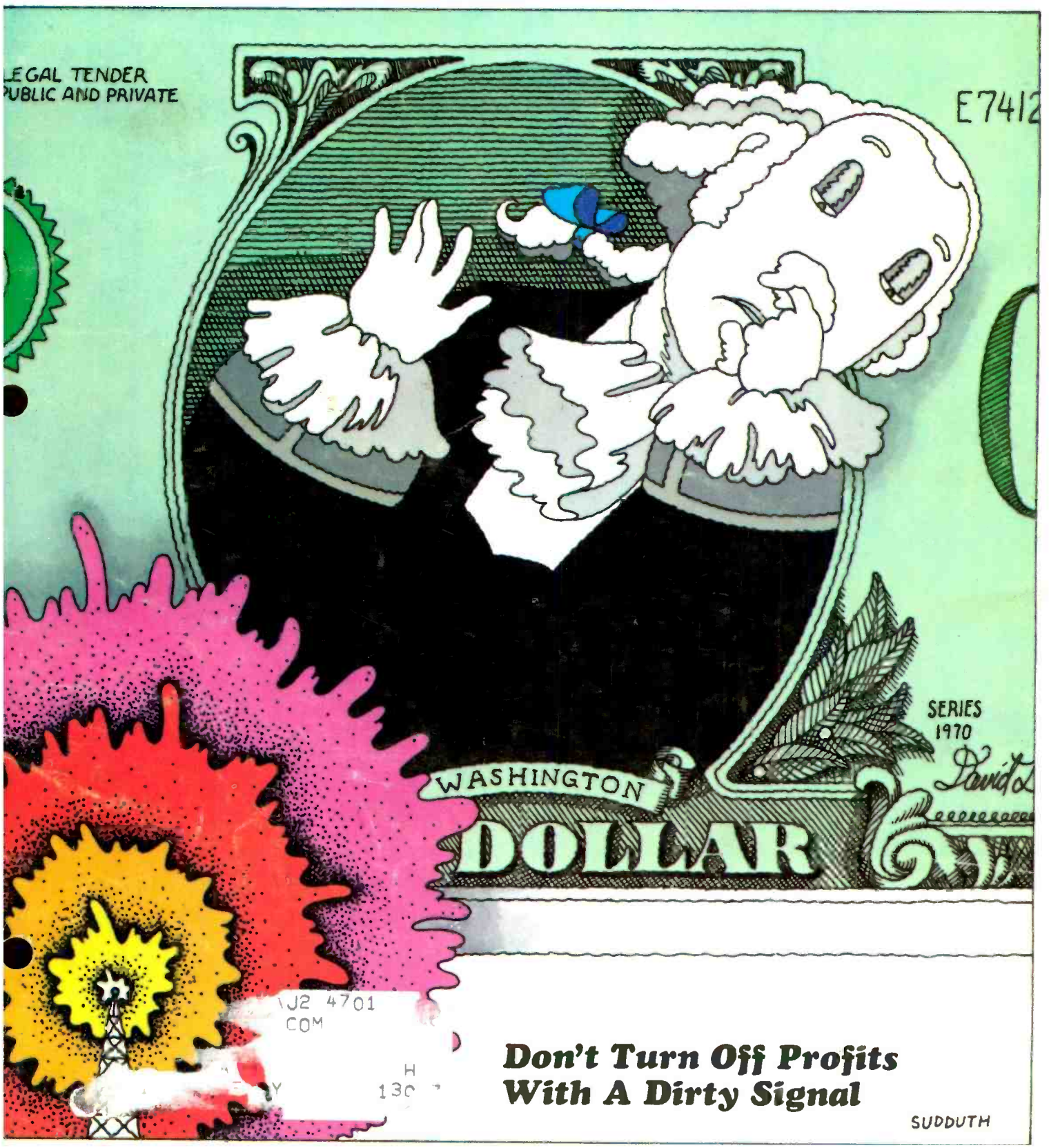
A MACTIER PUBLICATION / DECEMBER 1970

BM/E

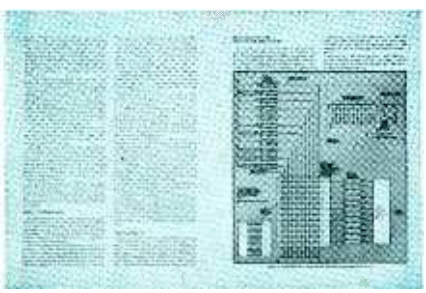
BROADCAST MANAGEMENT/ENGINEERING



If you're wise, you won't purchase a demodulator until you read this free paper.

You learn a lot while spending five years and several hundred thousand dollars in a research and development program. And, when you tell your story, wise people listen.

DYNAIR has included a wealth of original information about demodulators in an 8-page paper called "Facts About Television Demodulators." We think that you will find it very informative, particularly if you are planning a system which involves the pickup of off-the-air signals.

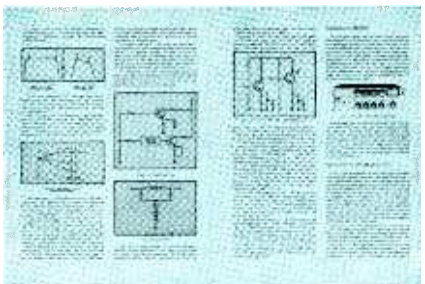


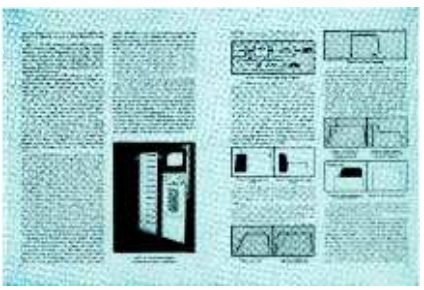
At first thought, it would appear to be a relatively basic design task to engineer a demodulator. Logically, it is often related to the tuner, IF and detector portions of a standard television receiver. However, it is one thing to design a demodulator which is acceptable for driving an ordinary viewing monitor and entirely another thing to design a demodulator which will be acceptable for testing purposes or for the regeneration of broadcast quality television signals. The demodulator portion of even the most sophisticated commercial television receiver would prove highly inadequate for applications such as those mentioned earlier in terms of sensitivity, stability and the amount of distortion introduced in the process of demodulation.

Until recently, the only available demodulators were of vacuum-tube vintage. These were designed years ago for monochrome applications; however, the complex NTSC color signal and its critical phase relationships require a much more sophisticated approach.

DYNAIR has been involved in a continuous research and development program on the color demodulator problem. After experimenting at great length with virtually every known approach to demodulation, a design was arrived at which contains many new and unique circuits, particularly in the areas of trapping, the control of envelope delay and other distortions and signal restoration. The design is now a product and, at this writing, a large quantity of the units are in the field, performing to industry standards.

The paper we are offering describes many of the problems we encountered





in designing the first quality solid-state color demodulator. The product is also briefly described, along with the many problems it will solve for the cable systems and broadcast engineer.

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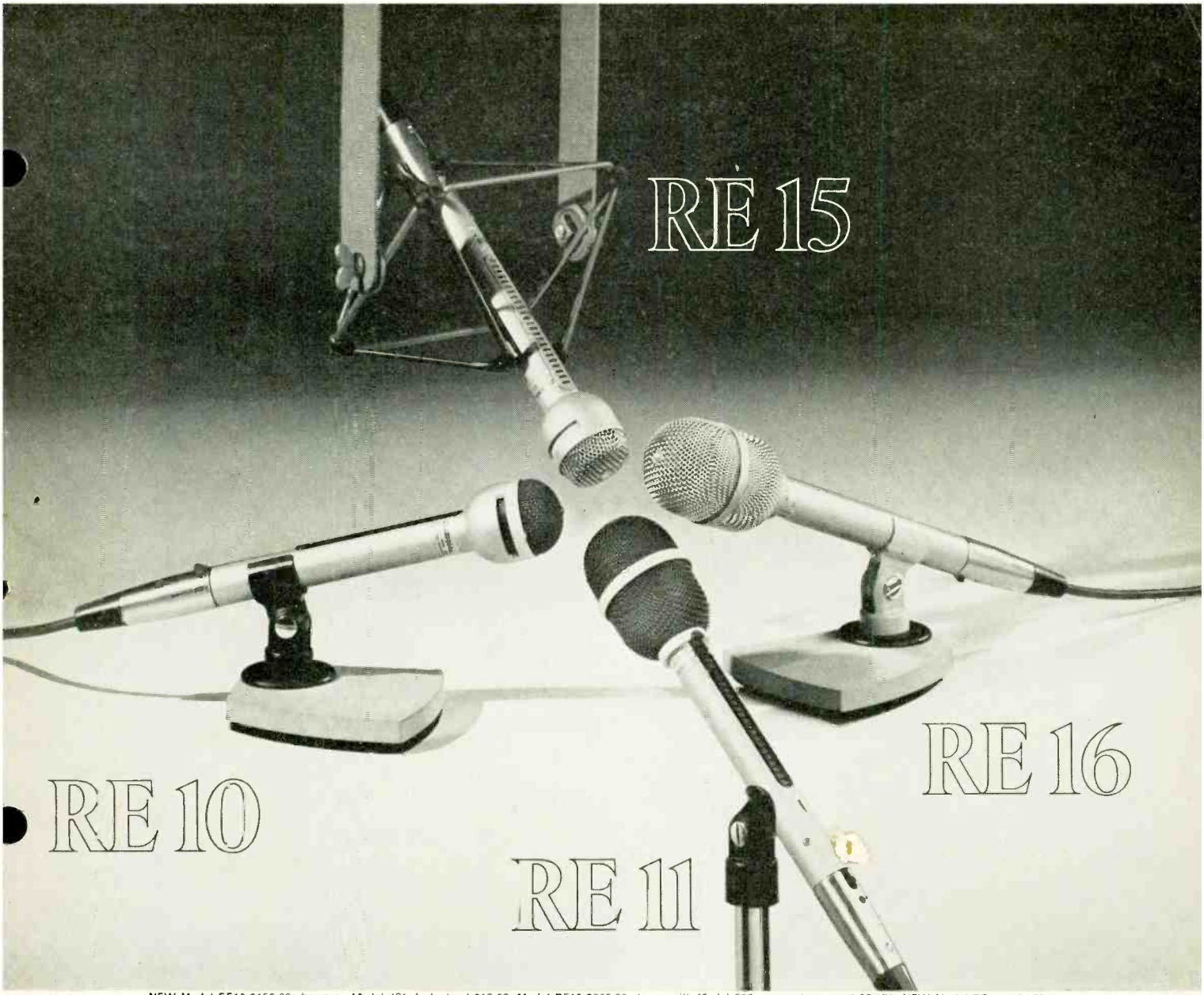

NEW Model RE10 $156.00 shown on Model 421 desk stand $18.50. Model RE15 $265.00 shown with Model 307 suspension mount $34.50. NEW Model RE11 $166.00, shown with Model 311 snap-out stand adapter $6.50. NEW Model RE16 $275.00, shown on Model 421 desk stand $18.50. List prices shown. Normal trade discounts apply.

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DECEMBER 1970/VOLUME 6/NUMBER 12

BM/E

BROADCAST MANAGEMENT/ ENGINEERING

This month's cover: In today's highly competitive broadcast marketplace, just being on the air isn't enough. You have to put out a quality signal —and program. Otherwise, as Art Sudduth illustrates, your audience and sponsors may be driven to your competitors.

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BROADCAST INDUSTRY

NEWS

NAB Fall Conferences: gripes, hopes, plans . . .

The six NAB Fall conferences give broadcasters a chance to compare notes and complaints. Typical was the scene at Philadelphia:

- "If we broadcasters do our work, the President's veto of the political spending bill will be sustained in Congress"—David A. Rock, WSMN, Nashua, N.H., urging that broadcasters as individuals write and visit their congressmen.
- "We define the drug problem as: People who use drugs and people who don't use drugs and people who make judgments about people who use drugs"—Peter Hammond, executive director of the National Coordinating Council on Drug Abuse Education and Information, discussing his organization's services to broadcasters.
- "Broadcasting's doing a better job than government"—former FCC Commissioner Lee Loevinger, during luncheon speech warning that bureaucratic government control would, among other things, make broadcasting as unprofitable as the post office.
- "The way to run good small-market radio is to get your staff to love you"—George Dietrich, WEMD, Easton, Maryland, whose wife got a First 'Phone license when he started working 12-14 hours a day as news director and station manager.
- "People expect government to help solve social issues. Wouldn't we rather they turn to business and broadcasting?"—George G. Huntington, TvB executive v-p, urging broadcasters to recognize the business value of social programming.

The International Broadcasting Convention

The International Broadcasting Convention, Britain's answer to the NAB, met in London this September—as it does every even-numbered year. There were 21 hours of technical papers, discussion and debate, as well as the professional TV equipment displays of almost 60 exhibitors. Attendance reached to over 2000 television engineers. An interesting fact: Most engineers and manufacturers in England and Europe observe the Common Market/Outer Seven allegiances—so those attending the London show do not go to its European counterpart, the International TV Symposium, which meets during May of odd years in Montreau, Switzerland.

The big news this year was Marconi's Mark VIII color camera billed as the world's first automatic color television camera. One push-button at the camera control activates an internal diascope, and an entirely automatic lining-up sequence of operations occurs in one half to three minutes. Color is balanced to the test illumination, and the three tubes are aligned in sequence; raster adjustments are made covering scan, amplitude, linearity, centering, skew and rotation on red and blue. The new camera offers a low silhouette, compact design and light weight (75 pounds), and should be a big contender at next year's NAB.

A new EMI color camera Type 2005, a natural successor to their popular initial effort, offers automatic centering plus new features the professional industry has come to expect.

Ampex and RCA displayed their latest capabilities in videotape; Andrew, Boston Insulated Wire, Gates, International Video, Memorex, Microwave Associates, Recortec, Shure, Tektronix and Television Equipment Associates completed the roster of American exhibitors.

Few American engineers attended IBC, notable exceptions being Blair Benson, Julius Barnathan, Mike Fisher and Phil Baldwin, plus marketing personnel from American firms exhibiting at IBC. Since a number of significant technical breakthroughs come from the British and European broadcast industries, it is unfortunate that more American broadcasters and equipment suppliers were not part of the IBC.

—By Bill Pegler, Director, Television Equipment Associates.

Citizens rights in TV: The critics criticized

Like a sluggish gadfly attacked by a leaner, hungrier breed, the National Citizens Committee for Broadcasting (NCCB) was itself assailed by minority representatives, including Black Efforts for Soul in Television (BEST). The incident occurred in New York City in October, during the First National Conference on Citizens Rights in Broadcasting.

