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BROADCAST **engineering**

October, 1976/75 cents

It's NAEB Convention Time *page 20*

Logic Illustrated
Radio Workshop
TV Automation

Ward-Beck at the XXI Olympiad



The XXI Olympiad, a dedication to excellence within the framework of competition. A challenge for the athletes. A challenge for the supporting communications equipment.

Ward-Beck is proud to have been chosen by Canadian Broadcasting Corporation to supply WBS 75046 Mobile Audio Consoles to broadcast the 1976 Olympic Games to the world.



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BROADCASTENGINEERING®

The journal of the broadcast-communications industry

October, 1976 Volume 18, No. 10

- 20 NAEB Convention Preview.** It may be touch and go for the NAEB this year, but their session plans indicate several interesting sessions. *Peggy Brown.*
- 24 Ten Seconds To Air.** An inside look at how a major university prepares its broadcast students for the real world of broadcasting. *Ron Whittaker.*
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- 44 Growing Into TV Automation.** First part of a two-part series on what you should know before and after you decide to get into automation. *Bob Hueffed.*
- 50 Logic Illustrated.** The second part of a four-part series illustrating the basics of digital logic. Includes truth tables and several practical illustrations. *Harold Ennes.*
- 56 Radio Workshop.** Our Radio Workshop editor reminds us that even though we can't change the weather, we can do a better job of reporting it. *Peter Burk.*

About The Cover

The NAEB takes the spotlight again with their annual convention. Coverage starts on page 20. The cover photo was taken at WUFT-TV and kicks off student training on page 24. Photo courtesy of Ron Whittaker, his wife, and WUFT.

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Editorial

Ronald N. Merrell, *Director*
Carl Babcoke, *Technical*
Pat Finnegan, *Maintenance*
Howard T. Head, *FCC Rules*
Robert A. Jones, *Facilities*
Walter Jung, *Solid State*
Peggy Brown, *Editorial Assistant*
Dudley Rose, *Graphic Designer*
Joe Roizen, *Video*
Peter Burk, *Radio Workshop*
Dennis Ciapura, *Audio Editor*

CIRCULATION

Greg Garrison, *Director*
Evelyn Rogers, *Manager*

ADVERTISING SALES

Mike Kreiter, *Director*
Gloria Parmenter, *Production*
P.O. Box 12901,
Overland Park, KS 66212
(913) 888-4664

Regional advertising sales offices

Indianapolis, Indiana—Roy Henry, 2469 E. 98th St., Indianapolis, Ind. 46280, (317) 846-7026

New York, New York—Stan Osborn, 60 E. 42nd St., Room 1227, New York, N.Y. 10017, (212) 687-7240

Mountain View, California—Dennis Triola, 2680 Bayshore Frontage Rd., Room 102, Mountain View, Ca. 94043, (415) 961-0378

London W.C. 2, England—John Ashcraft & Co., 12 Bear St., Leicester Square, Tele.: 930-0525

Badhoevedorp, Holland—John Ashcraft & Co., John J. Lucassen, Mgr., Sloteweg 303

Tokyo, Japan—International Media Representatives, Ltd., Shiba-Kotohiracho, Minatoku, Tele.: 502-0656

Editorial, advertising and circulation correspondence should be addressed to: 9221 Quivira Road, P.O. Box 12901, Overland Park, Kansas 66212, (a suburb of Kansas City, Missouri). (913) 888-4664.



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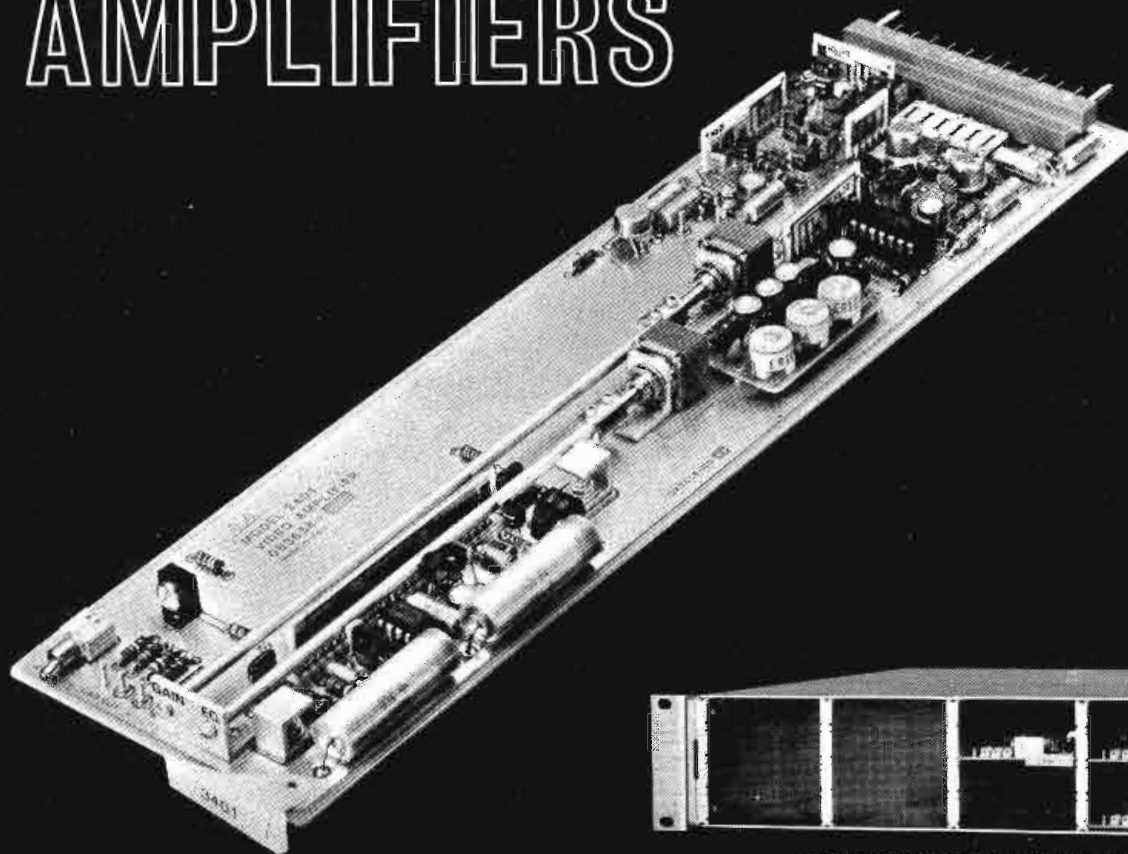


Robert E. Hertel, *Publisher*

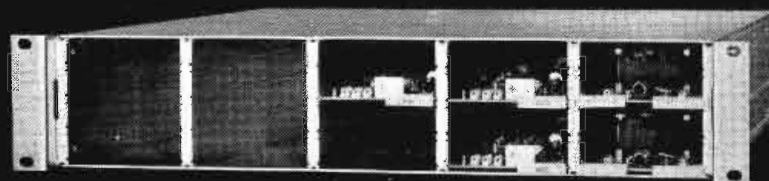
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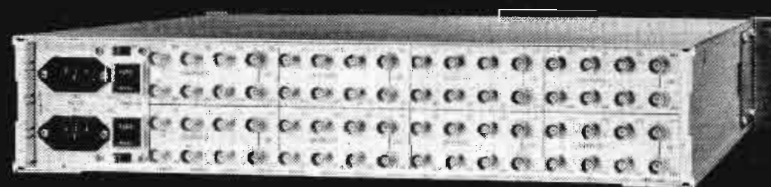
GRASS VALLEY GROUP 3400 SERIES AMPLIFIERS



MODEL 3401
GENERAL PURPOSE
1x6 VIDEO
DISTRIBUTION
AMPLIFIER



FRONT VIEW (LESS COVER)



REAR VIEW

Model 3401 video distribution amplifier is another new product in GVG's ever-expanding 3400 Series video terminal equipment. The 3401 is a very cost effective DA, especially when considering that the amplifier provides exceptional performance in the areas of stability, distortion, and noise.

Although listed as a general purpose device, the 3401 contains features normally only found in more comprehensive units. For example, differential input (± 30 volts com-

mon mode rejection), switchable AC or DC coupling, and provision for plug-in cable equalizers (optional) — either fixed or variable. Power consumption is less than two watts per amplifier.

The two-rack unit mounting tray, illustrated above, accommodates eight 3400 Series amplifiers and a 3200A power supply, with provision for a second optional supply for emergency protection. A one-rack unit, four-amplifier mounting tray is also available.

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DIRECT CURRENT FROM D. C.

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

Commission Tackles Radio Application Backlog

The Commission is making good progress in acting on the backlog of applications for new AM and FM radio stations and major changes which accumulated prior to the June 30, 1976 freeze on the acceptance of further applications (see August, 1976 D.C.). Engineering study has been completed on all of the commercial FM applications (the easiest kind), and these are now undergoing legal and financial scrutiny while the engineers tackle non-commercial FM applications and AM applications.

Several steps are being taken to speed up the processing and cut down its complexity. Several engineers are being recruited to enlarge the processing staff, and the Commission has already changed the AM Rules to specify that the nighttime interference-free contour of a Class II or Class III station shall be deemed to be the contour established by a single calculation of interference on a site-to-site basis. The Commission is also studying a proposal to establish a "standard pattern" for all existing directional antennas, which would permit both pattern calculations and interference studies to be performed by computer rather than laboriously by hand as now done. Standardizing directional antenna patterns will likely require some existing stations to file modified antenna parameters if the parameters now specified do not generate the "standard pattern".

Broadcasters Protest Lack of Protection from the Citizens Band Interference

TV broadcasters have petitioned the Commission for reconsideration and stay of the new rules expanding the Class D Citizens Band from 23 to 40 channels (see September, D.C.). Not only would the expansion of the band permit harmonic interference to TV Channel 6, but the harmonic radiation permitted is sufficient to cause interference to other TV channels as well.

Simultaneously, the Citizens Radio Section of EIA asked the Commission to reconsider new rules requiring Citizens Band receiver certification on the grounds that restrictions on local oscillator radiation are impossible to meet. Some receivers use local oscillator combinations which radiate in the vicinity of 37 MHz causing interference to land mobile reception in that band.

Continued on page 6

**Cetec Jampro FM antennas
give you both...**

High Power High Performance

For the past four years WDBN-FM in Medina, Ohio, has been using this 3-bay Cetec Jampro high-power JHCP-3 circularly polarized antenna to serve Cleveland and all of Northern Ohio with 118,000 watts ERP.

WDBN's Jampro antenna has an input power rating of 74,000 watts...*the highest input power rating in the world for three bays!* It also has a circular polarization power gain ratio of 1.60...plus all the standard Jampro features that make the JHCP known the world over as the leading high-power FM antenna, such as corona free operation!

If you want to use a high-power transmitter and low-gain antenna, talk to the high-power people about the Jampro JHCP CP FM antenna that's right for your station. Call or write the Cetec Broadcast Group today. We've got the facts on the Cetec family of equipment: Jampro FM antennas, Schafer automation, Sparta transmitters and audio products.

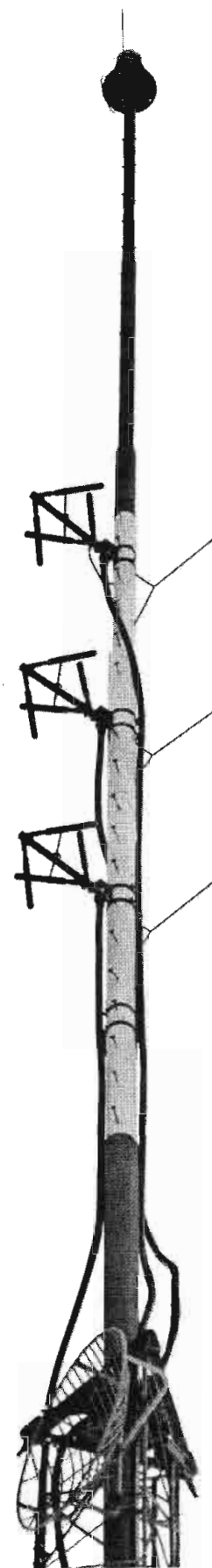


Cetec Broadcast Group

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DIRECT CURRENT FROM D. C.

Continued from page 4

Under the Commission's procedural rules, action on either petition is unlikely before the end of October. In the meantime, the Commission's Laboratory Division has begun accepting new CB transceiver models for type approval and certification. Time is short since the new rules permit the sale of 40-channel transceivers starting January 1.

AM Broadcaster Responsible for Reradiation

An FCC Administrative Law Judge has denied an application by the permittee of a directional AM station in Texas on the basis of a finding that the directional antenna cannot be made to work. So far as we know, this is the first case of its kind.

The station was first authorized for daytime-only operation with a power of 10 kW using a directional antenna. The station was unable to meet the antenna requirements with 10 kW power, but was authorized to operate temporarily with 5 kW power. At a hearing on the application for regular operation with reduced power, the evidence showed that even with the power reduction the directional antenna requirements could not be met, and the judge found that the basic problem was the presence of reradiating structures near the antenna site which made it impossible to achieve the required pattern.

Although the application was denied principally on engineering grounds, the judge also made an unfavorable finding with respect to the character qualifications of the permittee.

Short Circuits

The Commission has waived the interference requirements for two educational FM stations separated by only three channels, finding that any interference which might occur would be above the standard 30-foot receiving antenna height...The Commission has completed a new "Broadcast Operator Handbook" for use as a study guide in obtaining a 3rd Class permit with broadcast endorsement...Educational TV broadcasters and Western Union have filed applications for a network of satellite stations for educational network purposes...TV stations must now carry EBS messages visually as well as aurally for the benefit of the hard of hearing...The Commission has authorized a 50 Watt fulltime AM station at Unalaska, Alaska...Don't use or sell your CB rig in Mexico; both are a violation of Mexican law...The effective date of the new remote control pickup rules has been postponed to November 1, 1976...The Commission is preparing to amend the AM remote control rules to eliminate the "history" requirement for directional antennas which employ approved sampling systems.

Video Switchers... Tape Editing Systems... Automation... Central Dynamics!

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CD 480 The Smart Switcher

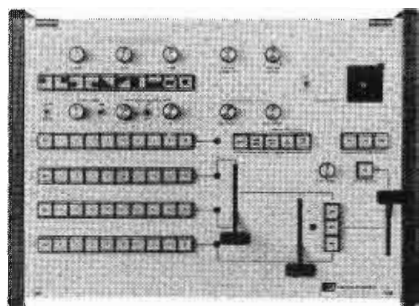
A revolutionary and modular switcher with unprecedented production power . . . and is extremely easy to operate with CDL's unique Sequential Effects (SFX) Amplifier. Two models available that offer every production feature plus a variety of optional modular accessories.

Circle 100 on Reader Service Card.

VSP-1260S Production Switcher

A dual Mix/Effects Switcher with 20 inputs, 6 buses, encoded chroma keyer and bordered keys.

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VS-14 Production Switcher

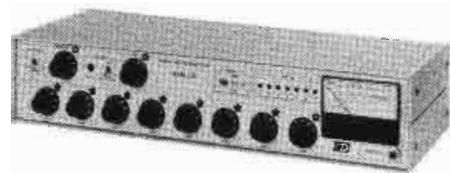
Self-contained and Remote models available with separate Effects, Mix and Title Amplifiers; hard or soft keys, wipes, split screens & spot-lights; positioner, and color black and matt generator.

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VS-10 Production Switcher

An 8 input switcher with Mix and Wipe/Key Amplifiers.

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AFM-10 Audio Mixer/Switcher

Audio mixer/remote controlled switcher with twin outputs, compressor-limiter, and switchable Mix/Line sensitivity on all 7 inputs.

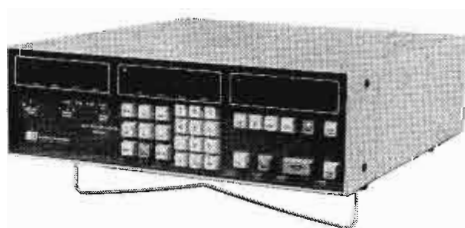
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PEC-120 Video Tape Editor

A computer editing system with an easily operated control panel and CRT display for rapid and precise control of VTR's & switcher. CDL's unique Self Learning Cueing Software Program is a new feature.

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EDS-200 Video Tape Editor

A two machine Time Code microprocessor Editor that interfaces to Quad, Helical or Sony VO 2850 cassette VTR's.

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DK-2160 Title Keyer

Titles non-sync sources. Can Dissolve/Cut titles and fade to black. Inputs for 4 key sources and dual character generator inputs. Colored borders are optional.

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VG-2210 Digital Sync Decoder

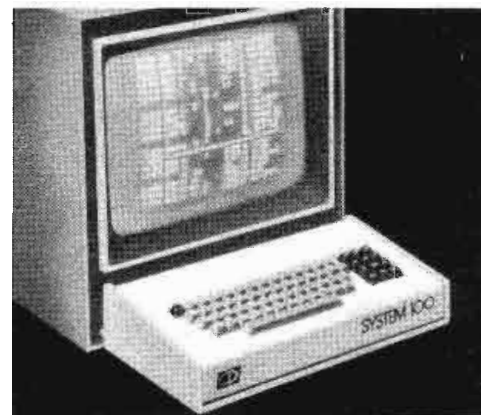
A programmable source of precisely timed standard pulses derived from a single reference signal input.

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Master Control Switchers

Ranging from CDL's new CD 480 MC to a 2 Bus MCS-829 or a 3 Bus MCS-770. PTS-121 17 event memory available on MCS-829 & MCS-770. All 3 can be interfaced to System 100 Technical Automation System.

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System 100 Automation

Computer controlled automation system for Technical Operations that communicates directly with a Business Computer System, and stores and retrieves the schedule with entry error checking, makes automatic time corrections, performs complicated audio/video switching sequences, assigns machines, verifies material, and prints the "As-Aired" log.

Circle 110 on Reader Service Card.

Also a complete line of production and TV Terminal Equipment including:

- SMPTE Time Code Generator and Reader (111)
- Video and Pulse Distribution Amplifiers (112)
- Chroma Keyers: RGB and Encoded (113)
- Processing Amplifiers (114)
- Audio/Video Routing Switchers (115)
- Pulse Assignment Systems (116)
- Machine Control Systems (117)

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Request our New Condensed Catalog.



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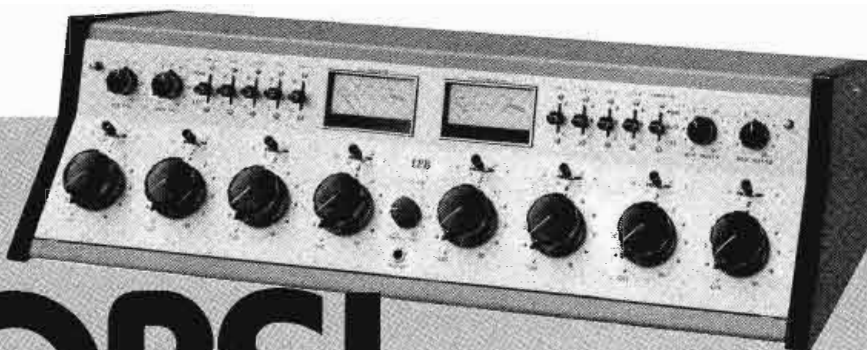
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TOPS!

That's LPB's stereo S-13B console, our top-line audio control center. Features include:

- 18 stereo and 6 mono inputs.
- Step attenuator mixers.
- Telephone-type switches.
- Plug-in fiberglass circuits.
- Stereo 12 watt/channel monitor.
- Internal cue amp and speaker.
- All transformer input and output.

The features and quality of LPB's S-13B just can't be found in other consoles at comparable prices. Take a hard look at the S-13B before you make a mistake!

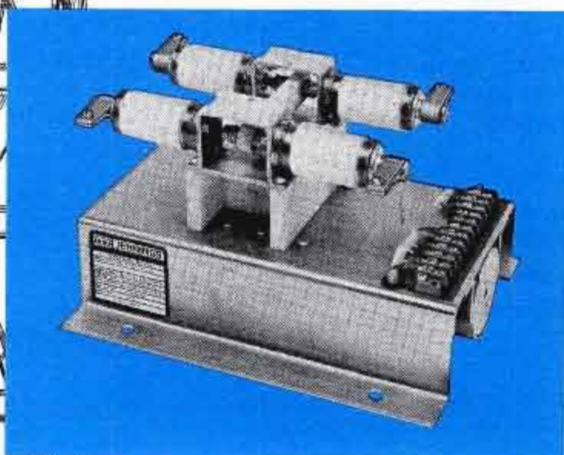
LPB has a complete line of mono consoles, too, and everything that goes with them. Call or write today for complete information.

LPB® LPB Inc.
520 Lincoln Highway, Frazer, PA 19355
(215) 644-1123

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This antenna relay could be the last you will have to install. It's THAT reliable.

This RF Vacuum Relay from ITT Jennings has contacts sealed in a vacuum to protect them from dust, moisture, heat, and electrical degrading. In the SPDT mode it will withstand up to 22 KV and carry 80 Amps RMS (40 Amps in DPDT mode) at 2 MHz for a minimum of 250,000 cold switching operations. At 24 MHz it will still carry up to 50 Amps RMS (25 Amps, DPDT) for just as long with low contact resistance (.0005Ω) throughout the life of the relay.



If you are installing or updating your antenna changeover gear find out about the ITT Jennings Model 4070 RF Vacuum Relay. The relay you can install and forget. For more information contact ITT Jennings, 970 McLaughlin Ave., San Jose, CA 95116, Phone: (408) 292-4025.

JENNINGS ITT

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Engineering Seminars Set For Oct., Nov.

The seven regional seminars sponsored by the National Association of Broadcasters for radio and television engineers will cover such topics as the Federal Communications Commission's new remote pickup rules, improved coverage, circular polarization for TV, the status of AM stereo and a review of FCC activities by a top Broadcast Bureau official.

The seminars will be held in Houston (Oct. 18-19), Denver (Oct. 21-22), Portland (Oct. 25-26), New York (Nov. 11-12), Atlanta (Nov. 15-16), Chicago (Nov. 18-19) and Washington (Nov. 22-23).

Registration will open at noon on the first day and the sessions will get underway at 2:00. The seminars will close with a luncheon the following day.

Luncheon speakers will be FCC Chairman Richard E. Wiley in Houston and an executive of a major advertising agency or a large radio advertiser in the other cities.

The agenda will include the following:

Understanding the New Remote Pickup Rules—M. E. McClanahan, Director of engineering, Marti Electronics, Inc., Cleburne, Tex. (Houston and Denver); John E. Leonard, Jr., Vice President for marketing, Moseley associates, Inc., Goleta, Calif. (other five).

Maintenance of Television Broadcast Facilities—Cecil Smith (Houston), Bud Rees (Denver), Charles Rhodes (Portland), Fred Seitz (New York), David Comstock (Atlanta), Bob Seaberg (Chicago), Dennis Chamberlin (Washington)—all from the Engineering Department, Tektronix, Inc., Beaverton, Ore.

Present Status of AM Stereo—Eric Small, Eric Small and Associates, San Francisco, Calif. (Houston and Portland); Eb Tingley,

Continued on page 10

Meet the TK-46 from RCA.

Successor to the world's most successful TV studio cameras.

What's new on the TK-46?

Better signal-to-noise ratio, for one thing. In low light, a new, advanced preamp design improved signal-to-noise ratio by 3 dB—especially useful in multiple-generation tape production.

Also new for the TK-46 is a tiltable viewfinder with an 8" diagonal screen. The cameraman can hold a horizontal view while tilting the camera through a 30° arc.

Simultaneous in- and out-of-band contours with combing and coring are standard on the TK-46.

Feature	Year Introduced	69	70	71	72	73	74	75	76
High Efficiency Prism Optics		•	•	•	•	•	•	•	•
Wide Range Voltage Regulation		•	•	•	•	•	•	•	•
Comb Filter and Coring		•	•	•	•	•	•	•	•
Chromacomp		•	•	•	•	•	•	•	•
Electromechanical Lens Cap		•	•	•	•	•	•	•	•
Small Diameter Mini Cable			•	•	•	•	•	•	•
Joystick Remote Control Panel				•	•	•	•	•	•
Internal Bias Light	TK-44A			•	•	•	•	•	•
Extended Sensitivity				•	•	•	•	•	•
Scene Contrast Compression				•	•	•	•	•	•
Compact Camera Control Unit				TK-44B	•	•	•	•	•
Simplified Set-Up Controls					•	•	•	•	•
Automatic Color Balance					•	•	•	•	•
Automatic Iris Control					•	•	•	•	•
Automatic Centering Control					•	•	•	•	•
Indoor/Outdoor Switch					•	•	•	•	•
Super Quiet Switch					•	•	•	•	•
Out of Band Aperture Equalization						•	•	•	•
Shared CCU with Portable Camera Head							•	•	•
New State-of-the-Art Preamps						TK-45		•	•
Tilting Viewfinder								•	•
Simplified Control Panel Layout								•	•
Accident-Proof Set-Up Controls								•	•
Simultaneous In/Out of Band Aperture Equalization								•	•
Operations-Oriented Styling								•	•
									TK-46

Chronology of a winner.

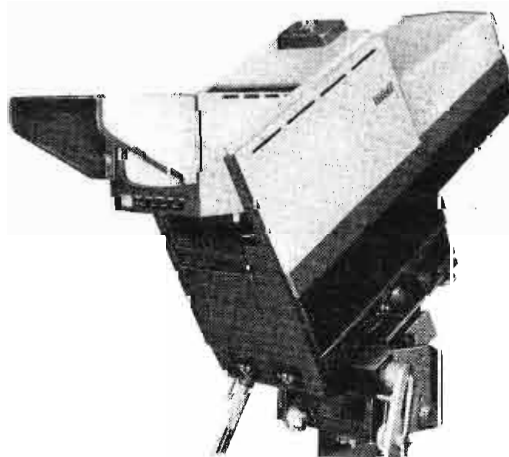
The TK-46 is a new camera.

But far from unproved.

It is actually the distillation of years of brilliant camera performance. With features introduced to the industry on the TK-44 and its successors.

Features proved in more than 1,300 of these cameras. Features improved, where possible, for the TK-46. To make it the worthy successor to the world's most successful TV cameras.

Above are 25 reasons why the TK-46 makes superb pictures.



Our chart will show you all the advantages and how long they have been performance proved.

To see what all the TK-46 excitement is about, see your RCA Representative.

RCA

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Ad Conferences Scheduled

"How Radio Stations Can Do a Better Job of Selling" will be the topic of luncheon speeches by leading advertising executives at six of this Fall's seven Regional Conferences.

The conferences, sponsored by the National Association of Broadcasters and the Radio Advertising Bureau, will be held in Houston (Oct. 18-19), Denver (Oct. 21-22),

Portland (Oct. 25-26), New York (Nov. 11-12), Atlanta (Nov. 15-16), Chicago (Nov. 18-19) and Washington (Nov. 22-23).

In Houston, the speaker will be Richard E. Wiley, chairman of the Federal Communications Commission.

Speakers at the remaining conferences will be announced later.

Industry News

Continued from page 8

Seminars

staff engineer, Electronic Industries Association, Washington, D.C. (Denver); Emil L. Torick, director, audio systems technology, CBS Technology Center, Stamford, Conn. (New York and Atlanta); Carl G. Eilers, Zenith Radio Corp., Chicago, Ill. (Chicago) and Harold Kassens, A. D. Ring and Associates, Washington, D.C. (Washington). All are members of the National AM Stereo Radio Committee.

What Automatic Transmission Systems Mean to the Broadcaster—William B. Honeycutt, Director of Engineering, KDFW-TV, Dallas, Tex. (Houston); Ralph F. Batt, Vice President and Manager of Engineering, WGN Continental Broadcasting Co., Chicago, Ill. (Denver and Chicago); Albin R. Hillstrom, Vice President, Engineering, KOOL Radio & Television, Phoenix, Ariz. (Portland); James D. Parker, Staff Consultant, Telecommunications, CBS Television Network (New York and Washington); Robert W. Flanders, Vice President, Engineering, McGraw-Hill Broadcasting Co., Indianapolis, Ind. (Atlanta).

Improving Coverage Through Signal Processing—J. P. Combs, Vice President, Product Management, or D. F. Masse, Vice President, Engineering, Broadcast Products Division, Harris Corporation, Quincy, Ill., in all cities.

Circular Polarization for Television—Robert E. Winn, Commercial Communications Systems Division, RCA Corp., Camden, N.J. (All except Atlanta and Washington); E. N. Luddy, Manager, Consultant Relations, RCA Corp., Washington, D.C. (Atlanta and Washington).

Ask the FCC—Wallace E. Johnson, Chief, Broadcast Bureau, Federal Communications Commission, Washington, D.C. (Houston); Neal K. McNaughten, the Bureau's Assistant Chief (Denver and Portland). FCC personnel participating in the remaining meetings will be announced later.

The Buck Stops Here—Engineers will have an opportunity to test their solutions to some actual problems faced by broadcasters during the past year.

No other tape cartridge machine can do so much for so little



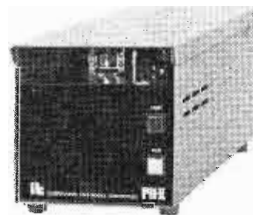
Recorder/reproducer \$775

PD II SERIES

At last—a machine that records and plays mono tapes in the "A" size cartridge, stops automatically on the 1kHz cue tone and—offers you longer life, less maintenance and better performance than any other cartridge machine at an economy price.

Compare for yourself

- ITC's famous air-damped solenoid with Teflon coated plunger assures super-quiet operation.
- Deck is milled from a solid block of 1/2 inch thick aluminum. It won't warp...presents the same flat, stable surface to cartridges every time. Assures correct azimuth of heads.
- Heavy-duty micro adjustment head assembly with adjustable tape guides. Designed for easy, accurate adjustments.
- Direct-capstan, 450 RPM, hysteresis-synchronous drive motor—with an electrolyzed shaft—minimizes wow and flutter. Eliminates need for rubber belts and separate flywheel assembly.
- New trim-line design lets you place three units side-by-side in a 19 inch rack. Each unit is only 5 3/4 inches wide, 5 1/4 inches high and 15 inches deep.
- Features latest solid state components, even for switching applications. No relays. Printed circuit cards plug in.



Reproducer \$550



Call us and we'll prove it to you

For complete information call us collect at 309/828-1381. You'll be talking to experienced broadcasters who not only know what ITC equipment can do—but know what you want it to do.

INTERNATIONAL TAPETRONICS CORPORATION

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You can get a technician
who knows cameras or a camera
that doesn't need technicians.



BCC-1 stays buttoned up.

You're not going to learn much about servicing an Ampex BCC-1 color studio camera, because it isn't going to need much service.

Inside the well-designed case, major electronic assemblies merely unplug and slide out. The entire front end also lifts away in a jiffy. And the optical components are sealed against contamination, firmly mated and precisely aligned. If, for any reason, you have to fix a BCC-1 camera, you'll probably

have it back in operation in minutes. But then again, you may not ever have to fix it.

You'll probably buy your BCC-1 for the pictures



it makes.

Steady, centered, sharp pictures within seconds of powering up from a cold start. Highly stable circuitry. Extended-red Plumbicon* tube fidelity. A masterpiece of graphic response.

But don't spend all your time admiring the picture. Save a good thought or two for the BCC-1 reliability. And if you don't trust your own evaluation, ask a technician about Ampex quality.

BCC-1 is the color camera designed by Ampex for broadcasters who can't take chances.

AMPEX

Complete technical and performance specifications are available in a free brochure. Write us at 401 Broadway, Redwood City, California 94063, or call (415) 367-2011.

*T.M. N.V. Philips

Introducing the Family of

Now you can add that perfect touch of editing professionalism to any news story or commercial on helical videocassettes with Convergence Corporation's Family of Fabulous Frame Finders. Discover how fast and easy it is to find any frame you're looking for and how simple it is to automatically do what you want once you're there.



SM-2 Joystick Search Module gives you incredibly flexible tape handling and remote control on a stand-alone VCR. The unique Convergence joystick allows you to see pictures at speeds continuously variable from still frame to three times normal play in forward and reverse. The LED tape timer lets you quickly screen and log news stories or commercials for pre-edit decision making. The SM-2 also programs precise on-air roll cues and lets you slave extra playback machines for A/B rolls.



ECS-1 Joystick Editor provides, for the first time, film-style editing flexibility on helical videocassettes. News film editors converting to video tape find the ECS-1 a snap to operate. In fact, networks and group owners are already using the ECS-1 by the hundreds. Production houses have found our Editor to be perfect for economical on-line and off-line editing. The Convergence Editor is great by itself, but it's fantastic when combined with the PC-3 and the TT-4 — the newest members of our Fabulous Family.

Fabulous Frame Finders.



TT-4 Digital LED Tape Timer fits neatly under the monitor on a standard ECS-1. It counts control track pulses to let you know where you're at and where you're going. It's just what helical video tape editors have been looking for. The TT-4 counts up and down and can be reset to zero or preset to any number. It even times assemble edits to give you accumulated program time. Buy it now or add it later.

PC-3 Program Computer combined with the ECS-1 gives you precise end insert timing and scene duration timing. Insert and stopwatch functions are programmable with the simple-to-operate PC-3 computer keyboard. Now you can automatically preview insert edits as many times as you want and trim them up to ± 99 frames from the keyboard. What's more, plug your PC-3 into a TT-4 and get keyboard access to automatic bidirectional tape search.

Take the time and trouble out of your VCR searching and editing. Join the Family of Fabulous Frame Finders today. They'll help you find exactly what you're looking for. For complete specifications and address of your nearest distributor, write Department BE10.

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Industry News

SMPTE Show Dates Are Set

The program for the 118th Technical Conference of the Society of Motion Picture and Television Engineers (SMPTE) has been announced by SMPTE Program Chairman Paul Wittlig, CBS, Inc.

The Conference is scheduled for the Americana Hotel in New York City, October 17-22.

According to Wittlig, the program will feature five days of technical sessions. The major subjects to be discussed are television and motion picture production, post production, distribution and exhibition. These subjects will take up the first three days of the meeting (Monday through Wednesday, Oct. 18-20). The final two days will zero in on such specific topics as New Products in Motion Pictures and Television, Labor in a Changing Technology, Motion Picture Landmarks and Future Trends, and

Computer Control and Signal Distribution in TV Broadcasting Centers.

In addition to the technical sessions, an extensive exhibition of professional motion picture and television equipment will run concurrent to the technical sessions Monday through Thursday, Conference week. More than 140 booths have been taken so far by most of the leading manufacturers and suppliers of professional film and video equipment.

Conference registration opens Sunday noon, October 17. The Technical Sessions begin on Monday October 18 with papers on Production. Kicking off the first session will be a Keynote address by famed producer George Schlatter.

The program schedule breaks down as follows: Monday, all day, Film and Television Production;

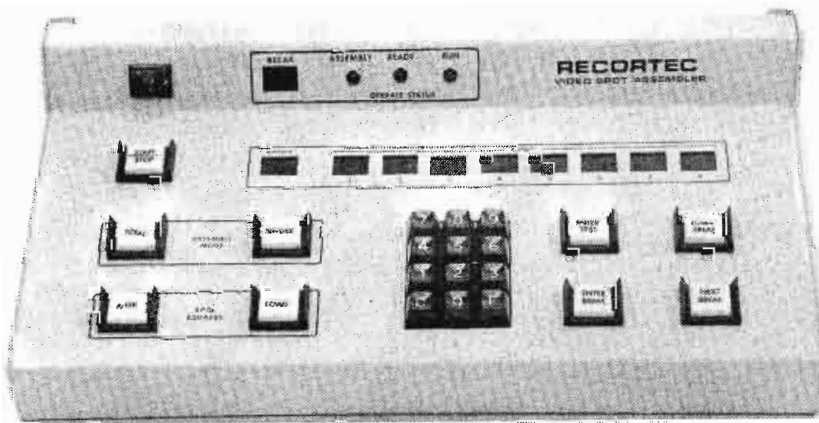
Tuesday, all day, Film and Television Post Production; Wednesday, all day, Film and Television Distribution and Exhibition; Thursday morning, New Products in Motion Pictures and Television; Thursday afternoon, Labor in a Changing Technology, and the Olympic Games Reports; Friday morning, Computer Control and Signal Distribution in Television Broadcasting Centers, and Friday afternoon, Motion Pictures: Landmarks and Future Trends.

