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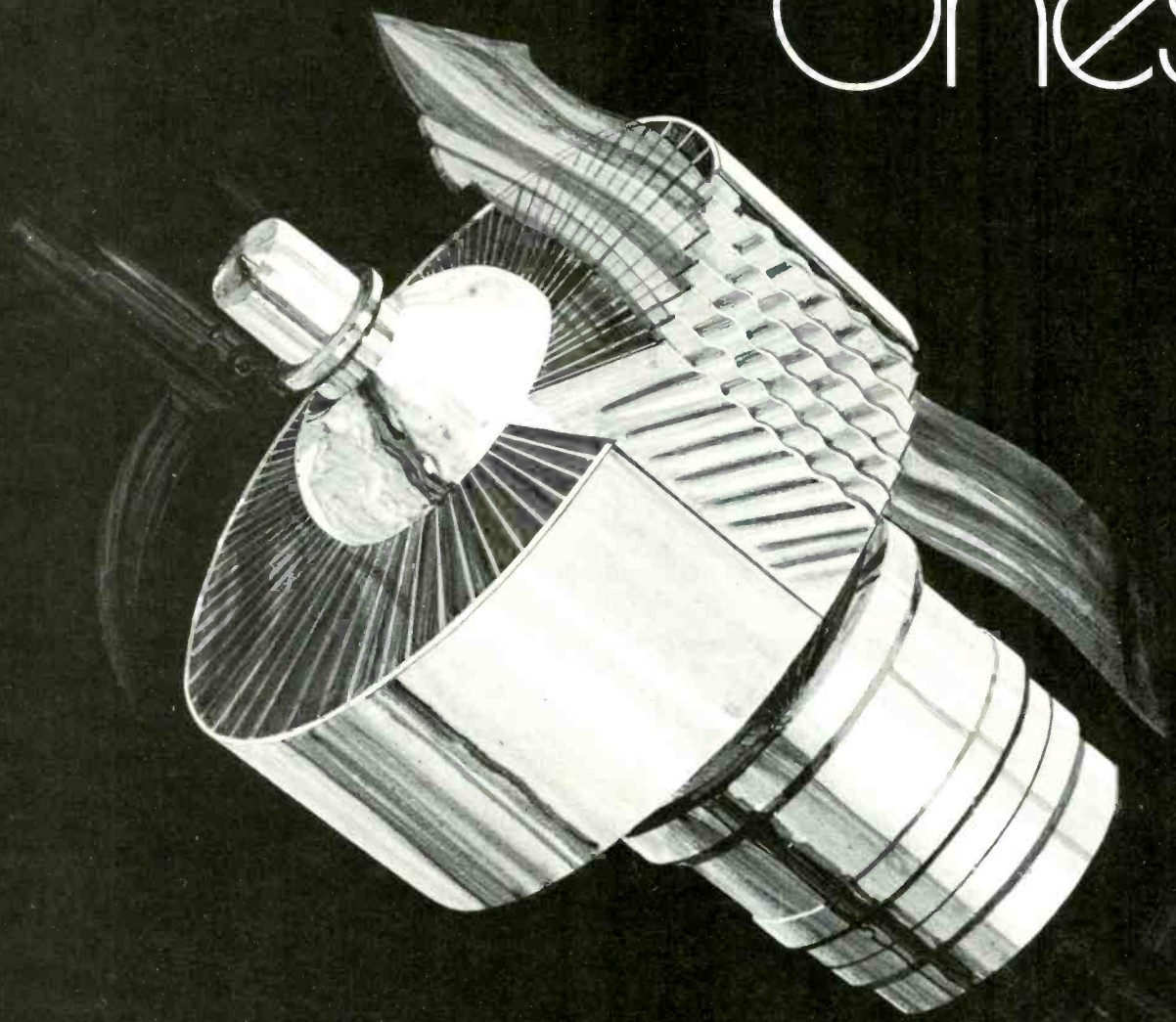

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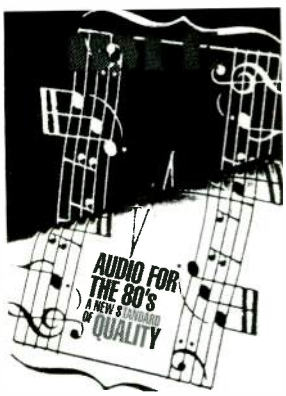

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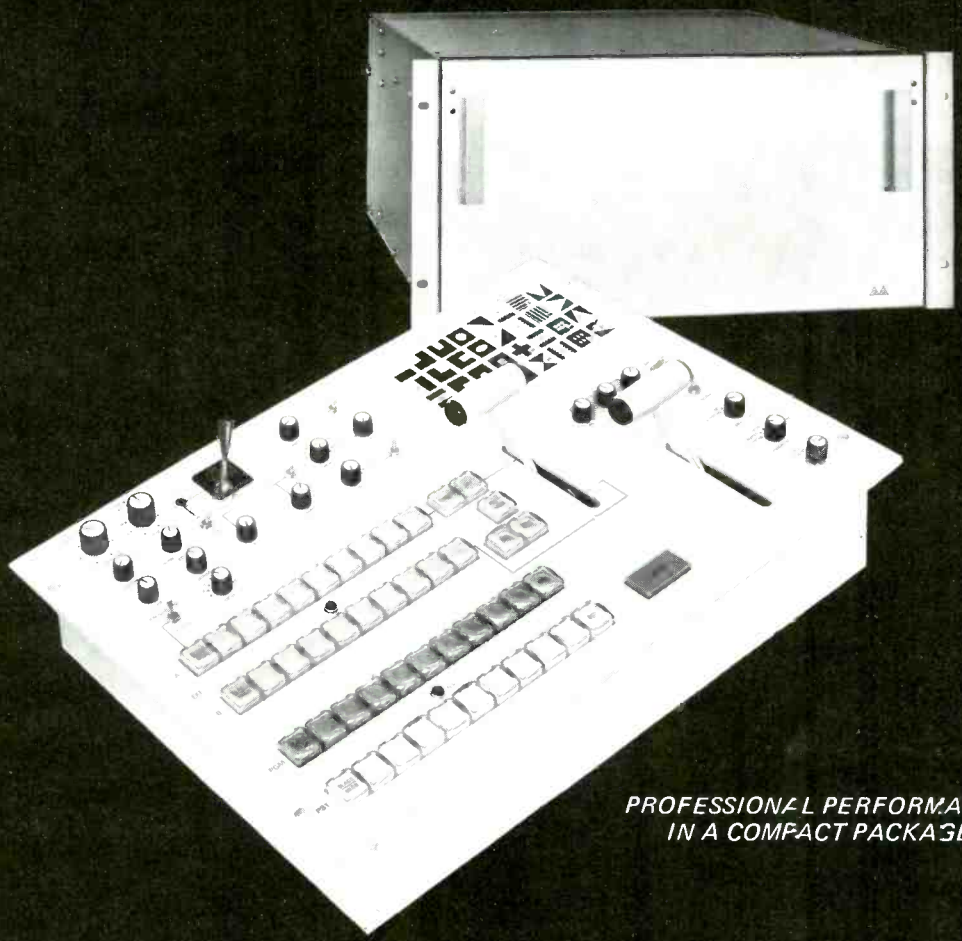

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BROADCAST INDUSTRY NEWS

Postpone Travelers Information Service: NAB

"As presently structured, TIS (Travelers Information Service) is plagued with congenital defects," according to a Motion for Stay filed by NAB general counsel Erwin Krasnow.

The Motion requests the FCC to suspend issuing rules for TIS, otherwise known as roadside radio, until the Commission rules on an NAB Petition for Reconsideration of the plan. TIS is a new category of station which would operate adjacent to the standard broadcast band at 530kHz and 1610 kHz. It would be operated by local government entities to supply information pertaining to traffic and road conditions, descriptions of local points of interest, availability of lodging, rest stops and service stations, etc.

"TIS will not provide the public with new or better service than it is now receiving from conventional broadcasting and there are crucial oversights in the plan which conflict with Commission policy and precedent," said the NAB Motion.

NAB pointed out that TIS is fundamentally inconsistent with the U.S. position on AM spectrum use as proposed for the World Administrative Radio Conference and urged the FCC to defer institution of the new service until the Conference is convened in 1979. NAB also raised questions about type approval for TIS transmitting equipment and potential problems of interference. Since TIS would be operated by local government, and would probably be funded from tax money, NAB urged that TIS applicants be required to give the community adequate notice of a proposed new station.

13 Additional Cities To Get Audio Program Channel Service

Audio Program Channel Service of Western Union will be available in thirteen additional cities beginning November 1, if FCC approval is obtained.

Western Union announced that this service to radio broadcasters would soon be available in Kansas City, Boston, Buffalo, Cincinnati, Cleveland, Detroit, Philadephia, Denver, St. Louis, Houston, Baltimore, Pittsburgh, and Columbus, Ohio. Cities already receiving Audio Program Channel Service are: New York, Washington, Chicago, Dallas, Atlanta, Los Angeles and San Francisco.

Audio program channels are offered to broadcasters via the Westar satellites

continued on page 8

Home Screen Competition Heats Up With RCA Entry

Competition for the home screen heated up in late August when RCA announced its entry into the home VCR market (above). RCA has escalated the battle for more recording time and lower price with a model that will record 4-hrs, and sell for $1000, a few hundred less than competitive models from Sony, Zenith, and Toshiba. Ramifications for broadcasters may mean an overhauling of scheduling strategy and changes in programming content.

"Discrete" Wins FCC Quad Listening Tests, But Not By Much

The "discrete" or 4-4-4 system for quadraphonic reproduction came out ahead in the listening tests the FCC has been conducting at its Laurel, MD lab over several months, according to the FCC report on the tests released just as this magazine was going to press.

But the margin of victory over the SQ matrix system was quite small, with the SQ coming out slightly ahead, in fact, in musical preference in the "fold-back" mode for two-channel and one-channel reproduction. The 4-4-4 was comfortably ahead in the localization tests, and a little ahead of the total of the musical preference tests.

Other systems included in the tests trailed those two, overall, although the QS 4-2-4 did well in certain of the tests.

The FCC followed closely the methodology worked out by the National Quadraphonic Radio Committee for its listening tests of more than a year ago. This was necessary, the report says, to make the results comparable to those the NQRC got. The same musical selections were used in the music preference tests.

The main difference between the two sets of tests, as the report sets out in detail (and as reported in earlier issues of *BM/E*), is that the FCC tested the SQ and QS matrix systems with the very latest decoding equipment for each. These were missing from the NQRC tests since both Columbia, with SQ, and Sansui, with QS, withdrew from the NQRC evaluations.

The FCC report emphasizes that each of the proponents with a system in the tests was allowed to set up its own equipment and to check it out at any time actual tests were not underway. This made it sure that all systems were fully and fairly represented.

The equipment set-ups, the testing methodology, and the statistics of the results are all covered in detail in the report. The significance of the results for the FCC's ongoing consideration of quad systems for FM is certainly not clear at this point; the FCC, in the report, is at pains to point out that the "present 4-2-4 systems with advanced logic and phase cancellation decoders compare favorably with the discrete 4-4-4 system." *BM/E* wants to return to the report after careful study in a later issue.

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and/or land based microwave facilities. Type I service is a 4kHz and Type II service is at 8kHz. Point-to-multipoint service at either bandwidth will be offered only via Westar satellites.

Subcommittee Gets Data On Local TV Service

Data on local service provided by TV stations to their communities was developed by NAB research and presented to the House Communications Subcommittee by John A. Dimling, vice president and research director for NAB.

According to the data, 200,000 hours of local news coverage was provided to the public by TV stations in 1976, nationwide. The amount of local coverage continues to grow, according to the report. Also, 89 percent of the viewers of local news report that they are either "very satisfied" or "somewhat satisfied" and 81 percent agree that "local newscasts do an excellent job of covering most of the major news stories in the area."

The report also indicated that there was a growing trend toward longer newscasts and more documentaries. Viewers are better informed about local political issues and viewing tends to narrow the information gap among social and income groups.

Other portions of the report pointed out that a total of 168,000 hours of programming nationwide was devoted to public affairs and other non-entertainment programming in 1975. In three markets selected as representative of large, medium and small television markets, 2,900 programs or program segments were devoted to identified community problems in Minneapolis-St. Paul; 1,900 in Omaha; and 1,100 in Beaumont-Port Arthur.

The information was provided to the Subcommittee because, according to John Dimling, "some people have come to question the appropriateness of retaining localism as a goal of broadcast policy."

Corporate TV Produces More Than Nets

According to a new research study corporations will produce 46,000 programs in 1977—more than the combined production of ABC, CBS, NBC and PBS.

The study, "Private Television Communcations: An Awakening Giant", reports that this programming will total more than 15,000 hours and will be produced by some 700 businesses and non-profit organizations by the end of 1977. The report, authored by Judith and Douglas Brush of D/J Brush Associates, New York, is published by the International Industrial Television Association. The overall size of the corporate video market, says the report, has doubled since 1973 and will pass the half-billion dollar mark in 1977. The market is expanding by nearly 40 percent per year and is expected to reach $1.6 billion by 1980.

Within a short span, the authors expect some people to be watching more television at work than they do at home as video becomes the prime medium for receiving news and information about corporate policies and activities.

Satellite Aids In Flood Stricken Johnstown

The Communications Technology Satellite (CTS), was undergoing tests in Texas under simulated natural disaster conditions to evaluate its potential for use in emergency conditions when a real natural disaster occurred in Johnstown, PA, where extensive flooding caused loss of life and property.

continued on page 10

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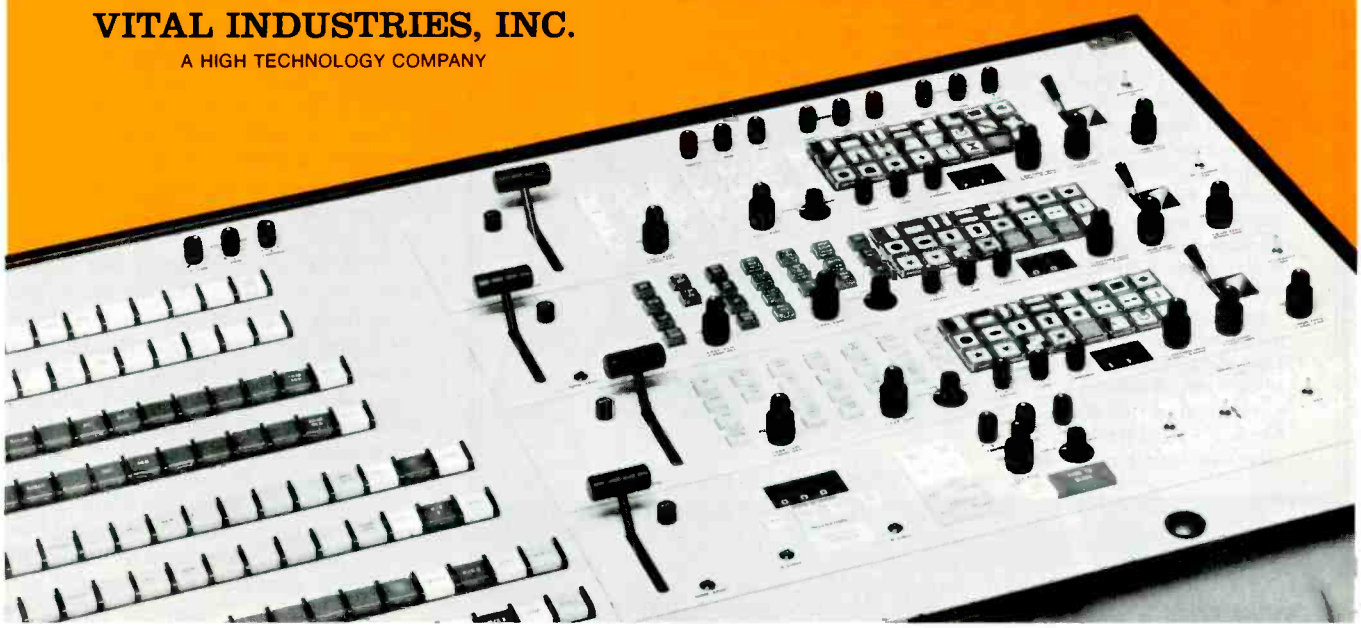

Circle 105 on Reader Service Card

News

The Red Cross which was cooperating in the experiment with Comsat, asked that the portable earth station equipment be transported to Johnstown for use there. The 1.2 meter dish and other equipment was sent to Johnstown where it was installed atop the Vocational Technology High School. In a short time the satellite was being used to transmit disaster-related information such as requests for medical services, supplies and situation maps. Eventually, the satellite was also used to assist families in reaching relatives around the country.

CTS, a cooperative NASA and Canadian satellite launched in January 1976, is stationed in a synchronous orbit over the equator, 22,300 miles above the earth. Signals were transmitted up to CST and down to a 4.6 meter antenna at Comsat headquarters in Clarksburg, MD. Land lines connected the Comsat headquarters to Red Cross headquarters in Washington, D.C. The real emergency pre-empted planned tests with the Canadians.

Billion Dollar Fiber Optics Market Seen

With AT&T and ITT moving rapidly towards quantity production of optical fibers, a Connecticut research firm predicts that "a market of at least $1 billion seems assured" for fiber optics "within the next ten years".

The first major use of the new technology, according to the 263 page report prepared by International Resource Development, Inc. (IRD), a New Canaan, CT, market research firm, is expected to take place under crowded city streets. Telephone and CATV companies are expected to take advantage of the information carrying capacity and small size of fiber optics to greatly expand information services without having to increase existing cable ducts. Another likely benefit of fiber optics is that while services can be increased without expansion of existing cableways, a replacement of the bulkier copper cable of today is likely to result in reduced cost.

With big manufacturers like DuPont and Corning Glass gearing up to produce fiber optics in massive quantities, the report cautions small manufacturers about attempting to compete with "the big boys". But, the report continues, there may be significant business opportunities for smaller firms in the manufacturing of connectors, splicing equipment and other ancillary equipment. The projected growth of the fiber optics market is expected to impact the $2 billion conventional cable and con-

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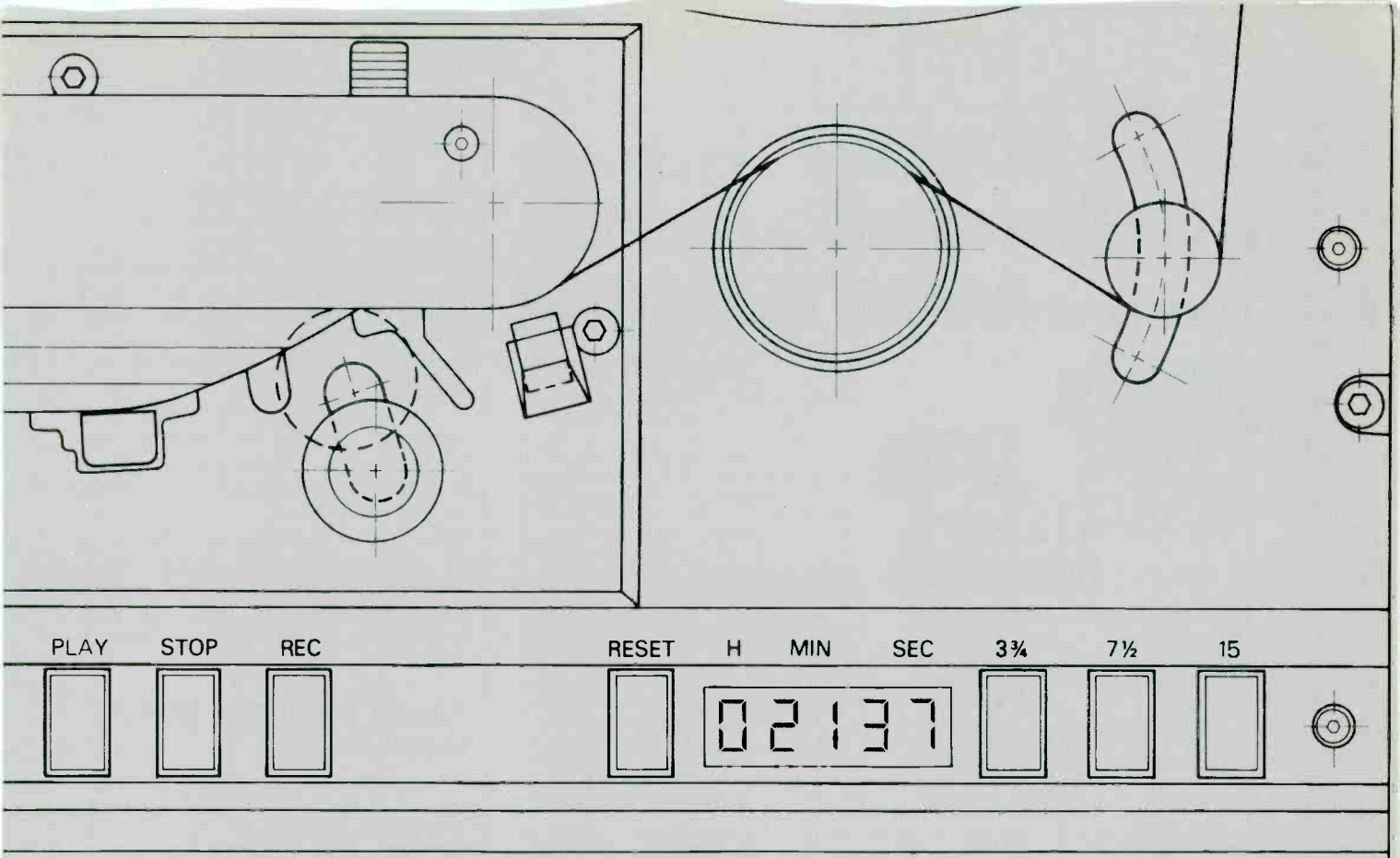

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News

nector industry but the report points out that there is little panic among the major manufacturers. Some manufacturers of conventional cable and connectors have already moved to enter the fiber optics business in a move to protect themselves. Detailed analysis of various manufacturers are included in the report.

The report, based on a survey of more than one hundred suppliers and potential users of fiber optics, indicates that the market is likely to grow from about $10 million in 1977 to more than $100 million by 1980 and will pass the $1 billion mark by 1987. The growth in shipment revenues will continue despite a sustained drop in pricing. Further details on the report can be obtained from IRD.

Strong Support of UHF Urged On FCC

"The Commission's 'Mr. Fixit' approach in the area of UHF spectrum management has been slow-footed at the very least, irresponsible at the most," according to Harford N. Gunn, Jr., vice chairman of the Board of the Public Broadcasting Service.

UHF television is twenty-five years old, yet its destiny is uncertain, if not shakey, complains Gunn. Confronted with increased demands for additional land mobile uses and the Commission's "flexible" attitude towards reallocating the UHF channels at the upcoming World Administrative Radio Conference, Gunn is prompted to ask whether or not the "Commission is prepared to act to help UHF." These comments on UHF, and others, appear in an article written by Gunn in the latest issue of Public Telecommunications Review, published bi-monthly by NAEB. Gunn concludes that "the management of the (UHF) spectrum will determine the fate of public television, public radio, minority ownership and participation in broadcasting as well as the quality of national and local programming."

NCTA Says FCC Decision On Fee-TV Threatens Consumer

The FCC's recent decision to include pay cable gross revenues in the base franchise fees came under attack from NCTA. NCTA claims that the decision will discourage cable operators from entering the "highly competitive pay cable business."

NCTA described pay-TV as a "high risk enterprise that attempts to market an expensive product in competition

continued on page 14

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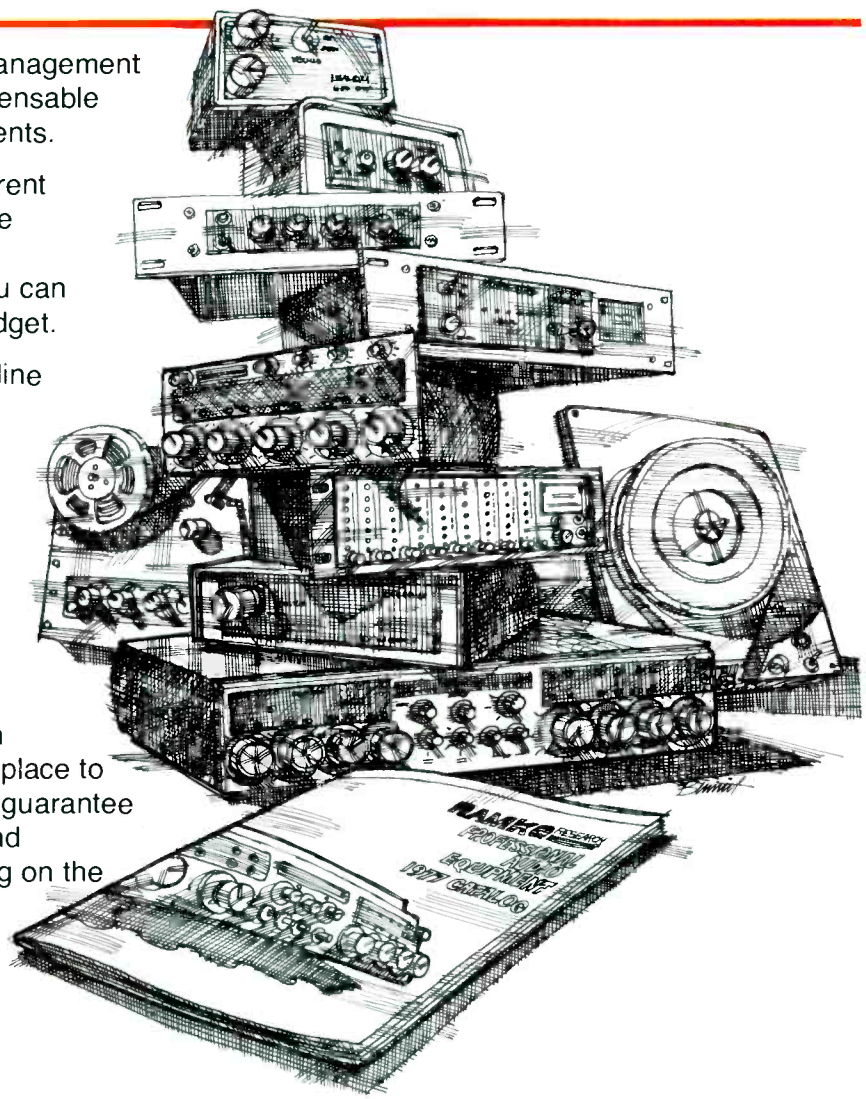

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with commercial television, over-the-air subscription TV, multi-point distribution service, home video recorders, and the local movie theatres. "Not one of these other competitive businesses," said NCTA president Robert L. Schmidt, "is saddled with the extra taxation such as the FCC proposes for pay cable television."

The FCC proposal would allow local franchising authorities to assess from 3 to 5 percent of gross pay cable revenues as part of the franchise fee. The decision has seemingly given with one hand and taken away with the other. Whereas cable operators are pleased that a ceiling has been retained on the level of fees that a franchising authority can levy, "on the other hand," said Schmidt, "(the Commission) by expanding the base upon which the fees are calculated, has allowed those same authorities to take an even bigger and more regressive bite from the consumer's pocketbook."

WEWS-TV Goes 'Total Automation'

WEWS-TV, Cleveland, has gone to "total automation" of its operation. The link-up of the station's technical operation with its business system is unusual in that the software for its GVG 1400 switcher consists of a 200 software package from Vital.

The GVG switcher driven by the Vital software is interfaced with the BIAS (Broadcast Industry Automation System), the second successful interface achieved by BIAS in recent months. Another anomaly at this Scripps-Howard station was the decision to go "live" with the automation system without a period of parallel operation. Normally stations operate the technical and business systems in parallel to a manual or semi-automated system for some time prior to the actual "live" switch in order to insure that all systems perform properly. WEWS decided to trust the computers and proceed immediately with an automated environment.

The first day of fully automated operations was a bit shakey and only portions of the program schedule were run on the automated switcher. Within a few days, however, the engineering department felt more comfortable with the new, more detailed BIAS automatic switching log and the full day's schedule with the exception of local news, was aired by the computer. WEWS vice president and chief engineer, Jim Bloyd, described the link-up as smooth and said, "I've been impressed with the way both BIAS and Vital people responded to our project."

News Briefs

The FCC has been told, "there has been a disturbing **trend of increasing commercialism by non-commercial radio and television** stations," by general counsel for the NAB, Erwin Krasnow. In some cases, said Krasnow, stricter enforcement of existing rules would be adequate but there is a need for more specific guidelines and restrictions on fund raising schemes that constitute an abuse of a non-commercial service . . . . New **tolerances for spurious emmissions** from high power broadcast transmitters has been opposed by the NAB. The proposal calls for limiting such emmissions to −90 dB and will be made to the World Administrative Radio Conference. NAB believes that current tolerances should be maintained.

In a letter from John B. Summers, executive vice president and gm of the NAB, to Sen. Ernest F. Hollings,

continued on page 16

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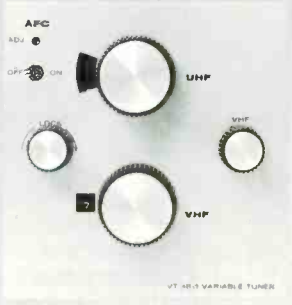

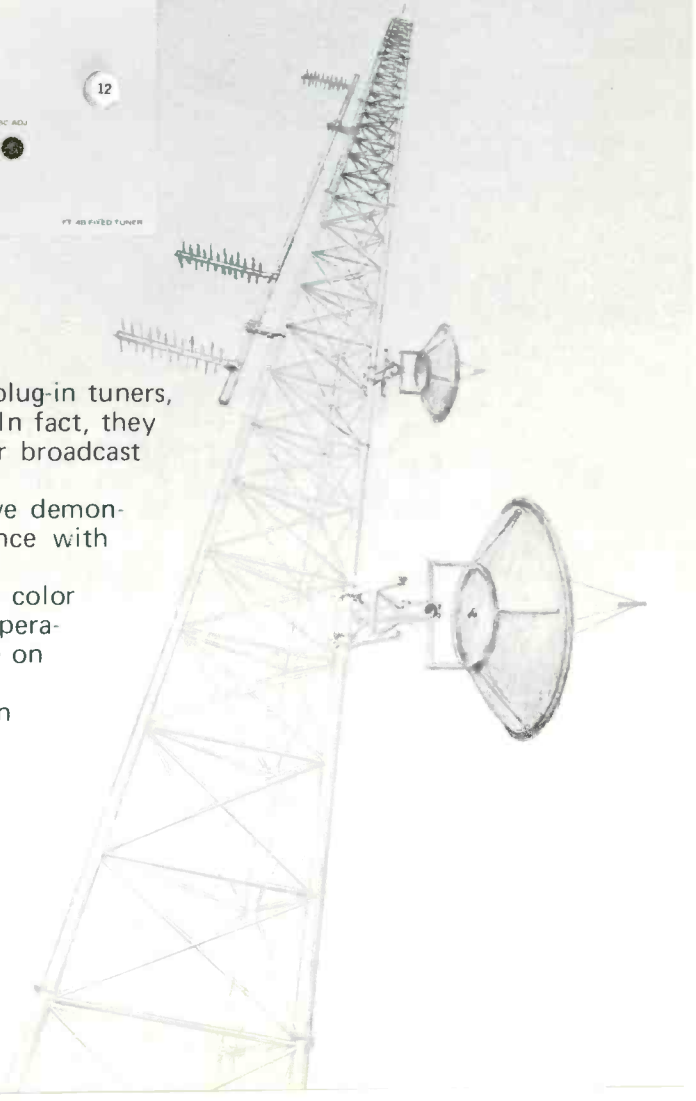

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News

Summers recommended that Congress set **lower minimum and maximum forfeitures** for some broadcast stations and CATV systems. The recommendation is that $50 minimum and $5000 maximum forfeitures be set for stations with 20 or fewer full time employees and cable systems serving 3500 or fewer subscribers. This group would comprise about 75 percent of all U.S. stations, and 77 percent of all cable systems . . . . General counsel of the NAB, Erwin G. Krasnow, has asked the FCC to reject a request by the National Citizens Committee for Broadcasting (NCCB) to **delay refund of fees due broadcast licensees.** Krasnow told the FCC the NCCB "lacks standing to inject itself into the final stages of years of litigation," and he pointed out that cable operators had long since received their refunds.

According to a full page ad on the cover of the July 30 issue of Editor and Publisher magazine, it is the belief of the publisher of The Minneapolis Star and Minneapolis Tribune, Donald R. Dwight, that unless the **newspaper industry is willing to join the fight for full first amendment rights for broadcasters,** the wholeness of the First Amendment is in jeopardy. Dwight said in the ad that newspaper journalists have stood aloof from the struggle "observing their struggling fellow broadcast journalists with the comment, 'your end of the boat is sinking' " . . . . Reacting to the possibility that a record of the recent committee **hearing on broadcast aspects of the proposed Communications Act Rewrite may not be printed,** NAB president Wasilewski has written a letter to chairman of the Communications Subcommittee, Rep. Lionel Van Deerlin, stating that a printed record "is imperative." "Since these hearings produced the first comprehensive testimony on broadcast issues in many years," wrote Wasilewski, "it would seem to us essential that this information be printed as soon as possible."

The NAB will hold 3 **meetings this fall to give the public an opportunity to ask questions** about radio and television codes and broadcast policies. The Broadcast Town Meetings will be held on October 18 in Cambridge, MA; November 11 in San Diego, CA: and November 15 in Dallas, TX . . . . The NAB has asked the FCC to **retain its feature movie restrictions** for subscription television (STV). NAB would like the Commission "to disclose the rationale of its abandonment of all feature film restrictions, provide interested parties a fair opportunity for comment, and place the burden on those who seek repeal of the rules."

After a slump in 1975, the **audiovisual product sales and services industry bounced back** in 1976 with gross income of $2.21 billion. According to Hope Reports, which conducted the study, most areas of the A/V industry were up over last year. The strongest gains were in the areas of sponsored films, slides, filmstrip and video production while the weakest segment of the industry was that of AV materials, both educational and training, down 4 percent from last year.

NCTA president Robert L. Schmidt came out with **strong support for the Wirth-Broyhill pole attachment bill** in testimony before the House Subcommittee on Communications. According to NCTA testimony, the bill which seeks to establish some forum for adjudicating pole attachment disputes between cable operators and utility companies, is essential "emergency legislation." Pole attachment fees which are now about 10 percent of a typical cable operator's pre-tax profit, are being increased around the country on an average of 60 percent . . . . A

continued on page 18

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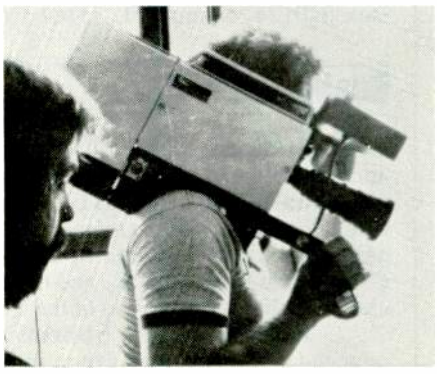
Your best dollar-for-dollar color mini-cam is the light-as-a-feather ASACA ACC-2000. With view finder, it weighs 21 lbs. Compact. Single unit form means no back pack is required. Built-in gen lock.

Broadcast quality picture from features seldom found in cameras priced below $30,000.00. 2 line contour compensator, 3 Plumbicon® (Satican®) tubes and I and Q encoder, pre-heat circuit—low power consumption of approximately 30 watts AC. Easily adapts to battery. Optional adaptor for use with 12V car or truck batteries. No wonder top TV news crews use.



Great indoors, too! Optional 5″ view finder readily adapts camera to studio. Add remote control unit with painting, iris and pedestal control that also accommodates many cameras and VTR.

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News

ruling that **cable television service is not subject to sales tax** was upheld by the Appellate Division, Third Department, New York State Supreme Court. The decision was viewed as a major victory for the New York State Cable Television Association which had been fighting the tax in court since June, 1976.