NCCB staged the conference to examine "the role of television in American democratic society." Six panels discussed minority inclusion, children's TV, politics in television, ownership concentration, CATV, and effecting legal change.

Discussions urged greater citizen participation in affecting television program content, license renewal, and political broadcasts. But during the luncheon, dissenters asked for and received permission to address the gathering. First to speak was Bill Wright, national coordi-

Continued on page 32

RCA Wins Coastal Antenna Contracts

San Francisco's Mt. Sutro and Manhattan's World Trade Center will support $6 million worth of RCA antenna equipment under contracts recently signed by RCA with Sutro Tower, Inc., and the Port of New York Authority. Shown here: RCA's Bob Rocamora.

The $2 million agreement with Sutro (formed by four San Francisco TV stations) calls for 150 tons of TV antennas to be mounted on a 750-ft tower—11 station antennas planned and room for more. Included in the contract is construction of a building on Mt. Sutro to house the TV stations' transmitters.

The World Trade Center contract, $4.071 million, covers design and fabrication of a 365-ft supporting mast with antennas and transmission lines for ten New York TVs, seven FM affiliates.

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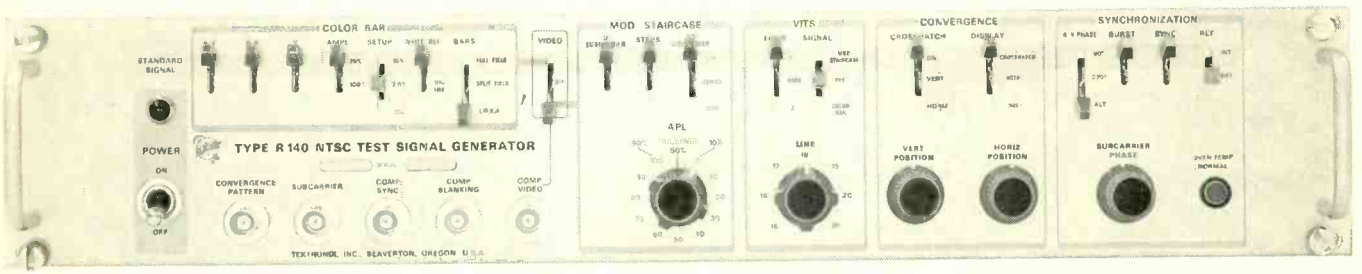
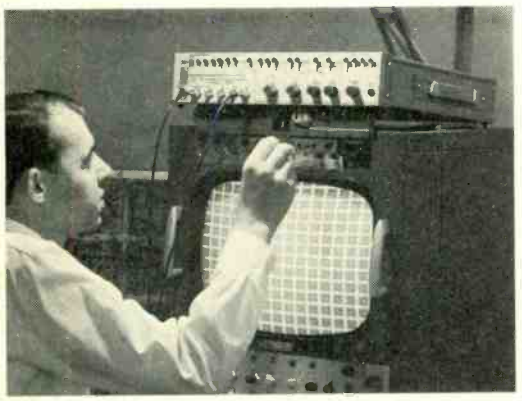
new TV signal generator





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CONVENTION LOG

Quality Ideas From IEEE

OBJECTIONABLE VARIATION in hue and saturation from station to station are permitted within the existing FCC specifications covering color television. Something ought to be done about it, according to Wendell C. Morrison, chairman, Subcommittee on Transmission and Transmission Paths, Joint Committee for Intersociety Coordination. Relying on field tests (See *BM/E*, Dec. 1969, page 26), Morrison's committee made some recommendations:

Hue. The burst-to-chrominance phase tolerance must be tightened. Excessive channel-to-channel hue variation occurs when the reference burst shifts in phase (although within FCC specs).

Saturation. Better specs are needed to control saturation. A better method of measuring average luminance of a picture is needed. The spec on frequency response permits excessive station-to-station variation. The prescribed method of measuring frequency response does not give an accurate indication of the chrominance-to-luminance (saturation) ratio. It's hard to detect luminance changes because they result from differential gain errors and quadrature distortion in rf amplitude detection as well as from frequency-response errors. Linearity (differential gain) and frequency-response measurements need to be unified to prevent tolerance build up.

Color burst. Burst is a poor reference signal for receivers with automatic chroma control. If the amplitude of the burst signal is high compared to other stations, variations occur.

Receivers. TV sets should be put to an exhaustive study to determine how they affect station-to-station color variation.

Morrison warned that you can often mess up a picture by reprocessing the burst.

An automatic equalizer system that could be incorporated in receivers to compensate for linear phase and amplitude distortion was proposed by Peter Bingham, Kelly Scientific Corp. The scheme made use of the color burst. But before an economical design could be achieved, a lot of field data on the nature of signals received by the typical receiver would be needed, Bingham said.

Tricks in producing clean mono from stereo

Compatibility problems in getting a good mono sound from stereo records were discussed in a paper prepared by Eric Small of WNCN-FM, New York.

Small recommended that all mono stations buy stereo pickups since all records released now are stereo. Playing a stereo record with a laterally-moving mono pickup introduces distortion and damages the disc grooves. The distortion results when a vertical component is produced as a result of the difference in phase or amplitude of the left and right channels.

Rather than getting a stereo pick-up strapped for mono playback, Small urged contemporary music stations, use the stereo pick-up as is and do summation in a stereo pre-amp after amplification.

Occasionally stereo records are made with the left and right microphones placed so widely apart (to pick up a piano and organ, for example) that their summation in mono nearly cancels. The mono then sounds ghastly. For a good mono sound, only one track should be played.

Center-channel buildup is causing most mono problems today according to Small. Center-channel buildup occurs when a vocalist is drowned out by his instrumentalist accompaniment on mono playback. In stereo playback, the vocalist is split equally (as intended) left and right and in a typical room the signals add at random to produce a sensation that is approximately 3 dB louder than either individual speaker. In mono electrical summation, however, the two signals being equal in phase and amplitude add in a coherent manner to produce a booming 6 dB increase. A 90-degree phase-shift network is one way to overcome this problem.

When tapes are used, azimuth errors can foul up mono. Azimuth errors cause drastic loss of high frequency when channels are summed. Stereo carts are bad offenders and tapes done on high-speed duplicators usually play badly on mono, Small said.

He recommends inspecting all incoming stereo tapes before using them. Incompatible material should not be used and stereo should be sacrificed—play it mono only.

Small pointed out the weakness of a 90-degree shift scheme as a means of eliminating many mono problems. He said, "Any material intentionally placed in the acoustic center by being recorded equal in phase and amplitude on both channels would appear to spread across the auditory stage. Certain musical instruments would be 'pulled' from their intended positions.

"A large portion of the information in a stereo recording is nearly equal in phase and amplitude and therefore uses a minimum of 38 kHz L-R subcarrier. A 90-degree phase shifter scrambles the coherence between left and right channel information. The result is

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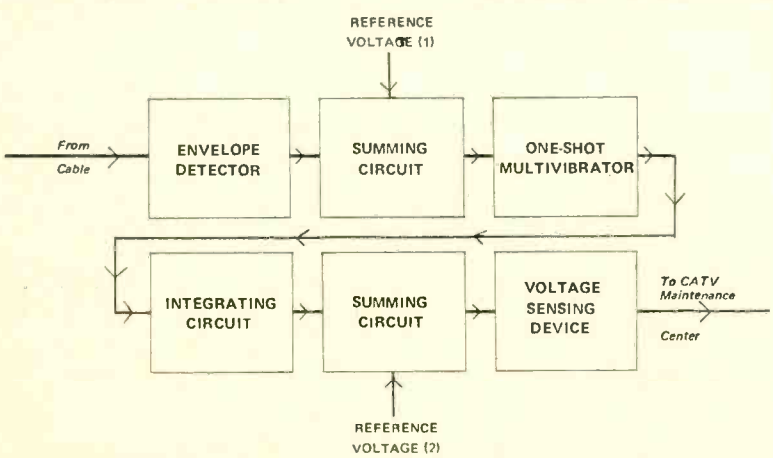

Cross modulation in CATV systems can be kept low by this monitoring system which detects signal-voltage buildup. See page 29.

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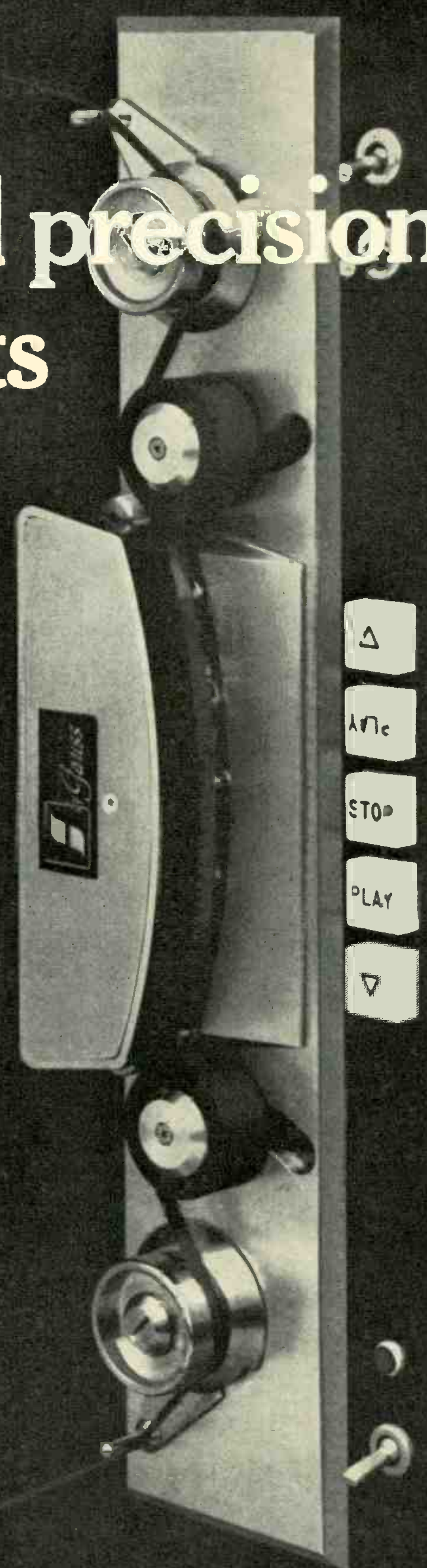

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INTERPRETING THE FCC RULES & REGULATIONS

Nondiscrimination—New FCC Rules

The Federal Communications Commission became the first federal agency to adopt formal rules designed to assure nondiscrimination in employment practices.

Under the new rules, *each* licensee (with five or more full-time employees) must file an *Annual Employment Report* (FCC Form 395)—the first being due May 31, 1971. Also, as of January 4, 1971, an exhibit delineating specific practices, to be followed to insure nondiscrimination in employment, must be completed and filed by applicants for (1) a new broadcast facility (FCC Form 301); (2) renewal of license (FCC Form 303); and (3) an assignment of license or transfer of control (FCC Form 314 or 315).

Background

In early 1967 the United Church of Christ filed a petition asking the Commission to adopt a rule precluding grant of a license to any station which discriminated in employment practices on the basis of race, color, religion, or national origin.

In establishing a rulemaking proceeding (Docket No. 18244) to consider adopting such a rule, the Commission noted that "there is a national policy against discrimination in employment on the basis of race, religion, sex or nationality." The Commission recognized that Title VII of the Civil Rights Act of 1964 made it unlawful for employers of 25 or more persons in an industry affecting interstate commerce to discriminate against potential employees. The Act is administered by the Equal Employment Opportunities Commission (EEOC).

The Commission noted that "a significant number of broadcast licensees" (by their estimate, 80% of the TV and 10% of radio stations) came within the nondiscriminatory requirement of the Civil Rights Act, thus falling under the jurisdiction of EEOC. Nonetheless, the Commission believed that it, too, had a duty to insure against discrimination by broadcast licensees; that it could grant an application for a broadcast authorization *only* after finding that the "public interest, convenience and necessity" would be served;[1] that its decision as to issuing a license must take into account whether an applicant has violated the laws of the United States. The Commission's conclusion: There would be "full exploration" of any Petition or Complaint raising substantial issues of fact concerning discrimination in employment practices in a particular station before granting a license.

In an order issued July 3, 1968, the Commission officially recognized the "serious national problem" of discrimination in employment practices, declaring that in passing on broadcast applications, it would consider complaints alleging such discrimination. The Commission recognized, however, that such action would not sufficiently alleviate the problem of discrimination in broadcast employment. Therefore, it proposed rulemaking to establish *a positive program of reporting and planning by licensees of equal employment opportunities.*

New rules have become effective now to require each broadcast licensee, with five or more full-time employees, to (1) file an Annual Employment Report and (2) prepare exhibits (when filing appropriate applications) delineating specific equal employment opportunities, plans and programs.

Annual Employment Report

On or before May 31 of 1971 and of every year thereafter, *each* licensee or permittee of a commercial or noncommercial AM, FM, or TV broadcast station (with five or more full-time employees) is required to file an Annual Employment Report on FCC Form 395.

A *separate* Annual Employment Report must be filled for *each* AM, FM, or TV station; however, a *combined* report may be filed for an AM-FM combination if both stations are owned by the same licensee and both stations are assigned to the same community. A separate report must be filed for *each* "Headquarters Office" of multiple station owners, where employees perform duties solely related to the operation of more than one broadcast station.

The Report is designed to provide statistical data relating to the number of minority-group employees on the staff of each broadcast station. Its announced purpose is to detect discrimination in employment. Statistical data are expected to provide a clear initial indicator of discrimination. For example, if a station, in a community with a population 30% Black and 20% Oriental, files an Annual Employment Report showing that no Black and Orientals are employed, then serious

Continued on page 36

This section, providing broad interpretation of FCC rules and policies, does not substitute for competent legal counsel. Legal advice on any given problem is predicated on the particular facts of each case. Therefore, when specific problems arise, you would be well advised to consult your own legal counsel.

1. 47 USC 307; 47 USC 309.

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What if you could build your dream of a radio station? Stereo FM, the highest fidelity and the best equipment available. It would cost a fortune; how would you make it pay? Chicago's WFMT(FM) is a dream come true, for staffers and listeners alike. And it makes money—without double spots, jingles or hard-sell commercials.