In addition to the technical sessions and the equipment exhibition several social events are planned, including the SMPTE Get-Together Luncheon on Monday, October 18, where SMPTE awards will be presented. The guest speaker at the luncheon will be John A. Schneider, President, CBS Broadcast Group.

For additional information on the SMPTE Conference and Exhibit, write to SMPTE Conference, 862 Scarsdale Ave., Scarsdale, NY 10583, or call 914-472-6606.

VIDEO SPOT ASSEMBLER

"The VSA is a low cost alternative or back-up system to cart machines"



The Video Spot Assembler is a special purpose editing controller that makes spot reel assembly faster and easier. The VSA controls two existing VTRs to produce multi-break spot reels using less VTR and oper-

ator time than conventional methods. Before you submit your budget for an expensive cart, consider the VSA alternative. The VSA will accomplish most of the tasks attributable to the cart at a saving of a few

hundred thousand dollars. The VSA is an electronic dream, not a mechanical nightmare. Try it before you are committed to a cart. Call or write for details.

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The finest multi-core studio and field camera system ever produced by Philips.

Which means the finest multi-core studio and field camera system ever produced.

In the decade since Philips re-invented color with the Plumbicon* tube, its PC-60 and PC-70 have successively stood as *the* reference standard for broadcast performance. Behind Philips' leadership, that standard has steadily improved to today's ultimate—the LDK-25.

That Philips has again leapfrogged the competition can surprise no one who knows broadcast cameras...since we created Plumbicon* technology. After a decade of refinement and improvement Philips is still the *only* company that manufactures all of the critical picture determining components—computer-matched yokes, beam splitting prism, deflection circuitry and Plumbicon* tubes. The *only* company that can design each component for optimum performance of the entire camera system. These advantages, of superior Philips design and in-house component availability, offer you unsurpassed stability, picture quality and value.

Further, at Philips, we offer you options that are options. The LDK-25 you buy is a custom unit, equipped

with the automatic features you select...not a 'loaded' factory package.

But you can't just read about the LDK-25...you've got to experience it.

Only a demonstration can show you how our anti-comet-tail Plumbicon* tubes handle highlights up to 32x normal peak-white level without blooming or streaking—and without loss of our famous color rendition and resolution. 'Live' is the only way to learn what our Color Line-Up Equipment (CLUE) can do for ease of balance... what electronic color temperature control, auto white balance, flexible auto iris and contrast compression mean in use.

Only after you've seen it all—after you've actually handled this remarkable camera—will you understand why the Philips name is a guarantee of incomparable stability...why no one else can match our 1000-hour performance.

To get your hands on an LDK-25 or to get more information, call us today at (201) 529-5900; (201) 529-3800, or write: Broadcast Products, Philips Audio Video Systems Corp., 91 McKee Drive, Mahwah, N.J. 07430.



LDK-25 *IS DECADE TWO*

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For Demonstration Only Circle (16) on Reply Card



Not just four new products. One new ENG system fully integrated to broadcast needs.

Sony introduces the first fully integrated ENG system designed to meet broadcast requirements. The components of this system represent a new high in heterodyne picture quality as well as a practical approach to editing and airing ENG tapes. Each unit is designed to work independently or as part of a system to insure quality, reliability and true economy.

1. BVU-100 Portable Broadcast U-Matic® Recorder

The new BVU-100 is the latest addition to the famous U-Matic format and is fully interchangeable with any of the previous portable U-Matic models. An additional longitudinal track, provided for recording SMPTE code on a battery-operated CG-100 SMPTE generator, is offered as an option. The new BVU-100 gives you extra dollar savings in addition to extra quality. Because it can be directly coupled to a TBC, you can go directly to air or microwave link, avoiding the cost of an additional playback machine in the remote van.

2. BVU-200 Broadcast Editing U-Matic

This recorder allows for high speed accurate editing utilizing either control track or SMPTE address systems. It incorporates BIDIREX™, a specially engineered system to move tape in faster or slower speeds in either direction.

When used with the Sony BVE-500 editing console, BIDIREX assures fast accurate editing that is fully frame servoed.

3. BVE-500 Broadcaster Editing Console

The BVE-500 provides a fully automatic editing control for tape-to-tape editing between a pair of BVU-200's. The BVE-500 is a three register editor with digital readouts for both source and record material. Changes in the edit-in and edit-out point can be programmed at a touch of a button. This highly accurate editing system provides both preview and frame trimming at a fraction of the cost of a computer editor. And of course all edits are frame servoed to insure clean picture quality without loss of timing information.

4. BVT-1000 Digital Time Base Corrector (not shown)

Sony's reputation for engineering reliability is combined with transparent picture quality and a wide 4H window to bring broadcasters a new standard of performance in time base correction. Line by line correction, velocity compensation, drop-out compensation, and full processing with standard advance sync, are all standard features of the BVT-1000.

For more information on this new ENG system, write to Sony Broadcast.

Sony Broadcast

Sony Corporation of America, 9 West 57 Street, New York, New York 10019

Sony® is a registered trademark of Sony Corporation of America.

NY Chapter Schedules November Meet



FCC Commissioner Robert E. Lee will deliver the keynote speech at the Third Annual Society of Broadcast Engineers New York Convention, to be held November 7 & 8, 1976 at the Holiday Inn in Hempstead, New York. This year, for the first time, the technical program will be conducted jointly with the Society of Cable Television Engineers.

A wide variety of papers of interest to both broadcast and CATV personnel will be presented on such topics as satellite interconnection, coherent video channeling, lightning dissipation, AM stereo, quadraphonic broadcasting, noise reduction, contact microphones, video character generation, stereo networking, electronic news gathering and many more, by experts from throughout the United States and Canada. The papers will be supplemented by demonstrations and an exhibit floor as diverse as the technical program.

Limited exhibit space and program slots are still available. For information contact Mark Schubert, Society of Broadcast Engineers, P.O. Box 607, Radio City Station, New York, New York 10019, (212) 765-5100, extension 317.

Chapter News

Chapter 3—Kansas

On June 8th Bill Keegan introduced Barney Geolat, Regional Representative of the Scientific Atlantic Corporation, from the Illinois office. Geolat introduced two gentlemen who presented a slide presentation on communication satellite earth stations. The presentation included scale models of 10-meter parabolic dish antennas and actual microwave receivers and transmitters. A general question and answer session followed concentrating on the present and

future application of portable and mobile earth stations and the planned use of earth stations by PBS stations in a nationwide network.

The slide presentation was also aimed at the engineer, going into considerable detail on the operating theory of the equipment used as well as the specifications and operation of the Scientific Atlantic equipment. Bill Keegan, Chairman, KTSB, P.O. Box 2700, Topeka, Kansas 66601, (913) 582-4000.

Chapter 5—Atlanta, Georgia

We'd like to welcome the Society's "newest" chapter which has just recently been recognized. The chapter was originally formed in 1968 but became inactive until just recently. This chapter has the distinction of being the fastest growing chapter in the country. Since the chapter had originally been issued a charter in 1968 it gets to use its original chapter number.

At the July 27th meeting chairman pro-tem Joe Abercrombie opened the meeting which was held at the Rollins Company and the following were elected as the chapter officers: Chairman—Russell Artz) Vice Chairman—Ed Graham; Secretary/Treasurer—P. G. Waters. After a short break, the program was conducted by Bill Powers regarding FCC docket 20817, Licensing of Radio Operators.

The August 17th meeting was held at the Rollins Company and at this meeting they were to put together comments on operator licensing for presentation to the FCC.

Chapter 18— Philadelphia/Trenton

Larry Will, Chairman, reports that the chapter meets on the third Monday of the month (except on holidays) from September till May. For meeting locations and topics he may be reached at the State of New

Jersey Public Broadcasting Authority, 1573 Parkside Avenue, Trenton, New Jersey 08638, (609) 882-5252.

Chapter 20—Pittsburgh, Pennsylvania

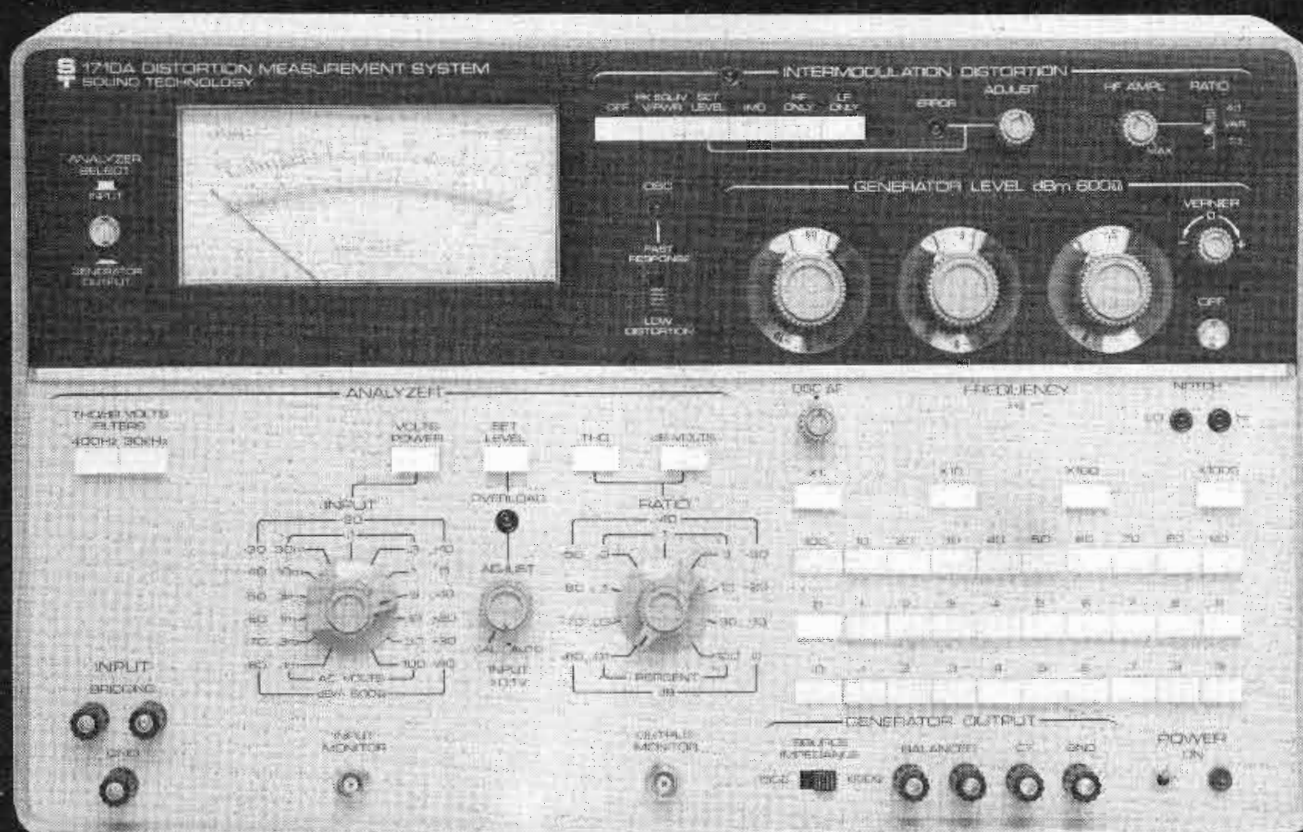
Chapter 20, whose Regional Convention will be held October 22nd, invites all broadcasters, school officials, closed-circuit and cable engineers and technicians, and those in allied fields who are interested in radio and TV equipment to attend this **free** show.

The site will be the same as it was for the highly successful 1975 convention—the Howard Johnson Motor Lodge in Monroeville, Pennsylvania. It is located at the intersection of Route 76 and Exit 6 of the Pennsylvania Turnpike, approximately 12 miles east of downtown Pittsburgh via the Parkway. For more information call Roy Hoover at KDKA-TV at (412) 391-3000 or Paul Stewart (also at the same number), James Hurley, Chairman, WTAE-TV, 400 Ardmore Blvd., Pittsburgh, Pennsylvania 15230, (412) 242-4300.

Certification List Is Growing

As of September 1st the Certification Board of the Society of Broadcast Engineers had certified 63 members and 13 non-members. This represents, however, only a portion of the number of applications received. Since the final guidelines for determining certification under the grandfather provision were recently finalized the Certification Board will have reviewed all applications by November 1st.

**Certification....
It Needs You
You Need It**



Your new automatic distortion measuring system for balanced measurements

REDUCED OPERATOR ERROR

Here's something you'll like — Sound Tech's new distortion measuring instrument for use in balanced work.

The new 1710A is much more than just a distortion analyzer. It's a system.

It contains its own ultra-low-distortion generator tracked with the analyzer. It's a system that greatly simplifies measuring — gives you fast measuring with simple operation that reduces operator error.

For example, push the frequency buttons and you set both generator and analyzer. Push "Distortion" and you have your reading. Automatically. No slow, tedious manual null-searching.

Features in the new 1710A include:

- a balanced, floating output (600/150 ohms)
- a balanced (bridging) input
- a high-level +26 dBm signal

- +26 to -90 dBm attenuator
- distortion measurements to .002%
- fast 5-second measuring speed
- automatic nulling, optional automatic set level.
- both harmonic and optional intermodulation distortion measurements.

SPECIAL OUTPUT CIRCUIT

In the 1710A you get a transformerless audio generator output that's balanced and floating. No transformer means no transformer distortion. Floating and balanced means you can connect to virtually any audio circuit regardless of configuration. And you can set the output from +26 to -90 dBm in 0.1 dB steps.

FAST, SIMPLE MEASURING

Automatic nulling and the automatic set level option (ASL) give you ex-

tremely fast measuring and little chance for operator error. You can measure in 5 or 6 seconds. *With ASL you can measure distortion vs. frequency, and distortion vs. voltage or power without resetting level.*

IM OPTION

An additional optional bonus is that the 1710A also measures intermodulation distortion. After you've made a harmonic measurement, just push the "IMD" button. In 3 seconds you'll have the IM reading. With this option you'll be ready for future IM requirements.

CALL/SEND NOW FOR LITERATURE

It's worth while getting the information on this major new distortion measuring system. Call Larry Maguire or Bob Andersen now and get our new product brochure. It's ready and waiting.

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NAEB '76 Convention

Satellites To Graphics In The Windy City

by Peggy Brown

Chicago is the site for the 52nd Annual NAEB Convention to be held in October. For three and a half days, starting October 25, professionals in all aspects of telecommunications will have a chance to attend sessions and seminars on engineering, management, instruction, programming, production, research and education.

Several awards will also be presented during the Convention. During the Monday morning, October 25 opening session, the NAEB Distinguished Service Award will be presented to two persons. The recipients are Virginia Kassell, the creator, producer and project director of Adams Chronicles; and Senator John Pastore (D-RI), who has demonstrated continued and adamant support for public broadcasting during his 18 years as chairman of the Senate Subcommittee on Communications. The NAEB Award is presented annually in recognition of significant contributions to the field of public communications.

The Association's Graphics and Design Professional Council will recognize the winners of the 6th Annual NAEB Design Competition Monday afternoon. The winning entries were chosen from the best in public stations' graphic designs, set designs, animation and promotion campaigns. The winning entries will be shown preceeding the presentation of the awards and will be on display during the Convention.

The program for this year's convention includes over 150 different specialized seminars and sessions. The programs for the seven professional areas, were developed by the Steering Committees of the dif-

ferent NAEB Professional Councils, drawing on membership suggestions.

Engineering Sessions

The NAEB Engineering Council, acknowledging that engineering is a field that requires keeping up on the latest technological developments, has planned the following sessions.

Monday afternoon, Oct. 25, 1:30 - 6 p.m.

- Discussion of UHF improvements and technical advances during the past year.
- Panel on latest developments in FCC and industry advancements.

Tuesday afternoon, Oct. 26, 1:30 - 6 p.m.

- Latest update on satellites, including information on SECA, PSSC, and the ATS-6.

Wednesday afternoon, Oct. 27, 1:30 - 6 p.m.

- Discussion of AM stereo and other radio advancements.

Station Management

Although station managers have overall responsibility for the operation and programming of their station, they also have special responsibilities ranging from personnel and employment concerns to FCC ascertainment requirements to participation in a satellite interconnect. The Steering Committee of the NAEB TV Managers Council has created these special sessions for managers.

Monday afternoon, Oct. 25, 1:30 - 6 p.m.

- Personnel Matters: discussions concerning employee benefits, affirmative action programs, employee training and staff development.

Tuesday morning, Oct. 26, 8 a.m. - noon

- Reunion: Harvard '76: all managers are invited to meet with the 1976 graduates of the NAEB Harvard Management Development Program.

Tuesday afternoon, Oct. 26, 1:30 - 6 p.m.

- Management Briefing: The Satellites: Description of various satellite efforts; implications of the satellite for stations; what new services can be operated—costs? who pays? when?
- Management and Research; Ascertainment of Community Problems- What The Requirements Are: legal briefing on FCC requirements for ascertainment.
- Meeting of TV Managers Council; Effective Management of Radio Volunteer Groups; Training Programs in Public Broadcasting: Job design, recruitment, interview and placement, orientation and training, evaluation and retention, and recognition. Group discussion on public participation in advisory groups, programming, research, station awareness campaigns and fund raising.

Wednesday morning, Oct. 27, 8 a.m. - noon

- Briefing on cable rules, copyright, UHF developments, and open learning.

The NAEB Broadcast Educators Council, under the direction of Dr. George Wilson, has planned an extensive program which reflects the varied interests of professionals involved in teaching broadcasting in American colleges and universities. The following is a list of titles of their sessions: Focus on the Future; Radio Resurgence; Careers and Utilization; Nature of National Television Courses for Credit, and

The CVS Time Machine

It's the CVS-520, only digital TBC that can colorize a quad from the past . . . bring quad quality to today's ENG . . . and handle signal processing breakthroughs yet to come. In fact, just about any TBC job you can think of, the CVS-520 can do. For segmented and non-segmented VTRs, both quad and helical.

For example, the CVS-520 automatically detects direct or heterodyne color. So, you can switch at vertical intervals between any vertical locked VTRs, no matter what color system they use.

In addition, an automatic burst-add circuit provides burst at the output at all times (unless programmed to

be deleted) even when you're processing monochrome signals.

There's also a built-in fully adjustable proc amp, a built-in digital drop out compensator, a line by line velocity corrector, and a gen-lockable sync generator. You also get digital output drives for future expansion.

As for quality, a few specs tell the CVS-520 story. Like a signal to noise ratio of 60 dB. A differential phase less than 2 degrees. And differential gain less than 2 percent.

In short, the CVS-520 is all the TBC you're likely to need for a long time to come. For a demonstration, call or write.



CVS Consolidated
Video
Systems, inc.

3300 Edward Avenue, Santa Clara, California 95050 (408) 247-2050

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NAEB Convention Exhibitors

These were the known exhibitors at press time, others will be added.

Acrodyne Industries, Inc. , Montgomeryville, PA.	Kliegl Bros. , Long Island City, N.Y.
Acmo Engineering Co. , Chicago, IL.	KNOX, Ltd. , Gaithersburg, MD.
American Scenic, Inc. , Greenville, S.C.	LPB, Inc. , Frazer, PA.
ASACA Corp. of America , Des Plaines, IL.	L-W International , Woodland Hills, CA.
BFA Educational Media , Santa Monica, CA.	Marti Electronics, Inc. , Cleburne, TX.
Broadcast Electronics, Inc. , Silver Spring, MD.	Miami-Dade Community College , Miami, FL.
Consolidated Video Systems, Inc. , Santa Clara, CA.	Microwave Assoc., Inc. , Burlington, MA.
Dage-MTI, Inc. , Michigan City, IN.	MSI TV, Inc. , Salt Lake City, UT.
Datatron, Inc. , Santa Ana, CA.	National Business Machines, Inc. , Rockville, MD.
Dynair Electronics, Inc. , San Diego, CA.	Publishers For Conventions, Inc. , Allison Park, PA.
Eastman Kodak Co. , Rochester, N.Y.	Q-TV/Telesync , New York, N.Y.
Educational & Industrial Television Magazine , Ridgefield, CT.	RCA
Electronics, Missiles & Communications, Inc. , White Haven, PA.	Strand Century, Inc. , Elmwood Park, N.J.
Great Plains National Instructional Television Library , Lincoln, NE.	Telemet, A Div. of Geotel, Inc. , Amityville, N.Y.
Image Magnification, Inc. , Verona, N.J.	Telescript, Inc. , Demarest, N.J.
Innovative Television Equipment , Woodland Hills, CA.	Time-Life Films , New York, N.Y.
Jamieson Film Co. , Dallas, TX.	TV Ontario , Toronto, Ontario
Johnson Electronics, Inc. , Casselberry, FL.	Uni-set Div. of Kniff Woodcraft Corp. , Rochester, N.Y.
	United Business Publications , New York, N.Y.
	Video Aids of Colorado , Loveland, CO.
	WQLN-TV , Erie, PA.

Spotlight on Students.

Among the sessions planned by the NAEB Instruction Council are National Agencies Instructional Radio and Television Briefing; Alternative ITV Delivery Systems; Some Cost Comparisons; ESAA Funding; Instructional Development in Business and Industry; Instructional Radio 1976; and Cable and Slow Scan: What's New?

The Graphics Steering Committee has planned a show and tell discussion of successful and innovative design solutions which are the result of good communication. Sessions will also be held on advertising, Planning Your Graphic Needs For Quality and Consistency and, there will be a film presentation and discussion of the communications processes by which creative individuals produce outstanding work.

Separate tracts have been planned by the Programming, Production Managers and Producers Councils of the NAEB under the professional heading Production and Programming. Sessions planned for Production Managers are Budget control and development; Effective Scheduling of Facilities; Target Date Planning; Employment Training and a business meeting of the

Production Managers Council.

Producers can attend programs on their relationship to the public relations department; Increasing Ratings of Locally-Produced Shows; Discussion of the Advantages and Disadvantages of the Mini-Camera; Public Affairs Programming; The Producer as Manager; The Producer's Role in Shaping Programming and Program Policy; working with Program Advisory Groups, and a business meeting of the Producers Council.

For Program Managers, the following programs have been planned: FCC Requirements for Ascertainment, Ascertainment, Radio Programming, Television Programming; Streamlining Operations, How To Construct an Effective Program Schedule, and Development and Programming. There will also be sessions on Programming for the Hearing Impaired, Radio Production, Meeting with the PBS Programming Staff, and a business meeting of the NAEB Radio and Television Program Managers Council.

Current Research

The NAEB Research Council's Steering Committee has organized a

convention program which will report on current research and address basic research concerns. The following is a list of session titles: Decision Oriented Research in Television Programming, Research and ESAA, Research on the activities of CPB Communication Research office and Research on Using Cable and Computers in Instruction. Papers in Telecommunications to be presented are Evaluative Studies of the Infinity Factory series; Development of a Televised Test of Elementary Science Process; and Children's Television Viewing and Relationships with Achievement Test Performances.

The Convention is open to non-members as well as members of the NAEB. Attendees may pick up advance registration credentials in the Lobby of the Conrad Hilton beginning at 2 p.m., October 23. Registration for exhibits only begins at 9 a.m., October 25.

All registrants are advised to make their hotel reservations with the Conrad Hilton no later than October 3. Any questions concerning the Convention should be directed to the NAEB Convention Office, 1346 Connecticut Avenue, NW, Washington, D.C. 20036. (202) 785-1100. □

We've lightened your load.

Here and here.

Our new portable video cassette recorder/player makes eyewitnessing the news easier than ever before.

JVC has done two things to improve your ENG capability: we've made the gear lighter and we've lowered its initial cost.

Our brand-new CR-4400U Color Portable Capstan-Servo 3/4" U-VCR weighs only 24.5 pounds, complete with rechargeable battery and standard 20-minute videocassette inside. And it sits as lightly on your checkbook as it does on your shoulder.

With the CR-4400U at your side, you're set to record top-quality color video, with a S/N ratio of better than 45 dB. There's a full-function keyboard, including pause/still and audio dub. Other JVC features include audio mixing and multi-purpose meter to read audio, battery, video and servo levels. Our exclusive auto assemble editing function enables you to get smooth, glitch-free edits between scenes, and can be operated by camera trigger or remote switch. With lock-up time to full speed at less than 0.2 second, you're always ready to shoot. And you can shoot 50% longer, too, since the CR-4400U requires 50% less power than most other decks.

JVC's unique patented dubbing switch is provided to facilitate quality tape transfers. For playback through regular TV sets, an optional RF converter can be plugged right into the deck. The CR-4400U operates on AC as well with its companion

New JVC CR-4400U Color Portable Recorder, shown with new CR-8300U Full-Editing Cassette Recorder, GC-4800U Color Camera, CC-4800U Camera Control Unit and Dual-Machine Remote Controller.



AA-P44U Power Adaptor, which also functions as a battery charger.

But the best way for you to find out how this light-weight, low cost portable video-cassette system can add to your newsgathering ability is to get yourself a hands-on demonstration. Call your JVC dealer, or send us the coupon below.

**JVC Industries, Inc.
58-75 Queens Midtown Expwy.
Maspeth, N.Y. 11378**

Please send information on:

- ☐ CR-4400U Portable Color 3/4" Video Cassette Recorder/Player
- ☒ GC-4800U Portable Color Camera
- ☐ CR-8300U Full Editing 3/4" Video Cassette Recorder/Player
- ☐ I'd like a demonstration

Name _____ Title _____

Organization/Company _____

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JVC INDUSTRIES, INC.

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"Ten Seconds To Air..."

WUFT Puts Students On The Line 4,167 Times

By Ron Whittaker, WUFT, University of Florida, Gainesville, Florida

For 17 years the University of Florida in Gainesville has offered students in the Department of Broadcasting a unique experience in television news—intensive, on-the-job experience producing a daily, 30-minute television newscast over WUFT, the university's VHF station.

In the early years of its history this daily newscast was the only TV news program available in much of the WUFT 16-county north-central Florida coverage area. Now, although numerous VHF and UHF stations overlap the channel 5 signal, the daily newscast still goes on providing both a news service for the 460,000 potential viewers in the area, and invaluable experience for many University of Florida broadcasting students.

Everything is there—world, national, state and local news and films; weather; sports and feature interviews. The only thing that you don't find are the commercials. They are replaced by 30 and 60-second public service announcements. Otherwise, the responsibilities and pressures are the same as you would find in any commercial TV newsroom. And this is why the WUFT experience over the years has been so important and beneficial to students preparing for careers in the very competitive broadcast news field.

For students in the news sequence, this on-air experience comes at the end of four years of university work in such required academic areas as U.S. history, political science, speech, cybernetics, newswriting, cinematography, radio production, TV production, law and communication theory.

But even all this background very often seems inadequate for those

first few (traumatic) times when students must face the cameras and report their first news stories. Nor is the initial "trauma" helped by the fact that students also know that the video tape of the newscast will be played back and carefully critiqued by their classmates and by Professor Don Grooms, the Executive Producer of the news.

Many students count these on-air sessions and the subsequent "post-mortems" as among the most uncomfortable (and instructional) of their college careers. After sitting through the replay of a particularly bad goof, many students can empathize with a football player who has to endure watching the re-runs of a foul-up on a crucial play. But everyone agrees that it is better to make the goofs here in the somewhat forgiving atmosphere of a basically academic experience, where supportive and constructive criticism is regularly provided, than in a competitive on-the-job situation where mistakes can jeopardize a job.

The Daily Routine

Before the availability of the 6-7 p.m. news blocks from the commercial stations in the Gainesville viewing area, the WUFT newscast was broadcast at 6 p.m. More recently, however, it has seemed more appropriate to provide mid-day news, and so the student newscast goes from 12 to 12:30 each weekday.

Much daily preparation goes into each day's 30-minute show, and for this reason the day must start early. At 8:30 a.m. each morning the students involved in the day's news show up at the WUFT newsroom to check over the AP teletypes and start organizing the news priorities for the day's show. All wire copy is

rewritten to the specific style of WUFT. Short sentences are required, for example, so that students can strive for maximum eye contact.

By 9 a.m. all 16mm news film shot by students must be delivered to the newsroom for processing. Because of financial restraints, WUFT has not as yet been able to get into color ENG units, although this may soon change. Upon occasion the station's black and white porta-pack has been used for crucial late-breaking stories. The tape can be played back on studio monitors and picked up by one of the color studio cameras, an approach which gets around extreme time-base stability problems.

By 10 a.m. the news film has been returned to the newsroom and the editing of the day's films begins. Generally, several silent films and one or two single-system sound-on-film news stories will be used each day. As soon as the films are edited, students start writing the copy for the films.

By 10:30 the day's studio director arrives at the newsroom to start planning the actual production elements—audio and video tapes, chroma-keys, slides, etc. It should be noted here that the studio production in the news show is primarily handled by advanced students in another broadcast sequence—Broadcast Production. So, in effect, there are students from two broadcast specialties cooperating in putting on each day's show.

The deadline for all but the top story for the day is 11:30 a.m. A 15-minute period from 11:30 to 11:45 is held open for a last minute change of copy in the lead story. By 11:45, the production crew for the day has already checked camera

Crew positions in "Weekday Report" are primarily handled by students in the Broadcast Production sequence of the Department of Broadcasting. Working on the fast-paced news show is one of the most demanding assignments for these students.





"Ten seconds to air," is the last cue by the floor director before the on-air tally light comes on to start another "Weekday Report" news program. The channel 5 signal reaches to both the Atlantic and Gulf coasts of Florida—a 16 county area.

shots and audio and have the films and tapes loaded.

On the news side, about six students appear on the air each day. First of all, there is the anchorperson for the day, who has also served as the news director throughout the morning in the newsroom. In addition, there are up to five "swing people" who handle individual on-air assignments.

Following the regular news, sports and weather segments, there is an interview each day on a current event topic. Each student is required to handle at least one such interview during the course of the academic quarter. It has been found that the ability to research and logically conduct an interview is closely associated with general professional effectiveness in the news field.

The various segments in the news show are broken up by 30 and 60-second PSA breaks. These simu-

late commercial breaks—most students will be working in commercial stations—and they also provide needed time in the studio for changes in swing people and camera positions.

Production Equipment

In its 17-year history, the student-produced news has seen a lot of production equipment come and go—reflecting the changing technology of the industry, itself. The earliest news shows used one vidi-con camera focused through the double glass of an announce booth. When it was (very quickly) found that this arrangement had some major shortcomings, the news moved to the main studio. This also made possible the use of a 3¼ x 4¼-inch projector for rear screen visuals.

Over the years the various improvements in the equipment made

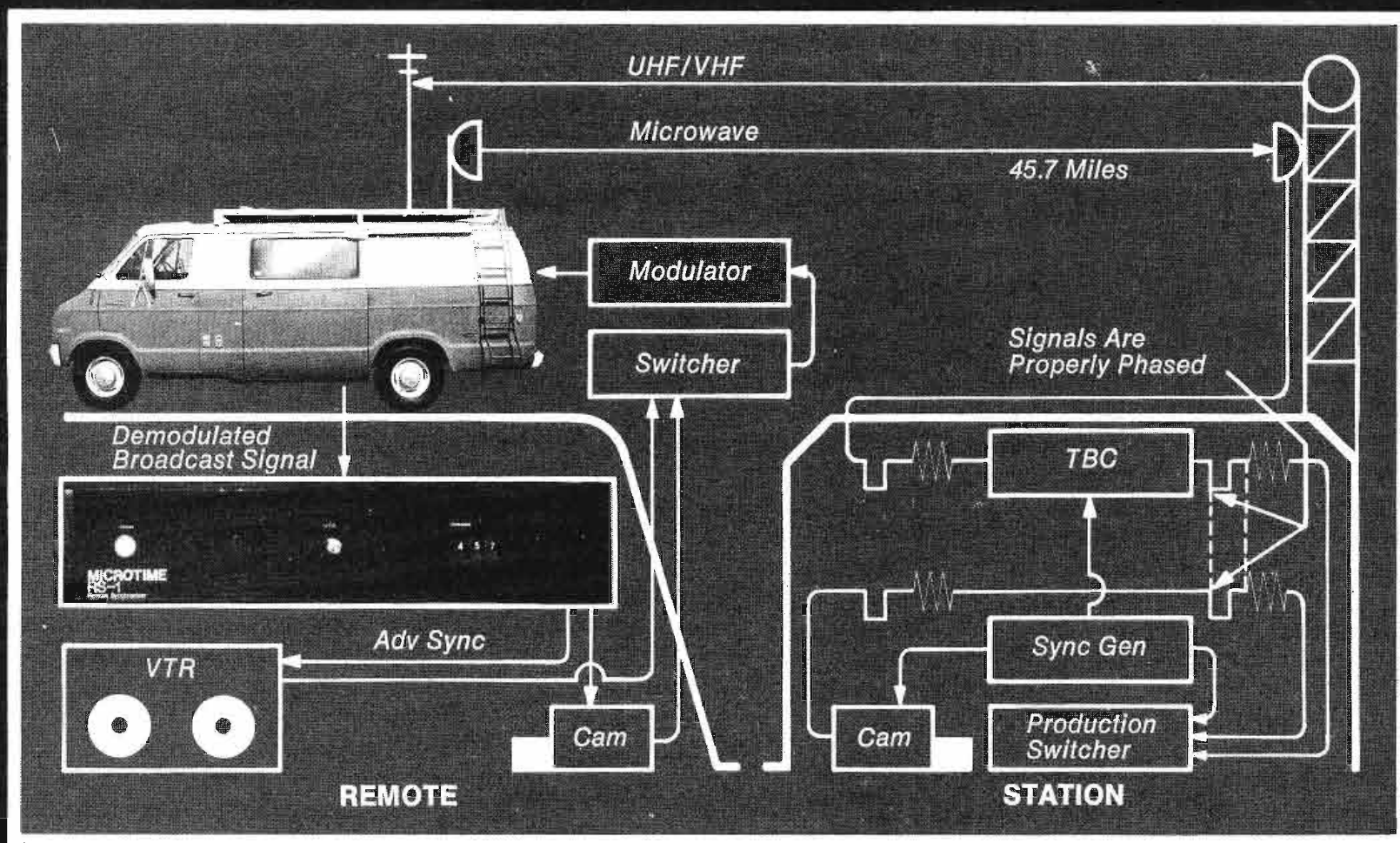
possible much more sophistication in the newscast. Today, "Weekday Report" is done with two 3-tube color camera and two film chains. "RP" visuals are shot on 35mm slides and chroma-keyed in. WUFT is equipped with four color VTR units—two 2-inch and two 1-inch—and a complete remote unit for covering governmental meetings.

There has long been an emphasis on the use of film for covering local news. Bell & Howell 70-DR and Cine-Voice II magnetic-track 16mm film cameras are used. As part of their assigned work, each student in the news class must complete a set number of silent and sound-on-film news and feature assignments during the academic quarter.

Although the station originally did all their 16mm film processing, for the past eight years they have found it cheaper to use the services of a local lab rather than maintaining their own processing facilities.

RS-1

Remote Synchronizer



Synchronizes remote camera or VTR to station without costly frequency standard or frame synchronizer

Phases remote signals for mixing-effects with station video

Provides 3.58 feedback to remote VTR to time base correct video at station in direct color mode

Use with any TBC located at station

The RS-1 Remote Synchronizer is an exciting new device for direct airing of remote camera or VTR feeds up to 59 miles away from the station. Priced under \$4,000 the RS-1 replaces costly rubidium/cesium standards or frame storage units to synchronize remote video feeds with station signals for use through a production switcher.

The RS-1 locks to demodulated broadcast signals to generate a camera or VTR sync reference that is advanced to compensate for the transmission path delay and the remote signal's return path delay. The remote signal can then be time base corrected at the station with station sync reinserted to prevent closed loop effects and to fully phase

the remote signal with station video for direct airing, editing, etc.

