

APRIL 1973

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**Instrumentation
 "Tells All!"**

**Broadcasters
 push for radio deregulation.**

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Circle 100 on Reader Service Card

APRIL 1973/VOLUME 9/NUMBER 4

BM/E



Broadcasters push for radio deregulation.

How to use the telephone (in unusual ways) and the spectrum analyzer (in new ways) are suggested. See articles on pages 24 and 28 for more information.

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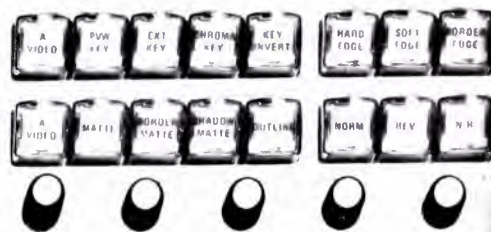
Coming Next Month: NAB 1973 Show-In-Print

CM/E MAGAZINE: For those with cable interests/Following page 34.



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BROADCAST INDUSTRY NEWS

Standards Proposed For Antenna Sampling

The FCC has issued a rule making and inquiry notice on minimum standards for equipment used in sampling antenna currents and phases in directional systems, to make sure the monitors required are reading the pattern correctly. The inquiry resulted in large part from representations to the FCC, during hearings on the new antenna monitoring requirements, that much of the sampling equipment in use was of poor design, had aged out of alignment, or was poorly maintained. Among the proposals are requirements that the sampling lines be of equal length and subject to equal environmental conditions; have solid outer conductors proportioned to produce minimum phase/temperature change; and with identical electrical characteristics. Sampling elements are proposed to be rigid, single-turn, unshielded loops, with all loops mounted at same height, and with other requirements to insure uniformity. The FCC invited comments and suggestions by May 7, 1973.

New Video-Film Process, Chromatran I, In Use

Another process for transferring color videotape material to 16mm

and 35mm film, called "Chromatran I," has been put into use by its developer, Video Tran, Inc., Chicago. Calling its process the "fourth generation" of video-film transfer technology, with the EBR electron-beam process as the third generation, the firm announced the Chromatran I development late in February with great fanfare and extensive claims for superb quality, but did not reveal a single fact about technical operation of the system. Preliminary line on how results compare with those of the EBR and CBS laser-beam systems (the latter not mentioned in the Video Tran publicity) must wait for some months of user experience.

Canadian Cable Group Attacks Bell Pole Restriction

The Canadian Cable Television Association in February urged the Canadian Transport Commission, national regulatory body, to rule that Bell of Canada abandon its restrictive rules on access to poles for cable systems. CCTA spokesmen said that Bell had refused to discuss an acceptable pole access agreement with cable companies, thus depriving many Canadians of cable service they would otherwise have. CCTA said that the poles constituted a public resource that should be available to all recognized services on reasonable terms, as they are in many parts of Canada and the United States.

New Non-Prescription Drug Rules Adopted by NAB

In another action aimed at tighter regulation of television advertising, the Television Code Review Board of the NAB adopted new rules on non-prescription drug ads which are to go into effect September 1, 1973. The intent of the new rules, said the NAB, is to encourage advertising which gives factual information about the products, advises users to read the label, and avoids representation that the product will alter the user's mood or otherwise perform beyond what can reasonably be expected. Barred under the new rules

are: on-camera taking of pills; drug ads in or adjacent to children's programs; using children in ads for drugs intended for adults; personal testimonials on drugs by celebrities or authority figures; approaches which imply a casual attitude to the use of drugs; reference to a non-prescription drug as "non-habit forming" or "non-addictive." Code Board Chairman Max Rice said: "In taking these actions, the Code Board demonstrated again that voluntary self-regulation machinery can protect the public interest by dealing effectively with difficult issues." Mr. Rice said that the NAB will hold a workshop for broadcasters to discuss the new drug rules, date and place to be announced later.

Television Viewing Reached Record High in 1972

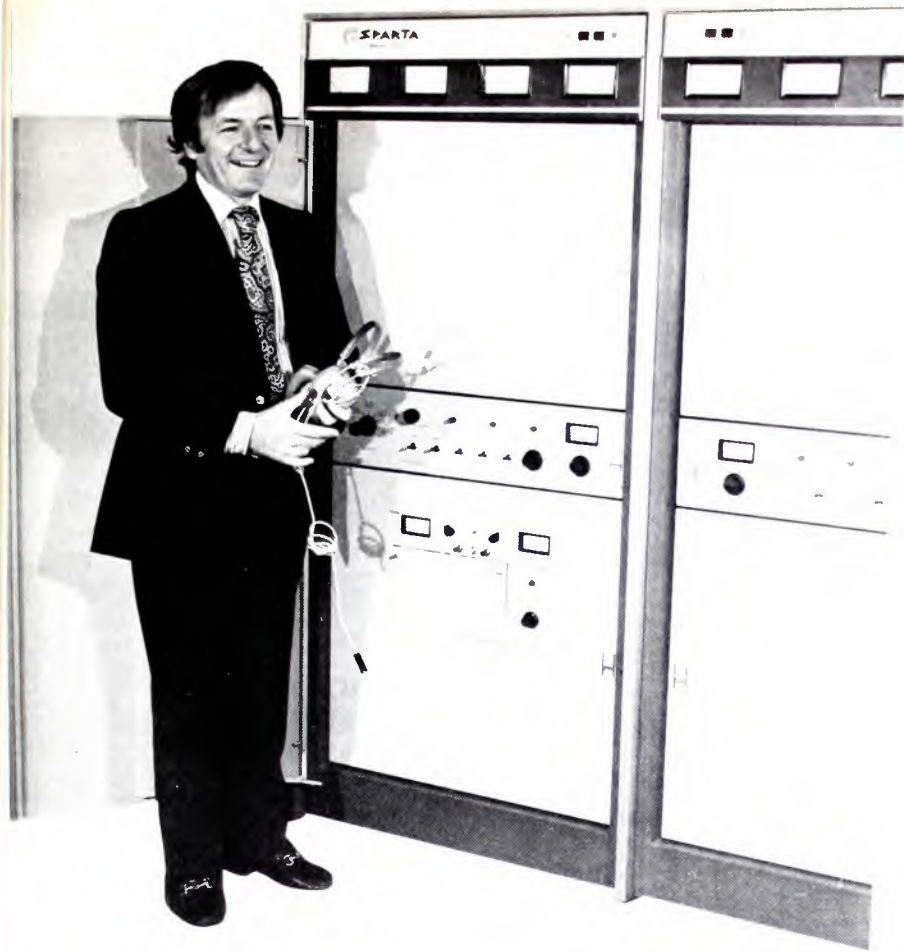
Television viewing per home reached the all-time high figure of six hours, 12 minutes per day in 1972, up from six hours, two minutes in 1971, according to a report from the Television Bureau of Advertising. The figures are based on findings of the A. C. Nielsen Company. They show ten months in 1972 at all-time high levels for each month, with January 1972 at seven hours one minute, the highest month on record.

New Rules on "Clutter" Adopted by NAB

New and tightened restrictions on the advertising of multiple products in a single announcement were adopted by the Television Board of the NAB in the attempt to reduce "clutter" on the air. To take effect September 1, 1973, the new rule provides that a multiple product announcement cannot be put in a time unit of less than 60 seconds, unless it is integrated to appear as a single message. A "single message" is one in which the products or services are related and interwoven into the framework of the announcement (related products or services have a
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Video Tran, Incorporated principals, left to right: David Bell, vice president, engineering; David Hartman, marketing manager; L. J. (Jack) Cook, president.



Mr. Ralph Guild, President of ASI Communications, Inc., shows his pleasure while inspecting the Sparta Model 620 FM Transmitter as installed at KFAC, Los Angeles. Other ASI stations include WERE, Cleveland; WRYT, Boston; KROY, Sacramento, KJTV, Bakersfield.

L.A. GETS 'JUST RIGHT' SOUND

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big enough to supply EVERYTHING.
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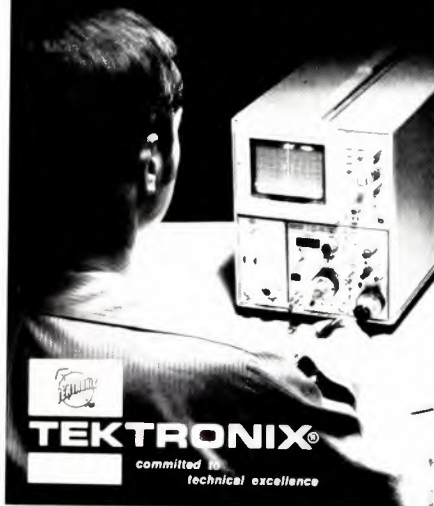


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8 For demonstration:

Circle 104 on Reader Service Card

NEWS

common character, purpose, and use); and the voices, setting, background, and continuity are used so as to appear to the viewer as a single message. The NAB Television Board voted unanimously for the amended rule.

ComSonics Design, Service Cable Installations

A new firm, ComSonics, Inc., announced that it is offering a wide variety of services for cable operators. Included are repairs and rebuilding of equipment, head-end upgrading, analysis and reworking of antennas, propagation studies, testing and analyzing system performance, and a number of other related services. Address is Box 1106, Harrisonburg, Virginia 22081.

FCC Commends NAB Re-Regulation Effort

The NAB's working group on re-regulation was commended by the FCC Task Force on re-regulation for initiating a new concept in federal regulation. At a meeting between the two groups in Washington, FCC Commissioner Richard E. Wiley said that the FCC recognizes the contribution NAB has made to the re-regulation effort, and that NAB has "really initiated the whole concept of closer industry-FCC cooperation."

NAEB Members Resolve To Keep Program Control; New Group Formed

The Board of Directors of Educational Television Stations, television arm of the National Association of Educational Broadcasters, resolved in a January meeting that program control for public broadcasting must continue to be exercised by local communities, the "licensees themselves and their publics." The resolution was clearly in response to the earlier Corporation for Public Broadcasting announcement that it planned to assume control of national programming for public television. The resolution, however, saying that first consideration must be given to continuity of programming, advised that for the time being cooperation should be given to the CPB staff toward that end.

In March, 52 stations met and agreed in principle to form a new association to represent them before Congress, OTP, CPB, and the

public. What is now PBS and NAEB's ETS group would merge into the new group. Ratification by the other 179 PTV stations was taken up at a March 28 meeting.

CPB Lists Main 1973 Program Plans

Meanwhile, CPB was evidently proceeding with its plans to continue and develop national public programming. The government agency released a preliminary list of major programs for 1973, including "Sesame Street" and the "Electric Company;" a science series to be produced by WGBH in Boston; a new "Theater in America" series; "Mr. Rogers' Neighborhood;" "Black Journal;" "WNET Opera;" and "Advocates." According to the announcement, plans were based on expectation of receiving about \$35 million from Congress for the year.

Later, the CPB said it was going to Congress to increase CPB funding. It also acted to increase inter-connection capability.

Freeze On AM Lifted; New Rules Set

Prohibited since July 1968, applications for new AM stations will again be accepted starting April 10, 1973, the FCC announced in February. At the same time the Commission issued new rules for legitimacy of applications. Among them: an AM applicant must provide a first service to at least 25% of the area or population getting primary service. An alternative is supplementing existing "inadequate" service, defined as a situation in which 20% or more of the area or population gets less than two interference-free aural services. Service by existing FM stations will be considered in determining acceptability. Stations more than 50 miles from a community do not count. Complete rules are available in Docket 18651.

Signetics Markets New Integrated FM Detector

A new method of demodulating FM signals, using linear gating, has been put on the market in monolithic integrated form by Signetics, semiconductor maker of Sunnyvale, California. Designated Model ULN2111, the new device includes a three-stage limiter and balanced detector, and is available in quantity, according to Jack Mattis, Signetics' manager of consumer products

continued on page 10



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marketing. Some features claimed for the new device are: simplified tuning, with only one, low-cost coil with a single adjustment; frequency range 5 KHz to 50 MHz; output of 0.6 v at less than 1% distortion; limiting threshold 400 microvolts rms; voltage gain 60 dB.

Combined Communications, Pacific-Southern Will Merge

Boards of directors of Combined Communications Corporation and of Pacific and Southern Broadcasting have approved in principle the merger of the two firms, with P&S to become a part of CCC's broadcast division, a company release says. The merger still requires stockholder and FCC consent. It would be consummated by issuance of CCC stock at an agreed value of \$24 a share, to P&S stockholders.

A Panegyric To Radio— "Open Forum for Community."

William O'Shaughnessy, president of radio stations WVOX in New Rochelle and WGHQ in Kingston, New York, recently paid this tribute to the medium: "Having gone beyond its jukebox phase, radio is now closer to the people than any other medium. It approaches its highest state when it resembles a community platform, a corner soapbox, an open forum—where many different voices are heard in the land. Radio's greatness lies in its ability to amplify the diverse viewpoints in a local community."

IITA Takes Over Merged Industrial TV Groups

The International Industrial Television Association has become the official successor to the Industrial Television Society and the National Industrial Television Association, two groups which voted last year to merge into one. As were the predecessor groups, IITA is an association of persons in business, industry, government, and education, who are specialists in the professional use of television and related techniques for communication, training, observation, and documentation. The new organization had its

continued on page 44

Video becomes as mobile as film with the Norelco PC-100A and PCP-90B."

says Warren G. Stitt,
President Mobilimage
Corporation, Hollywood,
California

Warren G. Stitt



When Mobilimage put a complete TV production studio into a small van, they didn't want to compromise on picture quality. So they turned to Norelco.

First for the PCP-90B . . . the world's first and finest hand-held color television camera. Its three-Plumbicon* design produces uncompromised studio-quality color pictures. Operating with pencil-thin triax cable, it weighs just 18 lbs. It can operate anywhere, self-powered from a battery back-pack; and can transmit direct live broadcast by microwave . . . no cables needed.

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Naturally the PC-100A uses triax cable too. Our exclusive ACT (anti-comet-tail) Plumbicon tubes eliminate the comet-tailing so commonly encountered in remote work.

Warren Stitt says, "Both cameras give immediate registration. They eliminate costly set up and strike time. They enable Mobilimage to meet the strictest requirements for perfect lap-to-lap film transfer. And they produce the best color pictures in television today."

Now you can combine the go-anywhere versatility of film with the instant replay, crisp imagery, and electronic control advantages of videotape.

For information on how you too, can get aboard the new-generation mobile TV production band wagon, call your nearest Norelco field representative, or write, today.



* Reg. T.M. N.V. Philips of Holland



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INTERPRETING THE **FCC** RULES & REGULATIONS

AM "Freeze" Lifted: Thaw Sets In

The Commission, by Order released February 28, 1973, has lifted the AM "freeze" which has been in effect since July 1968.

Under the new rules, broadcasters will once again have an opportunity to apply for new or changed standard broadcast facilities in the United States.

The new AM rules are considerably more restrictive than prior rules and, for the first time, provide for the consideration of FM service in determining whether or not new or changed standard broadcast facilities will be permitted in a given community.

A seminar held recently in Washington, D.C., for members of the Federal Communications Bar Association, revealed that there are many unresolved questions regarding the new AM rules. Indeed, the seminar clearly indicated the astonishing number of different questions that can arise concerning the new rules and how they apply to a specific situation in a particular community. This article is not designed to be exhaustive with respect to all considerations and phases of the newly-adopted AM rules. Rather, it is designed to provide a quick and ready reference for determining whether or not you would have an opportunity to apply for new or changed facilities.

A look at each of the pertinent provisions of the rules follows. It should be noted that there are separate rules for 1) new daytime-only facilities; 2) change in frequency of daytime-only facilities; 3) new unlimited-time facilities; 4) change in frequency of unlimited-time facilities; 5) night-time facilities by authorized daytime facilities; and 6) other changes by authorized facilities.

A look at each of the pertinent provisions of the rules follows. It should be noted that there are separate rules for 1) new daytime-only facilities; 2)

change in frequency of daytime-only facilities; 3) new unlimited-time facilities; 4) change in frequency of unlimited-time facilities; 5) night-time facilities by authorized daytime facilities; and 6) other changes by authorized facilities.

I. Initial Showing In Area To Be Served

A new paragraph has been added to Section 73.24 of the Commission's Rules ("Broadcast Facilities, Showings Required"). The following qualification must be met for new or changed facilities:

(j) that the 25 mv/m contour encompasses the business district of the community to which the station is assigned, and that the 5 mv/m contour (or, at night, the interference-free contour, if of a higher value) encompasses all residential areas of such community.

II. Showing Required In Application For 1) New Daytime Station, or 2) Change In Frequency Of Existing Daytime Station

Application for a new daytime standard broadcast station, or for changes in the frequency of an existing daytime station, must meet either of the following criteria:

(i) That at least 25% of the area or population which would receive interference or "free" primary service from the proposed station does not receive such service from an authorized standard broadcast station, or receive service from an authorized FM broadcast station with a signal strength of 1 mv/m, or greater;

OR

(ii) that no FM channel is available for use in the community designated in the application and that at least 20% of the area or population of the community re-

continued on page 14

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Field Strength Range: 100 μ V/m to 1V/m
Power: Internal battery
Calibration certificate supplied
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DAM-1 DIGITAL ANTENNA MONITOR

Frequency: Any frequency in the AM band; Phase Range: $\pm 180^\circ$;
Phase Accuracy: $\pm 1.0^\circ$; Phase Resolution: $\pm 0.1^\circ$; Ratio Range: 0.100 to 2.000;
Ratio Accuracy: $\pm 2.0\%$; Ratio Resolution: ± 0.001 ; Input Impedance: 50 or 75 ohms



Delta's new Field Strength Meter and Digital Antenna Monitor will help keep your directional antenna system within FCC specifications.

The DAM-1 Antenna Monitor meets the new FCC requirements for remote control. It is a true digital instrument using the latest integrated circuit and TTL techniques. Reads phase and true current ratio for up to six towers with different reference towers and different powers for DA-2. Monitors for larger arrays available on special order.

Delta also offers remote panels and interface units for controlling and reading the DAM-1 Phase Meter over multiconductor, two wire, UHF, or microwave circuits with no reduction in accuracy.

The FSM-1 Field Strength Meter is smaller and much simpler to operate than other field strength meters because it is fixed tuned to your frequency by plug-in modules. If you have to check more than one station, order the FSM-1 with additional frequency modules. For monitor point checks and extensive proof of performance work the FSM-1 will minimize errors and speed up field measurements.

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FCC RULES

ceive less than two daytime aural services. For the purpose of this showing an aural service shall be deemed to be provided by an interference "free" ground wave signal from an authorized standard broadcast station of a strength of 5 mv/m, or greater, or by . . . a signal from an authorized FM broadcast station of a strength of 70 dbu (3.16 mv/m), or greater.

Thus, under the new rules, applications for a new daytime station, or for a change in the frequency of an existing daytime station, *must show that at least 25% of the area or population which would receive interference "free" primary service from the station proposed in an application 1) does not receive primary service from an authorized standard broadcast station; or 2) receive service from an authorized FM station.* For the purposes of this paragraph primary service from an FM service is 1 mv/m.

If these criteria are not met, the possibility exists that an application for a new daytime station, or for a change in frequency of an existing daytime station, may still be made provided that no FM channel is available for use in the community designated in the application, *and that at least 20% of the area or population of the community receive fewer than two daytime aural services.* For purposes of this paragraph, the primary FM signal strength is 3.16 mv/m "city grade" service. In making a determination of aural services to the community from standard broadcast or FM stations, service provided by any standard broadcast station or FM broadcast station whose transmitter site is located *more than 50 miles* from the nearest boundary of the community designated in the application shall be *excluded* from consideration. Additionally, an FM channel will not be considered available for use in the community provided that 1) no channel is assigned to the community for commercial use in the FM Table of Assignments; or, 2) if assigned, is occupied by authorized facilities, and no unoccupied channel can be utilized to serve the community pursuant to the 15-mile rule in Section 73.203 (b).

Remember, if you cannot meet one of the two criteria set forth above, it will be impossible to obtain a construction permit for a new daytime AM station or for a change in frequency of an existing daytime station.

III. Application For 1) New Unlimited Time Station, 2) Change In Frequency Of Authorized Unlimited Time Stations or, 3) Night-Time Facilities By An Authorized Daytime Station.

The following rules are pertinent to applications for a new unlimited time station, for a change in the frequency of an authorized unlimited time station, or for night-time facilities by an authorized daytime station.

Regardless of any other consideration, the application for facilities in this category must show the following:

That objectionable interference at night will not result to any authorized station, as determined pursuant to [engineering standards] in Section 73.182.

