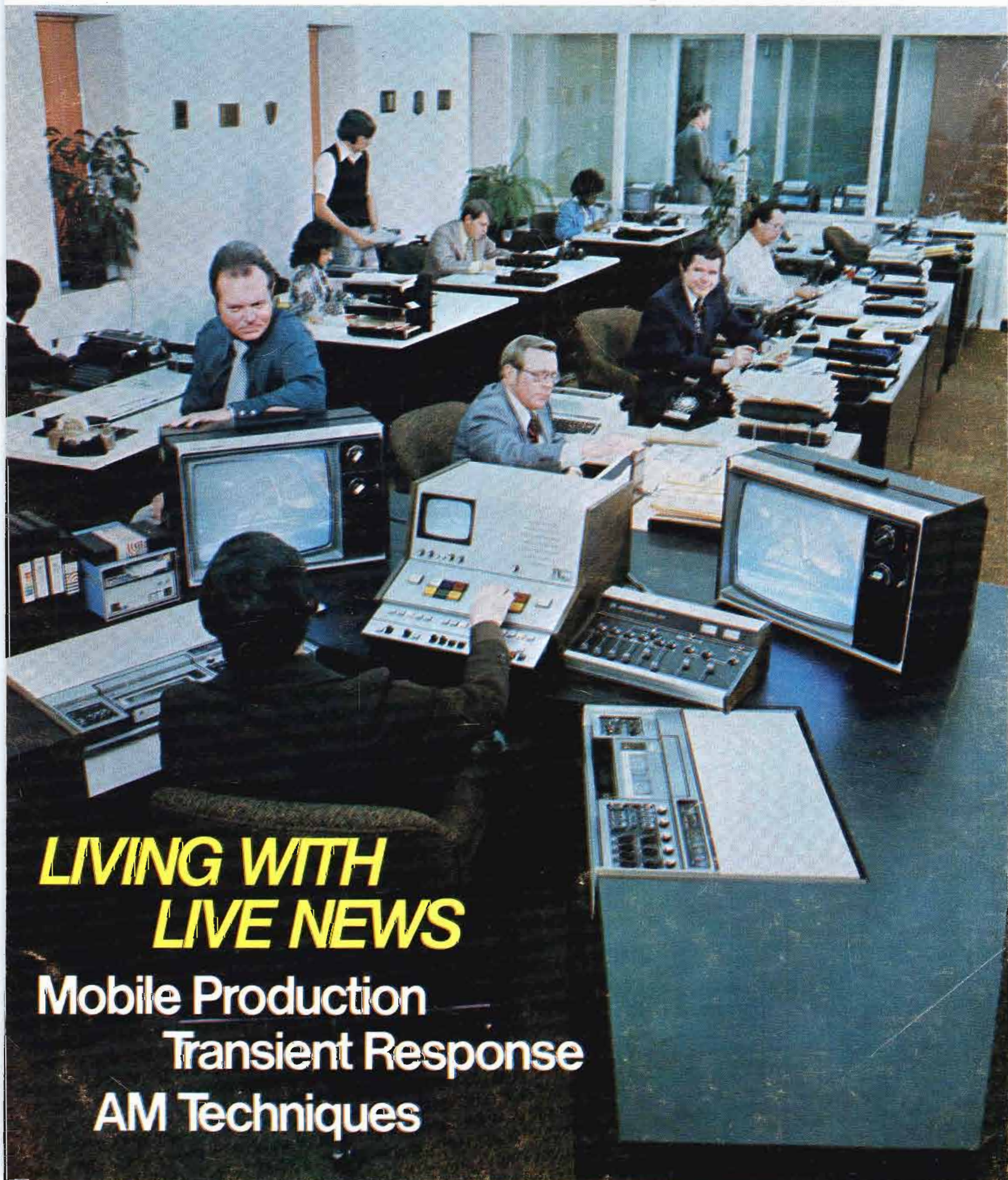


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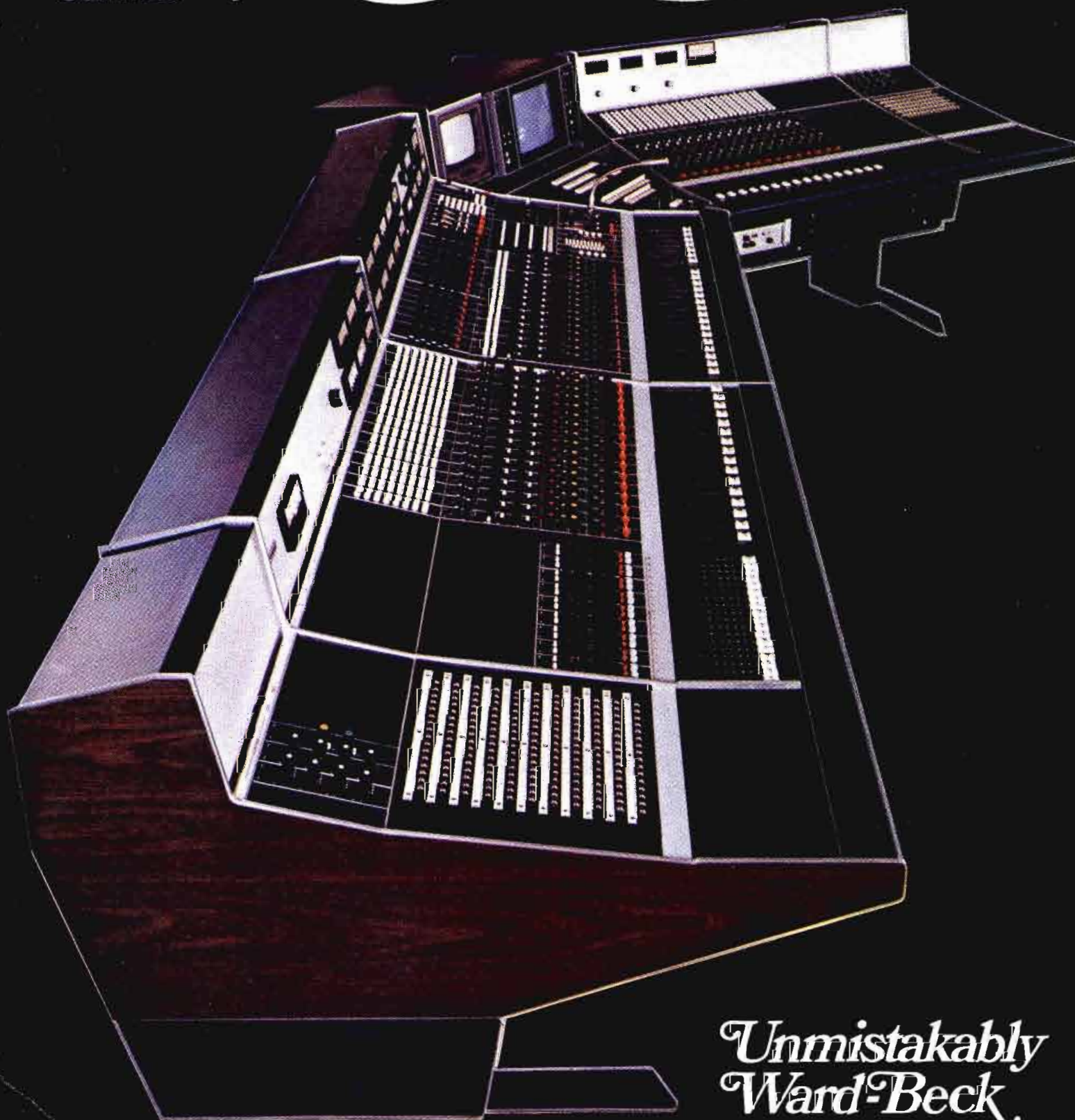


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46

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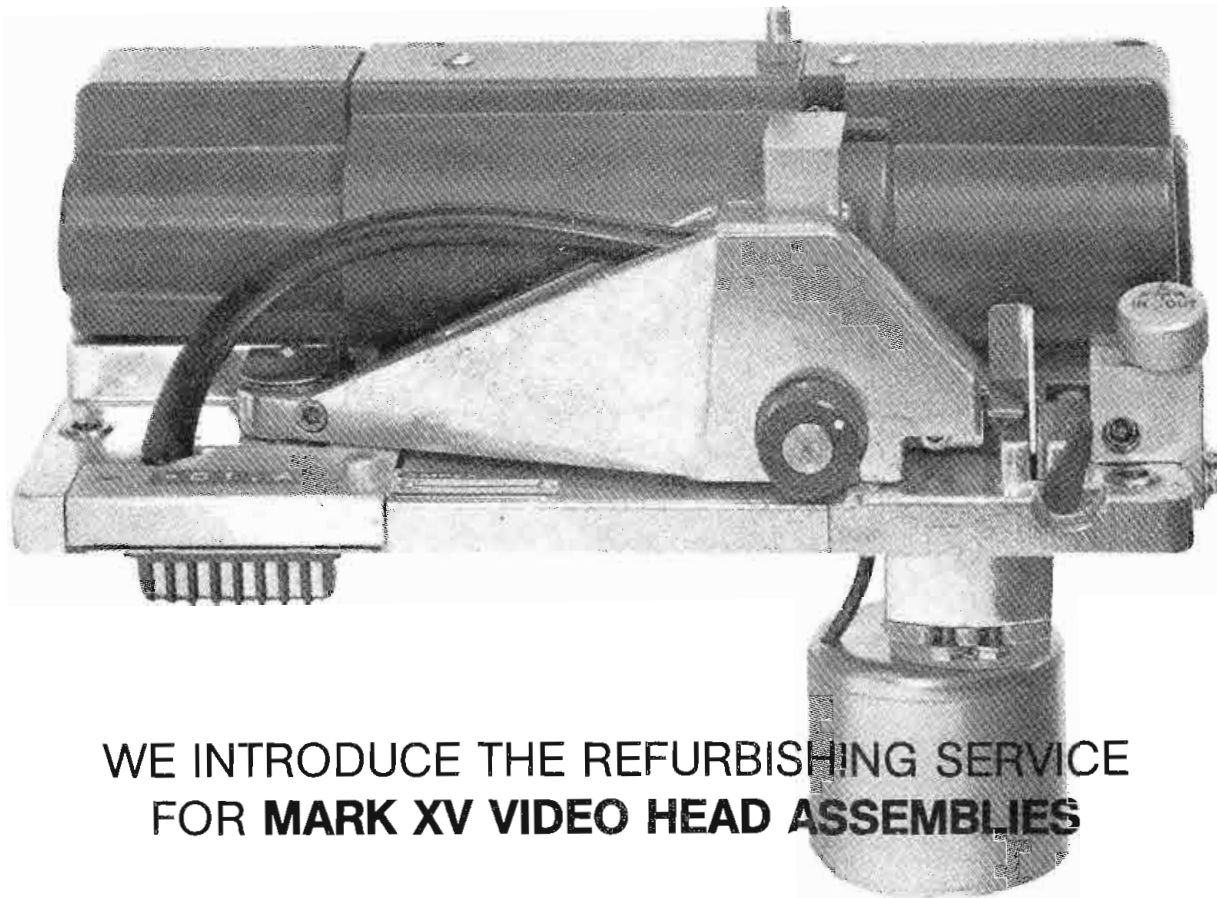


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- 20 **The Changing Faces of Live Journalism.** Live journalism gets an assist from some recent equipment and a new boost from a personnel approach.

- 26 **Learning to Live with Live News.** Tips on what others are learning about Live news equipment and techniques, and changes to look for in the near future. **Ron Merrell.**

- 32 **Simplifying On-location Production Work.** An inside look at how the Maryland ETV Center uses a van for some typical and not so typical production work. **Roger Hicks.**

- 38 **Can Anyone Feel My Pulse?** Part two of a two-part series on transient response. BE's Audio Editor discusses Overshoot and high frequency roll-off, and draws some conclusions about what can and can't be heard. **Dennis Ciapura.**

- 44 **AM Transmitter Techniques.** Part two of a two-part series covers the economics of various systems brought on by new solid state devices and hard-nosed R&D. **Glen Clark.**

About the Cover

Live Journalism continues to take the industry spotlight. This month we're updating the subject before NAB convention gives us more to consider.

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Howard T. Head, *FCC Rules*
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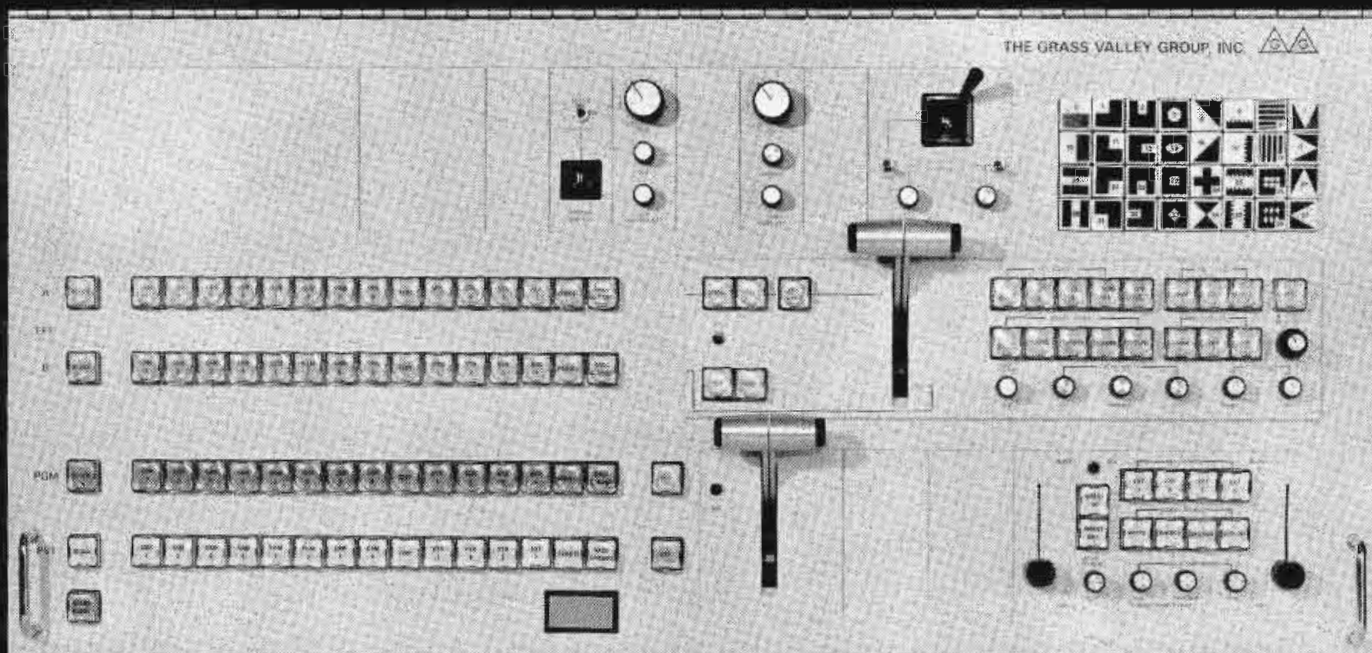


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DIRECT CURRENT FROM D. C.



January, 1976/By Howard T. Head and Harold L. Kassens

Clear Channel Case Reopened

The Commission has decided to look again into the matter of AM clear channels and what to do about them. If you're old enough, you'll remember that in 1945 they opened Docket 6741 to study the question of "super power" -- in those days 750 kilowatts -- for the Class I-A stations or duplication of the clear channels with additional assignments. After years of tedious study, great help from the industry, and over 70 volumes of comments, a decision was arrived at in 1961. Eleven of the 25 clear channels were duplicated with Class II-A stations in specific western states. These II-A stations are supposed to protect the 0.5 mV/m 50% skywave service area of the Class I-A stations and operate with at least 10 kilowatts at night, and not more than 50 kilowatts. Also in the decision, two channels were reserved for Class II stations to solve individual problems (760 kHz in San Diego and 750 kHz in Alaska.)

The Commission took no action on the remaining 12 Class I-A channels, pending consideration of the possibility of power greater than 50 kW or further duplication. The Commission wants to decide: (1) whether some or all of the Class I-A stations on unduplicated clear channels should be permitted higher power, whether they should be duplicated or whether they should be left in status quo; (2) whether additional Class II unlimited-time assignments should be provided for on the already duplicated clear channels; and (3) whether some or all of the I-A stations on the duplicated channels should be permitted higher power.

Broadcast "Reregulation" Continues

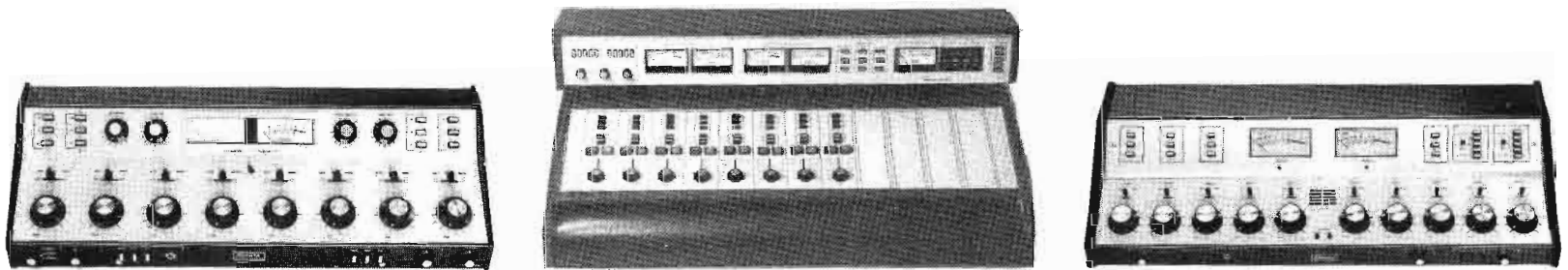
The Commission has adopted the Broadcast Reregulation Task Force's Ninth Order. What is "really big" about this one is that Section 74.665 on Operator Requirements for TV pickups has been relaxed and will aid considerably in Electronic News Gathering. From now on, TV pickups in Band D (12 GHz) with transmitter power of 250 milliwatts or less may be operated by any person whom the licensee shall designate. TV pickups in Bands A and B (2 and 7 GHz) and those in Band D with transmitter power above 250 milliwatts may be operated by any person whom the licensee shall designate, provided an operator with a first or second telephone ticket is on duty "at the receiving end of the circuit" to supervise operation.

(Continued on page 6)

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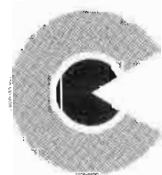
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DIRECT CURRENT FROM D. C.

(Continued from page 4)

Also for all TV auxiliaries (STL, inter-city relay, and TV pickup) if the auxiliary is operated by remote control (Section 74.634), a first or second telephone ticket holder must be on duty at the remote point. And if the auxiliary is operated unattended (Section 74.635), "he shall be on duty at the receiving end of the circuit."

The Order also includes another welcome change. A TV station may now change its transmitter without application provided the replacement is on the type accepted list and the Engineer-in-Charge, and the FCC in Washington, are notified within three days. For years, AM and FM stations have been able to make such changes. The difference for TV is that the notification must include a certification by the licensee "that the transmitter and overall station performance complies with the terms of its license and the technical requirements of the Rules." It must also attest to the fact that transmitter and station performance measurements have been made and are on file with the station's records.

FM Power Increases to Receive Extra Scrutiny

The Commission has announced new guide lines to be applied in instances where existing FM stations, already mutually short-spaced, enter into agreements for mutual power increases. The Commission will recognize and honor agreements between pairs and groups of stations for power increases up to the maximum permitted for the station class, but a special showing of service, interference, and other services available will be required to permit the Commission to determine the public interest aspects of the proposals.

The Commission has emphasized that not only does it not contemplate permitting power above the maximum for the class, but also that this is not a departure from its continued adherence to the basic mileage separation structure. Furthermore, the new guide lines are to be applied only in the case of power increases at existing transmitter sites with transmitter site moves being required to comply fully with the existing Rules.

Short Circuits

FCC Chairman Wiley has indicated that the Commission plans to "take another look" at the new EBS requirements and may consider extending the current April 15, 1976 deadline; nine encoders have now been type-accepted...The NQRC report has been formally presented to the Commission...An educational FM applicant in the Washington, D.C. area where the FM band is full, has proposed experimental operation on 87.9 MHz, just below the 88 MHz edge of the FM band and within TV Channel 6, not assigned to Washington... Filings were heavy in the Commission's Inquiry into making new VHF TV drop-ins in the top 100 markets; we will report more details to you in future issues.

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INDUSTRY NEWS

WOR-TV Earns ENG Award



(L. to R.) Ward Brody, Dir. of Marketing/Video Products for AKAI America, presents awards in Electronic News Gathering to WOR-TV Chief Engineer, Richard Quodomine, and news engineers Robert Hennessey and Ron Girellini.

Awards have been presented to WOR-TV's "News At Noon" program for the station's significant leadership in converting its facilities to an all electronic news gathering format.

The presentation was made to Richard Quodomine, Chief Engineer of WOR-TV, by Ward Brody, Director of Marketing, Video Products/Akai America, the manufacturers of the three new minicameras which replace the film cameras formerly employed at Channel 9. Awards also went to the engineers Robert Hennessey and Ron Girellini, for their innovative skill in handling the new video tape recorders on location.

Because WOR-TV is an independent station in a six commercial VHF market, it is important that the station serve as a viewing alternative. Channel 9's "News At Noon," is the New York/New Jersey area's only mid-day newscast, so it is crucial that morning stories are

ready for telecast as soon as possible. Film, because it requires extensive processing, would take too much time to be air-ready, and many major stories would be missed without the Electronic News Gathering (ENG) equipment.

Frank Anthony, WOR-TV News Director, said, "Both the skyscraper blaze at the 33-story Squibb Building on West 57th Street last July, and the charter plane crash last month at Kennedy Airport, are examples of major, fast-breaking stories which might not have been covered without the ENG camera/recorders. As it happened, Channel 9's minicam crews were able to give Tri-Staters their first video coverage of these calamities and the rescue efforts."

WOR-TV was the first New York City station to make the complete switch from filmed reports to ENG coverage, soon after it acquired its three Akai VTS-150 color camera/recorders in December, 1974.

NRBA Urges Self Promotion Rule To FCC

The National Radio Broadcasters Association has strongly urged the Commission not to promulgate any new rule in the area of station self-promotion, according to comments filed by NRBA General Counsel Thomas Schattenfield of the Washington law firm Arent, Fox, Kintner, Plotkin & Kahn, in response to the FCC Docket No. 20588 concerning the logging of sister station promotional announcements.

The NRBA comments cited the problems of drawing a clear line between acceptable, noncommercial promotional activities and purely commercial promotional activities, the administrative burden on licensees who would be forced to police ad lib disc jockey "chatter," and the fact that market forces can control the problem as reasons for the Commission to reconsider its Notice of Proposed Rule Making and not to promulgate such a rule.

ITT Proposes Digital Data Network

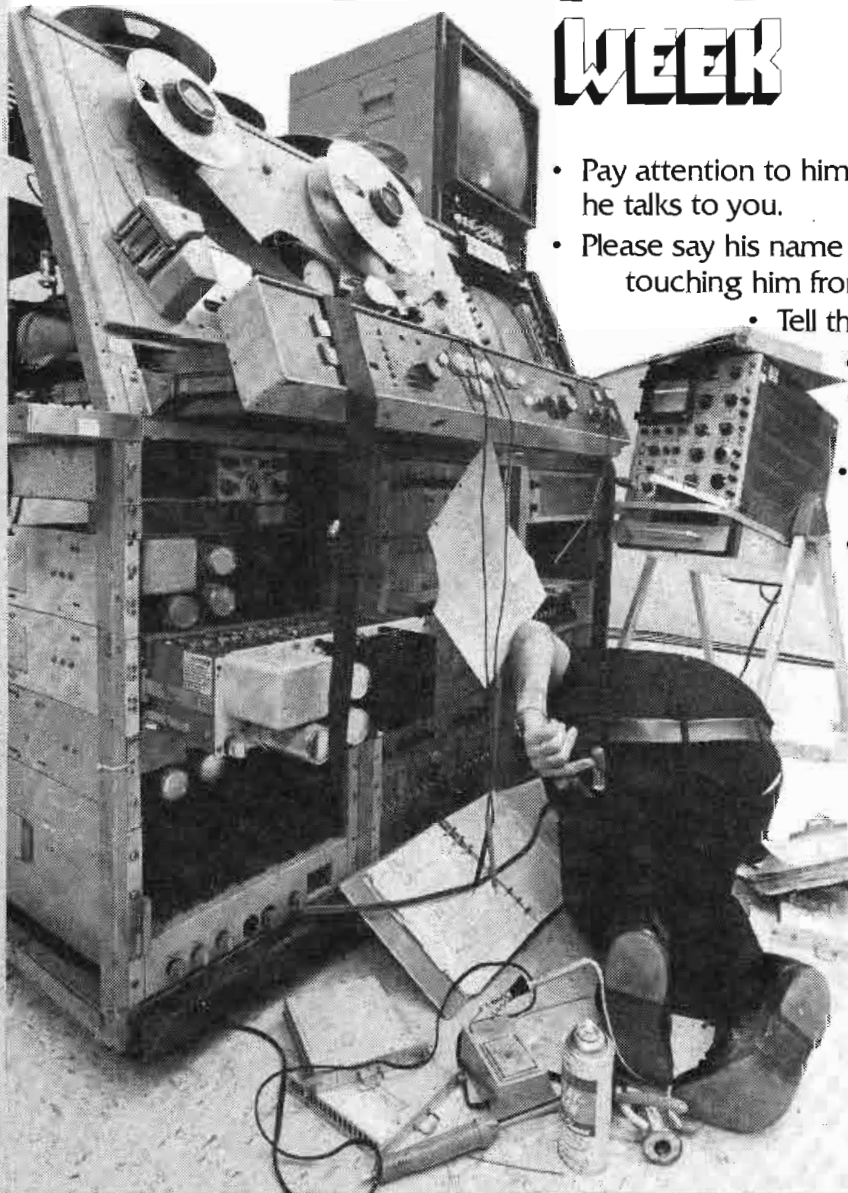
A domestic digital data network, costing an estimated \$40.5 million and using leased communications facilities to connect thousands of previously incompatible data terminals and computer devices, was proposed today to the FCC by ITT Domestic Transmission Systems, Inc.

The unique network would connect the existing data equipment, regardless of its design and mode of operation.

Francis T. Cassidy, executive vice president of ITTDTS, a subsidiary of International Telephone and Telegraph Corporation, said the system would put an end to the "babel of bits" that characterizes today's domestic data networks.

The network proposed by ITT, he said, would overcome this problem by establishing a method of operation acceptable to all data terminals now and in the future.