Rex A. Bradley has been named to chair the 1978 Convention Committee of the NCTA . . . . The NAB has requested FCC Chairman Richard E. Wiley to seek a **waiver of Office of Management and Budget restrictions** on the number of copies of amended FCC rules. NAB wants monthly mailings of such amendments to go to broadcasters which would require some 10,000 copies instead of the current 2,000 copies permitted . . . . The Executive Committee of the NAB has directed that a **Task Force be established** to attempt to foster an increase in minority broadcast ownership . . . . Action for Children's Television (ACT) has filed a complaint with the FTC which seeks a **ban on the Ralston Purina's "Cookie Crisp"** commercial. The commercial, charges ACT, "creates for the child the net impression that it is nutritionally desirable to consume cookies for breakfast."

"Broadcasters Clinic '77" will feature the presentation of significant technical papers by major equipment suppliers and engineering consultants, according to a spokesman for the UW-Extension WHA-TV and Radio, which will sponsor the event October 19 and 20 at the University of Wisconsin's Madison campus. For more information, contact Don Borchert, UW Telecommunications Center, 7th floor, Vilas Hall, Madison, WI 53705 . . . . **The Theatre Television Film Lighting Committee** of the Illumination Engineering Society has rescheduled "Make It Light," the TTFL '77 Symposium in Miami. The new dates are November 6-9. For more information, contact George Gill, TTFL, '77, PO Box 610124, Miami, FL 33161

Business Briefs

CMX Systems, a division of Orrox, announced an agreement with **Marconi Communications Systems** of Chelmsford, England. The agreement gives Marconi exclusive marketing rights to CMX products in the U.K. and non-exclusive rights in other areas of the world . . . . **RCA Broadcast Systems** announced price increases averaging 8.3 percent on RCA manufactured radio and television broadcast equipment.

continued on page 105

Their weight makes them portable. Their performance makes them professional.

Introducing Technics new professional portable cassette decks. Our top-of-the-line RS-686DS speaks for itself. Its 6 lbs., 13 oz. say it's portable. Its 3 heads say it's professional. And all the other features say it will give you recordings of professional caliber.

Features like a unique anti-rolling mechanism for unprecedented portable transport stability. A frequency generator servo motor that immediately counteracts any variation in rotational speed. Separate bias and equalization. Even Dolby.*

The RS-686DS also gives you controls you won't find on many non-portables. Like a tape/source monitor switch. Low cut filter. Mike attenuator. And a three-minute tape end alert eye.

A less expensive alternative is the RS-646DS. The portable deck with performance specifications usually found only in higher priced cassette decks.

The RS-686DS and RS-646DS. Professional specifications. Plus the flexibility of recording sound wherever it may take you.

TRACK SYSTEM: 4-track 2-channel record/playback. MOTOR: FG servo-controlled DC motor (RS-686DS), DC electronic speed control motor (RS-646DS). FREQ. RESP. (CrO2, ± 3 dB): 50-15,000 Hz (686) 50-14,000 Hz (646). WOW AND FLUTTER (WRMS): 0.07% (686), 0.10% (646). S/N RATIO (Dolby): 66 dB (686) 65 dB (646). DIMENSIONS: 3"H x 9½"W x 7⅞"D (686). 4½"H x 14¼"W x 11"D (646). SUGGESTED RETAIL PRICE: $599.95† (686). $299.95† (646).

Technics RS-686DS and Technics RS-646DS. A rare combination of audio technology. A new standard of audio excellence.

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First we made a commitment to the broadcast industry.

Here's how it happened.

We created logical, well designed products matched to the specific needs of electronic news gathering and high-band production recording. And to avoid confusion with any other products, we gave them the now-coveted designation "B" for broadcast.

The broadcast industry took a hard look at our BVU and BVH equipment.

And committed themselves to Sony Broadcast with overwhelming support.

Our broadcast ENG equipment has received rave reviews for its consistent picture quality and reliable performance under difficult field conditions.

And over fifty of our BVH-1000 1" High-Band recorders are in use by broadcasters across the country. Even after months of operation, response remains the same. "Unbelievable quality."

Below, you'll see a list of the Sony Broadcast product line. The most acclaimed and successful product line in our history.

You'll also see a list of all in the television industry who have purchased Sony Broadcast 1" and ENG equipment since its introduction last year.

If your name is on our list, we'd like to thank you.

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We'll continue our technological advancement in professional video products. And we'll continue to serve you with every means at our disposal.

If your name isn't on our list yet, it's probably because you don't know enough about Sony Broadcast.

Write or call us direct.

We'll give you all the facts about Sony Broadcast products.

We'll tell you more about who is using our equipment, and why.

And we'll try to convince you that our commitment deserves your commitment.

The Sony Broadcast Product Line:

BVH-1000 1" High-Band video recorders.

BVH-500 portable 1" video recorders, with battery operation.

BVT-1000 digital time base correctors.

BVU-100 portable U-matic recorders for electronic news gathering in the field.

BVU-200 editing U-matic recorders for news production.

BVE-500 automatic editing consoles.

BVG-1000 vertical interval time code generator/readers.

BVU-50 lightweight portable U-matic recorders for maximum mobility in the field.

BVP-100 3-Plumbicon* portable color cameras.

CG-100 battery-operated SMPTE generators.

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Our BVH-1000 Broadcast Users:

Columbia Broadcasting Company	New York, N.Y.
Consolidated Film Industries	Hollywood, Cal.
Fireman's Fund	San Francisco, Cal.
Jefferson Pilot	Charlotte, N.C.
KPLR	St. Louis, Mo.
KVAL	Eugene, Ore.
National Broadcasting Company	New York, N.Y.
One Pass Productions	San Francisco, Cal.
Opryland	Nashville, Tenn.
3-M Company	St. Paul, Minn.
WAFB	Baton Rouge, La.
WRAL	Philadelphia, Pa.
WTOG	St. Petersburg, Fla.

Our ENG Equipment Users:

American Broadcasting Company	New York, N.Y.
Austin Voc-Tech	Austin, Minn.
Bowling Green State University	Bowling Green, Ohio
Catholic TV Network	Chicago, Ill.
Childrens TV Network	New York, N.Y.
City & County of San Francisco	San Francisco, Cal.
Coast Community College	Costa Mesa, Cal.
Columbia Broadcasting Co.	New York, N.Y.
Datatron	Santa Ana, Cal.
Diocesan TV Center	Uniondale, N.Y.
Duhamel Broadcasting Enterprises	Rapid City, S.D.
Emerson College	Boston, Mass.
Florida Video	Miami, Fla.
German TV Network	Washington, D.C.
Hampshire College	Amherst, Mass.
Iowa Public Broadcasting	Des Moines, Iowa
Jefferson Pilot	Charlotte, N.C.
John F. Kennedy Institute	Baltimore, Md.
KABC	Hollywood, Cal.
KAET (Arizona St. Univ)	Tempe, Arizona
KAKE	Wichita, Kansas
KAKM	Anchorage, Alaska
KAMR	Wichita Falls, Tex.
KATU	Portland, Ore.
KATV	Little Rock, Ark.
KCBD	Lubbock, Tx.
KCMT	Alexandria, Minn.
KCST	San Diego, Cal.
KDKA	Pittsburgh, Pa.
KELO	Sioux Falls, S.D.
KENS	San Antonio, Tx.
Kentucky ETV	Lexington, Ky.
KGO	San Francisco, Cal.
KGW	Seattle, Wash.
KHQ	Spokane, Wash.
KIFI	Idaho Falls, Idaho
King Broadcasting	Seattle, Wash.
KLAS	Las Vegas, Nev.
KLVX	Las Vegas, Nev.
KMBC	Kansas City, Mo.
KMOX	St. Louis, Mo.
KMTV	Omaha, Neb.
KNBC	Burbank, Cal.
KNOE	Monroe, La.
KNXT	Los Angeles, Cal.
KOA	Denver, Col.
KOAA	Pueblo, Col.
KOIN	Portland, Ore.
KOLN	Lincoln, Neb.
KOMO	Seattle, Wash.
KOOL	Phoenix, Ariz.
KOTV	Tulsa, Okla.
KPIX	San Francisco, Cal.
KPLR	St. Louis, Mo.
KQEC	San Francisco, Cal.
KQED	San Francisco, Cal.
KRBC	Abilene, Tx.
KREM	Seattle, Wash.
KRON	San Francisco, Cal.
KSD	St. Louis, Mo.
KSL	Salt Lake City, Utah
KSLA	Shreveport, La.
KTBS	Shreveport, La.
KTEH	San Jose, Cal.
KTHV	Little Rock, Ark.
KTUL	Tulsa, Okla.
KTVB	Boise, Idaho
KTVI	St. Louis, Mo.
KTVK	Phoenix, Ariz.
KTVU	Oakland, Cal.
KUTV	Salt Lake City, Utah
KVII	Amarillo, Tx.
KVAL	Eugene, Ore.
KWTV	Oklahoma City, Okla.
KWWL	Waterloo, Iowa
KXAS	Fort Worth, Texas
KXTV	Sacramento, Cal.
KYW	Philadelphia, Pa.
LSU	New Orleans, La.
Meyer Broadcasting	Bismark, N.D.
National Broadcasting Co.	New York, N.Y.
Newsweek	New York, N.Y.
Nexus Productions	New York, N.Y.
Opryland	Nashville, Tenn.
Palmer Broadcasting	Davenport, Iowa
Prairie Public TV	Fargo, N.D.
Precision Video	New York, N.Y.
Rochester ETA	Rochester, N.Y.
South Carolina ETV	Columbia, S.C.
S/T Videocassette	Leonia, N.J.
State of Alaska	Juneau, Alaska
Studio TV Services	Hollywood, Cal.
Synergetic Productions	Syracuse, N.Y.
Thomson CFS Labs	Stamford, Conn.
3-M Company	St. Paul, Minn.
USIA	Washington, D.C.
United Nations Broadcasting	New York, N.Y.
U of California at Berkeley	Berkeley, Cal.
U of North Carolina	Chapel Hill, N.C.
U of Rochester	Rochester, N.Y.
U of Texas	Houston, Texas
U of Wisconsin	Madison, Wis.
Video Group	New York, N.Y.
WABC	New York, N.Y.
WAPA	San Juan, p.r.
WAST	Menands, New York
WAVE	Louisville, Ky.
WBAY	Green Bay, Wisc.
WBBM	Chicago, Ill.
WCAU	Philadelphia, Pa.
WCBS	New York, N.Y.
WBEN	Buffalo, N.Y.
WBIR	Knoxville, Tenn.
WBNS	Columbus, Ohio
WBRC	Birmingham, Ala.
WBRZ	Baton Rouge, La.
WBZ	Boston, Mass.
WCCO	Minneapolis, Minn.
WCVB	Needham, Mass.
WCPO	Cincinnati, Ohio
WDAF	Kansas City, Mo.
WDSU	New Orleans, La.
WDTN	Dayton, Ohio
WENH	Durham, New Hampshire
Western Electric	Lisle, Ill.
WFBC	Greenville, S.C.
WFMJ	Youngstown, Ohio
WFRV	Green Bay, Wisc.
WFTV	Orlando, Fla.
WGAL	Lancaster, Pa.
WGBH	Boston, Mass.
WGBY	Springfield, Mass.
WGNO	New Orleans, La.
WGR	Buffalo, N.Y.
WHYN	Springfield, Mass.
WIBW	Topeka, Kansas
WIS	Columbia, S.C.
WISH	Indianapolis, Ind.
WJZ	Baltimore, Md.
WKBN	Youngstown, Ohio
WKBW	Buffalo, N.Y.
WKPT	Kingsport, Tenn.
WKRG	Mobile, Ala.
WKYC	Cleveland, Ohio
WKZO	Kalamazoo, Mich.
WLS	Chicago, Ill.
WMAL (Evening Star Broadcasting)	Washington, D.C.
WMAQ	Chicago, Ill.
WMAR	Baltimore, Md.
WNBC	New York, N.Y.
WNDU	South Bend, Ind.
WNEP	Avoca, Pa.
WNET	New York, N.Y.
WNEW	New York, N.Y.
WOTV	Grand Rapids, Mich.
WPIX	New York, N.Y.
WPVI	Philadelphia, Pa.
WRAL	Raleigh, N.C.
WRC	Washington, D.C.
WSAZ	Huntington, W.V.
WSIL	Harrisburg, Ill.
WSM	Nashville, Tenn.
WSYR	Syracuse, N.Y.
WTAR	Norfolk, Va.
WTMJ	Milwaukee, Wisc.
WTNH	New Haven, Conn.
WTOL	Toledo, Ohio
WTTG	Washington, D.C.
WTTW	Chicago, Ill.
WTVD	Durham, N.C.
WTVF	Nashville, Tenn.
WTVT	Tampa, Fla.
WUFT (U of Florida)	Gainesville, Fla.
WWLP (Springfield TV)	Springfield, Mass.
WXEX	Peterburg, Va.
WXXI	Rochester, N.Y.
WXYZ	Southfield, Mich.
ZDF Network (Republic of Germany)	Washington, D.C.

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RADIO

PROGRAMMING & PRODUCTION FOR PROFIT

Radio Drama Again: With The Right Angel It Could Soar

IN THIS DEPARTMENT in the June issue, *BM/E* noted evidence for rising listener interest in radio drama: the big success of the CBS Mystery Theatre and Great Adventure Theatre series; the successful production of many dramas by the Communications Department at Western Michigan University and other educational institutions. The main problem for radio managements who might be interested in drama is unavailability: the CBS series are primarily for CBS network affiliates and the material produced by educational institutions generally cannot be used commercially.

However, there is at least one commercial operation which is distributing radio drama to all comers with high success. Charles Michelson, Inc., Beverly Hills syndicator, (9350 Wilshire Blvd.) is offering taped recordings of nearly a dozen of the top series from radio drama's heyday: "Suspense", "The Shadow", "The Lone Ranger", "The Best of Sherlock Holmes", "Dragnet", "The Whistler", "The Green Hornet" and others. Mr. Michelson told *BM/E* that at the time of writing (August) he had nearly 200 stations as subscribers and the trend is sharply up: he projects at least 250 subscribers within the year. He said that many stations are now taking two or three of the series at once, whereas a year and more ago one series at a time was the rule.

He made the point that radio managements (and radio advertisers) usually want a famous series name or a famous actor or famous play. He cited the "Suspense" episode in which Agnes Moorhead plays in "Sorry, Wrong Number", as combining in one package all these commercially attractive characteristics.

American playwright Edward Albee (seated right) consults with director John Tydeman (center) during recording of Albee's radio drama, "Listening," commissioned by Earplay.

Cast recording David Mamet's first radio play, "The Water Engine," commissioned by Earplay.

Undoubtedly the most ambitious of the non-profit radio drama production operations is the five-year-old "Earplay" of the Minnesota Public Radio Network. The money for Earplay—$455,000 is the 1977-78 budget—is provided by the Corporation for Public Broadcasting and the National Endowment for the Arts. The programs are distributed free to CPB—qualified stations, which include the National Public Radio members, state broadcast services for the blind, and some school and library operated stations. The programs go out on discs and can be used as often as the recipients want. Most are one hour long, a length chosen by Earplay after much experimentation.

Earplay is under the creative direction of Karl Schmidt, with long-time experience as a radio actor, later as manager of public radio station WHA at Madison, then of the Wisconsin State FM Radio Network. In 1967 he was one of the founding members of the National Public Radio board of directors.

The project has reached for excellence in radio drama in several ways. One is the commissioning of original plays by established playwrights, novelists and poets, such as Edward Albee, Arthur Kopit, Bruce Jay Friedman, David Mamet, Mark Modoff, John Gardiner, Richard Howard, Archibald MacLeish, Donald Barthelme, and a number of others. Commissions are also given to fledgling playwrights who have shown promise in the commercial or academic theatre. Another has been the production of classics—"A Doll's House", etc.—often using actors who made strong impressions on Broadway or elsewhere in the leading roles. Some of the original recordings are done in Chicago and New York, for access to acting companies of such groups as the Circle Repertory Theatre. Often cooperating is the famous Guthrie Theatre in Minneapolis.

Earplay also has exchange arrangements with radio drama operations in other countries. For example, the BBC, which produces a large number of radio dramas every year, regularly supplies programs to Earplay.

Looking over the list of 26 programs planned for the fall 1977-78 season, we see a well-stirred mix of heavyweight current playwrights and newcomers who have created some excitement in the commercial theatre. The original plays treat topics of tremendous variety.

Obviously this is very different from the old commercial-network-oriented drama; it is much richer and more varied, more "highbrow", but very exciting too. It is different in another way: modern multi-track recording techniques are often used, to lay different parts of the play on different tracks, even at different times (special sound effects can be added, for example). The final product results from a carefully modulated mixdown, very much as current recorded music is "created" in the mixdown. A new kind of skill has emerged, one which tremendously enriches the resources of radio drama.

Drama critics have given a number of the Earplay productions the full rave response; but this has little meaning for the program director of a commercial radio station, because under the rules of the Corporation for Public Broadcasting he can't get any of the programs. What Earplay and other academic radio drama projects probably mean to the commercial radio program director is this: these projects demonstrate in this country a large pool of high talent in playwriting, acting, directing, and modern radio-dramatic production, using multi-track techniques.

continued on page 24

PROBLEM SOLVERS

There are two kinds of suppliers in this world: (1) those who don't want any part of your problems and (2) those who want to help you solve them. All the first group is interested in is getting your order. Get in and get out is their motto.

We belong to the group that wants to help you solve your problems. If one of our standard consoles or audio systems won't solve your problem, we'll custom-engineer one that will and we'll stick with you until we've got the answer. We've been doing it this way for more than ten years.

Get in and get involved is our way of doing business.

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If there were some large-scale organization with the resources to put these people to work on material aimed directly at the needs of commercial radio, a whole new world of radio programming could emerge. Could that organization perhaps be a consortium of the stations themselves?

In England, of course, the government is accepted in the role of radio drama producer on a large scale, through the BBC, which reaches the whole radio audience. In this country programs produced with the government as angel (as by Earplay) are locked into the audiences of the National Public Radio stations. We need a free enterprise radio drama angel with a lot of money in the bank. On the face of it, it doesn't seem like an impossible idea; it might even turn out to be profitable. It would certainly blow a fresh wind into radio.

Radio Programming/Management
15552 Arbor Place, Southfield, MI 48075. Tel: 313-358-1040

THE POLICIES OF RADIO PROGRAMMING/MANAGEMENT are adding to a marked trend in the character of music available to some groups of American radio listeners: the music's range is widening greatly, because a number of syndicators are going outside the American music market for substantial sectors of their programming.

Radio Programming/Management is getting an especially high proportion of music from other countries. Tom Krikorian, president and founder, says that he is now importing most of his music from England and Japan, with some from Germany. His reason is like that of several other syndicators covered in this series: the American record industry simply does not produce enough music of the kind he needs to satisfy his subscribing stations.

He reports more than 50 subscribers (at the time of the interview) and satisfaction with the RPM material is clearly very high: Krikorian says his renewal rate over the years has been better than 96%. The music the majority of the stations have found so to their liking is "Contemporary Beautiful Music," Krikorian's original format.

The "contemporary" signifies that Krikorian uses a number of current popular titles, to give his programs a fresh quality that younger listeners like. The "beautiful music" means that these, and other pieces in the programming, are done in a beautiful music, often instrumental, style, which the 25-49 demographics group likes.

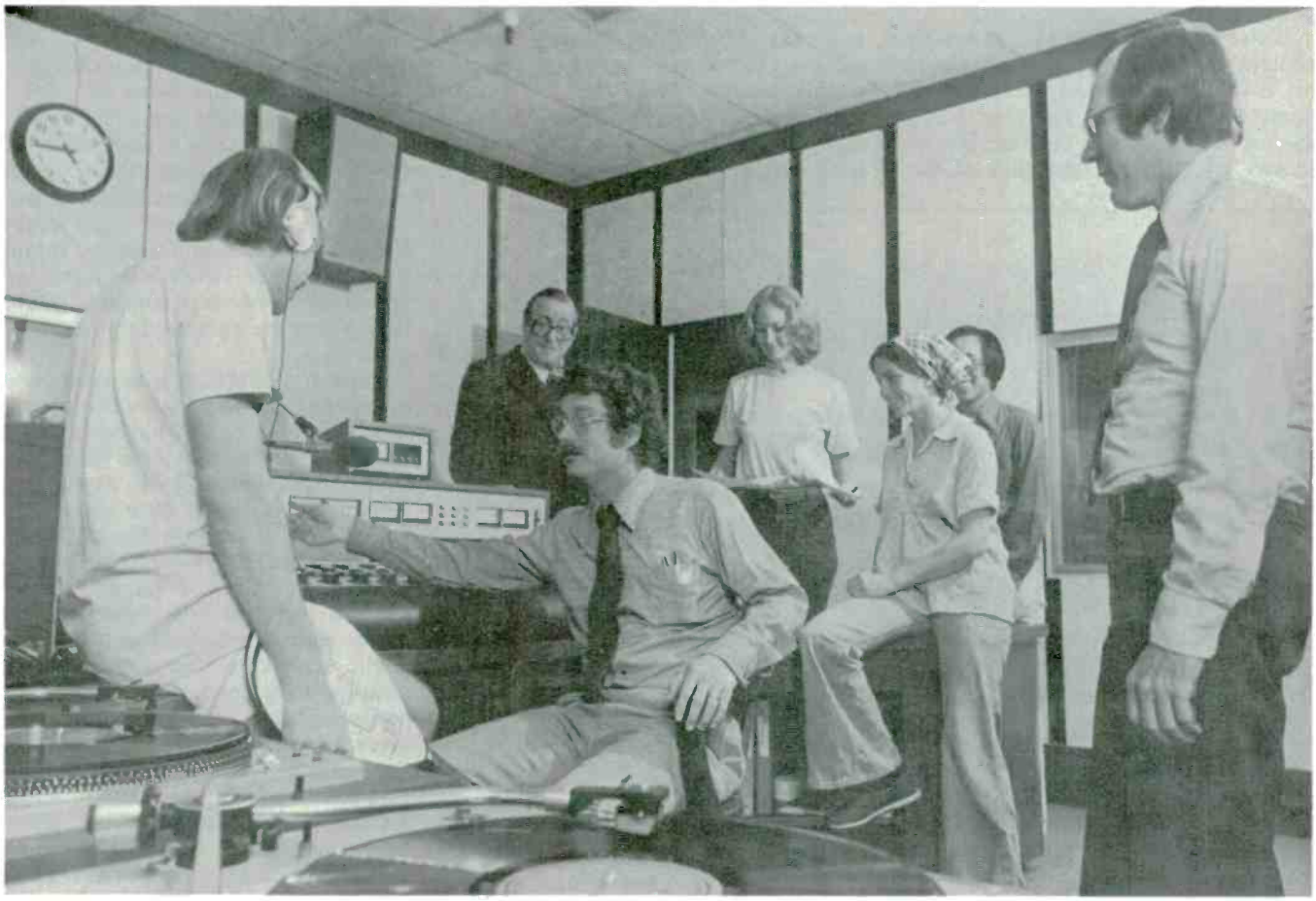
This combination of qualities is increasingly hard to find on the American music market, according to Krikorian. He describes his imports from Japan as particularly good in technical quality, as well as meeting his musical need. And the material recorded by BBC orchestras in England also stands very high, both technically and musically.

Tom Krikorian launched out on his own as a syndicator in 1970 after a substantial career in radio station marketing and programming, mainly in the Detroit area. Among his executive assignments were stints at WCAR and "W4"—WWWW. Listener response to his programming ideas at these and other stations encouraged him to put those ideas to work on a larger scale.

He said it took about two and a half years to get satisfactorily under way; his subscriber list is now at a "going" level and growth is about as fast as his facilities can handle. He acknowledges that his music is to some degree competitive with the various "soft rock" formats (although different from them). This "quieter" rock stems in

continued on page 26

It was a college broadcast facility; Now it's a public radio station; KUSC, Los Angeles, still has a Stanton in every table



A group of the staff meet in the Broadcast Studio of the Station.

It is interesting that the station which provides top quality classical music service to Los Angeles was an outgrowth of a College Radio Station ... and still bears its original call letters.

It now has been incorporated into the public broadcasting system since it was regarded as "too important a facility to be operated *only* by students in as large a city as Los Angeles". It serves all of Los Angeles, Ventura and Orange Counties (10 million persons in the market), with a format of 85% classical music and 15% informational programming primarily from the National Public Radio Service. KUSC goes direct from disc to air and uses the Stanton 600E on its turntables.

Since the station has received substantial university support for upgrading their sound, which includes a new transmitting system ... new tower antenna ... new control board ... new turntables ... *and* new cartridges ... KUSC plans to install Stanton's Calibrated 681SE cartridges in all their turntables.

So, their sure-to-improve sound is certain to have a favorable impact on their growing audience.

Stanton's 681 Calibration Series cartridges offer improved tracking at all frequencies. They achieve perfectly flat frequency response to beyond 20 Kc. And the top-of-the-line superb 681 Triple-E has an ultra miniaturized stylus assembly with substantially less mass than had been thought possible to achieve.

Each 681 Series cartridge is guaranteed to meet its specifications within exacting limits, and each one boasts the most meaningful warranty. An individually calibrated test result is packed with each unit.

Whether your usage involves recording, broadcasting or home entertainment, your choice should be the choice of the professionals ... the STANTON 681.

Write today for further information to: Stanton Magnetics, Inc., Terminal Drive, Plainview, N.Y. 11803.

STANTON

Ellen Falconer, a broadcast engineer, with two of her associates.

Gilbert Kuang, engineer, at the Master Control Console.

Ellen Falconer, engineer, signaling the start of a scheduled broadcast.

Alan Parker of the Programming Dept. completing a critical listening session in the Record Library.

Visit us at the National Radio Broadcasters Conference at the New Orleans Hilton, Booth #93

Circle 122 on Reader Service Card

part from the "magic" line, the highly successful programming of WGMK-FM, in Philadelphia, and from the often-repeated "discovery" that the "rock generation of the 50's and 60's has grown up to a quieter sound."

However, Krikorian's program choices and sequences are very much his own. This emphasizes again the point emerging from many of these studies of syndication: the real success factors are the taste and skill of the programmer himself. Radio station managements have no recourse but to *listen* to a large sample of a syndicator's product and evaluate what they hear against their own taste and their knowledge of the market.

Krikorian says that about 65% of his subscribers are using his original "Contemporary Beautiful Music"; he now has four other formats which cover a very wide range of the music popular today:

"Standard Beautiful Music" is a more conservative mix than the "Contemporary" with less use of current material: it is designed for stations that do not need to emphasize the young end of the demographics;

"Standard MOR" emphasizes a fairly conservative vocal repertory;

"Progressive MOR" is roughly a "Top 40" format, with the highest proportion of current hits;

"Rock 'N Gold" is an album-oriented rock format.

With each format the subscriber gets initially around 200 hours of music. With the "beautiful music" formats, this is updated with several hours of new music each month. The Progressive MOR is "freshened" every two weeks; the Rock 'N Gold every week. In each case the original library is laid out to cover the station's 24 hours (or other on-air period) in complete detail; the updates are integrated into the program plan.

Each of the formats is in use by one or more of the RPM subscribers, and satisfaction is nearly universal. The expansion in music styles is being paralleled by a geographical expansion: RPM recently added three stations in Puerto Rico and one in Alaska.

RPM, like other successful syndicators, produces a careful market analysis for each new subscriber and makes recommendations as to format, public service programming, promotion approach, etc. However, Krikorian says that he never tries to dictate every aspect of a station's operation but works with the management's own expertise to help the station move toward its objectives.

The analysis includes recommendations on equipment complement and use for high technical quality as well—but again, these are recommendations which the management may follow or not. The technical quality of the music tapes themselves is kept high in a computer-controlled mastering facility, with all mastering and duplication in RPM's own plant. The computer sets the timing of each master recording, within limits of 1%, puts cue tones on at exactly the right points, takes over all other routines of the operation. The operator concentrates, says Krikorian, on the "important matters"—musical quality, proper equalization, etc.

Duplication is all at playing speed, with standard programs put onto 10½ in. reels at 7½ ips, two-track stereo. Other configurations can be produced if the subscriber wants.

From this short survey, we learn that Radio Programming/Management is making a strong contribution to American radio along the same general lines as some other well-run syndicators: music put together with high professional polish and animated by individual taste, combined with a definite upgrading of technical quality.

The Best.
Neve Custom Audio Consoles.
And introducing NECAM, a computer assisted audio mixing/editing system for television.

15 Years of Neve

For 15 years Neve's been a world leader in the field of custom consoles for the broadcast industry, continuously providing the highest in quality, in performance and in reliability. Our sincere desire to serve our customers and our ability to build consoles truly to customers' requirements has earned us the reputation of being **"The Best."**

Over the past few years, we have made many friends in the North American broadcast market, both with network facilities and independent stations, to the point where a significant portion of all network originated audio is produced through Neve consoles. We want *your* friendship as well, so write us a line explaining your requirements, or simply call, and experienced Neve staff will work with you.

NECAM

NECAM is to audio what computerized editing is to video. This SMPTE time code based audio mixing/editing system utilizes a powerful mini-computer (not just another micro-processor) with expandable software coupled to a dual floppy disc drive unit.

There is no other system even approaching the performance of NECAM. It can store and recall as many mixes as you like, instantly. The "Merge" function lets you combine different sections from each of the multi-tracks with different mixes—all without touching the master tape or losing the original "memorized" information. And it does these things instantly, simply and perfectly . . . at the touch of a button on the small NECAM control panel. NECAM even runs your audio tape machine for you.

NECAM may be interfaced with your video editing facilities on a custom basis. Please accept our invitaion to discuss your requirements with us. If you're in TV sound production, NECAM is certain to be in your future.

Call Barry Roche
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Neve

WTAE-TV: A New Sound on The Horizon

"REMEMBER WHEN WE GOT OUR first video-tape machine?" asked Lou Snodgrass, sound technician at WTAE-TV Pittsburgh.

Assistant chief engineer Bill Satkoske chuckled in a way that people do when they're remembering something from long ago. "Yeah," he said.

Snodgrass leaned back on the AD's desk and said, "Poor ole Charlie—the transmitter operator. I remember him walkin' down the hall and you putting 'im on video for the first time. When you played it back to 'im right away, he couldn't figure out for the life of 'im how the hell you were doin' it."

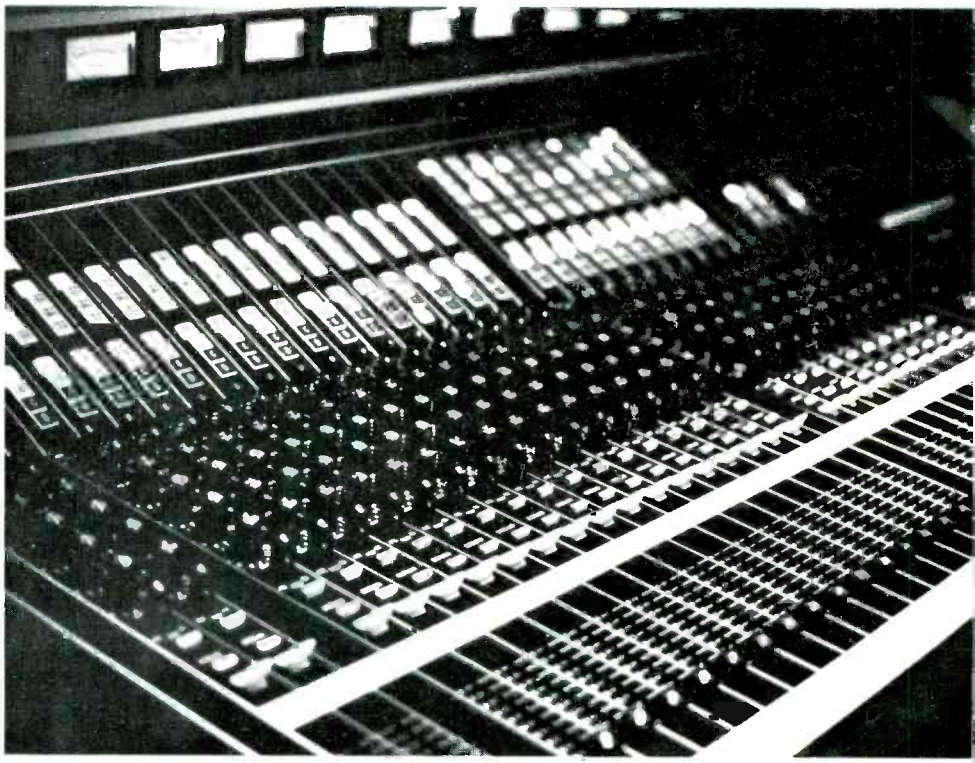
And that's the way it has been in television almost from its inception. Marvelous developments in video year in and year out. And for audio? It's been different. Year in and year out television station audio has been neglected. In fact, as Ed Gordon, director of operations for WTAE, points out, "We could have an audio problem and nobody at home would notice but the minute we had a video problem the switchboard would light up like a Christmas tree."

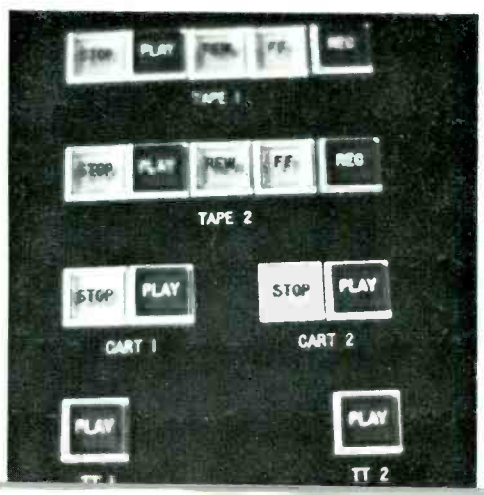
At WTAE that is all going to change. Like many stations around the country there is an increasing awareness and sensitivity to audio and how much it can mean to quality production.

WTAE is engaged in a major modernization program. New studio lights and a computerized lighting control board have been added as has been a new switcher (some time ago and already straining to meet station needs), tape machines, telecine and numerous other pieces of equipment. Central to WTAE's renewed efforts in the area of audio has been the installation of a new custom designed Audio Designs console with plans to add a second Audio Designs console shortly.

When *BM/E* visited WTAE in mid-August, the console had not yet been put in service. The station was in the process of revamping its entire audio system. An ancient audio distribution system was being replaced entirely and a great deal of planning was going into the ultimate architecture of the system in order to fully utilize the opportunities presented by a major modernization. What *BM/E* was seeking was a discussion of what WTAE hoped and expected to get from their efforts in audio. We'll go back in a few months and find out if the WTAE experience matches their expectations.

Sound technician Lou Snodgrass is very anxious to get to work on the new board. In the old days, each new audio problem was approached as it arose and the old RCA consoles soon took on the appearance of Rube Goldberg machines with a box here to handle telco inputs, a box there to handle an announce booth, a row of shop-crafted pads laying ready to be plugged in if the musical group in the studio was blasting the sound to smithereens. Operating the old board was hectic. What was needed were the hands of a concert pianist to get from bus to bus and input to input and the speed of a sprinter to make it to the patch panels when routing problems arose.





Audio Designs Custom Console in use at WTAE has brought order to the audio system and raised expectations for much higher audio quality.

Specially designed machine control board at the console may eventually prove as helpful in post-production as it will be in production.

Introducing the Newvicon™ color camera from the people who invented the Newvicon tube.

Up to now, there were just two kinds of color studio cameras. The kind you wanted. And the kind you could afford. But now there's Panasonic's new color studio camera and control unit, the WV-2150. At around $7,000 (not including lens), it gives you the professional results you want at a price you can afford.

First there's Panasonic's Newvicon tube and all the sensitivity that goes along with it. All you need is 200 footcandles of standard illumination at f/2.8. And with a flip of the 6 dB gain switch, only 25 footcandles is required at f/2.0. There's also a S/N ratio of 46 dB with standard illumination. As well as a stable color picture that's sharp and clear. With a maximum of resolution. And a minimum of blooming and burn-in.

The 2150 also includes automatic pedestal circuitry. Automatic color level contours for both high and low light levels. Horizontal and vertical aperture correction circuits. As well as new dynamic focusing circuitry for sharp, even focus over the entire tube.

The camera control unit features a flip-down front panel for easy access to all critical controls and adjustments. What's more, all printed circuit boards can be removed from the front. Also included is a self-contained subcarrier phase shifter with coarse and fine phase adjustments.

For less stringent requirements, take a look at the WV-2310. Panasonic's new lightweight color studio camera. At around $4,500 (not including lens), it comes complete with two vidicon tubes. A 3" viewfinder. And its own professional-type camera control unit.

