

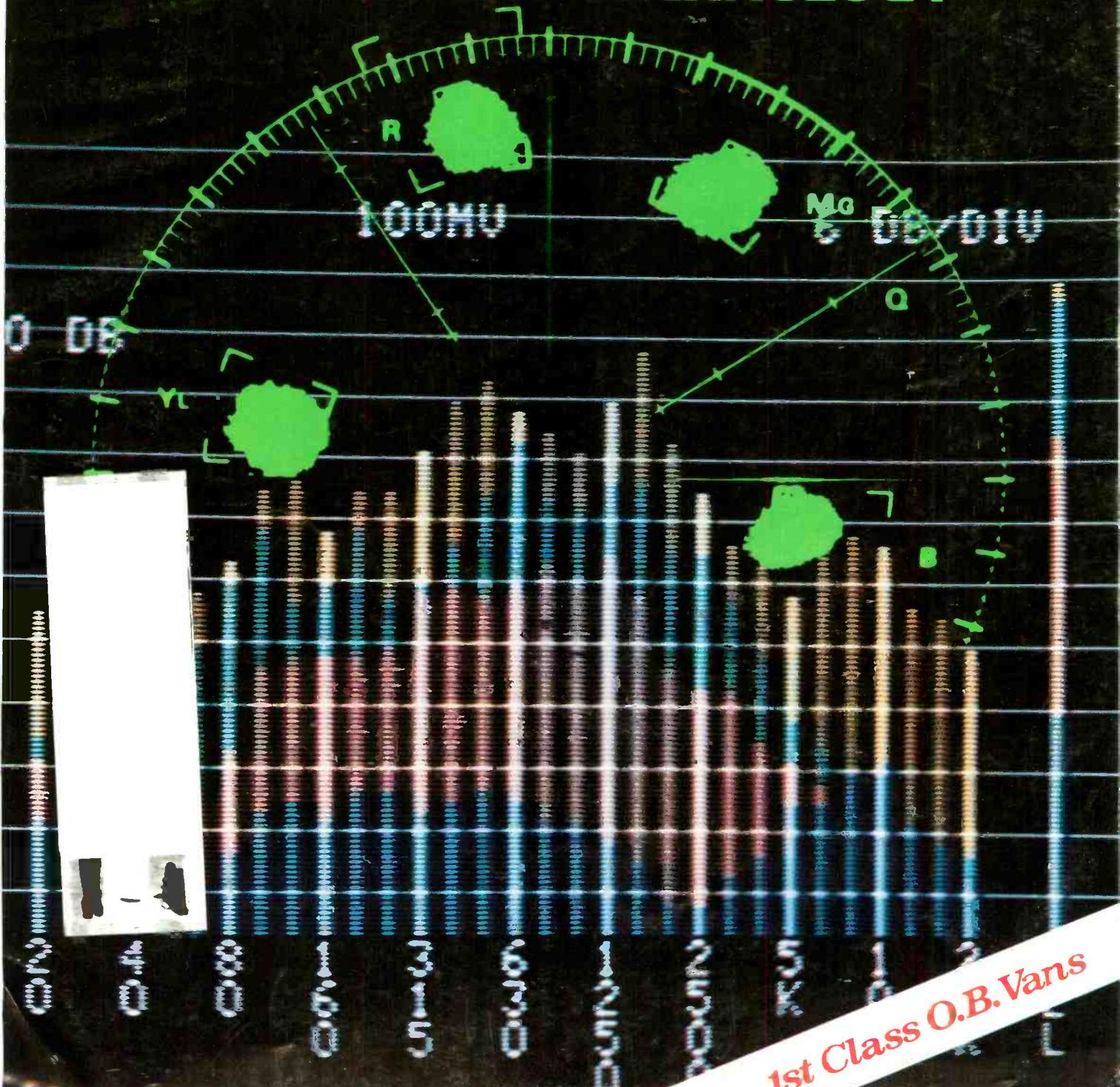
JULY 1981

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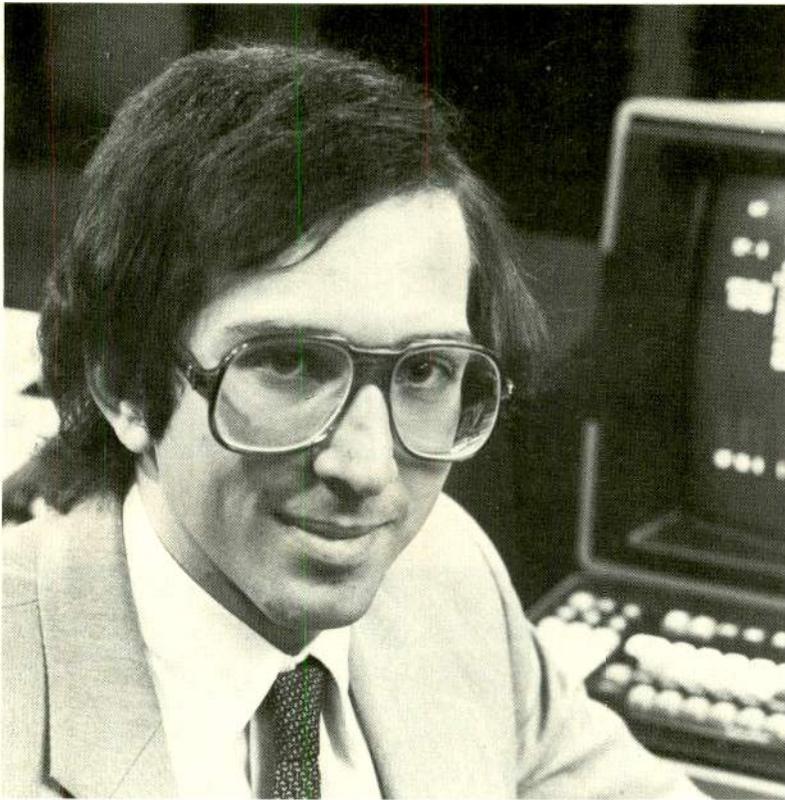
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"We Designed Our System Around The 340X"

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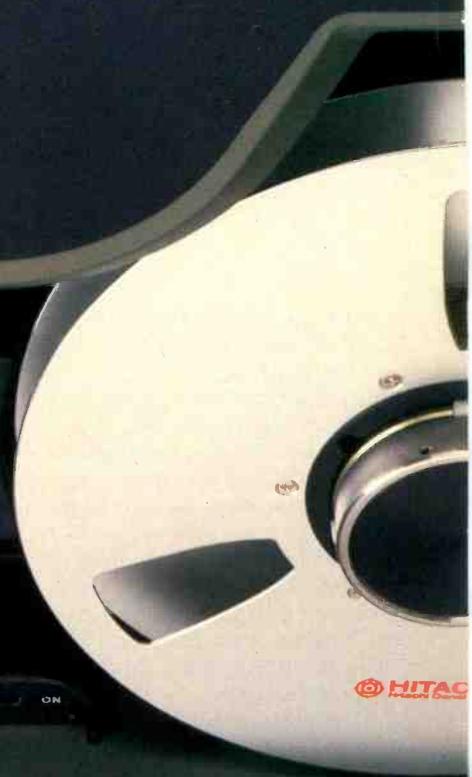
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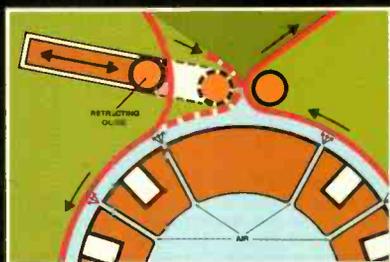
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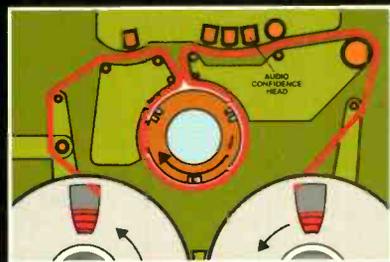
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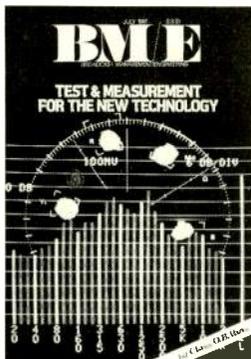
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BM/E

BROADCAST MANAGEMENT/ENGINEERING

JULY 1981/VOLUME 17/NUMBER 7



As new technology pours onto the market to aid broadcasters in their search for higher quality and greater efficiency, new problems arise. Can maintenance and performance standards be maintained? Is the industry trained and equipped to support the newest equipment? This issue takes a look at these critical questions. Thanks to Crown Engineering for the use of their Spectrum Analyzer display used in our cover design.

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BROADCAST INDUSTRY NEWS

First LPTV Application Granted By FCC

John W. Boler, a veteran broadcaster, has been granted the first application under the FCC's low power television proceeding. Boler's plan calls for a translator station in Bemidji, Minn., that would present local news, public affairs, and STV in addition to the signal of an independent TV station, to be brought in by satellite. The action came in mid-May, after the Commission had called a halt to the flood of LPTV applications that had inundated it (see *BM/E*, June, 1981).

Meanwhile, NAB has petitioned the FCC to exempt translator applications from the LPTV freeze, calling the inclusion "without rhyme or reason." There is "no question" but that translator service is in the public interest, NAB contended, adding that since the FCC staff is familiar with the processing procedures, little extra time would be required.

Hubbard Joins DBS Race As Comments Reach FCC

Group owner Hubbard Broadcasting, Inc., became the third entrant early in

May in the DBS sweepstakes with its proposal for an interim DBS service. Hubbard's plan differs from those offered by Comsat subsidiary Satellite Television Corp. and DBS Corp. in that it calls for large involvement on the part of local independent television stations.

Viewers could receive the signals directly through their own satellite dishes or through local broadcasters using conventional transmission. One broadcaster per market could join the system, and Hubbard would pay indies for their programming. Shows would be advertiser-supported, following NAB ad guidelines. Viewers would therefore be able to receive programs at no charge, in marked contrast to STC's pay-DBS plan, which Hubbard predicts could kill "free, over-the-air" TV. Hubbard called his system "the first national broadcast system fully available to all Americans."

DBS Corp.'s recent interim proposal (*BM/E*, June, 1981) would also make its offerings free to viewers, with the costs borne by programmers distributing their product over the common carrier-type service.

Meanwhile, comments are flowing into the FCC on the DBS proposal. A number of educational broadcasters, including the CPB, have commented that they see DBS as a potential threat to public TV licensees, draining off public stations' local funding. Terrestrial microwave users (as mentioned last month) are concerned over the possibility of having to vacate the 12 GHz band. Both Sony Corp. and NBC stressed the need for standardization of DBS equipment to allow consumers to pull programs in from any DBS bird with the same dish. NBC noted that such compatibility would ease market entry for DBS latecomers. Sony also urged reservation of the DBS frequencies for HDTV and digital audio.

AT&T TV Rate Increases Suspended By FCC

Protests from networks, TV station licensees, and program suppliers evidently were heeded at the FCC late in May. At that time, the Commission ordered a five-month suspension of proposed rate increases by AT&T for its terrestrial private line television transmission services, relied upon heavily by broadcasters.

Filing petitions to suspend or reject

"Trimulcasting" Succeeds In Little Rock



News anchors Angie Goshen (center) and Renee Cordell deliver their report as morning man Bruce Kramer looks on.

An AM/FM combo in Little Rock, Ark., has teamed up with the local cable company for what they believe is the first "trimulcasting" experiment anywhere.

KAAY-AM and KLPQ-FM are now broadcasting their morning radio program, *Good Morning, Little Rock*, over the facilities of Riverside Cable. The radio stations' morning personality, Bruce Kramer, shares the spot with news co-anchors Angie Goshen and Renee Cordell Monday through Saturday mornings from 6:00 to 10:00. The program originates from the studios of Riverside Cable in downtown Little Rock.

Phillip T. Zeni, vice president and general manager for KAAY/KLPQ, waxed eloquent about the success of the experiment, which debuted May 25. Interviewed only a week after the program's startup date, Zeni said the stations had already received "very exciting inquiries" from national as well as local advertisers, and that responses from listeners and viewers

were equally enthusiastic.

"We're learning new things every day that can be done in terms of video enhancement of audio," Zeni explained. For example, the producers positioned an extra live camera out the window on a recent rainy day, showing a shot of wet downtown Little Rock while the weather reporter was supered up in the corner. Another of the stations' standard morning items has also benefited from video. The DJ frequently plays a trio of songs saluting the high school class of a particular year; while the songs are playing, the video shows a nine-minute segment of shots taken from that year's high school yearbook.

Zeni said the crew was always coming up with new ideas — "We're limited only by our imagination." The cable system, he said, is adding an average of 150 homes a day and expects to have 70,000 homes wired by next spring. A possible linkup with another cable system in the area is being investigated.

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News

the tariff revisions were INTV; ABC, NBC, and CBS; Educational Broadcasting Corp., licensee of educational WNET-TV, Newark, N.J.; Hughes Television Network (HTN); and Wold Communications. Also filing against the rate hikes were ITT World Communications, which sought rejection, ITNA, and CNN.

The petitions cited the enormous rate

increases they said would result from the tariff revisions, with independent programmers claiming that broadcasters could be forced to lower the amount of live news, sports, and entertainment they offer. The nets, for example, said that annual rate increases under the new tariff would approach \$5 million; CNN said its rates would jump from \$1.1 million to \$1.5 million.

The Commission cited as a primary reason for its action AT&T's lack of justification for the difference in rate

scales between part-time and full-time use. Full-time services are used almost exclusively by the television networks, with non-network customers relying almost entirely on part-time service.

In a related action, the FCC first approved, then suspended AT&T's overall rate increase of 16.4 percent. The increases, which had originally been granted without the usual 90-day notice period, involved MTS, WATS, and private line services. In deferring the effective date of the increases, the Common Carrier Bureau indicated that "several serious problem areas" in the proposals "require additional information from AT&T and further analysis by Commission staff." The concerns included several technical flaws in the filings and a question as to whether proposed rate decreases for international calls would sufficiently offset large increases in other areas. Increases in private line rates, other than television transmission services, were allowed to stand.

FCC Rejects RCA Satellite Rate Rises

Proposed rate increases by RCA Americom were rejected late in May by the FCC, which found them "unjust and unreasonable." The tariff revisions had been requested to take effect last December, but instead were suspended for five months while the FCC investigated them.

The proposals would have, among other things, reduced the term of service for subscribers, eliminated one-year and part-time daily service, eliminated the unprotected and preemptible grade services, increased RCA's rates and rate of return, and substantially lengthened the renewal notice periods.

The Commission ruled that the reduction of length of service was unjustified and unlawful. RCA filed additional revisions to its tariffs in March that would restore the unprotected and preemptible service grades, rendering moot the Commission's objections to those changes.

Fowler Sworn In As FCC Chairman

Former broadcaster Mark S. Fowler took office as chairman of the Federal Communications Commission May 18, five days after his appointment was confirmed by the Senate. Information about a malpractice suit against Fowler's law firm, Fowler & Meyers, reached the Senate earlier in the month and precipitated a delay in the confirmation by Democrats. The "challenge" was short-lived, however, and Fowler faced little opposition to assuming his new role as nineteenth FCC chairman.

At his appointment, Fowler outlined

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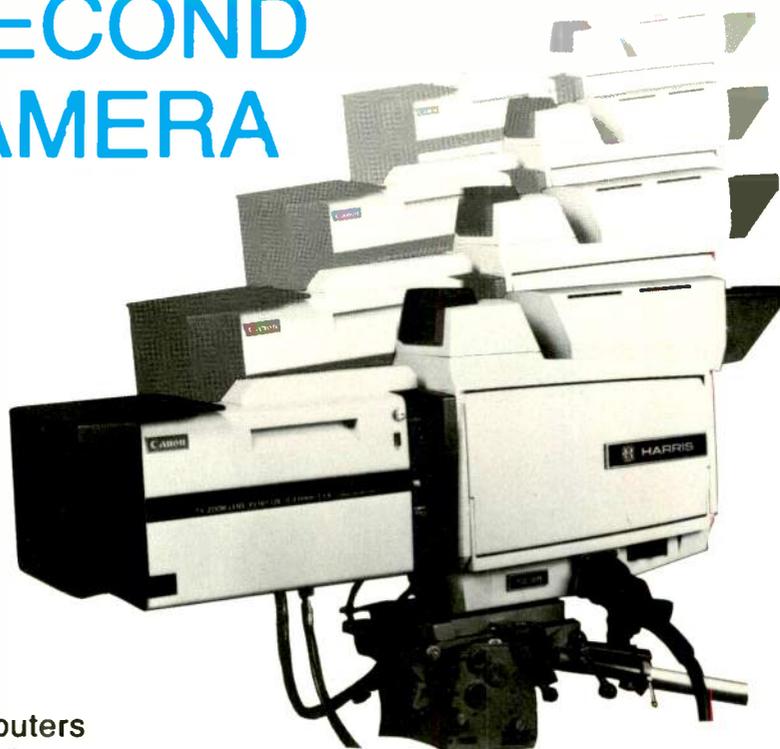
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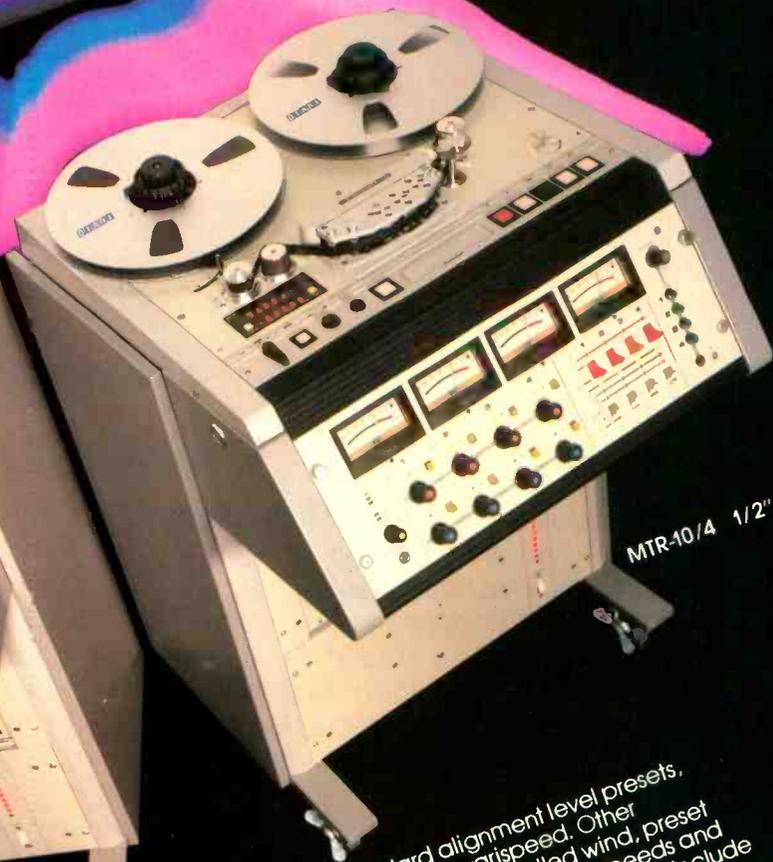


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five objectives for his tenure as chairman: the creation of "an unregulated, competitive marketplace environment" for telecommunications; elimination of "unnecessary regulations and policies;" "efficient, expeditious" service to the public; promotion of the coordination and planning of "internal communications which assures the vital interests of the American public in commerce, defense, and foreign policy"; and elimination of government infringement on freedom of speech and the press.

In addition, the new chairman announced several key FCC appointments. Gary M. Epstein assumed his duties as chief of the Common Carrier Bureau July 1; Epstein was a communications law specialist with Arent, Fox, Kintner, Plotkin and Kahn of Washington, D.C. Peter K. Pitsch was named chief of the Office of Plans and Policy, and Stephen A. Sharp was appointed general counsel for the FCC. William A. Johnson was designated acting chief of the Cable Television Bureau. It is expected that Richard Shiben will remain as head of the Broadcast Bureau.

Ascertainment Exemption Upheld for Small Markets

The FCC has moved to continue to exempt commercial TV stations in small communities in non-metropolitan areas from formal ascertainment requirements. The exemption, begun in 1976 as a three-year experiment, has been granted formal status; it applies to stations serving communities of 10,000 persons or less and not located within a Standard Metropolitan Statistical Area.

The Commission noted in its decision that it had received petitions to deny against the ascertainment-exempt TV stations at a rate less than half that of non-exempt stations. Commissioner Washburn filed a separate statement concurring with the action, but urging consideration of a similar exemption for noncommercial radio and television broadcasters. (Commercial radio stations were freed from ascertainment requirements by the radio deregulation proceeding.)

"Noncommercial broadcasters whose operations rely in part on shrinking federal dollars should not be left to bear the additional costs of formal ascertainment," Washburn wrote, "if the record shows that methods which they tailor to their own particular communities are a reasonable alternative."

Broadcasters, Cable Face Off In Copyright Hearings

Hearings on a House of Representatives

CATV copyright bill have pitted broadcasters against their cable competitors. The bill, sponsored by House Copyright Subcommittee chairman Robert W. Kastenmeier (D-Wisc.), would grant CATV operators compulsory license for only a limited number of distant signals — significantly raising copyright fees for cable operators. Systems serving fewer than 5000 subscribers would be exempt from copyright liability. Distant signal carriage rules would be reinstated.

An alternative bill, introduced by Rep. Frank of Massachusetts, would end compulsory licensing in January, 1983 and exempt "standalone" systems with fewer than 2500 subscribers from copyright liability.

Opponents of compulsory licensing held forth at the first of the hearings, with NAB's Vincent Wasilewski, MPA president Jack Valenti, and baseball commissioner Bowie Kuhn arguing against the special treatment for cable. Both Wasilewski and Valenti

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News

urged complete elimination of the compulsory license, and Wasilewski spoke strongly in favor of required carriage of local signals.

Kuhn called cable's retransmission of distant sports signals a threat to local teams, saying that if the trend is not reversed, "a significant decrease" in live sports broadcasts could result.

Cable's turn came the following

week, with representatives of cablecasters calling for retention of the status quo. Many of their arguments were criticized by the representatives, who appeared to be leaning toward increased copyright fees for cabling. The broadcasters' push for local signal must-carry rules seemed to have little support, however; Rep. Sawyer, for example, opined that "if the signals were of such value, broadcasters could at some price induce cable to carry them." One argument used against the

must-carry rules was that viewers could obtain a switch enabling them to receive over-the-air signals instead of cable; broadcasters pointed out that few viewers knew about or possessed such switches. A third cable copyright hearing was scheduled for June 17, after *BM/E's* press date.

RCA Announces Plans To Enter Pay Cable Field

RCA, parent corporation of the NBC network, surprised the net's affiliates at their May convention with its announcement that it was acquiring a 50 percent interest in RCTV, the pay cable venture of Rockefeller Center, Inc. (see *Broadcast Industry News*, February, 1981). RCTV will base much of its entertainment fare around the programming of the BBC, which has in the past been very successful for PBS.

NBC affiliates were reportedly unhappy with the announcement, fearing it might presage the sale by RCA of the net, ranked number three in a field of three. RCA's new chairman, Thornton Bradshaw (who took office July 1, after the convention), called the rumors of a sale "hogwash," saying that RCA was strongly committed to the network. Even so, few affiliates seemed to welcome the idea of their parent company supporting RCTV, which would be a natural competitor for them.

Both of the other TV networks have already announced moves into cable television. A recent restructuring of ABC's television division has moved Frederick S. Pierce, executive VP of ABC, Inc., and until now president of ABC Television, into a new position in which he will work at developing ABC's cable interests. John Severino will step up to fill the presidency of ABC Television.

Teletext Standard Closer After Toronto Meeting

May's Videotex '81 conference in Toronto made the major suppliers of teletext and videotex equipment to North America seem like one big happy family. AT&T pulled the wraps from its own new videotex plan, about which it had maintained much secrecy. The standard is compatible with both Telidon (Canada) and Antiope (France), the two systems that have gained most acceptance in the U.S. up to now. Graphics are even higher in quality than Telidon's — which can be upgraded to the AT&T level at minimal cost, according to David Carlisle, president of Infomart.

Telidon and Antiope got another boost before the conference when RCA announced its support for a teletext standard with asynchronous transmission, such as the Canadian and French sys-

Case History #437

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For an in-depth description of this and other case histories, get on the Electro-Voice "Mike Facts" mailing list. Write on your letterhead to Mike Facts, c/o Electro-Voice, 600 Cecil Street, Buchanan, MI 49107.

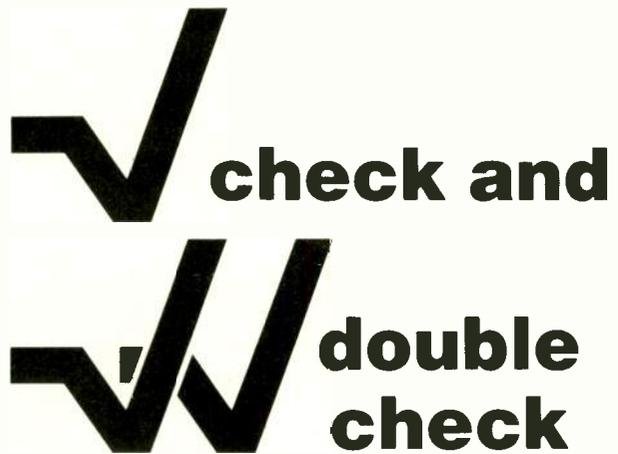
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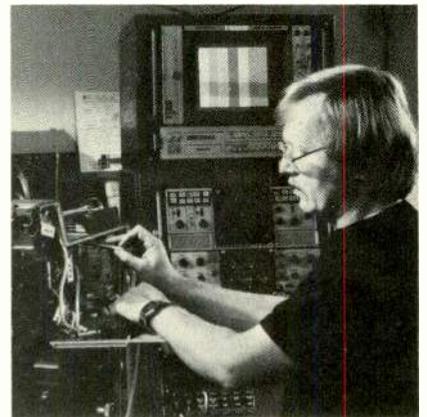
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News

tems employ. RCA's Albert PSCA-TORE (division vice president, business planning) told *BM/E* that his company considered asynchronous systems potentially more rugged and therefore better suited to U.S. conditions than synchronous systems, such as that backed by the British.

This leaves the British — first to be on line with a working system — the

only "incompatibles" in the picture. That situation is not expected to last for long, however; British representatives at the conference said they'd soon be marketing compatible equipment in North America.

Spanish Newscast Goes National On Westar

The first daily, national Spanish-language newscast made its maiden voyage June 1, with Wold Communica-

tions handling the satellite transmissions for Spanish International Network. About 95 SIN affiliates will bring the show into almost three million Hispanic homes.

Wold's role involves sending the signal by microwave from its WHMM-TV (Howard University) origination site to the Wold uplink at Fairfax, Va. From there, the program travels to Westar I, which beams it to SIN's center of network operations at KWEX-TV, San Antonio. SIN then retransmits the feed to its affiliates via its own uplink and satellite facilities.

The program involves national as well as international news, with a focus on issues of special interest to the U.S. Hispanic community.

News Briefs

Ohio State University's WOSU-AM/FM/TV will present a **Broadcast Engineers Seminar** at the university July 15 and 16. For information, contact John Battison, Director of Engineering, WOSU-AM/FM/TV, 2400 Olentangy River Road, Columbus, Ohio 43210, (614) 422-9678

NRBA has shifted the site of its 1981 convention to the Fontainebleau Hilton in Miami Beach. The meeting will take place September 13 to 16, a week earlier than originally planned

IEEE's thirty-first annual Broadcast Symposium will convene at the Hotel Washington, Washington, D.C., September 17 and 18

SMPTe has chosen the program chairmen for its Los Angeles conference, set for the Century Plaza Hotel October 25 through 30

The Western Educational Society for Telecommunications has scheduled its **eleventh annual conference** for October 13 through 15 at Harrah's, Reno, Nevada.

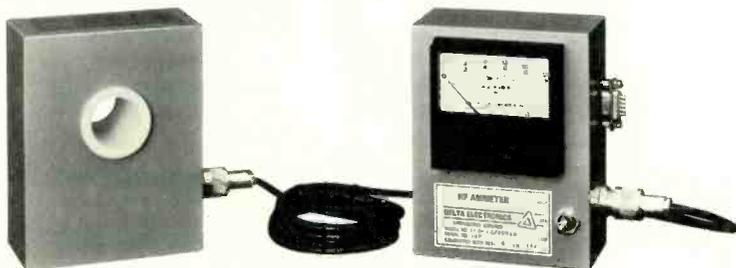
Southern New Jersey got a major new television outlet last month when WRBV-TV, Ch. 65, opened its Vineland facilities. The new station is licensed to Renaissance Broadcasting Corp. . . .

Jacksonville, Fla. life insurance company Gulf United will purchase Gene Autry's 48 percent interest in KOOL-FM/TV, Phoenix. Purchase price is a reported \$35 million.

