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OCTOBER, 1978/$3.00

BROADCAST COMMUNICATIONS®

THE INTERNATIONAL JOURNAL OF BROADCAST TECHNOLOGY

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McCURDY

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So you think you know all the answers?

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Name/Title _____

Company _____ Tel. ( ) _____ ext. _____

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CMX SYSTEMS TEST/Editing Fundamentals

Circle correct answer.

1. CMX systems make
   a. editing systems.
   b. master time code generators.
   c. portable time code generators.
   d. time code reader displays

2. CMX products make
   a. dollars.
   b. sense
   c. happy clients.
   d. happy editors.
   e. happy directors.
   f. happy producers.
   g. happy production managers.
   h. happy program managers.
   i. happy general managers.

3. CMX systems are (fill in the blank) computer assisted editing systems in the world.
   a. the most widely used
   b. used to produce more prime time video tape programming than any other
   c. the most flexible
   d. the most expandable
   e. the most proven
   f. the most powerful
   g. the most efficient
   h. the most cost effective
   i. interfaced with more different VTRs, ATRs, and switchers than any other
   j. the industry standard for

4. CMX equipment is used by
   a. all United States networks.
   b. all major United States post production facilities.

5. CMX equipment is in daily use in
   a. the United States.
   b. Canada.
   c. Australia.
   d. Japan.
   e. Latin America.
   f. Europe and the United Kingdom.

6. CMX systems is
   a. editing.

Any further questions?

Then please complete the following section, tear out and mail your test to CMX Systems for grading at 3303 Scott Boulevard, Santa Clara CA 95050. Or call us (408) 988-2000 and tell us your score.

I would like to
   a. order a CMX System. Please find my check enclosed.
   b. have a CMX salesman call on me.
   c. receive more information.

1) abcd 2) abcdefghi
3) abcdefghij 4) ab
5) abcdef 6) a

cmx systems
ORROX

To the multiple choices of editing systems, the right answer is always CMX.

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THE INTERNATIONAL JOURNAL OF BROADCAST TECHNOLOGY

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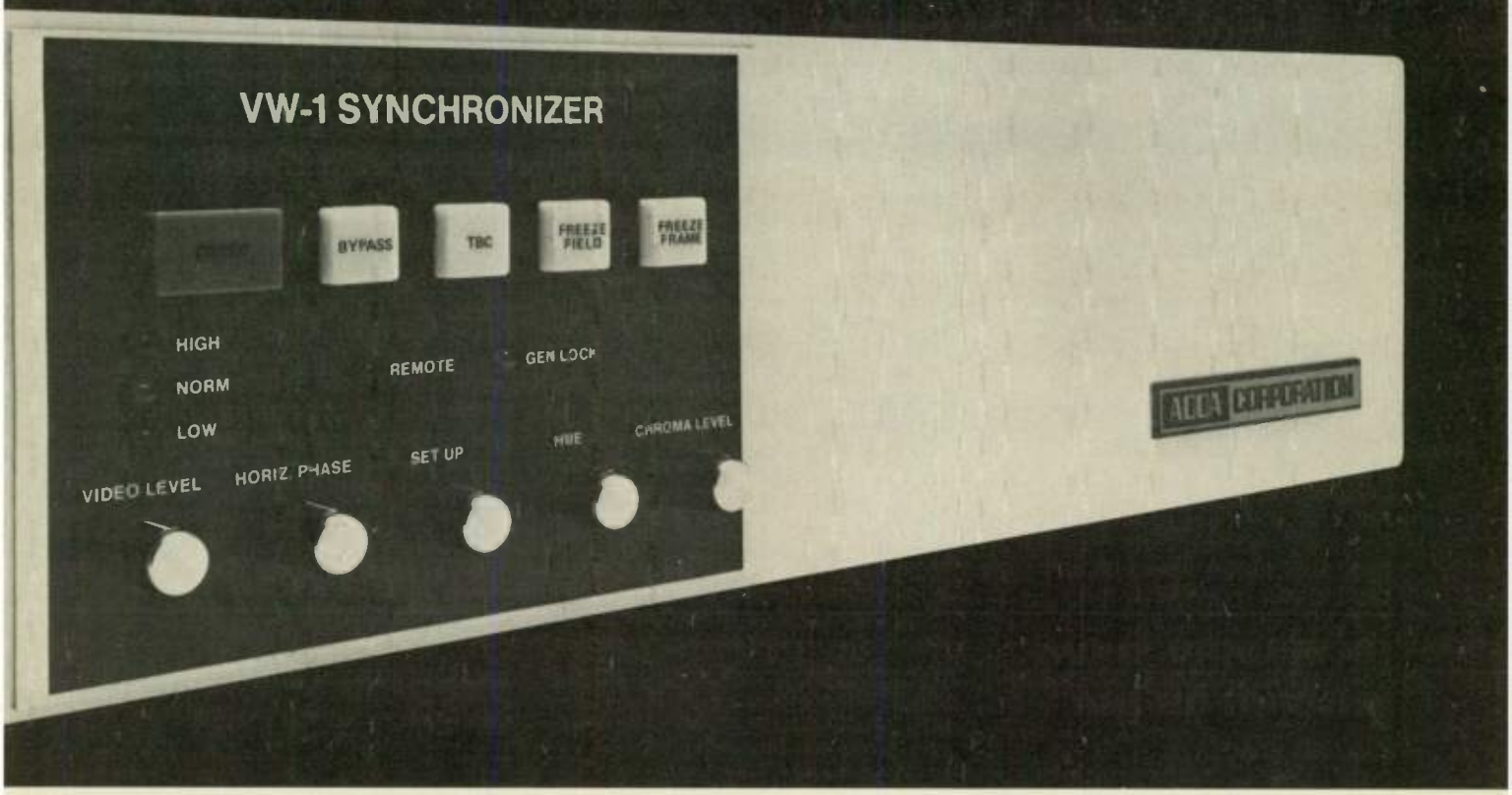

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October 1978 Volume 1/Number 1

BROADCAST COMMUNICATIONS

THE INTERNATIONAL JOURNAL OF BROADCAST TECHNOLOGY


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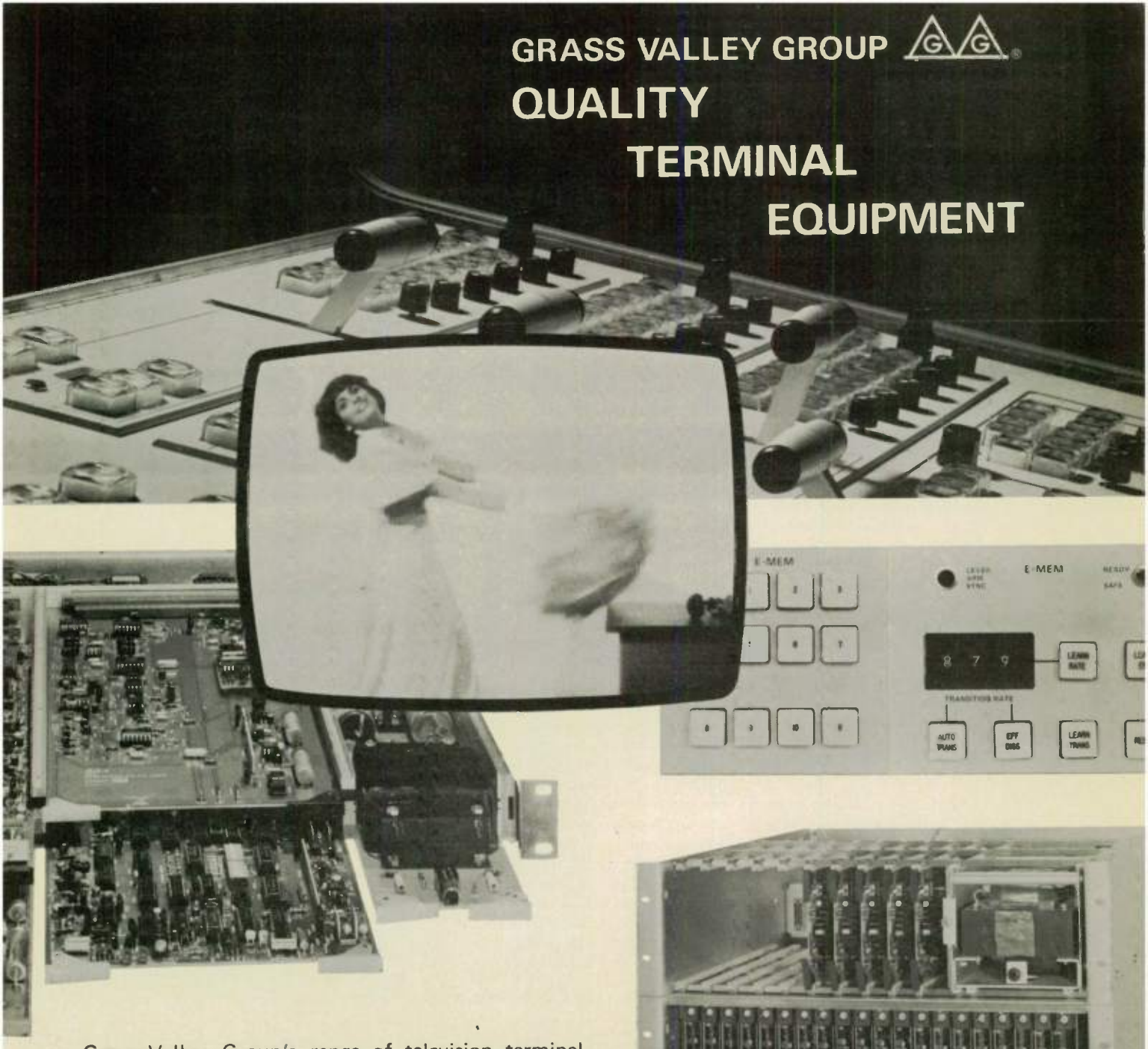
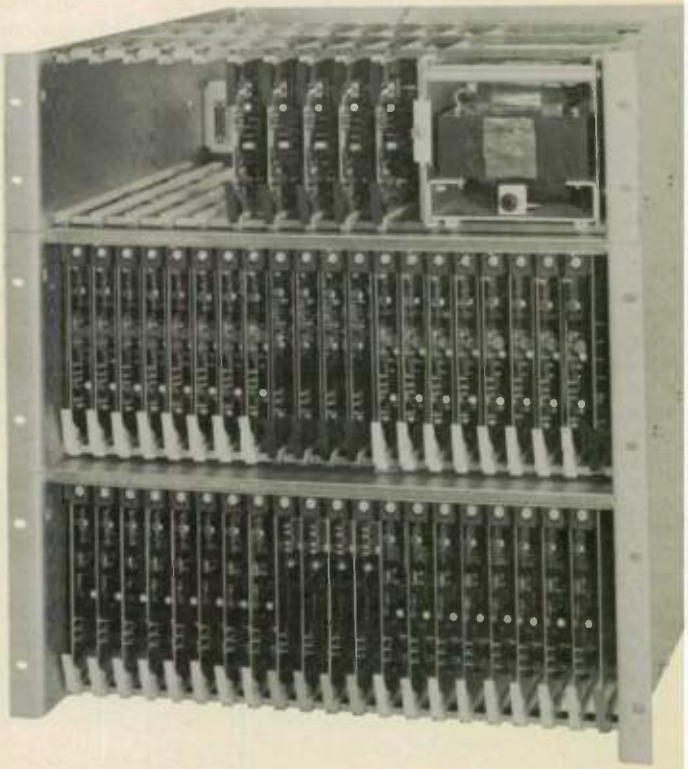
VIDEO around the world

AUDIO around the world

GRASS VALLEY GROUP

QUALITY TERMINAL EQUIPMENT





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UNITED KINGDOM

Turning on the local radio show

Local radio has arrived, and is prospering in the United Kingdom.

Just five years after being introduced, Independent Local Radio (ILR) has 19 stations on the air; and now, the Independent Broadcasting Authority (IBA), which controls ILR, is proposing the expansion of local radio to eventually reach 90% of the United Kingdom.

ILR was established in 1973 by legal statute to provide local radio service under terms of the IBA Act of 1955. Since then, stations have been introduced throughout the UK, from Radio Clyde in Glasgow to Capital Radio in London. ILR stations currently produce 150,000 hours a year of locally originated broadcasts which include music, news, and special community-affairs programming. National and international news is provided by Independent Radio News, a subsidiary of the London Broadcasting Company. Seven stations broadcast 24 hours a day; others broadcast around the clock on special occasions.

ILR has been controversial because of its emphasis on advertising as the primary source of revenue. Most stations are owned by local shareholders who provide the initial capital to put the station on the air. The success of the station is then dependent upon local advertising.

When ILR legislation was first proposed, the Newspaper Society, trade association for provincial papers, lobbied for provisions giving local newspapers preferential rights in the new radio companies. The Society felt that local papers and local radio stations could not coexist in small communities with a limited advertising base. Since 1973, however, the Society has eased its objections, realizing now that local newspapers and radio can survive together.

With this obstacle out of the way, the future looks bright for ILR. According to John Thompson, director of radio for the IBA, more than half of ILR stations have now covered their start-up costs and losses incurred during their first years of operation. And, Thompson predicts that within 18 months the vast majority of ILR stations will become profitable businesses.

Speaking before the Royal Society for the Encouragement of Arts, Manufacture and Commerce, Thompson made the position of IBA clear:

"ILR stations pay for themselves. An extension would help to provide Independent Radio News with a wider base for its service. With the existing local media now in fewer hands, new ILR stations would offer a fresh voice and a fresh outlet for editorial variety in many parts of the UK, both urban and rural. ILR's extension can be authorised under the existing legislation. There would be no extra call made on public funds, either central or local; and we have reason to believe that an expansion of local radio on these terms would have wide support on all sides of Parliament."

The support from communities throughout the UK is already there. The IBA has received inquiries from more than 60 areas requesting permission to form ILR stations.

CANADA

Teletext in Canada

Canada has developed a teletext system called Videotex.

Canada has joined the United States, England and France in the development of two-way, interactive television. Called Videotex, the new Canadian system is scheduled to undergo field trials in 1979.

Users of the Canadian Videotex system will retrieve, by phone or interactive cable, information stored in various computer data bases and have it displayed on modified TV receivers or business video terminals. Users could also transmit graphic, tonal or textual information to each other or to a data bank. Either a pushbutton unit or a keyboard would be connected to the TV for retrieving or inserting information.

The government, concerned about the future growth of Canadian industry, says the Videotex system could greatly enhance Canada's position in the worldwide electronics industry.

In announcing the Videotex development, Minister of Communications Jeanne Sauvé said, "It (Videotex) may be our last opportunity to innovate and refine a Canadian technology that will ensure a strong domestic electronics industry and contribute to the

Continued on page 8

Business Hotline

TIME AND FREQUENCY TECHNOLOGY has moved into new facilities in the Oakmead Village Industrial Park at 3090 Oakmead Village Drive, Santa Clara, California.

ESE, manufacturers of digital clocks and timers, is also planning a move to new quarters later this month. Their new address is 142 Sierra Street, El Segundo, California.

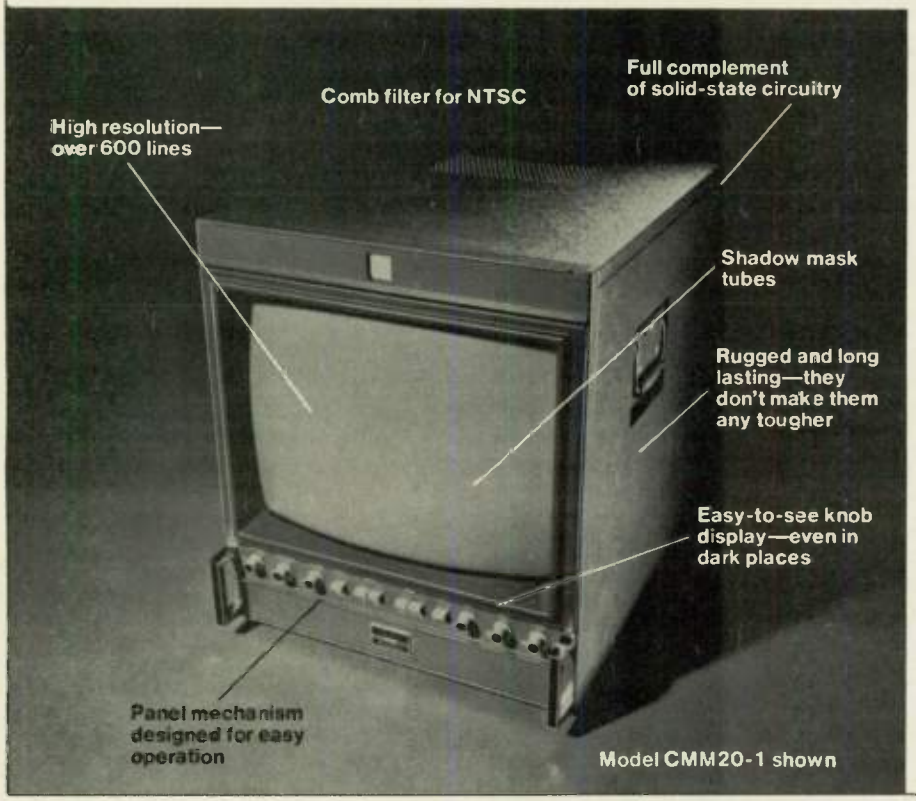
AMPEX has raised prices from 7-8% on most of its professional and industrial magnetic tape products. Unaffected by this general increase are the new magnetic media business products — flexible discs, data and voice cassettes, and magnetic cards — as well as ½-inch Betaformat videocassettes.

PHILIPS BROADCAST recently sold 26 new color TV cameras to the Gaylord Broadcasting Company, including 18 LDK-25 studio cameras, four LDK-15L production and studio cameras, and four LDK-14 ENG/EFP cameras. The cameras will be used at five of Gaylord's seven U.S. television stations; Gaylord also owns five radio stations.

3M COMPANY has given the first operational, hands-on demonstration of the 3M Datavision dual microprocessor character generator. Among the features of the D-8800 are two high-resolution channels which can be mixed and internal storage of up to four type fonts. The demonstration was made at 3M Company's corporate television studio in St. Paul, Minnesota.

MAGNASYNC/MOVIOLA has realigned its film-editing and studio-recording marketing department in order to improve service to its dealers. The company is located in North Hollywood, California.

BUILT TO TAKE IT!



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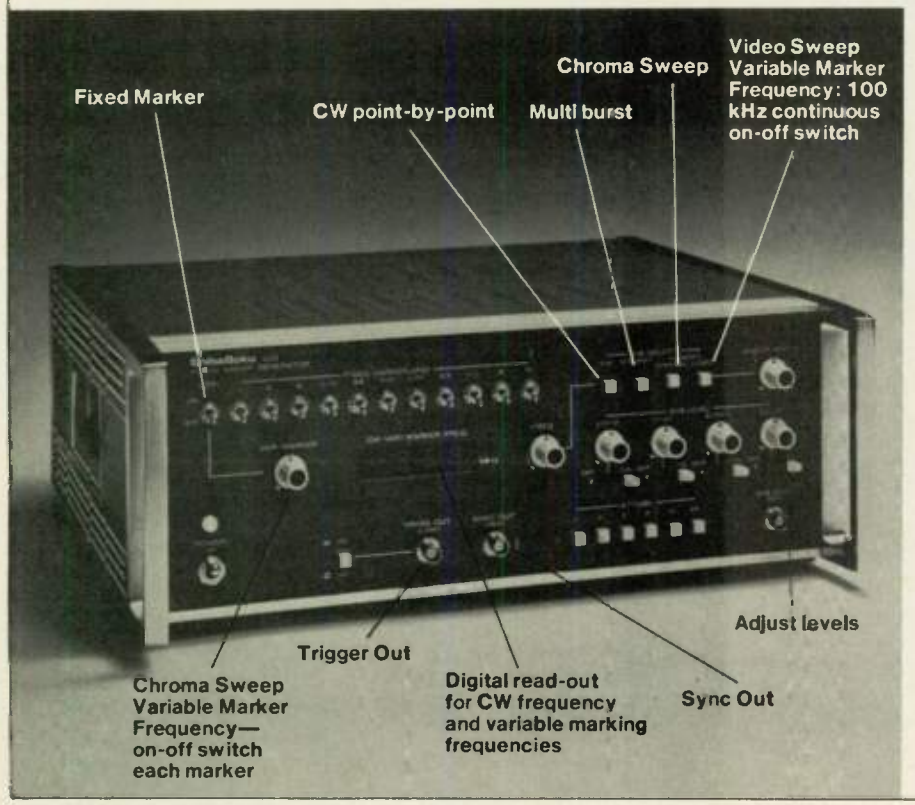
BUILT TO MAKE IT!



AND MAINTAIN IT!! Measures frequency response on TVs, VTRs and other video equipment.

The Asaca Video Sweep Generator 205 contains a built-in standard color sync signal generator. The color burst can be switched on and off so the 205 is ideal for oscillator comparisons to measure frequency response of color equipment.

There is a selection of output signals: video sweep (0.1 - 10 MHz), chroma sweep (sub carrier ±2MHz), CW and multi-burst.

Also, the 205 features facilities for composite sync signal outputs and trigger pulse outputs (H. D/V. D. Selectable) and so it can be used for oscilloscope triggering. Digital read out for CW frequency and variable marking.

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strengthening and enrichment of our cultural sovereignty."

Mme Sauvé said that the Department of Communications is ready to demonstrate the system to any Canadian organisation contemplating interactive television systems.

The Videotex system has already been demonstrated in laboratories at the Communications Research Centre. The electronic package to be used in the field trials is being developed by Norpak Ltd. of Packenham, Ontario, under license to the Department of Communications. A $245,000 contract was recently awarded to Norpak by the Department of Supply and Services to further develop interactive visual communications systems and hardware. Large scale integration (LSI) in microprocessing is expected to bring the cost of the Videotex modules within reach of the mass market in four or five years.

The Videotex user could perform three types of functions: 1) retrieval of information from any data bank linked to the system; 2) insertion of information into data banks; and 3) direct interaction with any other interactive TV terminal.

To retrieve information, the user simply pushes a button to call up any "page" of information held in any data bank. In theory, there's no limit to the amount of information that could be available on the system, including high-quality colour graphics or half-tone pictures. In fact, large numbers of users could access the data banks simultaneously.

Either a normal telephone line, a modified cable TV system, or an optical fibre could be used to transmit the information. Any "page" dialed up would be displayed on the screen within seconds.

Aside from extracting information, the user could become an electronic publisher by feeding information into the data bank for retrieval by others. With the addition of other devices, such as a joystick or a light pen, the user could even create graphics for insertion in a data bank. Once the system is in full operation, such a "publisher" would likely be paid a fee every time his information is retrieved by another user.

Direct interaction between two or more terminals would also be possible. With the same devices used to insert information, a user could type a message or letter, or create a graphic design and send it directly to any other terminal on the system.

Such a system also would allow the receiver to manipulate the information sent. For example, a user could add lines or elements to a graphic design, or answer or edit textual material. The two terminals can be thought of as a single electronic blackboard, upon which each user can see, introduce, change, or erase material.

United States: FCC Report

Sometimes, the more things change, the more they remain the same. A case in point, the FCC has proposed expanding the ascertainment primer for renewal applicants. It would require applicants to contact "all significant elements and institutions in their communities, even if they were not on the primer's community leader checklist."

Rather than specifically add to the 19 categories already listed, the Commission opted for changing the language in the primer to indicate that broadcasters had a responsibility to insure that all "significant elements" or institutions which are readily accessible be ascertained. It also proposed that "other elements" or institutions which "might be significant" in a particular community (but not readily accessible) be ascertained if their existence is brought to the attention of the broadcaster.

In other words, the Primer's 19 categories is still only a starting place. This action was in response to a petition by the National Gay Task Force and 142 gay organisations.

On the public service line, the Commission has begun an inquiry into public service announcements (PSA). In doing so, the Commission has opened the door on the role PSAs could or should play. In fact, they are inviting comments as to whether specific requirements should be imposed. The fact that they are asking for comments on how to give special credit for PSAs run during drive and prime time hours doesn't offset the negative prospects this intrusion could represent.

In other FCC actions, the Commission is considering a proposal that would restrict the amount of time educational stations devote to on-air auctions as well as non-auction fund raising. The proposal also would consider the timing and length of announcements identifying program underwriters.

The FCC's Office of Plans and Policy has released a report by the UHF Task Force entitled "Television Bandwidth Reduction." The report concludes that analogue techniques would be more efficient than digital techniques for bandwidth reduction. The report states that TV bandwidth reduction would save spectrum space, but this would be offset by the millions of TV receivers that would have to be replaced.

A system developed by CBS, called Simultaneous Transmission and Reception of Alternating Pictures (STRAP), would place two TV programs into one 6 MHz channel, reportedly with very little quality reduction. A limited number of copies of the report are available in the FCC Public Information Office, Room 202, 1919 M Street NW, Washington, D.C.

The EEO rules and forms are in for more changes. The Commission has proposed amending its EEO rules to include the handicapped and amending the Annual Employment Report (Form 395) for broadcasters to implement the revised rules.

In BC Docket No. 78-253, the Commission is looking into the role of low power television broadcasting, including TV translators, in the overall national telecommunications system. Comments are due December 11.

ITALY

Call for more regulation

A move is on to regain control of Italy's broadcast industry.

While some countries, like England, are encouraging the growth of privately-owned broadcast stations, Italy now faces the problem of too many stations and not enough regulation.

Italy's Constitutional Court ruled in 1975 that private stations have the right to operate as long as they do not exceed local limits and interfere with "essen-

Continued on page 10

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Then switch to the Video Controller

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WORLD UPDATE

tial" public services. Since that time, the number of radio and television stations has skyrocketed: today there are 2,000 privately-owned radio stations and nearly 450 TV stations. And the situation continues to worsen. For example, Rome is served by some 40 TV stations and more than 70 radio stations.

What has lured so many individuals and groups into the broadcast business is the modest investment needed to put a station on the air. A person can start a radio station with just a $5,000 investment; $50,000 can launch a television station.

Surprisingly, many of these stations have been successful. According to figures published by the Commonwealth Broadcasting Association, private TV stations have acquired 30% of the state system's audience, with private radio taking away 40%.

Despite the purported success of private stations, however, legislators are beginning to consider going back to the pre-1975 setup. A bill now in the Italian Parliament would place all stations under the control of a regulatory agency similar to the FCC in the United States.

The government would also limit the number of TV stations to about 300, with stations lacking proper equipment or enough finances to pay union rates being eliminated. A limit on the number of radio stations has not been determined.

UNITED STATES

Recording with digital audio

3M has leased its new digital system to four recording studios.

Digital audio has left the laboratory and entered the recording studio with the signing of lease-rental agreements between four major studios and the 3M Company.

The studios accepting 3M's new Digital Audio Mastering System are A&M Records, Hollywood, Calif.; Record Plant, Los Angeles, Calif.; Sound 80, Minneapolis, Minn.; and Warner Brothers Records, North Hollywood, Calif.

The multi-channel digital system is the result of almost six years of research and development work by 3M, and a joint two-year research project with the British Broadcasting Corporation. (For additional information on this system see Dennis Ciapura's article on digital audio elsewhere in this issue.)

Continued on page 12

AFA saved them $3,500,000 on 2" VTR's

TV STATIONS

KDAL-TV Duluth, MN
AMPEX VR-2000

WAST-TV Albany, NY
RCA TR-70C

WHP-TV Harrisburg, PA
AMPEX VR-1200

WAEO-TV Rhinelander, WI
RCA TR-70C

WZTV-TV Nashville, TN
AMPEX VR-2000

WVEC-TV Norfolk, VA
AMPEX VR-2000

KEVN-TV Rapid City, SD
(2) AMPEX VR-1200's

WCIX-TV Miami, FL
(2) AMPEX VR-1200's

KQED-TV San Francisco, CA
(2) AMPEX VR-1200's

KCMO-TV Kansas City, MO
AMPEX HS-200

INSTITUTIONS

N.Y. Institute of Technology Video Center NY
AMPEX VR-2000

Kansas City Baptist Temple Kansas City, MO
AMPEX VR-1200

National Aeronautics & Space Administration
AMPEX VR-1200

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(2) AMPEX VR-2000's

National Video Center New York, NY
AMPEX HS 200

Dolphin Production New York, NY
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Media Stream Lake Charles, LA
(2) AMPEX VR-1200's

Upstairs Productions Portland, OR
AMPEX VR-1200

Studio Television Services Los Angeles, CA
AMPEX VR-1200C

Bell & Howell Video Systems Evanston, IL
(2) AMPEX VR-1200's

TV-R, Inc. New York, NY
AMPEX VR-2000

Modern Telecommunications, Inc. New York, N.Y.
AMPEX HS-200

MANUFACTURERS

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Recortec, Inc. Sunnyvale, CA
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Spin Physics, Inc. San Diego, CA
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Computer Magnetics Corp. Sunnyvale, CA
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The first prototype was introduced last November at the Audio Engineering Society convention. Full production will begin in early 1979 at 3M's Camarillo, Calif., plant.

CANADA

Fibre optics on trial

Rural transmission system will examine feasibility of industrial applications of fibre optics.

The Canadian government is supporting the construction of a fibre optics transmission system to improve communications in rural Canada. But that is only the immediate objective.

Looking into the future, the government sees fibre optic technology playing an important role in Canadian industry, as well as Canada's position in the development of fibre optics. And this rural optical link is seen as an excellent way to study the feasibility of this technology in more far-reaching industrial applications.

With 25% of the Canadian population living in rural or non-urban areas, the need for new land-based transmission systems to reach these people is paramount. The planned trial transmission system was proposed by the Manitoba Telephone System, and will center around the town of Elie. The telephone company has agreed to supply housing, hardware, and personnel, with the finances coming from the Department of Communications and the Canadian Telecommunications Carriers Association; each have agreed to contribute $100,000 to carry out the project.

The optical transmission system will carry a number of communications services to rural residents, including single-party-line telephone service, at least five TV channels, FM radio, and two-way computer interactive signals for possible applications in teleshopping or information retrieval.

The immediate benefits will be realized in these rural communities, but the long-term benefits could include reduction in cost and greater efficiency in Canadian industry, and an important role for Canada in the development of fibre optics technology.