So if the color studio camera you've wanted hasn't been the one you've been able to afford, look again. At Panasonic.

For more information, write: Panasonic Company, Video Systems Division, One Panasonic Way, Secaucus, N.J. 07094. In Canada, contact Panasonic Video Systems Department, 40 Ronson Drive, Rexdale, Ontario M9W 1B5.

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just slightly ahead of our time.

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The fire, earthquake, election and touchdown company now brings you love scenes in Studio Two.

The new HK-312 studio camera from Ikegami, the ENG experts.

Wherever there's been news, from natural disasters to national elections to sport events, Ikegami ENG cameras have been there with the news teams. Now Ikegami makes news of its own: the introduction of our new state-of-the-art HK-312 studio and field camera.

We've built ENG cameras so good in the rough-and-tumble of news-gathering that more Ikegami ENG cameras are in use than all others combined. So imagine how good an Ikegami camera can be in the stable environment of a studio.

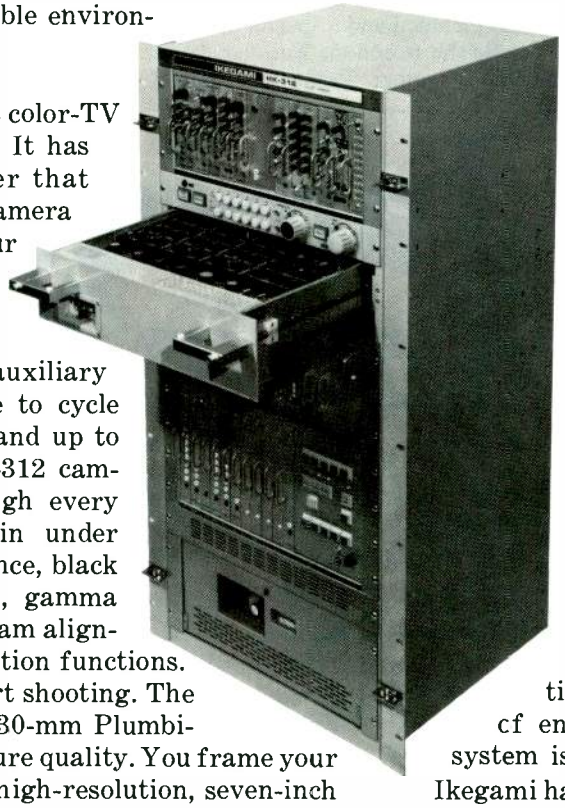
Very good indeed.

Ikegami's new HK-312 color-TV camera is like no other. It has a built-in minicomputer that helps trim the daily camera checkout from a one-hour ritual to an automatic run-through that's shorter than a 20-second commercial. With its auxiliary computer, you'll be able to cycle your Ikegami HK-312 (and up to four other Ikegami HK-312 cameras linked to it) through every adjustment parameter in under two minutes: white balance, black balance, flare correction, gamma correction, video gain, beam alignment, and eight registration functions.

All this before you start shooting. The HK-312 gives you three 30-mm Plumbicon tubes for highest picture quality. You frame your shot on a high-intensity, high-resolution, seven-inch tiltable viewfinder. Signal-to-noise ratio is better than 54 dB.

We've combined the zoom lens and camera tube into a single rigid assembly for highest accuracy of the optical axis. Class-A deflection amplifiers assure maximum linearity and best picture quality. Black level balance correction is automatic. Picture quality and brightness are maintained in spite of flare.

Camera-control unit for the HK-312



A complete two-line image enhancer provides horizontal and vertical detail correction. A special comb filter keeps background noise to a minimum.

All this and a lot more.

If your budget or production requirements are smaller, use our tried-and-tested TK-355 studio camera. Five were used for network feed at the 1976 Democratic National Convention where camera failure would blow a lot more than a few fuses.

The TK-355 uses three 25-mm Plumbicon tubes which are bias-lighted for reduced lag at low lighting levels. This reduces studio lighting and air conditioning power consumption. And the camera is more compact and lighter, a little easier to maneuver. The unique half-rack CCU facilitates multi-camera studio installations.

Both broadcast cameras use TV-81 minicable for ease of handling.

If you need a small, fixed-position camera for announcer booth and newscasting, check out the Ikegami HK-309. It can be operated remotely or simply turned on and left in fixed position.

For movies, the Ikegami TK-950 is a large-image film-chain broadcast camera system for 16-mm or 35-mm film or slides with highest quality color reproduction. Much of its operation is automatic, requiring a minimum of engineering support. Its unique optical system is dust-shielded and unusually compact.

Ikegami has been famous for its ENG cameras for a long time. Now take a look at what we can do with studio cameras. For specs or a demonstration, get in touch with us. We have nation-wide distribution.

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Plumbicon is a registered trademark of N.V. Philips.

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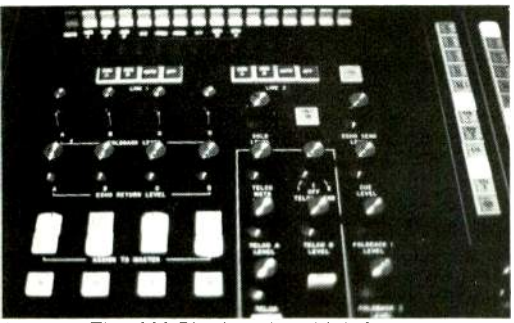
TV Programming

Now most of these functions have been simplified and incorporated right in the console. Snodgrass expects his job to be a lot easier especially on the evening news and the AM Pittsburgh program. First of all, it will be a lot easier to pre-set the levels of each on-camera talent. To ensure a smooth and consistent sound, a sort of audio profile of each correspondent will be made up over time.

With the built-in EQ and attenuators, each voice can be sweetened to the point that it is best. Moreover, auditioning incoming audio from the station's microwave van can also be accomplished. Film, cart and other tape segments all are routed into the high impedence side of the board and each can be preset so that when it is cued the only movement required will be bringing up the pot or throwing the switch. EQ and pads are available for each input so that each source can be adjusted for maximum quality.



The AM Pittsburgh, which features a call-in segment, will be much easier to handle with the built-in telco system (right). Folback and echo controls will be a big help for musical segments.

The microphones in WTAE's studios are organized by their location in the studio, i.e. studio A, rear wall, or ceiling, or whatever. Each section of the studio has been laid out to carry a number of audio cables, room for 64 microphones in all. Now nobody expects to use 64 microphones but the flexibility this provides for mic placement is most welcome.

Perhaps the most complex show produced at WTAE is its AM Pittsburgh program. Both studios are used and, in addition to the regular complement of talent, there may be a musical group, panel discussion, and, always, a call- in segment.

Some of the things built into the board to make a show of this complexity easier include foldback to permit talent to hear their own output without creating feedback noise. Automatic cue tone for the line feeds are also included and a special package to handle the telephone lines has been installed. Another factor that should make set up much easier is the built-in 10 × 70 patch matrix. Snodgrass will no longer have to run from room to room trying to locate patching problems. Also tied into the board is another section for handling an announce booth that will be built off to the side of the audio console room.

The console itself looks rather complex but Snodgrass feels he can learn the board in a relatively short time. In the heat of a live show, like AM Pittsburgh, however, anything can happen. So, one thing WTAE engineers came up with was an idea for an automatic Audio-Follow-Video system. Should an operator become overwhelmed by a complex segment, he can hit the AFV button and the audio will go into the AFV mode. This modification, conceived of by WTAE and developed by Audio Designs, has been so popular that other stations have requested that it be incorporated in their units. WWJ, Detroit, and WJZ, Baltimore, both use this AFV function.

Another custom feature on the WTAE console is a machine control console that remotes control of a couple of audio cart machines and audio tape recorders to the front panel of the console. Though this feature will be used for production, its greatest benefit may be found in post produc-

continued on page 34

THE BETTER WAY

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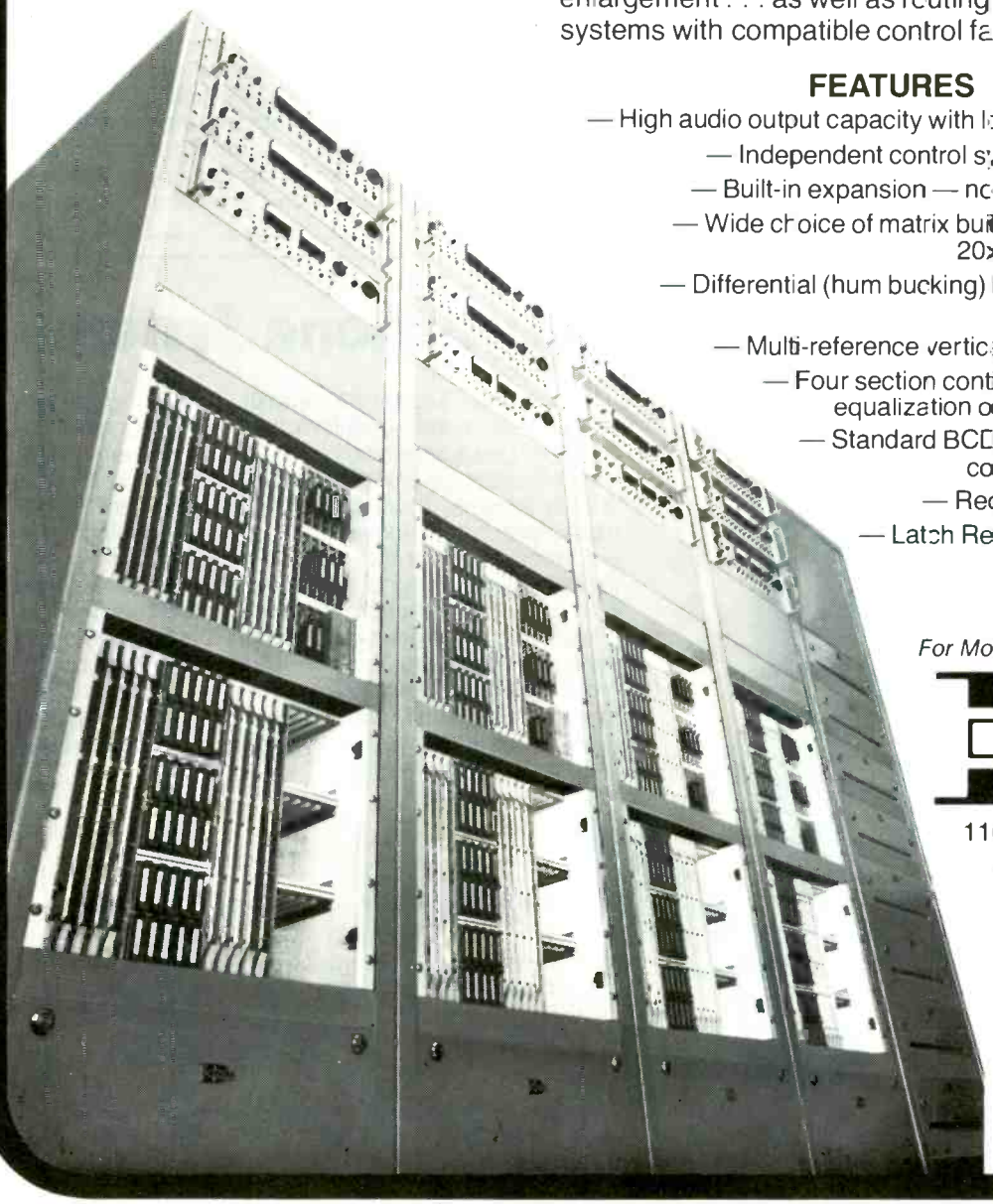
Look to Datatek for all your routing switcher needs. We manufacture a high quality system to satisfy your initial requirements, with built-in expansion provision for future enlargement . . . as well as routing switcher-related systems with compatible control facilities.



FEATURES

— High audio output capacity with low noise (dynamic range)
— Independent control system for each output bus
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tion for mixing a refined sound track.

For the most part, Snodgrass figures that the console will simplify his job, but he has been around this business a long time and he implied that as soon as the producers and directors figure out how much more he can do, his job is liable to get more complicated rather than less.

Director Rick Ettinger already senses the new things he'll be able to accomplish. Music programs, field production and post production are all areas where WTAE expects to be able to improve their performance. Little documentary work is done at the station now but with the addition of a new mobile van next year and the ability to work with the sound track, expectations for documentary work are also on the rise.

Among the staff, the mood is expectant; they have been accustomed, as have a lot of people in television, to paying more attention to video than audio. After all, everybody knows that the audience is equipped with those "crummy little 3-in. speakers" and "no matter what we put out, they'll get lousy audio." Or is that true? The staff at WTAE admits that they felt like that for years but the time has come to do something about audio. Maybe, they think, if we put out a better sound, this will encourage the TV manufacturers to install better audio systems in their sets.

The most immediate impact of the new console, according to Ettinger, will probably be in the area of commercial production. Clients and agency people are already hip to the need for good audio on many commercials. The sophisticated client has, in the past, gone to WTAE for his video and taken his sound tract to an audio house in town.

Now Ettinger feels that WTAE can offer as sophisticated a sound tract as a client can expect to get anywhere in the Pittsburgh area.

Assistant chief Bill Satkoske, who is in charge of maintaining the WTAE operation, figures it will make his job easier too. For one thing, the decision to revamp the audio operation prompted a complete reconstruction of the station's audio system. The snake pit that has grown up over the years with cables, bridging coils and patch panels all over the place will be replaced with a straightforward logical system. DAs will replace the bridging coil system and orderly cable networks will simplify the routing system. Moreover, the organization of the system is likely to remain neat since the 10 × 70 matrix in the console will handle most of the day-to-day patching and the modular design of the console will permit expansion or reorganization with a minimum of fuss.

Another area where Satkoske expects great relief will be in Proof of Performance. In the past, it might have taken up to a week to set up just a single studio to meet a POP. Now Satkoske expects to be able to meet such a test at almost anytime.

Carrie Richards, program director for WTAE, acknowledges that he was once a skeptic. On a tour in the Southwest, Richards visited a station where a complex and sophisticated audio console had been installed. Half jokingly, he asked the station's program director, "How many symphony orchestras do you mix a day?" Now Richards is anxiously awaiting the marked improvement in audio he thinks WTAE will achieve. The improvement that WTAE will get on its evening news alone is worth it according to Richards. Richards also pointed out that the acoustical design of most TV studios is not exactly perfect and that the EQ and attenuation available in the console should go a long way towards compensating for this.

In general, the feeling at WTAE is that most of the things they will be able to do haven't even been identified yet.

The new CEI-310. Is it really that good?

A lot of people who saw our new broadcast quality field production camera at NAB could hardly believe it. They asked us a lot of incredulous questions.

Is it really that small? That portable? Is it really making those incredibly good pictures we're seeing on the monitors? Even at those outrageously low light levels? Is the resolution actually as good as it looks?

Does it really require only one lightweight cable out to the electronics unit—for video and broadcast quality audio? Up to 400 feet? And up to 2500 feet with a systems integration unit?

Is it really that automatic? Does it really have full signal processing? Does it really accept different tube types—2/3 inch Saticons or Plumbicons?

Can it really operate from battery belt? Battery pack? Any 12-volt DC source? Or normal AC power?

Is this studio camera really the same as the portable one above?

Is it really totally modular? Can it truly be reconfigured in minutes to a full-fledged studio camera—self-contained or system—with a big 8-inch viewfinder?

The answer to all these questions, of course, is yes. Now ask yourself this question. Shall I play it safe with a big name like Philips or RCA or Fernseh? Or shall I show a little initiative and take a look at this new CEI camera everybody's talking about?

Just give us the chance to show you. Call your local CEI representative now. Or get in touch with us directly at 880 Maude Avenue, Mountain View, California 94043, (415) 969-1910.

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Give the people what they want

...I hope that the Dolby FM effort does finally make it everywhere...

...Until now I doubted that Dolby could significantly improve FM. But the incredible brilliance and clarity and the extended dynamic range of (San Francisco station) is fantastic proof...

...I only hope the broadcasters in this area will convert to your system...

...I am behind you 100%. I want quality radio...

...I've been looking forward to Dolby FM and now my favorite (Pennsylvania station) is installing it...

...I am convinced of the great improvement Dolby can make to FM broadcasting...

...Good luck on your efforts to increase dynamic range on FM — it sure is needed...

...We have been enjoying the benefits of the Dolbyized FM programs of (New York station) for a long time. We noticed at the outset the richer and cleaner sound especially in the high frequencies...

...I hope that some day all stations will broadcast with your marvelous system...

...All audiophiles owe you much for making cassettes such a wonderful source of music. I trust that your positive campaign to improve FM sound quality will bear equally impressive results...

...I now listen to Dolby FM broadcasting on (Buffalo station). The difference in sound quality between (this station) and other FM stereo stations is remarkable...

...Bravo on your campaign...

...I could not believe what I heard: The sound was clear, clean, brilliantly defined. After several hours' listening, I am still awestruck...

...I feel this is a step forward in FM broadcasting...

Dolby FM

The quotes above are selected and shortened from letters received on the subject of Dolby FM during the past year. Of 3,000 letters, only 5 have taken us to task — sample: "...(Dolby FM) smacks of nothing more than plain old commercialism."

August 1977 Dolby FM statistics: In U.S.A., FM stations in 10 metropolitan areas plus 101 other cities with Dolby FM encoders; 14 in Canada; 17 in other countries. 24 manufacturers with 62 different tuner and receiver models incorporating Dolby FM decoder circuits.

Write us for technical details, lists of products and Dolby FM stations.

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Prove to yourself how Dolby FM solves the high-level high-frequency problem.

Remember the first cassette recorders with the Dolby system, back in the early 70's? The advantages were easy to prove to yourself. You flipped the Dolby NR switch. Now you heard it; now you didn't.

A few years later and along comes Dolby FM, which you are at least curious about. The same 10 dB's are still there. But, unfortunately for demonstration purposes, they are used in a more subtle way. Let's face it, the effect is hard to hear most of the time (that's compatibility for you). To make a rigorous and convincing test is tough; for example, you would have to make elaborate in-out changes at your station and simultaneously in the monitoring receiver – not the easiest thing to organize.

Well, here's how to overcome these problems and make a quick and convincing test of the effect of Dolby FM on high-level high-frequencies. The demo is artificial, but technically valid.

1. **Using a receiver with Dolby FM circuitry, defeat the interstation muting switch.**
2. **Tune to a vacant place on the dial to get pure high-level hiss as a test signal (the extreme ends of the dial are usually good for this).**
3. **Switch back and forth between Dolby FM and conventional FM.**
4. **Listen to the increased high frequency content in the Dolby FM mode. The difference should be very obvious.**

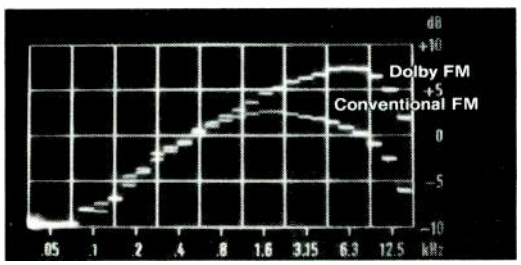
In the Dolby FM position the test signal will have a wide-range, open quality. The conventional FM hiss will be muffled. This is the high-frequency, high-level capability difference between Dolby FM and conventional FM. *All* the highs on the record at your station can actually get through to the listener. This allows the rest of your – and your listener's – equipment to do its job properly; all other specs become more meaningful.

The reduction of low-level transmission noises, the other half of Dolby FM, is harder to demonstrate at will. However, in due course you may wish to check out the fact that Dolby FM provides about 5 dB of CCIR weighted noise reduction.

This should help you get a better handle on Dolby FM. Not only a theoretical improvement, but one you can prove to yourself.

Technical Note

The use of wideband noise is becoming increasingly popular in testing audio equipment and acoustical characteristics. Interstation noise is equivalent to an FM carrier which is modulated with high-level white noise. This is a suitable signal for checking the high-level, high-frequency capability difference between Dolby FM and conventional FM. Relating the test result to actual listening, the difference shows how conventional FM muffles loud musical signals containing significant amounts of steady-state or transient high-frequency energy (for example, the steep waveforms of percussion and brasses).



Real-time analysis of Dolby FM receiver output when tuned to interstation noise, using Altec Hewlett-Packard 8050A analyzer. In a "perfect" FM system the trace would be a continuously rising straight line. Thus the results show that highly modulated high-frequencies can be reproduced with significantly improved accuracy using Dolby FM

Commercial Note:

Dolby FM is worthwhile primarily for stations who wish to use minimal amounts of conventional compression and limiting. The advantages of Dolby FM cannot be appreciated in highly competitive loudness-oriented market situations.

Dolby Model 334 FM Encoder Unit $1350

August 1977 Dolby FM statistics: In U.S.A., FM stations in 10 metropolitan areas plus 101 other cities with Dolby FM encoders; 14 in Canada; 17 in other countries. 24 manufacturers with 62 different tuner and receiver models incorporating Dolby FM decoder circuits. Write for details.

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Broadcasting's Audio For The Eighties

It will be of much higher quality in both radio and television than anyone in the early 1970's could have foreseen. In this report *BM/E* has put together the first extensive account of the powerful influences now pushing broadcast audio upward. In six articles, three covering radio and three television, we preview the coming progress of broadcasting audio.

BRINGING TOGETHER IN ONE PLACE descriptions of all the main forces now operating and soon to operate, on the quality of broadcast audio is an unsettling experience. It leads to a conclusion for which most of us are undoubtedly not prepared: audio quality will be pushed far upward in the next few years at a rapid rate, an upgrading on a scale unlike anything the industry has known.

In the six articles, we summarize the major influences coming to bear on radio and television audio. Though each article concerns either radio or television, we suggest that regardless of your special interest, you read all of them. Developments in both fields will play an important part in the evolution of the broadcast industry.

We set down here some overall conclusions that are worth emphasis at the beginning. A combination of listener demand, of brand-new technology, and of new competitive patterns is pushing the industry in directions no one expected it to go a short time back. Of the new technology, the most important elements are satellite networking, which is opening up wide as this is written, and stereo sound for television, some years down the road but already casting shadows ahead.

The articles that follow to make up this special report are:

"How Eight Radio Stations Take Special Care Of Their Audio," page 38, which shows how proper operating practices are used to assure top-grade audio now. That has a double significance: it has immediate value in any radio station seeking high-grade audio, and also emphasizes the kind of operations care that will be needed.

"Radio Station Equipment For Top Grade Audio Is Here Now," page 44, discusses the status of in-station electronics equipment already available—if proper selection is carried out. The article presents some general guidelines for that selection.

"Radio Satellite Nets Will Take Audio Sky-High," page 52, introduces the enormous persuasive power that satellite transmission is going to exert on the industry, in favor of higher-grade audio. Two examples of the coming nets are described but many others are on the way, and the total effect will be on a grand scale.

"TV Audio Will Get A Huge Boost From DATE And From Bell's Diplex System," page 54, tells about two operations that will strongly influence TV audio, one among the public television stations, the other, perhaps more importantly, on the commercial TV nets.

"Lincoln Center Works Out Top-Grade Live Pickup and Transmission Of Concert Hall Performance," page 56, shows a more specialized approach to TV audio, but one that will have tremendous influence as an example of what can be done.

"Stereo In TV Will Turn The Industry Over," page 58, reveals that the commercial nets are well advanced in planning for the biggest turnover of all, with titantic commercial implications: universal stereo audio for TV. This immensely important story has not been told earlier.

To the developments covered there we must add two grand technical changes which everyone is already watching closely, AM stereo and FM quad, clearly destined to put tremendous force into the upsweep in audio if they become commercial realities. In an accompanying box we give the latest status of the FCC deliberations on both AM stereo and FM quad.

For the individual broadcaster, the overall meaning of the information covered here is that he must consider carefully the upgrading of his audio equipment and operation sometime in the coming years, taking into account his competitive situation, programming sources available, etc. Perhaps this report will help him with some initial guidance for his deliberations.

How Eight Radio Stations Take Special Care Of Their Audio

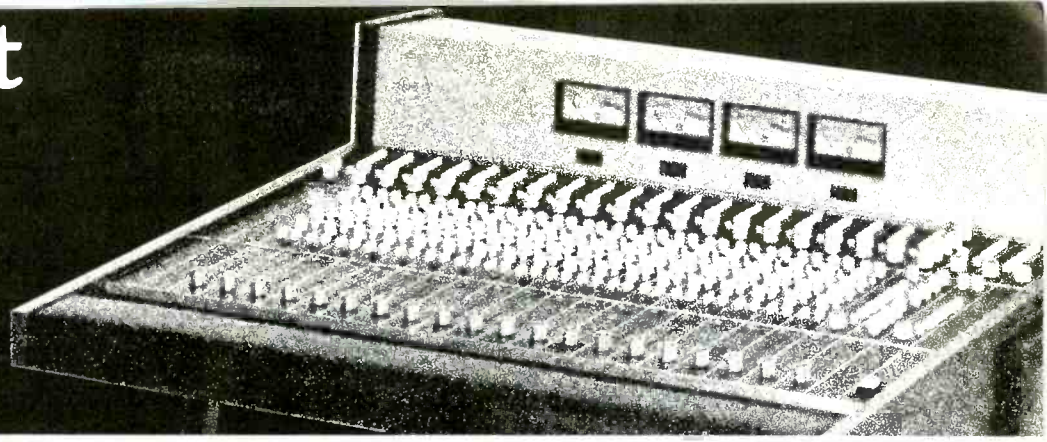
Skillful and constantly applied care is essential to top grade audio today and will be in the era of super-grade audio that is coming.

THERE IS A NITTY-GRITTY for high-grade audio in broadcasting, a combination of skill and hard work that has always been necessary and will still be, whatever new technology comes along. The combined experiences of the eight stations covered here show many things that can be done right now to solve the audio problems facing every broadcaster and to produce, with the right choice of equipment (see next section), a super grade of audio.

Scores of other stations could have been chosen: many

continued on page 40

Broadcast



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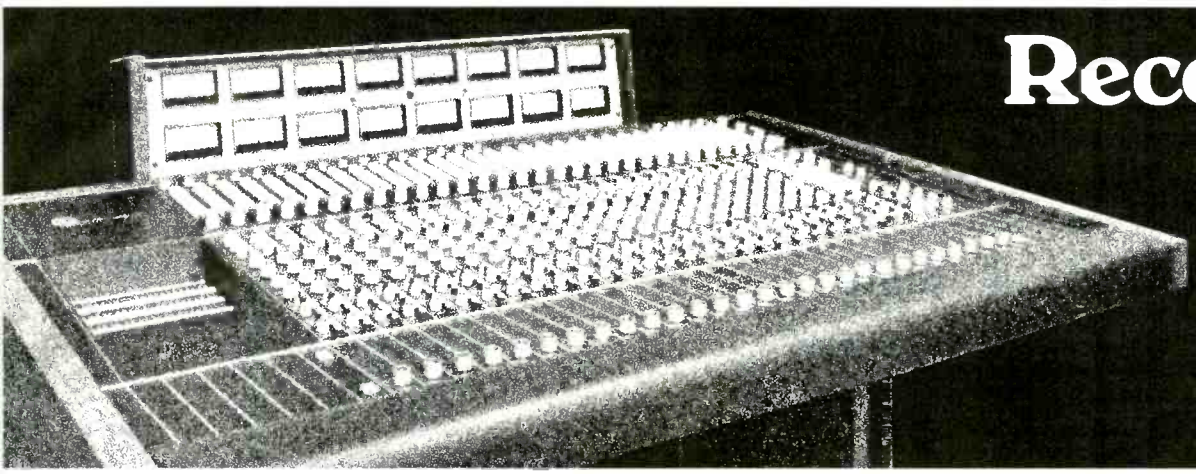
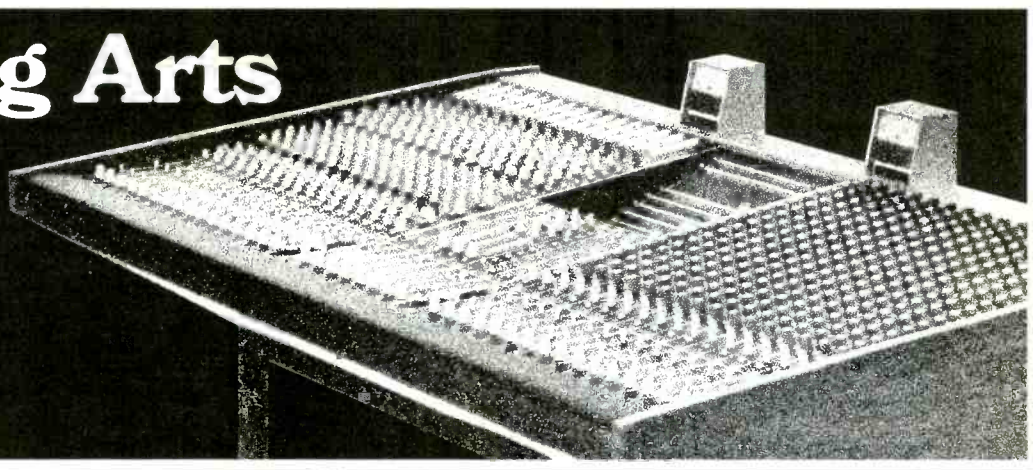


Performing Arts



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The top performer in any business is the top money maker. And it's no different whether your business is automobiles or race horses. You know that total performance is the key to a solid black bottom line. And that's why more and more recording studios, broadcast studios, and performing arts centers are turning to the total performer in audio consoles: Auditronics — The Money Machines.

With A Money Machine you'll find you've got quality that lasts. From the ground up every Money Machine is better designed and better built to handle your most demanding requirements. And when Auditronics has the leading role, you'll get less downtime, superior quality, affordable prices — the best total performance.

That's why Auditronics consoles are known as The Money Machines. While they save you money, they make you money. But don't just take our word for it. Talk with our customers. You'll find out why more audio professionals are selecting the top performer year after profitable year . . . The Money Machine.

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audio of the 80's.

Busiek is in accord with all the others on the necessity for having the tops in disc equipment. He notes that attention has currently turned to preamps for disc pickups: advances in the other units in the chain have revealed that many preamps do not match pickups properly, and thus sound "bad," a quality loss for which the cause was obscure until very recently.

For his tapes, he uses the new Ampex ATR100 whenever possible, Nagra portables for inaccessible remote pickups, Revox for the duplication of the tapes, always at playing speed. He agrees with a number of others that the new generation of audio processors is a big advance over that of three years and more ago: the problem of ringing is at least now heavily on the designers' minds.

He is also pleased that equipment is beginning to appear which takes out ticks and pops. He believes this problem is on the way to solution. On the ever-looming problem of how much processing to use, Busiek's advice is not to use any if a majority of the station's listeners will stand for it. Listeners with very small radios will complain that the music is either too soft or too loud, they can't get it right. So the answer seems to depend today on who the important audience is, what equipment they generally have, what they expect or can be taught to expect.

WXRT-FM, Chicago. This progressive rock station successfully battles the Chicago radio horde with its explicit emphasis on "best sound." Chief engineer Howard Williams, using discs almost 100% for on-air material, is in accord with the important strictures on quality equipment for discs put forward by the others in the foregoing and with their fanaticism on maintenance. He has the Stanton 681EEE pickup, the Technics SP-10 turntable. He uses the widest possible dynamic range, with little or no compression, protective limiting only, from his Spotmaster processor. He, too, trains his operators to clean each record before it goes on the turntable.

And it all works. The audience has learned to expect, says Williams, the dynamic range, the total bandwidth, and the low distortion that his maintenance and operating practices aim for. Any major transgression gets immediate complaint: for Williams, as for the other "good sound" stations, no news is usually good news. The positive news, of course, is that the station's ratings are satisfactory—the high grade sound has won a viable audience.

WPAT AM and FM, Patterson, N.J. Though corporately in Patterson, NJ and physically in Clifton, NJ, this station is actually operating in the shadow of, and to a large extent in direct competition with, New York's giant radio stations. The AM directional array is slanted toward Manhattan, just across the river and the FM covers the city. The program format is a kind of free-form "beautiful music," that stretches broadly to include some MOR, AOR, etc. The audience has come over many years to love it: WPAT has a most loyal following which makes the station an outstanding commercial success, not on the scale of WABC, for example, but far greater than anything Patterson, NJ, alone could sustain.

A key element of the mix for WPAT is very superior sound, and chief engineer Kenny Stout has an engineering program with some unusual methods to assure it. All programming is put onto reel-to-reel tape in the station, with the basic tape machines now the Ampex ATR-100s. The transfer from disc to tape is most carefully carried out. Stout uses a Shure V-15 Mark 3 stereo pickup. The playing tapes are not duplicated: the masters go on the air. The control of levels and other characteristics in the production, says Stout, takes most of the burden off the on-air operator: it is not up to him to set levels, they have been established in advance.

Commercials are on carts. A rigorous maintenance program keeps disc, tape and cart machines at their best, and is absolutely essential, says Stout, to the quality of the sound. The station has its own test tape with five-second tones at 100 Hz, 1 kHz and 10 kHz for setting azimuth, and this has to be done almost every day on the cart machines: constant maintenance is needed to keep them reasonably controlled. Very careful adjustment of pinch roller pressure and other mechanical operating characteristics is essential to keep cart flutter from getting out of hand.

Stout and his helpers use an elaborate array of test equipment in regular preventive maintenance of all units in the audio line; the new Sound Technology multi-test equipment is used for some of the tests. Stout also emphasizes the need for careful interfacing all along the audio line. To preserve this he does not take out a misbehaving unit and put another in its place; there are two complete lines all set up, one as spare, which is switched into use instantly if any unit in the operating line has to be serviced or replaced. This includes all filters, the STL, as well as all audio units—the complete path.

The FM station is automated and Stout's maintenance program includes regular checks of all the automation channels for headroom, noise, etc. For the 25 Hz cue tones, he uses a sharp notch filter tuned to 25 Hz, pointing out that overtones of the 25 Hz-50 Hz and up will degrade the quality if they get through.

WPAT has close cooperation between the program department and the engineering department on the desirability of sound quality of proposed material. Selections are often made by a group from both departments, and it sometimes includes in addition, station employees with no program or engineering expertise, particularly young women, whose natural sensitivity to unpleasantness in reproduced sound is well known. The station has found this group monitoring extremely helpful in keeping the sound on the air consistently attractive to the audience.

WCBS-FM, New York. This rock station, with one of the largest audiences in the United States, has put tremendous emphasis on getting the best quality out of tape carts. Although standard carts, in the view of most broadcasters, are inherently lower in audio quality than the best discs and reel-to-reel tapes, the WCBS program shows that with great skill and care carts can be brought into today's "good sound" fold. The future of carts in the super-grade audio era is less sure.

The network engineering department, led by Lawrence Solow and Ciro Torchia, worked closely with the station's operating staff on the carts which are used for all music. They came up with some unusual solutions for

well known cart problems.

To avoid trouble in the mono mix from the continuing headache of stereo phase slippage, WCBS-FM puts all stereo material through a matrix as it goes onto the carts, so that an L+R signal goes onto one cart channel, L−R onto the other. This is decoded just before it goes on the air, so that phase slippage between the two cart channels does not affect the final L+R signal. They have found this necessary to top quality in their mono signal, heard by a large part of their audience.

To minimize skew and misalignment in the tape path, a highly sophisticated system for guiding the carts into the playing machines and holding them there has been developed and applied to all machines in use. Key elements of the multi-featured system are a stiffening plate directly under the cart to minimize distortion of the whole cart; close side guides with spring loading on one side and a precision plate on the other; and downward pressure on the cart at the rigid edges, rather than in the middle where it would tend to deform the cart.

The transfer of material to the carts gets similar care. Every record or tape from which material is to be taken gets a full audition by a group, and any equalization or processing to be used is decided on. Solow and Torchia point out that much trouble is avoided by a technical check at the same time; for example, fairly frequently a record comes in that is out of phase already, and a reversal must be inserted before the record is dubbed. Levels, distortion, noise, etc., are all controlled with extreme care. The consistency in levels is one of the most important elements of the high on-air quality.

Naturally the maintenance of the cart recorders is constant and thorough. Special mountings for the heads have been developed that stay firmly locked, for reliability of the azimuth and zenith adjustments. The pressure adjustment is very critical to low flutter, proper pitch, etc; it is monitored frequently. All parts of the tape path—capstan, guides, etc., are cleaned at least daily.

