

October, 1977/75 cents

BROADCAST ENGINEERING



POST PRODUCTION: *one frame at a time*

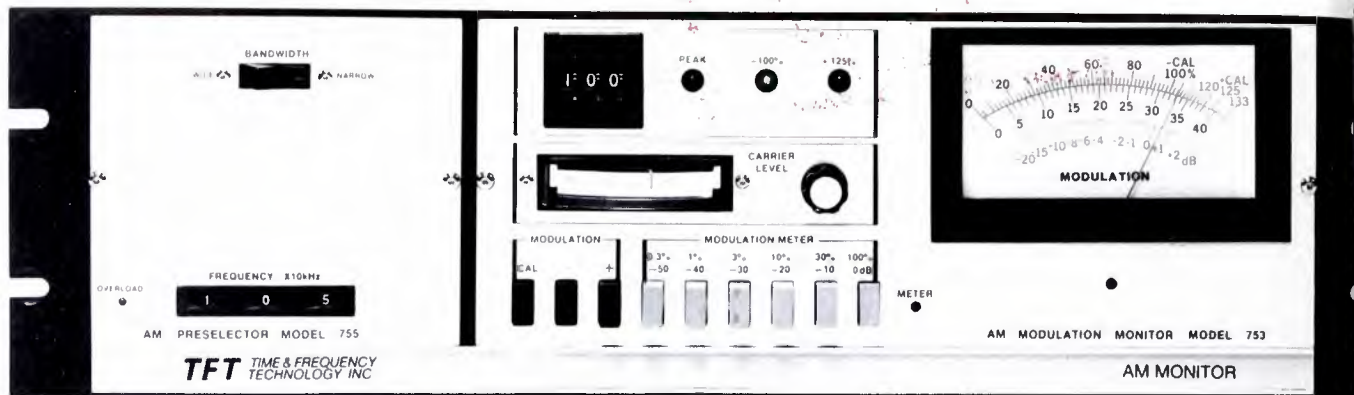
Page 21

- Automated Switching
- Compatible Automation
- Control Room Designs



Another TFT first in AM Modulation Monitors

THE EXTENDER



Extends Modulation Capability

TFT's new, competitively priced Model 753 precision broadband AM Modulation Monitor now accurately measures the +125% peak modulation and meets the new FCC monitoring requirements. A full complement of quality TFT features, for maximum transmitter modulation to the outer limits of coverage and for proof-of-performance measurements is also provided. The Extender is in a class by itself.

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For More Details Circle (1) on Reply Card

most impressed with Cinema Products' approach to the design and manufacture of film equipment, as well as the diversity and dependability of their products. CP-16R and STEADICAM are prime examples!"

Timothy Wolfe
Chief, Film Production
Maryland Center for Public Broadcasting

land Center for Public Broadcasting is the production of a network of PBS stations throughout the area. Timothy Wolfe, Chief, Production. Most of our programs are tailored to meet local needs while others are produced for a national audience. The production unit provides a wide range of materials for production, from film inserts to hour-long dramas to documentaries.

CP-16R is the finest camera of its kind."

We are well equipped for production of 16mm production. Our inventory is a CP-16R/A reflex with a viewfinder, a Model J-4 zoom control and several of our lenses. The cameras are extremely quiet, well built, and in service. Certainly the finest production camera of its kind, and we use the double system sound extensively."

Motion picture cameraman Kevin Weber concurs. "I have been using the CP-16R on location for the past year or so in community theatre, and music presentations in the Baltimore-Washington area," says Weber. "After hundreds of production productions, the CP-16R continues to function flawlessly. The camera is very quiet, yet it retains a balance that makes it extremely



Cameraman Kevin Weber (right) and Timothy Wolfe, Chief, Film Production, Maryland Center for Public Broadcasting.

functional.

"I enjoy shooting from the shoulder, so I often utilize a 10mm lens, and jump right into the action on stage. From this vantage point, my camera can become another character who is in close touch with the performers. The CP-16R is one of the finest handheld cameras I have encountered: silent and reliable, capable of handling almost any filming situation."

"Working with STEADICAM means developing a new technique of moving and shooting."

Says Wolfe: "A recent assignment to produce a short film about the sport of Siberian Husky dog racing presented us with an excellent opportunity to explore the unique capabilities of Cinema Products' new STEADICAM camera stabilizing system. Especially since director

Cameraman Steve Dubin with CP-16R and STEADICAM converts virtually any vehicle into an "instant" camera platform.



Marian Siegel wanted to include both tracking and point-of-view shots of the race itself.

"From Brenner Cine-Sound (Washington, D.C.) we rented a Universal Model STEADICAM and Cinevid system for use with our own CP-16R, allowing cameraman Steve Dubin sufficient lead time to familiarize himself with the unit under the guidance and supervision of Brenner technicians.

"The evening before the shoot, Steve took a feed from the Cinevid and recorded his moves on a video cassette machine. Time well spent, since working with STEADICAM means developing a new technique of moving and shooting.

"Using 7247 color negative for maximum depth of field, Steve shot with an 85N6 on the Angenieux 12-120mm zoom lens at f/16, keeping the focal length between 12-25mm."

"STEADICAM replaces costly and time-consuming methods of shooting."

"Steve moved easily with his STEADICAM, in and around dogs and trainers as the teams were being prepared for a run. He was then strapped to the tailgate of the truck for some tracking shots, leading the teams along little used trails, and ended the day riding in the dog sled on a run through the woods



"With STEADICAM, Steve was free to make complicated shots on short notice with relative ease — shots which would have been impossible to make had he been limited to a dolly, tracks, and hours of crew rehearsals! And the finished piece has a remarkably fluid and refined quality.

"STEADICAM replaces costly and time-consuming methods of shooting," concludes Wolfe. "The Universal Model is especially attractive, since it can be used interchangeably with 16mm and 35mm motion picture cameras, as well as with video cameras.

"I am most impressed with Cinema Products' approach to the design and manufacture of film equipment, as well as the diversity and dependability of their products. CP-16R and STEADICAM are the prime examples! With products like these, filmmaking remains a viable operation for a television production facility such as ours

For further information, please write to:

Cinema E products CORPORATION

Technology In The Service Of Creativity

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

STEADICAM is covered under U.S. Patent No. 4,017,168 and under foreign patents abroad.

BROADCAST ENGINEERING

The journal of the broadcast-communications industry



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About the cover

Our cover sets the stage for our lead article on post production. The article was made possible by the cast and crew of *One Day At A Time*, and by Donna and Joe Roizen. (Main photo by Donna Foster Roizen, top photo by Michael Feder.)

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- Station-to-Station
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- Zoom In
- SBE Journal
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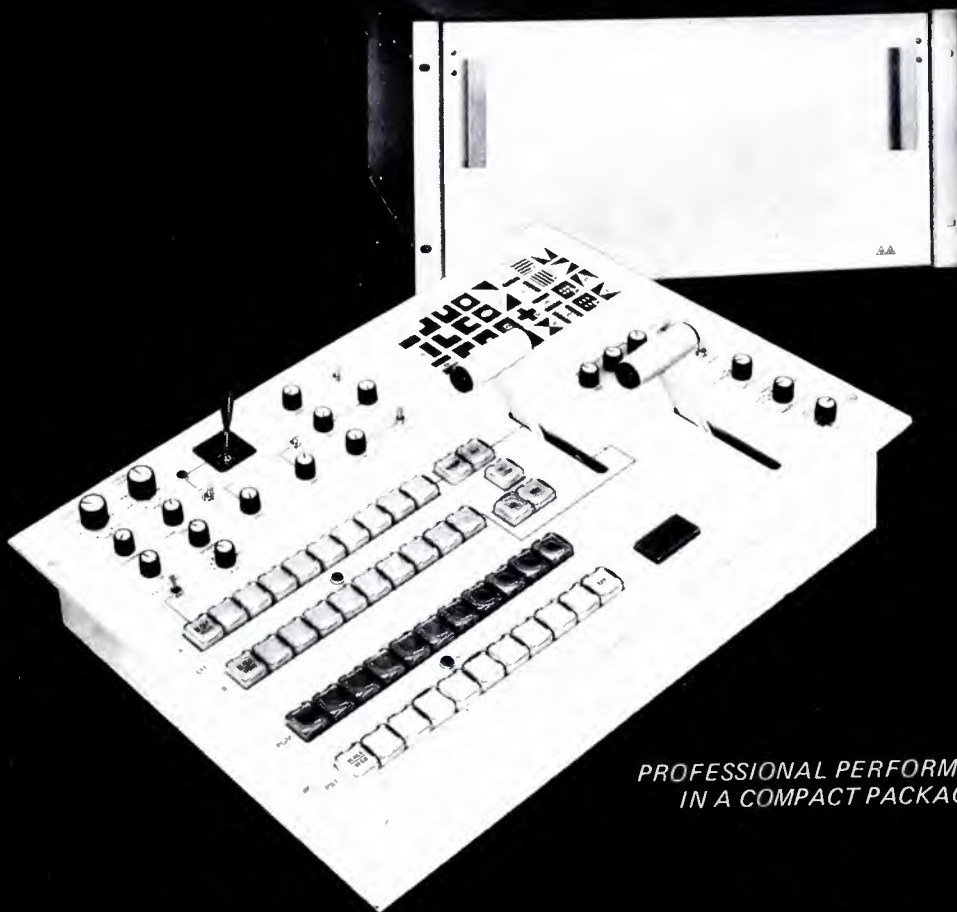
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DIRECT CURRENT FROM D.C.



October, 1977/By Howard T. Head and Harold L. Kasse

Windmill Interference

In work performed by three engineers of the University of Michigan under contract to the Energy Research and Development Administration it has been established that interference, sometimes substantial, can be caused to TV reception by large windmills being used to generate power. The report indicates that the large blades being used on the new power generators will produce a multipath which varies with the size of the blades, their speed of rotation, and the direction of the wind. Of particular concern is the modulating waveform produced by the rotation of the blades which approximates sync-like pulses that occur every half-revolution of the blades. The effect is said to increase with frequency and, hence, is worst at the upper UHF channels. Noticeable effects were observed up to two miles from a windmill.

FM Quadraphonic Report

After several months of testing, the FCC Laboratory has released the results of the tests it has conducted of quadraphonic audio systems. The tests were brought about by the fact that the staff of the FCC Laboratory decided, after examining the field test report of the National Quadraphonic Radio Committee, that the subjective tests conducted by the committee did not compare 4-4-4, 4-3-4, and 4-2-4 (matrix) properly because they did not use improved logic and phase cancellation decoders for the matrix systems which were developed after the committee's tests.


The Laboratory staff's assessment of their test results is that "the present 4-2-4 matrix systems using advanced logic and phase-cancellation decoders compare favorably with the discrete 4-4-4 system with respect to musical preference quadraphonic localization." The report went on to qualify this, however, by saying that the discrete 4-4-4 system was the majority choice although the preference in some cases was slight.

continued on page

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3CX3000A7 is an earful.

That's the economical ceramic triode specifically designed for our 3 and 5 kW transmitters. Its 'grounded grid' use eliminates neutralization and continuous fine tuning in the 603 and 605B. Added stability factors: vacuum variable capacitors in the driver stage. Standard APC. The 603 and 605B, like all CETEC Sparta transmitters, interface with all makes of ATS. Reliability? Superior high performance from our solid state direct FM 680 Exciter. It features advanced concepts such as digital temperature-compensated AFC. The 680 powers all our FM transmitters from 10 W to 25 kW. Operations? CETEC Sparta transmitters are a breeze. All important parameters are fully metered. All feature Tally Light fault locators with automatic recycle. All provide easy access to components. Interesting fact: only CETEC Sparta makes AM and FM solid state transmitters. Wouldn't you, as a professional broadcaster, prefer to talk to a broadcast professional? About the good group of products from Jampro, Schafer, and Sparta? Contact us. We're ready to listen to you.

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DIRECT CURRENT FROM D. C.

Continued from page 4

The report also contains some comments concerning reactions of those taking the tests and makes the interesting observation that their auditors (those taking the test) seemed to prefer the back sound to be only ambient or reverberated material for most music listening, rather than the surround sound which is being advocated by many in the recording industry. The report will be made a part of the Notice of Inquiry in Docket 21310 relating to FM Quadraphonic Broadcasting.

CB in Mexico

We previously reported that Mexican authorities were taking a dim view of U.S. citizens using their CB equipment in Mexico and were removing the units at the border. The Mexican government has adopted a new attitude and will now reserve three CB channels for use by U.S. tourists driving CB equipped vehicles. These channels may be used to contact other travelers or English-speaking Mexican officers who will monitor the channels to offer assistance.

Short Circuits

The FCC has waived the operator rules for the northern-most AM station in Alaska. It may use an operator with a first-class radiotelephone license who resides 300 miles from the transmitter site...The Harris Corporation has announced the development of an AM stereo system which it will test and petition to the FCC. This makes 5 systems actively in the running...The FAA is looking seriously into the possibility of requiring strobe lights on all towers over 300 feet above ground...At the FCC, type approval means to send the equipment in and the Commission will measure for compliance. However, recent experience has been that 50% of the units fail so the Commission is now requiring measurements to be submitted with the equipment to demonstrate compliance...The Commission received its "Receiver of Tomorrow" from Texas Instruments on August 15th when due and promptly returned it for an agreed-upon modification...All General and Advanced Class Amateurs licensed before April 1917 are entitled to credit for the Amateur Extra Class license. The Commission has decided that these individuals would now be at least 75 to 80 years old so they are now giving any eligible individual until March 1, 1978 to apply.

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Give the people what they want

... I hope that the Dolby FM effort does finally make it everywhere...

... Until now I doubted that Dolby could significantly improve FM. But the incredible brilliance and clarity and the extended dynamic range of (San Francisco station) is fantastic proof...

... I only hope the broadcasters in this area will convert to your system...

... I am behind you 100%. I want quality radio...

... I've been looking forward to Dolby FM and now my favorite (Pennsylvania station) is installing it...

... I am convinced of the great improvement Dolby can make to FM broadcasting...

... Good luck on your efforts to increase dynamic range on FM — it sure is needed...

... We have been enjoying the benefits of the Dolbyized FM programs of (New York

station) for a long time. We noticed at the outset the richer and cleaner sound especially in the high frequencies...

... I hope that some day all stations will broadcast with your marvelous system...

... All audiophiles owe you much for making cassettes such a wonderful source of music. I trust that your positive campaign to improve FM sound quality will bear equally impressive results...

... I now listen to Dolby FM broadcasting on (Buffalo station). The difference in sound quality between (this station) and other FM stereo stations is remarkable...

... Bravo on your campaign...

... I could not believe what I heard: The sound was clear, clean, brilliantly defined. After several hours' listening, I am still awestruck...

... I feel this is a step forward in FM broadcasting...

Dolby FM

The quotes above are selected and shortened from letters received on the subject of Dolby FM during the past year. Of 3,000 letters, only 5 have taken us to task — sample " (Dolby FM) smacks of nothing more than plain old commercialism"

August 1977 Dolby FM statistics: In U.S.A., FM stations in 10 metropolitan areas plus 101 other cities

with Dolby FM encoders; 14 in Canada; 17 in other countries; 24 manufacturers with 62 different tuner and receiver models incorporating Dolby FM decoder circuits.

Write us for technical details, lists of products and Dolby FM stations.

 **Dolby**[®]

Dolby Laboratories Inc

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Telex 34409
Cable Dolbylabs

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London SW9
Telephone 01-720 1111
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Prove to yourself how Dolby FM solves the high-level high-frequency problem.

Remember the first cassette recorders with the Dolby system, back in the early 70's? The advantages were easy to prove to yourself. You flipped the Dolby NR switch. Now you heard it; now you didn't.

A few years later and along comes Dolby FM, which you are at least curious about. The same 10 dB's are still there. But, unfortunately for demonstration purposes, they are used in a more subtle way. Let's face it, the effect is hard to hear

most of the time (that's compatibility for you). To make a rigorous and convincing test is tough; for example, you would have to make elaborate in-out changes at your station and simultaneously in the monitoring receiver — not the easiest thing to organize.

Well, here's how to overcome these problems and make a quick and convincing test of the effect of Dolby FM on high-level high-frequencies. The demo is artificial, but technically valid.

1. Using a receiver with Dolby FM circuitry, defeat the interstation muting switch.
2. Tune to a vacant place on the dial to get pure high-level hiss as a test signal (the extreme ends of the dial are usually good for this).
3. Switch back and forth between Dolby FM and conventional FM.
4. Listen to the increased high frequency content in the Dolby FM mode. The difference should be very obvious.

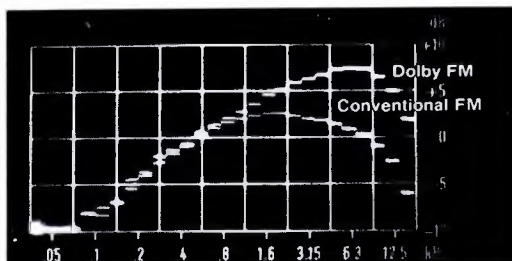
In the Dolby FM position the test signal will have a wide-range, open quality. The conventional FM hiss will be muffled. This is the high-frequency, high-level capability difference between Dolby FM and conventional FM. All the highs on the record at your station can actually get through to the listener. This allows the rest of your — and your listener's — equipment to do its job properly; all other specs become more meaningful.

The reduction of low-level transmission noises, the other half of Dolby FM, is harder to demonstrate at will. However, in due course you may wish to check out the fact that Dolby FM provides about 5 dB of CCIR weighted noise reduction.

This should help you get a better handle on Dolby FM. Not only a theoretical improvement, but one you can prove to yourself.

Technical Note

The use of wideband noise is becoming increasingly popular in testing audio equipment and acoustical characteristics. Interstation noise is equivalent to an FM carrier which is modulated with high-level white noise. This is a suitable signal for checking the high-level, high-frequency capability difference between Dolby FM and conventional FM. Relating the test result to actual listening, the difference shows how conventional FM muffles loud musical signals containing significant amounts of steady-state or transient high-frequency energy (for example, the steep waveforms of percussion and brasses)



Real-time analysis of Dolby FM receiver output when tuned to interstation noise, using Altec Hewlett-Packard 8050A analyzer. In a perfect FM system the trace would be a continuously rising straight line. Thus the results show that highly modulated high frequencies can be reproduced with significantly improved accuracy using Dolby FM.

Commercial Note:

Dolby FM is worthwhile primarily for stations who wish to use minimal amounts of conventional compression and limiting. The advantages of Dolby FM cannot be appreciated in highly competitive loudness-oriented market situations.



Dolby Model 334 FM Encoder Unit \$1350

August 1977 Dolby FM statistics: In U.S.A., FM stations in 10 metropolitan areas plus 101 other cities with Dolby FM encoders; 14 in Canada; 17 in other countries. 24 manufacturers with 62 different tuner and receiver models incorporating Dolby FM decoder circuits. Write for details.

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**industry
news**

**SMPTE drafts specifications
for 1-inch helical format**

The segmented helical VTR standards working group of SMPTE's Committee on Video Recording and Reproduction Technology has drafted five specifications for the 1-inch high-band helical VTR. The specifications describe basic system parameters, dimensions and locations of video, audio and control tracks, and video and audio electronic characteristics.

The drafts have been submitted to the committee for evaluation and comment, and subsequently will be passed to the SMPTE Standards Committee. The drafts then will be published in the Journal.

The format, introduced by the Robert Bosch Corp./Fernseh Group and known as the "BCN" 1-inch helical VTR format, is the basis for the draft specifications. In its policy to avoid reference commercialized terminology, the committee has proposed the format be formally identified as "One-Inch Type B Helical Video Recording." Portable and studio VTRs built to this specification are currently commercially available from several companies throughout the world.

SMPTE will publish details on the Type B specification in the Journal following approval by the Standards Committee. A full presentation will be given at the national conference, October 16-21, at the Los Angeles Century Plaza Hotel.

**Permanent status requested
for reregulation task force**

The FCC has been urged to give a permanent status to its Reregulation Task Force, a temporary body which has assisted the Commission in the deletion and amendment of more than 600 FCC rules and regulations.

The request was made in a letter from Vincent Wasilewski, president of the National Association of Broadcasters (NAB), to Richard Wiley, FCC chairman.

Wasilewski urged that the task force be made permanent "so that it may continue to serve both the Commission and the public in the exemplary manner it has in the past."

The NAB president said the reregulation program "is proof that outdated and unnecessary FCC rules can be eliminated, that unnecessary paperwork can be effectively reduced and that the Commission can succeed in its attempt to simplify or eliminate needless, outmoded and overly burdensome rules."

**FCC changes application rules
for EEO programs**

In compliance with a federal court ruling, the FCC has changed its requirements for broadcast stations applying for EEO programs. Broadcast stations with five or more full-time station employees, now

continued on page

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For More Details Circle (10) on Reply Card

be required to submit a written EEO program in conjunction with their applications.

In June 1976, the Commission revised its equal employment opportunity rules and adopted a 10-point EEO program to serve as a model to be followed and submitted by all broadcast applicants proposing to employ more than 10 persons on a full-time basis.

Under this revision, all broadcast applicants with five or fewer full-time employees were exempted from the written EEO filing requirement. Previously, only applicants with fewer than five full-time station employees were excused from the filing.

On August 5, 1977, however, the U.S. Court of Appeals for the Second Circuit (New York) partially set aside the FCC action raising the EEO exemption to 10.

The court said the FCC's order of June 26, 1976 was arbitrary and capricious. It went on to say that the justifications the Commission cited were unsupported and inadequate.

OTP the victim of President's reorganization plan

The Office of Telecommunications Policy (OTP), part of the Executive Office of the President, will be dissolved and its responsibilities redistributed to the Department of Commerce and Office of Management and Budget, if President Carter's reorganization plan is approved by Congress.

OTP is responsible for management of the government-use frequency bands, as well as determining policy and advising the President on domestic and foreign communications issues, including mass media, common carrier, privacy, and domestic security.

Under the Carter plan, the Commerce Department Office of Telecommunications Policy would assume the bulk of OTP's duties. The Executive Office would retain final authority for domestic communication although it would rely heavily on the Commerce Department's expertise.