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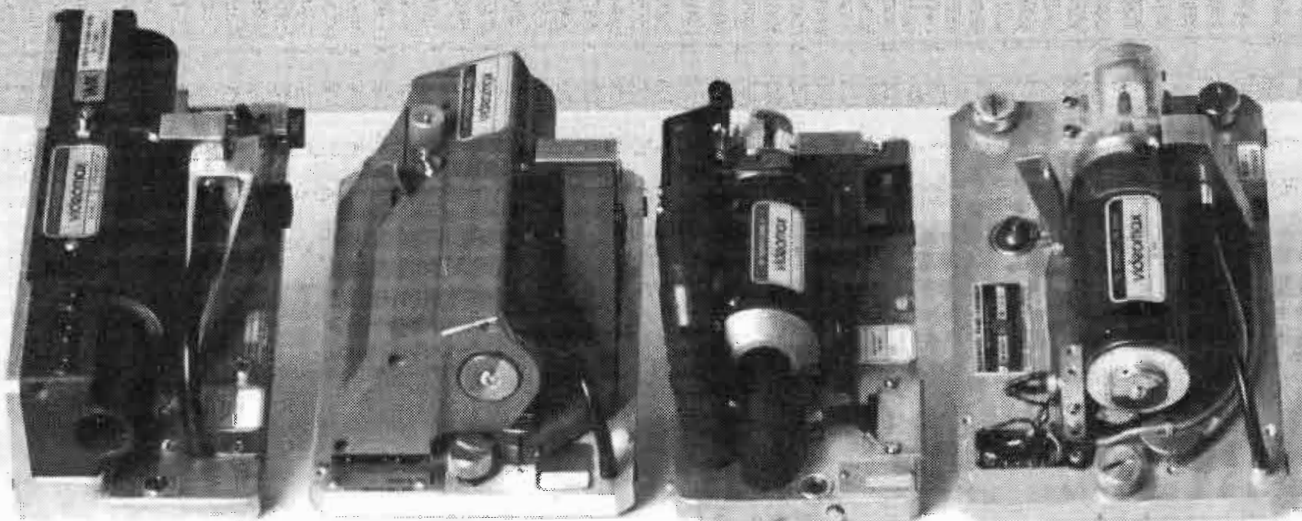


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Commission reopens Clear Channel Proceeding

The FCC has reopened its AM clear channel proceeding that was terminated in 1961.

In adopting the inquiry and rulemaking proposal, the FCC said it sought information for possible amendment of the rules governing the use of the 25 clear channels listed in Section 73.25(a) of the

rules, including allowing Class I-A stations to operate with higher power (in excess of 50 kW).

Under the inquiry portion of the proceeding, the Commission invited:

- the participation of parties in conducting studies and developing programs aimed toward the full ex-

ploitation of the potentialities of FM for extending nighttime service to all parts of the United States;

- a full discussion of the economic and social effects of high-power operation and sought suggestions or proposals for specific programs for developing meaningful information on these questions;

- responses from licensees of Class I-A stations on whether they would apply for greatly increased power, and the maximum power level they would apply for;

- the participation of parties in determining the sources and levels of interference to existing Class I-A stations;

- comments on the extent to which rules, adopted in 1971, governing the design of AM directional antennas may restrict the assignment of new Class II-A stations in areas needing additional nighttime service.

- the submission of results of independent audience surveys at night, and of the traveling public of listeners residing in areas with no primary standard broadcast service as to the extent to which the secondary service from clear channel stations is utilized.

The Commission said the rule amendments under consideration include:

- authorizing power in excess of 50 kW for selected Class I-A stations,

- authorizing additional stations (Class II-A) for nighttime operation on the "duplicated" Class I-A channels, either in limited numbers in areas designated by rule, or generally, with protection being afforded the I-A station's secondary service.

- authorizing unlimited-time Class II-A stations on channels that are now unduplicated, either at locations designated by rule, or more generally, with protection for the I-A station's secondary service,

- expanded use of some or all of the present I-A channels by a multiplicity of stations each providing local or regional service at night.

The Commission, in terminating the clear-channel case in 1961, amended its rules to permit assignment of a single unlimited time Class II-A station on 13 of the 25 clear channels, to help bring radio

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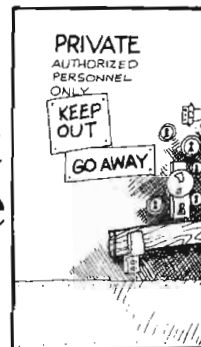
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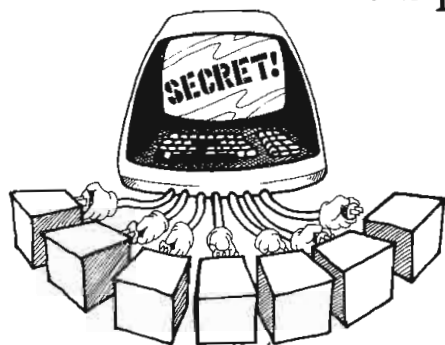


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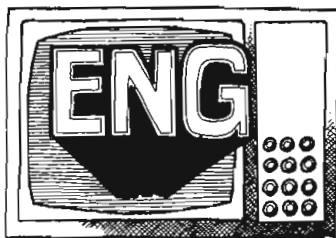


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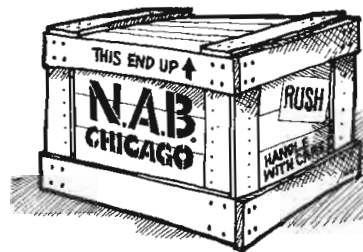


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Clear Channel

Continued from page 10

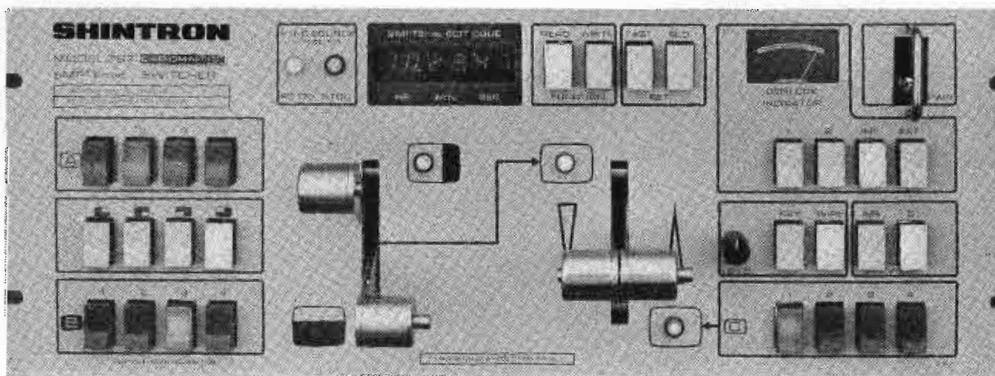
programming to approximately half the land area of the United States and about 25 million persons that were without nighttime primary service from standard broadcast stations.

Eleven new stations were to be authorized in specific western states deemed to have a dearth of nighttime primary service. The remaining two channels were for stations that had to be removed from their existing frequencies under the U.S.-Mexican standard broadcasting agreement (a pact covering all phases of AM broadcasting).

With one exception, the 770 kHz frequency, the remaining 12 clear channels were held for possible future consideration for higher power operation, or in the alternative, eventual duplication of these channels.

The 770 kHz frequency is the subject of a separate proceeding involving shared operation by WABC, New York, and KOB, Albuquerque, pending before the FCC.

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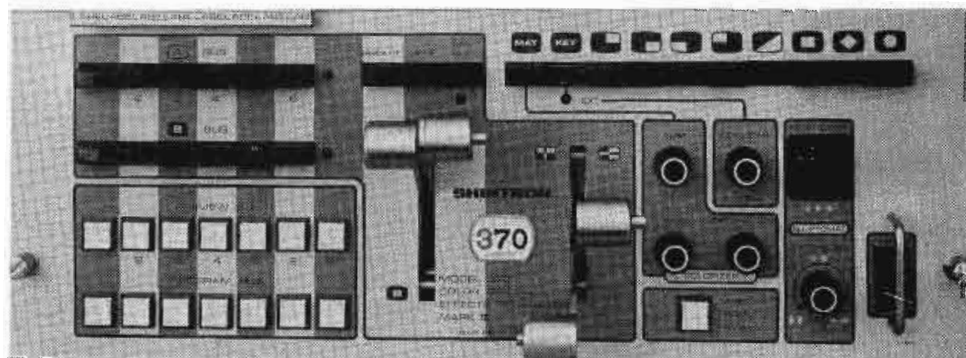
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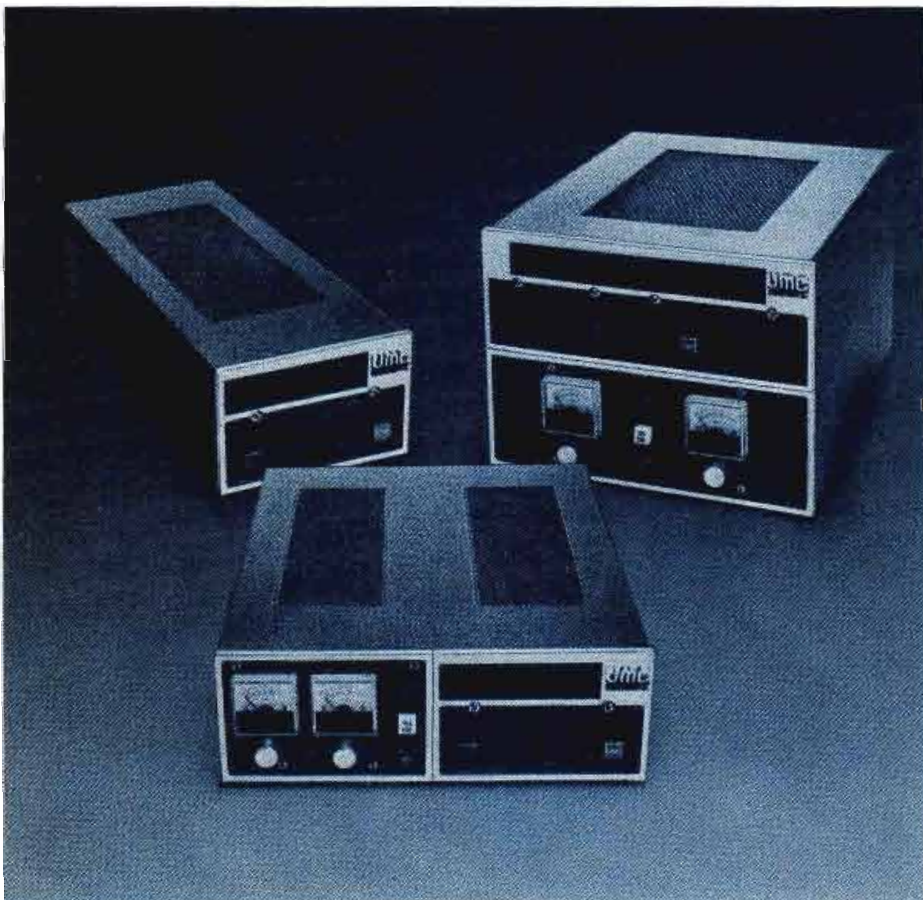


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Regional Conventions For 1976

Chapter 26 in Chicago is already laying the foundation for its Regional Convention in 1976. Final clearance has not yet been received, but it looks like October will be the month. Any early birds out there may contact Convention Chairman Brad Anderson, 300 S. Lombard, Oak Park, Illinois 60302. Further details will be published as plans are finalized.

Chapter 11 in the Boston area is also checking out possibilities for its Convention. They, too, are looking towards late October or early November and have set tentative plans to hold the meeting in Summerville. Frank Shufelt, at

Tektronix, Inc. will be the Convention Chairman and may be reached at (617) 861-6800, or at the Tektronix address: 482 Bedford Street, Lexington, Massachusetts 02173.

The end of 1975 was a rush for The Signal. One issue appeared in December and was followed shortly by a "special" issue, reporting on the November SBE Board meeting. Included were the Certification Program as finally adopted by the Board, information on the election of National officers, a proposed new rebate system, local chapter officer elections, Regional Convention information for 1976, and more. This is a very important issue for all members. If you have not received your copy by the end of January, please contact: Vincent Flanders, Assistant Secretary, SBE, P.O. Box 88123, Indianapolis, Indiana 46208.

Mr. Henry Ruh invites all SBE members (and non-members who may want to join) to help him start an SBE chapter in the Kansas City area. For further information, please contact Mr. Ruh, assistant

chief engineer for KTSB(TV) at P.O. Box 2700, Topeka, Kansas 66601, or, better yet, call (913) 582-4000.

Orlando, Florida is also organizing a Chapter. They have already held three meetings and are up for formal recognition soon. Any interested person may contact John Weyrick, 5765-F Kings Gate Drive, Orlando, Florida 32809. You may call him at his office at WMFE-TV, (305) 855-3691, or at home, (305) 857-3729.

CHAPTER MEETINGS

Chapter 2 met on November 17 at the RCA picture-tube plant in Dunmore, Pennsylvania, where Bernie Lobojesky led members on a tour of the facility. In December, Chapter 2 celebrated the holiday season with its annual Christmas party.

John Kowalchik (Chairman), RCA Solid State Division, Crestwood Road, Mountaintop, Pa. 18707, (717) 474-6761.

(Continued on page 16)

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Input-output configurations are virtually unlimited with this modular, building-block, solid-state, video switch. And . . . this flexibility comes at reduced cost.

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Best of all, users will really appreciate the economy. By specifying the initial and future capacity for the system, the buyer purchases only the hardware needed now without being penalized later. High reliability solid-state video switching costs can be cut below \$30 per crosspoint . . . less than competitive switching systems. Compatible with our Series 8100 Solid-State Audio Switching Equipment, the new 1400 Series offers, spec for spec, the lowest cost quality switching equipment available today!

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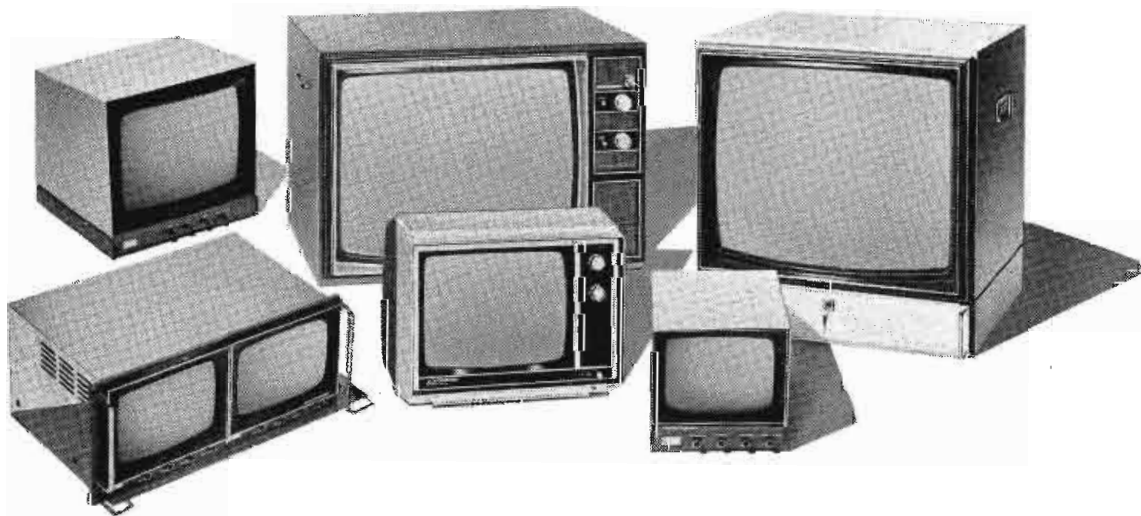
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(Continued from page 14)

Chapter 9: Phoenix, Arizona

The November meeting of the Phoenix Chapter was held at the KTAR studios. Jack Williams, president of Pacific Recorders and Engineering Corporation, gave a slide presentation on the newly constructed KFI studios and discussed the KOY production facility. The evening concluded with a tour of the KOY facility.

*Leon Anglin (Chairman), SBE,
P.O. Box 615, Phoenix, Arizona
85001, (602) 258-7333.*

Chapter 11: Boston, Mass.

Chapter 11's chairman reports that their meeting in November proved to be even more interesting than first expected. Members met at United Press International and had a look at the computer system there. Chairman Molloy claims that the last two years of technical advances in equipment were really an eye-opener for everyone there.

*Bob Molloy, 66 Bellevue Street,
Manchester, New Hampshire 03103,
(603) 669-1250.*

Chapter 15: New York, N.Y.

On Thursday, November 13, members of Chapter 15 listened to John Shipley and others from the RCA plant in Camden, New Jersey. The representatives put on a live demonstration of the AM stereo equipment presently being field-tested in Baltimore, Maryland, and Tijuana, Mexico. The group brought along a truckload of gear so everyone could get a chance to see the system in operation. Station managers and program directors were invited to attend this informative session.

*John Lyons (Chairman), WWRL
Radio, 41-30 58th Street, Wood-
side, New York 11377, (212) 355-
1600.*

Continued on page 69



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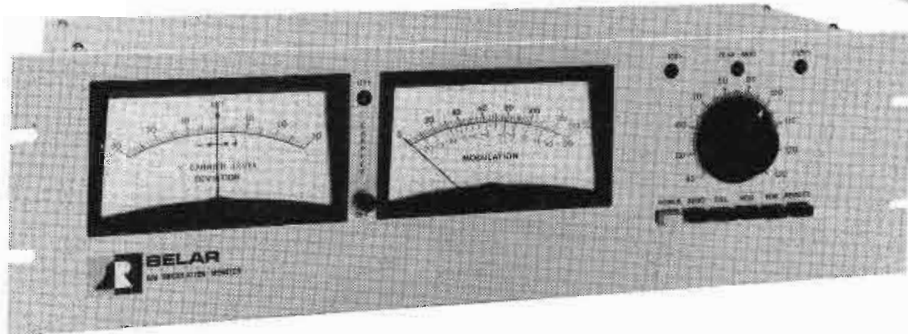
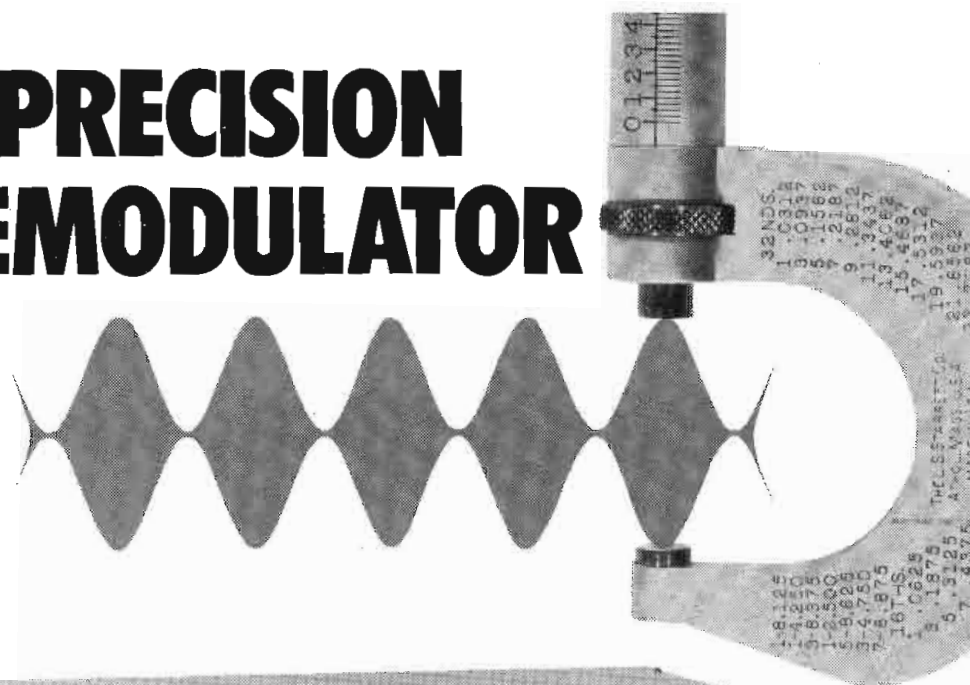
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The AMM-2 incorporates a phase-linear filter that does not produce overshoots when a negative peak clipper is used in the transmitter. The true modulation peak is measured instead of a false, higher peak introduced by the non-linear phase filters found in other monitors.

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Dolby Opens in San Francisco

A new head office and laboratory will be opened by Dolby Laboratories Inc. in San Francisco, California. The office will combine some of the activities now carried out in London with those of the present Dolby office in New York, which will be closed shortly after the San Francisco office opens in January 1976, at 731 Sansome Street (415 391-8892).

The new office will have the functions of research and development, new market development, licensing, and U.S. sales of Dolby professional noise reduction equipment manufactured in London. The company's policy of specialization in noise reduction technology will remain unchanged.

San Francisco executives will comprise Dr. Ray Dolby, President; David Robinson, Vice President Engineering; Ioan Allen, Vice President Marketing; Ian Hardcastle, Vice President Licensing; and John Gladysiewicz, Vice President Finance and Administration. Morley Kahn, who has been Vice President, Manager of U.S. Operations at the New York office for the past four years, is leaving the company at the end of January.

No Advantage?

"The NRBA is in agreement with the Commission's policy of reducing the competitive advantage enjoyed by sister stations," stated Schattenfield. "It feels strongly, however, that the proposed rule with respect to commercial treatment of self-promotional announcements is unnecessary, unworkable, and ill-advised. In a period when the Commission is conducting an ongoing effort to produce a 'simpler, more readily understandable set of rules' through reregulation, FCC Public Notice No. 8344, 'Broadcast Regulation Study,' released April 6, 1972, it seems particularly ironic that the Commission should propose to adopt a rule which will be difficult to administer and interpret and which will involve the Commission in regulation of the most minute details of daily broadcast programming."



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NEC?

It Makes ENG Sense At KSLA-TV



Art Shiver punches up the EA-5 on the KSLA-TV console as Don Owen, Vice President for News, (standing) and Tom

Erwin, Assistant News Director (behind the console), watch the news go live.

"Any news director would like to be able to control his product from the gathering of the news to the airing of the story..." That's how Don Owen, Vice President News, KSLA, Shreveport, Louisiana, feels about his operation.

Don Owen spoke for many a news director when we visited with his ENG crew in Shreveport, Louisiana, last month. And, KSLA has done just that...they've created the technical capability to totally produce the news in the newsroom proper (shown on our cover).

KSLA made the move to contemporary ENG techniques in mid year 1975. Their field crews are equipped with Sony DXC 1600 cameras and Sony 3800 VTR's. Interface to the station is provided by Sony U-Matic* 2850 3/4" cassette VTR's. But that's where the resemblance to conventional (1975 version) ENG ends.

News Room Control

The majority of the news is gathered on 3/4" cassettes and brought into the station for screening on a specially designed NEC (News Editing Console). The console is located in the newsroom complex and consists of two Sony 2850 3/4" cassette VTR's, two Zenith color monitors, an audio mixer and a Television Research International EA-5 editing system.

From that point on, the KSLA news department has full control of the development of the on-air product. Editing on the EA-5 is managed by Art Shiver, KSLA's Chief Photographer, with direct input from individual reporters and news department management.

An interesting twist was the addition of an audio mixer. Art Shiver can record studio voice-over the field audio pick-up, a capability not inherent in the Sony cassette VTR's!

When news on 16mm film is brought in from the field, it's transferred to 3/4" cassettes and edited on the TRI EA-5 system, then intercut into the cassette on-air master. The finished master then goes to master control. Master control uses two Sony 2850's processed through a Consolidated Video Systems CVS 504 to put the edited material on the air.

Just The Beginning

KSLA continues to expand the NEC concept. A second News Editing Console will be added to the

news room. Don Owen explained, "Now we'll be able to record (on 3/4" cassettes) the afternoon network feeds, CBS news conferences and remote feeds from our field microwave transmission."

A second addition to the KSLA news department is a remote microwave equipped van which will roam the vast broadcast area covered by the station. 45% of KSLA's audience is in East Texas.

The NEC Concept

A little background information is in order. For most of the station's history, they were housed on several levels of two downtown Shreveport buildings. The newsroom wandered around on different floors. Meanwhile, Master Control and engineering had to provide



Erwin and Owen discuss another ENG assignment. Erwin spends a lot of time flying the company plane to remote areas - with ENG equipment - to cover the news.

news with daily recording and editing time. This tied up quads and personnel like you can well imagine.

When KSLA moved into their handsome new facility four years ago, the NEC concept followed and master control is now 100% committed to station programming.

Management's Attitude

"We were the first on the air," explained Don Owen. "We pioneered news in this market and our standards have always been good. We felt we set the pattern. The station has always been commercially successful. The owners made a serious commitment to news."

That statement seems to sum up the most important ingredient in a station's rise to leadership. It's a comment we've heard over and over again from the achievers.

Handling The Equipment

For some news assignments, the news cameraman tucks the camera into the trunk of a car and zips off to the scene. You'd think that such abusive treatment would soon have the camera qualifying for the junk pile. Not so. Remember, a good many of the cameras first used for ENG were designed for closed circuit use, and by people who don't necessarily appreciate the fine points of electro-optical devices. And then came a few manufacturers who saw their cameras being used by pros but suffering the consequences of getting to the scene and back in time.

For other, more easily planned news coverage, KSLA uses a Ford panel truck to carry its two cameras and recorders. (Microwave equipment has been ordered, so that will be crowded in, too, in the near future.) To aid their coverage, they use a Central Dynamics switcher in the van.

"We use the smaller type truck," says Chief Engineer John Hicks,

What are the other Guys doing?

Some stations are saying that they've departed from the film scene altogether. Some, denying the live journalism movement (or waiting for new innovations and more proof of viability), are just as heavy into film as they ever were.

Matter of fact, when your BE editor broke away from the rush of producing a January issue in the midst of pre- and post-Christmas rushes, I sat down to relax in front of the tube. A local station ran a short promo on their news show. The scene was the delivery dock behind the station. A delivery man (in speeded up motion) was busy unloading numerous boxes of news film. At the end, the delivery man kept a couple of cans of film and threw them back into the truck, and said something like "Those other stations use film too, you know!"

I thought to myself, here we are in the onrushing tide of live journalism, and this station is promoting their news program by exaggerating how much film they use. One of my next thoughts was that old refrain so near and dear to our hearts... "We'll have a filmed report on the 10 o'clock news."

Well, maybe we're rushing too fast. I don't think so, but there are people who have stepped into deep water on ENG and come thrashing for the side. Others, obviously, have benefitted greatly from it, not just survived.

As one Chief Engineer put it, there is a difference between shooting the news on tape and on film. There are film people who do as well or better on tape than they did on film, and there are those who can't be as creative. It's just not the same.

KSLA still uses some film. And they use it because there is no denying that to go on a news assignment in ENG means the involvement of various pieces of gear. A film camera is simple and singular (or nearly so, depending on where the film is shot). So, there are some honest tradeoffs. Not everyone wants to discuss it, but they do exist.