The amount of sync advance generated by the RS-1 is determined by the distance between station and the remote location. A front panel range selector on the RS-1 corrects phasing up to 1/2 mile accuracy while the fine tuning range control corrects phasing to within 140 feet. A front panel selector provides advanced black burst for up to two cameras or a three line advanced composite sync reference for VTR's.

The RS-1 allows any TV station to program live remote broadcasts within a reasonable budget.

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MICROTIME

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Production personnel (from left to right) the Technical Director, the Director, and the soundman, are shown in the 4,167th telecast of the news from the university-owned full-power, full-color VHF station.

A Beneficial "Marriage"

Another part of the WUFT-University of Florida situation which is unique is the "marriage" between the two divisions. Faculty members, for example, both teach and produce programming for the station. Since the students also are involved in both divisions, this allows the faculty to follow up on classroom and lab experiences as they supervise the production and direction of the station's local programming.

About 12 percent of WUFT's 100-hour weekly programming is produced in-house. Last year this amounted to about 600 hours of locally-produced programming by the faculty and students. Students are involved in all production and operation phases of the WUFT operation. Since they are paid for their work, the students are able to defray some of the cost of their schooling while they accumulate valuable experience.

Another important part of the university broadcast operation should be mentioned in this connection—the two radio stations, WRUF-AM and WRUF-FM.

The AM station is one of the oldest in the region, having gone on

the air in 1928. (The call letters "KVOF" can be traced back to the station's early attempts to get established.) Both the 5-KW AM station and the 27-KW FM station (which came along 20 years later) are commercial stations licensed to the Board of Regents of Florida.

Like the TV operation, both radio stations utilize a basic full-time professional administrative staff, while relying heavily on student help for production and on-air duties. Many successful broadcast people got their start at WRUF, including the well-known sports personality Red Barber who started as a student announcer in 1930.

Before students come to the TV news course they have done on-air work on a nightly news program for WRUF-FM. This radio work is part of one of the required news writing courses in the broadcast curriculum. Although the radio work is limited, it does at least expose students to the procedures and problems of on-air work prior to taking the television news course. And, as in the case of the "Week-day Report" program, the daily radio newscasts are carefully critiqued for the benefit of the students involved.

But the on-the-job opportunities don't end with the three university broadcast stations.

The College also houses Radio Center, a production service which supplies several regular program series of an informational nature to commercial radio stations. Students are extensively involved in the various production and programming aspects of the Radio Center services.

There are also internships with local radio and television stations. Jacksonville, for example, with its three commercial television stations, is a major focus for this valuable on-the-job experience. Because there are a limited number of these internships, the students compete each academic quarter for placement. The students selected are paid by the station involved and they also receive three quarter-hours of academic credit. In particular, WJXT, Channel 4, in Jacksonville has accepted a large number of Department of Broadcasting students over the years.

Journalism Heritage

The Department of Broadcasting at the University of Florida is one of four undergraduate divisions of the College of Journalism and Communications. This year the College is celebrating its 50th year of training students for careers in news. With an upper-division enrollment of over 1,000 students, the College of Journalism and Communications is considered the largest in the country.

It was out of the strong news heritage that the "electronic journalism" program was established in the Broadcasting Department. In addition to the news and production areas of emphasis already mentioned, the department also has a film production sequence which emphasizes the news, documentary and industrial-type films.

The Broadcasting Department, like many around the country, is suffering from financial problems, and these are now limiting the development of core concentrations in new areas such as ENG, computer editing, and special video production techniques. The widening gap between the new (and rather expensive) technology and the budgets of schools of broadcasting is a problem which is of concern to higher education programs throughout the country. Because of this, a close working relationship between schools of broadcasting and broadcast and CATV installations will be of greater and greater importance in the future. (See the article "CATV and Schools—A Promising Alliance" in the August, 1974 edition of BROADCAST ENGINEERING for a discussion of the important mutual benefits that are possible here.)

The University of Florida's Department of Broadcasting, like all conscientious schools of this type across the country, is constantly seeking feedback from broadcast employers about the strengths and weaknesses of the preparation being provided to students. The more closely the broadcasting industry works with schools in this regard, the better their operations and general effectiveness will subsequently become as a result of better prepared young people taking their places in the field.

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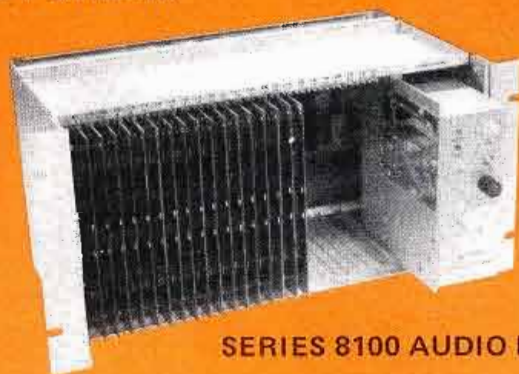
The CP-240A-AN controls up to 80 inputs on a standard 1 $\frac{3}{4}$ " rack increment!

Here's how it works with DYN AIR's 1400 and/or 8100 Series switching equipment: select your source group from the left bank; FILM, VTR, NET . . . whatever. The group button flashes until you select one of ten specific sources in the group on the right bank. Both buttons take on a steady glow. You have just switched the system (audio, video, audio and video, or data) to the selected source.

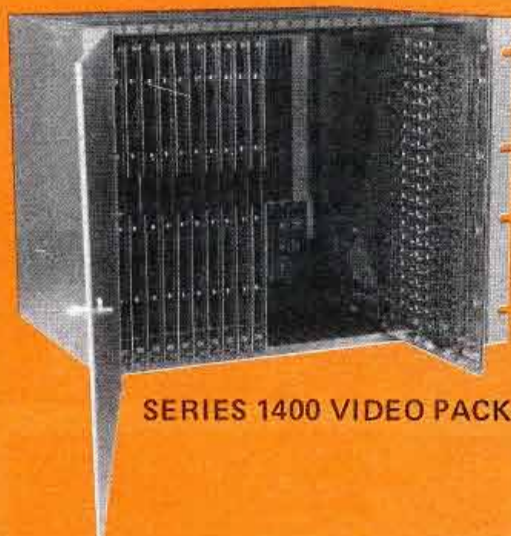
To make the next selection, repeat the process. If you change source groups the actual change will not occur until the specific source button has been depressed. For video systems, it's vertical-interval switching! The basic unit controls up to 40 internally programmable sources and includes plug-in expansion to 80 sources. Complicated controls and/or look-up tables are eliminated, saving operator time and confusion.

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While H.R.M. Queen Elizabeth, Lord Killanin and Prince Philip stand at attention during the Olympic flag ceremony, an ORTO backpack camera team covers the royal box for closeups of the dignitaries. (All photos by Donna Foster Roizen)

Technically speaking, the individual and team rowing events were some of the most interesting and challenging.



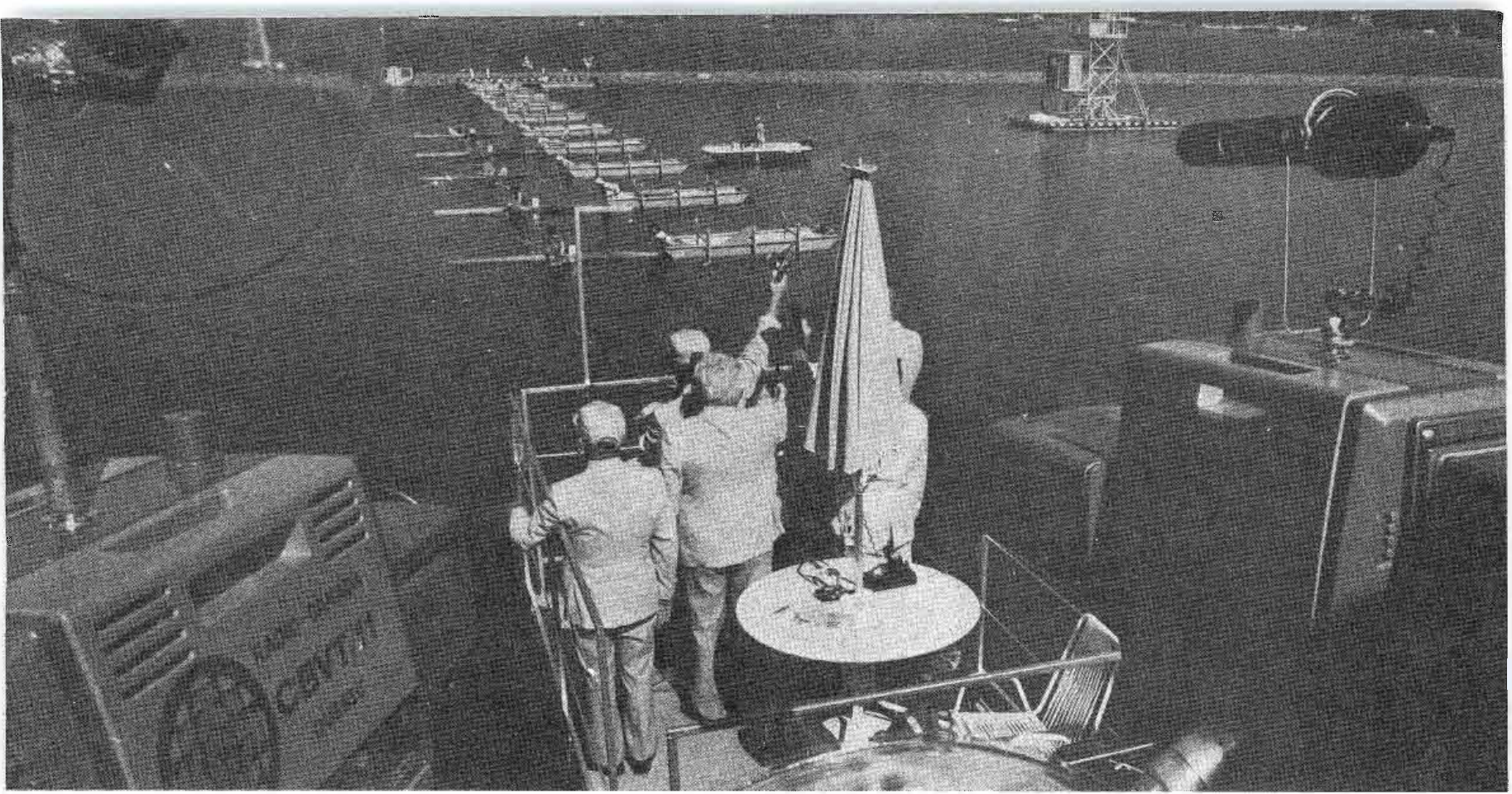
A portable camera hangs from a bracket in the open door of a Bell Long Range Helicopter, two of which were used as microwave relay stations and color camera platforms.

The two huge scoreboards at each end of the stadium could also display amazingly good video pictures. Here the spectators in the stands get a closer view of H.R.M. Queen Elizabeth as she performs her ceremonial duties at the opening of the games.

Olympic Television Par Excellence

By Joe Roizen

Henrikas Jushkevitchus, chef de mission for Soviet television, thought it was "most marvelous"; Phil Levens, ABC's general manager for field operations and a veteran of the Mexico and Munich Games, called it outstanding; Ashley Lewis of NZBC gave it a "fantastic"



rating and Victor Rojas of Televisa in Mexico said it was the best he had ever seen. They and the rest of the more than 70 broadcasters who covered the XXIst Olympiad in Montreal for their respective networks were talking about some of the highlights of the Canadian TV

coverage provided by the host broadcaster, Olympic Radio & Television Organization (ORTO), during the hectic duration of the Games.

The CBC turned in a gold medal performance that treated viewers around the globe to an incredible

array of sights and sounds that made up this awe inspiring spectacular.

ORTO, the division of the CBC set up specially to handle the Olympic television coverage, pulled off a magnificent coup that wowed boob tube aficionados from

Nanaimo to Newfoundland and from Toledo to Tokyo. In fact, the home viewer glued to the electronic kaleidoscope in the living room could see the unfolding pageantry and athletic contests with a close-up clarity and breath-taking totality that only today's advanced technology is capable of rendering. Even those lucky enough to have been on site during the event got a fuller and different perspective from the video tape playbacks they could watch later on when they got home and switched on their TV sets.

It was one of television's finest hours. A seemingly endless number of mobile and fixed TV color cameras followed the exciting sequences where, at 26 venues, skilled crews of technical and production people blended their outputs in a smooth composite that staggered

the imagination. The mind boggling "view from heaven" of the whole stadium floor during the opening and closing ceremonies came from an ORTO camera perched precariously 630 feet up on a moveable crane that could swing around for external shots as well.

The closeups of the two young torchbearers (symbolizing for the first time the equality of the sexes) were achieved by special mobile camera vehicles on the ground and in the air along their path from the Cross on Mount Royal down to the stadium entrance. Some of the sports like cycling, rowing, the Marathon and diving were given special treatment in order to bring unusually proximate images from these hard to cover events.

ORTO spared no effort in preparing for this TV super show and

it paid off in the most rewarding manner—a job well done—acclaimed by all who saw it as the crowning television achievement in four decades of Olympic TV.

Opening Ceremony

Since the advent of instant global television via synchronous satellites, Olympic ceremonies and major finals have attracted billion plus audiences around the world. As a result, the coverage of these events has grown into a proportionately large undertaking that involves a great deal of planning, equipment placement and meticulous execution.

ORTO's task at the opening ceremony started with the need to cover the torch bearers who were to carry the Olympic Flame through the streets of the city from the

Frame Synchronizers At The Olympics

The TV master control room set up by ORTO of the Canadian Broadcast Corporation to cover the 1976 Olympics was located in the old Radio Canada building on West Dorchester Boulevard in Montreal. Twenty-three remotes were fed by Bell lines to the master control room with 23 monitors continuously displaying these feeds. An additional two monitors displayed the output of two character generators. Over 100 TV cameras were used at the 23 remote stations.

Two of the remote feeds were from the two Micro Consultants Quantel DFS 3000 Framestore Synchronizers used by ORTO to handle those outside events covered by the two helicopters. Each helicopter was equipped with a TV camera and Sony 2850 video tape recorder and a microwave transmitter and receiver. Each helicopter operated with an electrically driven ground mobile unit also equipped with a TV camera and a Sony VTR. The signals from the mobiles were recorded on tape and simultaneously transmitted to the helicopter. The helicopter also had the capability of recording the signals received by its camera and of transmitting either of the live signals from the airborne camera or from the ground mobile unit.

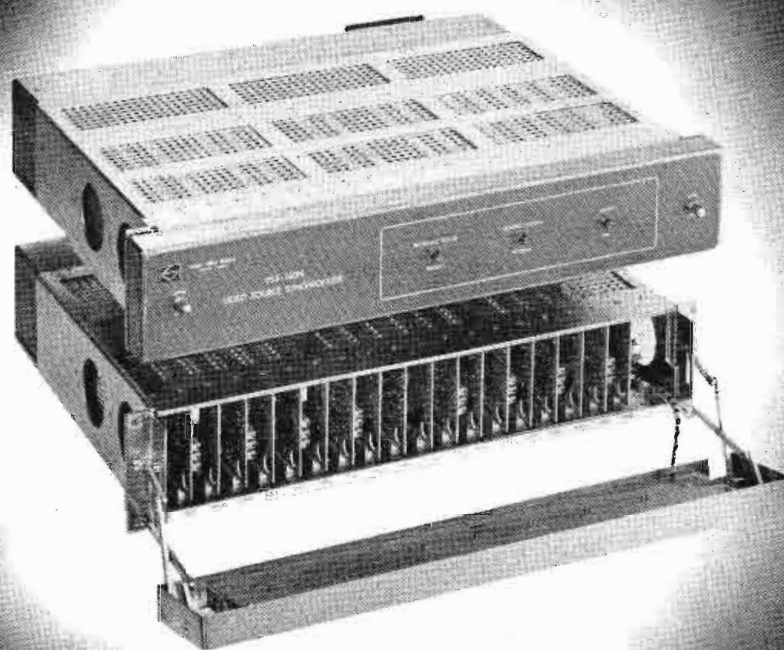
A manually operated antenna located at the University of Montreal tracked the helicopter and the signals were cabled to the Framestore synchronizers located in the remote control room in the University building.

The synchronizers are equipped with the non-phased processor to timebase correct signals from

heterodyne VTR's. Consequently, the video signal stored in either the airborne or the ground mobile tape recorders could be microwave transmitted to the receiving station where time base correction and synchronization of the incoming video were provided. This method of time base correction eliminates the need for a TBC with each recorder, thus greatly simplifying the mobile installation and reducing the number of digital encoding and decoding processes in the video path.

The advent of the framestore synchronizer has provided the TV industry with the capability of handling live TV signals for the first time. This capability was dramatically exploited at the 1976 Olympics as evidenced by the live coverage of the cycling race and the walking marathon and the insertion of the Olympic torch bearers in a quadrant of the TV monitor during the opening ceremony. This insertion was made possible by another of the technological innovations provided by the use of a digital framestore synchronizer. This application uses the video compressor option. Another feature provided with these synchronizers at the Olympics is the freeze capability. During occasions when the helicopter was transmitting the signal from the ground mobile, temporary loss of signal occurred when the unit passes under an obstruction such as a tree or bridge. When the signal loss happened, the synchronizer temporarily froze the last clean field and awaited the recovery of the signal before releasing the freeze.

Leitch Video meets an Olympian challenge... ...Synchronize twenty simultaneous remote video feeds!



Leitch Video Limited engineers tackled the problem of designing and supplying video synchronizing equipment for the 1976 Montreal Olympics. In order to provide worldwide distribution of numerous events occurring simultaneously, twenty remote video feeds reaching Master Control had to be fully synchronized for production mixing and recording. The incoming signals would arrive together by both microwave and line transmissions.

The system developed by Leitch to handle this complex task was a combination of VSS-160 N Video Source Synchronizers and CSC-165 N Color Sync

Comparators. Video phase comparators at Master Control phase-compared the remote video signals to the reference signal and an encoded phasing control signal was fed by standard telephone line to the remote locations bringing them into phase coincidence at Master Control.

Leitch Video provides a wide range of video, test and pulse equipment for all applications where reliability and performance are prerequisites. If you have an Olympic size challenge, or something less, contact us or our representatives. We'll come through for you too.

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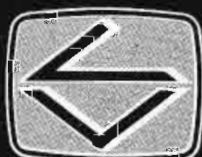
P.M. Electronics, 230 Mineola Blvd., Mineola, New York 11501. (516) 248-4858

South-West: Mr. Gene Sudduth

Gene Sudduth Manufacturers Representatives, 2809 Raintree Dr., Carrollton, Texas 75006. (214) 242-2690

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approach.

Inside the huge new stadium at least 13 color cameras were dispersed along the periphery and in the balconies overlooking the oval track. A back pack color camera with a two-man crew ranged over the area in front of the VIP section to relay close-up views of athletes as they marched by or turned around to get similar pictures of H.R.M. Queen Elizabeth, Lord Killanin, Prime Minister Pierre Trudeau and other dignitaries. Another small color camera on a special large wheeled dolly could also move with the action to follow the colorful ceremonial activities taking place. In the balcony section of the Cross on Mount Royal (one of Montreal's most famous landmarks), to the new Olympic Stadium some miles away. To do this they employed a system they built themselves, an Electrocam and a helicopter relay. The Electrocam is a battery operated vehicle which is equipped with a portable color camera mounted at the rear of this "super golf cart". This vehicle, which can operate at up to 40 mph with a radius of 50 miles, also had microwave links and a U-Matic VTR on board. The microwave connected with the Bell Long Ranger helicopter that hovered overhead, the U-Matic recorded the camera output as a backup in case of link difficulties.

The helicopter had its own small color camera for panoramic coverage of the scenes below and another microwave transmitter that linked up with a steerable receiving dish on the roof of the 26 story Maison Radio Canada. The control room for the helicopter-relayed video signals included frame store synchronizers so as to bring the remote images into sync and color lock with the rest of the system.

Leitch Video color comparators were used to phase up all the picture sources to accurate colorimetry standards. As the torch bearers arrived at the stadium, the overhead camera hoisted high above the entrance was moved along the crane tracks to look over the edge of the stadium and catch their

Continued on page 64

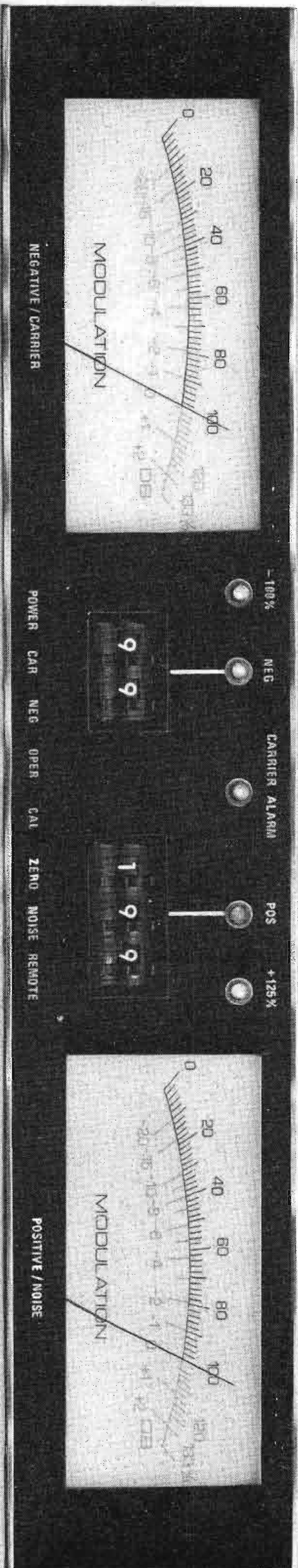
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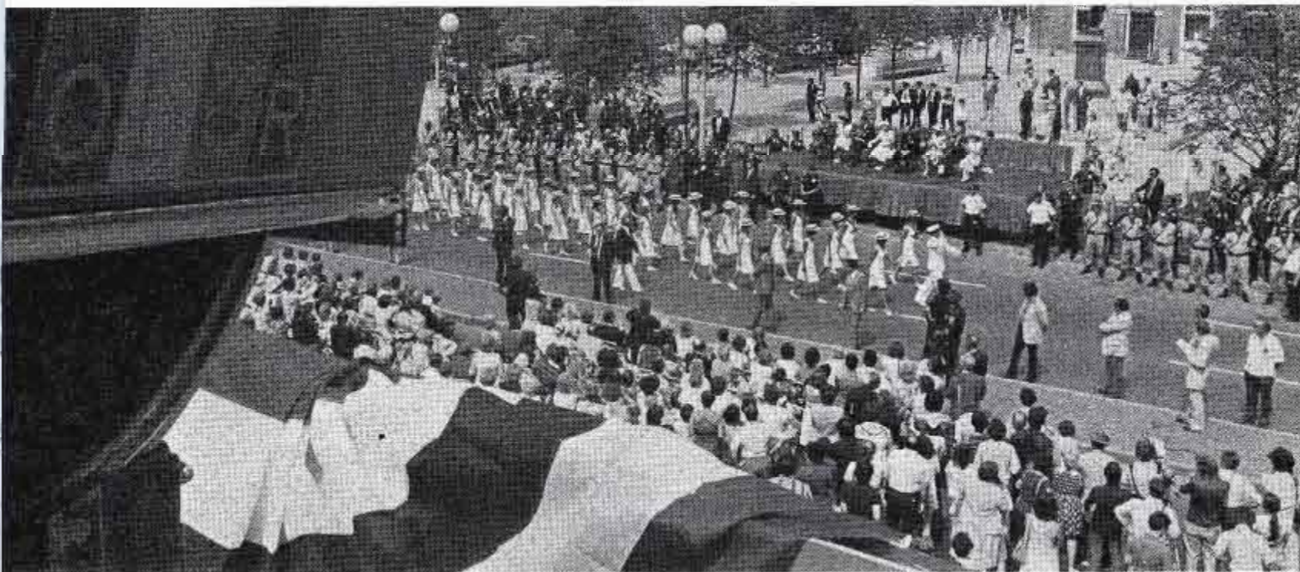
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Industrial Products Division

De Boelelaan 8, Amsterdam, Netherlands



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Visiting royalty covered in Boston on an almost step-by-step basis during their recent visit to the U.S.

In a longer shot, here you see the WCVB camera picking up the action as the parade passes the reviewing stand.

WCVB Brings An Audience To The Queen

By Steve de Satnick, WCVB, Boston.

On Sunday, July 11th, Her Majesty, Queen Elizabeth II, made history when she set foot on New England soil. WCVB-TV Boston added a page to our own history when he brought the New England television audience her visit—Live!

Of the three VHF stations in the Boston area, only Channel 5 provided live coverage, using ten

cameras and over one hundred and ten people.

The concept of eight hours of uninterrupted live coverage of a regal visitor was not only novel, but also timely. The summer viewing audience is marginal, and since production slacks off, an elaborate project we could all share in was like a shot in the arm.

The Beginning

On March 4th, an organization known as the "Boston 200" gathered the three VHF stations together to announce Her Majesty's visit. They indicated to Larry Pickard, Vice-President of Public Affairs, that they would like to cover it completely, so that the New England area could share this monumental

Graham Junior College trains communications, business, liberal arts, and *broadcast engineering* students. They need color television cameras that produce a top quality picture and are affordable and dependable.

Director of Engineering Dick Walsh writes:

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down time. That's reliability!

"We've never had cameras that worked as well as yours. We tweak them in the morning and they're stable all day long and into the night. Our faculty members, all broadcast professionals, are usually a little picky, but they are unanimous in praise of CEI cameras — particularly the stability and the overall picture quality.

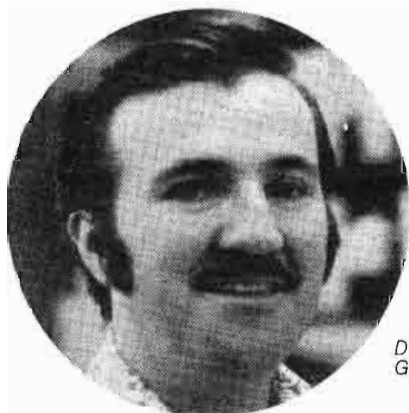
"Another thing we all like is that the cameras are easy to operate. This is important because they're being operated by students.

"Because of the overwhelming acceptance of the units now in

service, we have budgeted for two more CEI cameras to upgrade another color studio here at the college. We're all convinced CEI gives us a lot more for our camera dollar.

"Incidentally, Graham graduates end up in television operations all over the country, but especially here in New England, which is fast becoming 'CEI country.' "

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*Dick Walsh, Director of Engineering,
Graham Junior College, Boston*

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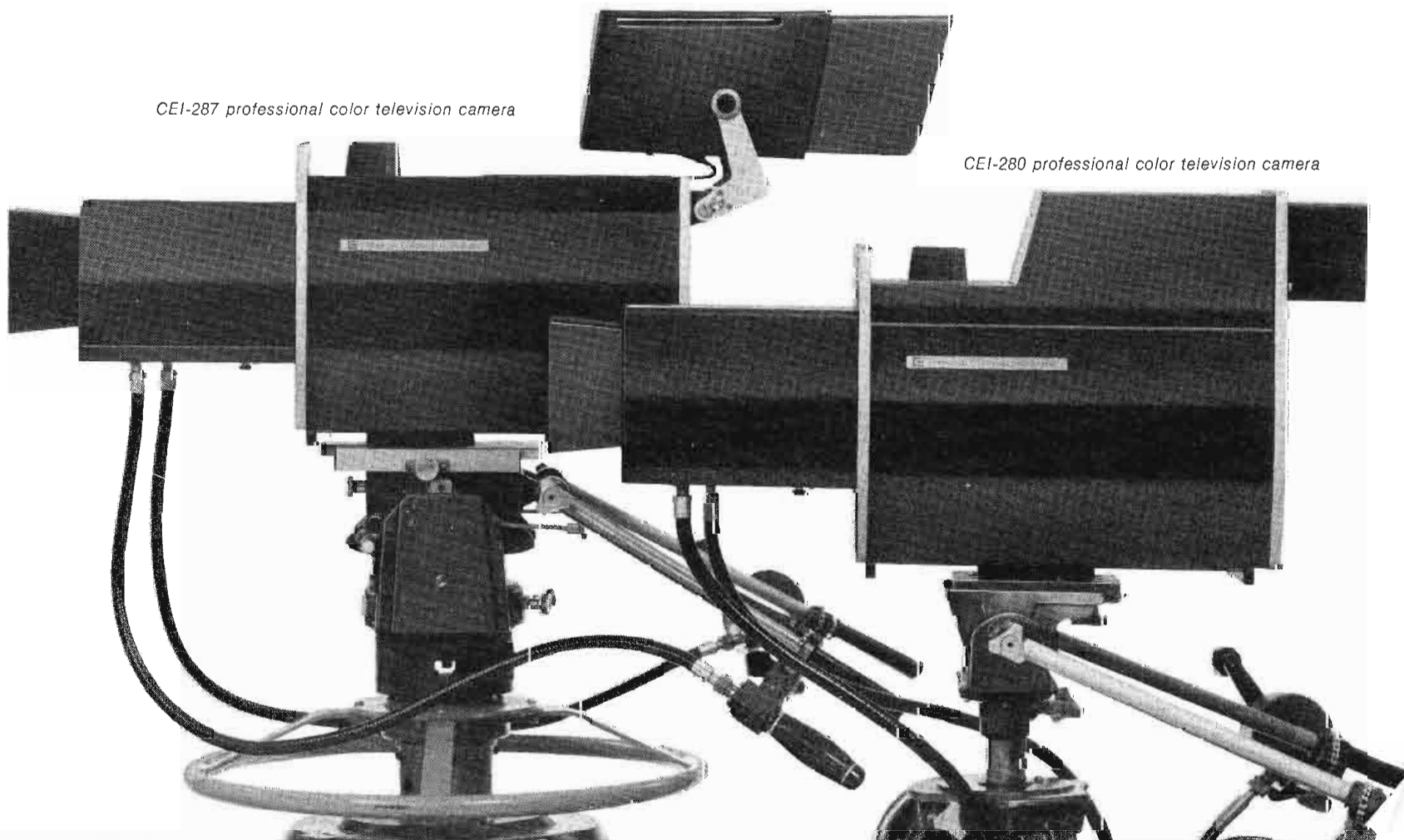
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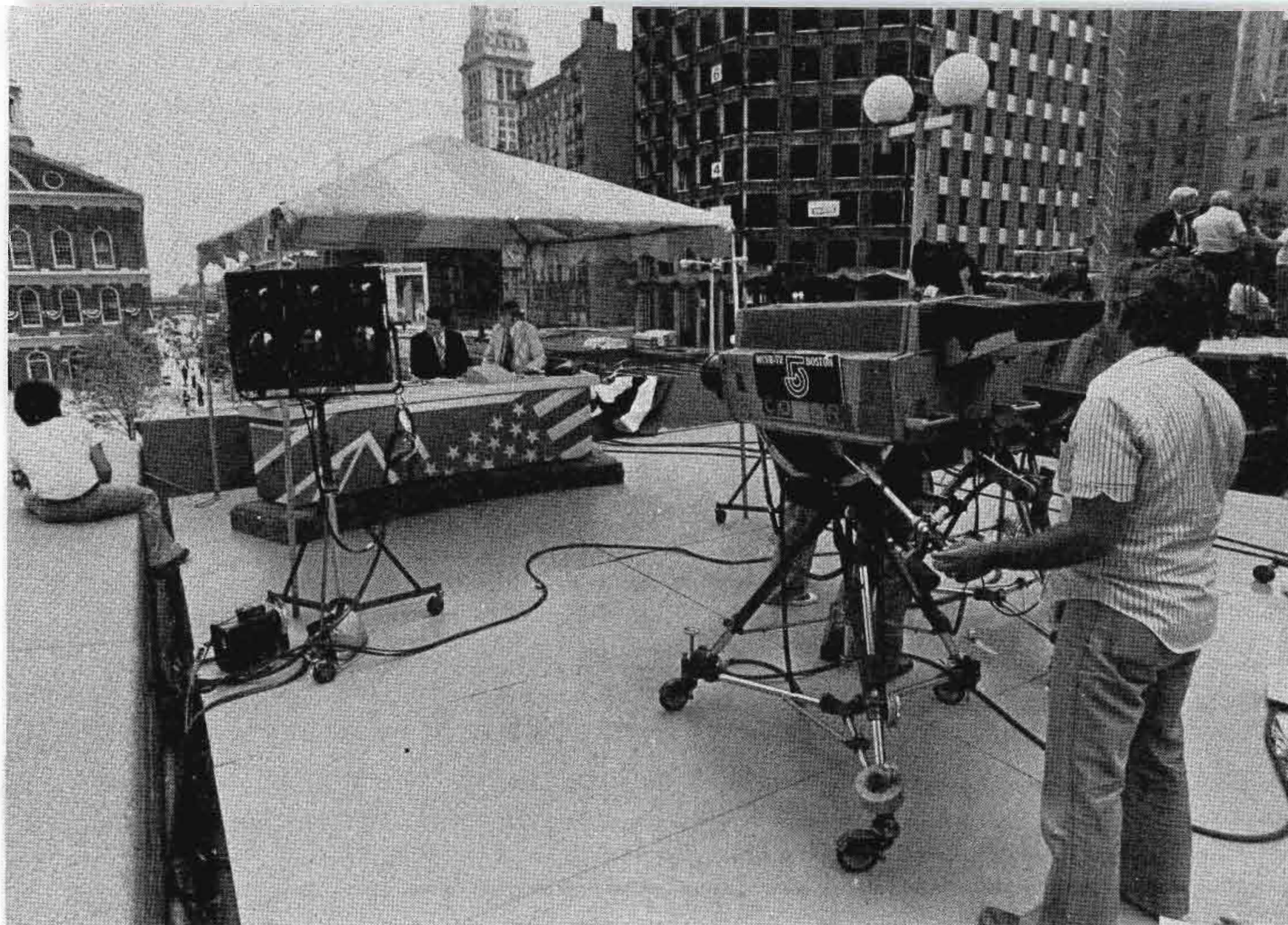
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**"OVER 4000 HOURS OF USE
WITH ONLY
SEVEN HOURS DOWN TIME.
THAT'S RELIABILITY."**

CEI-287 professional color television camera

CEI-280 professional color television camera





This photo shows the remote anchor position.

event. The coverage sounded so extensive it appeared to be a pool effort. However, the other stations were already committed to other programming and it was approaching the fact that normal news coverage would have to suffice.

Larry approached Bob Bennett, our Executive Vice President and General Manager, with the historical significance of the event and thought we should preempt normal programming to cover the entire day's visit—from the moment the royal yacht, "Britannia", sailed into Boston Harbor, until the yacht sailed off that evening. Bob Bennett asked for a financial breakdown, and stressed the necessity for frugality (isn't there always), and said he would consider it.

In planning our coverage and budget, the constant thrust was to eliminate frills or excess because the final product was dependent upon careful preparation and consistency.

When the basic outlines were presented to Bennett, he gave us the green light. He became the catalyst, and the enthusiasm became a reality.

Determining The Facilities

March 22nd began countless location surveys and meetings; evaluations were made of equipment needs and manpower. Because of the complexity of her tour, the extent of the coverage became more of a network undertaking, and not a local effort. However, like most other stations, when the Engineering Department commits itself, they achieve the impossible.

To effect quality coverage, we had to augment our own video, audio and relay equipment. Ross Kauffman, our Chief Engineer, and Jay Powell, our Engineering Supervisor, began making frantic calls to lease equipment. Since the networks were gathering everything for the

Democratic Convention, we were anticipating a difficult time in meeting our technical requirements. Since we couldn't be choosy, we had to rent a variety of gear which unfortunately, would result in the additional burden of familiarization.