Cable News Network has filed an ambitious suit against ABC, CBS, and NBC, charging them with antitrust law violations. CNN says the nets' practice of "pooling" news coverage has interfered with its attempts to cover national news. Also named in the suit are President Reagan, White House chief of staff James A. Baker, and deputy press secretary Larry Speaks, for alleged violation of CNN's right to equal access to Presidential activities and White House events. . . .

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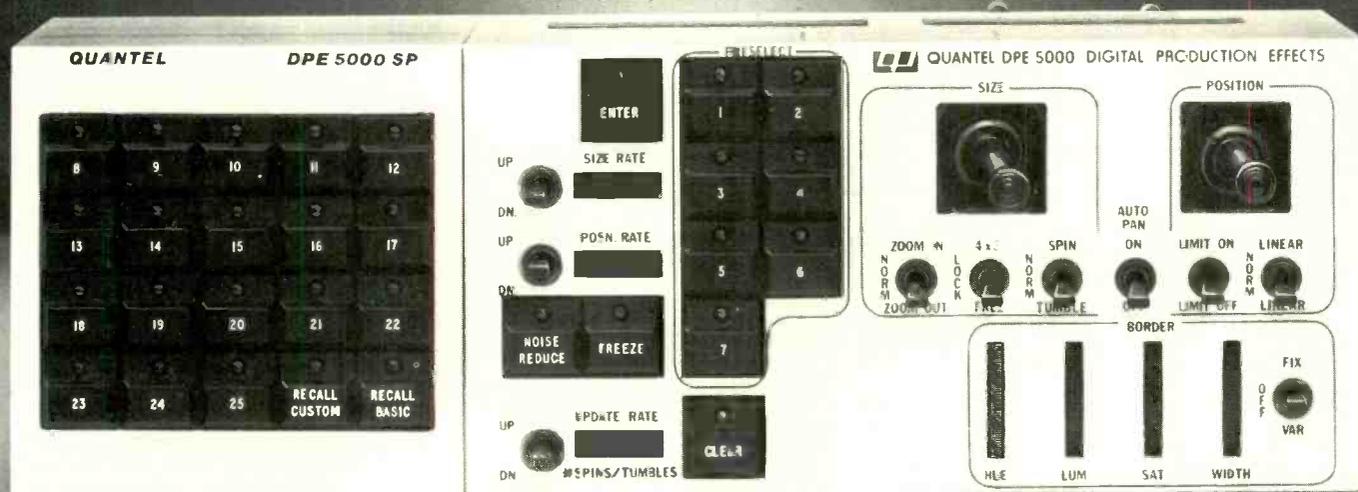
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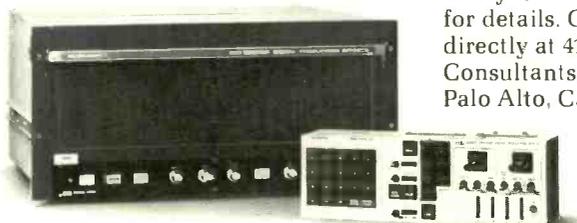
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News Briefs

lites was launched from Cape Canaveral in May. The series will provide satellite communications in the Atlantic Ocean region . . . A new **GOES weather watch satellite**, constructed by Hughes Aircraft Co.'s Space and Communications Group, went into orbit in May. It is also the second in its line; the third is scheduled for launch next year.

FCC data for 1980, recently released, show that **revenues for the eight radio networks** — CBS, MBS (two nets), NBC, and ABC (three AM and one FM) — and 35 network O&O stations rose by just over 16 percent. Profits, however, fell a dramatic 26 percent, reflecting large increases in operating expenses. . . . Frank Washington has **resigned his post** as deputy chief of the Broadcast Bureau to become vice president of Times-Mirror Cable Co., Irvine, Calif. . . . The

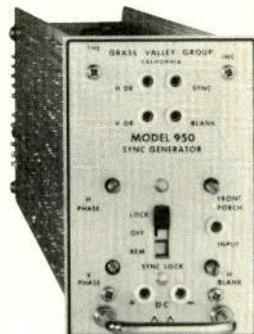
Commission is considering a request from RKO General for remand of the appeal of the **FCC's RKO decision**.

Classical Radio for Connecticut, Inc., has asked an appellate court to **review the FCC's January deregulation** of commercial radio. Three other petitioners, Henry Geller, the Citizens Communications Center, and the National Black Media Coalition, have received the support of the NAB in their request for clarification of the deregulation action. . . . Vincent Wasilewski has announced **new members to NAB's Radio and TV Code Boards**. New Radio Board members include Arthur W. Carlson, Susquehanna Broadcasting Co.; Ramsey G. Elliott, McClatchy; David C. Fuellhart, WPOC, Baltimore; Charles R. Sanford, WGAN-AM/FM, Portland Me.; and William Dudley Waller, KEBE/KOOI, Jacksonville, Texas. Philip T. Kelly was named radio chairman. Joining the TV Board were Carl E. Lee, Fetzer Broadcasting Co., and John J. McCrory, Times Mirror Broadcasting. The new TV chairman is Clayton Brace.

NAB has strongly criticized the FCC for its continued support of **9 kHz AM spacing**, urging the Commission to defer a decision until mid-July. . . . Radio Code Board chairman Philip Kelly told the board that **self-regulation** was becoming increasingly important for radio stations as deregulation plans progressed in the FCC and Congress. . . . NAB's Executive Committee has voted unanimously to urge the FCC to give high priority to **resolution of the AM stereo quagmire**. . . . If Congress is to allow collection of fees by the FCC, it must set "**specific and firm safeguards**," Vincent Wasilewski told the House Communications Subcommittee in May.

Walter Cronkite will receive the 1981 Paul White Memorial Award at September's RTNDA Conference in New Orleans. . . . **Phil Donahue** has received the George Foster Peabody Broadcasting Award "for sensitive, probing interviews on issues relevant to today's society." . . . PBS and its member stations were honored with a special award from **Action for Children's Television (ACT)** May 12. Other winners of ACT awards included Children's Television International, Falls Church, Va.; Children's Television Workshop; **KQED-TV**, San Francisco; **NBC**; **KDKA-TV**, Pittsburgh; **KGO-TV**, San Francisco; **WCVB-TV**, Boston; **WFTV**, Orlando; **WLBT-TV**, Jackson, Miss.; and **WLS Radio**, Chicago.

WTOP Radio, Washington, D.C., has been awarded the 1981 Maryland-Delaware-District of Columbia UPI Broadcasters Assn. award for best spot news coverage.



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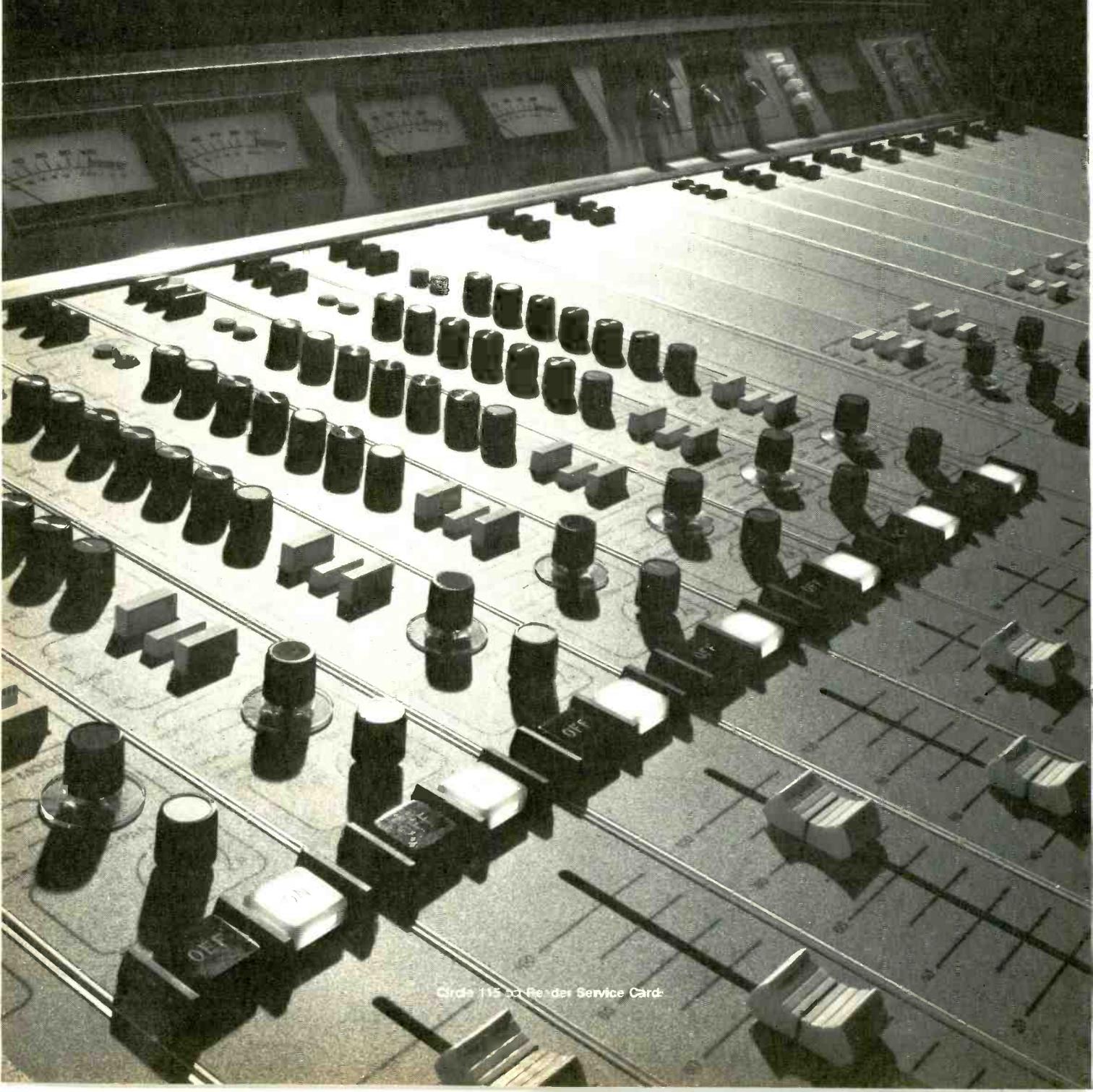
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RADIO

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Programmers At NAB

THE TURNOUT of programmers at NAB '81 brought about 25 to the exhibit floor, a respectable showing but well below the number at the most recent NRBA Convention. Those who came to the NAB liked the show, almost unanimously.

At least four were new to the NAB. Emil Ascher of New York maintains a large background music library. Any part of it is sold in disc form to radio programmers, who thenceforth pay a performance fee for most of the music items. The House of Music is a new syndicator from Irvine, Calif., with a new format it calls a "True MOR." This is a mixture of Beautiful Music, "softrock vocals, gentle jazz, selected oldies, and light country." Network is another background music library, operating much like Emil Ascher — music on discs, with fees paid for performances. Sacred Sounds is a syndicator of 100 percent religious music. Its headquarters is Riverside, Calif.

Reports from most of the syndicators on the floor pictured the industry as in a period of fine expansion, with the old-line syndicators almost universally engaged in fresh creativity, new programs with exciting rationales. Drake-Chenault described its new *Weekly Top Thirty*, a weekly three-hour show based on the week's hit music and put together with strong attention to a fast pace. CaVox had full information on *CaVox Country*, aimed to meet the demand for an inexpensive country format with high standards. Subscribers start with a library of 600 country selections on tapes and get 60 new selections every month. Live Sound added *Country Beautiful* to its long-running *Big Country*. The new format is for stations operated live and starts with an initial library of 1700 "Gold Songs" on 10½-inch reels. The library is constantly reviewed to keep it fresh.

Sound Communications is the new name of an enlarged Automated Music, of Nederland, Texas. The firm is expanding its programming with a library of *The Inspirational Sound*, 30 reels sold for a total of \$300 (or on a part payment plan). William B. Tanner described a number of special programs, series covering weekly or daily shorts of great topical interest.

Bonneville was touting its manage-

ment plan, described previously in this magazine, which is winning subscribers every day. Concept Productions touted its synthesizer system that allows the separate voice track, made for each client, to sound like the local station personnel on the job. Thomas J. Valentino of New York brought excellent material about its very large sound effects and background music library.

Each of the syndicators in the fore-

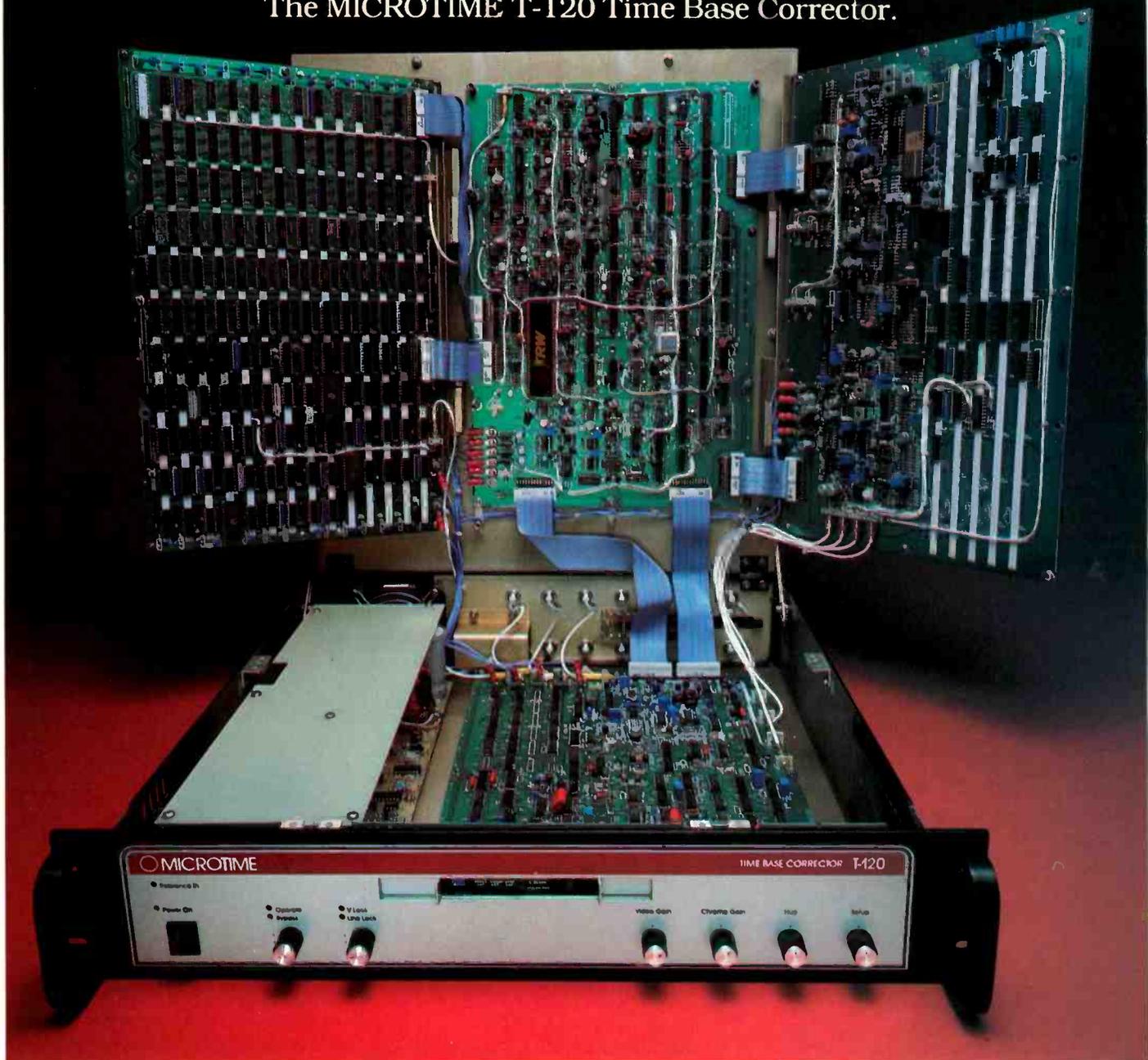
going described a full supply shelf of formats, many of them formats that have been strong on the radio program market for a number of years.

Also giving evidence of success with a full range of different formats were TM, the Music Works, Broadcast Programming International, KalaMusic, Peters Productions (see *BM/E*, February), and Jam Productions (with jingles and promotion packages). **BM/E**

The advertisement features a collage of logos for several radio programming and production companies. At the top left is the BPI logo. Next to it is the Peters Productions logo, which consists of a large stylized 'P' with the words 'PETERS PRODUCTIONS' underneath. To the right of Peters Productions is the logo for William B. Tanner Company, Inc., featuring a four-pointed star with arrows and the text 'WILLIAM B. TANNER COMPANY, INC.'. Below these are the logos for TM Concept, which includes the letters 'TM' and the word 'Concept' in a large, bold, sans-serif font, and Jam Productions, which has the word 'jam' in a stylized font with 'PRODUCTIONS' underneath. The largest logo in the center is for Century 21 Programming, Inc., with 'century 21' in a large, bold, sans-serif font and 'PROGRAMMING, INC.' in a smaller font below it. At the bottom left is the House of Music logo, which depicts a house with a musical note and the words 'house of MUSIC'. To the right of House of Music is the LSI logo, which features a stylized circular graphic with vertical lines and the letters 'LSI'. At the bottom right is the CaVox logo, which has the word 'CAVOX' in a bold, sans-serif font inside a rectangular border.

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TELEVISION

PROGRAMMING & PRODUCTION FOR PROFIT

Entertainment Tonight: Access From Heaven

THE INTRODUCTION of any new syndicated program is usually ballyhooed to the skies. Most of the flag-waving tends to be, charitably speaking, hyperbole. *Entertainment Tonight*, Paramount Television's new prime time access show, is being introduced with the usual bells and whistles, but in this case they may be deserved.

Entertainment Tonight is the first original syndicated show to be delivered entirely by satellite. And the fall-out from the distribution system that will be set up may have a powerful impact on how *all* shows are delivered in the future.

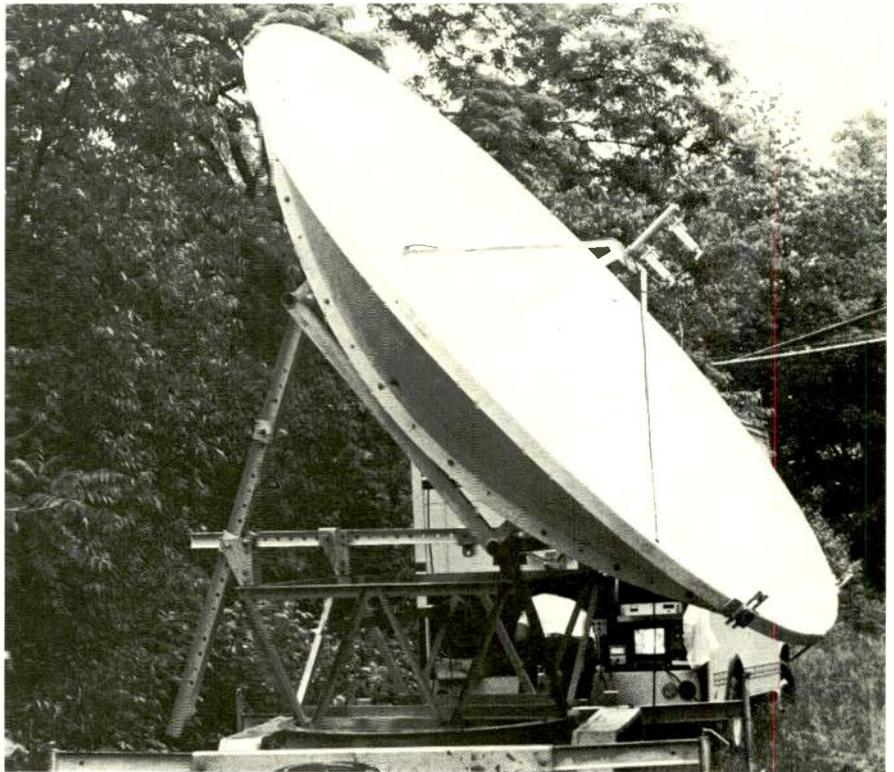
Before that claim is defended, just what is *Entertainment Tonight*? It is not, as the title might indicate, a talk/variety show with singers, dancers and the inevitable couch. *Entertainment Tonight* is a news show that deals with show business.

The show will be formatted in the same style as a normal news broadcast, but its subject matter will be entirely show business-related information. It will have the standard look, with regular anchors and correspondents filing reports from the field. There will be segments comparable to such familiar news topics as consumer items and special reports. On *Entertainment Tonight*, however, the segments will deal with gossip and personalities.

Some well-known entertainment reporters are signed up to do the show. Nationally syndicated columnist Rex Reed will handle theater and movie reviews; Robin Leach of *The Star* will provide occasional pieces on personalities; and Rick Dubrow of the Los Angeles *Herald Examiner* will comment on television. The three anchors, Tom Hallick, Marjorie Wallace, and Mario Machado, will be based in Los Angeles.

In addition to the anchors and the contributing reporters like Reed and Leach, there will be a number of reports culled from both staff reporters and from reporters working at the various stations that have purchased the show. At last count, over 100 stations had signed up for *Entertainment Tonight*.

There will be 12 reporters working on *Entertainment Tonight* out of bureaus in Los Angeles, Las Vegas (including Lake Tahoe and Reno), and New York. The support staff (exclud-



WPXI, Pittsburgh is one of the stations where Microdyne is doing site surveys before the installation of the downlink to receive *Entertainment Tonight*



The anchors for *Entertainment Tonight* (left to right) Mario Machado, Marjorie Wallace and Tom Hallick will broadcast from Los Angeles with reports from around the country

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TV Programming



The frequency coordination is being checked for a dish installation at a station in San Diego

ing technicians) will run about 42 persons in the Los Angeles office.

Entertainment Tonight will be fed out of Los Angeles every day at 3:30 EST on Westar III. The stations will tape it and turn it around for airing in the 7:30 access period. A few stations will air the show outside that time period, but most will air the show at 7:30.

Even though *Entertainment Tonight* will be taped in Los Angeles for playback on the satellite, it will be treated as a live show. It will be post-produced minimally or not at all.

From the station standpoint, *Entertainment Tonight* raises a number of issues over and above the decision to buy a syndicated program. When a station buys the show, it buys the concept of satellite delivery. And over 100 stations have bought the concept. Why?

On one level, the idea behind *Entertainment Tonight* would fit neatly into current program trends no matter how it were distributed. A number of programmers polled by *BM/E* all agreed that they probably would have purchased the show in any case. Chuck Sherman, VP and general manager of WTRF-TV, Wheeling, W. Va., explained, "We feel that some form of light information — magazine type information — would fit in extremely well with our news block."

Sherman had looked into *PM Magazine* because there is heavy cable penetration in the Wheeling-Steubenville ADI and many local viewers were watching *Evening Magazine* on KDKA, Pittsburgh. The station had had a commitment to news. It is the dominant news station in its market and does an hour of local news (until very recently, there were a couple of stations in Pittsburgh that didn't do an hour of

early news). The station felt that some kind of informational broadcast should follow the network news at 7:30. That's where *Entertainment Tonight* came in to fill the void.

"The entertainment industry is one that a great number of people are interested in," says Ken Ladage, program director at WRTV-TV in Indianapolis, "so that kind of format has great potential."

Since many stations would have purchased *Entertainment Tonight* anyway, the method of delivery has also given stations a potential for more than a same-day airing of the program. The installation of a downlink in the majority of the stations served by *Entertainment Tonight* increases the possibility of more flexible and creative local programming. According to Sherman, "It will give us much greater flexibility in programming that we've ever had before."

At this point, no one is quite sure how many of the *Entertainment Tonight* stations will install their own dishes. Wold Communications, the prime contractor to Paramount for the distribution of the show, has in turn contracted with Microdyne to install at least 50 seven-meter steerable dishes. The 50 dishes are being either leased or sold outright to the stations. In either case, the dish will be used for *Entertainment Tonight* during the half-hour daily feed and the hour version that is for air during the weekend. That leaves a lot of time available to take in other types of programming coming off the various birds.

When *Entertainment Tonight* goes on the air with its first show on September 14, it will usher in not only a new program but a new era. **BM/E**

The picture is worth a thousand words



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RADIO TESTING: SOME GROUND RULES FOR THE NEW GAME



To keep a radio plant up to the technical standards today's market demands, a radio engineer needs a set of fresh skills and a complement of test equipment many times as precise and resourceful as the gear radio grew up with.

KEEPING A RADIO STATION up to today's demanding operation standards requires testing and measurement about an order of magnitude more precise and resourceful than was common in radio stations a decade ago. T&M gear is responding to the need, with the whole measurement process on an upward ramp. The climb is not over, by any means. The "sophistication gradient" keeps tilting up.

As a benchmark of the sophistication gradient, consider the fact that a number of radio managements have bought a new spectrum analyzer, marketed by Tektronix early this year, for about \$15,000. This super-precise, super-resourceful instrument (one of several on the market) has a score of important uses in a radio station. It is not *essential* to good testing; however, it makes a number of tests rapidly and accurately. The radio managements that spent such large sums for test instruments were simply raising the efficiency and the many-sidedness of their operations. Their decisions on this point emphasize the strong pull that radio operators feel today toward a radically intensified test operation.

The trends that have combined to create this 1980s kind of radio testing emerged clearly in a series of interviews *BM/E* undertook for this report. The talks were with about 20 experts in the field — radio chief engineers, radio hardware makers, test equipment designers, consultants, and network engineering officials — and there was a 100 percent consensus on the following:

- Operating equipment is roughly 10 times as refined as it was a decade and more ago, and engineers need correspondingly refined test methods to find out if any unit is working properly or not;

- Signal processing is much more widespread, demanding far more sensitive testing;

- While the objective in the past was to just meet the FCC minimum requirements and then forget the subject until the next proof of performance had to be made, competition in the radio market and the public's hunger for top-grade sound now force a station to considerably exceed the FCC minimums in important respects or lose audience;

- Expert engineering help is scarce, so testing must be highly efficient to make full use of the staff skills that are on tap.

James Loupas pointed out another incentive for high-grade testing. He noted that today even the smallest radio stations with any success are capitalized for at least \$500,000, and the great majority at \$1 million and more. The owner's investment demands a first-class maintenance and protection effort plus highly efficient operation for a reasonable profit.

One of the main aspects of the problem of refining the radio signal to today's standards is isolating the cause of trouble when it turns up. If, for example, the overall signal-to-noise ratio of an FM station reads 45 dB on a monitor of some kind, the engineer needs test gear with highly precise and repeatable responses to run down the trouble and isolate the weak links in the chain. Incidentally, there is a gray area here in the FCC requirements. The FM proof of performance requires, of course, an S/N of 60 dB. But the rules say that processing equipment can be bypassed when the test is made. Thus, an FM plant that makes the 60 dB with all processing units bypassed can easily fall below that when those units are cut back in.

This is just one case in which very reliable, precise test gear with repeatable settings is needed. Geof Mendenhall of Broadcast Electronics noted another similar situation that frequently occurs: management buys top-level consoles and other audio gear (which can achieve 85 to 100 dB S/N), but fails to examine the old FM exciter. Older exciter models typically are noisy elements of an FM plant. Very good testing is needed to pinpoint this.

Since distortion and noise can be cumulative in a chain



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Radio Testing



The Crown BDP-2 spectrum analyzer has eight memories which can be used to hold long-term averages, or maximums, of up to eight signals. Display on screen shows long-term frequency contours of four different broadcast stations, for study of the particular "sound" of each station

of units, the test precision for individual units must be considerably better than the overall standard requirement. A distortion test system has to reach to about 0.01 percent, even though this is far below any audibility levels. Similarly, all other quantities must be measured to levels that are a fraction of those considered the "bottoms" a few years ago. Luckily, there is a considerable body of equipment on the market that reaches these precision levels, which would have seemed both impossible and ridiculous a little while ago.

Those are some of the general ideas that came up in *BM/E's* survey for this report. In the remainder of this article we briefly consider specific kinds of testing and test gear.

Distortion measurement. For a long time harmonic and intermodulation distortion tests have been basic in radio station maintenance and tuneup. Today, as already noted, the "allowable" figure has dropped to a small fraction of what it used to be. The body of superlative distortion measuring systems on the market betters considerably this small-fraction-of-one-percent precision.

This micro-valued sensitivity makes it possible to check individual units to such levels that the chain as a whole has cumulative distortion still very far down. The highly precise individual-unit checks have another vital function. If a unit develops distortion well above its "best" level, but still within the usual allowable range, it is often a sign of maladjustment or of incipient malfunctioning.

Every unit in the plant must be periodically checked with this "advance signalling" in mind — not just audio consoles (the best ones are almost distortionless), but also and especially processing gear, stereo generators, excitors, and STLs. Disk playing gear is a particularly good example. Phono pickups need a periodic IM check with a test record that has the two-tone IM signal. The IM analyzer in the distortion meter can read the result. IM from a phono pickup will start to rise as the stylus begins to wear — and before the effects of the wear are evident in any other way. Maladjustment of the tracking force, very destructive of record surfaces, also triggers early increases in IM.