Of course, the smaller market stations may feel that they can't afford the top of the line ENG equipment. **But they are** coming to realize that **with** ENG they can cover news faster and, generally, cheaper. In fact, some stations report that with tape, they are covering some stories they would have had to pass up in the past. The economy at smaller stations is becoming a key factor. They don't use enough film to justify a processor in house, so they must pay the freight on developing **and** film that can be used only once.

But, watch out for archiving. It just might become another plus. Especially when someone comes up with a means of random accessing the archives.

The Datatron Newsmaker Is Good News For The Broadcaster



In a world where everything is going up, Datatron is reducing the price of one of its complete electronic editing systems. The system is called the DATATRON NEWS-MAKER. The price is \$23,750. That doesn't buy you a stripped down model. It gets you a sophisticated piece of electronic editing equipment including two Sony 2850 tape decks. It's the perfect editing package for ENG and you can add a Jam-Sync generator to it, if you desire, for another \$3,750.

The Special Newsmaker Package

Datatron's Newsmaker is a complete electronic editing system. The heart of the system is the Model 5050-100 Video Tape Editing Unit. It uses standard SMPTE editing time codes. If you add Jam-Sync this remarkable piece of electronic equipment eliminates the need of pre-recording SMPTE codes on electronically edited master tapes. The system is so simple to operate that non-technical personnel can perform complex editing tasks. There's a simple keyboard entry for all functions and the unit can edit from tape or live video sources. The system displays tape position and all edit points while providing audio, video or audio/video edits.

The **Datatron Newsmaker** package includes two Sony 2850 tape decks and the system is ideally suited to the specialized needs of ENG.

The Deflated Newsmaker Price

\$23,750* buys you the complete **Datatron Newsmaker** package. We weren't kidding when we said it was economical. If you want to add Jam-Sync for

laying down the SMPTE edit code on the entire length of fresh tape during the assemble mode, it brings the total price of the system up to \$27,500. That's still thousands of dollars below competitive systems.

Field Facts About The Datatron Newsmaker

The **Datatron Newsmaker** is an old pro when it comes to ENG. If you've got any questions about how this electronic editing system performs in the field, just ask the news people at such stations as:

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| KNXT | Los Angeles |
| WTVJ | Miami |
| WWL | New Orleans |
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Or ask the news people at the many other stations across the country that are using the **Datatron Newsmaker**. We'd be happy to give you a long list of references. We'll also be glad to analyze your needs and tell you which Datatron Editing System best meets your needs for today and tomorrow. Write or phone today.

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EDITING SYSTEMS DIVISION

*Jam-Sync available as an optional extra for \$3,750.00
For More Details Circle (14) on Reply Card

"because you just can't get into the news scene in those bigger vans." Even quicker and more stringent requirements accounts for their carrying cameras in the trunk of a car.

So Who Wants It?

But the high spot of the KSLA-TV operation has to be their news room operation. As you can see, it calls for a commitment from all departments. And it works. It works because the NEC is where it should be. And look who is operating it.

Make no mistake about it, the whole live journalism scene is full of commitments. The news team must agree with the philosophy of this approach to coverage and soon learn how to take advantage of the differences. The crew's action at the scene and the news room's coordination is demanding because the news becomes a **now** business. And engineering, despite their agreement that most of the currently available equipment is really reliable, now has even more responsibility for equipment. Suppose, for example, that there is a breakdown at the

scene. That can be just as bad, if not worse, than some of the really terrible news film reports we've seen from time to time.

Broadcast Engineering is **not** saying, jump on the bandwagon. Go ENG. It won't work for every station. There must be a willingness to accept the responsibilities of real time or nearly immediate news reporting and all the sweat and work that goes with it. Once this is agreed to, we believe it's the way to go. This is why we have taken our approach live (live, immediate, video, electronic) journalism.



Political Reporter Wray Post leans over the console to watch a tape made on one of his assignments.

IVC BROADCAST UPDATE

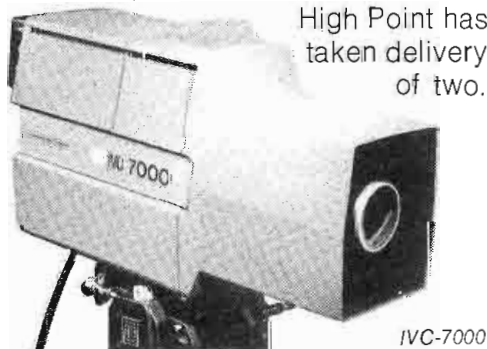
Here is the first in a series of reports highlighting IVC's worldwide broadcast and teleproduction activities. Over the months, we'll be bringing you new applications and installations along with current product information—we're making a lot happen and we'd like you to know.

9000's ON THE MOVE—Recognition of the IVC-9000 as THE production VTR seems to be the order of the day—seven 9000's did the production and mastering at the Pan American Games in Mexico City—exceptional technical performance and operating costs being the deciding factor in their selection. 9000's for teleproduction are now in place at TAV, Videotape Associates, Rombex, EMCOM, Rank Video, Dolphin, WDCA-TV, Advanced Systems, Image West and others...with more to come.



WDCA-TV

NORTH CAROLINA COTTONS TO 7000 CAMERAS—Joe Morgan, one of our sales engineers in the Southern Region, is in love with our 7000 cameras. And two of our customers in North Carolina know it. Winning in a "shoot-out" against top-line cameras, six IVC-7000 studio cameras have been ordered and installed at WUNC-TV in Chapel Hill. And WGHP-TV in High Point has taken delivery of two.



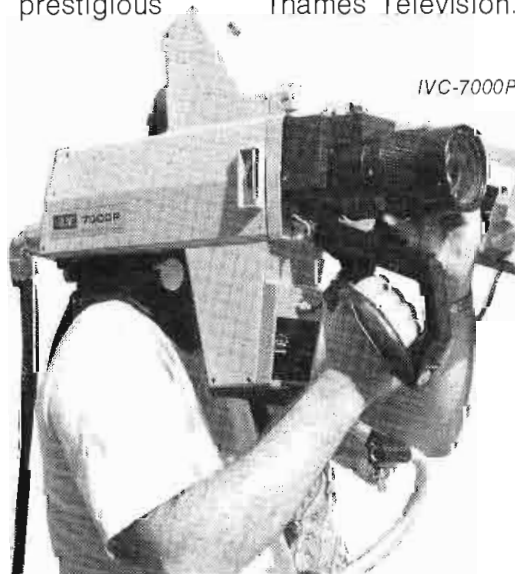
IVC-7000

TWO NEW VANS—IVC's TV Systems Department, which has designed, built and installed large and small studio systems over the years including complete television studio facilities on over a hundred U.S. Navy ships, has delivered another full production van—this one to KVIE-TV in Sacramento complete with IVC-7000 cameras... IVC-Canada has built and delivered a production van to CKND-TV in Winnipeg including 7000 cameras and IVC one-inch gear.



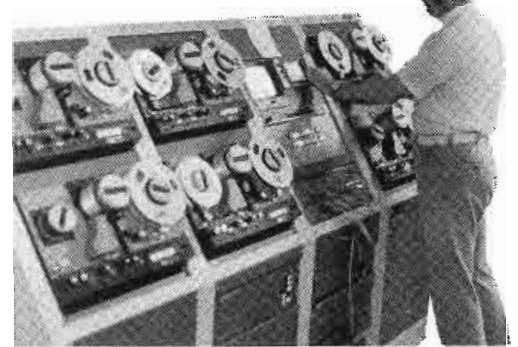
KVIE-TV MOBILE VAN

IVC-7000P PORTABLE VERSION of the IVC-7000 studio camera looks like a winner with a growing backlog and deliveries to begin in early '76... the latest order coming from Britain's prestigious Thames Television.



IVC-7000P

KJEO-TV



THE PROGRAMMED BROADCAST RECORDER (PBR) that we showed at last NAB—a six-deck, automated 1-inch system—is catching on with installations already in at CKOS-TV, Yorkton, Saskatchewan; KJEO-TV, Fresno; WCLY-TV, St. Petersburg; CKSH-TV, Sherbrooke, Quebec; with KDBC-TV in El Paso awaiting delivery.

ONE-INCH IN BROADCAST—Continuing to make their mark in broadcast are IVC one-inch recorders coupled with our TBC-2000 signal processors. Latest example is KVVU-TV, Las Vegas, which uses IVC-800 Series VTR's with a TBC, *dubbing commercials from quad* for simplicity, economy, yet quality of playback. Also KUTV, Salt Lake City and KGGM-TV in Albuquerque are among those using IVC one-inch VTR's for network delay. Why IVC for broadcast professionals? It's the quality that comes from full broadcast bandwidth *direct color*, not possible on lesser formats.

... Just a few of the reasons we're changing the picture in broadcast television. For more call the IVC office in Atlanta (404) 633-1462; Chicago (312) 729-5160; Houston (713) 784-2770; Los Angeles (213) 344-6001; New York (914) 694-1234; Toronto (416) 749-7539; Sunnyvale (408) 738-3900.

IVC
International Video Corporation



It's Super Bowl time again, and once more the live news equipment will get extra assignments.

Coordination in the newsroom is vitally important. And it calls for a new breed. Note here that it finally calls for a master control console, including talkback capability

Learning to live with **LIVE NEWS**

By Ron Merrell



Live journalism. Electronic journalism. Electronic news gathering. Call it what you may, the trend toward instant video news is established and doing well. And that's about it. Right? Not really!

While it's true that no new wealth of equipment has swept the scene, some noteworthy changes are taking place.

There was little doubt, in the beginning, that live journalism would be dealt with from every conceivable motive. Today, more than a year after its initial impact, there is a lot less of the "tinkering with toys" attitude at stations. At first, of course, the temptation was to jump in and prove that live journalism could be done...with almost any equipment...at almost any time. And, to prove it, almost any program could be interrupted with live news. After all, when your competitor(s) flaunt it, you either join the crowd or your shoes fill up with sweat as you ponder its meaning.

The New Breed

Okay, you **can** do it. What follows next?

As we saw in our article on the KMOX-TV live news operation, there is an immediate need for more new thinking: who will make the live news judgements for coverage, and who will make the decision as to whether or not regular programming should be interrupted? When you become fully locked in on live news, you discover the need for a variety of talent...all of which you may not have on hand.

At some stations, the new key news title is Electronic News Coordinator (ENC). The ENC has the responsibility of riding herd on assignments, newsroom coordination, and whether to air in a regularly scheduled news slot or break the program in progress.

What's more, the ENC, if he is going all the way, will have either the equipment at hand to talk to the reporter or cameraman as the news is being covered, or at least he can counsel the news team in the van if they find something unexpected at the scene and they need



The "Batista Sling" at KMOX-TV on the scene with their version of a live news van. Note the dish is folded down for transport.



The Ranger Rover actually has three camera positions. Cameras can be mounted as shown (and operated while the van is in motion) or on the top or rear.

Putting it on the road

Live journalism is the trend, although there is a small army of reporters who use portapacks in the field and carry their tape back to the station for nearly immediate airing. But whether live or taped, this movement into electronic news coverage is starting to make new demands on mobile equipment.

The van probably will take more shapes than it ever has, because it may be used for live or taped coverage. You can look forward to even more innovative microwave antennas, yet they still will have an effect on what type of vehicle is used.

If the small market station is interested only in taping the news, a station wagon could work quite well. However, recent design changes fall more in line with real station needs. The Ranger Rover (through RCA) is an example.

Panel trucks can do the job, and they likely will see more action in 1976. KMOX-TV uses one with dish atop and racks and ladders. These have the special feature of mobility. That is, they can move around easily within a news event area, whereas a large van would have to remain stationary. For fast breaking news, that's a decided advantage, because there may be a crowd at the scene when the van arrives. No room, no story!

Of course the technology will allow the signal to be sent back to the van without cables, but you can't overlook the dish alignment, if you are sending the story back live. A smaller van has a better chance of pulling it off. Proximity is a factor.

Generally, vans are the way to go. Despite design improvements, equipment must be carefully stowed. Tossing the equipment on the back seat or into the rear of a station wagon could result in damaged equipment and news lost forever.

advice. Obviously, we once more have revived the scare potential. What do you do when you're live and you have someone at the scene doing or saying something obscene?

Talking Into Bottles

With the great advantage of talk-back goes the responsibility of having more than one or two people at station familiar enough with the potential news item to suggest different shots or additional questions.

So also, back in the newsroom, there is a need for people who won't resist a hands on daily experience with video equipment. At the top market stations, the need is acute, otherwise, there would be more bottle necks than bottle openers.

At the outset, you could see live journalism at the scene of a major fire, outside the door of a labor meeting where a strike vote was being taken, and any number of happenings that could be aired **now**. In other words, an end to the old line (not yet dead), "We'll have a filmed report on the 10 o'clock news".

An then ABC took a chance on airing the Daytime Emmy awards... an event which took place on a boat cruising up and down the river! And all live!

What that signalled was that we have seen advances in antenna design, so much so that ghosts could virtually be eliminated. And on that note, the time frame opened so wide that it took most of us by surprise.

Could this be done by film? Not in the same time frame. (Historically, it was accomplished in limited coverage of the Olympics in Berlin by the Germans. The film was fed directly from the camera into the processor, and from there into a scanner.) The arguments have pinged and ponged over the past several months as to whether one system really saves more than the other. Of course, as one network executive said, "If it really improves your ratings, cost isn't a factor".

There's no denying that tape has cut into the film market. The competition, in the end, will have been most beneficial to the user, because lighter, more compact and more efficient systems will have evolved.

Fact is, TRI has delivered more than 500 EA-5's since day one twenty-one months ago, which may be a record for stand alone editing systems.

Now for the good news.

TRI introduces the EA-4 End Insert Timer, an extremely useful plug-in module which enables editors to pre-program the length of their insert. A handy plus factor is that the EA-4 also operates as an electronic stop watch to time related segments.

So here's what you can do with a Sony 2850 plus the EA-5/EA-4 combination:

- Precisely end inserts
- Time related segments electronically
- Preview edits

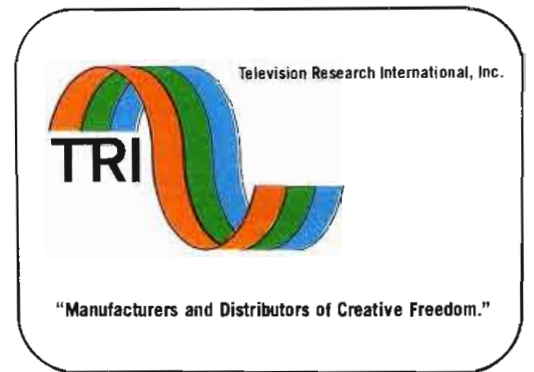
- Edit accurately to video or audio cues
- Edit with frame accuracy
- Search at up to 5 times play speed in either direction
- Interface the 2850 with other makes or models
- Adjust the edit point after preview
- Make your edit decisions with true still-frame assistance
- Control end insert point from the console
- Monitor audio and video at the console

More good news for editors involves price. The cost? Less than \$6,000 plus \$1,250 for the insert timer. Installation time? An hour or so. Training period? Measured in minutes.

For a "hands-on" demo, or more information, contact us or the best video distributor in your area.

Chances are he's our distributor.

Television Research International, Inc.
1003 Elwell Court
Palo Alto, California 94303
415/961-7475



53 broadcasters from New York to California, from Louisiana to Minnesota are editing with the EA-5/Sony 2850 combination.

Seeing is believing.



For More Details Circle (80) on Reply Card

For The Record

Meanwhile, one of the top cost arguments is that tape can be used over and over. Film can't be erased. But then, just maybe you don't want everything erased. If you are to maintain a station archive, something must be saved.

Through the use of the SMPTE time code, I think we'll see a more readily accessible events from archival storage. Naturally, it will involve logging procedures, but the day may come—obviously years down the road—when we can punch up a code and automatically retrieve events to produce a documentary without ever touching tape or tape

While quality cameras are being used on the scene, look for interesting, innovative uses at station in the near future. After all, they do offer flexibility studio cameras cannot match.



containers. So much depends upon the demand.

Back at the scene, you may find that the setup time can run as high as 25 minutes. It would pay to make a card file on each site as it is used to aid later recall of any special sighting that needs to be made, or other considerations. This is assuming, of course, that you're going live.

What some stations have found is that live news can gain a reputation that leads to other uses for basically ENG equipment. Stores doing special sales can see the advantage of an on-the-spot ad. Special probe reports can be done live. And the man on the street can gather local opinions on late breaking news of high local interest.

What Comes Next?

In the area of improvements you can expect to see, recorders probably rate the greatest needs. Cables, connectors and the like are certainly not standard, and the initial incentive for design still works against them. Originally, they were planned for closed circuit uses, mostly educational in nature. Yet strangely enough, they were designed as if they would never need repairs or preventive maintenance. As a matter of fact, on that account, much of the live journalism equipment still lacks the broadcast points of construction. It is true, however, that some manufacturers are making great headway in selling this equipment to the closed circuit market, which accounts for the tradeoffs. The equipment is made easy to operate and handle, for the most part by untrained persons.

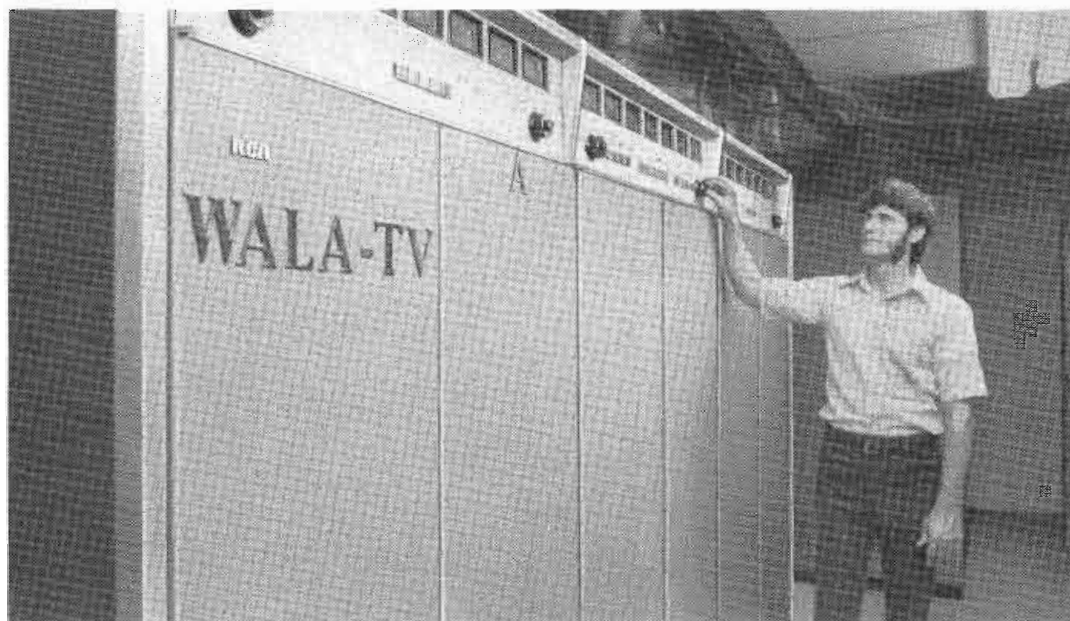
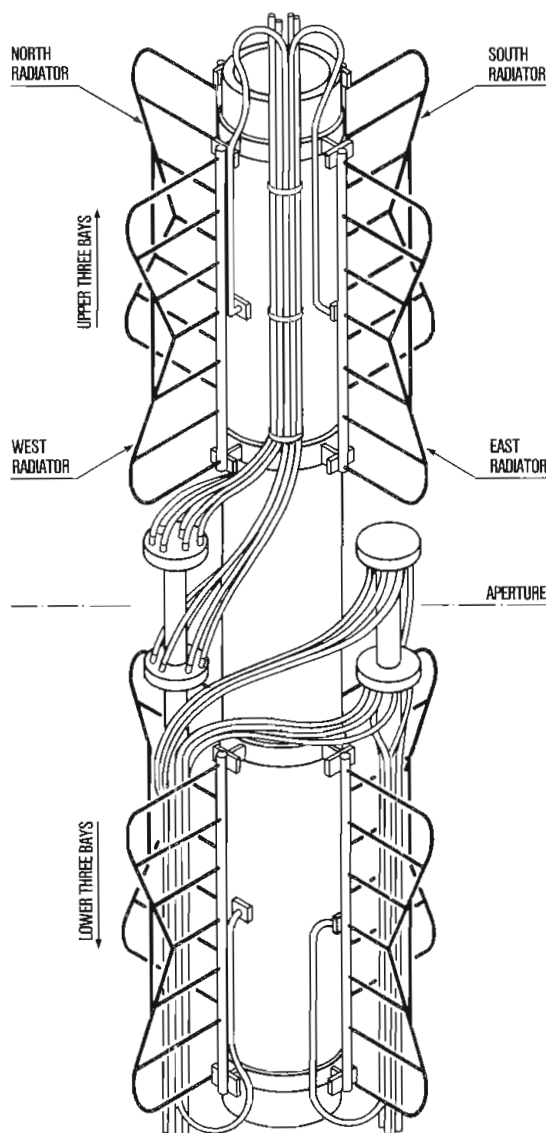
Despite the original design factors, most stations feel that the current live journalism equipment works quite well as a system. Certainly we'll see mechanical changes in recorders, and more compact, lighter equipment. Fact is, though, getting started on a limited scale is not as painful as it once might have been. Most equipment will at least equal the average film news product. It has proven reliable. But as your toe nears the water, consider whether for **you** it could be **cost effective** and **news effective**.

PRIME TIME

NEW TURNSTILE II ANTENNA OFFERS SUPERIOR PERFORMANCE FOR VHF CHANNELS 2-6.

Superturnstile concept.

Lowband VHF broadcasters can now enjoy superior picture quality with RCA's Turnstile II Antenna. It is a new design based on the Superturnstile—the most popular broadcast antenna.



WALA-TV EASES CHANGEOVER FOR TV TRANSMITTER PLANNERS.

Logistics crucial.

Any TV station that is planning transmitter replacement or relocation can benefit from the experience of Grady Jackson, Chief Engineer, WALA-TV, Mobile, Alabama. The complete story, "Painless Transmitter Changeover",

Turnstile II provides a 2:1 improvement in antenna VSWR (Voltage Standing Wave Ratio). Antenna reflection ghosting is virtually eliminated, with a substantial improvement in picture quality. The VSWR specification is 1.05/1.0 or less across the entire channel band.

Among the Turnstile II improvements: redesigned radiator elements; unjacketed, corrugated copper feedlines; a "double cancellation" feedsystem.

Ask for details on Turnstile II, the great new antenna for channels 2-6.

WSAV-TV buys first Turnstile II.

WSAV-TV, Savannah, Ga., will install a Turnstile II antenna on a new 1549-foot tower. Also to be installed is an RCA TT-25-FL, 25-kW transmitter. It will replace an RCA unit in use since 1956.

Harben Daniel, President and General Manager of WSAV, Inc., said that the new tall tower facility will increase the station's coverage area by approximately 50 per cent.

appeared in the August, 1975 issue of RCA Broadcast News. A reprint is available without charge from your RCA Representative.

35-day process.

WALA-TV purchased a new RCA TT-50FH transmitting system to replace a 22-year-old TT-50AH. Grady Jackson's logistics called for the 25 kW "A" side of the new transmitter to be installed temporarily and put on-air. Next came permanent installation of the "B" half of the new unit. "B" was put on-air and "A" was moved to its permanent spot adjoining "B". Interconnection was made with "B" transmitter.

The entire procedure, from delivery to proof-of-performance testing of the system, took just 35 days. Grady Jackson's log is included in the RCA Broadcast News article.

Positive benefits.

WALA-TV expects the new RCA TT-50FH to pay for itself in ten years. Major reasons include the system's extensive use of solid state electronics, its automatic functions, built-in remote control interface, and protection against lost air time offered by its parallel system design. Another positive benefit: a superb color signal blanketing WALA-TV's market area.

Leadership in transmission

RCA

For More Details Circle (17) on Reply Card

Simplifying on-location production work

By Roger Hicks, Assisted by Jerome Foreman and Paul Wilkinson, Maryland Center for Public Broadcasting.

A full capability color production facility, built into a Chevrolet Step Van, is in use at the Maryland Center for Public Broadcasting, and this compact "Field Recording Unit" is simplifying on-location production work.

Developed through the combined efforts of the production and engineering staff, the FRU has repeatedly demonstrated its flexibility by meeting diverse requirements of public and instructional television divisions. Although the unit was designed specifically to compliment the Center's house facilities, this low cost, two-camera production van has attracted the interest of other broadcasters, too.

Inside The Van

Two centrally located console-style racks contain the majority of the system's electronic equipment. Control, processing, and monitoring facilities for two IVC 500 camera chains are housed in these table equipped consoles. The IVC 500's make pictures of favorable quality and their light weight is a definite plus in remote applications. Ours are equipped for mini cable which reduces considerably the time and burden of setting up and striking a location.

Mounted above the consoles are a vectorscope and Tektronix 650 color monitor. These units serve a multiplicity of functions beyond that of program line monitoring. Either camera output can be displayed on the color monitor by actuating a momentary contact switch at each shading position. This feature, installed mainly for

the shader, is frequently used by directors as a color preview. Camera and VTR test signals can also be viewed on the vectorscope and 650 through the use of a passive switcher located at the shading position. During the recording of a University of Maryland football game, this switcher was used to supply our second VTR with isolated shots for later insertion into an edited sports program. This enhanced the coverage provided by two cameras.

A pair of rubidium driven Telemation sync generators with automatic changeover and gen-lock supply pulses to the rack equipment, VTR's, and program switcher. These are located in the lower part of the console racks. External connections to pulse and video equipment are made through a simple but dependable BNC patch panel at the rear of the consoles. During national coverage of the USLTA Tennis Matches from Salisbury, Maryland, a second van was tied with ours. The interface was completed and in operation in a matter of minutes through this panel. (All cables enter the rear of the truck through two ports, an arrangement which protects the connectors from deterioration due to climatic conditions. A mast mounted near these ports is used when "flying" cables to the truck.)

The remaining rack space is used by audio distribution and processing equipment, a time base corrector, and communication system controls.