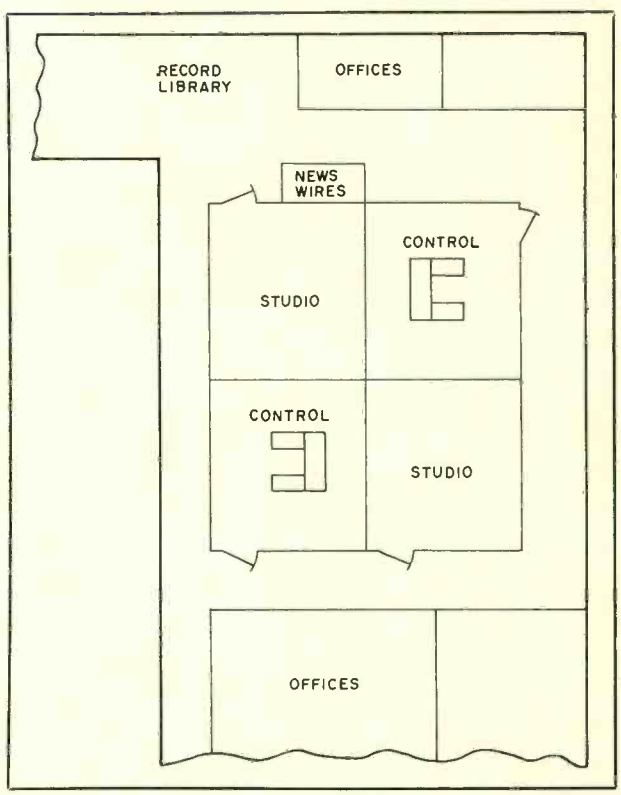
AT MANY RADIO STATIONS, engineering is regarded as a necessary evil, and equipment purchases are held to a bare minimum. Much too prevalent is the idea that as long as something works, it's OK.

WFMT's philosophy is just the opposite—sound engineering is the foundation for high-quality programs. Only the best equipment is used, to make WFMT's signal as clean and faithful a reproduction of the original performance as possible.

A potpourri of programs

WFMT—"Chicago's Fine Arts Station,"—programs classical music, opera, folk songs, musical comedy, drama, humor, literature, and discussion—nearly all in stereo and 24 hours a day. While much music is from conventional discs, there is a good amount of live and taped material from such sources as symphony concerts and music festivals.

Recently WFMT moved into new studios on Chicago's posh North Michigan Avenue. An area of 5500 square feet provides work space for the staff of 21. Everything in the installation was designed toward producing the cleanest air signal possible, a must for the station's carriage-trade audience with their high-quality stereo rigs. Operating convenience for the staff wasn't overlooked, either.



Simple studio floorplan puts on-air rooms inside, offices and hallways surrounding, with easy access to both.

Functional studies

Layout of the work area is simple and functional, as the sketch shows. The inner core is a rectangle comprised of the two control rooms and the two studios. Surrounding this program-origination center is a hallway which acts as a sound buffer. Outside the hallway are offices and support areas.

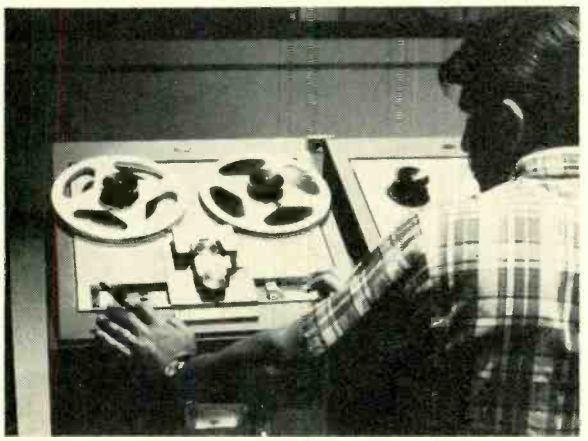
Custom consoles

WFMT felt that no stock console would satisfy its neeeds, so Engineering v-p Alfred Antlitz designed and built identical consoles for the two control rooms. Each has two pairs of outputs, and four VU meters, which permit broadcasting one program while recording or auditioning a second—both in stereo. Mono/stereo compatibility is handled with a single three-position switch.

There are 12 normal mixer channels, each of which will accept a single two-channel stereo signal from microphone, turntable, tape recorder, or remote line. Each input channel includes a straight-line fader, a pan pot, and a program/audition key.

Since the console has no master faders, using multiple mikes for a panel discussion would re-

Announcer Marty Robinson prepares for a newscast at console which has dual stereo output channels and four VU meters.



WFMT was probably the first U.S. radio station to use 3M Mincom tape machines, with consistent phase adjustment.

Engineering v-p Alfred Antlitz explains operation of one of two consoles he designed and built for WFMT.

quire the announcer-operator to ride gain on two or three faders individually. To avoid this, a microphone assignment system is used. Up to 12 stereo mikes in two studios may be assigned to either of two submaster mixers on each console. Level and balance for each mike are then preset and the announcer rides gain on the combination with a single vertical fader.

Each console contains more than 500 solid-state devices, including ICs. Although FCC requirements for S/N ratio are only 60 dB, WFMT consoles check out at 86 dB. Harmonic distortion is unmeasurable on test equipment rated at 0.01%. Frequency response is flat from 10 Hz to 150 kHz. Stereo separation is 120 dB, and there is no measurable crosstalk between any two lines or channels in the studios. One reason for this is that amplifier inputs and outputs are only 6 ohms impedance. A single amplifier type is used throughout the console—the Spectra Sonics Type 101. There are 112 of these plug-in cards in the studio complex, all completely interchangeable. There is also no ac in the consoles; all power is 24 Vdc. And there are no SCR light dimmers in the studios, thus precluding any hash pickup from that source. For reliability, only hermetically sealed military-type relays are used in the consoles.

WFMT's transmitter is remote controlled. Either control room may take the air, but only after a master switch has been preset to "ready" position. Normally the announcer monitors the air signal via a remote modulation monitor, but there is also a Marantz FM tuner as backup.

$5000 tape recorders

To reproduce concert tapes (such as performances of the Cleveland, Philadelphia, and Boston orchestras) WFMT chose Mincom tape machines, usually found only in recording studios. Two were built by 3M to WFMT specifications. The Mincom machines use the Isoloop head configuration, which eliminates the need for any back tension on the tape. Their tight loop helps minimize scrape, flutter and wow, and makes for consistent phase adjustment. And during recording they anticipate and cancel overloaded passages.

Gilding the lily, WFMT is probably the first U.S. station to install the Dolby noise reduction system, used with the Mincom tape gear to broadcast concerts by the Boston Symphony and the Fine Arts Quartet. (The station won an Armstrong Award for that program.) The Dolby system reduces low-level noise by at least 10 dB, and increases dynamic range by an equal amount. There is also a reduction of crosstalk and print-through.

In the Mincom machines, logic circuits permit the operator to advance from any mode to any other (as from rewind to play) with the machine performing all intermediate functions (braking, stopping, restarting) automatically. Taking advantage of this feature, WFMT tied its Mincoms into a remote-control panel at the console.

There are no tape cartridge machines at WFMT; commercials are usually done live by staff announcers. Certain programs are taped, however, and approximately 20% of WFMT programming comes from tape.

The ubiquitous disc

It's impossible to program music today without playing a lot of discs. To insure accurate playback pitch of the recorded sound, each WFMT control room contains two Sony servo-controlled turntables designed for variable-speed playback in the range of 33⅓ and 45 rpm. Some units have been modified to include 78 rpm, as the station plays

old classics now and then. Speed adjustment is made with a thumbwheel while observing a strobe track at the turntable rim.

Tone arms are from England's Audio and Design. An outstanding feature of each is the absence of leads from arm to base. Instead, four pins at the back of the arm float in four isolated pools of mercury in the base, making pivot binding impossible.

The phono cartridges are Shure V-15 Type II Supertrack. Elliptical styli are used for microgroove discs, and special styli for 78-rpm discs. Tracking is 1.5 grams. Preamps are by Marantz.

Careful acoustics

Because the announcer is on the air live so often, WFMT thought it wise to place each console away from the conventional position against the control-room double-glass window. Such a hard surface has poor acoustics. Each console is therefore in the approximate center of its respective control room. In both control rooms and studios, the walls are covered with cork and the floors with carpeting. All four rooms are quiet; low-velocity air conditioning with dampers is used.

In keeping with the other quality equipment, WFMT spared no expense in microphones. A dozen Neumann and Sony condenser mikes are scattered around the studio complex. The announce mike is a Neumann SM-69 with M-S stereo configuration.

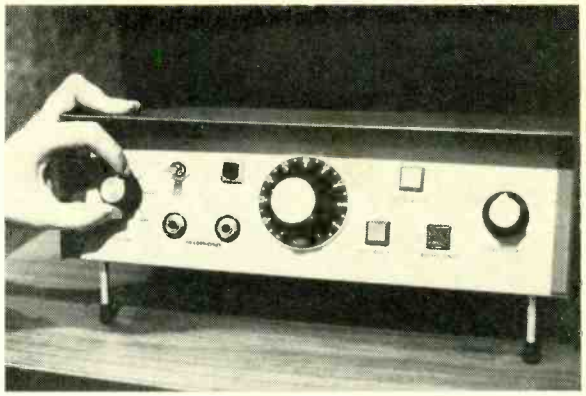
Home-style monitoring

Since WFMT's target is that home listener in his living room, the station set up control rooms and studios to simulate actual at-home acoustics. All four rooms are large (200-300 square feet) and the monitors are Marantz power amplifiers driving AR-3a and Bozak speaker systems.

Ahead of each monitor system is a selector box built by WFMT engineers. The box allows input choice of four program sources (two from each control room) plus the air signal. In addition, the box permits the breakdown of all signals by left- or right-channel only, or left-right mix to simulate mono reception. Each box also contains a separate pair of amplifiers with volume control for headphone monitoring.

The limiter bugaboo

Like other serious-music stations, WFMT hates volume compression and limiting, which alter the dynamic range of music and drama. Yet overmodulation is also undesirable and no operator can prevent an occasional fortissimo from driving the transmitter too hard.



Monitor selector box appears in each studio and control room, allowing check of stereo or mono from air or board.

Behind the stereo mike sits Ray Nordstrand, president and general manager of Chicago's Fine Arts Station.

The solution at WFMT is a black box called the Antlitzer, after its inventor. Antlitz built his unique modulation controller to restrict the level of only the offending peak, while leaving the dynamic range of the rest of the program material unchanged. Attack time is up to 0.1 μsec, and subjectively there seems no limiting or compression. Antlitz is reticent about how his device works, as he's still perfecting the design of what he calls an "in-line frequency differential peak controller."

Record library

WFMT's repertoire is vast—more than 50,000 selections are stored in seven rows of steel shelves six tiers high. The collection includes thousands of American recordings, as well as records and tapes from the BBC, Radio Nederland, NHK (Japan), Radio Canada, and other foreign broadcast organizations. There are also thousands of original tapes produced by WFMT.

Coverage area

At present, WFMT operates with an ERP of 44 kW from an antenna 815 feet AAT, atop the Prudential Building. Sometime later the transmitter will probably go to the antenna farm on the new John Hancock Building. At that location, operation will be 18 kW at 1165 feet AAT. With such

The WFMT formula

- Establish a mature yet entertaining program service
- Use the best equipment you can buy or build
- Hire good people and pay them well
- Don't sell your time cheap

All those knobs belong to the Antlitzer, a unique type of modulation controller which keeps WFMT's signal legal.

Careful record handling and storage preserves musical and spoken-word mainstay of WFMT programming, responsibility of librarian Andi McMahon.

power and antenna height, WFMT has regular listeners in six states—including some on the edge of the 10 μV/m contour.

An affluent audience

According to Pulse, the eight-county Chicago area has 80.4% FM penetration. Also from Pulse is the estimate that WFMT ranks first among Chicago FM stations in total persons reached (average quarter-hour audience estimates, Monday-Friday, 6 am-midnight).

The WFMT audience is largely 25-45, college trained, 75% executives or professional, most earning over $15,000. 70% live in the higher-income communities along Lake Michigan. Almost half the out-of-town listeners are in the affluent North Shore suburbs.

What's what in Chicago

One reason WFMT knows so much about its listeners is its monthly program guide. A recent issue had 92 pages. Priced at $5 per year, the guide has a circulation of 47,000. It's produced by a staff of three.

Backbone of the guide is a listing of WFMT programs for the month, including details on nearly every recording to be broadcast. "This Month in Chicago" describes upcoming area happenings in music, opera, ballet, art, cinema, discussion, etc. There are bylined articles by experts in music and art. "A Selective Guide to Dining" is a critique written by WFMT staffers who sample the cuisine at various local watering holes.

Listener support

To many, WFMT provides an oasis of culture in the midwestern desert of bland Top-40 radio. In at least three instances, listener groups in outlying areas have prevented other FM stations from using adjacent-channel frequencies and blocking their reception of WFMT.

The most famous instance of listener support occurred earlier this year. The station's original owner sold WFMT (because of illness) to WGN Continental, owner of WGN(AM) and WGN-TV Chicago. A local listeners' group protested to the FCC, fearing that WGN would change the WFMT format. The listeners yelled so loudly that WGN donated WFMT to the Chicago Educational Television Foundation, which operates educational TV stations WTTW and WXXW.

Today WFMT operates as a completely autonomous organization, with profits going to the educational TV stations.

Mature commercials

While some stations make money through volume, WFMT stresses quality instead of quantity. Four minutes of advertising per hour is the maximum permitted. (A one-time minute spot in Class-A time costs $50.) One-minute spots may not be double-spotted, and 30s and 10s may be doubled only with cultural or educational announcements. All commercials must be delivered live by the announcer on duty; no recorded spots may be aired. Thus WFMT broadcasts neither jingles nor singing commercials.

One hour separation is provided between competitive advertisers. Announcements are scheduled to approximate times only, as WFMT does not interrupt complete performances of musical or dramatic works.

Satisified clients

Some stations will do anything to please an advertiser, with little thought about listeners. WFMT takes the opposite approach. The listener is treated as an intelligent, informed, discerning adult. He or she is never insulted, but treated as an old friend. The relationship between announcers and listeners is almost personal.

As a result, the WFMT audience is intensely loyal. They know that WFMT screens potential advertisers, turning away hard-sell or dubious clients. (WFMT has only one salesman, but the biggest revenue in Chicago FM.) In return, listeners show their appreciation of WFMT policy by patronizing its advertisers. A typical success story is Talman Federal Savings, which has been with WFMT for nearly 12 years. Time and again new customers have walked into Talman, basing their choice on WFMT. During those 12 years, Talman's assets have grown from $160 M to $750 M. **BM/E**

Signal Analyzers Can Solve Sticky Problems

By Dick Laingor

Broadcasting has come a long way from the days when a VOM and a screwdriver would fix anything. Today's sophisticated equipment requires equally sophisticated test instruments for optimum performance. Signal analysis is a useful technique for checking the operation of much broadcast gear. Here's a brief look at what you can use.

