried into a station by a field engineer, or located at the end of factory telephone lines. They may suggest that each new switcher, synchronizer or self-aligning camera be sold with an accompanying floppy disc, on which is the test analysis software.

The new breed of designers will have their work set out for them. There will be problems far beyond accomplishing any of the speculations set forth herein. It will not be easy to fit in an additional 8-bit diagnosis bus, much less keep it from being a source of crosstalk or other circuit deterioration. Nor will it be easy to find room for additional chips and connectors. Beyond that will be the problem of keeping the mental processes of the diagnosis specialist and the circuit designer somewhat apart. After all, what is desired is to be able to self-

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14-2RHA featuring plug-in circuit boards for easy maintenance.

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diagnose the circuits created by a circuit designer, not to risk a compromise in circuit performance in an effort to design the circuit so as to be self-diagnosable.

Those who know anything about the development of software, circuit boards and chips might cringe at some of the thoughts suggested here, which would represent almost monumental undertakings. But there may not be any other choice. Manufacturers must produce and sell if they are to survive. They cannot sell if they are to survive. They cannot sell the prosaic simplicity of yesteryear. The news and program creators of today consume technical concepts with an insatiable appetite. If things inexorably become more complex at a time when station technical skills show signs of weakening, some new

directions will have to be opened up, regardless of the difficulties.

Other solutions

What has been suggested here is not intended to be a serious attempt at prophecy. Rather, they are words put out in the hope that they might stimulate a broader range of thought, in an area that would appear to have significance for broadcasters who find themselves increasingly immersed in complex technology. Important input would be expected from those who would be given the task of designing tomorrow's methods of diagnosis and service. Having had to face realities such as were suggested here, they may decide that other directions offer more promise.

For instance, they may suggest that the chipmakers could offer a partial solution. Everywhere in our society

we see the handiwork of sophisticated chip design employed in products that have become a part of daily life. Can anyone look at one of those \$15 LCD watches without wondering whether the technology can be applied to broadcast equipment? Does anyone dare to believe that future chips would have an LCD display on their top surface? Is it possible that the status and operation of complex chips could be displayed as are the calendar, stop watch and time functions? If possible, would it be practical?

Finally, all this discussion would be made academic if manufacturers could find a way to bring down the cost of devices so that we could throw them away when they fail. But that is another story. How come everyone keeps talking about the problem, but no one seems to be doing anything about it....or are they? □



Recent changes encourage radio prosperity



By Harriet "Sis" Kaplan, president, National Radio Broadcasters Association, Washington, DC

Tremendous changes have taken place this year in the regulatory and legislative areas of broadcasting—an unprecedented reversal brought about by the change in the administration in Washington, as a result of the presidential and congressional elections of November 1980.

The immediate effect of the election was to freeze many of the actions that the FCC, under Chairman Ferris' leadership, had planned to implement. Charles Ferris and Tyrone Brown resigned, and the new team took over. President Reagan had the unusual opportunity to appoint a chairman and three commissioners. We got Mark Fowler, Mimi Weyforth Dawson and Henry Rivera. Also, Jim Quello was reappointed. Suddenly the balance of power shifted. The new

chairman's philosophy completely changed the thrust of the FCC's plans and actions, and a new attitude and atmosphere prevailed at 1919 M Street.

In recent months, Chairman Fowler's words and actions have clearly lit the path he intends to follow. He is moving ahead to eliminate all the regulations he considers unnecessary and that current law will permit him to eliminate. Our new chairman believes that any regulations that are not necessary for technical management of the spectrum are unnecessary regulations. He knows that the Communications Act of 1934, as it now stands, mandates certain FCC regulation, and that is why he is moving to have Congress change the law and is urging our industry to put pressure on Congress to

change the law. The FCC's request that Congress repeal the Fairness Doctrine and Section 315 is the first step in the FCC's push to drastically revise the 1934 Act.

Chairman Fowler believes that you cannot hope to be deregulated as broadcasters and be protected at the same time. Freedom has its price, and that price is competition—not necessarily more stations, because the chairman is not sold on the theory that more is better—but surely more competition.

Now we come to the other component in this equation—the Congress.

The so-called deregulation of radio by the FCC in Docket 79-219 was not deregulation, but re-regulation. Rather than being a boon to broadcasters, it might very well prove to be a

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Prosperity

dangerous trap. Broadcasters who feel snug, warm and safe in their complacency are certainly in for a rude and expensive awakening.

Senate leaders such as Packwood, Goldwater and Cannon are determined to pass a deregulation bill in this current, 97th Congress. Senator Packwood, chairman of the Senate Commerce Committee, led the fight to attach the deregulation of radio to the Budget Reconciliation Bill, but he was blocked by the Democratic leadership of the House Commerce Committee.

Senator Packwood did, however, demand and receive two important concessions. One was a 7-year license term for radio (five for television), and the other was the deletion of license

fees. Senator Packwood had promised "no deregulation, no license fees," and he stuck to his promise.

We came out of the budget fiasco with several things. We have longer license terms and no fees, but the most important accomplishment was the firm establishment in the Senate that the time had come to deregulate radio.

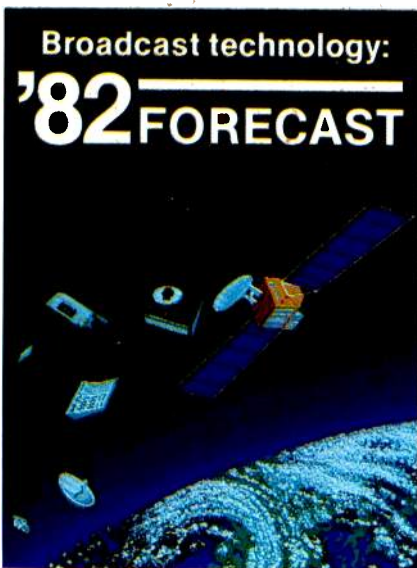
These changes, while they are not deregulation, are substantial victories for our over-regulated industry. Meanwhile, NRBA's fight for deregulation legislation continues and broadcasters' daily challenges remain.

There has been, and no doubt will be, a great deal of discussion about the new technologies and the increased competition they will inevitably bring. Competition is nothing new to radio.

The advent of television brought many false predictions of radio's demise. Radio broadcasters have for many years faced increased competition within their own markets for audience and advertising dollars. Radio will undoubtedly rise again to the challenges before us today and in the years ahead.

Though no one is quite certain what precise effects satellites, cable, videodiscs, DBS, etc. will have on the radio industry, it is generally agreed that creativity will be the key to radio's future. Successful radio broadcasters will be those who are innovative, find new answers to old problems, have open minds, and are willing to experiment.

I, for one, am confident that radio will continue to grow and prosper. □



Radio: Responding to a challenging future



An interview with Ralph Green, vice president of engineering, CBS Radio, New York, NY

In the following interview conducted by **Broadcast Engineering**, Ralph Green takes a look at what effect advancing technology has had on changes in the industry and at CBS Radio.

Q: How do the changing aspects of labor negotiations affect progress in broadcasting?

RG: Three years ago, we at CBS made some jurisdictional changes in our contact with IBEW. On the FM side, we are now permitted to go combo, which is a first in the history of this company. That has worked out rather well. It has not hurt the labor force as far as the unions are concerned. In areas where there has been staff reduction, it has been by attrition or transfer. When I say attrition, I mean retirement, or transfer to another broadcast part of CBS.

On the AM side, the only restriction

we have is that we have to have one person on duty in the control room that is feeding air. Of course, in our format, where we are basically news and talk, I don't really know how we could do our kind of programming having the news anchor run the whole thing. It really is a practical way to operate and not inefficient.

Currently we are in negotiations with IBEW for a new contract. The contract has a theoretical expiration date of Sept. 30, but the contract is self-perpetuating in that either side that wants to terminate or make changes has to notify the other side of their wishes.

We spent five weeks from the end of August through the end of September working on the negotiations, bargaining across the table with the union. We still have a lot to talk about and are not ready to say "Okay, fellas, this is it." We met again the first two weeks of November. I don't know how we're

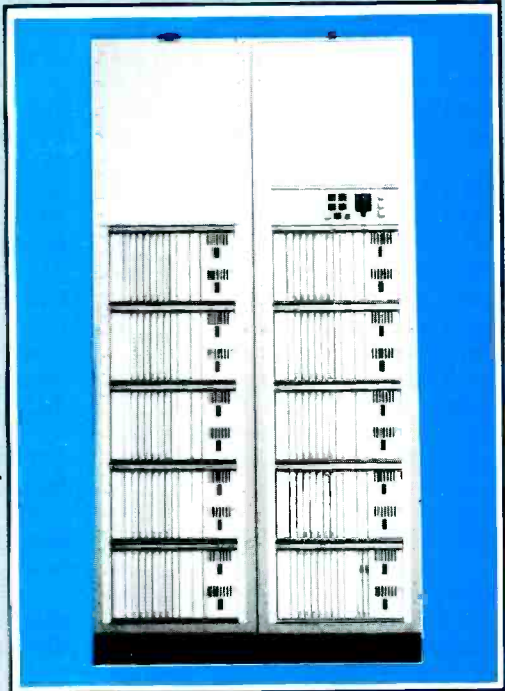
going to come out; whether we will be ready to agree that's all the talking we need to do or whether it will continue after that. This is basically a 3-year contract. The contract has an expiration date, but it is only meaningful if someone gives notice.

Anytime you negotiate with the technician's union, it is generally a tough negotiation because the union is trying to protect jobs. Anytime you talk about jurisdictional changes, which, from the union's perspective, threaten numbers of people on staff, they get concerned. I think the way we have been able to negotiate successfully at CBS is that, first of all, we put minimum guaranteed numbers on staff at the radio network and at the seven AMs and seven FMs. So there is that protection. The only way we can get down to the minimum number is by attrition or transfer.

Between CBS and IBEW there is a pretty good relationship; both sides

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Crosstalk @ 3.58 MHz	-63	71.1	65	-60 dB
Diff Gain	.05	.042	.05	0.1%
Diff Phase	0.1	.056	.08	0.12°
Diff Delay	1.0	.89	.95	± 1°
Freq Response	.05	.02	.05	± 1.2 dB
Hum & Noise	-79	-84.6	-80	-75 dB
Gain Uniformity, All Paths	.017	.006	.017	± .07 dB
Input Return Loss	46	51.2	46	40 dB
Output Return Loss	45	48.8	46	40 dB
AUDIO				
Crosstalk @ 20 KHz	-80	-84.7	-81	-75 dB
Hum & Noise	-88	-91.8	-90	-85 dBm
THD 30 Hz - 20 KHz				
@ 0 dBm	.017	.011	.015	0.1%
@ +24 dBm	.24	.13	.17	0.5%
Gain Uniformity, All Paths	0.1	.044	.09	0.2 dB
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Radio

respect the other's position. With that mutual respect, I hope that we will come through this negotiation with a contract that both sides can live with.

Q: What about satellite distribution for the major networks?

RG: As far as NBC, ABC and CBS are concerned, we are all actively talking to both carriers and earth terminal suppliers. At CBS we have a letter of intent to negotiate with RCA Americom and, we hope to arrive at a contract by the end of this year. Recently, AT&T came in with a proposal that also looks very attractive. These are basically carrier proposals. In other words, we would deliver signals to the carrier and they would take them to their ground station and uplink them to the satellite. After that point, it becomes basically a network responsibility for the receive-only terminals at the affiliated stations. This applies to both the RCA and the AT&T proposals.

In terms of terminal suppliers, we are talking with several vendors. We put out requests for proposals to six vendors around the beginning of September and have responses from four. The responses came in such a way that we can't make a direct com-

parison. Right now we are making a comparative analysis of these responses so that we can see the pluses and minuses to each proposal and the effect on bottom line dollar figures. It is our intent that our affiliates will own the receive station terminals. I might add that ABC and NBC have signed letters of intent to negotiate contracts with Scientific Atlanta. We have not signed such a letter with any vendor, and won't be able to do that until we have thoroughly analyzed the proposals submitted. By the way, these are digital transmission systems.

Q: What is a probable time frame for satellite linkage?

RG: Well, let's make some assumptions. Let's assume that we have these proposals analyzed and are ready to sit down, negotiate, and put signatures on a contract by the end of this year. If you do that, you're looking at almost a year or maybe even a little longer before the carriers would be ready to accommodate the digital transmission system to their uplink station.

Also, all the vendors have told us to allow a minimum of six months lead time from date of contract before they would start actual production and have earth stations coming off the line

at their plant. So, you're looking at roughly July of next year. We're looking for a minimum of 50 terminals a month coming off the line and, concurrently, being installed. If you look at our case, where we have approximately 425-430 affiliates right now, which probably will have grown a little bit by next year, you're looking at 450 affiliated stations at CBS at 50 a month. It would be approximately May 1983 before full implementation for CBS Radio.

I think that satellite distribution using a digital system for ABC, NBC and CBS is much closer to becoming a reality than it was a year ago. It's actively under consideration at these three networks, and I don't see it falling by the wayside.

Q: Has the loss of the first class license had an effect in terms of personnel selection or quality of broadcast signals?

RG: I would answer that from the perspective of a large market operation. Basically, it hasn't changed things for us. In the past, we insisted that people we hired have the license only because it presented scheduling problems for our operations people if they didn't have a license. (Such as having a person on duty and then having to relieve him with somebody else


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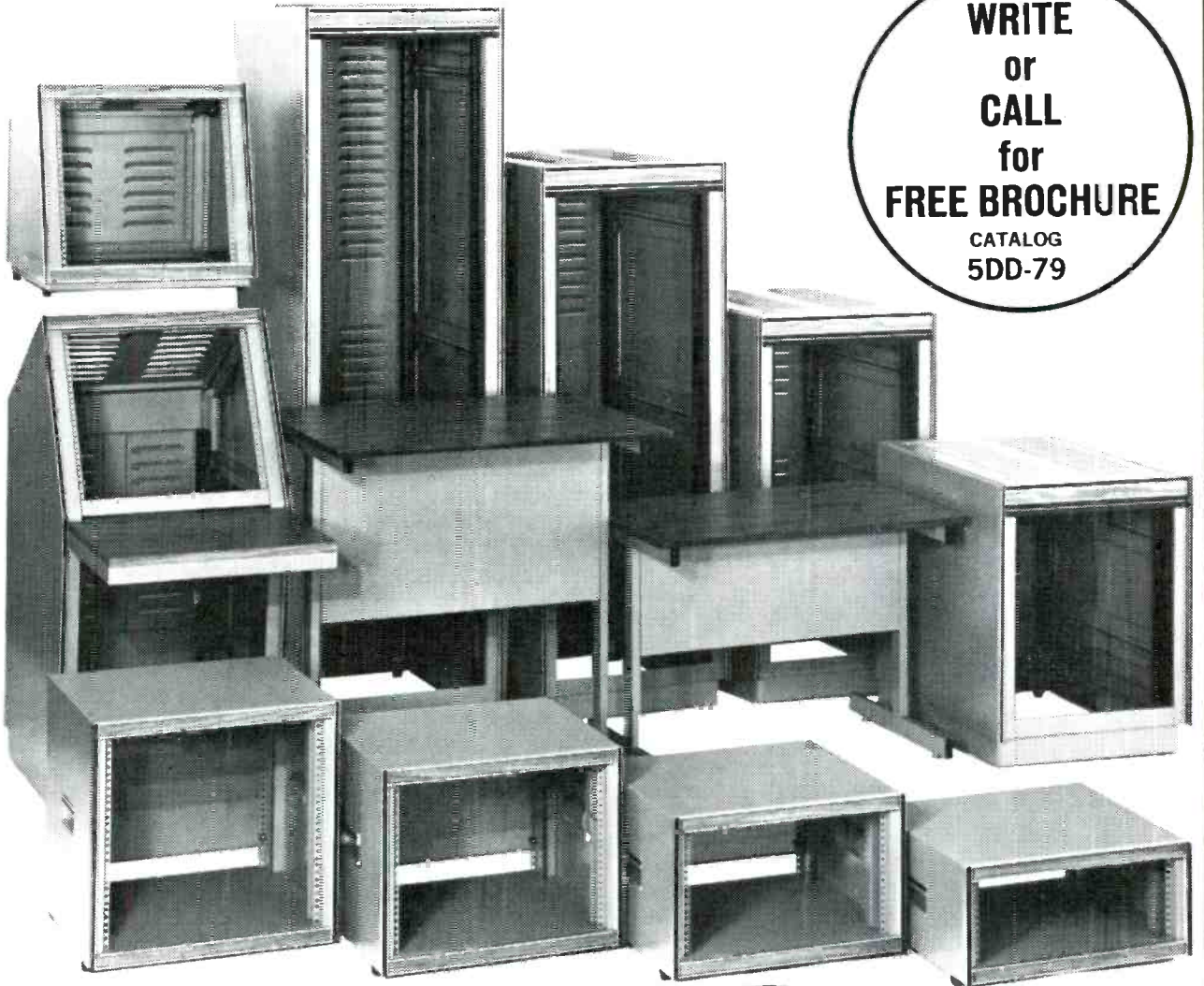
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Radio

for his breaks). That was a requirement, but not because it was supposed to indicate any degree of technical competence.

Now, a restricted permit is all that is needed to satisfy the FCC requirement. To that degree we have a lot more freedom in who we hire. We might hire people more for their production abilities than for their technical knowledge. That's one viewpoint.

Another viewpoint has to do with the way the order was written as it was published in the Federal Register. The chief operator himself had to perform certain maintenance and adjustment duties and things such as reviewing logs for completeness. NAB and ABC petitioned for a change so that the responsibility could be delegated under the direction of the chief operator to someone else at the station, and we supported those petitions.

Recently, the commission put out a correction, changing a couple of words here and there where they had said that the chief operator may initiate repairs, adjustments, etc. I don't know whether that's their response to the petitions or not, but it goes a long way toward allowing staff members to do the work. The problem for CBS and for other large broadcasters is that the chief operator typically is a member of management, and we have union contracts saying that management people cannot do the work. Maybe the commission considers the problem solved by the word changes that they made, or maybe they'll come out with something a little more specific. I think they understand and appreciate our situation.