Worldwide fibre optic use is expected to increase 33% each year. And it has been predicted that by 1990, the value of fibre optics investments in North America alone will exceed a billion dollars a year.

AUSTRALIA

New round for licensees

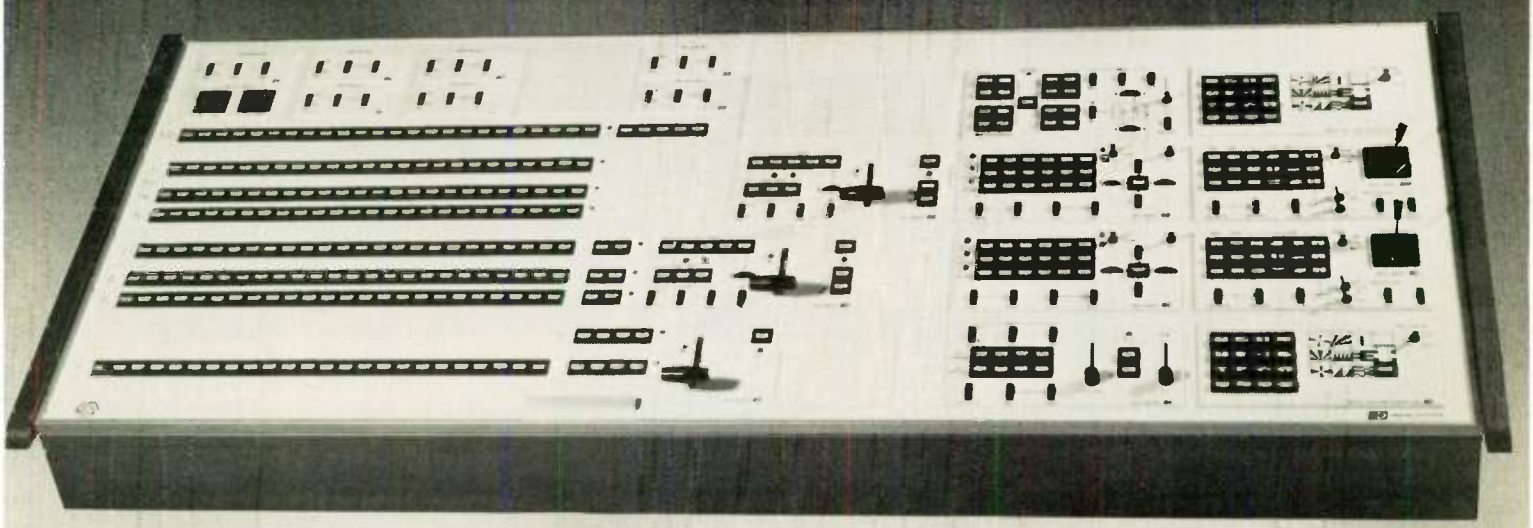
Hearings open this month on radio and TV license renewals.

A first in Australian broadcasting will take place later this month when public hearings for the renewal of commercial radio and television licenses open in Adelaide.

The hearings, first ever held to consider license renewals, will last four years, and cover all radio and television

Continued on page 14

The CD-480 "Smart Switcher" is here.



Why settle for anything less!

If you're interested in an outstanding video production switcher, compare the following—against any other switcher.

Operation: Simple. At last the operator will have an efficient and easy-to-use control panel. Spend more time being creative with the many outstanding special effects available on the CD-480 and spend less time fighting a maze of buttons, knobs and switches.

Features: Everything you would expect to find on a first-rate production switcher. Most standard, with an assortment of options such as rotary wipes, quadplexer, and many more. Even the smallest CD-480 will surprise you.

Technology: The latest. Providing unprecedented and outstanding operation, while ensuring the highest reliability available.

Your Requirements: No problem, various models are available. The CD-480 is modular and can be configured to meet your individual needs.

Expansion: A snap. The modular construction allows features to be added at any time, usually on a plug-in basis. Even on the control panel.

Price: A real bargain. Likely no more than you would expect to pay for a run-of-the-mill outdated switcher.

We Deliver: Switchers are presently in use in many areas of the world including 8 of the top 12 U.S. markets.

Why wait? Call us now.

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Tel 303-623-7603

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stations. They will be held before the Australian Broadcasting Tribunal, which last year replaced the Australian Broadcasting Control Board as the official licensing authority.

Broadcast organisations and the public will be able to use the hearings as a forum to express opposition to several recommendations made recently by the Tribunal. One of the more controversial proposals would require commercial TV stations to air 50% local-content programmes between 4 and 10 p.m. by March 1979.

With hearings scheduled for Sydney and Melbourne next March, headquarters for the most organised broadcast groups, a confrontation with the Tribunal is already expected. The Federation of Australian Commercial Television Stations has come out against the Tribunal's proposal, and will no doubt use the hearings to make its position known.

ARGENTINA

Translations via satellite

United Nations' remote interpretation experiment is conducted successfully.

An experiment to demonstrate and evaluate remote translation and interpretation via satellite was completed successfully during last month's United Nations conference on Technical Cooperation Among Developing Countries held in Buenos Aires, Argentina.

Speeches and documents presented during the conference were relayed via the Communications Technology Satellite (CTS) to UN headquarters in New York. United Nations' interpreters in New York provided simultaneous interpretation of the plenary session of the conference, and translated the documents for return the following day.

The United Nations, with the cooperation of the United States National Aeronautics and Space Administration (NASA), Communications Satellite Corporation (COMSAT), and ENTEL of Argentina, conducted the experiment to demonstrate and evaluate the feasibility of remote simultaneous interpretation of a conference and the transmission by facsimile of documents for remote translation via satellite.

To carry out the experiment COMSAT Laboratories installed a transportable earth terminal with a 2-meter antenna on the roof of the 12-story conference building in Buenos Aires. The COMSAT terminal was connected via CTS to an earth terminal at the United Nations in New York. The New York earth terminal, owned and operated by NASA, consisted of a bus containing all the required electronics and a roof-mounted 2.4-meter antenna.

The communications links between New York and Buenos Aires included one colour television channel each way, and a high-fidelity programme audio channel and eight voice-grade channels in both directions.

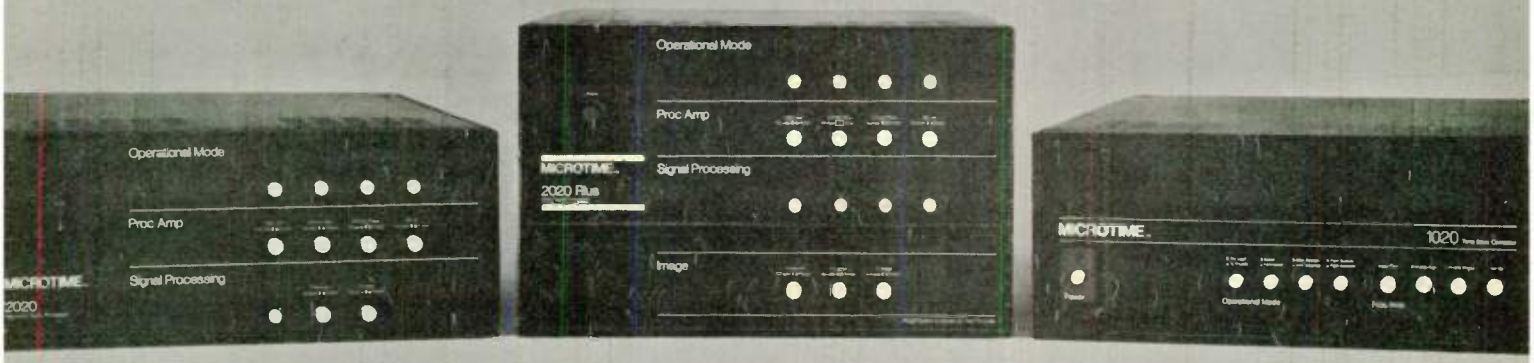
Voice and television pictures of the conference speaker were sent via CTS to New York. The simultaneous interpretations in five official UN languages were returned to Buenos Aires via satellite for transmission to the audio headsets of the delegates attending the conference. Each delegate was able to select the language of his choice.

CTS is a communications satellite owned jointly by Canada and the United States. It can simultaneously transmit and receive colour television, voice and

Continued on page 16

Solve your Wide Blanking problems with the MICROTIME Super Wide Window

FCC declares "... stations showing a steady pattern of blanking exceeding...21 lines vertical will be subject to more severe sanctions." (FCC 78-423)



Solve those all important wide blanking problems with MICROTIME's Super Wide Window available on all 2020 Plus, 2020 ESP and 1020 Time Base Correctors. The exclusive Super Wide Window option offers a 24 line correction range to guarantee correct vertical blanking, by providing TBC output blanking per FCC specifications.

The Super Wide Window eliminates the need for constantly "riding" the TBC advanced comp sync back to the VTR. The system is able to absorb even large inertial errors with no trace of the vertical picture shift associated with any small window time base corrector. So don't be concerned with the blanking problems which have plagued the television industry and caused numerous FCC complaints and citations. The Super Wide Window is the answer.

MICROTIME, first in Video Signal Correction, helping the television industry look its best!

Microtime, Inc.
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Bloomfield, Ct. 06002
(203) 242-0761 TWX 710-425-2390

MICROTIME

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data in both directions, between two earth terminals. The earth terminals operating with CTS transmit on 14 GHz and receive on 12 GHz.

CANADA

Telehealth programme

Telehealth is just one project planned for Anik B.

The Department of Communications has approved a proposal by Memorial University in Newfoundland to use the Anik B satellite, being launched in December, for a telehealth education programme.

The university plans to deliver, via satellite, educational health programmes to health-care professionals in surrounding areas. Also planned is the development of health programmes in seven remote communities in Labrador and Newfoundland.

The telehealth proposal is just one of 14 accepted for pilot projects on Anik B. To conduct the projects, the government has leased up to four channels on the satellite from Telesat Canada at a cost of $34 million. The two-year lease goes into effect early next year, and carries an option for another three years. An additional $4 million will be spent to provide 20 earth stations and planning for the projects.

Anik B, a hybrid satellite, will operate in the 4-6 GHz bands to carry commercial traffic and the 12-14 GHz bands for experimental applications. The new satellite will join three Aniks now in service.

Another project calls for a one-way video and two-way audio link between Edmonton and several northern communities in Alberta. Sponsored by the Alberta Educational Communications Authority (AECA), the project is designed to provide educational and community services for the native and non-native population.

The Ontario Educational Communications Authority (OECA), the British Columbia Ministry of Education, and Inuit Tapirisat of Canada (ITC) will also be conducting educational programmes via Anik B.

UNITED STATES

Winter Olympics to Europe

COMSAT, EBU sign agreement for 1980 Olympic coverage.

The Communications Satellite Corporation (COMSAT) has signed an agreement with the European Broadcasting Union (EBU) to provide direct satellite services to the EBU for European television coverage of the 1980 Winter

Continued on page 21

For you, the new breed of video professional,

the new breed of professional video from JVC.

If you're a video professional today, you're a tougher customer than ever.

So JVC's rugged professional line delivers the quality and features you demand at prices you want to pay.

We know you've got a lean new attitude about the video equipment you buy, no matter how long you've been in the business. Or whether you're in broadcasting...a sophisticated corporate A/V operation...a top production house...or building your first video capability.

And that attitude is, with all the people vying for your video dollar, you want more state-of-the-art technology in equipment that costs you less to own and maintain.

JVC's attitude is basic too. We build in engineering innovations—we don't add them on later. And we do it first. Which means you enjoy better picture and sound quality, easier operation, and sophisticated features you may not even find in equipment selling for twice the price.

For instance:

You wanted faster performance and greater accuracy in 3/4-Inch video editing.

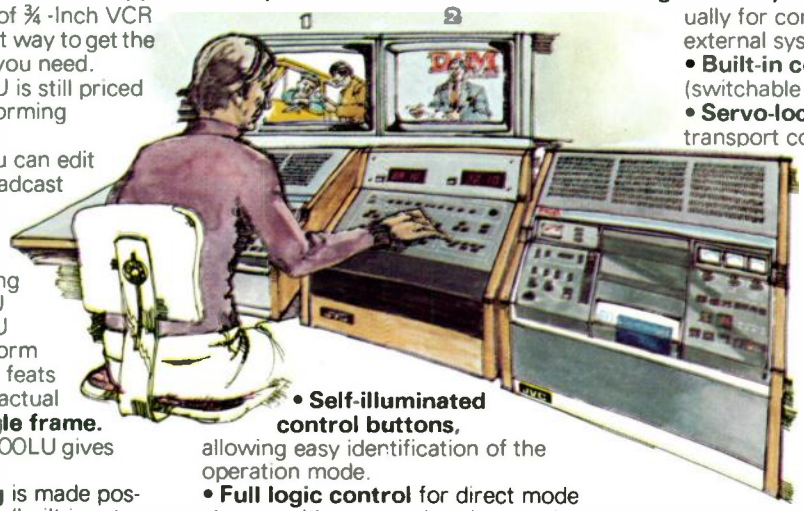
And JVC's new CR-8500LU Recorder/Editor System offers bi-directional fast/slow search from approximately 10 times to 1/20 time, with editing accuracy to ±2 frames.

It's a new generation of ¾-Inch VCR editing— the fastest, surest way to get the frame-by-frame accuracy you need.

But JVC's CR-8500LU is still priced well below its closest performing competition.

With a single unit, you can edit with full functions and broadcast quality. Even if you don't happen to have special technical knowledge.

With a complete editing system of two CR-8500LU units and the new RM-85U Control Unit, you can perform the most advanced editing feats at approximately 10 times actual speed, then stop **on a single frame.**



Here's how the CR-8500LU gives you that kind of precision:

- **Frame to frame editing** is made possible with the capstan servo/built-in rotary erase head/blanking switcher frame servo design. A design that also ensures true assemble and insert editing with no distortion at the edit points. Plus horizontal sync phase compensation to minimize timing error at the editing points.
- **Variable speed auto-search** lets you perform both high speed and low speed search. You can search at approximately 10 times in fast forward or reverse to find edit points faster. Or slow speed search at 2 times, 1 time, 1/5 time and 1/20 time. Or use the special auto-speed shift feature to automatically slow you down from 2 times, real time, 1/5 time, 1/20 time.
- **Automatic pre-roll** enables you to pre-roll tape between edits, with an automatic on/off switch. Which can come in especially handy during successive assemble edits using camera signals.
- **Self-illuminated control buttons,** allowing easy identification of the operation mode.
- **Full logic control** for direct mode change without pressing the stop button.
- **Remote control** of all operations, with the optional remote control unit RM-85U.
- **Audio level control with meters,** preventing over-level recording without audible distortion, with attenuator. Also, manual audio level controls let you adjust the audio recording level by checking the level meters.
- **Auto/Manual selection for video recording level control,** adjustable by the automatic gain control circuit or manually by referring to an independent video level meter.
- **RF output** to connect an external drop-out compensator.
- **Patented color dubbing switch** for stable color multi-generation dupes.
- **S.C./sync input connector** allows connection of time base corrector and allows for two second pre-roll.
- **Chroma level** can be controlled manually for convenient connection to an external system.
- **Built-in comb-filter** for playback (switchable on-off).
- **Servo-lock indicator** to check the tape transport condition.
- **Counter search mechanism,** permitting Auto-Search of a particular section of the tape.
- **Solid construction for easy maintenance:** both side panels, top and bottom panels are detachable for easy access to the inside.
- **Tracking control meter** for maximum tracking adjustment.
- **Heavy fan motor** for better circulation.

All that with one editing unit. But when you combine two editing units with our new RM-85U automatic editing control unit, you'll enjoy all the benefits of a total-performance system.

Starting with the kind of control only JVC's RM-85U can give you:

- **Independent LED time counters** for player and recorder, read out edit points in minutes, seconds and frames.
- **Edit-in and edit-out automatic control.** Four built-in memories let you control edit-in and edit-out points of both the player and recorder. And once starting and ending points are determined, accurate editing is memory-controlled automatically.
- **Edit shift control** allows frame-to-frame edit point correction.

• **Lap time indicated** for each insert edit length by LED display.
• **Edit preview mode available,** for "rehearsals" of actual edits.
• **Edit-in point search mechanism.** After each edit, a Return button rewinds the tape automatically to the edit-in point, so it's easier to check edit conditions.
• **Auto-shift search mechanism** to step down the tape speed automatically, and ensure quick and accurate location of the editing point.
• **Tape safety guard circuit.** Because leaving the unit in the still-frame mode can eventually cause damage to tape or video heads, a tape safety guard circuit places the unit into the stop mode automatically if it is left in the still-frame mode for more than 10 minutes.
• **Selective editing modes**—assemble editing, insert editing for audio channel-1, audio channel-2 or video.
• **Versatile editing capability** offering techniques like "edit-in/out," pre-roll, and automatic pre-roll.

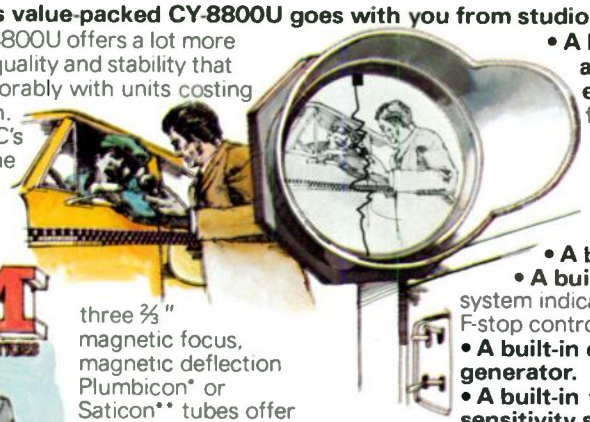
You'll find that nothing in its price class performs anywhere near the CR-8500LU/RM-85U videocassette editing system. And that you'd have to spend a *lot* more on the competitive unit that offers many of the same features.

That's what we mean by giving video people more of what they want, for less than they expect to pay.

You demanded more versatility in a moderate-priced, broadcast-quality camera.

And JVC's value-packed CY-8800U goes with you from studio to location.

Our CY-8800U offers a lot more than picture quality and stability that compares favorably with units costing twice as much. Thanks to JVC's technology, the CY-8800U camera, utilizing

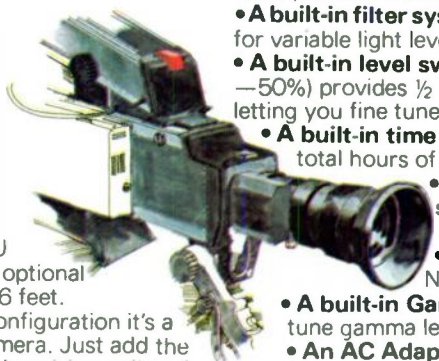


three ⅔" magnetic focus, magnetic deflection Plumbicon* or Saticon** tubes offer total flexibility. And a rugged die cast chassis in front and back to hold up under the toughest conditions.

With the **Basic** configuration, it's a compact ENG/EFP camera that's completely self-contained—no CCU required. It's easy to operate, ready to plug into our CR-4400LU/CR-4400U portable recorder, with optional cables available up to 66 feet.

With the **Studio** configuration it's a hard-working studio camera. Just add the RS-8800U remote Synchronizing unit and the large screen, top mounted viewfinder.

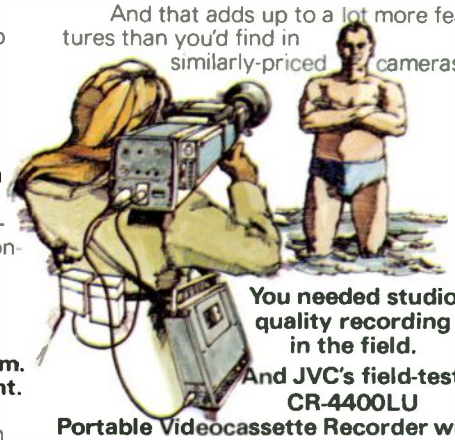
And as for big-ticket features, we've built in what the others would let you add on later:



• **A built-in 1.5 Inch adjustable electronic viewfinder** for the convenience of the operator.
• **A built-in battery warning system.**
• **A built-in tally light.**
• **A built-in VSI**—video system indicator for precision F-stop control.
• **A built-in color bar generator.**
• **A built-in +6dB, +12dB sensitivity switch** for low light level applications.
• **A built-in auto white balance.**
• **A built-in fast warm-up capability.**
• **A built-in electrical color temperature adjustment** for different applications (variable from 3000°K to 10,000°K).
• **A built-in filter system** (neutral density) for variable light levels.
• **A built-in level switch** (+50%, 0, —50%) provides ½ F-stop adjustment, letting you fine tune for added contrast.
• **A built-in time lapse meter** to show total hours of camera use.
• **A built-in intercom system** for studio applications.
• **An RGB output,** and NTSC encoding (Y, I, Q).
• **A built-in Gamma control** to fine tune gamma level.
• **An AC Adaptor**—standard.
• **Lightweight—17.4 lbs.—portability.**
• **Optional 12-to-1 zoom lens** with automatic iris and power zoom.

• **Built-in horizontal and vertical contour correction circuits.**
• **Signal-to-noise ratio of 49dB,** F .4/3000 lux.
• **Resolution of 500 lines at center.**
• **Return video** in the viewfinder.
• **A built-in -G circuit** for registration.
• **Minimum illumination** F 1.9/300 lux (+6dB switch on).
• **A comfortable hand grip** to stop and start the recorder. With a switch to operate iris control and a switch for return video.
• **A built-in CCU.**

And that adds up to a lot more features than you'd find in similarly-priced cameras.



You needed studio quality recording in the field.

And JVC's field-tested CR-4400LU Portable Videocassette Recorder with automatic editing lets you bring your recording/editing capability wherever you need to shoot.

If you spend time on location in either ENG or EFP applications, you need a portable video system that can shoot, edit, and give you something to show in no time flat. Without awkward equipment hassles.

JVC's CR-4400LU is the one to take along when you can't bring a studio.

Because it's the lightweight machine with heavyweight features:

• **Weighs in under 27 lbs.** So you can take it anywhere, and assemble edit on the spot. You enjoy total flexibility. Complete freedom. Fast results.
• **AEF (Automatic Editing Function)** gives you clean assemble edits.
• **Built-in, full color recording and playback circuitry.** No need to buy an adaptor.
• **Low-power consumption** that lets you operate on a miserly 13.5 watts, for longer battery life. A multi-purpose meter checks battery, audio, video and servo levels for precise control of all functions.
• **Flexibility to record with the CY-8800U** or other high quality color cameras.

So if you need a field-tested recording system with the features you want at a price you can afford, check out our CR-4400LU Portable Videocassette Recorder.

*registered trademark of North American Philips Corporation.
**registered trademark of Hitachi Corp.

JVC's new breed of professional video. Backed by an old tradition of JVC quality and reliability.

For the past fifty years, more and more professionals have turned to JVC for innovative equipment they can count on to perform.

Isn't it time you discovered why?

Call your JVC representative for a demonstration. Or write to your nearest JVC office:

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Arlington Heights, Ill. 60005
(312) 593-8997

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Compton, Ca. 90220
(213) 537-8230

3400 South Loop East
Houston, Texas 77021
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TV reception simulated

JVC Professional Video. The tough new breed.

JVC

JVC INDUSTRIES COMPANY
DIVISION OF US JVC CORP

Olympics from Lake Placid, New York.

Under the agreement COMSAT will install and operate an earth station near Lake Placid. EBU's television signals will be sent through the COMSAT earth station directly to an INTELSAT satellite over the Atlantic Ocean for reception at European earth stations designated by the EBU.

The EBU asked COMSAT to provide direct service because it said direct service would provide significant operational and technical advantages over the traditional means of providing the service via landlines to one of the COMSAT-operated permanent earth stations operating with the INTELSAT global satellite system.

The agreement is subject to approval by the U.S. Federal Communications Commission.

BELIZE

Changing to FM

The Belize government is ready to change over to FM.

With plans now completed and financing assured, the small Caribbean nation of Belize is ready to implement the first phase of a comprehensive programme to change over to FM broadcasting. The new VHF/FM system will be completed within 12 to 18 months.

The first step will be the installation of VHF transmitters at the FM facility in Belize City. This facility, which will broadcast stereo to some areas, will serve Dangriga, Belmopan, and Orange Walk Town directly. Smaller receiving stations will be located in Corozal Town, Punta Gorda, and San Ignacio. These stations, in turn, will rebroadcast to other areas on medium-wave frequencies.

Funding for the project is coming from the European Development Fund (EDF) and the British Development Aid Programme. Total cost of the project will be two million Belize dollars, with the Belize government contributing approximately 300,000 dollars. Unesco, and Cable and Wireless Limited have also provided assistance.

In addition to the move to FM, the government is planning to upgrade and enlarge their existing studios. Quality of programme content as well as studio facilities is also a prime concern. The Minister of Home Affairs, which controls broadcasting, has reorganised its advisory committee in order to promote good, objective programming. BC

NEWSMAKERS

Dr. Christos A. Siocos of the Canadian Broadcasting Corporation received the Honour Award for Distinguished Contributions to the Comite Consultatif International des Radiocommunications (CCIR). Dr. Siocos, director of engineering, international relations, was selected by the International Telecommunication Union for his contributions to two CCIR study groups concerning sound and television services, including the use and application of satellites. Dr. Siocos has been with the CBC for 25 years.

Enoh Maria Irukwu is the first woman director of the Nigerian Broadcasting Corporation. But this is her second "first": in 1972 she became the first woman controller at the corporation. Irukwu, director of training and manpower development, began her career with the Nigerian Broadcasting Corp. in April 1955. In her present position, Irukwu initiates training policies and devises courses for broadcasters. She also serves as liaison with the training departments of other broadcasting organisations.

The Society of Motion Picture & Television Engineers (SMPTE) will honour several individuals on October 30 when it holds its Annual Awards Presentation at the Americana Hotel in New York City. **Roderick T. Ryan,** Eastman Kodak Company, will receive the Herbert T. Kalmus Memorial Award for his continuing contributions to color film printing and processing systems. The Progress Medal has been

Continued on page 24

Moving Up

STUART RAUCH has assumed the new position of general marketing services manager at Philips Test & Measuring Instruments Inc. Rauch will also oversee all facets of the promotion programme, including advertising and public relations. In addition to his new duties, he will retain his present responsibilities as product manager of the professional TV test equipment line.

LES BROWN, who joined the Grass Valley Group recently as in-house sales engineer, has spent 24 years in broadcasting, with the last nine at WTEV-TV in New Bedford-Providence, Rhode Island.

JIM SUMMERS, vice president of marketing for Consolidated Video Systems, has been named general manager. In his new position, he will be directly responsible for company operations and will continue to head marketing.

N. (BUD) SCHNEIDER, director of marketing for CEI (Commercial Electronics Inc.), takes over responsibility for CEI's domestic marketing, sales, and service programmes.

Generator, Reader and Calculator in one advanced, integrated grouping.

Telcom's Time Code Center gives you, in a single compact unit, a combination of features that will help you increase videotape editing efficiency.

For instance, the Time Code Center lets you repair poorly recorded, intermittent, or otherwise faulty time code.

The JAM SYNC feature facilitates easier assembly editing.

If you are synchronizing audio and video tapes with differing time codes, the Time Code Center can change one of the time codes by any amount, to permit use of a conventional synchronizer.

Options include remote control keyboard, which can be located as far away as 1000 feet from the Time Code Center, and a character generator, a plug-in module which provides a video display for all functions.

Another option is Telcom's large typewriter keyboard which can be used with the character generator for titling or generating video messages for operator prompting, tape identification and many other practical uses.

Many more standard and optional features make Telcom's Time Code Center an outstanding addition to your videotape editing facilities. Write for Telcom's fully detailed brochure. There's no obligation.

TELCOM'S TIME CODE CENTER

telcom research

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awarded to **Robert Gottschalk**, president and chief executive officer of Panavision Inc., for his contributions in the design, development, and production of the Panaflex professional motion picture camera. **Reid H. Ray**, a pioneer film producer and educator in the educational and nontheatrical motion-picture field for over 50 years, will receive the Eastman Kodak Gold Medal Award. The John Grierson International Gold Medal Award is being given posthumously to the late **Forrest O. Calvin**, founder of Calvin Communications in Kansas City, Missouri. Calvin is being recognized for his contribution to the growth of the 16mm nontheatrical film industry, which was the heart of documentary films. The award will be accepted by Mrs. Calvin. The David Sarnoff Gold Medal goes to **Masahiko Morizono** of Sony Corporation. This award is presented to Morizono for his leadership and engineering achievements in the development of ENG equipment, especially portable helical-scan VTR systems. Several special commendation awards will also be given.

William H. Orr has been named chairman of the board at Orrox Corporation, succeeding John Herbert Orr, founder of Orrox, who recently retired. Bill Orr has served as president, board member, and chief executive officer at Orrox for the past five years, a period during which the two major subsidiaries Videomax and CMX Systems were acquired.

The National Association of Broadcasters (NAB) has re-elected **Donald Thurston** as chairman of the 45-member NAB board of directors. Thurston, president of Berkshire Broadcasting Co., serves as chairman of the combined radio and television boards. **Walter May**, president of WPKE Radio, Pikeville, Kentucky, replaces **Len Hensel** as chairman of the radio board of directors. Hensel's term on the board expired. Joining May as vice chairman is Carl Venters, Jr., president, Durham Life Broadcasting Service Inc. New chairman of the television board is **Thomas Bolger**, president, WMTV-TV, Madison, Wis.; for the past year Bolger served as vice chairman. Replacing Bolger in that capacity is **Robert King**, senior vice president, Capital Cities Communications, Philadelphia, Penn.

It all began in the engineering department of KCMT-TV. But for **Larry Ehnstrom** it didn't stop there: he is now the Midwest regional sales manager for the Grass Valley Group. Arden Hills, Minnesota, is the location of the new Grass Valley sales office, manned by Ehnstrom. The move from studio to sales was not overnight, however; along the way Ehnstrom held several equipment sales positions, and most recently was video sales coordinator for a Minneapolis distributor.

Aubrey Singer, previously controller BBC-2 (television), succeeded **Howard Newby** as the BBC managing director, radio. Newby retired after 29 years with the BBC. BC

Meet an editor who gets the most out of our new 1" equipment.

Who is he?