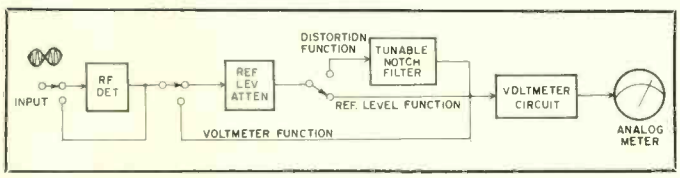


Fig. 1. Distortion analyzer block diagram. Notch filter removes fundamental frequency.

Fig. 2. Hewlett-Packard 334A Distortion Analyzer and 204D Oscillator in use at KLOV-AM-FM, Loveland.

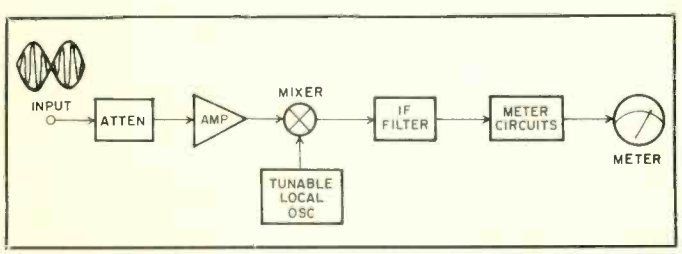


Fig. 3. Wave analyzer block diagram. This instrument is basically a selective voltmeter.

Dick Laingor is an engineer with Hewlett-Packard Co., Loveland, Colo.

THE NAME SIGNAL ANALYZER describes four types of instruments: distortion analyzers, network analyzers, spectrum analyzers and wave analyzers. This year, the broadcast industry will spend over two million dollars on them.

Broadcast engineers and consultants have problems that can't be solved by running simple tests and swapping parts. Problems like adjusting phase shifting networks, or balancing an output mixer stage for a minimum carrier third harmonic, or measuring the carrier level change between zero and 100% modulation . . . these are meat for signal analyzers.

Distortion analyzers measure the distortion content of waveforms. They are most useful during proof-of-performance tests, to measure system distortion.

Distortion is measured by setting a reference of 0 dB or 100% in the Reference Level Function (refer to Fig. 1). The fundamental frequency component is removed by going to the Distortion Function and tuning the notch filter to the fundamental frequency. The meter then reads the distortion content of the signal.

Two features which appeal to broadcasters are a built-in rf detector and automatic tuning. The auto-tune feature reduces the time for making a distortion measurement to less than a minute.

A **wave analyzer** is a selective voltmeter. The analyzer has a meter output and can be manually tuned or swept over a range of frequencies. The meter indicates the amplitudes of signals in that frequency range.

The block diagram of Fig. 3 shows the wave analyzer to have the input and output circuits of a voltmeter and the innards of a superheterodyne receiver. The i-f filter determines the selectivity of the instrument; several bandwidths, from a few hertz to a few kilohertz, are usually available. The analyzer is optimized for manual tuning but frequency sweeping is usually available.

A typical broadcast application is to measure AM carrier amplitude change as modulation is increased from zero to 100%. Also, a wave analyzer can usually be substituted for a spectrum analyzer in applications where a swept CRT output is not needed.

Broadcasters have tended to buy more expensive lines of wave analyzers with automatic sweeping and automatic attenuator ranging.

The **spectrum analyzers** most used by the broadcast industry are swept receivers which measure the individual frequency components of a waveform and display their amplitude vs. frequency on CRTs.

The basic block diagram of Fig. 5 looks the same as the wave analyzer in Fig. 3, with two significant exceptions:

- The meter has been replaced with a CRT output.
- The square-topped i-f filter has been replaced with a round-topped filter. The round-topped filter is optimized for swept operation rather than manual tuning.

A simple broadcast application would be to look at the sidebands, carrier and harmonics of a modulated waveform. Suppose an AM station had just repaired its modulator stage and needed to adjust the balance for a minimum of carrier third-harmonic output, and at the same time make a

Cost and Features of Specialized Instruments

Instrument	Price Range	Features
Distortion Analyzer	$700-$1000	Fast distortion measurement Accurate ac voltmeter
Wave Analyzer (Selective Voltmeter)	$2000-$5000	Resolves and measures rms value of signals at different frequencies Makes X-Y or strip-chart recordings of amplitude vs. frequency response Handles frequencies from sub-audio to tens of megahertz Identifies distortion and modulation components Selectivity is usually adjustable Has microvolt sensitivity 80 dB dynamic range often available Usually metered with ±0.5 dB accuracy available Often can lock-to and track signal Designed for manual tuning, but often can be swept
Spectrum Analyzer	$2500-$6000	Identifies distortion and modulation components Provides CRT display of amplitude vs. frequency, fast visual presentation of wideband signals Handles frequencies from audio to tens of gigahertz Has microvolt sensitivity 70 dB dynamic range usually available Best for swept measurements but can usually be manually tuned
Network Analyzer	$3500-$7500	Measures frequency response of networks (stimulus response) Measures complex impedances Makes comparison measurements Handles frequencies from a few kilohertz to tens of gigahertz Provides fast CRT display of amplitude vs. frequency Allows phase-shift matching of cables Can characterize devices like antennas

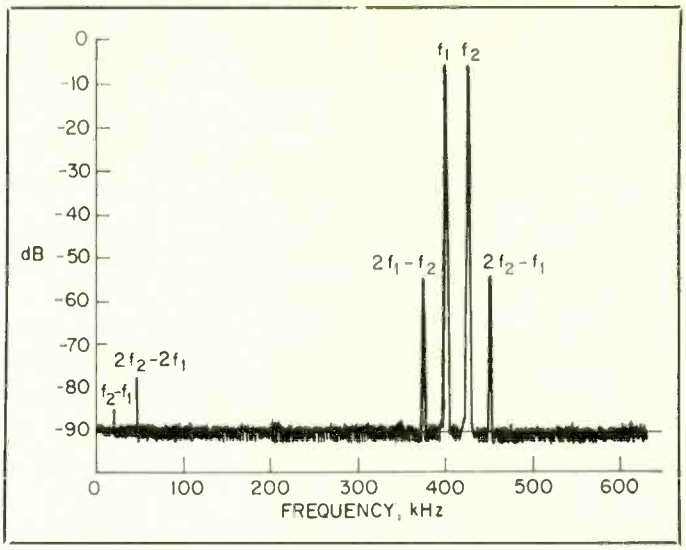


Fig. 4. X-Y recording of wave analyzer response during intermodulation tests.

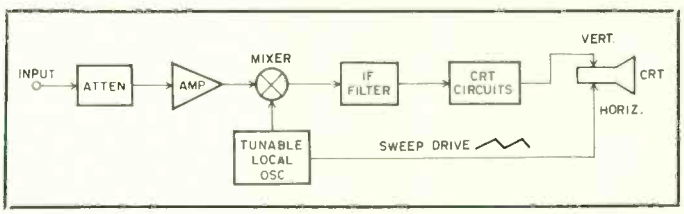


Fig. 5. Spectrum analyzer block diagram. Unit sweeps the band and displays amplitude and frequency on a CRT.

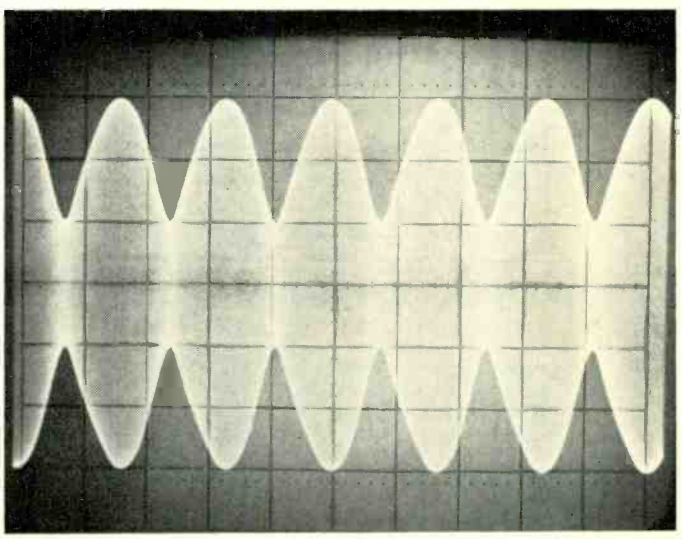
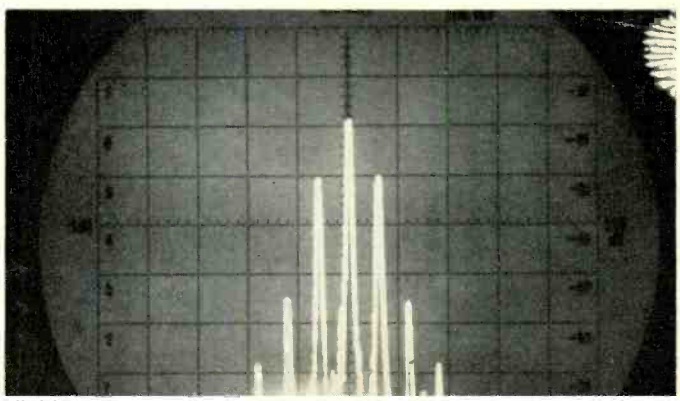


Fig. 6A. Time domain photograph of an amplitude-modulated carrier shown on a spectrum analyzer.

Fig. 6B. Same waveform as in Fig. 6A shown in the frequency domain. Frequency scan is 10 kHz.



Joint Responsibility in Station Operation

By John H. Mullaney, P.E.

Maintaining a broadcast station within FCC rules is a job requiring the three-way cooperation of the station licensee, the licensed operator, and the Commission. Even when management and engineering have done their jobs properly, there remains the Commission itself which has an obligation to broadcasters and operators to be fair and consistent in rule interpretations and station inspections.

MOST BROADCAST PERSONNEL are becoming familiar with FCC Form 793 due to the Commission's get-tough policy on rule violations. Form 793 is the Notice of Violation sent out under Section 1.89 of FCC Rules, to station licensees who appear to have violated any provision of the Communications Act or the Rules. During fiscal 1969 the Commission issued 269 Notices of Violations to stations, and seven short-term renewals. Overall, the Field Service Division issued 39,398 infraction notices to the communications industry.

Form 793 is the forerunner of any revocation, suspension, or cease-and-desist proceedings which may later be instituted against a licensee. A licensee can be the station owners, a station operator, or both.

Within ten days from receipt of notice (or such other periods as may be specified) the licensee shall send a written answer, in duplicate, direct to the office of the Commission originating the official notice. If within the ten-day period an answer cannot be sent nor an acknowledgment made, by reason of illness or other unavoidable circumstances, acknowledgment and answer shall be made at the earliest practicable date with a satisfactory explanation of the delay.

The answer to each notice shall be complete in itself and shall not be abbreviated by reference to other communications or answers to other notices. In every instance, the answer shall contain a statement of action taken to correct the condition or omission complained of and to preclude its recurrence. In addition:

- If the notice relates to violations that may be due to the physical or electrical characteristics of transmitting apparatus and any new apparatus is to be installed, the answer shall state the date such apparatus was ordered, the name of the manufacturer, and the promised date of delivery. If the installation of such apparatus requires a construction permit, the file number of the application shall be given, or if a file number has not been assigned by the Commission, such identification shall be given as will permit ready identification of the application.

John H. Mullaney is a consulting raido engineer in Potomac, Md.

- If the notice of violation relates to lack of attention to or *improper operation* of the transmitter, the *name and license number* of the operator in charge shall be given.

The above paragraphs are extracted from the Rules; the emphasis is mine. The second paragraph is seldom used by station management to help explain away a string of technical violations.

Unfortunately although a licensee must answer within ten days or the specified time, the Commission has no rule saying when *it* (the FCC) must respond; *therefore do not be misled by lack of response from the Commission.* You may still be in trouble!

The WHMC license renewal proceeding

A classic example of what can happen to a broadcaster is the case of WHMC (AM), Gaithersburg, Md. The station recently received an initial decision from a Commission hearing examiner recommending denial of its renewal application. The decision is under appeal; however, with no comment on the merits of the case, certain facts should be noted.

WHMC filed for renewal on July 5, 1966. About two months later, two radio inspectors visited the station. They took with them the transmitter log for May 29, 1966. The log was later returned to WHMC. Two years later, the log was destroyed, as the FCC had not ordered it to be kept longer. Unknown to WHMC personnel though, the inspectors had photocopied the legal-size log on a machine capable of making only letter-size copies. The FCC photocopy was therefore only the *upper* portion of the log. It omitted the bottom, which contained an entry noting that a proof had been run that day.

On October 5, 1966, the inspectors returned to WHMC and again inspected the May 29 log—without comment. In a hearing two years later, one inspector testified that during the October 5 inspection he had noted that the log had been altered by the addition of the proof entry at the bottom. Yet, he did not cite WHMC for violation.

During the period from July to October 1966, WHMC received several communications from the FCC, including a Form 793 charging 19 rule violations. WHMC responded within the allotted time to all such communications. In August 1968, WHMC was again inspected, and subsequently cited for ten rule violations. Again, WHMC responded within the proper time.

Meanwhile, the FCC had not granted renewal of license. In November 1968 the station owner requested a renewal hearing, which was granted. On March 17, 1969—two years and seven months after the renewal application had been filed—a one-day hearing was held.

In addition to the proof-entry mixup, WHMC was cited for another violation in the May 29, 1966 log. Apparently no operator had signed on and off the log from 2145 until station sign-off at 2405. The station owner had been on duty earlier that day, and he assumed all the handwriting on the log was his. After the hearing, the examiner recommended denial of renewal application, on the grounds that these and similar violations made the owner unsuitable as a licensee. However, a handwriting expert later determined that another person had made the log entries during the period 2145-2405.

In other words, the WHMC owner had neither the original nor a copy of the log in question, and was not properly prepared for the renewal hearing.

Lessons to be learned

First, whenever you turn over *any* of your records to the Commission, be sure to keep a photocopy of all. If you find yourself in a hearing two or three years later, you'll have some way of refreshing your memory.