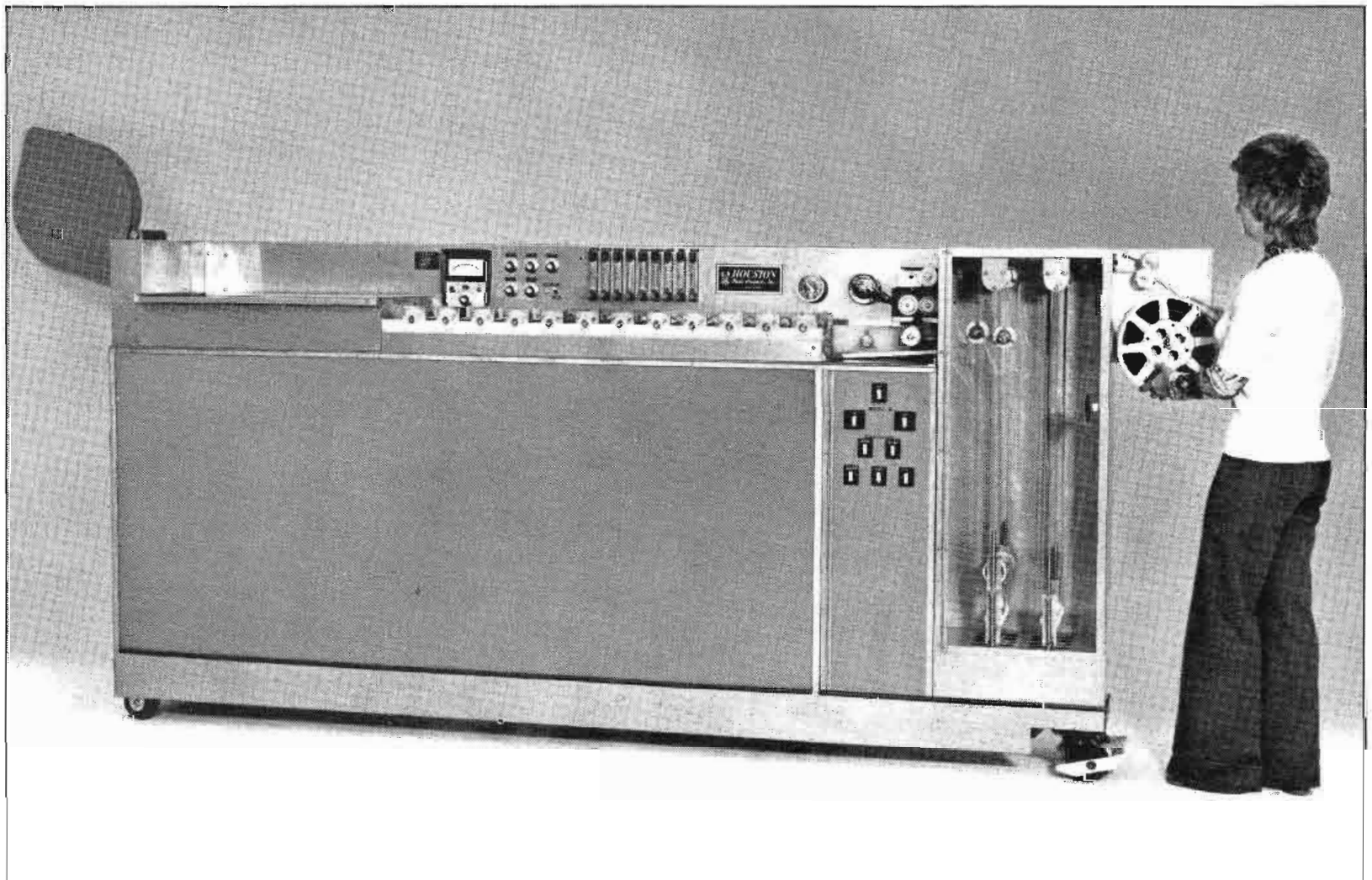
Planning The Coverage

As a result of our surveys to various points in Boston, we were able to arrive at a combination of camera and microwave locations that would allow us to return all feeds to our own mobile unit, which acted as the command truck. We would also use the four cameras in our truck to provide the coverage at City Hall, and at our anchor location on the plaza.

Once the video flow was established, our thoughts turned to audio and communications. Where we could, audio was routed along with the video on the microwave systems. Just as this portion of the

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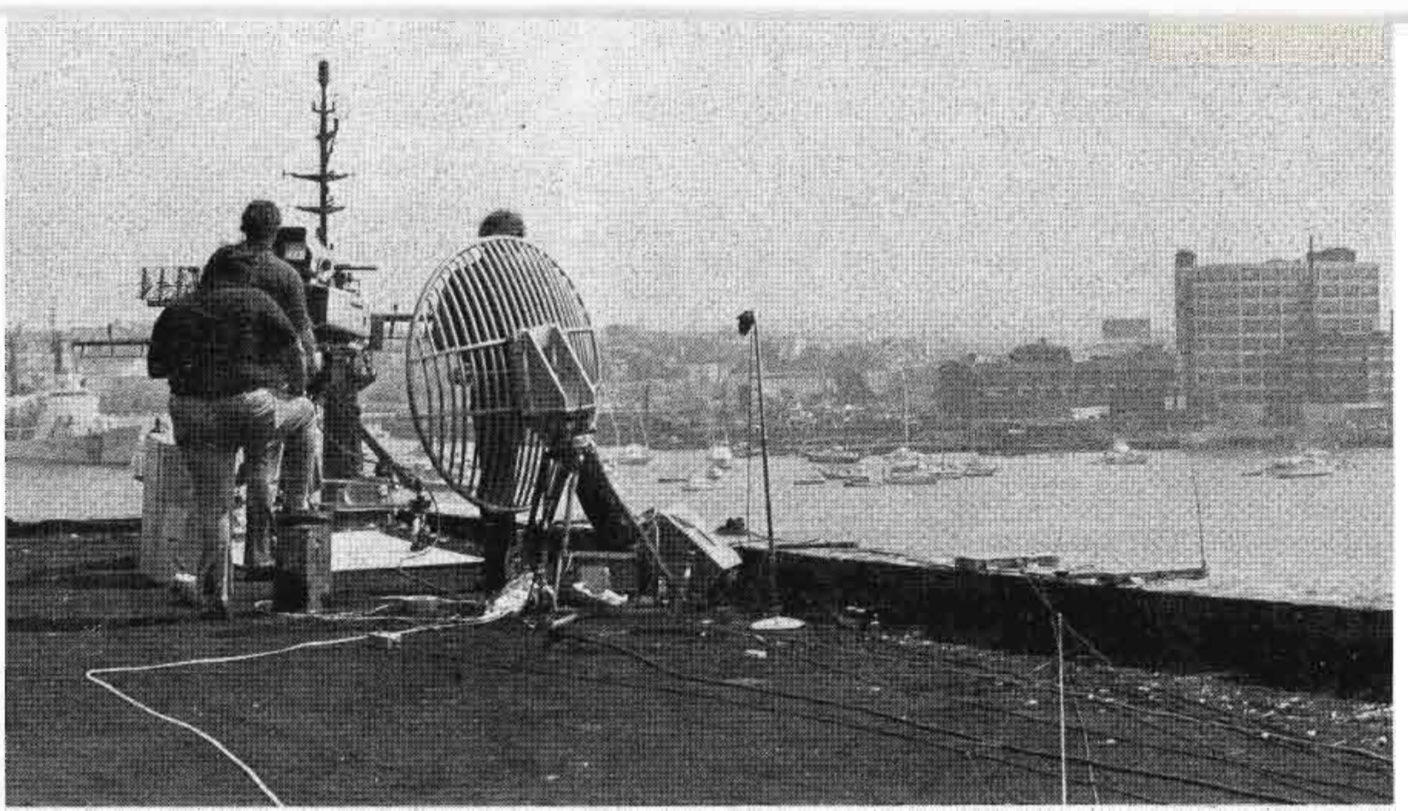
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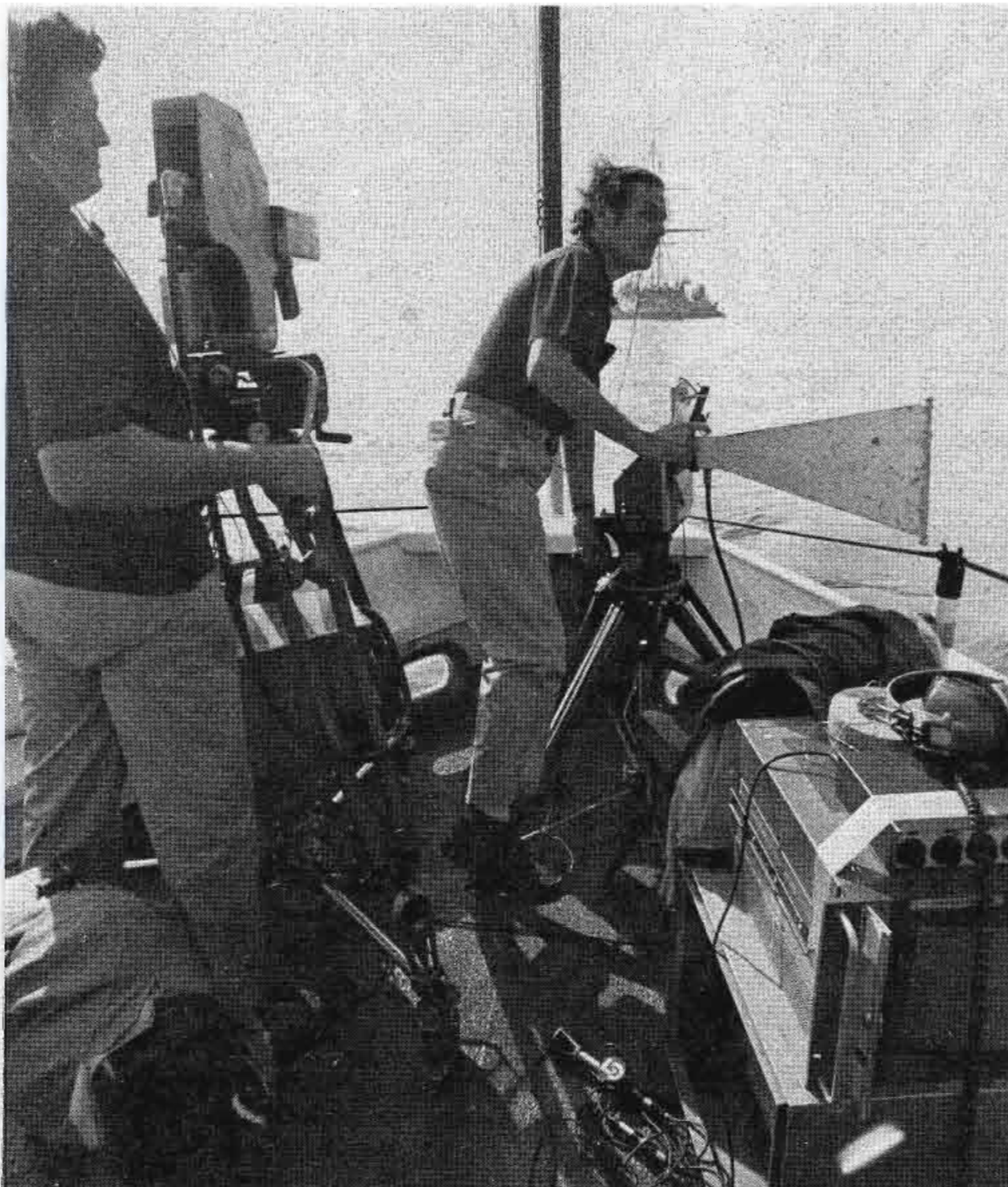
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This view is from atop a Coast Guard Station, showing camera and microwave during setup.



It's anchors away. Here the WCVB PCP-90 and crew operate from aboard a Coast Guard cutter.

coverage was firming up, we learned that the BBC and CBC were interested in recording our video feed; however, they hoped we could provide them with international sound without our commentary.

This resulted in the major redesign of our audio flow, the use of wireless microphones, and the rental of an audio truck to handle the increased demands. The end result was two separate audio feeds back to the station; one for our own on-air use, and the other for the international sound recording.

Our largest remaining concern was gen-locking the station to the remote video, so we could insert titles using the character generator from master control. Since we would be receiving four non-synchronous sources at the truck, and switching would take place between them, the whole system would be upset; especially the video tapes we were recording for the BBC and CBC. We were able to rent a frame synchronizer from Quantel, which not only re-timed the four incoming remotes to the truck, but supplied a freeze frame at those moments when we lost signal from the remotes.

The Day Of Broadcast

The day's coverage began at 9:00 a.m. from the Coast Guard press boat, the Cape Cross. As the HSW Britannia docked, the ceremonies were seen from the camera on the

Coast Guard base, which was used until the Queen's motorcade was out of sight.

A camera on the roof of the mobile unit at the Old North Church was used for her arrival there, and the Church service was covered by two cameras inside.

The Queen's next stop was at the Old State House, which was covered by a camera in an adjoining office building. Following that she walked through City Hall Plaza to a private luncheon.

While she was at lunch, we aired some highlights from earlier in the day, along with some pre-packaged film tours of areas she would visit that couldn't be covered live. We were also moving cameras and microwave systems to new sites in order to see the afternoon events.

Following her luncheon, there was a parade on Congress Street, and then then a visit to the USS Constitution. She boarded her yacht, and our major coverage was over. Most of the gear was struck, and the microwave and audio system "barreled" together to allow an evening pickup from the USS Constitution dock.

Looking Back

Any remote seems to have a number of problems that are in direct ratio to the complexity of the pickup. This one was no exception.

We anticipated shooting the coverage at the Old State House, along with our microwave signal, through an open window. Unfortunately, the Secret Service would not permit an opened window. The results were microwave fading and camera overheating. Every time we got a video hit, the synchronizer froze the frame and although the animated effect may have been offensive to Her Majesty, the freeze frame was better than no picture at all.

A lack of crowd control forced us to find a stepladder, and balance a microwave receiver on top. Although unconventional, it worked.

The most confusing and exciting area, of course, was the Command truck home base at City Hall. Although it was carefully prepared for this ordeal, the truck is over 15 years old, its expected capacity could be generously complimented.

Fortunately it was parked in the shade, which was extremely important in keeping it cool when the air-conditioning failed.

Epilogue

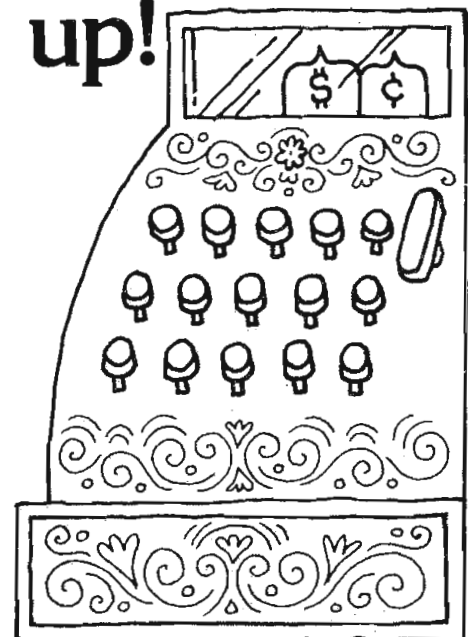
Although there are too many individual contributions to mention in this article, the Engineering efforts were of indescribable value. This particular remote generated more enthusiasm and creativity than anything we have undertaken in the past, and although there were disappointments that developed along the way, there were no regrets. The major grumble was the total saturation of cokes and cold sandwiches.

One of our directors summed it by saying, "Wait till she comes again, do I have some great ideal!"

Acknowledgements

I want to thank Jay Powell for his assistance in helping compose this article. □

It all adds up!



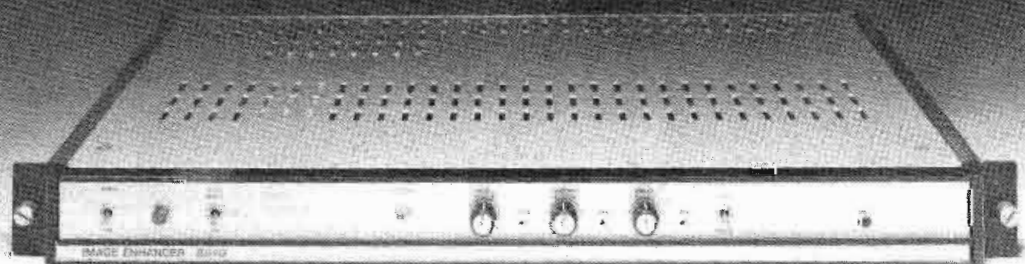
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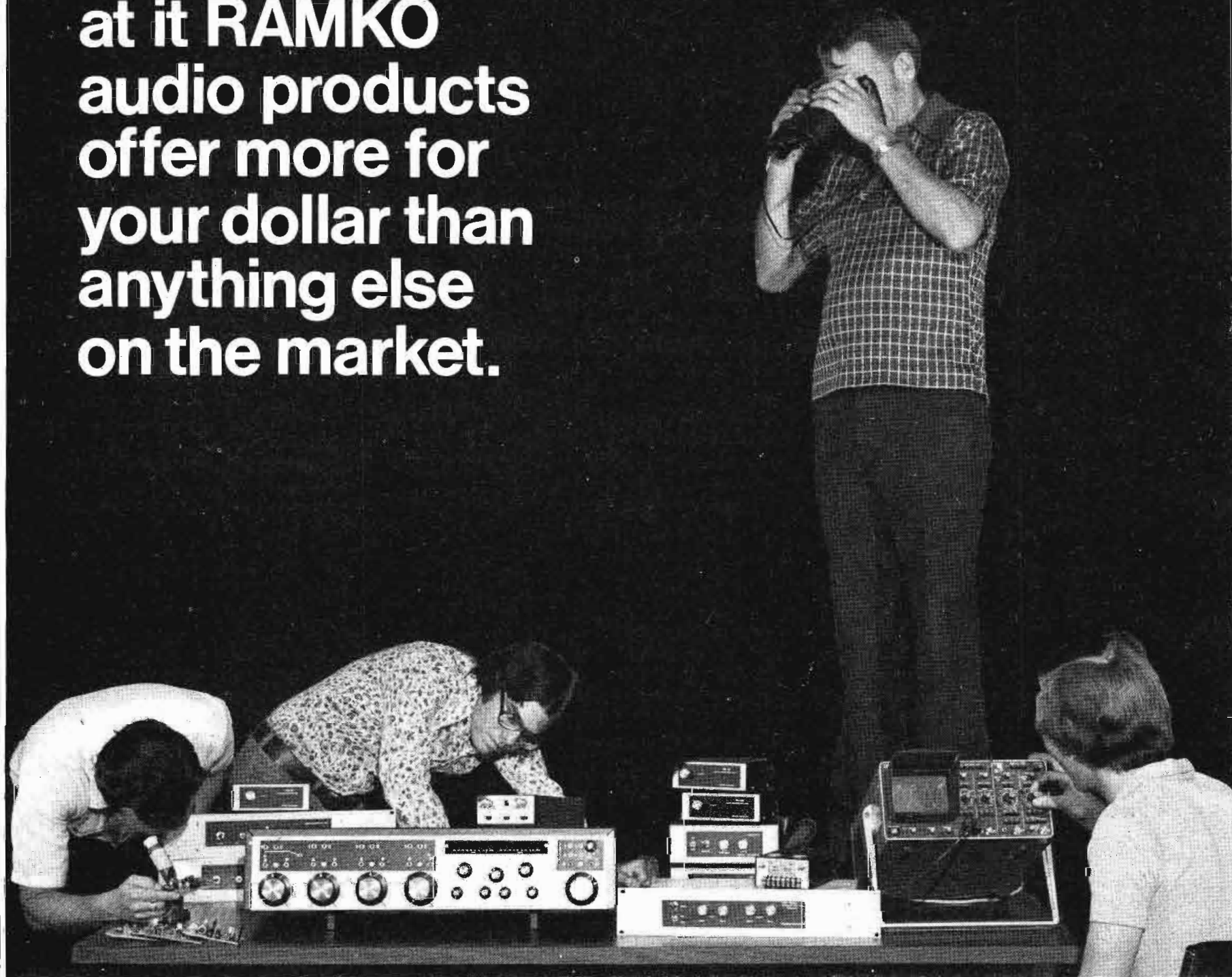


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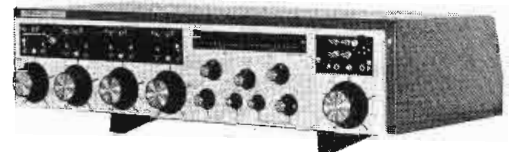
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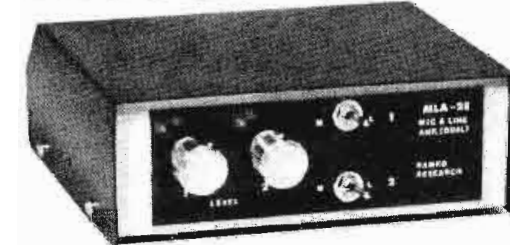
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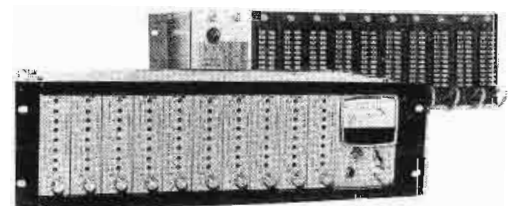
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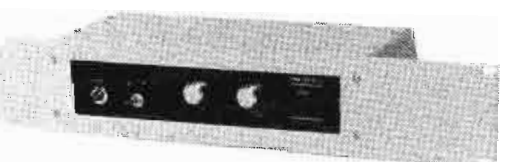
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If You Get People Involved...

You Can Take The Surprises Out Of TV Automation

Part 1 of a 2-part series
By Bob Hueffed

Broadcast Engineering originally planned a single automation case history article for this October issue. We had selected Metromedia and its TV stations.

While gathering information, our guest author, Bob Hueffed, firmly recommended that two separate articles were required. He uncovered many management principles and techniques that could be valuable to any station preparing for automation and a computer system. His first article in this issue has translated these and his own experiences into a "formula" that any station can use. It will be substantiated in the second article...the Metromedia case history that will appear in the November issue.

The "formula's" common denominator is people...station people...who must define and control the computer. Not necessarily experienced broadcast and computer people. Al Johnson, executive assistant to John Kluge (chairman and CEO of Metromedia), humorously reflected..."I was so naive

about TV that I whispered the first time I walked into WNEW's master control room"...and Navy man Ed Petrosky, traffic manager at WNEW for 13 years, has enjoyed every minute and equates his experience to a foreign port shore leave. These people, and many more that you will read about in November, conceived and specified the computer systems at Metromedia and WNEW.

We believe that these are the first in-depth magazine articles that describe the complete cycle of integrating a computer system into a TV station.

This first article emphasizes that station people have the capability, and will accept the responsibility, for defining and controlling **their** computer system. This may appear to be philosophical and tutorial, but **only** people can make a computer system work. Get people involved and let the computer work for them.

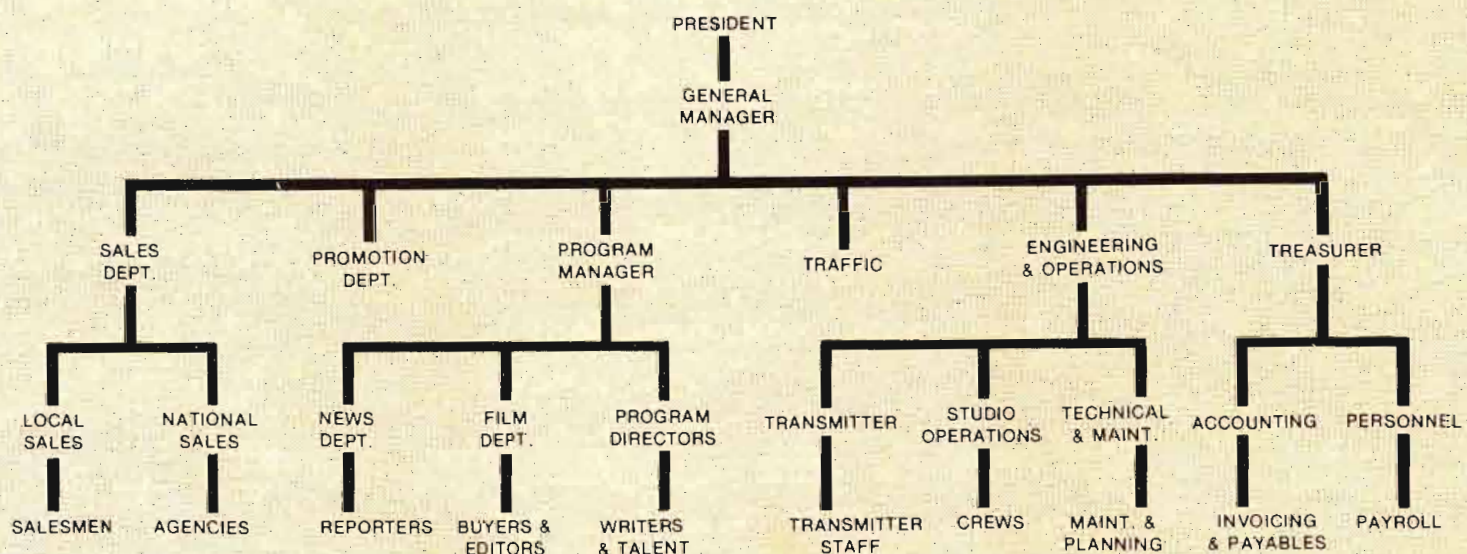
The second article (November issue) will trace Metromedia's history integrating the computer into their station operations. This case history will also emphasize people involvement...the major contribu-

tion for a successful computer operation.

How do you integrate a computer into a TV station? Very carefully!!

We have all heard horror stories and some humor (very little) about computers in TV stations. We also know of some successes. Depending upon who you talk to at a station, these experiences are usually bracketed around "it's terrible" or "it's great". There doesn't appear to be many in the middle. But even the "greats" were usually preceded by a "terrible".

But the computer has become entrenched in every industry and our daily lives...and we cannot uncreate. That is a limitation, but conversely it offers opportunities. Before we investigate exploiting opportunities, a few computer history flashbacks may be of some benefit. The digital computer was originally conceived (about 30 years ago) to be a smart and very fast calculator. That basic premise has not changed except computers are now much faster and people have made them smarter. The scientist praised them highly and the accountant learned to love their number crunching capability. Com-



TYPICAL T.V. STATION ORGANISATION

Figure 1

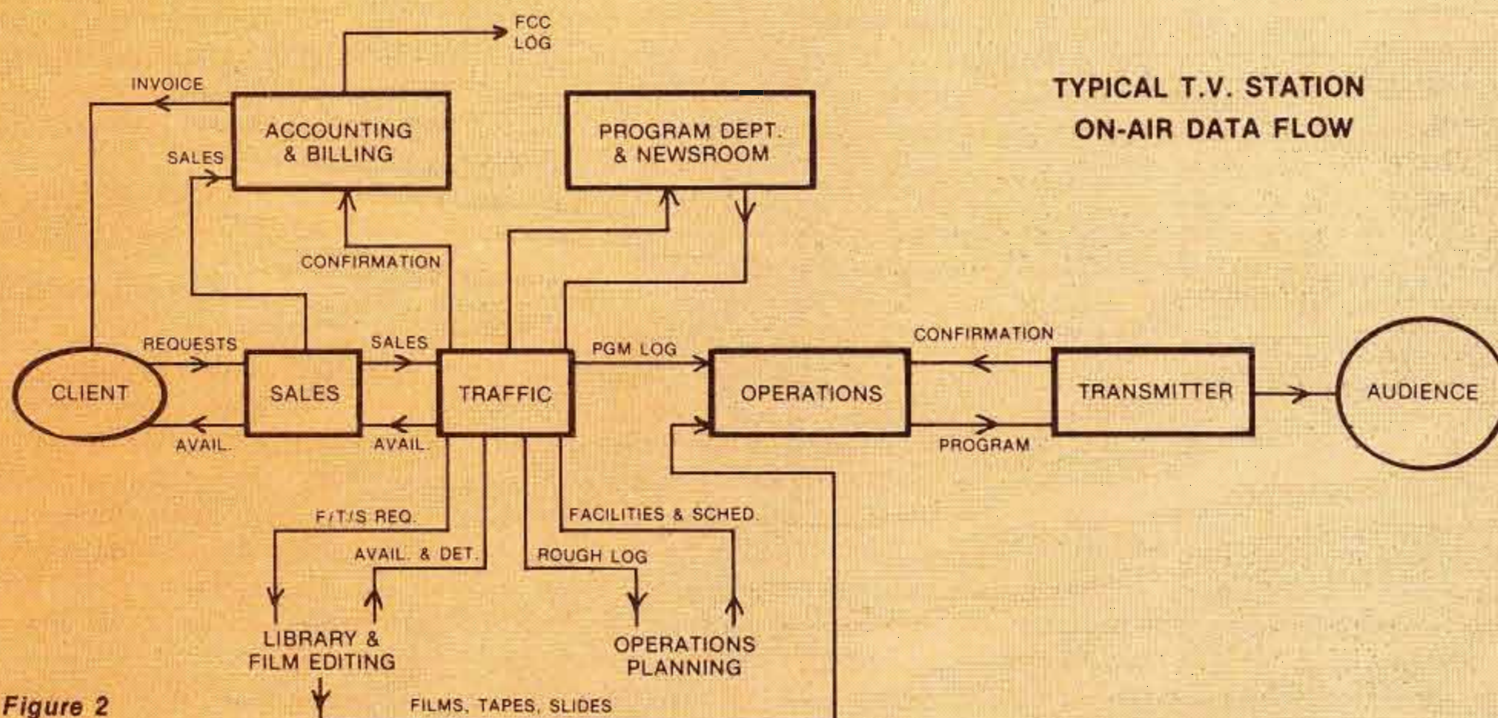


Figure 2

puters have become smarter because we have learned to encode and decode information that is digestible to its simple mind. This gradual learning process now permits us to control it, and make it work for us...rather than be a slave to it.

Fortunately, the computer's software programs are exclusively rooted in people...computer architects and programmers. Once we learn to communicate with them we can gain control of the computer. This communication requires more than a telephone call or learning computerese. In fact, don't start with either.

Start at the beginning of the cycle...by obtaining a thorough knowledge of your station's data and communication system. That requires experienced people, knowledge and "guts". You have all those qualifications.

- Experienced people...your own station people that have been operating your station seven days a week.
- Knowledge...no problem there. Your archives are full of knowledge and can be found with your experienced people.
- "Guts"...for what is required can be simply defined as foresight and some courage...but a lot of perseverance.

Preferably you should not be a computer expert. You have a better chance of seeing the forest from the trees if you are not.

You'll probably ask yourself... "How can we estimate the impact the computer will have on our people and operation?" YOU DON'T!! Eliminate the estimating by getting people involved. They are probably more anxious to contribute than you may suspect. Their involvement will help assure eliminating the mystical, frustrations, anxieties, and repercussions associated with "change".

The "formula" for integrating a computer into your station becomes quite simple. Experience, knowledge, guts, and involving people. It is the same "formula" used by many companies, in many industries, that have successfully solved problems and recognized opportunities.

Exercising the "formula" requires a management commitment and support. Once this commitment is made the computer integration cycle will run the gamut of enthusiasm, expectation, frustration, reawakening of interest, heartache, renewed hope and then final consumption. Read the words again and you will find that they describe many business deals, fighting a battle or courting a girl. Execution therefore requires tenacity...lots of it.

The Computer Integration Cycle

A planned approach must be made to meet the objective. This usually represents four phases in the computer integration cycle.

Preparation...problem investigation.

Incubation...not consciously thinking about the problem.

Illumination...a "happy thought".

Verification...a decision was made and the system works.

The verification phase is not executed as simply as stated. It will have its share of frustrations, heartache, expectations, and quite possibly a few tears. You cannot eliminate them, but the problems can be minimized if you keep people involved throughout the entire cycle.

The preparation phase is the longest and most critical. It has the greatest impact on a successful computer installation. The major task of the preparation phase is to develop a preliminary definition for your computer system. This is essential for accurate communications with the hardware suppliers.

You start by asking yourself many questions. And do not expect immediate answers.

A computer system will represent a change to your operation...BUT a change from WHAT? You have to define WHAT your department and station data and communication procedures are now. If you think you know, or if you are positive, do not trust your thoughts. The facts are that most manual systems have someone busily engaged in deviating from procedures because "it is easier" or "it is faster". Appended to these answers is un-

doubtedly "for me". This is not all bad. The system may be more efficient because of it. This could represent innovation, and may even be creative. Give these people a challenge, and an opportunity to obtain a better understanding of your entire system (get them involved), and they will contribute to developing a good definition for your computer system.

To initiate the WHAT task, make a graphic representation of your station's data and communication flow paths. Start with a skeleton and leave the details for later. (This mechanical approach may seem contradictory to the "people formula", but it isn't. You first have to determine what has to be done before you determine who should do it.)

Request the Personnel Department to dust off the station's organization chart and ask for only one copy. It probably looks very similar to the chart in Figure 1. This represents a planned distribution of authority with an idealized routing of communications. It is **only** that...planned and idealized. It might have some significance to your Personnel Department, but in fact you don't operate within the definition of this autocratic system. Nor does any other company in any other industry. (Note: Government was excluded).

Your first graphic attempt probably resembles the chart in Figure 2. The real world for a TV station. It represents the routing of data and communications in your everyday operation. It also identifies people, departments and their responsibilities to one another. Make sure you preserve this first impression. A comparison with others could be very enlightening. Misunderstandings, with their predictable consequences, could be dissolved, and the preparation phase shortened. Comparisons will assist to define **where** the computer system has to operate. It will also give you some insight to **how**.

Your first flow chart may not have positioned "Traffic" in the middle...unless you are in the Traffic Department. However, if you study the inputs and outputs, you will soon discover that Traffic is always "in-the-middle". They are the station's traffic cop. They have to be flexible and patient with the

demanding and changing "front end" of the business, yet issue accurate and timely instructions to Technical Operations.

Traffic is one of the first departments that should be studied to determine **how** the computer system should be defined. Many of their inputs and outputs are common to both "ends" of the business...from the client and sales to technical operations and the audience.

Determining **where** the system operates is easier to define; however, many times the obvious is overlooked. Start with the Client and analyze every department in the station, and include the Audience. Clients use computers for buying and paying the bills. Audiences are measured electronically and numbers are crunched through computers to produce ratings that effect programming and rate cards.

Technical Operations automation systems (another computer system) are not only compatible (talk the same language) with Business Computers, but can be linked to form a data and communications loop.

When **most** of your staff agree to the flow paths and positioning departments on the data and communications chart, you are ready to start the detailed question and answer tasks. If some have reservations about the chart's geometry, don't insist that **all** must agree. You are still in the preliminary stages and "doubts" could stimulate better questions and answers.

Now for the questions. There will be hundreds, but they will all include Who, What, Where, When, Why & How. Don't consider How Much (\$) during this phase. It sets up roadblocks that will stop you in your tracks or make you detour. Remember...during the preparation phase you only need to define **what** your operating system is **now**.

The following questions apply to entering an order, handling commercial material, distributing the program log, scheduling technical facilities, invoicing the client, and any other task in a TV station. It is only a partial list, and you will develop many more, but it should be entitled to the same wall space as a calendar.

- What am I trying to accomplish?
- Could I do it some other way?
- How did other people tackle it?
- What kind of people am I dealing

with?

- How can it be changed to fit me?
- How can I adapt to it?
- Can I use less?...More?...Only a portion?
- How about using something else?...Something older?...Something newer?
- WHAT WOULD HAPPEN IF I DID NOTHING??

You have probably observed that answers to these questions could represent compromise. Compromise is not new to you...you experienced it every day. You have to be **prepared** to compromise when selecting a computer system. But be **prepared**, and you will maintain control.

Question each of your individual and department tasks, and maintain a free exchange of ideas and information between departments. This will promote a better understanding of how other departments operate, and give you a better appreciation of the other person's job. Once the details have been studied, it is easy to assimilate the parts and compare with the whole. There will also be a greater assurance that data inputs are compatible with data outputs...an essential requirement for a successful computer operation. People can handle confusion and make a judgment, but those tasks are extremely difficult, to impossible, for a computer. It will hiccup, cough and halt at the most inopportune time.