Part of the anti-noise effort is extra shielding between stacked carts to reduce motor hum.

Discs are played on an EMT turntable with Stanton 681 pickup. The disc-to-cart systems have a combination start, with both machines on the same switch: the operator cues up record and cart, then operates the one switch. Every record is cleaned thoroughly before dubbing. Torchia and Solow have aimed for the greatest possible consistency in the dubbing process and this extends to using the *same operators* for each part of the process.

The signal goes through an Optimod with *very* light settings—the control of levels in the dubbing makes heavy limiting and compression unnecessary, while still allowing for a high average modulation level. WCBS-FM knows from the audience response that its quality fanaticism has paid handsomely.

Radio Station Equipment For Top Grade Audio Is Here Now

Program playing equipment and electronics units for radio broadcasting have reached very high levels of refinement already—and more is coming.

ONE OF THE STRENGTHS we can count on for the audio of the 80's is the quality of the in-station audio line equipment. From the program input through the transmitter, a solid advance to the new audio has already been made. By applying very high standards in the selection of equipment, and with expert system design, the station operator can have a super-grade audio line today. Some operators have done just that, as some of the preceding station stories suggest.

There will be further advances in station equipment, expected and unexpected. But the real force of the grand upsweep will come from the wide prevalence of commercial motivation for top grade audio. The main elements of that are treated in the following sections of this report.

Here are some general guidelines for the new standards in equipment selection.

Turntables and pickups. Top quality disc playing equipment has come into broadcasting in part from the high fidelity industry. The direct drive turntable with DC motor paced by a crystal oscillator, now widely used in broadcasting, first allowed high-end hi-fi systems to have flutter and wow at 0.03% and below, noise from −55 dB on down. Made rugged enough for broadcast use, these turntables have solved the flutter and table noise problems for the audio of the 80's.

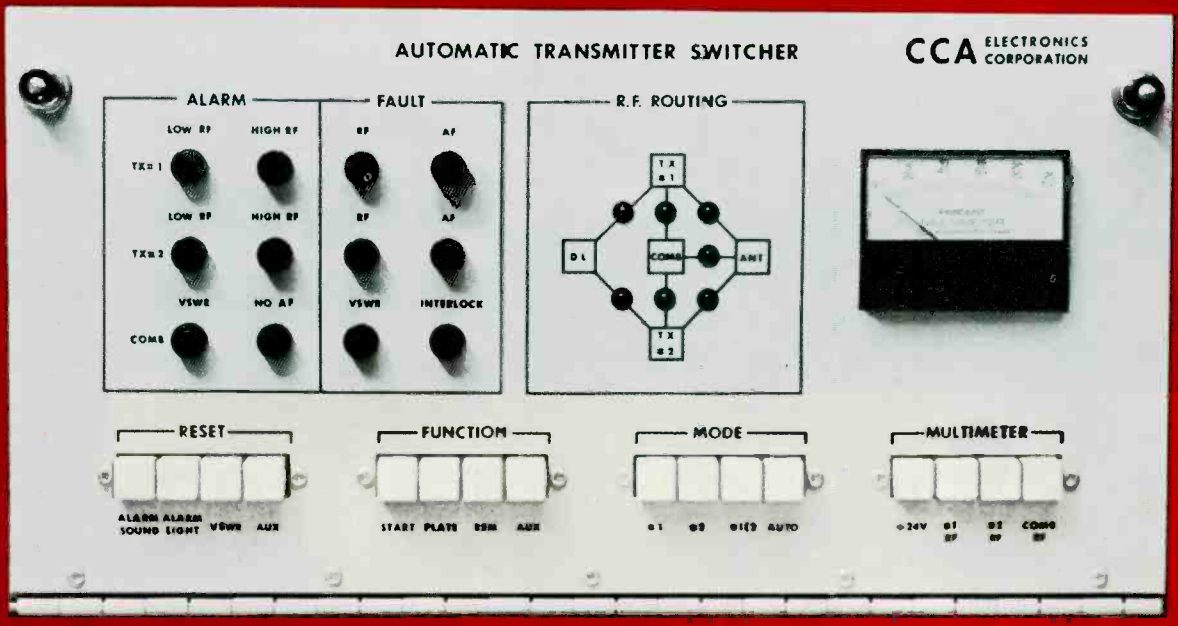
The stereo pickups now popular have a similar origin: they combine the total audio bandwidth and low tracking force of the top hi-fi units with broadcast ruggedness. Notions about blue-sky pickups are always plentiful in the audio industry, like the laser beam reproducer recently suggested in a paper at the Audio Engineering Society. Over the long range, top audio recording using video disc techniques seems attractive and probable, allowing for four or more top-grade channels on one disc. But the best stereo pickups we have now (or quickly realizable improvements on them) are quite good enough to sustain disc playing quality in the 80's.

Tape recorders. The best reel-to-reel machines are also ready for the 80's, although in general with slightly lower distortion and noise standards than the top disc machines (aside from a very few, very expensive tape machines).

But this comparative disadvantage of tape will be more than overcome by the digital tape recorder. Apparently somewhere between two and five years away, the digital tape machine will leap-frog over other program origination units to audio of higher quality than anything we have known. (See "New Machine Delivers Digital

continued on page 48

The only way to stop this from getting you back on the air is to cut the power.



If there's a way to get you back on the air, the new CCA Automatic Transmitter Switcher will do it.

By automatically sensing loss of RF.

By automatically sensing loss of audio.

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By automatically sensing programmed high or low power limits.

The new CCA Automatic Transmitter Switcher instantly initiates, and completes, a switchover from one transmitter to another. It performs all necessary intermediate steps automatically — such as removal of high voltage. Reconfiguration of the antenna switching network. Removal of a parallel transmitter from the circuit if one is used. And, in proper sequence, it will reapply high voltage after determining that no faults still remain — ultimately putting the remaining transmitter back on the air directly into the antenna.

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The CCA Automatic Transmitter Switcher is 100% solid-state with plug-in, easy-to-service circuit boards — state-of-the-art technology within easy reach of all broadcasters. And it's interfaceable with all AM and FM transmitters, requiring only low-level RF sensing inputs and controlling interface.

If there's a way to get you back on the air, the new CCA Automatic Transmitter Switcher will do it.

The new CCA Automatic Transmitter Switcher. Another reason why, with CCA, you may never go off the air again.

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Because these are no ordinary tubes. They're 16 vidicon types precisely matched to broadcast cameras. Broadcast needs. A perfect marriage of traditional RCA quality and a new set of criteria—with strict limits on such factors as amplitude response, lag, image retention, dark current and blemish criteria.

Tubes for virtually any broadcast use. All marked "BC."

The CAMERA READY line consists of: *Sulfide* (antimony trisulfide) vidicons for color film service. *S-T* (silicon-target) vidicons, with greater sensitivity and spectral range. *Vistacon* (lead oxide) vidicons for live color. And the new *SATICON*®* (selenium arsenic tellurium) vidicons for compact hand-held or small studio cameras, and telecine. What makes these tubes so special?

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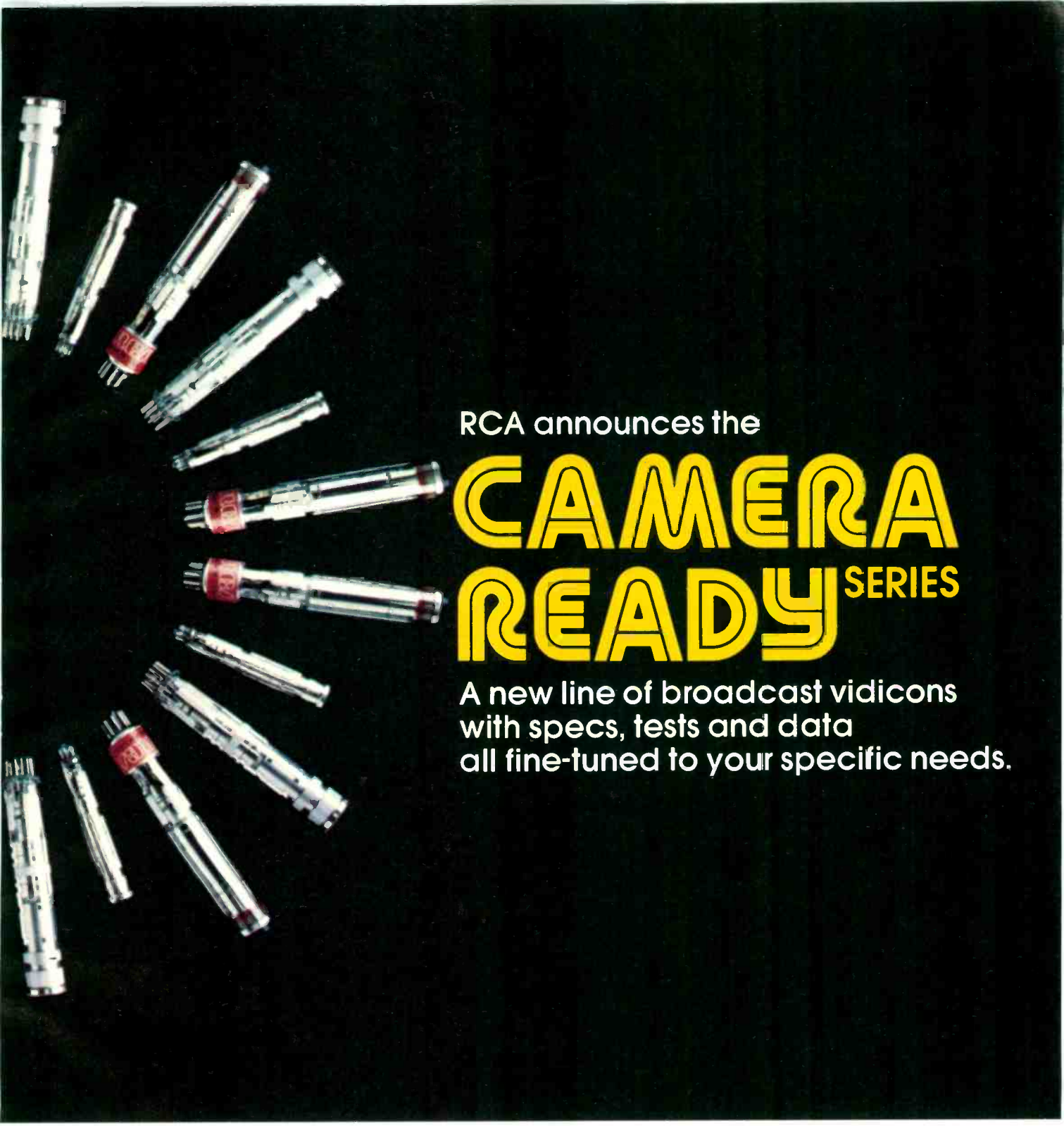
We test all tubes electrically under simulated end-use conditions—and that includes subjecting each tube to the typical range of lighting condi-



tions it will encounter in actual operation. Then, on a sample basis, we test *in a broadcast camera.* Under actual broadcast conditions. Both of these tests help ensure reliable picture quality.

With every tube a test data card.

When you get a CAMERA READY tube you know exactly what it will do. Because you know what it's already done. Every important test, every important performance characteristic is right there on a data card that comes with the tube.

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RCA

Fidelity," *BM/E*, February; and the preview of the Audio Engineering Society convention on another page of this issue).

Electronics. The technology of electronics for audio has been capable for some time of satisfying practically any demand made on it. For the audio of the 80's, the broadcaster has to learn to *ask enough of his electronics*. He will need, and will be able to get, audio units with distortion at a fraction of 1%, really flat total-audio bandwidth, noise in the −70 dB and below range, and other characteristics to match.

Such characteristics are available now. And refinements of various kinds are coming. One example springs from the finding referred to in the story of WGBH above, that many standard preamps do not match well the stereo pickups we use; the resulting distortion was unobservable until distortion in other parts of the chain came very low. Another refinement will apparently ensue from recent studies showing that slew-rate distortion in audio amplifiers is well correlated with ear quality. Electronics units for broadcasters are going to get even better than they are now; the present best level is fully up to the audio of the 80's.

System design. The audio system as a whole must meet the quality standards, and for this there is no short cut around high engineering skill. The best audio consultants will have a role here for many station operations.

Audio processing. This function is today in more of a state of flux than other elements of the system. We have a new generation of processors with much lower distortion than those of three and more years ago. Many stations are using the new processors with total satisfaction. A few chief engineers interviewed by *BM/E* acknowledge the great forward step, but believe that further refinement is needed.

In any case, the whole subject of proper processors and proper use of them is now very much to the fore (see the program of the NRBA Convention on another page of this issue). We can be certain that in the coming years there will be further refinement of audio processing as a system, with other parts of the station technique moving ahead to, perhaps, reduce the need for processing. (Some of the station stories suggest this). Thus, the handling of processing promises to be at the same high level as the rest of the audio of the 80's.

Transmitters. Upgrading of transmitters is one of the most essential parts of the audio upsweep. Everybody knows that the older AM transmitters, in particular, were not aimed at the kind of audio we envision here. If and when AM stereo comes, there will be a double motivation for replacing older AM transmitters.

Without waiting for stereo, designers of some of the most recent AM transmitters have given them the bandwidth and low distortion they will need, and thus

continued on page 52

Design Imperatives Of The Broadcast Tape Cartridge Machine

By Preston Weaver, chief engineer, Beaucart Division, UMC Electronics.

Users of broadcast quality stereo cartridge tape machines have long recognized that there are certain shortcomings, particularly in the electro-mechanical construction of the units, which affect channel-to-channel stereo phasing. These problems were nuisances, in that they affected the quality of output by FM stereo stations. With the approach of AM stereo, phasing has become an all-important concern for all broadcasters. Even more serious has been the effect on the mono mix from stereo carts—phase errors could seriously degrade the sound quality.

The following tells how one manufacturer, with long experience in hysteresis synchronous motor and tape head design, tackled the problems. First on the agenda was the method of mounting and adjusting the heads. It became apparent from a review of many designs that a solid block containing the head with a simple positive screw adjustment was required. This led to the "hemispherical head screws in conical seats" concept, which provided smooth and easy adjustment of head height, zenith and azimuth. It also had the advantage of providing full and uniform contact between the adjusting screw and its seat in the head mounting block, both during adjustment and when locked by the centralized clamping screw. We found that once the head was adjusted and locked no change occurred from shipment, use or abuse.

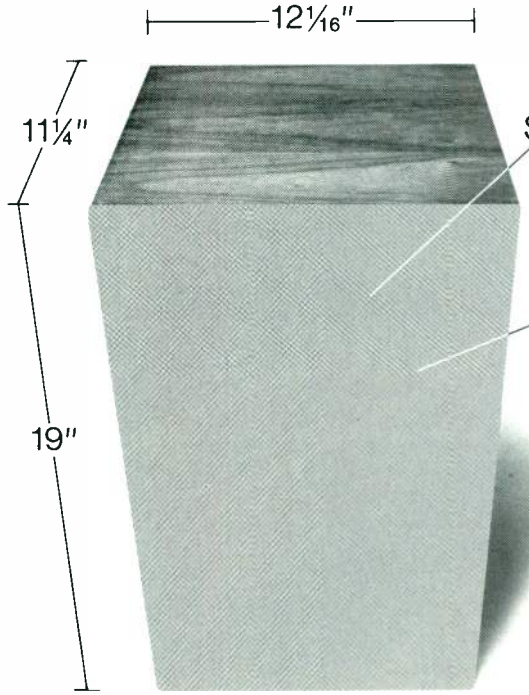
Our very detailed investigation showed important relationships between the cartridge and tape guides, and in the method of locating and holding the cartridge in the machine. On the first matter, we found that the best phasing results from a given cartridge often depended on how many guides were used: none, one, two or three. From this, it became evident that three separate and independent guides would be required so the user could mate the number used with the recommendations of the cartridge manufacturer. It was further found that the guides must all be set at the same correct height. A new gage was, therefore, designed and manufactured to span all guides at one time, with inside, top, and bottom surfaces of the guides in contact with the gage. The use of this gage will ensure a uniform tape path when tape guides are required.

Our investigation of methods of locating and holding down the cartridge pointed up certain common deficiencies. In many machines there is a small metal plate under the heads (to support the center section of the cart and shield the head to overcome a deficiency in signal-to-noise ratio) to act as a support. Since the hold-down spring was over the center, or, weakest part of the cartridge, it tended to distort the cartridge causing a shift in the left corner post height and a variation in phase angle every time the cart was inserted. We found it virtually impossible to maintain good phasing with this hold-down arrangement.

We decided that the best way to hold a cartridge would be to apply downward force over the extreme edges, the stiffest part of the cartridge. With pressure away from the center, we found no shift in the corner post height and the same phasing time after time. The lateral position of the cart is also important if the same phase angle is to be repeatedly maintained. For lateral stability, we added a spring on the left side of the machine that would force the cartridge against the right hand guide and provide a repeatable position. (Editor's note: as the story on WCBS-FM on another page recounts, very similar methods for improving cart alignment have been developed by the CBS radio network engineering department.)

In another vital area, much analytical and experimental work revealed the proper range of force that would provide the correct indentation of the capstan shaft into the pressure roller for any given hardness. When maintained at the established values, flutter, phase angle, and tape speed became extremely stable.

Now there's a JBL monitor specially designed for broadcast studios.



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Among other good things, the 4301 has exceptional clarity, solid bass, open high frequency reproduction and a nice honest face.

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If you're just now growing into more advanced production work, then you're going to want the EC-2 Edit Controller. This complete, sophisticated stand-up time code editing accessory can put you in command of as many as seven additional (similarly equipped) machines working in any combination of master/slave for production or multiple dubbing service.

Modular construction means an easy fit for your AVR-2, no matter where you want to use it—at a remote location, in your tape room, or out in the mobile van.

AVR-2 is the quad recorder that grows. Every accessory for this machine is available upon initial purchase or at any time in the future when you're ready. Tell us what it has to do, and we'll recommend the model that suits your needs.

AMPEX

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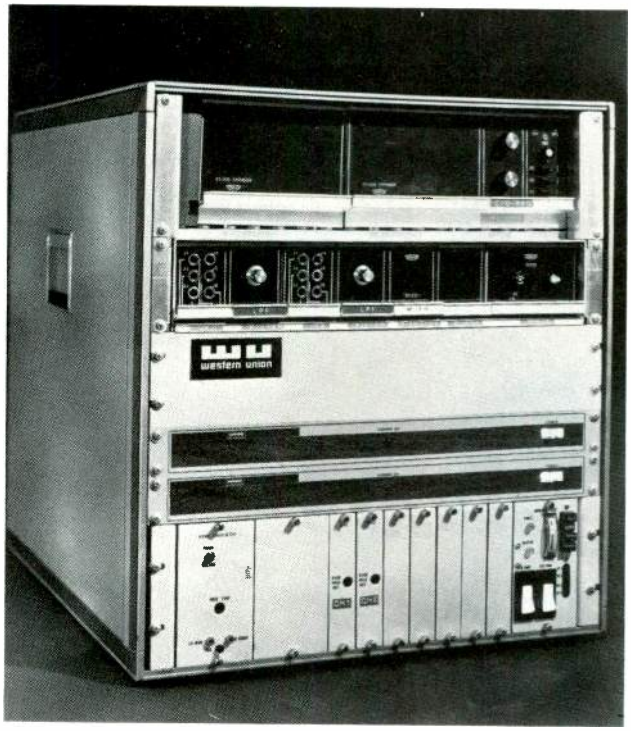
raised their audio performance to the 80's level. To get such a transmitter, the station operator must choose with extra care because many with the older lower standards are still around.

The FM transmitter has, of course, been held to higher audio standards from the beginning. But that does not eliminate the necessity for extreme care on sound quality when buying an FM transmitter for the 80's. The buyer can be sure the right transmitters can be had, if he chooses correctly.

Radio Satellite Nets Will Take Audio Sky High, Literally And Figuratively

The broadband, low noise potential of radio satellite nets is going to be exploited by a number of organizations, with immense effects on audio quality throughout radio broadcasting.



Typical of electronics in satellite systems which are helping bring the audio of the 80's is this control unit for Western Union receive-only radio earth terminal. Unit has capacity for six 15-kHz radio programs.

NOW WE COME TO THE QUESTION crucial to the whole idea of the audio upsweep: why will more and more radio stations in the coming decade try for the best audio they can get? Lower audio standards generally cost much less than the best.

Powerful persuaders for high quality are coming in the satellite networks that are springing up faster than you can say "Jack Robinson." Two basic points are these: the "single repeater" nature of a satellite channel and the ample bandwidth available make it easy to distribute nationwide audio signals of full bandwidth, low noise and distortion; the organizations setting up satellite nets are convinced that the American radio listener *wants* such audio quality, or at least can be won over by it, so the satellite organizers are getting ready to deliver it.

Things are happening so fast in satellites now that any report is sure to leave out highly significant developments. Here are just two examples that will illustrate the audio clout of the satellites.

Mutual heads for wide-band stereo. The Mutual Broadcasting Company has meant "nationwide news distribution" for so long that it is hard to think of it in any other role. But the management has been considering for a long time additional kinds of services Mutual might supply to its 750 affiliates. As previously reported in *BM/E*, Mutual is one of the organizations planning to go full-scale to satellite distribution.

The satellites will not only get the Mutual news pro-

Antenna for Western Union receive-only earth terminal is this 10-foot dish, being set on roof of WU headquarters in New Jersey. Small size and weight of antenna allows installation on roof of radio studio or nearby.

grams across the country easier, cheaper, more surely, than terrestrial lines, but will also open up spectacular opportunities for the new services the management is looking for. One of them: 15 kHz stereo delivery of musical programs, including live concerts from origination points around the country. The technology for this has been worked out by Mutual and Western Union, who will supply the satellite channels.

Each subscribing station will have its earth terminal right at the station, eliminating land lines and microwaves from the delivery loop. Mutual has an initial order in with Hughes Aircraft for 550 earth terminals, with more to come later. They will be supplied to Mutual's affiliates via various lease and sale arrangements.

The wide-band stereo channel for music was being demonstrated, when this was written, at station KIRO in

continued on page 54

In The FCC's Lap: FM Quad, AM Stereo, TV Stereo

Three of the most weighty influences for the new, better audio of the 80's are backed up, as this is written, in the FCC's hopper of pending decisions. As reported in earlier issues of *BM/E*, the FCC, some time ago, opened what we may hope are the final inquiries into rule making for FM quad and AM stereo. Final comments on FM quad (Docket 20310) are due by December 18. The FCC will have in hand by then, not only all such recent comments, but also the massive NQRC report of last year, and the results of the listening tests recently completed at the FCC lab in Laurel, MD. The "get it done" spirit of recent years may give us some hope that the decision on this hotly contested matter will be made early next year.

On AM stereo (Docket 21313), final comment date has been set at October 15. The FCC will also have the report of tests on several systems by the NASC, as described in detail in earlier issues of *BM/E*. No one at the FCC will now advance a guess on how long the decision might take thereafter. Many AM broadcasters are unhappy about delay; but there seems to be no way to avoid it.

The third inquiry, which will have great weight on the forward progress of TV sound, as discussed in the accompanying article, is headed "TV subcarriers" and asks for comment on the desirability of using subcarriers in the TV aural baseband for stereo, ENG cueing and control, foreign language translations, augmented audio for the blind, etc. Comments on this (Docket 21323) are now due by November 25. The general confidence in the television industry that stereo is coming suggests that the industry will strongly support the use of aural band subcarriers for stereo. At the time of writing, wide industry support on this had not yet reached the FCC but it seems most probable that it will be forthcoming.

Broadcasters (or any others) with any interest or stake in any of the three proceedings should send their comments to the FCC, under the respective Docket numbers, as soon as possible.

Seattle, and similar demonstrations will soon be made at a number of other stations around the country. Early reactions to the idea indicate that it will be widely used.

The significance of this for the audio of the 80's is that the Mutual affiliates will have strong incentive to take competitive advantage of the high quality of the Mutual signal. This, in turn, puts pressure on the competitors. With a number of other satellite operations similarly making high audio quality a competitive weapon, the audio upsweep gains great force.

It inevitably pulls along, too, the makers of radio receivers. Although the no-fidelity table-top or car radio will always be with us, it seems reasonable to expect that the availability of a high grade of signal off the air, widely known through station promotion, plus the growing fidelity consciousness of the public, will induce an ever larger segment of the public to pay the price for radio receivers of decent audio quality.

National Public Radio: quad from the start. A second radio satellite net will similarly carry to all parts of the country a super-grade audio signal, again directly to each station on the net. National Public Radio will send up to the satellite a signal consisting of four separate carriers, each with wide-band FM modulation. This is analog modulation and not the "DATE" digital system, once considered by NPR but rejected. *BM/E* erroneously reported in January that NPR was still on DATE. (See PBS, next section, for the future of DATE).

The four channels can be used as four separate mono signals, as two mono and one stereo, as two stereo or one quad. Each NPR affiliate—about 200 in all—will be able to receive in any of these modes, or to choose any program when more than one is transmitted.

The four-carrier system, points out George Geesey, technical director, will give the net tremendous flexibility and redundancy. The flexibility is particularly wanted to allow origination from a number of points around the country. NPR plans for around 15 uplinks eventually, to allow programming to come from every sector of the U.S. Geesey says the net wants to eschew forcefully the "Washington label," become a truly national operation.

For the audio of the 80's, the NPR net will strongly reinforce the effects of the Mutual net and of others that also take advantage of the satellite potential for high quality. It will be an accumulation of force, slow in the first few years, mighty by the end of the decade.

Television Audio Will Get A Huge Boost From DATE And From Bell's Diplex System

The log jams that have held up improvement of TV sound for so long are being swept away by the new network transmission systems, public and commercial.

THE AUDIO OF THE 80'S will transform the sound of television programs as well as those of radio. Again, the satellites will play one of the key roles. For example, the Public Broadcasting System, the national net of public-supported television stations, is far advanced on its satellite net—the management plans to have 20 stations on the net by March, 1978, and the whole 200-odd by the end of the year.

An essential part of the PBS net plan is DATE, the digital system for transmitting audio, described in earlier issues of *BM/E*. DATE consists of four super-grade audio channels digitally encoded into a single bit stream and transmitted on a carrier at 5.5 MHz, just above the video.

PBS will also send over the net a 15 kHz mono sound, with analog modulation, at the regular sound slot for video. Stations that do not choose to install the decoding equipment for DATE will have a high quality audio signal available.

However, Dan Wells, CPB vice president, engineering, reports that 55 stations have already signed up for DATE decoding equipment, and the prospect is that a heavy majority of the PBS stations will do so.

That implies, of course, a widespread expectation that the FCC will approve stereo sound for TV. Obviously that would bring a revolution in the television receiver industry, of which there will be more further on. But even before stereo gets onto the TV airwaves (if it does), DATE will add power to the upsweep of audio very much as the NPR system promises to do. By carrying to the top the audio service that has been especially low in quality, PBS will have an especially large effect.

The AT&T diplex system. But perhaps even more important, because it will affect the quality of sound on the commercial TV nets, is the diplex transmission system going into Bell System service as this is written. We can take this development as strong evidence of the wind of audio change that is blowing because the Bell System is notoriously conservative when it comes to major shifts in system technology.

This *is* a major shift. Instead of carrying TV sound around the country on telephone lines, with audio faults that have been criticized heavily in recent years, Bell will modulate the TV sound onto a subcarrier at 5.8 MHz and put it on the same wideband channel as the video. This delivers a 15 kHz, low noise, low distortion TV audio signal everywhere in the country.

But that is not the whole story. Bell's move seems almost sure to carry TV audio another big step further because the system is set up for easy addition of a second top-grade channel for stereo. The second audio channel would go on a second subcarrier, a little lower in frequency than the first one. The prospect of stereo in TV audio has such tremendous implications for the TV industry that we have discussed it separately in the final article of this report.

The commercial TV nets have been pressing for better

continued on page 56

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quality in sound transmission for some time. All of them will use the diplex system as fast as it gets into service. There will be a step by step introduction of the system, with all major routes brought in by early next year.

The Bell diplex system, added to the satellite system of PBS with its DATE audio, will break the old four-way chicken-egg dilemma holding down the quality of TV sound. TV set manufacturers pleaded "not our fault" because only poor sound was on the air. The TV station could say that that was the kind of sound coming in over the telco lines. Bell said the TV industry was not interested in better sound, would not pay the higher cost. Now all that has changed and the audio upsweep will gain great power.

The TV station operator, if he wants to do so, can upgrade his audio with much of the same equipment that the radio operator needs for that purpose. And recent developments in video equipment are adding greatly to the potential for upgrading. One of the problems with TV sound has been the unsuitability of the quad VTR for high quality audio. (See "Audio Is No Longer The Cinderella Of Television," *BM/E*, Oct. 75.) Important faults are the flutter produced by the physical impact of the rotating heads on the tape, and the orientation of the magnetic particles for transverse recording, rather than for the longitudinal recording of audio.

The new generation of 1-inch helical VTRs, which are exciting the industry on a number of counts, have high-grade audio going for them on top of their other virtues. The Sony BVH-1000 in particular is winning the adjective "superb" for its stereo audio system. This trend caps the others noted here: it makes us even more confident that TV audio is joining the upsweep of the 80's.

Lincoln Center Works Out Top-Grade Live Pickup And Transmission Of Concert Hall Performances

Although very few commercial TV managements now contemplate live pickup of symphony, ballet, etc., from concert halls, Lincoln Center's demonstrations might just be one wave of the TV future. The "simulcasting" of these programs has powerfully aided and abetted the coming of the new high quality network transmission of TV audio, described in the preceding article.

LINCOLN CENTER, sometimes attacked in its early years as a vast mausoleum of passé cultures, is proving to be a pathfinder, an example, a creative mover and shaker for the TV industry.

With the twin and laudatory objectives of getting nationwide audiences for its productions, and of finding more financial support for those productions, Lincoln Center has: developed the techniques for getting its productions, both sight and sound, on the air with superlative quality; pushed hard for top quality nationwide distribution, using "simulcasting"—stereo FM plus TV—for the early productions, but looking toward high audio quality on the TV carrier itself; developed methods (not yet in use) for selling its productions literally and directly to the audience.

The last of these developments has tremendous implications for all organizations producing culture, high, mid or low brow—that is a big story in itself. Here we are interested in the effects of Lincoln Center's activities on the audio of the 80's and those are clearly most significant.

Pickup techniques. Whether or not the concert hall itself is a durable part of our culture has been argued lately; the lines at symphony, ballet and opera box offices in the last few years seem to guarantee it life for at least another generation of concert goers. So we might expect at least a few TV program originators, encouraged by the quality of the audio of the 80's, and by Lincoln Center's example, to turn to the concert hall from time to time for material.

Lincoln Center's stated objectives were to get sight and sound on the air with superlative quality, with the normal stage lighting, and without any disturbance of the performers or the audience. For the video, this required much experimentation with low-light-level cameras.

For audio, Lincoln Center adopted a no-mix-down approach, with the idea of preserving the hall ambiance to the greatest extent possible. Microphones in general are well back in the hall and are placed carefully for the exact sound wanted. All balancing is done ahead of the transmission.

For ballet, four mics are used, two for the orchestra and two for ambiance. For opera, there are one or more additional mics, usually in the pit, calculated to pick up singers in the particular production. Solo instruments in the symphony are also sometimes miced separately, with the mic concealed near the instrument.

An interesting bit of special micing was that for the broadcast on January 30, 1976, of a symphony concert with pianist Van Cliburn as soloist. The piano had a mic inside it, an AKG-451, with swivel cardioid capsule. The mic had to be physically isolated from the piano structure by padding: it picked up the sound on the bounce from the sounding board. All the mics used, of course, are of the same top grade.

The electronics in the system meet extremely high standards of audio performance, and the audio line as a whole was designed for the lowest possible noise, for super-ample headroom, vanishing distortion, etc. Until recently, Lincoln Center has used a double-system for network recording, to avoid the well-known deficiences of the quad VTR for audio: sound went onto Ampex 440C machines. For the future, the engineering management is considering using the Sony BVH-1000 for network feeds, because of the high quality of the audio

continued on page 58

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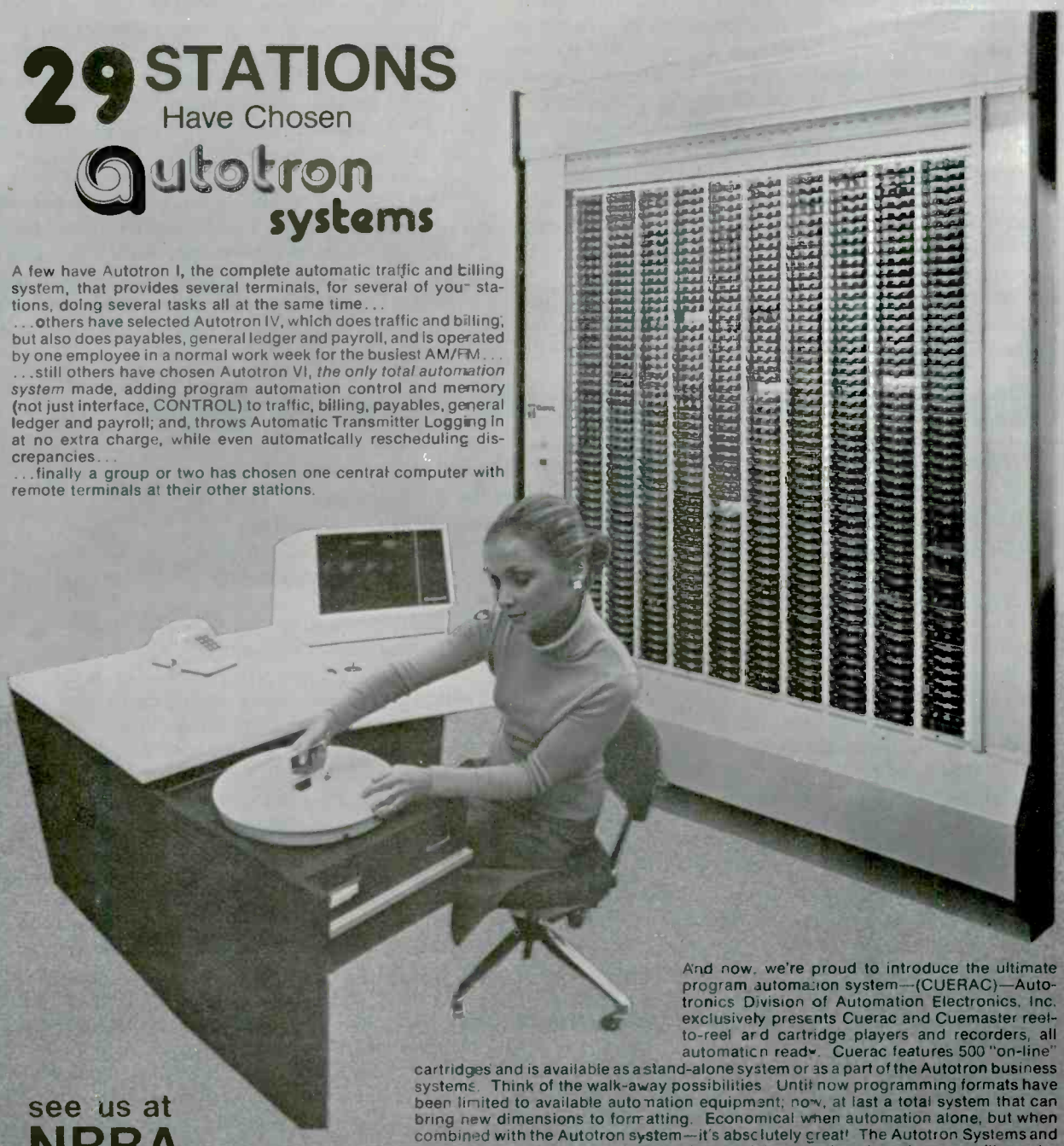
...finally a group or two has chosen one central computer with remote terminals at their other stations.



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on this helical machine (also noted in the preceding story).

Simulcasting as quality goad. Lincoln Center managed to enlarge to nationwide proportions its program of sending its TV audio signals, in stereo, to FM stations near each of the respective TV outlets. The audio transmission used a changing mix of terrestrial lines, microwaves, satellites. For the terrestrial lines, Lincoln Center coaxed the Bell System into installing experimental diplexing systems, already in development at Bell and elsewhere, putting the audio on subcarriers in the video channel (the Bell diplex system now going into regular service, as described in the preceding article, was in part an outgrowth of these experimental operations).