In addition to the above showing, it is necessary for applications in this category to make a showing

continued on page 19

PRIME-TIME

The Automatics. Comes the evolution.

The age of the Automatics in broadcasting has already begun.

As you'll see in this issue of Prime Time, there's a whole array of computer-oriented automatic equipment the broadcast manager can use to keep ahead in the profit race.

New needs emerging

In today's business environment the requirements of technical operations are just about as varied as the individual stations themselves.

We at RCA see automatic operation applied in many ways. Generally these applications will fall into three categories or groups.

One group (small today, but growing) is represented by "full computer control" of all equipment, programming and business functions.

Another can be characterized as "automatic programming" of segments of varying lengths, from station breaks to the late movie to an entire weekend schedule.

Still another is concerned with "automatic performance" of equipment. It's equipment that saves time, eliminates operational complexity, and generally will pay for itself in terms of better-quality programming and production.

New for NAB

At this year's convention RCA is showing systems of automatics designed to the needs of all three categories of operation.

A perfect illustration is the new TK-45 Color Camera System. Besides everything the TK-44 had, the

new system includes four new fully automatic features for faster setup time and better pictures than ever.

Another instance is the TK-28 Telescope System, which corrects for a variety of film base errors automatically. It's constantly on the job, even on a scene-to-scene basis.

Also fitting this automatic performance pattern are the new "F" line VHF transmitters, which incorporate a number of "hands-off" functions.

Expansion of the "cartridge" philosophy

Our TCR-100 Cartridge Tape Recorder ushered in the age of Automatics. Its profit-preserving perform-

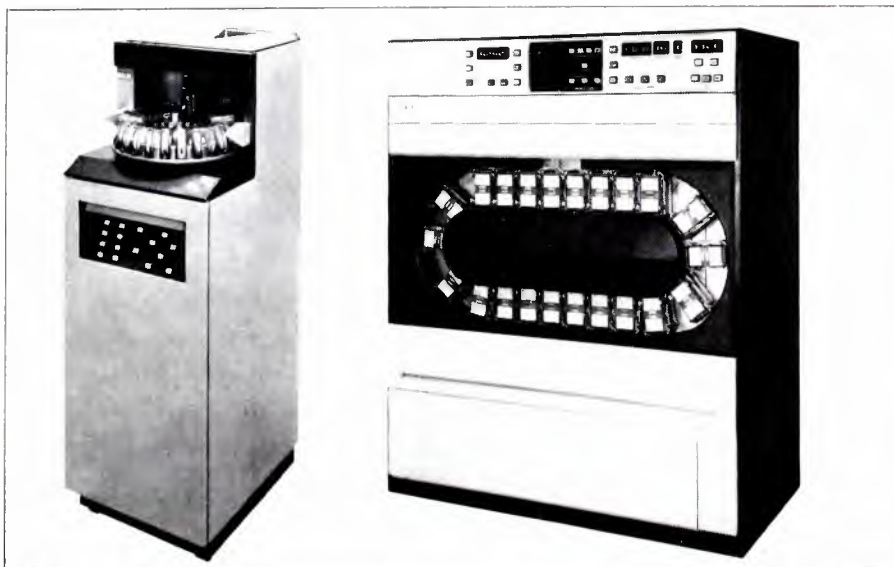
ance features fit ideally into computer-oriented thinking.

Additional far-reaching news for 1973 and beyond is the RCA TCP-1624 Cartridge Film System. It'll do for your film segments what the "Cart" Machine does for your video tape spots. And combined with the "Cart", it's a system of the future.

Automatic control functions

Command and Control Systems, which RCA is announcing at this time, also exemplifies computer-oriented automatic operation. These systems can integrate a mass of assorted video equipment into a

(Continued on last page)



Partners in automatic operation: The new TCP-1624 joins the TCR-100 in an RCA system of automatics.

TCR-100 Box Score

Number delivered	90
Number of commercials broadcast	2,051,000*
Present rate (commercials/day)	9,100*
Man hours saved	84,888*
*Estimate	

TCR-100's Delivered

KARD-TV, Wichita, Kan.
 KATU-TV, Portland, Ore.
 KBTV, Denver, Col.
 KCEN-TV, Temple, Tex.
 KFSN-TV, Fresno, Calif.
 KHQ-TV, Spokane, Wash.
 KIRO-TV, Seattle, Wash.
 KMGH-TV, Denver, Col.
 KNOE-TV, Monroe, La.
 KNTV, San Jose, Calif.
 KOB-TV, Albuquerque, N. M.
 KOCO-TV, Oklahoma City, Okla.
 KOMO-TV, Seattle, Wash.
 KOVR-TV, Stockton, Calif.
 KPLR-TV, St. Louis, Mo.
 KPRC-TV, Houston, Tex. (2)
 KPTV, Portland, Ore.
 KRON-TV, San Francisco, Calif. (2)
 KSD-TV, St. Louis, Mo.
 KSLA-TV, Shreveport, La.
 KSTP-TV, St. Paul, Minn.
 KTBS-TV, Shreveport, La.
 KTRK-TV, Houston, Tex.
 KTSM-TV, El Paso, Tex.

KTVW, Tacoma, Wash.
 KVRL-TV, Houston, Tex.
 KWGN-TV, Denver, Col.
 KWTU, Oklahoma City, Okla.
 KYTV, Springfield, Mo.
 NBC, Network, Burbank, Calif. (2)
 NBC, Network, N. Y. C. (4)
 WAFB-TV, Baton Rouge, La.
 WAPA-TV, San Juan, P. R.
 WATE-TV, Knoxville, Tenn.
 WBAL-TV, Baltimore, Md.
 WBAP-TV, Fort Worth, Tex. (2)
 WBAY-TV, Green Bay, Wisc.
 WBNS-TV, Columbus, O. (2)
 WBRC-TV, Birmingham, Ala.
 WBRE-TV, Wilkes Barre, Pa.
 WBTU, Charlotte, N. C.
 WDAF-TV, Kansas City, Mo.
 WDAY-TV, Fargo, N. D.
 WDCATV, Washington, D. C.
 WEAT-TV, W. Palm Beach, Fla.
 WECT-TV, Wilmington, N. C.
 WFMV-TV, Greensboro, N. C.
 WGN-TV, Chicago, Ill.
 WGR-TV, Buffalo, N. Y.

WISN-TV, Milwaukee, Wisc.
 WJAR-TV, Providence, R. I.
 WKBW-TV, Buffalo, N. Y.
 WKRC-TV, Cincinnati, O.
 WKRG-TV, Mobile, Ala.
 WKYC-TV, Cleveland, O.
 WMAL-TV, Washington, D. C.
 WNCT-TV, Greenville, N. C.
 WPTV, W. Palm Beach, Fla.
 WRAL-TV, Raleigh, N. C.
 WRC-TV, Washington, D. C.
 WSAV-TV, Savannah, Ga.
 WSB-TV, Atlanta, Ga.
 WSOC-TV, Charlotte, N. C.
 WSPA-TV, Spartanburg, S. C.
 WTAE-TV, Pittsburgh, Pa.
 WTAF-TV, Philadelphia, Pa.
 WTNH-TV, New Haven, Conn.
 WTOP-TV, Washington, D. C.
 WTVC, Chattanooga, Tenn.
 WTVN, Columbus, O.
 WUAB-TV, Cleveland, O.
 WUTV, Buffalo, N. Y.
 WWL-TV, New Orleans, La.

Austarama TV, Melbourne,
 Australia • CFRN-TV, Edmonton,
 Alberta, Canada • CFTO-TV,
 Toronto, Ontario, Canada •

CHAN-TV, Vancouver, B. C.,
 Canada • London Weekend TV,
 London, United Kingdom •
 TIMSA, Mexico City, Mexico •

TV-Q, Brisbane, Australia •
 Venevision, Caracas, Venezuela •
 YTV, Yorkshire, England •

Our "Cart" Machine. An automatic philosophy.

At RCA, we believe in automatic operation. Not for its own sake, however. But to serve the user's needs better, faster, more economically.

So we avoid the kind of automatic operation that makes things more difficult in favor of the kind that makes things easier.

Take our TCR-100 Cartridge Video Tape Recorder. Since its major purpose was complete automation of station breaks and other medium-length program segments, we included all the features really necessary for this purpose.

We feel needless sophistication means that you leave yourself vulnerable to needless complexities.

In sequencing, for instance, we opted for a "ready access" system rather than random access. This means individual carts are located at the front of the machine where they can be instantly identified and



The automatic TCR-100 "Cart" Machine at KVRL-TV, Houston.

changed quickly when necessary.

It means you can see exactly which segments are ready to play and in what order. Without ever having to refer to a special log (actually a log of a log) that's subject to errors.

The cartridge itself expresses our view of user benefits. Tape is totally enclosed when it's not actually in use in the machine, for protection against dust, fingerprints and other damage. It's always in a rewind state, ready for instant use.

And there are only two oxide contacts for longer wear.

Speaking of wear, you'll find both our cart tapes and headwheels have an unusual record for long play. Users have reported more than 3,000 plays for carts and over 1,000 hours for many headwheels.

And when it comes to the recording sequence, the "Cart" Machine's simplicity is especially apparent. There are only seven steps in the total procedure.

So when you need the TCR-100's help in production work, it's likely to be available, and not involved in time-consuming preparations such

Continued from preceding page)

is loading, locating, checking, logging and programming for some future break.

And there's more. Exclusive features like the optional EPIS (Electronic Program Identification system), play recue, audible cue tones and an error-preventing "last vent" warning, to name just a few.

Your RCA representative can show you literally dozens of additional ways the TCR-100 is designed for day-to-day use.

Or ask the owners of the 90 "Cart" machines we've already delivered.

"F-line" VHF Automatic Transmitters. The future is here.

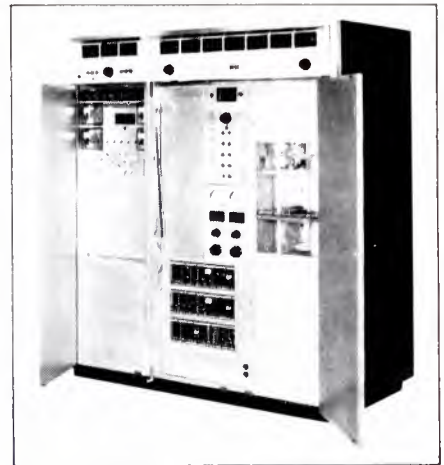
RCA F-line transmitters have evolved to the point where "hands-off" operation is now a reality.

From the 15 kW Type TT-15FL to the fully redundant 50 kW Type TT-50FH, these transmitters take the fullest advantage possible of solid-state technology (most have only six electron tubes of only two types).

They also take full advantage of the most sophisticated metering and switching equipment for remote operation and maintenance of signal during emergencies.

What this means to you now is the utmost reliability, because human error is virtually eliminated. One operator is all that is needed for logging and monitoring functions.

Automatic transmitter functions include the following: Automatic turn-on sequencing, pedestal level control, exciter switchover, current-limiting power supplies, automatic



The automatic TT-25FL VHF Lowband Transmitter.

shutoff if air falls below safe levels, automatic overload sensing and self-protection circuits.

Ask your RCA representative to give you the details of how an F-line transmitter can save you money now ... and in the future.

The TK-45.

It sees things your way. Automatically.

When you try to see things from the broadcaster's point of view, as we do, one trend of recent years stands out clearly.

And that's the shift to more and more local production.

So we feel that any camera improvements we make, should help you do this more effectively.

That's the reason behind the TK-45 Color Camera System. It does everything the TK-44 did. But automatically.

What we've done is to equip the TK-45 with four new fully automatic features specifically developed with an eye to production.

Starting with automatic black level. It's accomplished every time the TK-45's lens is capped.

Next: automatic white level. Doing this is simplicity itself. Just focus on a white reference card or a white area of the scene being shot, and press a button. Variations in scene-to-scene colorimetry are corrected instantly.

Then there's the automatic iris. It responds to changes in subject lighting faster than any human could. And it has a special memory circuit that holds the aperture during lens capping to avoid damage from too much light hitting the pickup tubes on uncapping.

The fourth new feature is auto-



The automatic TK-45 Color Camera.

matic centering. All the engineer has to do is push a button, and he has automatically compensated for the centering limitations of pickup tubes. So what used to be a tedious procedure is now a snap.

These features are all integral to the control console, not add-ons, so they don't add to cable clutter.

And of course, all of them are in addition to features that have been standard on the TK-44. And helped make it a standard of the industry.

Your RCA representative can tell you more about the TK-45.

Just ask him about the new color camera that produces more than just profits.

(Continued from first page)

smoothly operating, efficient entity.

Specifically, they can (1) interface tape with film machines and (2) interface either of these with network feed or live studio signals.

So you can program automatic sequences to practically any length you choose.

And that's just the beginning.

In production, they can act as a "computerized scratch pad", memorizing the segments that the producer has created, and through switching, re-create the effects in the proper sequence with precise timing.

The automatic evolution

So there they are. The Automatics. And we're calling it an evolution because we've structured both new and existing RCA equipment so you can fit them to your needs, your style of operation, even as it may change.

You can select just the degree of computer control you want at any particular time. Without having to worry about premature obsolescence. Because all the new RCA equipment is future compatible.

And present profitable.

The TK-28 Film Camera. Our automatic movie critic.

One benefit of automatic performance features is consistently high picture quality.

For example, take our TK-28 Telecine System. It doesn't like color film errors any more than you do. Its color-balancing circuits continuously sample and balance, correcting for errors caused by film aging, improper exposure or incorrect processing.

So you get true blacks and true whites in color film.

And of course, manual control can be reestablished at the push of a button.

For other color problems—such as accurately matching the TK-28 to the colorimetry of other cameras, compensating for commonly encountered variations in film stock, correcting low-color-saturation film or adjusting for scene-to-scene variations caused by improper printing—there's Chromacomp.

That's a color-masking system that was developed for the TK-44 Live Color Camera and adapted for the

TK-28's special needs.

All you do is determine your most frequently encountered problems and set up their solutions, which are activated as the need arises by a preset knob on the TK-28's operating control panel. Luminance (gray scale) is not affected by Chromacomp.

Other automatic controls include automatic white level, by means of a neutral-density disc that reacts to a 2:1 overexposure in less than 100 milliseconds.

And there's automatic black level, also automatically achieved in milliseconds. And also easily converted back to manual control.

One last annoying problem the TK-28 solves automatically is system flare, caused by dust in the optics or too-contrasty film. So contrast, like color, stays true and vivid.

Ask your RCA representative for more information on how the TK-28 can help you deliver a better-quality product.

Announcing the TCP-1624. It does for film spots what the "Cart" does for tape spots.

People who are sold on the TCR-100 may have wondered why something like it hasn't been created for film.

Well, now it has.

The TCP-1624 Cartridge Film Projector and a color film camera will present a completely automated all-film station break.

And in conjunction with the TCR-100, it permits a totally automated break using both film and tape.

Here's how it works.

The TCP-1624 is a two-projector system. Up to 24 segments, from one second to two minutes in length, can be loaded into its carousel.

So while one projector is running a film, the other is automatically re-winding the previously shown spot and cuing the next.

This eliminates all the work of manually threading individual film segments onto conventional projectors. And changing film after each has played.

It also ends the drudgery, the lack of flexibility and the possibility of



The automatic TCP-1624 Cartridge Film Projector.

film damage that come from splicing segments on one reel and resplicing later to put spots into a new sequence. Because the carousel is ready-accessed.

This means you can quickly rearrange the sequence of the spots just by shifting cartridges, without splicing.

And you can easily preload a carousel and slip it into place as soon as

the previous carousel has finished playing.

Once the film is threaded, the projector automatically detects whether each film's sound-track is optical or magnetic, and plays it properly.

And the system is flexible in another way. It can be programmed either to play one segment and then stop, or to run continuously until given a stop cue, at which time a TCR-100 can take over with a sequence of tapes.

In addition, since the new cartridge projector is used in combination with a TK-28 Telecine System, you get the benefit of that machine's ability to correct color film errors.

And the TCP-1624 also frees up conventional projectors for production work, like inserting filmed segments into taped programs.

This new cartridge projector is part of a system of automatics which points up our policy of using automatic performance features for the user's sake.

CC RULES

satisfactory under *either* of the below-listed criteria:

(ii) That at least 25% of the area or population which would receive interference-free primary service at night from the proposed station does not receive such service from an authorized broadcast station, or service from an authorized FM broadcast station with a signal strength of 1 mv/m, or greater.

OR,

(iii) that no FM channel is available for use in the community designated in the application, and at least 20% of the area or population of the community receive less than two night-time aural services. For the purpose of this showing, an aural service shall be deemed to be provided by an interference-free ground wave signal from an authorized standard broadcast station with a strength of 5 mv/m, or greater, or by . . . a signal from an authorized FM broadcast station with a strength of 70 dbu (3.16 mv/m), or greater.

V. Application By Authorized Stations Proposing Changes In Facilities (Other Than Change In Frequency)

All other AM applications by authorized stations (other than Class IV stations) proposing changes in facilities, other than a change in frequency, must make a satisfactory showing with respect to the following:

(i) For a change in night-time facilities that the proposed change will not result in objectionable interference to other stations as determined pursuant to engineering standards set forth in Section 73.182.

Additionally, an authorized station seeking a change in facilities other than a change in frequency must make a satisfactory showing under *either* of the following two criteria:

(ii) For an increase in power, either daytime or night-time, that the authorized operation, during the portion of the broadcast day for which the power increase is sought includes less than 80% of the area or population of the community to which the station is assigned and within its 5 mv/m, ground contour (or within its interference-free ground wave contour if of a higher value);

OR,

(iii) for an increase in power, that at least 25% of the area or population which, as a result of the power increase, for the first time would receive interference-free primary service from the station is without primary service from any other standard broadcast station.

V. Conclusion

The Commission has finally lifted its "AM Freeze" and, effective April 10, 1973, will once again begin accepting applications for new or changed standard broadcast facilities. As can be ascertained from the above, the new rules are much more restrictive than the original AM rules. Under the newly-adopted rules, consideration must be given to all aural services, *including FM*.

In sum, most metropolitan communities in the United States will be precluded from having additional AM service granted; however, smaller communities and rural areas presently under-served will have an opportunity to obtain new and changed AM stations.

It is difficult, but not impossible, to now obtain AM grants for new or changed facilities. It should be noted, however, that if the Commission is inundated with applications, they may declare that they will accept applications only during specified times of the year, and that there will be interim "freezes" to lessen the administrative work-load. **BM/E**

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Circle 116 on Reader Service Card

What Instrument Would You Like?

By Robert J. Horak

The Choice Is Yours.

IT MAY BE INDEED TRUE that fundamental research has slowed, but the use of technology continues—even at an accelerated rate. In fact, the recent “technical depression” and the accompanying tighter times have forced equipment suppliers to become more clever since they must fight harder to achieve sales.

The time is nearly at hand for the user to really buy based on *need* rather than what is available. The supplier is not lamenting this “buyers’ market.” The reason is simple enough—involvement by both supplier and user leads to a marriage of capability and use. The broadcaster benefits immensely because he can now get the instrumentation of his choice. It’s possible to order “custom-made” (or at least custom-modified) gear for a reasonable cost.

It’s the semiconductor and the IC that have forced the instrument world to change dramatically. Test equipment users should realize the total effect the semiconductor has had on the designer of equipment.

In particular, it has become possible to be microscopically wasteful. The kind of circuitry you might call “control” as opposed to “power” doesn’t in itself consume any power, and it has been proven possible to begin to put an awful lot into a little can for

Mr. Horak is manager of Test Equipment Products, AILTECH, City of Industry, California.

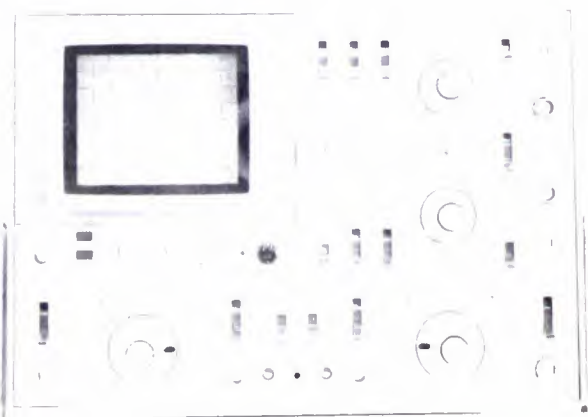


Fig. 1. Wide-band scope.
(Photo courtesy N. A. Philips Co.)