The new test equipment, therefore, is a potent maintenance tool. This vital emphasis on close individual-unit testing, however, should not divert radio operators from whole-chain testing. Kenny Stout, chief engineer of WPAT in Paterson, N.J., pointed out the importance of the whole-chain distortion test to uncover any interface problems that may be degrading performance. The "overhead," the room for peaks above the normal operating level, says Stout, is a highly significant figure for the station's overall audio performance.

Four of the most popular distortion test sets are the Sound Technology Model 1700 (with IM option), the new Tektronix 501/505 analyzer/oscillator combination, the

Amber multi-test set, and the Hewlett-Packard multi-test set. All measure distortion to levels so low they were unheard of as little as 10 years ago. They also include a wide variety of automation features that make operation fast and precise. Automatic nulling of extreme precision and automatic ranging are both standard, for example.

Frequency response. Every radio engineer has an individual approach to frequency response checks, still fundamental in any test program. Again, meeting the FCC minimums is no longer the whole story. There are a score of test situations in a radio plant in which a frequency response check is a necessary part of some more complex check. There are a large number of ways to do the check — and a variety of test gear that will do it.

This can range from punching in discrete frequencies one after another on a pushbutton oscillator while watching the results on a voltmeter, up to sweeping the whole band with a spectrum analyzer. Another test equipment combination is the audio generator feeding automatic tracking on an output analyzer. Virtually every radio station has the gear to do this job — though not necessarily at high speed and with extremely high precision.

Pink-noise generator. The handiness of a pink noise generator for many kinds of tests was a point made repeatedly in the *BM/E* interviews. Bob Orban of Orban Associates pointed out that a pink noise source of good quality can be made with about \$10 worth of parts, using an IC made especially for the purpose by National Semiconductor.

Flutter and wow. Digital recording is training us to hear a near-total absence of flutter. The old allowable range of about 0.06 to 0.1 percent will increasingly produce dis-

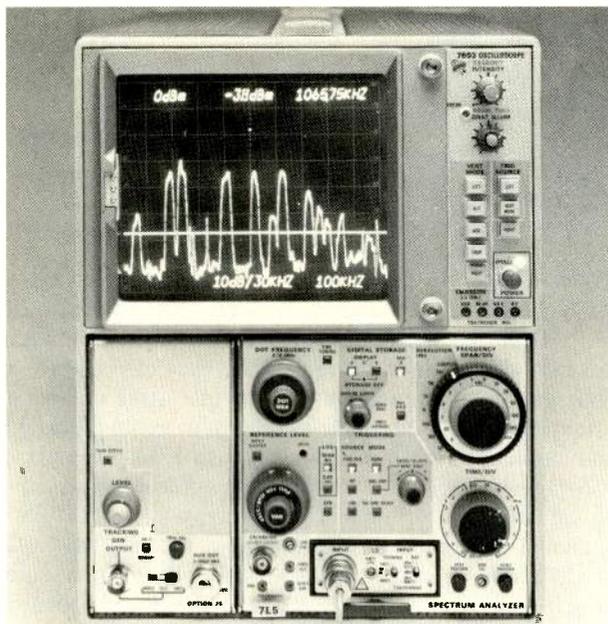
New FM Modulation Monitors Promise Super-Precision

Many radio engineers interviewed by *BM/E* have called the modulation monitor the weak link in precision testing for radio today. Two new monitors just coming on the market may remove this weakness.

Versa Count's new Model MM80, a microprocessor-controlled FM monitor, will read a number of characteristics of the FM signal. The maker says the distortion level is below 0.01 percent and the S/N ratio better than 80 dB. The unit reads true RMS as well as peak and average signal levels.

Belar Electronics, a stalwart of radio monitors for many years, will have a new FM monitor that reads modulation only. Arno Meyer of Belar calls it a factor of 10 better than earlier models. Again, the stated specs are extremely advanced: S/N ratio, 90 dB; harmonic and intermodulation distortion, 0.02 percent each; separation, better than 70 dB; "birdie" interference with SCA signals, down more than 90 dB. The stereo model is auto-ranging to facilitate proof of performance.

Radio Testing



On screen of Tektronix 7L5 spectrum analyzer are basebands of modulated carriers for analysis of interfering signals from other transmissions

tasteful and obtrusive effects, depending heavily, as always, on the character and tempo of the music. Weighted flutter on today's excellent turntables is down to the 0.01 to 0.03 percent range, and test gear should have precision enough to reach that range.

This new precision is especially valuable as a maintenance tool. Radio engineers with banks of reel-to-reel or cartridge tape players (often both) have a prime mechanical maintenance problem. Moderate increases in the flutter on any kind of tape machine, too small to cause audible distortion, are infallible signals of wear in rotating parts or misadjustment of some kind — in tape tension, for example. The same applies to turntables for playing disk recordings.

Modulation monitors. The one shadowy spot on the bright test equipment picture, according to several of the experts, is the modulation monitor, especially the FM monitor. There was agreement that the modulation monitor has fallen a little behind the general march to the new precision. A frequent complaint was the difficulty in keeping a modulation monitor precisely calibrated.

However, at least two monitors just on the market may have brightened the outlook. One is from Versa Count, the other from Belar. They are described in the box accompanying this article.

Frequency counters. Radio engineers can now buy, at very reasonable prices, as much precision as they want in a frequency counter, up to super-laboratory levels. A counter is not a necessity, but it is obviously very handy for a number of test jobs. This includes checking not only the carrier but also every variety of local oscillator — in the STL, for example, and in digital equipment.

Function generator. Square waves, used for years for quick checks of the quality of audio equipment, have lately burst into another test area: checking transmitter performance. This was emphasized in BM/E's May article, "New AM Transmitters for a New Grade of Sound." Many engineers now like square wave testing, not only for individual audio units but for the whole audio line and the

whole plant, from console input to demodulated signal. Performance of the transmitter in the infra-bass region, as noted in the May article, has become important for its effects on the handling of highly processed audio signals. Square waves can show a number of different things about the performance of any part of, or the whole of, a radio plant.

The spectrum analyzer. This familiar instrument has sprung up in the last two or three years to a distinctly higher level, becoming almost a new breed of device. It has far higher precision, far greater test resourcefulness, and a lot of automation. The new spectrum analyzer can carry out a score or more of valuable tests in a radio station, including:

- Absolute measurement of signal levels with built-in calibration;
- Very high precision in reading frequency response, gain, noise, and distortion;
- Instant identification of components of noise, distortion, and composite signals (for example, a noise spike at 120 Hz is clearly from poor power supply filtering; 60 Hz is leakage from ac circuits into low-level signal circuits);
- Close monitoring of the composite signal in FM transmission, with identification and measurement of all elements;
- With one or more memory sections, comparison of the signal with a standard curve programmed into the instrument, or determination of the highest peaks over a period of operation, or a number of other valuable checks making use of the instrument's ability to "hold" and "remember";
- Measurement of depth of modulation, deviation, and index in FM;
- Detection and identification of spurious signals leaking in from transmitted signals of nearby stations.

This list is a small part of the story; instruction booklets of any of the new super-resourceful spectrum analyzers will stir any engineer's imagination.

But the instrument is *not* essential, and some radio managements will find the cost too high. What, therefore, is a kind of bedrock complement of test equipment that will allow today's engineers to keep their station on the high-precision track?

Dave Harry of Potomac Instruments suggested the following list, which, in fact, describes quite well the available functions of Potomac's popular multitest set:

- Low-distortion audio generator with square wave and sine wave outputs;
- A set of precision attenuators;
- Analyzer for harmonic and intermodulation distortion;
- Electronic voltmeter (not necessarily digital);
- Circuitry to read stereo phasing directly on the meter;
- Wow and flutter testing;
- Balanced and unbalanced input and output at both 150 and 600 ohms.

A useful addition would be the pink-noise generator mentioned above. Total cost should be in the \$3000 to \$4000 range.

Checking audio processors. A fairly new need for a lot of radio engineers is keeping tabs on the performance of complex audio processing units. Greg Ogonowski of Gregg Laboratories pointed out that the peak-to-average ratio in the processor output is a significant overall performance figure. There are a number of ways to measure this, a spectrum analyzer providing one of them. The spectrum analyzer or a good scope will allow the engineer to see the waveform of the processed signal.

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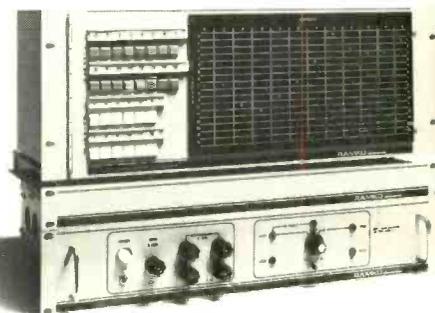
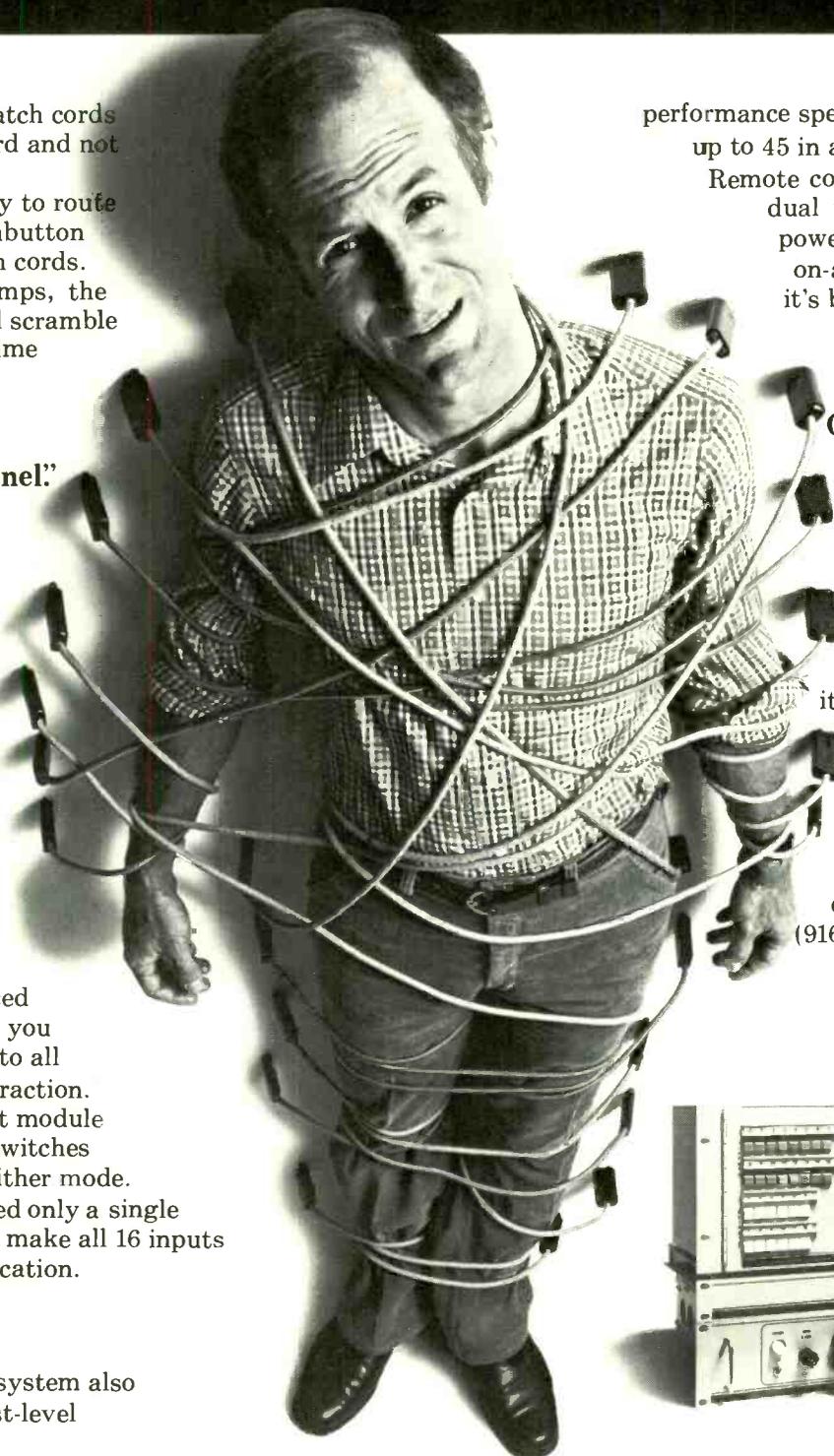
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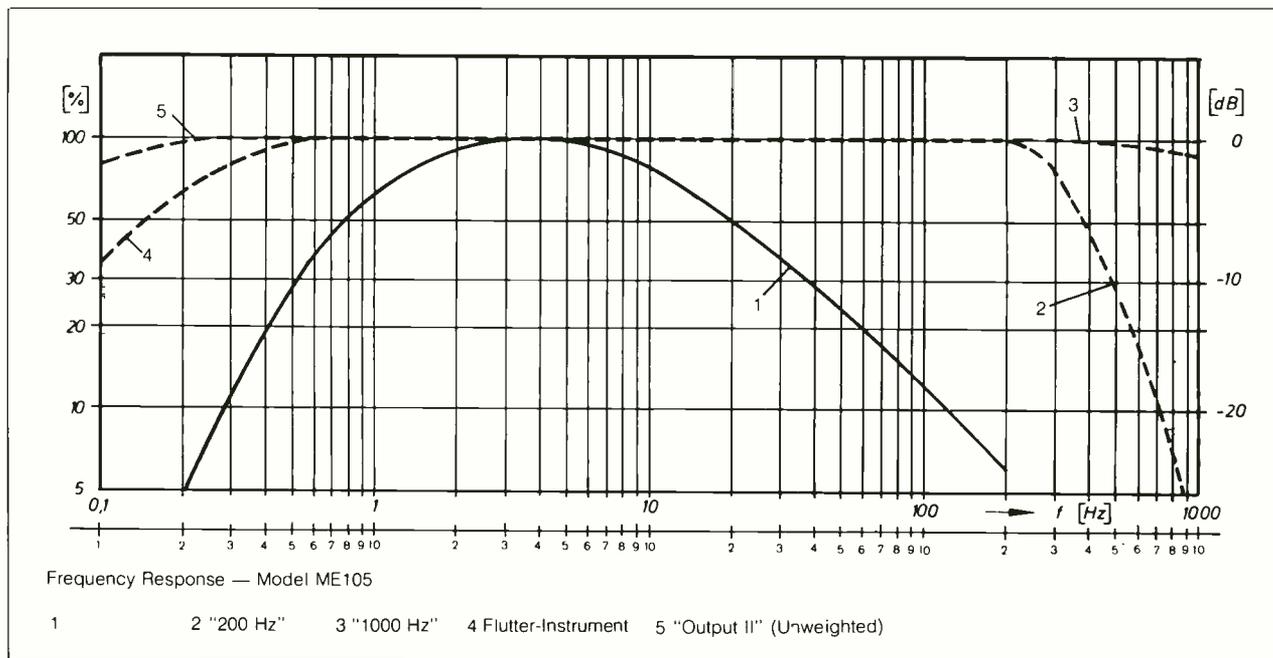
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RAMKO

Radio Testing



Of course, the processor should be given all the standard tests for units in the audio line: frequency response, harmonic and intermodulation distortion, and noise. Like every other unit in the line, it should perform well within the whole-line figures the engineer is shooting for.

Bob Orban also suggested that the pink-noise generator be used to feed standard signals to the processor. The input signal levels should be carefully adjusted to a series of values standard for the test. Then the output of each AGC band in a multi-band processor can be measured to find the exact amount of gain reduction at each input level. A spectrum analyzer will, of course, show the outputs of the various bands separately but simultaneously on the screen — a quick way to make the check. It can, however, be done with a simpler test setup on a "one at a time" basis.

Checking digital equipment. This is the future of testing in the radio plant. The technology has not reached the point of standards for coding or error correction, which complicates the testing job. Users of digital units are still heavily dependent on the manufacturer for maintenance and repair, which often takes the form of replacement of modules on a pull-out/plug-in basis.

Once an owner is thoroughly familiar with the operation of a digital remote control (or console or whatever), however, some troubleshooting will be advantageous. Fred Barbaria of Moseley made some suggestions along this line. A logic probe, of course, will show the state of each logic unit at any given time. This can pinpoint trouble spots. A frequency counter is very handy for checking internal oscillators and the internal clock. A fast scope with sensitive triggering will let the user see waveforms at various points in the gear for comparison with the manufacturer's diagrams of proper waveforms at those points.

George Stephenson of Harris added some further comments. He noted that a high-precision voltmeter is not necessary for checking TTL circuitry: any voltage from about 3.8 to about 5.5 means that an operable pulse is

present. Thus, field checking of digital units can often be done with the simplest voltmeters, in the \$15 to \$20 class, and analog readout is better than digital because it more readily averages out fast-moving pulses.

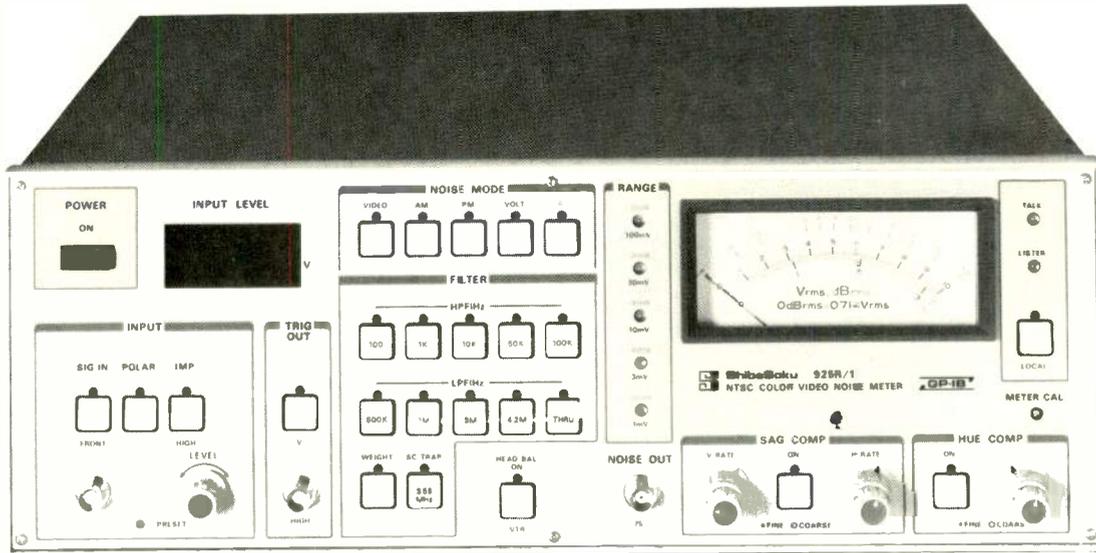
For looking at the pulse train, a good scope of about 35 MHz speed or better, with a calibrated time base, will supply the needed readout on pulse width and pulse intervals. The Tektronix 465 or 475 series or an equivalent will do this job (with built in voltmeter).

Stephenson agrees with the basic usefulness of the logic probe. He notes that a scope with sensitive triggering can show a pulse that is too fast or not repeated enough to make a visible trace: the triggering itself is the signal.

Stephenson also added that an engineer who knows the internal operation of a microprocessor or small computer in detail and has knowledge of the programming and how the unit is supposed to handle it can do in-depth troubleshooting with a system like the Hewlett-Packard Model 1610 digital analyzer. This will allow the engineer to see every move the system makes and to determine whether or not the moves are the planned ones in the system.

The greatest need: engineer training

Stephenson also made a comment that seems extremely important in any consideration of the New Test Era. He said that too many radio managements do not require or encourage their engineering staffs to go to manufacturers' seminars and professional meetings at which they can learn the latest testing techniques and keep up at least partially with the rapid advances of test methods and standards. The field is changing so much and so fast that an engineer who stays out of contact with the mainstream will become effectively incompetent. Simply studying the excellent application notes, brochures, and general discussions issued by such firms as Tektronix, Hewlett-Packard, Bruel and Kjaer, Sound Technology, and Philips can go a long way to filling the gap. The gap must be filled in one way or another if radio engineers are to keep their plants fully in the game in the competitive '80s. **BM/E**



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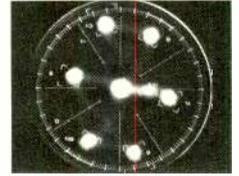
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TEST AND MEASUREMENT IN THE TRANSITION PLANT



The modern television plant, neither fish nor fowl, is trying to make sure that all the analog and digital equipment operates up to spec. The mixture of modes presents a whole new set of problems.

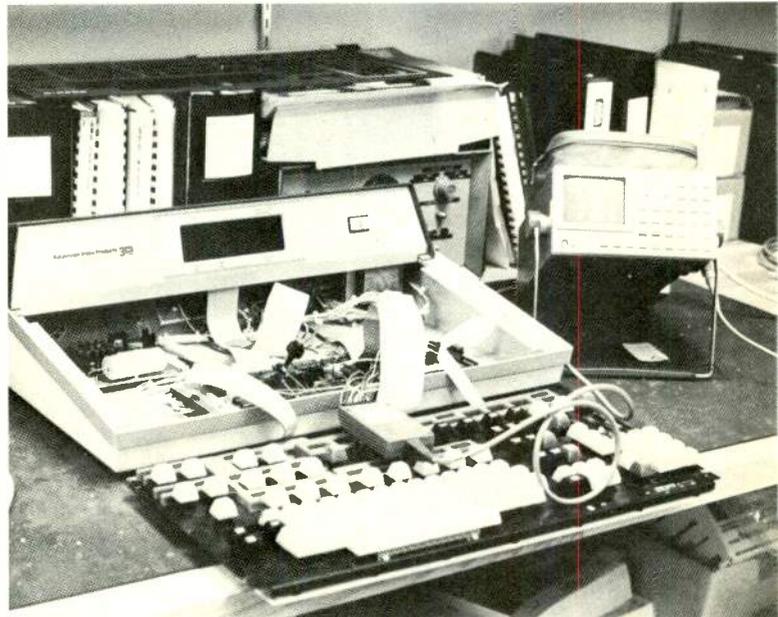
THE PROBLEM WITH test and measurement in the television station of the '80s is that it is like being a little bit pregnant. The modern television plant is a mixture of analog and digital equipment with different requirements for checking performance.

"Every time you buy something new, it's handled digitally until it gets ready to come out of the output port," says Johnnie Popwell, maintenance supervisor at WTSP-TV, Tampa. Popwell and many of his colleagues are faced with the same kind of problem — what kind of test equipment do you buy in a plant that is not really analog anymore and not yet digital?

The problem is more than just buying hardware. The whole concept of test and measurement is different when you start dealing with digital equipment. "You never get to work down to the component level anymore," explains Popwell. "You call the manufacturer and say 'hey, I've got a problem, and they say that it sounds like it's coming from such and such board. They end up just sending you the new board. The manufacturers are more than happy to send you all the boards you want, but you really can't get down to the component level and go in and correct an IC to correct the problem."

That seems to be one of the key complaints in dealing with whatever problems develop in digital equipment and the testing and measurement that goes into spotting the problem early. Many maintenance engineers around the country have little or no idea of what some pieces of equipment are supposed to do. It is difficult to do comparisons of readouts with a logic analyzer if you have no idea what the correct reading should be.

"Without knowing what should be there, it's very



The 308 Data Acquisition Probe connected to a V.A.R.T. in the D-8000 keyboard

difficult to do much of anything with the equipment," concludes Popwell. He and others feel that many manufacturers have become so concerned about their proprietary software that they are reluctant to give out too much detailed information about what the system is supposed to do.

"The whole area of the documentation of a piece of equipment is a problem," says Walt Nichol, engineering manager at KPIX-TV. "It was a serious problem in the days of analog. In the world of digital equipment it is frightening. It almost panics one to realize that you've purchased this highly sophisticated piece of equipment, and when you open the instruction book to where you expect to see schematics or logic diagrams, you find out that the information is proprietary."

Even if the problem is not with proprietary information,

The Transition Plant

it often lies with the sheer volume of information that goes into describing a system. "I've been told," says Popwell, "that the documentation for one piece of equipment that we have supposedly occupies a volume that is 12 inches thick."

The implication is that the problem is not so much that there isn't test equipment available to analyze the data, but that it's difficult to tell what the data is supposed to be.

"In most of the digital equipment that we are looking at, we're looking at very high speed data streams," explains Nichol. "You can't stop the system and look at it

because it doesn't exist unless it is running at full speed. The data stream is changing so rapidly in time that in most cases a logic analyzer is useless unless you know exactly what you are looking for. This is what the documentation does not provide."

The documentation issue gets further reinforcement from Steven Smith of Broadcast Technology Consultants. "There are all sorts of tools available to test digital equipment," Smith notes, "but you're not able to use them if you plug them into the equipment but don't know what to expect. The documentation doesn't tell you how to use it."

Gene Leonard of Da Vinci Systems Group also feels that there has to be a clearer understanding of what the system does. "Any diagnostic system has to include a model to assure that you can get early warning," Leonard stated. "It takes a good diagnostician or a guy who really understands the machine to know what warnings he is getting."

As an example of the kind of problem that confounds maintenance engineers, Walt Nichol describes troubleshooting a digital video effects device:

"You look at the output video and see a problem — there is a glitch in the output video. You can go in with your oscilloscope and look at the analog output stages. The problem is there, alright, but at the first point you have analog and it's still there.

"It tells you that it is either in the digital-to-analog converter or it's back in the digital domain. You start going back until eventually you get to a point where you have a logic analyzer hung across a data bus where data that comprises the video signal is charging through it.

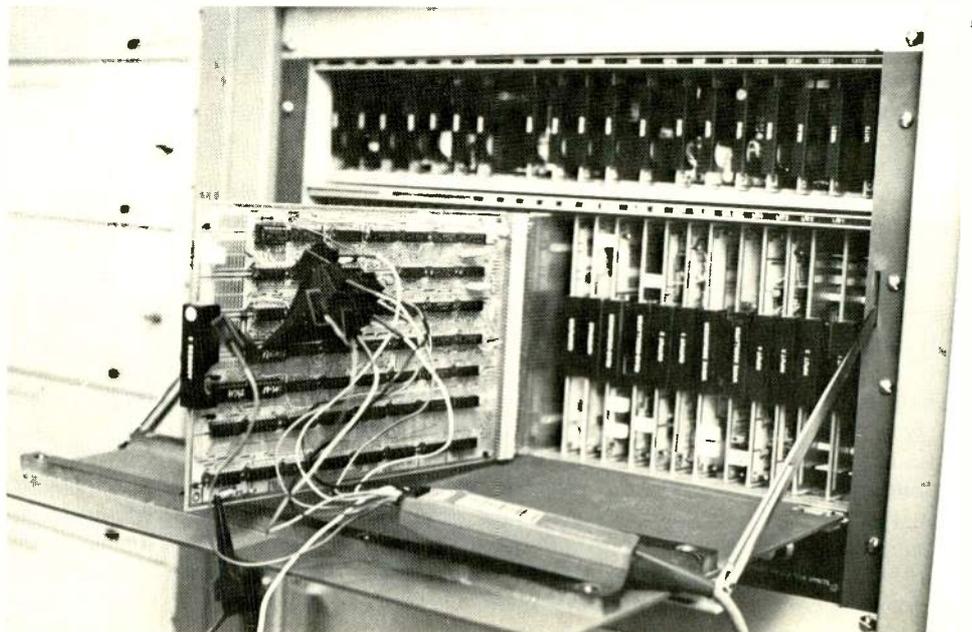
"Unless you know very clearly what the data protocol and the data flow is through that system, you have no idea, when you are looking at any particular word comprising a video signal, what it really is. You're just getting this mass of data streaming by.

"To know what to pick out of that, where to trigger, what to look for — that information just isn't there. Many manufacturers are providing you with a kind of guide. You look at the output video and match your description of what you're seeing to their list of descriptions, and that tells you in general where your problem most likely is.