Public information sessions on NAEB's convention agenda

Public information (PI) basics will be covered for the first time at the upcoming NAEB convention, to be held November 13-17 at the Sheraton-Park Hotel in Washington, D.C.

Art Singer and Bill Hallstead, development directors, have arranged a program to deal with two important subjects: "Writing that Moves" (for leased radio spots, ad copy, etc.) and "Living with the Press" (TV reviewers, reporters, TV listings editors and TV Guide).

The 53rd annual NAEB convention also will include sessions for engineers who are responsible for recommendations to management regarding the purchase of new equipment. Exhibitors will have an opportunity to make technical presentations on

continued on page

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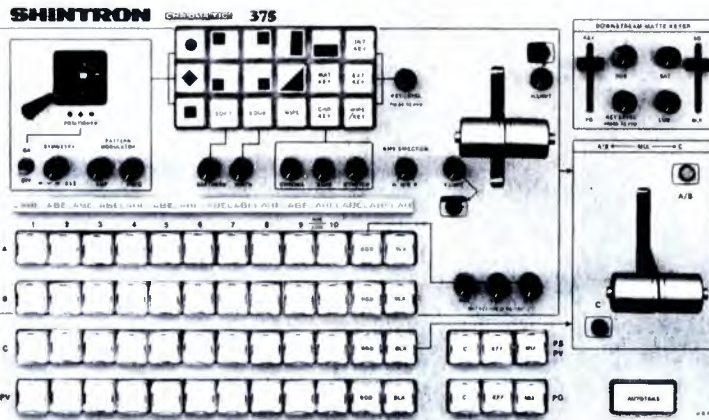
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news briefs

New satellite transmission rates

Several new categories of satellite television transmission service, with a corresponding new rate schedule will be offered starting November by RCA American Communications Inc. The proposed options (pending FCC approval) include protected or preemptible rates, fixed term or occasional service.

Attorney advertising controversy

The National Association of Broadcasters is opposing two proposals excluding the broadcast industry from attorney advertising. Brenda Fox, NAB assistant counsel testified before the Task Force of the American Bar Association which is considering the proposals. She said NAB is concerned that proposals would restrict the advertising to the print media unoverruled by the state court agency responsible for regulating lawyers' conduct.

Educational videocassette market

The president of Sony Corporation of America urged educational movie picture producers to transfer their libraries to videocassettes. Harry Schein said the introduction of Sony Betamax in schools has generated a huge market for pre-recorded educational programs. He spoke to more than 100 software executives attending a seminar on the marketing of 16mm films video formats at the World Trade Center.

Kuwait buys FM transmitters

Kuwait has purchased two 100 parallel-operated FM transmitters giving the Arabian Gulf State its first FM stereo broadcast service. The transmitters will be installed on the island of Failaka off the coast of Kuwait. The system will be remotely controlled from the studios in Kuwait City by telemetry circuits, includes a specially designed console as well as a CCA-provided program feed from studios to transmitter site.

Paraguay joins INTELSAT

Paraguay has become the 11th American nation to join the International Telecommunications Satellite Organization (INTELSAT).

continued on page

Here's how useful a distortion analyzer can be

voltage, power, distortion dB ratio.
 generator signal at the push of a button.
 18 dB per octave filters reject hum and frequency noise.
 pushbutton operation to preset level, measure power, then measure distortion.
 voltage or power 10 Hz to 110 kHz.
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 No manual nulling controls required (the 1710A is always in auto-null, reaches a null in less than 5 seconds).
 Intermodulation Distortion Analyzer optionally available.
 Oscillator distortion is typically .001%.
 ±1 dB Vernier adds fine level control.
 Internal oscillator adjustable from +26 dBm to -89.9 dBm in 0.1 dB steps.
 Turn off oscillator for quick S/N measurement.
 Tuning indicators help measure distortion of an external source.
 Simultaneously select oscillator and analyzer frequency with fast-to-use pushbuttons. 10 Hz to 110 kHz.
 Balanced and floating 150Ω or 600Ω Generator output.
 Automatic Set Level is optionally available.
 View distortion products on a scope.
 Measure distortion down to .002%, voltage or S/N ratios with 100 dB dynamic range.

Each of the above features are so outstandingly valuable that we especially invite your attention to them.

One is the fast, easy measuring you get with pushbutton-selected distortion-measuring circuits (signal source and measuring circuits are simultaneously selected with the same pushbuttons). Pushbuttons make it so simple to measure quickly to repeat measurements.

Secondly, you can drive virtually any type of load from the signal source output — whether

balanced, unbalanced, off-ground or whatever. That's because the signal source output circuit is fully isolated and balanced.

There is no output transformer to introduce noise or distortion.

Besides these outstanding conveniences, you can have the Sound Tech 1710A with an option that enables you to measure **intermodulation distortion**.

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The 119th SMPTE Technical Conference and Equipment Exhibit

Century Plaza Hotel, Los Angeles
October 16-October 21, 1977

This year's SMPTE national conference, scheduled for October 16-21 at the Century Plaza Hotel in Los Angeles, promises to be both a thorough updating on film and television technology and the largest equipment exhibit ever held by the society.

Sir Charles Curran, director of the BBC, will give the opening address on "Technology and the Consumer," and there are a number of papers from international broadcasting organizations such as the British Broadcasting Corporation and the Société Française de Production to round out the program.

In addition, there will be technical sessions on film and electronic program production for television, post-production techniques of video and audio, the new technology in fiber optics, and teletext transmissions for TV and motion picture film products and processes.

More than 100 exhibitors will represent virtually every major name in the motion picture film equipment and electronic television product field. Equipment on display will include film and video cameras, sound equipment, lighting equipment, editing equipment, lenses, laboratory equipment, projection equipment, television equipment, ENG and EFP gear, and VTRs.

The SMPTE engineering committees and the standardization groups will hold meetings during the conference.

Social events include an awards luncheon, a series of sponsored cocktail parties and a banquet. □

Program

Sunday, October 16
Registration, *afternoon*
Entertainment, *evening*

Monday, October 17
Interfaces, *morning*
Get-Together Luncheon, *noon*
New Products in Television, *afternoon*
New Equipment and Processes in Film, *afternoon*

Tuesday, October 18
Laboratory Practices, *morning*
Television Post Production, *morning*
Fellows Luncheon, *noon*
Laboratory Practices, *afternoon*
Television Post Production, *afternoon*

Wednesday, October 19
Television Sound, *morning*
Ecology for Laboratories, *morning*
Television Production, *afternoon*
Film-Sound, *afternoon*

Thursday, October 20
Corporate Uses of Motion Picture and Television Production, *morning*
Unconventional Imaging Systems, *morning*
Film Production, *afternoon*
Corporate Uses of Motion-Picture and Television Production, *afternoon*
Panel Discussion on Uses of Motion-Picture and Television Production, *afternoon*
University of Southern California, New Cinema Facilities Tour and Program, *evening*

Friday, October 21
New Television Technology, *morning*
General Television Subjects, *afternoon*

Exhibitors

Adda Corp.
The Allen Products Co.
Ampex Corp.
Arriflex Co. of America
Arvin/Echo Science Corp.
Belden Communications
Bell & Howell Co.
Berkey Colortran, Inc.
Birns & Sawyer, Inc.
Bosch-Fernseh
Brumac Industries
Canon USA Inc.
Carter Equipment Co., Inc.
Century Precision Cine/Optics
Christy's Editorial Film Supply Inc.
Cinematics, Inc.
Cine Precision Engineering
Cine Production Equipment, Inc.
Cine 60 Inc.
Cinema Products Corp.
CMX Systems, Orrox Corp.
Coherent Communications Co.
Cohu, Inc., Electronics Div.
Commercial Electronics, Inc.
Consolidated Video Systems
Continental Camera Systems
Convergence Corp.
Dolby Laboratories
The Durafilm Co.
Dynair Electronics Inc.
Eastman Kodak Co.

Ehrenreich Photo-Optical Industries Inc.
Eigen Video
Eiki International Inc.
Electro-Voice
Elmo
Farinon Electric Co.
F & B/Ceco
Film Equipment Rental Co.
Frezzolini Electronics Inc.
Adolph Gasser
General Electric Co.
Goldberg Brothers
Alan Gordon Enterprises Inc.
Gould Inc.
GTE Sylvania
Hammond Industries
Hazeltine Corp.
Karl Heitz
Hitachi Denshi America Ltd.
Hologon Optical Systems
Hollywood Associates
Hollywood Film Co.
Houston Fearless 76 Inc.
Houston Photo Products Inc.
Ikegami Electronics (USA) Inc.
Image Devices Inc.
Infotechnics
Jamieson Film Co.
J-K Camera Engineering Inc.
JVC
KEM Editing Systems Inc.

Kliegl Bros.
KLM Associates Inc.
Lab Methods Corp.
LaVezzi Machine Works Inc.
Lee Filters Ltd.
Lenco
Lisner Smith
Listec Television Equipment Corp.
Lowel-Light Mfg., Inc.
L.T.M. Corp. of America
L-W International
Magnasync/Moviola Corp.
Magna-Tech Electronic Co., Inc.
Matthews Studio Equipment
M B I Inc.
Merlin Engineering Works
Micro Consultants Inc.
Microtime, Inc.
Microwave Associates
Miller Professional Equipment Inc.
Mitchell Camera Corp.
Mole-Richardson Co.
Motion Picture Enterprises Inc.
Motorola Communications & Electronics Inc.
Multi-Track Magnetics Inc.
Nagra Magnetic Recorders Inc.
NEC America Inc.
Neumade Products Corp.
Norton Associates, Inc.
Nurad
O'Connor Engineering

Laboratories Inc.
Oxberry
The Perf-Fix Co.
Peterson Enterprises Inc.
Pioneer Marketing Corp.
Plastic Reel Corp. of America
David Pringle Cameras
Quick-Set Inc.
RCA Corp.
Recortec Inc.
Rosco Labs
Sachtler GMBH
Skirpan Lighting
Smith Victor Corp.
Sony Corp. of America
Soremec-Eclair USA Inc.
Strand Century Inc.
Super 8 Sound Inc.
Tele-Cine Inc.
TeleMation
Telescript Inc.
Television Equip. Assoc.
Tentel Corp.
Thomson CSF
Unimedia Corp.
Vega Electronics
Video Systems Network
Vital Industries
Vlahos-Gottschalk Research Corp.
Westrex
Wide Range Electronics Corp.
The Winsted Corp.

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Now you can significantly cut the time you spend editing 3/4U-format tapes, thanks to JVC.

The unique bi-directional search control of the CR-8300U Electronic Editing Recorder lets you fast-forward at 7 times normal speed. Reverse at 10 times normal.

And you can do it while the tape is threaded on the head. You don't have to stop to rethread.

The unique preview feature lets you pass the signal from a second source through the CR-8300U while it's playing, without erasing the tape. You'll cut down on false starts by knowing what your edit will be like.

FOR MORE ACCURATE EDITS

Accuracy is what the JVC CR-8300U is designed for.

The unique built-in Pre-Roll rewinds tape for about 4 seconds from the actual editing point, and puts the recorder in stand-by mode. When you push "Edit Start" the CR-8300U first plays back about 4 seconds of rewound program, then goes automatically into the recording mode at the edit point. You're assured of the highest accuracy.

When you assemble edit, video and audio signals are edited simultaneously. When you insert, you can edit video and either audio channel independently or in any combination. Either way, accuracy is ± 5 frames.

You want still frame and slow motion? You've got them. The forward speed can be adjusted from 0 to 1/15th normal speed. You'll always find the exact frame you want.

And the tape counter doesn't just count. It has a memory. When you know you'll want to find a particular point again you reset the counter to "000". Then when you rewind, it will automatically stop the CR-8300U right there.

No other moderately priced videocassette editor has this combination of features to give you the accuracy you're looking for.

FOR THE HIGHEST QUALITY PICTURE

But speed and accuracy are nothing without quality. And quality is what the JVC CR-8300U has most of. It has everything you need for NTSC-type color video *built-in*.

Automatic Phase Control and patented Color Dubbing assure generation after generation of duplicates with stable color lock and highest quality.

There's a built-in Dropout Compensator. There's a video S/N ratio

of better than 45dB (unweighted) on the Rohde & Schwarz noise meter. An audio S/N ratio of better than 45dB. Independent Audio VU Meters and Controls for both channels (which can be operated either automatically or manually) help you upgrade the quality of low-level audio recordings.

Black & white resolution is better than 320 lines; color, better than 240.

And if "flag-waving" turns you off, all you have to do is turn on the CR-8300U. The frame servo locks on the odd field, so every edit is smooth and clean.

JVC WORKS WITH YOU

JVC has worked with broadcasters and producers to give you what you want, what you say you really need. Speed, accuracy, quality. And the features you need to get them.

Features like an external sync input for V-locking other sources. A built-in capstan servo mechanism for jitter-free, stable tape speed. An internal time-lapse meter to make

regular maintenance easier. And a new remote-control system you can learn about by reading the next page.





AND...TO TIE IT ALL TOGETHER... THE JVC RM-83U REMOTE AUTOMATIC EDITING CONTROL UNIT.

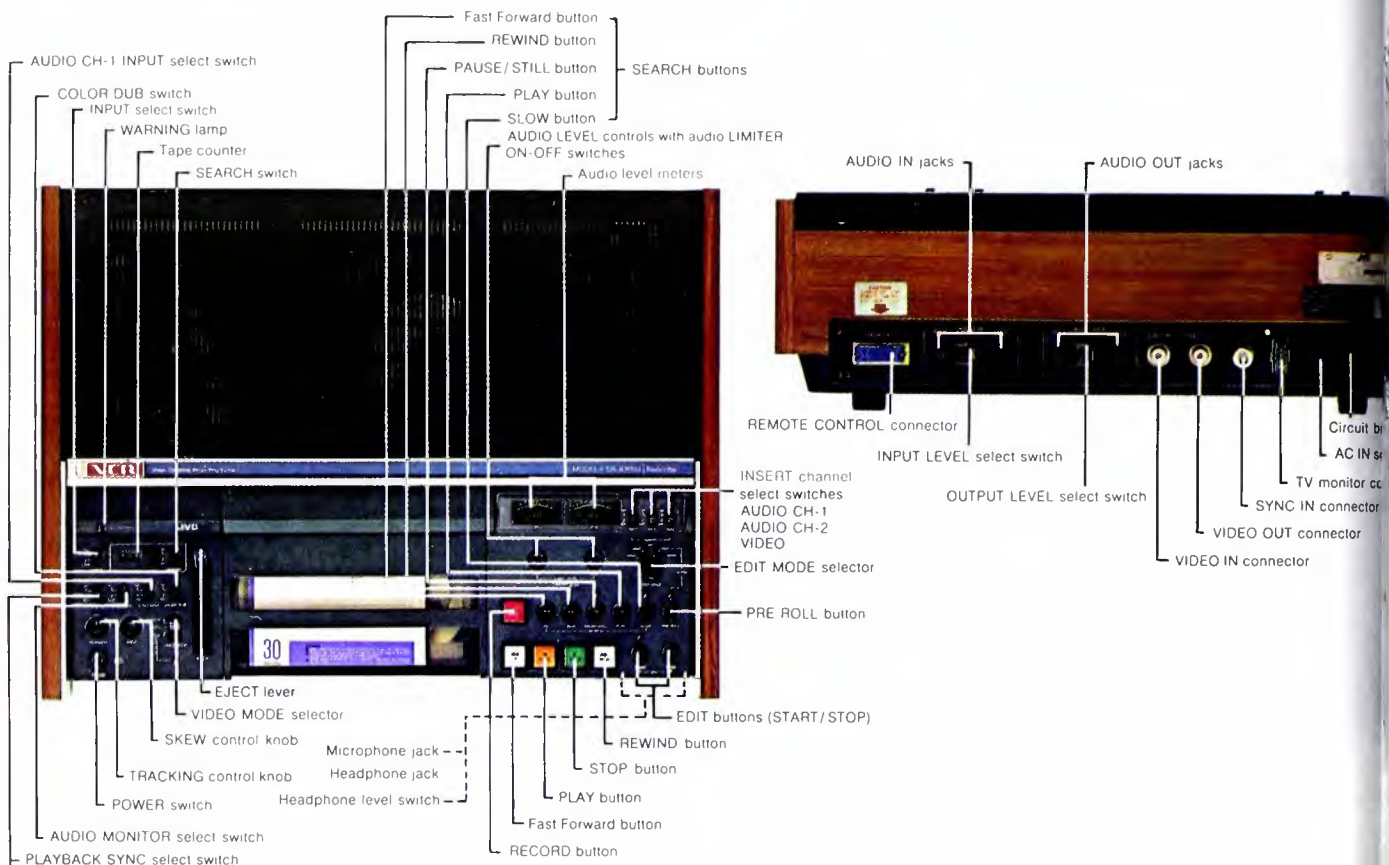
The RM-83U completely controls two JVC CR-8300U recorders for fast and accurate insert and assemble editing.

Its two independent LED timers (indicating minutes, seconds, and tenths of seconds) can be put on "Hold," so you can precisely identify the edit point. They then return to real time. "Hold" again at the end of the edit, and you've timed the length of your insert. Both clocks memorize the edit point—for fast and accurate review, you quickly return to it by touching "Search".

Not only can you *review*, you can *preview*. A unique rehearsal editing feature lets you see your edit without putting a signal on the tape. You can be sure you've got exactly what you want, exactly where you want it. After you've previewed, both machines go back to the edit point automatically. If you like what you saw, just push "Start" and you have it.

There are many more great features, such as the automatic safety device that shuts off both recorders if a tape is left in still-frame for 10 minutes. Get all the details on both the RM-83U and the CR-8300U by writing today to the address listed on the back page.

SPECIFICATIONS OF THE CR-8300U EDITING COLOR VIDEOCASSETTE RECORDER



GENERAL

Video Recording System	: Rotary two-head, helical scan system
Luminance	: FM recording
Color Signal	: Converted subcarrier direct recording
Video Signal System	: NTSC-type color signal
Power Requirement	: 120 V AC, 60 Hz, 120 watts
Temperature Operating	: 41°F to 104°F (5°C to 40°C)
Storage	: -4°F to 140°F (-20°C to 60°C)
Operating Position	: Horizontal only
Weight	: 67.5 lbs. (30.6 kg)
Dimensions	: 24-1/16" (W) x 7-11/16" (H) x 17-3/4" (D) (610 mm x 195 mm x 450 mm)

Tape Transport

Tape Speed	: 3-3/4 ips (95.3 mm/s)
Fast Forward Time	: Less than 6 min. for 60 min. tape
Rewind Time	: Less than 5 min. for 60 min. tape
Wow & Flutter	: Less than 0.2% RMS
Video Signals	
Input	: 0.5 V to 2.0 Vp-p, 75 ohms unbalanced
Output	: 1 V p-p, 75 ohms unbalanced
Signal-to-Noise Ratio	: More than 45 dBs (Rohde & Schwarz noise meter)
Horizontal Resolution	: Color 240 lines Monochrome 320 lines

Audio Signals

Input	: Mic -70 dB, 600 ohms unbalanced
	: Line -20/0 dB, 10k ohms unbalanced
Line Output Level	: -20/0 dBs (600 ohms unbalanced)
Headphone Output	: -28 dBs/-37 dBs (8 ohms unbalanced)
Signal-to-Noise Ratio	: More than 45 dBs (@ 3% distortion level)
Frequency Response	: 80 Hz to 15 kHz

Be sure to write today to JVC for more information on the CR-8300U Electronic Editing Color Videocassette Recorder and also for a copy of JVC's new Glossary of Video Terms.

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Flap of the fingers is Ken Keseloff's unique trademark in the TV directing field. Here he has just cued a cut for the post-production editor Kris Trexler to put in the edit decision list. (Photo by Donna Foster Roizen)

Post production: one frame at a time

By Donna Foster Roizen, TELEGEN

The secret ingredient in the success of many recent situation comedy shows on television is frequently inserted after the studio is dark and the stars have gone home. It's called post production and involves complex equipment, skilled operators and creative talent to pull together the segments of original recordings and shape them into fast-paced, audience-grabbing sequences.

Television's voracious and accelerating demand for popular programming has spawned a technical upheaval in the way post production is accomplished. Modern TV post-production centers do not have sophisticated computer-assisted VTR editing systems which involve off-line and on-line operations, automated assembly and the peripherals of slow/stop on discs, frame counting time codes, audio overlays and video special effects.

To get a good picture of how a post-production facility handles a contemporary show, it was decided to select a program in regular production at a well-equipped TV production center. Norman Lear's programs certainly qualify among the top echelon of impact sitcoms and *BE* was offered a choice of *In the Family* or *One Day at a Time* for a detailed analysis.

We chose the latter for several reasons, not the least of which was that a typical 26-minute episode contains more than 250 scene cuts, averaging one every six seconds. In fact, while watching the taping it seemed

some cuts were less than one second apart!

Many of the Lear shows are both shot and post produced at Metromedia Square, a large, modern TV complex in the heart of Hollywood. Recently, an extensive computer-assisted time-code editing system, including on-line, off-line and multitrack audio sweetening capabilities, was installed at the facility.

Production

While the thrust of this article is aimed at post production, there are enough interdependent factors between the way a show is produced and eventually edited that some background may be useful.

On Monday, the first reading with the cast involves 16-20 people with the director, four writer/producers and various on-hand assistants. Cast members make comments about their lines, discuss the impact on the audience, and generally try to agree on final wording with the writers. It's evident to any visitor that the members of this show enjoy working together.

On Tuesday, the corrected text is re-read and re-blocked with some concern about values and relationships between characters in this episode. Director Herb Keseloff sets the basic form for the show and everybody works from that. By Wednesday afternoon, Keseloff will invite Norman Lear to see the rehearsal, but he also admits, somewhat proudly, that Lear

continued on page 22



The Metromedia facility includes three off-line editing booths like this one. Equipment includes a CMX Systems 340-X computer-assisted editing system, Sony U-Matic cassette players, Amtron monitors, Convergence joystick and a variety of peripherals such as time-code generators, reader, audio and video controllers and speakers. (Photo by Donna Foster Roizen)

One frame at a time

continued from page 21

trusts him enough not to take up the invitation too often. *One Day at a Time* periodically shifts its emphasis through the major characters and Lear usually will attend those shows which feature one of the particular members.