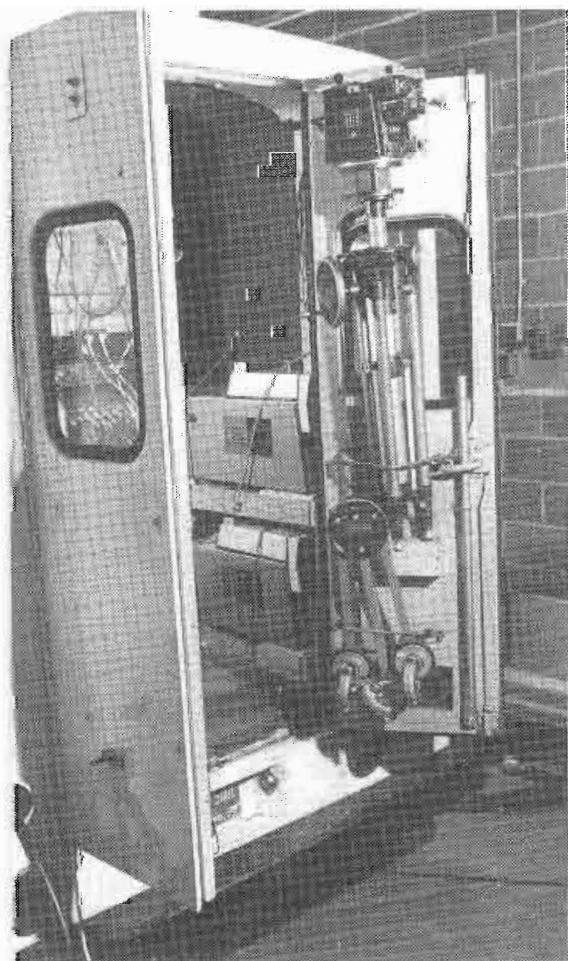
A third rack, positioned behind the driver's seat, serves as a

production control center. The director has exclusive use of the Richmond Hill EVS-7 video switcher, three black and white camera monitors, one color program monitor, and an audio monitor located in the production control rack. The seven input switcher provides four program outputs and mix effects capability. A drop leaf extension of the switcher table provides an additional area for scripts and shot sheets. The director's interphone and interrupt-foldback controls complete the production console. The final design of the production console was developed through discussions with directors who use the FRU.

Our TR-60 television recorder has proven itself to be an excellent choice for remote work. As our house production machines are quad, the extension of this standard to the Field Recording Unit was natural. Equipped with editing, CAVEC, and DOC, it serves as both a field production recorder and as a playback machine during live telecasts. A tape editing programmer has also been used to good advantage in the field. The vertical format of the TR-60 fits uniquely into our equipment layout, conserving vital floor space. As an added bonus, the "60" provides heat for the tech area during the winter. Before installation of the quad machine a number of productions were originated on a video record-playback system utilizing an IVC 900 and time base corrector. This system is also used as an isolated camera recorder and for making one inch helical scan dubs.



Director George Beneman and tape editor William Derr prepare for the next cut.



Limited space has led to some unusual solutions to the problems of camera and tripod storage.

The Operating Area

An operating area for audio is provided at the front of the van. Here, two Shure M67 mixers, mounted in a portable case, can be patched to the rack mounted processing and distribution equipment. Lines entering the rear of the truck are connected with the mixers through this same patching arrangement. Complex audio requirements with long runs are usually met by operating the mixers on the shooting site. A multi cable with a breakout box provides for mixer feeds, interphone, and audio-video monitoring at the shooting location. Rack mounted audio equipment includes a CBS Labs audimax, a third M67, and a Visual 612 distribution amplifier. All units have XLR style connectors allowing quick changes to meet various requirements. Although the equipment is basic, it offers a vast number of operating possibilities.

The camera interphone system has been expanded to provide additional connections at the camera heads and in the van. A speaker and amplifier at the video position bridge the interphone line and permit anyone on the line to "broadcast" to the truck. This is particularly helpful during setup.

Foldback and external video are

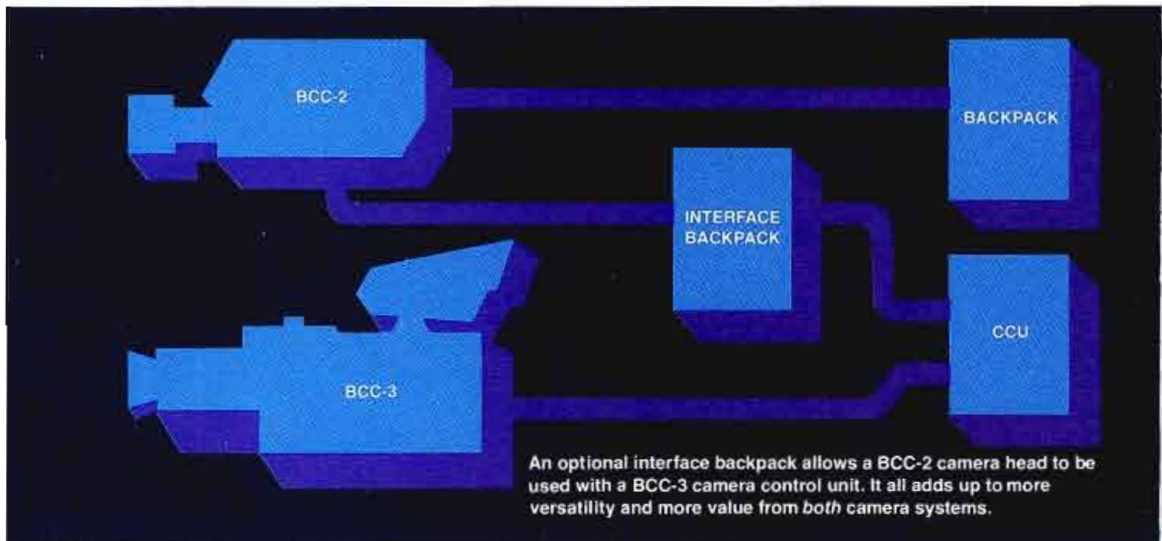
available at the camera head. On-site audio and video monitoring are therefore available without running extra cables. A selector switch at the foldback input changes it to interrupt foldback operation. A speaker-amplifier connected to the IFB allows the director to communicate with talent and floor crews simultaneously. This system is also used to provide a playback when actions are to be synchronized with prerecorded audio.

Power Requirements

Power requirements are less than 35 amps at 240 Volts under full load. Various lengths of three conductor #6 cable with twist lock connectors can be tied into electrical panels by means of a matching pigtail. This power cable (or a similar cable from the generator) is connected to a boost-buck and isolation transformer. These units are tapped to permit 208, 220, 240, or 277 Volt operation. Distribution to lighting, air-conditioning, and tech circuits is made through a breaker panel in the rear of the truck. Power monitoring equipment and an emergency generator "kill" switch are centrally located within the operating area. The gasoline generator shares a sub-chassis com-

Continued on page 36

Ampex, the first announces the last wor



BCC-2 Portable Color Camera

Designed and built like our VTRs, this hand-held ENG/Field camera puts out a studio quality picture, yet the camera head weighs less than 16 pounds, including tiltable viewfinder and lens.

It gives your on-air look a new dimension in quality—quality that comes from features like three 1" Plumbicon* tubes, including an extended red. High sensitivity. Automatic iris and color balance. Modular maintenance accessibility.

And more.

You'll discover a new dimension in flexibility, too. Your operator is on the air, or tape, in 2 or 3 seconds from standby. He can work up to 1000 feet from the van, or hook into a portable VTR for complete, battery-operated mobility. Conveniently located camera controls put him in better command of the action.

Most important: you'll appreciate how BCC-2's versatility lets it pay for itself fast. Mount it on a tripod with an optional studio viewfinder, and you have an ideal all-around production camera, with a picture just as good as its big brothers.

In all aspects, BCC-2's performance is equal to that of full-size cameras. In concert with BCC-3, it can add depth to your camera system and help you handle many different production applications, indoors or out.



t word in VTRs, d in camera versatility.

Complete camera systems in themselves, BCC-2 and BCC-3 "mate" to give budget minded broadcasters a new dimension in ENG/Field and studio production

Meet the first camera in its class to successfully combine high quality engineering with a long list of big camera features you don't find in comparably priced cameras.

BCC-3 is a studio camera system that delivers a top quality picture at a medium price. You'll get three 1" Plumbicon* tubes, including an extended red. A unique optical system that cuts lag by 50%. Excellent registration. Superb signal to noise ratio. Adjustable masking to insure precise colorimetry match between cameras. Maintenance accessibility. And construction so rugged you can take BCC-3 out of the studio on location with complete confidence.

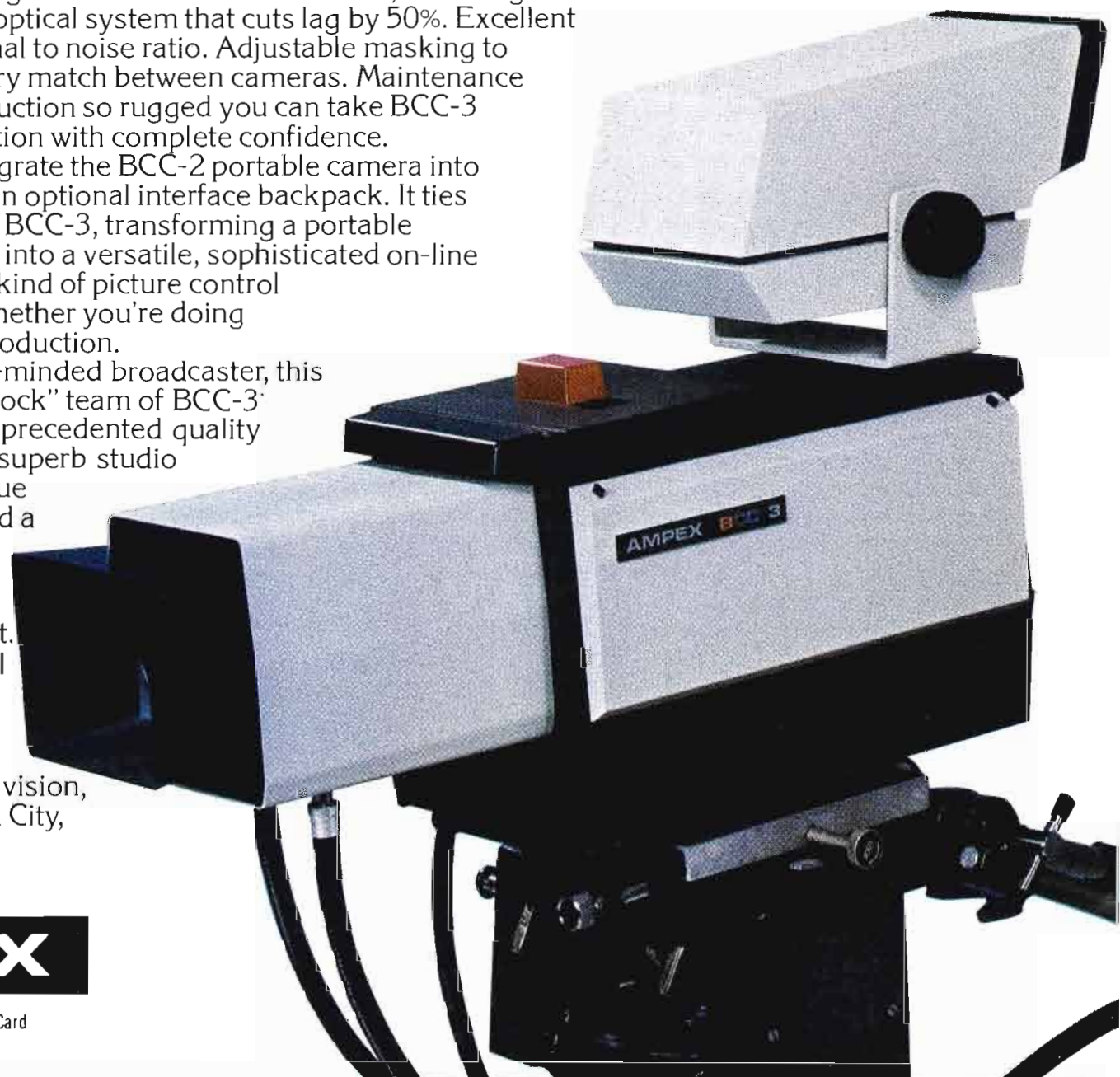
Also, you can integrate the BCC-2 portable camera into the BCC-3 system with an optional interface backpack. It ties BCC-2 to the CCU of the BCC-3, transforming a portable backpack recording unit into a versatile, sophisticated on-line camera. You'll enjoy the kind of picture control only a CCU can give—whether you're doing studio, field, or sports production.

If you're a budget-minded broadcaster, this new Ampex "building-block" team of BCC-3 and BCC-2 gives you unprecedented quality and flexibility. You'll get superb studio or remote production, true ENG/Field capability, and a high quality broadcast picture throughout.

All in step with any broadcaster's budget. For a demonstration, call your Ampex Broadcast Sales Engineer, or write: Ampex Corporation, Audio-Video Systems Division, 401 Broadway, Redwood City, California 94063.

*Trademark N.V. Philips

BCC-3 Color Studio Camera



AMPEX

For More Details Circle (28) on Reply Card

On Location Production

Continued from page 33

partment with the video-tape air compressor. An externally located door allows access to this area for servicing.

Except for the generator compartment, all of the interior design and installation was completed at the Maryland Center by our own personnel. The ceiling and walls of the van are finished in blue-green carpet tiles which attenuate noise and reflected light. A laminate of styrofoam and masonite was laid over the steel floor and then covered with a tough, water resistant red carpeting. The floor absorbs road vibrations and serves as a thermal barrier. The carpet also keeps loose dust to a minimum. Cooling is provided by two 13,500 BTU roof mounted air-conditioners. To subdue outside light, pull-up shades were installed at the front and quarter windows of the van. Self-retracting shades also operate with the sliding doors. Two lighting tracks, equipped with low power spots, provide illumination to each operational area. After regular power has been terminated, DC lighting is used for packing. Seating is available for three engineers, a producer, director, and one assistant.

The biggest challenge presented in building the FRU was that of equipment placement and providing adequate storage within the step van's 19 x 6½ x 7 ft. interior. The main equipment racks use the floor area between the rear wheel wells. Two cabinets, mounted over the wheel wells on either side of the shading position contain tools, microphones, a scope, parts and other small items. The top of the generator compartment serves as a table for the IVC 900 and production console. Across from this is the TR-60. In front of the right truck seat is a table for audio gear.

The area behind the racks is used for heavier storage. Fixtures on the rear swing-out doors carry the tripods and pan heads. Camera cables are transported on a reel which is removed upon arrival at the site. This allows access to the cameras, stacked one above the other in special flip-top trays.

Hooks located on the walls of this rear storage area are for video and microphone cables.

Portable Lighting

Additional equipment includes a portable lighting package consisting of five Colortran Vari "10" 1,000 Watt fixtures with stands, extension cables, and transport cases. These units draw 8.2 amps and can usually be operated from conventional lighting circuits found at most locations. When greater tonnage is needed a portable 200 amp feeder box can be tied across the mains. Twelve 15 amp and four 50 amp outlets are available from this panel. Outdoor locations are supplemented with double sided reflectors and lighting units balanced with dichroic gels. Dollies and cranes are often used on remote location. This equipment is transported in an auxiliary van which also includes seating for five crew members.

During the planning stages of each location shoot, a site survey is made by the producer, director, production supervisor, and engineering coordinator. Details of set, special equipment needed, availability of power, lighting design, vehicle parking, cable runs, and audio requirements are discussed during this survey. The engineer assigned to audio for a particular shoot also serves as coordinator for engineering as his area usually requires the greatest amount of input about the production. As coordinator he also checks on power, required cable lengths, and any unusual operating conditions which might affect other areas of engineering. The survey and follow up communication allows us to tailor our thinking and operations to the specific needs of the production. The flexibility offered by the equipment and this survey procedure can best be shown through example.

Program Flexibility

Aviation Weather is a weekly program which presents forecasts and informative segments for those interested in general aviation. It used several widely separated locations in covering the Reading Air Show. A home base was established from which the main air events and a number of formal interviews were recorded. For this part of the

coverage, power was taken from a nearby panel and cameras were located on the roof of the terminal building. Later, the equipment was powered by the generator and the cameras were placed on dollies to cover ground displays and man on the street interviews at three other locations.

Different requirements were met in recording a tour of a local brokerage house for **Wall Street Week**. Audio mixing equipment, cameras, and monitoring facilities were located in the brokerage offices. A multi cable and camera cables were run to the truck eighteen floors below. On this particular shoot we felt that the Field Recording Unit offered some of the portability of backpack while retaining the advantage of a production van, i.e. full sized tape deck and multiple camera switching.

Much of our work has been done for the Division of Instructional Television of the State Department of Education and for the Center's **College of the Air**. An unusual educational assignment was to tape some dramatic segments based on Milton's **Paradise Lost**. The Garden of Eden setting was beautiful but accessible only by several miles of unpaved road and field. Due to the narrow wheelbase we had no difficulties arriving at the site. Some minor problems were experienced in carrying cameras and equipment through the woods and brush but the product was well worth the effort.

Consumer Survival Kit is a consumer information program using a variety show format. Much of this variety has been supplied by the FRU including a song and dance number at a mobile home site, soap opera dramatics in a pharmacy, and a tenderfoot cowboy giving tips on land buying from the center of a meadow filled with cattle.

Each production has been different with respect to lighting, power, audio requirements and general production needs. In each case the Field Recording Unit has been able to meet those needs. This compact mobile television facility has given an outstanding performance in over 120 assignments and has dramatically increased our capacity to serve the public of Maryland. □

AKAI RELIEVES BACK PAIN.

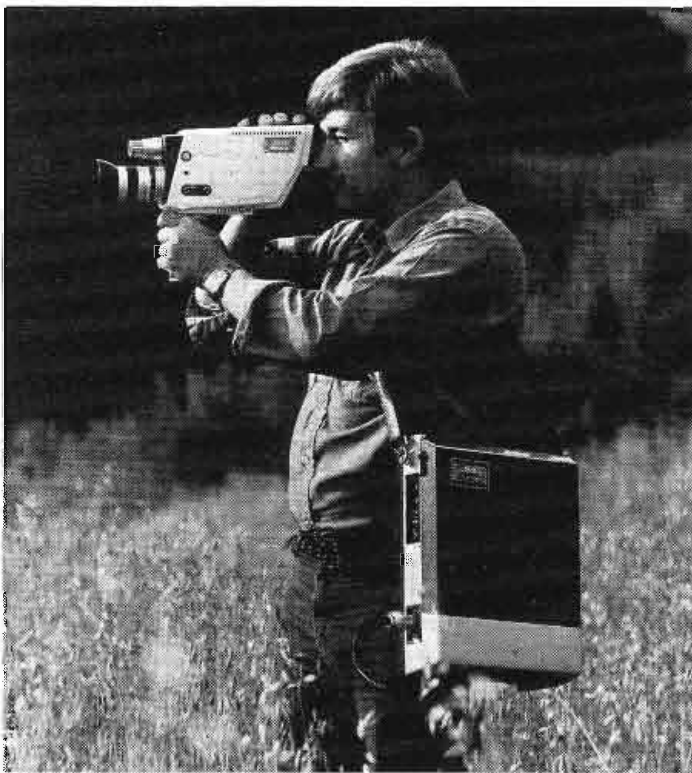
One of the common discomforts due to excessive videotaping is back pain.

Lugging around those 35 and 40 pound VTRs through crowds, down stairways, up stairways, up hills, steep hills.

Well, no more. Akai has a remedy — our new VTS-150B we call the Hustler.

The Hustler doesn't weigh 35 or 40 pounds like other recording units. It doesn't weigh half that.

In fact, it doesn't even



need to go on your back.

The Hustler is a 16 pound color videotape recorder you sling over your shoulder, and a 6 pound color camera you can carry in one hand.

No wonder 63 TV stations are now using our little Hustler.

The lightweight, two-piece, one-man operation that isn't a pain in the back — or anyplace else.

AKAITM

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For More Details Circle (81) on Reply Card

Can Anyone Feel My Pulse?

Part 2 of a 2-part series on transient response.

By Dennis Ciapura, BE Audio Editor

In part 1 of our FM transient response investigation, we looked at the response and waveform distortion characteristics of the various filters used for 15 kHz low pass and 19 kHz notch functions in FM stereo generators. While we have established that these filters do indeed result in some degree of ringing as well as complete integration of a square wave into a sine wave at frequencies as low as 6 or 7 kHz, the biggest question is whether these distortions are audible. And that brings us to the main topic of part II, Can Anyone Feel My Pulse?

This subject is particularly timely, as a great deal of publicity has been fielded in audiophile circles relative to new amplifiers employing VFET's and vacuum tubes for improved transient response beyond what even the best circuitry of a year ago could manage. The broadcast engineer must wonder if the state of the art is advancing to the point where the sheer mathematics of the FM multiplex system inflict a

barrier to our progress that simply cannot be negotiated.

The real question, however, is whether this barrier is a measurement limitation or an audible one. The overshoot problem can be handled in one of two ways. Either careful control of the input audio can insure that no waveform clipping is passed on to the stereo generator, a condition usually accompanied by a reduction in average modulation level for reasons we shall explore shortly, or, special signal processing and filtering techniques as described by Eric Small and Bob Orban can be employed.

The FM transient response situation is really two problems in one. The overshoot problem, which we can handle, and the limited risetime problem which we cannot ever completely solve because the risetime is directly related to the audio bandwidth, which, at least in the 38 kHz subcarrier portion of the composite spectrum, is limited. So, the question of whether the limited transient capability of the FM

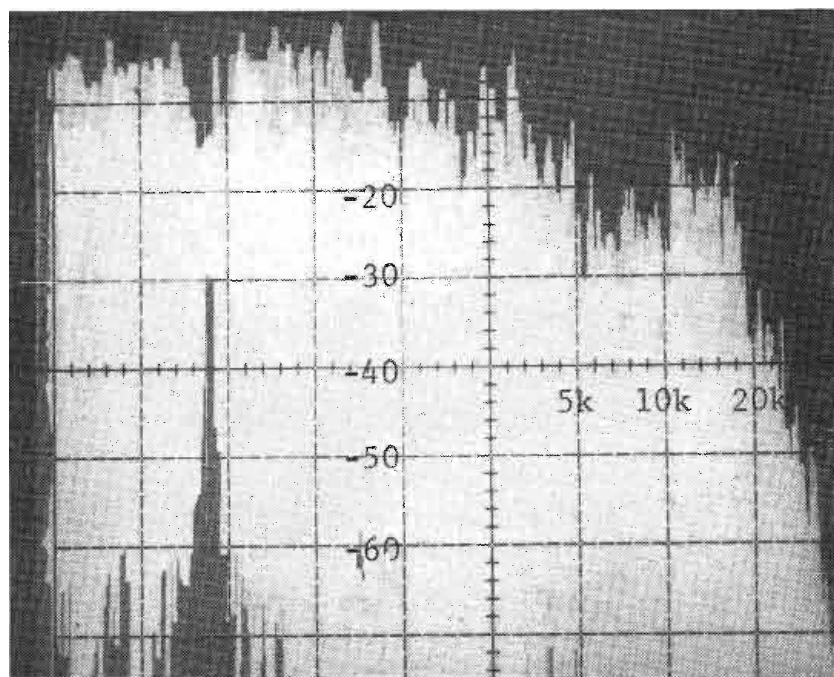
stereo system is really an audible loss is really basic to the question of whether we can truly duplicate the signal source. And if these distortions are not audible, should we shift our priorities and use the most effective filters to protect the 19 kHz pilot? These are some of the questions we hope to answer in Part II, so let's start by taking a look at what we found in our investigation of the overshoot problem.

Overshoot Problems

We calibrated a disc reproducing system to be flat to past 19 kHz and played all types of program material from strings to rock while observing the output on an oscilloscope to see if we could find any sign of clipped or very fast risetime signals, and could not. As we suspected, the bandwidth limitations of both the tape and disc mastering processes leaves the recording devoid of any fast risetime stuff that the original sonic performance may have had.

A low frequency spectrum analy-

Figure 1. Low frequency spectrum analyzer storage photo of sample program material. This selection is the left channel of Frank Pourcel's "The World is a Circle" from the album of the same title. We chose this selection for the photo because it contained an unusual amount of energy in the 15 to 20 kHz region due to a repetitive cymbal splash of pretty good amplitude. As you can see, the peak amplitude in the area of 19 kHz is still down about 30 dB so there is really not too much occasion for pilot interference as long as the audio from turntable to transmitter is clean and does not generate appreciable harmonic content.



Harris' MW-50 keeps some very fine company.

These pace-setting AM stations are now, or soon will be broadcasting, with Harris' MW-50, 50 kilowatt PDM (Pulse Duration Modulator) transmitters.

And here are a few of the reasons why:

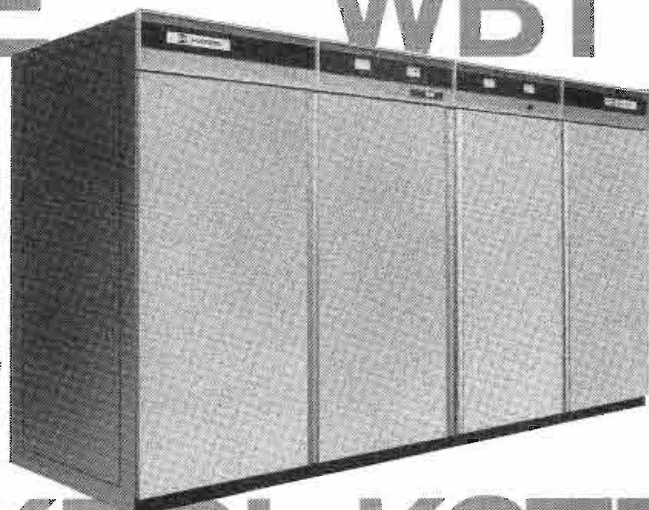
- 125% positive peak modulation capability.
- PA efficiency approaches 90%.
- 60 kW output capability.
- Excellent transient response.
- Only five tubes — three types.
- A cleaner, louder signal.

For more reasons why the MW-50 is at home in so many top stations, write Harris Corporation, Broadcast Products Division, Quincy, Illinois 62301.



HARRIS
COMMUNICATIONS AND
INFORMATION HANDLING

CFGO CKLW KCBS WJR
 KGBS KING WINZ KMOX
 CFCW KOB KDKA KFRE
 WWWE WBT WNOE
 WHDH WCAW
 WGTO WRKO
 WKBW WBBM
 KQRX KPOL KSTP WINS
 WGN KGO WABC WCAU



... AND IN BRAZIL, ECUADOR, INDONESIA, IRAN, LEBANON, MALAWI, NIGERIA AND VENEZUELA.