Suggestions And Precautions

Don't avoid a hunch. They are usually stimulated from studying facts, and can lead to some interesting discoveries.

If you think you have found a problem, make sure that it is not a symptom. Symptoms are only road signs that guide you to the problem, and solving a symptom (doesn't even sound good) does not get to the root of the problem.

If the problem does not cast a shadow, be careful, because that probably means that you just met chaos.

Once two or more people have the same definition of a problem, the problem will evaporate.

Keep an open mind. To some this means sticking to our opinions and let others have theirs. This gives us a sense of tolerance, but

You'll hear it from Harris loud and clear.

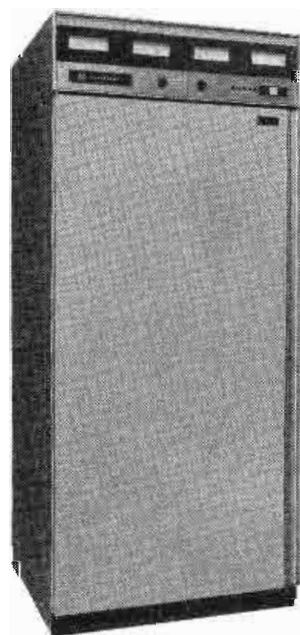
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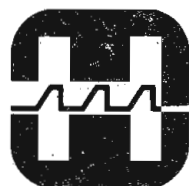
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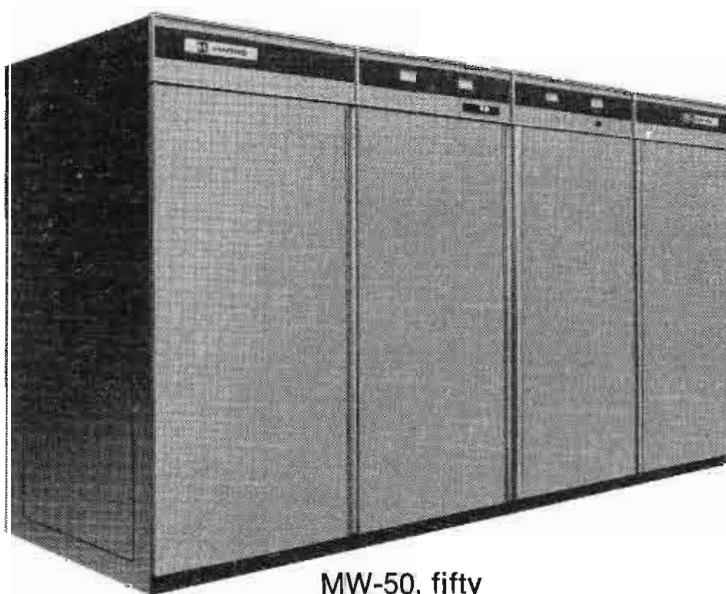
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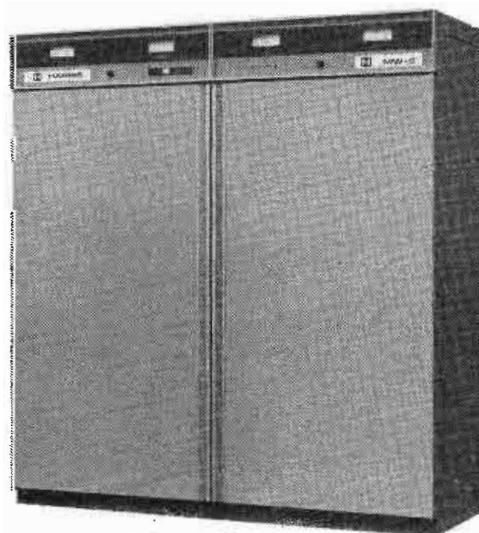
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MW-50, fifty kilowatt transmitter



MW-5, five kilowatt transmitter

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does not necessarily solve a problem. Really open your mind and consider other opinions objectively.

Use "round table" discussions often. They stimulate thinking and develop a team attitude.

You don't have to be smarter than the other guy, **BUT** you have to be more interested in your project than the other guy. This will automatically stimulate better questions that will get more answers, and the process continues until you find that a comfortable conclusion has been reached.

Don't forget to develop your "wish list". If you don't ask for something, you'll probably never get it.

Follow your nose, fly by the seat of your pants, and play it by ear...but for God's sake don't get them mixed up.

The end of the Preparation phase arrives when you **believe** you have an accurate definition of your data and communications system. During this phase you probably cruised through the Incubation and Illumination (happy thoughts) phases.

However, other tasks remain before you launch into the Verification phase. The most important are:

1. Produce a chart representing your data and communications system that shows flow paths and label the data inputs and outputs.

2. Define when data is required (timing), and its proper format. Also construct a brief job description of each staff function and how they handle the data.

3. List verbal communications that you would prefer to eliminate or efficiently reduce to writing.

4. Assemble the "wish list" items with detailed explanations and where they fit into the chart.

5. If you have discovered better operating procedures during the Preparation phase, document these and be able to define how these would change the chart. (Any major changes should probably be left undone until you discuss them with the computer supplier).

The next task is more difficult, but you have to take a stab at it. List future changes that could affect your future data operations, factual or hypothetical, that are not under your control. Examples are: FCC, clients and reps. Don't confuse this list with your "wish list".

Next task: Determine how your fellow broadcaster is using their computer systems. You are prepared with specific and meaningful questions, and will get good answers. You are in a better position to recognize practical and profitable changes you could incorporate. You will obtain their first-hand experiences and knowledge. This will be most helpful when installing your system. This task should be left as one of the last items during the preparation phase. Premature visits could shackle objective thinking when you are defining your system.

Verification...a decision was made and the system works. Not easy, but you are now prepared to start investigating computer systems.

Assembled in a nice, neat, well-defined package of information that accurately states what your system is and what you want. This is exactly what the computer people need. They can decode charts and definitions...and have to by necessity, because the computer is simple minded and has a very small vocabulary. They can convert your system into a smart computer that will **work for you**.

Their proposals may represent compromise, but it will be defined and understood because you have done your homework. You can determine if you can live with it, and that is much better than accepting compromise after a computer is installed.

Today computer suppliers are more familiar with broadcasting operations than you are with computers, and their experiences could improve your system. Keep an open mind...you are now in an excellent position to analyze their answers objectively. However, look out for ambiguities...every profession has them and they can hide many "don't knows" in vagueness.

There is also the problem of jargon. It does not mislead, but is incomprehensible and defeats communication and understanding. Don't hesitate to ask the computer supplier to translate computerese into English and broadcastese. And this is a two-way street. Be tolerant and insist that they understand broadcastese. Don't forget that you invented rotation, orbit, WEB, trailers, 20's, 30's, 60's, and re-

member...STIX NIX HIX PIX from Variety.

One of the most important requirements for installing a computer is training. People have to become familiar with the mechanics of new keyboards, CRT's, and maybe new formats. They will have to learn to trust the inputs and outputs. They have to obtain a better understanding of how the hardware operates... "what does that light really mean when it flashes". People will "settle in" to these changes quickly. The installation period is critical, and mechanical things do fail and software can have "bugs". With better training you can help the supplier fix your system faster. With better training you will probably learn how to do more with your system or have the supplier make a "happy" change to the software.

A supplier's training program is most important for your success, so make sure you get good answers.

We bypassed the **how much (\$)** question before, but it now has meaning. Some stations have launched into a computer system with a specification stating that they want the "least expensive" or the "most expensive" system. This obviously doesn't have any meaning if you have not accurately defined your operational needs. What you need is value. You are now prepared to make that evaluation.

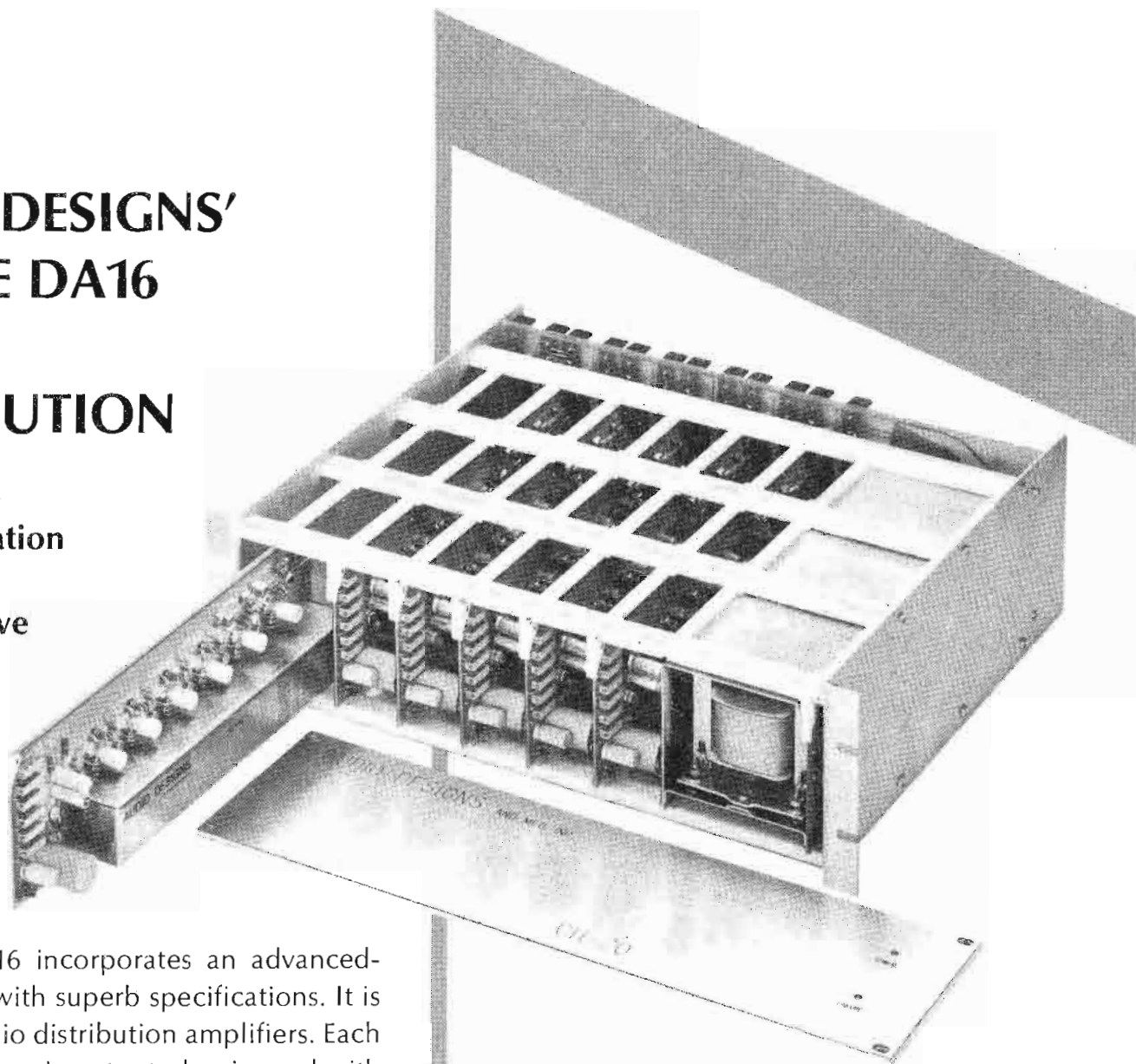
What is the cycle duration for integrating a computer into a TV station?

The preparation phase could take six months to one year, depending upon how well organized you are at the start. Verification phase: Plan on two to four months for selecting a computer system supplier. Add his manufacturing and delivery lead time plus one to four months for the installation "shake down cruise".

It is possible that at the end of the preparation phase you will determine that you do not need a computer system to manage your data and communications operations. But all that hard work will pay off. You probably have obtained a better understanding of your system and can improve it. You have involved people, and they have contributed and accepted accountability. When you need a computer you will be ready. □

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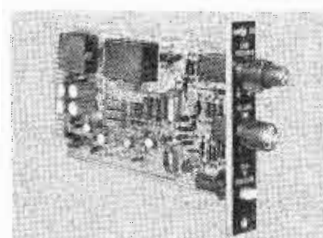


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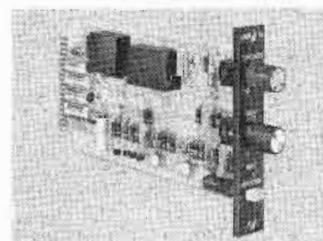
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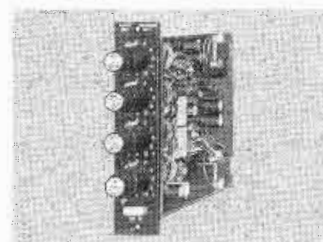
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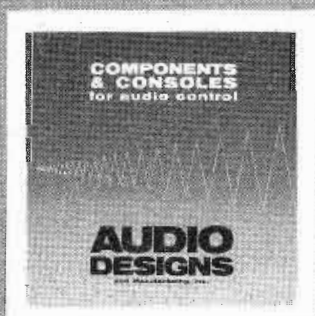
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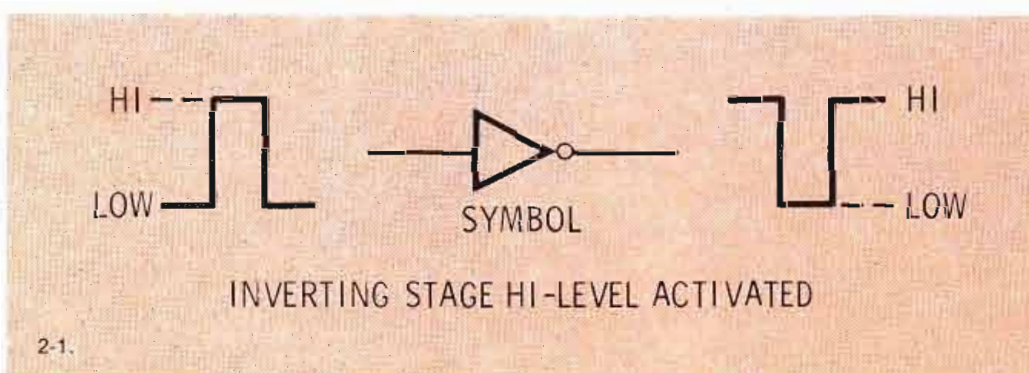
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Logic Illustrated

Part 2 of a 4-part series/By Harold Ennes

Up to this point, every **statement** (or **proposition**) has been positive in content. Thus when you say "the oscillator output level is normal and the frequency is within tolerance," you are making a positive statement

that is either true or not true (false).



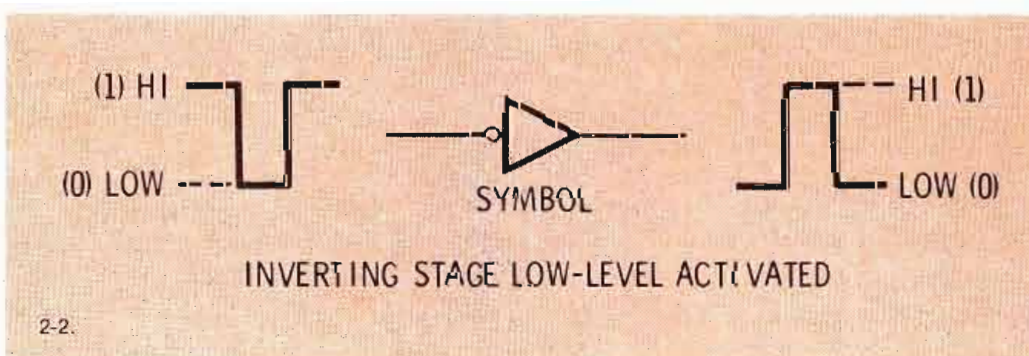
2-1. Every statement has an opposite:
 A = The oscillator output level is normal.
 $\bar{A}$ = The oscillator output level is NOT normal.
 B = The frequency is within tolerance.
 $\bar{B}$ = The frequency is NOT within tolerance.
 The bar over the A ($\bar{A}$) indicates the negative, or inverted form of A .

Similarly, the bar over the B ($\bar{B}$) indicates the negative, or inverted form of B .

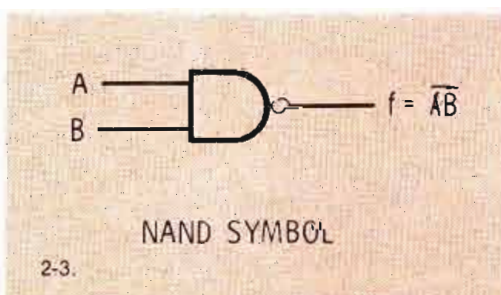
If $A = 1$, $\bar{A} = 0$.
 If $A = 0$, $\bar{A} = 1$.
 If $B = 1$, $\bar{B} = 0$.
 If $B = 0$, $\bar{B} = 1$, etc.

Sometimes a "straight inverting" stage (NOT gate) is used for logic inversion. The symbol is shown by Figure 2-1.

The small circle on the output means a "1" input (high level) results in a 0 (low level) output. It is termed a high-level activated stage.



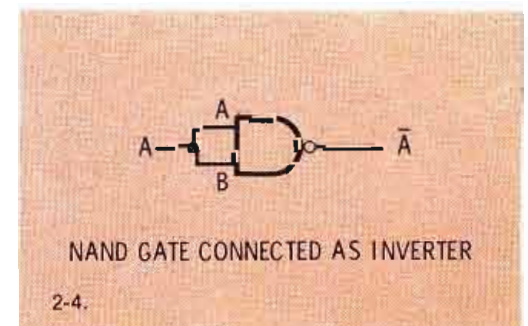
2-2. If the circle appears at the input, a 0 (low) input results in a 1 (high) output. (Low-level activated.) Either 2-1 or 2-2 is inverting; the circles at input or output are important only to clearly indicate the significant function.



2-3. A NOT AND circuit is termed a NAND gate. This is the schematic symbol.

$\bar{A}\bar{B}$ reads "Not A and B ." The small circle on the output indicates polarity reversal. This says that if A and B are both true (1), the output ($\bar{A}\bar{B}$) is false (0). It is the *inverted and* function.

2-4. Shows how an ordinary NAND gate can be connected as a "straight" inverter." Since both inputs are tied together, a 1 on the input will result in a 0 (inverted) output.



Important Note: If both inputs of a NAND gate are "floating" (neither

ground or a positive voltage), internal connections result in a small positive voltage at both inputs, resulting in a zero (low) voltage at the output. Therefore, the inputs must swing between ground (or a negative voltage) and a positive voltage. If just one input is at ground potential, the output is a positive (high) potential.

TRUTH TABLE (AND) (NAND)			
A	B	AB	$\overline{AB}$
0	0	0	1
0	1	0	1
1	0	0	1
1	1	1	0

2-5.

2-5. Shows the Truth Table for the AND function and the NAND function. Note that if one input of a NAND gate is 0, the output will always be 1. Output is reversal of AB.



INHIBITED GATE

2-6.

2-6. Schematic symbol for the inhibitor gate. Produces an output only when the inputs represent $\overline{AB}$ (A and B NOT). If the circle (indicating inversion) was on the A input, $f = \overline{A}B$ (reads A NOT and B).

A 1 input at B of the symbol becomes a 0 input to the AND gate. A 0 input at B becomes a 1 input to the AND gate. For a 1 to occur at the output, A must be 1 and B must be 0. Obviously if the circle was on the A input, $f = \overline{A}B$ (A NOT and B), and conditions are reversed.

2-7. Shows the Truth Table for $\overline{AB}$, $\overline{A}B$. Note that for $f = \overline{AB}$, output is inhibited (0) for all conditions except when A=1 and B=0. For $f = \overline{A}B$, output is inhibited except when A=0 and B=1.

In either case, inputs must be of

TRUTH TABLE (INHIBITOR)			
A	B	$\overline{AB}$	$\overline{A}B$
0	0	0	0
0	1	0	1
1	0	1	0
1	1	0	0

2-7.

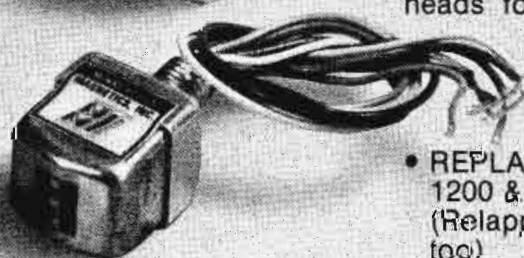
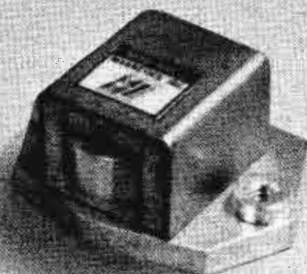
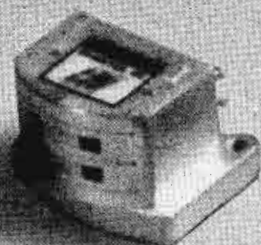
opposite character for an output to occur.

NOTE: It was stated in Part 1 that $\overline{A}$ can be read either "NOT A" or "A NOT." Also that $\overline{B}$ can be read either "NOT B" or "B NOT." The terms "A NOT" and "B NOT" are preferred as can be seen by the following example.

Assume you have the condition of $\overline{AB}$. If you read this as "NOT A and B," you are stating the condition of $\overline{AB}$ (reads "not A and B"), covered in section 2-3. But note the decided difference between Truth Tables 2-5 and 2-7. Thus you should use the term "A NOT and B" for $f = \overline{AB}$.



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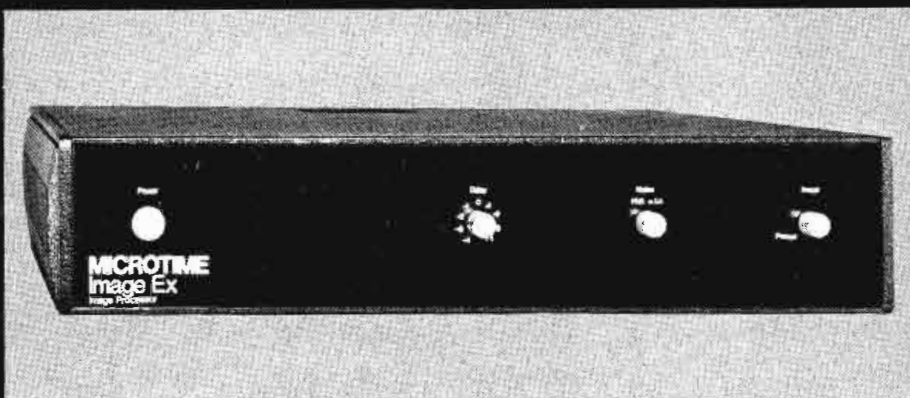
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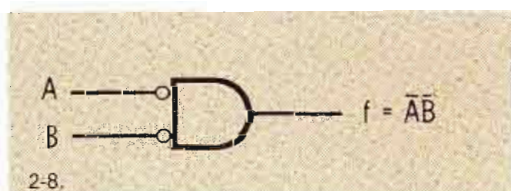
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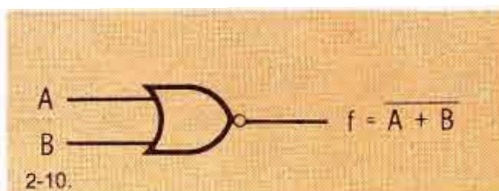
2-8. When small circles (indicating inversion) are at both inputs of an AND gate:

$f = \overline{A}\overline{B}$ reads $f = A$ NOT and B NOT.

2-9.

A	B	$\overline{A}\overline{B}$
0	0	1
0	1	0
1	0	0
1	1	0

2-9. Shows the Truth Table for $\overline{A}\overline{B}$. The output function is a 1 when (and only when) both inputs are 0. Note carefully that $\overline{A}\overline{B}$ (A NOT and B NOT) is different than $\overline{AB}$. (NOT A and B). Review 2-5.



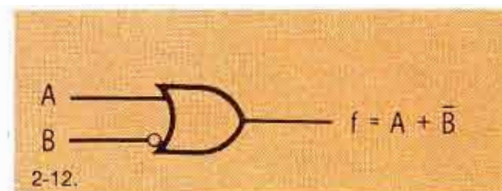
2-10. Inversion is used in OR gates as well as in AND gates. The term for the resultant (f) of a NOT OR gate is a NOR gate. This is the schematic symbol.

$A + \overline{B}$ reads NOT A or B. The small circle on the output indicates the polarity inversion. It is reversed polarity OR gate. Only when both inputs are low (0) is the output high (1).

2-11.

A	B	$A + B$	$A + \overline{B}$
0	0	0	1
0	1	1	0
1	0	1	0
1	1	1	0

2-11. Compares the Truth Table for the OR and NOR gates.



2-12. An ORed output can be obtained under all conditions except when $A=0$ and $B=1$ by this circuit. Thus $f=A+\overline{B}$ reads A or B NOT. The small circle on the B input indicates inversion. A 1 at the B input becomes a 0 at the OR gate input. A 0 at the B input becomes a 1 at the OR input. If the circle was at the A input, then $f=\overline{A}+B$. (Reads A NOT or B.)

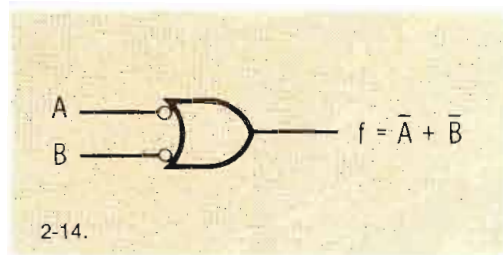
2-13.

A	B	$\overline{A}$	$\overline{B}$	$A + \overline{B}$	$\overline{A} + B$
0	0	1	1	1	1
0	1	1	0	0	1
1	0	0	1	1	0
1	1	0	0	1	1

2-13. Compares the Truth Table for $A + \overline{B}$, $\overline{A} + B$. For clarity, the in-

verted values of A and B are included where:

if A = 1, $\bar{A} = 0$.
 if A = 0, $\bar{A} = 1$.
 if B = 1, $\bar{B} = 0$.
 if B = 0, $\bar{B} = 1$.

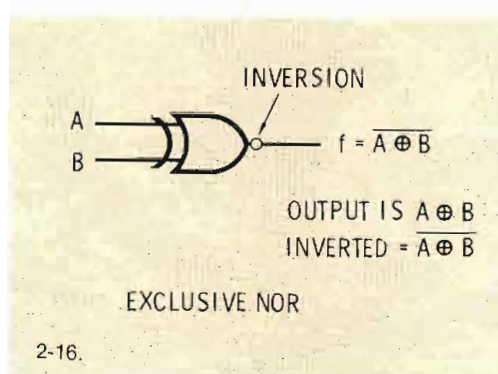


2-14. When small circles (indicating inversion) are on both inputs of an OR gate, $f = \bar{A} + \bar{B}$. (Reads A NOT or B NOT.) Only when both inputs are high (1) is the output low (0).

2-15.

A	B	$\bar{A}$	$\bar{B}$	$\bar{A} + \bar{B}$
0	0	1	1	1
0	1	1	0	1
1	0	0	1	1
1	1	0	0	0

2-15. Shows the Truth Table for $\bar{A} + \bar{B}$. Compare this to 2-11. Note that $\bar{A} + \bar{B}$ is NOT the same as $\bar{A+B}$.

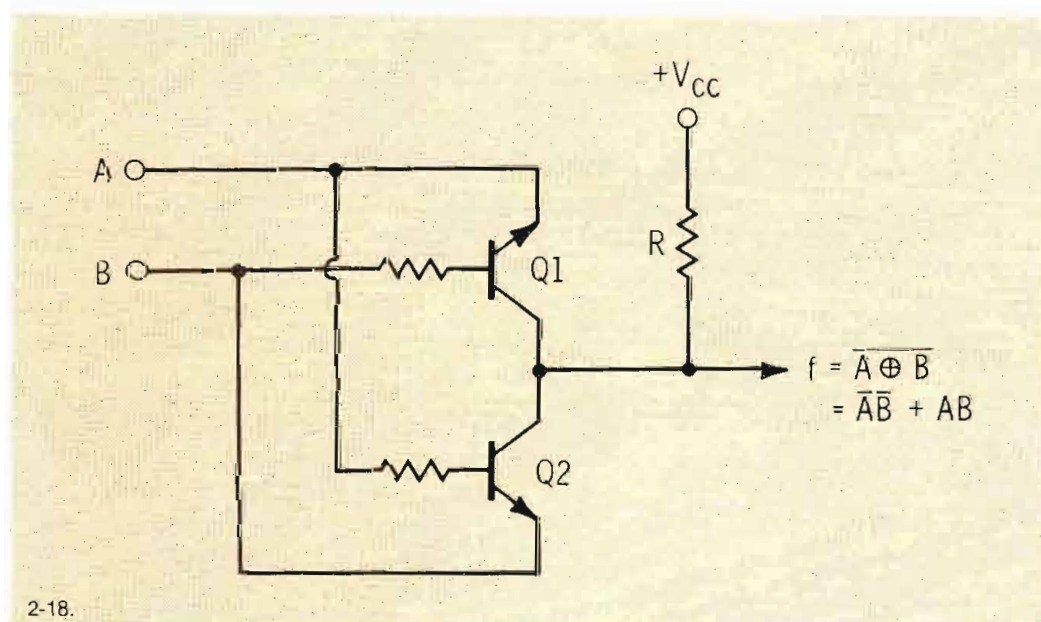


2-16. When an Or gate is specified, the "inclusive OR" is inferred. The schematic symbol for the *inverted* "exclusive OR (EXCLUSIVE NOR)" is shown by Fig. 2-16.

2-17.

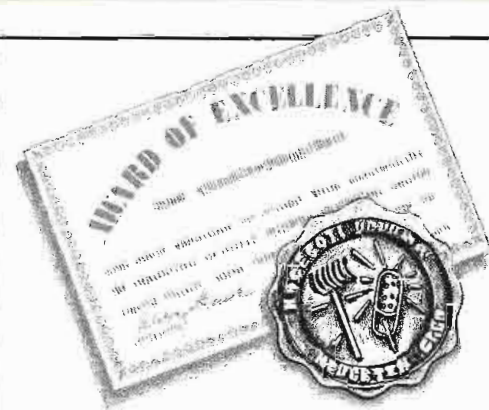
A	B	$\overline{A \oplus B}$
0	0	1
0	1	0
1	0	0
1	1	1

2-17. Illustrates the Truth Table for Exclusive NOR. Note that: $\overline{A \oplus B} = \bar{A}B + A\bar{B}$. Reads A NOT and B NOT or A and B.



2-18. Shows a discrete circuit illustrating $\overline{A \oplus B}$. When both A and B are alike (either 0 or 1), Q1 and Q2 have zero-biased base-emitter junctions, forming open switches. With no current through R, $f = +V_{CC} = \text{high} = 1$. When A

and B differ (0, 1), the opposite logic levels cause either Q1 or Q2 to conduct. The resultant current in R sends the output to essentially ground (low level or 0). Hence output is inverted (goes low for significant high pulse input).



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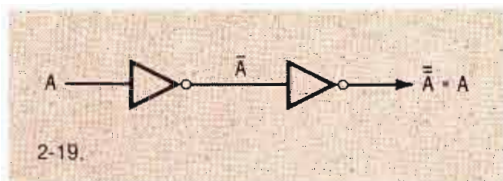
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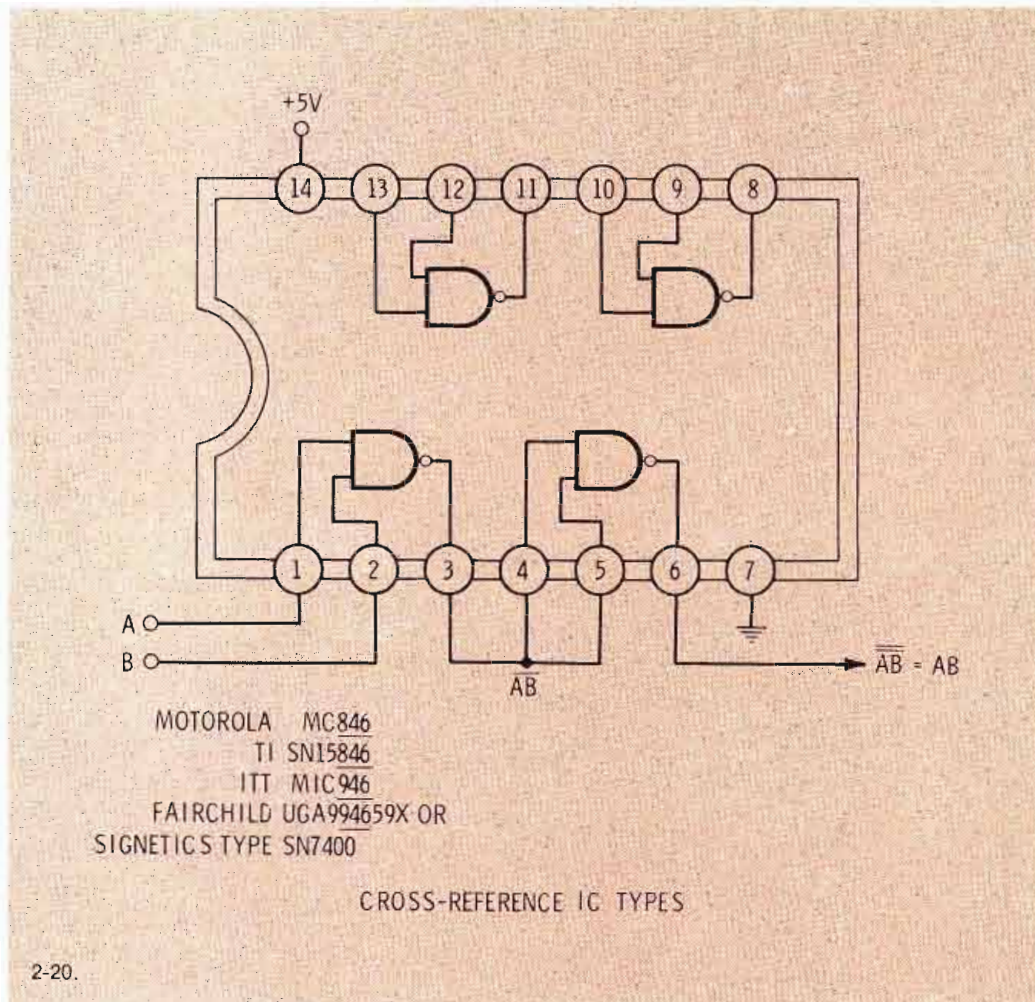
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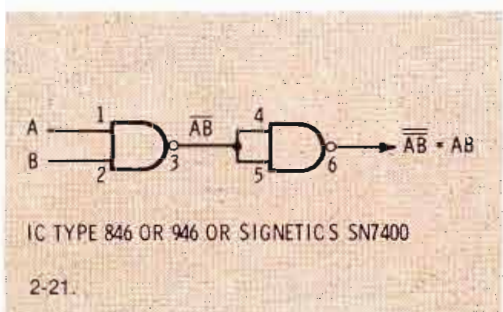


2-19. A given character passed through one inverting stage gives the reversed polarity of the original character. A given character passed through two consecutive inverting stages gives the original character polarity.

$\bar{A}$ = inverted A. $\bar{\bar{A}}$ = double inverted A = A. This is the same as passing any signal through two consecutive common cathode (tube) stages, or common emitter (transistor) stages. Original polarity results.



2-20. Shows how you would connect two of the quad 2-input NAND gates to obtain $\bar{A}\bar{B}$. The types 846 and 946 are identical except for temperature ranges.



2-21. Shows the equivalent schematic for 2-20.