Thursday finds the four studio cameras being

blocked-in for the 265 set-ups that they will have follow. Three cameras operate in a normal fashion and one is assigned an isolated (ISO) function to track special shots which are separately taped for potential insertion later.

On Friday, taping sessions are scheduled at 5 and 8:00 p.m. Some 14 people assemble in the control room with script folders in hand and direct or observe the live action in front of the cameras on the stage below. The show is done in front of a live audience, minimizing the need for a laugh track reaction audio later on. A nice touch was the floor-manager's introduction of the stage crew to the audience.

Never half safe

In the control room, Kenwith follows the TD on the monitor and snaps his fingers for the TD to make cuts on the switcher. In the meantime, "Pinky" Frank, the associate director, is calling the next shots on the intercom system to the camera crew. If something goes wrong, there is an instant decision to accommodate the error or cover it up from another angle, and the action continues.

Since two separate tapes are made of the same sequences, the errors in the first take can be discussed during the break and eliminated in the second. The best takes of both tapings are then selected for the final assembly of the finished program.

The rest of the people in the control room are meticulously following their scripts, monitoring the dialogue, checking timing and performing a quality control function on behalf of the writer/producer who contribute to the show.

By late Friday, the show is completely recorded
continued on page

Herb Kenwith: Profile of a director

Lucy called him the Godfather of Desilu, Albert Einstein brought Robert Oppenheimer and Ms. Joliot Curie to his plays, Frank Stanton gave him his TV start at CBS and he's probably the only TV director with a very calloused thumb and forefinger!

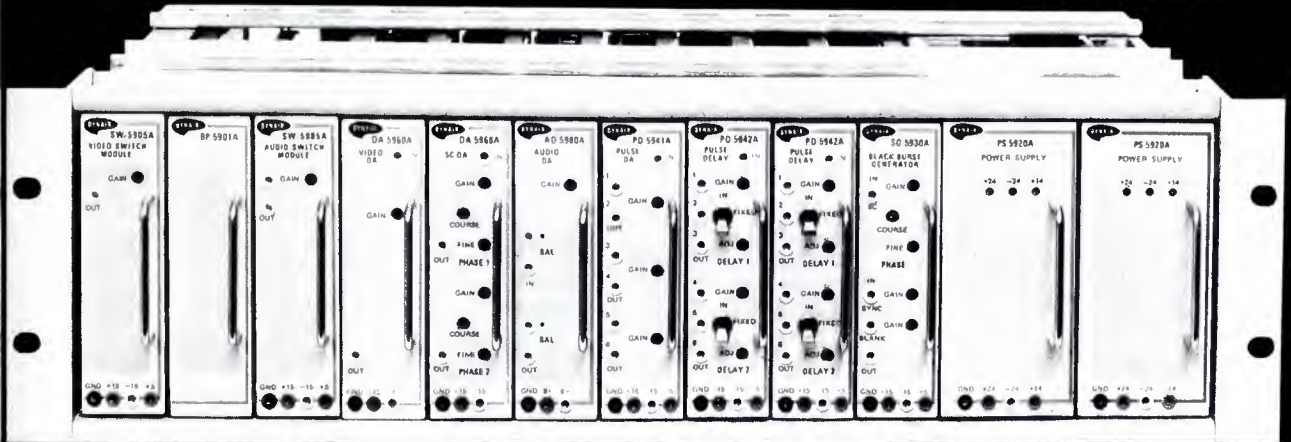
He's done it all, from location shooting of *Death Valley Days* to the space saga of *Star Trek*. His talents encompass a diversity of shows like *Daktari* and *All That Glitters*, and of the latter, he remembers doing 65 episodes in 11 weeks by working incredible hours. His Sitcom hits include a 3-year stint on *Good Times* and his current top-rated show, *One Day at a Time*, which has had two great seasons and is now starting its third.

His style is uniquely his own; the more than 250 camera cuts in a 26-minute episode are initiated by a staccato of finger snaps given with millisecond precision. When asked about this odd method of directing a TV crew, he explains that it's faster than a verbal command, and since all the camera shots are preset, his TD can follow his finger pops with amazingly short reaction time. The precise timing of these camera cuts that follow the fast pace of the dialogue is what gives *One Day at a Time* its major humorous impact when they are trying to be funny, or its dramatic intensity when the script calls for some tear-jerking trauma. Herb knows how to motivate his actors, but he also knows how to milk a scene for its maximum viewer attention by the expedient of pre-

cise post-production manipulation. It's a skill he has honed to a fine edge in his distinguished career.

He admits to being immensely intrigued by modern TV technology, while feeling somewhat buffered by its complexity. Nevertheless, he doesn't miss a trick in putting the most sophisticated computer-assisted editing system through its digital paces in order for it to keep up with his demands for a superbly finished program. The air copy of the on-line master is a vivid testimonial to his directing talent, and, of course, to all of his associates, who emote on cue, push the right buttons and sweat out the 20 frame pull-ups when Herb wants a scene tightened long after Ms. Romano, Julie, Barbie and Schneider have gone home.

If distribution is troubling you... use **DYNAIR'S 5900 SERIES** for **FAST** relief!



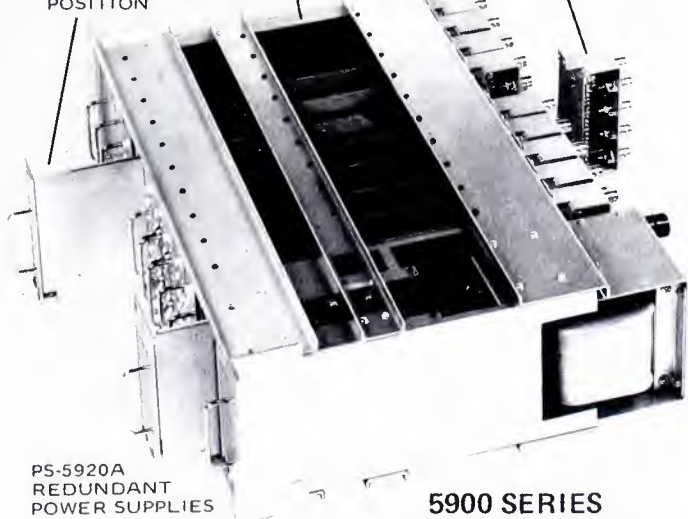
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- DA-5966A, 1 looping in, 6 out, Subcarrier DA
- PD-5941A, 1 looping in, 6 out, Regenerative Pulse DA
- PD-5942A, 1 looping in, 6 out, Regenerative Pulse Delay DA
- SG-5930A, 3 looping in (sync, blanking, sub-carrier), 2 out, Blackburst Generator
- SW-5905A, 5 in (looping or terminating), 1 out, solid-state remote control vertical interval Video Switcher, available in 5x1, 10x1, 5x5 configurations
- SW-5985A, 5 in (looping or terminating), 1 out, solid-state remote control Audio Switcher, available in 5x1, 10x1, 5x5 configurations

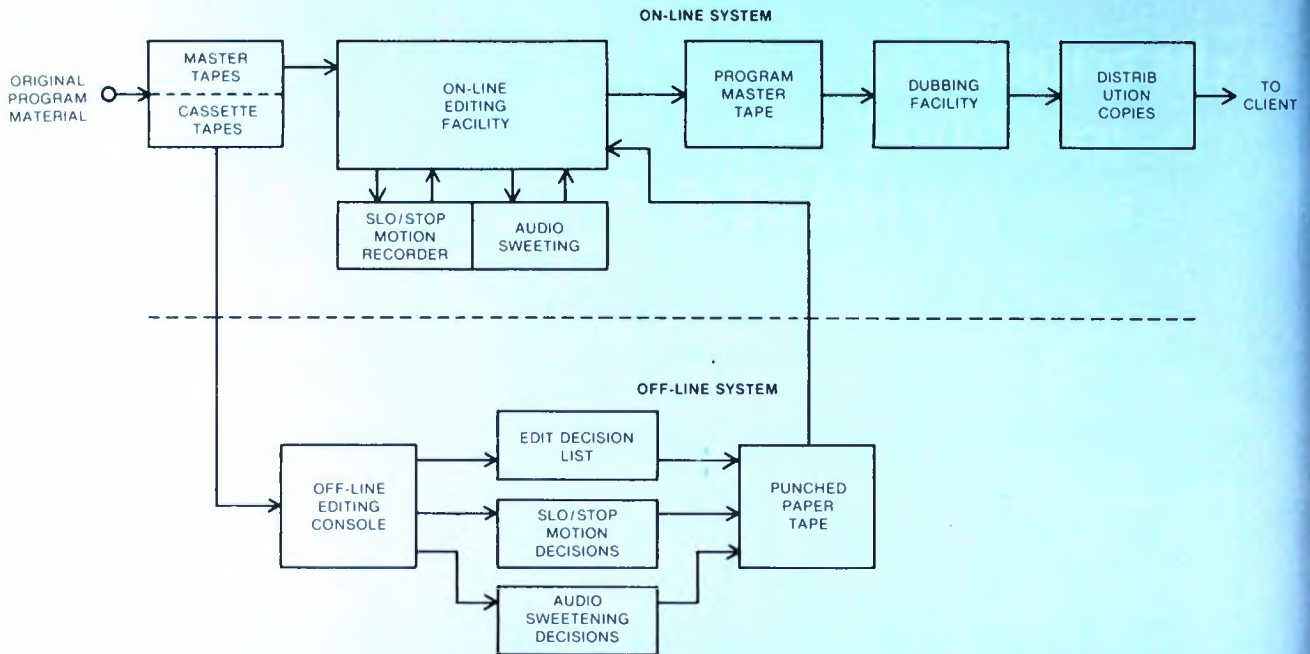
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DYNAIR

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POST PRODUCTION CYCLE



One frame at a time

continued from page 22

master reels of 2-inch tape and on the ¾-inch cassettes from which the edit decision list for the program master will be developed. Kenwith now has his diamond in the rough which must have its many facets carefully polished until each scene sparkles with the brilliance that the writers and actors worked for.

Post production

There is an analogy that TV production is like putting the words into a dictionary, while post production is the art of taking those same words and forming them into succinct sentences or paragraphs.

Early Monday morning, Kenwith meets with Pinky, and Kris Trexler, videotape editor, in the CMX-3, a small room in the bowels of Metromedia Square. This enclosure houses an off-line editing system with four U-Matic type cassette VTRs. The working material consists of six or eight recorded cassettes containing the same program sequences that are on the 2-inch quadraphonic master tapes. However, there is one small but important difference. The cassette tapes have an overlay of the SMPTE time and control code (frame address) right in the picture, so that when the cassettes are replayed at any speed or are in freeze frame mode, the frame number is clearly visible in the lower left quadrant of the picture.

Every individual image or frame on the tape has a unique number by which it can be searched out, cued or selected by the human editor. A computer with a memory bank is then brought into play, and it can follow instructions to initiate the appropriate electronic editing functions.

As the director, Kenwith gets the first cut at the tapes. For the next few hours he will select the points at which the edits are to be made, decide on where the ISO camera shots are inserted, suggest trimming

certain takes if the pace slackens or add pieces where the continuity requires it. As he and Frank build the final show, Kris is noting frame addresses as entering them in the computer memory. While he does this, the display terminal on the edit console shows the edit decision list accumulating on the screen.

If there is any doubt as to how a particular edit may really look, Trexler can manipulate the cassette with a bi-directional control (joystick) and program preview edit at the selected frame addresses, operating the console keyboard like a typewriter. If it doesn't look acceptable, he can jog frame by frame through a sequence until Kenwith says, "that's the spot I want." With the tape showing a still frame at that point Trexler can read off the time code and enter that number in the log or edit decision list. While as much as possible has been done to cut the camera, it still takes 80 to 100 edits and many hours of work to produce the finished program.

The editing session will include such additional attractions as selected freeze frames used under titles or credits at the beginning and end of the show. These selected frames must be identified carefully (each one is a little different) and transferred to an HS-100 videodisc for insertion into the program master. Commercials and three second "bumper" spots have to be added and Frank usually puts together the 30-second closing montage over which the closing credits crawl across the screen.

Great pains are taken to be sure the audio is just right. A scene in the local malt shop caused Kenwith to ask for some "hamburger noise" to be overlaid for authenticity. Audio levels are matched carefully between takes and can also be individually controlled to add or subtract emphasis. All of the audio changes are done in a separate editing room equipped with

continued on page

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One frame at a time

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multitrack audio recorders which can run synchronously with the VTRs being used.

After Kenwith is satisfied he has shaped the show adequately he now leaves the actual editing work to Frank and Trexler. As they assemble the actual edit list, they also produce a punched paper tape which a computer can read to direct the on-line equipment.

However, before the completed show can be committed to the program master tape, there is another session when the four writer/producers review Kenwith's masterpiece and suggest changes. These usually are not major alterations and a modified edit decision list is now ready to do its work.

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The on-line sequence

The punched paper tape carries all of the decisions needed to make the program master. As the computer starts reading the tape it directs the hub operators to load certain reels on the quadraphonic VTRs. It then proceeds to find the correct sequence by the address codes entered earlier and initiates the record reel on which the program material will be assembled. The computer can direct a program switcher to do cuts, fades, dissolves or special effects at desired places in the program. It also can control the synchronous audio recorders so they add edited audio tracks properly.

All of this is done through a mechanism known as a dedicated interface, a box with a microprocessor and a read-only memory which attaches to a VTR, a recorder or other studio device. This interface is programmed into it the pertinent characteristics of the device it is controlling. For example, in the case of a quadraphonic VTR, it would remember its start time, reel ballistics, pre-roll requirements, etc., and perform the necessary functions to follow an edit command from the computer with precise allowance for these factors. If the interface was controlling a U-Matic or a telecine machine, obviously the characteristics are different and the PROM contains different instructions in its memory.

While a segment is being transferred on one on-line VTR, the editing system can look ahead on the other machine and cue it up to be ready when its sequence is needed. This facility considerably reduces the editing time by minimizing wait periods.

The program master, assembled on the "recording" quadraphonic machine, can now be used to make a distribution copy. In the case of *One Day at a Time*, three such copies are made: one for CBS, the network that airs the show in the USA; one for Canadian distribution, and one for Australia, where the show is also popular. The NTSC tape sent to Australia is transcoded down under into the 625-line, 50-field color system for airing.

Summary

Watching the Kenwith/Frank/Trexler team produce a zippy show from the segmented tapes makes it seem almost too easy. Paradoxically, it's nothing of the sort, for between them there is a wealth of experience producing a whole which is more than the sum of its parts.

Kenwith admits to having felt more comfort when things used to be simple enough that he could manipulate the "slant tracks" (as he called them) himself. Today he is at the mercy of a lot of hardware, software and a maintenance regimen to keep

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Kenwith last reviews the script at the first reading with Herb Kenwith, the director. Left to right: Kenwith, Valerie Bertinelli, Cenzie Phillips and Pat Harrington, Jr. (Photo by Donna Foster Roizen)

Nevertheless, he has mastered the technique of doing all of this technology do his bidding. He is now at the point where he flatly states that he can do everything on tape he used to do with film and do it faster and faster!

Frank and Trexler suffer no such threshold inhibitions. Both are of the television age and adapt quickly to technical innovations. Selig Frank, whose nickname is Pinky, came from a high school incident when a bucket of paint ended up on his head and took six days to wash out, cut his TV teeth at KAKE in Kansas and KTLB in Los Angeles. To him the operations involving VTR, slo-mo discs, audio trickery and the like are second nature and comfortable, and are to be used when they are able to spruce up the production. He takes evident pleasure in describing the painstaking hours that have gone into some difficult editing sequences and remembers a recent musical concert of two 30-minute segments that had to be edited out of 32 reels of tape!

It is Trexler, the youngest of the trio, who was doing his first show, yet he seemed very competent at the controls. He claimed the keyboard entry to the computer was easy to learn because it closely resembles a standard typewriter. It took a little longer at first, but now he finds this method of editing to be so fast and efficient. Most of all he likes the wide variety of effects he can produce which he could not

do without computer assistance. Considering that he is new enough to tape editing to say that razor blade cuts on quadrasonic tape were before his time, this virtuoso on the keyboard taps out a fine time code.

Computer-assisted post-production editing is widely used and spreading further because it offers greater program production flexibility, a wider range of visually attractive results and economies in time for both the VTR duty cycles and the human editors involved.

While this article selected a specific show and a single facility, there are dozens of similar set-ups with equivalent equipment all over the United States, Canada and elsewhere, turning out the TV hits of today and tomorrow.

Acknowledgements

This article was made possible through the co-operative assistance of the following people: Barbara Broghatt, vice president, Media TAT Communications Co., who arranged the visits and photo clearances; Herbert Kenwith, director; Selig (Pinky) Frank, associate director; and Kris Trexler, videotape editor.

The title, "One Frame at a Time," is from a series of humorous out-takes of the show which was put together for internal amusement.

The post-production analogy is a quote from William Orr, president of Orrox/CMX Systems.



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Standard switching interface surfaces for total automation

By Phil Dean
New Rochelle, New York

Total automation, long considered the ultimate goal in efficiency and performance for TV and radio stations, has been "just around the corner" since computers first appeared on the broadcast operations horizon.

This "corner" was finally turned earlier this year, however, when the BIAS (Broadcast Industry Automated System) division of Data Communications Corporation announced it had perfected an automated interface system which would be compatible with all major makes of switchers.

Some industry experts, systems operators and manufacturers are now predicting that many stations will take the total automation route in the near future.

A number of TV stations have already gone "total automation" via

specialized system hook-ups. Metromedia stations, particularly WTCN-TV, Minneapolis, were of the first groups to go to a automation system with a custom-built interface developed by station engineers, using a standard switcher. WNEW-TV, New York, another Metromedia station, followed shortly thereafter with a custom-built interface.

Despite this early move to total automation, the potential for industry-wide total automation was neither evident nor viable until development and testing of a system which could be interfaced with various types of production switchers.

WNAC-TV goes automated

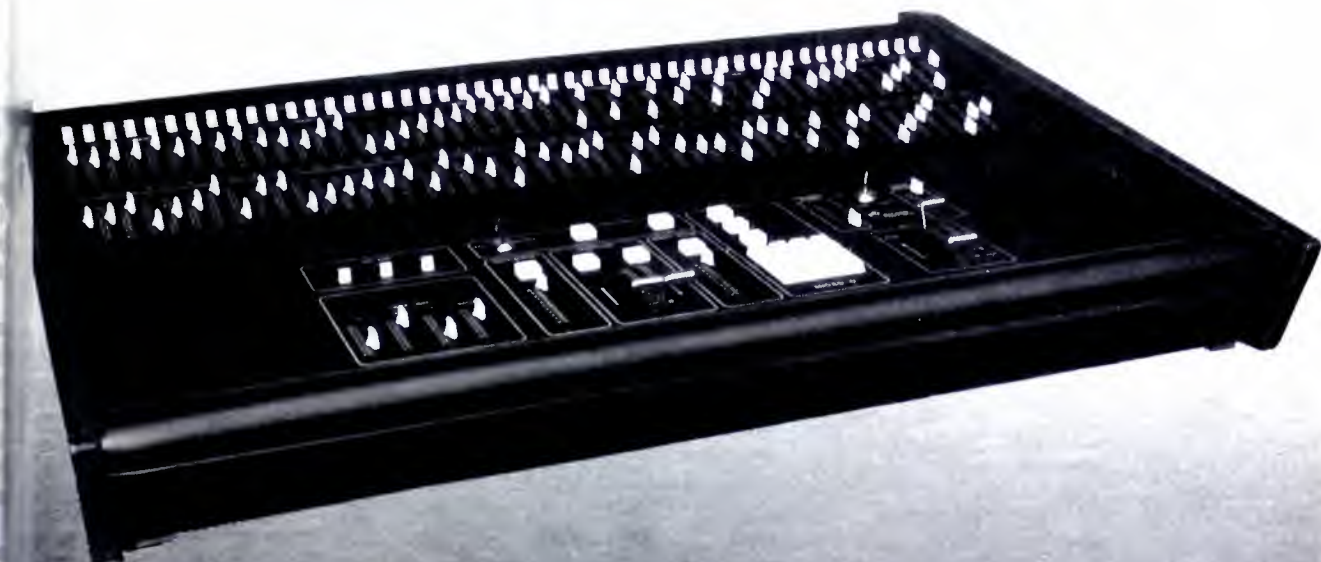
The BIAS development was quickly absorbed by a number of stations.
continued on page 10

In WNAC-TV control room are Ron Caron (left), station engineer, and Ronnie Wilkes of BIAS. Bottom left is a CDL master control switcher console.



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Interface surfaces

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stations, including WNAC-TV, Boston, the RKO-general station there, which in January 1977 began the conversion to total automation using the BIAS business system interfaced with a CDL technical switcher.

The Boston marriage of the business automation system, via BIAS, and the technical automation system, via a CDL system through the new BIAS interface, was begun on January 3, when a BIAS conversion team began the installation of the hardware/software for total automation.

On February 3, exactly one month later, WNAC-TV went on the air "live" with its total automation system. For the first few weeks the station maintained a parallel operation until the system was fully de-bugged. By the first week in March, the BIAS-CDL total automation system was in full operational control.

The decision to go to total automation was a major one for WNAC-TV's management and engineering staff. For the engineers it was a natural extension of the fast-changing state-of-the-art in broadcasting operations. For management, it came down to a "bottom-line" decision.

James Coppersmith, then vice president and general manager of WNAC-TV (and now head of WNEW-TV, New York) believes that the advantages offered by a total automation system more than offset the financial expense.

"The end product of total automation was far greater efficiency in the overall operation of the station." James Coppersmith, WNAC-TV [now with WNEW-TV]

"The end product of total automation," Coppersmith said, "was far greater efficiency in the overall operation of the station. It provided us a competitive edge in the highly competitive (Boston) market, and upgraded our on-air attraction, which was our major goal."

Coppersmith noted that the TV audience often has the "What you see is what you get" syndrome, and

that a station with a sharp, precise and consistent picture, with no "black space" in the continuity of its presentation, would make a big difference with viewers. "It's that upbeat, on-the-ball atmosphere that often makes a difference to a viewer," said Coppersmith, "and the total automation concept offers that."

Operational changes

The conversion to total automation at WNAC-TV has brought a number of operational changes to the station, particularly in the traffic department. The station has been on the BIAS system since 1975, so much of the detail work was in training the staff in procedural changes.