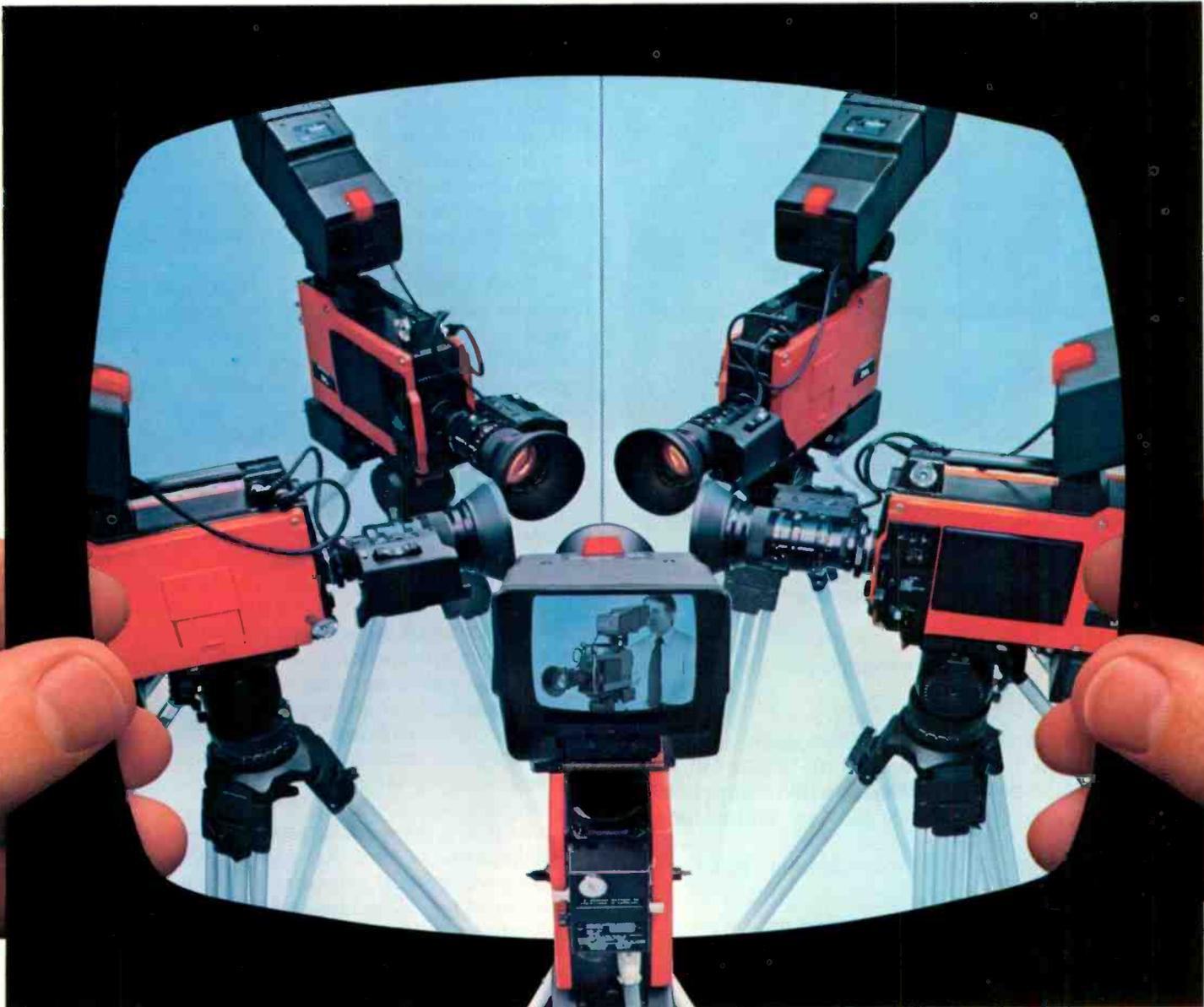


Here the 308 is using the Serial Data Probe connected to the Serial Output of AE-600 Editor. The Serial Data is sent to the remote control panels for the status indications

The 308 is connected to a PROM in the Quantel DPE-5000. A look at the PROM output shows different address inputs



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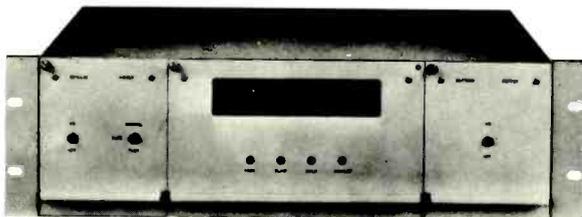
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The Transition Plant

"Sometimes the final video itself is your best diagnostic tool. Sometimes it's your only diagnostic tool."

This leaves most stations with a greater dependence on the manufacturer for support. Unfortunately, this also leads to a tail-chasing situation for all concerned. The greater the dependence the broadcaster places on the manufacturer for diagnostic help, the more strain is placed on the manufacturer's already strained field support staff. When manufacturers declare that their more sophisticated equipment is not "field maintainable," however, broadcasters have nowhere to turn except back to the manufacturer.

"It takes very specialized computer-aided diagnostic systems just to figure out where the problem is," says Nichol. "We find ourselves in the position of limiting our troubleshooting to just get it down to the board level and get the board back to the manufacturer for repair. Many of the manufacturers have never been in this position themselves before and their field support operations can't handle it. The broadcaster gets caught in the middle again."

On one level, this situation looks bleak for all concerned. It is difficult to set up monitoring systems if the end user has no clear idea what is supposed to be the normal output of the system. The lack of adequate documentation because of proprietary software places a heavy burden back on the manufacturer to provide strong field support services. Because the support services aren't adequate to handle the increased demand it is incumbent on the broadcaster to set up inhouse monitoring systems

... The circle continues.

There is, of course, some hope. There are two approaches that seem to offer the best way out of the digital testing morass.

The first is for manufacturers to begin designing-in self-diagnostic systems. According to Walt Nichol, "A major piece of digital equipment today that cannot, in the majority of the failure modes, tell you which board the failure is on is not meeting the needs of today's industry."

Along the same vein, there should be some way of at least plugging into the manufacturer's host computer so it can interrogate your device and tell you what's wrong with it.

The other approach that will help solve many of the test and measurement problems in the digital plant is the setting of standards. And most of the people *BM/E* interviewed for this story feel that just setting the standards is not the total solution. There has to be a recognition that, as Steve Smith puts it, "There are other types of test equipment that are prevalent in other industries that ought to be prevalent in our industry. It is because [without digital standards] manufacturers aren't designing their systems to use standard test equipment."

Leonard concurs, "When you get into the question of test and measurement in the digital plant," he states, "you are going to be confronted with a situation in which no one will invest in diagnostic equipment until things become stable. Nobody is going to invest in a \$100,000 diagnostic unit unless they are sure that the monitoring and communications techniques are the ones that are going to be used for the next five years."

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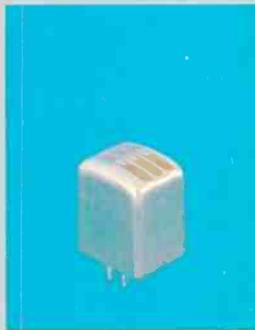
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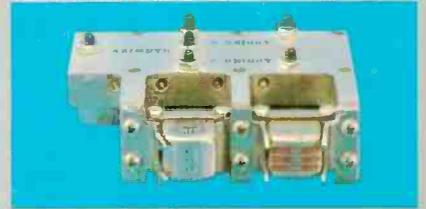
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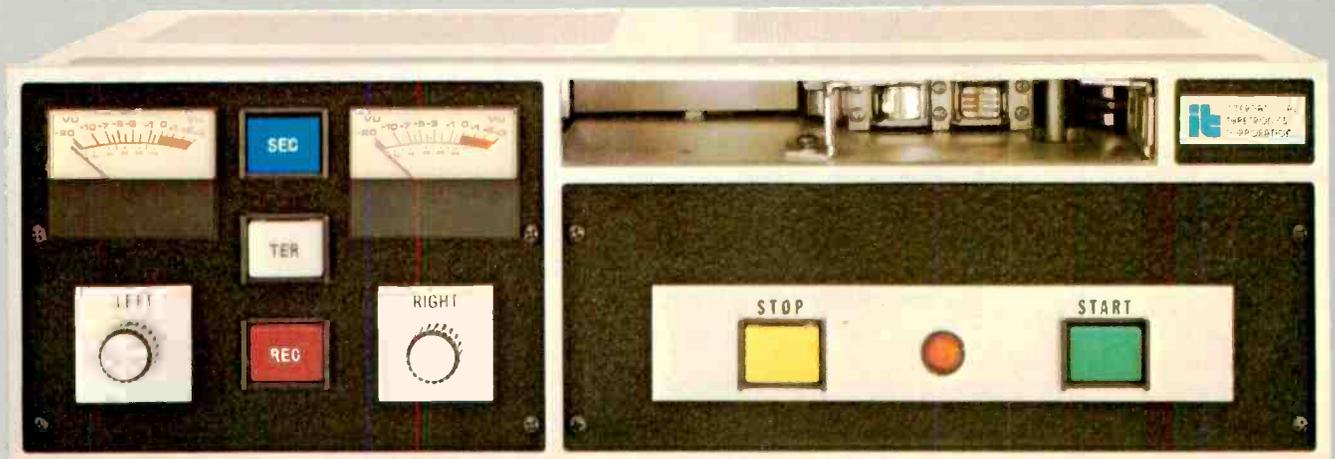
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TEST AND MEASUREMENT: A LOOK AT WHAT LIES AHEAD

By Tom Long

Increasing complexity and impending digitization are forcing changes in time-honored broadcast plant maintenance methods. Here, a representative of a company intimately involved with these changes gives his views on what broadcasters need to do to keep up.

LIKE THE WORLD, broadcast technology is getting more complex. Broadcasters want more technical and administrative control over the broadcast plant; they want more creative tools with which to dazzle the market; they want equipment that is more reliable; they want to cut costs; they want to keep up.

Some, however, have mixed feelings about the trend to greater technical sophistication. They see the age of seat-of-the-pants engineering slipping away, and many were more comfortable with it. They see fewer and fewer skilled technical people to go around. They see digital circuitry replacing analog circuitry, and they are aware that digital equipment has different characteristics. It can only tolerate drift or distortion to a certain threshold, and then it's go/no go. It is basically more reliable, can report on its own status, and can help diagnose its own problems. Much of it is programmable, and much can operate unattended. But there is still a need for test and measurement equipment, and there is concern that in the new world of digital equipment, T&M instruments will become expensive, difficult to use, and expensive to service.

This whole subject, of course, is of intense interest to manufacturers of T&M gear. By and large, I feel that the concern is unwarranted. In this article, I want to sum up current trends and where they're leading, and make some educated guesses about what lies ahead.

One basic shift among broadcasters is to the use of digitally controlled systems that require data terminals,

Tom Long is vice president and general manager, Communications Division, Tektronix, Inc.



Data analyzers like this Sony/Tektronix 308 will find increasing application as broadcasters confront state, timing, serial data and signature analysis problems

some in-house programming, and data-communications links. This is really part of a global trend affecting all industries, but broadcasters, because they deal in precision signals and minute fragments of time, have greater concern than many about lost data bits and high-speed troubleshooting. Terminals, storage devices, and mainframes are generally serviced by a manufacturer or its representative; but problems may arise elsewhere, in communications links or interfaces. Conventional station test gear won't do here; the instrument of choice is a data analyzer (or logic analyzer) that can be quickly connected to the data stream at specific points to track down the fault.

The most immediate evolving change is likely to be driven by the television industry's need for higher quality

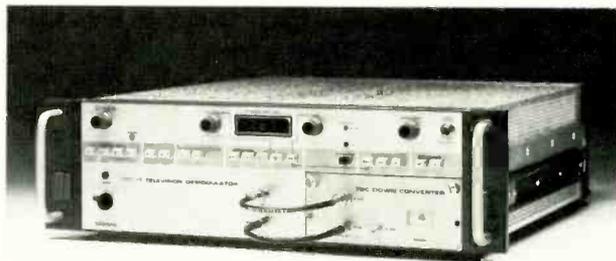
Test And Measurement



As higher quality audio becomes a necessary competitive strategy for radio stations, greater care must be given to large EQ systems and other audio paths employed

multichannel routing system and provides freedom from electromagnetic interference with the audio signal.

Programmable instruments are solving other nagging T&M problems for broadcasters, such as the time-consuming taking of video-signal measurements to satisfy NTC 7 and FCC requirements. The analog instruments traditionally used are subject to drift, loss of accuracy, and the need for frequent adjustment. Programmed digital instruments can do the work quickly — even automatically — with great accuracy and with the ability to diagnose their own faults, if any. They are less subject to drift. The other virtue of programmable equipment is that when future measurement needs change, it is a matter of updating software, not hardware.



Quadrature and in-phase detector provide a vectorscope-like display to help identify the source of intercarrier buzz

The increased use of microwave links for ENG coverage and the use of satellite up/downlinks, coupled with a growing shortage of skilled technical people, has created a demand for programmable versions of some testing instruments. Programmable spectrum analyzers, for example, are available for automated measurement and, through a GPIB interface, automated documentation of results. We see the trend in spectrum analyzers going both ways: simplified versions for some applications, more sophisticated microprocessor-controlled versions for others.

Another development that will affect the test and measurement of broadcast video signals is teletext, essentially a system of providing alphanumeric and graphic information to home users by means of common carriers — telephone, cable, broadcast TV. It is a reality in Britain and France and is being tested in Canada and the U.S. In broadcast systems, the information will be carried as a digital pulse train in the vertical blanking interval. It is vulnerable to distortion in transmitters or receivers, since distortion or ghosting can result in lost data bits that will garble the information and make it useless.

Teletext signals may require tightening of group delay and gain frequency response flatness in the 1 MHz to 3 MHz range. Delay and flatness errors result in intersymbol interference, a condition in which pulses lose their independent meanings and the transmission becomes gar-



Tek's Answer system is one of several larger computer-based systems which manufacturers are introducing to handle automatically a wide range of on-line and off-line test and measurement requirements

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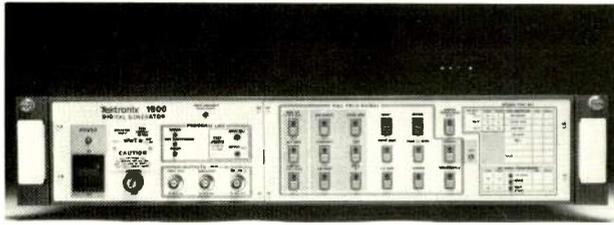
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Test And Measurement



Digital signal generators are becoming more common in order to provide the array and stability of test signals required for precise measurement

bled. A sequence of modulated \sin^2 pulses in the 1 MHz to 3 MHz range allows the testing of gain and delay flatness.

The digitization of the television signal, which is currently being done in digital video effects and which will be followed with digital videotape recorders and other studio equipment, will bring with it unique problems. Certain problems center around the need for a parallel-to-serial and serial-to-parallel data-stream conversion system that satisfies the industry's need for precision signal transmission. Intersymbol interference, noted as a possible problem with teletext, will be much more of a problem in the serial transmission of digital television signals. New test and measurement equipment will unquestionably be needed.

High-quality fiber-optic television distribution systems also present engineering-instrumentation problems. Test instruments to deal with these problems are in the works.

T&M equipment generally will become smaller, more intelligent, and programmable. More T&M instruments will automatically monitor equipment and indicate faults or status by lights or LEDs, rather than providing readouts in absolute values. There will be more and more remote, unattended transmitters, creating a greater demand for automatic monitoring equipment and for highly portable T&M equipment. Remote production also demands small, light, simple reliable test gear.

As digital circuitry helps reduce the size of T&M instruments, it will also make them inherently more reliable, with more and more serviceability built-in. Change will occur also in customer service. Companies making T&M instruments will be doing more and more service work, not at the broadcast station, but at regional shops. This is an inevitable outgrowth of two factors: the shortage of capable technical people, and the growing complexity of the instruments. The approach to product manuals may change as well. We prefer to explain theory as well as practice in our manuals, but it may well be that the emphasis will shift to structured diagnostic procedures rather than the theoretical information that permitted technicians and engineers to deduce problem sources.

Tracing the future

What other trends do we see? While the size of T&M equipment will shrink in the years ahead, the sophisticated instruments used in shops and labs will be substantially more complex and expensive. And although status indicators will multiply, don't look for LED's to replace cathode ray tubes. The oscilloscope gives a continuum of information that is difficult to reproduce any other way.

With the arrival of digital audio and digital video, is it possible those familiar scopes and WFMs will eventually disappear? Not likely. They will be supplemented with other products to help unravel the complexity of the signal.

Other developments — the slow change of the station from a technical to a data-oriented business environment, the advent of high-resolution video systems, the emergence of fiber optics as a transmission medium, and still others — will keep T&M people on their toes in the years to come. The products the industry will need are already taking shape today.

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Editors note: There is, today, more test and measurement instrumentation available than ever before. Much of the newer T&M approaches were in evidence at this past NAB. For a comprehensive review of the new products, from Tektronix and others, see our report on page 51. Other instrumentation is just coming to the attention of broadcasters especially in the areas of equipment for digital circuitry and computer maintenance.

Certainly, as computers become more pervasive in broadcasting, companies less familiar to broadcasters but known to the computer industry will begin to offer specialized instrumentation to this industry in competition with conventional suppliers. Companies providing logic analyzers and data analyzers likely to be heard from include, for these newer types: Hewlett Packard, Gould, Paratronics, Dolch, Philips. Audio distortion analyzers like Tek's AA-50, will also come from companies like Sound Technology and Potomac Instruments.

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Philips, of course.

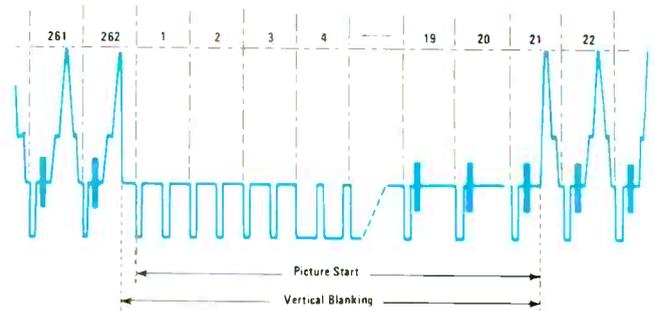


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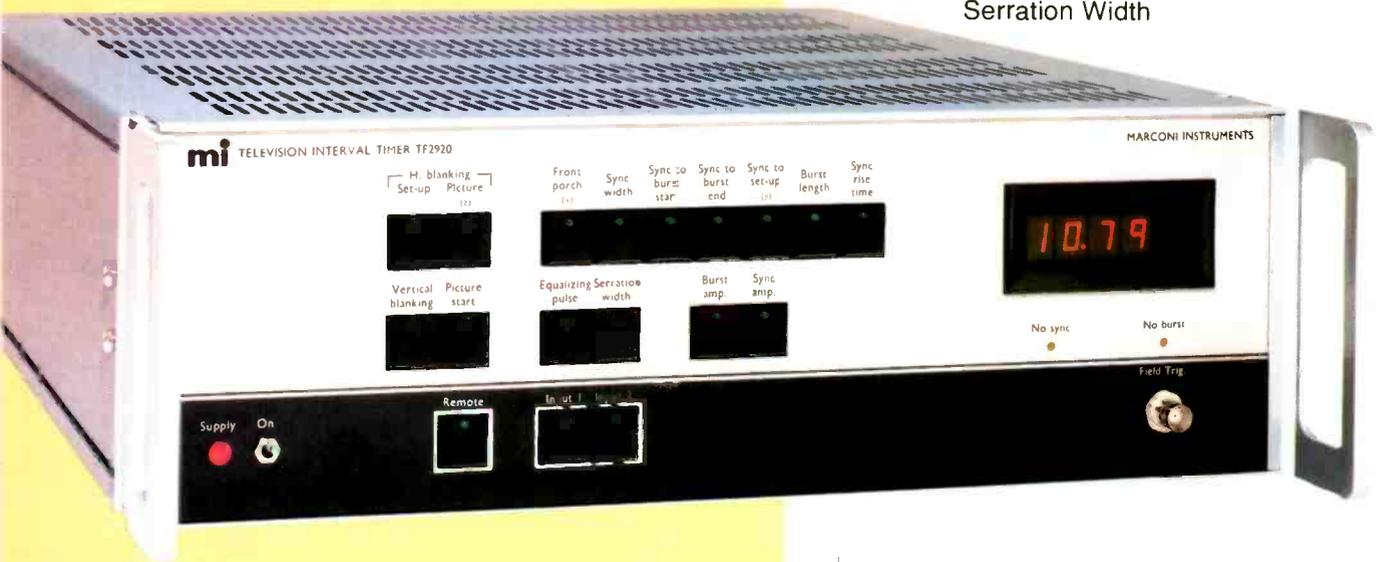
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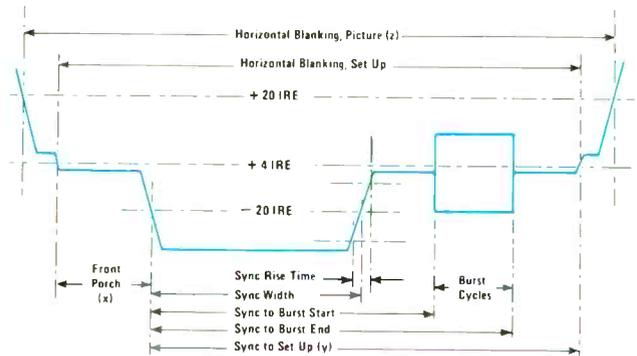
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NAB SHOW IN PRINT T&M 1981: KEEPING PACE IN A TIGHT RACE

By David Acker

As the industry rushes toward computerization and digital systems, concern grows over the ability of maintenance to keep up. NAB '81 showed test and measurement running hard and staying with the pack.

A TREND HAS BEEN SET by the major test equipment and instrumentation manufacturers in several new product introductions at last April's NAB. With radical equipment changes taking place at both radio and television stations, presaged by the equipment reported in last month's *BM/E*, the need for more automatic, faster, and simpler test, measurement, and monitoring technology is clear.

BM/E chose to treat T&M separately in this issue in order to give the reader an opportunity to see this new test and measurement gear against the backdrop of the changes taking place in other broadcast equipment and in the light of the structural changes taking place in the industry as a whole. The preceding articles describe some of the major concerns for support of the highly sophisticated equipment now coming on line. It is not surprising, therefore, that the sharp turn towards digital circuitry and computerization in other classes of broadcast equipment is recreated in the T&M category.

Microprocessor control is a key feature in many new products and permits more inherent sophistication and capability while easing the equipment operational interface. In many cases, the microprocessor programs test sequences, makes data comparisons and analyses and provides a more routine approach to testing studio, engineering, or production equipment. Periodic testing with hard-copy printout of several

David Acker is a consultant to the television industry and former president of Microtime, Inc.

important system parameters allows the user to get the full performance picture, preventing costly equipment breakdowns or degradation in performance that otherwise might go undetected until a catastrophic breakdown occurs.

Multiple-parameter testing is another key feature of many new products, saving money from several angles. Since fewer test units are needed, costs for original capital equipment, setup, and operating labor are reduced.

Promises of speedy or off-the-shelf delivery are also an important objective for many manufacturers. Most equipment introduced is either currently available or will be within 90 or 120 days.

The television monitor is appearing widely as a display medium for the new equipment. Notably, the picture monitor functions as an oscilloscope for Lenco's SCH measuring product, Vidioscope. Several audio manufacturers are also incorporating the monitor as a spectrum analyzer display. Another monitor-based product feature seen in many test equipment units is "spot" measurement for parameters such as luminance or chroma noise. Specific areas anywhere in the field can be selected for evaluation and measurements made to determine performance of important system parameters.

All in all, manufacturers are trying to provide the degree of sophistication required to quantify the performance of today's television processing equip-

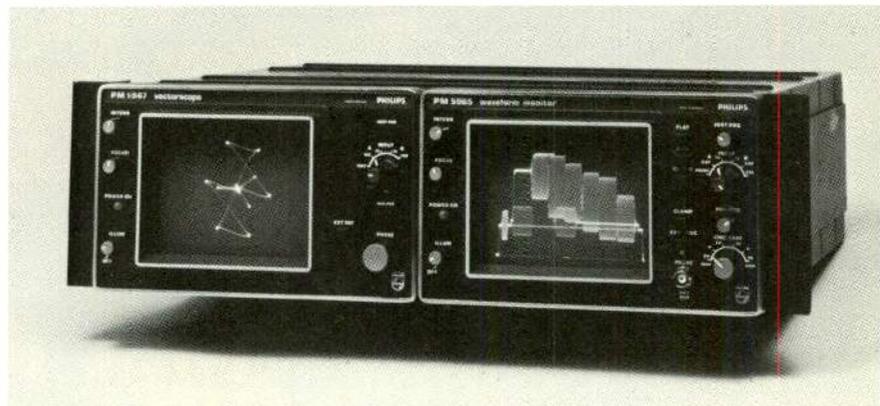
ment, while at the same time making the job easier for the operator. It is a big task, particularly in light of the ever-growing complexity of digital video equipment.

It appears that we're headed in the right direction, however. Micro-processor-controlled systems can provide the versatility and speed needed to test newer, more complex equipment. Cost-effective test systems that operate on a routine or, in some cases, continual basis will help spot problems before it's too late. Finally, the computer world can make important contributions as well. Standard computer interfaces will strengthen the test equipment role by providing the better, more reliable gear needed to continue the advancement of television equipment and programming.

While in this transitional stage, however, conventional T&M systems continue to expand their capabilities by progressively adding automatics and digital storage. One definite concern is the desire not to leave the analog world behind. Many of the new systems, therefore, look and operate like earlier equipment, but move the speed and accuracy of their functions far forward in order to keep pace.

TV heads toward computers

One direction in test and measurement was clearly demonstrated by Digital Video Systems' DPS-100 diagnostic



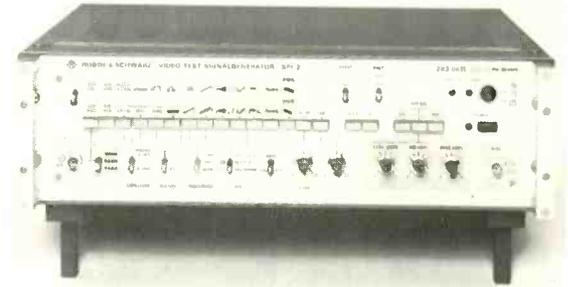
Philips introduced two companion instruments, the PM 5567 vectorscope and PM 5565 waveform monitor

NAB SHOW IN PRINT

system. As reported last month, this highly sophisticated system exemplifies the trend toward on-line T&M, providing constant monitoring of the various video and time base parameters and reporting developing problems to the operator. The system, of course, also provides off-line system testing through a series of digitally generated test signals that can be run and evaluated for complete system checks.

Philips Test and Measuring Instruments (not involved in the CDL deal) introduced the Model PM5565 waveform monitor and a new vectorscope, Model PM5566. These complementary products are available in both PAL and NTSC standards and list for \$2095 and \$2570, respectively. Other equipment from Philips' Professional Television (PTV) measuring division included the color pattern generator PM5534, which has a test pattern with 27 parameters, and several other video signal generators. A new digital storage oscilloscope, Model PM3310, samples the input waveform and stores it for analytic comparison purposes. Four memories provide multiple trace displays of stored information. The microprocessor-controlled unit can be interfaced to other equipment via the

Thirty-two different test signals are provided by the SPF 2



IEEE-488 bus. Transient signals up to 12.5 MHz and periodic signals up to 60 MHz can be processed. The unit is currently available at \$6995.

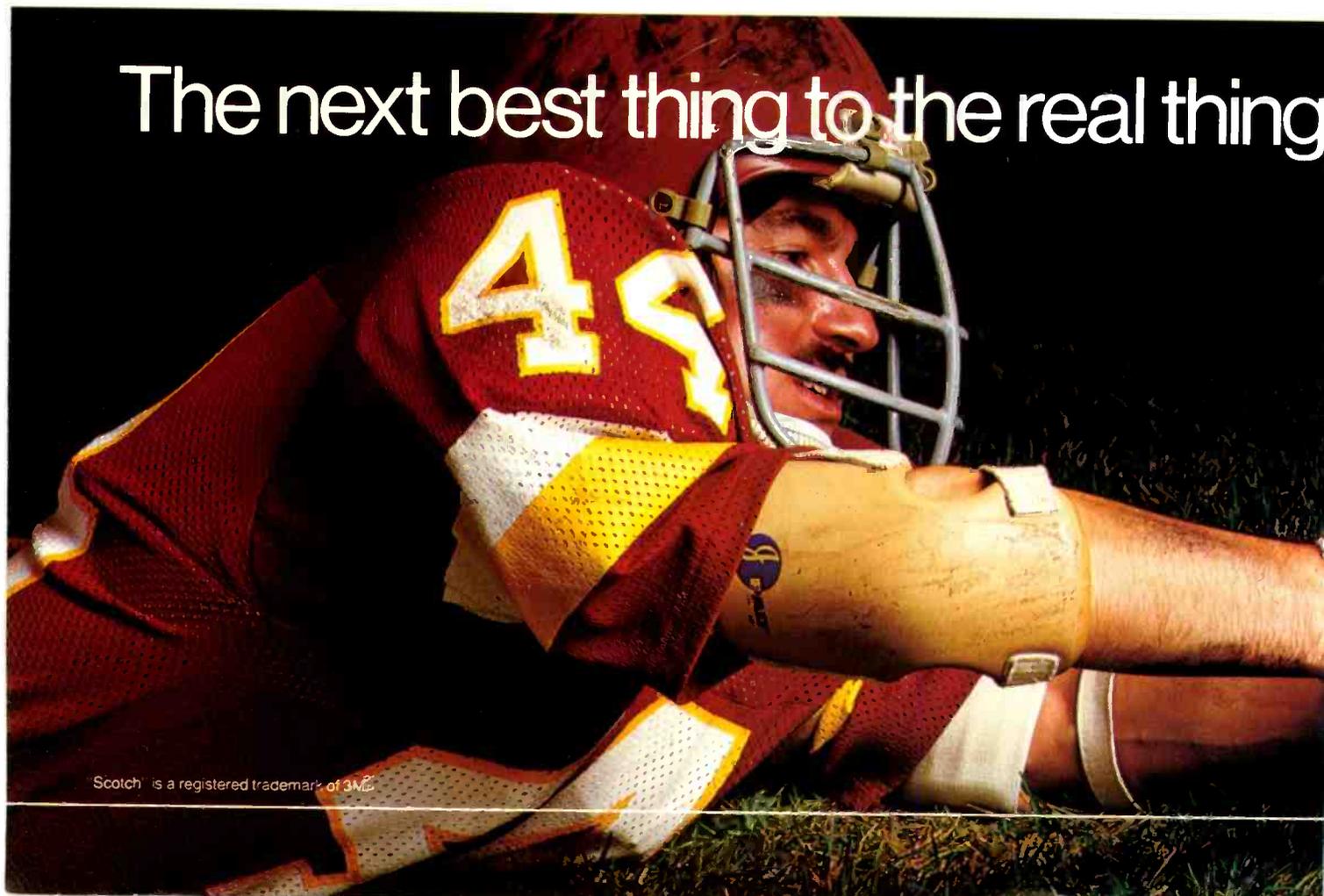
Several new T&M products were introduced by Tektronix, including a digital storage oscilloscope, a solid-state waveform monitor, a SMPTE color bar generator, a digital storage RF spectrum analyzer, and some new products for the overseas market. The digital storage oscilloscope, Model 468, operates exactly like the non-storage 465B except when in the storage mode, which is achieved with the push of a single button. The \$5600, 468, due to be available next month, uses a 25 MS/s, eight-bit digitizer and a display interpolation technique to achieve a 10 MHz "useful storage bandwidth."