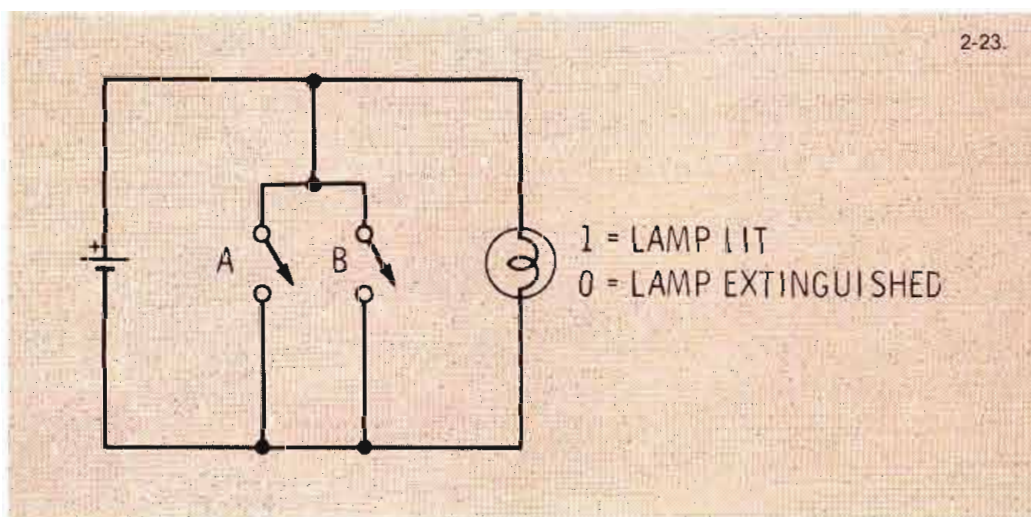
A	B	$\bar{A}$	$\bar{B}$	AB	$\bar{A}\bar{B}$	$\bar{A}B$	$A\bar{B}$	$A+B$	$\bar{A}+\bar{B}$	$\bar{A}B$	$A\bar{B}$	$A\oplus B$ ($\bar{A}B + A\bar{B}$)	$\bar{A}\oplus\bar{B}$ ($\bar{A}\bar{B} + AB$)
0	0	1	1	0	1	1	0	0	1	0	0	0	1
0	1	1	0	0	1	0	1	1	0	1	0	1	0
1	0	0	1	0	1	0	1	1	0	0	1	1	0
1	1	0	0	1	0	0	0	1	0	0	0	0	1

2-22.

2-22. Presents the comparative Truth Table for most of the logic gates covered thus far in Parts 1 and 2. Pick out any duplication in this Truth Table, and write the resulting relationship:

(1). Note that $\bar{A}\bar{B}$ and $\bar{A}+\bar{B}$ have the same function. Therefore, $\bar{A}\bar{B}$ is equivalent to $\bar{A}+\bar{B}$.

(2). Note that $\bar{A}B$ has the same function as $\bar{A}+\bar{B}$. Therefore, $\bar{A}B$ is equivalent to $\bar{A}+\bar{B}$.



2-23. State the conditions for a 1 to occur (lamp lit) in the circuit of 2-23. Answer: the only condition where a 1 can occur is for A and B to both = 1 (open switches). Thus:

$f = \bar{A}+\bar{B}$ (NOT A or B). This is equivalent to:

$f = \bar{A}\bar{B}$ (A NOT and B NOT). $\square$

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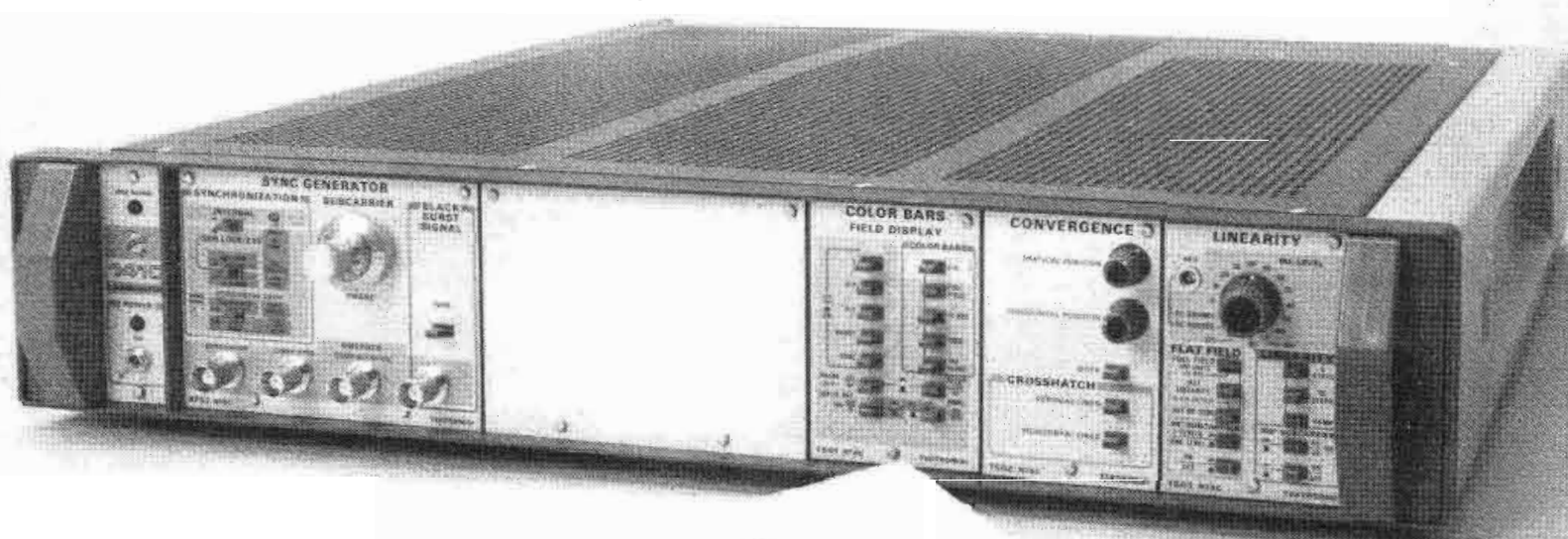


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You Can't Change The Weather But You Can Report It

by Peter C. Burk, Workshop Editor

Weather reporting should be more than giving a temperature check between spots and reading a half-day old zone forecast as fill material. One of the best ways to

DELTA ELECTRONICS

THE AM BROADCASTER'S SINGLE SOURCE FOR . . .

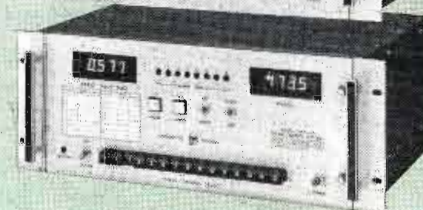
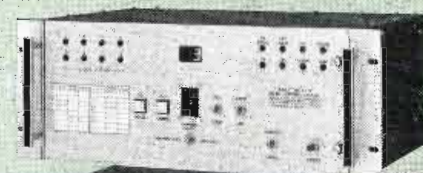
- DIGITAL ANTENNA MONITORING • TRANSMITTER/ANTENNA CONTROL
- MEASUREMENT/TEST INSTRUMENTS

Digital Antenna Monitoring

DAM-1 DIGITAL ANTENNA MONITOR — FCC type approved. Provides digital readout of amplitude, ratio and phase. Also available: DAMA-1 Base Current Adapter for remote digital readout of antenna base currents; DAMA-2 Analog Converter to Interface DAM-1 Monitor with existing analog remote control systems; DAMX-1 to extend capacity of DAM-1 to arrays up to 12 towers.

Transmitter/Antenna Remote Control

TMCS-1 TRANSMITTER/ANTENNA REMOTE CONTROL SYSTEM — Provides digital readout and control of the DAM-1 and transmitter over a single voice channel. Other systems available: DAMR-1/DAML-1 for digital readout and control of the DAM-1 only; DAMH-1 for use where the remote control point is close enough to the monitor to permit hardwired inter-connection.

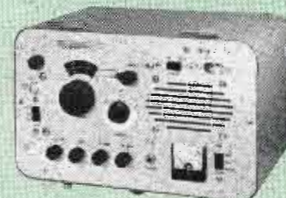


Measurement/Test Instruments

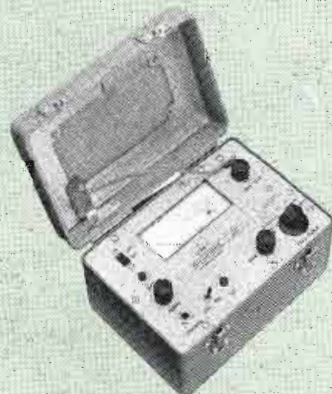
OIB-1 OPERATING IMPEDANCE BRIDGE — For antenna system measurements under transmitter power. May also be used as a conventional bridge.



RG-1 RECEIVER/GENERATOR — Two-watt signal generator with a tracking detector. Built-in rechargeable battery power supply for full portability in making low power impedance measurements. For use with OIB-1 or other RF bridges.



CPB-1 COMMON POINT IMPEDANCE BRIDGE — Monitors common point impedance continuously. Designed for permanent installation.

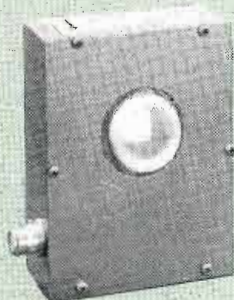


FSM-1 FIELD STRENGTH METER — Single frequency meter for simple, error-free, economical field strength measurements. Plug in modules for multi-frequency and harmonic measurements.



Other Products

TCT-() TOROIDAL CURRENT TRANSFORMER — Provides accurate, stable R. F. samples for phase and amplitude measurements. Available in three sensitivities. Also available: TCTR-1 Compensated Rectifier Circuit to provide DC voltage for remote current measurement when used with TCT-().



MJ-50 METER JACK — A make-before-break in line jack assembly that permits "hot" insertion of OIB-1 Bridge or Ammeters.

DELTA ELECTRONICS



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For More Details Circle (36) on Reply Card

improve weather reporting is to localize the information with weather instruments located at the station. If these instruments are properly installed and interpreted correctly, you can read between the lines of the official zone forecasts, and provide more accurate weather information to your listeners.

This month, "Radio Workshop" will help you select and install weather equipment for your station. Next month we'll present a short course on meteorology to help you translate the raw data into information your listeners can use.

Getting Tuned In

Of paramount importance is a link between your station and the nearest national weather service office. The official forecast, current conditions, and severe weather warnings all emanate from the national weather service. This doesn't have to be a teletype circuit, although this is one of the most common ways to collect the information quickly. If you're interested in getting on the NOAA weather wire, contact the marketing people at your local telephone company. In most cases, all you'll pay for is the local loop and lease on the ma-

chine. If you have access to a 75 w.p.m. printer, you can get by for just the cost of the local circuit.

If you live in range of one of the many VHF weather stations, you may be able to copy most of the desired information directly from an inexpensive VHF monitor. Generally, these stations transmit a transcribed sequence of information that is repeated about every five minutes. While it'll provide the basics, the primary disadvantage is that the information is for a broad geographical area, and isn't always as up to the minute as we broadcasters would like.

A similar source of information often overlooked is the automatic terminal information service (ATIS) available at many airports. These broadcasts are again continuous, but provide local conditions only. Primarily intended for pilots using the airport, the sequences are updated frequently, and include ceiling, visibility, precipitation, temperature, dewpoint, wind speed and direction, and barometric pressure. You'll need a VHF-AM receiver to copy this service. Check the nearest Flight Service Station or FAA control tower for availability and frequencies in your area.

A direct tie-line with the weather service may work well for you if you are in a multiple station market (see side-bar story).

Selection of weather instruments for your station will depend on how much data you need to collect directly at the station. If you are only a few miles from a weather service office, you probably won't need much more than a local thermometer. If, on the other hand, you are fifty miles from the nearest office, you might want to install a pretty elaborate weather station. Most radio stations are better off with remote indicating instruments so that the display can be right in the control room. One of the typical remote indicating units available is shown in Figure 1.

This unit measures temperature, barometric pressure and wind velocity and direction. A rain gauge and a hygrometer would complete a basic weather station. For a few more shekels, the digital system shown in Figure 2 will dress up just about any control room. This may be a little extravagant for a single station installation, but a combined AM-FM-TV facility can tie several indicators together so that all three stations report the same data.

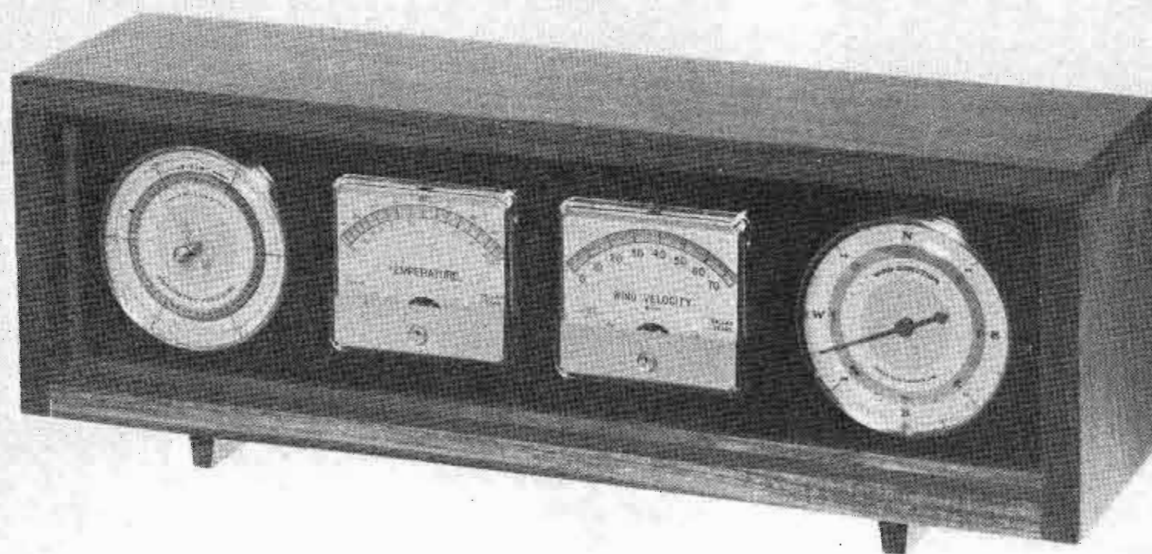
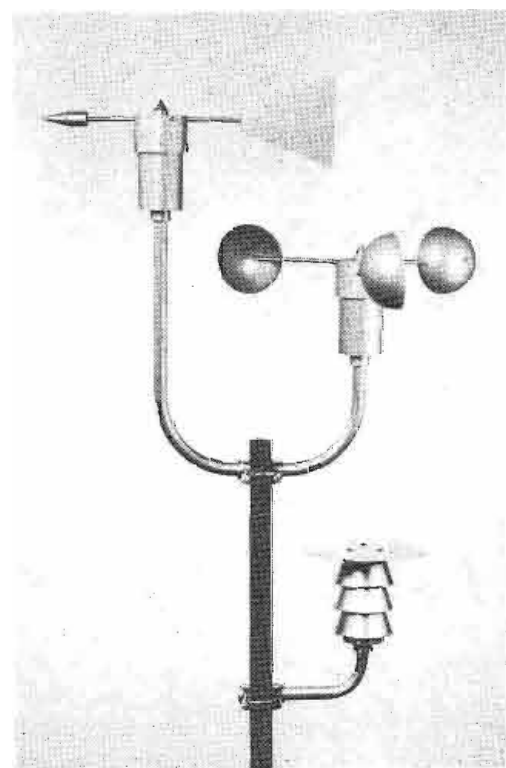
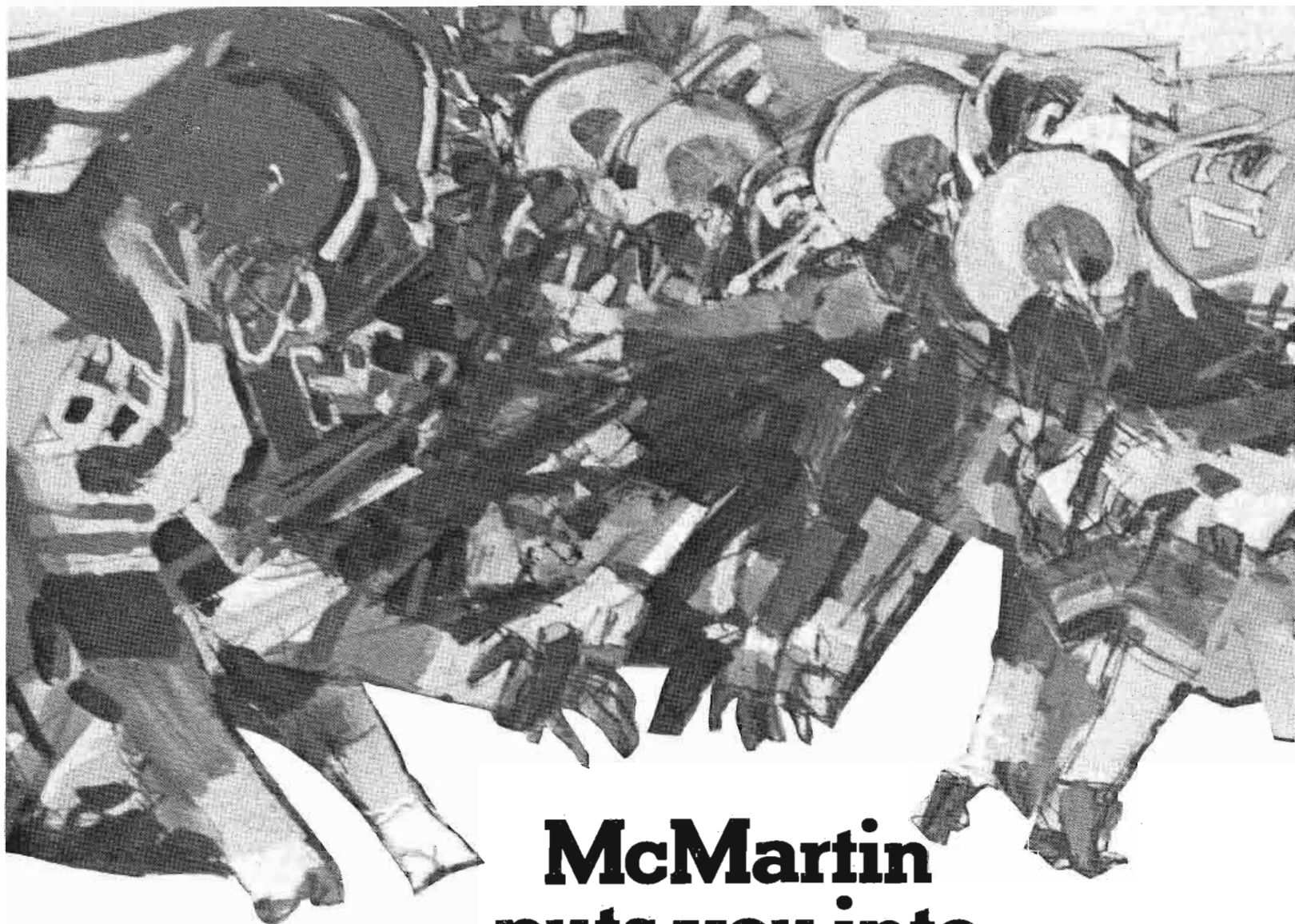


Figure 1. A typical remote indicating unit is shown. Remember to place the outside unit properly to insure an accurate reading.



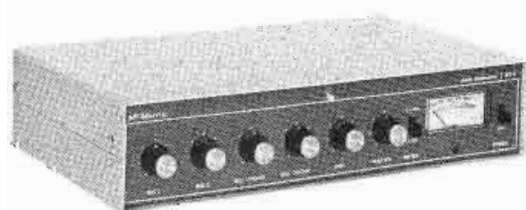
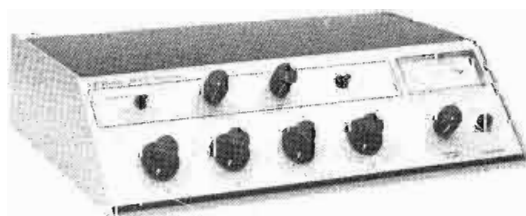


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On the playing field. At the scene of an emergency . . . a headline moment. McMartin remote broadcast equipment puts you into the kind of action that attracts listeners and builds profits.



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B-1100T / TBM-1100R. 40 watt combination FM transmitter / 3 channel mixer with a companion base station receiver. The ultimate in location flexibility and performance. No telephone lines required. Operates on any two specified frequencies in the 148-172 mega-Hertz range. **High fidelity performance.** Ideal for any remote pickup from on-the-scene news and sports to the most demanding music application. AC or battery operation.

B-1100T (transmitter/mixer) **\$750**
TBM-1100R (receiver) **\$450**

BR-400. Four channel broadcast remote mixer for telephone line or tape recorder feed. AC or battery operation (with optional internal battery pack) featuring automatic change-over to battery power in case of power line failure. Four low impedance mic channels, two are field convertible to RIAA equalized magnetic phono operation or 600 ohm line level input. Dual outputs: 600 ohm balanced line and 5K unbalanced output with independent level control. Built-in tone generator and headphone cue amplifier. Ideal for sports and D-J remotes. **\$310**

MX-5. For extreme low budget, educational, and sound reinforcement applications. Professional performance at low cost. 4 channel mixer. AC or external battery operation. Four low impedance mic inputs, two are field convertible to magnetic phono. Bridging high level 600 ohm program level input. Built-in tone generator. 600 ohms balanced line output. **\$149.50**

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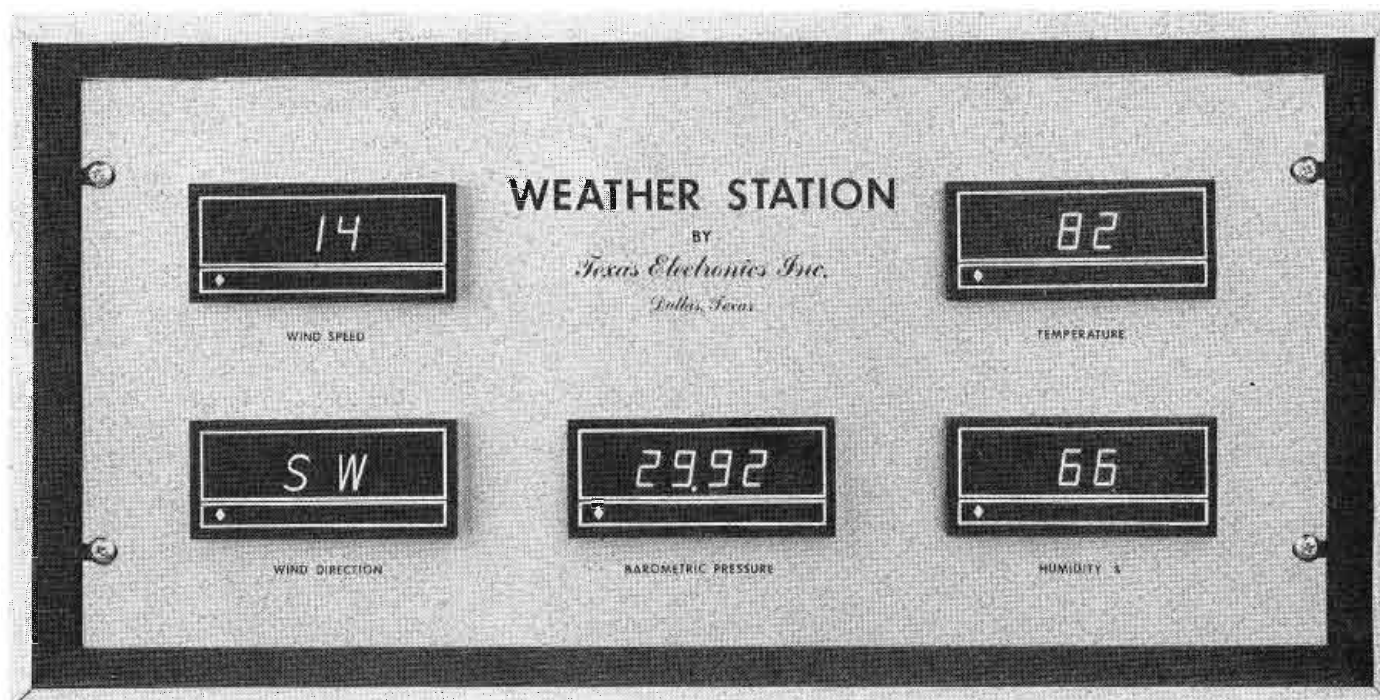


Figure 2. For a few more sheckels, the digital system shown will dress up a control room. One advantage of this system is the easy readability of the numbers from a distance.

Probing The Atmosphere

Once you have the instruments, you'll have to find a place to put the sensors where you can get reasonably accurate and meaningful readings. Almost every installation results in compromise, but we'll discuss the ideal environment for each instrument.

Wind sensors should be at least twenty feet above the surface on a tower that is exposed on all sides. The tower should be over terrain that is relatively level and free from obstructions to wind flow. The weather service recommends that when a compromise must be made, the sensing units should be at least

12 feet above any obstruction within 100 feet and at least as high as any obstruction within 100 feet to 200 feet of the sensor. It's amazing how much the surrounding structures affect the indication of wind speed, velocity, and temperature reading.

If you want to side-mount on an existing tower, try to mount the sensors at least five feet from the mast to avoid interference from the tower. Don't get carried away and mount the sensors 300 feet up on your FM tower. The wind changes as you gain height due to friction across the surface. Most people are more interested in the wind near the surface. Don't forget to provide

lightning protection for the mast.

The wind direction sensor needs to be oriented when it's installed. It can be referenced to either true north or magnetic north. Generally, true north is a better bet, since this is what the weather service uses for all of their reporting that is intended for the general public. To obtain true north from a compass reading, you'll need to know the magnetic variation for your location. This is indicated at the bottom of most topographic maps in the form of an arrow and number or degrees east or west. (Pull out the station's HAAT or field intensity topos). An east variation means that the north indica-

In the Quad-Cities, getting forecasts, current information, and severe weather warnings is compounded by the fact that the market spans a state line. Two teletype circuits would be necessary for any station to have the complete picture. To solve the problem, all of the radio and television stations in the market joined in a cost-sharing plan to set up a network via phone line from the local weather service.

The Weather Service Office can originate a message to every station in the market simultaneously by picking up one phone and pushing a "ring" button. All of the receive points are "dry"

connections so that sounds picked up by the various handsets are not transmitted around the network.

The batphone rings at 45 minutes past the hour every hour with the current readings, new forecasts when appropriate, and statistical data. Severe weather warnings are on the circuit within seconds. The weather service reads the data once for taping or direct on-air use, then once at a slower pace for copying.

The system has proven highly effective as an accurate, high speed method of disseminating weather information.

HITACHI SK-70

The One Camera That Can Do The Work Of Four... Inside Or Outside The Studio!

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

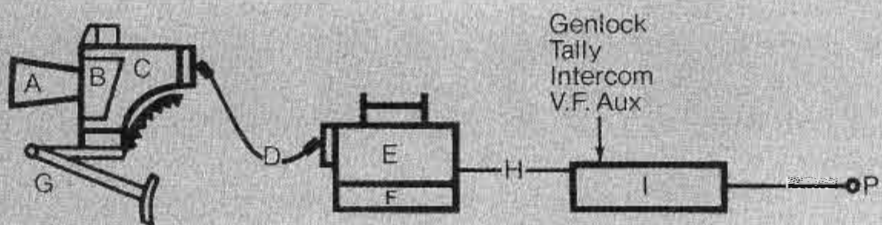
No matter which configuration you choose from those shown in the photo and three diagrams, the Hitachi SK-70 offers the precision and reliability of three 2/3" Saticon tubes in the camera head to insure excellent picture quality, combined with all the latest advances in broadcast camera technology.

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

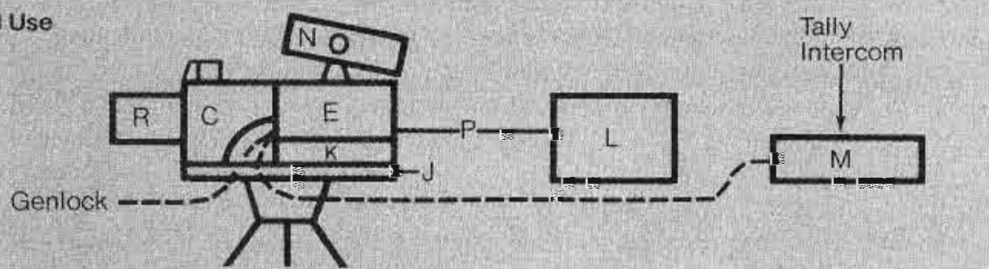
Fully studio-equipped



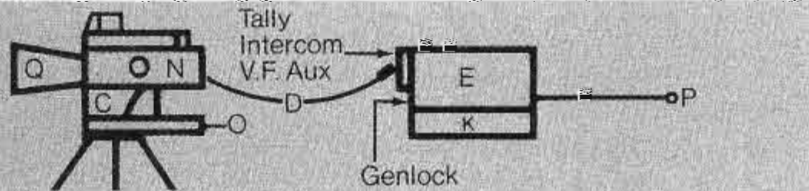
Portable Use



Field Use



Modified Studio Use



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



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tion should occur **WEST** of the north indication on a compass.

Temperature and humidity sensors should be installed in some sort of shelter to protect them from wind and direct sunlight. An ideal enclosure can be made using unfinished louvered ("saloon-style") shutters for the sides to provide adequate circulation. Paint the enclosure with white exterior paint. The shelter should be installed at least four feet above the surface, and preferably over grass. Keep at least one hundred feet away from parking lots or other paved surfaces. Roof mounting should be a last resort. If you're stuck with a roof top, get the shelter up away from exhaust fans or cooling towers. You can mount it so that it will extend horizontally from the side of a building to minimize the problems.

Rain Gauges

Rain gauges should be installed on level ground, if possible. Main-

tain a horizontal separation between the gauge and any vertical object of at least twice the height of the object. Naturally, the rim of the gauge should be kept level, and at a height well above the average level of snow accumulation. Again, roof mounting isn't ideal. Air currents above the surface will cause an apparent decrease in the amount of rain accumulated. A windbreak around the gauge will actually help get an accurate indication as long as the height of the windbreak is less than twice the distance from the gauge.

Barometers are easy to install. Just keep them away from direct sunlight, rapid temperature fluctuations, and direct drafts.

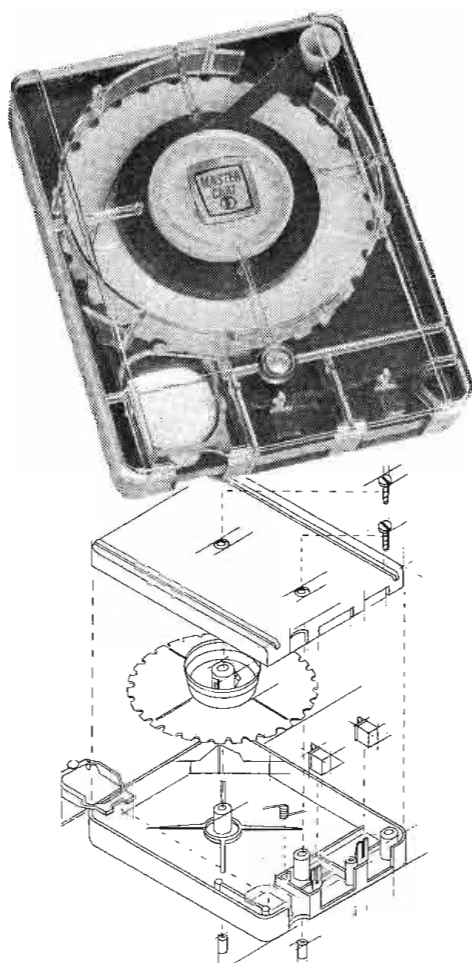
Decide how much cable you need for remote sensors before you order the units. Some units must be used with fixed lengths of cable, and should be ordered with the proper cable length supplied by the factory. Even with units that are not sensitive to changes in cable

lengths, one piece cables are a good idea, since the signals are usually on the order of a few millivolts.

If your installation is at a transmitter site, be aware of possible RF pickup at the sensor or in the cable. The temperature sensor is frequently the most susceptible, since many remote thermometers use diodes for the transducer. Proper bypass and cable routing and shielding will solve most RFI problems.

Once installed, the equipment should be calibrated. The manufacturer will provide instructions for his particular units.

Your weather station should require very little maintenance. The bearings in the wind sensor may require service after a number of years, and the electronics may require periodic calibration. Don't expect your readings to agree exactly with readings taken at the weather service. Local variations are normal, and in fact, can be used to advantage in reporting the weather.



MASTER CART

For the cleanest cart sound
your station can broadcast.

STEREO PHASING—60° normal (45° typical) to 12,500 Hz.

REPEATABILITY—Phase performance repeatable with each cartridge and each stereo machine assuming correct guidance to NAB alignment dimensions.

TAPE PATH—Cone shaped rear corner post and longer tape path eliminate tape distortion at the head area.

CIRCULAR BRAKE—Positions the cartridge straight into the heads to minimize unequal head penetration pressure.

PRESSURE PADS—Individually replaceable . . . high flexibility and low friction for extended tape life . . . provides full surface tape contact for straight-path tape motion.

Master Cart is easy to maintain, comes in all lengths up to 10½ minutes. For details, contact your Fidelipac Distributor or



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Old-New Reel Time Recorder

Telex/Magnecord series 1400 broadcast quality recorder/reproducer. An old name that spells reliability. A new design for today's state of the art.

- The Old. Telex/Magnecord products are still made in the USA so parts and service are always available. The series 1400 is still built on a solid die cast aluminum main frame for reliable operation around the clock. It's still available in full, half and

quarter track configurations, has fail safe differential brakes and accepts 8 1/4 inch reels. It also still comes with three motors—but then, that's touching on the new.

- The New. A brushless d.c. servo drive with a crystal oscillator control reference so accurate it virtually eliminates program timing errors. New, three speeds: 3 3/4 - 7 1/2 - 15 ips. New catenary head block for straight tape loading, the convenience of one hand cueing and the bi-level illumination of push button controls. New DTL logic controls eliminate EMI and provide fast, spill

proof tape handling gentle enough for half mil tape. And new electronics, clean to 60 dB S/N at all speeds.

- If you're looking for a real time, reel recorder with old name reliability but designed for today's demands, you'll find it in the Telex/Magnecord series 1400. For complete information please write:



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Canada: Telak Electronics, Ltd., Scarborough, Ontario

Olympic

Continued from page 34

stadium, close to the press section, there were larger studio-type color cameras in fixed positions that provided over-all and medium shots. The cameras all were controlled from mobile TV vans parked next to the stadium and their pictures could be mixed with pictures coming from the camera-carrying helicopter and ORTO's Electro-cam which had followed the

torch bearers.

The TV director could blend in the available scenes to create any desired effect. As the teams marched by, he would switch or fade between wide shots of the teams coming from the balcony cameras to detailed closeups of national flags or individual members that the floor cameras got. This added a more human touch to the proceedings. The overview from the crane camera was interposed with the normal camera shots to

give an otherwise unobtainable appreciation of the size and scope of an Olympic assembly involving 8400 athletes and 70,000 spectators.