Fig. 2. Battery-operable 20 MHz scope.
(Photo courtesy Vu-Data)



not very much money. One of the best examples is shown in the development of the “op amp.” Before the advent of the semiconductor, the operational amplifier was essentially only known in the application that had given the name to it—as the basic element in the analog computer. In the fifties you could get amazing little beasts 1 in. X 2 in. X 6 in. that, with a little bit of feedback, could do all the “tricks” of electronic math that the textbook said could be done. They consumed a few watts of power and sold for \$50.

Today? You can get four operational amplifiers every bit as good (maybe even quite a bit better) than that old radio-tube marvel in a can no bigger than a typewriter key. It will consume power in the sub-milliwatt region and cost 75 cents! The designer of 20 years ago wasn’t about to use a whole bunch of op amps, but the designer of today is a damn fool if he doesn’t use a whole bunch of them. He doesn’t have to think about amplifier circuitry—all he has to do is select some external feedback circuits to “form” the action of interest.

What may not be immediately obvious is that the role of the circuit designer has shifted from the equipment designer to the semiconductor physicist. These physicists can make one circuit available to millions of users for a very little bit of tooling. And the physicists compete with one another by introducing a variety of “typewriter keys” that all try to do the right things for the equipment designers. These days the equipment designer spends his time in keeping up, *not by reading more textbooks, but by reading more catalogs.*

There are innumerable alternatives to choose from. Thus it is not surprising that quite different designs result not only from different designers, but from just slightly different requests from the customer or the marketing department where the designer holes up. Take a look at some of the instruments available to the broadcaster today.

Want an oscilloscope? What do you want it for? To look at modulated IF? To examine detail of pulse form very carefully, for a nanosecond class of parasitic? For this you can buy a beaut such as the scope in Fig. 1. And it can come with built-in line and frame sync. But now wait a minute, Joe still has to lug that old monster scope with him every time he goes out to try to get the trailer to work just one more time for dear old wzzz. So let’s get him a scope before he breaks his arm. How about the one in Fig. 2? It’s battery operated, it’s good to 20 MHz, and it doesn’t really cost all that much.

Want a function generator? What's that? Well then, isn't it about time you got a new audio oscillator, a new gadget for checking sweep circuits, and an RF source. Well, you can get all of that in one box. Referring to Fig. 3, that box generates sine waves, triangles, square-waves, pulses, ramps, etc., at frequencies from 0.02 Hz to 20 MHz. And it doesn't cost much either. But let's not forget Joe again. Why not fix him up with the battery-operated job of Fig. 4. While it doesn't do all the things the big one does it sure goes well with the scope you just got for Joe.

The point to all this is that even now you can be mighty selective in your choice of instrumentation equipment. If you want a standard for regulatory reasons, an instrument for reasons of operational integrity or improvement, or a tester for reasons of troubleshooting and testing—they're all there. But while selection of best-equipment-for-your-use may be the challenge of the moment, this act of selection begins to define your needs—even starts to lead to equipment standards for general broadcasting use. Today the designer can produce what you need. He can't be expected to be as expert in your field as you are, so you must tell him of your needs.

Even without a lot of user-supplier technical interchange in the area of equipment specifications, specialty or custom equipment (without the automatic corollary of high price) is becoming available. Just for one example, the supplier of the function generator mentioned previously is in that business because he knows how to make function generators. He thinks the generator is more "powerful" as a general laboratory instrument than the oscillator. Yet he also produces an ultra-low distortion oscillator for "proof" testing, and an oscillator with dual metering for return-loss line measurements (see Fig. 5). Why does he produce these instruments? Because he can—and you told him that you needed them.

You no longer have to wait for the various peripheral industries to develop something you need. You can get what you need if you'll just figure out what you need. The time for industry/supplier synergism is here now. Use your societies; use the resources of your profession—NOW! **BM/E**

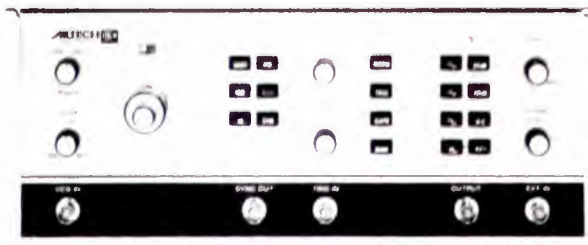


Fig. 3 Wide range laboratory function generator (Photo courtesy AILTECH)



Fig. 4 Battery operated function generator. (Photo courtesy Krohn Hite)

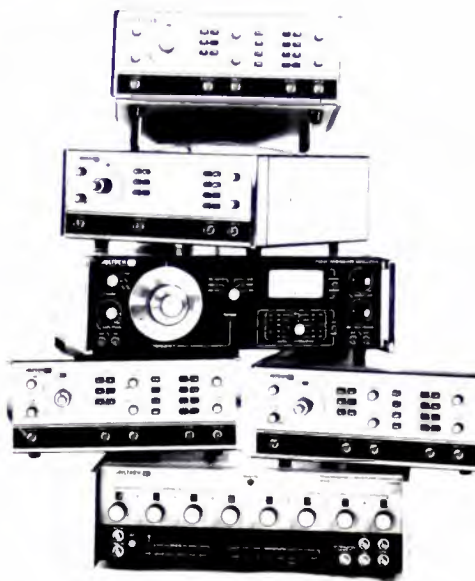


Fig. 5. Variety of signal source products. (Photo courtesy AILTECH)

Simplified Negative Tower Measurements

By Charles S. Wright

OVER THE YEARS, most station engineers have evolved their own favorite method for measuring "negative" tower impedance. Yet one of the simplest methods, requiring only a standard operating

Mr. Wright is vice president of Delta Electronics.

impedance bridge, is usually overlooked. This may be due, in part, to a lack of confidence in the measuring technique used with the operating impedance bridge. The purpose of this article is to explain the simple measuring procedure and mathematically demonstrate its validity.

Operating principles

The simplified diagram illustrates the essential components of the operating impedance bridge. The coupling box of the bridge consists of a primary line carrying the RF energy through the bridge and a center tapped secondary line lightly coupled to the primary line. The coupling between the two lines consists of capacitive and inductive components indicated by the capacity C , and the mutual inductances, m , for each half of the line. The voltage, E , applied to the input of the primary line will cause the current, I , to flow to the unknown load, Z_L . Of course,

$$I = \frac{E}{Z_L}$$

The center tap of the secondary line has an ammeter to ground indicating the total induced current, i . This current is the sum of three components: i_c , the current through the capacity; and i_{m1} and i_{m2} , the currents induced in each half of the secondary line by the primary line current and the mutual impedances. These currents have the following values:

$$i_c = +j \frac{E}{X_c}$$

$$i_{m1} = +j I X_m Y_s = +j \frac{E X_m Y_s}{Z_L}$$

$$i_{m2} = +j I X_m Y_b = +j \frac{E X_m Y_b}{Z_L}$$

Y_s is the complex admittance of the variable bridge standards (driven by the R and X front panel dials); and Y_b is the complex admittance of the bias components (internal components used to zero the bridge).

As the arrows indicate, the total meter current is:

$$i = i_c - i_{m1} + i_{m2}$$

Substituting the calculated values of the currents and letting i equal zero for a null condition gives:

$$0 = j E \left(\frac{1}{X_c} - \frac{X_m Y_s}{Z_L} + \frac{X_m Y_b}{Z_L} \right)$$

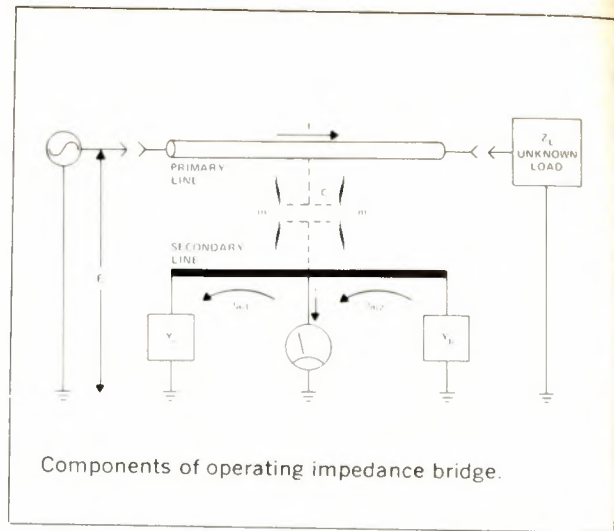
The terms in the parenthesis must be zero, therefore:

$$\frac{1}{X_c} = \frac{X_m}{Z_L} (Y_s - Y_b)$$

which may be restated as:

$$Z_L = \frac{X_m}{X_c} (Y_s - Y_b)$$

The term X_m/X_c is a constant fixed by the physical parameters of the bridge. Y_b is set at the factory to calibrate the bridge and remains constant. Therefore, the dials of the shunt variable resistor and variable capacitor making up Y_s can be calibrated directly for the R_L and X_L components of Z_L .



Negative measurements

Now consider what will happen when the bridge connections shown in the diagram are reversed. The source voltage, E , is exchanged with the unknown load, Z_L . The i_c current continues to flow in the same direction; but the currents i_{m1} and i_{m2} are reversed since the current flow in the primary line, I , is reversed. Under these conditions, the total meter current is:

$$i = i_c + i_{m1} - i_{m2}$$

With the meter current equal to zero and solving as before:

$$0 = j E \left(\frac{1}{X_c} + \frac{X_m Y_s}{Z_L} - \frac{X_m Y_b}{Z_L} \right)$$

$$\frac{1}{X_c} = \frac{X_m}{Z_L} (-Y_s + Y_b)$$

$$Z_L = \frac{X_m}{X_c} (-Y_s + Y_b)$$

Which may be restated as:

$$-Z_L = \frac{X_m}{X_c} (Y_s - Y_b)$$

It should be noted that the final equation is identical to the equation derived with the bridge in a forward direction; with the exception that Z_L is now negative. As a result, the bridge dials will now indicate the *negative* of R_L and X_L . If R_L is negative, as for a "negative" tower, a normal bridge balance is obtained.

If this technique for measuring a "negative" tower seems overly simple, it should be noted that the measurements were made with an operating impedance bridge rather than a conventional bridge. The conventional bridge is a two-terminal device, looking in one direction and measuring the equivalent resistance and reactance seen in that direction. The operating impedance bridge is a three-terminal device measuring the complex ratio of voltage and current. This by definition is the operating impedance of the unknown load.

BM/E

An Automatic Television Monitoring System

THE ECONOMIC BENEFITS OF REMOTE CONTROL and monitoring of transmitters has been recognized by the broadcast industry for a considerable time and many of today's transmitters are equipped with the necessary control facilities. Until recently, most systems provided information relating to the operational status of the transmitter rather than an assessment of the transmitted signal quality and the impairments which cause signal degradation.

Marconi Instruments offers an automatic monitoring system which will assess picture quality, display out of limits conditions of basic signal parameters or faults, and provide automatic executive control. The

Marconi Instruments' system is illustrated in Fig. 1. It is comprised of two units, an Insertion Signal Analyzer, Model 2914 (top unit), and a Data Monitor, Model 2915.

The analyzer permits the simultaneous measurement of up to 24 parameters of a previously introduced VIT signal. Some of the basic parameters measured are: the amplitude of bar, sync, 2T pulse; chrominance luminance gain, delay, and cross talk; luminance non-linearity, noise, LF error, bar tilt, differential gain and phase, etc. These parameters are expressed either in units of mV, nSecs, degrees, or as a percentage.

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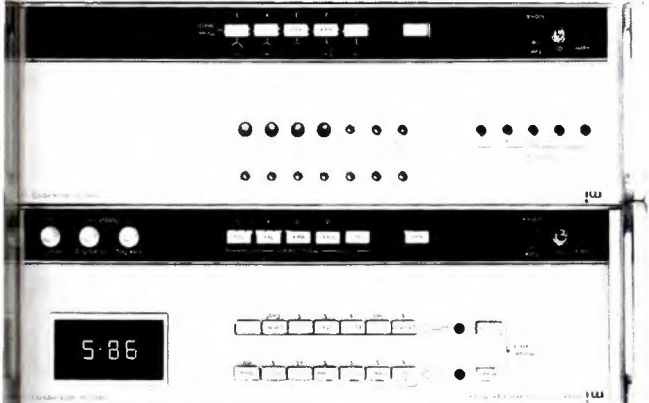


Fig. 1. Insertion signal analyzer (top) and data monitor (below).

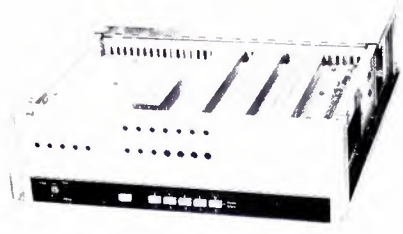


Fig. 3. Limits are set by plug-in buttons under hinged cover.

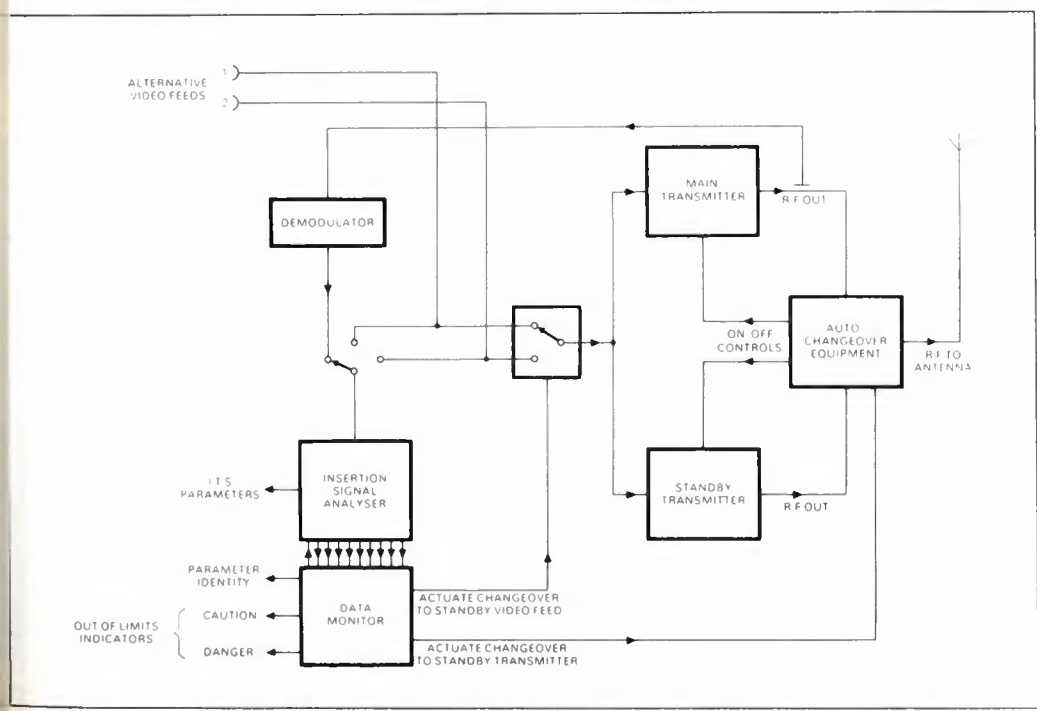


Fig. 2. A possible configuration of the monitor system.

Spectrum Analysis Of The TV And FM Signal

By Linley Gumm and Morris Engelson

Pulses, burst, chroma signals, harmonics, and deviation are just a few of the measurements that can be made with a spectrum analyzer.

BROADCAST ENGINEERS are increasingly turning to spectrum analyzers as a solution for some of the more difficult measurement and monitoring problems. The spectrum analyzer can be used to check the output spectrum for harmonics, spurious responses, and general spectrum shape; for monitoring in-service functions such as spurious signals from serrasoid modulators and aural carrier frequency deviation; and initial system calibration such as setting the peak deviation of the aural carrier to 25 kHz. The purpose of this paper is to discuss some of these measurements.

Spectrum of broadcast TV signal

The spectrum of a typical television station transmitting program material is shown in Fig. 1. The visual carrier is the large signal to the left and the aural carrier is the large signal to the right. The smaller signal between the visual and the aural carrier is the chroma subcarrier. From this photo we can determine several pertinent characteristics of the signal. First, the aural carrier has two spurious responses fairly close in and 55 dB down from the aural signal. These are probably serrasoid modulator spurs.

The performance of the vestigial sideband filter can be approximated by comparing the upper sideband response with the lower sideband response, the difference being the filter's response. One can also see the action of the video low-pass filter in the rapid fall-off of spectral components just below the aural carrier.

As the CRT readout indicates, the resolution bandwidth in Fig. 1 is 30 kHz. With this bandwidth the display will show the *average* value of the spectral components making up the TV signal instead of the peak values. Since the TV signal is made up primarily of pulses and bursts in the 4 to 10 μ s length range (sync, blanking, etc.), a resolution bandwidth of 300 kHz is necessary to observe peak values.

Fig. 2 shows a typical TV signal with a 300 kHz resolution bandwidth. The wider bandwidth allows the analyzer to reach peak amplitude during the

on-time of pulses such as sync tips and bursts such as multiburst. (Note that chroma burst is too short, 2 μ s, for the analyzer to reach peak amplitude.) The short pulses and bursts show up in the display as signals with a "feathery" appearance instead of being solid. Note the visual carrier. It now has both a solid bottom and a feathery tip. The solid bottom is the carrier signal from the blanking level to peak white. The feather is the carrier signal from blanking up to the sync tips. Blanking is 75% or -2.5 dB of sync level. Note that in Fig. 2 the height of the feather is about 2.5 dB (the vertical scale factor of the display is, as indicated in the CRT readout, 10 dB/div).

The chroma signal with 300 kHz resolution bandwidth is more complex. The chroma signal is made up of two main components, the burst and the chroma content of the picture. The burst is the same regardless of picture content, so it results in a stationary spectrum while the chroma content of the picture varies around it. In Fig. 2 the broad, feathery signal is the burst while the more solid carrier is the chroma information.

Anyone who has looked at a TV signal on a spectrum analyzer knows that the spectrum of the signal varies with picture content. Another effect that shows up is that the spectrum of the vertical interval is strikingly different than the rest of the picture.

During the time that the spectrum analyzer sweeps across the TV signal's spectrum, the TV signal continues to scan out the picture. If the sweep time of the spectrum analyzer is similar to the vertical frame rate of the TV signal being viewed, the spectrum of the vertical interval will roll through the spectrum analyzer display. Fig. 3 shows this effect. The upper display is the spectrum of the TV signal. The lower display is the demodulated TV signal from a demodulator. Both displays use the same time base. Note the notch in the spectrum during the vertical interval.

Far from being an annoyance, the vertical interval spectrum phenomena is very useful for in-service measurements. The usefulness stems from the realization that in the spectrum analyzer display one is viewing the energy at each frequency at the

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time the analyzer is tuned to it. This means that if we watch the vertical interval roll through the spectrum analyzer display, the spectrum of the VIT test signals can be identified and measured. Referring again to Fig. 3, at the right-hand edge of the vertical interval, the long line up from the spectrum

display is indicating the amplitude of the multiburst signal at that frequency.

Fig. 4 shows the entire multiburst spectrum. This particular transmission had two different multiburst signals with slightly different burst frequencies. Peak white carrier power is visible as a light line across

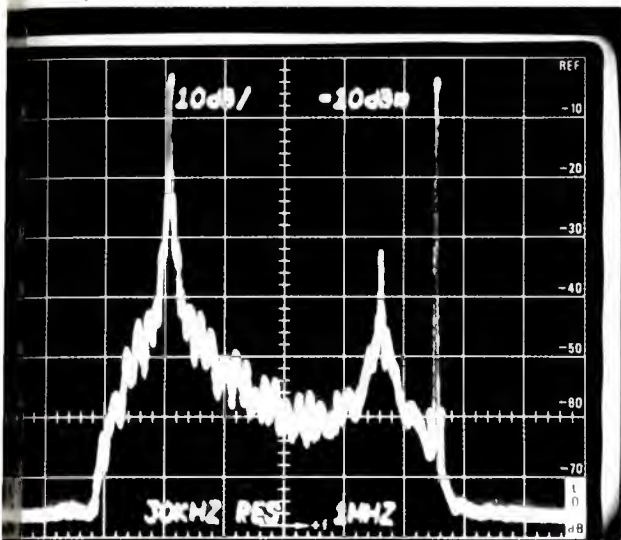


Fig. 1. Typical TV spectrum with narrow resolution bandwidth.