The new waveform monitor, Model 528A, is designed for use with camera

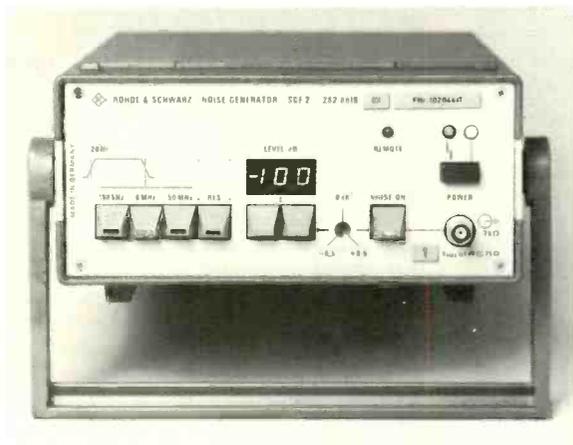
outputs, video system output lines, and video input lines in 525-line systems (625-line models are optional). The \$2095 unit is extremely compact at just 5.25 inches high. Its small size makes it appropriate for use with a companion unit such as a vectorscope. The new color bar generator is the TSG7 SMPTE monitor alignment color bar test signal generator. It is part of Tek's 1410 generator series and provides, in addition to monitor alignment, EIA color bars, full-field color bars, and several split-field color bar signals. The unit is priced at \$1300, and, according to Tek, deliverable in four weeks. A retrofit kit to add the monitor alignment function to the TSG1 will become available shortly.

Lenco, in addition to showing its Videoscope (which uses a conventional picture monitor to graphically display

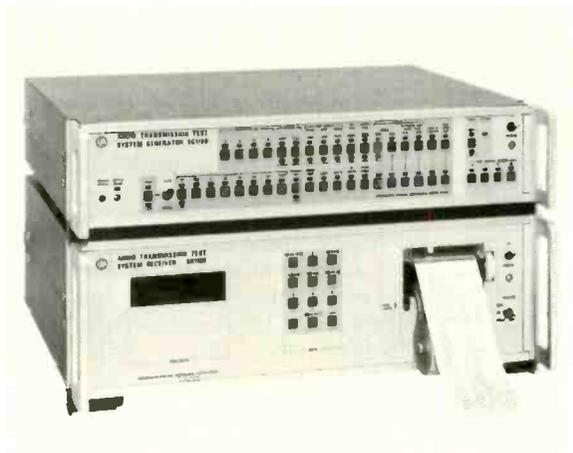
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Rohde & Schwarz's noise generator provides white noise over a bandwidth from 20 to 50 Hz

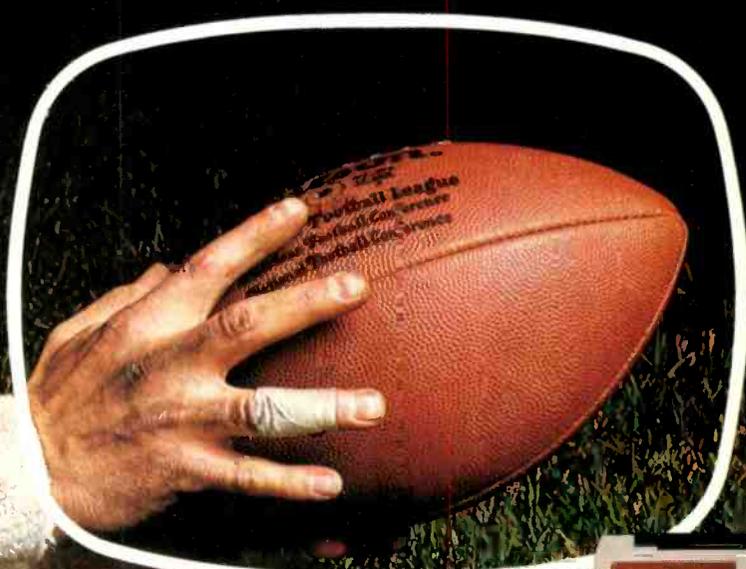


Marconi's new SR1100 and SG1100 audio testing system can examine some 46 key parameters in 3.5 seconds

relative horizontal and subcarrier timing relationships), demonstrated a new product — the PGL-413. This unit not only provides a genlock function and generates a black burst signal, but also operates as an RS-170 to RS-170A converter. Using the basic principles of the Videoscope, which permits accurate measurement of the SCH of one signal relative to another, the converter can correct the SCH of a given signal relative to an external reference or genlock to the signal and correct it on an absolute basis. No disturbance is seen when the correction is made, allowing correction to occur on the program line while on-air. The system is a good example of a simple display interface operation for maintenance people. The unit will be available in November, 1981 at an estimated price of \$2500.

Marconi also demonstrated its automatic video measuring equipment. Comprised of an insertion signal analyzer (Model 2914A), a line selector (Model 3146), data monitor (Model 2915), and data selector (Model 2917), the system, shown interfaced with an HP85, measures key performance parameters of processing equipment with a particular emphasis on VTRs. Line selection and hard-copy printout, among other features, permit fast routine testing with a copy of performance levels for future references.

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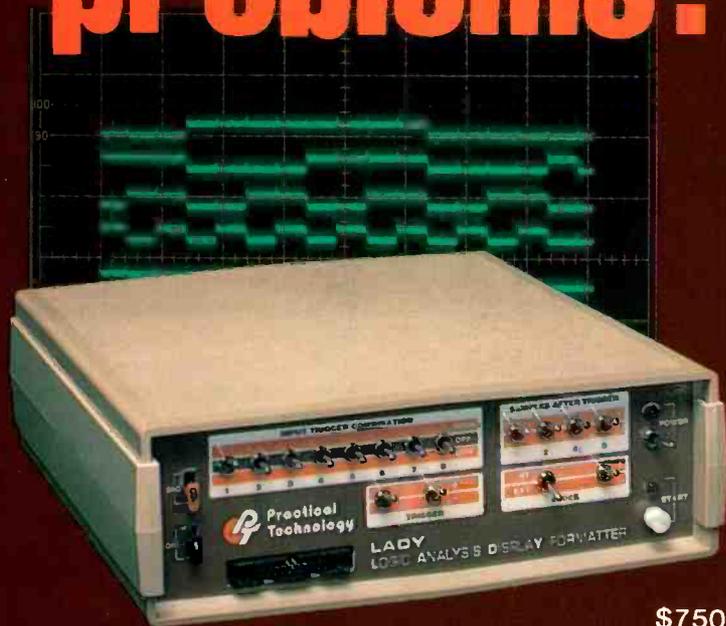
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Software prompting provides an easy interface for the operator. All equipment is currently available, with prices starting at \$17,500 (the cost of the 2914A). The system is good example of automated measuring equipment easing the complexity, cost and time of test and maintenance measurements.

Several new products from Rohde & Schwarz included the digital video test signal generator SPF 2, which provides 32 different test signals including color bars, linear and non-linear distortion test signals, convergence, and VITS. It employs digital processing and is available in both NTSC and PAL standards. Priced at \$9500, the unit is currently available.

The R&S video noise meter UPSF 2 features microprocessor control and ease of operation, along with digital readout of true RMS and peak values and autoranging. The unit will measure luminance and chroma noise over all lines, in any line or a selected spot in the field. Available in both NTSC and PAL standards, the UPSF 2 is priced at about \$16,000. Deliveries will start November 1.

The noise generator SUF 2, currently available at \$4400, generates white noise over a bandwidth from 20 Hz to 50 Hz. The noise spectrum can be used to detect non-linear distortions and to measure frequency response.

Videotek unveiled its new TSM-5 waveform monitor and a new vectorscope, Model VSM-5. The 5¼ high compactness of both units is attractive. They can be purchased separately or as a companion set housed in the same cabinet. The waveform monitor is available in either NTSC or PAL and provides several modes of display and filter selections. The vectorscope also provides several operational modes and an A/B input selectable display, as well as a test circle for calibration. Price for the combination is \$4530, with delivery in two weeks. Videotek also displayed its standard lines of professional picture monitors and receivers, a tuner/demodulator, and an audio program monitor.

Asaca/ShibaSoku continued to expand its influence in the television test and measurement field, displaying its widely respected color video noise meter, Model 925R; video sweep generator, SV11; white balance checker, 898B, and TV signal analyzer, TSA-7/1. The TSA-7/1 is an extremely sophisticated unit for automatic waveform measurement using a microcomputer for arithmetic-type measurement. It offers a wide variety of interfacing opportunities to extend its effectiveness. New to the line was the video sweep generator, SV11. This unit

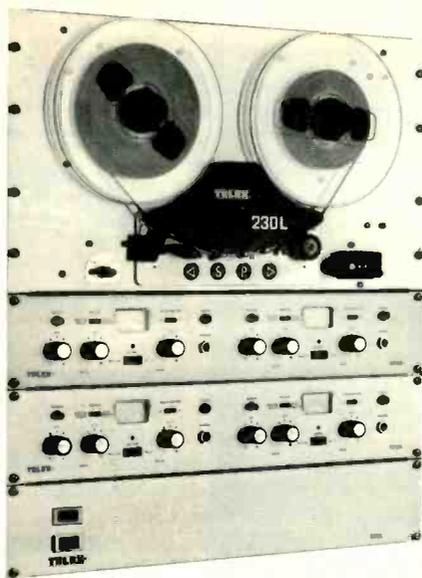
is for wideband video sweep operation from 100 kHz to 30 MHz. Two amplitude ranges allow sweep of the entire range or selection of a particular frequency. Sweep signals can be selected by switching V sweep of the built-in sync signal and power line frequency. A variety of marker functions can be added or extracted to allow the indication of attenuating band in the measured circuits. The unit is also suitable as a signal source for adjustment and test of high-resolution, wideband video equipment.

For-A Co. introduced a new sync pulse/color signal generator, the TSG-5000. Available in NTSC and PAL, the unit provides full sync drive outputs as well as color bars, black burst, and a color background signal. Genlock is derived from either composite video or subcarrier, comp sync and PAL pulse (as applicable). The unit also has a remote control feature that permits operation of the sync pulse/signal generator as well as the hue, saturation, and luminance level of the color background signal. Operation to full broadcast specifications is a key performance feature.

Leitch unveiled its microprocessor-controlled DTG-1000 digital test generator, capable of providing 35 different test signals on five separate outputs. Each test signal is digitally generated, based on a software program. Output signals are grouped into five test modes, each consisting of seven configurations. Scope trigger outputs further add to the versatility of the unit. Test signal selection and output can be remotely controlled. Status indicators provide the equipment operational modes. "Zero SCH" is a key feature. The \$8500 unit will be available in September.

Broadcast Video Systems introduced a new color signal monitor, model EV4060. This instrument, manufactured by Electronic Visuals Limited, is switchable between waveform and color vector display modes. Featuring full broadcast specifications, half-rack 5¼-inch height, a high-brightness trace on all sweeps, sound-in-sync capability, test circle, and squarewave calibration, the unit will be available in July at a cost of \$4500. BVS also showed the PW-200 pulse width measuring set, which determines sync and H and V blanking widths when used in conjunction with a black and white monitor. The unit reads out measurements as set by a cursor anywhere in the field.

Comprehensive Video Systems brought the new VTC-100 video test center. The \$795 equipment conveniently brings together video and audio test signals for checkout of cameras, VTRs, or any other processing equipment. Monitors are easily interfaced via separate connections on EIAJ eight-pin



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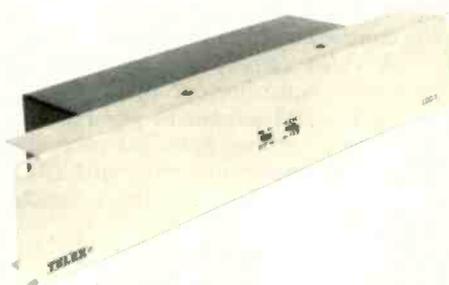
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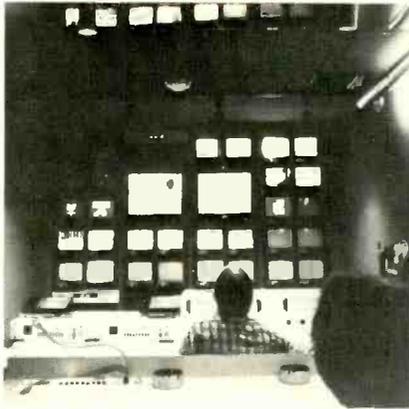
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proved that broadcast vehicle success is not predicated on hand-rubbed lacquer paint jobs or oversized off-the-road tires. Packed into a 20 foot stripped-out paramedic ambulance box atop a Ford chassis are three SK-70 digitally controlled cameras and an SK-80 minicam, a Grass Valley 1600 switcher, a Yamaha PM 700 21-input audio board, and an RTS intercom interfaced with a four-station telephone, so producers do not have to stay in the truck.

Video Productions of Nevada has had the van for three years, during which time it has produced world-class shows for clients as diverse as Don King Productions and NASA, for which it provided 17 days of non-fault pool coverage of the Pioneer flight through Saturn's rings.

VPN's ex-ambulance must travel with an outboard van that carries an RCA TH-200 one-inch VTR with slow mo and a TH-50 portable one-inch VTR; there is no on-board tape facility in the three-year-old truck, which counts among its clients Japan's NHK, Italy's RAI, and West Germany's ARD as well as the three commercial U.S. networks and PBS.

Midwest Corp. of Cincinnati, Ohio, showed its M-1, an EFP vehicle that is being built as near to a standard vehicle as is possible in this business. Based on an econoline-type van, the vehicle — which costs just under \$100,000 — is equipped with two Hitachi FP-40S cameras, an Echolab SE2 switcher, a Quantafont QV character generator, a Sony VO2860A U-Matic recorder/editor, Microtrak 6455 audio console, and a Technics RS-M85 audio cassette deck. In addition, the standardized broadcast van carries Panasonic TR932 dual nine-inch monitors, a Videotek VM8PR color monitor, a Tektronix 528 waveform monitor, and a VAC BPM-1 burst phase monitor, as well as a Lenco Video distribution system.



Mobile production vans increasingly offer spacious and comfortable interiors rivaling those found in studios. This is F&F Productions control room in its trailer



Strike Systems "Eagle" offers a surprisingly comprehensive news production package in one of the smaller off-the-road vehicles around

Options on the truck include editing equipment, microwave relay systems, additional cameras, a time base corrector, and alternate equipment selections and floor plans. The company promises that if it cannot have a basic M-1 vehicle ready for delivery within 30 days of order, it will knock \$2000 off the price tag.

A name new to NAB — but not to the broadcast vehicle field — is Gerstenslager, a custom coach builder based in Wooster, Ohio. Although the company did not bring its vehicles to Las Vegas, company representatives were happy to discuss the three model types the company builds. They include a four-camera transit bus model, a 20-foot Forward Control EFP truck, and 40-foot trailer rig equipped as a studio on wheels.

Even the camera makers are getting in on the broadcast vehicle act. Philips

introduced its new line of mobile television production vehicles, which are equipped with several Philips camera options, a one-inch VTR, production switcher, and audio facilities.

Philips initiates its mobile unit enterprise with four vehicles, the A-10, a 10-foot unit for single camera use; the B-14, a 14-foot unit for two camera operation; the C-16, a 16-footer also for two cameras, and the D-22, a 22-foot unit designed for three cameras. The B-14 and C-16 are expandable to three camera units while the D-22 can handle up to six cameras. All units sport complete audio and lighting facilities. Suggested cameras are triax or conventional LDK-14S, LDK-25B, or LDK-5B.

Video Production Services of Kansas City and Dallas endorsed Philips's camera choice. VPS showed off its new van, a Compact Video Services Com-



Vidcom offers a number of production vehicles suitable to almost any size location need



Video Production Services of Kansas City and Dallas was one of several large EFP vehicles which selected Philips LDK series cameras

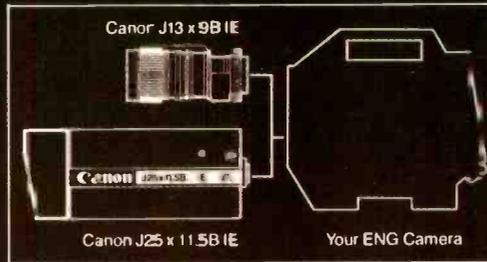
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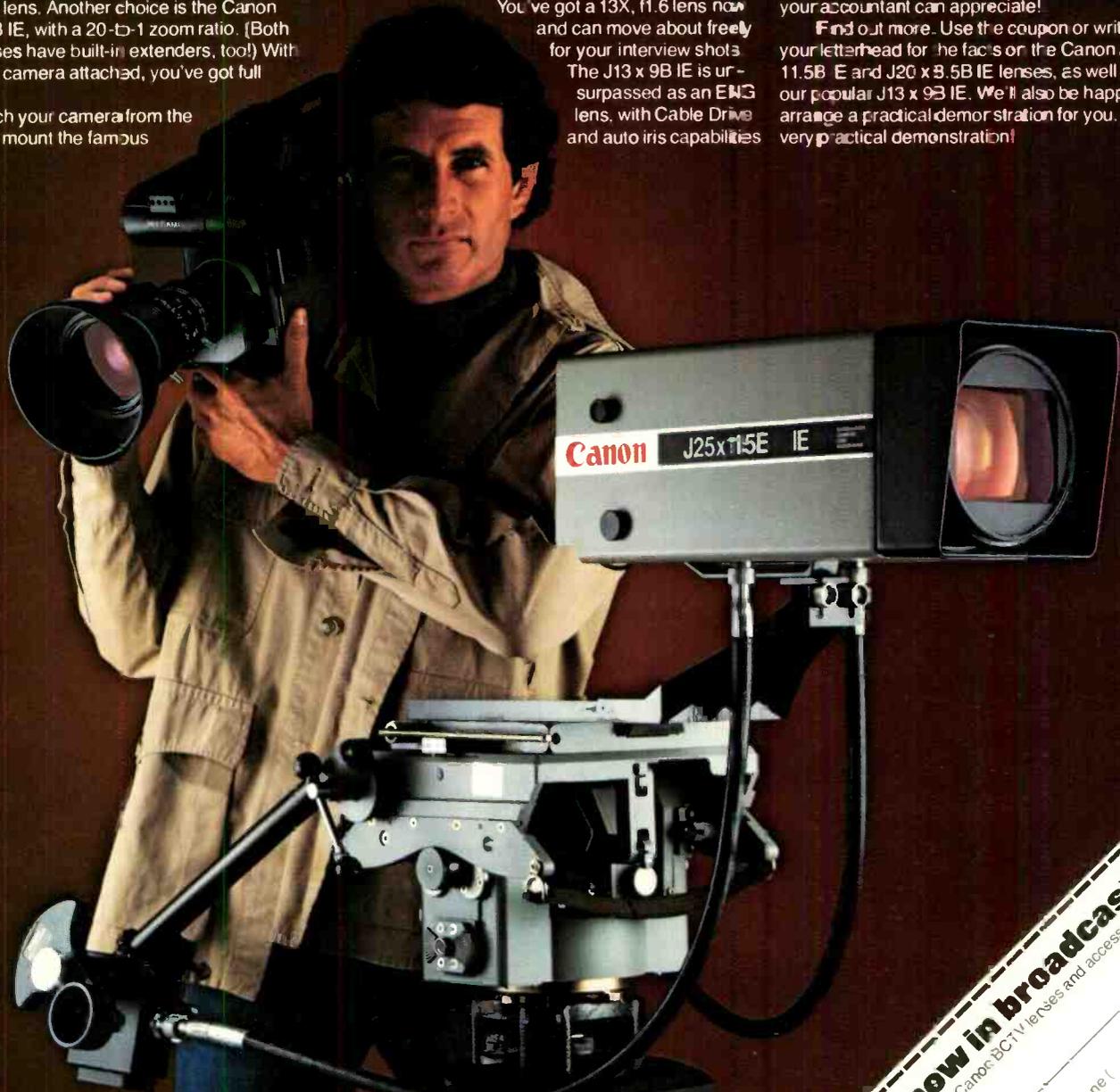
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pact 27 (these were introduced at last year's NAB by the California group) that carries four LDK 5Ps and two LDK 14s, all of which are triaxed. Electronic Location Productions displayed its new Compact Video Services Compact 21B, which also packs Philips LDK 14 cameras.

A new facilities house, Best Audio (whose partners, Messrs. Brand, Estrin, Schwartz, and Tourkow recently left Filmways to form the North Hollywood company), arrived at Las Vegas with a 75-day-old audio production van that already had done the Golden Gloves, a Diana Ross special, the Academy Awards, the AFI tribute to Fred Astaire, and a Bobby Vinton Special. Built on a 32-foot Ford utility van chassis, the vehicle makes up in accessibility, engineering ergonomics and front-running audio technology what it lacks in flash. Focal point of the van is its heavily redesigned Eclipse "C" Sphere console, providing 136 inputs and 42 outputs. Eight buses have been added, giving a total of 32. Six 16 by four submixers are on board, in addition to eight stereo submixer pots. Two Ampex ATRs and two Ampex 24-track MM 1200s complete this vehicle, which is available to production houses on a rental basis.

San Diego-based Centro Corp., which at the time of the show had just been acquired by one of its best clients, Skaggs Telecommunications Services of Salt Lake City, pulled the wraps from its "Iso Pack" truck. Essentially, the vehicle — on a GMC chassis — can be reconfigured from a series of 19-inch isolated (hence, "iso") modules.

Among the "Iso Pack" reconfigurations: a film-style van that includes two cameras and two one-inch VTRs; an Iso camera van, with one camera and microwave transmitter/VTR; an Iso tape van, which carries a slow-mo with two Ampex VPR-2s; an Iso graphics, with a Chyron character generator; audio mix pack, a multi-channel audio mixer with multi-track ATR; a camera control pack that handles up to six camera systems; a transmission pack with engineering-only equipment; and a cable pack that includes cable reels and motor.

Centro executives concede that the Iso Pack approach is not inexpensive, but it is considerably cheaper than having to purchase several different vans to achieve the same operational or technical flexibility afforded by a single "Iso" vehicle.

The company also introduced a 100 kW generator trailer that develops its output from a Lamborghini diesel. Centro, which has established itself as a designer/builder of studio control rooms and broadcast vehicles, is "defi-



Airborne television was still a highly attractive vehicular alternative at NAB. Bell's LongRanger provides room for five crew members



Centro, a well-established OB outfitter, continued to pack comfort and technical punch into its line of EFP vehicles



One of the first units outfitted by Philips itself, has gone to Tele-Curacao. Philips offers four different size vehicles with camera capacities ranging from one to six

nately thinking" in the direction of airborne news, according to ranking company insiders.

Compact Video Systems continued to push its Compact 17 and 19, 27, 40 and 42 series of vehicles. One of its strongest voices came from Video Production Services (the folks with the Philips cameras), which was at the show with its new Compact 27. In addition to the four LDK-5 and one LDK-14 triaxed cameras, the vehicle carries two Ampex VPR-2B one-inch VTRs with controllers, an Ampex VPR-20 one-inch field recorder, a Chyron IV titling system, a Grass Valley 1600-3F switcher, Quantel digital effects, Conrac color video monitors, an RTS four-channel IFB, a Studer 16 by four audio console, an Ampex ATR-700 audio recorder, an ITC stereo cart deck, JBL audio monitor, and an Adda frame synchronizer/still store.

The custom vehicle racket can be tough. Television Engineering Corp. was showing an unfinished four-camera unit built in a Barth body that sits atop a 23-foot Chevrolet chassis. The van features self-contained power, and while the VCR rack accommodates ¾-inch video with editing, company officials were quick to point out that changes could be made to customer specifications. This particular truck, with its side skirt and rear panel storage bins, could be completed within 30

days of the show — all it needed was a customer (normally, TEC takes between 90 and 120 days to produce a broadcast vehicle).

The company currently is building two identical 18-foot vans, the first time it has had a concurrent order for the same vehicle.

E-N-G Corp., which company officials say, has had "tremendous success" with its four-wheel-drive suburban vehicles since last year, arrived at the show with an even smaller vehicle — an Oldsmobile Cutlass ENG car, on loan from San Francisco's ABC affiliate, KGO-TV. The news car will carry three people in addition to the 500 W on-board generator and the Microwave Associates 13 GHz video/2 GHz audio microwave transmitters.

Wolf coach decided not to show its Step-Van-based Hippo this year, choosing instead a microwave relay truck built on a Ford econoline 350 chassis that the Northboro, Mass., company has built for New York City's WNBC-TV. Sticking with the microwave theme, Wolf this year introduced its QD-1, a bumper-mounted 12-foot tall post for any mini-transmitter. The QD-1, which breaks down for storage, can be fitted to virtually any vehicle bumper.

Getting off the ground with a turnkey airborne ENG Package, Hughes Helicopters unveiled its 300C piston-



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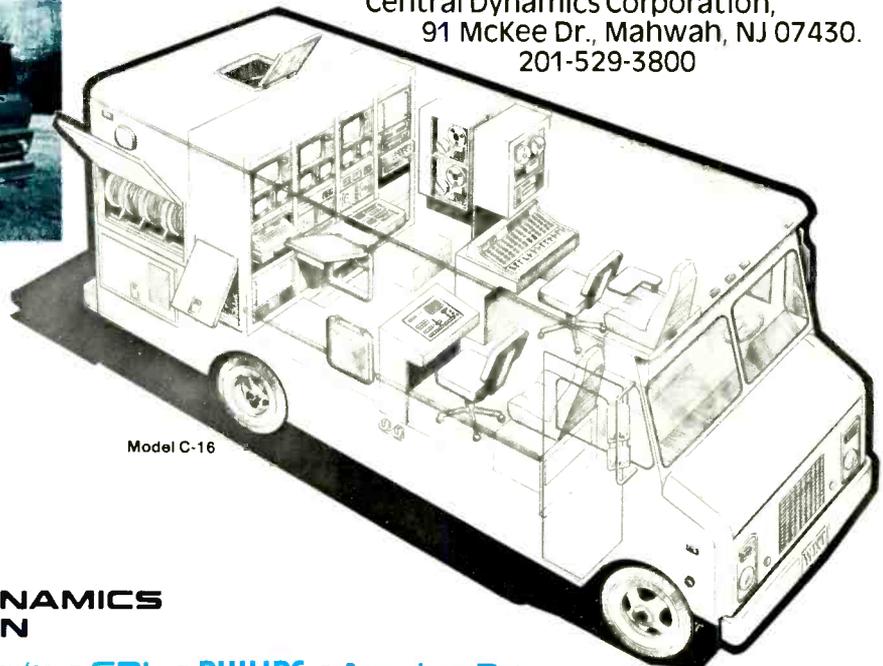
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Model C-16

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B-14: 12-14' production area, 2-3 cameras, 1 studio VTR, audio console, production switcher, audio cart and reel/reel recorder, intercom, and ancillary equipment.

C-16: See illustration to right, 16-18' production area, 2-4 cameras, 1-2 studio VTR's; other equipment similar to B-14

D-22: 18-24' production area, 3-6 cameras, 1-3 studio VTR's, A/V routing switcher, 2 audio cart recorders, telephone system; other equipment similar to B-14



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engined chopper, which packs either Tayburn or Microwave Associates microwave equipment — both of which are light enough to stay within the small helicopter's load capacity. The three-place bird, which can broadcast live or operate as a microwave transponder, costs \$160,000 fully equipped — about one-third the cost of other fully equipped turbine helicopters.