Olympic TV Firsts

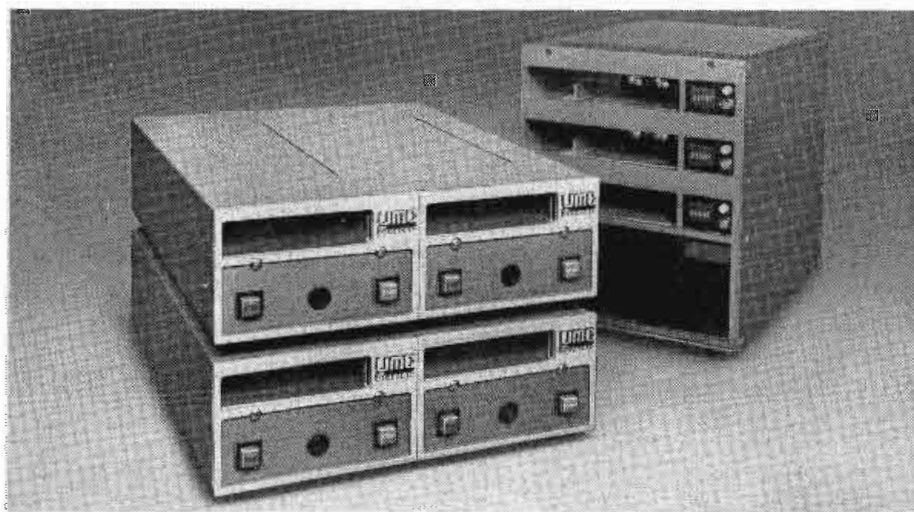
The progress of technology and their own ingenuity permitted ORTO to achieve a few Olympic TV "firsts" in Montreal. Simultaneous coverage of the Olympic Flame's progress and the events taking place in the stadium on a split screen basis, computer generated graphics of the Olympic logos to enhance programming, frame store synchronizers to hold and lock remote sources that could not be tied to cable, soft wipes and quad splits all held to stringent NTSC phase tolerances, rigid and floppy magnetic discs for instant reply in slow or stop motion with random accessed fixed frames—all these were innovations of the XXIst Olympiad.

With all these tools at their disposal, the TV directors made the opening ceremony very memorable and fast-paced television entertainment. The viewers at home saw Queen Elizabeth in her pink dress and matching hat, the athletes in their colorful national costumes, the flag transfer ceremony highlighted by the Habitant and Bavarian dancers and the groups of school children who performed with grace and artistry, twirling their cloth streamers, waving their flags or forming intricate patterns around the whole track. Finally, the viewers were treated to seeing the most moving sequence that television conveys so well, the lighting of the Olympic Flame when overlays of several cameras were used to provide a montage of the Olympic spirit combining the flame itself with a variety of scenes representing the humanistic aspect of this largest international sports event.

There was one more new facet introduced at the Olympic stadium. Two huge scoreboards that hung at both ends of it provided not only alpha-numeric displays, but also was fed with video signals that produced large screen recognizable images. As Her Majesty and Lord Killanin performed their official duties, the TV cameras in front of them that sent pictures to the master control also fed the score-

Continued on page 66

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 drive motors. And fast forward is available in any (or every) slot. But most important of all is the cost. The Beucart 4D mono single cue, at \$2,537 list, is only \$71 more per slot than an ordinary 3-deck machine, which typically lists for about \$1,690. And that \$71 is a terrific investment.

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

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RCA power tubes of the future have a remarkable past: actual lifespans up to 30,000 hours.

Tube Operating Hours Reported by 20 TV Stations*		
Up to 5 kW	24,142 hrs.	21,329 hrs.
Types 8890 & 8806	12,263 hrs.	19,200 hrs.
Aural service	16,200 hrs.	14,000 hrs.
Up to 12.5 kW	10,096 hrs.	10,525 hrs.
Type 8891	9,402 hrs.	
Visual service		
Up to 17.5 kW	16,600 hrs.	18,300 hrs.
Type 8807	29,800 hrs.	21,200 hrs.
Visual service	30,100 hrs.	20,400 hrs.
Up to 27.5 kW	9,778 hrs.	9,776 hrs.
Type 8916	7,875 hrs.	13,183 hrs.
Visual service	10,799 hrs.	

*Serial numbers and tube type data available on request

RCA power tubes are at work now in new-generation color transmitters. Proving their value with an excellent combination of high gain, high linearity, plus long operating life.

Documented long life. In the table, you can see actual operat-

ing hours reported by 20 TV stations. That reliability comes from RCA's sturdy, coaxial CERMALOX® construction and thoriated-tungsten mesh filament, which minimize inductances and feed-thru capacitances. So you can use simple, economical broadband circuitry.

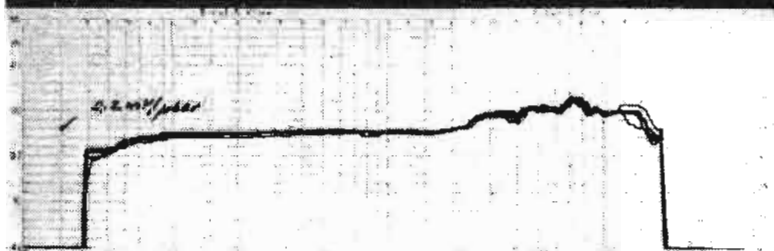
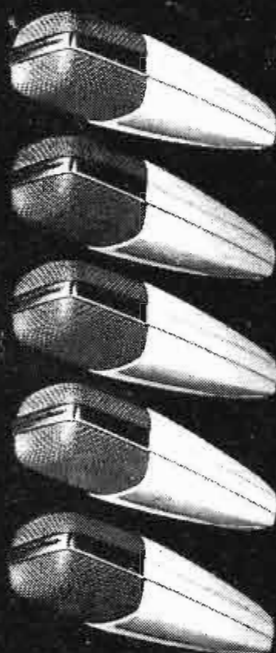
In fact, RCA can supply you with the right circuit and cavity to go with the tube you select.

For high performance and proven long life in a wide range of power tubes, there's one thing to do. Contact your RCA Representative. Or, RCA Power Tube Marketing, Lancaster, PA 17604. Telephone 717/397-7661.



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Response curve made with five random-selected MD 421 microphones.

ALL 5 OF THEM!

UNUSUAL? Not for Sennheiser.

The fact that the response curves of the five microphones are almost identical is commonplace for our engineers. And the individually-plotted curve we provide with each unit will confirm the fact. For besides the rigorous check of a response curve, each and every Sennheiser professional microphone undergoes numerous other inspections, to insure its absolute acoustical, electrical and mechanical integrity.

Perhaps this uniformity and unusual performance influenced the major recording companies in choosing Sennheiser microphones for both field and studio use (and made ours the 'standard' microphones of the continent).

You may think this kind of quality control is unusual for a production instrument. However, we are very particular about the kind of equipment bearing our name. Shouldn't this kind of 'insured performance' be built into your audio facilities, or those you install?

For further details, including full technical specifications, and a list of microphone accessories available for the MD 421, please write or call.



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Manufacturing Plant: Bissendorf, Hannover, West Germany

Continued from page 64

board screen so that the spectators in the grandstands could have a clearer view of what was happening.

The press section of the main stadium was equipped with 110 commentator positions, each having a TV monitor that showed what was going on the air and microphone circuits to carry the announcer's words describing the picture in the appropriate language of the recipient viewers. Altogether it was a very memorable afternoon (or morning or evening, depending on the time zone) for the viewers all over the earth who participated vicariously in this televised extravaganza.

Rowing and Canoeing

The dictum of the ORTO production plans was that there were no "minor" sports. Each was to be covered as best it could be so as to convey an adequate visual and aural impression to the remote spectator.

The rowing and canoeing competitions at the Olympic basin presented a special challenge because of the 2000 meter length of the waterway and the relatively low spectator and press stands near the finish line. Static coverage by cameras at both ends would not be adequate, so it was decided to set up a pair of mobile vehicles that worked in sequence to pace the paddlers along the water's edge.

The first vehicle, a medium sized mobile van brought in from Quebec City's CBC outlet, CBVT, had on its roof a pair of studio cameras, parabolic mikes and a pair of microwave dishes. Since this vehicle stood 15 feet tall it could only cover the race from the starter's pistol to about two-thirds of the way down to the finish line where no spectators or officials would have their view blocked. From that point on, a stripped down compact car frame with a color camera mounted on it would follow the rest of the race to the end. The low profile of this little gas powered vehicle enabled it to go by the grandstand without impeding the public or press coverage.

An umbilical camera cable covered with spaced rubber grommets attached to the gas buggy and

uncoiled along the ground as the camera moved along with the straining oarsmen. High overviews were available from another studio camera mounted on a "cherry picker" and additional coverage came from cameras in the grandstand, the official tower and on a small dock by the water. As a result, the television coverage of these events was smooth and exciting from the starter's pistol to the first prow that cleaved its way across the watery finish line.

Cycling

The major event in the sport of cycling is the Individual Road Race. This grueling contest required 14 circuits of a 12,500 meter course by a pack of contestants who had to contend with chilling drizzle and intermittent rain during the more than five hours of pedaling around the circuit. To bring viewers the most intimate coverage this type of road race has ever seen, ORTO marshalled a TV team that included two Autocameras, two helicopters, several grandstand cameras, a camera on a platform suspended from a mobile boom above the middle of the road just past the finish line and a roving back pack camera for close-up work.

All of this was backed up by a temporary control room with slow motion facilities, color phase locking loops, two frame store synchronizers, U-Matic playback facilities and the network of communications devices to keep aural contact with the drivers and the pilots, as well as the regular camera crews.

The system worked to perfection bringing views of the cyclists' features or the pumping calf muscles as they whizzed around the track at up to 40 km/hr. The two Autocameras with LeMans-type drivers who had to run with the pack while avoiding official cars, stray spectators and the racers themselves, kept circling the laps in tandem or apart as the leaders separated from the rest of the racers.

The two helicopters hovering overhead, besides relaying the Autocamera signals, each carried their own cameras that could be switched in for a bird's eye view of the racers

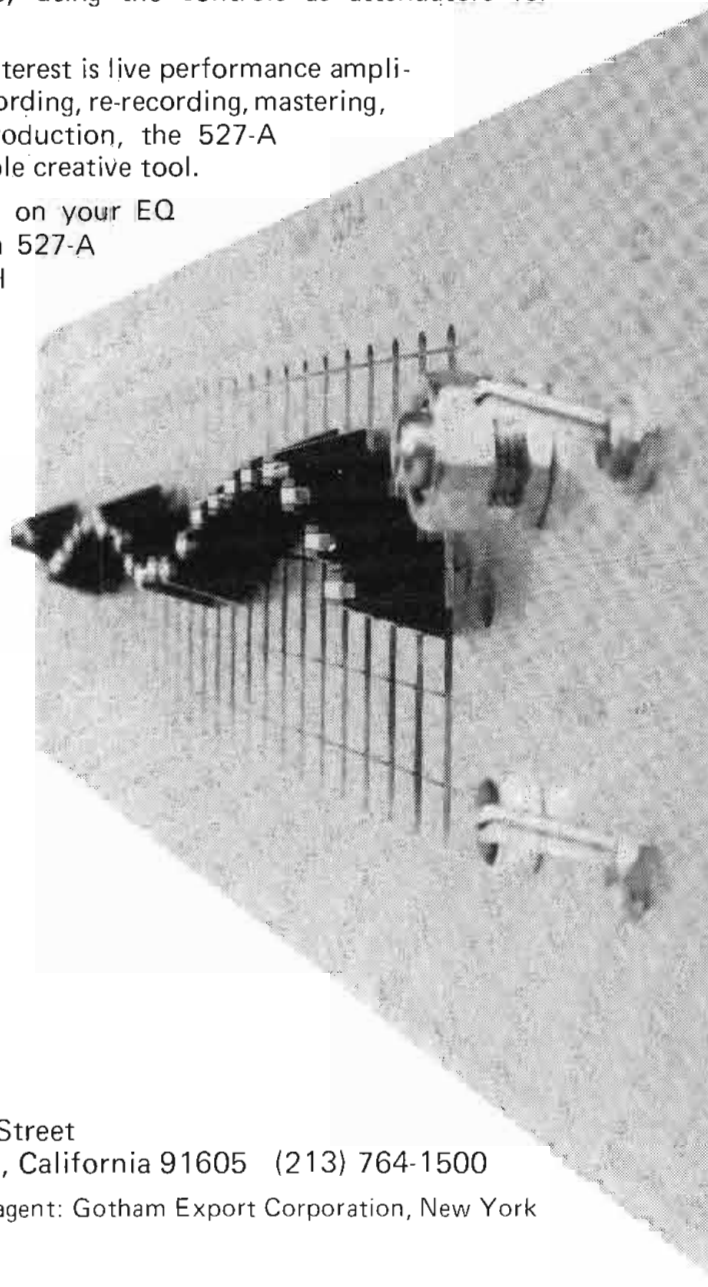
Continued on page 68

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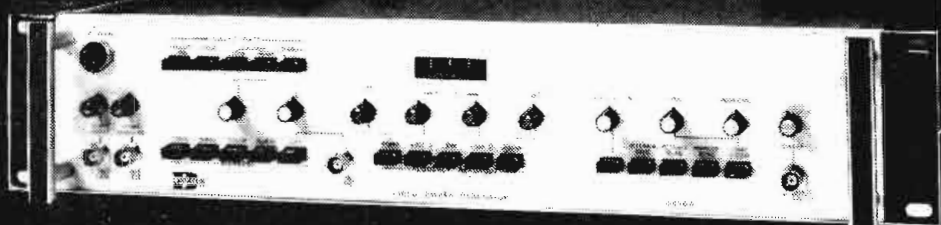
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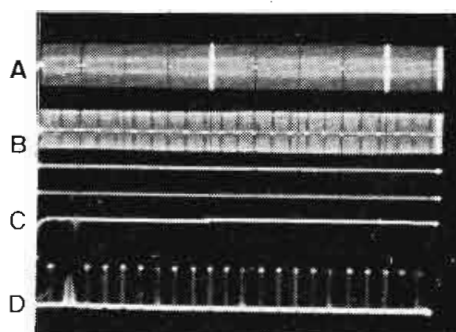
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Continued from page 67

strung out along the tree-lined suburb of Montreal. If a microwave link faded out because of the Auto-camera position, the frame store held the last full image transmitted until a new one came along.

At the finish line, the boom mounted camera could get a good view of the racers coming up to the red and white sign stretched across the road and also follow the cyclists through the lap marker and on around another circuit. At the end of the race, as Bernt Johansson gave the overhead hand clasp of victory, posed for the press and eventually got his gold medal for his sterling performance on wheels, a back pack portable camera followed him around, adding the finishing touches to a superbly managed and expertly executed television operation that brought unqualified praise from officials and cycling fans all over.

The Marathon

Nature was not about to help Frank Shorter win a second gold medal in the event he so surprisingly ran away with at the Munich Games in '72. By his own admission, he knots up in wet weather and it rained for most of the 42 km that this endurance test lasted.

ORTO assigned three production units to cover the Marathon which begins and ends in the main Olympic stadium. The two Electro-cams with their hovering twin helicopters followed the runners along the course, picking them up a short distance after they left the stadium, and staying with them until a drenched two hours later they pulled up just outside of the stadium entrance and continued to televise the now staggered contestants as they ran wearily by to the cheers of the onlookers.

Again, as with cycling, the mobile cameras on their battery driven carts brought back incredible close-ups of the athletes' struggles against the ravages of inclement weather and time. With the drivers, operators and color cameras swathed in plastic protectors, they made the full circuit while meeting the official requirements of generating no noise or noxious fumes. Their only output was the most intensive

coverage of this type of race with an esthetic quality unsurpassed at previous Olympiads. Frank Shorter came in second.

Closing Ceremony

ORTO production teams moved into the closing ceremony with a smoothness gained from two weeks of Olympic coverage. The equestrian finals in the main stadium preceding the evening spectacular were covered by the variety of cameras that had been used for the opening and the track and field events. The crane camera was hoisted up again for the overall bird's eye view high above the stadium and the back pack cameras were at the ready.

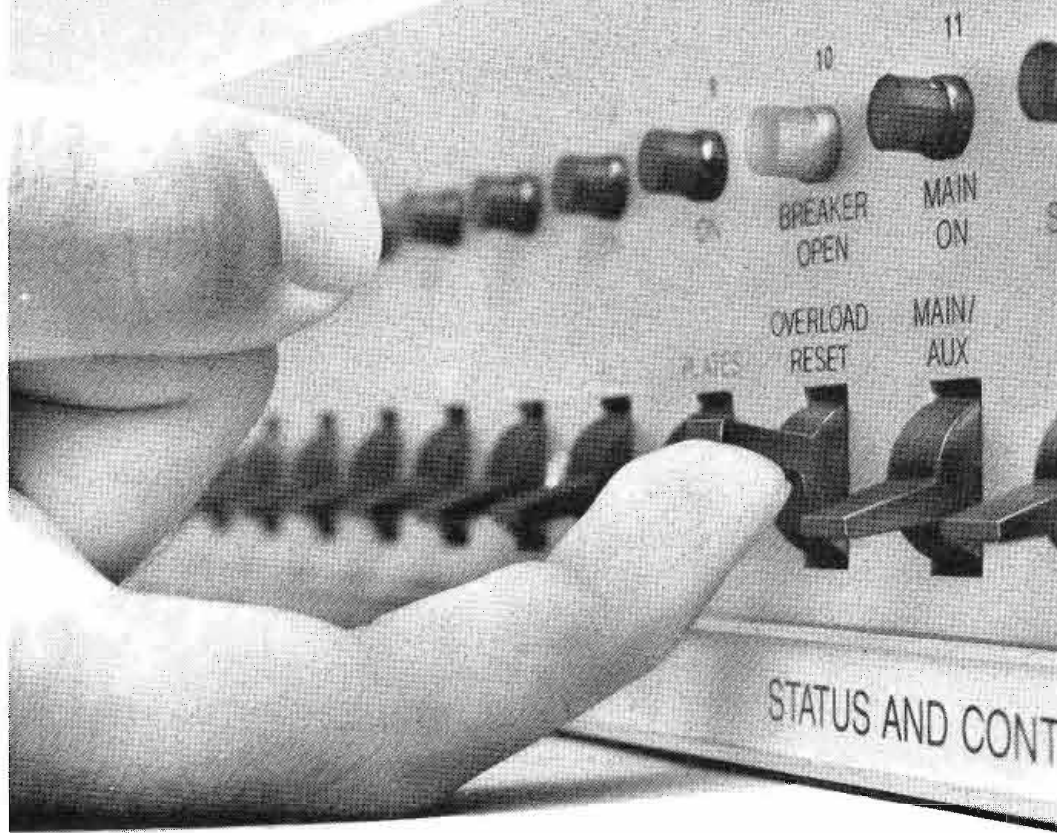
Canada chose to use an American Indian theme for the closing which included 300 Indians from seven tribes, including Cree and Mohawks. With their colorful costumes and head feathers they gave the color cameras a real workout and provided viewers with a superb panorama as they marched around and set up their multi-hued tents in the human Olympic rings formed by 500 young girls from Montreal schools.

The back pack cameras (KCNs) and the large rubber wheeled dolly cameras (KCRs) ranged around near the edge of the action providing the closeups of the Indian march, the flag and flame extinguishing ceremony and the joyous, spontaneous celebration at the end of the ceremony when it seemed almost everyone converged on the playing field. Careful camera positioning permitted good coverage of the nostalgic and moving trumpet soloist as the flag came down and the flame went out. The huge scoreboard also carried the close-up shots of the highlights for all of the stadium spectators to enable them to better see these events.

The final video "piece de resistance" for this memorable evening was a direct line linkup with Moscow which appeared on the video scoreboard. Images from the Soviet Union that included scenes of Red Square, the Bolshoi Ballet, folk dancers and an Olympic Flame with the U.S.S.R. logo for Olympiada '80 appeared on the huge

Continued on page 70

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The X-14 is just one of the many new ways TFT is applying digital techniques to simplify and improve broadcasting remote control. For a demonstration, call or write. In Canada: Orange County Associates, Winnipeg, Manitoba.

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Olympics

Continued from page 69

screen as the local spectators waved little luminescent candles as they said "adieu" to the XXIst Olympiad and were greeted from the site of the XXIIInd. The signals relayed from Moscow, in SECAM, transcoded and sent via the Atlantic satellite and Teleglobe to Montreal came through on schedule, adding a new dimension to the use of television for an Olympiad.

The Equipment

This huge television undertaking involved the assembly of existing equipment and the acquisition of new and special gear for the unique operational requirements imposed.

The standard pieces of gear were all over the place. Ampex AVR-2s in ORTO's main recording center, AVR-1s at the International Broadcast Center serving ABC, NZBC, Australian Broadcasting and CTV. RCA TR-600s were installed for the EBU editing complex using special time code readers made by a Canadian firm, Electro and Optical Systems. There was no shortage of Sony U-Matic machines for archival recording, backup and ENG-type coverage.

A newcomer to Olympic competition in the VTR field was the Fernseh BCN series, three of which were brought to Montreal for the combined German ARD and ZDF operation. The portable BCN-20 was used as an acquisition VTR on remote sites and 2 BCN-50 studio machines installed at the ORTO/EBU headquarters did editing and unilateral satellite feeds to West Germany every night.

In the camera area the largest single block were Bosch Fernseh studio and portables (KCU, KCR and KCN) which were in evidence at most of the major venues. RCA cameras from TK-45s on back to some older models still in service were used at the swimming and diving pool, the Olympic Stadium and other sites. Marconi Mark VIII cameras covered the studios at the Maison Radio Canada and provided the panoramic shot from the roof of the building that was frequently used as a chroma keyed backdrop for commentators.

There were Philips cameras at the Olympic Basin and EMI cameras at the University of Montreal stadium where fencing took place. All of the cameras on the mobile carts and the helicopters were modified by Editel for this application. Radio Quebec had a few Ampex BCC-2 cameras at Molson's stadium and several RCA TK-76 portables were used by the CBC and the German ARD network.

There were 27 HS-100 slow motion discs in use during the Games. This showed the importance this device has gained in sports coverage and it was used with good effect for explaining the fine points of diving or gymnastics. A new entity in the disc field was the frame store unit made by Arvin/Echo Science which got its first Olympic trial at three of the networks covering the Games. This device provided instant access on a Discassette floppy magnetic disc to 400 pre-recorded scenes or

graphics.

To achieve maximum color accuracy, ORTO installed an extensive color phasing system made by another Canadian company, Leitch Video Ltd., which used Rubidium atomic clocks in master control as references and then fed out correction signals to the remote venues via telephone lines. This system really paid off in matched colors from all the myriad of picture sources.

The newest frame store synchronizing technology was also applied via Quantel and CVS units which allowed wild video feeds from the mobile units like the Autocameras and the helicopters to be locked in perfectly with the local signals.

In the switching area, much of the pictorial material seen by the end viewer was beautifully enhanced by the use of the soft wipe especially when crowd shots were used to surround the winning athlete softly circled in the center of the screen. Quad splits with colorized dividers were also used to good effect and both the Central Dynamics and the Grass Valley Group switchers turned in excellent performances for the TV directors manipulating them.

Monitoring equipment for both pictures and signals was mostly Conrac for the images and Tektronix for the waveforms. Some of the newer CBC mobile vans had Barco monitors for camera matching for preview and line functions. The master

Continued on page 73

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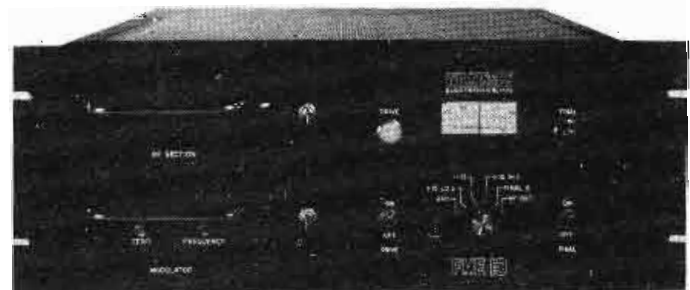


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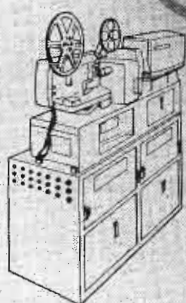
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NEW PRODUCTS

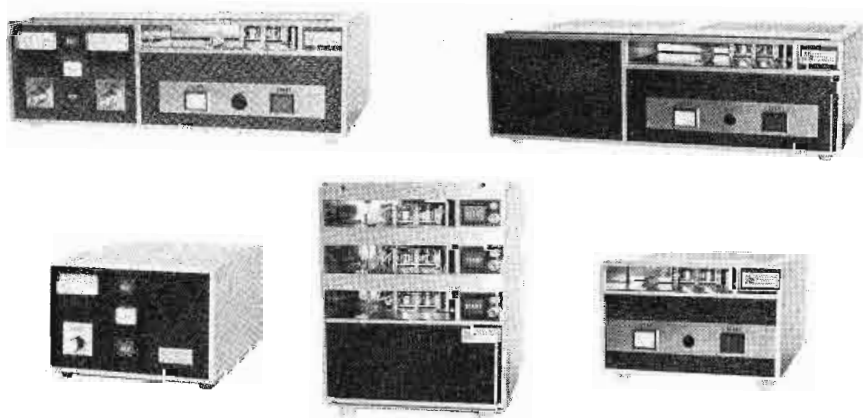
Stereo Compressor/Limiter

Orban Parasound announces the October availability of the new Model 418A Stereo Limiter/Compressor. The 418A features program-controlled attack and release times, which enable the device to work quite subtly with all types of program material without the necessity for critical manual adjustment.

The 418A is a complete limiting system consisting of a pair of stereo-ganged broadband compressor/limiters with smooth and subtle characteristics, followed by a high frequency limiter with four different time constants, user-selectable by means of a front panel switch. This variable time constant feature permits the characteristics of the high-frequency limiter to be tailored to the recording medium following the

Continued on page 74

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BROADCAST ENGINEERING

OCTOBER, 1976

CABLE engineering



Cable Is Committed To EEO

The chairman of the board of the National Cable Television Association and the president of the industry's major trade association has reaffirmed cable television's industry-wide commitment to equal employment opportunity.

NCTA National Chairman Burt I. Harris, and President Robert L. Schmidt appeared before House Communications Subcommittee hearings on EEO, cross-ownership and minority ownership in the CATV industry.

Acknowledging shortcomings in the industry's EEO performance, Harris vowed to pursue an aggressive campaign to educate cable operators on what EEO means and to reinforce the industry-wide commitment to improving cable's EEO record.

The cable industry has more than a legal obligation to comply with FCC EEO rules, Harris said. "It has a moral duty as well to seek out, encourage, train, and reward all Americans who are willing and able to contribute their skills, talents and energies to the development of our industry."

NCTA President Schmidt told the Subcommittee that in the midst of its own struggle against inequity, the cable industry has not fulfilled its obligations to provide equal employment and ownership opportunities for minorities and women.

A Plus For Cable

But, Schmidt added, he was committed to providing whatever assistance possible to encourage minority and female participation

in the CATV industry.

Schmidt pledged that cable would work to bring more minorities and women into the industry, provide support and training needed for participation in all levels of CATV system operation, develop and implement industry-wide affirmative action programs, continue to encourage minority and female participation in system ownership and continue to seek alternative methods of financing, including government sponsored programs.

Schmidt urged Congress to support these efforts to create what he called a strong and viable industry. "Give us the chance to provide the services and opportunities within our potential. I assure you we can and will accomplish meaningful results."

Owensboro Scores Another First

Owensboro Cablevision, which constructed the first earth receive station in the Midwest, has another "first" to its credit. The company has become the first cablevision system in the United States to receive and broadcast dual, simultaneous programs from its Earth Station.

The historic "first" officially came Friday, August 7, 1976, when the Christian Broadcast Network's Telethon began to be received at the Owensboro Cablevision Earth Station, and broadcast live on Cable Channel 2, the local origination station. Cable Channel 2 originates live local news at 6:00

p.m. daily and broadcasts live the weekly City Hall meeting each Friday morning. A host of other programs appear regularly on the local origination channel.

At the same time Owensboro Cablevision was receiving and transmitting the Christian Broadcast Network, the company was also engaged in receiving and transmitting programming from Home Box Office on Cable Channel 3.

Both simultaneous broadcasts were coming from the RCA satellite "Satcom #2", and were possible because of dual receiving capabilities of the Owensboro Cablevision Earth Station.

The Christian Broadcast Network programs were directed to all religious faiths and appeared on Cable Channel 2 Friday, August 6 from 9:00 a.m. to 2:00 p.m. during the CBN Telethon. In addition, CBN programs were seen Friday from 10:00 p.m. to 4:00 a.m., again Saturday at the same time and Sunday from 3:00 p.m. to 4:00 a.m. Monday.

Owensboro Cablevision is a subsidiary of Owensboro On The Air, Inc., which also operates radio stations WVJS (AM) and WSTO (FM) stereo in Owensboro.



Cable Asks For FCC Pole Regulation

The cable television industry has urged Congress to immediately require the FCC to regulate the terms and conditions of pole attachments used by CATV.

Amos B. Hostetter, Jr., Executive Vice President of Continental Cablevision, Inc., a Boston based CATV company, and Chairman of the Utilities Relations Committee of the National Cable Television Association, told the House Subcommittee on Communications that cable's ability to provide television programming and broadband communications service to the public was "gravely threatened by an unintended and presently unregulated monopoly...a monopoly involving the ownership and control of utility poles and underground conduits."

The cable industry presently faces what Hostetter called "backbreaking rate increases which we know to be unjustified."

Hostetter said the industry's request was fully consistent with the recommendations of the House Communications Subcommittee staff report, the report of the FCC's Federal/State Advisory Committee, the cable TV legislation drafted by the President's Office of Telecommunications Policy and, based on the concurring statement of Commissioner James H. Quello to the FCC July 1, 1976 decision, the Federal Communications Commission itself.

"The need for regulation is illustrated most graphically by the fact that in a very few instances when rate making agencies have reviewed the pole cost data of a utility, they have found that the particular pole attachment rate being sought was completely unjustified," Hostetter said.

"The need for comprehensive regulation over CATV pole and conduit use is clear and is no longer open to debate," he continued.

Hostetter noted that CATV facilities are attached to 10,000,000 poles, slightly over 3,000,000 of which are directly controlled by the Bell System companies. The communications space on approximately 70 percent of all the poles to which cable television attaches is controlled by independent telephone companies and power companies.

"To date, virtually none of these companies has acknowledged a willingness to follow the FCC formula for determining pole attachment rates and the vast majority of them have been unwilling even to justify their demand for rate increases with cost-related data," Hostetter told the Subcommittee.

Also testifying was David D. Kinley, Vice President for Planning Development for American Television and Communications Corp., one of the nation's largest multisystem cable operators. From 1973 to 1976, Kinley was Deputy Chief and Chief of the FCC's Cable Television Bureau.

Kinley said the attitude of many telephone

companies was that "their pole is like a piece of real estate for which they can charge whatever the traffic will bear in any given area."

The FCC jawboning policy, Kinley added, has been a complete failure and that there is now "no incentive whatever for the power companies who own more than half of the poles to which ATC attaches to agree to the FCC formula or to refrain from demanding whatever they want from the cable companies in the way of payments and conditions on pole attachment rights."

Kinley said that since the FCC policy has failed and since the Commission had refused to take further action, Congressional intervention was clearly needed.

Hook Moves Up To Education Commissioner

Commissioner Benjamin L. Hooks has been appointed Education Commissioner of the Federal Communications Commission, Chairman Richard E. Wiley has announced.

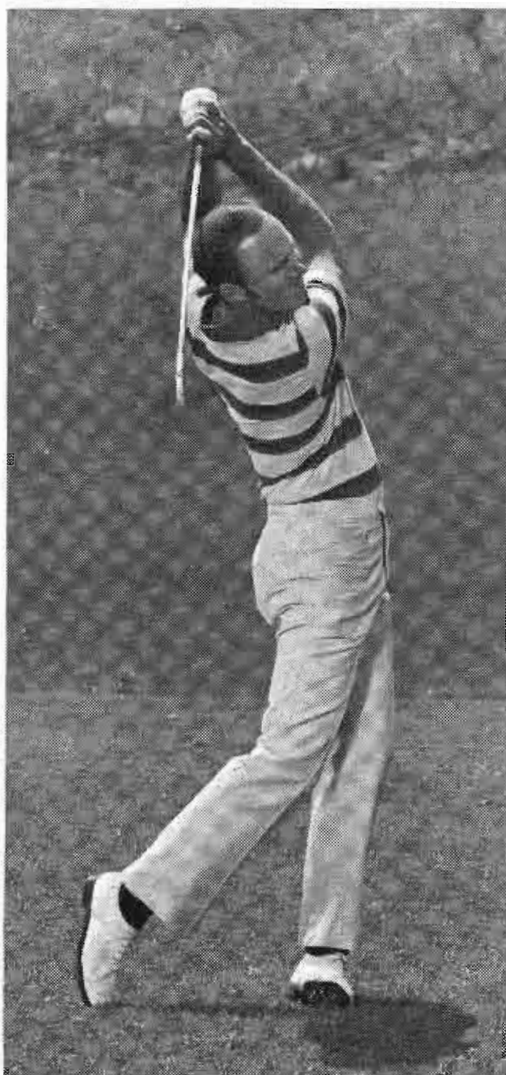
Commissioner Hooks succeeds former Commissioner Glen O. Robinson in this post.

"In this new position, I want to help stimulate the growth of public television so it can reach its exciting potential," Commissioner Hooks said, adding:

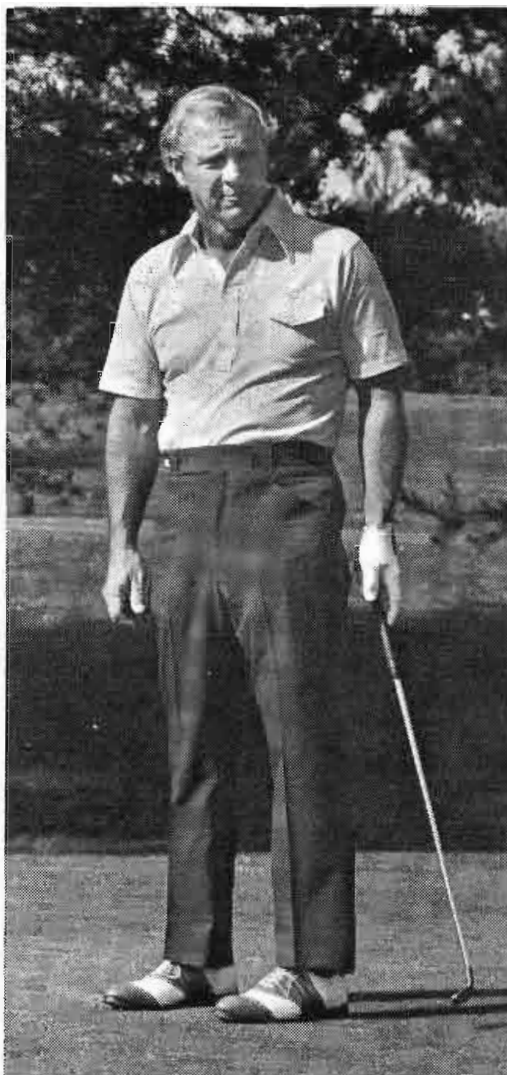
"I hope to meet with leaders of the Corporation for Public Broadcasting, the Public Broadcasting Service and the National Association of Educational Broadcasters and various other people. The objective will be to enhance and expand these services to all segments of the community."

Commissioner Hooks also is the FCC's Equal Employment Commissioner and Backlogs Commissioner, and is a member of the Telephone Committee.