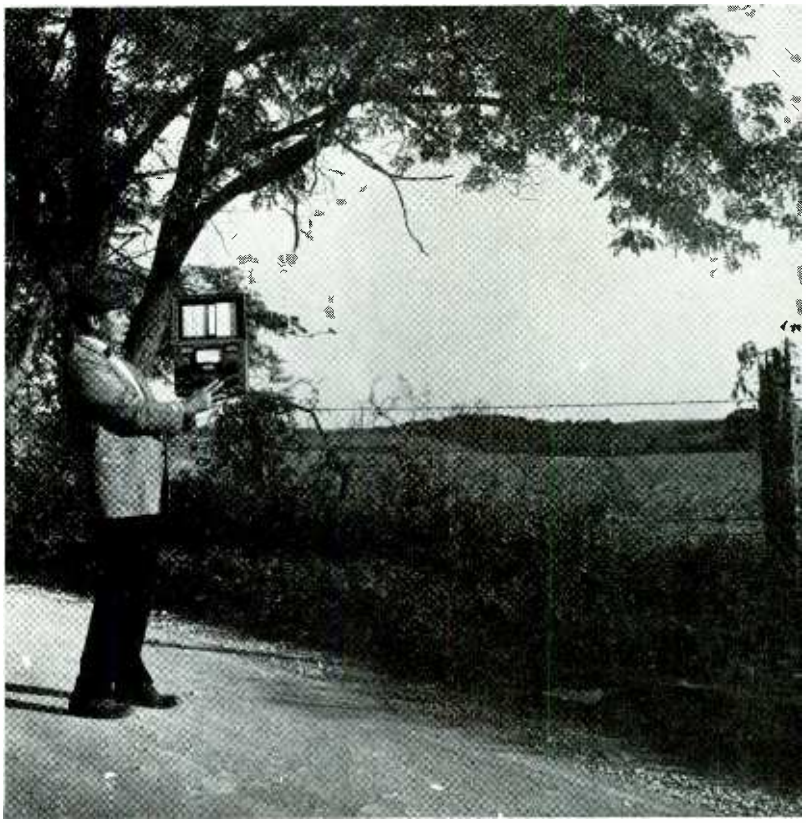
Second, be reluctant to destroy logs or other records, even after two years.

Third, the WHMC case should also make a broadcaster extremely cautious if he has received an Official Notice of Violation, Form 793, from the Commission. Unless you get an answer from the Commission after you tell your side of the matter, your answer could be used several years later to haunt you. I recommend that after a 30-day period, if you don't hear from the Commission, write them a letter. Say that you have responded to the citation to the best of your ability, but if the Commission needs further information you would be pleased to furnish it. You might close by stating that if you don't hear from the FCC within the next two weeks, you will assume the matter is closed.

Fourth, in a safe place, keep all station records which must be made available to an inspector. Such files should be readily available to the operator on duty. No operator should go on duty without knowing where the station records and the keys to the coupling house are, or without knowledge of the Commission Rules.

Many stations become the victims of careless operators. Some of these operators are drifters who have been all around the circuit, and you might be the next unlucky station to employ one in desperation to get a licensed operator. If you do, and you end up with a Form 793 with a string of violations as long as your arm, and some of these are due to careless procedures of your operator, put his license number down in your response. (Remember this is required.) Although this doesn't clear you completely, it may eventually catch up to the drifter and eliminate him from the broadcast scene.

Fifth, when an inspector conducts an inspection of your station, don't be afraid to ask him why he is citing you, if you don't understand the violation. Remember the inspector is not God; he is no different than you are, he too puts his pants on one leg at a time, and if you are half-way reasonable he probably will be too. Some broadcasters feel that the Commission's Motto is: "We may be wrong, but it will be the first time." Believe me, it's a two-way street; the inspectors make their share of mistakes, even though you probably never hear about them. As a consulting engineer with 20 years' experience in advising broadcasters on rule violations, I can state that all Commission field offices do not read the Rules the same. The verbiage of some of the Rules leaves much to be desired. Further, so-called policy Rules (i.e., unwritten rules which carry just as much weight) create confusion not only with the broadcaster who is usually miles from Washington, but also



More frequent and thorough field readings, made both summer and winter, will bracket a DA station's actual performance, and provide a measure of insurance against operation out of specified values. It's a good idea to run a skeleton proof perhaps each year, in both directional and non-directional modes, to verify array and phasor operation.

with consulting engineers and attorneys right at the summit in Washington.

Sixth, when you have a question regarding Commission Rules, write your attorney or consulting engineer. Better yet, go direct to the Commission; address your letter to:

Mr. Harold L. Kassens, Chief
Rules and Standards Div.
Federal Communications Commission
1919 M Street, N.W., Room 344
Washington, D.C. 20554

Ask for an interpretation of the Rule you want clarified. If it is one of those policy items, spell out what your problem is and ask for an answer. The Commission cannot be expected to do an application for you, but they can be expected to answer any serious request for information within a reasonable time.

Seventh, unless you're real sure of yourself, before mailing in your response to a Form 793 violation notice, have your attorney or consulting engineer look it over.

Finally, if you find yourself in a renewal or revocation proceeding, call on your attorney immediately. If you don't have a regular broadcast attorney, write the Secretary of the FCC and you will be sent a list of attorneys practicing before the Commission. Choose your attorney as you would a doctor before a serious operation.

Three-way partnership

Joint responsibility in maintaining a station within Commission Rules means exactly that: shared responsibility of the *broadcaster, the operator*, and last but above all the *Commission itself.* Ordinarily, the Commission is left out when we hear a discussion concerning responsibility—but why? It wrote the Rules. It allows the field staff to interpret the Rules and see to the enforcement. However, does the Commission's responsibility stop there? I believe not. My idea of responsibility is that the Commission should lead. It should purge the Rules of unnecessary verbiage and state in simple English exactly what each Rule is. If the Commission feels that all stations should have a copy of the Rules on hand, let it state which Rules are meant—all volumes, or only Volumes II and III. Today an inspector cites stations for failing to have a set of the Standards of Good Engineering Practice under Section 73.46 (a). This specific Section pertains to *transmitters,* and it is certainly difficult to read into the following the requirement that a station must have a set of Rules. Section 73.46 (a):

> The transmitter proper and associated transmitting equipment of each broadcast station shall be designed, constructed, and operated in accordance with good engineering practice in all phases not otherwise specifically included in the regulations in this subpart.

Where does it say a station will have the latest copy of the Rules?

Outmoded rules

Commission Rules have been changed from time to time on a piecemeal basis, and many should have been eliminated years ago. But like everything else, once the industry gets into the habit of doing something, it's hard to make a change. Seldom will the Commission change the Rules on its own initative. You as a broadcaster must be the one to start a Rulemaking Proceeding by filing a Petition for Rulemaking. True, NAB and some other groups from time to time file such petitions, but no one to date has really filed a petition to purge the Rules of the numerous paragraphs that contribute nothing to the state of the art but confusion. The Rules, in many cases, are *antiquated* because of advancements in modern electronics.

For instance, Section 73.60 (a) requires that a frequency monitor be installed in all AM broadcast stations. Further Section 73.113 (a) (2) requires among other things that the frequency monitor be read once each half hour and the results logged. This has been a Rule since the Commission's inception. Thirty years ago that rule made sense because we used master oscillators without crystal control. Even after we went to crystal control in the early days, crystal oscillators still left much to be desired from a stability standpoint. Today that rule is a waste of time. Take your own station: How many times have you been off as much as ten, let alone 20 Hz? Probably never. The reason is simple; if you have modern equipment you couldn't get the oscillator to drift that much unless you tampered with it.

Going further, most of us fly on commercial aircraft from time to time. You might be shocked to hear that Commission Rules do not require that air-to-ground radio operators, nor for that matter aeronautical remote control stations, maintain a continuously operating frequency, power or modulation indicator. Here we find frequencies, many times above the broadcast range, which require *much more precise frequency control,* and still we rely on a simple crystal and oven for stability with no readout, or for that matter frequency monitor. The matter of human safety might appear to be ignored by the Commission, however, it hasn't been; there is no need for a monitor because the state of the art is 20 years ahead of the Commission's broadcast rules.

One might say why quibble about taking a simple frequency meter reading every 30 minutes? True, it only takes a few seconds to walk over to the monitor, read it, and then log the results. But if you consider all the different items that an operator must read every half hour and log, plus program information, etc., is it any wonder that logs get improperly filled in, or the operator fails to enter his readings on time, or even misses certain readings? The truth of the matter is well known both to the Commission and to the broadcast industry: It is practically impossible to run a combo operation (majority of radio operations), announce, spin records, cue tapes and last but not least, keep up with the tremendous amount of paperwork required by Commission Rules.

It is common knowledge that the Commission's technical rules are subject to varied interpreta-

tions; even different FCC inspectors (whom we assume are qualified engineers) do not interpret a given rule the same. The reason is quite simple —these rules were written by non-technical lawyers for engineers and managers to live by.

Today the great majority of all licensees are not graduate engineers. *In fact most hold no technical licenses.* They must rely on several points.

- The honesty of their licensed operators. That is, when the licensee is told that his technical operation is run in accordance with Commission Rules, and he has *no knowledge* to the contrary, it is reasonable to assume *that all is technically well at the station.*
- The fact that the Commission has licensed operators after written examination. This can't help but create the impression, right or wrong, that the holder of a First-Class Radiotelephone license has some technical competence. If a station is violating the Rules, the operator has an obligation to inform management of the situation. *How can a non-technical licensee determine, for instance, that a current ratio or phase reading is improperly logged if he himself doesn't understand the technical meaning of either term?*
- The belief that a licensed operator realizes he has an obligation to the Commission under the terms of his operator license, and that he must not carelessly fill in logs or fail to obey Commission Rules.
- The assumption that when an FCC inspector conducts a station inspection he has a responsibility to inform the licensee *immediately* of any apparent violations before he returns to his office to study logs, etc. For instance, if an inspector finds, after interviewing the station's licensed operators, that they can't tell their hands from their head—shouldn't he immediately tell management that certain personnel are not qualified, and then issue a Form 793 to those operators?
- The assumption that an FCC inspector is mature, technically qualified, knows Commission Rules and policies, and was not sent out to "get" the licensee; that rather his purpose is to inspect the station and give helpful suggestions where appropriate to advance the state of licensed broadcasting. Unfortunately the image of many an FCC inspector is that of a policeman. But even a policeman explains serious violations to the offender at the time of offense.

Joint responsibility also applies to operating personnel. Most stations are unable to employ qualified licensed personnel with either first- or third-class radiotelephone licenses because they are hard to find. The quality of the so-called engineers coming out of Q-and-A schools with licenses is getting worse (if that's possible) rather than better. The typical newly licensed operator couldn't pour water out of a boot if the instructions were on the heel. He really doesn't care about the finer points of the Rules, he wants to talk into the mike, play tapes and records and just be a disc jockey. The only reason he obtained a license is because it's required to work in most smaller stations, which happen to constitute the majority of radio broadcasters. And those stations receive the majority of FCC citations for rule violations.

Suggestions

In view of the above situation what can the industry and the Commission do to help straighten this mess out? To begin, let's have a realistic set of Rules. Eliminate the half-hourly readings, substituting in certain cases daily or weekly readings, and in other cases eliminating the readings entirely.

Next, require that a station really perform its maintenance tasks, even if it has to rely on an outside consultant to do so.

The Commission can publish a checklist of exactly what an inspector is to inspect, and require him to explain each citation at the station. Then there should be no misunderstanding.

The Commission could also use this same checklist and require the station chief engineer to conduct a monthly inspection, date and sign it. It could also require management to do the same. Such a plan should eliminate 90% of the violations, because the station would have an exact format to follow.

The Commission could eliminate the daily station inspection—except for a check of the tower lights. Very little is discovered by a daily inspection because the operator generally rushes through it anyway. Furthermore, if the transmitter doesn't go on when he comes to work, if the tower isn't standing up, or if smoke pours out as he pushes the ON switch—even the typical operator today will realize that something is wrong. He then calls in the station chief or maintenance supervisor to correct the matter. The worst that

Continued on page 34

What good does it do to read and log the frequency monitor every 30 minutes when modern transmitters are so stable?

SONY COLORS THE TWIN COUNTY HILLS

If the signal can't get through, can the show go on?

For the more than 40,000 subscribers of Twin County Telerama, Inc., in Pennsylvania's hilly Lehigh and Northampton counties, the answer is *yes*.

In country where reception of big-city TV transmission ranges from frustrating to terrible, Telerama's Sony-equipped Channel 4 serves up not only bright CATV offerings from 12 VHF and seven UHF channels, including all major networks, but a generous portion of local color as well. And for two consecutive years, Channel 4 programming has earned the highest award of the National Cable Television Association.

Sony equipment abounds at Channel 4. On-the-scene news is taped with Sony portable VideoRovers, while most of its other shows utilize lightweight Sony color cameras and Sony one-inch Videocorder® video tape recorders.

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BROADCAST EQUIPMENT

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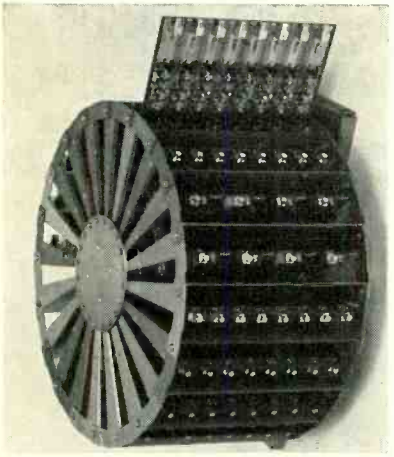
Computer-matched routing switcher for automated TV stations and network centers contains 128 crosspoints for 16 input and eight output matrices or any variation required. VS-700 contains 21 removable PC boards mounted radially around central core. Has



solid-state crosspoints (no relays), switching action within 300 ns, minimum crosstalk and nonlinear chroma distortion. Companion AS-700 audio switcher follows video. AMPEX. **297**

Film chain handles both Super-8 and standard 8-mm film. Model 711 system includes sync-motor projector with TV shutter, uniplexer, and 1-in. vidicon camera. Magnetic sound, black-and-white video. RIKER. **298**

CATV switcher for programmable nonduplication use allows deletion and substitution of commercials from/in off-air signals. Tape memory capacity of PCS-100 is 10,000 switching instructions. Switching

interval one minute, with one second optional. Output is 20 solid-state switches and/or will operate 19x19 matrix of 361 crosspoints. APPLIED INFORMATION INDUSTRIES. **300**

In-system CATV converter provides up to 24 channels on single trunkline in range 98–250 MHz. Serves up to 300 subscribers, can work with bidirectional trunk, trunk bridger, and distribuiton amplifiers. Requires 20–35 V rms, 1.2 A. ELECTRONIC INDUSTRIAL ENGINEERING. **301**

Video equipment

Titling generator produces one or two lines of 25 characters each from typewriter-like keyboard. Editing permits erasing single letter, word, or all material on screen. Both lines can be displayed static, or one line can crawl at rate from 2–20 char/sec. Model TCG-225 produces comp or noncomp video output, costs $2995. TKB-207 ASCII keyboard costs $795. TELEMATION. **275**