Included in the on-board equipment are a three-inch Sony color monitor, a Wolfburg 12-band UHF transmitter, and a Wolfburg 9600 channel VHF transmitter. Camera power is through the aircraft's electrical system, obviating the need for battery packs. Hughes representatives at Las Vegas said they were anticipating a very strong overseas market for the microwave-equipped 300C.

At the other end of the helicopter spectrum was Bell's LongRanger II, a seven-place turbine-engined aircraft that sells for \$500,000 *without* any broadcast equipment on board. This was the first time Bell has shown the LongRanger at an NAB; last year it had arrived with the five-place, \$300,000 JetRanger.

Advantages to the LongRanger, Bell representatives pointed out, were that a news director could work from either side of the fore or aft cabin, a reporter could sit next to the pilot or in the passenger cabin, the camera operator could shoot from either side of the craft or could shoot the reporter from a workable distance while in flight, and monitoring equipment could be placed pretty much wherever a producer desired.

Although ENG Helicopter did not show up with an aircraft this year, its president, Alex Carey, was showing his new Magic Movement camera mount, which, because it lacks counterweights, saves a seat within a helicopter. The nine-pound mount will accommodate cameras weighing up to 40 pounds. Cost of the constant resistance damping mount with aircraft fittings is \$12,000. **BM/E**

For more information: Strike System's Eagle Camera Car, **322**; F&F Production's GTX, **323**; Video Productions, **324**; Midwest Corp's M-1, **325**; Gerstenslager custom-built broadcast vehicles, **326**; Philips mobile television production vehicles, **327**; Centro Corp., "Iso Pack" truck, **328**; Television Engineering Corp., custom vehicles, **329**; ENG Corp.'s ENG car, **330**; Wolf Coach's QD-1, **331**; Hughes Helicopter's 300C, **332**; Bell Helicopter's LongRanger II, **333**; ENG Helicopter's Magic Movement camera mount, **334**.

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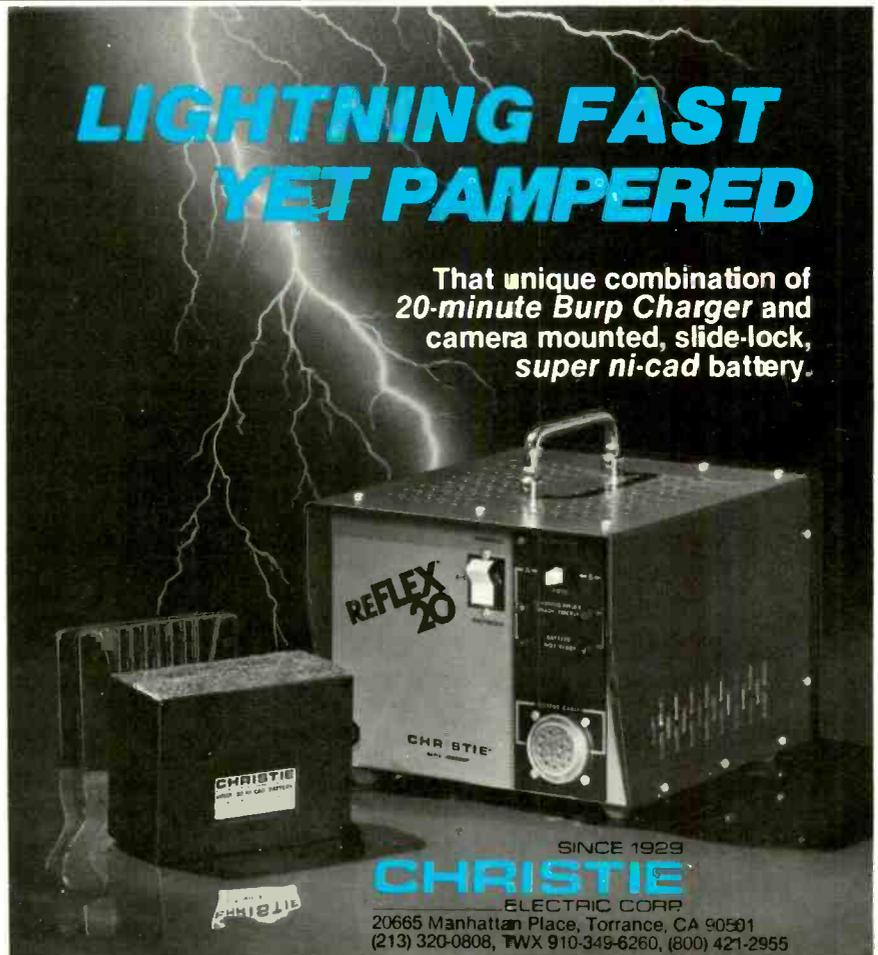
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NAB SHOW IN PRINT

STV: A BUSINESS WITH CLOUDS HAS A "GOLDEN LINING"

With the growth of STV, UHF broadcasters and LPTV visionaries wrangle with some sticky problems in the search for a new service.

OF ALL THE SESSIONS at this year's NAB convention, none proved more intriguing than STV. Clearly the new business has problems, but in the opinion of the panelists, the problems are manageable. The technology for STV is also a problem, but the exhibits demonstrated that the technical problems largely stem from a measure of confusion over how an STV operation is best created, and to what ends. To compete for viewers, STV needs the highest possible signal quality and complicated security for its terminal equipment. These "musts" are faced by an equally compelling need for economy.

The panel, "STV: Boom or Bust," was moderated by Robert Cahill of Chartwell Communications, Los Angeles. Cahill struck a theme in his opening remarks that was to pervade the rest of the discussion: "[STV] is not a get-rich-quick scheme," Cahill asserted. Rather, he said, it is a complicated, difficult business that can be an important and successful service if those who would prosper by it understand it and cooperate with one another.

STV, Cahill noted, is just over four years old. Its quick success in L.A. may have been too quick, he said, leading "all the UHF station owners immediately to think of this as a gold mine . . . So the UHF operators began to exact their nine pounds of flesh . . . and quite frankly, it brought STV to a halt for a time." It should be remembered that STV involves a delicate relationship between program supplier, service operator, broadcaster, and consumer. At this vulnerable stage of STV's evolution, any one of the participants could kill it off.

Panelist Chip Morris of American Television and Communications Corp. pointed out that STV holds tremendous

potential. A recent survey showed people want not just one, but multiple pay channels. Ninety percent of those surveyed who have one channel want two, and of those with two, 50 percent want a third. The technology for delivering multiple STV channels is developing and such multi- or all-channel boxes are only marginally more costly than single-channel boxes. The demand for new services can lead to tiered offerings as well as to entry into the market of multiple suppliers. John Gwin, representing Oak Communications on the panel, pointed out that in Oak's recent offering of an adult channel in Phoenix and Ft. Lauderdale, 60 percent of the basic subscribers signed up for the new tier. Sports channels have also proved successful, and while STV does not necessarily compete for the big pro sports, offering a careful selection of regional, amateur, and professional sports can help the STV operator appeal to males who make the STV decision.

Two sides to every story

Panelist Dick Wolfson of Wometco Enterprises said, "There are terrible problems in STV." Boxes become obsolete, pay TV gets most of the first-run product from Hollywood, service calls

on users' boxes are increasingly expensive with wages up, fuel prices are rising — the litany goes on. But, Wolfson said, ". . . it's 'get rich slowly.'" With perseverance and cooperation things can change. The economic balance will shift to STV's favor from CATV systems, which, Gwin said, "pay for themselves in something under a century." MDS is not seen as a serious competitor yet, and with some help from the producing community, the FCC, and the courts, CATV may someday be an asset. DBS is seen as a natural ally of STV. Several of the panelists noted that DBS could become a customer of STV programming.

But problems do abound. Piracy is a battle that STV may be winning. Gwin pointed to some success in getting the courts in Detroit to find against pirates under section 605 of the Communications Act and sees the FCC considering application of Section 302. More prosecution is needed, and STV operators look to producers to help them in this. Some STV operators report success in seeking damages against pirates. Recently, one operator sought to foreclose on the home mortgages of two pirates. Said one panelist, "We will beat it — we will see a lot of pirates in jail!"





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NAB SHOW IN PRINT

"Gold mine" hard to tap

While STV is profitable if done right, doing it right is not easy. Non-STV programming on an STV station must be beefed up to give the station an identity as a quality programming source. The signal must be crystal clear, which means higher-priced equipment and sharp attention to maintenance. For the STV operator, there are always the problems of maintaining the consumer equipment, collection, box theft, disconnects, and programming costs.

Oak's Gwin said that a break-even point exists in a system of 30,000 to 60,000, depending on the market potential. Before Oak is interested, Gwin explained, the market must have the potential for 90,000 to 100,000 subscribers. Chip Morris said that between 10 and 12 percent of a typical market's viewers were likely to subscribe, and that under today's economics, a million-home market is probably the minimum target.

It should also be noted that these guidelines vary when there is more than one pay service per market. A recent Boston Research study, however, placed the amortizable cost per subscriber at \$400, which gives the potential operator some guidance on the suitability of a market.

LPTV: maybe yes, maybe no

Wolfson of Wometco said flatly, "LPTV? I'm afraid it's a snare and a delusion." With potential market size probably much smaller, LPTV operators will still need to invest in all the hardware. Said Gwin, "I fail to understand what people envision for all these applications which have inundated the FCC." All Gwin could see were "new swimming pools" for the lawyers. He did allow, however, that some giant STV operator with a network of LPTV stations connected by satellite might make a go of it, though cost might well escalate.

Nevertheless, some panelists saw LPTV opportunities as possible adjuncts to cable services or as avenues for new specialized programs that could be produced economically for smaller audiences. One cited advantage of LPTV was the absence of public service requirements, which might lead to all-day STV and even new services. Clearly, the experts have severe doubts about the potency of STV as a magic elixir for the as-yet unborn LPTV industry.

Exhibits show systems ready

Among the exhibitors showing STV-related gear were Blonder-Tongue, Dynacom International, and

Oak Industries. As were the panelists in the STV session, the hardware people were concerned about the threat of piracy. The problem has two aspects: outright theft of the boxes and simple non-payment. The manufacturers offer two anti-piracy strategies, scrambled signals and addressable boxes.

Blonder-Tongue, supplier to Wometco Home Theatre, displayed its BTVision system, which offers a terminal to the subscriber containing a digital key word on ROM. Each subscriber gets a unique coded word installed in the user decoder at manufacture. The codes for all subscribers become a part of the station's computer system and can be used to turn on or off any of the boxes. The binary code is transmitted along with the normal TV signal. Theft of the box itself, or an attempt to defeat the key code, will lead to turn-off. Ten thousand unique addresses can be addressed every minute, and up to a million subscribers can be served on one system. The system can be expanded to handle up to four million subscribers.

Dynacom International took a lower-cost approach with its ticket module system, in which a coded key is mailed to the authorized subscriber when payment of the current bill is received. This very simple system has been used by several small-market operators. A larger, more sophisticated addressable system, Digicode, is offered for larger markets. The systems are available in NTSC, PAL, and SECAM. Dynacom offers complete turnkey installations for STV.

Oak Industries, of course, plugged its complete service, which includes turnkey installation of Oak STV gear and expert consulting by an Oak implementation team offering guidance on marketing, technical operations, installation and service training, and computer operations.

Oak uses the Sigma system, which offers audio and video encoding with complete addressability. Only slight modification to the station's transmitter is required. A complicated signal is transmitted to the decoder. If the data matches the decoder's unique address and authorized level, the Sigma decoder unscrambles the signal. Instead of reception through a UHF tuner, the unit converts the received signal to a locally unused VHF channel frequency for viewing. Getting STV on the VHF tuner is considered a marketing advantage.

One of the more talked-about STV systems comes from Zenith. This all-channel decoder system, however, was not on display at NAB. BM/E

For more information: Blonder-Tongue BTVision, **280**; Dynacom ticket module system, **281**; Oak turnkey service, **282**.

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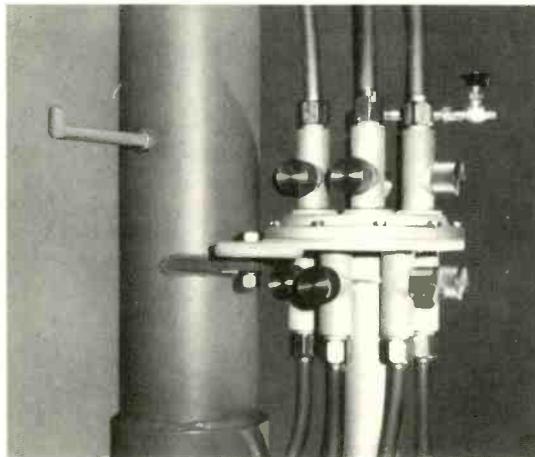
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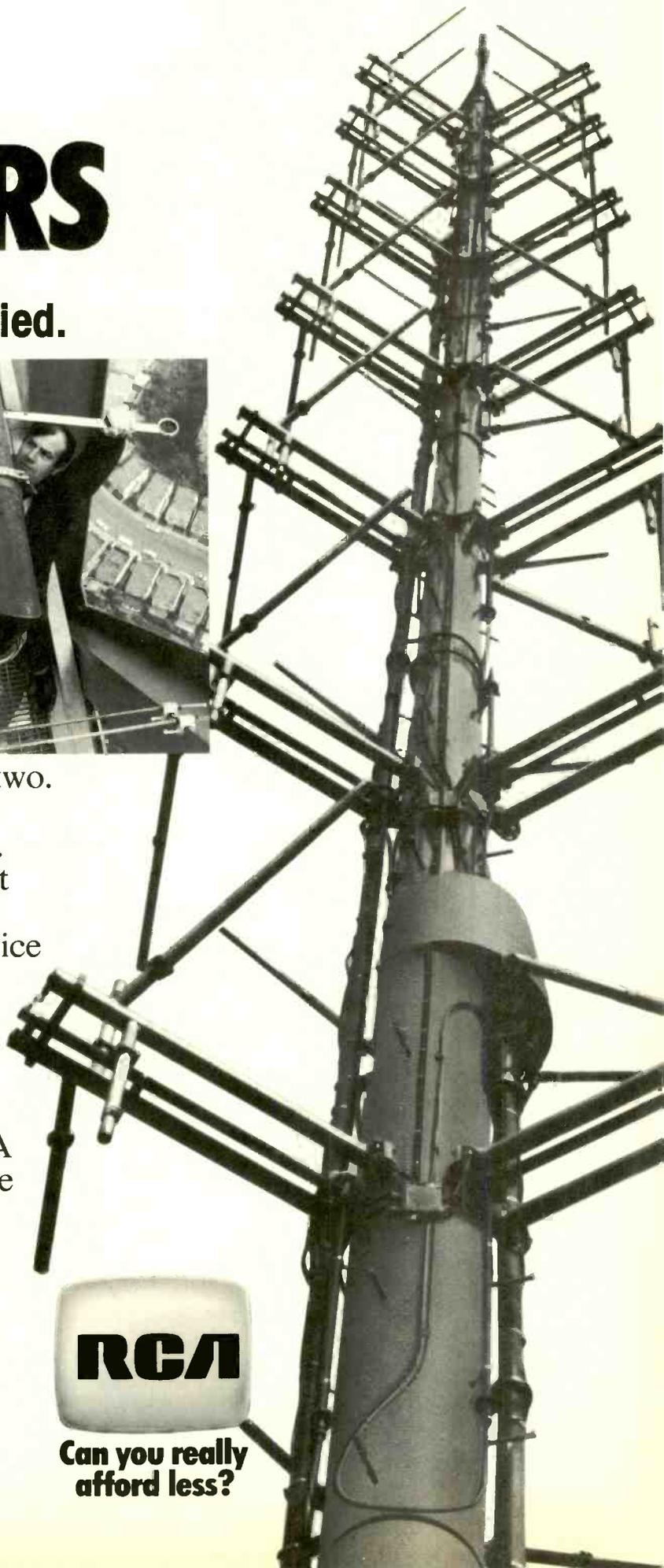
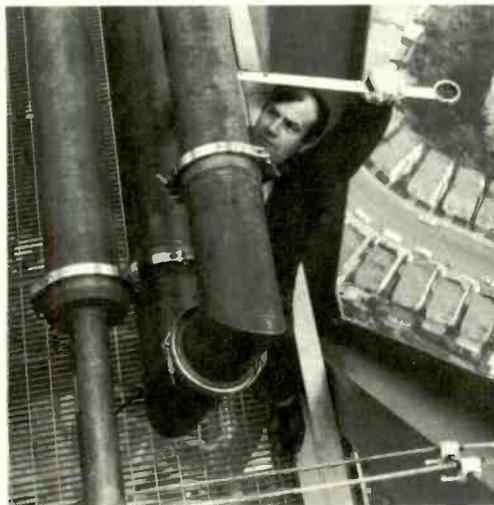
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"It's Time To Get Ready For Digital Television," Says Preban Hejberg

THE 1980s WILL BE, without a doubt, the decade in which digital equipment takes over the majority of functions in the TV world. Digital circuitry has been moving into television for a long time; the process started in the early 1960s. Before that time all equipment was analog only. Even master sync pulse generators made use of one-shots and delay lines to generate the synchronization waveforms.

The availability of fast and reliable integrated circuits (particularly TTL circuits) advanced the use of digital circuits, especially in production and test equipment. In fact, Philips marketed its first digital test generator in 1972. The instrument, PM5546, is an RGB generator that produces various video signals with high accuracy. The generator has no real memory circuits, but the digital waveforms are made by horizontal and vertical time base counters and logic circuits. Like much digital equipment, this unit is still going strong nine years later. The digital signals are converted to analog by a number of precision current generators, the currents of which are summed in a 75-ohm precision resistor. This is exactly how a modern digital-to-analog converter does it.

The digital framestore was on the market in the mid-1970s, and digital time base correctors and digital standards converters have also been in use for years. So why all the excitement now about digital TV?

First, because state-of-the-art integrated circuits such as D-A converters, A-D converters, and large memories (RAMs and PROMs) are now fast enough to meet the demand for sampling rates of 15 to 20 MHz, necessary for video applications. Furthermore, these circuits are becoming less and less expensive so that it is cost-effective to

make more and more circuits digital.

Second, the evolution of digital television equipment has reached the point at which it is desirable to interlink the various digital units on a digital basis, rather than converting each one back to analog output and then converting the next unit from analog to digital at the input. These analog interfaces now conform to analog TV standards defining line numbers, field rate, color encoding, polarity, and transmission levels.

In the same way, the shift to the digital interface from one unit to another will require the definition of a digital interface standard. Standardization committees in various parts of the world are now discussing this issue. If the industry succeeds soon in agreeing on such a standard, it will be the greatest single thing that has happened to digital television.

The drive toward digital television is so strong that the standards agreement will probably come before very long in any case. So the mostly digital TV plant is on the way. What test equipment will we need?

As a manufacturer of television test equipment, Philips is of course, confronted with this question. The long-standard television and universal test equipment that we have now will continue to be important for a time — as long as the television chain is basically analog.

More and more of the individual units are becoming digital, however. This complex digital equipment requires sophisticated digital test equipment for repair and fault-finding. Such digital test equipment is standard in the computer world, and as soon as a video signal has been digitized, any further processing or transmission is identical with that taking place in computers. The same techniques and equipment,

are used, therefore, as for computer repair and service.

This equipment is now on the market and includes such items as pulse generators, standard oscilloscopes, oscilloscopes with word triggering and digital event delay, logic analyzers, bit error rate analyzers, and even complete computers that run text programs and check that these programs are processed and transmitted properly.

As soon as the digital interface standard has been agreed on, test signal generators and corresponding monitors and analyzers with both digital and analog inputs and outputs can be designed. This kind of equipment will be important in the mixed digital/analog television chain (digital islands in the analog sea and, eventually, the other way).

On a longer term, the total television chain may or may not be completely digital. The outcome depends not so much on technology as on economic factors, standardization, the way it integrates into the television world as a whole.

To sum up: In the present phase, more and more analog units in television are being replaced with digital units, but the interfacing is still analog. Analog test procedures and test equipment are still essential, but the digital units themselves require computer-related general-purpose test equipment.

In the near future more and more of the individual units will become digital, putting more weight on the computer-related test equipment and procedures. The interface, however, will still be analog. The final phase, the totally digital television plant, will be a technological possibility. Just how soon it will come is uncertain at this time. Standardization and economics will be the controlling factors. **BM/E**



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Court Orders FCC To Review Site Changes

By Frederick W. Ford and Lee G. Lovett; Lovett, Ford, Hennessey, Stambler & Siebert, P.C., Washington, D.C.

SURELY EVERY BROADCAST LICENSEE has considered moving its transmitter site at one time or another. The possible motivations are many: too high a rent for the land occupied by the transmitter; the desire to eliminate unforeseen interference, and so forth. Since such a change involves modifying the facilities specified in the license or construction permit, the licensee (or permittee) must file a new FCC Form 301 Application, as required by the Communications Act, so that the Commission can formally approve the new facilities.

Generally, the Commission grants such applications with a minimum of effort. Sometimes, however, more serious issues are raised when grant of the application would actually amount to changing the community of license. In a recent decision in the *Communications Investment Corporation (CIC)* case,¹ the Court of Appeals ruled that when such "substantial and material questions" are raised by the transmitter move, the Commission must hold a hearing to resolve those questions.

The result of the FCC decision overruled by the *CIC* case was a "de facto reallocation" of the community of license² by two Ogden, Utah, FM stations to Salt Lake City. Section 303 of the Communications Act ("The

Act"), as amended, gives the Commission the responsibility to assign the various frequencies to individual communities.³ Each construction permit and license specifies the community of license for the AM, FM, or TV broadcast station. Only the Commission can authorize a change in communities. When it does so, the Commission must conform to the requirements of Section 307(b) of the Act, which empowers the Commission to distribute frequencies to different communities "so as to provide a fair, efficient, and equitable distribution of service" to each.⁴

In the *CIC* case, the court's primary legal concern was that the Commission had not complied with the legal requirement for a hearing when material questions of fact are raised.⁵

In the court's words, it reversed the FCC because:

"... we believe these questions may raise substantial questions under the 'suburban community' policy or 'de facto reallocation' doctrine. We believe the Commission's decision to act without a hearing was plainly unreasonable in this case."⁶

However, the Court's policy concern is fairly apparent — the Commission should examine carefully proposed license changes which might amount to disrupting service in one community to benefit another.

In this article, we will discuss this important case, with a focus upon the particular policy emphasis of the court. Although the court did caution that the measurements it articulated for its decision should not become an absolute standard (see below), the particular issues that it raised merit review. The court noted that:

"... [A] pattern of summary approval for transmitter relocation on the basis of an inadequate paper record may now once again be emerging..."⁷

The court is warning the FCC to approach these applica-

¹*Communications Investment Corp. v. FCC*, No. 78-1715, U.S. Court of Appeals, District of Columbia Circuit, Slip Opinion, January 21, 1981, 4 RR 2d 1291.
²See *Hall Broadcasting Co.*, 71 FCC 2d 235, 237 (1979):

"[D]e facto reallocation involves an attempt to utilize a channel assigned to one community in order to establish a broadcast service in another community, thereby depriving that assigned community of service from that channel. So long as it appears that an applicant will provide service to the assigned community additional service rendered by it to other communities does not result in de facto reallocation."

In the instant case, the Court determined there was such a reallocation.

³47 U.S.C. § 303 (1976).

⁴47 U.S.C. § 307 (b) (1976).

⁵47 U.S.C. §§ 309 (d) (e) (1976).

⁶*CIC v. FCC*, *supra*. Slip Op., p. 50.

⁷*Id.*, p. 3.

FCC Rules & Regulations

tions, maybe including yours, with more care than it evinced in this case.

The KDAB case

In 1973, an applicant for an available frequency in Ogden, Utah, specified a transmitter site on a mountain only 18 miles west of Salt Lake City but 41 miles, or more than twice as far, from Ogden. Salt Lake City FM station KALL, licensed to *CIC*, filed a petition to deny, arguing that such a proposal violated Section 307(b) by amounting to a *de facto* reallocation to Salt Lake City. The applicant, the predecessor to the current license of KDAB, eventually specified the site from which KDAB now seeks to move. The Commission approved the Ogden application in July 1975.

Only 11 months later, KDAB, now licensed to D & B Broadcasting Co., applied to move its transmitter to the original, and presently disputed, site — Farnsworth Peak. KDAB claimed that it was experiencing multipath problems as the signal from the site near Ogden reflected off a range of mountains east of the city. The signal as transmitted from Farnsworth Peak would travel parallel to the interfering range.

KDAB provided very little documentation of this problem, only a letter filed by a "field man" from KDAB's antenna supplier who conducted informal "tests." Although this fact was *not* of decisional significance, Judge Wilkey, noted that:

"The weight to be accorded his conclusion is uncertain, however; the president of the antenna company was quick

to assert in a letter [to KDAB] . . . that 'the antenna is very much OK' while admitting that 'we are not consulting engineers.' Furthermore, the 'field man's' qualifications were never determined."⁸

The court determined that the need for Commission review of the applicant's motivation, i.e., that it might be inspired by more than multipath problems, might turn on these facts:

- Salt Lake City's upgrade from "relatively low quality" primary service to city grade coverage; and
- The move would eliminate 10,000 rural residents outside of Ogden but add about 230,000 new Salt Lake City area listeners.

Furthermore,

" . . . because most of those added would be in the urban Salt Lake City vicinity, the added listeners represented a more concentrated and perhaps more affluent market, and therefore . . . demographically more attractive to KDAB's potential advertisers, than the scattered rural residents."⁹

Two stations had filed petitions to deny, including KALL. They also offered evidence of other sites nearer to Ogden free of multipath problems.

However, the Commission granted the KDAB application in February 1978.¹⁰ It ruled that the petitioners failed to show that the move amounted to *de facto* reallocation. Although the court noted that Ogden would still get as strong a signal as required under the Rules, it expressed concern that the FCC failed to consider that Salt Lake City would get an even stronger signal than Ogden.

⁸*Id.*, pp. 10-11.

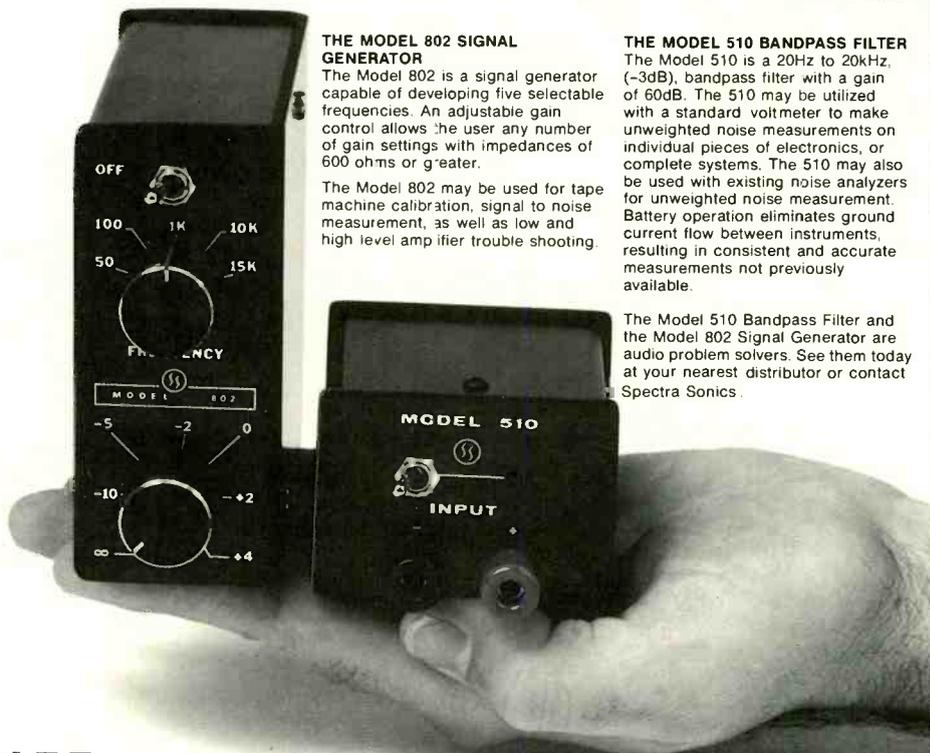
⁹*Id.*, p. 12.

¹⁰*D & B Broadcasting Co. (KDAB)*, 67 FCC 2d 570 (1978).