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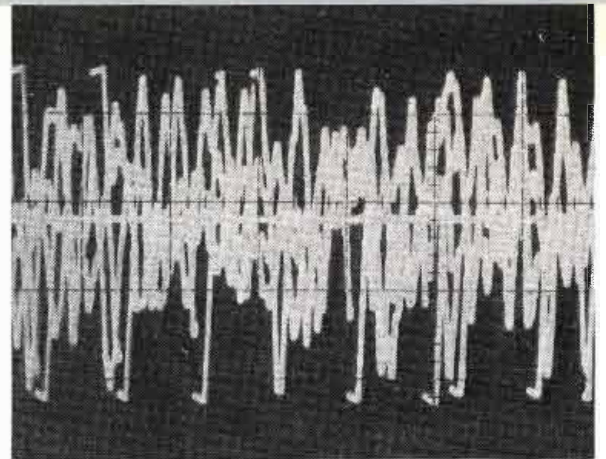
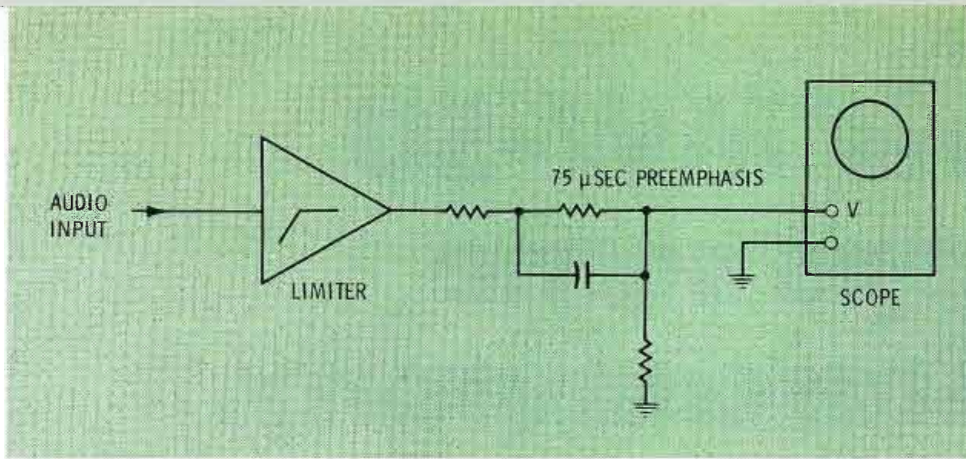


Figure 2. Taking a look at what the transmitter sees coming out of the limiter. It is necessary to preemphasize the FM limiter output to simulate the stereo generator's preemphasis to properly observe the transmitter's modulation input. Even though clipping may not be visible at the limiter output because of internal deemphasis, this method of testing will reconstruct the waveforms and show you what the transmitter sees. The photo shows peak clipping by the safety clippers in an FM limiter during a heavily scored passage. These pulse-like inputs can result in ringing in stereo generator filter circuits. More moderate input levels to the limiter resulted in negligible clipping.

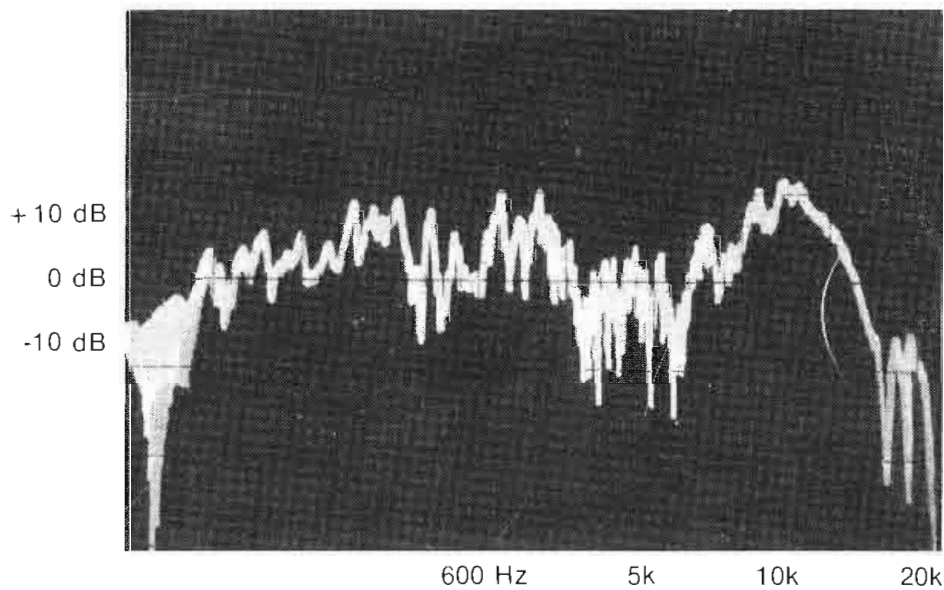
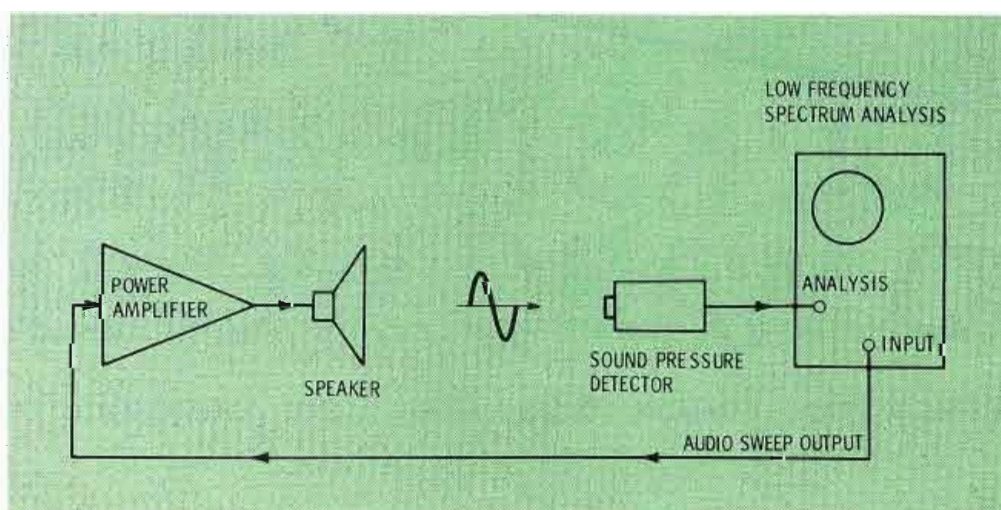


Figure 3. Frequency response of the Pioneer CS-R300 speaker used for the acoustic tests of square wave perception. The mid-range dips are due to standing waves in the room and although the response may look pretty ragged by amplifier standards, it is really quite good for a speaker system. As you can see, the tweeter is a little peaky at 8 kHz and flat again at 12 with about a 10dB loss at 15 kHz. The test set up used for the acoustic measurements is shown below. The sound pressure level meter used was within 2 dB to 14 kHz, which is far better than the average ear so the results of the waveform distortion tests are conservative in terms of what you are likely to hear. A Tektronix 5L4N low frequency spectrum analyzer in a D11 storage scope was used for the measurements and photos.



zer was utilized to observe the spectral content of the program material out to 100 kHz and once again, we were unable to find any output past 18 kHz and almost everything past 15 kHz was at least 30 dB down from the mid-range reference level. It appears that the accumulated losses in the recording processes result in a steep enough roll-off beyond 15 kHz to preclude the presence of any fast risetime components. Because of the extreme high frequency response required of the microphones, we doubt that the original program signals, even prior to taping, had much content past 20 kHz.

If the transmitter is going to see any square wave type signals, they are going to have to be the result of audio clipping. Assuming that adequate headroom has been provided in each segment of the program chain, the peak limiter is the most likely source of clipping. This clipping will not be apparent if a scope is simply tacked onto the limiter output, however, because FM limiters employ pre-emphasis before the limiting function and complimentary de-emphasis after. So any clipping is rounded off by the 75 usec. de-emphasis function.

Remember that the transmitter will pre-emphasize the limiter output though, and any clipping will be reconstructed. Use a 75 usec. pre-emphasis network at the input of the oscilloscope and you will observe what the transmitter really sees.

We tested various limiters and

How do you pick up sound without noise?

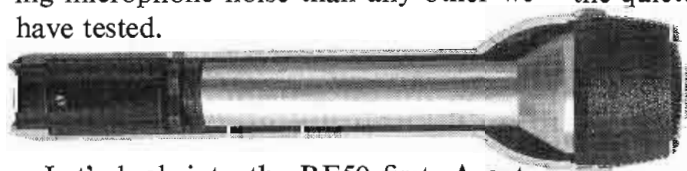
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found that the type with clippers for high frequency limiting exhibited substantial pulse type output even when operated at moderate levels. Limiters that use a fast AGC section for high frequency limiting and output clippers for safety limiting to catch short peaks that are passed by the AGC section, looked pretty clean unless driven into mid-range compression. The older series of Volumax (C.B.S. 411) is representative of this type. If set up so that low frequency input is about 4 dB below the limiting threshold, the pre-emphasized treble components seldom came through the limiter with sufficient amplitude to reach the clipping threshold of the safety clippers. Under these conditions the filter overshoot is no problem.

For stations wishing to obtain a higher modulation level than this mode of operation allows, Eric Small and Bob Orban have a combination limiter/stereo generator that uses a system approach and some special filter techniques to provide a high average level and pilot protection filtering, too. We are currently testing a new limiter

by Thompson C.F.S. the group that has taken over the C.B.S. broadcast line, which preliminary tests have shown to be very clean. The unit will be billed as the 4111 and its output, when pre-emphasized, showed very little clipping even when driven into 4 or 5 dB of low frequency compression and substantial high frequency limiting. Look for the complete test report on this limiter in a future issue of BE.

To summarize, the overshoot problem can be handled by carefully choosing limiter input levels or using some of the newer specialized FM processing gear, if a really high average level is your primary goal. This is the half of the transient response problem that we can do something about. Now let's take a look at the other half of the problem, the high frequency roll-off.

High Frequency Roll-Off

The sharp cut-off 15 kHz low pass filter with a 19 kHz notch was chosen for the audibility tests because it was the type that exhibited

the most severe waveform distortion. The filters (two for stereo) were connected to a multi-section switch so that they could be switched in and out of the audio lines for an A-B comparison of various types of program material from both records and tapes.

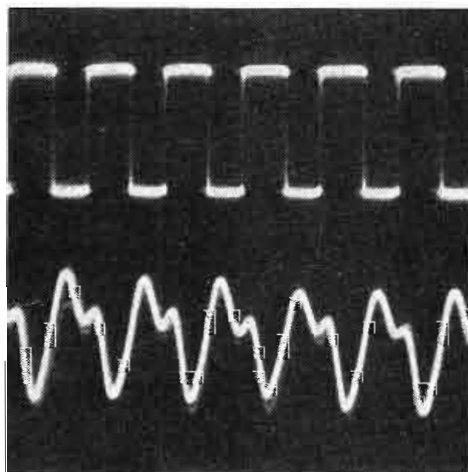
While setting up the equipment we noticed a very strange phenomenon. Above about 7 kHz, the square wave input and the sine wave output sounded exactly the same. It is strange to monitor the output on a scope and see the waveform change completely yet sound the same. This is not to say that audio clipping above 7 kHz is inaudible, it is. Music seldom consists of a single tone, and the I.M. components generated by clipping are well within the ear's bandpass and are audible as distortion.

The point is, however, that the ear will integrate a high frequency square wave into a sine wave even if the system will pass the pulse unaltered. The ear's high frequency response leaves a lot to be desired in terms of pulse detection for two reasons. First of all, the characteristic high frequency roll-off of the ear makes it difficult for the ear to respond to a fast risetime input, and second, a phenomena known as "masking" makes it very difficult to detect the relatively low amplitude harmonic components in the presence of the much stronger fundamental.

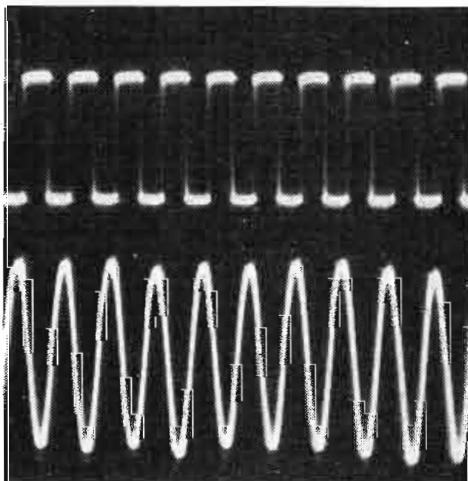
Realizing that the monitor speakers we were using imposed an acoustic limit to what we perceived, we also tried some units with a superb high end and found the same results, except at a somewhat higher frequency. Our original test speakers were Pioneer CSR300's, which are representative of moderate quality reproducers in use in home systems. With these speakers, the waveforms sounded the same after about 6 kHz. With Hartley Concertmaster juniors, which use Norelco dome tweeters that hold up past 15 kHz, we could detect a difference in sound up to about 7.5 kHz.

Some very careful A-B testing was required to tell the difference

(Continued on page 53)



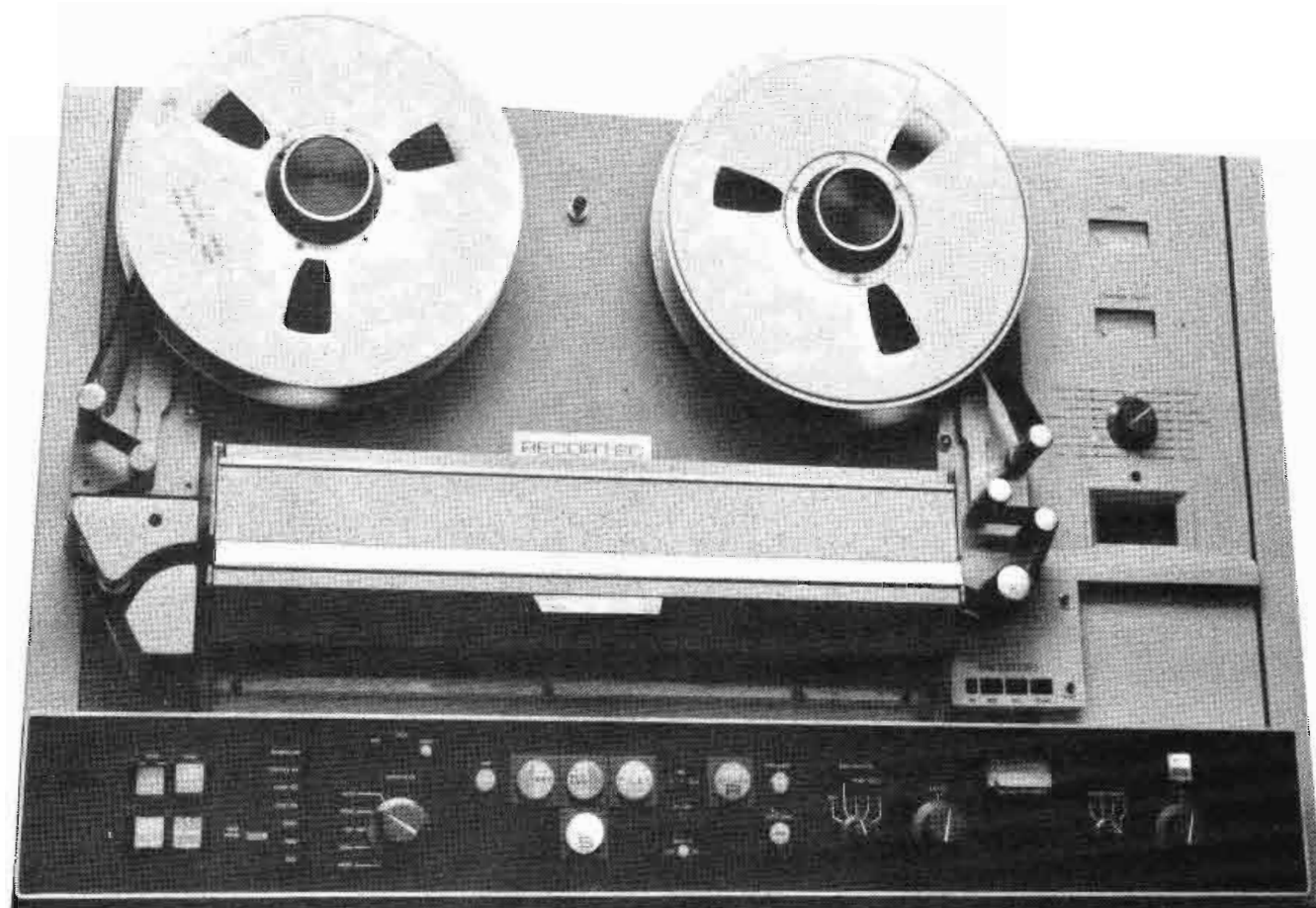
A



B

Figure 4. The top trace in each of the photos above is the square wave input signal and the lower trace is the acoustic output of the speaker system. Photo "A" is a 5 kHz input and photo "B" is a 7.5 kHz input. It appears that getting to hear a square wave as a square wave, even if it could be transmitted in perfect form, would be difficult if not impossible. Compare these photos with the photos of the filter distortion in part I of this series and note the similarity.

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By Glen Clark

Concluding a 2-part series.

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- (3) H. Swanson, "The pulse duration modulation: A new method of high-level modulation in broadcast transmitters," *IEEE Trans. Broadcast.*, vol. BC-17, pp. 89-92, Dec. 1971.
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- (5) C. B. Cox, "Enhancing AM signal coverage through improved modulation techniques," in *Proc. NAB annu. Broadcast Engineering Conf.*, 1974.

In the PDM system (3), the audio information is converted to pulse form quite early in the system. Referring to Fig. 11, a 70-kHz triangle wave and the applied audio are combined at the junction of R_1 and R_2 . This waveform is in turn fed to a trigger circuit which produces a pulse train at point D . Notice that as in the Ampliphase system, the positive duty cycle of the pulse train is a direct function of the amplitude of the applied audio; however, the frequency of the pulse train is not the same as the carrier frequency, but at 70 kHz.

This width-modulated square wave is then amplified and applied to the grid of a single modulator tube which is in series with the cathode of the PA. The amplitude of the square wave is sufficient to saturate the tube during the high state, and to cut it off completely during the low state i.e., it operates as a 70-kHz switch.

The PA tube is given constant carrier excitation and $B+$ voltage. The cathode circuit is alternately made and broken, or "keyed" by the modulator in much the same way as in a cathode-keyed CW transmitter. This arrangement causes the width of the "on" pulses of the PA to increase as the voltage of the applied audio increases, and decrease as the audio decreases.

A spectral analysis of the PA output at this point would reveal the carrier, plus symmetrical sidebands at the frequency of the applied audio and all odd-order harmonics of 70 kHz. A low-pass filter with a cutoff frequency between the upper end of the audio spectrum and 70 kHz is now inserted between the modulator tube and the PA. The spectral output is now simply the carrier and the audio sidebands.

This arrangement will pose no problems so long as the modulator turns on and off exactly as the carrier wave goes through a zero crossing, as in Fig. 12(a). During operation, however, there will constantly be instances of the modulator tube turning off while the carrier is not at a zero crossing, leaving energy trapped in the filter, such as in Fig. 12(b).

The voltage produced by energy stored in a coil is proportional to

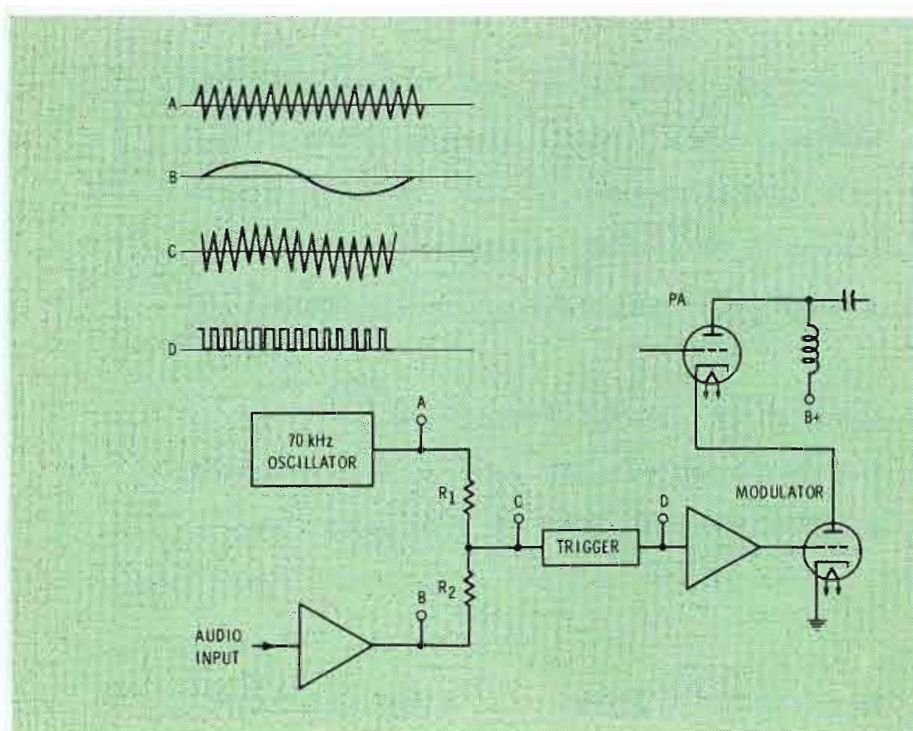
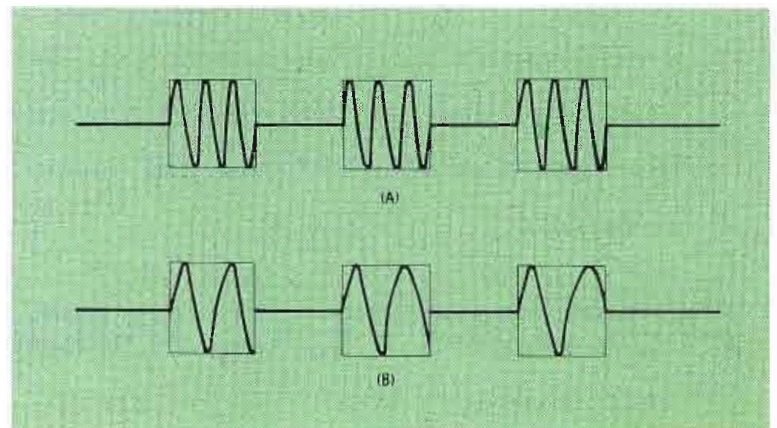


Figure 11

Figure 12



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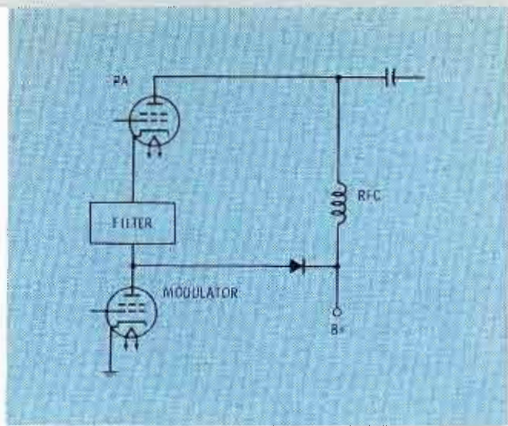


Figure 13

the impedance across which the energy is dissipated. If the impedance presented to the filter by the open-state modulator tube is infinite, the theoretical limit of the voltage applied across the modulator tube and the filter is also infinite. In practice, imperfections limit this transient to a finite value, but it will still be of sufficient magnitude to do damage to the rest of the circuit.

A high-voltage diode is placed between the junction of the modulator tube and filter, and the B+ supply, as in Fig. 13. Any peak transient appearing at this point is now fed back to the B+ supply. In

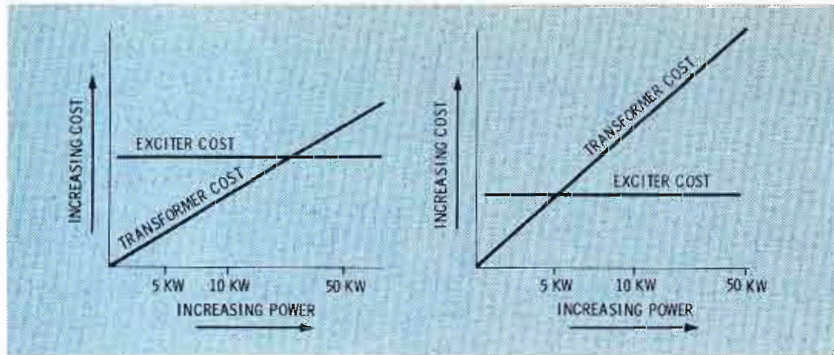


Figure 14

addition to preventing damage to the circuit, this also increases the efficiency of the system by conserving the energy contained in the transient.

Operating in class C service, the efficiency of the PA is high, as is the overall efficiency of the system. The present 50-kW version of this system requires 110-kW total power input when modulated at 100 percent with a steady-state sine wave.

Economics

Each of the last three modulation systems discussed was originally developed for use at 50 kW and above, where they would be more

economical both to build and to operate than a plate-modulated system. By avoiding a high-power class B audio section, overall efficiency of the new systems was generally higher, reducing power consumption.

In addition, at these power levels these systems were less expensive to manufacture than those using plate modulation. A good example of this is the evolution of the Ampliphase system.