Any editor seated in front of a Sony Broadcast BVE-500A Automatic Editing Control Unit.

It's true that our BVH-1000 1" Video Recorder has a handful of very remarkable editing capabilities. That's the big creative advantage of the 1" format. Video editing with a true "film" feeling.

But an editor may have his hands full putting those capabilities to work. Unless, of course, he works with an editing console built to fulfill the creative potential built into our BVH-1000.

And that's the Sony Broadcast BVE-500A.

Now wait a minute, you say. Isn't the BVE-500A primarily intended for U-matic editing?

Not at all.

When we designed the BVE-500A, we gave it specific features to make both 1" and U-matic editing faster, easier, and far more accurate. Then we created a unique Editing Interface Adaptor. The IF-1000. Which opens our BVH-1000 to all our BVE-500A advantages.

So the BVE-500A allows automatic control track editing between two BVH-1000 1" recorders. Between two BVU-200A U-matic recorders. Even between a BVH-1000 and a BVU-200A, side by side. It's like having two editing systems for the price of one.

(And a very attractive price it is.)

The BVE-500A performs assemble edits. Edit inserts. Edit preview. And edit review, all automatically.

Each edit point can be shifted by adding or subtracting individual frames.

But here's the best part.

Like our BVH-1000, our BVE-500A has BIDIREX: two self-return search dials that take the place of ordinary pushbutton search controls. With BIDIREX, an editor can search quickly or slowly, in both forward and reverse, without taking his eyes off the monitors. That's the moviola-type editing video editors have been waiting for.

And the BVE-500A also incorporates a new decision-prompting system, with indicator lamps that flash until edit commands are made. Even in a busy newsroom, with many interruptions, an editor can still tell at a glance the status of his last instruction.

One last instruction. Write Sony Broadcast, 9 West 57th Street, New York, N.Y. 10019. Or call us direct. In New York, at (212) 371-5800. In Chicago, at (312) 792-3600. Or in Los Angeles, at (213) 537-4300.

And introduce yourself to more information about the BVE-500A.

It's one professional editor your professional editors will all be very anxious to meet.

SONY BROADCAST

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For Demonstration Only Circle (22) on Reader Service Card

SMPTE/United States

Reasoner to open fall conference

SMPTE's fall conference combines technical sessions with a sold-out equipment exhibit.

Harry Reasoner will be the featured guest speaker at the 120th Technical Conference and Equipment Exhibit of the Society of Motion Picture and Television Engineers (SMPTE). And with floor space sold out since July, this year's equipment show may be SMPTE's largest ever.

SMPTE is expecting more than 6,000 film and television engineers, executives, and production people to attend their technical sessions and visit the equipment exhibits. The conference is slated for New York's Americana Hotel, October 30-November 3.

The conference will open Monday, October 30, with a general overview, followed by a get-together luncheon featuring Harry Reasoner, television commentator, as guest speaker. Presentation of SMPTE awards recognizing outstanding achievements in motion pictures and television, and service to the SMPTE also will highlight the luncheon.

The 211-booth exhibit will be occupied by 114 companies representing most of the major manufacturers and suppliers of professional motion-picture and television equipment. On exhibit will be the entire gamut of broadcast gear, including film and video cameras; editing equipment for film and tape; laboratory equipment; equipment for lighting, sound, and projection; lenses; VTRs and TBCs; microwave equipment for ENG; telecine projectors; tripods; and much more.

The remaining schedule of sessions is as follows:

Tuesday morning — Laboratory practices, satellite systems.

Tuesday afternoon — Laboratory practices, satellite equipment and delivery systems.

Wednesday morning — Laboratory practices, digital television.

Wednesday afternoon — Film production, film-to-tape and tape-to-film transfers.

Thursday morning — Theatrical sound, video production.

Thursday afternoon — Special effects and editing, television sound.

Additional information on the conference and exhibit is available from SMPTE Conference Dept., 862 Scarsdale Avenue, Scarsdale, NY 10583; (914) 472-6606.

RTNDA/United States

One-man staff

New survey shows typical radio news staff consists of one full-time person.

The typical U.S. television station news staff is growing. But on the radio side, the average newsroom staff is either dropping or just holding its own.

These were among the findings of a recent Radio Television News Directors Association (RTNDA) survey conducted by research chairman Dr. Vernon A. Stone. The results were based on responses from over 400 TV stations and more than 450 radio stations.

The survey confirmed that the highest turnover rate takes place in the TV and radio news staff of the small-market stations, while the most stable news staffs are those in the top-10 markets.

The typical radio news staff was manned by just one full-time person, assisted by one part-timer. But the median dropped one and settled at two and

Continued on page 28

Size of Radio News Staffs and Openings During Year, by Market Size

	Only Full-Time Staff (by %)						Staff Size (Median)			
	None	One	Two	3-5	6+		Full-Time	Full-Time & Part-Time	Openings for Year	Turnover Rate
ALL STATIONS	**26**	**36**	**16**	**14**	**7**	**99%**	**1.1**	**2.2**	**1.0**	**33%**
Major markets	16	22	13	17	32	100%	2.4	4.9	1.3	22%
Large markets	20	20	20	30	10	100%	1.9	3.0	1.3	34%
Medium markets	17	45	21	15	2	99%	1.2	2.2	1.0	30%
Small markets	44	43	8	5	1	101%	.6	1.6	.8	42%

Size of TV News Staffs and Openings During Year, by Market Size

	Only Full-Time Staff (by %)						Staff Size (Median)			
	None	1-5	6-10	11-20	21+		Full-Time	Full-Time & Part-Time	Openings for Year	Turnover Rate
ALL STATIONS	**3**	**20**	**22**	**28**	**27**	**100%**	**11.3**	**12.9**	**4.2**	**24%**
ADI 1-10	16	23	3	6	52	100%	30	40.8	5.6	16%
ADI 11-50	4	7	5	19	65	100%	23.9	25.9	5.4	20%
ADI 51-100	1	8	21	49	21	100%	13.8	15.4	4.4	27%
ADI 101-150	1	22	44	31	2	100%	7.8	9.2	3.2	31%
ADI 151-206	2	56	30	9	2	99%	4.9	5.7	3.0	45%

Information based on a survey conducted by the RTNDA Research Committee, Dr. Vernon A. Stone, chairman. Reprinted with permission of the RTNDA *Communicator*, August 1978.

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a half full-timers (in major markets) compared to figures from an RTNDA study completed a year and a half earlier. The demise of some all-news formats in 1966 and 1967 probably account for the drop.

In the large-market stations, the median staff was two, while the number dropped to one in medium markets, and down to only some stations reporting a full-time news person in the small markets. In the small-market stations, several reported not having even one news person working full time.

On the TV news department side, in the moderately large markets, the news staff grew by about two persons. Surprisingly, one-fourth of those hired for TV came straight from college campuses. One-third of those entering the news side at radio stations were recent graduates.

SBE/United States

SBE gaining recognition

SBE strengthens status as an international organisation.

Membership growth at the Society of Broadcast Engineers (SBE) continues to climb, moving it closer to major association status.

They're now reporting more than 3,000 members in 40 active chapters. But the SBE told *Broadcast Communications* they are working with engineers who are forming 27 additional chapters. Membership outside the U.S. also is growing.

The two newest chapters closing in on official recognition are being formed in Norfolk, Virginia (by Doyle Thompson of WTAR) and in Tulsa, Oklahoma (by Len Ballard of KRMG).

Meanwhile, SBE certification chairman Jim Wulliman (WTMJ-TV, Milwaukee) told *Broadcast Communications* that about 1,500 engineers have been certified. While Wulliman reports that everyone taking the test has passed, he said this was expected. He pointed out that the certification committee reviews the qualifications of all certification applicants, and that if they are accepted by the committee, they are experienced engineers who should pass the test.

The next round of tests is scheduled for late October and early November. Those interested in taking the test should apply through their local chapter, where the tests will be given. In cities where there is no SBE chapter, interested engineers are requested to contact the SBE (317-842-0836) and special arrangements will be made to administer the certification test.

URTNA/Africa

Stronger voice in broadcasting

New members give African broadcast organisation stronger voice.

The addition of Malawi and Mautitius as active members of the Union of National Radio and Television Organisations of Africa (URTNA) brings the total membership to 34, establishing URTNA as the voice of the major national broadcasting organisations in Africa.

Continued on page 30

Malawi, formerly part of the British Commonwealth, is a small nation in southeastern Africa. Mauritius, also a former Commonwealth member, is an independent island country in the Indian Ocean.

The URTNA, created in 1962, is committed to the development of all aspects of broadcasting in Africa. Its objectives include promoting cooperation between members; supporting the interests of radio and television organisations; coordinating the study of all questions relating to radio and television, and insuring the exchange of information on all matters of general interest; and working closely with members in the coverage of national and international events.

The Union, headquartered in Dakar, Senegal, also has a technical center in Bamako, Mali, and a monitoring center in Markala, Mali. And last year it opened the Programme Exchange Centre (PEC) in Nairobi, Kenya.

The PEC was established to promote the exchange of radio and television programs between African broadcasting organisations, as well as to work for higher production standards and to develop projects aimed at the enhancement of radio and television programs in Africa.

The URTNA serves as the coordinator of the program exchange for member organisations. All programs sent to the PEC are translated into the working languages of the members, and the scripts and tapes are then sent to all members. Until recently this exchange included only radio programs, but the PEC is now working on the exchange of television programs.

To promote this exchange, the URTNA General Assembly has asked for three member organisations in each of the Union's three language groups to send one television program each to the PEC. After the program is used by all members in the particular language group, the program is made available to other members.

The URTNA also is working with member organisations to improve the level of technical information available to broadcast personnel. This is being done through regularly scheduled conferences, seminars, workshops, and refresher courses.

Yet another aspect of the URTNA is its sound and visual archives at Dakar. The archives, accessible to all active members, include copies of radio and television programs, voice recordings of prominent African leaders, and other recordings of interest.

Included in the URTNA's future plans are the establishment of a Pan-African News Agency and satellite transmissions in Africa.

NAEB/United States

Video software on display

This year's convention will feature a Video Fair and "theme" shows.

The annual convention of the National Association of Educational Broadcasters (NAEB), scheduled for October 29-November 2, will feature one of the largest exhibitions of video software ever assembled in the United States for public broadcasting. The convention is being held in the Sheraton Park Hotel, Washington, D.C.

Nearly 2,500 delegates representing 165 public TV stations and other major users of educational programming are expected to attend the convention. Independent producers, film and video distributors, and stations producing SPC programmes will also find the video software show important.

In addition to the Video Fair, the NAEB is planning equipment "theme" shows and demonstrations. Separate meeting rooms will house these software and hardware shows, with selected exhibitors being able to display their products to an audience with corresponding interests (textbook publishers for broadcast education sessions; microphone manufacturers for radio engineering seminars; and portable video equipment for producers).

For those companies whose products are not displayed at either the Video Fair or theme shows, hospitality suites will be available for their exhibits. A listing of all hospitality suites will be distributed with the convention programme and posted on a display board in the hotel lobby.

Additional information may be obtained by writing to NAEB, 1346 Connecticut Avenue, N.W., Washington, DC 20036; (202) 785-1100. BC

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ON LOCATION *Broadcast Communications'* video production editor goes on location to cover the latest developments in broadcasting.

Film techniques and videotape co-star in Return Engagement

By Ron Whittaker

A new chapter in the history of U.S. television will be added next month when NBC broadcasts *Return Engagement*, starring Elizabeth Taylor. For one thing, this production marks the first time the internationally famous star has consented to do a feature-length teleproduction. More important, all scenes, both inside and out, were shot on videotape using a basic motion-picture (film) technique.

The director, Joseph Hardy, himself a veteran of both film and television, has successfully married the best of the two production approaches in the 90-minute Hallmark Hall of Fame special.

"I had never seen any other feature-length production that I thought looked any good (produced on videotape) and I thought this is ridiculous, it is more economical and you can get wonderful quality on tape." According to Hardy, tape can look more "present," real, or "live," and you can still light it like film and give yourself a lot of mood and ambience.

How did Miss Taylor adjust to electronic cameras? According to Hardy, "She told me after it was all over that she was scared to death for the first three days. She hated the idea of having to react to two or sometimes even three cameras. She said, 'I do different things for close-ups than I do for master shots.' But I never told her to play to just one camera because, frankly, I didn't want that. And after three days she got to loving it because it went so much faster."

Ron Whittaker, Video Production Editor, is the coordinator of television and film at Pepperdine University, Malibu, California.

"Hardy was able to stay on the set with the actors . . . as he would on a traditional Hollywood sound stage."

But Hardy, like so many experienced Hollywood film people, still has reservations about tape. "You still have a little more creative control with film," he said. "In film you can move the camera faster, and light faster. Video is still quite a monster to crank up and get going. But, although it may take you longer to get ready (with video), when you finally do, you can shoot (the whole scene) all at once and you are finished." With film a single scene has to be broken up into numerous camera shots, with each being set up, rehearsed, lit, and shot in separate takes.

It needs to be stressed in this regard that small, portable video cameras were *not* part of the basic on-location production gear for *Return Engagement*. For several reasons, including the probability that the master videotape will be converted to 35mm film for European release, full-size TK-45, studio-type cameras were used in conjunction with three 2-inch quad videotape recorders for both studio and on-location work. The exterior scenes, which were shot at different times of the day, also required extensive color balancing before being shot, a step which also consumed significant production time.

According to Phil Squyres, the technical operations supervisor for Metrotape West, a division of Metromedia, which handled the production work, "You generally want to hold your color corrections to a minimum, especially in cases where you are thinking of transferring the video to film. Color corrections in post-production can cause problems for the film transfer process."

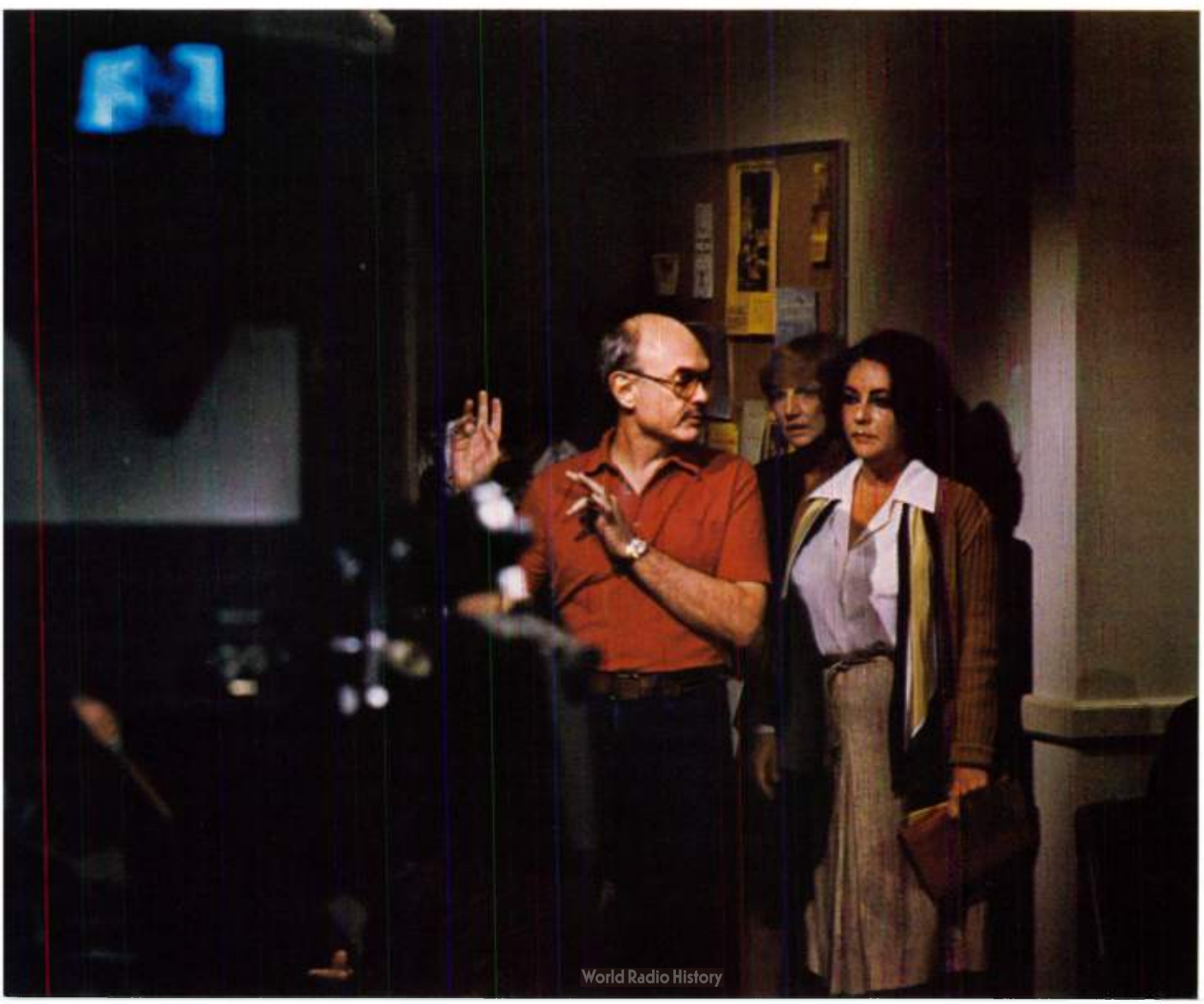
The major reason that the decision was made to do *Return Engagement* on tape rather than film was financial. "Thirty-five millimeter film production is usually about one-third more (in cost) than 2-inch tape," Tom Lowell, the production executive, said.

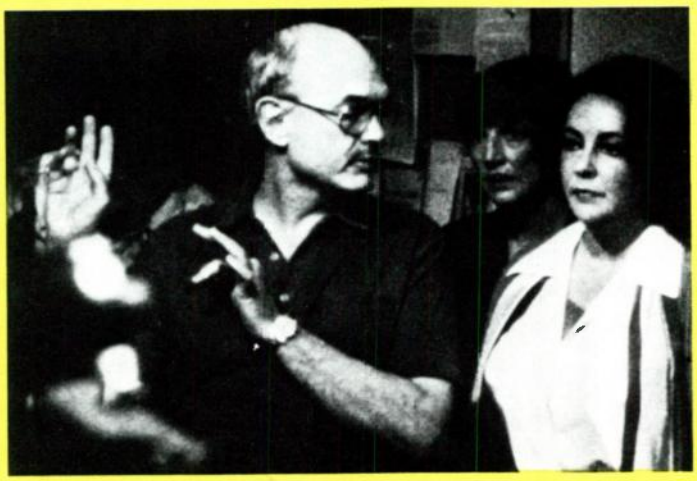
But, beyond this, there are definite artistic differences. "The public is changing," Hardy said. "Movies that are too slick and too wonderful don't appeal to them as much as they used to. With film there is more polish, more devisive artifice. For example, in a master shot there may not have been a light behind someone's head at all, a light that would be added in the close-up. By this embellishment it takes reality away from a production, even though it might look better. I

Continued on page 34

Although Miss Taylor told director Hardy that at first she was quite nervous in doing her first full-length video production, since she was not used to playing to more than one camera at a time, by the end of the 16 shooting days she said that the reduced production time involved proved to be a great advantage. *(Photo courtesy The Production Company)*

Return Engagement, the 90-minute Hallmark Hall of Fame special starring Elizabeth Taylor and Joseph Bottoms, is being produced by The Production Company. Co-producers are Franklin Levy and Mike Wise. Also included in the cast are Allyn Ann McLerie, Peter Donat and James Ray. Joseph Hardy is director, Michael Stanislavsky, associate director, and Tom Schamp, lighting director. The script was written by James Prideaux, and the music composed and conducted by Arthur Rubinstein. The production will be aired next month by NBC. This year the Hallmark Hall of Fame goes into its 28th season, making it the longest-running series on television.





Joseph Hardy, director of *Return Engagement*, has received the Tony Award for his Broadway and London productions of "Child's Play." He also received a Tony nomination for the London production of "Play It Again Sam." He has directed numerous other plays, including "You're A Good Man, Charlie Brown," and "Night of the Iguana." He has been awarded the Drama Desk award, the Vernon Rice award, the Lola d'Ammunzio award, and the Los Angeles Drama Critics' Award.

Hardy also has had considerable television experience. He staged "Shadow of a Gunman," "Man of Destiny" and "The Lady's Not For Burning." He directed *The Lily Tomlin Show* for CBS, and the NBC feature film, *Great Expectations*. He recently finished serving as producer and director for the award-winning series, *James At Fifteen*, and the Hallmark Hall of Fame production of *Taxi*. As this is written he is directing a film version of Joyce Haver's best-selling novel, *The Users*, for ABC-TV.

think one reason that soap operas on television are so popular is that they have the feeling of happening at the moment."

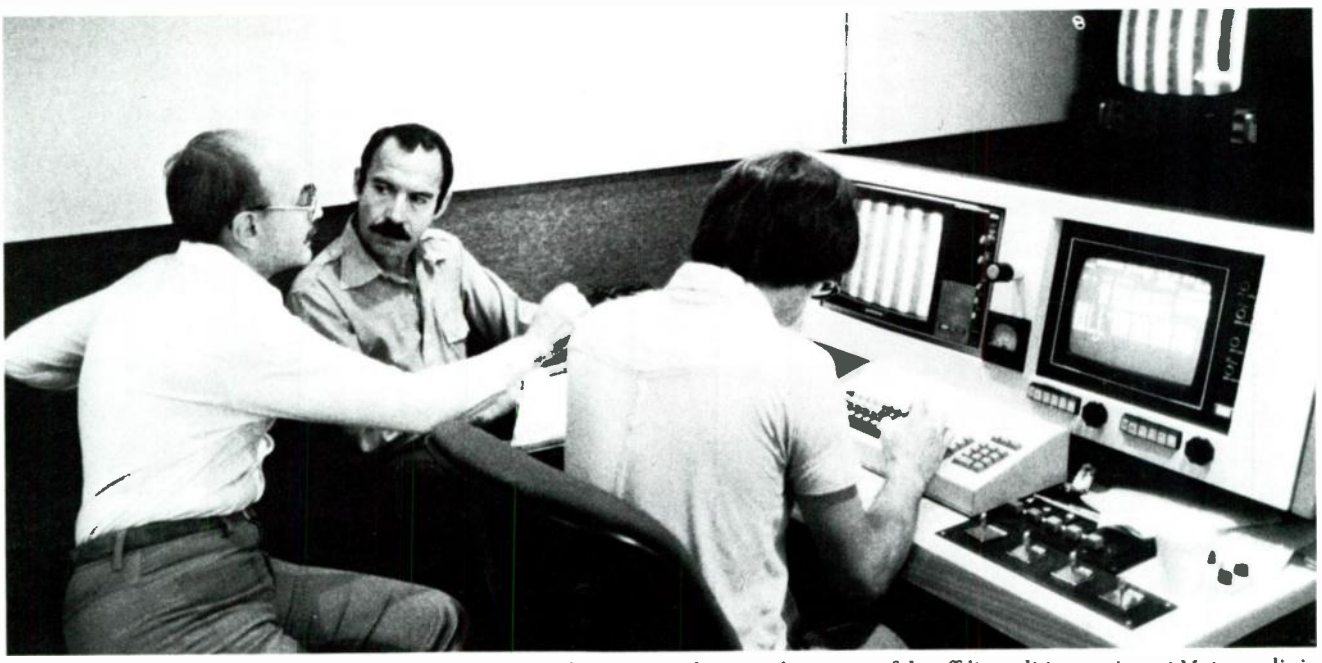
More than 90 percent of the production was shot with a two-camera approach, according to Michael Stanislavasky, associate director. "By shooting two cameras with a basic film technique, and with a third camera on a few scenes, we had the flexibility of running certain sequences from beginning to end without having to stop and reposition. We were able to take bigger chunks. We lit a great deal from the floor, and shot like film. We knew we were marrying two techniques, and I think it was important that we had the kind of director who understood film and tape very well."

With tape there was also the advantage for the director of being able to see precisely what the cameras were getting as each scene was rehearsed. And, of course, there was immediate confirmation of the scene after it was recorded. With film, "rushes" are not available until the next day, generally after lights, props, etc., are struck.

Since the cameras were each recorded "iso-style," Hardy was able to stay on the set with the actors and work with them exactly as he would on a traditional Hollywood sound stage.

In addition to some initial technical problems, *Return Engagement* also

Continued on page 36



Director Joseph Hardy (left) confers with Michael Stanislavsky, associate director, during one of the off-line editing sessions at Metromedia in Hollywood. Kris Trexler (right) punches time code information into the CMX 340-X editing system to build the off-line work print. About two weeks of off-line work was required before the 90-minute television special was ready for the on-line assembly. *(Photo by Ron Whittaker)*

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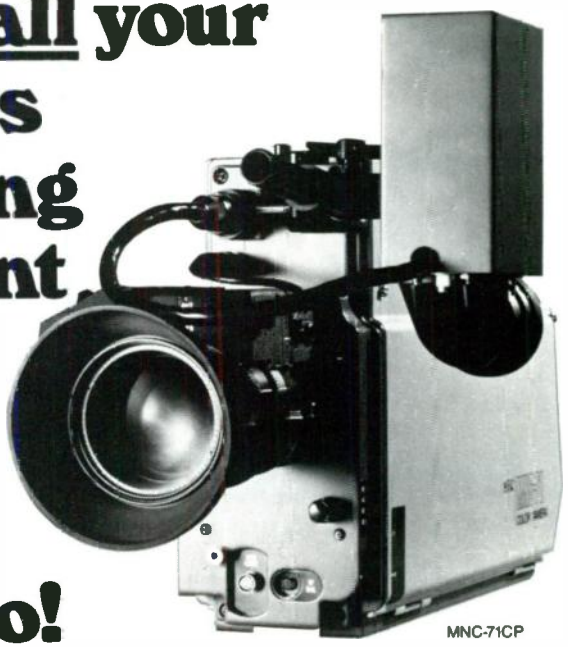

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On a recent visit to the U.S., Sadayuki Ikeda (right), Supervisor of NEC's Video Development Dept., Broadcast Equipment Division, and Cinema Products' Chief Engineer Robert Auguste exchange views on ENG/EFP practices and equipment requirements.

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

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"Sound sweetening" is the last step in the post-production process. Here, the music, sound effects, and sound equalization come together for the final master tape. This audio facility, which includes 8- and 16-track recorders, is all controlled by a CMX 340-X system. Tamara Johnson, a post-production mixer, and Phil Squyres, the technical operations supervisor for Metrotape West, are shown working in the facility. *(Photo by Ron Whittaker)*

suffered from numerous rescheduling problems brought about by the brief hospitalization of Miss Taylor for bronchial pneumonia. They originally had planned to finish shooting in 15 days. But even with the intervening delays, the production was still shot in 16 (non-consecutive) days. Hardy said that if they had used film instead of tape they probably would have finished the production in about the same number of total days, but each day would have included about two more hours of production time.

> **". . . it was just a matter of going with a basic film-style lighting."**

Probably the chief difference which has typically distinguished the appearance of film from tape in dramatic productions has been lighting. Multiple-camera video typically has used rather flat lighting so that the multiple camera angles can be accommodated simultaneously.

However, for *Return Engagement* Tom Schamp, the lighting director, concentrated on a film look. He lit for each individual camera angle, often from the floor instead of from a TV lighting grid. Once he knew where each camera angle was going to be, it was just a matter of going with a basic film-style lighting.

There was extensive use of the new HMI lights for on-location, daylight fill. Their high, 5,600°K, color temperature did not require color correction. Power requirements were also significantly reduced with the HMI-type lights.

All editing took place in post-production. Each camera was recorded with SMPTE time code and then dubbed down to 3/4-inch cassettes for editing. The off-line work took about two weeks. One of Metromedia's editing rooms, equipped with four, 3/4-inch machines and a CMX-340-X system, was used. Unlike film editing, the dissolves and fades to black could be viewed as the "work print" was being built. Tape saved time here, also.

Once the off-line version was finished and approved, the edit decision memory was transferred to punch tape for the on-line process. On-line employed two AVR-2 machines controlled by another CMX-340-X computer and took about two days. Minor color correction, when essential, was a part of this phase.

Then came "sound sweetening." This production area is also controlled by the CMX-340-X system. It incorporates 8- and 16-track recorders and a 24-input MCI audio board. Here, music, dialogue, sound effects, and special corrections for sound ambience and presence were mixed into the master audio track. The completed 2-inch master videotape was then run through an audio-only recorder for the final mix-down.