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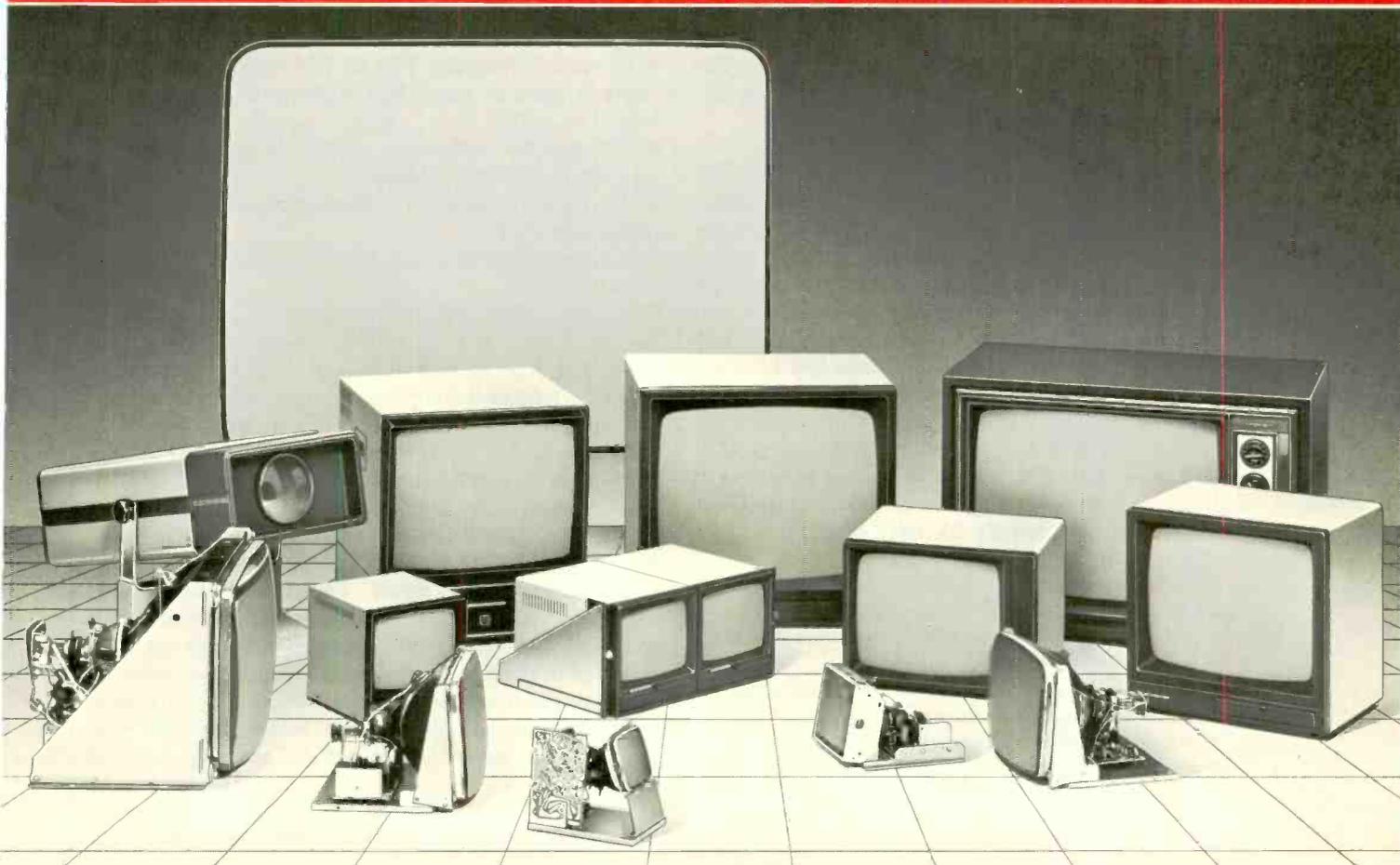
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FCC Rules & Regulations

The KZAN application

The facts behind the KZAN application were related to the KDAB case. In an original comparative proceeding, one group applied for yet another available FM at Ogden but at the Farnsworth Peak site. Another proposed a site closer to Ogden. KALL filed a petition to deny against the former just as it had against KDAB.

The Farnsworth site applicant dismissed its application in return for 20% of the remaining applicant but the merged applicant specified the Farnsworth Peak site. The Commission approved the settlement since it had recently settled the KDAB matter.

The CIC decision

The court reversed the Commission in both instances. As the court read the history of Section 307 of the Act, the Commission's duty was clear. "It must forestall excessive concentration of FM assignments in larger cities and ensure adequate service to smaller communities and 'sparsely populated' regions."¹¹ High power Class C FM stations, like those involved in this case, had been assigned in limited numbers to serve the central cities, suburbs, and surrounding rural areas with a protected radius of 65 miles. These stations had been assigned to Ogden and Salt Lake City with these several objectives in mind, although some overlap between the two sites was expected since they are only 33 miles apart.

In the majority view,

"If left to their own devices broadcasters would congregate around the biggest city in the area. In fact, it was against just this concentration that the current version of Section 307(b) was directed."¹²

In addition to this substantive duty to prevent such movement, there was also a procedural duty:

"Congress has also explicitly specified a quite natural and prudent procedural requirement that the Commission, in carrying out its Section 307 (b) mandate, hold hearings whenever an application for a transmitter site raises a substantial and material question of fact."¹³

In the past, whenever the Commission had forsaken hearings when such questions were raised, the Court had reversed the FCC.¹⁴

Nine test factors

Here, in addition to the *de facto* reallocation question, as in other related FM license proceedings, the court decided that "some careful inspection of the matter of broadcasters in selecting transmitter sites was necessary to assure that applicants had not subverted the policies behind the table [of assignments]."¹⁵ So, the Court proposed "test factors,"¹⁶ based on previous cases, that might suggest the need for a hearing:

- The ratio of the population of the city of license to that of the larger city, since it is likely that the temptation to cater to a larger market will grow in proportion to the relative size of that market;
- The ratio of the distance between the proposed trans-

mitter site and the city of license to the distance between the transmitter site and the larger city to which the station may be, in effect, moving;

- The expected ratio of the signal strength in the city of license to the signal strength in the larger nearby city;
- Whether a portion of the city of license is expected actually to *lose* coverage or, especially in the case of a Class C station with a duty to serve a widespread coverage area, whether there will be a loss area outside the city of license;
- Whether the proposed site is already in use by stations assigned to the larger city;¹⁷
- Common ownership with an AM station in the larger city and plans to share staff facilities on programming with it as well;
- Whether the station has evinced a prior interest in locating in the larger market;
- A proposal to move the studio as well as the transmitter to a larger market;
- Whether there is some unique advantage in the site proposed.

The court cautioned that it had based this analysis on past decisions and "not on our own invention." The court added that it in no way intends to foreclose community action so long as it complies with its statutory mandate.

Five of the nine factors suggested questions about a *de facto* reallocation from Ogden to Salt Lake City. First, the population ratio of Ogden to Salt Lake City is "substantial," about 1:2.4. The distance ratio is similarly large, 41:18, akin to the *Louisiana* case. A stronger signal was to be expected in Salt Lake City, although "evidence" could not be found in the record. Furthermore, Ogden was expected to receive "the absolute minimum signal" permitted by the rules. Fourth, over 10,000 people would be deprived of the KDAB service, although it was uncertain what other services they might still receive. Finally, as in a TV reallocation case, the new transmitter sites were being used by other stations in Salt Lake City (see note 17).

Both the Commission and the Ogden stations argued that they were in full compliance with statutory and regulatory requirements.

"All the key early cases cited to us . . . involved applicants in full literal compliance with all relevant FCC rules, yet hearings were nonetheless ordered to determine whether the table of assignments, an FCC rule, would be undercut by the proposed move."¹⁸

The Commission and the Ogden stations had failed to disprove concerns raised by the applications and hearings were ordered by the court.

Conclusion

All broadcasters should consult with communications counsel about this decision if they contemplate a transmitter site move for the Commission has taken some steps in recent months somewhat in conflict with the *CIC* decision, at least as regards new FM stations.¹⁹ The Commission's questions in particular involve the actual method of determining whether a reallocation has occurred. However, the court decision is now law unless amended or overturned in the future.

BM/E

¹¹*CIC v. FCC*, Slip op., p. 19.

¹²*Id.*, pp. 20-21. Emphasis is the court's.

¹³*Id.*, p. 21.

¹⁴See *Wometco Enterprises v. FCC*, 314 F.2d 266 (D.C. Cir. 1963) (*per curiam*), reversing *Scripps-Howard Radio, Inc.*, 22 RR 1054 (1962); and *Louisiana Television Broadcasting Corp. v. FCC*, 347 F.2d 808 (D.C. Cir. 1965) (*per curiam*), reversing *St. Anthony Television Corp.*, 2 RR 2d 348 (1964).

¹⁵*CIC v. FCC*, Slip Op., p. 28.

¹⁶*Id.*, pp. 30-33 for factors 1-9.

¹⁷"No matter where a station claims to be 'located', if FM tuners receive a signal from the same place as other stations allocated to the larger city, from a purely engineering perspective, the location of the station is the larger city." *Id.*, p. 32.

¹⁸*Id.*, p. 44.

¹⁹See *Bie Broadcasting Co.*, 81 FCC 2d 1, 49 RR 2d 471 (Rev. Bd. 1980); *Radio Wheeling, Inc.*, 48 RR 2d 1675 (Rev. Bd. 1981).

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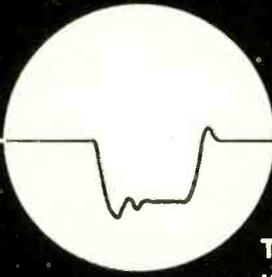
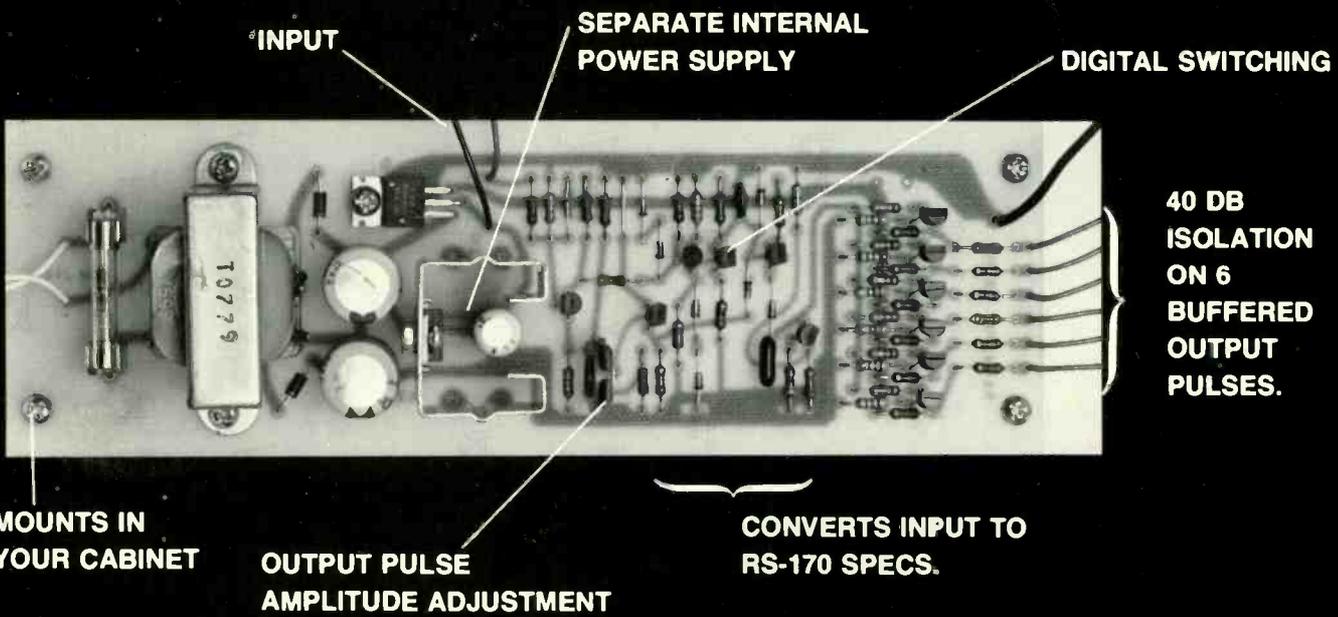
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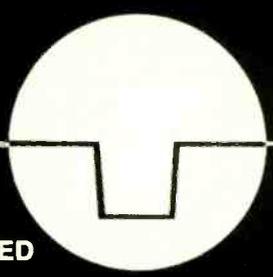


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GREAT IDEA CONTEST

Editor's Note: Before attempting to implement any Great Idea involving the modification of equipment, station personnel should check with the equipment manufacturer to insure that no violation of warranty will occur.

If the Great Idea involves any technical standards governed by the FCC, stations should make sure that the idea will in no way cause a violation of FCC rules.

16. Video Test Pattern Generator

J.R. Hall, Director of Engineering
Hunter College, New York, N.Y.

Problem: We needed a low-cost alignment pattern generator with video line output. National Semiconductor's MM5322 is an LSI chip that has most standard crosshatch and line patterns. The only problem is that for proper operation it needs a 378 kHz xtal or tuned network. We could not locate such a crystal, and the tuned network drifted.

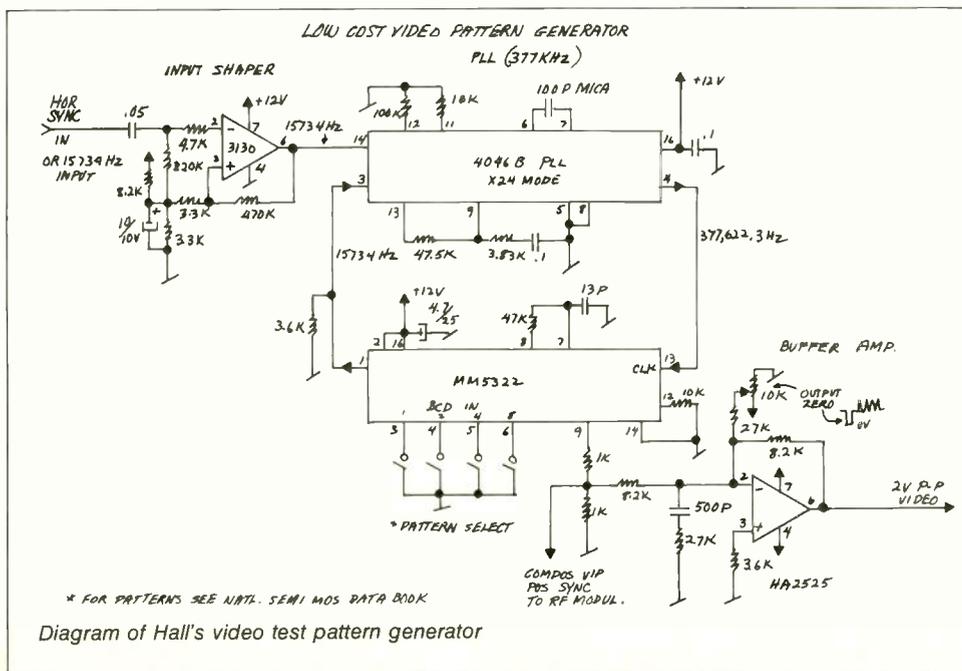
Solution: The solution turned out to be quite simple. A 4046 CMOS PLL, when used in the X24 multiply mode, provides exactly the right frequency with the additional bonus that it can genlock to some outside 15734H2 horizontal reference.

Circuit description: A CA3130 buffers and shapes the external clock or sync input. It provides the needed fast rise time input to the 4046. The output of the 4046 (pin 4) VCO is the input to the clock input of the MM5322. To obtain a reference signal for the comparator input, the PLL VCO will adjust itself until both inputs (pins 14 and 3) are of identical frequency and phase. Since the MM5322 divides the clock by 24, the PLL output must be multiplied by 24 to go into phase lock.

The composite video output of the 5322 is designed to feed directly to a video modulator (pos sync) and must be inverted and buffered to be useable as a line source. A high-speed HA2525 opamp does this. An IM318 should work just as well, if compensation is changed.

Patterns are changed by four toggle switches or by a BCD hex thumb switch. For color bar patterns the circuit in National's handbook (MOS) should be followed, but again, it uses a strange frequency.

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Great Ideas

17. Troubleshooting Moseley TRC-15

Bob Mayben, General Manager and Chief Engineer
WKXC-FM, Chattanooga, Tenn.

Problem: A single method for troubleshooting a downed Moseley TRC-15.

Solution: Recently, my remote control went down. Upon arrival I found the studio unit would calibrate, control, and read, but no action was taken by the transmitter unit. At the transmitter site, I made sure the phone line was good by attaching the phone line to the amplifier I keep at the transmitter. When the studio unit sent a pulse, it arrived up the hill, so my next step was to reconnect the line to the transmitter unit and then ground the shield on the audio lead while attaching a probe to the hot lead. I then walked through the Moseley, using the test points provided for scopes and metering. I was able to locate the problem quickly by simply signal tracing while feeding a raise burst from the studio unit. I replaced two ICs and a transistor and was back remote controlling in a flash.

18. AM Off-The-Air Carrier Alarm

Hank Roedell
WIBC/WNAP, Indianapolis, Ind.

Problem: To construct an AM off-the-air carrier alarm with LED bar graph modulation indication.

Solution: This circuit has an 11 second delay, with an

LED indicating an outage has occurred. It doubles as a fine listening radio. The antenna rod, capacitor, and IF transformers can be taken from an old inexpensive transistor radio. Q1 through Q5 are ECG 123A. Q6 is an ECG 132.

This circuit has been built, and all component values are proper. The LED VU is a moving dot, which is very impressive and shows at a glance whether the station is modulating properly. I built the circuit to fit into a four by seven by two-inch plastic case, with a 12 V 300 mA regulated power supply. The PC board layout should make PC work easier.

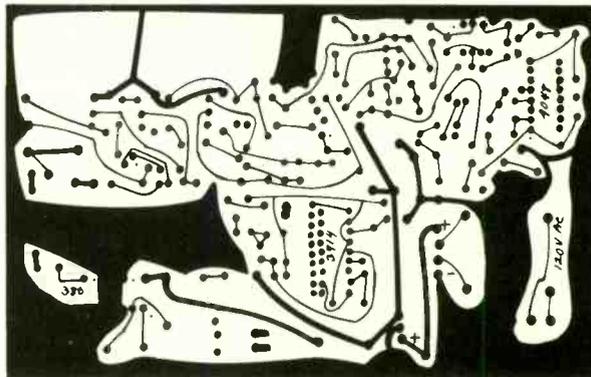


Diagram of Roedell's AM carrier alarm

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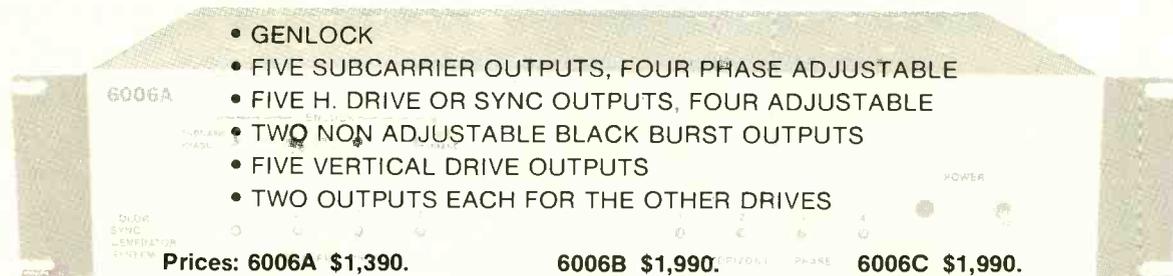
If you have timed a system, you will know how much of a nuisance it is to make adjustments at each camera head. It almost always requires two people and the conversation goes like this, "A little more. No! No! The other way". Well, now there is a better way.

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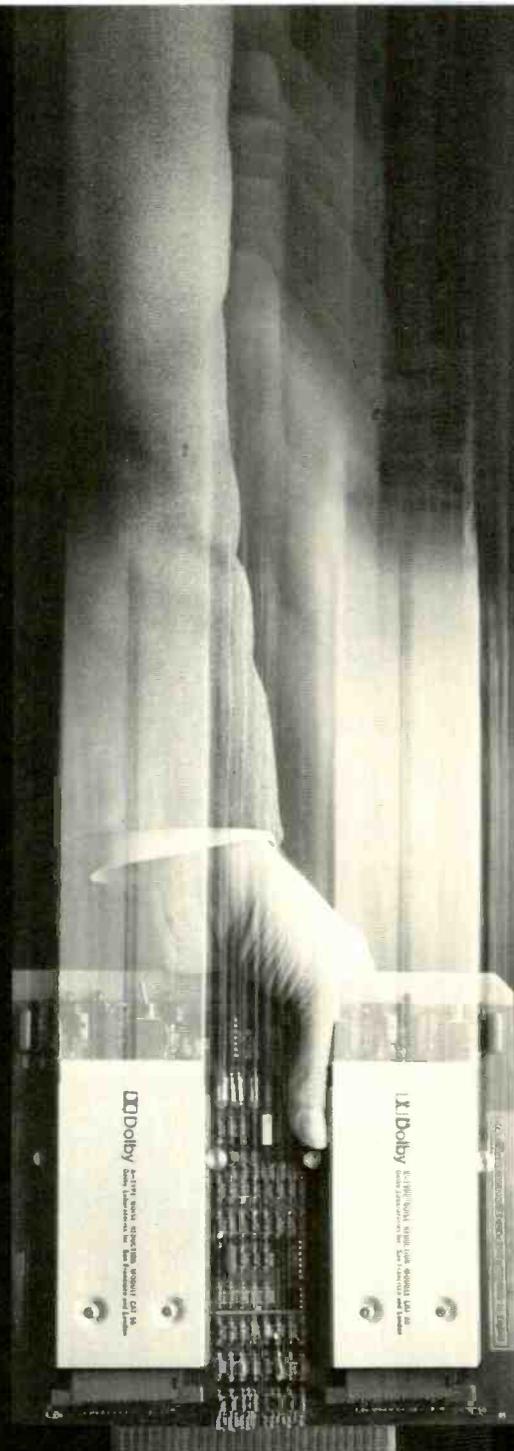
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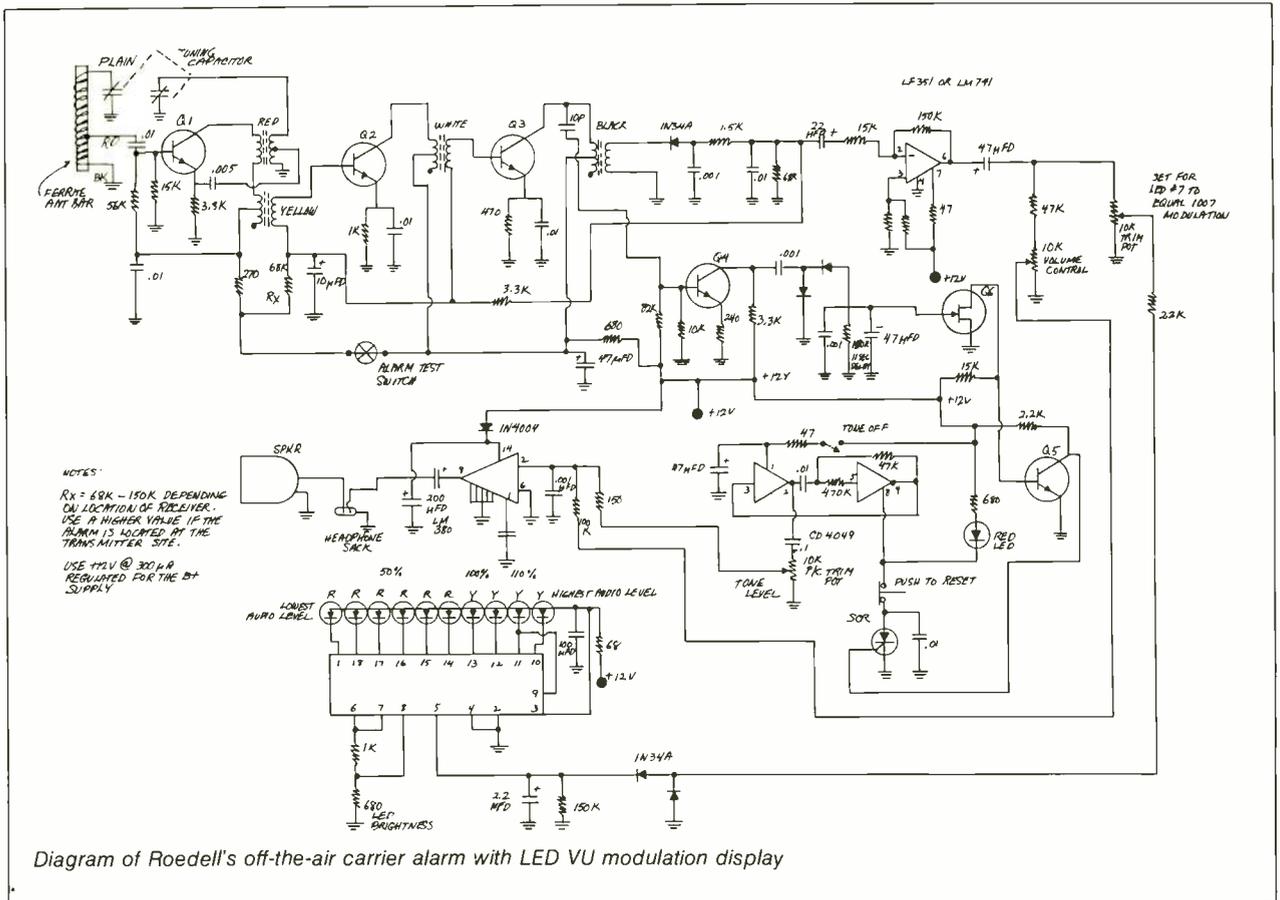


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Rules for BM/E's 1981 Great Idea Contest

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1981
 Entry Form

Name _____ Title _____
 Station Call Letters _____ City _____
 State _____ Zip _____
 Telephone No. _____
 Licensee _____

Class of Station at which idea is used (check one)
 TV _____ FM _____ AM _____
 Category: Audio _____ RF _____ Video _____ Control _____

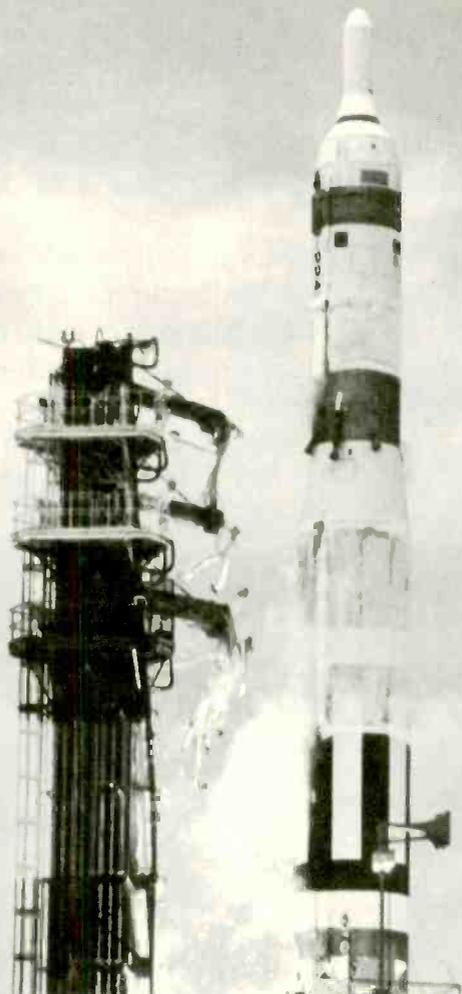
Objective or Problem: (In few words; use separate sheet for details)

Solution: (Use separate sheet—500 words max)

I assert that, to the best of my knowledge, the idea submitted is original with this station; and I hereby give BM/E permission to publish the material.

Signed _____ Date _____

- 1. Eligibility:** All station personnel are eligible. Consultants to the industry may enter if the entry indicates the specific station or stations using the idea or concept. Manufacturers of equipment or their representatives are not eligible.
- 2. How to Enter:** Use the Official Entry Form on this page or simply send BM/E a description of your work. State the objective or problem and your solution. Include diagrams, drawings, or glossy photos, as appropriate. Artwork must be legible but need not be directly reproducible and not exceeding three in number. Camera reproducible material is preferred. Length can vary, but should not exceed 500 words. BM/E reserves the right to edit material. Entry should include: Name, title, station affiliation, and the class of station—TV, FM, AM. Indicate if idea is completely original with you.
- 3. Material Accepted for Publication:** BM/E editors will make all decisions regarding acceptability for publication. If duplicative or similar ideas are received, BM/E editors will judge which entry or entries to accept. A \$10 honorarium will be paid for each item published.
- 4. Voting:** Every reader of BM/E is entitled to rank the ideas published. This can be done on the Reader Service Card in the magazine or by letters or cards sent to the BM/E office. To vote, readers should select the three ideas they like best and rank them 1, 2, or 3.
- 5. Winners:** Top rated entries in the year-long tally will become winners in each of the three major categories (AM, FM, TV). Final winners will be picked in February, 1982, and announced in the March, 1982, issue of BM/E.
- 6. Prizes and Awards:** Three top prizes will be awarded; a programmable electronic calculator will be awarded for the highest rated entry in the respective categories of AM, FM, and TV. Ten engineering slide rule calculators will be awarded as secondary prizes for the highest rated entries in the following additional categories (top three winners are not eligible for these prizes): audio (three prizes, one each in the AM, FM and TV categories); RF (three prizes, one each in the categories of AM, FM, TV); Control (three prizes, one each in the AM, FM and TV categories); Video (one prize in TV).