Western Union was encouraged to supply wide-band stereo channels on its satellites and to regularize this operation by filing for a tariff on it. Lincoln Center has been trying to get numerous other common carriers to make regularly available similar wide-band stereo for the audio transmission.

The result of this agitation for top quality audio has reached far beyond Lincoln Center's own simulcasts, becoming an important factor in the growing audio quality consciousness of the network operators and common carriers, noted in the foregoing articles. And Lincoln Center has been able, with one recent simulcast, to put its stereo audio signal into areas holding about one-half the TV audience in the U.S. Lincoln Center is pushing for further expansion in the audience for the simulcasting.

The simulcast, everyone recognizes, is an awkward way to get top-grade TV audio into the home. However, it *does* get that quality there, providing a listening experience totally missing with older transmission methods. And the Lincoln Center simulcasts have pushed ahead substantially the prospects for high-grade audio on the TV main line.

Stereo In TV Will Turn The Industry Over

The biggest commercial upheaval brought about by the audio of the 80's will be the equipping of the TV audience for stereo sound. The satellite nets and the Bell diplex system will supply the essential distribution links, as noted in preceding articles here. The FCC must approve local stereo transmission; then the receiver makers will have a vast turnover market.

NOBODY AT THE COMMERCIAL TV nets is ready to set a schedule yet, because some essential elements must still fall into place.

At best, everyone agrees, stereo in TV is some years away. But the pre-requisites are coming fast. We told, in the preceding article, how PBS with its satellite net and DATE audio system, will transmit super-grade stereo to its affiliated public TV stations. That will be a highly influential development but by itself would probably not bring about a complete turnover in the TV industry.

What could cause that turnover is the adoption of stereo by all the commercial nets—they are preparing. *BM/E,* for example, recently was taken on a tour of audio facilities at NBC network headquarters. A large program of upgrading the audio sections of those facilities is underway, and it will have stereo capability from stem to stern.

NBC already has in operation a digital system for carrying programs from various origination points to various points of use within the headquarters plant. There are more than 300 origination points, more than 100 use points; this required over 30,000 switch points. NBC wanted the video and *four audio channels* to switch all together, with audio of top grade maintained. It is all done with a special digital system developed by the NBC engineering department, putting the four audio channels into one digital bit stream, on a subcarrier above the video.

Right now, no one at NBC or anywhere else will say "stereo is definite—we will do it in 1980." As an NBC spokesman put it to *BM/E,* "we simply want to be ready *if* and *when.*" But all acknowledge that the high-grade transmission systems, the rising public expectations, are going to put rising pressure on the networks for dramatic improvements in TV sound.

There are, of course, two more links in the chain between the program origination and the listener. The FCC must approve the use of subcarriers for stereo in the TV aural baseband of TV transmitters. And an FCC inquiry on that is underway. In the accompanying box, we describe it in more detail, tell how to aid the FCC in its decision. The re-equipping of the local station, if the FCC approval comes, will not entail major new investment. *BM/E* will look into the transmitter industry's predictions on that in later articles.

That brings us to the receiver in the living room. The audio in the average TV receiver has been excoriated for so many years, and with so much justification, that it is going to be hard for us to change our habits. But the better TV audio that now seems sure to come will be welcome indeed—it will be one of the most positive changes ever made by the industry, on a par with color, for example, as a commercial stimulant.

We can be confident of this change because the availability of a high-grade signal on the air, the growing fidelity consciousness of the public, and the lack of other fresh attributes to sell more receivers will flip the competitive pressure from anti-sound to pro-sound.

The evidence given here for this development is a small part of what could be turned up in a comprehensive survey. *BM/E* carried out a sampling only. So many TV stations, satellite developers, earth terminal builders, programmers, microwave nets, etc., etc. are active on stereo that it would take weeks to get the story together. And things are happening fast so that any story is quickly out of date.

But the main facts are in hand. The audio of the eighties will include a totally new deal for TV sound. **BM/E**

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For NRBA's New Orleans Meet Radio Looks Stronger Than Ever

The nearly 100 companies participating in the show, the full four-day multi-track technical program, the expected record registration, are symptoms of radio's continuing upsurge.

Radio has climbed back to its own unassailable position on the national scene. The war with television has been over for some time. By finding a different role, a little distance from television, radio has been able to grow bigger, stronger, more profitable than it was when it reigned alone.

The main items of evidence are known to everyone: total revenues in 1976 of around $2.5 billion, a majority of the nearly 8,000 commercial radio stations in the black; even newcomer FM becoming a success, with the "average" or "typical" FM station making money in 1976 for the first time. Radio's strength is also obvious in the advance response to the Fourth Annual Convention of the National Radio Broadcasters Association, which will run at the Hilton Hotel, New Orleans, October 9 through 12.

Between 65 and 70 exhibitors will show their broadcast equipment on the floor of the Grand Salon, the largest number for NRBA so far. Another 30 companies will have demonstration and hospitality suites in the hotel, though they are not on the exhibit floor. And about 25 of the exhibitors will give the show a double run by having hospitality suites in addition to their exhibit booths. Enough hospitality is going to be dispensed in the four days of the show to float a small navy.

The information/technical sessions will be presented on five simultaneous tracks, with the headings Management, Sales, Programming, Promotion, and Engineering. On two days the Promotion track will be devoted to sessions under the heading of Research, which, of course, is another essential area of station operation.

A special effort has been made, according to President James Gabbert, to make the engineering sessions comprehensive, authoritative, and up to the minute. Jim Gabbert, himself, was the engineering chairman and he and his helpers have arranged sessions that cover a number of engineering topics of very broad interest and great importance. For example, on Monday, October 10, there are two concurrent engineering sessions, with different constituencies: "How To Compete With FM Sound," and "Improving FM Coverage For Better Ratings." For each session, a panel of acknowledged experts has been assembled and broadcasters who come to listen (and question) are almost sure to hear some stimulating new approaches to the respective topics.

continued on page 62

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NRBA Show

How do exhibitors feel about the show? *BM/E* talked to a few chosen at random. There was a strong consensus, which can be paraphrased this way: it's a comfortable show for us and gets us into contact with possible customers directly, easily; it is "our show." If NRBA can sustain this response among exhibitors, the show will have a long and glorious history.

Some other events on the Convention schedule include: the annual Armstrong Awards dinner, at 7:30 pm on October 9; an address at the luncheon of October 10 by Congressman Lionel Van Deerlin, head of the House Sub-committee on Communications and a most articulate and powerful government figure for broadcasters; an auction in the exhibit hall on Monday evening; a riverboat cruise on Tuesday.

A complete run down of exhibitors, showing the main products and services each will display follows below. Everything needed in a radio broadcasting plant will be on hand. As the rundown shows, there will be some interesting new kinds of equipment introduced at the show. Perhaps even more important are the many new and usually upgraded versions of standard items—consoles, transmitters, tape recorders, etc.—from firms long established in production of those items. This general advance springs from, and adds force to, radio's strength today.

What they'll show in New Orleans

AKG Acoustics, Booth 94. Will show microphones, headphones, stands, phono cartridges, reverb units.

Ampro Broadcasting Inc., Booths 8, 9, 10. Will introduce the new Monomax, cassette record and playback equipment. Also showing their line of audio consoles and cartridge equipment.

Audio Sellers Inc., Booth 27. Will demonstrate their music libraries, the Money Machine and Music Explo.

Automated Processes, Inc., Booth 66. Is introducing a new series of audio consoles for AM, FM and FM stereo for combined on-air and production use. Also a new intercom system using digital techniques, with 4-wire interconnect; and cross-point audio switching system with BCD and touchtone access; also the line of audio distribution amplifiers and full series of modules for audio processing.

Automation Electronics, Booths 109, 110. Will demonstrate business automation systems and also combined business/program switching systems, using the Cuerac 500-cart multicart machine, with both billing and program switching run by a single Honeywell computer.

Belar Electronics Lab, Inc., Booth 26. Showing AM, FM and TV monitors; will introduce new models of FM monitors.

Bloomington Broadcasting Corp., Booth 107. To demonstrate computer systems for radio business automation.

Broadcast Electronics, Inc., Booths 56, 57, 58, 59. Single and multiple deck tape cartridge systems; audio consoles.

Broadcast Programming Intl., Booths 73, 74. Will have information on all syndicated music formats: Rock Gold, Country, MOR, AOR, Easy Listening, Classical, Adult Contemporary, Bright and Beautiful.

Cablewave Systems, Inc., Booth 4. Will be showing coaxial transmission line systems. Will introduce a new low-cost dehydrator, Model SPD-10.

Capitol Magnetics, Booth 14. Will introduce the new Studio Pak AA-3 tape cartridge, shown in prototype at the NAB, now with production samples. Also the complete line of low-noise magnetic tape, magnetic film etc.

CBS Technology Center, Booth 122. Will demonstrate quadraphonic broadcasting equipment and professional test records for disc recording.

CCA Electronics Corp., Booths 42 through 55. Complete line of AM, FM transmitters will be shown; will introduce an auto-switching 55 kw FM transmitter.

Cetec Broadcast Group, Booths 32 through 37. Will show AM and FM transmitters, audio equipment, FM antennas, automation systems. New item at the show will be the Cetec-Schafer Series 7000 automation system.

Collins (Rockwell), Booths 63 and 64. Will show for the first time the new Model 828E-1 "Power Rock" 5 kw AM transmitter; and the Mark 8 stereo audio console.

Consolidated Electronics, Booth 111. Will show their Cuerac 500-cart machine, run by a Honeywell computer.

CSI Electronics, Booths 91, 92. Complete line of AM and FM transmitters.

Delta Electronics, Inc., Booth 22. Will have on demonstration an impedance bridge, automatic modulation controller, automatic power controller.

Digital Products Corp., Booth 118. Will show their automatic telephone calling system which can make up to 1000 calls a day, deliver a recorded message to each called person, record the responses: used for listener surveys, opinions on radio programming etc.

Dolby Laboratories, Booths 89, 90. Will show the Dolby FM broadcast encoder, Model 334; the Dobly noise reduction systems for recording and STLs, Models 360 and 361.

Edco Products, Inc., Booth 5, 6. On display will be the CA-77 dbx cassette recorder/players, Rapid Q tape cartridge equipment; the STE-100 stereo phase enhancer.

Fidelipac, Booth 114. Will show their new wow and flutter meter; also their line of tape cartridges and accessories.

Harris Corp., Broadcast Products Division, Booths 28, 29, 40, 41. Will demonstrate the MSP-100 audio processor, the MS-15 FM exciter; will show the System-90 automation system; the MW-1A 1kW solid state AM transmitter; the Criterion 90 cartridge machine; the M-90 audio console (both introductions at the show); and the Technics SP-10 MKII turntable.

IGM/NTI, Booths 119, 120. Are going to introduce a new audio switching control system, "BASIC," which operates from commands in plain English, handles 16 sources (optionally expandable). Basic A has RAM static memory for 4000 schedule entries, optionally expandable. Basic B uses floppy disc memory for up to 6000 schedule entries, also expandable. Unlimited real-time switching, automatic fade, English print-out logging are standard. Also shown: Instacart and Go-cart multi-cart players; Marc VII control system.

Inovonics, Inc., Booth 95. Will show audio signal processors; magnetic recorder electronics.

International Tapetronics Corp., Booth 25. Will have on display complete line of cartridge and reel-to-reel tape record/player equipment, including single and triple deck cart machines, cart delay machines, cart eraser/splice locator, 750 and 850 series of reel-to-reel recorders and record/players.

Jefferson Data Systems, Booth 100. Will demonstrate their System 80 computerized radio traffic/accounting/billing service.

Johnson Electronics, Inc., Booth 24. Will introduce at the show their new five-channel input mixer and AD-2 antenna orientator. Also showing SCA tuners and tuner-amplifier combinations.

Kaman Sciences/BCS, Booths 59, 60. Is going to show new BCS accounting packages. Will have data on the complete line of BCS computerized accounting systems.

Kay Industries, Inc., Booth 18.

continued on page 64

NRBA Show

Will have new transmitter models of rotary phase converters. Also showing the complete line of rotary phase converters.

James B. Lansing Sound, Inc., Booths 102, 103. Are going to introduce their new Model 4301 broadcast monitor.

LPB, Inc., Booths 84, 97. Will show for the first time their new DJ10 complete studio furniture systems. Also showing audio consoles, preamps, compressor/limiters, distribution amplifiers, turntables and the line of studio furniture systems.

Marathon Products Corp., Booth 108. Will have for the first showing their 1976 NAB Standard AA cartridges. Also showing line of cartridges, audio and TV tape machine torque testers, speed indicators, demagnetizers, head cleaners.

Marti Electronics, Inc., Booths 104, 105. Introducing new STL system and mobile repeaters. Showing line of aural STLs, remote control systems, complete ENG systems.

McCurdy Radio Industries, Inc., Booth 7. Will introduce a new series of phono preamplifiers. Also showing audio consoles, complete stereo "on-air" package system.

McMartin Industries, Inc., Booths 70, 71, 72. Showing AM/FM transmitters, FM monitors, RPU equipment. Will introduce the new B-1050 and B-1080 console series.

Micro Controls, Booth 113. Will have a complete line of aural STLs, both wideband composite and narrowband; also remote control systems; and introducing a new ATS. Also showing subcarrier transmitters and receivers, STL accessories.

Micro-Trak Corp., Booth 65. Showing the System D complete studio audio control system with Model 6445 five-channel stereo console; also showing the Model 6455 five-channel mono console in a portable case; and the Model 2580 automatic antenna heater control.

Minneapolis Magnetics, Booth 85. Showing their line of broadcast tape recorder replacement heads.

Moseley Associates, Inc., Booths 98, 99. Is introducing their new, TCS-2 telecontrol system which provides command, telemetry, and status report channels, each channel independent of all others. A single telco line or radio link makes all interconnections. Two TCS-2 systems can use one interconnecting link. Also showing: the line of aural STLs, digital remote controls, remote pickup links, audio amplifiers, audio processing units.

Fred A. Nudd Corp., Booth 19. Will show for the first time at NRBA their line of communication towers.

Orange County Electronics Corp., Booth 123. Is introducing a new generation of FM audio processors. Also showing combination processors, "Stressor" and others.

Orban Associates, Inc., Booths 15, 16. Will introduce their new Optimod-AM audio processor. Will also show the Optimod-FM stereo synthesizer, dual-spring reverb units, compressor/limiter, de-esser, parametric equalizer.

Otari Corp., Booths 86, 87. Showing their line of tape recorders and duplicators.

Pacific Recorders and Engineering, Booths 124, 125, 112. Is showing for the first time a new series of digital clocks, and a new standard broadcast console. Also on display: the Multilimiter and Multimax processing units, the line of audio consoles.

Paperwork Systems, Inc., Booths 11, 12. Will introduce at the convention new computerized billing and control system for cable television. Will also show the line of computer systems for broadcast traffic/billing/

accounting/payroll systems, including the BAT 1350, 1450, 1500 and 1750.

Phelps Dodge Communications Co., Booth 96. Will have their line of FM antennas installed on tower sections for the first time at a show. Will introduce a new super-power FM antenna. Also showing transmission lines and accessories for FM antenna systems.

QEI Corp., Booth 13. Will have a new automatic switch system. Also showing improved ATS and line of transmitting equipment, monitors, and audio processors.

Ramko Research, Inc., Booth 80. Will have new amplifiers, equalizers, tape recorder, cassette decks, speakers, tuners and turntables. Also showing their line of consoles, audio amplifiers, turntable preamps, tape winder, reel-to-reel recorders, power amps.

RCA Broadcast Systems, Booths 75, 76, 77, 78. Showing their solid-state AM transmitter, BTA-55S; 20 kW FM transmitter; BTE-115 exciter; BC-50, BC-15 consoles; line of broadcast microphones; BA-146, 147 speech processors.

Robins Broadcast and Sound Equipment Corp., Booth 115. Will introduce new plug-in cards in the 725 series of amplifiers, equalizers, etc; also a new power supply for remote attenuator boards; an 8 × 8 remote switching card; and a new broadcast module combining the 6681 fader and integrated amplifier. Also showing examples from the line of modular consoles.

Scully Recording Instruments, Booth 58. Will show the line of broadcast recorders and loggers.

Eric Small and Associates, Booths 20, 21. Will show their Telesis ATS/remote control/auto logger, turntables, tape machines, the LiteAlert; peak program meters; tape/cart/disc transfer system.

Sono-Mag Corp., Booths 81, 82, 83. Will introduce at the show a new remote control system and a DP-2 programmer with "Super-Clock." Also showing their line of radio automation systems.

Stanton Magnetics, Inc., Booth 93. Will show for the first time at NRBA the 881S cartridge, the 681EEE cartridge (S-type) and the BPS playback system for stampers and matrices. Also the line of other cartridges, headphones, the stylus timer, and turntables.

Studer Revox America, Inc., Booth 3. Is displaying reel-to-reel recorders, mixing consoles, microphones.

Tapecaster TCM Inc., Booths 1, 2. Bringing their Series 700 cartridge recorder/players and Mark IV broadcast cartridge.

Telex Communications, Inc., Booth 23. Are introducing the new CM series of cart recorder/players; and new lightweight headsets. Also showing the line of recorder/players and other headsets.

Time and Frequency Technology, Inc., Booths 38, 39. Are introducing the new Model 770 STL; also showing the line of AM, FM frequency and modulation monitors; digital remote control system; STL equipment.

UMC Electronics Co., Booths 30, 31. To show their line of tape cartridge recorder/players, splice finder, audio heads, motors.

Thomas Valentino, Inc., Booth 67. Will demonstrate their library of sound effects and background music.

Ward-Beck Systems, Ltd., Booths 61, 62. Will introduce a new line of radio modules for the R1200 and R2000 series radio consoles, with many original features. In addition, will show the Model 1002 portable console, the M7012 intercom, the 600 Series distribution and monitor amplifiers.

Wilkinson Electronics, Inc., Booth 79. Will show transmitting equipment and line surge protectors.

Windchime Communications Inc., Booth 121. Will demonstrate their Mellowmusic syndicated format.

Miami Newsfilm Update:

The two largest TV network affiliates in this competitive "Top 20" market choose to upgrade their newsfilm equipment rather than switch to All-ENG, recognizing the indispensable role of 16mm newsfilm in a balanced newsgathering operation.

Despite the continuing "All-ENG" hysteria, the majority of affiliate and independent TV stations across the country have opted for a balanced newsgathering operation — a healthy mix of modern, one-man-band newsfilm cameras and a limited number of ENG units with live transmission capabilities.

What's happening in a "Top 20" market like Miami is typical of current trends in gathering news for television.

Basically a flat narrow strip along the coast, with the Atlantic Ocean on one side and the Everglades on the other, Miami is considered among the fastest growing markets in the country. Long favored as a major convention town, Miami is also a gateway for South America, Central America, and one-stop service to Europe. Since 1960 Miami has been the third-ranked city in the country in terms of datelines, with more hard news stories in one day than any other market this size.

"Our cost analysis left it very much up in the air as to whether ENG saves you money in the long run."

WCKT-TV, the NBC affiliate in Miami, has won numerous awards in recent years for its outstanding news coverage and investigative reports.

"We have two ENG units with live and tape capabilities," says Gene Strul, News Director, WCKT-TV. "The time had come to decide whether to go All-ENG or to retain film cameras.

"Our cost analysis left it very much up in the air as to whether ENG saves you money in the long run.

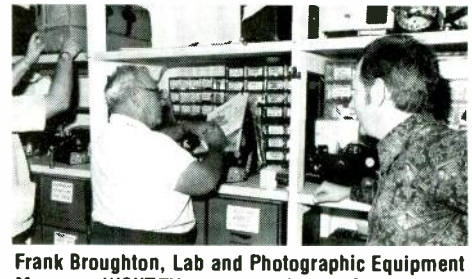
"We have also found that, contrary to reports, ENG units still do not serve as replacements for film cameras. We still cannot edit tape with any great speed. And the support equipment for ENG is bulky and difficult to maneuver. We use helicopters frequently to cover stories. (We also use them to rush material to us.) On occasion, we also shoot film from boats. ENG could be a problem when a helicopter or boat is needed. We also do a lot of investigative reporting where ENG would be difficult to use because the amount of equipment required would let everyone know what we're doing.

"As far as the public is concerned, it doesn't make much difference whether we use tape or film. The audience isn't interested in the difference — unless it's live. Of course, the public isn't gaining anything if a story is put on live just to use the live capability. That's just a promotional gimmick, and the public gets blasé after a while. After all, they have already seen a *moon walk* live, and they see golf games and other events live. After a while they say 'so what.' Why bring in a feature story live when it could have been done better on film?

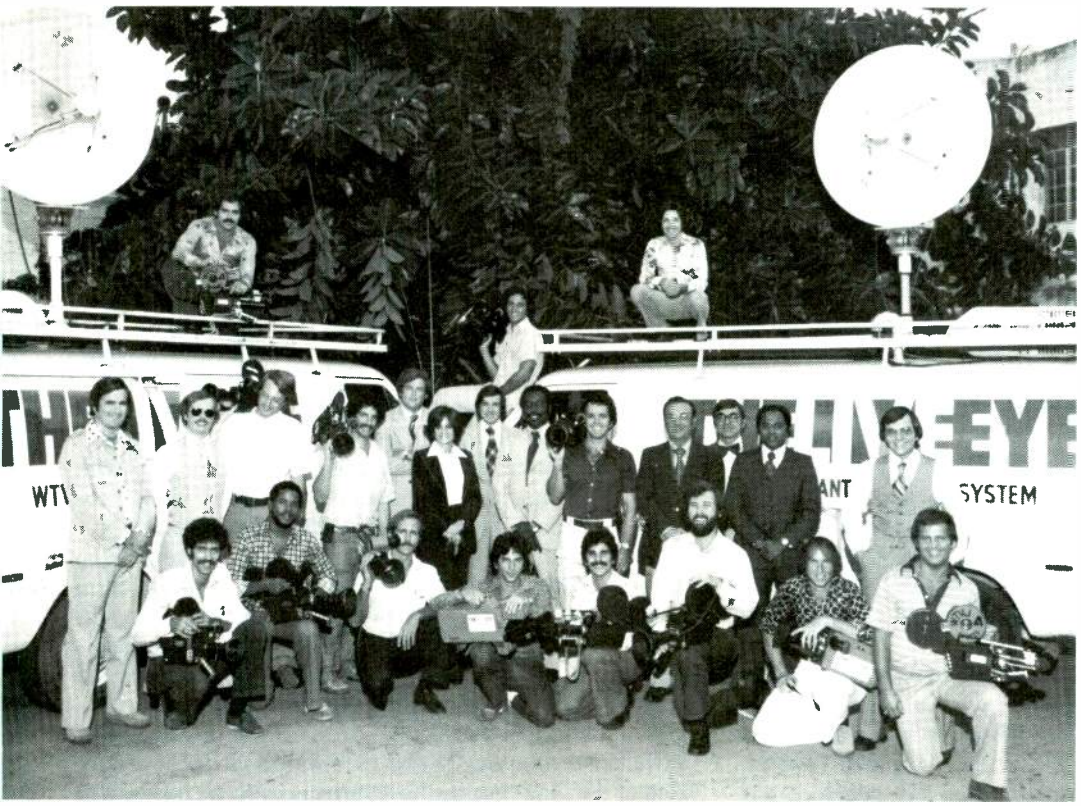
"The question was: should we invest in modern newsfilm cameras or more ENG? We felt that our two ENG units were enough to supplement film and serve our purposes at this point. And so, as our old newsfilm cameras have gone out, we're replacing them with new CP-16 units."

Dave Seeger, Newsfilm Reporter, WCKT-TV, loading his CP-16 into the news car. "VNF 7240 gives us a lot more latitude," says Seeger. "Working on various investigative series and shooting frequently at low light levels, I've probably 'forced' more film than any photographer around here." (Eastman Kodak has recently developed a new, remarkably fast stock, VNF 7250, with an ASA rating of 400, which permits shooting at light levels as low as two footcandles without requiring any forced developing! If needed, the new VNF 7250 can be pushed three stops to an ASA of 3200!)

Gene Strul (right), News Director, WCKT-TV, and Dave Choate, Assistant News Director, in conference about an upcoming investigative series. "We have found that, contrary to reports, ENG units still do not serve as replacements for film cameras," says Gene Strul.



Frank Broughton, Lab and Photographic Equipment Manager, WCKT-TV, accepts delivery of eight CP-16's from Charles Sutyak of Photomart (the regional CP-16 dealer headquartered in Orlando, Florida). WCKT-TV purchased two CP-16's in 1973, two in 1975, and in the winter of 1976-77 — twelve additional CP-16's!



"I don't think our equipment inventory should lie exclusively with ENG or film," says Ralph Renick, Vice President for News, Wometco stations. The WTVJ-TV news department equipment inventory includes two ENG vans, five ENG cameras, and nine of the station's CP-16's.

"I don't think a station should go All-ENG primarily because, with present ENG technology, your coverage would be limited."

WTVJ-TV, the CBS affiliate, is the oldest station in Miami. And the "Ralph Renick Report" is probably the longest continuing newscast in America. WTVJ-TV also has the greatest number of ENG units in Miami: five.

"I don't think our equipment inventory should lie exclusively with ENG or film," says Ralph Renick, Vice President for News, Wometco stations. "I don't think a station should go All-ENG primarily because, with present ENG technology, your coverage would be limited.

"Plus, some stories, especially features with a great deal of motion involved, lend themselves better to a newsfilm camera. Stories that are better covered with film include some breaking stories where you have to be able to move rapidly, and out-of-town stringer stories. While film in our shop is becoming a back-up or secondary system of coverage, with ENG being our primary and preferred mode of coverage, it is important that the news manager invest sufficiently in film equipment that is reliable.

"As for film versus ENG cost factors, the extra personnel involved in ENG and other extra expenditures have made the two a financial draw, they break down about evenly."

Ralph Renick (left), Vice President for News, Wometco stations, with Jim Rutledge, News Assignment Editor, WTVJ-TV. "We see film as part of the news operation for the foreseeable future," says Renick.

Cameraman Jeff Fort, of WTVJ-TV, takes a light meter reading, getting ready for a federal prisoner to come out of the courthouse building. WTVJ-TV acquired twelve new CP-16's in the fall of 1976, of which nine were assigned to the news department.

The leading TV stations in Miami may differ in their general approach to news and newsgathering, in the specific tape/film ratios they use in covering the news, and the extent to which they use ENG live capabilities. Though the competition among the stations is keen and lively, on one subject there's a definite consensus: *16mm newsfilm still remains the backbone of a balanced TV newsgathering operation.*

AES New York Meeting Will Show Big Advances In Audio

Plans for the biggest Audio Engineering Society New York meeting in history are further evidence that audio, including audio in broadcasting, is moving ahead broadly.

THE SPECIAL REPORT beginning on another page in this issue, "Broadcasting's Audio For The Eighties," describes the array of powerful influences that will push the quality of audio in radio and TV rapidly upward over the coming decade. There is an abundance of evidence that the technology of audio will be ready for, in fact, will be well ahead of, the much stricter demands to be made on it.

A batch of additional evidence on that point comes from the plans for the 58th Convention of the Audio Engineering Society, scheduled for November 4 through 7 at the Waldorf-Astoria Hotel in New York City. It will be the biggest New York meeting in the Society's history, and it shows an audio industry and profession rich in progress toward higher-grade audio. The meeting will have the largest number of exhibitors, over one hundred, in New York history. It will have the largest number of technical papers, some 75 or more.

Directly addressed to broadcasters is the technical session, "Audio in Broadcasting," scheduled for 9:00 AM on November 7, the last day of the Convention. The chairman will be O.S. Paganuzzi, facilities chief at NBC Network headquarters in New York. The papers will be: a report by Ben Bauer of CBS Technology Center and Gustavo Cota of Audiorama, Mexico, on the quadraphonic broadcasting of the Filharmonica of the Americas; Oscar Bonello on the plans for broadcasting the 1978 World Football Championships in Argentina; Robert Lifkin of Regent Sound on the use of synchronizing equipment in pre- and post-production of sound for TV programs; Paul Wickliff of AT&T on the new Bell System diplex transmission of TV audio (see discussion of this in the "Audio in the Eighties" report); and Hans Schmid on the "Chirp Test," new fast way of checking broadcast technical performance.

Also of prime interest to broadcasters is the fact that at least three digital tape recorders will be described, or on display, or both, at the convention. Soundstream Inc., of Salt Lake City, will show the latest form of their digital machine, described in *BM/E* in detail in the February issue. Mitsubishi will have their digital machine, introduced last May at the Los Angeles Convention of the AES. The 3M Company adds power to the movement toward digital recorders with a paper on a machine of their own.

There will also be a number of other pioneering papers on digital techniques in the full session on that topic. These help show the way into this new technology with so much promise for broadcasters, as detailed in the February, June and August issues of *BM/E* this year.

There will also be at least two papers, these from Tomlinson Holman and others at the Apt Corporation in Cambridge, MA, on the new ideas in design of preamplifiers for disc playback. This advance in system understanding is referred to in the equipment section of the report "Broadcasting's Audio For The Eighties."

A number of other papers deal with other aspects of advanced technology in disc recording and reproduction. One of the new systems for removing impulse noises will be described by Richard Burns and Thomas Packard of Packard Electronics, Dewitt, NY. A paper by workers at JVC will describe new, lower—distortion demodulators for the CD-4 discrete quad system, which could be of high interest if the FCC gives the go ahead for discrete quad in FM.

A whole session deals with the advancing design of music synthesizers, and gives further assurance that the versatility of synthesizers will continue to go up rapidly, with important benefits for the future of broadcasting. Numerous papers deal with new ideas in transducers—microphones, loudspeakers.

A few of the equipment trends to be seen on the exhibit floor that may interest broadcasters (in addition to the digital tape machines mentioned above) are: expansion of the movement toward multi-testing equipment, mainly from Amber, B&K, Inovonics, Sound Technology; impulse noise reducer, from Scientific Audio Electronics; more equalizers and more kinds of equalizers, from a number of firms; special effects units from firms established in this field, including Eventide, MXR, MICMIX and Lexicon, with new units from Sennheiser, Bozak, and others; new consoles from literally dozens of firms, with automated consoles emphasized by Neve, Harrison and MCI; new speakers also in a flood. This constitutes a very light sampling of the exhibits; the total is varied beyond anything the AES has assembled in New York in earlier years.

Special historical exhibits have been arranged to mark the 100th anniversary of the recording of sound, which started with Thomas Edison's tin-foil phonograph in 1877. The AES has announced that registration this year will be $25 for non-members, $20 for members of AES, ASA, IEEE, SMPTE and SBE; $5 for student nonmembers, $3 for student members. Registration admits the holder to all technical sessions, the exhibits and tutorial sessions. Full information on the convention can be had from the AES at 60 E. 42nd Street, New York, NY 10017. **BM/E**

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An Introduction To Digital Television Part IV: Digital Memories

By R.N. Hurst

IN THE EARLIER ARTICLES in this series, we have discussed the essential elements of a digital television system—sampling, A-to-D conversion, and D-to-A conversion—which permit us to translate the familiar analog signal into the digital domain for the purpose of performing some digital-based operation on it, and to retranslate the resultant signal back into the analog domain. While the video exists as a digital signal, a wide variety of operations can be performed on it. Indeed, as the digital television industry matures, we shall likely see such digital processing functions as picture enhancement, error removal, noise reduction, geometric manipulation, and chrominance modification—as well as other powerful functions as yet unconceived. At this early stage in the industry's development, however, the emphasis is on the storing of the digital television signal in digital memories, primarily (or at least, initially) for the purpose of modifying the time/frequency basis of the incoming signal. Memories, therefore, are the key elements of the presently-popular time-base correctors and synchronizers.

Since an understanding of these key elements is essential, we shall, in this article, present digital memories of several forms, starting with a very simple memory element and progressing by steps to an understanding of a relatively complex memory array.

What is a memory?

A memory, in the broadest terms, is any device that can be altered—either permanently or temporarily—with the alternation being used as an indication of some event which occurred in the past. In more primitive times, notches cut in a stick, or a blaze-mark on a tree, served as memories, or memory aids. In some cultures, knots tied in a string in certain patterns kept records of accounts, or of tribal history. Even the marks that you are now reading are alternations to the surface of a piece of paper, and hence serve as memory devices for my thoughts.

In electrical circuitry, many alterable devices are available to us as memories. For example, a capacitor can be charged and made to hold that charge; a transistor can be destroyed by avalanche breakdown; a fuse may be blown—and will serve as a memento of past overloads.

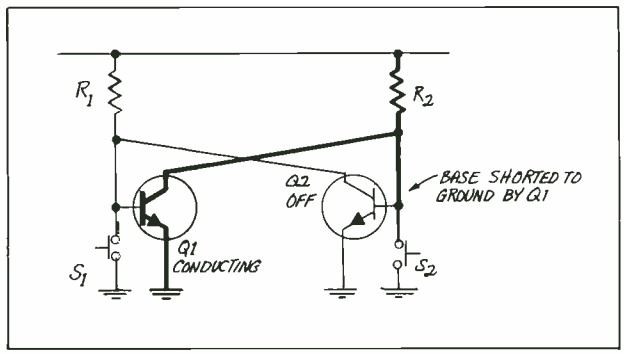

Fig. 1. Simple flip-flop circuit.

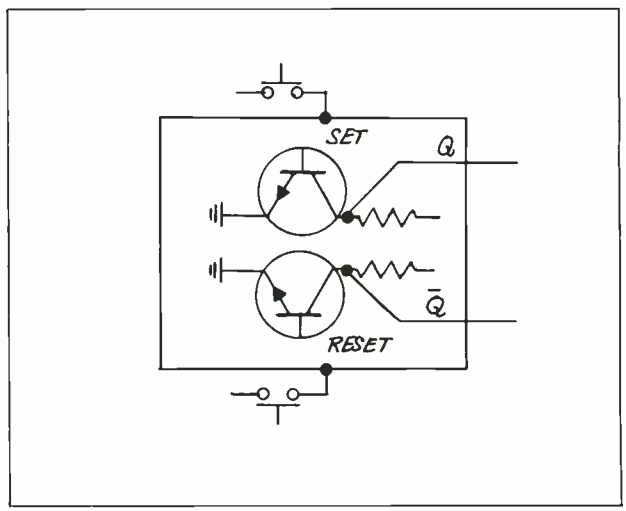

Fig. 2. Flip-flop with two outputs.

Author Hurst is Administrator, Broadcast And Technical Training, RCA, Camden, N.J.

How can we offer digital TBC quality and flexibility – at a price this low?

Simply by designing a better time base corrector.

For example, the single most complex and expensive part of a digital TBC is the analog-to-digital converter. The TBC-110A eliminates the A to D converter through the use of a charge-storage analog memory. By sampling and storing the video signal at 14.318180 MHz, the TBC-110A provides the same sampling speed and video bandwidth as the competition's highest priced model — **without** the expensive A to D converter.

A true time base corrector that does it all.

The TBC-110A will remove all high frequency jitter, waterfall, skew, and geometry error (S banding) from any type of non-segmented helical scan recorder. H lock VTRs can be corrected to house sync and FCC specifications by locking the TBC-110A to EXT sync. Other types of VTRs, such as line lock models, can be locked to the center of the floating window in the INT sync mode.

Fades, wipes, and inserts possible with non H-lock VTR's.

The internal digital sync generator provides a full complement of pulse outputs that are locked to either the internal oven-controlled crystal, or a VCO that is tracking the video input. The tracking mode (floating window) can be used to lock cameras to the sync outputs of the TBC so that fades, wipes, and inserts can be accomplished with non H-lock VTRs.

Complete video processing.

The TBC-110A provides complete video processing, including such features as separate luminance and chrominance processing in all modes, so that negative black spikes below sync are removed without clipping negative chroma. Chroma Gain and Chroma Phase are also adjustable in all modes (het and direct).

Exceptional skew error correction.

The TBC-110A is capable of removing step errors within one line after they occur, thus providing total and almost instantaneous skew error correction.

Truly superior heterodyne processing.

Heterodyne chrominance jitter is minimized because the TBC-110A first demodulates chroma — then removes time base error in parallel luminance and chrominance memories. The result is superior heterodyne processing — minimal color error.