So with *Return Engagement*, videotape as a production medium has taken another step forward into the domain of film. Although there are still a number of advantages to film, it is obvious from viewing *Return Engagement* that tape now provides the industry with some very important production advantages. ac

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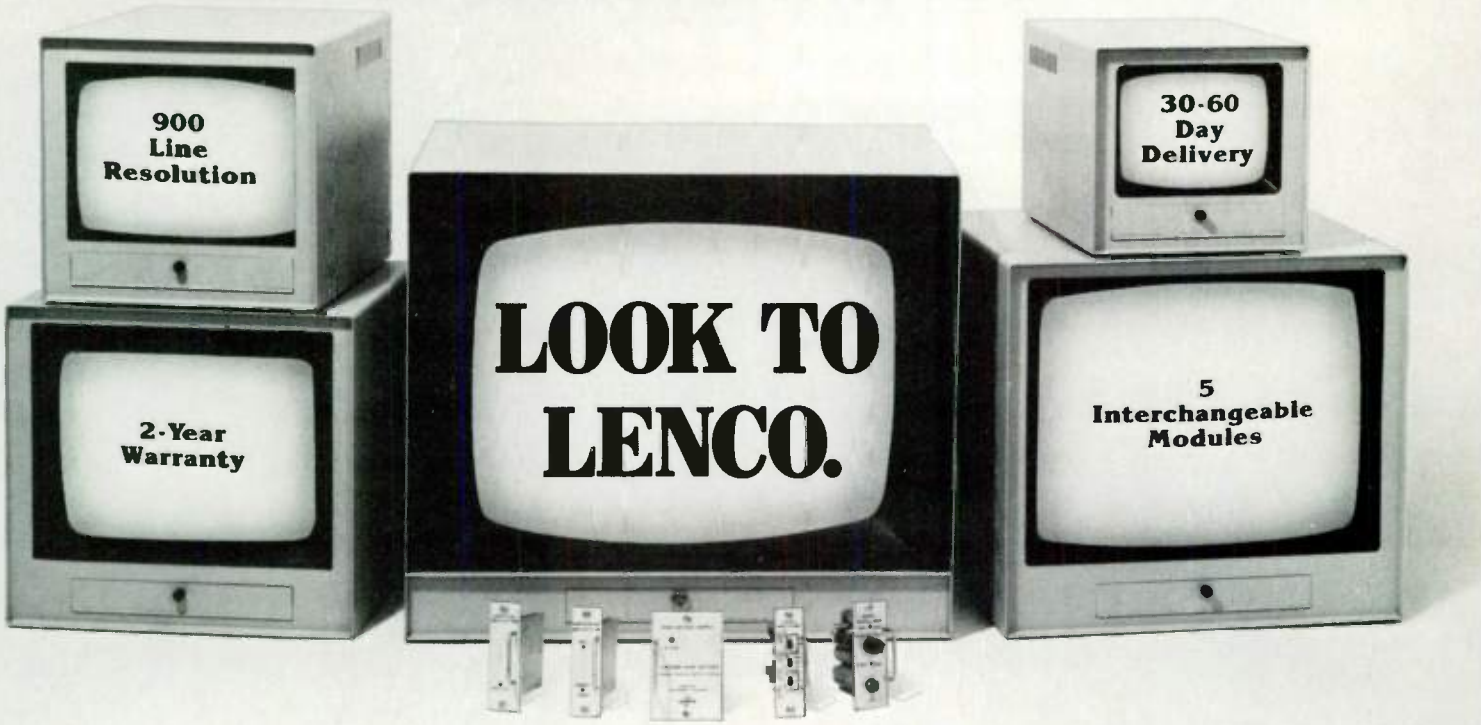

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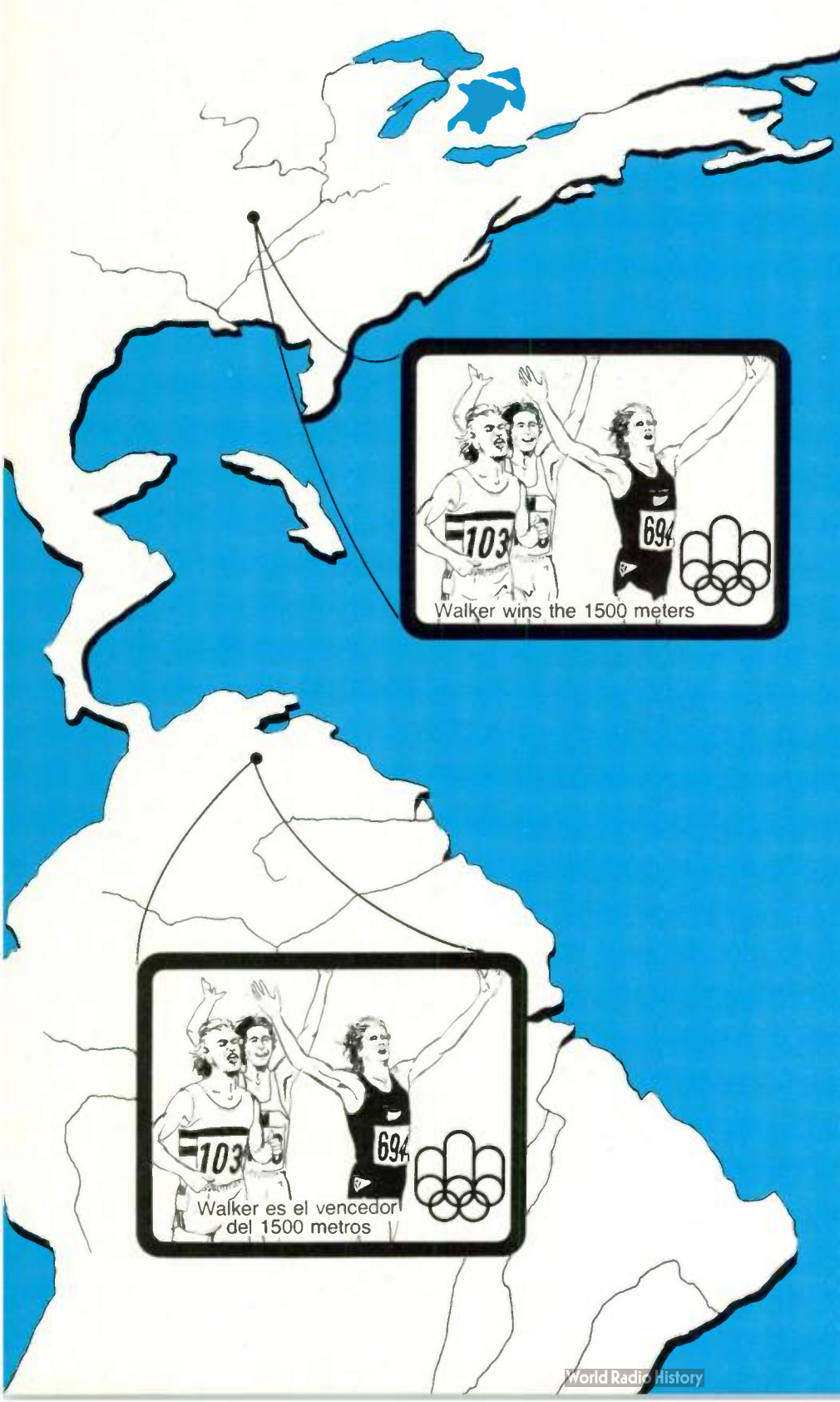
Circle (30) on Reader Service Card

Television around the world: A state-of-the-art overview

By Joe Roizen



Global television today is a healthy, dynamic industry constantly evolving to adapt new technology to its most sophisticated requirements. Thousands of individual and group researchers, working for large or small organisations, are vigourously advancing the state of the art to the benefit of the tele-spectator on every continent.

The numbers keep getting bigger: more countries with TV, more going colour, more channels, more production facilities, more home receivers, more hours on the air. In some countries, the colour TV set has become an information terminal, filtering alpha-numerics and graphics out of transmissions in the vertical interval. In others, the same set is serving as a home-computer display or a video-games playing field.

As analogue video signals over cabling systems approach their plateau of utility, new techniques involving digital conversion, fibre optics, laser scanning, charge-coupled methods, and bubble memories are emerging. Automation via computer control and distributive processing for equipment manipulation are contributing to the modernization of TV facilities that must cope with the mushrooming needs of programme producers.

Even new philosophies of production, involving electronic approaches to traditional methods of gathering news, shooting sitcoms or special programmes, have had a telling effect on broadcast hardware selection and application.

Whether it is the simultaneous viewing of an Olympiad by two billion avid sports fans (as is predicted for the Moscow Games), or the satellite transmission of an educational programme to a remote hamlet, the potential for improving national and international communications, and for achieving international understanding, is enhanced by the technology of television.

Up until very recently, the major deterrent to employing digital techniques in television were economic. The threshold price of an

Joe Roizen is International Video Editor for Broadcast Communications and President, Telegen.

Technology creates a world broadcast community in time to pull off the greatest event in the history of broadcasting.

A/D/A converter limited digital applications to areas where performance, not price, was the motivating factor. This barrier has been broken by the introduction this year of production-version LSI units which perform the signal conversion task in the space of a large chip, at a price well under $500. Even that price will erode as quantities climb.

In addition to that factor, the cost of digital bit memory is also diminishing. Evidence of that trend was visible at the 1978 National Association of Broadcasters show where frame stores (which use both converters and memory) were dropping prices in quantum leaps.

The established digital devices, such as time base correctors for VTRs and standards converters for international programme exchange, keep getting smaller and cheaper as 4K RAMs give way to 16K RAMs.

The latest family of digital equipment to establish itself soundly in the broadcast industry is the frame store. The ability to store every picture element in a memory which gives access to each bit opens up a vast area of manipulative effects for the user.

First, there is the simple, but very useful feature of reading out the bits in time with station sync, regardless of the timing from the remote source. Frame stores, therefore, make perfect synchronizers for external feeds from "wild" camera sources. It is not necessary to risk gen locking the whole studio to the remote operation; the studio clock is now the master, and everyone breathes a little easier.

When the picture element bits are read out of the frame store in a noncontiguous fashion, all sorts of unique visual effects can be achieved. Images can be dynamically inverted, split, quartered, mirrored, whirled and zoomed, all at the touch of a button or the movement of a fader arm.

Coupled to a new breed of switchers that are specially interfaced to these frame stores, the range of special effects is almost limitless. One unique extension of the frame-store capability is the creation of multiple sequential images of a moving object while the background remains the same. This effect can be

Continued on page 40

used in sports to diagram the path of a golf or tennis ball; or it can be used in education to show the progression of an experiment.

Digital techniques are also applicable to teletext transmission, noise reduction, disc and videotape recording; and they already exist in prototype production form in each of these and others.

The all-digital studio is still down the line, but there are a few small systems in development labs (such as the IBA's Crawley Court facility) which handle digital signals in a way that produce results similar to analogue video. The eventual goal is to have an all-digital format from the image origination process right up to the on-air transmitter, where conversion into NTSC, PAL or SECAM takes place so that normal home colour receivers can still get the broadcast images.

Technical highlights of television in the United States include satellite remotes, digital techniques, microprocessors, fibre optics, digital video effects, programme automation, and growing applications for ENG equipment. Meanwhile, the kickoff for AM stereo is expected in the coming year.

Within the worldwide TV community, American broadcasters have perhaps the greatest gamut of equipment available to them. Because the U.S. market is so large and varied, virtually every major manufacturer has attacked this nearly 10,000 AM, FM, and TV station market with vigour.

The U.S. private television industry is also experiencing an upward mobility in facilities requirements and programme production needs. The recently published Brush Report, which refers to this field as an awakening giant, predicts that the programme production expenses to nourish this giant will exceed $1.2 billion by 1980 and the producers of this programme material must invest about $360 million to achieve this end.

Cable and pay TV are on the upswing, too; and as viewers' tastes become more critical, they too need to cater to these by ever more sophisticated material that requires ever more complex hardware. Pay TV construction permits are now being handed out by the FCC to a growing number of stations in the major markets.

What happens in the United States can usually be expected to take place in the rest of North America at a pro-rated factor. Canada is an NTSC country and the Canadian market for communications hardware usually ranges from 15% to 20% of the U.S. figures. Even though their population is at approximately 10% of the United States', the desire for autonomy in Canada has generated "local content" regulations which require local production. This tends to make the originating equipment market there larger than it might otherwise be.

Montreal and Toronto both have modern television production facilities. The national network (CBC) has a dual-language service to satisfy the French-speaking viewers in Quebec province (and elsewhere) and an English service for the Anglophone tele-spectators.

The commercial network, an association called CTV, is a loose amalgamation of large and small independants similarly catering to regional needs. CFTO in Toronto and CFTM in Montreal each use their extensive and well-equipped studio and mobile facilities to produce local-content programmes to satisfy Canada's laws about television operations.

Western European television is comprised mainly of major TV networks operated under national government aegis, and some independent television which adheres to government supervision.

The major subsidy to support these networks (such as the United Kingdom's BBC, France's TDF, Germany's ARD, or Norway's NRK) comes from license fees charged to viewers for owning a radio or television set. Lest anyone think that this is a minor sum, the BBC's income from licenses last year exceeded 200 million pounds sterling (more than $400 million).

The IBA, Britain's commercial network, has 26 production companies to generate programmes; and both the BBC and IBA sell many of their best programmes (*Masterpiece Theatre, Ascent of Man, I Claudius, Upstairs Downstairs*, etc.) all around the world. The television companies that form the IBA derive 98% of their income from advertising sales; they also earned in excess of $400 million.

Few television facilities are better equipped than those that operate under the familiar logos of Thames Television, Granada, London Weekend, or ATV. Both networks offer extensive teletext services to their viewers, BBC 1 and BBC 2 supplying CEEFAX data and the IBA providing ORACLE.

Television in France also is moving forward. The three networks (TF1, A2F and FR3) each have an annual budget around one billion French francs (over $200 million). Two networks earn about half their income from advertising and the other half from receiver licenses. FR3, which carries no ads, gets its full support from the public license fee.

Huge production centers in Paris and smaller regional studios churn out programmes for Francophone countries with a vast array of video equipment.

Telediffusion de France (TDF), the coordinating organisation for French Radio and television, is now providing a teletext service called ANTIOPE in

Paris and Lyon. The daily quotations of the Paris stock exchange and election returns are current information available to viewers.

West Germany operates three separate networks, the ARD 1, ZDF and ARD 3; but they all come under common national control. Their operation is as impressive as those of the United Kingdom and France. The network stations in the nine regions are technologically advanced, which contributes to better programming. Teletext is also being tested in Germany by the Institut fur Rundfunktechnik, the national research organisation for TV development.

At the last count there were 15 million black and white, and 7 million colour sets in West Germany — not bad for a country of 55 million inhabitants.

The Netherlands may be a geographically small country, but you would never detect this from the extensive and modern TV facilities operated by NOS 1 and NOS 2 at Hilversum. In a country where Philips developed the Plumicon, NOS went full colour over a decade ago. Their huge studios and roving mobile vans turn out a wide array of local and internationally oriented programmes. And they often feed the EBU network with sports or entertainment shows that originate in Amsterdam.

Since 1975, when Italy's Constitutional Court ruled in favor of private stations, the growth of Italian television has been phenomenal. But that is exactly the problem: too many stations and not enough government regulation. Today there are some 450 privately-owned TV stations in Italy. Some government officials would like to reduce this number to about 300, however. A bill now before the Italian Parliament would not only limit the number of stations, but create a regulatory body similar to the FCC in the United States. (For more on Italian television, see our World Update section.)

The Middle East is a beehive of television activity. Petrodollars (petrofrancs, petromarks, petroyen) are flowing from these oil-rich areas, as these countries try to catch up with the rest of the world in the field of public and private television. Iran covered the Asian Games, in colour, then went colour on the NIRT national network. Oman installed a full colour facility right from the start. Further east, India was the first country to use a geostationary satellite for a massive test of public education in remote villages.

The People's Republic of China has recently entertained many trade fairs that featured colour television equipment, and they are now both building and acquiring equipment to help their expansion of colour TV in that vast country. South Korea, Hong Kong, Taiwan, the Philippines, Thailand, Malaysia, and Singapore are all enclaves of high colour television activity using either NTSC or PAL as a national standard.

Obviously, Japan is the most TV-saturated country in the Far East and perhaps in the world. Nippon Hoso Kyokai (NHK), the national network, permeates all of the islands; but they are not alone. Such independent giants as Asahi Broadcasting, TBS, and NET provide both commercial and educational broadcasting to the viewers who tune them in. NHK is also experimenting with a teletext system of their own design, which provides news, weather and shopping information to their audience.

Australia and New Zealand are also active in video developments. Both are well established in colour, Australia having reached more than one million colour TV households some time ago. With 100 TV stations almost evenly split between the national ABC network and the Federation of Australian Commercial Telecasters (FACTS), they represent the high technical standards that Australian engineers have set for their engineering plants. Teletext was also introduced in 1977 on a trial basis for field testing, and domestic satellites are being considered for better coverage of this huge continent.

Television in Africa is also on the rise; more than 10 countries are in either SECAM or PAL (depending upon their economic, technical, or political affiliation) and about 20 countries have black and white service. South Africa, after many years of strong government opposition to television, took the unprecedented step of going full colour on a national service that saw the whole country blanketed with chroma on January 5, 1976. This probably accounts for the lopsided set count in 1978 which shows half a million colour sets, far outnumbering monochrome sets.

There is plenty of television activity in such other African countries as Egypt, the Ivory Coast, Morocco, Nigeria, and Zaire, where two television studios of Tele-Zaire, located in Kinshasa and Lubumbashi, feed TV programmes to a reported 7,500 receivers. But the numbers all over Africa are climbing fast.

South America has television from the Panamanian partition at Columbia to the tip of Tierra de Fuego, where the only thing further south is Antartica.

Both Argentina and Brazil have large TV networks which are mainly commercial. Rio and Sao Paulo abound with competing stations like TV Globo and TV Tupi, which maintain a fast-paced TV

Continued on page 42

style. Brazil is also the only country in the world using PAL-M, a system that uses the PAL principle with the NTSC subcarrier frequency. As a result, almost all their TV equipment has to be custom built, rendering PAL-M into the descriptive acronym of "Pay A Little More."

Argentina recently relayed the World Soccer matches to the rest of the world via a special TV installation set up just for this event. Equipment from the United States, Germany and Japan was used to feed this international event to hundreds of millions of soccer fans everywhere.

International Broadcast Standards

Nearly 140 nations comprising the bulk of the world's population are now served by public television. The monochrome services available are on four standards: 405 lines, 50 fields; 525 lines, 60 fields; 625 lines, 50 fields; and 819 lines, 50 fields.

However, both the 405-line system, which covers the United Kingdom, and the 819-line system in France (and a few French-oriented countires) are both being phased out of service in favor of the parallel 625/50 services available in the same area. In fact, on both older systems, programme origination is in 625/50 with up or down conversion to feed the old 405 and 819 transmitters.

There are no colour services on either 405 or 819, and none are contemplated. Colour transmissions on all standards (NTSC, SECAM or PAL) are on either 525/60 or 625/50, and each of the colour systems is adaptable to both line and field rates. The subcarrier frequencies are altered to fit within the passband of the video channel allocation, and the displacement of the sound carrier.

Almost 90 countries currently provide public colour television services. The systems employed are as follows:

- NTSC (National Television Systems Committee). 525 lines, 60 field; 3.579 MHz colour subcarrier. Started in 1951, now used in 25 countries and the Province of Taiwan.
- PAL (Phase Alternation Line). 625 lines, 60 fields; 4.433 MHz colour subcarrier. Also, PAL-M version: 525 line, 60 fields; 3.575 MHz colour subcarrier. Started in 1965, now used in 37 countries.
- SECAM (Sequential and Memory). 625 lines, 50 fields; FM colour subcarrier at 4.406 and 4.250 MHz. Also, SECAM-N version: 625 lines, 50 fields; FM colour subcarrier at 3.50 and 3.39 MHz. Started in 1965, now used in 23 countries.

There are a few non-standard colour television systems being used for special purposes or experimentally to determine future applicability.

A 655-line, 24-frame system using NTSC coding has been developed to master videotapes which can be directly transferred to film without the problem of a differential image repetition rate between the television system and theatre optical projection. This system has an unusual bandwidth of 8 MHz and uses super-high-band frequencies (9-12 MHz) in the special video recorder adapted to it.

The NHK research laboratories in Japan are experimenting with a high-definition colour television system employing 1,125 lines, 60 fields. NHK displays this image on a special 30-inch (diagonal) colour CRT with an aspect ratio of 5:3, which comes closer to the wider screens used in motion pictures. To provide the high-resolution TV images to feed this display device, NHK has also developed a 70mm telecine system using three vidicons and an RGB colour camera with three return-beam Saticons as the pickup tubes. The result is an exceptionally sharp image with a smooth structure which rivals high-quality colour printing.

For the forseeable future, public colour television will no doubt continue on the established standards, if only because there is such a huge investment in the hundreds of millions of home receivers. However, the originating equipment may see some significant changes as digital techniques are applied to studio eqiupment, video recording, signal routing, and long-distance transmission.

Venezuela, Columbia, Chile and Peru are also active television countries where television is moving forward technically.

Worldwide television is constantly growing; and it gets its major impetus from new technology. Whirling discs were replaced by cathode ray tubes; monochrome gave way to colour; and ground links are diminishing as satellites take over. Many of the state-of-the-art products and services used today were just abstract theories a decade ago, especially satellite remotes.

The exchange of television programmes between countries has also expanded tremendously. Much of this exchange is currently accomplished through the normal methods of shipping the films or tapes around to the users; however, geosynchronous satellites and the Intelsat network of earth stations have greatly altered this situation.

Early Bird, the first television communications satellite, carried 150 programme hours between North America and Europe in 1965. A decade later, with the Intelsat IVA satellites over the Atlantic, Pacific, and Indian Oceans, the programme hours had jumped to nearly 18,000.

This should be another banner year, with an estimated 26,000 hours of television transmissions. In addition, of course, the domestic satellite traffic involving such nationally or commercially dedicated "birds" as Anik (Canada), Palapa (Indonesia), Symphonie (France), Molnya (USSR), Satcom (RCA), Westar (Western Union), and Comstar (AT&T, GT&E) are all adding to the mushrooming total of television traffic which no longer is dependent upon terrestrial microwave.

Probably the most dramatic orchestration of the worldwide state-of-the-art theme will be played via satellite in 1980 to the largest-ever television audience viewing of a single event.

Contrary to popular belief, the Russian word "bolshoi" is not an exotic name for a world-famous theatre or ballet company. It means simply "big" or "grand." And the 1980 Summer Olympics, which will be held in Moscow and distributed to the world from July 19 to August 3, are certainly shaping up that way.

From a television coverage viewpoint, the current plans by Soviet TV will eclipse all previous records with regard to hours of coverage and equipment applied to carry out this monumental undertaking.

In keeping with the IOC rules, the host country is solely responsible for the

Continued on page 44

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primary radio and TV coverage of the Olympics, and they in turn provide the rights and facilities to participating networks. With more TV services than ever planning to cover "Olympiade 80," Russian TV must provide not only the World Pool pictures, but the working space and video devices that make possible the multi-national, multi-lingual outputs that are beamed to the recipients' countries.

Soviet television is currently building a large telecommunications complex which includes a main center in the shadow of Ostankino Tower and sub center at 24 Olympic sites. The main TV center is a five-story structure across the street from the main Russian TV production center.

Dubbed OTRB (Olympic Television and Radio Building), this large complex will contain the main switching center with what is reported to be the world's largest television switcher. There will be TV programme origination studios of various sizes, videotape recording and editing rooms, off-tube commentation booths, telecine equipment, and all of the paraphenalia that goes with accommodating the expected 4,000 sports commentators and technicians that comprise a modern Olympiade.

They are planning up to 20 unilateral feeds for the major broadcasters and about 50 outside broadcast vans will be following the more mobile sports like cycling, rowing, and the marathon. There will also be an extensive closed-circuit TV system at the center and at the venues. As an example, a TV reporter at the Lenin Stadium, covering the track and field events, can switch over during quiet periods to watch 20 other channels with images from the other sports events.

Overall, Soviet TV will field more than 200 colour cameras, over 150 VTRs will be directly involved in recording, and 40 slo-mo machines will be in service for image time-frame manipulations. In fact, more of almost everything than has ever been used before will be tied into this super remote.

NBC, who will be covering the Olympics for the United States, is already billing the 1980 Games as the biggest event in television history. They plan to present 150 hours of coverage, nearly double the ABC time in Montreal, and to do extensive coverage of all events.

They will have their own cameras at all major venues: track and field, boxing, swimming, gymnastics, basketball, and wrestling. Combined with the Russian pool coverage, the NBC broadcast center in the OTRB will have plenty of programme material to work with. NBC will also have "flying squads" equipped with portable cameras and recording equipment to follow the mobile events.

Packaged into edited programmes on 1-inch helical Type C VTRs, or sent out live, the NBC feed will go by microwave from the ORTB via Ostankino Tower to the Moskva Intelsat earth station 200 kilometers away. Intelsat IVA will link the Soviet Union with the United States. AT&T circuits will then couple the satellite earth station with NBC in New York and the NBC Television Network facilities.

In an article titled "The Moscow Olympics on the Television Screens of the World," which appeared in the official journal of the Games "Olympiade 80," Henrikas Yushkiavitchus, deputy chairman of the State Committee for TV and Radio Broadcasting, made the following comments:

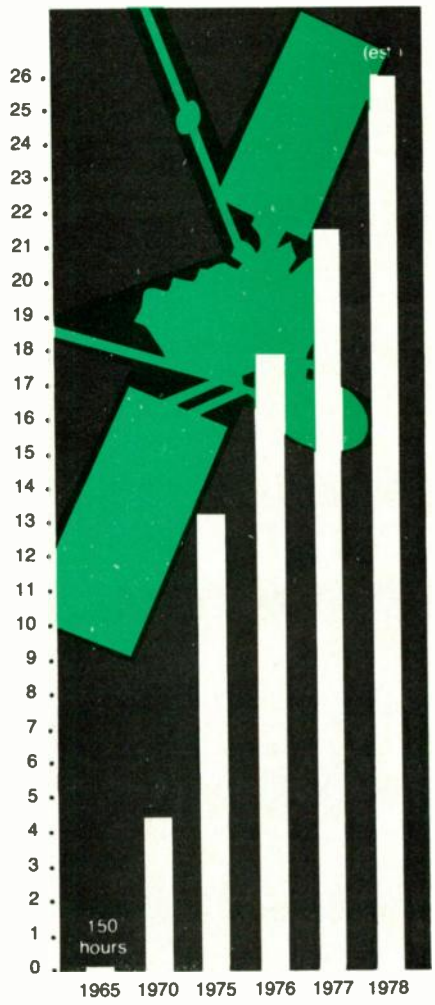
"I believe that everyone should long ago have realised an obvious truth: the bulk of the Olympic spectators are televiewers. Montreal's half-empty hotels during the Games, and the 800 hours of coverage for Europe alone, the deserted streets of major cities throughout the world during the more interesting events, on the other hand, are incontrovertible proof of this, in my opinion. I could give you another example: the biggest stadium in Munich could seat only 70,000 spectators, but the opening ceremonies of the Games were watched by a thousand million viewers in countries all over the world.

"One and a half thousand million people followed the Games in Montreal, and no less than two thousand million people, half of all humanity, will be able to watch the Moscow Olympics through new satellite link-ups which by 1980 will be operating on practically every continent. The 22nd Olympic Games will be watched by viewers in countries who have never had this chance before: most of the African continent, many Asiatic and Latin American countries.

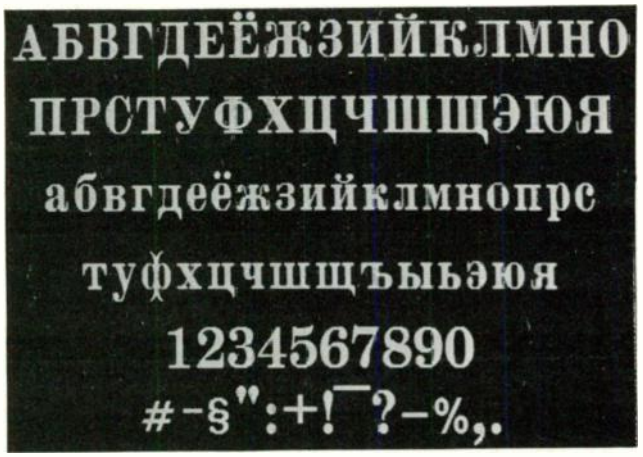
"The State Committee for Television and Radio Broadcasting has set itself the objective of being able to broadcast 18 to 20 colour TV programmes and up to 100 radio programmes to every continent by the opening of the Games. You might ask whether we find the scale of the task we face frightening. It would be hard to give a simple answer to such a question. . . . To deny it outright would be unjustifia-

Continued on page 46

INTERCONTINENTAL TV SATELLITE HOURS
(In 1,000 Hours)



In the late afternoon sun, Ostankino Tower reaches toward the clouds with its 533-meter (1748-foot) high TV mast. It will be the key relay point for television images and sound from the Moscow Games that will blanket the rest of the world.



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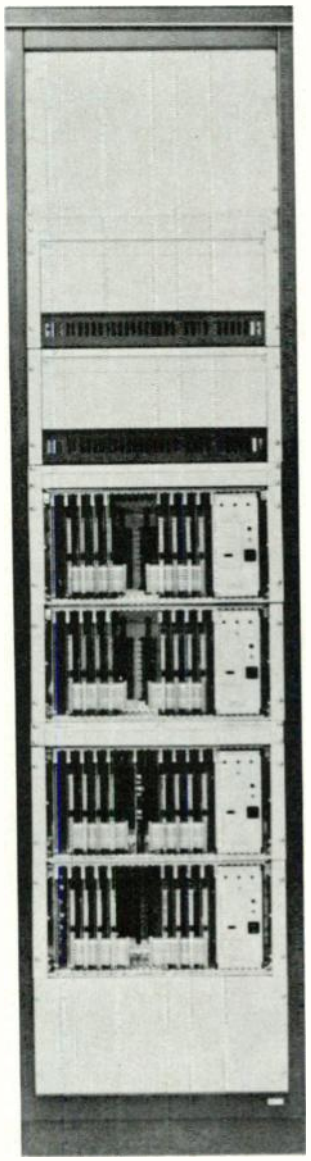

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bly presumptious. But to admit that we are afraid would also be untrue, since in that case we would never have undertaken the work in the first place.

"There is a good Russian proverb on this matter: 'Your eyes are afraid but your hand works.' And in our case, the only solution is to work and work and work. And I might say that is what the State Committee and Organising Committee experts directly concerned with televising the Games are doing."

On my last visit to Moscow, it was quite evident that the work was going on in every area of Soviet industry. By their own estimate, 75% of the Olympic telecommunications equipment will be made in the Soviet Union. Since the colour television standard in the USSR is the French-developed SECAM system, it was inevitable that a Franco-Soviet accord for the development of colour TV equipment and the supply of such gear would be agreed upon.

Past Olympiads have all depended upon a wide assortment of technical equipment, obtained from leading suppliers. Everything from Swiss timing to Swedish phones converge on the host country to help in providing the coverage and services needed. The Moscow Games are no different in that sense, combining a wide array of domestic and international products in the quest for the best television coverage ever achieved.

Coverage of the 1980 Olympic Games will be channeled out of Moscow, and accepted by broadcasters around the world. And this worldwide system and the stations that use it will be far more technically advanced than anyone could have expected even a few short years ago. What it will demonstrate is that worldwide television has developed into a universal technical community, with a future we're all challenged to imagine.

BC

Teletext Television

Teletext is the generic term for television systems which dedicate one or more blank lines in the vertical interval for the transmission of digital signals that can be recovered and displayed by a suitably equipped receiver. The home color TV set then becomes an information terminal, capable of bringing the viewer hundreds of "pages" of interesting or useful information at the touch of a button.