Q: What progress have we seen in the last year in the area of automation techniques? What do you see for the future?

RG: I've seen a leveling off in program automation systems for radio by the manufacturers and vendors. In our particular case at CBS Radio, with the contractual change we made three years ago giving us combo rights, we don't really see the need for automating the way we did eight to 10 years ago when we automated in FM. At that time it was worth spending a significant amount of money to automate each of our stations so that we would not have to increase staff by large numbers.

In 1972, we bought automation systems that paid for themselves after about 18 months of operation. We had the benefit of automation in our FM stations from 1972 through 1979. We made the contract change in '78, but it

took a year or so to implement the change. We had the benefits of automation as a labor saving device for about six or seven years. Once we made the change in the jurisdiction that allowed us to go with a live on-line jock doing his own thing, we thought that was a help. In general, the automation systems are now being used as operator assist devices, as opposed to totally automated systems the way we used them before.

Q: What developments do you see occurring in computer-assisted newsrooms?

RG: On the radio side, KCBS in San Francisco pioneered the use of what has been termed the electronic newsroom. Basically it's a text editing device. When it initially went in, there were some software problems, as there always are in these things, but once they were ironed out, the system performed rather well. The staff likes the system. We have portable terminals that can be taken to bureaus, for example, in Oakland, across the bay from San Francisco. A reporter can sit over there and write his story. With a modem he can send the data representing the story back to the station, where it comes out on a printer or visual display.

The other thing I would like to see in news is a means of putting something such as a SMPTE code on small audiocassette recorders and larger open-reel machines that would be doing lengthy recording. A SMPTE code would allow an editor to jot down times as he's listening to the material coming in, and then he could go back and very quickly find key points. He would be able to enter the time into the computer and the computer would search the tape and find the exact spot he wanted. And then, as in video, he could use that code for editing.

Q: How do you see AM stereo moving?

RG: At CBS, we're not looking at it because of our program format. We are news, talk and sports—and I don't see AM stereo as lending itself to that. I think something may happen on AM stereo within the next 12 months. I think that the commission recognizes that they've had this on the back burner for too long.

Q: What differences do you see in the new FCC regime, as compared to previous ones?

RG: I serve on the NAB radio allocations task force. I must say the new regime certainly is more open with this task force. They did reverse the former position on 9kHz vs. 10kHz, which I think pleased most broadcasters. I think the FCC

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Radio

recognized that adequate studies had not been done to support 9kHz. When they finally did get into it, and NAB funded a lot of those studies, it was pretty obvious that the cost just didn't justify what was being proposed.

Kalmann Schaefer, who's heading up the delegation to Rio, seems to understand the problem well. I think the commission is prepared to take an aggressive position at Rio on what is in the best interests of the United States. I think they're going to have some opposition on the night-time interference curves. Last year the proposal at the earlier session was to use 50% of the time interference curves. From everything I hear, most of the countries in the northern and southern hemispheres are willing to go along with that; however, the US position is to stick with 10%. At least I think it is, it hasn't been so stated officially, but I'm pretty certain that's the position.

So what may happen is that the conference will adopt the use of 50% of the time curves for Region II, but the United States, Canada and some Caribbean administrations may negotiate bilateral or multilateral agreements to stay with 10% of the

time interference curves insofar as interplay in this part of the hemisphere is concerned.

Q: Does the "Cuban interference" problem affect you?

RG: That's a very serious problem, and the people going to the Region 2 meeting are well aware of it. I think they are going to go in and do the best job that they possibly can. All we can do is hope that they're able to persuade the Cubans that things like directional antennas can do a better job, using less power, while giving the desired coverage of the island and also preventing the interference that large, high power nondirectional systems create both on the island and externally. I am optimistic, and I'm pleased with the competent people on the delegation.

Q: What can be done to help daytime broadcasters?

RG: The commission is trying to do something for daytime broadcasting. I think that's good. I don't know how it's going to come out or what can be done. Maybe reduced power operation from 6 a.m. to sunrise, sunset to 6 p.m., or a combination of reduced power and a simple directional antenna would be a solution.

Q: What is the future of quadraphonic broadcasting?

RG: It's on the back burner, as I see it. I don't know that anything's going to happen in the foreseeable future. The commission doesn't seem to have too much interest in it. There is little if any material being produced by the recording companies.

Q: What new trends do you see in audio processing?

RG: What I see, as a general industry trend, is a softening of the thrust that you have to process to the nth degree and bang away. Every station still wants to be the loudest one on the dial, but I do think there is a growing recognition in the industry that extreme processing is not the best thing. But there's still a lot of it. As a matter of fact we process on our FM stations, but it's done intelligently as opposed to just going in with base-band clippers and clipping heavily. We don't do it so much on AM because of the program format.

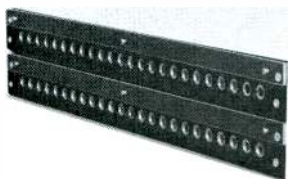
Q: Do you prefer adjustable processors or manufacturer-set processing?

RG: Well, if adjustable processors are used intelligently, they would be preferable. □

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Broadcast technology:
'82 FORECAST



Radio trends point to exciting new year

An interview with John Hidle, vice president for broadcast operations and engineering, Radio Technical Operations, ABC Radio, New York

In the following interview given to **BE**, the author addresses new developments in radio and how they will affect ABC and the industry in general.

Q: At the NRBA convention in September, we heard more about satellites than ever before. How do you see the trend at ABC Radio?

JH: It's coming fast, it's exciting, and it's the key to our future planning. Our distribution plans for radio programming are structured to what satellites and digital technology can do for our service and business.

We've been working on a scheme for about two years, and I've devoted about 80 percent of my time to designing and implementing a system. We're looking to the future, and we want a system that will work for us and provide the flexibility and capacity needed to handle the programming to be added. The system must meet the needs of our current network plus

the affiliate growth anticipated. This includes syndicated services to be added and the Super Radio system being planned.

Our plans call for dealing with a common carrier to put the signal on a satellite transponder and the distribution of our programming via digital transmission techniques. We've selected the digital transmission

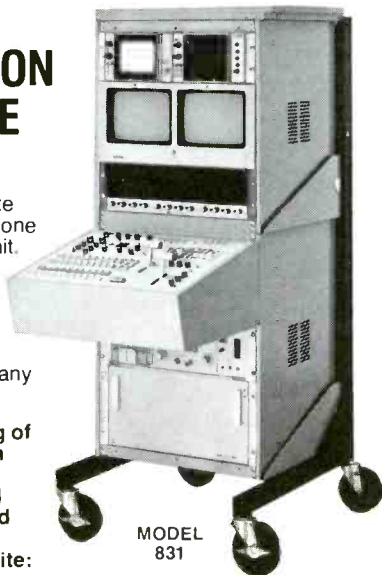
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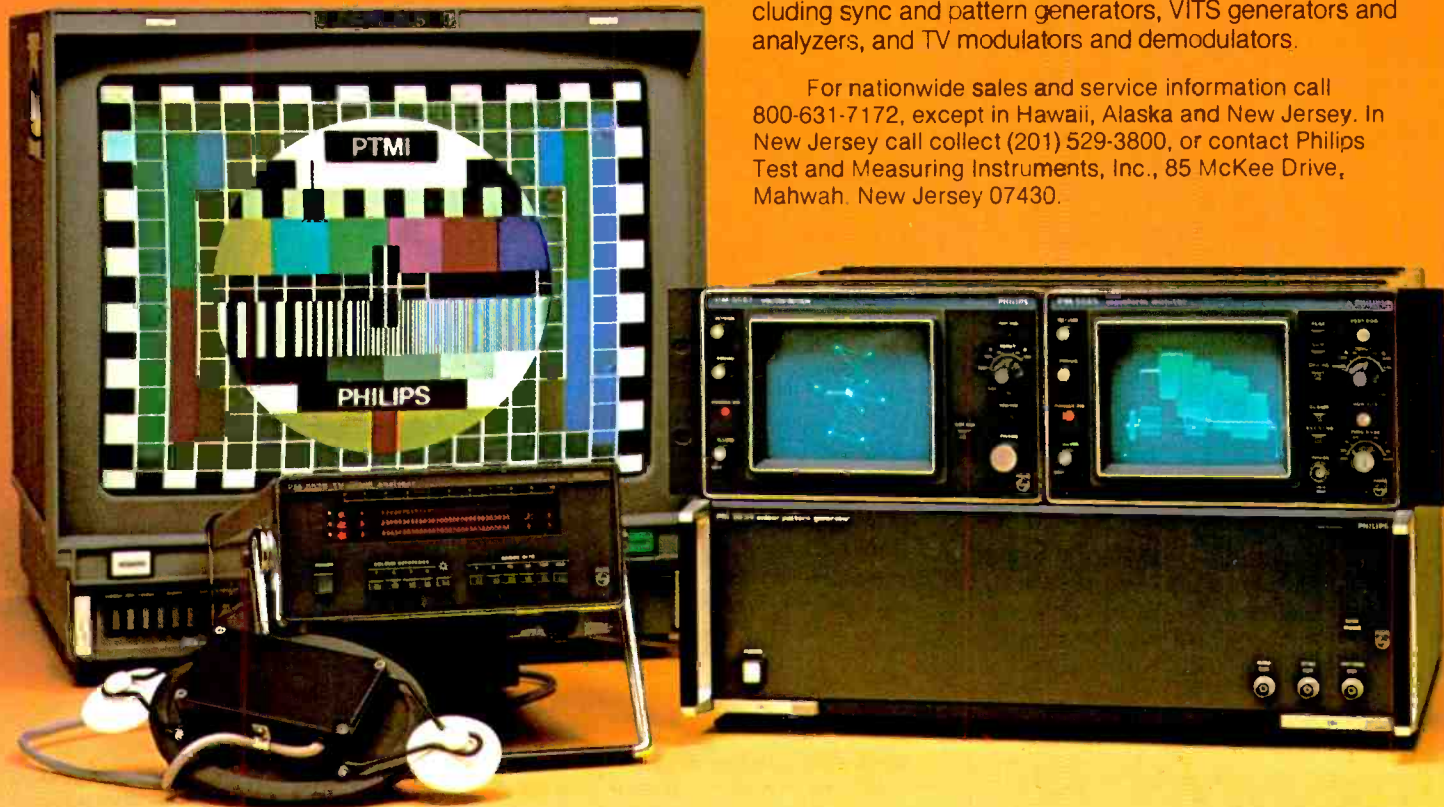
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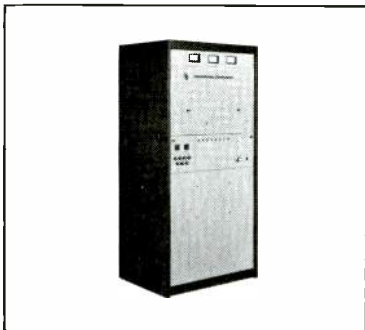
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Trends

method and signed a letter of intent with Scientific Atlanta to supply the head-end equipment for ABC at the network. This will take our audio on premises and convert it to a digital bit stream. The signals will go out as both a digital bit and single stream because we plan for diversity routing. The common carrier is then responsible for uplinking to the satellite.

The affiliates, with their own downlink facilities, can access as many program channels as desired. A typical user probably will have one audio channel used for normal network distribution and a second channel for special services and events that might be fed out at the same time as the normal network service. Of course, AM/FM combination stations will need additional channels to meet their needs.

We chose Scientific Atlanta to supply both the front-end gear and to market the earth stations to our affiliates. We're still negotiating with common carriers. We expect to sign a contract, rather than tariff operation, as a means of long-term savings.

Q: How many channels are you providing?

JH: We're planning 15 to 19 channels of audio, all full 15kHz bandwidth, along with various voice cue circuits and data transmission circuits so that we can save postage and time.

We're considering such things as program schedules, schedule changes, newscasts and text distribution prior to news time to help affiliates determine cues, promotional material, and other data to help our stations—and that's a lot of data for anyone with a full time printer.

Of course, we'll be feeding the different time zones with appropriate program information and fully expect all the flexibility needed from the equipment planned. At the station end, affiliates can receive and use any or all the materials as needed, make changes within the system programming at the flip of a switch, and have different stations using a variety of services.

Thus we view the satellite as an almost unlimited resource for program distribution. And if we end up with any excess capacity, which I doubt will happen, we'll find a way to use it.

Q: What technical/engineering problems stand in your way?

JH: Our major attention is to implementing the system, but some development effort is still required. Let's look at the system in more detail.

We're taking a typical audio channel through an A/D conversion, probably using an available chip. We're going with a 15-bit word, companded to 11-bit, and adding a parity bit. With 20 of these put together, we'll be using approximately the capacity of five T1 chips. We're maintaining standardization with the T1 technology so that we can use Telco distribution.

The system capacity will be broken into as many 15kHz audio channels as we need, using 12-bit words and a rate of 32 kilosamples/sec per channel. We'll put up to 19 of these channels together with appropriate cue and data channels into bit stream at the common carrier's uplink station. This will be forward error corrected by adding an extra bit frequently to get the bit error rate down to the order of 10^8 errors/sample. All this will be uplinked at about 8.8 megabits/sec.

The plan calls for new equipment to be built. We have demanded a flexible design for channel distribution and a single carrier/single bit stream with everything on it to be available simultaneously at each receiving station. These requirements have caused our supplier to come up with new hardware. No problems are expected, but it takes time to design and build such systems.

Q: Let's consider the receiving stations and their costs.

JH: The earth stations will have a 3m dish, 120°K LNAs, and up to 200 feet of cable. The receiver will consist of a standard TV downconverter, a 5-phase shift key demodulator and demultiplexing box to pick out the proper channels from the bit stream, and a D/A converter card. Most of this has to be built, but it uses current technology.

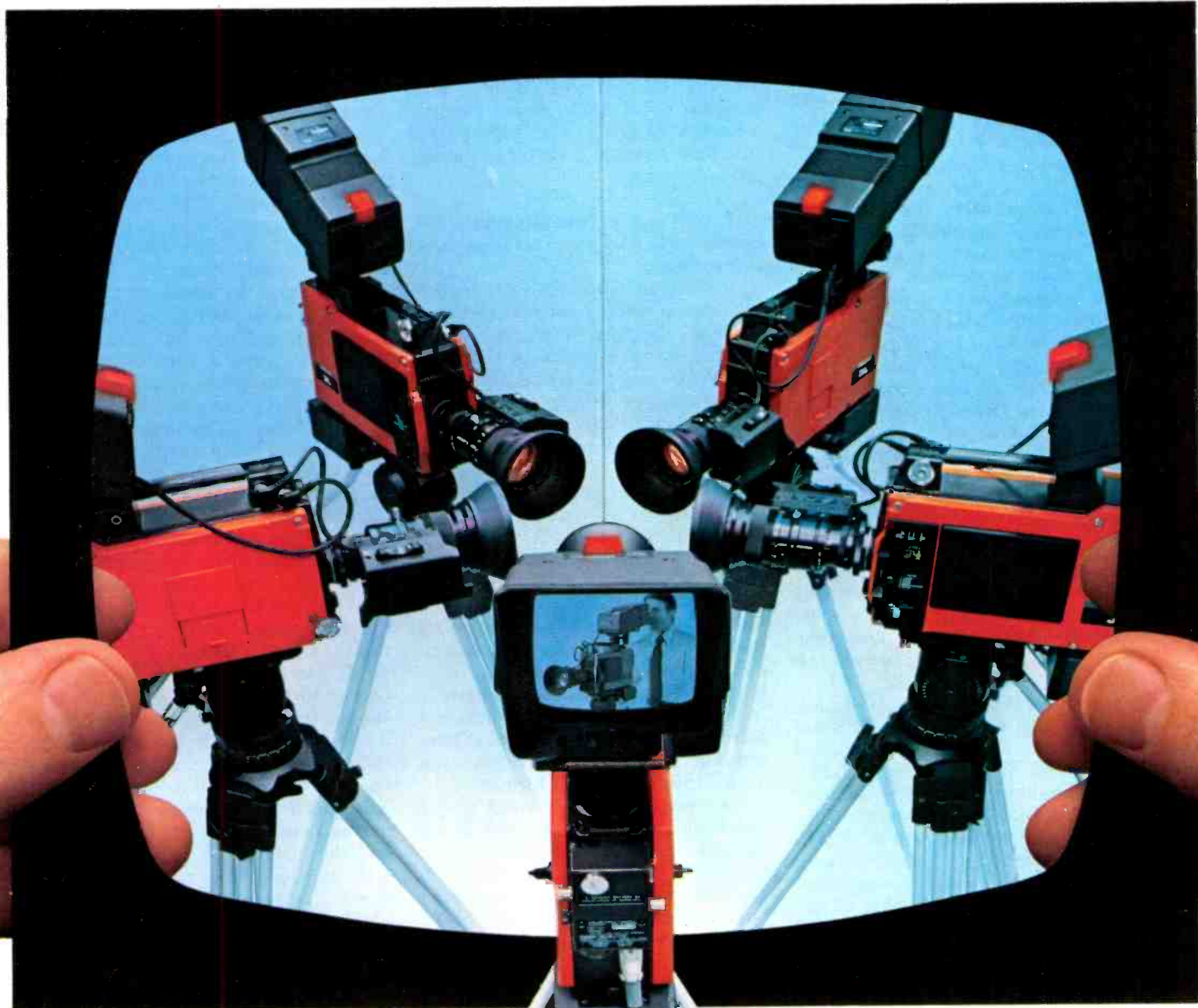
The receiving station is designed to keep the cost down—about the price of a new car. We're looking at about \$10,000 for the 3m dish, LNAs, 200 feet of cable, downconverter, demodulator/demultiplexer and D/A converter. This would provide two or three audio outputs and cue, voice, voice cue and data outputs. The supporting electronics would end up as a compact, 2-piece, rack-mounted system. The installation costs will be extra and will vary with locations and conditions.

Q: What is your time frame for implementing the system?