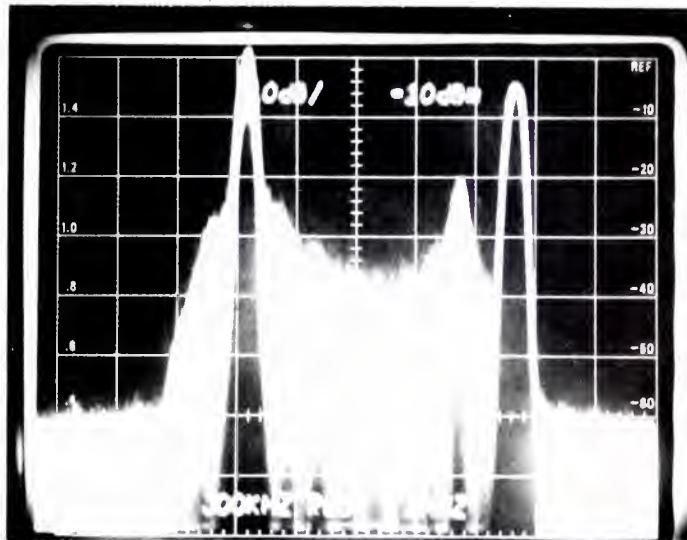


Fig. 2. Typical TV spectrum with wide resolution bandwidth.

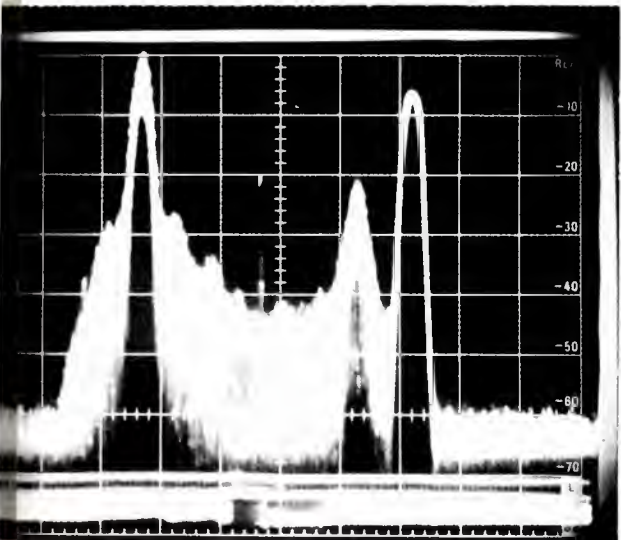


Fig. 3. TV spectrum with video display. Note relationship of vertical interval and notch in display and VIT signal.

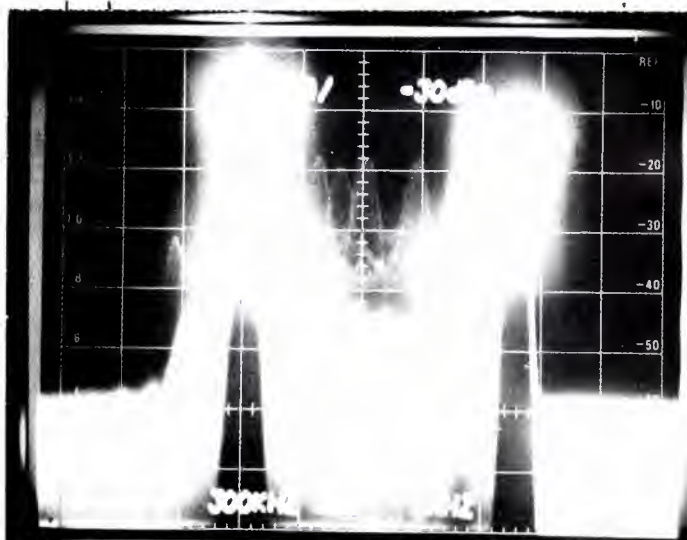


Fig. 4. VIT signal spectrum.

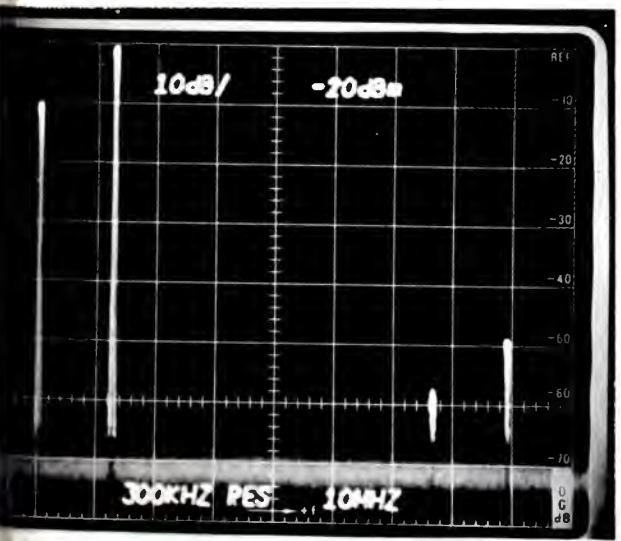


Fig. 5. Double exposure photo illustrating harmonic level measurement. Vertical scale is 10 dB per division.

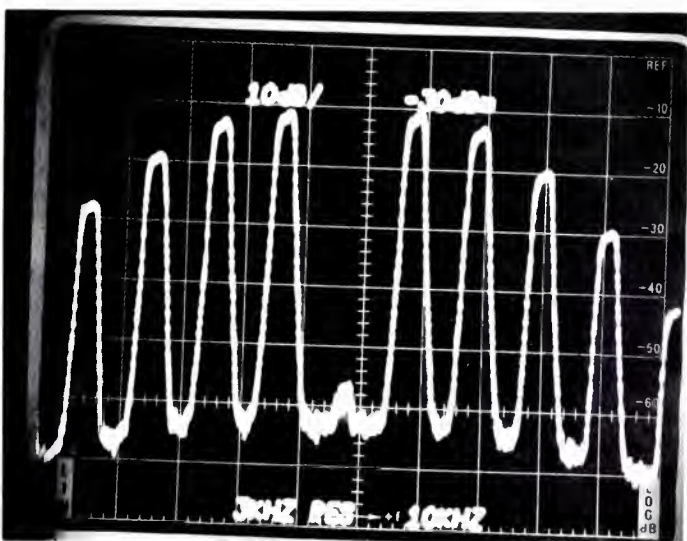


Fig. 6. Bessel null method of FM deviation adjustment.

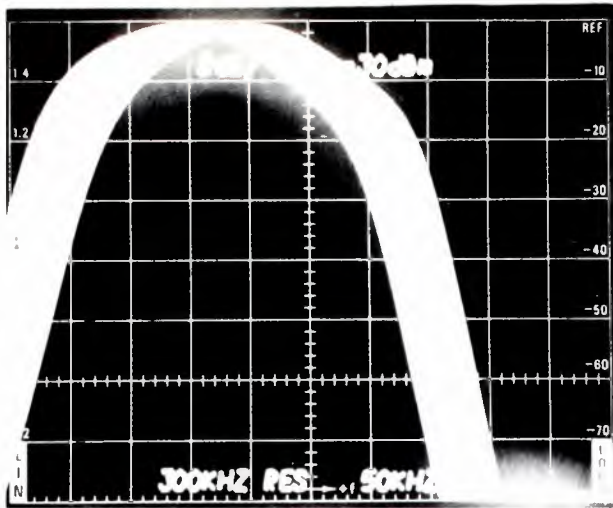


Fig. 7. Estimating FM deviation by direct observation.

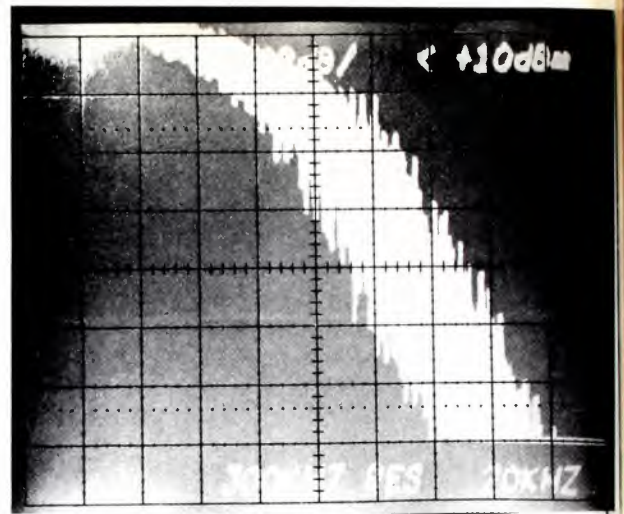


Fig. 8. Estimating FM deviation from on-the-air observation.

the visual carrier 16 dB down from sync TIP power.

Measuring harmonic level

Harmonic measurements are illustrated in Fig. 5. This is a double exposure photograph showing a 67 MHz signal and its second harmonic. The second harmonic amplitude appears to be 48 dB below fundamental at both -20 dBm reference level and with 10dB more attenuation at a -10 dBm reference level. This test shows that spectrum analyzer nonlinearities are not contributing to the harmonic level and the measurement is valid. The harmonic amplitude would change with a change in input level if it were generated by the spectrum analyzer.

Frequently there is a need to measure harmonic levels beyond the dynamic range capabilities of the spectrum analyzer. The easiest solution is to reduce the amplitude of the fundamental by means of either a high-pass or band-reject filter. Such a filter was used in this measurement. This filter has a 40 dB loss at 67 MHz and a 2 dB loss at 134 MHz. Consequently, the second harmonic amplitude is $48 + 40 - 2 = 86$ dB below that of the fundamental.

FM measurements

There are three related parameters in frequency modulation (FM). These are the modulating frequency (f_m), the deviation (ΔF), and the modulation index (β). The measurement of prime interest is that of deviation. This, however, cannot be measured directly to the desired degree of accuracy. Hence, the modulating frequency and modulation index are measured and the deviation is computed from $\Delta F = \beta f_m$. The reason it is difficult to observe the deviation directly is because the FM spectrum has, theoretically, an infinite number of sidebands. When the modulation index is large (e.g., 50), the sideband amplitudes outside the deviation fall off very rapidly and direct observation is quite accurate. But for small indices (e.g., 2), the sidebands outside the deviation are significant. While methods for making direct deviation measurements have been reported in the literature, these are not suffi-

ciently accurate for setting up a broadcast transmitter. Let us consider initial transmitter alignment first, and then we will take up the problem of in-service monitoring.

Initial transmitter alignment

The FM spectrum consists of a carrier and sidebands spaced at the modulating frequency (f_m) to either side of the carrier. The relative amplitudes of these are given by a set of Bessel functions of the first kind $[J_p(\beta)]$. Where the order (p) is the sideband number, $p=0$ represents the carrier. The argument (β) is the modulation index. The most accurate method of deviation adjustment makes use of the fact that the amplitude of each of the spectral components, including the carrier $[J_0(\beta)]$, goes to zero at specific values of β . These are known as "nulls." A list of the first five carrier nulls is given below.

Carrier null number	1	2	3	4	5
$\beta = \frac{\Delta F}{f_m}$	2.4048	5.5201	8.6531	11.7915	14.9309

To determine what input voltage will produce a desired deviation, we proceed as follows: First, we compute a modulating frequency which corresponds to a carrier null. In television the maximum permitted deviation is 25 kHz, resulting in a first carrier null at

$$f_m = \frac{25 \text{ kHz}}{2.405} = 10.4 \text{ kHz}$$

For broadcast FM the permitted deviation is 75 kHz so the first carrier null occurs at 30.7 kHz. This is beyond the system frequency range so one would have to use the second null at a frequency of 13.59 kHz. The transmitter is now modulated at the computed modulating frequency and the modulating voltage adjusted for a carrier null as observed on the spectrum analyzer. Fig. 6 shows such a measurement. The vertical is 10 dB per division so that the carrier amplitude is more than 50 dB below the level of the first sideband. With the modulating

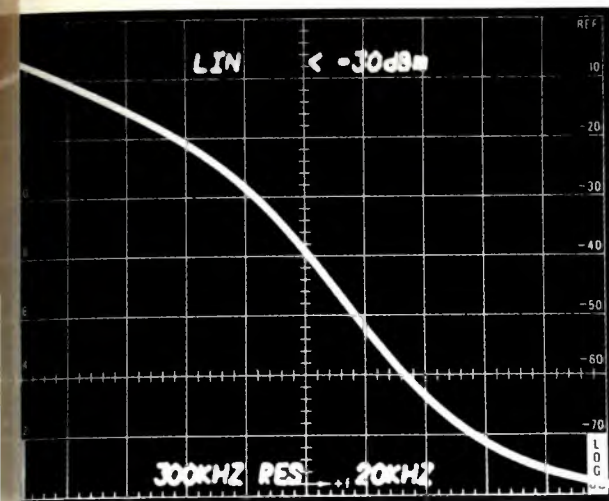


Fig. 9. Calibrating resolution curve for discriminator sensitivity.

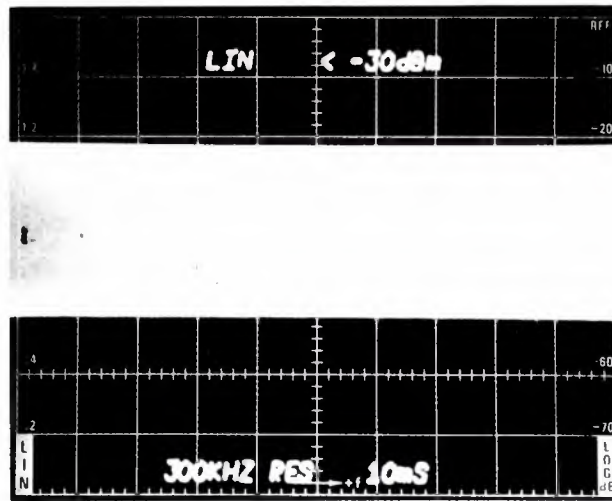


Fig. 10. FM deviation measurement by using resolution curve as discriminator.

frequency set to 10.4 kHz with a counter, the modulating voltage corresponds to a 25 kHz deviation within a fraction of a percent.

On-the-air monitoring

The Bessel null method is probably the most accurate technique available for determining FM deviation. However, it requires the use of specific predetermined modulation frequency. The modulating frequency cannot be controlled nor is there a single frequency when dealing with program material. Yet, it is useful to be able to monitor the deviation while the transmitter is operating.

As indicated before, the major error in the direct observation of FM deviation comes from the fact that sidebands extend beyond the deviation frequency. These sidebands are only apparent when the spectrum analyzer resolution bandwidth is less than the modulating frequency so that the sidebands are resolved. However, constant deviation signals have the same frequency width when the individual sidebands are not resolved. Such measurements have an accuracy of about 5%, which is sufficient for on-service monitoring. This method is illustrated in the following examples.

Fig. 7 shows an unresolved FM spectrum. The deviation was set to 25 kHz by the Bessel null method. The resolution bandwidth is set to 300 kHz which is much wider than any possible modulating frequency. As the signal frequency swings plus and minus the deviation about the carrier, we get a signal width of $2 \Delta F$. This $2 \Delta F$ swing is distorted by the shape of the resolution filter so that a different width will be observed on a different part of the display curve. Thus, at 50 kHz/div, the signal is more than a division wide two divisions from the top and almost exactly 50 kHz wide on the bottom. The steeper the resolution filter shape factor, the less the difference in apparent deviation at different heights of the display. This error is, however, of no consequence provided one precalibrated the spectrum analyzer with a known deviation and subsequent measurements are made on the same level with respect to signal peak. Fig. 7 was standardized

for a full-screen display and signal width was measured on the bottom graticule. Accuracy is improved by reducing the frequency span (e.g., 10 kHz/div) for easier viewing. A span of 50 kHz/div was chosen for Fig. 7 so that the peak as well as the bottom of display could be shown in one photograph.

Fig. 8 is an off-the-air photograph of the audio from one of the local television stations. The display was observed for one minute using a storage oscilloscope to increase the chance of observing the peak deviation being transmitted. The baseline was raised by one division to eliminate obscuring the 20 kHz/div readout. Signal width at the bottom is 40 kHz; hence, the peak deviation is 20 kHz.

Another monitoring method is based on the use of a calibrated discriminator to detect the FM signal. Any device that has a non-zero voltage-out versus frequency-in transfer function can be considered a discriminator; this includes the slopes of the spectrum analyzer's resolution amplifier response curve. Fig. 9 shows one side of the 300 kHz resolution amplifier response. It is obtained by feeding a CW signal into the spectrum analyzer. The gain of the spectrum analyzer was adjusted to give a full-screen display for ease of calibration. At 20 kHz/div frequency span, the transfer characteristic taken around the central portion of the curve is 4.4 vertical divisions per 80 kHz horizontally. This is 0.55 divisions per 10 kHz. Fig. 10 shows the detected FM signal. This display is obtained by taking a full-screen display, such as in Fig. 7, and reducing the frequency span to zero. The spectrum analyzer center frequency is adjusted to bring the demodulated signal onto the central portion of the resolution curve corresponding to the previous calibration. Here the detected FM signal is 2.8 divisions high which corresponds to 50.9 kHz for $2 \Delta F$. This differs by only 2% from the previously set value of $\Delta F = 25$ kHz.

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Broadcasters Can Get All Kinds of Return Signals Via the Telephone

The telephone can be more than a call-in device. With memory, it becomes a vote counter, an opinion recorder, and much more.

WE NORMALLY THINK OF THE TRANSMITTER and the airwaves as the broadcaster's channels of communication. But the broadcaster has another essential piece of communications equipment: namely, the telephone. The telephone is more than a means for day-to-day business or editorial communication. Used creatively, it can be made an auxiliary means of communication with listeners of the station. Management can use the telephone to establish its de-

sired demographic image, stimulate exciting interest in its programs, and to adjust its programs more responsively to the desires and needs of its audience.

Radio station WFBR, serving the Baltimore, Maryland, area, is using the telephone to provide a new and exciting way of reaching for new listeners and holding them, once reached. In so doing, it has modified the demographic composition of that audience in accordance with a pre-designed plan.

The latter objective has been accomplished fairly recently, during the latter part of 1972. To achieve that purpose, the station created electoral contests, with listeners casting the votes. The telephone, in conjunction with a device called a "Code-a-phone," was the communication medium used for recording those votes.

This is just one of the many ways the telephone is being used by WFBR, program director Norman H. Brooks points out. For years one of the most popular radio programs in the Baltimore area (population: approximately 2,800,000) has been the station's "Conference Call" program. Also popular are music/talk programs, with conversation between listeners and the announcer. The station and the telephone company are currently working on technical improvements designed to make this kind of program even more effective. Listeners also have telephone access to the "ear" of the station at any time of the day or night on any subject they want to talk about, and know that it will be recorded and considered in program decisions.

Contest goal: A younger listener

The idea of a contest, with listeners functioning as the electorate, was developed in part as a means of attracting a younger audience, Brooks relates. The first contest accordingly pitted performer Donnie Osmond against the Jackson Five. Beginning Saturday at 6:00 a.m. the station played one selection by each group every half hour, and invited listeners to call the station to vote their preferences. This contest, as have the others, concluded Sunday at midnight. The station selected weekends for its contests as this is otherwise the slowest part of the week.

At first, listeners were asked to call the announcers to give them their votes personally. Station WFBR received about 1200 calls the first day, and this represented only a fraction of listeners who tried



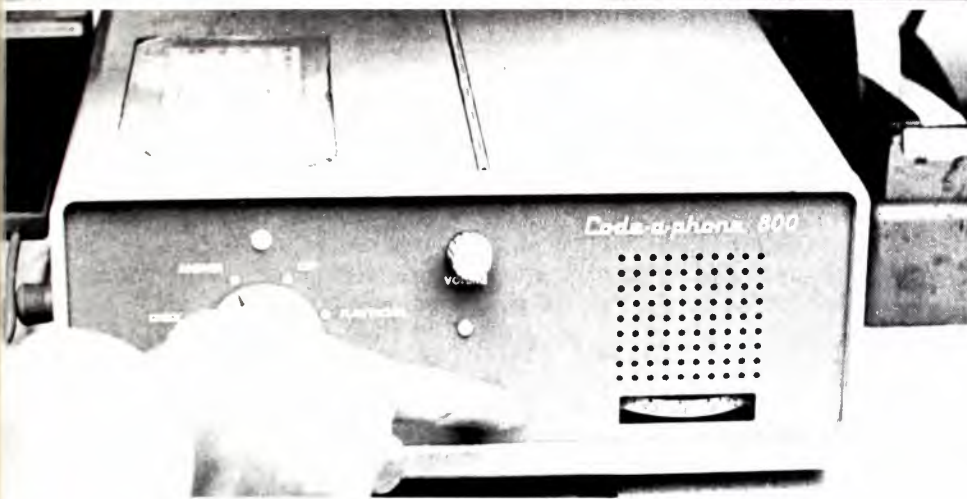
One of station's more popular programs is this combination music/talk show, with listeners telephoning in requests and comments direct.