The English started it all when the BBC, in 1974, pioneered an experimental public service called the "Magazine of the Air" which went by the acronym CEEFAX (seeing the facts). Not to be outdone, the commercial network in the United Kingdom, the IBA, provided a similar service which they labeled ORACLE. Now all three U.K. networks (BBC1, BBC2 and IBA) provide daily services to viewers which use the same transmission standard. In this way, a viewer switching between channels can get the CEEFAX or ORACLE information with the use of the same decoder and control unit.

It all starts in an editorial room at the TV center, where the pages are composed and updated with the latest news, weather forecasts, sports information, entertainment guides, and a host of other subjects. Converted into digital signals at a 6.9 MHz rate, they are inserted into lines 17 and 18 on one field and lines 330/331 in the next. The home receiver detects these digital signals and routes them to a page store which, on command, selects the desired page and activates a character generator which puts alpha-numeric video on the TV screen. It is possible to have the picture itself, the alpha-numerics alone, or combinations of both.

As teletext services appeared to be achieving popularity in the U.K., the French national TV networks began to look at a system of their own. Dubbed ANTIOPE and developed by their research center in Rennes, it is currently in use in Paris and Lyons for stock market reports and election coverage.

Additional services are also now being contemplated. The ANTIOPE system differs somewhat from the CEEFAX format, and it is applicable to a variety of uses including television teletext and full-channel data transmission. In its teletext mode, it also uses an assigned number of dedicated lines in the vertical interval and it can provide a wide range of informational services to the viewer with the same options. In addition, the ANTIOPE system may be expanded to use the whole TV channel or it may be transmitted by phone lines or FM radio.

Both the BBC and TDF systems have their proponents. CEEFAX is being tested in Sweden, Germany, Australia and the United States. ANTIOPE will be used at the Moscow Olympics for various internal and press information services; it is also being looked at seriously by a number of North American organisations after a series of demos at NCTA and ICC in 1978.

Unquestionably, teletext services will increase, starting with national networks (funded by the public purse) where additional services to the viewer are a primary mandate. Eventually, commercial applications will emerge, providing services not only to a wider range of television viewers, but to the industry as well. In the United States, a form of teletext is being developed and put into service by PBS. Using digital signals in line 21, captioning for viewers with impaired hearing is being offered to those equipped with proper receivers.

Also in the United States, the Info-Text data transmission system has been demonstrated by Micro TV Inc. The system requires a special decoder at the receiving location. They are expecting initial sales to commercial or institutional point-to-point users.

Canada recently announced the development of their own system called Videotex. The Videotex system has undergone tests at the Communications Research Centre, and plans call for field trials to begin early next year. (More information about Videotex can be found in our World Update section).

In Japan, the research labs of Nippon Hoso Kyokai (NHK) have developed a teletext system suited to the Japanese character script. Because of the complex nature of this writing form (it takes at least 1500 characters as compared to 26 in the English alphabet), NHK has accepted a much more limited potential for their teletext information service.

The key to the expansion of teletext lies in the development of a low-cost decoder in LSI form. A number of major manufacturers of solid-state devices are now in the process of designing such LSI units which will greatly reduce the cost of the future teletext decoders in color TV receivers.

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Digital audio surfacing in recording studios

By Dennis Ciapura

By now digital audio has been hailed almost universally as the wave of the future, so the time has come to get down to the nuts and bolts of the issue and see just what areas can substantially and audibly be improved by digital.

Conversely, let's also take a look at the state of analogue recording to see which elements of the audio art are already being handled with a degree of perfection that renders further improvement a matter of diminishing returns. Let's begin our investigation by taking a look at digital audio recording as it exists today and try to predict what impact digital will have on the industry.

Dennis Ciapura is the Audio Editor.

To get a feel for what digital can and cannot do, we must first have at least a basic understanding of how digital audio works. As you can see from Figure 1, with digital audio we are in the business of describing the voltage levels that form the musical waveforms with binary numbers. In analogue transmission and recording, varying voltage levels live in a world that is enclosed at a lower limit by a noise floor and by a ceiling at which overload occurs. An operating level which is a compromise between headroom and S/N ratio is selected.

Our digitally synthesized waveform is composed of a series of numbers describing a finite number of voltage levels; so, the noise floor is related to the ambiguity that results. Practical systems are based on 14- or 16-bit formats which obviously provide a much more detailed representation of the musical waveform. Most systems intended for professional use offer an 85 to 95 dB overload-to-noise ratio. It should also be obvious from Figure 1 that the sampling or clock frequency must be at least twice the highest audio frequency to be reproduced. Since this clock frequency will appear at the output of the digital system, it must be attenuated to a subaudible level. The filter required to perform this function usually results in some phase shift in the audio band, depending upon its cutoff frequency and slope.

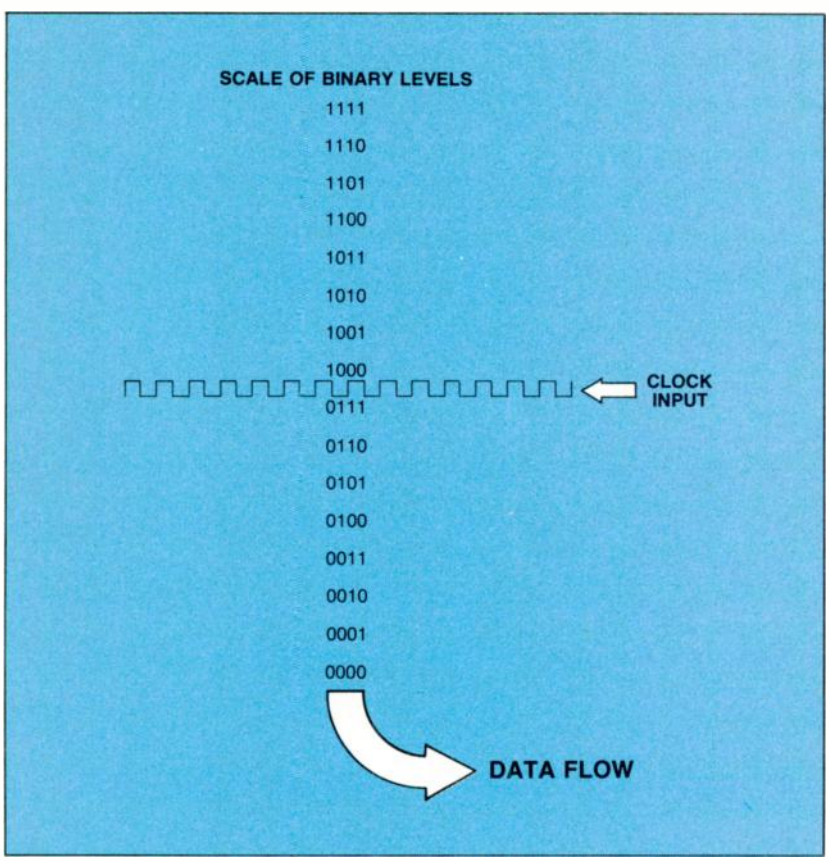

Figure 1

Digital audio technique also has its own set of limitations which are very easy to predict and control. Several systems by various manufacturers have been introduced for professional audio, and all have been received very well. 3M, Soundstream, Mitsubishi, Technics, JVC, and Sony have introduced practical systems ranging in price from several thousand dollars to several tens of thousands.

However, Edwin Enberg, manager of audio products for Ampex, tells us that Ampex also is working on a digital audio recording system and has proposed standards specifications to the AES Committee.

The 3M system, designed for multitrack studio work, is one of the more complex systems introduced thus far. Although the system was originally expected to sell for around $150,000, 3M has decided to lease it instead. Consisting of a 32-track recorder along with a 2-track mastering recorder to mix down onto, the 3M digital audio mastering system was designed for immediate application in recording studios.

Figure 2 and Figure 3 illustrate the performance capability compared to a

Continued on page 50

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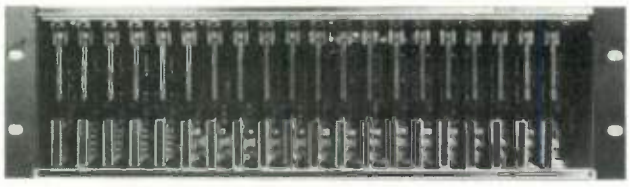
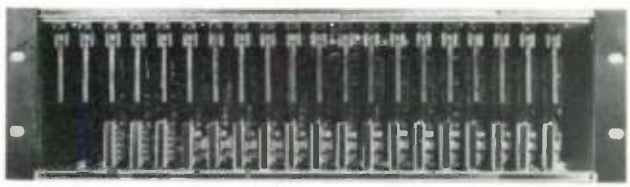


MODEL 5801 VIDEO ASSEMBLY



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typical analogue system. This digital system is capable of a 90 dB S/N ratio and .03% distortion. One of the most attractive features of digital recording, however, is the fact that multiple generations can be accomplished without degradation with respect to noise, distortion, and bandwidth. Noise-reduction equipment is not required, even with 32 tracks of audio.

As mentioned earlier, 3M has decided to lease the system rather than sell it at this time, and our latest information indicates that the monthly fee is $4,000 with an additional usage fee of $4.00 per hour. There is also a reservation/installation fee. Although this sounds like big money for an audio recording system, the cost of developing practical systems is enormous. Some of the simplest problems demand complex remedies when translated to digital.

For example, the inevitable tape drop-outs which result in only a momentary loss of audio in analogue recording can totally confuse a digital recorder, resulting in a noise burst. 3M worked for three years in cooperation with the research department at the BBC to develop a suitable error-correction system. Early efforts at the BBC involved using some of the available tracks for parity so that a redundant source of digital data flow could be maintained in the event of a drop-out on any single track. The obvious disadvantage of this type of error-correction system is that the maximum number of audio channels for a given tape width is reduced.

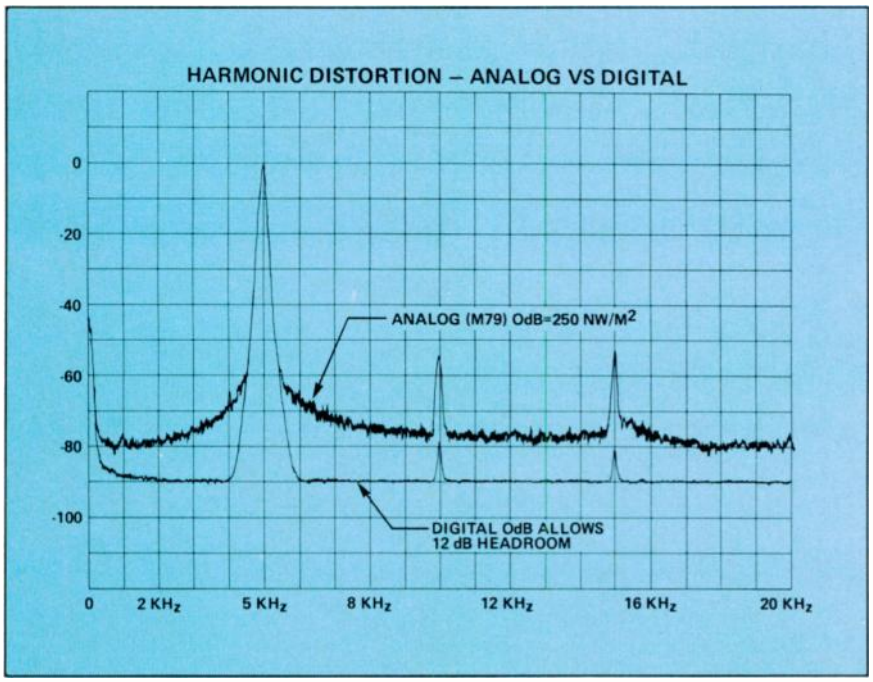

Figure 2 Harmonic distortion ⟨0.03% above 100 Hz at maximum input/output level (+28 dBm) across the entire passband with levels not exceeding +15 dBm. On analogue recorders, distortion is typically specified at 3% at a single frequency at maximum record level.

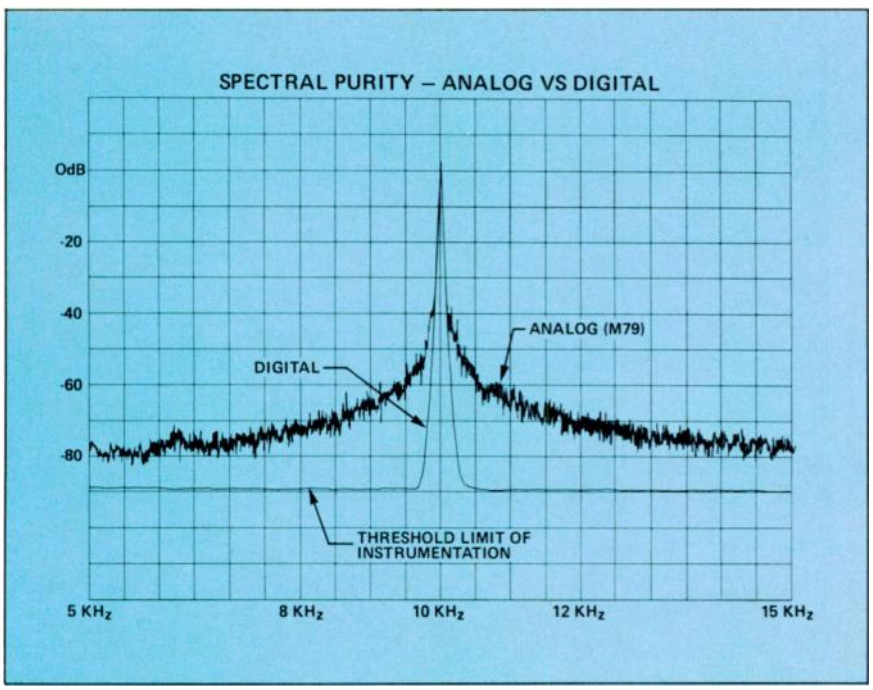

Figure 3 Modulation noise caused by high frequency (scrape) flutter (a spectral purity problem).

> "Digital editing is done electronically with some very sophisticated circuitry, but the user does not have to be aware of the binary goings on . . ."

A series of developments eventually resulted in a sophisticated data reordering system that spreads the digital information and correction data out along the length of the tape so that extra audio tracks are not required. This is the type of system that has been implemented at 3M; and it reportedly works very well.

Editing is another digital challenge, since you cannot simply splice pulse trains together. Digital editing is done electronically with some very sophisticated circuitry, but the user does not have to be aware of the binary goings on; he simply edits. Playing time for the 3M system is about 30 minutes on 12 ½-inch reels that spin off 7,200 feet of 1-inch tape at 45 ips; 14-inch reels can be accommodated for 45 minutes of recording time, if required.

In addition to the lack of signal degradation through multiple generations, digital audio recording is also characterized by unmeasurable print-through, cross-talk down in the noise

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level, and complete erasure. And since the audio pitch is as accurate as the clock frequency, which is crystal-controlled, short- and long-term variations are eliminated. In other words, no wow and flutter.

Also, since no pre- and de-emphasis is employed, the usual increase in audio distortion at high levels and high audio frequencies does not occur. 3M illustrates this phenomena to good advantage by comparing distortion levels for digital vs. analogue at 5 kHz. Modulation noise is another imperfection which is conspicuous by its absence by digital recording.

On the other hand, analogue recording has come a long way, and state-of-the-art conventional recording systems are far more than just adequate for broadcast applications.

For example, using an Ampex ATR-102 recorder and 456 Grant Mastering tape (both selected at random) we measured 0.1% total harmonic distortion (primarily third) at 1 kHz at an operating level that provided 12 dB of headroom and a 60 dB under-weighed S/N radio. A 17 kHz low-pass filter was employed so that ultrasonic bias components would not obscure the true noise level.

However, a flat 15 kHz bandwidth was employed in favor of weighted measurements for better comparison with the digital systems. Distortion was measured on a Tektronix 5L4N low-frequency spectrum analyzer.

At this point, I want to point out that

". . . state-of-the-art conventional recording systems are far more than just adequate for broadcast applications."

the digital system exhibits a different kind of overload than we are accustomed to with tape saturation. As is obvious from Figure 1, an input waveform that exceeds the maximum number of voltage levels available will simply flat-top positive and/or negative, like an amplifier that has run out of supply voltage. So, hard clipping occurs when maximum output level is exceeded.

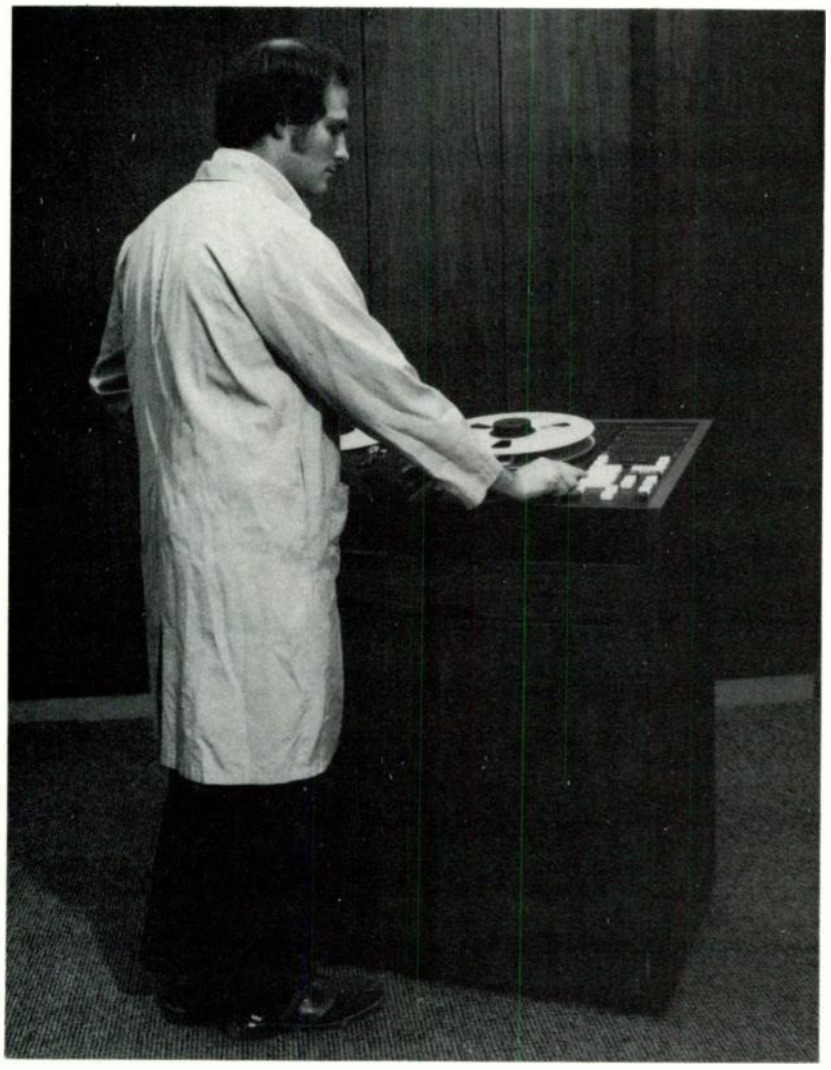
With conventional audio recording, saturation is usually (U.S. Standards) defined as the 3% distortion point. This was the case with our ATR-102/456 tests. The softer overload characteristic of analogue recording is quite different sounding than hard clipping. Less headroom could be tolerated, so a somewhat higher normal operating point can be used without audible distortion on peaks.

Taking this factor into account, I would prefer 20 dB of headroom in a system that hard clips, which means that the digital system would still provide a 70 dB S/N ratio as compared with about 60 dB for analogue recording. So what we are really looking for in terms of S/N is about a 10 dB improvement.

All in all, the ability to make multiple-generation and multiple-track tapes without degradation of audio quality is likely to revolutionize the recording industry. But what does all this mean to the broadcaster? Are digital audio recorders likely to find application in radio and television station production rooms in the near future? And is a first-generation analogue copy of a disc or tape from an outside source likely to be audibly inferior to a digital copy of the same signal source?

Given the limits of the analogue transmission system, will an FM listener at home be able to tell the difference if broadcasters convert all in-house audio to digital? After all, the transmission and receiving systems will still be analogue and are subject to about the same overload, S/N ratio, and distortion limitations that analogue tape recording is heir to.

These are vitally important questions for broadcasters who wonder whether or not to invest in the latest conventional audio recording systems when digital



Engineer Michael Kelly of 3M Company demonstrates the 32-track digital recorder, part of the Digital Audio Mastering System introduced during the Audio Engineering Society meeting in New York City. Recording 32 audio channels on special 1-inch tape, it is reported to be distortionless and noise-free. The 2/4-track stereo recorder in the system is not shown.

audio is being billed as the "coming attraction" in broadcast technology.

At this stage of development, it is obvious that digital recording is a very expensive endeavor, both in terms of equipment purchase or lease costs, and the cost of tape consumed. In the real world of broadcasting and broadcast production, a device must make an improvement that will be audible to the listener if its purchase is to be considered a worthwhile investment.

There is no doubt that the ability to record 32 tracks of audio and mix down to a master that has 90 dB overload-to-noise ratio without any noise-reduction gizmos is a breakthrough for the recording industry. However, it is unlikely that very many broadcasters will be enticed to look for a 90 dB overload-to-noise ratio recording system to feed a 60 to 65 dB S/N ratio FM broadcasting system, unless the cost is at least similar to what modern analogue systems are selling for.

Although some manufacturers are expected to introduce digital audio adapters to be used with relatively inexpensive home-type video recorders, electronic editing and professional-quality, error-correction systems are necessities for the professional that really mean little or nothing to the consumer. So there may develop a vast void between digital audio recorders for under $2,000, which are suitable for the sophisticated audiophile at home, and the truly professional recorders with the necessary features that sell for nearly $100,000. If sufficient recording-studio usage provides enough quantity to bring professional digital audio recorders down to the $10,000 price category, broadcasters might consider them economically feasible. Until that happens, digital's development will have little effect on broadcast analogue sales.

Digital audio is an exciting new development emerging from an infancy born of high development cost and great secrecy. It's a new technology characterized by both heated debate and enormous promise for an industry interested in mathematically precise audio reproduction. It is also an area of development which *Broadcast Communications* will pursue with continuing interest.

In future articles we'll take a more detailed look at the BBC error-correction systems, as well as digital audio transmission systems. We'll report on the latest developments around the globe to keep you abreast of advances as they happen. And above all, we'll ask the questions and make the lab tests that produce the answers you need to know. ac

Radio election remotes . . .

Not all the winners are on the ballot

By Don McGuire

Every successful political candidate needs teamwork from his organization to win an election. The same is true for radio stations hoping to score high with their election coverage.

Historically, election coverage and general news were among the first attractions of the earliest American broadcast stations, stations such as KYW and KDKA. But major-market radio stations today are faced with competition from a growing number of FM and TV stations. Serious coverage now requires a lot more up-front planning and a highly organized and coordinated news/engineering team for execution.

KYW Newsradio is a 50,000 Watt all-news station in Philadelphia owned by Westinghouse Broadcasting (Group W). It was a pioneer in 1921 when it went on the air for the first time. And it became a pioneer again in 1965 when it began broadcasting "All News, All the Time" and "News the Minute You Want It." Its news and features went on the air 24 hours a day, 7 days a week.

Those of us involved with the new format from the beginning soon learned that when your programming is dictated largely by events beyond your control, about the only major event you can really count on is an election. And at a deeply committed news operation, the election means a lot of work for the entire station staff.

Reporter Dick Standish (right) interviews candidate at Norristown, Pa., remote. This remote was fed to KYW studios via 450 Mhz radio pickup units in foreground.

While a general election usually calls for our greatest work load, it was the Pennsylvania primary in May that developed into KYW's largest team effort to date.

With KYW gearing up to handle the election, the regular broadcast of the Philadelphia Phillies baseball team had to be rerouted. Because of the station's overriding commitment to news, the ball game on election night was aired in Philadelphia by the local alternate, an FM station.

Because the game aired in Philadelphia contained commercials different from those carried by many of the 30 stations along the baseball network, the play-by-play feed from Houston was split into two separate signal chains within the console of another control room and studio set at KYW. This console engineer inserted the spots for the network, as the airman in the studio punched off the spots for the local alternate station. The engineer mixed both feeds and routed one channel output to the FM station's line; the second channel output went to AT&T for the network.

Now an off-year primary fight, or any general election, normally involves two or three major candidates. But by early March seven major gubernatorial candidates had filed, and each was judged to have a chance to make it. So, of course, this meant we had

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Don McGuire is the maintenance supervisor at KYW Radio in Philadelphia, Pennsylvania.

Scranton, Pa., wire remote setup with reporter Ed Kasuba. Equipment includes two "piggy-back" Shure mixers and KYW-built microphone mult box.

Photos by KYW staffers Ray Barker, George Grammond, Dick Maloney, Dave Martin, Bill Zino and Don McGuire.

Overall view of newsroom writing area. News Director Nelson Cohen (left), Editor Maggi Schivane on telephone with news source, and writers preparing air copy for studios in background.

New medium brought modern times

Warren G. Harding had promised the American people a "Return to Normalcy" during the 1920 Presidential election. But what lay in store for America was anything but normal; and the direction was forward, not backward.

Despite the election outcome and Harding's rhetoric, the United States entered modern times in 1920. Of greater impact on the arrival of modernity was the rise of mass communications — in particular, the introduction of radio as a consumer medium. And, ironically, the first generally-accepted radio broadcast went on the air during that historic 1920 election.

KDKA, Pittsburgh, signed on election night, broadcasting election results to receiving operators in Pennsylvania, Ohio, and West Virginia. The returns were received via the telephone from a Pittsburgh newspaper office and sent out over wireless telephone. They were heard on makeshift contraptions set up everywhere from the kitchen table to large auditoriums.

The *Westinghouse Electric News*, published by the Westinghouse Electric & Manufacturing Company, which owns KDKA, ran an account of the election-night broadcast on November 15, 1920. The following is an excerpt from that publication:

"In Vandergrift, Pa., slide bulletins were shown in the street for the benefit of hundreds of people there, the news being shown from ten minutes to a half hour before they were received by means of an auxiliary telegraph wire between Vandergrift and Pittsburgh. In addition, the wireless set was connected by means of a cable with the local telephone exchange, and the wire chief sent the news directly to subscribers who had arranged beforehand for the service, and also gave the results to any one making inquiries.

"At Latrobe the messages were utilized in a similar manner, thus enabling large crowds to get the messages early.

"At Irwin a large hall was filled to its capacity to hear the results of the election, motion pictures being shown throughout the entire evening.

"Not only in the immediate vicinity of Pittsburgh were the returns as sent from the Westinghouse Plant heard, but throughout Ohio and West Virginia they were heard with equal clearness.

"Also in Pittsburgh the radio method of sending returns was utilized in two ways. Persons having simple sets did not need to leave their homes to receive the returns, and by means of sets installed in a number of clubs throughout the city, large assemblages were able to have social functions at the same time as receiving the returns. At the Edgewood Club in particular a loud sounding horn was in use, and people could hear all over the large ballroom the voice of the speaker at East Pittsburgh as transmitted through the radio apparatus.

"At the same time the wireless telephone was giving this news to radio operators hundreds of men and women were receiving up-to-minute election returns in the auditorium of the cafeteria. As early as 8:30 in the evening announcements were made from several states as to how the election was going. The plan used to inform the people was very unique and thorough. As the returns were received they were thrown on the screen from the motion picture booth.

"It was possible to receive the very latest returns through the cooperation of the wireless telephone service.

"When returns were not being announced, a splendid entertainment program was in progress, consisting of music by Gill's Orchestra, motion pictures at intervals, vocal solo by Miss Ada France, vocal duet by Misses Ada and Agnes France and vocal solos by Miss Laura Atkin, Miss Anna Chilcote, George E. Kellogg and Fred Ward. Miss Julia Bartletti, pianist for the Community Chorus, accompanied the singers. The master of ceremonies for the occasion was A. S. Duncan."

Radio's most famous broadcast: The Harding-Cox election returns on November 2, 1920. This coverage on KDKA Radio, Pittsburgh, gave birth to modern broadcasting, opening a new era in communications. Pictured in this original photo is the first broadcast staff: William Thomas, operator; L.H. Rosenberg, announcer; R.S. McClelland and John Frazier handling telephone lines to the newspaper office. On hand as chief engineer, although the title was not known at the time, was D.G. Little. *(Courtesy of KDKA Radio)*

to deliver seven full remote pickups.

With a total of 11 candidates for governor, 20 for lieutenant governor, and 36 candidates for those congressional districts in our area, considerable research was necessary. Students assisting our regular staff helped build a file on each candidate. This included biographical material and political views, plus those "nitty gritty" details so necessary to a radio station: names, addresses, and phone numbers for contacts and press arrangements. Telegrams offering free air time were sent to all candidates, and about 45 accepted the offer. Their statements had to be scheduled for recording and airing. The various political organizations, partisan and nonpartisan, received close cooperation.

Less than a month before election day, the internal operations of the newsroom — the difference between coherence and chaos to the listener's ears — were set up.

About 50 staff members were fitted into the election night jigsaw puzzle. Fred Walters, KYW executive editor, headed up the overall election-night operation as executive producer, along with his assistant. The news director was given supervision of the newsroom activity. Other persons assigned to the newsroom were an in-studio producer; an editor for election news, in addition to an editor for non-election news; anchormen for election coverage; anchormen for non-election coverage; three election analysts, one each experienced in city, suburban, and statewide politics; four newswriters to prepare copy; and a tape editor to direct the handling of the miles of audiotape that would be used.

Five reporter/engineer teams were assigned to pickups at the candidates' headquarters covered by KYW. KDKA, the Group W outlet in Pittsburgh, was coordinated into the KYW operation to cover the two candidates headquartered there.

As the campaign heated up, air coverage by the outside reporters was intensified. All candidate appearances around Philadelphia were covered, with debates carried live when possible. And background series pieces, calling for 45 to 50 carts, were aired by the reporters.