If your studio operates one or more helical scan recorders, a time base corrector is a virtual necessity. The TBC-110A has the credentials to satisfy the most demanding studio requirements, while maintaining a price that is comfortable even for small distribution systems.

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All these techniques are currently in use as electrical memories, but none is so common as the alterable-state circuit known as the *flip-flop*.

A flip-flop is shown in its simplest configuration in Fig. 1. In this circuit, if we assume that Q_1 is conducting initially, it shorts to ground the base of Q_2, and thereby forces Q_2 to be *off*. This state—Q_1 *on* and Q_2 *off*—will persist almost as permanently as a notch in a stick, unless something is done to change it. That something can be the depressing of pushbutton S_1, which shorts the base of Q_1 to ground, forcing *it* to be *off* instead. Since Q_1 now no longer is shorting Q_2's base, Q_2 will come *on, and will stay on even after* S_1 *is released*. The fact that Q_2 is *on*, therefore, is a memory of the fact that S_1 was pushed sometime in the past.

A flip-flop is usually diagrammed as a box with two outputs labelled Q and $\overline{Q}$, respectively, as shown in Fig. 2. The two outputs, which correspond to the two collectors in Fig. 1, are always opposite to each other; that is, when Q is *high*, $\overline{Q}$ is *low*, and vice versa. The pushbuttons of the elementary flip-flop of Fig. 1 can be visualized as driving the input connections labelled *set* and *reset* in Fig. 2; these functions have the same action on the flip-flop as the corresponding pushbuttons of Fig. 1.

But the input to be remembered by the flip-flop is rarely a finger on a pushbutton, but is instead an elec-

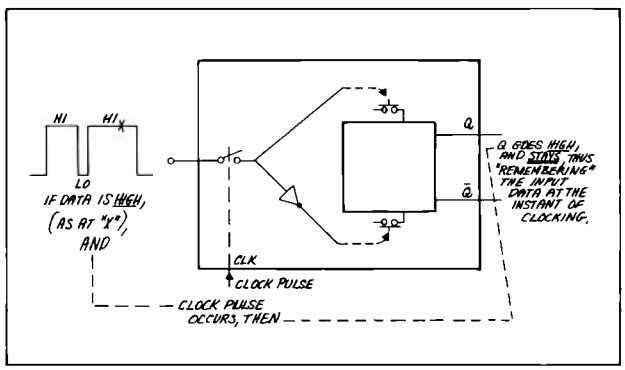

Fig. 3A. Flip-flop extended to remember data.

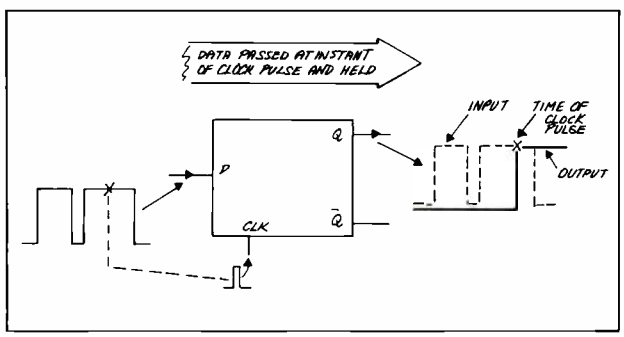

Fig. 3B. A flip-flop is clocked.

trical data stream, in the form of a series of *highs* and *lows* appearing on a wire. To permit our flip-flop to remember electrical data, we can extend it as indicated (conceptually) in Fig. 3A.

In this figure, *highs* and *lows* are presented to an input marked "D" (for *data*). Since switch S_3 is open, however, nothing happens. Then, at some instant, a *clock pulse* is applied to an input marked "CLK", momentarily closing S_3, and connecting the input data to the set/reset "pushbuttons." If the data value is *high* at that instant, the upper "button" is "pushed," causing Q to go *high*—and stay high, even after the clock pulse ends. If the input data value is *low*, however, the inverter will "push" the lower "button," causing Q to go *low*—and stay *low*.

So, at the instant of clocking, the data value on the "D" input is passed through to the Q output, as sketched in Fig. 3B, and held there, at least until the next clock pulse. This type of flip-flop is known as a *"D" flip-flop*. Also, since the input at the clocking instant is seized and held at the output, this circuit is sometimes called a *latch*.

A single "D" flip-flop can remember only one *high* or one *low* at a time; it can seize new data only by totally forgetting the former data. To avoid this data loss, we sometimes provide a long string of "D" flip-flops, as in

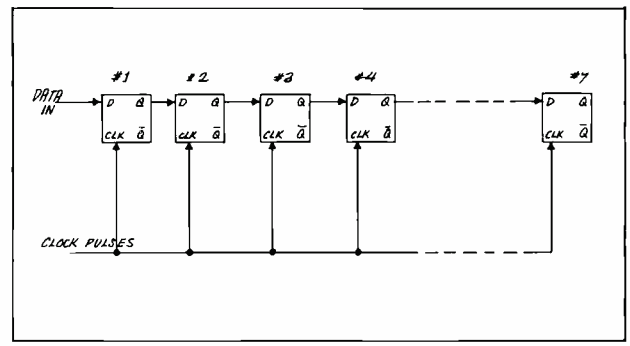

Fig. 4. Flip-flop formed into a shift register.

Fig. 4, so arranged that the first flip-flop can shift its data to the next one in line, just before it is required to remember new data. If, for example, flip-flop #1 had just remembered a *high*, and next will have to remember a *low*, the *high* at #1's "Q" will be seen by #2's "D", and, at the clock pulse, #2 will seize and remember that *high*, while #1 is now free to remember the new *low*. At the *subsequent* clock pulse, the *high* will be passed to flip-flop #3, and so on down the line, appearing after *n* clock pulses at the nth flip-flop's output. A memory holding a string of data like this is called a *register*, and since this register operates by shifting data bits bucket-brigade-fashion down a long line, it is known as a *shift register*.

If, for example, there are 910 flip-flops in a shift register, and the clock rate is 14.3 MHz, (or one pulse every 69.8 ns,), then it will take a given data bit $69.8 \times 10^{-9} \times 910 = 63.55$ microseconds—one TV line—to traverse the entire shift register. This would constitute a one-line delay.

Unfortunately, the 910-bit shift register of Fig. 4 could handle only one bit of our 8-bit system; that is, it could discern only black or white. To handle the $2^8 = 256$ levels required for gray scale resolution, we must have 8 flip-flops in #1 position, 8 more in #2 position, and so on, for a total of $910 \times 8 = 7{,}280$ flip-flops. This configuration, shown in Fig. 5, is reasonable only through the high memory density and low memory cost made feasible by LSI.

Avoiding the tunnel

An undesirable characteristic of the shift register is

continued on page 76

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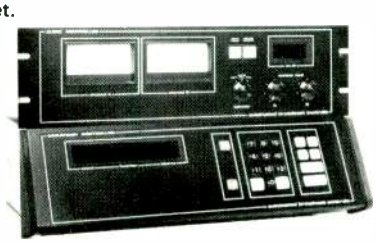

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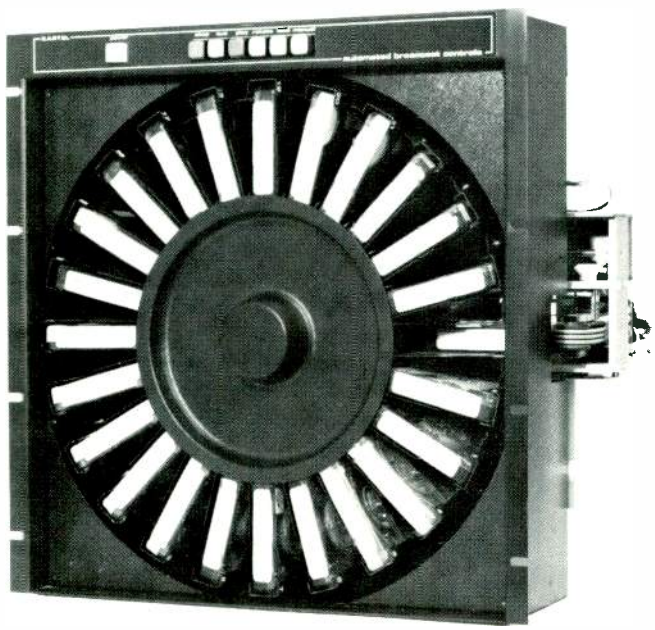

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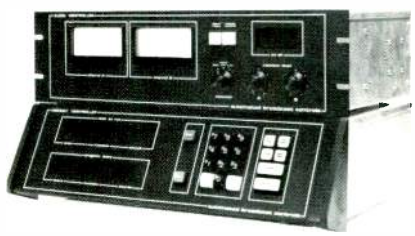

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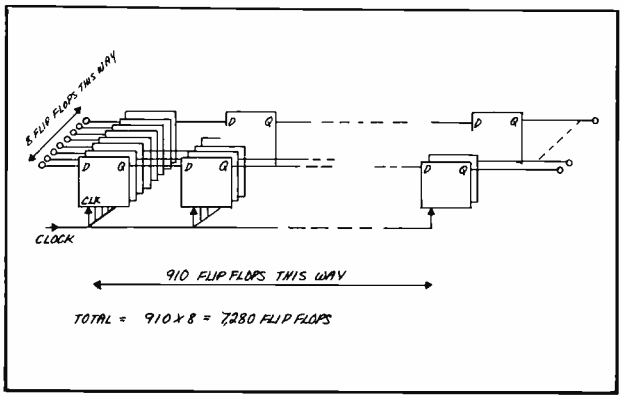

Fig. 5. Shaft register organized to handle 8-bit system.

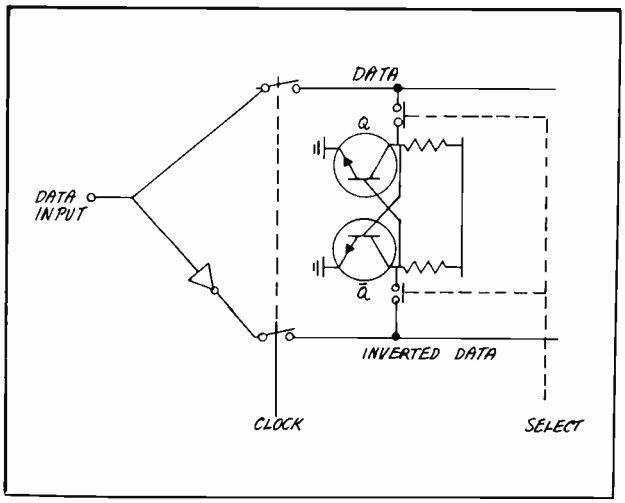

Fig. 6. Flip connected to data and inverted data.

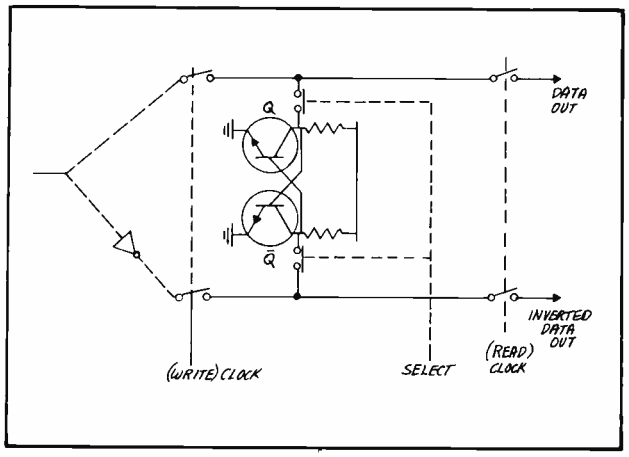

Fig. 7. Fig. 6 organized to read stored information.

that it operates like a tunnel, in that a bit entered into the register is totally inaccessible until the required number of clock pulses makes it drop out the far end. In many applications, it would be much better if we could store a bit *anywhere* in the memory, at any time, and also could *extract* a stored bit from anywhere in the memory, at any time. The storage elements of such a memory would be accessible on a random basis. Such memories exist and are called *Random Access Memories*, or *RAMs*.

To understand a RAM, let us revise slightly our original Fig. 1, combining it with the data drive scheme of Fig. 3A, to make a slightly different configuration, as drawn in Fig. 6. Here, the "pushbuttons" are not pushed alternately to *set* and *reset* the flip-flop, but are "pushed" simultaneously to connect the two flip-flop connectors to the *data* and *inverted data*, respectively. The data value itself directly forces the set or reset. If the data input is *high* at the time of clock, Q is forced *high*, and $\overline{Q}$ *low*. The flip-flop will then remember this information.

Note that the data values go in at Q and $\overline{Q}$, which are also the outputs. (This was also true in Fig. 1, although it was less obvious in the drawing.) This enables us to make a very simple system to read the stored information of the flip-flop. See Fig. 7.

In this figure, pushing the "pushbuttons" connects the flip-flop to the same data lines, but now a pair of switches on the right enables the data stored in the flip-flop to appear on the output lines. (Please remember that, throughout this article, the emphasis is always on concepts, not actual circuits.) This sharing of input and output on common lines enables us to make a string of randomly-selectable flip-flops as shown in Fig. 8.

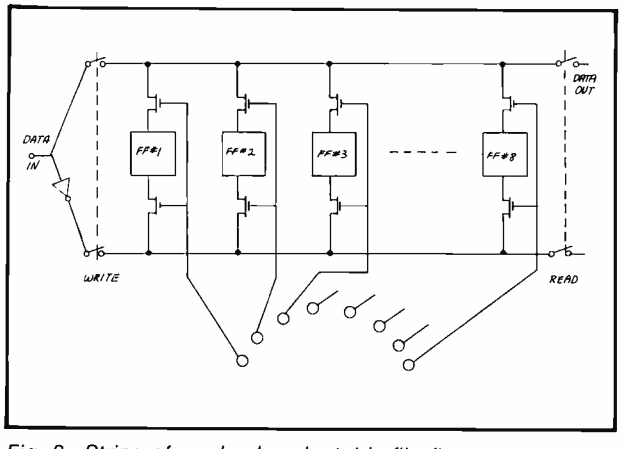

Fig. 8. String of randomly selectable flip-flops.

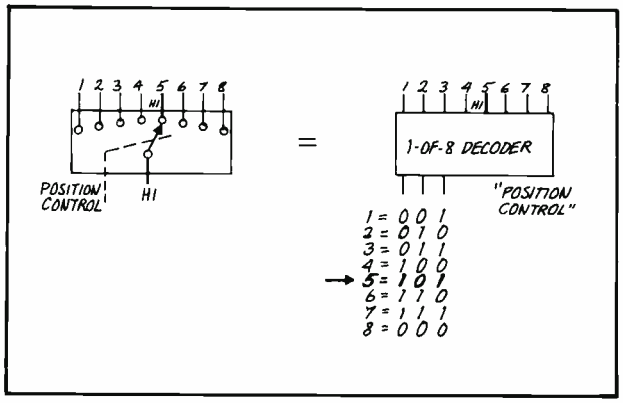

Fig. 9. "1 of n" decoder as selector switch.

Here, the pushbuttons have been replaced with FET's, which are turned on when the "selector switch" chooses that pair of FET's. It would be possible, for example, to *write* in flip-flop #2, then *read* from flip-flop #7, then *write* in #75, then *read* from #12, and so on, with each flip-flop randomly accessible for reading or writing by controlling the position of the selector switch.

Of course, the "selector switch" is not actually a

continued on page 78

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switch, but is instead a device such as in shown in Fig. 9. This figure shows how the selector-switch function is carried out by a device known as a "1-of-n decoder." In the figure, a 1-of-8 decoder is shown as a replacement for an 8-position selector switch. To "position" the "selector switch" on, for example, the 5th contact, the binary code for 5 (which is 101) is supplied to the three wires which are the input of the 1-of-8 decoder. This will cause the 5th output wire to go *high*, while all other output wires remain *low*[1]. If this wire is enabling the fifth flip-flop of a string, as in Fig. 8, then the fifth flip-flop can be written into or read from, while the other flip-flops remain untouched. Placing 101 on the 1-of-8's input, therefore, has located and enabled a particular flip-flop for us; 101 is therefore that flip-flop's *address*. Placing 010 on the input would locate and enable the 2nd flip-flop; 110 would locate the 6th flip-flop, and so on. These binary numbers are all addresses, and are used, in any random order, to access the RAM's flip-flops.

As long as we are dealing with RAMs of only 8 flip-flops, it is reasonable to use a 1-of-8 decoder and to string a separate enable lead to each of the eight flip-flops. However, a 1024-bit RAM would require a 1-of-1024 decoder, with 1024 lines to the 1024 flip-flops. This would be a bit awkward, so most high-density RAMs arrange their flip-flops in a *square* array, which, as we shall see, cuts down considerably on the number of enabling leads required.

Fig. 10 is an example of a 16-flip-flop memory arranged in a 4 × 4 array. A 1-of-4 decoder is shown selecting the third column from the left, while another 1-of-4 decoder selects the second row down from the top. At the intersection of the row and column select-

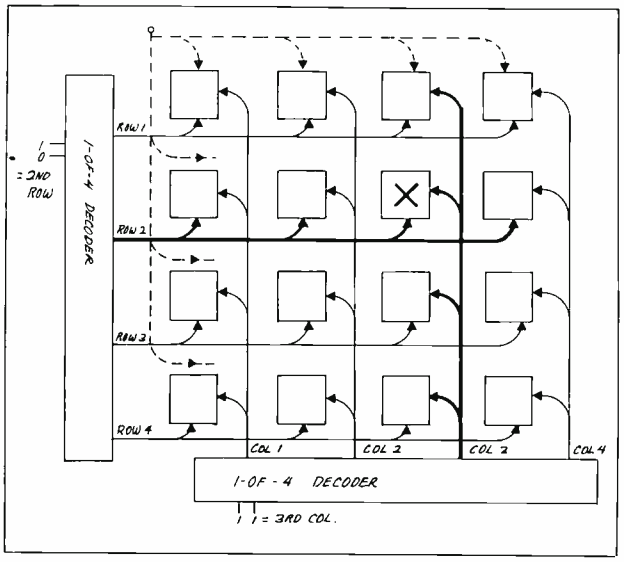

Fig. 10. Sixteen flip-flop memory in 4 × 4 array.

lines is a flip-flop marked "X". This is the flip-flop selected. And, although data is applied to all flip-flops, only the "X" flip-flop will record the impressed data at that instant.

Note that only 4 row lines and 4 column lines—a total of 8—are needed to access 16 flip-flops. For larger RAMs, the saving is even more impressive. A 1024-bit RAM, for example, can be arranged in a 32 × 32 array, and the arrangement permits 32 *plus* 32 wires to access 32 *times* 32 flip-flops. This configuration can be seen in Fig. 11, which is a partial block diagram of an actual 1024-bit RAM.

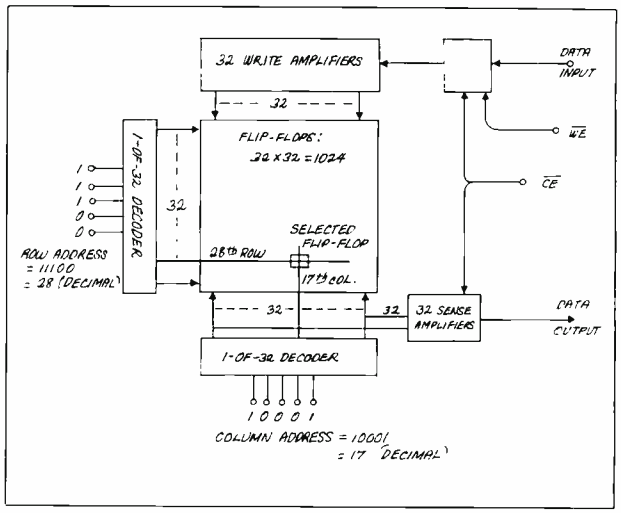

Fig. 11. A 1024 bit RAM in 32 × 32 array.

The figure shows a 5-bit row address of 11100 (decimal 28) selecting the 28th row, and a 5-bit column address of 10001 (decimal 17) selecting the 17th column. The chosen flip-flop is at the intersection of the chosen row and the chosen column, and its total address is 11100 10001.

The figure shows that the data enter the array through 32 individual write amplifiers; the driving of all 1024 flip-flops from a single amplifier would offer problems, so the drive is supplied on a per-column basis. Similarly the outputs are coupled through 32 sense amplifiers; the row/column selection process ensures that writing and reading is isolated to the chosen flip-flop.

Note that the figure shows an input marked $\overline{CE}$, which is *chip enable*. When this control line is *high*, the memory is disconnected from the outside world, and can neither read nor write. You will also note another control line marked $\overline{WE}$, which is *write enable*. To write in the memory, a valid address must be presented to the two 1-of-32 decoders, the $\overline{CE}$ line must be *low*, and the $\overline{WE}$ line must be *low*. When these conditions are met, the data bit on the input will be written into the selected flip-flop.

To read from the memory, you must select the flip-flop to be read by a valid address to both 1-of-32 decoders, and you must again pull the $\overline{CE}$ line *low*, but the $\overline{WE}$ must be *high* (that is, the inverse of Write Enable is Read Enable). Under these conditions, the data bit stored in the chosen flip-flop will appear at the output.

Static vs. dynamic rams

The RAM just described is a reasonably permanent memory. If a bit is stored in one of its flip-flops, and we keep power applied to the memory, that bit will sit patiently, forever, waiting to be read. Nothing is done to the RAM during the waiting period; the circuitry is sta-

Continued on page 80

[1]The reader should be aware that, in digital circuitry, it is conventional to number outputs, flip-flops, etc., starting at zero instead of 1. The outputs of the 1-of-8 should be labelled 0, 1, 2, 3, . . . 7. However, in introductory tutorial material, this convention forces the writer to refer to the fourth flip-flop as "flip-flop #3," with a consequent distraction to the thought processes of the student. For tutorial purposes, I have chosen to use "normal" numeration.

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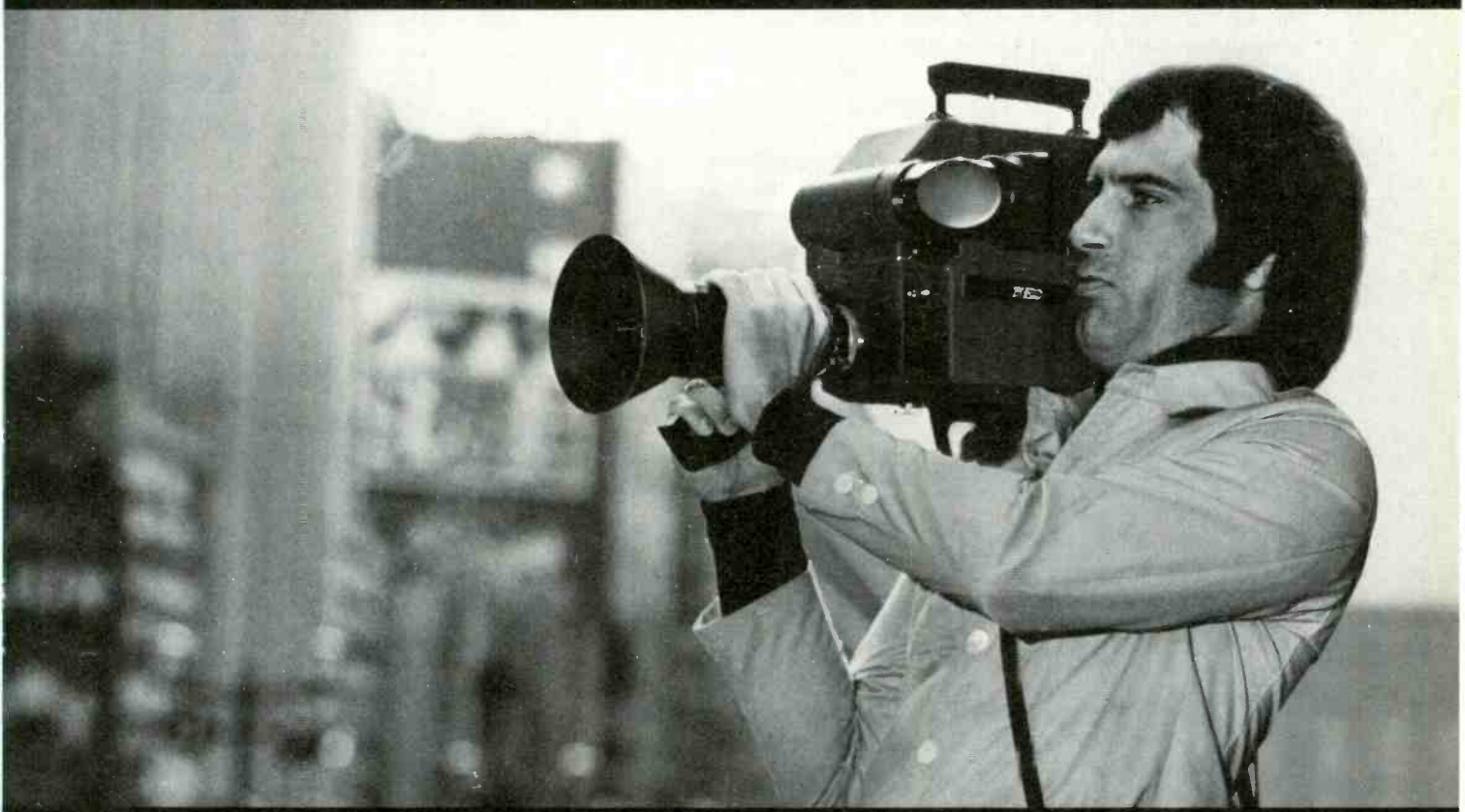

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tionary, or static, until the output bit is actually requested. For this reason, such a RAM is called a *static RAM*.

In contrast, there is a class of RAMs whose memory is very brief—in the order of milliseconds—unless some action is taken regularly to refresh the memory. A bit may be written in, just as in the static RAM, but during the waiting-to-be-read period, a series of pulses must be applied regularly to the RAM to refresh its memory. A RAM of this type is called a *dynamic RAM*.

The dynamic RAM's tendency toward amnesia is attributable to the fact that it does not use flip-flops as memory elements, but stores its bits on tiny capacitors on the chip. As the capacitor charges leak off, the information is lost, unless action is taken to recharge those capacitors which held a charge, (carefully *not* recharging those capacitors which were *not* charged).

Obviously, a dynamic RAM is somewhat more difficult to use. It is popular, however, because at 4 transistors per cell, it uses much less chip area per cell than the ten-transistor-per-cell static RAM; hence, the number of bits per chip can be markedly increased by the dynamic RAM configuration.

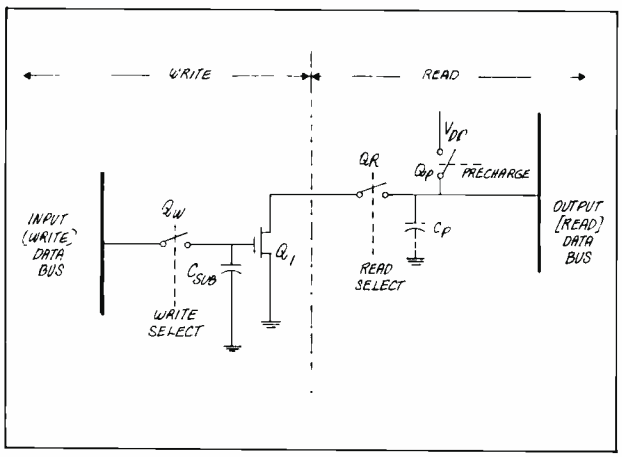


Fig. 12. Dynamic RAM memory cell.

Fig. 12 shows the simplicity of the dynamic-RAM memory cell. Although only one FET, Q_1, is shown, the "switches" labelled Q_W, Q_R, and Q_P are also FET's. The writing function takes place to the left of the dotted line; and the read function, to the right.

When data appears on the write data bus, a write select bus closes FET-switch Q_W, causing capacitor C_{sub} (which is a stray capacitance in the substrate) to charge (for data bit = 1) or *not* charge (for data bit = 0). Q_W then opens, and the charge (or lack of charge) on C_{sub} represents the stored bit.

To read the memory is slightly more involved. First, Q_P is closed, causing capacitor C_P to charge up to the power supply, V_{DD}. Then, FET-switch Q_R is closed by the read-select line. If the bit-storage capacitor C_{sub} is charged, (stored bit = 1), Q_1 will be *on*, and closing Q_R will discharge C_P. If C_{sub} is *not* charged, (stored bit = 0), Q_1 Will be *off*, and closing Q_R will have no effect; C_P will remain charged. Since the output data bus is tied to C_P, the output will correspond to the charge on C_P after the above operation. Note that the output is inverted; if C_{sub} is charged, (stored bit = 1), then C_P is caused to *dis*charge (output = 0). Similarly, if C_{sub} is *not* charged, (stored bit = 0), C_P will remain charged, (output = 1). Of course, a simple inverter on the chip can reinvert the data.

Refreshing without pausing

Each time a dynamic RAM's memory cell is read, an amplifier looks at its (inverted) output, re-inverts it, and feeds this data bit back to the *write* side to refresh the

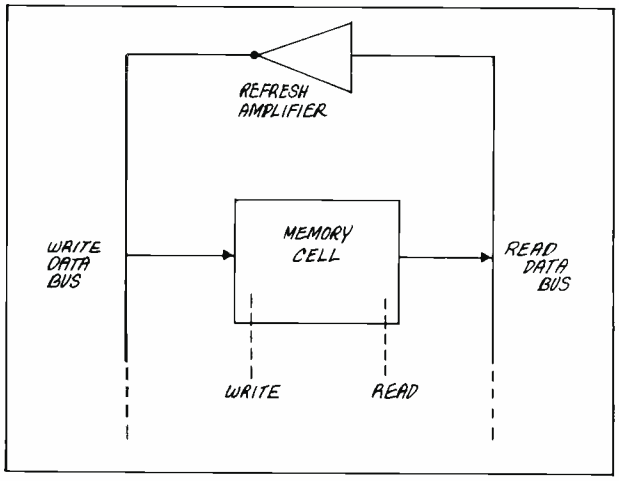


Fig. 13. Refresh scheme of a dynamic RAM.

charge on C_{sub}. (See Fig. 13.) Fortunately, we do not need a refresh amplifier for every cell, or a 1024-bit RAM would have 1024 refresh amplifiers. Instead, the chip circuitry is arranged so that each *column* has a refresh amplifier serving all 32 cells of that column, as shown in Fig. 14. Thus, only 32 refresh amplifiers are needed.

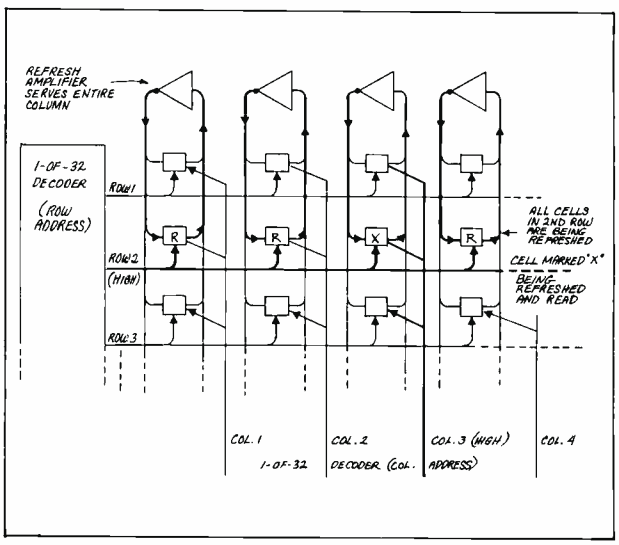


Fig. 14. System requiring only 32 refresh amplifier.

As can be seen in the figure, the selected enable line for the *rows* causes every cell in that row to be refreshed, but only the cell at the intersection of the *high* row-line and *high* column-line (marked "X") is actually read to the output.

At the next instant, another row address will activate

the *3rd* row-enable line, and all cells of the third row will have their turn using the refresh amplifiers to refresh their bits. To completely refresh the entire RAM, it is necessary only to scan through all the row addresses once, within the time specified by the manufacturer—usually about one scan every 2 milliseconds or so.

Sharing pins: the multiplexing of addresses

The tiny chips of silicon on which these memories are built will fit easily in a 16-pin DIP. However, their complexity is such that they require more than 16 pins to supply addresses, power, and controls. So manufacturers are often forced to house the memories in the larger 18- and 22-pin packages, just to get the required number of wires in and out. As an alternative, it is possible to share certain pins of a 16-pin package, and thus be able to operate the chip in the smaller package. When hundreds or even thousands of these chips are used in a large memory, such as a frame store, the use of the smaller chip can dramatically reduce the board count, and hence reduce the cost of the product.

The pin-sharing is done between *row* addresses and *column* addresses. Consider, for example, a 4096-bit RAM. It requires 6 row-address lines, and 6 column address lines, for a total of 12 required address lines. Since only 6 pins are allowed for the 12 lines, the 6 row-address bits are applied to the pins first, (See Fig. 15), and these six bits are temporarily stored in 6 latches.

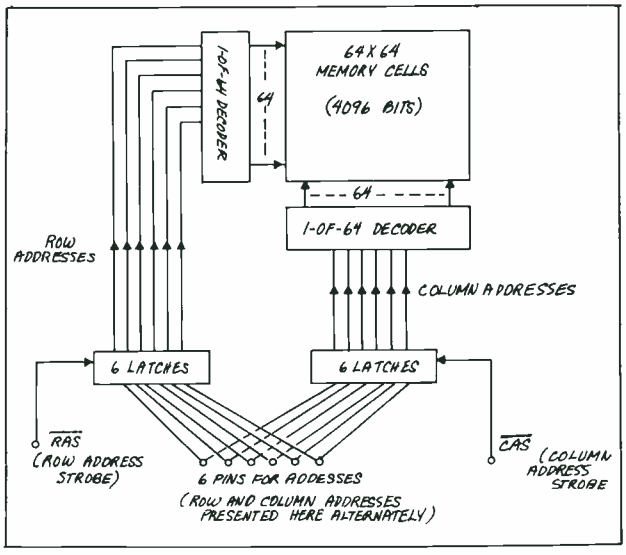


Fig. 15. Pin sharing 4096-bit RAM.

The column-address bits are now applied to the same six pins, and these bits are stored in another 6 latches. (The latches are told when to seize the bits by the *row address strobe pulse* (RAS), and the *column-address strobe pulse* (CAS), respectively.) All 12 address bits are now available to the memory-cell matrix, and will be used to locate the one particular memory cell being addressed at that instant by that combination of address bits.

Next . . .

In the next article in this series, we shall discuss how these memories can be used in hardware to accomplish time base correction and synchronization. **BM/E**

What The VU Meter Is/Is Not/Will Be

By Dr. Roland Gubisch

As a culmination of the issues raised in a series of Speak Outs on vu meters, Dr. Gubisch provides a historical perspective on how vu meters got to be what they are today and discusses future trends in sound level measurement.

A VU METER WITH THE WRONG DYNAMIC response can fool an audio engineer into setting program levels too high—and running afoul of the FCC—or too low, and losing listeners to "louder sounding" stations. But a vu meter is a vu meter, and they're all the same, true? False! During the last 10 years many meters intended for consumer-type applications have been popping up in professional broadcast and recording consoles, disguised by such impressive names as "sound level meters," or just plain "vu meters." Very few of these perform as the Standard Volume Indicator specified in ANSI C16.5.

Are we being too fussy? Judge for yourself: a "true vu meter" has a maximum overshoot, or pointer deflection beyond the correct indication, of 1.5% of reference level (0vu); a "pseudo vu meter" may have 5% to 25% pointer overshoot. An engineer setting program levels with this "pseudo vu meter" would drop average station modulation from 100% to 80%. But there aren't any hard-and-fast rules for knowing how much a "pseudo vu meter" is fooling you. The same meter on different program material might lead the engineer to overmodulate 10 or 20%. If the station is already running near FCC modulation limits, going higher is bad news.

In a recent "Speak Out" in *BM/E* (June, 1977) Hans Schmid pointed out how even a "true vu meter," one that performs per ANSI C15.5, can lead to incorrect program level settings as content changes from voice to rock music, or even from steady to staccato voice!

Dr. Gubisch is product marketing manager, Analog Products, for Weston Instruments and a member of the AES committee charged with revising the vu meter standard.