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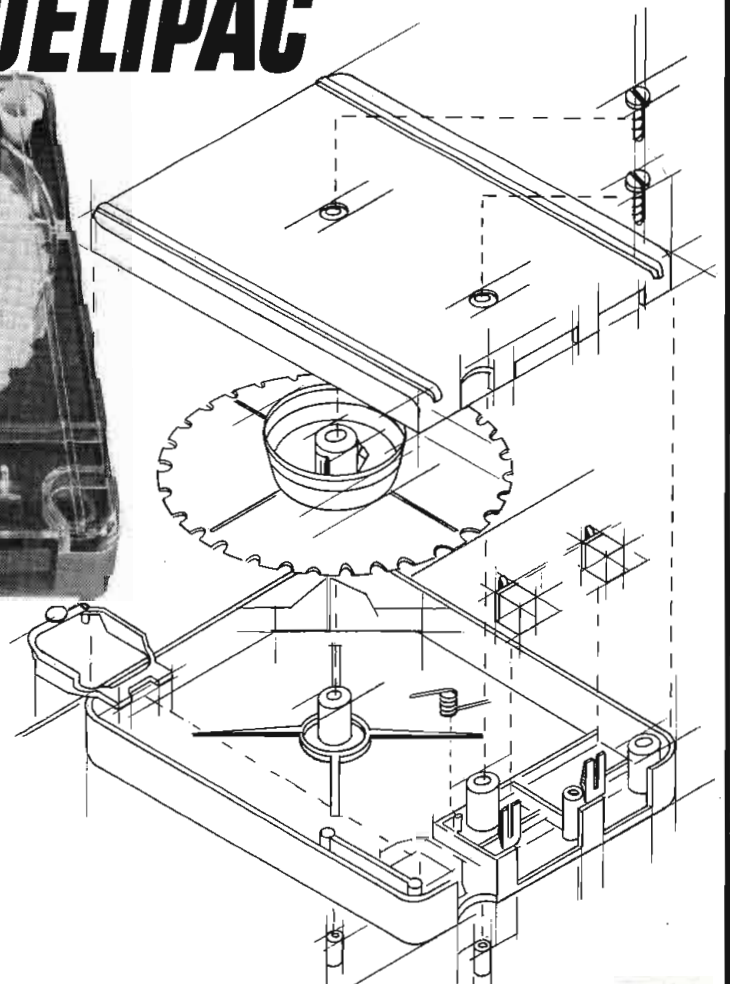
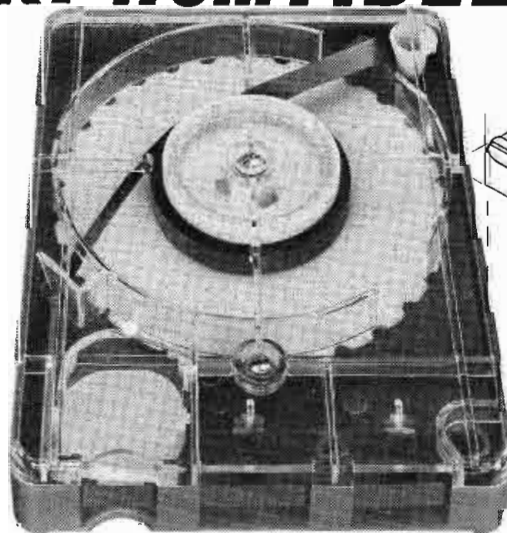
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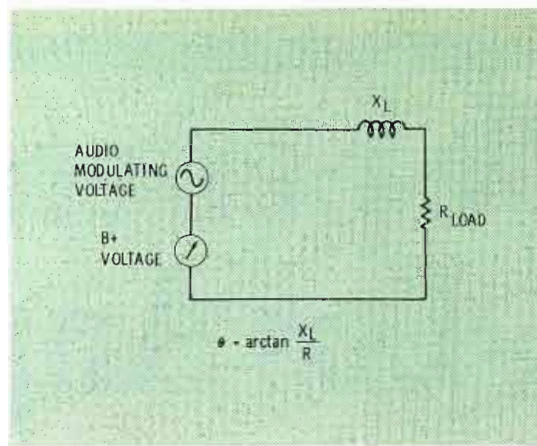


Figure 15

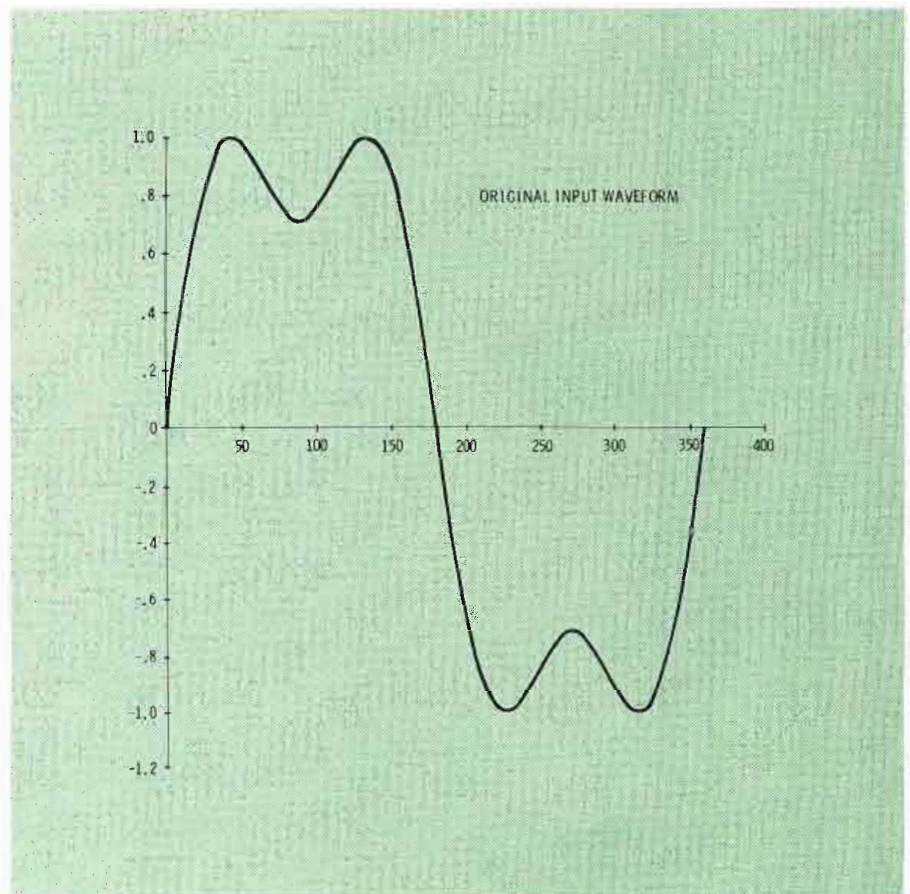


Figure 16

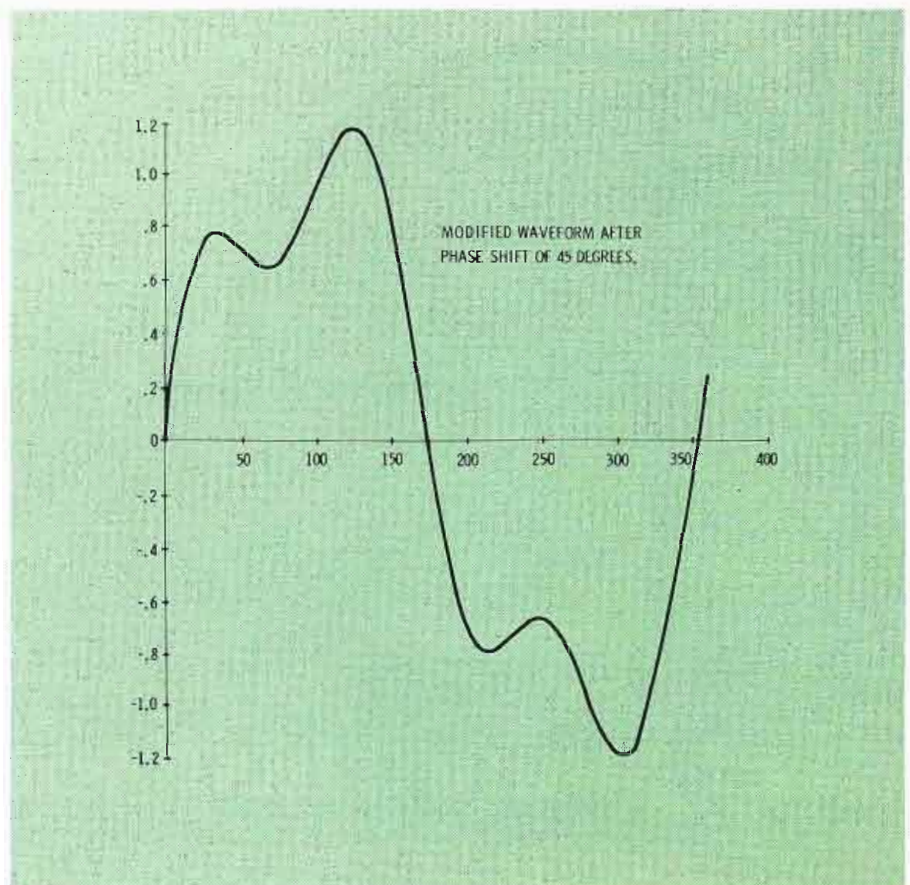


Figure 17

Since the Ampliphase system requires two RF amplifiers but no high-power audio section, the determining cost factors then become the modulation transformer and the exciter.

The cost of the modulation transformer increases with power as in Fig. 14(a). The cost of the exciter is constant for all power levels. For those powers where a modulation transformer is less expensive than an exciter, the plate-modulated system is more economical to build. Conversely, where the transformer is more costly than the exciter, the Ampliphase system is more economical.

When this system became popular in the United States in the early 1960's the point of equilibrium was between the 10- and 50kW levels. Subsequent increases in the cost of copper and labor have forced the price of transformers up. Meanwhile, it has been possible to reduce the cost of the exciter by replacing the original tube-type circuit with a solid-state version. Fig. 14(b) shows these adjusted values. The point of equilibrium is now reached somewhere below the 5-kW level.

Similar courses of evolution can also be traced for the other two new systems.

Performance

A by-product of these approaches to a less expensive, more economically operated modulation system has been higher performance; specifically, higher average modulation levels.

As has been discussed in previous papers (4), (5) the percentage modulation of a plate-modulated transmitter bears no simple direct relationship to the amplitude of the input audio. The effective load placed on the secondary of the modulation transformer consists not only of the operating impedance of the PA, but also the inductive reactance (X_L) of the secondary winding itself, as in Fig. 15. This reactance in conjunction with the load resistance forms a simple single-section low-pass filter and phase-shift network. The input/output voltage relationship of the filter is described by

$$a = \frac{R}{\sqrt{X_L^2 + R^2}}$$

The input/output phase relationship is described by

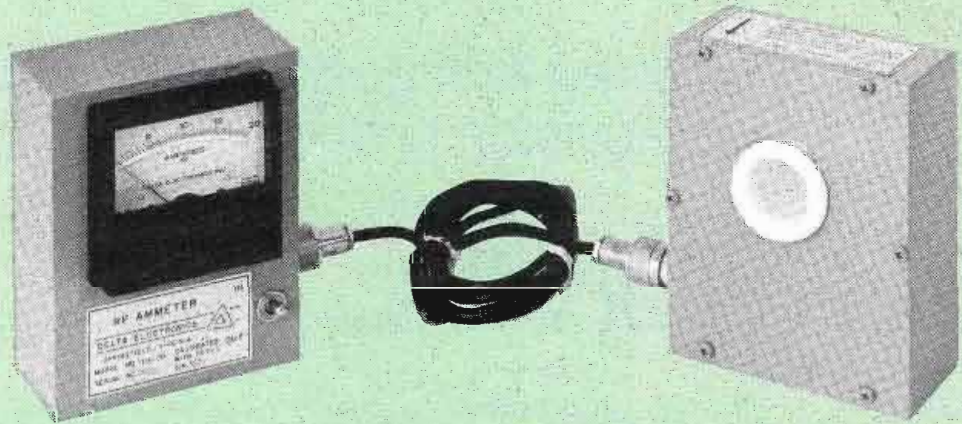
$$\Theta = \arctan \frac{X_L}{R}$$

So long as the value of X_L is small in comparison to the load resistance, a is essentially unity, and Θ is essentially zero. But as frequency increases, so does the value of X_L . The resulting increase in Θ and decrease in a will pose no problem while the transmitter is modulated with a discrete frequency

sine wave. However, it will radically alter a complex wave which has components on both sides of the break point of the filter.

To examine the effects of the changes in a and Θ let us assume the complex modulating wave in Fig. 16. It contains the first two Fourier terms of a square wave, f and $3f$, with amplitudes of a and $a/3$, respectively. Assign it an amplitude of ± 1 . Shifting the phase of the higher frequency component 45° produces the wave in Fig. 17.

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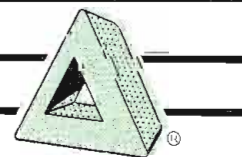
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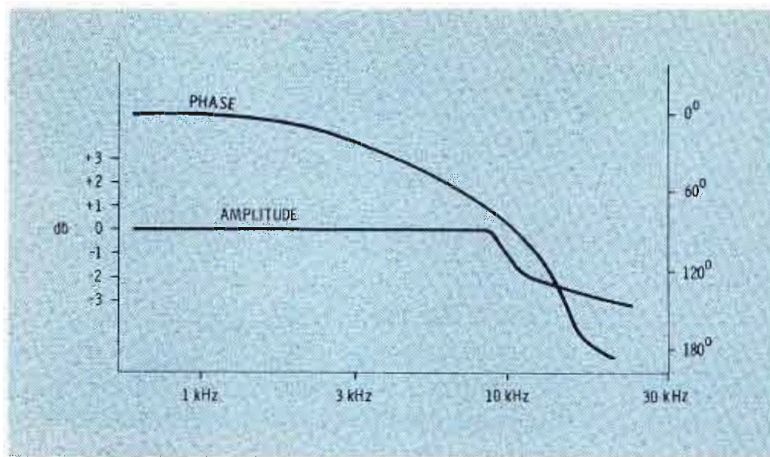


Figure 18

The peak value is now 1.17. If the gain of the system was sufficient to cause 100-percent modulation with the original waveform, the modified waveform will cause 117-percent modulation, or severe carrier clipping on negative peaks.

Taking into account now both the total phase shift and reduced gain at higher frequencies, let us take two examples from Fig. 18. This is a graph of the frequency versus amplitude and frequency versus phase curves measured from a typical 10-kW transmitter.

If we choose f to be 1000 Hz, $\theta = 20^\circ$ and $a = 1.0$. These values produce the waveform in Fig. 19. It has a peak amplitude of 1.08 unit.

Choosing f to be 5000 Hz, $\theta = 105^\circ$ and $a = 0.749$. This produces the waveform in Fig. 20. It has a peak amplitude of 1.27. If the gain was set to produce 100-percent modulation with the original waveform, this modified wave will produce 127-percent modulation. To avoid excessive overmodulation, the audio gain must be reduced slightly more than 2 dB below what it could be if the transmitter were transparent. This will result in modulation levels well below 100 percent when the program content does not include complex waves with content in the upper audio spectrum. One should recognize at this point that the effects of this inability to process program material with wide spectral content in a linear fashion become even more acute for those stations where audio clipping is employed. All broadcast transmitters attempt to flatten response and minimize phase shift through the use of negative feedback. Notice from Fig. 1, however, that in a plate-modulated transmitter the feedback loop includes only the audio amplifiers. The modulation transformer, the prime contributor to phase shift and rolloff, cannot be included in the loop due to the danger of oscillation. If the phase shift were to become greater than 180° , the feedback would suddenly become positive, and the entire audio section would break into oscillation.

The value of X_L in the transformer windings can be reduced to minimize these effects by increasing the wire diameter of the turns. This in turn will require more copper

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which returns one to the economic consideration. In the end one is faced with a direct tradeoff between performance and an economically feasible transformer.

Of the other systems covered, only the PDM has reactances in audio determining circuits at this power level. In it, the specifics of the circuit are such that the performance/economics tradeoff can be pushed much further in the performance direction. The three non-plate-modulated systems are therefore much more nearly transparent. This allows limiter outputs to be set substantially higher, resulting in a louder sounding signal.

As broadcasters continue to seek ways to increase their listener appeal through increased competitive loudness, substantial differences in the marketability of different transmitting systems are being felt.

Asymmetrical Modulation

Closely related to competitive loudness is the asymmetrical modu-

lation dilemma. Some stations have attempted artificial means of producing an asymmetrical modulating wave to increase modulation in the positive direction and hence loudness. These processes introduced some type of DC component into the audio wave. The transmitter, being AC-coupled, removed this DC component, often leaving the ambitious broadcaster in worse shape than when he started.

To date, little serious consideration has been given to the idea of a transmitter with a DC-coupled audio section. Even if the massive audio amplifiers were directly coupled, the signal would be baseline-shifted at the transformer.

Conclusion

The purpose of this paper is not the enumeration of the foibles of plate modulation, a very sound and straightforward method of amplitude modulation. In theory it has few restraining performance limitations. However, in practice it has economic limitations which make it less and less competitive as the

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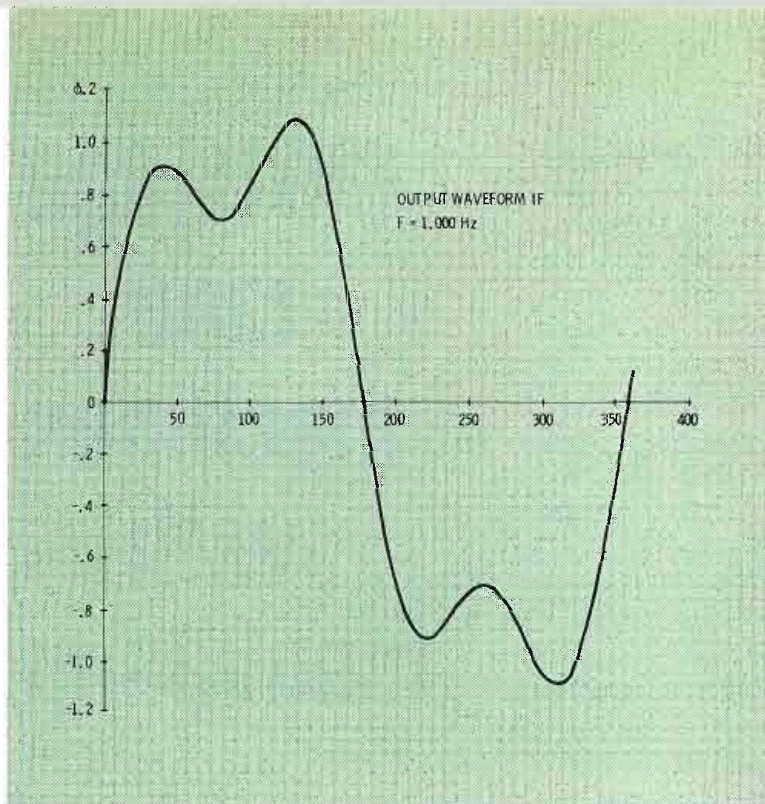


Figure 19

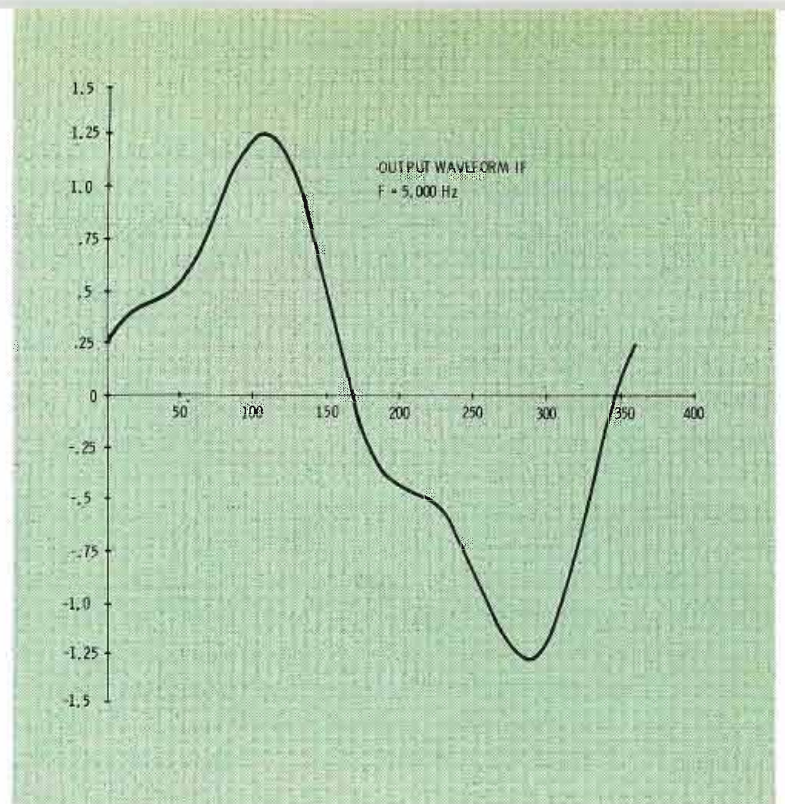


Figure 20

power level increases.

None of the other three systems discussed is new. Each manufacturer has enhanced its system through a well-thought-out execution, but the basic principles have been known and a matter of record

for some time. It has not been until recently, however, that advances in materials, primarily solid-state devices and ceramic power tubes, that these systems were economically advantageous for anyone except the high-power broadcaster.

Acknowledgement

The author wishes to thank J. Kunin, Prof. L. Silva, and F. Zellner for constructive criticism, and D. Holcomb for assistance in the preparation of the computer graphics.

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Can You Feel My Pulse?

(Continued from page 42)

in either case unless the input frequency was below 6 kHz, so, we have to wonder how sensitive the ear is to pulse inputs mixed with other waveforms in music reproduction.

Let's pause for just a moment and take stock of all of the roll-offs that a typical record is likely to encounter from original recording to broadcast. The first limited bandpass link is the microphone. In practice, of course, microphones are chosen to compliment the instrument being recorded and a couple of dozen may be used in a single recording, with several different types utilized.

Assuming that the musical instruments with the highest frequency output are recorded through microphones with 20 kHz response (quite a super microphone by the way), the accumulated high frequency loss of a couple of dB in the mics, a couple in the tape mastering system and a couple in the disc mastering process, all combine to make it very, very difficult to

preserve any acoustic output much past 15 kHz. In fact, we were flat amazed to find any output at all in the 15 to 20 kHz region and suspect that most of what we found was second harmonic distortion resulting from stylus tracing error, which is a function of frequency, velocity, linear speed and minimum playback stylus radius. An elliptical stylus was used for the tests to minimize tracing distortion, but some harmonic output is inevitable, particularly during heavily scored passages.

In any case, it does seem that there is little if anything lost in limiting the audio bandpass to 16 kHz or so. Obviously, it is of the utmost importance that absolutely flat response be maintained up to that limit, but apparently, things really go off the deep end just past the limit of audibility whether you look at the transducers or the ear. So, there's little point to preserving transient response that speakers won't reproduce and ears can't hear, even if recordings could record it.

Amplifiers with better transient response often sound better, but amplifiers with better transient response usually exhibit better sta-

bility because of more careful feedback design and they usually are optimized for minimum harmonic and I.M. distortion as well. Good performance within the audible band seems to be where the biggest gains can be made. We have not, in any of our tests, thus far been able to demonstrate that a loss past 16 kHz is audible in terms of spectral content or pulse response.

Obviously, the transmission system should be as stable as possible and not go wacky when tickled by a square wave or musical transient, but there just does not seem to be a case for attempting to extend the response halfway to infinity for fidelity's sake. At the same time, there does not appear to be too much of a problem with stereo pilot interference unless there is some distortion in the system resulting in harmonic output in the 19 kHz region. It seems, therefore, that both wide and narrow band approaches to stereo generator design are correct in view of what is likely to appear at the audio input terminals.

It is possible that live program material might sound better through a wideband stereo generator, but then again, interference with the

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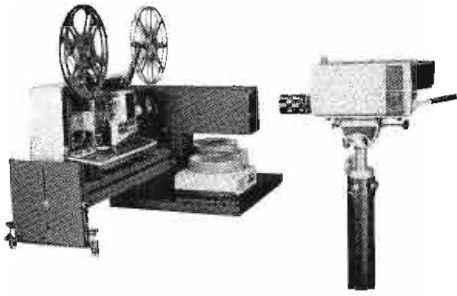
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stereo pilot would be more likely, too. Fortunately or unfortunately, as the case may be, almost all audio broadcasts are pre-recorded, so either system works well. Even if the recorded program did contain fast risetime components, it is unlikely that many listeners will have speaker systems flat to 30 or 40 kHz with which to reproduce our flawless pulses, which the ear probably wouldn't hear any differently than a rounded version anyway!

In conclusion, it seems safe to say that the FM broadcaster still has the opportunity to transmit program material to the listener which will rival the best reproduction he could attain with state of the art phono and tape gear at home. As a matter of fact, the engineer who is willing to invest some time in careful reproducer calibration and distortion reduction can air a more accurate audio replica than the audiophile with little or no test gear could obtain from his own equipment.

Flack against Roadside radio

The NAB has urged the Federal Communications Commission to abandon its plan for a network of roadside radio travelers information stations, saying it's a needless waste of public funds that could result in less information for motorists.

In comments filed with the FCC, the National Association of Broadcasters said there's been no demonstrated need for a service "highly duplicative" of that now provided by broadcasters announcing weather and highway conditions, the availability of food, gasoline and lodging, etc.

It said the installation and maintenance of a government-sponsored system would be "very costly" to taxpayers and would offer service differing little from what commercial broadcasters now provide at no cost to local governments and the motoring public.

NAB noted that the Federal Highway Administration, at NAB's suggestion, has recently granted individual states authority to post highway signs giving the frequencies of local broadcast stations providing needed travel information. This would enable motorists unfamiliar with local stations to "tune in" for local weather and traffic reports.

To document the scope of current radio service, NAB referred to comments filed by the California Broadcasters Association enumerating the extensive services now provided by California radio broadcasters and the many thousands of dollars already invested by them in air and land mobile equipment—let alone the annual costs to the individual stations.

Under FCC's proposal, local and state agencies would be authorized to build and operate facilities using frequencies just above and below those used by broadcast stations for non-commercial announcements for "travelers information." Motorists could switch from their regular stations to the upper or lower ends of their car radio bands for voice-only announcements on highway hazards, weather conditions, service facilities, etc.

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Commission Adopts Rules Requiring Program Recordings

The Commission has adopted rules requiring non-commercial, educational broadcasting stations who receive Federal financial assistance to retain, for a period of 60 days, audio recordings of programs in which issues of public importance are discussed.

The Commission's action completed a rulemaking proceeding instituted following the enactment by Congress of Public Law 93-84, which added Subsection (b) to Section 399 of the Communications Act. Subsection (b) required noncommercial, educational broadcast stations which receive Federal assistance in the form of matching grants, grants or payments, to retain audio recordings of programs that have been broadcast in which issues of public importance are discussed. Copies of such recordings would be made available upon request to members of the public.

The Commission said the key question was whether the requirement for recording and retention was limited to programs containing "controversial issues of public importance" or extended to programs in which "any" issue of public importance was discussed.

It said compliance with Section 399(b) would be "achieved by the recording and retention of those programs which consist of talks, commentaries, discussions, speeches, editorials, political programs, documentaries, forums, panels, roundtables, and similar programs primarily concerning local, national, and international public affairs, where the licensee, on the basis of a subjective, good faith judgment, determines that the program in question involves an issue or issues that are likely to have an impact upon the community at large, society, or its institutions."

The Commission said the required audio recording and requested copies of that recording must be accurate, complete, intelligible and capable of being played on devices commonly available to the general public.

What's In The News?

It Starts With

Direct Current—Page 4

Industry News—Page 8

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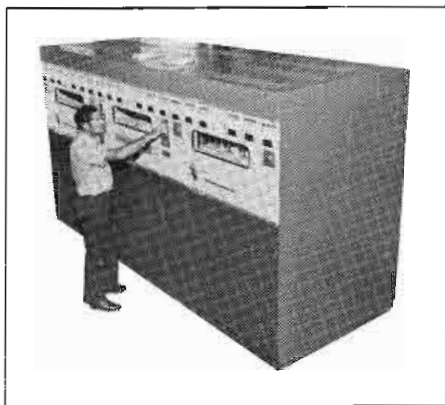
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NAB Convention Plan

The National Association of Broadcasters and the Radio Advertising Bureau will jointly plan and coordinate many radio portions of NAB's 1976 convention.

The convention, to be held March 21-24 in Chicago, will be reformatted to benefit the special needs of radio and television. Most of the program will be split down the middle, with separate radio and TV sessions.