During the countdown stages of the last week, maintenance engineers checked out all remote equipment and installed the control room operating position for the executive producer. The Telco lines for the four wire remotes (two in Philadelphia, one each in Scranton and Harrisburg, the state capital) were wired-in the day before the election. The fifth KYW remote was covered

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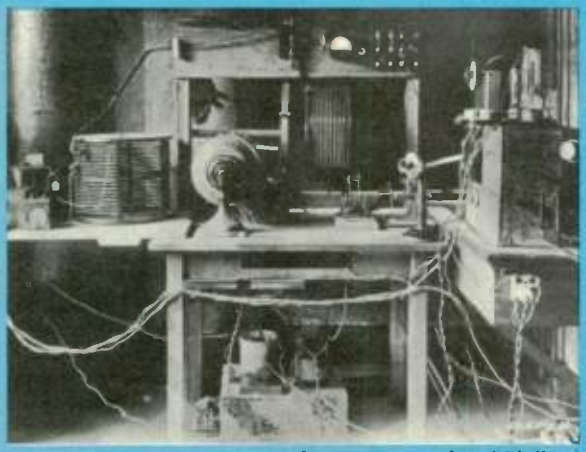
RENG
since the beginning

By Ron Merrell

When ENG became the hottest topic on the television side of the industry, I was reminded that live electronic remotes really go back to the first days of radio. To distinguish the difference between TV and radio remotes, let's call radio remotes RENG.

Several stations, including KYW and KDKA, pulled off remotes almost from the beginning. In these pictures you see some of the portable and home-station gear. The old car and remote team in front of the Syria theatre were from KDKA, circa 1926.

(Photo courtesy of Rod Phillips)



(Photo courtesy of Rod Phillips)

The KYW remote shot was taken in 1937. And it's thought to be of a special broadcast celebrating the opening of the Walnut Street studios.

The transmitter shot is of an early KYW rotary spark transmitter. While some of the gear is mounted in and on soap boxes, in its day this was not considered an unusual layout.

Despite the strange and awkward-looking gear, in its very earliest days, radio established the viability of remotes. So while the programming, equipment, and vehicles have undergone great changes, RENG continues as an important facet of radio broadcasting.

(Photo courtesy of KYW Radio)

by the station's two-way radio system.

The two remaining remotes, covered by KDKA, were fed into KYW through the Group W "hub and spoke" type network lines that link all Westinghouse stations to their Washington News Bureau. The wiring was changed temporarily to connect Philadelphia and Pittsburgh together directly. This was necessary because the "hub" (Washington) was unmanned for that evening.

On election day, the portable remote equipment was assembled into suitcases and the reporter/engineer teams sent to their assigned locations.

With the remotes finally set up and checked out, election coverage began at 7 p.m. Election results were received from the wire services, the staff people at the election bureau's computer center, and stringers set up throughout the area. Election coverage was aired during the first 15-minute segment of each half-hour block of air time. During this segment, the station aired remote reports, voting updates, and discussion by the anchor and his three analysts. The final 15 minutes of each half hour were used for non-election news, prepared and aired by a different news team.

Walters cued all those involved during their segment from his operating position next to the console. While the non-election news was airing, he set up the general coverage priorities and arranged the sequence events for the upcoming election segment.

To aid the executive producer, the engineering department developed a simple and easily installed temporary communications system. Through a small panel before him, the producer was in touch with each local remote, the Pittsburgh remotes via the "hub and spoke," the in-studio producer, and the recording area — either individually or in any combination. The regular intercom system to the newsroom and other studios and controls rooms was also used.

An "interrupted cueback" system for remotes was set up by installing two Telco lines to each remote: an equalized line for feeding from remote to studio; the other a cue line (unequalized) to constantly feed the air product back to the remote for monitoring. When the producer talked to the remote via the cue line, he momentarily interrupted the air monitor feed.

The same result was achieved with radio pickup remotes, since the two-way system was operated "full duplex." The remote's receiving frequency was removed 5 MHz from its transmit frequency, permitting simultaneous transmit and receive between the remote and the base station.

Another feature of the producer's election setup was the "All Call" mode that allowed him to talk to all parties simultaneously with a single lever key. Throwing the key in the opposite direction gave a "Conference" mode that connected all remotes together. (This meant that the remote teams could talk with each other without requiring the producer to relay the conversation.)

Since the in-studio producer's earset was on one of the producer's keys, Walters relayed instructions to the anchor and analysts with cue cards when the mikes were "hot." Walters also had the option of speaking directly to the air people through earsets plugged into another similar monitor/cueback system. We found it an advantage to have a producer acting as traffic cop in the studio itself, to avoid confusion.

On the remotes side, the two-way radio system was used in suburban Norristown not only because of difficulty in obtaining equalized lines, but because a satellite receiver, feeding an equalized line to the voting panel at the studios, happened to be located atop the courthouse across the street. A Moseley RPL-4 radio pickup transmitter combined with the high-quality receiving chain gave us fidelity and reliability comparable to our wire remotes.

The Norristown reporter used a Motorola HT220 Handie-Talkie modified at KYW by adding a broadcast-type EV635 microphone. A simple transformer and response-shaping RC filter fed the EV635 directly to the HT modulator. The HT220 audio quality was enhanced considerably.

The two distant KYW remotes, at Scranton and Harrisburg, were each equipped with a "piggy-backed" pair of Shure M67 mixers. The tandem units were sent to the farthest points as additional fail-safe precautions. The second unit could have been substituted instantly if the primary unit failed. These two pickups had amplified mult (single input/multiple output) boxes for headphones on the cueback line. Again, the second M67 could sub for a mult-box failure. (For a more detailed description of the mult box, turn to the World Forum section, page 80.)

In the case of the two downtown locations, only a non-amplified passive headphone mult box was required. We had just two Collins 212Z remote mixers, so only one was assigned to each downtown point. The one remaining mixer on hand, a Shure SE30, was held at the studios in reserve. In case of a mixer failure in town, which did not

Continued on page 60

Executive Editor Fred Walters, election-night executive producer, talks to a remote location from his operating position set up just for the evening.

All-News Radio: The Front-Page News Service

By Michael Scheibach

Fred Walters recently left KYW to become program director at WINS in New York. But during his six years as KYW executive editor, he came to believe in the importance of the all-news format — a format adopted by KYW 13 years ago.

Walters believes that radio definitely has a role to play in the coverage of live events, including elections, despite the obvious edge television commands by bringing both sound and video to the news scene.

"I guess you might say that television news crews do command more priority, particularly during live remotes between 10 and 11 p.m., when stations are broadcasting their news," Walters said. "But our reporters do not feel they are competing directly with television crews. Most coverage at a candidate's headquarters consists of the candidate making an announcement or comment at the front of the room which any reporter can cover. Where the competition comes into play is in the extracurricular, exclusive interview, and it is here that the television camera commands priority. But at KYW we were not that concerned with getting this kind of exclusive interview."

Walters was quick to point out that all-news radio has its own distinct advantages. "Radio is like a general-circulation newspaper," he said. "We have immediacy. We can go beyond the radio station that carries only 10 minutes of news each hour, and a television station that provides 30 minutes of news twice daily. All-news radio not only can cover major news events, but can cover them in-depth, from a wide array of angles, complete with analysis — the side-bar aspect of the news."

With today's emphasis on electronic journalism, Walters adds that radio is like a "front-page news service," in the traditional sense of what front-page news used to mean. Like a newspaper, all-news radio can cover the headlines from a variety of categories, including national and local news, sports, society, literature, and business. It is this approach that makes all-news radio important. As Walters said, "Most news coverage is spontaneous: an event happens, and the reporter gets the story." It is the quality of this coverage that determines the legitimacy of the station's news.

happen, this reserve unit could have been delivered very quickly.

For locations where a crowd could have been a problem, we put together what has been dubbed the "umbilical cord" unit. This unit is a very small box worn on the reporter's belt, which accepts a mike with a 5-foot line. A headphone jack with volume control is mounted in the box to output the cue-back feed from the studios. The microphone output, together with the headphone feed, can be carried back to the mixer through a single cable containing two individually shielded pairs. The shielding is sufficient to prevent crosstalk from the +8 VU headphone pair into the very low-level mike pair. Isolation is adequate for a cable run of a hundred feet or more.

Every remote included a cassette recorder for feeding tape interviews through the mixer. We also used a business telephone with a QKT voice coupler attached as backup for line failure. All equipment, including the radio unit, was equipped with a battery backup and, therefore, was independent of AC line failures. This paid off when two remotes experienced several power failures.

One other remote unit made the job easier. We used an amplified distribution box for feeding several mixers and recorders, with various input connections and required levels. By accepting a mike input by XLR connectors, or a pair of wires by way of binding posts at any level from +20 VU to less than −30 VU, the distribution box could feed 9 XLR mike level connectors at better than 60 dB isolation. Additionally, the unit has six standard phone jacks, six mini jack outlets, and two sets of binding post outputs — all at line level.

The operator can monitor the output from a level-controlled headphone line or by a small VU meter. The 7" x 5" x 3" distribution box can be AC or battery powered; the power mode in use is indicated by one of the two LEDs. This unit is valuable when several other units at the location must be fed from a single source.

Back at the station, a reel tape machine continuously recorded each of the remotes, regardless of whether anything was actually being fed. Nothing was missed, even if the remote could not give advance warning that a feed was coming. The machine was monitored constantly, and the important segments were transferred to cartridges. We estimated that at least 100 carts were recorded during the night's coverage, for use that same evening and the following day.

Continued on page 62

DELTA ELECTRONICS

NEW AMC-1 AMPLITUDE MODULATION CONTROLLER – Provides automatic control of the modulation levels of an AM broadcast transmitter.

NEW DPM-1 DIGITAL PANEL METER – Provides remote meter reading for Delta's RF ammeter systems. Up to 16 channels available with front panel pushbuttons.

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AAM-1 ANALOG ANTENNA MONITOR – FCC type approved. Provides accurate true ratio and phase readings. Easy to interface with existing control systems. AAMH-1 provides hardwired remote control of AAM-1.

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; DAMX-1 to extend capacity of DAM-1 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.

OIB-3 OPERATING IMPEDANCE BRIDGE – The new OIB-3 features direct reading of 'R' to 1000 Ohms and 'X' to 900 Ohms. The OIB-3 also contains an integral rf amplifier.

RG-3 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.

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6730 COAXIAL TRANSFER SWITCHES (for 1-5/8 in. 50-ohm transmission lines) – used to switch transmitters, transmission lines, antennas, dummy loads, and auxiliary equipment quickly and efficiently when failures occur, when operating procedure is changed, or during scheduled maintenance periods.

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

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Circle (41) on Reader Service Card

Engineering side of control room used for election-night programming. Engineer Maureen Shaughnessy at console mixes all program elements into the final air product.

Polling returns could have inundated us, but here again, advance planning paid off. Each update was numbered and timed in. The election editor then routed the returns to the statisticians for collation, and to the writers for preparation into air copy for the anchorman.

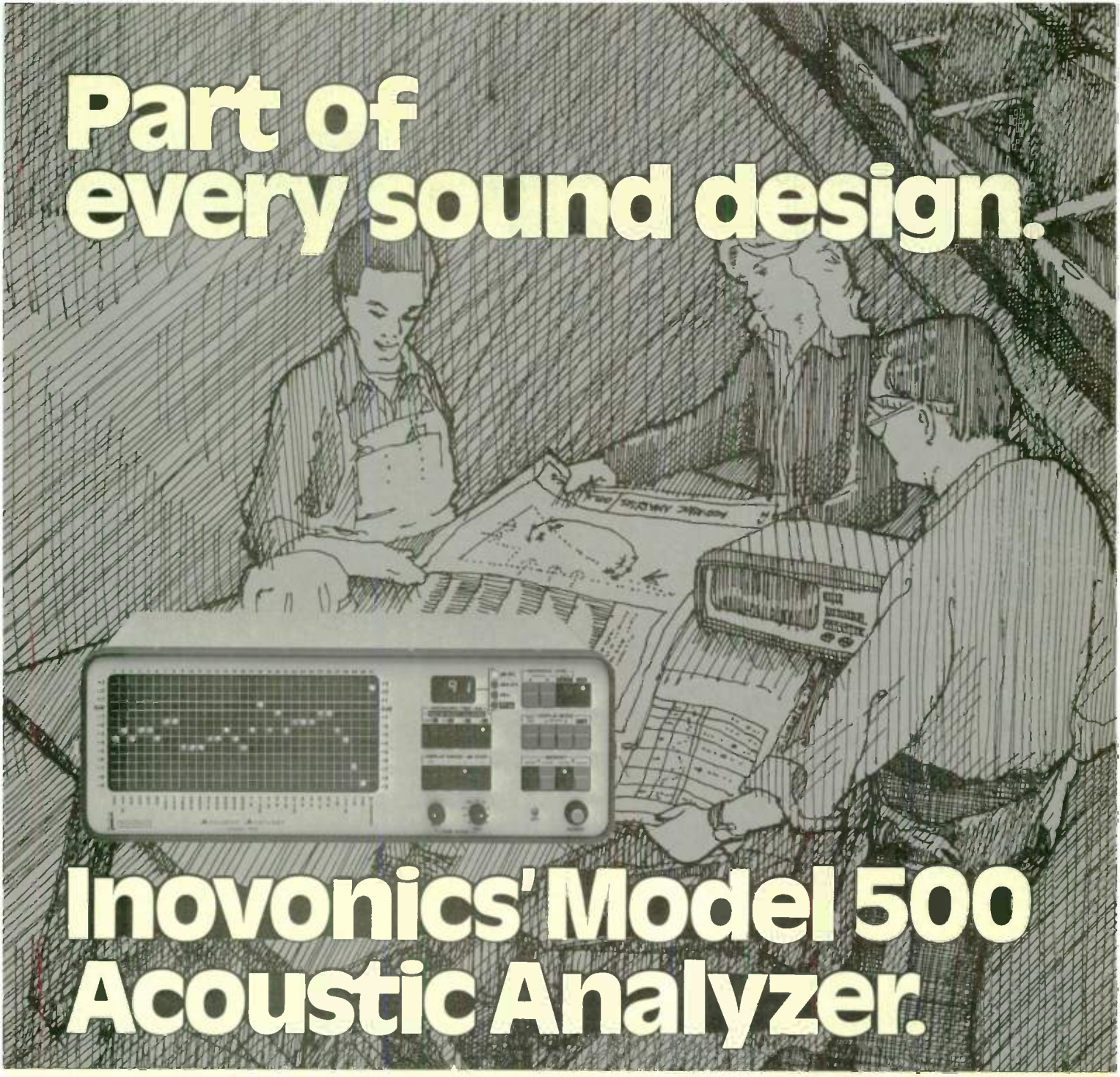
Surprisingly, the actual volume of paperwork was not as large as might be expected for the amount of air time involved. The bulk of each segment was ad-lib, being mostly live reports from the remotes, telephone interviews, and the extended discussions by the anchor and the analysts. Usually, only the return figures were scripted, for obvious reasons.

While the election night coverage started at 7 p.m., some of the races weren't decided until 3 a.m.; intensive coverage continued until 5 a.m. without problems. It was an outstanding team effort, although admittedly seven remotes in one evening is a little unusual for a radio station these days!

But does this kind of effort and planning really pay off? Before the changeover to all-news in 1965, KYW's audience was far below every major station in the market. It was jokingly claimed that even the police radio had a larger audience! What a different story today.

Recent figures give KYW about a 15% share of the 21-station market, and a weekly cumulative audience of more than 1.4 million.

Of course, not all stations want to commit this much effort and equipment for election coverage. But if these stations would limit their coverage to a specific issue or set of issues or a limited number of office races, the same kind of thoroughness will pay off. The key is total team cooperation. ac



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Circle (43) on Reader Service Card

Broadbanding your antenna is important for AM stereo

By Robert A. Jones

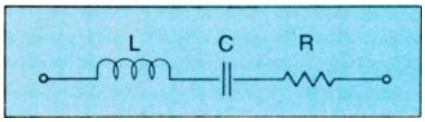

Figure 1 Equivalent circuit of ideal antenna, where $X_L = X_C$ at f_0 and R = 50 ohms.

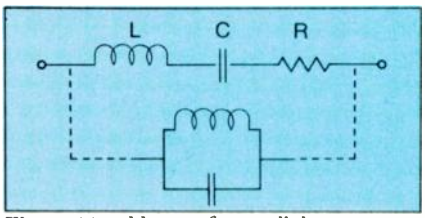

Figure 1A Addition of a parallel corrective network to achieve better load impedance over bandwidth of transmitter.

For years now, broadbanding for television has been a fact of life. Surprisingly, it's been overlooked in AM. As the countdown on AM stereo continues, and as the newer type transmitters are bolted in place, it will be important to consider more than just matching the transmitter to the antenna at the carrier frequency. It's more important to maintain a reasonably constant load impedance over the modulating bandwidth transmitted by the transmitter.

In some installations the antenna resistance curve does not impose any special design requirements, but in others the impedance bandwidth problem may become a major factor in the antenna coupler network design.

Robert A. Jones heads up a consulting group in La Grange, Ill. He has written numerous antenna articles, and recently completed a book on directionals.

If the load impedance is made reasonably constant over a frequency range significantly in excess of the bandwidth to be transmitted, transmitter performance will be greatly improved and overall operation significantly stabilized. If your transmitter performance measurements indicate that significant problems with frequency response are present, and if harmonic distortion climbs with increases in audio frequency, serious consideration must be given to the antenna coupling circuit, and it should be done now.

An analysis of a transmitter's output stage performance indicates that the optimum load impedance, as a function of bandwidth, should be the equivalent of a dissipative parallel resonant circuit. A simple antenna whose resistance is constant and whose reactance varies as a series resonant L-C circuit is shown in Figure 1. The curve of this ideal load impedance is plotted in Figure 2.

Suppose now, that you put a reactive network across the input terminals and try to improve the match. If this network in parallel with the antenna is a parallel L-C network resonant to the carrier frequency, the effect at the lower sideband frequency (f_L) will be to transform the admittance from the uncorrected value to a new value. The admittance at the carrier frequency will not be changed, but at the upper sideband (f_U) it will be improved. For moderate impedance bandwidth problems, a significant improvement can be made by proper choice of the L-C ratio of the compensating network (Figure 1A).

If the mismatch between sidebands is significantly severe, a simple reactive compensation network no longer would offer a satisfactory improvement.

Normally we try to match the complex impedance of the antenna or common point to the characteristic resistance of the transmission line at the carrier fre-

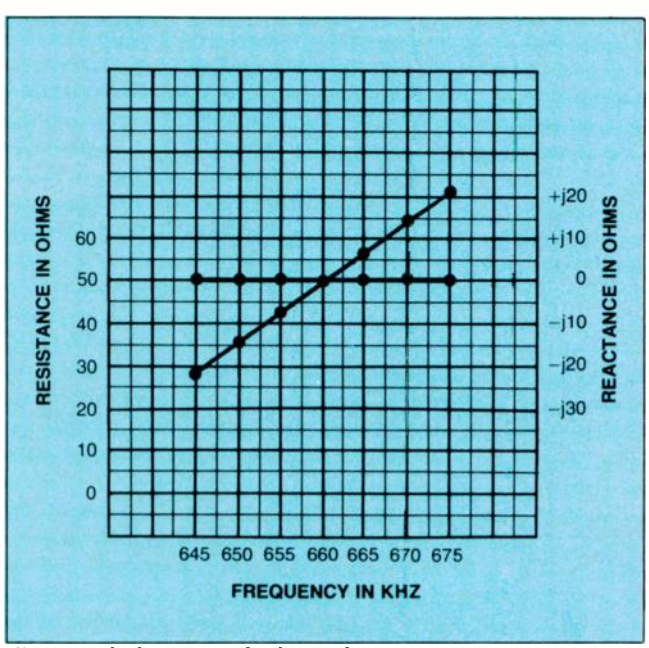

Figure 2 Ideal operative load impedances.

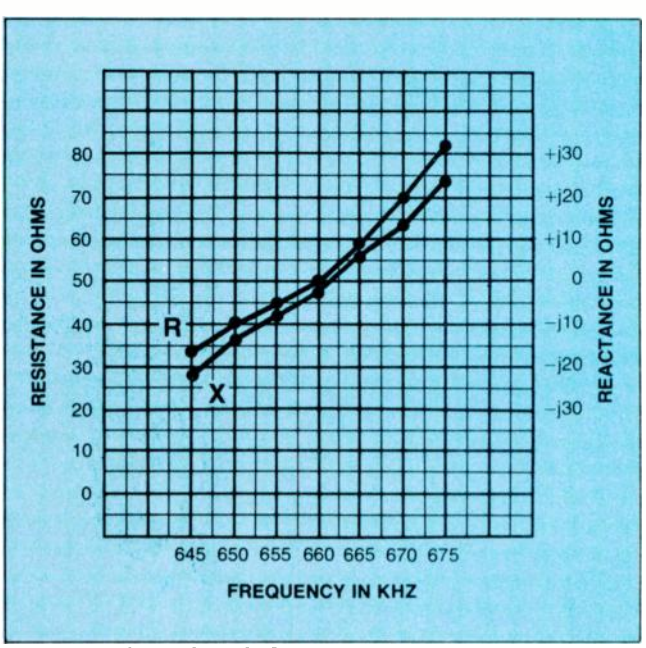

Figure 3 Load impedance before correction.

quency. This is accomplished by inserting a matching network of some sort between the antenna and the transmission line of the common point. At the carrier frequency (fo), the transmission line is matched to (and sees a resistance approximately equal to) its characteristic resistance. This load is reflected as a pure resistance of the same value back to the sending end of the line, but only at the carrier frequency.

At the sideband frequencies, the load will reflect to the sending end of line something different than a pure resistance. At this point we can say the line is not "matched" at the frequency of the sidebands.

It usually becomes a complex impedance, depending upon the antenna or common point network that the sidebands see. This also can depend upon the design of the matching network. At the sideband frequencies, the transmission line acts as an impedance transformer of the load presented to the transmitter. The sending end of the transmission line will be affected by the length of the line in electrical degrees.

Let's look at some measurements I observed recently. The resistance and reactance curve is shown on Figure 3. The carrier frequency of 660 kHz is well matched, but at 10 kHz the impedance mismatch is 1.19 VSWR at the lower sideband, and 1.44 VSWR at the upper one. At 15 kHz the mismatch would be 1.23 VSWR on the lower and 1.73 VSWR at the upper.

If we had an ideal load and the power were 50 kW, the relationship at ± 10 kHz would be that shown in Figure 4. Namely, 12.5 kW of power in each sideband. Figure 5 shows the real conditions measured. The mismatch in resistance, in impedance, and in sideband power is obvious.

The solution is to control the match at the sideband frequency by adjusting the length of the transmission line either physically or by inserting a delay or advance network in series with the line. In most cases the use of a well-constructed delay line is recommended. This would allow variable control; and, it is more efficient.

So let's look at how you can correct the mismatch noted earlier. To do this you need a special type of chart, called a Smith Chart. This is a circular graph with the reference point in the middle at −50 ohms. The graph represents a half wavelength of displacement. Another way to approach this type of chart is to note that it simultaneously displays R ±jX and frequency. Figure 6 is a Smith Chart representation for the load our

Continued on page 66

660 kHz transmitter was looking into. As you can see, the black plot is semicircular and bends to the left. If our plot were ideal, it would be crescent-shaped and would deflect slightly downward along the 50-ohm reference line.

The best solution is to find a corrective network that will rotate our crescent-shaped plot about a third of the way around the graph. To be precise, we need 70° of shift toward the transmitter. We can achieve this by using a T or Pi network with a 70° lagging phase angle.

Figure 7 shows the circuit configuration used. It consists of two inductors (L_1 and L_2) that form the arms of the T network, with a single capacitor forming the stem of the T. The values are shown in the calculations before the circuit. Once you know the reactive ohms required, it is a simple matter to compute the microhenries and microfarads required. In this case, where fo is 660 kHz, the values are 8.44 uh, and 0.0045 $u$fd.

Since a corrective network sees 50 ohms in and 50 ohms out and achieves only a shift in phase, it could be installed at either end of the transmission line. It really amounts to having added 70° more line between the transmitter and the antenna.

Figure 8 is a representation of how the impedances and power division work out after installation of the corrective network. The talk power in each sideband is now almost equal. It represents 27.7 kW, or 2.7 kW more than required for 100% modulation. With this tuning condition, you would have to slightly reduce the audio input to the transmitter.

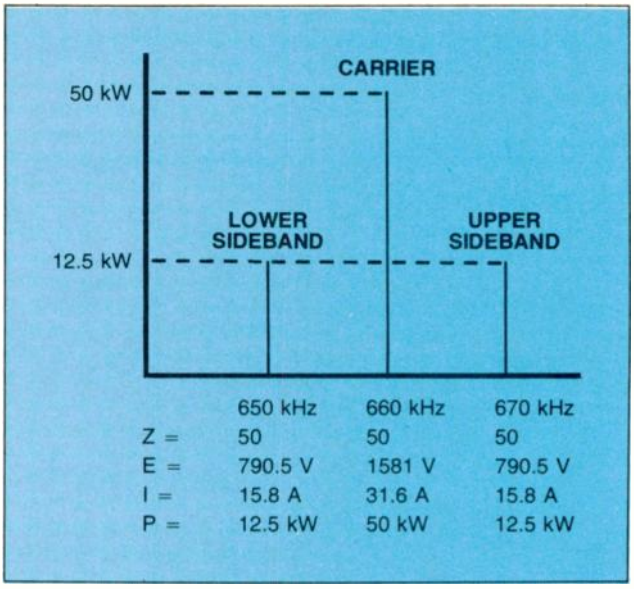

Figure 4 Ideal conditions for transmitter to look into.

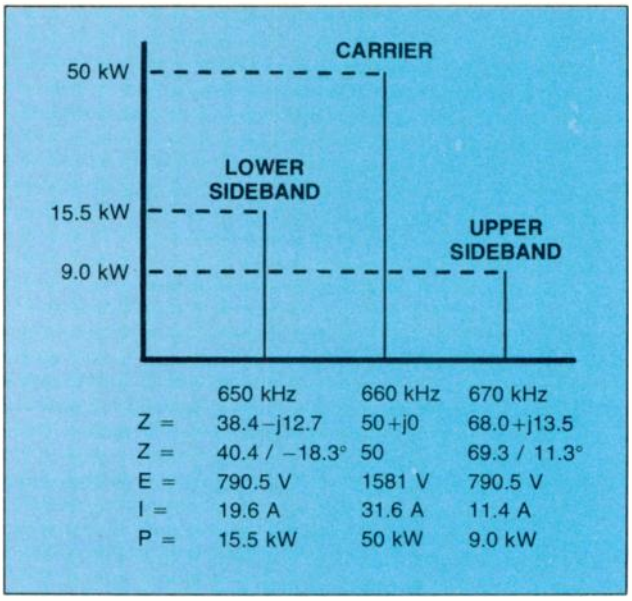

Figure 5 Condition as found at transmitter output.

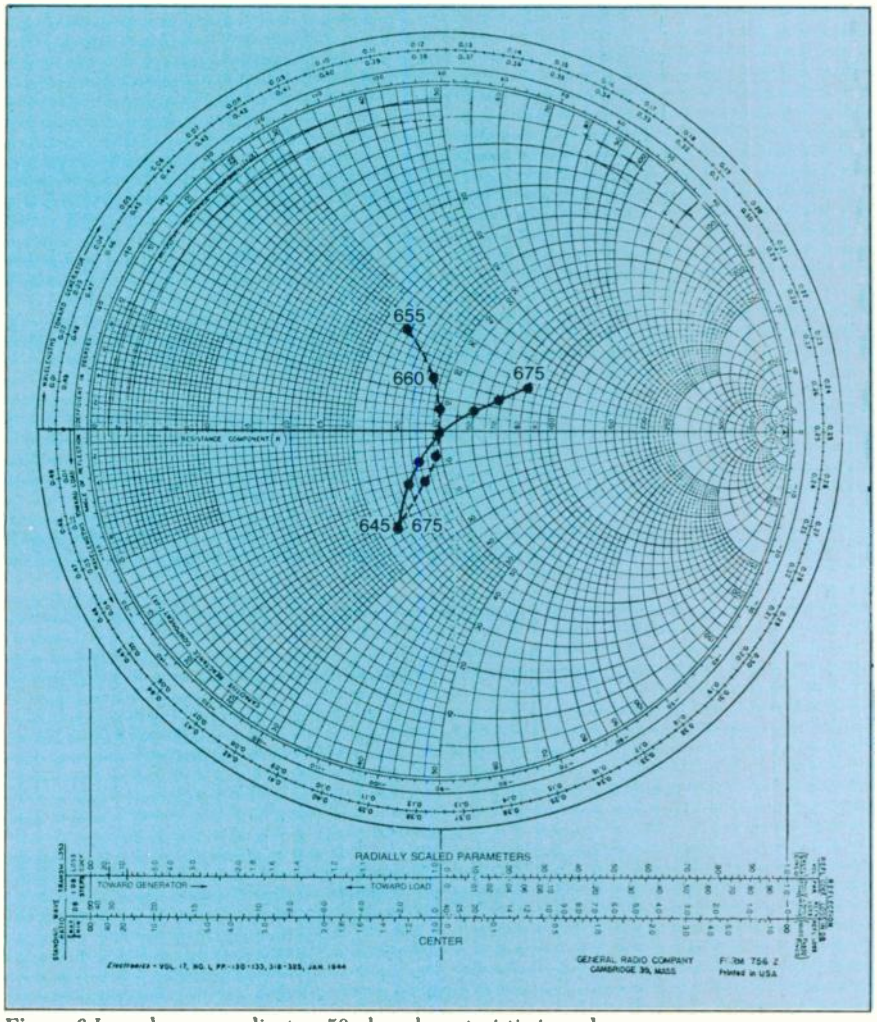

Figure 6 Impedance coordinates: 50-ohm characteristic impedance.

A transmitter with this load impedance would be easy to modulate.

On Figure 6 the broken line shows the corrected value of load impedance. Figure 9 is a rectangular plot of these same results. You will note that this plot is very close to our ideal operating plot displayed in Figure 2. The resistance curve tends to be flat with frequency (1.2:1.0 ratio), while the reactance curve is equal and opposite. The fact that this reactance curve slopes negatively, whereas the ideal one slopes positively, will make no difference.

The ultimate test is to conduct an audio proof on the transmitter. With a load this flat and a normal transmitter, you should have no trouble achieving an audio response of less than ±1 dB out to 7,500 Hz and less than ±2 dB to 10,000 Hz. Harmonic distortion would easily be 2.0% or less.