JH: That's hard to pinpoint until the contracts are signed. After that there's a lag of about six months to get production up to delivering 50 to 100 stations per month.

We plan to have the signal on the transponder by mid-1982 with initial programming to aid startup. By the end of the first year, we expect to have

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at least 1000 earth stations in operation.

Some affiliates already have earth stations, and they could be operational early. Eventually, at an investment of \$10,000 plus installation, each affiliate is expected to have its own earth station. With line charges running \$300 per month and up, the system will pay for itself.

Q: What incentives do the stations have to adopt your system?

JH: The cost savings over land lines alone would be sufficient encouragement. But the technical quality of the delivered audio, which is unbelievably superb, will speed the transition. The distortion figures are down into the 0.005% range, the frequency response is within 0.1dB from 30 to 15kHz, with distortion 0.02% maximum over the entire range. Phase between channels is within a degree. This digitization is almost perfect as far as specifications are concerned. And, using 15- to 11-bit companding, there's no discernable companding ever. It doesn't show the pumping or breathing you normally associate with companding or compressing systems because companding comes about through an algorithm.

The signal-to-noise ratio from peak signal to noise floor is about 80dB and the dynamic range with 11 bits is about 60dB. Every system has trade-offs and compromises. With a higher bit rate we could have an even greater dynamic range—about 6dB/bit. That's why the recording industry, with 16-bit words, achieves an exceptional dynamic range. For the cost of the space segment through the transponder and the cost of transmission, we elected to go with the capacity attainable with an 11-bit word vs. lower capacity and higher dynamic range obtainable with the higher bit rate. The trade-off is capacity vs. cost, and 60dB is enough dynamic range.

Q: What are the Super Radio plans?

JH: Our *Super Radio*/syndicated music service is planned for early 1982. We've already leased three SCPC channels from Robert Wold on a 2-year contract to distribute those programs. This, ultimately, will be replaced with our digital network.

This system has been in use for some time. The ABC network has been head-ending the different time zones from New York, with satellite channels to Chicago and Los Angeles. So the Central time zone is fed by Western Union Satellite to Chicago where it head-ends into the Telco system for the Central zone. The Mountain and Pacific zones go by

RCA Satellite to Los Angeles for telephone distribution. This system has been operational for some time, but not directly to the affiliates.

Q: How many affiliates will be linked to the new system?

JH: We have now from 1800 to 1900 affiliates, but this changes daily, and includes about 1200 affiliate stations who pick up the signal by paying their own line charges from other nearby ABC affiliates.

Q: Will you be providing both FM Stereo and AM programming over this system?

JH: We plan to provide every service we have, including network and syndication services. Presently many specials are distributed by disc, but this will be replaced by satellite when our new system is operational. There will be a number of channels designated for stereo pairs.

Q: What about new facilities under way?

JH: One talk format is planned in '82. Right now we're building four new studios in New York. The equipment has been on order for about two months, and will include 24-in/4-out consoles, tape machines and eight cart machines per studio. We now have the space and construction is underway. We expect equipment delivery in mid-December 1981. These are for the radio syndication, the *Super Radio* and the talk format.

We have two new studios under construction in Los Angeles being readied for operation in January 1982. We expect to have two more, which are being rebuilt at our AM station in Los Angeles, completed by mid-May '82. Also, we're considering rebuilding eight control rooms at our radio network control center in New York, and that's a tough undertaking to schedule. The new radio facilities in Los Angeles are for the combined use of KABC-AM and for the syndicated talk programming.

In our case, the remodeling of facilities, new program endeavours and use of satellites are parts of a package commitment. This is how we see the future growth, and we're putting our resources, people and money behind our commitment. We're enthusiastic because we're tired of listening to the garbage we sometimes get from telephone line distribution. The time has come to set garbage aside and give the people the good audio they've come to expect.

Q: In other areas, how do you see AM and FM moving in general?

JH: I'll be blunt. AM radio has taken a back seat for 10 to 12 years now because of our regulatory agency.

They recently tried to do it in with the 9kHz business. Hopefully that's resolved, but we've still got to see what happens at the Rio Conference.

Also, AM radio has been dealt a severe blow by manufacturers producing the cheapest possible radios. Over the past 20 years, AM radio has lost its sensitivity and you can't get good reception unless you're somewhere in the 10mV contour. The problems hold for high quality home sets as well as portables. I have long advocated that the better quality AM receivers get back to reasonable sensitivity and use a variable bandwidth based on the received signal intensity. For instance, inside the 10mV contour of a station, it would widen out the bandwidth to provide full bandwidth reception. Then, if you were in the 2mV range or below, it could narrow the IF to 5kHz, and you could still get good reception. The major problem for AM radio today is in the quality of the average receiver, not in the programming materials being provided.

In 1978 we rebuilt WLS in Chicago, starting from the tower. We designed a network to match the tower to the transmission line that was within 1.03 VSWR from 880 to 900. The station has a very simple audio system. From the console to a multimeter, through an STL to the transmitter, through a limiter to the transmitter; it's clean. We can put 15kHz in at the studio and it comes out at the transmitter and is radiated. We thought we could get a receiver to receive this. We found it was 4dB down at 10kHz and almost non-existent beyond that. That was with the best receiver we could find.

We've done the same thing at WABC, but while audio is there to 15kHz, you could receive it if you had a receiver that is broad enough to do it. The only way you could have a receiver capable of that bandwidth would be if you had it 15kHz wide in a strong signal. That costs a few dollars more per set to achieve, but it is certainly within reach of technology.

We've run controlled experiments in Chicago and New York and determined that the problems are with receivers, not transmission. In fact, during our AM stereo tests we learned something interesting in some circuitry. We purchased standard sets from a well-known chain supplier and modified the AM sections for AM stereo reception. The FM section was excellent, but on AM we discovered that they used a capacitor across the detector to roll it off. That's a serious compromise if you want good reception.

Q: How about AM stereo?

JH: My opinions have been clearly stated in the past and I have not changed them. ABC tested the in-

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dependent sideband AM Stereo system in 1979 and concluded that we supported this approach vehemently. When we went on the air with AM stereo, we did so quietly, with no announcement to the public. We tested it full time, for several months and at considerable expense, because we had to recart all of our music, put in a stereo control room, etc. Our report to the FCC fully denotes our findings. In summary, we felt that independent sideband was one AM stereo system that would work, and work now. It is compatible with current systems.

One thing that could really save AM is the use of synchronous type detection in AM receivers. This is a detector that regenerates a carrier within itself or locks onto the carrier with a phase lock loop. Another solution is to use a synchronous detector to achieve a high signal-to-noise ratio or better interference rejection by a few decibels, with no sideband splatter. If the United States were to suddenly receive a big influx of receivers that use synchronous detectors, over a period of 20 years, the diode detector would disappear. Then we could switch over to a system that did not involve use of strong carriers.

At WABC we analyzed what would happen if we reduced the carrier from 50kW down to 50W (a 30dB reduction in carrier, maintaining the same level

of sidebands). Using a synchronous detector in our present coverage area or even in the skywave areas, the detector would lock onto the carrier with no ill effects. There would be excellent reduction in co-channel whistling and interference. By reducing the carrier power needed for the AM transmission industry, millions of barrels of oil per year would be saved.

The solution is simple, and the precedent was set when Congress passed the all-channel legislation for TV receivers. If they would say, for example, that after January 1, 1983, all AM receivers manufactured in the United States would be capable of receiving suppressed carrier transmissions (for example, synchronous detection), then in 10 years we could start to knock the carrier powers down. But it takes an act of Congress to make this happen. And it doesn't cost much more to make a synchronous detector on a chip than it does to make a diode detector for envelope detection. But the manufacturers need the incentive to do it.

Q: Are you looking at any techniques to conserve energy?

JH: The energy consumption is rather high for AM transmission, but radio does not require as much energy as TV lighting in studios. For that reason, I wouldn't make a deal about it.

Q: What are some needed im-

provements in various areas of the audio chain?

JH: Consider the state of microphones. If we're going to attain the ultimate in sound fidelity, we may eventually have to use a low-noise microphone, one with a drastically reduced noise floor. While that could be a ways off, we can expect a breakthrough someday in low-noise mics and preamps that will open up a new era in sound quality. With the right equipment, we could consider going digital right there and continue through the mixer and all stages digitally. That could be a decade away. I have talked to some manufacturers about it and I believe it is feasible.

Q: What are your feelings about the new FCC team?

JH: I am encouraged. I spent four weeks with the experts in Geneva, Switzerland, studying the 9kHz issue. I applaud the FCC member's courage, skills and decisions in facing this situation.

Q: What about the Cuban interference problem?

JH: It is a serious problem. Our team is pushing for engineering logic and solutions. The Cuban representatives at the Geneva Convention seemed receptive to technical solutions. But you don't know what will happen from the political side. □



Some troublesome issues in a deregulated environment



By Charles D. Ferris
of Minty, Levin, Cohn, Ferris,
Glovsky and Popeo;
Washington, DC

The author, formerly chairman of the FCC, takes a fresh look at technical and legislative issues that will affect the future of broadcasting, communications and consumerism.

At a recent meeting of the Society of Motion Picture and Television Engineers, noted filmmaker Francis Ford Coppola appeared on a panel along with a number of technically oriented broadcast industry execu-

tives. He spoke of films "to be mixed like music instead of edited" and studios that would "pump pictures and sound around like hot and cold running water." Why would Coppola take time from a busy schedule to ap-

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Ferris: Issues

pear at technical group meetings?

He appeared to encourage the design and development of distribution systems that allow the viewer to receive the full power of the electronic cinematographer's art. Coppola's appearance was significant, I think, because it is one of the more overt signs that technology is creating new pressures on familiar relationships.

Coppola's concern that technology might not advance sufficiently to allow him to fully exploit his theories in video is one example of these pressures. Another comes from the advent of satellite-delivered programming because it is putting increasing pressure on network-affiliate relations. Networks, after all, are bi-directional brokers that capture economies for the other party on either side. They allow programmers to develop products for sale to hundreds of outlets; however, they deliver programming to those same outlets in a highly cost-effective manner. With the proliferation of high quality programming and its relatively inexpensive availability by satellite, there will be an increasing incentive for affiliates to be more selective in the programming they elect to broadcast in

the future. I believe competition for viewers will require a more focused set of programming judgments on the part of local broadcasters.

However, the re-definition of these relationships is only one effect of the steady development of new technological options. Perhaps the single most important effect of the widespread implementation of new technology, particularly computer-based equipment, is the new possibilities it creates. The benefits of these possibilities are well known and are being readily accepted by industry, customers and government. From my own communications policymaking perspective, I can say that the many deregulatory initiatives of the past few years were premised on the successful exploitation of these possibilities.

Regulation/deregulation

In theory, federal regulation is designed to protect consumers when the market itself cannot. On its face, this is a simple concept. Commentators, particularly those trained in economic analysis, have argued that the simplicity is deceptive. What these experts have shown rather clearly is that regulation itself imposes some costs upon consumers and that these costs must be measured against the costs consumers will pay in a defi-

cient market that is unregulated.

What a deregulatory policy emphasizes is that the entrepreneurs—large or small—striving to achieve the benefits of these possibilities, are changing the structure of the markets in which they operate. Not only are they breaking down market classifications that only a short time ago seemed immutable, but the *internal* character of each of the markets is changing as well.

A few examples will illustrate this point. The current interest in view-data and teletext services raises many issues that can be analyzed within one general model. Shall new services, combining some elements of TV entertainment, some of newspaper publishing and some of data base services, be treated as one or the other service, or as something entirely new? This is a question not yet answered by the legal system in communications. My own view is that new services can only meet the public need they were designed for if policymakers rethink the applicability of, or need for, the regulatory premise each time a new service is introduced. Only in this way can a service and its market be assessed on its own terms rather than as an amalgam of ill-fitting regulatory garments from another era.

Even within particular markets, the



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nature of the business is changing. High capacity cable systems, videocassette and videodisc players, MDS, STV and DBS hopefuls are all attempting to deliver video programming to consumers. In this case, is television the right market anymore? I believe that it still is, because the viewing public does not have the same access to these technologies as it does to over-the-air television. Nevertheless, it is quite clear that the day is coming when an individual viewer's program consumption will depend on his or her choices made from hundreds of available channels. The only question is when that time will arrive.

Because the nature of markets in which these new services will be offered is still so uncertain, it is difficult to support the need for regulation in them. With an increasingly plentiful supply of both programs and distribution media to deliver those programs, the chances for a competitive market look good. As with the common carrier industry, it is also appropriate that the new entrants, without significant market power to protect themselves from suffering the consequences of poor performance, should be deregulated first.

The present deregulatory policies recognize the competitive potential of the new technologies. To impose a

system of rules and restrictions before one can tell whether competition will take root is to guarantee that its progress will be deflected. As a result, I think the hands-off, pro-market approach to these new technologies is the most appropriate policy now.

Questions on standards

Given this notion, however, there are several issues that are ambiguous enough to warrant special consideration. These problems involve the question of whether technical standards should be adopted by the government and two related issues of integrity: whether government should take an active role in assuring that delivery systems are not abused to invade subscribers' privacy interests or programmers' property interests.

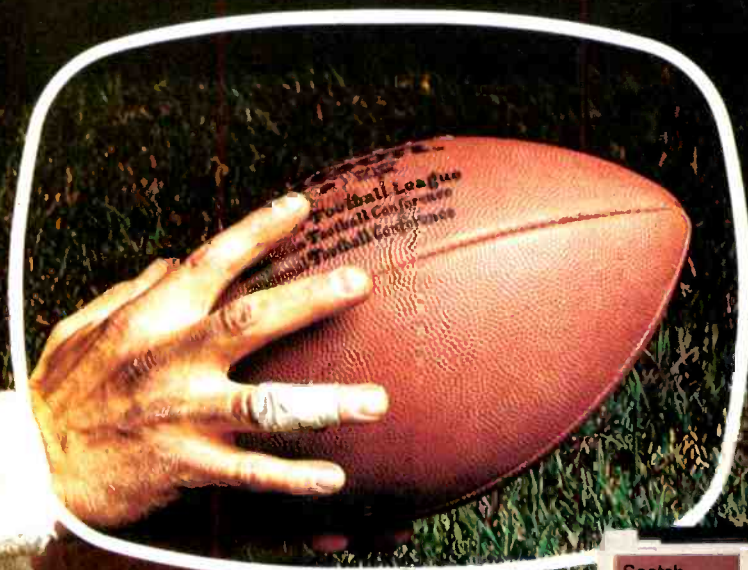
The area of technical innovation involves an exceedingly delicate balance of efficient use of scarce resources—particularly when spectrum is employed—technological dynamism, commercial/competitive consequences and design and development expertise. The establishment of design or operating standards provides certainty to manufacturers, operators and subscribers. This certainty is often necessary before manufacturers can bring unit costs

low enough to develop substantial markets for their products. Consumers obtain benefits in a number of ways. The adoption of an industry-accepted standard may allow for an earlier introduction of the product than would otherwise be possible. It may also allow manufacturers to charge lower prices while protecting some customers from suffering a sudden obsolescence if the design of a competing model is defeated in the market.

But the establishment of a technical standard by regulation freezes the technology too. Technical advances that might have been only a short time away but that demand more flexibility would be foreclosed. Other promising avenues of research would be pointless pursuits. And the benefits to be derived will be achieved, for the most part, regardless of whether a standard is arrived at by operation of market forces selecting a design or the government doing so. Given the breathtaking successes that have occurred over the past several decades, freezing technological progress is a radical step.

Government policymakers, it seems to me, should be modest when confronted with a number of the nation's most prestigious research houses, each risking real (and big) money in

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Ferris: Issues

the belief that its design is superior to all others. This need for such modesty is confirmed by the fact that policy-makers are generally not technical experts but are nevertheless forced to make judgments about differences that in some cases are extraordinarily subtle and refined and in others dramatic and fundamental. Unfortunately, neither alternative provides much solace. This is particularly the case when these differences may represent deliberate marketing choices and are designed to be optimal for selected applications, and would be foreclosed by government adoption of a single technical standard.

There may be circumstances in which the costs of picking a standard can be minimized. For example, when there are a limited number of alternative proposals, and each is generally recognized as performing at comparable quality levels and there are consumer benefits, either in direct costs or advantages of compatibility, the selection of one plan may be warranted. When this rare combination of fortuitous circumstance is not present, however, the public is best served if the market, or at least broadly based industry groups, resolve the question of any design or operational standards that may be deemed necessary.

Privacy: In danger

The issue of privacy poses even greater difficulties in assessing the market's ability to secure the important customer and supplier interests at stake. Advances in the miniaturization of computing power bring with them the source of, and perhaps a solution to, these problems. Interactive technology, combining customer expressions of preferences with memory capacity, makes it possible for third parties to compile detailed profiles of customers without their knowledge.

In the home of the future, family members will bank, shop, read, do their taxes and calculate their check-books and investment returns at their terminal. Each night they will choose between programming presenting cultural, informational, political, news or other entertainment formats. This same home may be wired into the communications system with exterior and interior monitoring for alarm purposes.

The amount of personal information suddenly being turned over to a system operator under these circumstances is enormous. The interests at stake are at the very heart of

our society. A citizenry whose predilections, strengths and foibles are so exposed can never be secure in its freedom without an effective system of safeguards.

I believe it is the responsibility of the system providers and, in turn, that of the design and development engineers, to determine how this technology can provide its cornucopia of services without robbing us of our ability to enjoy them in our solitude. This issue is a serious one, and the consequences of a failure to address it before it becomes a real problem will be severe. Already certain governmental computer system architectures have been rejected because of their privacy implications.

Because of the fundamental value our society places on the right to privacy, I believe the market's ability to assure its protection will be closely scrutinized. A free market requires that consumers have information adequate to allow them to make rational comparative decisions. In this case, however, the computers receiving and retaining the information on each of us will be at distant and often times unknown locations. Moreover, the compilation of individual profiles will almost, by definition, be an after-the-fact operation, and may even involve third parties joining data from otherwise separate facilities. Thus, consumers may never know the status of the information they unwittingly generate in the course of their daily lives.