Ultra-sensitive CCTV monochrome camera produces usable picture with faceplate illumination of .001 fc visible or .02 fc infrared light, using silicon-diode-array vidicon. TD-1400 camera produces video and rf output, has 550-line center resolution, EIA sync. Price $1500. G.B.C. **276**

Videotape evaluator cleans and tests tapes at 120 in/s, indicates tape length, number of edge damages, and number of surface defects. VTE uses nine read heads, handles two- and one-in. tapes. Price $12,500, delivery 60 days. Printer option indicates error location, costs $1750. RECORTEC. **277**

Color sync generator uses high-temp crystal in proportionally controlled oven, has aging rate of better than one part in 10^6 per year. Model 601 performs pulse fanout and regenerates subcarrier in single-line pulse-distribution systems, locks to composite color signal or remote CW carrier, using 105–ns window. CONTROL CONCEPTS. **279**

Audio gear

Stereo/mono console has six mike inputs to two faders, nine high-level inputs to five faders, all dual slide types switchable L/R channels. Cue facility and power supply included in TSC-4. WILKINSON. **280**

Cardioid dynamic mike, model M-80, has four-stage blast filter to minimize pops, wind noise, howlback. Shock-mounted element, 150 ohms. COLLINS RADIO. **281**

Broadcast cassette recorder uses standard 1⅞ in/s speed, 150-mil tape cassette, with freq resp of 40–15,000 Hz within 3 dB, 40 dB stereo separation. Available in five models for mono, 2-track stereo, quad, and mono/stereo with cue tracks. Compatible with Philips (Norelco) portable machines. SCHAFER INTERNATIONAL. **282**

Chromium-dioxide cassette has higher sensitivity with lower print-through than conventional tape. Also has better high-freq resp and dynamic range, less dropouts and head clogging. Has thinner coating, stronger base material, with same tape thickness as iron-oxide type. Type C60 is 60 min; C30, 30 min. BASF SYSTEMS. **283**

Updated reel-to-reel recorder, model RT-21D, has etched capstan shaft to reduce tape slippage, increased current-handling relays, increased freq resp at 7½ in/s. Meets NAB specs, also provides CCIR equalization and operation from both 117-V/60-Hz and 240-V/50-Hz. Entire system test-operated before shipping. RCA. **284**

Cable equipment

CATV modulator for local origination furnishes FM output on any vhf channel at 50 dBmV with freq. stability of ±.005%. Model FMS-2000 accepts audio input, provides FM and blanked video output. CATEL. **285**

Spectrum analyzer operates in range 10 MHz–40 GHz. Portable model 761 operates up to six hours from nickel-cadmium battery pack. Also operates from power sources of 50–440 Hz, 117 or 235 V. Has calibrated scan widths from 100 kHz to 500 MHz with five i-f bandwidths from 1 KHz to 1 MHz. SYSTRON-DONNER. **286**

Field-strength meter for CATV-MATV is solid-state, portable, battery-operated. Covers both vhf and uhf ranges, with meter range from 10 μV to 2 V. Accuracy ±1.5 dB. Input 75 ohms, output jack provides detected signal for headphones or scope. JFD. **287**

Continued next page

For more information, circle boldfaced numbers on Reader Service Card.

UHF-VHF headend converter uses balanced Schottky barrier-diode mixer and oven-mounted crystal-controlled local oscillator. Freq stability meets proposed FCC CATV specs and Canadian Broadcast Procedure 23. Low-noise uhf preamp available. Price without preamp is $970, with preamp, $1110. Delivery 90 days. C-COR. **288**

Sweep-marker generator uses triggered pulse to enable test during programming without interference to subscribers. Output is 1 V rms into 75 ohms over 300 kHz–300 MHz range Rf output is AGC'd flat for amplitude linearity of better than ±0.25 dB over freq range. Sweep width is 200 kHz–300 MHz. Price $950. KAY ELEMETRICS. **289**

Radio gear

Two-tube transmitter available in two models. Type 315F (5 kW) and 316F (10 kW) each have solid-state exciter-modulator, and two-tube high-efficiency linear amplifier. Exciter uses 22 npn transistors of two types, furnishes 40-W output. Both models include Magniphase antenna-protection circuit which detects faults, interrupts carrier. CONTINENTAL ELECTRONICS. **290**

Spectrum analyzer measures line-related sidebands on carriers up to 110 MHz. Scan widths 200 Hz–100 MHz. Model 8552B/8553B has less than 1 Hz residual FM with automatic stabilization. Sensitivity is −140 dBm (25 nV). Display modes: 10 dB/div log; 2 dB/div log; linear from 0.1 μV/div to 100 mV/div. HEWLETT-PACKARD. **291**

FM exciter is solid-state, stereo capable, produces output with freq resp of 15 Hz–350 kHz ±0.25 dB. THD is less than 0.3%, FM noise −75 dB below 100% modulation. Inbuilt power supply, freq range 88–108 MHz. Price $1895. Companion stereo generator costs $1495. WILKINSON. **292**

Log verification system works with automated or manual radio stations, prints plain-language readout, additionally computer data. Spot cartridges are encoded with teletypewriter, data read out when cart is broadcast. CYBRIX. **293**

Telephone-answering system records incoming messages (for news or sports phone-ins when station is off air) or plays back recorded message (for sports-score service to listeners). Does not include tape machine. Phone-Mate 100 costs $149.95. Accessory RCA cassette recorder costs $40. TRON-TECH. **294**

SALE
OF THE MONTH

Persistence and a public service tie-in win back an Old Client

D. Ellis Mueller
Account Executive
WHEB Radio
Portsmouth, New Hampshire

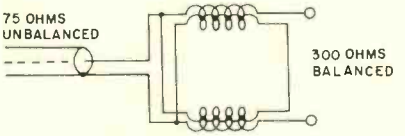
The Challenge: Sometimes it's harder to win back an old customer than to sign up a new one. When I took over as account executive I found that a good former client had been unwilling to resume advertising on our station—because of a personality clash with former personnel. After three visits, I had introduced myself to the owner and to the sales manager, and I had been told the company was not ready to advertise yet. I knew I had a real job on my hands when I heard the client sponsoring, on the competing radio station, a program similar to one I had presented during my first visits.

The Solution: I waited for ten days while working up a program sure to meet the requirements the client had discussed with me: local relevance and public-service value. When I arrived I found the owner and the sales manager in the same office—and my persistence paid off. Here's what we worked out: It was election time, so we printed a flyer, listing local and state candidates, for a "Pick the Winner" contest. People could enter by getting this form from the premises of our client, a Volkswagen dealer, and sending it to us with their guesses as to who would win the elections. For public service, the VW dealer sent out a "Votes-Wagon" Microbus which picked voters up at their homes, drove them to the polls and then back home again—free. All they had to do was phone the dealer and ask. We aired 45 commercials (60-sec spots) to promote "Pick the Winner" and the "Votes-Wagon," running them during the week before election. And it was a success. The dealer found a way to build his community public service image, and we found a way to get back our old client.

CATV TERMS
For Broadcasters

Balun: A transformer used to convert *bal*anced to *un*balanced transmission lines. In broadcast work the common lo-Z-to-line transformer is a type of balun. At rf however, the construction is somewhat different. Maintaining balance over the entire vhf band presents some special design considerations. Modern CATV baluns consist of twisted wires, bifilar-wound on a small ferrite core. With one end in parallel and the other end series-connected, a 1:4 impedance match is obtained.

Baluns are commonly attached to the TV set antenna terminals to match the 75-ohm cable system to

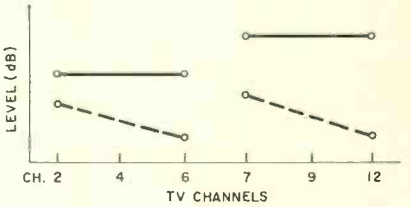


the 300-ohm receiver input. Another balun, inside the TV, reverses the process to feed the 75 ohm tuner input. The two transformers could be eliminated by extending the tuner input directly to the back of the set. However, TV sets are manufactured primarily for conventional antenna reception which requires a 300 ohm balanced input. These two transformers could be by-passed, but it has become common practice for CATV personnel to avoid removing the backs of the sets.

The design of the balun depends on good impedance terminations for proper operation. The typical TV antenna input is not a constant impedance. As a result, the performance is impaired and can cause ghosting or direct pickup.

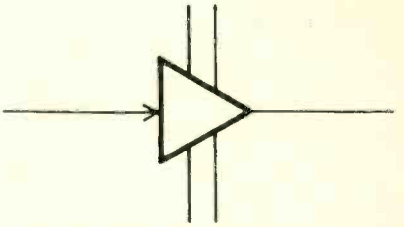
Beat: The combining of two or more frequencies to produce additional frequencies. The broadcaster is familiar with the a crowded band in which transmitters with nearby frequencies cause an audible squeal. Similiar beats which have frequency differences of 0.5-6 MHz produce interference in CATV systems. This is observed on the TV raster as a herringbone pattern. A cable system is particularly vulnerable to second-order beats, since the entire vhf band is amplified, and many sums and differences are possible. Originally, the high and low TV channels were allocated by the FCC to eliminate second-order beats. Second harmonics of the low band channels fall in the normally unused mid-band. For 12-channel systems, the mid-band is not used (except for FM). For more than 12-channel systems, the mid-band is used, and second-order beats become a problem. Push-pull design is used in CATV amplifiers to reduce interference from second harmonics.

Block tilt: A form of amplitude pre-emphasis is added to an amplifier to



compensate for cable attenuation. Block tilt refers to a block or group of equal-level channels, where each block is set at a different amplitude level. For a 12-channel system the levels of channels 2 and 6 are the same, as are the levels of 7 and 12. Other compensation methods include full tilt, half tilt, and flat. Relative levels for block tilt are shown.

Bridging amplifier: A high quality CATV amplifier with multiple outputs. It is usually connected to the



trunk or main line of the system and feeds other distribution lines. Because of the multiple outputs (usually four) performance characteristics are somewhat below that of trunk amplifiers. The symbol for a bridging amplifier is shown here.

CATV TERMS For Broadcasters is a regular BM/E department aimed at broadcast managers and engineers involved in cable TV. This continuing series of definitions for common cable terms is intended only to broaden the broadcaster's understanding of cable terminology, not to serve as a course in cable technology. The author, Larry Roeshot, is president of Spectra Inc., CATV consultants, in State College, Pennsylvania; he is also technical director of the National Cable Television Center at Pennsylvania State University in University Park.

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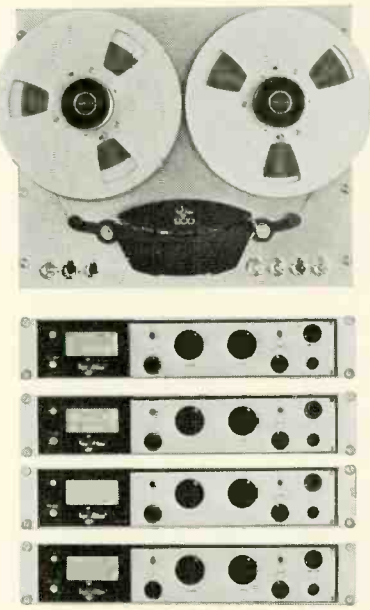
IT DOES ITS THING

Tape-Athon 900 Portable

REGARDLESS OF THE PACKAGE, THE APPLICATION, OR THE OPERATOR

Tape-Athon 900 Console



Tape-Athon 900 Rack Mounting

Tape-Athon's Model 900 Recorder/Reproducer can be expected to provide the same dependable performance in any situation — it's been engineered to take long hours and rough handling, designed to make operation easy and foolproof, and always up to NAB specs.

Available in 2, 4, or 8 track versions, the 900 is the smartest investment the studio can make. It gives you more equipment per dollar than any machine around. Write for brochure TA 250 and a quote. Then we'll do *our* thing.

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NEW LIT

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

Wind pressure-to-velocity conversion table (measurements in miles/hour, kilometers/hour and knots), useful in determining wind loading and writing tower specs; includes checklist of engineering considerations in purchase and installation of microwave tower and in writing tower specs; describes wind velocity, icing and rigidity as related to tower specs. Microflect. **200**

Color Television, edited by Richard S. O'Brien. Subtitled *Selections from the Journal of the SMPTE,* this book is a valuable desk reference covering fundamental aspects of color TV technology. There are 27 reprinted papers; chapter subjects are: Basic Color; Color Television Systems; Color Film; Color Television Cameras and Studio Practices; and Color Television Broadcasting Facilities and Measurements. An excellent volume. Soft cover, 8½ × 11 in.; 231 pages, including appendices; 1970. Price $7.50, less 20% discount to SMPTE members. Society of Motion Picture and Television Engineers, 9 East 41 St., New York, N.Y. 10017.

Antenna systems, illustrated with specs and performance data, in Phelps Dodge 68-page catalog, including mounting hardware, duplexers and cavity resonators, coaxial-cable systems and antenna-mounting accessories. **201**

Electronic parts and supplies in Allied Electronics' 616-page 1971 Catalog No. 710. Send $2.00 to Allied Electronics, 2400 W. Washington Blvd., Chicago, Ill. 60680. Price refunded with first order.

Remote selection Audio Follow Video Dial Access Switching System, in Rust Corp. brochure, including table for selection of basic main frames to get any desired number of inputs and outputs. **202**

RFI/EMI miniature filters in 12-page catalog from Lundy Electronics. **203**

Facsimile equipment and accessories from Alden Electronic and Impulse Recording Equipment in 44-page illustrated catalog, with specs and prices; includes graphic communications equipment, satellite tracking systems, oceanographic instrumentation and weather chart recordings. **204**

CATV equipment from AEL, featuring company's Model CT2-1C Super-Band Tunerless Converter. **205**

"Dialing for Subscribers," sales manual for marketing cable TV by telephone; by Del P. Henry, Jr., TM Communications' director of marketing; includes basic phone-sales techniques, media strategy, budgeting for the campaign, forms, cost-per-sale analyses and follow-up research procedures. Costs $25, from TM Communications, 1375 Sunflower Avenue, Costa Mesa, Calif. 92626.

Broadcast audio recorders, ABR Series, in Ampex spec sheet **(206)** and **videotape,** 161 Series, for one-inch helical scan recorders in another from Ampex **(207).**

Rf catalog, 72 pages, showing the complete Texscan line. **208**

Microphones, Turner's complete line, in 24 pages; includes section on how to choose a microphone. **209**

Closed-circuit and broadcast TV system tying a Greenville, Miss., Baptist church with WABG-TV, described in Cohu four-pager with photos and block diagram. **211**

Continued from page 8

nearly equal L-R and L+R signal. The 38 kHz subcarrier will average 50% modulation detracting from the main channel."