Program director Norman H. Brooks, right, and station engineer Doug Bartram check over telephone-answering circuitry component.





Two Code-a-phone Model 250 units. Connected to telephones on weekends, a call to one records a vote for one "contestant;" a call to the other for the opponent. Count is kept by automatic counters shown here on top of machines and connected to them.



This Code-a-phone answers telephone automatically and receives messages from callers in return. Many requests for musical selections come in on this machine, which is also promoted (by telephone number) on station programs several times throughout the day.

to get the station. The telephone company reported that they had over 4000 other calls backed up and they were sure that there were many others who tried without success to get the station. "Obviously, receiving the calls personally took far too much time," Brooks said.

Before the next weekend, the station installed two automatic telephone answering devices with counters attached. Each "Code-a-phone" was connected to a telephone with its own telephone number. As explained on the radio, a call to one number indicates a vote for one performer, while a call to the other number records a vote for the other group. Each machine answered the telephone automatically, with a recorded announcement. While these "Code-a-phones" have a duration of three minutes, they can be adjusted to any length, and the station made this as brief as possible. It simply announced that the caller's selection for that performer had been recorded and immediately disconnected.

This method of recording reduced the time to just a fraction of that formerly required. The very first weekend after installation of the machines the station received 40,000 calls, almost equally divided between the two competing performers. Even that did not represent the total of interested listeners, Brooks points out, since it took unusual perseverance for a listener to record the vote. Many had to call as many as 10, 15, even 20 times before their choice was recorded.

One weekend contest even had to be cancelled because the number of calls "wiped out" one of the telephone company's main exchanges. "The utility called us explaining that a number of vital services, including hospitals and fire departments, were with-

out telephone service as a result. Naturally, we cancelled for that weekend," he recalls.

The degree of interest stirred up by the contest took the station by surprise. A number of those participating took time to call the station directly to point out a degree of unfairness they had observed due to the greater length of time it took to dial one of the numbers. One of the voting numbers took about three seconds longer to dial due to having higher digits than the others. To compensate, the station made an announcement acknowledging the vote on the other line to be three seconds longer, and explained this to its listeners.

The winner of each weekend contest is announced the first thing Monday morning. The degree of listener interest is also indicated by the large number of calls received during the week asking the identity of the contestants for the following weekend. The first contest started in October and was followed by other contests up to the end of the year, approximately 12 weeks in all.

All of those contests were musically oriented, and all elicited a good response. Although they didn't maintain the high of the second week, they did not thereafter fall below the 10,000-to-12,000 level.

The device can be used for other types of contests as well, Brooks points out. When the Baltimore Colts fired their coach in the middle of the football season, for example, the station asked its listeners to vote their approval or disapproval. The voting time for this covered a 24-hour span in the middle of the week, and did not interfere with the weekend contest.

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Broadcasters Give Radio Re-Regulation A Big Push at NAFMB Meetings

Executives of more than 500 stations air their specific complaints about existing rules, at meetings in 21 cities.

THE FCC IS HARDLY LIKELY TO COMPLAIN any more that the broadcast industry has injected too few of its own ideas into the re- or de-regulation of radio, now in full swing. At one-day meetings in 21 cities, organized by the National Association of FM Broadcasters and held on February 22, a total of more than 500 broadcasters met to tell what bothered them in the present FCC rules and regulations on radio.

And if the New York meeting, which *BM/E* observed, was fairly typical, the assembled broadcasters did in fact let loose a full-fledged barrage that should at least give the FCC plenty to think about. Transcripts of all the meetings will be forwarded to the Commission's Task Force on Radio Re-Regulation. The result will certainly be an acceleration and broadening of the re-regulation process, whatever the decisions on specific suggestions and requests.

As detailed in *BM/E* in February and March, two batches of rules changes and eliminations were announced by the FCC in November and December, to take effect April 4, 1973. These changes, most of them individually fairly minor, in total take off the broadcaster's back a considerable load of burdensome regulation in the area of inspection, logging of meter readings, reports, notification on emergency operation, etc. For example, the old rule that the operator must have "visibility" of the transmitter and monitor meters, often interpreted to mean that all the meters must be in front of the operator—obviously a difficult rule for many broadcasters—has been reinterpreted to allow meters 360 degrees around the operator, "so located that deviations from normal indications of the instruments can be observed."

Welcome as these changes obviously are, broadcasters—again taking the New York meeting as a good sample—are deeply disturbed by a number of rules, and FCC practices, of broader importance. With Steven Crane of the FCC, who attended, inevitably handed the roles of complaint-receiver and policy explicator, the broadcasters present gave a thorough going over to, especially: ascertainment of community problems; quotas for non-entertainment program segments as pre-requisite to

renewal; citizen challenges to renewal; cost of political advertising and announcements; extension of the license period; and renewal forms.

Moderator of the meeting for NAFMB was Chuck Bailey of WCBS-FM. He gave Steve Crane first crack, and Crane reported that, as of that date, the FCC had received 611 letters on re-regulation, 200 of which said, in effect, they didn't believe it, but hooray anyway. He assured the group that re-regulation was real, and that the FCC would benefit greatly from direct feedback from broadcasters. He said that, in addition to the changes announced in November and December, the FCC was studying a large number of other possible points of change, among them the rules on frequency monitors, retention of records, renewal forms (possibly a "short form" would evolve), automated transmitters, and others.

The discussion that followed impressed *BM/E* greatly with its earnestness, with the sense of responsibility and thoughtfulness evidenced. The following is a brief skimming of what was literally a day of talk; included are just some main points made on the main topics.

Ascertainment

The main complaints centered on the difficulty a small station staff faces in interviewing enough people to make up a sample of the community. In a medium to large city, 300 people, say, might be considered an inadequate sample, but the interviews would constitute a heavy burden for the staff. In addition, there was the hazard of acknowledging problems mentioned by listeners and then not being able to do anything about them. Uncovering the problems, as one man put it, "puts a gun at the station's head."

On the question of what constitutes "doing something" about community problems, Steven Crane pointed out that the FCC had no formula: it sought evidence that the station was broadly responsive to the community's needs, and this generally meant some programming in the area. He suggested that several stations might join to hire a professional research team to survey the community; this would

olve, among other problems, that of the community leaders who would be interviewed over and over again, if each station did the job separately. Or the job could be divided up among the local stations.

Several station managers won praise for their descriptions of the use of taped ascertainment interviews on the air, in some cases with station comment, plus a number of five-minute community reports, eight to 12 a week. Speaking against the professional research approach, one broadcaster said he found the ascertainment interviews "refreshing" and gave them as much time as they needed.

There was general agreement on two points. The first was that a continuing dialogue would be better than a single frantic effort a few months before renewal—it would tend to keep the station on its toes and might also give potential protesting groups a chance to blow off steam away from the renewal issue. Second, most agreed that general guidelines, as at present, were better than a formula of some kind that would lock the station into a particular way of handling community problems.

Program quotas

On the related problem of program quotas on renewal applications, there was opposition to the idea of fixed "percentages" on several counts. Some of those present held that, if a station's audience wanted 100% music, giving it to them should be considered "serving the public interest, etc." But others felt that a broadcast station has a responsibility to supply its audience with basic news and community coverage. And a number doubted that a "wall-to-wall music" station would survive: the market imposed its own quota system on the broadcaster.

Steve Crane said that the FCC was moving away from the idea of fixed quotas in any case, and toward a more general requirement simply called "substantial service to the community." A number of those present agreed that a mostly-music station usually should get its news and public affairs material into about five minutes in each hour, to hold the audience. But even this formula was not a universal one; the broadcasters wanted room for each to find a workable pattern, and apparently FCC thinking is on the same track.

Challenges to renewal

As could be expected, this topic caused the loudest outcries of distress. Crane in large part passed the buck to Congress, which is mulling over several bills on the subject. He said the FCC was not, he believed, in a position to put limitations on challengers, without specific Congressional authority. He advised broadcasters to reach their Congressmen individually and through industry groups, such as NAFMB and NAB.

License period

On the related question of whether a five-year or ten-year period was better than three years, a consensus emerged that longer periods would be distinctly better if there were no new protection forth-

coming against renewal challenges, but that if the renewal process were given more stability, the extension of license period would have less importance. With reasonable assurance of going on beyond the three years, a broadcaster would have a chance to build a viable operation; three years alone is too short. The serious discouragement the present situation gives to major investors, thus cutting down a station's chances for enlargement, was just one of the evils the broadcasters saw in being wide-open to challengers.

Renewal form

Complaints against the complication of the renewal form were silenced by Crane's report that the FCC was, in fact, considering a short form, somewhat analogous to the income tax form 1040A, which could be used by many stations. There was no indication as to if, or when, this might become reality.

The 90-second editorial

One station manager got praise for his description of one form of public affairs programming developed for his station: 90-second guest editorials. It was agreed that this constituted valid public affairs coverage, and had the attraction of giving voice to many different viewpoints. In favor of such "programs," as against a half-hour on Sunday night, is the expectation that the audience will stick with the 90-second bit, with a longer public affairs program having a much higher turn-off risk.

On the *third-class exam*, some complained that applicants could pass without learning much about how to run the station. Crane admitted there was a gap between passing the exam and the real expertise expected, and said the FCC was considering the problem. However, he said this seemed largely a training problem which the industry itself, or each station, must attack.

On *performance specifications*, several were strongly in favor of more complete performance requirements for *studio equipment*; the consensus was that a majority of the poor-equipment problems these days are in the audio units that do not have to meet such rigid requirements as the now generally reliable transmitting equipment. The feeling was that the FCC should sharply upgrade the requirements for audio equipment.

On the *cost of political broadcasts*, Crane said this was one of the most frequent complaints in the letters received by the FCC, and pointed out that the problem was before Congress in several proposed bills. Those at the meeting agreed that there was a major complaint here.

At the end of the meeting, it was obvious that everyone present felt better for having blown off some steam and participated in some constructive criticism. The ball passes to the FCC: but broadcasters cannot afford to relax into total silence. Reinforcement on many issues is needed; a continuing dialogue is the thing, through letters, and personal contact at the FCC (warmly invited by Steven Crane).
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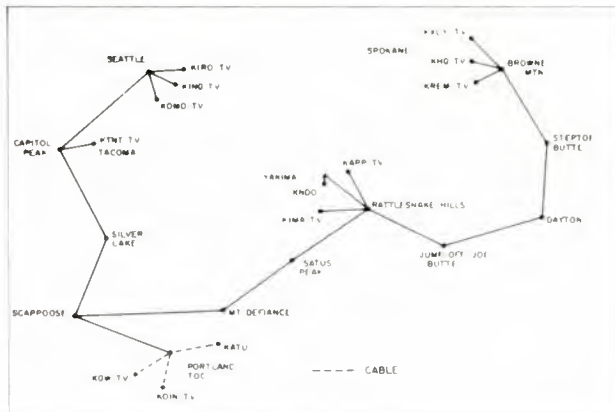
Computer Monitored Microwave System Serves Pacific Northwest TV Stations

By David N. Corbin

THE NEW VIDEO MICROWAVE SYSTEM serving 13 television network (ABC, CBS, NBC) affiliate stations in the Pacific Northwest uses computerized monitoring to maintain reliability. The system, owned and operated by Western Tele-Communications, Inc., brings network TV programming into Tacoma, Seattle, Yakima, and Spokane from Portland, replacing existing telephone company service. The stations served by the new system are: KINT-TV (Tacoma); KIRO-TV, KING-TV, and KOMO-TV (Seattle); KAPP-TV, KNDO, and KIMA-TV (Yakima); KXLY-TV, KREM-TV, and KHQ-TV (Spokane); and KGW-TV, KOIN-TV, and KATV (Portland). Western Tele-Communications, a specialized communication common carrier, is the largest contract carrier of video in the country serving the CATV and TV broadcast industry.

The system is operated and controlled from the WTCI Technical Operating Center at Portland. The network video and audio signals are picked up at

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Pacific Northwest microwave TV network.

Technical Operating Center at Portland showing alarm status and mini-computer at the right.



Portland by interconnection with another carrier. The three Portland stations are then fed by coaxial cables. Separate microwave radio channels for each network carry the video and audio from the Portland TOC to Scappoose Mountain. From there the signals are split to feed the Seattle and Yakima-Spokane legs.

Outbound from Portland, the system consists of the three network channels, an occasional-use channel for special event distribution, and a protection channel. The inbound system provides one occasional-use hot standby channel for special event feeds to other locations; 436 route miles are involved with equipment installations at 13 sites other than the local studios. More than 100 separate transmitter and receiver units are involved.

System configuration

Receive automatic baseband protection is provided at each studio with channel monitoring for all channels remoted to the receive protection switching logic located at the terminal repeater. At each terminal city the final repeater power-splits the protection and occasional-use channels and combines them with the associated network channel for transmission to the respective studio locations.

Two independent switching sections are provided on the Scappoose, Yakima-Spokane system: Scappoose to Jump-Off-Joe Butte, and Jump-Off-Joe Butte to Spokane. The channel monitoring equipment is remoted to the switch logic at Jump-Off-Joe Butte.

A single non-protected return channel is provided from each of the studios to the terminal repeater for the city. At the terminal repeater any one studio can be patched into the common return channel. A hot standby heterodyne return channel is provided from Seattle to Portland; and a single, non-protected, heterodyne return channel extends from Spokane to Portland. IF switching at Rattlesnake, with remote control from the Portland Technical Operation Center, permits interconnecting the return channel from Yakima with the return channel to Portland and with the occasional-use channel to Spokane. Origination of both video and audio traffic at any studio is therefore possible.

Microwave equipment description

The basic system consists of the Raytheon KTR-3A heterodyne equipment with KTR-2A 11 GHz

equipment utilized from studio to terminal repeaters. This equipment is completely solid state except for the traveling wave tube final amplifiers in the transmitters. Frequencies in the 6 GHz band are used except when frequency coordination requires 1 GHz channels, such as in the Seattle, Spokane, and Portland areas.

Each channel is equipped to originate video and audio programming at the Portland TOC. A 10 MHz pilot is injected on the baseband of all channels, and a network identity pilot is injected on all channels except the protection channel. These pilots are used to monitor channel status at receive switching locations and for switching functions.

A noise monitor is also provided at the receive switching locations. The noise and pilot monitors furnish the input to the 1 for N switch logic at the receive end of the switching sections. The protection channel will carry the network or occasional-use audio and video program in the event of failure of the respective network channel as indicated either by loss of pilot or high noise.

Pilot and noise monitoring equipment on all channels is provided at each studio. This information is remoted to locations of receive 1 for N switch logic. The presence or absence of the network I.D. pilot on the protection channel is also monitored. When a switch is performed at the transmit end of the 1 for N switching section, an I.D. pilot appears in the protection channel. The presence of this I.D. pilot will initiate a switch to protection at the appropriate studio.

Hot standby operation is achieved using a diode switch at RF. Control of the RF switch is provided from monitoring: 1 the receive carrier level; 2 the transmitter power; 3 the receive local oscillator AFC; and 4 the transmit local oscillator AFC. A non-redundant SSB service channel system is provided over the hot standby channel. The receive section of the SSB system is normally connected to the A channel of the hot standby system, but switches to B on failure of the A receiver.

The transmit section of the SSB service channel is split and applied to both A and B transmitters. The hot standby receive terminal is located at the Portland TOC. Switching is performed at baseband. This switching is controlled from monitoring: 1 the receive carrier level; 2 the local oscillator phase lock; and 3 the receive program audio carrier.

To achieve the best frequency coordination and help prevent future interference problems, high performance antennas are used. Andrew UHX 10-foot 6 GHz antennas provide a 75 dB front-to-back ratio with gain of 43 dB. The high performance with low sidelobe radiation is achieved by the use of a "shaped pattern feed" which reduces illumination of the reflector edge.

Control and alarm

Independent service channel drops for the Seattle and Spokane sections provide: a. switch control channels, b. a local order wire facility; and c. fault alarm injection. The supervisory control is achieved by a dual tone multi-frequency (DTMF) encoder

Baseband Spectrum Allocation

Nominal Bands

0 - 4.3 MHz	Video
5.8 MHz ± 300 KHz	TV audio
8.2 MHz ± 100 KHz	Portland-Seattle Service Channel
± 200 KHz	
8.3 ± 25 KHz	Occasional-Use Channel Identity Pilot
8.35 ± 25 KHz	NBC Channel Identity Pilot
8.40 ± 25 KHz	CBS Channel Identity Pilot
8.45 ± 25 KHz	ABC Channel Identity Pilot
8.70 to 9.3 MHz	Noise Monitoring Slot
9.75 ± 100	Portland Yakima Spokane Service Channel
± 200 KHz	
10 MHz	Channel Pilot

at the Portland TOC and decoders at the controlled locations. The tones are transmitted on the service channel.

The alarm system is computer controlled for rapid and efficient monitoring of the entire operation. A 16-K word PDP-11 computer, with one interrupt level, controls the entire alarm monitor operation. A Moore 800 ALC Master, with remotes at each station site, feeds alarm data to the computer. Up to 128 alarm points can be monitored at each location. These include unauthorized entry, RF equipment condition and faults, power failure, etc.

Computer interface is provided by a standard ASR 33 Teletype. The operator can load software, delete or restore remotes, and request reports with the ASR 33. The system will print a real time log which includes data points going into and out of alarm as they occur, a current alarm log, and a month-to-date summary log. The month-to-date summary log consists of a system summary, a network summary, and a station summary.

With this system problems can be immediately pinpointed and corrected. Trends or recurring conditions can be spotted for preventive maintenance investigation. The result is a highly reliable service to the network user.

Added communication services

To achieve maximum usage of the RF frequency resources and equipment, Western Telecommunications is engineering the addition of PCM carrier to unused portions of the system baseband. The T compatible PCM carrier will provide data, voice, and general communication service for many users between these cities. These added services will be integrated into the specialized communication common carrier systems recently authorized to WTCI by the FCC. This PCM service WTCI calls "MOVE"—Messages Over Video Economically. It will be used on other video microwave systems for customer communication channel requirements on low density routes.

This new WTCI video system with its potential for maximum reliability, and with added PCM carrier, demonstrates the ability of the "specialized" non-telephone common carrier to provide highly reliable, yet economical, services to the communication user.

BM/E

Much of this material originally appeared in the January issue of "Telecommunications" magazine.

"We obviously have to introduce variety into this to maintain interest, like anything else," Brooks says. "This should not be any problem, since the device lends itself easily to many subjects including some of community-wide interest."

Listener participation always strong

Listener participation programs have a special durability of their own, he points out. Interest in the "Conference Call" program has never flagged. This program starts at noon, with a conference of four members of the WFBR staff, including Brooks, discussing questions called in by listeners earlier that day. Calls are received by the station, starting at 9:00 a.m. until 11:00 a.m., by a station employee over the telephone. The most interesting questions are selected, and background information is researched before the conferees go on the air at noon. Subjects raised even include comments unfavorable to the station. Their conference starting at noon lasts until 12:30 p.m. Meantime, listeners are telephoning their own comments on the opinions expressed by the conferees. These are taped, and the best comments are selected for playing back during the last half of the program from 12:30 until 1:00 p.m.

In all these programs, enlisting the active partici-

AUTOMATIC SYSTEM

 Continued from page 23

The Data Monitor digitizes each analog parameter and compares the results with programmed limits, which in turn can initiate executive action such as changing the transmitter or video feed.

Four inputs are provided to the Analyzer, two for transmitter feeds and two for video. Illustrated in Fig. 2 is one possible configuration of the monitoring system.

In the automatic mode, the Data Monitor cycles the Analyzer through all parameters. Information on each parameter is then transferred to the monitor for limits comparison. Four limits can be set up for each parameter consisting of a high and a low limit of two grades. Red limits are used for transmitter output and tighter amber limits are used for video inputs to the transmitter. Alternatively, these limits may be assigned cautionary or urgent levels so that trends may be indicated prior to failures. These limits, which are changed by plug-in buttons, are accessed via a hinged panel of the Data Monitor, 2915, as shown in Fig. 3.

Operation in the manual mode is also possible. In this case, a 3½ digit panel meter on the Analyzer displays the parameter in its natural units—voltage, delay time, degrees of phase shift, or as a percentage.

In the automatic mode, when an out-of-limits condition is detected, a separate scan counter monitors that condition for several measurement cycles and an indication is only given when it continues to exist over a pre-set number of these measurement cycles. The visual display of a fault condition is by

the extinguishing of a normally lit LED on the monitor. When a fault condition is found, the system also automatically cycles the monitor—first to the main video input, then the reserve, then the transmitter outputs—in order to detect which section is faulty. The result of this search operation is displayed by extinguishing one or more of five LEDs on the monitor. These LEDs represent the four possible feeds plus transmitter failure. At the same time, a signal is provided by the executor which can switch the transmitter or video input as necessary to maintain transmission, or report remotely transmitter failure or complete station failure.