Of course, this problem exists even today. Its effects will be exacerbated, however, in an era when even the most superficial of our daily functions is recorded by memory-equipped machinery. The functions performed by this equipment do not require unbridled discretion regarding the treatment of this data. Program selections, for example, can be stored in local memory that is polled only in the aggregate and at limited times. Storage can be compartmentalized to make access impossible for unauthorized purposes. Erasures should be made regularly. I urge the technical community to address this issue before those with less substantive expertise are forced to do so by the pressure of an outraged public.

Program protective

Finally, the relationship of industry's electronic capabilities and its property rights in programming transmitted over the air is highly uncertain. MDS, STV, satellite delivered channels of all kinds and, to a lesser extent, cable systems, all are vulnerable to the uncompensated, unauthorized reception of a signal meant for sale. Within certain

technical constraints, advances in technology may allow more or less sophisticated scrambling techniques to be employed. But with the sale of the first decoder to an authorized customer, history shows that the first unauthorized decoder cannot be far behind. Perhaps programmers will be able to develop randomly changed scrambling patterns or interactive decoders designed to indicate their legitimacy. But unless a product or technique can be invented that cannot be duplicated without the consent of the originator, some form of governmental enforcement of the producer's property right may warrant consideration.

The current Section 605 of the Communications Act prohibits the unauthorized interception of radio signals. The number of court cases around the country against "pirate" vendors indicates that at the very least, this provision is not specific enough about the rights and duties of various parties in the modern era. Representatives Waxman and Wirth, the latter Chairman of the House Subcommittee on Communications, have introduced a bill that contains both criminal and civic penalties for unauthorized receptions of pay programming. While stiffening the penalties for commercial entities engaged in these businesses, this bill also contains a provision for limiting fines of "innocent" individuals to \$100.

I believe this bill warrants careful consideration. It does not solve all the problems associated with the issue, of course, because it is not self-policing. Only a (reasonably) unbreakable technological solution can achieve that. And that technology may only be developed when the market losses of programmers are high enough to justify the technology to prevent it. If that technology is not likely to be developed soon, however, Waxman and Wirth's proposal may provide adequate protection to programmers and distributors, without impinging excessively on the free flow of information.

The issues of standards, privacy rights and unauthorized reception all represent the coming together of conflicting interests. A deregulatory, hands-off approach, such as regulations themselves, needs to be rethought so that it is not blindly followed either. These issues, at least in some circumstances, may warrant a more affirmative government approach. If they do, it will be a result of a conclusion that for technical, economic or political reasons, entrepreneurs could not produce a better solution. As such, I hope the market has made a concerted effort on which to be judged.

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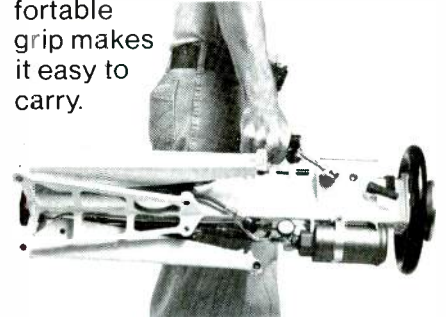
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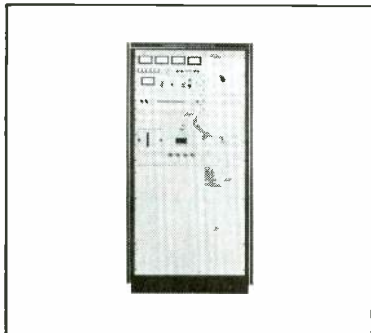


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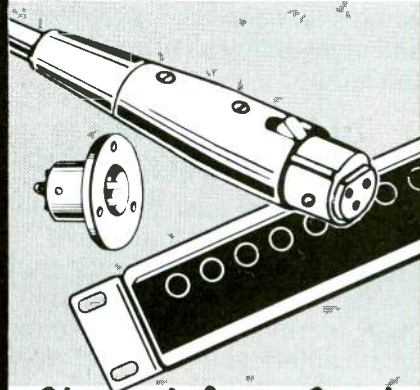
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View of the KHTZ-FM production room showing the three MCI machines.



Front view of the machine used for the test.

Field Report: The MCI JH-110 series tape recorders

By Joe McCleary,
chief engineer, KHTZ-FM,
Los Angeles, CA

About 26 years ago, a company named Music Center Inc. came into existence in the quality audio field. It progressed rapidly and soon outgrew its modest beginning and name. It became MCI, a name that today brings to mind high quality, professional recording equipment. MCI began production of the JH-110 in 1975, and came out with the JH-110B in 1979. We evaluated the JH-110A for this report.

The field report is an exclusive **BE** feature for broadcasters. Each will be prepared by the staff of a broadcast station, production facility or consulting firm. The intent is to have the equipment tested on-site. The author is at liberty to discuss his research with industry leaders and to visit other broadcasters and/or the manufacturer to track down pertinent facts.

In each field report, the author will discuss the full applicability of the equipment to broadcasting, including personal opinions on good features and serious limitation—if any.

In essence, these field reports are prepared by the industry and for the industry. Manufacturer's support will be limited to providing loan equipment and to aiding the author if support is requested in some area.

It is the responsibility of **Broadcast Engineering** to publish the results of any piece tested, whether positive or negative. No report should be considered an endorsement by **Broadcast Engineering** for or against a product.

The JH-110 series of recorders consists of a JH-110 transport, from 1- to 8-channels of audio electronics, and a power supply. Special broadcast and mastering machines are also available, and some of the systems are offered in 10½-inch, 14-inch and/or 1000m DIN reel sizes. The systems are available for standard 19-inch rack-mount, or mounted in the variable profile cabinet or in the overhead bridge cabinet.

The JH-110 deck-plate is heavy and rugged. The reel motors are servo-controlled dc torque motors that provide constant tape tension at all speeds, and controlled tension in the fast modes. The capstan motor is phase-locked and provides accurate, long-term tape speeds. The capstan shaft is machined from hard non-magnetic ceramic material. Associated with the capstan motor is the tape speed select switch—7½, 15 and 30ips. Also available are the optional 3¾, 7½ or 15ips and all speeds are quartz-controlled.



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Field report

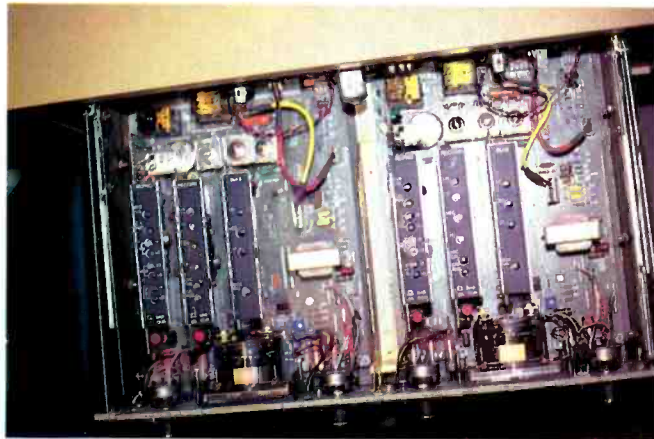
The reference selector is a 3-position switch providing: 1) variable, with a 10-turn pot to vary speed; 2) fixed, a crystal-controlled reference for the capstan servo; and 3) external, a wide range speed control using any +5V control signal interface. The return-to-zero feature, called the RTZ 111, which is standard on all recorders, is microprocessor-controlled and has four memories in addition to the return-to-zero function. It also provides a pre-settable up/down counter and a built-in tape velocity in-

dicator. A real time tachometer in the tape path provides linear tape travel information for the RTZ 111. We found tape handling to be smooth and reliable on our JH-110 machines. All tape handling functions are controlled by TTL logic circuitry employing plug-in cards.

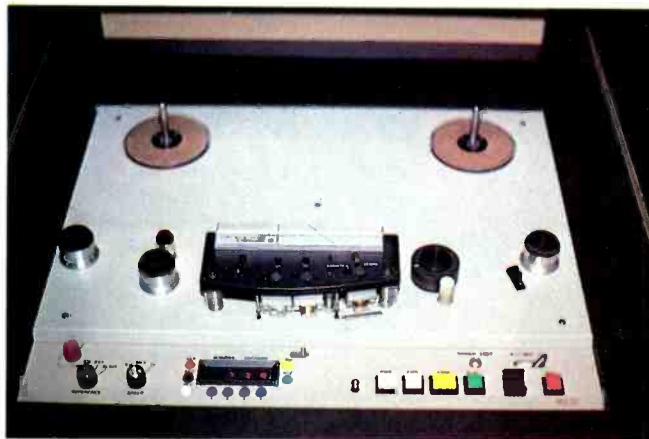
The JH-110B has an additional roller guide and an improved magnetic feedback circuit for the dancer arm assembly. MCI has kits available for the installation of these features in older machines. We installed them in our decks and found them to be worth the effort. Flutter and tape handling were



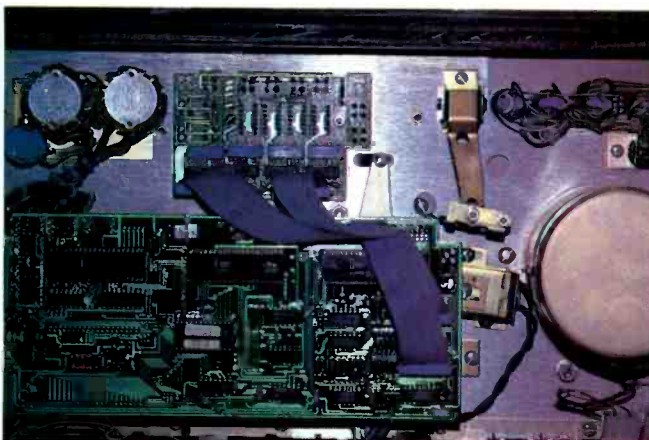
View of the front of the machine with the tape transport raised. The electronics shown on the bottom are the analog and digital logic circuits, which control all the tape transport functions.



Top view showing the electronics drawer with the plug-in cards for reproduce, record and bias.



View from the top showing the tape transport.



View of the bottom of the tape transport deck showing the microprocessor card for the RTZ 111 feature.

greatly improved. The instructions for installation provided by MCI were clear and complete.

The electronics consist of three plug-in cards: reproduce, record and bias. Easily accessible on the reproduce card are the controls for cue level, reproduce calibrate and a high and low frequency equalizing control for each of the three speeds. Included is a switch for selection of NAB or CCIR equalization. All of the controls are multi-turn pots for precise settings.

On the record card, the three equalization controls, one for each speed, are variable capacitors. The rest of the controls are multi-turn pots. One sets the record level and the other sets the record calibration. The third control is for record linearity and provides compensation for a wide range of tape characteristics that could cause excessive intermodulation distortion. The NAB, CCIR curve is also switchable here.

The bias card has four controls: bias level for each of the three speeds and bias calibrate for the metering circuit.

The three cards plug into a mother board, which can be unplugged from the strip board that is mounted to the back of the chassis and contains the sockets for the head cable plugs and power plug. Everything can be removed for inspection or servicing in a matter of minutes.

The JH-110B has some refinements in the equalization circuits that provide better phase shift characteristics at high frequencies. The transformer in the reproduce head circuit has been eliminated by the use of differential input amplifiers. The improvement in

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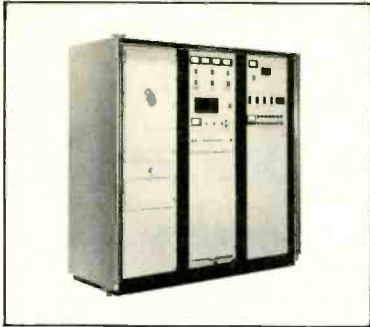
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Field report

the square wave response is impressive. The controls for the record amp equalizing circuits are multi-turn pots that lend themselves to precise adjustment.

All JH-110 machines employ a QUIOR (Quiet Initiation of Record circuit). With most decks, if one attempts to edit or overdub, several problems arise. Overlapping recordings at the beginning and blank spots at the end of the inserted material occur and "punch in" and "punch out" noise is generated. The overlapping and blank spots are caused by the physical distance between the erase and the record heads. Record punch in and out noise is caused by sudden change in bias and erase current. The QUIOR circuit tends to eliminate these problems by delaying turn on and turn off of the bias current in the record head long enough for the tape to travel between the two heads. At the same time, both bias and erase currents are switched on and off through a ramp circuit that provides optimum slope. The QUIOR circuit can be defeated if so desired.

The heads used in the JH-110 series are manufactured by Woelke in Germany. In 2-track format the reproduce head gap height is 90 micro-inches. The record head gap height is 300 micro-inches. The 4-track record head is also 300 micro-inches, but the play heads are 160 micro-inches.

Our testing was performed using Ampex 406 tape and the tape speed was 15ips. For a reference level and response test, we used the MRL Cat. No. 21J205 test tape. The reference fluxivity is 250nWb/m. After careful equalization, the response run we made was excellent. From 500Hz to 20kHz, the response was essentially flat within +0.5dB. As recommended by MCI, the low frequency alignment was made after completing the record adjustments.

Next the machine was put into the record mode and the bias current was optimized by increasing the bias for 3dB of overbias at a frequency of 10kHz. Next, we proceeded to record equalization. The test gear used here was the Sound Technology 1710A distortion measurement system. The oscillator output level was set for +4.0dB at 1kHz and the input pot on the record card adjusted for 0dB while metering the playback. Switching the meter back to input, the record calibration pot on the record board was set for 0dB. Next we adjusted the reproduce equalization for the low end while recording the oscillator frequencies from 30Hz to 500Hz. The response was down 1.5dB at 30Hz and there were a few bumps from 50Hz to

about 200Hz, but from 50Hz to 500Hz the response was within 0.75dB. From 500Hz to 20kHz, it was flat to within 0.5dB.

For our distortion measurement, we increased the input level 3dB. This corresponds to a fluxivity of about 350nWb/m. Distortion measured was 0.3%. The 3.0% distortion point required 11dB more input. This would be about 1200nWb/m. In the specification sheet for the 110B, at a reference level of 510nWb/m at 1kHz, distortion is less than 0.52%. This, of course, depends on the tape formulation and the bias used. Our headroom using the 406 tape is 11dB. (For those interested, the way to convert nWb/m to decibels is to take the log of the ratio and multiply by 20. Conversely, the antilog of dB divided by 20 will give you the ratio. For instance, our reference level was 250nWb/m and our output level at 3% distortion was 14dB. Fourteen divided by 20 is 0.7; the antilog of 0.7 is 5.0. Five is our ratio and fives times 250 is 1253nWb/m.)

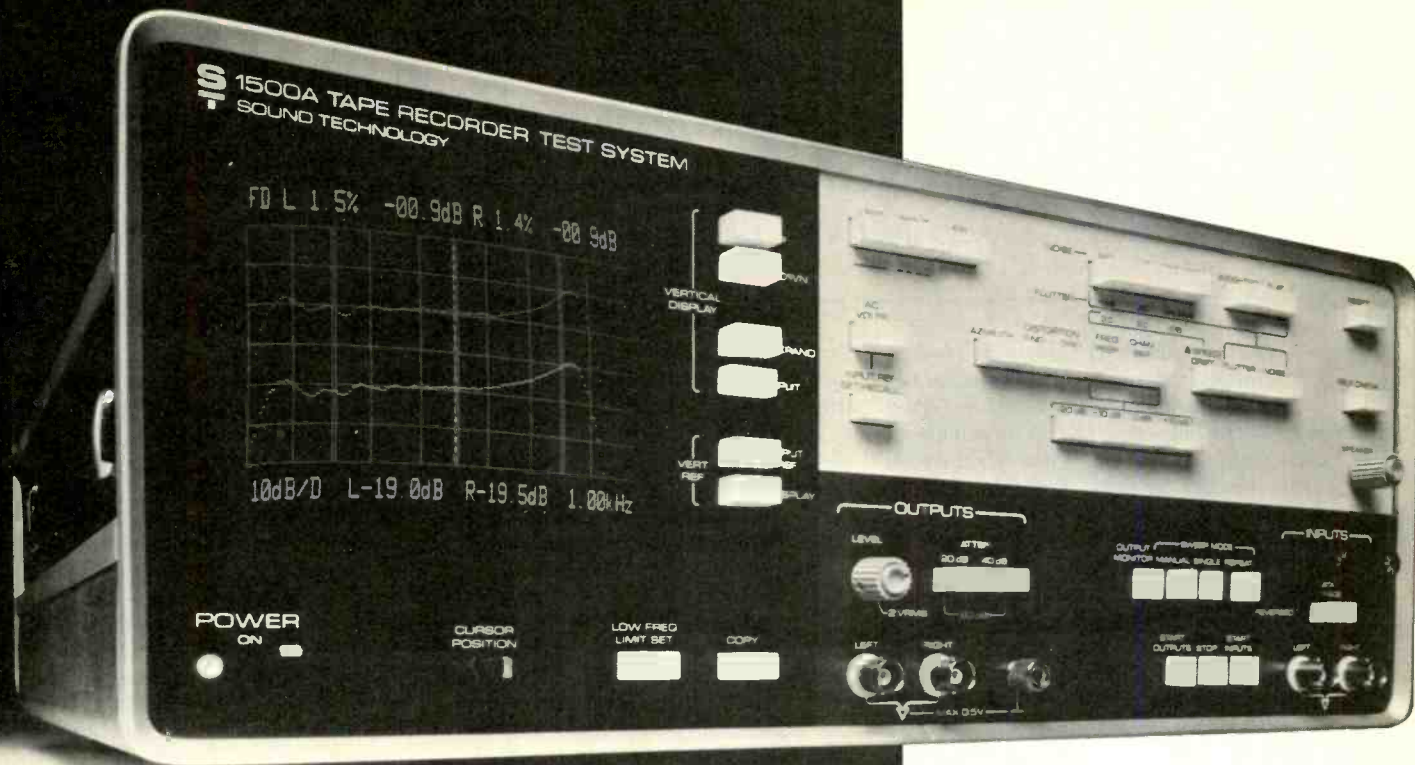
Our noise measurements were made using the Sound Technology system with the hum filter in and the noise filter set to 30kHz. With the machine on and no tape motion, noise measured -66dB. With a clean tape running in the play mode, noise was -65, and with tape running in record mode, with no input, noise was -64.