CATV quality

How to keep signal levels just low enough in a CATV distribution system to prevent cross modulation was the subject of a paper by Erik Ackerlind of Cascade Manufacturing Co.

Ackerlind has developed a means of identifying slowly varying signal levels which will cause cross modulation when a threshold is passed. He also showed how this could be done with a remote monitoring technique.

It has been hard to pin down the proper threshold level because parameters shift so with time. Slowly changing parameters are randomly displaced (with respect to time) sync pulses, varying phase angle and carriers and changes in mean levels of picture modulation.

When many stations are on a cable, cumulative effects (e.g., a lot of black modulation) can change levels.

Average values have to be measured. Peak-voltage reading methods are of no value. The peaks as read at various locations on the system have no relationship to the level at the headend because of group delay (a manifestation of phase nonlinearity).

To monitor the signal level remotely, a measuring circuit is needed at the remote location and auxiliary circuits (or two-way capability) are needed to get the measured signal back to the headend for comparison.

The remote measuring circuit consists of a rectifier, a smoothing or integrating circuit, and a voltage transducer—either an oscillator voltage (VCO) or a digital code as derived from an analog-to-digital (AD) converter. A workable circuit is illustrated on page 8.

The amplitude of the composite envelope is obtained by means of a conventional diode and RC circuit. The envelope amplitude is added to a negative reference voltage (1)—supplied by a battery, electret, or Zener diode. Whenever the envelope voltage exceeds the reference voltage, a one-shot multivibrator is activiated. The multivibrator output pulses are summed or integrated. The integrator circuit will have a voltage buildup dependent upon the rate at which the pulses are supplied by the one-shot multivibrator.

When the integrator voltage exceeds a certain reference voltage (2) a voltage transducer is activated and a signal goes back to the headend.

Note that it is not the picture at any moment that is fed back to the headend but a signal that is initiated only as the picture level exceeds the set safe threshold at a certain rate (as determined by the integrating circuit fed by the one-shot multivibrator). The threshold is that level which cannot be exceeded without excessive cross modulation occurring. Both the initial reference voltage (1) relative to envelope amplitude and the second reference voltage (2) which relates to the rate must be found experimentally.

George Dixson of C-Cor discussed CATV amplifier design approaches to automatic level control. For best control, Dixson urged dual pilot carriers (one for low band, one for high band). A 30-kHz square wave, he recommended rather than a CW pilot. **BM/E**

Signal Analyzers

continued from page 17

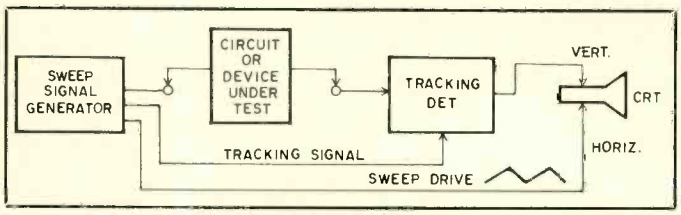

Fig. 7. Network analyzer block diagram. Instrument measures amplitude and phase vs. frequency.

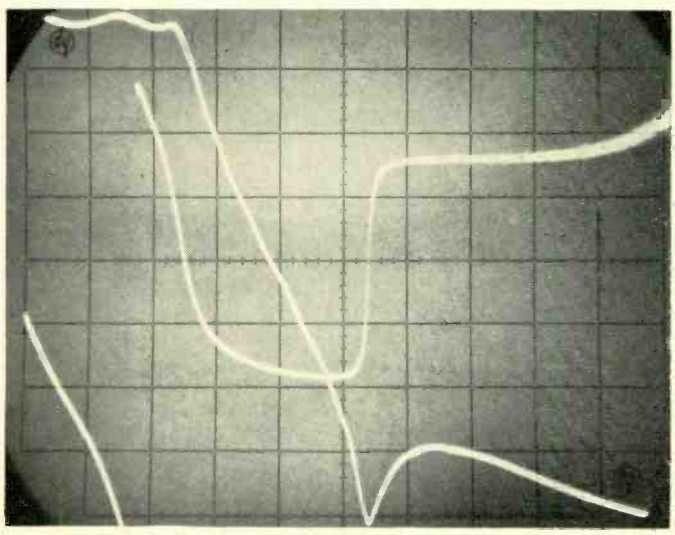

Fig. 8. Amplitude and phase response of a low-pass filter such as those used in directional antennas.

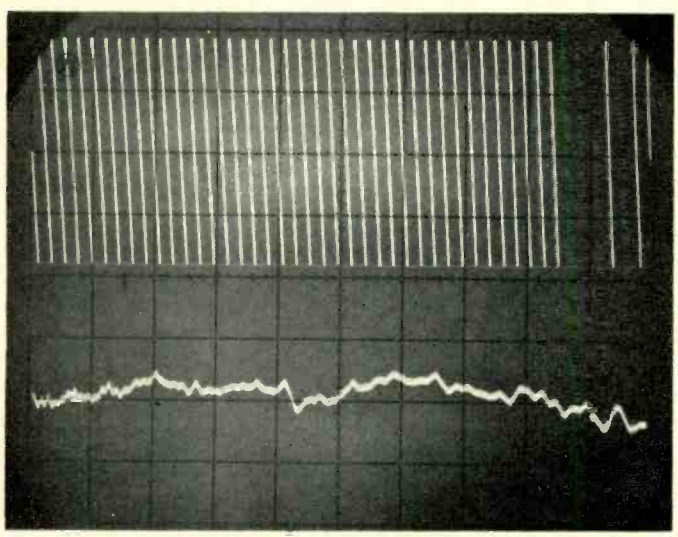

Fig. 9. Phase shift through 1000 feet of RG-58/U cable, top trace. Bottom trace shows how to match two pieces of cable.

few other adjustments to equalize the sideband amplitudes. A spectrum analyzer connected at the sampling loop or near the antenna would show how each adjustment affects the output.

The most useful feature of the spectrum analyzer is the CRT output, which gives the user a fast look at the signals existing in a wide or narrow range of frequencies, depending on how he sets the sweep-width controls. Another important feature is the ability to resolve signals which are at nearly equal frequencies.

Figure 6 (a) is a time-domain photograph of an amplitude-modulated carrier. The percent modulation is: $M = (6-2)/(6+2) = 4/8 = 50\%$. (Scope calibration is 0.1 ms/div, and 50 mV/div. The same waveform is measured in the frequency-domain mode at Fig. 6 (b). Since the carrier and sidebands differ by 12 dB, M = 50%. Frequency scan is 10 kHz/div, centered at 1 MHz and the log reference level is +10 dBm. You can also measure second- and third-harmonic distortion on this waveform. Second-harmonic sidebands at $f_c \pm 2\ f_m$ are 25 dB below the fundamental side bands at $f_c \pm f_m$.

A **network analyzer** can be made up of a sweeping signal generator, a tracking detector and a CRT display. Such an analyzer can measure the amplitude and phase vs. frequency characteristics of electrical networks using the signal generator to stimulate the network. The tracking detector and CRT measure and display the response.

Applications in the broadcast industry include adjusting phase shifting T-networks in directional antenna systems, measuring the loss and phase-shift characteristics of CATV transmission lines, and matching cables for phase-shift characteristics.

Figure 8 shows the amplitude and phase response of a low-pass filter, made using a dual-channel oscilloscope and amplitude and phase outputs of an HP 675A/676A Network Analyzer. Note 180° phase shift at the 11-MHz transmission zero. The phase discontinuity at 3.5 MHz is where the phase shifter recycled from −180° to +180°.

In Fig. 9, the top trace is the phase shift through 1000 feet of RG-58/U coaxial cable. The bottom trace shows how two identical 1000-foot pieces can be easily phase matched using the dual-channel capability of the HP 675A/676A Network Analyzer. **BM/E**

Want more info?

Technical Application Notes are available at no charge. Write Hewlett-Packard, 1501 California Street, Palo Alto, California 94304

AN 63	Spectrum Analysis
AN 63A	More on Spectrum Analysis
AN 65	Swept Frequency Techniques
AN 77-3	Complex Impedance Measurement
AN 92	Network Analysis at Microwave Frequencies
AN 99	Automatic Network Analysis
AN 112-1	Low Frequency Network Analysis
AN-121-1	RF Network Analysis
AN 126	Theory and Application of Wave Analyzers

WTEV-6 turned a move to local color news into an overnight success.

"Let me talk to any station that thinks it can't go into the Kodak ME-4 Process," says Lee Tanner, Assistant Operations Manager and Chief Engineer for the Providence/New Bedford station. "We bought one of the new smaller processors now on the market. In one night we moved our old B&W processor out, piece by piece, and replaced it with our color machine. We were B&W one day, and full color the next. It was spectacular.

"The Kodak people were fantastic. A Sales and Engineering Representative was up all night to mix the first batch of chemistry. We ran test strips the next day and were right on target.

"Now we're processing an average of 900 feet of color film daily—not only for local news, but also commercials for our advertisers. The ME-4 Process is so simple . . . let me put it this way: We hired a smart young man to run the machine. He had no experience with color processing. The packaged chemistry made it so easy that he could now go anywhere and talk competently about ME-4 processing of Kodak Ektachrome films.

"Listen, I'm sold 100% on the ME-4 Process. I can talk about it all day if you want."

That's it. New, smaller, less expensive processors. Packaged chemistry. All the Kodak assistance you need. Talk with a Kodak Regional Chief Engineer. He'll show you how to go full color with an ME-4 package just right for your station. In New York, call Ray Wulf; Chicago, Dick Porter; Hollywood, John Waner. Get moving.

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Kodak

Broadcast Industry News

Continued from page 6

nator for BEST. He charged that NCCB was guilty of the same charge it makes against the commercial networks: Failure to live up to its potential. He politely but firmly demanded that NCCB include minority representatives in its board of directors, and that it actively seek minority participation in broadcasting, CATV, and cassette TV.

NCCB chairman Thomas P. F. Hoving then offered the microphone to others—an offer promptly accepted by a handful of people representing various groups: Women's Liberation; Mexican-Americans; artists; students; Puerto Ricans; deaf children; black militants; and a community videotape group.

Hoving responded by promising to expand the NCCB board of directors to include representatives of minority groups, and to report within a month on working to actively promote minority participation in broadcasting.

Panel discussion: Which way cable?

Cable, cartridge and computer TV were panel discussion subjects during the First National Conference on Citizens Rights in Broadcasting.

First to speak was CATV consultant Sidney A. Dean, Jr., on behalf of the public. He deplored the fact that broadcasting isn't a common carrier, but is controlled by private interests; urged that CATVs be classified as common carriers, prohibited from originating their own programs—instead, merely furnishing carrier facilities at reasonable charges to all who can afford them.

Supporting CATV freedom to import unlimited distant signals was Moses Shapiro, board chairman of General Instrument Corp. which owns CATV manufacturer Jerrold. His feelings: Origination could get the message across for political candidates, minority groups and any one else who wanted it; there should be a reasonable copyright arrangement worked out for CATV; cable wouldn't hurt any viable uhf; and it can pinpoint only the share of market you want to reach—less costly than covering the entire market by broadcast.

TelePrompTer president Irving B. Kahn called cable TV "a monument to unplanned parenthood"; and repeated suggestions that "'broadband communications" would be a more accurate name.

His points: CATV is no mere extension of television service, but an entirely new medium encompassing TV, two-way, computer service, etc.; local orgination he defended as an incentive for building larger systems to reach more citizens.

A contrasting view from Frank Stanton, president of Avco's Cartridge Television Inc.: Video playback systems may render CATV's common carrier v. merchandising medium argument moot since video cartridges may give each citizen control of his own set—choosing software he wants, instead of only seeing what networks, TV stations, and cable systems offer.

Moderator Paul Klein, president of Computer Television Inc., favored marrying CATV, cartridges and computers. Films or tape could be stored at a central location and dialed on command by cable subscribers hooked up to a computer (no lease of cartridges needed). The result: advantages of both CATV and cartridges, at less cost to the consumer.

Next came president of Chicago's North Advertising, Don P. Nathanson, also a CATV operator: CATV should not be a common carrier, should originate, but advertising must pay the bills; duplicating broadcast-type movies and game shows, CATV can't possibly equal the polished products of Madison Avenue and will fail; cable operators should emulate suburban newspapers—don't compete with the big city but cover local news instead.

John Pemberton, Jr., former executive director of the American Civil Liberties Union, joined Dean speaking for the public: Local government franchises took too much of the CATV pie for themselves, he felt, leaving commercial advertisers no incentive to provide the maximum number of channels to serve the public. New York City's recent Manhattan franchises, he said, didn't go far enough and should have required additional cable channels for commercial leasing—then the public would get the maximum number of program choices.

Last speaker, former FCC commissioner Kenneth A. Cox (now a v-p of Microwave Communications Inc.), repeated his familiar position: CATV must pay its own way and distant signal importation must be limited to protect broadcasters so they can continue to offer free TV.

During the Q & A period following, participants lined up for battle: CATV and advertising interests v. cartridge TV v. the FCC/broadcast viewpoint. On the floor, a representative of Black Efforts for Soul in Television said no panelist spoke for "the people," urged that the audience ask their congressmen to require of CATV and broadcasting time and channels accessible to minority groups.

FINANCIAL REPORTS show **Belden Corporation's** third-quarter earnings down to $808,115 (41 cents a share) from 1969's third-quarter mark of $1,222,079 (62 cents a share) . . . **Cox Broadcasting's** third quarter net income was $1,503,001, up from 1969's $1,428,153—a one-cent-per-share increase to 26 cents. . . . **Cohu** suffered a loss with sales down to $5,427,969 for the first nine months of 1970, leaving a net loss of $176,166. Last year the nine-month figures were sales of $7,623,811; net income $394,885. . . . **Combined Communications'** first three quarters of 1970 saw a 55% increase in earnings to $852,511, 41 cents a share . . . **Comsat's** third quarter net income was $4,271,000, 43 cents a share, up from 1969's $1,446,000, 14 cents a share. An initial quarterly dividend of 12½ cents a share was declared . . . **Communications Properties** reported a nine-month net income of $191,810, before its merger with **Tower Communications.** The combined CATV system resulting is owned 65% by **Citizens Financial Corporation,** former owner of Tower, is the 14th largest in the country and serves 65,000 subscribers . . . The country's second largest cable operator, **Cox Cable Communications,** reported a third-quarter income of $204,323, below last year's $246,781; income for the first nine months, however, was up to $872,621 from 1969's $764,416 . . . **Datatron's** third quarter net income was $98,267, an earning of 5½ cents a share . . . **Grass Valley Group's** nine months to September 30 featured after-tax earnings of $479,000, $100,000 less than last year . . . **Gulf + Western's** fiscal year ending July 31 gained net earnings of $49,825,000 before securities transactions which pulled the figure down about $5 million . . . **Scientific-Atlanta** first-quarter net profits increased from last year's $51,411 to $72,555, although net sales were down 7% to just under $4 million . . . **Superscope** sales went up, but net income was down for the third quarter (by $30,000) to $742,767.