In addition to the Model 250, the station has used a Model 800 "Code-a-phone" (manufacturer is Code-a-phone, Box 06459, Portland Oregon, 97206) for over two years for the sole purpose of providing listeners with a sympathetic ear for the comments they may want to make on any subject. Most often, though, listeners use it to request musical selections, usually for a specific station program. Station WFBR is first of all a music station, although some of its programs do combine music and talk. One of the more popular programs is exactly that kind, with the announcer talking back and forth with the people calling in on the telephone throughout the program. Three times daily, the station tells listeners the telephone number to call to leave requests or voice opinions.

The engineering department of the station is working closely with the telephone company for developing better fidelity through the telephone, to bring this up to par with radio tone quality. They are also working to develop equipment which will permit the announcer to chat with the callers so that both can be heard simultaneously, without one overriding the other. "This will make the conversational interplay more natural and spontaneous as well as faster and more interesting," Brooks states. **BM/E**

In order to prevent false reporting during a re-start or initial warm-up period, an inhibit facility is provided on the system.

Although primarily intended for broadcast transmitters, this system may find other applications in real time monitoring of TV picture quality throughout the transmission network. This monitoring system can be supplied in a bench configuration or rack mounted, and internal plugs convert the standard unit from 525 to 625 line systems to meet national and international standards.

Further details on this monitoring system can be obtained from Marconi Instruments, 111 Cedar Lane, Englewood, New Jersey. **BM/E**

Automatic Systems at NAB Convention

Both CBS Laboratories and Tektronix unveiled at the NAB Convention last month systems that could use a VIR reference to automatically correct for transmission line degradation of video gain, chrominance/luminance gain ratio, burst phase and burst gain, set-up level and sync gain.

BROADCAST EQUIPMENT

Low-cost microphone stand has grip latch and scuff-resistant, triangular gel base. Model MS-50 adjusts from 42 in. to 63 in., has a base 14½ in. wide on a side. \$8.75. ATLAS SOUND. 277

Phone patch comes with 15-foot telephone leads, has built-in VU meter, gain control and locking push-to-talk



switch. Realistic Phone Patch has a three-foot transmitter lead. \$19.95. RADIO SHACK. 282

Interface unit intended to optimize combined performance of multi-channel microwave and CATV systems provides an additional 12 dB of automatic gain control beyond the range of the AML system. AML/CATV interface also generates and inserts pilot carriers required by the cable system, raises all signals to the usual output level of a trunk amplifier, and provides tilt control when needed. THETA-COM. 275

New cesium beam tube in primary frequency standard raises absolute accuracy for frequency from ± 1 part in 10^{11} to ± 7 parts in 10^{12} . Improved Model 61A retains long-term stability bet-



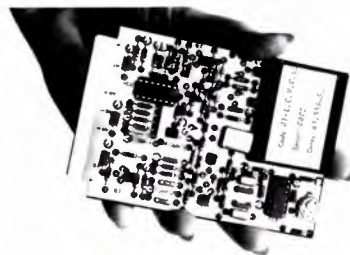
ween that $\pm 5 \times 10^{12}$, and compared with earlier model has greater immunity to effects of external magnetic fields, vibration, rotation, and rapid temperature changes. \$18,860 (with new tube). HEWLETT-PACKARD. 276

videotape for ¼-in. helical scan is designed for close-circuit video recording in education, business, and professional fields. The 160 Series has a sintered back coating, gives head

life of about 1000 hours with Alfesil heads. \$10.30 for half-hour, \$20.15 for one hour, \$43.37 for two hours. AMPEX. 278

Automatic telephone dialer for alarm systems records numbers to be called, plus voice messages. Model R2 Dialtronic calls the recorded numbers and delivers messages on activation by fire or burglary sensor. Adjustable time delay (0-30 seconds) puts off activation until constant alarm is indicated. MOUNTAIN WEST ALARM SUPPLY CO. 279

Compact video delay modules for dropout compensation and image enhancement use glass delay lines. Series have both input and output at video



frequencies, provide delay of 63.5 microseconds, 4.5 MHz bandwidth, 55 dB s/n ratio. CORNING GLASS WORKS. 283

Low-cost table-top optical multiplexer sends any of three projector inputs to camera. Model OM 300T has a transfer time of 175 milliseconds, is self-



dousing, can use optional remote control. \$930. KALART VICTOR CORP. 284

Cordless battery wall clock has easy-reading 24-hour time dial, operates for a year from a C-size flashlight battery. The Langhorne has a separately marked inner circle to show hours, outer circle for minutes. With 8-in dial, \$22.00; 12-inch, \$25.50. FRANKLIN INSTRUMENT COMPANY. 280

New small decorative sound baffles include wide range of styles and shapes. The 4+ Series can be had with bi-directional or surface mount-

ing, and a variety of finishes. SOUND-OLIER, INC. 281

Voltage controlled audio amplifier has linear voltage/decibel gain range from -100dB to +30 dB. Model 202 has input noise of 6 microvolts, peak signal up to 100 volts, flat frequency response to 20 KHz, distortion 0.07%. DBX INCORPORATED. 285

Remote start/slate system for handheld cameras allows cameraman to start a remote recorder by pushing button on camera. System uses transmitter on camera, miniature receiver on recorder, has range greater than 100 yards, cues tape at start for picture/sound sync. \$510 to \$650, depending on camera. STUART R. CODY CO., INC. 286

Paneling for television studio backgrounds provides easily-erected textured surface. Marlite panels give



texture. cable operators or other small studio users quick, attractive "rear-wall" for camera room. MARLITE. 287

Portable digital multimeter has instant auto-ranging. Model 4444 DMM has four-digit display, and automatic setting of decimal, polarity sign, units annunciator, overranging, overload protection. Common mode rejection is 130 dB for DC measurements, DC accuracy is $\pm 2\% \pm 1$ digit ± 10 microvolts. \$575. WESTON. 288

Noise and signal measuring set covers +23 dBm to -95 dBm, and +113



dBm to -5 dBm. Model 510 has flat response from 30 Hz to 20 KHz, or can be modified for C-MSG, high pass, 3 KHz or 15 KHz weighting.

continued on page 36



TEST TAPES

Available in cassette or open reel, each precision calibration and alignment tape is individually mastered from the finest instrumentation by the Standards Laboratory of TEAC Audio Systems Corporation of Japan.

To avoid undue aging, the tapes are normally produced to order and are shipped in a shielded metal canister.

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Test tapes are available for speed deviation checks, standard operating levels, azimuth standards, frequency alignment standards and references, standard reference level, and cross-talk checks.

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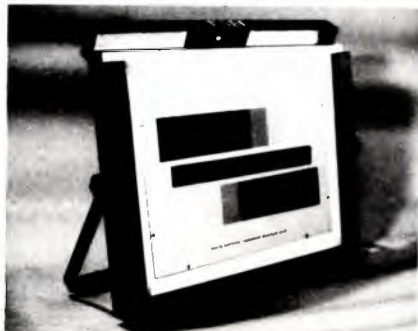
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Circle 117 on Reader Service Card

PRODUCTS

It maintains over 85,000 ohms across the line, with close tolerances when bridging or terminating. Battery pack or AC. \$385.00. **TM SYSTEMS. 289**

Set of TV test patterns is mounted in aluminum case, which can be stood on table or held by microphone or light stand. "Porta-Pattern" includes resolution, registration, ball and chip



charts, with chart in use simply moved to front of case. \$180. **TELECOMMUNICATIONS INDUSTRIES. 290**

Low-light-level photo-detection assembly uses a 10-stage photomultiplier tube. The PF1023 Series can include a variety of optical filters and signal conditioning amplifiers, user specified, with all units in a RFI and magnetic shielded, insulated housing. Gain can be remotely controlled from about 10^2 to 10^5 , by voltage or resistors. **RCA. 291**

Single-channel yagi antennas have 5 elements, for any VHF channel or the FM band. EY Series have 6 MHz response, gain typically 7 dB over a tuned dipole, front to back ratio up to 16 dB, beam widths 56° to 65° . Ten-element versions are available for higher gain (10 dB) on any channel, 7 through 13. **BLONDER-TONGUE LABS. 292**

Digital incremental readout system measures and displays position, angle, or other variables. Model DIR Incremental Readout consists of an optical encoder and a counter-display unit. Single or dual axis systems are available, with 5, $5\frac{1}{2}$, or 6 digit readout. Resolution is 0.0001 inches, 0.001 millimeters, or 0.001 degrees. **SEQUENTIAL INFORMATION SYSTEMS. 293**

Magnetic disc drive for data storage will hold from 25 million to 100 million bits per drive. DPX Series can be daisy-chained up to four units, for 400-million bit storage. Access time is 10 ms track to track, 35 ms random. Data rate is 2.5 MHz at 2400 RPM. **PER DATA. 294**

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Sound pressure levels up to 137 dB.



Sony's new condenser microphones; ECM-64P (Uni) and ECM-65P (Omni) handle sound pressure levels up to 137 dB, with less than 1% distortion.

Both microphones shield the capsule with a unique double windscreens to reduce pop susceptibility when close miking is employed. In addition, they're designed to filter out unwanted extreme low frequencies, all but eliminating the proximity effect that can severely impair the performance of a hand-held microphone. Primarily designed for Phantom power the ECM 64P/65P operates equally well from a self contained battery.

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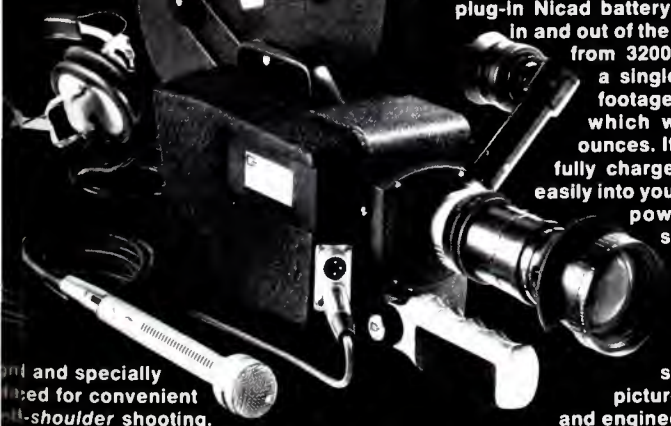


end of the daily struggle with backbreaking
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unbalanced cameras? Tired of dangling
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uncomfortable body braces,
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and specially
designed for convenient
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weighs a little less than 17 pounds when fully
equipped. And "fully equipped" means fully.
The 400-ft. magazine loaded with 400 feet of
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The plug-in Nicad battery pack. With a criti-
cally accurate crystal-controlled DC servo-
motor for single and double system sync
recording. Plus the Crystasound recording system
and built-in amplifier. That's right. Less than
17 pounds!

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you've got to "not hear" the CP-16/A to believe
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approximately 31 dB at 3 feet. But the real

sound test is your professional ear, and the
actual quality of the sound recording.

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erances required by cordless double system
recording, with a frame rate accuracy of ± 15
parts per million over a temperature range of
0-140° F. And if something should go wrong, the
easily visible out-of-sync
warning lamp, located
at the front of the
camera, will instantly
light up.

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designed a special lock-
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Then there is the power supply problem.
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which weighs a mere sixteen
ounces. It is so compact—a spare,
fully charged battery pack will slip
easily into your shirt pocket. And it also
powers the CP-16/A sound
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Lately, more and more
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PRODUCTS

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295

Switchers for audio machines give push-button control of two open reel recorders, two turntables, or four cart



machines. Custom units are available for almost any other combination of studio sources. **DYMA ENGINEERING.**

296

Digital multimeter has 5 1/2 digits, with autoranging and autopolarity. Model 8375A measures DC, 1 microvolt to 1100 volts, AC from 10 microvolts to 1100 volts, and 100 microohms to 12 megohms. Also: broadband noise rejection filter, variable sample-rate control. \$1995. **FLUKE.**

297

Cassette alignment tape provides tests for azimuth, frequency response, speed and flutter. Model AT-200 also has primary and secondary reference levels. Each test is announced by voice, recording is full track, running time 15 minutes minimum. **NORTRONICS.**

298

Telemetry system uses a phone line to read remote meters. Model RD230 sends back up to eight variables in sequence after number is dialed; read-



ings are displayed on "home" meter, with channel identified. Recorder output is included. **METRODATA SYSTEMS, INC.**

299

Color TV modulator has a phase-lock system to allow CATV operation on same channel as a broadcast TV signal. Model CTM2 thus eliminates co-channel bars, or beats; in addition to

continued on page 40

You wouldn't have to make good if you didn't send bad.



Every time a heavy dropout burst from your VTR causes lost sync, your viewers might as well be watching the radio.

And if it happens during a commercial, you know the ad agency is going to be right in there demanding another "make-good."

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There's just nothing else that works like the 3M DOC.

It replaces the lost video information in full color within the video signal itself. Luminance and color are processed through separate delay lines, with the color phase-inverted to achieve color interlace with the stored signal. When dropouts are

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The 3M DOC comes with an adjustable dropout replacement threshold, with rf agc to maintain the level set; a chroma auto-phase corrector; and a built-in dropout simulator for alignment without a test tape. All standard features, not expensive options.

You'll find that the 3M Brand Color Dropout Compensator works better and is easier and less expensive to use than anything else you've tried.

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Circle 122 on Reader Service Card

PRODUCTS

CATV transmission it provides relatively simple "in-house" monitoring (along with CTD1 demodulator)



ELECTRONIC INDUSTRIAL ENGINEERING (RCA). 30

High-power RF tubes use improved grid material. "Pyrobloc," for power of more than 25 kW at above 100 MHz. Vapor-phase cooling, plus Pyrobloc grid, reduces size of broadcasting tetrodes at powers above 500 kW by a factor of 2 or 3. THOMSON CSF. 30

Coaxial attenuators allow adjustment of signal level at input or output of headend and at set-top converters. Attenuator is 2.75 in. by .4375 in., has a "T" network of 75 ohms impedance comes with 3, 6, 10, 12, 16, and 20 dB attenuation. AMECO. 30

AM broadcast transmitter puts out up to 55 kW, has dual selectable oscillator circuits. Model AM-50KD is in a three-section cabinet, uses high level plate modulation into a 4CX35000C tetrode in a high efficiency circuit; has oil-filled modulator and reactor. All audio and low level RF circuits are solid state. AMERICAN ELECTRONIC LABORATORIES. 30

Monitoring and controlling instrument for two-way radio systems goes in transceiver antenna lead. "Base Command" measures SWR, transmitter power, modulation level, monitors audio quality, field strength of remotes. A TV interference filter is included. PATHCOM, INC. 30

Very compact dual trace oscilloscope weighs 3.4 pounds, is 3 x 5 1/2 x 9 inches. Model 212 has 500 KHz



bandwidth and 1 mV/div vertical sensitivity. Included are rechargeable nickel cadmium batteries. \$725. TEKTRONIX. 30

"Cartridges are our lifeblood. We have some of the most sophisticated cartridge-handling equipment in the country. We are converting to the Audiopak[®] Model A-2 cartridge exclusively."

—Eric Small,
Chief Engineer,
WXLO 98.7
Stereo New York.



"We've tested other cartridges. A lot of other cartridges. Our tests showed no cartridge superior to the Audiopak A-2 in ruggedness, mechanical design, or (most important of all) consistency in phase stability."

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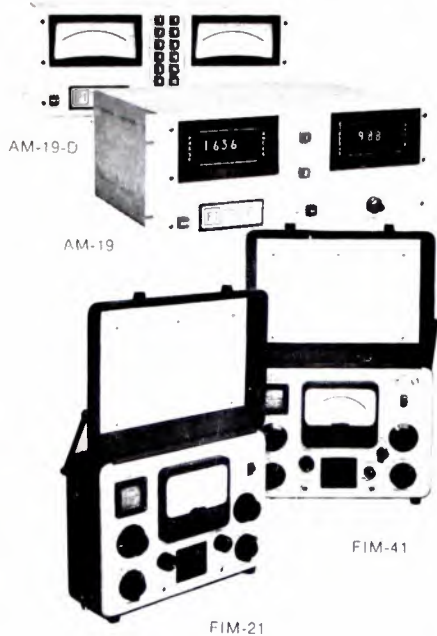
"We make 50 to 150 carts a week. We've got to be able to rely on them. That's why we have standardized on the Audiopak A-2."

"Since all our music is on carts, they must be dependable. Without doubt, the A-2 gives us the reliability we need."

Shown here with Mr. Small is John Bailie, Maintenance Supervisor.

New Audiopak[®] A-2 Broadcast Cartridges

WE'VE MADE THE BEST EVEN BETTER!



FIM-21 Field Strength Meter, 535 KHz to 1605 KHz Lightweight, easy-to-use, the '21' is the new solid state replacement for the time-proven Nems-Clarke FIM-120 (RCA WX-2). Using six standard D cells, the unit features a ceramic IF filter, ganged osc receiver tuning, front panel speaker and illuminated meter and dial. Field strength values between 10 microvolts/Meter and 10 volts/Meter. An external RF input jack is provided for tunable voltmeter applications.

FIM-41 Field Strength Meter. 540 KHz to 4.8 MHz This lightweight unit measures AM broadcast harmonics to -80db. Exceptionally stable over a wide temperature range, it includes the same features as the Model FIM-21. Exceptionally easy to use, it is particularly well suited for transmitter 'proof-of-performance' reporting as defined by FCC Rule 73.47(a)(5).

AM-19 Antenna Monitor The basic instrument for measuring phase and loop current ratio, the AM-19 can monitor up to 12 towers and accommodate DA-1, DA-2 and DA-3 patterns. Phase meter resolution is 0.5 degrees. Loop current accuracy is $\pm 1.5\%$ with a 0.5% resolution.

The **AM-19-D** offers digital readout of phase angle and loop current ratio to provide phase and current resolutions of 0.1 degree and 0.1% respectively.

For complete information, please write or call:



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Circle 124 on Reader Service Card

NEW LIT

For copies of these literature offerings, circle number for appropriate items on Reader Service Card.

Patching devices, switching systems, connectors, cable for CATV, TV, telephones, telemetry, etc., are covered in new 60 page catalog. Trompeter Electronics. **200**

RF and AF test oscillators and generators are detailed in eight-page brochure. AIL Tech. **201**

Sales Bulletin 97, a 32-page catalog, shows thousands of items including **micro-wave/waveguide, electronic test instruments, coaxial connectors and switches signal generators,** many others. Lectronic Research Laboratories. **202**

Radiofacsimile converter is covered in two-page data sheet, with complete specifications. Alden Electronic and Impulse Recording Co. **203**

Catalog covers full line of **studio, theatre, and television lamps,** including operating information on tungsten-halogen, incandescent, and arc-discharge lamps. GTE Sylvania. **204**

Data sheets for cable operators show levels vs. volts, CATV channels by frequency in MHz, and potential O-beats of all cable channels from T-7 to T. Magnavox CATV Division. **205**

Line of **RF current probes,** for measurements up to 1 GHz, are covered in detail in 42-page book with application notes, electrical and physical specs, and transfer impedances. Singer Instrumentation. **206**

Audio control systems with integral computer, the 700 series, are described in eight-page color brochure. International Good Music, Inc. **207**

Four-page brochure covers **dual-magnet stereo phono cartridges,** including models designed for discrete-quad playback. Audio-Technica. **208**

A "**Guide To Selection and Use of Diesel Electric Systems**" covers specifications for various requirements, cost estimation, and other aspects of choosing and using a diesel system. Allis-Chalmers. **209**

Full line of land mobile antennas with all electrical and mechanical specifications, including pattern coverage, is shown in 72-page catalog. Phelps Dodge. **210**

General catalog shows complete line of

microwave components and test instruments in 30 pages, with application notes and specs. Singer Instrumentation. **211**

"Telephone Cables For Inside Plant" covers **terminating cable, switchboard cable, inside wiring, and connecting cable** for internal applications. General Cable. **212**

Line of **instrumentation products**—multimeters, recorders, counters, etc.—is fully described in new catalog. Simpson Electric Co. **213**

RF power modules MX 7.5 and M 12, handling up to 14 watts, designed for 12-volt broadband UHF applications, are described fully in new data sheet. TRW Inc. **214**

Cable tapes and sealing material connectors and tools, splicing and blocking accessories are shown in 2-page color catalog. "Outside Plant" 3M Company. **215**

Home-study electronics technology programs are the subject of new catalog of mail courses. International Correspondence School. **216**

"Pioneer News" is a bi-monthly newsletter carrying topics concerning Pioneer's **high fidelity products.** Pioneer. **217**

Line of **low-cost character generators** for television is covered in a series of two-page spec sheets. Datavision, Inc. **218**

More than 500 symbols used in electronics are shown and defined in a new pocket-sized handbook. Cleveland Institute of Electronics. **219**

"Selection and Use of Kodak and Eastman Motion Picture Film" is a new 56-page book on the **technical aspects of films, film emulsions,** and film use, covering the selection of film for different applications, and on using film properly. Eastman Kodak. **220**

Catalog covers wide variety of **cabinet and equipment racks,** and accessories. Stantron. **221**

Report on the EIAJ-Type 1 1/2-inch open-reel VTR lists 52 models, of different manufacturers, discusses the history of the standard, its technical operation, the development of color. Available for \$1.00 from National Industrial Television Association, P.O. Box 297, Summit, N.J. 07901.