Wow and flutter measurements were made with a Leader LFM-39A system. Flutter measured 0.08%, wow 0.01% and weighted wow and flutter was 0.03%. These measurements were made in accordance with CCIR specifications. We found that we could null the wow and flutter reading by adjusting the supply reel motor tension and that tension measured with a model T2-H20-ML Tentelometer turned out to be about 2 ounces.

To some broadcasters, myself included, documentation is almost as important as the equipment itself. I have worked on some fine equipment with instruction books that leave a great deal to be desired. The instruction book provided by MCI is first class. Instructions for maintenance and operation are clear and concise. Paper and printing are of good quality.

In summary, the quality of your audio using MCI VH-110 series recorders will be limited mainly by the tape you choose to use and the care you use in biasing it. Reliability and ease of maintenance are important to any busy broadcast engineer, and MCI provides both to help keep you on the air. □

The MCI JH-110 series tape recorders covered in this field report is manufactured by MCI Inc., 1400 W. Commercial Blvd., Ft. Lauderdale, FL 33309. Comprehensive literature on the series may be obtained by writing MCI directly.



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TECHNOLOGY

Advanced production techniques

By Brent Feulner, production manager, Video West, Salt Lake City, UT

The first thing to realize in reviewing *advanced production technique* is that it is a matter of semantics. What are generally referred to as *advanced techniques* in videotape production are similar to those that film technicians developed and have been using for nearly a century.

No doubt, videotape production today bears little resemblance to its faded cousin of even a decade ago, when bulky cameras, powerful studio lights and boom microphones chained us to the studio. What is really advanced, however, are the tools that have freed producers from the studio and given them the ability to pursue the visual image wherever it may lead. In effect, this portability, image quality and versatility has allowed us to return to the use of those production methods.

Video West, a division of Bonneville

Productions, was formed four years ago to provide commercial and industrial videotape production services to clients. About that same time, new developments in videotape production technology were beginning to sweep the industry and grab the attention of engineers, producers, management—and some clients.

Change does not come without adjustment. New production technology has created a new type of videotape specialist—someone who is given the time and training needed to master the computer-driven tools that they are assigned to operate.

Some of these so-called advanced production techniques provide an interesting glimpse into the impact that technology had on the business of specialized videotape production.

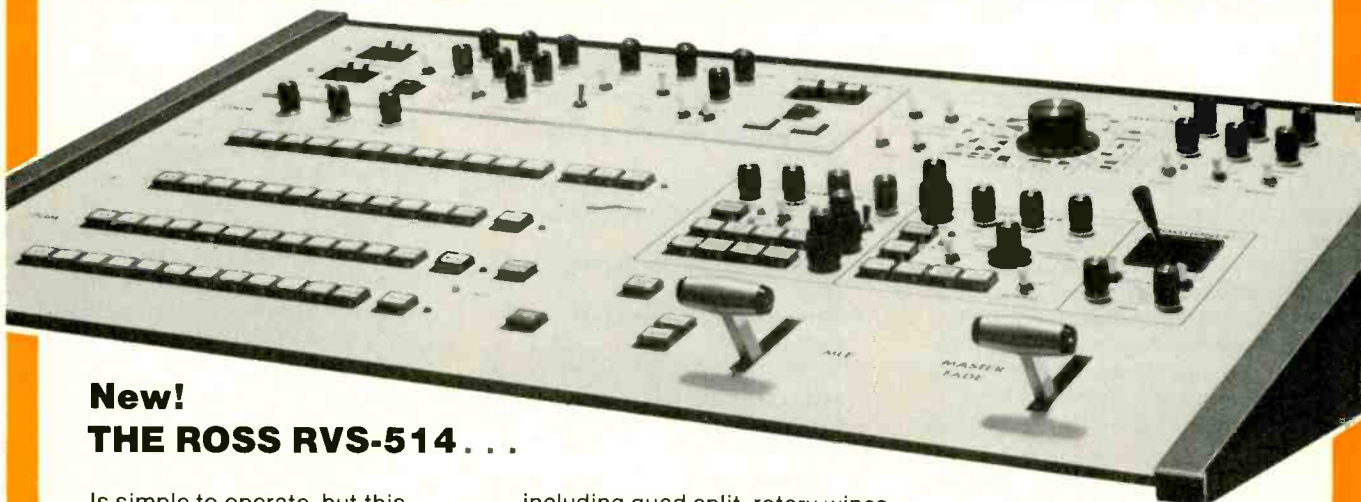
Where once we were limited to the

studio, we can now shoot in a limitless variety of locations with lightweight, portable equipment. Where once we were limited to 1-dimensional sound, we can now produce the audio portion of our videotape tracks separately to impart an interesting multilayered quality. Where once we could fade in or out, we can now wipe, matte, flip, spin, cube, page turn—any of hundreds of different variations akin to optical film affects. Perhaps most importantly, we can now edit scenes on videotape quickly and accurately while maintaining a variety of creative options.

Film-style shooting

The most revealing indication of how far videotape production has come is evidenced by the terms used to describe its methods. Take *film-style*, for example.

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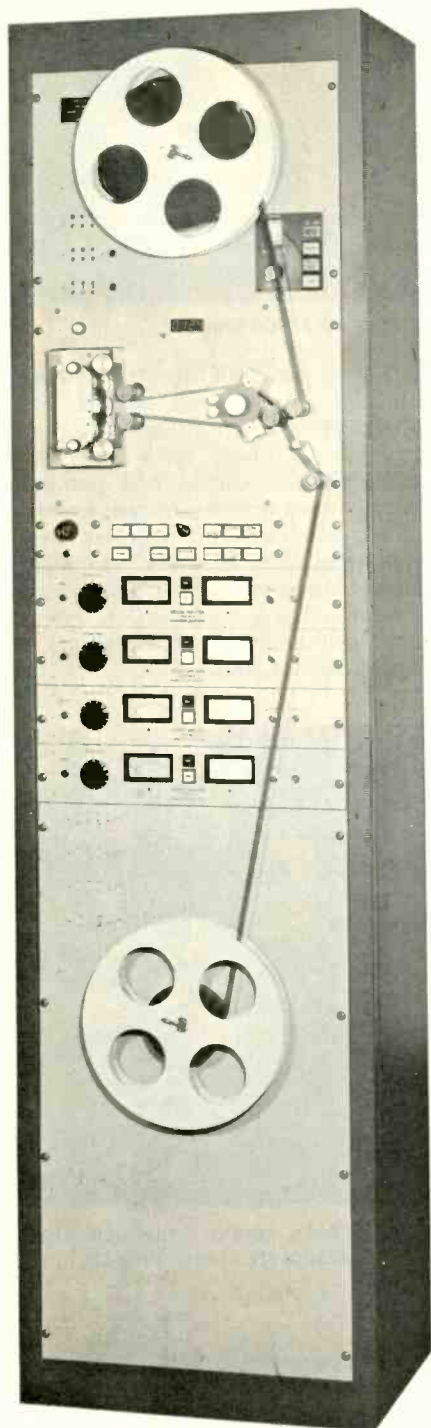
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Production

Video West was one of the first production companies in the country to take portable gear into the field, set up shot by shot, and bring the scenes back to the studio to assemble. When we first began, we used an RCA TK-76B portable color camera with an Ampex VPR 1 mounted on a hand-truck. Though it was not quite in the same league as our current set-up (a 19-foot production truck designed by Compact Video of Burbank, CA, it served us well for four years.

The Compact 19 that we now use is equipped with an Ikegami HL79A camera and an Ampex VPR20 portable 1-inch VTR. The 4-wheel drive truck is air-conditioned and equipped with a self-contained 6.5kW generator. A companion vehicle transports additional lighting and grip gear.



Video West's Edit Bay II features a CMX-340X editor, a Grass Valley 300 switcher with E-MEM, a Fernseh Compositor I and a 12-channel stereo audio mixer. The suite commands up to six Ampex VPR-2B 1-inch VTRs.

We have found that refining our lighting methods was critical to getting the most from the sophisticated camera gear. Each scene is carefully lit using a variety of instruments: scrims, reflectors, flags and dots. We are constantly developing new uses for filters: to create the proper contrast, subdued look, diffusion and even fog. Our aim is sometimes to take the hard edge off of video, but always to strive to maintain the highest technical quality with whatever aesthetic effect being sought.

The remote van is fitted with dedicated CCU and color monitoring, portable time-code generator, a complete audio package with wireless mics and a speed dolly. We regularly use a dolly or crane on location as a means of lending more interest to an otherwise ordinary shot.

Techniques used in remote film-



Shooting a commercial on a 25' x 40' insert stage.

style videotape production are still evolving. As a result, each shoot poses problems that we may never before have encountered. A winter remote for K-Mart, for example, required a full day shoot in waist-deep snow at a ski resort near Salt Lake City. Snowmobiles served as tracking dollies. The camera and VTR were secured to a sled pulled by one machine while a second, carrying models, rode alongside. An untimely collision with a snowbank, however, threw equipment and crew overboard, and buried the videotape machine under three feet of snow. Despite the spill, the machine (enclosed in a plastic cover) continued to record the scene. Still another crash sheared the wide angle lens off of the camera. We put the scene on tape once we re-secured the lens attachment on the camera with gaffer tape.

Our success in film-style shooting has come not just from portable equipment and careful attention to detail in both lighting and audio, but from a specialized crew whose titles reflect a film tradition. That means a camera operator who is really a director of photography; a lighting specialist; director; gaffer and even a stylist. Each person knows his or her position thoroughly to ensure the success of the shoot. It is a far cry from simple studio setups with oversized cameras and a skeleton crew.

Editing suites

Once the images are *in the can*, to borrow another film term, they are brought back to the Video West studios to be assembled in one of two edit suites. We use the CMX 340X computer-assisted editing system, hand in hand with the Grass Valley Group 300 switcher, and the DVE Mk II 2-channel digital video device.

The GVG 300 is two devices in one because the DVE is a separate add-on unit. The microprocessors in the GVG

300 and the DVE are trade-named E-MEM (Electronic Mix-Effects Memory). They are capable of setting crosspoints, matte levels, key clip levels, border widths and patterns. They can manipulate an image on the screen in hundreds of different ways. Plus, they will remember a sequence for as long as it is kept in the system's memory. (An optional E-Disc system can store complete effects setups on floppy disc for later use.)



Video West's central tape operations room contains six Ampex VPR-2B 1-inch VTRs.

The computers in the switcher and the computer in the DVE work together with the CMX computer. The operator can program sources, videotape cue points, effects beginning points, end points and size changes, and any other effects variations into the system's memory. Once programmed, the setup can be recalled and modified as many times as is necessary to refine the details before video recording.

Though the GVG 300 is called a triple re-entry system, it is in fact in-

finitely re-enterable. Normally our editor would have to rearrange a switcher when the decision is made to alter a sequence or make additions to an effect. But there is no re-entry pattern with the GVG 300. The editor can start an effect on ME2, go up to ME1, drop down to ME3 and re-enter. We have found that this feature of the system greatly enhances an editor's efficiency because it eliminates the need for time-consuming reprogramming.

One application for which the GVG 300/DVE Mk II was ideally suited involved a commercial for an agricultural client. The product was advertised infrequently and to such a narrow market segment that the production budget was slim. To compound this, the product, seed corn, was contained in a large bag. It needed some kind of interesting visual effect to give it life. We selected a posterization effect, which gave the image a luminant quality, full of matte colors. A hand entered the bag in slow motion, picked up the corn, and let it slip through the fingers. At this point, we made a transition from effects to normal video. We achieved an animated look that could be done in real time. The client was delighted with both the different look of the spot, as well as with the production cost.

We have found that, despite the abundance of effects that the system can execute, there is a tendency among clients to rely upon flash, and what we call *gee-whizzes*, to substitute for imagination. The GVG 300 will not insert creativity, manipulate a poor idea, or remember that careful pre-planning is still a number one element in an effective TV commercial. We encourage clients to become familiar with the system's capabilities so that, as they script, they can plan transitions and effects around the unit, rather than depend on it to bail them out.

The central brain for the switching/editing system is contained within the CMX 340X. At Video West we have two complete CMX 340X systems, one in each edit suite. They are linked to central tape operations located in an adjoining room and acoustically isolated from the edit suites and insert stage. The two CMX systems control up to six VPR 2Bs as well as a variety of other sources: Scully 4-track and Ampex 2-track audio tape machines; an AVR 2 quad machine; the video switchers and the audio mixers.

As a post-production tool, the 340X is indispensable. It allows the human editor to function in a creative capacity, liberated from the manual tasks of cueing, searching and re-cueing tape machines. It offers what might be compared to a *flatbed* style con-

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Production

venience of film editing, because the image is visible at up to 30x normal speed for easy identification of scenes.

The computer in the 340X uses the SMPTE time code to reference tape, frame by frame. The code gives each machine a reference point that allows it to maintain synchronization with each of the other tape sources. We can, for instance, tell VTR 1 to locate a certain time-coded scene, cue up to that point, back up for a 5-second pre-roll and stop. We can do the same for VTR 2, which might be on another scene. Assuming that VTR 3 is our record machine, the editor through the 340X will tell it to assign itself an edit point corresponding to a particular time code. The processor in the CMX will then roll the entire group of machines in frame accurate synchronization, execute video and audio transitions and effects at the proper time, and stop all machines when the event is complete. Only when each member of the creative team is satisfied with every aspect of the event must it be committed to tape.

The 340X is programmed to control basic out, wipe, mix and key functions on the switcher. So when we get into a complex sequence, the effects memories on the switcher must be programmed by the operator. The CMX then triggers those effects memories at the precise moment, and in the correct sequence needed to complete the event. The switcher computer and the DVE computer are still subfunctions of the CMX.

The versatile 340X system also has an audio mixing system that can do dissolves, cuts, split edits—all as programmed. Or it can defeat its internal system on command, and hand control over to the audio console as it can in video mode. We use the system for a good portion of our audio mixing. In cases in which we need control of more channels, or we have to EQ, we operate the audio console manually. In a pinch, the Scully 4-track audio recorder plays a useful role. We reserve track four on the tape for SMPTE time code. The Scully can then be slaved to any chosen VTR, and controlled with the 340X. This gives us three additional audio tracks with computer-edit capability.

All of this production capability, though wondrously complex, actually performs a simple function; by controlling many sources through a central computer, what was once complex becomes orderly and manageable. Thus, the job of the human once again becomes that of creative source.

During the past several years, many

production companies have abandoned their cramped editing/tape rooms in favor of aesthetically designed edit suites. These rooms, which more closely resemble a living room than a TV control room, first appeared around the time that computer-assisted technology separated the tape function from the editing function. That is, editing could now be conducted in a separate, more peaceful environment. From experience, I can assure that these edit suites are not decadent exercises in self-indulgence. Video West features a client lounge, game room, kitchen, shower, dressing and conference room in addition to a pair of versatile, comfortable edit suites. The suites are designed with subdued lighting, plush chairs, carpet, wall covering and wall prints. We have taken care to provide an aesthetic, creative atmosphere for clients who are concerned with achieving a high quality product without the distractions associated with production equipment. We have found that, in terms of return on investment, the money spent on aesthetics was a small price to pay. In the end, assuring the psychological well-being of the client often creates repeat customers.

Audio sweetening

Audio has long been a foster child of television: at best, tolerated; and in the worst cases, ignored. The reasons are readily apparent. For one, the sound reproduction capability of TV receivers has traditionally been barely adequate. Secondly, technical limitations have hampered engineers in removing a sound track in order to enhance it, and then being able to replace it with any assurance of maintaining synchronization. Digital technology has changed all of that.

SMPTE time code, as useful in audio as in video editing, is comparable to sprocket holes and edge numbers on a piece of film. A code assigned to a frame of tape, either audio or video, is a unique point of reference for a microprocessor that is able to synchronize various sources according to that code. Now it is possible to manipulate a sound track independently of a videotape and replace it in perfect sync. This manipulation might include anything from equalizing a live voice track to replacing English-speaking actors' voices with a foreign language.

A good example of what has come to be called audio sweetening occurs with a live musical concert. Video West would record the event using from two to five cameras. Simultaneously, Bonneville Productions, our multi-track audio division, would record 24-track sound on an

Ampex MM1200 audio machine. The SMPTE time code provides the point of reference for the video and audio machines. The videotape machines would contain a rough mix scratch track for reference when it came time to edit the video. The video edit would begin to accommodate time constraints, continuity, excitement, flow and song progression. That edited 1-inch master would then be transferred to ¾-inch cassette. The time-coded cassette gives the audio engineer a reference to use when sweetening the sound portion. Bonneville uses a Q-Lock synchronizer that interfaces with a variety of tape machines. Each track is manipulated separately—reverberation added, equalization used for enhancement, dynamic ranges flattened to conform to TV audio—even applause and special effects to provide the program with a real concert feel. The completed tape audio is then transferred to 4-track, brought back to the Video West studios, and laid back on the edited video master in perfect time code synchronization.

The same technique, on a smaller scale, is used for adding sound effects to commercials, looping location dialogue in the studio, or simply EQ-ing an otherwise acceptable passage. Of course, this technique has been used in larger markets for some time. Only now is it beginning to filter into other parts of the country. Nevertheless, audio's time has come, and the next few years will see a major increase in the use of sweetening for TV audio. Stereo satellite transmission is now being tested; stereo TV sound is upon us. All of this demands that the audio portion of a production receive as much attention as the picture. Synchronization makes it a simple matter to strip off sound, improve it, and lay it back with its picture counterpart.

Time compression is another technique that technology has made available for TV production. In simple terms, compression, is similar to speeding up a record player, yet maintaining normal tonal qualities. It is useful for turning 32, 33 or 34 seconds of audio into a 30-second spot. It is especially useful if the audio is in the form of a narration track.