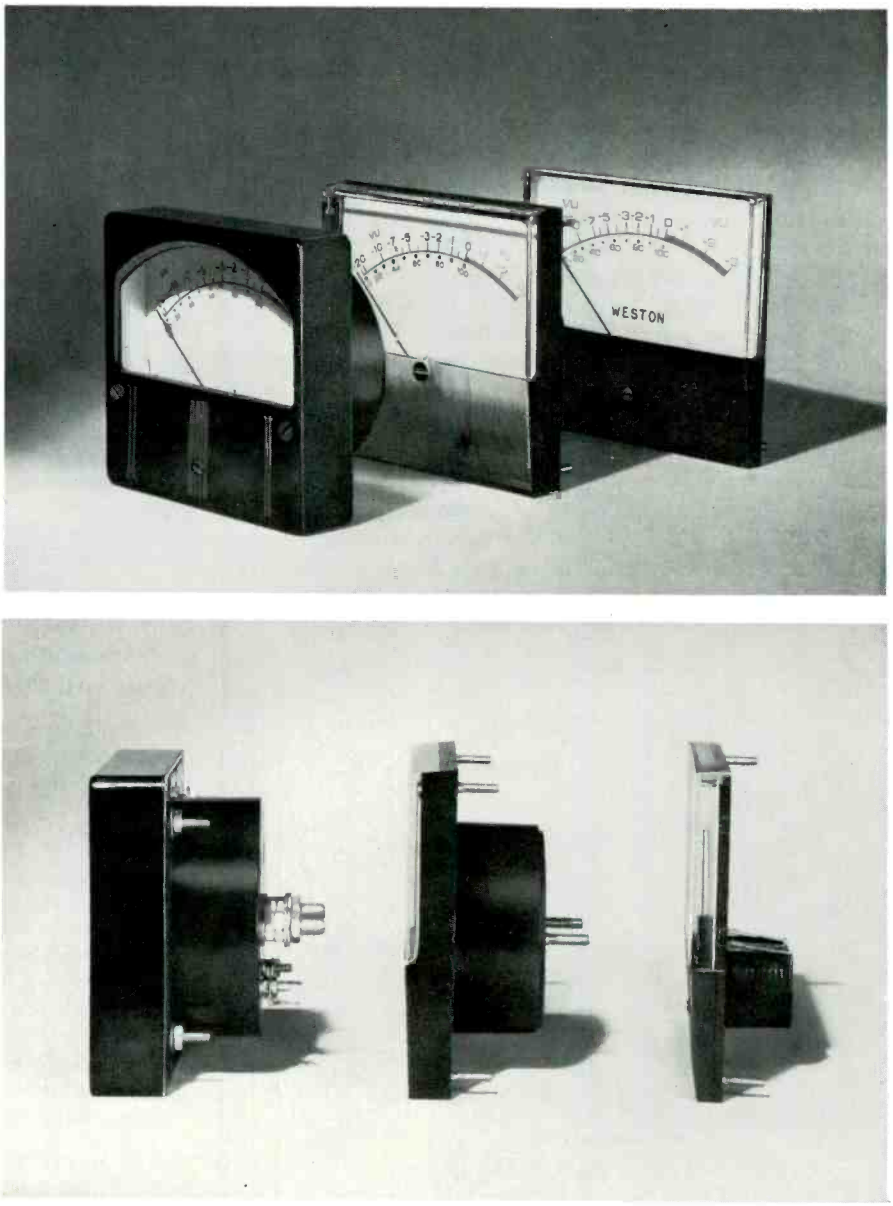


Fig. 1. Trends in vu meter packages. Weston Models 962 (left, 1948), 2042 (center, 1969), and Mustang 7542 (right, 1976). Upper photo shows front and case design; lower photo indicates change in profile over the years.

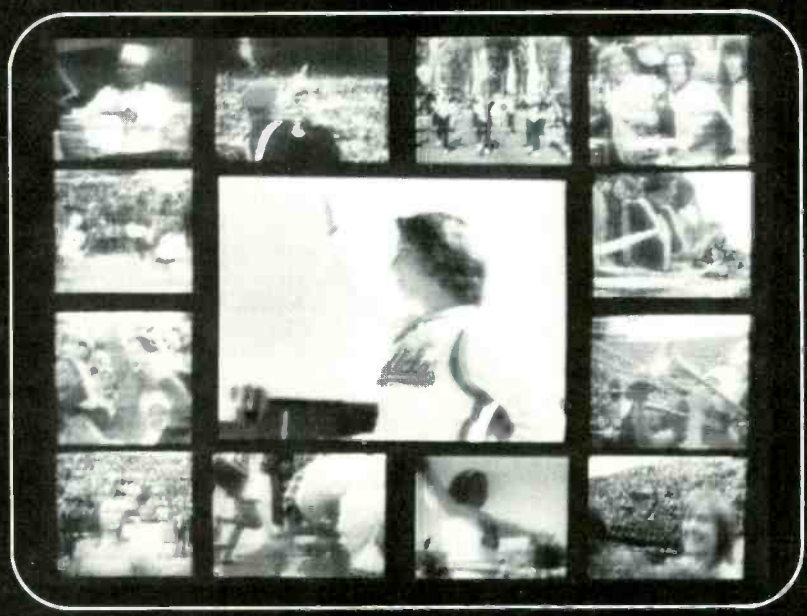
This problem becomes a nightmare when the vu meter doesn't conform to any particular standard for accuracy or ballistics. Because the hazards in being fooled by a vu meter are real—legal and financial—it's worth a few minutes to review the history and future of these indicators.

The vu meter history

By 1937 a number of meters were in use to monitor and compensate for program power losses in telephone transmission cables and studio equipment. Many of these meters had differing calibrations and response times, resulting in inconsistent output levels as audio engineers responsed to changes in program content. During 1938 and 1939 engineers from Weston Instruments collaborated with engineers from CBS, NBC and Bell Telephone Laboratories to develop an indicator with consistent performance and a meaningful display.

This background work led to several publications in 1939 and 1940 which

continued on page 84



NCAA Football lead-in courtesy of ABC Sports and Image West.

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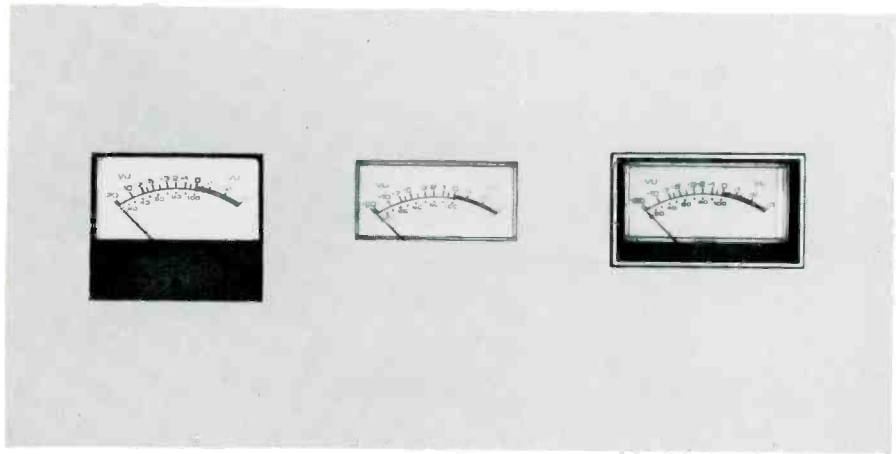

Fig. 2. Trends in vu meter styling; Weston Mustang Series 7500. Left, panel mount; center, window mount, right, bezel mount.

recommended the adoption of a standardized volume indicator. In 1942 these recommendations were formalized as a standard which is now ANSI C16.5-1954, reaffirmed in 1961. Vu meters, by one name or another, have been with us for forty years.

The standards

There are some commonly-held misconceptions about what C16.5 does and does *not* specify, so it's worth looking at a few of its details. For example: No major U.S. manufacturer of panels meters offers for sale a Standard Volume Indicator in compliance with C16.5! Why not? Because C16.5 stipulates that a Standard Volume Indicator consists of two parts: 1) a meter and 2) an attenuator or pad. U.S. meter manufacturers do not offer such an attenuator. This point may seem nitpicking, but it's one often overlooked.

Other points *not* specified in ANSI C16.5-1954 include:

1) Meter sensitivity: 0vu is defined as 1 mW in a resistance equal to the circuit or line impedance. Today's "vu" Meters equate 1.23 V as 0vw, or 4dB above 1mW into a 600 ohm line.

2) Pointer speed toward rest position; the standard merely states that it should be "not greatly different" from response time upscale.

3) Pointer target shape: although the spade has become conventional, it is not required.

4) Meter impedance; the specification refers to "good practice" being 12.5 times the line impedance. Over the years, 3900 ohms has become common for the meter. As low-power semiconductor circuits proliferate in consumer and professional audio components, even the 3900 ohm custom is

changing. To reduce meter-induced distortion below 0.3%, some console manufacturers are now seeking impedances of 15,000-25,000 ohms.

Notwithstanding these exceptions, ANSI-C16.5 *does* establish rigorous requirements for vu meter accuracy and dynamic performance:

Frequency: deviation from 1 kHz indication

±0.2 dB 35-10 kHz
±0.5 dB 25-16 kHz

Deflection: 0.3 sec. ±10% to 99% of reference value
Overswing: 1-1.5% of reference value

These are the familiar specifications which so-called "true" vu meters should meet. That buff-colored dial, originally conceived to relieve eye strain yet provide good contrast for continuous monitoring, is recommended, but *not* required by C16.5.

vu meters in the marketplace

Analog panel meters designed and built to meet the requirements of C16.5 as well as customs added over the years are costly to manufacture, compared with "plain-vanilla" moving-coil analog meters. The rapid response time and low overshoot requires a special coil or magnet or both, as well as hand-selected internal resistances. These special features lead to vu meter costs two or three times higher than, for example, a standard 0/1 ma sensitivity.

Until a few years ago such expensive "true vu" meters were used not only in professional broadcast and recording systems, but also in quality "hi-fi" amplifiers for the consumer market. Competitive price pressure over the past ten years has forced high fidelity component manufacturers to abandon "true vu" meters in favor of cheaper "pseudo vu" meters—with virtually no standard sensitivity or ballistic response, but having buff type A or type B scales conforming to ANSI recommendations. "Pseudo vu" meters are typically 200 microamps or 1 mA in sensitivity, with response time and overshoot of about 0.5 seconds and 5-25% respectively. The sluggish response and high overshoot of "pseudo vu" meters can lead to substantial errors of under or over correction of audio level, depending upon the nature of program content.

The wide use of sound level indicators in consumer equipment has led to several improvements in meter cosmetics and lighting, which are now available to professional users. Panel, bezel and window-mounting styles give the console designer several esthetic choices; before, only a protruding panel-mount version was available. Rear illumination of a translucent scale is now a standard option with several meter vendors. It provides brighter, more uniform illumination than the older method of locating two lamps below and in front of an opaque vu scale. The lamp is more readily accessible for replacement, as it is not buried inside the meter case.

During the past five years console manufacturers have also succumbed to increasing profit pressure, and have begun to substitute "pseudo vu" meters for those which conform to ANSI C16.5. Some of these console manufacturers were no doubt assisted in their transition by meter vendors who claimed to provide "true vu" meters at very attractive prices. But those meters did not meet standard performance requirements. Other console manufacturers candidly acknowledged their less-than-standard meters, but resorted to ambiguous labels such as "sound level meters" or "program level meters" or merely "vu indicators."

The future of vu meters

This trend of expanding use of nonstandard vu meters in professional equipment is continuing but it will be offset over the next several years by two factors: 1) Solid state circuitry built into analog meters and 2) New standards which account for "true vu"

continued on page 86

Speak Out

and "pseudo vu" meters. With semiconductor technology it is possible to design an inexpensive amplifier circuit with a frequency response characteristic which, when used to drive a "pseudo vu" meter, will provide performance meeting most or all of the requirements of ANSI C16.5. With sufficient unit volume the circuitry can be customized on a small IC chip and located within the vu meter case itself. Such an "electronic true vu" meter would require power supply terminals as well as audio signal input terminals. The concept is workable and has been used in some audio processing equipment, but it has not yet been packaged by meter manufacturers.

Another opportunity for semiconductor technology to marry analog displays comes from the development of peak-program meters. Widely used and promoted by the BBC, peak-program meters typically feature an electronically-synthesized response time of 10 milliseconds to tone bursts and a fall back time of 2-3 sec. Studies indicate that peak-program measurements are less dependent upon program material than are vu measurements, and the use of peak-program rather than vu meters results in an overall level increase. The EBU (European Broadcasting Union) published a performance standard for peak-program meters in 1974; and since that time U.S. acceptance has been growing. At least one domestic manufacturer of professional broadcast recording equipment now features peak-program meters in console modules.

Solid state "bar-graph" displays made from a row of 6 to 50 individual LED lamps are beginning to appear in consumer hi-fi components for sound level indication. They're being featured for their novelty rather than for clarity of display (which is currently poor). As these LED displays become refined and are joined by liquid crystal and other similar display methods, solid state vu meters will become popular in consumer and professional audio equipment. The chief advantage of solid state displays over electromechanical ones is their virtually instantaneous response times—which can be tailored to provide the best features of both peak-program and vu meters.

Another potential advantage is the ability to "freeze" solid state displays at an instantaneous peak value, a useful feature for tape processing.

These trends in usage and technology present an enormous challenge to the conscientious broadcast equipment manufacturer and buyer. What will be the best display for the 1980's? How do I specify? What standards govern performance? In contrast to the last three decades of stability, the next ten years will be a hardware merry-go-round.

Fortunately, work is going on right now to revise the present ANSI C16.5 standard to broaden its application to future sound level indicators. It will very likely define some "less than true" vu meters as well as true versions, peak-program and solid state display types. The standard will also be compatible with its European counterpart to be published by the IEC (International Electrotechnical Commission).

In the meantime, however, users and manufacturers of broadcast equipment must either insist upon documented compliance of prospective meters with ANSI C16.5, or they should try samples of several different meters to determine which one will best satisfy their audio monitoring needs. Among "pseudo vu" meters there is a wide selection available of vendors, styles, methods of illumination and price. As in the past, product reliability and vendor service are frequently overlooked, but important points to consider. **BM/E**

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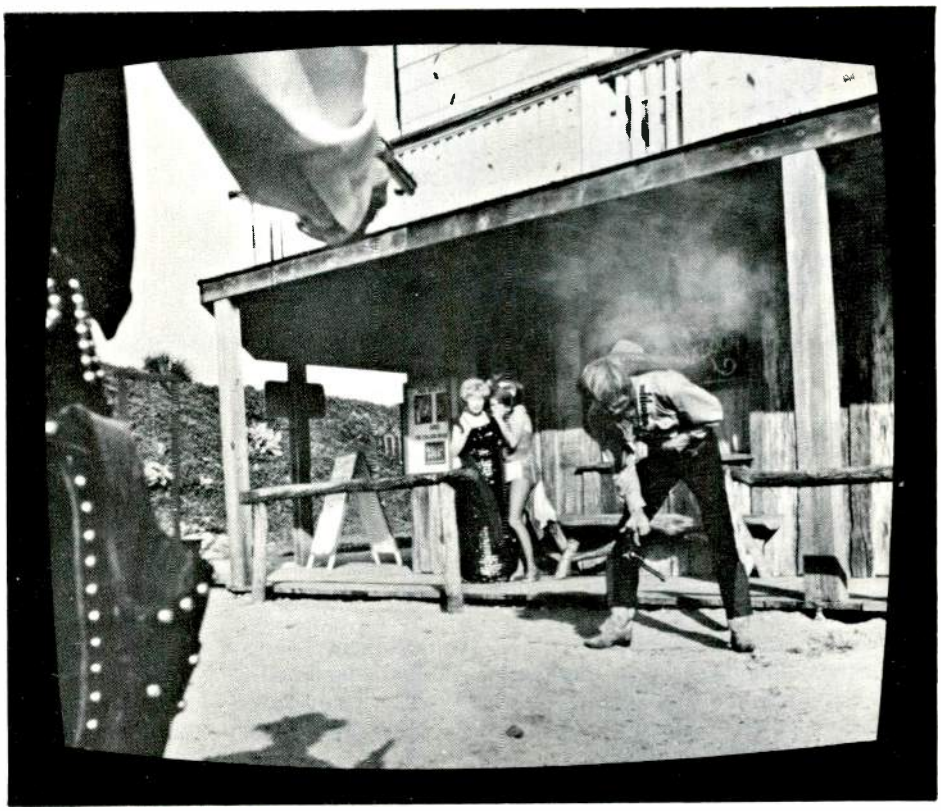

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INTERPRETING THE FCC RULES & REGULATIONS

Personal Attack Rules

By Frederick W. Ford and Lee G. Lovett; Pittman, Lovett, Ford and Hennessey, Washington, D.C.

THE COMMISSION HAS JUST IMPOSED a $1,000 fine upon the licensee of non-commercial educational television station, WNET, for violating the Commission's personal attack rules.[1] The station had presented a news documentary about Times Square in New York City. The documentary focused upon blight in the area, the dim prospects for restoration and, specifically, a residential hotel inhabited by elderly persons who were, allegedly, taken advantage of by the owner. The documentary portrayed the owner as a "slumlord" who had intentionally set fire to the building to force elderly tenants to vacate. He had also "possibly" threatened the life of a priest for protesting living conditions.

The Commission found that all of these remarks constituted personal attacks. The station taped (*prior* to broadcasting the program) an appearance by the building owner. The station did not send the owner a script or tape of the broadcast, nor did it offer him further response time *after* the broadcast. The Commission found that the licensee had violated the personal attack rules[2] since the station edited his remarks and permitted only responses to specific questions. Despite providing this opportunity to respond, the licensee failed to comply with the personal attack rule requirements.

This decision has dismayed a number of station executives. Others, including many non-broadcasters see it as necessary to balance the pervasive power wielded by broadcast media outlets. In any event, station managers and operating personnel should regularly review the personal attack rules to avoid running afoul of the sometimes tricky requirements.

A personal attack can occur *only* when a station is presenting views on a *controversial issue of public importance*. Any attack made "upon the honesty, character, integrity or like personal qualities of an identified person or group" constitutes a personal attack.

The Commission's Rules do *not* prohibit personal attacks. Broadcasters' free speech rights are constitutionally protected. The Commission can make no rule which infringes upon a licensee's discretion in its programming. Anyway, the subject of a personal attack has other remedies in most cases. If the licensee makes libelous statements, the person or organization attacked is always free to sue the licensee.

Seven-Day Rule

When a station makes a personal attack, it has an obligation to submit to the individual or organization attacked the following within a reasonable time, but in no event, more than one week:

(1) The *date*, *time* and *identification* of the broadcast containing the personal attack; (2) A *script* or *tape* of the personal attack; and (3) An *offer* of a *reasonable* opportunity to respond over the licensee's facilities.

Note that the time requirement is *first* a "reasonable time," and, *second*, "no more than one week." In certain circumstances where time is of the essence, notification seven days after the personal attack may not be deemed reasonable. Station personnel should keep this in mind when coordinating personal attack notification. Look at each factor involved. Is there any reason why the person or organization being attacked should, in all fairness, be notified in fewer than seven days? This is a matter of licensee discretion—*responsibly* and *objectively* exercised.

Right To Respond

When a personal attack is made, the right to respond is *personal* to the individual or organization attacked. The broadcaster cannot specify a reply spokesperson, even if that spokesperson espouses the same point of view as the person or organization attacked. On the other hand, the person or organization who has a right to reply time may specify an alternative spokesperson. Since the personal attack rules come within the gambit of the Fairness Doctrine, a broadcaster may still have a duty to provide an opposing point of view if (1) the person or organization attacked *declines* to take advantage of offered response time *and* (2) the station has not presented balanced coverage of the controversial issue of public importance upon which the personal attack was based.

Most broadcasters will agree that it is hard enough to police their own broadcasts for compliance with the personal rules. But, the Commission has deemed fit to extend broadcaster responsibilities even farther. The personal attack rules apply to *any* broadcast aired by a station, including syndicated programming, network programming, etc.

Exemptions

Personal attack rules do not apply to the following:

(1) Attacks on foreign public figures or foreign organizations:
(2) Attacks made by "legally qualified candidates, their authorized spokesman, or those associated with them in the campaign, on other such candidates, their authorized spokesmen, or persons associated with the candidates in the campaign; and
(3) Attacks made during bona fide newscasts, news interviews and on-the-spot coverage of news events.

This final exception is especially tricky. The WNET case noted at the beginning of this discussion is a case in point. The station argued that the presentation on the Times Square area constituted a news *program*. The Commission disagreed stating that it was a news *documentary* not exempt from the personal attack rules because it had been broadcast three times over the period of a year.

Note that the exemption from the personal attack rules does *not* apply to *editorials* broadcast by the licensee.

Broadcast matter exempted from the personal attack

[1] *Educational Broadcasting Corp.*, 40 RR 2d 1676 (1977).
[2] Section 73.123 of the Commission's Rules (for AM stations); Section 73.300 (for FM stations); and Section 76.697 (for television stations).

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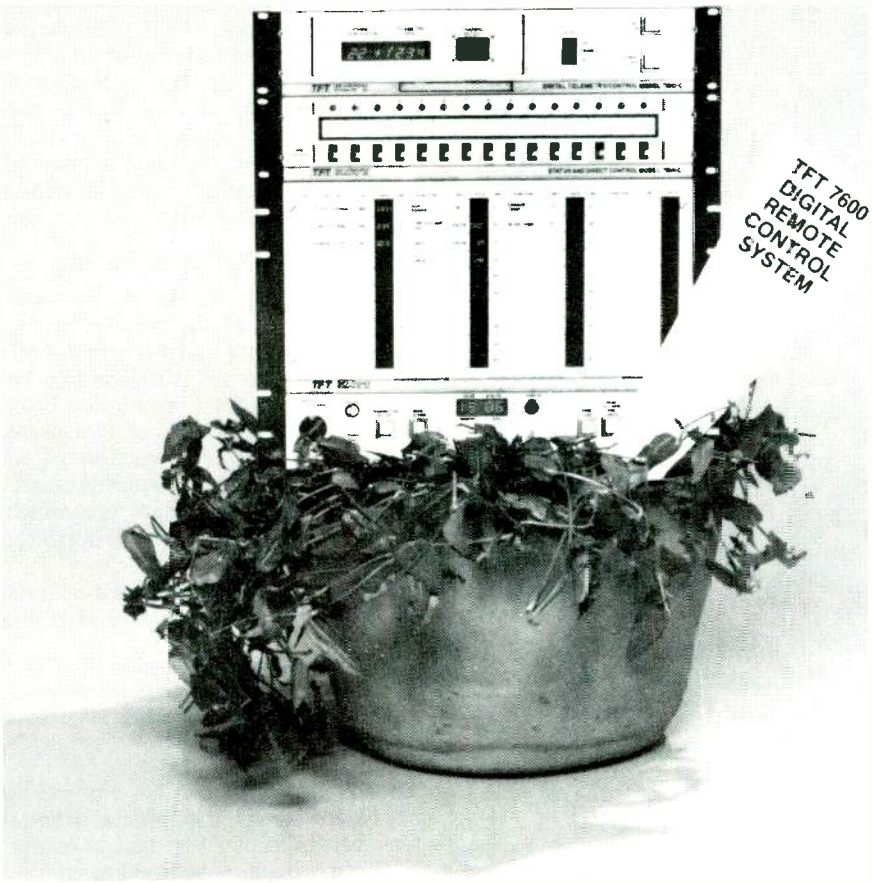

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rules is *not* exempted from the requirements of the Fairness Doctrine; a licensee must continue to make the following determination for the Fairness Doctrine compliance: (1) Did the broadcast matter constitute a treatment of a controversial issue of public importance? If so, (2) has the station presented, in its overall programming, *balanced* coverage of the controversial issue?

One additional note must be made concerning the "legally qualified candidate" exemption. The exemption is, loosely speaking, a candidate-to-candidate exemption. What if a candidate makes a personal attack upon a *non*-candidate? Does the station have to comply with the personal attack rules? Yes. The station must comply with the personal attack rules outlined above.

Examples Of Personal Attacks

Even after reviewing the personal attack rules carefully, many broadcasters have trouble picking out "borderline" personal attacks. Review of a few Commission decisions on the subject should be helpful.

In one case, the Commission held that remarks by a broadcaster that actions of two persons who initiated a lawsuit to block construction of an "airpark" were "questionable" and characterization of the individuals as "troublemakers" were *not* attacks on the honesty, character, integrity of those persons. Hence, there was no personal attack.

In another case, a broadcast editorial criticized the bail set by a Justice of the Peace as follows:

> "Judge Morelli, in our opinion, mind you we said in our opinion, you are not an honorable Justice of the Peace. Five Hundred Dollars Bail. It's disgusting. You should get out of Office, that's what we think."

The Commission held that this was not a personal attack because it criticized an official action of the Justice of the Peace and was not personal in nature.

When a licensee accused an individual of "pandering with falsehoods," a personal attack occurred.

Two cases involving hospital personnel are instructive. In one, the Broadcast Bureau held that a station's statement that doctors and nurses in a particular hospital were "incompetent" did not constitute a personal attack. In another case, the Broadcast Bureau held that a personal attack occurred when a station, in a broadcast involving a controversial issue of public importance, accused a doctor of "unethical conduct" in the death of two young children and of being convicted and found guilty in the death of a young boy. The distinction between these two cases appears to be that they first one did not sufficiently identify the person or group being attacked; the second one was unquestionably clear as to the individual being attacked.

Characterization of an association as one with "subversive designs" (where the word subversive clearly meant Communist) constitutes the personal attack.

Proving A Personal Attack

The First Amendment dictates that broadcasters maintain maximum possible control over programming content. For this reason, the person complaining of a personal attack rule violation has the *burden of proof* against the accused station. In any area of adjudication, the burden of proof is a substantial handicap. Further, in reviewing a personal attack complaint, the Commission will utilize the following standard: Whether the licensee's judgment as to (1) what the issue involved is and (2) whether that issue is controversial and of public importance, *transcends the bounds of reasonableness and good faith*. The Commission *cannot* substitute its own judgment as to what is reasonable or done in good faith. **BM/E**

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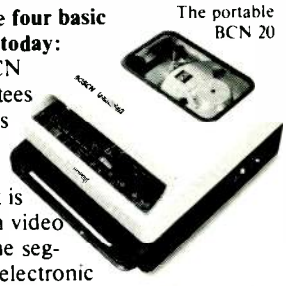

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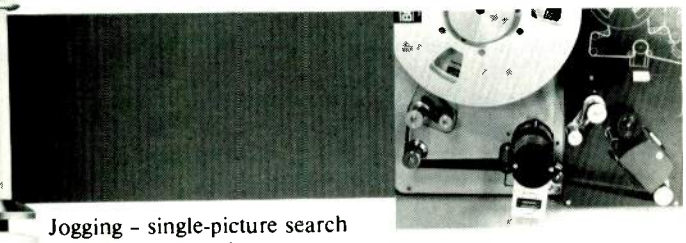

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A Speak Out For Satellite Networking

Broadcasters Better Get Ready To Take Advantage Of New Networking Capabilities

By Bill Wormington

FOR THE PAST SEVERAL MONTHS the possibility of a "Fourth Network" has been one of the main topics of conversation wherever and whenever broadcasters and advertisers have gotten together.

The Fourth Network concepts have covered a wide spectrum of possibilities; a coalition of the independent TV stations throughout the country; a mixture of independent TV stations and CATV systems covering the major markets and the program-oriented networks such as the recent "Operation Prime Time," effort which was built around quality programming first, with the network then being put together.

All of these are praiseworthy ventures and they have stressed more than ever the need for an alternate networking apparatus to the present three network structure.

Yet, few people have considered the area in which the greatest strides are being made: the satellite area. For the past two years, Transcommunications Corporation of Greenwich, Connecticut, has been developing a Satellite Network Service system which encompasses the most advanced improvements in the State of the Art of the broadcast transmission system and which now constitutes a potential network which will eventually cover every major market in the country.

There is little question that satellite transmission of broadcast programming is becoming more and more important to both station operators and programming executives. The costs savings alone are of sufficient magnitude to immediately catch the eyes of cost-conscious comptrollers. When an independent TV station such as KBMA-TV in Kansas City can save over 60% in the transmission of baseball games using satellite rather than land lines, the economics of satellite transmission becomes more important.

The general feeling in the broadcast industry about satellite transmission would seem to be that it's a "gimmick," a "show-biz" stunt without practical industry applications. They couldn't be more wrong. Our firm, Satellite Network Services, Inc., is already functioning as part of a soon-to-be operational network service interconnecting various markets in the country.

When fully operational, our services will be as a major distribution video network. Our clients will be a combination of radio, TV, CATV, MDS, program and package producers, syndicators, motion picture distributors, and a host of others.

Most of the thrust of a "Fourth Network" concept has been towards the utilization of the independent TV stations throughout the country. Yet the largest investors of Earth Stations by far are the CATV systems operators. As these CATV operators continue to expand their potential for receiving additional programming from a wide variety of sources their potential for audience growth assumes significant proportions—and the satellite importation of distant signals, if it is furthered, could change marketing areas.

With well over 100 Earth Stations now being utilized by both independent TV stations and CATV systems, the potential for an interconnecting network service to supply programming, scheduling, transmission, marketing, network clearances and the other detail work becomes increasingly important. The effective management of such a networking enterprise would result in lower distribution costs and a greater diversity of programming to both general and special interest markets.

Our initial operation, when completed, will provide us with coverage of 50% of the total United States population; 57% of total ADI households; 95% of all independent VHF stations, 90% of all independent UHF stations, 31% of all cable television subscribers and 59.2% of all effective buying income.

Of all these markets 93% have authorized MDS stations, 87% have pay-TV programs and it covers 62% of all retail sales generated in the US. The coverage also includes 94% of all major professional sports teams, 84% of all Fortune 500 manufacturing companies and 60% of all television revenues generated.

Satellite interconnection will also include data for specific areas, specially developed video programming for professional groups, sales seminars originating at one point and distributed to a number of regional headquarters of major companies and a wide variety of additional information.

Broadcasters have had their heads in the sands for so long that it's become second nature to shun any advances in technology. What's new? to them usually means "how much was your profit this year?" They are facing an entirely new concept of distribution for both video and non-video information and when this satellite-oriented system achieves its maturity they may well be in the position of the buggy whip company owners who thought that the auto would never make it. The technology is already here and it's only a question of time before another form of "networking" makes its impact on the communications world. **BM/E**

Mr. Wormington is president of Satellite Network Services, Inc., Greenwich, CT.

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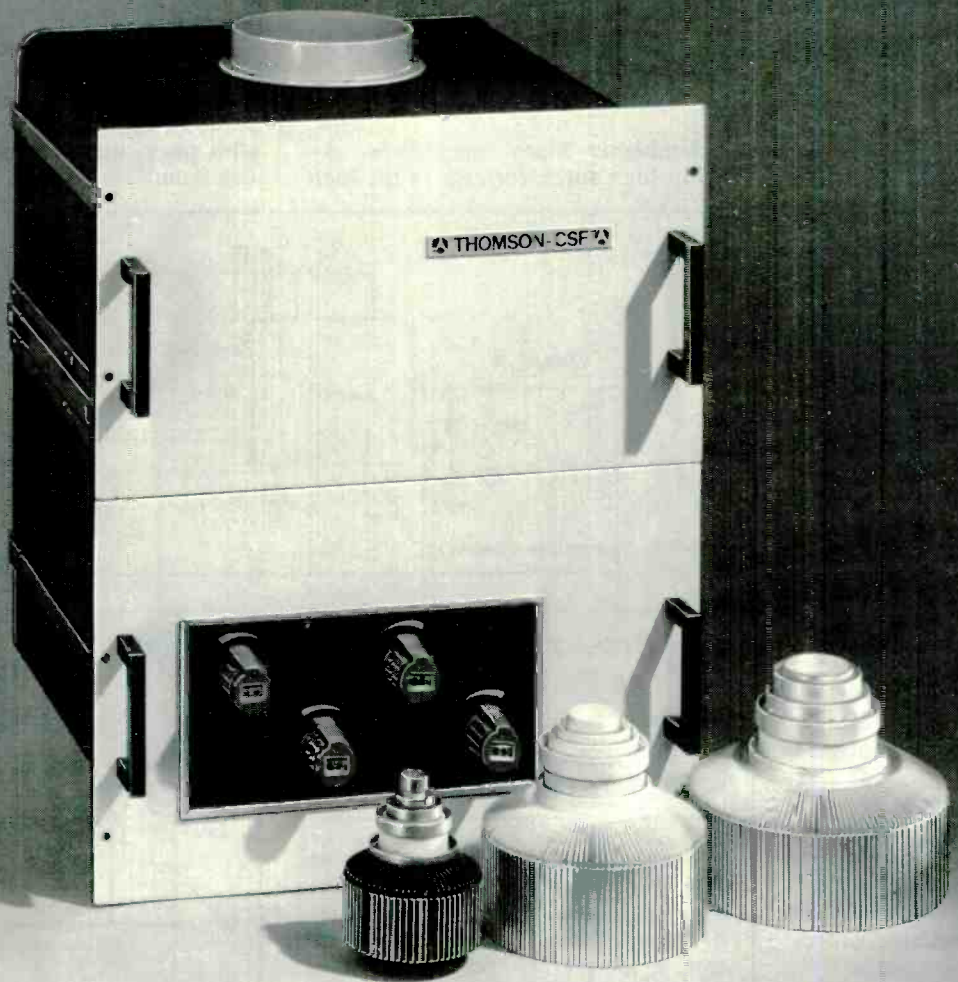

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France - THOMSON-CSF Division Tubes Electroniques / 38, rue Vauthier / 92100 BOULOGNE-B LANCOURT / Tel. : (1) 604.81.75
Germany - THOMSON-CSF Elektronenröhren GmbH / Leerbachstr. 58 / 6000 FRANKFURT am MAIN 1 / Tel. : (0611) 71.72.81
Italy - THOMSON-CSF Tubi Elettronici SRL / Viale degli Ammiragli 71 / I - 00136 ROMA / Tel. : (6) 638.14.58
Japan - THOMSON-CSF Japan K.K. / TBR Building / Kojimachi 5-7 / Chiyoda-Ku / TOKYO 〒102 / Tel. : (03) 264.63.41
Spain - THOMSON-CSF Tubos Electronicos S.A. / Alcala 87 / 3° Dcha / MADRID 9 / Tel. : (1) 226.76.09
Sweden - THOMSON-CSF Elektronrör AB / Box 27080 / S 10251 STOCKHOLM 27 / Tel. : (08) 225.815
United Kingdom - THOMSON-CSF Components and Materials Ltd / Ringway House / Bell Road / BASINGSTOKE RG24 0QG / Tel. : (0256) 29155 / Telex : 858865

3116

Circle 164 on Reader Service Card

GREAT IDEA CONTEST

25. Automatically Rotating Power Control To Zero Upon Plate Shut-Down.

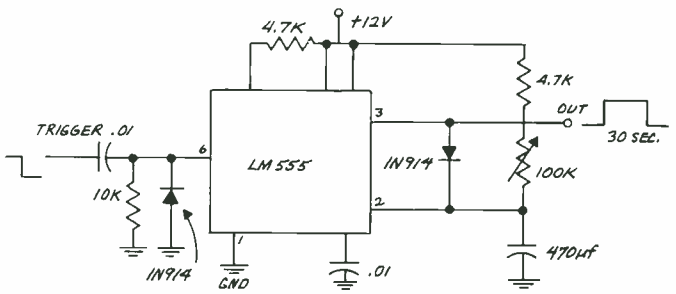
Charles Kelly Jr., CE, James Burt, Asst. CE, KRSJ, Durango, CO

Problem: Many transmitters develop high surge currents in the high voltage stack rectifiers when the plate supply is turned on. This can stress the rectifiers and contribute to failure at a later date.

Our FM transmitter works more reliably if the operator rotates the power adjust control to zero before applying plate voltage. When they forget the procedure it often means expensive stack replacement. The objective is to design a device to automatically rotate the power control to zero upon plate shut-down.

Solution: This simple circuit simply energizes a relay for 30 seconds following the shut-down of the plate circuit. When the plate control relay shuts down the trigger is dropped to ground which sets the timer producing a positive voltage which will drive a small relay. The length of the pulse is dependent on the 470 μF electrolytic and the 100k time set pot.