Since all the data flows from the BIAS host computer in Memphis through the minicomputer in the traffic department and then on to the technical computer in the control room, maintaining the station logs accurately is imperative. Before introduction of the automatic switching system, traffic was required only to input all spot orders and commercial instruction, entering the name of the advertiser, the length of the spot, and the media. The master control engineer on duty would consult his operational log and roll the right commercial at the proper time. Exact timing of each log element was not essential from the traffic department.

With the total automation system, the computer controlling the technical switcher must know not only what commercial is running, but also detailed instructions as to the time and content of each commercial program element on the log. It is their responsibility to time out the log and include more detail on the commercial data needed for the exact timing for on-air status.

This puts a greater load on the traffic department, but as Dave McCracken, traffic director for WNAC-TV, notes, "The traffic people have had to learn a new language and have had to use that language precisely. The increase in responsibility has brought about an increase in morale and our staff enjoys the feeling that they are an important segment in the overall operation."

In the WNAC-TV operation, the log is held in the traffic department until it is fairly certain there are no additional changes. Then McCracken calls master control to see if they're ready for the log. When they say okay, the BIAS Nova II computer transfers the log to the CDL-PDP II technical switching computer

which then takes over control of the airing of the schedule.

Other benefits

Although the traffic department staff must spend more time guaranteeing the absolute accuracy of the timing segments to be sent to master control computer, the peripheral benefits from the automation system are obvious.

The man-hour savings in engineering and accounting are substantial, and this savings enables the engineering staff to devote more time to creative efforts and other important duties. The accounting department is relieved of most reconciliation duties as the automated system records all log data and transmits it back to BIAS' host computer for future invoicing.

The computer elements involved in the total automation system

**"The increase in responsibility has brought about an increase in morale and our staff enjoys the feeling that they are an important segment in the overall operation."
Dave McCracken,
WNAC-TV**

include the host computer at EMI headquarters in Memphis, and Burroughs Tri-processor '67 models, which handle the more than 160 stations on the firm's customer list, and a Honeywell Multics system. The BIAS system is an on-line, real-time, fully dedicated service and access to the host computer via a Data General Nova minicomputer based at the station. The third computer element is the Nova computer controlling the technical switcher in the master control room which is interfaced with the BIAS system.

Versatile interface

While the WNAC-TV total automation system was undergoing a shakedown phase in Boston, the BIAS conversion team was working on an even more exotic link-up with station WEWS-TV, the Scripps Howard station in Cleveland, Ohio. The WEWS-TV conversion was an ideal opportunity to demonstrate

satellite of the BIAS interfacing concept. Though all of the technical equipment at WNAC-TV was made by one switching manufacturer, CDL, the WEWS-TV technical set-up included a Grass Valley Group 1400 switcher driven by Vital Industry's VIMAX 200 software package.

The conversion was initiated in March when John Moore and Robert McCommons from BIAS arrived in Cleveland to do the pre-conversion survey work which included the establishment of all program codes and a time table for the actual conversion. On April 18, Moore and Madeline Simonetti began the actual physical conversion to total automation. On April 27, WEWS-TV ran its first "live" automatic switching log.

Unlike WNAC-TV, the Cleveland station did not run a parallel operation but decided to put its faith in the automated system for at least parts of its program for the first day. Although there were a lot of crossed fingers around the station everything went smoothly with only a few minor crises to mar the occasion.

Within a few days the full schedule with the exception of local news, was being carried by the station and all hands were feeling more comfortable with the new concept. Jim Boyd, WEWS feeling more comfortable with the new concept. Jim Boyd, WEWS vice president and chief engineer, was enthusiastic about the cooperation that existed between the BIAS and station people and his own staff. "I think that's why the transition ran so smoothly," he said.

Boyd, who has felt for a long time that total automation is the

answer to a number of TV station problems, had been bidding his time until many of the technical production problems were solved. "We wanted to go into total automation in the 1960s," he said. "But due to the inexact timings of the commercials (films, slides, VTR), the inherent accuracy built into the computers would have caused problems. When the computer controls the switcher, a 30-second spot is just that—30 seconds. And in those days many of the spots were not timed exactly. The situation is a lot better today and the majority of the commercials we receive are timed out pretty much on the nose."

Tough beginnings

The conversion to total auto-

"We learned more about accuracy, cues, and gained a greater understanding of the flexibility of the computer. . . ."
George Cervený,
WEWS-TV

mation is not without its traumatic effects, however, particularly in the traffic department. George Cervený, traffic director for WEWS, tabbed the early days of conversion as "controlled chaos," but looks back on it now as a vital experience.

"It was quite an education," Cervený said, "both for me and my staff. We learned more about ac-

curacy, cues, and gained a greater understanding of the flexibility of the computer and a more thorough knowledge of the importance of a strong link-up between the business side and the technical side of our station operations."

One of the benefits that came out of the conversion, according to Cervený, was a better understanding of the engineering function at the station. "We now have an open communications policy with the engineering department," he said, "which will allow us to continue to fine tune the operation. It's been a revelation."

With conversion of WNAC-TV and WEWS-TV accomplished, BIAS is working on conversion of a third TV station with a third and different master-control switching product to interface with. This is station KTLA-TV, Los Angeles, and the initial surveys and projection studies have already begun.

The importance of proper preparation was underlined by James McKee, president of the BIAS division of Data Communications, who stressed, "Conversion to total automation is an exact science. There is no room for guesses or errors. It is important that prior to each conversion every person connected with the operation be fully briefed and trained."

To accomplish this, an intensive training program is conducted for the station personnel. The new computer is explained, the operation of both hardware and software is covered in detail, and the need for complete and total accuracy is impressed upon the staff. During the conversion, the staff people from BIAS, the switching manufacturer, and the engineering department from the station along with the traffic people work closely together so that everyone will understand all facets of the conversion program and its end result.

Looking ahead

McKee thinks that the introduction of the standard interface concept, which has been accepted by the three major technical switching manufacturers, will open the doors to many TV stations which are now in a semi-automated status and which can be converted fairly rapidly in a short period of time.

"The custom-built, made-to-order tag has been removed from the field," McKee said. "The technical sophistication that set total automation apart for so long is now standardization. . . for total automation, the future is now." □



Garry Van Camp (left), engineering liaison, WEWS-TV, and James E. Boyd, vice president and chief engineer, WEWS-TV, check out master control room of new total automation system.

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 KAMR, Wichita Falls, Tex.
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 KDKA, Pittsburgh, Pa.
 KFI, Sioux Falls, S.D.
 KENS, San Antonio, Tex.
 Kentucky ETV, Lexington, Ky.
 KGO, San Francisco, Cal.
 KGW, Seattle, Wash.
 KHQ, Spokane, Wash.
 KIFI, Idaho Falls, Idaho.
 King Broadcasting, Seattle, Wash.
 KLAS, Las Vegas, Nev.
 KLVX, Las Vegas, Nev.
 KMBC, Kansas City, Mo.
 KMJN, St. Louis, Mo.
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 KVAS, Fort Worth, Texas.

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 U of North Carolina, Chapel Hill, N.C.
 U of Rochester, Rochester, N.Y.
 U of Texas, Houston, Texas.
 U of Wisconsin, Madison, Wis.
 Video Group, New York, N.Y.
 WABC, New York, N.Y.
 WAPA, San Juan, P.R.
 WAST, Menands, New York.
 WAVF, Louisville, Ky.
 WBAY, Green Bay, Wis.
 WBBM, Chicago, Ill.
 WCAU, Philadelphia, Pa.
 WCBN, New York, N.Y.
 WBFS, Buffalo, N.Y.
 WBIR, Knoxville, Tenn.
 WBNS, Columbus, Ohio.
 WBRC, Birmingham, Ala.
 WBRZ, Baton Rouge, La.
 WBZ, Boston, Mass.
 WCCO, Minneapolis, Minn.
 WCVB, Needham, Mass.
 WCPQ, Cincinnati, Ohio.
 WDAF, Kansas City, Mo.
 WDSU, New Orleans, La.
 WDTN, Dayton, Ohio.
 WDNH, Durham, N.H.
 Western Electric, Tulse, Ill.

WFB, Greenville, S.C.
 WFMJ, Youngstown, Ohio.
 WFRV, Green Bay, Wis.
 WFTV, Orlando, Fla.
 WGAI, Lancaster, Pa.
 WGBH, Boston, Mass.
 WGBY, Springfield, Mass.
 WGNO, New Orleans, La.
 WGR, Buffalo, N.Y.
 WHYN, Springfield, Mass.
 WIBW, Topeka, Kansas.
 WIS, Columbia, S.C.
 WISH, Indianapolis, Ind.
 WJZ, Baltimore, Md.
 WKBN, Youngstown, Ohio.
 WKBW, Buffalo, N.Y.
 WKPT, Kingsport, Tenn.
 WKRG, Mobile, Ala.
 WKYC, Cleveland, Ohio.
 WKZO, Kalamazoo, Mich.
 WLS, Chicago, Ill.

WH-1000 Equipment Users:

American Broadcasting Company, New York, N.Y.
 A-Tech, Austin, Minn.
 Green University, Bowling Green, Ohio.
 Catholic Network, Chicago, Ill.
 Adrens Network, New York, N.Y.
 Country, San Francisco, Cal.
 Incisisco Coast College, Costa Mesa, Cal.
 Columbia Broadcasting Co., New York, N.Y.
 Stratton, Santa Ana, Cal.
 Mesan Center, Uniondale, N.Y.
 Thamel Broadcasting, Rapid City, S.D.
 Enterprises, Boston, Mass.
 College Video, Miami, Fla.
 Sherman Network, Washington, D.C.
 College, Amherst, Mass.
 Public Broadcasting, Des Moines, Iowa.
 in Pilot, Charlotte, N.C.
 Kennedy Institute, Baltimore, Md.
 KABC, Hollywood, Cal.
 KAET, Tempe, Arizona.

Star Broadcasting, Washington, D.C.
 WMAQ, Chicago, Ill.
 WMAR, Baltimore, Md.
 WNBC, New York, N.Y.
 WNDU, South Bend, Ind.
 WNEP, Asoca, Pa.
 WNET, New York, N.Y.
 WNEW, New York, N.Y.
 WOTV, Grand Rapids, Mich.
 WPIX, New York, N.Y.
 WPVI, Philadelphia, Pa.
 WRAL, Raleigh, N.C.
 WRC, Washington, D.C.
 WVAZ, Huntington, W.V.
 WSHI, Harrisburg, Ill.
 WSM, Nashville, Tenn.
 WSYR, Syracuse, N.Y.
 WTAR, Norfolk, Va.
 WTMJ, Milwaukee, Wis.
 WTNH, New Haven, Conn.
 WTOI, Toledo, Ohio.
 WTTG, Washington, D.C.
 WTTW, Chicago, Ill.
 WTVB, Durham, N.C.
 WTVI, Nashville, Tenn.
 WTVT, Tampa, Fla.
 WFTL, Gainesville, Fla.
 WFLP, Springfield, Miss.
 WFLX, Petersburg, Va.
 WXXI, Rochester, N.Y.
 WXXZ, Southfield, Mich.
 ZDF Network (Republic of Germany), Washington, D.C.

United Nations Broadcasting, New York, N.Y.
 U of California at Berkeley, Berkeley, Cal.
 U of North Carolina, Chapel Hill, N.C.
 U of Rochester, Rochester, N.Y.
 U of Texas, Houston, Texas.
 U of Wisconsin, Madison, Wis.
 Video Group, New York, N.Y.
 WABC, New York, N.Y.
 WAPA, San Juan, P.R.
 WAST, Menands, New York.
 WAVF, Louisville, Ky.
 WBAY, Green Bay, Wis.
 WBBM, Chicago, Ill.
 WCAU, Philadelphia, Pa.
 WCBN, New York, N.Y.
 WBFS, Buffalo, N.Y.
 WBIR, Knoxville, Tenn.
 WBNS, Columbus, Ohio.
 WBRC, Birmingham, Ala.
 WBRZ, Baton Rouge, La.
 WBZ, Boston, Mass.
 WCCO, Minneapolis, Minn.
 WCVB, Needham, Mass.
 WCPQ, Cincinnati, Ohio.
 WDAF, Kansas City, Mo.
 WDSU, New Orleans, La.
 WDTN, Dayton, Ohio.
 WDNH, Durham, N.H.
 Western Electric, Tulse, Ill.

Star Broadcasting, Washington, D.C.
 WMAQ, Chicago, Ill.
 WMAR, Baltimore, Md.
 WNBC, New York, N.Y.
 WNDU, South Bend, Ind.
 WNEP, Asoca, Pa.
 WNET, New York, N.Y.
 WNEW, New York, N.Y.
 WOTV, Grand Rapids, Mich.
 WPIX, New York, N.Y.
 WPVI, Philadelphia, Pa.
 WRAL, Raleigh, N.C.
 WRC, Washington, D.C.
 WVAZ, Huntington, W.V.
 WSHI, Harrisburg, Ill.
 WSM, Nashville, Tenn.
 WSYR, Syracuse, N.Y.
 WTAR, Norfolk, Va.
 WTMJ, Milwaukee, Wis.
 WTNH, New Haven, Conn.
 WTOI, Toledo, Ohio.
 WTTG, Washington, D.C.
 WTTW, Chicago, Ill.
 WTVB, Durham, N.C.
 WTVI, Nashville, Tenn.
 WTVT, Tampa, Fla.
 WFTL, Gainesville, Fla.
 WFLP, Springfield, Miss.
 WFLX, Petersburg, Va.
 WXXI, Rochester, N.Y.
 WXXZ, Southfield, Mich.
 ZDF Network (Republic of Germany), Washington, D.C.

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 For More Details Circle (23) on Reply Card



Russ Wood, KSL-AM sales manager, gets the latest avails from the terminal in his sales area. The sales staff at each station is provided a terminal from which they may access avails, spot locations in individual breaks, day-parts or total schedules and pre-logs. These are "retrieval" terminals only and do not permit input of any kind.

Can TV and radio automation be compatible?

By Joe Meier*

In July, 1975 an article appeared in **Broadcast Engineering** describing a "minicomputer" traffic and accounting system developed by the engineering department at KSL Television in Salt Lake City, Utah. Prior to that time, in-house development of a reliable system capable of handling all of television's traffic and accounting needs was regarded by many as too expensive and too expansive. But, having done it, the development team was asked to take

*Information supplied by Bill Loveless, technical director of KSL Inc., and Brent Sylvester, system programmer

on what seemed to be an even more unlikely task: make the same system work for radio.

Could it handle radio and TV?

The question that needed to be answered was simply: Could a single software and procedures package effectively meet the needs of both radio stations and television stations? Most of the group sales managers felt it could not. The programmers felt that it could. Both were right.

On the "sales" level, the dynamics of AM radio, FM radio and television are vastly different. On the "computer" level, these differences are less distinct, and while the system did require some modi-

fication, the basic software remained intact. The key to solving the problem was the system flexibility.

During the past two years, Bonneville Traffic and Accounting (BTA) system has been installed at 10 radio stations within the group, and since the formats employed are widely diverse, the capability as well as the flexibility of the new General Automation 16/440 minicomputer and the software package developed by the Bonneville programmers have undergone a broad and meticulous evaluation by the station management, sales personnel and engineers. The result, according to Bill Loveless, director of engineering for KSL and supervisor of the Computer Development Project for Bonneville International, is a system that provides a full range of options and strategies tailored to the specific needs of both radio and television in a single package.

Serving mixed formats

The system is now operating with a variety of formats, four of which might serve to illustrate its depth and versatility.

KIRO Radio in Seattle, Washington has a newsradio format that carries a full 18 minutes per hour of commercial load. The station does extensive public affairs and sports programming and is a CBS affiliate. KIRO program logs run 60 pages daily with 366 similar pages stored in the system.

KMBZ Radio in Kansas City, Missouri has a strong "MOR" format, plus heavy by-play sports coverage of professional and collegiate sports (about 300 games per year), and CBS Radio Network. Maximum commercial load, again, is the order of the day (no pun intended), with the usual problems of rotation and separation.

KBIG-FM in Los Angeles, using Bonneville, "Beautiful Music" format, with the commercial load restricted to a maximum of 10 minutes (or 10 units) per hour, the format puts a premium on each location as well as tight control over all "talk" segments. The system produces 23 to 25 pages of log each day for this format, each log controlled by the automation computer, thereby effectuating a total operational control mechanism.

At KSL Television in Salt Lake City, the prototype for the television software is efficiently handled by the same system. For television:

continued on page

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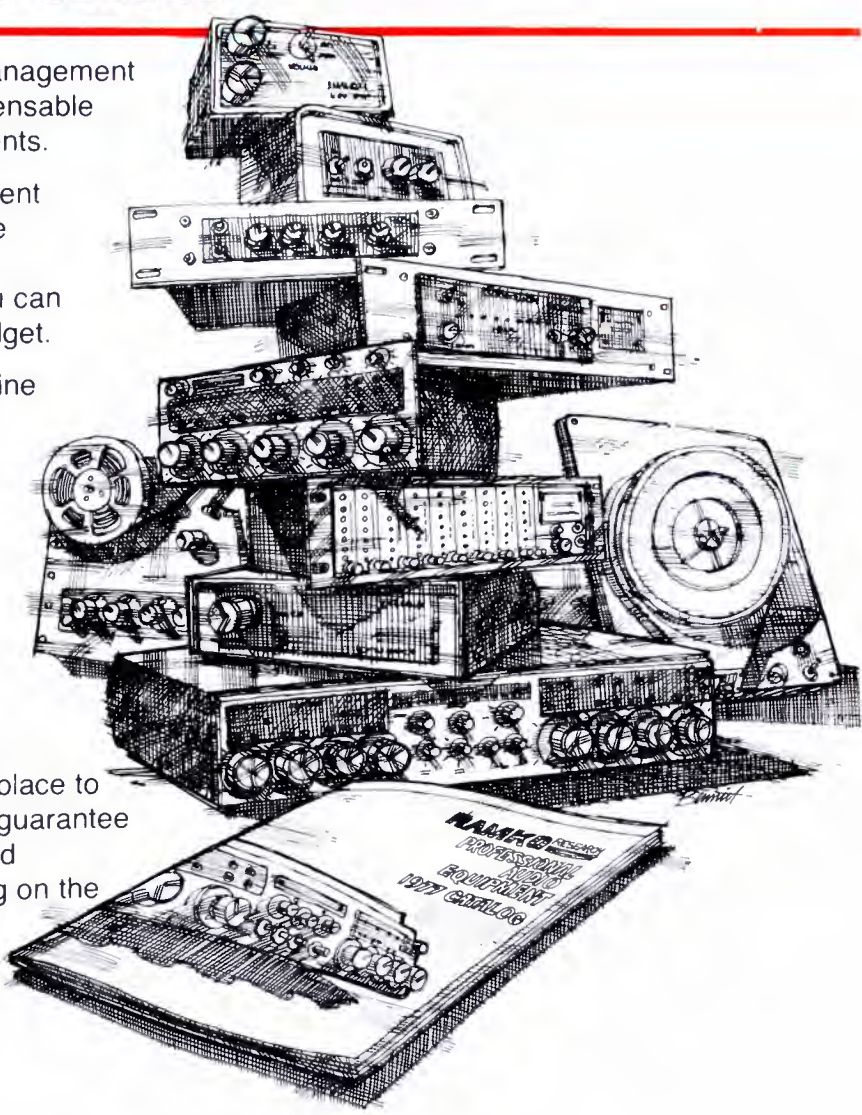
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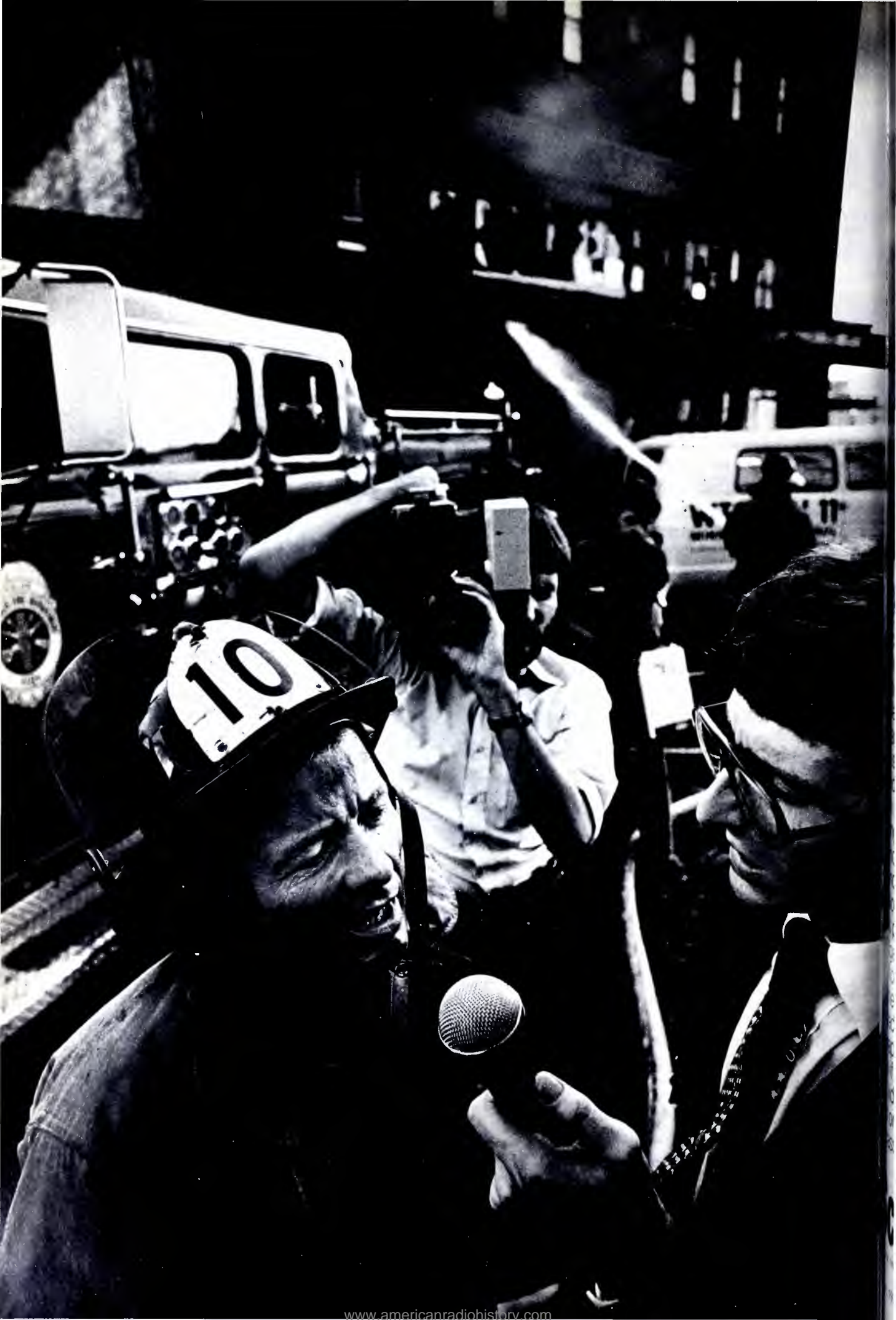
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Here's a videocassette made for the people who make the news. It's the new "Scotch"® Brand Master Broadcast U-Matic videocassette. MBU for short. The first ¾" videocassette designed specifically for tough ENG recording and the repetitive stress of editing.