Character generators

One of the most useful tools for any production facility is a sophisticated character generator. Video West uses a 2-channel Fernseh Compositor 1 with graphics compose. This system allows us to generate type in a nearly unlimited variety of fonts; store graphics; and key or matte them on the screen.

Several clients store logos and special type fonts in the Compositor

1's disc-drive memory. This eliminates the need for them to bring camera cards whenever they produce commercials, saving time and money.

The Compositor 1 also has a simple animation system. This allows us to build letter-by-letter, word-by-word, sentence-by-sentence, or in entire paragraphs or pages. It can also generate its own drop shadows, colored letters and internal backgrounds. The dual channel capability of the system allows us to layer font effects and manipulate characters on a stationary field of other characters or logos.

Character generator operators who are familiar with the system and can quickly input information are extremely valuable. Many have developed from studio assistants into specialized members of the production team.

Videotape production in all of its aspects is now a multibillion dollar industry. Advances in distribution and delivery systems will push that figure even higher as the incumbent need for programming grows. And as it grows, technology will move right along beside it—sometimes keeping pace, sometimes actually leading the industry's ability to make use of it.

Video West is constantly seeking developments in production technology and techniques that will keep us in the forefront of our industry. Some of the innovations on the horizon that will help to make this possible include:

- video switchers with internal digital effects and frame synchronizing capability, thus eliminating the need for separate "black boxes."
- the development of a digital video standard, without regard to format. Though it is still two to three years away, it would greatly facilitate the international exchange of information.
- digital VTR. This would allow us to record video over many generations with no perceptible degradation in signal quality.
- practical, high resolution TV systems, comparable to 70mm film. This would lend itself to projection in theaters and convention halls.

Of course, as technology takes an even firmer hold on the industry, it will be necessary for technicians, operators and producers to update their knowledge with new developments both within and outside of their field of specialization. The manner in which new technologies are employed will determine whether videotape as a production medium will continue to adapt and develop new techniques, or become mired in a sea of "gee-whiz" gimmickry. □

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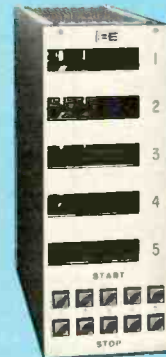
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December 1981 *Broadcast Engineering* 89

Sensational automation sound

By John E. Shepler, technical consultant, Rockford, IL; and Neal R. Nussbaum, general manager, WXXQ- FM/WFRL-AM, Freeport, IL

The fiercely competitive situation of radio in the '80s demands that broadcasters exercise more control over air sound than ever before. These demands have created a new generation of broadcast automation systems that are more sophisticated and reliable than their electromechanical predecessors.

Execution of a format under computer control produces a more consistent product, whether it be live assist or fully automated. A station's best air talent can be more creative on the air when they are not bogged down by the technicalities of punching a different button every 30 seconds.

Although state-of-the-art automation systems can give incredible

operating flexibility, they also present a greater need for high quality technical performance.

Through at least the next decade, broadcasters will still be saddled with mainly mechanical tape systems. Nearly all source material for automation will use prerecorded tapes and cartridges. Because of this, it is likely that more tape equipment will be in use at any time than would be used in a live situation. Broadcasters will also demand more of this equipment because it will be unattended much of the time.

High quality from all audio sources is critical because competition will come from stations using disc-to-air systems, which are easier to maintain.

However, if broadcasters are willing to put forth the extra effort that automation audio demands, they will be able to maintain a consistent and competitive sound without the personnel headaches that are inherent in live systems.

Getting automation under control

The most important concept in automation is for the machines to take over all the routine details of running the station, but yet to allow station personnel to maintain artistic control at the same time. With this in mind, one should select an automation system that will be sophisticated enough to handle all format demands and still leave station operators free for other duties.

Stations that use a prerecorded music service will have to depend on their suppliers to deliver consistently high quality tapes. However, it is the station's responsibility to maintain its reel-to-reel machines to the same standards that its supplier is using. In almost all cases, this will be the NAB tape standard. Even so, the 15kHz azimuth and phasing are so critical that the only way for a station to assure that its machines are aligned to the music service is to have the service supply the station with a specially produced test tape.

Cartridges for music and commercials will be produced locally, and it is important that these events have the same professional sounds as the nationally syndicated material. Stations should be sure that their automated cartridge playback equipment is aligned to the same standard as their production cart recorder.

Consistent levels are especially important because the control system will not compensate for sloppy production in the way that a live operator can. Nearly every music service provides audio level tones at the beginning of each tape. A new tape should be cued by adjusting the left and right channels to 0 VU, using the cue circuitry of the system. If the automation offers a null function, use it to balance the two channels. Operators may want to set the playback level on their cart machine 2 or 3dB lower than their reel-to-reels, because the commercial production will contain much more energy than the music level of their tapes.

Fine tuning automation audio

Nearly all reel and cart sources found in automation systems will be set up for stereo. One of the best ways to maintain top stereo performance

Neal R. Nussbaum is general manager of WFRL/WXXQ, Freeport, IL; and John E. Shepler is a technical consultant, formerly a chief engineer of WROK/WZOK in Rockford, IL. They have recently authored the *Sensational Sound Handbook* available from Concept 81 Publishing, Box 684, Freeport, IL 61032. Cost is \$27.50.

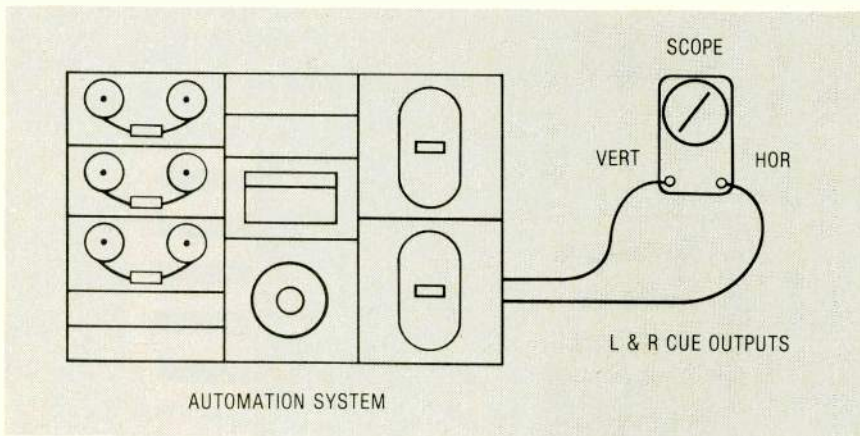


Figure 1. How to hook up a phase scope to your automation system.

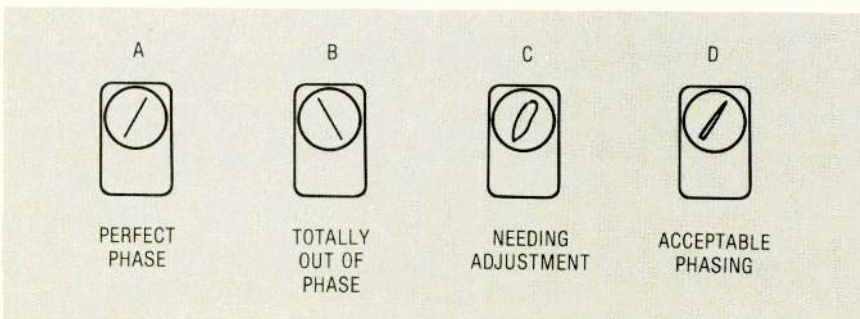


Figure 2. Typical phase patterns on the scope.

Sensational Sound Handbook

A book on sound has been recently released titled *Sensational Scund Handbook*. The book, by Neal R. Nussbaum and John E. Shepler, has 100 pages, including numerous schematics.

The handbook covers the following topics:

- 1) philosophy and overall game plan;
- 2) building a solid foundation for high quality audio;
- 3) testing your system;
- 4) tape machines — most stations' biggest problem;
- 5) phono systems for the eighties;
- 6) special considerations for each studio;
- 7) automation/live assist;
- 8) transmitter links;
- 9) audio processing for the eighties;
- 10) audio processing techniques for AM;
- 11) audio processing techniques for FM; and
- 12) audio processing techniques for TV.

For more information, write Concept 81 Publishing Company, P.O. Box 684, Freeport, IL 61302.

will loom much larger. To execute the format properly, timing between events must be tightly controlled. This is handled by 25Hz tones on reel tape and the 150Hz secondary tone on cart. The start of the switching tone will begin the next event and the overlap will end when the tone drops out. This makes placement of the secondary tone critical on carts. To make life easier, use a common start button for the cart record and tape playback in the production studio. An accurate timer is needed to tell when the end of the spot is near.

Also, the automation system may provide rolltime adjustment that allows the operator to make events as tight or loose as desired without making any changes in the recorded material. One final point for consistent production is to insist on using one type of cartridge and one type of reel tape for all the production in your station.

Even though automation presents some special challenges it can also provide a smooth and professional air sound with consistent audio quality that can match the best live operation. If you keep in mind that automation is simply another tool to extend your creativity, then you will be in a position to make the best use of the technology available today. □

from tape equipment is to periodically check and adjust head alignment with an oscilloscope. To make this effort painless, permanently hook a scope to the automation monitor, as shown in Figure 1. Select an adequate scope for the work, but don't overlook the new audio oscilloscopes often found in better stereo stores.

Use your standard alignment tape to check the frequency response of each

reproducer. Adjust the playback head to minimum phase error as shown in Figure 2. Each unit should be flat from 50 to 15,000Hz when the head is properly aligned. Be especially critical of multiple cart playback units because most employ a mechanical system for loading the cartridges. Small alignment errors will result in muddy, distorted audio. When cart sources play back to back, small differences

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Teletext: KPIX's experiment

By Harmon M. Shragge, Jr., media consultant, New York, NY

The Westinghouse Broadcasting Company is conducting the first teletext experiment in the San Francisco Bay area out of company-owned KPIX-TV, San Francisco (a CBS affiliate). The test, begun in late October, marks the entrance of Group W into the fast-growing US teletext market.

KPIX is broadcasting the teletext signal via hardware acquired through a lease/purchase agreement from Antiope Videotex Systems Inc. of Washington, DC (a subsidiary of Tele-diffusion de France), as are CBS-owned KNXT and PBS affiliate KCET, both of Los Angeles. The lease agreement was contracted because the French Antiope, along with the Canadian Telidon system and AT&T, are joining together in the formation of a single compatible system to be known as the *North American Teletext Standard*. If this standard is adopted, all companies involved will find it necessary to update their equipment.

The \$250,000 turnkey system at KPIX consists of an X-COM dual disc drive master computer, manufactured in France and reported to be the only one of its kind in the United States. The X-COM is supplemented by an alpha-geometric keyboard, a light pen, an RCA TC2711 security camera, and an Apple II computer used for graphic generation and signal digitalization.

For in-house use, KPIX has one French-manufactured Thomson decoder implanted TV set. The remaining 30 sets used in the experiment are RCA XL 100 decoder implanted TV sets that have internal memories of up to four pages. The sets will be placed in high access public locations throughout San Francisco.

The Antiope language features an 8-color capability with such special ef-

fects as flashing and animation, as well as special alphabets to be used with four languages simultaneously. The experiment is using the NTSC 525/60 field structure, with lines 15 and 16 on the vertical blanking interval used for transmission of the teletext signal. The data transmission rate for the digital information is 5.72 megabits/sec (**BE** June 1981).

The proximity of KPIX, San Francisco to KNXT and KCET of Los Angeles is no coincidence. The convenience of the short distance between the cities is helpful, as is the operation of similar Antiope equipment. Charles "Buck" Perry III, vice president of Broadcast Operations and Engineering at Group W in New York, said that, in addition to having one of the best engineering staffs of any Group W station, KPIX was chosen as the logical initial test site for two reasons. First, because of their close proximity and similar teletext systems, KNXT and KCET are in a position to assist KPIX in the early phases of the experiment. Though each test is separate and independent, KPIX is working to develop a contractual relationship with KNXT and KCET, and eventually hopes to be able to exchange certain teletext pages.

Secondly, Group W chose San Francisco as the location for conducting its first teletext experiment because of the city's rough terrain and hilly environment. One of the major problems confronting broadcast teletext, particularly in San Francisco, is breakup of the signal and ghosting of the transmission because of the rough broadcast environment. This results in poor signal reception, which renders the text illegible. Group W believes that these problems might be solved by adjusting the data bit rate

transmission and/or upgrading the performance of the receiver antennas.

But technical considerations are only part of the KPIX teletext experiment. Bill Baker, president of Group W in New York, contends that the KPIX experiment was initiated more to assess the public need and the marketability of such a system, rather than to overcome specific technical problems. Baker views teletext as maximizing existing technological resources in order that they be devoted to the best interest of the public and our free, over-the-air broadcasting system.

The San Francisco test is designed to receive the greatest amount of input and to reach the greatest number of people possible. Project Director Ron Lorentzen of KPIX believes that this is being accomplished through the information provided by the teletext service. News and information suppliers include the Associated Press, the United Press International and the Bay City News Service. Page headings are composed of local and national news of the day, weather, sports, stock market quotes and entertainment.

An on-going evaluation is being conducted by KPIX to determine which pages are called upon most frequently and why they are more popular than the others. KPIX has reserved a certain number of teletext pages for commercial use. The station, however, is not allowed to receive financial reimbursement for advertisements because of the recent FCC ruling that prohibits teletext from raising revenue.

The KPIX teletext experiment is scheduled to run through February, at which time it will undergo a project re-evaluation to assess the future potential of the service. □

calendar

January 11-15

Communication Networks 1982 has scheduled its fourth annual program and exposition to be held in Atlanta at the Georgia World Congress Center. Eighty sessions are scheduled, covering a broad range of communications topics including electronic mail, teleconferencing and local area networks (a new technology for office and in-plant systems).

For more information, contact Bill Leitch, Communication Networks, 375 Cochituate Road, Box 880, Farmingham, MA 01701; (617) 879-0700.

January 28-30, 1982

The First Annual Low Power Television Conference and Exposition (LPTV '82) will be held at the Sheraton Washington Hotel in Washington, DC. Fifty sessions will cover hardware requirements, financing, teleconferencing, marketing, programming and investment potentials. Speakers will include experts from all areas of the business and broadcasting industries. For more information, contact Global Village Conference Management Corporation, 17 Washington St., Norwalk, CT 06854; (203) 852-0500.

April 4-7, 1982

Dallas will be the site of the 60th Annual National Association of Broadcasters Convention. For more infor-

mation, contact NAB, Convention Information, 1771 N St. NW, Washington, DC 20036.

July 18-22, 1982

Communications and the Future, the Fourth General Assembly of the World Future Society, will be held at the Sheraton Washington Hotel in Washington, DC.

The assembly will cover the spectrum of the communications field, including the future of telecommunications, computers, broadcasting, films, newspapers, libraries, magazines, advertising, and interpersonal communication and new research into the process of human communication. It will explore how the revolution in communications will affect a wide variety of other areas such as business, government, human values, economics, family life, education and environmental issues.

For more information, write 1982 Assembly Committee, World Future Society, 4916 St. Elmo Ave., Bethesda, MD 20814.

July 21-23, 1982

The Second Annual WOSU Broadcast Engineering Conference will be held at the Fawcett Center for Tomorrow, Ohio State University, Columbus, OH. Papers are invited and full details can be obtained from John H. Battison, director of engineering, WOSU AM/FM/TV, 2400 Olen-tangy River Road, Columbus, OH 43210. □

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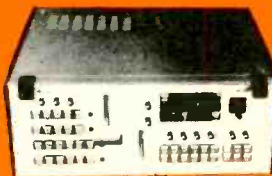
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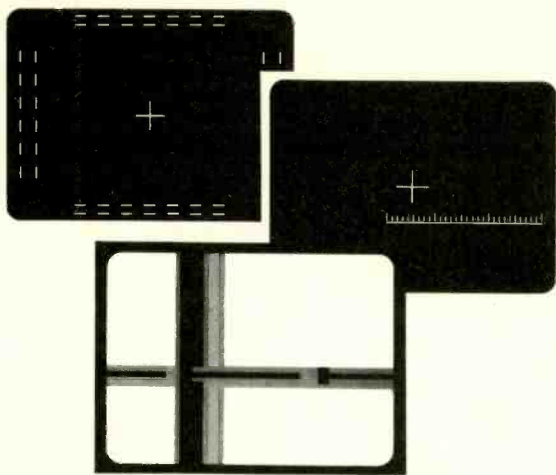
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AG 341 displays may be used separately or in combination . . . and for extra convenience in post-production, Safe Area/Safe Title, Center Marker and Micro-Mark Cursor may be selected by optional remote control box.

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Colette Eisele has been named advertising manager for Compact Video Systems Inc. Eisele is responsible for coordinating all advertising and promotional activities for Compact Video's manufacturing group, which includes Compact Video Systems Inc., RTS Systems Inc. and Skirpan Lighting Systems.

Peter Adamiak has joined National TeleConsultants Inc. as vice president, Engineering. Adamiak comes to National TeleConsultants from the American Broadcasting Companies Inc., where he served as manager of Systems Design for ABC owned-and-operated TV stations.

Continental Electronics has announced the following personnel changes. Promotions: **B. T. Watson, Jr.**, executive vice president, Administration; **W. D. Mitchell**, executive vice president, Operations; **R. F. Burgert**, senior vice president, Finance-Treasurer; **R. C. Forbes**, senior vice president, Materials & Services; **A. V. Collins**, vice president, Domestic Marketing; **E. L. King Jr.**, vice president, International Marketing; and **R. M. McDonald**, vice president, Manufacturing. Product-line assignments: **C. R. Koppa**, director, High Frequency Broadcasting; **R. G. Nash**, director, VLF Communications; **J. C. Pinkerton**, director, High Frequency Communications; **J. D. Rogers**, director, R & D and Special Projects; **H. A. Tackett**, director, Medium Frequency AM & FM Broadcasting, and **C. K. George**, director, Manufacturing. Other officers: **Peter W. Walker**, controller; and **Mildred A. Whiteside**, assistant secretary. While announcing the new promotions, the company announced the retirement of **Mark W. Bullock**, vice president, Marketing.