The case discussed here is just one method of solving a poorly matched antenna load. The use of parallel tuned circuits, line stretchers, and conversion of L circuit ATU's to T or Pi circuits, are all possibilities for curing a mismatched condition.

Not all radio stations can achieve an ideal load for their transmitters, and several factors account for this. In some cases, where directional antennas are involved, the conflicting impedances reflected into the common point circuit make it too difficult. In some cases the power losses in the extra coils and capacitors make it impossible for the

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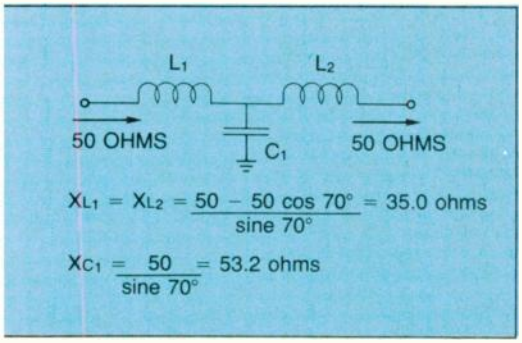
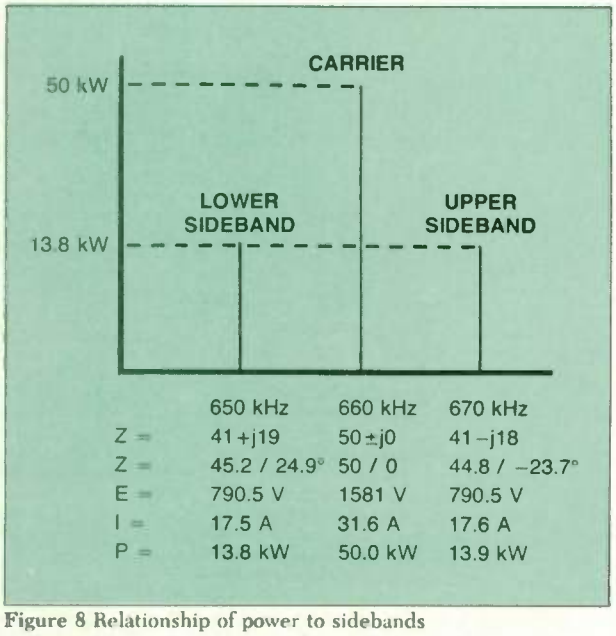


Figure 7 Circuit for corrective network.



	650 kHz	660 kHz	670 kHz
Z =	41+j19	50±j0	41−j18
Z =	45.2 / 24.9°	50 / 0	44.8 / −23.7°
E =	790.5 V	1581 V	790.5 V
I =	17.5 A	31.6 A	17.6 A
P =	13.8 kW	50.0 kW	13.9 kW

Figure 8 Relationship of power to sidebands

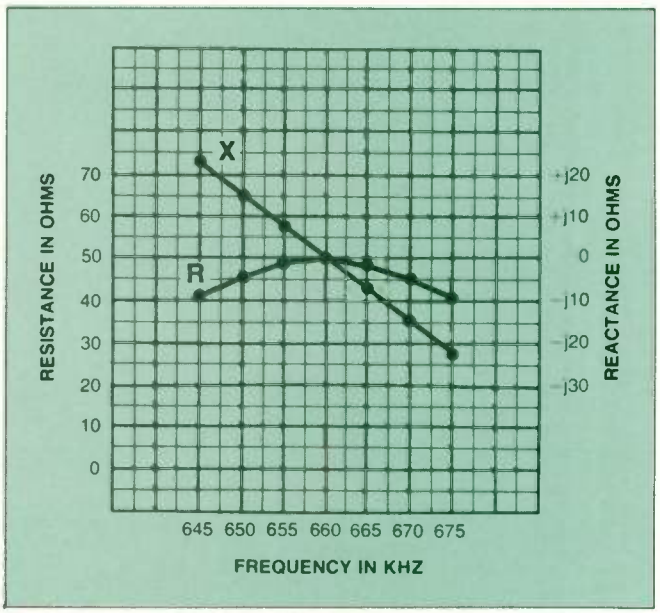


Figure 9 Corrected load impedance

transmitter to achieve rated power. In fact, harmonic traps and cross-modulation filters can affect the impedance curve beyond an engineer's ability to correct it. And in some cases it would require a completely new antenna phasing circuit design, making it economically prohibitive.

In other words, we can't always move mountains, or bridge canyons, or redesign existing antenna arrays. Whatever your needs may be, they should be attacked now. When AM stereo does come, you'll be ready to take full advantage of it. BC

"this Auditronics 110 in the Louisiana Superdome...

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

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

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

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

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

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Circle (49) on Reader Service Card

New antenna will help HCJB project "the voice of the Andes"

By Ron Merrell, Editorial Director

In recent years, the list of stations operating on the international shortwave frequencies has been growing steadily. Already faced with variable sunspot activity, international stations must now deal with the resultant spectrum-crowding problem. The situation for many stations has been further complicated by greatly expanded language services.

While some relief may come from the WARC, stations around the world have been making changes in their operations to take the programming strain off their staff. At the same time, they've been looking for technical improvements (other than taking super power as the only answer) to find a means of consistently reaching their listeners.

For more than 40 years, international shortwave listeners have been accustomed to easily picking out HCJB, "the voice of the Andes." But while these listeners seldom realized it, since HCJB's first broadcast from Quito, Ecuador, the station has been a leader in international shortwave equipment and antenna designs. And now they're on the verge of pouring their RF into a unique antenna system that will make their

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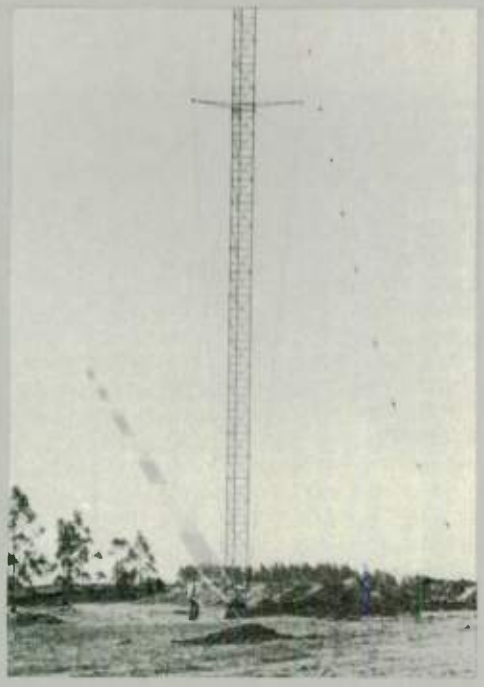
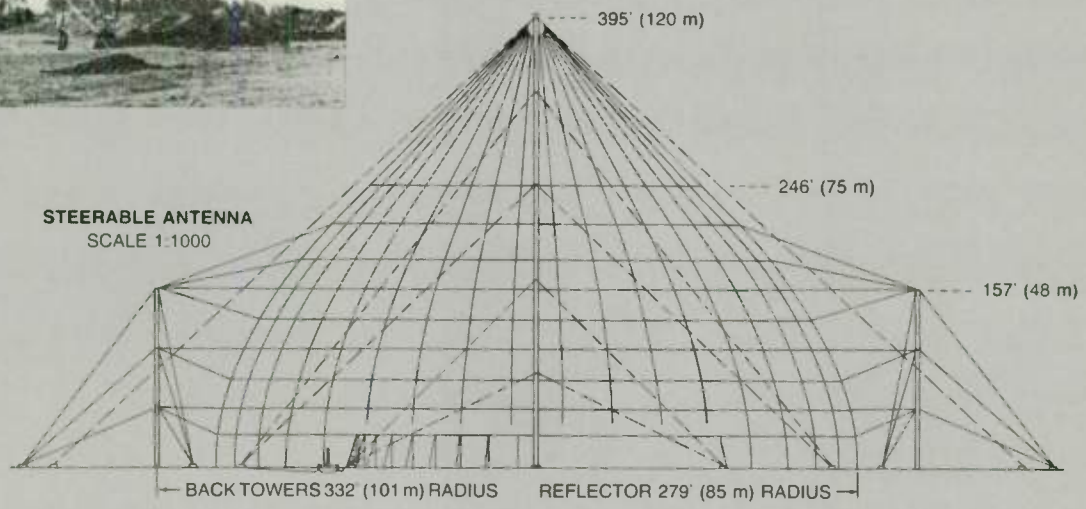
The stereo production control room is equipped with ITC 850 machines on the left and a Rupert Neve BCM10/2 mixer in center.



The 127-meter (417-foot) support tower for the steerable antenna is raised in one piece. It was built in the HCJB shop.



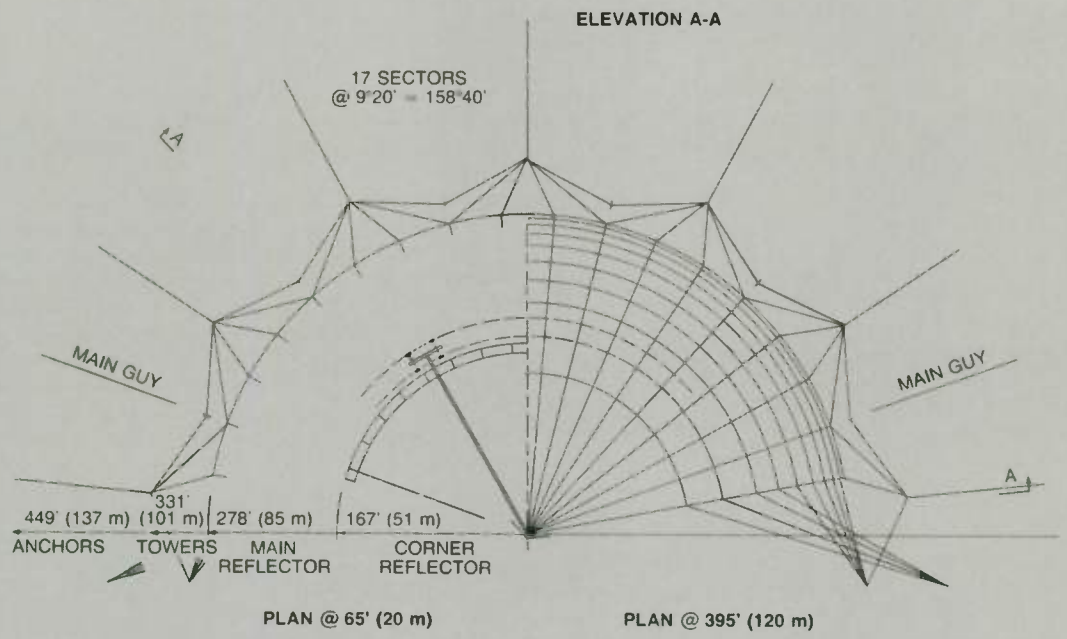


Figure 1 *Broadcast Communications* artist's conception of the HCJB steerable antenna.

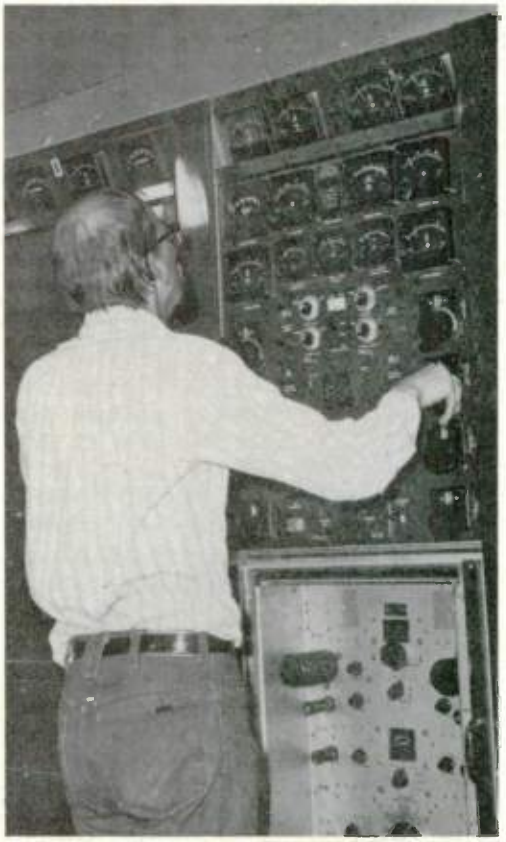
This look inside the HCJB transmitter building shows several RCA BHF-100 100 kW shortwave transmitters.

HCJB is operated by the World Radio Missionary Fellowship, Incorporated. In addition to their local and regional broadcasts in Spanish and Quechua, the station also beams programmes to the Caribbean, Central and South America, North America, the Soviet Union, Japan and the South Pacific.

Their effective worldwide penetration is reflected in their correspondence from listeners. In 1977, they received 111,530 letters and signal reports from 130 different countries and geographical locations.

In addition to their international shortwave radio operations, HCJB produces dramas and special spot announcements for use on local television stations. They also maintain a 50,000 call per month telephone system. And the effectiveness of their quality control is reflected in a total average downtime for all their operations of just 0.5%.

Since HCJB operates 24 hours a day, you should easily find them operating on the 49-, 31-, 25-, 19- and 16-meter bands.



An HCJB engineer adjusts the RCA BHF-100 100 kW shortwave transmitter.

Transmitter building (below) at the HCJB Pifo site.

whole operation more flexible, efficient, and consistent.

HCJB engineers, constantly upgrading the station, are now at work on a "steerable" antenna that will allow them to shift their signals from continent to continent. At the same time, this new antenna will provide extremely high gain.

Since the antenna is still under construction, no pictures are available, but Figure 1 is our *Broadcast Communications* artist's conception of the project.

Designed for operation in the 49-, 31-, 25-, 19- and 16-meter bands, HCJB's horizontally polarized steerable antenna will give them from 19 dB gain at 49 meters to 25 dB gain at 16 meters.

What's more, this design will have multiple program handling capability. It will take up to four programs at the same time, with a power capability that could accept RF from four 500 kW transmitters.

The steerable system features two mobile feeds on a circular track for the wide target areas, and two or more fixed feeds for narrow target areas. The beam direction on the mobile feed is variable over a 120-degree arc, with a beam width of 15 degrees at 16 meters and 30 degrees at 49 meters. The final operating design may include several other feed radiators inside this one massive reflector.

According to the current design, the mobile feed radiator will shift the HCJB beam direction from North Africa up to Europe, the Soviet Union, North America, on to the other side of the world for the Far East and the Philippines.

To get an idea of the size of this system, the central antenna support tower is 127 meters (417 feet), while the base of the reflector is 169 meters (555 feet) wide. Together with all towers, reflector and supporting guy lines, the HCJB steerable antenna will occupy about 6 hectares (15 acres) of land space.

As the drawings show, the reflector structure is an intricate network of horizontal and vertical wires that will require about

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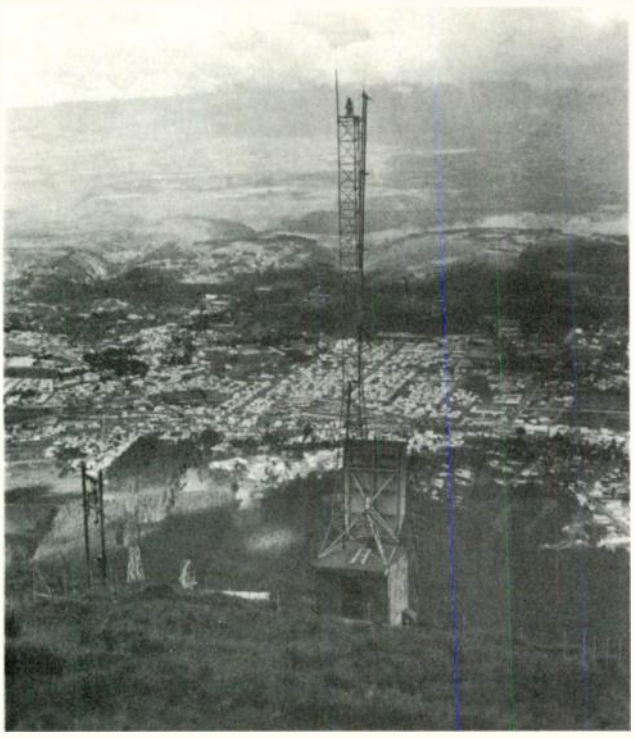


This FM stereo transmitter site is 914 meters (3,000 feet) above Quito. The FM transmitter runs a 5 kW passive reflector for reflecting microwave STL signals to the Pifo site.

5,000 wire wraps and about 30 kilometers (18 miles) of wire. The cables, including guys, total about 10 kilometers (six miles).

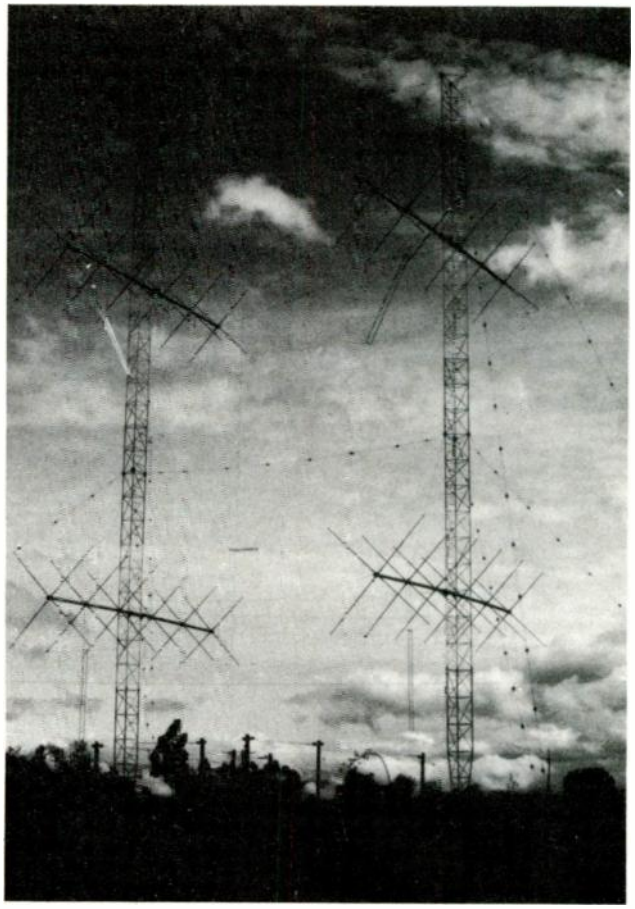
Like many international broadcast stations, HCJB maintains a true antenna farm. Due to shifting conditions, these stations need the flexibility of operating on more than one band. Caught in the crunch of overcrowded bands, some international shortwave stations have even opted for operating outside the limits of the international shortwave bands.

Currently, HCJB is using 19 antennas at their Pifo site 24 kilometers (15 miles) east of Quito. These antennas range from 24 to 73 meters (80-240 feet) high. These are curtain antennas, except for an array of four stacked six-element quads for 13-meter service to Europe, and a colinear dipole for 49-meter regional service.

Due to their diversity of services, HCJB operates from two transmitter sites. The 50 kW primary medium-wave transmitter and a 5 kW FM-stereo transmitter, which carry local programming, are planted 914 meters (3,000 feet) above Quito on the slope of a 4,794 meter (15,728 foot) dormant volcano. The main transmitter site is at Pifo, which is at an elevation of 2,610 meters (8,563 feet).

At the Pifo site they operate three 100 kW, two 50 kW, and two 30 kW shortwave transmitters, and a 30 kW medium-wave standby transmitter. They are planning now to add a 500 kW shortwave transmitter next year.

Powering up all these transmitters and facilities is no easy task. Power for the Pifo site is generated at their hydroelectric plant located on the eastern slope of the Andes mountains. At the Pifo site they have three diesel generators which can produce 1.2 MW. In Quito, the power is supplied by the local power company, backed up by an HCJB standby diesel generator.



A view of the four-bay, six-element cubical quad antenna for 13-meter service to Europe.

At the HCJB studios, multiple-language programming and broadcasting have made great demands on the staff. But typical of their management operation, the station is moving ahead here, too. The HCJB traffic and operations department is operating a lot more efficiently these days on the strength of automation. With more than 65 hours of daily programming in 13 languages, program flow has been a major challenge, but now even more relief is on the way.

Earlier this year HCJB's new program automation system went into semi-automatic operation. The new system, called Program Automation Control System (PACS), has expanded and refined their programming capabilities.

PACS now doubles the number of audio programs (from four to eight) that HCJB can originate simultaneously. An added advantage is that this facilitates better system maintenance through redundancy.

According to HCJB, PACS helps them produce a much smoother audio program flow and control through such features as automatic silence monitoring of program lines, complete automatic gain control and limiting, and automatic manipulation of system tape decks and audio switching. The operator can control the system with a minimum of button-pushing.

All audio switching is accomplished with MOS analogue

multiplexer chips. Program-to-program fading is handled by an electronic fader, built around a four-quadrant multipler chip.

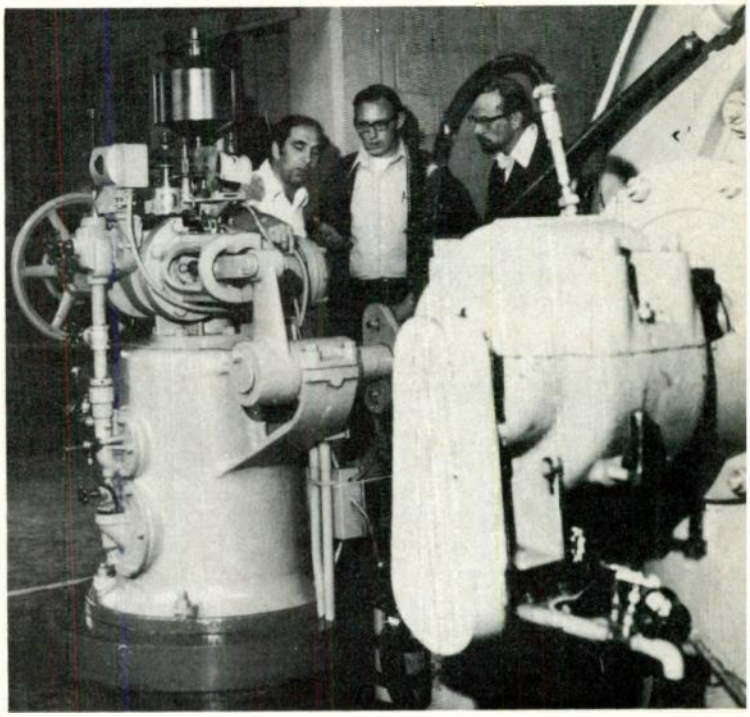
The present semi-automatic control system is implemented with TTL series 7400 digital logic. When completed, the final and highest level of system operation will employ microprocessor technology. Once under total computer control, the TTL semi-automatic control will act as a backup system.

Full computer control of PACS will include such features as computer maintenance of the program schedule and automatic computer response to program line conditions such as broken tapes, miscued tapes, and running the wrong tapes. HCJB expects their full program computer operation to be completed during the first quarter of 1979.

Further upgrading of the HCJB technical operation is taking place in the studios, where they have recently installed a number of new audio consoles. And they also are working on improvements for their studio-to-transmitter link system.

The upcoming World Administrative Radio Conference will have to deal with the shortwave spectrum-crowding problem. And there may be some relief for international broadcasters when the conference is concluded. But meanwhile, HCJB's answer to their reception problems is their steerable antenna. When completed, the added gain it will deliver should improve their reception reports, especially on the long-haul routes.

By early 1979, the steerable antenna and most of the HCJB modifications should be completed, delivering more consistent signals and smoother programming for "the voice of the Andes." BC



Power for the Pifo site is supplied by these hydroelectric generators located at a plant on the eastern slope of the Andes mountains.

Microprocessor Workshop

Winning the catch-up game

By Peter Burk

The microprocessor invasion of broadcast equipment is gathering such momentum that understanding their operation and potential application is a necessity. Putting it off will create a catch-up game we can't afford to play.

Up till now, there hasn't been a great rush to understand *exactly* what's going on inside the box. Anyway, most of us haven't had the test equipment (and in some cases, the documentation) to delve into serious troubleshooting problems. Instead, we're troubleshooting at the plug-in level and letting the manufacturer provide a replacement for the defective board.

While this approach is acceptable for maintaining most pieces of microprocessor-based equipment, it cuts us off from the real potential of the microprocessor. When we have a more thorough understanding of what goes on *inside* those chips, we will be better able to specify equipment, troubleshoot systems, and even create our own microprocessor assist circuits for those special applications where there isn't a product already available. (If you've already made this kind of progress, we invite you to send your ideas and microprocessor applications to our World Forum editor.)

The purpose of this series is to take some of the pain out of understanding how microprocessors work. We'll demonstrate how you can create your own "black boxes" to solve some of those problems that appear to be unique to your facility. When we've done this, we'll be in a better position to judge the latest equipment on the market.

If you're new to microprocessors, there are a few essentials that must be tackled first. The most important of these is a thorough understanding of basic digital techniques. Since microprocessors work entirely within the digital realm, it makes sense that you'll need to be comfortable with "ones and zeros." Several microprocessor kits offer "hands-on" conversion exercises.

Digital logic is normally divided into two groups: combinational and sequential logic. When you start working with microprocessors, you'll find that almost all the support hardware will be in the form of combinational logic. This might make combinational logic appear to be the place to put the most emphasis.

In reality, since the microprocessor functions more nearly like sequential logic, your understanding of microprocessor techniques will be greatly enhanced by a good grasp of good old sequential logic. If you need some review in this area, arm yourself with a good textbook, a "kludge board" and your half of the kitchen table.

When the digital groundwork is behind you, it's time to start shopping for a small system to experiment with. Some, such as the Heathkit ET-3400, are designed for

Continued on page 78

Peter Burk, BC's Radio Editor, is the chief engineer at WKBW Radio, Buffalo, New York.

The following are books currently available on the basics of microprocessors, home computers, and digital circuits. If you're already past the basic stage and would like to suggest a book that was helpful, drop a line to Microprocessor Workshop Editor, *Broadcast Communications*, P.O. Box 12268, Overland Park, KS 66212.

Microcomputer Handbook
Petrocelli/Charter
641 Lexington Avenue
New York, NY 10022

Your Home Computer $6.00
DYMAX
Menlo Park, CA 94025

Getting Involved With Your Own Computer: A Guide for Beginners $5.95
Ridley Enslow Publishers
60 Crescent Place, Box 301
Short Hills, NJ 07078

Microprocessor Applications Manual
McGraw-Hill Book Company
New York, New York

Microprocessors: From Chips to Systems $9.95
BITS, Inc.
70 Main Street
Peterborough, NH 03458

Microprocessor Interfacing Techniques $9.95
Sybex Inc.
2161 Shattuck Avenue
Berkeley, CA 94704

An Introduction To Microcomputers (Volume 0, 1, 2)
Osborne & Associates
P.O. Box 2036, Dept. 17
Berkeley, CA 94702

Programming Proverbs
Basic Basic
Hayden Book Company
50 Essex Street
Rochelle Park, NJ 07662

Understanding Microcomputers $9.95
The Scelbi Byte Primer $10.95
Scelbi Computer Consulting, Inc.
P.O. Box 133 PP STN
Dept. B
Milford, CT 06460

How To Program Microcomputers
Digitals In Broadcasting
Microcomputer Primer
Howard W. Sams & Co.
4300 West 62nd Street
Indianapolis, IN 46268

Microprocessor/Microprogramming Handbook $6.95
Tab Books
Blue Ridge Summit, PA 17214

Use a stacked deck . . . . .

System 21

No gambles! DYNAIR's System 21, carefully developed through 21 years of distribution switching experience, is a sure thing.

The video cards are stacked with such numbers as 0.15% differential gain, 0.15° differential phase and ±0.1 dB frequency response to 5 MHz. Check the audio card's harmonic distortion of less than 0.2% at full 30 dBm output with hum and noise riding 105 dB below.

Matrix switching cards – audio, video, time code, data, machine control – are all instantly replaceable with power on. They're controlled by a microprocessor with battery-backed memory so loss of power doesn't lose the setup. Control troubleshooting is straightforward since self-diagnostics are built in.

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Circle (57) on Reader Service Card

use with a course of instruction. Later, you'll want to look for a system that includes a monitor of some sort. (A monitor consists of software routines that let you enter data into the various registers and output data from the microprocessor to some type of display.) Without a monitor, it's next to impossible to tell what's going on inside the machine.

A very nice feature for entering machine-language programs is a hex keyboard. Several of the available trainers include this alternative to "bit-switching" with toggle switches.

If you purchased a trainer or evaluation kit complete with a course of instruction, you know what to do next: reclaim your share of the kitchen table and dig in. Without a structured course you'll have to spend more time ferreting out the information you need to help you become more familiar with your device. Don't become discouraged. You don't need a master's degree in computer science to understand the workings of a microprocessor. Like other circuits that first appear complicated, breaking the problem into smaller parts and tackling one section at a time will open all the doors you need.

Your initial study should start with the basic architecture of a microcomputer system and specifically the microprocessor itself. (The microprocessor, or MPU, is just one component in a microcomputer. Other components are read-only memory, random-access memory, input/output interface, and a system clock.)

Your first system needn't be a sophisticated collection of hardware with 16 K of memory, an ASCII keyboard, and a CRT. For a professional programmer, that would barely qualify as a minimum system, but for our purposes we can do just fine with substantially less; 512 bytes of random-access memory in the beginning leaves plenty of room for simple machine-language programs and data storage.

We've mentioned machine language several times. For many programmers, machine language is a last resort, since programming this way involves converting every intended command or operation into statements that the machine understands instead of using high-level language instructions that more closely resemble the way people think. For our purposes, machine language has some definite advantages.

Any high-level language program is ultimately converted to machine language for execution, either before it is run or while it is running, depending upon the type of language. It makes sense to gain an understanding of the microprocessor at the most basic level first.

Also, for some of our applications, high-level languages would either take up too much memory or would slow down the execution too much. Later on, you'll want to be able to put together a black box that uses a minimum number of components to do something useful. The extra several thousand bytes of memory needed by the language might be quite a luxury.

It's hard to pick your first microprocessor, since the relative advantages and disadvantages are obscure to the newcomer. If you start with a learning kit, you'll be in a better position to make this decision. There is no one "best" unit for all applications, just as there isn't one best automobile for all types of driving. And this is further complicated by the fact that new chips and equipment are being developed almost daily.