Eight-page brochure shows full operating characteristics and applications of the **7L12 spectrum analyzer,** covering 0-1800 MHz. Tektronix. **222**

Catalog covers line of **waveform and function generators** with complete specifications and application notes. AIL Tech. **223**

Save from One Third to Two Thirds on Central Studio Background Music



You can turn your unused FM side channel into a moneymaker by offering a background music service. But why take the profit out of it by paying more than you have to... and getting less than you should? Competitive sources usually charge rates averaging 10% to 20% of your gross. Ours usually averages only 5%.

Our tapes are 100% music, not 15 minutes on, 15 minutes off. They are the highest quality tapes available, always new (we destroy old, returned tapes).

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complete and ready for on-air, recording studio or remote operation. Included are:

- Console.
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- 2 12-inch Tone Arms.
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first annual convention at the Shoreham Hotel, Washington, March 28-30, coinciding with the NAB annual at the same spot. Membership is spread through the U.S.A., Canada, and Europe. The headquarters address of IITA is P.O. Box 297, Summit, New Jersey 07901.

CCTA Convention Set For Toronto in May

The Canadian Cable Television Association has set its 16th annual convention and trade show for the Sheraton Hotel in Toronto, May 21-25, 1973. General themes on the agenda will be business aspects of the industry, the latest technical developments, and refinements in local programming. All sessions will be videotaped for later viewing. The industry exhibits will be open throughout the convention.

New Firm To Supply CCTV Equipment and Services

Videco is the name of a new firm, a division of Image Communications Inc., which has been set up to supply all needs for closed-circuit television users, including primary and accessory equipment items, the design and installation of studios, maintenance, rentals, leasing, and engineering consulting services. Headquarters of Videco is 528 North Michigan Ave., Chicago.

Highest-Power FM Station Slated for Ohio

With an agreement to buy three 25 kW FM broadcast transmitters from CCA Electronics of Gloucester City, N.J., Station WDBN, Medina, Ohio, is setting the stage to become the most powerful FM broadcaster in the United States. The three transmitters will be used together to put 75 kW into the low-gain, high-power antenna system for a planned saturation coverage of Medina, Akron, Cleveland, Canton, Elyria, Lorain, and Mansfield.

New Chemo-Optical System Promises Flat TV Screens

An optical switching system which uses crystals that become opaque to polarized light in an electric field has been patented by two professors at the University of Mis-

continued on page 46



Model F380A Audio Sine Generator. Proof accuracy in one box.

- Total distortion less than 0.1%
 - Balanced 150/600 ohm output
- Built-in voltmeter, calibrated in volts and db, for easy monitoring
 - 20 Hz to 20K Hz frequency span
 - Solid state design

Model F380A—the ultimate in broadcast test instrumentation. With Model F380A, complete station speech, network and transmission equipment can be accurately tested, monitored and maintained. Featuring a low distortion balanced output with a hum level 100 db below zero, Model F380A is calibrated at 110 db output attenuation. Selectable impedances eliminate the need for matching transformers. The price for all this? \$925.00. Write today.

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The TV-COSMICAR-EE 16mm f/1.6 is a high-speed E lens specially designed for 2/3" vidicon cameras. It maintains image luminance 100 lx against subject brightness between LV11.3 ~ 17 (350 ~ 18,000 cd/m²), about 1,800 ~ 96,000 lx.

The automatic electric-eye diaphragm close down completely provided that subject brightness exceeds approx. LV20 (144,000 cd/m²), 768,000 lx. In case the camera is switched off and not in operation, the automatic diaphragm closes down, completely shutting off the light for protection of the vidicon camera.

The "Change-over Switch" in front of the lens controls the operation of the diaphragm.

When the switch lever is turned on to "EE", the lens diaphragm operates as fully automatic electric-eye, and is brought on to "OPEN", the diaphragm stays fully opened condition.

Be sure to get the finest image recording results with quality Cosmicar lenses.

Also available are scores of other lenses, ranging from 8.5mm to 1,000mm telephoto, zoom and those motordriven among them, for immediate delivery, after being tailored to your specifications.



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Cartridge.



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NEWS

Mississippi, according to an announcement from the University. Drs. T. J. Klingen and J. R. Wright, who assigned their rights to the University, say the process could be used to make "picture-thin" TV screens, or for applications in laser switching and high-speed computer data processing. The rearrangement of molecules which changes the light transmission of the crystals takes place in about a trillionth of a second, the developers say.

Houston Firm Starts MDS For "Private TV"

A new firm in Houston, Texas, the Houston Multipoint Television Co., inaugurated in March what appears to be the first on-air application of the new Multipoint Distribution Service (MDS), private point-to-point television system described in *BM/E's* February news column. MDS provides private television by scrambling broadcasts, with unscramblers at the subscribers' receivers, using channels in the 2150-2160 MHz band. The Houston firm offers broadcasts from its headquarters or from the sub-

scribers' premises, for intracompany communication, marketing, training, new product introduction, etc.

Oral Roberts U. Gets RCA Color Production Studio

Oral Roberts University, in Tulsa, Oklahoma, has installed a complete color TV production studio, using RCA equipment, at a cost of about \$650,000. The studio will be used to produce the Oral Roberts television programs, formerly put together in Burbank, California. The studios will also provide a laboratory for students in telecommunications, said Ronald R. Smith, executive vice president of Oral Roberts University.

Swiss Cable Association Formed in Zurich

Operators of major cable systems in Switzerland have formed a national association, with objectives similar to those of the United States NCTA, including provision of a "unified stand on matters of licenses, franchises, copyright laws, local origination, and similar matters." In its French form, the name of the group is "Association Suisse des Ex-

continued on page 48

the MCMARTIN 10 watt FM exciter



B-910 exciter \$1995.00

B-910T transmitter \$2355.00

ULTRA STABLE with automatic phase-lock sensing
EASILY MAINTAINED with plug-in modular design
CRISP, CLEAN SOUND from latest DCFM design

a brilliant new addition to the "full choice line" The solid state B-910 is perfect for your new station, your 10 watt educational application or for updating your existing transmitter. This new exciter/transmitter brings you all the professional "know how" that McMartin has pioneered in SCA/Stereo

Accessories: B-110 Stereo Generator \$1250.

B-113 SCA Generator \$450.

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Efficient design is the key. The "Performer" is elliptically polarized for a clearer signal, even in the fringes of your broadcast area. And its low VSWR guarantees you better stereo performance.

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- EMT Reverb units
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- EMT compressors
- DANNER linear attenuators
- EMT turntables
- NEUMANN microphones
- DANNER rotary attenuators
- WOELKE flutter meters
- STELLAVOX tape recorders
- NEUMANN disk cutting systems
- K + H equalizers
- EMT polarity testers
- STUDER tape recorders
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Now you can have the best of both worlds.

In Studer's B62 studio tape recorder—the only 1/4" machine with electronic servo control to assure constant tape tension from the outside of a 10 1/2" to the inside of a 5" reel. A servo loop capstan drive lets the B62 operate on any line frequency or voltage anywhere in the world. Pilotone sync and self-resolving is just a matter

of plug-in accessories.

And it's the only unit that includes—without extra charge—a built-in, precision tape timer, a device which normally sells for \$295.00.

What about the price tag? As low as \$2207 from stock. So that you can enjoy the engineering skill of Studer—without having to pay a premium.

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- WILKINSON Silicon Rectifiers function in ambient temperatures of from - 85 F to +158 F.
- No more filament heat and consequent filament burnout... lower power cost and reduced hum, too.
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NEWS

plottants d'Antennes Collectives (ASEAC)," and is addressed "Care of Rediffusion AG, Zurich, Switzerland."

Penn University To Expand Two-Way TV Courses

Use of two-way television for teaching courses in engineering and other subjects has proven so successful at the University of Pennsylvania that the program will be expanded, according to an announcement from the University. Initially designed to help engineers get graduate credits by study at or near their place of work, the system is being enlarged to include undergraduate physics and courses leading to degrees in business administration. Lessons learned from the experiment, according to Dr. Octavio M. Salati, director, include the need to tighten course content because television covers material much faster than traditional classroom teaching. The system included broadcasts to special receivers on the 2500 MHz band, plus two-way FM radio and telephone talk-back.

New York Area CCTV Net Near Programming Start

The Metropolitan Regional Council, organization of municipal and county governments in the New York metropolitan area planning a CCTV net for intra-region governmental communication, announced a variety of programs in final stages of preparation. With nearby counties of New Jersey and Connecticut, as well as New York City and nearby New York counties, as members of the net, the MRC will disseminate a variety of training programs for professional municipal and county staffs, a series of pollution-control workshops, courses in law enforcement, and many others of interest to the governments. Construction of the net was to be completed early in 1973.

NCTA Awards Will Be Made At Anaheim Meeting

The National Cable Television Association announced its Cablecasting Awards contest for 1973, with the awards to be given at the annual convention in Anaheim, California, June 17-20. The awards will be made at a cablecasting session, along with a showing of outstanding cable programs. Last year's con-

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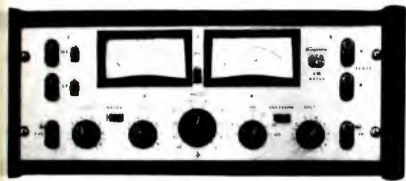
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APRIL, 1973—BM/E

DISTORTION-TEST AUDIO EQUIPMENT

- easily
- quickly
- accurately



Now the TECRON IMA makes measuring IM distortion even easier than measuring THD!

Just one piece of equipment has both internal oscillators and intermodulation distortion analyzer. Simply connect the oscillator output to the input of the test unit, and hook the test unit's output to the input of the analyzer. One quick set up, then switch a single control to simultaneously adjust input and output levels. Take up to ten power level measurements in 5db steps in just 60 seconds! Readouts over a wide span of output levels fully describe the distortion characteristics of the test unit.

The IMA itself has a guaranteed residual IMD of less than 0.005% (typically under 0.003%). There are seven IM ranges with accuracy adjusted to within 5% of full scale (+0.005% to the 0.1 full scale range).

As all other TECRON laboratory instruments, the IMA is of advanced design, ruggedly constructed from the best quality components by skilled American craftsmen.

Product literature is free upon request. For a technical discussion on the advantages of using IM testing to detect audible distortion, send 25¢ for A.S. Preprint No. 871(B-9) to Crown International, Box 1000, Elkhart, Indiana, 46514, U.S.A.

Full input and output metering; also full input and output monitoring oscilloscope terminals ■ Solid state construction, utilizing FETs for stability and compact size (7" x 19" x 7") ■ full complement of level controls ■ two internal oscillators eliminate the need for additional test equipment ■ rack mount list price \$570, walnut cabinet \$595

Made Only in America

TECRON

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APRIL, 1973—BM/E

NEWS

test drew 175 entries and 35 awards were made. The contest rules are available from the NCTA, 918 16th Street NW, Washington, D.C. 20006.

Taft's WDAF Forfeits \$4000 For "Hidden" Ads

The FCC announced that station WDAF-TV, Kansas City, Mo., licensed to Taft Broadcasting Co., has apparently forfeited \$4000 for failing to log any commercials on a program called "Let's Get Growing," aired a number of times in March, April, and May 1972. The FCC separately admonished Taft for broadcasting "program-length commercials" and for failing to require John Paul Tobin, host of the show, to identify himself as a full-time salesman for Gordon Corporation, maker of fertilizers and pesticides. Tobin recommended Gordon's products, as well as others, on the show. Taft had 30 days from the notice (February 21, 1973) to pay or contest the action. In a related action the Commission defined programs which interweave entertainment or information with product promotion as "program-length commercials." Broadcast of such a program is a "serious dereliction of duty," and sanctions will be imposed, if necessary, to prevent it, said the FCC.

Certron Announces Magnetic Tape Advance

Certron Corporation has released a new magnetic tape for cassettes with, the company says, greatly improved low-noise, high-output characteristics. Called "gamma powered," the new tape does not require a different recording bias from standard tapes, but is claimed to "outperform" chromium dioxide and cobalt doped high energy tapes. The maker is aiming for the video, as well as audio, cassette markets.

Kent U. To Produce Local Shows for Cable System

The Kent and Ravenna (Ohio) Cable Company has entered an agreement with Kent State University, under which the University will produce a wide variety of locally-originated programs, using the University's own television studio. Among the cable programs coming from the University will be regular

continued on page 50

FREE from AKG

48-page technical brochure on Field Effect Transistor condenser microphones and describing in detail:

- Structural details of new type miniature condenser microphone capsules with various pick-up pattern, complete with performance and comparison charts.
- F.E.T. condenser microphone preamplifier technology, including schematics and specifications.
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Circle 138 on Reader Service Card

NEWS

local newscasts, University sports coverage, campus events, music, lectures, and others. The University hails the plan because it gives it more contact with the community, and provides good experience for students in telecommunications.

Mexican-American Committee Offers Free Radio, TV Material

The National Mexican American Anti-Defamation Committee, Washington-based group devoted to improving the economic status and image of the Chicano, has the following material for local media outlets: "Confetti," a one-hour weekly radio program, aired by WRC in Washington; "La Raza En DC," eight half-hour color TV public affairs programs, produced on WRC-TV; "The Emerging Minority," two half-hour color TV programs on Spanish-Americans, produced on WTTG-TV; and "The Mexican-American and the Administration of Justice," two half-hour color TV programs produced on KRMA-TV, Denver. Broadcasters or cable operators can get any of the programs free by sending in video or audio tape for dubs; address Director, Public Broadcast Service, NMAADC, 1605 Connecticut Avenue NW, Washington, D.C. 20009.

Syracuse U. Contest Teaches TV Scripting

A contest, jointly sponsored by Syracuse University and the Syracuse Board of Education, drew more than 300 scripts for public-service TV ads from students 8 to 17 years old in the Onondaga County public schools. Given the theme "commercials for a better tomorrow," the students produced highly varied and creative scripts. Called "Tell-A-Vision," the contest will include actual production on Syracuse TV stations of the winning scripts, and also of a 30-minute documentary showing how a TV script is turned into a "live" program. Among the objectives of the contest was illustration of potential careers in television.

Business Briefs

Tocom, Inc. reported an increase in sales and earnings for the six months ended December 31, 1972; sales were \$1,339,000 and earnings \$229,000, against \$909,000 and

Spotmaster

Broadcasters' Choice:
A77 Mk. III-B
Spotmaster/Revox



\$799

- Lifetime guarantee
- Superb specs & performance
- Advanced features
- Accepts 10½" reels & NAB hubs

Check that price again . . . for a broadcast quality stereo tape recorder with all the performance and features of machines costing 50% more. Spotmaster and Revox have joined forces to create the Model A77 Mark III-B (the "B" stands for "broadcast"), a ruggedized version of the recorder that is winning laurels all over the world.

Guaranteed for life. Every basic part of the A77 Mark III-B is protected by a lifetime guarantee except the heads, capstan and pressure roller, which are guaranteed for a full year. This should tell you something about the reliability engineered into the Mark III-B.

18 new features. The original A77 model, so widely praised since its introduction, has been improved in 18 ways. For example, a new oscillator circuit for greater efficiency, lower distortion. A modified and strengthened braking system. A new hardening process to reduce capstan wear. Improved tape handling and spooling.

But we didn't change the already great things: servo control capstan, outstanding speed stability, 10½" reel operation, modular and plug-in electronics, pinpoint editing ease, separate bias adjustment for each channel and speed, remote control of all functions, undetectable wow and flutter, 30 Hz to 20 KHz response, etc.

Designed for rack-mounting, the A77 Mark III-B provides 2- or 4-track stereo operation at 7½ and 3¾ ips. Other speeds, full-track heads, accessories optional. Call or write:

BROADCAST ELECTRONICS, INC.

A Filmways Company

8810 Brookville Rd., Silver Spring, Md 20910
(301) 588-4983

NEWS

\$95,450 for the 1971 period . . . **Amplex Corp.** announced a sale to Storer broadcasting stations of ACR-25 video cart systems worth about \$2 million . . . **Vicon Industries** said that sales for 1972 were \$1,201,336, up 25% over 1971, and earnings per share .094 cents, compared with .014 cent in 1971.

Eastman Kodak Company sales and earnings were at record highs in 1972, the company said: world-wide sales were over \$3.4 billion, earnings \$546,250,000, 17% and 30%, respectively, over 1971 . . .

Conrac Corp. reported 1972 sales at \$58,329,222, net income at \$2,-383,824, up from \$48,931,000 and \$1,925,922 in 1971 . . . **Oak Industries** said 1972 income was \$2,-998,149, highest in history, on sales of \$97,231,396.

Scientific-Atlanta: Sales \$8,780,-000 (up 15%), earnings \$293,000 (1971 \$83,000) for six months ended December 31, 1972. **American Television and Communications Corp.:** Sales \$9,608,387 (up 41%), earnings \$1,011,214 (up from \$547,435), for six months ended December 31, 1972. **Metromedia, Inc.:** Revenues \$181,880,025 (up 18%), earnings \$12,534,429 (up 63%), for year 1972. **Cohu, Inc.:** Sales \$11,378,987 (1971, \$9,059,-383), earnings \$539,350 (1971 \$232,531), for year 1972. **Burnup and Sims, Inc.:** Revenues \$62,812,-800 (1971, \$41,195,300), earnings \$3,548,800 (1971, \$1,855,700), for nine months ended January 31, 1973.

Cox Broadcasting Co., WSB Television, and **WSB Radio** announced a joint grant of \$25,000 to Clark College, Atlanta, in support of a Mass Communications Center being set up by the college . . . **Broadcast Products, Inc.** will be a distributor of Dolby noise reduction systems to the broadcast industry . . . **AEL Communications Corp.** was awarded a turnkey contract for a 200-mile cable plant in New Bedford, Mass., for the Athena Division of Gulf and Western; the two-way system will have 27 forward channels.

FM station WFMT, Chicago, got a special 1973 Ohio State Award for its live, four-channel broadcast in September 1972 of opening night at the Chicago Lyric Opera, a production of "Semiramide" by Rossini . . . **WRTV,** television outlet in Indi-
continued on page 52

At 120dB the loudest noise is the human voice

Ampligard Headphones & Headsets



This rugged headset provides excellent communication on noisy musical production and remotes — fully weatherproof with a high degree of noise attenuation averaging 40dB over voice frequency range. Foam cushions — noise cancelling carbon mike — 3 position mike switch — interchangeable all professional TV cameras — factory installed Switchcraft® plugs.

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Bill Pegler

'phone (516) 628-8068

Television Equipment Associates

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Loaded with Schafer value.



Schafer's new Model RP720 professional tape recorder and reproducer provides excellence in craftsmanship and performance at an unbelievably low price. Value-packed features include:

- 3 speeds • Ferrite heads • Positive reel locks
- Hysteresis synchronous capstan motor • Plug in head assembly • Tape index counter

For details on the remarkable performance-to-price ratio of this new tape recorder, contact Schafer Electronics Corp., 75 Castilian Dr., Goleta, Ca. 93017, (805) 968-0755. In Canada: Schafer Electronics Ltd., 5824 Burbank Rd. SE, Calgary, Alberta, Can. T2H1Z3, (403) 253-0351.

schafer Electronics Corporation

Circle 140 on Reader Service Card

Send only the best.




CBS Laboratories Mark III Image Enhancer is preferred by most TV stations. Because it sharpens both vertical and horizontal detail automatically. And improves picture resolution as well as color fidelity. The Mark III, with unique "crispended-comb" filter, separates chrominance from luminance, providing sharper contrasts with more defined picture detail. Available for all monochrome and color cameras. From CBS Laboratories, of course.

CBS LABORATORIES

A Division of Columbia Broadcasting System, Inc.
227 High Ridge Road, Stamford, Connecticut 06905

Circle 141 on Reader Service Card



PROTECT
your broadcast equipment
against lightning surges
with WILKINSON
AC LINE SURGE
PROTECTORS 

Excessive voltage surges caused by lightning, transformer arcing and induced transients are everyday occurrences that cause heavy damage to valuable broadcast equipment.