Robert E. Pellino has been appointed western area sales manager for Ampex Corp.'s Magnetic Tape Division. Pellino, who has served as midwest regional sales manager since 1973, replaces Jack Valdespino, who resigned.

John A. Poserina has been elected vice president and treasurer of Chyron Corp. (OTC-NASDAQ). Poserina joined Chyron in February 1979 and has been controller of the company since December of that year.

Ansel Kleiman, president of Telex Communications Inc., a wholly owned subsidiary of the Telex Corp., has been elected to the corporation's board of directors. Kleiman, with the company since 1964, was appointed a corporate group vice president and president of Telex Communications Inc. in 1973.

Scientific-Atlanta Inc. has announced the appointment of **Anthony A. Martinelli** as general sales manager for the instrumentation group. Martinelli will be responsible for the instrumentation group sales organization, including Scientific-Atlanta's regional sales managers who sell products manufactured by the Atlanta, New Jersey and Burlington instrumentation divisions.

Robert Tourkow has been appointed sales engineer for RTS Systems Inc., a subsidiary of Compact Video Inc. Tourkow's efforts will be directed toward applications engineering and design of communications systems for studio facilities, mobile location vehicles, and theaters, both domestically and internationally.

Dennis R. Ciapura, formerly general manager of Telecommunications for New Jersey-based Greater Media Inc., was named group vice president, Telecommunications. In addition to managing the company's Greater Starlink Communications subsidiary, Ciapura is in charge of technical operations for the corporation overall and will be exploring new communications business opportunities such as Greater Media's recent Starnet affiliation. Before joining Greater Media Inc., Ciapura was director of engineering for Sudbrink Broadcasting and has been active in broadcasting engineering management and consulting for the last 15 years. He also owns and operates Teknimax, a communications and aviation management consulting company. Ciapura also serves as a technical consultant and technology editor for **Broadcast Engineering**.

S. Richard Ravich has been appointed vice president of Marketing for AKG Acoustics Inc. Before his appointment, Ravich held the position of marketing manager. He has been with AKG Acoustics Inc. since 1974.

Arthur P. Bodner, vice president of LRC Electronics Inc., an Augat subsidiary, has been appointed vice president of Business Development for the Augat CATV Division. Bodner will be responsible for the evaluation of opportunities for Augat CATV components outside of the cable market, and seeking out new opportunities for Augat in the CATV market.

William L. Brydia has been appointed president of Leader Instruments Corp. a subsidiary of Leader Electronics, Japan. Brydia was previously corporate vice president and general manager of Leader Instruments.

System Concepts Inc. recently announced that **Leonard F. Zaller**, president of System Concepts International—a subsidiary of System Concepts Inc.—will be responsible for the total marketing of both companies. All domestic and international operations will be directed by Zaller. Zaller is co-founder of System Concepts, a privately held Salt Lake City company established in 1974.

James Pagliaro Jr. has been appointed to the position of national market development manager, Video Systems Division of Panasonic. Pagliaro is responsible for the national marketing of products used in corporate communications video networks. Pagliaro came to Panasonic in 1977 as a district sales manager for the Video Systems Division. He was promoted to manager, Market Development in the Eastern United States before assuming his new post.

The Broadcast and Professional Audio group of Telex Communications Inc. has announced the appointment of **Jerry B. Wade** to the position of product manager. Although Wade's responsibilities cover the entire Telex Pro Audio line, he will place special emphasis on Turner Microphones, Audiocom Intercom Systems and the Telex Commercial Music line.

The following personnel appointments have been announced by CMX/Orox: **Joe Drummond** has been named director of Operations; **Rita Alsina-Powell** is appointed manager, Sales Administration; and **Gary G. Schultz** has been named product specialist, Medium-Scale Systems.

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ES251-Six digit SMPT E Time Code Reader displaying Hours, Minutes and Seconds. Reads at play back speed. Momentary hold switch permits "freezing" of time displayed. Releasing hold switch updates display to correct time.



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ES253-Eight digit reader, displays Hours, Minutes, Seconds and Frames.

Reads at play back speed, has "freeze" control. **\$454**

ES254-BI-DIRECTIONAL, MULTI-SPEED (1/20 to 20 times), eight digit reader with "freeze" control. On loss of code, displays last valid code read. **\$675**

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ES255 is an eight digit, multi-speed, bi-directional SMPT E reader which adds the SMPT E input to your video. You can now "burn" the time code into the video portion of your tape, or feed a monitor directly. **\$995**



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Otari opens West Germany company

Otari Electric Co. Ltd. has announced the opening of Otari Electric Deutschland GmbH in West Germany.

The sales and service organization, located near Dusseldorf, is headed up by Ken Hirano, operations manager.

Opened in June, the new branch of the Japanese professional audiotape machine manufacturer will handle West German business and service for all Otari products. The new address is Otari Electric Deutschland, GmbH, Gielenstrasse 9, 4040 Neuss, West Germany.

Microdyne Corporation expands Ocala facility

Microdyne Corporation recently began construction of its new production facility, which will be located in the Silver Springs Shores Industrial Park in Ocala, FL.

The new 40,000 square foot expansion will be adjacent to an existing plant. Microdyne manufactures its

satellite TV products in this plant.

Koplar Communications orders RCA TV equipment

Koplar Communications of California Inc. is modernizing the company's recently acquired TV station in Sacramento, CA, with TV equipment valued at \$1.6 million, on order from RCA Broadcast Systems.

The equipment for KRBK-TV (formerly KMUV-TV), Channel 31 in Sacramento, includes four TH-280 1-inch videotape machines, which feature 3-hour recording capability and associated time base corrector. A TH-50 portable recorder will be used for on-location production assignments, along with a TK-86 hand-held camera.

Also included in the purchase were two TCR-100A videotape cartridge machines. One will be installed in the company's St. Louis station, KPLR-TV, along with a complete telecine system, which includes three TP-66 16mm projectors and an FR-35B 35mm projector.

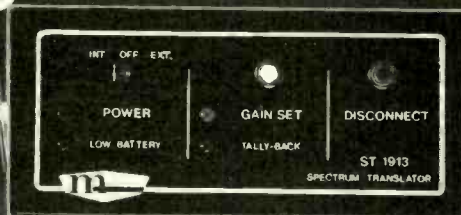
Precision Data purchases Arvin/Echo

Precision Data Inc. has announced the purchase of the Arvin/Echo magnetic recording and reproducing equipment business of Arvin Industries Inc. Founded in 1964 as Echo Science Corp., Arvin/Echo specializes in high-performance wideband disc and tape recording systems. The Echo Science operation has been providing the professional TV industry with video recording equipment such as the frame store and slow motion units used in producing ABC TV's *World News Tonight* and *Wide World of Sports*.

Arvin/Echo has recently introduced the "Image Maker" to the professional TV industry. The "Image Maker" is a videodisc system that simplifies preparation of graphics for news, sports and commercials. The company has also developed advanced wideband recording technology for research and medical imaging applications.

The acquisition was a cash transaction. The Echo Science operation will

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function as a wholly owned subsidiary of Precision Data. Annual sales of the combined product lines exceed \$16 million.

BBC employs Animated News Titles

The BBC brought Animated News Titles (ANT) into service recently. ANT electronically generates the opening sequences for the BBC's revised news presentations.

The hardware in ANT was based on that used for generating the BBC 2 electronic clock and the animated Open University logo. This equipment needed modification to cater for multiple captions, the generation of "key" signals for the picture overlay, and to define certain areas of the display. The system is divided into two distinct parts: hardware and software.

The hardware consists of three groups of modules. In the first group, two general purpose units contain the microprocessor, with its support circuitry, and the controlling program, along with the data tables that define the animation.

In the second group, three more specialized units control the display. One of these contains the data and generates the four separate captions. This data is held in run length form, which states how long each run of white or black should last along each horizontal line, rather than telling each picture element (pixel) on the screen whether it should be white or black. This results in a considerable saving of data for text displays. The other two units in this group control the system timing and display of moving parts of the sequences. They contain a Random Access Memory (RAM), which is written to by the Central Processing Unit (CPU) as the animation progresses. The RAM is read by the controller in real time for the actual display. These units are used for the dynamic parts of the symbol ('0' to '9') and the flashing cursor.

Finally, the third group includes a color synthesizer and PAL coder used to set the various colors in the display and encode them into a standard TV signal conforming to PAL System I.

The software has been written in structured modules. The program controls the commands and the sequences of the animation. It is about 500 lines of source code, and occupies less than 1k bytes of memory.

The data is stored in tables for each step of animation with a "look up table" to arrange the actual sequence. The data is incremental in that each

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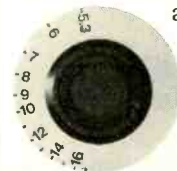
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AM BROADCASTING - HIGH FIDELITY Are these terms mutually exclusive?

YES NO DON'T KNOW

Surprisingly, many broadcasters may not know that the correct answer to this question is no. Large sums of money are spent each year to purchase new transmitters, new studio equipment, new audio processing equipment and to modify antenna systems for improved AM sound. Unfortunately, until now, there has been no such thing as a professional quality AM monitor receiver. As a result, the perceived fidelity of an AM signal has been severely restricted by receiver performance.

Potomac has developed the SMR-11 Synthesized Monitor Receiver which will let you hear and measure the quality of your transmitted AM signal ... perhaps for the first time. Features include: Crystal Stability; 60 dB Signal to Noise Ratio; Audio Frequency Response ± 0.5 dB, 20 Hz to 8 kHz; Total Harmonic Distortion less than 0.2% (95% Modulation) at audio frequencies above 40 Hz ... please write for complete descriptive brochure.



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Business

data table defines those parts of the picture that need to be changed, assuming a current state. This avoids the need to define the whole screen for each step. This is convenient because the animations proceed in a defined sequence, which considerably reduces the workload of the microprocessor. This is important because, to avoid conflicts during access to the Display RAM, the CPU can only work during the field interval—1.6ms out of every 20ms. The disadvantage is the relatively large amount of data needed, in this case more than 6k bytes.

The microprocessor is triggered 25 times a second by the display controller to precisely control timing of the sequences. The system can be automatically started from the audio tape machine carrying the news signature tune so as to maintain the relationship between sound and vision. Production versions of the Animated News Title equipment are being made for installation in the three BBC TV News Studios.

Tentel moves to new headquarters

Tentel of Campbell, CA, the manufacturer of the Tentelometer tape tension gage and similar service tooling, has announced a move into newer and larger quarters. The new address is 1506 Dell Ave., Campbell, CA 95008; (408) 379-1881 or (800) 538-6894 in the continental United States, except for California.

Parcom named representative for Ramko

Ramko Research Inc. has announced the appointment of Parcom as its exclusive representative for Texas, Oklahoma, Arkansas and Louisiana. Parcom is a new manufacturer's representative company formed by Darryl Parker, who formerly was associated with MZB and Associates. Parcom is located at 2460 Raintree Drive, Southlake, TX 76092; (817) 481-7221.

Shively Laboratories moves to new facility

Shively Laboratories has announced that it is now operating out of its new 22,500-square-foot plant in Bridgton, ME. The facility is on an 8-acre site where the company is building both a full scale and a model antenna test range. The new facility will permit a sizable expansion of Shively Labs' manufacturing and testing capabilities.



IT'S A SNAP

Portable Energy Products announces the PEP Snap Pack—the only snap-on power source available offering the advantages of sealed lead-acid batteries:

- No "memory effect."
- The battery maintains excellent voltage regulation even in extreme temperatures.
- Plus low self discharge.
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The PEP Snap Pack only weighs five pounds. It attaches to standard keyhole mounting brackets via three quick release studs. And PEP's high

performance, two-step constant current maximizes battery life by preventing over charging.

These features plus Portable Energy Product's reputation for quality, reliability and service add up to make the PEP Snap Pack the most dependable snap-on power source available.

PEP

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Shively Laboratories manufactures FM broadcast antenna systems and related products such as transmission line, patch panels, reflectometers, FM harmonic filters and filter couplers, AM/FM isolation units and pressurization equipment. The new address is Shively Laboratories, Harrison Road, Bridgton, ME 04009; (207) 647-3327.

CBS Sports purchases HR-100 VTRs

Hitachi Denshi America Ltd. has announced the sale of three HR-100 portable 1-inch, type "C" VTRs to CBS Inc. The VTRs will be used by the CBS Sports Division.

The HR-100 VTR is noteworthy for its excellent serviceability through extensive use of plug-in modules and fast head and scanner replacement. It is the smallest and lightest type "C" VTR available, which maintains required sturdiness through its all metal construction.

The Edge wins Industrial Design award

The Industrial Designers Society of America (IDSA) recently awarded the Industrial Design Excellence Award for Instrumentation to The Edge, the CMX videotape editor console. Chosen from more than 200 entries in 10 categories, The Edge was singled out for recognition because of its successful simplification of a complex unit. The judges found its severity of design exciting and dramatic and praised the appropriate use of materials and the ambidextrous nature of the design as well.

Designed by Steinhilber & Deutsch Associates of San Francisco for CMX/Orox Corp. of Santa Clara, CA, the editor is a portable desktop console on which raw tape scenes can be assembled onto the final presentation tape. It synchronizes action to both music and narration and allows an editor to control up to three videotape recorders at once. The Edge can program dissolves, fades and cuts, speeding and simplifying the editing process at a low cost.

The Edge is housed in polyurethane structural foam plastic. The tape position wheels are machined from solid aluminum with a hard anodic coating for mass and precise balance. Compact and lightweight, the console features a sloped-forward desk that gives operators a comfortable place to rest their forearms while providing a convenient, slightly recessed well to hold worksheets in place.

Teletext magazine premieres in Chicago

Nite-Owl, a news and information

WHY BUY TWO LENSES WHEN THIS ONE WILL DO?



Schneider 14X ENG/EFP lens zooms from super wide angle to long telephoto.

Changing lenses to handle changing conditions could cost you a once-in-a-lifetime shot. And that's why you should know about the Schneider 14X ENG/EFP lens. It gives you two-lens versatility in an economical one-lens package.

It can power zoom from 9mm–126mm. Or with the built-in 2X extender from 18mm–252mm. With the 6.3mm–9mm aspheric lens attachment, it can power zoom on the super wide angle shots. And, when the action calls for close and tight, it's got macro focusing.

The Schneider 14X is designed to bring out the best in Ampex, CEI, Fernseh, Hitachi, Ikegami, JVC, NEC, Panasonic, Philips, RCA, Sharp, Sony, Thomson and Toshiba $\frac{2}{3}$ " cameras. Lightweight, compact, ruggedly constructed, and weather resistant, it comes with a complete line of accessories. Superb European optics combined with excellent f/1.7 sensitivity bring back crisp, clear pictures even under low light level conditions.

In addition, Schneider offers the 14X lens in a $\frac{1}{2}$ -inch format for the new one-piece VCR cameras such as RCA Hawkeye, Panasonic and Sony. Schneider broadcast lenses are available throughout the United States and Canada from: **TELE-CINE CORP.**, 400 Crossways Park Drive, Woodbury, NY 11797; (516) 496-8500.

Schneider 14X ENG/EFP

Tele-Cine Corp. is a subsidiary of Schneider Corporation of America.

Circle (89) on Reply Card

Business

teletext magazine, premiered in September on WFLD-TV, Chicago (Channel 32). *Nite-Owl* is broadcast seven nights a week, midnight to 6 a.m., providing a continually updated TV news package.

Viewers see rolling pages of text and computer-produced graphics of the latest international, national and local news, sports, weather, travel, entertainment and financial information, plus advertising messages.

The 20-minute news orbits are updated throughout the night by specially trained teletext journalists who use *Nite-Owl's* flexibility and speed to rapidly include new information on developing stories and to report late-breaking news.

Nite-Owl is produced by Field Electronic Publishing Inc., a subsidiary of Field Enterprises Inc. Since April, FEP has been broadcasting KEYFAX, a demand teletext system that allows users to select information through a hand-held keypad. KEYFAX is carried on an unused portion of the Channel 32 signal to decoder-equipped TV sets in Chicago area high-traffic public places and private homes.

KEYFAX is the first commercial

teletext experiment approved by the Federal Communications Commission. The data base for KEYFAX and *Nite-Owl* includes information supplied by the Associated Press, United Press International, Dow Jones, the Chicago City News Bureau, the Chicago Sun-Times and the Chicago Public Library.

3M supports 48kHz sampling rate

In the interest of a universally acceptable professional digital audio standard, 3M has announced its support of the 48kHz sampling rate currently being proposed within technical audio, video and broadcast study groups.

Robert Youngquist, corporate scientist for 3M's digital audio and representative in numerous standards discussions, continues to believe 50kHz is better for purely technical reasons.

"The rate, selected almost a decade ago and incorporated in some 60 recorders worldwide during the past 2½ years, has some advantages over 48, particularly as it relates to video. Some users may, in fact, elect to continue using 50 indefinitely," Youngquist said. "But, we concede that 48 is very workable and presents no real

sacrifice in audio quality, our principal concern."

Moseley names Rank Electronics representative

Moseley Associates Inc. has announced the appointment of Rank Electronics Pty. Ltd., as its exclusive distributor for Australia and New Guinea.

Rank Electronics will be servicing the two countries for Moseley's full line of broadcast point-to-point data distribution and supervisory control equipment. Rank will also be incorporating products of the Moseley line into its existing physical security systems for distribution throughout the two territories.

SMN purchases Audio & Design limiters

Audio & Design Recording Inc. has announced the sale of a large, but undisclosed, quantity of its Ex-press Limiters to the Satellite Music Network. These limiters will be used on various uplinks to provide high fidelity processing. The Ex-press Limiter is a versatile compact multiratio compressor/limiter/expander. A soft clipper can be switched in following the limiter for absolute peak control.