Joint Responsibility

Continued from page 21

happens is that the station doesn't come on the air—and the poor listeners will have to tune to a competitor for solace. No one's life is at stake (such as on an airliner), and a few such incidents cannot help but get management and engineering on the ball to correct the difficulties. Remember, a station off the air affects the owner's pocketbook, and that's one book he knows the rules on.

The Commission could also require that any transmitter over 20 years old be replaced with a new model. This same procedure could be applied to other type-accepted and type-approved equipment. As an alternative, if the station insists its equipment is as good as new after 20 years (ten years would even be more realistic), require the station to have the equipment type-accepted or -approved again. This procedure would help eliminate junk, and require stations to use modern equipment which doesn't need day-to-day attention.

The Commission could require all stations using directional antennas within a renewal period to file a skeleton proof-of-performance. Some stations haven't filed field measurements in over 20 years; when these stations were originally proofed, they didn't even have a nondirectional requirement. The present condition of their directional antennas is anyone's guess. Very few stations have not experienced seasonal effects or changes in their monitor-point readings from summer to winter, and some of these stations find themselves operating out of specifications because of this. Actually if these stations were required to file summer-and-winter skeleton proofs at least every five years, a realistic set of allowable radiations could be set forth on the license, and few stations would find that they are out of tolerance.

As part of his joint responsibility, each operator should make a checklist of Commission Rules, studying them until he can explain exactly what his obligation is as a licensed operator. If he is asked to shortcut the Rules by management, he should refuse, writing instead a memo to management explaining why he can't comply with the request. He should keep a copy of that memo. He may later be looking for another job, but he'll have proof why he's out of work. The average station manager isn't looking for trouble, and if he realizes that he too is accountable, everyone will get along better.

Management, as part of joint responsibility, can join the Let's Get A Realistic Set of Rules club. Send your suggestions for rule changes directly to Chairman Dean Burch at the FCC.

Chairman Burch, in his Jan. 15, 1970, speech to the Federal Communications Commission Bar Association, asked for help from the broadcast industry regarding the Commission Rules; so here is your chance to speak your piece. **BM/E**

An Authoritive, Practical Guide on How to Create Effective Video Tape Productions

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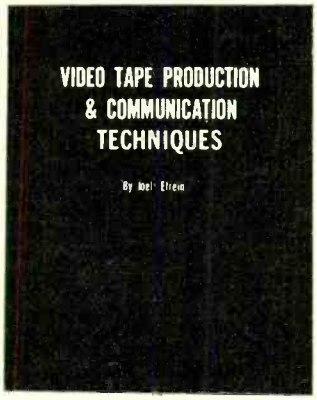

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This is not a manual on equipment—although the author does acquaint you with the pertinent facts concerning video equipment—rather, it is a handbook on techniques, with emphasis on production—beginning with the basics, the rudiments of putting a program together, and finally the direction of the complete package. The entire book is written with the idea of providing a complete basic course on the subject—suitable for use by those in both industry and education whose work demands, or would be enchanced by, the video medium.

Clearly, this is a book long-needed in our rapidly-advancing technological society. It assumes little in the way of prior knowledge and reveals all the techniques involved in producing effective audio-visuals.

The text is divided into two parts: **"The Medium"** and **"The Message."** The author begins by explaining what is required in the way of equipment, including a concise report on video tape recorders, tape formats, cameras, and ancilliary equipment. The first Chapter describes a basic recording system, the basic setup and operation of a VTR. An applications Chapter follows for those interested in business and educational uses of the audio-visual medium. In the third Chapter, the author tells how to put a system together—what to look for in equipment, including an honest economic appraisal for various professional levels.

In Chapter 4, the author gets down to the basics of production, with a complete examination of the various production elements. Included are fundamentals of lighting, the effective use of graphics, sets and props, sound and audio effects, etc.

Direction techniques are covered in Chapter 5, beginning with an examination of the director's duties. Introduced are the important aspects of framing, camera movement, composition, shot patterns, pacing, formats, and styles of direction. You'll learn how a director "sets the scene," decides how to position the "talent," place the cameras, chooses the best shots for effective communications, and how he controls or adapts to a natural pace for the program. There is also a discussion of formats and styles of direction. Chapter 6 acquaints you with the post-production techniques of editing—mechanical as well as electronic including audio over dubbing, and duplicating.

Part Two: The Message, begins with an analysis on pre-production planning—how to develop a show idea, how to bring it into focus and form, choose the talent, and decide on content and format. You'll learn how to prepare an outline, bring the talent into the picture, and how the producer and director work out the details of production.

Chapter 8 provides a spectator view of the actual production. You'll see how the producer arranges for the set and graphics, how the director makes studio arrangements, how the producer works with the talent, and how the producer and director work together to create the most effective presentation. Then, in Chapter 9, you'll see the program actually produced. The final Chapter includes sample program formats to guide you in developing your own. The Appendices offer a wealth of reference data on tape-handling procedures, a glossary of terms, and comparative specifications. 256 pps. Over 125 illustrations. Hardbound.

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Interpreting FCC Rules

Continued from page 10

questions would arise as to the station's policy of recruiting and hiring members of minority groups.

The new FCC Form 395 has tables designed to ascertain the number of minority-group employees in each of several job categories that cover the entire range of positions from officials to service workers.

The job categories are the same as those used in EEO-1 forms. Thus many of the categories do not specifically relate to uniquely broadcast positions (e.g. "comboman," "on air talent"); however, the Commission is including full instructions with each Form 395 to ease the broadcaster's burden of specifically categorizing broadcast positions.

Full statistical data are what the Commission wants from each broadcast station (with five or more full-time employees) regarding employment of minority-group individuals. Citing the "urgent national need" in eliminating discrimination in employment the Commission intends to insure that broadcasters do their share—hence the decision to get statistical information. This information will give the Commission a profile of the broadcasting industry, and will be useful in indicating noncompliance with rules forbidding discrimination in employment. In adopting its new rules, the Commission quoted portentiously from *State of Alabama v. United States*[2]: "In the problem of racial discrimination, statistics often tell much, and courts listen."

2. 304 F. 2d at 586.

New application forms

In all applications filed on or after January 4, 1971, for construction permit, assignment or transfer of license, or renewal, the applicant will be required to complete a *new Section VI*. The new Section VI will require that applicants adopt an *affirmative written program* designed to remove any vestiges of discrimination in employment practices, and to show specifically:

> The applicant's equal employment opportunity program, indicating specific practices to be followed in order to assure equal employment opportunity for Negroes, Orientals, American Indians and Spanish Surnamed Americans, in each of the following aspects of employment practice: recruitment, selection, training, placement, promotion, pay, working conditions, demotion, layoff and termination. . . .

There are *two exceptions* to the preparation of such an exhibit. The exhibit need not be submitted if (1) the station has less than five full-time employees or (2) the station is in an area where the relevant minorities are represented in such insignificant number that a program would not be meaningful; in the latter situation, however, a statement of explanation should be filed.

Assignors, transferors and renewal applicants must submit *two additional exhibits:*

> **I.** Submit a report as Exhibit ___ indicating the manner in which the specific practices undertaken pursuant to the station's equal employment opportunity program have been applied and the effect of these practices upon the applications for employment, hiring and promotions of minority group members.
>
> **II.** Submit as Exhibit ___ a brief description of any complaint which has been filed before any body having competent jurisdiction under Federal, State, territorial or local law, alleging unlawful discrimination in the employment practices of the applicant, including the persons involved, the date of filing, the court or agency, the file number (if any), and the disposition or current status of the matter.

Guidelines for nondiscrimination

To assure nondiscrimination in (1) recruiting, (2) selection and hiring, (3) placement and promotion and (4) all other areas of employment practices, the Commission has established the following guidelines *which must be reflected in appropriate exhibits in the new Section VI.*

1. To assure nondiscrimination in recruiting:

a. Post notices in station employment offices informing applicants of their equal employment rights and their right to notify the Federal Communications Commission or other appropriate agency if they believe they have been the victim of discrimination.

b. Place a notice in bold type on the employment application informing prospective employees that discrimination because of race, color, religion or national origin is prohibited and that they may notify the Federal Communications Commission or other appropriate agency if they believe they have been discriminated against.

c. Place employment advertisements in media which have significant circulation among minority-group people in the recruiting area.

d. Recruit through schools and colleges with significant minority-group enrollments.

e. Maintain systematic contacts with minority and human relations organizations, leaders and spokesmen to encourage referral of qualified minority applicants.
f. Encourage present employees to refer minority applicants.
g. Make known to all recruitment sources that qualified minority members are being sought for consideration whenever the station hires.

2. **To assure nondiscrimination in selection and hiring:**
a. Instruct personally those of your staff who make hiring decisions that minority applicants for all jobs are to be considered without discrimination.
b. Where union agreements exist:
(1) Cooperate with your unions in the development of programs to assure qualified minority persons of equal opportunity for employment;
(2) Include an effective nondiscrimination clause in new or re-negotiated union agreements.
c. Avoid use of selection techniques or tests which have the effect of discriminating against minority groups.

3. **To assure nondiscriminatory placement and promotion:**
a. Instruct personally those of the station staff who make decisions on placement and promotion that minority employees are to be considered without discrimination, and that job areas in which there is little or no minority representation should be reviewed to determine whether this results from discrimination.
b. Give minority group employees equal opportunity for positions which lead to higher positions. Inquire as to the interest and skills of all lower-paid employees with respect to any of the higher-paid positions, followed by assistance, counselling, and effective measures to enable employees with interest and potential to qualify themselves for such positions.
c. Review seniority practices and seniority clauses in union contracts to insure that such practices of clauses are nondiscriminatory and do not have a discriminatory effect.

4. **To assure nondiscrimination in other areas of employment practices:**
a. Examine rates of pay and fringe benefits for present employees with equivalent duties, adjusting any inequities found.
b. Advise all qualified employees whenever there is an opportunity to perform overtime work.

Conclusion

These new rules relating to nondiscrimination in employment practices are of extreme importance to all broadcasters. However, many small stations will undoubtedly believe that the task is impossible. The Commission has disclosed that small stations need not formulate elaborate or formal programs in hiring, promotion, and the like. "All that is required is that where the small station is operating in an area with a substantial minority, it takes appropriate and practical steps . . . to assure that it does afford an equal opportunity to minority groups to obtain employment and advance."

Each broadcaster (whose station employs more than five full-time employees) must (1) prepare and file an Annual Financial Report on or before May 31 of each year, and (2) prepare and file exhibit data relating to nondiscrimination in employment with each renewal, transfer or assignment, or construction permit application.

Obviously many problems will arise in this troublesome area; consult legal counsel. **BM/E**

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FROM THE EDITOR

A Commitment to Quality

Facing the prospect of smothering in our own refuse, most of us spend a few moments every day pondering the quality of life today. Hopefully we litter less, buy unleaded gasoline, eschew detergents, consume only those beverages that are sold in returnable glass bottles and turn off non-essential lights. Hopefully we support bills for clean air and clean water.

But are we taking stock of what we are doing lately to clean up our own air sound and our rf signal? Are we making a dirty buck by polluting the airwaves?

Think for a minute about our air sound. Is it cluttered with an excessive number of jangling commercials? Is it one continuous string of garbage promotions? (What else do you call dollar giveaways designed to get a listener mired to your frequency?) Is our sound so shrilly overmodulated that it goes into distortion just to grab attention?

In short, are we putting out an honest sound or is it some abomination that threatens one to listen or else. . . .

Let's give a moment's thought to our rf signal. Is it distortion free? Is it a full natural bandwidth without artificial peaks? Does our stereo give a compatible mono sound? Is our color burst under control? Can we say we are making a clean dollar?

We wish we could affirm that a clean, pure signal is the best sure way of making a profit—as is the case with WFMT, Chicago (page 12). Unfortunately this is not so: There will probably always be some marginal broadcaster in a marginal market who will take quality-devastating short cuts.

We can sympathize with the struggling station. On the other hand, we can certainly be critical of broadcasters who, as Jack Harris of KPRC-TV/AM says, "aim at minimum standards to maximize their profit." Harris was talking primarily of programming content but his comments are equally valid in discussing quality in general. He recommends to fellow broadcasters that the primary motive should be "improved service to our constituency. We have been licensed to serve and in so doing we have been offered the opportunity for profit."

Respect for the quality of our environment will cause many of us to change our customs and habits. We must think "quality" before we act in programming, in engineering and in selling time. We have to make a commitment.

James A. Lippke
Editor

PRODUCT INDEX

A quick reference to products mentioned editorially or in advertisements. Page number is listed first light face type) followed by reader service number (bold face.)

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24/294	**Telephone answering system**/Tron-Tech

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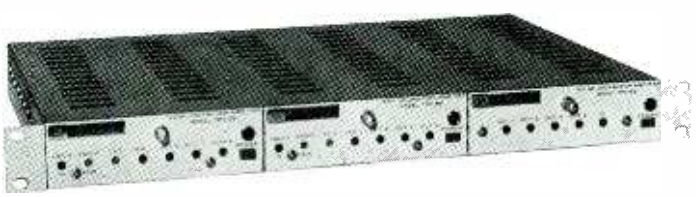
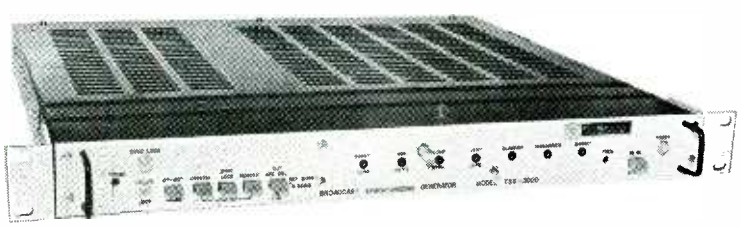


TeleMation's TMV-551 Video Distribution Amplifier provides four completely isolated outputs from one bridging input. Built-in power supply and connector panel, IC series regulator for constant power supply voltage standard. Top color performance.



The TSG-3000 Broadcast Color Synchronizing Generator with all-digital circuitry, the highest time base stability and lowest pulse jitter performance available. Plus programmable pulse widths and *digital* genlock for *Crashlock* (next-field, operator-controlled lockup) or *Ratelock* (adds or subtracts one line per field until lockup is achieved).

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Circle 124 on Reader Service Card

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That's some replacement.

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