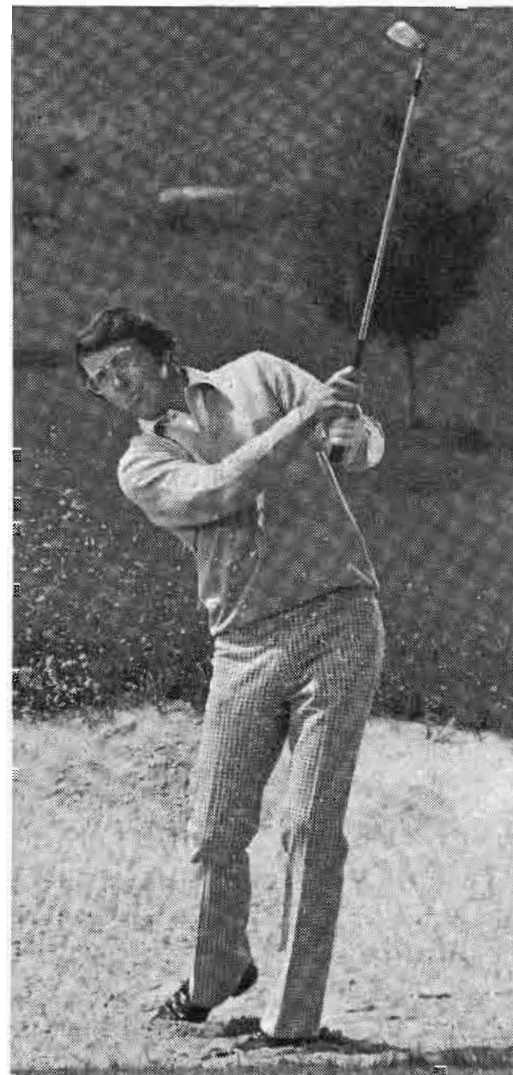
***For The Latest
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Page 4-6***



Lou Graham

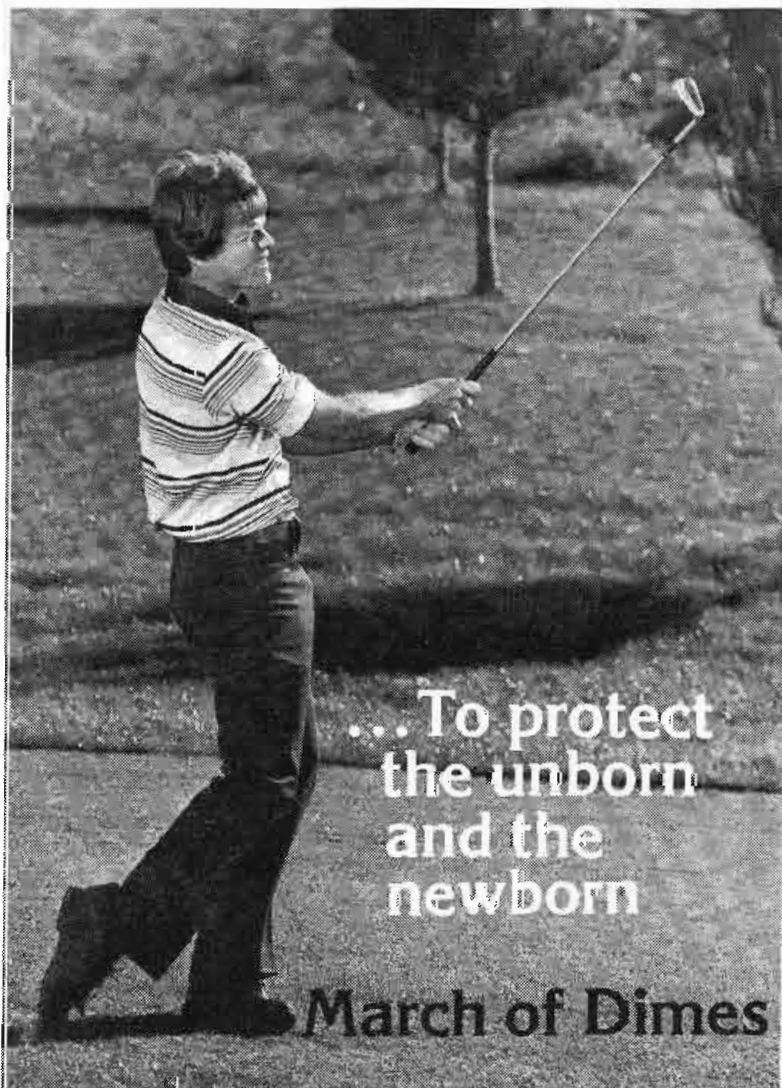


Arnold Palmer says:



Hale Irwin

It's a tough course...



Tom Watson



Tom Weiskopf

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control room at ORTO headquarters was impressive with its 26 simultaneous venue monitoring bays arranged around a central control console.

Particular attention was also paid to sound at most of the venues with the use of special parabolic mikes often hand held or aimed on tripods to pick up the "international" sound at the sporting events.

ACKNOWLEDGEMENTS

The assembly of this report on the Montreal Olympics involved too many ORTO and supplier personnel to name them all; however, a few should be mentioned for their generous help during what was a very busy period.

Marius Morais and his engineering staff consisting of Larry Bailey, Jean Choquette, Peter Ford, Noel Lecluyse and Duncan Nicholson, as well as Phillipe Paquet and his group consisting of Roger Nissenbaum, Michel Petrovich and Claire Robinson, all of ORTO.

Maurice Evans, of Electro and Optical Systems, R. A. Lehtonen of Leitch Video Ltd., Jean-Louis Major of Ampex, Dr. Marey of Fernseh, George Sekula of RCA and Lee Stratton of Arvin/Echo Science.

On the operations side: Claude Baikie, Gordon Craig and Bill Sheehan of CBC; Noel Ashley of NZBC, Henrikas Jushkevitchus of Soviet Television, Phil Levens of ABC, Ron May of Australian Broadcasting and Victor Rojas of Televisa. □

PEOPLE IN THE NEWS

Georg Neumann, a pioneer in the field of audio recording and the inventor of the gastight nickel cadmium battery, died at his home in West Berlin on August 30. Neuman developed the first of a long line of disk mastering lathes as well as one of the first electro-mechanical disk cutting heads and in 1957 his company introduced the world's first stereophonic disk recording system. Neumann was awarded the Audio Engineering Society's Gold Metal, its highest honor, this past Spring.

Guy M. Lewis is the new Manager of Northern Broadcast Sales for RCA Broadcast Systems....**Lewis** is succeeding **James A. Gimbel** who has been named Sales Manager for Europe, Africa, and the Middle East.

Philip Schneider, President of RCA Americom, reports the appointment of **Paul W. Gaillard** as Director of Marketing....**Joachim P. Diermann** is now filling the position of Chief Engineer of the Ampex Corporation Audio-Video Systems Division.

Sid McCollum's new position as CMX Sales Manager has been announced by **W. H. Orr**, President of Orrox, the parent corporation....**Arthur A. Silver** as the new Vice President Sales/Marketing for Ampro Corporation will be responsible for the day to day operation of the entire Broadcast Division.

David J. Edmonds is the Director of Eastern Hemisphere Operations at International Video Corporation's new European corporate headquarters branch in Reading, England.



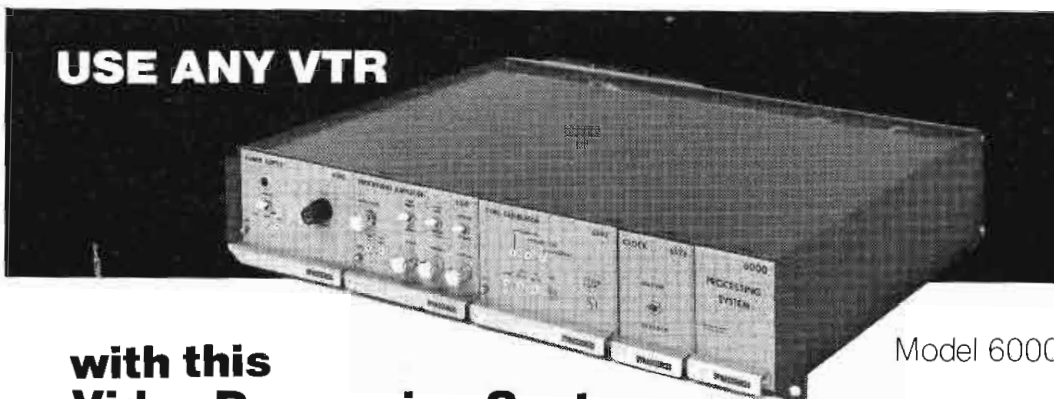
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New Products

Continued from page 72

limiter, such as disc, cassette, or 7.5 ips tape.

The 418A is a modification of the Orban Broadcast Optimod-FM Limiter.

Because of the operating simplicity of the 418A, it is particularly well suited as a "mixdown machine", to be used in situations where time is a problem. Most decisions are made for the operator on the basis of an automatic analysis of the input program, therefore the 418A can be used effectively for rough mixes, broadcast production, commercials, and the like.

For More Details Circle (70) on Reply Card

Automatic Frequency Counters

Two fully-automatic frequency counters covering 80MHz and 520 MHz have been introduced by Philips Test & Measuring Instruments, Inc., a division of North American Philips Corporation. Both the 80MHz, PM6661, and the 520-MHz, PM6664, have only one control, the on-off switch.

Triggering, noise suppression, 80-MHz/520MHz range selection on the PM6664, and leading zero blanking are all automatic. Input sensitivity is 20mV_{rms} up to the maximum frequency.

An eight-digit LED display with MHz/KHz/Hz-grouped readout gives clear measurement readings with no overflow. The counters are contained in a rugged metal case and are extremely compact and lightweight—measuring 45 x 145 x 240mm (1.7" H x 5.6" W x 9.3" D) and weighing only 1.5 kg (3.3 lbs.). A 110 or 220 VAC (15%) line supply is required, at 45 to 440 Hz.

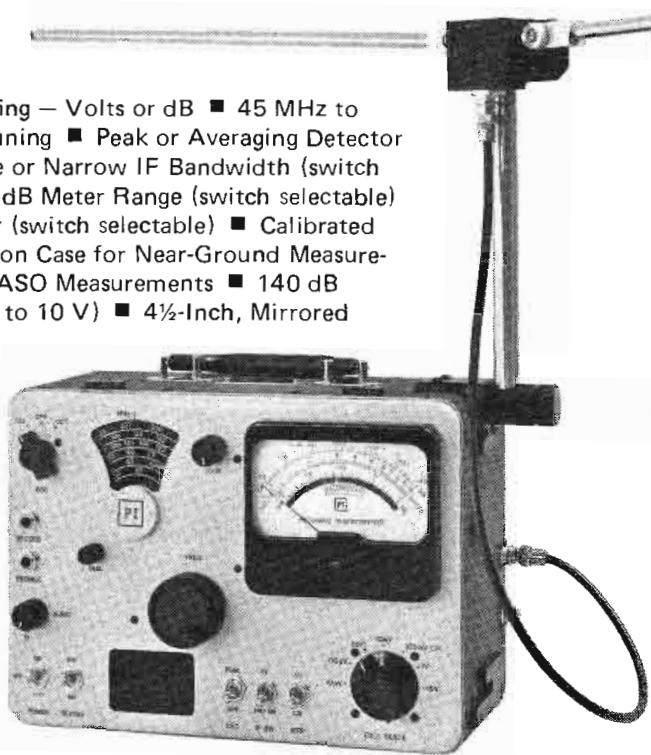
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VHF-FM Mobile Radios

Harris Corporation's RF Communications Division has introduced two new VHF-FM mobile radios as part of its "value improved" series of two-way radio products for professional communicators.

NEW FM AND TV FIELD STRENGTH METER FIM-71

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- Recorder Output
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Analog Waveform Recorder

American Electronic Laboratories, Inc. (AEL), manufacturer of the PTR-9000 series of pulse and transient recorders, introduces Option 1, a memory add-on. Option 1 is designed to expand the record length of PTR systems from 2K to 8K samples without the use of a shift register.

The unit is a memory replacement card set which does not require system modification when installed. It can be purchased with the PTR system, initially, or later when the expanded capability is required.

PTR system flexibility is maintained without loss of the system's random access, pretrigger and delayed trigger capabilities. The memory expansion allows a total record time of up to 82 μ s, yet preserves the 10 ns sample interval. For alternate mode recording at a sample rate of 100 ns (200 ns/channel) each channel may be recorded for up to 819 μ s.

For More Details Circle (73) on Reply Card

Continued on page 76

The Harris RF-1525 is a 25-watt transceiver that operates in the 132 to 174 MHz range, while the RF-1550 is a 70 or 100-watt radio operating in frequencies from 148 to 174 MHz.

Both offer mobile/base station interchangeability, 12-channel capacity, positive or negative ground operation and 1.5 MHz frequency spread. The 25-watt unit is FCC Type Approved and Canadian DOC and British Post Office Approved.

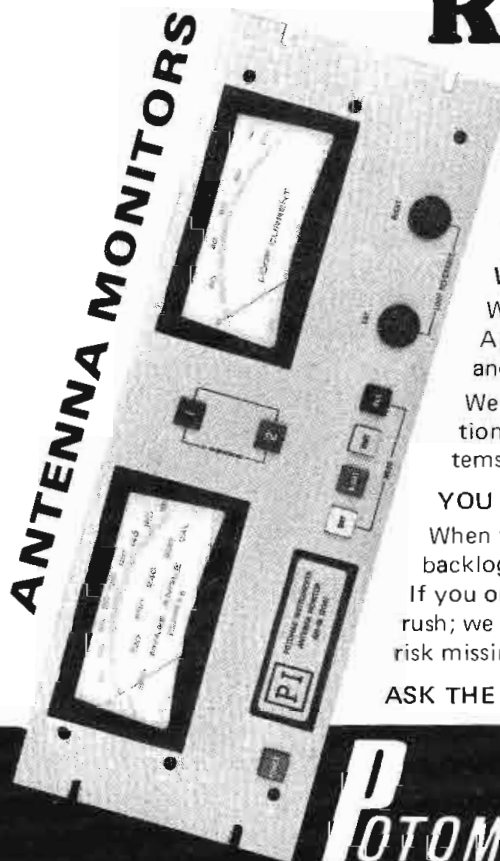
Harris "Value improved" series mobile radios may be interchanged with Harris base stations of the same power in emergencies.

The positive or negative ground feature makes it possible to switch polarity by changing a single wire.

Harris mobile radios may be mounted under the dash, overhead, on a side wall, under or behind a seat. In addition, the dash-mounting RF-1525 may be mated with the RF-4805 "Porta Pac II" portable power system, thereby providing a 25-watt "portable radio".

For More Details Circle (72) on Reply Card

Just A Friendly Reminder



In case it happened to slip your mind and you are one of the few remaining directional stations yet to comply with paragraph 73.69 of the FCC Rules... you have until June 1, 1977 to have in operation a "Type Approved" antenna monitor.

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TEA

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New Products

Continued from page 75

Color Bar/Sync Generator

Dynasciences, a subsidiary of Whittaker Corporation, is introducing their Model 360 Color Bar and Sync Generator. The new low-cost unit produces a full-field NTSC color bar pattern and a full set of synchronizing signals. Other features include a black burst output and a 100 Hz audio test tone. All pulse and subcarrier outputs conform to EIA RS-170. Video outputs are via BNC connectors, audio by standard phone jack.

Sync generator outputs (two of each) are 4 volts p-p negative-going for sync, blanking, and horizontal and vertical drive, with subcarrier outputs of 2 volts p-p at 3.579545 MHz ± 10 Hz.

Color bar output is 1 volt p-p for white bar amplitude of 100 IRE and 75 percent saturated colors.

All video outputs are 75 ohms impedance, source terminated. Audio output is low-impedance, single-ended.

For More Details Circle (74) on Reply Card

Character Generator

KNOX, LTC. has announced a compact production grade version of its popular K128 television titling system. Designated the K128/MOD8, the unit features independent preview and program channels of very high resolution characters.

An expanded internal memory of eight pages may be randomly selected for program airing while any other page is being previewed or edited. Automatic line centering has been added to the MOD8 version to facilitate rapid composition on-the-air.

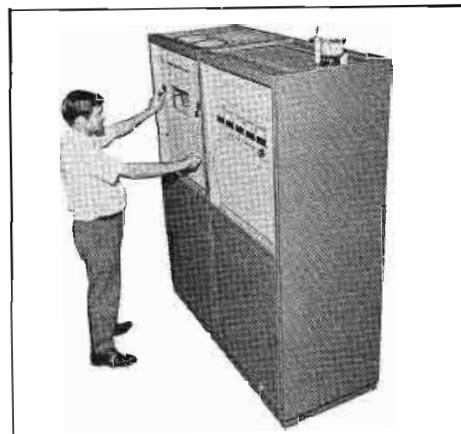
All other features of the K128 system are standard in the MOD8 as well, including full remote capability, audio storage mode and title mode memory expansion allowing 8 lower third titles per page.

Optional extras include the new super size character mode which generates 64 scan line characters for high impact production work. Vertical roll and horizontal crawl are standard features in the MOD8 version.

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Portable SMPTE Time Code Generator

To meet the increasing needs of remote productions on video tape when SMPTE Time Code is essential for post-production editing, CMX has introduced a new portable time code generator.

This unit is unusually compact, measuring only 8" x 1 3/4" x 8 1/2" and very light (2 lbs. with batteries). It will run continuously for 40 hours on a rechargeable battery and can also operate while being charged. A particularly bright liquid crystal display with large (0.8") figures is easy to see, even under sunlight.

The unit features both drop and non dropframe operation, pre-set time front panel controls and data ones, and clocks outputs for a remote display.

Specifications include input requirements of 1 to 5 volts P to P of composite video or sync and an output level adjustable to 4 volts P to P into a 2K load. Lock-up time is 3 frames.

For More Details Circle (76) on Reply Card

Magnetic Recorder/Reproducer System

RCA Film Recording has announced a new magnetic recorder/reproducer system, the PM-86SL, which can interface with both film and tape machines to meet the demanding post-production needs of motion picture and teleproduction operations.

The new units feature a servo-controlled film transport mechanism

designed to apply smooth continuous drive motion to the film, according to Adron M. Miller, Manager of the RCA activity.

The PM-86SL can be equipped for 16mm. or 35mm. sound recording. Interchangeable sprockets and plug-in head assemblies permit changing from one film to the other quickly and easily, Miller said.

The PM-86SL is designed for stand alone operation, and for electrical or electronic interface with other equipment.

A built-in electronic interlock facility permits the PM-86SL to run precisely synchronized with a variety of machines—another sprocketed sound recorder, a projector, a video tape machine, or a capstan-drive sound recorder, Miller said. The unit can be locked to non-sprocketed equipment using SMPTE, EBU and other time code data, with appropriate interface.

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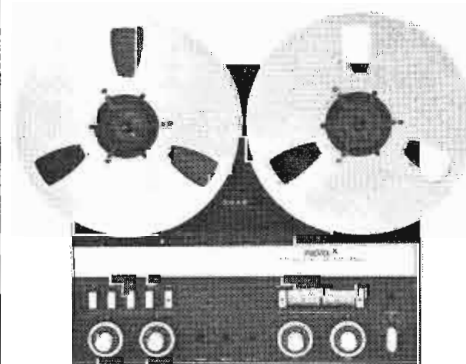
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BROADCAST CRYSTALS for AM, FM or TV transmitters. frequency change, repair or replacement of oven types. Also new vacuum types for RCA, Gates, Collins, etc. transmitters. Quality products, reasonable prices and better delivery! Don't be without a spare crystal. Frequency change and service for AM and FM frequency monitors. Over 30 years in the business. Eidson Electronic Co., Box 96, Temple, Texas, 76501. Phone (817) 773-3901. 12-74-tf

MOTORS FOR SPOTMASTERS

NEW Paps hysteresis synchronous motor HSZ 20.50-4-470D as used in series 400 and 500 machines. Price \$49.00 each prepaid, while they last. 90 day warranty. Terms check with order only, no COD's. Not recommended for Tapecaster series 600 or 700.

TAPECASTER TCM, INC., Box 662
Rockville, Maryland 20851

1-72-tf

MICA AND VACUUM transmitting capacitors. Vacuum relays. Large stock; immediate delivery. Price lists on request. SURCOM ASSOCIATES, 305 Wisconsin Ave., Oceanside, Ca 92054, (714) 722-6162. 3-76-tf

FOR SALE: TR-22 High band color video tape machine, also one CEI-280 plumbicon broadcast camera. Write WXON-TV, P.O. Box 2020, Southfield, Mich. 48075 or call 313-355-2901. 5-76-tf

GOOD COLLINS 21E transmitter. Call 408-475-0172 or write: Grant Wrathall, P.O. Box 483, Aptos, Calif., 95003. 7-76-6t

RAZOR BLADES—Single Edge, Tape Editing, \$24/M, \$15/5C, 25884B Highland, Cleveland, Ohio 44143. 9-76-6t

FOR SALE: 2 Marconi Mark 7 Electronic Color Cameras, includes head, control unit, power supply, module extenders, set of good used tubes, Tektronic 527 Waveform monitors, lens2 - 3M Co. encoders, cable, etc. For complete specifications and details contact: Central Michigan University Purchasing Department, Mt. Pleasant, MI 48859. (517) 774-3118. 9-76-2t

GATES FM250B XMTR, 250 Watts, ON THE AIR, Call eve. (203) 261-2393. 9-76-2t

MICROTIME 640 TBC—Brand new digital \$10,995. Box 921, Beverly Hills, CA 90213. 9-76-2t

TMI MODEL #640 and Model #388 Time Base Corrector, demonstrators, in like-new condition, both reduced in price. Write or call Larry Ehnstrom, H&B Inc., 2629 30th Avenue South, Minneapolis, Minnesota 55406. 9-76-2t

AMPEX 2000B VIDEOTAPE RECORDERS. Two VTR's in exceptional condition. Equipped with Amtec, Colortec, Velocity Comp., Auto Chroma, Head Optimizer, Editor, Auto Comp., Venturi Vacuum, Oversize Reel Mod., Dual Remote Control, 3M Drop-out Compensator, and modifications for CMX and EECO Interface Cards. Manuals, Spare Heads and parts available. Asking \$58,500 each. Contact Rod Hall: (213) 577-5575. 9-76-2t

AMPEX 350 AND 351 AUDIO RECORDERS, Excellent condition. Have fourteen recorders at \$650.00 each. Package price considerations. Contact Rod Hall: (213) 577-5575. 9-76-2t

RCA RECTIFIER STACKS—#426162 for BTF-20E1 FM transmitter power supply. Six available, \$150 each—half price! Contact Don Hain, 8425 Peach St., Erie, Pa. 16509 (814-868-4654). 10-76-2t

DEMO—Console—Mono—Fourteen input channels—two output. Built in clock and automatic timer. Loaded with operator oriented innovations. Dyma, Box 1697, Taos, NM 87671. 10-76-3t

2 RCA TK-43 color studio cameras soon to be removed from service. Complete with pedestals, monitors, etc. 713-488-8009, Box 58366, Houston, 77058. 10-76-1t

380 FOOT, 30 inch tubular heavy duty galvanized tower with guys, photocell, flasher, and lights, 210 feet 1-5/8 inch transmission line. \$8500 disassembled. CBS 444 Stereo Audimas, 411 FM Volumax—\$1200. KZEL, Box 10527, Eugene, Oregon 97401 (503) 747-1221. 10-76-1t

EQUIPMENT FOR SALE (CONT.)

ELEGANT cart storage. Any number. Bargain on 300 capacity rack. Formica finished. Dyma, Box 1697, Taos, NM 87571. 10-76-3t

FOR SALE QUICK—need the space—RCA TT10AH/TT25BHLA VHF transmitter tuned to channel 10 with diplexer dummy load and some spare parts. C.E. 417-862-7474. 10-76-1t

FOR SALE: Used FM Antenna, Collins 37CP-12, 12 Bays 100 KW ERP side mount. Tuned to 104.1 MHz. Two sections of feed line damaged. Price \$3,500.00. KBFM, 311 West University, Edinburg, Texas 78539 or call 512/383-4961. 10-76-1t

TEST EQUIPMENT—Waveforms 452A audio transmission measuring set—\$500.00. Crown IMA intermodulation distortion analyzer—\$575.00. Digilin 340 digital multimeter—\$100.00. Manuals supplied with each instrument. Pacific Recorders and Engineering Corporation, 11100 Roselle Street, San Diego, California 92121 (714) 453-3255. 10-76-1t

FOR SALE: Sparta RS-224 (SonoMag 252RS) Carousel cart machine. Serial #1982, Stereo w/EOM, Sequential/adaptable to random. List over \$1900, asking \$1200—new condition, used about 6 hours and stored. Call Hoff (714) 595-4303. 10-76-1t

EECO Time Code BE-421, 431, 432, 434, 435—Reader Thumbwheel, Cue, Synchronizer. \$4,495.00. Also, Digital Video Labs 6 line, 4 times subcarrier Time Base Corrector. Excellent condition. Best Offer. 512-472-2892. 10-76-1t

MIXING BOARD: 16 in., 4 main out, 2 aux. Patching possible. Nice floor-standing console. Needs 12 faders, we can install for you. Good specs, condition; barely used. Excellent for small studio or TV. Kim Gould, WVBR-FM, 227 Linden, Ithaca, NY 14850. 10-76-1t

CARTRIDGE AUTOMATION EQUIPMENT. Gates multiple cartridge handler. Model 855, stereo. Holds 55 cartridges, plays in sequential order. Excellent condition. Just \$795. FOB WGTR, Natick, Ma. 01760, (617) 655-2500. 10-76-1t

FOR SALE...EMT TURNTABLE. LOW RUMBLE, REMOTE CONTROL INSTANT START, BUILT-IN STROBE, ADJUSTABLE SPEED. COST \$1200, SELL FOR \$700. ALSO, 65 FT. 3" HELIAX, RCA STEREO CONSOLE. ART, (816) 531-2535. 10-76-1t

SITUATION WANTED

HARD WORKING BROADCAST ENGINEER—1st phone, seeks to re-locate in small to medium market—AM-FM-TV or Educational. 4 years experience FM & UHF TV. Specialized skills: rehabilitation & custom design. Ronald Holmes, 1303 Eighth Ave., Longmont, Colorado 80501. 10-76-3t

BROADCAST TECHNICIAN looking for position as assistant chief engineer at any station in the Arizona-Southern California region only. Have four years experience in AM and TV, possess ASET degree and First Phone. For inquiries write: Dept. 363, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 10-7-6-2t

HELP WANTED

CHIEF ENGINEER for University based Public TV-FM-CCTV facility. Responsibilities include design, maintenance and technical supervision of a modern full color facility. Minimum requirements: BSEE or equivalent, FCC first, three years' experience in engineering management capacity and complete knowledge of state-of-the-art broadcast electronics systems. Available: Immediately—Salary: Open. Please send resume with references and salary history to: Broadcast Engineering, Dept. 362, 1014 Wyandotte Street, Kansas City, Mo. 64105. An Equal Opportunity Employer. 9-76-2t

PATENTED MATV. \$200.00 day profit possible. Preliminaries \$3.00. Box 809, Boynton Beach, Fla. 33435. 10-76-6t

HELP WANTED (CONT.)

TELEVISION BROADCAST MAINTENANCE TECHNICIAN WANTED. A person is required to maintain the entire equipment array in a two studio color television operation and to maintain an extensive R.F. (VHF) multichannel distribution system. This person should have a diploma in electronic technology from a recognized institution, several years of recent experience with color television systems and extensive knowledge in digital circuitry. The salary range is \$14,440 to \$19,200 depending on qualifications and experience. If you have this kind of background, please submit your resume to: Personnel Office, Mount Royal College, 4825 Richard Road, S.W., Calgary, Alberta, Canada. T3E 6K6. 10-76-1t

TELEVISION MAINTENANCE. Electronic or Digital Systems Technicians, or T.V. Servicepersons, for Northern New Jersey, New York area, or Orange County, California. Send resume to: V.P.C., P.O. Box 268, New Hyde Park, N.Y. 11040. 10-76-1f

VIDEO ENGINEER—Our Medical Center has a new 1" Color Production Studio and 2 channel closed circuit distribution system. The individual we seek must be experienced in systems maintenance and repair, but will participate in other facets of studio operations as well. The ideal candidate will have a minimum of two (2) years experience. We offer a competitive salary plus an excellent fringe benefit package. For more details and to arrange a personal interview please contact: Employment Office, Mercy Hospital & Medical Center, Stevenson Expressway at King Drive, Chicago, Illinois 60616. (312) 567-2136. 10-76-1t

KXXX AM & FM IN COLBY, KANSAS, IS NEEDING AN EXPERIENCED ENGINEER WITH A FIRST CLASS LICENSE. GOOD STARTING SALARY. THIS PERSON COULD BECOME THE CHIEF ENGINEER IN THE NEAR FUTURE. FOR MORE INFORMATION CALL MR. ED MASON OR MR. HERB DEREMER AT 913-462-3305 OR SEND A RESUME TO KXXX, P.O. BOX 27, COLBY, KANSAS 67701. 10-76-1t

Microwave Sales Engineer

San Francisco Peninsula

FARINON has an opening for a Sales Engineer with experience in the engineering and sales of video microwave systems. This Sales Engineer will operate out of San Carlos, California, should be a self-starter, willing to travel and have a broad knowledge of the broadcast, CATV, ETV, and satellite markets.

We offer room for personal growth in a lively, growing, commercial-products manufacturing company with one of the most consistent success records in the industry. We are large enough to be very effective in our markets and small enough to be flexible, informal, and fun. We have good fringe benefits and stock purchase plan, and everyone shares in company profits.

If you are interested and qualified,
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Farinon Electric

1691 Bayport Ave., San Carlos, CA 94070
(415) 592-4120

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HELP WANTED (CONT.)

WANTED: Christian Broadcast Engineer with maintenance experience on quad VTR and color camera chains. Salary commensurate with experience. Send resume to: Operations, PTL Club, P.O. Box 1819, Matthews, N.C., 28105. 10-76-1t

BROADCAST ELECTRONICS FACULTY POSITION: To teach the final year of a Bachelor of Science program. The subjects to be taught include two-way communications, Radio Transmitters (AM and FM), CATV, and Color Television Transmitters. Bachelor of Science degree required plus significant work experience. Apply to: M. R. Halsey, Ferris State College, Big Rapids, MI 49307. (616) 796-9971—Ext. 208. AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER. 9-76-2t

CONSULTING ENGINEER—Familiar with allocations principles and video tape recording theory and practice. Forward complete resume to: Kessler & Wilhelm, 3700 N.E. 53rd Avenue, Gainesville, Florida 32601. 10-76-1t

TELEVISION SYSTEMS ENGINEER

The Grass Valley Group, Inc. has an immediate opening for a television systems engineer. The individual chosen for this career opportunity will work closely with our Sales Department to provide technical assistance in the generation of sales quotations.

Applicants should have 5 years of broadcasting engineering background.

CIRCUIT DEVELOPMENT ENGINEER

We are seeking a creative, resourceful individual for a challenging career opportunity in circuit development engineering.

Position requires a BSEE degree and 5 years design experience with the latest solid-state circuit techniques and devices.

Desirable qualifications may also include experience in the design of video switching systems, video processing systems and possibly digital video systems. Some experience in television studio operations and techniques is also desirable.

The Grass Valley Group, a leading manufacturer of television line and terminal equipment, is located in the foothills of the Sierra mountains where excellent living and recreational areas are available.

Interested applicants should submit resumes in complete confidence to:

Val R. Marchus
The Grass Valley Group, Inc.
P.O. Box 1114
Grass Valley, California, 95945

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HELP WANTED (CONT.)

TELEVISION TECHNICAL ENGINEER: First class FCC License—minimum 2 year Technical experience in TV including TCR 100 & TR 70B. Salary negotiable. Contact: Personnel Dept., Capitol Broadcasting Co., Box 12000, Raleigh, N.C. 27605. An Equal Opportunity Employer. 10-76-1t

MAINTENANCE ENGINEER with first class license for aggressive TV station in major mid-west market for heavy maintenance on TCR-100 and other major items. Sony experience helpful in large ENG operation. Equal opportunity employer. Salary excellent. Send resume to Dept. 364, Broadcast Engineering, Box 12901, Overland Park, KS 66212. 10-76-1t

VIDEO SWITCHER SALES:

Locate L.A. area, willing to travel West Coast. Like to sell quality products. Video technical background essential. Write:

Nubar Donoyan
3700 N.E. 53rd Avenue
Gainesville, FL 32601 Tel.: 904-378-1581

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Professional Broadcast Switching, Control and Distribution equipment Territorial Sales Managers are immediately needed in the Northeast and Southwest Regions. Mail resume and salary requirements to: H. Bjorklund, American Data - BE, 401 Wynn Drive - Box 5228, Huntsville, Alabama 35805

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High Blood Pressure is the country's leading contributor to stroke, heart disease and kidney failure. Any of which can kill.

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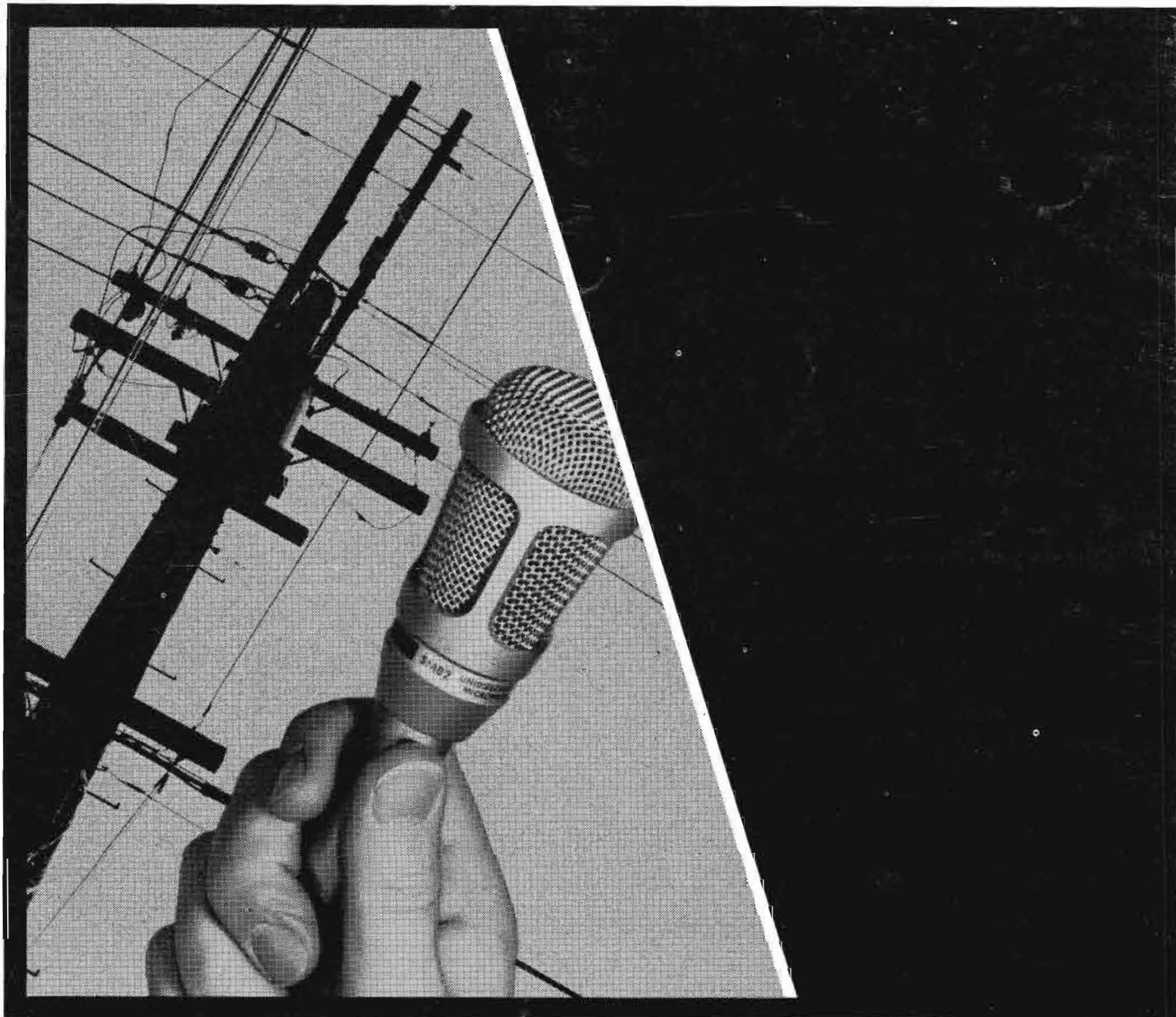
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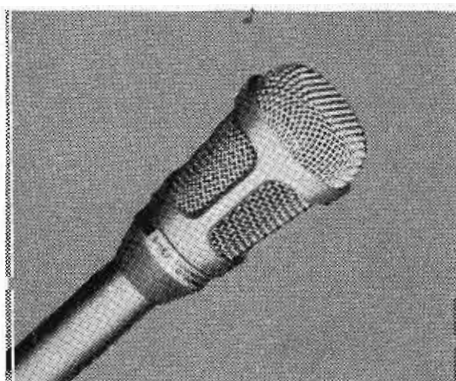
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