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phantom-powered electret microphones. Designed to work from external power, internal regulation automatically handles any voltage from 9 to 52 VDC without adapters, switches, or rewiring. Just plug in and enjoy. With current drain a mere 0.3 mA at 9 volts (4 mA at 12-52V) a 9V battery lasts thousands of hours, not just the 60 or 70 hours typical of other mikes.

When your power supply isn't available, or isn't enough, use ours. The new AT8501 Dual Battery Supply holds two 9V batteries. One to use, and one in reserve. Instant switchover and test LED eliminates guesswork. And spares are as near as the closest shopping center. Near!

But convenience and versatility are just two of the advantages of the new ATM models. All-new electronics provide plenty of headroom inside the microphone with no more than 1% THD even when used in acoustic fields of 141 dB SPL. Which sets new standards for clean sound even close-up to big brass or inside a powerful drum kit.

And the sound you hear is wide-range and *musical*. Presence without peaks. Highs to 20,000 Hz but without a raspy "edge." Yet despite their responsiveness, these new ATM microphones have the "Road Tough" reliability proved so often on stage and in the studio.

Before you add another microphone, compare our sound, our convenience, our reliability, and our cost. Write for literature and list of nearby ATM microphone specialists. Get great sound...right from the start! AUDIO-TECHNICA U.S., INC., 1221 Commerce Drive, Stow, Ohio 44224. (216) 686-2600.

audio-technica[®]

new products

Noise reduction unit

Dolby Laboratories has introduced a new professional multi-track noise reduction unit, the SP series, which provides up to 24 tracks of Dolby A-type noise reduction. In addition to being compact (12¼ inches of rack space,) the SP series has control and performance refinements over the Dolby MH series.

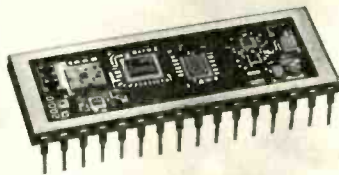
The series provides Dolby A-type noise reduction characteristics through standard Dolby Cat. No. 22 modules. However, the SP series is otherwise an all-new design that can contain as many as 24 noise reduction tracks across its standard 19-inch rack width. A separate regulated power supply with electronically controlled output protection and twin, low-noise fans assures cool, reliable operation. One new feature is an LED display for each track that permits accurate Dolby level calibration (within ± 0.1 dB if desired) by matching the intensity of LED pairs. Additional LEDs indicate the presence of signals and clipping, and assist alignment with

high level reference tapes.

Circle (211) on Reply Card

Sample/hold amplifier

An improved second source to the SHC-85 sample-hold amplifier (SHA), featuring better performance and lower cost, has been introduced by Analog Devices. The new ADSHC-85 reduces sample/hold transient settling time to 300ns, (to within ± 1 mV) typical; 500ns, maximum (vs. 500ns typical for competing devices).



The 14-pin hybrid SHA acquires analog signals to $\pm 0.01\%$ accuracy in a 4.5μ s, maximum, for a 10V step

change, and 5.0μ s, maximum, for a 20V change. Applications for the ADSHC-85 include use in data acquisition and distribution systems, analog delay and storage circuits and for peak amplitude measurements.

Rated specifications apply over an operating temperature range of 0 to $+70^\circ\text{C}$. The ADSHC-85 is housed in a hermetically-sealed metal package and offers high reliability with a MTBF of more than 460,000 hours, calculated per MIL-HNBK-217.

Circle (209) on Reply Card

500W inverter

The LTM 500W Inverter introduced



STL

PRECISION



MAGNETIC TEST TAPES

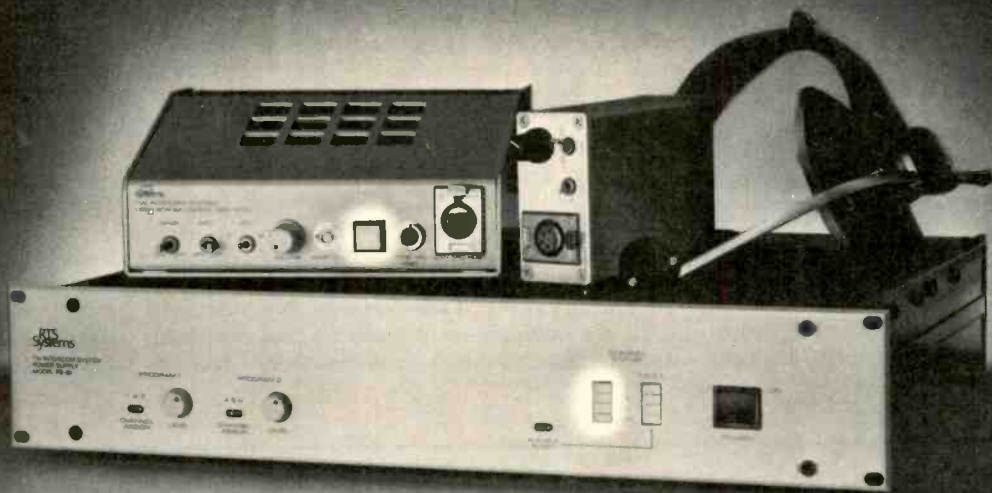
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PERFORMERS CAN AFFORD TO BE TEMPERAMENTAL.



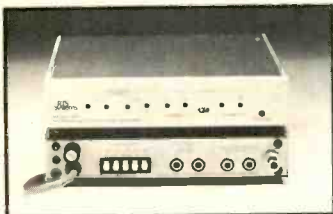
Your Communications System Can't.

When an entertainer has an off day, that's a problem. When your communications system decides to take the day off, that's a disaster.

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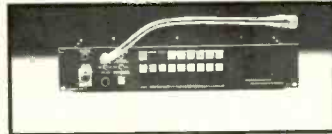
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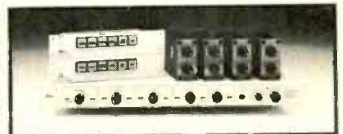
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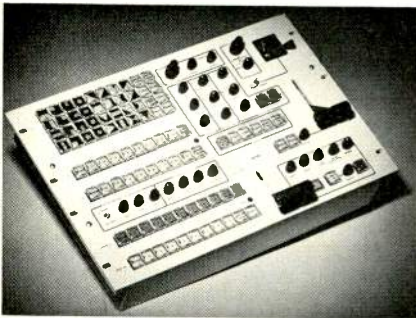
Circle (93) on Reply Card

New products

by LTM Corp. of America and any 12V automobile battery allows simultaneous use of two of the most popular LTM HMI models: The Luxarc 200W (Fresnel Spot) and the Ambiarc 200W (Open Face Flood). It does so by converting the 12Vdc into 120V 60 cycles, crystal-controlled. The inverter gives the freedom to use lights and any other ac equipment, wherever ac is simply not available. It weighs 24 pounds and measures 13"x8½"x6".

Circle (206) on Reply Card

Production switcher



Industrial Sciences Inc. has introduced the ISI 210 Production

Switcher, which has the following standard features:

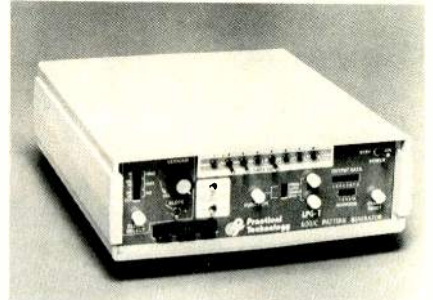
- 10 inputs including black and color background;
- Four input busses;
- 32 effect patterns;
- Three types of pattern modulation with freeze;
- Mix, wipe, key, mix-key, wipe-key and fade through black effects modes;
- Auto transitions for effects (with external trigger for GPI pulse);
- Midstream keyer with edging and key mask using effects patterns;
- Flip-flop mixer with take bar;
- Control provisions for downstream character generator;
- Master fade-to-black with pulse processing;
- Non-sync inhibit system; and
- Rack mount 9" x 12¼" control panel.

Circle (208) on Reply Card

Data generator

Practical Technology has announced the availability of the LPG-1, Logic Pattern Generator. The LPG-1 is a programmable parallel and serial data generator that provides digital signals for a wide variety of applications. The unit is a companion to multichannel data display devices such as Practical

Technology's Logic Analysis Display formatter (LADY) or other logic analyzers. By using LPG-1 to provide various known patterns of input signals, the testing and troubleshooting of logic-based products is greatly simplified.



The LPG-1 provides a set of 32 8-bit parallel outputs or alternately a string of 256 bits of serial data. Output rate is selectable in decades between 1Hz and 10MHz or continuously variable by use of the front panel vernier control. Data is programmed into the unit's 8 x 32 memory through the use of front panel switches. LED indicators display memory data and address information for the user. A manual mode permits review of memory contents. The power switch has a standby position to retain



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memory content so the unit does not have to be reprogrammed.

Circle (207) on Reply Card

Dubbing rack

Designed to safely stack as many as five VTRs in a variety of setups for 3/4-inch videotape duplicating, the new Model 450A from Winsted features pullout shelves on ball-bearing rollers for fast, complete access to equipment.

Sturdy steel construction provides lasting durability. The unit has a beige and cocoa brown finish, with walnut woodgrain shelves. Basic racks can be bolted together to form an economical "in line" duplicating center.



Circle (205) on Reply Card

Ceramic disc capacitors

KD Component's has introduced a new line of high voltage ceramic disc capacitors, constructed to meet military thermal shock requirements of -55° to 125°C without mechanical or electrical failure. The new capacitors have low corona characteristics and are available in ceramic types NPO, X7R and Z5U. Capacitors are available in 1pfd thru 22,000pfd and voltages of 3kV to 20kV for delivery in eight weeks. Available in all standard tolerances, sizes and lead spacing.

Circle (202) on Reply Card

Time-delay network

Howe Audio Marketing has introduced the Howe Series 2000 Phase Chaser, an electronically controlled precision time-delay network that corrects for the relative phase-errors between the left and right channels of a stereo audio signal. This provides for optimum combining of left-plus-right

signals for monaural compatibility. No other audio parameter is affected.

The following Howe Audio circuit advances are featured:

- A dual response error-correction feedback loop having a long-term correction of plus or minus 360° and instantaneous correction to plus or minus 20° (for accurate characterization of stereo tape cartridge playback conditions). Measurements at 10kHz;
- A voltage-controlled time-delay network modeled to within 1% of "real world" time delay errors; and
- A wideband phase-error detector accurate to within 0.5% at all fre-

quencies from 20Hz to 20kHz.

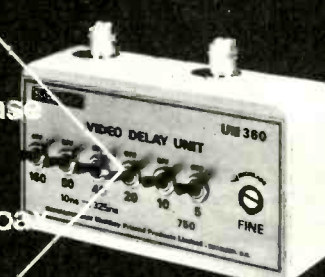
The Howe Series 2000 Phase Chaser is available as a module for multiple use.

Circle (203) on Reply Card

Earth station modulator

Blonder-Tongue Laboratories Inc. has announced that its Earth Station Modulator, ESM-4928 is now available in the superband frequency range. The ESM-4928 can also be obtained for VHF channels 2-13 and mid-band channels A-1. The unit is specifically designed with all required features for operation with TV Receive-Only (TVRO) satellite ter-

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Zeppelin® wind screen

The Zeppelin® Wind Screen insures perfect sound recording in all conditions where wind or air movement is present. Its aerodynamic design screens the microphone from wind but allows sound in. Although extremely lightweight, the Zeppelin is virtually indestructible and can be boom mounted or hand held with the Independent Suspension Shock Mount. There are Zeppelins available to house Sennheiser 816 and 416, AKG CK-8 and CK-9 and other similar microphones. Zeppelins and ISS Mounts are all-American made.

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minals where the audio and video are provided as separate baseband signals.



The ESM-4928 is a sideband audio-video modulator with extremely accurate crystal-controlled visual and aural carriers that minimize color beats and audio distortion. The unit has a calibrated video modulation meter and a true peak-reading LED audio overmodulation indicator to assure precise modulation control.

A video low-pass filter in the ESM-4928 rejects unwanted subcarrier frequencies of secondary satellite services, preventing adjacent channel interference, and a low loss RF loop-through diplexer allows higher output levels with lower distortion when combining channels.

The ESM-4928 is compact, weighs eight pounds, and can be mounted in a standard EIA 19-inch rack. All indicators and controls are located on the front panel for easy monitoring and adjusting.

Circle (204) on Reply Card

Automation system

Sphere Electronics has introduced the Travis Fader and Sphere Digital Attenuator. These elements together form the Datalog Automation System that places the analog signal under digital control. The audio signal is never converted to digital, thereby retaining the warmth (and harmonics) that the latest generation of analog tape machines are capable of reproducing.

The Travis Fader is a digital encoding device that features no moving parts. Infrared light bridge technology feeds a 6500 series microcomputer that can receive and process information from four fader units. Level changes are accomplished by placing a finger tip anywhere in the shallow fader trough and moving it up or down. There is a row of LEDs next to the fader that tracks level and is analogous to knob position. Located along the bottom of each fader are three switches: Preset 1, Preset 2 and fader Solo/Mute. Each fader has two present level memories that are available by pressing the appropriate switch. The fader output is an 8-bit digital word that routes to the at-

tenuator and to the automation computer.

The Sphere Digital Attenuator is a resistive ladder, CMOS switching device that controls the analog signal with 224 discrete, repeatable digital steps. No distortion or noise is introduced by this passive circuitry. The attenuator is designed to either replace current VCAs or plug directly into the audio signal, thereby making SMPTE time code automation available for consoles in service today on a field-installed, retrofit basis.

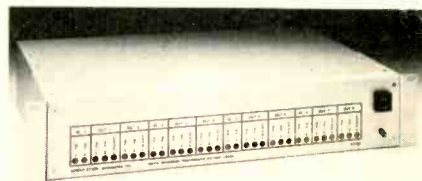
Sphere Datalog Automation is the combination of the digital fader and attenuator, which eliminates many problems associated with interfacing and manipulating analog VCAs. With many chores handled by the fader's own microcomputer, the main communications computer is left with relatively easy tasks.

Circle (200) on Reply Card

Audio distribution amplifier

Modulation Associates Inc. has introduced an audio distribution amplifier designed to drive up to eight local loops from a satellite terminal or other program audio sources. Designated the AD148, this amplifier provides four high impedance (50k) balanced inputs and eight 600Ω balanced outputs. Balanced input impedances ranging from 150 to 900Ω are achieved by the addition of a terminating resistor on input terminal connections. Balanced, high impedance bridging techniques are used on the audio inputs to minimize loading effects when the amplifier is used on 600Ω output systems. By strapping the inputs, the amplifiers can be configured in a quad 1-for-2, dual 1-for-4, or a single 1-for-8 distribution system.

Other features of the AD148 include frequency response of ± 0.1dB from 50Hz to 20kHz, THD less than 0.5% at 50Hz, and a signal-to-noise ratio greater than 80dB. Individual front panel gain adjustments provide up to 20dB of gain or 10dB of loss to allow the average program level (OVU) to be



set individually at +8dBm for program loops or 0dBm for voice grade loops. The output clipping level is +20dBm at 600Ω. Balanced front panel bridging testpoints are provided on all inputs and outputs.

Circle (201) on Reply Card

Price, Performance and Features Pushed Us to THE EDGE

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"We were surprised that we could get all the features THE EDGE™ has to offer at a price way below the competition. It's a real value."

Michael Wall, Director of Engineering, Sacramento, California

Price Waterhouse Likes the Human Touch

"THE EDGE is easy for anyone to operate, no matter what his experience. This is important to me because it means operators can focus all their energy on creativity."

Harry Larson, Director of Audio Visual Operations, New York City

South Carolina ETV: Running Smoothly

"With only five cables, we were up and editing with THE EDGE. It was so portable we took it on remotes. And there is a smooth interface between our VTR's and THE EDGE!"

Glen McKinney, Broadcast Engineering Supervisor,
Columbia, South Carolina

CMX Means a Great Deal says Videosmith

"The name CMX on an editing system says it all for me. I know I'm getting maximum performance for my money."

Ron Smiley, General Manager, Philadelphia

WLVT-TV Technically Impressed

"CMX did some thinking before they introduced THE EDGE. Not only is down time minimal, but the built in diagnostics help me identify a trouble spot before it becomes a major problem."

Jerry Richards, Director of Engineering,
Bethlehem, Pennsylvania

Trans Northern Protected Against Obsolescence

"The modular nature of THE EDGE enables us to expand and update. That means we can plug in the latest technical advances and also keep up with our customers' expectations for state of the art equipment."

Bob Nudo, Sales and Marketing, Hollywood

It's clear that these innovators in television technology representing the ever-expanding world of videotape editing recognize the total value of THE EDGE, the medium-scale computer-assisted editing system from CMX. That's why it keeps winning over experts like these every day.

Let us lead you to THE EDGE.



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WANTED: TELEVISION BROADCAST TECHNICIAN. Duties to include operations and maintenance of portable and studio cameras; ¾", 1" and 2" VTR's; production switchers; TTU60 transmitter; and related equipment. Applicants should be motivated and hard-working with a strong background in analog and digital circuitry. Previous experience in TV or radio preferred. A friendly, good place to work in an exciting community. Contact: David Wood, WKOW-TV, Box 100, Madison, Wisconsin 53701. An Equal Opportunity Employer. 12-81-11

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OPENING FOR ASSISTANT CHIEF ENGINEER at a well-equipped, major group-owned television station in Austin, Texas. Duties include direct supervision of engineers at studio facility, master control operation, and maintenance. Room for advancement with salary commensurate to experience. Contact Bill Hutchison, Chief Engineer, KTVV-TV, P.O. Box 490, Austin, Texas 78767 or call collect 512-476-3636. Equal Opportunity Employer. 12-81-11

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BROADCAST-MANAGEMENT—Kenneth R. Meades, Box 3831, Beverly Hills, California. 12-81-11

POSITION WANTED

ENGINEER SEEKS STABLE POSITION with non-commercial radio station. Desire to perform remote and location recording of classical and jazz music. Also enjoy board shifts. Ear for high grade sound. Please contact Thomas Eifert at (608) 257-3117. 12-81-2t

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