The relay can drive the power adjust motor and the length of the time required is set with the 100k pot. Another set of contacts on the relay can inhibit plate turn-on until the pot is at minimum.



KRSJ transmitter saver.

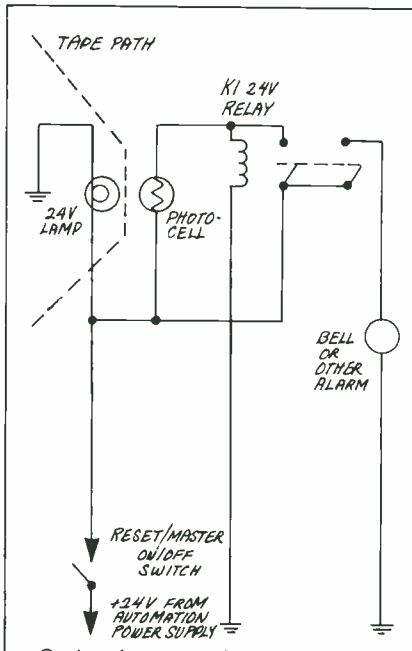
26. Providing An Alarm For The End Of Automation Tapes.

Stuart Graham, Chief Engineer, WAYX, WLTE-FM, Waycross, GA

Problem: The live announcer on AM is responsible for changing the automation tapes when they run out on FM. Since there is always some leader tape at the end of the reel, a visual inspection of the tape does no good at all and dead air was common as reels ran out. An inexpensive, simple, and reliable system to let the announcer know that the tape needed changing was called for.

Solution: Using a photocell, with decreasing resistance when struck by light, across the tape path and hooked in series with a 24 V relay solved the problem. The relay uses one set of contacts to latch itself on and another to

continued on page 96



Graham's system for alerting announcer that tape needs changing.

New! For heterodyne VTRs

a broadcast quality, digital TBC

It's the CVS 516, first digital TBC made and priced to give users of non-segmented, heterodyne VTRs all the proven advantages of modern digital video processing.

The CVS 516 is ideal for ENG, teleproduction, studio VTR backup and much more because it comes with features that, before, you'd find only in TBCs costing up to twice as much.

For example, correction of chroma/luminance delay problems, a 3 dB chroma noise reduction, velocity compensation and color dropout compensation are standard.

So is "Gyrocomp," an exclusive, use-proven CVS memory design that easily handles severe gyroscopic distortions—without breakup.

There's also a broadcast stable, gen-lock sync generator, automatic VTR advanced sync and a built-in completely adjustable processing amplifier.

If all that's not enough, add our optional, moderately priced Image Enhancer/Noise Reducer. This plug-in card substantially reduces luminance and chroma noise and significantly improves subjective resolution. And, to tame even the wildest instability, you can add our optional 16 line window.

Simple operation is another plus for the CVS 516. Front panel controls give you total mastery of your video signal. Each control also has a preset unity position to give you a consistent starting point for all your tapes.

All this, and more, is contained in a package that weighs only 25 pounds, is only 3½ inches high and uses only 175 watts—major advantages with today's increasing emphasis on ENG and field production.

So, to give your heterodyne productions the quality they deserve, get the one digital TBC made and priced to do the job—the CVS 516. For full details and/or a demonstration, contact your authorized CVS Distributor or CVS. And ask for our new booklet about the basics of digital time base correction. It's free.

CVS Consolidated Video Systems, inc.

1255 E. Arques Avenue, Sunnyvale, California 94086 (408) 737-2100 Telex: 35-2028

Circle 165 on Reader Service Card

provide power to a bell alarm. The bell is loud enough to be heard anywhere in the building, but does not "bleed over" on AM when that announcer's mike is on.

24 V is supplied by the automation system power supply and the alarm is re-set by a master on/off switch for the "tape alarms." Windows are placed on the tape immediately after the last selection by removing the oxide from the tape with acetone. Two photocells can be connected in parallel for each relay used thus making expansion of the system for two or more tape decks very inexpensive.

"DEAD AIR" caused by the tapes running out, or breaking has been virtually eliminated at WLTE by this system costing less than $25.00 for 4 tape decks.

A note about Great Idea No. 12 "An LED, Cart Status Circuit"

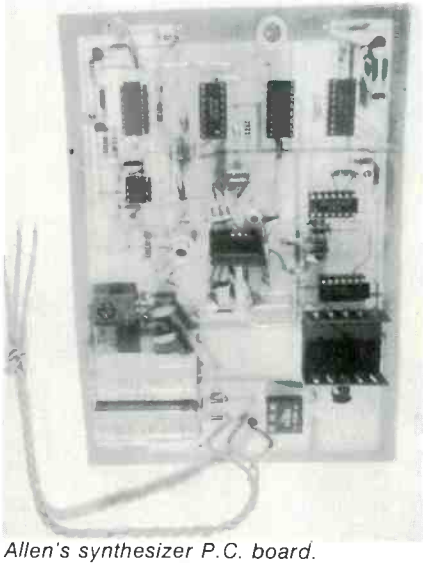
Ricky Benson noted a mistake in the circuit diagram for his Great Idea. The SCR is shown backwards in the circuit. The Cathode should face the LED and the Anode should face the "+ VDC."

27. Counter Calibrator Synthesizer.

Rod Allen, Xmtr. Supv., WKBS-TV, Philadelphia, PA

Problem: To accurately calibrate station's main frequency counter for use in direct measurement of visual & aural carrier frequency and for checking and setting secondary standards.

Solution: The three major TV networks all use atomic frequency referenced sync generators, with color burst being one of the final products, of counting down, from this reference. This far exceeds FCC specifications for a primary frequency standard for TV use. The color burst is also traceable to National Bureau of Standards, who publish all Network Subcarrier offset frequencies, monthly.

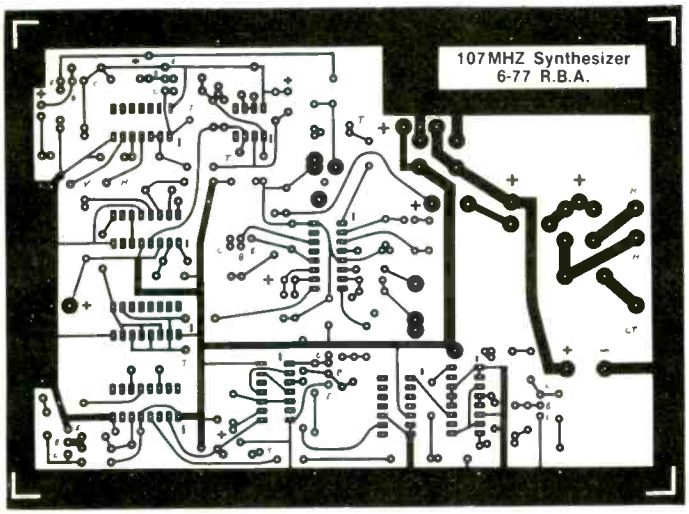


Allen's synthesizer P.C. board.

To use this atomic standard is a matter of feeding 1 volt P.P. of composit video, from network show into P.C. board. R.F. output frequency will be exactly 107386363.64 Hz. A divide by ten output is provided for under 100 MHz counters. A 12.6 volt, .5A, center tapped transformer is used to power board directly. D.C. supplies are on board.

On the board, the 3.58 MHz burst is sampled, held, then multiplied to 107 MHz, using a divide by N synthesizer circuit. The output is phase locked 30 times above the burst frequency. Output RF exceeds 2.5 volts at 107 MHz and 3.5 volts at 10.7 MHz. The 3.58 MHz output is for HI-Z reference use only. RF output should be terminated into 50 ohms at counter input.

Several checks and adjustments should be made while using video input, to insure correct operation. DC across filter caps. should be +8 and +18 volts. Look for noisy, positive



Underside shows circuit connections on Allen's synthesizer board.

going, separated sync. at collector of Q2. Check burst gating, using dual trace scope and horizontal trigger pulse from 74C14. The low cap. probe goes on the 15 μh coil test point. Standard probe on the 4049 test point. Burst should fit inside positive going gate pulse. If not, change 4098 I.C. or R-C timing on same. While watching burst, adjust slug in 15 μh coil for maximum.

D.C. level at collector of Q4 should be about 2.5 volts.

Frequency counter to 3.58 MHz out, test point. Short burst coil leads together. Trim C1 for 3579.545 KC plus or minus ten Hz.

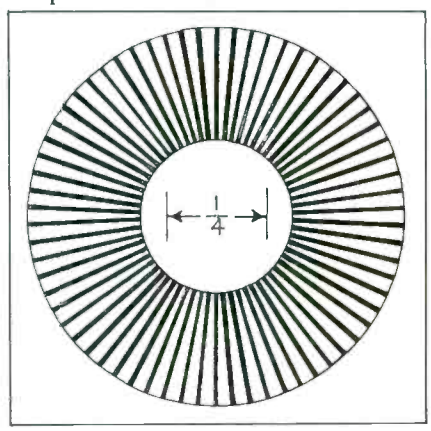
Frequency counter connected to 107 MHz output, the 4044 removed, free running frequency should be well above 107 MHz, typically 130 to 180 MHz. If not, change C2.

All I.C.s can be bought locally or by mail order. Don't substitute the transistors or the 74C14. Use only R.C.A. CMOS for the 4049 & 4098. All resistors are ¼ watt. All caps. are 16 volt units. The 1 μf, 10 μf, and 220 μf caps. are radial lead type. Be sure to mount the 17 Jumpers on board before other components. Last but not least, epoxy heat sinks on the ECG797 and 11C90 I.C.s.

28. Determining Cause Of Sound Flutter Or Wow On RCA TP-66.

Tom Schultz, Engineer, WGHP, High Point, NC

Problem: A simple method is needed to determine if sound flutter or wow on an RCA TP-66 film projector is caused by irregular speed of the soft-driven sound drum, film wrap, or the pressure roller.



Solution: Construct a strobe disk which can be mounted to the front of the sound drum with rubber cement or

continued on page 98

Great Ideas

photo mounting spray. Sound drum speed can then be checked by merely observing the strobe disk in the ambient fluorescent lighting. If operation is correct, the lines will appear to be stationary. If lines appear to rotate slowly in one direction at constant speed, compare speed and direction to that observed when projector is running without a film threaded. The same observation indicates a film wrap problem as the film drag on the sound drum is responsible for about one percent of sound drum speed. Slow lock up during start indicates a sound drum drive problem. Erratic speed may be caused by a bad bearing on the sound drum shaft. For the station which may wish to adapt this idea to other projectors or other line frequencies, the design procedure is indicated below:

Film Speed = 24 frames/sec = 7.187 in/sec.

Sound Drum Circumference = 3.936 in.

Drum Speed = 7.187/3.936 = 1.826 revolutions per second.

Fluorescent light frequency = 120 pps.

Marks per revolution = 120/1.826 = 66 evenly spaced marks per revolution (nearest whole number).

29. Simple, Easy, Fast Way To Check For Bad Audio Cable.

Jack Smith, Chief Engineer, KVVU-TV, Las Vegas, NV

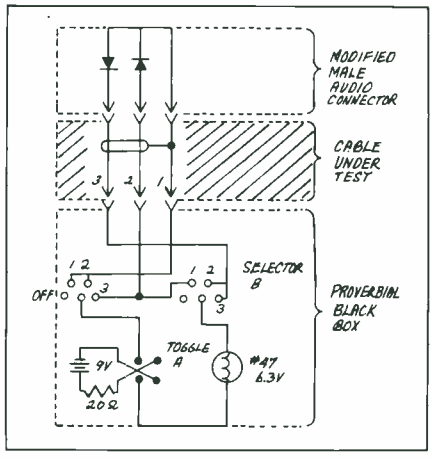
Problem: If any technician has ever strung hundreds of feet of cable at a stadium or some other remote only to find that you have "no audio" at the mixer end, then he will be familiar with the hassle involved in tracking down the bad cable.

Solution: Some technicians still use the old time consuming method of collecting the cable so that you have both the female and male connectors in one spot for a continuity check with an ohmmeter or some sort of "black box." With an inexpensive and simple audio cable tester, you can make yourself, you can now leave the cable strung out in position, and check each one in just a few minutes to find the faulty cable. 90% of the time it can be repaired on the spot, since most of the time the problem is with a broken wire at one of the pins, brought about by rough handling.

With this tester, when a known good cable is checked, the indicator will light on only one side of the toggle switch. This has been a great time and

Great Ideas

trouble saver for us, and I'm sure others will find the same to be true.



Smith's audio cable tester.

PARTS

1—Male audio connector (mosified)
1—Female audio connector
1—Toggle switch
1—9V Power supply (battery)
1—#47 6.3V lamp
1—Waffer switch
2—1N914 Diodes (or any gen'l purpose diodes)
1—Black Box 6" × 3½ × 2"

CABLE PROBLEM	LIGHT INDICATOR
Normal	*(see text)
1&2 Short	Light "ON" in both positions of toggle switch ("A) when in position #1 of selector switch ("B)
1&3 Short	Light "ON" in both positions of toggle switch ("A") when in position #2 of selector switch ("B)
2&3 Short	Light "ON" in both positions of toggle switch ("A") and any position of selector switch ("B")
Pin 2 Open	Nothing in positions 1&3 of selector switch ("B"). Light will be "ON" in one of the positions of the toggle switch ("A") with selector switch in position 2.
Pin 3 Open	Nothing in positions 2&3 of selector switch ("B"). Light will be "ON" in one of the positions of the toggle switch ("A") with selector switch in position 1.
Pin 1 Open	Nothing in positions 1&2 of selector switch ("B"). Light will be "ON" in one of the positions of the toggle switch ("A") with selector switch in position 3.

VOTE NOW!

GREAT IDEA
CONTEST BALLOT
ON READER SERVICE
CARD

BROADCAST EQUIPMENT

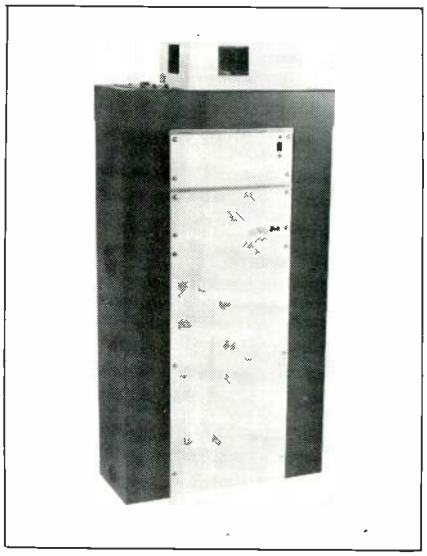
For more information circle bold face numbers on reader service card.

Video/Audio Routing Switcher 300

Switching system has multireference vertical interval or random switching on each bus. Model D-400 can be had as follows: 20 in, 10 or 15 out; 30 in, 10 or 15 out. Enlarged capacity is available with optional additional matrix frames. Crosspoints are 30 x 1 or 20 x 1 audio-follow-video, with discrete solid state for video, DIP reed relays for audio. Multireference vertical interval or random switching available for each bus. Two video outputs and two +24 dBm balanced audio outputs per bus. DATATEK.

Multiplexer For Telecine 301

Multiplexer accepts up to three projector imputs simultaneously. Model



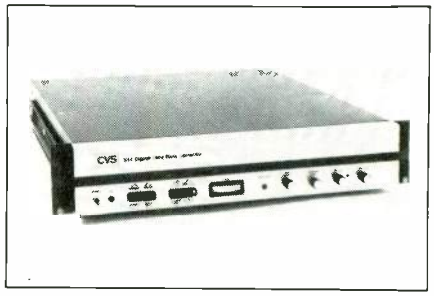
TMM-205 will accommodate 8mm, 16mm and 35mm film projectors, to feed color or monochrome camera. Transitions from source to source take about 0.5 seconds, and don't bounce. All equipment can be connected to a shelf or pedestal with three-point adjustable mount. $995.00. TELEMATION.

TV Transmitter 12 kW, Diplexed 302

Two hybrid-combined 6 kW TV transmitters make up new 12 kW system. Model TT-447 has automatic failure sensing and optional modulator switching. Personnel can work with safety on one-half the transmitter while the other operates. The modulator operates at TV IF frequencies; outputs are crystal controlled carriers at sound and visual frequencies. ACRODYNE.

TBC For PAL/SECAM 303

Digital time base corrector accepts color or monochrome signals from PAL or SECAM helical video tape recorders. Output of Model CVS-517 for

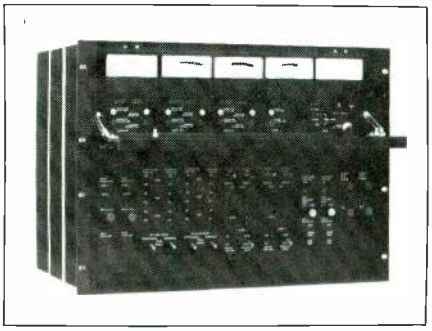


PAL is corrected composite video; for SECAM it is synchronized RGB that can be routed to an RGB switching system. The unit can also act as a PAL/SECAM converter with a plug-in SECAM option. Thus either PAL or SECAM in can be PAL or SECAM out. Unit has genlock signal generator; color dropout compensation; line by line velocity compensation; digital color averaging; a processing amplifier; and a 2-line window. CONSOLIDATED VIDEO SYSTEMS.

AM Audio Processor 304

Audio processor orginally released for FM has been expanded for AM use. MSP-100 incorporates a tri-band AGC, with most operating parameters—frequency bandwidth, thresholds, attack/recovery times—variable according to user taste. The AGC module may be set for use as a gentle AGC, as a spectral equalizer, or a fast parallel

split-band compressor, or anything between. The limiter module analyses program material and automatically selects the optimum attack/recovery constants. Protection module follows the limiter, splits signal into two frequency bands to optimize limiting of



high frequency content (for the FM model). In the AM model, there is a protection module that is a fast broadband peak limiter; assymetrical limiting allows operation with 125% positive peak modulation. HARRIS CORPORATION.

Lens Adaptor For TV Cameras 305

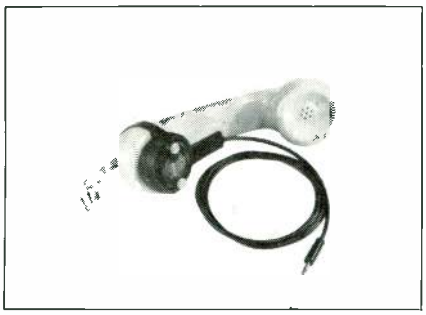
Adaptor is available to fit virtually all standard three-tube video cameras, to fit to them almost any motion picture or SLR lens. Fixed Lens Adaptor will hold lenses from widest angle to telephoto, has no light loss, aperature of f/1.5, claims no field of view change, no vignetting or distortion. It has a built-in iris and focusing mount. COMQUIP.

Video Loss Detector 306

Unit has four separate sync detectors, each with alarm relay. Model 404 has green panel LED that is lit when conditions are normal. A loss causes a red LED to light, and two relays to operate. One is form C, opening and closing with signal. The other is form A, which latches electronically until reset. Each alarm has adjustable time control, with delay from 1 to 10 seconds. The four units are on one card; 101 frame holds three cards for 12 video feeds. The 103 frame holds 10 cards for 40 video feeds. Model 404, $420.00; 101 frame, $245, DI-TECH INC.

Acoustic Telephone Coupler 307

Coupler can be strapped to a telephone in seconds to feed in recorded material, for remote broadcasting. Model 50 AC can be driven by any tape recorder, or by a microphone plus a line amplifier (including the Shure SM82 line level



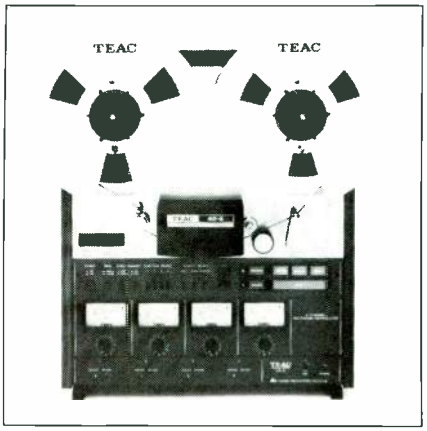
microphone). The telephone mouthpiece is not removed, nor is telephone wiring system altered in any way; unit has no induction coils. Background noise is eliminated by complete coverage of mouthpiece. A lever allows interjection of live commentary without interrupting transmission of the taped material. Unit has a frequency response tailored to 300 to 3000 Hz for optimum voice transmission via the telephone. $28.50. SHURE BROTHERS.

A/D And D/A Video Converters 308

Eight-bit converters are built on single circuit boards, are designed specifically for video applications. Model ADC 820 is a 20 MHz A/D, with antialiazing filter right on the board, and the entire quantizing and digital coding carried out by three LSI chips, designed so that sample and hold is not needed. Differential phase is rated less than ½°, differential gain at 1% rms. Model DAC 850 is a 50 MHz D/A converter, also on a single card, dissipating less than 5 watts, available with 3 times or 4 times subcarrier output filters, or with no filter. Differential phase is rated less than ¼°, differential gain ¾% rms. ADC 820, $1650; DAC 850, $525. OEM quantities cheaper. TEKTRONIX, INC.

Four-Track Tape Recorder 309

New four-track machine has same transport and chassis as earlier 80-8,



continued on page 102

Broadcast Equipment

eight-track machine. New model 40-4 puts four tracks on ¼-inch tape. It has three heads, fully integrated circuit logic with motion sensing and a memory stop function. TEAC CORPORATION.

Phono Cartridges For Pro Use 310

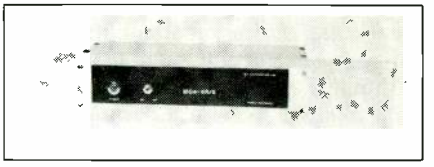
New Line of phono cartridges are aimed for heavy use by broadcasters, discotheques, etc. Models ATP-1, ATP-2 and ATP-3 have cantilevers designed for trouble-free back-cueing; they also have a highly visible coating forcueing in low light. Stylus damping mechanisms are individually hand-tuned. ATP-3 has a .3 x .7 mil elliptical is rated to track at 2-3 grams; retail $40. ATP-2 is rated to track at 3-5 grams, has a .4 x .7 mil elliptical diamond, retails for $30. ATP-1 tracks at 3-5 grams, has a .6 mil spherical diamond tip. AUDIO-TECHNICA.

Rebuilding U-Matic Kits 311

Kits for rebuilding U-Matic cassettes consist of "Scotch" tape for insertion in cassettes, "U-Do-It" relead kits can be used with only a Philips-type screwdriver and a pencil. 60-minute kit uses same tape as is in "Scotch" U-Matic cassette. 30-minute and 15-minute (mini) kits use "MBU" tape. Suggested list: $17.50 for the mini, $21.00 for the 30-minute, $27.50 for the 60-minute. 3M COMPANY.

Microphone Distribution Amps 312

Mic amps raise output to line level, provide up to 12 simultaneous, separate feeds. MDA series have balanced 150/250 ohm input, for levels from -60 dBm to -30 dBm. Output is +21 dBm, for 6 balanced or 12 unbalanced 600 ohm outputs. Frequency response is rated +0, -1 dB from 10 Hz to 15 kHz



with .03% distortion. Available in table top or rack mount, with either one control or six individual controls. $197 to $225. RAMKO RESEARCH.

500 W Audio Power Amp 313

Stereo audio power amplifier is rated at 500 watts per channel output. Model RB-5000 claims frequency response from DC to 100 kHz, hum and noise at -120 dB, distortion .009% at 1 watt. It has a triple power supply with 3 transformers, power meters, peak LED

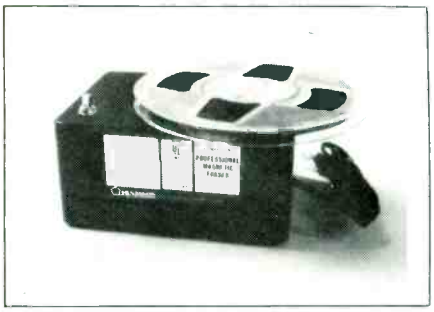
readouts, limiter for ¼, ½, and full power, blower, 3-position filter switch. $2250. ROTEL.

Speed Shifter, Turntables 315

Electronic speed shifter allows speed of synchronous disc turntables to be changed from minus 8% to plus 8%, allowing music programmer to select speed for optimum excitement. Model SC-3345 can be attached to any fixed-speed table using a synchronous motor. $249.00. QRK, INC.

Bulk Eraser 314

Bulk tape eraser handles reels up to 10-½ in., tape up to ½ in. wide. Model



81-09 claims to reduce noise to 3 to 6 dB below normal erase head level. Power, 110-120 V at 5 amps. PENTAGON INDUSTRIES.

TV Master Clock/Calendar 316

System displays time and date on the television screen with 12 seven-segment digits. Model QSI-600 shows

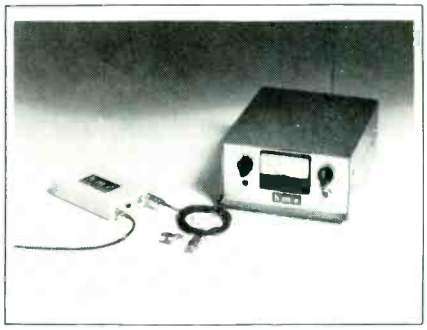
month, day, year, hour, minute, second. A fast-run mode allows settings system to the time wanted; after setting system all functions appear automatically throughout the year. The display can be put in any screen area QSI SYSTEMS, INC.

Shipping Case, Videotape 317

Flame-retardant shipping case for 2 in. videotape is rated to extinguish itself in 3 seconds if it catches fire. The shipper also protects tape edges and can be securely latched and locked to prevent accidental opening. FUJI PHOTO FILM USA.

Wireless Microphone System 318

VHF high band wireless microphone system has two selectable RF levels, and adjustable non-clipping compressor. System 22 is aimed for professional sound reproduction, claims



studio quality audio performance. The system consists of a transmitter with compressor circuit which soft-limits the first 20 dB of the full 50 dB dynamic range. Transmitter is compatible with any electric or dynamic microphone, runs on one 9-volt battery. The receiver has calibrated meter reading of vu, RF, and battery condition. Its dynamic range matches the transmitter output; it can run on AC or battery. Balanced output can be at mic or line level, with monitoring by headphone or speaker on the line level. HM ELECTRONICS, INC.

Low-Cost Music Synthesizer 319

Music synthesizer uses system of "writing" on 44 keys (6-½ octaves)

continued on page 104

Broadcast Equipment

with two metal styli to produce tones. Model 350S "Stylophone" also has tone switches for a great variety of instrumental and special effects tones; a photo control that allows hand motions to produce swell effects and others; switches for vibrato, sustain/decay, reiteration, and many others. Unit weighs less than five pounds, fits into a brief case, runs on two PP9 or equivalent batteries. AUDIO ARTS, INC.

For more information circle bold face numbers on reader service card.

Drop-Out Monitor 320

Add-on system provides a running account of drop-outs on videotape, on a VTR or VCR. The "DOM" has an LED display registering each time a drop-out is detected by the machine. A low-cost printer is optional, for a permanent record. System allows monitoring tape quality and machine quality control. STUDIO TAPE EXCHANGE.

Lighting For New Cameras 321

Lightweight lighting system for news and other remote pickups with film cameras consists of a focusing news light, a 100-watt/12 v 3400° K quartz lamp and 12v battery with built-in charger. CP Newslite system is designed especially for new, faster film such as Eastman VNF 7250 and Fujicolor RT400. Newslite is for mounting on top of CP-16, CP-16R and other 16mm cameras. Battery charges overnight. CINEMA PRODUCTS CORP., 2037 Granville Ave., Los Angeles, CA 90025.

Mounts For Light Cameras 322

Dunlin fluid head has 75 lb. capacity, 4 in. center of gravity adjustment, ±50° tilt. Petrel 777 Panatograph head has 100 lb. capacity, 2 in.—5 in. C of G. Model 63 lightweight combination includes tripod, dolly and elevation unit, 110 lb. capacity. Dunlin head, $1575; Petrel head, $675; Model 63, $975. LISTEC TELEVISION EQUIP. CORP.

Digital Antenna Monitor 323

Monitor for AM antennas which are attended during directional hours has true ratio reading, is in rack mount 3½ in. high, consumes 6 watts. Model CM is type-approved by the FCC, has LED display, continuous show of phase sign. GORMAN-REDLICH MFG. CO.

News continued from page 18

The increases were effective September 15, 1977.

Associated Press Radio has passed the 500 affiliate mark after just 34 months of operation. Recent expansion of the service via satellite into Alaska helped bring AP Radio over the 500 mark with the addition of 3 Anchorage stations and another station at North Pole, near Fairbanks . . . . **Wometco Enterprises, Inc.,** announced that it has finalized the acquisition of 80 percent of **Blonder Tongue Broadcasting Corp.,** owner of Channel 68, Newark, NJ, and an 80 percent interest in BTVision, Inc., a corporation that programs the station's evening hour subscription TV system . . . . **Meredith Corp.** officials signed a contract to buy WPCH-FM, Atlanta, GA, from **Sudbrink Broadcasting, Inc.** The purchase, subject to the approval of the FCC, will bring Meredith's broadcast holdings to four VHF stations, three AM stations and two FM stations.

The first circularly polarized television broadcast antenna to be manufactured by the **Broadcast Products Division of Harris Corp.** was shipped to **KBYU-TV,** Provo, Utah. The station has received authorization from the FCC to conduct comparative tests of the antenna in its CP mode . . . . **Warner Cable Corp.,** a subsidiary of Warner Communications Inc., announced the appointment of four people to newly created executive posts in its **QUBE division.** QUBE was itself recently set up to introduce the company's new two-way interactive communication service on its Columbus, Ohio, CATV system. Named to the new posts are: J. Ronald Castell, vp marketing; James L. Fischer, vp operations; Dr. Vivian Horner, vp educational and children's programming; and Harlan Kleiman, vp premium programming.

Charles V. Andersen and **Charles A. Steinberg** have been elected to the office of executive vice president by the board of directors of **Ampex Corp** . . . . **Lee Tate,** newly appointed president of the **Tape-Athon Corp.,** announced a reorganization of the company into four new divisions: Sales/Marketing will be headed by **Wally Rubin; Joe E. Otis** will be director of Audio Products division; **Robert Haller** was named to head the Operations division, and **Bernard Sayers** will head the new Engineering division.

CCA has shipped 10 kW FM transmitters to Kuwait where they will initiate that nation's first FM stereo broadcast service . . . . **Broadcast Electronics, Inc.** has relocated to a new 31,000 square foot plant at 4100 N. 24th St., Quincy, IL, 62301; tel; 217-224-9600 . . . . **Commercial Electronics Inc.,** CEI, has announced a contract with EMI to manufacture the new EMI 2008 broadcast color television camera to be marketed primarily in Europe.

A.B. Pearl of Sweden, manufacturer of PMI microphones, has appointed **Cara International, Ltd.,** 4145 Via Marina, #120, Marina del Rey, CA (tel: 213-821-7898) as their import agent for the western United States . . . . **RCA Service Co.** announced the opening of a new videotape duplicating center. The new facility is located in the Rank Office Center, 1263A Rand Rd., Des Plaines, IL.

The **Ontario Corp.** of Muncie, IN, is scheduled to go on the air with its new UHF station, Channel 55, in Ft. Wayne, IN, the first of the year. The station is currently installing a new **RCA** TTY-30C, 30 kW UHF transmitter and other RCA broadcast equipment . . . . The first TV station in the Bahamas, to be known as **Radio Bahamas, will go on the air later this year using $2.5 million worth of RCA** broadcast equipment including studio production equipment, remote news gathering equipment and transmitting equipment . . . **RCA earnings** in the second quarter of 1977 rose 31 percent over the same period a year ago, attaining the highest level of any quarter in the company's 58 year history.

United Video, Inc. has filed with the FCC to carry the programming of Chicago station WGN via satellite to cable systems with earth stations . . . . **Columbia Pictures Pay Television,** which recently announced a "major commitment to the pay television market," has completed production on four shows to be included in its offerings. The four programs are: a segment of its musical series, "In Session," "Orson Welles at the Magic Castle," "Jamboree In The Hills," and "No Cover, No Minimum" . . . . **UA Columbia Cablevision Inc.** will use **RCA American Communications, Inc's** satellite to carry sports and special events live from Madison Square Garden to the nation's cable systems.

Correction on 1-Inch VTR Standard

The story "1-in, VTR Standard OK'd," BM/E, Aug., p. 6, implied that the Ampex VPR-1 existing format could not record VITs and VIR signals. That is not true; it is only the first ten lines of sync (reconstituted on playback) that are dropped. Video verification as a result of a flying reproduce head is another feature of the VPR-1.

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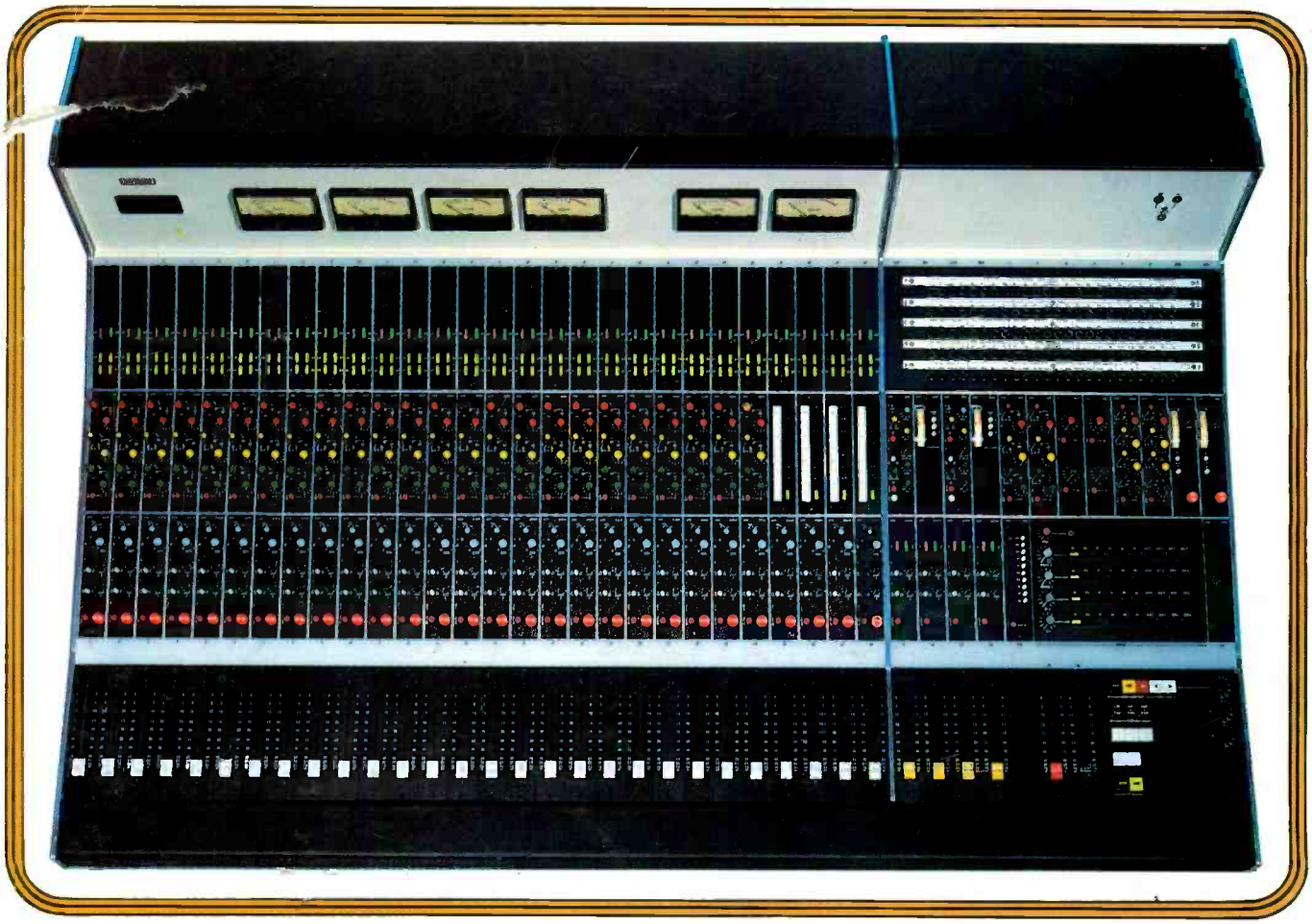

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