RAB's expanded role in the convention was agreed upon today in a meeting of NAB and RAB top executives and the chairmen of their respective Boards of Directors, as well as the chairman of the RAB Board's Task Force on Radio Identity.

In a joint statement, NAB President Vincent T. Wasilewski and RAB President Miles David said: "Following our successful NAB-RAB Regional Radio Conventions,

we believe coordinated efforts will build the most useful possible, professionalism-oriented radio sessions at the national convention.

"Radio broadcasters want and will get content targeted to their own needs and entirely separate, except in some governmental subject areas, from TV sessions."

Participating in the planning meeting today were: Harold L. Neal, Jr., President ABC Radio and Chairman of RAB's Board; Wilson Wearn, President, Multimedia Broadcasting and Chairman of NAB's Joint Board; Dwight Case, President, RKO Radio and Chairman of RAB's Task Force on Radio Identity; Robert H. Alter, Executive Vice President, RAB; James Hulbert and Burns Nugent, Executive Vice Presidents of NAB; Harold Niven, Vice President for Planning and Development of NAB, in addition to Mr. David and Mr. Wasilewski.

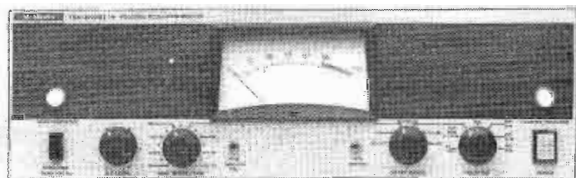
Preliminary steps toward the new convention structure, with its separate sessions for radio and TV, were taken last week in Washington when committees of NAB and RAB met. The NAB committee was chaired by Wilson Wearn. Its members attending the meeting in Washington were: Victor C. Diehm, Chairman, Hazleton Broadcasting Co., Hazleton, Pa.; Harold Krelstein, Chairman, Plough Broadcasting Co., Memphis, Tenn.; Kay Melia, General Manager, KLOE, Goodland, Kansas; Andrew M. Ockershausen, Vice President, Washington Star Stations, Washington, D.C.; Donald A. Thurston, President, WMNB, North Adams, Mass.

Representing RAB were members of its Task Force on Radio Identity, set up by the RAB Board at its October meeting to seek greater separate identity for Radio within broadcasting's industrywide activities.

"Our goals for 1976," Mr. Wasilewski and Mr. David stated, "are to maximize idea and information exchange, without eliminating traditional convention opportunities to meet informally with broadcaster friends and associates."

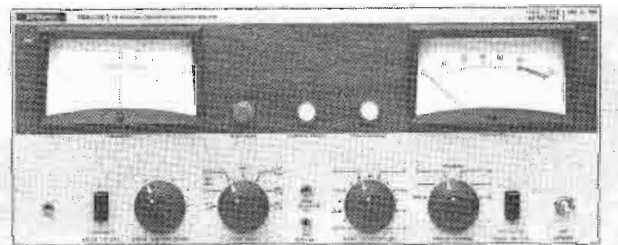
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CABLE engineering



NCTA Preparing Now For April Convention

More than five thousand registration forms went into the mail the week of December 8 to encourage early registration for the National Cable Television Association's 25th annual convention in Dallas, April 4 to 7, 1976.

The first 200 people who return their paid registration materials to NCTA will receive a copy of the best-selling SYLVIA PORTER'S MONEY BOOK.

For its 25th annual convention NCTA has selected a theme of "CATV '76: Our Silver Year."

"The theme combines the nation's Bicentennial celebration with our own 25th anniversary," according to NCTA Convention Chairman Beverly Land of TeleCable Corp., Norfolk, Va.

Land said that the early mailing of registration forms is intended to make CATV industry members more aware of the significance of this Silver Anniversary Convention.

"This will be NCTA's first convention in Dallas, and we want to make sure everyone has plenty of time to plan to attend," Land said. "That is the main reason why we are sending our first mailing out about six weeks earlier than usual."

Subsequent mailings are planned for early February and March.

NCTA also unveiled the logo which will be displayed on most printed forms used for the convention. A stylized "CATV '76" emblem—including a single silver star and four horizontal strips—is symbolic of the NCTA convention theme, the host state and the Bicentennial.

"Copies of the logo have been distributed to all NCTA associate members," Land said. "We hope that many of these suppliers will begin using the logo in their industry advertisements during the coming months."

Program plans for NCTA's 25th annual convention are still being completed. The emphasis will be on system management and operations and on major federal, state and local regulations affecting the industry. Key subjects will include pay cable, political cablecasting, and financial administration.

Technical and management papers, solicited last September, are currently being reviewed. A list of speakers on both the technical and management programs will be announced early next year. Invitations have already been submitted to several top Washington officials whose decisions affect CATV operations, Land said.

In connection with this year's convention, NCTA has planned a post-convention tour to Mexico City for April 7-11. This is the first post-convention tour in ten years and includes accommodations at the Maria Isabel Hotel in Mexico City and tours of the area. Details about the trip are included with NCTA registration materials.

Access Awards

Awards for access programming and new cable services in addition to the traditional local origination programming category will be made in 1976, the National Cable Television Association announced.

The two new categories have been established for the 1976 NCTA Cable Services Awards Competition.

"The annual NCTA programming competition has been redesigned to accommodate the industry's expanded concept of cablecasting and to encourage further experimentation and innovation in the delivery of services via cable television," Barry Lemieux, Education/Community Services Commit-

tee chairman said in announcing the competition.

All cable systems—even those which do not currently cablecast programs—are eligible to submit entries in the New Services Competition, Lemieux said. He cited data services, consumer information channels, and addressable specialized programs as examples of the type of entries suitable for the New Services Competition.

Programs in the local origination competition are defined as shows which are conceived, designed and produced by a CATV system.

Access programs include shows conceived and produced by non-CATV industry personnel, whether or not the cable system production facilities are used to record the program. Access programming includes material presented on designated public, educational and access channels.

New services refer to entries demonstrating pioneering uses of cable channels; entries may be segments of programs, but the emphasis will be placed on the practical application of new services and contributions to the community. Appropriate entries in this category might include taped documentation of cooperative development of access facilities and training; of closed circuit information systems to serve specialized community needs; of cablecasting of specialized data; or of cooperation with city emergencies.

The Cable Services Awards, which replace NCTA's six-year-old Cable-casting Competition, will be presented at the 25th Annual NCTA convention in Dallas, Texas, April 4-7, 1976.

All entries will be reviewed by a panel of independent judges. Programs must have been produced after January 31, 1975, and must be

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submitted to NCTA by January 31, 1976. Each system may enter a total of up to five programs: two each in the local origination and access categories and one example of new services. Programs or program segments of less than five minutes each should be submitted;

Turner Communications Orders satellite station

Turner Communications Corporation has ordered an earth satellite send and receive station to relay the programs of WRET (TV) Charlotte, N.C. to cable TV systems in the United States. The Scientific-Atlanta Video Earth Terminal and transmitter will be aimed at a satellite-transponder over the equator and will beam back the station's programming to cable systems that have access to a reflector-receiver.

Although TV networks and some stations have used the orbiting satellites on occasion to bring programming across the country and over oceans, this should mark the first time that an individual station will put their full program schedule on a satellite and make it available nationwide.

WRET is an independent TV station operating on Channel 36 from Charlotte and carries extensive movie and sports programming. The station is expected to be formatted to operate 24 hours a day and carry more regional sports programming with special emphasis on Atlanta Braves National League Baseball, Atlanta Flames National Hockey League contests and Atlanta Hawks NBA basketball games.

Turner Communications Corporation's Board Chairman R. E. "Ted" Turner first announced plans to distribute programming from either Turner station WTCG, Atlanta or WRET, Charlotte at a meeting of the Alabama Cable Television Association in Birmingham on October 15.

A station representative told Mississippi and Virginia CATV operators at their November meetings of the signal distribution plan and quoted a tentative cost to systems of ten cents per cable home

all entries must be submitted on cassette in either a 3/4-inch or an EIAJ standard 1/2-inch format.

A complete list of entry regulations is available from Lydia Neumann, Cablecasting Coordinator, NCTA, 918 16th St., N.W., Washington, D.C. 20006.

per month to help defray the anticipated one million dollar yearly rental of a transponder continuous channel on an earth satellite. If the FCC relaxes "leapfrogging" rules governing priority on importing distant stations, then Turner's WTCG, Channel 17 Atlanta will be the station delivered to the satellite for re-transmission.

Scientific-Atlanta will manufacture the Series 8000 Video Transmit/Receive Earth Station and associated equipment. A 10 meter/33' diameter dish-shaped reflector is the heart of the station which operates in the 5925-6424 MHz band for transmission and 3700-4200 MHz frequencies to receive.

In making the announcement Turner said, "Our stations in Atlanta and Charlotte have a large following in 8 states and there is no reason why we shouldn't use space-age technology to make our 24 hour programming and sports telecasts available beyond our signal areas and the patterns of practical microwave pickup. Right now our two stations are available on more than 150 CATV systems serving 550,000 cable homes," Turner added. Trade sources indicate 50-70 satellite receiver stations for TV pickup are in the planning stage or active construction.

The company's earth transmit and receive station could be operating as early as May, 1976 in time for Braves baseball telecasts.

Turner Communications Corporation is based in Atlanta and owns, in addition to the two TV stations, radio stations WGOW-AM and WYNQ-FM in Chattanooga, Tennessee and Turner Marketing, involved in direct marketing on television.

Three-point Program for Small systems

Deregulation of small cable TV systems and parity of CATV and Master Antenna Television regulation should be part of a proposed redefinition of cable TV, according to the National Cable Television Association.

NCTA outlined a three-point program which, it said, would accomplish these goals of deregulation and parity of delivery systems which provide similar services.

(1) All cable operations delivering broadcast signals for a fee—including multi-unit home master antenna systems—should be defined as "CATV systems" for regulatory purposes.

(2) Very small CATV systems (fewer than 1,000 homes) should be exempted from virtually all FCC regulation, and slightly larger systems (up to 3,500 subscribers) should be placed under light regulation.

(3) Where a small system (such as an apartment service) operates in the same community as a larger system (e.g. a full-service house-to-house system), both services should be placed under the same rules to create a "parity of regulation."

"Implementation of these three steps," NCTA said, "will result in an even-handed regulatory posture which will be fair not only for the private entities involved, but for the public as well."

In comments on the Federal Communications Commission's proposals to redefine CATV systems, NCTA outlined more than a dozen specific aspects of FCC regulations which affect small and reception-only CATV systems. NCTA suggested ways to simplify the regulations governing small system operations.

Master Antenna TV regulations should also be revised, NCTA said, to create a parity among various types of transmission and retransmission services which provide the same basic services to apartments, hotels, trailer parks and other multi-family units.

PEOPLE IN THE NEWS

In the news this time we find **William H. Butler** the new president and chief executive officer of Commercial Electronics Inc. (CEI). Butler had been a consultant to CEI and previously was a VP of the Business Equipment Division of Rockwell International....He also was a founder of CMX Systems....

Albert E. Audick, former Commander of the American Forces Radio and Television Service, is now the Washington area Liaison manager for International Video Corporation.... **Ken Schwenk**, Director of Marketing for Telemet, has announced the appointment of two new regional sales managers: **Robert Daines** in the West, and **Lew Parson** in the Southeast. Daines formerly was with Time & Frequency Technology....

Juan C. Gregorio has joined the Engineering Department of McMartin Industries, Inc....He formerly worked with Sparta and CCA....Meanwhile, at Electro-Voice, **Robert D. Pabst** has been appointed executive VP and General Manager....At Ampex, **Frank Rush** has been appointed senior field sales engineer for broadcast video sales....

In Denver, **Robert Richardson** and **James Duca** (formerly with Computer Image Corp.) have formed their own company—Duca-Richardson. The company will design and manufacture production, master control, editing and routing systems for television....

Broadcast Engineering's Video Editor, **Joe Roizen**, was invited by the Royal Television Society of Great Britain to be their guest speaker at the Royal Institution in London. President of Telegen (a consulting firm) Roizen has received two other awards from the Society: the Wireless World Premium and the EMI Premium....**Joseph Dillard**, manager of advanced systems technology for the Westinghouse power systems company, has been elected president of the IEEE. The IEEE, with 170,000 members, is the world's largest professional engineering society....

Rick Schlack has been appointed Eastern Regional Manager for Cablewave Systems....Infonics has appointed **Ed Bethune** as Vice President for Engineering....

George Causey is the new Chief Engineer for the Donrey Media Group's KGNS-TV, Laredo, Texas. He formerly was CE for WAPT and WRBT....

(Continued on page 58)

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You know that horrible feeling. . . .when your master sync generator has drifted out of spec. . . .or has just failed.

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There's only one NTSC color sync generator that has that kind of long-term stability which retails for \$700; it's the new VACC model 100. Nothing else even comes close. There's more we can tell. Circle the bingo card and mail today, or call (303)-667-3301.

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Manufacturer's of:
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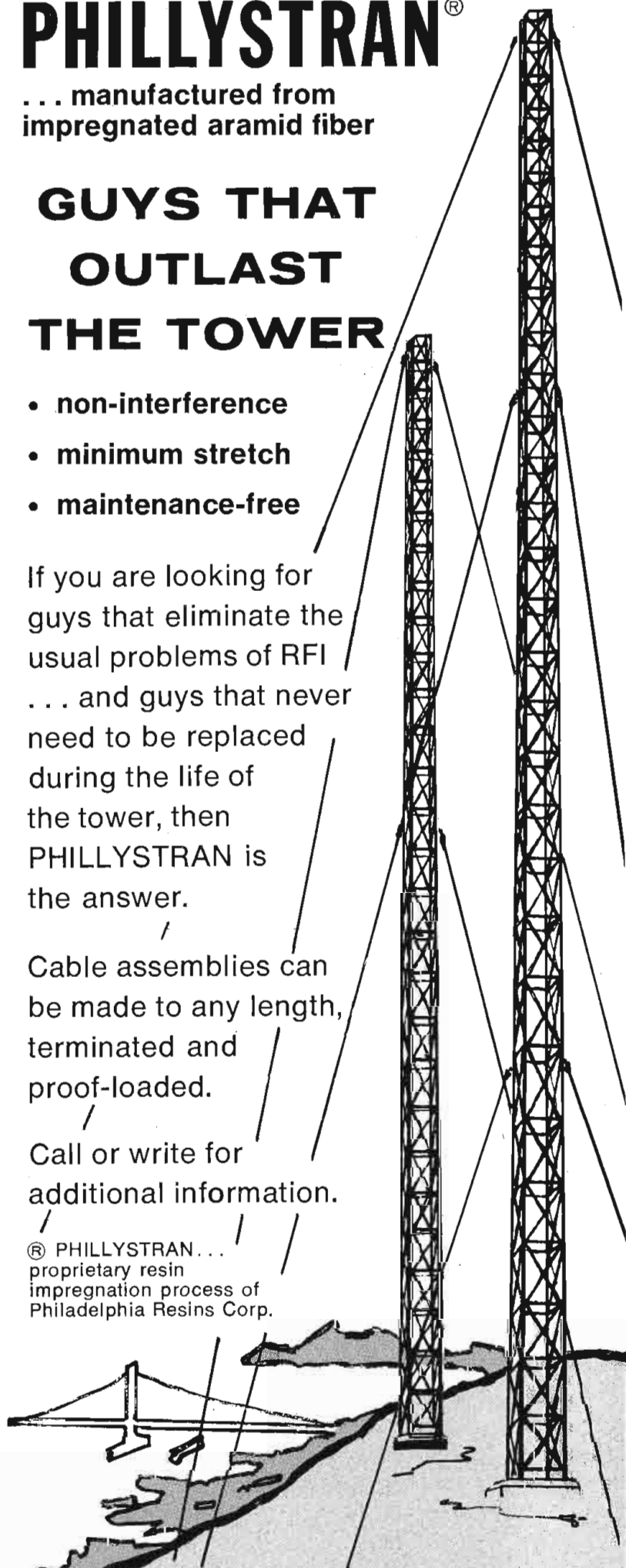
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People In the News

(Continued from page 57)

Ray Scott, former voice of NFL football on CBS and former Sports Director for Hughes TV Network, has been named Sports Director of Continental Communications, Inc., a national cable TV net... **Thomas K. Paine** is appointed Director of Radio for Greater Toledo Educational TV Foundation... **William Sanders** has been named VP and GM of the Mullins and Marion Broadcasting Company (WJAY and WCIG) in Mullins, S.C. He replaces **James Ramsey** who is now VP and GM at WWDR-AM-FM.

Sales manager shifts continue as Cetec Audio appoints **Robert Slutske** National Sales Manager of consoles and audio components... Ampex International names **Bob van der Leeden** manager of Ampex's video and audio systems for Europe, Africa and Middle East... **Scotty Wallace** joins Switchcraft as their Eastern Regional Sales Manager, and **Wally Wheaton** has been promoted to position of Midwest Regional Sales Manager.

Wayne J. Lee rejoins IVC as VP, Operations, and Robert Riddle has been named Director of Marketing ... **Samuel Jones** has been promoted to post of Sales Manager for Robins-Fairchild Div... Orban/Broadcast OPTIMOD 8000 will be seeing **Eric Small** as exclusive marketing agent... and **Ken Gangwer** returns to Davis Manufacturing in expanded role as general manager of marketing.

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BROADCAST ENGINEERING

TECHNICAL DATA

A new eight-page catalog that gives design information on more than 170 different types of opto-electronic devices is available free from **Raytheon Company**.

The catalog covers both Raysistor optically coupled isolators and photoconductive cells, and contains operating parameters, dimensional drawings, and application notes. Copies may be obtained by writing Raytheon Company, Industrial Components Operation, 465 Centre Street, Quincy, Mass. 02169.

The newly-published 72-page **Cherry C-75** catalog is offered by **Cherry Electrical Products Corporation**. The catalog is expanded and updated to offer complete listings, engineering drawings, operating characteristics and technical data on the complete Cherry switches and keyboards line.

Included in the catalog are Snap-Action Switches, Leverwheel and Thumbwheel Switches, Matrix Selector Switches, Keyboards and Keyboard Switches. Other information and data on the Cherry plant facilities, equipment, in-house manufacturing capabilities and worldwide sales offices are pictured and described.

For a copy of the new Catalog C-75, write: Cherry Electrical Products Corporation, P.O. Box 718, Waukegan, Illinois 60085.

GTE Lenkurt Incorporated has issued a Microwave Radio Products booklet which describes the company's broad line of heterodyne and baseband microwave radio systems for the transmission of video, voice and data.

The illustrated booklet provides a comprehensive description of the type 70F1, 75 and 78 microwave radio systems, and explains the company's equipment designations. Also included are basic information on FCC and CCIR frequency bands, and on fundamentals of heterodyne and baseband repeater operation.

The 16-page booklet is divided into sections covering each radio product, including FCC data and complete technical summaries. Descriptions of such auxiliary microwave radio subsystems as alarm, order wire and multiline switching assemblies are also included.

For a copy of the Microwave Radio Products booklet, write GTE Lenkurt Incorporated, Dept. C720, 1105 County Road, San Carlos, CA. 94070.

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Offering superior quality and lowest maintenance, our products provide the greatest value

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Studio Tape Exchange Inc.



QUALITY & SERVICE AT THE LOWEST PRICES

For More Details Circle (39) on Reply Card

For More Details Circle (40) on Reply Card



Introducing the dawn of a new era. Flicker-free HMI daylight.

Our new flicker-free Quartzcolor daylight spotlights are now available in 575W, 1200W, 2500W and 4000W models. Each unit is complete with lamp, cable and the special flicker-free ballast.

What's more, Quartzcolor radiates very little heat, uses power very sparingly (85 - 102 lumens per watt), and produces light like tomorrow's dawn.

The output efficiency of our 2500W model at 5600° K is equal to that of a 10,000W incandescent unit corrected to daylight. And that's a lot of light. In a system that doesn't weigh a ton or cost a fortune to operate.

That's Ianiro Quartzcolor. The dawn of a new era in lighting.

For details, write Ed Gallagher, National Director of Television/Motion Picture Sales.

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STRAND CENTURY INC
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NAB agrees: Billing Rule is needed

The National Association of Broadcasters has agreed that the Federal Communications Commission should adopt its proposed rule on fraudulent billing, with some modification.

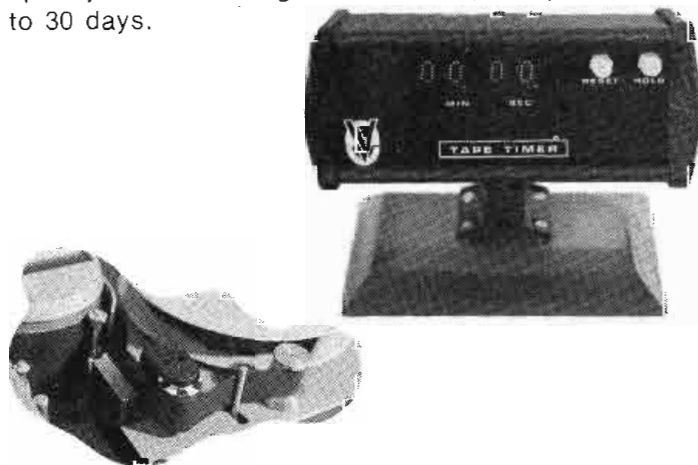
The rule would hold a licensee liable for failing to exercise reasonable diligence to see that its agents and employees do not issue documents containing false information concerning the amount charged for advertising, misrepresenting the nature, quality or quantity of such advertising or other pertinent information. It also would hold the licensee liable for issuing a document to a program supplier specifying erroneous information concerning the broadcast of program matter, including commercial matter.

NAB also recommended that an additional provision be included that "Nothing in this rule should be interpreted to place any limitation on the licensee's discretion to delete any material that it believes to be indecent, profane, obscene, in bad taste, or otherwise contrary to the public interest." It further recommended that the Commission's policies be clarified to insure that licensees do not have to disclose editorial deletions based on the above quoted language in the absence of a specific contractual provision calling for such disclosures.

NOW DIGITAL - IVC

YES—the leader in digital tape timing devices now introduces another **FIRST**. Replace the old, poor-resolution, mechanical counter in your IVC transport with the **NEW VAMCO Model 759 DIGITAL TAPE TIMER**.

Timer mounts in minutes with two attaching screws. Display format is in minutes and seconds coming in two versions: rack-mounted or desk-mounted. Please specify when ordering. Price: \$595., complete; stock to 30 days.



VAMCO ENGINEERING
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leadership through creativity in design

For More Details Circle (37) on Reply Card

BROADCAST ENGINEERING

NEW PRODUCTS

Portable VTR Time Cable Generator

A time code generator for use in portable VTR equipment has recently been developed by the **Optek Company** of Anaheim, California, according to Optek president, John S. Baumann. The unit, which should increase the efficiency and economy of Electronic News Gathering (ENG) operations, is a mere handful in size. "It had to be," explained Baumann. "The Optek Time Code Generator had to fit into the RF modulator plug of the Sony VO3800 VTR, the standard pack in ENG today. That's **not** a very big hole."

The Optek Time Code Generator affixes the standard SMPTE indexing code to the video tape during operation of the VTR. An 8-segment light emitting diode display, located on the face of the Generator, reads out the hours, minutes, seconds and frame

numbers. Convenient Reset and Load buttons complete this compact package.

An hour of tape shot in the field has meant an hour of edit-coding back at the studio. The Optek Time Code Generator helps eliminate this costly, time-consuming procedure. This step forward should help convince ENG doubters of the economies inherent in this method of news gathering.

The Optek Time Code Generator is distributed exclusively, along with other Optek products, by Broadcast Communication Devices.

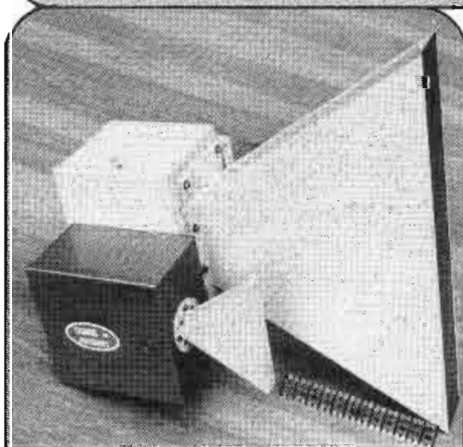
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Antenna Current Instruments

Delta Electronics, Inc. announces the introduction of the new Models TCA and TCA-XM radio frequency measuring instruments designed to

NOW 7GHz FOR **ENG**

The New Model 70 QP 1 is a Quad Polarized Receive Antenna System for Remote TV Broadcasting in the 7GHz Band.



2 GHz & 7 GHz Antenna Elements side by side

FEATURES OF THE NEW MODEL 70 QP 1, 7GHz SYSTEM:

- 70% smaller than the NURAD 20 QP 1, 2 GHz equipment
- Provides identical electrical performance to the NURAD 20 QP 1, 4 element system

CONTACT NURAD FOR COMPLETE DETAILS

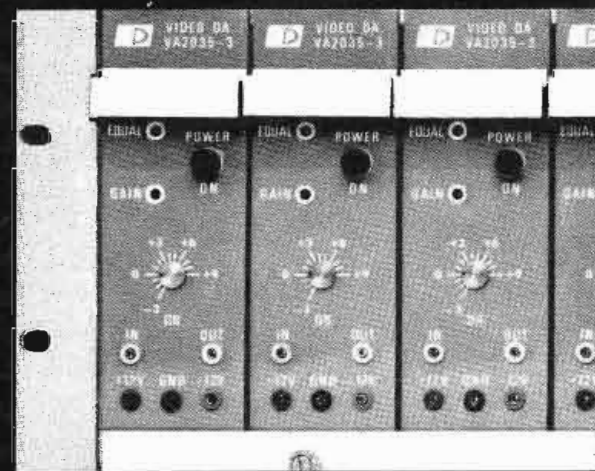
NURAD, INC.

2165 Druid Park Drive
Baltimore, Md. 21211

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301-462-1700

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Specifications

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WRC, WIIC, KENS, WDBO,
KNXT, WGBH, WSM,
WNET, WEWS



For More Details Circle (46) on Reply Card

New Products

measure currents in broadcast antenna systems. These instruments are intended for applications where conventional thermocouple meters are ordinarily used. The TCA and TCA-XM are substantially more accurate for all operating conditions, and they meet FCC requirements of 2% accuracy. Calibration at broadcast frequencies assures that there are no errors due to frequency effects when using the instruments.

Antenna current samples are taken from the current carrying conductor by a toroidal current transformer that requires no interruption of the RF circuit. An integral lightning protection switch on the indicator eliminates the requirement for a meter switch in the RF circuit. Current samples are transported to a 50 ohm terminating resistor by a six foot 50 ohm coaxial cable. The voltage developed across the terminating resistor is rectified by a special temperature compensated silicon diode rectifier circuit and displayed on a mirror scale taut band indicating instrument. The rectifier circuit and indicating instrument are housed in a shielded enclosure for the TCA models. For the TCA-XM models, the rectifier circuit is housed in a small shielded enclosure, and the indicating instrument is separate for panel mounting.