We took the same high energy oxide videotape you've used for years and fused it to an incredibly strong backing. The result is a videotape that won't twist, tear or jam in the field. An unyielding videotape that won't stretch or slip under the strain of tape editing's fast forward, still and reverse modes or degrade in extended motion.

To protect it even under the worst conditions, "Scotch" MBU videotapes are packed inside a high impact plastic shell.

Of course, "Scotch" MBU videocassettes have the same high signal-to-noise ratio and low wear and dropout rates of our superb U-Matic tapes.

So if you've ever worried about a good story being lost because a videocassette broke at the same time, rely on "Scotch" Master Broadcast U-Matic videocassettes. They'll always back you up.



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"Scotch" MBU Videocassettes.

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For More Details Circle (25) on Reply Card

March, 1977

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Automation

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only addition is one terminal dedicated to continuity control.

In every case, the system provides instant availabilities, long-range and short-range forecasts, a variety of sales and budget reports and comparisons, invoicing statements, aging reports and accounts receivable controls, in addition to the daily log.

"We have developed a system with the capacity and flexibility of the 'on-line' systems," said Lovelless, "with the economy and control

of an in-house minicomputer."

Software language

One of the secrets of this success was the use of "Assembly Language" in the development of the software. Even though this dedicates the program to the particular hardware used (in this case the General Automation 16/440) and takes longer to write, it does make maximum use of the hardware capability by coding at the machine level. This pays off handsomely in more efficient use of core and bulk and delivers faster execution.

From now on, all other multi-cart machines are out of date.



Beucart 4D.

Even if you've just purchased a multi-slot broadcast audio cartridge reproducer, you're already behind the times. Because Beucart has introduced a revolutionary four-slot machine with features so advanced that existing units can't come close.

While standard 3-deck machines use a single motor and power supply to drive three carts, the Beucart 4D is really four completely independent cart reproducers in one housing. Not only are key operating specs, like wow and flutter, easier to uniformly maintain, but the failure of an operating component will put only one slot out of service. Each machine may be individually removed from the 4D housing, leaving the other three still on the air. Try that with a 3-deck!

Other features? Dozens. 4D is the only multi-slot machine with the new, patented Beau pancake hysteresis-synchronous motor. This guarantees the quietest and coolest machine in the industry. And fast forward is available in any (or every) slot.

Let us tell you more about the exciting Beucart 4D. Models available in stereo and with built-in recorders. Call today.

UMC

BEUCART DIVISION
UMC ELECTRONICS CO.

460 Sackett Point Rd. North Haven, CT 06473 (203) 288-7731

For More Details Circle (26) on Reply Card

Going "Up" in a new station has not been a problem. The vendor drop-ship the hardware to designated site and the local station engineers handle the shakedown and pre-test. (In addition to the computer, each station installation employs two Wangco T2221 Drives for 20 Mega bytes of storage, three Hazeltine 2000C CRT terminals, two Centronics 306C printers with two fonts and autostart, Penril 300A modem and one Data-Mation M200 card reader.)

Once the hardware has been installed and is operational, the software is installed by simply loading two boxes of pre-punched cards into the card reader and pushing the button. In a matter of minutes the software resides on disc. The data base is then downloaded through the CRT terminals. Broadcast and commercial forms are loaded into the model week and copied throughout future logs. Individual items such as programs, PSAs and promo announcements may also be copied.

Next the broadcast orders are entered from forms filled in by the sales department. As each order is entered on the CRT, automatic placement occurs in future logs. Immediate feedback on the log shows the future time, position and date for each spot placed on the log, with an indication of preemptions that may occur. The operator has the option of modifying or canceling the order at any time. At the conclusion of the entry process, or whenever the operator chooses, a single command at the CRT brings out a hand copy of the newly entered or modified orders in four- or five-part confirmation contract forms pre-loaded into the designated printer. The two printers are shared via CRT commands rather than patch cords.

Continuity instructions, availability mats and sales budgets are entered. In three to five workdays, depending on commercial load, the station's traffic personnel have constructed the first half of the data base and have learned how to operate the system as well. Daily program logs are now generated and the traffic operation proceeds on the computer system.

Near the end of the first month of operation on the system, the counting portion of the data base is inserted. All prior accounts receivable information is entered via CRT terminals. This updates computer files by placing all unpaid invoices in the system. At this point

continued on page 2

The VTR Format of Tomorrow.

While others are still talking about it... Bosch already has it: the BCN System.

Since the BCN was first introduced, more than 370 of these systems have been ordered from all parts of the world.
More than 150 of them have been delivered and are in operation.

The four basic requirements placed on a new VTR

- Top broadcast quality for all TV standards.**
- Universal applicability.**
- Reel-to-reel and cassette handling.**
- Adaptable to future developments.**

The BCN System meets these four basic requirements for a new VTR format today:

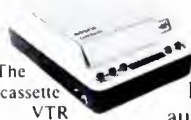
The compatible and economical BCN 1" format produced by Bosch guarantees broadcast quality in all TV standards and color systems (PAL, PAL-M, SECAM, NTSC). For all fields of telecasting and VTR applications. It is adaptable to future developments in video tape and video head technology. The segmented-field process makes purely electronic switching of writing speeds possible. As a result, the BCN is already an economical and universal VTR with a guaranteed future today.



The portable BCN 20

The BCN System offers two different portable versions: the portable BCN 20 with a tape capacity of more than 60 minutes on one reel - and the BCN 5, the 20-min. cassette recording and play-back version.

The BCN 5 cassette VTR



Both versions operate under all conditions with full broadcast quality. In the future, the BCN cassette version will also be used in an automatic multi-cassette VTR.

The BCN System features electronic editing with:

Single-picture display - for an unlimited time with no danger to the tape.



Tape guidance system in the BCN 20

Jogging - single-picture search mode, forward and reverse.
Slow-motion, fast-motion - variable take-search mode.
And all this with a state-of-the-art digital store.

The BCN format also offers the possibility of filing over 100.000 single pictures (for example, slides) on a 90-min. video tape with an extremely short access time to each single picture.

The BCN System is designed for both basic tape-handling methods: reel-to-reel and cassette handling in full broadcast quality, in both portable and stationary VTR's.

BCN - a format with a guaranteed future.

See us at Booth 26 and 27, SMPTE show, Oct. 17-20, Century Plaza Hotel, Los Angeles.

BOSCH FERNSEH

Robert Bosch GmbH, Geschäftsbereich Fernsehanlagen,
Postfach 429, D-6100 Darmstadt, Federal Republic of Germany
Robert Bosch Corporation, Fernseh Group,
279 Midland Avenue, Saddle Brook, New Jersey 07662

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All terminals are plug interchangeable and traffic managers may operate any of the systems in the event of an emergency. The disc packs are also interchangeable and redundant. The terminal in the foreground has push-button access to all three systems and is used by all three traffic managers to generate print commands. This leaves the regular terminal free for input chores, permits simultaneous printing of various forms and maximizes the real-time capacity of the system.



The "computer room" at KMBZ/KMBR in Kansas provides a clean, cool atmosphere with complete "around" access to all hardware. Lin Harper (top), news manager, and Bob Minter, operations director, inspect the system prior to bringing it "up."

Automation *continued from page 40*

invoices, summary of invoices, statements and aging reports may be printed.

The entire process takes two, one-week training segments; the system is fully operational and the station staff has been trained. A detailed "Operations Manual" is then given to each staff member for

further reference and the station is on "stand alone" status with complete control in-house.

Automatic software features

While it is true that computers can't think, it is just as true that they do have a certain definable structure, intelligence and person-

ality. The software is, of course, the controlling element that gives the system its identity. The Bonneville system has been revised, expanded and enriched many times in the four years and the resulting "automatic" features have proven to be extremely useful. Some examples

continued on page

Increase Your Modulation...



...with the new
MSP-100



HARRIS
COMMUNICATIONS AND
INFORMATION HANDLING

See Us at NRBA Booth # 28, 29, 40 and 41.

MAXIMUM signal loudness and performance...
minimum distortion...with Harris MSP-100 AM/
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Extremely flexible, the MSP-100 optimizes your signal no matter what the format. A tri-band AGC processes separate segments of the audio spectrum.

A sophisticated limiter program sampling circuit automatically selects the proper attack/recovery times.

Ease of adjustment and repeatability of settings is assured by use of precision step switches.

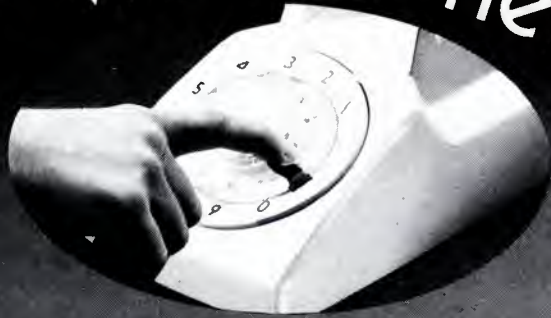
Peak reading output...rugged modular construction...simplified maintenance...LED's for monitoring and troubleshooting.

The MSP-100 has it all, and packs a powerful sound. Write: Harris Corporation, Broadcast Products Division, Quincy, Illinois 62301.

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DIAL-A-WATTmeter



... or dial for an RF load or plug-in element. Dielectric Communications now offers toll free dialing for easy ordering and quick shipment of its complete line of RF instruments.

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- **Easy** — dial 800-341-9679 to order
- **Reliable** — Full two-year-warranty on all RF wattmeters, loads and elements
- **Convenient** — Use MasterCard or (BankAmericard) VISA



A complete line of terminating loads:
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Accurate and portable insertion wattmeters measure forward and reflected radio frequency powers. Large scale, easily read meter movement with plug-in power detectors and quick match RF connectors.

Equipment is tested and serviced to exact specifications.

Now it's covered with two-year warranty.

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Now...
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Year Warranty**



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The small machine for big stations. The big machine for small stations. AVR-2.

...s what it has to do. There's an Ampex AVR-2 for every videotape assignment in your station.

If you already have a complete production/editing setup, you probably don't need a lot of accessories for your AVR-2.

... it with basic manual controls, and you're ready to go to work.

If you might want Super High Band Pilot. Comes with optional switch selection to convert the standard High Band Color controls, and it adds valuable depth to your regeneration production work.

If you're just now growing into more advanced production work, then you're ready to want the EC-2 Edit Controller.

This complete, sophisticated stand-up time code editing accessory can put you in command of as many as seven additional (similarly equipped) machines working in any combination of master/slave for production or multiple dubbing service.

Modular construction means an easy fit for your AVR-2, no matter where you want to use it—at a remote location, in your tape room, or out in the mobile van.

AVR-2 is the quad recorder that grows. Every accessory for this machine is available upon initial purchase or at any time in the future when you're ready. Tell us what it has to do, and we'll recommend the model that suits your needs.



AMPEX

Q.

What's smaller than a breadbox, tells the truth, and won't flutter your RFI or wow your wallet?

A. **FIDELIPAC®**
WOW & FLUTTER METER.



For less than \$350.00 you can have a portable, solid-state instrument that quickly and accurately measures the wow, flutter and drift characteristics of any sound reproducing device . . . cartridge or reel-to-reel tape recorder, turntable, film chain, etc. It's easily connected to your equipment and features a standard phone output jack for oscilloscope connection as well as a self contained switchable weighting filter. With its internal precision 3.150 Hz reference oscillator and its complete immunity to EMI and RFI, Fidelipac's Model 65-390 Wow and Flutter Meter is truly indispensable for your test bench or studio.

For more information, contact Fidelipac or your local Fidelipac distributor.

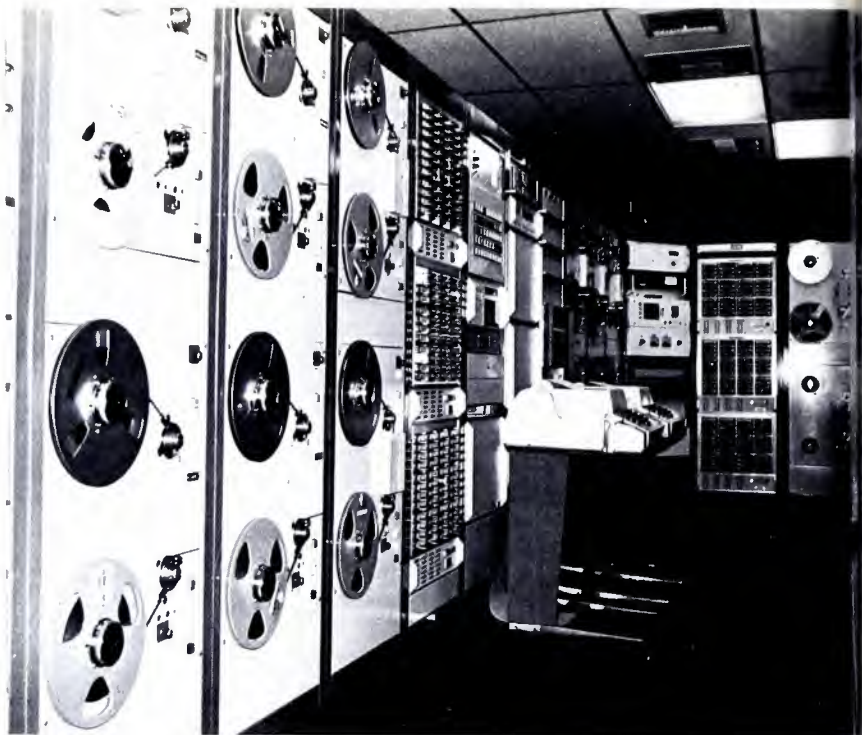
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The BTA 101 traffic computer generates logs precoded for entering into KBIG/KBRT automation computer (a general automation spec 16). Interface the two systems is part of the Bonneville computer division's long-range plan.

Automation

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- A program "Sprayer" permits special programs, sponsored or unsponsored, (e.g., public affairs or sports broadcasts) to be inserted into the regular log format instantaneously. The program "Special" so inserted will have the proper commercial format and spots already scheduled and the time segment that is preempted will be rescheduled or placed in the preempt file at the option of the operator.
- Development of a pre-log for radio as well as television. The pre-logs reside in the system and can be printed out or reviewed page by page on the CRT. The pre-logs, in two formats, may be called up for any day or day-part for up to a year in advance.
- A "place" program has been developed which, at the option of the operator, can be called at any time prior to the printing of the final log. When the place program is called, all spots on the log and all spots in the preempt file are reviewed by the computer. High priority spots are automatically placed (preempting spots of a lower priority if necessary) and any "holes" in the log are filled from the

preempt file. The process takes 30 minutes.

Complete redundancy

"One of our big concerns," says Loveless, "has been the protection of the data base and station operation in the event of failure. We took a giant step forward in solving this problem when we constructed the software in 'Assembly Language.' This gave us maximum speed, capacity and efficiency at the outset. We then developed a method of 'talking' to the computer that avoids both the time consuming 'question and answer' format and the cumbersome, 'fill-in-the-blank' transactional system. This made it possible for us to develop all of the features specified by the stations in a system that would operate normally on a single disc drive."

"Since the hardware configuration was designed for two disc drives," Loveless continued, "complete redundancy was achieved without limiting speed or capacity. The redundant disc drive, of course, provides the needed protection."

Each drive has a "fixed" and "removable" disc pack. Normally only the two fixed discs are used

data base. The two removable
ks are spare copies of the data
e and since they are removable,
y can be saved for any specified
h of time. The two printers and
e CRTs are plug interchangeable
are also redundant.

he system has been reliable,
s and extremely fast. The servo
trolled magnetic heads in the
drive fly on a thin film or air in
lean air environment and never
ch the disc surface. Average
cess time is 30 milli-seconds.
ncumbered by "line" limitations,
system operates at a speed of
0 baud, which means more
ctions can be performed faster
with greater economy than
st" computer systems that must
ire their "real-time" capacity
m many other stations.

Computer advantages

According to Loveless, the de-
velopment team has had the same
directive from the beginning of the
project to the present: "Develop a
system that will provide manage-
ment with the tools to optimize the
station's sales capacity, accurately
monitor all business and program
activity and provide positive custom-
er verifications."

Here are some of the ways the
Geneville Traffic and Accounting
system has met those objectives.

Availabilities are projected in
week increments, up to one year
in the future. These avails are
presented multi-dimensionally by
day by time (hour or day-part) by
station and by percent of time sold.

Management and sales projections
can be pulled out, up to one year in
the future and reported in many
dimensions, including day-date
comparisons, year-to-date compari-
sons, sales projections, variance in
budget by percent or actual amount.

The "place" command optimizes
the log by automatically exchanging
spots in the preempt file with
spots of lower priority and/or lower
value, all within contract
parameters.

The "find" feature locates all spots
for a particular client and displays
(in print) the date, time and
location for all spots in the schedule.
This command may be given at any
time and may be further refined to
show any spots in the schedule that
have been preempted.

The continuity system operates
with the client's spot rotation in-
structions and flags missing copy on
the pre-log and/or a separate
log that can be called up to show

continued on page 48

Transmitters Love Our Modulimiter.

The Competition Will Hate Your New Sound.

The BL-40 Modulimiter is a unique automatic AM broadcast limiter, which will maximize modern transmitter performance. Whatever your format—hard rock to classical, Modulimiter will increase transmitter efficiency and extend coverage.

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Automation

continued from page 47

only those accounts for which continuity has not been assigned.

- Many powerful sort options are provided that greatly simplify the management of sales and accounting. For example, the cash flow system generates customer reports sorted in sequence for each sales person, showing all accounts delinquent, with the name, address and telephone number of the person to contact, an excellent report to help the manager stimulate cash flow.

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- The system maintains a computer model of the physical broadcast materials in the station. It can sort in three dimensions and produce lists of carts in any desired sequence. An "inactive" or "erasure" list can be produced easily by sorting inventory by sequence number, contract expiration date, and name.

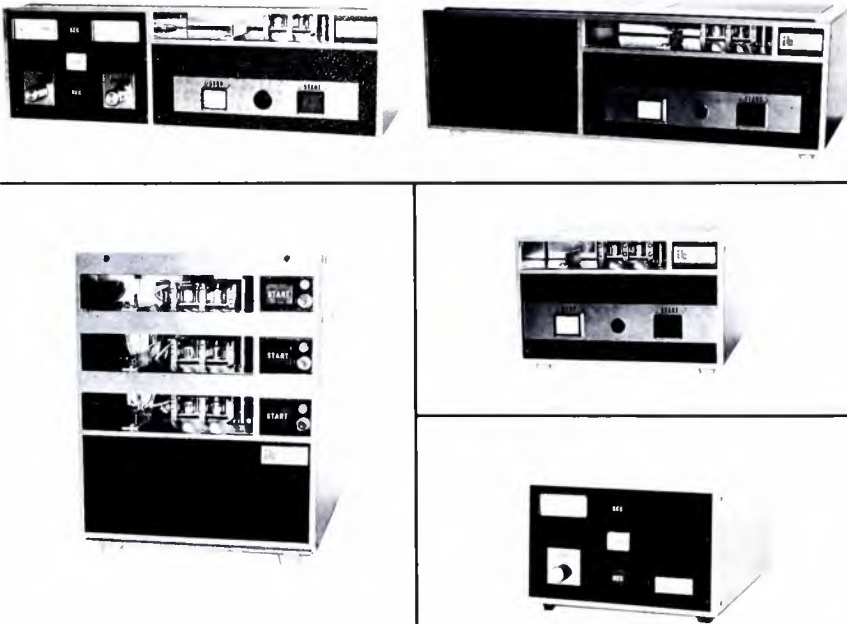
- Sales commissions are reported by either sales amount or cash collection.

- The system produces six accounting journals: cash receipt, unapplied cash, cash applied, invoice, debits, credits, and production invoice journals.

- The addition of a CRT in the sales department provides them with their own avails access. Furthermore, the modem may be connected into the national TWX network for dial-up computer avails in all sales offices. It may also be connected to a data phone for any number of dial-up CRT terminals outside the station. Changeable security keys and option locks in the software are provided for each CRT and the modem.

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For More Details Circle (33) on Reply Card

Interchangeable options

Even though the sales needs and business dynamics vary widely between AM, FM and TV, the advantages of a single package system are readily apparent. At KSL Inc. the three systems are located in the same physical area. Terminals for all three stations are placed in a room adjacent to the hardware. The printers (the only "noise" producers) are housed with the computers, but a high degree of visibility is maintained through a large window that separates the hardware from the terminal room.

Since the same basic system and procedures are in effect at all three stations, personnel can be interchanged if necessary, to cover sickness or vacation periods. In addition, each system's hardware is plug interchangeable. In the event of a breakdown, the unaffected systems can easily pick up the slack until repairs can be made. To cut down the number of terminals necessary in multiple system operations, a CRT terminal switcher is installed to access any of the dedicated computer systems from any of the CRTs.

"All of the radio and television systems currently available have some degree of compatibility," Loveless said, "but this may be the only totally unified computer system effectively handling AM, FM and TV in existence today."