From the several dozen families available, the two most popular are Intel's 8080 and Motorola's 6800. For machine-language programming, the 6800 seems a little easier, but the pros and cons could be debated for many pages.

Some of the things to look for are: (1) good documentation from the manufacturer; (2) a versatile instruction set; (3) availability of family-support devices; (4) easy interface to the outside world; and (5) available programs.

Since most of these criteria are pretty hard for a newcomer to judge, your best bet is to make an accounting of your application needs. This will eliminate some choices because of such consideration as the importance of speed, memory, and input/output ports. Most of the conversation you'll hear will be based on personal preferences, but if you sift carefully through all the comments and bounce them off your needs, you'll begin to get a feel for what's best for your station. You just have to be prepared to ask a lot of basic questions.

If your initial purchase is a small system, your choice is not that critical, since you'll want to eventually become skilled at working with more than one microprocessor anyway. It's to be expected that as your knowledge and experience grows, you'll step closer to full-blown computers.

Once you have a grasp of the way the system is put together, you can concentrate on simple programming. You won't have to master the entire instruction set all at once. Just learning a few basic instructions such as MOV or LDA will get you started and let you experiment with various forms of addressing, and transferring data from one location to another. This is the stage where you'll really firm up your understanding of the architecture, too.

As you progress with programming, you'll find more and more need to understand interfacing techniques. Moving bits around inside the system doesn't do much good if you can't respond to real-world stimuli and produce an interpretable output signal. You'll probably find that interfacing becomes the most challenging facet of microprocessors, and will certainly take the most time to learn.

Are all of those nights punching in programs and watching the machine repeatedly crash going to pay off? Well, only if the end result is the ability to produce something useful. As you gain a better understanding of microprocessors, you'll see more and more applications that are "tailor-made" for microprocessor implementation. Once a little efficiency is acquired, you'll be amazed at how little time it takes to implement a microprocessor design.

Future articles in this series will deal with using microprocessors in dedicated systems to solve problems. We'd like to solicit your comments. If you have a solution to a problem that you'd like to share, or for that matter, a problem that needs a solution, tell us about it. Address your correspondence to the author, in care of *Broadcast Communications*. BC

SMPTE Technical Conference
October 29 — November 3
Americana Hotel, New York City (USA)

SMPTE awards go international

This year's SMPTE awards for technical achievements in television and motion pictures or service to the Society, reach out to recipients in countries all over the world. British, French, German, Swiss, and Japanese citizens join their American colleagues in being recognized for their significant contributions and dedication to progress.

The awards will be presented by president William D. Hedden during the Society's 120th Technical Conference in New York City, October 29 through November 3. Individual awards are as follows:

- The David Sarnoff Gold Medal will go to **Masahiko (Morrie) Morizono,** vice president and general manager of Sony Corporation's Video Products Division. The award is in recognition of Morizono's contribution to the development of ENG equipment, especially in relation to the U-matic format and associated editing equipment.
- The Samuel L. Warner Memorial Award went to **Dr. Ray M. Dolby,** president of Dolby Labs and a noted pioneer in the fields of video and audio recording. This award is in recognition of his development of a noise reduction system for motion-picture sound which has been used with great success in movies such as *Star Wars* and *Close Encounters of the Third Kind.* Dr. Dolby has also been elected to Fellowship in the SMPTE.
- The Eastman Kodak Gold Medal Award goes to **Reid H. Ray** in recognition of his contributions to the educational and nontheatrical motion-picture field as a pioneer film producer, an educator, and leader in professional organisations.
- **Roderick T. Ryan,** Eastman Kodak Company, has been given the Herbert T. Kalmus Memorial Award. This award is presented to Dr. Ryan for his continuing substantial contributions to colour film printing and processing systems.
- **Dr. George Broussard,** director of research of Thomson-CSF in Paris, will receive the SMPTE Commendation award. Dr. Broussard, who has been working on video discs since 1969, has lectured and written frequently about his commitment to a thin film disc which is easily distributed in a mailing envelope.
- From the United States, **Julius (Julie) Barnathan,** president of ABC's Broadcast and Operations Engineering, also has received this distinguished commendation for his contributions in all phases of television engineering. Barnathan's first use of the broadcast video disc at the Mexican Olympic Games, his innovative equipment array in Munich, Innsbruck and Montreal at those Olympiads, and his encouragement of broadcast-gear manufacturers to tailor new devices to field requirements, have all led to improved TV coverage.

Fellowships have also been widely dispersed among a group of television experts whose work has brought them to the Board of Governors' attention. In the international arena, Joseph M. Polonsky of France and Heinrich L. Zahn of Germany were elected Fellows of the SMPTE.

- **Joseph Polonsky** is currently the technical director of the Broadcast and TV Division of Thomson-CSF in Paris. He has been a leader in the development of television equipment ranging from microwave gear to studio and portable cameras.
- **Heinrich (Henry) L. Zahn** is the director of technical development for Bosch/Fernseh in Darmstadt, West Germany. Zahn, who holds 30 patents, is regarded as one of the prime movers in German television technology.

Several U.S. members of TV broadcast organisations and equipment manufacturers were also elevated to Fellowship status:

- **Albert H. Chismark,** manager of technical services for Meredith and director of engineering for WTVH, Syracuse, New York, received his award for a variety of contributions. Among these were presidency of the Society of Broadcast Engineers (SBE) from 1968-69, chairmanship of the NAB engineering advisory committee, and chairmanship of the Society's Television Video Committee.
- **William G. (Bill) Connolly** is managing director for development at the CBS Television Network. He has received an Emmy Award for the development of the CSS colour corrector,
- **Gideon Fiat,** director of ENG at ABC, has been with that network for over 10 years. His Fellowship citation indicates a wide background in colour measurement and the development of a colour correction system for television using computer techniques.
- **David K. Fibush,** Ampex Corporation's engineering section manager, is also a Fellowship recipient. As a member of the SMPTE Video Tape Technology Committee, he played a major role in standardization efforts on the Type C helical format. He is presently chairman of the Helical Recording Subcommittee.
- **Abraham A. Goldberg,** manager of digital TV development at the CBS Technology Center in Stamford, Connecticut, has been active in the design of television, audio and magnetic recording systems.
- **L. Merle Thomas,** associate director of technical operations for the PBS, is being honoured for contributions in the development of national and international standards in the magnetic videotape recording field.

The SMPTE is presenting four special citations for Outstanding Service to the Society:

- **John Corso Jr.,** received his award for his efforts on behalf of the San Francisco section, where he has served as an officer, manager and programme chairman.
- **Fred Remley** has been involved in every phase of Society activities: engineering, standards, programmes, and management.
- **Paul Wittlig** of CBS Television and **Kurt Wulliman** of the 3M Company are honoured for their contributions to the New York section.


MORIZONO


DOLBY


POLONSKY


BARNATHAN


ZAHN


FIBUSH


CONNOLLY

UNITED STATES

Inside the mult box

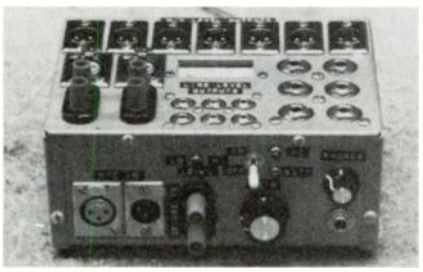
By Don McGuire

Here's a closer look at the microphone multiple output distribution amplifier used by KYW Radio, Philadelphia.

Here are construction details of the versatile microphone multiple output distribution amplifier used for remotes at KYW Newsradio in Philadelphia, which is described briefly in the Election Night article on page 54.

As shown in Figure 1, the mult box is built around a manufactured board assembly: the model AA-100B 200-miliwatt utility amplifier, marketed by RHA Audio Communications of East Brunswick, New Jersey.

Don McGuire is the maintenance supervisor at KYW Radio in Philadelphia, Pennsylvania.

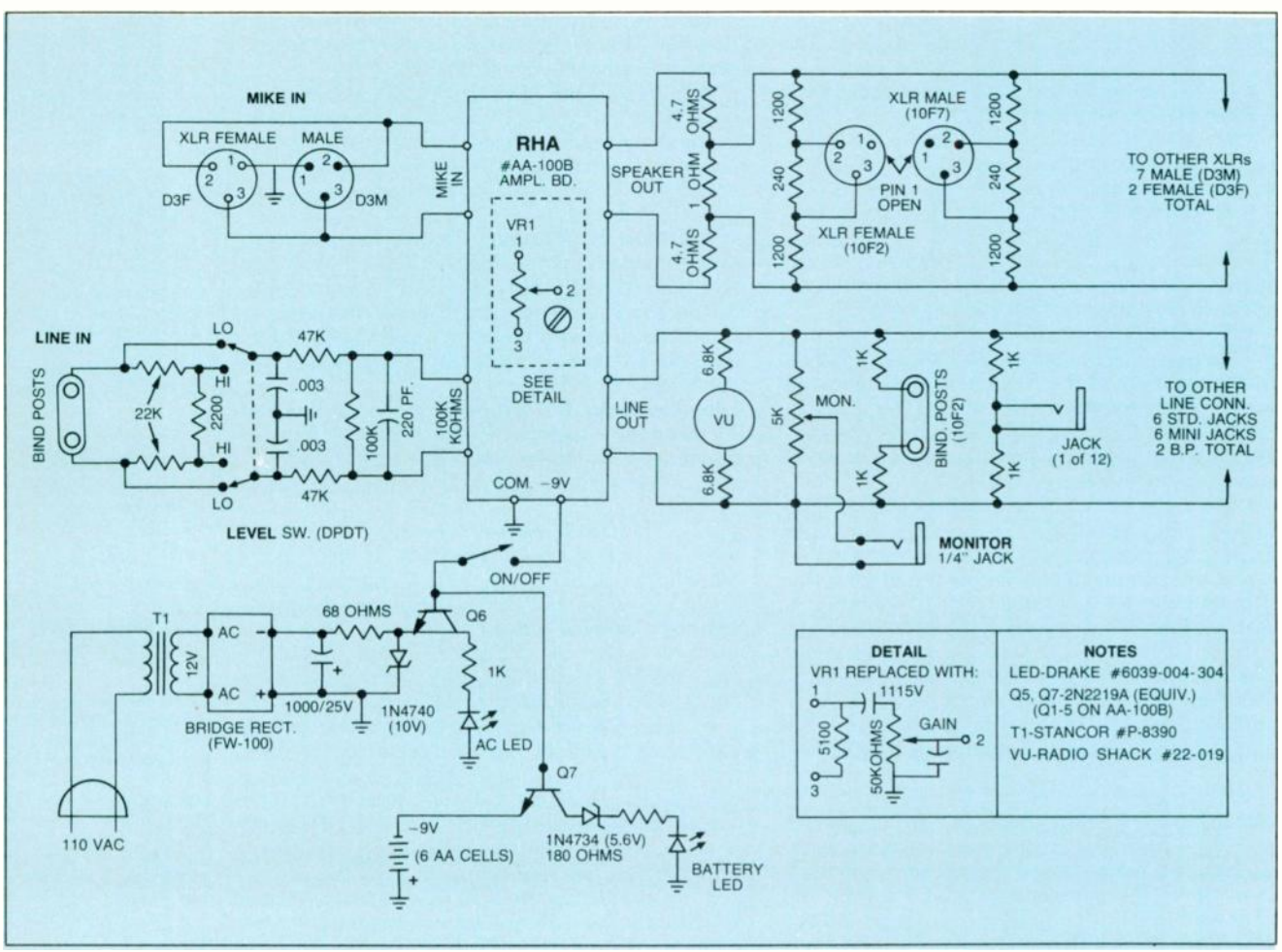


The KYW mike mult box. The top of the 7" x 5" x 3" box contains all output connectors and VU meter. Front has mike and line input connectors, gain controls, operator's headphone jack, separate AC and battery power supply LEDs.

I've used this little 5½" x 1¾" board many times over the years for a variety of projects, always with good results. While having the usual desirable features such as high gain, low power consumption, etc., its real versatility and advantage to the broadcaster come from the various transformer-coupled input and output impedances provided.

The shielded input transformer has a microphone impedance (50-150 ohms) winding, and a separate high impedance (100 Kohm) winding for line bridging applications. There are two separate output transformer windings — one at 8 ohms for feeding a speaker, and the other at 500 ohms for feeding a line, headphones, and so on. The amplifier requires a 9-volt supply and will draw about 50 mA when driven to the maximum 200-MW output. However, usual line-feeding applications will draw only half that current. Six AA penlite cells in series is a long-lasting battery supply.

But before installing the AA-100B, a few small modifications must be made. First, the 100-Kohm input winding and the 8-ohm speaker output winding each have one side connected to the ground or common of the circuit board. These



should be lifted by cutting the PC trace from each terminal to the common foil. Now all external signal connections will be balanced and isolated from chassis ground, to prevent hum and interaction problems. Then the emitter bypass capacitor C7 (30 MF/5 V) in the third stage Q3 of the amp is removed. This lowers the gain, which is usually too high, and helps the amp behave better by introducing more negative feedback.

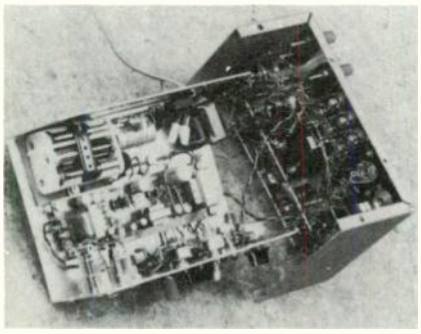
The last AA-100B modification is to substitute an external gain control for the small screwdriver control soldered on the board. This pot (VR1) is removed and a 5100-ohm resistor installed in its place. The high end of the external 50-Kohm pot connects through a 1-MF blocking capacitor to the high side (Q1 collector) of the 5100-ohm R. (You don't want DC flowing through a gain control.) The low end of the 50-Kohm pot goes to the ground or common foil of the board. The arm is wired to the former location of the VR1 arm. (See Figure 1.)

With the AA-100B thus modified as the "heart" of the mult box, we've only to add suitable input and output circuitry and an automatic-changeover AC and battery power supply.

Let's look first at the two inputs. The mike input is two XLR connectors in parallel directly to the mike input winding. Why *two* XLRs? One is male, the other female, to take care of any eventuality, or for feeding the microphone line to another amplifier. The second or high-level input appears on a set of binding posts and feeds the 100-Kohm winding through the pads and "LEVEL" switch network shown. It then can accommodate a wide range of input levels that may be encountered at the site. The amp will easily handle inputs of from +20 VU down to less than −30 VU, in addition to the mike level input.

The main purpose of the mult box is to feed the mike inputs of several pieces of equipment simultaneously with a good degree of isolation between them. To accomplish this, the speaker output winding is padded down to a mult output source impedance of just 1 ohm. Then the 1200-ohm buildout resistors in each leg of the 9 XLR output connectors provides the more than 60-dB isolation. Each of the seven male and two female XLRs is terminated with 240 ohms to maintain the isolation in event that high-impedance equipment is plugged into the XLRs.

Additionally, there are 14 line-level (+4 VU) outputs available for feeding tape recorders, headphones, etc. They consist of six standard ¼-inch phone



Mike mult box opened up to show amplifier assembly, power supplies, and input connectors in lower half of mini box; output connectors are in upper half at right.

jacks, six mini jacks, and, for wire feeds, two sets of binding posts. The frames of all jacks are mounted on plastic boards to isolate them from the chassis ground. Each leg of each of these 14 output connectors is series fed through a 1-Kohm resistor to prevent accidental shorting out of the line output feeds.

For the operator's headphone monitor, another jack ("MONITOR") is provided with a separate control across the line output. Proper amplifier output level is set and monitored by a small VU meter, recessed in the box for protection.

This leaves just the power supplies to complete the project. Here you've probably already noticed a unique circuit of transistors, zener diodes, and LEDs. The AC supply is straightforward out to the 1N4740 10-volt zener. Note the supply is fed through the E-B junction of Q6, which is *not* a regulator. Instead, Q6 is used to turn on the "AC" LED whenever the amp is actually drawing current from the AC supply. Should the AC supply fail, the 9-volt battery supply takes over automatically with no interruption. Now Q7's E-B junction becomes forward biased to turn on the "BATT" LED. Q5 and "AC" LED have turned off. The two LEDs indicate which supply is actually in use — only one being lit at a time. The E-B junction of Q7 provides the steering diode to turn off the batteries when the AC supply is in use.

Now look at the collector circuit of Q7. The series arrangement of 1N4734 5.6-volt zener, 180-ohm resistor, and "BATT" LED results in an indication when the batteries are depleted enough to just affect amplifier gain and distortion. For the AA-100B, that supply level has been found to be about 7.3 V. As the batteries wear down to that voltage, the "BATT" LED gradually dims but remains visible until at 7.3 V the LED abruptly extinguishes altogether. The operator then knows to change the batteries before the amplifier's performance is noticeably decreased.

The finished unit, housed in a 7"x5"x3" minibox, is quite small and light enough to be included in your remote suitcase. Since I built it two years ago, it has been used on many field pickups to feed other radio and TV stations, and on one occasion a national network. The mult box "saved the day" for them when they were unable to set their own mikes.

But it can be used for many other situations, whether on location or back at the studios. You may possibly have been stimulated by this article into visualizing such a need in your own particular operation. If so, we hope we've been helpful. Perhaps you can suggest improvements or your own cir-

Continued on page 82

The WFLN horseshoe control room arrangement shown here allows their engineers access to the wiring and equipment. The walk space around the studio furniture is just enough to allow adequate working room. *(Photo courtesy of WFLN-AM-FM, Philadelphia)*

cuit which is better. In any event, we would appreciate your feedback and like to share your ideas in this feature.

Send your construction tips, studio modifications, or circuit suggestions to World Forum Editor, Broadcast Communications, P.O. Box 12268, Overland Park, KS 66212.

UNITED STATES

"Convenience" is the word

By Ron Merrell, Editorial Director

Control rooms are now being designed with both operator and engineering convenience in mind.

While visiting radio stations around the country, I've noticed that a number of engineers have designed horseshoe furniture to house the console, decks, turntables, controls, and accessories.

In fact, the main console furniture sits in the center of the room. This allows the engineer access to the backside of all key equipment. Servicing can be accomplished on most of the equipment, or equipment can be replaced, while the DJ is on the air. Good examples of this are WIRE in Indianapolis and WFLN in Philadelphia. However, many stations still have the console flush against the wall and the DJ looks over the top through glass into the next studio, or he has the transmitter in plain view.

On a recent visit to KCMO in Kansas City, their chief engineer showed me how they had solved the stand-up, sit-down operation problem. The entire console furniture is sitting on a decor-matched riser. If the operation were to go back to sit-down, they would simply pull out the riser and the entire console furniture would be at normal desk height. As you can imagine, the operation can be changed from stand-up to sit-down in short order.

Depending upon the kind of operation you have, there may be several configurations that work. If you have a layout that truly adds to operator and engineering convenience, take a snapshot of it or sketch it, tell us the operating and engineering advantages, and send it to World Forum. (Yes, we do pay for your entries.)

Send your entries to World Forum Editor, Broadcast Communications, P.O. Box 12268, Overland Park, KS 66212. BC

FOR MORE INFORMATION
To obtain additional information on any product in Product Premier, simply circle the number on the Reader Service Card that corresponds with the boldface number following each product name.

Optical transmission system (60)

TELEMET — In addition to electrical and space-saving efficiencies, the model 4210 optical transmission system minimizes the need for amplifiers, equalizers, and correctors for most applications.

Consisting of an optical transmitter and receiver, the model 4210 transmits video and wideband data signals over optical fiber cables. According to Telemet, both the transmitter and receiver are remarkably free of the equalization and correction circuitry associated with conventional coaxial transmission lines. The system is also smaller in size and lighter in weight than coaxial units.

100 MHz oscilloscope (63)

PHILIPS TEST & MEASURING INSTRUMENTS — An alternate time-base display facility showing main and delayed time-base displays together over the entire screen width is just one feature of the new model PM3262 dual-trace oscilloscope. It also has a third channel for simultaneous viewing of trigger signals.

The 100 MHz/5 mV (2 mV at 35 MHz) scope offers an improved CRT which produces a sharper display coupled with high writing speeds, according to Philips.

Digital effects generator (70)

3M COMPANY — The model 5130 digital-effects generator from 3M's Mincom Division is a stand-alone unit compatible with any switcher having an external key input.

Designed for both closed-circuit and broadcast applications, the square-effects generator produces 16 patterns by sequencing 256 raster areas for special effects, including spiral, horizontal, diagonal, and random wipes at five different switchable rates.

Cartridge playback system

UMC ELECTRONICS — The "Playmate" system is a self-contained, logic-controlled, semi-automated device for the playback of prerecorded tape cartridges. The system is designed to minimize the handling of tape cartridges by providing preloading of up to 24 prerecorded messages in the proper sequence in which they are to be played — with remote access to them from several different locations simultaneously. Access is given through up to five remote-control console/panels which are plugged into the main equipment rack.

Sync pulse generator (71)

LEITCH VIDEO — The SPG-102N, an NTSC master sync pulse generator, is a modular unit with a wide choice of options. This makes the digital sync generator suitable for use in any pulse system.

The SPG-102N features improved temperature stability and time-base errors of less than 1 nsec. All pulse widths and timing relationships are adjustable. The generator includes an automatic digital sync lock, switchable 1- or 2-line advance, selectable vertical blanking width of 19, 20 or 21 lines, and a color frame ident pulse with expanded choice of position.

Time code reader/generator (72)

ELECTRO & OPTICAL SYSTEMS — The Elector Mk II Time Code Series consists of the TCR/VCG/D-2 time code reader and the TCG/D-2 time code generator.

The TCR/VCG/D-2 is a high-speed reader of the SMPTE/EBU time code. It operates in either forward or reverse from the low speeds encountered in machine control, to the high fast-forward and rewind speeds of shuttling operations.

The TCG/D-2 is a precision edit code generator capable of generating either SMPTE or EBU time code. The generator is of all CMOS construction, and can be rack-mounted or used as a free-standing unit.

Frame synchronizer (74)

NEC AMERICA — Designed to eliminate the common, ENG-related occurrence of expanded blanking, the FS-15 FE automatically expands the incoming signal both vertically and horizontally as it is digitized. Frame synchronization also takes place at the same time. Expansion increments of 1% to 7% can be selected for accurate video versus blanking adjustment.

Antenna systems (73)

NURAD — Three antennas have been introduced by Nurad: HEMI™, SLIMLINE™, and QUADROD™.

The HEMI hemispherical antenna is designed for airborne TV microwave systems.

The SLIMLINE directional circularly polarized antenna operates in the 2 GHz band. It is especially useful with the new microminiature portable ENG/EJ transmitters.

QUADROD is a 7 GHz counterpart to Nurad's GOLDENROD™ antenna. Featuring a gain of 22 dB, its primary use will be as a mobile, low-windload transmit antenna operated in conjunction with the 70 QPI QUAD or 70 QP-series SUPERQUAD™ quad-polarized receive antenna system.

Video Graphic System (75)

DYNASCIENCES — The new video graphic system (model 9048) is a software-based system using a floppy disc for program control and page storage. The 9048 has high-resolution characters. And, to help the user, the unit has a plain English format for ease of operation and an instructional programme to assist in the preparation of video programme material.

Super-wide correction window (78)

MICROTIME — A super-wide correction window, available as an option to the 2020 wide window, helps assure that vertical blanking from VTRs used in ENG applications will always be correct. The super-wide window allows wide blanking to be processed through its ±12-line range, with the TBC output blanking per FCC (U.S.) specifications.

An additional feature is Microtime's exclusive Auto-Trac II™ which "centers" the VTR output into the middle of the correction range of the wide-window, assuring proper and automatic operation.

Camera lens (88)

ANGENIEUX — The 25X is a new design for a basic lens in the 2/3-inch format with a 25X zoom range, focal lengths of F=10mm wide angle with a f/1.4 aperture to a F=250mm narrow angle with a f/2.8 aperture in an 11-pound package.

With attachments, the 25X becomes six lenses. Three accessory units in combination with the basic lens make up the system. Attachments include a 0.76X Retrozoom and a 1.6 telephoto lens. The third accessory unit is a two-position range extender subassembly, allowing remote-controlled switching of 1X and 1.5X extenders. A long focal length of F=600mm at f/4.2 can be achieved with the 1.5X extender in combination with the 1.6X telephoto attachment and the accessory range extender subassembly.

Editing system (80)

CEZAR INTERNATIONAL — The Z6 editing system features a new element in the state-of-the-art computer editing design:

Continued on page 84

PRODUCT PREMIER

micro-code. This code, as opposed to time code (such as SMPTE) uses only 32 bits to provide a microprocessor-based editing system with all the necessary videotape information required for VTR control.

"Slant-track" VTR (84)

AMPEX — The VPR-2 "slant-track" videotape recorder meets the SMPTE Type C format while retaining the exclusive features of Ampex's VPR-1 VTR.

The VPR-2 features automatic scan tracking (AST), which provides broadcast-quality slow-motion and still-frame playback. The VPR-2 also provides built-in frame-accurate editing, variable play and shuttle features. It is designed for professional broadcast, CCTV, and post-production use, together with its companion digital time-base corrector, the TBC-2.

Video distribution amp (86)

DATATEK — The D-606 video distribution amplifier is a plug-in printed circuit board module with individual AC power supply. It provides six 75-ohm highly isolated outputs from a single bridging input.

D-606 features include differential input for 60 dB longitudinal 60 Hz hum and noise rejection; DC-restored or AC-coupled operation, selectable by shorting plugs; resettable transit time, with continuous adjustment for minimum system differential path delay; high-gain operation, up to 18 dB available; and high-input return loss.

Tape recorders/reproducers (87)

AMPRO — Thirty-four different cartridge tape recorders/reproducers are available from Ampro, all designed and built to be the equivalent of the finest studio reel-to-reel machines.

All models include 1 kHz stop cue and audio switcher as standard features. Other convenience features include front-insertion rack enclosures, flip-top desk cabinets, modular electronic assemblies, and plug-in rear panel audio and remote connectors.

Type C 1-inch VTR (89)

HITACHI — A new Type C 1-inch helical VTR is being introduced to dealers, with a prototype machine available for market demonstrations. Production units will be shown at the National Association of Broadcasters convention in March 1979.

The 1-inch VTR line will include both console and portable models with digital time base corrector and editing.

Routing switcher (91)

DI-TECH — The 5800 series AFV routing switcher employs separate frames to house the video and audio modules. A building-block approach is utilized in order to expand the inputs or outputs as future requirements change. Non-proprietary multi-source components are used throughout. BC

THIS MONTH'S HALL OF FAME

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- ☐ A. Commercial TV Network
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- ☐ C. Commercial Radio Network
- ☐ D. Government-operated Radio Network
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- ☐ F. AM Station
- ☐ G. FM Station
- ☐ H. AM & FM Station
- ☐ I. TV & Radio Combination Station
- ☐ J. International Shortwave Radio
- ☐ K. Satellite or Microwave Relay
- ☐ L. Teleproduction Facility
- ☐ M. Independent Program Producer
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- ☐ O. Educational, Public or Religious TV
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2. YOUR JOB FUNCTION

- ☐ 1. Corporate Management (President, Vice President, Owner, Partner, Chairman, Chief Executive, etc.)
- ☐ 2. Technical Management & Engineering (Chief Engineer, Technical Director or Supervisor, Vice President in Charge of Engineering, Recording Engineer, etc.)
- ☐ 3. Programming & Production (Program Manager or Director, Producer, Production Manager or Director, Editor, Lighting Director, etc.)
- ☐ 4. Other Station Management & Administrative Titles
- ☐ 5. Other _____

3. YOUR PURCHASING AUTHORITY

- ☐ A. Full authority to buy
- ☐ B. Specify or approve purchases
- ☐ C. Recommend make, model or brand
- ☐ D. No purchasing authority

4. REASON FOR YOUR INQUIRY

- ☐ 1. Immediate interest (see Special Service)
- ☐ 2. Future reference

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111	112	113	114	115	116	117	118	119	120
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131	132	133	134	135	136	137	138	139	140
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231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250
251	252	253	254	255	256	257	258	259	260
261	262	263	264	265	266	267	268	269	270
271	272	273	274	275	276	277	278	279	280
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- ☐ FM Station
- ☐ TV & AM & FM Station
- ☐ TV & AM Station
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- ☐ Teleproduction Facility
- ☐ Independent Program Producer
- ☐ Recording or Sound Studio
- ☐ Educational, Public or Religious TV
- ☐ Educational, Public or Religious Radio
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- ☐ Consulting Engineers
- ☐ Systems House
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- ☐ Importer, Exporter, Dealer or Distributor of Broadcast Equipment
- ☐ Government Official, Agency or Administrator
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- ☐ Other: Specify _____

II. Please check the category that best describes your title classification:

- ☐ **Corporate Management**
  Includes President, Vice President, Owner, Partner, Chairman, and other officers, chief executives and officials.
- ☐ **Technical Management and Engineering**
  Includes Chief Engineer; Technical Director, Supervisor or Manager; Maintenance Supervisor; Engineering Supervisor or Director; Vice President in Charge of Engineering; Recording Engineer; and other technical titles.
- ☐ **Programming and Production**
  Includes Program Manager or Director, Producer, Production Manager or Director, News Director, News Editor, Sports Director, Editorial Director, Film Editor, Videotape Editor, Lighting Director and other creative department managers and personnel.
- ☐ **Other Station Management and Administrative Titles**
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- ☐ **Other:** Specify _____

III. Please indicate your involvement in purchasing broadcast equipment, components and services:

- ☐ Full authority to buy
- ☐ Specify or approve purchases
- ☐ Recommend make, model or brand
- ☐ No purchasing authority

IV. Which of the following professional associations and societies are you a member of:

☐ NAB	☐ NRBA	☐ IEEE	☐ RTS
☐ SMPTE	☐ RTNDA	☐ EBU	☐ ASTVC
☐ SBE	☐ AES	☐ ABU	☐ OIRT

V. Which of the following conventions and exhibitions do you plan to attend in 1979:

- ☐ NAB
- ☐ Montreux
- ☐ Canadian Association of Broadcasters
- ☐ NRBA
- ☐ SMPTE Winter Conference
- ☐ SMPTE National Conference
- ☐ AES

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