Now through the use of WILKINSON voltage sensitive Line Surge Protectors you can protect your equipment from line surges that may exceed even twenty times the normal line voltage.

A WILKINSON pulse compensated Line Surge Varistor, is placed across a line of its rated voltage. Should a surge or increase of voltage occur, the resistance of the varistor decreases at log scale as the voltage increases, thus acting as a momentary load or short circuit to the surge. WILKINSON Line Surge Protectors draw little or no current and are capacitor compensated for microsecond surges, thus damping all line disturbances as well as excessive voltage increase.

A small investment in WILKINSON Line Surge Protectors is your assurance that your valuable broadcast equipment will not be damaged due to line surges.

Model SIA 1 110 V Single phase \$150.00

Model SIA 2 220 V Single phase \$250.00

Model SIA-3 220 V. Three phase \$350.00

Model SIA-4 440 V Three phase \$450.00

For complete details write to:

WILKINSON
ELECTRONICS, INC.

1937 MacDADE BLVD. • WOODLYN, PA. 19094
 • TELEPHONE (215) 874-5236 874-5237 •

NEWS

anapolis, is conducting a "race to thinness," in which overweight viewers join a campaign to lose weight, with diet guidelines supplied by the station and prizes for the "winners."

Hotel theatre system of **Athena Communications Corp.** has been installed in the new 1000-room International Tower Hotel at O'Hare Airport, Chicago: guests can choose (and be billed for) current feature films shown on the TV screen in each room . . . **Jerrold Corporation** opened a new 100,000-square foot headquarters building in Horsham, Pa., for executive, sales, research, and supporting groups.

Western Telecommunications, Inc., Denver-based supplier of television, voice, and data transmission for private subscribers, opened a Los Angeles sales office at 12636 Beatrice Street; the company also appointed Ray Campion as sales manager-communications services.

Multiplier Industries Corp. is a new firm at 224 North Fifth Avenue, Mt. Vernon, N.Y., which will supply safety equipment to the cable industry, specifically aiding in compliance with the new OSHA, Federal safety law. Principals are Walter Heim, long-term maker of safety equipment for public utilities, and Walter Ulrich, cable executive and member of the NCTA OSHA Committee . . . **National Teleproductions**, Chicago, announced comprehensive facilities for video production, including creative, directorial, and technical personnel, a large sound stage, VTR equipment, Norlco color cameras, remote trucks, computer editing, 16/35mm film chain.

L-W Photo, Van Nuys, Calif., maker of stop-motion film projectors, bought a new headquarters site in the Warner Center Business Park . . . **Time and Frequency Technology Inc.** moved to a larger plant at 3000 Olcott Street, Santa Clara, Calif., in response to tripled sales and expanded product line . . .

John C. Ranck, Indicia Inc., New York, announced agreement with COFCI, video production firm in Paris, for Ranck to market COFCI services to U.S. users who need production facilities in France.

Allan Sands Productions, New York, has a recorded radio series, "Boating Tips," consisting of 260 45-second spots on the handling and maintenance of pleasure boats . . . **WLS**, ABC-owned Chicago sta-

tion, in a two-day "Blood Vigil," with frequent on-air appeals for donations, collected well over 1000 units of blood.

New Jersey Public Broadcasting Authority and film producer **John Drimmer** won a DuPont-Columbia broadcast journalism award for the 30-minute television program, "Towers of Frustration," first aired on WNJT-TV, Jersey public station in Trenton.

WRCH-FM, Farmington, Conn., went on the air with a new 50 kW FM transmitter, increasing coverage about 50% in the Hartford, New

**THE
LEADER
IN
CATV
TOWERS**



**"Quality—Service
and Price!"**

Yes, quality, service and price on CATV systems are the reasons for Fort Worth Tower's position as the industry's leading supplier. Experience gained as a pioneer supplier of CATV enables Fort Worth Tower to provide you with a quality product at a price that is reasonable and attractive.

Take advantage of our experience. For assistance in systems planning, engineering and complete systems quotations . . .

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—Associated Companies—
 Tommy Moore, Inc.
 Big State Engineering, Inc.
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Circle 142 on Reader Service Card

Circle 143 on Reader Service Card
 APRIL, 1973—BM/E

Britain, New Haven and Springfield
 rea . . . **Fairchild Industries** has
 ought from Peoples Broadcasting
 Co. stations WYOO (AM) and
 WRAH (FM) in Richfield, Minn.;
 formerly WPBC and WPBC-FM.
 The two stations are being complete-
 ly reprogrammed by the new owner
 . . . **Edison Electronics**, division of
 McGraw-Edison, has set up a parts
 and service operation for the Daven-
 port and Measurement product lines; ad-
 dress is c/o Richard Smith, Box
 309, Ft. Wayne, Indiana; phone,
 19-747-5621.

The annual meet of the **New Eng-
 land Cable Television Association**
 will be April 18-19, Sheraton-Regal
 Inn, Hyannis, Mass.; data from
 Bill Kenny, P.O. Box 321, Tilton,
 N.H. . . . **Gotham Audio**, New York
 supplier of broadcast and recording
 equipment, moved to larger quar-
 ters, the "Gotham Building," at 741
 Washington Street, New York . . .
McMartin Industries has bought an
 additional building in Omaha, and
 will relocate to it initially metal
 fabrication and printed circuit
 board production.

CBS Radio Network releases its
 first sales report for 1973, showing
 sales to 30 major advertisers, in-
 cluding Ford, General Motors,
 Goodyear, Gulf Oil, Howard John-
 son, AT&T, Pennzoil . . . **Warner
 Communications** announced record
 earnings at \$2.20 per share in
 1972, compared with \$1.89 per
 share in 1971 . . . **Cox Cable Com-
 munications** reported record sales
 and earnings of \$15,798,422 and
 \$1,692,110 in 1972; earnings were
 up 32% and sales 17% over 1971.

Hughes Sports Network has
 slated a number of major golf tourna-
 ments in 1973, among them: the
 Kemper Open, Charlotte, June 2;
 the Sealy-Faberge Women's, Las
 Vegas, same date (later in the day);
 Western Open, Chicago, June 30;
 Memphis Open, May 19; Westches-
 ter Classic, Harrison, August 4 . . .
**American Television and Commu-
 nications Corp.** and **Cox Cable**
 announced that the antitrust trial
 concerned with their proposed merger
 would start in Atlanta on June 25.

E. J. Stewart, video production
 firm of Broomal, Pa., announced in-
 stallation of high-band RCA color
 videotape equipment for their TV
 studio facility, which handles both
 broadcast and cassette productions
 . . . A new firm, **TV Cable Supply
 Company, Inc.** of Carlisle, Pa., is
 the result of purchase of an older
 TV Cable Supply Company by

continued on page 54

"8" CHANNEL AUDIO CONTROL console

- B-800 series**
 the B-801 monaural \$2350
 the B-802 stereo \$3200
 B-803 dual channel \$2650

for complete information
 please contact
 the Director of Sales
 Dept B-80



McMartin MCMARTIN INDUSTRIES INC., 605 NORTH THIRTEENTH STREET
 OMAHA, NEBRASKA, 68102 TELEPHONE (402) 342-2753

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CARTRIDGE TAPE EQUIPMENT

- RAPID-Q Adjustable Delayed Automatic Fast Forward Standard
- Modular Independent Units Single, Dual, or Triple Cases
- Rack or Desk Top Mount
- Superior Performance




■ RECORD ■ PLAY ■ MONO ■ STEREO MODULAR UNITS

RAPID-Q

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 (408) 736-8737

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Send only
 the best.

Only the best is good enough. And that's exactly what you get with CBS Laboratories power twins, Audimax and Volumax. Audimax delivers a distortion free signal by eliminating thumping, background "swish-up" and audio "holes." And Volumax prevents overmodulation and permits maximum per-watt coverage power. The power twins! From CBS Laboratories, of course.

CBS LABORATORIES

A Division of Columbia Broadcasting System, Inc.
 227 High Ridge Road, Stamford, Connecticut 06905

Circle 146 on Reader Service Card

NEWS

Russell Brong, president of Lighting Electric of Pennsylvania. The new TVC will concentrate on serving the cable industry.

PEOPLE

John J. Kope, Jr. was appointed vice president, marketing, for Telemation, Inc. . . . **Jack Forde** became manager of MSO sales for Jerrold Electronics Corp. . . . **Dennis G. Christensen** is the new national sales manager, broadcast products, International Video Corp.

James D. McKunney was named director of purchasing for Television Communications Corp. . . . **James Fazio** joined Television Microtime Inc. as project engineer for design of time base corrector accessories; and **Joseph L. Stickley** was named senior applications engineer.

Albert L. Cavalieri is the new director of engineering of AEL Communications Corp. . . . **Salvatore L. Raia** was named national sales man-

ager of Vicon Industries . . . **H. Lou Woosley** became assistant director of engineering, Springfield Broadcasting Co. . . . **Darrell Hunter** was appointed chief engineer of WKEF, Dayton.

Jonathan Ward was named director, program services, for the CBS Radio Division . . . **Vincent J. Conroy, Jr.** became national manager, record advertising sales CBS/FM. . . . **Larry Fry** was promoted to customer service supervisor for the

CATV division of Anaconda Electronics . . . **Leonard Hedlund**, vice president in charge of research for McMartin Industries, attended the the CCIR conference in Geneva as a delegate from the U.S. . . . **Tom Donahue** became vice president and general manager of KSAN, Metro-media FM station in San Francisco.

Robert F. Ennist, Sr. was named manager of turnkey project operations for Jerrold Corp. . . . **Andrew F. Tresness** became marketing systems manager, Magnavox CATV Division . . . **Kenneth Owen** was named vice president and general manager of McLean operations for Telecom, Inc.

Dr. George Bahder was elected vice president and director of research and development for General Cable Corp. . . . **Ivan Curtis** became CATV sales representative for United Video, Inc., microwave subsidiary of LVO Cable . . . **W. A. Gossett** joined Harmon and Co. as vice president, to aid in development of "Cablevision Bingo," program to be leased to cable companies.

Paul W. Lancaster joined Goldmark Communications Corp. as director of cable TV engineering . . . **Philip D. Marella** was elected a director of LIN Broadcasting Corporation; he was already president of WAVY-TV, LIN subsidiary . . . **A. James Ebel** became president of stations KOLN-TV, KGIN-TV, and KMEG-TV.

Charles A. Batson, president of Cosmos Broadcasting Corp., Columbia, S.C., was named chairman of the Television Code Review Board, NAB . . . **Carol Oughton** joined TelePrompTer Corp. as research director of new department of community development . . . **Frederick C. Rueckert** was appointed director of

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For a quality spot, SPOT QUALITY!

This gold seal assures you of the finest quality, fresh tape, factory loaded by Fidelipac, under strict quality controls. At a glance, know that you can trust the splice and tape tension and depend on accurate tape run-out. COMMUNICATION MEDIAS and FIDELIPAC, where quality is understood. Contact us for pricing information.



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Some of the features of the Model CA-10V:

- 8 active inputs for up to 32 input sources
- 2 independent program outputs
- Illuminated push button assign switches
- Illuminated V.U. meters
- Professional straight-line slide level controls
- Plus channel muting, separate monitor circuits
- Talkback, audio following, etc.

For more information call or write
CUSTOM FIDELITY COMPANY, Inc., 7925 Santa Monica Blvd
Hollywood, California 90046 (213) 654-7211

orporation planning for Oak Industries.

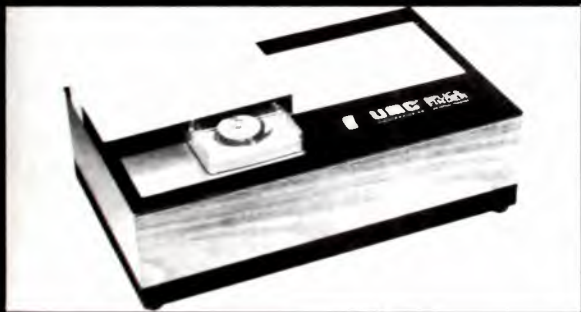
Suchet Potewirantanand joined communications Transistor Corp. as senior engineer in RF transistor development . . . **Roy Schaub** became western sales manager; **George Hierisch**, Great Lakes sales manager; and **James Razor**, southeastern sales manager; all for the cable and telecommunications marketing of scientific-Atlanta, Inc.

Gene Bidun was named eastern sales manager for Broadcast Electronics, Inc. . . . **George Allison** became vice president of William B.anner Co., in charge of the TV media department . . . **Helen Psaros** the new executive producer of the BS AM stations' Private Line News Exchange (PLNX).

Frank Drendel was named manager of the Comm/Scope division of Superior Continental Corp., maker of cables, connectors, and related equipment. . . **Alan F. Culbertson**, president of Culbertson Industries, was re-elected to a second term as president of the IEEE Communications Society.

BM/E

Completely AUTOMATIC SPLICE FINDER & ERASER



- Simplified operation and design. Automatic start and ejection.
- Automatically stops splice within 1" beyond capstan.
- Pressure sensitive function. Does NOT require prerecorded signal.
- Pre-set to sense all 1.5 mil splicing tapes. Can be adjusted.
- No manual positioning of splice is required.
- Eliminates annoying noise effect of recording over splice.
- Accepts A, B, and C size (NAB) tape cartridges.
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- Built-in bulk eraser.

Model SFE-1 Power: 117V, 60 Hz., 250 Watts
 SPLICE FINDER & ERASER Size: 16 3/8" w, 6 1/4" h, 10 1/8" d
 PRICE \$325.00 Weight: 18 lbs.
 FOB North Haven, Conn. Tape Speed: 15 IPS

The SENSSTROL Model SFE-1 SPLICE FINDER & ERASER pays for itself by reducing related operating expenses. Order directly from:

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U.S. Patent Pending

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If you have any connection with advertising—selling, writing, promotion, public relations, production, merchandising, or whatever—you will gain many benefits from this new book. For maximum effectiveness, A Common Sense Guide to Advertising takes you behind the scenes and shows how successful advertising is created. Contains scores of formulas and rules—some flexible, some inflexible—in a down-to-earth, practical treatment. The immense value of the content is the way it fills the gap between beginners and experienced professionals. For advertising managers, it is a complete guide which suggests directions in all phases of advertising responsibility. For beginners, it is an all-in-one sourcebook of clearly detailed fundamentals and techniques. Completely covers the subject—from corporate identity to how to write a hit jingle. A dependable guide covering principles and practice in all areas of advertising. The author details practical, honest ideas that work, including solutions to many tough ad and merchandising problems. 320 pages, with drawings, charts, and photos. Hard bound.

About the Author:

Arl Lavidge is chairman and Chief Executive of Lavidge & Associates, Inc., one of the largest advertising agencies in the southeast, representing many leading regional, national and local concerns. After graduating from De Pauw University, he served as a pilot in the U.S. Naval Air Corps during W.W. II. He then returned to Northwestern U. where he took graduate studies in advertising. After three years in varying responsibilities with several ad agencies, he started his own agency with a second hand typewriter, a card table for a desk, and no clients. Arl Lavidge has proved his authority on the subject through his growing agency and list of clients.

Contents

The Advertising Agency—Manager	The Ad Man as a Merchandiser and Sales Promoter
The Ad Man as a Marketing Executive	The Ad Man as a Media Planner
The Ad Man as an Assistant Executive	The Ad Man as a Public Relations Practitioner
The Ad Man as a Supervisor	The Ad Man as an Advertising Manager
The Ad Man as a Copywriter	The Ad Man as a Businessman
The Ad Man as an Art Director	Useful Supplementary Information
The Ad Man as a Promotion Manager	Ads at Work
The Ad Man as a Creator of Top Copy	A Picture Tour Through an Ad Agency
The Ad Man as a Creator of Radio Commercials	Questions and Answers

But, prove it to yourself...order at our risk for 10 days FREE examination. Send no money! Simply fill in and mail the NO-RISK coupon below to receive your own copy of this helpful volume. Save \$2.00—the Special Prepublication price of only \$7.95 (regular price \$9.95) available through June 30, 1973.

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 Please send me _____ copies of A Common Sense Guide to Advertising at only \$7.95

I enclose \$_____ postage prepaid.
 Please return to me in 10 days, FREE trial and Free 28 p. Catalog.

Name _____ Phone _____
 Company _____
 Address _____
 City _____ State _____ Zip _____
 Expires 6/30/73 P. 1337/1338/73 B-43

Circle 160 on Reader Service Card

BM/E CLASSIFIED MARKETPLACE

CLASSIFIED ADVERTISING RATES

DISPLAY CLASSIFIED ADVERTISING: \$22.50 per inch 1x; \$22.00 per inch 3x; \$21.00 per inch 6x; \$20.00 per inch 12x. ALL OTHER CLASSIFIED ADVERTISING 25¢ per word; minimum \$3.00. BLIND BOX NUMBER: No extra charge. Replies sent to address below will be forwarded to you. PAYABLE IN ADVANCE; send check with order. CLOSING DATE: 5th of 2nd month preceding issue date.

BM/E, Monterey and Pinola Avenues, Blue Ridge Summit, Pa. 17214 Phone 717/794/2191

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Send letter and resume, stating salary requirements to R. F. Goodspeed, Manager

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Broadview, Illinois 60153

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WANTED: Instructor—Broadcast Engineer Technician—Two Year College Southeast Ohio—Challenging and Rewarding Position. Salary open. Contact Dean of Education, Hocking Technical College, Route 1, Nelsonville, Ohio 45764. (614) 753-3514. The College is an Equal Opportunity Employer.

We are looking for additional Reps to sell our products. Must already be in broadcast equipment sales field. Send photo and resume to Box 473-2, c/o BM E, Blue Ridge Summit, Pa., 17214.

Established station in all U market needs maintenance supervisor with experience in VTR's and color cameras. Salary commensurate with experience. Equal Opportunity Employer. Send resume to Box 473-1, c/o BM E, Blue Ridge Summit, Pa. 17214.

WANTED IMMEDIATELY, Video Tape Engineer. Excellent Salary. Live near the top ski areas of the Rocky Mountain West. America's cleanest air. Contact collect: Scott Tipton, Opr. Dir., KYCU-TV, Cheyenne, Wyo. (307) 634-7755.

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RECORDING STUDIO CONSOLE

Ideal for sophisticated TV audio, 18 microphone or high-level inputs with EQ & echo on each. EQ on each of the 4 output channels. Built-in multi-freq. oscillator. Group submastering, channel masters, grand master, 4 reverb devices, 4 dual-60 watt amps. Intercom while recording; talkback (mic's. included). Audition any input while recording. "Silence" button prevents performer ruining audio by disturbance during echo "overhang" at end of "take". Producer's desk; all audio in accompanying rack. Very compact! Slightly used, guaranteed. Sacrifice for half of new value.

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SEC CUSTOM AUDIO CONSOLES at prices comparable to manufacturers' standard units. Modern styling with vertical slide potentiometers and "soft" audio switching. Completely assembled or save even more on console kit. Call or write for custom quotation. Also, plug-in audio modules, distribution amplifiers, preamplifiers, active combining networks, monitor amplifiers. Write or call for brochure S. E. Company, P.O. Box 49224, Atlanta, Ga. 30329. 404 631-3586.

EQUIPMENT FOR SALE (Cont'd)

FOR SALE

Complete FM System except antenna: One Federal FM Transmitter Type 103A, 5 to 10kW tuned to 101.7; Federal Mono Match Model 412 F GE FM Transmitter BT-3B 9kW tuned to 101.7; GE Modulation Monitor-Freq. Monitor, assembled, model GE-1000; CBS FM Volumax Control Model 410; RCA Console Six Channel Mono with talkback Type 76B5; Gates Console Ten Channel Mono, needs some work. Contact: Robert A. Clark, KFIY Radio, P.O. Box K, Corvallis, Oregon 97330 (503) 754-6633

Ampeg 602-04 Tape Recorder Player, KRS-SB1-RFP Cartridge Recorder Player, Dage 520 Solid State Camera Viewfinder type with control console and cable. CATV cameras, small studio type with external drive and special effects, lenses, motorized pedestals, coaxial cable, etc. Call or write, Central Television Systems, 809 Court Street, Utica, N.Y. 13502. (315) 735-6474

MOTORS FOR SPOTMASTERS

NEW Papst hysteresis synchronous motor HSZ 20.50-4-470D as used in series 400 and 500 machines. Price \$39.00 each prepaid while they last. 90 day warranty. Terms check with order only, no COD's. Not recommended for Tape-caster series 600 or 700.

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