Production engineers at KFRC now have two compact but efficiently designed studios in which to produce the many tape cartridges used by KFRC and her sister stations in the RKO Radio chain. Special care has been taken to insulate studios from surrounding noise because of the closeness of other facilities. (Photograph courtesy of Ampex Corp.)

Remodeling, not rebuilding, the answer for KFRC

By Robert M. Kanner*

Although the trend in recent years has been for radio stations to build new facilities rather than remodel old ones, such was not the case at KFRC, San Francisco. Making their existing structure, a building which was erected after the 1906 earthquake, personnel at the station KFRC completely remodeled and upgraded its broadcast production facilities over a year period, without losing a minute of broadcast air time.

Such a project is not easy to complete, but the rewards are well worth the price paid in temporary inconvenience.

Extensive use of tapes

As a contemporary music station, KFRC utilizes a tight broadcast schedule that relies heavily on tape

cartridges. Except for air personalities, news anchormen and selected phone callers, everything broadcast on the station is prerecorded on tape.

Similar work for KFRC-FM, along with the responsibility of producing automation tapes for four other FM stations that are part of the RKO Radio chain, meant an almost 24-hour-a-day work schedule in one production studio. Existing equipment was outdated, space was being used inefficiently, and the decision was made to go to a combo broadcast operation.

The need to upgrade and expand broadcast and production facilities became pressing as KFRC's business and responsibilities continued to grow. Like most older radio stations, KFRC added equipment and rearranged facilities as the need arose, until it reached the point where the sum of the parts wasn't adequate to serve the whole operation.

After studying the options, management decided it would be more

economical to remodel the existing structure. For starters, ceilings were pulled down and replaced, walls were rearranged to get maximum use from the space available, and a false floor was built to house all the wiring.

"Permanent" temporary facilities

Because both stations continued regular operations during the upheaval, logistics became a special problem—and temporary facilities became a permanent way of life for two years.

For example, temporary editing facilities for the news department were rigged up in master control, and the news staff was moved into the sales area while work proceeded. Air personalities took over a production studio while the broadcast facility was ripped up and rebuilt for the combo operation. At one point it was necessary to rig up a warning system so that carpenters would cease pounding when a record ended and resume their

continued on page 50

*Engineering, KFRC AM/FM, San Francisco

"The Ikegami HL-77 gives me the best picture I've ever seen on a portable camera."

That's what Jack Everette, Executive Vice President of Midwest Television, Inc., Champaign, Illinois, quotes Midwest news teams as saying about their Ikegami HL-77 ENG cameras. Midwest Television, Inc., has three cameras at Champaign (WCIA), a fourth at the state capitol in Springfield, Illinois, two in Peoria, Illinois (WMBD-TV), and two in San Diego, California (KFMB-TV).

Other comments:

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An air personality at KFRC is pictured from the adjoining news studio as prepares to go on the air. When the radio station went to a combo operation freed space for the news studio in space formerly occupied by broadcast engineers. (Photograph courtesy of Ampex Corp.)

Remodeling

continued from page 49

work when the next one came on.

The major challenge came in the design and construction of a block of four studios that would share common walls. Facing two production studios, where sound frequently reaches 110 dB in intensity, would be a studio for the recording of public affairs programs and the main broadcast studio.

Isolating each studio from the noise generated by its three neighbors was of paramount importance, and it was decided to solve the problem by following the room-within-a-room concept. Walls that separate the studios were built of sheet rock bonded to lead (two pounds of lead per square foot) and heavy metal doors were installed to further reduce the noise. Acouspa-pane®, a very dense glass that deadens sound, was used in the studios where needed. And wall speakers were mounted on springs to prevent the energy generated by bass notes from penetrating the walls.

Efficient use of space

While studio space was increased during the rebuilding, it didn't reach the point where technical personnel had to worry about unused space. Special attention was given to the layout of the production facilities, and the result was efficient use of the space available.

Careful planning left ample room in each production studio for the key equipment—a customized M. Curdy console, an Ampex ATR-1 professional audio recorder, and an Ampex AG-440 master recorder/recorders—and still enough space for easy movement by production personnel.

The end result is a modern facility with two well-equipped production studios that will serve the needs of the dominant radio station in three markets for years to come. And it's all housed in a remodeling building that rents for substantially less money than other available space.

Program line equalizer

Paul H. Bock, Jr., WSSV/WPLZ, Petersburg, Virginia

One common complaint of AM listeners is a lack of "crispness," or high frequency response, in an audio system, particularly with a compression amplifier and peak limiter in the audio chain. At the TV, the program chain looks like that shown in Figure 1, and under normal compression and limiting there is some bass boost and high

frequency rolloff, particularly above 7500 Hz. To overcome this deficiency, a variable equalizer as shown in Figure 2 was inserted in the program chain at the point marked "X" in Figure 1. Actual component values were derived experimentally, although a chart of inductive and capacitive reactance

continued on page 52

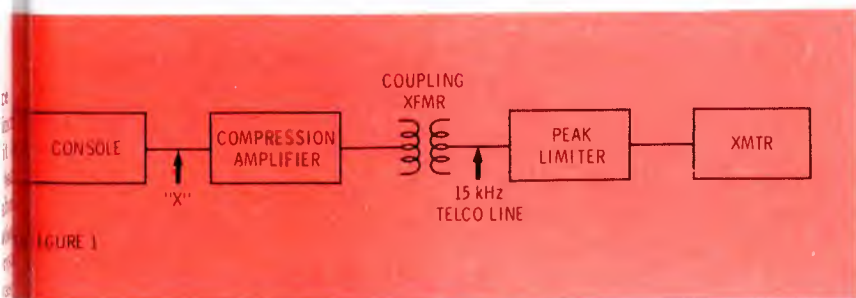


FIGURE 1

TABLE 1

	X_C	X_L
0	2650	9.42
0	1590	15.7
10	795	31.4
10	198.75	125.6
100	79.5	314
100	31.8	785
100	15.9	1570
100	10.6	2355
100	7.95	3140
100	6.36	3925
100	5.3	4710

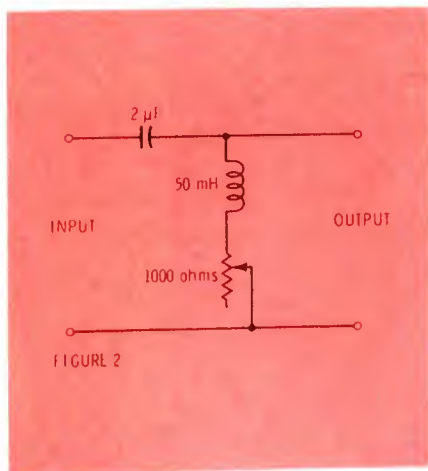


FIGURE 2

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16-480



30X WIDE
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16-480
1" f/1.7
12.5-375



15X WIDE
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16-240
1" f/1.7
12.5-190



11X UNIV.
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Program line equalizer

continued from page 51

values is shown in Table I for reference. It should be remembered that the actual reactance values at the point of insertion may vary depending on circuit constants in the equipment located on either side of the equalizer; that's why the final values were determined experimentally, after numerous frequency response runs on the system.

As shown in the graph of Figure 3, the equalizer combines bass rolloff and high frequency boost. This graph, incidentally, was made for 50% modulation with the compression amplifier set to zero compression and the limiter disabled, and is a duplicate of the 50% modulation Proof of Performance curve from microphone input to antenna.

By increasing the amount of resistance (R) in the circuit, the curve contour can be varied. In actual practice, the potentiometer is adjusted until either the 100 Hz or 5000 Hz limit falls within 0.1 to 0.2 dB of the ± 2 dB limit as prescribed

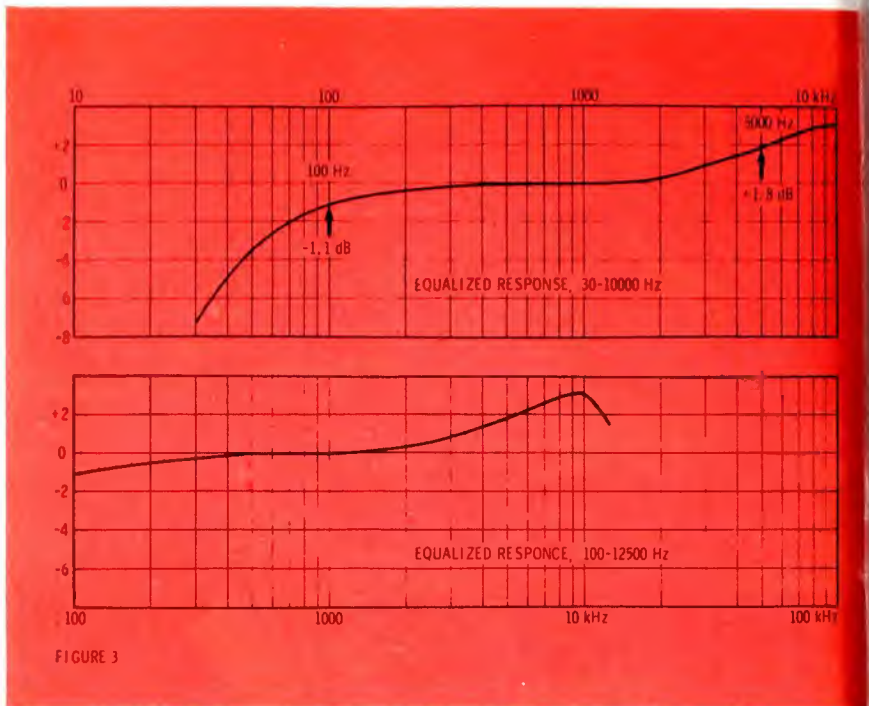


FIGURE 3

by the FCC. The system response then meets FCC specifications over the 100-5000 Hz bandwidth. When the compression is set to the normal operating position and the limiter enabled, the curve tends to flatten

out, thereby providing a more nearly uniform response over wide frequency range. Needless to say, the improvement in signal quality is obvious, and the cost is negligible.

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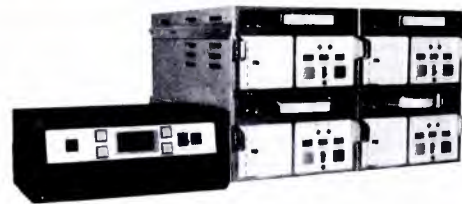


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There is very real evidence that the lack of such a general exchange of ideas has stunted the acceptance of various station titles as professionals. Keeping these kinds of ideas, locked in the station—or a lack of sharing—means that those who could have benefitted will have to learn the hard way. Meanwhile, without the knowledge they could have had, everyone comes up appearing less professional.

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If you don't have any items for the Station-to-Station column, the NAB Handbook can be purchased directly from the NAB by writing to: Station Services Department, NAB, 1771 N. Street, N.W., Washington, D.C. 20036. The price for non-NAB membership people is \$45. For NAB members, it's \$30.

... those whose equipment tips and operating ideas are accepted by Broadcast Engineering for use in Station-to-Station will be given the option of receiving a cash payment or a copy of the latest edition of the

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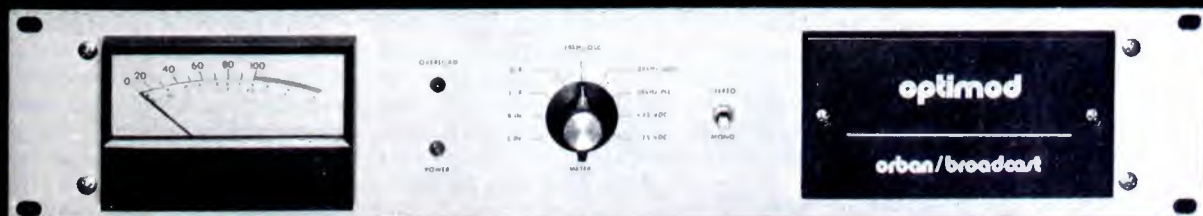
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For More Details Circle (37) on Reply Card



Announcer Jim Shanahan is shown doing a show at WHCN. Visible are the three McCurdy SP-10D turntables, three ITC cart machines, and the close proximity of the carts.

Control rooms can be designed for operators *and* engineers

By Lawrence Titus, chief engineer, WHCN

The studios at WHCN were designed around the needs of an active announcer and the demands of the engineering department for ease of equipment replacement and repair. The move of the studios to a previously unoccupied suite allowed me to create a studio design that incorporated the best of the studio designs of the past 10 years at WHCN.

The format of this station required the announcer to monitor the transmitter functions as well as handle records, carts and the board. I designed the studio around the announcer's needs to perform these responsibilities. The console is designed so the announcer does not have to move more than a few feet in any direction to get a record or cart for air play. Normally this would lead to a studio that would

make the announcer feel closed in. The placement of the windows to adjacent studios and into the reception area, however, give the feeling that the room is much larger than it really is.

Stand-up operation

The console is a stand-up type that allows the announcer to either stand or use the bar-stool chair to sit during his show. The board is directly in front of the announcer, raised off the console top by an inch to allow for copy and records to fit under the board. The copy rack is made of clear plexiglass so the announcer can see through it into the news studio.

There are three McCurdy SP-10 D turntables clustered around the announcer. The turntables are direct-drive and have a digital logic

start-stop circuit with triac motor control¹. They are remoted to push button switches located under respective pots for the turntable. The turntables have been further modified so that the leads to the table are on plugs. This allows to pull any table within a few seconds and get out of the studio and out of the announcer's hair. Having three tables in the studio will leave the announcer with two one should need to be removed.

The turntable preamps are located under the turntable as a part of the pedestal. The pedestal contains 250 pounds of sand sealed in the base. The bottom of the pedestal is mounted on a layer of foam rubber so the slower building resonances will not get into the turntable. This is due to the relatively large mass of the pedestal.

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...t.

Cart removal

The cart machines are located to the left of the announcer. I have three ITC cart machines. Each one can be removed in case of failure and not leave the announcer stranded. The machines are located on a wooden frame that allows them to be pulled forward enough for servicing, without removing them from the wooden rack.

There was a shadow created on the turntables when the cart machines were placed above the turntables, so I placed a number 47 light on each cart machine on the under-neath. This light shines onto the turntables from a vent hole cut in the bottom of the wooden rack. This creates an effect of slight spotlighting of the tables.

The board is an Autogram IC-10, a channel board. This board has enough versatility so that a patch panel was not necessary in this studio. All of the audio processing is done in the engineer's office, which allows repairs on the processors to be done without inconveniencing the announcer, makes the repairs easier (since the processors are located far from the test equipment), and keeps the processing out of reach of unauthorized hands.

The monitor rack is located just above the board. This wooden enclosure contains the remote control for the off-air monitors, and the on-air monitors. At a glance, the announcer can see the state of the transmitted signal and take the appropriate corrective measures if necessary, all within arms reach of where he is sitting.

Lighting the CR

The monitor rack has two spotlights which shine on the copy rack. The studio has surface-mounted fluorescent spotlights that are timer controlled. The announcer can set the mood for whatever he needs. The air conditioning and humidifier for the studios is also controlled from this location.

I have found there must be a fairly high percentage of humidity in the studios for adequate static electricity control. I have the system set for a level of 80%, which keeps the dust off records, reduces the static level to the point that the announcers aren't drawing arcs with their fingers, and is comfortable to sit in. It pushes in cool air without the noise of a high-velocity

continued on page 56



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Announcer Jim Shanahan does his show on the Autogram IC-10.

Control rooms

continued from page 55

system. It uses fiberglass ducts which reduce any transferred noise from the system or from studio to studio to an imperceptible level.

Ease of operation

The accent in the design of these studios was on the ease of operation and the ease of maintenance. With any component failure, the engineer is in the studio only long enough to remove the defective unit. The announcer is in control of his environ-

ment and can contour it to his personal taste. The proximity of the equipment and the material to be programmed generate more time for the announcer to spend doing show, not concerning himself with the motion involved in location and airing that material.

1. Titus, L. L., "Remote Start for Turntables," *Broadcast Engineering*, November 1972.

Editor's Note: It's always interesting to see how other stations view the need for major facility change. This control room certainly offers some distinct advantages for stations operating under circumstances similar to those at WHCN. Of course any change should be based more on operating and engineering than on color cameras and contouring aimed at impressing VIPs.

If you have suggestions for facility changes, send them to our Station-to-Station department. If they're accepted, we'll either send you a check or a copy of the new *NA Engineering Handbook*, whichever you desire.

If you've recently undergone major facility change and want to share the details with the industry, drop a line to the editor. Your efforts may turn into an article. After all, sharing our experience will help make all of us more professional.



Larry Titus, chief engineer, and his assistant, Neil Portnoy, make final alterations on monitor rack.

The antenna: AM's "final filter"

by Peter Burk

Recently there has been a lot of interest in AM antenna bandwidth. Antennas that have been operating fine, but "dumb and happy" for years suddenly deciding that the antenna system is causing audio problems. Frequently, the antenna is responsible for at least part of the problem, but before we blame it, let's look at our poor sounding audio on the final link in the chain, let's see if we can look objectively at the system.

Why now?

The antenna bandwidth problem is not by any means a recent discovery. Doherty wrote a very thorough paper on the subject 18 years ago! AM stereo may have triggered the most recent wave of concern. Indeed, any of the proposed AM stereo systems will demand flat antenna systems, but the concern is valid even for a station that intends to remain mono. The effects of a sharply tuned antenna on the high-end frequency response, distortion, and modulation depth can be severe enough to cost ratings points in a competitive market.

An antenna system that produces lower impedances in the sidebands than at carrier leaves you wide open for a citation if your modulation monitor isn't connected at precisely the right point. That is, it's possible for the modulation monitor at the transmitter to indicate less than 100%, but out in the field (where the R.I. makes his measurements) you might be substantially over 100%.

As the impedance goes higher in the sidebands, you won't have to worry about overmodulation...you'll have to worry about the program director instead. The effective modulation depth in the field will be less than it is at the transmitter.

The sidebands that are different from any other cause another set of problems, chiefly high distortion.

Other problems

The bandwidth of the antenna

system can be responsible for some less obvious problems, too. If your transmitter is blessed with a reflectometer in the output, you may have faced the problem of VSWR shutdowns with modulation. The reflectometer is a wideband device. If the antenna system is narrow, the reflectometer will see high VSWR every time the audio frequency is high enough to get out of the antenna's passband. The audio peaks are too fast to move the VSWR meter, so you don't see any change in the VSWR. But if the shutdown circuit is very fast (Harris MW series, for example), the peaks will be enough to dump the transmitter.

How to find out

First, determine if your station really does have an antenna problem. There are numerous approaches including the classic cold bridge measurements of 30 kHz on either side of carrier frequency. This information is useful, but there are several limitations inherent to the procedure.

First, in a directional system the RF generator used with the bridge may not produce enough energy to bring the mutual impedances into play. In a nondirectional, sources of re-radiation may exist which affect the antenna system but do not show up on the cold bridge.

Even if the bridge measurements reflect the true system characteristics, it is a little difficult to determine just how much effect any specific mismatch has on the audio without the aid of a computer. Just how flat does the curve have to be for reasonable performance?

Several standards have been written for "normal" load impedances. Years ago, the RMA specification called for resistance to be within 5% at ± 5 kHz and 10% at ± 10 kHz. Reactance was to be less than 18% of the midband resistance at ± 5 kHz and less than 35% at ± 10 kHz. The EIA specification isn't much different. Both specifications

continued on page 58

"No problems at all. Fantastic for their reliability."

That's what Len Eden, Director of Engineering, Broadcast Division, Evening News Association and Chief Engineer at WWJ TV Detroit, and his colleagues have to say about their Ikegami HL-77 ENG cameras. Other comments by the WWJ news crew include:

"We're very pleased with their performance and lack of need for maintenance."

"Temperature conditions are rough in Detroit, but our Ikegami ENG cameras work reliably."

"Super for news."

"Our Ikegami HL-77s are for everyday use. Reliable."

News-gathering teams use more Ikegami ENG EFP cameras than all other cameras combined. And if they all feel the same way about Ikegami the way they do in Detroit, it's no surprise.

Hear what we have to say about Ikegami ENG cameras. For further information contact Mort Russin, V.P., Sales, Ikegami Electronics (USA), Inc., 29-19 39th Avenue, Long Island City, N.Y. 11101 (212) 932-2577

Ikegami



For More Details Circle (40) on Reply Card

Radio workshop

continued from page 57

were written to provide the manufacturers with a guideline for designing output networks and broadcasters with an idea of what range of load impedances their transmitter would be content with.

Making the transmitter happy and making the G.M. happy can be two different animals. Let's find another way to look at the problem.

Look at the sidebands

Since the object of the exercise is to make certain that both upper and lower sidebands are reasonably flat and nearly identical, the best approach might be to look at the sidebands. A spectrum analyzer comes in handy here, but don't go away if you don't have one...there's another way.

We'll want to look at several locations in the field to be sure we gather meaningful data. Arrange for several monitoring points (in the major lobe if directional) at least a couple of miles from the transmitter.

You'll need power for the spectrum analyzer and communications with the transmitter, so plan ahead.

An operator at the transmitter should send a set of tones for you at a precise level of modulation. Use something less than 100% modulation, both for the sake of the transmitter and to make certain that all field readings stay within 100%, even if the modulation depth happens to be greater in the field.

Take a picture of the analyzer display at several frequencies. (The FCC proof-of-performance frequencies are spaced about right.) You can superimpose all sweeps on one exposure if you like.

Don't have a spectrum analyzer? Meaningful results can still be obtained with a field intensity meter or even a communications receiver with a fairly narrow bandwidth, provided the receiver has a good signal strength meter.

Modulate the carrier as before, then tune either side of the carrier for the sidebands. You will see three distinct signals (just like the book says!). Measure the amplitude of all three signals, and repeat for several audio frequencies. Five, 10, and 15 kHz should be adequate.

If you're unsure of the bandwidth

of the receiver, you can check to see if it's narrow enough to accurately measure the frequency question by tuning one of the sidebands, then removing the tone. The signal strength should drop at least 20 dB. If it doesn't, it means that the receiver is too broad. You have to confine your measurements to higher audio frequencies.

Analyze the data

After taking several sets of readings at various locations, compute the difference between your observations and the indications of your modulation monitor at the transmitter.