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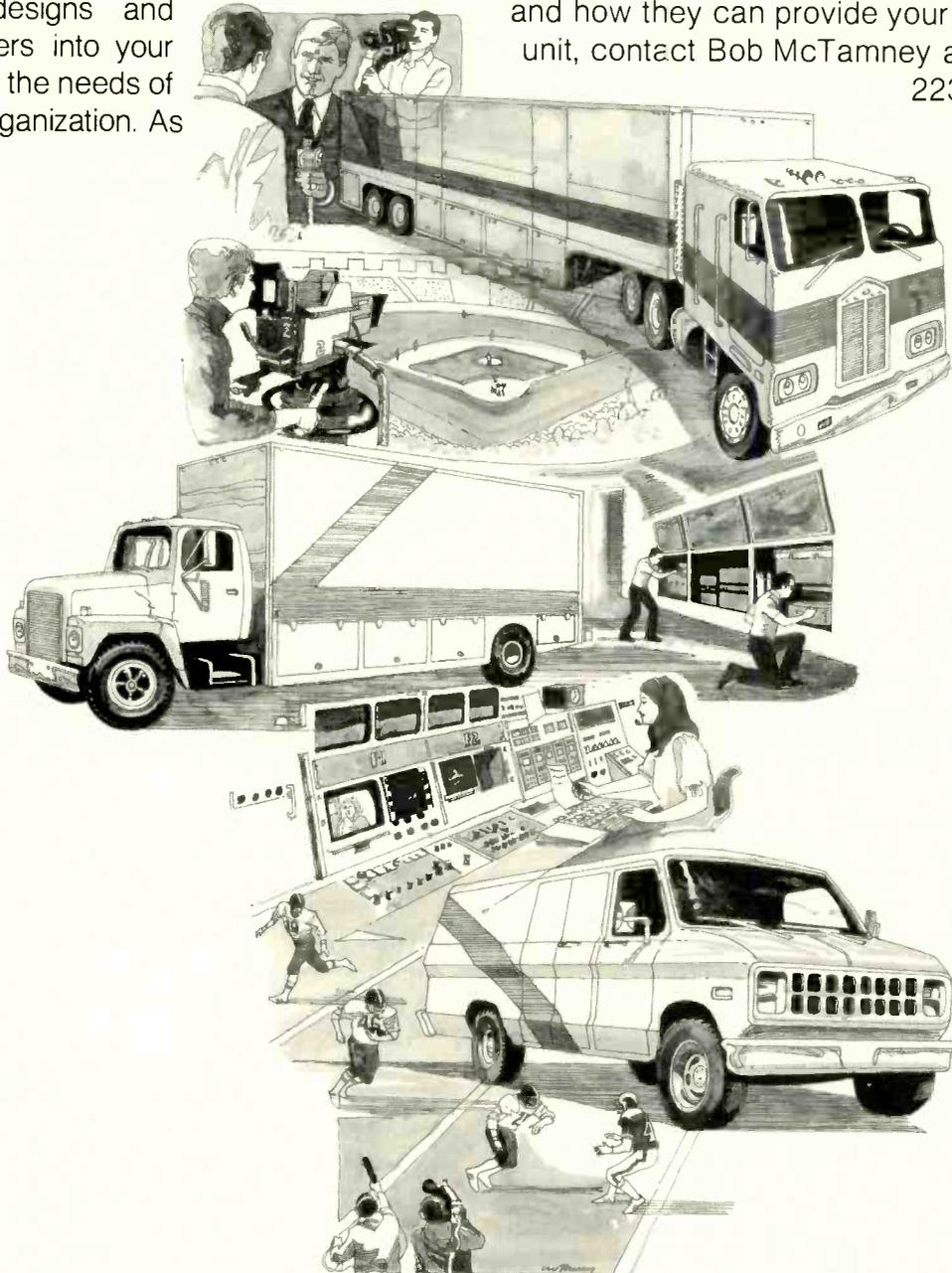
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BROADCAST EQUIPMENT

This month's Broadcast Equipment column continues the theme of the issue by highlighting new products for testing and measurement.

Audio Transmission Tester 250

Model S1100 AWA audio transmission test system consists of a compact generator and receiver that combine to measure up to 46 significant transmission parameters, including absolute receive level, frequency response, THD, IM distortion, RMS noise, 1 kHz noise stereo crosstalk, stereo phase, peak level, wow and flutter, and quasi-peak noise (weighted and unweighted). These can all be measured and reported in approximately 3.5 seconds. The SG1100 generator inserts on command, in place of program, a brief multiple frequency stimulus that includes a unique signal source ID code. The SR1100 receiver monitors the program line but remains quiescent until it detects a particular coded sequence, when it performs the selected parameter measurements. The system enables extension system performance measurements to be carried out with virtually no interruption to program in both radio and TV sound channels. \$13,200. MARCONI INSTRUMENTS.

Color Bar Identifier 251

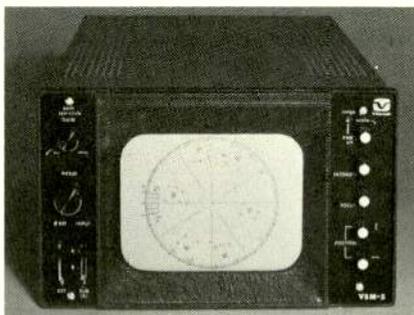
Model CB7300 is a portable television color bar identifier for verifying signal source in portable link operations. It operates on either 115 V ac or 12 V dc (switch selectable) and combines a color bar generator with alphanumeric character generator and audio signal source in a compact 19 by two by 7½-



inch enclosure with video bypass. The unit incorporates a 525/60 NTSC color sync generator, EIA RS-189 split field color bar generator, and field-programmable eight-digit ASCII character generator. An audio generator provides a 1000 Hz +18 dBm full level tone from a 600 ohm, balanced transformer-isolated output. \$2295. QSI SYSTEMS, INC.

Vectorscope 252

The VSM-5 vectorscope provides bright, sharp, easy-to-observe vector displays on a five-inch CRT and is described as a perfect companion to the maker's TSM-5 waveform monitor. Standard features include: selectable A/B video with looping BNC inputs



and subcarrier 'A' select; selectable A/B calibrate subcarrier and external subcarrier looping inputs; test circle/alternate line, pushbutton selectable; high voltage regulation; and 100 percent solid state circuitry. The compact design mounts in 5¼ inches of vertical rack space and is one-half rack width wide. VIDEOTEK.

Waveform Monitor 253

Model 523A is a solid state video waveform monitor designed to display and monitor waveforms from camera outputs, video system output lines, and video input lines on 525-line systems (with an option for 625-line systems).



The compact (5.25 inches high by one-half rack space wide) monitor, an update of the older 528, has an internal CRT graticule that provides parallax-free waveforms for more accurate readings. Display of either of two 75 ohm video signal inputs is, selectable from

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the front panel. The displayed video signal is also provided at a video output jack on the rear panel for viewing on a picture monitor or vectorscope. Other features include built-in 1 V calibration signal; flat, IRE, chroma, and diff gain frequency response positions on the front-panel response switch; and a horizontal sweep selector switch. \$2095. TEKTRONIX, INC.

Videocassette Evaluator 254

Model 750 is a videocassette evaluator that incorporates the same technology as the maker's larger videotape evaluation equipment. Illuminated bar graph displays are located on the front panel, with a tape time reference scale above the bars, calibrated from 0 to 66 minutes in half-minute increments. The center bar identifies video dropout and the upper and lower bars identify edge damage. Each bar has 128 illuminating LED segments, each representing a



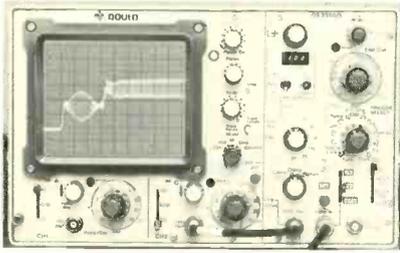
half-minute of tape. Also featured are three pushbuttons that can be customer-calibrated to sort tape into categories (for example, "master stock," "commercial quality," "minimum acceptable standards"). An optional printer reproduces all three grading or nine bar charts together with time/location scale. A one-hour cassette can be cleaned, evaluated, and rewound with constant tension, and graded in six minutes. Manufactured by Elcon Associates. TELEVISION EQUIPMENT ASSOCIATES.

TV Monitor Scope 255

OS3350/5 is a portable, professional-quality TV monitor oscilloscope that combines the functions of an NTSC 525-line waveform and picture monitor with those of a general-purpose 40 MHz dual trace scope. It is especially suited for testing and troubleshooting TV, CATV, CCTV, video recorder/playback, and other video equipment in

Broadcast Equipment

mobile TV, broadcast station, and other applications. A timebase generator permits the scope to perform line-by-line examination of 525-line wave-



forms or to display complete pictures. It accepts standard level composite video signals with or without sound-in-sync signals and provides five different triggering modes. A multiturn vernier control provides triggering delays up to 90 μ s, allowing parts of a line to be examined in detail. \$4395. GOULD, INC.

Diagnostic System For T.O.P.S.Y.256

TDE II diagnostic equipment for the T.O.P.S.Y. option for the Mark III flying spot telecine gives the user access to all addresses in the T.O.P.S.Y. address

field. The manufacturer states that this simplifies analysis and fault diagnosis and allows the user to program data externally for analysis of a required address area with an oscilloscope. The unit's monitor program gives the operator a trace instruction, register display, break points, run or go, memory display, exit, and system reset. With the system, the user can analyze the local interface, mainframe, and remote racks either by running the pre-

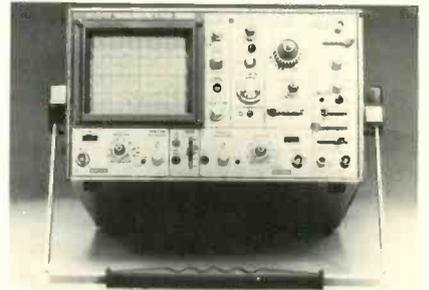


programmed routines or by writing a special program for examination of a specific parameter. If desired, TDE II can run T.O.P.S.Y.'s remote rack itself. RANK CINTEL.

100 MHz Oscilloscope

257

Model V-1050 is a new quad trace, 100 MHz oscilloscope with stated sensitivity of 500 μ V/div (5 MHz). It will simultaneously display four signals; a total of eight traces can be seen with the



alternate time base feature. Frequency response of channel 1 and channel 2 vertical amplifiers is dc to at least 100 MHz (-3 dB) and rise time is 3.5 ns or less. Channels 3 and 4 have frequency response dc to 70 MHz (-3 dB). A bandwidth limit switch can limit bandwidth to approximately 20 MHz. The unit offers calibrated delayed sweep

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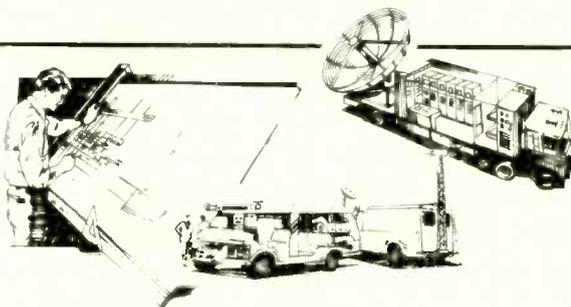
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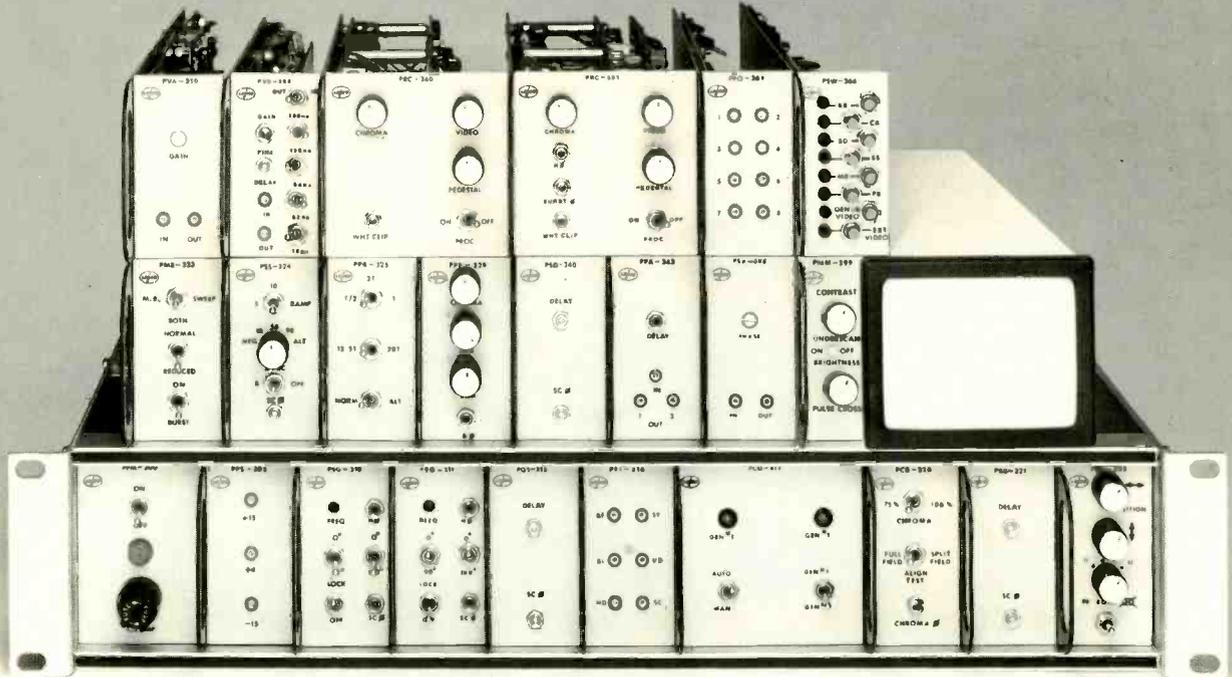
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capability. Horizontal display modes include A only, A intensified, alternate, and B delayed. The six-inch CRT has an acceleration voltage of 20 kV, with useful screen area of eight by 10 cm. Internal graticule, variable scale illumination, and P31 phosphor are standard, as is a TV synchronization circuit for video applications. Power consumption is 50 W or less. \$2390. HITACHI DENSHI AMERICA.

Microwave Receiver 258

The Series 1780 programmable microwave receiver is designed to reduce antenna testing time by providing high data rate capability. Programmable bandwidth and data averaging offer a choice of high measurement speed or increased sensitivity. The IEEE-488 compatible receiver is programmable from 1 to 40 GHz and operates at fixed frequencies to over 100 GHz. An optional low-frequency converter extends coverage down to 100 MHz. Two- and three-channel models are available, with up to three channels of amplitude data and two channels of relative phase. The receiver automatically calibrates the IF system with a stable internal crystal oscillator, allowing compensation for any IF system errors resulting from long-term or short-term drift. A programmed service mode permits internal troubleshooting to the board level, reducing servicing time. SCIENTIFIC-ATLANTA.

Signal Generators 259

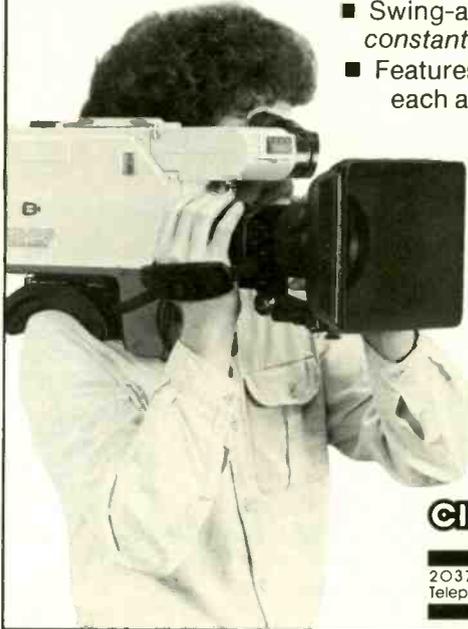
Two new signal generators, Model 6070A (200 kHz to 520 MHz) and Model 6071A (200 kHz to 1010 MHz), feature many microprocessor-controlled features: direct keyboard functional control; "spin knob" tuning; digital sweep with ramp and pen lift outputs for x-y recording; internal "learn-mode" memory for storing complete front-panel setups for later recall (up to 50 locations); AM, FM, or OM relative frequency and amplitude for offset measurements; and frequency step buttons. They have a noise floor of -150 dBc/Hz at 20 kHz offset; non-line related non-harmonic spurs are -90 dBc to -100 dBc. IEEE-488 interface is standard. Virtually all front-panel functions of the 5¼-inch high units are remotely programmable. Model 6070A, \$15,000; Model 6071A, \$17,000. FLUKE.

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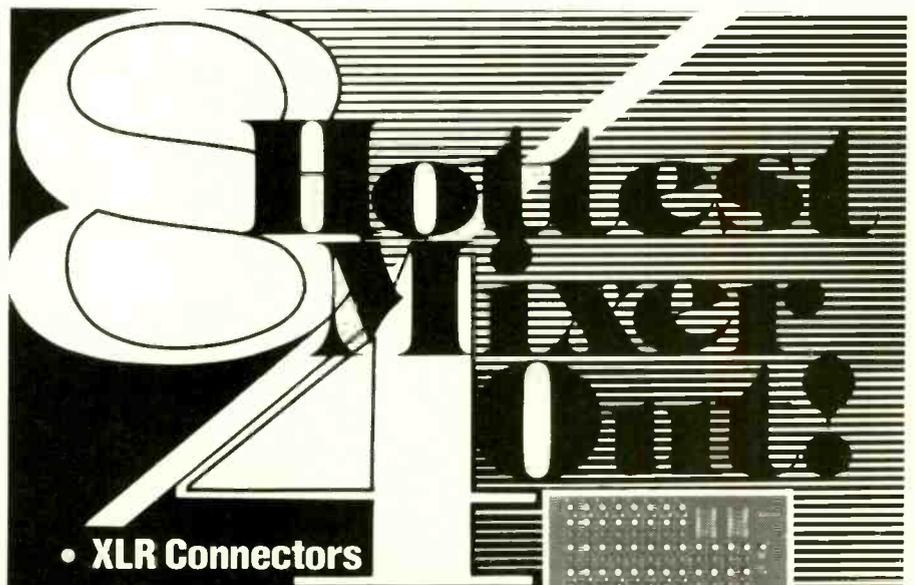


- Swing-away type matte box maintains *constant orientation*.
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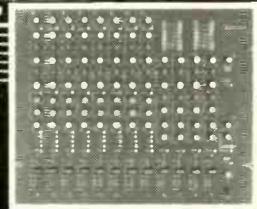
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Broadcast Equipment

TV Sync Option For Scopes 260

Television sync capabilities are added to 100 MHz oscilloscopes Models 1740A, 1741A, and 1742A with the 005 option. This option adds the circuits and controls necessary for triggering on a composite video signal while maintaining measurement capabilities

for design and troubleshooting. Oscilloscope inputs are modified to provide convenient matching to video signals. Channel A incorporates a built-in 75 ohm input for impedance-matching most video sources. Channel B has a TV clamp that stabilizes the display of video signals. This TV sync circuit locks on the one complete frame of video, with switching between fields accomplished by a pushbutton. TV line scan capability allows individual lines to be singled out for inspection and

measurement. Segments of individual lines may also be examined in the triggered mode. Adds \$215 to price of scope. HEWLETT-PACKARD.

Audio Multimeter 261

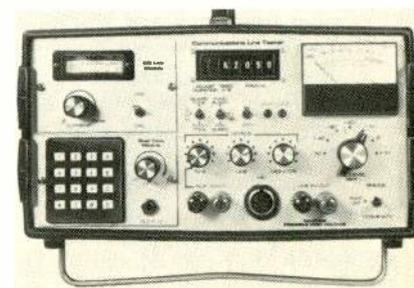
The Bulgin Soundex audio multimeter is a multi-purpose instrument suitable for line testing and listening, peak program metering, amplification of microphone signals, calibration of peak program monitors, and other audio functions. It combines a switched gain amplifier with 400 V peak instrumentation input and a full-spec PPM capable of audio program level measurements



down to -72 dB with 0.1 dB accuracy at center scale, as far as -50 dB. Amp input is fully protected to 400 V, isolated and balanced to prevent grounding when connected to a jack field. The 50 ohm impedance output has sufficient power to drive headphones. Front-panel buttons provide four gain settings, ON/OFF, battery test, 600 ohm termination, and access to variable gain potentiometer. Power is from internal rechargeable batteries, with built-in ac converter/charger for bench use. Measures 175 by 115 by 67 mm. H.R. KIRKLAND CO.

Communications Line Tester 262

The CLT 1000 Communications Line Tester is a portable unit for testing communications lines used in two-way radio remote control and other standard 600 ohm audio line applications. It provides all features necessary for troubleshooting and level setting, including: tone synthesizer; separate guard tone



oscillator; separate 1000 Hz tone generator; burst generator section to simulate actual operation of a base station control console; intercom feature for communication between the tester

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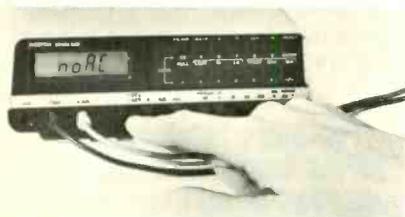
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and a remote control unit; wide range dBm meter for measurement of hum and noise down to -60 dBm and tone levels up to +13 dBm; high-quality line amplifier for matching or bridging phone lines; and auxiliary input jacks for inputs from external audio generators. Options include dc line module and dual tone module. INDUSTRIAL ELECTRONICS SERVICE CO.

"Educated" DMM

263

The 6504 microcomputer-based portable digital multimeter is described by its manufacturer as "the most educated DMM in the world." The 4½ digit, LCD-display instrument offers five-range measurement of dc and ac voltage and current, with true RMS ac sensing and six-range measurement of resistance. It has a basic accuracy of +0.03 percent ±2 digits and wideband ac frequency response (to 20 kHz). Programmed-in automatic self-



checking routines make operation accurate and foolproof, according to the manufacturer. Any combination of six basic computing modes is selectable by panel pushbutton keys: filter, null, scale/offset, percent deviation, max/min monitoring, and hi/lo limits. The LCD readout provides a user/machine interface that maintains continuous communication with the operator through its self-diagnostic ability and eight-word prompting vocabulary. Standard options include rechargeable battery and IEEE-488 interface bus. A series of probes is also available. \$690. WESTON INSTRUMENTS.

Sweep Oscillator

264

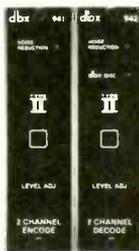
Model 430C sweep oscillator mainframe, applicable to both octave band and Model 4310A/K-16P multiband systems, features an integrated IEEE-488 interface bus option, designated -09. The option may be field-installed. Functions controlled by Option -09 and the bus include: RF power (with up to 256-point resolution over a 15 dB range); frequency (with 10,000 point resolution between any start and

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stop frequency); band select; sweep on/off; and RF on/off. The unit is designed for applications in the 0.01 to 40 GHz frequency range and is suited for EW or communication systems evaluation and broadband testing of RF attenuators, cables, and other RF components; it will also serve as the signal source in computer-controlled test systems. The 430C measures 14.29 cm high by 42.54 cm wide by 40 cm deep. WEINSCHTEL ENGINEERING.

True RMS Voltmeter 265

The MV-800 analog voltmeter is a true RMS instrument that will accurately present the effective power of waveforms that depart from a true sine wave. Fifteen ranges are provided, from 30 μ V full scale to 300 V, and from -90 dB full scale to +50 dB in decades. Readings as low as -105 dB are therefore readily accomplished. A front-panel bandwidth switch permits a choice of wideband measurements, standard first-order audio bandpass (20-20 kHz), or "external filter." A range of standard or custom plug-in filter modules are available. The unit, described as highly accurate and ex-

tremely rugged, has internal rechargeable Ni-cad batteries. \$495. IET LABS, INC.

Audio Console 266

The 6509 broadcast audio console comes in four versions. Models 6509-RS and 6509-LS are five-channel stereo units, the first with rotary pots and the second with linear pots. Models



6509-RM and 6509-LM are monaural units. Each is packaged in a new low-profile housing design. Audio level controls feature proven VCA techniques with conductive plastic potentiometers. Sealed rotaries and high-performance Waters® linear units provide long-silent service, the manufacturer states. A dipswitch selectable muting system allows mute on any or all channels. The standard unit features one low-impedance mic preamp and four high-level inputs. Channels 1, 2,

and 3 each have one input, while channels 4 and 5 have three each, switch-selectable from the front panel. MICRO-TRAK CORP.

Stereo Equalizer 267

The 674A stereo equalizer is a dedicated split-stereo version of the maker's 672A. It features eight bands, graphic-type EQ controls, and continuously variable center frequency and bandwidth in each band. Wide-range and low-pass filters with 12 dB/octave Butterworth slopes follow the EQ section and can function as independent, tunable two-way electronic crossovers. Ganged controls make one-hand stereo operation easy, the manufacturer states. Each of the eight bands tunes over a 3:1 frequency range and offers 16 dB boost or cut with reciprocal curves. "Q" typically can be varied between 0.3 and 20 for extra-narrow notches. High and low-pass filter sections are continuously tunable over 100:1 frequency range in two decades; each is independently switchable. Nominal output

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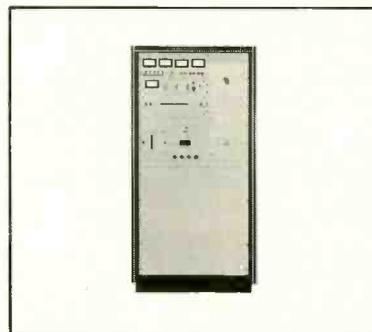
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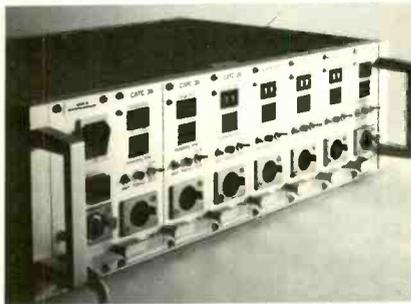
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level is +4 dBm; maximum output level before clipping is over +19 dBm. Total noise at output is less than -78 dBm, giving a dynamic range of over 97 dB. THD and SMPTE IM are both less than 0.08 percent at +18 dBm out. \$1149. ORBAN ASSOCIATES.

Digital Multiple Charger 268

Model CATC 35 is a digital multiple charger designed to charge seven Ni-cad batteries simultaneously and independently. It will charge all types of Ni-cad batteries, with voltage variations from 2 V to 40 V. Charging time for any specific battery will depend on



its state of discharge; for example, a fully discharged 4AH battery will fully recharge in 2½ hours. Each channel of the CATC 35 is an independently func-

tioning plug-in module, programmable according to the battery to be recharged. The charger features a two-digit counter for setting charge time; a digital clock that continuously displays remaining charge time; battery light; charge start pushbutton; and toggle selector switch. Operates on 110 and 220 V. The unit measures 5½ by 17½ by 12¼ inches and weighs 38 pounds. \$2195. CINE 60.

Reverb Decay Analyzer 269

The RT60 reverb decay analyzer, designed to operate in conjunction with the maker's DN60 real time analyzer, gives the user control over many of the parameters of decay analysis. A cursor switch allows choice of measurement using any single ISO third-octave frequency or the total bandwidth. The user can also select any portion of the time window from 0 dB to -30 dB in 2 dB increments. The unit will plot the decay curve, displaying the results on the DN60. Choice of 16, 64, or 208 ms gives the user control over the horizontal resolution of the plotted curve. The user can also accumulate up to 32 separate curves, enabling a true averaging of different point measurements. \$1395. KLARK-TEKNIK ELECTRONICS, INC.

Fluid Head

270

Model A-4000 Pearson balanced fluid head is designed for the professional camera operator. It allows the camera to remain in perfect balance in any position; camera position is quickly adjustable to compensate for camera body load and lens weight. The magnesium-cast head is lightweight (15 pounds) and rigid. Pans of nearly 360 degrees and tilts with fingertip control are possible. The control handle adjusts 360 degrees and is available in stainless steel or chrome plate. Fluid tension is adjustable; springs, pads, weights, and tilt plates are unnecessary. BCD, INC.

Power Amplifier

271

Model 7000, first member of the "Pro-Line" family of power amplifiers, is FTC rated at 200 W average continuous power per channel into 8 ohms, 20 Hz to 20 kHz, at no more than 0.1 percent THD (350 W/channel into 4 ohms, IHF). The amplifier is 5¼ inches high and rack mountable, and includes front-vented forced-air cooling. Level is adjustable by means of detented front-panel controls. \$749. BGW SYSTEMS, INC.

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