These new instruments are available in 5 ranges up to 80 amperes.

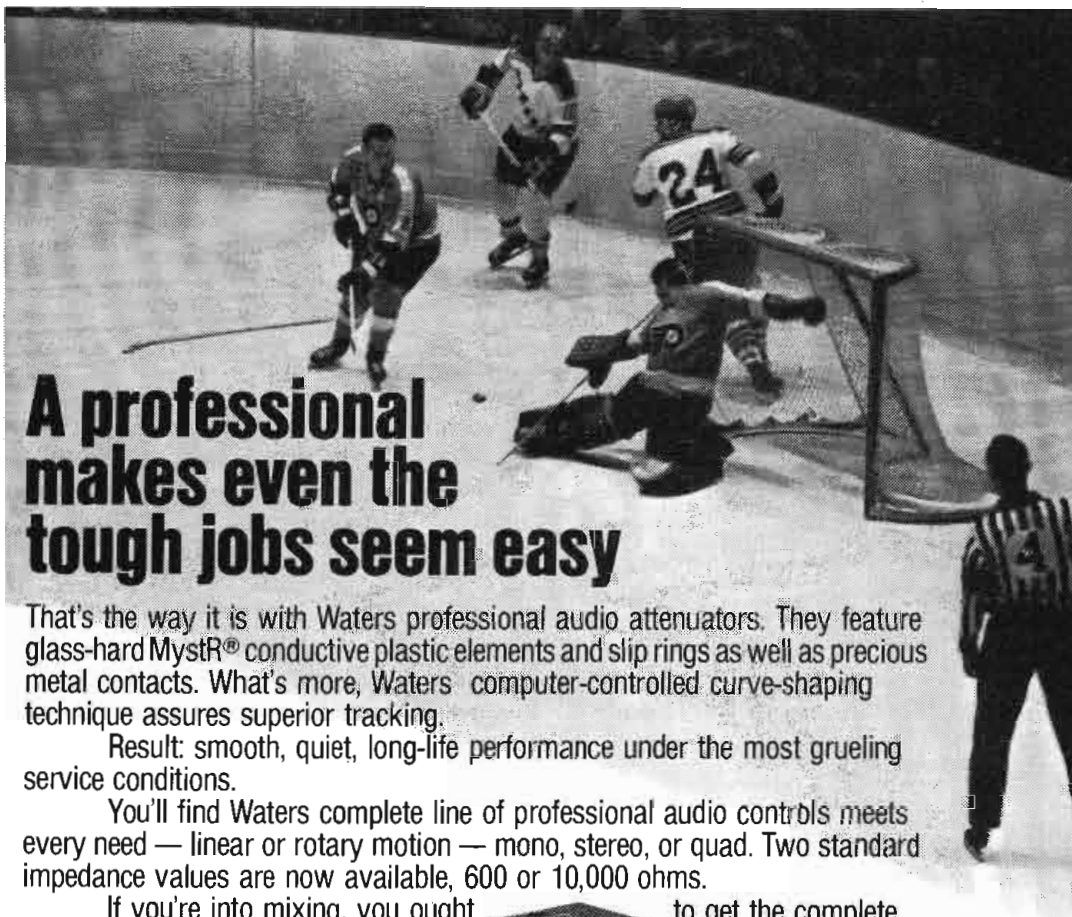
For More Details Circle (91) on Reply Card

Multiple Cartridge Player

A new instant play multiple cartridge machine is announced by **Systems Marketing Corporation (SMC)**. Called the "CAROSTAT," this newest addition is the result of combining time-proven techniques with the latest solid-state circuitry.

The CAROSTAT has only three moving parts for any cart. It plays instantly when called for—all carts stand ready, each with its individual head nest. There are no moving heads. Carts are played in a vertical plane with the path of tape travel from the bottom edge up past the head.

The CAROSTAT has a rugged cast aluminum frame and features



A professional makes even the toughest jobs seem easy

That's the way it is with Waters professional audio attenuators. They feature glass-hard **MystR**® conductive plastic elements and slip rings as well as precious metal contacts. What's more, Waters computer-controlled curve-shaping technique assures superior tracking.

Result: smooth, quiet, long-life performance under the most grueling service conditions.

You'll find Waters complete line of professional audio controls meets every need — linear or rotary motion — mono, stereo, or quad. Two standard impedance values are now available, 600 or 10,000 ohms.

If you're into mixing, you ought to get the complete story on Waters audio controls. Write today, or call us at 617-358-2777.

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Jack Hansen, WFMD, Frederick, Md.

Directional Antenna Monitoring Simplified

With the Model AM-19D (210) Digital Antenna Monitor, accuracy is assured and operating cost savings are realized. Now antenna phase angle and loop current ratio readings can be taken by lesser grade operators. The easy-to-read numeric readout provides exact readings and eliminates interpretation errors common with conventional meters. Resolution is 0.1° for phase angle and 0.1% for current ratio.

Contact us now on this and other FCC type approved Antenna Monitors.

POTOMAC INSTRUMENTS

932 PHILADELPHIA AVE.
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For More Details Circle (48) on Reply Card

a non-magnetic capstan shaft of stainless steel, all solid-state electronics. It is available in a 12-tray or a 24-tray rack mount model. Both types are available in stereo or mono.

For More Details Circle (92) on Reply Card

Digital Timers

McCurdy has developed a digital stop-watch and a digital clock that apply to communications uses. The SA137 digital stop-watch and the SA138 digital clock are studio accessories designed for desk or in-console mounting.

State-of-the-art MOS and TTL devices are used throughout, with proven Hewlett-Packard LED displays as readouts.

A full control complement is provided on both devices. The clock has set/run switching as well as fast minutes and seconds advance.

The stopwatch controls include start, stop, clear, load, pre-set thumbwheels, up/down (switch), and re-set/start (from machine start buttons). All controls are remote from the unit. That's right, a control input is provided to allow use with external machine start

controls. This action is repeated each time a machine (cartridge or turntable, for example) is started.

For More Details Circle (93) on Reply Card

In-Line Chroma Keyer

The International Nuclear Model TCK2 In-Line Chroma Keyer is designed to accept a 1 volt p-p composite NTSC color video input signal into a high impedance bridging input. It separates from the composite color signal any desired color and produces a Keying output of 1 volt p-p into a 75 ohm cable when color saturation is 75% or more. There is also provided through a feedback amplifier a video output, identical to the input signal, for use elsewhere in the studio.

The TCK2 may be used with any production switcher that accepts an external keying signal. The most advantageous feature of this instrument is that it requires no retiming of any of the other video signals. This is accomplished by accurately adding to the inherent delay in the comb filter such that the overall delay between the video signal and

Accurate Field Strength Measurements Can Be Easy

With the Model FIM-21, electromagnetic field strengths can be measured to within 2% across the entire 535 to 1605 KHz AM band. And to intensity levels as low as $10 \mu\text{V}/\text{m}$. Its integral shielded antenna in the cover, front panel speaker, large illuminated mirrored meter, and ganged oscillator/receiver tuning, make it easy to operate in the field. An optional telescoping stand adds convenience. It's also a versatile instrument — use it as a tuned voltmeter for RF bridge measurements.

Contact us now for complete details on our line of field strength meters.



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Cameraman's Headset... Keeps the crew in touch

A professional TV Cameraman's Headset series specifically designed to interface with existing Western Electric circuits. Single side unit receives intercom only. Dual side, bin-aural unit receives intercom and monitors program. Carbon boom mike with optional push-to-talk switch. Designed for comfort and rugged dependability in every day use. Keeps the crew in touch—in or out of the studio. For complete information please write:



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For More Details Circle (50) on Reply Card

New Products

the keying output is exactly equal to one horizontal line, hence appearing as a single unit vertical shift. It has been determined that this vertical shift is not apparent on high quality studio monitors, and thus is justified in producing a reliable, inexpensive, and simply installed chroma keyer.

The TCK2 is mounted in a 19" rack with a height of 1 $\frac{3}{4}$ ". A remote control panel if furnished which contains the hue selector and positive clip controls, as well as a power indicator. The remote control panel may be mounted as far away as 100 feet from the main unit.

For More Details Circle (94) on Reply Card

Dual Cue Controller

Designed for use with EECO's BE450 wide range synchronizer, the Dual Cue Controller - BE460 - now includes a "Chase" operating mode at no increase in price.

Incorporating Intel's 4004 four-bit microprocessor, the new operating feature was made possible by the addition of one PROM and expanding the software program. The "Chase" feature allows the user to select either one of two tape transports to chase the other in a "Follow-the-leader" mode during fast forward and rewind operations. This feature is in addition to the original capability of cueing two transports (Master and Slave) automatically to any selected point—individually or simultaneously. Also a code verification routine has been added to improve overall system operations.

Update kits incorporating these features consisting of plug-in program PROMS are available for field modification.

For More Details Circle (95) on Reply Card

Recorder For Eight-Track Masters

The Audio/Tek Model 511 eight-track, one-inch recorder is specifically designed to prepare duplicator work masters.

The Model 511 is comprised of two single channel reproduce/record amplifiers, a compact 7 1/2-15ips transport, and an eight-track, two channel shifting head assembly.

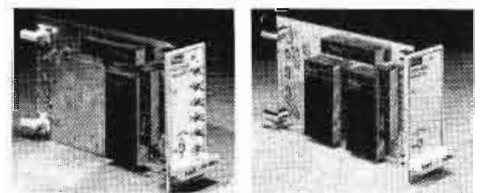
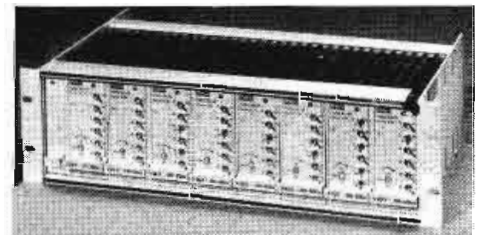
The shifting head assembly on the Model 511 eliminates the need to use a conventional eight-track studio recorder for duplicator work master

Unique approach to cartridge tape equipment.

here
Beucart is coming.
See the revolutionary Beucart on page 13.

For More Details Circle (51) on Reply Card

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Features

- * Range 10-2120ns
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- * Available with or without switches
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Television Equipment Associates, Inc.

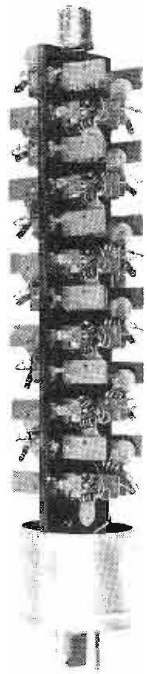
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- Just plug in WILKINSON Silicon Rectifiers... no re-wiring is necessary.
- Only WILKINSON Silicon Rectifiers are fully guaranteed and have a safety margin well in excess of tube rating.

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701 Chestnut St., Trainer, Pa. 19013
TELEPHONE (215) 497-5100

For More Details Circle (53) on Reply Card

production.

The two channel operation of the Model 511 minimizes service and production cost. The Model 511 is also more compact than most conventional eight-track recorders. The solid state circuitry and tape transport are housed in a durable attractive case. For user convenience the Model 511 is available in a table top cabinet or a floor console unit.

For More Details Circle (96) on Reply Card

Remote TV Antenna

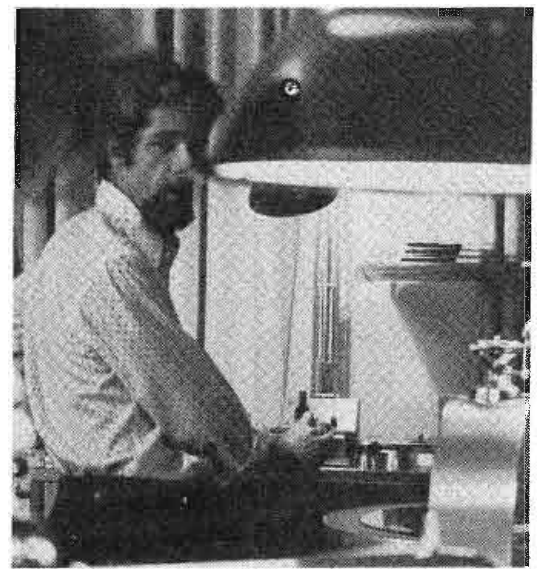
Nurad, Incorporated, announces a major addition to its product line of antenna systems for remote TV pick-up applications. The new system, designated Model 70 QP1, is a 7 GHz counterpart to the 2 GHz Model 20 QP1 Quad Polarized Antenna System that is now being operated by TV stations in over thirty major metropolitan areas.

TV broadcasters now have the option of Quad Polarized systems for either the 2GHz or 7 GHz band, a significant advantage in the light of congestion of frequencies so often experienced in the metropolitan areas.

The 70 QP1 is the functional and electrical equivalent of the 20 QP and has the added advantage of being 70% smaller. (See photo.) It consists of an omnidirectional array of four "Quad Polarized" antenna elements with remote selection of direction and polarization. It is designed to work with existing microwave receivers at a central receiving location. For the mobile or remote location a circularly polarized parabolic antenna, Nurad Model 70 CR2, is used with the remote transmitter.

For unobstructed microwave path operations the antenna system will reject all reflected or multipath signals by utilizing the antenna in its circularly polarized mode. For use in obstructed path operations the antennas will only receive reflected signals and reject other direct signals by the proper selection of polarization. Another important advantage is that a Microwave Survey of the remote installation is completely eliminated. The total time for set up of a remote microwave site can be reduced to minutes for those time critical requirements such as live news coverage. The omni-directional capability of the 70 QP-1 system also eliminates the need of rotational components or mechanical adjustments.

For More Details Circle (97) on Reply Card



Top Disc Cutting Studios, like The Mastering Lab, rely on Stanton's 681- Calibration Standard in their Operations.

Not everyone who *plays* records needs the Stanton Calibration Standard cartridge, but everyone who *makes* records does!

At The Mastering Lab, one of the world's leading independent disc mastering facilities, the Stanton 681 Triple-E is the measuring standard which determines whether a "cut" survives or perishes into oblivion.

A recording lathe operator needs the most accurate playback possible, and his constant comparing of lacquer discs to their original source enables him to objectively select the most faithful cartridge. No amount of laboratory testing can reveal true musical accuracy. This accuracy is why the Stanton 681 Series is the choice of leading studios.

When Mike Reese, principal disc cutter at The Mastering Lab, plays back test cuts, he is checking the calibration of the cutting channel, the cutter head, cutting stylus, and the lacquer disc. The most stringent test of all, the evaluation of direct to disc recordings, requires an absolutely reliable playback cartridge... the 681 Triple-E.

All Stanton Calibration Standard cartridges are guaranteed to meet specification within exacting limits. Their warranty, an individual calibration test result, comes packed with each unit. For the technological needs of the recording and broadcast industries, and for the fullest enjoyment of home entertainment, you can rely on the professional quality of Stanton products.

For further information write
Stanton Magnetics, Inc., Terminal Drive,
Plainview, N.Y. 11803



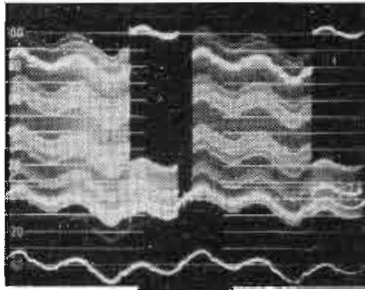
STANTON

All Stanton cartridges are designed for use with all two and four-channel matrix derived compatible systems.
For More Details Circle (54) on Reply Card

Desktop Titler

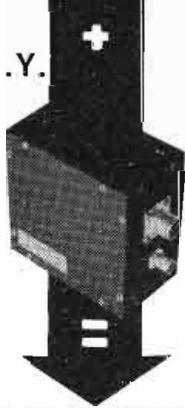
The first in a line of desktop television title generators has been announced by **Knox, Ltd.** Dubbed the K128, the titler produces pages of information electronically for superimposing on TV pictures in broadcast, CATV, and CCTV applications. A built-in keyboard enters standard typewriter alphanumeric characters and symbols as well as lower case and foreign language letters, math and en-

STOP GROUND-LOOP HUM!

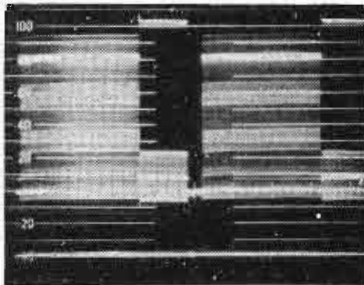


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NEW!



NEW!



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HSC 1

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The **Potomac Instruments SD-31** synthesizer-detector is a high output signal generator of precisely known frequency combined with a sensitive, selective detector for RF bridge measurements of AM antenna impedance. This new instrument is packaged in a single lightweight battery-powered unit.

A frequency synthesizer determines the generator frequency which can be adjusted in 0.5 kHz steps on a front panel control that takes you from 100 kHz to 1999.5 kHz. Accuracy is the same as that of the internal crystal reference

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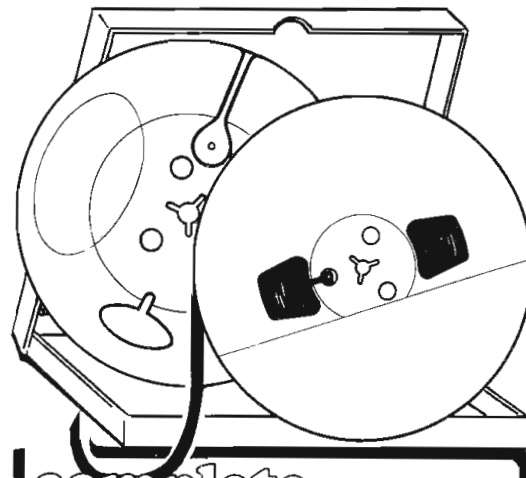
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SBE

(Continued from page 14)

Chapter 16: Seattle, Wash.

Chapter 16 gathered at the Norselander Restaurant for a noon meeting to hear Ken Reichel of Shure Bros. speak on the subject of the proper usage of microphones.

In December, Mr. Joseph Wu, founder and president of Time and Frequency Technology, spoke on

what TFT has designed to comply with the new Emergency Broadcast System Rule changes.

January's meeting will welcome an RCA representative to speak on circular polarization of TV antennas.

Bob Ingalls (Chairman), 5441-187th Avenue, N.E., Redmond, Washington, 98052, (206) 543-7774.

Chapter 17: Minneapolis/St. Paul

Chapter 17 met November 19 at

Sound 80, Inc., where the engineering staff held a demonstration of the MCI 1/4" tape recorder. This meeting also gave members an opportunity to tour the facility. In December, the Chapter's meeting was addressed by Mr. Harold Allen, Engineer in Charge of the FCC District Office.

In January, members will meet at Wahl & Wahl, Inc., a local vendor, where factory representatives from the Phillips Broadcast Corp. will show their Minicam, and the Ampex staff will feature their time base corrector.

Lance Raygor (Chairman), Route 1, Box 337, Chisago City, Minnesota 55013, (612) 373-4807.

Chapter 20: Pittsburgh, Pa.

Chapter 20 holds noon meetings regularly and in November saw a special-feature video tape of the "Miracle on Second Avenue," an account of Bell Telephone's replacement of a portion of the New York phone system following a fire which destroyed a large part of one of their buildings.

Discussion of this year's annual Convention was part of the business meeting and—would you believe—they even covered plans for the 1976 convention!

Jim Hurley (Chairman), WTAE-TV, 400 Ardmore Blvd., Pittsburgh, Pa. 15230, (412) 242-4300.

Chapter 26: Chicago, Illinois

Members of Chapter 26 went to the Tektronix Service Center in Rolling Meadows, Illinois, on November 11. Mr. Craig Latham, service center supervisor, spoke on service procedures and demonstrated the washing and calibration of electronic equipment. Host Bob Seaburg, a Tektronix sales engineer, arranged for refreshments and a tour of the new facility. A unanimous re-election of officers concluded the meeting.

The December "special" attracted a number of people to the Federal Aviation Control Center in

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Aurora, Illinois. The tour was repeated on a second evening to give everyone an opportunity to see this important center.

Early plans for the beginning of 1976 include visits to NBC to see radio automation, Sears Tower for another E.N.G. session, AT&T, ABC to see the reconstructed layout, WTTW for audio, and much more.

Bob Churchill (Chairman), SBE, 121 W. Wacker Drive, Room 540, Chicago, Illinois 60601, (312) 729-5215.

Chapter 28: Milwaukee, Wis.

In October, Chapter 28 held its election of officers and chose Mr. Dave Dzurick as chapter chairman, Jan Pirtzl vice-chairman, Tod Boettcher secretary, and Nels Harvey treasurer. After the formal business meeting, the evening's speaker was introduced to speak on AM stereo and the RCA Minicam.

"Goodbye, Rotary Switch" was the topic of the evening in November when members met at the Wisconsin Telephone Company. This session featured a detailed look at the latest in telephone equipment and the "electronic switching system."

Dave Dzurick (Chairman), WRJM, 4201 Victory Avenue, Racine, Wisconsin 53405, (414) 634-3311.

Chapter 32: Tucson, Arizona

Chapter 32 met November 20 at Roh's, Inc., to see a Mircotime 640 demonstration and a Tektronix training tape. On December 9, a meeting was held at KGUN-TV. The topic for the evening was B.C.D. and E.N.G. Members fin-

ished up the year with a Christmas party at Shakey's, graciously sponsored by Elliot Electronics.

H. J. "Bart" Paine, (Chairman), Chief Television Engineer, University of Arizona, College of Medicine, Tucson, Arizona 85724, (602) 882-6644.

Chapter 36: San Diego, Calif.

The San Diego Chapter met November 19 at KGTU-TV10. The program for the evening covered

electronic journalism technology. The presentation was given by Mr. Jon Munderloh of Southwest Mesa Associates.

Bob Boulio (Chairman), SBE, 6841 Convoy Court, San Diego, California 92111.

SBE Journal Begins on Page 14

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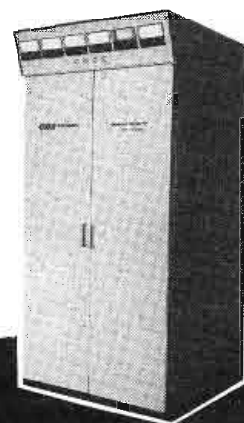
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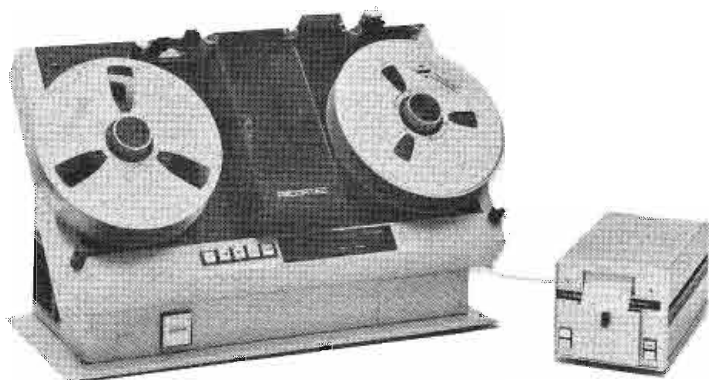
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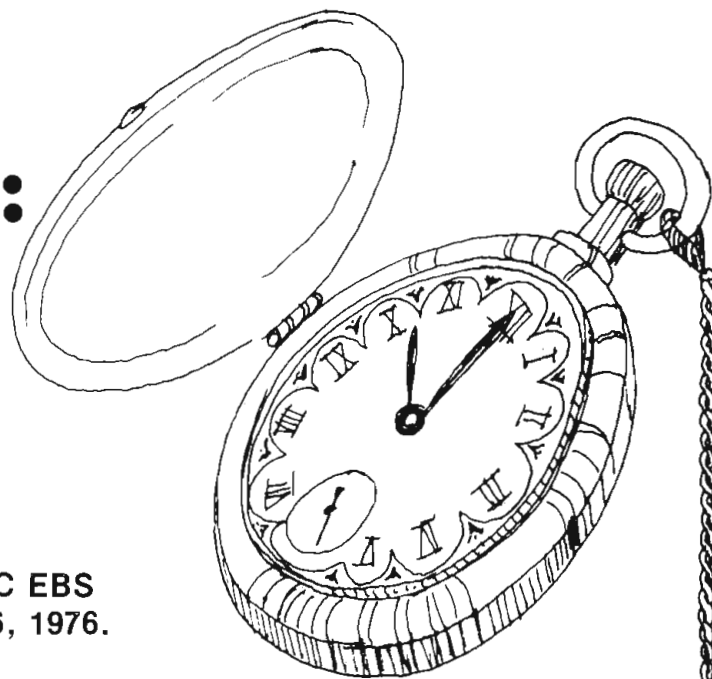
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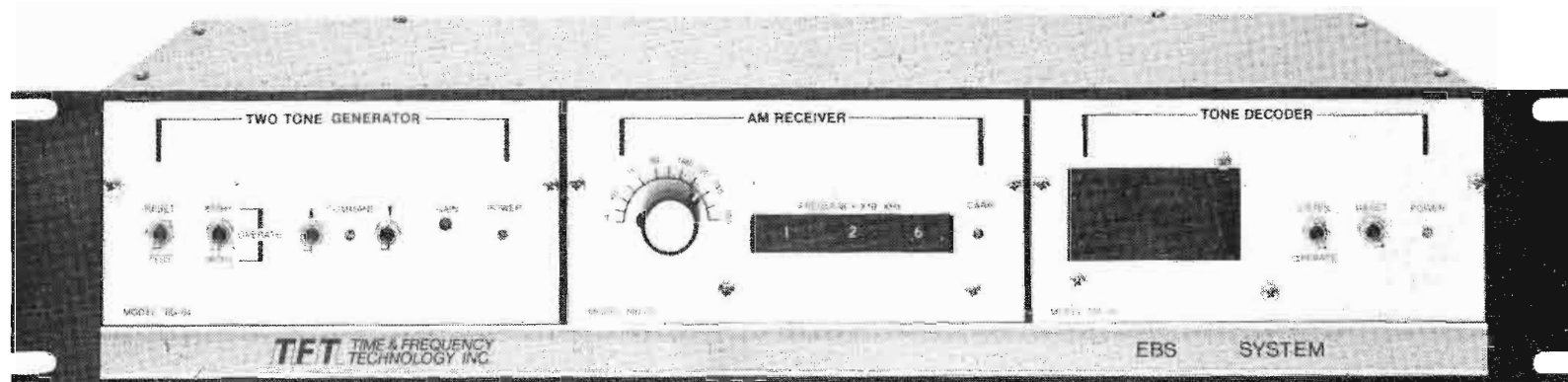


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