The power in each sideband can be figured from the formula:

$$P_{sb} = \frac{m^2 P_c}{4}$$

where:

P_{sb} = Power developed in one sideband

m = modulation percentage divided by 100

P_c = carrier power

The voltage you should read in t

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For More Details Circle (41) on Reply Card

d for each sideband can be
nd from:

$$E_{sb} = \frac{mEc}{2}$$

re:

sb = voltage measured for one
sideband

c = voltage measured for
carrier

ne sidebands should be sym-
metrical and, ideally, should show
equal or higher percentage of
modulation in the field than at the
transmitter. If they're reasonably
close, go look somewhere else for
the audio problem. If not, you've
got some work to do.

The cure

There are several approaches to
solving this problem. Like anything
else, the "cheap" cures usually are
less effective than the expensive
ones. Most likely you'll have to
compromise (unless you'd planned
out up new towers anyway!).

The classic approach is the "line
trimming" technique. A phase shift

network is installed at the output of
the transmitter to swing the resis-
tance and reactance curves around
to something more desirable for the
transmitter. In many cases, this will
mean an additional "T" network in
the line, but it's possible that an
existing impedance transforming
network can merely be readjusted
to provide the proper phase shift.

The amount of phase shift desired
can be determined by plotting the
 ± 30 kHz bridge measurements on
a Smith Chart. The "horseshoe" is
then rotated so that it opens to the
top (sidebands at a lower imped-
ance). The necessary amount of
phase rotation can be read directly
from the Smith Chart. More infor-
mation on using the Smith Chart can
be found in several of the refer-
ences at the end of this article.

**One word of caution here: The
amount of phase rotation necessary
is that which will put a symmetrical
load on the plates of the final, not
the output tuning network of the
transmitter. The inherent phase shift in
the output tuning network of the
transmitter must be taken into
account, either mathematically or
by actual measurement.**

Once the proper phase shift has
been introduced, another set of field

measurements should be made to
confirm your findings. You might
have to trim the phase shift slightly
to get symmetrical sidebands in the
field.

Monitoring the modulation

Having symmetrical sidebands is
nice and having them go lower in
impedance than carrier is nice too,
but it puts another responsibility in
our laps. If you've done everything
right, you'll have higher modulation
in the field than you might be
reading at the transmitter.

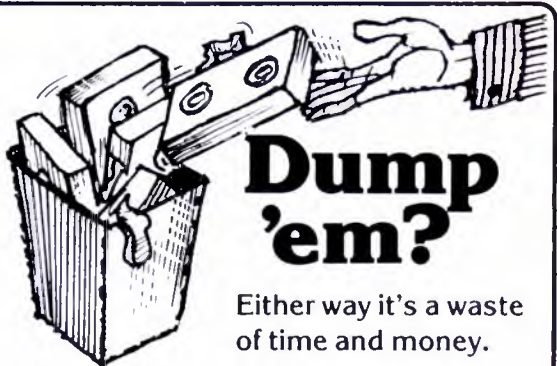
In case you haven't already
discovered it, the modulation mon-
itor will read differently when
connected to different points along
the transmission line. You'll also get
a different indication if you switch
from a voltage sample to a current
sample or vice-versa (unless your
antenna system is perfectly flat).

The reason is that a voltage
sample alone (the usual type of
pickup in the transmitter) doesn't
give you a true picture of the power
being developed with modulation
unless the load is perfect. For any
system, there is one point along the

continued on page 73

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For More Details Circle (42) on Reply Card

This is the official column of the American Society of TV Cameramen (ASTVC). The ASTVC can be contacted by writing to P.O. Box 296, Sparkill, NY 10976 (914) 359-5985

Take 1... Letters from

John Francis Lehman, WSYR-TV

From time to time, portions of our column will be "guest-scripted" by members of the ASTVC. This offering is by our newly appointed regional representative for the upstate New York area.

I have just finished shooting 1700 feet of Kiss Me Kate on 16 mm for the Newman Chaplain at Syracuse University. I also shot two 20-minute segments on a Sony DXC 1600 with a 3/4-inch VTR cassette and one 10-minute segment to be incorporated into studio sequences with a TK 76.

I was pleased to read the story of "JS" in a recent issue of **BE**. I originally filled out a standard network job application form and was

interviewed by someone. I cleared by NABET, and if memory is right, the network person said that I would be contacted. It was 15 years ago.

I did a forerunner of *WV Sports* (some time back) at Al Bald Stadium at Syracuse University. The "action" camera had a handle on it that was 48 inches long. From the press box roof could fill the screen with stitches of the football on the yard line. We spent most of the afternoon looking at buildings a good two miles away.

Where are the cameramen tomorrow going to come from? Certainly not from where they have come from for the past 25 years. It is with a questioning eye that I take a look at the workshop that will be sponsored by the New York outlets of the American Federation of Television & Radio Artists, N.Y. branch of Screen Actors Guild, Writers Guild of America, DGA at Brooklyn College. The project workshop kicked-off its first program in September, teaming with professional actors, writers, directors and college students majoring in production and management.

In case anyone is a member of Theatre, TV and Film Lighting Committee of the Illuminating Engineering Society, they will hold their national symposium November 11 in Miami, under the chairmanship of George Gill. Focus will be on developments in the field of entertainment lighting and energy conservation through the use of more efficient sources.

Take 2... In line with the preceding article

The *New York Daily News*, in a recent editorial, printed the following: "With \$500,000 in federal money, the (N.Y.) State Correction Department has set up an ambitious program to train convicts for jobs as television reporters, cameramen, producers, and commentators."

Take 3... Open invitation

Zoom In invites all cameramen to join ASTVC's goal of furthering professionalism of cameramen. We do not share your ideas on today's camera situations with others? In this way you'll help another cameraman, and you'll keep the ASTVC lines open for feedback. You can contact the ASTVC at the address at the top of the column, or by phoning (914) 359-5985.



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For More Details Circle (43) on Reply Card



**SOCIETY OF
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P.O. Box 50844, Indianapolis, Indiana 46250

equipment allows it to pick up signals it should not be receiving.

Further, many radio and television stations and thousands of amateur radio operators, not to mention millions of citizens band, are unduly accused and harassed for causing interference when, in fact, it is the fault of the receiver. In case after case, broadcast transmitters and amateur radio transmitters are being operated in the same building or adjacent to properly built home entertainment equipment with absolutely no interference, yet the neighbors are subjected to RF interference. The broadcast station and the ham or the CB operator can do little about it if the neighbor's phonograph or intercom decides to act like a radio receiver because of poor design.

A few manufacturers of home electronic devices recognize the problem and include interference-reducing components in their equipment. This shows that the components can be included and marketed at competitive prices. A large number, however, still do not include these components.

Adoption of the Goldwater Bill is a means of insuring that the nontechnical public will have available
continued on page 62

SBE backs law for interference-free receivers

The Society of Broadcast Engineers is urging adoption of legislation that gives the Federal Communications Commission authority to require inclusion of interference-protection components in consumer electronic devices. Senate Bill 1064, introduced by Senator Barry Goldwater of Arizona, would amend Section 302 of the Communications Act of 1934 to give the FCC authority to regulate the sale, shipment, import and use, as well as manufacture, of consumer electronic devices, and specifically to require use of "protective components which are capable of reducing interference to such equipment from radio frequency (RF) energy."

With the burgeoning growth in use of personal communications

devices and FCC studies that show almost all interference problems can only be cured at the receiver, the SBE states that legislation is needed to protect both the right of the nontechnical citizen to interference-free use of home electronic devices and right of individuals to use properly functioning personal communications devices.

FCC field offices received over 100,000 complaints last year, and current projections indicate over 800,000 will come in next year. FCC studies also show that for each complaint actually received there are at least 14 others who are annoyed and disturbed by RF interference in their daily lives because of inadequate design of home electronic equipment in their daily lives because of inadequate design of home electronic

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The Time Tunnel is offered in two models, TDG-1 with a 15Khz bandwidth and the TDG-2 with a 7.5Khz bandwidth. Both models have a frequency response flat within $\pm .25\text{db}$ and a total harmonic distortion of less than 5% .

The Time Tunnel also offers a wide dynamic operating range of greater than 66db with a clip-level of -12db and a system signal to noise ratio of greater than -80db .

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units a run for their money. Power amplifiers, parametric equalizers and a series of studio monitor speakers that will astound you with their amazingly faithful reproduction.

Panasonic pulled out all stops on their research and development program for this series. Undoubtedly, with the performance, quality, and reasonable prices exhibited by this audio gear the "Technics" name will be a major consideration in your future purchasing decisions.

Whatever your needs, RAMKO RESEARCH offers a full line of the highest quality audio equipment available. Turntables, Tape Cartridge machines, a wide variety of distribution, mic, line, power and turntable preamps. Cassette record/play units & reel to reel recorders. And of course the most advanced broadcast consoles in the industry.

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SBE

continued from page 61

able consumer electronics devices that are capable of interfering with free operation in the vicinity of properly operating personal communications devices and broadcast stations.

Goldwater to speak at SBE convention

Chapter 35 (Kentucky) announced that its 1977 "State of the Region" convention will be held November 30 through December 1 at the Marriott Inn, Clarksville, Indiana (in the Greater Louisville area). More than 3,000 broadcast engineers are expected to attend.

Highlights will include the presentation of papers on the new 1-inch helical format, digital television and much more. In addition, approximately 50 exhibitors are expected to display their "state of art" equipment and to be on hand to answer questions.

"Such national names as Ampex, Harris, Sony, Tektronix and Panasonic have already reserved their spaces," Bob Cossavella, exhibit coordinator, said.

Senator Barry Goldwater (R-UGA) will be the main speaker at the Friday night banquet. His speech will include comments on the changing role of engineers in broadcast and a look at the communication re-write now going to Congress.

Admission to the show is free. Lunches and dinners also will be available at the show. Rooms have been reserved. Anyone interested in attending, contact: Robert Klein, KET-TV, 600 Cooper Drive, Lexington, KY 40502.

More regional conventions scheduled

Pittsburgh, Pennsylvania—October

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21. Contact Roy Hoover, KDKA-
(412) 391-3000.
Scottsdale, Arizona—November
8 (in conjunction with the Ari-
zonia Broadcast Association's Winter
Convention). Contact Joe Manning,
KT-TV, (602) 965-3506; Roger
Johnson, KOY, (602) 258-8181; or Al
Johnson, KOOL, (602) 257-1234.
Non-members are always wel-
come at SBE regional conventions;
please attend and meet the broadcasters in
your area.

Other happenings

New SBE chapters are being
organized in Huntsville, Alabama;
Athens, Georgia; Miami Beach, Flor-
ida; Columbia, Missouri; Corpus
Christi, Texas; and Tri-Cities,
Washington. Anyone interested in
more information can contact the
national SBE office for the name of
an appropriate person in your
area.

CHAPTER REPORTS

Chapter 25—Indianapolis, Indiana
The August 23rd meeting featured
a presentation by Hewlett Packard.
John Alt and David Hayes, of the
company office, discussed and demon-
strated digital circuit testers and
analyzers. Several of the testers are
new additions to the HP line.

Chapter 43—Sacramento, California
Chapter 43 met on August 27th
for a tour of the Grass Valley Group
plant and demo video studio in
Grass Valley.

Chapter 44—Shreveport, Louisiana
The Society welcomes the new
Chapter 44 and congratulates Chair-
man Carr Stalnaker for his constant
effort toward getting the chapter
organized. Congratulations are also
extended to KRMD Radio for its
support of Chapter 44 by helping
with mailing expenses during the
organizing period and treating all
members to dinner the night of
the third meeting. □

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formal convention agenda and on the exhibit floor. James Fellows, NAEB president, said more 3,000 public broadcasting and technical executive well as representatives for the military services, 10 state and federal government, foreign embassies, medical profession, business, and industry expected to attend.

Video Disc '77 scheduled for November 8-9

Video Disc '77, to be held November 8-9 at British Academy of Film & Television Arts, feature the first public demonstration of the Phil MCA video disc system in the United Kingdom.

In addition to the presentation by Philips, information will be available on RCA and Thomson technologies, as well as the German-invented system.

Representatives of video disc developers manufacturers will speak at the conference. Scheduled are representatives from companies involved with disc mastering and pressing, TV broadcast international program sales, engineering, publishing, copyright, and video disc program exploitation.

Western Union to expand audio program channels

On November 1 Western Union will expand Audio Program Channel Service for radio broadcasters to include 13 additional cities, subject approval by the Federal Communications Commission.

The 13 cities will be served with a combination Westar satellites and Western Union's land-based microwave facilities. The cities are: Kansas City, Boston, Buffalo, Cincinnati, Cleveland, Detroit, Philadelphia, Denver, St. Louis, Houston, Baltimore, Pittsburgh and Columbus, Ohio.

The new cities join seven original cities from which Western Union's Audio Program Channel Service been available for more than a year, via Westar satellites.

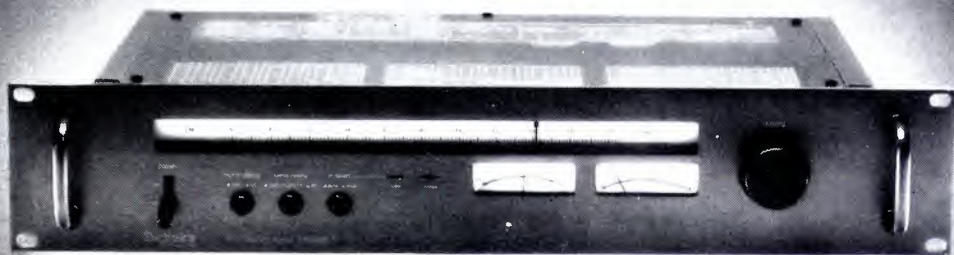
Type I (4 kHz) audio program channels will offered to the broadcast industry for point-to-point service using the Westar satellites, land-based microwave or a combination of the two. Point-to-multipoint service will be offered only via Westar satellites.

Type II (8 kHz) audio program channels will also offered for point-to-point service using the Westar satellites and/or land-based microwave facilities. Point-to-multipoint 8 kHz channels will be offered via Westar satellites.

James T. Ragan, Western Union's vice president broadcast services, noted that the expansion of company's Audio Program Channel Service will result in "more flexibility and higher broadcast quality networks, packagers and independent stations will seek programming variety.

continued on page

roducing the Technics ST-9030 tuner.
urists would feel better if it cost over \$1,000.



ob some, tuners that offer 0.08% THD, 50 dB stereo
comparison, a capture ratio of 0.8 dB and waveform
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That's quite a feat for a tuner. But then the
ST-9030 is quite a tuner. It has two completely
independent IF circuits: A narrow band, for ultra-sharp
selectivity. And a wide band, for ultra-high separation
and ultra-low distortion. It even selects the right band,
depending on reception conditions, automatically.

Both bands give you the same extended flat
frequency response. Because, unlike conventional
tuners, the ST-9030 utilizes an electronic pilot cancel
circuit that cuts the pilot signal, without cutting any of
the high end. It's ingenious. And a Technics innovation.

The Technics ST-9030 has one of the quietest,
most sensitive front ends of any tuner. With an
advanced linear frequency 8-ganged tuning capacitor
and 3 double-tuned circuits, plus dual gate MOS

FETs in the 2-stage RF amplifier and balanced mixer
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THD (stereo): Wide—0.08% (1kHz). Narrow—0.3%
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18 kHz +0.1, -0.5 dB. SELECTIVITY: Wide—25 dB.
Narrow—90 dB. CAPTURE RATIO: Wide—0.8 dB.
Narrow—2.0 dB. IF, IMAGE and SPURIOUS RESPONSE
REJECTIONS (98 mHz): 135 dB. AM SUPPRESSION
(wide): 58 dB. STEREO SEPARATION (1 kHz): Wide—50
dB. Narrow—40 dB. CARRIER LEAK: Variable — 65 dB
(19 kHz). Fixed —70 dB (19 kHz, 38 kHz). SUGGESTED
RETAIL PRICE: \$399.95*

Technics ST-9030. A rare combination of audio
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Increasing commercial trend by noncommercial stations

Erwin G. Krasnow, general counsel of the National Association of Broadcasters (NAB), told the Federal Communications Commission that "there has been a disturbing trend

of increasing commercialism by non-commercial radio and television stations."

He noted that educational licensees encounter difficulties in

obtaining adequate financial support, but urged the Commission consider the adoption of rules "will truly ensure the maintenance of the essentially noncommercial nature of educational broadcasting."

In some instances, Krasnow proper enforcement of existing rules would be adequate, citing as an example announcements promoting the sale of a product or service. However, he stated that there is a need for more specific guidelines and restrictions on fund-raising schemes constituting an abuse of noncommercial service.

Krasnow said he agrees with the Commission that educational institutions should be permitted to broadcast community bulletin boards, similar programs, or announcements of cultural or entertainment activities available in the area. However, he said announcements providing details on ticket prices or unguaranteed attendance should not be allowed.

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NAB tires of FCC's Chinese puzzle

The general counsel of the National Association of Broadcasters (NAB) has labeled some Federal Communications Commission institutions "as easy to fathom as a three-tiered Chinese puzzle" and asked that they be amended.

Erwin G. Krasnow was referring to the requirement that stations make semimonthly announcements of their responsibilities and in audience comment, plus license renewal notifications. These four types of announcements, specific times of the day and date of the month.

He said there are ways of simplifying the wording and scheduling requirements "without in any way derogating whatever value these announcements may have to the public."

He said NAB's approach is to have only one rule and give broadcasters greater flexibility in wording and scheduling of announcements.

Krasnow said the Commission had three years to evaluate the effectiveness of these requirements and they now can be amended without a rule-making procedure.

For More Details Circle (113) on Reply Card

New! For heterodyne VTRs

CVS 516 Digital Time Base Corrector



a broadcast quality, digital TBC

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

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

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

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

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

If all that's not enough, add our optional, moderately priced Image Enhancer/Noise Reducer. This plug-in card

substantially reduces luminance and chroma noise and significantly improves subjective resolution. And, to tame even the wildest instability, you can add our optional 16 line window.

Simple operation is another plus for the CVS 516. Front panel controls give you total mastery of your video signal. Each control also has a preset unity position to give you a consistent starting point for all your tapes.

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

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

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For More Details Circle (111) on Reply Card

Nashville station dedicates new facility

WDCN-TV/8, Nashville's public television station, celebrated its 15th anniversary last month with the dedication of its new Telecommunication Center. The station moved into the Center last November, but final installation of equip-

ment took place recently. The building, built at a cost of \$1.4 million, is a full-color state-of-the-art facility containing production, broadcast and offices.

WNEW-TV buys 1-inch VTRs

WNEW-TV recently installed three new 1-inch videotape re-

orders, including a built-in edit system and one 1-inch portal videotape recorder.

American Satellite expands operations

American Satellite Corp. (ASC) was granted authority to build two earth stations on the island of Oahu in Hawaii and one near Stockton, Cal. ASC, digital communication service to various government agencies, also has requested FCC authorization to construct an earth station in the Washington, D.C. area.

U.S./Southeast Asian Telecommunication Conference

Raymond E. Spence, Jr., FCC chief engineer, will deliver the keynote speech at the first U.S./Southeast Asian Telecommunication Conference and exhibition to be held January 19-21, 1978 in Singapore.

RCA markets four-hour videocassette recorder

RCA is offering the electronics industry's first four-hour videocassette recorder/player, optionally priced at \$1,000. The unit is capable of recording two or four hours of program material, live or off-the-air, on a single cassette. The RCA "SelectaVision" videocassette recorder unit is priced about \$100 below the current leading competitive VCR instrument.

Connector symposium announced

The 10th annual Connector Symposium will be held October 19-20 at the Cherry Hill Hyatt Hotel, Cherry Hill, New Jersey. The symposium is sponsored by the Electronic Connector Study Group with cooperation of more than 100 connector manufacturers.

People's Republic of China joins INTELSAT

The People's Republic of China acceded to the Agreement of the International Telecommunication Satellite Organization (INTELSAT) August 16, 1977. The agreement designed to establish a global communications satellite system, was signed by the Peking Administration of Long Distance Telecommunications. China, the 98th member, has been using the INTELSAT system since 1972.

SYSTEM ONE

The unique broadcast console from
Pacific Recorders and Engineering

SYSTEM ONE is completely modular, with provision for up to 25 input positions. CMOS digital logic provides extensive console and peripheral control capability at each input position. SYSTEM ONE provides the flexibility needed to meet every broadcast requirement.

A SYSTEM ONE console is modern, versatile and provides a quality and reliability of performance that will set a new standard of excellence for broadcast audio.

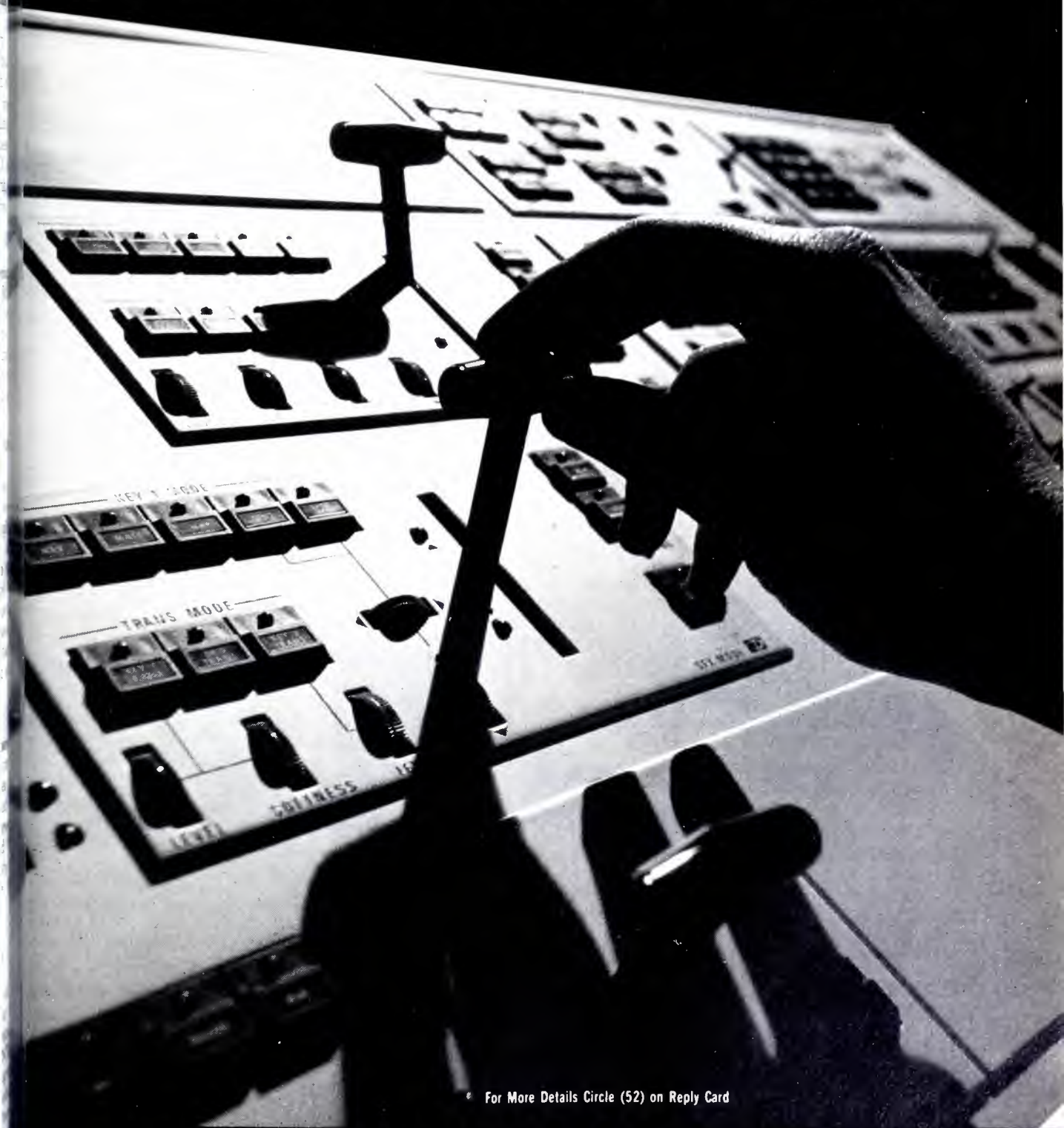
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people in the news

The promotion of **Andrew M. Hilliard** to manager, advertising and promotion, a new position in the RC commercial communications systems division, has been announced. Hilliard, who has been with RC since 1956, will have advertising and promotion responsibility for the division's Broadcast Systems and Mobile Communications Systems businesses.

Harvey Schein, president and chief executive officer at Sony Corporation of America for the past five years, has been promoted to chairman of the board. He will continue as the company's chief executive officer.

In related corporate action at Sony, **Kazuo Iwama**, president of the parent company, becomes chairman of the executive committee. **Akio Morita**, chairman and co-founder of Sony, is the new chairman of the finance committee of the American subsidiary.

In his new capacity as director of marketing for TTI and Frequency Technology, Inc., **Robert Cochran** will assume responsibilities for the marketing of the corporation's full product line. Cochran joined TFT as director of sales for the Communications Product line.

Carl P. Hollstein, Jr., moves from Information Storage Systems to Consolidated Video Systems, where he becomes vice president, engineering. Hollstein, who has also been associated with IBM, holds several patents relating to data recording technology.

Terry L. White, formerly with Tektronix Inc., is the new national program director for microprocessor products at Leasametric, a division of Metrotech Resources Corporation.



HOLLSTEIN



WHITE



HUDSON

As director of operational planning at Altec Corp. Lansing sound products division, **Don Hudson** will be responsible for coordinating the efforts of marketing, engineering and manufacturing during development and start-up operations of new products.

Telex Communications Inc. announces the promotion of **Richard D. Larson** to director of training and service. Larson's responsibility includes expanding service training programs both domestically and internationally for the company's Aviation, Audio/Visual Professional Audio and Personal Communication product groups.

Franklin C. Snyder, vice president, The Hearst Corporation, and chairman of the Association of Maximum Service Telecasters, Inc. (MST), has announced the appointments of **Jack B. Everette** and **William**

less as members of the association's engineering committee. Everette is executive vice president and manager, Midwest Television Inc., Champaign, Illinois. Loveless is director of engineering, KSL-TV, Salt Lake City, Utah.

manager of marketing and export programs for the western division of GTE Sylvania is **Evan Baker**, former manager of the division's Springfield, Virginia, office. Baker succeeds **Richard Brockway**, recently appointed director of export programs, Western Europe, for GTE Sylvania electronics systems group.



KEFFER HUBER FULFORD

appointment of **Edward H. Huber** as eastern and mid States regional sales manager for the broadcast division of American Electronic Laboratories, Inc. has been announced by **Thomas Keffer**, commercial and industrial marketing director. Huber will be responsible for all sales of AM and FM transmitters east of the Mississippi, as well as the management of all field sales representatives in that area.

Robert P. Fulford, president of Appleson Studios Inc., in Miami Beach, is this year's chairman of the National Engineering Society's South Florida Chapter. Fulford is a broadcast/recording veteran with more than 14 years in the industry and is active in community and industry events.

new director of marketing for CEI is **Robert P. Fulford**, formerly the product manager for the company's broadcast color television camera line. Before joining CEI, he was product manager for the hi-video systems division of Ampex.

Robert P. Fulford joins TerraCom as international sales manager. Fulford had been with Farinon Electric for 10 years in international sales management.

Robert P. Fulford has been named electronic marketing specialist for Belden Corp.'s electronic division. Fulford, who joined Belden in 1969, has been a field sales representative in the New York sales region. His responsibilities will focus on the needs of the water industry and the sale of such products as transmission lines, point-of-sale terminal cable, shielded power cords.

Steve Crane, who joined the FCC in 1972 as a broadcast specialist, has returned to his former position of broadcast specialist, reregulation staff, chief of chief, policy and rules division, broadcast division. Crane has served as chief of the policy analysis branch since October 1976.

continued on page 72

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munications group, with responsibilities for techn
direction.

Carolyn Alk joins CCA Electronics Corp. as marke
services manager after spending three years as
vertising and sales promotion coordinator for Chi
Company. She will be responsible for coordinating
advertising, public relations, product literature, tr
shows, and sales support materials.

J. L. (Jack) Neff of Neff Communications Inc.
assumed the position of vice president, North Am
can marketing, for Consolidated Electronics Indust
Pty. Ltd., an Australian firm. Neff is the former pr
dent of Broadcast Electronics, Inc.

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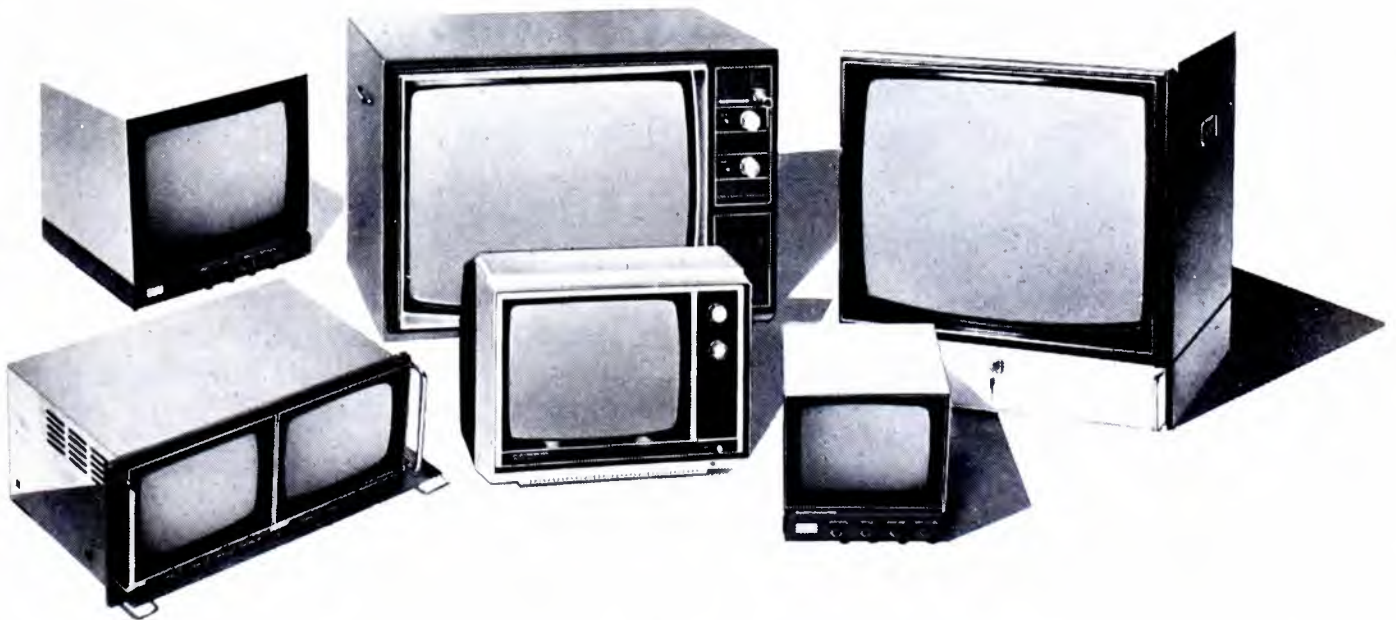
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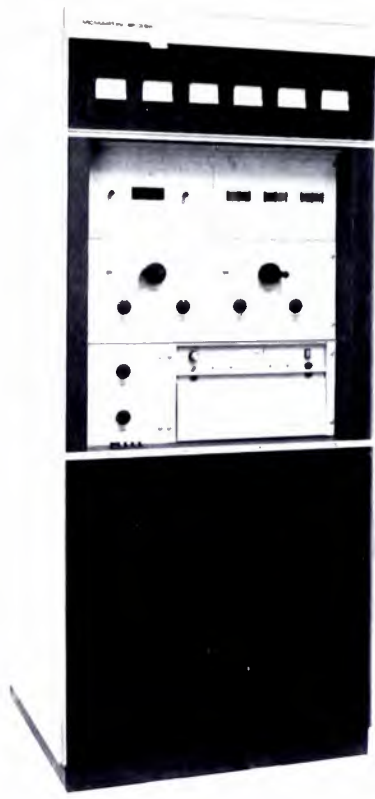
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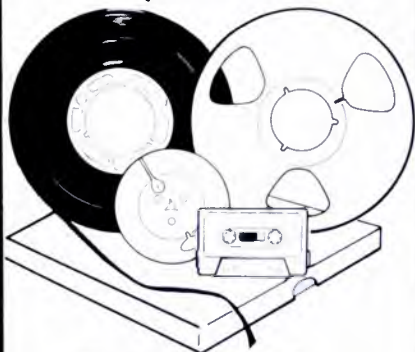
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**new
products**

.....
continued from page 75

and black-guard grille for bright sharper pictures, even under adverse lighting conditions.

For More Details Circle (87) on Reply Card

Ferrite circulator

Microwave Associates, Inc. marketing a new coaxial ferrite circulator. The MA-7L943-S001 designed to operate in severe broadband E.C.M. environments at 4.6-9.9 GHz. It has small, compact packaging for integration into frequency multiplexer filter banks.

The MA-7L943-S001 is completely magnetic and R.F.I. shielded, with location of connectors an option for the designer to accommodate specific system requirements.

Features include: rugged compact construction; optional direction of circulation; and magnetic and R.F.I. shielding.

For More Details Circle (88) on Reply Card

Digital Photometer

A new booklet from Tektronix describes various applications for researching, designing, installing and maintaining optical communications equipment using the J Digital Photometer/Radiometer.

Specific test descriptions included in the booklet are: measuring the output of visible and infrared LEDs and laser diodes, checking fiber attenuation and splice loss, testing detector responsivity and adjusting systems for peak efficiency.

For More Details Circle (89) on Reply Card

Frame storage/retrieval systems

ADDA Corporation is marketing its new line of digital, computer controlled, NTSC frame storage/retrieval systems. On-line storage capacity vary from 200 to 3,000 frames depending upon user needs. These systems have full editing capabilities for the broadcast, institutional and industrial markets.

Engineering applications include elimination of slide handling, prevention of damaged and lost slides, centralized slide storage with slides accessible from four separate remote locations; relief of telecine peak loads; and reduced floor, rear and control panel space requirements.

Newsroom applications include instant slide creations from original artwork, ENG sources, VTR, tele-

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Model 2102

features:

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cine chains, or character generator; and 12 dB random noise reduction in original artwork and studio stills.

Production applications include the ability to incorporate stills from new sources for incorporation into final takes. This capacity is particularly effective for animation and other special effects.

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Transmission test set

Telecommunications Technology, Inc., has introduced the model 1120 Transmission Test Set, a portable instrument that meets all the requirements of Bell System Technical Ref. PUB 41009 for the measurement of transmission level, frequency, noise and notch noise.

The 1120 is a third-generation digital instrument which is controlled by its own on-board microprocessor. All measurement and transmit functions are handled by the microprocessor, as well as a self-diagnostic routine for checking all internal and analog circuitry. Twelve seconds after pushing the self-test button, the 1120 will display the results in English. For example, if all major circuitry is operating properly, the display will indicate "PASS ALL."

For More Details Circle (91) on Reply Card

Video clock/calendar

The QSI Television Master Clock/Calendar is a standard video time and date generator designed to add numerical clock and calendar information to any standard video signal.

The QSI-600 displays the time and date in 12 seven-segment digits in the following order across the television screen: month, day, year, hour, minute, second. Time may be set by selecting one of the six times and holding a fast or slow advance control until the time you want appears on the TV monitor. Once placed into the run mode all the time and date functions occur automatically throughout the year.

The time base is controlled by the 50/60 Hz power input. Automatic time correction occurs whenever the power frequency is updated.

Features include: 12-digit clock/calendar in two sizes; display positionable to any screen area; automatic timing functions; loss of power resets all digits to zero.

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Frequency counter

In the frequency monitor GU 027, Rohde & Schwarz has designed a

continued on page 78

Belar AMM2 Modulation Monitor



\$313
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We have found the Belar Modulation-Only AMM2 one of the most fully dependable monitors on the market... Delivers all the FCC requires. You save \$37 off the list price of \$850 when your payment is sent with the order. Satisfaction is Unconditionally Guaranteed. Price expires 12-31-77 and includes UPS.

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Empty	\$1.39	\$1.70	\$1.39	\$3.00
20 Sec	1.60	2.20	2.15	3.05
40 Sec	1.70	2.30	2.20	3.10
70 Sec	1.75	2.35	2.25	3.15
100 Sc	1.80	2.40	2.30	3.20
140 Sc	1.90	2.45	2.35	3.25
2.5 Mn	2.00	2.50	2.37	3.25
3.5 Mn	2.10	2.60	2.47	3.30
4.5 Mn	2.25	2.70	2.55	3.35
5.5 Mn	2.35	2.80	2.66	3.40
7.5 Mn	2.50	3.00	2.81	3.50
10.5 M	2.90	3.27	3.05	No

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Stanton D5107AL [6] for \$39
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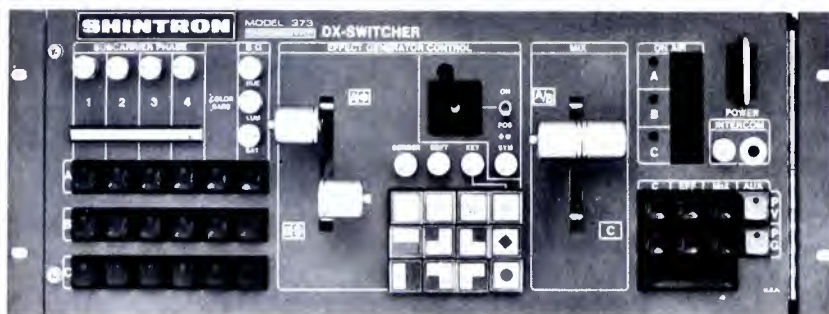
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Other Cameras thru Universal Interface

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new products

.....
continued from page 77

frequency comparator plus frequency counter for systems performing precise frequency measurement line with CCIR recommendation. The equipment is particularly suitable for remotely measuring frequency of transmitter signals can be used in conjunction with receivers over the whole RF range of 10 kHz to 1000 MHz.

The measuring methods used—offset-frequency method for substitution method for FSK, intercarrier method for FM—are independent of receiver characteristics such as setting accuracy and oscillator stability. Measurement is accurate to within 0.1 Hz.

The large screen of the GU can show Lissajous figures and frequency markers for AM, FM spectrum in the modes FM broad and narrow, frequencies for FSK intercarrier levels with line triggered X deflection. The frequency display is given by six LEDs, outputs of the frequency monitor enable frequency and phase recording plus data output of offset center frequencies in BCD code.

For More Details Circle (93) on Reply Card

Test monitoring switcher

The QSI-800BC Test Monitor Switcher (TMS) lends itself a broadcast television video quality control monitoring device.

A typical application is at video operators positions. Video sources from studio cameras studio switcher effects busses made available to the QSI-800 inputs, where they are automatically programmed and sequenced color matching, level monitoring phase comparisons.

In the case of two or more quality control positions (video operator camera/studio selection are programmed via the flick of a front panel switch into the automatic sequencing arrangement. Momentarily pressing any of the eight indicator buttons stops the sequence at that position for long term observation. An LED indicator above the indicator button, plus an inserted character in the video indicate which source you are observing and measuring.

Momentarily pressing the sequence button activates the programmed sequence. Adjusting front panel dwell control sets up most convenient rate of video sequence

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features:

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- pattern positioner
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ling.

Remote switching and rate sampling is made available by an external trigger input. For high rate sampling and slow rate observation a time lapse videotape recorder may control the switching rate, plus record the switcher output.

For More Details Circle (94) on Reply Card

Line surge protector

Protection of sensitive electronic equipment from destructive line voltage surges and spikes is the aim of a new product developed by DYMA Engineering.

The DYMA AC Line Surge Protector protects television, hi-fi and CB equipment, computers of all types, microwaves, broadcast electronics, solid-state memories and logic, and telephone equipment against these surges. It is particularly valuable when used with equipment installed at remote sites.

The unit contains a state-of-the-art suppressor coupled with an exclusive ferrite filter. The surge suppressor absorbs the energy from transients that exceed the protection level and the surge protector. Power line hash, glitches and RF interference are thereby reduced to a minimum.

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Camera pedestal

The "PortaPed" from Virten combines the main attributes of studio and outside broadcast camera mountings: smooth pneumatic counterbalance with low-weight portability. It incorporates a levelling device for the central column to ensure correct vertical support despite uneven terrain or awkward locations. When used with ENG and portable cameras, the PortaPed can be moved and relocated without removing the camera.

The pneumatic counterbalance system employs a self-pumping action and requires no external charging equipment. The control column is fitted with a knurled screw friction control and snap-action brake to lock the column at any point in its 48-centimeter (18-inch) travel. Balance is quickly achieved by pumping the center column up and down, then shutting off a valve.

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Logic state analyzer

The new model 1610A keyboard-controlled logic state analyzer from Hewlett-Packard is a general purpose analyzer for design and

continued on page 80

Belar AMM3 Modulation Monitor



\$1249
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Now In Stock

If you like to push 125 percent use the AMM3 and be totally automatic.

- Window setting for both positive and negative peaks.
- Carrier limit alarms—one for upper limit, one for lower.
- Independent of carrier shifts & program symmetry.
- Built-in noise volt-meter for measuring S-N-R.

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

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

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

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

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

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

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

Each 681 Series cartridge is guaranteed to meet its specifications within exacting limits, and each one boasts the most meaningful warranty. An individually calibrated test result is packed with each unit.

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STANTON

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new products

continued from page 79

troubleshooting of digital systems—from the most elementary to the most complex. Powerful triggering capability assures that the desired data is captured in digital systems ranging from basic logic circuits through microprocessor-based systems, computers and computer systems.

With the 1610A keyboard, the user can trace events in as many as 32 channels at rates up to 10 MHz, selecting only the particular occurrences, coincidences or logical sequences that are of interest, with results displayed in an organized format on the CRT screen.

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The new stereo series, the Professionals, employs the "dual magnet" system. This gives each stereo channel a separate generating system, resulting in superior channel separation and low-moving mass that means lower record and stylus wear, less distortion, and extended high frequency response.

Stylus cantilevers are designed for problem-free backcueing and eliminate stylus "sag" at the higher tracking forces required by some records and studio conditions. All models come with tapered cantilevers for rigidity with low mass.

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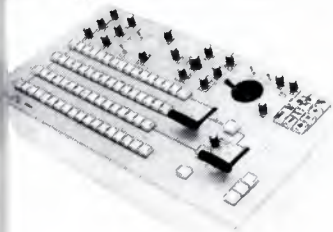
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ber, 1977

technical data

Telecommunications Technology, Inc.--The SAS-2 Switched Access System which provides instant access to communications circuits in Class 4 and 5 telephone offices and similar applications is described in a full-color, 12-page illustrated brochure.

The literature illustrates a typical test sequence while providing general and technical information, applications data, diagrams and specification describing the SAS-2, which handles all types of circuits including private lines, message trunks and subscriber lines.

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International Rectifier Corp.--A technical bulletin providing users of solid-state relays with detailed information of the thermal characteristics, repetitive surge, fuse selection and duty cycle of SSRs is now available.

Bulletin No. 500-11 was developed specifically for IR's Crydom Series 3 for more comprehensive, thorough application information.

The data sheet also allows a designer to select a fuse on a sound engineering basis by showing a curve of maximum allowable I²T versus pulse basewidth.

A curve relating duty cycle and current is also shown. The graph relates on-time in seconds to the percent of continuous current rating for duty cycles ranging from 12.5% to 75%.

In addition to a photograph of the device in use, the literature includes dimensional drawings, a system schematic and application notes regarding the surge rating and the use of snubbers.

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Sony Corp. of America--An eight-page brochure outlining the total systems approach to video production is now available. The brochure, "Put It All Together In a Sony Production System," explains the advantages of a Sony U-Matic color video system.

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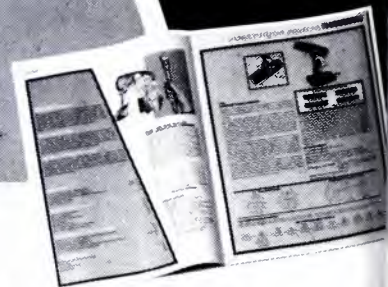
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